MICRO FOCUS | SERENA

ChangeMan® ZMF

Customization Guide

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Welcome to ChangeMan® ZMF

ChangeMan® ZMF is a comprehensive and fully integrated solution for Software Change Management systems in z/OS environments. It provides reliable and streamlined implementation of software changes from development into production. ChangeMan ZMF manages and automates the application life cycle, protects the integrity of the code migration process, and results in higher quality delivered code to any test environment and to the production environment.

Before You Begin — See the Readme for the latest updates and corrections for this manual.

Objective — The *ChangeMan ZMF Customization Guide* provides detailed information about ChangeMan ZMF components that you can modify for functions you need for software change management at your company.

Audience — This document is intended for ChangeMan ZMF administrators and technical staff who are responsible for the installation and maintenance of ChangeMan ZMF software. This document assumes that you are familiar with ChangeMan ZMF functions and architecture.

Change Bars — Change bars in the left margin identify substantive changes in this manual since the last time it was published.

Guide to ChangeMan ZMF Documentation

The following sections provide basic information about ChangeMan ZMF documentation.

ChangeMan ZMF Documentation Suite

The ChangeMan ZMF documentation set includes the following manuals in PDF format.

Manual	Description
Administrator's Guide	Describes ChangeMan ZMF features and functions with instructions for choosing options and configuring global and application administration parameters.
ChangeMan ZMF Quick Reference	Provides a summary of the commands you use to perform the major functions in the ChangeMan ZMF package life cycle.
Customization Guide	Provides information about ChangeMan ZMF skeletons, exits, and utility programs that will help you to customize the base product to fit your needs.
Db2 Option Getting Started Guide	Describes how to install and use the DB2 Option of ChangeMan ZMF to manage changes to DB2 components.
ERO Concepts	Discusses the concepts of the ERO Option of ChangeMan ZMF for managing releases containing change packages.
ERO Getting Started Guide	Explains how to install and use the ERO Option of ChangeMan ZMF to manage releases containing change packages.

Manual	Description
ERO Messages	Describes system messages and codes produced by ChangeMan ZMF ERO.
ERO XML Services User's Guide	Documents ERO functions and services available for general customer use. These services are also known as the "green" services and provide mostly search and query functions.
High-Level Language Functional Exits Getting Started Guide	Provides instructions for implementing and using High-Level Language (Cobol, PL/1, and REXX) exits, driven consistently by all clients to enforce local business rules in ZMF functions.
IMS Option Getting Started Guide	Provides instructions for implementing and using the IMS Option of ChangeMan ZMF to manage changes to IMS components.
INFO Option Getting Started Guide	Describes two methods by which ChangeMan ZMF can communicate with other applications: ■ Through a VSAM interface file. ■ Through the Tivoli Information Management for z/OS product from IBM.
Installation Guide	Provides step-by-step instructions for initial installation of ChangeMan ZMF. Assumes that no prior version is installed or that the installation will overlay the existing version.
Java / zFS Getting Started Guide	Provides information about using ZMF to manage application components stored in USS file systems, especially Java application components.
Load Balancing Option Getting Started Guide	Explains how to install and use the Load Balancing Option of ChangeMan ZMF to connect to a ChangeMan ZMF instance from another CPU or MVS image.
M+R Getting Started Guide	Explains how to install and use the M+R Option of ChangeMan ZMF to consolidate multiple versions of source code and other text components.
M+R Quick Reference	Provides a summary of M+R Option commands in a handy pamphlet format.
Messages	Explains messages issued by ChangeMan ZMF, SERNET, and System Software Manager (SSM) used for the Staging Versions feature of ChangeMan ZMF.
Migration Guide	Gives guidance for upgrading ChangeMan ZMF.
OFM Getting Started Guide	Explains how to install and use the Online Forms Manager (OFM) option of ChangeMan ZMF.
SER10TY User's Guide	Gives instructions for applying licenses to enable ChangeMan ZMF and its selectable options.
User's Guide	Describes how to use ChangeMan ZMF features and functions to manage changes to application components.

Manual	Description
XML Services User's Guide	Documents the most commonly used features of the XML Services application programming interface to ChangeMan ZMF.
ZMF Web Services User's Guide	Documents the Web Services application programming interface to ChangeMan ZMF.

Using the Manuals

Use Adobe® Reader® to view ChangeMan ZMF PDF files. Download the Reader for free at get.adobe.com/reader/.

This section highlights some of the main Reader features. For more detailed information, see the Adobe Reader online help system.

The PDF manuals include the following features:

- **Bookmarks.** All of the manuals contain predefined bookmarks that make it easy for you to quickly jump to a specific topic. By default, the bookmarks appear to the left of each online manual.
- **Links.** Cross-reference links within a manual enable you to jump to other sections within the manual with a single mouse click. These links appear in blue.
- **Comments.** All PDF documentation files that are delivered with ChangeMan ZMF have enabled commenting with Adobe Reader. Adobe Reader version 7 and higher has commenting features that enable you to post comments to and modify the contents of PDF documents. You access these features through the Comments item on the menu bar of the Adobe Reader.
- **Printing.** While viewing a manual, you can print the current page, a range of pages, or the entire manual.
- **Advanced search.** Starting with version 6, Adobe Reader includes an advanced search feature that enables you to search across multiple PDF files in a specified directory.

Searching the ChangeMan ZMF Documentation Suite

There is no cross-book index for the ChangeMan ZMF documentation suite. You can use the Advanced Search facility in Adobe Acrobat Reader to search the entire ZMF book set for information that you want. The following steps require Adobe Reader 6 or higher.

1. Download the ZMF All Documents Bundle ZIP file and the ZMF Readme to your workstation from the Documentation tab on the Micro Focus SupportLine website.
2. Unzip the PDF files in the ZMF All Documents Bundle into an empty folder. Add the ZMF Readme to the folder.
3. In Adobe Reader, select **Edit** | **Advanced Search** (or press **Shift+Ctrl+F**).
4. Select the **All PDF Documents in** option and use **Browse for Location** in the drop down menu to select the folder containing the ZMF documentation suite.
5. In the text box, enter the word or phrase that you want to find.
6. Optionally, select one or more of the additional search options, such as **Whole words only** and **Case-Sensitive**.
7. Click **Search**.
8. In the **Results**, expand a listed document to see all occurrences of the search argument in that PDF.
9. Click on any listed occurrence to open the PDF document to the found word or phrase.

Using Online Help

Online help is the primary source of information about ChangeMan ZMF. Online help is available as a tutorial, through Help screens, and in ISPF error messages.

Online Tutorial

ChangeMan ZMF includes an online tutorial that provides information about features and operations, from high-level descriptions of concepts to detailed descriptions of screen fields.

To view the tutorial table of contents, select option T from the Primary Option Menu, or jump to it from anywhere in ChangeMan ZMF by typing =T and pressing ENTER.

Press PF1 from anywhere in the Tutorial for a complete list of Tutorial navigation commands and PF keys.

Online Help Screens

If you have questions about how a ChangeMan ZMF screen works, you can view a help panel by pressing PF1 from anywhere on the screen.

Online Error Messages

If you make an invalid entry on a ChangeMan ZMF screen, or if you make an invalid request for a function, a short error message is displayed in the upper right corner of the screen. Press PF1 to display a longer error message that provides details about the error condition.

Remember that the long message does not display automatically. Request the long message by pressing PF1.

Typographical Conventions

The following typographical conventions are used in the online manuals and online help. These typographical conventions are used to assist you when using the documentation; they are not meant to contradict or change any standard use of typographical conventions in the various product components or the host operating system.

Convention	Explanation
italics	Introduces new terms that you may not be familiar with and occasionally indicates emphasis.
bold	Emphasizes important information and field names.
UPPERCASE	Indicates keys or key combinations that you can use. For example, press the ENTER key.
`monospace`	Indicates syntax examples, values that you specify, or results that you receive.

Convention	Explanation
monospaced italics	Indicates names that are placeholders for values you specify; for example, *filename*.
vertical rule |	Separates menus and their associated commands. For example, select File | Copy means to select Copy from the File menu. Also, indicates mutually exclusive choices in a command syntax line.

Notes

Sterling Connect:Direct® is an IBM® point-to-point file transfer software product that can be used to transfer files between two ChangeMan ZMF instances. The original name of the product was Network Data Mover (NDM). The "NDM" mnemonic persists, embedded in Connect:Direct and ChangeMan ZMF component names, options, and JCL examples.

Chapter 1
Introduction

The ChangeMan ZMF rules-based environment for software configuration management provides processes based on best practices for managing application components.

Software change management can be expressed differently in different companies. ChangeMan ZMF architecture allows customers to modify details of the development lifecycle process. While user interfaces for ChangeMan ZMF have expanded beyond the host environment, many key functions are based on batch processing that can be customized to fit your requirements.

This design provides flexibility for you to quickly modify ChangeMan ZMF to fit your needs. However, there are some general recommendations that you should follow to protect the integrity of your ChangeMan ZMF components. These recommendations are detailed in the sections that follow.

Preserving Vendor Versions of ChangeMan ZMF Components

Preserve the versions of components that are delivered in the ZMF installer. Do not edit components in the mainframe libraries unloaded from the installer. Allocate *custom* libraries to concatenate over vendor (delivered) libraries in the SERNET started procedure and other JCL that use ChangeMan ZMF libraries.

If you preserve the delivered version of components, you can to return to the original version if modifications you make do not work as expected.

Using ChangeMan ZMF To Manage ChangeMan ZMF Components

We recommend that you use ChangeMan ZMF to manage ChangeMan ZMF components. This means that you create an application in production ChangeMan ZMF and create library types for ISPF skeletons, ISPF panels, ISPF messages, source code, load modules, and JCL. The baseline or production libraries for this application are concatenated under the ISPSLIB, ISPPLIB, ISPMLIB, and STEPLIB of the SERNET started procedure.

To modify a ChangeMan ZMF component such as a skeleton, you create a change package, check out and edit the skeleton, then promote the package to populate a test skeleton library concatenated in the ISPSLIB ddname of a test ChangeMan ZMF instance. After testing the skeleton in a test ChangeMan ZMF environment, you audit and freeze the package, then obtain approvals that include management responsible for your change management software. When the package is installed, your production ChangeMan ZMF automatically starts using the new version of the skeleton.

For debugging purposes, users should copy their customized skeletons to a CUSTOM.SKELS library, and concatenate the CUSTOM.SKELS library ahead of the skeleton library distributed with the ChangeMan ZMF product.

Chapter 2 ISPF Skeletons provides details on customizing ChangeMan ZMF panels and variables. Chapter 3 User Exits describes exit functions, where they are invoked, and common uses. Extensive help is built into the ISPF environment, pressing the PF1 key once gets you some information, pressing the PF1 key a second time for ChangeMan ZMF Messages will get you more information. See the ChangeMan ZMF Messages Guide for further message details.

Nomenclature

Mainframe components of **SERNET** run as **started tasks** under z/OS. Each SERNET started task is assigned a unique one-character **subsystem ID**.

ChangeMan ZMF runs as an **application** under SERNET technology. It uses the subsystem ID assigned to the SERNET started task, but SERNET requires the subsystem ID even when there is no ChangeMan ZMF application.

One occurrence of SERNET is referred to as a SERNET **instance**. One occurrence of ChangeMan ZMF is referred to as a ChangeMan ZMF **instance**.

The ChangeMan ZMF programs that run under SERNET are called ChangeMan ZMF **server** programs. ChangeMan ZMF programs that run in the user address space, such as the ChangeMan ZMF ISPF interface, are referred to as ChangeMan ZMF **client** programs.

Chapter 2

ISPF Skeletons

This chapter tells you how to use the flexibility of standard IBM ISPF services to build your own change management processes that run within the secure environment of ChangeMan ZMF.

Introduction

ChangeMan ZMF uses standard ISPF services to build batch job JCL from ISPF skeletons. This design provides extraordinary flexibility through standard IBM facilities. You can build your own batch processes inside ChangeMan ZMF for component builds and other processes while ChangeMan ZMF maintains the integrity of your software change management processes by securing development and production libraries and allowing only authorized access to its functions.

The *ChangeMan ZMF Installation Guide* describes skeletons that you must modify to bring up a test or demonstration ChangeMan ZMF instance and process a change package through the package life cycle. This chapter provides more details about customization in a complex ChangeMan ZMF environment.

A routine is available which allows the notification of Job Completion messages via email (only for z/OS 2.3 or greater). See the sample skeleton CMN$$ENT.

Skeleton File Tailoring in ChangeMan ZMF

File tailoring obtains variable values from ISPF variable pools populated by ChangeMan ZMF programs. It obtains ISPF skeletons from libraries concatenated under the ISPSLIB ddname in the SERNET started task JCL. ChangeMan ZMF file tailoring builds batch JCL to perform the following functions:

- Checkout in batch
- Compile, assemble, and link edit (build) procedures
- Promotion
- Audit
- Audit Auto Resolve
- Batch freeze
- Package distribution, installation, and baseline ripple
- Package backout
- Utility functions such as Component Compare, Print, and Copy (export)
- Development and management of CICS web services.

Skeletons are delivered in the CMNZMF SKELS library in the ZMF installer.

Skeleton Naming Conventions

When ChangeMan ZMF was first released, there was a rigid naming convention for skeletons that conveyed their purpose and their position in the skeleton imbed hierarchy. As the product matured and the number of skeletons multiplied, the naming conventions lost their rigor.

However, where you see certain structures in a skeleton name, you can still infer information about the skeleton.

The table below explains the conventions in this sample skeleton name:

```
aaaiifff
```

where:

aaa	The first three characters of the delivered ChangeMan ZMF skeletons are CMN, which is an abbreviation for the product name.
ii	The following values usually carry the listed meaning: $$ Subordinate skeleton in an imbed hierarchy. IM IMS Option skeleton. IN Install skeleton, often for the IMS Option. JS Skeleton to insert a new JOB statement after 255 steps in generated JCL. PR Promotion skeleton, often for the IMS Option. RP Skeleton for promotion to a remote site. Zn Online Forms Manager skeleton. nn Installation job skeleton.
fff	Three-character acronym or abbreviation for the skeleton function.

We recommend that you use an abbreviation for your company name as the first three characters of a skeleton name when you create a custom skeleton that is not a derivative of a skeleton that is delivered with ChangeMan ZMF.

Skeleton Variables

ISPF variables are used in ChangeMan ZMF skeleton logic to:

- Provide values for component names, data set names, parameters, subparameters, and other elements of JCL.
- Provide the conditions for file tailoring logic to include or exclude JCL statements.

Skeleton Variable Example

The following code fragment from a ChangeMan ZMF skeleton provides an example of both variable functions:

```
)SEL &DB2PCLL NE &Z
//STEPLIB  DD DISP=SHR,DSN=&DB2PCLL
)ENDSEL &DB2PCLL NE &Z
```

In this example, if variable DB2PCLL is not a null value (blank), then the STEPLIB statement is included in the JCL generated by file tailoring.

If the STEPLIB statement is included in the generated JCL, the data set name of the library will be the value stored in variable DB2PCLL.

Where Variables Are Defined

ISPF variables are made available for file tailoring by these ChangeMan ZMF facilities:

- ChangeMan ZMF base product programs that set variable values based on conditions in the package master file, component master file, files under ChangeMan ZMF control, and values entered by users on standard ChangeMan ZMF panels.
- Package User Information variables entered by package creators if the Package User Information facility is turned on by the global administrator. See "Package User Information" on page 92.
- Stage User Option variables set by users on the custom ChangeMan ZMF User Option Panel built by the administrator or technician responsible for customizing ChangeMan ZMF. See "Staging User Options" on page 96.
- Skeletons CMN$$DSN, CMN$$VAR, CMN$PARM, PRM$aaaa, and VAR$aaaa that you customize to set variables used in build processing.
- Release ID variables set by the global administrator. See "Release ID Variables" on page 103.
- Custom variables V01-V10 passed from ISPF panels to file tailoring for some ChangeMan ZMF batch jobs.

#VARLIST

Member #VARLIST in the CMNZMF SKELS library lists ISPF variables and variable tables defined in base ChangeMan ZMF programs.

- The variables and tables are grouped under the ChangeMan ZMF function that defines them.
- The variables in each table are listed.
- For each variable, the variable length and a short definition are provided.
- High level skeletons for each ChangeMan ZMF function are listed.

Skeleton Imbedding

ChangeMan ZMF uses the imbed facility of ISPF file tailoring to reduce redundancy. Common functions are coded in a skeleton. The common skeleton is then imbedded in other skeletons with the `)IM` control statement.

Imbedded skeletons can contain imbeds for other skeletons. ISPF file tailoring limits imbeds to 15 levels of imbedding, if you attempt further you will get an error with the skeleton name and record number that attempted to exceed that limit e.g. **Exceeds maximum)IM level of 15, CMN014 record-3**

Each ChangeMan ZMF skeleton begins with a JCL comment (except skeletons that generate JOB statements). This JCL comment contains the name of the skeleton. ISPF file tailoring passes JCL comments in skeletons directly to the output JCL. You can find the names of all of the ChangeMan ZMF skeletons used to generate a job by looking for JCL comments that look like this:

```
//*)IM CMNxxxxx
```

The sequence of these JCL comments shows the sequence of skeletons processed by ISPF file tailoring to generate a job. The sequence may mean that a skeleton is imbedded in a skeleton named previously in a JCL comment in the job.

See Appendix B, "Analyzing ZMF ISPF Skeletons" on page 217 for tables that show the hierarchy of imbedded ChangeMan ZMF skeletons. The appendix also provides

instructions for analyzing skeleton imbed hierarchies, which you can use to analyze your customized skeleton structures.

Skeleton Maintenance Facility

ChangeMan ZMF includes a skeleton maintenance facility that the global administrator can use to:

- Customize skeletons
- Check skeleton syntax
- Create and maintain application-level variables called Release ID variables for use in file tailoring for batch job JCL.

Accessing Skeleton Maintenance

To display the **Skeleton Maintenance Options** menu, use one of these two methods.

- Access the **Skeleton Maintenance Options** panel directly by typing **=A.G.S** and pressing **Enter**,

or

- Follow these steps to access the **Skeleton Maintenance** panel using ChangeMan ZMF menus:

  a On the **Primary Option Menu**, select **option A Admin**.

  b On the ***Administration Options*** *menu,* select **option G Global**.

  c On the ***Global Administration Options*** *menu,* select option **S Skeleton**.

  The **Skeleton Maintenance Option** menu (CMN3DSKL) is displayed.

```
CMN3DSKL                 Skeleton Maintenance Options
Option ===> ____________________________________________________

M  Maintain       Maintain skeleton release variables
A  Assist         File tailoring assistance of skeleton procedures
```

Options on the **Skeleton Maintenance Options** menu include:

- **M Maintain** to take you to the **Maintain Release ID Variables** panel where you create and update release ID variables. See "Developing Skeletons With File Tailoring Assistance" on page 26.
- **A Assist** to take you to the **File Tailoring Assistance** panel where you can edit skeletons and test skeleton syntax. See "Release ID Variables" on page 103.

CAUTION! Never select **A Assist** on a production ChangeMan ZMF instance.

When you select **A Assist**, ISPF skeleton libraries are immediately enqueued, and skeleton file tailoring cannot be executed.

Developing Skeletons With File Tailoring Assistance

We recommend that you use ChangeMan ZMF to manage ChangeMan ZMF components. See "Using ChangeMan ZMF To Manage ChangeMan ZMF Components" on page 18. However, early in the initial implementation of ChangeMan ZMF, there may be justification for using the File Tailoring Assistance facility in ChangeMan ZMF global administration to modify skeletons.

File Tailoring Assistance automatically obtains a skeleton you want to edit or validate from the first occurrence of the skeleton in the ISPSLIB concatenation of the SERNET started task. Editing is performed in an ISPF edit session running under ChangeMan ZMF. When edit changes are saved, ChangeMan ZMF saves the customized skeleton back into the top library in the ISPSLIB concatenation. The top library in the ISPSLIB concatenation should be your custom skeleton library.

Advantages of Using File Tailoring Assistance

The advantages of using File Tailoring Assistance include:

- Rapid editing of skeletons.
- Automatic preservation of vendor versions of skeletons (if you properly allocate a custom skeleton library and concatenate it at the top of the ISPSLIB libraries in your started task JCL).
- Syntax checking of complex skeleton logic without creating application, component, and user conditions that will create variable values to exercise that logic.
- Rapid testing of skeletons from the same ChangeMan ZMF instance where they were edited.

Disadvantages of File Using Tailoring Assistance

The disadvantages of using File Tailoring Assistance include:

- No skeleton versions are preserved between the original vendor version and the current custom version that is running the ChangeMan ZMF instance.
- There is no audit trail of skeleton changes.
- There is no guarantee that variable values assigned in File Tailoring Assistance are available in the ChangeMan ZMF function where the file tailoring is actually performed.
- All libraries in the ISPSLIB concatenation are enqueued while File Tailoring Assistance facility is in use. Execution of batch functions on this ChangeMan ZMF instance are blocked.

CAUTION! For this reason, never use File Tailoring Assistance on a production ChangeMan ZMF instance.

- Skeleton developers must be granted update access to the custom skeleton library. This is not acceptable if the library is used to run production ChangeMan ZMF instances.
- When skeleton changes are saved, the changes are effective immediately. There is no promotion facility to test the skeleton outside of File Tailoring Assistance.

Recommended Use of File Tailoring Assistance

The disadvantages listed above make the use of File Tailoring Assistance inappropriate in a ChangeMan ZMF instance that manages production components.

File Tailoring Assistance may be used in an initial implementation of ZMF:

1 Bring up the new ChangeMan ZMF instance

2 Use File Tailoring Assistance to perform initial skeleton modifications to get ESSENTIAL batch jobs to run successfully.

3 Create a ChangeMan ZMF application, and continue development of custom components under ChangeMan ZMF supervision.

Editing Skeletons in File Tailoring Assistance

1 Display the **Skeleton Maintenance Options** menu using one of these two methods.

- Access the **Skeleton Maintenance Options** panel directly by typing **=A.G.S.A** and pressing **Enter**,

or

- On the **Skeleton Maintenance Option** menu, select option **A Assist**. The **File Tailoring Assistance** panel (CMN3DSA0) is displayed.

```
CMN3DSA0                  File Tailoring Assistance
Option ===> ____________________________________________________

   blank Display skeleton list              E Edit skeleton
       S Select for file tailoring          V View skeleton

Skeleton name . . . CMN11___  (Blank for list; required for options E,V,S)
Release id  . . . . ____      (Blank for list)
Application . . . . ACTP      (Blank for list)
```

2 On the **File Tailoring Assistance** panel:

a Type **E Edit** in the **Option** line.

b Type the name of a skeleton in the **Skeleton Name** field.

c Press **Enter**.

The skeleton you named is opened in an ISPF edit session.

```
ISREDDE2   CMNTP.CMN810.C6.SKELS(CMN11) - 00.00           Columns 00001 00072
Command ===> _____________________________________________ Scroll ===> CSR
****** *************************** Top of Data ****************************
000001 )IM CMN$$SJN
000002 //*)IM CMN11
000003 //*
000004 //*  JOB TO INSERT &PKGNAME INFORMATION IN PACKAGE MASTER AT &RMTSITE
000005 //*
000006 )CM
000007 )CM  UPDATE DDNAME CMN11ENQ WITH A VALID DATASET NAME BEFORE USING;
000008 )CM  THIS DATASET ELIMINATES CONFLICTS WITH RECORDS BEING UPDATED IN
000009 )CM  THE PACKAGE MASTER FROM THE .PACKAGE DATASET
000010 )CM
000011 )SEL &RSTTTYP EQ FTP
000012 )CM
000013 )CM   RECEIVE PACKAGE DATASET
000014 )CM
000015 )SET RCVDSN    = &PRSPKG
000016 )SET STEPID    = PACK
000017 )IM CMN$$RCV
000018 )CM
000019 )CM   RECEIVE INSTALLATION "X" DATASET
000020 )CM
000021 )SET RCVDSN    = &PRSNOD
000022 )SET STEPID    = DOTX
000023 )IM CMN$$RCV
000024 )CM
000025 )CM   RECEIVE ALL THE STAGING DATASETS
000026 )CM
000027 )CM  SPECIFY THE REQUIRED PARAMETERS FOR THE CMNSUBIR SKELETON:
000028 )CM
000029 )SET SUBDOT   = &RMLBTBL
000030 )SET SUBPARJS = 230
000031 )SET SUBNR1SK = &Z
000032 )SET SUBNR1JS = 0
000033 )SET SUBREPSK = CMN$$F08
000034 )SET SUBREPJS = 4
000035 )SET SUBNR2SK = &Z
000036 )SET SUBNR2JS = 0
000037 )SET SUBERRSK = CMN11ERR
```

3 Use standard ISPF edit commands to change the skeleton.

4 Press **PF3** or type **END** and press **Enter** to save the edit changes and return to the **File Tailoring Assistance** panel.

5 If File Tailoring assistance found the skeleton in the library at the top of the ISPSLIB library concatenation in the started task JCL, the updated member is saved back to that library. If the skeleton was found in another library lower in the concatenation, it is saved to the top library.

NOTE Editing in File Tailoring Assistance is not the same as editing a ChangeMan ZMF package component. In File Tailoring Assistance, you are editing directly in the skeleton library, and there is no compare listing or commit process when you press PF3. Your changes are simply saved directly into the live data set.

Syntax Checking in File Tailoring Assistance

With File Tailoring Assistance, you can check the syntax of skeletons you have modified. A simulated file tailoring session resolves variable substitutions and presents the resulting file on the screen for review.

NOTE File Tailoring Assistance does not resolve variables with values provided by ChangeMan ZMF panels and functional programs. Likewise, ISPF tables are not built. You can provide values for variables using the Release ID Variable facility described in the next section.

1 Display the **Skeleton Maintenance Options** menu using one of these two methods.

- Access the **Skeleton Maintenance Options** panel directly by typing **=A.G.S.A** and pressing **Enter**.

  or

- On the **Skeleton Maintenance Option** menu, select option **A Assist**. The **File Tailoring Assistance** panel (CMN3DSA0) is displayed.

```
CMN3DSA0                  File Tailoring Assistance
Option ===> S

   blank Display skeleton list              E Edit skeleton
       S Select for file tailoring          V View skeleton

Skeleton name . . . CMN11___  (Blank for list; required for options E,V,S)
Release id  . . . . ____      (Blank for list)
Application . . . . ACTP      (Blank for list)
```

2 On the **File Tailoring Assistance** panel:

a In the **Application** field, type the name of the application that contains the skeleton you want to test.

b Type the name of a skeleton in the **Skeleton Name** field and press **Enter**, or leave the field blank and press **Enter** to display the **Skeleton Member List** panel, then type **S** in the **line command** for a skeleton and press **Enter**. You may have to select a Release ID first from the **Release Id List** panel (CMN3DSA2)

```
CMN3DSA2                       Release Id List              Row 1 to 1 of 1
Command ===> ____________________________________________ Scroll ===> CSR

   Id     Changed       User     Description
S V6R1 2008/07/09 13:35 USER25
****************************** Bottom of data ********************************
```

```
ISREDDE2   CMNTP.A008A.#CE259A5.#75A7E25                  Columns 00001 00072
Command ===> ____________________________________________ Scroll ===> CSR
****** ***************************** Top of Data ******************************
000001 //S8CPRMA JOB (SM-1IKF-SM),'CMN',
000002 //        CLASS=A,
000003 //        NOTIFY=USER25,
000004 //        MSGCLASS=X
000005 //*
000006 //* THE ABOVE JOB CARDS CAME FROM THE IMBED OF SKEL CMN$$JCD
000007 //*)IM CMN$$JCD
000008 //*
000009 //*  JOB REQUESTED BY USER25 ON 2014/12/02 AT 21:59
000010 //*
000011 //*)IM CMN$$DSN
000012 //*)IM CMN$$JBL
000013 //JOBLIB   DD DISP=SHR,DSN=CMNTP.CMN810.C6.LOAD
000014 //         DD DISP=SHR,DSN=CMNTP.SER810.C6.LOAD
000015 //         DD DISP=SHR,DSN=CMNTP.CMN810.LOAD
000016 //         DD DISP=SHR,DSN=CMNTP.SER810.LOAD
000017 #%
000018 //*)IM CMN$$SJN
000019 //*
000020 //*  PACKAGE FROZEN BY USER015 ON 2014/12/02 AT 21:59
000021 //*
000022 //*)IM CMN$$DSN
000023 //*)IM CMN$$JBL
000024 //JOBLIB   DD DISP=SHR,DSN=CMNTP.CMN810.C6.LOAD
000025 //         DD DISP=SHR,DSN=CMNTP.SER810.C6.LOAD
000026 //         DD DISP=SHR,DSN=CMNTP.CMN810.LOAD
000027 //         DD DISP=SHR,DSN=CMNTP.SER810.LOAD
000028 //*)IM CMN11
000029 //*
000030 //*  JOB TO INSERT ACTP000008 INFORMATION IN PACKAGE MASTER AT
000031 //*
000032 //*)IM CMN00INS
000033 //CMN00   EXEC PGM=CMNBATCH,   *** Access ChangeMan ZMF started task
000034 //             PARM='SUBSYS=6',
000035 //             COND=(4,LT)
000036 //*)IM CMN$$SPR
000037 //SER#PARM DD  DISP=SHR,DSN=CMNTP.SER810.C6.TCPIPORT
```

3 The JCL created from the file tailored skeleton is displayed, at least up to the point where a syntax error was detected or file tailoring assistance tried to resolve a variable or open a table that does not exist. Error messages from file tailoring are displayed at the top of the JCL.

NOTE The record numbers referenced in error messages are the skeleton record numbers, not records in the output JCL.

Debugging Skeletons in Started Task Procedures

Starting in ChangeMan ZMF 5.1, ISPF file-tailoring is migrated from your TSO address space to file tailoring address spaces that are initiated by the SERNET started task that runs ZMF. You have no access to these separate address spaces, so you cannot directly test file tailoring for custom skeletons.

CLIST CMNDBGAS executes ChangeMan ZMF programs in your address space. You can run this CLIST in tools like ISPF Dialog Test to debug custom skeletons.

File Tailoring Procedure Names

In releases prior to ChangeMan ZMF 5.6, ISPF file-tailoring is performed by a single started procedure named CMNxADSP, where x is the subsystem ID of the started task under which ChangeMan ZMF runs.

Since ChangeMan ZMF version 5.6, ChangeMan ZMF administrators can specify up to four different procedures that perform the following file-tailoring functions:

- Installation JCL builds.
- Batch component builds.
- Promotion JCL builds.
- All other file-tailoring functions.

The ChangeMan ZMF global administrator identifies these procedures on the Global Parameters, Part 2 of 8 [CMNGGP02] panel. Refer to the *ChangeMan ZMF Administrator's Guide* for a description of this panel.

If there is a failure in the execution of a file tailoring started task, it sends a message to the console log. You can use the JobID associated with the console log message to find the file tailoring server output in SDSF (or another sysout viewing tool) that contains information about the cause of the failure.

Considerations

- You must have global administrator authority to run the started task procedure address space programs in your TSO address space.
- CLIST CMNDBGAS uses control information that is generated by a file tailoring started procedure when the TRACE facility is enabled in the ZMF started task. When TRACE is on in the ZMF instance, the spawned file tailoring started task writes the control information to dynamically allocated sysout DDname RQST.
- CMNDBGAS reads the control information from a sequential file. Before executing CMNDBGAS, you must allocate the sequential file and copy the control information from the RQST sysout data set into the new file.
- The method you use to copy the RQST sysout records to a cataloged data set depends on the facilities and requirements at your site. The procedure described in this section assumes that you use your sysout viewing tool to copy that information into a cataloged data set.
- Execute the procedure described in this section using your test ChangeMan ZMF system. The TRACE facility generates a significant volume of output, which could be harmful in a ChangeMan ZMF instance being used by many developers.

Set Up CLIST CMNDBGAS

1 Copy member CMNDBGAS from the vendor CLIST library to your custom CLIST library.

2 Code an appropriate SYSOUT class for DDnames SERPRINT and RQST.

3 Replace the ALLOC statement for ddname SER#PARM with the same statement in your log-on CLIST for ChangeMan ZMF.

4 Replace the LIBDEF statements for ISPLLIB, ISPMLIB, and ISPPLIB with the LIBDEFs in your ZMF logon CLIST.

5 Replace the library concatenation in the LIBDEF ISPSLIB statement with the concatenation in your ZMF started procedure.

6 To ensure a clean ISPF variable environment, ensure that CLIST CMNDBGAS specifies a NEWAPPL() application id that does not contain ChangeMan ZMF variables in the profile pool member in ISPPROF.

Run CLIST CMNDBGAS

The instructions in this section assume that you use SDSF to browse spool output and are authorized to issue the commands shown. Substitute appropriate steps and commands if you do not have the required authorization or use another sysout viewing tool.

1 Turn on the TRACE facility with the following modify command:

```
F server,TRACE,ON,CMN,CLASS=1
```

where *server* is the jobname of the SERNET started task that runs ZMF.

2 Execute your logon CLIST to connect to ChangeMan ZMF through the ISPF interface, and execute the ZMF function that will file tailor the skeleton you want to test. The purpose of this step is to capture the control information required to run this function with CLIST CMNDBGAS.

3 Turn off the TRACE facility with the following modify command:

```
F server,TRACE,OFF,CMN,CLASS=1
```

where *server* is the jobname of the SERNET started task that runs ZMF.

4 Allocate a small sequential data set *somnode*.CMNADSP.REQUEST with DCB:

```
RECFM=FB
LRECL=1000
```

This file will only contain a few records.

5 Enter SDSF and set PREFIX to the name of the file tailoring started task. Display the SDSF queue appropriate for the SYSOUT class coded in the file tailoring started procedure.

6 Type **?** in the line command for the file tailoring started task sysout and press **Enter**.

7 Type **SE** in the line command for the RQST ddname and press **Enter** to display the sysout data in edit mode.

8 Copy the contents of the RQST sysout data set into *somnode*.CMNADSP.REQUEST that you allocated previously:

- **a** In the line command for the first record, type **C9999**.
- **b** On the **Command** line, type **REPLACE** and press Enter.
- **c** On the **Name** line of the **Edit/View Replace** panel, type DSN *somnode*.CMNADSP.REQUEST and press **Enter**.
- **d** Press **Enter** on the **EDIT - Confirm Replace** panel, ignoring the difference in the record format.
- **e** Exit the RQST sysout data set.

9. Invoke CLIST CMNDBGAS from within a debugging environment, such as ISPF dialog test (Note that this CLIST is distributed in the supplied CLIST library for ChangeMan ZMF and will need to be updated and placed in a custom library before you can use it).
10. When prompted, enter the data set name *somnode*.CMNADSP.REQUEST.

ISPF Table CMNTBN

Programs running in a started task procedure address space start with a clean ISPF environment. To ensure that no ChangeMan ISPF tables are left open in a user's address space, a TBEND is issued for each ISPF table that was created during the session.

These TBENDs occur when you exit from a client ChangeMan ZMF session in an ISPF environment. ChangeMan knows which tables to TBEND by maintaining another ISPF table called CMNTBN. CMNTBN contains a list of all ISPF tables created during the ChangeMan session.

Table CMNTBN may help you when you are debugging under ISPF dialog test.

Error Codes

- User abend 6 is issued if the user cannot connect to the ChangeMan ZMF instance.
- User abend 10 is issued if the saved request block data set cannot be opened.

CMN$$AUD - Audit for ALL applications

You can modify this skeleton to include all applications in the cross-application considerations of package audit.

Note that the more applications you include in the scope the longer audit will take.

This is not an option selectable from the submission panel. If used it needs to be coded in the audit skeleton and will affect every audit job.

in CMN$$AUD replace these records:

```
)DOT SCOPTABL
XAP=&APPLMNE
)ENDDOT SCOPTABL
```

with

```
XAP=*
```

(or any number of asterisks, as long as the first character is an asterisk)

This has the same effect as getting the application-in-scope selection list up (during audit submission) and using SELECT ALL to select every application.

CMN$$JBL - JOBLIB / STEPLIB

We recommend against including ChangeMan ZMF load libraries in the LINKLIST. ChangeMan ZMF includes skeleton CMN$$JBL, which provides a standard JOBLIB concatenation for batch jobs submitted from the started task.

Skeleton CMN$$JBL is also used to provide ZMF libraries in a STEPLIB for plan lookup program CMNDB2PL in the DB2 Option. In file tailoring, the DD name defaults to JOBLIB unless variable &JOBLBDD is set to STEPLIB or some other value.

Skeleton CMN$$JBL is included by these skeletons.

Skeleton	Description	DD Name
CMN$$BRQ	Routine to connect to a remote task for backouts and reverts	STEPLIB
CMN$$D2J	JOB statement for DB2 bind jobs	JOBLIB
CMN$$JCD	JOB statement for user-initiated jobs	JOBLIB
CMN$$JNM	JOB statement for baseline ripple and other installation jobs at the development instance	JOBLIB
CMN$$NTF	Routine to invoke batch approval notification	JOBLIB
CMN$$PRB	Routine for DB2 binds at promotion or demotion	STEPLIB
CMN$$RAL	Routine for release audit reporting tables update	STEPLIB
CMN$$RAP	Routine for generate release audit reports	STEPLIB
CMN$$RAU	Routine for audit area	STEPLIB
CMN$$RPB	Routine for DB2 binds at remote promotion or demotion	STEPLIB
CMN$$RPJ	JOB statement for remote promotion or demotion	JOBLIB
CMN$$SJN	JOB statement for remote site installation or backout	JOBLIB
CMN$$SPB	Sample routine for promotion DB2 binds using local shadow libraries	STEPLIB
CMN21	Routine for DB2 binds for production library installation	STEPLIB
CMN32	Routine for DB2 binds for baseline ripple	STEPLIB
CMN49	Routine for DB2 binds for production library backout	STEPLIB
CMN56	Routine for DB2 binds for reverse baseline ripple	STEPLIB

The delivered skeleton contains selection logic to concatenate test ZMF load libraries in front of production ZMF libraries for a test instance of ChangeMan ZMF. The actual data set names are in variables that are defined in the skeleton CMN$$DSN.

If you license the ChangeMan ZMF DB2 Option, do not include a DB2 system load library in skeleton CMN$$JBL. Skeletons that create JCL for DB2 bind jobs obtain the DB2 library name from variable &STSLOD using logic like this (example taken from CMN$$PRB):

```
//DB2PL   EXEC PGM=CMNDB2PL,   *** DETERMINE DB2 BIND REQUIREMENTS
//             REGION=0M,
//             COND=(4,LT)
)SET JOBLBDD = STEPLIB
)IM CMN$$JBL
)SEL &STSLOD NE &Z
)SET DB2DSNLD = &STSLOD
)IM CMN$$D2X
```

```
//         DD  DISP=SHR,DSN=&DB2DSNLX
//         DD  DISP=SHR,DSN=&STSLOD
)ENDSEL &STSLOD NE &Z
```

Variable &STSLOD contains the library name entered in the DB2 System Load Library field on the DB2 Physical Subsystems Part 1 of 2 (CMNGD2S0) panel in DB2 global administration.

Customization Tasks:

1 Copy skeleton CMN$$DSN from your vendor CMNZMF SKELS library to your custom SKELS library.

2 In the section that defines the JOBLIB, code the appropriate values to use delivered and CUSTOM load libraries for CMNZMF LOAD and SERCOMC LOAD libraries. This is as delivered (note the first half are for a test instance of ChangeMan ZMF, second half are for a production instance of ChangeMan ZMF):

```
)CM  THIS DEFINES THE VARIOUS LOAD LIBRARIES USED TO BUILD THE JOBLIB
)CM  CONCATENATION.
)CM  (CMN$$JBL)
)CM
)SET ZMFCTST = somnode.CMNZMFt.CUSTOM.LOAD
)SET SERCTST = somnode.SERCOMCt.CUSTOM.LOAD
)SET ZMFVTST = somnode.CMNZMFt.LOAD
)SET SERVTST = somnode.SERCOMCt.LOAD
)SET ZMFCPRD = somnode.CMNZMF.CUSTOM.LOAD
)SET SERCPRD = somnode.SERCOMC.CUSTOM.LOAD
)SET ZMFVPRD = somnode.CMNZMF.LOAD
)SET SERVPRD = somnode.SERCOMC.LOAD
```

Note that in the distributed CMN$$DSN, the commented name in brackets tells you the name of the relevant skeleton(s) using these variables, in this example it is CMN$$JBL.

3 If you have a ChangeMan ZMF test instance, there is logic in CMN$$JBL based on subsystem ID so that your test libraries are concatenated in front of the libraries you use to run your production ChangeMan ZMF instance. You will also need to copy and edit the CMN$$JBL skeleton to use the correct subsystem ID for your test instance.

Setting Build Parameters

Build process parameters are provided to skeleton file tailoring from the following sources:

1 Skeleton CMN$$VAR - Initializes build parameter ISPF variables to blank.

2 Skeleton CMN$PARM - Assigns system-wide values to build parameter variables.

3 Optional skeleton PRM$*aaaa* (where *aaaa* is an application mnemonic) - Overlays system-wide default values with application specific values.

4 Compile parm and link edit parm fields set in the user interface and stored in component history.

Build Parameter ISPF Variables

These are build parameter variables initialized to a null value in CMN$$VAR, then set in "global" skeleton CMN$PARM, and used in build process skeletons.

Variable Name	Description
&DB2PPRM1	DB2 Precompile Parameters Part 1
&DB2PPRM2	DB2 Precompile Parameters Part 2
&DB2PPRM3	DB2 Precompile Parameters Part 3
&CICSPRM1	CICS Translate Parameters Part 1
&CICSPRM2	CICS Translate Parameters Part 2
&CICSPRM3	CICS Translate Parameters Part 3
&MAPDPRM1	BMS MAP DSECT Parameters Part 1
&MAPDPRM2	BMS MAP DSECT Parameters Part 2
&MAPDPRM3	BMS MAP DSECT Parameters Part 3
&COMPPRM1	Compile Parameters Part 1
&COMPPRM2	Compile Parameters Part 2
&COMPPRM3	Compile Parameters Part 3
&PLNKPRM1	Prelink Parameters Part 1
&PLNKPRM2	Prelink Parameters Part 2
&PLNKPRM3	Prelink Parameters Part 3

These are the compile parameter and link edit parameter variables used in build process skeletons that are set in the user interface or retrieved from component history.

Variable Name	Description
&COMPOPT1	Compile Parameters Part 1
&COMPOPT2	Compile Parameters Part 2
&COMPOPT3	Compile Parameters Part 3
&COMPOPT4	Compile Parameters Part 4
&COMPOPT5	Compile Parameters Part 5
&LINKPRM1	Link Parameters Part 1
&LINKPRM2	Link Parameters Part 2
&LINKPRM3	Link Parameters Part 3

Build Parameter Skeleton Architecture

Skeleton CMN$$VAR is imbedded in every build procedure main skeleton. Skeletons CMN$PARM and optional skeleton PRM$*aaaa* are imbedded in CMN$$VAR. Variables &COMPOPTx and &LINKOPT are put into the ISPF variable pool by ChangeMan ZMF build process programs.

