System Automation for OS/390

IBM

User's Guide

Version 2 Release 2

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> **Note!**
>
> Before using this information and the product it supports, be sure to read the general information under "Notices" on page xi.

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>
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About This Book

This book describes System Automation for OS/390 (SA OS/390) and contains information on how to use SA OS/390 to monitor and control your systems.

This document provides an overview of the operator tasks. It points you to ways to manage your systems. For further detail, refer to the help panels or online documentation available on both 3270 panels and workstation windows.

Who Should Use This Book

Installing, maintaining and using SA OS/390 is performed by personnel from the user groups defined in "SA OS/390 User Groups". This book is intended primarily for operators, but may also be useful for others. The information provided is specifically about using SA OS/390 and assumes the following knowledge and experience:

- An understanding of OS/390
- An understanding of basic network concepts and terminology
- Using NetView
- Using the NetView Management Console (NMC)
- Responding to messages and some trouble-shooting

System administrators, programmers and help desk personnel may find the information helpful for installation, maintenance, and investigating and correcting problems. It also helps educate users about the SA OS/390 functions.

SA OS/390 User Groups

There are the following primary SA OS/390 user groups:

- **System programmers** are responsible for:

  product installation
  > This is basically taking the product from tape and moving it into system libraries.

  system configuration
  > This is basically allocating data sets and configuring individual systems to run the product. At the end of this process, a ready to use installation of the customization dialog and NetView is available to be used by further SA OS/390 user groups. Additional work may be required to help set up processor operations and the NMC workstation.

  maintenance
  > This is the task of applying APARs to the base code and performing whatever system actions are required afterwards.

- **Automation programmers** are responsible for:

  policy migration
  > If your enterprise uses policy for earlier SA OS/390 releases, this information needs to be migrated to the new release.

  policy definitions and distribution
  > Using the customization dialog, automation programmers will, with help from specialist system programmers and operators, define the

automation policy for the enterprise. This includes the definition of all automated resources and the individual definitions required for each resource. Thus they are creating the knowledge base that SA OS/390 will use to run their applications and systems. As the creation of this knowledge base can be done centrally on a system where the customization dialog is installed, the policy files that are created need to be distributed to the appropriate target systems before they can be used.

automation customization
This covers writing and modification of customer automation procedures that run alongside SA OS/390. Existing automation procedures may need modifying to take account of changes that have been made with the current SA OS/390 release.

workstation setup and configuration
This task will also often fall upon the automation programmers. It is concerned with getting a workstation set up to run the SA OS/390 workstation, the NMC workstation and for the workstation user to be able to issue commands from it.

- **Operators** are the end users of the product, as it aims to simplify their jobs. They are responsible for:

ensuring application availability
This basically means starting applications when they need to be started, picking them up if they break down and stopping them when required.

monitoring systems and applications
Operators are responsible for detecting any problems that might occur with the systems or with the application software running upon them. When they find one, they will generally try a few standard fixes and then contact a system programmer.

IPLs and shutdowns
Operators are responsible for ensuring the orderly shutdown of systems and applications when they need to be stopped, and for their successful restarting afterwards.

special operations
This covers all of the things that the operators are asked to do that are not a part of their scheduled (or planned) activities. Examples might be keeping an application available until later in the day, changing the time that a particular event will happen, recycling applications to pick up fixes, or issuing special commands after an application has been started.

Where to Find More Information

The System Automation for OS/390 Library

The following table shows the information units in the System Automation for OS/390 library:

Table 1. System Automation for OS/390 Library

Title	Order Number
System Automation for OS/390 Planning and Installation	SC33-7038
System Automation for OS/390 Customizing and Programming	SC33-7035
System Automation for OS/390 Defining Automation Policy	SC33-7039
System Automation for OS/390 User's Guide	SC33-7040
System Automation for OS/390 Messages and Codes	SC33-7041
System Automation for OS/390 Operator's Commands	SC33-7042
System Automation for OS/390 Programmer's Reference	SC33-7043
System Automation for OS/390 CICS Automation Programmer's Reference and Operator's Guide	SC33-7044
System Automation for OS/390 IMS Automation Programmer's Reference and Operator's Guide	SC33-7045
System Automation for OS/390 OPC Automation Programmer's Reference and Operator's Guide	SC23-7046
System Automation for OS/390 Licensed Program Specifications	SC33-7037

The System Automation for OS/390 books (except Licensed Program Specifications) are also available on CD-ROM as part of the following collection kit:

IBM Online Library z/OS Software Products Collection (SK3T-4270)

SA OS/390 Homepage

For the latest news on SA OS/390, visit the SA OS/390 homepage at http://www.ibm.com/servers/eserver/zseries/software/sa

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Related Product Information

The following table shows the books in the related product libraries that you may find useful for support of the SA OS/390 base program.

Table 2. Related Products Books

Title	Order Number
ISPF User's Guide	SC34-4484
ISPF Dialog Management Guide and Reference	SC34-4266
MVS/ESA MVS Configuration Program Guide and Reference	GC28-1817
MVS/ESA Planning: Dynamic I/O Configuration	GC28-1674
MVS/ESA Support for the Enterprise Systems Connection	GC28-1140
MVS/ESA Planning: APPC Management	GC28-1110
MVS/ESA Application Development Macro Reference	GC28-1822
OS/390: MVS System Commands	GC28-1781
MVS/ESA SPL Application Development Macro Reference	GC28-1857
OS/390 Hardware Configuration Definition: User's Guide	SC28-1848
OS/390 Information Roadmap	GC28-1727
OS/390 Information Transformation	GC28-1985
OS/390 Introduction and Release Guide	GC28-1725

Table 2. Related Products Books (continued)

Title	Order Number
OS/390 JES Commands Summary	GX22-0041
OS/390 Licensed Program Specifications	GC28-1728
OS/390 Printing Softcopy Books	S544-5354
OS/390 Starting Up a Sysplex	GC28-1779
OS/390 Up and Running!	GC28-1726
Planning for the 9032 Model 3 and 9033 Enterprise Systems Connection Director	SA26-6100
Resource Access Control Facility (RACF) Command Language Reference	SC28-0733
S/390 MVS Sysplex Overview – An Introduction to Data Sharing and Parallelism	GC23-1208
S/390 MVS Sysplex Systems Management	GC23-1209
S/390 Sysplex Hardware and Software Migration	GC23-1210
S/390 MVS Sysplex Application Migration	GC23-1211
S/390 Managing Your Processors	GC38-0452
Tivoli/Enterprise Console User's Guide Volume I	GC31-8334
Tivoli/Enterprise Console User's Guide Volume II	GC31-8335
Tivoli/Enterprise Console Event Integration Facility Guide	GC31-8337
Tivoli NetView for OS/390 Administration Reference	SC31-8222
Tivoli NetView for OS/390 Application Programming Guide	SC31-8223
Tivoli NetView for OS/390 APPN Topology and Accounting Agent	SC31-8224
Tivoli NetView for OS/390 Automation Guide	SC31-8225
Tivoli NetView for OS/390 AON Customization Guide	SC31-8662
Tivoli NetView for OS/390 AON User's Guide	GC31-8661
Tivoli NetView for OS/390 Bridge Implementation	SC31-8238
Tivoli NetView for OS/390 Command Reference Vol. 1	SC31-8227
Tivoli NetView for OS/390 Command Reference Vol. 2	SC31-8735
Tivoli NetView for OS/390 Customization Guide	SC31-8228
Tivoli NetView for OS/390 Customization: Using Assembler	SC31-8229
Tivoli NetView for OS/390 Customization: Using Pipes	SC31-8248
Tivoli NetView for OS/390 Customization: Using PL/I and C	SC31-8230
Tivoli NetView for OS/390 Customization: Using REXX and CLIST Language	SC31-8231
Tivoli NetView for OS/390 Data Mode Reference	SC31-8232
Tivoli NetView for OS/390 Installation: Getting Started	SC31-8767
Tivoli NetView for OS/390 Installation: Migration Guide	SC31-8768
Tivoli NetView for OS/390 Installation: Configuring Graphical Components	SC31-8770
Tivoli NetView for OS/390 Installation: Configuring Additional Components	SC31-8769
Tivoli NetView for OS/390 Messages and Codes	SC31-8237
Tivoli NetView for OS/390 MultiSystem Manager User's Guide	SC31-8607

Table 2. Related Products Books (continued)

Title	Order Number
Tivoli NetView for OS/390 NetView Management Console User's Guide	GC31-8665
Tivoli NetView for OS/390 User's Guide	SC31-8241
Tivoli NetView for OS/390 RODM and GMFHS Programming Guide	SC31-8233
Tivoli NetView for OS/390 Security Reference	SC31-8606
Tivoli NetView for OS/390 SNA Topology Manager and APPN Accounting Manager Implementation Guide	SC31-8239
Tivoli Management Platform Reference Guide	GC31-8324
TSO/E REXX/MVS User's Guide	SC28-1882
TSO/E REXX/MVS Reference	SC28-1883
VM/XA SP GCS Command and Macro Reference	SC23-0433
VSE/SP Unattended Node Support	SC33-6412
VTAM Messages and Codes	SC31-6493
VTAM Network Implementation Guide	SC31-6404
VTAM Network Implementation Guide	SC31-6434

Using LookAt to look up message explanations

LookAt is an online facility that lets you look up explanations for most messages you encounter, as well as for some system abends and codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at: http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/ or from anywhere in z/OS or z/OS.e where you can access a TSO/E command line (for example, TSO/E prompt, ISPF, z/OS UNIX System Services running OMVS).

The LookAt Web site also features a mobile edition of LookAt for devices such as Pocket PCs, Palm OS, or Linux-based handhelds. So, if you have a handheld device with wireless access and an Internet browser, you can now access LookAt message information from almost anywhere.

To use LookAt as a TSO/E command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO/E from a disk on your *z/OS Collection* (SK3T-4269) or from the LookAt Web site's **Download** link.

Accessing z/OS™ licensed documents on the Internet

z/OS licensed documentation is available on the Internet in PDF format at the IBM Resource Link™ Web site at:

http://www.ibm.com/servers/resourcelink

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Related Online Information

SA OS/390 provides online help for all parts of its operator interfaces. From any terminal display, press PF1 to obtain help for that display.

SA OS/390 also provides online help panels to support the tasks of installation and customization.

Part 1. Introduction and Concepts

Chapter 1. Introducing SA OS/390

System Automation for OS/390 (SA OS/390), is a NetView-based application designed to provide a single point of control for a full range of systems management functions. SA OS/390 plays a key role in supplying high-end automation solutions. SA OS/390 functions include monitoring, controlling and automating a large range of system elements spanning both the hardware and software resources of your enterprise.

Your Enterprise

Your Information System:

Processors, Software,
I/O Devices, Coupling Facility

Operating Systems:

OS/390, MVS, VM, VSE, LINUX for zSeries, z/OS

Software Resources:

RMF ISPF JES SDSF OPC CICS
TSO IMS ACF/VTAM RACF DB2
LOGREC SYSLOG JES SPOOL

...

NetView

SA OS/390

Panels and Windows
Automation Commands
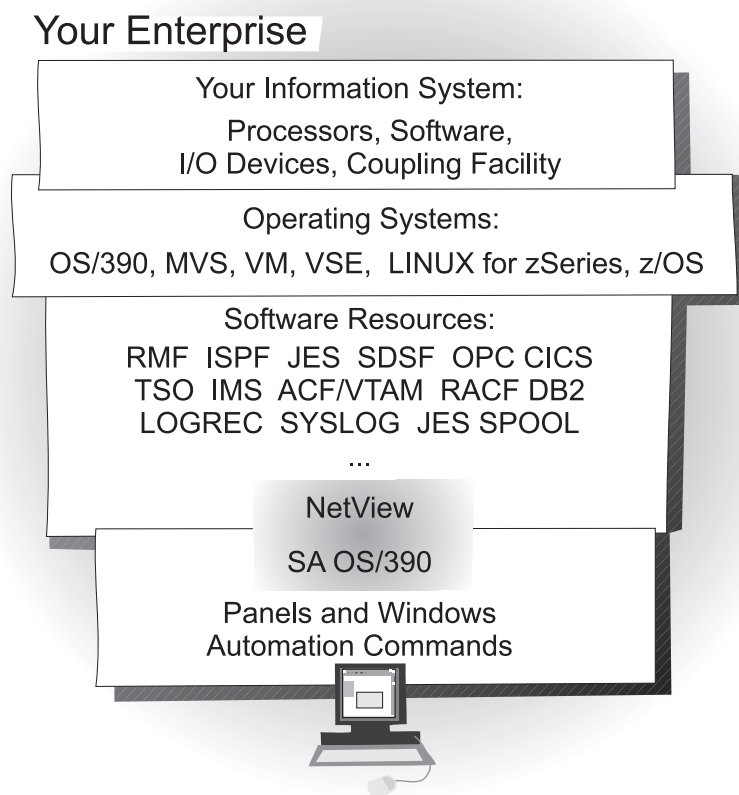
Overview

SA OS/390 is a systems management program with a single point of control. You see a single system image for a full range of essential systems management functions.

Monitor

Monitor your resources to respond before they affect end users:

- Monitor hardware components
- Monitor software products and applications
- Monitor automated processes
- Monitor messages and alerts

Control

Take action to control conditions:

- Start and stop your entire enterprise system; initiate hardware and software startup and shutdown sequences
- Manage both remote and local operations and support any zSeries and 390–CMOS processor within a Parallel Sysplex
- Manage several operating systems: z/OS, OS/390, MVS™, VM, VSE, and LINUX for zSeries
- Control a coupling facility as a target system with coupling links in a Parallel Sysplex environment
- React to errors and unscheduled events

Automate

Automate many repetitive and complex tasks:

- Start/shutdown software resources
- Start/shutdown hardware resources
- Control channels and channel paths
- Control availability of I/O devices
- Control switching of I/O device ports
- Detect and respond to system messages
- Perform initial program load (IPL)
- Perform system power-on reset (POR)
- Build automation policy for your enterprise
- Extend the built-in automation routines by writing your own automation policies

You monitor and control hardware and software resources from a NetView Management Console (NMC) workstation or from a NetView console.

Component Description

System Operations

System operations monitors and controls system operations applications and subsystems such as NetView, SDSF, JES, RMF™, TSO, RODM, ACF/VTAM®, DB2™, CICS®, IMS™, and OPC.

With system operations, you can automate Parallel Sysplex applications. SA OS/390 can automate applications distributed over a sysplex by virtually removing system boundaries for automation through its automation manager/automation agent design. SA OS/390 reduces the complexity of managing a Parallel Sysplex through its goal driven automation and its concepts such as grouping and powerful dependency support which enable you to model your configuration. Single systems are also fully supported; the automation scope is then just one system.

Enterprise monitoring is used by SA OS/390 to update the NetView Management Console (NMC) resource status information which is stored in the Resource Object Data Manager (RODM).

Processor Operations

Processor operations monitors and controls processor hardware operations. It provides a connection from a focal point processor to a target processor. With NetView on the focal point system, processor operations automates operator and system consoles for monitoring and recovering target processors.

Processor operations allows you to power on and off multiple target processors and reset them, perform IPLs, set the time of day clocks, respond to messages, monitor status, and detect and resolve wait states.

I/O Operations

I/O operations provides a single point of control for managing connectivity in your active I/O configurations. It takes an active role in detecting unusual I/O conditions and lets you view and change paths between a processor and an input/output device, which can involve using dynamic switching (the ESCON® switch).

I/O operations changes paths by letting you control channels, ports, switches, control units, and input/output devices. You can do this through an operator console or API.

Hardware Overview

Figure 1 illustrates a basic hardware configuration.
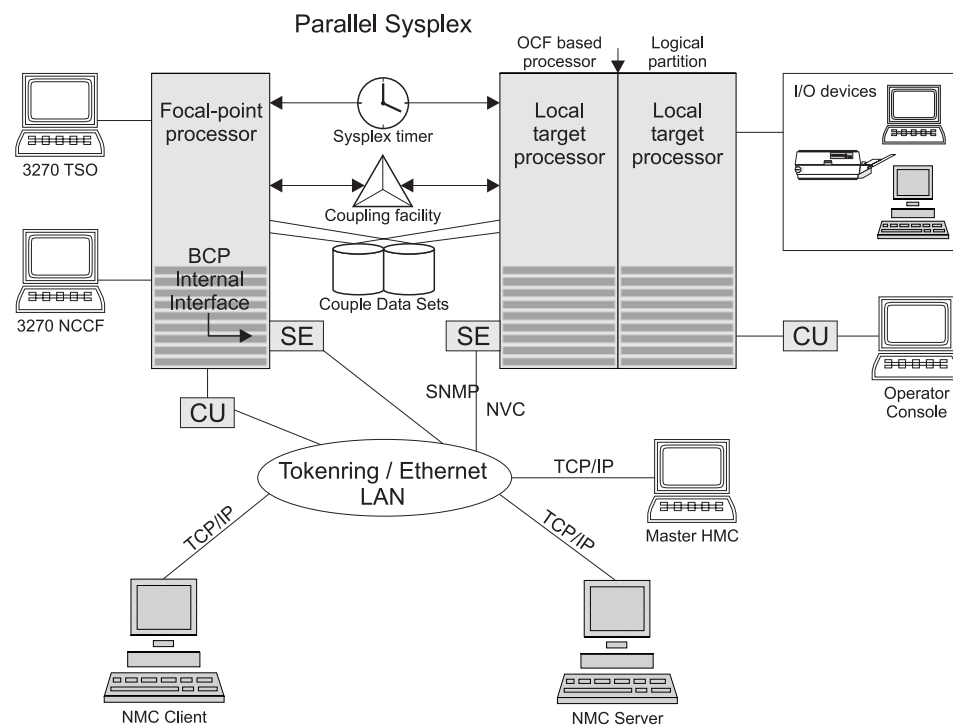
Figure 1. A Basic Hardware Configuration

It shows a two processor Parallel Sysplex configuration, with systems running on it. One is playing the role of a SA OS/390 focal point. For example, the role of the SA OS/390 NMC focal point with information about all the systems and applications in the sysplex, running under the control of SA OS/390.

Operators can use a workstation with the SA OS/390 NMC client code installed, to work with graphical views of the SA OS/390 controlled resources stored on the focal point. The NMC server component receives status changes from the NMC focal point and distributes them to the registered clients to update their dynamic resource views. Sysplex specific facilities, like the coupling facility hardware can be managed and controlled using the NMC's client graphical interface, as well as the 3270 NCCF based SA OS/390 operator interfaces.

With the same interfaces, processor operations, another SA OS/390 focal point function can be operated. With processor operations it is possible to manage and control the complete processor hardware in a sysplex. Operator tasks like re-IPLing a sysplex member, or activating a changed processor configuration can be accomplished. Processor operations uses the processor hardware infrastructure, consisting of the CPC Support Element (SE), or the Hardware Management Console (HMC) interconnected in a processor hardware LAN, to communicate with the own, other local, or remote located Support Elements of other CPCs. The Support Elements provide the Systems Management Interface OCF (Operations Command Facility) to perform hardware commands like LOAD or SYSTEM RESET to control the hardware and hardware images. SA OS/390 processor operations can be customized to use SNA based NetView connections (NVC), or IP based SNMP for communication. For Parallel Sysplex environments, SA OS/390 provides an additional processor hardware interface, the BCP (basic control program) internal interface. This interface is independent from processor operations. It allows processor hardware operation in a sysplex, without requiring external network CUs (control units). From a system in the sysplex, the SE of the own CPC as well as the SEs of the other processors in the sysplex can be accessed.

SA OS/390 Resources

The following describes the functions and resources used by SA OS/390 and its components.

Focal point processor
In a multi-system environment, the primary (or *issuing*) host processor has SA OS/390 installed. You might think of it as SA OS/390's *command center*. This is where you enter commands you want to process. It includes a central processor complex which is a collection of hardware that consists of central storage, one or more central processors, timers, and channels. NetView and SA OS/390 are installed on this processor.

Target processor
The processor that is controlled by a focal point processor. It can be a local or remote processor, or a logical partition of a processor. When you send a command from a focal point system, the target is the processor you want the command to affect. The operating system can be OS/390, VM, VSE, or a coupling facility. If the operating system is OS/390, SA OS/390 should be installed on the target processor for full SA OS/390 functionality. If the operating system is VM, or VSE, or if the target processor is a coupling facility, only SA OS/390 processor operations functions are available for the target.

OCF-based processor	CMOS-S/390, zSeries operations command facility (OCF) for interacting with human operators or external programs to perform operations management functions on the central processor. Processor operations uses this facility to manage and control the processors.
Parallel Sysplex	A set of OS/390 systems communicating and cooperating with each other through certain multi-system hardware components (coupling devices and sysplex timers) and software services (couple data sets). In a Parallel Sysplex, OS/390 provides the coupling services that handle the messages, data, and status for the parts of a multi-system application that has its workload spread across two or more of the connected processors. Sysplex timers, coupling facilities, and couple data sets containing policy and states for basic simplex functions are all parts of a sysplex.
	An OS/390 sysplex can be viewed and managed as a single system image on the NMC workstation.
Logically Partitioned (LPAR) mode	A processor with the PR/SM feature that can be divided into partitions with separate logical system consoles that allocates hardware resources among several logical partitions. (It is called *logical* because the processor is not physically divided, but divided only by definition.) The partitions are defined, monitored, and activated separately by processor operations.
	A processor that does not use logical partitions is in "basic mode".
Images	Processors can operate as *single images* or *partitioned images*. A single image allows a multiprocessor system to function as one central processor complex.
	A multiprocessor system that functions as two or more independent processors (with separate power, water, and maintenance boundaries) is a *physically partitioned configuration image*.
Communications links	Paths that connect the focal point system processor to target processors so that commands, messages, and alerts can flow.
	Two types of communication links can be selected for communication between the focal point and the target processor hardware: SNA based NetView connections (NVC) and IP based SNMP connections.
Communications Task	An SA OS/390 user task responsible for all communications with the target processor hardware. Communications tasks receive commands from target control tasks or operator tasks and send them to the hardware. The number of communications tasks to be used is defined using the customization dialog.

OSA	I/O operations can display the open system adapter (OSA) channel logical definition, physical attachment, and status. You can configure an OSA channel on or off.
ESCON Director	The enterprise systems connection (ESCON) Directors (also known as *switches* or *dynamic switches*) are hardware electronic switching units with ports that dynamically switch to route data to input/output devices. Each port on the switch is an addressable connection, controlled by I/O operations commands. Two switches (one dynamic and one static) can be linked or chained together to increase the path length.
Ports	On an ESCON switch, a port is an addressable connection. The switch routes data through the ports to the channel or control unit. Each port can be given a name that can be entered into a switch matrix, and you can use commands to change the switch configuration.
Control units	Control units are hardware units that control input/output operations for one or more devices. You can view information about control units through I/O operations, and can start or stop data going to them by blocking and unblocking ports. For example, if a control unit needs service, you can temporarily block all I/O paths going to it.
Coupling Facilities	A hardware storage element with a high-speed cache, list processor, and locking functions that provides high performance random access to data for one system image or data that is shared among system images in a sysplex. With I/O operations you can see stand-alone coupling facilities. It handles them as control units with up to eight devices, all defined by the user. With SA OS/390 system operations, you can display the status of coupling facilities from a single system's point of view or you can display sysplex-wide status.
Devices	Input/output devices include hardware such as printers, tape drives, direct access storage devices (DASD), displays, or communications controllers. You can access them through multiple processors. You can see information about all devices and control paths to devices. You can vary devices—or groups of devices—online or offline.
Sysplex Timer	An IBM unit that synchronizes the time-of-day (TOD) clocks in a multiprocessor or in processor sides. External Time Reference (ETR) is the generic name for the IBM Sysplex Timer (9037).
NMC Workstation	A NetView feature running on a personal computer that provides a graphic series of windows controlled by NetView allowing you to monitor the SA OS/390 enterprise graphically.

Automation policy   Operations and procedures (or *policy*) information is kept in files that describe routine repetitive procedures, as well as the resources in your enterprise and their relationships. Automation automatically starts, restarts, monitors, or stops resources. You define the policy using the customization dialog. The resulting files are the system operations control files (automation control file and automation manager configuration file) (see also "Automation Policy" on page 11).

Channels

A channel is a path that transmits signals and data. It can be a standard channel or a special purpose channel such as OSA (open system adapter) or a coupling facility sender or receiver channel. For channels operating in block mode, you can display and change the state of the channels. The types of channels with ESCON switches supported by I/O operations are shown in the following list:

CNC   A channel path that transfers data between a host processor image and an ESCON control unit. This path from a channel to a device may be point to point or switchable.
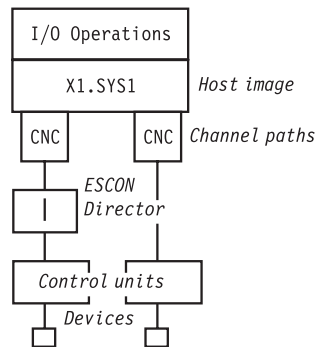
CTC   The channel-to-channel (CTC) channel can communicate with a CNC on another host for intersystem communication.
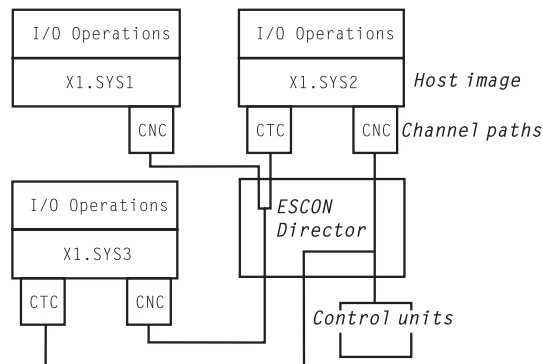
CVC and CBY
A channel operating in converted (CVC) mode transfers data in blocks and a CBY channel path transfers data in bytes. Converted CVC or CBY channel paths can communicate with a parallel control unit. This resembles a point-to-point parallel path and dedicated connection, regardless of

whether it passes through a switch.

```
┌─────────────────────┐
│   I/O Operations    │
├─────────────────────┤
│      X1.SYS4        │   Host image
├──────┐       ┌──────┤
│ CVC  │       │ CVC  │   Channel paths
└──────┘       └──────┘
   ┌──┐      ESCON
   │  │      Director
   └──┘
┌─────────┐  ┌──────────────┐
│Converter (to parallel)    │
└─────────┘  └──────────────┘
┌───────────────────┐
│   Control units    │
└───────────────────┘
       Devices
   ┌──┐        ┌──┐
   │  │        │  │
   └──┘        └──┘
```
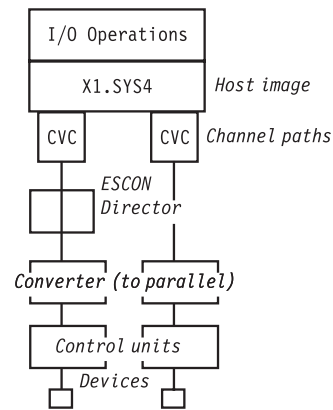
Parallel

Parallel channels operate in either byte (BY) or block (BL) mode. You can change connectivity to a parallel channel operating in block mode.

```
┌─────────────────────┐      ┌──────────────────┐
│   I/O Operations    │      │  I/O Operations  │
│                     │      │  not running on  │
├─────────────────────┤      │  this host       │
│      X1.SYS4        │      │                  │
├────┬─────┬──────────┤      ├────┐             │
│ BL │ CNC │ CNC      │      │ BL │  Channel paths
└────┴─────┴──────────┘      └────┘
┌─────────────────────────┐   ┌───┐
│CV Parallel channel converters │
└─────────────────────────┘
┌───────────────────────────────┐
│   Chained ESCON Directors      │
└───────────────────────────────┘
        ┌───────────────────┐
        │ ESCON 3990 control units
        └───────────────────┘
         ┌──┐        ┌──┐
         │  │        │  │
         └──┘        └──┘
```
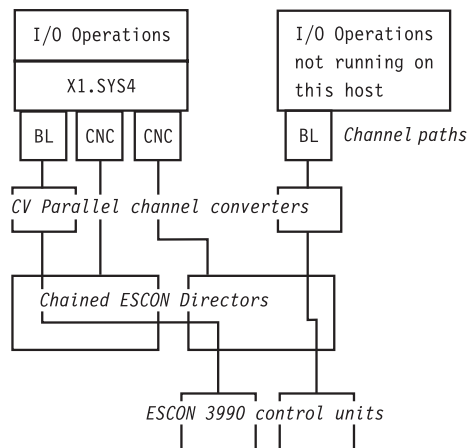
CFR/CFS and ISC/ISR

The I/O operations component of SA OS/390 can display connectivity data and control connectivity for integrated system channels (ISC) connected to a coupling facility. This includes coupling facility receiver (CFR) channels and coupling facility sender (CFS) channels.

Processors, Systems

The SA OS/390 processor operations component monitors the status of target processors (including logical partitions) and target systems. The status is determined based upon messages and alerts from the target hardware that processor operations has received at the focal point system.

Alerts are high-priority events that require operator action. Alerts are issued for situations in the target hardware and target system, and also for situations in the supporting processor operations environment. The following alerts will result in a status change of a resource, which will in turn cause a change in the representation of that resource in the SA OS/390 displays, thus alerting you to a potential problem.
• Target hardware problem
• Wait state detected
• Disabled Console Communication Facility (DCCF) message detected
• Console lost

- Console access lost
- Communications task failed
- System console could not be obtained

For OCF-based processors, processor operations automates support element-generated alerts to update status of resources viewable on SA OS/390 panels and graphic displays.

Messages received by processor operations at the focal point system allow processor operations to update the status of a target system as it initializes. You can view the initialization status of a target system using processor operations panels. Examples of some of the initialization statuses which can be seen are: Stage-1 Activate complete, IPL complete, IPL failed, Load failed, Waiting for IEA101A Start Message (OS/390 target systems), and Waiting for VM Start Message (VM target systems).

I/O Devices

On a dynamically updated resource display, the status of an I/O device is updated when a message to the operator console or to the OS/390 system log is trapped at the target system.

Automation Policy

Resource
Any target system, application, job, or associated hardware capable of being monitored or automated by SA OS/390.

Automation operators
Autotasks or unattended NetView tasks that do not require a terminal or logged-on operator. Automation operators may receive messages and process automation procedures.

(NetView) automation procedures
A sequence of commands, packaged as a NetView command list, a REXX procedure, or a command processor written in a high-level language. An automation procedure performs automation functions and runs under the NetView program. Automation procedures may exploit SA OS/390 generic routines.

NetView message automation table
A table against which the NetView program compares incoming messages. A match with an entry triggers the specified response.

Command processor
A module designed to perform a specific function. Command processors (which can be written in assembler or a high-level language) are invoked as commands.

Command list (CLIST)
A list of commands and statements written in the NetView command list language or REXX. The list performs specific functions for a user. It may be as simple as a list of commands, or complex and include variable substitution and conditional logic (more like a conventional program). Command lists are typically interpreted rather than compiled.

REXX procedure
A command list written with the Restructured Extended Executor (REXX) which is an interpretive language.

Policy database
    The automation definitions (the automation policy) that the automation
    programmer specifies using the customization dialog is stored into the
    policy database. Also, using some function of the customization dialog, the
    automation programmer builds the system operations control files (ACF
    and AMC file) from the policy database. Another file built from the
    information contained in the policy database is the processor control file.
    These files derived from the policy database define how SA OS/390
    applies automation to the resources.

Applications
    In SA OS/390, applications refer to OS/390 subsystems, started tasks or
    jobs automated and monitored by SA OS/390. On SNMP-capable
    processors, "application" may be used to refer to a subsystem or process.

Application groups
    Using the SA OS/390 customization dialog, you can group applications
    into application groups. Application groups are linked to a system. Thus
    you can have SA OS/390 automate applications that belong or depend on
    each other in one unit.

Grouped resource objects
    Systems can be organized into groups or subgroups to simplify working
    with them and displaying them on panels. They can be grouped this way:
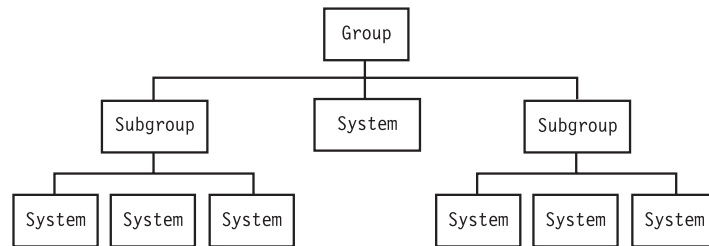
    System groups can either be *standard* or *sysplex*, but processor operations
    treats them both the same. Applications can be grouped for being
    automated as an entity.

Status display facility (SDF)
    An SA OS/390 facility that provides a 3270-based display of automated
    systems and resources using assigned status colors. An operator can
    monitor the status of automated systems and resources by viewing the SDF
    main panel.

Chapter 2. Concepts

This chapter contains information that you need to know while working with
SA OS/390. The following topics are discussed:

- "Automation Concepts"
- "SA OS/390 Automation Flags" on page 28
- "Statuses Supplied by the Automation Manager" on page 30
- "Statuses Supplied by Automation Agents" on page 34
- "Using SA OS/390 for Monitoring" on page 48

Automation Concepts

In SA OS/390, the automation function is split up:

- The observing, reacting and doing parts are located within the NetView address
  space, and are known as the *automation agents*. The automation agents are
  responsible for:
  - recovery processing
  - message processing
  - active monitoring: they propagate status changes to the automation manager
- The coordination, decision making and controlling functions are gathered into a
  single address space outside of NetView within each sysplex. This address space
  is called the *automation manager*.

You define the resources that you want to automate with SA OS/390 using the
customization dialog. Thus the automation manager contains a model of all of the
automated resources within the sysplex. The automation agents are the automation
manager's eyes and arms. They feed the automation manager with status
information and perform the actions that the automation manager tells them to.
The automation manager is the brain of automation. It does all of the decision
making that involves interaction between one or more resources.

The automation manager provides *sysplex-wide* automation. So its main purpose
is to provide one central point of book-keeping of all resources within a sysplex,
that is, the automation manager knows:

- the grouping of resources
- the dependencies between resources
- the statuses of resources
- the goals for the resources, that is when which resources are to be made
  available or unavailable.

According to the available information, the automation manager makes decisions
and instructs the corresponding automation agent where the resource is located to
put the resource into the desired state.

The automation manager knows five different statuses from each of the resources:

- the observed status;
- the desired status;
- the automation status;

- the startability status;
- the compound status;

More detail about these statuses is provided in "Statuses Supplied by the Automation Manager" on page 30.

Decision making is done by the automation manager with the help of so called goals. Goals are defined either by the automation programmer who defines permanent automation policy using the customization dialog (see *System Automation for OS/390 Defining Automation Policy*) or they are created interactively by operators who issue commands to define goals.

In all cases, the automation manager is told about the goals of a certain application or resource, that is, when the resource should be up or down (available or unavailable). Goals also take into account the dependencies of resources as defined via relations in the customization dialog and they check whether a trigger is defined for a resource that determines whether the availability of a resource depends upon some external events outside of SA OS/390 automation.

This is why automation performed by SA OS/390 is also called *goal driven automation*.

Information about goals is provided to the automation manager in the following ways.

1 OPERATOR
> by the operator command INGREQ (see "How Requests Become Goals" on page 19); these requests are labelled with originator OPERATOR(USERID) in the INGVOTE command dialog (see Figure 21 on page 91).

2 AUTOOPS
> by the INGREQ command issued from automation procedure (REXX exec, CLIST); these requests are labelled with originator AUTOOPS in the INGVOTE command dialog.

3 EXTERNAL
> by the OPC component; if the OPC product interfaces with SA OS/390, then OPC will take care of the startup of supporting resources required for applications that are scheduled with OPC; these requests are labelled with originator EXTERNAL in the INGVOTE command dialog.

4 SCHEDULE
> by a resource override, that is by the operator command INGSCHED with a resource parameter, which will interactively override a service period specifically for the specified resource (see "Resource Override" on page 94); these requests are labelled with originator SCHEDULE in the INGVOTE command dialog (see Figure 21 on page 91).

5 SCHEDULE
> by a schedule override, that is by the operator command INGSCHED, which can be used to kind of interactively override service periods for all resources that use this service period (see "Schedule Override" on page 94); these requests are labelled with originator SCHEDULE in the INGVOTE command dialog (see Figure 21 on page 91).

6 SCHEDULE
> by means of automation policy as defined in the customization dialog. The automation programmer uses *service periods* for applications or application groups as a comfortable method to let SA OS/390

automatically schedule up and down times of these resources. So these service periods are also referred to as *schedules*. These requests are labelled with originator SCHEDULE in the INGVOTE command dialog.

For most of the methods from the previous list, you can specify one of the following priorities for a goal which is checked in the case of two conflicting goals:

1. LOW
2. HIGH
3. FORCE (not applicable for schedules)

Table 3 now shows the hierarchy of all possible requests. So you can see that the strongest goal that you can specify for a resource is to interactively issue an INGREQ command to make a resource unavailable, such as:

```
INGREQ AGFG2/APL/AOC7 REQ=STOP PRI=FORCE
```

The weakest goal you can define for a resource is to make it available with low priority according to a service period.

You see that a request to make a resource available is in most cases preferred to a request to make this same resource unavailable.

Note: However, a more recent request from the same source will always overwrite an earlier request to the same resource without regard to the earlier request's priority. For example operator JOHN can overwrite his INGREQ request with HIGH priority to make a resource available with a later request of only LOW priority to make the same resource unavailable.

Note:

For all priorities except FORCE, within the same method, the request/goal to make a resource available has a higher priority than to make it unavailable.

Why then is *FORCE UnAvailable* issued by an operator of the highest priority?

This is really the only method to beat SA OS/390's attempts to make a resource available if for any reason you want to have this resource down anyway.

The operator can easily override his or her own FORCE Unavailable request for a resource with even a LOW priority request against this same resource. Thus this implementation of priorities ensures high flexibility and quick reaction in emergency cases.

Table 3. Hierarchy of Requests

Rank	Method	Goal
FORCE Priority		
1	**1** OPERATOR	Unavailable
2	**1** OPERATOR	Available
3	**2** AUTOOPS	Unavailable
4	**2** AUTOOPS	Available
5	**3** EXTERNAL	Unavailable

Table 3. Hierarchy of Requests (continued)

Rank	Method	Goal
6	**3** EXTERNAL	Available
	HIGH Priority	
7	**1** OPERATOR	Available
8	**1** OPERATOR	Unavailable
9	**2** AUTOOPS	Available
10	**2** AUTOOPS	Unavailable
11	**3** EXTERNAL	Available
12	**3** EXTERNAL	Unavailable
13	**6** SCHEDULE	Available
14	**6** SCHEDULE	Unavailable
	LOW Priority	
15	**1** OPERATOR	Available
16	**1** OPERATOR	Unavailable
17	**2** AUTOOPS	Available
18	**2** AUTOOPS	Unavailable
19	**3** EXTERNAL	Available
20	**3** EXTERNAL	Unavailable
21	**6** SCHEDULE	Available
22	**6** SCHEDULE	Unavailable

The automation manager transforms such a goal, for example, the request that a certain resource (application) should be up, into an order to the corresponding automation agent where the application should run.

The automation agents therefore are executing the orders coming from the automation manager. While executing the automation, the automation agents also take information from the defined policy for the resources which is available in form of the automation control file on each automation agent. As an example, for an order to start a resource coming from the automation manager, the automation agents retrieve information about the appropriate startup command from the automation control file.

For enterprise monitoring, the automation manager has the task to gather and control information about which resources are available, what is the status of the resources and what status updates are occurring during automation. The SA OS/390 topology manager extracts and transfers this information into the enterprise-wide RODM data base from where this information is picked up by the NMC workstation to display user-defined graphical views.

The communication between automation manager and automation agents can be implemented with MQSeries®. This allows you to restart of the automation manager on a different system in case the automation manager terminates unexpectedly. This ensures that no requests are lost.

The main commands you can use to retrieve information from the automation manager are:

- INGLIST: displays detail information about one or more resources (subsystem, application group and so on)
- INGINFO: displays lots of details for an individual resource or application group
- INGVOTE: displays the requests that have been issued and are currently pending for a specified resource
- INGSCHED: displays information about the current Up and DOWN service periods for resources

With the INGREQ command, you can issue a request to the automation manager, such as the goal for the specified resource should now be: available or the goal should be changed to: unavailable.

Requests that are sent to the automation manager using the INGREQ command are persistent. That means, if the automation manager terminates and is restarted later, it then remembers all requests (goals) that were valid at termination time. The automation manager will then continue to pursue all these goals for the resources. This means that if a resource should run on a certain system, and this system fails and is restarted later, the automation manager will continue to pursue the specified goals across IPL times unless they conflict with the IPL schedule times.

> **Summary of terminology:**
>
> *Goal:* There are only two goals for a resource: available or unavailable. Note that the success of carrying out a goal is also influenced by the dependencies of resources (defined as relationships in the customization dialog) and by triggers.
>
> **Note:** If no goal is explicitly specified, then the default goal is: make the resource available.
>
> *Request:* If an operator specifies a goal interactively using the INGREQ command, this is called a request. According to the two goals for a resource, there are the two requests to achieve these: *MakeAvailable* and *MakeUnavailable*.
>
> *Order:* An order is the result of a specified goal. An operator can specify goals interactively using the INGREQ command, or an automation programmer implicitly defines goals as automation policy by means of service periods.
>
> The automation manager transforms such a goal, for example, the request that a certain resource (application) should be up, into an order to the corresponding automation agent where the application should run.
>
> *Vote:* Resources can have relationships to other resources. As an example, a dependent resource needs a supporting resource before it can be made available. See *System Automation for OS/390 Defining Automation Policy* for information on how to define relationships. If an operator generates a request to start a dependent resource, the automation manager internally generates another request to make the supporting resource available as well. Or, alternatively in an INGREQ command to shutdown a resource, the operator can also request the shutdown of the dependent resources, which internally generates a request on these dependent resources. Such an internally generated request is called a ***vote***.
>
> It may happen that votes conflict or compete which each other. Such a scenario is illustrated in "Conflicting Relationships and Requests" on page 20. In such a case, the vote with the highest priority will win. If votes/requests even with the same priority come into conflict, then the requested action decides which request will win: the request to make a resource available is higher than the request to make that resource unavailable. To make a resource unavailable when it has the request to make it available, you must send it a higher priority request or revoke the *MakeAvailable* request.
>
> Using the INGVOTE command, you will see all currently active requests with their priorities, may they have been generated explicitly by an operator, implicitly because of the automation policy or internally as a consequence of relationships.

One automation manager must exist on each sysplex and one on each stand-alone system. In a sysplex, you can have one or more secondary automation managers (SAM) for backup purposes. That is, if the system on which the primary automation manager (PAM) runs, abends or if the automation manager itself abends, the first secondary automation manager recognizing this, will become the

new PAM and will take over all current requests from the former PAM. The automation agents in the sysplex will not notice the switch from one automation manager to the other.

> **Note:**
> No request will be lost.

How Requests Become Goals

A request asks that one specific resource (its *target resource*) should be moved to a specific state (its *goal*). A resource may, for example, be an application that should run on a certain system.

Example:
```
INGREQ abc REQ=START
```

specifies that SA OS/390 should start the resource called *abc*, that is, SA OS/390 should set the desired status of this resource to AVAILABLE on a system.

Now, SA OS/390 knows the dependencies for each of the actions that can be taken against the resource through the resource's relationships with its supporting resources. Using these, it propagates the request onto those resources. These internally created requests are called *votes*. Let us have a look at a CICS scenario: It makes sense to start a *Terminal Owning Region* (TOR_1) only after an *Application Owning Region* (AOR_1) is up. So you could define TOR_1 (running on a certain system) in our example to become a dependent resource and AOR_1 to become the supporting resource. So if you request to start TOR_1, SA OS/390 would generate a vote to start AOR_1.

Start requests are generally propagated from dependent resources up to supporting resources so that the supporting resource is started before the dependent resource is started. Stop requests are propagated down to dependent resources in order to stop dependent resources first.

How Request Propagation Works

If the request is a higher priority than whatever request the supporting resource currently has, then the new request wins and the supporting resource's goal is changed to comply with the request. The process then repeats itself for the supporting resource to its supporting resources.

Eventually the propagation will stop either if SA OS/390 does not encounter another supporting resource or when it encounters higher priority requests. At this point, SA OS/390 knows which resources are not in their goal state. For those whose prerequisites for being started or stopped are met, SA OS/390 will issue start or stop commands.

Once a resource's goal has been set, SA OS/390 will continue trying to achieve that goal. This means that if the resource abends, and its desired status is still AVAILABLE, then SA OS/390 will try to restart it. If the goal changes to UNAVAILABLE, SA OS/390 will stop the resource. If a resources starts when its goal is UNAVAILABLE, SA OS/390 will also stop it.

Conflicting Relationships and Requests

One of the most effective automation capabilities of SA OS/390 is the concept of **dependency relationships**. Using the customization dialog, the automation programmer defines relationships and conditions between dependent resources and supporting resources. For information on how to achieve this, refer to *System Automation for OS/390 Defining Automation Policy*.

In complex environments, it may happen that relationships exist that are opposed in both direction and meaning as illustrated in Figure 2. The following abbreviations are used:

- for dependency relationships

  MaWa   denotes *MAKEAVAILABLE/WhenAvailable*

  MuWu
         denotes *MAKEUNAVAILABLE/WhenUnvailable*

- for statuses

  Unav   denotes *Unvailable*

  Avail   denotes *Available*

- for requests or votes

  Av   denotes a request or vote to become available

  Un   denotes a request or vote to become unavailable
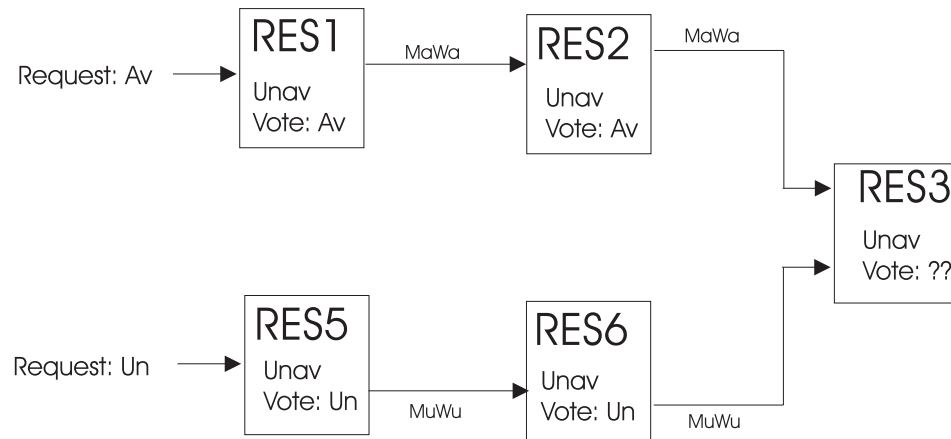
Figure 2. Conflicting Relationships and Requests

In Figure 2, **RES1** is in status Unavailable (Unav) and gets the request to become available (which internally creates the corresponding vote).

So the relationship *MAKEAVAILABLE/WhenAvailable* propagates requests to make resources available and the relationship *MAKEUNAVAILABLE/WhenUnavailable* propagates requests to make resources unavailable.

Note: The first part of a dependency relationship always applies to the resource where the arrow starts, and the condition always applies to the resource where the arrow ends.

As requests are internally stored and propagated as votes, in Figure 2, you see two conflicting votes that would be propagated to **RES3**. From **RES1** we have the vote

to be available while from *RES5* we have the vote to be unavailable. *RES3* has received both of these votes, but cannot satisfy them at the same time. You could see the conflicting votes for *RES3* by issuing the INGVOTE command against this resource.

In cases when two separate streams of propagation meet, the priority of votes/requests is evaluated and used to determine the winning vote. A priority is assigned to a request either by the operator interactively using the INGREQ command or by the automation programmer setting priorities for service periods.

A request to make a resource available wins over a request to make it unavailable with the same priority. This is only valid due to the *propagation* of requests. However, if an operator sends a request to start a resource, and the same or another operator later sends another request to stop this resource, the latter one will win. The difference is, that this is not a *propagation* of requests.

How the Automation Manager and Automation Agents Cooperate in a Sysplex

As described in "Automation Concepts" on page 13, SA OS/390's automation logic in a sysplex is split up between the automation agents and the automation manager.

Also, for reasons of high availability, SA OS/390 offers the concept of the primary and secondary automation manager (PAM and SAM), where the SAM can take over the work of the PAM without loss of any information or without any requests being processed twice.

In a sysplex, the automation agents communicate with each other exploiting XCF. Automation managers communicate with the automation agents exploiting MQSeries or XCF.

SA OS/390 provides two options for establishing communication between the automation manager and the automation agents:
- Using MQSeries V5R2 queues for both communication and backup
- Using XCF for communication and a VSAM data set for backup

Figure 3 on page 22 shows a typical configuration in a sysplex, showing the communication paths and methods between its members. Automation managers and automation agents communicate via MQSeries using the coupling facility. Automation agents communicate via XCF. XCF is only used at initialization time or to determine if an automation agent leaves or joins the sysplex. For more detailed information on how MQSeries queues are used to perform the communication refer to *System Automation for OS/390 Planning and Installation*.
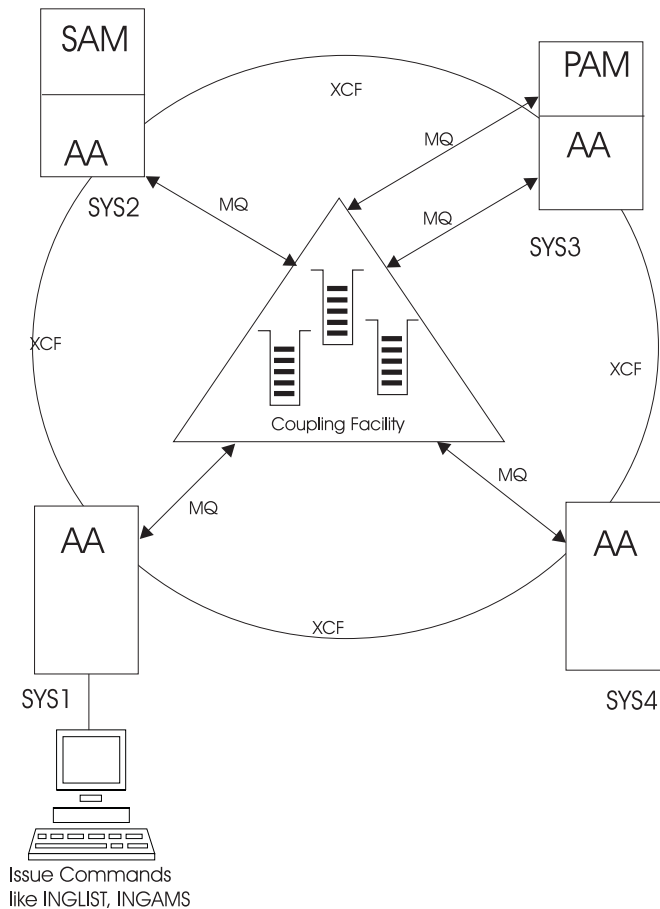
Figure 3. Automation Manager and Automation Agents Cooperation in a Sysplex

Controlling Application Move and Server Management

Application move refers to the process of stopping an active set of resources and starting an alternative set in a coordinated fashion.

Server management refers to the starting and stopping of equivalent resources to maintain a desired level of server capacity. Although it will work with any type of resource, it is designed to work with servers that are loosely coupled to the applications using them. Loosely coupled in this sense means that applications using the servers will not be adversely impacted if one instance of the server group is stopped and another one is started.

SA OS/390 uses the mechanism of grouping resources as described in *System Automation for OS/390 Defining Automation Policy* to implement the move mechanism, namely the groups of nature MOVE and SERVER obey all move instructions described later in this section, along with an availability target instruction that specifies, how many members of a group should be available, if not all are required.

Move Functions

The move functions that you can specify against a group are:

- Automatic group management to maintain application availability. This includes the activation of backup/alternate resources in response to resource or system failure.
- The ability to move resources away from a system en masse, on either a group/subgroup level or a system level.
- The ability to query and dynamically change a group's policy so as to cause one instance of a resource to be stopped and another started.
- The ability to estimate the impact of those changes before committing them.
- The ability to perform actions resulting from the above in a delayed, non-disruptive fashion.
- The ability to return resources to their normal systems in a delayed, non-disruptive fashion.

The INGGROUP command offers the following methods to apply move functions to a group:

EXCLUDE/AVOID/INCLUDE
> This indicates that you want to remove movable members from a system (exclude), prohibit SA OS/390 from activating movable members on a system (avoid) or that you wish to undo either of the other two actions (include).

Availability Target (AVTGT)
> This specifies the availability target that is to be set for the group. The value is the number of the group members that should be made available when the group has to be available. You can dynamically overwrite a group's availability target which is statically defined in the automation policy.

Preference (PREF)
> This parameter specifies preference values for being available for the members of a group. You can dynamically overwrite the preference values which are statically defined in the automation policy for each member. More information about the preference value is provided in "Controlling Application Move with Preference Values".

Controlling Application Move with Preference Values

Controlling application move and server management is done by means of preference values. Preference values are numbers between 0 and 1000. They express the importance of each individual member of the group.

Note that only MOVE groups and SERVER groups support preference values. With BASIC groups you cannot specify preferences, as all members need to be available. For MOVE and SERVER groups, the preference defines which of the resource members of the group should preferably run. Remember that a MOVE group is designed for backup solutions. A MOVE group can have many components, but one and only one is supposed to be active. All other components are for backup only. Thus MOVE groups usually contain members of one kind (where one application can replace the others).

SERVER groups are created when not all but only a certain number of their resources need to be available in order to consider the application group as being available. The number of desired available resources is controlled by the *Availability Target* parameter in the customization dialog. And once again, with the preference value in the customization dialog, you control which resources you prefer to be available and which you want to keep as backups.

Note that preference values are statically defined with the automation policy defined in the customization dialog for the groups. Using the INGGROUP command, operators can interactively change the preferences of group members. This new preference adjustment replaces the value defined in the customization dialog.

A special threshold preference value is 600. This acts as a divider between resources that are available for nomal startup (primary instances) and resources with lower preferences that are only available for startup during recovery situations (backup instances).

Four preference values are maintained by SA OS/390 for each member in a group:
1. The *base preference* which is specified in the customization dialog.
2. A *preference adjustment* which is dynamically set via the INGGROUP command.
3. Its *calculated preference* which is the sum of its base preference and its preference adjustment.
4. Its *effective preference* which is the sum of its calculated preference and some modifications that the automation manager applies.

The value of the *effective preference* will be visible in the INGGROUP command dialog as shown in Figure 35 on page 107.

The automation manager applies the following modifications to the preference values:
- If the resources observed status is Unknown, SysGone, HardDown or Problem its effective preference is always 0 and the manager will never attempt to start it.
- If the resource requires an excluded system, its effective preference is always 0, because it will not be able to receive requests anyway.
- If the resource requires an avoided system and it is not available, then its effective preference has a maximum value of 100 and it can only be picked in recovery mode (see "Recovery Mode").
- If the resource is Available or WasAvailable, its effective preference is increased by 250.
- If the resource is Starting or Degraded, its effective preference is increased by 225.

This lets the automation manager calculate an effective preference for each member that reflects both the users preference and the current state of the member.

Note: If a base preference 0 has been specified for a resource of a SERVER or MOVE group in the customization dialog, and it is in one of the observed statuses: *Available, WasAvailable, Degraded, Starting* then SA OS/390 grants an effective preference of 1250 upon this resource.

Recovery Mode
In this context, the concept of the recovery mode is of importance. Recovery mode is entered when a previously available member of the group goes into an unavailable status and the group is unable to find enough members with a *calculated preference* greater than 600 to make the group available. When this happens it enters recovery mode and is allowed to start members with a calculated preference of less than 600.

Initially, when the group is not in recovery mode, only members with a calculated preference of greater than 600 will be started. Once the group is available, it will try to maintain its availability by using only members with a calculated preferences of greater than 600. If it cannot, then it will enter recovery mode and use the lower preference members to bring the group back to availability.

The preference value and recovery mode interact to allow you to specify the behaviour of members of the group.

Note: Recovery mode is automatically entered if an EXCLUDE list is used with the INGGROUP command (see also "Move Functions" on page 22).

Available Preference Values
See Table 4 for available preference values. Preferences other than listed are also accepted to define your own fine-tuning.

> **Note:**
> The preference values listed in the following are *calculated preferences*.

Table 4. Preference Values and Behaviour of Members

Calculated Preference	Resulting Behaviour
Values for Primary Resources	
1000	The member is always selected when the group has been started and the system associated to this member comes up. Other resources from the same group with preference 700 are stopped in favour of this member.
900	The member is always selected when the group has been started and the system associated to this member comes up. Members with preference 500 will be stopped in favour of this group.
700	The member is always selected when the group has been started and the system associated to this member comes up. Members with preference 300 will be stopped in favour of this group. It is not stopped unless a very high preference (1000) alternative becomes available. This value is the default. Use it in a MOVE group for the resource that normally runs.
600	This value is used as a threshold. A resource with preference 600 and lower will not be started at group start up.
Values for Backup Resources	
500	This resource is not selected but will be selected when the group enters recovery mode. Once the problem is over, it will be stopped as soon as a primary member with a calculated preference > 750 is available.
300	This resource is not selected but will be selected when the group enters recovery mode. Once the problem is over, it will be stopped as soon as a primary member with a calculated preference > 550 is available.
100	This resource is not selected but will be selected when the group enters recovery mode. As soon as a preference 500 backup member is available, it will be stopped in favour of the backup member.
1	A resource with this preference will never be selected by SA OS/390 automation. If it is available, it will be used, but automation will never ask for it to be started if it is unavailable. Operators may make such resources available interactively by using the INGGROUP command and give it a higher preference. Use this value to provide completely manually controlled application availability.

Table 4. Preference Values and Behaviour of Members (continued)

Calculated Preference	Resulting Behaviour
0	This value indicates that the member is passive and that no requests should be sent to it. If a member is made passive, then any requests that have been previously sent will be withdrawn.

Preference Scenarios
To understand the interactions of the various flavours of preference values and the concept of the recovery mode, the following sections describe some scenarios of how SA OS/390 reacts according to the specified and automatically applied preferences.

Backup with Non-Disruptive Restoration: In this scenario you have an application *ABC* which can run on one of two systems - *SYS1* and *SYS2*. Only one instance of the application should normally be active. The instance on *SYS1* is the primary instance (set preference 700), while the instance on *SYS2* is the backup instance (set preference 500).

The preferences 700 and 500 mean that the applications will behave as follows:
1. If *SYS2* is IPLd first, then the application will not be started (preference 500, not in recovery mode).

   When *SYS1* is IPLd, its instance of the application will be started (preference 700, highest startable instance).
2. If *SYS1* should fail, the instance on *SYS2* will be started (preference 500, in recovery mode, highest startable instance).
3. When *SYS1* is IPLd again, it will not start its instance (preference 700, but active instance with preference 750 (500 + 250 for being available).
4. At the end of the service period the instance of *SYS2* will be stopped.
5. At the start of the next service period, the instance of *SYS1* will be started (preference 700, highest startable instance).

Backup with Disruptive Restoration: This scenario is like the above, but you want the application to return to *SYS1* as soon as *SYS1* is available, even if this causes an additional service interruption. You can use preferences of 700 for *SYS1* and 300 for *SYS2*, or 900 for *SYS1* and 500 for *SYS2*. As these are the only two applications involved, either combination will work (the important thing is that they are more then 250 apart). The example uses the 700 and 300 values.
1. If *SYS2* is IPLd first, then the application will not be started (preference 300, not in recovery mode).

   When *SYS1* is IPLd, its instance of the application will be started (preference 700, highest startable instance).
2. If *SYS1* should fail, the instance on *SYS2* will be started (preference 300, in recovery mode, highest startable instance).
3. When *SYS1* is IPLd again, its instance will be started (preference 700, highest startable instance) and the *SYS2* instance will be stopped (preference 550 (300 + 250 for being available), lower than 700). This causes a short service interruption as the application moves back to *SYS1*.
4. At the end of the service period the instance of *SYS1* will be stopped.
5. At the start of the next service period, the instance of *SYS1* will be started (preference 700, highest startable instance).

Figure 4 illustrates the difference of non-disruptive and disruptive restoration between the steps 2 and 3 in each scenario: in the non-disruptive scenario, the application *ABC* continues to run on *SYS2* until the end of the service period for the group, because this resource now has a higher priority of 750 than the resource on *SYS1* which would only have priority 700. In the disruptive restoration on the other hand, **SYS1** takes over for the rest of the service period after the problem has been fixed.
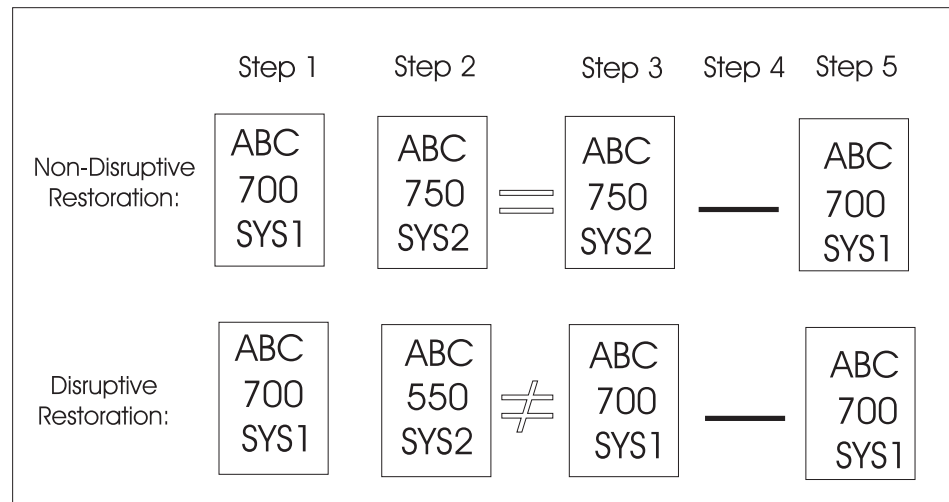
Figure 4. Non-Disruptive and Disruptive Restoration

Real Hierarchy of Preferences: In this scenario, you have three systems where the application can be run. *SYS1* is where you normally run it, *SYS2* is a back up and *SYS3* is where it can run in extreme emergency only. You would specify preferences as 700, 500 and 100.

1. If either *SYS2* or *SYS3* are IPLd first, their instances will not be started (preferences 500 and 100, not in recovery mode). The operator can, of course, explicitly request one of the instances to be started (which should be done if they want the application to be available and know that *SYS1* will not be IPLd for a while).
2. When *SYS1* comes up its instance will be started (preference 700, highest startable instance).
3. If *SYS1* fails, the *SYS2* instance will be started (preference 500, in recovery mode, highest startable instance).
4. Now, if *SYS1* were to return at this point, we would be back in the first scenario - non-disruptive backup.
5. Instead, let us suppose that *SYS2* now fails. This causes the instance on *SYS3* to be started (preference 100, in recovery mode, highest startable instance).
6. Now if either of the other two systems came back (let us assume it is *SYS2*), then its instance will be started (preference 500, in recovery mode, highest preference instance) and the instance on *SYS3* will be stopped (preference 350 (100 plus 250 for being available), lower than 500). This would cause an application outage, but would get the application off *SYS3*.
7. If *SYS1* then comes back, its instance will not be started (preference 700, lower than 750 (500 + 250 for being available)).
8. After the next service period stop, we would be back to running the instance on *SYS1*.

Note: If *SYS1* was down at the end of the start of the next service period, then the application would not be restarted. Using preferences of 900, 700, 100 (or 300) would get around this, but also means that the application could be automatically started on *SYS2* if it was IPLd before *SYS1*.

Server Battery with Backups: In this scenario your sysplex consists of four systems (*SYS1*, *SYS2*, *SYS3* and *SYS4*). You defined a Sysplex Application Group of nature SERVER with an availability target of 3 that should normally run on systems *SYS1*, *SYS2* and *SYS3*. A backup resource is defined on *SYS4*, but it should only be used when one or more of the main servers is unavailable. Preference of 700 should be used for the resources on *SYS1*, *SYS2* and *SYS3*, while the backup resource on *SYS4* should have a preference of 300.

1. When all systems are IPLd, the resources on *SYS1*, *SYS2* and *SYS3* will be started (preference 700, 3 highest startable resources). The resource on *SYS4* will not be started (preference 300, not in recovery mode).

2. If either *SYS1*, *SYS2* or *SYS3* should fail, then the resource on *SYS4* will be started (preference 300, now in recovery mode).

3. When the failed system is restored, its resources will be restarted (preference 700, three highest startable resources) and the resource on *SYS4* will be stopped (preference 550 (300 + 250 for being available)).

Note: Setting a preference of 500 for the resource on *SYS4* would cause it remain running when the failed system returned, effectively turning the resource on the returned system into the back up. It is also possible to set the preferences as 700, 700, 700, 690 which will let automation start the resources on which ever systems it needs to make the application available, but to prefer not to use the *SYS4* resource if the other three are available (which they may not be at IPL time).

SA OS/390 Automation Flags

Automation flags are automation policy settings defined in the customization dialog that specify whether certain types of automation are on or off for a resource. For information on how to set automation flags, refer to *System Automation for OS/390 Defining Automation Policy*.

Automation Agent Flags

If an event occurs that triggers automation, SA OS/390 checks the appropriate flag to determine if automation is currently on. If it is, SA OS/390 proceeds with the automation actions associated with the flag. For example, if TSO fails and the Restart flag is on for TSO, SA OS/390 restarts TSO according to the policy specified in the customization dialog.

There is one flag that controls all the other flags. This is:

Automation
>   If this flag is set to N (No), no automation is allowed, regardless of how the other flags are set. If this is set to Y (Yes), SA OS/390 checks each of the other flags to see if they are set to Y or N.

The other flags which apply to each resource are:

Initstart
>   If this flag is turned on and the SA OS/390 automation status for a

subsystem is DOWN, SA OS/390 can try and start the subsystem when all other conditions necessary for its startup (as defined in your automation policy) are met.

Start If this is on, automation manages and completes the startup process of the subsystem.

Recovery
If this is on, automation takes the specified action for any MVS message that is not associated with the initialization, startup, shutdown, or restart of a subsystem. For example, if this flag is on, automation takes corrective actions in response to messages that indicate shortages of WTO buffers and JES spool space. Automation also invokes offload routines when the following MVS data sets are about to fill up: SYSLOG, LOGREC, SMF, MVS dump.

Shutdown
If this flag is turned on, SA OS/390 can process automated shutdown requests for this subsystem. The setting of this flag can be overridden when the shutdown is requested. Also, the flag can be used to control secondary automation that occurs during the shutdown process. Secondary automation covers things such as replying asynchronously to WTORs and issuing commands in response to messages from the subsystem.

Restart
If this flag is turned on and the SA OS/390 automation status for a subsystem is RESTART, SA OS/390 can try and start the subsystem when all other conditions necessary for its startup (as defined in your automation policy) are met.

When you set an automation flag to Y in the customization dialog, that automation flag is on all the time, unless someone does one of the following:

- Turns the flag off for a period by scheduling an override in the customization dialog. For example, you could schedule an override that turns initialization and shutdown automation off on Sundays from 12:00 to 16:00, so you can do your system backups.

  You can display these scheduled overrides using the DISPSCHD command dialog, as explained in "Displaying Automation Agent Flag Override Settings" on page 101.

- Turns the automation off using the INGAUTO command dialog. These command dialogs are discussed later in the chapter.

- Causes a higher level flag to be turned off, for example the subsystem's Automation flag or the SUBSYSTEM Restart flag.

If a flag is set to N, you cannot schedule an override in the customization dialog to set it on for a particular time. You must use the INGAUTO command dialog.

If a flag is set to E, then an exit is executed to determine whether or not automation is allowed. See *System Automation for OS/390 Customizing and Programming* for details of flag exits.

The Automation Manager Global Automation Flag

Using the INGLIST or the INGSET command (see *System Automation for OS/390 Operator's Commands*) you can set an automation flag for the individual resources, which is checked by the automation manager before it sends any order to the automation agent to start or stop the specific resource.

The purpose of this flag is to prevent (if flag is set to NO) or enable (YES) the starting or stopping of resources from the point of view of the automation manager. This can be done for resources that reside on systems that are currently inactive, for example, to prevent the startup of the resource at IPL time of the system.

The Hold Flag

As the default for all resources is to be available, you can use the *hold flag* for resources to prevent their startup at IPL time of the system.

The hold flag is primarily used for the NOSTART reply to the AOF603D WTOR.

You can manipulate the hold flag with the INGLIST or the INGSET command or just view it with INGINFO.

Statuses Supplied by the Automation Manager

The automation manager is keeping track of five different statuses for each resource:

Observed Status
> This indicates the current status of the resource, as reported by the automation agent.

Automation Status
> The automation status of a resource tells the automation manager in which automation status a resource currently resides. If a resource's automation status currently is *idle*, this means that the automation agent does nothing for automation, or conversely, if the automation status is *denied*, this means that automation is currently not allowed, possibly because the automation flag has been set off.

Desired Status
> This status reflects the goal of a resource. The automation manager will be continuously trying to place the resource into this status unless the goal is revoked or changed. This status can be either *Available* or *Unavailable*. If it is *Available*, the automation manager will try and start the resource. If it is *Unavailable*, the automation manager will try and stop the resource. The default is to try and make the resource available.

Startability Status
> This is a calculation as to whether or not it is possible to start the resource if this is requested. It includes the startability of all inactive start dependent resources. This status is mainly used as input for Compound Status calculations and by groups to prevent them from selecting members that cannot be started.

Compound Status
> This status is the composition of the other statuses to give the operator a chance to check from the automation manager if a resource is currently OK concerning the automation.

The operator can retrieve the status using two commands:
- INGLIST command: provides some main attributes of a resource, for example a resource's different statuses.
- INGINFO command: provides information about a resource from the point of view of the automation manager.

Two of these statuses, the observed status and the automation status, are supplied by the automation agent responsible for running the resource. The desired status is derived through the request propagation mechanism. The startability status is derived through status propagation. The final status, compound, is a summary of all of the other statuses and a number of other values. The compound status is made visible through INGLIST or INGINFO and, eventually, placed into RODM and made visible on the NMC workstation.

Observed Status

This represents the current status of the resource and is provided by the related automation agent.

Possible values are:

Unknown (Assumed unavailable)
> The automation manager has no observed status information about the resource. To be on the safe side, the automation manager will assume that the resource is unavailable and will try to make it available if this is the desired status. On the other hand, this assumption allows the automation manager to process shutdown requests for supporting resources which can only be made unavailable if this resource is unavailable.

SysGone (unavailable)
> The system on which the resource is defined is no longer a member of the sysplex.

SoftDown (unavailable)
> The resource is unavailable and automation may restart it.

HardDown (unavailable)
> The resource is unavailable and automation will not restart it.

Starting (available)
> The automation agent is either in the process of making the resource available or has detected actions from some outside command to make the resource available.

Available
> The resource is ready for use.

Degraded (available)
> The resource is available but not all required members in the server group are available.

Standby (available)
> The resource has a primary/secondary system association defined. The automation agent posts this status to the automation manager when setting the automation agent status to MOVED or FALLBACK.

> **Note:** The automation manager treats STANDBY like a HARDDOWN status except that it is not considered that this indicates an error condition.

Problem (available)
> The resource is available but has a serious problem, probably making it unusable.

Stopping (available)
> Either the automation agent is in the process of stopping the resource, or it has detected that some outside command is doing so.

WasAvailable (Assumed available)
> The automation manager has lost contact with the automation agent
> responsible for the resource, however the resource was available when
> contact was lost and the system it is on still appears to be running. The
> resource will be treated as being available. This is primarily to prevent
> inappropriate recovery actions from being initiated whenever an
> SA OS/390 NetView is recycled.

Observed Status Transitions

```
          unavailable  !  available
                       !
                       !  was available
                       !
Unknown                !
                       !
SysGone                !
                       !----> Starting ---------------------------------------
                       !                    |      |      |      |      |     |
                       !                    |      |      |      |      |     |
                       !                    |      |      |      |      |     |
Standby or             !                    v      v      v      v      v     v
HardDown <---> SoftDown !                 Available   Problem    Degraded
                       !                    ^      ^      ^      ^      ^     ^
                       !                    |      |      |      |      |     |
                       !                    |      |      |      |      |     |
                       !----- Stopping <----
                       !
                       !
```
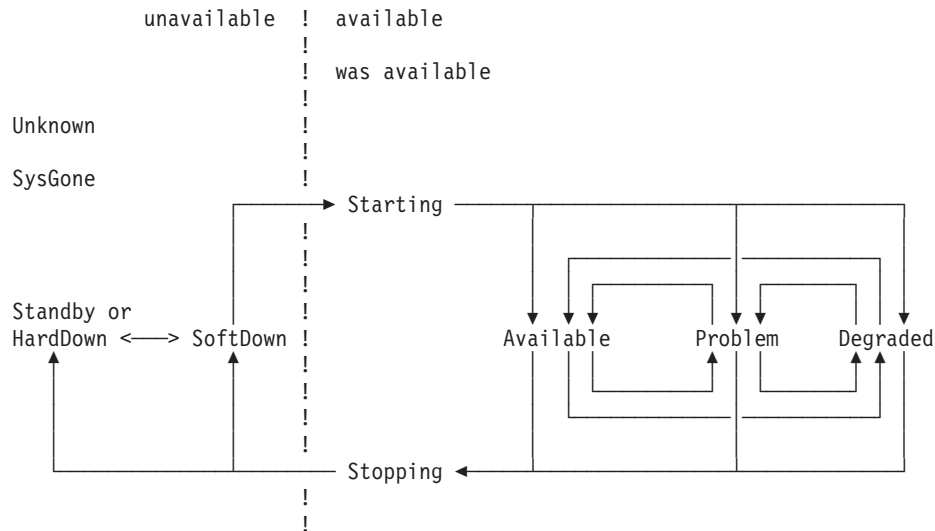
Figure 5. Observed Status Transitions

Automation Status

This indicates the status of the automation for the resource. It is provided by the
related automation agent.

