

# CICSplex Systems Management Overview

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## Overview

- CPSM Benefit and Functions
- CPSM Interfaces
- Operations
- Business Application Services
- Workload Management
- Real Time Analysis

## CICSplex SM Benefits

- **Provides a Single System Image**
  - Allows data from multiple CICS systems to be viewed in a single view.
  - For instance, all Tasks associated with a unit of work can be displayed on one view.
  
- **Provides a Single Point of Control**
  - Resources can be installed or modified in multiple CICS systems by performing a single action.
  - CICS systems in the CICSplex can be modified from the one view.

## CICSplex SM Benefits

- **Systems management functions via the following interfaces**
  - Web User Interface
  - Batch repository update
  - Application Programming Interface
  
- **Integrates with Tivoli Business System Manager**
  - Collects and displays CPSM information
  - Can link to the Web User Interface

## CICSplex SM Functions

- **Operations**

- Allows modification of managed CICS systems and modification of resources installed on those systems.

- **Business Application Services**

- Used to create, update, and install resource definitions. Definitions can be installed on multiple systems in a single action.
- CICS Configuration Manager can assist with migration of definitions from the CSD to CPSM Data Repository and from the Data Repository to the CSD, it also provides Configuration Management.

## CICSplex SM Functions

- **Real Time Analysis (Threshold Analysis)**

- Provides automatic, external notifications when certain conditions occur.
- Can automatically perform simple modifications to a resource when certain conditions occur.

- **Workload Management**

- Dynamically routes work across CICS systems in the CICSplex to meet defined goals.

## CICSplex SM Interfaces

- **Web User Interface**

- View and manipulate CICS and CPSM information through a web browser
- Views can be customized via the View Editor
- Interface is NLS enabled
- Browsers connect to a Web User Interface server (a specialized CICS system).

**CICS region**  
 EYUVC12801 15 records collected at 2004/1/006 15:32:37.

Context: APOLLO      Automatic refresh:  60 seconds.  
 Scope: APOLLO      Refresh

15 records on 1 pages.

| Record name | CICS system name | Job name | MVS system ID | Current number of tasks | CICS status | CICS Release | Total CPU time used | Number of page-in requests | Number of page-out requests | Number of IO requests |
|-------------|------------------|----------|---------------|-------------------------|-------------|--------------|---------------------|----------------------------|-----------------------------|-----------------------|
| 1           | IYEMST01         | IYEMST01 | MV51          | 4                       | ACTIVE      | 0640         | 0:02:16.6065        | 0                          | 0                           | 18976                 |
| 2           | IYEMST02         | IYEMST02 | MV51          | 4                       | ACTIVE      | 0640         | 0:00:04.0860        | 0                          | 0                           | 9130                  |
| 3           | IYEMST03         | IYEMST03 | MV51          | 3                       | ACTIVE      | 0640         | 0:00:04.5808        | 0                          | 0                           | 10629                 |
| 4           | IYEMST05         | IYEMST05 | MV51          | 4                       | ACTIVE      | 0640         | 0:00:04.2426        | 0                          | 0                           | 9335                  |
| 5           | IYEMST07         | IYEMST07 | MV51          | 4                       | ACTIVE      | 0640         | 0:00:03.9259        | 0                          | 0                           | 9364                  |
| 6           | IYEMST09         | IYEMST09 | MV51          | 4                       | ACTIVE      | 0640         | 0:00:03.7781        | 0                          | 0                           | 9890                  |
| 7           | IYEMST11         | IYEMST11 | MV51          | 3                       | ACTIVE      | 0640         | 0:00:03.3687        | 0                          | 0                           | 8686                  |
| 8           | IYEMST12         | IYEMST12 | MV51          | 3                       | ACTIVE      | 0640         | 0:00:04.4269        | 0                          | 0                           | 10643                 |
| 9           | IYEMST13         | IYEMST13 | MV51          | 4                       | ACTIVE      | 0640         | 0:00:04.1407        | 0                          | 0                           | 10143                 |
| 10          | IYEMST14         | IYEMST14 | MV51          | 5                       | ACTIVE      | 0640         | 0:00:04.2977        | 0                          | 0                           | 9454                  |
| 11          | IYEMST15         | IYEMST15 | MV51          | 3                       | ACTIVE      | 0640         | 0:00:05.3946        | 0                          | 0                           | 9799                  |
| 12          | IYEMST17         | IYEMST17 | MV51          | 4                       | ACTIVE      | 0640         | 0:00:04.1048        | 0                          | 0                           | 9530                  |
| 13          | IYEMST18         | IYEMST18 | MV51          | 3                       | ACTIVE      | 0640         | 0:00:03.7951        | 0                          | 0                           | 9231                  |
| 14          | IYEMST19         | IYEMST19 | MV51          | 3                       | ACTIVE      | 0640         | 0:00:04.2419        | 0                          | 0                           | 9713                  |
| 15          | IYEMSW1W         | IYEMSW1W | MV51          | 10                      | ACTIVE      | 0640         | 0:03:08.1087        | 0                          | 0                           | 93522                 |

