CICS Transaction Server for z/OS



CICSPlex SM Concepts and Planning

Version 5 Release 4

CICS Transaction Server for z/OS



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Version 5 Release 4

Note
Before using this information and the product it supports, read the information in "Notices" on page 73.

This edition applies to the IBM CICS Transaction Server for z/OS Version 5 Release 4 (product number 5655-Y04) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this PDF

This PDF provides a general introduction to CICSPlex SM. It is for system designers, planners, and programmers responsible for preparing an enterprise for the introduction of CICSPlex SM.

It describes:

- At a high level, how CICSPlex SM works, and introduces some new concepts
- The main functions and benefits of CICSPlex SM as a CICS® system management tool
- How to approach the design of a CICSPlex SM configuration
- How to start defining your CICSPlex SM environment
- How to plan for use of CICSPlex SM Business Application Services, workload management, real-time analysis, and monitoring functions
- How to prepare for the installation of CICSPlex SM.

These tasks are done in conjunction with the *Program Directory*.

For details of the terms and notation used, see Conventions and terminology used in the CICS documentation in IBM Knowledge Center.

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Chapter 1. CICSPlex SM overview

The CICSPlex® System Manager element of CICS® Transaction Server for z/OS® is a system management tool that enables you to manage multiple CICS systems from a single control point.

Enterprises in which CICSPlex SM might be needed range from those running 10 or 15 CICS regions, to those running two or three hundred (or more) CICS regions: in the latest z/OS sysplex environment, having such large numbers of CICS regions to support a transaction processing workload is becoming increasingly common.

CICSPlex SM has the following key aspects:

CICSPlex SM conforms to the IBM® strategy for system management

- It provides consistent creation and management of system management data.
- It is an enterprise-wide system management application.
- It supports increased automation of system management tasks.
- It is structured into manager and agent components, has an enterprise information base, a coordination information base, and is based on a data model.

CICSPlex SM has many reliability, availability, and serviceability (RAS) features

For example:

- User application CICS regions are managed by a discrete controlling region that has no associated terminals or use application elements or components. There can be multiple instances of this managing region.
- User access to CICSPlex SM functions is provided using a separate address space, of which there can also be multiple instances in an enterprise.
- System management data is held separately in data-space caches, so that it is unaffected by what happens in both managing and managed CICS systems.

CICSPlex SM is secure

Even though CICSPlex SM has the potential to allow access to all of an enterprise's CICS resources from a single session, it ensures that security is not compromised. You can use a SAF-compliant external security manager to prevent unauthorized access to:

- CICSPlex SM procedures and data
- CICSPlex SM system management functions and the CICS resources they manage

Security checks that are usually performed by CICS (that is, CICS command checking and CICS resource checking) are performed instead by CICSPlex SM.

"The CICSPlex SM environment" on page 2 provides an overview of the basic CICSPlex SM features and functions.

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The CICSPlex SM environment

Before you begin to define your CICSPlex SM environment, you must understand the components of CICSPlex SM, either because you have to define them or because they can affect the design of your environment.

Each CICS region that is managed by CICSPlex SM is called a *managed application system* (MAS). You define and manage MASs as part of a *CICSplex*. Every MAS in a CICSplex is managed by a *CICSPlex SM address space* (CMAS). More than one CMAS can manage the MASs in a CICSplex, but a MAS can connect only to one CMAS at any given time.

All CICSPlex SM components, resources, system management requirements, and the relationships between them, are held as *objects* in a *data repository*. You can manage these objects using one or more of the provided interfaces:

- The CICS Explorer® is an Eclipse-based tool that you can use to create, install, and manage the objects in the data repository.
- The Web User Interface (WUI) provides a Web interface to create, install, and manage the objects in the data repository.
- The batched repository-update facility provides a batch job to create CICSPlex SM resource definition objects.

In every CICSplex there is one CMAS that is defined as the *maintenance point*. The CMAS maintenance point is responsible for maintaining the data integrity of the objects in every data repository by synchronizing its data repository with the data repository of other CMASs. It performs this synchronization by using CMAS-to-CMAS links, which are typically used for routing management commands and data between CMASs.

The Web User Interface (WUI) server runs on a dedicated MAS. The Web User Interface server code must be at the same release level as the CICS region on which it runs and the CMAS to which it is connected.

You manage resource definition through Business Application Services (BAS). You can also use workload management (WLM), real-time analysis (RTA), and monitoring services to manage the CICSPlex SM configuration and gather statistical information.

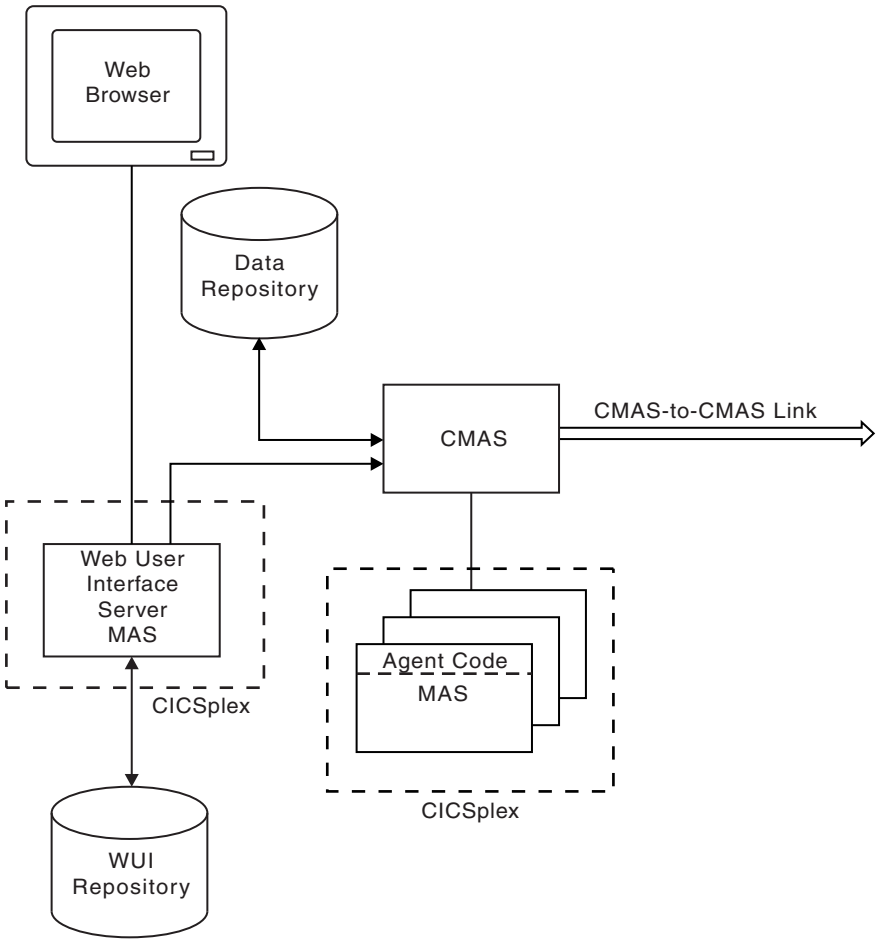


Figure 1. Key components of a CICSPlex SM configuration

The CICSplex

A *CICSplex* is any grouping of CICS systems that you want to manage and manipulate as if they were a single entity. That is, a CICSplex is a management domain, made up of those CICS systems for which you want to establish a single system image (SSI).

A CICSplex managed by CICSPlex SM could include every CICS system in your enterprise. Alternatively, you could define multiple CICSplexes, each of which would include a logical grouping of CICS systems. For example, a CICSplex could comprise all CICS systems on a particular MVS image, or all CICS systems accessible by a subset of your users, or all CICS systems serving a particular geographical area. Furthermore, the composition of a CICSplex can be altered without affecting the functions of the underlying CICS systems. The CICS systems in a single CICSplex managed by CICSPlex SM do not have to be explicitly connected to each other for management purposes.

The most significant facts about a CICSplex managed by CICSPlex SM are:

- The CICSplex is the largest unit you can work with. That is, you cannot group CICSplexes and manipulate such a group as a single entity.

- You cannot copy CICSPlex SM data from one CICSplex to another. For system management purposes, the CICSplex is "sealed" against other CICSplexes.
- CICSplexes are mutually exclusive, so no CICS system can belong to more than one CICSplex.

CICSPlex SM enables you to define subsets of a CICSplex, which are known as *CICS system groups*. CICS system groups are not mutually exclusive, and can reference the same CICS systems. Thus, if you decide to include every CICS system in your enterprise in a single CICSplex, there are mechanisms for managing groups of CICS systems within the CICSplex in a single system image manner.

You can assign an unlimited number of CICS systems and CICS system groups to an existing CICSplex.

Although you can define a CICS system to only one CICSplex, you can assign a CICS system to multiple CICS system groups within the CICSplex. You can also assign the CICS system group to any number of other CICS system groups.

The managed application system (MAS)

Each running CICS system that is being managed by CICSPlex SM is known as a *managed application system* (MAS).

For details of the supported CICS releases that CICSPlex SM can manage, see the information about upgrading CICSPlex SM in Upgrading.

All the MASs within a CICSplex are managed by the same *CICSPlex SM Address Space (CMAS)* or the same group of CMASs.

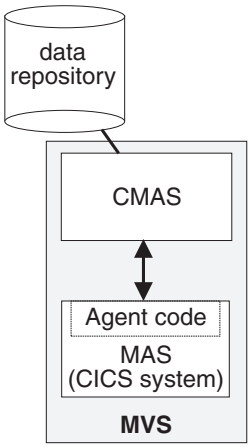


Figure 2. MASs and their CMAS. Each of these components is described in this section.

Each MAS contains CICSPlex SM *agent code* that implements CICSPlex SM function, such as data collection, for the CMAS by which it is managed. For example, if resource monitoring is active for a particular MAS, agent code in the MAS monitors the selected resources and feeds the resulting data to the CMAS.

The MASs within a single CICSplex do not have to be explicitly connected to each other for CICSPlex SM-specific communication. However, CICS connections required in support of transaction routing and function shipping are still required.

MASs can be defined and managed as individual CICS systems or grouped into *system groups* within the CICSplex. Each system group is one or more CICS systems that you want to manage as a unit subset of the CICSplex. System groups are described in Identifying system groups.

All MASs are local, that is they run on the same MVS image as the CMAS by which they are managed. You do not need to define an explicit link between the CMAS and the local MAS. For local MASs, system-management data is accumulated in data-space caches (as shown in Figure 1 on page 3) and is communicated to the CMAS via the Environment Services System Services (ESSS) address space (which is described in Environment Services System Services (ESSS)).

A MAS can be set up as a CICSPlex SM Web User Interface server. In this case, the CICS release level of the MAS and the CICSPlex SM Web User Interface server must be the same.

CICSPlex SM address space (CMAS)

The CICSPlex SM address space (CMAS) is the hub of any CICSPlex SM configuration, because it is responsible for most of the work involved in managing and reporting on CICS systems and their resources. Every CICSplex is managed by at least one CMAS. The CMAS is responsible for the *single system image (SSI)* that enables the operator to manage a CICSplex as if it were a single CICS system, regardless of the number of CICS systems defined as belonging to the CICSplex, and regardless of their physical location.

The CMAS implements the BAS, WLM, RTA, and monitoring functions of CICSPlex SM, and maintains configuration information about the CICSplexes it is managing. It also holds information about its own links with other CMASs. It stores this information in its *data repository*. (See Figure 2 on page 4).

A CMAS is a full-function CICS Transaction Server for z/OS system. Most CMAS components run as CICS tasks, and CMAS connections to other components are implemented using CICS intercommunication methods.

Note: The CMAS does not support user applications or terminals, and its resources should not be considered available for non-CMAS tasks, including (without limitation) the use of any monitoring and performance tool other than those supplied as a part of CICSPlex SM.

A CMAS cannot be running a lower release of CICS than its MASs. Also, both the CMAS and the MASs must be running the same release of CICSPlex SM.

A CMAS is not part of any CICSplex: a single CMAS can participate in the management of multiple CICSplexes, but belongs to none of them.

If a CICSplex is managed by multiple CMASs:

- The CMASs are connected to each other by *CMAS-to-CMAS* links defined to CICSPlex SM. These links ensure that each CMAS can access data held by other CMASs, and a single-system image can be presented to the operators.
- One of the CMASs is designated the *maintenance point* CMAS. That CMAS is responsible for maintaining all the CICSPlex SM definitions relating to a CICSplex and keeping all the data repositories in synchronization.

CICSPlex SM can issue SNA generic alerts to NetView®, provided that a CMAS is installed on the same MVS™ image as the NetView instance with which CICSPlex SM is working.

Environment Services System Services (ESSS)

Environment Services System Services (ESSS) is a limited-function, MVS system address space that provides z/OS services to CICSPlex SM components. In particular, ESSS owns all of the MVS/ESA data spaces on an z/OS image, so that they can exist independently of CMASs and MASs, yet remain accessible by both. The benefit of this arrangement is that the CICSPlex SM data accumulating in the data spaces is not vulnerable to events in the MAS and CMAS components. ESSS also plays a part in some aspects of communication between a CMAS and any NetView instance on the same z/OS image as the CMAS.

There is one instance of ESSS for each version or level of CMAS on any z/OS image.

The CICSPlex SM Web User Interface

The CICSPlex SM Web User Interface (WUI) is a customizable, platform-independent interface for your Web browser.

The Web User Interface is used:

- By the CICSPlex SM operator, who uses it to monitor and control the resources of their CICS systems.
- By the system administrator, who uses the interface to define and maintain the CICSPlex SM configuration, and to specify BAS, WLM, RTA, and monitoring requirements.

You can link to the Web User Interface from any location that can launch a Web browser.

The server component of the Web User Interface runs on a dedicated CICSPlex SM local MAS connected to a CMAS at the same release level.

The Web User Interface is supplied with a set of linked menus and views but can also be customized to reflect your business procedures and to suit the needs of individual users.

Information about your enterprise is displayed in formatted displays called *views*. An example view is shown in Figure 3 on page 7.

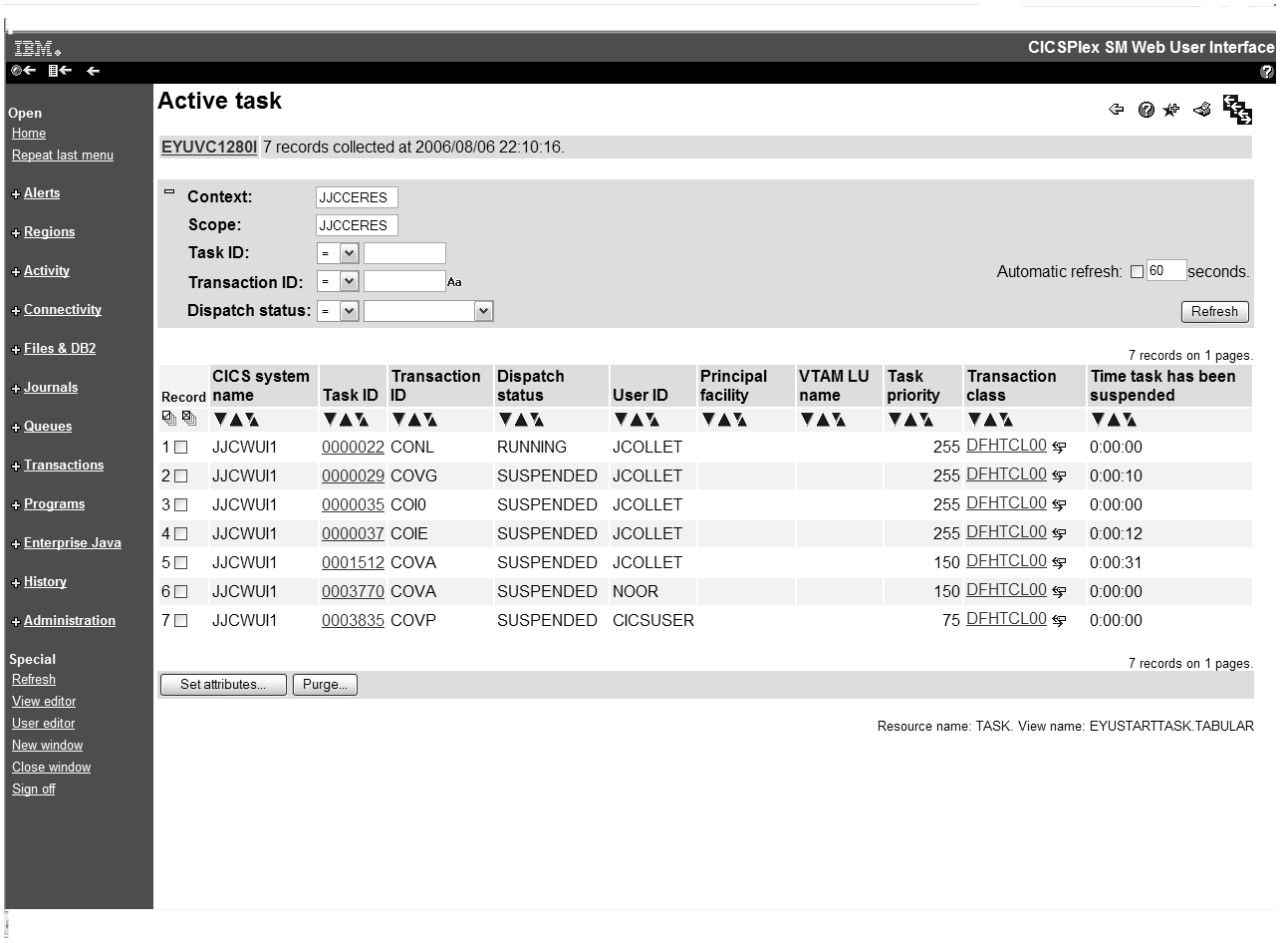


Figure 3. A tabular view

The title of the view is displayed at the top of the view and is descriptive of the view. The resource name is the name of the resource associated with the view; each resource is represented by a resource table. All WUI views supplied with CICSPlex SM by IBM are named EYUSTART`object.viewtype` where `object` is the name of the associated resource and `viewtype` describes the type of view. In Figure 3, the view title is **Active task**, the resource name is TASK, and the view name is EYUSTARTTASK.TABULAR. Throughout this document, views are referred to by view names with the resource names in parentheses.

You navigate between views to control the type of information that is displayed using hyperlinks on views and menus. Typically, hyperlinks are highlighted and underlined. In the example view, Task ID is a hyperlink. From a view, you use *action buttons* to manage the displayed data. In Figure 3, Set attributes and Purge are action buttons.

The general principles of the WUI, and other details of the menus and views, are described in CICSPlex SM Web User Interface overview. Resource tables are described in CICSPlex SM resource tables in Reference.

CICSPlex SM objects

To define the configuration of your CICS systems to CICSPlex SM, and to define your BAS, WLM, RTA, and monitoring requirements, you create *CICSPlex SM objects*, and associate them with each other.

For each object, and for each association or link between them, a record is created in a CMAS data repository. Figure 4 shows how the CICSPlex SM objects relate to each other.

This figure contains a high-resolution graphic that is not supported in this display format. To view the graphic, please use the CICS Information Center.