Possible values are:

Unknown
> No connection with the automation agent.

Idle No orders have been sent; the automation agent is not doing anything. The
manager may send the automation agent new orders.

Ordered
> Orders have been sent. This status is only posted within the automation
> manager.

Busy The automation agent is processing the orders, or observing/assisting a
start or stop process initiated by some outside command. This status is
entered when a resources status becomes Starting or Stopping and the
previous Automation Status was Idle or Ordered. This status is changed to
Idle if the resource achieves an observed status other than Starting or
Stopping. This status may be posted directly by the automation agent.

Denied
> The automation agent was not allowed to process the last order it received.
> This status is changed to Idle if the resource achieves an observed status of
> HardDown, SoftDown or Available. This status is posted directly by the
> automation agent.

Problem

The automation agent encountered a problem while processing for the resource. This status is changed to Idle if the resource achieves an observed status of HardDown, SoftDown or Available. This status is posted directly by the automation agent.

Internal

This means that the automation of the resource is being handled internally.

Automation Status Transition
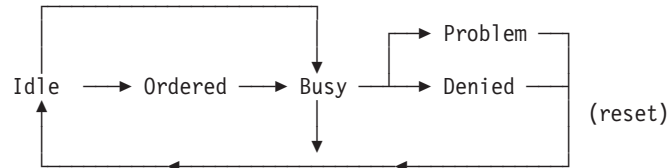
```
Unknown

    ┌──────────────────────────────┐
    │                    ┌─→ Problem ─┐
    │                    │            │
Idle ──→ Ordered ──→ Busy ──→ Denied ─┤    (reset)
 ↑  │                │            │   │
 │  │                │            │   │
 │  └────────────────┴────────────┘   │
 └─────────────────────────────────────┘

Internal
```

Figure 6. Automations Status Transitions

The automation manager may only send orders to an idle automation agent.

Transition from Idle to Busy occurs when the automation agent detects a third party (such as an operator or ARM) starting or stopping a resource.

Desired Status

You set the desired status of a resource either:
- by an INGREQ command
- by a service period
- by a schedule/resource override (INGSCHED)
- or indirectly through a vote which stems from the request propagation.

It's possible values are:

Available

The resource should be started (made available).

Unavailable

The resource should be stopped (made unavailable).

Startability Status

The startability status is calculated from the resource's current status, its automation status, its automation and hold flags and the startability of its supporting resources.

Possible values are:

Yes   The resource is either startable or already started.

No   The resource cannot be started due to a problem with the resource itself.

Inhibited

The resource cannot be started because of either a problem with one of its supporting resources or because automation has been prohibited.

Compound Status

The Compound status is a summary of all the statuses of a resource. It considers elements of the four other statuses as well as a number of other values.

Possible values are:

Problem
There is a problem with this resource that automation cannot solve. Operator intervention is required.

Denied
The resource is not in its desired state and automation is unable to proceed because either the automation flag has been turned off or the automation manager hold flag for the resource is set to YES.

Inhibited
The resource is not in its desired state and automation is unable to proceed because of a problem with a supporting resource. Operators should try to fix supporting resources with compound status *Problem* and *Denied*.

Awaiting [Automation]
The resource is not in its desired status and SA OS/390 is waiting for its supporting resources to reach the appropriate state.

InAuto[mation]
SA OS/390 is in the process of starting or stopping the resource.

Degraded
For a group it means that it is partially running, but not at full capacity. For normal resources, it can mean that the resource is Starting or Stopping, or that the application is suffering from a performance or throughput problem (corresponding to automation agent status HALTED).

Satisfactory
The resource's desired and observed statuses are corresponding; no further automation or operator activity is required.

Statuses Supplied by Automation Agents

There are different types of statuses that may be applied to an application. They are all retrieved on the side of the automation agent. These are:
- "Automation Agent Statuses"
- "Application Monitor Status" on page 43
- "Automatic Restart Manager Statuses" on page 44

Furthermore, this chapter discusses the following related topics:
- "Mapping the Automation Agent Statuses to the Automation Manager Observed Status" on page 45
- "SA OS/390 Processes Involved in Status Determination" on page 47

Automation Agent Statuses

SA OS/390 defines different automation agent statuses that it applies to automated resources. The automation agent status of a resource is determined from a combination of its application monitor status, its desired status, recent history, and intended action.

These statuses are used on the automation agents to control the automation. They are translated to *observed statuses* (see "Mapping the Automation Agent Statuses to the Automation Manager Observed Status" on page 45) and then sent to the automation manager.

On the automation agent you can use the DISPSTAT and DISPINFO commands to see the automation statuses.

Following is a brief description of each automation agent status.

Value	Meaning
ABENDING	The application is undergoing a recoverable abnormal end. This status is entered when a TERMINATION message with the ABEND=YES attribute is received. It remains in ABENDING until its final termination message is received. If the application is defined to Automatic Restart Manager it may be posted to EXTSTART when Automatic Restart Manager attempts to recover it. If the application has not exceeded its critical threshold, SA OS/390 posts the application to RESTART and attempts to restart it. If it has exceeded its critical threshold it is put into BROKEN status when it has been cleaned up, and SA OS/390 does not attempt to start it. If it is slow to leave the system after its FINAL message is received it may go to ZOMBIE status. If the application is undergoing a normal shutdown by SA OS/390 no further shutdown commands are issued. The shutdown may be resumed by using the INGREQ command with a stronger type.
ACTIVE	The application is running, but is not yet ready for work. An application can be put into ACTIVE status in response to the following conditions: **(i)** SA OS/390 has received an ACTIVE message for the application. **(ii)** The SA OS/390 startup checker has run for the application when its automation status was STARTED. The startup checker found the application monitor status for the application to be ACTIVE. **(iii)** During routine status checking the application monitor status for the application was found to be ACTIVE when its automation status indicated it should be otherwise. **(iv)** SA OS/390 attempted to start the application, but found that its application monitor status was ACTIVE. **(v)** SA OS/390 found that the Automatic Restart Manager status for the application is STARTING, but has not received any messages concerning the application status. **(vi)** SA OS/390 checked an attempt by Automatic Restart Manager to restart the application and found that its Automatic Restart Manager status is UNREGISTERED, but the application monitor status for the application is ACTIVE. An application remains in ACTIVE status until its UP message is received. If the application is starting or restarting, an SA OS/390 monitoring check for the application is done after its start delay time. If the application is not found it is put into INACTIVE status. If it is found, but is not yet UP, it is put into STARTED2 status.

Value	Meaning
ASSIST	This is an unusual status. When an application has ASSIST=DISPLAY coded for one or more of its automation flags, SA OS/390 puts the application into ASSIST status whenever it wants to issue a command that is controlled by that automation flag. ASSIST indicates that SA OS/390 is ready to take an action which will affect an application, but that you must approve the action before it occurs. An application can enter ASSIST status when SA OS/390 is going to start it, stop it, or perform secondary automation for it. When an application is in ASSIST status you can access an ASSIST panel using SDF. This panel is used to tell SA OS/390 to issue the command where it should be issued, to issue the command on the your account, or to ignore the command. The regular monitor ignores applications that are in ASSIST status, and most command dialogs will not process them. To get an application out of ASSIST status you must respond to all the ASSIST panels that are present in SDF for the application. If the commands are issued in the correct place, the application should come up. You can use the DISPASST command dialog to see assist settings, and the SETASST command dialog to change them dynamically.
AUTODOWN	The application is shut down. SA OS/390 may restart it to comply with an operator request. If the shutdown specified that the application was to be restarted, it is put into RESTART status when the shutdown is complete. **(i)** SA OS/390 has shut the application down at the request of an operator. **(ii)** When SA OS/390 initialized, the operator replied NOSTART to the AOF603D WTOR. Any applications which would have been put into the DOWN status during initial status determination have instead been put into the AUTODOWN automation status. You can use the SETSTATE command to change the application status to either RESTART or CTLDOWN. SA OS/390 may attempt to restart an application in AUTODOWN status when SA OS/390 is reloaded, or when an operator requests SA OS/390 to start one of the application descendents. In both cases, the application goes to RESTART status.
AUTOTERM	SA OS/390 is in the process of shutting the application down. The shutdown is in response to a INGREQ REQ=STOP command. This status persists until SA OS/390 is sure that the application has been cleaned up. Many things may happen to an application that is being shut down. If the shutdown is successful, the application is placed in either AUTODOWN or CTLDOWN status. If the shutdown specified that the application should be restarted it goes through AUTODOWN to RESTART status. If the application abnormally ends while it is being shutdown it may go into either ABENDING or BREAKING. A normal shutdown will stop processing an application that abends, but other shutdowns will continue. If the shutdown runs out of commands to issue, the application is placed into STUCK status. If it has problems shutting down, the application may be placed into ZOMBIE status.

Value	Meaning
BREAKING	The application is undergoing a non-recoverable abend; that is, it has received a termination message specifying BREAK=YES. If the application is undergoing a normal shutdown by SA OS/390 no further shutdown commands are issued. The shutdown may be resumed by using the INGREQ REQ=STOP command. This status persists until SA OS/390 receives its final termination message and is sure that the application has been cleaned up. If the termination experiences difficulties, the application may be posted to ZOMBIE status.
BROKEN	The application has suffered a non-recoverable abend. SA OS/390 will not restart it. An application can be put into BROKEN status in response to the following conditions:
	(i) The application has suffered a non-recoverable abend, indicated by the reception of a TERMINATION message with the BREAK=YES attribute.
	(ii) The application has suffered sufficient recoverable abends to exceed its critical threshold.
	This status is preserved across a recycle of SA OS/390 or a re-IPL of the processor, unless the application has its Start on IPL/RECYCLE Option set to YES.
CTLDOWN	The application is shut down and SA OS/390 is not allowed to restart it.
	(i) An operator asked SA OS/390 to shut the application down and not to restart it until authorized to do so by an operator.
	(ii) An operator used a SETSTATE command to tell SA OS/390 that an application should not be restarted until an operator authorizes SA OS/390 to do so.
	(iii) SA OS/390 was recycled, the application monitor status is INACTIVE, and its Start on RECYCLE Option is NO.
	(iv) SA OS/390 was started for the first time, the application monitor status is INACTIVE and its Start on IPL Option is NO.
	(v) SA OS/390 was recycled while the application was in a CTLDOWN status. If the AOFCTLOPT advanced automation option is set then the application status remains CTLDOWN regardless of all other settings, parameters, and options, providing its application monitor status remains INACTIVE.
	You can use the SETSTATE command to change an application status from CTLDOWN to RESTART or AUTODOWN, in which case SA OS/390 will attempt to restart it.

Value	Meaning
DOWN	The application has not been started during the lifetime of this SA OS/390. The DOWN status is set only during initial status determination and is possible only if the application monitor status is INACTIVE. The automation status of the application when SA OS/390 was last shut down on this system is used in the following manner to determine if it is to be placed into the DOWN status. **(i)** The previous automation status was not one of STOPPED, CTLDOWN or BROKEN. **(ii)** The START on IPL option for the application is YES and this is the first time that SA OS/390 has been started since MVS was last IPLed. If the previous automation status was CTLDOWN and the AOFCTLOPT advanced automation option is set then the automation status remains as CTLDOWN. **(iii)** The START on RECYCLE option for the application is YES and this is not the first time that SA OS/390 has been started since MVS was last IPLed. If the previous automation status was CTLDOWN and the AOFCTLOPT advanced automation option is set, then the automation status remains as CTLDOWN. **(iv)** The application does not have a Start on IPL Option of NO. If it does, its status is set to CTLDOWN. **(v)** The application does not have a Start on RECYCLE Option of NO. If it does, its status is set to CTLDOWN.
ENDED	This status is used for transient applications only, and indicates that the job for the application has finished and left the system without any errors. Any start-dependent resources for the application will be started as though it were a normal OS/390 subsystem that was UP. If the transient application can be re-run, you can use the SETSTATE command to restart it. If the transient application cannot be re-run, it will remain in ENDED status.
ENDING	A transient application is in the process of terminating. A transient application goes to ENDING status when a termination message is received for it, and it is not being shut down by SA OS/390. This status shows that the application is terminating, but that this is expected. A transient application may also go to ENDING if an operator is shutting it down outside SA OS/390 control, or if it has abnormally ended, but the abend messages are being treated as normal termination messages. The application remains in ENDING status until either: • an abend message is received, which will put it into either ABENDING or BREAKING status. If the application abends then either SA OS/390 or Automatic Restart Manager can restart it. • the application final termination message is received, at which point the RESTARTOPT for the application is checked. If it is ALWAYS then the application is put into RESTART status and SA OS/390 will attempt to restart it. If it is anything else, the application go to ENDED status. It is assumed that if a transient application ends normally then it will deregister from Automatic Restart Manager. If it is slow to clear the system after its FINAL message is received it may go to ZOMBIE status. If an ACTIVE or UP message is received for the application, its automation status is changed to either ACTIVE or UP, as appropriate.

Value	Meaning
EXTSTART	SA OS/390 has determined that the application is being started or restarted by an agent external to SA OS/390. In situations where SA OS/390 is able to identify the external agent (such as Automatic Restart Manager), it takes appropriate steps to monitor that agent's actions and, if necessary, step in to assist it. An application can be put into EXTSTART status in response to the following conditions: **(i)** SA OS/390 is unable to identify the external agent. **(ii)** Automatic Restart Manager is in the process of restarting the application.
FALLBACK	The application is not running on the primary system where it should run, but this status has been encountered for this application on one of its secondary systems. It should be active on another system. If the other system fails, the application can fall back to this system, where it could possibly be restarted. However, SA OS/390, will not perform the restart on the fallback system, but this may be done by an operator request. This is implemented to leave the decision of restarting the application on the fallback system to the operator. An application can be put into FALLBACK status in response to the following conditions: **(i)** It is defined with a secondary association on this system. **(ii)** An operator has used the SETSTATE command to put the application into the MOVED status. If this is one of the secondary systems for the application it will go to FALLBACK instead.
HALFDOWN	SA OS/390 was in the process of shutting the application down, but the stop request was canceled while it was in progress. The application shutdown did not complete (for example, ASCBs may still be active). You may sometimes find that some, but not all, of the shutdown commands have been issued. To recover an application from HALFDOWN status you must determine where it is in its shutdown process and complete the shutdown manually. Applications go into HALFDOWN only when you cancel a stop request. Alternatively, you can use SETSTATE to put the application back into UP or RUNNING status.
HALTED	The application is still running, but something has happened which may have severely impacted its capabilities. **(i)** SA OS/390 has received a HALT message for the application. **(ii)** SA OS/390 has detected that the application represents a JES2 application which is running short of spool space. **(iii)** The Automatic Restart Manager status for the application is ELSEWHERE, but SA OS/390 found its application monitor status to be either STARTING or ACTIVE. An application is taken out of HALTED status if its UP message is received. Also, operators may use the SETSTATE command to put the application into UP/RUNNING status.

Value	Meaning
INACTIVE	At some point in monitoring, the application monitor status was INACTIVE when the automation status indicated that it should be either ACTIVE or STARTING. An application can be put into INACTIVE status in response to the following conditions: **(i)** The application monitor routine found the application's status to be INACTIVE. **(ii)** The startup checker found that the application monitor status was INACTIVE. If the application RESTART option is ALWAYS, the application is restarted rather than put into INACTIVE status.
MOVED	The application is not running: this is one of its primary systems: it should be active on another system. An application can be put into MOVED status in response to the following condition: **(i)** An operator has used the SETSTATE command to put the application into the MOVED status. This is possible only on a primary system.
RESTART	The application is ready to be started. It has been previously active in the system. An application can be put into RESTART status in response to the following conditions: **(i)** The application abended and, after checking thresholds, SA OS/390 is allowed to restart it. **(ii)** SA OS/390 has shut the application down in response to an operator request and is now preparing to restart it. **(iii)** An operator has used the INGREQ REQ=START command to ask SA OS/390 to restart the application. **(iv)** SA OS/390 checked an attempt by Automatic Restart Manager to restart the application and found that its Automatic Restart Manager status is UNREGISTERED and the application monitor status for the application is INACTIVE. This implies that the attempt by Automatic Restart Manager to restart the application timed out while the application was in RESTARTING status. SA OS/390 changes the automation status of the application to RESTART and attempts to start the application itself. During restart processing, the application RESTART automation flag is checked. If it is turned on, the application start commands are issued and the application is put into STARTED status. If the RESTART automation flag is off, the application remains in RESTART status and the startup monitor cycle initiates the start up process each time it runs.
RUNNING	This status is equivalent to UP, but is used for **transient** applications. It indicates that the UP message has been received for the transient application, or an operator has used the SETSTATE command to change the status of a transient application to RUNNING. A transient application is one which SA OS/390 expects to terminate on its own. When the job finishes the application goes through ENDING status to ENDED, at which point its descendants are started. Unlike the UP status, the descendants of a transient application are not started until it has terminated. A transient application should leave RUNNING status on its own. If it gets stuck, you should use investigate it. You can use the INGREQ REQ=STOP command to put it into AUTODOWN status.

Value	Meaning
STARTED	The commands to start the application have been issued, but it has yet to start running. An application can be put into STARTED status in response to the following conditions: **(i)** SA OS/390 has issued, or will soon issue, the commands. **(ii)** When SA OS/390 attempted to start the application it found that the application monitor status for the application was STARTING. **(iii)** During initial status determination, SA OS/390 found that the application monitor status for the application was STARTING. **(iv)** SA OS/390 checked an attempt by Automatic Restart Manager to restart the application and found that its Automatic Restart Manager status is UNREGISTERED, but the application monitor status for the application is STARTING. Note that the relevant automation flag, Initstart or Restart, must be on. The application startup commands as defined in the automation control file are issued after the application is placed in STARTING status. An application remains in STARTING status until either its ACTIVE or its UP message arrives. After the application start delay time, an SA OS/390 monitoring check is issued for it. If it is not found, it is put into INACTIVE status. If it is found, but is not yet UP, it is put into ACTIVE status.
STARTED2	The application has become active, but has not indicated that it is ready to accept work within its **start delay**. An application can be put into STARTED2 status in response to the following conditions: **(i)** The startup checker found that the application monitor status was still STARTING. **(ii)** The startup checker was called for an application whose automation status was ACTIVE. **(iii)** SA OS/390 found the Automatic Restart Manager status for the application to be AVAILABLE-TO. **(iv)** SA OS/390 checked an attempt by Automatic Restart Manager to restart the application and found that its Automatic Restart Manager status is one of AVAILABLE-TO, RESTARTING or RECOVERING. **(v)** SA OS/390 checked an attempt by Automatic Restart Manager to restart the application and could not find a better status to put it into. Its application monitor status is ACTIVE. This covers situations where the restart checker is unable to determine the Automatic Restart Manager status for the application, or its status is FAILED. An application remains in STARTED2 status until either its UP message arrives or an operator uses the SETSTATE command to change the application status to UP/RUNNING.

Value	Meaning
STOPPED	The application has been shut down by an external agent, such as an operator cancel. SA OS/390 is not permitted to restart it and will not allow Automatic Restart Manager to restart it. This status is preserved across a recycle of SA OS/390 or a re-IPL of the processor unless the application has its Start on IPL/RECYCLE Option set to YES. An application remains in STOPPED status until an operator uses the SETSTATE command to change its status to either RESTART or CTLDOWN. An application may also leave STOPPED status if it is restarted outside the control of SA OS/390. In this case, it goes to either the ACTIVE or the UP status, depending on which message is received.
STOPPING	The application is being shut down by an external agent. This status is entered when a TERMINATION message is received while SA OS/390 is not in the process of shutting the application down. It may also indicate that the application is abending, but the abend messages issued are being treated as normal termination messages by automation. An application that is STOPPING remains in that status until either an abend message is received which puts it into ABENDING or BREAKING status, or the final termination message for the application is received, at which point the application RESTART option is checked. If RESTART is ALWAYS, the application is put into RESTART status and SA OS/390 attempts to restart it. Otherwise, the application goes to STOPPED status. If it is slow to clear the system after the final message is received, it may be placed into ZOMBIE status. If an ACTIVE or UP message is received for the application, its automation status is changed to either ACTIVE or UP, as appropriate. Automatic Restart Manager interaction with this status depends on a number of factors. If the application is deregistered then there is no interaction. If the application is registered then Automatic Restart Manager will attempt to restart it. If the application goes to STOPPED status before the SA OS/390/Automatic Restart Manager exit is invoked then SA OS/390 will tell Automatic Restart Manager not to restart the application. If it does not, then SA OS/390 will tell Automatic Restart Manager that it can restart the application.
STUCK	An application can get STUCK when it is being shut down. This is because SA OS/390 has run out of NORM, IMMED, or FORCE shutdown commands.

Value	Meaning
UP	The application has finished initializing and is ready for work. An application can be put into UP status in response to the following conditions:
	(i) SA OS/390 has received an UP message for the application.
	(ii) An operator has used the SETSTATE command to change the application automation status. In this case, SA OS/390 assumes that the operator has ensured that the application is actually UP.
	(iii) During initial status determination the application monitor status was found to be ACTIVE.
	(iv) SA OS/390 found the Automatic Restart Manager status for the application to be AVAILABLE.
	There are a number of ways for an application to leave the UP status:
	• If it is shutdown with the INGREQ REQ=STOP command, it goes to AUTOTERM status
	• If it is shutdown outside SA OS/390, it goes to STOPPING status
	• If it abends, it might go to STOPPING, ABENDING or BREAKING status
	• If it has problems, it may go to HALTED status
	• If the regular monitor cannot find it, it will go to INACTIVE status
	• If the application abends, SA OS/390 does not pick up the abend messages, and Automatic Restart Manager detects that the address space has ended, the application may go to EXTSTART.
ZOMBIE	When an application is leaving the system it can get into ZOMBIE status. This indicates that the final termination message for the application has been received but that SA OS/390 monitoring in TERMMSG still finds the application. The application is put into ZOMBIE status if this situation persists for more than twice the application termination delay time.
	There are three ways in which an application can get into ZOMBIE status:
	• If MVS is slow in clearing the application and the termination delay time is short.
	• If there are two jobs with the same name in the system, one of which is the application. When either of them terminates SA OS/390 assumes that the application has stopped, but SA OS/390 monitoring will find the other job. To change the status to UP, either manually shut the other job down, or use the SETSTATE command to change the application status back to UP.
	• The job may have become stuck in the system after issuing its final message.
	From ZOMBIE status, if the application suffers an unrecoverable abend it will go into BREAKING status. **Note:** The **START ON IPL** and **START ON RECYCLE** options of the customization dialog may override these resource statuses at SA OS/390 IPL or RECYCLE, resulting in SA OS/390 starting the subsystem. If either **START ON IPL** or **START ON RECYCLE** are set to **NO**, the application is placed in CTLDOWN status.

Application Monitor Status

SA OS/390 determines the application monitor status of an application by running a routine that you specified in the customization dialog. You can specify the routine for an individual application, and you can specify a default application monitor routine for applications on an entire system. For further information on

application monitor routines, refer to *System Automation for OS/390 Defining Automation Policy*.

Table 5. Regular Monitoring: Automation Status Determination

Application Monitor Status	Automation Status Change
ACTIVE	The application automation status is changed to ACTIVE.
STARTING	The application automation status is changed to STARTED and a startup checker is scheduled for it.
INACTIVE	If the application is defined with a RESTART option of ALWAYS, the automation status is changed to RESTART and the restart process is invoked. If its RESTART Option is not ALWAYS, its automation status is changed to INACTIVE.

Automatic Restart Manager Statuses

The OS/390 Automatic Restart Manager statuses are determined by SA OS/390 and are used to help determine automation statuses. These statuses are included here as background information so that you can better understand the SA OS/390 automation statuses. They are a superset of the statuses that Automatic Restart Manager uses, the added statuses being ELSEWHERE and UNREGISTERED. Possible values for the Automatic Restart Manager status are:

Value	Meaning
AVAILABLE	The element name is registered with Automatic Restart Manager, the job is running on this system and the Automatic Restart Manager status for it is AVAILABLE.
AVAILABLE-TO	The element name is registered with Automatic Restart Manager and the job is running on this system. The job has been restarted by Automatic Restart Manager, has issued its IXCARM REGISTER call, but did not issue its IXCARM READY call within the **ready timeout** defined to OS/390 for it.
STARTING	The element name is registered to Automatic Restart Manager and the job is running on this system. The job was started by an agent external to MVS, has issued its IXCARM REGISTER call, but has not yet issued its IXCARM READY call. Unlike the RECOVERING status, this status does not time out to the AVAILABLE-TO status.
RECOVERING	The element name is registered to Automatic Restart Manager and the job is running on this system. Automatic Restart Manager has issued the restart command for the application, it has issued its IXCARM REGISTER call, but has not yet issued its IXCARM READY call. It if takes too long to do this, it is placed in the AVAILABLE-TO status.
FAILED	The element name is registered with Automatic Restart Manager, the job has failed, but was last active on this system. It is unknown at this point if Automatic Restart Manager will attempt to restart the job. SA OS/390 will continue to report an elements status as FAILED until MVS either deregisters it, or is committed to restarting it. MVS query commands issued during this time will probably return a RESTARTING status, however MVS Automatic Restart Manager is still consulting its policies and exits to determine whether or not it should restart the element.

Value	Meaning
RESTARTING	The element name is registered with Automatic Restart Manager, the job has failed and Automatic Restart Manager is attempting to restart it. This status is entered very early in the restart process, before Automatic Restart Manager is committed to restarting the element. SA OS/390 continues to report the status as FAILED until Automatic Restart Manager *is* committed to issuing the restart commands. This means that MVS query commands may report a status of RESTARTING while SA OS/390 reports a status of FAILED. The RESTARTING status is exited when the job issues its IXCARM REGISTER call. If it takes too long to do this, its element name is deregistered.
ELSEWHERE	The element name is registered with Automatic Restart Manager, but is currently active on a different system. Unless that system fails, Automatic Restart Manager will not move the application to this system.
UNREGISTERED	The element name is not, currently, registered with Automatic Restart Manager. This may mean that the application has never been active within the sysplex, or it may mean that it failed and Automatic Restart Manager could not recover it. If the SA OS/390 routine to determine an Automatic Restart Manager status finds that Automatic Restart Manager recovery is inactive, the UNREGISTERED Automatic Restart Manager status is returned for all enquiries. This means that SA OS/390 effectively ignores Automatic Restart Manager.

Mapping the Automation Agent Statuses to the Automation Manager Observed Status

Table 6 shows how the current resource statuses retrieved by the related automation agents are mapped to the observed status used by the automation manager:

Table 6. Automation Agent to Automation Manager Status Mapping

Automation Agent	Observed	Automation	Notes
DOWN	SoftDown	Idle	The automation agent is ready to perform an initial start of the resource.
RESTART	SoftDown	Idle	The automation agent is ready to perform a start up of the resource.
STARTED	Starting	Busy	The automation agent has issued the start commands for the resource.
EXTSTART	Starting	Busy	This means that the automation agent has detected that an external agency (probably ARM) is in the process of starting the resource.
ACTIVE	Starting	Busy	The automation agent has received some indication that the start is successful, although it is not yet complete.
STARTED2	Problem	Problem	Although the resource is still active, it does not appear to have started properly within the time period that the automation agent expected it to start within.
UP	Available	Idle	The resource has entered a stable state and is available for usage.

Automation Agent	Observed	Automation	Notes
HALTED	Degraded	Busy	The resource has encountered a problem, but is still active. The automation agent may be attempting to return it to an UP state.
RUNNING	Starting	Busy	The resource is a transient subsystem that is currently executing.
ENDING	Starting	Busy	The resource is a transient subsystems that is terminating.
AUTOTERM	Stopping	Busy	The automation agent is in the process of stopping the resource.
STOPPING	Stopping	Busy	The automation agent has detected that the application is terminating normally outside of its control.
ABENDING	Stopping	Busy	The automation agent has determined that the application is terminating abnormally but can be recovered.
BREAKING	Stopping	Busy	The automation agent has determined that the resource is terminating abnormally in a non-recoverable fashion.
ENDED	Available	Idle	The resource is a transient subsystem that has completed successfully.
AUTODOWN	SoftDown	Idle	The resource is down and may be restarted as needed by automation.
CTLDOWN	HardDown	Idle	The resource is down and may not be restarted by automation.
STOPPED	HardDown	Idle	The automation agent has determined that the resource has been stopped normally outside the control of automation and its policy indicates that an automated restart is not allowed.
BROKEN	HardDown	Idle	The automation agent has determined that the application has failed in a non-recoverable fashion.
INACTIVE	SoftDown	Idle	The automation agent has found the resource to be 'missing'. It may be restarted by automation.
HALFDOWN	Degraded	Problem	A shutdown for the resource by the automation agent was cancelled at the users request. Although the resource is still active, it's status is indeterminate.
STUCK	Stopping	Problem	While trying to stop or start the resource, the automation agent ran out of instructions.
ASSIST	-	-	Not posted.
ZOMBIE	Problem	Problem	The automation agent believes that the resource should be inactive, but it is not.
MOVED	Standby	Idle	The automation agent has determined that the resource is active elsewhere within the sysplex. The manager may reactivate it on this system.

Table 6. Automation Agent to Automation Manager Status Mapping (continued)

Automation Agent	Observed	Automation	Notes
FALLBACK	Standby	Idle	The resource is a backup for a resource which normally runs on a different system within the sysplex. The manager may start it if it needs to.

SA OS/390 Processes Involved in Status Determination

This section describes a number of SA OS/390 processes that are involved in determining the various statuses of resources. A resource's status is determined by the automation agent and reported to the automation manager.

Initial Status Determination
This process occurs at the end of SA OS/390 initialization and after a configuration refresh. It attempts to determine a suitable automation status for each application that is defined to SA OS/390.

Subsystem Startup
This process is invoked whenever SA OS/390 is about to start an application. It checks that conditions are right for the application to be started and that SA OS/390 is allowed to start the application. If appropriate, the subsystem startup process then issues the commands to start the application and changes the application automation status to STARTED.

Startup Checker
This process is run for each application after SA OS/390 has issued the startup commands, after the amount of time specified by the Start Timeout defined for the application. It changes the automation status from STARTED to STARTED2 if the application fails to start within its expected start delay.

Regular Monitoring
This process runs at an interval defined by the automation programmer in the customization dialog. Normally the time interval is between 30 minutes and 12 hours. The purpose of regular monitoring is to carry out a reality check to ensure that the current SA OS/390 automation status for an application is consistent with the current application status as determined by the application monitor routine.

To help determine consistency, SA OS/390 statuses are divided into four groups:

UP STATUSES
These statuses mean that the application monitor status should be ACTIVE. They include UP, RUNNING, ACTIVE, and HALTED.

DOWN STATUSES
These statuses indicate that the application monitor status should be INACTIVE. They include DOWN, RESTART, INACTIVE, AUTODOWN, CTLDOWN, BROKEN, STOPPED, ENDED, FALLBACK, and MOVED.

STARTING STATUSES
These statuses indicate that the application monitor status may be STARTING or ACTIVE. They include STARTED, STARTED2, and EXTSTART.

TRANSITIONAL STATUSES

These statuses are either a part of the shutdown process, or indicate that the application may or may not be present in the machine. ALL application monitor statuses are possible with any transitional status. They include AUTOTERM, STUCK, ZOMBIE, BREAKING, ABENDING, HALFDOWN, STOPPING, ENDING, and ASSIST.

If regular monitoring finds a status mismatch, it changes the application automation status according to Table 5 on page 44.

It should be noted that several other routines have similar status mismatch detection capabilities built in.

Secondary Monitor

This is invoked, after a small delay, from the application monitor routine. This process performs a recheck for a specific application that the application monitor routine found to be in an unusual (generally a transient) state. It is responsible for making some of the transitions outlined under the Routine Monitor process.

Shutdown

This process is normally invoked by an operator to shut down one or more applications. The shutdown process is responsible for the sequencing of the various shutdown commands. Depending on the parameters it is invoked with, the application that is shut down may be put into an AUTODOWN or CTLDOWN automation status, or it may be restarted.

Resynchronization Process (Environmental Analysis Process)

It may be invoked manually by an operator using the RESYNC command. This process assesses the current status of the various parts of the OS/390 system that SA OS/390 automates. It issues display commands to obtain information on WTORs and sysplex resources. It also invokes the Initial Status Determination process. When it runs, all previous status information is discarded.

Using SA OS/390 for Monitoring

As an operator, you can monitor and display information about the resources using two types of interfaces:

- The NMC workstation provides monitoring capability for system operations and processor operations.
- The SA OS/390 3270-type interface
  - provides monitoring capability for processor operations
  - provides monitoring capability for system operations via Status Display Facility (SDF), displaying status information (INGLIST) and detailed resource information (INGINFO and DISPINFO for the automation agent view)

You can also monitor messages and alerts. More information about this topic is given in "How to Monitor Alerts on a NetView Console" on page 129.

If SA OS/390 has been configured properly, status mismatches between the actual and the monitored status should not occur. In the customization dialog, the automation programmer can specify a monitoring interval for every resource individually. If such an individual interval is not defined for a resource, then every half hour (which is the default, but the interval is user specifiable) SA OS/390 will

run a monitor routine to check the resources' status as known to SA OS/390 versus its actual status. If the result indicates an error, its automation status will be updated.

In the customization dialog, the automation programmer can define either an individual monitor routine per application or a default monitor routine for a system that will monitor all applications running on that system. You can manually invoke an application's related monitor routine through the MONITOR command. You can use a wildcard for the applications (subsystems) that you want to be monitored, for example, use *abc* for all subsystems containing the string 'abc' in their names.

Resynchronization

If you believe that a lot of the status information provided by SA OS/390 is badly out of sync with reality, you can request that SA OS/390 reruns its complete subsystem resynchronization process.

This is achieved with the RESYNC command, but it should be used with care. The resynchronization can take a few minutes and during this time a lot of SA OS/390's commands are not available.

Chapter 3. Starting and Stopping SA OS/390

This chapter contains the following sections:

- "Starting, Stopping and Maintaining the Automation Manager"
- "Starting and Stopping I/O Operations" on page 54
- "Starting NetView (System Operations)" on page 54
- "Starting and Stopping Processor Operations" on page 55

Starting, Stopping and Maintaining the Automation Manager

Normally, user interaction with the automation manager is limited to using ING... commands, for example, to send it requests to start or stop resources. In special cases, however, there may be a need to interact with the automation manager during the initial start process and when it is necessary to stop an automation manager instance.

Starting the Automation Manager - START (S)

The automation manager runs in an OS/390 address space of its own. Normally, you would add this start command into the COMMNDxx PARMLIB member so that the automation manager is automatically started at IPL time as described in *System Automation for OS/390 Planning and Installation*. Alternatively, it may be started by an MVS start command, which calls a module that initializes the automation manager.

In certain cases, you can also use the START (S) Command.

As the automation manager runs as a started task, the start command format may be modified by the installation, however a sample procedure is provided and can be used in most installations without modification. In addition to the various data sets identified by this procedure, there are several parameter values that may be specified. None of these parameters are required due to default values and/or additional sources of the information that are provided. You can find a sample startup procedure called HSAMPROC in the SINGSAMP sample library, see also *System Automation for OS/390 Planning and Installation*.

In most cases, the parameters specified via the start command, if provided, override information obtained from the automation manager's PARMLIB member or other default value. The only exception to this is that START=HOT will be ignored when another automation manager instance has claimed primary mode.

> **Note:**
>
> Do not start two instances of the automation manager with the same job name on the same system. They would come up as the primary and secondary automation manager. However, if you issue a stop command with the same job name, it would be accepted by both instances.
>
> Also you cannot start more than nine instances of an automation manager per OS/390 system within the sysplex or per single system.
>
> To allow your installation to specify a preference as to which automation manager instance should assume PAM responsibility at sysplex IPL, each automation manager enters a DELAY state. The duration of this state is set with the DELAY parameter of the automation manager initialization member of the PARMLIB (see also the description of the HASPRM00 sample member in *System Automation for OS/390 Planning and Installation*). This allows other instances with a lower delay value to assume PAM mode if started within the difference (in seconds) between the respective delay values. This makes sense when you would prefer that the primary automation manager runs on a special powerful processor.

Stopping the Automation Manager STOP (P)

To allow an automation manager to be stopped or otherwise influenced by an operator, the automation manager "listens" for MVS MODIFY and STOP commands (see also "Making an Automation Manager the Primary One".) When an MVS STOP (P *jobname*) command is received, the automation manager will be terminated. If the automation manager was the primary one, all work in process will be completed prior to actual termination.

If you try to stop the last primary automation manager, you will receive the reply HSAM1390E to which you must confirm the automation manager stop request.

Making an Automation Manager the Primary One

You can use GO subcommand of the MVS MODIFY (F) command to cancel the initial DELAY invoked when an automation manager instance is started thereby making it eligible to become the primary instance without having to wait for the delay time to complete. This is useful when it is known that a preferred primary system will not become available during a sysplex wide IPL:

F *jobname*,GO

Stopping the Automation Manager with Different Options

The STOP subcommand of the MVS MODIFY (F) command may be used to stop an automation manager instance in different ways:

F *jobname* ,STOP,[NORMAL | IMMED | FORCE | DEFER],[NORESTART | RESTART]

The available options are:

NORMAL
> The instance will be stopped after all in progress work has been completed

and committed. No new work will be accepted from the automation agents, however any internally queued work will be processed. This is the default option.

IMMED

The instance will be stopped after the current work items have been completed and committed. Internally queued work may be lost.

FORCE

The instance will be stopped without waiting for in progress work to complete.

DEFER

The instance will be conditionally and normally stopped after the STOPDELAY interval has expired. Termination will occur only if another (secondary) instance is available, or if no automation agent is active.

On a secondary automation manager instance, the above variations are effectively treated as NORMAL as there is no work to be completed by SA OS/390. The second option specifies whether ARM restart processing should be attempted following the completion of the stop request.

NORESTART

The instance will be stopped as requested and no restart attempt will be made by ARM. This is the default option.

RESTART

The instance will be stopped in such a way as to cause ARM to attempt an automatic restart. Note that this will only occur if the instance is properly defined to ARM.

Getting Automation Manager Diagnostic Information

There are two methods of getting diagnostic information from the automation manager activities in case problems occur:

- You can get a snapshot of the state image queue written into a specified data set using the command:

  F *jobname*, DIAGINFO,SNAP,*data_set_name*

- You can get a log of the automation manager's activities (maybe the ones to reproduce the problem) for problem reporting. You issue a command to start the log which is written to a specified data set. With a second command, you terminate the log:

  - to start recording:

    F *jobname* , DIAGINFO,RECORD,*data_set_name*

  - to stop recording:

    F *jobname* , DIAGINFO,ENDREC

Note: The DIAGINFO command accepts every data set name without checking if the data set exists or without checking if it is accessed by some other user. In case of conflicts, the automation manager then does not write any diagnostic information, but will not issue a message to the user.

Starting NetView (System Operations)

NetView must be started on the host before you can use the system operations and processor operations of SA OS/390. NetView can be automatically initialized when you start OS/390. For general information on initializing NetView, see *Tivoli NetView for OS/390 Installation: Configuring Additional Components*. You may have a dual NetView environment: a Networking NetView (which runs NetView Graphic Monitor Facility and other networking facilities) and an Automation NetView (which runs SA OS/390). This topic assumes that both instances of NetView are initialized at the focal point system and that you are logged on to a NetView user ID at the SA OS/390 workstation.

The system programmer may have set up your system so that SA OS/390 is started automatically when the Automation NetView initializes. (Directions for performing this setup are given in *System Automation for OS/390 Planning and Installation*). As SA OS/390 initializes, a multiline write-to-operator (MLWTO) message, AOF767I, is issued describing the options available and system default actions. See Appendix A, "Automation Initialization Options", on page 237 for the options that can be defined and for details about the MLWTO. To continue automation, enter

R *number*

(where *number* is the message reply number of the accompanying *AOF603D* message). This is the default. If you do not issue a reply within two minutes, automation continues and SA OS/390 loads automation policy from an automation control file.

Note: Using the AOFINITREPLY variable you can suppress the issuing of the *AOF603D* message and have SA OS/390 initialize with the default settings (see also *System Automation for OS/390 Customizing and Programming*).

Starting and Stopping I/O Operations

It is likely that the system programmer will have customized SA OS/390 to initialize all of its components (system operations, processor operations and I/O operations) and related applications automatically. If this is not the case, you need to start the SA OS/390 I/O operations manually.

1. I/O operations is started as an application running on the Automation NetView at the focal point system and at the target systems. To start I/O operations, issue the following command from the OS/390 operator console, specifying the I/O operations procedure name that has been created as a member in your SYS1.PROCLIB or USER.PROCLIB (the location of the I/O operations procedure depends on your installation). In the following example, INGEIO is the procedure name. Optionally, you can append an MVS identifier, which is IO in the example.

   /S INGEIO.IO,SUB=MSTR

   You can omit SUB=MSTR, but this is not recommended. If SUB=MSTR is omitted and the JES subsystem is not running, I/O operations will neither start nor run.

2. You stop I/O operations by issuing one of the commands **/P INGEIO** or **/P IO**.

Starting and Stopping Processor Operations

1. Processor operations is started as an application running on the automation NetView at the focal point system. To start processor operations, issue the following command from a NetView operator console:

   ISQSTART *data_set_name*

   where *data_set_name* is the name of the data set containing the processor operations control file built by the customization dialog. For details on the ISQSTART command, refer to *System Automation for OS/390 Operator's Commands*.

2. You stop processor operations by issuing **ISQSTOP** from the NetView operator console.

Chapter 4. Refreshing Automation Policy

The primary method to refresh the automation policy is to issue the command:

```
INGAMS REFRESH
```

This command operates sysplex-wide. All systems in the sysplex are refreshed automatically. It supports incremental updates on a system basis, that is, only the data that is affected by changes in the policy database is refreshed.

Besides the method of using the INGAMS command with the REFRESH option, there are other ways to perform the task of refreshing the automation policy. These are described in this chapter.

To help you dynamically change policy after you have initialized SA OS/390 on your system, SA OS/390 lets you

- load a different automation control file
- reload an automation control file that you have changed
- restore an automation control file that has been previously saved into a warm start cache.

The automation control file load is normally performed at system operations initialization (NetView start). It is automatically triggered, if the automation manager configuration file (AMC file) is changed. It can also be triggered from an operator by entering an ACF LOAD/REFRESH command. You do normally not have to know the correct automation control file name. It is automatically determined by SA OS/390.

At an ACF load the automation manager is contacted and queried for the 'Configuration Token' to make sure that the ACF that will be loaded is compatible with the AMC file.

If you issue an **ACF** command and there is no automation control file that is compatible with the AMC file, the load is not performed and an error message is issued.

The ACF REFRESH is able to do incremental updates of an ACF that is either in storage or in the save/restore cache. An ACF load will normally not be necessary, in most cases an ACF REFRESH is sufficient. The initialization processes the different data on several autotasks in parallel. Therefore there is no need to disable automation during a refresh.

Note: For a description of the complete ACF syntax, refer to *System Automation for OS/390 Operator's Commands*.

To reload or replace the current NetView message automation table after making changes to it, type the following on any NetView command line:

```
autotbl member=tablename
```

where *tablename* is the name of the current NetView message automation table.

Note: If the NetView message automation table you nominate does not contain the entries that SA OS/390 needs, you will get unpredictable results.

See *Tivoli NetView for OS/390 Automated Operations Network User's Guide* for more information on the AUTOTBL command.

Refreshing an Automation Manager Configuration

The REFRESH subcommand of the MVS MODIFY (F) command may be used to initiate a configuration refresh operation, and is effective only when directed to the primary automation manager.

```
F jobname
,REFRESH,new_data_set_name
```

The *new_data_set_name* may be specified in several forms as follows:
- dsname - This form specifies the fully qualified data set name to be used.
- gdgname(generation) - This form specifies a generation data group name and the generation group member to be used. The generation number is relative to the most recently created member, and may be 0 (for the most recent) or a negative number (-1,-2,...-n) where n is the number of generations specified when defining the GDG minus 1.
- * (Asterisk) - This specifies that the refresh operation should use the same data set (and GDG member) as was used on the last successful refresh operation or during automation manager initialization.
- *(generation) - This specification form specifies that a member of the same GDG used for the previous refresh operation is to be used. The generation number is relative to the most recently created GDG member at the time of command entry.

Use this command when no automation agent is running.

Example:
```
REFRESH,*(0) - use most recent generation of the specified GDG
```

Identifying the Current Automation Control File and NetView Message Automation Table

The automation control file and the NetView message automation table are the two files that control system-level automation. The automation control file contains SA OS/390 automation policy, which specifies what, when, and how to automate. The NetView message automation table specifies which automation procedure to run when various messages are received.

Some sites use different automation control files and NetView message automation tables for different occasions. For example, a site may use one NetView message automation table during normal operations and another during holiday weeks. If your site has more than one automation table, you may need to determine which one is active.

An automation control file and NetView message automation table are made available during SA OS/390 initialization. The NetView message automation table is loaded into NetView, and the automation control file can be either loaded into SA OS/390 or restored from a warm start cache.

To identify the currently active automation control file (ACF) and NetView message automation table you can use the command dialog DISPSYS. See Figure 7 for an example.

```
AOFKADAE                 SA OS/390 - Command Dialogs    Line  1    of 39
Domain ID   = IPSFM      ---------- DISPSYS ----------   Date = 04/12/02
Operator ID = OPER            System  = KEY1             Time = 14:25:16

 System         : KEY1          in Sysplex  : KEY1PLEX
 Domain         : IPSFM
 Sysplex Group  : SYSPLEX_GROUP_01
 XCF Group  name : INGXSGOY

 Software
    Operating System  : z/OS 01.02.00
    NetView           : Tivoli NetView for OS/390 V1R4
      Tower(s)        : SA MVSCMDMGT
    System Automation : V2R2M0

 Configuration
    Data set      : KAT.V22.KEYPLEX.ACF(ACFZ995)
    Built by      : KAT 04/11/02 10:20:36
    Activated     : 04/11/02 10:21:19
    CFG Token     : 200204051055068A0345169672

 Message automation table(s)
    DSITBL01 TSTMSG01

 Flags
    Automation   : No
    Init Start   : No
    Start        : No
    Recovery     : No
    Shut Down    : No
    Restart      : No

 Scheduling Subsystem   : JES2
    Type                : JES2
 Root for SDF updates   : KEY1


Command ===>
 PF1=Help     PF2=End     PF3=Return                      PF6=Roll
 PF7=Back     PF8=Forward PF9=Refresh                     PF12=Retrieve
```

Figure 7. Command Dialog DISPSYS

Identifying the Current AMC File Used by the Automation Manager

To identify the current automation manager configuration file, you can use the diagnostic facilities of the INGAMS command (see also "How to Use the Diagnostic Option of INGAMS" on page 259). From the INGAMS command dialog, you can select option *B Show Details* for an automation manager. A panel similar to the following is displayed, where relevant information concerning the AMC file is shown.

```
INGKYAM3                 SA OS/390 - Command Dialogs     Line  1    of 24
Domain ID   = IPSFM    ---------- INGAMS   ----------    Date = 04/12/02
Operator ID = OPER           Sysplex = KEY1PLEX          Time = 15:11:16

 Automation Manager  : KEY2$$$1       running on system : KEY2
 Operation mode      : PAM            Job name          : AMOY
 Status              : READY
 XCF-Groupname       : INGXSGOY

 Logic Deck ...
   Release           : V2R1M0
   Date built        : 25 Feb 2002
   Time built        : 16:28:49
   Last APAR         : OW51676

 Config dataset name : KAT.V22.KEYPLEX.ACF
 Config member       : HSAZ999
                               Z999CLGC   STRUCTURE   20020405105506
                               Z999CRES   STRUCTURE   20020405105506
                               Z999CSCH   SCHEDULE    20020405105506
 Config token        : 200204051055068A0345169672
 Config version      : 01

 Diagnostic Info
  Snapshot size          : 3492180
  Number of resources    : 277
  Number of requests     : 65
  Number group requests  : 62
Command ===>
   PF1=Help     PF2=End       PF3=Return                    PF6=Roll
                PF8=Forward    PF9=Refresh                   PF12=Retrieve
```

Figure 8. Command Dialog INGAMS

Part 2. Using SA OS/390 on the Host

Chapter 5. Getting Started

Different sets of commands are available from host sessions:

- automation manager commands
- system operations commands (automation agent commands)
- processor operations commands
- I/O operations commands

With system operations commands, you can control and maintain all of the resources sysplexwide from a single point of control. They operate in two modes:

- fullscreen mode: If it is a command to display information and you just enter the command name, a panel is displayed showing all available resources. On this panel, you can specify further actions/commands for a special resource.

  It you enter a command to maintain a resource without further parameters, a fullscreen panel prompts you for more information.

- line mode: From a command line, you can enter the complete syntax of a command to receive either the desired output directly or to manipulate the resource you wanted in the way you wanted.

All system operations commands (automation agent commands) also operate in fullscreen mode and line mode unless it is stated in the reference documentation that the OUTMODE parameter is not supported.

The tasks that you can manage with the available commands are described in more detail in the subsequent chapters and sections. If you need the complete syntax of these commands, refer to *System Automation for OS/390 Operator's Commands*.

Issuing Commands

With SA OS/390, there are several ways you can issue a command:

- You can use command dialogs to enter command parameters and issue commands using 3270 panels. See "Using Command Dialogs" on page 64.
- You can use an object's pop-up menu on the NMC workstation.

  SA OS/390 adds a selection of predefined processor operations commands and system operations commands to the NetView Management Console thus enabling you to use the NetView Management Console as a front end for managing your OS/390 host environment.

  The sets of available commands are provided in corresponding response files. If you want to add or remove commands from the delivered sets, you can use the *Command Profile Editor* (CPE). For information on how to use this editor, refer to *NetView Management Console User's Guide*.

  For information on how to use this graphical command interface, refer to Chapter 10, "Using the NetView Management Console for SA OS/390", on page 195.

- You can enter I/O operations commands at the OS/390 operator console. See "Using the OS/390 Operator Console for I/O Operations Commands" on page 190.

- You can issue processor operations commands, system operations commands and automation manager commands from the same interface via NetView terminals as described in "Using Command Dialogs".
- I/O operations commands can be issued from ISPF dialog panels as described in "Using the I/O Operations ISPF Dialog" on page 190.

For each method, instructions on the window or panel tell you what to do. The commands are described in greater detail in *System Automation for OS/390 Operator's Commands*.

Using Command Dialogs

To start SA OS/390, type AOC from the NetView command line in your NetView session to reach the *System Operations MAIN MENU* shown in Figure 9.

```
AOFPOPER              SA OS/390 - System Operations
Domain ID   = IPUFM     --------- MAIN MENU ---------      Date = 03/09/02
Operator ID = HUT                                          Time = 12:31:59

     Select                 Description                Component

       1                Operator Interface               OPER
       2                Command Dialogs                  CD
       3                Status Display Facility          SDF
       I                IMS Automation Feature           IMS
       C                CICS Automation Feature          CICS
       O                OPC Automation Feature           OPC
       L                User defined Local Functions


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Command ===>
  PF1=Help    PF2=End       PF3=Return              PF6=Roll
                                                    PF12=Retrieve
```

Figure 9. System Operations Main Menu

Type 2 or CD on the command line to invoke the *Command Dialogs Main Menu* (Figure 10 on page 65). Starting with this menu, you can interact with 3270-type panels to issue SA OS/390 system operations commands.

You can enter a command with two methods:
- Type the number or letter corresponding to the desired command on the command line,
- or type the name of the command. If you choose to type a command, you can add options to it.

For example, if you type number **2** into the command line of the *Command Dialogs Main Menu*, you reach the AOCTRACE command dialog which prompts you for further options.

```
AOFPOCIM              SA OS/390 - Command Dialogs     Line  1  of 23
Domain ID   = IPSFM    ---------- Main Menu ---------   Date = 04/12/02
Operator ID = OPER                                      Time = 15:42:19

     1     AOCHELP      Displays or executes System Operations commands
     2     AOCTRACE     Turn Debugging feature on or off
     3     DISPAUTO     Display automation statistics
     4     DISPSTAT     Display current automation status of subsystem(s)
     5     DRAINJES     Initiate DRAIN process for JES2 controlled devices
     6     INGAMS       Operate the automation manager (stop/modify op mode)
     7     INGAUTO      Turn automation on/off for resource(s)
     8     INGGROUP     Manipulate Groups
     9     INGHIST      Show history information about workitems
    10     INGLIST      Display list of resources
    11     INGLKUP      Display unknown jobs and STCs
    12     INGNTFY      Change status of operator notifications
    13     INGRPT       Display Statistics
    14     INGRELS      Show relationships and evaluation for a resource
    15     INGREQ       Initiate shutdown or startup process for a resource
    16     INGSCHED     Display all defined schedules  (service periods)
    17     INGTHRES     Displays/sets thresholds for resource(s)
    18     INGTRIG      Display all triggers within automation manager scope
    19     INGVOTE      Display all requests and pending votes
    20     SETASST      Turn assist on/off for resource(s)
    21     SETSTATE     Change state of subsystem(s)
    22     SETTIMER     Displays current timer(s)
     X     EXIT         Leave SA OS/390 Command Dialogs


Command ===>
  PF1=Help     PF2=End      PF3=Return                   PF6=Roll
               PF8=Forward                               PF12=Retrieve
```

Figure 10. SA OS/390 Command Dialogs Main Menu

Some of the commands operate sysplex-wide; especially those sent to the automation manager. For other commands you can specify a target system on which they should operate, for example, if you want to display the automation flags on a certain target system.

The commands present a snapshot of the data, taken at the time the command is executed. Some data may be refreshed when other commands are issued from the same panel. To force a refresh of all data you must press PF9.

How to Get Help

In case you need help, you have the following possibilities:

- Get dialog help: On a NetView console, type AOCHELP or ISQHELP to see the main help panel.
- On an SA OS/390 panel, press PF1 for a description of the panel and its fields.
- Get help for a message: On a NetView console, type HELP or HM and the message identifier on a NetView console. For example, type :
  HELP AOF001
- Get information about automation agent and automation manager status: Type EXPLAIN *status_name*, for example EXPLAIN UP. Or type EXPLAIN *resource_name* to get information about the automation agent status of the specified resource. Type help *amstatus* to see information about the automation manager status.
- Get command help: On the NetView console, type
  HELP commandname

Chapter 6. How to Get Resource Information Sysplexwide

This chapter describes commands that you can use to retrieve information from all resources defined within a sysplex from a single point of control. The commands are presented here in an overview. Each command is documented with sample screens and the complete syntax in *System Automation for OS/390 Operator's Commands*.

SA OS/390 provides commands that let you look at resources from two different point of views:

- from the point of view as seen by the automation manager; this lets you see which state a resource is in or which votes are currently active against this resource. These commands are described in "Commands that are Processed by the Automation Manager"
- from the point of view as seen by the automation agents; this lets you see thresholds or startup and shutdown commands defined for the resources. These commands are described in "Commands that are Processed by the Automation Agents" on page 72.

Commands that are Processed by the Automation Manager

The automation manager decides how automation is performed for the known resources in the sysplex. To decide how to handle the requests that it receives through the various channels (for example, the defined automation policy or interactive operator requests), the automation manager uses an internal hierarchy of priorities which are listed in Table 3 on page 15.

SA OS/390 offers a series of commands with which you can find out which information the automation manager currently holds about resources, for example, relationship information or information about the status of resources and whether schedules exist for them. These commands are introduced in the following sections.

How to Use INGLIST to View Resources

This command provides the details about the resources in the sysplex from the point of view of the automation manager. The following information is displayed for a resource:

- name and type of the resource
- compound status
- current status (observed)
- desired status
- automation status
- startability status
- automation flag
- hold flag
- description
- schedule name, if any
- trigger name, if any
- start type

- stop type
- resource category and nature

```
INGKYST0                   SA OS/390 - Command Dialogs      Line  1    of 284
Domain ID  = IPUFM       -------- INGLIST  ---------      Date = 03/10/00
Operator ID = HUT                System  = AOC7            Time = 16:18:15
CMD: A Update    B Start     C Stop    D INGRELS  E INGVOTE  F INGINFO
     G Members   H DISPTRG   I INGSCHED  J INGGROUP          / scroll
CMD Name        Type System   Compound     Desired      Observed    Nature
--- ----------- ---- -------- ------------ ----------- ---------- --------
    AGFG        APL  AOC7      INHIBITED    AVAILABLE    SOFTDOWN
    AGFG2       APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    AOC7        SYG  AOC7      PROBLEM      AVAILABLE    PROBLEM     BASIC
    AOC7        SYS  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    APPC        APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    ASCH        APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    BATB000P100 APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BATB000P200 APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BATB000P300 APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BATB000S100 APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BATB000S200 APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BATB000S300 APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BLSJPRMI    APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    BNK#$X$X    APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    BNK§#$X$X   APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    BNKBAGT     APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    BNKCICSPA   APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    BNKDB       APL  AOC7      SATISFACTORY AVAILABLE    AVAILABLE
    BNKDEMO1    APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BNKDEMO2    APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN
    BNKDEMO3    APL  AOC7      PROBLEM      AVAILABLE    HARDDOWN

Command ===>
 PF1=Help    PF2=End     PF3=Return   PF4=DISPSTAT PF5=Filters   PF6=Roll
             PF8=Forward PF9=Refresh PF10=Previous PF11=Next     PF12=Retrieve
```

You can see more information about the resources by scrolling horizontally using
PF11. Some of this information, especially the automation status, changes in real
time. By pressing PF9 (Refresh), you can obtain a new set of data for the displayed
subsystems.

On this panel, you can use PF5 to invoke a filter dialog (which is equivalent to
using the INGFILT command available from any command line). With this filter,
you can reduce the amount of information shown in the display. It enables you to
setup a specific operator view for an operator. For example, you can set up a filter
that shows only certain resources in specified observed and desired states.

You can also use the INGLIST command dialog to launch other actions that are
related to resources or groups, that means, you can also this command to maintain
and control resources.

The CMD column on the left hand side of the screen allows you to issue any of the
commands listed across the top of the screen against any of the resources that are
displayed. Enter the letter corresponding to the command beside the resource you
want it issued against and press enter. When you return from the command there
may be a slight pause as the display refreshes itself.

The available commands are indicated at the top of the INGLIST panel:

```
A Update    B Start     C Stop    D INGRELS  E INGVOTE  F INGINFO
G Members   H DISPTRG   I INGSCHED  J INGGROUP          / scroll
```

On the INGLIST panel, you can use PF4 to toggle to the DISPSTAT command
dialog, which gives you the automation agent view of the resources in the sysplex

(see "How to Display the Automation Agent View with DISPSTAT" on page 72). To return to the INGLIST panel press the PF3 key on the DISPSTAT panel. Note that pressing PF4 on the DISPSTAT panel displays the INGLIST panel for all resources shown in the DISPSTAT panel but this might not be the same as the original INGLIST display since the DISPSTAT display might have been modified due to filtering or suppressing of resources that the automation agent does not handle.

You can use PF5 to define a filter as described in "How to Specify Filters".

How to Specify Filters

Figure 11 shows the INGFILT command dialog where you can specify or revise filter criteria.

```
INGKYFLT                 SA OS/390 - Command Dialogs
Domain ID   = IPUFM    ---------- INGFILT  ----------    Date = 06/19/00
Operator ID = MIK                                        Time = 15:00:36

Specify or revise the filter criteria:

  Resources...           format:  name/type/system  or *am*/*/*
      AGFG*/*/*_____
      _____

  Observed Status   ==>  AV_____
  Desired  Status   ==>  *_____
  Automation Status ==>  *_____
  Compound Status   ==>  *_____

  Automation flag   ==>  ___            Yes or No

  Resource category ==>  *_____
  Resource subtype  ==>  *_____


Command ===>
 PF1=Help    PF2=End    PF3=Return    PF4=Clear    PF5=Reset     PF6=Roll
                                      PF9=Save                  PF12=Retrieve
```

Figure 11. INGFILT Command Dialog

The panel from Figure 11 shows the current INGLIST filters. The filter settings are saved, so when you next run INGLIST they will be used again. Press PF9 to save your currently displayed filter criteria.

You can specify one or more of the following filters:

Resources
> is the list of resources in name/type/system format. You can also specify a wildcard.

Observed status
> is the list of observed statuses. You can abbreviate the status, for example "av" for Available. Any resource whose observed status is in the list is eligible for display.

Desired status
> is the list of desired statuses. You can abbreviate the status. Any resource whose desired status is in the list is eligible for display.

Automation status
> is the list of automation statuses. You can abbreviate the status. Any resource whose automation status is in the list is eligible for display.

Compound status

    is the list of compound statuses. You can abbreviate the status. Any resource whose compound status is in the list is eligible for display.

Automation flag

    is the automation flag for the resource. Specify YES or NO.

Resource category

    is the list of categories the resource belongs to. This is one of the following: CICS, IMS, DB2, OPC, JES2, JES3, USS, or IMAGE.

Resource subtype

    specifies the region subtype for CICS, DB2 and IMS or the controller type for OPC applications, for example, AOR for *CICS* or IRLM for *DB2*.

In order to be eligible for the display, a resource must match all filter criteria. An asterisk means that the filter is not set.

Use the PF4 key to clear the currently established filter settings. The filter will then contain an asterisk, meaning that the filter is not set, or a blank. Use the PF5 key to go back to the currently established filter settings.

Note: If INGFILT was called from INGLIST, then the filters that are displayed will take effect when you press ENTER. If you press PF9 first, then the filters will be saved.

How to Use INGINFO to View a Selected Resource

The INGINFO command displays details about a specified application or application group as seen by the automation manager. If you enter this command without parameters, a dialog prompts you for more information. For a detailed description of the command syntax refer to *System Automation for OS/390 Operator's Commands*.

Or you can issue this command for a certain resource displayed in the result panel of the INGLIST command. In the upcoming panel, you will see information about the resource's different statuses, its automation flag settings, whether dependencies are satisfied and which votes are currently active against the resource.

```
INGKYIN0             SA OS/390 - Command Dialogs      Line  1    of 220
Domain ID   = IPUFM    ---------- INGINFO ----------   Date = 07/13/00
Operator ID = MIK           Sysplex = AOC7PLEX         Time = 12:53:10

 Resource   ==> APPC/APL/AOC7                    format: name/type/system
 System     ==>             System name, domain ID or sysplex name

 Resource     : APPC/APL/AOC7
 Description   : APPC/MVS automation policy.

 Status...    :
    Observed Status   : AVAILABLE
    Desired  Status   : AVAILABLE
    Automation Status : IDLE
    Startable Status  : YES
    Compound Status   : SATISFACTORY

 Dependencies  :
    PreStart        : Satisfied
    Start           : Satisfied
    PreStop         : Satisfied
    Stop            : Unsatisfied
    Startability    : Satisfied

 Current Order       : -None-

 Flags...     :
    Automation      : YES
    Hold            : NO

 Commands...   :
    Start type      : -None-
    Stop  type      : -None-

 Trigger             : -None-
 Schedule            : -None-

 Backward Relationships :
    AOC7/SYG/AOC7        HasMember
    ASCH/APL/AOC7        HasParent

 Forward Relationships  :
    VTAM/APL/AOC7        HasParent

 Requests      :

 Votes         :

 Origin...     :
    Nature          : Resource
    Owner           : SA OS/390 Resources
    Loaded from     : SATEST.WORK.ACF(Z995CRES)

 History       :
    2000-07-13 04:58:26
        Workitem ID = 07D0070D023A69460001
        HSAL6104I Linked to trigger: HsaNMCObserver
    2000-07-13 04:54:58
        Workitem ID = 07D0070D0236E53D0001
        HSAL6105I Unlinked from trigger: HsaNMCObserver


Command ===>
 PF1=Help     PF2=End     PF3=Return                        PF6=Roll
             PF8=Forward  PF9=Refresh                       PF12=Retrieve
```

On the INGINFO panel, you can use PF4 to toggle to the DISPINFO command
dialog, which gives you the automation agent point of view of the current resource
(see "How to Use DISPINFO to Display Detailed Information" on page 77).

How to Display Relationship Information: INGRELS

The INGRELS command displays a panel which shows the relationships that are
defined for the specified resource and the status of the current conditions (whether
they are satisfied or unsatisfied).

```
 INGKYRL0                    SA OS/390 - Command Dialogs     Line  1    of 13
 Domain ID   = IPUFM      ---------- INGRELS  ----------    Date = 03/15/00
 Operator ID = HUT              System  = AOC7              Time = 10:11:42

  Resource   ==>  APPC/APL/AOC7
  System     ==>                  System name, domain id or sysplex name

 Resource    Type System   Dir Relationship
 ----------- ---- -------- --- ---------------------------------------------
 AOC7        SYG  AOC7      B  HasMember
                               Cond: startDependency
                               Cond: stopDependency
                               Cond: extStart -  UNSATISFIED
                               Cond: extStop -  UNSATISFIED
                               Cond: extStopDelayed
                               Cond: prestartDependency
                               Cond: prestopDependency
 ASCH        APL  AOC7      B  HasParent  - Strong
                               Cond: stopDependency -  UNSATISFIED
 VTAM        APL  AOC7      F  HasParent
                               Cond: startDependency
                               Cond: startable
```

Figure 12. INGRELS Command Dialog

The INGRELS command dialog shows the relationships defined for the current
resource (in our example from Figure 12 for resource *APPC/APL/AOC7*) in both
directions. So in column *Dir* from the INGRELS command dialog shown in
Figure 12, you see:

- a *B* for backward relationships; that means the relationship exists from the
  partner resource to the specified resource;
- an *F* for forward relationships; that means the relationship exists from the
  specified resource to the partner resource;

Relationship conditions are also shown (with signature *Cond:*) and whether they
are unsatisfied.

Commands that are Processed by the Automation Agents

An automation agent is installed on each system upon which resources reside that
need to be automated by SA OS/390. For example, automation agents are
responsible for having the appropriate commands processed for subsystem startup
and shutdown, reporting status updates to the automation manager and message
automation. Automation agents access information for their tasks from the
automation control file.

SA OS/390 offers some commands with which you can acquire information about
resources running on the system where the automation agent resides.

How to Display the Automation Agent View with DISPSTAT

The DISPSTAT command displays full-screen panels showing the following
information for resources defined to the current automation agent:

- subsystem name
- automation status (not dynamically refreshed)

- the system the instance of the subsystem is running on
- job name
- current automation flag settings
- the type (MVS, Transient, One Shot, or Non-MVS) of the subsystem
- which trigger, if any, is associated with the subsystem; this information can only be seen for down level SA OS/390 systems.
- which service period, if any, is associated with the subsystem; this information can only be seen for down level SA OS/390 systems.
- the date and time its automation status last changed
- the date and time its automation status was last confirmed by active monitoring
- a user supplied description of the resource

Status conditions are color-coded to make it easier to identify problems.

If you have run DISPSTAT without filtering and you did not provide any input parameters, a panel similar to the following is displayed:

```
AOFKSTA5                  SA OS/390 - Command Dialogs      Line  1  of 441
Domain ID   = IPUFA     -------- DISPSTAT ----------      Date = 03/30/00
Operator ID = MIK                                         Time = 17:25:32
 A ingauto  B setstate  C ingreq-stop  D thresholds  E explain  F info  G tree
 H trigger  I service  J all children  K children  L all parents  M parents
CMD  RESOURCE       STATUS     SYSTEM    JOB NAME  A I S R D RS TYPE     Activity
---  -----------   --------   --------  --------  ------------ -------- ---------
     HUGSGX         UP         AOCA      HUGSGX    Y Y Y Y Y Y  MVS      --none--
     HUGSHUTINIT    UP         AOCA      HUGSHUTI  Y Y Y Y Y Y  MVS      --none--
     HUGSRVGRPT2    ENDED      AOCA      HUGSGT2   Y Y Y Y Y Y  ONE SHOT --none--
     HUGSRVGTRA1    DOWN       AOCA      HUGSGTR1  Y Y Y Y Y Y  MVS      --none--
     HUGSTART       INACTIVE   AOCA      HUGSTART  Y Y Y Y Y Y  MVS      --none--
     HUGTRIG1       DOWN       AOCA      HUGTRIG1  Y Y Y Y Y Y  MVS      --none--
     HUGWTSO        UP         AOCA      HUGWTSO   Y Y Y Y Y Y  MVS      --none--
     HUGWVTAM       UP         AOCA      HUGWVATM  Y Y Y Y Y Y  MVS      --none--
     IRRDPTAB       ENDED      AOCA      IRRDPTAB  Y Y Y Y Y Y  ONE SHOT --none--
     JESWTR         ENDED      AOCA      JESWTR    Y Y Y Y Y Y  ONE SHOT --none--
     JES2           UP         AOCA      JES2      Y Y Y Y Y Y  MVS      --none--
     JLP111A        UP         AOCA      JLP111A   Y Y Y Y Y Y  MVS      --none--
     JLP111B        UP         AOCA      JLP111B   Y Y Y Y Y Y  MVS      --none--

Command ===>
 PF1=Help    PF2=End      PF3=Return     PF4=INGLIST   PF5=Filters  PF6=Roll
 PF7=Back    PF8=Forward  PF9=Refresh  PF10=Previous PF11=Next     PF12=Retrieve
```

Figure 13. DISPSTAT Command Dialog

Note: If you have defined exit routine AOFEXC04, there is an additional action code U. See *System Automation for OS/390 Customizing and Programming* for details.

The panel from Figure 13 does not show all of the data that is available. To access the next panel, press PF11.

```
AOFKSTA5                SA OS/390 - Command Dialogs       Line  1  of 441
Domain ID   = IPUFA      -------- DISPSTAT ----------     Date = 03/30/00
Operator ID = MIK                                         Time = 17:26:25
 A ingauto  B setstate  C ingreq-stop  D thresholds  E explain  F info  G tree
 H trigger  I service  J all children  K children  L all parents  M parents
CMD  RESOURCE      STATUS    LAST CHANGED      LAST MONITORED
---  -----------   --------   -------- -------- -------- --------
     HUGSGX        UP          03/29/00 20:41:38 03/30/00 17:10:49
     HUGSHUTINIT   UP          03/29/00 20:40:59 03/30/00 17:10:49
     HUGSRVGRPT2   ENDED       03/29/00 20:29:45 03/30/00 17:10:49
     HUGSRVGTRA1   DOWN        03/29/00 20:29:45 03/30/00 17:10:49
     HUGSTART      INACTIVE    03/30/00 14:46:51 03/30/00 17:10:49
     HUGTRIG1      DOWN        03/29/00 20:29:47 03/30/00 17:10:49
     HUGWTSO       UP          03/30/00 14:36:48 03/30/00 17:10:49
     HUGWVTAM      UP          03/30/00 14:36:49 03/30/00 17:10:49
     IRRDPTAB      ENDED       03/29/00 20:29:50 03/30/00 17:10:49
     JESWTR        ENDED       03/29/00 20:29:50 03/30/00 17:10:49
     JES2          UP          03/29/00 20:29:51 03/30/00 17:10:49
     JLP111A       UP          03/29/00 20:52:17 03/30/00 17:10:49
     JLP111B       UP          03/29/00 20:49:41 03/30/00 17:10:49

Command ===>
 PF1=Help    PF2=End      PF3=Return    PF4=INGLIST   PF5=Filters  PF6=Roll
 PF7=Back    PF8=Forward  PF9=Refresh   PF10=Previous PF11=Next    PF12=Retrieve
```

In cases where a wide (132 column) display is used, all of the data can be
displayed on two screens. On a smaller 80 column display there is a third screen,
which displays the Trigger, Service Period and Description data.

Trigger and Service Period information is only shown when SA OS/390 1.3
resources are displayed.