- This screen shows a WUI Tabular View the screen shows information about a number of CICS systems in a CICSplex. The screen is constructed as follows:
  - On the left of the screen there is a Navigation Menu for going directly to views containing information
  - The main part of the screen starts with the view title (in the case CICS region)
  - There is then a message area
  - Then there are a series of filters and a button for refreshing the screen
  - Next there are a series of columns that show selected information about CICS system in the CICSplex (for example “Job name” “Current number of tasks” and “CICS status”)



## CICSplex SM Interfaces

### ▪ **Application Programming Interface**

- Allows you to write programs to monitor and control resources and CICS systems
- Allows you to write programs that perform functions on CPSM administrative functions
- Can be used with C, PL/I, Cobol, REXX and Assembler via EXEC CPSM verb

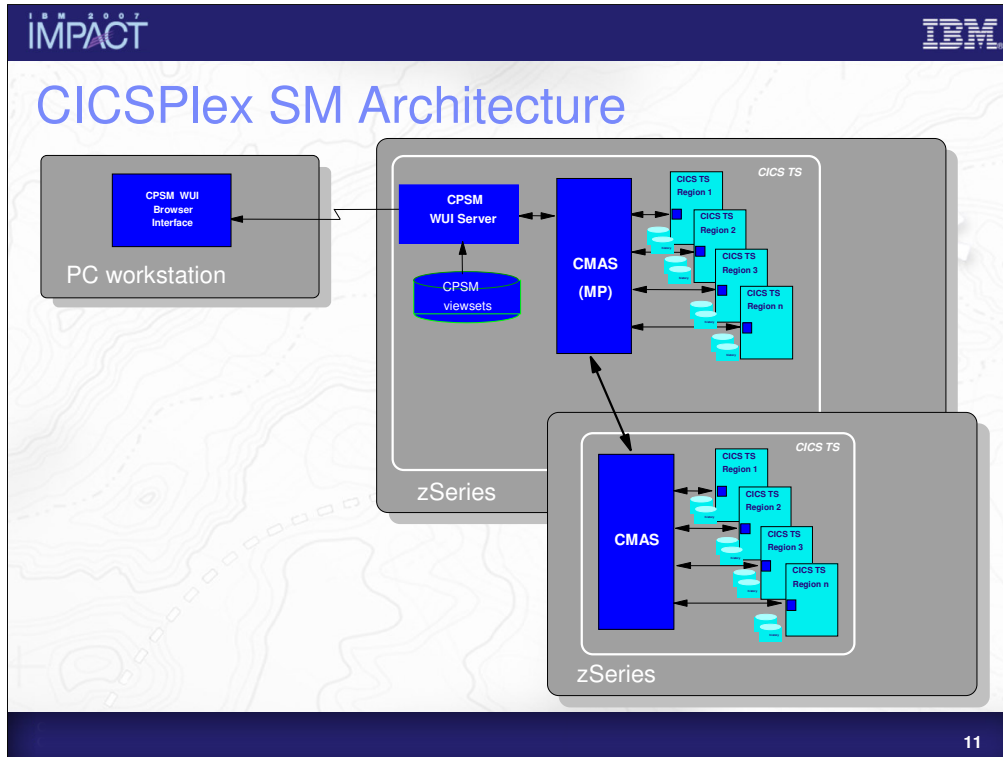
### ▪ **Batched Repository Update**

- Can be used to create new definitions
- Assists with migration from the CSD
- Assists with migration from one CICSplex to another
- Jobs can be started via the WUI or via JCL