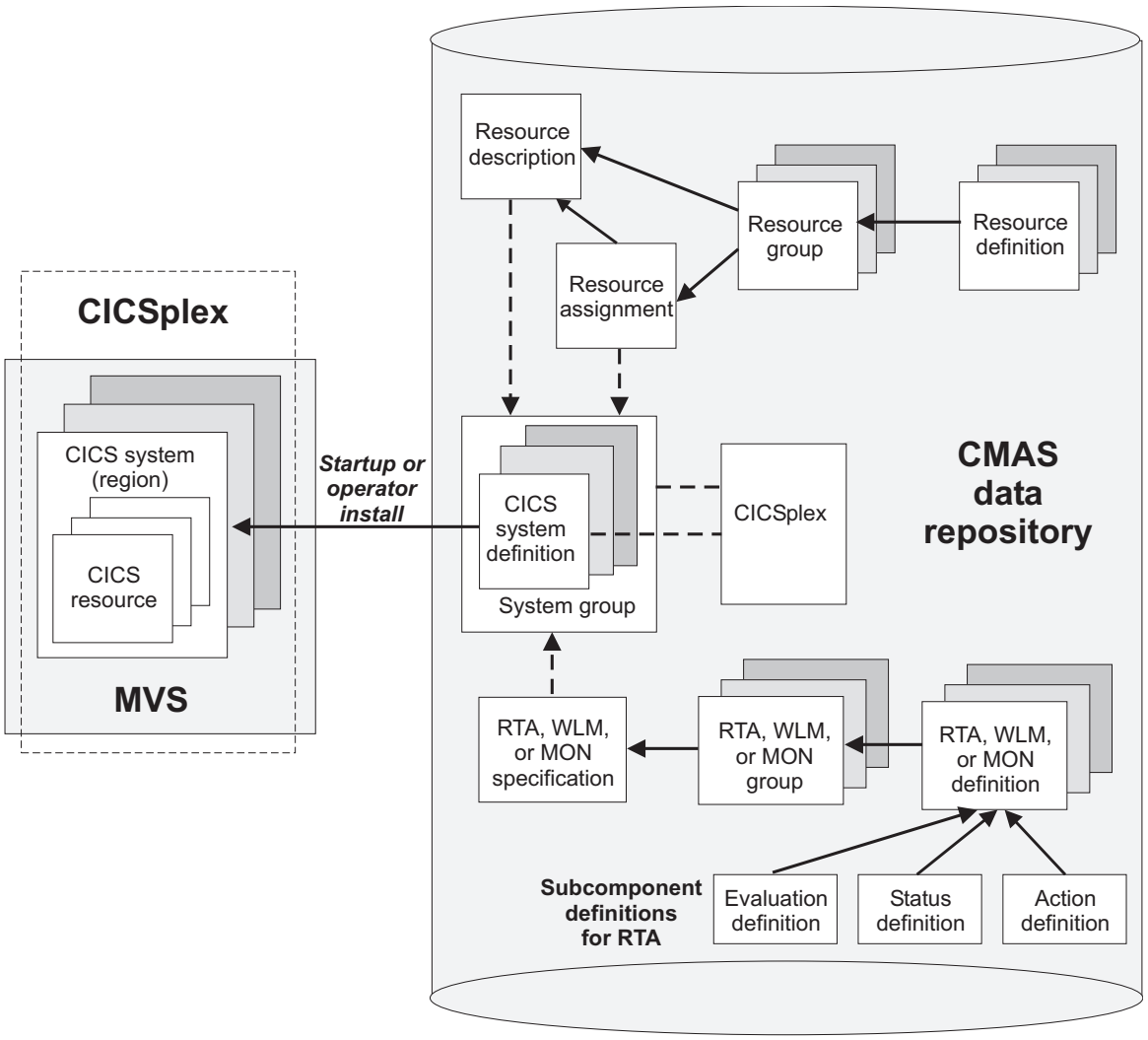


Figure 4. The CICSPlex SM object model

These objects can be split into three categories:

1. *CICSplex and CICS system* objects, used for defining the CICSplexes and CICS systems to be managed by CICSPlex SM. This includes defining the links between CICS systems and creating CICS system groups. These objects are described in Designing your CICSPlex SM environment; information on defining these objects is in Defining the CICSPlex SM configuration and topology.
2. *BAS* objects, used for logical scoping and managing the CICS resource definition and installation processes. You can look on the objects in this category as defining what resources you want your CICS systems to use. These CICSPlex SM objects are described in Multiple versions of a resource definition. Information on defining BAS objects is in Using full-function form BAS.

3. *Operation* objects are those objects used for operating the CICS resources that exist in running CICS systems. You can look on the objects in this category as identifying the resources you want to monitor at run-time, for automated workload management, automated exception reporting, and collection of statistical data. These CICSPlex SM objects are described in Managing monitoring functions, Workload management resources, and Managing RTA.

The data repository

The single-system image of a CICS system or group of CICS systems is provided by the CMAS using the CICSPlex SM and resource definitions held on the *data repository*.

Each CMAS has its own data repository. The data repository is a VSAM KSDS that is created using a CICSPlex SM post-installation job. As with all data sets, you need to take regular backups of each data repository in your environment.

CICSPlex SM definitions and CICS resource definitions held on the data repository can be managed in the following ways:

- Using WUI views; see "The CICSPlex SM Web User Interface" on page 6.
- Using the EYU9XDBT CICSPlex SM definition utility.
- Using the batched repository-update facility (BATCHREP); see "The batched repository-update facility."
- Using the API

You can generate a visual map of the definitions in your data repository. The map can be of business application services, resource monitoring, real-time analysis, or workload monitoring. You select a starting point for the map, which might be for example, a CICS system group or an individual resource, from a WUI detail or tabular view. CICSPlex SM displays the starting point and all the definitions that either refer to that definition or are referred to by it. See How to map CICSPlex SM definitions.

The batched repository-update facility

To help you in the migration of your CICS definitions to CICSPlex SM, you can use the EXTRACT command of the CICS DFHCSDUP utility to read CSD records.

CICSPlex SM provides an exit routine EYU9BCSD that generates, from the DFHCSDUP output, equivalent resource definitions for input to the batched repository-update facility.

The batched repository-update facility is also useful for migrating your definitions from one platform to another. You can use it to retrieve existing resource definitions from the CICSPlex SM data repository then, after making any required changes to the definitions, input the changes to another batched repository-update facility run that creates resource definitions on the new platform.

Chapter 2. Designing your CICSPlex SM environment

Map out your enterprise to design a CICSPlex SM environment that meets your system management requirements. Your design must include topology information, such as identifying the CICSplexes, CMASs, and WUI server regions that are required, as well as making other design decisions such as what naming convention to follow.

Before you begin

To design a CICSPlex SM environment, you must be familiar with the concepts and components of CICSPlex SM

Be aware of some considerations that can help to avoid issues with the set-up or maintenance of CICSPlex SM:

- When you apply service to CICSPlex SM, PTFs that are applied to the ESSS are not intended to be downward-compatible with earlier maintenance levels at the same release. This means that all CMASes, MASes, WUI Server regions and API programs must run at the same maintenance level as the ESSS for their release. Otherwise, abends, data corruption and unexpected results might occur. When you apply PTFs to CICSPlex SM, it is essential that all ++HOLD ACTION items associated with the SMP/E maintenance are followed carefully.
- Additionally, IBM suggests the following when you design a CICSPlex SM topology:
  1. Avoid running Production and non-Production (for example, Test, Development, or QA) regions on the same LPAR. All regions that run the same CICSPlex SM release use one copy of the ESSS: that is, they share the ESS. As a result, applying a PTF to this shared ESSS requires an outage of both the Production and the non-Production regions.
  2. Connect the WUI Server directly to the MP CMAS, so that they are both at the at the highest CICSPlex SM release level. This is to ensure that the WUI Server uses the highest resource tables and WUI views and generally simplifies upgrades. When you run a mixed release environment, it might be necessary to have more than one WUI Server. In that case, the advice here still applies; have one WUI server at the highest release level and connected directly into the MP CMAS, and any other lower release WUI Servers connected into the appropriate release CMAS, if required.
  3. Connect the MP CMAS only to other CMAS and a WUI server. Directly connecting MASes into the MP CMAS prevents the MP CMAS from being easily moved to a different LPAR in the event of an outage.
  4. Use a single Maintenance Point CMAS to prevent complexity during upgrades. For example, this helps avoid a potential conflict of CICSPlex SM release levels which can cause CMASes to be isolated from the management of a CICSplex during an upgrade.

Procedure

1. Decide how to group your CICS regions into system groups to identify what CICSplexes are required. The CICSplex is the largest unit that you can manage in your CICSPlex SM configuration.
2. Decide how many CMASs are required for each CICSplex and how to link them together. The CMAS is the component of the CICSPlex SM topology that

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is responsible for most of the work involved in managing and reporting on CICS regions and their resources. Each CICSplex must have at least one CMAS.

3. Decide how many WUI servers are required and how to link them to the correct CMAS.
4. Decide on a naming convention for the CICSPlex SM components. The naming convention must be meaningful and extendable.
5. Decide on an implementation strategy.

Results

Following these steps results in a detailed topology map of your enterprise.

What to do next

When you have completed your map of the enterprise, you are ready to plan the installation of CICSPlex SM to create your proposed configuration. Make sure that you keep your map up-to-date as you add more system groups or regions or make changes to the topology, because an accurate map makes it easier to maintain the CICSPlex SM configuration and topology data.

Designing your CICSplexes

The CICSplex is the largest unit that you can manipulate in your CICSPlex SM configuration. A CICSplex is made up of an association of CICS systems and CICS system groups. This section gives guidance on deciding how to group your CICS systems into system groups, and then to identify CICSplexes.

Identifying your CICS systems and regions

The very first thing you must do when planning to install CICSPlex SM is to identify the CICS systems or regions in your enterprise. You may already have a clear picture of the systems you have, and of where they are installed. However, in the larger enterprises, where CICS systems are numbered in the hundreds, it's possible that no one individual has this complete view.

Whatever the case, the aim of this exercise is to *document* the current arrangement of your CICS systems in a graphical form. The “map” you produce should be a logical representation of your CICS systems rather than a physical one, so don't worry unduly about recording where particular processors are located, for example. Whether you sketch the map on paper or use an on-line graphics tool, be sure to leave plenty of space so that you can update the map with CICSPlex SM components as you work through this exercise.

Figure 5 on page 13 shows an example of the type of map you should be aiming to produce.

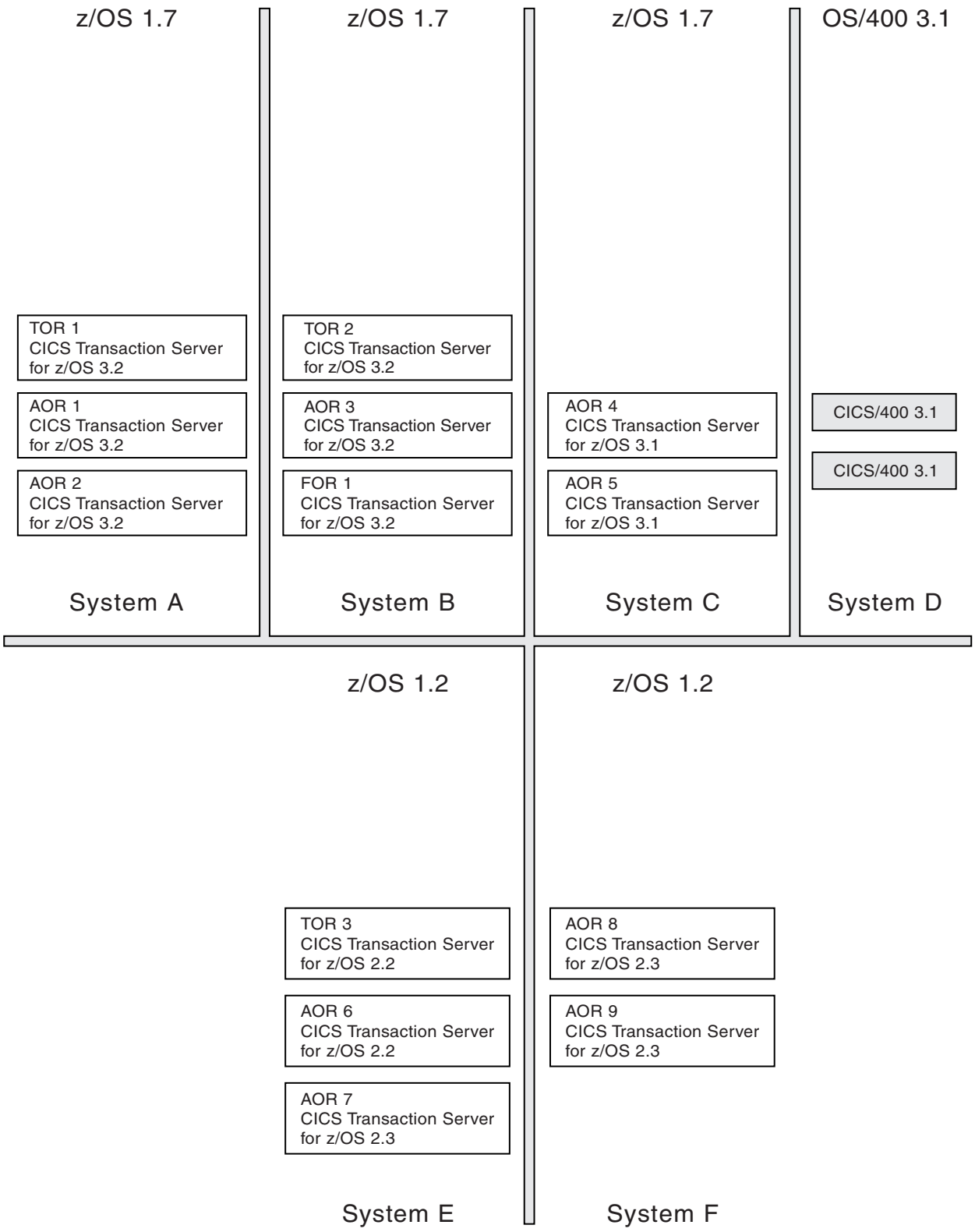


Figure 5. A map of the enterprise CICS systems. This enterprise has 15 CICS systems distributed among OS/390, z/OS, and OS/400, environments.

Your initial map of the enterprise CICS systems should include every operating environment in which CICS is installed. It should also show:

- The current version and release of the operating systems being used
- The CICS systems running in each environment, and the CICS platform, version, and release of each one
- The resource-manager role of each CICS system, if applicable

(If you can't get all of this detail on your map, record it separately from the graphical representation of the CICS systems.)

Which CICS systems can be managed by CICSPlex SM?

Refine the map of CICS systems and regions by identifying which systems or regions can and cannot be managed by CICSPlex SM.

Any CICS systems that are not directly-connectable to CICS Transaction Server for z/OS, Version 5 Release 1 and later will need special consideration when you are locating CMASs (see "Locating CMASs" on page 19).

In the example map shown in Figure 5 on page 13, only the CICS systems running under OS/400® cannot be managed by CICSPlex SM. On your own map, choose a convention, such as shading or use of color, for marking CICS systems that cannot be managed by CICSPlex SM. However, don't remove them from the map altogether. If you decide to move those systems to a CICS platform or release that CICSPlex SM can manage, they can be reinstated easily in the enterprise map.

All the other CICS systems become your MASs.

How many CICSplexes are there in your enterprise?

When you have identified those CICS systems or regions in your enterprise that can be managed by CICSPlex SM, your next task is to decide how many CICSplexes you want to define to CICSPlex SM, and which of your CICS systems is to belong to each CICSplex.

You can have any number of CICSplexes. For example, you could define one CICSplex for:

- The entire enterprise
- Each geographical location
- Each business unit within the enterprise, or
- Each existing TOR-AOR-FOR configuration, or
- Each processor

If you do not plan to use workload management facilities, there are no restrictions on how you combine CICS systems and CICS system groups to form a CICSplex. For example, you might associate CICS systems by:

- Geographic area within the CICSplex
- Function, such as all CICS systems that are application-owning regions (AORs), file-owning regions (FORs), or terminal-owning regions (TORs)
- Application, such as the CICS systems serving as AORs, FORs, and TORs that are used by a specific application or group of applications
- Time period, such as all CICS systems that are normally active during specific hours of the day or night

If you do plan to use workload management facilities, you must ensure that:

- Each CICS system that is to act as a target for specific workload processing must be in the same CICSplex as the CICS systems acting as routing regions. (The routing regions and target regions associated with a CICSplex can be in the same or different MVS images.)
- CICS systems acting as the routing regions must be CICS TS systems.

If you plan to use the logical scoping, resource management, or installation functions of BAS, keep a business application within one CICSplex.

If you plan to use CICS BTS, you should keep a BTS-set with one CICSplex.

The question is, how do you decide what to do? There are no hard-and-fast rules governing the number of CICSplexes you define, but there are some guidelines that will help you select the most suitable configuration for your enterprise. These guidelines are presented in the form of a three-step process:

1. Decide to have a single CICSplex for the entire enterprise.
2. Look for reasons why a single CICSplex might not be feasible.
3. Confirm your decision.

Step 1: Have a single CICSplex for the entire enterprise

The majority of enterprises find that having a single CICSplex best suits their system management goals.

The CICSplex is the largest single entity that CICSPlex SM can manage. None of the CICSPlex SM definitions or specifications can cross a CICSplex boundary. Furthermore, CICSplexes are mutually exclusive. No CICS system can belong to more than one CICSplex. Therefore, having a single CICSplex for the enterprise brings several advantages. For example:

- Providing the greatest opportunity for sharing and reusing BAS, WLM, RTA, and monitoring specifications and definitions.
- Giving you the most flexibility in managing the CICS workload when using the CICSPlex SM workload routing functions.
- Giving a single system image (SSI) of the entire enterprise. Also, the CICS operator is able to have a complete view of the enterprise CICS resources from a single CICSPlex SM window. (Because any CICSPlex SM window can display data from only a single context—that is, a single CICSplex—multiple windows would have to be displayed in a multi-CICSplex environment.)

In summary, having one CICSplex means that there are no system management barriers between one group of the enterprise CICS systems and another.

Step 2: Look for reasons why a single CICSplex might not be feasible

The single CICSplex solution is not the best approach in every enterprise, either because implementation is not possible, or because it does not accord with other system management goals.

Firstly, you must ask whether the organization of your enterprise lends itself to a single CICSplex. For example, if you have processors in different geographical locations, are there connections between those processors, or are they managed as separate entities, each with its own workload? If you have these separate units in your enterprise, it is likely that you will need to define multiple CICSplexes, and so manage the enterprise CICS systems as if they belonged to more than one enterprise.

Similarly, is your enterprise organized and run as multiple, separate business units? For example, if you are running a bureau that provides computing services to a variety of customers, the absolute separation of one set of regions from another, even in a single processor, might simplify other processes, such as security management, customer billing, or workload management. If you have similar reasons for wanting to keep the management of some regions entirely separate from the management of others, consider defining multiple CICSplexes instead of one.

If you have decided that you need to define more than one CICSplex, it is probably obvious to you already which CICS system or CICS systems should belong to each. If it is not, consider revisiting your decision to have multiple CICSplexes because it suggests that you are trying to erect artificial barriers. As a final check, ensure that the way you separate the regions is not disruptive to your other system management goals. For example, if you want to use CICSPlex SM WLM functions, both routing regions and the target regions to which they route transactions must belong to the same CICSplex, unless you are planning to customize the supplied dynamic routing program.

Step 3: Confirm your decision

When you have decided whether to have one CICSplex or many, check your decision against these other considerations:

- Does your CICSplex organization mirror your enterprise organization? If your enterprise is structured as multiple, independent units, having multiple CICSplexes is probably the better approach. If it is structured as a single entity, the single-CICSplex solution is likely to be the more suitable.
- Does your decision conflict with your enterprise's plans, either for its business or its information systems? For example, if your enterprise currently operates as multiple, separate entities, are there plans to unify them?
- Is your proposed configuration as simple as it could be? For example, are you planning to define four CICSplexes when two would support your system management goals?
- If you are planning multiple CICSplexes, have you considered whether CICS system groups could be used to achieve your goals? CICS system groups, unlike CICSplexes, are not mutually exclusive. This can be an advantage or a disadvantage, depending on your reasons for having multiple CICSplexes.

Remember that you can alter your decision. Ideally, you will discover the best possible configuration at your first attempt. However, if you decide after a while that a different CICSplex configuration would be better, you can make the necessary changes.

Identifying system groups

You can identify one or more subsets of the CICS systems within a CICSplex as a CICS system group, which can be manipulated as a single entity and independently of the rest of CICSplex.

For example, if you define a CICSplex made up of TOR, AOR, and FOR CICS systems, you might want to define the AORs as a CICS system group, so that you can use a single CICSPlex SM command to make changes to, or request data from, all CICS systems in that category.

This section gives some suggested CICS system groups for the example configuration:

CICSplex 1

- Group 1: TOR 1 and TOR 2
- Group 2: AOR 1 through AOR 5
- Group 3: FOR 1
- Group 4: All CICS systems on System A
- Group 5: All CICS systems on System B
- Group 6: All CICS systems on System C
- Group 7: Group 4 and Group 5
- Group 8: All CICS systems in CICSplex 1

CICSplex 2

- Group 1: TOR 3
- Group 2: AOR 6 through AOR 9
- Group 4: All CICS systems on System E
- Group 5: All CICS systems on System G
- Group 6: Group 4 and Group 5
- Group 7: All CICS systems in CICSplex 2

Notice that Group 7 in CICSplex 1 and Group 6 in CICSplex 2 comprise of other groups. Defining groups within groups is very efficient, both for you (because it means less effort) and for CICSPlex SM.

Group 8 in CICSplex 1 and Group 7 in CICSplex 2 include the same set of CICS systems as the CICSplex to which it belongs. These are often useful groups to define because the scope value (as specified for a monitor specification, for example) can be a CICS system or a CICS system group name only: it cannot be the name of a CICSplex.