Use PF11 to cycle through this as well to see the following information.

```
AOFKSTA5                SA OS/390 - Command Dialogs       Line  1  of 441
Domain ID   = IPUFA      -------- DISPSTAT ----------     Date = 03/30/00
Operator ID = MIK                                         Time = 17:26:51
 A ingauto  B setstate  C ingreq-stop  D thresholds  E explain  F info  G tree
 H trigger  I service  J all children  K children  L all parents  M parents
CMD  RESOURCE      STATUS    TRIGGER  SCHEDULE DESCRIPTION
---  -----------   --------   -------- -------- --------------------------------
     HUGSGX        UP                           only test for RR
     HUGSHUTINIT   UP                           Application with shutinit command
     HUGSRVGRPT2   ENDED                         Server group with transients
     HUGSRVGTRA1   DOWN                          Server group with transients
     HUGSTART      INACTIVE                      HUG application with prestart...
     HUGTRIG1      DOWN                          HUG application with triggers
     HUGWTSO       UP                            resource for combination move-bas
     HUGWVTAM      UP                            resource for combination move-bas
     IRRDPTAB      ENDED                         RACF dynamic parsing table init a
     JESWTR        ENDED                         Write SYSLOG after IPL
     JES2          UP                            JES2 application for each test sy
     JLP111A       UP                            MAWA/P
     JLP111B       UP                            MAWA/P

Command ===>
 PF1=Help    PF2=End      PF3=Return    PF4=INGLIST   PF5=Filters  PF6=Roll
 PF7=Back    PF8=Forward  PF9=Refresh   PF10=Previous PF11=Next    PF12=Retrieve
```

Some of this information, especially the automation status, changes in real time. By
pressing PF9 (Refresh), you can obtain a new set of data for the displayed
subsystems.

You can use PF4 to toggle to the INGLIST panel to see the same resources as
shown in the DISPSTAT panel but now from the automation manager point of

view. To return to the DISPSTAT panel press the PF3 key on the INGLIST panel. Note, pressing PF4 on the INGLIST panel displays the DISPSTAT panel for all resources shown in the INGLIST panel but this might not be the same as the original DISPSTAT display since the INGLIST display might have been modified due to filtering.

From the DISPSTAT display you can initiate a number of other commands:

INGAUTO
>This lets you change the subsystems automation flags

SETSTATE
>This lets you change the subsystems automation status if it is inactive.

INGREQ - STOP
>This lets you shut down the subsystem.

thresholds - INGTHRES
>This lets you review the subsystems threshold settings.

EXPLAIN
>This presents an explanation of the subsystems current automation status.

DISPINFO
>This presents a detailed display of the subsystem.

DISPTREE
>This presents a view of the target systems parent/child graph, focused on the subsystem.

DISPTRG
>This shows details of whichever trigger, if any, is associated with the subsystem.

INGSCHED
>This shows details of the service period that has been defined for the subsystem.

All of these commands work in the same way as DISPSTAT - fetching it from the target system and presenting it to you on a full screen panel.

On the DISPSTAT panel, you can use PF5 to invoke a filter dialog which is equivalent to using the DISPSFLT command available from any command line (see Figure 14 on page 76). With this filter, you can reduce the amount of information shown in the display. It enables you to setup a specific operator view for an operator. For example, you can set up a filter that shows only resources of a certain name or that are in a specific state. For more information refer to *System Automation for OS/390 Operator's Commands*.

```
AOFKSTA3                  SA OS/390 - Command Dialogs
Domain ID   = IPUFM       -------- DISPSFLT ----------      Date = 05/23/00
Operator ID = HUT                                           Time = 11:21:18

  Resources       ( *, *esour*, resource or jobname )
    AGFG AGFG2 APPC ASCH BATB000P100 BATB000P200 BATB000P300 BATB000S100

  Statuses        ( *, status or choice, leading ^ or \ negates)
    *

   Precoded:  1 All resources that are currently UP or ENDED
              2 All resources that are in a normal status
              3 All resources that are in a down status
              4 All resources that are in a start transition state
              5 All resources that are in a stop transition state

  Target Systems  ( system name , domain ID , sysplex name or * )
    AOC7



Command ===>
 PF1=Help    PF2=End    PF3=Return    PF4=Clear    PF5=Reset      PF6=Roll
                                      PF9=Save                    PF12=Retrieve
```

Figure 14. DISPFILT Command Dialog

The panel displays the filters that will be used for the DISPSTAT display. The
filters are stored in task global variables, and you can update them by pressing
PF9. When the panel is invoked from within DISPSTAT, pressing ENTER will take
you to the DISPSTAT display, using the filters that are currently displayed. The
filters are not saved unless you have previously pressed PF9 in the DISPSFLT
command dialog.

The filters you can set are:

- **Resources:**

  You can specify a list of one or more subsystem names. They can have leading
  or trailing wildcards (for example, *VIEW, NET* and *TVIE* are OK, but NE*EW
  will not work).

  You can also specify a list of jobnames instead of subsystem names.

- **Statuses:**

  You can specify a list of automation statuses to be included or excluded from the
  display. This filter is used whenever the display is refreshed.

  SA OS/390 provides the following sets of pre-grouped statuses, which can be
  abbreviated by their numbers:

  1. All resources that are currently UP or ENDED

  2. All resources that are in a normal status: DOWN, STARTED, UP,
     AUTOTERM, AUTODOWN, ACTIVE, ENDED, ENDING, RESTART,
     EXTSTART, RUNNING

  3. All resources that are in a down status: DOWN, INACTIVE, RESTART,
     AUTODOWN, CTLDOWN, STOPPED, BROKEN, MOVED, FALLBACK

  4. All resources that are in a start transition state: RESTART, STARTED,
     STARTED2, ACTIVE, RUNNING, EXTSTART

  5. All resources that are in a stop transition state: AUTOTERM, ENDING,
     STOPPING, ABENDING, BREAKING

- **Target Systems:**

  This lets you specify the systems within the sysplex that you want data gathered
  from. By default it shows just your local system.

You can specify a list of one or more system and/or domain names and/or sysplex names, and the query is sent to those systems. Alternatively you can specify '*ALL', and the query is sent to all active systems within the sysplex.

In general the more specific your query and the fewer systems you send it to, the faster it will execute.

When you have updated the filters (the defaults will do for just exploring), press ENTER to go into the DISPSTAT display.

How to Use DISPINFO to Display Detailed Information

To see detailed information on a subsystem from the automation agent's point of view, use the DISPINFO command. This will only work on one subsystem at a time. If the subsystem you specify happens to be on more than one system within the sysplex, you will be prompted to select the one you would like to see information about.

The DISPINFO command displays information about the selected resource, in the following example, the APPC resource. As you can see, it displays a lot of the definitions that have been made to SA OS/390 about the subsystem. You can use PF8 to scroll forward to see more information about this resource. You can use PF4 to toggle to the INGINFO command display for this resource which shows the automation manager view of it.

```
 AOFKINFO              SA OS/390 - Command Dialogs      Line  1    of 103
 Domain ID   = IPUFM    -------- DISPINFO ----------    Date = 06/18/02
 Operator ID = OPER                                     Time = 14:48:25

  Subsystem ==>  APPC        System ==>  AOC7     System name, domain ID
                                                  or sysplex name
  Subsystem   : APPC        on System : AOC7

  Description : APPC/MVS automation policy.

               The APPC/MVS address space must be operational
               before the Operations workstation can be
               fully functional. (In particular, I/O monitoring
               functions require the use of APPC/MVS.)

  Class       : None

  Job Name    : APPC

  Job Type    : MVS

  Automation status  : UP
    Last Monitored   : 16:47:35 on 06/13/02
    Last Changed     : 17:36:40 on 06/01/02
    Last Message     :
      AOF571I 14:36:40 : APPC SUBSYSTEM STATUS FOR JOB APPC IS UP - AT
      SYS-OPS RECYCLE


 Command ===>
  PF1=Help    PF2=End      PF3=Return    PF4=INGINFO            PF6=Roll
            PF8=Forward  PF9=Refresh                          PF12=Retrieve
```

Figure 15. DISPINFO Command Dialog

Use PF8 to display the following:

```
AOFKINFO                    SA OS/390 - Command Dialogs        Line  23   of 103
Domain ID   = IPUFM         -------- DISPINFO ----------       Date = 06/18/02
Operator ID = OPER                                             Time = 14:50:38

 Subsystem ==>  APPC         System ==>  AOC7      System name, domain ID
                                                   or sysplex name
 Monitor            : AOFAJMON  (default)
   Monitor Status   : ACTIVE

   Monitor Interval : None specified

 ARM Element Name   : None

 Association        : Primary

 WLM Resource Name  : None

 Managing Feature   : None

 Command Prefix     : None

 Flags - Automation : Yes
         Init Start : Yes
         Start      : Yes
         Recovery   : Yes
         Shut Down  : Yes
         Restart    : Yes


 Command ===>
  PF1=Help     PF2=End      PF3=Return    PF4=INGINFO              PF6=Roll
  PF7=Back     PF8=Forward  PF9=Refresh                           PF12=Retrieve
```

Use PF8 to display the following:

```
AOFKINFO                    SA OS/390 - Command Dialogs        Line  45   of 103
Domain ID   = IPUFM         -------- DISPINFO ----------       Date = 06/18/02
Operator ID = OPER                                             Time = 14:52:14

 Subsystem ==>  APPC          System ==>  AOC7      System name, domain ID
                                                    or sysplex name
 Restart after IPL     : START
 Restart after Recycle : START
 Restart when Stopped  : ABENDONLY

 Thresholds    -       APPC     SUBSYSTEM    DEFAULTS
   Critical    :   Undefined   2 in 01:00   5 in 01:00
   Frequent    :   Undefined   3 in 05:00   3 in 05:00
   Infrequent  :   Undefined   4 in 12:00   1 in 10:00

 Start Up Mechanism    :
   Scheduling Subsystem : Default

   External startup     : NEVER

     Prestart :
       None

     Startup :

       Start command to be used  :
         MVS S APPC,APPC=07
```

Not all panels are shown here. Use PF8 until you reach a display line like the
following, that indicates the end of the display:

Data produced at 14:52:35 on 06/18/02.

```
AOFKINFO              SA OS/390 - Command Dialogs      Line  111 of 143
Domain ID   = IPUFM    -------- DISPINFO ----------    Date = 06/18/02
Operator ID = OPER                                     Time = 14:52:38

 Subsystem ==>  APPC    System ==>  AOC7         System name, domain ID
                                                 or sysplex name
             ACTIVE - ACTIVE MESSAGE RECEIVED
   2002-06-17 15:21:12 :
     AAA006I APPC IS UP
   2002-06-17 15:21:13 :
     AOF571I 15:21:13 : APPC SUBSYSTEM STATUS FOR JOB APPC IS
             UP - UP MESSAGE RECEIVED
     AOF570I 15:21 : ISSUED "INGTIMER APPC EVERY
             00:15:00,XX:33:00,17:00:00 PPT PIPE LIT /INGTIMER
             INGPOSTSTART OF APPC/ | COLOR PINK | LOGTO NETLOG"
             FOR SUBSYSTEM APPC - MSGTYPE IS POSTSTART


 User Information
    first  line
    second line

 Configuration data has been last modified at 15:12:00  on 03/18/02

 Data produced at 14:52:35 on 06/18/02.

Command ===>
 PF1=Help    PF2=End       PF3=Return    PF4=INGINFO              PF6=Roll
 PF7=Back                  PF9=Refresh                            PF12=Retrieve
```

Note: If you have defined the exit routine AOFEXC03, the DISPINFO panel also shows user supplied information about the subsystem. Refer to *System Automation for OS/390 Customizing and Programming* for more information about AOFEXC03.

If you use DISPINFO for a CICS-, or IMS-controlled resource, then PF10 is active with which you can view additional CICS or IMS related information as if you issued the INGCICS REQ=INFO or INGIMS REQ=INFO commands.

The following specific information is added for resources defined with INGVTAM startup and shutdown commands:

```
 VTAM Communication Information :
   Specific APPLID  : IPSAMT          ACB     :
   Generic APPLID   :                 USERVAR :
   Major Nodes      : IPSMBT
```

This displays the specific APPLID and optionally the ACB (if it is different from the APPLID) that the resource is using. It also shows the generic APPLID and USERVAR if any have been defined. Finally a list of major nodes that have been registered as being used by the resource is displayed.

The following specific information is displayed for a CICS resource:

```
CICS Information :
    Version         : 6.1 (Transaction Server V2.1)
    Indoubt UOW     : NO
    Last Start Type : EMERGENCY
    RLS Status      : RLSINACTIVE
    XRF Status      : Active
```

This displays the Version (both CICS and Transaction Server), the Indoubt Unit of Work status, the last start type and optionally the RLS and XRF status of the CICS system.

The following specific information is displayed for an IMS resource:

```
IMS Information :
    Version        : 7.1
    CQS Name       : None
    FDR Name       : None
    MVS sub-system ID : M712

  IMS OLDS Information :
    Minimum Available :  3        Spares        :  3
    Active         :  1        Number        :  7
                                Archive
    DDNAME    Status       Job Num.   Error
    DFSOLP00 AVAILABLE
    DFSOLS00 AVAILABLE
    DFSOLP01 AVAILABLE
    DFSOLS01 AVAILABLE
    DFSOLP02 INUSE
    DFSOLS02 INUSE
    DFSOLP03 AVAILABLE
    DFSOLS03 AVAILABLE
    DFSOLP04 STOPPED                    SPARE
    DFSOLS04 STOPPED                    SPARE
    DFSOLP05 STOPPED                    SPARE
    DFSOLS05 STOPPED                    SPARE
    DFSOLP99 STOPPED                    SPARE
    DFSOLS99 STOPPED                    SPARE
```

This shows the Version of IMS running, the subsystem name of the shared queues control task, the subsystem name of the Fast Database Recovery region, the command prefix for commands, the OLDS information with counts of active and spare OLDS and details of the status of each OLDS dataset.

How to Use DISPTREE to Display Dependency Information

Generally if a resource has not been started, it will be because of a problem with one of its supporting resources. You may also wish to know which other subsystems will be impacted by problems with a particular subsystem. To find out what the problem is, use the DISPTREE command.

The DISPTREE command presents a view of the start dependencies, stop dependencies or the group membership of the specified subsystem (resource). Supporting resources are shown above and to the left of it, its dependent resources are shown below and to the right. The following screen shot shows the DISPTREE display for a start dependency for a JES2 subsystem. As you can see, JES2 in our example has no supporting resources.

```
 AOFKTREE              SA OS/390 - Command Dialogs     Line  1    of 15
 Domain ID   = IPUFM    -------- DISPTREE ----------    Date = 03/13/00
 Operator ID = HUT                                      Time = 17:08:37

  Subsystem ==>  JES2        System ==>  AOC7      Dependency ==>  START

   JES2

   +-- IRRDPTAB
   +-- JESWTR
   +-- LOGRECJ
   +-- RMF
   !    +-- RMFIII
   +-- SMFDUMPJ
   +-- VTAM
        +-- APPC
        !    +-- ASCH
        +-- BNKTSO
        !    +-- BNKVTAM
        !        +-- BNKJES
        +-- TSO
        +-- UNIQUE




 Command ===>
  PF1=Help    PF2=End     PF3=Return    PF4=Focus    PF5=Info      PF6=Roll
                          PF9=Refresh                PF11=Right  PF12=Retrieve
```

The actual screen uses reverse video to improve the highlighting. Application
groups are indicated with |.

PF4 will refocus the display onto the subsystem under the cursor. PF5 will invoke
DISPINFO against the subsystem under the cursor. However, you cannot use
DISPINFO on application groups.

How to Display Statistical Information

The INGRPT command displays a panel providing statistical information about the
automation agent and some basic information about the automation manager of a
system in a sysplex.

The summary report lists information about, for example:
- the number of resources defined to NetView and managed by the automation
  agent
- the total number of messages automated
- the total number of resulting commands
- the total number of START and STOP commands issued
- the number of systems in the sysplex
- the total number of resources managed by the automation manager

```
 INGKYRP0                SA OS/390 - Command Dialogs      Line  1    of 45
 Domain ID   = IPSFM      ---------- INGRPT   ----------    Date = 04/12/02
 Operator ID = OPER            System  = KEY1               Time = 17:45:36

 **************************** Summary Statistics *****************************
 System   : KEY1                                        12 Apr 2002 17:45:34
 ----------------------------------------------------------------------------

 Begin of statistics  : 04/08/02 07:52:00        Domain   : IPSFM
 End   of statistics  : 04/12/02 17:45:34        Sysplex  : KEY1PLEX
 Elapsed time (hours) : 105:53  (6353 min)

 Automation Agent Statistics
  CPU time used (seconds)                         :  4428.44

  Total number of resources defined              :  83
  Total number of resources managed              :  16

  Total number of messages automated             :  13
  Average number of messages per hour            :  0.1

  Total number of resulting commands             :  7
  Average number of commands per hour            :  0.1

  Total number of StartUp commands issued        :  5
  Total number of ShutDown commands issued       :  0

  Total number of workitems sent                 :  725
      QUERY        569
      UPDATER      156
  Average number of workitems per hour           :  13.1
  Total number of TimeOuts                        :  0
  Average wait time (in seconds)                 :  0.2
  Maximum wait time (in seconds)                 :  0.4

  Total number of orders received                :  154
      ACF          1

  Total number of TimeOuts                        :  0
  Average wait time (in seconds)                 :  0.2
  Maximum wait time (in seconds)                 :  0.4

  Total number of orders received                :  154
      ACF          1
      OBSERVER     115
      OTHERS       1
      START        37
  Average number of orders per hour              :  2.8

 Automation Manager Statistics
  Number of systems in sysplex                   :  2
  Total number of resources                      :  233
      Number of APL resources                    :   152
      Number of APG resources                    :   48


 Command ===>
  PF1=Help     PF2=End     PF3=Return                         PF6=Roll
               PF8=Forward PF9=Refresh                        PF12=Retrieve
```

Figure 16. Statistics Summary – INGRPT Command Dialog

If you want to see detailed statistical information for a particular resource, issue
the command INGRPT STATS=DETAIL. A panel similar to the following is
displayed which shows statistical information about all resources that are
automated by the automation agent.

```
INGKYRP1                SA OS/390 - Command Dialogs     Line  1    of 11
Domain ID  = IPSFM    ---------- INGRPT  ----------    Date = 04/12/02
Operator ID = OPER         System = KEY1               Time = 18:40:44

Cmd:  S Show details
                              ---Automated--- ---Commands----
Cmd  Name        Type System    Msgs    Cmds   Start    Stop   Crits
---  ----------- ---- --------   ------- ------- ------- ------- -------
     EYUCMS1A    APL  KEY1           1       1       0       0       0
     IMS711C4    APL  KEY1           2       2       0       0       0
     IMS713C4    APL  KEY1           1       0       0       0       0
     MHB         APL  KEY1           0       0       1       0       0
     OPCF        APL  KEY1           1       2       0       0       0
     PROC_OPS    APL  KEY1           0       0       1       0       0
     SGG1MSTR    APL  KEY1           1       1       0       0       0
     SG11        APL  KEY1           1       1       0       0       0
     TESTAPPL    APL  KEY1           0       0       1       0       0
     TWSCMDSRVR  APL  KEY1           0       0       1       0       0
     TWSREQSRVR  APL  KEY1           0       0       1       0       0


Command ===>
   PF1=Help     PF2=End       PF3=Return                    PF6=Roll
                              PF9=Refresh                   PF12=Retrieve
```

Figure 17. Statistical Information about Resources – INGRPT Command Dialog

For each resource the following information is shown:

- the number of messages automated
- the number of commands resulting from the message traps
- the number of START and STOP commands that were issued
- the number of critical threshold conditions that have occurred

Select a resource to display details by entering S in the Cmd column.

```
INGKYRP0                SA OS/390 - Command Dialogs    Line  1    of 22
Domain ID   = IPSFM     ---------- INGRPT  ----------   Date = 04/12/02
Operator ID = OPER             System = KEY1            Time = 18:45:23

************************* Detail Resource Statistics *************************
System  : KEY1                                       23 Apr 2002 14:43:09
Resource : OPCF
----------------------------------------------------------------------------

Begin of statistics  : 04/23/02 09:35:32         Domain   : IPSFM
End   of statistics  : 04/23/02 14:43:09         Sysplex  : KEY1PLEX
Elapsed time (hours) : 05:08  (308 min)

  Total number of messages automated            :  1
  Average number of messages per hour           :  0.2
  Total number of resulting commands            :  2
  Average number of resulting commands per hour :  0.4

  Total number of StartUp commands issued       :  8
  Total number of ShutDown commands issued      :  2

  Number of critical threshold reached hits     :  1

  Breakdown...                          message / command
     POSTSTART                              3          3
     SHUTNORM                               2          2
     STARTUP                                5          5



Command ===>
 PF1=Help     PF2=End     PF3=Return                      PF6=Roll
              PF8=Forward PF9=Refresh                     PF12=Retrieve
```

Figure 18. Detailed Statistical Resource Information

Chapter 7. How to Monitor and Control Resources

This chapter introduces a series of commands that you can use to control resources. Controlling resources in this context means, making them available or unavailable.

Besides the principal methods for controlling resources as introduced in Chapter 2, "Concepts", on page 13, SA OS/390 offers more sophisticated techniques to the operator.

With the commands introduced in this chapter, you can for example:
- start or stop a resource or application group
- view resource/group details
- turn on/off the automation flag for a resource or application group
- view and/or modify service periods, referred to as schedules
- manage sysplex resources
- display resource statistics
- view the trigger definitions.

The following topics are discussed:
- "How to Start and Stop Resources"
- "How to Display Trigger Information - INGTRIG and DISPTRG" on page 95
- "How to Work with Application Groups" on page 103
- "How to Set a Timer" on page 108
- "How to Interact with the Automation Manager - INGAMS" on page 109
- "How to Change the Automation Agent Status - SETSTATE" on page 110
- "How to Monitor Hardware" on page 118
- "How to Monitor and Control a Sysplex" on page 137

How to Start and Stop Resources

Besides goal driven automation that you exploit by defining automation policy, SA OS/390 offers a series of commands that let the operator react on special circumstances beyond regular automation. The commands for such purposes are introduced in the subsequent sections. Each command is documented with the complete syntax and some further sample output screens in *System Automation for OS/390 Operator's Commands*.

How to Use INGREQ

As described in "Automation Concepts" on page 13, commands issued with INGREQ and a high priority are the most powerful automation commands to make applications available or unavailable. They supersede all other requests that exist against a resource at that time.

You can use this command to:
- initiate the start process of one or more specified application resources or application group resources

- initiate the shutdown process of one or more specified application resources or application group resources.

A request is persistent until:
- you cancel it using the INGVOTE command
- it expires according to the specified EXPIRE parameter
- it is automatically removed when a specified condition comes true
- you want it to be cancelled after a specified timeout period, if the request has not been satisfied after that time
- it is overwritten by a request from the same source

Even though requests are persistent, it is not guaranteed that they will be satisfied by the automation manager.

With a request you specify two categories of parameters:
- How should the request be executed (for example, with low or high priority)?
- What should happen with the request during its lifetime, for example, should it expire after a certain time anyway, or after a timeout if it has not been successful.

If you specify the command name without any parameters, SA OS/390 displays a panel where you can specify, for example, startup or shutdown parameters, a priority, and a timeout for the request.

```
 INGKYRU0                   SA OS/390 - Command Dialogs
 Domain ID   = IPSFM     ---------- INGREQ   ----------     Date = 07/21/02
 Operator ID = OPER                                         Time = 10:18:29

   Resource    =>                                  format: name/type/system
   System      =>               System name, domain ID or sysplex name

   Request     =>               Request type (START, UP or STOP, DOWN)
   Type        => NORM          Type of processing (NORM/IMMED/FORCE/user) or ?
   Scope       =>               Request scope (ONLY/CHILDREN/ALL)
   Priority    => LOW           Priority of request (FORCE/HIGH/LOW)
   Expire      =>          ,          Expiration date(yyyy-mm-dd), time(hh:mm)
   Timeout     => 0   / MSG     Interval in minutes / Option (MSG/CANCEL)
   AutoRemove  =>                      Remove when (SYSGONE, UNKNOWN)
   Restart     => NO            Restart resource after shutdown (YES/NO)
   Override    => NO                        (ALL/NO/TRG/FLG/DPY/STS/UOW/INIT)
   Verify      => YES           Check affected resources (YES/NO/WTOR)
   Precheck    => YES           Precheck for flags and passes (YES/NO)
   Appl Parms  =>


 AOF710A VERIFY/REVISE INPUT AND THEN PRESS ENTER
 Command ===>
   PF1=Help    PF2=End     PF3=Return                      PF6=Roll
                                          PF11=Next    PF12=Retrieve
```

Figure 19. INGREQ Command Dialog

With the *Request* parameter you specify whether you want to launch a request to make the specified resource available (startup) or unavailable (shutdown).

With the *Type* parameter you specify the type of the startup/shutdown. Valid shutdown types are NORM, IMMED and FORCE. Valid startup types are NORM and any other type defined by the user in the policy database for the resource. Specify a questionmark (?) to see the list of user defined startup types.

Note:

The value specified here will be overridden by the INGSET
STARTTYPE/STOPTYPE value if previously specified. However, a stop type
of FORCE, wherever specified will always be honored.

Use the VERIFY option to view the TYPE value that will be used for this
request.

With the *Scope* parameter you can specify whether the startup/shutdown affects
this resource and/or its descendants, as follows:

ONLY Only the resource is started/stopped.

ALL The resource and its dependants are started/stopped.

CHILDREN

Only the dependants are stopped. This option does not apply for a start
request.

> **Note:**
> A request against a resource to make its children unavailable
> (MakeUnavailable, Scope=CHILDREN) will not affect the resource itself, as
> you do not want to make it unavailable, but only want to make the
> dependent resources unavailable. So this request is propagated to the
> dependent resources. On the original target resource, however, such a vote
> will never be considered for the winning vote evaluation. Whatever priority
> such a vote will have, it will never become the winning vote on this resource.

With the parameter *Precheck* you can specify whether or not SA OS/390 should
perform a validation check before the startup/shutdown command is issued. For
example, SA OS/390 would check if automation flags permit a startup/shutdown.
YES is the default.

With the parameter *Appl Parms* you can specify modifications and parameters to
the START or STOP request that are particular to the application being started or
stopped. This applies primarily to CICS, DB2 and IMS subsystems. The contents of
this field is placed into the EHKVAR1 substitution variable. This variable can be
used in the start or stop command.

With parameter **MULT=YES** you can specify whether INGREQ will allow multiple
resources to be targeted in linemode. Without this parameter the specification of
multiple resources (by the use of wildcards) will be considered ambiguous and an
error message will be issued.

Using PF11, you can specify descriptive information on the comment lines, for
example, why the request was made.

After pressing ENTER to submit the request, you will see a verification panel that
lists all resources that are affected either when posting an INGREQ command to
the automation manager or when cancelling a previously made request. When
making a request, a resource is affected if it is within the dependency graph that
the request is propagated along. This will also display resources that are already in
the desired state. In this case nothing will happen to the resource.

When cancelling a request, a resource is affected when it holds a vote for the request to be removed. Only resources that are highlighted will be processed by the command. All other resources are already in the state satisfying the appropriate dependencies.

With the *Verify* option you can decide whether you want to see a verification panel before submitting the request (see Figure 20). Starting with the verification panel, you can manipulate affected requests, using the commands listed in the top of the panel, for example, you can invoke the INGVOTE command dialog for a selected resource. Or, you can go back to the INGREQ command dialog to change the options/parameters.

In the *TRG* column of the INGREQ verification dialog form Figure 20, you can see whether for a resource a trigger condition is satisfied.

In the *SVP* column, you can see whether a service period is linked to the resource and whether the current time is within the service period.

```
AOFKVFY1                   SA OS/390 - Command Dialogs      Line  1    of 3
Domain ID  = IPUFM     ---------- INGREQ   ----------      Date = 03/13/00
Operator ID = HUT                                          Time = 18:05:21


 Verify list of affected resources for request START

CMD: S show overrides   T show trigger details    V show votes
Cmd Name         Type System    TRG SVP  W  Action Type      Observed Stat
--- ----------- ---- -------- --- ---- -  ------ -------- -------------
    APPC         APL  AOC7              Y          NORM     AVAILABLE
    JES2         APL  AOC7                         NORM     AVAILABLE
    VTAM         APL  AOC7                         NORM     AVAILABLE
```

Figure 20. INGREQ Verification

The *W* column indicates whether this vote is the winning vote for this resource.

Note: You can use a DB2 specific feature for shutdown on the INGREQ panel: In the case of using the *Precheck* option on the INGREQ command dialog, this will check the DB2 subsystem for INDOUBT threads. If there are any, then the ING107E message is issued and the shutdown disallowed. However, you can ask for this precheck not to be done by entering Precheck=N. Later when the actual subsystem is asked to be shutdown, the INDOUBT check is again performed although the Precheck was set no N. To get over this, you can enter an override of ALL or UOW and the shutdown will go ahead without this check.

Starting Subsystems
In order to start a subsystem it must be put into either the DOWN or the RESTART automation status seen by the automation agent. The DOWN status occurs just after SA OS/390 initialization and indicates that the subsystem has not been active since SA OS/390 was last started.

To put a subsystem into the RESTART status, you can use the SETSTATE command.

If Subsystems do not Start
If you have asked for a subsystem to start and SA OS/390 refuses to do it, there are some things you can check.

At first examine the AOF313I message. This should clearly state why the start up request was rejected. If there isn't one, then search your netlog for more information.

- *Supporting Resources Not Up*

  If supporting resources are not up, SA OS/390 tries to start them. If you wait a while they should come up and then the target subsystem will be started.

  You can check on the state of the parents through the DISPTREE display, including status, or through messages issued to the NCCF console. If for example, it turns out that a parent is in a status of BROKEN, it is not possible to start the desired subsystem until this problem is fixed.

- *Automation Flags Turned Off*

  Automation flags may be turned off for the subsystem or for just the INITSTART or RESTART actions. If the INITSTART flag is turned off, the subsystem cannot be started from a DOWN status. If the RESTART flag is turned off, the subsystem cannot be started from a RESTART status.

  To see the flag settings for a subsystem you can use either DISPFLGS or DISPINFO. DISPFLGS will show you both the current settings in force for the subsystem and, perhaps more importantly, the settings that were made which resulted in those values.

- *Trigger Not Satisfied*

  Triggers tell SA OS/390 when it is allowed to stop and start subsystems. If a trigger has been linked to a subsystem, SA OS/390 will not stop or start that subsystem unless the trigger says it is OK to do so. Normally this function is fine, but there may be times when you need to override it.

  To find out about the trigger linked to a subsystem, use the DISPTRG command. For example, the command

      DISPTRG TEST0,TARGET=KEY3

  shows the triggers and events associated with the resource *TEST0*.

  If you want to start something and override the event settings you can either issue an INGREQ REQ=START OVERRIDE=TRG command or with the INGREQ command, you can specify that trigger conditions should not be considered by specifying option *Override ==> TRG* in the panel from Figure 19 on page 86. Or if you want to ensure that the trigger is satisfied before you start the resource, you can set it with INGEVENT. INGEVENT can be used to set an event (but may affect more than just the subsystem you are dealing with).

- *the automation manager automation flag is off:*

  Use the INGINFO command or the INGLIST command to find out what the current setting is. If the automation flag is off, the automation manager will not send the order to start the subsystem to the automation agent.

For a detailed scenario on how to use SA OS/390 diagnosis methods, refer to Chapter 8, "Scenario: Finding out Why a Resource is not Available", on page 177.

If Subsystems do not Stop

If you have asked for a subsystem to stop and SA OS/390 refuses to do so, here are some things you can check:

- *supporting resource cannot stop:* the supporting resources cannot be brought in the condition fulfilling the stop dependency, so that the dependent resource that you want to stop, also cannot stop. This is the case if the compound status indicates: AWAITING.

- *request with higher priority to have the subsystem UP:*

Use the INGVOTE command to determine if a higher priority request exists for the subsystem. If so, you can either re-issue the stop request with a higher priority thus overruling the other request or cancel the other request.

- *the shutdown trigger is not satisfied:*

  Use the DISPTRG command to find out the trigger conditions defined for the subsystem. Watch the shutdown conditions that are defined for the subsystem. You can either set one or more events bringing the shutdown condition into a satisfied state or use the INGREQ OVERRIDE=TRG parameter to bypass the trigger check.

- *automation flags turned off:*

  The automation flag may be turned off for the subsystem or just the terminate action. To see the flag settings, use DISPSTAT, DISPFLGS, or DISPINFO.

- *the automation manager automation flag is off:*

  Use the INGINFO command or the INGLIST command to find out what the current setting is. If the automation flag is off, the automation manager will not send the order to stop the subsystem to the automation agent.

- *check history:*

  Use the INGINFO command to analyze the history of the resource.

How to Use INGVOTE

Whenever you (or a program) want the automation manager to do something, you must send it a request. Requests are remembered within the automation manager. They are made against individual resources and then propagated over the relationship graph to other resources within the automation manager. If for example, your request is to start resource A, and A has a relationship to B in a way that B needs to be started before A can run, then the automation manager generates a vote to resource B to start it. So a request can be viewed as a black box of related votes generated by the automation manager.

If you enter the INGVOTE command without any parameter, it displays all pending requests that are persistent at the automation manager.

If you enter the INGVOTE command specifying a resource, or launch it from the INGLIST command dialog, then SA OS/390 displays all pending votes for this given resource with the following information:

- name of resource the request was made against
- request action
- source of request
- request priority
- request vote

```
INGKYRQ2                 SA OS/390 - Command Dialogs      Line  1    of 15
Domain ID  = IPUFA     ---------- INGVOTE ----------     Date = 06/27/02
Operator ID = OPER           Sysplex = AOCPLEX           Time = 14:12:47

Cmd:  C Cancel request   K Kill request    S Show details    V Show votes
Cmd Name         Type System   Request Data
--- ----------- ---- -------- ------ --------------------------------------
    SVPEVENT     SVP           Req : MakeUnAvailable
                               At  : 2002-06-27  10:00:01
                               Org : SCHEDULE
                               Pri : 01120000  Should Be Down - Schedule
                               Stat: Winning
    SVPH0730     SVP           Req : MakeUnAvailable
                               At  : 2002-06-27  08:00:00
                               Org : SCHEDULE
                               Pri : 02120000  Must Be Down - Schedule
                               Stat: Winning
    SVPL1200     SVP           Req : MakeUnAvailable
                               At  : 2002-06-27  12:30:00
                               Org : SCHEDULE


Command ===>
 PF1=Help     PF2=End      PF3=Return                     PF6=Roll
              PF8=Forward  PF9=Refresh                    PF12=Retrieve
```

Figure 21. INGVOTE Command Dialog

From the INGVOTE command dialog, you can enter the following commands against a selected vote:

C   Cancels the request. This command displays the verification panel that lists all resources that are affected if you want to cancel the selected vote/request (see also "How to Use INGREQ" on page 85.

K   Cancels the request without showing the verification panel.

S   Shows details about the request.

V   Displays all the requests/votes that have been entered for the selected resource.

How to Use INGHIST

The INGHIST command is a sysplex-wide command issued against the sysplex's automation manager. It displays history information about the workitems processed by the automation manager. You can specify a certain resource for which you want SA OS/390 to display the work history, or you can specify a time interval, for which you want to see all activities or you can combine both criteria.

If you enter this command without parameters, you receive the output for the complete sysplex starting from the last hour before you entered this command. Your output panel may look similar to the following:

```
INGKYHI0                 SA OS/390 - Command Dialogs      Line  1    of 112
Domain ID   = IPUFM      ---------- INGHIST  ----------   Date = 05/23/00
Operator ID = HUT              Sysplex = AOC7PLEX         Time = 16:46:17

 Start time ==>  2000-05-23 15:46:00    format: yyyy-mm-dd hh:mm:ss
 End time   ==>                         Resource ==>

Cmd:  + Expand workitem (e)   - Collapse workitem (c)
Cmd Date       Time     Footprint
--- ---------- -------- ------------------------------------------------------
 _  2000-05-23 16:46:14 GLOBAL automation flag is set off
 _  2000-05-23 16:46:05 INITSTART automation flag is set off
 _  2000-05-23 16:44:21 INITSTART automation flag is set off
 _  2000-05-23 16:44:12 GLOBAL automation flag is set off
 _  2000-05-23 16:43:32 GLOBAL automation flag is set off
 _  2000-05-23 16:43:23 INITSTART automation flag is set off
 _  2000-05-23 16:42:11 GLOBAL automation flag is set off
 _  2000-05-23 16:42:02 INITSTART automation flag is set off
 _  2000-05-23 16:40:24 INITSTART automation flag is set off
 _  2000-05-23 16:40:14 GLOBAL automation flag is set off
 _  2000-05-23 16:23:15 Startup for PROC_OPS/APL/AOC7 completed

 Command ===>
   PF1=Help     PF2=End      PF3=Return                    PF6=Roll
                PF8=Forward  PF9=Refresh                   PF12=Retrieve
```

In the *Cmd* column on the left hand side of the INGHIST panel, with the **+** or the *e*
command, you can expand each workitem so that you see information about
which detail actions have been performed by the automation manager and which
resources have been involved. In Figure 22 you see for example, that at first the
automation status has been set to *Idle* for resource *PROC_OPS/APL/AOC7*.

```
2000-05-23 16:23:15 Startup for PROC_OPS/APL/AOC7 completed
   HSAL6269I Status/Automation is Idle              (PROC_OPS/APL/AOC7)
   HSAL6282I Status/Compound is Satisfactory        (PROC_OPS/APL/AOC7)
   HSAL6172I Group Observer update sent             (PROC_OPS/APL/AOC7)
   HSAL6157I Make Available order completed         (PROC_OPS/APL/AOC7)
```

Figure 22. Expanded Workitem

With **-** or *c*, you can collapse expanded workitems again.

How to Use Schedules - INGSCHED

Service periods (also called schedules) are one of the methods to set goals for
resources. Service periods are defined as permanent automation policy in the
customization dialog. To display all service periods defined in the sysplex, use the
INGSCHED command dialog as shown in Figure 23 on page 93.

```
INGKYSP0                  SA OS/390 - Command Dialogs      Line  1    of 7
Domain ID   = IPUFM     ---------- INGSCHED ----------     Date = 03/14/00
Operator ID = HUT             System  = AOC7               Time = 17:13:58

Cmd:  A Show Details   B Show Overrides    C Show Resources

Cmd Schedule  Description
--- --------  ---------------------------------------
    BZOETEST  SVP with a lot of entries
    KRZTEST
    SHIFT1    Weekday A.M. (06:00 - 11:59)
    SHIFT2    Weekday P.M. (13.00 - 16.59)
a   SHIFT3    Mo-Fr 16.00 - 05.55 ... 16.04 - 05.59
    SHIFT4    Saturday 6.00 - 17.59
    SHIFT5    Sunday 6.00 - 12.00
```

Figure 23. INGSCHED Command Dialog

On the INGSCHED panel, you can enter the following command codes for a
selected schedule:

A   Using this action code, you can see the UP and DOWN time windows of
the selected service period for the week as shown in Figure 24 for service
period SHIFT3 in our example. No updates are possible on this panel.

B   Displays the actual UP and DOWN time windows for the selected
schedule including the overrides starting with the current day. Use this
option if you want to override a schedule for all resources that use this
schedule (that means, for all resources, to which this schedule is linked in
the customization dialog). Such an override is called a *schedule override*
and is described in "Schedule Override" on page 94.

C   Displays the resources that are using the selected schedule. You can select a
resource to view the schedule that is used for this resource. Now you can
override the schedule just for the selected resource. Such an override is
called a *resource override* and is described in "Resource Override" on
page 94.

```
INGKYSP1                  SA OS/390 - Command Dialogs      Line  1    of 14
Domain ID   = IPUFM     ---------- INGSCHED ----------     Date = 03/14/00
Operator ID = HUT             System  = AOC7               Time = 17:17:03

Schedule. . : SHIFT3       Mo-Fr 16.00 - 05.55 ... 16.04 - 05.59

  Day      Pri  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop
  ---      --   ---------  ---------  ---------  ---------  ---------
  MON  UP   H   1600-2359  ____-____  ____-____  ____-____  ____-____
       DN   H   0000-1559  ____-____  ____-____  ____-____  ____-____
  TUE  UP   H   0000-0555  1601-2359  ____-____  ____-____  ____-____
       DN   H   0556-1600  ____-____  ____-____  ____-____  ____-____
  WED  UP   H   0000-0556  1602-2359  ____-____  ____-____  ____-____
       DN   H   0556-1601  ____-____  ____-____  ____-____  ____-____
  THU  UP   H   0000-0557  1603-2359  ____-____  ____-____  ____-____
       DN   H   0557-1602  ____-____  ____-____  ____-____  ____-____
  FRI  UP   H   0000-0558  1604-2359  ____-____  ____-____  ____-____
       DN   H   0559-1603  ____-____  ____-____  ____-____  ____-____
  SAT  UP   H   0000-0559  ____-____  ____-____  ____-____  ____-____
       DN   H   0600-2400  ____-____  ____-____  ____-____  ____-____
  SUN  UP   L   ____-____  ____-____  ____-____  ____-____  ____-____
       DN   H   0000-2359  ____-____  ____-____  ____-____  ____-____
```

Figure 24. INGSCHED Details

The column with the *UP* and *DN* entries indicates whether the schedule is an UP
or DOWN time window.

Schedule Override

You can interactively override a schedule for all resources that use this schedule. You can interactively override the schedule starting from a specified starting date for selected dates in the near or far future.

To reach the panel shown in Figure 25, select option *B* from the panel shown in Figure 23 on page 93 or use the INGSCHED command with the schedule name as a parameter. Schedules that have been overwritten are shown in yellow. From this panel you can now overtype or complete the displayed schedule.

```
INGKYSP2                    SA OS/390 - Command Dialogs
Domain ID   = IPUFM     ---------- INGSCHED ----------     Date = 05/23/00
Operator ID = HUT             Sysplex = AOC7PLEX           Time = 18:12:22

 Schedule . . . : SHIFT3      Daily 16.00 - 19.00 high UP
 Starting date => 05 / 23 / 2000     (mm/dd/yyyy)

C Date          Pri  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop
- ------------ -- ---  ---------  ---------  ---------  ---------  ---------
  05/23/00 Tue UP  H   1600 1900  ____ ____  ____ ____  ____ ____  ____ ____
             DN  H   0000 1600  ____ ____  ____ ____  ____ ____  ____ ____
  05/24/00 Wed UP  H   1600 1900  ____ ____  ____ ____  ____ ____  ____ ____
             DN  H   0000 1600  ____ ____  ____ ____  ____ ____  ____ ____
  05/25/00 Thu UP  H   1600 1900  ____ ____  ____ ____  ____ ____  ____ ____
             DN  H   0000 1600  ____ ____  ____ ____  ____ ____  ____ ____
  05/26/00 Fri UP  H   1600 1900  ____ ____  ____ ____  ____ ____  ____ ____
             DN  H   0000 1600  ____ ____  ____ ____  ____ ____  ____ ____
  05/27/00 Sat UP  H   1600 1900  ____ ____  ____ ____  ____ ____  ____ ____
             DN  H   0000 1600  ____ ____  ____ ____  ____ ____  ____ ____


Command ===>
 PF1=Help      PF2=End      PF3=Return                     PF6=Roll
 PF7=Backward  PF8=Forward  PF9=Refresh                    PF12=Retrieve
```

Figure 25. Panel for Schedule Overrides

Resource Override

To reach the panel shown in Figure 26 on page 95, select option *C* from the panel shown in Figure 23 on page 93 and then select the resource for which you want to override the schedule.

Another way to reach the resource override panel is to issue the INGSCHED command with a certain resource name as a parameter, like:

```
INGSCHED AGFG2/APL/AOCA
```

Finally, there is a third way to reach the resource override panel: from the INGLIST command dialog (see "How to Use INGLIST to View Resources" on page 67) you can issue action code *I* against a selected resource. In the upcoming panel you will see the desired schedule. Service windows that are overrides for the resource are shown in pink. Now you can edit the schedule by typing new values.

```
 INGKYSP2                  SA OS/390 - Command Dialogs
 Domain ID   = IPUFM     ---------- INGSCHED ----------    Date = 05/23/00
 Operator ID = HUT            Sysplex = AOC7PLEX           Time = 18:34:32

  Resource . . . : BZOLGSVP/APL/AOC7               Schedule . . :  BZOETEST
  Starting date => 05 / 23 / 2000     (mm/dd/yyyy)

 C Date           Pri   Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop
 - ------------ -- ---   ---------  ---------  ---------  ---------  ---------
   05/23/00 Tue UP  H    0800 0810  ___ ___    ___ ___    ___ ___    ___ ___
                DN  H    0000 0759  ___ ___    ___ ___    ___ ___    ___ ___
   05/24/00 Wed UP  L    0600 0700  ___ ___    ___ ___    ___ ___    ___ ___
                DN  L    0000 0600  ___ ___    ___ ___    ___ ___    ___ ___
   05/25/00 Thu UP  H    1200 1600  ___ ___    ___ ___    ___ ___    ___ ___
                DN  H    0000 1159  ___ ___    ___ ___    ___ ___    ___ ___
   05/26/00 Fri UP  H    1200 1230  ___ ___    ___ ___    ___ ___    ___ ___
                DN  H    0000 1159  ___ ___    ___ ___    ___ ___    ___ ___
   05/27/00 Sat UP  L    0900 1000  ___ ___    ___ ___    ___ ___    ___ ___
                DN  L    0000 0859  1000 2400  ___ ___    ___ ___    ___ ___


 Command ===>
  PF1=Help     PF2=End      PF3=Return                     PF6=Roll
  PF7=Backward PF8=Forward  PF9=Refresh                    PF12=Retrieve
```

Figure 26. Panel for Resource Overrides

From this panel which is specific for the current resource you can:

- enter new service times
- overtype or blank out existing service times
- and delete a complete (pink) schedule override by entering action code *D* into the command column. Then the schedule override will disappear and the general schedule for all resources will be restored for the current resource (in green).

How to Display Trigger Information - INGTRIG and DISPTRG

Triggers are a very powerful tool of goal driven automation. As they influence the behaviour of applications and application groups, the automation programmer needs to be very careful in connecting triggers to resources. For information on event and trigger support refer to *System Automation for OS/390 Defining Automation Policy*.

In SA OS/390 two commands are available to display trigger information:

INGTRIG

This command shows all triggers that are defined and used by resources within the automation manager scope. For each trigger you can view all resources that use this trigger.

```
INGKYTR0                 SA OS/390 - Command Dialogs      Line  1    of 13
Domain ID   = IPUFM      ---------- INGTRIG  ----------   Date = 03/23/00
Operator ID = MIK                 Sysplex = AOCPLEX        Time = 16:31:20

Cmd:  S show associated resources

Cmd Trigger    Description
--- --------   ----------------------------------------
    BATCHSTP   Batch jobs B000P100,P200,P300
    BATCHSTR   Batch jobs B000S100,S200,S300
    DRWTRG1    TD Trigger 1 (evt1 - evt8)
    DRWTRG2    TD trigger 2 (evt9 - evt12)
    HUGTRIG1   Trigger for HUG applications
    MSCTRG1    scheduling test trigger 1
    MSCTRG2    scheduling test trigger 2
    TRIGGER6   Hourly window + batch controlled events
    TRIGGER7   Command controlled events, No UNSET
    TRIGGER8   Command controlled events, diff. unsets


Command ===>
   PF1=Help     PF2=End        PF3=Return               PF6=Roll
                               PF9=Refresh              PF12=Retrieve
```

DISPTRG

This command displays the trigger conditions for a resource. To display a
panel similar to the one shown in the following screenshot, enter:

DISPTRG BATB000P100

(If you enter this command without parameters, SA OS/390 prompts you
for more information).

```
AOFLT000                 SA OS/390 - Command Dialogs      Line  1    of 1
Domain ID   = IPUFM      ---------- DISPTRG  ----------   Date = 05/23/00
Operator ID = HUT                System  = AOC7           Time = 18:41:22

 Resource   ==>  BATB000P100/APL/AOC7
 System     ==>                System name, domain id or sysplex name
 Trigger. . . :  BATCHSTP                     Observed status :  HARDDOWN

Cmd:  S show details
Cmd Type      Events
--- --------  -------- -------- -------- -------- -------- -------- ---------
    STARTUP   BATCHSTP



Command ===> _____
   PF1=Help     PF2=End        PF3=Return               PF6=Roll
                               PF9=Refresh              PF12=Retrieve
```

With the command code *S*, for each trigger you can view the events that
must be set to activate the trigger. You will see a panel similar to the
following one:

```
AOFLT100                SA OS/390 - Command Dialogs       Line  1    of 1
Domain ID   = IPUFM    --- Trigger Condition List ----    Date = 05/24/00
Operator ID = HUT            System  = AOC7               Time = 16:48:32


 Trigger . . . . : BATCHSTP
 Condition type. : STARTUP
 Resource. . . . : BATB000P100/APL/AOC7        Observed status : HARDDOWN

Cmd:  D show resources   S set event for resource   U unset event for resource
Cmd Event     Status      Unset  Description
--- --------  ----------  -----  --------------------------------------------
    BATCHSTP  UNSET       NONE   Batch jobs B000P100,P200,P300




Command ===>
   PF1=Help     PF2=End       PF3=Return                  PF6=Roll
                              PF9=Refresh                 PF12=Retrieve
```

Figure 27. Trigger Condition List

> Note that in our example, the trigger and its event have the same name
> *BATCHSTP*. The event for this trigger is currently unset. With the
> command code *S*, you can set it.

How to Display Event Information - DISPEVT, DISPEVTS and INGEVENT

You can reach the DISPEVT command dialog by issuing `DISPEVT` *event_name* or
using the command code *D* from the trigger condition list shown in Figure 27.

This panel shows all resources that have the specified event defined within their
trigger definition. For each resource the following information is displayed:
- the name of the resource
- the type of the resource
- the name of the system where the resource resides
- the name of the trigger that the resource is linked to.
- the status of the event (SET or UNSET). If the *Status* column remains blank this
  means that the status is unknown. This is treated as UNSET.

```
AOFLE000                    SA OS/390 - Command Dialogs      Line  1    of 3
Domain ID   = IPUFM     ---------- DISPEVT ----------   Date = 05/24/00
Operator ID = HUT              Sysplex = AOC7PLEX        Time = 16:43:21

 Event          ==> BATCHSTP
 System         ==> AOC7      System name, domain id or sysplex name
 Description  . . : Batch jobs B000P100,P200,P300
 Unset condition. : NONE

 Resource     Type  System    Trigger   Status
 -----------  ----  --------  --------  ------
 BATB000P100  APL   AOC7      BATCHSTP  SET
 BATB000P200  APL   AOC7      BATCHSTP  SET
 BATB000P300  APL   AOC7      BATCHSTP




Command ===>
  PF1=Help     PF2=End        PF3=Return                   PF6=Roll
                              PF9=Refresh                  PF12=Retrieve
```

Figure 28. DISPEVT Command Dialog

With the INGEVENT command, you can set or unset an event for a specified
resource or for all resources in the sysplex for which it is defined.

To reach the INGEVENT command dialog, perform the following steps:

1. Issue the DISPEVTS command from any command line. You will see a panel as
   shown in Figure 29 which displays the events defined for resources in the
   sysplex.

```
AOFLE100                    SA OS/390 - Command Dialogs      Line  1    of 29
Domain ID   = IPUFM     ---------- DISPEVTS ----------   Date = 05/31/00
Operator ID = MIK              Sysplex = AOC7PLEX        Time = 14:41:46

Cmd:  D show related resources    S set/reset event

Cmd Event     Unset  Description
--- --------  -----  ----------------------------------------
    BATCHSTP  NONE   Batch jobs B000P100,P200,P300
    BATCHSTR  NONE   Batch jobs B000S100,S200,S300
    B000P100  DOWN   Stop cond 1 Trigger6 (batch job end)
    B000P200  DOWN   = P1
    B000P300  DOWN   Stop cond 2 Trigger6 (batch job 1 min)
    B000S100  UP     Start cond 1 Trigger6 batch job end
    B000S200  UP     = P1
    B000S300  UP     Start cond 2 Trigger 6 batch end (1 min)
    MDOEVENT  NONE   Donies Event1
    MDOEVT2   DOWN   Donies Event2
    MDOEVT3   START  Donies Event3
    MDOEVT4   UP     Donies Event4

Command ===>
  PF1=Help     PF2=End        PF3=Return                   PF6=Roll
               PF8=Forward    PF9=Refresh                  PF12=Retrieve
```

Figure 29. DISPEVTS Command Dialog

From this command dialog, you have the following options:

D   show related resources

S   set/reset event

2. Now use option *S* for a selected event to reach the INGEVENT command dialog shown in Figure 30.

   Note: With the line mode INGEVENT command, you can directly set or unset an event for all or a specified resource, like for example:

   ```
   INGEVENT BATCHSTP REQ=UNSET RESOURCE=BATB000P200/APL/AOC7
   ```

   After successful completion, this will produce the message:

   ```
           AOF442I UNSET EVENT BATCHSTP DONE FOR RESOURCE BATB000P200/APL/AOC7
           ON AOC7. - FROM=AOC7
           AOF099I FUNCTION COMPLETED
   ```

```
AOFLE110                  SA OS/390 - Command Dialogs
Domain ID   = IPUFM        -------- INGEVENT ---------    Date = 05/31/00
Operator ID = MIK             Sysplex = AOC7PLEX          Time = 15:34:04

Event . . . . . . . : BATCHSTP
Description . . . . : Batch jobs B000P100,P200,P300
Unset condition . . : NONE

Specify/revise the following parameters and then press enter:

  Function  ==> UNSET        SET or UNSET
  Resource  ==> BATB000P100/APL/AOC7          Resource name


  System    ==> AOC7         System name, domain ID or sysplex name




AOF442I UNSET EVENT BATCHSTP DONE FOR RESOURCE BATB000P100/APL/AOC7 ON AOC7.
Command ===>
F1=Help      F2=End      F3=Return                        F6=Roll
                                                          F12=Retrieve
```

Figure 30. INGEVENT Command Dialog

Determining Automation Agent Flag Values

You can determine the current values of the automation flags for a particular subsystem using the DISPSTAT command dialog.

The DISPSTAT command dialog also provides a fast path to other command dialogs so you can change certain automation policy settings for a particular subsystem. It also shows the status of each subsystem.

```
AOFKSTA5                  SA OS/390 - Command Dialogs      Line  1  of 441
Domain ID   = IPUFA       -------- DISPSTAT ----------      Date = 03/30/00
Operator ID = MIK                                           Time = 17:25:32
 A ingauto  B setstate  C ingreq-stop  D thresholds  E explain  F info  G tree
 H trigger  I service  J all children  K children  L all parents  M parents
CMD  RESOURCE      STATUS    SYSTEM   JOB NAME  A I S R D RS TYPE      Activity
---  -----------   --------  -------- --------  ----------- --------  ---------
     HUGSGX        UP        AOCA     HUGSGX    Y Y Y Y Y Y  MVS      --none--
     HUGSHUTINIT   UP        AOCA     HUGSHUTI  Y Y Y Y Y Y  MVS      --none--
     HUGSRVGRPT2   ENDED     AOCA     HUGSGT2   Y Y Y Y Y Y  ONE SHOT --none--
     HUGSRVGTRA1   DOWN      AOCA     HUGSGTR1  Y Y Y Y Y Y  MVS      --none--
     HUGSTART      INACTIVE  AOCA     HUGSTART  Y Y Y Y Y Y  MVS      --none--
     HUGTRIG1      DOWN      AOCA     HUGTRIG1  Y Y Y Y Y Y  MVS      --none--
     HUGWTSO       UP        AOCA     HUGWTSO   Y Y Y Y Y Y  MVS      --none--
     HUGWVTAM      UP        AOCA     HUGWVATM  Y Y Y Y Y Y  MVS      --none--
     IRRDPTAB      ENDED     AOCA     IRRDPTAB  Y Y Y Y Y Y  ONE SHOT --none--
     JESWTR        ENDED     AOCA     JESWTR    Y Y Y Y Y Y  ONE SHOT --none--
     JES2          UP        AOCA     JES2      Y Y Y Y Y Y  MVS      --none--
     JLP111A       UP        AOCA     JLP111A   Y Y Y Y Y Y  MVS      --none--
     JLP111B       UP        AOCA     JLP111B   Y Y Y Y Y Y  MVS      --none--

Command ===>
 PF1=Help    PF2=End     PF3=Return    PF4=INGLIST   PF5=Filters  PF6=Roll
 PF7=Back    PF8=Forward PF9=Refresh  PF10=Previous PF11=Next     PF12=Retrieve
```

Figure 31. Example Display of Status of All Automated Resources (DISPSTAT)

The automation flags are:

A   Automation

I   Initial Start

S   Start

R   Recovery

D   Shutdown

R   Restart

Automation flags are set by the automation programmer in the customization
dialog. Their meanings are explained in detail in *System Automation for OS/390
Defining Automation Policy*.

Each flag has one of the following values:

-   there is no explicit setting.

N   the flag is turned off.

E   The value of the automation flag depends upon the values returned by one
         or more user exit and will be determined when the value is required.

Y   the flag is turned on.

?   there is an error.

Displaying Actual and Effective Automation Agent Flags

In addition to using the DISPSTAT command dialog to see the current automation
flags for every subsystem, you can use the DISPFLGS command dialog to display
both the actual flags that are set, and the effective flags for those subsystems that
have explicit flags coded.

To display the actual and effective automation flags type DISPFLGS on any
command line.

```
AOFKAAAU                  SA OS/390 - Command Dialogs      Line  1    of 123
Domain ID   = IPSFM      ---------- DISPFLGS ----------    Date = 04/30/02
Operator ID = OPER                                         Time = 11:00:35

Cmd:  A Add flags    C Change flags    R Reset flags    S Scheduled Overrides
                                         Actual       Effective
Cmd   System     Resource              A I S R D RS  A I S R D RS
---   --------   --------------------- - - - - - -   - - - - - -
      KEY1       APPC                  N - - - - -   N N N N N N
      KEY1       ASCH                  N - - - - -   N N N N N N
      KEY1       CICSK1G               N - - - - -   N N N N N N
      KEY1        AUTO                 N - - - - -   N N N N N N
      KEY1        SOS                  N - - - - -   N N N N N N
      KEY1        TRAN                 N - - - - -   N N N N N N
      KEY1        VIOL                 N - - - - -   N N N N N N
      KEY1        VTAMACB              N - - - - -   N N N N N N
      KEY1       CICSK1H               N - - - - -   N N N N N N
      KEY1        AUTO                 N - - - - -   N N N N N N
      KEY1        SOS                  N - - - - -   N N N N N N
      KEY1        TRAN                 N - - - - -   N N N N N N


Command ===>
   PF1=Help      PF2=End      PF3=Return                    PF6=Roll
                 PF8=Forward  PF9=Refresh                   PF12=Retrieve
```

Figure 32. DISPFLGS Command Dialog Panel

Two sets of flags are shown. Those on the left of the panel are the actual flags, and
those on the right are the effective flags. The values shown for each flag are
explained in "Determining Automation Agent Flag Values" on page 99.

The following command codes are supported:

A   allows you to define automation flags for a resource using the same flag
         settings as the selected resource. Another panel is displayed where you can
         specify the resource name and optionally overtype the flag settings.

C   allows you to modify the automation flags of the selected resource.
         Another panel is displayed showing the current flag settings where you
         can overtype the flag values.

R   causes to reset the automation flags to the values specified in the
         automation control file (ACF).

S   shows the scheduled override settings of the automation flags for the
         selected resource. You can specify scheduled overrides using the
         customization dialog. These are specific times when the automation is
         turned off for a particular flag and resource.

Displaying Automation Agent Flag Override Settings

The customization dialog allows you to turn automation flags off for a scheduled
time period. You can view these time period settings by issuing the DISPSCHD
command.

```
AOFKAASC                SA OS/390 - Command Dialogs      Line   1 of 1
Domain ID   = IPUFM    ---------- DISPSCHD ---------     Date = 05/23/97
Operator ID = WAS                                        Time = 09:13:10

 System     Resource    Fl  Day       Start    - End       Flags
 --------   ----------- --  --------- ------------------- -------------------
 KEY3       VTAM        S   MONDAY    08:00:00 - 10:00:00 A   Automation
 KEY3       TSO         I   SUNDAY    00:00:00 - 01:00:00 I   Initial Start
                                                          S   Start up
                                                          R   Recovery
                                                          D   Shut down
                                                          RS  Restart


Command ===>
        PF1=Help    PF2=End     PF3=Return
        PF6=Roll                PF8=Forward    PF9=Refresh   PF12=Retrieve
```

- The System field shows the name of the system where the resource is defined.
- The Resource field shows the name of the resource.
- The Fl (flag) field shows an abbreviation of the automation flag name.
- The Day field shows the day of the week that automation is turned off.
- The Start and End fields show the time periods that automation is turned off.
- The Flags field shows the full name and the one character abbreviation for each automation flag.

In our example, Start up is not automated for VTAM on Mondays from 8 to 10 pm and Initial start is not automated for TSO on Sundays from midnight to 1 am.

Setting Automation On or Off - INGAUTO

You can change the automation setting for a specific automated resource or a group of automated resources using the INGAUTO command dialog. You can turn all automation off or only particular automation flags.

Note: Be sure to specify the correct sub-component name. Although the sub-component does not exist, the message FUNCTION COMPLETED will appear.

If you type INGAUTO on any command line, you see the following panel:

```
 ┌─────────────────────────────────────────────────────────────────────┐
 │ AOFKAASF              SA OS/390 - Command Dialogs                     │
 │ Domain ID   = IPUFM   ---------- INGAUTO ---------      Date = 05/23/97│
 │ Operator ID = WAS                                        Time = 09:13:10│
 │                                                                        │
 │  Resource name  =>  TSO_____     Specific or group resource or DEFAULT│
 │  Sub-components =>  _____   Resource sub-component│
 │                    Note : Be sure to specify the correct sub-component  │
 │  System         =>  _____      System name, sysplex name or domain ID │
 │  Scope          =>  ONLY____     Change automation for:                 │
 │                                     ONLY     - only this resource       │
 │                                     CHILDREN - dependants               │
 │                                     ALL      - resource and dependants  │
 │  Automation     =>  N            Specify new settings for automation flags│
 │  Initstart      =>  _            Y - flag is always on                   │
 │  Start          =>  _            N - flag is always off                 │
 │  Recovery       =>  _            E - exits called if specified, otherwise│
 │  Shutdown       =>  _                 always on                          │
 │  Restart        =>  _            R - return to automation control file   │
 │                                       settings                          │
 │  Interval       =>  _____      Specify duration of change (dd:hh:mm)   │
 │                                  or leave blank for an indefinite change │
 │                                                                          │
 │ Command ===>                                                            │
 │        PF1=Help    PF2=End    PF3=Return                                 │
 │        PF6=Roll                                     PF12=Retrieve        │
 └─────────────────────────────────────────────────────────────────────┘
```

Figure 33. INGAUTO Command Dialog

In the **Resource name** field, type the name of the resource for which you want to
determine automation flags. If you specify the value defaults, you set automation
flags for all resources that do not have more specific automation flags defined or
that do not belong to a group that has flags defined.

In our example screen from Figure 33, automation is turned off for the TSO
resource.

You can use the **Interval** field to turn automation on or off for all or selected flags
for a specific time period. In this field, type the amount of time you want the
automation turned on or off. This time period begins immediately when you press
the Enter key.

At the end of the interval, the flag(s) will be reset to the value defined by your
automation control file. If you leave the **Interval** field blank, the flag(s) will remain
changed until they are manually reset or updated.

For the complete syntax of the commands introduced in "Determining Automation
Agent Flag Values" on page 99, refer to *System Automation for OS/390 Operator's
Commands*.

How to Work with Application Groups

An application group is a resource which both summarizes the status of other
resources (its members) and which controls the activation of those members. A
special feature is that the members can inherit the group's dependencies.

Each member is a resource, as is the group itself. This means that groups can
contain other groups. You can issue commands to start or stop groups as an entity.
Also, you can link a group to a service period and thus schedule it automatically.

Detailed information on how to organize applications into a group and how to
nest groups into other groups and how to generate resources from groups and
applications is provided in *System Automation for OS/390 Defining Automation Policy*.

The concept of resources allows you to dynamically move applications and groups from one system to another system in the sysplex. This move is achieved by stopping an active set of resources and starting an alternate set in a coordinated fashion. With this concept, you can also start and stop equivalent resources to maintain a desired level of server capacity.

There are two types of application groups:
- *System Application Groups* - application groups that are associated with particular systems.
- *Sysplex Application Groups* - application groups that are associated with a certain sysplex. The application group members can be spread over multiple systems within this sysplex.

Furthermore, groups can have one of three different natures:

BASIC

In a BASIC application group *all* of its components must be available before the group is considered to be available.

MOVE

In a MOVE application group exactly one of its components must be available before the group is considered to be available. In MOVE groups you can specify alternative components that will be started if the primary component fails to start.

SERVER

In a SERVER application group any number of components can be specified that must be available before the group is considered to be available. In SERVER groups you can specify what should happen if its components fail to start.

The automation programmer can set the numbers of members that should be available for a SERVER group by specifying the *Availability Target* when defining the group.

Preference values are used for SERVER and MOVE groups to determine which members should preferably be made available.

For detailed information on how to define application groups and which nature to use for which purposes, refer to *System Automation for OS/390 Defining Automation Policy*.

How to Use INGGROUP to Change Policy for Applications

The functions provided by the INGGROUP command are:
- automatic group management to maintain application availability. This includes the activation of backup/alternate resources in response to resource or system failure.
- a superset of the behaviour provided by Automatic Restart Manager. While INGGROUP does not provide a true cross system restart, it is able to take recovery actions in a variety of situations where Automatic Restart Manager is not. These include application failure, supporting application failure, and 'total active instance' based management (for SERVER groups).
- the ability to move resources away from a system, on either a group/subgroup level or a system level.
- the ability to query and dynamically change a group's policy so as to cause one instance of a resource to be stopped and another started.

- the ability to view an estimate of the impact of those changes before committing them.
- the ability to perform actions resulting from the above in a delayed, non-disruptive fashion.
- the ability to return resources to their normal systems in a delayed, non-disruptive fashion.

So one of the most important functions of the INGGROUP command is moving resources around in a sysplex. Moving applications or application groups from one system to another, that means, stopping an active set of applications (dependent and supporting resources) on one system and starting them on another system without loss of information. This can be advisable for the following reasons:
- to ensure availability of resources throughout a sysplex despite single system failure
- to balance workload in a sysplex
- to enable complete applications to be moved away from a certain system if this is needed for other work or maintenance

Application move is implemented in SA OS/390 in two flavours:
- a planned or scheduled move, which is defined by automation policy and where the availability of resources is automatically ensured due to defined availability targets and preference values for the single resources. For detailed information, refer to *System Automation for OS/390 Defining Automation Policy*.
- an immediate move for emergency reasons; for this purpose, you can use the INGGROUP command which you issue against a group to move it.

When an application has been automatically moved to a backup system after a problem, the policy can be set to return it to its home system either as soon as the home becomes available (causing an application outage) or at the next (scheduled) application outage.

For more information about application move see "Controlling Application Move and Server Management" on page 22.

You can invoke the INGGROUP command dialog either by typing the command name into the command line or by selecting option *J* from the INGLIST command dialog. In both cases you reach the panel shown in Figure 34 on page 106.

```
INGKYGRA                SA OS/390 - Command Dialogs
Domain ID   = IPUFM     ---------- INGGROUP ----------    Date = 03/30/00
Operator ID = MIK            Sysplex = AOCPLEX            Time = 10:29:31


 Specify or revise the following data:

  System   =>  _____     System name, domain id or sysplex name

  Action   =>  _____     EXCLUDE-AVOID-INCLUDE or ACTIVATE-PACIFY

  Group(s) =>  HUGMGRPAPG/APG_____
               _____
               _____
               _____

  System(s)=>  _____
               _____

Command ===>
 PF1=Help    PF2=End      PF3=Return   PF4=Members              PF6=Roll
                                       PF10=GO                  PF12=Retrieve
```

Figure 34. INGGROUP Command Dialog (1)

This panel allows you to change the policy of application groups. You may specify:

- The target sysplex for the command through the system field. If omitted, this defaults to the local system/sysplex. Specify the system name only when viewing/changing the policy of an application group that is not part of the local sysplex.

- The policy change that you want to make through the action field.

- Next you must specify either the name of the target group or a set of templates that will match one or more groups. All policy items work with a list of group name templates and apply to all Move and Server groups matching those names. While applying a policy to a Basic group is not an error, it will not achieve anything either.

- For the Exclude/Avoid/Include option, you can specify a list of systems that the policy is to be set for. Specify a questionmark (?) in the *System(s)* line to see the list of systems within the sysplex.

  This option indicates that you want to remove movable members from a system (exclude), prohibit SA OS/390 from activating movable members on a system (avoid) or that you wish to undo either of the other two actions (include).

  Note: The AVOID/EXCLUDE options are only applied to the members of the group which are applications. They are not applied to members of a group which are also groups. In other words, these options are not recursively spread out to nested application groups.

- With the PACIFY option, you can make the specified group passive. This option will immediately revoke all votes from all of the group members. This may cause the desired state of some of its members to change, resulting in them being started or stopped.

  With the ACTIVATE option, you can make a group active. When a group becomes active, SA OS/390 will propagate *MakeAvailable* requests to the group members that are required to make the group available. Those members which are not required will receive a *MakeUnavailable* request. Note that if a member has a preference of 1 it will always be propagated a *MakeUnavailable* request and if it has a preference of 0 (a passive member) it will never be propagated any sort of request.

To make your changes active, press PF10. Pressing PF4 from the previous panel will bring you to the one shown in Figure 35 where you can change the preference policy values for the members of a Server group.

```
INGKYGRB                 SA OS/390 - Command Dialogs     Line  1    of 3
Domain ID   = IPUFM     ---------- INGGROUP ----------   Date = 03/30/00
Operator ID = MIK             Sysplex = AOCPLEX          Time = 10:30:26

 Group: HUGMGRPAPG/APG                  Nature: Server
 Description: sample server group
 Excluded:
 Avoided :
 Mode: Normal    Availability Target: 1    Adjust: 0    Result=> 1

 Name         Type System    Pref   Adj   Result Avl    Eff    Stat  Act
 -----------  ---- --------  ----  ----  ------  ----  ----   ----  ----
 HUGMGRP      APL  AOCA       700     0    700   Yes    950    Sel   --
 HUGMGRP      APL  AOCB       700     0    700   No     700    Uns   --
 HUGMGRP      APL  AOCD       700     0    700   Nst      0    Uns   --



Command ===>
 PF1=Help    PF2=End     PF3=Return                         PF6=Roll
                         PF9=Refresh   PF10=GO   PF11=Reset  PF12=Retrieve
```

Figure 35. INGGROUP Command Dialog (2)

On the panel shown in Figure 35, you can change the values in the **Result** field to change the availability target for that server group. Also, in the **Result** column you can change the preference value for that member. The effective preference value is now shown in the **Eff** column. (Preference value changes are also possible for Server groups).

Changes to preference values for members, as set via the Result field are implemented in the following manner:

1. The preference value in the automation policy is not affected.
2. An adjustment value is calculated, which produces the Result value, when it was applied to the preference value in the automation policy.
3. The Result preference value is used by the automation when a preference value is required.
4. The adjustment value, not the Result, is preserved across automation manager HOT restart and across INGAMS REFRESH, but is lost during WARM and COLD restarts.

To make your changes active, press PF10. To reset the initial settings, press PF11.

The action taken after PF10 is pressed may differ from the assumed or proposed action displayed in the action column of panel INGKYGRB. This is because the assumed or proposed action is calculated by processing the group's resources in alpha-numeric sequence, while the actual action performed is calculated by the automation manager which processes the group's resources in a random sequence.

For detailed information about the INGGROUP command refer to *System Automation for OS/390 Operator's Commands* and to the online help of the INGGROUP command dialog.

How to Set a Timer

You can set a timer to issue commands at a specific time or interval of time for your convenience. Therefore, you do not need to be present at a console to perform a repetitive task at a certain time.

This NetView timer is actually the SETTIMER command that issues a command or list of commands at a specified time or specified interval.

Using the SETTIMER command, displays a list of existing timers as shown in Figure 36. From this panel, you can perform the following tasks:
- "How to Create a Timer"
- "How to Modify a Timer" on page 109
- "How to Delete a Timer" on page 109

```
 AOFKATI                  SA OS/390 - Command Dialogs      Line  1    of 32
 Domain ID   = IPSFM       ---------- SETTIMER ----------    Date = 04/15/02
 Operator ID = OPER            System = KEY1                 Time = 12:46:40
 Enter ADD on the COMMAND line to create a new timer entry
 or use CMD selections A add, C change, or D delete to modify existing timers.
 CMD TIMER-ID SCHEDULED TIME    TYPE  TASK      INTERVAL     CLOCK SAVE CTUP
 --- -------- ---------------- ----- -------- ------------ ----- ---- ----
     AOFI0004 04/15/02 12:47:26 AFTER PPT                    GMT    NO
        Cmd: AOFRASCD AOFWRK06 AOFRSMOO STARTUP,DB2T,,NORM,NO,,**,YES
     AOFI0006 04/15/02 12:47:39 AFTER PPT                    GMT    NO
        Cmd: AOFRASCD AOFWRK08 AOFRSMOO STARTUP,CICSK1H,,NORM,NO,,**,YES
     AOFI0008 04/15/02 12:47:44 AFTER PPT                    GMT    NO
        Cmd: AOFRASCD AOFWRK08 AOFRSMOO STARTUP,OPCD,,NORM,NO,,**,YES
     AOFI000B 04/15/02 12:47:50 AFTER PPT                    GMT    NO
        Cmd: AOFRASCD AOFWRK02 AOFRSMOO STARTUP,TESTFLAG_I,,NORM,NO,,**,YES
     AOFI0005 04/15/02 12:47:59 AFTER PPT                    GMT    NO
        Cmd: AOFRASCD AOFWRK04 AOFRSMOO PRESTART,IM631C4,,NORM,NO,,**,YES
     AOFI0002 04/15/02 12:53:22 *igno PPT      000 00:30:00 GMT   TIME
        Cmd: AOFRASCD AOFWRK04 AOFRSMN2 TWSCMDSRVR



 Command ===>
   PF1=Help     PF2=End      PF3=Return                  PF6=Roll
                PF8=Forward  PF9=Refresh                 PF12=Retrieve
```

Figure 36. SETTIMER Command Dialog

How to Create a Timer

Type add on the command line from the panel shown in Figure 36 and press Enter. On the upcoming panel (shown in Figure 37 on page 109), fill in the fields as required.