## CICSplex SM Interfaces

### ▪ CPSMUTIL

- Alternative migration tool to using BATCHREP
  - Avoids to need to update BATCHREP input during migration by providing overrides
- Compiled REXX program
  - Includes Rexx Alternate Runtime Library
- Available as an unsupported Support pack for CICS TS 1.3, 2.2, 2.3 and 3.1
  - Known as CS1G
  - Available from:
    - <http://www-1.ibm.com/support/docview.wss?uid=swg24011552>



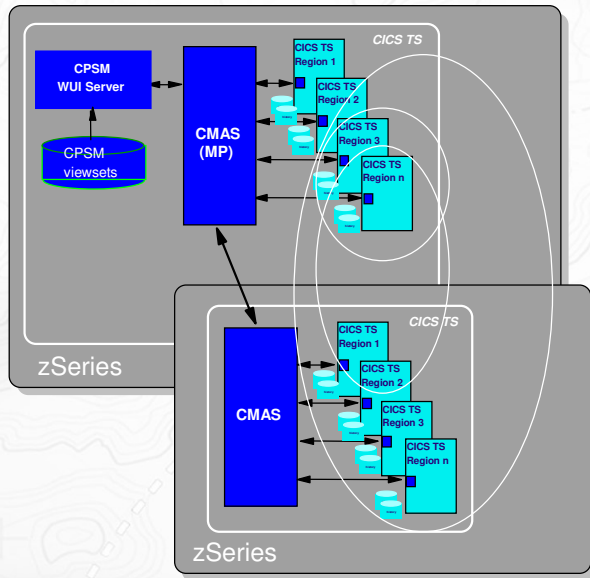
This diagram shows a set of CICS systems participating in a CICSplex. The CICSplex is split across two MVS images.

There is a CPMAS in each imaging managing the systems in that image. A CPMAS is a specialized CICS system that manages the participation of CICS systems in a CICSplex.

One of the CPMAS is labelled MP, this means it is the Maintenance Point CPMAS. The MP CPMAS has overall responsibility for managing the whole of the CICSplex.

Connected to the MP CPMAS is a CPSM WUI Server. This is a specialized CICS region that serves up HTML pages to users Web Browsers when they are interacting with CPSM via the Web User Interface.

## Grouping CICS Systems



- CICS system can only belong to one CICSplex.
- CICS systems can be grouped together.
  - e.g. FORs, TORs, AORs
- A CICS system can belong to more than one group.

This diagram shows that CICS regions in a CICSplex can be grouped in any you like. Regions do not have to be in the same MVS Image to belong to the same group, and a region may belong to more than one group at the same time.

## Operations

- Similar to CEMT
  - Some views show more information than CEMT (e.g. for CICS regions)
- Can view information on a resources across all CICS systems in a scope
- Can perform action on resources across all systems in a scope in one operation

The screenshot shows the IBM IMPACT interface for CICS operations views. At the top, there is a dark blue header with the IBM logo and the text 'IBM 2007 IMPACT'. Below the header, the page title is 'CICS operations views'. A light blue bar contains two input fields: 'Context: APOLLO' and 'Scope: APOLLO', with a 'Set' button to the right. Below this bar, the main content area is titled 'CICS operations views' and contains a list of 20 hyperlinks, each representing a different type of CICS operation view. At the bottom left, there is a section for 'Related resources' with one link: 'Monitoring views'. At the bottom right, the text 'Menu name: EYUSTARTOPERATE' is displayed. The footer of the page is a dark blue bar with the number '14'.

IBM 2007 IMPACT

IBM

CICS operations views

Context: APOLLO

Scope: APOLLO Set

CICS operations views

- [CICS Business Transaction Services \(BTS\) operations views](#)
- [CICS region operations views](#)
- [Connection operations views](#)
- [DB2 and DBCTL operations views](#)
- [Document template operations views](#)
- [Enqueue model operations views](#)
- [Enterprise Java component operations views](#)
- [Exit operations views](#)
- [FEPI operations views](#)
- [File operations views](#)
- [Journal operations views](#)
- [Program operations views](#)
- [Task operations views](#)
- [TCP/IP service operations views](#)
- [Temporary storage queue \(TSQ\) operations views](#)
- [Terminal operations views](#)
- [Transient data queue \(TDQ\) operations views](#)
- [Transaction operations views](#)
- [Unit of work \(UOW\) operations views](#)

Related resources

- [Monitoring views](#)

Menu name: EYUSTARTOPERATE

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The above diagram shows a the “CICS operations views” menu from the Web User Interface. It is possible to see details of all your regions and the resources installed within them from this menu.

