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Session Number: T&MS14 *Towards 24x7: Managing Application Program Libraries Dynamically*

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This session will introduce you to dynamic LIBRARY support, what a LIBRARY is, and how to make use of the support.

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Dynamic LIBRARY Support

- CICS Transaction Server for z/OS V3.2 introduces the ability to dynamically introduce data sets from which program artifacts are to be loaded, without restarting the CICS region. This allows such data sets to be defined dynamically in addition to the existing means of defining them statically in the DFHRPL concatenation.
- A dynamic LIBRARY represents a PDS or PDSE, or a sequence of concatenated PDS/PDSEs, containing program artifacts that make up for example an application or group of applications. DFHRPL is a special example of a LIBRARY that cannot be altered in a running CICS system.
- This session will introduce dynamic LIBRARY support, explain how it can be used and why you might want to do so, and describe how to define and use dynamic LIBRARYs.

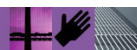
The objectives of this session are to explain the new support for dynamic program LIBRARY management in CICS Transaction Server V3.2, which allows you to introduce new applications into CICS without restarting the CICS region.

The session will take you through some scenarios which illustrate the benefits of this new capability, and will then explain the details of how to define data sets containing program artifacts in dynamic LIBRARY resources.

This will include how you specify the order in which CICS searches for programs, how to do this in conjunction with the existing static DFHRPL, and how to find out where a program has been loaded from. The session will also look at audit logging for LIBRARY resources, security, statistics, and at messages issued for LIBRARY resources.

Dynamic LIBRARY Support - Topics

- Overview (the problem and its solution)
- New LIBRARY resource
- Some example scenarios
- Defining and installing a LIBRARY
- LIBRARY Inquire, Set and Discard
- INQUIRE PROGRAM enhancements
- Audit logging
- Security
- Statistics
- Exits
- Messages



The first topic will give an overview of the problem and how it has been solved by this support.

The new resource that is introduced, a LIBRARY, will then be explained, with some details about its attributes.

We will then look through a few scenarios which show how this support might be used in a (hypothetical) real-life situation.

The slides then return to some more of the details, looking at how a LIBRARY is defined and installed, explaining the LIBRARY INQUIRE, SET and DISCARD commands, and describing some associated enhancements to the INQUIRE PROGRAM command.

Other aspects of LIBRARY support are the provision of audit logging for LIBRARY changes, security controls and statistics. Finally, there are a few changes to user exits associated with this support and a range of new messages.

LIBRARY Overview



We start with an Overview of this support.

The Problem (pre-CICS TS V3.2)

- Load library data sets containing program artifacts defined to CICS in DFHRPL in the CICS start-up JCL
- **To change any of the data sets specified to CICS, it is necessary to edit the JCL and to restart CICS**
- There can be a need to change the data sets used to load programs, to
 - ▶ Apply emergency fixes to a program while CICS is running
 - If the fixed version of the program is put in a data set earlier in the concatenation, it can be loaded in place of the 'broken' program
 - Can be done today
 - e.g. Include a special data set for fixes in the DFHRPL concatenation, then move the fixed program into this data set
 - Gets difficult to know what is in the special fix data set.
 - ▶ Add new programs while CICS is running, or new versions of programs
 - Possibly happens more in development and test systems
 - However, enabling this in production could assist 24x7 operations
- Would be helpful to know the data set a program was loaded from



The problem being addressed by this support is that in order to change the configuration of the data sets used to load programs, it has always been necessary to change the DFHRPL concatenation in the CICS JCL and recycle CICS. Over the years, people have developed workarounds for this, of which a very popular example is to keep a spare data set in the DFHRPL concatenation for adding in fixes to the running system (by copying members into that data set). However, this is not a very controlled mechanism.

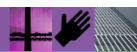
Also, DFHRPL does not in general lend itself to organisation by application.

Another problem addressed by this support is how you can find out which data set a program was loaded from.

It is felt that this new function might be of more use in dynamic and less rigidly controlled environments, such as development and test or QA regions, rather than in Production. However, it can contribute to 24x7 operations, and also adds better organisation of application artifacts, so it should also be of value in production.

The CICS TS V3.2 Solution

- Make it possible to specify, **dynamically** while CICS is running, data sets from which to load programs
- Introduce some organisation to the collections of data sets
 - ▶ Allow organisation by application rather than for expediency
 - ▶ Easier to keep track of what is where
- Make it possible to take an application offline, for example where it has time-based restrictions on its use
 - ▶ Or to take PDS data sets offline for compression
- The data sets that are dynamically specified are defined using a CICS **resource definition** - the new **LIBRARY** resource
- Provide information on which data set and LIBRARY a program has been loaded from



The solution provided by this support is to allow dynamic definition of the data sets from which programs (program artifacts) can be loaded.

This addresses the following types of use cases:

- A package has been delivered for deployment, either from an external supplier or an internal development group, as a PDS. Procedures dictate that separate applications reside in separate data sets, so it is not acceptable to simply copy the programs into a dataset already in the DFHRPL concatenation. The maintenance window is some days (or weeks) away, but it is critical that the package be deployed. Dynamic LIBRARY support will allow the data set to be defined to CICS and made available without restarting the system.
- Dynamic LIBRARY support allows a level of organisation to be applied to data sets containing application artifacts, rather than an unstructured list as in DFHRPL. Fixes often have to reside in emergency patch data sets, and it can become difficult to keep track of them, whereas dynamic LIBRARY support allows the data set containing the fix to be defined in a specific LIBRARY.
- An application that has time-based restrictions on its usage; e.g. it must only be available during business hours, can be taken offline out-of-hours by disabling the dynamic LIBRARY containing the application.
- If a partitioned data set needs to be taken offline for compression, there is no way to specify to CICS that data sets within the DFHRPL concatenation are to be taken out of use for this purpose, but a dynamic LIBRARY containing such a data set can be disabled.

DFHRPL and dynamic LIBRARY support

- DFHRPL will still exist
 - ▶ Can use this unchanged, and not use the new support
 - ▶ Can move some data sets out of DFHRPL and define them dynamically
 - e.g. use DFHRPL only in production CICS regions and a combination of DFHRPL and the new support in development and test regions
 - ▶ Some data sets **have** to be defined in DFHRPL
 - SDFHLOAD, SEYULOAD etc.
 - Phase 1 PLT programs
 - Non-SMS managed data sets
 - Data sets with DISP other than SHR



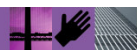
It is important to note that dynamic LIBRARY support does not replace the DFHRPL concatenation in the CICS startup JCL, which will still exist. It is up to you how much or how little you use the new functionality.

DFHRPL will continue to be required for:

- CICS data sets
- Programs which run in phase 1 PLT (because the new dynamic definitions cannot be available to the system until after phase 1 initialization).
- Data sets which do not obey the rules for the new dynamic support: the data sets must be SMS-managed and used with DISP=SHR. For example, if another job allocates the data set with a DISP of OLD, then install of an enabled LIBRARY, or enable of a disabled LIBRARY, would fail with an error on the attempt to allocate the data set to the LIBRARY.

Terminology

- 'program'
 - ▶ Sometimes used in this presentation as shorthand for any type of program artifact e.g. BMS maps, tables, GLUEs, TRUEs, URM, and of course programs
- library
 - ▶ A PDS or PDSE, or a sequence of concatenated PDS(E)s. This presentation will generally use 'data set' for a single PDS(E), but the use of library or load library is often used for the single entity as well as for a concatenation.
- LIBRARY
 - ▶ New CICS resource type
 - ▶ One or more data sets (PDS/PDSEs) containing program artifacts
- Plural of LIBRARY
 - ▶ LIBRARY resources
 - ▶ LIBRARY concatenations
 - ▶ LIBRARYs



This slide lists some terminology relating to dynamic LIBRARY support, that is used in these slides and in the InfoCenter documentation.

Throughout this presentation, where 'program' is used, it can be assumed that in appropriate situations this also covers other types of program artifacts, such as BMS maps, tables, GLUEs and TRUEs, and URM.

The term 'library' is used in the z/OS environment to refer either to a single data set (PDS or PDSE) or to a concatenation of such data sets, but it is probably more often encountered as referring to a single data set (although the DFHRPL concatenation itself is the "relocatable program library").

A LIBRARY is a CICS resource, which is always spelt in uppercase, to distinguish it from the various other uses of the word 'library'. The plural is "LIBRARY resources", "LIBRARY concatenations" or, where space is at a premium, "LIBRARYs".

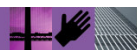
The new LIBRARY resource



This section introduces the new LIBRARY resource.

The new LIBRARY resource

- Typically one LIBRARY per application or related set of applications, or per vendor package
 - ▶ But up to installations how they organise their data sets
- The LIBRARY resource definition includes
 - ▶ LIBRARY Name (will be used as a DD name)
 - ▶ Up to 16 data set names which will form a concatenation
 - Can have just 1 data set (and must have *at least* 1)
 - Can have up to 16 data sets, for different pieces of the application
 - Can specify data sets 5, 10, and 15 (say) to leave room to add more
 - ▶ **Ranking**
 - Where this library belongs in the search order of all LIBRARYs
 - ▶ **Critical** status (Critical or Noncritical)
 - Whether this library is critical to starting CICS
 - ▶ **Enablement** status (Enabled or Disabled)
 - An enabled LIBRARY is active in the search order
 - (STATUS is the resource attribute name)



This support introduces a new resource, called a LIBRARY. The way of dynamically defining data sets to CICS is to group them in a LIBRARY resource.

The expectation is that LIBRARY resources would be used to map each application to a separate LIBRARY, but there is nothing to impose this behaviour.

The name given to the LIBRARY will become the DD name for the concatenation of data sets which it contains. There can be between 1 and 16 data sets defined in a LIBRARY, and these will be concatenated together in the order in which they are specified in the definition.

The ranking, critical status and enablement status of a LIBRARY will be explained in more detail in later slides in this section.

```

Session C - [24 x 80]
File Edit View Communication Actions Window Help

OVERTYPE TO MODIFY                                CICS RELEASE = 0650
CEDA DEfIne LIBrary( TAMLIB  )
  LIBrary      : TAMLIB
  GRoup       : TMCONF
  DEscription ==> EXAMPLE LIBRARY FOR T & M CONFERENCE
  RAnking     ==> 20                1-9 | 11-99
  CRITICAL    ==> Yes              No | Yes
  StAtus      ==> Enabled          Enabled | Disabled
DATA SET NAMES
DSNAME01     ==> MOXEYC.NEWLIB3.LOAD
DSNAME02     ==>
DSNAME03     ==>
DSNAME04     ==>
DSNAME05     ==>
DSNAME06     ==>
DSNAME07     ==>
DSNAME08     ==>
DSNAME09     ==>
+ DSNAME10   ==>
I New group TMCONF created.

SYSID=CIGO APPLID=IYCWZCGO
DEFINE SUCCESSFUL                                TIME: 15.49.43 DATE: 07.274
PF 1 HELP 2 COM 3 END                            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
MA c                                             07/022
Connected to remote server/host winmvs2d.hursley.ibm.com using lu/pool IYCXTC50 and port 23

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```

This shows a screen shot from using CEDA to define a LIBRARY called TAMLIB in a group TMCONF. In case the slide is hard to read, the text is:

```

OVERTYPE TO MODIFY                                CICS RELEASE = 0650
CEDA DEfIne LIBrary( TAMLIB  )
  LIBrary      : TAMLIB
  GRoup       : TMCONF
  DEscription ==> EXAMPLE LIBRARY FOR T & M CONFERENCE
  RAnking     ==> 20                1-9 | 11-99
  CRITICAL    ==> Yes              No | Yes
  StAtus      ==> Enabled          Enabled | Disabled
DATA SET NAMES
DSNAME01     ==> MOXEYC.NEWLIB3.LOAD
DSNAME02     ==>
DSNAME03     ==>
DSNAME04     ==>
DSNAME05     ==>
DSNAME06     ==>
DSNAME07     ==>
DSNAME08     ==>
DSNAME09     ==>
+ DSNAME10   ==>
I New group TMCONF created.

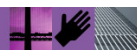
SYSID=CIGO APPLID=IYCWZCGO
DEFINE SUCCESSFUL                                TIME: 15.49.43 DATE: 07.274
PF 1 HELP 2 COM 3 END                            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL

```

At least one data set name must be specified when a LIBRARY is defined, but it does not have to be the first one (DSNAME01). It is also possible to leave blank DSNAMEs between ones which are filled in (to allow for future changes).

Search Order

- When locating programs in DFHRPL
 - ▶ CICS searches in the first data set in the concatenation
 - ▶ If the program is not found, CICS searches the second data set
 - ▶ Etc.
- For dynamically installed LIBRARYs
 - ▶ The data sets within the LIBRARY are searched in concatenation order
 - ▶ What determines whether one LIBRARY is searched before another?
- An overall **search order** determines the order in which all active LIBRARY concatenations will be searched
 - ▶ Each LIBRARY has a **search position**
 - ▶ This is derived dynamically from the LIBRARY **rankings**



When a program is to be located for loading, currently CICS will search the data sets in the DFHRPL concatenation in the order in which they are specified until the first instance of that program is located. For dynamic LIBRARY resources, we need some way of defining the search order that will be used when looking for a program. (Program location is explained shortly.)

This is done by assigning a RANKING value to each LIBRARY, as explained on the next slide.

Ranking

- Ranking is how the relative position of a LIBRARY in the overall search order (its search position) is specified
- Ranking is a number between 1 and 99
- A smaller number means the LIBRARY is earlier in the search order
 - ▶ Gets searched for programs to load before a LIBRARY with a larger ranking
- For most applications, it doesn't matter if they come before or after other applications
 - ▶ Default ranking is **50** (in the middle of the range)
- For some applications, and when introducing a fix or a change, it does matter
- Emergency fixes might mean a LIBRARY has to come before DFHRPL
 - ▶ DFHRPL has a pre-set ranking of 10
 - ▶ To put a LIBRARY ahead of this, specify a ranking between 1 and 9
 - ▶ A ranking of 10 is reserved for DFHRPL (cannot be specified)
 - ▶ Rankings below 10 are not encouraged



The search position of a LIBRARY is determined by assigning a RANKING value to each LIBRARY. A LIBRARY with a smaller ranking number will be searched before a LIBRARY with a larger ranking (and then the data sets within that LIBRARY will be searched in concatenation order).

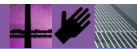
The ranking can be a number between 1 and 99 (but not 10, which is reserved for DFHRPL itself). So, if programA is to be loaded from LIBRARY newapp in preference to LIBRARY oldapp, then newapp should be given a ranking number which is smaller than that of oldapp, so that it will come before it in the search order. In most cases, the contents of each LIBRARY will contain discrete applications with no overlapping programs, in which case the default ranking can be used. The default is 50, which is in the middle of the ranking range.

DFHRPL has a pre-set ranking of 10, and other LIBRARY resources cannot use this ranking. A ranking below 10 is intended for use only in special cases, so if a LIBRARY is given a ranking of less than 10, a warning will usually be issued (depending on how you have specified the ranking) to make sure that really was the intention.

SEARCH POSITION is derived from *but not equal to* ranking. CICS works out the search positions based on the rankings of all installed and enabled LIBRARYs (disabled LIBRARYs have a search position of zero), and dynamically updates the search positions when a LIBRARY is installed, created, enabled, disabled, or changes its ranking.

Locating and Loading programs

- The first time a program is referenced
 - ▶ It has to be **located** on disk
 - ▶ This uses the search order to locate which LIBRARY and which data set in that LIBRARY the program is found in first
 - The search stops when it finds the first instance in the search order
 - The search includes DFHRPL in its current position in the search order
 - ▶ The locate also determines where on disk the program can be found
 - ▶ The program is then loaded into CICS storage
- Subsequent requests can
 - ▶ Use the existing copy from CICS storage
 - ▶ Reload a fresh version into CICS storage (e.g. if RELOAD specified)
 - From its located position on disk
 - ▶ If NEWCOPY or PHASEIN has been issued
 - Re-locate the program by searching the LIBRARY search order again
 - ▶ Also, if the LIBRARY had been disabled
 - A reload will cause the program to be re-located



Up until now (and elsewhere in this presentation), we have been a little careless in the use of the term 'loading' for programs.

A key point regarding program "loading" is that before being loaded for the first time, the location of the program on disk must be found. This is known as 'locating' the program. Subsequent requests to use the program will do one of the following:

- Just use the existing copy that is loaded into CICS storage.
- Reload the program if the RELOAD option is specified, or if the program storage has been deleted as a result of program compression. The reload will be from the location CICS previously found for the program, even if in fact there is now another copy of it earlier in the search order.
- To find a new copy of the program, a program NEWCOPY or PHASEIN needs to be issued, to cause the program to be re-located. If the LIBRARY has been disabled, this will be detected if we try to reload (but not if we reuse the in-storage version), and a NEWCOPY or PHASEIN will be required.

So where we say "search for a program to load" we more accurately mean "locate the program prior to loading it", and sometimes a program load will not do any searching.

Critical status

- Critical status of a LIBRARY
 - ▶ **critical** – if LIBRARY is installed during CICS startup, and an error occurs (e.g. not all data sets are available), then
 - a 'GO or CANCEL' converse (WTOR) message will be issued to allow the operator to decide whether to override the criticality and allow CICS to start or to fail the startup (**DFHLD0702**)
 - If reply is 'GO', CICS will continue and the LIBRARY will be installed in DISABLED status (unless install was not possible at all)
 - If reply is CANCEL (or anything other than GO), CICS startup will terminate
 - ▶ **noncritical** – if LIBRARY is installed during CICS startup, and an error occurs (e.g. not all data sets are available), then
 - CICS startup will continue (with message **DFHLD0703**), and the LIBRARY will be installed in DISABLED status (unless install was not possible at all)
 - ▶ If CICS continues, a later attempt can be made to resolve the problem and enable the LIBRARY
 - ▶ Default is noncritical (for dynamic LIBRARY resources)
 - ▶ Critical status only has meaning at startup



The critical status of a LIBRARY provides a way to mimic the behaviour of DFHRPL at CICS startup, which is that CICS will not start if a data set in DFHRPL is not available. For dynamic LIBRARYs, where this behaviour is necessary, the LIBRARY can be defined as CRITICAL. The default is for the LIBRARY to be NONCRITICAL, meaning that (unlike with DFHRPL), CICS can be started when the data sets required for that LIBRARY are not available. The CRITICAL setting does not fully mimic DFHRPL, in that rather than just failing CICS, a WTOR message is issued to give the operator a choice.

Some LIBRARY Scenarios



Let's look at some simple examples of Dynamic LIBRARY resources in action at 'Acme Co.', a go-ahead organisation which likes to keep its application data sets and programs well organised.

Acme Co.'s current DFHRPL concatenation