Note: If you want to add a new timer but use most of the same values as an already-defined timer, type A in the CMD column and modify the SETTIMER panel.

```
AOFKATIR                SA OS/390 - Command Dialogs
Domain ID   = IPSFM      ---------- SETTIMER ----------    Date = 04/15/02
Operator ID = OPER              Add/Change Timer          Time = 12:59:18


Timer ID         =>  EVE00070    on System : KEY2
Type             =>  EVERY       AT, EVERY, AFTER, CHRON
When?
  Interval       =>         days  0-365   and   00:10:00   (elapsed hh:mm:ss)
  Specific date  =>               mm/dd/yy  at             (AT or EVERY)
  Day of Week    =>                         at             (AT or EVERY)

Task             =>  AUTWRK01    Operator ID or PPT
Save             =>  NO          No, Yes    Timer clock =>  GMT    GMT, LOCAL

CHRON parameters =>

Timer command => EVEEMHCN EYUMAS2B 0 EVECHLTH 30 INIT .




Command ===>
  PF1=Help   PF2=End    PF3=Return   PF4=Clear Command        PF6=Roll
                                                              PF12=Retrieve
```

Figure 37. Add/Change Timer

How to Modify a Timer

On the panel shown in Figure 36 on page 108, type C in the CMD column for the timer you want to change. The upcoming panel is the same as shown in Figure 37 where you now can modify the settings of your selected timer.

How to Delete a Timer

On the panel shown in Figure 36 on page 108, type D in the CMD column for the timer you want to delete and press Enter.

How to Interact with the Automation Manager - INGAMS

You can operate the automation manager itself with the INGAMS command in the following way:

- display information about all currently registered automation managers and automation agents.
- change the operation mode of an automation manager from secondary to primary
- refresh the configuration data used by the automation manager

This command displays all currently registered automation managers and automation agents as shown in Figure 38 on page 110. The *Role* describes what you see:

AGENT
: denotes an automation agent

PAM denotes a primary automation manager

SAM denotes a secondary automation manager

```
INGKYAM0                  SA OS/390 - Command Dialogs    Line  1   of 6
Domain ID   = IPUFA       ---------- INGAMS  ----------   Date = 06/27/02
Operator ID = OPER            Sysplex = AOCPLEX          Time = 14:47:44

Cmd:  A Manage     B Show Details  C Refresh Configuration  D Diagnostic

Cmd  System     Member     Role   Status    Sysplex   XCF-Group Release  Comm
---  --------   ---------  -----  --------  --------  --------- -------  ----
     AOCA       AOCA       AGENT  READY     AOCPLEX   INGXSGA0  V2R2M0   XCF
     AOCA       AOCA$$$$1  PAM    READY     AOCPLEX   INGXSGA0  V2R2M0   XCF
     AOCB       AOCB       AGENT  READY     AOCPLEX   INGXSGA0  V2R1M0   XCF
     AOCC       AOCC       AGENT            AOCPLEX   INGXSGA0  V1R3M0
     AOCD       AOCD$$$$1  SAM    READY     AOCPLEX   INGXSGA0  V2R2M0   XCF
     AOCD       AOCD       AGENT  READY     AOCPLEX   INGXSGA0  V2R2M0   XCF




Command ===>
   PF1=Help     PF2=End        PF3=Return                    PF6=Roll
                               PF9=Refresh                  PF12=Retrieve
```

Figure 38. INGAMS Command Dialog

Entering the following command codes displayed in the upper part of Figure 38,
you can initiate all activities concerning automation managers:

A   You can modify the operation mode of the automation manager from
         secondary to primary, and enable takeover file processing.

B   You can have additional information displayed about the automation
         manager or the automation agents. For an automation agent, the DISPSYS
         command is issued to show details about the agent and the environment it
         runs on.

C   You can have a panel displayed that prompts you for the name of the data
         set containing the automation manager configuration file members. This
         panel is used to update the definition data for the automation manager in
         real time and also for reloading the corresponding automation control files
         on the active automation agents. This command thus maintains the
         consistency of the configuration data as used by the automation agent and
         the associated automation control files.

D   You can issue this command for a primary automation manager to view or
         produce diagnostic information, such as recording actions performed
         during automation. For more information, see "How to Use the Diagnostic
         Option of INGAMS" on page 259.

How to Change the Automation Agent Status - SETSTATE

You may wish to change the status of an application under the following
circumstances:
- When you want SA OS/390 to resume handling of an application after a
  manual operator shutdown or after any other event that causes an application to
  go to a non-automatable status (for example, STOPPED, CTLDOWN, BROKEN,
  ACTIVE).
- When you want to prevent automation from restarting an application by setting
  its state to CTLDOWN.
- When you want to inform SA OS/390 that an application that has been shut
  down is going to be moved to another system.

System operations defines twenty six different statuses for automation, described in "Automation Agent Statuses" on page 34. For details about these statuses, see the help panels or *System Automation for OS/390 Customizing and Programming*. See Figure 39 and Figure 40 on page 112 for the relationships of the automation statuses. You can change the states illustrated here with the SETSTATE command (described in the *System Automation for OS/390 Operator's Commands*).
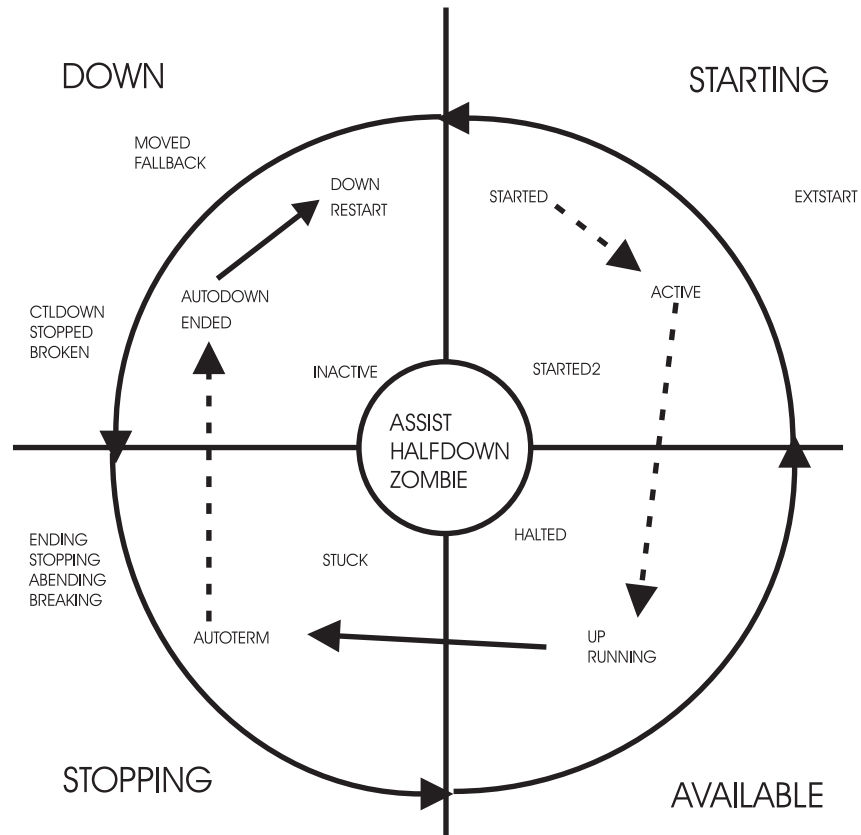
Figure 39. Transitions for a Normal Subsystem
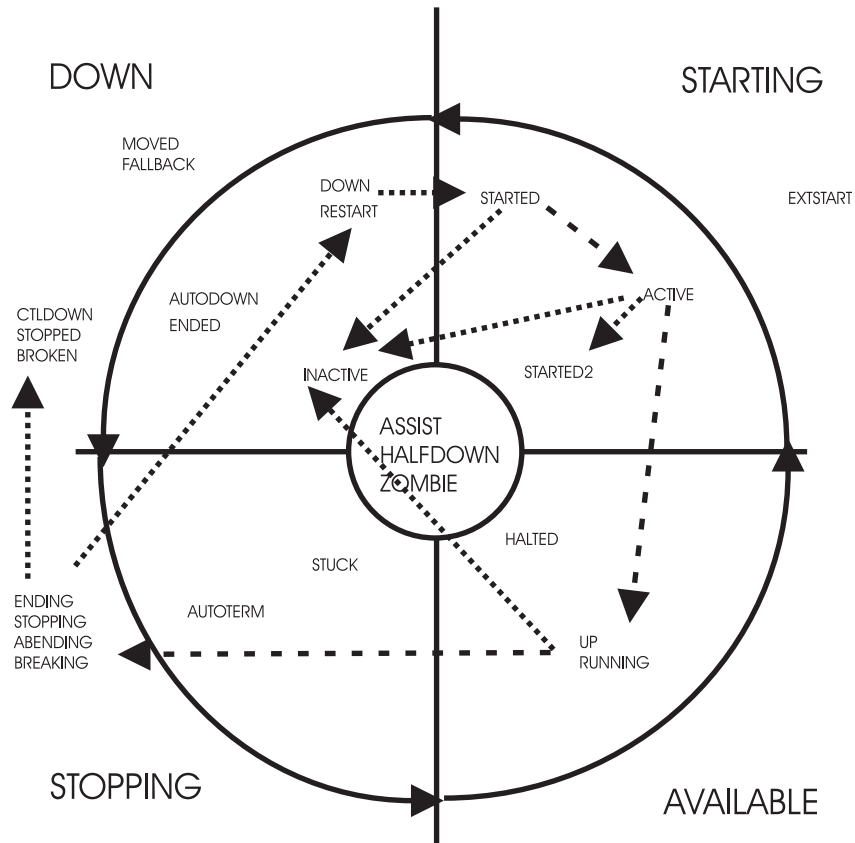
Figure 40. Transitions for an Abending Subsystem

To change the status of a subsystem, issue the SETSTATE command (see Figure 41 on page 113). The SETSTATE command is used to change the automation status of a subsystem or a group of subsystems (supporting and dependent resources). The status change you are able to make depends upon the subsystem's application monitor status. If the subsystem's application monitor status is ACTIVE, you may change its automation status to UP. If its application monitor status is INACTIVE, you can change it to RESTART or CTLDOWN. You may also be able to change it to MOVED or FALLBACK, depending upon its system associations.

With the SETSTATE command dialog, you can change the automation agent status of a subsystem or a group of subsystems by means of the *Scope* field as shown in the panel from Figure 41 on page 113. In this sample panel, the status of the TSO application and all of its dependent applications is set to CTLDOWN.

```
AOFKSAST                 SA OS/390 - Command Dialogs
Domain ID   = IPUFM    ---------- SETSTATE ----------    Date = 03/10/00
Operator ID = HUT                                        Time = 17:24:11

Specify subsystem and new state:

  Subsystem  =>   TSO_____   Subsystem to be processed
  System     =>   _____     System name, domain ID, sysplex name or *ALL
  State      =>   CTLDOWN_     Put subsystem in the following state:
                               (RESTART / AUTODOWN / CTLDOWN / UP / ENDED /
                                MOVED)

  Scope      =>   ALL_____     Change state for:
                                ONLY     - only this subsystem
                                CHILDREN - only dependant subsystems
                                ALL      - resource and dependants
  Start      =>   NO___        Start or restart subsystem now (YES/NO)
  Override   =>   NO_          Override(Start=YES) (NO/FLG/TRG/SVP/EVT/ALL)



Command ===>
  PF1=Help     PF2=End     PF3=Return                    PF6=Roll
                                                         PF12=Retrieve
```

Figure 41. SETSTATE Command Dialog

Note: The *Override* field is valid only for systems automated with downlevel
SA OS/390.

How to Monitor Messages

Message suppression facilities at the target system determine the amount of
message traffic sent from a target system sent to a console. Messages that do not
normally require operator intervention are usually suppressed at the target system.
Messages that do normally require operator intervention may also be suppressed
at the target system as automation programming is developed to respond for you.

You can monitor messages at the SA OS/390 workstation via several mechanisms
and at several levels. You can:
• See no messages
• See a summary of outstanding WTOR messages
• See messages sent to a specific system console or operator console
• See messages related to the control of processor operations-managed resources
• See SA OS/390 messages (specified by message class)

How to See Outstanding WTOR Messages
WTOR (Write to Operator with Reply) messages are OS/390 messages which
require operator action. These messages can be seen on the OS/390 operator
console.

How to Monitor WTORs on NetView Consoles
Write to Operator with Reply (WTOR) messages are OS/390 system messages that
inform you of various conditions. WTORs are messages that require a response.

To view a WTOR on NetView operator consoles, use the DISPWTOR command.

For further information on the DISPWTOR command refer to the *System
Automation for OS/390 Operator's Commands*.

The WTORs are sorted by subsystem, with each subsystem's primary WTOR shown first, and then any secondary WTORs. The primary WTOR is the one that shutdown reply is passed to.

```
AOFKADAC                    SA OS/390 - Command Dialogs      Line  1    of 5
Domain ID   = IPSFM       ---------- DISPWTOR ----------     Date = 04/15/02
Operator ID = OPER                                           Time = 12:42:33

   Rply  System    Subsystem    Message
   ----  --------  -----------  ----------------------------------------
     95  KEY1      IMS711C4     DFS996I *IMS READY* M711
     88  KEY1      MVSESA       DSI802A IPSNM REPLY WITH VALID NCCF
                                SYSTEM OPERATOR COMMAND
     93  KEY1      NETATST      DSI802A IPSFM REPLY WITH VALID NCCF
                                SYSTEM OPERATOR COMMAND




Command ===>
  PF1=Help      PF2=End       PF3=Return                 PF6=Roll
                              PF9=Refresh                PF12=Retrieve
```

How to See Messages for a Specific System or Operator Console

You can choose to receive all messages for a specific target system operator console using the *Processor Operations Interested Operator List*. These messages are displayed at your NetView console session.

Messages from the target console that are displayed include new message lines displayed on the Support Element console integration (CI) window, sent by OS/390, VM, Linux for z/Series, VSE, or the Coupling Facility Control Code (CFCC). Multi-line messages issued by OS/390 look like several single-line messages from the console. Similarly, if an OS/390 message extends over two lines, it looks like multiple separate messages from the processor operations console.

When you are monitoring a CI, make sure it is enabled to receive regular messages. For OS/390, refer to the VARY CONSOLE command parameters ACTIVE, DEACTIVATE.

All processor operations messages from a target system begin with the processor operations identifier ISQ900I or ISQ901I plus the target system name and the console type. Messages prefixed by ISQ900I are not displayed but are used by the automation. User automation should key on the ISQ900I messages. Messages prefixed by ISQ901I are sent to interested operators and should not be used for user automation. Multi-line messages appear as multiple messages.

Join or Leave an Interested Operator List: For target system operator console messages from CI use the ISQXMON command. For general processor operations resource control information messages use the ISQCMON command on a NetView console.

See the List of Interested Operators: The processor operations status facility contains status panels showing the list of interested operators for a specific target system.

You cannot directly access the *Processor Operations Interested Operator List* panel with the ISQXDST command. You can access the *Processor Operations Interested Operator List* panel only from the following status panels:
- *Target System Summary* panel (Figure 45 on page 124)
- *Target Hardware Summary* panel — accessible only from other status panels

The best way to access the *Processor Operations Interested Operator List* panel is to issue the following command to access the *Target System Summary* panel for a specific target system:

```
ISQXDST target_system_name
```

The resulting status panel shows the communication path status for the connection between the processor operations focal point and the target hardware (CPC) where the target system image is running (LPAR or Basic Mode). Place the cursor on the communication status line and press the PF7 key to see the associated *Processor Operations Interested Operator List* panel. If your operator identifier (the name you use to log on to NetView) is in this list, you should be receiving messages from that path. All other operators whose names are in the list also receive messages from that path.

You check the interested operator list for processor operations resource control messages (the ISQCMON list) by issuing the following NetView command:

```
LIST ASSIGN=GROUP
```

The interested operator list for processor operations is in group +TSCFMON.

How to See SA OS/390 Messages Specified by Message Class

Notification operators are defined during customization of SA OS/390, using the SA OS/390 customization dialog. A notification operator is a NetView console operator who is authorized to receive messages from SA OS/390. The classes of messages which a notification operator is authorized to receive are specified at the time a notification operator is defined. See the tasks below to understand how to display information about a specific notification operator, how to add and delete notification operators, and how to change the messages which a notification operator receives.

Automation manager messages can automatically be received.

Also, you can receive messages from all systems within the sysplex.

Table 7. SA OS/390 Message Classes

Message Class Description	Message Class Number
General Message Classes	
Errors	0
Debug	1
Automation Agent Related Message Classes	
All automation agent messages	40
Down status	41
Up status	42
Information	43
Action	44
Status	45
User intervention	46
Critical threshold setting exceeded	50
Frequent threshold setting exceeded	51
Infrequent threshold exceeded	52

Table 7. SA OS/390 Message Classes (continued)

Message Class Description	Message Class Number
Assist mode alert	55
IMS Automation Messages	60
Automation Manager Related Message Classes	
All automation manager messages	80
Intervention required	81
Automation denied	82
Automation Impacted	83
Awaiting Automation	84
In Automation	85
Degraded - Target resources	86
Degraded - All resources	87
Satisfactory - Target resources	88
Satisfactory - All resources	89
SA OS/390 Infrastructure/Environment	90

How to Get Notify Messages - INGNTFY

In this section, you find all information required for notification operators and
messages about which notification operator should be notified.

Display Settings for a Notification Operator: To display notification operator
settings type DISPNTFY on any command line.

```
AOFKAANT                  SA OS/390 - Command Dialogs    Line  1    of 2
 Domain ID   = IPUFM      ---------- DISPNTFY ----------   Date = 11/07/97
 Operator ID = LRM                                         Time = 13:58:29

    Operator  System   Log  Rcv  Description
    --------  --------  ---  ---  -----------------------------------
    SYSOP     KEY3      Y    Y
    MIK       KEY3      N    N



 Command ===>
   PF1=Help      PF2=End       PF3=Return                PF6=Roll
                               PF9=Refresh               PF12=Retrieve
```

For further information on the DISPNTFY command refer to the *System Automation
for OS/390 Operator's Commands*.

Query a Specific Notification Operator: To display information about a specific
notification operator, type INGNTFY on any command line and type query into the
Status/Action field. Also, type the ID of the operator you want information about
(in the example below, the operator ID is ″NETOP1″).

```
 AOFKAASN                   SA OS/390 - Command Dialogs
 Domain ID   = IPSFM     ---------- INGNTFY ----------    Date = 04/15/02
 Operator ID = OPER                                       Time = 12:49:43

 Specify operator authority:
   Status/Action =>                Operator status:
                                     ON     - Set your notifications ON
                                     OFF    - Set your notifications OFF
                                     ADD    - Add or Modify an operator
                                     DELETE - Remove an operator
                                     QUERY  - Look up an operator
   Operator ID   =>                Operator for ADD, DELETE or QUERY
   Classes       =>                              Up to 10
   Description   =>

   Held Messages - Information      =>      Immediate Action     =>
                   Eventual Action  =>      Immediate Decision   =>
                   System Wait      =>

   System        =>                System name, domain ID or sysplex name

 Command ===>
   PF1=Help     PF2=End     PF3=Return                   PF6=Roll
                                                         PF12=Retrieve
```

Turn On or Off all Notification Messages: Use INGNTFY OFF on a NetView or
operator console to temporarily turn off messages when you do not want to see
them. Use INGNTFY ON on a NetView or operator console to turn the messages
back on when you wish to see them again.

Add a Notification Operator: You can add more notification operators through
the INGNTFY command dialog. Remember that this operator will only be able to
receive messages until the next time the automation control file is loaded, when all
changes made using the operator interface are lost.

To add a notification operator, type INGNTFY on any command line. You see the
panel as shown on page 117. Type add into the *Status/Action* field. Also, type the
ID of the operator you want to add.

In the Classes field, type the class(es) of messages you want this operator to see.
(See Table 7 on page 115 for a list of message classes.) The default classes are 40
and 80.

If you want to hold certain types of messages on this operator's screen, move the
cursor beside the desired Message type (Information, Eventual Action, Immediate
Decision, System Wait, or Immediate Action), and type any character. For more
information on message types, see *System Automation for OS/390 Messages and
Codes*.

Change the Messages a Notification Operator Receives: To change the messages
you or another operator receives, you access the INGNTFY command dialog and
you fill in the panel exactly as if you were adding a new operator. (You do not
have to delete the definition first because the new definition overwrites the old.)

Because the new definition overwrites the old, you need to be careful when you
are changing the messages an operator receives. For example, if the operator was
originally assigned to receive classes 41 and 43, and you typed 44 in the Classes
field, 44 would be the only class that the operator would now receive. If you want
to add a class, you must also type all the classes that were previously assigned.

You can perform a query to find out what messages the operator currently has assigned. See task "Query a specific notification operator" (page 117) for more information.

Delete a Notification Operator: You can also use the INGNTFY command dialog to delete notification operators. Remember that if you use this panel to delete an operator, the deletion will be in effect only until the automation control file is reloaded.

To delete a notification operator, type `delete` into the *Status/Action* field. Also, type the ID of the operator you want to delete. This field can contain any valid NetView operator or the keyword SYSOP. If SYSOP is defined as a notification operator its function is to receive messages to the master console when no other operator is logged on, or to receive specific messages depending on the message classes assigned.

How to Monitor Hardware

You can monitor all hardware, from processors to devices, using processor operations and I/O operations.

You can also monitor hardware resources and you can issue system operations and processor operations commands from the NetView Management Console as described in Chapter 10, "Using the NetView Management Console for SA OS/390", on page 195.

Some General Information About Panels: Pressing the Enter key toggles between a dynamically updated panel and a static panel. If any processor operations screen is updated frequently, it appears to flicker. You may need to place the panel into a static condition to select another function. The `Updates` field in the top right of the panel shows the current mode of the panel (`Dynamic` or `Static`).

Processor Operations Status Information

Processor operations allows you to monitor target processors, target systems, and focal point communication path by using the ISQXDST status panels of your NetView operator console. These panels are available only on a NetView operator console attached to the SA OS/390 processor operations focal point system.

ISQXDST command on NetView console
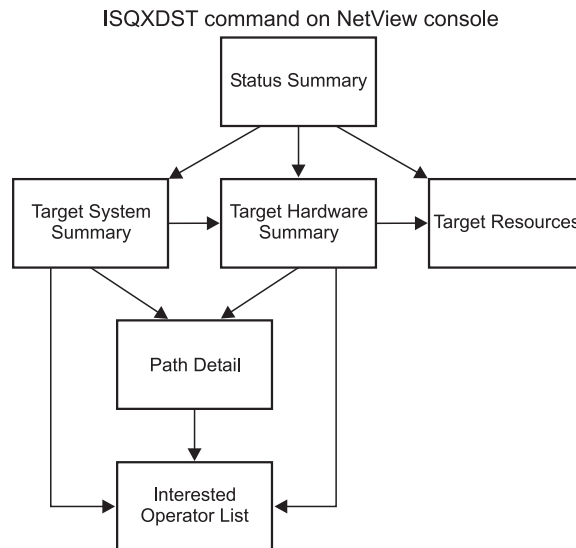
Figure 42. ISQXDST Command on NetView Console

Displaying Processor Resource Information

To view target hardware summary of a processor, select PF9 from the *Target System Summary* panel (Figure 45 on page 124) or from the *Status Summary* panel (Figure 44 on page 123) on a NetView console.

```
ISQEHARP         SA OS/390 Target Hardware Summary  Updates: Dynamic

Target Hardware Name: YORAMA    Type:  9672     Mode: LPAR
                                Model: RX4       Serial Number: 51-0064523

Target Hardware Description: Web Services Backbone Bldg. 14-101

Initialized Target Systems: KEY6         CF61          CF62




Communication Path Error Status:

Last Significant Message:




Enter=Static   PF1=Help  PF3=Exit  PF5=Resource      PF6=Roll
PF7=Oper List  PF11=Path Detail  PF12=Quit
```

Figure 43. Target Hardware Summary Panel for OCF-Based Processors

This panel defines the PF keys as follows:

- PF5 displays the *Target Resources* panel. This panel provides status information about the desired and actual resources available to the target hardware.
- The PF7 key displays the *Processor Operations Interested Operator List* panel (the one accessed with the ISQXMON command).
- PF11 displays the *Path Detail* panel (Figure 46 on page 128). This panel provides detailed status information about a specific NetView path. First place the cursor on the line with the name of the path for which you want more information, and then press PF11.

The *Target Hardware Summary* panels show the following specific information:

Target Hardware Name
> The name assigned to this definition of target hardware in the customization dialog.

Target Hardware Type
> Indicates the machine type of a zSeries or 390-CMOS processor.

Target Hardware Mode
> LPAR, ESA

Target Hardware Description
> Short textual description of this definition of target hardware, defined in the customization dialog.

Initialized Target Systems
> (updated dynamically) List of target systems currently initialized to this target hardware. For non-LPAR-mode target hardware, this field lists one or none. For LPAR-mode target hardware, this field can list multiple target systems. This field is blank if no target systems are initialized to this target hardware.

Communication Path Error Status
> (updated dynamically) Status information in case of a communication problem between the NetView focal point and the target hardware.
>
> Valid values for the status of the NetView connection path are:
>
> **NVC or SNMP SESSION BUSY**
> > (red) Processor operations cannot presently communicate with the target support element, the problem appears recoverable.
>
> **NVC or SNMP SESSION PROBLEM**
> > (red) Processor operations cannot communicate with the target support element.

Last Significant Message
> The last significant message or alert associated with this target hardware

Display Target Resource Status

To access the *Target Resources* panel, press the PF5 key at one of the following panels:

- *Status Summary* panel
- *Target System Summary* panel (if the target system is running on target hardware that is not in LPAR mode)
- *Target Hardware Summary* panel

Actual resource information is gathered by ISQXDLC and ISQXIPL CHECK for 9021, 9121, or 3090 systems only.

```
ISQETHR          SA OS/390 Target Resource              Updates: Dynamic

Target Hardware Name: FREEWAY                       Mode: LPAR

Description: Query Server, SAP, Linux Farm

Reset Profile Name: PROD1

Load Profile Name:












Enter=Static PF1=Help PF3=Exit PF6=Roll PF12=Quit
```

The *Target Resources* panel shows the following information:

Target Hardware Name
> The name assigned in the customization dialog to this definition of target hardware.

Target Hardware Mode
> LPAR, ESA.

Target Hardware Description
> A short textual description of target hardware as defined in the customization dialog.

Load Profile Name
> The Load profile name defined at the support element. With LPAR mode, this field is empty.

Reset Profile Name
> The Reset profile name defined at the support element.

Display Target System LPAR Resources

You access the *Target System LPAR Resource* panel by pressing PF5 at the *Status Summary* panel from Figure 44 on page 123 or at the *Target System Summary* panel from Figure 45 on page 124, if the target system is running in a logical partition.

The *Target System LPAR Resource* panel shows the status of the resources available to the target system. The actual hardware resources for an image or a processor can be viewed by using an HMC. This applies for SNMP connections only. With NVC connections you can use ISQSEND <target> SC PROFILE <profile options> to display or change activation profiles. With SNMP connections you can use the command ISQCCMD <target> APROFILE <aprofile options> to display or modify a subset of the activation profile fields.

```
ISQETSR        SA OS/390 Target System LPAR Resource Updates: Dynamic


Target Hardware Name: FREEWAY        Target System Name: KEY4
Description: Online Accounting Services
                                              Mode: ESA
                                         LPAR Name: KEY4
                                 Image Profile Name: KEY4
                                  Load Profile Name: KEY4L




 Enter=Static  PF1=Help                 PF3=Exit
```

The *Target System LPAR Resource* panel shows the following specific information:

Target Hardware Name
>   The name assigned in the customization dialog to this definition of the target hardware.

Target System Name
>   The name assigned in the customization dialog to this definition of the target system.

Target Hardware Mode
>   ESA, CF, LINUX.

Target System Description
>   A short textual description of target system as defined in the customization dialog.

Image Profile Name
>   The Image profile name defined at the Support Element.

Load Profile Name
>   The Load profile name defined at the Support Element.

How to Monitor Processor Status

Processor status can be monitored by viewing the status of a system icon on the NMC workstation or processor status can be seen in more detail using the processor operations 3270-type panels. On the NMC workstation, the status of a system icon represents the aggregation of status of the target's operating system software and its underlying processor hardware. You can see at a glance whether the systems for which you are responsible have satisfactory status.

Refer to Chapter 10, "Using the NetView Management Console for SA OS/390", on page 195 for information on how to enter commands against an unsatisfactory processor operations object.

This section contains the following subsections that describe certain aspects of monitoring processor status:
- "View Status Summary of all Target Systems"
- "View One Specific Target System" on page 123

View Status Summary of all Target Systems
On a *3270 console*, issue isqxdst (with no parameters) on a NetView console. The *Status Summary* panel is displayed.

```
ISQESUM                    SA OS/390 - Status Summary      Updates: Dynamic  1

ProcOps control dataset in use: SATEST.SYSTEM.V211.IPVFJ.ISQCNTL

Place cursor on desired system and press PF key for more details

Target System Name     Status  3

    CFA            CLOSED
    CFB            CLOSED
    CFF            CLOSED
    CF1            UNKNOWN
    CF61           INITIALIZED
    CF62           INITIALIZED
    KEYA           STAGE-1 ACTIVATE COMPLETE
    KEYB           IPL COMPLETE
    KEY1           IPL COMPLETE
    KEY2           INITIALIZED
    KEY3           INITIALIZED
    KEY4           IPL COMPLETE
    KEY5           WAITING FOR IEA101A MESSAGE
    KEY6           IPL COMPLETE
    KEY6B          POWERED OFF
    KEY7           IPL COMPLETE
    OLI1           NOT ACTIVE
    PTHTIE1        LOAD FAILED

Enter=Static  PF1=Help PF3=Exit PF4=Target System Summary PF5=Resource  2
PF6=Roll     PF7=Up   PF8=Down PF9=Target Hardware Summary  PF12=Quit
```

Figure 44. Status Summary Panel

1   This indicates whether updates are static or dynamic (it changes automatically whenever the status changes). You can toggle to a static state with the Enter key (for example, when you want to enter a choice).

2   The PF keys allow you to invoke other status panels.

3   The status that you see for a target system represents the most severe condition that exists for that system. These values are extracted from the *status, target hardware, attention,* and *console summary* status fields of the **Target System Summary** panel (see illustration in task below).

View One Specific Target System

On a *3270 console*, use ISQXDST followed by the name of the target system on a NetView console. The **Target System Summary** panel is displayed.

```
ISQETARG            SA OS/390 Target System Summary   Updates: Dynamic

 Target System Name: KEY4
 Target System Description: Online Accounting Services
 Status         : IPL COMPLETE
 Target Hardware:
 Attention      :

 Target Hardware: FREEWAY            O.S.     : MVS
 Mode           : LPAR              LPAR Name: KEY4


 Connection Path Information

         Type  : SNMP
         Status: ACTIVE

 Lock Holder    : IGORDON


 Last Significant Message:
 ISQ417I CMD STATUS(ACCEPTED)

 Enter=Static  PF1=Help PF3=Exit  PF5=Resource   PF6=Roll PF7=Oper List
 PF9=Target Hardware    PF11=Path Detail PF12=Quit
```

Figure 45. Target System Summary Panel

This panel defines the PF keys as follows:

- The PF5 key displays the "Resource" status panel for the selected target system. If the target system runs in a logical partition, you will go to the *Target System LPAR Resource* panel. If the target system runs in target hardware that is not in LPAR mode, you will go to the *Target Resources* panel. These panels provide status information about the desired and actual resources available to the target system, and are identical for target systems running on target hardware not in LPAR mode.

- The PF7 key displays the *Processor Operations Interested Operator List* panel (the one accessed with the ISQXMON command).

- The PF9 key displays the *Target Hardware Summary* panel (Figure 43 on page 119). This panel provides detailed status information about the target hardware on which the target system is defined.

- The PF11 key displays the connection *Path Detail* panel. This panel provides detailed status information about a specific connection path.

The *Target System Summary* panel shows the following specific information:

Target System Name
> The name assigned in the customization dialog to this target system.

Target System Description
> Short textual description of this target system, defined in the customization dialog.

Status (updated dynamically) The current value of the processor operations internal variable *tstat*.

> You can change this status from INITIALIZED, LOAD FAILED, or IPL FAILED to IPL COMPLETE by issuing the ISQVARS command to change the internal variable *tstat*. (For more information about specifying *tstat* as a keyword on the ISQVARS command, see the description of the ISQVARS command in *System Automation for OS/390 Operator's Commands*). You would want to do this when you perform a cold start of processor operations while a target system is already running. After the cold start,

you issue the ISQXIII command to the target system that is already running so its status becomes INITIALIZED, then you change the value of *tstat* to IPL COMPLETE. You may also want to change the status manually if the cause of the LOAD FAILED status was corrected by using the pass-through facility of processor operations, or if it was corrected locally at the site of the target system.

You can also issue the ISQVARS command to change the internal variable *tstat* from IPL COMPLETE to IPL FAILED. Processor operations sets a status of IPL COMPLETE when it initiates a load of a target system and receives an operating system specific message which indicates, the operating system received a level where it is ready to work. However, neither of these operating systems provide a sufficient indication that the load process failed, preventing processor operations from changing the target system status appropriately.

Valid values for this status field are as follows:

CLOSED
> (green) The target system has been closed.

INITIALIZED
> (green) The target system has been successfully initialized.

IPL COMPLETE
> (green, yellow, or red) For a TPF or VSE system, the Load or Load Clear process started. For an OS/390 system, processor operations automation responded to the IEA347A message. For a VM system, processor operations automation responded to the VM start message. If this condition is displayed in red, this is done to get your attention to inform you that something is wrong (such as processor operations lost its communication link with the target system) rather than that the IPL process failed. This condition will revert to being displayed in green when the problem is corrected.

STAGE-1 ACTIVATE COMPLETE
> (yellow) The Support Element power-on reset has occurred but the load is not yet complete.

NOT ACTIVE
> (yellow) Activate response was received from the target and did not indicate that stage-1 activation was complete. If the target is running in an LPAR, the logical partition is found not activated.

IPL FAILED
> (red) OS/390 only — Error messages were generated during the initial program load process.

LOAD FAILED
> (red) The Load or Load Clear operation did not complete successfully.

UNKNOWN
> (green) No attempt has been made to initialize or activate this target system. This status can be set only by a cold start of processor operations.

WAITING FOR IEA101A START MESSAGE
> (yellow or red) OS/390 only: ACTIVATE, ISQXIPL, or ISQXLOD command processing has completed for an OS/390 system and processor operations is waiting for the IEA101A message on the

operator console. If this condition is displayed in red, it is to get your attention to inform you that something is wrong (such as processor operations lost its communication link with the target system) rather than that processor operations has been waiting for the message too long.

WAITING FOR IEA347A MESSAGE
(yellow or red) OS/390 only: processor operations has replied to the IEA101A message and is waiting for the IEA347A message on the operator console. If this condition is displayed in red, this is done to get your attention to inform you that something is wrong (such as processor operations lost its communication link with the target system) rather than that processor operations has been waiting for the message too long.

WAITING FOR VM START MESSAGE
(yellow or red) VM only: processor operations is waiting for the first VM IPL message on the Support Element CI. The ACTIVATE or LOAD command processing has completed for a VM system and processor operations is waiting for the first VM IPL message. If this condition is displayed in red, it is to get your attention to inform you that something is wrong (such as processor operations lost its communication link with the target system) rather than that processor operations has been waiting for the message too long.

Target Hardware
(updated dynamically) The current value of the processor operations internal variable *thwstat*. Valid values are as follows:

blank   (not highlighted) No problem has been reported for the target hardware. You can also use the ISQVARS command to change *thwstat* to blanks after correcting an error condition reflected in this field.

TARGET HARDWARE PROBLEM
(red) The Support Element of the processor (CPC) reported a target hardware problem.

POWERED OFF
(red) The CPC is physically powered off.

Attention
(updated dynamically) The current value of the processor operations internal variable *tattn*. Valid values are as follows:

blank   (not highlighted) The target system has not encountered any of the following conditions. You can also use the ISQVARS command to change *tattn* to blanks after correcting an error condition reflected in this field.

DCCF   (red) OS/390 only — Processor operations has detected a DCCF message.

DISABLED WAIT
(red) Processor operations has detected a Disabled Wait condition.

Target Hardware
The name of the target hardware on which this target system is running.

O.S.   MVS, VM, VSE, LINUX, or CF

Mode   LPAR, ESA, 370

LPAR name
>The name of the logical partition in which this target system is running.

Connection Path Information
>Identifies the connection type and current status of the connection between the processor operations focalpoint and the CPC support element or HMC.

Type NVC (SNA based NetView connection), SNMP (IP based Simple Network Management Protocol connection.

Status (updated dynamically) The current value of the processor operations internal variable scstat.

>**blank** (not highlighted) Either the target system has not encountered any of the following conditions, or the condition has been resolved.

>**PATH PROBLEM**
>>(red) The focal point system cannot communicate with the Support Element on the NetView connection. Look at the Path Detail panel for more information (Figure 46 on page 128).

>**ACTIVE**
>>(green) The path is ready for communications.

>**NVC SESSION BUSY**
>>(red) Processor operations cannot presently communicate with the target Support Element, the problem appears recoverable.

>**NVC SESSION PROBLEM**
>>(red) Processor operations cannot communicate with the target Support Element.

>**SNMP SESSION BUSY**
>>(red) Processor operations cannot presently communicate with the target Support Element, the problem appears recoverable.

>**SNMP SESSION PROBLEM**
>>(red) Processor operations cannot communicate with the target Support Element.

Lock Holder
>(updated dynamically) The current NetView operator owning the lock for the target system and the connection path. Locks can be set and unset using the ISQXLOC and ISQXUNL commands. Locks grant the exclusive use of a connection path of a target hardware and its associated target systems.

Last Significant Message
>(updated dynamically) The text of the last command response or report received from the target system. The date and time of the message are also displayed. The text of the message is truncated to 79 characters, including the message identifier but not including the time stamp. The message is not removed from the panel when the condition that generated the message is resolved.

How to Monitor Communications Path Status
The communications paths from the processor operations focal point system to target systems are of two types: NVC and SNMP. For these types of path, you can display details of the connection.

Display Path Details: Press PF11 at the *Target System Summary* panel or at the *Target Hardware Summary* panel.

```
 ISQEPNVC              SA OS/390 PATH Detail      Updates: Dynamic

  Target Hardware Name: FREEWAY        Connection Type: SNMP

  Network ID         : DEIBMD1        LU Name        : X7F1E30A

  Support Element IP Address or Hostname:
  9.164.172.200

  Hardware Management Console IP Address or Hostname:
  SAHMC

  Connection Authorization: POKLICKO   Lock Holder    : IGORDON

  PATH Status    : ACTIVE

  Poll Frequency : 30
  Poll Retries   : 2

  Last Significant Message:



  Enter=Static          PF1=Help          PF3=Exit          PF6=Roll
  PF7=Oper List         PF12=Quit
```

Figure 46. Path Detail Panel

The *Path Detail* panel shows the following information:

Target Hardware Name
: The name assigned in the customization dialog for the processor to which this connection path details belong.

Connection Type
: Type of path assigned in the customization dialog to be used for communication between the processor operations focal point and the target hardware.Connection types can be the following:

  SNMP
  : IP based communications protocol which requires that the address information for either SE or HMC are defined. If both addresses are customized in the customization dialog, the SE address has priority.

  NVC SNA based communications protocol requiring the CPC SNA address.

LU Name
: The NAU part of the CPC SNA address, which is also the logical unit name assigned to the NetView connection path.

Network ID
: The NETID part of the CPC SNA address, which is also the name of the SNA network ID for the NetView connection.

Support Element IP Address or Hostname
: The name or IP address assigned in the customization dialog to the SE of this target hardware.

Hardware Management Console IP Address or Hostname
: The name or IP address assigned in the customization dialog to the HMC of this target hardware.

Connection Authorization
In case of an NVC connection, the authorization token is displayed. For SNMP connections the community value is shown. The authorization values are defined in the customization dialog for a selected target hardware.

Lock Holder
(updated dynamically) The current NetView operator owning the lock for the connection path. Locks can be set and unset using the ISQXLOC and ISQXUNL command. Locks grant the exclusive use of a connection path.

Path Status
(updated dynamically) The status of the NetView path. Valid values are:

UNKNOWN
(green) No command was ever issued to this path name.

ACTIVE
(green) The path is ready for communications.

PATH PROBLEM
(red) The focal point system cannot communicate with the Support Element on the NetView connection. This status is accompanied by a Last Significant Message.

Path Frequency
The time (in minutes) that processor operations should poll the Support Element for status.

Poll Retries
(updated dynamically) The number of attempts to retry that should occur before processor operations notifies the operator that the connection failed.

Last Significant Message
(updated dynamically) The text of the last command response or report received from the target system. The text of the message is truncated to 79 characters, including the message identifier but not including the time stamp. The message is not removed from the panel when the condition that generated the message is resolved.

How to Monitor Alerts on a NetView Console
Alerts are high priority events that require operator action.

Issue NPDA from the command line of your NetView operator's console. The NPDA (Network Problem Determination Application) menu will be displayed. You can request a dynamic display of alerts. From that display you can select an individual alert and see event detail and recommended action. For more details on the use of the NPDA panels, refer to *Tivoli NetView for OS/390 User's Guide*.

Monitoring with the Status Display Facility (SDF)

The Status Display Facility (SDF) displays the status of various resources of an OS/390 system, and of other OS/390 systems that specify this system as an automation focal point. The resources that can be displayed by SDF include:
- applications and subsystems
- WTORs
- gateways.
- application groups

> **Note:** A *gateway* is a combination of a NetView-NetView task session and two automation operators (one on each of two systems) that allows communication of messages, commands, and responses between the two systems.

SDF also shows spool usage problems and ASSIST requests from OS/390 subcomponents. SDF consists of a hierarchy of dynamically updated panels showing color-coded status conditions. SDF is set up during the customization of SA OS/390.

Use the status display facility (SDF) to monitor the status of application software, WTORs and gateways on your systems from a NetView or operator console.

All the resources you need to monitor are set up by hierarchical arrangement during customization. At this time, the system programmer:

1. Defines the SDF hierarchy.

   The SDF hierarchy indicates which automated resources are affected by status changes in other automated resources (see "How SDF Works" on page 133). The SDF hierarchy can be different from that specified in the automation control file for system startup and shutdown. Use whatever makes sense for your system.

   If SDF displays more than one system, programmers create an SDF hierarchy for each system.

2. Creates the panels that show the systems and subsystems. These panels can also be customized to display gateway sessions and WTORs.

3. Determines the status colors and other screen defaults for the enterprise or takes the defaults for these attributes.

For information on setting up SDF, see *System Automation for OS/390 Programmer's Reference* and *System Automation for OS/390 User's Guide*. Because SDF can be customized, your panels may not look like those shown in this topic.

SDF Focal Point Monitoring

At first you need to construct an SDF screen that contains all systems within your sysplex. This will give you an *at a glance* panel that will be dynamically updated with the overall status of each system in your sysplex. By selecting an individual system, you can view a more detailed display of the state of the resources on that system.

On the focal point, you can now issue a command, specifying a target system. The command interacts with the target system (via XCF or RMTCMD) and gives you a full screen display as if you were logged on to the target system.

This means that from SDF you can issue DISPINFO on a target subsystem by simply pressing a key. This allows you to see detailed information about a subsystem that has a problem.

Other commands that support this kind of usage include:
- DISPERRS
- DISPFLGS
- DISPSTAT
- DISPTREE
- INGINFO
- INGREQ

- INGTHRES
- INGVOTE
- SETSTATE

All of these commands can be used from the focal point to interrogate the target system without having to log on to it.

> **Note**
>
> If the target system is not in the same sysplex as your focal point system, then RMTCMD will be used for the inter system communication. This means that there is a dependency upon VTAM being active on both the focal point and the target system for communication to be possible.
>
> If the target system is in the same sysplex, then communications occur via XCF and you do not need to have VTAM active on the target system to talk to it.

Interpreting Colors in the SDF and DISPSTAT

In SDF and on the DISPSTAT command dialog, subsystems appear in different colors which indicate their status. In SDF, the condition of WTORs and gateways is also indicated by color.

Subsystem Colors and Priorities

The color of a subsystem on a DISPSTAT command dialog panel and the color and the highlighting of a subsystem in SDF indicate the current status of a subsystem (the possible status conditions are defined in "Automation Agent Statuses" on page 34). The following list shows the default color (and highlighting) assigned to each status when SA OS/390 was shipped. White is also used by default to identify status components without a tree structure. These colors may have been changed for your SDF display. Blinking as a means of highlighting is not used by all types of display, in particular when you are using 3270 terminal emulation on a PC. You may see another type of highlighting, for example, black text on a white background.

Table 8. Table of Default Subsystem Status Colors and Priorities

Color	Highlight	Status	Priority
Red	Reverse	BROKEN	120
Red	Blinking	BREAKING	130
Red	Underline	INACTIVE	140
Red	Normal	STOPPED	150
Pink	Normal	HALFDOWN	220
Pink	Blinking	STARTED2	230
Pink	Underline	STUCK	240
Pink	Reverse	ZOMBIE	250
White	Reverse	ABENDING	320
White	Underline	HALTED	330
White	Blinking	ASSIST	340
Yellow	Reverse	STOPPING	420
Yellow	Normal	AUTOTERM	430

Table 8. Table of Default Subsystem Status Colors and Priorities (continued)

Color	Highlight	Status	Priority
Yellow	Underline	ENDING	440
Turquoise	Blinking	RUNNING	520
Turquoise	Reverse	ACTIVE	530
Turquoise	Underline	STARTED	540
Turquoise	Normal	RESTART	550
Turquoise	Blinking	EXTSTART	550
Green	Normal	UP	640
Green	Underline	ENDED	650
Blue	Underline	DOWN	730
Blue	Normal	AUTODOWN	740
Blue	Blinking	CTLDOWN	750
Blue	Reverse	MOVED	760
Blue	Normal	FALLBACK	770

Each automation status is assigned a priority number, which SDF uses to determine what color to display if there are multiple status conditions present in a system. The status conditions are listed in the preceding table in order of descending priority. In other words, the first status listed is the status with the highest priority, and the one whose color will dominate. All of the colors and priorities listed above are defaults, and can be modified when a customer defines SA OS/390 policy.

Note: Panels can be modified according to your needs.

MVS Subcomponent Colors
Blinking white is used to display MVS subcomponents that are in ASSIST mode.

Gateway Colors
Besides displaying the status of subsystems, SDF uses colors to show the status of gateway sessions. The following list explains what the gateway colors indicate:

Color	What it means
Reverse Turquoise	Gateway is active
Red	Gateway is inactive

Spool Colors
SDF uses the following colors to show the status of spools.

Color	What it means
Green	Spool is OK
Yellow	Spool is short
Red	Spool is full

WTOR Colors
SDF also uses colors to show what type of WTOR each displayed WTOR is, based on classifications that have been specified using the customization dialog. See

System Automation for OS/390 Defining Automation Policy for more details.

Color	What it means
Green	WTOR is normal
Yellow	WTOR is unusual
Red	WTOR is important

Using SDF

You use SDF to monitor the status of subsystems, WTORs, and gateways on your system and other systems. To monitor status, you watch the highest level SDF panel (also known as the root panel or system summary panel). The following example shows a panel with the systems of a sysplex. This panel displays for example, systems, subsystems, WTORs or gateways within this sysplex.

```
 SYSTEM              SA OS/390 - SUPPORT SYSTEMS

    System   Subsystems   WTORs     Gateways   Products  System

     KEY1      HUGC2APL0     NETATST1  IPSFPO    C I D O    P V M B T U

     KEY2      IMS723C4      IMS721M1  IPSFNO    C I D O    P V M B T U

     KEY3      IMS733C4      NETATST3  IPSFOO    C I D O    P V M B T U

     KEY4                                        C I D O    P V M B T U

     XXXX                                        C I D O    P V M B T U




                                                  07/12/00 08:45
  ===>
 1=HELP 2=DETAIL 3=RETURN   6=ROLL    8=NEXT SCR    10=LEFT 11=RIGHT 12=TOP
```

Figure 47. Example SDF System Summary Panel

On this panel, each system is displayed in a color that reflects the highest priority status of the resources in that system. If a resource in a system changes status, the system changes color to reflect the new status. By watching this panel you will see status changes in any system.

Imagine, KEY1 HUGC2APL0 is displayed in red reverse on your screen, which means, the subsystem HUGC2APL0 on system KEY1 is in status BROKEN. To view more information on this subsystem, move the cursor to HUGC2APL0 (or KEY1) and press PF2 to get a panel as shown in "How to Check Resource Status Conditions" on page 134.

How SDF Works

SDF uses the hierarchy established during SDF customization to propagate colors up to the highest level panel. The following figure shows a graphic representation of an example SDF hierarchy for KEY1:

KEY1
YELLOW

SYSTEM
YELLOW

GATEWAY
GREEN

WTOR
GREEN

APPLICATION
YELLOW

APPLGROUP
GREEN

AOCAPPL
GREEN

JES
GREEN

VTAM
GREEN

TSO
YELLOW

RMF
GREEN

AOCSSI
GREEN

Airline Reservation
GREEN

DB2_GROUP
GREEN
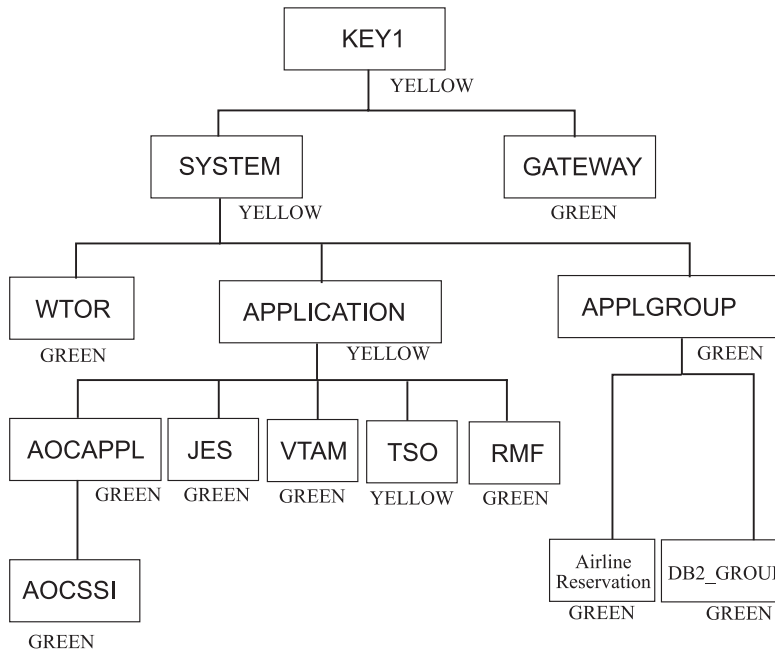
Figure 48. Example SDF Hierarchy for KEY1

Imagine that TSO appears in yellow on your screen because it is in AUTOTERM status. This color is reflected up the hierarchy to APPLICATION, SYSTEM, and KEY1, because AUTOTERM has a higher priority than the status UP (indicated by the color green). If various resources in a system have different status conditions, the one with the highest priority status controls the color of that system. This allows you to resolve issues concerning the highest priority status first, then deal with the lower priority status conditions.

How to Access SDF

To access SDF, type SDF on a NetView command line or type 3 (SDF) on the command line of the SA OS/390 System Operations menu (see "Using Command Dialogs" on page 64).

You see the highest level (or root) panel of SDF. Figure 47 on page 133 shows an example of the highest level panel for the SA OS/390 supported systems. On this panel, **KEY1 HUGC2APL0** is highlighted to indicate that it appears in red on your screen, which means that subsystem HUGC"APL0 on KEY1 is BROKEN. All other systems may appear in green, which means UP.

How to Check Resource Status Conditions

Normally when you use SDF to monitor resources, you watch the highest level panel until you see a system change color. This color change indicates a change in status in one of the resources in the system. To determine which resource, and to see more information on the status change:

1. Move the cursor to the system (or subsystem) that shows a status change.
2. Press PF2. This takes you to the Detail Status Display panel for the resource that caused the system to change color.

   If more than one resource changes status at the same time, SDF shows the information for the system with the highest priority status first. See "Subsystem Colors and Priorities" on page 131 for information on status priorities. You can press PF8 to page through the Detail Status Display panels for other resources on KEY1.

For example, in the Best Goods Company, you move the cursor to MVSESA3 (the system in red). When you press PF2, you see the Detail Status Display panel for DB2, which is the resource with the highest priority, because it is BROKEN.

```
                ---- DETAIL STATUS DISPLAY ----
                                                      1 OF  514


      COMPONENT: HUGC2APL0            SYSTEM   : KEY1

      COLOR    : RED                  PRIORITY :     120

      DATE     : 07/17/00             TIME     : 10:11:42

      REPORTER : GATIPUFA             NODE     : IPUFA

      REFERENCE VALUE: HUGC2APL0

       AOF571I 10:11:42 : KEY1.HUGC2APL0 SUBSYSTEM STATUS FOR JOB HUGC2A0 IS
       BROKEN




  ===>
 1=HELP  3=RETURN 4=DELETE  6=ROLL 7=UP 8=DOWN 9=ASSIST 11=BOTTOM 12=TOP
```

Figure 49. Example SDF Detail Status Display Panel for HUGC2APL0

This panel also shows the automation or human operator that sent the notification and gives the priority number that corresponds to the automation status. Priority numbers determine which color the resource is displayed in and the order of the Detail Status Display panels (the lower the number the higher the priority).

In this example, the panel is one of four Detail Status Display panels (as indicated at the top right corner of the panel), one for each of the resources under MVSESA3 that has detail information. Press PF8 to see the Detail Status Displays for the other resources. PF8 pages through the displays in order of descending status priority.

To return to a particular panel, you can press PF7, which pages through the displays in order of ascending priority, or you can press PF12, which takes you back to the first Detail Status Display in the stack, the one with the highest priority status.

PF3   Returns to the system panel.

PF4   Deletes the panel you are currently on. (The record is physically deleted.)

       Note: You should normally not use this PF key.

PF9   Takes you to the Operator Assist panel when in assist mode.

PF11   Moves to the Detail Status Display panel for the resource with the lowest priority, the last panel in the Detail Status Display stack.

PF12   Moves to the Detail Status Display panel for the resource with the highest priority, the first panel in the Detail Status Display stack.

Note: PF keys can be customized. How to achieve this is described in the *System Automation for OS/390 Programmer's Reference*.

How to Look at the Resource Hierarchy

To look at the resource hierarchy, select a resource with the cursor and press PF8 to go down a level or PF7 to go up a level.

```
Resource Status for System Boulder1

System    Subsystem   WTORs     Gateways    Spool   MVS Comps
FOC1      SDSF        NetView               JES2
FOC2      AOCAPPL3
TGT1      AOCSSI
TGT3      JES
SYS1      VTAM
SYS2      TSO
SYS4      RMF
```

How to Monitor WTORs with SDF

To view a WTOR through SDF, - if SDF is set up to display WTORs - , you can type SDF on a NetView console to use the status display facility. Position the cursor on a job under WTORs (for example, INGESO, in the following panel extract) and press PF2 for more details. A Detail Status Display panel will be shown, containing text and information about an outstanding WTOR message.

```
Resource Status for System Boulder1

System       Subsystem   WTORs       Gateways    Spool   MVS Comps
SYS_TSCF2    INGESO      INGESO                   JES2
```

How to Monitor Application Groups with SDF

To view application groups through SDF, - if SDF is set up to display application groups (see also "How SDF Works" on page 133 - , you can type SDF on a NetView console to use the status display facility. By using PF8 (ZOOM), navigate to the SUMMARY STATUS panel for the system, for which you want to monitor application groups. In our customized example from Figure 50, we selected system *KEY3*.

```
   KEY3
                              SUMMARY-STATUS
                                  KEY3

                    >WTOR          >GATEWAY
                    >MESSAGES      >MVSCOMP

                    !-------------------!

                             >MVS

                             >SYSTEM

                    >APPLS          >GROUPS

                             >TEST




                                              06/05/00 14:02
   ===>
  1=HELP 2=DETAIL 3=RETURN 6=ROLL 7=UP     8=ZOOM    12=TOP
```

Figure 50. SDF Summary Status Panel

Now position the cursor under GROUPS and press PF8. In our example, we will see a customized panel containing information about application groups on *KEY3*.

```
 KEY3                    KEY3:  APPLGROUP-STATUS


    QFETCH

    SYBNET_G

    SYBSYS_G



                                                        06/05/00 14:13
  ===>                               13=EXPLAIN            17=START 18=STOP
 1=HELP 2=DETAIL 3=RETURN 6=ROLL 12=TOP  20=APPLGR 21=ACF 22=ASF 23=LIST 24=INFO
```

Positioning the cursor on an application group of your choice and pressing PF2 (DETAIL) will display the SDF Detail Status Display panel for the selected application group, in our example, *QFETCH* (see Figure 51).

```
                ---- DETAIL STATUS DISPLAY ----
                                                   1 OF    3


       COMPONENT: QFETCH              SYSTEM   : KEY3

       COLOR    : PINK                PRIORITY :      490

       DATE     : 06/05/00            TIME     : 12:57:08

       REPORTER : AUTMSG              NODE     : IPSNO

       REFERENCE VALUE: QFETCH

        QFETCH GROUP STATUS FOR SYSTEM APPLGROUP IS CTLDOWN


  ===>
 1=HELP   3=RETURN        6=ROLL 7=UP 8=DOWN 9=ASSIST 10=QUIT   11=BOTTOM 12=TOP
```

Figure 51. SDF Detail Status Display Panel for an Application group

How to Monitor and Control a Sysplex

SA OS/390 provides a command interface to monitor and operate sysplexes. It helps operators to manage critical sysplex resources like coupling facilities and CF structures, couple data sets, and more. You can benefit from reduced sysplex operations complexity leading to higher sysplex availability and greater productivity.

The following section describes the panels of the system operations commands that support you in working with sysplex specific automation tasks. For details about the syntax and parameters of these commands, refer to *System Automation for OS/390 Operator's Commands*.

How to Work with Sysplex Automation

SA OS/390 provides the command INGPLEX to monitor and control the couple data sets and coupling facilities of your sysplex.

If you enter INGPLEX in the command line without any parameters, the following selection panel is displayed:

```
 INGLX000                    SA OS/390 - Command Dialogs
 Domain Id    = IPSFO      --------- INGPLEX ---------        Date = 10/02/01
 Operator Id = OPER                                           Time = 15:34:10

 Sysplex . . . . . . : KEY1PLEX

 Select the desired command:                                 INGPLEX ...

   1 Display systems (including ETR & signalling paths)        SYStem

   2 Display consoles                                          CONsole

   3 Control coupling facilities                               CF

   4 Control couple data sets                                  CDS


   6 Display IPL information                                   IPL

   7 Control dumps                                             DUMPS




 Command ===>
 F1=Help      F2=End      F3=Return                           F6=Roll
                                                              F12=Retrieve
```

Figure 52. INGPLEX Selection Panel

Specify the number or the function and press ENTER.

These subcommands support the following functions:

SYStem
> Displays the target sysplex name, its GRS mode and its systems. For each system, details about the system name and status are shown.

CONsole
> Displays details about the target sysplex. For example, the master console name, WTO and WTOR buffer utilization, and the number of queued messages.

CF   Displays the coupling facilities in the sysplex. For each coupling facility the structures and paths can be displayed, and the coupling facility can be drained and enabled.

CDS   Displays the couple data sets in the sysplex. For each couple data set you can obtain detailed information, and you can switch the couple data sets or allocate new alternate couple data sets.

IPL   Collects IPL information.

DUMPS
> Displays the DUMP submenu.

These functions are described in more detail in the following chapters.

INGPLEX SYStem
INGPLEX SYStem displays the target sysplex name, its GRS mode and details about its systems.

```
AOFKX100                    SA OS/390 - Command Dialogs         Line 1    of 4
Domain ID   = IPSFO          ----- INGPLEX SYSTEM ------        Date = 10/02/01
Operator ID = OPER                                             Time = 16:11:29

Sysplex . . . . . . : KEY1PLEX
GRS Mode  . . . . . : STAR

 Display more info:  C CPU  E ETR  I IPL  O IOS  S STOR/ESTOR
  Signalling Path :  D device  T structure
                           Monitor              ----------- SSUM -----------
Cmd  System    Status   Timestamp  INTERVAL  Action       TIME       WEIGHT
---  --------  -------- ---------  --------  ----------   --------   ------
 _   KEY1      ACTIVE   16:11:25   86400     PROMPT       86400      1
 _   KEY2      ACTIVE   16:11:25   86400     PROMPT       86400      1
 _   KEY3      ACTIVE   16:11:27   86400     PROMPT       86400      1
 _   KEY4      ACTIVE   16:11:23   86400     ISOLATE      0          1




Command ===>
F1=Help      F2=End       F3=Return                          F6=Roll
                          F9=Refresh                         F12=Retrieve
```

Figure 53. INGPLEX SYStem Panel

- The **Sysplex** field shows the name of the sysplex.
- The **GRS Mode** field shows the GRS mode of the target system. The mode can be either STAR or RING.
- The **CMD** column allows you to specify one of the command codes to display more information. Type the appropriate letter next to the resource name, and press ENTER.
- The **System** column shows the name of the system.
- The **Status** column shows the status of the system.
- The **Monitor Timestamp** column shows the last time stamp recorded for status monitoring on this system.
- The **INTERVAL** column shows the system failure detection interval in seconds. This interval is the time XCF lets elapse without a status update before assuming that the system failed.

The last three columns contain configuration data of the SFM policy (if applicable).

- The SSUM Action field shows the SSUM action. It can be one of the following:
  - ISOLATE
  - DEACTIVATE
  - RESET
  - PROMPT
  - N/A
- The SSUM TIME field shows the SSUM interval as specified in the current SFM policy.
- The SSUM WEIGHT field shows the SSUM weight specified in the current SFM policy. This weight is used in sysplex configurations after a signalling connectivity failure.

To display more detailed information, enter the following command codes:

C   Displays the status of selected central processors

E   Displays the timer synchronization mode and ETR ports

I   Displays IPL information

O   Displays IODF data

S   Displays the number of megabytes of central and expanded storage
         assigned and available to the system

D   Displays detailed information about signalling path data for specific
         signalling paths

T   Displays detailed signalling path information for all coupling facility
         structures

Note: The INGPLEX SYStem command replaces the command DISPXSYS used in
         previous releases of SA OS/390.

INGPLEX CONsole

INGPLEX CONsole displays the following information for the target sysplex:

- The name of the master console
- WTO & WTOR buffer utilization
- Number of queued messages (replies) of various types
- Number of outstanding mount requests
- Number of operator requests and list of consoles (name, status, authority,
  number of WTOR buffers, UD, device, system, ALTGRP, MSCOPE)

```
 INGLX400                SA OS/390 - Command Dialogs     Line   1   of 6
 Domain Id   = IPSFO      ----- INGPLEX CONSOLE -----          Date = 10/02/01
 Operator Id = OPER                                            Time = 16:13:35

 Sysplex  . . . . . . : KEY1PLEX       Master Console . . . : --none--
 Message Buffer Usage : 10 / 9999      Reply Buffer Usage . : 10 / 99
 Awaiting Replies . . : 10             Eventual Action  . . : 0
 Immediate Action . . : 0              Awaiting Mounts  . . : 0
 Critical Action  . . : 3              Operator Requests  . : 0
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds: D Details / R Requests

   Console   Status    AUTH    NBUF  UD  Device  System    ALTGRP    MSCOPE
   --------  --------  ------  ----  --  ------  --------  --------  --------
 _ MASTER    INACTIVE  MASTER  n/a   Y   -none-  --none--  --none--  *ALL
 _ MASTER1   INACTIVE  ALL     n/a   N   -none-  --none--  --none--  *ALL
 _ 03        INACTIVE  MASTER  n/a   N   -none-  --none--  --none--  *ALL
 _ 04        INACTIVE  MASTER  n/a   N   -none-  --none--  --none--  *ALL
 _ 05        INACTIVE  MASTER  n/a   N   -none-  --none--  --none--  *ALL
 _ 06        INACTIVE  MASTER  n/a   N   -none-  --none--  --none--  *ALL

 Command ===>
 F1=Help     F2=End      F3=Return                       F6=Roll
                         F9=Refresh                      F12=Retrieve
```

Figure 54. INGPLEX Console Panel

- The **Sysplex** field shows the name of the sysplex.
- The **Message Buffer Usage** field shows the actual outstanding WTO message
  buffers and the maximum number of outstanding WTO message buffers
  allowed.
- The **Awaiting Replies** field shows the number of messages awaiting replies.
- The **Immediate Action** field shows the number of outstanding immediate action
  messages (with descriptor codes 1 or 2). If the number is greater than 99999,
  asterisks appear in this field.
- The **Critical Action** field shows the number of outstanding critical eventual
  action messages (with descriptor code 11). If the number is greater than 99999,
  asterisks appear in this field.

- The **Master Console** field shows the name of the master console.
- The **Reply Buffer Usage** field shows the actual outstanding WTOR message buffers and and the maximum number of WTOR message buffers allowed. The maximum value is specified by the RMAX parameter in the CONSOLxx parmlib member.
- The **Eventual Action** field shows the number of outstanding eventual action messages (with descriptor code 3). If the number is greater than 99999, asterisks appear in this field.
- The **Awaiting Mounts** field shows the number of outstanding mount requests.
- The **Operator Requests** field shows the number of outstanding requests for operator intervention.
- The **CMD** column lets you specify the command codes shown on the panel. Type the appropriate letter next to the resource name, and press Enter.
- The **Console** column shows the name of the console as specified in the CONSOLxx parmlib member.
- The **Status** field shows the status of the console. This can be one of the following:

  HARDCOPY
  Hardcopy log. This condition is indicated when the console is active on the system where the command processes.

  ACTIVE
  Active console.

  ACTIVE-P
  In the process of becoming an active console. This condition will be indicated only when the console is active on the system where the command is processing.

  MASTER
  Master console

  INACTIVE
  Inactive console

  INACT-P
  In the process of becoming a non-active console. This condition will be indicated only when the console is active on the system where the command is processing.

  PROB-DET
  The active system console is in the problem determination mode. PD is indicated only for the system console.

  SUBSYS
  Subsystem-allocatable console

- The **AUTH** column shows which commands can be entered from this console:

  ALL Any INFO SYS, IQ or CONS command can be entered from this console.

  CONS INFO commands and any commands from the console command group can be entered from this console.

  INFO Any command from the informational command group can be entered from this console.

  IO INFO commands and any commands from the I/O control command group can be entered from this console.

MASTER

The specified console is authorized to enter any operator command.

NONE

This console has no command authority.

SYS   INFO commands and any commands from the system control command group can be entered form this console.

- The **NBUF** column shows the number of WTO message buffers currently queued to this console. If *nnnn* is greater than 9999, asterisks (****) appear in this field.
- The **UD** column shows whether this console is receiving messages with the UD attribute.
- The **Device** column shows the name of the console as specified in the CONSOLxx parmlib member. This console can be a subsystem allocatable console.
- The **System** column shows the device number of the active console.
- The **ALTGRP** column shows the alternate group defined for this console.
- The **MSCOPE** column lists the name of the system or systems from which this console is receiving unsolicited messages. Note that these systems might be different from the system where this console is physically attached.

Note: The INGPLEX CONsole command replaces the command DISPCONS used in previous releases of SA OS/390.

INGPLEX CF

With INGPLEX CF you can:

- Drain or enable a selected coupling facility
- Display the paths and structures to a selected coupling facility

```
 INGLX900                SA OS/390 - Command Dialogs     Line   1   of 2
 Domain Id   = IPSFO      ---------- INGCF ----------          Date = 10/02/01
 Operator Id = OPER                                            Time = 16:14:27

 Sysplex . . . . . . : KEY1PLEX        SM process level  . : 9
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds: D drain CF / E enable CF / P display sender paths / S display structures

   CF Name   Total Space  Free Space Free%  Volatile  CF level
   --------  -----------  ---------- -----  --------  --------
 - CF01         509184 K    289792 K 56.91     YES       9
 - CF02         509184 K    508672 K 99.90     YES       9




 Command ===>
 F1=Help     F2=End      F3=Return                     F6=Roll
                         F9=Refresh                    F12=Retrieve
```

Figure 55. INGCF Panel

This panel displays all coupling facilities in a sysplex including particular storage information of each coupling facility. On this panel you can select one of the following actions by entering the command code next to the coupling facility:

D (Drain CF)

Releases a coupling facility from its structures and connections in order to remove it from the sysplex for maintenance.

E (Enable CF)

Integrates a coupling facility into a sysplex.

P (Display Sender Paths)

Displays the paths from the systems in the sysplex having a connection defined to the specified coupling facility. For each path the physical and the logical status are displayed.

S (Display Structures)

Shows all structures allocated in the specified coupling facility.

These actions are described in detail in the following sections.

Drain CF: With this function, you can remove a CF from the sysplex, for example, for maintenance purposes. You can perform the following sequence of tasks:

1. Display information for all allocated structures of the CF.
2. Rebuild all rebuildable structures on another CF and delete instances of structures on the target CF that are being duplexed on another CF.
3. Force the deletion of structures that have no active connectors and cannot be rebuilt.

Note that there are structures that you can neither rebuild nor delete with the force action. These include the structures that have at least one active connector and do not support rebuild. To remove such structures first disconnect all active connectors, and then delete the structure manually if it is persistent or has persistent connections.

4. Disconnect the CF from the systems with which it is connected

The DRAIN option ensures that these actions are performed in the correct order, as specified above.

Depending on the status of the CF and its allocated structures, you can execute one of four actions with the program function keys:

REBUILD (F10)

Starts the rebuild of structures that can be rebuilt on another CF. Therefore, a rebuild is only initiated for structures whose preference list contains more than one CF.

There are two methods for rebuild, user-managed and system-managed rebuild. User-managed rebuild is supported for all release levels. System-managed rebuild is only available with systems that have OS/390 2.8 or above; it must have been enabled by formatting the CFRM couple data sets with the specification

```
ITEM NAME(SMREBLD) NUMBER(1)
```

System-managed rebuild is only performed when the requirements for user-managed rebuild are not met. This applies, for example, to structures without active connectors.

The REBUILD action also deletes all structure instances on the target CF that are being duplexed on another CF.

FORCE (F5)

Forces the deallocation of structures with one of the following conditions:

- No connection exists.
- No alternate CF for structure with no active connections.
- No alternate CF for structure with no connections.

This action is only available after all structures that can be rebuilt have been rebuilt.

DRAIN (F4)

Disconnects the coupling facility from its connected systems by setting the sender path(s) OFFLINE.

This action is only enabled after all structures of the target CF have been removed to another CF or deallocated. Note that structures that have active connectors but do not support rebuild cannot be removed with F10 or F5. They must be deallocated manually before execution of this step is enabled.

Example of draining a CF:

```
 INGLX901                   SA OS/390 - Command Dialogs      Line   1   of 31
 Domain Id   = IPSFO        ------- INGCF DRAIN -------          Date = 10/02/01
 Operator Id = OPER                                              Time = 07:01:00

 Coupling Facility ==> CF1              Status . . . . . . : NORMAL
 Sysplex . . . . . ==> KEY1PLEX         Permission . . . . : ALL
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Structure          Condition
 ----------------   ------------------------------------------------------------
 DFHXQLS_TESTTSQ1   No active connections. System-managed rebuild supported.
 DSNG_LOCK1
 DSNG_SCA           System-managed rebuild is supported.
 ISGLOCK
 ISTGENERIC
 IXCGRS
 IXCPLEX_PATH1
 M7SG_LOCK1        *No alternate CF for structure with no active connections.
 M7SGEMHQ           No active connections. System-managed rebuild supported.
 M7SGMSGQ           No active connections. System-managed rebuild supported.
 M7SGMSGQOV         No active connections. System-managed rebuild supported.


 Command ===>
 F1=Help     F2=End      F3=Return                           F6=Roll
             F8=Forward  F9=Refresh  F10=Rebuild              F12=Retrieve
```

Figure 56. DRAIN CF Command Dialog

The status of the CF (NORMAL) and the authorization type of the operator (ALL) are displayed on the right side of the panel. The main part of the panel consists of a list containing the structures allocated in CF1 and their conditions. The conditions are classified by color and an asterisk. The asterisk signifies that a structure cannot be rebuilt.