**Active task**

EYUVC1280I 4 records collected at 2004/10/06 15:47:19.

Context='APOLLO' Scope='APOLLO' Task ID=' Transaction ID='CEDA' Dispatch status=' Automatic refresh:  60 seconds. Refresh

4 records on 1 pages.

| Record | CICS system name | Task ID | Transaction ID | Dispatch status | User ID | Principal facility | VTAM LU name         | Task priority | Transaction class | Time task has been suspended |
|--------|------------------|---------|----------------|-----------------|---------|--------------------|----------------------|---------------|-------------------|------------------------------|
| 1      | IYEMST01         | 0004470 | CEDA           | SUSPENDED       | CTSQQ1D | TC14               | '000000000000000000X | 1             | DFHTCL00          | 0:51:19                      |
| 2      | IYEMST07         | 0000077 | CEDA           | SUSPENDED       | CTSQQ1D | TC02               | '000000000000000000X | 1             | DFHTCL00          | 1:09:15                      |
| 3      | IYEMST11         | 0000089 | CEDA           | SUSPENDED       | CTSQQ1D | TC11               | '000000000000000000X | 1             | DFHTCL00          | 0:04:43                      |
| 4      | IYEMST13         | 0000091 | CEDA           | SUSPENDED       | CTSQQ1D | TC13               | '000000000000000000X | 1             | DFHTCL00          | 0:27:02                      |

4 records on 1 pages.

Set attributes... Purge...

Resource name: TASK. View name: EYUSTARTTASK.TABULAR

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This diagram shows the “Active task” view from the Web User Interface. It shows some details of tasks that have a Transaction ID of CEDA in four different CICS regions in a CICSplex.

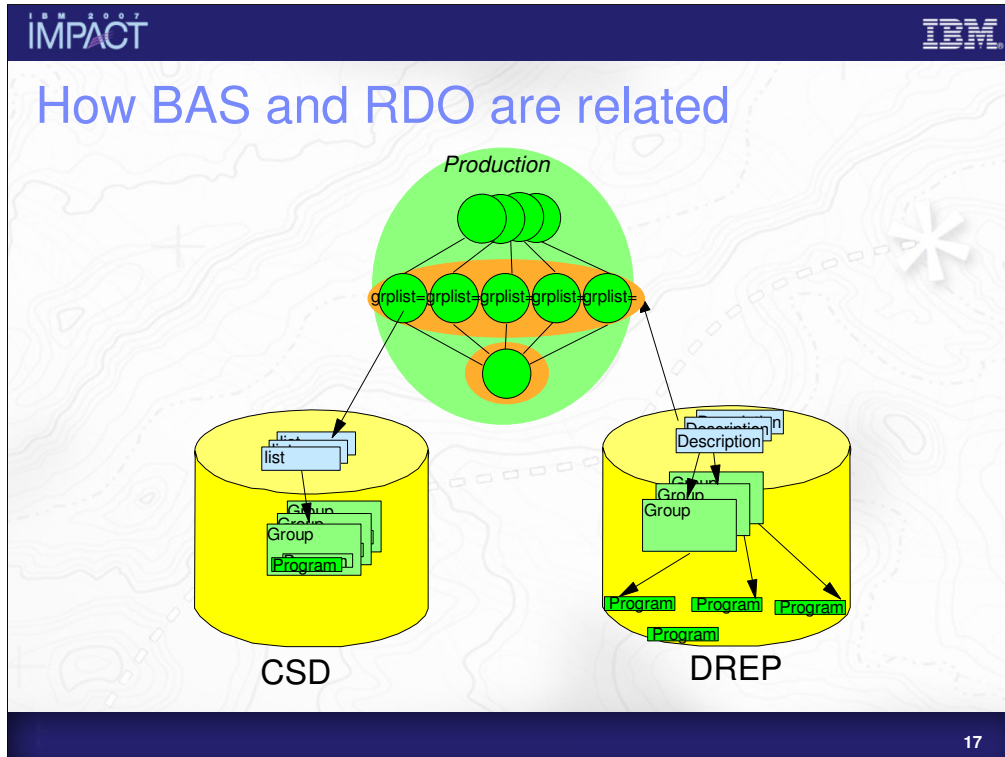
Detailed information for a specific task is available by clicking on a Task ID you are interested in.