This is merely an initial list of system groups. It is likely to be added to (or altered) when BAS, WLM, RTA, and monitoring requirements are identified.

You can identify one or more subsets of the CICS systems within a CICSplex as a CICS system group, which can be manipulated as a single entity and independently of the rest of CICSplex. For example, if you define a CICSplex made up of TOR, AOR, and FOR CICS systems, you might want to define the AORs as a CICS system group, so that you can use a single CICSPlex SM command to make changes to, or request data from, all CICS systems in that category.

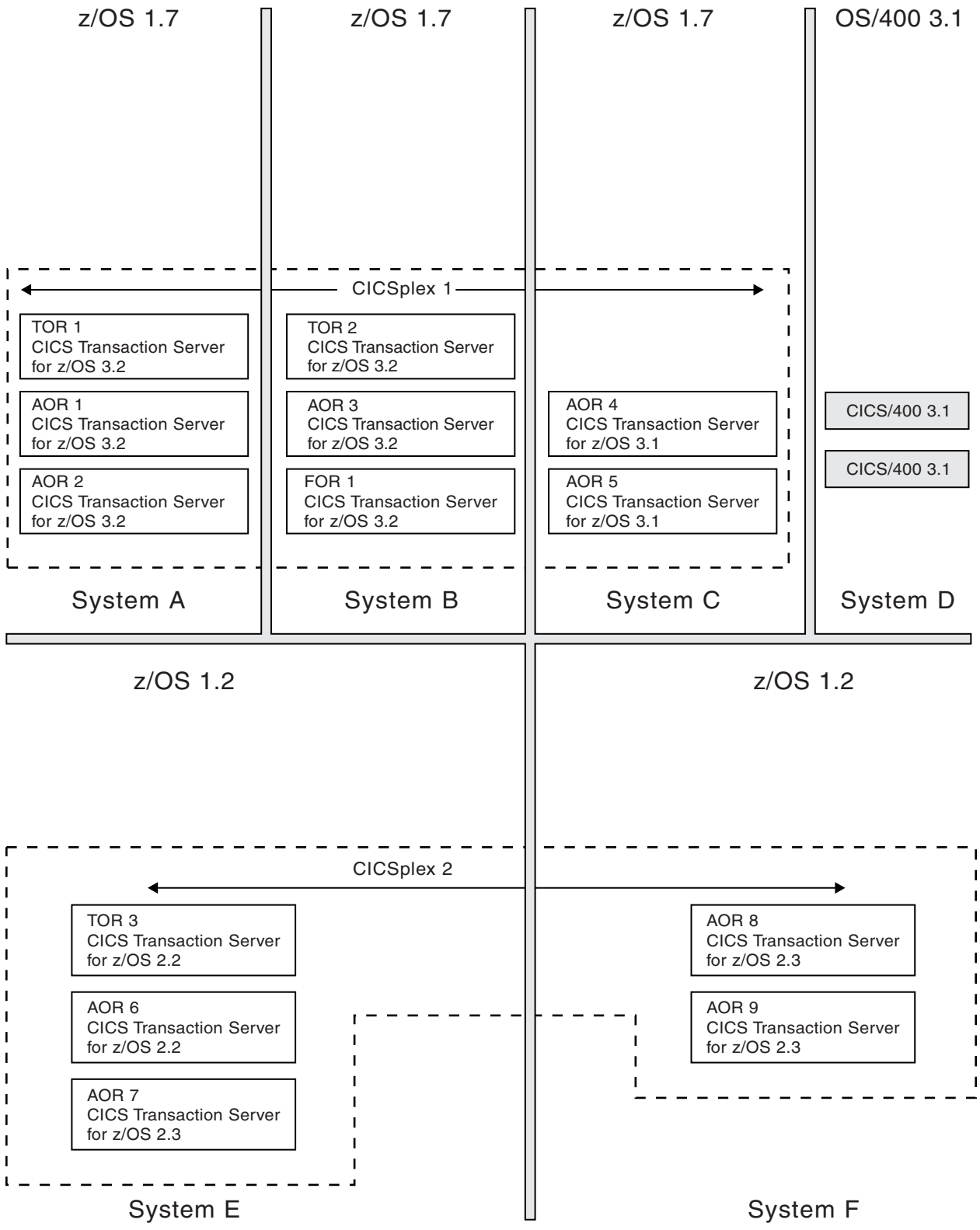


Figure 6. Identifying the CICSplexes. The example enterprise operates as two discrete units: the first three MVS images process a different workload from the remaining two, and there is no sharing of resources between those two groups. Accordingly, the enterprise CICS systems are to be divided between two CICSplexes. CICS systems that cannot be managed by CICSPlex SM (the CICS/400 systems, in the example) have been shaded.

Alternatively, you could define a single group for any of the following:

- Particularly heavily loaded CICS systems
- CICS systems that have different security requirements from the other CICS systems in the CICSplex
- CICS systems in which particular applications run

CICS system groups, unlike CICSplexes, do not have to be mutually exclusive: a CICS system can belong to any number of groups within a CICSplex. However, because the CICS system group is a subset of the CICSplex, a system group cannot cross CICSplex boundaries.

Groups within groups

You can create CICS system groups from other groups.

For example, if you want a single group to contain all AORs and all TORs in CICSplex, you can define its members as:

- The CICS system group comprising all AORs
- The CICS system group comprising all TORs

Any duplication of CICS system names that occurs in this way (for example, if a particular CICS system belongs to more than one constituent group) is accommodated by CICSPlex SM. When a CICS system group is the target of a CICSPlex SM command, CICS systems appearing in the group more than once are acted on once only.

Locating CMASs

The CMAS is the component of the CICSPlex SM topology that is responsible for most of the work involved in managing and reporting on systems and their resources.

It is the CMAS that is responsible for presenting the SSI to the operator. Each CICSplex is managed by at least one CMAS. This section gives you guidance on deciding where to put CMASs and how many to have.

Where to install CMASs

After you decide which CICS systems are to be managed by CICSPlex SM, and how they are to be organized into CICSplexes, you should think about where CMASs are required.

The rules and recommendations governing where a CMAS can, and must, be installed are as follows:

- Each CICSplex must be managed by at least one CMAS.
- Each CICSplex must have a maintenance point CMAS.
- A CMAS can participate in the management of multiple CICSplexes.
- The SDFH* libraries and the SEYU* libraries in the CMAS must be the same level, and the CMAS must be appropriate to the level of CICSPlex SM that you are running. See, Upgrading CICSPlex SM
- See, the appropriate Upgrading information set in the CICS information center.
- If you want CICSPlex SM to issue SNA generic alerts to a NetView instance, a CMAS must be installed on the same MVS image as the NetView instance.
- Install one CMAS on each MVS image on which managed CICS systems are running.

- You can have more than one production CMAS in an MVS image, but it is unlikely to be necessary.

You should also consider the performance implications of your decision. Each CMAS has its space requirements and its own data repository.

If we apply these rules and recommendations to the example enterprise, you can see that:

- You must have at least one CMAS in the enterprise.
- NetView is installed on System C; to send SNA alerts to that NetView instance, you must install a CMAS on the same MVS image.

Figure 7 on page 21 shows the example map updated again, this time to show the application of these CMAS rules and recommendations.

CMAS-to-CMAS links

When a CICSplex crosses multiple MVS images, multiple CMASs are likely to be involved in managing that CICSplex. The CMASs must be connected to each other (using CICS intercommunication methods) so that data relating to the CICS systems belonging to the CICSplex is accessible by all relevant CMASs, and an SSI can be presented to the CICS operator.

The minimum requirement is that CMASs managing the same CICSplexes be linked to form an open chain of CMASs, so that each CMAS is linked, if only indirectly, to every other CMAS. Meeting this requirement ensures that there is at least one path from each CMAS to every other CMAS involved in managing the same CICSplex. To achieve the best performance and availability, link every CMAS directly to every other CMAS.

Figure 8 on page 22 illustrates the concept of direct and indirect CMAS-to-CMAS links.

The links between multiple CMASs involved in managing the same CICSplex are responsible for the SSI of the CICS systems or systems that belong to that CICSplex. However, you do have a degree of choice regarding the *number* of links you define. First, here's a reminder of the rules and recommendations concerning CMAS-to-CMAS links:

- To establish an SSI of a CICSplex, the CMASs managing that CICSplex should at the very least be linked to form an open chain.

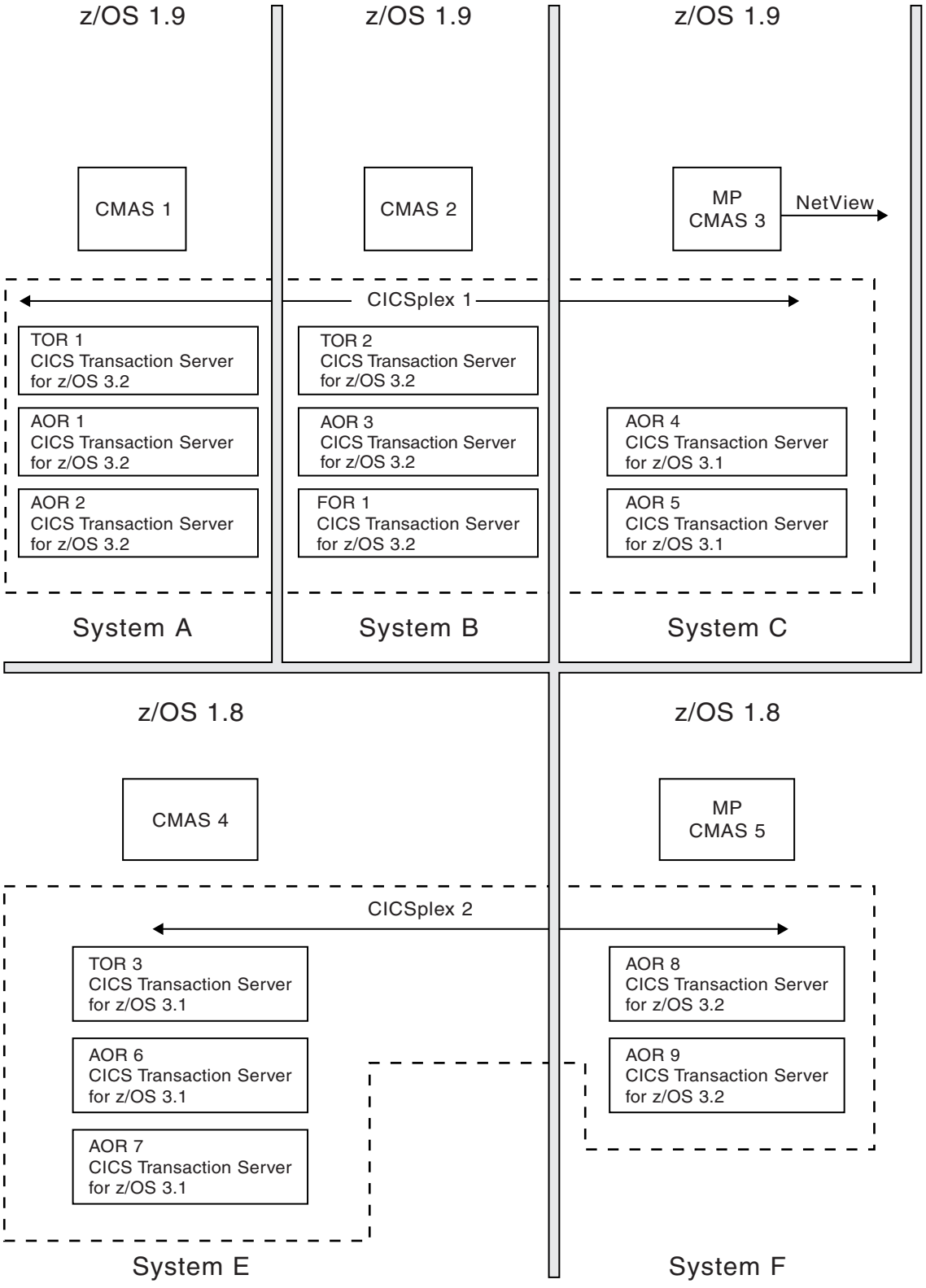


Figure 7. Adding CMASs to the enterprise map. A CMAS has been installed on each MVS image. CMAS 3 can issue SNA generic alerts to the NetView instance on the same MVS image. CMAS 3 is the maintenance point CMAS for CICSplex 1, and CMAS 5 is the maintenance point CMAS for CICSplex 2. (That is, CMAS 3 will be the context CMAS when you define CICSplex 1, and CMAS 5 will be the context CMAS when you define CICSplex 2 to CICSPlex SM.)

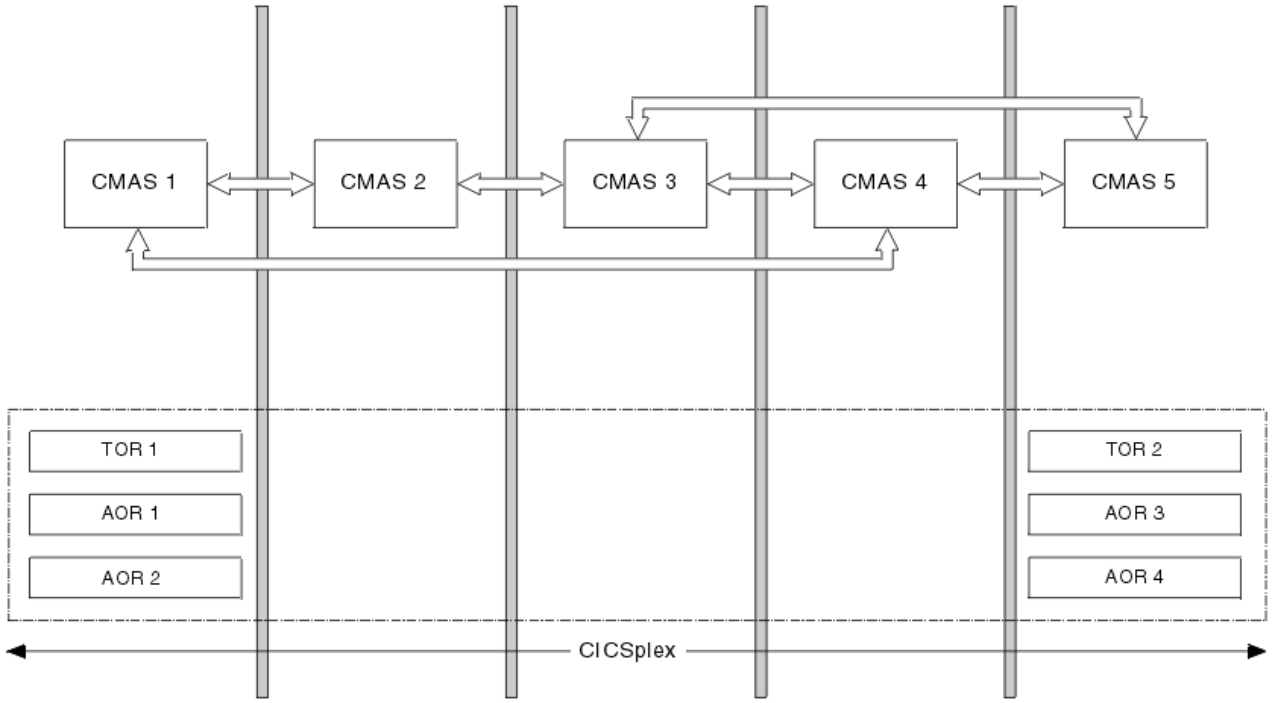


Figure 8. CMAS-to-CMAS links. This CICSplex is made up of six CICS systems, three managed by CMAS1 and three managed by CMAS5. In the absence of a direct link between the two CMASs, CICSPlex SM is able to navigate dynamically around its "network" to gather information relevant to the CICSplex. It could go via CMAS4 or, if CMAS4 is unavailable, for example, it could go via CMAS2 and CMAS3. For optimum performance, however, a direct link should be added between CMAS1 and CMAS5.

- The more links you establish, the better the performance. The best performance is achieved when every CMAS is directly connected to every other CMAS involved in the management of a single CICSplex.
- A multiplicity of CMAS-to-CMAS links is also better for availability: if CMAS 1 is at the end of the chain and is connected to CMAS 2 only, the failure of CMAS 2 breaks the chain and leaves no connection to CMAS 1.

In the example configuration, full CMAS-to-CMAS connectivity is established for each of the two CICSplexes. That is, for management of CICSplex 1, CMASs 1, 2, and 3 are directly connected to each other; for management of CICSplex 2, CMASs 4 and 5 are directly connected to each other. Thus, eight CMAS-to-CMAS links must be defined:

CICSplex 1	**CICSplex 2**
CMAS1 to CMAS2	CMAS4 to CMAS5
CMAS1 to CMAS3	CMAS5 to CMAS4
CMAS2 to CMAS1	
CMAS2 to CMAS3	
CMAS3 to CMAS2	
CMAS3 to CMAS1	

You could have decided not to link CMAS 1 to CMAS 3 directly. This arrangement would have met the minimum CMAS-to-CMAS link requirement (by leaving us with an open chain of CMASs) and would have reduced the number of links to be defined by two. Had you done so, information requested from System C about CICS resources on System A, for example, would be obtained indirectly (via the

adjacent CMAS, CMAS 2) rather than directly. Wherever full connectivity is not established among a group of CMASs, CICSPlex SM works out the quickest route to the requested data dynamically.

The performance impact is slightly higher when information is obtained indirectly, but this needs to be set against the overhead of setting up and maintaining the CMAS-to-CMAS links. In fact, even if you had defined one CICSplex rather than two in your example, full connectivity among the CMASs would have been feasible. (That is, you would have needed 20 CMAS-to-CMAS links, because the number of links required is $n^2 - n$, where n is the number of CMASs to be connected.) However, if you had ten CMASs managing a single CICSplex, the number of links required would jump to 90; if you had 15 CMASs, the number would be 210. In summary, you have to decide how many direct links you are prepared to define, and where indirect links can be accommodated, always remembering that the minimum requirement is for an open chain of CMAS-to-CMAS links.

Figure 9 on page 24 shows the CMAS-to-CMAS links in the example configuration.

When there are multiple CMASs on the same MVS system, managing the same CICSplex, a local MAS that specifies only the CICSPLEX(name) CICSPlex SM system parameter, and not the CMASSYSID(name) CICSPlex SM system parameter, will connect to the last CMAS to initialize on the MVS image that manages the named CICSplex for a specific release of CICSPlex SM.

CMAS-to-CMAS links for multiple CICSplexes

In our example, there are two CICSplexes. So that the CICSPlex SM operator can access CICSplex 2 data from System B, for example, you could establish a link between any one (or more) of the CMASs involved in managing CICSplex 1 and any one (or more) of the CMASs involved in managing CICSplex 2. For example, you could establish a link from CMAS 1 to CMAS 5, thereby forming a chain of all of the enterprise CMASs.

Locating the maintenance point CMAS

When a single CICSplex is managed by multiple CMASs, one of them is designated the *maintenance point* CMAS. The maintenance point CMAS is responsible for maintaining all CICSPlex SM definitions relating to a CICSplex, and for distributing up-to-date information to the other CMASs involved in managing the same CICSplex, so that no data repository is out of step with any other.

The maintenance point CMAS is the CMAS that is the *context* value when the CICSplex is defined to CICSPlex SM. Each CICSplex can have only one maintenance point CMAS, but a single CMAS can be the maintenance point for more than one CICSplex. If the maintenance point CMAS is unavailable at any time, no changes to any CICSPlex SM definitions can be made.