The only action that is enabled is F10=Rebuild. Pressing F10 displays the following confirmation panel:

```
┌────────────────────────────────────────────────────────────────────────────┐
│ INGLX92R                    SA OS/390 - Command Dialogs                       │
│ Domain Id   = IPSFO       ------- INGCF DRAIN -------          Date = 10/02/01│
│ Operator Id = OPER                                             Time = 07:01:04│
│                                                                              │
│ Coupling Facility . : CF1                                                    │
│ Sysplex . . . . . . : KEY1PLEX                                               │
│                                                                              │
│                        R E B U I L D  Confirmation                           │
│                                                                              │
│ The REBUILD process runs asynchronously on the next system in the sysplex that│
│ has access to the CFRM couple data set and can perform all necessary actions.│
│ Each structure that has no * indicator in front of its status is rebuilt to its│
│ status accordingly. The structures are processed in sequence. Once started use│
│ the refresh PF key for getting the current status of the process. When more  │
│ than one structure is being rebuilt a timeout occured indicating that XCF is │
│ very busy. But processing continues. A display without any structure or only │
│ structures that cannot be rebuilt indicates a successful completion.         │
│                                                                              │
│                                                                              │
│                                                                              │
│                                                                              │
│ Command ===>                                                                 │
│           F2=End        F3=Return                              F6=Roll       │
│                                      F10=Go      F11=Cancel  F12=Retrieve    │
└────────────────────────────────────────────────────────────────────────────┘
```

Figure 57. DRAIN Command Dialog: Confirmation Panel for REBUILD

After F10 has been pressed, the structures are in the process of being rebuilt:

```
┌────────────────────────────────────────────────────────────────────────────┐
│ INGLX901                   SA OS/390 - Command Dialogs    Line  1  of 6      │
│ Domain Id   = IPSFO       ------- INGCF DRAIN -------          Date = 10/02/01│
│ Operator Id = OPER                                             Time = 07:18:44│
│                                                                              │
│ Coupling Facility ==> CF1            Status . . . . . . : REBUILDING         │
│ Sysplex . . . . . ==> KEY1PLEX       Permission . . . . : ALL               │
│ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -     │
│ Structure      Condition                                                     │
│ ---------------  ----------------------------------------------------------- │
│ DSNG_LOCK1      Structure is awaiting rebuild.                                │
│ ISGLOCK         Structure is awaiting rebuild.                                │
│ ISTGENERIC      Structure is awaiting rebuild.                                │
│ IXCGRS          Structure is being rebuilt.                                  │
│                                                                              │
│                                                                              │
│                                                                              │
│                                                                              │
│                                                                              │
│ Command ===>                                                                 │
│ F1=Help     F2=End       F3=Return                            F6=Roll        │
│                                      F9=Refresh             F12=Retrieve     │
└────────────────────────────────────────────────────────────────────────────┘
```

Figure 58. DRAIN Command Dialog: Rebuild Process

After the rebuild has been completed, a panel similar to the following is displayed:

```
INGLX901                SA OS/390 - Command Dialogs     Line   1   of 1
Domain Id   = IPSFO     ------- INGCF DRAIN -------          Date = 10/02/01
Operator Id = OPER                                          Time = 07:53:36

Coupling Facility ==> CF1             Status . . . . . . : NORMAL
Sysplex . . . . . ==> KEY1PLEX        Permission . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure      Condition
----------------  ----------------------------------------------------------
M7SG_LOCK1      *No alternate CF for structure with no active connections.







Command ===>
F1=Help     F2=End      F3=Return             F5=Force     F6=Roll
                        F9=Refresh                         F12=Retrieve
```

Figure 59. DRAIN Command Dialog: Panel After Rebuild

One structure could not be rebuilt because no alternate CF is specified in its preference list. The REBUILD status is no longer available. Instead, the FORCE action (F5) is offered because the structure that could not be rebuilt has a condition that allows forcing the deallocation of the structure. Pressing F5 displays a confirmation panel similar to that for REBUILD. Pressing F10 on the confirmation panel and refreshing the command dialog after the action has been completed results in the following panel:

```
INGLX901                SA OS/390 - Command Dialogs     Line
Domain Id   = IPSFO     ------- INGCF DRAIN -------          Date = 10/02/01
Operator Id = OPER                                          Time = 08:12:28

Coupling Facility ==> CF1             Status . . . . . . : NORMAL
Sysplex . . . . . ==> KEY1PLEX        Permission . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure      Condition
----------------  ----------------------------------------------------------








Command ===>
F1=Help     F2=End      F3=Return    F4=Drain                F6=Roll
                        F9=Refresh                           F12=Retrieve
```

Figure 60. DRAIN Command Dialog: Panel After Forcing

Now, no more structures are allocated in the CF and the CF can be released from the connections with the systems of the sysplex (F4=Drain). After completion of that action, the status of the CF changes to DRAINED, as shown on the following panel:

```
 INGLX901                SA OS/390 - Command Dialogs      Line
 Domain Id   = IPSFO     ------- INGCF DRAIN -------          Date = 10/02/01
 Operator Id = OPER                                           Time = 08:12:32

 Coupling Facility ==> CF1              Status . . . . . . : DRAINED
 Sysplex . . . . . ==> KEY1PLEX         Permission . . . . : ALL
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Structure       Condition
 ---------------- -----------------------------------------------------------






 Command ===>
 F1=Help     F2=End      F3=Return                             F6=Roll
                         F9=Refresh                 F12=Retrieve
```

Figure 61. DRAIN Command Dialog: Panel After Draining

After the CF has been released from all connections with the sysplex members, it can be inactivated. This must be done manually.

Enable CF: With this function, you can (re)integrate a CF into a sysplex. You can perform the following tasks:

1. Connect the systems of the sysplex with the coupling facility.
2. Switch to another CFRM policy if the target CF is not defined in the active policy and a suitable policy is available.

   A suitable CFRM policy must contain:
   - A definition of the target CF
   - Appropriate definitions for every active CF and every allocated structure
3. Rebuild all structures on the target CF whose preference list starts with this CF, unless this is excluded by other requirements.

The ENABLE CF option ensures that these actions are performed in the correct order, as specified above.

The following function keys support these actions:

ENABLE (F4)
> Sets the sender paths of all systems of the sysplex to ONLINE. This action is enabled when the CF is active.

SWITCH (F5)
> Switches to another CFRM policy when the target CF is not defined in the active CFRM policy and a suitable policy is available. When there is more than one suitable policy you can choose one of these from a selection panel.
>
> A CFRM policy is suitable when it contains:
> - A definition of the target CF
> - Definitions for every active CF and every allocated structure

This action is only available when the target CF is active, but not defined in the current CFRM policy.

POPULATE (F10)

Starts a rebuild process in which all structures that have the target CF at the beginning of their preference list but are currently allocated on another CF are allocated on the target CF.

This action requires that the CF is enabled, connected to all members of the sysplex, and defined in the current CFRM policy. The action is offered whenever SA OS/390 detects that a structure is not allocated on the target CF although it is the preferred CF of that structure.

In the following example, a CF that has already been activated is reintegrated into the sysplex.

```
 INGLX901                  SA OS/390 - Command Dialogs     Line
 Domain Id   = IPSFO       ------ INGCF ENABLE -------         Date = 10/02/01
 Operator Id = OPER                                            Time = 11:06:06

 Coupling Facility ==> CF02              Status . . . . . . : DRAINED
 Sysplex . . . . . ==> KEY1PLEX          Permission . . . . : ALL
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Structure        Condition
 ----------------  -----------------------------------------------------------







 Command ===>
 F1=Help      F2=End        F3=Return    F4=Enable               F6=Roll
                            F9=Refresh                           F12=Retrieve
```

Figure 62. ENABLE command dialog: panel before any action

The selected CF has already been activated manually, therefore its status, as shown on the right side of the panel, is DRAINED. The authorization type of the operator (ALL) is also displayed on the right side of the panel. The main part of the panel is empty because no structures are allocated in CF02. The only action that is activated is ENABLE (F4). Pressing F4 displays the following confirmation panel:

```
INGLX92E                  SA OS/390 - Command Dialogs
Domain Id   = IPSFO      ------ INGCF ENABLE -------             Date = 10/01/01
Operator Id = OPER                                               Time = 11:06:20


Coupling Facility . : CF02
Sysplex . . . . . . : KEY1PLEX

                        E N A B L E   Confirmation

The ENABLE process runs asynchronously on the next system in the Sysplex that
has access to the CFRM couple data set. All sender paths of all system in the
sysplex are set to ONLINE. Once started use the refresh PF key for getting
the current status of the process. The status NORMAL indicates a successful
completion.




Command ===>
          F2=End       F3=Return                               F6=Roll
                                   F10=Go        F11=Cancel   F12=Retrieve
```

Figure 63. Confirmation Panel for ENABLE

After pressing F10 on the confirmation panel, the command dialog changes as follows:

```
INGLX901                  SA OS/390 - Command Dialogs     Line   1   of 3
Domain Id   = IPSFO      ------ INGCF ENABLE -------             Date = 10/02/01
Operator Id = OPER                                               Time = 11:06:39

Coupling Facility ==> CF02              Status . . . . . . : NORMAL
Sysplex . . . . . ==> KEY1PLEX          Permission . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Structure         Condition
----------------  ------------------------------------------------------------
GRPYCSQ_ADMIN     Structure is currently allocated in CF01.
GRPYHSAQUEUE      Structure is currently allocated in CF01.
HSA_LOG           Structure is currently allocated in CF01.








Command ===>
F1=Help      F2=End      F3=Return                             F6=Roll
                         F9=Refresh  F10=Populate              F12=Retrieve
```

Figure 64. ENABLE command dialog: panel after enabling

The status has changed to NORMAL, and you can populate the CF with F10. This implies that the target CF is defined in the active CFRM policy. If this were not the case, the new state would have been NOTINPOLICY, and if a suitable policy were available, the action key F5 for a policy switch would have been offered.

The structure list contains three entries with the condition 'Structure is currently allocated in CF01.'. These are the structures that are currently allocated in CF01, but have CF02 at the first position in their preference list.

Pressing F10 now populates the CF, and the refreshed panel looks similar to the following:

```
 INGLX901                   SA OS/390 - Command Dialogs     Line   1   of 3
 Domain Id   = IPSFO        ------ INGCF ENABLE -------       Date = 10/02/01
 Operator Id = OPER                                           Time = 11:17:35

 Coupling Facility ==> CF02              Status . . . . . . : NORMAL
 Sysplex . . . . . ==> KEY1PLEX          Permission . . . . : ALL
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Structure          Condition
 ----------------   -------------------------------------------------------
 GRPYCSQ_ADMIN      System-managed rebuild is supported.
 GRPYHSAQUEUE       System-managed rebuild is supported.
 HSA_LOG




 Command ===>
 F1=Help      F2=End       F3=Return                       F6=Roll
                           F9=Refresh                      F12=Retrieve
```

Figure 65. ENABLE command dialog panel: panel after populating

The POPULATE action is no longer available because all structures whose preference list starts with CF02 are now allocated in CF02.

Display Sender Paths: With this function, the paths from the connected systems to the specified coupling facility are displayed.

```
 INGLX903                   SA OS/390 - Command Dialogs     Line  1    of 4
 Domain Id   = IPSFN        ------- INGCF PATH --------       Date = 06/20/01
 Operator ID = HIR                                            Time = 10:28:49

 Coupling Facility ==> CF01              Allocated Structures: 37
 Sysplex . . . . . ==> KEY1PLEX          Permission  . . . . : ALL
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds: F set OFFLINE / N set ONLINE

   System   CHPID  Physical            Logical  Type
   --------  -----  ------------------  -------  ----
 _ KEY1      A5     ONLINE              ONLINE   CFS
 _           A9     ONLINE              ONLINE   CFS
 _ KEY2      A5     ONLINE              ONLINE   CFS
 _           A9     ONLINE              ONLINE   CFS
 _ KEY3      A5     ONLINE              ONLINE   CFS
 _           A9     ONLINE              ONLINE   CFS
 _ KEY4      05     ONLINE              ONLINE   CFS
 _ KEY6      A5     ONLINE              ONLINE   CFS
 _           A9     ONLINE              ONLINE   CFS

 Command ===>
 F1=Help      F2=End       F3=Return                       F6=Roll
              F8=Forward   F9=Refresh                      F12=Retrieve
```

Figure 66. Display Sender Path Panel

The following command codes are available:

F   Sets the sender path OFFLINE.

N   Sets the sender path ONLINE.

- The **Coupling Facility** field shows the name of the coupling facility for which the paths should be displayed. It can be overtyped to show another display.
- The **Allocated Structures** field shows the number of allocated structures.
- The **Permission** field shows your authorization level.
- The **System** column contains the names of the systems that are connected to the target CF.
- The **CHPID** column shows the IDs of the sender channel paths.
- The **Physical** column shows the status of the sender channel paths.
- The **Logical** column shows the logical status of the paths to that CF.
- The **Type** column shows the type of the sender channel paths.

Note: The display sender paths option of the INGPLEX CF command replaces the command DISPPATH used in previous releases of SA OS/390.

Display Structures: This option shows all allocated structures for the selected coupling facility.

```
 INGLX904                    SA OS/390 - Command Dialogs     Line  1    of 3
 Domain ID   = IPSFM        ----- INGCF STRUCTURE -----          Date = 02/22/02
 Operator ID = NETOP1                                            Time = 16:09:04

 Coupling Facility ==> CF01
 Sysplex . . . . . ==> KEY1PLEX          Permission . . . . : ALL
 Include condition ==> YES (Yes/No - Condition retrieval takes longer)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds: D display details / F force / P stop duplex / R rebuild / S start duplex

   Structure        P D  Condition
   --------------- - -  -------------------------------------------------------
 _ DSNA_GBP0           U  Duplex rebuild is active.
 _ DSNA_GBP32K      P U
 _ DSNA_LOCK1         S  Duplex rebuild is active.
 _ DSNA_SCA           S  System-managed rebuild is supported.
 _ ISGLOCK
 _ ISTGENERIC            System-managed rebuild is supported.
 _ IXCGRS
 _ IXCVLF
 _ M8SGEMHQ              System-managed rebuild is supported.
 _ M8SGMSGL
 _ M8SGMSGQ              System-managed rebuild is supported.
 _ RRSARCH
 _ RRSDELAY
 _ RRSMAIN
 _ RRSREST          P   *No alternate CF defined or available.


 Command ===>
 F1=Help      F2=End      F3=Return                     F6=Roll
                          F9=Refresh                    F12=Retrieve
```

Figure 67. Display Structures Panel

- The **Include Condition** field is an input field. By entering Yes or No in this field you determine whether or not the conditions of the structures are displayed in the **Structure** column.
- The **Permission** field shows your authorization level. There are two possible values, ALL and DISPLAY. DISPLAY indicates that you can only use the display functions. ALL indicates that you can also rebuild and delete structures.
- The **Structure** column shows the names of the structures.
- The letter P in the **P** column indicates that policy changes are pending for the structure.

- The **Condition** column shows the status of the structures. You can switch the display of the conditions on and off with the **Include Condition** field.
- The D field indicates the type of duplexing being possible. The following values are possible:

U   User-managed duplexing

S   System-managed duplexing

B   User-managed and system-managed duplexing

The following command codes are available:

Display Details (D)
Diplays detail information about the structure.

Force (F)
Forces the deallocation of the structure if it has one of the following conditions:

- `No connection exists.`
- `No alternate CF for structure with no active connections.`
- `No alternate CF for structure with no connections.`

When you try to force the deallocation of a structure that can be rebuilt, an error message is issued.

P   Stops duplexing of the selected structure.

Rebuild (R)
Starts the rebuild of the selected structure on another coupling facility. Depending on the PENDING status, the automation starts the rebuild to the same CF, or to another CF. A rebuild is only initiated for structures whose preference list contains more than one CF.

There are two methods for rebuild, user-managed and system-managed rebuild. User-managed rebuild is supported for all release levels. System-managed rebuild is only available with systems that have OS/390 2.8 or above. It must have been enabled by formatting the CFRM couple data sets with the specification
`ITEM NAME(SMREBLD) NUMBER(1)`

System-managed rebuild is only performed when the requirements for user-managed rebuild are not met. This applies, for example, to structures without active connectors.

INGCF STRUCTURE accepts a rebuild request for structures with the condition 'No active connection exists.', but *deallocates* them.

The rebuild function works differently depending on the status of the structure (PENDING calls LOCATION=NORMAL, otherwise LOCATION=OTHER).

S   Starts duplexing of the selected structure.

There are two methods for duplexing, user-managed and system-managed duplexing. User-managed duplexing is supported for all release levels. System-managed duplexing is only available with systems that have OS/390 2.8 and above (or z/OS 1.2 and above); it must have been enabled by formatting the CFRM couple data sets with the specification
`ITEM NAME(SMDUPLEX) NUMBER(1)`

System-managed duplexing is only performed when the requirements for user-managed duplexing are not met. This applies, for example, to structures without active connectors.

Starting the duplex rebuild of a structure requires at least the policy entry allowing the duplex rebuild of the structure. If there is no entry the duplex rebuild is disabled. The other requirements depend on the type of the duplex rebuild. When all connectors to a structure allow user-managed duplex rebuild, this type takes precedence over system-managed duplex rebuild. However, user-managed rebuild also requires at least one active connector. Thus, when the operator starts the duplex rebuild for a structure allowing user-managed duplex rebuild as well as system-managed rebuild but without having active connectors, XCF tries to initiate a system-managed duplex rebuild. System-managed duplex rebuild has the following requirements:

- System-managed rebuild must be supported by all connectors.
- The structure must be allocated in a coupling facility supporting system-managed duplexing and another coupling facility supporting system-managed duplexing must be defined in its preference list.
- The CFRM couple data set must support system-managed duplex rebuild and the structure must not have a policy change pending.
- The structure must be defined in the active CFRM policy when any connection state is not active.

Note: The display sender paths option of the INGPLEX CF command replaces the command DISPSTR used in previous releases of SA OS/390.

INGPLEX CDS

INGPLEX CDS displays information about all the couple data sets in the sysplex and allows the operator to:

- Switch from the primary to the alternate CDS
- Allocate a new alternate CDS
- Change the active policy (if applicable)
- Display CHPIDs and CDS information

```
INGKX300                    SA OS/390 - Command Dialogs    Line  1    of 18
Domain ID   = IPSFO     ------- INGPLEX CDS -------    Date = 10/02/01
Operator ID = OPER           Sysplex = KEY1PLEX         Time = 16:15:20

System..: KEY3              Interval...: 86400         OPNotify: 86400
Maxmsg..: 999999           Cleanup....: 60            Retry...: 255
Classlen: 956              Max CFlevel: 9             COUPLExx: COUPLER1
SMREBLD.: N/A              Max SMlevel: 9

Cmds: A allocate alternate CDS  / C display CHPIDs
      D display CDS information / P switch alternate CDS to primary CDS

    Type       MS   Volume  Dev   Couple Dataset Name
    --------   --   ------  ----  --------------------------------------------
_   SYSPLEX
     PRIMARY..: 10   KEY1SP  260A  SYS1.KEY1.PXCFCDS
     ALTERNATE: 10   KEYLIB  2610  SYS1.KEY1.AXCFCDS
_   ARM
     PRIMARY..:  8   KEY1SP  260A  SYS1.KEY1.PARMCDS
     ALTERNATE:  8   KEYLIB  2610  SYS1.KEY1.AARMCDS
_   CFRM
     PRIMARY..: 32   KEY1SP  260A  SYS1.KEY1.PXESCDS
     ALTERNATE: 32   KEYLIB  2610  SYS1.KEY1.AXESCDS
_   LOGR
     PRIMARY..: 32   KEY1SP  260A  SYS1.KEY1.PLOGCDS
     ALTERNATE: 32   KEYLIB  2610  SYS1.KEY1.ALOGCDS



Command ===>
F1=Help     F2=End      F3=Return                        F6=Roll
            F8=Forward  F9=Refresh                       F12=Retrieve
```

Figure 68. INGPLEX CDS Panel

This panel contains sysplex-related information about the system on which the
INGPLEX command was executed. The details are as follows:

- The **System** field shows the name of the system.
- The **Interval** field shows the system failure detection interval in seconds. This
  interval is the amount of time XCF lets elapse without a status update before
  assuming that the system failed.
- The **OPNotify** field shows the number of seconds that XCF waits before
  notifying the operator of a potential system problem.
- The **Maxmsg** field shows the default value for the maximum amount of
  kilobytes of message buffer space. This default value is used when MAXMSG is
  not specified on SETXCF START commands.
- The **Cleanup** field shows the number of seconds that XCF waits for cleanup of
  members.
- The **Retry** field shows the default value for the retry limit. This value is used
  when the RETRY keyword is not specified on SETXCF START commands.
- The **Classlen** field shows the default length (in bytes) of messages allowed for a
  transport class. This value is used when CLASSLEN is not specified on the
  SETXCF START CLASSDEF command.
- The **Max CFlevel** field shows the maximum CFLEVEL supported by this system.
  This system can connect to a coupling facility with a higher CFLEVEL than the
  value of **Max CFlevel** but would not be enabled to use any functions supported
  by the higher level coupling facility.
- The **COUPLExx** field shows the COUPLE*xx* parmlib member used for system
  IPL.
- The **SMREBLD** field shows whether (value 1) or not (value 0) system-managed
  rebuild has been activated in the CFRM couple dat set.

- The **Max SMlevel** field shows the maximum system-managed process level supported by this system.

For each couple data set you can enter one of the following command codes to initiate an action:

A - allocate alternate CDS

   This action replaces the current alternate CDS for a selected CDS type by a new one. There are two options how to do this:

   - The alternate CDS is allocated automatically by SA OS/390.

     This automatic allocation requires that spare volumes have been defined, and that one of these spare volumes is available. For details see *System Automation for OS/390 Defining Automation Policy*.

   - You specify the data set that is used as the new alternate CDS.

     If you specify your own data set, verify the following:

     - The data set must exist
     - It must have been formatted with the XCF formatting tool
     - It must be at least as large as the current primary CDS, which means that every value you have passed to the XCF formatting tool (for example, in the case of a sysplex CDS, the maximum number of systems supported) must be equal to or greater than the corresponding value of the primary CDS.

C - display CHPIDs

   This action displays information about the channel paths for the selected CDS type.

D - display CDS information

   This action displays detailed information about the selected CDS type. If the CDSs of the selected type contain policies, the detail information panel provides further actions:

   display policy (D)

      This action displays details about the selected policy.

   display pending structures (P)

      This action is only available for the CFRM couple data sets. A pending structure is produced by a switch of the CFRM policy when the structure was allocated at the time of the switch and, for example, the new policy defines the structure differently from the old policy or not at all.

   start policy (S)

      This action makes the selected policy the active policy. The policy switch must be confirmed before it is executed.

P - switch alternate CDS to primary CDS

   This action makes the alternate CDS the primary. Since an alternate CDS is no longer available after the switch, SA OS/390 displays a confirmation panel before the action is performed. On this panel you can specify a new alternate CDS. When CDS recovery is switched on and you do not supply your own alternate, SA OS/390 tries to allocate a new alternate CDS automatically.

Note: The INGPLEX CDS command replaces the command DISPCDS used in previous releases of SA OS/390.

INGPLEX IPL

With the INGPLEX IPL function you can record, view and compare the IPL information of the operating system. If a system does not behave after IPL as expected, the IPL recording function enables you to identify parameters that were changed, for example, since the last IPL. The recording function enables you to compare different IPL scenarios. INGPLEX IPL is a tool that helps to identify and resolve the cause of startup problems. The following information can be displayed:

- The selected system (or blank)
- The name of the sysplex
- The maximum number of IPLs that are stored for each system
- An indicator showing whether comments in PARMLIB members are ignored when collecting information

```
 INGLX200                 SA OS/390 - Command Dialogs          Line  1   of 6
 Domain ID   = IPSFM       ------- INGPLEX IPL -------          Date = 02/22/02
 Operator ID = NETOP1                                           Time = 17:59:27

 System  . . . . . ==>            Max. number of IPL records/system : 10
 Sysplex . . . . . ==> KEY1PLEX   Suppression of PARMLIB comments . : N
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds: C compare record / D display details / E erase record

   System   IPL Timestamp     Dev  Volume  OpSys  Release  FMID
   --------  ----------------  ----  ------  ------  --------  --------
   KEYA      2002-02-22 13:52  770E  120204  z/OS    SP7.0.2   HBB7705
   KEYA      2002-02-09 09:28  770E  120204  z/OS    SP7.0.2   HBB7705
   KEYA      2002-02-08 15:28  770E  120204  z/OS    SP7.0.2   HBB7705
   KEYA      2001-12-10 14:31  0707  120147  z/OS    SP7.0.2   HBB7705
   KEYB      2002-02-22 13:59  770E  120204  z/OS    SP7.0.2   HBB7705
   KEYB      2002-02-14 16:24  770E  120204  z/OS    SP7.0.2   HBB7705
   KEYB      2002-02-11 18:46  770E  120204  z/OS    SP7.0.2   HBB7705
   KEYB      2002-02-11 15:36  770E  120204  z/OS    SP7.0.2   HBB7705
   KEYB      2002-02-11 14:22  770E  120204  z/OS    SP7.0.2   HBB7705


 Command ===>
 F1=Help     F2=End      F3=Return                          F6=Roll
             F8=Forward  F9=Refresh  F10=Previous F11=Next   F12=Retrieve
```

Figure 69. INGPLEX IPL Panel

Use F10 and F11 to scroll through all available columns. SORT by column numbers is supported as well as the FIND and RFind command to locate information on the panel. You can also limit the display to a particular system by specifying the system name in the appropriate entry field.

The following command codes are available:

C Compares the complete IPL information with another IPL record. A second panel will be displayed where you can select the second record.

D Displays detailed information about this IPL record.

E Erases the IPL information records. This action must be confirmed.

- The Sysplex field shows the name of the sysplex.
- The System column shows the name of the system in the sysplex.
- The IPL Timestamp column shows the date and time of the IPL. The format is YYYY-MM-DD HH:MM converted to local timezone.
- The Dev column shows the IPL device number.
- The Volume column shows the volume serial of the IPL device.

- The OpSys column shows the name of the operating system, for example, z/OS or OS/390.
- The Release column shows the release level of the operationg system.
- The FMID column shows the FMID of the operating system.

For further information about the panel fields refer to the online help.

INGPLEX DUMP

The INGPLEX DUMP function lets you control the default dump options sysplex-wide.

```
INGLX250                  SA OS/390 - Command Dialogs         Line   1   of 12
Domain Id   = IPSFP      --------- INGPLEX ---------          Date = 02/26/02
Operator Id = NETOP1                                          Time = 16:30:36

Sysplex . . . . . . : KEY1PLEX

Select the desired command:                                  INGPLEX ...

  1 Control default SDUMP options                              SDUMP
  2 Issue SVC dumps                                            SVCDUMP
  3 Control SLIP trap settings                                 SLIP




Command ===>
F1=Help      F2=End       F3=Return                            F6=Roll
                                                               F12=Retrieve
```

Figure 70. INGPLEX DUMP Panel

If you select option 1, the following panel is displayed:

```
INGLX251                  SA OS/390 - Command Dialogs         Line   1   of 12
Domain Id   = IPSFP      ------ INGPLEX SDUMP ------          Date = 02/26/02
Operator Id = NETOP1                                          Time = 15:44:58

Sysplex . . . . . ==> KEY1PLEX           Permission . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: C change

  System    Dump options
  --------  ------------------------------------------------------------------
  KEY1      Q=     Type=      Buffers=   0K  MaxSpace=   500M  MsgTime=99999
                                             LSQA
                   TRT
  KEY2      Q=     Type=      Buffers=   0K  MaxSpace=   500M  MsgTime=99999
                                             LSQA
                   TRT
  KEY3      Q=     Type=      Buffers=   0K  MaxSpace=   500M  MsgTime=99999
                                             LSQA
                   TRT
  KEY4      Q=     Type=      Buffers=   0K  MaxSpace=   500M  MsgTime=99999

Command ===>
F1=Help     F2=End       F3=Return                             F6=Roll
            F8=Forward   F9=Refresh                             F12=Retrieve
```

Figure 71. INGPLEX SDUMP panel

The following command code is available:

C change

Invokes the modification panel by providing the options of the selected system as input

- The Sysplex field shows the name of the sysplex.
- The System field shows the name of the system in the sysplex.
- The Permission field shows your authorization level.
- The Dump options field shows the default SDUMP options of all systems in the sysplex. For each system the following details are displayed:

Q= Shows whether or not SDUMP quiesces the system while dumping the contents of the SQA or CSA.

TYPE=

Causes SVC dump to dump the cross memory address spaces that the caller has when SVC dump gets control (XMEM) or when the error causing the dump occurs (XMEME).

BUFFERS=

Shows the reserved storage exlusively used by SVC dump. This storage can be used while capturing the contents of the common area storage.

MaxSpace

Shows the maximum amount of virtual storage that SVC dump can use to capture volatile virtual storage data, summary dump data, and component-specific data before writing the dump to DASD.

MsgTime

Shows for which amout of time (mm) the message IEA793A is shown at the console. When the system deletes the message, it also deletes the captured dump.

The FIND and RFIND commands are supported. If you specify command code C, the following panel is displayed:

```
INGLX252                  SA OS/390 - Command Dialogs          Line   1   of 12
Domain Id   = IPSFP       ------ INGPLEX SDUMP ------          Date = 02/26/02
Operator Id = NETOP1                                           Time = 16:18:08

System  . . . . . . : KEY1
Sysplex . . . . . . : KEY1PLEX          Recommended options are underlined.

NODUMP ... ==> N    (all other options below are ignored)

ALLNUC ... ==>    ALLPSA(*)  ==>      COUPLE ... ==>    CSA ...... ==>
GRSQ ..... ==>    LPA ...... ==>      LSQA ..... ==> Y  NUC ...... ==>
PSA ...... ==>    RGN ...... ==>      SERVERS .. ==>    SQA(*) ... ==>
SUMSUMP(*) ==>    SWA ...... ==>      TRT ...... ==> Y  WLM ...... ==>
XESDATA .. ==>    (*) = The NOxxx option is generated when not selected.

Q(uiesce)  ==>        (YES / NO)
Type ..... ==>        (XMEM / XMEME)
Buffers .. ==> 0K     (nnnnK / nnnM)
MaxSpace . ==> 500    (MB)
MsgTime .. ==> 99999  (minutes)

Command ===>
F1=Help      F2=End      F3=Return    F4=Set SYS   F5=Undo all  F6=Roll
                                      F10=Set SYSS F11=Set SYSP F12=Retrieve
```

Figure 72. INGPLEX SDUMP modification panel

The modification panel allows to modify all SDUMP options. Furthermore, you can delete SDUMP options. After entering your changes you can set the new options for:

- The selected system
- All systems in the sysplex
- Selected systems in the sysplex

To set the options press the appropriate F-key. If you want to modify selected systems in the sysplex, you are prompted for the systems on which the SDUMP options are being changed. To reset the options to the state when the modification panel was invoked press F5 Undo all.

Note: The user must be authorized to change any SDUMP option. The authorization can be any of those which are used for controlling coupling facilities and couple data sets.

For further information about the panel fields refer to the online help.

With the INGPLEX SVCDUMP command you can display the dump status information of each system in the sysplex. The INGPLEX SVCDUMP function allows you to issue a multisystem dump of up to 15 address spaces of a single system including their data spaces and structures.

```
INGLX26S                SA OS/390 - Command Dialogs         Line   1   of 6
Domain Id   = IPSFP      ----- INGPLEX SVCDUMP -----         Date = 02/06/02
Operator Id = NETOP1                                         Time = 17:05:17

The following systems of sysplex KEY1PLEX are registered to the automation.
Use any non-blank character to select one system and then press ENTER.


      Sel   System
      ---   --------
       _    KEY2
       _    KEY3
       _    KEY4













 Command ===>
       F1=Help      F2=End      F3=Return         F6=Roll
                                                  F12=Retrieve
```

Figure 73. INGPLEX SVCDUMP target system selection panel

- The Sel field lets you select a system for which a dump should be taken.
- The System field shows the name of the system having joined the same XCF group the operator is logged on to.

For further information about the panel fields refer to the online help. After selecting a system and pressing ENTER, the following panel is displayed:

```
 INGLX260                    SA OS/390 - Command Dialogs           Line  38    of 63
 Domain Id   = IPXFG       ----- INGPLEX SVCDUMP -----              Date = 03/11/02
 Operator Id = NETOP1                                               Time = 12:26:26

 System  . . . . . ==> KEYA
 Sysplex . . . . . ==> KEYAPLEX
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Cmds: D/S de-/select job names for the SVC dump (up to 15 can be specified)

    Jobname    ASID  WorkUnitID   Userid
    --------         ----         ----------
 _  PCAUTH     0002
 _  PORTMAP    0042  STC06027     PORTMAP
 _  RACF       0023  STC05974     STCUSER
 _  RASP       0003
 _  RESOLVER   001D  STC05973     TCPIP
 _  RMF        0221  STC06506     STCUSER
 _  RRS        0046
 _  SGA1DBM 1  0044  STC06035     SGAUSER
 _  SGA1DIST   0041  STC06038     SGAUSER
 _  SGA1IRLM   0043  STC06032     SGAUSER
 _  SGA1MSTR   001C  STC06028     SGAUSER
 _  SMF        0015
 _  SMS        0008
 _  SYSBMAS    0009
 _  TCPIP      001A  STC05986     TCPIP
 _  TNF        0024
 _  TRACE      0004
 _  TSO        003B  STC05983     STCUSER
 _  VLF        0019
 _  VMCF       0025
 _  VTAM       001E  STC05982     STCUSER             selected
 _  WATS       0217  TSU06587     -                   selected
 _  WLM        000B
 _  XCFAS      0006

  Command ===>
  F1=Help     F2=End       F3=Return           F5=NextPnl    F6=Roll
              F8=Forward   F9=Refresh                        F12=Retrieve
```

Figure 74. INGPLEX SVCDUMP address space selection panel

If you select VTAM address space and WATS address space, which is a user, press
ENTER, then F5, the following panel is displayed:

```
INGLX261                 SA OS/390 - Command Dialogs         Line   1   of 15
Domain Id   = IPXFG      ----- INGPLEX SVCDUMP -----         Date = 03/11/02
Operator Id = NETOP1                                         Time = 12:34:04

System  . . . . . . : KEYA
Sysplex . . . . . . : KEYAPLEX
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: D/S de-/select the areas to be dumped (max. 113 structures)
          A selection of the job name includes all related areas.

  Jobname   ASID  T Data Space/XCF Group Member/Structure
  --------  ----  - ------------------------------------------
_ VTAM      001E
_               D ISTNMPDS
_               D ISTNMSDS
_               D IST08648
_               D IST56892
_               D IST69B2F
_               D IST9BD36
_               D IST90C95
_               D 00012IXL
_               D 00013IXL
_               L  ISTGENERIC                          selected
_               M ISTCFS01.KEYB.VTAM.IPXVH___DEIBMIPS  selected
_               M ISTXCF.KEYB.VTAM.IPXVH___DEIBMIPS    selected
_               M IXCLO008.KEYB.VTAM.M28               selected
_ WATS      0217
Command ===>
F1=Help      F2=End      F3=Return   F4=PrevPnl  F5=NextPnl    F6=Roll
             F8=Forward   F9=Refresh                           F12=Retrieve
```

Figure 75. INGPLEX SVCDUMP address space detail panel

Address space VTAM has many dataspaced (D), one list structure (L) and some xcf members (M). TSO user WATS has nothing.

The following command codes are supported:

D   Deselects the previous selection

S   Selects a local address space, data space, structure, or XCF group member address space for the SVC dump.

If you press F5, the dump option selection panel is displayed:

```
INGLX262                 SA OS/390 - Command Dialogs        Line   1   of 6
Domain Id  = IPSFP       ------- INGPLEX SVC -------         Date = 02/26/02
Operator Id = NETOP1                                         Time = 18:02:56

System  . . . . . . : KEY3
Sysplex . . . . . . : KEY1PLEX

Title .... ==>
          ==>

SDATA Dump Options (recommended options are underlined)
ALLNUC ... ==>      ALLPSA(*)  ==> Y    COUPLE ... ==>      CSA ...... ==> Y
GRSQ ..... ==> Y    LPA ...... ==>      LSQA ..... ==>      NUC ...... ==> Y
PSA ...... ==>      RGN ...... ==> Y    SERVERS .. ==>      SQA(*) ... ==> Y
SUMSUMP(*) ==> Y    SWA ...... ==>      TRT ...... ==> Y    WLM ...... ==>
XESDATA .. ==>      (*) = The NOxxx option is used when not selected.

Structure Dump Options (SUMMARY and ADJUNCT/ENTRYDATA are mutually exclusive)
COCLASS .. ==>      EMCONTROLS ==>      LISTNUM .. ==>      STGCLASS . ==>
ADJUNCT .. ==>      ENTRYDATA  ==>      SUMMARY .. ==>

Command ===>
F1=Help      F2=End       F3=Return    F4=PrevPnl  F5=Dump       F6=Roll
                                                                 F12=Retrieve
```

Figure 76. INGPLEX SVCDUMP dump option panel

The panel shows the default dump options being set on invocation. After
specifying the dump title, press F5 to issue the dump. When the dump is taken,
the function returns to the address space selection panel with all selections cleared.
The SORT, FIND and RFIND commands are supported. For further information
about the panel fields refer to the online help.

With the INGPLEX SLIP command you can display serviceability level indication
processing (SLIP) traps being set at all systems in the sysplex. With INGPLEX SLIP
you can view, enable, disable, and delete the SLIP trap defined in the sysplex.

```
INGLX270                 SA OS/390 - Command Dialogs        Line   1   of 6
Domain Id   = IPSFP      ------ INGPLEX SLIP -------         Date = 02/26/02
Operator Id = NETOP1                                         Time = 18:20:21

System  . . . . . ==>           (leave blank for all systems)
Slip Trap Id  . . ==>           (leave blank for all ids)
Sysplex . . . . . ==> KEY1PLEX          Permission . . . . : ALL
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Cmds: +/- display/hide settings  D disable  E enable  R remove

  System   Id    Status   Settings
  -------- ----  -------- --------------------------------------------------
_ KEY1     XB37  ENABLED
_ KEY1     XD37  ENABLED
_ KEY1     XE37  ENABLED
_ KEY1     X0E7  ENABLED
_ KEY1     X0F3  ENABLED
_ KEY1     X013  ENABLED
_ KEY1     X028  ENABLED
_ KEY1     X13E  ENABLED

Command ===>
F1=Help     F2=End      F3=Return                           F6=Roll
            F8=Forward  F9=Refresh                           F12=Retrieve
```

Figure 77. INGPLEX SLIP main panel

The following command codes are available:

+   Shows the settings of the SLIP trap.

–　Hides the settings of the SLIP trap.

D　Disables the SLIP trap.

E　Enables the SLIP trap.

R　Deletes the SLIP trap.

The SORT, FIND and RFIND commands are supported.

Note: The user must be authorized to enable, disable, and delete a SLIP trap. The authorization can be any of those which are used for controlling coupling facilities and couple data sets.

For information about the panel fields refer to the online help.

How SA OS/390 Uses Error Thresholds

Error thresholds influence whether SA OS/390 recovers from an error situation or not. For applications, you can define a critical threshold for restarting these applications. This is a number of error conditions within a certain time interval, for example, five error conditions requiring restart within one hour. During a condition requiring restart, SA OS/390 checks whether the number of occurrences of the condition reaches the critical threshold. If it is reached, SA OS/390 does not attempt to restart a resource.

For OS/390 components, such as dump data sets or log data sets, you can define thresholds to limit the frequency of how often they may be deleted after they have filled up without an action being taken or a notification being sent to the operator.

Error thresholds also determine when you should be alerted to problems. The primary use of error thresholds is to track subsystem abends and ensure that the abend and restart cycle does not become an infinite loop, but they may also be customized for other uses.

Refer to *System Automation for OS/390 Defining Automation Policy* for information on how to define error thresholds. The following sections describe how to obtain information about them.

Displaying Threshold Settings and Occurrences

SA OS/390 counts the number of times that a subsystem abends. Each time, an abending subsystem is restarted, a check is made to see if the restart is done too often. SA OS/390 allows you to specify thresholds in terms of error rates. If the measured error rate reaches the *critical* threshold, SA OS/390 stops to recover the resource and posts it to a broken status.

You have the following possibilities to both obtain information about threshold settings and to view when thresholds have been reached:

INGTHRES
>　If you want to display all defined thresholds or add, change, or delete threshold settings for a particular resource, use the INGTHRES command. This displays the related **Command Dialogs** panel similar to the one shown in Figure 78 on page 164.

DISPERRS
>　If you want to check the error counts for all resources on a specific system, you should issue a DISPERRS command to this target system. SA OS/390

will display the DISPERRS *Command Dialogs* panel with a list of all the errors that have been recorded for all resources on the target system (see "How to Display Occurred Errors - DISPERRS").

DISPASF

If you want to check the error counts for a specific resource on a specific target system, issue the DISPASF command.

How to Display Threshold Settings for a Selected Resource - INGTHRES

Type INGTHRES on any command line to display a panel similar to the following that shows the settings for the critical, frequent, and infrequent thresholds for specified resource:

```
 INGKYTH0                 SA OS/390 - Command Dialogs    Line  1    of 77
 Domain ID   = IPSFM      ---------- INGTHRES ----------   Date = 04/12/02
 Operator ID = OPER                                        Time = 17:33:52

 Cmd:  A Add thresholds    C Change thresholds    D Delete thresholds

 Cmd   System      Resource           Critical      Frequent    Infrequent
 ---   --------    ----------------   -----------   -----------  -----------
       KEY1        CICSK1G.SOS         4 in 00:05    4 in 01:00   7 in 24:00
       KEY1        CICSK1G.TRAN        2 in 00:05    4 in 01:00   5 in 24:00
       KEY1        CICSK1G.VIOL        3 in 00:05    3 in 01:00   6 in 24:00
       KEY1        CICSK1H.SOS         4 in 00:05    4 in 01:00   7 in 24:00
       KEY1        CICSK1H.TRAN        2 in 00:05    4 in 01:00   5 in 24:00
       KEY1        CICSK1H.VIOL        3 in 00:05    3 in 01:00   6 in 24:00
       KEY1        CICSK3E.SOS         4 in 00:05    4 in 01:00   7 in 24:00
       KEY1        CICSK3E.TRAN        2 in 00:05    4 in 01:00   5 in 24:00
       KEY1        CICSK3E.VIOL        3 in 00:05    3 in 01:00   6 in 24:00
       KEY1        DB2.DSNL008I        5 in 01:01    3 in 02:02   1 in 03:03
       KEY1        DB2C.DSNL008I       5 in 02:00    3 in 03:00   2 in 05:00
       KEY1        DB2T                5 in 00:30    3 in 00:30   2 in 00:30

 Command ===>
    PF1=Help      PF2=End       PF3=Return                   PF6=Roll
                  PF8=Forward   PF9=Refresh                  PF12=Retrieve
```

Figure 78. INGTHRES Command Dialog

How to Display Occurred Errors - DISPERRS

If you specify the DISPERRS command, you get the DISPERRS command dialog, which displays the number of errors for all the applications on the target system and also when an application has reached its threshold. Scroll through the panel to find the resource that has failed.

```
AOFKAAD5                 SA OS/390 - Command Dialogs      Line  1    of 19
Domain ID   = IPUFM      ---------- DISPERRS ----------   Date = 10/28/97
Operator ID = MIK                                         Time = 15:30:24

   System    Resource     Type        Thrs  No Date      Time
   --------  -----------  -----------  ----  -- --------  -----
   AOC7      AOFIPLDT     CONTROL            10 03/03/99  12:11
   AOC7                                       9 03/03/99  09:22
   AOC7                                       8 03/01/99  12:12
   AOC7                                       7 02/24/99  10:32
   AOC7                                       6 02/18/99  08:13
   AOC7                                       5 02/05/99  14:26
   AOC7                                       4 02/01/99  15:42
   AOC7                                       3 01/25/99  07:49
   AOC7                                       2 01/15/99  12:01
   AOC7                                       1 01/04/99  07:21
   AOC7      THRY000NN10  SUBSYSTEM    CRIT   3 02/25/99  13:15
   AOC7                                       2 02/25/99  13:14
   AOC7                                       1 02/25/99  13:00
   AOC7      TRGG007AA00  SUBSYSTEM    CRIT   1 02/19/99  09:38
   AOC7      TRGG007AA10  SUBSYSTEM    CRIT   1 02/19/99  09:38
   AOC7      MVSDUMP      MVSESA       CRIT  10 01/25/99  08:23
   AOC7                                       9 01/25/99  08:08
   AOC7                                       8 01/21/99  07:21
   AOC7                                       7 01/21/99  07:17
   AOC7                                       6 12/15/98  23:31
   AOC7                                       5 12/15/98  23:31
   AOC7                                       4 12/15/98  23:30


Command ===>
   PF1=Help      PF2=End       PF3=Return                   PF6=Roll
                               PF9=Refresh                  PF12=Retrieve
```

Figure 79. DISPERRS Command Dialogs Panel

In this sample screen, the AOFIPLDT entry shows when the last IPL was
performed on the system. The THRY000NN10 subsystem is shown as having
reached its *critical* threshold at 13:15 on 02/25/99.

If a subsystem is in the BROKEN status and it has not exceeded its critical
threshold, then it has probably encountered an unrecoverable error. If you look
into either SDF or DISPINFO for it, you should find the text of the AOF571I status
change notification message, which will explain why it was posted to BROKEN.

How to Display Occurred Errors for a Specific Resource - DISPASF

While DISPERRS displays occurred errors for all a system's resources, DISPASF
lets you see detailed information about errors for a resource on a specific system.
For example, if you want to see more information about the error with resource
MVSDUMP on system *AOC7* from the panel in Figure 79, issue the following
command:

DISPASF MVSDUMP TARGET=AOC7

to display the following information:

```
AOFK3D0X                 SA OS/390 - Command Response    Line  1   of 19
Domain ID   = IPUFM     ---------- DISPASF ----------    Date = 03/04/99
Operator ID = HUT                                        Time = 12:35:42

Command = ASF ID=MVSDUMP,REQ=DISP
SYSTEM = AOC7      STATISTICS DISPLAY REQUESTED FOR MVSDUMP
--------------------------------------------------------------------------------
STATISTICS DISPLAY REQUESTED FOR MVSDUMP
ID= MVSDUMP          , TYPE= MVSESA     , STATUS= DOWN
 LAST UPDATE BY OPERATOR AUTREC
 LAST THRESHOLD EXCEEDED - CRIT
 OPERATOR NOTIFIED: N
 LAST STATUS CHANGE DATE= 08/08/98 , TIME= 06:26 , OPID= AUTREC
 LAST MONITORED DATE= 08/08/98 , TIME= 06:26
   ERROR COUNT     DATE      TIME
           01    12/03/98   21:56
           02    12/03/98   21:56
           03    12/15/98   23:30
           04    12/15/98   23:30
           05    12/15/98   23:31
           06    12/15/98   23:31
           07    01/21/99   07:17
           08    01/21/99   07:21
           09    01/25/99   08:08
           10    01/25/99   08:23
END OF MULTI-LINE MESSAGE GROUP



Command ===>
   PF1=Help     PF2=End      PF3=Return              PF6=Roll
                             PF9=Refresh             PF12=Retrieve
```

Figure 80. DISPASF Command Response

How to Set or Change Error Thresholds

You can set or change thresholds for a resource, the resource group defaults, or the system defaults using the INGTHRES command dialog.

1. Follow the instructions in "How to Display Threshold Settings for a Selected Resource - INGTHRES" on page 164 to specify the resource for which you want to set thresholds and to access the INGTHRES command dialog.

2. To change the Critical, Frequent, or Infrequent thresholds, type the number of errors and specify the time period.

Handling Jobs that are not Controlled by SA OS/390

The INGLKUP command dialog displays all active jobs, started tasks (STC), and APPC/MVS transaction programs that are not controlled by SA OS/390. You can either stop, cancel, or force these jobs.

```
 INGKYLU0                SA OS/390 - Command Dialogs      Line  1    of 23
 Domain ID   = IPSFM     ---------- INGLKUP ----------    Date = 04/12/02
 Operator ID = OPER            System  = KEY1             Time = 17:43:59

 Cmd:  C cancel job      F force job      P stop job

 Cmd Job        Step      Procedure Type  ASID
 --- --------   --------  --------- ----  ----
     AMOY       AMOY      AMPROC    SO
     AMOZ       AMOZ      AMPROC    SO
     AVM        AVM       AVM       S
     ENQMON     ENQMON    ENQMON    S
 C   FTPD1      STEP1     FTPOE     AO                    ** CANCELLED **
     FTPOE1     STEP1     FTPOE     AO
     IMS711I1   IMS711I1  IMS711I1  S
     IMS711PP   IMS711PP  IMS711PP  S
     IMS712I1   IMS712I1  IMS712I1  S
     IMS713I1   IMS713I1  IMS713I1  S
     IMS811I1   IMS811I1  IMS811I1  S


 Command ===>
   PF1=Help      PF2=End       PF3=Return                  PF6=Roll
                 PF8=Forward   PF9=Refresh                 PF12=Retrieve
```

Figure 81. INGLKUP Command Dialog Panel

For each job the following information is displayed:
- job name
- step name
- procedure name
- job type
- address space ID (this is only shown when the job name is not unique)

Communicating with Other Systems

This chapter discusses the following topics:
- "Sending Commands within a Sysplex"
- "Terminal Access Facility Full-Screen Sessions" on page 173
- "Gateway Sessions" on page 175

Sending Commands within a Sysplex

This section informs you about the prerequisites for communicating with systems
- within a sysplex; this scenario is called *single system image*.
- within your complete enterprise; this scenario is called *single point of control for the enterprise*.

There is also a series of commands that are directly processed by the automation manager of a sysplex. For these commands, you need no target parameter. You can retrieve sysplexwide information, such as the statuses of resources within the sysplex. For a complete list of sysplexwide commands, refer to the *System Automation for OS/390 Operator's Commands*.

You can use a system within the sysplex to monitor and manipulate all other systems in the sysplex. Then each system in the sysplex looks like the one you are currently working on (single system image).

If your system is the focal point system, you can use it to manipulate all resources of your enterprise from this focal point system issuing NetView commands. The target systems need not be members of your sysplex (single point of control).

To exploit these features, the following prerequisites and conditions need to be fulfilled:
- The target system is within the local sysplex (this is valid for single system image) or the target system has a direct gateway connection with the local system (this is valid for single point of control).

The following prerequisites need to be fulfilled for both cases:
- The target has SA OS/390 release 3 or higher installed.
- The target is active.
- SA OS/390 on the target has been fully initialized.
- The target can either be reached by XCF or by RMTCMD.

SA OS/390 will search your environment for the target system in the following order:
- system name within the local sysplex
- domain ID within the local sysplex
- local sysplex name
- domain ID within the enterprise
- system name within the enterprise
- sysplex name within the enterprise

You have several choices as to how to route commands to other systems within the sysplex. These choices are described in the following subsections.

INGSEND

This will assist you in sending a command through either the SA OS/390 Gateways (this requires an NNT gateway to be established between the two systems and depends upon VTAM) or over a semi-shared RMTCMD session (this requires some configuration setup and depends upon VTAM).

1. Type INGSEND with no parameters on the command line of any NetView or system operations panel and you see the Command Routing panel:

```
  AOFK2DG                   SA OS/390 -Operator Interface
                         ------ COMMAND ROUTING ------

       DOMAIN ID   = IPUFM                      DATE = 10/06/97
       OPERATOR ID = LRM                        TIME = 17:34:25


          Response  =>  YES          Enter ACK, YES, NO or CORR

          Operid    =>  LRM          Leave blank for default

          To        =>               netid.luname if CRM = RMTCMD

          CRM       =>  RMTCMD        Enter ROUTE or RMTCMD

          Corrwait  =>  10            Only if CRM = RMTCMD

          Command   =>



  Action ===>
  PF1=Help  PF2=End    PF3=Return                      PF6=Roll
```

2. Type RMTCMD in the command routing mechanism (CMR) field.
3. Fill out the other fields and press Enter. (For more information on the individual fields, refer to *System Automation for OS/390 Operator's Commands*).

Personal RMTCMD
You can use NetView native RMTCMD (this requires you to be defined upon the target system and depends upon VTAM).

MVS Route
This sends a command to OS/390 on your system, which then passes it onto the target system via OS/390s extended console services.

This interface can only be used to send MVS commands to the target system, but has the advantage that it does not depend upon VTAM. This means that it can be used to restart NetView or VTAM on the target system.

Single System Image and Single Point of Control
If the command you want to send is an SA OS/390 command and is supported by single system image (most of them are), you can just issue it, specifying the destination system as the target. This only requires that NetView be active on both systems - VTAM is not used.

The following example shows the usage of single system image to determine the status of APPL1 on every system within the sysplex (AOCA, AOCB, AOCC, AOCD) and then to restart it on AOCC where it is BROKEN. All operations are carried out from the IPUFA system.

```
  DISPSTAT APPL1,TARGET=*ALL
```

```
AOFKSTA5                SA OS/390 - Command Dialogs      Line  1    of 3
Domain ID   = IPUFM     -------- DISPSTAT ----------     Date = 04/12/00
Operator ID = MIK                                        Time = 10:06:25
 A ingauto  B setstate  C ingreq-stop  D thresholds  E explain  F info  G tree
 H trigger  I service  J all children  K children  L all parents  M parents
CMD  RESOURCE     STATUS     SYSTEM    JOB NAME  A I S R D RS TYPE     Activity
---  -----------  --------   --------  --------  ------------ -------- ---------
     APPL1        AUTODOWN   AOCA      APPL1      Y Y Y Y Y Y  TRANS    --none--
     APPL1        DOWN       AOCB      APPL1      Y Y Y Y Y Y  TRANS    --none--
     APPL1        BROKEN     AOCC      APPL1      Y Y Y Y Y Y  TRANS    --none--
     APPL1        CTLDOWN    AOCD      APPL1      Y Y Y Y Y Y  TRANS    --none--


Command ===>
 PF1=Help    PF2=End      PF3=Return    PF4=INGLIST   PF5=Filters  PF6=Roll
             PF8=Forward  PF9=Refresh  PF10=Previous PF11=Next     PF12=Retrieve
```

Enter B against APPL1 on AOCC and press enter.

```
AOFKSAST                    SA OS/390 - Command Dialogs
Domain ID   = IPUFM    ---------- SETSTATE ----------    Date = 04/12/00
Operator ID = MIK                                        Time = 10:16:32

Specify subsystem and new state:

  Subsystem  =>   APPL1      Subsystem to be processed
  System     =>   AOCC       System name, domain ID, sysplex name or *ALL
  State      =>              Put subsystem in the following state:
                             (RESTART / AUTODOWN / CTLDOWN / UP / ENDED /
                              MOVED)

  Scope      =>   ONLY       Change state for:
                               ONLY     - only this subsystem
                               CHILDREN - only dependant subsystems
                               ALL      - resource and dependants
  Start      =>   NO         Start or restart subsystem now (YES/NO)
  Override   =>   NO         Override(Start=YES) (NO/FLG/TRG/SVP/EVT/ALL)



Command ===>
  PF1=Help    PF2=End    PF3=Return                    PF6=Roll
                                                       PF12=Retrieve
```

Complete the command parameters (STATE=RESTART, START=YES) and press
ENTER to issue the command. It will be sent to the target system and executed.

Route a Command with a Gateway Session

1. Determine if the session or path you want to use is active. Use the DISPGW
   command and look at the Status field.
2. Type INGSEND command with no parameters on the command line of any
   NetView or system operations panel and you see the Command Routing panel.
3. Type ROUTE in the CMR field on the Command Routing panel.
4. Fill out the other fields and press Enter. For further information on the
   individual fields, refer to *System Automation for OS/390 Operator's Commands*.

Cross-Domain Sessions

Cross-domain sessions let you send commands to other domains using NetView
RMTCMD, gateways, Terminal Access Facility (TAF), or NetView-NetView task
(NNT) sessions. To display cross domain sessions, from the NetView command
line, type AOC to invoke the SA OS/390 main menu. From the SA OS/390 main
menu, type **1** (Operator Interface) and press the Enter key. You see the *Main
Operator Menu*. On the command line, type **1** (CROSS DOMAIN) and press the
Enter key. You see the *Cross Domain Menu*. From this menu you can display
cross-domain sessions.

```
AOFK2D                    SA OS/390 - Operator Interface
                      -------- COMMAND DOMAIN MENU -------


       DOMAIN ID   = IPUFM                              DATE = 03/06/00
       OPERATOR ID = HUT                                TIME = 15:36:51


  Select:




      1      Cross Domain - Enter Cross Domain Commands using NNT Sessions
      2      Cross Domain - Enter Cross Domain Commands using INGSEND
      3      Cross Domain - Enter Cross Domain Commands using TAF Sessions
```

NetView-NetView Task Sessions: You can use the Cross Domain Entry Menu to display a list of the NetView-NetView task (NNT) sessions defined for an operator ID using the customization dialog and to determine the status of each session. You can also route commands to other systems using this panel.

To access the *Cross Domain Entry Menu*, from the NetView command line, type **Oper**. You see the Main Operator Menu. Type **1**. You see the Cross Domain Menu. Type **1**.

You see the Cross Domain Entry Menu, which shows the current status of the NNT sessions defined in the customization dialog. If no NNT sessions are defined for your operator ID you will see a line mode message AOF041I UNABLE TO FIND ENTRIES FOR NNTS. Press PF1 to obtain information on the status conditions shown.

```
AOFK2DC                   SA OS/390 - Operator Interface        Page 1      of 1
                 ----- CROSS DOMAIN ENTRY MENU ------

DOMAIN ID   =  IPUFM                              = 07/04/96
OPERATOR ID =  NETOP1                        TIME =  11:00:30
SEL                                  DOMAIN
#    DESCRIPTION                       ID      LOGONID      STATUS
---  ------------------------------  ------   -------      ------
1    Network Concentrator A          AOF01    OPER1        INACTIVE
2    Primary CICS Service            AOF02    NETOP1       ACTIVE
3    Development Machine             AOF03    OPER1        ACTIVE







To initiate/terminate a session enter I/T plus a selection number (no blanks).
To send a command enter / plus the selection number (no spaces) and command.

Action ===>
PF1= Help   PF2= End   PF3= Return
PF6= Roll                                         PF12=Retrieve
```

Figure 82. Using the Cross Domain Entry Menu Panel to Display NetView-NetView task Sessions

If you want to issue a command to another system, you first need to check the value in the Status field:

- If the value in the Status field is ACTIVE, you can issue the command. If the Status is INACTIVE, you need to activate the NNT session. To do this, type in **i***number* where **i** is the letter i, and *number* is the number of the session you want to activate. There is no space between the i and the number. Press the Enter key.

- Press PF1 to obtain information about the status shown and for suggestions on what you can do to activate your session.

To issue a command, type

/ *number command*

where / is the slash key, *number* is the number of the NetView-NetView task session, and *command* is the command you want to send to that domain.

EXAMPLES

When you enter this panel, session 1 is the default. To initiate session 1, type **i**.

To send the NetView ACT AYAZ0027 command to session 2, you would type

/2 act ayaz0027.

Session 2 now becomes the default. To send another command to session 2, type **/** followed by the command.

To terminate session 3, type **t3**.

Sending Commands to a Linux Target System

Use the ISQSEND command of processor operations to send a command to a Linux target system. The system previously must have been initialized successfully, using the ISQXIII command. In order to see the responses on the NetView screen, the command ISQXMON must have been used to add you to the interested operator list of the target system.

Since the Linux operating system handles commands case sensitive, you have to use the "netvasis" prefix. In the following example, the Linux command ps -x is issued to show Linux process related information. Note, that NetView suppresses the "netvasis" prefix when redisplaying the entered command.

```
NCCF                    Tivoli Netview   IPVFJ TIL     05/28/01 15:19:09
 * IPVFJ    ISQSEND FCLX2 OC PS -X
 U IPVFJ    ISQ901I  FCLX2 SC ISQ417I CMD STATUS(ACCEPTED)
 U IPVFJ    ISQ901I FCLX2    OC  PS -X
 U IPVFJ    ISQ017I ISQSEND COMPLETED SUCCESSFULLY.
 U IPVFJ    ISQ901I FCLX2    OC   PID TTY      STAT   TIME COMMAND
 U IPVFJ    ISQ901I FCLX2    OC     1 ?        S      0:00 init
 U IPVFJ    ISQ901I FCLX2    OC     2 ?        SW     0:00 ¢kMCHECK!
 U IPVFJ    ISQ901I FCLX2    OC     3 ?        SW     0:00 ¢keventd!
 U IPVFJ    ISQ901I FCLX2    OC     4 ?        SW     0:00 ¢kswapd!
 U IPVFJ    ISQ901I FCLX2    OC     5 ?        SW     0:00 ¢kreclaimd!
 U IPVFJ    ISQ901I FCLX2    OC     6 ?        SW     0:00 ¢bdflush!
 U IPVFJ    ISQ901I FCLX2    OC     7 ?        SW     0:00 ¢kupdated!
 U IPVFJ    ISQ901I FCLX2    OC   306 ?        SW     0:00 ¢keventd!
 U IPVFJ    ISQ901I FCLX2    OC   309 ?        SW     0:00 ¢keventd!
 U IPVFJ    ISQ901I FCLX2    OC   312 ?        SW     0:00 ¢keventd!
 U IPVFJ    ISQ901I FCLX2    OC   315 ?        SW     0:00 ¢keventd!
 U IPVFJ    ISQ901I FCLX2    OC   436 ?        SN     0:00 syslogd -M 0
 U IPVFJ    ISQ901I FCLX2    OC   450 ?        SN     0:00 klogd
 U IPVFJ    ISQ901I FCLX2    OC   469 ?        SN     0:00 crond
 U IPVFJ    ISQ901I FCLX2    OC   488 ?        SN     0:00 inetd
 U IPVFJ    ISQ901I FCLX2    OC   507 ?        SN     0:00 httpD
 U IPVFJ    ISQ901I FCLX2    OC   554 console  S      0:00 -bash
 U IPVFJ    ISQ901I FCLX2    OC   603 console  R      0:00 ps -X
 U IPVFJ    ISQ901I FCLX2    OC  ¢root@boelnfc2 /root!#
 ---------------------------------------------------------------------



 ???
```

Figure 83. Sending a Command to a Linux Target System

Terminal Access Facility Full-Screen Sessions

The NetView terminal access facility (TAF) allows you to log on to multiple applications either on your system or other systems. *Tivoli NetView for OS/390 Automated Operations Network User's Guide* describes in detail how to use TAF.

SA OS/390 allows you to define TAF sessions in the customization dialog so that you do not have to set them up each time you want to use them. Refer to *System Automation for OS/390 Defining Automation Policy* for more details.

Determining the Status of TAF Full-Screen Sessions

Using the TAF Fullscreen Menu panel you can see the list of TAF full-screen sessions that have been defined to SA OS/390 for your operator ID, and determine which of these are active.

To see the list of TAF full-screen sessions available to you:

1. From the NetView command line, type **Oper**. You see the Main Operator Menu.
2. On the Selection line, type **1** (CROSS DOMAIN) and press the Enter key. You see the Cross Domain Menu.
3. On the Action line, type **3** and press the Enter key. You see the TAF Fullscreen Menu.

   Note: If no TAF sessions are defined for your operator ID, you will see a line mode message

   AOF041I UNABLE TO FIND FULL SESSION ENTRIES

```
AOFK2DF              SA OS/390 - Operator Interface          Page 1 of 1
                       -------- TAF FULLSCREEN MENU -------

        DOMAIN ID   = IPUFM                        DATE = 11/06/97
        OPERATOR ID = OPER1                        TIME = 17:25:34


   SEL     DESCRIPTION        APPLID    SYSTEM            STATUS
   ---     -----------        ------    ------            ------
    1      TSO                IPSFM     KEY3              ACTIVE
    2      IMS                IPSFN     KEY4              INACTIVE


   Enter SELECTION NUMBER  (plus a T to terminate session)

   Action ===>
            PF1= Help    PF2= End    PF3= Return
            PF6= Roll
```

Figure 84. TAF Fullscreen Menu Panel

If the status is ACTIVE, the session has been started. If it is INACTIVE , you have to start the session before you can use it.

Managing TAF Full-Screen Sessions

You can start, resume, or end sessions from the TAF Fullscreen Menu panel.

Starting TAF Sessions: If the TAF session you want to use is inactive, you can start it from the TAF Fullscreen Menu. To do this:

1. On the Action line, type the number of the session you want and press the Enter key.

   For example, to start IMS, you type **2** and press the Enter key.

   The status changes to Active.

2. Log onto the application as you normally would.

   Refer to *Tivoli NetView for OS/390 Automated Operations Network User's Guide* for more information on using TAF.

Leaving TAF Sessions: There are two ways to leave a TAF session. You can:

- hit PF6. Note that PF6 is not available in your TAF session.
- hit PA1 and select a suspension option from the NetView TAF menu you are presented with. You can also end the TAF session from here.

Resuming TAF Sessions: If you have previously started a TAF session, you resume it using the TAF Fullscreen Menu panel. To do this:

   On the Action line, type the number of the session you want to resume and press the Enter key.

   You return to a line mode display.

Ending TAF Sessions: You can also end a TAF session. This changes the session to INACTIVE. To do this:

1. On the Action line, type the number of the session you want to end followed by a space and **t**.

2. Press the Enter key.

   The status changes to INACTIVE.

   For example, to end the TSO session, you type **1 t** and press the Enter key.

Note: You must customize the NetView command list CNME1001 (BFSESS) to your required LU prefix as it is currently defined to TAF.

Gateway Sessions

In SA OS/390 you can monitor other systems and issue commands to those systems using gateway sessions. Gateway sessions are NetView-NetView task (OST/NNT) sessions that SA OS/390 establishes and maintains for you, according to information you supply in the customization dialog.

Gateways are useful because they:

- save you the step of logging on to the NetView on the other system
- let you communicate with another system even if you do not have an ID for that system
- can provide a second NetView session with a system if you have an ID for that system.

SA OS/390 provides several panels that let you check your communication links with other systems and send commands to those systems. You can:

- determine the status of gateway sessions.
- determine the status of paths. A path uses an intermediate system to connect two systems that are not directly linked.
- issue commands to other systems using gateway sessions.

Determining the Status of Gateway Sessions

You can determine which gateway sessions have been defined and see which of these are active. You may want to do this if you use SDF to monitor other systems, since SDF uses gateway sessions to receive information from remote systems.

You also need to check the status of a gateway session if you want to receive notification messages from other systems. (Notification messages are messages that document significant actions that SA OS/390 has detected or taken.) Finally, you need to check the status of a gateway session if you want to issue a command to another system using a gateway session.

You can obtain information on gateway sessions from the Gateway Display panel or from SDF, if SDF has been customized to do this.

To access the Gateway Display panel, type DISPGW from any command line and press the ENTER key.

```
AOFK2GL                   SA OS/390 - Command Dialogs      Line  1    of 6
Domain ID   = IPUFM     ---------- DISPGW   ----------     Date = 11/04/97
Operator ID = LRM                                          Time = 09:38:06
      System =  KEY3                             Focal Point =  IPSFM
Domain   Sdfroot      Status      Description
------   --------     --------    ------------------------------------- ---
IPSFN    KEY4         ACTIVE      Gateway to target key4
IPSFO    KEY5         ACTIVE      Gateway to target key5
IPSFP    KEY6         ACTIVE      Gateway to target KEY6
IPUFK                 NOT STARTD  Gateway to target AOC5
IPUFM    AOC7         ACTIVE      Gateway to target AOC7
IPVFH    TSCF2        ACTIVE      Gateway to target TSCF2
```

For further information on the DISPGW command refer to the *System Automation for OS/390 Operator's Commands*.

Chapter 8. Scenario: Finding out Why a Resource is not Available

For most operators, the key resource to be monitored is the application. You want to be sure that your enterprise's critical jobs and subsystems are getting the service they require and are operating satisfactorily. The scenario contained in this chapter gives you a general idea of how to use SA OS/390 commands to discover and react to problems affecting your important applications.

So imagine the following scenario:

You get a phone call from one of your users: Resource **MSCSK1** is not available. Please find out why and start it!

Now here are the steps you perform to make the resource available:

1. Use the INGLIST command to find out details (especially the status information) about resource *MSCSK1*. As you know the name of the resource, you can issue the command as follows on your NetView console:

   INGLIST MSCSK1

2. Suppose you get an output screen as shown in Figure 85, which shows that the compound status for *MSCSK1* is *SATISFACTORY* which results from the fact that the observed status *SOFTDOWN* fulfills the desired status (*UNAVAILABLE*). However, you wonder why is the desired status *UNAVAILABLE* even though you and your user expected it to be available. This needs further investigation.

```
INGKYST0                 SA OS/390 - Command Dialogs    Line  1    of 1
Domain ID   = IPUFM       -------- INGLIST  ---------    Date = 05/09/00
Operator ID = MSCH              Sysplex = AOC9PLEX        Time = 14:10:36
CMD: A Update    B Start    C Stop    D INGRELS   E INGVOTE   F INGINFO
     G Members   H DISPTRG   I INGSCHED  J INGGROUP            / scroll
CMD Name         Type System   Compound      Desired     Observed   Nature
--- ------------ ---- -------   ------------  -----------  ----------  --------
E   MSCSK1       APL  AOC9      SATISFACTORY  UNAVAILABLE  SOFTDOWN


Which
votes are
involved?










Command ===>
 PF1=Help    PF2=End      PF3=Return   PF4=DISPSTAT  PF5=Filters   PF6=Roll
                          PF9=Refresh PF10=Previous PF11=Next    PF12=Retrieve
```

Figure 85. INGLIST Output

3. To find out the votes that unexpectedly caused the resource to be unavailable (SOFTDOWN), you enter action code **E** into the **CMD** column next to the resource *MSCSK1* in the INGLIST command dialog panel as indicated in Figure 85 on page 177.

4. This will lead you to the INGVOTE command dialog as shown in Figure 86. From this panel you can see that there has been an operator request (MakeUnAvailable) with highest priority (hex 005A0000) to stop the resource; this has obviously been satisfied.

```
INGKYRQ0                SA OS/390 - Command Dialogs      Line  1    of 4
Domain ID   = IPUFM      ---------- INGVOTE  ----------   Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX          Time = 14:13:14

 Resource   ==>  MSCSK1/APL/AOC9
 System     ==>                 System name, domain id or sysplex name

Cmd:  C cancel request   K  Kill request    S show request details
Cmd Action WIN Request/Vote Data
--- ------ --- ----------------------------------------------------------------
C    STOP    Y  Request    : MakeUnAvailable
                Originator : OPERATOR(MSCH)
                Priority   : 005A0000    Must Be Down - Operator
                Status     : Winning/Satisfied




Command ===>
  PF1=Help     PF2=End       PF3=Return                   PF6=Roll
                             PF9=Refresh                  PF12=Retrieve
```

Figure 86. INGVOTE Output

5. As this request is persistent and can only be beaten by any other request with priority FORCE, you must cancel it to allow the resource to become available again. (The request obviously stems from an operator's INGREQ command with high priority which is the strongest request you can issue with SA OS/390, see also "Automation Concepts" on page 13 for the documentation of the hierarchy of requests). Therefore you enter action code **C** into the **CMD** column next to the request as indicated in Figure 86.

6. On the INGVOTE command dialog, you will see the confirmation that the request has been cancelled. Now press PF3 to go back to the INGLIST command dialog and press the PF9 key to refresh the information shown for resource *MSCSK1*. Let us assume you see the output as shown in Figure 87 on page 179.

```
INGKYST0                 SA OS/390 - Command Dialogs    Line  1   of 1
Domain ID   = IPUFM     -------- INGLIST  ---------    Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX         Time = 14:16:00
CMD: A Update   B Start    C Stop     D INGRELS  E INGVOTE  F INGINFO
     G Members  H DISPTRG  I INGSCHED J INGGROUP           / scroll
CMD Name         Type System   Compound     Desired     Observed    Nature
--- ------------ ---- -------- ------------ ----------- ---------- --------
F   MSCSK1        APL  AOC9      AWAITING     AVAILABLE   SOFTDOWN




                           Refresh INGLIST
                           status with PF9


Command ===>
 PF1=Help    PF2=End      PF3=Return   PF4=DISPSTAT PF5=Filters   PF6=Roll
                          PF9=Refresh PF10=Previous PF11=Next     PF12=Retrieve
```

Figure 87. Refreshed INGVOTE Output

What you now see is that the compound status for *MSCSK1* is **AWAITING**
(awaiting automation) and the observed status is still **SOFTDOWN** which is
not exactly what you might have wanted or expected. You want observed and
desired status to be **AVAILABLE**. There must be something else that inhibits
this. Maybe there are dependency relationships to supporting resources that
are not fulfilled.