```
//DFHRPL DD DSN=CICSTS32.CICS.SDFHLOAD,DISP=SHR
// DD DSN=CICSTS32.CICS.SEYULOAD,DISP=SHR
// DD DSN=CEE.SCEECICS,DISP=SHR
// DD DSN=CEE.SCEERUN,DISP=SHR
// DD DSN=ACMECO.PANIC.FIXES,DISP=SHR
// DD DSN=SYS2.DB2.SDSNLOAD,DISP=SHR
// DD DSN=ACMECO.CICS.TABLES,DISP=SHR
// DD DSN=SUPAVEND.SUPAVU.PRIMARY,DISP=SHR
// DD DSN=SUPAVEND.SUPAVU.SECONDARY,DISP=SHR
// DD DSN=SUPAVEND.SUPAVU.THEREST,DISP=SHR
// DD DSN=SUPAVEND.SUPATOO.SUPARUN.PKG,DISP=SHR
// DD DSN=ACMECO.OURBIZ.ADDCUST.CUSTOM,DISP=SHR
// DD DSN=ACMECO.OURBIZ.ADDCUST.MAINAPP,DISP=SHR
// DD DSN=ACMECO.OURBIZ.ADDCUST.SPECIAL,DISP=SHR
// DD DSN=ACMECO.PROGS.ALL,DISP=SHR
```



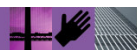
This slide shows what Acme Co.'s current DFHRPL concatenation might look like (just after migration to CICS TS 3.2).

This example is a fairly typical structure for DFHRPL. Obviously the CICS data sets come first, followed by other IBM products (such as MQ, DB2). It is common to have a data set for urgent fixes somewhere early in DFHRPL (ACMECO.PANIC.FIXES in this case). After that come any vendor product data sets, and then one or more data sets for applications created in-house. Although in this example there are several such data sets, it is not uncommon to have the in-house applications all jumbled into one data set.

Scenario 1 - Add a new application

- A new application is supplied by the development team
- The programs, map sets etc. are in a couple of data sets
 - ▶ DEVTEAM.ACCOUNTS.INITIAL
 - ▶ DEVTEAM.ACCOUNTS.APPLICN.BITS
- It is ready to be deployed into the CICS system
 - ▶ e.g. deploy into a development CICS, or into a QA CICS after the application has had other testing, or into a production CICS which might have no window for restarting the region (after thorough testing!)

- Define a LIBRARY for the application



The first scenario is to add in a new application that Acme Co.'s development team has just delivered.

The description of the scenario suggests that the reason for using a dynamic LIBRARY to introduce this application into the production system (after thorough testing) would be if there is no window for restarting the production CICS system. However, although a primary benefit of dynamic LIBRARY support is that the region does not need to be recycled, it might be that Acme Co. would choose to put this application into a named LIBRARY anyway, in preference to just adding it into the DFHRPL concatenation (especially as it requires two data sets, and there is no real mechanism in DFHRPL to indicate that these are related to each other).

```
Session C - [24 x 80]
File Edit View Communication Actions Window Help
OVERTYPE TO MODIFY                                CICS RELEASE = 0650
CEDA DEFine Library( ACCOUNTS )
  Library      : ACCOUNTS
  Group       : NEWAPPS
  DDescription ==> PROGRAM ARTIFACTS FOR NEW ACCOUNTS APP
  Ranking     ==> 50           1-9 | 11-99
  Critical    ==> No           No | Yes
  Status      ==> Disabled     Enabled | Disabled
DATA SET NAMES
DSNAME01    ==>
DSNAME02    ==>
DSNAME03    ==> ACMECO.ACCOUNTS.INITIAL
DSNAME04    ==> ACMECO.ACCOUNTS.APPLICN.BITS
DSNAME05    ==>
DSNAME06    ==>
DSNAME07    ==>
DSNAME08    ==>
DSNAME09    ==>
+ DSNAME10  ==>
SYSID=CIGO APPLID=IYCWZCGO
DEFINE SUCCESSFUL                                TIME: 11.37.38 DATE: 06.306
PF 1 HELP 2 COM 3 END                            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
MA c                                             06/022
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```

This is the CEDA definition panel that Acme Co.'s Systems Programmer could use to define the LIBRARY for the new application. The next slide explains some of the choices made in this definition.

Defining the LIBRARY

```

CEDA DEFine LIBRARY( ACCOUNTS )
  Library      : ACCOUNTS
  Group        : NEWAPPS
  Description  ==> Program artifacts for new accounts app
  Ranking      ==> 50           1-9 | 11-99
  Critical     ==> No          No | Yes
  Status       ==> Disabled    Enabled | Disabled
DATA SET NAMES
DSNAME01      ==>
DSNAME02      ==>
DSNAME03      ==> ACMECO.ACCOUNTS.INITIAL
DSNAME04      ==> ACMECO.ACCOUNTS.APPLICN.BITS
DSNAME05      ==>
DSNAME06      ==>
DSNAME07      ==>
DSNAME08      ==>
DSNAME09      ==>
+ DSNAME10    ==>
  
```

Use a name that reflects the application

Default ranking because no program artifacts clash with others in other data sets

CICS can start without this application

Disabled because the data sets to be used are not created yet

These are the names for the data sets when used by CICS

More data sets (up to 16) could be defined



This slide explains some of the LIBRARY parameters, and how they would be set in this scenario.

For example, the LIBRARY name can reflect that this is an ACCOUNTS application, with the description providing further detail. The default ranking of 50 can be used because the program artifacts are unique to this application. In this case, it is not essential to CICS that the application is available, so the Critical status is 'No'.

The LIBRARY is defined as 'Disabled', which means that when it is installed it will be in a disabled state. This is chosen because the data sets which will be used have not yet been created (in this scenario). Or it could be chosen in order to bring the application online in a controlled way some time after installing the LIBRARY.

The DSNAME03 and DSNAME04 slots are used for the data set names. This allows for some future addition of other data sets, if required, before or after them.

Using the ACCOUNTS application

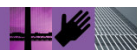
- Install the LIBRARY.
 - ▶ As specified, it will be installed as disabled
- Create the ACMECO.ACCOUNTS.** data sets and copy over the application artifacts from DEVTEAM.ACCOUNTS.**
- Define and install the necessary programs, transactions, webservices, etc.
- SET LIBRARY(ACCOUNTS) ENABLED to enable the LIBRARY and allow it to participate in the LIBRARY search order, which is searched for program artifacts to load
- Start to use the application



A sequence of steps that could be used to make the ACCOUNTS application available are described on this slide.

Scenario 2 - Move data sets from DFHRPL

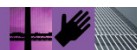
- Decide to move the 'add customer' application from DFHRPL to a dynamic LIBRARY definition
- Define a LIBRARY 'ADDCUST' with data sets
 - ▶ ACMECO.OURBIZ.ADDCUST.CUSTOM
 - ▶ ACMECO.OURBIZ.ADDCUST.MAINAPP
 - ▶ ACMECO.OURBIZ.ADDCUST.SPECIAL
- Decide whether this application is critical to the CICS, i.e. if it is not available at CICS start, should the start terminate or be allowed to continue?
- To start using it now without restarting CICS, specify Ranking of 9, and issue PHASEINs. On next restart, remove data sets from DFHRPL, and change Ranking to 50 (say).
- Or plan to introduce at next restart, by defining with ranking of 50 (say), removing from DFHRPL and including in GRPLIST or BAS install



The second scenario is to show how an application could be converted from being included as a list of data sets in DFHRPL into being included in a dynamic LIBRARY.

Scenario 3 – Oh no! There's a problem in ACCOUNTS

- Luckily, the programmer knows how to fix it and provides the fix
- So.. Copy the corrected member(s) into 'ACMECO.PANIC.FIXES' (in DFHRPL) and issue program newcopy requests?
 - ▶ Well, that would work, as DFHRPL has a ranking of 10, and ACCOUNTS has ranking of 50
 - ▶ But what else is in ACMECO.PANIC.FIXES? Would anyone remember to take this fix out again?
- Instead,
 - ▶ Either, Redefine and reinstall ACCOUNTS with a data set containing the corrected member(s), inserted as (say) DSNAME01
 - ▶ or, Define and install a new LIBRARY ACCNTFIX containing the data set, and a ranking of 49.
 - ▶ PERFORM NEWCOPY for the programs in ACCOUNTS

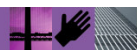


This third scenario illustrates how problems can be fixed dynamically using this support.

Acme Co.'s new DFHRPL concatenation and LIBRARY list

```
//DFHRPL DD DSN=CICSTS32.CICS.SDFHLOAD,DISP=SHR
// DD DSN=CICSTS32.CICS.SEYULOAD,DISP=SHR
// DD DSN=CEE.SCEECICS,DISP=SHR
// DD DSN=CEE.SCEERUN,DISP=SHR
// DD DSN=SYS2.DB2.SDSNLOAD,DISP=SHR
// DD DSN=ACMECO.CICS.TABLES,DISP=SHR

CEMT INQ LIB
  Lib(DFHRPL ) Sea(0001) Ran( 10 ) Num(006) Ena Cri
    Dsname01(CICSTS32.CICS.SDFHLOAD )
  Lib(SUPAVU ) Sea(0002) Ran( 30 ) Num(003) Ena Cri
    Dsname01(SUPAVEND.SUPAVU.PRIMARY )
  Lib(SUPATOO ) Sea(0003) Ran( 30 ) Num(001) Ena
    Dsname01(SUPAVEND.SUPATOO.SUPARUN )
  Lib(ACCTFIX ) Sea(0004) Ran( 49 ) Num(001) Ena
    Dsname01(ACMECO.ACCOUNTS.FIX1 )
  Lib(ACCOUNTS) Sea(0005) Ran( 50 ) Num(002) Ena
    Dsname01(ACMECO.ACCOUNTS.INITIAL )
  Lib(ADDACUST) Sea(0006) Ran( 50 ) Num(003) Ena
    Dsname01(ACMECO.OURBIZ.ADDCUST.CUSTOM )
  Lib(OTHERS ) Sea(0007) Ran( 60 ) Num(002) Ena
    Dsname01(ACMECO.PROGS.ALL )
```



This slide shows what Acme Co.'s DFHRPL concatenation might look like after defining some dynamic LIBRARYs, and how those LIBRARYs might appear in a CEMT INQUIRE LIBRARY (see later for more on LIBRARY inquires).

Notes on this:

- ACMECO.PANIC.FIXES is no longer needed.
- To see one of the data sets on CEMT, ACCOUNTS has been redefined in this example with the first data set defined as DSNAME01 (the CEMT summary panel shows DSNAME01 if it is filled in, or nothing if not).
- The approach of using an ACCTFIX library has been used for scenario 3 for the purposes of illustration.

Defining and Installing a LIBRARY

Returning to the description of this support, the next section looks at how LIBRARY resources are defined and installed.

Defining & Installing a LIBRARY

- Defining a LIBRARY
 - ▶ RDO
 - Using CEDA or DFHCSDUP, to define LIBRARY in CSD
 - ▶ CICSplex SM BAS
 - To define LIBDEF in CICSplex SM repository
- Installing a LIBRARY
 - ▶ via CEDA, CICSplex SM BAS, GRPLIST install, etc.
 - ▶ If install fails, due to environmental errors such as data sets not available
 - LIBRARY is installed but DISABLED
- EXEC CICS CREATE LIBRARY
- No limit on numbers of installed LIBRARYs
 - ▶ Other than system limits on numbers of allocated and concatenated data sets



All the usual methods of defining and installing CICS resources are supported for LIBRARY resources, including EXEC CICS CREATE.

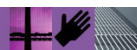
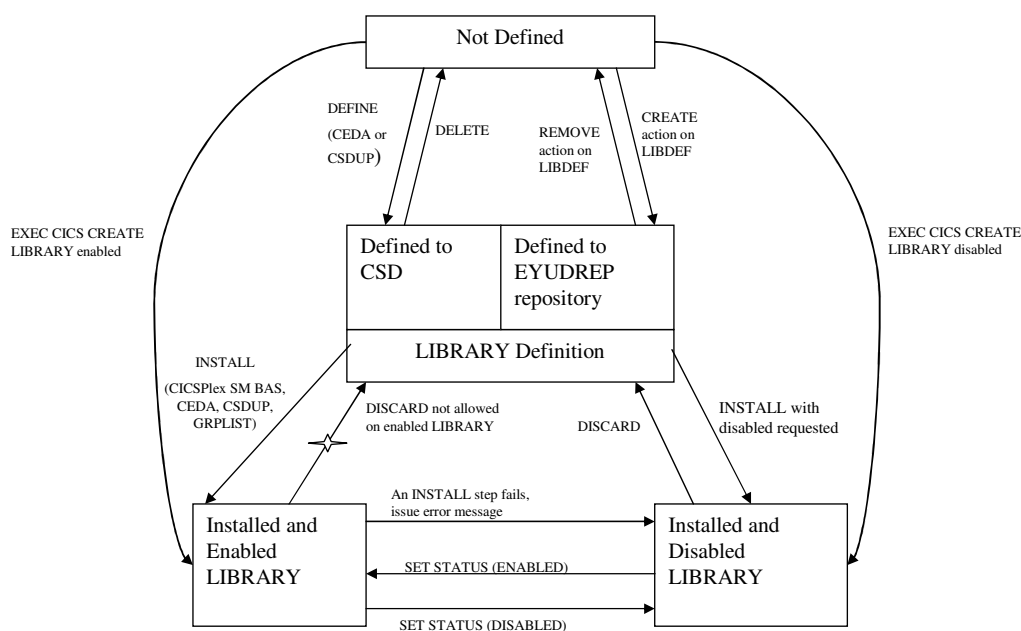
There is no autoinstall for LIBRARYs.

Environmental errors result in a LIBRARY that is installed but DISABLED.

CICS does not place any limits on the number of dynamic LIBRARY resources that can be defined or that can be installed into a CICS region. However, with extremely large numbers of dynamic LIBRARY resources, it is possible to encounter MVS system limits.

The TIOT size controls the number of data sets that can be allocated and concatenated in a job step, and if you try to install a dynamic LIBRARY which would exceed this limit, you will see errors on the install. (If you are encounter this limit, you can increase the TIOT size defined in the ALLOCxx member in SYS1.PARMLIB (unless it is already at the upper limit).

LIBRARY define/install/create summary



This diagram is a schematic representation of the sequence of commands and actions involved in defining and installing a LIBRARY.

The left hand side of the diagram relates to an enabled LIBRARY and the right hand side to a disabled LIBRARY.

Either RDO or CICSplex SM BAS can be used to create a LIBRARY definition (in the CSD or in the CICSplex SM repository respectively)

Install of a LIBRARY results in

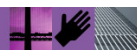
- An enabled LIBRARY if enable status was specified in the definition and all install steps succeeded.
- A disabled LIBRARY if disable status was specified in the definition.
- A disabled LIBRARY if enable status was specified in the definition but one of the install steps failed.
- No installed LIBRARY if an early install step failed (a rare situation).