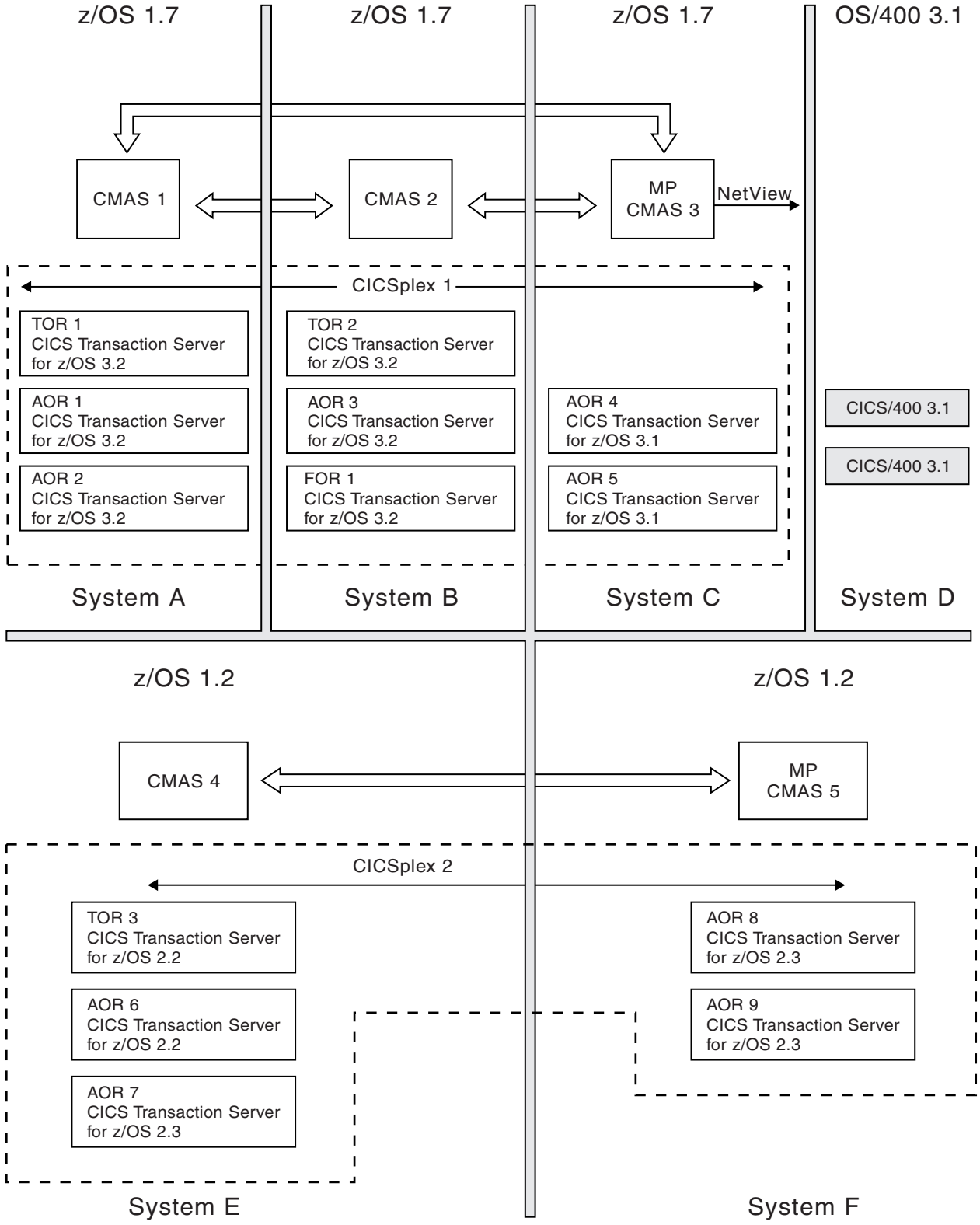


Figure 9. Adding CMAS-to-CMAS links to the example map. Eight links have been defined, giving full connectivity among CMASs managing the same CICSplexes.

A maintenance point CMAS can also function as a normal (not maintenance point) CMAS for other CICSplexes.

Note: The CICSPlex SM single point of control means that changes to the maintenance point CMAS can be made from any system on which the CICSPlex SM WUI is available.

Planning the location of WUI servers

The location and number of WUI server regions in your enterprise depend on your availability requirements and globalization support.

Before you begin

You must have planned where to install the CMASs and how to link them together before planning where to install the WUI server regions.

About this task

The WUI server is a CICS region that acts as a CICSPlex SM application, using the API to view and manage objects in the data repositories of CMASs.

Procedure

1. Decide if you want a WUI server to be available in every MVS image. If you have a WUI on each MVS image, you do not have to connect the WUI servers directly to the CMAS on each MVS image.

   Tip: If you define a separate CICSplex for the WUI servers, the number of CMAS maintenance points across your enterprise are kept to a minimum. It also separates the WUI servers from statistics generated from CICSplexes that are running CICS applications.
2. Decide what national languages the WUI must support. If you want to display the WUI in more than one language, you require a WUI server for each language.
3. Decide what connections are required from each WUI server region to the CMASs.
   - The CMAS to which the WUI server connects must be managing all the CICSplexes to which the WUI server requires access. However, it is not necessary for the CMAS to which the WUI connects to be managing any of the MASs in these CICSplexes.
   - The CMAS and the WUI server that you want to connect must be at the same release level of CICS Transaction Server.
4. Update your topology map to include the WUI server regions.

Example

On system F, a WUI server is connected to the maintenance point, CMAS 5, and is in a separate CICSplex called CICSplex 4. The WUI server and CMAS 5 are both at the same level of CICS Transaction Server. CMAS 5 is the maintenance point for both CICSplex 2 and CICSplex 4.

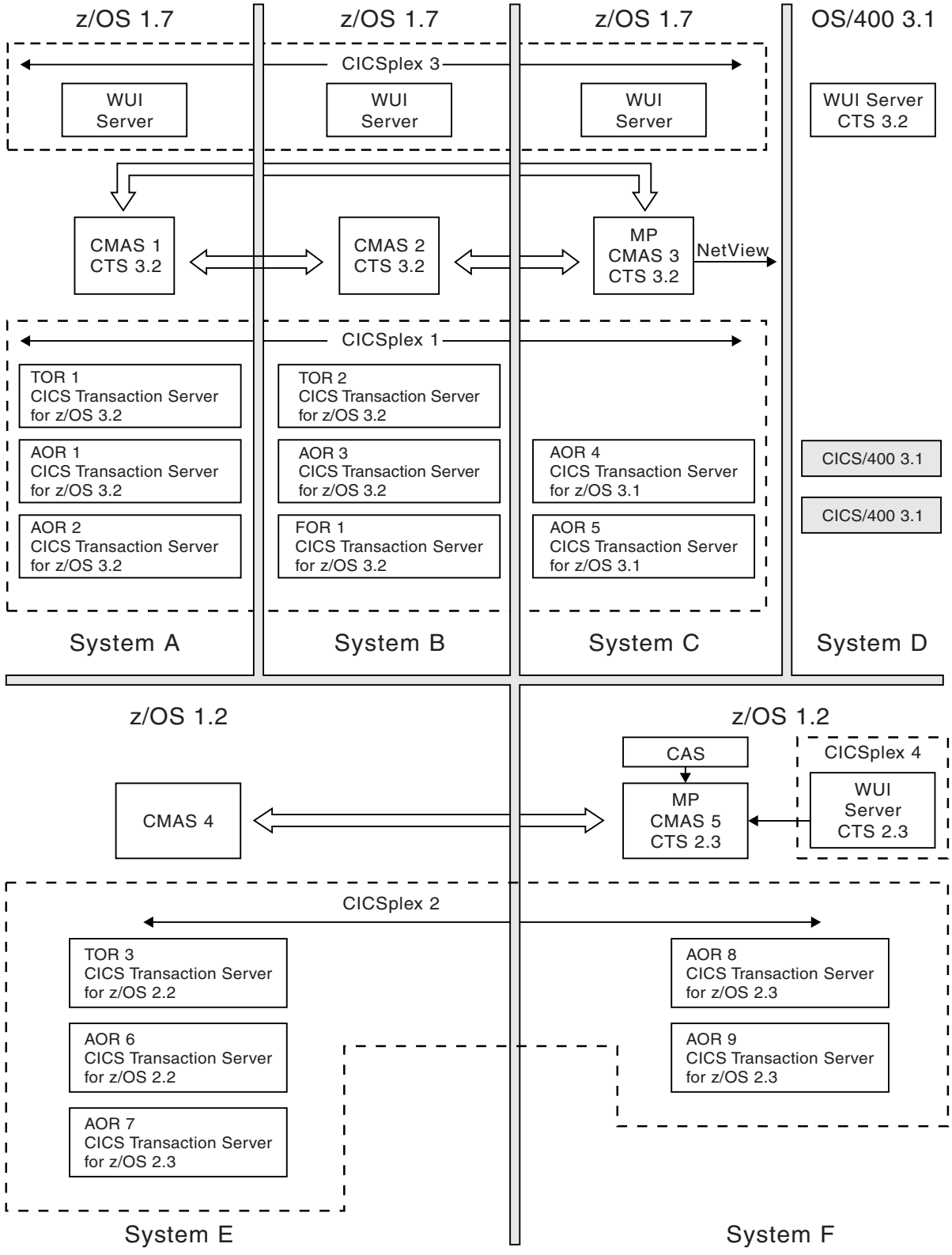


Figure 10. Adding WUI servers to the example map

Naming your CICSPlex SM entities

All the entities that you have defined, and entered on to your CICSPlex SM map, have to be named. You must devise a convention for naming those entities that is both meaningful and extendable.

A staged implementation

If you have a very large number of CICS systems, or if you have decided to create multiple CICSplexes, you might want to consider implementing CICSPlex SM in stages.

You can install CICSPlex SM on a subset of your systems and use it to manage a single CICSplex or, if you have defined a single CICSplex for the enterprise, you can use it to manage particular system groups. Additional CICS systems can be added to the configuration gradually.

If you opt for the gradual approach, you will need to revisit your final map of the enterprise CICS systems and identify those you plan to start with. For example, if a staged implementation were adopted for your example map, you could decide to begin by implementing CICSplex 2 only. The CMAS-to-CMAS links would be much reduced in number (two CMAS-to-CMAS links, rather than 12), but the other decisions made about CICSplex 2 are still valid. That is, the same CICS system groups can be defined, and the CMAS installations are still required.

Chapter 3. Planning CICSPlex SM setup

CICSPlex SM is installed as part of the product. To set up CICSPlex SM you must decide on a naming convention, plan the security that is required, and which time zones to use in the CICSplex.

To implement CICSPlex SM in your existing environment, you can use the samples that are supplied with CICS to get started.

CICSPlex SM naming conventions

For its configuration and for its operation, CICSPlex SM requires a variety of entities to be defined.

You must devise a convention for naming those entities that is both meaningful and extendable. The rules governing the naming of CICSPlex SM elements are as follows:

- Each element name can be up to 8 characters.
- The element name must begin with an alphabetic (or national) character, and must have no embedded blanks. Subsequent characters can be alphabetic or numeric.
- Names of CICSplexes and of CMASs must be unique within the enterprise.
- Names of CICS systems and CICS system groups must be unique within the CICSplex.
- All other names must be unique for their type within the CICSplex.

The entity types, for each instance of which a name is required, are:

- CICSPlex SM components and CICSplex entities
  - CMAS, CICSplex, MAS (CICS system or WUI server), CICS system group, and time-period definition.
- BAS entities
  - Resource assignments, resource descriptions, resource definitions, and resource groups.

    Application resource definitions are:

    - DB2® transactions, files, map sets, partition sets, programs, transient data queues, transactions, CICS BTS process types, document templates, FEPI nodes, FEPI pools, FEPI property sets, FEPI targets, file and key file segment definitions, LIBRARY definitions, map sets, sysplex enqueue models, TCP/IP services, temporary storage models

    Region resource definitions are:

    - DB2 entries, enterprise beans, journals, journal models, local shared resource (LSR) pools, profiles, temporary storage queue models, transaction classes, terminals, typeterms

    System–system connectivity resource definitions are:

    - Connections, DB2 connections, IPIC connections, partners, sessions
- Monitor entities
  - Monitor definition, monitor group, and monitor specification
- Analysis entities

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  - Analysis definition, analysis group, analysis point specification, analysis specification, action definition, evaluation definition, and status definition
- Workload management entities
  - Transaction group, workload definition, workload group, and workload specification.

Ensure that any convention you select can accommodate all of these entity types.

Generic names

CICSPlex SM supports the use of generic names in many of its commands. For example, you can specify that all transactions whose names begin with the letters "DNW" are to be monitored once every 300 seconds. You do not have to name each transaction individually

.

The rules governing use of generic names are as follows:

- The asterisk character (*) can be used in place of one or more characters. It can appear once only in any name, and must appear at the end of any partial string. For example, the string "DNW*" means all names beginning with the letters DNW.
- The plus sign (+) can replace any single character and can occur in any position in the name. For example, "DNW+++L" means any name of 7 characters starting with the letters DNW and ending with the letter L.

Security planning

CICSPlex SM uses a SAF-compliant external security manager, such as RACF® to prevent unauthorized access to CICSPlex SM functions and CICS resources, and to control the simulation of CICS command checking and CICS resource checking

In both cases, security checking is handled by the CMASs managing the CICS systems that are the target of any request to access a resource. For example, if a CICSplex is managed by two CMASs, and a request is made to access a resource in all CICS systems belonging to that CICSplex, the security check is performed in both CMASs.

To activate security checking, you must modify the JCL used to start the CMAS or its managed CICS systems. If security checking is switched off for the CICS system, no checking occurs, regardless of the CMAS setting. However, if security checking is switched off for the CMAS but switched on for the CICS system, the CICS system is not able to connect to the CMAS.

You should begin by deciding how much security checking you need. In particular, identify those users who need access to CICSPlex SM, and ensure that an individual user has the same user ID across all systems on which a CMAS is installed. The user ID against which the security check is performed is the RACF ID that has been used to sign on to CICSPlex SM. Consider also the type of security checking you want to implement.

See Implementing CICSPlex SM security for more information about how to set up CICSPlex SM security.

Protecting access to CICSPlex SM functions and CICS resources

To prevent unauthorized access, you create security profiles for combinations of CICSPlex SM functions, and CICS resources that are to be protected.

In most cases, the security provided by CICSPlex SM security profiles is adequate.

An external security manager is also used to protect CICSPlex SM libraries, procedures and Web User Interface resources. Full details of how to protect CICSPlex SM libraries and procedures are provided in Implementing CICSPlex SM security. In order to protect Web User Interface views, menus, help information and the View Editor, you need to create an appropriate profile in the FACILITY class. See Controlling access to Web User Interface resources for more information.

Special considerations for BAS

You should be aware of the need to take special care in the protection of the BAS views, so that unauthorized users cannot create and administer resources. The equivalent in RDO terms is leaving your CSD unprotected.

You should also take care if you are using the EXEC CICS CREATE command to build new resources. Any definition created with the CICSplex as the context is automatically distributed to all CMASs in the CICSplex. Therefore, giving a user authority to create BAS objects is equivalent to giving authority to install resources on any CICS system in the CICSplex. When the CICS system starts, there is no check on who installed the resource in the system.

CICS command and resource checking

CICS command and resource checking is simulated by CICSPlex SM in the CMASs to which a request is directed.

This allows you to protect CICS systems that do not support your external security manager. It also allows for a level of consolidation of your security checking. Determine where CICS resource and command checking is in effect, and decide whether it needs to be retained along with other CICSPlex SM security checking.

Defining time zones

Much of the activity of CICSPlex SM is time dependent.

For example, you can specify that a monitor definition or an analysis definition is to be active during a particular time period. CICSPlex SM does not require every MAS in a single CICSplex to be running in the same time zone, and so must be able to accommodate any time-zone differences between entities. Therefore:

- Whenever you create a time-period definition (using the CICSPlex SM **Time period definitions** view), you must specify a time zone in the definition.For example, you could create a time-period definition called “MORNING” for the hours 0800 through 1159 *Eastern standard time*.
- You must specify a time zone for each CMAS in its data-repository initialization job, EYU9XDUT. A permanent change to the CMAS time-zone value can be made, even while the CMAS is running, via the CICSPlex SM Web User Interface.
- A time zone must be established for each managed CICS system. When you define a CICS system to CICSPlex SM, you can specify the time zone in which

the system is running. Alternatively, if you don't specify a time zone in the CICS system definition, the CICS system is assumed to be running in the time zone that is the default for the CMAS to which it connects. You are recommended to allow the time zone of a managed CICS system to default to that of its CMAS. The time zone of a managed CICS system can be altered subsequently while the CICS system is running. Any change made in this way lasts for the lifetime of the CICS system, or until it is next changed, whichever is sooner.

- A time zone must be specified for every CICSplex when it is first defined. This time zone is used by the CICSPlex SM monitor function to determine the actual time at which the monitor interval for the CICSplex expires. The CICSplex time zone can be altered via the CICSPlex SM end-user interface.

Time zones are specified using single-character codes in the range B through Z. For example, code "S" represents Mountain Standard Time, code "T" represents Central Standard Time, and code "C" represents Eastern Europe time. A complete list of the codes can be found in *CICSPlex SM Administration*. CICSPlex SM allows offsets (known as "time zone adjustments") in the range 0 through 59 minutes to be specified to accommodate regions that are not running in the standard time zones. Also, daylight saving time can be specified.

Because multiple CICSPlex SM entities require a time zone to be specified, there is obvious potential for "conflicting" time-zones to be specified. For example, it is quite possible that a CMAS and a MAS in the same CICSplex could be in different time zones. CICSPlex SM always honors the time zone of the MAS. For example, if:

- The time-period definition time zone is S

and

- The CMAS time zone is B

and

- The MAS time zone is C

time zone C is used by the MAS, and the CMAS makes any necessary adjustments between time zones B, C, and S to ensure that the time zone is honored.

Reuse of CICSPlex SM object definitions

CICS does not provide identical support for resources and functions across all of its platforms or releases.

For example, a resource, such as FEPI, that is supported in the CICS TS environment might not be supported on other platforms. Similarly, the amount or type of data available for a resource can vary among CICS platforms and releases. These variations in support pose a special challenge to CICSPlex SM, which offers a SSI of multiple and varied CICS systems.

Here are some examples that illustrate how CICSPlex SM handles variations in support for resources and functions throughout a CICSplex that includes CICS TS.systems.

- **Example 1: monitoring of transient data queues**

  You create a monitor definition for transient data queues, add it to a monitor group, and associate the monitor group with a monitor specification. The scope of the monitor specification is every CICS system in the CICSplex. As each CICS system starts, CICSPlex SM determines whether it can install the monitor definition in that system. If not, CICSPlex SM issues a message to inform you

that the monitor definition could not be installed. Both the monitor function and transient data queue resources are supported underCICS TS, so CICSPlex SM installs the monitor definition in those environments and monitoring begins.

- **Example 2: RTA of monitored programs**

  You create an evaluation definition and name MPROGRAM (monitored programs) as the resource to be evaluated by theCICSPlex SM RTA function. The evaluation definition is named in an analysis definition, which is linked, via an analysis group, to an analysis specification. The scope of the analysis specification is every CICS system in the CICSplex. The analysis definition is installed in the CICS TS systems. If an analysis definition names multiple evaluation definitions, CICSPlex SM installs those that are supported in the target environment.

In summary, if you request a function that isn't available in a particular CICS environment, CICSPlex SM issues a warning message. You do not have to respond to the message and, more importantly, you do not have to take variations in support into account when creating CICSPlex SM object definitions: you should always consider CICSPlex SM object definitions to be reusable.

Chapter 4. Defining the CICSPlex SM configuration and topology

Once CICSPlex SM has been installed, and you have a map of your CICSPlex SM environment, you can define the configuration and topology.

Defining CICSplex topology

When you have identified your CICSplexes and MASs, you need to create the definition objects that will identify them to CICSPlex SM. You should be aware that you will not have all the information required at this point; more information will emerge as the design of your CICSPlex SM system proceeds.

More information about designing CICSplexes is given in "Designing your CICSplexes" on page 12

Preparing CICSplex definitions

Each CICSplex must be defined to CICSPlex SM by a name that is unique within the enterprise.

Naming conventions are given in "Naming your CICSPlex SM entities" on page 27. You also should be aware that you will need other information for the CICSplex definition, which will become available as you proceed with the design of your CICSPlex SM system. This information includes:

- The name of the CMAS to which the CICSplex is to be defined. (This is the maintenance point CMAS for the CICSplex.)
- The names of any other CMASs that are to participate in management of the CICSplex.
- A time zone for the CICSPlex SM monitor function.
- Whether CICS command checking is to be simulated.
- Whether CICS resource checking is to be simulated.

Managing the CICSplex definitions

You identify a CICSplex identified to CICSPlex SM with the **CICSplex definitions** view (CPLEXDEF object).

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To enter this information, you can use either the appropriate **CMAS configuration administration** views, accessed from the **CMAS configuration administration** menu, or the batched repository-update facility.

When you have created a CICSplex definition, you can associate CICS systems (MASs) and CICS system groups with the CICSplex. See "Planning CICS system definitions."

Planning CICS system definitions

To manage a CICS region with CICSPlex SM, you must associate the CICS region with a CICSplex that is defined to CICSPlex SM. The definition that establishes this

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association also contains information about how the CICS system is to use the BAS, WLM, RTA, and monitoring components of CICSPlex SM.