Users can also set alterable attributes of the task or perform a task Purge from this view.

## Business Application Services (BAS) – Defining Resources

- **BAS is similar to RDO, except**
  - A resource can belong to more than one group
  - Allows creation of resource definitions for all supported releases of CICS
  - Resource Assignments enables flexible resource deployment
  - Logical Scoping, e.g. resources can be grouped according to the application they are used in
  - SYSLINK construct simplifies connection installation





The above diagram shows the ways in which RDO and BAS are related.

RDO definitions reside on the CSD, while BAS definitions reside on the CPSM Data repository.

In RDO resources are contained within groups and a resource can belong to only one group.

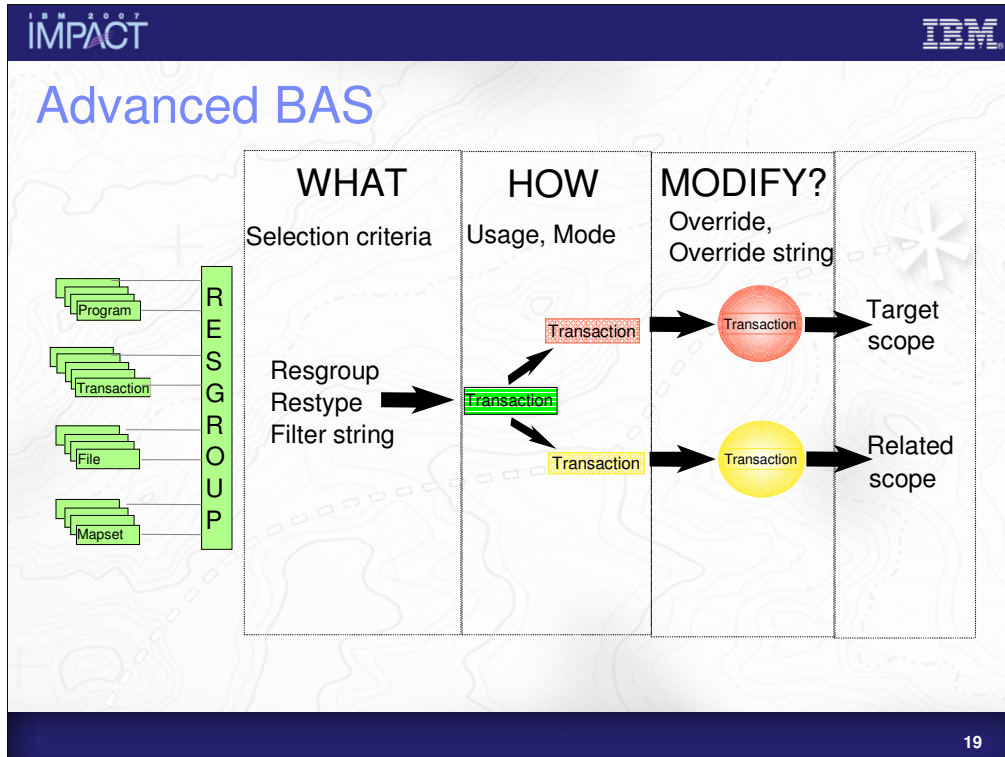
In BAS resources can exist without belonging to a Group and can belong to more than one group at once.

To install RDO resources upon system start up, resources are added to a List and this List is then specified in the JCL for the region.

In BAS this is done through the use of a Resource Description which (through CPSM) is associated with a CICS region or a group of CICS regions.