Create effectively bypasses the definition step, to install the LIBRARY as specified on the CREATE command.

An installed LIBRARY can be enabled or disabled. A disabled LIBRARY can be discarded, but an enabled LIBRARY cannot.

Installed but disabled

- When installing a LIBRARY whose definition specifies enabled status:
 - ▶ CICS will 'Activate' the LIBRARY by allocating its data sets, concatenating them (if more than one), and opening the LIBRARY
 - ▶ If an activation step fails
 - Providing things got far enough to create the internal control structures needed, the LIBRARY is installed but disabled
 - This can happen if data set allocation or concatenation fails, or if the open of the resulting concatenation fails, or if write of LIBRARY to the catalog fails
 - If any data set allocation fails, they all fail, but CICS will go on to attempt all allocations to flush out any other problems up front
 - Many problems can be resolved without changing LIBRARY definition (e.g. actually create the data sets), so then just SET LIBRARY ENABLED
 - If LIBRARY definition does need changing, can replace a disabled LIBRARY without discard
 - ▶ What happens if some steps worked (e.g. allocate and concatenate succeeded, but not open)?
 - These get backed out so that a disabled LIBRARY always has the data sets unallocated (and therefore not concatenated or opened) (*except in some rare error situations*)
 - Back out is: close LIBRARY if open, deconcatenate LIBRARY if concatenated, and unallocate any data sets that were allocated.



This explains the meaning of "installed but disabled", which is where a LIBRARY has either been installed with disabled status requested as its initial state, or enabled status has been requested but a step to activate the LIBRARY has failed.

There are some internal control structures required to represent a LIBRARY, and if these can be created, then the LIBRARY will be installed.

A LIBRARY that is installed in a disabled state can be enabled by issuing a SET LIBRARY ENABLED command. If this fails, the LIBRARY reverts to being disabled.

If any of the steps to enable an installed LIBRARY fail (either at install-time or on a SET LIBRARY ENABLED command), then the previous steps which had succeeded will be backed out.

The intention is that in the disabled state, none of the data sets in the LIBRARY are allocated (or at least, not to this LIBRARY – they could be allocated if they are also defined in another LIBRARY). Thus, disabling a LIBRARY can be used to perform maintenance operations on it such as compression or (supposing you wanted to) migration.

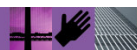
There are some rare error situations, in which LIBRARY close, deconcatenation or unallocation fails, where a disabled LIBRARY might still have allocated data sets associated with it. There should have been error messages on the log and in the audit trail when these situations arise.

CICSplex SM LIBRARY Definition

- **LIBDEF** is the BAS base table for LIBRARY resource definitions
- It is used in the standard way for BAS resources, with the standard set of actions

LIBRARY names

- Must be valid DD names
- It is not possible to create a LIBDEF, define a LIBRARY in RDO, or issue EXEC CICS CREATE LIBRARY using any of the following names, as they are reserved for system use:
 - *DFHRPL or any name beginning with 'DFH'
 - *Any name beginning with 'EYU'
 - *JOB LIB
 - *STEP LIB
 - *JOB CAT
 - *STEP CAT
 - *SYS ABEND
 - *SYS UDUMP
 - *SYS MDUMP
 - *CEE DUMP
 - *SYS IN
 - *SYS OUT
 - *DUMMY



We saw the CEDA DEFINE LIBRARY panel earlier, and this slide introduces the CICSplex SM LIBDEF.

The slide also shows that a number of names are reserved and cannot be used as LIBRARY names. A define via RDO (CEDA or DFHCSDUP), or create of a LIBDEF, or an EXEC CICS CREATE LIBRARY, will fail if the name is one of those listed on the slide. This is to try and avoid potential DD name conflicts, because the LIBRARY name is used as the DD name for the LIBRARY concatenation (or of the single allocated data set if the LIBRARY only contains one data set).

Some of the DD names are reserved by MVS, DFHRPL is reserved for use in the CICS start-up JCL as the name of the static library, and SYSIN and SYSOUT and DUMMY are conventionally used as DD cards and therefore inadvisable as library names. LIBRARY names beginning with CEE should be used with caution, but are accepted. LIBRARY names beginning with 'DFH' or 'EYU' are not accepted, to ensure that these namespaces remain available for use by CICS.

Note also that the install of the LIBRARY will fail if the chosen name conflicts with DD names already in use in the system.

The LIBRARY name is also checked for being a valid DD name.

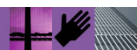
LIBDEF views

- The following standard BAS views are available for LIBRARY definitions:
 - ▶ TABULAR
 - ▶ DETAILED
 - ▶ CREATE/UPDATE
 - ▶ REMOVE
 - ▶ INSTALL
 - ▶ ADDTOGRP

- These views can be accessed in the standard ways

LIBINGRP

- The LIBINGRP table describes the membership of a LIBRARY definition (LIBDEF) in a resource group (RESGROUP)



The LIBDEF base table has associated views to allow LIBRARY definitions to be created and updated, installed, and removed, and to be presented in a tabular and detailed format.

A LIBDEF can be added to a resource group, and the LIBINGRP table describes membership of LIBDEFs in resource groups.

LIBDEF TABULAR view screenshot

LIBRARY definitions

Context: ALI2CPSM

Name: = [] Aa

Version: = []

Resource group name: []

CICS system name: []

Automatic refresh: 60 seconds. [Refresh]

3 records on 1 pages.

Record	Name	Version	Time created	Last modification	Description
1 <input type="checkbox"/>	FRANK		1 03/16/07 13:14:08	03/22/07 13:48:44	
2 <input type="checkbox"/>	LIB01		1 03/16/07 11:21:08	03/22/07 14:54:19	
3 <input type="checkbox"/>	LIB02		1 03/16/07 11:23:37	03/16/07 11:48:06	

3 records on 1 pages.

[Create...] [Update...] [Remove...] [Install...] [Add to resource group...] [Map]

Resource name: LIBDEF. View name: EYUSTARTLIBDEF.TABULAR



This slide shows an example of the LIBDEF tabular view. This view shows the LIBDEFs that have been created. They can be updated, removed, installed or added to a resource group.

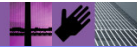
LIBDEF CREATE view screenshot

LIBRARY definitions

Name	<input checked="" type="checkbox"/>	FRED	
Version	<input checked="" type="checkbox"/>	0	
Description	<input checked="" type="checkbox"/>		
Resource group name	<input type="checkbox"/>		
User data area 1	<input checked="" type="checkbox"/>		
User data area 2	<input checked="" type="checkbox"/>		
User data area 3	<input checked="" type="checkbox"/>		
LIBRARY attributes			
Ranking	<input checked="" type="checkbox"/>	65	(1-99, not 10)
Critical status	<input checked="" type="checkbox"/>	No	
Enabled status	<input checked="" type="checkbox"/>	Enabled	
Data set names			
Data set name 01	<input checked="" type="checkbox"/>		
Data set name 02	<input checked="" type="checkbox"/>		
Data set name 03	<input checked="" type="checkbox"/>		
Data set name 04	<input checked="" type="checkbox"/>		
Data set name 05	<input checked="" type="checkbox"/>		
Data set name 06	<input checked="" type="checkbox"/>		
Data set name 07	<input checked="" type="checkbox"/>		
Data set name 08	<input checked="" type="checkbox"/>		
Data set name 09	<input checked="" type="checkbox"/>		
Data set name 10	<input checked="" type="checkbox"/>		
Data set name 11	<input checked="" type="checkbox"/>		
Data set name 12	<input checked="" type="checkbox"/>		
Data set name 13	<input checked="" type="checkbox"/>		
Data set name 14	<input checked="" type="checkbox"/>		
Data set name 15	<input checked="" type="checkbox"/>		
Data set name 16	<input checked="" type="checkbox"/>		

Perform 'Create?'

Resource name: LIBDEF View name: EYUSTARTLIBDEF.CREATE



This shows the LIBDEF create view, for creating a new LIBDEF LIBRARY definition, specifying attributes such as the ranking and critical status, and up to 16 data set names. In this screen shot, the LIBRARY details have been partially filled in.

LIBDEF DETAILED view screenshot

The screenshot displays the 'LIBRARY definitions' page in the IBM CICSPlex SM Web User Interface. The browser address bar shows 'http://wfevms12c.hursley.ibm.com:27294 - CICSPlex SM Web User Interface - YK3ZAB6 - X - Mozilla Firefox: IBM Edition'. The page title is 'CICSPlex SM Web User Interface' and 'Information Center'. The main content area shows details for library 'EYUVC1280', which has 3 records collected at 03/29/07 14:06:50. A 'Refresh' button is located to the right of the record count.

LIBRARY definitions

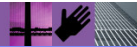
EYUVC1280 3 records collected at 03/29/07 14:06:50 [Refresh]

Name	LIB01
Version	1
Description	
Time created	03/16/07 11:21:08
Last modification	03/22/07 14:54:19
User data area 1	
User data area 2	
User data area 3	
LIBRARY attributes	
Ranking	50
Critical status	No
Enabled status	Disabled
Data set names	
Data set name 01	ALISONB.UTLS.ALI
Data set name 02	
Data set name 03	
Data set name 04	
Data set name 05	
Data set name 06	
Data set name 07	
Data set name 08	
Data set name 09	
Data set name 10	
Data set name 11	
Data set name 12	
Data set name 13	
Data set name 14	
Data set name 15	
Data set name 16	

[Resource groups with which this is associated](#)

[Create] [Update] [Remove] [Install] [Add to resource group] [Map]

Resource name: LIBDEF. View name: EYUVC1280.DETAILED



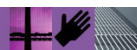
This view provides the details for a specific LIBDEF.

Inquire, Set and Discard for LIBRARY concatenations

This section looks at how LIBRARY resources can be inquired upon, have some of their properties set, and be discarded.

Inquiring on LIBRARY concatenations

- CICS supports inquiring on LIBRARY resources using
 - ▶ New **INQUIRE LIBRARY** SPI
 - ▶ New **CEMT INQUIRE LIBRARY** command
 - ▶ CICSplex SM WUI (Web User Interface)
 - New **LIBRARY** and **LIBDSN** resource tables, and tabular and detailed views, to show information about LIBRARY concatenations
 - Richer capabilities than via CEMT
- All information in the resource definition is returned (name, ranking, data sets, etc.), and also the **search position** where this LIBRARY appears in the search order
 - ▶ **Searchpos** is 0 for disabled LIBRARYs
 - ▶ Searchpos is 1 for lowest ranked LIBRARY, 2 for next ranked LIBRARY etc.
 - ▶ Searchpos of equally ranked LIBRARYs is preserved across warm/emerg starts (and based on install/create time)



- The usual INQUIRE/browse/view mechanisms (CEMT, SPI, CICSplex SM) are provided for LIBRARY resources.
- The CICSplex SM views provide some more capabilities and ease-of-use, such as the LIBDSN view.

```

T&MS14 | Managing Program Libraries Dynamically
IBM
Session C - [24 x 80]
File Edit View Communication Actions Window Help
INQ LIB
STATUS: RESULTS - OVERTYPE TO MODIFY
Lib(DFHRPL ) Sea(0001) Ran( 10 ) Num(023) Ena Cri
  Dsname01(UTL.MOXEYC.LOAD2 )
Lib(REALDSNS) Sea(0002) Ran( 25 ) Num(001) Ena
Lib(NEWLIB ) Sea(0003) Ran( 30 ) Num(001) Ena
Lib(SOMEREA) Sea(0000) Ran( 50 ) Num(003) Dis
Lib(ACCOUNTS) Sea(0000) Ran( 50 ) Num(002) Dis
Lib(TWOREAL ) Sea(0004) Ran( 60 ) Num(002) Ena
  Dsname01(MOXEYC.GENERAL.LOAD )

SYSID=CIGO APPLID=IYCWZCGO
RESPONSE: NORMAL TIME: 12.59.53 DATE: 05.18.07
PF 1 HELP 3 END 5 VAR 7 SBH 8 SFH 9 MSG 10 SB 11 SF
MA C 01/011
Connected to remote server/host winmvs2d.hursley.ibm.com using lu/pool IYCXTC68 and port 23
37 2007 Transaction & Messaging Technical Conference © 2007 IBM Corporation

```

This slide shows an example of CEMT INQUIRE LIBRARY:

```

INQ LIB
STATUS: RESULTS - OVERTYPE TO MODIFY
Lib(DFHRPL ) Sea(0001) Ran( 10 ) Num(023) Ena Cri
  Dsname01(UTL.MOXEYC.LOAD2 )
Lib(REALDSNS) Sea(0002) Ran( 25 ) Num(001) Ena
Lib(NEWLIB ) Sea(0003) Ran( 30 ) Num(001) Ena
Lib(SOMEREA) Sea(0000) Ran( 50 ) Num(003) Dis
Lib(ACCOUNTS) Sea(0000) Ran( 50 ) Num(002) Dis
Lib(TWOREAL ) Sea(0004) Ran( 60 ) Num(002) Ena
  Dsname01(MOXEYC.GENERAL.LOAD )

```

Sea is the Search Position, Ran is RANKING, and Num shows the number of data sets in the LIBRARY concatenation. Note that only DFHRPL can have more than 16 data sets.

The list is in RANKING order, and by install time within LIBRARYs of equal ranking (ACCOUNTS was installed after SOMEREA). This is almost the same as by order of search position, except that disabled LIBRARYs appear in the list where they would be in the search order if enabled.

Note that if there is a data set in the Dsname01 position, it is displayed on the summary panel. If that Dsname is empty, then the line is not shown.

```

T&MS14 | Managing Program Libraries Dynamically | IBM
Session C - [24 x 80]
File Edit View Communication Actions Window Help
I LIB
RESULT - OVERTYPE TO MODIFY
Library(AACCOUNT2)
Searchpos(0000)
Ranking( 45 )
Numdsnames(003)
Enablestatus( Disabled )
Criticalst( Noncritical )
Dsname01(ACMECO.ACCOUNTS.PRIMARY.LOAD)
Dsname02()
Dsname03(ACMECO.ACCOUNTS.SECONDRY.LOAD)
Dsname04()
Dsname05(ACMECO.ACCOUNTS.COMMON.LOAD)
Dsname06()
Dsname07()
Dsname08()
Dsname09()
Dsname10()
Dsname11()
+ Dsname12()

SYSID=CIGO APPLID=IYCWZCGO
TIME: 13.13.38 DATE: 05.18.07
PF 1 HELP 2 HEX 3 END 5 VAR 7 SBH 8 SFH 10 SB 11 SF
MA c 01/009
Connected to remote server/host winmvs2d.hursley.ibm.com using lu/pool IYXTC68 and port 23
38 2007 Transaction & Messaging Technical Conference © 2007 IBM Corporation

```

This slide shows the CEMT details for a specific LIBRARY:

- Library(AACCOUNT2)
- Searchpos(0000) ← Search Pos is 0 for a disabled LIBRARY
- Ranking(45)
- Numdsnames(003) ← This LIBRARY contains 3 non-blank dsnames
- Enablestatus(Disabled)
- Criticalst(Noncritical)
- Dsname01(ACMECO.ACCOUNTS.PRIMARY.LOAD)
- Dsname02() ← empty data sets are shown as such
- Dsname03(ACMECO.ACCOUNTS.SECONDRY.LOAD)
- Dsname04()
- Dsname05(ACMECO.ACCOUNTS.COMMON.LOAD)
- Dsname06()
- Dsname07()
- Dsname08()
- Dsname09()
- Dsname10()
- Dsname11()
- + Dsname12() ← scroll down to get dsnames 13 to 16.

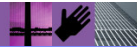
INQUIRE LIBRARY SPI

```

      .----- .
      v                                     |
>>-INQUIRE LIBRARY (data-value)-----+-----+-----><
                                     +-CRITICALST (cvda)-----+
                                     +-DSNAME01 (data-area)----+
                                     +-DSNAME02 (data-area)----+
                                     +-DSNAME03 (data-area)----+
                                     +-DSNAME04 (data-area)----+
                                     +-DSNAME05 (data-area)----+
                                     . . . .
                                     +-DSNAME16 (data-area)----+
                                     +-ENABLESTATUS (cvda)----+
                                     +-DSNAMELIST (ptr-ref)----+
                                     +-NUMDSNAMES (data-area)-+
                                     +-RANKING (data-area)----+
                                     '-SEARCHPOS (data-area)--'

```

For browsing: INQUIRE LIBRARY START, NEXT, END



This slide shows the syntax for the INQUIRE LIBRARY SPI command (with some of the DSNAMExx parameters omitted to fit on the slide).

The use of the DSNAMELIST parameter is explained on the next slide.

The INQUIRE LIBRARY command has START, NEXT and END options to allow a browse through the LIBRARY resources in the system.