About this task

For every CICS region that is to be managed by CICSPlex SM, you must gather the following information:

Procedure

1. Gather the basic information about your CICS region to create a definition.
   a. Decide the name by which this CICS region is to be known to CICSPlex SM. This name can be up to 8 characters in length.
   b. Find the APPLID, that is, the z/OS Communications Server application identifier of the CICS region.
   c. Find the SYSID, that is, the CICS system identifier of the CICS region.

   This information is sufficient to add the definition to the data repository. If you have special BAS, WLM, RTA, or monitoring requirements for any CICS region, you can gather the information before adding the definition or update the definition later.
2. Optional: Gather additional information about your CICS region for the definition.
   a. If you are implementing system availability monitoring (SAM), find the name of the primary CMAS and the hours of operation of the CICS region. The primary CMAS is the CMAS that the CICS region usually connects to.
   b. Decide whether or not to simulate CICS command checking.
   c. Decide whether or not to simulate CICS resource checking.
   d. Decide what types of connections are required to other CICS regions and how many sessions to allow on each connection. If you want to create IP interconnectivity (IPIC) connections, you must also the port number, the host name, and network ID of the CICS region.
   e. Decide what time zone of the CICS region is to use, if it is not to be the same as that of its CMAS.

What to do next

When you have gathered the information necessary to create a system definition, you can use the CICS Explorer or the **Topology administration** views in the Web User Interface to create the definition in the data repository.

Preparing CICS system group definitions

For each CICS system group to be defined to CICSPlex SM, you need provide only a name for the group, which may be unique within the CICSplex.

The CICS system group must be defined before you can add CICS systems to it. To define a CICS system group, you use the **Topology administration** (ADMTOPOL) views.

Defining CICS system groups, perhaps more than any other part of the design stage, is an iterative process and a cumulative one. It might be obvious to you already that there are natural groupings of CICS systems within your CICSplexes, and that you will want to manipulate each of those groups as a single entity. If this is the case, start to document the groups now. Because groups do not have to be

mutually exclusive, and because a CICS system can belong to any number of groups, you can add CICS system group definitions as new requirements emerge.

To create CICS system groups, you use the **System group definitions** view (CSYSGRP object).

You can display information about the CICS system groups, and the CICS systems associated with them, that are known to the CICSplex identified as the current context, by using the **System group definitions** view (CSYSGRP object).

CICS system definition views

The Web User Interface provides a number of views to help you define, install, and manage CICS system definitions. You can also use the CICS Explorer to perform the same tasks.

These views are described in detail in CPSM administration views.

Table 1. View sets to manage CICS system definitions

WUI view set	Object name	Description
ISC/MRO connection definitions	CONNDEF	To create and administer connection definitions that identify remote systems that a CICS region communicates with using intersystem communication (ISC) or multiple region operation (MRO).
CICS system definitions	CSYSDEF	To create and administer the definition that associates a CICS system with a CICSplex. The definition also contains information about how the CICS system is to use the WLM, real-time analysis, resource monitoring, and business application services components of CICSPlex SM.
System group definitions	CSYSGRP	To create and administer CICS system groups within a CICSplex, including adding CICS regions to CICS system groups.
IPIC connection definitions	IPCONDEF	To create and administer TCP/IP connection definitions that describe the outbound attributes of connections between CICS regions that communicate using IP interconnectivity (IPIC) connections.
Time period definitions	PERIODEF	To create and administer time period definitions, which identify specific ranges of hours and minutes to be used with resource monitoring and real-time analysis.
Session definitions	SESSDEF	To create and administer session definitions that describe the nature of logical connections between regions that communicate using intersystem communication (ISC) or multiple region operation (MRO).
CICS system links	SYSLINK	To create and administer the links between CICS regions in the CICSplex.
TCP/IP service definitions	TCPIPS	To create and administer TCP/IP connection definitions that describe the inbound attributes of connections between CICS regions.

CICSPlex SM provides the **Runtime MAS display** (MAS) view set that you can use to manage configuration definitions when the associated CICS regions are active.

Table 2. View set to manage configuration definitions in an active CICS region

WUI view set	Object name	Description
Runtime MAS display	MAS	To manage information about active CICS regions known to a CICSplex or connected to the designated CMAS involved in managing the CICSplex. • Display information about the active CICS regions • Browse or temporarily update the general, WLM, real-time analysis, resource monitoring, and MAS trace attributes of an active CICS region. • Stop MAS agent code in an active CICS region.

Note: Using the **CICS system definitions** view (CSYSDEF object) and the **Time period definitions** view (PERIODEF object) to update definitions affects both a currently running system and the definitions in the data repository. Updates made using the **Runtime MAS display** view (MAS object), however, are not included in the data repository.

Where next?

You have a working CICSPlex SM environment, with your configuration and topology defined, and with the links between the entities defined.

The entities can communicate with each other and you can run transactions. However, to optimize the operation of your enterprise and to take full advantage of the facilities offered by CICSPlex SM, you need to set up your BAS, WLM, RTA, and monitoring requirements. For guidance, go to Managing resources using Business Application Services (BAS), Managing workloads, , or Collecting statistics using CICSPlex SM monitoring, as appropriate.

Chapter 5. Administering resources with CICSPlex SM

You can manage all of your CICS and CICSPlex SM resources through any of the following interfaces; the CICS Explorer, the CICS Management Client Interface (CMCI), a WUI view, or using the CICSPlex SM API.

Manage your resource definitions in the following ways:

- Using the CMCI, which accepts HTTP requests from your application.
- Using the CICS Explorer, which takes advantage of CMCI.
- Using the CICSPlex SM Web User Interface (WUI).
- Adding CICSPlex SM API commands directly to your application.

Managing and installing resources

Use Business Application Services (BAS) to manage and install CICS resources that are stored on the CICSPlex SM data repository.

Use CSD to manage and install CICS resources that are stored on the CICS System Definition (CSD) repository.

You must define a CSDGROUP for a CSD resource and a DEFVER for a BAS resource.

Managing resources using Business Application Services (BAS)

Business Applications Services is the component of CICSPlex SM that you use to manage the CICS resource definition and installation process for business applications at your enterprise.

What is Business Application Services (BAS)?

Business Application Services (BAS) is an alternative to resource definition online (RDO) that enables you to manage CICS resources in terms of the business application to which they belong, rather than their physical location in the CICSplex.

A business application can be any set of resources that represent a meaningful entity in your enterprise. Within the application, you can group together resources of a particular type and define the run-time characteristics of that group. At run-time, you can refine the selection of resources to be installed by using a filter expression, and you can change the resource attributes by using an override expression.

Limitations of RDO

RDO is the traditional CICS method of defining resources to CICS systems.

With RDO, resource definitions are tied to a single group and groups that are processed sequentially from a group list. Any duplicate definition found later in the process overrides any earlier one. In addition, the very nature of the definitions that RDO requires and the extent to which they are available to multiple CICS systems can prove limiting. RDO has several disadvantages in a CICSPlex SM environment:

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- Resources are assigned to groups that are assigned to specified CICS systems.
- Resource definitions have to be duplicated across CICS systems, unless the CSD is shared.
- Each end of every communications link has to be defined explicitly.

BAS concepts

BAS enables you to view and manage your resources in terms of their use in your business, and independently of their physical location.

This section introduces the basic concepts of the BAS function.

Logical scoping:

Once your CICS resources are defined to CICSPlex SM, you can monitor and control resources in terms of their participation in a named business application, rather than their physical location in the CICSplex.

Logically-related resources can be identified and referred to as a set, regardless of where they reside at any given time.

Sets of definitions can be reused and associated with any number of other logical associations of resources that reflect your business needs, rather than your system configuration.

If you set the scope to be your application, any operation or monitoring views will display only those resources that satisfy your selection criteria. This gives you the power to control precisely how those resources are managed.

Multiple versions of a resource definition:

With BAS, you can have multiple versions of the same resource.

Each time you create a new definition for the same resource and the same name, BAS allocates a new version number. Note that a new version number is not created if you update the resource. You can specify a specific version of a resource definition by its version number.

Version support allows you to develop resource definitions as your business applications develop. You can then have, for example, a single version of a resource in multiple groups, or multiple versions of the resource throughout the CICSplex. Note that you can install only one version of a resource in a CICS system at one time.

Centralized resource definition:

RDO definitions are held in a CICS System Definition (CSD) file. BAS resources are held on a central data repository that is accessed by all the CICS systems in the CICSplex.

The CICSPlex SM data repository (EYUDREP) serves as the central repository for all your CICS resource definitions. This minimizes the number of resource definitions you need for your CICSplex by:

- Providing a single system image approach to defining CICS resources across all supported platforms.
- Producing both local and remote instances of a resource from a single definition.

- Managing multiple versions of a definition. For example, you can have different versions of the resources for an application as it progresses through a number of test phases.
- Generating multiple CICS communication links from a single set of connection and session definitions.

CICS system links:

With Business Application Services, you can create one set of BAS resource objects to define the connection definitions and reuse them in many CICS regions by using a system link (SYSLINK) object. The established method of defining connections between CICS regions is to use RDO to manually create and install definitions that describe the connection. Each resource definition is unique to the CICS region and cannot be reused in other regions.

The system link definition describes the type of connection and connection definitions that are required to create a connection between a pair of CICS regions. You can use these connection definitions as a model to create any number of system links that share the same characteristics.

You can define different types of connections using SYSLINK objects:
- MRO or ISC connections require CONNDEF and SESSDEF resource objects to describe the CONNECTION and SESSION resources.
- IPIC connections require IPCONDEF and TCPDEF resource objects to describe the IPCONN and TCPIPSERVICE resources.

When you install a SYSLINK that uses these model definitions, the resource definitions are installed in the CICS regions automatically to create the connection.

Distributed resource installation:

Resources that are defined to CICSPlex SM must still be installed in the appropriate systems, either by CICS or by CICSPlex SM.

You can use BAS to install your resources either automatically, at CICS initialization, or dynamically, while a system is running. A single resource can be installed in multiple CICS systems either locally or remotely, as appropriate.

Two forms of BAS

You can use BAS in two ways; The migration form, or in the full-function form. You can use either or both of these forms, depending on the situation and degree of precision you require.
- Migration form, in which resource groups are associated with resource descriptions. In this form, resource descriptions are similar to group lists. See Figure 11 on page 42 and “Using migration form BAS” on page 49.
- Full-function form, in which resource assignments are used to qualify the contents of resource groups and resource descriptions, and to control the assignment of resources to CICS systems. See Figure 12 on page 43 and “Using full-function form BAS” on page 49.

The simplest form is the migration form using resource descriptions. You create resource definitions and resource groups, and associate them with one or more resource descriptions. It is the resource description that defines the logical scope for the resources. The resources are assigned to specific CICS systems and you therefore still need separate definitions for a resource that is local to one system

and remote to another. This approach to BAS is similar to using RDO, in that the resource description is analogous to the group list. You in effect create a version of your CSD on the CICSPlex SM data repository. Though this is a good position from which to establish your CICSPlex SM resources environment, you cannot take advantage of all the facilities offered by BAS.

To take advantage of the facilities offered by BAS to manage your resources in terms of the business application rather than location, you need to use resource assignments. A resource assignment selects resources of a particular type from a group, and assigns them to the appropriate CICS system. A resource assignment is associated with a resource description. The resource description then no longer functions like a group list, but becomes a user-defined, logical set of resources, such as an application.

Using resource assignments allows you to manage your individual resources and change their attributes for individual systems, or to suit special circumstances. You can:

- Control resources of a given type in a given group.
- Identify resources as either local or remote, and assign them to various CICS systems with a single resource definition.
- Process selected resources from a group by specifying a filter expression.
- Modify resource attributes for a particular use by specifying override expressions.

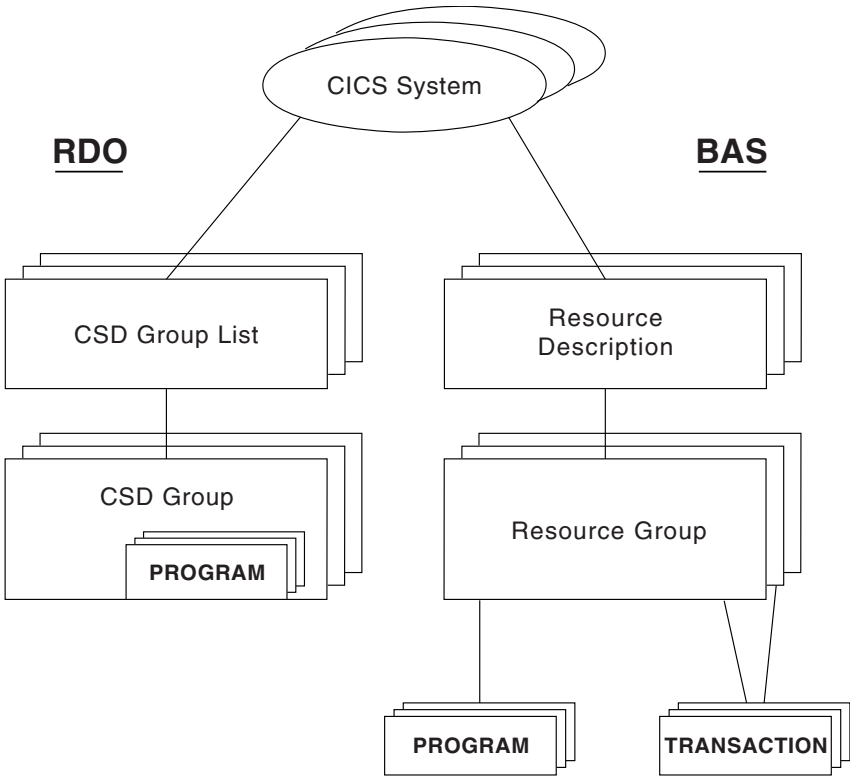


Figure 11. Migration form BAS

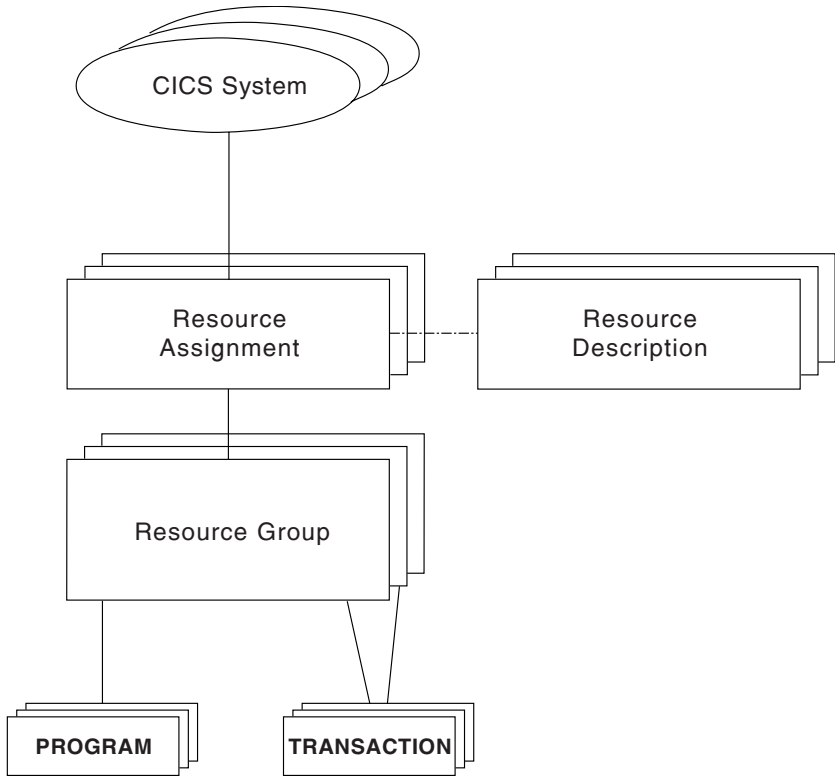


Figure 12. Full-function BAS

Advantages of using BAS

The BAS approach to the management of resources offers several advantages over RDO.

The advantages are as follows:

- A familiar, RDO-like definition process with a choice of interfaces (WUI, batch or API).
- Logical scoping, that allows you to handle your resources in terms of business application rather than location.
- A common definition repository for all resources in a CICSplex, across all supported CICS platforms.
- A reduction in the number of definitions required, with the ability to reuse definitions and override individual attributes as needed.
- Consistent resource definitions and a great deal of control over the definition process.
- A resource can be added to additional regions by adding it to the groups that define where the application will run.
- Because the application is known to CICSPlex SM, commands can be directed to a scope that matches the application, not to an arbitrary group of regions.

Managing BAS

Your BAS environment is set up and managed using these WUI view sets and resource administration objects.

Table 3. WUI view sets and resource administration objects

WUI view set	Object name	Description
Resource assignment definitions	RASGNDEF	A resource assignment describes the characteristics of the selected resource definition type, and how those resources are to be assigned to CICS systems. The assigned resources must all be of one type, for example, files, and must belong to a resource group. A resource can be assigned as both local and remote in one or more CICS systems. Before you can use the resource assignment, you must associate with a resource description; see the **Resource description definitions** (RESDESC) view. This object is also used to identify the attributes to be used in selecting the resources to be assigned and any attribute values to be changed when the resources are assigned.
Resource assignments in resource description	RASINDSC	This view displays information about resource descriptions, and the resource assignments associated with them. This information includes, for each resource, its resource group and any assigned CICS system to CICS system group.
Resource selected by resource assignments	RASPROC	This view displays the resources that will be processed when the specified resource assignment is processed. The resources displayed are selected from those in the associated resource group, using any supplied selection criteria.
Resource selected by resource description	RDSCPROC	This view displays the resources that will be selected when a specified resource description is processed. The resources can be selected from resource groups that are directly related to the resource description, as in migration form BAS, and from resource assignments, using any selection criteria currently in effect.
Resource description definitions	RESDESC	A resource description identifies a set of resource groups, and hence resource definitions. You use this object to specify whether or not you want to use logical scoping for this resource description, and the CICS systems for the associated resource groups.
Resource group definitions	RESGROUP	This object is used to associate one or more related resource definitions. The resource definitions may be of the same or different types.
Resource groups in descriptions	RESINDSC	This view displays information about existing resource descriptions and the resource groups associated with them.
Resource definitions in resource groups	RESINGRP	This view displays information about existing resource groups and the resource definitions associated with them.
CICS system link definitions	SYSLINK	This view displays information about the links that exist between CICS systems in the CICSplex. The information includes the names of the CICS systems and the names of the connection and session definitions used in defining the link.
CICS system resources	SYSRES	This view displays the resources that will be assigned to a specified CICS system. The resources are selected on the basis of the resource descriptions currently associated with the CICS system.

Table 3. WUI view sets and resource administration objects (continued)

WUI view set	Object name	Description
Resource definitions	*res*DEF where *res* identifies the resource being defined	For each resource definition type, there is a resource definition object that defines the attributes for that definition. The available resource types (shown in parentheses) and the WUI views used to define them for CICSPlex SM are: • Atomservice definitions view (ATOMDEF object) • BUNDLE definitions view (BUNDDEF object) • CICS-deployed jar file definitions view (EJDJDEF object) • DB2 connection definitions view (DB2CDEF object) • DB2 entry definitions view (DB2EDEF object) • DB2 transaction definitions view (DB2TDEF object) • Deployed enterprise java archive definitions view (EJCODEF object) • Document template definitions view (DOCDEF object) • FEPI node list definitions view (FENODDEF object) • FEPI pool definitions view (FEPOODEF object) • FEPI property definitions view (FEPRODEF object) • FEPI target list definitions view (FETRGDEF object) • File definitions view (FILEDEF object) • File segment view (FSEGDEF object) • Global enqueues view (ENQMDEF object) • IPIC connection definitions (IPCONDEF object) • ISC/MRO connection definitions view (CONNDEF object) • Journal definitions view (JRNLDEF object) • Journal model definitions view (JRNMDEF object) • LIBRARY definitions view (LIBDEF object) • LSR pool definitions view (LSRDEF object) • Map set definitions view (MAPDEF object) • Partner definitions view (PARTDEF object) • Pipeline definitions view (PIPELINE object) • Process type definitions view (PROCDEF object) • Profile definitions view (PROFDEF object) • Program definitions view (PROGDEF object) • Partition set definitions view (PRTNDEF object) • Request model definitions view (RQMDEF object) • Session definitions view (SESSDEF object) • TCPIP service definitions view (TCPDEF object) • Transient data queue definitions view (TDQDEF object) • Terminal definitions view (TERMDEF object) • Transaction definitions view (TRANDEF object) • Transaction class definitions view (TRNCLDEF object) • Temporary storage model definitions view (TSMDEF object) • Typeterm definitions view (TYPTMDEF object) • WebSphere® MQ connection definition view (MQCONDEF object)

The object models showing the relationships between these objects are shown in Figure 13 and Figure 14 on page 47. The view titles are followed by the resource name in parentheses.