## BAS and RDO comparison

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>▪ RDO             <ul style="list-style-type: none"> <li>- Repository                 <ul style="list-style-type: none"> <li>- Sysplex shared</li> <li>- Discrete - need copies</li> </ul> </li> <li>- Data                 <ul style="list-style-type: none"> <li>- volume - baseline</li> <li>- consistency - CHECK cmd</li> </ul> </li> <li>- Access control                 <ul style="list-style-type: none"> <li>- dataset RACF</li> <li>- records LOCK/UNLOCK</li> </ul> </li> <li>- Install span of control                 <ul style="list-style-type: none"> <li>- Coldstart</li> <li>- region -&gt; Sysplex</li> </ul> </li> <li>- Runtime                 <ul style="list-style-type: none"> <li>- Single system</li> </ul> </li> <li>- API access                 <ul style="list-style-type: none"> <li>- No access to CSD data</li> <li>- EXEC CICS CREATE</li> </ul> </li> <li>- Integration into runtime                 <ul style="list-style-type: none"> <li>- None</li> </ul> </li> <li>- Interface                 <ul style="list-style-type: none"> <li>- 3270 from within CICS</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>▪ BAS             <ul style="list-style-type: none"> <li>- Repository                 <ul style="list-style-type: none"> <li>- Globally shared</li> <li>- No need to copy things around</li> </ul> </li> <li>- Data                 <ul style="list-style-type: none"> <li>- volume - less due to sharability</li> <li>- consistency - increased</li> </ul> </li> <li>- Access control                 <ul style="list-style-type: none"> <li>- dataset RACF</li> <li>- records RACF</li> </ul> </li> <li>- Install span of control                 <ul style="list-style-type: none"> <li>- Coldstart</li> <li>- Global</li> </ul> </li> <li>- Runtime                 <ul style="list-style-type: none"> <li>- Global</li> </ul> </li> <li>- API Access                 <ul style="list-style-type: none"> <li>- Full access from CICS, batch, TSO, NetView</li> </ul> </li> <li>- Integration into runtime                 <ul style="list-style-type: none"> <li>- enables subset resource management</li> </ul> </li> <li>- Interface                 <ul style="list-style-type: none"> <li>- Web Browser via WUI</li> </ul> </li> </ul> </li> </ul> |
|---|---|



This diagram shows how Resource Assignments can be used in BAS.

A Resource Assignment allows you to alter how a resource is installed (at install-time) without changing the definition itself.

In the example above we want to install a specific transaction as dynamic in one system and static in another.

The transaction is defined as static on the data repository.

The resource assignment allows us to do the following:

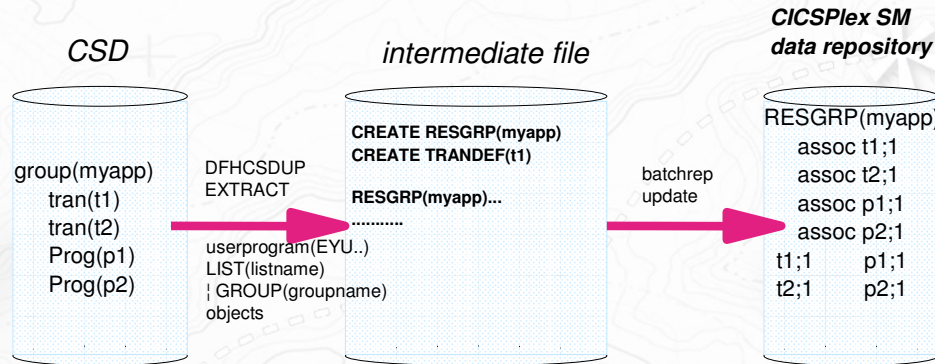
- Select which transaction we wish to alter at install time
- Change how it is installed
- Modify any resource attributes

So we select the transaction we want and install it as Remote in one system and Static in another system.

## Resource Assignment Advantages

- Easier to see where resources are assigned and how
- Can share resources across multiple environments
- Easier to do global change
- Increased consistency - no mismatches
- Movement from test; QA; production
- No need to edit resource definitions to adapt to topology change
- New application version becomes Resource Description, Resource assignments and changed definitions

# Resource definition migration



The diagram above shows the migration of definitions from a CSD to the CPSM Data Repository.

NOTE!! If you are not using the BAS function in CPSM you do not need to migrate off the CSD, you can continue using RDO as normal.

Resource definitions are extracted from the CSD using DFHCSDUP. This creates a flat file which can be used as input to a BATCHREP job to load the resource definitions into the Data Repository.