INQUIRE for DFHRPL

- DFHRPL is a special case of a LIBRARY
 - ▶ “The **static** LIBRARY”
 - ▶ Pre-set ranking of 10, always critical, cannot be changed dynamically
 - ▶ Can have more than 16 data sets
 - Up to maximum of 255 single extents (an MVS restriction)
 - ▶ Will appear in INQUIREs like another LIBRARY
 - ▶ INQUIRE LIBRARY command will return up to 16 data sets from DFHRPL, plus the total number of data sets (**NUMDSNAMES**), and a buffer containing a list of all the data sets (**DSNAMELIST**)
 - DSNAMELIST will also be returned for dynamic LIBRARY resources, but will never have more than 16 data sets, and could have blank slots



DFHRPL is also a LIBRARY, but it is not dynamic, and is known as the static LIBRARY. It appears in CEMT INQUIRE LIBRARY etc. as one of the LIBRARYs installed in the system, but none of its attributes can be changed. Also, it is (obviously) not limited to 16 data set names. The actual limit is 255, and is an MVS restriction (strictly speaking, the maximum number of *extents* allowed in a concatenation is 255, so if any of the data sets has more than 1 extent, then the actual maximum number of data sets permitted will be less than 255).

Since INQUIRE LIBRARY only returns 16 dsnames, how can a program using the INQUIRE LIBRARY SPI get all the data set names for DFHRPL? This is where the DSNAMELIST parameter becomes useful, because this contains a list of all the dsnames (including the first 16), with the actual number being returned in NUMDSNAMES. For DFHRPL, NUMDSNAMES will be the length of the list. For a dynamic LIBRARY, it will be the number of non-blank dsnames in the LIBRARY concatenation, and the DSNAMELIST will return the dsnames in position, with the blank names included but blank.


```

T&MS14 | Managing Program Libraries Dynamically
IBM
Session C - [24 x 80]
File Edit View Communication Actions Window Help
I LIB
RESULT - OVERTYPE TO MODIFY
Library(DFHRPL)
Searchpos(0001)
Ranking( 10 )
Numdsnames(023)
Enablestatus( Enabled )
Criticalst( Critical )
Dsname01(UTL.MOXEYC.LOAD2)
Dsname02(PUBCER.IT2M.LOAD)
Dsname03(BLDBSF.CERXA.SDFHLOAD)
Dsname04(PP.ADLE370.ZOS170.SCEECICS)
Dsname05(PP.ADLE370.ZOS170.SCEERUN)
Dsname06(PUBCER.MAIN.TABLES)
Dsname07(FV.TABLECER.LOAD)
Dsname08(UTL.MOXEYC.LOAD)
Dsname09(UTL.MOXEYC.LOAD)
Dsname10(UTL.MOXEYC.LOAD)
Dsname11(UTL.MOXEYC.LOAD)
+ Dsname12(UTL.MOXEYC.LOAD)

SYSID=CIGO APPLID=IYCWZCGO
TIME: 13.15.32 DATE: 05.18.07
PF 1 HELP 2 HEX 3 END 5 VAR 7 SBH 8 SFH 10 SB 11 SF
MA C 01/009
Connected to remote server/host winmvs2d.hursley.ibm.com using lu/pool IYCXTC68 and port 23
41 2007 Transaction & Messaging Technical Conference © 2007 IBM Corporation

```

This shows an example of the details of INQUIRE LIBRARY for DFHRPL...

```

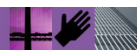
Library(DFHRPL)
Searchpos(0001)
Ranking( 10 )
Numdsnames(023)
Enablestatus( Enabled )
Criticalst( Critical )
Dsname01(UTL.MOXEYC.LOAD2)
Dsname02(PUBCER.IT2M.LOAD)
Dsname03(BLDBSF.CERXA.SDFHLOAD)
Dsname04(PP.ADLE370.ZOS170.SCEECICS)
Dsname05(PP.ADLE370.ZOS170.SCEERUN)
Dsname06(PUBCER.MAIN.TABLES)
Dsname07(FV.TABLECER.LOAD)
Dsname08(UTL.MOXEYC.LOAD)
Dsname09(UTL.MOXEYC.LOAD)
Dsname10(UTL.MOXEYC.LOAD)
Dsname11(UTL.MOXEYC.LOAD)
+ Dsname12(UTL.MOXEYC.LOAD)

```

... with apologies for not having very original data set names in the last positions.

CICSplex SM LIBRARY base tables

- There are 2 CICSplex SM base tables representing the LIBRARY resource:
 - ▶ LIBRARY – one per LIBRARY, to contain all LIBRARY details except the data set names
 - ▶ LIBDSN – one per LIBRARY data set, to contain details about that data set
- Two tables are used because there can be a variable number of data sets defined in a library
 - ▶ 16 for dynamically defined LIBRARYs
 - ▶ up to the MVS limit (255) for DFHRPL
- For simplicity, there is just one LIBDEF table for BAS definition of a LIBRARY, as the number of data sets which can be specified for a dynamic LIBRARY is limited to 16 (it is not possible to dynamically define DFHRPL).



There are two CICSplex SM base tables (and related views) for investigating installed LIBRARYs. The LIBRARY base table represents a LIBRARY's attributes (ranking etc.) and the LIBDSN base table represents a data set within a LIBRARY concatenation.

LIBRARY WUI views

- **LIBRARY TABULAR view**
 - ▶ Using the supplied WUI views and menus, this view can be accessed in the following ways:
 - Under the Programs twistie in the navigation bar
 - CICS operations views => Program operations views => LIBRARYs

- **LIBRARY DETAILED view**
 - ▶ Using the supplied WUI views and menus, this view can be accessed in the following ways:
 - From the LIBRARY TABULAR view
 - From the LIBDSN TABULAR and DETAILED views (see on)
 - From the Programs view (see on)



This slide explains the LIBRARY views provided for the CICSplex SM Web User Interface. Examples of these follow.

LIBRARY TABULAR view screenshot

LIBRARY

EYUVC12801 4 records collected at 03/29/07 10:01:02.

Context: ALI2CPSM
 Scope: ALI2CPSM
 LIBRARY name: = []
 Critical status: = []
 Enable status: = []

Automatic refresh: 60 seconds. Refresh

4 records on 1 pages.

Record	CICS system name	LIBRARY name	Search position	Ranking	Critical status	Enable status	Number of DSNAMES
1 <input type="checkbox"/>	IYK3ZAB6	DFHRPL		1	10 Critical	Enabled	17
2 <input type="checkbox"/>	IYK3ZAB6	FRANK		2	65 Noncritical	Enabled	1
3 <input type="checkbox"/>	IYK3ZAB6	LIB01		0	50 Noncritical	Disabled	1
4 <input type="checkbox"/>	IYK3ZAB6	LIB02		0	65 Noncritical	Disabled	7

4 records on 1 pages.

Set attributes... Enable... Disable... Discard...

Resource name: LIBRARY. View name: EYUSTARTLIBRARY.TABULAR

This view displays information on every LIBRARY installed in the current context and scope (including DFHRPL)

The “LIBRARY name” field links to the LIBRARY DETAILED view for the selected LIBRARY

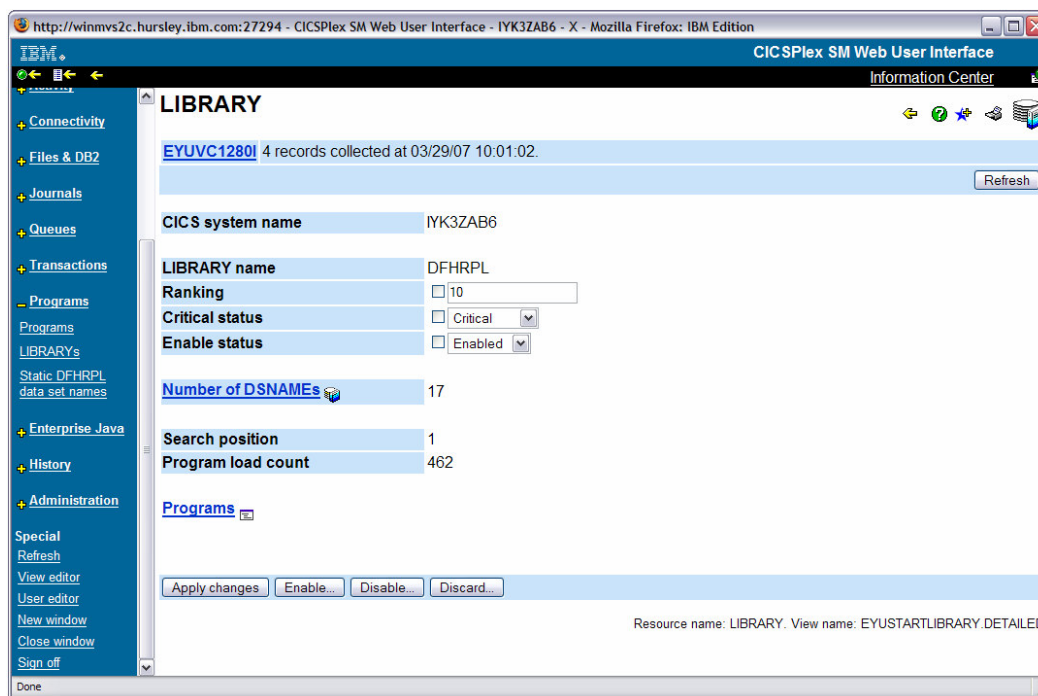
The “Number of DSNAMES” field links to the LIBDSN TABULAR view for all data sets in the selected LIBRARY

The LIBRARY actions available from the view are:

- Set attributes (ranking, enable status and critical status)
- Enable
- Disable
- Discard

The LIBRARYs are shown in search position order, with disabled LIBRARYs at the end (a difference from CEMT).

LIBRARY DETAILED view screenshot



This view displays all information on a specific LIBRARY.

The "Number of DSNAMES" field links to the LIBDSN TABULAR view for all data sets in the selected LIBRARY.

The "Programs" field links to the PROGRAM TABULAR view for all programs loaded from data sets in this LIBRARY.

The LIBRARY actions available from the view are:

- Set attributes (ranking, enable status and critical status)
- Enable
- Disable
- Discard

LIBDSN views

- LIBDSN TABULAR view
 - ▶ Using the supplied WUI views and menus, this view can be accessed in the following ways:
 - From the LIBRARY TABULAR view
 - From the LIBRARY DETAILED view

- LIBDSN DETAILED view
 - ▶ Using the supplied WUI views and menus, this view can be accessed in the following ways:
 - From the LIBDSN TABULAR view
 - From the Programs view (see on)



This slide explains the LIBDSN views provided. Examples of these follow.

LIBDSN TABULAR view screenshot

LIBRARY data set names

EYUVC12801 17 records collected at 03/29/07 14:00:20.

Context: ALI2CP5M
 Scope: YK3ZAB6
 LIBRARY name: YK3ZAB6
 Data set name: DFHRPL

Automatic refresh: 60 seconds. Refresh

Record	CICS system name	LIBRARY name	LIBRARY data set number	Data set name	Data set search enumerator
1	YK3ZAB6	DFHRPL	1	CPSMDEV.DUMMY.LOAD	1001
2	YK3ZAB6	DFHRPL	2	UTLALISQNB.LOAD	1002
3	YK3ZAB6	DFHRPL	3	CPSMDEV.TABLE650.LOAD	1003
4	YK3ZAB6	DFHRPL	4	PUBCER.IT2C.LOAD	1004
5	YK3ZAB6	DFHRPL	5	PUBCER.IT2C.TABLES	1005
6	YK3ZAB6	DFHRPL	6	BLDBSF.CERXA.SEYULOAD	1006
7	YK3ZAB6	DFHRPL	7	PP.ADL370.ZOS170.SCEEICIS	1007
8	YK3ZAB6	DFHRPL	8	PP.ADL370.ZOS170.SCEEERUN	1008
9	YK3ZAB6	DFHRPL	9	PP.PLI.V230.PLIBASE	1009
10	YK3ZAB6	DFHRPL	10	PP.PLI.V230.PLILINK	1010
11	YK3ZAB6	DFHRPL	11	PP.PLI.V230.SIBMBASE	1011
12	YK3ZAB6	DFHRPL	12	BLDBSF.CERXA.SDFHLOAD	1012
13	YK3ZAB6	DFHRPL	13	BLDBSF.CERXA.SDFHLOAD	1013
14	YK3ZAB6	DFHRPL	14	BLDBSF.CERXA.SDFHLOAD	1014
15	YK3ZAB6	DFHRPL	15	BLDBSF.CERXA.SDFHAUTH	1015
16	YK3ZAB6	DFHRPL	16	BLDBSF.CERXA.SDFHAUTH	1016
17	YK3ZAB6	DFHRPL	17	BLDBSF.CERXA.SDFHAUTH	1017

17 records on 1 pages.

Resource name: LIBDSN. View name: EYUSTARTLIBDSN.TABULAR

This view displays information on LIBRARY data set names for the specified LIBRARY or LIBRARYs in the current context and scope (including, as shown in this screen shot, for DFHRPL).

The "LIBRARY name" field links to the LIBRARY DETAILED view for the specified LIBRARY.

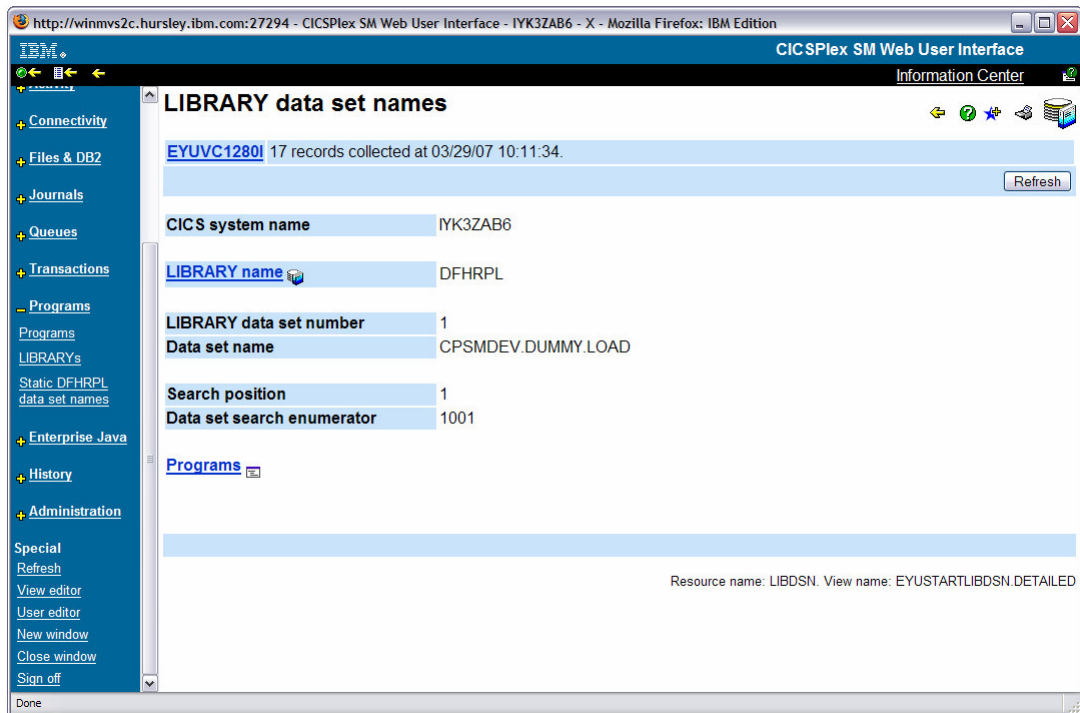
The "LIBRARY data set number" field links to the LIBDSN DETAILED view for the specific LIBRARY data set.

The Data set search enumerator is derived from the search position of the LIBRARY and the "position" of the data set in the LIBRARY concatenation, resulting in a hypothetical global list of the order in which each data set is searched.

Note that the LIBDSN view means that if there are more than 16 data sets in the DFHRPL concatenation, these can all be shown (compare the DSNAMELIST parameter in the INQUIRE LIBRARY SPI).

No actions are available for LIBDSNs

LIBDSN DETAILED view screenshot



This view displays detailed information for a specific LIBRARY data set

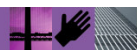
The "LIBRARY name" field links to the LIBRARY DETAILED view for the specified LIBRARY

The "Programs" field links to the PROGRAM TABULAR view for all programs loaded from this data set.

No actions are available for LIBDSNs

SET and DISCARD for LIBRARYs

- SET supported for some of the characteristics of LIBRARY resources
 - ▶ Ranking
 - ▶ Critical status (Critical/Noncritical)
 - ▶ Enablement Status (Enabled/Disabled)
 - SET ENABLED will allocate and concatenate data sets and open LIBRARY
 - SET DISABLED will close LIBRARY and deconcatenate and unallocate data sets
- The data sets within a LIBRARY can only be changed by altering the resource definition
- **SET LIBRARY** SPI and **CEMT SET LIBRARY** command
- **DISCARD LIBRARY** SPI and CEMT command
 - ▶ LIBRARY must be Disabled before it can be discarded
- CICSplex SM supports actions on **LIBRARY** objects
- SET and DISCARD operations not accepted for DFHRPL



SET LIBRARY can be used to set ranking, critical status, and enablement status.