This code fragment from skeleton CMN$$VAR shows initialization of build parameter variables, the imbed of skeleton CMN$PARM, and the imbed of optional skeleton PRM$&PROJECT. An)IM command in a skeleton will be ignored if the OPT parameter is given and the skeleton is not found.

```
)SET COMPPRM1 = &Z
)SET COMPPRM2 = &Z
)SET COMPPRM3 = &Z
. . .
)CM
)CM  SET GLOBAL (I.E. SHOP STANDARD) COMPILE, LINK, ETC. PARAMETERS.
)CM
)IM CMN$PARM
. . .
)CM
)CM  PERFORM IMBED OF APPLICATION-SPECIFIC PARMS FOUND IN A "PRM$XXXX"
)CM  SKELETON MEMBER, IF THIS MEMBER EXISTS.
)CM
)IM PRM$&PROJECT OPT
```

These code fragments from skeletons CMN$$CO2 and CMN$$LNK (named in bold on IM comment) show the build parm variables in the PARM statements for a COBOL2 compile step and a link edit step.

```
//*)IM CMN$$CO2
)CM
)CM  ROUTINE TO COMPILE COBOL2 SOURCE CODE
)CM
. . .
//COBOL2&C#N  EXEC PGM=IGYCRCTL,   *** COMPILE COMPONENT &CMPNAME
//              COND=(4,LT),
//              PARM=('&COMPPRM1',
)SEL &COMPPRM2 NE &Z
//             '&COMPPRM2',
)ENDSEL &COMPPRM2 NE &Z
)SEL &COMPPRM3 NE &Z
//             '&COMPPRM3',
)ENDSEL &COMPPRM3 NE &Z
//             '&COMPOPT')
. . .

//*)IM CMN$$LNK
)CM
)CM  ROUTINE TO LINK-EDIT A PROGRAM
)CM
. . .
//LINK&L#N!EXEC!PGM=IEWL,       *** LINK-EDIT COMPONENT &CMPNAME
//              COND=(&CC$SUCC,LT),
//              PARM=('&LINKPRM1',
)SEL &LINKPRM2 NE &Z
//              '&LINKPRM2',
)ENDSEL &LINKPRM2 NE &Z
)SEL &LINKPRM3 NE &Z
//              '&LINKPRM3',
)ENDSEL &LINKPRM3 NE &Z
)SEL &TLODLIKE EQ N
//              'NCAL',
)ENDSEL &TLODLIKE EQ N
//              '&LINKOPT')
. . .
```

Customization Steps

Execute these steps to set values for build parameter variables.

1. Copy skeleton CMN$PARM from your vendor CMNZMF SKELS library to your custom SKELS library.
2. Assign system-wide values to build parameter variables according to language, or code your own selection logic.
3. If necessary, create an optional application skeleton in your CUSTOM SKELS library.
   a. Copy skeleton PRM$CMAN from your vendor CMNZMF SKELS library to your custom SKELS library.
   b. Rename the skeleton PRM$*aaaa*, where *aaaa* is an application mnemonic.
   c. Assign application-level overrides to build parameter variables, only where they are different than system-wide values in skeleton CMN$PARM.

NOTES Sample skeleton VAR$CMAN can be renamed VAR$aaaa, where aaaa is an application mnemonic, to overlay system-wide default values set in CMN$$VAR with application specific values.

Transmit Selected Remote Promote Components

With the promotion skeletons that are delivered with ChangeMan ZMF, when you selectively promote components to a remote site, all components in the staging library are transmitted to the remote site. Only the components you selected for promotion are copied from the transmitted library to the promotion library.

Skeleton code is available to create remote promote JCL that sends only the components selected for promotion to the remote site.

This facility was created for the ERO Option where promotion originates with release area libraries, which are typically much larger than package staging libraries. However, the function can be used to enhance performance of all remote promotion jobs in ChangeMan ZMF, not just ERO area promotion.

If you want to enable the skeleton code that creates more efficient remote promotion jobs, follow the instructions in comments at the top of these skeletons.

CMN$$RPM

CMNIMRPM

CMNRPMDL

If you want the more efficient remote promotion JCL to be created for all remote promotion jobs in ChangeMan ZMF, not just for ERO area promotion, follow the instructions in the comments at the top of this skeleton.

CMN$$PMT

JES Node Names and Transmission Site Names

Prior to ChangeMan ZMF 6.1 the values entered in the **Logical Unit/System Name** field in Global Administration Parameters and Global Site definitions were used for two purposes:

- JES node name that specifies where a ChangeMan ZMF batch job is run for promotion or install.
- Transmission site names that specify where install JCL, staging libraries, and package master records are transmitted from and to when they are distributed for installation.

Customers have noted that JES node names and transmission site names are not necessarily the same for a ChangeMan ZMF instance.

Since ChangeMan ZMF 6.1 this single field has been expanded and is now two fields: **Site node name** and **Logical unit/system name** on the `Global Parameters - Part 1 of 8` panel (CMNGGP01).

```
CMNGGP01                Global Parameters - Part 1 of 8
Command ===> ____________________________________________

Subsystem: 6

ChangeMan ZMF environment . . . . DP       (A/D/DP/P)
Job entry system  . . . . . . . . JES2     (JES2 or JES3)
Site node name  . . . . . . . . . SERT6
Logical unit/system name  . . . . BUCKS
Default unit name . . . . . . . . SYSDA
Default volume serial . . . . . . ______
Default non-vio unit name . . . . SYSDA
ChangeMan ZMF security resource . $CMNTP
Default job scheduler . . . . . . MANUAL   (CMN, Manual, Other)
Scheduler interval (CMN)  . . . . 010      (Minutes)

Enter "/" to select option
  /  Allow CMN scheduler
  /  Allow Manual scheduler
  /  Allow Other scheduler
```

- **Site node name** - If this is a DP, P or D site, the 'Site Name' (specified in Global Administration 'SITE') where packages will be installed. If an A site, enter an easily recognizable name (city, department, etc.).
- **Logical unit/system name** - If your data transmission vehicle is Connect:Direct® or BDT, enter the logical unitname (the name that Connect:Direct or BDT uses to identify this system). If IEBCOPY, enter the system name (e.g. 'SYSA').

Chapter 3

Exposing Mainframe Resources to Web and Desktop Applications

IBM has provided a few mechanisms to make mainframe resources available as Application Program Interfaces (APIs) to Web and desktop applications. These mechanisms include:

- z/OS® Connect.
- Several mechanisms specifically within CICS to expose CICS transactions as Web Services.
- Support for CICS bundles.

ChangeMan ZMF supports these mechanisms by enabling the resource artifacts to be staged into ZMF packages and processed through the ZMF package lifecycle.

ZMF Support for z/OS Connect

What is z/OS Connect and How Does It Work?

z/OS Connect is IBM's mechanism for exposing mainframe resources (such as a batch program, CICS® transaction, IMS™ transaction, and so on) to web applications and desktop clients as Representational State Transfer (REST)-ful APIs, using GET/PUT/POST/DELETE actions along with JavaScript Object Notation (JSON) message bodies.

z/OS Connect runs as a started task through which external communications are routed to the target z/OS resource. IBM products such as CICS, IMS, MQSeries®, and so on, are already enabled to talk to z/ OS Connect. However, any mechanism that can call WebSphere® Optimized Local Adapter (WOLA) services can use z/OS Connect to talk to the outside world.

A z/OS resource is identified to z/OS Connect as a service. A zFS file called **server.xml** defines the method by which the z/OS resource/service is to communicate with the z/OS Connect started task. You simply edit this file; there is no build process. You need to be able to promote the file to the relevant target directory so it will be picked up by the relevant z/OS Connect server.

The service itself is provided by a back-end process (for example, a CICS transaction, a program that uses WOLA services, and so on) that is able to communicate with the z/OS Connect server.

A request copybook and a response copybook are required to expose the service to the outside world. For example, a COBOL copybook maps the data as the back-end program will see incoming requests and present outgoing responses. These copybook components are used to generate the following zFS files:

zFS File	Description
serviceName_request.json	The request JSON schema.
serviceName_response.json	The response JSON schema.
serviceName.wsbind	The data structure mapping.
serviceName.sar	The service archive.

An IBM-provided utility BAQLS2JS takes the copybooks and generates these outputs.

Once the service archive (.sar) file is created, you can use it to build an API to a web or desktop application. You use the IBM-supplied desktop workbench called IBM® Explorer for z/OS® with the z/OS Connect EE API editor.

The output from this process is another archive, the API archive (.aar) file.

The build process required to generate a service archive to support communications via the CICS IP Interconnectibility (IPIC) facility, or via native Db2 RESTful, is different to the z/OS Connect build processes available earlier. We cannot use the BAQLS2JS or the BAQJS2LS service programs to perform the generation. We must use the z/OS Connect Build Toolkit.

A sample build procedure is supplied, CMNBAQIP. This works on a like-SRC parameter to generate a (like-P, zfs) target .sar component, and listings. The service archive

component implements the service mechanism between the HTTP requester, z/OS Connect, and the target CICS IPIC facility.

What is ChangeMan ZMF's Role

The artifacts that define the service to z/OS Connect must be built under the control of ZMF and generated as ZMF package components. The build process is driven from a like-SRC parameter component in a similar fashion to that described for the CICS web services below.

A utility program (delivered as a load module) and four skeletons (delivered as members of the CMNZMF.SKELS distribution library) enable this process::

Module	Description
CMNBAQLJ	Skeleton to generate z/OS Connect JSON schema and binding.
CMNBAQJL	Skeleton to generate z/OS Connect copybooks and binding from JSON schema
CMNBAQIP	Skeleton to build a (like-P, zfs) .sar component for z/OS Connect and the target CICS IPIC facility
CMNBAQD2	Skeleton to build a (like-P, zfs) .sar component for z/OS Connect and the target Db2 RESTful service.
CMNBAQ00	Program to prepare input to the IBM-provided BAQLS2JS utility and CMNBATCH activation transactions.

Initially, outputs are built to temporary directories. These outputs are copied to the ZMF package staging directories only when the build process has been successful. The SUCCESS step execution of CMNBATCH results in all related components being activated in the package.

You can stage any RESTful API (.aar file) that you have developed based on this service definition directly into a ZMF package from the directory where it currently resides. It can then be processed through the package lifecycle.

The definitions for the web service itself are generated by the build process and consist of artifacts such as the .sar and .wsbind files and the JSON schemas.

ZMF Support for CICS Web Services

CICS provides specific mechanisms (in addition to z/OS Connect facilities described above) for making CICS transactions available as Web Services in either of two ways:

- Using Simple Object Access Protocol (SOAP) Web Service Definition Language (WSDL) files.
- Using Representational State Transfer (REST)-ful services through Http/Javascript Object Notation (JSON).

CICS also provides utilities to aid in generating the artifacts required to make these mechanisms work and enable ChangeMan ZMF to manage them.

Four different build functions are supplied as the four sample build procedures described below to support the development and management of CICS Web Services. Each build process makes use of the CMNBAQ00 program in ZMF to generate the required script with which the relevant IBM-supplied utility is executed. The four build functions are supplied by the following members of the CMNZMF.SKELS library:

Sample CMNZMF.SKELS Library Skeleton	CICS-Supplied Utility	Description
CMNDFHJS	DFHLS2JS	Creates JSON schemas and bind file for input language structures such as COBOL and PL/I copybooks. This utility is aimed at exposing CICS to use externally provided RESTful services.
CMNDFHJL	DFHJS2LS	Creates language structures (copybooks) and bind file from input JSON schemas. This utility is aimed at allowing CICS to use externally provided RESTful services.
CMNDFHWS	DFHLS2WS	Creates WSDLs and bind file from input language structures. This utility is aimed at exposing CICS transactions as SOAP services.
CMNDFHWL	DFHWS2LS	Create language structures and bind file from input WSDLs. This utility is aimed at allowing CICS to use externally provided SOAP services.

Parameters are passed from a like-SRC parm component to the build; the target skeleton adds to these parameters to direct how CMNBAQ00 proceeds. If there are parameters that CMNBAQ00 needs to override in order to maintain control of the build, CMNBAQ00 will do that. Otherwise, the parameters are passed on as is to the execution of the IBM-supplied utility. The resulting execution generates components that are stored in the package and associated with the original like-SRC parameter component.

Other generated zFS component types, for example, JSON schemas and WSDLs, will have their target staging directories allocated if they are missing when the generated components are copied back to the staging directories.

However, you need to preallocate the needed copybook staging library. You can pre-allocate this library with exit CMNEX0026. (See member CMNEX0026 of the CMNZMF.ASMSRC distribution library.) An example of the coding you might add to

CMNEX0026 to ensure that all relevant libtypes are allocated when the source component is built follows:

```
*-------------------------------------------------------------------*
* Application based library type table:
*    This table is designed for generating a list of library types to
*    be passed back for processing when staging. The staging libraries
*    for the additional library types will be allocated to the package.
*
*    Each entry in this table must contain the following information.
*       1) An applications name or mask '*' with a length of 4 (CL4).
*       2) The library type being staged or a mask '*' with a length
*          of 3 (CL3).
*       3) A list of library types to process, maximum of 10.
*          0 library type would be defined as CL30' ' and CL30
*          would be decremented by 3 for each library type until
*          10 library types are added.
*
*-------------------------------------------------------------------*
X26@LTYP DS    0CL37               library type description table
*
         DC    CL4'STEV'           just STEV
         DC    CL3'C2J'            DFHLS2JS control member
         DC    CL3'JSN'            JSON component
         DC    CL3'LSH'            zfs listings
         DC    CL24' '             the rest of them (8 spare)
*
         DC    CL4'STEV'           just STEV
         DC    CL3'C2W'            DFHLS2WS control member
         DC    CL3'WSD'            WSDL component
         DC    CL3'LSH'            zfs listings
         DC    CL24' '             the rest of them (8 spare)
*
         DC    CL4'STEV'           just STEV
         DC    CL3'W2L'            DFHWS2LS control member
         DC    CL3'WCP'            generated copybook
         DC    CL3'LSH'            zfs listings
         DC    CL24' '             the rest of them (8 spare)
*
         DC    CL4'STEV'           just STEV
         DC    CL3'J2L'            DFHJS2LS control member
         DC    CL3'WCP'            generated copybook
         DC    CL3'LSH'            zfs listings
         DC    CL24' '             the rest of them (8 spare)
* end of application table
X26#LTYP EQU   (*-X26@LTYP)/37     number of entries
```

If a CICS transaction is to be identified as a RESTful (JSON) web service, a number of artifacts must be generated from the development process to allow that to happen.

A request and a response copybook is required to expose the transaction to the outside world (for example, a COBOL copybook mapping the data as the transaction program will see incoming requests and present outgoing responses). These copybook components are used to generate a number of zFS files as follows:

- The request JSON schema *xxx*.json
- The response JSON schema *yyy*.json
- The data structure mapping *zzz*.wsbind

The IBM-provided utility DFHLS2JS is used to take the copybooks and generate these outputs.

A CICS transaction can also be identified as a SOAP web service, there are a number of artifacts which must be generated from the development process to allow that to happen.

A request and a response copybook is required to expose the transaction to the outside world (for example, a COBOL copybook mapping the data as the transaction program will see incoming requests and present outgoing responses). These copybook components are used to generate a number of zFS files as follows:

- The WSDL *xxx*.wsdl.
- The data structure mapping *zzz*.wsbind.

The IBM-provided utility DFHLS2WS is used to take the copybooks and generate these outputs.

Conversely, a CICS transaction may request information through a RESTful web service. To allow this to happen, we take in the JSON schemas that describe the response/request formats expected by the external service provider (as generated by that provider) and generate language structure copybooks to allow the CICS program to map those structures along with a bind file to describe the data mapping. The IBM-provided utility DFHJS2LS does this.

Similarly, a CICS transaction may request information through a SOAP web service. To allow this to happen, we take in the WSDL file that describes the service interface expected by the external service provider (as generated by that provider) and generate language structure copybooks to allow the CICS program to map those structures along with a bind file to describe the data mapping. The IBM-provided utility DFHWS2LS does this.

The following sections describe these build processes in detail.

Generate JSON Outputs from Input Copybooks (CMNDFHJS Skeleton)

This process requires an input like-SRC parameter component in which any directives required to be passed to the IBM-provided utility DFHLS2JS must be placed. This must include the names of the request and response copybooks from which the bind file and JSON outputs are generated. An example parameter member might look like this:

```
REQMEM=ZCONREQ
RESPMEM=ZCONRESP
LANG=COBOL
MAPPING-LEVEL=4.0
CHAR-VARYING=COLLAPSE
PGMNAME=CICSCBL
URI=http://host_computer:7082/CobolService/CobolService
PGMINT=COMMAREA
SYNCONRETURN=YES
```

CMNDFHJS is the skeleton that contains the sample procedure to be used. CMNDFHJS has the following steps:

- SERCOPY copies the input parameter member to a temporary data set which is passed to the subsequent execution of CMNBAQ00.

- CR8TEMP executes CMNHUTIL to create the temporary zFS directories used by the build. It also allocates the named temporary PDSE into which the input copybooks will be placed by the SYSLIB search performed by CMNBAQ00.
- BAQ00 executes CMNBAQ00 with PARM=DFHLS2JS, which tells CMNBAQ00 we are working with a DFHLS2JS build process. The parameters from the SERCOPY step are passed as SYSIN along with extra, skeleton-generated, parameters that are used to direct what CMNBAQ00 is doing. For example:

```
//SYSIN    DD  DISP=(OLD,DELETE),DSN=&&SOURCE(CICSCBL)
//         DD  *
PGMNAME=CICSCBL
ZMF-PKG=STEV001485
JAVA-DIR=java/J8.0_64
USS-DIR=cicsts52
SERVICE=:
PATH-PREFIX=/Service
UTILITY-LOC=/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHLS2JS
TARGET-DIR=/tmp/STEV001485/WSER58/cics/cmngen
LISTING-DIR=/tmp/STEV001485/WSER58/cics/cmnlst
COPYLIB=CMNDEV.WSER58.D180320.T012307.CICS.CPY
USER=WSER58
SSI=6D8059FA
PROC=CMNDFHJS
SRC-LTYP=C2J
JSON-LTYP=JSN
BIND-LTYP=WSB
/*
```

The parameters added by the skeleton are internal to CMNBAQ00 and, in general, are not passed to the actual execution of DFHLS2JS (unlike the parameters from the like-SRC component which is driving this whole process). These parameters are:

Parameter	Description
PGMNAME=	Is set to the input component name and is used to generate the names of files that are part of the build process. For example, the log file will be written as filename <PGMNAME>.log to the directory indicated by the LISTING-DIR parameter.
ZMF-PKG=	Is set to the name of the current package and is used to generate appropriate CMNBATCH transactions to activate the generated components.
The next four parameters are all required by the IBM-supplied DFHLS2JS shell script. They should be specified in exactly the same format as you would for that shell script, that is, whatever works with the standard IBM process will work here.	
JAVA-DIR=	Is an indication of where JAVA can be found.
USS-DIR=	Is an intermediate zFS directory node that is used by the script.
SERVICE=:	An extra parameter that is used by the script. This parameter should only be changed under direction from IBM.
PATH-PREFIX=	Is a high-level node prepended to directory names built by the shell script.

Parameter	Description
UTILITY-LOC=	Is where the DFHLS2JS shell script is to be found.
TARGET-DIR=	Where outputs will be generated. It is a temporary zFS directory whose contents will be copied to the package staging directories if the build is successful.
LISTING-DIR=	Where information output will be directed. Contents will be gathered up into a single listing component at the end of the build.
COPYLIB=	The named temporary PDSE into which the request and response copybooks will be placed after they have been located in the SYSLIB concatenation.
USER=	The build-submitting user, used in creating activation transactions for CMNBATCH later.
SSI=	The build System Status Index (setssi) value for CMNBATCH.
PROC=	Name of this build procedure, for CMNBATCH
SRC-LTYP=	Library type of the input like-SRC parameter member, for CMNBATCH.
JSON-LTYP=	Library type into which any generated JSON schemas will be placed, for CMNBATCH.
BIND-LTYP=	Library type into which any generated wsbind files will be placed, for CMNBATCH.

These CMNBAQ00 internal parameters are generated within the supplied CMNDFHJS skeleton. An indication of how this is done is given here (from the skeleton itself):

```
)CM
)CM  The following variable definitions customize this process.
)CM  They are specified here for clarity but could just as well
)CM  be performed in CMN$$VAR.
)CM
)CM  &DFHGEN is the temporary directory where the json/bind
)CM          components will be placed. If the build is successful
)CM          they will be copied back to staging libraries.
)CM  &DFHLST is the temporary directory where all zfs hosted
)CM          listings will be placed. These will be consolidated
)CM          into the overall build listing at the end of the process.
)SETF DFHGEN    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmngen)
)SETF DFHLST    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmnlst)
)CM
)CM  &JHOME  is the home directory for Java (in the format required
)CM          by the DFHLS2JS script as supplied by IBM)
)CM  &DFHUSS is the intermediate zfs node (as required by
)CM          by the DFHLS2JS script as supplied by IBM)
)CM  &DFHSRV is the service modifier (as required by
)CM          by the DFHLS2JS script as supplied by IBM)
)CM  &DFHPFX is the path prefix (as required by
)CM          by the DFHLS2JS script as supplied by IBM)
)CM  &DFHLOC is the location for the DFHLS2JS script
)CM
)SETF JHOME     = &STR(java/J8.0_64)
)SETF DFHUSS    = &STR(cicsts52)
)SETF DFHSRV    = &STR(:)
)SETF DFHPFX    = &STR(/Service)
)SETF DFHLOC    = &STR(/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/)
)SETF DFHLOC    = &STR(&DFHLOC.DFHLS2JS)
)CM
)CM  &DFHLIB is the name of the temporary PDS used for the copybooks
)CM  e.g. DSN=yourhlq.userid.date.time.CICS.CPY
)CM
)SETF DFHLIB    = &STR(yourhlq.&STGERID)
)SETF DFHLIB    = &STR(&DFHLIB..D&SYMDEF(LYYMMDD).T&SYMDEF(LHHMMSS))
)SETF DFHLIB    = &STR(&DFHLIB..CICS.CPY)
)CM
)CM  &JSONLTP is the ZMF library type for the generated json components
)CM  &BINDLTP is the ZMF library type for the generated wsbind cmpnts
)CM
)SETF JSONLTP   = &STR(JSN)
)SETF BINDLTP   = &STR(WSB)
)CM
```

The DFHLS2JS utility is invoked using an IBM-supplied shell script which expects the relevant parameters to be in a zFS file at a specific location. The shell command is generated by CMNBAQ00 and is passed in the output file allocated to ddname CMNSTDPM. This command, using the parameter values entered above, looks like this (as directed by IBM):

```
SH /Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHLS2JS
 java/J8.0_64
 cicsts52
 /tmp/STEV001485/WSER58/cics/cmngen/LS2JS
 :
 /Service
```

- The parameters used to drive the execution of the DFHLS2JS utility need to be written to a zFS file. This is done by passing a series of CMNHUTIL commands with ddname CMNHUTIL.
- The two input copybooks are located from the SYSLIB concatenation (which is built in the sample skeleton like any other ZMF build SYSLIB is built) and written out to the named temporary library as directed by the COPYLIB= statement.
- CMNBATCH transactions which will be used to activate the various generated components are written to the CMNBAT90 ddname.
- Indication of everything that CMNBAQ00 has done is written to SYSPRINT.
- The step that follows execution of CMNBAQ00 is RUNUTIL, which executes CMNHUTIL using the commands generated by CMNBAQ00 to the CMNHUTIL output ddname. This step sets up the input expected by the DFHLS2JS utility when it runs.
- The step called DFHLS2JS runs BPXBATCH to execute the shell command passed from the CMNSTDPM ddname of the CMNBAQ00 step. This step generates the required outputs.
- If the generation is successful, the next step, CPY2STG, executes CMNHUTIL to copy the generated components and listings back to the relevant package staging directories.
- The SUCCESS step, executing CMNBATCH, makes the original like-SRC component active and then, directed by the CMNBAT90 output from CMNBAQ00, activates all the generated components.
- Additional steps follow to deal with build failures and tidy up the intermediate working directories and PDSE.

The source-to-load display for a successfully built DFHLS2JS parameter component looks like this:

```
CMNSR2LD                Source to Load Relationship         Row 1 to 4 of 4
Command ===>                                                  Scroll ===> CSR
         Package: STEV001485      Status: DEV      Install date: 20180820
Source name . . . . CICSCBL                                                 +
Lib type  . . . . . C2J
Setssi  . . . . . . 6D8059FA

Related Load Modules:

  Name              + Type Promotion  Changed          User     Setssi
  CICSCBL             LST   0 STAGING 20180320  012422 WSER58   6D8059FA
  CICSCBL.wsbind      WSB   0 STAGING 20180320  012420 WSER58   6D8059FA
  CICSCBL.C2J.list    LSH   0 STAGING 20180320  012420 WSER58   6D8059FA
  CICSCBL_request.jso JSN   0 STAGING 20180320  012420 WSER58   6D8059FA
  CICSCBL_response.js JSN   0 STAGING 20180320  012420 WSER58   6D8059FA
****************************** Bottom of data ********************************
```

The names of the generated components are formed as follows:

- The LST listing takes the name of the original like-SRC component, in this case CICSCBL.
- The LSH has the source libtype and the literal 'list' appended, in this case CICSCBL.C2J.list.
- The bind component name takes the form <name>.wsbind where <name> is taken from one of three sources in order of preference:

  - From the WSBIND=xxxx/xxxx/xxxx/<name>.wsbind parameter statement present in the original like-SRC parameter component. This is typically how this value will be assigned.
  - From the SERVICE-NAME=<name> parameter statement present in the original like-SRC parameter component. This is atypical for this process and is included for compatibility with the zosConnect build process.
  - From the PGMNAME=<name> parameter as supplied by the skeleton input. Again atypical, but this provides a backstop.
- The JSON request component name takes the form <name>.json (method 1) or <name>_request.json (methods 2 and 3) where <name> is one of, in order:
  - From the JSON-SCHEMA-RESPONSE=xxxx/xxxx/xxx/<name>.json parameter in the original like-SRC parameter component. This is typically how this value will be assigned.
  - From the SERVICE-NAME=<name> parameter statement present in the original like-SRC parameter component. This is atypical for this process and is included for compatibility with the zosConnect build process.
  - From the PGMNAME=<name> parameter as supplied by the skeleton input. Again atypical, but this provides a backstop.
- The JSON response component name takes a similar form to the request component, replacing 'request' with ’response.'

Generate WSDL Outputs from Input Copybooks (CMNDFHWS Skeleton)

This process requires an input like-SRC parameter component in which any directives required to be passed to the IBM-provided utility DFHLS2WS must be placed. This must include the names of the request and response copybooks from which the bind file and WSDL outputs are generated. An example parameter member might look like this:

```
REQMEM=ZCONREQ
RESPMEM=ZCONRESP
SERVICE-NAME=CobolService
WSDL=/u/wser58/CobolService.wsdl
WSDL_2.0=/u/wser58/CobolService_20.wsdl
LANG=COBOL
MAPPING-LEVEL=4.0
CHAR-VARYING=COLLAPSE
PGMNAME=WSDLCBL
URI=http://host_computer:7082/CobolService/CobolService
PGMINT=COMMAREA
SYNCONRETURN=YES
```

CMNDFHWS is the skeleton that contains the sample procedure to be used. CMNDFHWS has the following steps:

- SERCOPY copies the input parameter member to a temporary dataset which is passed to the subsequent execution of CMNBAQ00.
- CR8TEMP executes CMNHUTIL to create the temporary zFS directories used by the build. It also allocates the named temporary PDSE into which the input copybooks will be placed by the SYSLIB search performed by CMNBAQ00.

- BAQ00 executes CMNBAQ00 with PARM=DFHLS2WS, which tells CMNBAQ00 we are working with a DFHLS2WS build process. The parameters from the SERCOPY step are passed as SYSIN along with extra, skeleton-generated parameters that are used to direct what CMNBAQ00 is doing. For example:

```
//SYSIN    DD  DISP=(OLD,DELETE),DSN=&&SOURCE(WSDLCBL)
//         DD  *
PGMNAME=WSDLCBL
ZMF-PKG=STEV001485
JAVA-DIR=java/J8.0_64
USS-DIR=cicsts52
SERVICE=:
PATH-PREFIX=/Service
UTILITY-LOC=/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHLS2WS
TARGET-DIR=/tmp/STEV001485/WSER58/cics/cmngen
LISTING-DIR=/tmp/STEV001485/WSER58/cics/cmnlst
COPYLIB=CMNDEV.WSER58.D180320.T045833.CICS.CPY
USER=WSER58
SSI=6D808C79
PROC=CMNDFHWS
SRC-LTYP=C2W
BIND-LTYP=WSB
WSDL11-LTYP=WSD
/*
```

The parameters added by the skeleton are internal to CMNBAQ00 and, in general, are not passed to the actual execution of DFHLS2WS (unlike the parameters from the like-SRC component which is driving this whole process). These parameters are:

Parameter	Description
PGMNAME=	Is set to the input component name and is used to generate the names of files that are part of the build process. For example, the log file will be written as filename <PGMNAME>.log to the directory indicated by the LISTING-DIR parameter.
ZMF-PKG=	Is set to the name of the current package and is used to generate appropriate CMNBATCH transactions to activate the generated components.
The next four parameters are all required by the IBM-supplied DFHLS2WS shell script. They should be specified in exactly the same format as you would for that shell script, that is, whatever works with the standard IBM process will work here.	
JAVA-DIR=	Is an indication of where JAVA can be found.
USS-DIR=	Is an intermediate zFS directory node that is used by the script.
SERVICE=:	An extra parameter used by the script. This parameter should only be changed under direction from IBM.
PATH-PREFIX=	Is a high-level node prepended to directory names built by the shell script.
UTILITY-LOC=	Is where the DFHLS2WS shell script is to be found.
TARGET-DIR=	Where outputs will be generated. It is a temporary zFS directory whose contents will be copied to the package staging directories if the build is successful.
LISTING-DIR=	Where information output will be directed. Contents will be gathered up into a single listing component at the end of the build.

Parameter	Description
COPYLIB=	The named temporary PDSE into which the request and response copybooks will be placed after they have been located in the SYSLIB concatenation.
USER=	The build-submitting user, used in creating activation transactions for CMNBATCH later.
SSI=	The build System Status Index (setssi) value for CMNBATCH.
PROC=	Name of this build procedure, for CMNBATCH.
SRC-LTYP=	Library type of the input like-SRC parameter member, for CMNBATCH.
WSDL11-LTYP=	Library type into which any generated 1.1 WSDL will be placed, for CMNBATCH. A synonym for this parameter name is WSDL-LTYP=.
WSDL20-LTYP=	Library type into which any generated 2.0 WSDL will be placed, for CMNBATCH. If this parameter is missing, the same libtype specified for WSDL11-LTYP will be used.
BIND-LTYP=	Library type into which any generated wsbind files will be placed, for CMNBATCH.

These CMNBAQ00 internal parameters are generated within the supplied CMNDFHWS skeleton. An indication of how this is done is given here (from the skeleton itself):

```
)CM
)CM  The following variable definitions customize this process.
)CM  They are specified here for clarity but could just as well
)CM  be performed in CMN$$VAR.
)CM
)CM  &DFHGEN is the temporary directory where the wsdl/bind
)CM          components will be placed. If the build is successful
)CM          they will be copied back to staging libraries.
)CM  &DFHLST is the temporary directory where all zfs hosted
)CM          listings will be placed. These will be consolidated
)CM          into the overall build listing at the end of the process.
)SETF DFHGEN    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmngen)
)SETF DFHLST    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmnlst)
)CM
)CM  &JHOME  is the home directory for Java (in the format required
)CM          by the DFHLS2WS script as supplied by IBM)
)CM  &DFHUSS is the intermediate zfs node (as required by
)CM          by the DFHLS2WS script as supplied by IBM)
)CM  &DFHSRV is the service modifier (as required by
)CM          by the DFHLS2WS script as supplied by IBM)
)CM  &DFHPFX is the path prefix (as required by
)CM          by the DFHLS2WS script as supplied by IBM)
)CM  &DFHLOC is the location for the DFHLS2WS script
)CM
)SETF JHOME     = &STR(java/J8.0_64)
)SETF DFHUSS    = &STR(cicsts52)
)SETF DFHSRV    = &STR(:)
)SETF DFHPFX    = &STR(/Service)
)SETF DFHLOC    = &STR(/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/)
)SETF DFHLOC    = &STR(&DFHLOC.DFHLS2WS)
)CM
)CM  &DFHLIB is the name of the temporary PDS used for the copybooks
)CM  e.g. DSN=yourhlq.userid.date.time.CICS.CPY
)CM
)SETF DFHLIB    = &STR(yourhlq.&STGERID)
)SETF DFHLIB    = &STR(&DFHLIB..D&SYMDEF(LYYMMDD).T&SYMDEF(LHHMMSS))
)SETF DFHLIB    = &STR(&DFHLIB..CICS.CPY)
)CM
)CM  &BINDLTP is the ZMF library type for the generated wsbind cmpnts
)CM  &WSDL1LT is the ZMF library type for the generated wsdl 1.1 cmpnts
)CM  &WSDL2LT is the ZMF library type for the generated wsdl 2.0 cmpnts
)CM                                                          (optional)
)SETF BINDLTP   = &STR(WSB)
)SETF WSDL1LT   = &STR(WSD)
)CM
```

The DFHLS2WS utility is invoked using an IBM supplied shell script which expects the relevant parameters to be in a zFS file at a specific location. The shell command is generated by CMNBAQ00 and is passed in the output file allocated to ddname CMNSTDPM. This command, using the parameter values entered above, looks like this (as directed by IBM):

```
SH /Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHLS2WS
 java/J8.0_64
 cicsts52
 /tmp/STEV001485/WSER58/cics/cmngen/LS2WS
 :
 /Service
```

- The parameters used to drive the execution of the DFHLS2WS utility need to be written to a zFS file. This is done by passing a series of CMNHUTIL commands with ddname CMNHUTIL.
- The two input copybooks are located from the SYSLIB concatenation (which is built in the sample skeleton like any other ZMF build SYSLIB is built) and written out to the named temporary library as directed by the COPYLIB= statement.
- CMNBATCH transactions which will be used to activate the various generated components are written to the CMNBAT90 ddname.
- Indication of everything that CMNBAQ00 has done is written to SYSPRINT.
- The step that follows execution of CMNBAQ00 is RUNUTIL, which executes CMNHUTIL using the commands generated by CMNBAQ00 to the CMNHUTIL output ddname. This step sets up the input expected by the DFHLS2WS utility when it runs.
- The step called DFHLS2WS runs BPXBATCH to execute the shell command passed from the CMNSTDPM ddname of the CMNBAQ00 step. This step generates the required outputs.
- If the generation is successful, the next step, CPY2STG, executes CMNHUTIL to copy the generated components and listings back to the relevant package staging directories.
- The SUCCESS step, executing CMNBATCH, makes the original like-SRC component active and then, directed by the CMNBAT90 output from CMNBAQ00, activates all the generated components.
- Additional steps follow to deal with build failures and tidy up the intermediate working directories and PDSE.

The source-to-load display for a successfully built DFHLS2WS parameter component looks like this:

```
CMNSR2LD                Source to Load Relationship         Row 1 to 4 of 4
Command ===>                                                  Scroll ===> CSR

         Package: STEV001485      Status: DEV      Install date: 20180820

Source name . . . . WSDLCBL                                                 +
Lib type  . . . . . C2W
Setssi  . . . . . . 6D808C79

Related Load Modules:

  Name              + Type Promotion  Changed          User     Setssi
  CobolService.wsbind WSB   0 STAGING 20180320  045905 WSER58   6D808C79
  CobolService.wsdl   WSD   0 STAGING 20180320  045905 WSER58   6D808C79
  CobolService_20.wsd WSD   0 STAGING 20180320  045905 WSER58   6D808C79
  WSDLCBL             LST   0 STAGING 20180320  045908 WSER58   6D808C79
  WSDLCBL.C2W.list    LSH   0 STAGING 20180320  045908 WSER58   6D808C79
****************************** Bottom of data ********************************
```

The names of the generated components are formed as follows:

- The LST listing takes the name of the original like-SRC component, in this case WSDLCBL.
- The LSH listing has the source library type and the literal 'list' appended, in this case WSDLCBL.C2W.list.

- The bind component name takes the form <name>.wsbind where <name> is taken from one of three sources in order of preference:
  - From the WSBIND=xxxx/xxxx/xxxx/<name>.wsbind parameter statement present in the original like-SRC parameter component. This is typically how this value will be assigned.
  - From the SERVICE-NAME=<name> parameter statement present in the original like-SRC parameter component. This is atypical for this process and is included for compatibility with the zosConnect build process.
  - From the PGMNAME=<name> parameter as supplied by the skeleton input. Again atypical, but this provides a backstop.
- The WSDL 1.1 component name takes the form <name>.wsdl where <name> is one of, in order:
  - From the WSDL=xxxx/xxxx/xxx/<name>.wsdl parameter in the original like-SRC parameter component. (WSDL_1.1= is a synonym.) This is typically how this value will be assigned.
  - From the SERVICE-NAME=<name> parameter statement present in the original like-SRC parameter component. This is atypical for this process and is included for compatibility with the zosConnect build process.
  - From the PGMNAME=<name> parameter as supplied by the skeleton input. Again atypical, but this provides a backstop.
- The WSDL 2.0 component name takes the form <name>.wsdl where <name> is from the WSDL_2.0=xxxx/xxxx/xxx/<name>.wsdl parameter in the original like-SRC parameter component. If this parameter is not present, no 2.0 WSDL will be generated.

Generate Copybooks from JSON Inputs (CMNDFHJL Skeleton)

This process requires an input like-SRC parameter component in which any directives required to be passed to the IBM-provided utility DFHJS2LS must be placed. This must include the name prefixes for the request and response copybooks which will be generated by the process as well as the names of the request/response JSON schemas from which the bind file and copybooks are generated. An example parameter member looks like this:

```
REQMEM=JSREQ
RESPMEM=JSRESP
JSON-SCHEMA-REQUEST=CobolService_request.json
JSON-SCHEMA-RESPONSE=CobolService_response.json
WSBIND=CobolJSON.wsbind
LANG=COBOL
MAPPING-LEVEL=4.0
CHAR-VARYING=YES
PGMNAME=CBLJSON
PGMINT=COMMAREA
```

CMNDFHJL is the skeleton that contains the sample procedure to be used. CMNDFHJL has the following steps:

- SERCOPY copies the input parameter member to a temporary data set which is passed to the subsequent execution of CMNBAQ00.

- CPY$ALC dynamically allocates the named temporary PDSE into which the required copybooks will be generated. This library must not be allocated in the JCL of any step in this job; otherwise, there will be contention issues with the BPXBATCH-spawned process which does the writing of the copybooks to this PDSE. We also allocate a second version of this PDSE into which the copybooks are copied so that this version can be allocated in JCL by the later CMNBAT90 step without causing problems with the spawned process.
- CR8TEMP executes CMNHUTIL to create the temporary zFS directories used by the build.
- BAQ00 executes CMNBAQ00 with PARM=DFHJS2LS, which tells CMNBAQ00 we are working with a DFHJS2LS build process. The parameters from the SERCOPY step are passed as SYSIN along with extra, skeleton-generated parameters that are used to direct what CMNBAQ00 is doing. For example:

```
//SYSIN    DD DISP=(OLD,DELETE),DSN=&&SOURCE(CBLJSON)
//         DD *
PGMNAME=CBLJSON
ZMF-PKG=STEV001485
STG-DIR=/cmndev/cmni/STEV/#001485
JAVA-DIR=java/J8.0_64
USS-DIR=cicsts52
SERVICE=:
PATH-PREFIX=/Service
UTILITY-LOC=/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHJS2LS
TARGET-DIR=/tmp/STEV001485/WSER58/cics/cmngen
LISTING-DIR=/tmp/STEV001485/WSER58/cics/cmnlst
COPYLIB=CMNDEV.WSER58.D180320.T055200.CICS.CPY
USER=WSER58
SSI=6D809900
PROC=CMNDFHJL
SRC-LTYP=J2L
BIND-LTYP=WSB
JSON-LTYP=JSN
CPY-LTYP=WCP
/*
```

The parameters added by the skeleton are internal to CMNBAQ00 and, in general, are not passed to the actual execution of DFHJS2LS (unlike the parameters from the like-SRC component which is driving this whole process). These parameters are:

Parameter	Description
PGMNAME=	Is set to the input component name and is used to generate the names of files that are part of the build process. For example, the log file will be written as filename <PGMNAME>.log to the directory indicated by the LISTING-DIR parameter.
ZMF-PKG=	Is set to the name of the current package and is used to generate appropriate CMNBATCH transactions to activate the generated components.
STG-DIR=	Names of the package staging directories, that is, where the input JSON components will be found.
The next four parameters are all required by the IBM-supplied DFHJS2LS shell script. They should be specified in exactly the same format as you would for that shell script, that is, whatever works with the standard IBM process will work here.	
JAVA-DIR=	Is an indication of where JAVA can be found.

Parameter	Description
USS-DIR=	Is an intermediate zFS directory node that is used by the script.
SERVICE=:	An extra parameter that is used by the script. This parameter should only be changed under direction from IBM.
PATH-PREFIX=	Is a high-level node prepended to directory names built by the shell script.
UTILITY-LOC=	Is where the DFHJS2LS shell script is to be found.
TARGET-DIR=	Where outputs will be generated. It is a temporary zFS directory whose contents will be copied to the package staging directories if the build is successful.
LISTING-DIR=	Where information output will be directed. Contents will be gathered up into a single listing component at the end of the build.
COPYLIB=	The named temporary PDSE into which the request and response copybooks will be placed.
USER=	The build-submitting user, used in creating activation transactions for CMNBATCH later.
SSI=	The build System Status Index (setssi) value for CMNBATCH.
PROC=	Name of this build procedure, for CMNBATCH.
SRC-LTYP=	Library type of the input like-SRC parameter member, for CMNBATCH.
JSON-LTYP=	Library type from which the input JSON schemas will be taken.
CPY-LTP=	Library type into which any generated copybooks will be placed, for CMNBATCH.
BIND-LTYP=	Library type into which any generated wsbind files will be placed, for CMNBATCH.