The screenshot displays the IBM IMPACT interface for BAS Administration Views. At the top, the title "BAS Administration Views" is shown. Below it, a box titled "CICS resource definitions using Business Application Services (BAS)" contains three bullet points: "Analysis point monitoring administration views", "Basic CICS resource administration views", and "Fully functional Business Application Services (BAS) administration views". Red arrows point from the last two items to two side-by-side screenshots of the web user interface.

The left screenshot, titled "Basic CICS resource administration views", shows a form with the following fields:
 

- CMAS context: [YKJZDD1]
- Context: [JWBFLX1]
- Scope: [JWUPLX1]

 Below the form are sections for "Definitions", "Associations", and "Resources deployed by ...". The "Definitions" section includes links for "CICS resource definitions", "Resource groups", and "Resource descriptions". The "Associations" section includes links for "CICS resource definitions in resource group", "Resource groups in description", and "CICS system links". The "Resources deployed by ..." section includes links for "Resource description" and "CICS system".

The right screenshot, titled "Fully functional Business Application Services (BAS) administration views", shows a similar form with the following fields:
 

- CMAS context: [YKJZDD1]
- Context: [JWBFLX1]
- Scope: [JWBFLX1]

 Below the form are sections for "Definitions", "Associations", and "Resources deployed by ...". The "Definitions" section includes links for "CICS resource definitions", "Resource groups", "Resource assignments", and "Resource descriptions". The "Associations" section includes links for "CICS resource definitions in resource group", "Resource groups in description", "Resource assignments in description", and "CICS system links". The "Resources deployed by ..." section includes links for "Resource description", "Resource assignment", and "CICS system".

At the bottom right of the interface, the text "Menu name: EYU8TARTADMBS2" is visible. The slide number "22" is located at the bottom right corner of the slide.

The above diagram shows the two types of BAS menu in the Web User Interface. When not using Resource Assignments you may want to use the “Basic” menu and the “Full” menu for when you do. However, when not using Resource Assignments either menu can be used.

Transaction Definition

Transaction definition name   Aa

Definition version

Definition description   Aa

Resource group name

User data area 1   Aa

User data area 2   Aa

User data area 3   Aa

First program name

Size in bytes of transaction work area (TWA)   (0-32767, blank)

Transaction profile   Aa

Default application partition set

Enabled status

Primed storage allocation   (0-65520, blank)

Task data location

Task data key

Storage clearance status

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The above diagram shows what it looks like when defining BAS resources in the Web User Interface. The resource we are defining in this case is a Transaction Definition.

Most fields are exactly the same as the ones you will find in RDO but there are a few differences:

- “Definition versions” allow you to create up to 15 versions of a resource using the same definition name.
- User data areas allow you to enter site specific information
- As CPSM allows different releases of CICS in a CICSplex there may be additional attributes in the view to support previous CICS releases

**CICS resource definitions in resource group**

EYUVC1280I 2 records collected at 2004/10/06 15:45:57.

Context: APOLLO

Resource group name: [dropdown]

Resource definition name: [dropdown] Aa

Resource definition version: [dropdown]

Resource definition type: [dropdown]

Automatic refresh:  60 seconds.

2 records on 1 pages.

| Record                     | Resource group name | Resource definition name | Resource definition version | Resource definition type | Last time definition changed |
|----------------------------|---------------------|--------------------------|-----------------------------|--------------------------|------------------------------|
| 1 <input type="checkbox"/> | PJGROUP             | PJPROG                   | 1                           | PROGDEF                  | 2004/10/06 15:45:30          |
| 2 <input type="checkbox"/> | PJGROUP             | ABCD                     | 1                           | TRANDEF                  | 2004/10/06 15:45:04          |

2 records on 1 pages.

Resource name: RESINGRP. View name: EYUSTARTRESINGRP.TABULAR

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The above view is from the Web User Interface. It shows a Program definition (PJPROG) and a Transaction definition (ABCD) associated with Resource group PJGROUP.



## Workload Management

- Balances work from multiple routing regions across multiple target regions
- Target region selected using one of two methods:
  - Queue.
  - MVS Goal.
- Workload Separation
  - Work can be balanced across a sub-set of target regions.
- Affinity Handling
  - e.g. if all transactions must run in same system
- The following work can be routed:
  - Transactions, Dynamic program link requests, EXEC CICS START TRANSID TERMID requests, BTS processes and activities, 3270 bridge requests, EJB requests, non-terminal STARTs.