7. You now use INGINFO (action code **F**) to display more information about
   why *MSCSK1* is still awaiting automation. Scroll down the INGINFO output
   panel until you reach a panel similar to the one shown in Figure 88.

```
INGKYIN0                 SA OS/390 - Command Dialogs    Line  29   of 145
Domain ID   = IPUFM     ---------- INGINFO ----------    Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX         Time = 14:17:37

 Resource   ==>  MSCSK1/APL/AOC9                    format: name/type/system
 System     ==>             System name, domain ID or sysplex name

 Schedule            : -None-

 Backward Relationships :
    AOC9/SYG/AOC9           HasMember

 Forward Relationships  :
    MSCSK2/APL/AOC9         HasParent
    NETVIEW/APL/AOC9        HasParent

 Requests      :

 Votes         :


Command ===>
 PF1=Help    PF2=End      PF3=Return   PF4=DISPINFO            PF6=Roll
 PF7=Back    PF8=Forward  PF9=Refresh                          PF12=Retrieve
```

Figure 88. INGINFO Output

From this output panel you find out that *MSCSK1* has a *HasParent*
dependency on the supporting resource *MSCSK2/APL/AOC9*.

Figure 89 illustrates the current situation as you have investigated it until now using the various commands: An operator has made *MSCSK1* unavailable by issuing a SOFTDOWN request. *MSCSK1* is dependent upon *MSCSK2*.


Figure 89. Current Automation Situation

8. You now need to find out more about *MSCSK2*. To do this, proceed as in step 1 on page 177 using the INGLIST command:

   ```
   INGLIST MSCSK*
   ```

   You may get an output similar to the one shown in Figure 90

```
INGKYST0                  SA OS/390 - Command Dialogs     Line  1    of 2
Domain ID   = IPUFM       -------- INGLIST   ---------    Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX           Time = 14:19:32
CMD: A Update    B Start    C Stop     D INGRELS   E INGVOTE   F INGINFO
     G Members   H DISPTRG   I INGSCHED  J INGGROUP             / scroll
CMD Name          Type System   Compound     Desired     Observed    Nature
--- ------------ ---- -------  ------------  -----------  ----------  --------
    MSCSK1        APL  AOC9      AWAITING     AVAILABLE    SOFTDOWN
E   MSCSK2        APL  AOC9     SATISFACTORY  UNAVAILABLE  SOFTDOWN

Which
votes are
involved?




Command ===>
 PF1=Help    PF2=End       PF3=Return   PF4=DISPSTAT  PF5=Filters   PF6=Roll
                           PF9=Refresh PF10=Previous PF11=Next      PF12=Retrieve
```

Figure 90. INGLIST Output for MSCSK Resources*

This panel informs you that *MSCSK2* is also not available (observed status is SOFTDOWN), and that this even conforms to its desired status. This is obviously not what you want, so now you must find out the reason for this.

9. As in step 3 on page 178, you use action code **E** to find out the votes that unexpectedly caused the *MSCSK2* resource to be unavailable (SOFTDOWN). SA OS/390 might display a panel like shown in Figure 91 on page 181.

```
INGKYRQ0                 SA OS/390 - Command Dialogs      Line  1   of 4
Domain ID   = IPUFM      ---------- INGVOTE ----------    Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX           Time = 14:20:43

 Resource   ==>  MSCSK2/APL/AOC9
 System     ==>                 System name, domain id or sysplex name

Cmd:  C cancel request   K  Kill request    S show request details
Cmd Action WIN Request/Vote Data
--- ------ --- -------------------------------------------------------------
    STOP    Y  Request   : MakeUnAvailable_Only
               Originator : SCHEDULE
               Priority   : 00520000    Must Be Down - Schedule
               Status     : Winning/Satisfied




Command ===>
  PF1=Help     PF2=End        PF3=Return                   PF6=Roll
                              PF9=Refresh                  PF12=Retrieve
```

Figure 91. INGVOTE Output for MSCSK2

> From this panel you can see that there has been a request (MakeUnAvailable)
> generated by a service period (SCHEDULE) to stop the resource *MSCSK2*.
> This obviously has been satisfied.

10. To find out more about the service period defined for *MSCSK2*, on the
    INGLIST panel, type action code **I** into the **CMD** column next to *MSCSK2*.
    Suppose, you see a display as shown in Figure 92. From this figure, you can
    see that the resource *MSCSK2/APL/AOC9* is scheduled with high priority to be
    down on Tuesdays between 14:10 PM and 16:00 PM and that the current time
    is 14:21:50, which is actually within the requested down-time (and indeed, the
    indicated date of 05/09/00 was a Tuesday).

```
INGKYSP2                 SA OS/390 - Command Dialogs
Domain ID   = IPUFM      ---------- INGSCHED ----------   Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX           Time = 14:21:50

 Resource . . . : MSCSK2/APL/AOC9            Schedule . . :  MSCSCED8
 Starting date => 05 / 09 / 2000     (mm/dd/yyyy)

C Date          Pri  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop
- ----------- -- ---  ---------  ---------  ---------  ---------  ---------
  05/09/00 Tue UP  H   1320 1340  1400 1402
               DN  H   1300 1319  1341 1359  1410 1600
  05/10/00 Wed UP  H   1320 1340  1400 1402
               DN  H   1300 1319  1341 1359
  05/11/00 Thu UP  H   1320 1340  1400 1402
               DN  H   1300 1319  1341 1359
  05/12/00 Fri UP  H   1320 1340  1400 1402
               DN  H   1300 1319  1341 1359
  05/13/00 Sat UP  H   1320 1340  1400 1420  1500 1520  1540 1600  1640 2359
               DN  H   1300 1319  1341 1359  1440 1459  1521 1539  1620 1639


Command ===>
  PF1=Help     PF2=End      PF3=Return                      PF6=Roll
  PF7=Backward PF8=Forward  PF9=Refresh                     PF12=Retrieve
```

Figure 92. INGSCHED for MSCSK2

11. To allow automation to make the *MSCSK2* available and keep it available for
    the rest of the day, you could now specify an additional up-time schedule for

Tuesdays, starting from now (14:26 PM) until midnight (24:00) as shown in Figure 93. This method is called a schedule override (as it overrides a schedule defined by automation policy).

> **Note:**
> Schedule overrides done by INGSCHED are permanent.

```
INGKYSP2                  SA OS/390 - Command Dialogs
Domain ID   = IPUFM       ---------- INGSCHED ----------    Date = 05/09/00
Operator ID = MSCH             Sysplex = AOC9PLEX           Time = 14:25:18

 Resource . . . : MSCSK2/APL/AOC9                Schedule . . :  MSCSCED8
 Starting date =>  05 / 09 / 2000    (mm/dd/yyyy)

C Date          Pri  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop  Strt/Stop
- ------------ -- ---  ---------  ---------  ---------  ---------  ---------
  05/09/00 Tue UP  H   1320 1340  1400 1402  1426 2400
               DN  H   1300 1319  1341 1359  1410 1426
  05/10/00 Wed UP  H   1320 1340  1400 1402
               DN  H   1300 1319  1341 1359
  05/11/00 Thu UP  H   1320 1340  1400 1402
               DN  H   1300 1319  1341 1359
  05/12/00 Fri UP  H   1320 1340  1400 1402
               DN  H   1300 1319  1341 1359
  05/13/00 Sat UP  H   1320 1340  1400 1420  1500 1520  1540 1600  1640 2359
               DN  H   1300 1319  1341 1359  1440 1459  1521 1539  1620 1639

AOF099I FUNCTION SUCCESSFULLY COMPLETED
Command ===>
 PF1=Help     PF2=End      PF3=Return                     PF6=Roll
 PF7=Backward PF8=Forward  PF9=Refresh                    PF12=Retrieve
```

Figure 93. Schedule Override for MSCSK2

12. Now with PF3, go back to the INGLIST command dialog and press PF9 to see if any changes have occurred. From Figure 94 you can see that *MSCSK2* is now available, but *MSCSK1* is still SOFTDOWN, AWAITING automation.

```
INGKYST0                  SA OS/390 - Command Dialogs    Line  1    of 2
Domain ID   = IPUFM       -------- INGLIST  ---------    Date = 05/09/00
Operator ID = MSCH             Sysplex = AOC9PLEX        Time = 14:26:23
CMD: A Update    B Start    C Stop     D INGRELS   E INGVOTE   F INGINFO
     G Members   H DISPTRG  I INGSCHED J INGGROUP              / scroll
CMD Name         Type System   Compound      Desired      Observed    Nature
--- ------------ ---- -------   ------------  -----------  ----------  --------
    MSCSK1       APL  AOC9      AWAITING      AVAILABLE    SOFTDOWN
    MSCSK2       APL  AOC9      SATISFACTORY  AVAILABLE    AVAILABLE


Command ===>
 PF1=Help     PF2=End      PF3=Return   PF4=DISPSTAT PF5=Filters   PF6=Roll
                           PF9=Refresh PF10=Previous PF11=Next     PF12=Retrieve
```

Figure 94. Refreshed INGLIST Output

As a consequence, you might suppose that for this resource, some automation flag inhibits startup or automation.

13. So in a next step, you check the automation flags for *MSCSK1*. You can do this by scrolling the INGLIST output from Figure 94 to the right with PF11 until you reach a display similar to Figure 95 on page 183.

```
INGKYST0                SA OS/390 - Command Dialogs    Line  1   of 2
Domain ID   = IPUFM      -------- INGLIST  ---------    Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX         Time = 14:27:20
CMD: A Update    B Start    C Stop    D INGRELS  E INGVOTE  F INGINFO
     G Members  H DISPTRG  I INGSCHED J INGGROUP             / scroll
CMD Name         Type System   Automation  Startable   Auto Hold  Category
--- ------------ ---- -------   ----------  ----------  ---- ----  --------
    MSCSK1       APL  AOC9      IDLE        YES         YES  NO
    MSCSK2       APL  AOC9      IDLE        YES         YES  NO


Command ===>
 PF1=Help    PF2=End      PF3=Return   PF4=DISPSTAT  PF5=Filters   PF6=Roll
                          PF9=Refresh PF10=Previous PF11=Next     PF12=Retrieve
```

Figure 95. Checking Automation Flags with INGLIST

> However, the result shows that *MSCSK1* is startable and automation is allowed for it (**Auto=YES** and **Hold=NO**). So what else can be the reason that prevents *MSCSK1* from starting?

14. You probably guessed right: there might be a trigger for *MSCSK1* with the events for its startup condition not set, thus preventing the resource from starting. Scroll horizontally in your current INGLIST output until you see the column **Trigger** as shown in Figure 96.

> **Note:** The DISPSTAT command cannot be used as it only displays service periods and triggers from downlevel SA OS/390 systems.

```
INGKYST0                SA OS/390 - Command Dialogs    Line  1    of 2
Domain ID   = IPUFM      -------- INGLIST  ---------    Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX         Time = 14:28:33
CMD: A Update    B Start    C Stop    D INGRELS  E INGVOTE  F INGINFO
     G Members  H DISPTRG  I INGSCHED J INGGROUP             / scroll
CMD Name         Type System   Starttype   Stoptype  Trigger   Schedule
--- ------------ ---- -------   ----------  --------  --------  --------
    MSCSK1       APL  AOC9                            MSCTRG1
    MSCSK2       APL  AOC9                                      MSCSCED8


Command ===>
 PF1=Help    PF2=End      PF3=Return   PF4=DISPSTAT  PF5=Filters   PF6=Roll
                          PF9=Refresh PF10=Previous PF11=Next     PF12=Retrieve
```

Figure 96. Checking Triggers with INGLIST

> From this panel, you see that indeed, a trigger *MSCTRG1* is connected to *MSCSK1*.

> Now let us have a look at Figure 97 on page 184 to see the automation scenario for resource *MSCSK1*:

> * *MSCSK1* is dependent upon *MSCSK2*. So *MSCSK2* must be up before *MSCSK2* can be started.
> * Availability of *MSCSK2* is controlled by a schedule. So the time of day must be within one of the up-time schedules defined for this resource.
> * *MSCSK1* has a connected trigger. On top of all the other prerequisites for starting this resource, at least one startup condition for that trigger must be fulfilled to make this resource available.
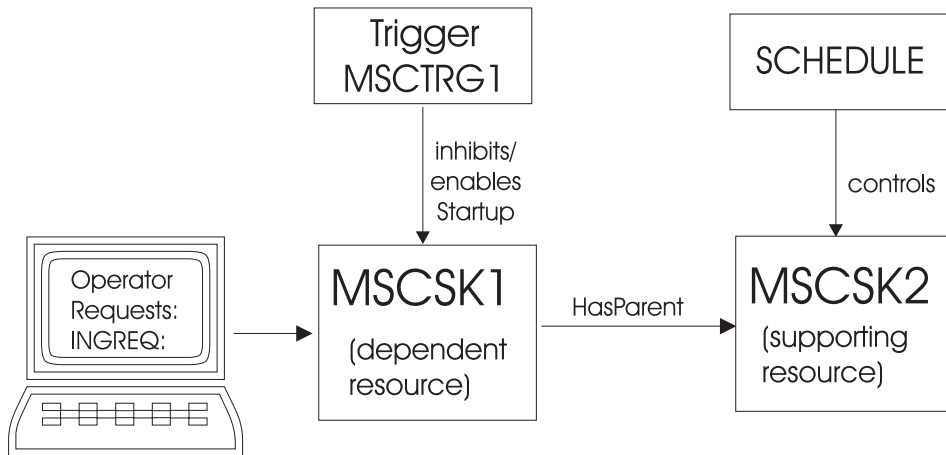
Figure 97. Complete Automation Environment for MSCSK1

15. Now in this step, you will check the startup conditions for trigger *MSCTRG1*. You achieve this by entering action code **H** (for DISPTRG) into the **CMD** column next to *MSCSK1*. This will display triggers and their events for the selected resource. In this scenario, we get the DISPTRG output shown in Figure 98.

```
AOFLT000                    SA OS/390 - Command Dialogs     Line  1    of 2
Domain ID   = IPUFM      ---------- DISPTRG  ----------     Date = 05/09/00
Operator ID = MSCH              System  = AOC9              Time = 14:29:47

 Resource    ==>  MSCSK1/APL/AOC9
 System      ==>               System name, domain id or sysplex name
 Trigger. . . :  MSCTRG1                      Observed status :  SOFTDOWN

Cmd:  S show details
Cmd Type       Events
--- --------   -------- -------- -------- -------- -------- -------- ---------
S    STARTUP    MSCEVTUP
     SHUTDOWN   MSCEVTDN


Command ===>
   PF1=Help     PF2=End       PF3=Return                  PF6=Roll
                              PF9=Refresh                 PF12=Retrieve
```

Figure 98. DISPTRG Command Dialog

In this output, you can see that trigger *MSCTRG1* has a startup condition, which will be fulfilled if event *MSCEVTUP* is set. This is what you need to find out in the next step.

16. To see more details about an event (or about the condition), type action code **S** into the **CMD** column next to the startup condition (event *MSCEVTUP*). This produces the following output:

```
AOFLT100                  SA OS/390 - Command Dialogs    Line  1    of 1
Domain ID   = IPUFM   --- Trigger Condition List ----    Date = 05/09/00
Operator ID = MSCH              System  = AOC9            Time = 14:30:46

 Trigger . . . . : MSCTRG1
 Condition type. : STARTUP
 Resource. . . . : MSCSK1/APL/AOC9            Observed status : SOFTDOWN

Cmd:  D show resources   S set event for resource   U unset event for resource
Cmd Event      Status       Unset Description
--- --------   -----------  ----- -------------------------------------------
S   MSCEVTUP   UNSET        UP    scheduling test event UP


Command ===>
   PF1=Help     PF2=End        PF3=Return                   PF6=Roll
                               PF9=Refresh                  PF12=Retrieve
```

Figure 99. Trigger Condition List

17. From Figure 99, we see at a glance that the event *MSCEVTUP* is not set
    (column **Status** contains UNSET). By typing action code **S** (set event for
    resource) into the **CMD** column next to the event *MSCEVTUP*, you now set
    this event to fulfill the startup condition for trigger *MSCTRG1*, thus allowing
    resource *MSCSK1* to start.

    By magic, SA OS/390 will now put your environment into the status you
    desired.

    After a few minutes, you should be able to verify this. Go back to the
    INGLIST command dialog for both resources involved (INGLIST MSCSK*):

```
INGKYST0                  SA OS/390 - Command Dialogs    Line  1    of 2
Domain ID   = IPUFM    -------- INGLIST  ---------       Date = 05/09/00
Operator ID = MSCH            Sysplex = AOC9PLEX          Time = 14:32:52
CMD: A Update   B Start    C Stop    D INGRELS  E INGVOTE   F INGINFO
     G Members  H DISPTRG  I INGSCHED  J INGGROUP            / scroll
CMD Name         Type System   Compound      Desired     Observed   Nature
--- ------------ ---- -------   ------------  ----------- ---------- --------
    MSCSK1       APL  AOC9      SATISFACTORY  AVAILABLE   AVAILABLE
    MSCSK2       APL  AOC9      SATISFACTORY  AVAILABLE   AVAILABLE


Command ===>
 PF1=Help    PF2=End       PF3=Return  PF4=DISPSTAT PF5=Filters  PF6=Roll
                           PF9=Refresh PF10=Previous PF11=Next    PF12=Retrieve
```

Figure 100. Verifying Automation Status

    Now you see that both resources have AVAILABLE for the observed and
    desired status which is SATISFACTORY for SA OS/390 as the compound
    status and, hopefully, for you , too.

Chapter 9. Using I/O Operations

I/O operations is a highly flexible connection environment that expands the distance for channel and control unit communication.

You can use the SA OS/390 I/O operations component:

- to get a single point of logical control for managing connectivity in your active I/O configurations.
- to have information presented on the operator console from which you issue a command or from the I/O Operations ISPF dialog. You can also use the I/O operations application program interface (API) to get information via a user-written call.
- as a tool for automating these I/O configurations. I/O operations takes an active role in detecting unusual conditions and lets you view and change paths between a processor and an I/O device, using dynamic switching (the ESCON director).

To fulfil the tasks of managing and automating I/O configurations, various commands are available, like for example, a command to define a dynamic connection between ports, commands to block or permit data transfer through ports or a series of commands to display I/O configuration information.

You can issue these commands either through the ISPF dialog (see Appendix B, "Using the I/O Operations ISPF Dialog", on page 241) or from the operator console.

More features of the I/O operations are, for example:

- For an I/O resource that passes through a dynamic switch, I/O operations can detect and report several types of I/O configuration mismatches. It reports these mismatches when the program is started or when the configuration is dynamically reconfigured.
- You can use I/O operations as a single point of control:

  I/O operations lets you change the connectivity of I/O resources. From any one system where I/O operations is running, you may affect the I/O connectivity of a target system on which I/O operations is also operating, thereby providing a single point of control.

  I/O operations performs these functions when you enter, or send, one of its connectivity commands to one of the hosts on which the program is running. That host issues the commands to the affected hosts. The hosts that can be affected by the command depend on several factors, including the domain of the issuing host.

  With the feature of a single point of control, you can:
  - remove the dependency on a dynamic switch
  - manage the devices across hosts; that is, you can vary devices on or off
  - remove and restore channnel paths among system images and have the pathing status automatically adjusted
  - manage switchable paths in a system-integtrated manner

With I/O operations, you can display and control the following I/O resources:

- *Channels* of the following types:

- ESCON channels
- Parallel channels
- Coupling facility channels
- *Dynamic switches*, such as the ESCON Directors
- *Ports*, which are the interfaces on a dynamic switch
- *Control units*
- *I/O devices*
- and other objects

Making Connectivity Changes

With I/O operations you can easily perform the following connectivity changes:

- Remove and restore channel paths: These commands not only instruct OS/390 to reconfigure a CHPID, they also issue the appropriate vary path requests. In these commands, you can specify any CHPID that is defined to one of the hosts in the issuing host's group. The CHPID can be either switchable or point-to-point, ESCON or parallel.
- Remove and restore devices: These commands allow you to remove one, a range, or an array of devices from - and restore them to - one or an array of hosts in a group. These commands therefore expand the capabilities of the analogous Vary Device system commands, so that devices can be varied across system images-all within the issuing host's group.
- Use switching commands, like:
  - Commands that affect only ports
  - Remove Switch
  - Restore Switch
  - Commands that define a chained path and remove these definitions

Display Commands To Obtain Data About I/O Resources

With such commands, you can for example, retrieve data about one or all channels (CHPIDs) defined to the host image on which the command was issued. Or you can retrieve data about one, a range, or all the devices and their paths defined to the host image. You can also display data about the addressable port(s) on one or all switches allocated, or attached, to the issuing host.

Examples for this category of commands are:

- DISPLAY CHP
- DISPLAY DEVICE
- DISPLAY PORT
- DISPLAY RESULTS

Connectivity Commands That Affect a Switch

With commands of this category you can for example permit or prohibit dynamic communication between two specified ports or between one port and all other ports on the same switch or the same ports on all the switches allocated to, or attached to, the issuing host.

Or, you can stablish or remove a static, or dedicated, connection between two ports on the same switch or the same two ports on all the switches allocated to, or attached to, the issuing host.

Examples for this category of commands are:

- ALLOW
- PROHIBIT
- CONNECT
- DISCONNECT
- BLOCK
- UNBLOCK
- CHAIN
- UNCHAIN

Display and Utility Commands Related to Connectivity Commands

With commands of this category you can for example display the specified number or all of failed vary path requests as a result of the last connectivity command.

Or you can build a list of the vary path requests that would be needed to synchronize path status with the physical settings of the specified switch.

You can also display or reset the number of seconds that the issuing hosts (I/O operations) will wait to receive votes from the I/O operations that from its voting set.

Examples for this category of commands are:

- DISPLAY VARY
- SYNC SWITCH
- RESET HOST
- DISPLAY TIMEOUT
- RESET TIMEOUT

Utility Commands for General Processing

With such commands, you can for example, acquire or release exclusive control of I/O operations command processing for a specified user ID.

Or you can instruct the switch(es) to send their log data to the host on which the issuing I/O operations is running.

Another usage of such a command would be to ensure that the issuing I/O operations's configuration map is correlated with the active configuration on the switch(es).

Examples for this category of commands are:

- GETLOCK
- UNLOCK
- LOGREC
- RESET SWITCH

Using the I/O Operations ISPF Dialog

A set of REXX EXECs is shipped with SA OS/390 that – when installed as the I/O operations Interactive System Productivity Facility (ISPF) dialog – offers you a simple way to enter the same commands to I/O operations that you can enter at an OS/390 operator console.

In addition to entering I/O operations commands, you can create entire switch configurations, starting with the default matrix of switch ports that is shipped with the dialog.

Detailed information about the I/O operations ISPF dialog is included in Appendix B, "Using the I/O Operations ISPF Dialog", on page 241. The information in this section helps you get started using the dialog. For more information, refer to the online tutorial and online help panels supplied with the dialog.

Using the OS/390 Operator Console for I/O Operations Commands

Some I/O operations commands can be entered at the OS/390 operator console. To enter a command in the OS/390 environment, use the *Modify* command, which can be shortened to F. Specify the I/O operations procedure name that has been created as a member in your SYS1.PROCLIB. The member name for the procedure as supplied by SA OS/390 is *INGEIO*.

- If you did not append an OS/390 identifier to the Start command when I/O operations was started, the syntax is as follows:

    /modiFy *procname,I/O_operations_command*

- If you did append an OS/390 identifier to the Start command when I/O operations was started, the syntax is as follows. (NOTE: if the SA OS/390 I/O operations component was started automatically by the automation supplied with SA OS/390, an identifier of "IO" was used by the Start command.)

    /modiFy *identifier,I/O_operations_command*

For example, **/F IO,D N CU.C00* *** instructs I/O operations to display names of, and salient data about, the port or ports that have been assigned names with the common character string 'CU.C00' on the dynamic switches allocated to the issuing instance of I/O operations.

The NetView program provides an OS/390 interface that allows a NetView REXX EXEC or an operator at a NetView console to issue OS/390 operator commands. For example, the following Display Switch command can be coded in a REXX EXEC or issued at a NetView console:

    MVS /F IO,D S *

(The output of this Display Switch command is displayed on the NetView console, not the OS/390 operator console.)

When you use the NetView console to enter I/O operations commands, keep the following points in mind:

- Control authorization is not checked. The same I/O operations commands can be entered that can be entered at the OS/390 operator console.

- Commands can be entered from different consoles to the same system operator ID. You should, therefore, have a central point of control for I/O operations processing, especially for its connectivity and utility commands.

Part 3. Using SA OS/390 on Workstations

Chapter 10. Using the NetView Management Console for SA OS/390

The NetView Management Console (NMC) is a part of the NetView product and is used for monitoring network resources. As SA OS/390 is based on NetView, it also exploits the graphical capabilities of the NMC.

You can monitor and control your whole enterprise with the NMC. It is also possible to monitor your enterprise from a single workstation (single point of control). This is valid for system operations as well as for processor operations. For general information about the NMC see *NetView Management Console User's Guide*. This chapter only describes the extensions that have been added for monitoring SA OS/390 resources.

Introduction

The communication between SA OS/390 and the NMC is maintained by the SA OS/390 topology manager. An SA OS/390 topology agent on each target system retrieves the enterprise data from the automation manager. The SA OS/390 topology manager on the focal point provides the information into RODM. GMFHS takes the information from RODM and presents it in a graphical form on the NMC workstation. The following sketches the main tasks of the SA OS/390 topology manager for system operations. For processor operations, the mode of operation is similar.

At initialization time, the SA OS/390 topology manager retrieves SA OS/390 information for one or more sysplexes from the respective automation managers. To do that, it contacts an SA OS/390 topology agent that resides on a system within the sysplex to be monitored. The SA OS/390 topology agent obtains the information from the automation manager of the sysplex and passes it to the SA OS/390 topology manager.

The retrieved information includes all resources, for example, applications (type APL), application groups (type APG), systems (SYS), and groups of systems (GRP) with their mutual dependencies, and relationships. The SA OS/390 topology manager stores these resources together with their dependency information within RODM.

The SA OS/390 topology manager calls BLDVIEWS to build the views that are necessary for these resources to be displayed on the NMC. The definitions for the views must be supplied by the users.

This process is illustrated in Figure 101 on page 196. The arrows with broken lines represent requests, those with solid lines stand for delivery of information. This figure shows an idealized system configuration. Any constellation of systems is supported according to the abilities of SA OS/390. For example, all components can be installed on a single system.
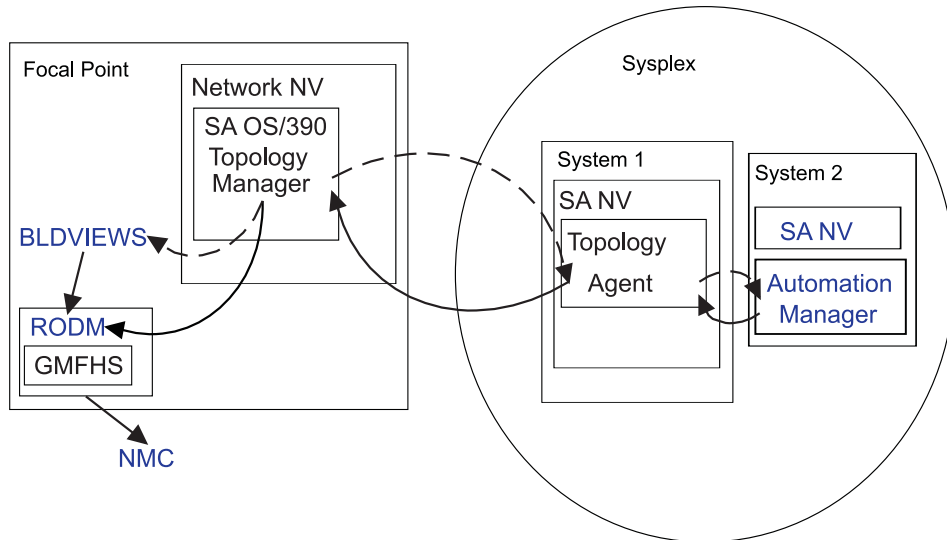
Figure 101. Overview

Note: In SA OS/390, a single system can be regarded as a special sysplex with one system only.

At runtime, the SA OS/390 topology manager performs the following tasks:
- It updates the NMC whenever the status of a displayed resource changes.
- It dynamically displays events like WTORs or tape mount requests on the NMC.
- Users can issue SA OS/390 commands from the NMC which will be routed by SA OS/390 to the appropriate system for processing.
- It resynchronizes its resource structure for one or more sysplexes with the respective automation managers. When this happens, the views affected by eventual changes are rebuilt.

Starting the NMC

Before you start the NMC, make sure that the following conditions are satisfied:
- The NMC server must be up and running and must be communicating with NetView.
- Before an NMC session can be initiated, you should be logged on to NetView for the focal point system. However, you can also configure NetView in a way that you can skip this step. The NMC will initiate the session to NetView itself.
- In order to issue interactive commands (see "Interactive Commands" on page 206), you must have set up your NetView 3270 Management Console correctly. See *System Automation for OS/390 Planning and Installation* for details.

After you have started the NMC, the **Sign On** panel is displayed. Enter the user ID and the password in the respective fields. The user ID must be identical to that of an active NetView host session. In the **Host Machine** field you must enter the address of the NMC server. If you do not know the correct address, contact your system administrator.

When you have signed on successfully, the **Tivoli NetView for OS/390 Management Console** is displayed. The left part of that window contains the *Business Tree*. If you select a view from the *Business Tree*, it is displayed in the right

part. The SA OS/390 views are descendants of the **Networking** view as shown in the following figure.
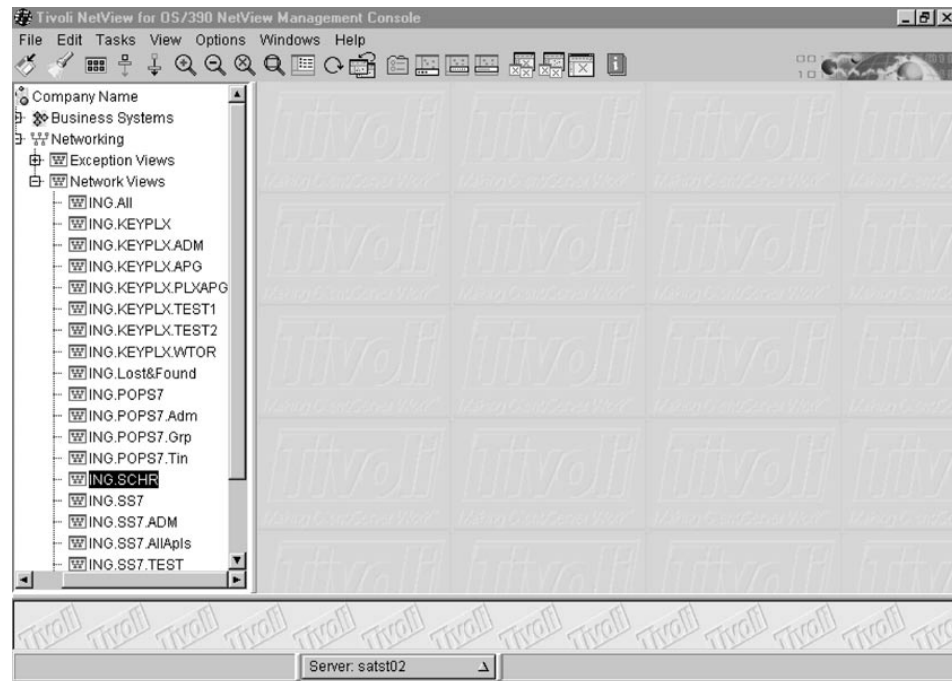
Figure 102. Tivoli NetView for OS/390 Management Console

Monitoring SA OS/390 on the NMC

On the NMC workstation, you can see the graphical visualization of what is automated in system operations and processor operations.

For system operations, the automation manager knows about the configuration of the sysplex and the resources running in it. The SA OS/390 topology manager communicates with these automation managers.

For processor operations, it is the processor operations focal point which knows about the processor operations configuration and therefore, the SA OS/390 topology manager communicates with it.

Besides the resource information retrieved from the automation managers, the SA OS/390 topology manager maintains SA OS/390 objects that have no counterpart within the automation manager. The following sections explain the representation of these two types of SA OS/390 resources on the NMC.

Regular Resources

SA OS/390 resources in RODM that also exist within the automation manager are called *regular*. For example, systems (SYS resource type), system groups (GRP), applications (APL), and application groups (APG) are regular resources. Figure 103 on page 198 shows a network view of regular resources.

Figure 103. Network View for Regular Resources

The members of a group are represented on the NMC by subviews. For instance, if you double click on the application group SS7.AOC7.APG.CICSGRPJSHP of Figure 103, the following view will be displayed:
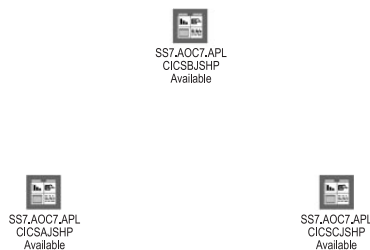
Figure 104. Subview with Applications of an Application Group

Minor Resources, Anchors and Tokens

The SA OS/390 topology manager distinguishes between *major* and *minor* resources. Major resources, such as applications or systems, exist independently. Minor resources are subcomponents of applications (or MVS components) that cannot exist independently, but are always associated with a major resource. Typical examples for minor resources would be the spool of a JES application or transactions of a CICS application. Minor resources have their own automation flags so that you can, for example, switch on automation for an application, but switch it off for one of its subcomponents. This is one main reason for introducing the distinction between major and minor resources.

The minor resources that are defined in the policy database and known to SA OS/390 are a special type of regular resources. They are retrieved by the SA OS/390 topology manager from an automation manager (either during initialization of the SA OS/390 topology manager or when the information in RODM must be resynchronized with the automation manager).

In addition to regular minor resources, the SA OS/390 topology manager also knows *dynamic* minor resources. Dynamic minor resources are posted to the SA OS/390 topology manager at runtime with the INGPOST command. You can also change the state of an existing dynamic resource with INGPOST. For more information on the INGPOST command, see *System Automation for OS/390*

Programmer's Reference. In contrast to regular resources, you can delete dynamic minor resources in RODM from the NMC.

To post a dynamic minor resource to the SA OS/390 topology manager, you must specify the major resource to which this minor resource belongs, and also the sysplex for the major resource. When the SA OS/390 topology manager finds the major resource within RODM it connects the new minor resource with the major resource and displays it immediately in all (network) views that contain the major resource.

The major resource specified to INGPOST can be a regular resource or an *anchor*. Anchors are special objects that exist in RODM, but not in the automation manager. They play the role of major resources and serve two purposes:
- They are used to display dynamic minor resources for which either the specified major resource or the specified sysplex does not exist in RODM. See "'Lost&Found'-Anchors" on page 201.
- Anchors are used to display and group minor resources that derive from events such as WTORS and tape mount requests.

Anchors and Events
The SA OS/390 topology manager is able to represent events such as WTORs or tape mount requests on the NMC. The events are posted to it with the INGPOST command. The SA OS/390 topology manager treats them as dynamic minor resources; these resources are called *event resources*. Event resources are connected to an anchor as their major resource. All events connected to one anchor belong to the same event type. Thus there are, for example, anchors for WTORs, and anchors for tape mount requests.

The SA OS/390 topology manager automatically creates one anchor per sysplex for several event types, for example for WTORs and tape mount requests. Whenever an event of such a type is posted to the SA OS/390 topology manager, it is attached to the appropriate anchor of the respective sysplex, and all views that include this anchor are immediately updated.

Thus, when a WTOR originating from system AOC7 is posted to the SA OS/390 topology manager and AOC7 belongs to sysplex SS7, this WTOR is attached as a minor resource to the (automatically generated) WTOR anchor of sysplex SS7 and dynamically added to any view that includes the WTOR anchor of SS7.

Besides these automatically created anchors, in the INGTOPOF file, you can define your own anchors for any events. You must post these events to the SA OS/390 topology manager with the INGPOST command.

Figure 105 on page 200 shows a view that contains all the automatically created anchors for the sysplex SS7 with event resources attached to some of them.

SS7.
ANCH.
HEARTBEAT
Anchor

SS7.
HEARTBEAT.
AOC7 OK_
11:41:33

SS7.
HEARTBEAT
OK_11:41:
33

SS7.
ANCH.
WTOR
Anchor

SS7.
ANCH.
SYSPLEX
Anchor

SS7.
ANCH.
TAPE
Anchor

SS7.ANCH.
TOKEN Set
13 Apr
2000 11:
14:33

SS7.
WTOr.
SYS1.
0001
NETATST7_
D8I802A
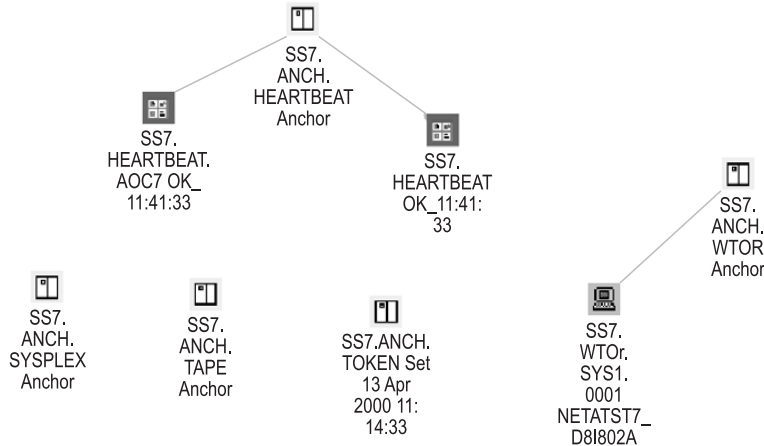
Figure 105. Anchor View

The anchors and their minor resources have the following function:

Heartbeat

These resources represent the connection between the SA OS/390 topology manager and the sysplex. Usually, two minor resources are attached to the heartbeat anchor. One icon represents the heartbeat for the sysplex (the right one in Figure 105), the other is the heartbeat for the system that is currently being used to monitor the sysplex (the left one in Figure 105).

Note that heartbeats, in contrast to other event resources, cannot be deleted by the operator. For more information on heartbeats, see *System Automation for OS/390 Defining Automation Policy*.

Note: When the communication between the SA OS/390 topology manager and the target system(s) fails, icons are created to represent the status: you will find a heartbeat icon with a corresponding label, such as *APLX.HEARTBEAT.NOTARGET* and a sysplex group labelled for example, *APLX.GRP.NoTarget NoCommunication*. The heartbeat icon is there to represent the state. On the sysplex group you can initiate an `INGTOPO REBUILD <system>` or an `INGTOPO SWEEPSYS <system>`.

Location

The location anchor can be used to group events, for example, geographically rather than logically.

Net The network anchor can be used to hold network alerts as minor resources. A network anchor is created for exactly those systems whose domain IDs are listed in the SYSPLEX statement of the INGTOPOF file.

For the description of the INGTOPOF file syntax, see *System Automation for OS/390 Planning and Installation*.

WTOR

Write To Operator with Reply (WTOR) messages are OS/390 messages that inform you of various conditions and require a reply of the operator. In Figure 105, one WTOR is attached to the WTOR anchor.

In the label of this WTOR, 'WTOR' is the major resource name, and 'SYS1.0001' the minor resource name. The additional information is the message content.

By defining a view that contains the WTOR anchors of all sysplexes in the enterprise, you can monitor all WTORs at a single glance. For defining views, see "Creating Views" on page 208.

Tape mount request

When a tape mount request for sysplex SS7 is posted to the SA OS/390 topology manager, it is attached to the tape mount request anchor of this sysplex.

'Lost&Found'-Anchors

To post a new minor resource to the SA OS/390 topology manager, you must specify the major resource to which this minor resource belongs, and also the sysplex for this major resource. When the SA OS/390 topology manager cannot find the major resource in RODM, it attaches the minor resource to one of several special anchors that serve to display such unconnected minor resources. These anchors are also automatically generated.

There is one such anchor at sysplex level, which collects minor resources whose major resource does not exist in RODM, but whose sysplex is known to the SA OS/390 topology manager. If even the sysplex is unknown, the SA OS/390 topology manager attaches the minor resource to an anchor with the prefix 'Lost&Found'. There are 'Lost&Found'-anchors for WTORs, tape mount requests, heartbeats, and for sysplex related resources.

Figure 106 displays a view that comprises the 'Lost&Found'-anchors.

| LOST&FOUND. ANCH.WTOR Anchor | LOST&FOUND. ANCH.SYSPLEX Anchor | LOST&FOUND. ANCH.TAPE Anchor | LOST&FOUND. ANCH. HEARTBEAT Anchor |

Figure 106. View with 'Lost&Found'-Anchors

Tokens

A token is an object, which is generated automatically by the SA OS/390 topology manager. The date and time when the SA OS/390 topology manager was initialized is appended to the name of the token, In the *Data1* field of the resource properties, you can find the original ACF token or the processor operations token of the monitored system. This can be used for diagnostic purposes.

Properties of SA OS/390 Objects on the NMC Workstation

All resources are represented by icons. Dependencies are displayed as lines; no difference is made between start and stop dependencies. Association of a minor resource to a major resource is also represented through a line. The state of the resources is indicated by the color of the icon. The colors are mapped to the compound states of the resource as follows:

GREEN	Satisfactory
LIME	InAutomation
CYAN	Awaiting
WHITE	Inhibited
YELLOW	Degraded

PINK	Denied
RED	Problem
GREY	Status not known (NMC specific)
BLACK	Resource deleted in RODM (NMC specific)

For more information on the compound status, see "Compound Status" on page 34.

The labels of the icons consist of three (four) parts, namely

1. The sysplex name as defined in the INGTOPOF file.

   For the INGTOPOF file, see *System Automation for OS/390 Planning and Installation*.

2. A derivative of the major resource name.

   This part of the label differs from the resource name within the automation manager in that the order of its components is reversed and the slashes are replaced by dots (for example, the standard resource name JES2/APL/SYS1 becomes SYS1.APL.JES2). The reason for this reversal is explained in "Names" on page 209.

3. Possibly a minor resource name.

   The minor resource name of the JES2 spool in Figure 103 on page 198 is SPOOL

   When a minor resource name contains more than one part, the separator slashes are also replaced by dots, but no reversal of the components takes place (for example, TRAN/ABC123 would become TRAN.ABC123).

4. Additional information.

   With major resources, this additional information is essentially the compound status. In most cases, it is supplemented by a suffix that indicates whether the status refers to starting or stopping the resource. Thus there is an INHIBITED_START state and an INHIBITED_STOP state. The SATISFACTORY compound state is replaced by the pair AVAILABLE and UNAVAILABLE.

   For the minor resource in Figure 103 on page 198, the additional information is 'OK'.

Fore more information on the labels, see "Names" on page 209.

If you have the appropriate CPE profile setup for your user ID, you can view and possibly edit the **Resource Properties** of the displayed resources (see also *NetView Management Console User's Guide*).
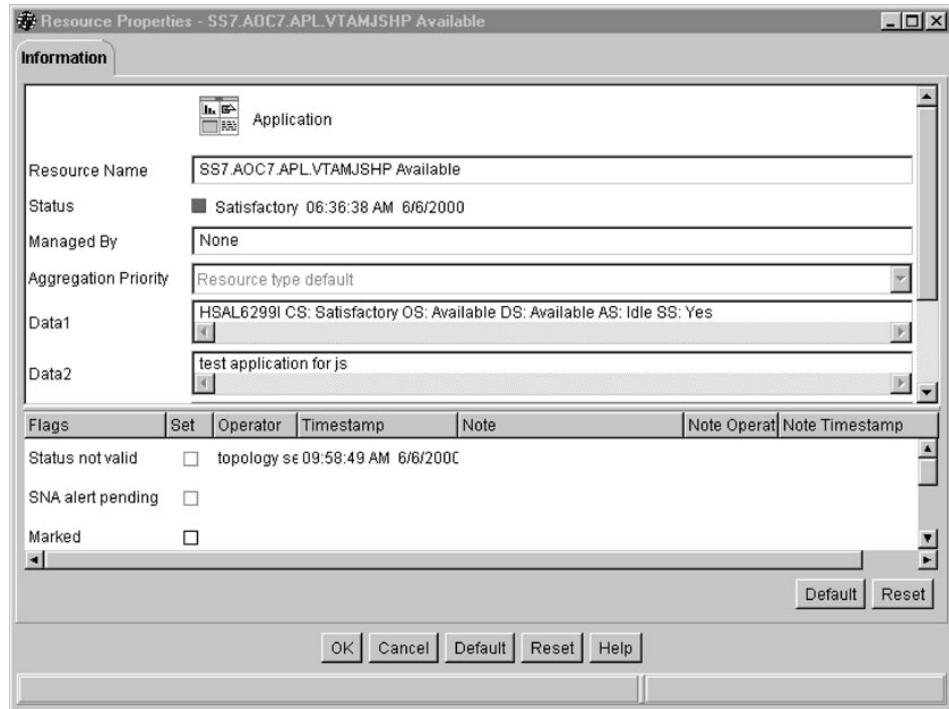
Figure 107. Resource Properties Window

For regular major resources, the **Data 1** field contains detailed status information, and the **Data 2** field can contain a comment, for example by an operator. For dynamic minor resources (see "Minor Resources, Anchors and Tokens" on page 198), the **Data 1** field corresponds to the `message` parameter of the INGPOST command, **Data 2** corresponds to the `userdata` parameter of the INGPOST command; see *System Automation for OS/390 Programmer's Reference* for more information on INGPOST. **Data 3** and **Data 4** are currently not used.

SA OS/390 information is presented on the NMC in *network* views or in *exception* views. Network views represent the topology of resources, that is, grouping of resources and their connections. Figure 103 on page 198 is an example for a network view. Exception views display resources that have certain properties in common.

Dynamic Behaviour of the SA OS/390 Topology Manager

In a running SA OS/390 enterprise, you can imagine scenarios where new systems are IPLed while the SA OS/390 topology manager is already running, or new systems are added to a sysplex and so on. The following sections describe how the SA OS/390 topology manager behaves in these events.

SA OS/390 Topology Manager Initialization: INGTOPO INIT

If the systems are set up accordingly, SA OS/390 automatically issues the INGTOPO INIT command after it received the completion code of the start of the NetView MultiSystem Manager. If this is not the case, you have to start the SA OS/390 topology manager manually by issuing the INGTOPO INIT command.

With the INGTOPO INIT call, the SA OS/390 topology manager queries the INGTOPOF file and contacts each of the specified target systems (the specified sysplexes or the processor operations focal point). For the contacted target systems, it creates the according objects in RODM.

System Detection

When a system on which SA OS/390 is installed becomes active, it sends a signal to the SA OS/390 topology manager. The SA OS/390 topology manager, which is already running, checks whether the system belongs to a sysplex or a processor operations focal point it knows (i.e., that is defined in the INGTOPOF file) and whether this sysplex or processor operations focal point was incommunicative until now. If both conditions are fulfilled, the SA OS/390 topology manager performs the initialization process for this sysplex or processor operations focal point. In all other cases the SA OS/390 topology manager ignores the signal. Note that these signals never reach any operator when the SA OS/390 topology manager is not present.

The Heartbeat Function

When the SA OS/390 topology manager makes contact with a system that can act as a representative of a sysplex, it launches a *heartbeat* timer on that system and a deadmans's timer for that sysplex on the focal point system. The heartbeat timer sends a generic alert to the focal point system at a regular interval to indicate that the target system is still in good health. This alert resets the deadman's timer on the focal point. If the alert does not arrive before the deadman's timer expires, the SA OS/390 topology manager assumes that the current representative cannot respond. The processing in such a case is described in "Takeover when a System Goes Down".

Takeover when a System Goes Down

If the SA OS/390 topology manager needs to assume that the sysplex representative cannot respond, it tries to find another one according to the specified systems in the in the SYSPLEX statement in the INGTOPOF file. Therefore the sequence of the specified SYSPLEX and PROCOPS statements and the sequence of the specified systems is relevant. If it finds a new representative, communication continues with the new one and the representation on the NMC continues. If it finds none, it considers the communication with the respective sysplex interrupted; all resources of the sysplex assume the color representation of the status *Unknown*.

Issuing Commands from the NMC

In order to issue a command against a resource, click on this resource with the right mouse button to open a context menu. This menu contains only those system operations or processor operations commands that are applicable to the respective resource. Some SA OS/390 commands are not provided because they cannot be reasonably connected to a resource.

When the state of the resource is affected by the command, the state information (event component of the label, color of the icon) is actualized on the NMC.

The following sections describe the different command types.

Direct Commands

Some commands, for example INGINFO, need no user specified parameters. They are immediately executed after having been selected in a command submenu. Their output is displayed in the log of the NMC.

Dialog Commands

Most SA OS/390 commands accept or need parameters that you must specify. When you select such a command from a submenu, a window will open where you can enter the appropriate values. Their output is displayed in the log of the NMC.

If you select, for example, the command INGTHRES for the resource SS7.AOC7.APL.VTAMJSHP in the view of Figure 103 on page 198, the appropriate parameter window is opened as shown in Figure 108.

Figure 108. Parameter Window for INGTHRES

All parameter windows consist of two parts. The upper part contains the fields where you can enter the parameter values. The lower part displays the operator

command that is generated from your input in the upper part. All you have to do is to enter the required values or choose the required option in the parameter fields (which has already been done in Figure 108 on page 205) and issue the command by clicking on one of the two **send** buttons.

You can edit the command string in the **Command string** box at the bottom of the window. However, this is not necessary and may even lead to errors if you do not have a thorough understanding of the INGRTCMD command. "The INGRTCMD Command" on page 207 contains a brief summary of the INGRTCMD mechanism.

Interactive Commands

There are commands that require a continued dialog before they can be processed. Such commands are routed to a NetView 3270 Management Console and are processed there; this presupposes that you have set up the 3270 console correctly.

The INGREQ STOP command provides an example:

After clicking on the resource SS7.AOC7.APL.VTAMJSHP in Figure 103 on page 198 and selecting the entry **SA Operations Commands**, a submenu is opened which includes the **INGREQ Stop** entry. If you select this command, the request is forwarded to a NetView 3270 console, which would look as follows:
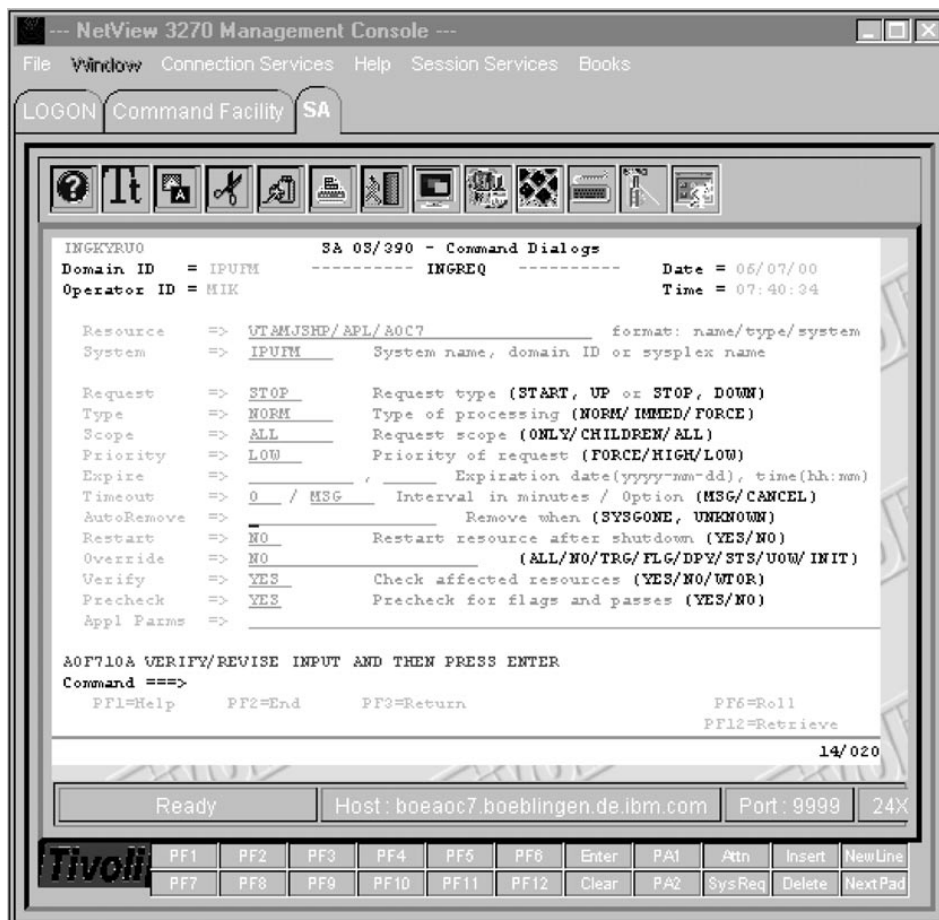
Figure 109. NetView Console with INGREQ Panel

After pressing ENTER you are presented with a list of the resources affected by the command (SS7.AOC7.APL.VTAMJSHP and SS7.AOC7.APG.CICSGRPJSHP) . If you confirm the request the resources are stopped. The view of Figure 103 on page 198 is actualized, and now looks as follows:

SS7.AOC7.APL
JES2JSHP Available

SS7.AOC7.APL
VTAMJSHP Unavailable

SS7.AOC7.APG
CICSGRPJSHP
Unavailable

Figure 110. Actualized View

Note the modified event components in the label of the resources SS7.AOC7.APL.VTAMJSHP and SS7.AOC7.APG.CICSGRPJSHP.

Note: Depending on your setup, at the initial start of the NetView 3270 Management Console, triggered by an SA OS/390 command that needs to be transferred to the NetView 3270 Management Console, you might be confronted with messages, or even problems (e.g. failing logon), that are not related to the original SA OS/390 command. Handle these messages or problems as appropriate and retry the command.

The INGRTCMD Command

When you select a resource and then choose an operator command, a template of that command is generated. In this template, a place holder value is specified for all parameters of the command to which an attribute of the selected resource can be assigned as its value. The place holder points to this attribute. The place holders all have the format ?*name*.. Thus, for example, ?RESOURCE. refers to the resource name (which would be VTAMJSHP/APL/AOC7 in our example) of the object you clicked on.

Before the command is forwarded to the appropriate target system, these place holders must be replaced by real values. This is done by the command INGRTCMD. In order to be able to substitute the placeholders, INGRTCMD must be passed the ID of the object whose attributes are to supply the parameter values, so that the format of the command is as follows:

INGRTCMD *object_id command_string*

In the parameter window, the *object_id* is specified in the form %OBJECTID%, which is a reference to the RODM object ID of the selected resource. The command string displayed in Figure 108 on page 205 would thus be converted by INGRTCMD into

INGTHRES VTAMJSHP/APL/AOC7,CRIT=(2,02:00) outmode=line

and would be routed to the system representing the sysplex SS7.

Creating Views

The RODM objects representing SA OS/390 resources must be included in a view in order to be displayed on the NMC. The definition of these views is up to you. The SA OS/390 topology manager, however, offers some support for executing view definitions and updating the views whenever necessary. In order to exploit this feature, you must specify your view definitions in the format required by the NetView BLDVIEWS tool. Some familiarity with this tool and with the terminology and class structure of RODM (see *Tivoli NetView for OS/390 Resource Object Data Manager and GMFHS Programmer's Guide*) will be assumed in the following description.

The files containing your BLDVIEWS view definitions can be introduced to the SA OS/390 topology manager in the INGTOPOF configuration file (for information on the INGTOPOF file, see *System Automation for OS/390 Planning and Installation*). When the SA OS/390 topology manager is started, it will, after constructing the SA OS/390 objects, create the views in RODM by calling BLDVIEWS for all the definition files that it finds in the INGTOPOF file. BLDVIEWS will create a view object in RODM for every definition and connect every resource that meets the selection criteria specified in the definition with this view object.

At runtime, it will be necessary to rebuild the views for certain sysplexes when their SA OS/390 objects in RODM are not, or no longer, current. In such a case, it is desirable that the views be rebuilt only for those sysplexes whose SA OS/390 structure has in fact changed. For this reason, the definition files are associated in the INGTOPOF file with sysplexes. Thus, when defining a sysplex specific view, be sure to put it into a file that is associated in INGTOPOF with this sysplex. The same consideration applies to sets of target processors. For more information, see "Network Views and Exception Views".

Note: You can also call the BLDVIEWS tool independently of the SA OS/390 topology manager to update views or create further views. However, these will not be automatically updated when new major resources are created in RODM.

Network Views and Exception Views

NetView provides different types of views. For displaying SA OS/390 resources, only *network views* and *exception views* are used.

Network views are intended to display the structure of a network. Therefore, all relationships between resources are displayed on the NMC. Furthermore, network views are static with regard to their structure; unless the link between a view element and the view object is removed or a new link is established, they always contain the same elements.

Exception views, on the other hand, display resources that have certain properties in common, for example, all resources that are in an exception state and marked by an operator. The relationships are not displayed in an exception view. Exception views are dynamic; although the underlying structure does not change, new elements are included in the view when a resource acquires the appropriate combination of properties (for example, when an operator marks a resource that is

in an exception state), and elements are removed when they change any of their relevant properties (for example, when the resource is unmarked again).

A BLDVIEWS definition of a view typically consists of two parts. With the VIEW (for network views) or EVIEW (for exception views) statement you specify the type and properties of the view.

The second part of the definition specifies the resources that are to appear in the view. All SA OS/390 resources in RODM are Non-SNA (GMFHS Managed Real) resources. Thus, you can use either the **MyName** or the **DisplayResourceName** field as a selection criterion for the Non-SNA resources to be included in the view. Note that you can specify more than one selection criterion.

Following are a typical network view and a typical exception view definition. First the network view:

```
VIEW=ING.SS7.APPL,ANNOTATION='Sysplex SS7'
NONSNA='SS7.AOC7.*',QUERYFIELD=DRN
```

The NONSNA statement must be read as "Include in the view all Non-SNA resources whose **DisplayResourceName** field contains a value beginning with SS7.AOC7.". For more information on view definitions for the BLDVIEWS tool see the online help which is shipped with NetView.

Now a typical exception view:

```
EVIEW=ING.SS7.EXC,ANNOTATION='Exceptions SS7',DSF=NOXCPT,MF=OFF
NONSNA='SS7.AOC7.APL.*',QUERYFIELD=DRN
```

Note the interplay between the selection criterion of the NONSNA statement and the filter parameters of the EVIEW statement. In contrast to the network view, the NONSNA statement for an exception view only specifies the *candidates* for appearance in the view. Which of these candidates are in fact included depends on the filter parameters. In the example definition, the exception state filter (DSF parameter) and the mark filter (MF parameter) are set so that only those candidate resources are displayed that are in an exception state and marked by an operator.

In order to be able to specify the selection criteria correctly, you must know how the names of the SA OS/390 resources in the RODM **MyName** and **DisplayResourceName** fields are constructed. This is explained in the following section.

Names

Every SA OS/390 resource in RODM has two names, an *object name* (RODM **MyName** field) and a *display name* (RODM **DisplayResourceName** field). The object name identifies the object uniquely within RODM, the display name appears as the label of the icon that represents the object on the NMC. When defining a view to BLDVIEWS, you can use either of these names as a selection criterion for the objects to be included in the view.

Since the names for system operations objects and for processor operations objects are rather different, they are described separately.

Names for System Operations Objects
The object names for system operations objects have the following format:

sysplex_name.{*name/type/system* | *name/type* | *anchor_name*/ANCH}[.*minor_res_name*]

Here *sysplex_name* is the name of a sysplex as defined by a SYSPLEX statement in the INGTOPOF file.

The display names have the following format:

sysplex_name.{system.type.name | type.name | ANCH.anchor_name}[.minor_res_name]
[ev_summ]

Here again, *sysplex_name* is the name of a sysplex as defined in the INGTOPOF file. Note that the order of the component names for major resources is reversed in the display name. This is done to provide more flexibility when specifying filter criteria for views. Note further that slashes (/) are replaced by dots in the names of minor resources. *ev_summ* stands, in the case of a regular major resource, for the current compound status of the resource. With minor resources it stands for various information, for example for the message content of a WTOR or the timestamp of a heart beat.

The following are some examples for both name types:

1. Application TSO on system AOC7 in sysplex SS7:

   Object Name:
   > SS7.TSO/APL/AOC7

   Display Name:
   > SS7.AOC7.APL.TSO

2. Regular minor resource SPOOL of application JES2JSHP on AOC7 in sysplex SS7 in state OK:

   Object Name:
   > SS7.JES2JSHP/APL/AOC7.SPOOL

   Display Name:
   > SS7.AOC7.APL.JES2.SPOOL OK

3. WTOR outstanding on system AOC7 in sysplex SS7:

   Object Name:
   > SS7.WTOR.AOC7/0007

   Display Name:
   > SS7.WTOR.AOC7.0007 NETCTST7_DSI802A

Note: The display name can be customized. For further information, refer to "Appendix B, Syntax for INGTOPOF File" in *System Automation for OS/390 Planning and Installation*.

Names for Processor Operations Objects

The object names for processor operations objects have the following format:

procops_name.name/type[/focal_point_system]/1st_level_min[/2nd_level_min[/3rd_level_min]]

Here *procops_name* is the name of a focal point configuration as defined by a PROCOPS statement in the INGTOPOF file.

The display names have the following format:

procops_name.[focal_point_system.]type.name.1st_level_min[.2nd_level_min[.3rd_level_min]]
[ev_summ]

Here again, *procops_name* is the name of a focal point configuration as defined in the INGTOPOF file. As with the system operations names, the order of the major resource component names is reversed, and slashes (/) are replaced by dots. *ev_summ* stands for the current processor operations state of the resource.

SA OS/390 Topology Manager Commands

There are two commands through which you can communicate with the SA OS/390 topology manager, namely INGTOPO and INGPOST. For more information on these commands, also refer to *System Automation for OS/390 Programmer's Reference* and *System Automation for OS/390 Operator's Commands*.

INGTOPO Command

This command gathers SA OS/390 information about one or more sysplexes (systems) or sets of target processors from the respective automation manager(s) or focal point processor(s) and updates the SA OS/390 structure for these sysplexes (systems) within RODM accordingly. You must call it with a parameter that specifies its mode of operations. The following parameters are valid:

INIT[*task_name***]**
> In INIT mode, INGTOPO sets up the sysplex (processor operations focal point) for monitoring and builds or updates the SA OS/390 objects in RODM in accordance with the automation managers of all sysplexes (systems) that are defined in the INGTOPOF file. INIT is the mode which you must specify at the very first call of INGTOPO. In this case, you must also specify the name of the autotask under which the SA OS/390 topology manager runs.
>
> You may call INGTOPO with INIT any time. INGTOPO will then either rebuild the SA OS/390 objects from scratch or just perform the necessary update operations.

REBUILD *sysplex_name_or_procops_name*
> In REBUILD mode, INGTOPO removes all SA OS/390 objects in RODM for the specified sysplex (or processor operations focal point) and rebuilds them from scratch. You can use this call to rebuild the SA OS/390 information for a sysplex (or processor operations focal point) when the RODM data for this sysplex (or processor operations focal point) appear to be incomplete or damaged.

RESYNC *sysplex_name_or_procops_name*
> In this mode, INGTOPO resynchronizes the SA OS/390 information in RODM with the specified sysplex (or processor operations focal point). The INGTOPO command with the RESYNC option is typically initiated automatically by the target system. This may only involve a status update, but can also mean a complete rebuild of the SA OS/390 information, if this is necessary.

SWEEPSYS *sysplex_name_or_procops_name*
> In this mode, INGTOPO removes all SA OS/390 objects in RODM for the specified sysplex or processor operations focal point and stops all monitoring services.

SWEEP
> In this mode, INGTOPO removes all SA OS/390 objects in RODM for all sysplexes and all processor operations focal point and stops all monitoring services.

For more information, see *System Automation for OS/390 Operator's Commands*.

INGPOST Command

This command is normally invoked from within a program. It is used to dynamically display subsystems or other events. For example, if you have a CICS running, and one of its transaction runs into problems, you could specify an INGPOST which links a corresponding minor resource of this transaction to the CICS major resource, specifying the event and indicating its status by a corresponding color.

The purpose of INGPOST is to enhance problem management. You can also use INGPOST to visualize any other alerts or events and to create or manipulate minor resources.

For more information on INGPOST, see *System Automation for OS/390 Programmer's Reference*.

Processor Operations on the NMC

Processor operations deals with controlling operations of the processor hardware. One or more of these processors are controlled from a focal point. There can be more than one focal point. It is these focal points that the SA OS/390 topology manager contacts for gathering information. A focal point with its associated target processors is called a processor operations focal point configuration or, if no confusion is likely to arise, simply a *focal point configuration*.

Processor operations is independent from system operations. Accordingly, when the same enterprise component (for example, a system) is integrated into processor operations and also into system operations, the SA OS/390 topology manager creates two representations of it in RODM. For these reasons it will usually be advisable to keep the processor operations objects apart from the system operations objects in the NMC views. See "Creating Views" on page 208 for defining views.

The following figure shows a network view of a processor operations configuration.
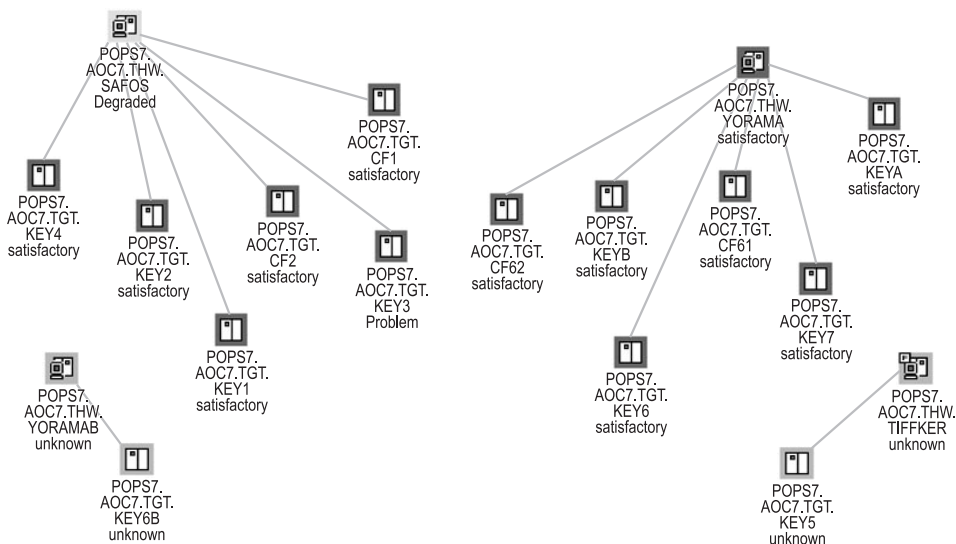
Figure 111. Processor Operations View

The SA OS/390 topology manager knows four kinds of processor operations objects which can be distinguished by the type component of their labels. This label is constructed as follows:

1. The name of a focal point configuration as defined in the INGTOPOF file.

   For the INGTOPOF file, see *System Automation for OS/390 Planning and Installation*.

2. The resource name.

   This consists of the name itself, the type identifier, and optionally a system name.

   There are four resource types, whose names are derived (with one exception) from the corresponding processor operations type names by omitting the prefix ISQ. The names have the following meanings:

   TGT This characterizes a target system.

   THW This characterizes a target processor.

   PGR This characterizes a group of target systems.

   > **Note:** This type identifier is different from the second part of the corresponding processor operations type name, which is ISQGRP. The reason for this deviation is that GRP is already used within system operations.

   SBG This characterizes a subgroup of target systems.

3. A minor resource name consisting of one, two or three parts. The parts are separated by dots.

The states of processor operations objects are interpreted in terms of NMC states. You can view the complete processor operations status in the **Data 2** field of the **Resource Properties** window.

Monitoring Sysplex Resources

The SA OS/390 topology manager detects and provides objects that represent sysplex resources (for example, coupling facilities and couple data sets). Also sysplex resource specific commands are provided so that you can issue them in the same way as described in "Issuing Commands from the NMC" on page 204.

Problem Management

Problem management facilities offered by the NMC workstation consist of the following aspects described in the subsequent sections:

- "Exception Views"
- "Marked and Unmarked Resources" on page 214
- "Updating Operator Data" on page 214
- "Problem Management of Minor Resources" on page 215

These sections are an outline of suggestions how you can use the combination of these facilities to establish an efficient problem management.

Exception Views

Exception views are typically used for problem management. It is recommended that you define your exception views in pairs, where the difference between the two views is that one of them contains only unmarked resources, and the other

only marked resources. For example, the marked resources could be those being worked upon by an operator, the unmarked ones are not yet handled. The exception views are actualized dynamically; if you mark a resource within a view that contains only unmarked resources, the resource is immediately removed from that view and added to the corresponding view with marked resources.

The following view, for example, shows one of the resources also occurring in Figure 103 on page 198 that is in an exception state.

Figure 112. Exception View

For more information on network and exception views, see "Network Views and Exception Views" on page 208.

Marked and Unmarked Resources

The feature of marked and unmarked resource as introduced in "Exception Views" on page 213 is provided for every resource via the resources command menu. The NMC workstation just lets you mark resources. Marked resources are displayed with a flag. You define within your enterprise what the meaning of the mark should be. So for example, you can distinguish resources in different states of attendance. Marked and unmarked resources dynamically change within the appropriately defined views according to your marking actions.

Markings processed through the SA OS/390 marking commands (offered in the pop-up menu) are persistently stored by SA OS/390. This is the advantage over the standard marking function as provided by native NMC.

Updating Operator Data

You can write messages into the **Data 2** field of the **Resource Properties** window from the NMC. This can be used for problem management. For example, when you mark a resource that is in an exception state in order to indicate that you are working on the problem you can add in this way a comment for your colleagues.

You call this function by selecting **SA Icon Commands** and then **Update Operator Data**. A window appears where you can enter your comment. This will immediately be written into the **Data 2** field of the selected resource.

The advantage of this function, as compared to the standard function for information exchange between operators in the lower part of the **Resource Properties** window is that the comments are persistently stored.

Problem Management of Minor Resources

Minor resources inherit the view properties of the related major resources. Thus they appear in the same views as the major resource.

For example, if a major resource could appear in an exception view, and now a minor resource of this major resource runs into a problem, then this minor resource will appear in the exception view (independently of whether the major resource is visible). However, as minor resources are bound to a major resource, they can only appear in views where you would expect the major resource.

You can apply problem management on minor resources just as you would do for major resources; that is, you can mark and unmark minor resources and you can also append a comment to them as described in "Updating Operator Data" on page 214. Additionally, in contrast to major resources, you can delete minor resources.

Part 4. TEC Notification by SA OS/390

Chapter 11. Using TEC Notification by SA OS/390

This chapter describes how to use TEC Notification by SA OS/390. After an introduction, "SA OS/390 Messages, Alerts and Tivoli Events" on page 220 describes how SA OS/390 messages and NetView alerts are mapped to Tivoli events. "Operation of TEC Notification by SA OS/390" on page 229 contains the information required to monitor Tivoli events from the Tivoli desktop. You find information on how to install TEC Notification by SA OS/390 in *System Automation for OS/390 Planning and Installation*.

Understanding the Use of TEC Notification by SA OS/390

SA OS/390 is an availability management product and covers several aspects of automation and enterprise monitoring of OS/390 for a single system as well as in a sysplex environment.

However, automation may fail and in such cases, messages or alerts indicate that administrator intervention is required. In those cases, SA OS/390 sends out messages to the NetView operators and/or the system operator. The system operator is responsible for handling all events reported by SA OS/390 from a single point of control for systems automation.

It may be desirable, however, to run SA OS/390 integrated with Tivoli, so that events reported by SA OS/390 as well as other events reported in a distributed heterogeneous environment are received at and handled from a single point of control. So SA OS/390 is enhanced in a way that SA OS/390 notifies the Tivoli Enterprise Console™ (TEC) in cases when SA OS/390 issues messages and alerts indicating critical situations. Such messages and alerts are forwarded to the TEC event server.

Thus, a Tivoli administrator running the Tivoli Enterprise Console may become aware of this event. The Tivoli administrator may also be notified when such an event is received by running an appropriate TEC rule which for example triggers a Tivoli notice to be sent to the Tivoli administrator's notice board.

You may also correlate such an event with other events from the distributed heterogeneous environment so that the coincidence of correlated events may trigger a certain action.

Thus, a Tivoli administrator can use the Tivoli Enterprise Console as a single point of control for monitoring and handling events from both the distributed environment and SA OS/390.

This function of SA OS/390 is called *TEC Notification by SA OS/390*. This notification is taking advantage of the *Tivoli GEM Event/Automation Service*. In this environment, the source of notification is of no importance. All events occurring in your enterprise, originating from Tivoli, NetView or SA OS/390 and so on, are handled from the Tivoli Enterprise Console which is the single point of control for Tivoli administrators.

The *GEM Event/Automation Service* allows you to effectively manage both distributed and OS/390 events from a single interface on a single console. You can exploit the event correlation and automation capabilities of the Tivoli Enterprise

Console for all events in the enterprise. You can find more information on the GEM Event/Automation Service in *Tivoli Global Enterprise Manager User's Guide* and *Tivoli Global Enterprise Manager Adapter Guide*.

> **A Note on Terms:**
> A selection of SA OS/390 messages is mapped to Tivoli events. In contrast to traditional Tivoli events, these new events mapped from SA OS/390 messages will be called **SA OS/390 events** in this documentation.

Introduction of TEC Notification by SA OS/390

The SA OS/390 notification may notify Tivoli Enterprise Console (TEC) about an automation problem on OS/390 by sending an event to the TEC event server.

For this purpose, on OS/390 systems, messages or alerts are transformed into Tivoli events and sent to the *TEC event server* which is running on a Tivoli managed node in your network.

These events in turn may cause a notification of a Tivoli administrator on the TEC, may be correlated with other events on the TEC event server, or may result in opening a trouble ticket for example, dependent on what you programmed at the TEC event server.