These CMNBAQ00 internal parameters are generated within the supplied CMNDFHJL skeleton. An indication of how this is done is given here (from the skeleton itself):

```
)CM
)CM The following variable definitions customize this process.
)CM They are specified here for clarity but could just as well
)CM be performed in CMN$$VAR.
)CM
)CM &DFHGEN is the temp directory where the json component(s) will
)CM          be copied into from the package and where the generated
)CM          bind component will be placed. If the build is successful
)CM          the bind cmpnt will be copied back to staging directory.
)CM &DFHLST is the temporary directory where all zfs hosted
)CM          listings will be placed. These will be consolidated
)CM          into the overall build listing at the end of the process.
)SETF DFHGEN    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmngen)
)SETF DFHLST    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmnlst)
)CM
)CM &JHOME  is the home directory for Java (in the format required
)CM          by the DFHJS2LS script as supplied by IBM)
)CM &DFHUSS is the intermediate zfs node (as required by
)CM          by the DFHJS2LS script as supplied by IBM)
)CM &DFHSRV is the service modifier (as required by
)CM          by the DFHJS2LS script as supplied by IBM)
)CM &DFHPFX is the path prefix (as required by
)CM          by the DFHJS2LS script as supplied by IBM)
)CM &DFHLOC is the location for the DFHJS2LS script
)CM
)SETF JHOME     = &STR(java/J8.0_64)
)SETF DFHUSS    = &STR(cicsts52)
)SETF DFHSRV    = &STR(:)
)SETF DFHPFX    = &STR(/Service)
)SETF DFHLOC    = &STR(/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/)
)SETF DFHLOC    = &STR(&DFHLOC.DFHJS2LS)
)CM
)CM &DFHLIB is the name of the temporary PDSE into which the
)CM generated copybooks will be placed. If the build is successful
)CM they will be copied back to the relevant staging library.
)CM e.g. DSN=yourhlq.userid.date.time.CICS.CPY
)CM
)CM Note that this dsname must not be allocated by JCL to any step
)CM in this job else the USS process will get an allocation error
)CM on it. We need to copy the contents to a different temp PDSE
)CM in order to work with it in later steps, this &CPYLIB.
)CM
)SETF DFHLIB    = &STR(yourhlq.&STGERID)
)SETF DFHLIB    = &STR(&DFHLIB..D&SYMDEF(LYYMMDD).T&SYMDEF(LHHMMSS))
)SETF CPYLIB    = &STR(&DFHLIB..TEMP.CPY)
)SETF DFHLIB    = &STR(&DFHLIB..CICS.CPY)
)CM
)CM &BINDLTP is the ZMF library type for the generated wsbind cmpnts
)CM &JSONLTP is the ZMF library type for the input json cmpnt(s)
)CM &CPYLTP  is the ZMF library type for the generated copybook cmpnts
)CM
)SETF BINDLTP   = &STR(WSB)
)SETF JSONLTP   = &STR(JSN)
)SETF CPYLTP    = &STR(WCP)
)CM
```

The DFHJS2LS utility is invoked using an IBM-supplied shell script which expects the relevant parameters to be in a zFS file at a specific location. The shell command is generated by CMNBAQ00 and is passed in the output file allocated to ddname

CMNSTDPM. This command, using the parameter values entered above, looks like this (as directed by IBM):

```
SH /Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHJS2LS
 java/J8.0_64
 cicsts52
 /tmp/STEV001485/WSER58/cics/cmngen/JS2LS
 :
 /Service
```

- The parameters used to drive the execution of the DFHJS2LS utility need to be written to a zFS file. This is done by passing a series of CMNHUTIL commands with ddname CMNHUTIL.
- The two input JSON schemas must be present in the package in which these components are being built.
- The IBM-supplied utility will generate names for the copybooks based on the prefixes (up to 6 bytes) specified in the REQMEM and RESPMEM parameters. The utility will add *nn* (for example, 01) to the end of the prefixes. The copybooks will be written to the PDSE specified in the COPYLIB= parameter.
- CMNBATCH transactions which will be used to activate the various generated components (except for the generated copybooks, whose names will be generated by the IBM utility) are written to the CMNBAT90 ddname.
- Indication of everything that CMNBAQ00 has done is written to SYSPRINT.
- The RUNUTIL step follows execution of CMNBAQ00. It executes CMNHUTIL using the commands generated by CMNBAQ00 to the CMNHUTIL output ddname. This step sets up the input expected by the DFHJS2LS utility when it runs.
- The step called DFHJS2LS runs BPXBATCH to execute the shell command passed from the CMNSTDPM ddname of the CMNBAQ00 step. This step generates the required outputs.
- If the generation is successful, the next step, CPY4BT90, copies all generated copybooks to a separate temp PDSE that can be allocated to the follow-on step, in the JCL, without conflicting with the spawned USS process which wrote them in the first place. The follow-on step, BAT90CPY, executes CMNBAT90 to analyze the contents of the temp PDSE in order to generate the activation transactions for all generated copybook names.
- Subsequently, step CPY2STG copies the generated copybooks back to the staging library. Step ZFS2STG copies the zFS components (that is, the bind file) to the relevant staging directory.
- The SUCCESS step, executing CMNBATCH, makes the original like-SRC component active and then, directed by the CMNBAT90 output from CMNBAQ00, activates all the generated components.
- Additional steps follow to deal with build failures and tidy up the intermediate working directories and PDSE.

The source-to-load display for a successfully built DFHJS2LS parameter component looks like this:

```
CMN2R2LD              Source to Load Relationship          Row 1 to 4 of 4
Command ===>                                                  Scroll ===> CSR

         Package: STEV001485      Status: DEV      Install date: 20180820

Source name . . . . CBLJSON                                                 +
Lib type  . . . . . J2L
Setssi  . . . . . . 6D809900

Related Load Modules:

  Name              + Type Promotion  Changed          User     Setssi
  CobolJSON.wsbind    WSB   0 STAGING 20180320  055235 WSER58   6D809900
  CBLJSON             LST   0 STAGING 20180320  055238 WSER58   6D809900
  CBLJSON.J2L.list    LSH   0 STAGING 20180320  055238 WSER58   6D809900
  JSREQ01             WCP   0 STAGING 20180320  055235 WSER58   6D809900
  JSRESP01            WCP   0 STAGING 20180320  055235 WSER58   6D809900
****************************** Bottom of data ********************************
```

The names of the generated components are formed as follows:

- The LST listing takes the name of the original like-SRC component, in this case CBLJSON.
- The LSH listing has the source library type and the literal 'list' appended, in this case CBLJSON.J2L.list.
- The bind component name takes the form <name>.wsbind where <name> is taken from one of three sources in order of preference:
  - From the WSBIND=xxxx/xxxx/xxxx/<name>.wsbind parameter statement present in the original like-SRC parameter component. This is typically how this value will be assigned.
  - From the SERVICE-NAME=<name> parameter statement present in the original like-SRC parameter component. This is atypical for this process and is included for compatibility with the zosConnect build process.
  - From the PGMNAME=<name> parameter as supplied by the skeleton input. Again atypical, but this provides a backstop.
- The request copybook component name takes the form <prefix>*nn* where <prefix> is taken from the REQMEM=<prefix> parameter statement present in the original like-SRC parameter component, and *nn* is the suffix added by the IBM utility (for example, 01).
- The response copybook component name takes the form <prefix>*nn* where <prefix> is taken from the RESPMEM=<prefix> parameter statement present in the original like-SRC parameter component, and *nn* is the suffix added by the IBM utility (for example, 01).

Generate Copybooks from WSDL Input (CMNDFHWL Skeleton)

This process requires an input like-SRC parameter component in which any directives required to be passed to the IBM-provided utility DFHWS2LS must be placed. This must include the name prefixes for the request and response copybooks which will be

generated by the process as well as the names of the WSDL from which the bind file and copybooks are generated. An example parameter member might look like this:

```
REQMEM=WSREQ
RESPMEM=WSRESP
WSDL=/u/wser58/CobolService.wsdl
WSBIND=CobolSoap.wsbind
BINDING=WSDLCBLHTTPSoapBinding12
LANG=COBOL
MAPPING-LEVEL=4.0
CHAR-VARYING=YES
PGMNAME=WSDLCBL
URI=http://host_computer:7082/CobolService/CobolService
PGMINT=COMMAREA
SYNCONRETURN=YES
```

CMNDFHWL is the skeleton that contains the sample procedure. CMNDFHWL has the following steps:

- SERCOPY copies the input parameter member to a temporary data set which is passed to the subsequent execution of CMNBAQ00.
- CPY$ALC dynamically allocates the named temporary PDSE into which the required copybooks will be generated. This library must not be allocated in the JCL of any step in this job; otherwise, there will be contention issues with the BPXBATCH-spawned process which does the writing of the copybooks to this PDSE. We also allocate a second version of this PDSE into which the copybooks are copied so that this version can be allocated in JCL by the later CMNBAT90 step without causing problems with the spawned process.
- CR8TEMP executes CMNHUTIL to create the temporary zFS directories used by the build.
- BAQ00 executes CMNBAQ00 with PARM=DFHWS2LS which tells CMNBAQ00 we are working with a DFHWS2LS build process. The parameters from the SERCOPY step are passed as SYSIN along with extra, skeleton-generated parameters that are used to direct what CMNBAQ00 is doing. For example:

```
//SYSIN    DD  DISP=(OLD,DELETE),DSN=&&SOURCE(CBLWSDL)
//         DD  *
PGMNAME=CBLWSDL
ZMF-PKG=STEV001485
STG-DIR=/cmndev/cmni/STEV/#001485
JAVA-DIR=java/J8.0_64
USS-DIR=cicsts52
SERVICE=:
PATH-PREFIX=/Service
UTILITY-LOC=/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHWS2LS
TARGET-DIR=/tmp/STEV001485/WSER58/cics/cmngen
LISTING-DIR=/tmp/STEV001485/WSER58/cics/cmnlst
COPYLIB=CMNDEV.WSER58.D180320.T082516.CICS.CPY
USER=WSER58
SSI=6D80BCEC
PROC=CMNDFHWL
SRC-LTYP=W2L
BIND-LTYP=WSB
WSDL-LTYP=WSD
CPY-LTYP=WCP
/*
```

The parameters added by the skeleton are internal to CMNBAQ00 and, in general, are not passed to the actual execution of DFHWS2LS (unlike the parameters from the like-SRC component which is driving this whole process). These parameters are:

Parameter	Description
PGMNAME=	Is set to the input component name and is used to generate the names of files that are part of the build process. For example, the log file will be written as filename <PGMNAME>.log to the directory indicated by the LISTING-DIR parameter.
ZMF-PKG=	Is set to the name of the current package and is used to generate appropriate CMNBATCH transactions to activate the generated components.
STG-DIR=	Names of the package staging directories, that is, where the input WSDL component will be found.
The next four parameters are all required by the IBM-supplied DFHLS2JS shell script. They should be specified in exactly the same format as you would for that shell script, that is, whatever works with the standard IBM process will work here.	
JAVA-DIR=	Is an indication of where JAVA can be found.
USS-DIR=	Is an intermediate zFS directory node that is used by the script.
SERVICE=:	An extra parameter that is used by the script. This parameter should only be changed under direction from IBM.
PATH-PREFIX=	Is a high-level node prepended to directory names built by the shell script.
UTILITY-LOC=	Is where the DFHWS2LS shell script is to be found.
TARGET-DIR=	Where outputs will be generated. It is a temporary zFS directory whose contents will be copied to the package staging directories if the build is successful.
LISTING-DIR=	Where information output will be directed. Contents will be gathered up into a single listing component at the end of the build.
COPYLIB=	The named temporary PDSE into which the request and response copybooks will be placed.
USER=	The build-submitting user, used in creating activation transactions for CMNBATCH later.
SSI=	The build System Status Index (setssi) value for CMNBATCH.
PROC=	Name of this build procedure, for CMNBATCH.
SRC-LTYP=	Library type of the input like-SRC parameter member, for CMNBATCH.
WSDL-LTYP=	Library type from which the input WSDL will be taken.
CPY-LTP=	Library type into which any generated copybooks will be placed, for CMNBATCH.
BIND-LTYP=	Library type into which any generated wsbind files will be placed, for CMNBATCH.

These CMNBAQ00 internal parameters are generated within the supplied CMNDFHWL skeleton. An indication of how this is done is given here (from the skeleton itself):

```
)CM
)CM  The following variable definitions customize this process.
)CM  They are specified here for clarity but could just as well
)CM  be performed in CMN$$VAR.
)CM
)CM  &DFHGEN is the temporary directory where the wsdl component will
)CM          be copied into from the package and where the generated
)CM          bind component will be placed. If the build is successful
)CM          the bind cmpnt will be copied back to staging directory.
)CM  &DFHLST is the temporary directory where all zfs hosted
)CM          listings will be placed. These will be consolidated
)CM          into the overall build listing at the end of the process.
)SETF DFHGEN    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmngen)
)SETF DFHLST    = &STR(&HFSTEMP/&PKGNAME/&STGERID/cics/cmnlst)
)CM
)CM  &JHOME  is the home directory for Java (in the format required
)CM          by the DFHWS2LS script as supplied by IBM)
)CM  &DFHUSS is the intermediate zfs node (as required by
)CM          by the DFHWS2LS script as supplied by IBM)
)CM  &DFHSRV is the service modifier (as required by
)CM          by the DFHWS2LS script as supplied by IBM)
)CM  &DFHPFX is the path prefix (as required by
)CM          by the DFHWS2LS script as supplied by IBM)
)CM  &DFHLOC is the location for the DFHWS2LS script
)CM
)SETF JHOME     = &STR(java/J8.0_64)
)SETF DFHUSS    = &STR(cicsts52)
)SETF DFHSRV    = &STR(:)
)SETF DFHPFX    = &STR(/Service)
)SETF DFHLOC    = &STR(/Service/usr/lpp/cicsts/cicsts52/lib/wsdl/)
)SETF DFHLOC    = &STR(&DFHLOC.DFHWS2LS)
)CM
)CM  &DFHLIB is the name of the temporary PDSE into which the
)CM  generated copybooks will be placed. If the build is successful
)CM  they will be copied back to the relevant staging library.
)CM  e.g. DSN=yourhlq.userid.date.time.CICS.CPY
)CM
)CM  Note that this dsname must not be allocated by JCL to any step
)CM  in this job else the USS process will get an allocation error
)CM  on it. We need to copy the contents to a different temp PDSE
)CM  in order to work with it in later steps, this &CPYLIB.
)CM
)SETF DFHLIB    = &STR(yourhlq.&STGERID)
)SETF DFHLIB    = &STR(&DFHLIB..D&SYMDEF(LYYMMDD).T&SYMDEF(LHHMMSS))
)SETF CPYLIB    = &STR(&DFHLIB..TEMP.CPY)
)SETF DFHLIB    = &STR(&DFHLIB..CICS.CPY)
)CM
)CM  &BINDLTP is the ZMF library type for the generated wsbind cmpnts
)CM  &WSDLLTP is the ZMF library type for the input wsdl cmpnt
)CM  &CPYLTP  is the ZMF library type for the generated copybook cmpnts
)CM
)SETF BINDLTP   = &STR(WSB)
)SETF WSDLLTP   = &STR(WSD)
)SETF CPYLTP    = &STR(WCP)
)CM
```

The DFHWS2LS utility is invoked using an IBM-supplied shell script which expects the relevant parameters to be in a zFS file at a specific location. The shell command is generated by CMNBAQ00 and is passed in the output file allocated to ddname

CMNSTDPM. This command, using the parameter values entered above, looks like this (as directed by IBM):

```
SH /Service/usr/lpp/cicsts/cicsts52/lib/wsdl/DFHWS2LS
 java/J8.0_64
 cicsts52
 /tmp/STEV001485/WSER58/cics/cmngen/WS2LS
 :
 /Service
```

- The parameters used to drive the execution of the DFHWS2LS utility need to be written to a zFS file. This is done by passing a series of CMNHUTIL commands with ddname CMNHUTIL.
- The input WSDL must be present in the package in which these components are being built.
- The IBM utility will generate names for the copybooks based on the prefixes (up to 6 bytes) specified in the REQMEM and RESPMEM parameters. It will add *nn* (for example, 01) to the end of the prefixes. The copybooks will be written to the PDSE specified in the COPYLIB= parameter.
- CMNBATCH transactions which will be used to activate the various generated components (except for the generated copybooks, whose names will be generated by the IBM utility) are written to the CMNBAT90 ddname.
- Indication of everything that CMNBAQ00 has done is written to SYSPRINT.
- The RUNUTIL step follows execution of CMNBAQ00. RUNUTIL executes CMNHUTIL using the commands generated by CMNBAQ00 to the CMNHUTIL output ddname. This step sets up the input expected by the DFHWS2LS utility when it runs.
- The step called DFHWS2LS runs BPXBATCH to execute the shell command passed from the CMNSTDPM ddname of the CMNBAQ00 step. This step generates the required outputs.
- If the generation is successful, the next step, CPY4BT90, copies all generated copybooks to a separate temp PDSE which can be allocated to the follow-on step, in the JCL, without conflicting with the spawned USS process which wrote them in the first place. The follow-on step, BAT90CPY, executes CMNBAT90 to analyze the contents of the temp PDSE in order to generate the activation transactions for all generated copybook names.
- Step CPY2STG copies the generated copybooks back to the staging library and step ZFS2STG copies the zFS components (that is, the bind file) to the relevant staging directory.
- The SUCCESS step, executing CMNBATCH, makes the original like-SRC component active and then, directed by the CMNBAT90 output from CMNBAQ00, activates all the generated components.
- Additional steps follow to deal with build failures and tidy up the intermediate working directories and PDSE.

The source-to-load display for a successfully built DFHWS2LS parameter component looks like this:

```
CMNSR2LD                  Source to Load Relationship          Row 1 to 4 of 4
Command ===>                                                  Scroll ===> CSR

         Package: STEV001485      Status: DEV      Install date: 20180820

Source name . . . . CBLWSDL                                                  +
Lib type  . . . . . W2L
Setssi  . . . . . . 6D80BCEC

Related Load Modules:

  Name              + Type Promotion  Changed          User     Setssi
  CobolSoap.wsbind    WSB   0 STAGING 20180320  082623 WSER58   6D80BCEC
  CBLWSDL             LST   0 STAGING 20180320  082626 WSER58   6D80BCEC
  CBLWSDL.W2L.list    LSH   0 STAGING 20180320  082626 WSER58   6D80BCEC
  WSREQ01             WCP   0 STAGING 20180320  082623 WSER58   6D80BCEC
  WSRESP01            WCP   0 STAGING 20180320  082623 WSER58   6D80BCEC
****************************** Bottom of data ********************************
```

The names of the generated components are formed as follows:

- The LST listing takes the name of the original like-SRC component, in this case CBLWSDL.
- The LSH listing has the source library type and the literal 'list' appended, in this case CBLWSDL.W2L.list.
- The bind component name takes the form <name>.wsbind where <name> is taken from one of three sources in order of preference:
  - From the WSBIND=xxxx/xxxx/xxxx/<name>.wsbind parameter statement present in the original like-SRC parameter component. This is typically how this value will be assigned.
  - From the SERVICE-NAME=<name> parameter statement present in the original like-SRC parameter component. This is atypical for this process and is included for compatibility with the zosConnect build process.
  - From the PGMNAME=<name> parameter as supplied by the skeleton input. Again atypical, but this provides a backstop.
- The request copybook component name takes the form <prefix>*nn* where <prefix> is taken from the REQMEM=<prefix> parameter statement present in the original like-SRC parameter component, and *nn* is the suffix added by the IBM utility (for example, 01).
- The response copybook component name takes the form <prefix>*nn* where <prefix> is taken from the RESPMEM=<prefix> parameter statement present in the original like-SRC parameter component, and *nn* is the suffix added by the IBM utility (for example, 01).

ZMF Support for CICS Bundles

ZMF supports the creation and maintenance of CICS JSON REST bundles. The build process is provided by member CMNBUNJL (of the CMNZMF.SKELS distribution library).

The CMNBUNJL skeleton calls the IBM-supplied utility DFHJS2LS with the BUNDLE= parameter to process a specified JSON schema.

The output from this process is a number of zFS files (the *bundle*), which are generated in the target directory. Typically, the build process creates a Language Environment (LE) language copybook (COBOL or PL/I, for example), a listing, and the bundle. Once installed, CICS uses these components to implement the API.

Here is an example Source to Load Relationship (panel CMN2R2LD) display for a successful staging of a JSON REST schema:

```
CMN2R2LD                 Source to Load Relationship          Row 1 to 5 of 5
Command ===>                                                 Scroll ===> CSR

         Package: STEV001489      Status: DEV      Install date: 20180820

Source name . . . . JSONMINE                                                +
Lib type  . . . . . J2B
Setssi  . . . . . . 6DB28FDD

Related Load Modules:

  Name             + Type Promotion  Changed          User     Setssi
  JNMINE01            WCP  0 STAGING 20180427  032652 WSER58   6DB28FDD
  JSONMINE            LST  0 STAGING 20180427  032655 WSER58   6DB28FDD
  JSONMINE.J2B.list   LSH  0 STAGING 20180427  032655 WSER58   6DB28FDD
  JSONMINE/jsbinds/JS BDL  0 STAGING 20180427  032652 WSER58   6DB28FDD
  JSONMINE/jsbinds/My BDL  0 STAGING 20180427  032652 WSER58   6DB28FDD
  JSONMINE/META-INF/c BDL  0 STAGING 20180427  032652 WSER58   6DB28FDD
```

In this case, a copybook (the WCP component), a listing, and three bundle components in the BDL libtype. The full names of the bundle components are:

- JSONMINE/jsbinds/JSONMINE.jsbind
- JSONMINE/jsbinds/*My-test-client-request*.json
- JSONMINE/META-INF/cics.xml

Skeletons CMN30 and CMN30I have been enhanced with the SUBDIRS=Y parameter to enable the development libraries to be cleaned up after the package installation and baselining steps have been performed.

Chapter 4

User Exits

ChangeMan ZMF exits are programs that are called by base product programs. Exits permit you to alter the processing of base product programs depending on the information passed to the exit.

Introduction

ZMF 8.1 and later releases provide central high-level language exit services that can be called by any client that can connect to ZMF. You can code the exits in any Language Environment (LE) compliant language as well as REXX. The same customer-supplied exit code will be executed regardless of which client is being used. For details of the new HLL Exits, please see the *ChangeMan ZMF High Level Language Functional Exits Getting Started Guide*.

Please also note HLL exit points have no relation to, and do not replace, any existing ZMF assembler exit points described in this chapter.

Using the assembler exits, you can:

- Change defaults and settings for ChangeMan ZMF interaction with the operating system
- Alter what ChangeMan ZMF will do under specific component, package, or life cycle conditions
- Change who has authority to initiate specific ChangeMan ZMF tasks
- Change when authorized users can perform certain tasks

Common reasons for using exits include:

- Adapt ChangeMan ZMF to your data center standards and environment
- Enforce your company's standards, processes, and procedures for software change management
- Implement custom processes to manage unique component build processes
- Add rule-based flexibility to standard ChangeMan ZMF processing

All exits that are active when the started task is brought up are displayed in the SERPRINT output for the task.

User Exit Source

Source for user exits is delivered in the CMNZMF ASMSRC library in the ChangeMan ZMF installer.

When you modify exit source, preserve the delivered version in the delivered source library. See "Preserving Vendor Versions of ChangeMan ZMF Components" on page 18.

User Exit Interface Data

The data passed between calling programs and exits is defined in copybooks in the CMNZMF ASMCPY library. This library is delivered in the ZMF installer.

Do not modify copybooks used to call exit programs. Even if you code the exit to handle the altered copybook, you cannot change the control block used to call the exit from the base product program.

Most exits exchange data with the calling program through two copybooks:

- CMNEXITS - This copybooks is common to nearly all ChangeMan ZMF exits.
- CMNEX*nnn* - The name of the copybook matches the name of the exit program in which it is included.

Not all fields in copybooks CMNEXITS and CMNEX*nnn* are populated by the calling program. See the comments at the top of the exit program source for a list of fields in these copybooks that are available to the exit you are customizing.

No Access to TCA

Starting with ChangeMan ZMF 5.5, you cannot access the TCA in user exits. The TCA register no longer points to the TCA when an exit is called. Any attempt to reference the TCA in a user exit results in an S0C4 abend.

Customizing Exits

ChangeMan ZMF exit programs are delivered inactive, except for exit CMNEXINS. Follow these steps to customize and activate an exit to modify ChangeMan ZMF behavior.

Find the Exit You Want

See "Exit Descriptions" on page 75 to find an exit that targets the function you want to modify. Review the examples in the exit description to see how the exit can be used to alter the target function.

Read the comments at the top of the exit source member for more information about the exit. Review the sample code in the exit to see if the exit can perform the function you want.

Modify Exit Source

Follow these steps to modify the exit source to perform the function you want.

1 Check out the exit source in your ChangeMan ZMF application. If you do not have a ChangeMan ZMF application, copy the source from the delivered ASMSRC library to your custom ASMSRC library.

2 Edit the source to enable the exit. Comment out the following code to cause the exit program to be loaded at ChangeMan ZMF started task initialization:

```
*********************************************************************
*
* Comment (or delete) the following 2 lines to activate this exit.
*
CMNEX014 CSECT
         DC    Y(2046)             inactive module
*********************************************************************
```

3 Modify the exit source. Many exits are delivered with examples that can be used as they are delivered, or the sample code can be modified to perform the function you desire.

   a Some exits contain tables with entries that can be changed and extended to serve the purpose you need. Examine the end of the table to see how the program detects the end of table data, and make adjustments if necessary.

   b If necessary, set the exit return code. If sample code is provided, it usually sets the return code to the appropriate value to communicate the exit result to the calling program. Valid values for return codes are described in comments at the top of source members.

4 Use coding techniques that will make it easy to see and understand your modifications when they must be updated or applied to the next release of ChangeMan ZMF.

   If you comment out delivered code or overtype it, compare tools will often show the custom code as interleaved sets of inserted and deleted lines that are hard to understand. Use one of the following techniques to make code compare results easier to read:

   - Code custom table entries as a separate copybook component, and insert a `COPY` statement into the exit code in place of the delivered sample table. To update the table, change the copylib member and reassemble the exit.
   - Use an AGO statement to exclude delivered code, then place your custom code beneath the excluded code.

```
****
* Valid work request number table
****
X14$VWR# DS    0CL12               valid work request number
         AGO  .SKIP14
         DC    CL12'WORK#0000001'
         DC    CL12'WORK#0000002'
         DC    CL12'WORK#0000003'
         DC    CL12'WORK#0000004'
         DC    CL12'WORK#0000005'
         DC    CL12'WORK#0000006'
.SKIP14  ANOP
         DC    CL12'CUSTOM000021'  custom work request
         DC    CL12'CUSTOM000022'  custom work request
         DC    CL12'CUSTOM000023'  custom work request
         DC    CL12'CUSTOM000024'  custom work request
X14#VWR# EQU   (*-X14$VWR#)/12     maximum entries
```

5 Add comments to your custom code so you will know what you were trying to accomplish when you must reapply your code to a new release of ChangeMan ZMF.

Assemble Exit Source

Stage customized exit source in your ChangeMan ZMF application. If you do not manage ChangeMan ZMF components with ChangeMan ZMF, assemble the exit source manually.

1 Use the sample assembly JCL provided in member ASSEMBLE in the CMNZMF CNTL library, or use your standard assemble procedure.

2 Use the options per the sample member in the supplied .CNTL library:

   - Assemble ASMA90: LIST,XREF(SHORT),RENT,OBJECT
   - Binder IEWL: LIST,XREF,RENT,REFR,MAP,REUS,AC=0

- Follow instructions provided in sample .ASMSRC library members

3 Preserve the delivered exit load modules by link editing into a custom load library, not the delivered load library. See "Preserving Vendor Versions of ChangeMan ZMF Components" on page 18.

4 Verify that the assemble and link edit steps completed successfully and that the link edit completed without unresolved external references.

5 Verify that the link edit options displayed in the directory of your custom LOAD library are the same as those displayed in the directory of the delivered LOAD library.

IMPORTANT! In particular, check directory entries for AC, AM, and RM.

6 Test the new exit load module in a test ChangeMan ZMF instance.

Refresh Exit Load

After you assemble and link edit a customized exit, you must take further action to ensure that your changes take effect.

This table tells you what action to take depending on where the exit runs.

Where the Exit Runs	Action
SERNET started task	Stop and start (recycle) the started task
ChangeMan ZMF ISPF client	Exit and reenter your ChangeMan ZMF ISPF session
File tailoring task (CMNADSP) or batch job	Rerun the task, job, or job step

This table tells you where each exit runs.

Exit Name	STC	ISPF	TASK /JOB
CMNEXINS	Y	Y	Y
CMNEX001		Y	
CMNEX002	Y	Y	
CMNEX003	Y	Y	
CMNEX004	Y		
CMNEX005		Y	
CMNEX006	Y	Y	
CMNEX007	Y	Y	
CMNEX008	Y	Y	Y
CMNEX009	Y		Y
CMNEX010	Y		
CMNEX011		Y	
CMNEX012	Y	Y	
CMNEX014	Y	Y	

Exit Name	STC	ISPF	TASK /JOB
CMNEX027	Y	Y	
CMNEX028	Y	Y	Y
CMNEX030	Y	Y	
CMNEX031	Y		
CMNEX032	Y		
CMNEX033		Y	Y
CMNEX034	Y	Y	
CMNEX035	Y	Y	
CMNEX036		Y	
CMNEX037		Y	
CMNEX038			Y
CMNEX039		Y	
CMNEX040			Y
CMNEX041		Y	

Exit Name	STC	ISPF	TASK /JOB
CMNEX015	Y		
CMNEX016			Y
CMNEX019	Y	Y	
CMNEX020			Y
CMNEX021			Y
CMNEX022			Y
CMNEX023	Y	Y	
CMNEX024	Y		
CMNEX025	Y		
CMNEX026	Y	Y	

Exit Name	STC	ISPF	TASK /JOB
CMNEX042		Y	
CMNEX043	Y	Y	
CMNEX044			Y
CMNEX101			Y
CMNEX102	Y		
CMNEX103			Y
CMNEX201			Y
CMNEX210	Y		
CMNEX220		Y	

Refresh VLF and LLA

If you put ChangeMan ZMF load libraries in the LINKLIST, you must:

1 Reload the Virtual Lookaside Facility (VLF) if it is enabled.

2 Refresh the Library Lookaside (LLA) facility.

NOTE The *ChangeMan ZMF Installation Guide* recommends that you do not LINKLIST ChangeMan ZMF libraries and that you use STEPLIB and JOBLIB instead.

Exits Listed in SYSPRINT

Active exits are listed in SYSPRINT for the SERNET started task at startup. Example:

```
SER4340I CMNSTART CMNEXINS loaded
SER4340I CMNSTART CMNEX023 loaded
SER4340I CMNSTART CMNEX026 loaded
```

NOTE These four exits are not listed in SYSPRINT even if they are active:

```
CMNEX044
CMNEX201
CMNEX210
CMNEX220
```

Calling XML Services from User Exits

ChangeMan ZMF exit programs can access XML Services by calling client program SERXMLAC. This program is described in an appendix in the *ChangeMan ZMF XML Services User's Guide*.

Customers should be aware that mistakes in their use of SERXMLAC called from an exit can be fatal to the program that called the exit, including SERVER running in the started task.

Exit Descriptions

This section describes ChangeMan ZMF exit functions.

SEREX001

Exit Function	Override the default algorithm that calculates space requirements for reallocating a library that has run out of space in a SERCOPY operation where a compress with IEBCOPY did not remedy the problem. This exit only affects PDS(E) libraries, not PAN, or LIB data sets.
Calling Function	Reallocate staging PDS(E) data set (SERNET function)
Examples of Use	Use `UNIT=SYSDA` parameter for reallocated PDS libraries.

SEREX002

Exit Function	Validate or alter the first four JOB statement records in JCL before the job is submitted for execution.
Calling Function	Module SERSUBMT calls this exit each time a job is submitted
Notes	This exit runs in the SERNET started task address space, which provides security against a malicious user being able to submit jobs. See exit CMNEX008, which performs a similar function but executes in the address space of the user who submits a job rather than in the SERNET started task address space. This exit, as delivered, is enabled but does not perform any JOB statement alterations. Follow the comments in the source code if you want to alter JOB statements or disable the exit.

SEREX003

Exit Function	Allows read-only access to JES output, and only allows users to cancel, purge, or requeue jobs that they own. As delivered, CMNEX003 is enabled.
Notes	**IMPORTANT!** Access to JES jobs is normally controlled by resource classes JESJOBS and JESSPOOL, regardless of whether SEREX003 is activated. If these resource classes are activated and appropriate rules have been established by your security administrator, we recommend that you disable this exit. To disable the exit, do one of the following: ■ Use SERNET keyword parameter EX003=NO. ■ Customize the exit as described in source code comments at the top of the program.

SEREX005

Exit Function	Provide library member level security. After a library name is checked against data set access rules in your security system, SEREX005 constructs a second data set name that is checked in your security system: Original DSN LIBRARY.NAME SEREX005 DSN LIBRARY.NAME.MEMBER
Calling Function	Various ChangeMan ZMF modules call this exit for every GET, PUT, DELete, or RENname library member request.
Examples of Use	To allow userIDs in group $ABC exclusive update access to LIBRARY.NAME members that have names starting with XYZ, leave SEREX005 enabled and issue these RACF commands: ADDSD 'LIBRARY.NAME*.*' UACC(READ) PERMIT 'LIBRARY.NAME*.XYZ*' ID($ABC) ACCESS(UPDATE)
Notes	For this exit to function correctly, the length of the constructed data set name LIBRARY.NAME.MEMBER cannot exceed 44 characters. To avoid this limitation and to restrict access to components within the framework of ZMF functions and security, we recommend that you disable CMNEX005 and use ZMF component level security. See topic "Setting Component Level Security" in the *ChangeMan ZMF Administrator's Guide*. **IMPORTANT!** As delivered, CMNEX005 is enabled. To disable SEREX005, do one of the following: ■ Use SERNET keyword parameter EX005=NO. ■ Customize the exit as described in source code comments at the top of the program.

CMNEXINS

Exit Function	Specify the data set name, space allocation, DCB attributes, and extended attributes for EAV (extended address volumes) of the temporary work data set used during logon, checkout, edit, stage, recompile, relink, file tailoring, browse, compare, monitor, and many utility functions.	
Calling Function	API Service - Component API Service - File tailoring API Service - Installation job file tailoring Batch I/A table maintenance Batch Interface - Main driver Batch Interface - Main driver (freeze, stage) Batch stage called from CMNAPI Browse compressed listing Browse/print/copy baseline members Checkout from baseline/promotion Compare staging library to baseline/promotion Copy / Stage components	Copy VSAM Package Master to sequential file Edit package component Edit / Browse Notification File ISPF client main driver Monitor (Limbo and Scheduler) Promote package Query Package Master Recompile Relink Staging Versions Submit services XML Services - Data set XML Services - Save Staging Versions XML Services - Utility Request

Examples of Use	Most customers use this exit to set a high level qualifier so that ChangeMan ZMF does not need ALTER access to every TSO user's high level qualifier.
Notes	Sample code between AGO *.label* and *.label* ANOP statements is skipped by the assembler and does not appear in the assembler listing. To enable the code, delete or comment out the AGO statement. A particular volume serial for temporary work data sets can be specified in several locations in ChangeMan ZMF. This is the search order for a specified volume serial: 1 X15$VOLS in CMNEX015 if this exit is enabled 2 INS$VOLS in CMNEXINS if this exit is enabled 3 DEFAULT VOLUME SERIAL field in Application Administration Parameters 4 DEFAULT VOLUME SERIAL field in Global Administration Parameters

CMNEX001

Exit Function	Specify who can update package information.
Calling Function	Update change package information
Examples of Use	Allow anyone to update package information before first approval entered. Allow approvers who have not approved frozen package to update installation date. Block changes to super or complex packages except by administrators.

CMNEX002

Exit Function	Restrict installation date by one of more of the following: Application, global or application administrator authority, specified date, day of week, package type, from install time, to install time, values in package user information variables.
Calling Function	Create change package Update package installation date
Examples of Use	Restrict CICS changes to weekend installation dates.

CMNEX003

Exit Function	Impose a lead time for package create from the installation date using one or more of the following: Application, global or application administrator authority, specified date, day of week, package type, values in package user information variables.
Calling Function	Create change package Update package information
Examples of Use	Enforce installation lead time standards for packages with high risk rating. Block planned package installation date lead time less than 3 business days.

CMNEX004

Exit Function	Prohibit use of specified mnemonics when creating applications.
Calling Function	Application Administration: Create new application ChangeMan ZMF

CMNEX005

Exit Function	Set requirements for application approval lists.
Calling Function	Application Administration: Create/update planned and unplanned approval lists
Examples of Use	Require at least two approvals for an unplanned approval list. Validate approval security entity naming conventions against application mnemonic.

CMNEX006

Exit Function	Restrict creation of packages with specified package level by application.
Calling Function	Create change package
Examples of Use	Prohibit super/complex packages in specified applications.

CMNEX007

Exit Function	Restrict package installation date by administrator authority, application, user, installation date, package type, or package user information variables.
Calling Function	Create change package Update change package information

CMNEX008

Exit Function	Validate or modify JOB statement information in the first four batch job records.
Calling Function	Submit batch job from ChangeMan ZMF online function Build package installation JCL (X Node data set) Build remote promote JCL
Examples of Use	Prohibit use of JCLLIB, EXEC, and INCLUDE keywords in JCL coded in JOB statement Information fields on user and administration panels. Override or restructure job names obtained from ChangeMan ZMF administration.

CMNEX009

Exit Function	Add approvals to the Planned Approval List during the package freeze or post-approval processes. Approvals can be added based on one or more of the following conditions: ■ If specified library types are included in the package and have components staged into them ■ If installations are scheduled at specified remote sites in the package ■ If specified library types have scratched and/or renamed components included in the package
Calling Function	Freeze package.
Examples of Use	Add CIO approval if package user information indicates a high risk change. Add CICS systems programmer as approver if package contains BMS Map change. Add data center manager approver if package will be installed at remote center. Add a DBA approver if a package contains scratched DBRM components. Add approvers if certain Online Forms Manager (OFM) forms (pre defined in copybook ASMCOPY(CMNEX009) and limited to 50) are included in the package.
Notes	Copybook CMNEX009 contains library type table X09$SLTP, with up to 100 entries, that tells you what library types are in the package. Each entry in the table contains indicator X09$FTYP with three independent bit switches to tell you if any one of the package components in the library type is a staged component, a scratch utility request, or a rename utility request. The global administrator must set the Display Package User Option Panel(s) field to YES on the Global Parameters - Part 4 of 6 (CMNGGP04) panel if you want to be able to access user variables *user0101* through *user7205* from this exit. Refer to the notes in the sample source code in ASMSRC(CMNEX009).

The points in the package lifecycle at which CMNEX009 is called depends on whether a package is planned or unplanned.

For planned packages, CMNEX009 is called at package freeze if you have requested it to check for any of the criteria listed above. Approvers that you designate in the exit code are notified in addition to the approvers on the planned package list. Once approved, the package is installed at the scheduled time.

For unplanned packages, CMNEX009 is called at two points in the package lifecycle:

- At package freeze - Approvers that you designate in the exit code are notified in addition to the approvers on the unplanned package list.
- At post-approval processing (after the package has been installed) - The approver list is rebuilt. Approvers that you designate in the exit code are added to the planned package approver list and are notified in addition to the approvers on the planned list after the package has been installed.

Consult the comments in the source code for this exit for detailed instructions on how to code the conditions that the exit is to check and to add approvers if these conditions are true.

CMNEX010

Exit Function	Restrict who can enter a package approval by one or more of the following: Global or administration authority, package name, approving userid, date of approval, subsystem ID, package type, package level, approval function (A,R,C.V), approval entity, work request number, package creator, hierarchical order number, nearest installation date.
Calling Function	Approve package
Examples of Use	Prevent a package creator from approving any package, planned or unplanned.
Notes	This exit is called after an approval panel has been submitted by the user but before the approval is processed.

CMNEX011

Exit Function	Set minimum library security access requirements for promotion, baseline, and production library configuration functions.
Calling Function	Configure application libraries in application administration
Examples of Use	Prevent configuration of a library for promotion if the ChangeMan ZMF instance does not have update access to the library.

CMNEX012

Exit Function	Compare the package create day-of-week to the specified normal business days-of-week to determine whether to use the unplanned approval list for unplanned packages.
Calling Function	Create package
Examples of Use	Consider Wednesday to be a non-business day so that unplanned packages created on Wednesday are always defined with the unplanned approval list.

CMNEX014

Exit Function	Validate department number and/or work request number against a specified list of valid values by application. Cross-edit work request number, department number, and package user information when flag X14$IVAL indicates that package user information is passed.
Calling Function	Create package Update package information Create package user information Update package user information

CMNEX015

Exit Function	Direct dynamically allocated temporary work data sets to a specified VOLSER.
Calling Function	Any task that involves the dynamic allocation of data sets
Notes	A specific volume serial for temporary work data sets can be specified in several locations in ChangeMan ZMF. This is the search order for a specified volume serial: 1 X15$VOLS in CMNEX015 if this exit is enabled 2 INS$VOLS in CMNEXINS if this exit is enabled 3 DEFAULT VOLUME SERIAL field in Application Administration Parameters 4 DEFAULT VOLUME SERIAL field in Global Administration Parameters

CMNEX016

Exit Function	Modify or skip expanded copybook records written to SYSOFILE by CMNWRITE.
Calling Function	Program CMNWRITE in build jobs
Examples of Use	Create a PANVALET like exit to prefix COBOL COPYBOOK source statements with user defined input.
Notes	CMNEX016 mimics a CA Librarian exit that modifies copybook records included in source with the -INC command. Sample code between AGO *.label* and *.label* ANOP statements is skipped by the assembler and does not appear in the assembler listing. To enable the code, delete or comment out the AGO statement.

CMNEX019

Exit Function	This exit is called before and after checkout, checkin, and build and may be used for any function desired at those points in component processing, depending on the availability of data passed from and returned to the calling program.
Calling Function	Checkout component Checkin component Build component
Notes	Checkin is one of the two processes that make up the stage from development function: ■ Checkin copies a component from a library outside ZMF to a staging library. ■ Build transforms source into one or more executables. Sample code between AGO *.label* and *.label* ANOP statements is skipped by the assembler and does not appear in the assembler listing. To enable the code, delete or comment out the AGO statement. This exit was used with the ChangeMan ZMF APS Option that was retired with Version 6.1.

CMNEX020

Exit Function	Reset return codes for package audit out-of-synch conditions.
Calling Function	Package Audit
Notes	Sample code between AGO *.label* and *.label* ANOP statements is skipped by the assembler and does not appear in the assembler listing. To enable the code, delete or comment out the AGO statement.

CMNEX021

Exit Function	Use library type, application, package creator, or other fields passed from package audit to bypass: ■ SYNCHnn! processing ■ Component relationship processing ■ Promotion libraries in SYNCH15! processing.
Calling Function	Package Audit
Notes	Sample code between AGO *.label* and *.label* ANOP statements is skipped by the assembler and does not appear in the assembler listing. To enable the code, delete or comment out the AGO statement.

CMNEX022

Exit Function	Exclude specified load and non-load components from processing by package audit and by the impact analysis LDS build. Include CSECT, with the same name as the composite load module, in the Impact Analysis Table to show LOD relationships, and in package audit processing to detect SYNCH8!.
Calling Function	Package Audit Impact Analysis Maintenance
Examples of Use	Prevent IBM subroutines with names starting in ILBO, DLI, DFS, DFH, CEE, IBM, and IGZ from cluttering up the package audit report where they obscure important information.

CMNEX023

Exit Function	Enable the Package User Information facility. Define ISPF variable names used for Package User Information variables in file tailoring for installation JCL.
Calling Function	All remote file tailoring and ISPF driven stage, recompile, and relink package functions

CMNEX024

Exit Function	Prohibit package freeze depending on one of more of the following: Application, global or application authority, package type, library types in package, installation date, installation from or to time, installation day of week, Package User Information variable.
Calling Function	Freeze change package

CMNEX025

Exit Function	Prohibit package freeze or selective refreeze of component depending on compile parameters, link edit parameters, and user options used in last stage job. Other validations can be performed on application mnemonic, component library types, component names, language, compile procedure.
Calling Function	Freeze change package Selective refreeze

CMNEX026

Exit Function	Dynamically allocate additional staging libraries based on component type, user options, or other data passed to the exit. Prohibit package component delete based on library type, member name, or whether component is promoted.
Calling Function	Stage component Delete component during staging
Examples of Use	Allocate additional staging libraries for build processes with multiple outputs.
Notes	Do not use CMNEX026 to control delete of related components from staging libraries. Use ILOD records instead.