## Workload Management Algorithms

- **Work is not balanced in a round-robin fashion**
  - WLM selects the system most likely to meet specified criteria (mentioned below).
  - If all target regions can handle the work within a specified criteria then a system is selected at random.
  
- **Queue algorithm**
  - Selects the system with shortest queue of work (load count) relative to system MAXTASKS
  - The system least likely to be affected by SOS, SYSDUMP and TRANDUMP conditions
  - The system least likely to cause the transaction to abend

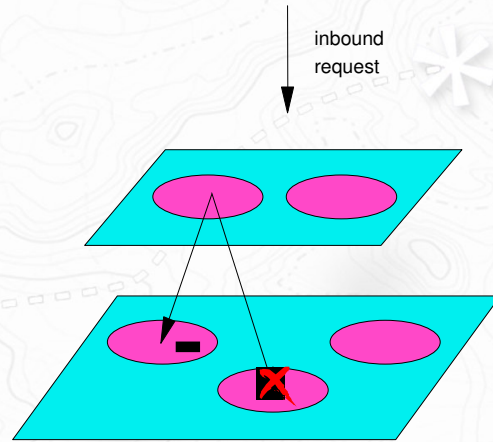
## Workload Management Algorithms

- Goal algorithm
  - Is most likely to meet average MVS WLM response time goals
  - Therefore Goals must be defined to MVS WLM



## Workload Management Affinities

- Inbound request routed
- Creates data in a region
- Next part routed to different region
- At best request fails
- WLM will honor such affinities to prevent failure



## Real Time Analysis

- Can send notifications about any aspect of a resource's state in which you express an interest – not just error conditions.
- Notification take two forms
  - Console messages
  - SNA Generic alerts (can be used by NetView)
  - ...or both
- When a condition is triggered, an EVENT also appears in the EVENT view.
- CPSM can also perform simple modifications to resource when a notification is sent.
  - You can create CPSM API applications to listen for RTA events and take actions accordingly.

## Real Time Analysis

- RTA is divided into two main areas
  - System Availability Monitoring (SAM)
  - RTA resource monitoring
- RTA resource monitoring divided into two further areas
  - MAS Resource Monitoring (MRM)
  - Analysis Point Monitoring (APM)

## RTA System Availability Monitoring

- In a basic setup detects the following conditions
  - Short on Storage
  - System dump in progress
  - Transaction dump in progress
  - System has reached MAXTASKS limit
  - Tasks stalling because of resource contention
  
- If time period for a CICS system being active is given, a message is sent if the system is not active during this time.
  
- Messages produced can be customized

## RTA MAS Resource Monitoring

- Able to send notifications when the status of a specific (or generic) resource reaches a certain threshold.
- Threshold can be simple
  - e.g. status of Connection SYS1 is RELEASED
- Threshold can be made more sophisticated by combining simple thresholds with logical operators
  - e.g. Use Count of transaction ABCD is greater than 50 OR less than 5
- Possible to specify a number of times the threshold must be breached before CPSM will issue an alert.



## RTA MAS Resource Monitoring

- When generic resource being analysed an aggregation of the status can be tested
  - e.g. average Use Count across all transactions matching M\*
- MRM allows the use of user-written status programs to monitor resources not managed by CPSM.
- A threshold can apply to an individual system or groups of systems. Each system in the group will issue a notification when required.

## RTA Analysis Point Monitoring

- Thresholds can be set in the same way as MRM.
- In a group of systems, one notification is issued when a threshold is reached.
- Useful when there is a group of cloned systems.

## RTA – Performing Actions

- RTA can perform SET actions on resources when a threshold is reached.
- Products such as NetView can be set to listen for SNA Generic alerts and run REXX API scripts as required.
- A CPSM API application can use the LISTEN verb to wait for notifications and then take appropriate action.

## CICSplex SM Summary

- Fully functional Single System Image System Management tool
- Provided as part of CICS Transaction Server
- Providing
  - Resource definition
  - Operations
  - Thresholding
  - Automation
  - Dynamic workload management
  - Modern Browser interface
  - Scripting APIs
  - Integration with IBM System Management tooling

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**Questions  
and  
Answers**

impact·venture\*

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