It cannot be used to set any of the data set names, which requires a change to the definition of the LIBRARY followed by reinstall.

For DISCARD LIBRARY, the LIBRARY has to be disabled before it can be discarded.

SET and DISCARD do not apply to DFHRPL.

Enabling a LIBRARY results in the data sets being allocated and concatenated, and the LIBRARY concatenation being opened.

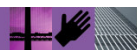
Disabling a LIBRARY results in the LIBRARY concatenation being closed, and the data sets being deallocated and unconcatenated.

LIBRARY information for a Program

Another aspect of Dynamic LIBRARY support is that information is made easily available about where a program has been loaded from.

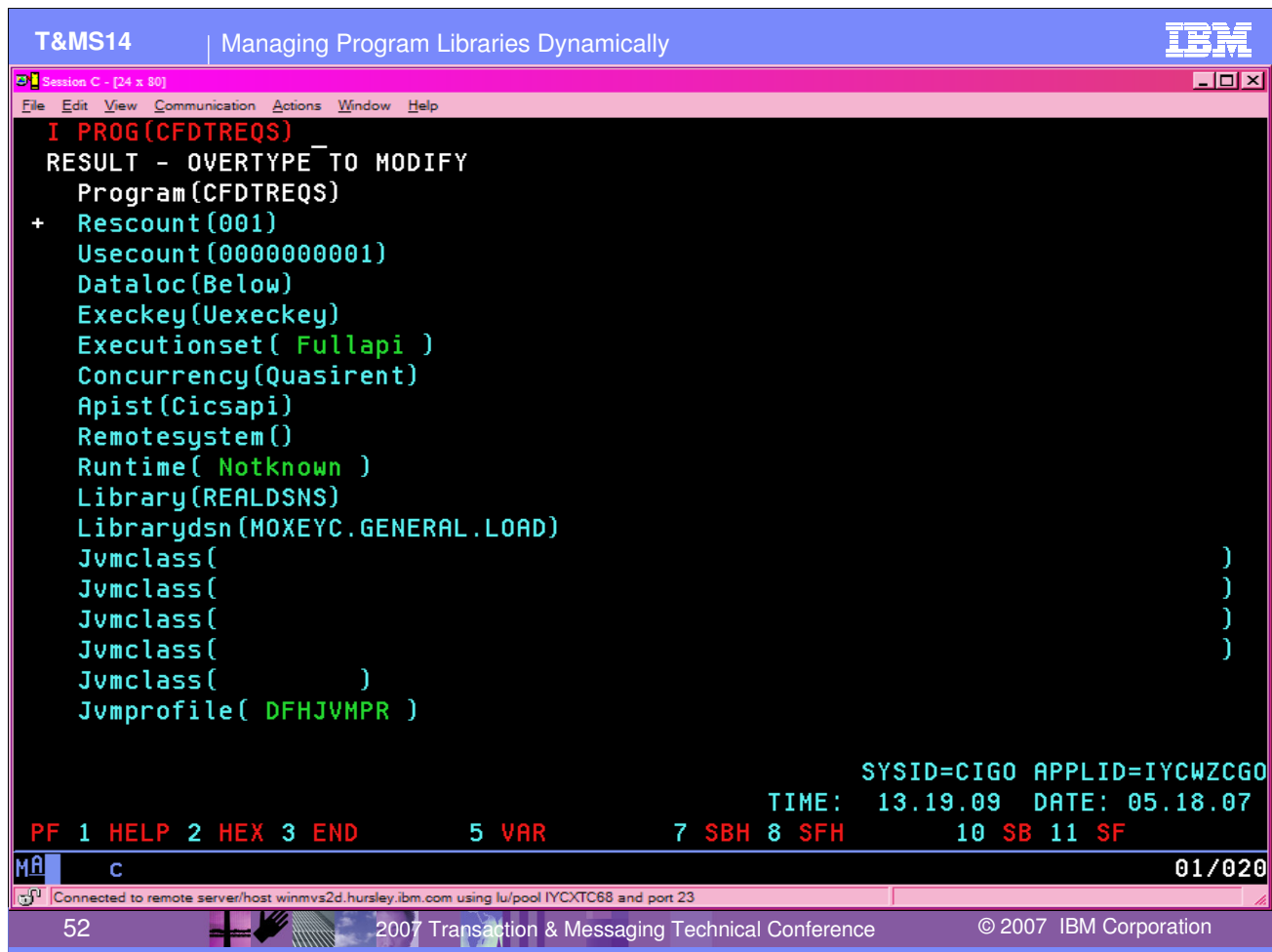
Returning LIBRARY information for Programs

- It would be useful to know which data set a program is loaded from
 - ▶ Pre-3.2, there is *some limited* information provided about this
 - The statistics for programs show the concatenation number of the data set in the DFHRPL concatenation
 - The CICSplex SM WUI views for programs (PROGRAM) (*and for program monitoring (MPROGRAM)*) also show this.
 - ▶ In 3.2, the **LIBRARY, and data set name within the LIBRARY**, that a program is loaded from are provided
 - In the statistics
 - In the CICSplex SM WUI PROGRAM object and view
 - *Not MPROGRAM which is no longer updated*
 - On INQUIRE PROGRAM (SPI and CEMT)
 - On the DFHPGISX INQUIRE_PROGRAM and INQUIRE_CURRENT_PROGRAM XPI



There is some information provided about the DFHRPL data set that a program has been loaded from in CICS TS V3.1 and earlier, in that the program statistics and CICSplex SM program views include an RPL offset concatenation number.

In CICS TS V3.2, the statistics and CICSplex SM views are enhanced to give the data set name rather than an offset, and also the LIBRARY name. This information is also provided on the INQUIRE PROGRAM SPI command, on CEMT INQUIRE PROGRAM, and on the INQUIRE_PROGRAM and INQUIRE_CURRENT_PROGRAM XPI commands.



This example screen shot shows how the LIBRARY and LIBRARYDSN can be seen on CEMT INQUIRE PROGRAM, by selecting the program details and scrolling down to the second screen...

```

I PROG(CFDTREQS)
RESULT - OVERTYPE TO MODIFY
  Program(CFDTREQS)
+ Rescount(001)
  Usecount(0000000001)
  Dataloc(Below)
  Execkey(Uexeckey)
  Executionset( Fullapi )
  Concurrency(Quasirent)
  Apist(Cicsapi)
  Remotesystem()
  Runtime( Notknown )
  Library(REALDSNS)
  Librarydsn(MOXEYC.GENERAL.LOAD)
  Jvmclass( )
  Jvmclass( )
  Jvmclass( )
  Jvmclass( )
  Jvmclass( )
  Jvmprofile( DFHJVMPR )

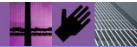
```

← Library

← data set within LIBRARY

INQUIRE PROGRAM continued

- When are LIBRARY and LIBRARYDSN set?
 1. If the program has not yet been loaded, both are blank
 2. If the program has not been LIBRARY loaded (i.e. loaded from LPA), both are blank
 3. If the program has been loaded from a LIBRARY, both are filled in, unless
 - The LIBRARY has been disabled, when the LIBRARYDSN is blank
 - The LIBRARY has been discarded, when both are blank
 4. If a NEWCOPY fails due to an I/O error, the LIBRARY and LIBRARYDSN information (and other program information) is set back to the previously loaded program information



It is useful to understand what can be deduced from the information in the LIBRARY and LIBRARYDSN for a program, as explained on this slide.

CICSplex SM PROGRAM Base Table Changes

- 2 new display-only fields added to the PROGRAM base table :
 - ▶ LIBRARY - the name of the LIBRARY from which the program was loaded
 - ▶ LIBRARYDSN - the name of the data set from which the program was loaded
- These are blank if the program has not been loaded, or if the LPASTATUS is LPA (indicating that the program has been loaded from the LPA).
- Both the TABULAR and DETAILED PROGRAM views display this information
- Also, the help text for other fields and actions reflect the possibility of programs being loaded from dynamic LIBRARYs as well as from DFHRPL



The CICSplex SM PROGRAM base table and views also provide information about where a program was loaded from.

PROGRAM TABULAR view screenshot

The screenshot displays the 'PROGRAMS' view in the CICSPlex SM Web User Interface. The interface shows a list of 15 program records. A red arrow points to the 'LIBRARY name' and 'Load data set name' columns, highlighting the information available for programs loaded from DFHRPL.

Record	CICS system name	Program name	Enabled status	Total number of times program was executed	Number of times program currently accessed	Language	Share status	CEDF status	New-copy-required status	LIBRARY name	Load data set name
1	IYK3ZAB6	EYUTVTGE	Enabled	1	1	Assembler	Private	Nocefd	Notrequired	DFHRPL	UTL ALISONB LOAD
2	IYK3ZAB6	EYUTVTGK	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
3	IYK3ZAB6	EYUTVTGS	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
4	IYK3ZAB6	EYUTVTHE	Enabled	1	1	Assembler	Private	Nocefd	Notrequired	DFHRPL	BLDBSF.CERXA SEYULOAD
5	IYK3ZAB6	EYUTVTHK	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
6	IYK3ZAB6	EYUTVTHS	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
7	IYK3ZAB6	EYUTVTJE	Enabled	1	1	Assembler	Private	Nocefd	Notrequired	DFHRPL	BLDBSF.CERXA SEYULOAD
8	IYK3ZAB6	EYUTVTJK	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
9	IYK3ZAB6	EYUTVTJS	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
10	IYK3ZAB6	EYUTVTME	Enabled	11	11	Assembler	Private	Nocefd	Notrequired	DFHRPL	UTL ALISONB LOAD
11	IYK3ZAB6	EYUTVTMK	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
12	IYK3ZAB6	EYUTVTMS	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
13	IYK3ZAB6	EYUTVTSE	Enabled	1	1	Assembler	Private	Nocefd	Notrequired	DFHRPL	UTL ALISONB LOAD
14	IYK3ZAB6	EYUTVTSK	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		
15	IYK3ZAB6	EYUTVTSS	Enabled	0	0	Assembler	Private	Nocefd	Notrequired		

This shows a PROGRAM TABULAR view, illustrating that for programs that have been loaded, the LIBRARY and the data set within that LIBRARY from which they are loaded are shown in the 'LIBRARY name' and 'load data set name' columns. (As it happens, all the programs in this example screen shot have been loaded from DFHRPL, which demonstrates that the information is available for DFHRPL as well as for dynamic LIBRARIES).



PROGRAM DETAILED view screenshot

The screenshot shows the 'PROGRAM DETAILED' view in the CICSplex SM Web User Interface. The left sidebar contains navigation options like Connectivity, Files & DB2, Journals, Queues, Transactions, Programs, and Administration. The main content area displays the following details:

Number of times program currently accessed	1
Total number of times program was executed	1
Number of times program was used since last reset	1
Number of times JVM program used since last reset	0
Number of NEWCOPY requests issued	0
Number of times removed by program compression	0
Number of times program loaded into storage	1
LIBRARY name	DFHRPL
Load data set name	UTL.ALISONB.LOAD
RPL data set number	1
Program name in remote system	
Remote system name	
New-copy-required status	<input type="checkbox"/> Notrequired
Runtime environment information	<input type="checkbox"/> Nonle370

At the bottom, there are buttons for 'Apply changes', 'New copy...', 'Phase in...', 'Enable...', 'Disable...', and 'Discard...'. The resource name is 'PROGRAM' and the view name is 'EYUSTARTPROGRAM.DETAILED'.

This slide shows the LIBRARY name and Load data set name in the PROGRAM DETAILED view. For compatibility, the 'RPL data set number' is retained for DFHRPL (for programs loaded from dynamic LIBRARYs it will be zero).

In both the tabular and detailed views, the "LIBRARY name" field links to the LIBRARY DETAILED view for the specified LIBRARY

In both views the "Load data set name" field links to the LIBDSN DETAILED view for the specified LIBRARY data set

If the new fields are blank, these links will not be set

LIBRARYs at CICS startup

This section looks briefly at aspects of CICS startup relevant for LIBRARY resources.

CICS Startup

- Representation of DFHRPL as a static LIBRARY is constructed at startup
- Cold or Initial start
 - ▶ LIBRARY resources can be installed by GRPLIST install or CICSplex SM BAS install
 - Installed after phase 1 PLT processing
 - ▶ LIBRARY resources are purged from the catalog on cold and initial start
- Warm or Emergency start
 - ▶ LIBRARY resources are restored from the catalog and installed
 - ▶ LIBRARY resources that were enabled at the time of CICS shutdown are re-enabled (if possible)
 - ▶ The relative search order of LIBRARYs is preserved
 - ▶ Programs that have been recovered are re-located by searching in the newly constructed LIBRARY configuration
- The CRITICAL status of a LIBRARY is taken into account at startup



During CICS cold or initial start, LIBRARY resources can be installed via RDO grouplist install or via CICSplex SM BAS install. These both take place after the first phase of PLT processing, so PLT programs which are to run in phase 1 PLT processing must be included in data sets in the DFHRPL concatenation.

On warm or emergency restart, LIBRARY resources are recovered from the catalog, and if they were enabled before, then processing is carried out to allocate and concatenate the data sets and open the LIBRARY concatenation. Also, programs that have been restored from the catalog are located from the LIBRARYs in the search order. The LIBRARY search order is preserved.

LIBRARY Audit Logging

A full audit trail capability is provided to allow you to keep track of changes to the LIBRARY configuration.

Audit Logging

- Changes are logged to new **CSLB** transient data queue for LIBRARY updates, for
 - ▶ Install of a LIBRARY – **DFHLD0501** (start) and **DFHLD0502** (end)
 - Followed by full details about the LIBRARY definition – **DFHLD0505, DFHLD0506, DFHLD0507**
 - Error on install – **DFHLD0503, DFHLD0504**
 - ▶ Discard of a LIBRARY – **DFHLD0512**
 - Error on discard – **DFHLD0513**
 - ▶ A change to the enablement status of a LIBRARY
 - Enabled – **DFHLD0523**
 - Disabled – **DFHLD0524**
 - ▶ A change to the ranking of a LIBRARY – **DFHLD0521**
 - ▶ A change to the critical status of a library – **DFHLD0522**
 - ▶ Error on setting enablement, ranking or critical status – **DFHLD0525**

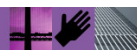


An audit trail of changes made to LIBRARY resources is created by writing messages to the CSLB transient data queue. This can be used to find out what the configuration of the system is, as well as being able to audit who has made the changes.

As with other similar audit logging, this audit logging is always “on”. The only exceptions are during startup (as described on the next chart).

Audit Log of new LIBRARY list

- After any change that potentially affects the search order of LIBRARYs (install, enable, disable, change ranking)
 - A set of messages is logged to list each LIBRARY in its new position in the search order
 - **DFHLD0555** followed by **DFHLD0556** as many times as there are installed **enabled** LIBRARYs
 - Not written for installs during startup, but logged when startup completes
 - Some events can trigger these messages without actual change to search order



The audit log message DFHLD0555, followed by a sequence of message DFHLD0556, shows all of the enabled LIBRARYs in the system, in search position order.

These messages are issued after each change which affects the search order, with the following exceptions:

- The messages are not issued during CICS startup, as this could produce too much output if many LIBRARYs are installed. Instead, we wait for startup to complete and then issue the messages to show the search order as it is at the completion of startup. Each change after this point will cause the set of messages to be written.
- Changes which have the potential to change the search order, but which in practice did not, can still trigger the set of messages. Examples of this are: (1) changing the RANKING of a disabled LIBRARY, which does not actually affect the search order as this only contains enabled LIBRARYs; (2) the RANKING of a LIBRARY might be changed without moving it to a new position (e.g. change it from 50 to 40, but the next lower LIBRARY has ranking of 30).

It should also be noted that, although install of a LIBRARY during startup via grouplist install (or CICSplex SM BAS install) causes the install audit log messages for that LIBRARY to be written, recovery of a LIBRARY from the catalog at warm or emergency restart does not result in any audit log messages (partly because this occurs at a time when CSLB is not available, but mainly to avoid a flood of these messages). The writing of the DFHLD0555, 0556 set of messages at the end of startup is therefore particularly useful for warm/emergency start.