CMNEX027

Exit Function	Override the promotion or demotion rule for individual promotion levels.
Calling Function	Promote package Demote package Unfreeze/refreeze Revert
Examples of Use	Specify Promotion Rule by Promotion Site/Level Break down Promotion Rules into behaviors that can be specified separately for a site/Level.
Notes	CMNEX027 is called twice for promotion/demotion: ■ Before the promotion or demotion panel displays the history ■ After promotion or demotion

CMNEX028

Exit Function	Set several administration options that are not included in the ISPF interface: ■ Add extra job statements for batch processing ■ Do not to release unused space in staging libraries during a freeze ■ Bypass CMNAPI case conversion for lower case languages ■ Bypass expansion of duplicate %INCLUDE statements when the copybook does not exist in the staging library
Calling Function	Extended administration options affecting various areas throughout ChangeMan ZMF
Notes	JOB statements 5 and 6 added for batch recompile, batch freeze, and package audit only.

CMNEX030

Exit Function	Bypass checkout enforcement rule depending on the component library type.
Calling Function	Stage component from development

CMNEX031

Exit Function	Bypass package audit processing based on library type.
Calling Function	Package audit Package integrity check

CMNEX032

Exit Function	Process specified library types as compressed listings (like-LST)
Calling Function	Baseline browse

CMNEX033

Exit Function	Override package status validation when adding or removing participating packages in complex or super packages. Allow automatic close of super or complex packages after update if all participating packages have completed the package lifecycle.
Calling Function	Update Complex/Super Information Close super or complex packages

CMNEX034

Exit Function	Assign processing to specified library types when creating or updating impact analysis relationships. Processing that can be assigned with CMNEX034: JCL Process the specified library type as JCL when creating JCL-Procedure, PGM Name/Symbol, and DSN Name/Symbol relationship records. PRC Process the specified library type as cataloged procedures when creating JCL-Procedure, Pgm Name/Symbol, and DSN Name/Symbol relationship records.
Calling Function	Impact Analysis Maintenance Baseline ripple
Examples of Use	Parse components in library type JC2 like JCL to create relationship records in the Impact Analysis file.
Notes	Starting with ChangeMan ZMF 6.1, object components and NCAL load components are supported in the base product with like-object (O) and like-NCAL (N) in global and application administration.

CMNEX035

Exit Function	Restrict the library types displayed on the valid library selection list for checkout, stage, browse baseline, browse compressed listing, compare, scan, scratch/rename, and relink functions.
Calling Function	Checkout, stage, browse baseline, browse compressed listing, compare, scan, scratch/rename, and relink.

CMNEX036

Exit Function	Call an edit preprocessor or different editor.
Calling Function	Edit-in-stage
Examples of Use	Use SMART EDIT instead of ISREDIT. Invoke an SDF2 editor interface.

CMNEX037

Exit Function	Call an edit macro like ASG-JCLPREP or your own edit macro.
Calling Function	Edit-in-stage VIEW in edit-in-stage
Examples of Use	Call edit macro for ASG-JCLPREP at end of edit-in-stage session for JCL members.

CMNEX038

Exit Function	Assign a default language for a particular library type. Specify a starting column and ending column for source code parsing by CMNPARSE.
Calling Function	Parse source to determine language
Notes	The starting column must start before the ending column. The copy/include statement must fit between the starting and ending columns.

CMNEX039

Exit Function	Assign group names to a list of installation sites. Installation site group names are displayed on the Create: Site Information panel and Update: Site Information panel, and on the Site Selection List panel for those functions. The Query: Site Information panel shows individual site names, including any sites in an installation site group.
Calling Function	Create package Update package information
Notes	If an installation site group includes a site that is not fully defined in an application, the group name is not displayed in package create or update in that application. **Caution!** If an installation site is included in more than one installation site group in CMNEX039, and both groups are added to a package, then the site is added to the package twice, and file tailoring for package installation JCL will fail with messages CMN1000A and CMN8703I.

CMNEX040

Exit Function	Enforce the use of a specific file or PDS member for package audit auto resolve parameters.
Calling Function	Package audit

CMNEX041

Exit Function	Specify special authorization for package IMS information update.
Calling Function	Updating IMS package information

CMNEX042

Exit Function	Display panel CMNEX042 for component general description and store information as discrete fields on the package master.
Calling Function	Stage component

CMNEX043

Exit Function	Add custom processes that are executed outside of ChangeMan ZMF at the end of package create.
Calling Function	Create change package

CMNEX044

Exit Function	Specify like-copy library types to be excluded from package audit SYNCH15! processing.
Calling Function	Package audit
Notes	See exit CMNEX021 to bypass promotion libraries in the processing of SYNCH15! conditions.

CMNEX093

Exit Function	Override the default 755 permission for zFS staging libraries.
Calling Function	This exit is loaded at startup and is called by LIBTYPE SERVICE ALLOCATE during the dynamic allocation of an zFS staging library (zFS path).

CMNEX101

Exit Function	Add, manipulate, or verify DB2 bind control processed by CMNDB2PL.
Calling Function	DB2 Option binds at promotion, installation, and baseline ripple. This exit is called from the DB2 Option Plan Lookup Program CMNDB2PL.
Notes	CMNEX101is called after DSN BIND commands are templated by CMNDB2PL and non-standard records set aside by CMNEX103 are restored to the end of the command set. BIND command sets are presented to CMNEX101 one command keyword per record.

CMNEX102

Exit Function	Define a collection ID for the DB2 Option that is different from the default of CMN*x* (where *x* is the Subsystem ID of the ChangeMan ZMF instance). This exit is invoked from ZMF to allow the user to define a collection id other than that assigned by ZMF where the collection id of CMNx or CMNZMF will be supplied to DB2 to qualify a package to be used for DB2 access. See the comments within the exit code.
Calling Function	Program CMNDB2SQ in all DB2 Option functions that access a ChangeMan ZMF collection ID under CMNPLAN, including plan lookups for DB2 binds at promotion, installation, and baseline ripple

CMNEX103

Exit Function	Sets aside records from DSN BIND command sets before parsing in CMNDB2PL in preparation for templating.
Calling Function	Program CMNDB2PL in the DB2 Option before keyword operand templating.
Examples of Use	Set aside "comment" records with asterisk (*) in position 1 that control the behavior of CMNEX101, then restore the comment records at the bottom of the DSN BIND command or stored procedure DDL after templating.
Notes	Exit program CMNEX103 is called by program CMNDB2PL to delete or set aside records in DSN BIND commands. Using CMNEX103, you can take one of three actions for each DSN BIND: ■ Pass the record back for parsing and keyword operand templating. ■ Drop the record. ■ Withhold the record from parsing and templating, then restore the record at the end of the DSN BIND command set before CMNEX101 is called.

CMNEX201

Exit Function	Bypass processing of specified library types in ERO release audit.
Calling Function	ERO Release Audit
Examples of Use	Exclude a DDI library type from release audit processing.

CMNEX210

Exit Function	Validate conditions before attaching a package to an ERO release or detaching a package from a release.
Calling Function	Attach a package to a release Detach a package from a release
Notes	If activated, this exit is called before the attach or detach function and after the attach or detach function. On the pre-function call anything but an RC=0 will halt the function. If the package is already attached to a release and it is being updated to a new release, the exit is actually called four times: a pre- and post-function call for detaching the package from the old release and a pre- and post-function call for attaching the package to the new release. Only users with global, application, or release administrator authority can detach packages from a release.

CMNEX220

Exit Function	Validate conditions before checking in a component to an ERO release area or before retrieving a component from an area.

Calling Function	Check components in to an ERO release Retrieve components from a release
Notes	Pre-checkin or pre-retrieve calls can alter the selected component list or halt all the processing. The components that are selected by this exit are skipped by the check-in or retrieve function. All all other components are selected as normal. Post-checkin or post-retrieve calls to this exit have no effect on the internal processing of the check-in or retrieve operation. On post-check-in or post-retrieve calls, the component list only contains components that completed the function successfully.

Chapter 5

User Data

ChangeMan ZMF includes four facilities that enable you to enter information that can be used by skeleton file tailoring to customize ChangeMan ZMF functions that are executed in batch jobs. Some of these facilities store your data in the package master or component master files, and you can display that information on custom reports.

Package User Information

Package User Information is an optional facility that stores data in 71 fields of various lengths on the package master. You enter Package User Information on panels that are displayed when you create a package and when you update package information. The information stored in Package User Information fields is available for processing by several exits, and it is available in file tailoring for installation JCL.

The Package User Information facility is designed to be flexible so that you can customize it to meet your needs for package level user data. You can customize up to two data entry panels, selecting the fields you want to display, labeling the input fields with names you choose, and coding edit rules and other panel processing to satisfy your requirements. You can use Package User Information data in program logic in certain ChangeMan ZMF exit programs. You can choose your own names for the variables that are made available to file tailoring for install JCL.

Package user information is available in all remote file tailoring and ISPF driven stage, recompile and relink package functions, and all exit calls which are package driven.

Package User Information Field Names

Package User Information fields have different names on input panels, in copybook CMNEXITS that represents how they are stored on the package master, and in file tailoring for install JCL. The field names follow a convention that relates the name representing the data stored on the package master to the other names that refer to the same data. This naming convention also tells you how long the data field is.

The following example shows the names that identify a 3-byte Package User Information field in various ChangeMan ZMF functions. In the field naming convention:

- *ll* represents the length of the field in bytes.
- *nn* is a field identifier that is unique among fields of the same length.

Where Name is Used	Name	Modifiable?	Example
Input Panels	USR/*lnn*	No	USR0301
Copybook CMNEXITS	IXP$/*lnn*	No	IXP$0301
File Tailoring	USR/*lnn*	Yes	USR0301

There are a total of 71 Package User Information fields. They vary in length from 1 byte to 72 bytes. This table shows how many fields of each length are stored on the package master:

Field Length	Count	Field Names on ISPF Panels	CMNEXITS Field Names (Package Master)	Default File Tailoring Variable Names	ZDDOPTS Variable Names
1	15	USR0101 to USR0115	IXP$0101 to IXP$0115	USR0101 to USR0115	UserVarLen101 - UserVarLen115
2	11	USR0201 to USR0211	IXP$0201 to IXP$0211	USR0201 to USR0211	UserVarLen201 - UserVarLen211
3	10	USR0301 to USR0310	IXP$0301 to IXP$0310	USR0301 to USR0310	UserVarLen301 - UserVarLen310

Field Length	Count	Field Names on ISPF Panels	CMNEXITS Field Names (Package Master)	Default File Tailoring Variable Names	ZDDOPTS Variable Names
4	10	USR0401 to USR0410	IXP$0401 to IXP$0410	USR0401 to USR0410	UserVarLen401 - UserVarLen410
8	10	USR0801 to USR0810	IXP$0801 to IXP$0810	USR0801 to USR0810	UserVarLen801 - UserVarLen810
16	5	USR1601 to USR1605	IXP$1601 to IXP$1605	USR1601 to USR1605	UserVarLen1601 - UserVarLen1605
44	5	USR4401 to USR4405	IXP$4401 to IXP$4405	USR4401 to USR4405	UserVarLen4401 - UserVarLen4405
72	5	USR7201 to USR7205	IXP$7201 to IXP$7205	USR7201 to USR7205	UserVarLen7201 - UserVarLen7205

The last column of the table show the default names for variables made available to file tailoring for install JCL. You can change the default variable names to names that are meaningful to you.

Package User Information Input Panels

Your ChangeMan ZMF global administrator activates the Package User Information feature by selecting the following option on the Global Parameters - Part 5 of 8 (CMNGGP05) panel:

_ Enable package user variables

If the Package User Information feature is activated, two sample ISPF input panels are displayed when you create a change package or update package information.

You can customize these panels to display and process the Package User Information fields that you want to use to store information on the package master.

The first Package User Information panel displayed is the **Create - Sample Package User Panel 1** (CMNDPUP1).

```
CMNDPUP1             CREATE - Sample Package User Panel 1
Command ===> ____________________________________________

Enter "yes" or "no" to indicate value of variable

  Field 1 . . . . . NO
  Field 2 . . . . . NO
  Field 3 . . . . . NO
  Field 4 . . . . . NO
  Field 5 . . . . . NO
  Field 6 . . . . . NO

Enter "/" to select option
  / Next panel
```

If you select the **Next panel** option on the **Create - Sample Package User Panel 1**, the **Create - Sample Package User Panel 2** (CMNDPUP2) is displayed.

```
CMNDPUP2             CREATE - Sample Package User Panel 2
Command ===> ____________________________________________________

Enter "yes" or "no" to indicate value of variable:

  Test Value1 . . . . . NO
  Test Value2 . . . . . NO
  Test Value3 . . . . . NO
  Test Value4 . . . . . NO
```

Package User Information and Exits

Package User Information fields are included in copybook CMNEXITS and are available in every package related exit program.

These exits are for ChangeMan ZMF basic package functions:

CMNEX001	CMNEX009	CMNEX024	CMNEX029	CMNEX038
CMNEX002	CMNEX010	CMNEX025	CMNEX030	CMNEX041
CMNEX003	CMNEX014	CMNEX026	CMNEX033	CMNEX043
CMNEX007	CMNEX019	CMNEX027	CMNEX036	
CMNEX008	CMNEX023	CMNEX028	CMNEX037	

For package audit, package user information is available in exits CMNEX020, CMNEX021, and CMNEX031.

For ERO, package user information is available in exit CMNEX210.

Implementing the Package User Information Facility

Follow the steps in this section to modify Package User Information components delivered in ChangeMan ZMF libraries so that they satisfy your needs for package level user data.

Choose Package User Information Fields

1 List the kind of data you want to store for a change package and map your list to the 71 fields available in the Package User Information facility.

2 Choose the shortest fields that will accommodate the data that you will store.

See "Package User Information Field Names" on page 92 for a description of the 71 available fields.

Modify Sample Package User Information Panels

1 Copy sample Package User Information panels CMNDPUP1 and CMNDPUP2 to your custom panels library from the CMNZMF PANELS library unloaded from the ZMF installer.

2 Modify the)BODY section of the panels to change the title displayed on the panels, and to display field tags that identify the data users should enter.

3 Modify the)INIT section to initialize blank fields. Modify the ZVARS statement to associate panel fields with the appropriate Package User Information field name.

4 Modify the)PROC section to validate information entered by the user and to perform cross-field edits, if required.

NOTE Panel field name USR0199 is reserved for the **Next Panel** field on panel CMNDPUP1 to determine whether the second Package User Information panel CMNDPUP2 will be displayed. Even if you do not use panel CMNDPUP2, and alter the panel so that you do not display field USR0199 on CMNDPUP1, you must still set a value for this field.

5 Copy sample help panels CMN12350 and CMN12355 to your custom panels library from the CMNZMF PANELS library unloaded from the ZMF installer.

6 Modify the panels to describe the fields on your custom CMNDPUP1 and CMNDPUP2 panels respectively.

Modify Exits

Package User Information fields in copybook CMNEXITS are populated with your data stored on the package master when the exit is called.

1 Copy the exit program source you want to modify to your custom source library from the CMNZMF ASMSRC library delivered in the ChangeMan ZMF installer.

2 Modify exit program logic to use the Package User Information fields in copybook CMNEXITS.

See Chapter 4, "User Exits" on page 69 for general instructions for enabling and coding ChangeMan ZMF exit programs. Coding for exit program CMNEX023 is described in the next topic.

Modify Exit 23 For Install JCL File Tailoring

If you want to use Package User Information in file tailoring for install JCL, you must enable exit program CMNEX023. This exit defines ISPF variables for Package User Information in the ISPF session used by file tailoring.

You can use CMNEX023 to change the names of the ISPF variables that are defined in the ISPF session for install JCL file tailoring. You can also use CMNEX023 to populate variables with other information available to the exit.

The sample code delivered in CMNEX023 shows modifications to accomplish both of these objectives. For example, the default file tailoring variable USR0115 is renamed to

X23PTYP, and whatever data was stored on the package master for that field is overlaid with the Package Type that is in CMNEXITS field IXP$PTYP.

NOTE When you enable exit program CMNEX023 as it is delivered in the ZMF installer, some Package User Information variables defined to file tailoring for install JCL will be modified by the sample code in the exit. Check the program comments, the variable names in #SPFVARS, and the procedure code at label EXT$0000 to ensure that the sample code will not interfere with what you want to do in file tailoring for install JCL. You may have to change the sample code to restore the default Package User Information ISPF variable names and field contents.

Modify Install Skeletons

1. Copy install skeletons to your custom skeleton library from the CMNZMF SKELS library unloaded from the ZMF installer.
2. Modify those skeletons to use the ISPF variables you defined in exit program CMNEX023.

Enable Package User Information

In Global Administration Parameters (=A.G.1), select the **Enable package user variables** field on the **Global Parameters - Part 5 of 8** panel (CMNGGP05):

```
CMNGGP05                Global Parameters - Part 5 of 8
Command ===> ____________________________________________

Audit package lock  . . . . OPTIONAL (Always/Never/Optional)

Enter "/" to select option
  _  Job name increment override
  _  Use zprefix in batch jobs
  _  Suppress msgs in dis/ins/bas jobs
  _  Create component work records
  _  Force audit of unplanned packages
  _  Allow link packages
  _  Memo delete empty packages only
  /  Enable package user variables
  _  Enable component user variables
  _  Add user variables to package list table
  _  Allow component in multiple applications
  _  Auto scratch load member with source
  _  Run health checks
  Approval Restrictions
  _  Package creator cannot approve
  _  Package worker cannot approve
  _  Only 1 approval per user
```

Staging User Options

User options are component-level user data that is stored in 57 fields of various lengths on the component master. You enter user options on customizable panels that are displayed in build processes like stage, recompile and relink. The information stored in user options is available in file tailoring for build processing JCL.

User option settings are included in designated compile procedures, so you can lock down these fields that determine how build processing is performed. User options can be validated by exit program CMNEX025 to ensure that prohibited values are not used before a component is installed.

Using a combination of user options and custom compile procedure skeletons, you can create highly flexible build processes that fits your unique needs.

User Options Field Names

The 57 user option fields vary in length from 1 byte to 72 bytes. This table shows user option field lengths and the names of the fields at key points in component build processing:

Field Length	Count	Field Names on ISPF Panels	CMNEX025 Field Names	CMNEX026 Field Names	File Tailoring Variable Names	ZDDOPTS Variable Names
1	20	USROP01 to USROP20	X25$UO01 to X25$UO20	X26$OP01 to X26$OP20	USROP01 to USROP20	UserOption01 to UserOption20
1	5	CUSR011 to CUSR015	X25$0101 to X25$0105		CUSR011 to CUSR015	UserOption101 to UserOption105
2	3	CUSR021 to CUSR023	X25$0201 to X25$0203		CUSR021 to CUSR023	UserOption201 to UserOption223
3	3	CUSR031 to CUSR033	X25$0301 to X25$0303		CUSR031 to CUSR033	UserOption301 to UserOption303
4	3	CUSR041 to CUSR043	X25$0401 to X25$0403		CUSR041 to CUSR043	UserOption401 to UserOption403
8	5	CUSR081 to CUSR085	X25$0801 to X25$0805		CUSR081 to CUSR085	UserOption801 to UserOption805
10	2	CUSR101 to CUSR102	X25$1001 to X25$1002		CUSR101 to CUSR102	UserOption1001 to UserOption1002
16	2	CUSR161 to CUSR162	X25$1601 to X25$1602		CUSR161 to CUSR162	UserOption1601 to UserOption1602
34	2	CUSR341 to CUSR342	X25$3401 to X25$3402		CUSR341 to CUSR342	UserOption3401 to UserOption3402
44	2	CUSR441 to CUSR442	X25$4401 to X25$4402		CUSR441 to CUSR442	UserOption4401 to UserOption4402
64	5	CUSR641 to CUSR645	X25$6401 to X25$6405		CUSR641 to CUSR645	UserOption6401 to UserOption6405
72	5	CUSR721 to CUSR725	X25$7201 to X25$7205		CUSR721 to CUSR725	UserOption7201 to UserOption7205

User Option Input Panels

On stage, recompile, and relink panels that have not been customized, if you select the **Other options** field, four **User Options** panels (CMNUSR01/2/3/4) are displayed in a series.

```
CMNUSR01                      User Options Part 1
Command ===> ____________________________________________________

  Name: ACPSRCEE                                                    +
  Type: SRC        Language: COBOL2

  Compile only . . . . . _      IMS DLITxxx entry . . . _
  CICS precompile  . . . _      Drop include stmts  . . _
  Easytrieve object  . . _      User option 06  . . . . _
  User option 07 . . . . _      User option 08  . . . . _
  User option 09 . . . . _      User option 10  . . . . _
  User option 11 . . . . _      User option 12  . . . . _
  User option 13 . . . . _      User option 14  . . . . _
  User option 15 . . . . _      User option 16  . . . . _
  User option 17 . . . . _      User option 18  . . . . _
  User option 19 . . . . _      User option 20  . . . . _

Enter "/" to select option
  / Mixed Case
```

```
CMNUSR02                      User Options Part 2
Command ===> ____________________________________________________

  Name: ACPSRCEE                                                    +
  Type: SRC        Language: COBOL2

 Additional build parameters:

 CUSR641 ____________________________________________________________
 CUSR642 ____________________________________________________________
 CUSR643 ____________________________________________________________
 CUSR644 ____________________________________________________________
 CUSR645 ____________________________________________________________

Enter "/" to select option
  / Mixed Case
```

```
CMNUSR03                      User Options Part 3
Command ===> ____________________________________________________

  Name: ACPSRCEE                                                    +
  Type: SRC        Language: COBOL2

 Additional component attributes:

 CUSR011 . . . . _    CUSR081 . . . . _________  CUSR021 . . . . __
 CUSR012 . . . . _    CUSR082 . . . . _________  CUSR022 . . . . __
 CUSR013 . . . . _    CUSR083 . . . . _________  CUSR023 . . . . __
 CUSR014 . . . . _    CUSR084 . . . . _________
 CUSR015 . . . . _    CUSR085 . . . . _________

 CUSR031 . . . . ___  CUSR041 . . . . ____      CUSR101 . . . . ___________
 CUSR032 . . . . ___  CUSR042 . . . . ____      CUSR102 . . . . ___________
 CUSR033 . . . . ___  CUSR043 . . . . ____

Enter "/" to select option
  / Mixed Case
```

```
CMNUSR04                      User Options Part 4
Command ===> ____________________________________________________

  Name: ACPSRCEE                                                    +
  Type: SRC        Language: COBOL2

 Additional component attributes:

 CUSR161 . . . . ____________________
 CUSR162 . . . . ____________________
 CUSR341 . . . . ____________________________________________
 CUSR342 . . . . ____________________________________________
 CUSR441 . . . . ____________________________________________________
 CUSR442 . . . . ____________________________________________________

 CUSR721 - CUSR725
 ____________________________________________________________________________
 ____________________________________________________________________________
 ____________________________________________________________________________
 ____________________________________________________________________________

Enter "/" to select option
  / Mixed Case
```

The panels shown here are the sample CMNUSR01, CMNUSR02, CMNUSR03, and CMNUSR04 panels that are delivered on the ChangeMan ZMF installer. You can customize these panels to display and process the user options fields that you want to use.

User Options and Exits

User options variables are available in two exits.

Exit	Function
CMNEX025	Prohibit package freeze or selective refreeze of Source and Load depending on compile parameters, link edit parameters, and user options used in the last stage job.
CMNEX026	Dynamically allocate additional staging libraries based on component type, user options, and other data passed to the exit. Define relationships between library types so that when a component is deleted, components with the same name in related library types are also deleted. Prohibit delete based on library type, member name, or whether component is promoted. **Note:** Only the first twenty 1-byte user options (panel field names USROP01 to USROP20) are available in this exit.

Implementing the User Options

Follow the steps in this section to modify user options components delivered in ChangeMan ZMF libraries so that they satisfy your needs for build processing.

Choose User Options Fields

1. Plan how you want user options to store information at the component level and to control build processing. Identify how you want user options to control file tailoring to create build job JCL, set build process parameters, manage target library types with CMNEX026, and any other use you can devise.
2. Map each user option variable to the purpose it will serve and the values that will be valid. Choose the shortest fields that will accommodate the data that you will store.

   See "User Options Field Names" on page 97 for a description of the 57 available fields.
3. Mock up one or more prototype Stage User Options panels, and choose field tags that will fit in the available space.

Modify Sample Stage User Options Panels

1. Copy sample Stage User Options panels CMNUSR01-04 into your custom panels library from the CMNZMF PANELS library unloaded from the installer.
2. Modify the `)BODY` section of the panels to display field tags that identify the data users should enter in each user option field. To enhance usability, group user options that serve a similar purpose under panel subheadings.
3. Modify the `)INIT` section to initialize blank fields. Modify the .ZVARS = statement to associate panel fields with the appropriate user option field name.
4. Modify the `)PROC` section to validate information entered by the user and to perform cross field edits, if required. Set the value of variable USRPAN to the member name of the next Stage User Options panel, and set USRPAN to blank for the last panel in the chain.

5 Copy sample help panel CMNHMSC9 to your custom panels library from the CMNZMF PANELS library unloaded from the ZMF installer. Modify the panel to describe the user options on your custom CMNUSR01 panel. Create new help panels for the other Stage User Options panels. Code the help panel member names in the .HELP = statement in the)INIT section of each Stage User Options panel.

6 Verify that your customized Stage User Options panels and help panels look like you want when accessed from these panels.

- CMNCMPH2 Compile and Link Edit Options
- CMNQRY22 Query Compile and Link Edit Options
- CMNRCMP1 Recompile Job Information
- CMNRCMP3 Recompile Job Information
- CMNRLNK1 Relink Job Information
- CMNSTG04 Stage Build
- CMNSTG05 Stage Mass Build Edit

Modify Exits

User options fields in copybooks CMNEX025 and CMNEX026 are available in copybooks CMNEX025 and CMNEX026 respectively.

1 Copy the exit program source you want to modify to your custom source library from the CMNZMF ASMSRC library delivered on the ChangeMan ZMF installer.

2 Modify exit program logic to use the user options.

See Chapter 4, "User Exits" on page 69 for general instructions for enabling and coding ChangeMan ZMF exit programs.

Modify Build Skeletons

1 Copy stage process skeletons to your custom skeleton library from the CMNZMF SKELS library unloaded from the ZMF installer.

2 Modify those skeletons to use the user options variables.

NOTE Skeleton CMN$$VAR is imbedded in every compile procedure skeleton delivered with ChangeMan ZMF. Use this skeleton to:

- Translate ChangeMan ZMF ISPF variable names into names that are meaningful to you
- Convert a value in a single user option into multiple variables
- Set one or more variables for file tailoring from combinations of user options

User Option Example

The sample CMNUSR01 panel contains five examples of user options that are fully coded in the compile procedure skeletons delivered with ChangeMan ZMF. You can change these examples to use USROP01-USROP05 for any purpose you choose.

This section describes how the first example user option is used to create stage job JCL that creates object but does not link edit the object into a load module.

User Option Panel CMNUSR01

In the **)BODY** section of panel CMNUSR01, the first user option (USROP01) is labeled "Compile only". In the **)PROC** section, a VER command ensures that Y and N are the only acceptable values for data entered in that field otherwise message CMN132 is issued.

Help panel CMNHMSC9 should be updated to describe this first user option and its purpose.

Variable Skeleton CMN$$VAR

In skeleton CMN$$VAR, near the top, the value of variable USROP01 is tested. If the value is Y, variable COMPONLY is set to Y. If USROP01 is N, COMPONLY is set to N.

Search skeleton CMN$$VAR for occurrences of COMPONLY to see how other variables are set for Object processing.

Compile Procedure CMNCOB2

In compile procedure CMNCOB2, variable COMPONLY is tested for value equal to Y and also for not Y (NE Y). Some skeleton code is selected when the value of COMPONLY is Y, and link edit skeletons CMN$$SSI and CMN$$LNK are only included when COMPONLY is not Y (NE Y).

HLLX exit requirements

This replaces ISPF dialog panel logic prior to display of the first panel. If you change the first user panel names from the defaults in only the ISPF panel and not the HLLX exit, the **UV** command will not work correctly.

Subsequent panels displays ABCUSR02, ABCUSR03 etc are done as they are today by setting USRPAN to the next panel name in the series.

A simple REXX example follows, if the user is ABCD233 then change the default src and non-src names as follows:

```
if userid = "ABCD233" then
do
  if userPanel = "CMNUSR01" then
  do
    userPanel = "ABCUSR01"
  end
  if userPanel = "CMNUSR11" then
  do
    userPanel = "ABCUSR11"
  end
end
```

The code must include the Boolean "if" logic about the default panel names, otherwise each time a subsequent panel is called into the exit it will be changed to ABCUSR01/11 and not display any more. In essence this is a 'what to do first time through', subsequent panels are displayed as per usual by setting the USRPAN variable on the user panel

E.G. without the first time "if" logic, if you set the panels to be ABCUSR01-04, when ABCUSR02 is processed by the exit it will be changed to ABCUSR01 again and the panel loop logic will terminate prematurely.

Release ID Variables

Release ID variables are sets of global-level variables created and set by the global administrator. An application administrator can associate one of these release ID variable sets with an application. These variables are available to file tailoring for all batch jobs submitted for an application. You can define up to 54 variables under each release ID.

CAUTION! If you define more than 54 release ID variables, only 54 are kept and only 53 are available during processing. The 54th variable, if defined, will have a null value during processing. No warning is issued.

The original intent of release ID variables was to make it easy to change release numbers for system libraries by including release version variables in system data set names used in ChangeMan ZMF skeletons. Customers have found many ways to use release ID variables to add flexibility to their custom skeletons.

CAUTION! Use caution when designing skeleton customization around release ID variables. These variables and values must be entered and maintained by hand in the ChangeMan ZMF instance that you use to manage components in your production environment. As a more reliable alternative, consider coding variables in skeleton CMN$$VAR. You can manage a skeleton like CMN$$VAR with ChangeMan ZMF, which will guarantee that what you test is what you install in production.

Release ID variables are defined and updated in the Maintain option of the ChangeMan ZMF Skeleton Maintenance facility.

Accessing Maintain Release ID Variables

Display the **Maintain Release ID Variables** panel using one of these two methods.

- Access the **Skeleton Maintenance Options** panel directly by typing **=A.G.S.M** and pressing **Enter**,

  or

- Follow these steps to access the **Maintain Release ID Variables** panel using ChangeMan ZMF menus:

  a On the **Primary Option Menu**, select **option A Admin**.

  b On the ***Administration Options*** menu, select **option G Global**.

c On the ***Global Administration Options*** menu, select option **S Skeletons**. The **Skeleton Maintenance Options** menu (CMN3DSKL) is displayed.

```
CMN3DSKL                 Skeleton Maintenance Options
Option ===> ____________________________________________

M  Maintain       Maintain skeleton release variables
A  Assist         File tailoring assistance of skeleton procedures
```

d On the **Skeleton Maintenance Options** menu, select option **M Maintain**.

The **Maintain Release ID Variables** panel (CMN3DSM0) is displayed.

```
CMN3DSM0                 Maintain Release Id Variables
Option ===> ____________________________________________

   blank Display release id list             D Delete release id
       R Rename release id                   S Select release id

Release id . . . . . ____  (Blank for list; required for options S,R,D)
New release id . . . ____  (If option R selected)

Enter "/" to select option
  / Confirm delete (if option D selected)
```

This table describes the fields on the **Maintain Release ID Variables** panel.

Field	Description
Option	Type one of the following options, or leave the Option line blank and type a line command next to a component name. S — Select the release ID typed in the **Release ID** field. R — Rename the release ID typed in the **Release ID** field using the new name typed in the **New Release ID** field. D — Delete the release ID typed in the **Release ID** field. blank — Display the **Release ID List** panel where you use line commands to take action against existing release IDs. C — Cancel entries on this panel and return to the previous panel. (Long form: CANCEL)
RELEASE ID	Type a 1-4 character release ID when Option S, R, or D is selected.
NEW RELEASE ID	Type a new name for a release ID when Option R is selected.
CONFIRM DELETE	Type Y or N to determine whether a confirmation panel is displayed before ChangeMan ZMF deletes a release ID. Y — Display the Confirm Delete panel before a release ID is physically deleted. N — Delete a release ID without displaying the Confirm Delete panel.

Creating a New Release ID

Follow these steps to create a new release ID and new release ID variables.

1 On the **Maintain Release Id Variables** panel (CMN3DSM0):

a Type **S** in the **Option** line.

b Type a 1-4 character name in the **Release id** field. The name cannot start with a number.

```
CMN3DSM0                 Maintain Release Id Variables
Option ===> s

   blank Display release id list             D Delete release id
       R Rename release id                   S Select release id

Release id . . . . . v8r1  (Blank for list; required for options S,R,D)
New release id . . .       (If option R selected)

Enter "/" to select option
  / Confirm delete (if option D selected)
```

2 Press **Enter** to display the ***releaseID* - Skeleton Variables** panel (CMN3DSM2).

```
CMN3DSM2                  V8R1 - Skeleton Variables          Row 1 to 21 of 21
Command ===> ________________________________________________ Scroll ===> CSR_

Release id description: Test Release number 1_________

    Variable Description                          Value
___ ________ ________________________________ ________________________________
___ ________ ________________________________ ________________________________
___ ________ ________________________________ ________________________________
___ ________ ________________________________ ________________________________
___ ________ ________________________________ ________________________________
___ ________ ________________________________ ________________________________
___ ________ ________________________________ ________________________________
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___ ________ ________________________________ ________________________________
___ ________ ________________________________ ________________________________
******************************* Bottom of data ********************************
```

This table describes the fields on the ***releaseID* - Skeleton Variables** panel.

Field	Description
Command	Type one of the following commands with the appropriate parameter, or leave the command line blank and type a line command next to a release ID variable. LOCATE *variable* — Locate a variable. (Abbreviation: L) SAVE — Save changes on this panel. (Abbreviation: S) COPY *releaseID* — Copy an existing release ID variable list to this list. (Abbreviation: CO) REFRESH — Refresh the variable list from the package master. (Abbreviation: R) CANCEL — Cancel updates on this panel. (Abbreviation: CA)
Release id description	Type a description for this release ID.
Line Command	Type one of the following line commands. I Insert a line R Repeat a line D Delete a line
Variable	Type a variable name to be used in ISPF skeletons. Do not precede the name with ampersand (&) unless you intend for the ampersand to be part of the variable name.
Description	Type a description of the variable.
Value	Type a 1-32 character value for the variable. If you need a longer variable value, such as a long data set name, you can string two variables together in skeleton code.

3 On the ***releaseID* - Skeleton Variables** panel, type a **Release id description** and type information in the **Variable**, **Description**, and **Value** fields for each new variable.

4 Press **PF3** to save the new release ID.

Maintaining an Existing Release ID

Follow these steps to maintain an existing release ID.

1 On the **Maintain Release Id Variables** panel, press **Enter** to display the **Release Id List** panel (CMN3DSM1).

```
CMN3DSM1                        Release Id List                Row 1 to 1 of 1
Command ===> ____________________________________________________ Scroll ===> CSR

  Id   New  Changed          User     Description                    Request
_ V8R1 ____ 2015/02/24 00:58 USER015  Test Release number 1
****************************** Bottom of data ********************************
```

This table describes fields on the **Release Id List** panel.

Field	Description
Command	Type one of the following commands with appropriate parameters, or leave the command line blank and type a line command next to a release ID. LOCATE *releaseID* — Locate the specified release ID. (Abbreviation: L) SELECT *releaseID* — Select the specified release ID for edit. (Abbreviation: S) CLEAR *releaseID* — Clear the previous request for the specified release ID. (Abbreviation: CL) DELETE *releaseID* — Delete the specified release ID. REFRESH — Refresh the **Release Id List** panel from the package master. (Abbreviation: REF) RENAME *oldreleaseID newreleaseID* — Rename the specified old release Id to a specified new name (Abbreviation: REN) CANCEL — Cancel updates on this panel. (Abbreviation: CA)
Line Command	Type one of the following line commands. S Select a release ID for edit. R Rename the release ID to the new name specified in the **New** field. D Delete the release ID. C Clear the request made for this release ID.
Id	Displays the release ID
New	Type a new release ID name when the R line command or the RENAME command is used.
Changed	Displays the last date and time the release ID was changed.
User	Displays the TSO ID of the person who created the release ID or changed it last.
Description	Displays the release ID description.
Request	Displays the request made on this panel that will be processed when you exit from the panel. If you cancel these requests are not processed.

2 Using commands with parameters typed in the **Command** line, or using **line commands** types on a release ID row, specify the action required for each release ID and the press **Enter**. The requested action appears in the **Request** field on the **Release ID List** panel. Clear a request with the **CLEAR** command or the C line command.

3 When you are satisfied with the information in the Request column, press PF3 to exit the panel and execute the requests.

If you requested a **Select** for a release ID, the ***releaseID* - Skeleton Variables** panel is displayed when you exit. This table describes the fields on the ***releaseID* - Skeleton Variables** panel.

Field	Description
Command	Type one of the following commands with the appropriate parameter, or leave the command line blank and type a line command next to a release ID variable. LOCATE *variable* — Locate a variable. (Abbreviation: L) SAVE — Save changes on this panel. (Abbreviation: S) COPY *releaseID* — Copy an existing release ID variable list to this list. (Abbreviation: CO) REFRESH — Refresh the variable list from the package master. (Abbreviation: R) CANCEL — Cancel updates on this panel. (Abbreviation: CA)
Release id description	Type a description for this release ID.
Line Command	Type one of the following line commands. I Insert a line R Repeat a line D Delete a line
Variable	Type a variable name to be used in ISPF skeletons. Do not precede the name with ampersand (&) unless you intend for the ampersand to be part of the variable name.
Description	Type a description of the variable.
Value	Type a 1-32 character value for the variable. If you need a longer variable value, such as a long data set name, you can string two variables together in skeleton code.

4 On the ***releaseID* - Skeleton Variables** panel, make the additions and changes you want, then press **PF3** to save the updated release ID values.

Associating a Release ID with an Application

To make release ID variables available for file tailoring, you must associate the release ID with an application by specifying the release ID in Application Administration parameters.

Follow these steps to add a release ID to an application.

1 Display the ***application* Parameters - Part 1 of 3** panel by typing **=A.A.1** and pressing **Enter**. As an alternative, you can use the ChangeMan ZMF menu hierarchy to reach the panel:

a On the **Administration Options** panel, select Option **A Application**.

b On the **Update Application Administration Options** panel, input the application you want to modify, and select Option **1 Parms**.

The ***application*** **Parameters - Part 1 of 4** panel (CMNGLP01) is displayed.

```
CMNGLP01              ACTP Parameters - Part 1 of 4
Command ===> ____________________________________________________

Application description  . . . . ACTP Accounts Payable (Base ZMF)
Skeleton release id  . . . . . .  ____          (* for list)
Normal business hours: from  . .  0001
                         to  . .  2300
Audit level  . . . . . . . . . .  4             (0,1,2,3,4,5)
Checkout enforcement rule  . . .  1             (1,2,3)
Entity check if rule 2 . . . . .  ________
Staging restriction level  . . .  1             (1,2,3)
Entity check if level 2  . . . .  ________
Promotion/demotion rule  . . . .  0             (0,1,2,3,4)
Cmnaudrc entity check  . . . . .  ________
Audit package lock . . . . . . .  ALWAYS        (Always/Never/Optional)
Component unlock entity  . . . .  CMPULENT

Enter "/" to select option
  /  Allow temporary packages
  _  Disallow concurrent checkout
  _  Allow checkout to personal lib
  _  Overlay prior staged module
  _  Validate version during staging
```

2 Type a **release ID** in the **Optional Skeleton Release ID** field, or use ***** for a list to select from.

3 Repeatedly press **Enter** to cycle through all ***application*** **Parameters** panels until you are returned to the **Update Application Administration Options** panel.

Custom V01-V10 Variables

Custom variables V01 through V10 were added to ChangeMan ZMF early in its development so you can pass information from ISPF panels to skeleton file tailoring when file tailoring is performed in an address space that is different from your ChangeMan ZMF session.

Originally all file tailoring could be performed in your own ISPF ChangeMan ZMF session address space, but you could choose to have file tailoring performed in a separate address space for some functions so that your terminal can be released for other work. This choice is displayed on ChangeMan ZMF ISPF panels as an option for Batch processing.

In ChangeMan ZMF version 5 and later, file tailoring for some functions, such as building install JCL, is always performed in a separate address space. However, you can still use the Batch option for freeze to pass custom V01-V10 variable information to the skeleton file tailoring that builds install JCL.

Data in custom V01-V10 variables is not stored on the package master or the component master. You customize ChangeMan ZMF ISPF panels to add new fields, you assign values to custom V01-V10 variables, and you customize ChangeMan ZMF skeletons to use the custom V01-V10 variables to meet your needs.

Custom V01-V10 Field Names

Custom V01-V10 Variables have the same name on ISPF panels and in skeleton file tailoring.

There are a total of ten Custom V01-V10 fields. They are either 8 or 72 characters long.

Field Length	Count	Field Names on ISPF Panels	CMNEXITS Field Names (Package Master)	File Tailoring Variable Names
8	5	V01, V02, V03, V04, V05	Not applicable	Same as ISPF panels
72	5	V06, V07, V08, V09, V10	Not applicable	Same as ISPF panels

Using Custom V01-V10 Variables

When you assign a value to a V01-V10 variable in the panel that initiates the following functions, you can use that V01-V10 variable in logic in the skeleton that is file tailored.

- Batch checkout from baseline/promotion
- Batch checkout from package component list (copied forward at create package)
- Staging Versions panel imbedded in batch checkout
- Batch stage from development
- Batch mass stage
- Batch selective mass stage
- Batch recompile
- Batch mass recompile
- Batch selective mass recompile
- Relink
- Full and selective promote
- Full and selective demote

The **Save Previous Version** panel (CMNCMP03) displayed in batch checkout is a special case. This panel is not always displayed for batch checkout, so if it is not displayed, V01-V10 retain the values assigned on the **Checkout** panel (CMNCKOT1). If the **Save Previous Version** panel (CMNCMP03) is displayed, values assigned to V01-V10 replace values set on the **Checkout** panel (CMNCKOT1).

If you attempt to use variable names V01-V10 to pass values from ChangeMan ZMF panels to file tailoring performed in your ChangeMan ZMF session address space, your variable values might not be available to file tailoring. ChangeMan ZMF programs that initiate batch file tailoring clear the value of V01-V10 in the ChangeMan ZMF ISPF session before processing any panel information.

You cannot use values assigned to custom variables V01-V10 in file tailoring for any of the following functions:

- Freeze from Package List (F1 and F2 on CMNLIST3)

- Freeze Package List Options (F1 and F2 on CMNLIST5)
- Online freeze
- Batch freeze

Summary

The following tables summarizes the data that is presented in this chapter.