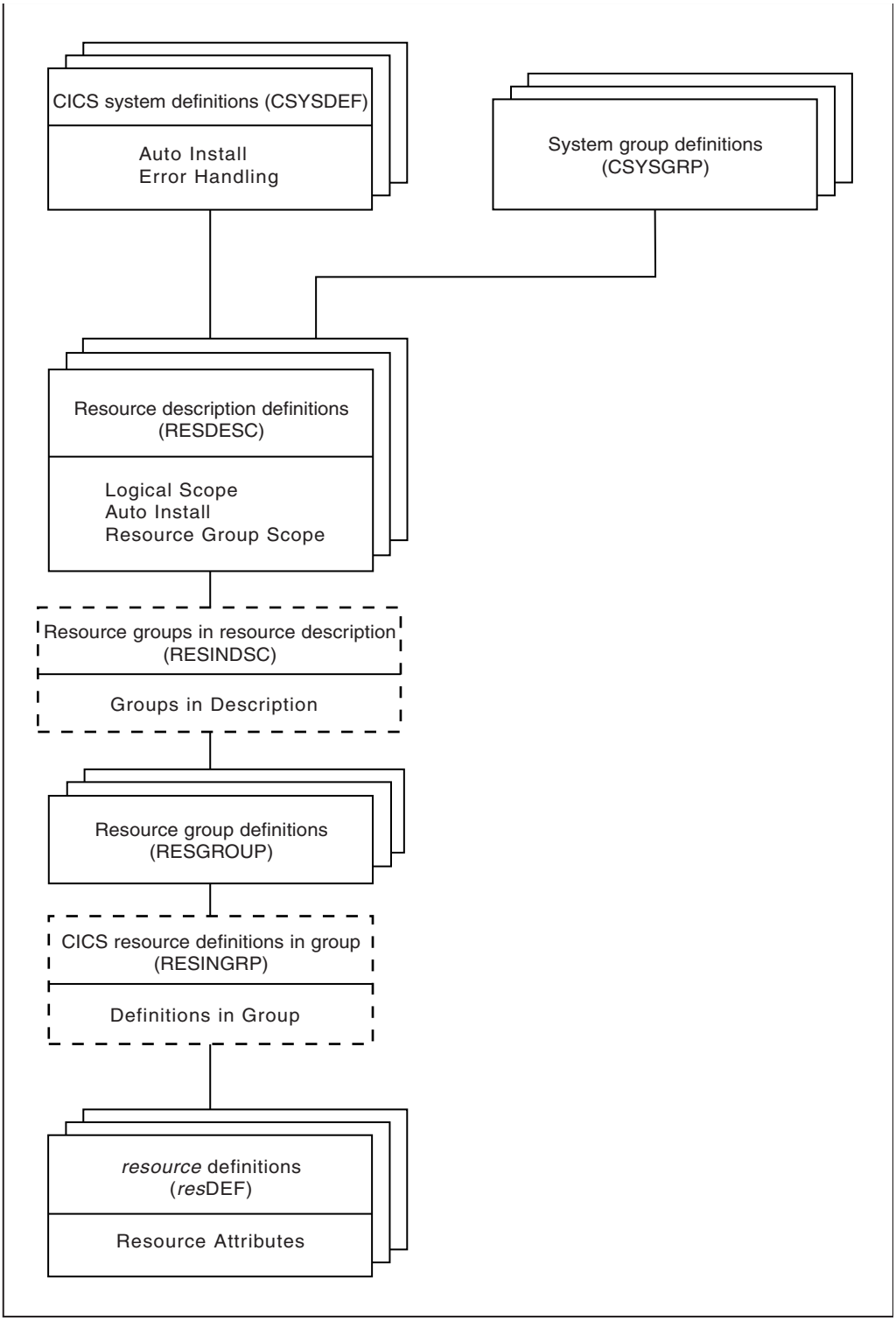


Figure 13. The migration form BAS object model

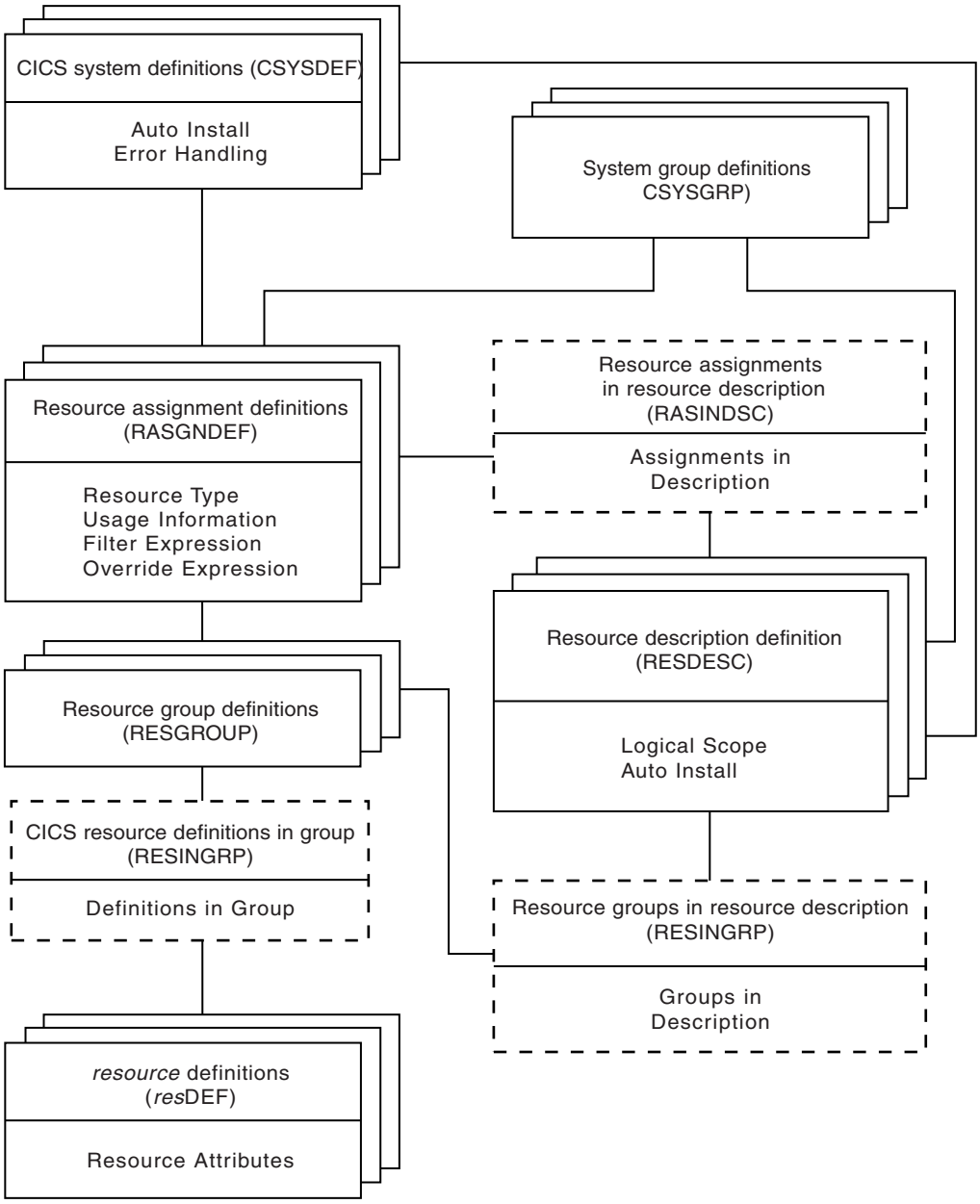


Figure 14. The full-function BAS object model

Migrating your resource definitions

You do not have to re-create your resource definitions and resource groups in BAS. You can migrate your existing CSD structures.

About this task

To move your resource definitions and resource groups from your CSDs to the data repository, use the following process. This process maintains the relationship between resources and groups. You can migrate all or part of a CSD, or more than one CSD, at any one time.

Procedure

1. Use the EXTRACT command of the DFHCSDUP utility routine to read the CSD records.
2. Use the CICSPlex SM extract routine EYU9BCSD to create batched repository-update facility commands.
3. Input these commands to The batched repository-update facility in Administering to create resource definitions and resource groups, and the objects that link them.

Related information:

Defining resources

You can use BAS to define and maintain resource definitions across a CICSplex. By creating resource definition objects in the data repository, you can use these objects as templates for creating large numbers of resource definitions.

The definition of resources for CICSPlex SM is similar to CICS RDO. To define a resource, you create a *resource definition object*. You describe the attributes of the resource in the definition but you do not have to define every occurrence of every resource; you can use a small number of resource definitions as templates for the creation of large numbers of resources. The resource definitions are stored in the data repository for the CICSplex.

The differences between CICSPlex SM resource definition objects and CICS resource definitions are:

- The same resource definition can be used by any CICS region in the CICSplex, across all supported platforms.
- You can define to CICSPlex SM all the attributes of each resource, including both local and remote values. CICSPlex SM determines the correct subset of attributes to use when the resource definition is assigned to a CICS region.
- You do not have to define every instance of your resources from scratch. You can create a resource definition as a "template" for many resources with similar, even identical, attribute values. You can specify temporary or permanent variations, called *overrides*, for CICSPlex SM to create resources with different sets of values.
- You can create multiple versions of the same named resource definition. Each version is effectively a different resource definition, and can be used by different CICS systems or for different system requirements. For example, you might have different resource requirements for development and test systems. See "Validating resources."

You can create resource definition objects in three ways:

- Using the administration views in CICS Explorer or the BAS administration and definition views in the Web User Interface
- Using the batched repository-update facility (see The batched repository-update facility)
- Using the CICSPlex SM API; see Developing CICSPlex SM applications.

Validating resources

BAS performs many of the same resource definitions checks as RDO does.

As individual resources are defined and installed, BAS checks:

- Individual attributes of a resource
- Interdependent resources attributes
- Release-specific resource attributes

In addition, BAS checks that each *set* of resources is consistent. Every time you make a change to a resource set, BAS checks that the resource being added or updated is not in conflict with a resource already in the CICS system. For example, you would get an inconsistent set error if you tried to assign different versions of the same resource to the same CICS system, or assign a resource as both local and remote.

BAS also provides a MAP function that allows you to check that your resource associations are what you want. You use this facility to display the structure of your resource associations, starting at any point in hierarchy.

Defining resource groups

A *resource group* is a set of related resource definitions that you want to manage as a unit. Resources groups are defined using the **Resource group** view (RESGROUP object). The resource definitions in a group may be of the same type or of different types, but usually have something in common. They might be logically related by their use in a given application or communications network, or geographically related by their use at a given site.

There is no real limit to the number or combination of resource definitions that can make up a group. However, only one version of any given resource can be included in a resource group at one time. You have to maintain each version of a resource definition in a different resource group.

Using migration form BAS

With migration form BAS, your resource groups are associated directly with *resource descriptions*.

A resource description specifies whether or not you are using logical scoping, and the CICS systems for the resource groups associated with the resource description. See Figure 13 on page 46.

When you have migrated or defined your resources and resource groups, you need to create resource descriptions to define your applications. Resource descriptions are defined using the RESDESC object. A resource description is directly related to one or more resource groups that are to be managed as an entity. In the migration form BAS model, this relationship can be considered to represent a logical scope, but the resource description is really analogous to a RDO group list, in that all the resources are tied to a given CICS system or CICS system group.

Using full-function form BAS

With full-function form BAS, resource groups are not associated directly with resource descriptions.

An additional object, the *resource assignment* (RASGNDEF), defines the characteristics and usage of a selected resource type from a resource group. The resource assignment is associated with a resource description, which can then be used to represent a business application. See Figure 14 on page 47.

These objects are used to define your resources in terms of their business application.

Using resource assignments

Power and flexibility in the management of resources is offered by the *resource assignment* (RASGNDEF) object.

Note: If you are using the migration form of BAS, you do not use resource assignments.

Each resource assignment relates to one resource type within a resource group, and it must be associated with a resource description, if it is to be used in logical scoping or automatically installed. Each resource group can be in more than one resource assignment.

You can further refine the selection of resources within the type specified by the resource assignment by using a filter expression, and you can change the resource attributes using an override expression. You can combine in the expression an unlimited number of attribute values, using the logical operators AND, OR, and NOT. When the resource description is specified as the scope, CICSPlex SM processes only those resources that meet the specified selection criteria. This gives you a great deal of control over the management of your resources.

Each resource assignment must be added to a resource description, if it is to be installed and used in logical scoping. Creating resource assignments and adding them to a resource description enables you to manage sets of resources with a logical scope that can span many CICS systems. In this case, the resource description becomes, in effect, a user-defined, logical set of resources, such as an application. You might have several different resource descriptions associated with a given CICS system, each one representing a different set of resources.

For example, with a resource assignment, you can:

- Select specific resources from a resource group.
- Identify the CICS systems where local and remote instances of a resource should be assigned.
- Temporarily override the values of specific resource attributes.

The resources selected by a resource assignment cannot be managed independently. The resources must be members of a *resource group* and the resource assignment must be associated with at least one resource description.

Using resource descriptions

With full-function BAS, a resource description represents an application, that is, a set of logically-related resources that can span more that one CICS system. The resource description thus identifies the *logical scope* of the application.

Each resource group to be used as part of the application must be added to the resource description. You can associate whole resource groups with a resource description to create a larger set of resources (much like a CSD group list). This allows you to manage the resources more efficiently. The set of resources identified in a resource description can be:

- Identified as a logical scope (such as an application) for use in subsequent CICSPlex SM requests
- Installed either automatically, when the CICS system identifies itself to CICSPlex SM as a MAS, or dynamically, while the CICS system is up and running.

The BAS objects that are used for creating and managing these resource associations shown in Figure 13 on page 46 and their functions are summarized in Table 3 on page 44.

Installing applications and resources

Optionally, as an alternative to installing resources from the CSD, you can use BAS to install your resources, from the data repository.

BAS allows you to install all the resources associated with an application, by installing the resource description, or one resource group. BAS applies any resource assignments you have associated with the application resource description or resource group, and selects the actual resources to be installed on the basis of those criteria. Alternatively, you can install an individual resource into one or more CICS systems, either locally or remotely, as appropriate.

BAS can install resources either automatically at system initialization time or dynamically into an active CICS system. Before installing a resource, CICSPlex SM performs checks to determine whether the resource already exists in the CICS system. The normal situation is that if the resource exists, the new resource is considered a duplicate and is not installed. However, when you dynamically install resources, BAS offers the option of bypassing the duplicate resource checking and forcing the unconditional installation of resources.

Automatic installation
When a CICS system initializes and identifies itself to a CMAS, BAS reviews the resources associated with that system and decides the set of resources to be installed.

Dynamic installation
You can install resources dynamically into an active CICS system by clicking the **install** button either from the appropriate resource definition view, or from one of the following views:

- **Resource group definitions** view.
- **Resource description definitions** view.
- **System link definitions** view.

Security considerations

Because of the importance of resource definitions to your CICSPlex SM environment, you need to consider carefully the implications of allowing users access to certain types of resource or to certain functions.

You can allow a user to have access to all resource definition views and their related administration views, or you can restrict access to the definition views for a particular resource type. You can also define the type of access a user has, for example, one user might have read-only access to **ISC/MRO connection definitions** views (CONNDEF object) and **Session definitions** views (SESSDEF object), but update access (which permits creation and administration of resources) to all other resource types. You need to make sure that the BAS views are adequately protected, so that unauthorized users cannot create and administer resources.

You should also take care if you are running CICS TS, and are using the EXEC CICS CREATE command to build new resources. Any definition created with the CICSplex as the context is automatically distributed to all CMASs in the CICSplex. Therefore, giving a user authority to create BAS objects is potentially equivalent to

giving authority to install resources on any CICS system in the CICSplex. When the CICS system starts, there is no check on who installed the resource in the system.

For details on setting up security for CICSPlex SM at your enterprise, see BAS security considerations.

Planning for BAS

BAS allows you to create CICSPlex SM objects that define your resources and to group them in such a way that you have close control over the running of your applications.

You do not have to transfer all your CSD resources to CICSPlex SM at the same time, neither do you have to decide at the outset which approach you will use. You can extract the resource definition records from one or more CSDs, or only a subset of records from one CSD. You can move directly to using full-function BAS, or you can use migration form BAS, and gradually move towards full-function BAS. You can use RDO, migration form BAS, and full-function BAS in the same CICSplex.

This section poses some of the questions you might like to consider when you start planning to implement BAS in your enterprise:

- If you are going to use the extract facilities:
  - In what order do you want to extract your CSDs?
  - Do you want all the records from a CSD or a subset?
  - Are you going to extract more than one CSD at a time?
- Are you going to use the migration form approach?
- Are you going to implement full-function BAS? You then need to think about how your business applications use resources and the assignments you need to create.
- Which resources are to be installed automatically and which are to be installed dynamically?
- Which definitions are required before PLT processing? Definitions required before PLT phase 2 processing must be in the CSD.
- Where are the resources to be installed?
- Do you need to define manually any resources that are not defined in the CSD?
- What security measures do you need to implement? (See “Security considerations” on page 51).

The CICS Interdependency Analyzer can assist you in the planning and understanding of your application resource flow; it shows you:

- Transaction resource dependencies; that is, the sets of resources used by individual CICS transactions, and on which the transactions depend in order to run successfully
- Transaction affinities; that is, those groups of transactions that have affinities with each other, meaning that the whole group must be installed in the same region, or in a particular region

For more information about CICS Interdependency Analyzer, see CICS Interdependency Analyzer for z/OS.

Implementing BAS

This section describes a route you could take to implement BAS on your CICSplex.

Creating migration for BAS

The first stage in the process of moving to using BAS is to migrate your resources from CICS to CICSPlex SM:

- Move your resource definitions, resource groups, and the relationships between them, from the CSD to the CICSPlex SM data repository. This process, which is described in "Migrating your resource definitions" on page 47, gives you an intermediary resource hierarchy that is very like CEDA, in that each resource definition is in a resource group.
- Create definitions and groups for any resources that are not held on the CSD.
- Create applications by associating each resource group with a resource description.

There are no resource assignments and, although you can now run your CICSPlex SM system perfectly satisfactorily, you will not be taking advantage of the special functionality offered by BAS.

Once you have extracted your CEDA definitions, you can proceed to migrate your resource definitions to full BAS function, as described in "Migrating to the use of resource assignments."

Migrating to the use of resource assignments

You don't have to migrate all your resources to resource assignments at the same time.

You can identify certain resources in which you are interested, remove them from direct association with resource definitions, and create resource assignments, using the **Resource assignment definitions** view (RASGNDEF object) for them. When you are happy with the resource assignments, you can move on to defining another set of resource definitions.

As you move towards processing your resource definitions more full-functionally, you should remove resource groups from direct association with a resource description and identify them instead in one or more resource assignments.

Note: You can use the same resource description to manage both whole resource groups and selected resources identified in resource assignments. As you begin to take advantage of the resource assignment capabilities, you may have to update some of the underlying resource definitions. For example, a resource definition that was previously associated as is with a CICS system might require additional attributes before it can be assigned as both a local and remote resource in different CICS systems.

A recommended approach

When you decide to implement BAS functions in your enterprise, you should begin by defining the appropriate objects.

This section summarizes the preceding sections. You should:

- Extract resource definitions and resource groups from the CSD, as described in "Migrating your resource definitions" on page 47. Alternatively:
  - Use the appropriate resource definition views to create resource definitions.
  - Use the **Resource group definitions** view to create resource groups (RESGROUP objects).
- Use the **Resource assignment definitions** view to create resource assignments (RASGNDEF object) .

- Use the **Resource description definitions** view to a create resource description to associate the definitions and assignments just created (RESDESC object).

Then, to create associations between these objects:

- Use the appropriate resource definition view to add resource definitions to a resource group (RESINGRP object).
- Use the **Resource group definitions** (RESGROUP) view to add the resource group to a resource description (RESINDESC object).
- Use the **Resource assignment definitions** view (RASGNDEF object) to associate the resource assignment with a resource description (RASINDSC object).
- Use the **Resource assignment definitions** view (RASGNDEF object) to associate the resource assignment with a CICS system or CICS system groups.

You can use the **Map** action button to display a visual map of the BAS definitions in your data repository. If you want to see a list of the objects and associations you have already defined, use the **Resource definitions in resource groups** view (RESINGRP object).