The TEC event server is a notification target for SA OS/390. Note that not all messages, but only messages indicating critical situations and alerts are forwarded as TEC events to the TEC event server using the respective Tivoli GEM Event/Automation Service Adapter.

A Tivoli administrator who wants to deal with a problem indicated by an event forwarded to the TEC event server by SA OS/390 needs access to the affected OS/390 system. For this purpose, you may use the Tivoli NetView 3270 Management Console. With TEC Notification by SA OS/390, the TEC administrator may log on to the NetView operator console by starting the NetView 3270 Management Console from the TEC console by executing a task. See "How TEC Notification by SA OS/390 Works" on page 231 for a description on how to achieve that.

Note: Forwarding of SA OS/390 messages to TEC will not start until SA OS/390 and the GEM Event/Automation Service are up and running. SA OS/390 messages issued during SA OS/390 startup will not be forwarded to TEC.

SA OS/390 Messages, Alerts and Tivoli Events

Not the complete set of SA OS/390 messages is mapped to Tivoli events, but only an appropriate selection is handled by TEC Notification by SA OS/390. Table 9 on page 221 shows which messages and alerts are mapped to Tivoli events. Table 10 on page 224 shows a list of available new Tivoli events mapped from SA OS/390 messages and how they are integrated into the existing Tivoli event class structure. For details on the format of message mapping or alert mapping see the respective shipped files: *INGMFMT* for message mapping and *INGACDS* for alert mapping.

Section "TEC Rules for SA OS/390 Events" on page 227 describes the correlation rules between certain SA OS/390 events defined by TEC Notification by SA OS/390.

Mapping SA OS/390 Messages to Tivoli Events

In this section:

- you find information about the Tivoli event class structure,
- Table 9 shows how SA OS/390 messages are mapped to Tivoli events (SA OS/390 events)
- Table 10 on page 224 shows for all involved SA OS/390 events, how SA OS/390 messages are mapped to them.

For more information about the meaning of SA OS/390 messages, refer to *System Automation for OS/390 Messages and Codes*.

Event classes are defined hierarchically, with child classes inheriting attribute value defaults from the parent. The SA OS/390 event classes follow a simple hierarchy.

All SA OS/390 events are instances of event classes which inherit from *NV390MSG_SA* which in turn inherits from event class *NV390MSG_Event*, the top level class of all event classes. All event classes defined for the NetView message adapter inherit from this class. This inheritance structure is outlined in Figure 113 on page 224.

The following attributes are used in event group filters. They are set by the NetView OS/390 Message Adapter and overridden by TEC Notification by SA OS/390:

sub_source

> All events originating from SA OS/390 messages are issued by SA OS/390 system operations. This is indicated by sub_sources="SAOS390_SysOps".

The following attributes are new with *NV390MSG_SA* and common for all SA OS/390 events:

date_msg

> Gives the date and time when the message is generated. This may differ from the date and time the event to which it is mapped is generated - see attribute **date**. The format is "MMM dd, hh:mm:ss" as in date and date_reception, for example, **Nov 03, 18:34:27**.

system_id

> Is a 1-8 character identifier of the OS/390 system image on which the message was issued.

sysplex_id

> Is a 1-8 character identifier of the sysplex from which the message originated. As it is not always applicable the default is *N/A*.

os_version

> OS/390 system product level of the OS/390 system on which the message was generated.

Table 9. Mapping SA OS/390 Messages to SA OS/390 Events

SA OS/390 Message	Tivoli Event Class	Tivoli Severity
AOF200I	SA390MSG_CmdUnexpectedCmdResult	CRITICAL
AOF201I	SA390MSG_ClistFailed	CRITICAL
AOF203I	SA390MSG_ClistAuthorizationFailed	WARNING
AOF204I	SA390MSG_ClistInvalidMissingParms	WARNING
AOF205A	SA390MSG_ClistFailedTimerExpired	CRITICAL

Table 9. Mapping SA OS/390 Messages to SA OS/390 Events (continued)

SA OS/390 Message	Tivoli Event Class	Tivoli Severity
AOF206I	SA390MSG_CmdFailed	CRITICAL
AOF211E	SA390MSG_ACFNoAutoOps	CRITICAL
AOF212I	SA390MSG_ACFNoPrimaryOperatorID	CRITICAL
AOF213E	SA390MSG_CFGLOCKFailed	CRITICAL
AOF214A	SA390MSG_EnvironmentNotInitialized	CRITICAL
AOF216I	SA390MSG_EnvironmentNotInitialized	CRITICAL
AOF218I	SA390MSG_CmdFailedACFSaveInProgress	WARNING
AOF221I	SA390MSG_ACFNoPrimaryFocalPoint	WARNING
AOF222I	SA390MSG_ACFNoBackupFocalPoint	WARNING
AOF228I	SA390MSG_NoInactiveResourceInScope	WARNING
AOF230I	SA390MSG_ACFNoTimeoutValue	WARNING
AOF231I	SA390MSG_ACFTimeoutValueInvalid	CRITICAL
AOF232I	SA390MSG_ACFNoTimeoutValue	WARNING
AOF241I	SA390MSG_ClistInvalidMissingParms	CRITICAL
AOF244I	SA390MSG_ShutdownDelayed	HARMLESS
AOF248I	SA390MSG_ShutdownAlreadyInProgress	WARNING
AOF253I	SA390MSG_TimerNotFound	WARNING
AOF255I	SA390MSG_ACFInvalidUserExit	CRITICAL
AOF256I	SA390MSG_ACFNoOptionalExits	CRITICAL
AOF292I	SA390MSG_CannotAssignReplyId	CRITICAL
AOF293I	SA390MSG_NoOutstandingReply	CRITICAL
AOF294I	SA390MSG_SpoolShortageCmdsExhausted	CRITICAL
AOF303I	SA390MSG_RequestedStateAlreadySet	WARNING
AOF305I	SA390MSG_ProcessorNotInControl	WARNING
AOF309I	SA390MSG_TimerForCatchupExecuted	HARMLESS
AOF312E	SA390MSG_AutoFlagAlreadyOff	WARNING
AOF314I	SA390MSG_TimerForCatchupNotExecuted	CRITICAL
AOF315I	SA390MSG_TimerDeleted	HARMLESS
AOF324A	SA390MSG_ACFInvalidEntry	CRITICAL
AOF350E	SA390MSG_ClistFailed	CRITICAL
AOF355E	SA390MSG_ClistFailed	CRITICAL
AOF356E	SA390MSG_ClistFailed	CRITICAL
AOF501I	SA390MSG_ThresholdActionTaken	WARNING
AOF561A	SA390MSG_ACFNoDrainCmds	WARNING
AOF562I	SA390MSG_JES2DrainFailed	CRITICAL
AOF563A	SA390MSG_UnknownResourceType	WARNING
AOF564A	SA390MSG_ShutdownHaltedActiveJobDev	WARNING
AOF565A	SA390MSG_DrainCmdOff	WARNING
AOF568I	SA390MSG_OutBoundGTWStatus	WARNING

Table 9. Mapping SA OS/390 Messages to SA OS/390 Events (continued)

SA OS/390 Message	Tivoli Event Class	Tivoli Severity
AOF569I	SA390MSG_InBoundGTWStatus	WARNING
AOF575A	SA390MSG_RecoveryNotInProgress	CRITICAL
AOF576A	SA390MSG_RecoveryAutoFlagOff	WARNING
AOF577E	SA390MSG_ThresholdRecoveryHalted	WARNING
AOF580I	SA390MSG_AutoFlagOff	CRITICAL
AOF582A	SA390MSG_RecoveryFailed	CRITICAL
AOF583I	SA390MSG_AutoFlagOff	CRITICAL
AOF584I	SA390MSG_ACFNoCmds	CRITICAL
AOF585I	SA390MSG_AutomationAlreadyInProgress	WARNING
AOF587I	SA390MSG_ThresholdRecoveryContinued	WARNING
AOF591E	SA390MSG_RecoveryAutoFlagOff	WARNING
AOF593A	SA390MSG_ShutdownCmdsExhausted	CRITICAL
AOF608A	SA390MSG_WarmStartFailure	CRITICAL
AOF609A	SA390MSG_InvalidReply	MINOR
AOF701A	SA390MSG_MsgTableNotLoaded	CRITICAL
AOF703E	SA390MSG_CmdsExhausted	CRITICAL
AOF719I	SA390MSG_ClistUnexpectedCmdResult	CRITICAL
AOF739I	SA390MSG_ACFNoJESSubsystem	CRITICAL
AOF740A	SA390MSG_ShutdownAutoFlagOff	CRITICAL
AOF745E	SA390MSG_ShutdownNoFinalMsg	WARNING
AOF746A	SA390MSG_ShutdownSuspended	CRITICAL
AOF747A	SA390MSG_ShutdownStuck	CRITICAL
AOF748E	SA390MSG_ShutdownNoFinalMsgResume	WARNING
AOF750I	SA390MSG_ShutdownCmdRplyFailed	CRITICAL
AOF752E	SA390MSG_ShutdownAutoFlagOff	CRITICAL
AOF754A	SA390MSG_ShutdownHalfdown	CRITICAL
AOF759A	SA390MSG_RecoveryACFCMDFailed	CRITICAL
AOF760E	SA390MSG_ClistTrapped	CRITICAL
AOF766I	SA390MSG_ACFEntryMissed	CRITICAL
AOF768I	SA390MSG_ACFEntryMissed	CRITICAL
AOF797A	SA390MSG_ACFLoadStopped	CRITICAL
AOF859I	SA390MSG_ACFInstructionIncomplete	CRITICAL
AOF860I	SA390MSG_ACFInstructionRejected	WARNING
AOF861I	SA390MSG_ACFRetractRejected	WARNING
AOF862I	SA390MSG_ACFBadInstruction	CRITICAL
AOF863I	SA390MSG_ACFDublicateAssert	WARNING
AOF864I	SA390MSG_ACFModifyToAssert	WARNING
AOF865I	SA390MSG_ACFInheritedDataModified	WARNING
AOF866I	SA390MSG_ACFInvalidKeyword	WARNING

Table 9. Mapping SA OS/390 Messages to SA OS/390 Events (continued)

SA OS/390 Message	Tivoli Event Class	Tivoli Severity
AOF867I	SA390MSG_ACFInconsistentData	CRITICAL
AOF868I	SA390MSG_ACFNoJESSubsystem	CRITICAL

Figure 113 outlines the inheritance structure of SA OS/390 event classes.

```
NV390MSG_Event
|
|----> NV390MSG_SA
        |
        |----> SA390MSG_ACFProblem
        |      |
        |      |----> SA390MSG_ACFDataInvalid
        |      |      |
        |      |      |----> SA390MSG_ACFEntryMissed
        |      |      |
        |      |      ...
        |      |
        |      |----> SA390MSG_ACFUpdateInvalid
        |      |      |
        |      |      |----> SA390MSG_ACFBadInstruction
        |      |      |
        |      |      ...
        |      |
        |----> SA390MSG_Threshold
        |      |
        |      |----> SA390MSG_ThresholdActionTaken
        |      |
        |      |----> SA390MSG_ThresholdRecoveryContinued
        |      |      |
        |      |      ...
        |      |
        |      ...
        |
        ...
```
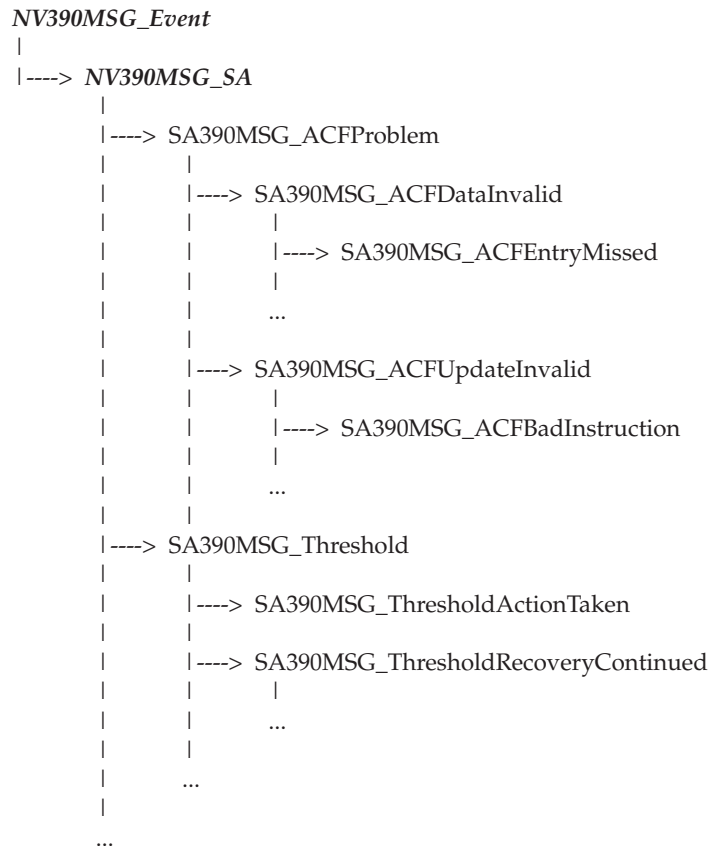
Figure 113. Tivoli Event Inheritance

In the example of Figure 113 you see that **SA390MSG_Threshold** is the base class for all SA OS/390 events indicating reached critical thresholds.

Table 10 gives the details of the inheritance structure of SA OS/390 event classes.

Table 10. SA OS/390 Events and Corresponding Mapped SA OS/390 Messages

Tivoli Event Class	SA OS/390 Message	Tivoli Severity
SA390MSG_ACFLoadStopped	AOF797A	CRITICAL
SA390MSG_ACFProblem	base class	
SA390MSG_ACFDataInvalid	base class	
SA390MSG_ACFEntryMissed	AOF766I AOF768I	CRITICAL
SA390MSG_ACFInconsistentData	AOF867I	CRITICAL

Table 10. SA OS/390 Events and Corresponding Mapped SA OS/390 Messages (continued)

Tivoli Event Class	SA OS/390 Message	Tivoli Severity
SA390MSG_ACFInstructionIncomplete	AOF859I	CRITICAL
SA390MSG_ACFInvalidEntry	AOF324A	CRITICAL
SA390MSG_ACFInvalidUserExit	AOF255I	CRITICAL
SA390MSG_ACFNoAutoOps	AOF211E	CRITICAL
SA390MSG_ACFNoBackupFocalPoint	AOF222I	WARNING
SA390MSG_ACFNoCmds	AOF584I	CRITICAL
SA390MSG_ACFNoDrainCmds	AOF561A	WARNING
SA390MSG_ACFNoJESSubsystem	AOF739I AOF868I	CRITICAL
SA390MSG_ACFNoOptionalExits	AOF256I	CRITICAL
SA390MSG_ACFNoPrimaryFocalPoint	AOF221I	WARNING
SA390MSG_ACFNoTimeoutValue	AOF230I AOF232I	WARNING
SA390MSG_ACFTimeoutValueInvalid	AOF231I	CRITICAL
SA390MSG_ACFUpdateInvalid	base class	
SA390MSG_ACFBadInstruction	AOF862I	CRITICAL
SA390MSG_ACFDublicateAssert	AOF863I	WARNING
SA390MSG_ACFInheritedDataModified	AOF865I	WARNING
SA390MSG_ACFInstructionRejected	AOF860I	WARNING
SA390MSG_ACFInvalidKeyword	AOF866I	WARNING
SA390MSG_ACFModifyToAssert	AOF864I	WARNING
SA390MSG_ACFRetractRejected	AOF861I	WARNING
SA390MSG_AutoFlagAlreadyOff	AOF312E	WARNING
SA390MSG_AutoFlagOff	AOF580I AOF583I	CRITICAL
SA390MSG_AutomationAlreadyInProgress	AOF585I	WARNING
SA390MSG_CannotAssignReplyId	AOF292I	CRITICAL
SA390MSG_CFGLOCKFailed	AOF213E	CRITICAL
SA390MSG_Clist	base class	
SA390MSG_ClistAuthorizationFailed	AOF203I	WARNING
SA390MSG_ClistFailed	AOF201I AOF350E AOF355E AOF356E	CRITICAL
SA390MSG_ClistFailedTimerExpired	AOF205A	CRITICAL
SA390MSG_ClistInvalidMissingParms	AOF204I AOF241I	WARNING
SA390MSG_ClistTrapped	AOF760E	CRITICAL
SA390MSG_ClistUnexpectedCmdResult	AOF719I	CRITICAL
SA390MSG_CmdFailed	AOF206I	CRITICAL

Table 10. SA OS/390 Events and Corresponding Mapped SA OS/390 Messages (continued)

Tivoli Event Class	SA OS/390 Message	Tivoli Severity
SA390MSG_CmdFailedACFSaveInProgress	AOF218I	WARNING
SA390MSG_CmdsExhausted	AOF703E	CRITICAL
SA390MSG_CmdUnexpectedCmdResult	AOF200I	CRITICAL
SA390MSG_DrainCmdOff	AOF565A	WARNING
SA390MSG_EnvironmentNotInitialized	AOF214A AOF216I	CRITICAL
SA390MSG_InBoundGTWStatus	AOF569I	WARNING
SA390MSG_InvalidReply	AOF609A	MINOR
SA390MSG_JES2DrainFailed	AOF562I	CRITICAL
SA390MSG_MsgTableNotLoaded	AOF701A	CRITICAL
SA390MSG_NoInactiveResourceInScope	AOF228I	WARNING
SA390MSG_NoOutstandingReply	AOF293I	CRITICAL
SA390MSG_OutBoundGTWStatus	AOF568I	WARNING
SA390MSG_ProcessorNotInControl	AOF305I	WARNING
SA390MSG_RequestedStateAlreadySet	AOF303I	WARNING
SA390MSG_SpoolShortageCmdsExhausted	AOF294I	CRITICAL
SA390MSG_SubsystemRecovery	base class	
SA390MSG_RecoveryACFCMDFailed	AOF759A	CRITICAL
SA390MSG_RecoveryAutoFlagOff	AOF576A AOF591E	WARNING
SA390MSG_RecoveryFailed	AOF582A	CRITICAL
SA390MSG_RecoveryNotInProgress	AOF575A	CRITICAL
SA390MSG_SubsystemShutdown	base class	
SA390MSG_ShutdownAlreadyInProgress	AOF248I	WARNING
SA390MSG_ShutdownAutoFlagOff	AOF740A AOF752E	CRITICAL
SA390MSG_ShutdownCmdsExhausted	AOF593A	CRITICAL
SA390MSG_ShutdownCmdRplyFailed	AOF750I	CRITICAL
SA390MSG_ShutdownDelayed	AOF244I	HARMLESS
SA390MSG_ShutdownHalfdown	AOF754A	CRITICAL
SA390MSG_ShutdownHaltedActiveJobDev	AOF564A	WARNING
SA390MSG_ShutdownNoFinalMsg	AOF745E	WARNING
SA390MSG_ShutdownNoFinalMsgResume	AOF748E	WARNING
SA390MSG_ShutdownStuck	AOF747A	CRITICAL
SA390MSG_ShutdownSuspended	AOF746A	CRITICAL
SA390MSG_Threshold	base class	
SA390MSG_ThresholdActionTaken	AOF501I	WARNING
SA390MSG_ThresholdRecoveryContinued	AOF587I	WARNING
SA390MSG_ThresholdRecoveryHalted	AOF577E	WARNING

Tivoli Event Class	SA OS/390 Message	Tivoli Severity
SA390MSG_Timer	base class	
SA390MSG_TimerDeleted	AOF315I	HARMLESS
SA390MSG_TimerForCatchupExecuted	AOF309I	HARMLESS
SA390MSG_TimerForCatchupNotExecuted	AOF314I	CRITICAL
SA390MSG_TimerNotFound	AOF253I	WARNING
SA390MSG_UnknownResourceType	AOF563A	WARNING
SA390MSG_WarmStartFailure	AOF608A	CRITICAL

Mapping NetView Alerts to Tivoli Events

SA OS/390 processor operations indicates severe failures which require operator intervention by issuing NetView alerts.

These alerts are forwarded to the Tivoli Enterprise Console exploiting the Tivoli GEM alert adapter. The generic mapping of the NetView generic alerts applies, that is, no new event classes are introduced, but those defined by the NetView OS/390 alert adapter.

The only attribute default changed in case of alerts issued by SA OS/390 processor operations is the default of the attribute *sub_source*. While the adapter fills in *NET* as default, the *sub_source* attribute has the value *SAOS390_ProcOps* in case of alerts issued by SA OS/390.

The following table describes the resulting mapping of SA OS/390 processor operations alerts to the Tivoli Enterprise Console event classes:

Table 11. Mapping SA OS/390 Messages to SA OS/390 Events

AlertId	SA OS/390 processor operations Alert	Tivoli Event Class
1	COMMUNICATION TASK FAILED	SNA_Software_Program_Error
2	LOST PS/2 SESSION	SNA_Link_Error
3	DCCF DETECTED	SNA_Software_Program_Error
4	WAIT STATE DETECTED	SNA_Software_Program_Error
5	CONSOLE LOST	SNA_Input_Output_Device_Error
6	CONSOLE ACCESS LOST	SNA_Input_Output_Device_Error
7	COULD NOT OBTAIN SYSTEM CONSOLE	SNA_Input_Output_Device_Error
8	TARGET HARDWARE PROBLEM	SNA_Equipment_Malfunction

TEC Rules for SA OS/390 Events

A selected set of SA OS/390 messages is mapped to Tivoli events and forwarded to the Tivoli Enterprise Console. Those events can be filtered at the Tivoli Enterprise Console, correlated with other events, and/or trigger an action.

With TEC Notification by SA OS/390 you receive a set of sample rules correlating SA OS/390 events.

The following sections list the SA OS/390 messages for which correlation rules are provided and the semantics of those rules is shortly described.

Correlation Rules for SA OS/390 Message AOF564A

SA OS/390 Message

```
AOF564A time : { JES2 SHUTTING DOWN - txt - OPERATOR INTERVENTION
REQUIRED | title | {job_name } + | {task_name}+  | {device_name}+ }
```

Where *'txt'* is one of:

```
DEVICES NOT DRAINED
JOBS STILL EXECUTING
JOBS STILL EXECUTING, DEVICES NOT DRAINED
TASKS STILL EXECUTING, DEVICES NOT DRAINED
JOBS AND TASKS STILL EXECUTING
JOBS AND TASKS STILL EXECUTING,DEVICES NOT DRAINED
```

and *'title'* is one of:

```
Tasks ...
Devices ...
Jobs ...
```

Description

JES2 is being shutdown and there are jobs, tasks and/or devices that have not been drained. This is indicated by :

```
AOF564A time : JES2 SHUTTING DOWN - txt -
OPERATOR INTERVENTION REQUIRED.
```

This message is followed by a number of messages of type

AOF564A time : title
AOF564A time : {device_name } + | {job_name }+ | {task_name }+

providing the jobs/tasks/devices causing the shutdown halt.

Event Class

SA390MSG_ShutdownHaltedActiveJobDev

Event Severity

WARNING

Correlation Rules:

```
sa390msg_related_564_rule1
sa390msg_related_564_rule2
sa390msg_related_564_rule3
sa390msg_related_564_rule4
sa390msg_related_564_rule5
sa390msg_related_564_rule6
```

These rules link events originating from messages:

```
AOF564A time : {device_name } + | {job_name }+ | {task_name }+
```

to the event originating from a message

```
AOF564A time : JES2 SHUTTING DOWN - txt - OPERATOR INTERVENTION REQUIRED.
```

Further devices/jobs/tasks listed in the above message are copied to attribute *user2* of the event originating from

```
AOF564A time : JES2 SHUTTING DOWN - txt - OPERATOR INTERVENTION REQUIRED.
```

When events originating from messages of type

```
AOF564A time : title
```

are received, the information on the type of resource causing the shutdown halt is added to attribute *user1* of the event originating from

```
AOF564A time : JES2 SHUTTING DOWN - txt - OPERATOR INTERVENTION REQUIRED.
```

If the status of an event originating from a message of type

```
AOF564A time : {device_name } + | {job_name }+ | {task_name }+
```

is changed, this is propagated to the linked message originating from a message of type

```
AOF564A time : JES2 SHUTTING DOWN - txt - OPERATOR INTERVENTION REQUIRED.
```

by adding this information into attributes *user3* and *user4*.

Operation of TEC Notification by SA OS/390

This chapter describes the use of TEC Notification by SA OS/390. It is separated in the following sections describing the appropriate aspects of using TEC Notification by SA OS/390:
- "Startup of TEC Notification by SA OS/390"
- "How TEC Notification by SA OS/390 Works" on page 231
- "Termination of TEC Notification by SA OS/390" on page 234

The starting point for all Tivoli-related operations after a successful startup of TEC Notification by SA OS/390 is the Tivoli desktop.

Startup of TEC Notification by SA OS/390

This section lists:
- the actions you need to perform to prepare the monitored OS/390 systems for routing messages and alerts to Tivoli (see "Host Part")
- the actions that need to be performed on the monitoring Tivoli Enterprise Console to let you see incoming events displayed (see "Tivoli Enterprise Console Part" on page 230).

Host Part
Prerequisites:
- Tivoli NetView for OS/390 is up and running.
- Automation table with fragment *INGMTEC* included is active.
- System Automation for OS/390 is initialized.

If all prerequisites are fulfilled, the autotask has been started and the notification classes for the autotask have been set. Message *AOF646I* (*Tivoli Enterprise Console Notification Service is initialized*) is issued to indicate that the system is correctly customized and initialized.

Actions and System Responses:
1. On the OS/390 focal point system where the message adapter is running, you need to start the GEM Event/Automation Service. Issue the command:

   S IHSAEVNT

If you issue this command as shown here without any options, the GEM Event/Automation Service will use the defined initialization and adapter configuration files. For more information on this command, see *Tivoli Global Enterprise Manager User's Guide*.

2. As a result of the previous step, the message adapter and, if configured, the alert adapter become initialized. If these initializations are complete, this is indicated by the *IHS0124I* messages:

   IHS0124I: Message adapter task initialization complete.
   IHS0124I: Alert adapter task initialization complete.

3. The message *IHS0124I* for the message adapter triggers the execution of the Notification Service initialization procedure *INGRTIN*. This procedure sets the environment global variables and as a result of this procedure, the routing of SA OS/390 messages to TEC is enabled. This is indicated by message *AOF642I*: *Tivoli Enterprise Console Notification Service is enabled*.

4. The alert routing must be enabled manually. Either on the SA OS/390 processor operations focal point system or on the SA OS/390 system operations focal point system, depending on where the GEM alert adapter is running, you need to issue the NetView command

   `NPDA SRFILTER TECROUTE PASS E NTFY`

   to set the alert filter for alerts of type *NOTIFICATION* to **PASS**.

   The message BNJ1341I SRF/SRFILTER COMMAND ACCEPTED is returned. The correct setting for the filter can be verified by issuing the command ***NPDA DFILTER TECROUTE***. The output shown below should be displayed on the NetView console with the action for the ***ETYPE NTFY*** set to PASS.

   ```
   N E T V I E W          SESSION DOMAIN: IPUFJ    BALI      06/10/97 10:33:57
   NPDA-20A                     * CURRENT FILTER STATUS *           REC 1 TO 2 OF 2
                       FILTER TYPE: ALERT FORWARDING TO T/EC

   SEL# ACTION DATA   ETYPE FTYPE   -------- RESNAME, TYPE, OR ADAPTADR ------
   ( 1) PASS    .....  NTFY
   **** DEFAULT ACTION **** BLOCK ****
   ```

Tivoli Enterprise Console Part

Prerequisites:
1. Enter the appropriate Tivoli® command to have the Tivoli desktop up and running.
2. TEC event server is started. If this is not the case, you can start it, for example, from the **Start-up** pull-down menu of the **EventServer** icon.

Sequence:
1. Start the Tivoli Enterprise Console. Now your Tivoli desktop could look similar to Figure 114 on page 231.
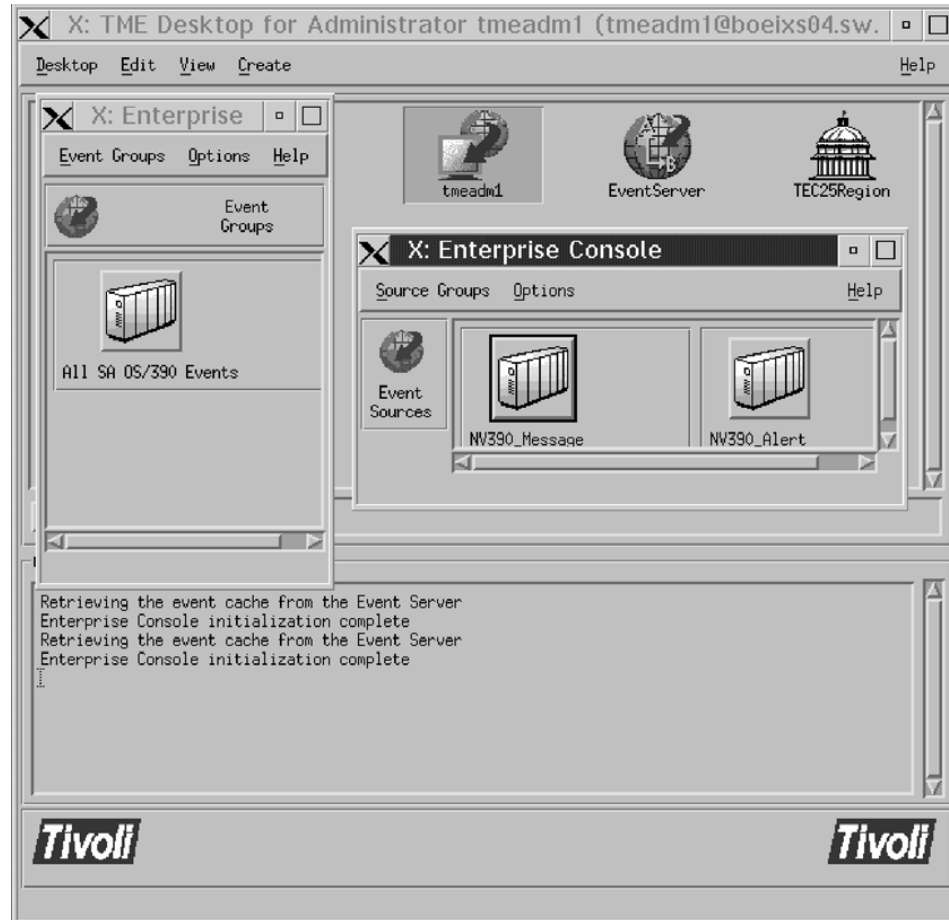
Figure 114. Tivoli desktop with started Tivoli Enterprise Console

2. Open the event groups specific for SA OS/390 to have incoming events displayed by double-clicking on the appropriate icon. In our sample Tivoli Enterprise Console from Figure 114, you would open the event group **All SA OS/390 Events**.

How TEC Notification by SA OS/390 Works

Host Part
SA OS/390 issues messages using the module *AOFMSG* which generates and forwards the messages to the registered auto operator task *%AOFTECTASK%*. This autotask processes the automation table fragment *INGMTEC*. If the message matches the filter criteria, it is either directly routed to TEC (in case you work in a local configuration) or via the focal point system (for a distributed configuration). You find a description of both the local and the distributed environment in *System Automation for OS/390 Planning and Installation*.

SA OS/390 alerts are forwarded to the Networking NetView focal point system and provided to the alert adapter, which routes them to TEC.

Tivoli Enterprise Console Part
Incoming events are displayed in the corresponding event groups (**All SA OS/390 Events**). Predefined correlation rules are applied if applicable. TEC Notification by SA OS/390, provides a Tivoli task that enables you to invoke the NetView 3270 Management Console from the Tivoli Enterprise Console - no matter where the

NetView 3270 Management Console is installed. As shown in Figure 115 you select an event for which you want to invoke the NetView 3270 Management Console and from the **Task** pull-down choice, you select action **Execute on Selected Event...**.
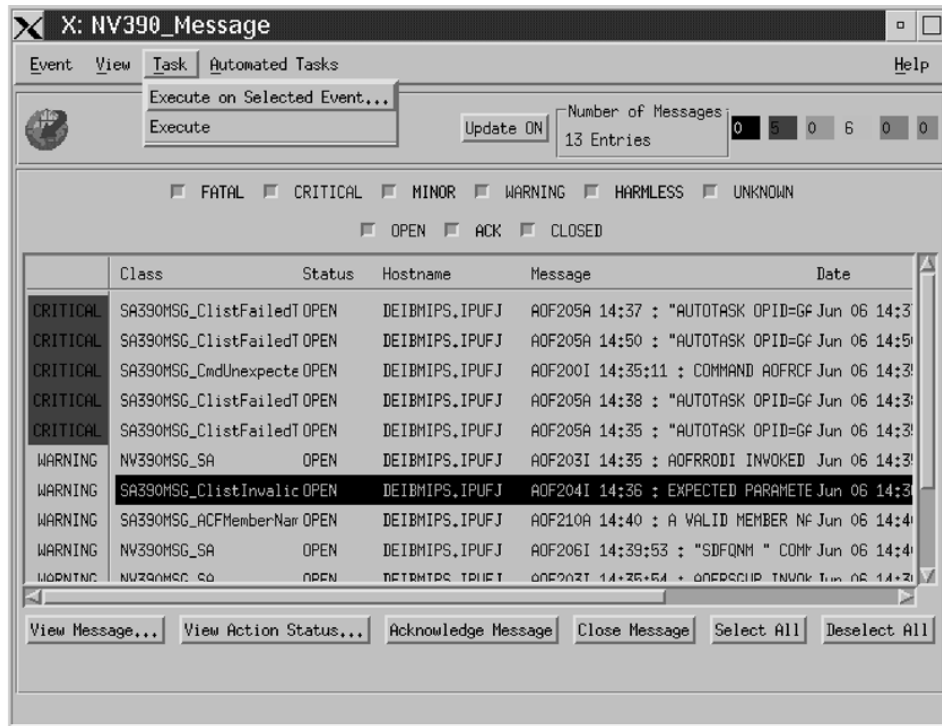
Figure 115. Invoking Predefined Actions for Events

This brings up another dialog, called the *TEC Tasks* dialog, shown in Figure 116 on page 233. From this dialog, you can now invoke the NetView 3270 Management Console:

- Double click on a task library (in our example: *SAOS390 Tasks*).
- Double click on a task (in our example: *Start NetView Console*).
- Optionally you can change the default configuration parameters for the startup of the NetView 3270 Management Console.
- Set the push button beneath the list of configuration parameters to *Execute Local*.
- Press the **Execute and Close** push button.
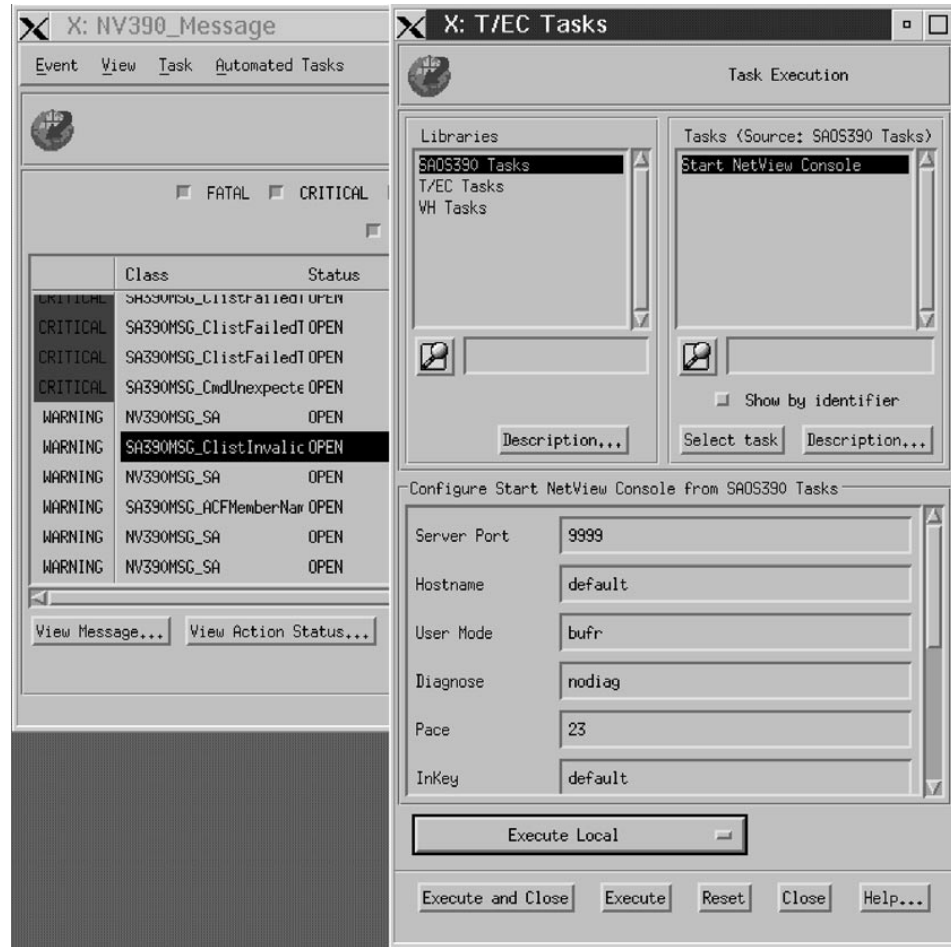
Figure 116. TEC Tasks Dialog

An example of a NetView 3270 Management Console screen is shown in Figure 117 on page 234. Before you reach this screen, a *NetView Logon Panel* prompts you to enter your operator ID and the password.

With the NetView 3270 Management Console you can logon to the NetView of the OS/390 system which, as the event source, triggered the event. In this way, you as a system operator or Tivoli administrator can repair damages on the monitored OS/390 system directly from your Tivoli Enterprise Console by entering NetView commands into the NetView 3270 Management Console.
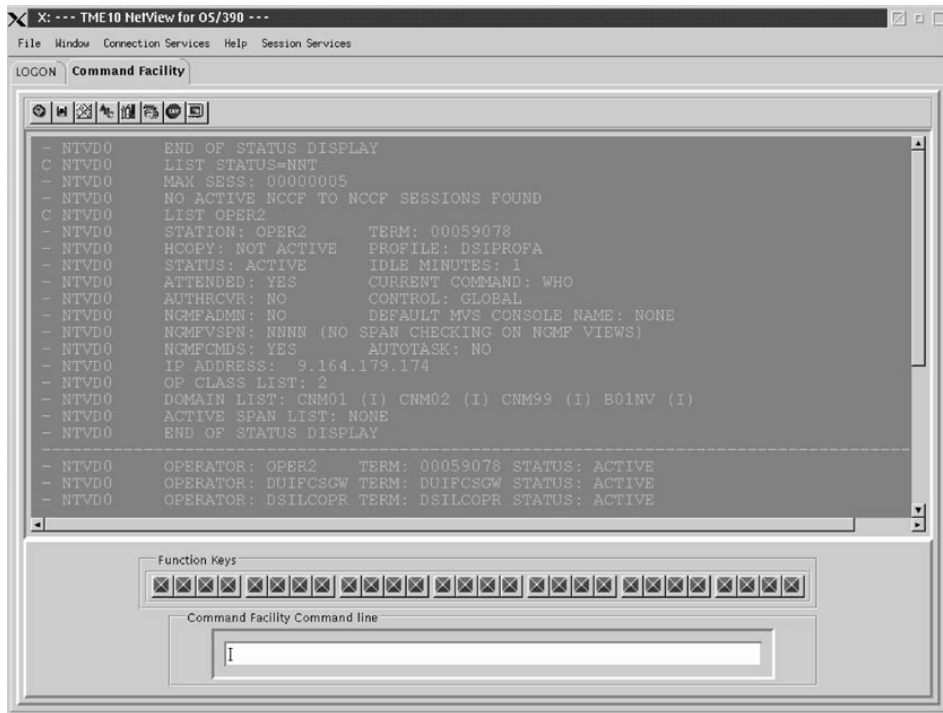
Figure 117. NetView 3270 Management Console

Termination of TEC Notification by SA OS/390

Host Part
Terminating the SA OS/390 message notification to TEC is achieved by
deregistering the auto operator task ***AUTOTEC*** as a notification target for
SA OS/390 messages. You cancel this notification for the auto operator *AUTOTEC*
using the NetView command:

```
ingntfy off AUTOTEC
```

Terminating the NetView alerts notification is achieved by setting the TECROUTE
filter to BLOCKED:

NPDA SRFILTER TECROUTE BLOCK E NTFY

Tivoli Enterprise Console Part
After terminating the notification of SA OS/390 messages and NetView alerts on
the host, you will only see incoming traditional Tivoli events on the Tivoli
Enterprise Console.

Part 5. Appendixes

Appendix A. Automation Initialization Options

At the start of SA OS/390 initialization a multiline write-to-operator (MLWTO) message, AOF767I, is issued describing the options available and system default names and actions. The lines of the MLWTO define the options that can be specified for SA OS/390 initialization. Each line is listed and explained below.

AOF767I is followed by either an AOF603D or an AOF606D WTOR. SA OS/390 replies automatically to an AOF603D after two minutes unless this has been changed as a part of your site's automation policy. SA OS/390 does not automatically reply to an AOF606D message.

The appearance of AOF767I, AOF603D and AOF606D can be suppressed by setting the variable AOFINITREPLY to 0 (see appendix *Global Variables to Enable Advanced Automation* in *System Automation for OS/390 Defining Automation Policy*).

A description of the options follows:

. STOP - CANCEL AUTOMATION
> This line is always present. It indicates that you can reply **STOP**. Doing so causes SA OS/390 to issue an AOF605I and stop running. You must recycle NetView to restart SA OS/390.

. PAUSE - SUSPEND AUTOMATION
> This line is present unless SA OS/390 initialization has previously been paused. It indicates that you can reply **PAUSE**. Doing so causes SA OS/390 to go into a paused state. An AOF604I message is issued, the AOF767I message is reissued, and an AOF606D WTOR is issued. You should not automate the reply to the AOF606D WTOR, as this disables the pause function.
>
> If the automation manager is (re-)started or refreshed (via the INGAMS or MVS modify command) while the automation agent is paused, the reply is cancelled and the automation agent initialization is redriven from the beginning.

. TABLE= - OVERRIDE DEFAULT AUTOMATION TABLE
> This line is always present. It indicates that you can reply **TABLE=**_new_table_. Doing so causes SA OS/390 to load the NetView message automation table _new_table_ rather than the ones whose names are specified in the automation control file being loaded. The NetView message automation table name specified here overrides a table name stored in the warm start cache. The NetView message automation table name specified must exist. If SA OS/390 is unable to load the automation table it issues an AOF701I message telling you this, and an AOF715D WTOR asking you to specify the name of an alternative automation table.

. NOSTART - DO NOT AUTOMATE SUBSYSTEM STARTUP
> This line is always present. It indicates that you can reply **NOSTART**. Doing so causes SA OS/390 to initialize the status of all subsystems to AUTODOWN, rather than DOWN and set the resource's hold flag on the automation manager to YES. This means that after initial status determination is complete, SA OS/390 does not go on to start the subsystems. When you do want the subsystems started, issue an appropriate SA OS/390 command to achieve this. If VTAM is up you can log onto NetView and issue the commands there.

. NOSAVE - DO NOT SAVE DATA TO CACHE
This line is present if the DSISVRT task, which is used for the warm start cache, is operational. It indicates that you can reply **NOSAVE**. Replying **NOSAVE** instructs SA OS/390 not to save the data loaded from the automation control file into the warm start cache. The default action (if you do not reply **NOSAVE**) after a cold start is to save the data into the warm start cache.

. WARM - PERFORM A WARM START FROM CACHE
This line is present if SA OS/390 has determined that the warm start cache is available and contains data from an automation control file that was generated by the SA OS/390 customization dialog. It indicates that you can reply **WARM**. Doing so causes SA OS/390 to start from the warm start cache.

. REFRESH - PERFORM A WARM START FROM CACHE, REFRESH CHANGED DATA
This line is present if SA OS/390 has determined that the warm start cache is available and contains data from an automation control file that was generated by the SA OS/390 customization dialog. This indicates that SA OS/390 has detected changed data on disk. Specifying **REFRESH** means that SA OS/390 starts from the warm start cache and picks up changed data from the disk.

. COLD - PERFORM A COLD START FROM DISK
If you specify **COLD**, SA OS/390 will start with data from the disk and will not use any data from the cache.

. ENTER - CONTINUE WITH *default*
where *default* is one of **WARM**, **REFRESH** or **COLD**. Refer to the appropriate description in this list.

NOTE: COLD START NOT POSSIBLE, NO ACF MEMBER AVAILABLE
This line is present if no valid automation control file has been found on disk.

NOTE: WARM START NOT POSSIBLE, DSISVRT NOT AVAILABLE
This line is present if SA OS/390 has determined that the warm start cache is unavailable. It indicates that the DSISVRT task could not be started.

NOTE: NO USABLE ACF IN CACHE
This line is present if SA OS/390 has determined that the warm start cache is available, but the data in it cannot be used.

NOTE: CACHE NEEDS TO BE REFRESHED
This line is present if SA OS/390 has determined that the warm start cache is available, but needs refreshing.

NOTE: CACHE IS CURRENT, NO UPDATE REQUIRED
This line is present if SA OS/390 has determined that the warm start cache is available, and does not need refreshing.

NOTE: DEFAULT IS: *default*
This line indicates the default (one of **WARM**, **REFRESH** or **COLD**).

A sample of how the AOF767I message could look, is in Figure 118 on page 239.

```
AOF767I AUTOMATION OPTIONS: 497
. STOP    - CANCEL AUTOMATION
. PAUSE   - SUSPEND AUTOMATION
. NOSTART - DO NOT AUTOMATE SUBSYSTEM STARTUP
. NOSAVE  - DO NOT SAVE AUTOMATION CONTROL FILE
. COLD    - COLD START FROM DISK
. TABLE=  - OVERRIDE DEFAULT AUTOMATION TABLE(S)
. ENTER   - CONTINUE WITH 'COLD'
NOTE: NO USABLE ACF IN CACHE
NOTE: DEFAULT IS: COLD
68 AOF603D ENTER AUTOMATION OPTIONS - DOMAIN IPSNO
```

Figure 118. Sample AOF767I Message

If the message on your screen looks significantly different from the sample shown, ask your automation programmer whether he used the initialization exit *AOFEXI01* to modify the message.

Appendix B. Using the I/O Operations ISPF Dialog

Notes:

1. Refer to *System Automation for OS/390 Planning and Installation* for instructions on how to install and to modify the ISPF dialog.

2. The IBM-supplied REXX code, including the EXECs, panels, messages, and tables, is supported, provided it has not been modified. Therefore, if you intend to modify IBM-supplied code, it is advisable to retain two copies: the IBM-supplied copy and the modified

3. Refer to the ISPF publications listed in Table 2 on page xv for more information on ISPF.

Getting Started

To use the I/O operations ISPF dialog:

- You must already be logged on to your user ID and using ISPF.
- The I/O operations ISPF dialog must be available.

To see whether the I/O operations ISPF dialog is available, display the ISPF/PDF *Primary Option* panel on the ISPF main menu.

- If I/O operations is displayed as an option on the ISPF main menu, select it.

  The I/O operations ISPF main menu, which is shown on the next page, should now be displayed. If it is not, consult your system administrator or *System Automation for OS/390 Planning and Installation* for further instructions.

- If I/O operations is not displayed on the ISPF/PDF *Primary Option* panel:
  1. Select option 6 (Command) on the ISPF/PDF *Primary Option* panel and press **Enter**.
  2. If the library required by the customization dialog (ING.CUSTOM.IHVCONF) has been allocated using the TSO logon procedure or using a CLIST of your own, type **INGDLG SELECT(IOCONNECT) ALLOCATE(NO)**

     (To issue the INGDLG command, the data set ING.SINGIREX must be allocated in the SYSPROC DD statement of your logon procedure.)

     The I/O operations ISPF main menu, which is shown on the following page, should now be displayed. If it is not, or if your TSO logon procedure is not set up to allocate the data set required by the ISPF dialog, consult your system administrator or *System Automation for OS/390 Planning and Installation* for further instructions.

Starting with the I/O Operations ISPF Main Menu

```
                                        ┌─┐                    ┌─┐
                                        │B│ View              │C│ Options
                                        └─┘                    └─┘
                               ┌──────────────────┐   ┌──────────────────┐
                               │ 1. Hosts...       │   │ 1. Assist...      │
                               │ 2. CHPIDs....      │   │ 2. Command...     │
                               │ 3. Ports or Names..│   │ 3. Getlock...     │
                               │ 4. Devices...      │   │ 4. Matrix...      │
                               │ 5. Command Results │   │ 5. Unlock...      │
                               │ 6. Varys...        │   │ 6. Verify...      │
                               │ 7. SWCH...         │   └──────────────────┘
                               └──────────────────┘
         ┌─┐                                    ┌─┐                         ┌─┐
         │A│ Modify                             │E│ Locking                │D│ Help
         └─┘                                    └─┘                         └─┘
   ┌──────────────────────────┐          ┌──────────────┐        ┌──────────────────────┐
   │ 1. Work with active...    │          │ 1. Unlock     │        │ 1. How to get help... │
   │ 2. Work with saved....     │          │ 2. Getlock    │        │ 2. Help on keys...    │
   │ 3. Work with a default Matrix│        └──────────────┘        │ 3. Navigation Help... │
   │ 4. Single change to all SWCHs...│                             │ 4. Help Index...      │
   └──────────────────────────┘                                   │ 5. Tutorial...        │
                                                                   └──────────────────────┘

   ┌─┐                      ┌────────────────────────────────────────────────────────────┐
   │1│ Menu Bar            │  Modify View  Locking  Options  Help                         │
   └─┘                      │ ----------------------------------------------------------- │
                            │                  SA OS/390 I/O Operations                   │
                            │                                                              │
                            │    System Automation for OS/390                              │
                            │    Version 2 Release 1                                       │
                            │    Licensed Materials - Property of IBM                      │
                            │    5655-137                                                  │
                            │    (C) Copyright  IBM Corp. 1990, 2000 All Rights Reserved   │
   ┌─┐                      │                                                              │
   │2│ I/O Ops             │  I/O Ops                                                     │
   └─┘ Command             │  Command ===>                                                │
        Line                │                                                              │
                            │                                                              │
   ┌─┐                      │  Comand ===>                                                 │
   │3│ ISPF                │    F1=Help   F2=Split   F3=End   F9=Swap   F10=Actions   F12=Cancel
   └─┘ Command             └────────────────────────────────────────────────────────────┘
        Line
```

1 **Menu Bar** from which you select menus **A** through **E**

A **Modify Menu**
lets you modify a switch configuration in matrix format and issue a change to all switches allocated to the issuing SA OS/390 I/O operations. Place the cursor underneath **Modify** and press **Enter** See "A. If You Select the Modify Menu" on page 243 for more information.

B **View Menu**
prompts you for the operands of the Display commands and then displays the data you request. Place the cursor underneath **View** and press **Enter** See "B. If You Select the View Menu" on page 245 for more information.

C **Options Menu**
lets you customize the IBM-supplied defaults for your user ID. Place the cursor underneath **Options** and press **Enter** See "C. If You Select the Options Menu" on page 248 for more information.

D **Help Menu**
shows you how to display the online help and the online tutorial. Place the cursor underneath **Help** and press **Enter** See "D. If You Select the Help Menu" on page 249 for more information.

E **Locking Menu**
is a simple way to enter the Getlock and Unlock commands. Enter **1** or **2.** If access is controlled by RACF®, the UNLOCK command requires only the

Read authorization, but the GETLOCK command requires the Control level. See *System Automation for OS/390 Operator's Commands* for information about authorization required for I/O operations commands and for information about the GETLOCK and UNLOCK commands.

2 **ISPF Command Line**

On the ISPF command line, you can enter any applicable ISPF command. For more information on ISPF, see the ISPF publications listed in Table 2 on page xv.

3 **I/O Operations Command Line**

On the I/O operations command line, you can enter any SA OS/390 I/O operations command. See *System Automation for OS/390 Operator's Commands* for a complete list of these commands.

A. If You Select the Modify Menu

```
                View
┌─────────────────────────────┐
│ 1. Hosts...                 │
│ 2. CHPIDs....               │
│ 3. Ports or Names...        │
│ 4. Devices...               │
│ 5. Command Results          │
│ 6. Varys...                 │
│ 7. SWCH...                  │
└─────────────────────────────┘
```

Select A Subtask	Action (Press Enter When Needed)
1. Work with active (matrix)...	• a. Select a switch from the list on the *Select SWCH* panel. • b. Go to "A Sample Way to Modify a Switch Matrix" on page 244 for more information.

2. Work with saved (matrix)...	• a. Select a saved configuration from either:
	  – Host (saved in ISPF)
	  – Switch
	• b. Follow directions.

3. Work with a default Matrix	• Go to "A Sample Way to Modify a Switch Matrix" on page 244 for more information.

4. Single change to all SWCHs...	• a. Select a command on the *Single Change to All SWCHs* panel.
	• b. Enter the required information in the fields on the panel (for example, enter a port address or name for the Block command).
	• c. Press **F6**.
	• d. If the *Verify* panel is displayed, verify the information and press **Enter**.
	• e. When processing is complete, do one of the following:
	  – Repeat this sequence of steps to make another change.
	  – Press **F3** to exit.

After you have created or changed a switch configuration in matrix format, you can activate it or make it operational on the designated switch, or you may save it

on the host or on a selected ESCON Director. The issuing SA OS/390 I/O operations must be running and the switch must be allocated to it.

You cannot activate the IBM-supplied default matrix until you have changed its default switch device number of *0000* to a number that is valid for your configuration. (See the last entry in the table under "And Here Are Some Sample Changes You Can Make to a Port ...".)

It is very advisable to save an active switch matrix, even if this is not mandatory.

A Sample Way to Modify a Switch Matrix

When a switch matrix is displayed, you can make the following changes on it; you do not have to enter commands on the command line.

1. If you want to assign a name to the switch, enter the name in the *SWCH Name* field.

   Note: Press **Enter** if you want to see the change highlighted.

2. To make a change to a port, check whether that port's horizontal row is displayed on the matrix. If it is not:
   - To scroll down the leftmost column of ports, use **F8** to scroll to the higher port addresses and **F7** to scroll in the other direction (backwards).
   - To scroll across the columns of ports in the matrix, use **F11** to the right across the screen and **F10** to scroll to the left.

   Some sample changes are shown under "And Here Are Some Sample Changes You Can Make to a Port ...".

3. After you have finished making changes, consider whether you want to save or to activate the switch configuration, or both.

   Note: It is strongly recommended that you save a switch configuration before activating it.

4. To save a switch configuration:
   a. Press **F5**.
   b. On the *Select Destination of Save Configuration* panel, first choose between saving at a switch or at the host. Then, either select a name from the list that is presented, or enter a new name and description.
   c. Press **Enter** to save the matrix of the switch configuration.
      If you are replacing another switch configuration, another panel will prompt you to verify the change. In that case, press **Enter** again.
   d. If you want to activate the switch configuration, refer to the next step.

5. To activate the switch configuration:
   a. Press **F6** on the screen of the matrix.
   b. Verify the information.
   c. Press **Enter**.

And Here Are Some Sample Changes You Can Make to a Port ...

I/O operations Command	Action
Block a port	• Type **B** at the intersection point between the port row and the B column. For example, if you type **B** in the B column at D5's row, D5 will be blocked.

I/O operations Command	Action
Unblock a blocked port	• Type **U** or a space at the intersection point between the port row and the B column. For example, type **U** over the B in the B column at D5's row to unblock port D5.
Connect two ports statically (dedicated)	• Type the port address of the 2nd port at the intersection point between the 1st port and the C column. For example, type **C3** in the C column at port row E4 to connect C3 and E4 statically.
Disconnect a static (dedicated) connection	• Type spaces over the port address at the intersection point between the port row and the C column. For example, type spaces over C3 in the C column at port row E4 to disconnect C3 and E4 from each other.
Prohibit a dynamic connection	• Using **F10** and **F11** to scroll right and left, display the port column of the 2nd affected port. • Type **P** at the intersection point between the 1st port's row and the 2nd port's column. For example, type **P** at the intersection of port row D7 and port column E1 to prohibit these ports from connecting dynamically to each other.
Allow a dynamic connection	• Using **F10** and **F11** to scroll right and left, display the port column of the 2nd affected port. • Type **A** at the intersection point between the 1st port's row and the 2nd port's column. For example, type **A** at the intersection of port row D7 and port column E1 to allow these ports to connect dynamically to each other.
Copy Allows and Prohibits from one port row to another port row	• Type **C** on the blank line to the left of the port row you plan to use as a source. • Type **T** on the blank line to the left of the port row you plan to use as a target.
Name or rename a port	• Type a port name at the intersection point between the port row and the Name column. For example, type **PRINTER1** in the Name column of port row C5 to name C5 PRINTER1. It is recommended that the name be in upper-case letters. (Refer to *System Automation for OS/390 Planning and Installation* for suggestions for naming ESCON Director ports.) You can remove a name by typing blanks over it.
Change the switch device number	• Type a switch device number in the *Target SWCH Number* field. (This is a required action if you start with the IBM-supplied default matrix of 0000.)

B. If You Select the View Menu

```
      Options
 1. Assist...
 2. Command...
 3. Getlock...
 4. Matrix...
 5. Unlock...
 6. Verify...
```

If you select the *View* menu, the subtasks shown at the left are displayed. When the selected view is displayed:

• Use **F7** to scroll backward and **F8** to scroll forward to view the information.

• Press **F3** to return to the display selection screen.

Selection	Option	Action
1. Hosts...	The SA OS/390 I/O operations base programs that are known to the issuing SA OS/390 I/O operations.	Type * on the 1st blank line. See the DISPLAY HOST command in *System Automation for OS/390 Operator's Commands*.
	Detailed information about the SA OS/390 I/O operations base program specified.	Type the VTAM name of an SA OS/390 I/O operations on the 1st blank line. See the DISPLAY HOST command in *System Automation for OS/390 Operator's Commands*.
	A list of all SA OS/390 I/O operations base programs that have the specified switch allocated to them.	Type a switch device number on the 2nd blank line. See the DISPLAY HOST command in *System Automation for OS/390 Operator's Commands*.

Selection	Option	Action
2. CHPIDs...	A list of all CHPIDs with their associated information	Type * on the blank line. See the DISPLAY CHP command in *System Automation for OS/390 Operator's Commands*.
	Detailed information about a specified CHPID	Type a CHPID number on the blank line. See the DISPLAY CHP command in *System Automation for OS/390 Operator's Commands*.

Selection	Option	Action
3. Ports...	A list of all ports with the same name	Type the name of a named port on the 1st blank line. A generic port name may be used. See the DISPLAY NAME command in *System Automation for OS/390 Operator's Commands*.
	Details about a port name or port address on a specified switch	Type either a port address on the 2nd blank line or a port name on the 3rd blank line. Then, type a switch device number on the 4th blank line. See the DISPLAY PORT command in *System Automation for OS/390 Operator's Commands*.
	Information about all ports, only blocked ports, or only statically connected ports on a specified switch	Type **A**, **B**, or **C** on the 5th blank line. Then, type a switch device number on the 6th blank line. See the DISPLAY PORT command in *System Automation for OS/390 Operator's Commands*.

4. Devices...	A list of all devices attached to a specified switch	Type * on the 1st blank line. Then, type a switch device number on the 2nd blank line. See the DISPLAY DEVICE command in *System Automation for OS/390 Operator's Commands*.
	Detailed information about a specific device with relation to all switches	Type a device number on the 1st blank line. Then, type * on the 2nd blank line. See the DISPLAY DEVICE command in *System Automation for OS/390 Operator's Commands*.
	Detailed information about a specified device relative to a specified switch	Type a device number on the 1st blank line. Then, type a switch device number on the 2nd blank line. See the DISPLAY DEVICE command in *System Automation for OS/390 Operator's Commands*.
	Multiple devices on a specified switch	Type a range of device numbers on the 1st blank line. Then, type a switch device number on the 2nd blank line. See the DISPLAY DEVICE command in *System Automation for OS/390 Operator's Commands*.

5. Command Results	A list of command results with relation to each SA OS/390 I/O operations	See the DISPLAY RESULTS command in *System Automation for OS/390 Operator's Commands*.

6. Varys...	A list of failed vary path requests with relation to a specific SA OS/390 I/O operations host	Type the SA OS/390 I/O operations VTAM name on the blank line. See the DISPLAY VARY command in *System Automation for OS/390 Operator's Commands*.

7. SWCH...	A list of all switches allocated, or attached, to the issuing instance of I/O operations.	Type * on the blank line. See the DISPLAY SWITCH command in *System Automation for OS/390 Operator's Commands*.
	Details about a specific switch	Type a switch device number on the blank line. See the DISPLAY SWITCH command in *System Automation for OS/390 Operator's Commands*.

C. If You Select the Options Menu

```
              Help
 ┌────────────────────────────┐
 │ 1. How to get help...      │
 │ 2. Help on keys...         │
 │ 3. Navigation Help...      │
 │ 4. Help Index...           │
 │ 5. Tutorial...             │
 └────────────────────────────┘
```
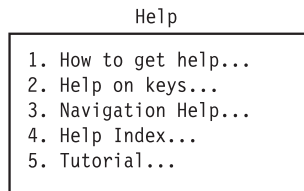
In the I/O operations ISPF dialog, a number of options are shipped with IBM-supplied defaults. You can customize these defaults to your ISPF user ID. Except for the *Verify* option, your customized options remain in effect for your user ID across SA OS/390 I/O operations sessions.

1. Do either of the following:
   - On the dialog's main menu, select the *Options*, and select one of the entries.
   - Enter **OPTIONS** in the command area of a dialog panel
2. Make a selection (1—6).
3. If you want to save your change, press **F3** or enter **END**

1. Assist

Describes the return codes and reason codes in the messages. Selections are:

1. To receive explanatory text and specific messages (IBM-supplied default)
2. Not to receive explanatory text on the return codes and reason codes.

2. Command

Specifies a set of default connectivity options. Selections are:

1. NOForce, Vary, BAckout (IBM-supplied defaults)
2. NOForce, Vary, NOBackout
3. NOCheck, Vary, BAckout
4. NOCheck, Vary, NOBackout
5. Force, Vary, NOBackout
6. Force NOVary, NOBackout

3. Getlock

Obtains processing control. (See the GETLOCK command in *System Automation for OS/390 Operator's Commands* for more information.) Selections are:

1. Never take control from another user.
2. Be prompted with the *Getlock* panel so you can decide whether you want to take control (IBM-supplied default).
3. Always take control. If a command is being processed by another user, however, processing can be interrupted and the command can fail.

4. Matrix

Specifies which changes on the switch configuration will be activated by SA OS/390 I/O operations. (Select them with any character.) Selections are:

___ ALL commands (overrides other options; IBM-supplied default)

___ Allow and Prohibit

   ___ Connect and Disconnect

   ___ Block and Unblock

   ___ Port names

   ___ Switch name

5. Unlock

Relinquishes control of SA OS/390 I/O operations command processing. (See the UNLOCK command in *System Automation for OS/390 Operator's Commands* for further information.) Selections are:

1. No automatic unlock. You must enter the Unlock command.

2. Automatic unlock when you press **F3** or **END** from the I/O operations ISPF main menu (IBM-supplied default).

3. Automatic unlock after every command.

6. Verify

Requires you to verify a command before the dialog activates it. Contrary to the other options, you can tailor the *Verify* option for the remainder of the session only. The default for this option resets to the IBM-supplied default at the beginning of each session. Selections are:

1. Verify before activating (IBM-supplied default).
   - If you press **Enter** after entering a connectivity command, the dialog will continue.
   - If you press **F3** or **END**, command processing is halted, and the preceding screen will be displayed.

2. Do not verify.

D. If You Select the Help Menu

```
                              ┌───────────┐
                              │  MVSESA3  │
                              └───────────┘
                                 YELLOW
              ┌───────────────────┴──────────────────────┐
        ┌───────────┐                              ┌───────────┐
        │  SYSTEM   │                              │  GATEWAY  │
        └───────────┘                              └───────────┘
           YELLOW                                     GREEN
     ┌────────┴─────────────────────┐
 ┌───────────┐                  ┌────────────┐
 │   WTOR    │                  │APPLICATION │
 └───────────┘                  └────────────┘
    GREEN                          YELLOW
     ┌────────┬──────────┬──────────┬──────────┐
┌───────────┐ ┌───────┐ ┌───────┐ ┌───────┐ ┌───────┐
│  AOCAPPL  │ │  JES  │ │ VTAM  │ │  TSO  │ │  RMF  │
└───────────┘ └───────┘ └───────┘ └───────┘ └───────┘
    GREEN       GREEN     GREEN     YELLOW     GREEN
┌───────────┐
│  AOCSSI   │
└───────────┘
   GREEN
```
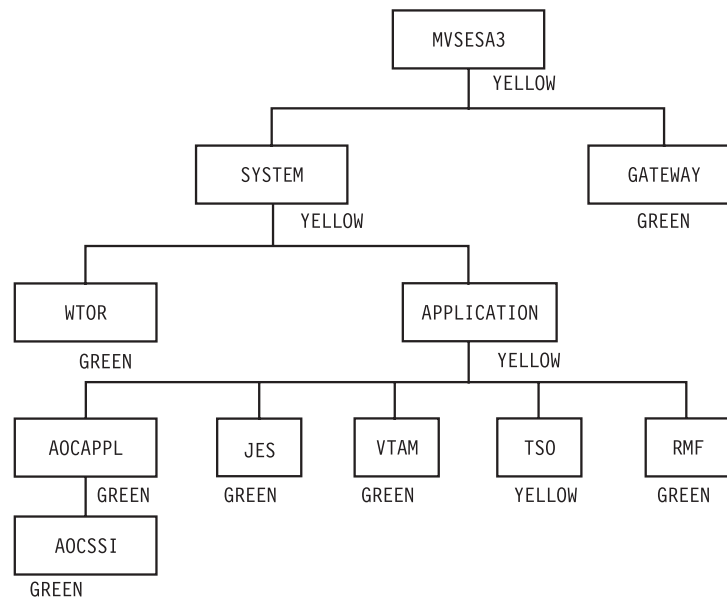
1. How to get help...
   - To get the entries shown above, select the *Help* menu from the I/O operations ISPF main menu.
   - To get field-oriented help, press **F1** on any input field on a screen.

Appendix B. Using the I/O Operations ISPF Dialog   **249**

- To get screen-oriented help, press **F1** on any full screen. If you press **F1** twice in a row, an ISPF help panel, not an I/O operations ISPF help panel, is displayed.

2. Help on keys... explains the I/O operations ISPF dialog settings of the following function keys: F1 (Help); F3 (End); F5 (Save); F6 (Activate).

3. Navigation Help... helps you navigate through the panel, or screen, flow of the I/O operations ISPF dialog.

4. Help Index... lets you choose among a selected number of topics that are listed alphabetically.

5. Tutorial ... Do one of the following:

   - Select the *Help* menu on the main menu. Then:

     a. Select *Tutorial*

     b. Select one of the topics shown in on the screen below.

   - Enter **TUTORIAL** on a panel of the dialog. Then:

     a. Press **Enter**

     b. Select one of the topics on the tutorial main menu shown below.

```
SA OS/390 - IO-Ops ISPF Tutorial Main Menu

Select a specific topic by typing the topic number on the command
line and pressing Enter.

1          Overview of IO-Ops and SWCHs
2          Displaying and Changing SWCH Configuration Data
3          Displaying Other Types of Information
4          Setting Options
5          Guidelines and Precautions
6          Understanding and Using the Matrix Screen
7          Making a Single Change to All SWCHs
8          Connectivity Command Options


COMMAND ===>
F1= Help      F2=          F3= END     F4= RETURN  F5=          F6=
F7= Help      F8=          F9=         F10=        F11= Index   F12=
```

Appendix C. Coexistence between SA OS/390 2.2 Commands and Commands from Earlier Releases

Suppose, in your enterprise, you have sysplexes installed with a mixture of systems with SA OS/390 1.3, SA OS/390 2.1, and SA OS/390 2.2 as shown in Figure 119. This section discusses what to observe when manipulating systems within such a sysplex.
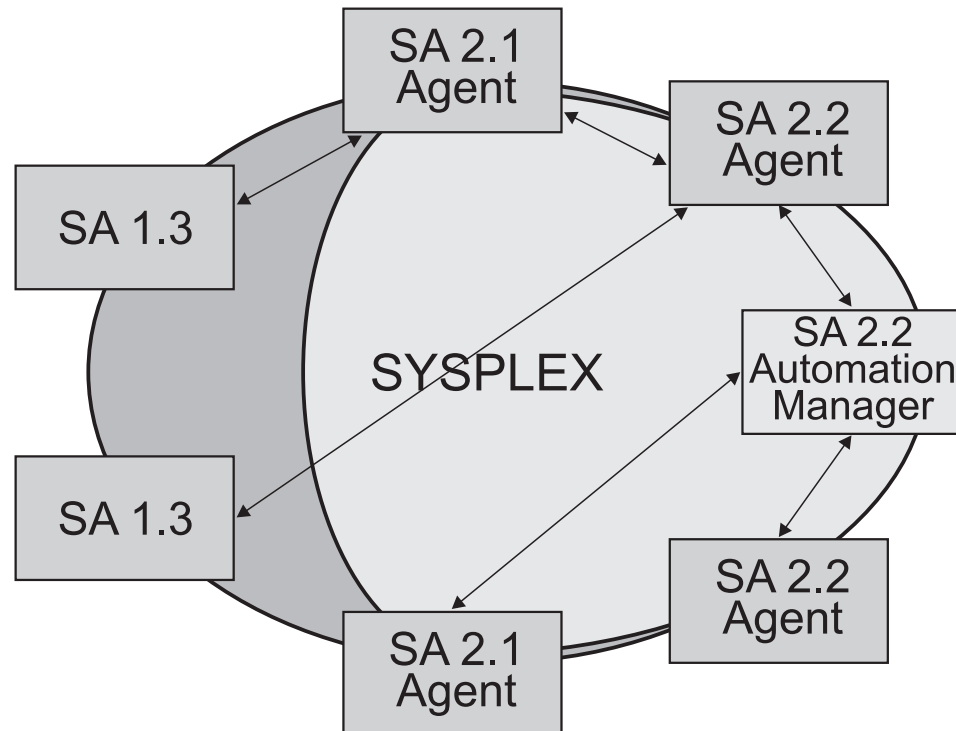
Figure 119. Coexistence of New and Old Commands

- When you are working with a SA OS/390 1.3 system, you can issue all commands available in this release to any other system in the sysplex, including SA OS/390 2.1 and SA OS/390 2.2 systems. However:
  - you cannot issue any of the deleted commands listed in chapter ***What is New in SA OS/390 2.2*** of *System Automation for OS/390 Planning and Installation* to a SA OS/390 2.2 system.
  - a DISPSVPL command is not supported if sent to a SA OS/390 2.1 or SA OS/390 2.2 system.
- When you are working with a SA OS/390 2.1 or SA OS/390 2.2 system, and you:
  - issue an `INGSCHED` command for a SA OS/390 1.3 system, this is converted to DISPSVP.
  - issue `INGREQ resource REQ=STOP/DOWN` to SA OS/390 1.3, then this command is converted to SHUTSYS with the following restrictions:
    - INGREQ has a timeout function, with the effect that after the timeout, the request is either purged or a message is sent to the operator; this functionality is not supported when converted to SHUTSYS.

- INGREQ has an EXPIRE option, in a way that after the command is expired, it is automatically purged (withdrawn) from the sysplex. this option is not supported when converted to SHUTSYS.

- The options `ALL/NO/TRG/FLG/DPY/STS/UOW/INIT` of the *Override* parameter are not supported when converted to SHUTSYS (see Figure 19 on page 86).

– issue `INGREQ resource REQ=START/UP` to SA OS/390 1.3, then this command is converted to SETSTATE with the following limitations:

- INGREQ has an EXPIRE option, in a way that after the command is expired, it is automatically purged (withdrawn) from the sysplex. this option is not supported when converted to SETSTATE.

- the start types available for INGREQ are not supported when converted to SETSTATE.

- The options `ALL/NO/TRG/FLG/DPY/STS/UOW/INIT` of the *Override* parameter are not supported when converted to SETSTATE (see Figure 19 on page 86).

- The parameters *AutoRemove*, *Timeout* and *Priority* are not supported when converted to SETSTATE.

For other new automation manager commands, there is no support on SA OS/390 1.3 and SA OS/390 2.1 systems.

The following table lists commands that have been replaced by new commands.

Table 12. Replaced Commands

Command in Earlier Releases	Replaced by New Command
DISPATHR	INGTHRES
DISPTHRS	INGTHRES
SETEVENT	INGEVENT
DISPCONS	INGPLEX
DISPPATH	INGCF
DISPSTR	INGCF
DISPXSYS	INGPLEX
DISPCDS	INGPLEX
CFDRAIN	INGCF

Appendix D. Problem Determination

This appendix contains various subtopics that deal with methods of avoiding or detecting problems during SA OS/390 automation. The following topics are discussed:

- "Concurrent User Access within the Customization Dialog"
- "Maintaining System Status During a Status Forwarding Path Failure"
- "Debugging and Tracing" on page 254

Concurrent User Access within the Customization Dialog

The customization dialog allows you the editing of certain entry types by multiple users at the same time. To prevent simultaneous usage of the same resource, a serialization is implemented using the ENQ and DEQ macros with global resources. If an installation runs several systems in a global resource serialization (GRS) complex, but GRS is not installed, it should be ensured that the following major names (qname of ENQ resp. DEQ macro) are propagated:

INGPDB

This name is used by SA OS/390 to serialize access within the customization dialog. It is mandatory to have this major name distributed among all systems where the customization dialog may run. Otherwise different users may overwrite their changes and data may get lost.