User Data Facility	Description	Data Entry	Data Stored
Package User Information	■ 71 fields per package ■ 1-72 character fields	2 ISPF package information panels provided for your customization	Package record
Staging User Options	■ 57 fields per component ■ 1-72 character fields	4 ISPF component staging panel provided for your customization *	Component record
Release ID Variables	■ 54 fields per release ID ■ 1 release ID per application ■ 32 characters in each field	Global Administration ISPF panel	Global record
Custom V01-V10 Variables	■ 10 fields ■ 8 and 72 character fields	You add to standard ISPF panels for batch processes	Not stored

Chapter 6

Utilities

This chapter describes utility programs used in ChangeMan ZMF batch processes. Use the information provided to modify the behavior of these utilities to provide custom ChangeMan ZMF functions that fit your requirements.

IMPORTANT! The utilities described in this chapter are stand-alone programs that run in batch jobs under z/OS with JCL. These utilities are not written to be called by other programs, REXX execs, or other macro language routines or scripts.

CMNBAHST - Initial History Record

Utility program CMNBAHST adds an initial component history record for a component in a baseline library that has never been checked out to a package and processed through a change package life cycle. This program also removes history for specified components.

Use this utility is when you first bring a library of components under ChangeMan ZMF control by adding the library as a baseline library in application administration. With CMNBAHST, you can set component information like language, compile procedure, compile parameters, binder options, and user options for members in the new baseline without checking out and staging the components.

You cannot add component history for a component that already has component history.

Program CMNBAHST connects to the ChangeMan ZMF instance specified in the SUBSYS execution parameter, and it updates the component master coded in the started procedure. When you run CMNBAHST, the ChangeMan ZMF instance must be running.

CMNBAHST Input

- Execution parameters in the program PARM statement
- Keyword parameters in the SYSIN DD statement
- Baseline libraries specified in application administration
- Component master specified in the started procedure JCL

Output

Updated component master

Sample JCL

Sample JCL is delivered in member CMNBAHST in the delivered CMNZMF CNTL library.

DD Statements

This table describes DD statements for program CMNBAHST.

DDNAME	I/O	Purpose
SER#PARM	Input	PDS(E) library containing information used to connect to the ChangeMan ZMF server through TCP/IP. This library must contain a member named #SERx, where x is the one-character subsystem ID of the ChangeMan ZMF instance.
SYSIN	Input	File containing 80-byte keyword parameter records.

PARM Options

The PARM parameter is required in the EXEC statement for CMMBAHST. This table describes CMMBAHST options that are input through the PARM parameter.

Parameter	Use	Description
SUBSYS=	Required	Specifies the one-character subsystem ID of the ChangeMan ZMF instance.
USER=	Required	Userid of the person or entity that executes CMNBAHST. A userid is required for CMNBAHST to connect to ChangeMan ZMF server programs. This userid is not used to determine security authorization.

SYSIN Parameters

Keyword parameters for program CMNBAHST that are input to SYSIN are described in comments in job CMNBAHST delivered in the CMNZMF CNTL library.

Additional notes:

- Records with * in the first position are considered comments.
- Blank records are skipped.
- Library types, languages, and compile procedures specified in keyword parameters are validated against definitions in global administration. If the validation fails, processing for the component is skipped.

Return Codes and Error Messages

Return codes for program CMNBAHST are described in comments in job CMNBAHST delivered in the CMNZMF CNTL library.

Program messages are written to SYSPRINT for step HISTORY.

Reporting

Program results are written to SYSPRINT for step HISTORY.

CMNBAQ00 - Prepare Input for the IBM BAQLS2JS Utility

The CMNBAQ00 utility is used to prepare the input to the IBM BAQLS2JS utility. z/OS Connect and the four skeletons that call utility program CMNBAQ00 to develop and manage the components needed to support CICS web services, as well as the parameters they pass to CMNBAQ00, are described in detail in "Exposing Mainframe Resources to Web and Desktop Applications" on page 41.

CMNBAT90 - Register Build Output Modules

CMNBAT90 creates transactions for CMNBATCH with information about build output PDS components. CMNBATCH processes these transactions to register the generated components in the package master. CMNBAT90 is included in build procedures for stage, recompile, and relink.

NOTE CMNBAT90 is not used in build procedures for components stored in zFS directories.

If a build output PDS component is a true load module created by the binder (link edit), CMNBAT90 collects additional information for CMNBATCH transactions:

- Subprogram-to-load relationships imbedded in statically linked composite load modules
- Information about statically linked subprograms that were not created in this build process

CMNBAT90 has two methods for analyzing the structure of a composite load module:

- Scan the SYSPRINT listing from the binder - This is the default method and the most accurate. The binder must be executed with the MAP and LIST options to generate binder listing information that is required for CMNBAT90.
- Scan the members in the load library output from the binder. - This is a legacy method, which works well in many cases. However, the binder listing scan method was added because of exceptions discussed in "CMNBAT90 Notes" on page 121.

Unless otherwise indicated by the BINDLIST= execution parameter, CMNBAT90 attempts to use the binder listing scan to analyze the structure of load modules. If this method is not successful, CMNBAT90 automatically changes to the load library scan. Either method can be forced with the BINDLIST= execution parameter.

CMNBAT90 Input

- Program execution parameters
- Keyword SYSIN statements
- Binder listing
- Load library concatenation matching the SYSLIB concatenation in the binder step
- Library containing build output components

Output

- Transactions for program CMNBATCH
- List of the input keyword statements
- Program messages

Sample JCL

This build job JCL fragment, which was file tailored from skeleton CMN$$PDB, shows a CMNBAT90 step that creates CMNBATCH transactions to register a DBRM in the package master.

```
//BT90DBR EXEC PGM=CMNBAT90, *** RECORD DBR NAMES
//             COND=(4,LT),
//             PARM='BINDLIST=XLMOD'
//SYSPRINT DD DISP=(,PASS),DSN=&&LIST21D1,
//            UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//            DCB=(RECFM=FBM,LRECL=133,BLKSIZE=0)
//BAT90IN  DD DISP=(OLD,PASS),DSN=&&DBRMLIB
//BAT90OUT DD DISP=(MOD,PASS),DSN=&&BAT90CTL,
//            UNIT=SYSDA,SPACE=(CYL,(2,1)),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=0)
//SYSIN    DD *
PKG=ACTP000041
SLT=SRC
SNM=ACPSRCD1
SID=USER015
SSI=67B2BC9B
LNG=COBOL2
PRC=CMNCOB2
LLT=DBR
SUP=YES
//SYSUDUMP DD SYSOUT=*
//ABNLIGNR DD DUMMY
```

This build job JCL fragment, which was file tailored from skeleton CMN$$LNK, shows a CMNBAT90 step that creates CMNBATCH transactions to register a composite load module in the package master.

```
//BT90LOD EXEC PGM=CMNBAT90, *** RECORD LOD NAMES
//             COND=(4,LT)
//SYSPRINT DD  DISP=(,PASS),DSN=&&LIST51L1,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FBM,LRECL=133,BLKSIZE=0)
//BAT90IN  DD  DISP=(OLD,PASS),DSN=&&LOAD
//BAT90OUT DD  DISP=(MOD,PASS),DSN=&&BAT90CTL,
//             UNIT=SYSDA,SPACE=(CYL,(2,1)),
//             DCB=(RECFM=FB,LRECL=80,BLKSIZE=0)
//BAT90LST DD  DISP=(OLD,PASS),DSN=&&LIST50L1
//BAT90WRK DD  DISP=(,DELETE),DSN=&&BAT90WRK,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FBA,LRECL=121,BLKSIZE=0)
//*)IM CMN$$SYL
//BAT90LIB DD  DISP=SHR,DSN=CMNTP.S6.ACTP.STG6.#000038.LOD
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.PROM.S6P1IT.LOD
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.OBJ
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.LOS
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.LOD
//         DD  DISP=SHR,DSN=CEE.SCEELKED
//*)IM CMN$$SYL END
//* ADDITIONAL SYSIN CONTROL CARDS BELOW COME FROM IMBED OF CMN$$ILC
//SYSIN    DD  *
PKG=ACTP000038
SLT=LOS
SNM=ACPSRS00
SID=USER015
SSI=67BCF0C2
LNG=COBOL2
PRC=CMNCOB2
RLK=YES
SUP=NO
LLT=LOD
```

```
SLB=ACTPLODCMNTP.S6.ACTP.STG6.#000038.LOD
SLB=ACTPLODCMNTP.S6.V810.PROM.S6P1IT.LOD
SLB=ACTPOBJCMNTP.S6.V810.BASE.ACTP.OBJ
SLB=ACTPLOSCMNTP.S6.V810.BASE.ACTP.LOS
SLB=ACTPLODCMNTP.S6.V810.BASE.ACTP.LOD
ILB=ACTPLOSCMNTP.S6.V810.BASE.ACTP.LOS
//SYSUDUMP DD  SYSOUT=*
//ABNLIGNR DD DUMMY
```

DD Statements

This table describes DD statements for CMNBAT90.

DDNAME	I/O	Purpose
SYSIN	Input	80-byte keyword statements with information for the CMNBATCH transactions
BAT90IN	Input	Library containing the build output components to be registered in the package master.
BAT90WRK	I/O	Temporary CMNBAT90 work data set
BAT90LST	Input	SYSPRINT list from the binder step **Note:** BAT90LST is only required for the binder listing scan method of analyzing load modules.
BAT90LIB	Input	Load library concatenation that matches the SYSLIB concatenation in the binder step **Note:** BAT90LIB is only required for the load module scan method of analyzing load modules. CMNBAT90 searches this library concatenation to determine the library where each statically linked subprogram originated.
BAT90OUT	Output	Transaction records for input to CMNBATCH
SYSPRINT	Output	List of SYSIN keyword statements, program messages

Program Execution Parameters

The PARM= statement is not required for program CMNBAT90. This table describes execution parameters that may be used with program CMNBAT90.

Parameter	Use	Description
BINDLIST=	Optional	Force the behavior of CMNBAT90 for analyzing build output for statically linked subprograms. Valid values: XLMOD Suppress load module analysis. Use this option when the build output members at DDname BAT90IN are either non-load modules, or load modules that cannot contain statically linked subprograms, like BMS MAP load or IMS MFS load. Abbreviation: X YES Scan the binder listing at the BAT90LST DD statement for statically linked subprograms. NO Scan every load module in the library at the BAT90IN DD statement for statically linked subprograms. If the BINDLIST execution parameter is omitted, then CMNBAT90: 1 Assumes that the library at DDname BAT90IN contains load modules that may contain statically linked subprograms. 2 Opens DDname BAT90LST to scan the binder listing for statically linked subprograms. If that fails, then CMNBAT90... 3 Scans load modules in the library at DDname BAT90IN for statically linked subprograms.

SYSIN Keyword Statements

CMNBAT90 keyword statements are input to the program through the SYSIN ddname. Format rules include:

- Keyword options must start in position 1
- Comment records are designated by * in position 1
- Blank SYSIN records are permitted

This table describes the keyword statements for CMNBAT90.

Option	Use	Description
* in position 1	Optional	Comment.
PKG=	Required	Package name (10 characters)
SLT=	Required	Input library type (like-source library type for stage and recompile, like-NCAL library type for relink)
SNM=	Required	Input member name (like-source member name for stage and recompile, link edit control member name for relink)
SID=	Required	Stage user's userid
SSI=	Required	SETSSI for the new load module
LNG=	Required	Language name
PRC=	Required	Compile procedure
RLK=	Optional	RLK=YES indicates that the build is a recompile or relink. Omitting this keyword indicates that the build is a stage job.

Option	Use	Description
SUP=	Optional	YES Suppress the component activation messages issued by a stage job. NO Issue a component activation messages from a stage job. Value is always NO for recompile or relink.
LLT=	Required	Target load library type
SLB=	Required	Binder SYSLIB library data set information. The data for this keyword is a string of made up of the following: **Char Data** 4 Application 3 Library type 44 Data set name 8 ERO origin of this library - Values: Staging Package staging library Baseline Application baseline library Current ERO current release Prior ERO prior release 8 ERO Release 8 ERO release area **Note:** SLB keyword statements are created by skeleton CMN$$ILC using the same ISPF tables and selection logic as CMN$$SYL uses to create the SYSLIB library concatenation for the binder and for CMNBAT90. If you customize CMN$$SYL, then you must customize skeleton CMN$$ILC in a parallel manner.
ILB=	Required	Binder INCLIB library data set information. The data for this keyword is a string of made up of the following: **Char Data** 4 Application 3 Library type 44 Data set name 8 ERO origin of this library - Values: Staging Package staging library Baseline Application baseline library Current ERO current release Prior ERO prior release 8 ERO Release 8 ERO release area **Note:** ILB keyword statements are created by skeleton CMN$$ILC using the same ISPF tables and selection logic as CMN$$ILL uses to create the INCLIB library concatenation for the binder. If you customize CMN$$ILL, then you must customize CMN$$ILC in a parallel manner.

Return Codes and Error Messages

This table describes program return codes for CMNBAT90.

Return Code	Description
0	Successful execution
4	CMNBAT90 finished, but the scan method was changed or the relationship analysis was incomplete; see messages at the SYSPRINT DD statement.
8	CMNBAT90 failed; see messages at the SYSPRINT DD statement.
12	System error; see messages

NOTE CMNBAT90 always sets RC=4 for build output components that were not created by the binder. For these components, execution parameter BINDLIST=NO suppresses message CMN4574A but not message CMN4575A.

Program messages are documented in the *ChangeMan ZMF Messages* manual.

Reporting

Program CMNBAT90 lists input keyword statements in a report at the SYSPRINT DD statement. This is an example of the report.

```
ChangeMan(R) ZMF      CMNBATCH - 8.1.0  2015/02/24  22:21:07
Attempting to initiate dialog with ChangeMan ZMF subtask
Session established with ChangeMan ZMF subtask
SYSIN: ACTP000038 90 RTP=ILOD
SYSIN: ACTP000038 90 SLT=LOS
SYSIN: ACTP000038 90 SNM=ACPSRS00
SYSIN: ACTP000038 90 SID=USER015
SYSIN: ACTP000038 90 SSI=67BCF0C2
SYSIN: ACTP000038 90 LNG=COBOL2
SYSIN: ACTP000038 90 PRC=CMNCOB2
SYSIN: ACTP000038 90 RLK=Y
SYSIN: ACTP000038 90 LLT=LST
SYSIN: ACTP000038 90 LNM=ACPSRS00
Component ACPSRS00 is in ACTIVE status and the package master
 LOAD record has been updated accordingly.                  ACTP000038
 LOAD COMPONENT ACTIVATED.                                  ACTP000038
 LOAD COMPONENT ACTIVATION LOGGED.                          ACTP000038
 HISTORY RECORD has been updated accordingly.               ACTP000038
SYSIN: ACTP000038 90 CID=
END OF DATA ON SYSIN - TERMINATING
Session terminated with ChangeMan ZMF started task
```

CMNBAT90 Notes

1 Best results are obtained when CMNBAT90 can scan the binder listing to obtain the name of the library that provided each statically linked subprogram. This is the default behavior of CMNBAT90.

2 The binder must be run with options LIST and MAP for the binder listing to display the information needed by CMNBAT90. If binder options LIST and MAP, are not used,

CMNBAT90 displays message CMN4581A in SYSPRINT, the step return code is set to RC=4, and the load module scan is performed instead of the binder listing scan.

3 When CMNBAT90 must analyze a load module to obtain information about statically linked subprograms, that information will be incomplete if any of the following are true:

- The library concatenation at the BAT90LIB DD statement does not exactly match the concatenation at the SYSLIB DD statement in the binder step.
- INCLUDE link edit control statements are used to statically link application object modules or load modules from libraries that are not in the concatenation at the BAT90LIB DD statement. Example:

```
INCLUDE INCLIB(subpgm1)
INCLUDE PRODLIB(subpgm2)
```

- The contents of multiple load libraries are combined using a skeleton like CMN$$XPL to get around the limit of 128 extents in the binder SYSLIB DD statement.

4 There must be an SLB= or ILB= SYSIN keyword statement for each ZMF managed library in the link edit SYSLIB and INCLIB concatenations. If you use INCLUDE link edit control statements that reference a different DDname, you must add an ILB= keyword statement for each ZMF managed library in the concatenation under that DDname. See "SLB and ILB Keyword Statements" below.

5 Statically linked PL/I subprograms are discovered more accurately using BINDLIST=YES. Specifically, PL/I subprograms that have not been cycled through ZMF and do not have ChangeMan ZMF format IDR data will be recognized successfully only if you use BINDLIST=YES.

6 CMNBAT90 is not used to create CMNBATCH transactions for compressed listings created in build jobs. CMNBATCH transactions for LST components are generated in file tailoring for skeleton CMN$$PCP.

SLB and ILB Keyword Statements

To correctly build CMNBATCH transactions for package master relationship records, CMNBAT90 must find the application and library type for each statically linked subprogram that the binder (linkage editor) obtains from a ZMF managed library.

CMNBAT90 uses the following process to get the application and library type for statically linked subprograms.

1 Skeleton CMN$$ILC constructs SLB= and ILB= keyword statements for input to CMNBAT90. These records contain a library name and the corresponding application and library type. See "SLB=" on page 120 and "ILB=" on page 120 for the record formats.

- For every ZMF managed library in the link edit SYSLIB concatenation, CMN$$ILC constructs an SLB= statement. The CMN$$ILC logic that builds SLB= statements is the same as the logic in CMN$$SYC that builds the SYSLIB concatenation.
- For every ZMF managed library in the link edit INCLIB concatenation for relink, CMN$$ILC constructs an ILB= statement. See "INCLIB and CMNSSIDN" on page 173 for information about INCLIB. The CMN$$ILC logic that builds ILB= statements is the same as the logic in CMN$$ILL that builds the INCLIB concatenation.

2 CMNBAT90 finds the name of the library that provided each statically linked subprogram to the linkage editor by either:

- Analyzing the binder listing (preferred), or by...
- Searching the library concatenation at the BAT90LIB DD statement, which is built by skeleton CMN$$SYL and should mirror the SYSLIB concatenation in the link edit step.

3 CMNBAT90 uses the name of the library where a statically linked subprogram originated to get the application and library type for the subprogram from SLB= and ILB= information.

IMPORTANT!

- If you customize the concatenation of ZMF managed libraries in the SYSLIB DD statement, either by customizing skeleton CMN$$SYL logic or by hard coding ZMF libraries, you must customize CMN$$ILC in the same manner.
- If you customize the concatenation of ZMF managed libraries in the INCLIB DD statement for relink, either by customizing skeleton CMN$$ILL logic or by hard coding ZMF libraries, you must customize CMN$$ILC in the same manner.
- If your link edit control statements refer to other DD names, you must manually code an ILB= statement for each library concatenated at that DD statement. Example:

```
INCLUDE ACTRLIB(ACRSCN00)

//ACTRLIB   DD DISP=SHR,DSN=CMNTP.S4.V711.BASE.ACTR.LCN

ILB=ACTRLCNCMNTP.S4.V711.BASE.ACTR.LCN
```

CMNBAT90 Example - Composite Load Module

The example in this section shows input and output for CMNBAT90 from a relink job for composite load module ACPSRC50 that contains statically linked subprograms ACPSRS5A, ACPSRS5B, ACPSRS5C, and ACPSRS00.

Binder and CMNBAT90 JCL

This JCL fragment shows job steps for the binder and for CMNBAT90 that were file tailored from ISPF skeleton CMN$$LNK. Notice the temporary files for the binder listing and the library containing the link edited load module that are passed from the binder to CMNBAT90. This JCL fragment also shows matching libraries in:

- Load library concatenation at the SYSLIB DD statement for the binder at the LINK step
- Load library concatenation at the BAT90LIB DD statement for CMNBAT90
- SLB= keyword statements in the SYSIN DD statement for CMNBAT90

In the same way, INCLIB concatenations match ILB keyword statements.

```
//LNK     EXEC PGM=IEWL,       *** LINK-EDIT COMPONENT ACPSRS00
//             COND=(4,LT),
//             PARM=('LIST,XREF,MAP,RENT',
//             '')
//SYSPRINT DD  DISP=(,PASS),DSN=&&LIST50L1,
```

```
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FBA,LRECL=121,BLKSIZE=0)
//SYSUT1   DD  UNIT=SYSDA,SPACE=(CYL,(5,5))
//*)IM CMN$$OBL
//*)IM CMN$$SYL
//SYSLIB   DD  DISP=SHR,DSN=CMNTP.S6.ACTP.STG6.#000038.LOD
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.PROM.S6P1IT.LOD
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.OBJ
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.LOS
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.LOD
//         DD  DISP=SHR,DSN=CEE.SCEELKED
//*)IM CMN$$SYL END
//*)IM CMN$$ILL
//INCLIB   DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.LOS
//SYSLMOD  DD  DISP=(OLD,PASS),DSN=&&LOAD
//SYSLIN   DD  DISP=(OLD,DELETE),DSN=&&NULLIN
//         DD  DISP=(OLD,PASS),DSN=&&LCT
//*)IM CMN$$CND
//*
//BT90LOD EXEC PGM=CMNBAT90, *** RECORD LOD NAMES
//             COND=(4,LT)
//SYSPRINT DD  DISP=(,PASS),DSN=&&LIST51L1,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FBM,LRECL=133,BLKSIZE=0)
//BAT90IN  DD  DISP=(OLD,PASS),DSN=&&LOAD
//BAT90OUT DD  DISP=(MOD,PASS),DSN=&&BAT90CTL,
//             UNIT=SYSDA,SPACE=(CYL,(2,1)),
//             DCB=(RECFM=FB,LRECL=80,BLKSIZE=0)
//BAT90LST DD  DISP=(OLD,PASS),DSN=&&LIST50L1
//BAT90WRK DD  DISP=(,DELETE),DSN=&&BAT90WRK,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FBA,LRECL=121,BLKSIZE=0)
//*)IM CMN$$SYL
//BAT90LIB DD  DISP=SHR,DSN=CMNTP.S6.ACTP.STG6.#000038.LOD
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.PROM.S6P1IT.LOD
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.OBJ
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.LOS
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.LOD
//         DD  DISP=SHR,DSN=CEE.SCEELKED
//*)IM CMN$$SYL END
//* ADDITIONAL SYSIN CONTROL CARDS BELOW COME FROM IMBED OF CMN$$ILC
//SYSIN    DD  *
PKG=ACTP000038
SLT=LOS
SNM=ACPSRS00
SID=USER015
SSI=67BCF0C2
LNG=COBOL2
PRC=CMNCOB2
RLK=YES
SUP=NO
LLT=LOD
SLB=ACTPLODCMNTP.S6.ACTP.STG6.#000038.LOD
SLB=ACTPLODCMNTP.S6.V810.PROM.S6P1IT.LOD
SLB=ACTPOBJCMNTP.S6.V810.BASE.ACTP.OBJ
SLB=ACTPLOSCMNTP.S6.V810.BASE.ACTP.LOS
SLB=ACTPLODCMNTP.S6.V810.BASE.ACTP.LOD
ILB=ACTPLOSCMNTP.S6.V810.BASE.ACTP.LOS
//SYSUDUMP DD  SYSOUT=*
//ABNLIGNR DD  DUMMY
//*)IM CMN$$CND
//*)IM CMN$$PAS
//CPYLOD  EXEC PGM=SERCOPY,    *** COPY TO LOD STAGING LIB
//             REGION=3M,
//             COND=(4,LT),
//             PARM=('RETRY,REALLOC',
//             'OUTDSN(CMNTP.S6.ACTP.STG6.#000038.LOD)')
```

```
//SYSPRINT DD  DISP=(,PASS),DSN=&&LIST1001,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FBM,LRECL=121,BLKSIZE=0)
//SYSUT1   DD  DISP=(OLD,DELETE),DSN=&&LOAD
//SYSUDUMP DD  SYSOUT=*
//ABNLIGNR DD  DUMMY
```

SYSPRINT Report of Keyword Input

This is an extract from the compressed listing for the relink job showing the SYSPRINT report of CMNBAT90 keyword input.

```
*******************************************************************************
* DDNAME: BT90LOD.SYSPRINT                                                    *
*******************************************************************************

ChangeMan(R) ZMF      CMNBAT90 - 8.1.0  TUESDAY FEBRUARY 24, 2015  22:21:02
SYSIN: PKG=ACTP000038
SYSIN: SLT=LOS
SYSIN: SNM=ACPSRS00
SYSIN: SID=USER015
SYSIN: SSI=67BCF0C2
SYSIN: LNG=COBOL2
SYSIN: PRC=CMNCOB2
SYSIN: RLK=YES
SYSIN: SUP=NO
SYSIN: LLT=LOD
SYSIN: SLB=ACTPLODCMNTP.S6.ACTP.STG6.#000038.LOD
SYSIN: SLB=ACTPLODCMNTP.S6.V810.PROM.S6P1IT.LOD
SYSIN: SLB=ACTPOBJCMNTP.S6.V810.BASE.ACTP.OBJ
SYSIN: SLB=ACTPLOSCMNTP.S6.V810.BASE.ACTP.LOS
SYSIN: SLB=ACTPLODCMNTP.S6.V810.BASE.ACTP.LOD
SYSIN: ILB=ACTPLOSCMNTP.S6.V810.BASE.ACTP.LOS
CMN5400I - Time of day at end of job: 22:21:03 - Condition Code on exit: 00
```

IEBGENER of Transactions for CMNBATCH

This is a listing of the component registration transactions created by CMNBAT90 for processing by CMNBATCH. Hex values display as blanks here, but notice the CID= transactions that provide information about subprogram load modules that were not created in this relink job. This information is recorded in subprogram-to-load relationship records in the package master.

```
ACTP    !     RTP=ILOD
ACTP    !     SLT=LOS
ACTP    !     SNM=ACPSRC50
ACTP    !     SID=USER239
ACTP    !     SSI=5F4E19A9
ACTP    !     PRC=CMNCOB2
ACTP    !     RLK=YES
ACTP    !     LLT=LOD
ACTP    !     SUP=NO
ACTP    !     LNM=ACPSRC50
ACTP    !     CID=ACPSRS5A 5F0EF2BC ACTP000034 ACTP LOS I
ACTP    !     CID=ACPSRS5B 5F0EEC33 ACTP000031 ACTP LOS I
ACTP    !     CID=ACPSRS5C 5F0EEC32 ACTP000031 ACTP LOS I
ACTP    !     CID=ACPSRS00 5F0EEC28 ACTP000031 ACTP LOS I
ACTP    !     CID=
```

CMNBILOD - Verify that an ILOD record does not already exist

Utility program CMNBILOD is used to verify that an ILOD record does not already exist for a component.

When a SRC component build is requested, all existing 'ILOD' (i.e. SRC-LOD relationship) records associated with that SRC are deleted from the package master metadata. When program CMNBILOD executes within the staging job it checks that there are still no ILOD records. If none are found, the build job is allowed to proceed and the component can be activated in the expected manner.

If program CMNBILOD finds that ILOD records do exist, however, it will stop the stage job completing with a message like

Out of sync situation: component tied to DB2TST1.DBR

This is primarily to prevent any 'orphan' ILOD records being allowed to slip through unnoticed and to potentially allow unwanted components to make it into baseline or production libraries.

This means that any prior build job submitted for a SRC component must either be completed, or cancelled prior to execution, before a subsequent build job is submitted.

NOTE See the description below for return code 8, this is signifying that the load/target component is already linked to another component. Build jobs must complete before the next build job is started for the same component. If you have two build jobs running at the same time, the second build job will complete with a return code of 8, with an out of synch situation encountered. To resolve the return code 8, start the submit process again for the component.

Program Execution Parameters

The PARM= statement is required for program CMNBILOD. This table describes execution parameters that are used with program CMNBILOD:

Parameter	Use	Description
SUBSYS=	Optional	Specifies ChangeMan subsystem, default is blank.
USER=	Required	TSO ID to use to connect.

DD Statements

This table describes DD statements for CMNBILOD.

DDNAME	I/O	Purpose
SYSIN	Input	Required. Component information PKN=package name, LNM=component type, LTP=component type.
SYSPRINT	Output	Program messages.

Return Codes and Error Messages

This table describes program return codes for CMNBILOD

Return Code	Description
00	Successful execution.
04	An application error has ocurred.
06	Started task inactive or a connection error.
08	Load/target component already linked to another component.

CMNBKRST - VSAM MASTER UNLOAD, RECOVER, LOAD

Utility program CMNBKRST performs the following three functions the ChangeMan ZMF VSAM package master, component master, and long name component master VSAM KSDS files:

- **Unload** (backup) - The records in the VSAM KSDS files are written to separate QSAM files. In each output file, CMNBKRST writes a header record with the date/time that the file is created.
- **Forward Recovery** - The records in the three QSAM unload files are written to initialized VSAM KSDS files. Forward recovery records in a sequential copy of the CMNRECV file are written to the appropriate VSAM file if the record time/date is more recent than the QSAM unload file header date/time.
- **Load** (restore) - The forward recovery function is executed. However, if no forward recovery records are input to CMNBKRST, or if there are no recovery records that are more recent than the date/time in the QSAM unload file headers, then no forward recovery records are applied, and the operation is effectively a VSAM file load.

Program Execution Parameters

The PARM= statement is always required for program CMNBKRST, and it must have a value. This table describes execution parameters that may be used and the program functions invoked by each.

PARM=	Function	Description
BACKUP	Unload	Tells CMNBKRST to perform the unload function
RESTORE	Forward recovery	Tells CMNBKRST to perform the forward recovery function.
	Load	Tells CMNBKRST to perform the forward recovery function. However, if no forward recovery records are input to CMNBKRST, or if there are no recovery records that are more recent than the date/time in the QSAM unload file headers, then no forward recovery records are applied, and the forward recovery is effectively a VSAM file load.

CMNBKRST Input and Output

This table shows the inputs and outputs for the three functions performed by CMNBKRST.

PARM= (Function)	Input	Output
BACKUP (Unload)	■ Program execution parameter ■ VSAM KSDS package master ■ VSAM KSDS component master ■ VSAM KSDS short name component master	■ QSAM unload package master ■ QSAM unload component master ■ QSAM unload long name component master ■ SYSPRINT report
RESTORE (Forward Recovery)	■ Program execution parameter ■ QSAM forward recovery file ■ QSAM unload package master ■ QSAM unload component master ■ QSAM unload long name component master	■ VSAM KSDS package master ■ VSAM KSDS component master ■ VSAM KSDS short name component master ■ SYSPRINT report
RESTORE (Load)	■ Program execution parameter ■ QSAM unload package master ■ QSAM unload component master ■ QSAM unload long name component master	■ VSAM KSDS package master ■ VSAM KSDS component master ■ VSAM KSDS short name component master ■ SYSPRINT report

Sample JCL

This sample JCL executes the unload (backup) function of CMNBKRST for the package master, the component master, and the long name component master. There is a sample named BACKUP in the distributed CNTL library, step named BACKUP.

```
//BACKUP  EXEC PGM=CMNBKRST,   *** BACKUP VSAM MASTER FILES
//             REGION=4M,
//             PARM=BACKUP
//SYSPRINT  DD SYSOUT=*
//SYSUDUMP  DD SYSOUT=*
//CMNPMAST  DD DISP=SHR,DSN=CMNTP.S6.V810.CMNZMF.CMNPMAST
//CMNCMPNT  DD DISP=SHR,DSN=CMNTP.S6.V810.CMNZMF.CMNCMPNT
//CMNCMPNL  DD DISP=SHR,DSN=CMNTP.S6.V810.CMNZMF.CMNCMPNL
//CMNPQSAM  DD DISP=(,CATLG),
//             DSN=CMNTP.S6.V810.BACKUP.CMNPMAST(+1),
//             UNIT=SYSDA,SPACE=(CYL,(1,1),RLSE),
//             DCB=(RECFM=VB,LRECL=5000,BLKSIZE=0)
//CMNCSQSM  DD DISP=(,CATLG),
//             DSN=CMNTP.S6.V810.BACKUP.CMNCMPNT(+1),
//             UNIT=SYSDA,SPACE=(CYL,(1,1),RLSE),
//             DCB=(RECFM=VB,LRECL=5000,BLKSIZE=0)
//CMNCLQSM  DD DISP=(,CATLG),
//             DSN=CMNTP.S6.V810.BACKUP.CMNCMPNL(+1),
//             UNIT=SYSDA,SPACE=(CYL,(1,1),RLSE),
//             DCB=(RECFM=VB,LRECL=5000,BLKSIZE=0)
```

This sample JCL executes the forward recovery or load (restore) function of CMNBKRST for the package master, the component master, and the long name component master.

```
//BKRST   EXEC PGM=CMNBKRST,   *** RESTORE MASTER FILES FROM LATEST
//             REGION=4M,COND=(4,LT),      BACKUP AND APPLY CHANGES
//             PARM=RESTORE
//SYSPRINT  DD SYSOUT=*
```

```
//SYSUDUMP  DD SYSOUT=*
//CMNPMAST  DD DISP=SHR,DSN=CMNTP.S6.V810.CMNZMF.CMNPMAST
//CMNCMPNT  DD DISP=SHR,DSN=CMNTP.S6.V810.CMNZMF.CMNCMPNT
//CMNCMPNL  DD DISP=SHR,DSN=CMNTP.S6.V810.CMNZMF.CMNCMPNL
//CMNPQSAM  DD DISP=SHR,DSN=CMNTP.S6.V810.BACKUP.CMNPMAST(0)
//CMNCSQSM  DD DISP=SHR,DSN=CMNTP.S6.V810.BACKUP.CMNCMPNT(0)
//CMNCLQSM  DD DISP=SHR,DSN=CMNTP.S6.V810.BACKUP.CMNCMPNL(0)
//CMNRQSAM  DD DISP=(OLD,DELETE),DSN=&&RECV
//*  Add additional recovery datasets from CLEARRCV as needed
//SORTSTAT  DD SYSOUT=*
//SYSOUT    DD SYSOUT=*
//SORTWK01  DD UNIT=SYSDA,SPACE=(CYL,10)
//SORTWK02  DD UNIT=SYSDA,SPACE=(CYL,10)
//SORTWK03  DD UNIT=SYSDA,SPACE=(CYL,10)
//SORTWK04  DD UNIT=SYSDA,SPACE=(CYL,10)
```

DD Statements

This table describes DD statements for CMNBKRST.

DDNAME	I/O	Purpose
CMNPMAST	*	Package master VSAM KSDS
CMNCMPNT	*	Component master VSAM KSDS
CMNCMPNL	*	Long name component master VSAM KSDS
CMNPQSAM	*	Package master QSAM unload file
CMNCSQSM	*	Component master QSAM unload file
CMNCLQSM	*	Long name component master QSAM unload file
CMNRQSAM	Input	QSAM copy of forward recovery CMNRECV VSAM file
SYSPRINT	Output	CMNBKRST record count report

* See "CMNBKRST Input and Output" on page 128.

SYSIN Keyword Statements

There are no SYSIN keyword parameters for CMNBKRST.

Return Codes, Completion Codes, and Error Messages

When CMNBKRST encounters a problem:

- Diagnostic messages are displayed in the SYSPRINT data set.
- If an error condition would result in a return code of 8 or greater:
  - CMNBKRST forces an abend.
  - The return code is displayed in the USER COMPLETION CODE.
  - This message is displayed on the operator console (WTO): UNACCEPTABLE RETURN CODE - ABEND.

IMPORTANT! Always check messages in SYSOUT for the CMNBKRST job step, especially if CMNBKRST abends.

This table describes program return codes for CMNBKRST.

Return Code	Description
0	Successful execution
4	CMNBKRST finished, but an abnormal condition was encountered; see SYSOUT
8-16	Fatal error; see SYSPRINT.

CMNBKRST issues no numbered messages, so there are no CMNBKRST messages in the *ChangeMan ZMF Messages* manual.

Reporting

Program CMNBKRST lists record counts in a report at the SYSPRINT DD statement.

NOTE Record counts for QSAM unload files do not include the header created by CMNBKRST.

This is an example of the report when CMNBKRST is run with PARM=BACKUP.

```
CMNBKRST - EXECUTION BEGINS: 2013/06/01  20:05:55
           FUNCTION: BACKUP
           INPUT PACKAGE MASTERS:                      0003007
           OUTPUT PACKAGE MASTERS:                     0003007
           INPUT SHORT NAME COMPONENT MASTERS:         0001134
           OUTPUT SHORT NAME COMPONENT MASTERS:        0001134
           INPUT LONG NAME COMPONENT MASTERS:          0000000
           OUTPUT LONG NAME COMPONENT MASTERS:         0000000
           END OF JOB; RC=0000
```

This is an example of the report when CMNBKRST is run with PARM=RESTORE, but no forward recovery records are input.

```
CMNBKRST - EXECUTION BEGINS: 2013/06/01  20:57:29
           FUNCTION: RESTORE
           PACKAGE MASTER BACKUP TAKEN:                20130601/20402449
           SHORT NAME COMPONENT MASTER BACKUP TAKEN:   20130601/20402449
           LONG NAME COMPONENT MASTER BACKUP TAKEN:    20130601/20402449
           INPUT RECOVERY RECORDS:                     0000000
           INPUT PACKAGE MASTERS:                      0003007
           OUTPUT PACKAGE MASTERS:                     0003007
           INPUT SHORT NAME COMPONENT MASTERS:         0001134
           OUTPUT SHORT NAME COMPONENT MASTERS:        0001134
           INPUT LONG NAME COMPONENT MASTERS:          0000000
           OUTPUT LONG NAME COMPONENT MASTERS:         0000000
           END OF JOB; RC=0000
```

This is an example of the report when CMNBKRST is run with PARM=RESTORE, and forward recovery records are input and applied.

```
CMNBKRST - EXECUTION BEGINS: 2013/06/01  20:32:05
           FUNCTION: RESTORE
           PACKAGE MASTER BACKUP TAKEN:               20130601/19535684
           SHORT NAME COMPONENT MASTER BACKUP TAKEN:  20130601/19535684
           LONG NAME COMPONENT MASTER BACKUP TAKEN:   20130601/19535684
           INPUT RECOVERY RECORDS:                    0001169
           INPUT PACKAGE MASTERS:                     0002993
           OUTPUT PACKAGE MASTERS:                    0003007
           PACKAGE RECOVERY RECORDS USED:             0000073
           INPUT SHORT NAME COMPONENT MASTERS:        0001130
           OUTPUT SHORT NAME COMPONENT MASTERS:       0001134
           SHORT NAME CMPNT RECOVERY RECORDS USED:    0000012
           INPUT LONG NAME COMPONENT MASTERS:         0000000
           OUTPUT LONG NAME COMPONENT MASTERS:        0000000
           LONG NAME CMPNT RECOVERY RECORDS USED:     0000000
           END OF JOB; RC=0000
```

CMNBKRST Notes

1 There are situations where you can use IDCAMS in place of CMNBKRST to unload and load the three ChangeMan ZMF VSAM KSDS master files. For example, housekeeping jobs to reorganize the VSAM files can use IDCAMS. However, IDCAMS backups cannot be used for forward recovery, so periodic "backups" of the package master, component master, and long name component master should always use CMNBKRST instead of IDCAMS.

2 It is important to keep package and component data synchronized, so you should unload, forward recover, and load the three VSAM files as a set.

However, CMNBKRST skips processing for a file if you code DUMMY in the input and output DD statements for the file. This sample JCL unloads only the long name component master VSAM file.

```
//BACKUP  EXEC PGM=CMNBKRST,   *** BACKUP VSAM MASTER FILES
//             REGION=4M,
//             PARM=BACKUP
//SYSPRINT  DD SYSOUT=*
//SYSUDUMP  DD SYSOUT=*
//CMNPMAST  DD DUMMY
//CMNCMPNT  DD DUMMY
//CMNCMPNL  DD DISP=SHR,DSN=CMNTP.S6.V810.CMNZMF.CMNCMPNL
//CMNPQSAM  DD DUMMY
//CMNCSQSM  DD DUMMY
//CMNCLQSM  DD DISP=(,CATLG),
//             DSN=CMNTP.S6.V810.BACKUP.CMNCMPNL(+1),
//             UNIT=SYSDA,SPACE=(CYL,(1,1),RLSE),
//             DCB=(RECFM=VB,LRECL=5000,BLKSIZE=0)
```

3 When you run CMNBKRST to forward recover a corrupted or lost ZMF VSAM master file, you can input multiple sequential copes of CMNRECV forward recovery files. These files are:

- Concatenated at DDname CMNRQSAM
- Input in any order
- May have overlapping date ranges

CMNCICS1 - CICS NEWCOPY

Utility program CMNCICS1 refreshes an application load module in a CICS region after ChangeMan ZMF has updated that program in a DFHRPL library.

CMNCICS1 is the driver program for CICS newcopy in ChangeMan ZMF. It validates SYSIN input by verifying that the keyword parameters are grouped and sequenced properly, and then it calls subprogram CMNCICS2 to initiate newcopy commands.

NOTE "Newcopy" is used as a generic term that refers to the CICS load module refresh process that includes PHASEIN as well as NEWCOPY. Where sample commands here show subparameter NEWCOPY or NEW, you can substitute PHASEIN or PHA. NEWCOPY is the default where nothing is specified.

Subprogram CMNCICS2 executes newcopy processing in CICS regions that run on the same LPAR as the batch job that executes CMNCICS1. CMNCICS2 calls subprogram CMNEMTP using the CICS external call interface (ECI) to execute newcopy processing in CICS regions that run on different LPARs in the same SYSPLEX.

CMNCICS1 or CMNEMTP verifies whether the program to be newcopied is present in a specified library in the DFHRPL concatenation unless this function is suppressed by a CMNCICS1 execution parameter.

There are six options for executing CICS newcopy processing:

Option	Description	
SRB	Compatibility:	CICS/ESA 4.1 and below
	LPAR:	The batch job that executes CMNCICS1 must be on the same LPAR as the CICS region where the program is refreshed.
	Method:	CMNCICS2 schedules SRB to the CICS region to alter the PPT and force a program refresh.
	CICS Trans ID:	None
	Comments:	If used with CICS Transaction Server 1.2 and above, CMNCICS1 gives RC=0 but the target CICS program is not refreshed.
ESA	Compatibility:	CICS/ESA 4.1 and below
	LPAR:	The batch job that executes CMNCICS1 must be on the same LPAR as the CICS region where the program is refreshed.
	Method:	CMNCICS2 uses access registers of the CICS address space to alter the PPT and force a program refresh.
	CICS Trans ID:	None
	Comments:	If used with CICS Transaction Server 1.2 and above, CMNCICS1 gives RC=0 but the target CICS program is not refreshed.