Audit log example: successful LIBRARY install

CSLB audit log messages

```
DFHLD0501 I 05/18/2007 11:05:13 IYCWZCGO TC68 CEDA LIBRARY REALDSNS is being installed with status Enabled.
DFHLD0502 I 05/18/2007 11:05:13 IYCWZCGO TC68 CEDA Install of LIBRARY REALDSNS has completed successfully. Enablement status is
Enabled.
DFHLD0505 I 05/18/2007 11:05:13 IYCWZCGO Details for LIBRARY REALDSNS, ranking: 25, critical status: Noncritical, enablement
status: Enabled.
DFHLD0506 I 05/18/2007 11:05:13 IYCWZCGO Details for LIBRARY REALDSNS, data sets 1-8: ---, ---, ---, ---, MOXEYC.GENERAL.LOAD,
---, ---, ---.
DFHLD0507 I 05/18/2007 11:05:13 IYCWZCGO Details for LIBRARY REALDSNS, data sets 9-16: ---, ---, ---, ---, ---, ---, ---, ---.
DFHLD0555 I 05/18/2007 11:05:13 IYCWZCGO Current LIBRARY search order follows.
DFHLD0556 I 05/18/2007 11:05:13 IYCWZCGO Position in search order: 1, LIBRARY: DFHRPL.
DFHLD0556 I 05/18/2007 11:05:13 IYCWZCGO Position in search order: 2, LIBRARY: REALDSNS.
DFHLD0556 I 05/18/2007 11:05:13 IYCWZCGO Position in search order: 3, LIBRARY: NEWLIB.
DFHRD0127 I 05/18/2007 11:05:13 IYCWZCGO IYXTC68 CICSUSER CEDA INSTALL LIBRARY(REALDSNS) ← CRDI
TC68 CEDA CICSUSER 05/18/07 11:05:13 INSTALL LIBRARY(REALDSNS) GROUP(TESLIB).
```



This shows an example of the audit log messages sent to CSLB when a LIBRARY is installed successfully. This also shows the set of messages which give the current search order (DFHLD0555 followed by DFHLD0556 for each enabled LIBRARY).

Messages DFHLD0506 and DFHLD0507 indicate blank data set name positions using '---' rather than having 44 blanks inserted in the message. (A data set name cannot have '-' in the first position.)

In this example, the LIBRARY only contains one data set name. All except the indicated CRDI message are sent to the CSLB transient data queue.

An example of the error messages issued for an unsuccessful install is given later.

Audit log examples: SET and DISCARD

Enable a LIBRARY

```
DFHLD0523 I 05/21/2007 13:11:46 IYCWZCGO TC97 CECI LIBRARY MYLIB2 has been enabled.
DFHLD0555 I 05/21/2007 13:11:46 IYCWZCGO Current LIBRARY search order follows.
DFHLD0556 I 05/21/2007 13:11:46 IYCWZCGO Position in search order: 1, LIBRARY: DFHRPL.
DFHLD0556 I 05/21/2007 13:11:46 IYCWZCGO Position in search order: 2, LIBRARY: MYLIB2.
DFHLD0556 I 05/21/2007 13:11:46 IYCWZCGO Position in search order: 3, LIBRARY: NEWLIB8.
DFHLD0556 I 05/21/2007 13:11:46 IYCWZCGO Position in search order: 4, LIBRARY: REALDSNS.
```

Disable a LIBRARY

```
DFHLD0524 I 05/21/2007 13:11:51 IYCWZCGO TC97 CECI LIBRARY MYLIB2 has been disabled.
DFHLD0555 I 05/21/2007 13:11:51 IYCWZCGO Current LIBRARY search order follows.
DFHLD0556 I 05/21/2007 13:11:51 IYCWZCGO Position in search order: 1, LIBRARY: DFHRPL.
DFHLD0556 I 05/21/2007 13:11:51 IYCWZCGO Position in search order: 2, LIBRARY: NEWLIB8.
DFHLD0556 I 05/21/2007 13:11:51 IYCWZCGO Position in search order: 3, LIBRARY: REALDSNS.
```

Discard a LIBRARY

```
DFHLD0512 I 05/21/2007 13:23:34 IYCWZCGO TC97 CEMT LIBRARY MYLIB2 has been successfully discarded.
```

Change critical status of a LIBRARY

```
DFHLD0522 I 02/21/2007 19:34:10 IYCWZCGO TC24 CEMT Critical status of library REALDSNS changed from Noncritical to Critical.
```

Change ranking of a LIBRARY

```
DFHLD0521 I 05/21/2007 14:02:22 IYCWZCGO TC97 CECI Ranking of LIBRARY MYLIB2 changed from 20 to 15.
DFHLD0555 I 05/21/2007 14:02:22 IYCWZCGO Current LIBRARY search order follows.
DFHLD0556 I 05/21/2007 14:02:22 IYCWZCGO Position in search order: 1, LIBRARY: DFHRPL.
DFHLD0556 I 05/21/2007 14:02:22 IYCWZCGO Position in search order: 2, LIBRARY: MYLIB2. etc...
```



These examples show the audit log messages when the various SET LIBRARY commands are issued, as well as DISCARD LIBRARY.

Note that LIBRARY DISCARD and a change to the critical status of a LIBRARY do not result in messages DFHLD0555 and DFHLD0556, because they can be guaranteed not to change the search order. (A LIBRARY must be disabled before it can be discarded, and a disabled LIBRARY does not participate in the search order.)

Security for LIBRARYs

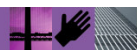


This section covers the security controls for dynamic LIBRARY support.

LIBRARY Security

- Command-level security protection of CICS resource definition and Inquire/Set operations
 - ▶ Control who is able to view and make changes to the LIBRARY configuration
 - RDEFINE VCICSCMD LIBSAMP UACC(NONE) NOTIFY(sys_admin_userid) ADDMEM(LIBRARY)
 - PERMIT LIBSAMP CLASS(VCICSCMD) ID(sys_prog_group) ACCESS(UPDATE)

- Query Security
 - ▶ QUERY SECURITY RESTYPE(SPCOMMAND) RESID(LIBRARY)
 - ▶ Or, depending on the XCMD and SECPRFX system initialization parameter settings (this example assumes XCMD=YES and SECPRFX=NO):
 - QUERY SECURITY RESCLASS(CcicsCMD) RESID(LIBRARY) RESIDLENGTH(7).



Security controls for LIBRARYs are via CICS command-level security, and are the normal security controls for new commands. Thus security management can be used to control who can view LIBRARY resources (INQUIRE and browse commands), who can update them (SET commands) and who can alter them (CREATE and DISCARD commands). The new resource identifier for specifying command security for LIBRARY resources is (not surprisingly) called 'LIBRARY'. The example on the slide shows a profile LIBSAMP being set up to protect LIBRARY commands, and then users in the sys_prog_group being given permission to make updates to LIBRARY resources. The sys_admin_userid will be notified when changes are made to LIBRARY resources via the LIBRARY SPI.

The existing security controls for CEDA will govern who can define and install LIBRARY resources via CEDA, and control of job submission and modifications to CICS startup JCL will govern the use of GRPLIST install.

To discover the level of access to LIBRARY commands, the QUERY SECURITY command can be used with a RESTYPE of SPCOMMAND (SPI command) and specifying the new RESID of LIBRARY (for LIBRARY SPI commands). An alternative QUERY SECURITY command if XCMD=Yes and SECPRFX=NO is also shown.

CICSplex SM LIBRARY security

- CICSplex SM security together with simulated CICS security
 - ▶ Controls who can view and make changes via CICSplex SM operations and definitions

- LIBRARY operations security
 - ▶ For both the LIBRARY and LIBDSN resource tables:
 - Resource level security is as for PROGRAM
 - Command level security is on LIBRARY itself
 - ▶ Standard WUI security for the LIBRARY operations views

- LIBRARY BAS security
 - ▶ Standard BAS security:
 - BAS.DEF to create, display, and maintain LIBRARY definitions (LIBDEF), and to describe the membership of a LIBRARY definition in a resource group (LIBINGRP)
 - BAS.PROGRAM if you want to be more specific
 - ▶ Standard WUI security for the LIBRARY BAS views



This slide describes CICSplex SM security for LIBRARYs, which uses a combination of CICSplex SM security, and simulated CICS command-level security.

Operations on the LIBRARY and LIBDSN are specified using the OPERATE.PROGRAM resource name.

Security for the LIBDEF is specified using the BAS.DEF and BAS.PROGRAM resource names (the latter for install).

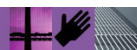
The WUI views are secured via standard WUI security.

Statistics for LIBRARYs

The following section covers the statistics changes for dynamic LIBRARY support.

Statistics – New DSECTs and fields

- DFHLDBDS – new LIBRARY stats DSECT
 - ▶ LIBRARY name, ranking, critical status, enablement status
 - ▶ Number of data sets and data set names
 - ▶ Position of LIBRARY in overall search order
 - ▶ Number of program loads from data sets in the LIBRARY
- DFHLDGDS – updates to Loader Global stats DSECT
 - ▶ Number of LIBRARY search order updates (due to install, ranking change, etc.)
 - ▶ Waits for program load due to search order updates
 - ▶ Time spent updating LIBRARY search order
- DFHLDRDS – updates to program stats DSECT
 - ▶ Name of LIBRARY from which program was loaded (if loaded)
 - ▶ Name of data set within LIBRARY from which program was loaded (if loaded)
 - ▶ RPL offset – retained for compatibility, applies to DFHRPL and LIBRARYs



A new statistics DSECT has been added for LIBRARY stats: DFHLDBDS (with, as usual, versions for Assembler, Cobol and PL/I).

DFHLDBDS contains:

- Normal header information with length, ID (31) and version (currently 01)
- LIBRARY information: name, search position, ranking, critical status, enablement status
- Data set information: number of dsnames and an array of the dsnames
- Stats information: number of program loads from the LIBRARY

There have also been additional fields added to existing statistics DSECTS.

Some global LIBRARY statistics have been added to the loader global stats DSECT (DFHLDGDS for assembler, Cobol and PL/I):

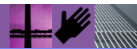
- Number of LIBRARY search order updates is a measure of the number of times the LIBRARY configuration has been changed (due to install of LIBRARYs, changes to LIBRARY ranking and enablement status etc.)
- Program load waits for search order updates, and time spent updating search order, is intended as a measure of the impact of changes to the LIBRARY configuration on the system.

Some LIBRARY information has also been added to the program stats DSECT (DFHLDRDS for assembler, Cobol and PL/I):

- LIBRARY and data set within that LIBRARY from which the program was loaded (if loaded, and LIBRARY still valid)
- RPL offset – this was provided previously for DFHRPL, and is less useful than the actual data set name. It is retained for compatibility, and is populated for dynamic LIBRARY data sets as well as for DFHRPL.

Statistics – New commands, DFH0STAT & STUP changes

- Solicited LIBRARY stats
 - ▶ PERFORM STATISTICS RECORD LIBRARY
 - ▶ CEMT PERFORM STATISTICS LIBRARY
- Unsolicited LIBRARY stats
 - ▶ When LIBRARY is disabled (removed from search order)
- EXTRACT STATISTICS RESTYPE
 - ▶ CVDA 1177 for LIBRARY
 - ▶ Snapshot of current set of LIBRARYs
- COLLECT STATISTICS PROGRAM
 - ▶ Loader global stats, including new fields
- DFH0STAT
 - ▶ New LIBRARY and LIBRARY Dataset Concatenation reports
 - ▶ Updates to loader global and program reports (data set as concatenation offset due to space limits)
 - ▶ RPL analysis is for DFHRPL and 'other' (dynamic) LIBRARYs
- DFHSTUP
 - ▶ New LIBRARY report
 - ▶ No summary (meaningless for LIBRARYs, due to possible config changes during interval)
 - ▶ Updates to loader global and program reports (LIBRARY and data set name)



In support of dynamic LIBRARY statistics, a new LIBRARY option is provided for PERFORM STATISTICS, and a new RESTYPE (with CVDA value 1177) has been provided on EXTRACT STATISTICS. Also, COLLECT STATISTICS PROGRAM will now include the new fields for loader global and program stats.

Note that EXTRACT STATISTICS provides a 'snapshot' of the LIBRARY configuration at the time, it cannot show what has happened historically to change the search order of LIBRARYs, or the data sets within a LIBRARY, etc.

Unsolicited statistics are written for a LIBRARY when it is disabled. This is the point at which it ceases to be an active participant in the search order, so is the most useful place to gather USS.

There are changes in support of LIBRARY resources to the statistics sample program DFH0STAT and the statistics utility program DFHSTUP.

The following slides show some examples from DFH0STAT to illustrate these changes.

DFH0STAT Reports

```

Sample Program - CICS Statistics Print Report Selection
                                02/01/2007  16:06:22

Select the statistics reports required and press 'Enter' to validate

System Status . . . . . Y   Page Index . . . . . N
Storage Manager . . . . . Y   Dispatcher . . . . . Y
Storage Subpools . . . . . Y   Dispatcher MVS TCBs . . . . . N
                                Loader . . . . . Y
Transaction Manager . . . . . Y   LIBRARYs . . . . . N
Transactions . . . . . N   Programs . . . . . N
Transaction Classes . . . . . N   Programs by DSA and LPA . . . . . N
                                DFHRPL and LIBRARY Analysis . . . . . N
Temporary Storage . . . . . Y   Transient Data . . . . . Y
Temporary Storage Queues . . . . . N   Transient Data Queues . . . . . N
Temporary Storage Queues by Pool . . . . . N
Temporary Storage Models . . . . . N   Logstream Global (System Logs) . . . . . Y
                                Logstreams . . . . . N
Files . . . . . N   Journals . . . . . N
Data Set Names . . . . . N
LSR Pools . . . . . N   Coupling Fcty Data Table Pools . . . . . N

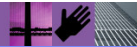
F1=Help   F3=Return to Print   F8=Forward   F10=Save   F12=Restore
  
```



This shows that new reports have been added for LIBRARYs, and that the DFHRPL analysis report now includes some LIBRARY analysis.

DFH0STAT – Loader report

Applid	IYK2Z1V3	Sysid	CJB3	Jobname	CI07CJB3	Date	05/17/2007	Time	13:12:23	CICS	6.5.0	PAGE	3
<u>Loader</u>													
LIBRARY Load requests	:								469	LIBRARY Load Rate per second	:		6.33
Total LIBRARY Load time	:						00:00:03.25998			Total Program Uses	:		6,722
Average LIBRARY Load time	:						00:00:00.00694			Program Use to Load Ratio	:		14.33
LIBRARY Load requests that waited	:								3	Times LIBRARY secondary extents detected	:		0
Total LIBRARY Load request wait time	:						00:00:00.03808				:		
Average LIBRARY Load request wait time	:						00:00:00.01268				:		
Current Waiting LIBRARY Load requests	:								0		:		
Peak Waiting LIBRARY Load requests	:								1		:		
Times at Peak	:								3	Average Not-In-Use program size	:		8K
LIBRARY search order updates	:								3	Load requests waited - search order update	:		0
Total LIBRARY search order update time	:						00:00:00.00000				:		
Average LIBRARY search order update time	:						00:00:00.00000				:		
<u>CDSA</u>													
Programs Removed by compression	:								0	Programs Removed by compression	:		0
Time on the Not-In-Use Queue	:						00:00:00.00000			Time on the Not-In-Use Queue	:		00:00:00.00000
Average Time on the Not-In-Use Queue	:						00:00:00.00000			Average Time on the Not-In-Use Queue	:		00:00:00.00000
Programs Reclaimed from the Not-In-Use Queue	:								0	Programs Reclaimed from the Not-In-Use Queue	:		2
Programs Loaded - now on the Not-In-Use Queue	:								0	Programs Loaded - now on the Not-In-Use Queue	:		11
<u>SDSA</u>													
Programs Removed by compression	:								0	Programs Removed by compression	:		0
Time on the Not-In-Use Queue	:						00:00:00.00000			Time on the Not-In-Use Queue	:		00:00:00.00000
Average Time on the Not-In-Use Queue	:						00:00:00.00000			Average Time on the Not-In-Use Queue	:		00:00:00.00000
Programs Reclaimed from the Not-In-Use Queue	:								0	Programs Reclaimed from the Not-In-Use Queue	:		0
Programs Loaded - now on the Not-In-Use Queue	:								0	Programs Loaded - now on the Not-In-Use Queue	:		0



This shows that the Loader global report has been updated to include the new LIBRARY statistics information on search order updates and their impact.

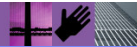
In this example, there have only been 3 updates to the LIBRARY search order, so it is unsurprising that no loads have been recorded as needing to wait for such updates, and that the time spent doing this has not registered.