Where next?

Once you have identified your BAS requirements, you need to set up your resources and their associations.

This is described in Creating resources with BAS in Administering.

Chapter 6. Monitoring CICSPlex SM

There are several methods you can use to monitor CICSPlex SM.

Monitoring using real-time analysis (RTA)

Real-time analysis is the component of CICSPlex SM that you use to define and manage notification of exception conditions at your enterprise.

When you have identified your RTA requirements, define them to CICSPlex SM as described in Working with real-time analysis administration views in Monitoring.

What is real-time analysis?

CICSPlex SM real-time analysis (RTA) function provides automatic, external, notification of conditions in which you have expressed an interest.

Real-time analysis is not concerned solely with commonly recognized error conditions: you can ask to be notified about any aspect of a resource's status.

The RTA functions are:

- System Availability Monitoring (SAM): see "System Availability Monitoring (SAM)" on page 57
- RTA resource monitoring, which includes:
  - MAS resource monitoring (MRM): see "MAS resource monitoring (MRM)" on page 58
  - Analysis point monitoring (APM): see "Analysis point monitoring (APM)" on page 59

For example, if you tell CICSPlex SM that all files used by CICS systems AORPAY1 must be in ENABLED status, CICSPlex SM sends out warning messages when the status of any of those files is other than ENABLED. However, CICSPlex SM isn't restricted to telling you about a problem only after it has occurred. CICSPlex SM real strength lies in its ability to detect *potential* problems with CICS resources. Indeed, CICSPlex SM is unrivaled in its ability to detect and warn of the slightest change in the status of a CICS resource. For example, CICSPlex SM can tell you that resource contention is growing, or that the dynamic storage area (DSA) free space is falling, or that the number of users of a particular transaction is high: these can all be indicators of future problems that you could avoid by taking preventive action.

The notification can take the form of a console message, or of a generic alert to NetView, or both. The CICSPlex SM application programming interface (API) makes it possible for automation products actively to gather status information from CICSPlex SM, rather than waiting for CICSPlex SM to send out MVS messages and SNA generic alerts.

Why automate?

The CICSPlex SM operator can monitor RTA messages and take appropriate action.

For example, the CICSPlex SM operator can change the status of a file from DISABLED to ENABLED using the CICSPlex SM **Local files** view set (LOCFILE

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object). However, this approach is becoming less satisfactory as CICS availability and performance requirements grow. Most enterprises are using more and more CICS systems, often via cloning, to process a growing workload. This factor alone has made the CICSPlex SM operator's task more difficult and error prone. At the same time, however, service-level agreements are setting performance and availability targets that are more demanding than ever before. Consequently, the ideal environment is one in which the CICSPlex SM operator is presented with problems only in the most exceptional circumstances. Such an environment is now possible, because most actual and potential problems detected by CICSPlex SM can be corrected or prevented by intelligent use of automation products, such as:

- NetView
- Automated Operations Control/MVS (AOC/MVS)
- Automated Operations Control/MVS CICS Automation (AOC/MVS CICS Automation)
- CICSPlex SM itself. (Not only does CICSPlex SM provide detailed and timely information about CICS resource status to other automation products, it is also capable of correcting many of the problems it detects.)

The RTA external notifications

An RTA external notification is generated when the status of a CICS resource is not as expected. The notification can take the form of either an *external message* or an *SNA generic alert*, or both.

External messages:

External messages are operator messages that are written to the MVS console by default. External messages can also be viewed from the CICSPlex SM **RTA outstanding events** view (EVENT object) while a condition is active.

When a condition has been resolved, it disappears from the **RTA outstanding events** view (EVENT object). (However, external messages written to the **RTA outstanding events** view (EVENT object) view are also written to the CICSPlex SM EYULOG to provide a record of the contents of the **RTA outstanding events** view (EVENT object).) In the **RTA outstanding events** view (EVENT object), external messages are sorted in order of urgency, with the message about the most urgent condition at the top of the list. The urgency of a condition is user-defined.

External messages are issued in pairs: one message is issued at the start of a condition, and another is issued when the condition ends. The messages all have the prefix “EYUPN”. External messages can be intercepted by automation products, such as NetView, AOC/MVS, and AOC/MVS CICS Automation.

SNA generic alerts:

CICSPlex SM can construct SNA generic alerts and transmit them, via the NetView program-to-program interface (PPI), to NetView for processing.

NetView can trap SNA generic alerts in its automation table, which can either take action itself to resolve the problem, or start some automation code from a command list (CLIST) or command processor.

Advantages of RTA

There are a number of advantages of using RTA. These are as follows:

- Actions can be taken within CICS, removing the requirement to use external automation products.

- Potential problems are detected and corrected before they become critical.
- Performance to the end-user is improved by the early detection of bottlenecks that could affect response time.
- The volume of information presented to operators is reduced by filtering out unnecessary messages.

System Availability Monitoring (SAM)

CICSPlex SM has a system availability monitoring (SAM) function that monitors CICS systems during their planned hours of availability.

If any of a set of predefined conditions occurs while a CICS system is being monitored, CICSPlex SM sends out external notifications at the start of the condition and also when it is resolved. The conditions are:

SAMMAX
CICS has reached maximum tasks.

SAMOPS
The CICS system is not available.

SAMNRM
A CMAS has lost contact with an active MAS that it is managing.

The SAMNRM event is raised after the MAS fails to respond to a query from the CMAS for a period of 60 seconds. Unlike other SAM conditions, this event can be detected only when the CMAS interacts with the MAS. The condition is not detected if no CMAS to MAS interaction occurs.

SAMSDM
A CICS system dump is in progress.

SAMSOS
A CICS dynamic storage area (DSA) is short on storage.

SAMSTL
One or more tasks in a CICS system are stalled because of contention for resources such as DBCTL, DL/I, transient data, files, journals, and temporary storage .

SAMTDM
A CICS transaction dump is in progress.

For example, if CICS system AORPAY2 must be active from 0900 hours to 1200 hours and CICSPlex SM finds it inactive at 0930 hours, CICSPlex SM issues external messages by default. A typical response, from the CICSPlex SM operator or from an automation product, would be to try to restart the CICS system, or perhaps to start another.

Customizing the SAM external notifications

When any of the SAM conditions occurs, CICSPlex SM issues an external message by default.

Each of the SAM conditions has a default severity and priority value that determines the position of the external message, relative to other external messages, in the EVENT view. For example, the SAMTDM condition has a severity of HW (High Warning) and a priority of 128, whereas the SAMSOS condition has a severity of HS (High Severe) and a priority of 255 (the highest priority), so SAMSOS precedes SAMTDM in the **RTA outstanding events** view (EVENT object).

You can customize the default SAM notifications for any CICS system by creating a CICSPlex SM *action definition*. Using an action definition, you can change:

- The type of notification that is issued for a SAM condition. For example, you could specify that, for a particular CICS system, the SAMSOS condition will cause an SNA generic alert to be sent to NetView (so that NetView can take corrective action), and that no external message is to appear in the **RTA outstanding events** view (EVENT object).
- The severity value and the priority value of a SAM condition. For example, you could specify that the SAMTDM condition must have a severity of LW (Low Warning) in a particular CICS system, and that the SAMSOS condition must have a priority of 128.

You can also use the action definition to request that CICS TS systems affected by a condition are to be cancelled and restarted using the MVS automatic restart manager (ARM). This might be a suitable automation action for the SAMOPS condition, for example.

Automation and SAM

An automation product, such as AOC/MVS or NetView, can intercept SAM notifications and take corrective action, such as starting up or shutting down a CICS system, disabling a transaction, or requesting a dump.

For example, if a CICS system becomes unavailable, one of the automation products could attempt to restart the system, or perhaps start another.

However, most of the SAM notifications relate to actual problems that are already having an effect on users, so your scope for preventive action is small. Consequently, the best automation option for most SAM conditions is usually to request a dump, which can provide more information about a problem and its causes.

MAS resource monitoring (MRM)

Using CICSPlex SM MAS resource monitoring (MRM) function, you can monitor the status of *any* specific or generic CICS resource, and be informed when its status deviates from a specified norm.

(SAM, by contrast, is the monitoring and evaluation of a "default" resource, the CICS system itself. Although you can tailor the type of notification you receive from SAM, the condition that triggers the notification is defined by CICSPlex SM.) Using MRM, you can select both the resource status you are interested in and the type of external notification it generates. Here are some examples of the ways in which MRM can be used:

- You can use MRM to inform you of changes in the absolute status of a resource. For example, if the status of an LU6.2 connection is ever RELEASED at a time when you have specified it must be ACQUIRED, external notifications can be issued so that the CICSPlex SM operator or an automation product can attempt to reacquire the connection. MRM can warn you of changes in the absolute status of many resources. For example, you can ask to be informed when a journal is CLOSED, when a transient data queue is DISABLED, when a FEPI node or a terminal is OUTSERVICE, when a transaction is DISABLED, and so on.
- In addition to monitoring absolute status values of CICS resources, CICSPlex SM can provide information about subtle changes in a resource status, such as degradations in the response time of a transaction, or increases in the number of

users of a program, or changes in the number of DB2 threads in a CICS system. These are all examples of trends in resource behavior that might be indicators of incipient problems.

- Using MRM, you can specify complex conditions. For example, you can ask for an external notification to be issued when the number of users of a particular transaction reaches a specified level *and* the dynamic storage area (DSA) free size is falling. Only when both conditions are true is the notification issued. Conditions can be of any complexity.
- MRM even supports the monitoring of non-CICS resources, such as DB2, and of other members of the CICS family, such as CICS/400, by invoking user-written programs called *status probes*.

As its name suggests, MAS resource monitoring operates at the CICS system level. That is, if a resource's status changes in two regions, two sets of external notifications are issued, one for each region.

Automation and MRM

MRM offers great scope for automation of CICS resource management, because it can alert you to both actual and potential problems.

In alerting you to actual problems, MRM provides you with an opportunity to take *remedial* action; in alerting you to potential problems, MRM provides you with an opportunity to take *preventive* action. Furthermore, an automated response is possible to all MRM-detected problems.

When changes in the absolute status of a resource occur (for example, when a file that should be ENABLED becomes DISABLED, or when a connection that should be INSERVICE goes OUTSERVICE), remedial action is usually required. CICSPlex SM itself can correct the status of such resources automatically, as can any of the automation products, such as NetView or AOC/MVS CICS Automation.

When more subtle changes in a resource's status occur, an automation product such as NetView can tailor its response to the severity of the problem. For example, CICSPlex SM could monitor the DSA free size in a CICS system every five seconds. If CICSPlex SM finds the DSA free size to be:

- Between 86KB and 100KB 4 times in succession, it issues an SNA generic alert to NetView with a severity of LW (low warning)
- Between 71KB and 85KB three times in succession, it issues an SNA generic alert to NetView with a severity of LS (low severe)
- 70KB or less twice in succession, it issues an SNA generic alert with a severity of VLS (very low severe).

In response to any of these alerts, the NetView automation table could issue an MVS modify command to the affected region to increase the DSA size dynamically, thereby preventing a short-on-storage condition (the SAMSOS condition, in fact) from occurring. The amount by which the DSA is increased in each case could vary according to the severity attached to the SNA generic alert by CICSPlex SM.

Analysis point monitoring (APM)

CICSPlex SM has an analysis point monitoring (APM) function which is the same as its MRM function, except that when resources are monitored in multiple CICS systems (a CICS system group or an entire CICSplex), the occurrence of the same problem in any number of those CICS systems can result in one external notification rather than several.

APM is especially useful in environments that use cloned AORs, where regions are identical and one notification is sufficient to alert you to a general problem. APM does not support the use of status probes for monitoring non-CICS resources. In all other respects, however, APM offers the same opportunities as MRM for early detection of potential problems, and for an automated response in such situations.

Managing RTA

RTA is set up and managed using the WUI view sets and resource objects.

This is described in Table 4.

Table 4. Real-time analysis objects

WUI view set	Object name	Description
Installed analysis definitions associated with an analysis point specification	APACTV	This object shows information about RTA definitions associated with an RTA point specification.
Action definitions	ACTION	An action definition designates the type of external notification that is to occur when the condition or conditions identified in an RTA definition are true.
RTA analysis point specifications	APSPEC	This object shows information about RTA point specifications. An RTA analysis point specification identifies one or more CMASs that are to be responsible for analyzing CICS systems within the CICSplex identified as the context.
RTA specifications in primary CMASs	CMDMPAPS	This object shows the association between RTA specifications and a primary CMAS.
RTA specifications in secondary CMASs	CMDMSAPS	This object shows the association between RTA specifications and secondary CMASs.
Evaluation definitions	EVALDEF	This object shows information about evaluation definitions. An evaluation definition identifies the resources in one or more CICS systems that are to be sampled and evaluated. When the result of the evaluation is true, an associated RTA definition is used to determine if a notifiable condition has occurred.
Real Time Analysis (RTA) outstanding events	EVENT	This object shows information about outstanding changes in the status of a CICSplex or one of its CICS systems.
Specifications to system group links	LNKSRSCG	This object shows CICS system groups associated with analysis specifications.
RTA specifications to CICS system links	LNKSRSCS	This object shows CICS systems associated with analysis specifications.
Real Time Analysis (RTA) installed analysis and status definitions	RTAACTV	This object shows information about RTA and status definitions installed in CICS systems known to the CICSplex identified as the current context.
RTA definitions	RTADEF	An RTA definition identifies the evaluations to be performed on a periodic basis and the actions to be taken should a notifiable condition occur.
RTA groups	RTAGROUP	An RTA group is used to associate one or more related RTA definitions, status definitions, or both.
RTA group in analysis point specifications	RTAINAPS	This object displays the names of RTA groups associated with RTA point specifications.
RTA definitions in RTA groups	RTAINGRP	This object displays the names of RTA groups and the RTA and status definitions associated with them.

Table 4. Real-time analysis objects (continued)

WUI view set	Object name	Description
RTA groups in RTA specifications	RTAINSPC	This object shows the names of RTA specifications and the RTA groups associated with them.
RTA specifications	RTASPEC	An RTA specification identifies the default control attributes that are used for system availability monitoring and provides an anchor for all RTA definitions and status definitions associated with a CICS system.
Status definitions in RTA groups	STAINGRP	This object shows status definitions in RTA groups.
Status probe definitions	STATDEF	A status probe definition identifies a user-program that is to be called by CICSPlex SM at specific intervals.

The RTA object model is shown in Figure 15 on page 62. This figure shows the titles of the WUI views with the names of the resources in parentheses.

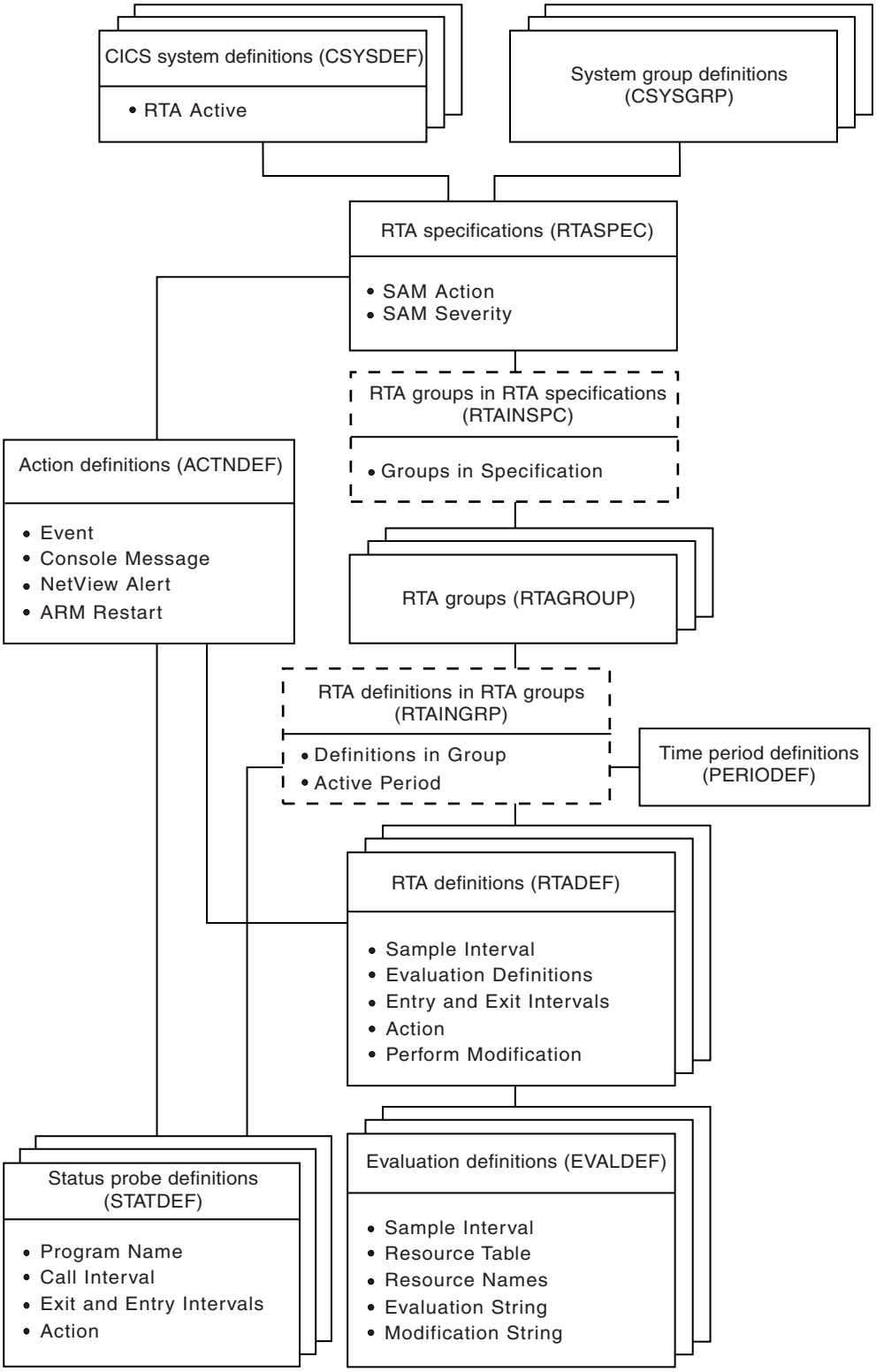


Figure 15. The real-time analysis object model

Planning for RTA

When you are planning to implement RTA, you might consider the following points:

- You will probably want to use SAM, because not only is it very easy to implement (see "Implementing system availability monitoring (SAM)") but you will need to be aware when any of your CICS systems are not active when they should be. You need to:
  - Decide whether you want to customize any of the default conditions
  - Identify the primary CMAS for each CICS system
- To use MRM and APM, you need to identify:
  - The resources you are interested in
  - The point at which their status becomes of interest to you
  - How you want to be notified of an interesting status
  - The interval at which you require resource evaluations
  - The interval at which you require data analysis
  - The primary CMAS

    Note: For APM only, you may also specify one or more secondary CMASs.

Implementing RTA

Real-time analysis should be implemented gradually and in response to an established need for the resultant information, especially if you are not planning to automate your responses to exception conditions.

You are recommended to begin by implementing SAM, and to implement MRM after having analyzed records, such as problem logs, that give you some indication of where MRM would be useful.

Implementing system availability monitoring (SAM)

You are recommended to implement SAM as follows:

1. Use the **Time period definitions** view to create time-period definitions (PERIODEF objects) for the expected availability times of each CICS system to be managed by CICSPlex SM. For example, if seven of your CICS systems should be active from 0800 hours through 1900 hours, create one time-period definition for that part of the day.
2. When you define each CICS system to CICSPlex SM, supply the name of the time-period definition that defines the system's hours of availability.

These two actions are sufficient to activate SAM and to cause the default external notifications to be generated when a noteworthy condition occurs. As you can see, you can implement SAM as soon as CICSPlex SM is installed in your enterprise, and with very little additional effort. You are recommended to continue using SAM with the default notifications, at least until you have had an opportunity to see the default notifications of all SAM conditions. If you decide to customize any of the notifications, start by creating an action definition for one of the SAM conditions and apply it to a single CICS system to test the effects. When you are happy with the change, apply it to other SAM conditions and other CICS systems, as appropriate.

The overheads associated with SAM are not high, so you can activate it throughout the enterprise CICSplexes without affecting the general performance of CICSPlex SM or the CICS systems it manages.