Option	Description	
OPR	Compatibility:	All CICS releases
	LPAR:	The batch job that executes CMNCICS1 must be on the same LPAR as the CICS region.
	Method:	CMNCICS2 issues an operator modify command to execute CICS supplied operator transaction CEMT under the master console terminal control in the target CICS region: F CICS cicsid,'CEMT SET PROG(pgmname) NEW'
	CICS Trans ID:	CEMT
	Comments:	CEMT returns many messages to the master console for each NEWCOPY
OPS	Compatibility:	CICS TS 1.2 and above
	LPAR:	The batch job that executes CMNCICS1 must be on the same LPAR as the CICS region where the program is refreshed.
	Method:	CMNCICS2 issues an operator modify command to execute ChangeMan ZMF transaction SEMT that is processed by program CMNEMTP in the target CICS region: F CICS cicsid,'SEMT SET PROG(pgmname) NEW'
	CICS Trans ID:	SEMT ■ Processed by ZMF program CMNEMTP ■ Executes a subset of CEMT commands ■ Executes with the same authority as CEMT ■ Returns only one message to the OS console
OPQ	Compatibility:	CICS TS 1.2 and above
	LPAR:	The batch job that executes CMNCICS1 must be on the same LPAR as the CICS region where the program is refreshed.
	Method:	CMNCICS2 issues an operator modify command to execute ChangeMan ZMF transaction SEMQ that is processed by program CMNEMTP in the target CICS region: F CICS cicsid,'SEMQ SET PROG(pgmname) NEW'
	CICS Trans ID:	SEMQ ■ Processed by ZMF program CMNEMTP ■ Executes a subset of CEMT commands ■ Executes with the same authority as CEMT ■ Suppresses all messages to the OS console
XCI	Compatibility:	CICS TS 1.2 and above
	LPAR:	The batch job that executes CMNCICS1 must be on the same SYSPLEX as the CICS region where the program is refreshed, but it may be on a different LPAR.
	Method:	CMNCICS2 uses the CICS EXCI facility to call program CMNEMTP in the target CICS region. CMNEMTP issues command: EXEC CICS SET PROGRAM(program) NEWCOPY
	CICS Trans ID:	SEML – This is a dummy transaction ID required for the EXCI interface.
	Comments:	XCI is the only way to issue a NEWCOPY in a CICS region that is running on a different LPAR than the batch job that executes CMNCICS1.

IMPORTANT! XCI is the only option where RC=0 indicates that the newcopy was executed successfully. Options OPR, OPS, and OPQ issue operator commands which do not return a status code.

CMNCICS1 Input

- PARM execution parameters
- SYSIN keyword parameter statements

Output

- Altered PPT or MODIFY commands or EXEC CICS SET PROGRAM... commands, all to initiate newcopy.
- Program execution listing
- Program return code

Sample JCL

JCL to execute program CMNCICS1 is file tailored from skeleton CMN$$CNC, which you customize and imbed as needed in skeletons for promotion, demotion, installation, backout, baseline ripple, and reverse baseline ripple.

```
//JOBLIB    DD DISP=SHR,DSN=CMNTP.S4.V710.CMNZMF.CUSTOM.LOAD
//          DD DISP=SHR,DSN=CMNTP.S4.V710.CMNZMF.LOAD
//          DD DISP=SHR,DSN=CMNTP.S4.V710.SERCOMC.CUSTOM.LOAD
//          DD DISP=SHR,DSN=CMNTP.S4.V710.SERCOMC.LOAD
//          DD DISP=SHR,DSN=SYS2.CICSTS22.CICS.SDFHEXCI  *FOR XCI ONLY
...
//CILCNC  EXEC PGM=CMNCICS1,   *** CICS NEWCOPY FOR CIL
//             COND=(4,LT),
//             PARM=(XCI)
//SYSPRINT  DD DISP=(,PASS),DSN=&&LISTCNC,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FA,LRECL=133,BLKSIZE=133)
//SYSIN     DD *
  TARGET=CICSC102
    DFHRPL=CMNTP.S4.V610.PROD.ACTP.CIL
      PROGRAM=GNLCIS10
/*
```

DD Statements

This table describes the DD statements for program CMNCICS1.

DDNAME	I/O	Purpose
SYSIN	Input	Input file containing 80-byte keyword parameter records
SYSPRINT	Output	Report file that displays information from the execution of CMNCICS1
CMNIN	Input	Alternate for DD name SYSIN
CMNOUT	Output	Alternate for DD name SYSPRINT

PARM Options

The PARM parameter is required in the EXEC statement for CMNCICS1.

The subparameters in the PARM statement are positional and are separated by commas..

```
//CILCNC  EXEC PGM=CMNCICS1,
//             PARM=(option,check,prefix)
```

This table describes CMNCICS1 options that are input through the PARM parameter.

Parameter	Use	Description
option	Required	3 character code for the method used to execute the newcopy function. Valid values: SRB ESA OPR OPS OPQ XCI Options are described in in the table page 132.
check	Optional	Controls whether the library named in the DFHRPL= SYSIN statement is checked to see if it contains the load module named in the PROGRAM= SYSIN statement. Valid values: CHECK — Check the RPL library for the presence of the module to be newcopied. This is the default value if this subparameter is not coded. NOCHECK — Do not check the RPL library for the presence of the module to be newcopied. DFHRPL verification is performed by CMNCICS1 for options SRB, ESA, OPR, OPS, and OPQ. Verification is performed by CMNEMTP for option XCI.
prefix	Optional	Code 3 characters to replace the first 3 characters of ChangeMan ZMF CICS transactions SEMT, SEMQ, and SEML. The resulting transIDs must be valid, and they must be defined in any CICS region where they will execute. **Note:** Replacement characters may be coded in the PREFIX= keyword parameter for program CMNCICS1 instead of in the PARM statement. See "SYSIN Parameters" below.

SYSIN Parameters

Keyword parameters are input to CMNCICS1 through the SYSIN ddname.

```
//SYSIN    DD  *
PREFIX=prefix
TARGET=cicsid,setoption
  DFHRPL=loadlib
    PROGRAM=pgmname
    PROGRAM=pgmname
    PROGRAM=pgmname
```

- Keyword parameters start in positions 1-60.
- Keyword parameters may be indented to show hierarchy and groupings.
- Each SYSIN record should contain only one keyword parameter.

- Blank SYSIN records are permitted.
- Comment records are designated by * in position 1.
- A maximum of 65,535 DFHRPL= parameters may be input for each TARGET= parameter.
- A maximum of 65,535 PROGRAM= parameters may be input for each TARGET= parameter.

This table describes keyword parameters that are input to CMNCICS1 through the SYSIN DD statement.

Parameter	Use	Description
* in Position 1	Optional	Denotes a comment.
PREFIX=	Optional	Code 3 characters to replace the first 3 characters of ChangeMan ZMF CICS transactions SEMT, SEMQ, and SEML. The resulting transIDs must be valid, and they must be defined in any CICS region where they will execute. If multiple PREFIX records are input, only the last one is retained. **Note:** Replacement characters may be coded in the PARM statement for program CMNCICS1 instead of in this SYSIN keyword statement. See "PARM Options" on page 135.
TARGET=	Required	The TARGET keyword parameter can have two arguments separated by a comma: cicsid — An identifier for the target CICS region, 1-8 characters. The type of identifier depends on the option you are using. CICS region name — Use the CICS region name if you are using options SRB, ESA, OPR, OPS, or OPQ. VTAM APPLID — Use the CICS region VTAM APPLID for option XCI. setoption — The option to be executed by the SET PROGRAM(pgmname) command. NEW — Execute NEWCOPY. This is the default option. PHA — Execute PHASEIN. Examples: TARGET=CICSA,PHA TARGET=CICSA,NEW TARGET=CICSA
DFHRPL =	Required	Load library in the CICS region DFHRPL where the CICS program resides. Must be a fully qualified data set name, up to 44 characters.
PROGRAM =	Required	Name of the program to newcopy, 1-8 characters.

Return Codes and Error Messages

Messages issued by ChangeMan ZMF are described in the ChangeMan ZMF Messages book. This section contains additional information that will be helpful in diagnosing problems with the CMNCICS1 newcopy utility..

Return Code	Description
04	An error was detected before the newcopy method was executed, but the step was allowed to finish with non-fatal return code. See the messages in SYSPRINT. Examples: CMN7210E TARGET CICS not active on system CMN7205E CMNCICS1 Group has no DFHRPL statements at all
08	An error was detected before the newcopy method was executed, and the step issued a fatal return code. See the messages in SYSPRINT. Examples: CMN7207E CMNCICS1 DFHRPL dataset failed to allocate CMN7206E CMNCICS1 DFHRPL dataset does not exist
20	Problem allocating or opening the external CICS interface pipe; these types of errors indicate a problem with inter-system communications or the lack of an EXCI connection in the target CICS.
28	Indicates a problem with the DPL (Distributed Program Link) to program CMNEMTP; these types of problems indicate an error in the installation of the trans IDs or program within the target CICS.
36	With CICS abend AXFQ, indicates that the transaction profile parameter INBFMH is not set to ALL. See the CICS resource definition examples provided here.

Message Number	Description
CMN7213E	CICS RETURNED ERRORS | CICS regions returned errors when doing newcopy **Explanation:** CMNCICS2 attempted a CICS NEWCOPY/PHASEIN for an application program, but the application program is not found in the target region. Only programs that have been defined in the CICS system definition file (CSD) and installed on the running CICS system are accessible to ZMF newcopy facilities. **Solution:** Create a definition for the application program in the target CICS region.
CMN7214E	EXCI FAILURE | Unable to establish EXCI session with target CICS **Explanation:** CMNCICS2 is unable to allocate or open an EXCI connection to the target CICS region to perform a NEWCOPY/PHASEIN. The NEWCOPY is not performed. **Solution:** Ensure the target CICS region is running, and that the EXCI connection has been properly installed.
CMN7215E	INSTALL ERROR | ZMF newcopy support not installed in target CICS **Explanation:** CMNCICS2 is unable to start the SEML transaction in the target CICS region to perform NEWCOPY/PHASEIN. The NEWCOPY is not performed. **Solution:** See the ChangeMan ZMF Installation Guide for the steps to install the SEML transaction in the target CICS region.

Reporting

The SYSPRINT DD statement for CMNCICS1 displays the following information:

- Program name and title.
- Keyword parameter records input to SYSIN.
- Information and error messages.

Example:

```
CMNCICS1           CICS NEW PROGRAM UTILITY

  TARGET=CICSC101
    DFHRPL=USER.SERENA.CICSLOAD
      PROGRAM=ACCT01
                   CMN7209E Program ACCT01 was not found in DFHRPL library
```

Notes and Comments

The examples below show the difference in message volume between option OPR and OPS. The SYSLOG output is also visible in the CICS JESMSGLG.

This is the JCL, and SYSPRINT output from option OPS, and SYSLOG output.

```
JCL:
//USER015B JOB ,,CLASS=A,NOTIFY=&SYSUID,
//         COND=(4,LT),MSGLEVEL=(1,1),MSGCLASS=X,
//         REGION=4M
//JOBLIB    DD DISP=SHR,DSN=CMNTP.CMN810.LOAD
//          DD DISP=SHR,DSN=CMNTP.SER810.LOAD
//*
//LCXCNC  EXEC PGM=CMNCICS1,   *** CICS NEWCOPY
//             PARM=(OPS,CHECK)
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD *
   TARGET=CICSC102,PHA
   DFHRPL=USER.SERENA.CICSLOAD
   PROGRAM=CMNEMTP
*************************** Bottom of Data *****

SYSPRINT:
CMNCICS1            CICS NEW PROGRAM UTILITY

   TARGET=CICSC102,PHA
   DFHRPL=USER.SERENA.CICSLOAD
   PROGRAM=CMNEMTP
*************************** Bottom of Data *****

SYSLOG:
S0296623 00000080  +SEMT SET PROG(CMNEMTP) PHA
                                Set command completed normally
S0296623 00000080  +Resp=0000 Resp2=0000
```

This is the JCL and SYSPRINT output from option OPR, and also the output to the SYSLOG.

```
//USER015C JOB ,,CLASS=A,NOTIFY=&SYSUID,
//         COND=(4,LT),MSGLEVEL=(1,1),MSGCLASS=X,
//         REGION=4M
//*********************************************
//*  FROM USER015.JCL.CNTL(CICSJOB1)
//*
//*  JOB TO DO A CICS NEWCOPY
//*********************************************
//JOBLIB    DD DISP=SHR,DSN=CMNTP.CMN810.LOAD
//          DD DISP=SHR,DSN=CMNTP.SER810.LOAD
//*
//LCXCNC  EXEC PGM=CMNCICS1,
//             PARM=(OPR,CHECK)
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD *
   TARGET=CICSC102
   DFHRPL=USER.SERENA.CICSLOAD
   PROGRAM=CMNEMTP
*************************** Bottom of Data *****

CMNCICS1            CICS NEW PROGRAM UTILITY

   TARGET=CICSC102
   DFHRPL=USER.SERENA.CICSLOAD
   PROGRAM=CMNEMTP
****************************** BOTTOM OF DATA *

 SDSF OPERLOG  C001     02/25/2015     0W                      COLUMNS 41- 120
 COMMAND INPUT ===>                                           SCROLL ===> CSR
S0296623 00000080  + 581
     581 00000080    Program(CMNEMTP)
     581 00000080    Length(0000009664)
     581 00000080    Language(Assembler)
     581 00000080    Progtype(Program)
     581 00000080    Status( Enabled )
     581 00000080    Sharestatus( Private )
     581 00000080    Copystatus( Notrequired )
     581 00000080    Cedfstatus( Cedf )
     581 00000080    Dynamstatus(Notdynamic)
S0296623 00000080  + Rescount(000) 582
     582 00000080    Usecount(0000000002)
     582 00000080    Dataloc(Any)
     582 00000080    Execkey(Uexeckey)
     582 00000080    Executionset( Fullapi )
     582 00000080    Concurrency(Quasirent)
     582 00000080    Remotesystem()
     582 00000080    Runtime( Notknown )
     582 00000080    Jvmclass(
     582 00000080   )
S0296623 00000080  + Jvmclass( 583
     583 00000080   )
     583 00000080    Jvmclass(
     583 00000080   )
     583 00000080    Jvmclass(
     583 00000080   )
     583 00000080    Jvmclass(                        )
     583 00000080    Hotpooling( Nothotpool )
     583 00000080    Jvmprofile(DFHJVMPR)
     583 00000080    NORMAL
S0296623 00000080  + RESPONSE: NORMAL TIME:  01.47.49  DATE: 02.25.15 584
     584 00000080    SYSID=C102 APPLID=CICSC102
```

CMNCICS1 - CICS BUNDLE

The SYSIN for CMNCICS1 may also specify BUNDLE keywords following the TARGET keyword.

The format of the keyword is: BUNDLE=***bundlename*** where ***bundlename*** is the name of the bundle as defined by the CICS system definition (CSD). The bundle keyword results in the deployment of a CICS transaction SEMB, which invokes CMNBUND, a new component in 8.2.0. Therefore, the ZMF resource definitions must be installed in each of

the potential target CICS regions. The CSD component CMN820G in the installation library has the suggested CSD define statements.
In the case of bundle, the ESA and SRB methods are not valid. Any of the operator commands or the XCI method is preferred.

The CMNBUND logic is as follows:

- Verify that the BUNDLE exists
- Discard the BUNDLE
- Wait until the BUNDLE is completely discarded.
- Install the BUNDLE
- Check to see that the BUNDLE is installed.

For example:

```
//SYSIN     DD *
  TARGET=CICSname
  BUNDLE=Bundlename
```

CMNCICS1 - CICS PIPELINE

The SYSIN for CMNCICS1 may also specify PIPELINE keywords following the TARGET keyword.

The format of the keyword is: PIPELINE=***pipeline*** where ***pipeline*** is the name of the pipeline as defined by the CICS system definition (CSD). The pipeline keyword results in the deployment of a CICS transaction SEMT, which invokes CMNEMTP, a new component in 8.1.0. Therefore, the ZMF resource definitions must be installed in each of the potential target CICS platforms.

In the case of pipeline, the ESA and SRB methods are not valid. Any of the operator commands or the XCI method is preferred.

The CMNEMTP logic is as follows:

- Verify that the PIPELINE exists
- Perform PIPELINE SCAN

For example:

```
//SYSIN     DD *
  TARGET=CICSname
  PIPELINE=Pipename
```

CMNCICS1 - CICS WEBSERVICES

The SYSIN for CMNCICS1 may also specify WEBSERVICE keywords following the TARGET keyword.

The format of the keyword is: WEBSERVICE=***webservice*** where ***webservice*** is the name of the webservice as defined in the CICS system definition (CSD). The webservice keyword results in the deployment of a CICS transaction SEMT, which invokes CMNEMTP. Therefore, the ZMF resource definitions must be installed in each of the potential target CICS platforms.
For example:

```
//TSTWBSRV  EXEC PGM=CMNCICS1,PARM='OPR'
...
//SYSIN     DD *
  TARGET=CICSname
  WEBSERVICE=webservicename
```

CMNCICS6 - CICS CSD Extract

The CICS CSD interface lets you extract defined table entries in a CICS CSD file, and translate the results into an editable format. This process is controlled by specifying keywords in the SYSIN data stream.

Export Option

Program CMNCICS6 validates the CMNIN file by verifying the keywords (DFHCSD, EXPORT, IGROUP, and OGROUP) are grouped and sequenced properly.

A group consists of one DFHCSD card, one EXPORT card, one or more IGROUP cards (up to 256), and one OGROUP card. You can specify up to 256 groups in a single execution.

- For each DFHCSD/EXPORT keyword pair, CMNCICS6 will issue a GETMAIN for a work area.
- For each DFHCSD card read CMNCICS6 will lock the VSAM data set specified.
- For each EXPORT card read CMNCICS6 will allocate the PDS data set allocated.
- For each IGROUP and the OGROUP card read CMNCICS6 will build an entry in the work area.

Once all of the data has been read and the work areas built, CMNCICS6 will allocate the SORTWORK data sets. For each work area built, CMNCICS6 will open a member in the PDS data set named by the OGROUP specified. SORT is invoked specifying E15 (input) and E35 (output) exits. The E15 (input) SORT exit will read data from the PDS member and translate the GROUP name to that specified in OGROUP. The E35 (output) SORT exit will translate each record into an 'editable' member in the PDS.

A typical job stream to execute CMNCICS6 EXPORT Option follows.

- The DFHCSD keyword must specify a fully qualified cataloged VSAM data set name not exceeding 44 characters in length.

- The EXPORT keyword must specify a fully qualified PDS data set name not exceeding 44 characters in length.
- The IGROUP keyword must specify a valid GROUP entry on the CICS CSD data set specified with the DFHCSD keyword and must not exceed 8 characters in length.
- The OGROUP keyword must not exceed 8 characters in length.

Basic Format of CMNCICS6 Export Control Statement

The following is an example of JCL for export executing CMNCICS6:

```
//CHGMAN6 JOB (account)
//*
//*  JCL for EXPORT
//*
//STEPONE EXEC PGM=CMNCICS6
//STEPLIB DD DSN=somnode.SERENA.CMNZMF.VxRxMx.LOAD,DISP=SHR
//        DD DSN=somnode.SERENA.SERCOMC.VxRxMx.LOAD,DISP=SHR
//CMNOUT  DD SYSOUT=*
//CMNIN   DD   *
DFHCSD=VSAM data set name
EXPORT=PDS data set name
IGROUP=input group
IGROUP=input group
IGROUP=input group
 .
 .
 .
OGROUP=output group
DFHCSD=VSAM data set name
EXPORT=PDS data set name
IGROUP=input group
IGROUP=input group
IGROUP=input group
```

This table describes placeholders in the CMNIN parameter statements.

Subparameters	Description
VSAM data set name	Test data set name of the CICS-defined CSD where IGROUP clusters will be read.
PDS data set name	Test data set name of the ChangeMan ZMF PDS where the OGROUP members will be written.
input group	Name of an application-defined group name residing in the CICS CSD VSAM data set.
output group	Name of the production-defined group name for this application

Import Option

The purpose of this interface is to let you add CICS table entries to a CICS CSD file from an edited format. The input data is usually created by the CSD export process. The import process is controlled by specifying certain keywords in the SYSIN data stream.

Program CMNCICS6 validate SYSIN by verifying the keywords are grouped and sequenced properly. DFHCSD and IMPORT are the valid SYSIN keywords.

A grouping consists of one DFHCSD card, and one IMPORT card. You can specify up to 256 groups in a single execution.

- For each DFHCSD/IMPORT keyword pair, CMNCICS6 will issue a GETMAIN for a work area.
- For each DFHCSD card read CMNCICS6 will lock the VSAM data set specified.
- For each IMPORT card read CMNCICS6 will allocate the PDS data set allocated.
- Once ALL the SYSIN cards are read and the work areas built, CMNCICS6 will allocate the SORTWORK data sets.
- For each work area built, CMNCICS6 will read each member, and for each member invoke SORT, specifying the E15 (input) and E35 (output) exits.
- The E15 (input) SORT exit will read the PDS member and translate the member into a VSAM data record.
- The E35 (output) SORT exit will add or update the CSD file from the VSAM data record.

A typical job stream to execute CMNCICS6 IMPORT Option follows.

- The CMNIN data stream can start in any column. Multiple imports can be specified.
- The DFHCSD keyword must specify a fully qualified cataloged VSAM data set name not exceeding 44 characters in length.
- The IMPORT keyword must specify a fully qualified PDS data set name not exceeding 44 characters in length.

Basic Format of CMNCICS6 Import Control Statement

The following is an example of JCL for export executing CMNCICS6:

```
//CHGMAN6 JOB (account)
//*
//*  JCL for IMPORT
//*
//STEPONE EXEC PGM=CMNCICS6
//STEPLIB DD   DSN=somnode.SERENA.CMNZMF.VxRxMx.LOAD,DISP=SHR
//        DD   DSN=somnode.SERENA.SERCOMC.VxRxMx.LOAD,DISP=SHR
//CMNOUT  DD   SYSOUT=*
//CMNIN   DD   *
  DFHCSD=VSAM data set name
    IMPORT=PDS data set name
  DFHCSD=VSAM data set name
    IMPORT=PDS data set name
  DFHCSD=VSAM data set name
    IMPORT=PDS data set name
 .
 .
 .
  DFHCSD=VSAM data set name
    IMPORT=PDS data set name
```

This table describes placeholders in the CMNIN parameter statements.

Term	Description
VSAM data set name	is the production DATA SET name of the CICS defined CSD where the clusters will be written.
PDS data set name	is the production DATA SET name of the ChangeMan ZMF PDS from which the members will be read.

CICS Keywords processed by CMNCICS6

This CMNCICS6 assembler code defines the CICS keywords and their default values for PROGRAMS, MAPSETS, TRANSACTIONS and PROFILES:

```
*
*    Definition and defaults for programs
*
PPTDEF   DS    0D
 DC CL80'DEFINE Group()'
 DC CL80'        PROGram()'
 DC CL80'        Language(Cobol)         cobol | assembler | pli | rpg'
 DC CL80'        RELoad(No)              no | yes'
 DC CL80'        RESident(No)            no | yes'
 DC CL80'        RSl(00)                 0 -24 | public'
 DC CL80'        Status(Enabled)         enabled | disabled'
 DC X'FF'
```

```
*
*    Definition and defaults for mapsets
*
MAPDEF   DS    0D
 DC CL80'DEFINE Group()'
 DC CL80'        Mapset()'
 DC CL80'        RSl(00)                 0 -24 | public'
 DC CL80'        Status(Enabled)         enabled | disabled'
 DC X'FF'
```

```
*
*    Definition and defaults for transactions
*
PCTDEF   DS    0D
 DC CL80'DEFINE Group()                                          '
 DC CL80'        TRansaction()                                  '
 DC CL80'        PROGram()                                      '
 DC CL80'        TWasize(00000)           0 - 32767             '
 DC CL80'        PROFile(DFHCICST)                              '
 DC CL80'        PArtitionset()                                 '
 DC CL80'        STatus(Enabled)          enabled | disabled    '
 DC CL80'        PRIMedsize(00000)        0 - 65520             '
 DC CL80'*    REMOTE ATTRIBUTES                                 '
 DC CL80'        REMOTESystem()                                 '
 DC CL80'        REMOTEName()                                   '
 DC CL80'        TRProf()                                       '
 DC CL80'        Localq()                 no | yes              '
 DC CL80'*    SCHEDULING                                        '
 DC CL80'        PRIOrity(001)            0 - 255               '
 DC CL80'        TClass(No)               no | 1 - 10           '
 DC CL80'*    ALIASES                                           '
 DC CL80'        TAskreq()                                      '
 DC CL80'        Xtranid()                                      '
 DC CL80'*    RECOVERY                                          '
 DC CL80'        DTimout(No)              no | 1 - 7000         '
 DC CL80'        Indoubt(Backout)         backout | commit | wait'
 DC CL80'        REStart(No)              no | yes              '
 DC CL80'        SPurge(No)               no | yes              '
 DC CL80'        TPurge(No)               no | yes              '
 DC CL80'        DUmp(Yes)                yes | no              '
 DC CL80'        TRACe(Yes)               yes | no              '
 DC CL80'*    SECURITY                                          '
 DC CL80'        Extsec(No)               no | yes              '
 DC CL80'        TRANsec(01)              1 - 64                '
 DC CL80'        RSL(00)                  0 - 24 | public       '
 DC CL80'        RSLC(No)                 no | yes | external   '
 DC X'FF'
```

```
*
*    Definition and defaults for profiles
*
PRFDEF   DS    0D
 DC CL80'DEFINE Group()                                            '
 DC CL80'         profile()                                        '
 DC CL80'         scrnsize(default)        default | alternate     '
 DC CL80'         modename()                                       '
 DC CL80'         printercomp(no)          no | yes                '
 DC CL80'*    JOURNALLING                                         '
 DC CL80'         journal(no)              no | 1 - 99            '
 DC CL80'         msgjrnl(no)              no | input | output | inout'
 DC CL80'*    PROTECTION                                          '
 DC CL80'         msginteg(no)             no | yes               '
 DC CL80'         onewte(no)               no | yes               '
 DC CL80'         protect(no)              no | yes               '
 DC CL80'*    PROTOCOLS                                           '
 DC CL80'         dvsuprt(all)             all | nonvtam | vtam   '
 DC CL80'         inbfmh(no)               no | all | dip | eods  '
 DC CL80'         raq(no)                  no | yes               '
 DC CL80'         logrec(no)               no | yes               '
 DC CL80'*    RECOVERY                                            '
 DC CL80'         nepclass(000)            0 - 255               '
 DC CL80'         rtimout(no)              no | 1 - 7000         '
 DC X'FF'
```

If the functionality of the CMNCICS6 utility meets the current requirements of your installation, you may continue to maintain your existing PROGRAM and TRANSACTION

definitions with the CMNCICS6 utility. If your installation requires use of PROGRAM or TRANSACTION definition parameters that are not supported by CMNCICS6 (for example, the DATALOCATION parameter), or if you wish to use ChangeMan/ZMF to control other RDO resource types (for example, TERMINAL definitions) you must use DFHCSDUP.

The DFHCSDUP utility is supplied by IBM as part of CICS. It does not provide the richness of functionality of CMNCICS6 (multiple DFHCSD statements, IMPORT EXPORT statements) but does support all CICS RDO parameters.

Here is the sample JCL to unload existing definitions from the DFHCSD. The primary purpose of this step would be to pull the definitions out of a test CICS, so that they could be maintained in ZMF:

```
//STEP1   EXEC PGM=DFHCSDUP,REGION=0M,
//             PARM='CSD(READWRITE),PAGESIZE(60),NOCOMPAT'
//STEPLIB  DD DSN=cicshlq.SDFHLOAD,DISP=SHR
//*****************************************************************
//** THIS JCL WILL UNLOAD AN EXISTING DFHCSD GROUP IN A FORMAT THAT**
//** WILL ALLOW IT TO BE LOADED TO ANY OTHER DFHCSD LIBRARY        **
//*****************************************************************
//DFHCSD   DD  DISP=SHR,DSN=cicshlq.DFHCSD
//SYSPRINT DD SYSOUT=*
//CBDOUT DD SYSOUT=A
//SYSIN DD *
EXTRACT GROUP(XXXXXXXX) USERPROGRAM(DFH0CBDC) OBJECTS
/*
```

Here is the sample JCL to upload new definitions from ZMF to the DFHCSD. The input to this step would be the resource definition stored in ZMF. Existing resource definitions created by CMNCICS6 will work without any changes required:

```
//STEP1   EXEC PGM=DFHCSDUP,REGION=0M,
//             PARM='CSD(READWRITE),PAGESIZE(60),NOCOMPAT'
//STEPLIB  DD DSN=cicshlq.SDFHLOAD,DISP=SHR
//*****************************************************************
//** THIS JCL WILL UPLOAD CICS RESOURCE DEFINITIONS TO THE DFHCSD    **
//*****************************************************************
//DFHCSD   DD  DISP=SHR,DSN=cicshlq.DFHCSD
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
```

CEDA Language Review

OGROUP members of the PDS subject to ChangeMan ZMF control will have identical format to those supplied and documented in the IBM publication *CICS/VS Resource Definition Online*. CMNCICS6 will read these members and create VSAM records for each definition in an identical manner to the online CICS transaction CEDA.

Although multiple CSD files have been used by more prudent installations, the control of a CSD file by ChangeMan ZMF implies that a production CSD file should be kept separate from a testing CSD file and that the testing file can be subject to change using CEDA whereas the production system should have these resource definition online (RDO) transactions disabled. This eliminates the probability of unauthorized changes to the production environment outside of ChangeMan ZMF control.

In the IBM publication, the RDO defined defaults are shown in parentheses. The required keywords are shown in their entirety. Ranges of values are shown with valid limits.

CMNCICS6 assumes that all source has been exported from a valid CSD file. Therefore, any syntactical errors introduced by users of external editors will cause entries to be ignored by CMNCICS6. Default values will be assigned as shown.

For example, the following is the definition for a program. The information here is the same as that used by CEDA to build a PPT entry.

```
PROGram(pgmname)
Language(COBOL)                 COBOL | Assembler | Pl1
RELoad(No)                      No | Yes
RESident(No)                    No | Yes
RSl(00)                         0-64 | Public
Status(Enabled)                 Enabled | Disabled
```

CMNFIXMN - Generate SETSSI Data

Program CMNFIXMN checks the SETSSI in the IDR record of load modules to ensure that it contain information compatible with ChangeMan ZMF processing. If a SETSSI is incompatible, CMNFIXMN can update it. CMNFIXMN can also ensure that the load library directory contains the correct SETSSI value.

ChangeMan ZMF audit uses the load module SETSSI as a date/time stamp to discover out-of-synch conditions. When a load module is built by ZMF, the SETSSI is set to an eight-byte alphanumeric representation of a four byte binary number that is the number of seconds between January 1, 1960 and the link date of the load module. To improve the efficiency of ZMF programs that use the SETSSI, it is also stored in the directory of the load library.

If you add a load module or a load library to ChangeMan ZMF, the SETSSI may be blank or it may not contain the same value that ZMF would calculate. This may prevent audit from detecting out-of-synch conditions. CMNFIXMN prepares your load modules and load libraries for management by ChangeMan ZMF.

CMNFIXMN can be run in two modes. When you use the REPORT execution parameter, CMNFIXMN executes the SETSSI check and report its findings for each load module, but no updates are done. After you examine the report, you can run CMNFIXMN with execution parameter EXECUTE to update the load modules and the load library directory.

Input

Load library containing load modules that were not built by ChangeMan ZMF.

Output

Load library where all load module SETSSI are compatible with ChangeMan ZMF processing and the load library directory contains SETSSI values.

Sample JCL

Sample JCL is delivered in member CMNFIXMN in the delivered CMNZMF CNTL library.

DD Statements

This table describes DD statements for CMNFIXMN.

DDNAME	I/O	Purpose
LOD	I/O	Load library to be updated with SETSSI.
SYSPRINT	Output	Report of mock directory updates or actual updates.

PARM Options

The PARM parameter is required in the EXEC statement for CMNFIXMN. You must use one of the PARM values listed in this table. There is no default value.

Parameter	Use	Description
REPORT	Alternative	Produces a report of current SETSSI and ZMF calculated SETSSI. No updates are performed.
EXECUTE	Alternative	Produces a report of current SETSSI and ZMF calculated SETSSI, and where they are different, updates load modules and the load module directory.

Return Codes and Error Messages

This table lists return codes for CMNFIXMN.

Return Code	Description
0	OK. No errors encountered.
4	Linkage date not found.

This table lists abend codes for CMNFIXMN.

Abend Code	Description
U01	Unable to open //SYSPRINT DD
U02	Unable to open //LOD DD
U03	LOD Library record format not undefined (not allocated as RECFM=U)
U04	Unable to load //LOD DD (probably sequential)
U10	Unable to stow //LOD DD (probably directory full)

Reporting

This is a sample from a report from CMNFIXMN executed with PARM=REPORT.

```
CMN (MVS-8.1.0) JOB EXECUTION: DATE=WEDNESDAY FEBRUARY 25, 2015  TIME=12:21:06
CMN INVOCATION: PGM(CMNFIXMN - PROCESS SETSSI ROUTER)  COMPILE(20141010 11.58)

 PARM='REPORT'
 PARM interpretation: REPORT; mock execution, NO UPDATES!

 LOD library DSNAME=USER015.ISPLLIB

Now a report of a mock update follows; NO UPDATES!

Module                  Dir      Module   Module     SSI    Update
Name     Alias-Of Exec SETSSI   SETSSI   Link Date  Type   Dir
-------- -------- ---- -------- -------- ---------- ------ ------
CLS               Yes  MISSING  61257D9E 2011/08/24 Genned Yes    <MOCK UPDATE>
COLOURS           Yes  610A8BE2 610A8BE2 2011/08/04 Actual No
CURPOS            Yes  MISSING  61008925 2011/07/27 Genned Yes    <MOCK UPDATE>
DELINKI           Yes  MISSING  56D592F0 2006/03/01 Genned Yes    <MOCK UPDATE>
HELLOW            Yes  MISSING  64809EE4 2013/06/06 Genned Yes    <MOCK UPDATE>
...
S0C1              Yes  MISSING  662ECC1F 2014/04/28 Genned Yes    <MOCK UPDATE>
S0C4              Yes  MISSING  662ECD14 2014/04/28 Genned Yes    <MOCK UPDATE>

      33 Total members
       9 ALIAS notations
       0 Considered Not Executable
       0 Directory SETSSI unusable, replaced by module SETSSI
      23 Directory SETSSI missing, replaced by module SETSSI
       0 Directory SETSSI does not match module, replaced
       1 Directory SETSSI matches module, no action taken

CMNFIX30: PO(pdse) PROGRAM LIBRARY PROCESSOR COMPLETED.  RETURN CODE=00
CMNFIXMN: ROUTER PROCESSING COMPLETED.  RETURN CODE=00
```

CMNIALD0 - Impact Analysis Db2 Load

Prior to ChangeMan ZMF 6.1, impact analysis data was stored in sequential files or in Db2 tables. Some customers created their own applications to use the Db2 tables.

To allow customers to continue using those applications, program CMNIALD0 extracts baseline unique number (BUN) data and component relationship data from impact analysis data stores introduced in ChangeMan ZMF 6.1. The program formats that data in records ready for load to Db2 tables CMNBUN and CMNBASE.

Execution JCL for program CMNIALD0 is delivered in sample JCL member LDS2DB2 in the CNMZMF CNTL library. This member also includes a Db2 load step for tables CMNBUN and CMNBASE.

The JCL also includes Db2 DDL for an expanded CMNBASE Db2 table with impact analysis relationship data that was added with ChangeMan ZMF 6.1. The extract files created by program CMNIALD0 contain data to populate the new fields.

CMNIALD0 Input

- BUN information extracted from the impact analysis LDS by program CMNIALU0 in the impact analysis unload process
- Relationship information extracted from the impact analysis LDS by program CMNIALU0 in the impact analysis unload process
- Other impact analysis information read from the IALDS impact analysis LDS

Output

- Sequential file of data ready for load to the CMNBUN Db2 table
- Sequential file of data ready for load to the CMNBASE Db2 table or to the extended CMNBASE table.

Sample JCL

Sample JCL to execute program CMNIALD0 is delivered in member LDS2DB2 in the CMNZMF CNTL library.

The sample JCL also includes:

- Job step to execute Db2 procedure DSNUPROC to load Db2 tables CMNBUN and CMNBASE
- Sample LOAD statements for an extended CMNBASE table
- Sample DDL to create the extended CMNBASE table and indexes.

DD Statements

This table describes DD statements for program CMNIALD0.

DDNAME	I/O	Purpose
CMNIMPCT	Input	Impact analysis LDS
BUNSPACE	Input	BUNSPACE sequential file written by program CMNIALU0 in sample JCL member LDSUNLD
RELSPACE	Input	The RELSPACE sequential file written by program CMNIALU0 in sample JCL member LDSUNLD
BUNDB2	Output	Reformatted BUN records
RELDB2	Output	Reformatted relationship records
CMNPRINT	Output	Report of records read and records reformatted and written. See "Reporting" on page 151.

CAUTION! Use the BUNSPACE and RELSPACE files created by program CMNIALU0 in sample JCL member LDSUNLD. Do not use files created by program CMNIA000 that is executed in the online impact analysis data extract (skeleton CMN$$IAX) or in sample JCL member IMPACT.

PARM Options

There are no program execution parameters for program CMNIALD0, so there is no PARM parameter in the EXEC statement.

Return Codes and Error Messages

Error messages are written to DD statement CMNPRINT.

Reporting

This is a sample report from program CMNIALD0.

```
20150225 13474033 ChangeMan(R) ZMF      CMNIALD0 - 8.1.0 Impact Analysis Reformat for DB2
20150225 13474033 Phase I begins
20150225 13474035              55 BUN records read
20150225 13474035              55 BUN records reformatted, written
20150225 13474035 Phase I  ends
20150225 13474040 Phase II begins
20150225 13474058              96 relation records read
20150225 13474058              96 relation records reformatted, written
20150225 13474058 Phase II  ends
```

Notes or Comments

- Read the comments in sample JCL member LDS2DB2 in the CMNZMF CNTL library.
- For input to program CMNIALD0, use the BUNSPACE and RELSPACE files created by program CMNIALU0 in sample JCL member LDSUNLD. Do not use files created by program CMNIA000 that is executed in the online impact analysis data extract (skeleton CMN$$IAX) or in sample JCL member IMPACT.
- The impact analysis LDS is not accessed through the started task, so the started task can be up or down.
- In *job step* LDS2DB2 in sample JCL member LDS2DB2:
  - The STEPLIB concatenation (or the JOBLIB concatenation if you do not use STEPLIB) must be authorized or the Db2 load step will fail.
  - You might need to add SYSUT1 and SORTWKnn data sets. Check your DSNUPROC cataloged procedure.

DDL for CMNBUN and CMNBASE

This is the DDL for Db2 tables CMNBUN and CMNBASE. (DDL for the extended CMNBASE table is included in sample JCL member LDS2DB2.)

```
CREATE TABLE CMNx.CMNBUN
        (INT_BUN         INTEGER      NOT NULL WITH DEFAULT,
         TXT_APPL        CHAR(4)      NOT NULL WITH DEFAULT,
         TXT_LIBTYPE     CHAR(3)      NOT NULL WITH DEFAULT,
         TXT_LIKE        CHAR(3)      NOT NULL WITH DEFAULT,
         TXT_LIKI        CHAR(1)      NOT NULL WITH DEFAULT,
         TXT_DSNAME      CHAR(44)     NOT NULL WITH DEFAULT)
        IN database.cmnspace2;
 COMMIT WORK;
CREATE TABLE CMNx.CMNBASE
        (COMPNAME       CHAR(32)      NOT NULL WITH DEFAULT,
```

```
        COMPTYPE       INTEGER       NOT NULL WITH DEFAULT,
        RELATION       CHAR(3)       NOT NULL WITH DEFAULT,
        TOWHAT         CHAR(44)      NOT NULL WITH DEFAULT,
        TOWHATYP       INTEGER       NOT NULL WITH DEFAULT)
       IN database.cmnspace1;
COMMIT WORK;
```

CMNPMLOD - Master File XML Extractor

Data extract program CMNPMLOD (previously called SERPMLOD) uses XML Services to provide you with access to package master and component master data while insulating you from changes in how ChangeMan ZMF data is stored. Extracted data is delivered as XML Service replies, with each reply in a separate sequential file.

Program CMNPMLOD can be run against production master file data or against backup data, but the data must be stored in VSAM files. CMNPMLOD does not require ChangeMan ZMF to be running. CMNPMLOD is available only in batch.

Sample JCL for CMNPMLOD is now delivered in member EXEPMLOD in the vendor CMNZMF.CNTL library.

A LIST facility has been introduced which shows which services are currently supported. To use this function, specify an execution PARM. For example:

//PMLOD EXEC PGM=CMNPMLOD,PARM='LIST'

Output is routed to SYSPRINT and consists of output thus:

```
DDname     Service  Scope    Message  Unloadable Description
--------   -------- -------- -------- ---------- ----------------------------------------------
CMN$GPRM : PARMS    GBL      LIST     Yes        Global parameters
CMN$GSIT : SITE     GBL      LIST     Yes        Global sites
CMN$GPRC : PROCS    GBL      LIST     Yes        Global procedures
CMN$GLTP : LIBTYPE  GBL      LIST     Yes        Global library types
CMN$UFNS : FLDNAMES SERVICE  LIST     Yes        Field name substitutions
...
```

CMNPMLOD Input

- Package master
- Component master
- Long name component master
- XML services MAPDATA file

Output

One or more QSAM files containing master file data in XML format, or SYSPRINT output with PARM LIST.

Sample JCL

The following is a sample job for a CMNPMLOD step that extracts one type of package master data (global compile procedures).

```
//CMNPMLD EXEC PGM=CMNPMLOD,REGION=0M
//STEPLIB  DD  DISP=SHR,DSN=CMNTP.CMN810.LOAD
//         DD  DISP=SHR,DSN=CMNTP.SER810.LOAD
//*==============================================================*
//* ChangeMan ZMF master files
//CMNPMAST DD  DISP=SHR,DSN=CMNTP.S6.V810T06.CMNZMF.CMNPMAST
//CMNCMPNT DD  DISP=SHR,DSN=CMNTP.S6.V810T06.CMNZMF.CMNCMPNT
//CMNCMPNL DD  DISP=SHR,DSN=CMNTP.S6.V810T06.CMNZMF.CMNCMPNL
//*Note: CMNELDSP is obsolete as of ZMF 7.1.3
//*CMNELDSP DD  DISP=SHR,DSN=somnode.subsys.CMNELCTX
//*==============================================================*
//* XML DATASPACE BACKUP
//MAPDATA  DD  DISP=SHR,DSN=CMNTP.SER810.MAPDATA
//*==============================================================*
//* TRACES AND DUMPS
//SERPRINT DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//*==============================================================*
//* GLOBAL XML DOCUMENT FILES
//CMN$GPRM DD  DISP=(,CATLG),DSN=USER015.CMN$GPRM.XMLDATA,
//             UNIT=SYSDA,SPACE=(TRK,(10,10),RLSE),
//             DCB=(RECFM=VB,LRECL=4096,BLKSIZE=0)
```

This is an excerpt of what was created in the CMN$GPRM data set by the JCL above:

```
******************************** Top of Data ********
<?xml version="1.0"?>
 <service name="PARMS">
 <scope name="GBL">
 <message name="LIST">
<result>
 <cmnEnvironment>3</cmnEnvironment>
 <enablePanBaseLib>N</enablePanBaseLib>
 <enableLibrBaseLib>N</enableLibrBaseLib>
 <enableLLamBaseLib>N</enableLLamBaseLib>
 <enableOtherBaseLib>N</enableOtherBaseLib>
 <allowStageOverlay>Y</allowStageOverlay>
 <autoScratchLoadMbr>N</autoScratchLoadMbr>
 <enableJes2Spool>Y</enableJes2Spool>
 <disableCalendar>N</disableCalendar>
 <useSerCompress>N</useSerCompress>
 <createCmpWorkRecs>N</createCmpWorkRecs>
 <showUserPanels>Y</showUserPanels>
 <allowOnlyOneApproval>N</allowOnlyOneApproval>
 <keepBaselineBySite>N</keepBaselineBySite>
...
 <enableDisplayOrderDbdOverride>N</enableDisplayOrderDbdOverride>
 <enableDisplayOrderPsbOverride>N</enableDisplayOrderPsbOverride>
 <enableDisplayOrderXmlReport>N</enableDisplayOrderXmlReport>
 <enableDisplayOrderApplication>N</enableDisplayOrderApplication>
 <enableDisplayOrder3dSkel>N</enableDisplayOrder3dSkel>
 </result>
   </message>
  </scope>
 </service>
****************************** Bottom of Data ******
```

DD Statements

This table describes DD statements for program CMNPMLOD.