DFH0STAT – LIBRARYs report

Appid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 05/17/2007 Time 13:12:23 CICS 6.5.0 PAGE 5

LIBRARYs

LIBRARY Name	Search Position	Rank -ing	Critical	Enable Status	Program Loads	Number Dsnames	Concat-enation	Dataset Name	Dsname Number
DFHRPL	1	10	Yes	Enabled	464	15	0	CBAKER.JAVA.PDSE	
							1	UTL.CBAKER.LOAD	
							2	PUBCER.IT2M.LOAD	
							3	BLDBSF.CERXA.SEFYLOAD	
							4	BLDBSF.CERXA.SDFHLOAD	
							5	UTL.CBAKER.LOAD	
							6	PP.ADLE370.ZOS170.SCEECICS	
							7	PP.ADLE370.ZOS170.SCEERUN	
							8	PP.CBC.ZOS170.SCLBDLL	
							9	PP.TCPIP.ZOS170.SEZATCP	
							10	CBAKER.CSATTOOL.SDFHLOAD	
							11	MQM.V531.SCSQAUTH	
							12	MQM.V531.SCSQANLE	
							13	MQM.V531.SCSQCICS	
14	PP.REXXCICS.V110.SCICLOAD								
TESTLIB	2	50	No	Enabled	5	3	0	JTILLI1.NODDYTRU.LOAD	02
							1	CBAKER.TESTPROG.LOAD	04
							2	UTL.CBAKER.LOAD	07



This shows the report for LIBRARYs, which shows each LIBRARY in order, its details such as the search position, ranking and enablement state, and the data sets within the LIBRARY concatenation. It also shows the LIBRARY stats information about program loads from the LIBRARY.

The Dsname Number is only relevant for dynamic LIBRARY resources, and shows the position of the data set in the LIBRARY definition. That is, TESTLIB has been defined with CBAKER.TESTPROG.LOAD as DSNAME04, etc.

DFH0STAT – LIBRARY data set report

Appid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 05/17/2007 Time 13:12:23 CICS 6.5.0 PAGE 6

LIBRARY Dataset Concatenation

Concat- enation	Dataset Name	Dsname Number	LIBRARY Name	Ranking	Critical
0	CBAKER.JAVA.PDSE		DFHRPL	10	Yes
1	UTL.CBAKER.LOAD				
2	PUBCER.IT2M.LOAD				
3	BLDBSF.CERXA.SEYULOAD				
4	BLDBSF.CERXA.SDFHLOAD				
5	UTL.CBAKER.LOAD				
6	PP.ADLE370.ZOS170.SCEECICS				
7	PP.ADLE370.ZOS170.SCEERUN				
8	PP.CBC.ZOS170.SCLBDLL				
9	PP.TCPIP.ZOS170.SEZATCP				
10	CBAKER.CSATTOOL.SDFHLOAD				
11	MQM.V531.SCSQAUTH				
12	MQM.V531.SCSQANLE				
13	MQM.V531.SCSQCICS				
14	PP.REXXCICS.V110.SCICLOAD				

15	JTILLI1.NODDYTRU.LOAD	02	TESTLIB	50	No
16	CBAKER.TESTPROG.LOAD	04			
17	UTL.CBAKER.LOAD	07			

18	CBAKER.TESTPROG.LOAD	03	TESTLIB2	50	No



This shows the LIBRARY data set concatenation report that is provided for LIBRARYs. This aims to provide a view of the data sets in search order, so that the concatenation column is for a hypothetical concatenation of all data sets together. Other information about the Dsname number from the LIBRARY definition, and the LIBRARY name, ranking and critical status are also included.

DFH0STAT – Programs report

Appid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 02/19/2007 Time 12:18:31 CICS 6.5.0 PAGE 48											
Program Name	Data Loc/Exec Key	Times Used	Times Fetched	Total Fetch Time	Average Fetch Time	<-- LIBRARY --> Name	Offset	Times Newcopy	Times Removed	Program Size	Prog Locn
IGZCLNC	Below/USER	0						0	0		None
IGZCLNK	Below/USER	0						0	0		None
IGZCMGEN	Below/USER	0						0	0		None
IGZCMGJA	Below/USER	0						0	0		None
IGZCMGUE	Below/USER	0						0	0		None
IGZCPAC	Below/USER	1	1	00:00:00.04100	00:00:00.04100	DFHRPL	7	0	0	409,176	ERDSA
IGZCPCC	Below/USER	1	1	00:00:00.00393	00:00:00.00393	DFHRPL	6	0	0	12,432	ERDSA
IGZINSH	Below/USER	0						0	0		None
IIBMSGT	Below/USER	0						0	0		None
IIGZMSGT	Below/USER	0						0	0		None
IOSTREAM	Any/CICS	0						0	0		None
IXM4C54	Any/CICS	0						0	0		None
JTRUE1	Any/CICS	1	1	00:00:00.00158	00:00:00.00158	DFHRPL	11	0	0	2,312	ECDSA
MONEXIT	Any/CICS	0						0	0		None
PBREPTR	Any/CICS	0						0	0		None
PBREPTRJ	Any/CICS	0						0	0		None
PBSTRTR	Any/CICS	0						0	0		None
REMOSTAT	/	0						0	0		None
RMIIN	Any/CICS	1	1	00:00:00.01435	00:00:00.01435	TESTLIB	0	0	0	336	ECDSA
RSINDI	Any/CICS	1	1	00:00:00.00241	00:00:00.00241	DFHRPL	1	0	0	56	ECDSA
SM64PROG	Any/CICS	0						0	0		None
WLMNOUT	Any/CICS	0						0	0		None
XPBASIC	Any/USER	0						0	0		None
Totals		6,628	107					1	0		



This example shows the updates to the Programs report, to which information has been added about the LIBRARY from which the program has been loaded (where applicable) and the offset of the data set within that LIBRARY concatenation from which the program has been loaded.

In this example, program IGZCPAC has been loaded from the data set at offset 7 in DFHRPL, and program RMIIN has been loaded from the data set at offset 0 in the NEWLIB dynamic LIBRARY configuration. Mapping back to the LIBRARYs report would allow us to work out which data sets these were. A program such as IGZCLNK has either not been loaded, or loaded from LPA.

DFH0STAT – DFHRPL and LIBRARY analysis

Applid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 05/17/2007 Time 13:12:23 CICS 6.5.0 PAGE 50

DFHRPL Analysis

DFHRPL Offset	DFHRPL Dataset name	Programs	Times Used	Fetches	Average Fetch Time	Newcopies	Removes
0	CBAKER.JAVA.PDSE	0	0	0		0	0
1	UTL.CBAKER.LOAD	3	3	3	00:00:00.00779	0	0
2	PUBCER.IT2M.LOAD	0	0	0		0	0
3	BLDBSF.CERXA.SEYLOAD	0	0	0		0	0
4	BLDBSF.CERXA.SDFHLOAD	71	6,197	79	00:00:00.00611	0	0
5	UTL.CBAKER.LOAD	0	0	0		0	0
6	PP.ADLE370.ZOS170.SCEECICS	1	1	1	00:00:00.00545	0	0
7	PP.ADLE370.ZOS170.SCEERUN	8	8	8	00:00:00.11992	0	0
8	PP.CBC.ZOS170.SCLBDLL	0	0	0		0	0
9	PP.TCFIP.ZOS170.SEZATCP	6	10	6	00:00:00.01531	0	0
10	CBAKER.CSATTOOL.SDFHLOAD	0	0	0		0	0
11	MQM.V531.SCSQAUTH	1	1	1	00:00:00.01358	1	0
12	MQM.V531.SCSQANLE	0	0	0		0	0
13	MQM.V531.SCSQCICS	0	0	0		0	0
14	PP.REXXCICS.V110.SCICLOAD	0	0	0		0	0
Totals		95	6,225	103		1	0

LIBRARY Analysis

	Programs	Times Used	Fetches	Average Fetch Time	Newcopies	Removes
Totals	5	5	5	00:00:00.01008	0	0



This example shows the DFHRPL and LIBRARY Analysis. As can be seen, details for DFHRPL are provided at the data set level, while for the dynamic LIBRARYs an overall summary has been provided. It is felt that analysis on a per-LIBRARY basis would probably not be useful, because changes to LIBRARY definitions and configuration during the statistics collection period could not be accurately reflected (so, for example, the fetch count might be assigned to one LIBRARY when in fact some of those fetches were from a different LIBRARY when it was at a different position in the search order).

DFH0STAT – Programs by DSA and LPA

Applid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 05/17/2007 Time 13:12:23 CICS 6.5.0 Page 53											
Program Name	Concurrency Status	API Status	Times Used	Times Fetched	Total Fetch Time	Average Fetch Time	LibDsn Offset	Times Newcopy	Times Removed	Program Size	Program Location
CBTRUE1	Threadsafe	CICS	1	1	00:00:00.00182	00:00:00.00182	1	0	0	2,752	ECDSA
DFH\$STAS	Quasirent	CICS	1	1	00:00:00.00180	00:00:00.00180	4	0	0	648	ECDSA
DFH\$STCN	Quasirent	CICS	228	1	00:00:00.00192	00:00:00.00192	4	0	0	808	ECDSA
DFH\$STER	Quasirent	CICS	1	1	00:00:00.00366	00:00:00.00366	1	0	0	1,440	ECDSA
DFHACF	Quasirent	CICS	3	1	00:00:00.00264	00:00:00.00264	4	0	0	6,160	ECDSA
DFHKCRP	Quasirent	CICS	1	1	00:00:00.00238	00:00:00.00238	4	0	0	1,904	ECDSA
DFHPLT65	Quasirent	CICS	1	1	00:00:00.01668	00:00:00.01668	1	0	0	80	ECDSA
DFHPSIP	Quasirent	CICS	1	1	00:00:00.00856	00:00:00.00856	4	0	0	1,144	ECDSA
DFHSNLE	Quasirent	CICS	2	1	00:00:00.00140	00:00:00.00140	4	0	0	1,680	ECDSA
DFHTAJP	Quasirent	CICS	1	1	00:00:00.00267	00:00:00.00267	4	0	0	2,488	ECDSA
DFHTEP	Quasirent	CICS	1	1	00:00:00.00236	00:00:00.00236	4	0	0	2,880	ECDSA
DFHTEPT	Quasirent	CICS	1	1	00:00:00.00168	00:00:00.00168	4	0	0	3,728	ECDSA
DFHTFP	Quasirent	CICS	1	1	00:00:00.00241	00:00:00.00241	4	0	0	9,064	ECDSA
DFHZNEP	Quasirent	CICS	1	1	00:00:00.00252	00:00:00.00252	4	0	0	624	ECDSA
DFHOSTM	Quasirent	CICS	2	1	00:00:00.00129	00:00:00.00129	4	0	0	3,344	ECDSA
DFHOSTS	Quasirent	CICS	1	1	00:00:00.00160	00:00:00.00160	4	0	0	8,400	ECDSA
ENABCB1	Threadsafe	CICS	1	1	00:00:00.01651	00:00:00.01651	1	0	0	352	ECDSA
ENABJT1	Threadsafe	CICS	1	1	00:00:00.01353	00:00:00.01353	0	0	0	240	ECDSA
EZACIC21	Quasirent	CICS	1	1	00:00:00.01480	00:00:00.01480	9	0	0	6,592	ECDSA
JTRUE1	Threadsafe	CICS	1	1	00:00:00.00145	00:00:00.00145	0	0	0	2,312	ECDSA
RMIIN	Threadsafe	CICS	1	1	00:00:00.01707	00:00:00.01707	1	0	0	336	ECDSA
RSINDI	Threadsafe	CICS	1	1	00:00:00.00304	00:00:00.00304	1	0	0	56	ECDSA
Totals			253	22				0	0		



This shows an example of the Programs by DSA and LPA report.

The LibDsn Offset column gives the offset into the LIBRARY concatenation of the data set from which the program was last loaded (for non-LPA resident modules). This field is blank if the program has not been loaded, so a value of zero means that the program has been loaded from the data set at offset 0.

Applid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 05/17/2007 Time 13:12:23 CICS 6.5.0 PAGE 56

User Exit Programs

Program Name	Entry Name	<---- Global Area ---->			No. of Exits	Program Status	Exit Program Use Count	LIBRARY	
		Entry Name	Length	Use Count				Name	LIBRARY Dataset Name
DFHEDP	DLI		0	0	0	Started	0	DFHRPL	BLDBSF.CERXA.SDFHLOAD
DFHMOTRU	MQM	MQM	32	1	0	Started	9	DFHRPL	BLDBSF.CERXA.SDFHLOAD
CBTRU1	CBTRU1		0	0	0	Started	0	TESTLIB	CBAKER.TESTPROG.LOAD
RMIIN	RMIIN		0	0	1	Started	12	TESTLIB	CBAKER.TESTPROG.LOAD
RSINDI	RSINDI		0	0	1	Started	72	DFHRPL	UTL.CBAKER.LOAD
JTRUE1	JTRUE1		0	0	0	Started	0	TESTLIB	JTILLI1.NODDYTRU.LOAD
EZACIC01	EZACIC01	EZACIC01	468	1	0	Started	10	DFHRPL	PP.TCPIP.ZOS170.SEZATCP

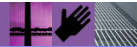
Applid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 05/17/2007 Time 13:12:23 CICS 6.5.0 PAGE 57

Program Name	Entry Name	API	Program Concurrency		Qualifier	Length	<----- Task Related User Exit Options ----->						
			Concurrency	Status			Taskstart	EDF	Shutdown	Indoubt	SPI	Purgeable	
DFHEDP	DLI	Cics	Quasirent	Quasirent		284	No	No	No	No	Wait	No	No
DFHMOTRU	MQM	Open	Threadsafe	Threadsafe	MQCD	224	No	No	Yes	Wait	Yes	No	No
CBTRU1	CBTRU1	Open	Threadsafe	Threadsafe		0	No	No	No	No	Wait	No	No
RMIIN	RMIIN	Cics	Threadsafe	Threadsafe		0	No	No	No	No	Wait	No	No
RSINDI	RSINDI	Cics	Threadsafe	Threadsafe		0	No	No	No	No	Wait	No	No
JTRUE1	JTRUE1	Open	Threadsafe	Threadsafe		0	No	No	No	No	Wait	No	No
EZACIC01	EZACIC01	Open	Quasirent	Threadsafe		788	No	No	Yes	No	Wait	No	Yes

Applid IYK2Z1V3 Sysid CJB3 Jobname CI07CJB3 Date 05/17/2007 Time 13:12:23 CICS 6.5.0 PAGE 58

Global User Exits

Exit Name	Program Name	Entry Name	<----- Global Area ----->			Number of Exits	Program Status	Program Concurrency	
			Entry Name	Length	Use Count			Concurrency	Status
XRSINDI	RSINDI	RSINDI		0	0	1	Started	Threadsafe	Threadsafe
XRMIIN	RMIIN	RMIIN		0	0	1	Started	Threadsafe	Threadsafe



This shows the DFH0STAT user exit reports. The first of these now shows the LIBRARY and data set from which the exit was loaded.

(This example also shows that the way in which the program concurrency information is shown has been improved in CICS TS V3.2.)

LIBRARY global stats in CICSplex SM

- 3 new display-only fields added to the **CICSRGN** base table :
 - ▶ LDGLBSOU - the number of LIBRARY search order updates
 - ▶ LDGLWSOU – the number of waits for a program load due to LIBRARY search order updates
 - ▶ LDGLSORT – the amount of time spent updating the LIBRARY search order
- The CICSRGN DETAILED view displays this information.
- Field RDEBRBLD (now called “Number of times LIBRARY reopened and load retried”) has been moved to be located with the other fields relating to LIBRARYs in the view.

- 3 new display-only fields added to the **LOADER** base table:
 - ▶ LDGLBSOU - the number of LIBRARY search order updates
 - ▶ LDGLWSOU – the number of waits for a program load due to LIBRARY search order updates
 - ▶ LDGLSORT – the amount of time spent updating the LIBRARY search order
- There is no LOADER view included in the set of shipped views, so these just appear in the base table.



The new global LIBRARY statistics have been added to the CICSRGN base table and the LOADER base table. These are displayed on the CICSRGN DETAILED view.

CICSRGN DETAILED view screenshot

The screenshot displays the following data in the 'CICSRGN DETAILED' view:

CICS system name	IYK3ZAB2
CICS Release	0650
Job name	WUIAB02
VTAM application ID	IYK3ZAB2
MVS system name	MV2C
MVS system ID	MV2C
CICS system ID	AB02
XCF group ID	DFHIR000
Activity keypoint (AKP) frequency	<input type="checkbox"/> 4000
Number of MRO requests to be batched	<input type="checkbox"/> 1
Priority aging value	<input type="checkbox"/> 500
Runaway time interval	<input type="checkbox"/> 20000
Terminal scan delay time	<input type="checkbox"/> 1
Exit wait time	<input type="checkbox"/> 100
Number of I/O requests	17743
Number of load requests	15
Total loading time	0:00:00.0972
Number of waiting loader requests	0
Total load waiting time	0:00:00.0000
LIBRARY search order updates	0
LIBRARY search order update time	0
Load requests waited due to search order update	0
Number of times LIBRARY reopened and load retried	0

This screenshot shows the LIBRARY statistics information displayed in the CICSRGN view.

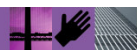
Note also that the number of LIBRARY reopens to retry a program load request now appears in this portion of the view.

Exits and LIBRARYs

This section discusses some topics relating to user exits for Dynamic LIBRARY support.