Implementing MAS resource monitoring (MRM)

You should start by implementing MRM on a system-by-system basis. Select a single resource type, such as connections or files, in a single CICS system, and create these CICSPlex SM objects:

- An *evaluation definition*, to identify the instances of the resource you are interested in, the frequency with which CICSPlex SM is to evaluate the resource status, how CICSPlex SM is to interpret its findings, and the severity to be assigned to a true condition
- An *analysis definition*, to identify the frequency with which CICSPlex SM is to analyze the results and the point at which an external notification should be issued
- An *action definition*, to identify the type of external notification to be issued

The interval between resource evaluations (as specified in the evaluation definition) and the intervals at which data is to be analyzed (as specified in the analysis definition) should be intelligently matched (and ideally the same). In particular, do not analyze the data more frequently than it is evaluated. Also, resource evaluations should be performed as infrequently as possible while still providing useful data: the more frequently data is collected, the greater the cost of its collection.

Begin by installing the analysis definition manually in the active CICS system. When you are satisfied that MAS resource monitoring is working as you expected, consider whether automatic installation of the analysis definition would be useful. If it would, add the analysis definition to an analysis group, and associate the analysis group with an analysis specification. At this point, decide whether to monitor additional resources in the same CICS system. To extend MAS resource monitoring to other resources, an additional evaluation definition would be required, an additional analysis definition might be required, but the original action definition could probably be reused.

Implementing analysis point monitoring (APM)

When you are happy with the MAS resource monitoring results, progress to analysis point monitoring (APM), which is applied to a logical grouping of CICS systems. You should consider which CICSplexes are affected by your analysis point monitoring requirements, and identify the CMASs involved in management of those CICSplexes.

As most of the CICSPlex SM definitions required for MAS resource monitoring can be reused for analysis point monitoring, the cost of staging the implementation in this way is not high. For example, a single action definition is likely to be usable by multiple analysis definitions. However, for analysis point monitoring you must create at least one analysis point specification. As in the case of MAS resource monitoring, you should start analysis point monitoring with simple definitions, and move gradually to using more complex definitions.

A recommended approach

When you decide to implement RTA functions in your enterprise, you should begin by defining the appropriate objects.

You should:

- Use the **RTA definitions** view to create an analysis definition (RTADEF object).
- Use the **Evaluation definitions** and **Action definitions** views to create the required subcomponents of an analysis definition (EVALDEF and ACTION objects).

- Use the **RTA groups** view to create an analysis group (RTAGROUP object).
- Use the **RTA specifications** view to create an analysis specification (RTASPEC object).

Then, to create associations between these objects:

- Use the **RTA definitions** view to add the analysis definition to the analysis group (RTAINGRP object).
- Use the **RTA groups** view to add the analysis group to the analysis specification (RTAINAPS object).
- Use the **RTA specifications to CICS system links** view (LNKSRSCS object) or the **RTA specifications to CICS system groups links** view (LNKSRSCG object) to associate the analysis specification with a CICS system or CICS system group. For more information about the LNKSxSCG parameters, see Special attribute and resource table considerations: LNKSxSCG Records (LNKSMSCG, LNKSRSCG, LNKSWSCG).

You can use the **Map** action button to display a visual map of the real-time analysis definitions in your data repository. If you want to see a list of the objects and associations you have already defined, use the **RTA definitions in RTA groups** view (RTAINGRP object), the **RTA groups in RTA specifications** view (RTAINSPC object), the **RTA specifications to CICS system links** view (LNKSRSCS object), and the **RTA specifications to CICS system groups links** view (LNKSRSCG object).

Collecting statistics using CICSPlex SM monitoring

Monitoring is the component of CICSPlex SM that you use to define and manage the collection of performance-related data in your enterprise.

What is monitoring?

CICSPlex SM *monitoring* supports the collection of performance-related data, at user-defined intervals, for named resource instances within a set of CICS systems.

CICSPlex SM monitoring offers the following advantages:

- Summary and detailed information on resources is readily available, enabling you to provide an improved help-desk service.
- System availability and performance are improved by allowing operators to be more effective in investigating problems and seeking out bottlenecks.

At user-defined intervals, monitoring gathers status information and statistics for selected resources, wherever they exist in the CICSplex, and makes them available at any point of control. CICSPlex SM gathers information using standard CICS interfaces (EXEC CICS INQUIRE, EXEC CICS COLLECT STATISTICS) and can be used instead of the CICS Monitoring Facility (CMF). If CMF is running, CICSPlex SM exploits the information provided. Monitoring need not be specified for resources being overseen by real time analysis (see “Implementing RTA” on page 63), as these are monitored separately.

The CICSPlex SM monitoring functions are:

- Monitoring of resources: see “Monitoring of resources” on page 66
- Monitoring interval: see “The monitor interval” on page 66
- Sampling interval: see “The sample interval” on page 66

Monitoring of resources

CICSPlex SM has monitor functions that can periodically monitor the performance of CICS resources.

The data collected by this monitoring activity is either the type of data that is collected by the CICS command EXEC CICS COLLECT STATISTICS, or is *derived* from such data, that is, CICSPlex SM calculates rates, totals, averages, and percentages from the raw statistics data. For local MASs only, CICSPlex SM can also obtain some detailed monitoring data via the CICS monitoring facility (CMF).

The monitor interval

When you monitor the activity of a particular resource, you are usually interested in its performance over a specific period of time. Therefore, when you define a CICSplex to CICSPlex SM, you specify a *monitor interval* for the CICSplex.

Use the **CICSplex definitions** view (CPLEXDEF object) to define a CICSplex. The monitor interval is a period of time, at the end of which counters holding derived monitoring data are reset to zero. For example, if you set the monitor interval to 60 minutes, counters are incremented for 60 minutes, then are reset to zero and the accumulation of monitoring data starts again. This sequence is repeated while monitoring is active. The interval is specified in minutes (15 through 1440), and defaults to 480 minutes (8 hours). Values derived by CICSPlex SM during the monitor interval are prefixed with the letters “MI” in relevant views.

The sample interval

For each type of resource you monitor (such as files or connections), you specify a *sample interval*. The sample interval governs the frequency with which CICSPlex SM collects performance-related data for selected instances of that resource type.

For example, you can specify a sample interval of 300 seconds for files used in a particular group of CICS systems. Values derived by CICSPlex SM during the latest sample interval are prefixed with the letters “CS” in relevant views. Thus, the CS values allow you to identify rapid rates of change, whereas the MI values are more useful in identifying longer-term trends.

Managing monitoring functions

The monitoring functions are set up and managed using the WUI view sets and resource objects.

These are described in Table 5.

Table 5. Monitoring WUI view sets and resource objects

WUI view set	Object name	Description
Monitor definitions	MONDEF	A monitor definition qualifies a resource type identified in a monitor specification by indicating the occurrences of the resource that are to be included in or excluded from monitoring. A monitor definition also identifies which resources are to be reported to the resource status facility when it is activated.
Monitor groups	MONGROUP	A monitor group is used to associate one or more related monitor definitions.

Table 5. Monitoring WUI view sets and resource objects (continued)

WUI view set	Object name	Description
Monitor definitions in groups	MONINGRP	This object displays the names of monitor groups, the monitor definitions associated with them, and the time period during which the monitor definitions are to be active.
Monitor groups in monitor specifications	MONINSPC	This object displays the names of monitor specifications and the monitor groups associated with them.
Monitor specifications to system group links	LNKSMSCG	This object shows CICS system groups associated with monitor specifications.
Monitor specifications to CICS system links	LNKSMSCS	This object shows CICS systems associated with monitor specifications.
Active monitor specifications	POLMON	This object shows information about monitor definitions installed in CICS systems known to the CICSplex identified as the current context.

The monitoring object model is shown in Figure 16 on page 68. The titles of the WUI views are followed by the resource names in parentheses.

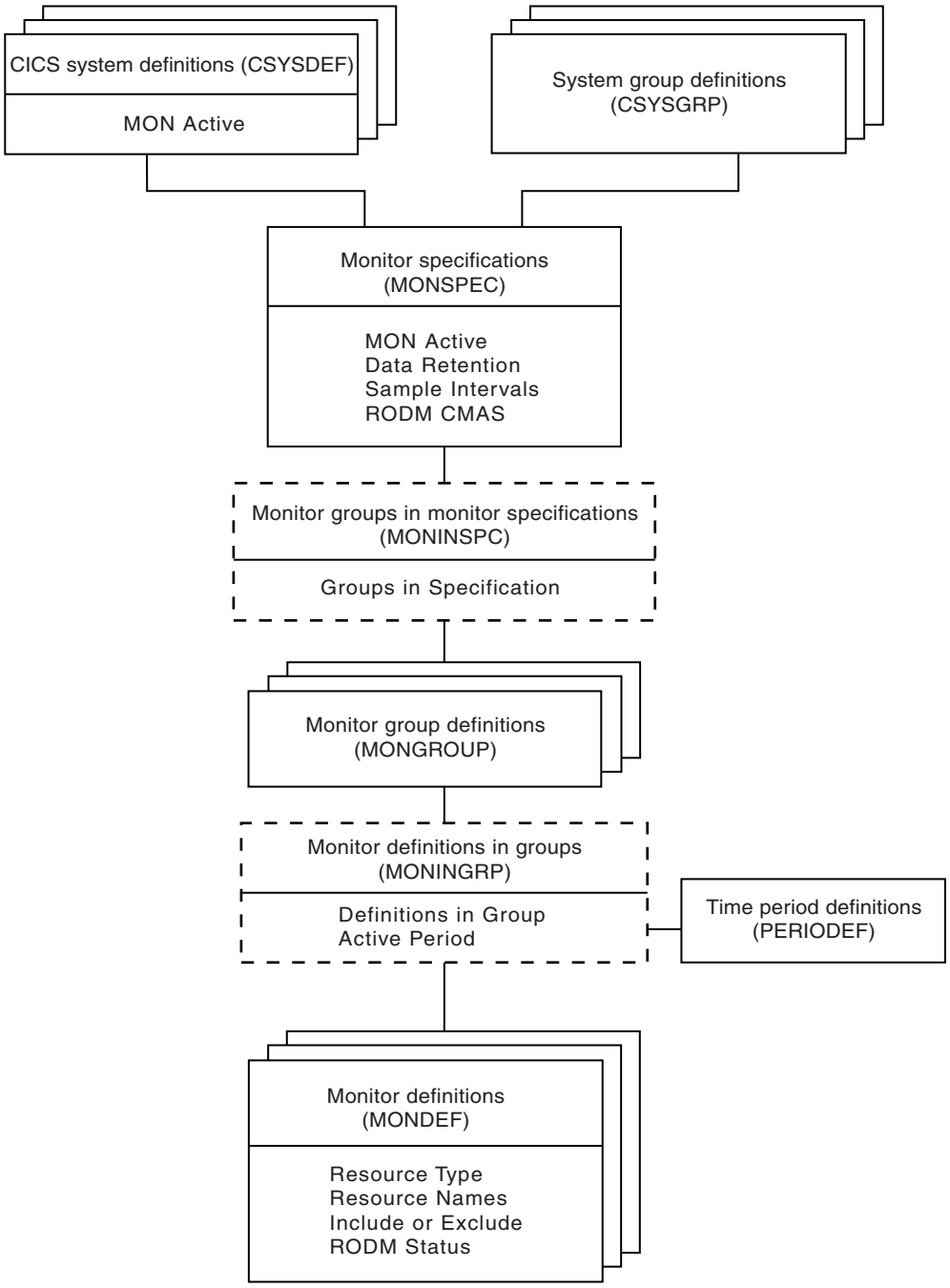


Figure 16. The resource monitoring object model

Planning CICSPlex SM monitoring

When you are planning what to monitor in your enterprise using CICSPlex SM, the following recommendations can help you make best use of the monitoring functions that are available.

Always have a use for the monitor data you request

Each resource class with a sample interval greater than zero has a CICS task in each MAS (that is, in each managed CICS system) for which

monitoring is required. So, for example, if you activate monitoring of transactions in every CICS system in a CICSplex, each MAS is supporting a CICS task to monitor transactions at the specified interval. Also, CMAS processing is required to maintain the monitor-data cache. You can see that general and unrestricted monitoring would very quickly become an unacceptable overhead. Therefore, do not activate monitoring for any CICS system nor for any CICS resource class without being aware of why you want the data.

Identify resources as specifically as possible

CICSPlex SM monitoring is a specialized function that provides detailed usage and performance data. In general, it will be most useful to you for short-term trend analysis, in anticipating future problems, or dealing with actual problems. For example:

- Resources that are limited in quantity can be candidates for monitoring if their use levels are high, because the monitor data will help you to decide whether to increase quantities of the resource.
- Resources for which there is contention are also good candidates. Such data can help you to assess the impact of contention on throughput.

However, you should give some thought to understanding which resources are of greatest interest to you. For example, are you really interested in CICS-supplied resources? Often it is tempting to supply an asterisk (*) as the resource name, which effectively means any instance of the specified resource. If you are not interested in every occurrence, use generic name patterns; for example, you can ask for monitoring of all transactions beginning "PAY" by specifying the resource name "PAY*". Similarly, resources whose status is being reported to the resource status facility should be identified as fully as possible.

Specify as long a sample interval as you can

The shorter the sample interval you specify for a resource class, the greater the cost of gathering the monitoring data. For example, if you set the sample interval to one second for every resource, no other CICSPlex SM work is going to get done at all. Therefore, always specify the longest possible sample interval at which you can obtain useful data. To determine exactly what this interval should be, you must apply what you already know about any particular resource instance. In general, the sample interval should reflect the probable level of use of the resource: if you find that successive sampling of a resource is not showing significant changes, you should increase the sample interval. The sample interval should also have some relationship to the frequency with which the CICSPlex SM or NetView operator will be looking at the monitor data.

Specify as long a monitor interval as you can

The monitor interval determines the frequency with which counters holding accumulated monitor data are reset to zero. You should set it to a value that is significant in your enterprise, so that the information you get from it is also significant. For example, the interval could be a shift duration, or some other time during which a particular workload is being processed.

You are recommended not to make the interval too short, not only because CICSPlex SM overheads grow as the monitor interval reduces, but also because too short an interval is unlikely to provide you with useful statistics.

Do not define more monitor specifications than you really need
Avoid having too many monitor specifications, not only because of the extra work involved in creating them and associating them with CICS systems, but also because a CICS system can belong to only one monitor specification at a time. The more monitor specifications you define, the smaller the opportunity for establishing a general-purpose monitoring policy.

Specify a suitable retention period
You don't have to specify a retention period. However, the retention period defaults to zero minutes, and so as soon as monitoring stops for any CICS system, that system's monitor data is lost. If some unexpected event occurs, the data could be invaluable, so setting the retention period greater than zero is advisable. Note, however, that if a CICS system stops, monitor data is lost when you restart the system regardless of any retention period you may have specified. In this case, it's important to look at the monitor data before you restart the CICS system.

You can set the retention period to any value between 1 and 1440 minutes (24 hours). You can specify a retention period on the monitor specification, in which case that period applies to every CICS system associated with the monitor specification. Alternatively, you can specify a retention period in the CICSPlex SM CICS system definition.

Decide when to activate monitor definitions
When you add a monitor definition to a monitor group, you can specify the part of the day during which it is to be active. You should make considered use of this feature. For example, you probably will not want monitoring active overnight, or during any period when general use is low and no one is around to view the data, so ensure that monitor definitions are not in effect at those times. Also, if you're monitoring resources for which there is contention, think about when this contention occurs. Is it constant, or does it occur only between 0900 and 1100 hours? If the latter, limit your monitoring to that period.

Implementing CICSPlex SM monitoring

Possibly the best way to implement CICSPlex SM monitoring is to start with no monitoring at all, and to implement it piecemeal for particular CICS systems and CICS resource instances.

That is:

1. Create a monitor specification, and associate it with every CICS system in the CICSplex. However, ensure that every sample interval remains at its default value of zero, and that monitor status remains set to “OFF”. This is because the one thing you must have in place before you can gather any monitoring data is a monitor specification. If you follow these instructions, monitoring will be enabled, but not *activated*.
2. When you decide to monitor a particular resource instance, as used by one of the CICS systems in the CICSplex, you must:
   a. Update the CICS system definition to switch monitoring on, and to specify a sample interval for the resource. You make this change to an active CICS system, using the Topology **Runtime MAS display** view (MAS object), and it applies for the current execution of the CICS system only.
   b. Create a monitor definition to name the resource instance, and install it manually in the CICS system.

3. Repeat this piecemeal approach to monitoring until it becomes apparent that you have some regular requirements. At that point, consider installing the monitor definitions automatically (and for every execution of the CICS system) by adding the monitor definitions to a monitor group, and associating the monitor group with the monitor specification. You can make the sample interval and monitor status permanent by setting them either in the monitor specification—in which case, they apply to all CICS systems associated with the monitor specification and for which an appropriate monitor definition has been provided—or in the CICS system definition, in which case they affect no other CICS system.

You can refine your approach to monitoring gradually, by creating additional monitor specifications for the CICSplex, for example, and by using timed monitor definitions, which are installed automatically for a specified duration. Remember that:

- Although you can make changes to a monitor specification while it is in use, the effect of those changes is not felt until the CICS system is next started. Note, however, that you can use the MAS view to change monitoring values for an active CICS system.
- A CICS system can be associated with only one monitor specification at a time.
- You can associate a monitor specification with a CICS system that is already running, but the effect of that new association is not felt until the CICS system is next started.

Aim to ensure that any monitor specifications and monitor definitions you provide support the normal situation, and that CICS system overrides are used for the exceptions.

Activating the resource status facility

To activate the resource status facility you must do the following:

- Update the CICSPlex SM definitions of those CICSplexes whose resources are to be reported to the resource status facility.
- Update or create monitor definitions to set the resource status facility Status flag to YES and to identify resource instances.
- Update or create monitor specifications to set the sample interval for each resource type.

Instructions for all of these tasks are provided in Administering CICSPlex SM and Resource monitoring in Monitoring.

For more information about the resource status facility see the description of the **RESSTATUS** parameter in CICSPlex SM system parameters in Installing.

Using the CICS Monitoring Facility (CMF) with CICSPlex SM

Some classes of monitoring data for CICSPlex SM, in particular detailed task-related data that is displayed in some transaction monitoring views, cannot be collected unless CICS performance class data monitoring is active in the monitored CICS system.

You can activate performance class data monitoring for an active CICS region using the CICSPlex SM operations functions, the CICS monitoring facility transaction CEMN, or the **SET MONITOR** command. Alternatively, you can activate performance class data monitoring permanently using CICS system initialization parameters.

CICS monitoring data is usually written to an SMF data set. However, if you prefer, you can collect monitoring data for use by CICSPlex SM without having it written to an SMF data set, by specifying the CICSPlex SM system parameter **SUPPRESSCMF**. For more information about this parameter, see CICSPlex SM system parameters in Installing.

For more information about the different classes of monitoring data, and about controlling the CICS monitoring facility, see Introduction to CICS monitoring in Monitoring.

A recommended approach

When you decide to implement monitoring functions in your enterprise, begin by defining the appropriate objects.

1. Create the following objects:
   - Use the **Monitor definitions** view to create a monitor definition (MONDEF object).
   - Use the **Monitor groups** view to create a monitor group (MONGROUP object).
   - Use the **Monitor specifications** view to create a monitor specification (MONSPEC object).
2. Create associations between these objects:
   - Use the **Monitor definitions** view to add the monitor definition to the analysis group (MONINGRP object).
   - Use the **Monitor groups** view to add the monitor group to the analysis specification (MONINSPC object).
   - Use the **Monitor specifications to CICS system links** view (LNKSMSCS object) and the **Monitor specifications to CICS system group links** view (LNKSMSCG object) to associate the monitor specification with a CICS system or CICS system group. For more information about the LNKSxSCG parameters, see Special attribute and resource table considerations: LNKSxSCG Records (LNKSMSCG, LNKSRSCG, LNKSWSCG).

You can use the **Map** button to display a visual map of the monitor definitions in your data repository. If you want to see a list of the objects and associations you have already defined, use the **Monitor definitions in groups** view (MONINGRP object), the **Monitor groups in monitor specifications** view (MONINSPC object), the **Monitor specifications to CICS system links** view (LNKSMSCS object), and the **Monitor specifications to CICS system group links** view (LNKSMSCG object) view.

Where next?

Once you have identified your monitoring requirements, you should define them to CICSPlex SM.

This is described in IBM 3174 Establishment Controller: Functional Description.

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- Developing applications
- Developing system programs
- RACF security overview
- Developing for external interfaces
- Reference: application developmenth
- Reference: system programming
- Reference: connectivity

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- Data Areas
- Diagnosis Reference
- Problem Determination Guide
- CICSPlex SM Problem Determination Guide

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