DDNAME	I/O	Purpose
CMNPMAST	Input	Package master VSAM KSDS
CMNCMPNT	Input	Component master VSAM KSDS
CMNCMPNL	Input	Long name component master VSAM KSDS
MAPDATA	Input	MAPDATA sequential file created by the XMLLOAD job that creates the XMLSPACE VSAM LDS that is coded in the started task JCL
SERPRINT	Output	Program messages
SYSPRINT	Output	LIST output
CMN$ssss	Output	One or more sequential files containing extracted master file data in XML format, where CMN$ssss is the XML service name

Extract processing is triggered by the presence of an output DD statement with a ddname that matches an XML service name.

The ddnames you can use to trigger extracts of package master and component master data are described in the following subtopics.

Global Records:

DD Name	Service	Scope	Message	Description
CMN$GPRM	PARMS	GBL	LIST	General Parameters
CMN$GSIT	SITE	GBL	LIST	Global Sites
CMN$GPRC	PROCS	GBL	LIST	Procedure Names
CMN$GLTP	LIBTYPE	GBL	LIST	Global library types
CMN$UFNS	FLDNAMES	SERVICE	LIST	Field name substitutions
CMN$RESN	REASONS	SERVICE	LIST	Reason Codes
CMN$GLNG	LANGUAGE	GBL	LIST	Globel languages
CMN$GRPT	REPORT	GBL	LIST	Global report definitions
CMN$GICR	IMSCRGN	GBL	LIST	IMS System Information
CMN$GIDO	IMSOVRD	GBL_DBD	LIST	IMS DBD Overrides
CMN$GIPO	IMSOVRD	GBL_PSB	LIST	IMS PSB Overrides
CMN$GOFM	FORMS	GBL	LIST	Global forms definitions
CMN$GDBP	DB2ADMIN	GBL_PHYS	LIST	Db2 Physical Subsystem
CMN$GDBL	DB2ADMIN	GBL_LOGL	LIST	Db2 Logical Subsystem
CMN$HLLA	HLLEXIT	ADMIN	LIST	HLLX admin/exit definitions
CMN$SCHD	SCHEDULE	SERVICE	LIST	Global scheduler information
CMN$3DSH	SKELS	GBL_HEDR	LIST	Global 3d-skels header information
CMN$3DSV	SKELS	GBL_VAR	LIST	Global 3d-skels variables

Package Records

DD Name	Service	Scope	Message	Description
CMN$PPRM	PACKAGE	GEN_PRMS	LIST	Package Information
CMN$PDSC	PACKAGE	GEN_DESC	LIST	Package Description
CMN$PIMI	PACKAGE	IMP_INST	LIST	Implementation Inst.
CMN$PSCD	PACKAGE	SCH_RECS	LIST	Scheduling Information
CMN$PLTP	LIBTYPE	PKG	LIST	Library Types
CMN$PAPR	APPROVER	PKG	LIST	Approval/Reject/Checkoff
CMN$PPPK	PACKAGE	PRT_PKGS	LIST	Participating Packages
CMN$PAAR	PACKAGE	AFF_APLS	LIST	Affected Applications
CMN$PRBR	PACKAGE	REASONS	LIST	Revert/Backout Reasons
CMN$PURC	PACKAGE	USR_RECS	LIST	Package User Records

Package "I" Records

DD Name	Service	Scope	Message	Description
CMN$PSCC	CMPONENT	PKG_COMP	LIST	Source components
CMN$PILC	CMPONENT	PKG_LOD	LIST	Load Information
CMN$PUTL	CMPONENT	PKG_UTIL	LIST	Scratch/Rename info.
CMN$PISC	CMPONENT	SRC_INCL	LIST	Source to Includes
CMN$PCUW	CMPONENT	PKG_WRKL	LIST	Component Work List
CMN$PICR	PACKAGE	IMS_CRGN	LIST	IMS Control Region
CMN$PIAS	PACKAGE	IMS_ACB	LIST	IMS ACB statements
CMN$PIDO	IMSOVRD	PKG_DBD	LIST	IMS DBD overrides
CMN$PIPO	IMSOVRD	PKG_PSB	LIST	IMS PSB Overrides
CMN$PLNK	PACKAGE	PKG_LINK	LIST	Linked Packages
CMN$PINC	CMPONENT	LOD_SUBR	LIST	Load to included CSECTs
CMN$PSIT	SITE	PKG	LIST	Site Information
CMN$PPRH	PACKAGE	PRM_HIST	LIST	Package promote history
CMN$PPCH	CMPONENT	PRM_HIST	LIST	Component promote history

Application Records

DD Name	Service	Scope	Message	Description
CMN$APRM	PARMS	APL	LIST	Application parameters
CMN$ASIT	SITE	APL	LIST	Sites, Jobcards
CMN$ALTP	LIBTYPE	APL	LIST	Library Types
CMN$ALNG	LANGUAGE	APL	LIST	Language Names
CMN$AAPR	APPROVER	APL	LIST	Approval List
CMN$ADBA	DB2ADMIN	APL_ACTV	LIST	Application Db2 active libraries

DD Name	Service	Scope	Message	Description
CMN$APRC	PROCS	APL	LIST	Procedure Names
CMN$ARPT	REPORT	APL	LIST	Application report definitions
CMN$AICR	IMSCRGN	APL	LIST	Application IMS control regions
CMN$AIDO	IMSOVRD	APL_DBD	LIST	Application IMS DBD overrides
CMN$AIPO	IMSOVRD	APL_PSB	LIST	Application IMS PSB overrides
CMN$BASL	BASELIB	SERVICE	LIST	Baseline Libraries
CMN$PRDL	PRODLIB	SERVICE	LIST	Production Libraries
CMN$PRMS	PROMLIB	SITE	LIST	Promotion Site Information
CMN$PRML	PROMLIB	LIBRARY	LIST	Promotion Site Libraries

ERO Records

DD Name	Service	Scope	Message	Description
CMN$RLSM	RLSMRLSE	SERVICE	LIST	Release Data
CMN$RGAP	RLSMAPPR	GLOBAL	LIST	Release Global Approvers
CMN$RASC	RLSMAPPR	ASCAPPRV	LIST	Release Area Approvers
CMN$RARE	RLSMAREA	SERVICE	LIST	Release Area Data
CMN$RAPL	RLSMAPPL	SERVICE	LIST	Release Application Data
CMN$RLTP	RLSMLTYP	SERVICE	LIST	Release Library Type
CMN$RAAP	RLSMAPPR	RELEASE	LIST	Release security entity data
CMN$RPRD	RLSMRLSE	PRIOR	LIST	Release Prior Release
CMN$RRBR	RLSMRLSE	REASONS	LIST	ERO revert/backout reasons
CMN$RSYD	RLSMAPPL	SYSLIB	LIST	Release Application Syslib
CMN$RPRM	RLSMAPPL	PROMOTE	LIST	Release Promotion
CMN$RCLK	RLSMAREA	CMP_LOCK	LIST	Release Component Lock
CMN$RPKG	RLSMRLSE	PACKAGE	LIST	ERO release packages

Component Records

DD Name	Service	Scope	Message	Description
CMN$GCGD	CMPONENT	GBL_CDSC	LIST	Global Description
CMN$ACGD	CMPONENT	APL_CDSC	LIST	Application Description
CMN$GCSC	CMPONENT	GBL_SECR	LIST	Component Security
CMN$ACSC	CMPONENT	APL_SECR	LIST	Application Security
CMN$CHIS	CMPONENT	HISTORY	LIST	Component History
CMN$GDCP	CMPONENT	GBL_DPRC	LIST	Designated Compile Procs
CMN$ADCP	CMPONENT	APL_DPRC	LIST	Application Designated Procs

PARM Options

No PARM parameter is required in the EXEC statement for CMNPMLOD except when invoking the LIST function or the Unload function to extract records to load into Db2 or another database.

Return Codes and Error Messages

This table describes return codes for CMNPMLOD.

Return Code	Description
04	There was a B37 condition for one or more output files, but processing continued for other output DD statements. See JESMSGLG.

Reporting

This is an example of EXEPMLOD job output at the JESMSGLG DD statement.

```
******************************** TOP OF DATA ********************************************************************
                   J E S 2  J O B  L O G  --  S Y S T E M  C 0 0 1  --  N O D E  M P 3 J E S 2

19.02.02 J0620680 ---- SUNDAY,    22 MAR 2015 ----
19.02.02 J0620680  IRR010I  USERID USER015  IS ASSIGNED TO THIS JOB.
19.02.02 J0620680  ICH70001I USER015  LAST ACCESS AT 18:47:31 ON SUNDAY, MARCH 22, 2015
19.02.02 J0620680  $HASP373 USER015G STARTED - INIT 1    - CLASS A        - SYS C001
19.02.04 J0620680  +SER6702I SERNET XML Dsect Cross Reference. Created: 30 Jan 2015 16:48:44
19.02.04 J0620680  +SER6710I CMNPMSEQ processing - 00001402 records read - key  JHFS 000000
19.02.04 J0620680  +SER6708I CMN$GPRM Closed - 00000145 records written
19.02.04 J0620680  -                                          --TIMINGS (MINS.)--            -----PAGING COUNTS----
19.02.04 J0620680  -STEPNAME PROCSTEP    RC   EXCP   CONN    TCB    SRB  CLOCK   SERV  WORKLOAD  PAGE  SWAP   VIO SWAPS
19.02.04 J0620680  -CMNPMLD              00    391    290    .00    .00     .0  51156  BATCH        0     0     0     0
19.02.04 J0620680  -USER015G ENDED.  NAME-PACKAGE CACHE LOAD   TOTAL TCB CPU TIME=    .00 TOTAL ELAPSED TIME=    .0
19.02.04 J0620680  $HASP395 USER015G ENDED
------ JES2 JOB STATISTICS ------
  22 MAR 2015 JOB EXECUTION DATE
          128 CARDS READ
          189 SYSOUT PRINT RECORDS
            0 SYSOUT PUNCH RECORDS
           11 SYSOUT SPOOL KBYTES
         0.04 MINUTES EXECUTION TIME
******************************** BOTTOM OF DATA *****************************************************************
```

Sample CMNPMLOD Extract

This is the first 16 records of CMNPMLOD program output into the data set used at the CMN$GPRC DD statement.

```
<?xml version="1.0"?>
 <service name="PROCS">
 <scope name="GBL">
 <message name="LIST">
<result>
 <procName>CMNCOB2</procName>
 <language>COBOL2</language>
 <procDesc>Stage COBOL2 source</procDesc>
 <displayOrderNo>00000</displayOrderNo>
 </result>
<result>
 <procName>CMNSQL</procName>
 <language>SQL</language>
 <procDesc>Translate, compile, and link SQL Stored Proc</procDesc>
 <displayOrderNo>00000</displayOrderNo>
 </result>
<result>
 <procName>CMNMAPGN</procName>
 <language>ASM</language>
 <procDesc>CICS BMS MAP Gen</procDesc>
 <displayOrderNo>00000</displayOrderNo>
 </result>
```

Notes or Comments

- Execution parameter REGION=0M is suggested. The storage required to process up to 64 extract files can be substantial.
- DD statements CMNPMAST, CMNCMPNT, and CMNCMPNL are optional, but you must input either the package master file or the two component masters.
  - If you are extracting data from the package master only, you can omit DD statements CMNCMPNT and CMNCMPNL.
  - If you are extracting data from the component masters only, you can omit DD statement CMNPMAST.
- Use BLSR to reduce EXCP on the VSAM package master and to shorten job runtimes. Specify BLSR in your JCL as follows:

```
//CMNPMAST  DD SUBSYS=(BLSR,'DDNAME=CMNPMALT','STRNO=255')
//CMNPMALT  DD DISP=SHR,DSN=CMNTP.S6.V810T06.CMNZMF.CMNPMAST  * Package Master
```

- Output extract XML files all have DCB attribute LRECL=4096. However, you can use RECFM FB or VB.
  - In FB files, XML statements occupy the complete 4096 record, with a record break on a new result.
  - In VB files, each XML tag is on separate record.
- XML extract file space requirements depend broadly on the type of data being extracted.
  - For global and application data extracts, a few tracks should suffice depending on the number of library types, sites, applications, etc. in your ChangeMan ZMF system.
  - For package data extracts, the space required is proportional to the number of packages in your system. As an example, for PACKAGE PARMS LIST allow 1 cylinder of standard 3390 space per 90 packages on the package master.

- If a B37 abend occurs on an XML extract file, the extract to the affected file is suspended, but extracts to other files continue. The job ends with RC=04.

Sample CMNPMLOD LIST

This is the (minimal) JCL required:

```
//PMLODLST EXEC PGM=CMNPMLOD,PARM='LIST'
//STEPLIB  DD   DISP=SHR,DSN=CMNTP.CMN820.LOAD
//         DD   DISP=SHR,DSN=CMNTP.SER820.LOAD
//SYSPRINT DD SYSOUT=*
```

Here are the first few records of the SYSPRINT output:.

```
******************************** TOP OF DATA ***********************************************

 List of service output currently supported by CMNPMLOD at 8.2.0 follows:

 DDname     Service    Scope      Message    Unloadable   Description
 --------   --------   --------   --------   ----------   ----------------------------------

 CMN$GPRM : PARMS      GBL        LIST          Yes       Global parameters
 CMN$GSIT : SITE       GBL        LIST          Yes       Global sites
 CMN$GPRC : PROCS      GBL        LIST          Yes       Global procedures
 CMN$GLTP : LIBTYPE    GBL        LIST          Yes       Global library types
 CMN$UFNS : FLDNAMES   SERVICE    LIST          Yes       Field name substitutions
 CMN$RESN : REASONS    SERVICE    LIST          Yes       Global reason code information
 CMN$GLNG : LANGUAGE   GBL        LIST          Yes       Global languages
 CMN$GRPT : REPORT     GBL        LIST          Yes       Global report definitions
 CMN$GICR : IMSCRGN    GBL        LIST          Yes       Global IMS control regions
 CMN$GIDO : IMSOVRD    GBL_DBD    LIST          Yes       Global IMS DBD overrides
 CMN$GIPO : IMSOVRD    GBL_PSB    LIST          Yes       Global IMS PSB overrides
 CMN$GOFM : FORMS      GBL        LIST          No        Global forms definitions
 CMN$GDBP : DB2ADMIN   GBL_PHYS   LIST          Yes       Global Db2 physical subsystems
```

Note the unloadable column specifies whether the record type can be extracted in a format compatible with Db2 LOAD.

CMNPMLOD - UNLOAD to Db2 Loadable Format

Standard CMNPMLOD produces XML as output. If you want to load package master/component master data into Db2, you can use PARM=UNLOAD to do this.

The prime purpose of CMNPMLOD is to extract package master/component master data and present it in a format that does not change with each release. The standard mechanism for doing this is to generate XML in the same way as the ZMF XML services. In this way each piece of data is tagged with the name associated with that data. This information can be parsed with no further input.

PARM=UNLOAD provides output in a format that can be directly loaded into Db2 (or any other DBMS).

This facility has been tailored specifically for use with Db2 in that the DDL and LOAD utility statements required to create and load a Db2 table with the results of the CMNPMLOD unload extract are generated at the same time as that output. If you are not going to use Db2, you can still make use of the LOAD utility statements to define the format of the output:

- Db2 users can use the PARM=UNLOAD execution parameter to generate package master record output along with the DDL and LOAD utility parameters that can be used to load the package master information directly into a Db2 table. This method

uses the least amount of DASD for the unload file but requires all columns to be loaded.

- Db2 users who want to load a subset of the available columns to a Db2 table can use the PARM=UNLOADFIXED execution parameter to generate fixed position data in the unload record along with associated DDL and LOAD utility parameters. The DDL can be modified to generate a table with the desired sub-selection columns. Similarly, the LOAD parameters can be modified to load just the columns of interest. This method uses more DASD but the unload file can be discarded once the load has completed.
- Non-Db2 users who want to load data to a database of choice can use PARM=UNLOADFIXED to produce fields at fixed locations in the output record and then use the sample DDL/LOAD parameters to build the utility control information they need to load to their target database.

We make use of the existing DD name method to select the data to be output. For example, if the DD statement CMN$ALTP is present, the program will generate output as provided by the libtype.apl.list service.

To generate Db2-loadable data, instead of xml, into the CMN$*xxxx* file you need to specify the execution parameter PARM=UNLOAD. For example:

```
//PMLOD   EXEC PGM=CMNPMLOD,PARM='UNLOAD'
//*
//CMNPMAST DD SUBSYS=(BLSR,'DDNAME=CMNPMALT','STRNO=255')
//CMNPMALT DD DISP=SHR,DSN=CMNTP.S7.CMNPMAST
//CMNPMSEQ DD DISP=SHR,DSN=CMNTP.S7.CMNPMAST
//CMNCMPNT DD DISP=SHR,DSN=CMNTP.S7.CMNCMPNT
//CMNCMPNL DD DISP=SHR,DSN=CMNTP.S7.CMNCMPNL
//MAPDATA  DD DISP=SHR,DSN=CMNTP.S7.MAPDATA
//SERPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//*
//CMN$ALTP DD DISP=(,CATLG),
//            DSN=CMNTP.PMLOD.ALTP.UNLOAD,
//            UNIT=SYSDA,SPACE=(CYL,(5,10),RLSE),
//            DCB=(RECFM=VB,LRECL=4096,BLKSIZE=0)
```

Note that the 4096 LRECL with a RECFM of VB will suffice for all service output, except for CMN$BASL where an LRECL of 12000 is recommended.

This execution will dynamically allocate two further data sets, namely DDL$ALTP and LOD$ALTP. They will be allocated to SYSOUT. However, if these DDnames are precoded in the JCL, those allocations are used instead. (See information on the sample EXEPMUNL member of the CMNZMF.CNTL distribution library below).

The first of these DDnames will contain the DDL required to define the table that will hold this data. In this example, the DDL is as follows (but will vary depending on the service output that has been requested):

```
DROP TABLESPACE dbname.CMN$ALTP;
     COMMIT WORK;
CREATE TABLESPACE CMN$ALTP IN dbname
            FREEPAGE 0 PCTFREE 10
            CLOSE NO BUFFERPOOL BP0
            USING STOGROUP SYSDEFLT
            SEGSIZE 32 LOCKSIZE PAGE;
     COMMIT WORK;
CREATE TABLE CMNx.CMN$ALTP
         (APPLNAME CHAR(4)
         ,LIBTYPE CHAR(3)
         ,LIKETYPE CHAR(1)
         ,MANAGEMENTCLASS CHAR(8)
```

```
            ,STORAGECLASS CHAR(8)
            ,UNITNAME CHAR(8)
            ,VOLUME CHAR(6)
            ,SPACETYPE CHAR(3)
            ,PRIMARYSPACE CHAR(8)
            ,SECONDARYSPACE CHAR(8)
            ,DIRBLOCKS CHAR(6)
            ,RECORDFORMAT CHAR(3)
            ,RECORDLENGTH CHAR(6)
            ,BLOCKSIZE CHAR(6)
            ,LIBRARYVERSION CHAR(1)
            ,ISPDSELIBTYPE CHAR(1)
            ,ISPDSLIBTYPE CHAR(1)
            ,ISSYSMANAGED CHAR(1)
            ,ISPDSEOBJECT CHAR(1)
            ,ISIMSLIBTYPE CHAR(1)
            ,ISSSVALLOWED CHAR(1)
            ,ISSSVENFORCED CHAR(1)
            ,ISDB2LIBTYPE CHAR(1)
            ,CHKOUTCOMPONENTGENDESC CHAR(1)
            ,CHKOUTACTIVITYFILE CHAR(1)
            ,DEFERSTAGELIBCREATION CHAR(1)
            ,INCLUDEUTILITYINFO CHAR(1)
            ,TARGETLOADLIBTYPE CHAR(3)
            ,TARGETACTIVITYFILE CHAR(3)
            ,LIBTYPEDESC VARCHAR(44)
            ,IMSENTITY CHAR(1)
            ,SSVOPTION CHAR(8)
            ,DDLSQLSUBTYPE CHAR(1)
            ,STOREDPROCSUBTYPE CHAR(1)
            ,TRIGGERSUBTYPE CHAR(1)
            ,PLANBINDCONTROLSUBTYPE CHAR(1)
            ,PACKAGEBINDCONTROLSUBTYPE CHAR(1)
            ,SQLSTOREDPROCDEFINITION CHAR(1)
            ,DBRMSUBTYPE CHAR(1)
            ,NATIVESQLSPDEFINITION CHAR(1)
            ,DB2SQLTERMINATIONCHAR CHAR(1)
            ,LIBRARYSEQUENCENO CHAR(3)
            ,ISHFSLIBTYPE CHAR(1)
            ,EATTR CHAR(1)
            ,DISPLAYORDERNO CHAR(5)
            )
IN dbname.CMN$ALTP;
     COMMIT WORK;
```

Column names are the same as the XML tag names. (If any tag name is greater then 30 bytes, which is the Db2 maximum length for a column name, it is truncated from the left.)

The default database name is *dbname* and the table qualifier is 'CMN*x*'. However these names may be changed by adding to the execution parameter. For example:

```
//PMLOD   EXEC PGM=CMNPMLOD,PARM='UNLOAD,SCD820,CMNI'
```

will replace the database name with SCD820 and the qualifier with CMNI

The second DDname, LOD$ALTP, contains the Db2 load utility parameters required to load this data to the table:

```
LOAD DATA INDDN UNLD     LOG NO  REPLACE  NOCOPYPEND
     EBCDIC  CCSID(01047,00000,00000) INTO TABLE
     "CMNx"."CMN$ALTP" (
      "APPLNAME"
           POSITION(*)           CHAR(4)
      ,"LIBTYPE"
           POSITION(*)           CHAR(3)
      ,"LIKETYPE"
```

```
     POSITION(*)           CHAR(1)
,"MANAGEMENTCLASS"
     POSITION(*)           CHAR(8)
,"STORAGECLASS"
     POSITION(*)           CHAR(8)
,"UNITNAME"
     POSITION(*)           CHAR(8)
,"VOLUME"
     POSITION(*)           CHAR(6)
,"SPACETYPE"
     POSITION(*)           CHAR(3)
,"PRIMARYSPACE"
     POSITION(*)           CHAR(8)
,"SECONDARYSPACE"
     POSITION(*)           CHAR(8)
,"DIRBLOCKS"
     POSITION(*)           CHAR(6)
,"RECORDFORMAT"
     POSITION(*)           CHAR(3)
,"RECORDLENGTH"
     POSITION(*)           CHAR(6)
,"BLOCKSIZE"
     POSITION(*)           CHAR(6)
,"LIBRARYVERSION"
     POSITION(*)           CHAR(1)
,"ISPDSELIBTYPE"
     POSITION(*)           CHAR(1)
,"ISPDSLIBTYPE"
     POSITION(*)           CHAR(1)
,"ISSYSMANAGED"
     POSITION(*)           CHAR(1)
,"ISPDSEOBJECT"
     POSITION(*)           CHAR(1)
,"ISIMSLIBTYPE"
     POSITION(*)           CHAR(1)
,"ISSSVALLOWED"
     POSITION(*)           CHAR(1)
,"ISSSVENFORCED"
     POSITION(*)           CHAR(1)
,"ISDB2LIBTYPE"
     POSITION(*)           CHAR(1)
,"CHKOUTCOMPONENTGENDESC"
     POSITION(*)           CHAR(1)
,"CHKOUTACTIVITYFILE"
     POSITION(*)           CHAR(1)
,"DEFERSTAGELIBCREATION"
     POSITION(*)           CHAR(1)
,"INCLUDEUTILITYINFO"
     POSITION(*)           CHAR(1)
,"TARGETLOADLIBTYPE"
     POSITION(*)           CHAR(3)
,"TARGETACTIVITYFILE"
     POSITION(*)           CHAR(3)
,"LIBTYPEDESC"
     POSITION(*)           VARCHAR
,"IMSENTITY"
     POSITION(*)           CHAR(1)
,"SSVOPTION"
     POSITION(*)           CHAR(8)
,"DDLSQLSUBTYPE"
     POSITION(*)           CHAR(1)
,"STOREDPROCSUBTYPE"
     POSITION(*)           CHAR(1)
,"TRIGGERSUBTYPE"
     POSITION(*)           CHAR(1)
,"PLANBINDCONTROLSUBTYPE"
     POSITION(*)           CHAR(1)
```

```
 ,"PACKAGEBINDCONTROLSUBTYPE"
      POSITION(*)           CHAR(1)
 ,"SQLSTOREDPROCDEFINITION"
      POSITION(*)           CHAR(1)
 ,"DBRMSUBTYPE"
      POSITION(*)           CHAR(1)
 ,"NATIVESQLSPDEFINITION"
      POSITION(*)           CHAR(1)
 ,"DB2SQLTERMINATIONCHAR"
      POSITION(*)           CHAR(1)
 ,"LIBRARYSEQUENCENO"
      POSITION(*)           CHAR(3)
 ,"ISHFSLIBTYPE"
      POSITION(*)           CHAR(1)
 ,"EATTR"
      POSITION(*)           CHAR(1)
 ,"DISPLAYORDERNO"
      POSITION(*)           CHAR(5)
 )
```

This format of output is variable in length. To save space any field over 16 bytes in length is presented as varchar. For example, for CMN$ADCP we have:

```
LOAD DATA INDDN UNLD     LOG NO  REPLACE  NOCOPYPEND
     EBCDIC  CCSID(01047,00000,00000) INTO TABLE
     "CMNx"."CMN$ADCP" (
      "COMPONENT"
           POSITION(*)           VARCHAR
      ,"COMPONENTTYPE"
           POSITION(*)           CHAR(3)
      ,"APPLNAME"
           POSITION(*)           CHAR(4)
      ,"BUILDPROC"
           POSITION(*)           CHAR(8)
      ,"COMPILEOPTIONS"
           POSITION(*)           VARCHAR
      ,"LINKOPTIONS"
           POSITION(*)           VARCHAR
      ,"LANGUAGE"
           POSITION(*)           CHAR(8)
      ,"USEDB2PRECOMPILEOPTION"
           POSITION(*)           CHAR(1)
      ,"FORCEASSIGNEDBUILDPROC"
           POSITION(*)           CHAR(1)
      ,"USEROPTION01"
           POSITION(*)           CHAR(1)
      ,"USEROPTION02"
           POSITION(*)           CHAR(1)
      ,"USEROPTION03"
           POSITION(*)           CHAR(1)
      ,"USEROPTION04"
           POSITION(*)           CHAR(1)
      ,"USEROPTION05"
           POSITION(*)           CHAR(1)
      ,"USEROPTION06"
           POSITION(*)           CHAR(1)
      ,"USEROPTION07"
           POSITION(*)           CHAR(1)
      ,"USEROPTION08"
           POSITION(*)           CHAR(1)
      ,"USEROPTION09"
           POSITION(*)           CHAR(1)
      ,"USEROPTION10"
           POSITION(*)           CHAR(1)
      ,"USEROPTION11"
           POSITION(*)           CHAR(1)
      ,"USEROPTION12"
```

```
     POSITION(*)           CHAR(1)
,"USEROPTION13"
     POSITION(*)           CHAR(1)
,"USEROPTION14"
     POSITION(*)           CHAR(1)
,"USEROPTION15"
     POSITION(*)           CHAR(1)
,"USEROPTION16"
     POSITION(*)           CHAR(1)
,"USEROPTION17"
     POSITION(*)           CHAR(1)
,"USEROPTION18"
     POSITION(*)           CHAR(1)
,"USEROPTION19"
     POSITION(*)           CHAR(1)
,"USEROPTION20"
     POSITION(*)           CHAR(1)
,"USEROPTION0101"
     POSITION(*)           CHAR(1)
,"USEROPTION0102"
     POSITION(*)           CHAR(1)
,"USEROPTION0103"
     POSITION(*)           CHAR(1)
,"USEROPTION0104"
     POSITION(*)           CHAR(1)
,"USEROPTION0105"
     POSITION(*)           CHAR(1)
,"USEROPTION0201"
     POSITION(*)           CHAR(2)
,"USEROPTION0202"
     POSITION(*)           CHAR(2)
,"USEROPTION0203"
     POSITION(*)           CHAR(2)
,"USEROPTION0301"
     POSITION(*)           CHAR(3)
,"USEROPTION0302"
     POSITION(*)           CHAR(3)
,"USEROPTION0303"
     POSITION(*)           CHAR(3)
,"USEROPTION0401"
     POSITION(*)           CHAR(4)
,"USEROPTION0402"
     POSITION(*)           CHAR(4)
,"USEROPTION0403"
     POSITION(*)           CHAR(4)
,"USEROPTION0801"
     POSITION(*)           CHAR(8)
,"USEROPTION0802"
     POSITION(*)           CHAR(8)
,"USEROPTION0803"
     POSITION(*)           CHAR(8)
,"USEROPTION0804"
     POSITION(*)           CHAR(8)
,"USEROPTION0805"
     POSITION(*)           CHAR(8)
,"USEROPTION1001"
     POSITION(*)           CHAR(10)
,"USEROPTION1002"
     POSITION(*)           CHAR(10)
,"USEROPTION1601"
     POSITION(*)           CHAR(16)
,"USEROPTION1602"
     POSITION(*)           CHAR(16)
,"USEROPTION3401"
     POSITION(*)           VARCHAR
,"USEROPTION3402"
     POSITION(*)           VARCHAR
```

```
 ,"USEROPTION4401"
      POSITION(*)           VARCHAR
 ,"USEROPTION4402"
      POSITION(*)           VARCHAR
 ,"USEROPTION6401"
      POSITION(*)           VARCHAR
 ,"USEROPTION6402"
      POSITION(*)           VARCHAR
 ,"USEROPTION6403"
      POSITION(*)           VARCHAR
 ,"USEROPTION6404"
      POSITION(*)           VARCHAR
 ,"USEROPTION6405"
      POSITION(*)           VARCHAR
 ,"USEROPTION7201"
      POSITION(*)           VARCHAR
 ,"USEROPTION7202"
      POSITION(*)           VARCHAR
 ,"USEROPTION7203"
      POSITION(*)           VARCHAR
 ,"USEROPTION7204"
      POSITION(*)           VARCHAR
 ,"USEROPTION7205"
      POSITION(*)           VARCHAR
 )
```

The Db2 load utility works out the location of each field to account for the varchar nature of much of the data. This format is typically of use only if you are using Db2 and if you will be loading all columns to your table. If desired, you can work these positions out for yourself, each CHAR data item is exactly the length as specified, each VARCHAR begins with a 2-byte length followed by the data item with the length just specified (that is, the length does not include the length 2 bytes. For example, XL2'0008',CL8'12345678'), each value follows on immediately from the one before. This data format takes up the least amount of space in the output extract file.

The sample EXEPMUNL member of the CMNZMF.CNTL distribution library is provided to show how to extract, create a table, and load it in one job, discarding the extract. For example:

```
//*       ddnames are processed sequentially.
      //*
      //* The output file, CMN$xxxx, is in a format which may be used
      //* to immediately load a DB2 table.
      //*
      //* The DDL$xxxx file contain DDL which can be used to create a table
      //* to hold the output fields.
      //*
      //* The LOD$xxxx contains a DB2 load command for this data but it can
      //* also be used to show the format of the output file records for
      //* use by other DBMS load processes.
      //*
      //* If no records are found for the requested record type then
      //* CMNPMLOD will end with rc=6 to prevent further steps from
      //* executing.
      //*
      //JOBLIB   DD  DISP=SHR,DSN=somnode.CMNZMF.LOAD
      //         DD  DISP=SHR,DSN=somnode.SERCOMC.LOAD
      //         DD  DISP=SHR,DSN=DSNvrm.SDSNEXIT
      //         DD  DISP=SHR,DSN=DSNvrm.SDSNLOAD
      //*
      //* Execute the ZMF extract utility with the UNLOAD parm
      //*
      //PMLOD   EXEC PGM=CMNPMLOD,REGION=0M,
      //             PARM='UNLOAD,datbase,qual'
      //*
```

```
//CMNPMAST DD  SUBSYS=(BLSR,'DDNAME=CMNPMALT','STRNO=255')
//CMNPMALT DD  DISP=SHR,DSN=somnode.CMNZMF.CMNPMAST
//CMNPMSEQ DD  DISP=SHR,DSN=somnode.CMNZMF.CMNPMAST
//CMNCMPNT DD  DISP=SHR,DSN=somnode.CMNZMF.CMNCMPNT
//CMNCMPNL DD  DISP=SHR,DSN=somnode.CMNZMF.CMNCMPNL
//*
//* XML dataspace backup
//*
//MAPDATA  DD  DISP=SHR,DSN=somnode.SERCOMC.MAPDATA
//*
//* Traces and dumps
//*
//SERPRINT DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//*
//* DB2 unload output
//*
//CMN$xxxx DD DISP=(,PASS),DSN=&&UNLOAD,
//            UNIT=SYSDA,SPACE=(CYL,(ppp,sss),RLSE),
//            DCB=(RECFM=VB,LRECL=4096,BLKSIZE=0)
//*CMN$BASL   DCB=(RECFM=VB,LRECL=12000,BLKSIZE=0)
//*
//* Sample Drop/Create DDL
//*
//DDL$xxxx DD DISP=(,PASS),DSN=&&DDL,
//            UNIT=SYSDA,SPACE=(TRK,(1,1)),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=0)
//*
//* Sample DB2 LOAD command
//*
//LOD$xxxx DD DISP=(,PASS),DSN=&&LOAD,
//            UNIT=SYSDA,SPACE=(TRK,(1,1)),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=0)
//*
//* Drop/Create the table required to hold this data
//*
//CREATE  EXEC PGM=IKJEFT01,COND=(4,LT),
//             DYNAMNBR=20
//SYSTSPRT  DD SYSOUT=*
//SYSTSIN   DD *
 DSN SYSTEM(ssss)
 RUN  PROGRAM(DSNTIAD) PLAN(DSNTIAvr) -
      LIB('DB2ssss.RUNLIB.LOAD')
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DISP=(OLD,DELETE),DSN=&&DDL
//*
//* Load the data into the table
//*
//LOAD     EXEC PGM=DSNUTILB,
//             PARM='ssss'
//SYSPRINT  DD SYSOUT=*
//UNLD      DD DISP=(OLD,DELETE),DSN=&&UNLOAD
//SYSUT1    DD UNIT=SYSDA,SPACE=(CYL,10)
//SORTOUT   DD UNIT=SYSDA,SPACE=(CYL,10)
//SYSMAP    DD UNIT=SYSDA,SPACE=(CYL,10)
//UTPRINT   DD SYSOUT=*
//SYSIN     DD DISP=(OLD,DELETE),DSN=&&LOAD
```

An easier way to extract specific items of data (at the cost of using more DASD for the extract), or to extract data for loading into a DBMS other than Db2, is to force each item (whether CHAR or VARCHAR) to occupy the maximum width. This format is requested using the PARM='UNLOADFIXED' execution parameter. For example:

```
//PMLOD   EXEC PGM=CMNPMLOD,PARM='UNLOADFIXED'
```

or

```
//PMLOD   EXEC PGM=CMNPMLOD,PARM='UNLOADFIXED,SCD820,CMNI'
```

Using this mechanism, for example, the format of the LOAD parameters produced in the LOD$ALTP ddname now looks like this (and the data output to CMN$ALTP matches this different format):

```
LOAD DATA INDDN UNLD     LOG NO  REPLACE  NOCOPYPEND
     EBCDIC  CCSID(01047,00000,00000) INTO TABLE
     "CMNx"."CMN$ALTP" (
      "APPLNAME"
           POSITION(00001:00004) CHAR(4)
      ,"LIBTYPE"
           POSITION(00005:00007) CHAR(3)
      ,"LIKETYPE"
           POSITION(00008:00008) CHAR(1)
      ,"MANAGEMENTCLASS"
           POSITION(00009:00016) CHAR(8)
      ,"STORAGECLASS"
           POSITION(00017:00024) CHAR(8)
      ,"UNITNAME"
           POSITION(00025:00032) CHAR(8)
      ,"VOLUME"
           POSITION(00033:00038) CHAR(6)
      ,"SPACETYPE"
           POSITION(00039:00041) CHAR(3)
      ,"PRIMARYSPACE"
           POSITION(00042:00049) CHAR(8)
     ,"SECONDARYSPACE"
          POSITION(00050:00057) CHAR(8)
     ,"DIRBLOCKS"
          POSITION(00058:00063) CHAR(6)
     ,"RECORDFORMAT"
          POSITION(00064:00066) CHAR(3)
     ,"RECORDLENGTH"
          POSITION(00067:00072) CHAR(6)
     ,"BLOCKSIZE"
          POSITION(00073:00078) CHAR(6)
     ,"LIBRARYVERSION"
          POSITION(00079:00079) CHAR(1)
     ,"ISPDSELIBTYPE"
          POSITION(00080:00080) CHAR(1)
     ,"ISPDSLIBTYPE"
          POSITION(00081:00081) CHAR(1)
     ,"ISSYSMANAGED"
          POSITION(00082:00082) CHAR(1)
     ,"ISPDSEOBJECT"
          POSITION(00083:00083) CHAR(1)
     ,"ISIMSLIBTYPE"
          POSITION(00084:00084) CHAR(1)
     ,"ISSSVALLOWED"
          POSITION(00085:00085) CHAR(1)
     ,"ISSSVENFORCED"
          POSITION(00086:00086) CHAR(1)
     ,"ISDB2LIBTYPE"
          POSITION(00087:00087) CHAR(1)
     ,"CHKOUTCOMPONENTGENDESC"
          POSITION(00088:00088) CHAR(1)
     ,"CHKOUTACTIVITYFILE"
          POSITION(00089:00089) CHAR(1)
     ,"DEFERSTAGELIBCREATION"
          POSITION(00090:00090) CHAR(1)
     ,"INCLUDEUTILITYINFO"
          POSITION(00091:00091) CHAR(1)
     ,"TARGETLOADLIBTYPE"
          POSITION(00092:00094) CHAR(3)
     ,"TARGETACTIVITYFILE"
```

```
     POSITION(00095:00097) CHAR(3)
,"LIBTYPEDESC"
     POSITION(00098) VARCHAR
,"IMSENTITY"
     POSITION(00144:00144) CHAR(1)
,"SSVOPTION"
     POSITION(00145:00152) CHAR(8)
,"DDLSQLSUBTYPE"
     POSITION(00153:00153) CHAR(1)
,"STOREDPROCSUBTYPE"
     POSITION(00154:00154) CHAR(1)
,"TRIGGERSUBTYPE"
     POSITION(00155:00155) CHAR(1)
,"PLANBINDCONTROLSUBTYPE"
     POSITION(00156:00156) CHAR(1)
,"PACKAGEBINDCONTROLSUBTYPE"
     POSITION(00157:00157) CHAR(1)
,"SQLSTOREDPROCDEFINITION"
     POSITION(00158:00158) CHAR(1)
,"DBRMSUBTYPE"
     POSITION(00159:00159) CHAR(1)
,"NATIVESQLSPDEFINITION"
     POSITION(00160:00160) CHAR(1)
,"DB2SQLTERMINATIONCHAR"
     POSITION(00161:00161) CHAR(1)
,"LIBRARYSEQUENCENO"
     POSITION(00162:00164) CHAR(3)
,"ISHFSLIBTYPE"
     POSITION(00165:00165) CHAR(1)
,"EATTR"
     POSITION(00166:00166) CHAR(1)
,"DISPLAYORDERNO"
     POSITION(00167:00171) CHAR(5)
)
```

Note that the field positions are now each at an explicit, fixed, location in the extract record (as given by the POSITION sub-parameter).

A comparison of DASD usage for the worst case scenario, that is, CMN$CHIS, shows the following for a test subsystem, which had 328,574 component master history records at the time these extracts were run:

Standard XML: 510 Cyls
UNLOAD: 179 Cyls
UNLOADFIXED: 913 Cyls

Other records, less populous and with fewer fields per record, will not show such a wide spread.

CMNSRCPP - Assembler Macro Discovery

The CMNSRCPP utility program discovers assembler macros in assembler source code. It can also discover copybooks in assembler source code and may be used to replace CMNWRITE for this function. CMNSRCPP executes after the assembly (unlike CMNWRITE which executes before the assembly). CMNSRCPP processes two kinds of sidefile:

- ADATA - Information about both macros and copybooks included by the assembler are passed in the SYSADATA output to CMNSRCPP. CMNSRCPP then records the details as source-to-copy records in the current package.

- Output produced by the assembler LIBRARY exit. We have written our own assembler LIBRARY exit, CMNHLALX, which will pass on information only about macros to CMNSRCPP. This mechanism allows CMNWRITE to be used as well as CMNSRCPP in case you rely on some other feature of CMNWRITE (that is, other than the copybook detection feature). So, in this case, CMNWRITE will detect and write source-to-copy records for copybooks and CMNSRCPP will add source-to-copy records for macros.

The output from CMNSRCPP (which appears after the assembler output) looks a lot like the copybook analysis produced by CMNWRITE. The SYSIN to this utility is similar too with the TYP= keyword assigning library types to syslib libraries. The only significant differences in SYSIN are:

- CLR=YES or NO

  CLR=YES is the default. This parameter tells CMNSRCPP whether (YES) to delete all pre-existing source-to-copy records for the component in the current package before proceeding. That is, we are using CMNSCRPP to record both macros and copybooks.

  CLR=NO means that pre-existing source-to-copy records will not be deleted. CLR=NO should only be specified where CMNWRITE will have cleared the source-to-copy records before adding entries for copybooks. CMNSRCPP then adds entries for macros only.

- XCL=*library.name*

  This parameter tells CMNSRCPP to ignore macros and copybooks drawn from this library. It allows us to ignore library macros and copybooks over which ZMF has no control. In our skeletons we currently have these libraries specified:

  XCL=SYS1.MACLIB

  XCL=SYS1.MODGEN

  XCL=TCPIP.SEZACMAC

CMNSSIDN - LINK EDIT Control Preparation

Program CMNSSIDN prepares link edit control statements for the link edit step in stage, recompile, and relink.

If there are no link edit control statements for the object or load being processed, program CMNSSIDN fabricates the necessary statements and passes them to the subsequent link edit step. The fabricated link edit control statement are not kept after the link edit step.

If you provide link edit control statements in a package staging library or in a baseline member, CMNSSIDN processes those control statement, sometimes modifying them, and passes them to the subsequent link edit step. The control statements in the staging or baseline member are not changed.

NOTE File tailoring for skeleton CMN$$LNK may add INCLUDE statements for CICS language interface modules to the link edit control passed from program CMNSSIDN and input the SYSLIN ddname for the linkage editor.

Whether CMNSSIDN modifies existing link edit control statements, or how it fabricates control statements from scratch, is determined by:

- Object created by previous compile or recompile processing.
- CMNSSIDN program execution parameters included in the JCL when skeleton CMNSSIDN is file tailored.
- CMNSSIDN program SYSIN keyword options included in the JCL when skeleton CMNSSIDN is file tailored.