Exits


- New parameters on DFHPGISX INQUIRE_PROGRAM and INQUIRE_CURRENT_PROGRAM
 - ▶ LIBRARY
 - ▶ LIBRARYDSN
- No LIBRARY XPI
- No LIBRARY-related GLUE points
 - ▶ But XRSINDI exit invoked for LIBRARY install and discard




New parameters have been added to the XPI for INQUIRE_PROGRAM and INQUIRE_CURRENT_PROGRAM, to return the LIBRARY and LIBRARYDSN from which the program has been loaded. These behave as on the INQUIRE PROGRAM SPI.

There is no new XPI for LIBRARY resources.

Also, there are no new user exit points for LIBRARY management, but the XRSINDI Resource Install and Discard exit is invoked as normal when a LIBRARY resource is installed (or created) and when a LIBRARY is discarded.

T&MS14 | Managing Program Libraries Dynamically 

LIBRARY Messages

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This section shows a number of the messages generated by dynamic LIBRARY support.

Messages for successful LIBRARY install

CSLB audit log messages for successful LIBRARY install

```

DFHLD0501 I 05/18/2007 11:05:13 IYCWZCGO TC68 CEDA LIBRARY REALDSNS is being installed with status Enabled.
DFHLD0502 I 05/18/2007 11:05:13 IYCWZCGO TC68 CEDA Install of LIBRARY REALDSNS has completed successfully. Enablement status is
Enabled.
DFHLD0505 I 05/18/2007 11:05:13 IYCWZCGO Details for LIBRARY REALDSNS, ranking: 25, critical status: Noncritical, enablement
status: Enabled.
DFHLD0506 I 05/18/2007 11:05:13 IYCWZCGO Details for LIBRARY REALDSNS, data sets 1-8: ---, ---, ---, ---, MOXEYC.GENERAL.LOAD,
---, ---, ---.
DFHLD0507 I 05/18/2007 11:05:13 IYCWZCGO Details for LIBRARY REALDSNS, data sets 9-16: ---, ---, ---, ---, ---, ---, ---, ---.
DFHLD0555 I 05/18/2007 11:05:13 IYCWZCGO Current LIBRARY search order follows.
DFHLD0556 I 05/18/2007 11:05:13 IYCWZCGO Position in search order: 1, LIBRARY: DFHRPL.
DFHLD0556 I 05/18/2007 11:05:13 IYCWZCGO Position in search order: 2, LIBRARY: REALDSNS.
DFHLD0556 I 05/18/2007 11:05:13 IYCWZCGO Position in search order: 3, LIBRARY: NEWLIB.
DFHRD0127 I 05/18/2007 11:05:13 IYCWZCGO IYXTC68 CICSUSER CEDA INSTALL LIBRARY(REALDSNS)
TC68      CEDA CICSUSER 05/18/07 11:05:13 INSTALL LIBRARY(REALDSNS) GROUP(TESLIB).

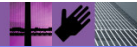
```

CICS Log Messages for install of LIBRARY when a data set in the LIBRARY is migrated

```

10.02.44 JOB00563 +DFHLD0712 IYCWZCGO 289
289          Attempt to install or enable LIBRARY NEWLIB8 will be delayed because
289          data set MOXEYC.TESTLIB8.LOAD is being recalled.

```



The top half of the slide shows a reminder of the sequence of audit log messages when a LIBRARY is installed successfully.

The bottom half of the slide shows the message DFHLD0712 sent to the CICS log when a LIBRARY is installed which includes a data set that is migrated. This message is an indication that the install will be delayed while the data set is recalled.

Messages for install of LIBRARY with non-existent data set

CEDA INSTALL messages (PF9)

MESSAGES - USE ENTER TO RETURN

NAME	TYPE	GROUP	DATE	TIME
SOMEREAL	LIBRARY	TESLIB	07.073	10.51.27

W Install of LIBRARY SOMEREAL encountered a data set allocation failure.
The LIBRARY is installed but disabled.

Console Error messages

+DFHLD0720 IYCZWZCGO 666

Dynamic allocation of data set MOXEYC.INVENTED.LOAD for LIBRARY
SOMEREAL failed. DYNALLOC return codes: X'00000004',X'1708',X'0002'.

+DFHLD0710 IYCZWZCGO Install of LIBRARY SOMEREAL encountered an error. The LIBRARY is installed but disabled.

CSLB audit log messages

DFHLD0501 I 05/18/2007 11:05:21 IYCZWZCGO TC68 CEDA LIBRARY SOMEREAL is being installed with status **Enabled**.

DFHLD0503 W 05/18/2007 11:05:21 IYCZWZCGO TC68 CEDA Install of LIBRARY SOMEREAL has failed to complete successfully, for reason code 2. Enablement status is **Disabled**.

DFHLD0505 I 05/18/2007 11:05:21 IYCZWZCGO Details for LIBRARY SOMEREAL, ranking: 50, critical status: Noncritical, enablement status: **Disabled**.

DFHLD0506 I 05/18/2007 11:05:21 IYCZWZCGO Details for LIBRARY SOMEREAL, data sets 1-8: ---, MOXEYC.GENERAL.LOAD, ---, MOXEYC.TESTLIB.LOAD, ---, MOXEYC.INVENTED.LOAD, ---, ---.

DFHLD0507 I 05/18/2007 11:05:21 IYCZWZCGO Details for LIBRARY SOMEREAL, data sets 9-16: ---, ---, ---, ---, ---, ---, ---, ---.

DFHRD0127 I 05/18/2007 11:05:21 IYCZWZCGO IYXTC68 CICSUSER CEDA INSTALL LIBRARY(SOMEREAL) ← To CRDI

TC68 CEDA CICSUSER 05/18/07 11:05:21 INSTALL LIBRARY(SOMEREAL) GROUP(TESLIB)



This shows the various messages written when an attempt is made to install an enabled LIBRARY but one of the data sets does not exist.

Firstly, the warning message returned to the CEDA panel for CEDA INSTALL is shown.

Next, the error messages sent to the console are displayed.

Thirdly, the messages sent to the audit log are given. The LIBRARY is still installed, but disabled, as shown by the sequence of messages DFHLD0505-0507.

Critical LIBRARYs at startup

```

12.18.00 JOB02085 +DFHSI1511I IYCWZCGO Installing group list CMMLIST.
12.18.00 JOB02085 +DFHLD0720 IYCWZCGO 569
569 Dynamic allocation of data set BLANK.LOAD for LIBRARY BLANKS failed.
569 DYNALOC return codes: X'00000004',X'1708',X'0002'.
12.18.00 JOB02085 +DFHLD0710 IYCWZCGO Install of LIBRARY BLANKS encountered an error. The LIBRARY is installed but
disabled.
12.18.00 JOB02085 +DFHLD0703 IYCWZCGO Noncritical LIBRARY BLANKS could not be installed as enabled. CICS startup continues.
12.18.00 JOB02085 +DFHAM4812 W IYCWZCGO 572
572 Install of LIBRARY BLANKS encountered a data set allocation failure.
572 The LIBRARY is installed but disabled.
12.18.00 JOB02085 @87 DFHLD0702D IYCWZCGO Critical LIBRARY MYLIB2 could not be installed. Reply GO or CANCEL.
12.18.12 JOB02085 R 87,GO
12.18.12 JOB02085 +DFHAM4834 E IYCWZCGO Install of LIBRARY MYLIB2 failed because the installed definition is not disabled.

```

```

15.14.20 JOB04242 +DFHSI1511I IYCWZCGO Installing group list LISTST.
15.14.20 JOB04242 +DFHLD0720 IYCWZCGO 637
637 Dynamic allocation of data set NO.SUCH.DSNAME for LIBRARY BADDY
637 failed. DYNALOC return codes: X'00000004',X'1708',X'0002'.
15.14.20 JOB04242 +DFHLD0710 IYCWZCGO Install of LIBRARY BADDY encountered an error. The LIBRARY is installed but disabled.
15.14.20 JOB04242 @88 DFHLD0702D IYCWZCGO Critical LIBRARY BADDY could not be installed. Reply GO or CANCEL.
15.14.42 JOB04242 R 88,CANCEL
15.14.42 JOB04242 +DFHLD0704 IYCWZCGO Reply CANCEL was received.

```



This shows the messages written when CRITICAL and NONCRITICAL LIBRARYs fail to install during startup, in this case as a result of group list install.

The messages DFHLD0720 and DFHLD0710 (at the top of the slide) show that install of LIBRARY BLANKS has encountered an error. Message DFHLD0703 is issued because LIBRARY BLANKS is noncritical.

Message DFHLD0702 is issued because LIBRARY MYLIB2 encounters an install error, and is critical. The example shows the response to this message as GO, in which case we continue with CICS startup. In this case, MYLIB2 could not be installed because there was already a LIBRARY of that name installed, which was not disabled and so could not be replaced.

The bottom half of the slide shows LIBRARY BADDY encounter an install error because one of the data sets in the LIBRARY does not exist. This is also a critical LIBRARY, so message DFHLD0702 is issued, and this time the response is to cancel CICS, triggering message DFHLD0704.

New/changed loading messages

Module not found in LPA

```
15.31.38 JOB02330 +DFHLD0109I IYCWZCGO 725
725          DFHLDL1 is unable to locate module DFHAPDM in the LPA. DFHRPL or
725          dynamic LIBRARY version of module will be used.
15.34.06 JOB02330 +DFHLD0109I IYCWZCGO 028
028          DFHLDL1 is unable to locate module CFDTREQS in the LPA. DFHRPL or
028          dynamic LIBRARY version of module will be used.
```

DFHLD0109 replaces DFHLD0107

I/O Error Messages

```
11.02.01 JOB09195 IEW4009I FETCH FAILED FOR MODULE CFDTREQS FROM DDNAME NEWLIB  BECAUSE OF AN I/O ERROR.
11.02.01 JOB09195 IEW4005I FETCH FOR MODULE CFDTREQS FROM DDNAME NEWLIB  FAILED BECAUSE IEWFETCH ISSUED RC 0F AND REASON 40
11.02.01 JOB09195 CSV031I LIBRARY ACCESS FAILED FOR MODULE CFDTREQS, RETURN CODE 24, REASON CODE 26080021, DDNAME NEWLIB
11.02.01 JOB09195 IEW4009I FETCH FAILED FOR MODULE CFDTREQS FROM DDNAME NEWLIB  BECAUSE OF AN I/O ERROR.
11.02.01 JOB09195 IEW4005I FETCH FOR MODULE CFDTREQS FROM DDNAME NEWLIB  FAILED BECAUSE IEWFETCH ISSUED RC 0F AND REASON 40
11.02.01 JOB09195 CSV031I LIBRARY ACCESS FAILED FOR MODULE CFDTREQS, RETURN CODE 24, REASON CODE 26080021, DDNAME NEWLIB
11.02.01 JOB09195 +DFHLD0206 IYCWZCGO Loader SVC LOAD request failed due to I/O errors on LIBRARY NEWLIB.
11.02.01 JOB09195 +DFHLD0002 IYCWZCGO A severe error (code X'1925') has occurred in module DFHLDL1.
```

DFHLD0203 (existing message) is issued for I/O error on DFHRPL

DFHLD0206 (new message) is issued for I/O error on a dynamic LIBRARY



This illustrates some changes in messages issued for loading errors:

(1) Previously, if LPA=YES and a module was LPA eligible, then if it was not found in the LPA, message DFHLD0107 would be issued. The text of that message required updating for this support, to mention that the program could be loaded from a dynamic LIBRARY as well as from DFHRPL. As this is a change to the message text, a new message number was needed: DFHLD0109.

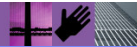
(2) The existing error message to report an I/O error on DFHRPL (DFHLD0203) has been retained, and an equivalent new message added for I/O errors on a dynamic LIBRARY (DFHLD0206).

An I/O error is regarded as a severe error, so triggers message DFHLD0002.

Some interesting quirks

- Search positions of LIBRARYs with the same ranking
 - ▶ Should not be significant, but is preserved across restart
 - ▶ The LIBRARYs are searched in the order in which they were installed
 - ▶ Might not always give the order you expect e.g. changing a ranking of a LIBRARY to be the same as another it was installed before, will put it above that LIBRARY in the search order.

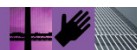
- Sometimes a successfully installed LIBRARY cannot be used
 - ▶ If a LIBRARY definition specifies a data set which is not a valid PDS/PDSE, CICS cannot always detect this
 - The LIBRARY will appear to be installed and enabled, problems might only be seen when attempt is made to load programs from the LIBRARY (resulting in I/O error)
 - Similar to specifying an invalid data set in DFHRPL



- The search positions of LIBRARYs with the same ranking should not be important, bearing in mind that if you give them the same ranking, then this means the ordering is not significant. However, because the order is preserved against a restart, there is an algorithm which determines the order. LIBRARYs of equal ranking are in the order in which they were installed. There are some implications of this: installing a set of LIBRARYs via GRPLIST install can result in a different install time order from installing via BAS INSTALL.
- Also, consider the following sequence:
 1. Install LIBRARY libA with ranking of 30
 2. Install LIBRARY libB with ranking of 30
 3. Install LIBRARY libC with ranking of 20.
 Assuming all three are enabled, the searchpos will be:
 - libC - searchpos = 1
 - libA - searchpos = 2
 - libB - searchpos = 3
- Now set the ranking of LIBRARY libA to be 20, which is the same as libC. The intuitive expectation might be that libA will appear after any LIBRARYs which have the same ranking i.e. libC because it was the last one to be set to that ranking value. However, it will in fact 'jump above' libC because it was installed earlier than libC, i.e.
 - libA - searchpos 1
 - libC - searchpos 2
 - libB - searchpos 3
- You should be aware that CICS does not offer full protection against defining a LIBRARY with a data set which is not a valid data set for loading program artifacts from. This is no different from DFHRPL, except that the LIBRARY will in many such cases appear to install successfully. The problem is often not seen until an attempt is made to locate a program in the LIBRARY, or load programs from it, when an I/O error will normally be seen.
- Because of this problem, CICS does not terminate a search for programs when an I/O error occurs on a dynamic LIBRARY, but will go on to look in the next LIBRARY in the search order.

Displaying all load data sets using CICSplex SM

- LIBRARY tabular view shows a list of installed LIBRARYs
- Follow the 'Number of DSNAMES' link for any of the LIBRARYs to get to the LIBDSN view
- Amend the filter by clearing the LIBRARY name and refresh
- Resequence the resulting list of all data sets in all LIBRARYs into Sort Ascending by 'Data set search enumerator'
- Results in a list of all data sets in the order in which they will be searched



You can use the CICSplex SM WUI to get a complete listing, in search order, of all load data sets in a CICS system.

By default the "LIBRARY" operational view, that is available on the "Program operational views menu", shows a tabular list of each LIBRARY (including the static DFHRPL), together with the number of data sets in each LIBRARY. Select the "Number of DSNAMES" link for a LIBRARY on a specific CICS system to see the "LIBRARY data set names" view. This view is filtered by the selected LIBRARY with each LIBRARY data set displayed, and sequenced by the "LIBRARY data set number".

To see all data sets in the CICS system, clear the "LIBRARY name" filter and press Refresh. Then resequence the view using the "Sort ascending" icon for the "Data set search enumerator". This sequences the data sets by a combination of their LIBRARY search position and the LIBRARY data set number within each LIBRARY.

Data sets for DISABLED LIBRARYs are listed at the bottom of the view with a "Data set search enumerator" value of "N/A".

**“I have always imagined that Paradise will be
a kind of library”**

Jorge Luis Borges (1899 - 1986)



A relevant quote (perhaps).

Dynamic LIBRARY Support: Summary

- Specify the data sets and order that CICS will locate program artifacts for loading
 - ▶ Without restarting CICS
- Organise data sets by application
- Provided in addition to static DFHRPL
- New CICS resource: LIBRARY
 - ▶ Can define and install LIBRARYs
 - ▶ Can see the installed LIBRARYs, set the ranking and criticality
 - ▶ Can enable and disable LIBRARYs, and discard them
 - ▶ LIBRARY audit logging, security and statistics are provided
- New information to discover where a program has been loaded from (LIBRARY and data set within LIBRARY)



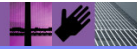
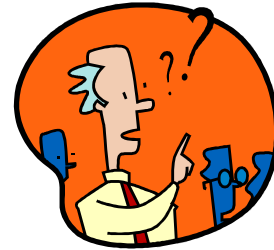
CICS TS V3.2 introduces the ability to make data sets from which to load program artifacts dynamically available to CICS, without the need to restart the CICS region. This allows such data sets to be defined dynamically in addition to the existing means of defining them statically in the DFHRPL concatenation.

LIBRARY is a new CICS resource, with full RDO, SPI and CICSplex SM support.

Information about the data set and LIBRARY a program has been loaded from is provided.

Questions

- Any further questions?
- Thank you!!
- Please complete the session evaluation form (thanks)



Thank you.