SYSDSN

This name is used by SA OS/390 to obtain the user ID of a resource holder in case a policy database cannot be accessed. If this major name is not distributed, messages indicating that a resource cannot be accessed would not show a user ID.

SPFEDIT

This name is used by SA OS/390 to obtain the user ID of a resource holder in case an ISPF table, which holds the data within a policy database, cannot be accessed. If this major name is not distributed, messages indicating that a resource cannot be accessed would not show a user ID.

Maintaining System Status During a Status Forwarding Path Failure

SA OS/390 uses processor operations functions and XCF to attempt to maintain the current status of a system, even if there is a failure in the status forwarding path. SA OS/390 system operations uses XCF for both passive and active monitoring of system status. As long as there is one SA OS/390 in a sysplex with an active status forwarding path, SA OS/390 is able to use XCF to maintain system status for all systems in the sysplex.

SA OS/390 system operations receives alerts generated by processor operations for target systems monitored by processor operations. If, for example, a target system enters a wait state or a DCCF condition, SA OS/390 will use the resulting alert from the processor operations functions to update the system status, even if the status forwarding path between SA OS/390 and the target system is down.

Debugging and Tracing

This chapter describes the tracing and debugging facilities that are available with SA OS/390. The following topics are discussed:

- "Using Trace Services for the Automation Manager"
- "Using AOCTRACE" on page 258
- "How to Use a Log with INGHIST" on page 259
- "How to Use the Diagnostic Option of INGAMS" on page 259

For collecting debugging information you can also use the command INGLKUP REQ=COLLECT.

Using Trace Services for the Automation Manager

For tracing the control flow of a process, SA OS/390 uses the **MVS Component Trace Facility** with all its capabilities.

This requires an External Writer as soon as the trace is started. The writer is internally started if it is not already active.

Before the trace can be activated the trace data set must be allocated. The recommended data set name is *'SYS1.HSA.sysname.CTRACE01'*. Appropriate JCL is provided in the SINGSAMP SA OS/390 sample library as member HSACTWR. In addition, the JCL of the component trace's external writer must be cataloged into SYS1.PROCLIB. For more information on customizing the component trace refer to *System Automation for OS/390 Planning and Installation*.

To activate the trace, on an OS/390 console, enter the command:

```
TRACE CT,ON,COMP=HSAAM
```

When the system responds with a WTOR expecting the trace options you reply:

```
xx,WTR=HSACTWR,OPTIONS=(ALL|set_of_options),END
```

where *set_of_options* means one of the following:

Option	Activates the trace in...
ALL	all of the options following
B[ase]	SA OS/390 service routines using OS/390 system services.
COM[munication]	the communications framework
CON[trol]	the base framework
E[vent]	the Sysplex Event Handler
F[ramework]	the service sustaining the LE environment
I[nstruction]	the services encoding or decoding the instruction streams
L[ock]	the service creating and deleting locks
MQ	MQSeries services
R[equest]	the beginning and ending of a workitem (request) processing
S[chedule]	the service overriding service period definitions

Option	Activates the trace in...
W[orkitem]	all components working on work items

You deactivate the trace through the command:

```
TRACE CT,OFF,COMP=HSAAM
```

This command is automatically issued when the last automation manager in a single image terminates while the trace is active.

Before the trace records can be analyzed by IPCS the trace data set(s) must be made available to IPCS. This is done by the operator command:

```
TRACE CT,WTRSTOP=HSACTWR
```

If the related message indicates that more than one data set contains trace data, the IPCS **COPYTRC** command must used to combine the data sets into a new one.

For analyzing the trace data the IPCS **CTRACE** command has to be used. JCL is provided for the IPCS batch interface. The command supports lots of parameters. At least the following must be adapted:

- COMP(HSAAM)
- USEREXIT(HSAPSTUE)
- DSNAME(trace_data_set_name)
- OPTIONS((filter_options))

  where **filter_options** are a combination the following items, separated by comma:
  - BASE
  - COMMUNICATION
  - CONTROL
  - EVENT
  - FRAMEWORK
  - INSTRUCTION
  - LOCK
  - MQ
  - REQUEST
  - SCHEDULE
  - WORKITEM
  - AM=xcf_member_name
  - CALLID=(callid[,callid])
  - KEY=(key[,key])
  - METHOD=(method[,method])
  - MODULE=(module[,module])
  - TASKID=(taskid[,taskid])
  - TOKEN=(token[,token])

  The keyword options are connected by a logical *AND* while the values of a keyword and the remaining options are connected by a logical *OR*. Except <u>AM</u>, each keyword option supports up to 5 different values separated by comma or space. Imbedded spaces or commas of a value require delimiters '<u>..</u>' or "<u>..</u>".

JCL Sample for Printing the Trace Records

The following JCL sample member HSAJPTRC is stored in the SA OS/390 library SHSASAMP. The data set names of the DDnames STEPLIB, IPCSDDIR, and TRACEDS must be changed to their actual values before the job is submitted. This

is also true for the OPTIONS parameters completely listed because the values of the keywords are sample values only.

```
//HSAAMTRC JOB (),CLASS=A,REGION=4M
//* Change the data set names of the following DD names to their
//* actual values:
//*   STEPLIB  - SA OS/390 load library
//*   IPCSDDIR - VSAM data set representing the IPCS Dump Directory
//*   TRACEDS  - trace data set to be analyzed
//IPCS      EXEC PGM=IKJEFT01,DYNAMNBR=20
//STEPLIB  DD  DISP=SHR,DSN=SYS1.SHSAMOD4
//IPCSDDIR DD  DISP=SHR,DSN=SYS1.DDIR
//TRACEDS  DD  DISP=SHR,DSN=SYS1.HSAAMTRC
//SYSTSPRT DD  SYSOUT=*
//* Change and/or remove the OPTIONS parameter according to your
//* requirements.
//* Each keyword except AM supports up to 5 different values separated
//* by comma or space.
//* Don't forget the concatenation character at the end of each line
//* separated by an intervening space from the data.
//SYSTSIN  DD  *
  IPCS NOPARM
  SETDEF DDNAME(TRACEDS) NOCONFIRM
  CTRACE -
    FULL -
    COMP(HSAAM) -
    USEREXIT(HSAPSTUE) -
    OPTIONS(( -
BASE -
COMMUNICATION -
CONTROL -
EVENT -
FRAMWORK -
INSTRUCTION -
LOCK -
MQ -
REQUEST -
SCHEDULE -
WORKITEM -
AM='xcf_member_name' -
CALLID=('callid 1' -
'callid N' -
'callid 5')-
KEY=('key 1' -
'key N' -
'key 5') -
METHOD=('method 1' -
'method N' -
'method 5') -
MODULE=('module 1' -
'module N' -
'module 5') -
TASKID=('taskid 1' -
'taskid N' -
'taskid 5') -
TOKEN=(token1 -
tokenN -
token5) -
    ))
  END
/*
```

Figure 120. Print the trace records

Using AOCTRACE

Use the AOCTRACE command to enable and disable the automation debugging facility. It writes information to the NetView log or to the screen.

```
AOFKAAND                   SA OS/390 - Command Dialogs
Domain ID   = IPUFM     ---------- AOCTRACE ----------   Date = 05/25/00
Operator ID = HUT                                        Time = 17:42:55

     Current global mode is ON                           Trace Settings

     Current clist is _____                           A All
            debug is                                     R Results
             trace is _                                  I Intermediates
                                                         C Commands
     Select option:                                      E Errors
      1     Turn global execution trace OFF              F Failures
      2     Turn specific clist debug                    L Labels
      3     Show current clist debug settings            O Off
      4     Display clists being traced                  N Normal
                                                         _ Default
     Specify Subroutines to be traced:  (* for all)
     _____
     _____


Command ===> __
    PF1=Help    PF2=End    PF3=Return    PF6=Roll         PF12=Retrieve
```

Figure 121. AOCTRACE Command Dialog

Use *Select option 1* to turn ON or OFF the Current global mode. When the Current global mode is ON, each system operations automation CLIST writes a record to the NetView log containing the name of the CLIST, the issuing operator ID, and any parameters sent to the CLIST.

Use *Select option 2* to turn ON or OFF the CLIST debug feature. When turned ON, the CLIST will write debug information to the NetView log or to the screen. Not all CLISTs make use of this debug feature.

Use *Select option 3* to show the current debug settings for the specified CLIST. These are CLIST debug, CLIST trace and the subroutines being traced.

Use *Select option 4* to get a list of all CLISTs which are in trace/debugging mode. Additionally the trace and debug mode can be switched OFF for all displayed CLISTs (PF10 on panel AOFKAANL).

You specify the select option on the command line.

To set/revise the CLIST trace setting, overtype the trace field with the wanted REXX trace setting (chosen from the list on the panel) and press ENTER. Optionally, specify the list of subroutines that should be traced.

By default, only the CLIST mainroutine will be traced. Specify '*' for tracing of all subroutines.

Note: The CLIST debug setting need not be ON to use CLIST trace.

You can also enable more detailed levels of debugging for one or more CLISTs. The global mode must be ON to use CLIST debug and CLIST trace. You can set tracing ON for several CLISTs, then disable all tracing by simply turning the global mode OFF.

The syntax of the AOFTRACE and some additional information can be found in *System Automation for OS/390 Operator's Commands*.

Information about using AOCTRACE to trace user written automation procedures is provided in *System Automation for OS/390 Customizing and Programming*.

For more information about trace settings, see TRACE in *TSO/E REXX/MVS Reference*.

How to Use a Log with INGHIST

With the INGHIST command you can specify the request to display a log with automation manager messages. For this purpose, type: INGHIST REQ=LOG on the command line to reach a panel similar to the one shown in Figure 122.

```
INGKYHI1                SA OS/390 - Command Dialogs      Line
Domain ID   = IPUFM     ---------- INGHIST  ----------   Date = 05/26/00
Operator ID = HUT              Sysplex = AOC7PLEX        Time = 11:41:12

 Start time ==>  2000-05-26 10:41:00    format: yyyy-mm-dd hh:mm:ss
 End time   ==>

                        Logger Messages
Date      Time                                           Group    XCF-Member
--------------------------------------------------------------------------
2000-05-29 11:06:36                                      INGXSG   AOC7$$$$1
       HSAM1308I  SA OS/390 PRIMARY AUTOMATION MANAGER INITIALIZATION
                  COMPLETE, TYPE=COLD.
2000-05-29 11:06:36                                      INGXSG   AOC7$$$$1
       HSAM1311I  Processing config part,
                  'SATEST.PROD.ACF.G0042V00(Z995CSCH)'.SCHEDULE.2000052314260
2000-05-29 11:06:36                                      INGXSG   AOC7$$$$1
       HSAM1310I  RC=2 REAS=4384 OPCODE=08020001 (MAIN.2)
                  ApplyConfiguration.


Command ===>
  PF1=Help     PF2=End      PF3=Return                   PF6=Roll
                            PF9=Refresh                  PF12=Retrieve
```

Figure 122. INGHIST Logger Messages

This panel displays automation manager messages that are written to the system logger. Two or more lines are displayed for each message depending on the size of the message text. The first line contains the date and time when the message was issued. It also shows the XCF member name of the automation manager and the XCF group name the automation manager belongs to. The second and following line(s) contain the message.

How to Use the Diagnostic Option of INGAMS

From the INGAMS command dialog, you can select option *D Diagnostic*. This leads you to the panel shown in Figure 123 on page 260 where you can initiate the following diagnostic functions:
- Write snapshot of state image queue
- Start/stop recording

```
INGKYAM4                 SA OS/390 - Command Dialogs
Domain ID   = IPUFM    ---------- INGAMS  ----------    Date = 05/26/00
Operator ID = MIK             Sysplex = AOCPLEX          Time = 11:09:32

 Specify or revise the following data:

   Action  ==>  __      1.  Write Snapshot
                        2.  Start recording
                        3.  Stop recording

   Data set name ==>  _____

   System        ==>  _____      System name, domain id or sysplex name




Command ===>
  PF1=Help    PF2=End    PF3=Return                     PF6=Roll
                                                        PF12=Retrieve
```

Figure 123. Diagnostic

In this panel's fields, enter the following information:

Data set name
> specify the name of the data set that will hold the snapshot data. The
> snapshot data set and the recording data set should be pre-allocated with
> RECFM FB and LRECL 80. The snapshot data set can be a sequential file or
> a member of a partitioned data set, however, the recording data set can
> only be a sequential file. It is strongly recommended that you use a
> partitioned data set extended (PDSE) or to make your allocation of the
> snapshot data set according to the snapshot size information that you will
> receive when selecting option *B Show Details* for an automation manager
> from the INGAMS command dialog. This displays the following panel
> showing the snapshot size (highlighted in the example).

```
INGKYAM3                SA OS/390 - Command Dialogs      Line   1    of 30
Domain ID   = IPSFO    ---------- INGAMS  ----------    Date = 06/27/02
Operator ID = ASTA          Sysplex = KEY1PLEX          Time = 16:13:58

 Automation Manager  : KEY3$$$$1       running on system : KEY3
 Operation mode      : PAM            Job name          : AMA0
 Status              : READY
 XCF-Groupname       : INGXSGA0

 Logic Deck ...
   Release           : V2R2M0
   Date built        : 15 May 2002
   Time built        : 11:36:23
   Last APAR         : SAV2R2

 Config dataset name : SATEST.SAMPLE.ACF
 Config member       : HSAZ999
                               Z999CLGC   STRUCTURE   20020618085707
                               Z999CRES   STRUCTURE   20020626090342
                               Z999CSCH   SCHEDULE    20020626090342
                               Z999CRES   STRUCTURE   20020626090342
                               Z999CSCH   SCHEDULE    20020626090342
Config token         : 20020626090342000915282064
Config version       : 01

Diagnostic Info
  Snapshot size            : 986132
  Number of resources    : 521
  Number of requests     : 55
  Number group requests  : 49

                                --------Number of Messages--------
Queue                             maximum  current     high     low
HSA.INGXSGA0.WORKITEM.QUEUE         10000        0     8000    7000
HSA.INGXSGA0.AGENT.QUEUE           10000        0     8000    7000
HSA.INGXSGA0.STATE.QUEUE           50000        0    40000   35000



 Command ===>
   PF1=Help     PF2=End      PF3=Return                    PF6=Roll
                PF8=Forward  PF9=Refresh                   PF12=Retrieve
```

Figure 124. INGAMS Command Dialog, Show Details

> **Note:** A data set name is required when writing a snapshot or when
> starting recording.

System
>   is the name of the system where the automation manager resides. This is
>   only necessary when the automation manager is not within the local
>   sysplex. You can specify either the system name, the domain ID or the
>   sysplex name.

Glossary

This glossary includes terms and definitions from:

- The *IBM Dictionary of Computing* New York: McGraw-Hill, 1994.

- The *American National Standard Dictionary for Information Systems* , ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies can be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018. Definitions are identified by the symbol (A) after the definition.

- The *Information Technology Vocabulary* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions of published parts of this vocabulary are identified by the symbol (I) after the definition; definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T) after the definition, indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposed or substantively different meaning.
Deprecated term for. This indicates that the term should not be used. It refers to a preferred term, which is defined in its proper place in the glossary.
See. This refers the reader to multiple-word terms in which this term appears.
See also. This refers the reader to terms that have a related, but not synonymous, meaning.
Synonym for. This indicates that the term has the same meaning as a preferred term, which is defined in the glossary.
Synonymous with. This is a backward reference from a defined term to all other terms that have the same meaning.

A

ACF. Automation control file.

ACF/NCP. Advanced Communications Function for the Network Control Program. See *Advanced Communications Function* and *Network Control Program.*

ACF/VTAM*. Advanced Communications Function for the Virtual Telecommunications Access Method. Synonym for *VTAM*. See *Advanced Communications Function* and *Virtual Telecommunications Access Method*.

ACO. Automated console operations.

active monitoring. In SA OS/390, the acquiring of resource status information by soliciting such information at regular, user-defined intervals. See also *passive monitoring*

adapter. Hardware card that enables a device, such as a workstation, to communicate with another device, such as a monitor, a printer, or some other I/O device.

adjacent hosts. Systems connected in a peer relationship using adjacent NetView sessions for purposes of monitoring and control.

adjacent NetView. In SA OS/390, the system defined as the communication path between two SA OS/390 systems that do not have a direct link. An adjacent NetView is used for message forwarding and as a communication link between two SA OS/390 systems. For example, the adjacent NetView is used when sending responses from a focal point system to a remote system.

Advanced Communications Function (ACF). A group of IBM licensed programs (principally VTAM, TCAM, NCP, and SSP) that use the concepts of Systems Network Architecture (SNA), including distribution of function and resource sharing.

advanced program-to-program communication (APPC). A set of inter-program communication services that support cooperative transaction processing in a Systems Network Architecture (SNA) network. APPC is the implementation, on a given system, of SNA's logical unit type 6.2.

alert. (1) In SNA, a record sent to a system problem management focal point or to a collection point to communicate the existence of an alert condition. (2) In the NetView program, a high-priority event that warrants immediate attention. A database record is generated for certain event types that are defined by user-constructed filters.

alert condition. A problem or impending problem for which some or all of the process of problem determination, diagnosis, and resolution is expected to require action at a control point.

alert focal point system. See entry for NPDA focal point system under *focal point system*

alert threshold. An application service value that determines the level at which SA OS/390 changes the associated icon on the NMC workstation to the alert color. SA OS/390 may also issue an alert. See *warning threshold*

AMC. (1) Automation Manager Configuration (2) The Auto Msg Classes entry type

APF. Authorized program facility.

APPC. Advanced program-to-program communications.

application. An OS/390 subsystem or job monitored by SA OS/390.

Application entry. A construct, created with the customization dialog, used to represent and contain policy for an application.

application group. A named set of applications. An application group is used to represent and contain common policy for the contained applications. Applications in an application group can be automated as an entity. Application groups can behave differently according to their defined nature (BASIC, MOVE, SERVER). An application group can also be used for monitoring purposes.

ApplicationGroup entry type. A construct, created with the customization dialog, used to represent and contain policy for an application group.

application program. (1) A program written for or by a user that applies to the user's work, such as a program that does inventory or payroll. (2) A program used to connect and communicate with stations in a network, enabling users to perform application-oriented activities.

ARM. Automatic restart management.

ASCB. Address space control block.

ASCB status. An application status derived by SA OS/390 running a routine (the ASCB checker) which searches the OS/390 address space control blocks (ASCBs) for address spaces with a particular job name. The job name used by the ASCB checker is the job name defined in the customization dialog for the application.

ASCII (American National Standard Code for Information Interchange). The standard code, using a coded character set consisting of 7-bit coded characters (8-bits including parity check), for information interchange among data processing systems, data

communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters. (A)

ASF. automation status file.

assist mode facility. An SA OS/390 facility that uses SDF and enables interaction with automation before SA OS/390 takes an automation action. SDF prompts the operator with a suggested action, then provides options for using that action, modifying and using the action, or canceling the action. Also called assist mode, it is enabled using the customization dialog, or dynamically.

authorized program facility (APF). A facility that permits identification of programs that are authorized to use restricted functions.

automated function. SA OS/390 automated functions are NetView automation operators, that are assigned to perform specific automation functions. However, SA OS/390 defines its own synonyms, or *automated function names*, for the NetView automation operators, and these function names are referred to in the sample policy databases provided by SA OS/390. For example, the automation operator AUTBASE corresponds to the SA OS/390 automated function BASEOPER.

automated console operations (ACO). The concept (versus a product) of using computers to perform a large subset of tasks ordinarily performed by operators, or assisting operators in performing these tasks.

automatic restart management. An OS/390 recovery function that improves the availability of specified subsystems and applications by automatically restarting them under certain circumstances. Automatic restart management is a function of the Cross-System Coupling Facility (XCF) component of OS/390.

automatic restart management element name. In MVS 5.2 or later, OS/390 automatic restart management requires the specification of a unique sixteen character name for each address space which registers with it. All automatic restart management policy is defined in terms of the element name, including SA OS/390's interface with it.

automation. The automatic initiation of actions in response to detected conditions or events. SA OS/390 provides automation for OS/390 applications, OS/390 components, and remote systems that run OS/390. SA OS/390 also provides tools that can be used to develop additional automation.

automation agent. In SA OS/390, the automation function is split up between the automation manager and the automation agents. The observing, reacting and doing parts are located within the NetView address space, and are known as the *automation agents*. The automation agents are responsible for:

- recovery processing
- message processing
- active monitoring: they propagate status changes to the automation manager

automation control file (ACF). In SA OS/390, a file that contains system-level automation policy information. There is one master automation control file for each NetView system on which SA OS/390 is installed. The SA OS/390 customization dialog must be used to build the automation control files. They must not be edited manually.

automation flags. In SA OS/390, the automation policy settings that determine the operator functions that are automated for a resource and the times during which automation is active. When SA OS/390 is running, automation is controlled by automation flag policy settings and override settings (if any) entered by the operator. Automation flags are set using the customization dialog.

automation manager. In SA OS/390, the automation function is split up between the automation manager and teh automation agents. The coordination, decision making and controlling functions are processed by each sysplex's *automation manager*.

The automation manager contains a model of all of the automated resources within the sysplex. The automation agents feed the automation manager with status information and perform the actions that the automation manager tells them to.

The automation manager provides *sysplex-wide* automation.

Automation Manager Configuration. The Automation Manager Configuration file (AMC) contains an image of the automated systems in a sysplex or of a stand-alone system.

Automation NetView. In SA OS/390 the NetView that performs routine operator tasks with command procedures or uses other ways of automating system and network management, issuing automatic responses to messages and management services units.

automation operator. NetView automation operators are NetView autotasks that are assigned to perform specific automation functions. See also *automated function*. NetView automation operators may receive messages and process automation procedures. There are no logged-on users associated with automation operators. Each automation operator is an operating system task and runs concurrently with other NetView tasks. An automation operator could be set up to handle JES2 messages that schedule automation procedures, and an automation statement could route such messages to the automation operator. Similar to *operator station task*. SA OS/390 message monitor tasks and target control tasks are automation operators.

automation policy. The policy information governing automation for individual systems. This includes automation for applications, OS/390 subsystems, OS/390 data sets, and OS/390 components.

automation policy settings. The automation policy information contained in the automation control file. This information is entered using the customization dialog. You can display or modify these settings using the customization dialog.

automation procedure. A sequence of commands, packaged as a NetView command list or a command processor written in a high-level language. An automation procedure performs automation functions and runs under the NetView program.

automation status file. In SA OS/390, a file containing status information for each automated subsystem, component or data set. This information is used by SA OS/390 automation when taking action or when determining what action to take.

automation table. Also called NetView message automation table. See *NetView message automation table*

autotask. See *automation operator*.

available. In VTAM programs, pertaining to a logical unit that is active, connected, enabled, and not at its session limit.

B

basic mode. A central processor mode that does not use logical partitioning. Contrast with *logically partitioned (LPAR) mode*.

BCP Internal Interface. Processor function of CMOS-390, zSeries processor families. It allows the communication between basic control programs such as z/OS and the processor support element in order to exchange information or to perform processor control functions. Programs using this function can perform hardware operations such as ACTIVATE or SYSTEM RESET.

beaconing. The repeated transmission of a frame or messages (beacon) by a console or workstation upon detection of a line break or outage.

C

central processor (CP). The part of the computer that contains the sequencing and processing facilities for instruction execution, initial program load (IPL), and other machine operations.

central processor complex (CPC). A physical collection of hardware that consists of central storage, one or more central processors, timers, and channels.

central site. In a distributed data processing network, the central site is usually defined as the focal point for alerts, application design, and remote system management tasks such as problem management.

CFR/CFS and ISC/ISR. I/O operations can display and return data about integrated system channels (ISC) connected to a coupling facility and coupling facility receiver (CFR) channels and coupling facility sender (CFS) channels.

channel. A path along which signals can be sent; for example, data channel, output channel. See also *link*.

channel path identifier. A system-unique value assigned to each channel path

CHPID. In SA OS/390, channel path ID; the address of a channel.

CHPID port. A label that describes the system name, logical partitions, and channel paths.

channel-attached. (1) Attached directly by I/O channels to a host processor (for example, a channel-attached device). (2) Attached to a controlling unit by cables, rather than by telecommunication lines. Contrast with *link-attached*. Synonymous with *local*.

CI. Console integration.

CICS/VS. Customer Information Control System for Virtual Storage.

CLIST. Command list.

clone. A set of definitions for application instances which are derived from a basic application definition by substituting a number of different system-specific values into the basic definition.

clone ID. A generic means of handling system-specific values such as the MVS SYSCLONE or the VTAM subarea number. Clone IDs can be substituted into application definitions and commands to customize a basic application definition for the system that it is to be instantiated on.

CNC. A channel path that transfers data between a host system image and an ESCON control unit. It can be point-to-point or switchable.

command. A request for the performance of an operation or the execution of a particular program.

command facility. The component of the NetView program that is a base for command processors that can monitor, control, automate, and improve the operation of a network. The successor to NCCF.

command list (CLIST). (1) A list of commands and statements, written in the NetView command list language or the REXX language, designed to perform a specific function for the user. In its simplest form, a

command list is a list of commands. More complex command lists incorporate variable substitution and conditional logic, making the command list more like a conventional program. Command lists are typically interpreted rather than being compiled. (2) In SA OS/390, REXX command lists that can be used for automation procedures.

command procedure. In the NetView program, either a command list or a command processor.

command processor. A module designed to perform a specific function. Command processors, which can be written in assembler or a high-level language (HLL), are issued as commands.

Command Tree/2. An OS/2-based program that helps you build commands on an OS/2 window, then routes the commands to the destination you specify (such as a 3270 session, a file, a command line, or an application program). It provides the capability for operators to build commands and route them to a specified destination.

common commands. The SA OS/390 subset of the CPC operations management commands.

common routine. One of several SA OS/390 programs that perform frequently used automation functions. Common routines can be used to create new automation procedures.

communication controller. A type of communication control unit whose operations are controlled by one or more programs stored and executed in the unit or by a program executed in a processor to which the controller is connected. It manages the details of line control and the routing of data through a network.

communication line. Deprecated term for *telecommunication line*.

communications path. A set of communications facilities that SA OS/390 uses to connect a focal point system to a target system. There are two types: a NetView connection and a workstation.

communications task. An SA OS/390 task responsible for all communications with a number of workstations. Communications tasks receive commands from target control tasks and send inbound messages to the message monitoring task. There can be many communications tasks. Communications tasks are defined using the configuration dialogs.

configuration dialogs. A user interface for entering the information that defines the SA OS/390 configuration. In SA OS/390 the configuration dialogs are an ISPF application.

connectivity view. In SA OS/390, a display that uses graphic images for I/O devices and lines to show how they are connected.

console automation. The process of having NetView facilities provide the console input usually handled by the operator.

console connection. In SA OS/390, the 3270 or ASCII (serial) connection between a PS/2 computer and a target system. Through this connection, the workstation appears (to the target system) to be a console.

console integration (CI). A hardware facility which if supported by an operating system, allows operating system messages to be transferred through an internal hardware interface for display on a system console. Conversely, it allows operating system commands entered at a system console to be transferred through an internal hardware interface to the operating system for processing.

consoles. Workstations and 3270-type devices that manage your enterprise.

Control units. Hardware units that control I/O operations for one or more devices. You can view information about control units through I/O operations, and can start or stop data going to them by blocking and unblocking ports.

controller. A unit that controls I/O operations for one or more devices.

couple data set. A data set that is created through the XCF couple data set format utility and, depending on its designated type, is shared by some or all of the OS/390 systems in a sysplex. See also *sysplex couple data set* and *XCF couple data set*

coupling facility. The hardware element that provides high-speed caching, list processing, and locking functions in a sysplex.

CP. Central processor.

CPC. Central processor complex.

CPC operations management commands. A set of commands and responses for controlling the operation of System/390 CPCs.

CPC subset. All or part of a CPC. It contains the minimum *resource* to support a single control program.

CPCB. Command processor control block; an I/O operations internal control block that contains information about the command being processed.

CPU. Central processing unit. Deprecated term for *processor*.

cross-system coupling facility (XCF). XCF is a component of OS/390 that provides functions to support cooperation between authorized programs running within a sysplex.

CTC. The channel-to-channel (CTC) channel can communicate with a CTC on another host for intersystem communication.

Customer Information Control System (CICS). A general-purpose transactional program that controls online communication between terminal users and a database for a large number of end users on a real-time basis.

customization dialog. The customization dialog is an ISPF application. They are used to customize the enterprise policy, like for example the automated enterprise resources and the relationships between resources, or the automation policy for systems in the enterprise.

CVC. A channel operating in converted (CVC) mode transfers data in blocks and a CBY channel path transfers data in bytes. Converted CVC or CBY channel paths can communicate with a parallel control unit. This resembles a point-to-point parallel path and dedicated connection, regardless whether it passes through a switch.

D

DASD. Direct access storage device.

data services task (DST). The NetView subtask that gathers, records, and manages data in a VSAM file or a network device that contains network management information.

data set. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

data set members. Members of partitioned data sets that are individually named elements of a larger file that can be retrieved by name.

DBCS. Double-byte character set.

DCCF. Disabled console communication facility.

DCF. Document composition facility.

Devices. You can see information about all devices (such as printers, tape or disk drives, displays, or communications controllers) attached to a particular switch, and control paths and jobs to devices.

direct access storage device (DASD). A device in which the access time is effectively independent of the location of the data; for example, a disk.

disabled console communication facility (DCCF). An OS/390 component that provides limited-function console communication during system recovery situations.

disk operating system (DOS). (1) An operating system for computer systems that use disks and diskettes for auxiliary storage of programs and data. (2) Software for a personal computer that controls the processing of programs. For the IBM Personal Computer, the full name is Personal Computer Disk Operating System (PCDOS).

distribution manager. The component of the NetView program that enables the host system to use, send, and delete files and programs in a network of computers.

domain. (1) An access method and its application programs, communication controllers, connecting lines, modems, and attached workstations. (2) In SNA, a system services control point (SSCP) and the physical units (PUs), logical units (LUs), links, link stations, and associated resources that the SSCP can control by means of activation requests and deactivation requests.

double-byte character set (DBCS). A character set, such as Kanji, in which each character is represented by a 2-byte code.

DSIPARM. This file is a collection of members of NetView's DSIPARM data set. It determines how automation is applied to resources.

DST. Data Services Task.

E

EBCDIC. Extended binary-coded decimal interchange code. A coded character set consisting of 8-bit coded characters.

ECB. Event control block. A control block used to represent the status of an event.

EMCS. Extended multiple console support.

enterprise. An organization, such as a business or a school, that uses data processing.

entry type. Resources, such as processors or applications, used for automation and monitoring.

environment. Data processing enterprise.

error threshold. An automation policy setting that specifies when SA OS/390 should stop trying to restart or recover an application, subsystem or component, or off-load a data set.

ESA. Enterprise Systems Architecture.

event. (1) In the NetView program, a record indicating irregularities of operation in physical elements of a network. (2) An occurrence of significance to a task; for example, the completion of an asynchronous operation, such as an input/output operation. (3) Events are part of a trigger condition, in a way that if all events of a

trigger condition have occurred, a *STARTUP* or *SHUTDOWN* of an application is performed.

exception condition. An occurrence on a system that is a deviation from normal operation. SA OS/390 monitoring highlights exception conditions and allows an SA OS/390 enterprise to be managed by exception.

extended recovery facility (XRF). A facility that minimizes the effect of failures in OS/390, VTAM, the host processor, or high availability applications during sessions between high availability applications and designated terminals. This facility provides an alternate subsystem to take over sessions from the failing subsystem.

F

fallback system. See *secondary system*

file manager commands. A set of SA OS/390 commands that read data from or write data to the automation control file. These commands are useful in the development of automation that uses SA OS/390 facilities.

focal point. In the NetView program, the focal point domain is the central host domain. It is the central control point for any management services element containing control of the network management data.

focal point system. (1) A system that can administer, manage, or control one or more target systems. There are a number of different focal point system associated with IBM automation products. (2) **SA OS/390 automation focal point system.** The SA OS/390 automation focal point system is an SA OS/390 NetView system that collects status information from other SA OS/390 NetViews within your enterprise. It is supported by SA OS/390, which uses NetView NNT/OST sessions to forward information to it. (3) **SA OS/390 configuration focal point system.** The SA OS/390 configuration focal point is the system on which SA OS/390 is installed. The SA OS/390 policy databases exist on this system and are built into automation control file fragments, and processor control file on this system (if this is being done using SA OS/390). (4) **SA OS/390 workstation focal-system.** The SA OS/390 workstation focal point must be the same as the NMC focal point system. SA OS/390 code is installed on both the workstation and the NMC focal point system. The SA OS/390 workstation focal point system collects status information about systems and applications within your enterprise. It is supported by SA OS/390. (5) **NMC focal point system**. The NMC focal point system is a NetView system with an attached workstation server and LAN which gathers information about the state of the network. This focal point system uses RODM to store the data it collects in the data model. The information stored in RODM can be accessed from any LAN-connected workstation with

NetView Management Console installed. (6) **NPDA focal point system.** This is a NetView system which collects all the NPDA alerts that are generated within your enterprise. It is supported by NetView. If you have SA OS/390 installed the NPDA focal point system must be the same as your NMC focal point system. The NPDA focal point system is also known as the *alert focal point system*. (7) **Status focal point system.** In NetView, the system to which STATMON, VTAM and NLDM send status information on network resources. If you have a NMC focal point, it must be on the same system as the Status focal point. (8) **SA OS/390 focal point system.** This is a NetView system that has SA OS/390 host code installed, and network connections to a number of SA OS/390 workstations. The SA OS/390 focal point system receives messages from the systems and operator consoles of the machines it controls. It provides full systems and operations console function for its target systems. It can be used to IPL these systems. Note that some restrictions apply to the Hardware Management Console for an S/390 microprocessor cluster. (9) **Hardware Management Console.** Although not listed as a focal point, the Hardware Management Console acts as a focal point for the console functions of an S/390 microprocessor cluster. Unlike all the other focal points in this definition, the Hardware Management Console runs on a LAN-connected workstation,

frame. For a System/390 microprocessor cluster, a frame contains one or two central processor complexes (CPCs), support elements, and AC power distribution.

full-screen mode. In the NetView program, a form of panel presentation that makes it possible to display the contents of an entire workstation screen at once. Full-screen mode can be used for fill-in-the-blanks prompting. Contrast with *line mode*.

G

gateway session. An NetView-NetView task session with another system in which the SA OS/390 outbound gateway operator logs onto the other NetView session without human operator intervention. Each end of a gateway session has both an inbound and outbound gateway operator.

generic alert. Encoded alert information that uses code points (defined by IBM and possibly customized by users or application programs) stored at an alert receiver, such as NetView.

generic routines. In SA OS/390, a set of self-contained automation routines that can be called from the NetView message automation table, or from user-written automation procedures.

Group entry type. A collection of target systems defined through the customization dialog. An

installation might set up a group to refer to a physical site or an organizational entity. Groups can be of type STANDARD or SYSPLEX.

H

Hardware Management Console (HMC). A console used to monitor and control hardware such as CMOS-390 or zSeries processors.

Hardware Management Console Application (HWMCA). A direct-manipulation object-oriented graphical user interface that provides single point of control and single system image for hardware elements. HWMCA provides customer grouping support, aggregated and real-time system status using colors, consolidated hardware messages support, consolidated operating system messages support, consolidated service support, and hardware commands targeted at a single system, multiple systems, or a customer group of systems.

heartbeat. In SA OS/390, a function which monitors the validity of the status forwarding path between remote systems and the NMC focal point system, and monitors the availability of remote OS/390 systems, to ensure that status information displayed on the SA OS/390 workstation is current.

help panel. An online panel that tells you how to use a command or another aspect of a product.

hierarchy. In the NetView program, the resource types, display types, and data types that make up the organization, or levels, in a network.

high-level language (HLL). A programming language that does not reflect the structure of any particular computer or operating system. For the NetView program, the high-level languages are PL/I and C.

HLL. High-level language.

host system. In a coupled system or distributed system environment, the system on which the facilities for centralized automation run. SA OS/390 publications refer to target systems or focal-point systems instead of hosts.

host (primary processor). The processor at which you enter a command (also known as the *issuing processor*)

HWMCA. Hardware Management Console Application. Application for the graphic hardware management console that monitors and controls a central processor complex. It is attached to a target processor (a system 390 microprocessor cluster) as a dedicated system console. This microprocessor uses OCF to process commands.

I

images. A grouping of processors and I/O devices that you define. You can define a single-image mode which allows a multiprocessor system to function as one central processor image.

IMS/VS. Information Management System/Virtual Storage.

inbound. In SA OS/390, messages sent to the focal-point system from the PS/2 computer or target system.

inbound gateway operator. The automation operator that receives incoming messages, commands, and responses from the outbound gateway operator at the sending system. The inbound gateway operator handles communications with other systems using a gateway session.

Information Management System/Virtual Storage (IMS/VS). A database/data communication (DB/DC) system that can manage complex databases and networks. Synonymous with IMS.

INGEIO PROC. The I/O operations default procedure name; part of the SYS1.PROCLIB

initial program load (IPL). (1) The initialization procedure that causes an operating system to commence operation. (2) The process by which a configuration image is loaded into storage at the beginning of a workday or after a system malfunction. (3) The process of loading system programs and preparing a system to run jobs.

initialize automation. SA OS/390-provided automation that issues the correct OS/390 start command for each subsystem when SA OS/390 is initialized. The automation ensures that subsystems are started in the order specified in the automation control file and that prerequisite applications are functional.

input/output support processor (IOSP). The hardware unit that provides I/O support functions for the primary support processor and maintenance support functions for the processor controller.

Interactive System Productivity Facility (ISPF). An IBM licensed program that serves as a full-screen editor and dialog manager. Used for writing application programs, it provides a means of generating standard screen panels and interactive dialogs between the application programmer and the terminal user.

interested operator list. The list of operators who are to receive messages from a specific target system.

internal token. A *logical token* (LTOK); name by which the I/O resource or object is known; stored in IODF.

IOCDS. I/O configuration data set. The data set that describes the I/O configuration.

I/O Ops. See *I/O operations*

IOSP. Input/Output Support Processor.

I/O operations. The part of SA OS/390 that provides you with a single point of logical control for managing connectivity in your active I/O configurations. I/O operations takes an active role in detecting unusual conditions and lets you view and change paths between a processor and an I/O device, using dynamic switching (the ESCON director).

I/O resource number. Combination of channel path identifier (CHPID), device number, etc. See internal token.

IPL. Initial program load.

ISA. Industry Standard Architecture.

ISPF. Interactive System Productivity Facility.

ISPF console. From this 3270-type console you are logged onto ISPF to use the runtime panels for I/O operations and SA OS/390 customization panels.

issuing host. See *primary host*; the base program at which you enter a command for processing.

J

JCL. Job control language.

JES. Job entry subsystem.

job. (1) A set of data that completely defines a unit of work for a computer. A job usually includes all necessary computer programs, linkages, files, and instructions to the operating system. (2) An address space.

job control language (JCL). A problem-oriented language designed to express statements in a job that are used to identify the job or describe its requirements to an operating system.

job entry subsystem (JES). A facility for spooling, job queuing, and managing I/O. In SA OS/390 publications, JES refers to JES2 or JES3, unless distinguished as being either one or the other.

K

Kanji. An ideographic character set used in Japanese. See also *double-byte character set*

L

LAN. Local area network.

line mode. A form of screen presentation in which the information is presented a line at a time in the message area of the terminal screen. Contrast with *full-screen mode*.

link. (1) In SNA, the combination of the link connection and the link stations joining network nodes; for example, a System/370 channel and its associated protocols, a serial-by-bit connection under the control of synchronous data link control (SDLC). (2) In SA OS/390, link connection is the physical medium of transmission.

link-attached. Describes devices that are physically connected by a telecommunication line. Contrast with *channel-attached*.

local. Pertaining to a device accessed directly without use of a telecommunication line. Synonymous with *channel-attached*.

local area network (LAN). (1) A network in which a set of devices is connected for communication. They can be connected to a larger network. See also *token ring*. (2) A network in which communications are limited to a moderately sized geographic area such as a single office building, warehouse, or campus, and which do not generally extend across public rights-of-way.

logical partition (LP). A subset of the processor hardware that is defined to support an operating system. See also *logically partitioned (() mode*.

logical switch number (LSN). Assigned with the switch parameter of the CHPID macro of the IOCP

logical token (LTOK). Resource number of an object in the IODF

logical unit (LU). In SNA, a port through which an end user accesses the SNA network and the functions provided by system services control points (SSCPs). An LU can support at least two sessions — one with an SSCP and one with another LU — and may be capable of supporting many sessions with other LUs. See also *physical unit (PU)* and *system services control point (SSCP)*.

logical unit (LU) 6.2. A type of logical unit that supports general communications between programs in a distributed processing environment. LU 6.2 is characterized by (a) a peer relationship between session partners, (b) efficient use of a session for multiple transactions, (c) comprehensive end-to-end error processing, and (d) a generic application program interface (API) consisting of structured verbs that are mapped into a product implementation. Synonym for advanced program-to-program communications (APPC).

logically partitioned (LPAR) mode. A central processor mode that enables an operator to allocate system processor hardware resources among several logical partitions. Contrast with *basic mode*.

LOGR. The sysplex logger.

LP. Logical partition.

LPAR. Logically partitioned (mode).

LU. Logical unit.

LU-LU session. In SNA, a session between two logical units (LUs) in an SNA network. It provides communication between two end users, or between an end user and an LU services component.

LU 6.2. Logical unit 6.2.

LU 6.2 session. A session initiated by VTAM on behalf of an LU 6.2 application program, or a session initiated by a remote LU in which the application program specifies that VTAM is to control the session by using the APPCCMD macro.

M

MCA. Micro Channel* architecture.

MCS. Multiple console support.

member. A specific function (one or more modules/routines) of a multisystem application that is defined to XCF and assigned to a group by the multisystem application. A member resides on one system in the sysplex and can use XCF services to communicate (send and receive data) with other members of the same group.

NetView message automation table. A table against which the NetView program compares incoming messages. A match with an entry triggers the specified response. SA OS/390 entries in the NetView automation table trigger an SA OS/390 response to target system conditions.

message class. A number that SA OS/390 associates with a message to control routing of the message. During automated operations, the classes associated with each message issued by SA OS/390 are compared to the classes assigned to each notification operator. Any operator with a class matching one of the message's classes receives the message.

message forwarding. The SA OS/390 process of sending messages generated at an SA OS/390 target system to the SA OS/390 focal point system.

message group. Several messages that are displayed together as a unit.

message monitor task. A task that starts and is associated with a number of communications tasks. Message monitor tasks receive inbound messages from

a communications task, determine the originating target system, and route the messages to the appropriate target control tasks.

message processing facility (MPF). An OS/390 table that screens all messages sent to the OS/390 console. The MPF compares these messages with a customer-defined list of messages on which to automate, suppress from the OS/390 console display, or both, and marks messages to automate or suppress. Messages are then broadcast on the subsystem interface (SSI).

message suppression. The ability to restrict the amount of message traffic displayed on the OS/390 console.

Micro Channel architecture. The rules that define how subsystems and adapters use the Micro Channel bus in a computer. The architecture defines the services that each subsystem can or must provide.

microprocessor. A processor implemented on one or a small number of chips.

migration. Installation of a new version or release of a program to replace an earlier version or release.

MP. Multiprocessor.

MPF. Message processing facility.

Multiple Virtual Storage (MVS). An IBM licensed program. MVS, which is the predecessor of OS/390, is an operating system that controls the running of programs on a System/390 or System/370 processor. MVS includes an appropriate level of the Data Facility Product (DFP) and Multiple Virtual Storage/Enterprise Systems Architecture System Product Version 5 (MVS/ESA SP5)

multiprocessor (MP). A CPC that can be physically partitioned to form two operating processor complexes.

multisystem application. An application program that has various functions distributed across OS/390 images in a multisystem environment.

multisystem environment. An environment in which two or more OS/390 images reside in one or more processors, and programs on one image can communication with programs on the other images.

MVS. Multiple Virtual Storage, predecessor of OS/390.

MVS image. A single occurrence of the MVS/ESA operating system that has the ability to process work.

MVS/JES2. Multiple Virtual Storage/Job Entry System 2. An OS/390 subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system. In an installation with more than one

processor, each JES2 processor independently controls its job input, scheduling, and output processing.

MVS/ESA. Multiple Virtual Storage/Enterprise Systems Architecture.

MVS/ESA SP. Multiple Virtual Storage/Enterprise Systems Architecture System Product.

MVS/XA. Multiple Virtual Storage for Extended Architecture.

N

NAU. (1) Network accessible unit. (2) Network addressable unit.

NCCF. Network Communications Control Facility.

NCP. (1) Network Control Program (IBM licensed program). Its full name is Advanced Communications Function for the Network Control Program. Synonymous with *ACF/NCP*. (2) Network control program (general term).

NetView. An IBM licensed program used to monitor a network, manage it, and diagnose network problems. NetView consists of a command facility that includes a presentation service, command processors, automation based on command lists, and a transaction processing structure on which the session monitor, hardware monitor, and terminal access facility (TAF) network management applications are built.

network accessible unit (NAU). A logical unit (LU), physical unit (PU), control point (CP), or system services control point (SSCP). It is the origin or the destination of information transmitted by the path control network. Synonymous with *network addressable unit*.

network addressable unit (NAU). Synonym for *network accessible unit*.

NetView automation procedures. A sequence of commands, packaged as a NetView command list or a command processor written in a high-level language. An automation procedure performs automation functions and runs under the NetView program.

NetView Command list language. An interpretive language unique to NetView that is used to write command lists.

NetView (NCCF) console. A 3270-type console for NetView commands and runtime panels for system operations and processor operations

NetView hardware monitor. The component of NetView that helps identify network problems, such as hardware, software, and microcode, from a central control point using interactive display techniques. Formerly called *network problem determination application*

NetView log. The log in which NetView records events pertaining to NetView and SA OS/390 activities.

NetView-NetView task (NNT). The task under which a cross-domain NetView operator session runs. Each NetView program must have a NetView-NetView task to establish one NNT session. See *operator station task*

NetView paths via logical unit (LU 6.2). A type of network-accessible port (VTAM connection) that enables end users to gain access to SNA network resources and communicate with each other. LU 6.2 permits communication between processor operations and the workstation.

NetView-NetView task session. A session between two NetView programs that runs under an NetView-NetView task. In SA OS/390, NetView-NetView task sessions are used for communication between focal point and remote systems.

network. (1) An interconnected group of nodes. (2) In data processing, a user application network. See *SNA network.*

Network Communications Control Facility (NCCF). The operations control facility for the network. NCCF consists of a presentation service, command processors, automation based on command lists, and a transaction processing structure on which the network management applications NLDM and NPDA are built. NCCF is a precursor to the NetView command facility.

Network Control Program (NCP). An IBM licensed program that provides communication controller support for single-domain, multiple-domain, and interconnected network capability. Its full name is Advanced Communications Function for the Network Control Program.

Networking NetView. In SA OS/390 the NetView that performs network management functions, such as managing the configuration of a network. In SA OS/390 it is common to also route alerts to the Networking NetView.

Network Problem Determination Application (NPDA). An NCCF application that helps you identify network problems, such as hardware, software, and microcode, from a central control point using interactive display methods. The alert manager for the network. The precursor of the NetView hardware monitor.

NMC focal point system. See *focal point system*

NMC workstation. The NMC workstation is the primary way to dynamically monitor SA OS/390 systems. From the windows, you see messages, monitor status, view trends, and react to changes before they cause problems for end users. You can use multiple windows to monitor multiple views of the system.

NIP. Nucleus initialization program.

NNT. NetView-NetView task.

notification message. An SA OS/390 message sent to a human notification operator to provide information about significant automation actions. Notification messages are defined using the customization dialog.

notification operator. A NetView console operator who is authorized to receive SA OS/390 notification messages. Authorization is made through the customization dialog.

NPDA. Network Problem Determination Application.

NPDA focal point system. See *focal point system*

NTRI. NCP/token-ring interconnection.

nucleus initialization program (NIP). The program that initializes the resident control program; it allows the operator to request last-minute changes to certain options specified during system generation.

O

OCA. In SA OS/390, operator console A, the active operator console for a target system. Contrast with *OCB.*

OCB. In SA OS/390, operator console B, the backup operator console for a target system. Contrast with *OCA.*

OCF. Operations command facility.

OCF-based processor. A central processor complex that uses an operations command facility for interacting with human operators or external programs to perform operations management functions on the CPC. Contrast with *screen-oriented processor*.

OPC/A. Operations Planning and Control/Advanced.

OPC/ESA. Operations Planning and Control/Enterprise Systems Architecture.

operating system (OS). Software that controls the execution of programs and that may provide services such as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominantly software, partial hardware implementations are possible. (T)

operations. The real-time control of a hardware device or software function.

operations command facility (OCF). A facility of the central processor complex that accepts and processes operations management commands.

Operations Planning and Control/Advanced (OPC/A). A set of IBM licensed programs that automate, plan, and control batch workload. OPC/A analyzes system and workload status and submits jobs accordingly.

Operations Planning and Control/ESA (OPC/ESA). A set of IBM licensed programs that automate, plan, and control batch workload. OPC/ESA analyzes system and workload status and submits jobs accordingly. The successor to OPC/A.

operator. (1) A person who keeps a system running. (2) A person or program responsible for managing activities controlled by a given piece of software such as OS/390, the NetView program, or IMS. (3) A person who operates a device. (4) In a language statement, the lexical entity that indicates the action to be performed on operands.

operator console. (1) A functional unit containing devices that are used for communications between a computer operator and a computer. (T) (2) A display console used for communication between the operator and the system, used primarily to specify information concerning application programs and I/O operations and to monitor system operation. (3) In SA OS/390, a console that displays output from and sends input to the operating system (OS/390, VM, VSE, or LINUX). Also called *operating system console*. In the SA OS/390 operator commands and configuration dialogs, OC is used to designate a target system operator console.

operator station task (OST). The NetView task that establishes and maintains the online session with the network operator. There is one operator station task for each network operator who logs on to the NetView program.

OS/390 component. A part of OS/390 that performs a specific OS/390 function. In SA OS/390, component refers to entities that are managed by SA OS/390 automation.

OS/390 subsystem. Software products that augment the OS/390 operating system. JES and TSO/E are examples of OS/390 subsystems. SA OS/390 includes automation for some OS/390 subsystems.

OS/390 system. An OS/390 image together with its associated hardware, which collectively are often referred to simply as a system, or OS/390 system.

OSA. I/O operations can display the open system adapter (OSA) channel logical definition, physical attachment, and status. You can configure an OSA channel on or off.

OST. Operator station task.

outbound. In SA OS/390, messages or commands from the focal-point system to the PS/2 computer or target system.

outbound gateway operator. The automation operator that establishes connections to other systems. The outbound gateway operator handles communications with other systems through a gateway session. The automation operator sends messages, commands, and responses to the inbound gateway operator at the receiving system.

P

page. (1) The portion of a panel that is shown on a display surface at one time. (2) To transfer instructions, data, or both between real storage and external page or auxiliary storage.

panel. (1) A formatted display of information that appears on a terminal screen. Panels are full-screen 3270-type displays with a monospaced font, limited color and graphics. (2) By using SA OS/390 panels you can see status, type commands on a command line using a keyboard, configure your system, and passthru to other consoles. See also *help panel*. (3) In computer graphics, a display image that defines the locations and characteristics of display fields on a display surface. Contrast with *screen*.

parallel channels. Parallel channels operate in either byte (BY) or block (BL) mode. You can change connectivity to a parallel channel operating in block mode.

parameter. (1) A variable that is given a constant value for a specified application and that may denote the application. (2) An item in a menu for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed to a program or procedure by a user or another program, namely as an operand in a language statement, as an item in a menu, or as a shared data structure.

partition. (1) A fixed-size division of storage. (2) In VSE, a division of the virtual address area that is available for program processing. (3) On an IBM Personal Computer fixed disk, one of four possible storage areas of variable size; one can be accessed by DOS, and each of the others may be assigned to another operating system.

partitionable CPC. A CPC that can be divided into 2 independent CPCs. See also *physical partition, single-image mode, MP, side*.

partitioned data set (PDS). A data set in direct access storage that is divided into partitions, called *members*, each of which can contain a program, part of a program, or data.

passive monitoring. In SA OS/390, the receiving of unsolicited messages from OS/390 systems and their resources. These messages can prompt updates to resource status displays. See also *active monitoring*

path. Communication link (either NetView or PS/2) between a processor and console

PCE. Processor controller. Also known as the "support processor" or "service processor" in some processor families.

PDS. Partitioned data set.

physical partition. Part of a CPC that operates as a CPC in its own right, with its own copy of the operating system.

physical unit (PU). In SNA, the component that manages and monitors the resources (such as attached links and adjacent link stations) of a node, as requested by a system services control point (SSCP) through an SSCP-PU session. An SSCP activates a session with the physical unit to indirectly manage, through the PU, resources of the node such as attached links.

physically partitioned (PP) configuration. A mode of operation that allows a multiprocessor (MP) system to function as two or more independent CPCs having separate power, water, and maintenance boundaries. Contrast with *single-image (SI) configuration*.

POI. Program operator interface.

policy. The automation and monitoring specifications for an SA OS/390 enterprise. See *SA OS/390 policy*

policy database. The database where the automation policy is recorded.

POR. Power-on reset.

port. (1) System hardware to which the I/O devices are attached. (2) On an ESCON switch, a port is an addressable connection. The switch routes data through the ports to the channel or control unit. Each port has a name that can be entered into a switch matrix, and you can use commands to change the switch configuration. (3) An access point (for example, a logical unit) for data entry or exit. (4) A functional unit of a node through which data can enter or leave a data network. (5) In data communication, that part of a data processor that is dedicated to a single data channel for the purpose of receiving data from or transmitting data to one or more external, remote devices. (6) power-on reset (POR) (7) A function that re-initializes all the hardware in a CPC and loads the internal code that enables the CPC to load and run an operating system.

PP. Physically partitioned (configuration).

PPT. Primary POI task.

primary host. The base program at which you enter a command for processing.

primary POI task (PPT). The NetView subtask that processes all unsolicited messages received from the VTAM program operator interface (POI) and delivers

them to the controlling operator or to the command processor. The PPT also processes the initial command specified to execute when NetView is initialized and timer request commands scheduled to execute under the PPT.

primary system. A system is a primary system for an application if the application is normally meant to be running there. SA OS/390 starts the application on all the primary systems defined for it.

problem determination. The process of determining the source of a problem; for example, a program component, machine failure, telecommunication facilities, user or contractor-installed programs or equipment, environment failure such as a power loss, or user error.

processor controller. Hardware that provides support and diagnostic functions for the central processors.

processor operations. The part of SA OS/390 that monitors and controls processor (hardware) operations. Processor operations provides a connection from a focal point system to a target system. Through NetView on the focal point system, processor operations automates operator and system consoles for monitoring and recovering target systems.

processor operations control file. Named by your system programmer, this file contains configuration and customization information. The programmer records the name of this control file in the processor operations file generation panel ISQDPG01.

processor operations workstation. This 3270-type display echoes commands run by automation and relays commands from the focal point system to the target processor, and messages from the target processor to the focal point system. The display can also be used as operator consoles. The workstation attaches to a processor through the processor controller.

Processor Resource/Systems Manager* (PR/SM*). The feature that allows the processor to use several operating system images simultaneously and provides logical partitioning capability. See also *(*.

ProcOps. See *Processor Operations*

product automation. Automation integrated into the base of SA OS/390 for the products DB2, CICS, IMS, OPC (formerly called *features*.

program to program interface (PPI). A NetView function that allows user programs to send or receive data buffers from other user programs and to send alerts to the NetView hardware monitor from system and application programs.

protocol. In SNA, the meanings of, and the sequencing rules for, requests and responses used for

managing the network, transferring data, and synchronizing the states of network components.

proxy resource. A resource defined like an entry type *Application* representing a processor operations target system.

PR/SM. Processor Resource/Systems Manager.

PU. Physical unit.

R

remote system. A system that receives resource status information from an SA OS/390 focal point system. An SA OS/390 remote system is defined as part of the same SA OS/390 enterprise as the SA OS/390 focal point system to which it is related.

requester. A requester is a workstation software, which enables users to log on to a domain, that is, to the server(s) belonging to this domain, and use the resources in this domain. After the log on to a domain, users can access the shared resources and use the processing capability of the server(s). Because the bigger part of shared resources is on the server(s), users can reduce hardware investment.

resource. (1) Any facility of the computing system or operating system required by a job or task, and including main storage, input/output devices, the processing unit, data sets, and control or processing programs. (2) In NetView, any hardware or software that provides function to the network. (3) In SA OS/390, any OS/390 application, OS/390 component, job, device, or target system capable of being monitored or automated through SA OS/390.

Resource Access Control Facility (RACF). A program that can provide data security for all your resources. RACF protects data from accidental or deliberate unauthorized disclosure, modification, or destruction.

resource group. A physically partitionable portion of a processor. Also known as a *side*.

Resource Monitoring Facility (RMF). A program that measures and reports on the availability and activity of system hardware and software resources, such as processors, devices, storage, and address spaces. RMF can issue reports about system performance problems as they occur.

Resource Object Data Manager (RODM). A data cache manager designed to support process control and automation applications. RODM provides an in-memory data cache for maintaining real-time data in an address space that is accessible by multiple applications. RODM also allows an application to query an object and receive a rapid response and act on it.

resource token. A unique internal identifier of an ESCON resource or resource number of the object in the IODF

restart automation. SA OS/390-provided automation that monitors subsystems to ensure that they are running. If a subsystem fails, SA OS/390 attempts to restart it according to the policy in the automation control file.

Restructured Extended Executor (REXX). An interpretive language used to write command lists.

return code. A code returned from a program used to influence the issuing of subsequent instructions.

REXX. Restructured Extended Executor.

REXX procedure. A command list written with the Restructured Extended Executor (REXX) which is an interpretive language.

RMF. Resource Measurement Facility.

RODM. Resource Object Data Manager.

S

SAF. Security Authorization Facility.

SA OS/390 automation focal point system. See *focal point system*

SA OS/390 customization dialog. An ISPF application through which the SA OS/390 policy administrator defines policy for individual OS/390 systems and builds automation control data.

SA OS/390 customization focal point system. See *focal point system*

SA OS/390 enterprise. The group of systems and resources defined in the customization dialog under one enterprise name. An SA OS/390 enterprise consists of connected OS/390 systems running SA OS/390.

SA OS/390 focal point system. See *focal point system*.

SA OS/390 policy. The description of the systems and resources that make up an SA OS/390 enterprise, together with their monitoring and automation definitions.

SA OS/390 policy administrator. The member of the operations staff who is responsible for defining SA OS/390 policy.

SA OS/390 satellite. If you are running two NetViews on an OS/390 system to split the automation and networking functions of NetView, it is common to route alerts to the Networking NetView. For SA OS/390 to process alerts properly on the Networking NetView,

you must install a subset of SA OS/390 code, called an *SA OS/390 satellite* on the Networking NetView.

SCA. In SA OS/390, system console A, the active system console for a target hardware. Contrast with *SCB*.

SCB. In SA OS/390, system console B, the backup system console for a target hardware. Contrast with *SCA*.

screen. Deprecated term for display panel.

screen handler. In SA OS/390, software that interprets all data to and from a full-screen image of a target system. The interpretation depends on the format of the data on the full-screen image. Every processor and operating system has its own format for the full-screen image. A screen handler controls one PS/2 connection to a target system.

SDF. Status display facility.

SDLC. Synchronous data link control.

SDSF. System Display and Search Facility.

secondary system. A system is a secondary system for an application if it is defined to automation on that system, but the application is not normally meant to be running there. Secondary systems are systems to which an application can be moved in the event that one or more of its primary systems are unavailable. SA OS/390 does not start the application on its secondary systems.

server. A server is a workstation, that shares resources, which include directories, printers, serial devices, and computing powers.

service period. Service periods allow the users to schedule the availability of applications. A service period is a set of time intervals (service windows), during which an application should be active.

service threshold. An SA OS/390 policy setting that determines when to notify the operator of deteriorating service for a resource. See *alert threshold* and *warning threshold*

service language command (SLC). The line-oriented command language of processor controllers or service processors.

service processor (SVP). The name given to a processor controller on smaller System/370 processors.

session. In SNA, a logical connection between two network addressable units (NAUs) that can be activated, tailored to provide various protocols, and deactivated, as requested. Each session is uniquely identified in a transmission header by a pair of network addresses identifying the origin and destination NAUs of any transmissions exchanged during the session.

session monitor. The component of the NetView program that collects and correlates session-related data and provides online access to this information. The successor to NLDM.

shutdown automation. SA OS/390-provided automation that manages the shutdown process for subsystems by issuing shutdown commands and responding to prompts for additional information.

side. A part of a partitionable CPC that can run as a physical partition and is typically referred to as the A-side or the B-side.

Simple Network Management Protocol (SNMP) . An IP based industry standard protocol to monitor and control resources in an IP network.

single image. A processor system capable of being physically partitioned that has not been physically partitioned. Single-image systems can be target hardware processors.

single-image (SI) mode. A mode of operation for a multiprocessor (MP) system that allows it to function as one CPC. By definition, a uniprocessor (UP) operates in single-image mode. Contrast with *physically partitioned (PP) configuration*.

SLC. Service language command.

SMP/E. System Modification Program Extended.

SNA. Systems Network Architecture.

SNA network. In SNA, the part of a user-application network that conforms to the formats and protocols of systems network architecture. It enables reliable transfer of data among end users and provides protocols for controlling the resources of various network configurations. The SNA network consists of network addressable units (NAUs), boundary function components, and the path control network.

SNMP. Simple Network Management Protocol (a TCP/IP protocol). A protocol that allows network management by elements, such as gateways, routers, and hosts. This protocol provides a means of communication between network elements regarding network resources.

solicited message. An SA OS/390 message that directly responds to a command. Contrast with *unsolicited message*.

SRPI. Server-Requester Programming Interface.

SSCP. System services control point.

SSI. Subsystem interface.

start automation. SA OS/390-provided automation that manages and completes the startup process for subsystems. During this process, SA OS/390 replies to prompts for additional information, ensures that the startup process completes within specified time limits, notifies the operator of problems, if necessary, and brings subsystems to an UP (or ready) state.

startup. The point in time at which a subsystem or application is started.

status. The measure of the condition or availability of the resource.

status focal point system. See *focal point system*

status display facility (SDF). The system operations part of SA OS/390 that displays status of resources such as applications, gateways, and write-to-operator messages (WTORs) on dynamic color-coded panels. SDF shows spool usage problems and resource data from multiple systems.

steady state automation. The routine monitoring, both for presence and performance, of subsystems, applications and systems. Steady state automation may respond to messages, performance exceptions and discrepancies between its model of the system and reality.

structure. A construct used by OS/390 to map and manage storage on a coupling facility. See cache structure, list structure, and lock structure.

subgroup. A named set of systems. A subgroup is part of an SA OS/390 enterprise definition and is used for monitoring purposes.

SubGroup entry. A construct, created with the customization dialog, used to represent and contain policy for a subgroup.

subsystem. (1) A secondary or subordinate system, usually capable of operating independent of, or asynchronously with, a controlling system. (2) In SA OS/390, an OS/390 application or subsystem defined to SA OS/390.

subsystem interface. The OS/390 interface over which all messages sent to the OS/390 console are broadcast.

support element. A hardware unit that provides communications, monitoring, and diagnostic functions to a central processor complex (CPC).

support processor. Another name given to a processor controller on smaller System/370 processors; see *service processor*.

SVP. Service processor.

switches. ESCON directors are electronic units with ports that dynamically switch to route data to I/O

devices. The switches are controlled by I/O operations commands that you enter on a workstation.

switch identifier. The switch device number (swchdevn), the logical switch number (LSN) and the switch name

symbolic destination name (SDN). Used locally at the workstation to relate the VTAM application name

synchronous data link control (SDLC). A discipline for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or non-switched links. The configuration of the link connection may be point-to-point, multi-point, or loop. SDLC conforms to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute and High-Level Data Link Control (HDLC) of the International Standards Organization.

SysOps. See *System Operations*

sysplex. A set of OS/390 systems communicating and cooperating with each other through certain multisystem hardware components (coupling devices and timers) and software services (couple data sets).

In a sysplex, OS/390 provides the coupling services that handle the messages, data, and status for the parts of a multisystem application that has its workload spread across two or more of the connected processors, sysplex timers, coupling facilities, and couple data sets (which contains policy and states for automation).

A parallel sysplex is a sysplex which includes a coupling facility.

sysplex application group. A sysplex application group is a grouping of applications that can run on any system in a sysplex.

sysplex couple data set. A couple data set that contains sysplex-wide data about systems, groups, and members that use XCF services. All OS/390 systems in a sysplex must have connectivity to the sysplex couple data set. See also *couple data set*

Sysplex Timer. An IBM unit that synchronizes the time-of-day (TOD) clocks in multiple processors or processor sides. External Time Reference (ETR) is the OS/390 generic name for the IBM Sysplex Timer (9037).

system. In SA OS/390, system means a focal point system (OS/390) or a target system (MVS, VM, VSE, TPF or CF).

System Automation for OS/390. The full name for SA OS/390.

system console. (1) A console, usually having a keyboard and a display screen, that is used by an operator to control and communicate with a system. (2)

A logical device used for the operation and control of hardware functions (for example, IPL, alter/display, and reconfiguration). The system console can be assigned to any of the physical displays attached to a processor controller or support processor. (3) In SA OS/390, the hardware system console for processor controllers or service processors of processors connected using SA OS/390. In the SA OS/390 operator commands and configuration dialogs, SC is used to designate the system console for a target hardware processor.

System Display and Search Facility (SDSF). An IBM licensed program that provides information about jobs, queues, and printers running under JES2 on a series of panels. Under SA OS/390 you can select SDSF from a pull-down menu to see the resources' status, view the OS/390 system log, see WTOR messages, and see active jobs on the system.

System entry type. A construct, created with the customization dialog, used to represent and contain policy for a system.

System Modification Program/Extended (SMP/E). An IBM licensed program that facilitates the process of installing and servicing an OS/390 system.

system operations. The part of SA OS/390 that monitors and controls system operations applications and subsystems such as NetView, SDSF, JES, RMF, TSO, RODM, ACF/VTAM, CICS, IMS, and OPC.

system services control point (SSCP). In SNA, the focal point within an SNA network for managing the configuration, coordinating network operator and problem determination requests, and providing directory support and other session services for end users of the network. Multiple SSCPs, cooperating as peers, can divide the network into domains of control, with each SSCP having a hierarchical control relationship to the physical units and logical units within its domain.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

System/390 microprocessor cluster. A configuration that consists of central processor complexes (CPCs) and may have one or more integrated coupling facilities.

T

TAF. Terminal access facility.

target. A processor or system monitored and controlled by a focal point system.

target control task. In SA OS/390, target control tasks process commands and send data to target systems and workstations through communications tasks. A target control task (a NetView autotask) is assigned to a target system when the target system is initialized.

target hardware. In SA OS/390, the physical hardware on which a target system runs. It can be a single-image or physically partitioned processor. Contrast with *target system*.

target system. (1) In a distributed system environment, a system that is monitored and controlled by the focal-point system. Multiple target systems can be controlled by a single focal-point system. (2) In SA OS/390, a computer system attached to the focal-point system for monitoring and control. The definition of a target system includes how remote sessions are established, what hardware is used, and what operating system is used.

task. (1) A basic unit of work to be accomplished by a computer. (2) In the NetView environment, an operator station task (logged-on operator), automation operator (autotask), application task, or user task. A NetView task performs work in the NetView environment. All SA OS/390 tasks are NetView tasks. See also *communications task*, *message monitor task*, and *target control task*.

telecommunication line. Any physical medium, such as a wire or microwave beam, that is used to transmit data.

terminal access facility (TAF). (1) A NetView function that allows you to log onto multiple applications either on your system or other systems. You can define TAF sessions in the SA OS/390 customization panels so you don't have to set them up each time you want to use them. (2) In NetView, a facility that allows a network operator to control a number of subsystems. In a full-screen or operator control session, operators can control any combination of subsystems simultaneously.

terminal emulation. The capability of a microcomputer or personal computer to operate as if it were a particular type of terminal linked to a processing unit to access data.

threshold. A value that determines the point at which SA OS/390 automation performs a predefined action. See *alert threshold warning threshold* , and *error threshold*

time of day (TOD). Typically refers to the time-of-day clock.

Time Sharing Option (TSO). An optional configuration of the operating system that provides conversational time sharing from remote stations. It is an interactive service on OS/390, MVS/ESA, and MVS/XA.

Time-Sharing Option/Extended (TSO/E). An option of OS/390 that provides conversational time-sharing from remote terminals. TSO/E allows a wide variety of users to perform many different kinds of tasks. It can handle short-running applications that use fewer sources as well as long-running applications that require large amounts of resources.

timers. A NetView command that issues a command or command processor (list of commands) at a specified time or time interval.

TOD. Time of day.

token ring. A network with a ring topology that passes tokens from one attaching device to another; for example, the IBM Token-Ring Network product.

TP. Transaction program.

transaction program. In the VTAM program, a program that performs services related to the processing of a transaction. One or more transaction programs may operate within a VTAM application program that is using the VTAM application program interface (API). In that situation, the transaction program would request services from the applications program using protocols defined by that application program. The application program, in turn, could request services from the VTAM program by issuing the APPCCMD macro instruction.

transitional automation. the actions involved in starting and stopping subsystems and applications which have been defined to SA OS/390. This can include issuing commands and responding to messages.

translating host. Role played by a host that turns a resource number into a token during a unification process.

trigger. On top of requests, triggers, in combination with events, are used to control the starting and stopping of applications in a single system or a Parallel Sysplex. Triggers act as inhibitors for the requested action.

TSO. Time Sharing Option.

TSO console. From this 3270-type console you are logged onto TSO or ISPF to use the runtime panels for I/O operations and SA OS/390 customization panels.

TSO/E. TSO Extensions.

U

UCB. The unit control block; an MVS/ESA data area that represents a device and which is used for allocating devices and controlling I/O operations.

unsolicited message. An SA OS/390 message that is not a direct response to a command. Contrast with *solicited message*.

user task. An application of the NetView program defined in a NetView TASK definition statement.

V

Virtual Machine/System Product (VM/SP). An IBM licensed program. It is an operating system that manages the resources of a real processor to provide virtual machines to end users. As a time-sharing system control program, it consists of the virtual machine control program (CP), the conversational monitor system (CMS), the group control system (GCS), and the interactive problem control system (IPCS).

Virtual Storage Extended (VSE). An IBM licensed program whose full name is Virtual Storage Extended/Advanced Function. It is an operating system that controls the execution of programs.

Virtual Telecommunications Access Method (VTAM). An IBM licensed program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability. Its full name is Advanced Communications Function for the Virtual Telecommunications Access Method. Synonymous with *ACF/VTAM*.

VM/ESA*. Virtual Machine/Enterprise Systems Architecture*

VM/SP. Virtual Machine/System Product.

VM/SP HPO. Virtual Machine/System Product High Performance Option.

VSE. Virtual Storage Extended.

VTAM. Virtual Telecommunications Access Method.

W

warning threshold. An application service value that determines the level at which SA OS/390 changes the associated icon on the NMC workstation to the warning color. See *alert threshold*

workstation. In SA OS/390 workstation means the *graphic workstation* that an operator uses for day-to-day operations.

write-to-operator (WTO). A request to send a message to an operator at the OS/390 operator console. This request is made by an application and is handled by the WTO processor, which is part of the OS/390 supervisor program.

write-to-operator-with-reply (WTOR). A request to send a message to an operator at the OS/390 operator console which requires a response from the operator. This request is made by an application and is handled by the WTO processor, which is part of the OS/390 supervisor program.

WTO. Write-to-Operator.

WTOR. Write-to-Operator-with-Reply.

WWV. The US National Institute of Standards and Technology (NIST) radio station that provides standard time information. A second station, known as WWVB, provides standard time information at a different frequency.

X

XCF. Cross-system coupling facility.

XCF couple data set. The name for the sysplex couple data set prior to MVS/ESA System Product Version 5 Release 1. See *sysplex couple data set*

XCF group. A set of related members that a multisystem application defines to XCF. A member is a specific function, or instance, of the application. A member resides on one system and can communicate with other members of the same group across the sysplex.

XRF. Extended recovery facility.

Numerics

3270 connection card. A 3270 emulator card installed in a workstation used to connect the workstation to the target system. Four 3270 connection cards can be installed in a workstation.

37x5. A 3705, 3725, or 3745 communication controller.

3x74. A 3174 or 3274 subsystem control unit. A control unit to which 3270-family display stations are attached.

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