CMNSSIDN Input

- Object code in a sequential file from a compile step.
- Link edit control statements from a dynamically allocated staging or baseline library.
- Optional program execution parameters.
- Keyword options read through SYSIN.

Output

Link edit control statements ready for a link edit step.

Sample JCL

This is a sample job fragment that illustrates what a CMNSSIDN step can look like. This JCL was created from skeleton CMN$$SSI by ISPF file tailoring.

```
//SSIDN   EXEC PGM=CMNSSIDN,   *** PROCESS LINK-EDIT CONTROL CARDS
//             COND=(4,LT)
//SYSPRINT DD  DISP=(,PASS),DSN=&&LIST40S1,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//             DCB=(RECFM=FA,LRECL=133,BLKSIZE=0)
//SYSUDUMP DD  SYSOUT=*
//ABNLIGNR DD  DUMMY
//OBJ      DD  DUMMY
//LCT      DD  DISP=(,PASS),DSN=&&LCT,
//             UNIT=SYSDA,SPACE=(TRK,(1,5)),
//             DCB=(RECFM=F,LRECL=80,BLKSIZE=0)
//STG      DD  DISP=(,PASS),DSN=&&NULLLCT,
//             UNIT=SYSDA,SPACE=(TRK,(1,1,1),RLSE),
//             DCB=(DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=0)
//SYSIN    DD  *
BAS=CMNTP.S6.V810.BASE.ACTP.LCT
LCT=ACPSRS00
SSI=67BCF0C2
PKG=ACTP000038
RLK=Y
UIL=Y
OPT=CALL
```

DD Statements

This table describes DD statements for CMNSSIDN.

DDNAME	I/O	Purpose
OBJ	Input	Sequential file containing object code from a compile step. This DD statement is omitted for relink.
LCT	Output	Sequential file containing control statements for a linkage edit or binder step.
STG	Input	Staging library for link edit control members.
SYSIN	Input	File containing 80-byte keyword option records.
SYSPRINT	Output	File that displays information from the execution of CMNSSIDN: See "Reporting" on page 187.

Program Execution Parameters

The PARM= statement is not required in CMNSSIDN execution JCL. Any parameter that can be input though the program PARM= statement can be input through a SYSIN control statement using the OPT= keyword. If a parameter is input through both the PARM= statement and an OPT= SYSIN control statement, the SYSIN control statement takes precedence.

This table describes program parameters for program CMNSSIDN.

Parameter	Use	Description
CALL	Optional	Pass INCLUDE statements found in staging or baseline link edit control member to the output file at ddname LCT. Default: Omitting this parameter and the NCAL parameter is the same as coding CALL.
NCAL	Optional	Do not pass INCLUDE statements found in staging or baseline link edit control member to the output file at ddname LCT. Default: Omitting this parameter and the CALL parameter is the same as coding CALL.
NAME	Optional	Pass NAME statements found in staging or baseline link edit control member to the output file at ddname LCT. If no NAME statement is found in a stored link edit control member, or if there is no stored member, fabricate a NAME statement and write to ddname LCT. Default: Omitting this parameter and the NONAME parameter is the same as coding NAME.
NONAME	Optional	Do not pass NAME statements found in staging or baseline link edit control members to the output file at ddname LCT. Suppress fabrication of NAME statement if no NAME statement is found in a stored link edit control member, or if there is no stored member. Default: Omitting this parameter and the NAME parameter is the same as coding NAME.

DLITASM	Optional	Generate these link edit control statements and write to the output LCT file.
		`INCLUDE SYSLIB(DFSLI000)`
		`  ENTRY DLITASM`

Parameter	Use	Description

DLITCBL	Optional	Generate these link edit control statements and write to the output LCT file.
		`INCLUDE SYSLIB(DFSLI000)`
		`  ENTRY DLITCBL`

DLITPLI	Optional	Generate these link edit control statements and write to the output LCT file.
		`INCLUDE SYSLIB(DFSLI000)`
		`  ENTRY DLITPLI`

OBJECT	Optional	Change object processing as follows: ■ Copy object code from ddname OBJ to ddname LCT. ■ Fabricate SETSSI and IDENTIFY statements and write to ddname LCT. ■ Copy any non-object from ddname OBJ to ddname LCT. Non-object in an object deck is usually a NAME link edit control statement generated by the Easytrieve compiler or by the COBOL compiler when the NAME option is used. Use the OBJECT parameter when staging or recompiling Easytrieve source or COBOL source when the NAME option of the COBOL compiler is used.

SYSIN Control Statements

CMNSSIDN keyword options are input to the program through the SYSIN ddname.

- Keyword options must start in position 1.
- A SYSIN record should contain only one keyword option.
- Blank SYSIN records are not permitted.
- Comment records are designated by * in position 1.

This table describes keyword options input to CMNSSIDN through the SYSIN ddname.

Option	Use	Description
* in Position 1	Optional	Denotes a comment.
BAS=*library*	Required	Specifies a baseline library for link edit control members.
CST=Y	Optional	Forces CMNSSIDN use the first CSECT name in the object ESD for the generated NAME statement written to ddname LCT. Default: The default for this option is CST=N.
LCT=*member*	Required	Specifies a link edit control member to input to program CMNSSIDN. Default: If you omit this control statement, the output load module name will be set to TEMPNAME.
NID=*csect*	Optional	Suppresses generation of an IDENTIFY statement for the specified CSECT. Up to 64 NID= control statements can be input to CMNSSIDN.

Option	Use	Description

OPT=*parameter*	Optional	Inputs program execution parameters through the SYSIN ddname.
		Program execution parameters are described in "Program Execution Parameters" on page 171. Example:
		OPT=NCAL
		Note: Each OPT= keyword specifies only one CMNSSIDN execution parameter, but there can be multiple OPT= keyword option records input to SYSIN. The following are functionally equivalent:
		`PARM='NAME,CALL,OBJECT'`
		...and...
		`//SYSIN DD *`
		`OPT=NAME`
		`OPT=CALL`
		`OPT=OBJECT`

PKG=*packageID*	Required	Specifies the package ID of the component being processed. The package ID is part of the ChangeMan ZMF fingerprint that CMNSSIDN creates for the IDENTIFY statement that is fabricated and written to ddname LCT. Default: If you omit this control statement, the package ID in the fingerprint is set to 10 spaces.
RLK=Y	Optional	Indicates that there is no object input to CMNSSIDN. Default: The default for this option is RLK=N.
RMB=*csect*	Optional	Indicates that package audit auto resolve has found a CSECT that must be replaced in the composite load module named in LCT=*member.* If there is no link edit control for LCT=*member*, then CMNSSIDN fabricates a REPLACE statement for the specified CSECT and writes the statement to ddname LCT. See "INCLIB and CMNSSIDN" on page 173.
SSI=*hexvalue*	Required	Specifies the hexadecimal value in the SETSSI statement written to ddname LCT. This number is also included in the ChangeMan ZMF fingerprint in the IDENTIFY statement fabricated by CMNSSIDN and written to ddname LCT. Default: If you omit this control statement, the SETSSI in the fingerprint is set to zeros.
UIL=Y	Optional	Indicates when CMNSSIDN fabricates a REPLACE link edit control statement, it will fabricate an INCLUDE INCLIB(*member*) rather than INCLUDE SYSLIB(*member*) and write it to ddname LCT. See "INCLIB and CMNSSIDN" on page 173. Default: The default for this option is UIL=N.

INCLIB and CMNSSIDN

Skeleton CMN$$ILL builds a library concatenation at ddname INCLIB for relink job JCL. INCLIB contains staging, promotion, and baseline libraries for the relink target load library type.

However, ddname INCLIB is not always referenced when a relink is executed. CMNSSIDN fabricates an INCLUDE INCLIB(*member*) statement when:

1. A relink job is initiated by package audit auto resolve to replace one or more statically linked subprograms in composite load module *member*.
2. There are no link edit control statements for *member* in baseline or staging libraries. (The composite load module *member* was created with the Automatic Call Library facility of the linkage editor when *member* source was staged or recompiled.)

Return Codes and Error Messages

This table describes user abend codes for program CMNSSIDN.

Code	Cause
S000 U0005	Unable to open //SYSPRINT.
S000 U0006	Unable to open //SYSIN.
S000 U0007	Unable to open //OBJ when PARM=OBJECT or OPT=OBJECT in //SYSIN is specified.
S000 U0008	Unable to open //LCT.
S000 U0009	Read error on baseline or staging LCT member.

Reporting

Program CMNSSIDN reports input keyword options, program execution parameters, what link control statement libraries it used, and the output link edit control statements it wrote to output ddname LCT. The report is written to the SYSPRINT ddname.

This is an example of the report.

```
*******************************************************************************
* DDNAME: SSIDN.SYSPRINT                                                      *
*******************************************************************************

ChangeMan(R) ZMF      CMNSSIDN - 8.1.0  TUESDAY FEBRUARY 24, 2015  20:46:47
 PARM=''
SYSIN: BAS=CMNTP.S6.V810.BASE.ACTP.LCT
SYSIN: LCT=ACPSRC1A
SYSIN: SSI=67BCDAA5
SYSIN: PKG=ACTP000038
SYSIN: RLK=
SYSIN: UIL=
SYSIN: OPT=CALL
Options compiled from PARM/SYSIN follow:
 NAME        - Allow "NAME" directive.
 CALL        - Allow "INCLUDE" directives.
END OF DATA ON "OBJ" DETECTED
STAGING "LCT" OPENED
STAGING "LCT" MEMBER NOT FOUND
ATTEMPTING TO ALLOCATE BASELINE "LCT"
BASELINE "LCT" ALLOCATED
BASELINE "LCT" OPENED
BASELINE "LCT" MEMBER NOT FOUND
FABRICATING LCT CARDS FROM SCRATCH
       <...+....1....+....2....+....3....+....4....+....5....+....6....+....7.>.
LCT:           SETSSI 67BCDAA5
LCT:         IDENTIFY ACPSRC1A('ACPSRC1A/67BCDAA5/ACTP000038')
LCT:            NAME  ACPSRC1A(R)
```

CMNSSIDN Examples

- **Stage simple program without link edit control member**

Input LCT	None

Output LCT	FABRICATING LCT CARDS FROM SCRATCH
	`<...+....1....+....2....+....3....+....4....+....5....+`
	`LCT:  SETSSI 67BCDAA5`
	`LCT:  IDENTIFY ACPSRC1A('ACPSRC1A/67BCDAA5/ACTP000038')`
	`LCT:  NAME  ACPSRC1A(R)`

- **Stage simple program with link edit control member**

Input LCT	`<...+....1....+....2....+....3....+....4....+....5....+` `LCT:  NAME  ACPSRS5C(R)`

Output LCT	PROCESSING MEMBER IN BASELINE "LCT"
	`<...+....1....+....2....+....3....+....4....+....5....+`
	`LCT:  SETSSI 53F61C58`
	`LCT:  IDENTIFY ACPSRS5C('ACPSRS5C/53F61C58/ACTP000082')`
	`LCT:  NAME  ACPSRS5C(R)`

- **Relink composite load using link edit control member**

Input LCT	`<...+....1....+....2....+....3....+....4....+....5....+`
	`LCT:  INCLUDE SYSLIB(ACPSRS5A)`
	`LCT:  INCLUDE SYSLIB(ACPSRS5B)`
	`LCT:  INCLUDE SYSLIB(ACPSRS5C)`
	`LCT:  INCLUDE SYSLIB(ACPSRS00)`
	`LCT:  NAME  ACPSRC50(R)`

Output LCT	PROCESSING MEMBER IN BASELINE "LCT"
	`<...+....1....+....2....+....3....+....4....+....5....+`
	`LCT:  INCLUDE SYSLIB(ACPSRS5A)`
	`LCT:  INCLUDE SYSLIB(ACPSRS5B)`
	`LCT:  INCLUDE SYSLIB(ACPSRS5C)`
	`LCT:  INCLUDE SYSLIB(ACPSRS00)`
	`LCT:  SETSSI 53F7E98A`
	`LCT:  NAME  ACPSRC50(R)`

- **Relink initiated by audit auto resolve for composite load without link edit control member (link edited with Automatic Call Library facility)**

Input LCT	None

Output LCT	FABRICATING LCT CARDS FROM SCRATCH
	`<...+....1....+....2....+....3....+....4....+....5....+`
	`LCT:  REPLACE  ACPSRS1B`
	`LCT:  INCLUDE INCLIB(ACPSRC1A)`
	`LCT:  SETSSI 53F7EADF`
	`LCT:  NAME  ACPSRC1A(R)`

CMNUPDAT - Stacked Reverse Delta Management

Program CMNUPDAT manages the current and prior versions of text components that use stacked reverse delta (SRD) storage means in baseline libraries.

Differences between component versions are stored as reverse deltas (SRD) that can be applied to the full current version to create prior versions. The current version of a component is stored in a baseline PDS(E), library, and all deltas for the component are stored in a single PDS(E) member with the same name in a delta library.

Program CMNUPDAT performs four functions:

- **Baseline Ripple** - Compare the staging library member to the baseline library member to create a set of delta records. Add the delta records to the front of the member in the SRD library, effectively rippling prior versions down the stack. Discard the oldest set of delta records if the set exceeds the maximum number of versions. Replace the current baseline member with the staging library member.
- **Reverse Baseline Ripple (Backout)** - Apply the latest delta records in the SRD library member to the current baseline library member to create the prior version. Replace the baseline library member with this prior version. Delete the latest delta records in the SRD library member, effectively reverse rippling the stack of prior versions.
- **Scratch** - Compress the baseline library member into a set of delta records. Add the delta records to the front of the member in the SRD library, effectively rippling prior versions down the stack. Discard the oldest set of delta records if the set exceeds the maximum number of versions. Delete the member from the baseline library.
- **Copy** - Apply the required sets of delta records to the baseline library member to recreate the requested prior version. Copy this prior version to a specified data set. (If the specified data set is a staging library, this is checkout of a prior version.)

Special cases, like baseline ripple for a new component or scratch for a component that has no prior versions execute these same functions while managing empty baseline and/ or SRD library members.

CMNUPDAT Input and Output

Input and output for CMNUPDAT depend on the function being performed.

Function	Input	Output
Baseline Ripple	Staging library Baseline library Baseline SRD library	Baseline library Baseline SRD library
Reverse Baseline Ripple (Backout)	Baseline library Baseline SRD library	Baseline library Baseline SRD library
Scratch	Baseline library	Baseline library Baseline SRD library
Copy	Baseline library Baseline SRD library	PDS member or staging library.

Sample JCL

This is a ChangeMan ZMF installation job fragment that shows a CMNUPDAT step for baseline ripple. This JCL was created from skeleton CMN30SRD by ISPF file tailoring.

```
//UPDSRC  EXEC PGM=CMNUPDAT,   *** RIPPLE SRC COMPONENTS
//             REGION=4M,
//             COND=(4,LT),
//             PARM='APPLY,REALLOC,MAXLEVEL(9)'
//*)IM CMN$$ENQ
//SYSUT3   DD  DISP=(MOD,DELETE),
//             DSN=CMNTP.S6.V810.BASE.ACTP.SRC.ENQ,
//             UNIT=SYSDA,SPACE=(CYL,(5,5))
//SYSUT4   DD  UNIT=SYSDA,SPACE=(CYL,(5,5))
//CMNUPDAT DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//ABNLIGNR DD  DUMMY
//SYSUDUMP DD  SYSOUT=*
//BASELIB  DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.SRC
//DELTALIB DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.SRC.DELTA
//STAGELIB DD  DISP=SHR,DSN=CMNTP.S6.ACTP.STG6.#000039.SRC
//SYSIN    DD  *
ACTCOB01
```

DD Statements

This table describes DD statements for program CMNUPDAT.

DDNAME	I/O	Purpose
SYSUT3	N/A	Creates an enqueue to single thread jobs
SYSUT4	I/O	Temporary work data set
CMNUPDAT	O	Listing from the process that was executed. Examples: ■ SERCMPAR listing of text differences that were converted into delta records ■ CMNDELTA listing that shows delta records that were applied to create a prior version
SYSPRINT	O	Listing that displays actions taken for each member processed.
BASELIB	I/O	Baseline library. **Note:** This DD name can be changed with the BASELIB(ddname) subparameter of the PARM statement.
DELTALIB	I/O	Stacked reverse delta library. Must be RECFM=FB. If incorrect, message CMN5114A - Stacked reverse delta minus baseline must be RECFM=FB **Note:** This DD name can be changed with the DELTALIB(ddname) subparameter of the PARM statement.

DDNAME	I/O	Purpose
STAGELIB	I	Output PDS(E) library for generated member. This DD statement must refer to a PDS(E). If you want to print the generated member, use this library as input to IEBGENER. **Note:** This DD name can be changed with the STAGELIB(ddname) subparameter of the PARM statement.
SYSIN	I	Members to be processed. Multiple member names that are coded on the same SYSIN record are delimited by space or comma. Names may be coded be on multiple SYSIN records. This DD statement is ignored if the MEMBER(mem,...) subparameter of the PARM statement is used.

PARM Options

The PARM parameter is required in the EXEC statement for CMNUPDAT. This table describes CMNUPDAT options that are input through the PARM parameter.

Parameter	Use	Description
Program function	Required	Specifies the function to be performed. Code one of the following: APPLY Baseline ripple RESTORE Reverse baseline ripple (backout) DELETE Scratch COPY Recreate a prior version and copy to another library or data set. These function are described at the top of section "CMNUPDAT - Stacked Reverse Delta Management" on page 175.
COMPRESS	Optional	Indicates that the baseline library uses compressed format.
RETRY	Optional	If an out-of-space condition occurs in an output PDS library, compress the PDS and retry.
REALLOC	Optional	If more space is required for an output library, reallocate the library.
ABEND	Optional	Abend program CMNUPDAT if any error occurs.
BASELIB(ddname)	Optional	Specifies an alternate ddname for the baseline library. Default: BASELIB
DELTALIB(ddname)	Optional	Specifies an alternate ddname for the delta library. Default: DELTALIB
STAGELIB(ddname)	Optional	Specifies an alternate ddname for the staging library. Default: STAGELIB
ALLMEM	Optional	Process all members. This parameter is ignored if the MEMBER() execution parameter is used or if members are listed in SYSIN.
MEMBER(mem,...)	Optional	Specifies the members to be processed. Member names are separated by commas. If this parameter is coded, SYSIN is ignored. If this parameter is omitted, the member names are read from SYSIN.

Parameter	Use	Description
VERSION(n)	Optional	Specifies the number of prior level deltas to apply for the RESTORE or COPY function. Default: 1 (the level prior to the current baseline version)
MAXLEVEL(n)	Optional	Sets the maximum number of prior levels saved in the delta member to n. Delta records for level n+1 are discarded when a new set of delta records is added. Default: No limit Example: If application administration specifies 10 levels for a baseline configuration, then n = 9.
TEXT(a)	Optional	Specifies comparison parameters for creating delta records. Default: TEXT(PANEL) **Note:** Differences in spaces, and commas in the use of COBOL, are ignored. Precede any of the subparameters below with the $ character to flag as changed any line where the only difference is in the use of spaces (and commas in the case of COBOL). Examples: TEXT($.) or $COBOL . (period) — The first four records are analyzed to identify the target language to determine the kind of text compare that should be done. COBOL — Positions 7 through 72 are compared. PANEL, REPORT, SCRIPT — Positions 1 through 80 are compared. ALC, BAL, JCL, PASCAL, C, CLIST, FORTRAN, PL/1, PL/I, PL1, PLI, NATURAL, REXX, RPG — Positions 1 through 72 are compared.

Notes or Comments

When stacked reverse delta files are created in the baseline ripple process, special characters and codes are inserted in delta records to tell ChangeMan ZMF how to apply delta records and uncompress text.

CAUTION! If your components include the codes and characters used by program CMNUPDAT, do not use SD-Stacked Reverse Delta for the baseline storage means in application baseline configuration. Use P - Standard PDS instead.

These are the special characters and codes that you should avoid in text managed by the SRD storage means.

Special Characters and Codes	Notes
<UPDATE>	
<ADD>	
<DELETE>	
<NULL>	
<STATS	
<*STAMP	
<*END.OF.MEMBER>	
<*END.OF.DELTA.DECK>	
<n,	n is any integer.
<n>	n is any integer, and the rest of the record must be blank for this to be detected as ZMF SRD reserved text. This is to avoid conflict with Focus code in the format "<n> text".
X'FF03'	This code is reserved for the first byte of SRD members. Members starting with x'FF03' that are not compressed may be incorrectly processed as compressed in the following cases: ■ Print and copy baseline components in ChangeMan ZMF ISPF option 1.B. ■ Compare of staging component to promotion or baseline when the library type is LST but the component is not a compressed listing. LST is currently reserved for compressed listings.

CMNWRITE - Copy And Include Management

CMNWRITE is executed as a step in a ChangeMan ZMF stage (compile or build) job. It parses source code and selectively expands copybooks into the source. The expanded source is written to the file at DD statement SYSOFILE, which is then used as input into a precompiler or compiler.

CMNWRITE attempts to resolve copybook names by searching PDS(E) libraries concatenated at the SYSLIB DD statement. After searching SYSLIB libraries, CMNWRITE searches any CA Panvalet and CA Librarian libraries that are named in SYSIN keyword control statements.

CMNWRITE can process copybooks nested up to 99 levels.

For copybooks that are resolved, including nested copybooks, CMNWRITE writes source-to-copy relationship records to the package master. Audit uses these records to find SYNCH5, SYNCH15, and SYNCH16 errors in package components. These records are also used to create relationship records used by impact analysis.

CAUTION! If you omit CMNWRITE from a custom build process for like-source components that use copybooks, audit will be unable to detect some out-of-synch conditions.

If a copybook name is successfully resolved, but in-line expansion is either not required or not possible, CMNWRITE writes the copybook to a separate PDS at DD statement SYSUT3, which is included at the bottom of the SYSLIB concatenation in the subsequent precompile or compile step.

If a copybook is expanded in the source, CMNWRITE can generate comment box at the top of the expanded code that displays its level of nesting and member information from the library where it was found.

CMNWRITE Input

- Execution parameters in the program PARM statement
- Keyword parameters in the SYSIN DD statement
- Source code in a PDS or sequential file
- PDS libraries to be searched for copybooks
- CA Panvalet libraries to be searched for copybooks
- CA Librarian files to be searched for copybooks

Output

- Source code with copybooks expanded in-line
- Source code comments for every expanded copybook showing ISPF statistics for the copybook, the level of nesting under the source member, and the number of lines in the copybook
- A PDS library containing copybooks that have not been expanded in-line

- SYSPRINT output displaying the library search order and a report of copybooks detected

Sample JCL

This is a fragment from a stage job submitted by ChangeMan ZMF. This JCL was created by file tailoring skeleton CMN$$WRT.

```
//*)IM CMN$$WRT
//WRITE   EXEC PGM=CMNWRITE,   *** PARSE/EXPAND COMPONENT CTST
//             COND=(4,LT),
//             PARM=('SUBSYS=6,USER=USER015',
//             '')
//*)IM CMN$$SPR
//SER#PARM DD  DISP=SHR,DSN=CMNTP.SER814.C6.TCPIPORT
//SYSPRINT DD  DISP=(,PASS),DSN=&&LIST10W1,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE)
//*)IM CMN$$SYC
//SYSLIB   DD  DISP=SHR,DSN=CMNTP.S6.ACTP.STG6.#000081.CPY
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.CPY
//         DD  DISP=SHR,DSN=CMNTP.S6.V810.BASE.ACTP.CP2
//SYSIFILE DD  DISP=(OLD,PASS),DSN=&&SOURCE(CTST)
//SYSOFILE DD  DISP=(,PASS),DSN=&&WRITE,
//             UNIT=SYSDA,SPACE=(CYL,(1,1)),
//             DCB=(RECFM=FB,LRECL=80,BLKSIZE=0)
//SYSUT3   DD  DISP=(,PASS),DSN=&&CPYLIB,
//             UNIT=SYSDA,SPACE=(CYL,(1,1,20),RLSE),
//             DCB=(DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=0)
//ABNLIGNR DD  DUMMY
//SYSUDUMP DD  SYSOUT=*
//SYSIN    DD  *
TYP=CPY/CMNTP.S6.ACTP.STG6.#000081.CPY
TYP=CPY/CMNTP.S6.V810.BASE.ACTP.CPY
TYP=CP2/CMNTP.S6.V810.BASE.ACTP.CP2
CMP=CTST.SRC
LNG=COBOL2
PKG=ACTP000081
//*)IM CMN$$CND
//*)IM CMN$$CO2
```

DD Statements

This table describes DD statements for CMNWRITE.

DDNAME	I/O	Purpose
SER#PARM	Input	PDS(E) library containing information used to connect to the ChangeMan ZMF server through TCP/IP. This library must contain a member named #SERx, where x is the one-character subsystem ID of the ChangeMan ZMF instance.
SYSIFILE	Input	File containing source code. This DD statement must point to a sequential file or a PDS(E) member.
SYSIN	Input	File containing 80-byte keyword control records.
SYSLIB	Input	PDS libraries containing copybook members. The library concatenation for this DD statement is usually built by skeleton CMN$$SYC.

DDNAME	I/O	Purpose
SYSOFILE	Output	Sequential file containing source code with expanded copybooks. The file written by this DD statement is passed to precompile or compile steps.
SYSPRINT	Output	Report file that displays information from the execution of CMNWRITE: See "Reporting" on page 187.
SYSUT3	Output	PDS containing copybook members that could be detected in the input source code but were not expanded in the source written to SYSOFILE. The library created from this DD statement can be included at the bottom of the SYSLIB concatenation for precompile and compile steps.

CA Panvalet and CA Librarian libraries are specified in SYSIN keyword control statements and are dynamically allocated. See "SYSIN Parameters" on page 183. These libraries are searched after the SYSLIB concatenation is exhausted.

PARM Options

The PARM parameter is required in the EXEC statement for CMNWRITE. This table describes CMNWRITE options that are input through the PARM parameter.

Parameter	Use	Description
SUBSYS=	Required	Specifies the one-character subsystem ID of the ChangeMan ZMF instance.
USER=	Required	Userid of the person or entity that executes CMNWRITE. A userid is required for CMNWRITE to connect to ChangeMan ZMF server programs. This userid is not used to determine security authorization.
EXPAND	Optional	Indicates whether or not to expand copybooks in source code output to SYSOFILE. EXPAND — Expand detected copybooks in output source and write unexpanded copybooks to SYSUT3. This is the default value. NOEXPAND — Do not expand detected copybooks in output source and write all detected copybooks to SYSUT3.

SYSIN Parameters

CMNWRITE keyword parameters are input to CMNWRITE through the SYSIN ddname.

- Keyword parameters must start in positions 1-60.
- A SYSIN record should contain only one keyword parameter.
- Blank SYSIN records are permitted.
- Comment records are designated by * in position 1.

This table describes keyword parameters input to CMNWRITE through the SYSIN ddname.

Parameter	Use	Description
* in Position 1	Optional	Denotes a comment.
CMP=	Optional	Specifies a component name and library type. Format: CMP=cccccccc.ttt where cccccccc Component name ttt Library type If the component cannot be found in the component master, the return code is set to at least 4. See "CMNWRITE and Audit" on page 189.
COBSYN=	Optional	Defines a synonym for COBOL or Assembler COPY verb. Multiple synonyms are allowed. Code a separate COBSYN= for each synonym. **Note:** Copybooks resolved using this parameter are not expanded in-line. These copybooks are written to the PDS at the SYSUT3 DD statement for input to the compile step in the SYSLIB concatenation.
EOSPERIOD=	Optional	This parameter was introduced for backward compatibility when the default function of CMNWRITE was modified to require an end-of -sentence period for COBOL COPY statements so that the COPY REPLACING statement could be correctly parsed. OPTIONAL Do not require end-of-sentence periods for COBOL COPY statements. Using this parameter may affect detection of the COPY REPLACING phrase.
EXPAND=	Options	Provides finer control over the copy and include structures that CMNWRITE detects and expands. ALL Default - Expand all types of copy PANVALET Only expand CA Panvalet ++INCLUDE LIBRARIAN Only expand CA Librarian -INC COPY Only expand COBOL/Assembler COPY PLI Only expand PL/1 %INCLUDE CEE Only expand C #include SQL Only expand EXEC SQL INCLUDE NONE No expansion (like the NOEXPAND program parameter) **Notes:** ■ Any combination of the above is valid. ■ ALL overrides everything but NONE. ■ NONE overrides everything. ■ PARM=NOEXPAND overrides all EXPAND keyword parameters.
FAPIW=	Optional	Specifies a substitution character for FIS Systematics EXEC API PROC member name processing that is enabled by SYSIN parameter SITE=FIDE.

Parameter	Use	Description
LIB=	Optional	Specifies the DSN of a CA Librarian baseline library to be searched for copybooks. ■ Up to ten PAN**=** and LIB**=** keyword parameters may be input in any combination. ■ These libraries are searched in the order the LIB= and PAN= records are read in SYSIN. ■ Libraries specified in LIB= and PAN= keyword parameters are searched after the SYSLIB concatenation is exhausted.
LIBSYN=	Optional	Defines a synonym for CA Librarian -INC verb. Multiple synonyms are allowed. Code a separate LIBSYN= for each synonym. **Note:** Copybooks resolved using this parameter are not expanded in-line. These copybooks are written to the PDS at the SYSUT3 DD statement for input to the compile step in the SYSLIB concatenation.
LNG=	Optional	Determines how CMNPARSE analyzes source code to find copy and include statements: **Value** **Source Parsed As Language...** AS Assembler BAL Assembler C (C followed by a blank) C+ (C+ followed by a blank) EZ Easytrieve FORT FORTRAN MFS IMS MFS PL PL/I blank CMNPARSE attempts to differentiate between Assembler and COBOL **Notes:** ■ If PL, then source will be searched for %INCLUDE. ■ If C, then source will be searched for #INCLUDE. ■ In all languages, source is searched for CA Panvalet ++INCLUDEs and CA Librarian -INC. ■ Any characters coded after those listed above are ignored. However, if the codes above are not complete, the language may be incorrectly identified. For example, CPLUS would be considered COBOL since it is not followed by a blank or plus sign and blank. However, PL2 would still be considered PL/I.

Parameter	Use	Description
OPT=	Optional	Output formatting option FLOWER — Default - Add a comment "flower box" at the top of each copybook that is expanded in the source and written to SYSOFILE. NOFLOWER — Suppress the comment flower box in expanded copybooks. CONTINUE — Specifies that existing ISIC records for this component are NOT deleted. Use this subparameter in the second CMNWRITE step of a dual compile scenario where the first CMNWRITE step creates ISIC records and the second CMNWRITE step creates more. Existing ISIC entries are cached. Duplicate entries in the second CMNWRITE step are not added. The existing entries with possibly older copybook data are retained. This may be needed to ensure that certain SYNCH conditions are not missed
PAN=	Optional	Specifies the DSN of a CA Panvalet baseline library to be searched for copybooks. ■ Up to ten PAN**=** and LIB**=** keyword parameters may be input in any combination. ■ These libraries will be searched in the order the LIB= and PAN= records are read in SYSIN. ■ Libraries specified in LIB= and PAN= keyword parameters are searched after the SYSLIB concatenation is exhausted.
PKG=	Optional	Specifies the change package ID. If the package cannot be found in the package master, the return code is set to at least 4. See "CMNWRITE and Audit" on page 189.
PLISYN=	Optional	Defines a synonym for PL/1 %INCLUDE verb. Multiple synonyms are allowed. Code a separate PLISYN= for each synonym. **Note:** Copybooks resolved using this parameter are not expanded in-line. These copybooks are written to the PDS at the SYSUT3 DD statement for input to the compile step in the SYSLIB concatenation.
PVSYN=	Optional	Defines a synonym for CA Panvalet ++INCLUDE verb. Multiple synonyms are allowed. Code a separate PVSYN= for each synonym. **Note:** Copybooks resolved using this parameter are not expanded in-line. These copybooks are written to the PDS at the SYSUT3 DD statement for input to the compile step in the SYSLIB concatenation.
SITE=FIDE	Optional	Enables wild card substitution in FIS Systematics EXEC API PROC member name before the member is expanded.

Parameter	Use	Description
TYP=	Optional but Recom-mended	Specifies the library type, data set name, and origin of a like-copy library. Format: TYP=ttt/L/ppppppppp where ttt Library type L Like-copy library data set name ppppppppp Package ID of a participating package (Generated by file tailoring only if cross pollination of copybooks from associated participating packages is in effect.) ■ TYP= parameters are created in skeleton file tailoring (CMN$$WRT) to identify which application and library type supplied each copybook that is processed. This information is stored in the package master and is used by package audit to discover SYNCH15 errors. ■ If you omit TYP= parameters, CMNWRITE will not fail, but audit will not detect SYNCH15 errors. ■ TYP= parameters have no effect on the library search order of CMNWRITE. **Note:** If you customize the SYSLIB concatenation in CMN$$SYC to include like-copy baseline libraries from other applications, use the following TYP= format to avoid SYNCH15: TYP=ttt/L/aaaa where ttt Library type L Like-copy library data set name aaaa Application ID of the specified library

Return Codes and Error Messages

Return Code	Description
0	Successful execution.
4	Refer to the short and long messages displayed within the job.
6	Unable to connect to ChangeMan ZMF instance; resubmit job under an active ChangeMan ZMF instance.
8	Package master I/O error; check all messages displayed within job.
12	System error; see messages.

CAUTION! A non-zero return code from CMNWRITE can lead to invalid SYNCH5, SYNCH15, and SYNCH16 audit errors. See "CMNWRITE and Audit" on page 189.

Reporting

The SYSPRINT DD statement for CMNWRITE displays the following information:

- Program version.

- PARM input.
- Keyword parameters input to SYSIN.
- Copybook library search order.
- Summary report of copybook members and hierarchy.

The summary report from the sample CMNWRITE JCL above might look like this:

```
*******************************************************************************
* DDNAME: WRITE.SYSPRINT                                                      *
*******************************************************************************

ChangeMan(R) ZMF      CMNWRITE - 8.1.4  SUNDAY NOVEMBER 26, 2017  21:51:24
 PARM='SUBSYS=6,USER=USER015,'
 PARM interpretation: ChangeMan ZMF subsystem "6"
  Expansion of uncovered COPY/Include variations

SYSIN: TYP=CPY/CMNTP.S6.ACTP.STG6.#000081.CPY
SYSIN: TYP=CPY/CMNTP.S6.V810.BASE.ACTP.CPY
SYSIN: TYP=CP2/CMNTP.S6.V810.BASE.ACTP.CP2
SYSIN: CMP=CTST.SRC
SYSIN: LNG=COBOL2
SYSIN: PKG=ACTP000081
CMN7500I - Attempting to initiate dialog with started task.
CMN1400I - Session established with ChangeMan ZMF started task.
Library search order: PDS/CMNTP.S6.ACTP.STG6.#000081.CPY               (CPY)
                      PDS/CMNTP.S6.V810.BASE.ACTP.CPY                 (CPY)
                      PDS/CMNTP.S6.V810.BASE.ACTP.CP2                 (CP2)
 LV -MEMBER--- VV.MM --CREATE-- --LAST CHANGED--  SIZE  INIT -USERID- -- L I B R A R Y   N A M E ----------------- ---FINGERPRINT---
                                                          --- C O M P O N E N T   D E S C R I P T I O N ---(IF ANY)---------------
 00 CTST       01.02 2012/07/01 2017/11/26 21:51     7     7 USER015  SYS17330.T215123.RA000.USER0157.SOURCE.H09   AF94653D-000000CD
 01 COPYHELO   01.03 2012/07/01 2017/11/26 21:50     1     1 USER015  CMNTP.S6.ACTP.STG6.#000081.CPY               7A3EDE59-00000023
CMN1410I - Session terminated with ChangeMan ZMF started task.
CMN5400I - Time of day at end of job: 21:51:24 - Condition Code on exit: 0
           Record count in ====> 00007
           Record count out ===> 00014
```

In this report, the hierarchy of nested components is indicated by the LV column. If a copybook is not expanded inline into the source and is written to SYSUT3 instead, the LV number is preceded by "N," and message CMN5420I is printed beneath the component list.

Notes

COPY and INCLUDE Variations

This table displays examples of source code COPY and INCLUDE statements that CMNWRITE can detect. This is not an exhaustive list of statements that CMNWRITE can process.

Format	Action	Comment
01 COPY ABC.	Expanded	COBOL variation
COPY "ABC".	Expanded	COBOL variation
COPY ABC	Expanded	Assembler format
COPY ABC	Noted as resolved but not expanded	COBOL format
COPY ABC REPLACING...	Noted as resolved but not expanded	COBOL variation
01 FIELD-NAME. COPY ABC.	Noted as resolved but not expanded	COBOL variation
#INCLUDE <abc>	Expanded	"C" variation
#INCLUDE "abc"	Expanded	"C" variation

Format	Action	Comment
+INCLUDE abc	Expanded	PL/1 variation
++INCLUDE ABC	Expanded	CA Panvalet, any language
%INCLUDE DDNAME(MEMBERNAME)	Expanded	PL/1 variation
%XINCLUDE DDNAME(MEMBERNAME)	See **Note 1**	PL/I variation
-INC ABC	Expanded	CA Librarian, any language
EXEC SQL INCLUDE ABC END-EXEC	Expanded	Any language, can cross up to three lines. EXEC and the SQL must appear on the same line.
EXEC API PROC APIC?PRC (PARM1, PARM2, PARM3) END EXEC	? set to value in SYSIN parameter FAPIW=	FIS Systematics COBOL

Note 1: When PL/I source contains %XINCLUDE statements, you must suppress copybook expansion in CMNWRITE with one of the following:

- NOEXPAND subparameter of the PARM= statement
- SYSIN keyword parameter EXPAND=NONE

CMNWRITE and Audit

CMNWRITE writes ISIC records to the package master. ISIC records contain source-to-copy information from stage that is used by audit to evaluate source-to-copy relationships in package components to find SYNCH5, SYNCH15, and SYNCH16 errors.

Audit may report invalid SYNCH5, SYNCH15, and SYNCH16 errors if CMNWRITE does not write ISIC records because:

- CMNWRITE yields a non-zero return code.
- The package specified in the PKG= keyword parameter cannot be found.
- The component specified in the CMP= keyword parameter cannot be found.
- The stage process does not contain CMNWRITE.

Keyword Option OPT=NOFLOWER

By default, CMNWRITE adds a comment "flower box" at the top of each copybook that is expanded in the source and written to SYSOFILE. This comment box displays ISPF statistics from directory of the library where the copybook member was found. A typical flower box looks like this:

```
000006              *#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#
000007              * COPY COPYHELO
000008              * 1 COPYHELO 01.03 2012/07/01 2017/11/26 21:50     1     1 USER015
000009              *#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#
```

You can suppress this comment flower box by specifying OPT=NOFLOWER in SYSIN.

Skeleton Variable COPYLIBA

CMNWRITE writes copybooks that can be detected and resolved but not expanded to DD statement SYSUT3. Skeleton CMN$$WRT builds the SYSUT3 library to temporary data set &&CPYLIBA.

Skeleton CMN$$WRT also sets variable CPYLIBA to YES. Skeleton CMN$$SYC adds the &&CPYLIBA data set to the SYSLIB concatenation if variable CPYLIBA is YES. In skeletons delivered with ChangeMan ZMF, variable CPYLIBA is not reset to NO until the end of procedures where CMN$$SYC might be imbedded multiple times.

Do not customize skeletons to reset variable CPYLIBA to NO until after all imbeds of CMN$$SYC that must include &&CPYLIBA in the SYSLIB concatenation.

Recursive Nesting and C++ Headers

Programming language C++ implicitly allows recursive copy structures by requiring each programmed function to include all headers it will use. Compiler directives #ifndef and #define prevent looping in the resulting definitions. It is beyond the scope of CMNWRITE to interpret these compiler directives, so the NOEXPAND program parameter or the EXPAND=NONE SYSIN parameter should be used with C++ source to allow the C++ compiler to resolve these potentially recursive structures.

CMNWRITE must still analyze source and copybooks to provide source/copy information for audit, so beginning with ChangeMan ZMF 5.2, it records the names of all copybooks it encounters in a nest structure. As it begins a new level of a nest, it checks the new copybook name against those that have previously been encountered in this chain. If the name is found, then CMNWRITE assumes that a recursion has been discovered, and it will not search this copybook for copy or include commands.

Modifying Copybook Records With CMNEX016

CMNWRITE processes source code containing CA Librarian -INC statements where the source and copybooks reside in PDS(E) libraries rather than CA Librarian libraries. Exit program CMNEX016 mimics a CA Librarian exit that modifies copybook records included in source with the -INC command.

If CMNEX016 is enabled, it is called by CMNWRITE before each copybook record is written to the file at DD statement SYSOFILE. You can add logic to CMNEX016 to modify or skip copybook records before they are written to SYSOFILE.

The source for CMNEX016 is delivered in the CMNZMF ASMSRC library. See program comments for more information.

SERCOPY - Copy Utility

Program SERCOPY provides enhanced copy services for ChangeMan ZMF batch jobs and internal processes. Some copy functions are provided by proprietary programs, and other functions may be provided by calls to standard IBM copy utilities.

SERCOPY performs these functions:

- Copy partitioned data set member.
- Copy sequential data set.
- Compress Expand compressed listings.

- Add, reset, or update ISPF statistics
- Dynamically reallocate PDS libraries during a copy function.
- SERENQ, Enqueue/dequeue data set

SERCOPY Input

- Partitioned data set or sequential data set.
- Keyword parameters in the PARM statement.
- Member names in the SYSIN statement.

Output

- Members in partitioned data set.
- SYSPRINT output.

Sample JCL

The following is a sample job fragment showing a SERCOPY step.

```
//SERCOPY EXEC PGM=SERCOPY,    *** COPY CTST FROM STAGING
//             REGION=3M,
//             PARM=('INDSN(CMNTP.S6.ACTP.STG6.#000081.SRC)',
//             'MEMBER=CTST')
//SYSPRINT DD  DISP=(,PASS),DSN=&&LIST00,
//             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE)
//ABNLIGNR DD  DUMMY
//SYSUT2   DD  DISP=(,PASS),DSN=&&SOURCE(CTST),
//             UNIT=SYSDA,SPACE=(CYL,(1,2,1),RLSE),
//             DCB=(DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=0)
//SYSUT3   DD  UNIT=SYSDA,SPACE=(CYL,(5,5))
//SYSUT4   DD  UNIT=SYSDA,SPACE=(CYL,(5,5))
```

DD Statements

This table describes DD statements for SERCOPY.

DDNAME	I/O	Purpose
SYSIN	Input	Member list for copies if MEMBER keyword parameter is not coded in the PARM statement
SYSPRINT	Output	Report file that displays information from the execution of SERCOPY
SYSUT1	Input	PDS if INDSN and INFILE keyword parameters are not coded in the PARM statement
SYSUT2	Output	PDS if OUTDSN and OUTFILE keyword parameters are not coded in the PARM statement
SYSUT3	I/O	Work data set
SYSUT4	I/O	Work data set

The data set in DD statement SYSUT1 is dynamically allocated if keyword parameter INDSN or INFILE is coded in the PARM statement.

The data set in DD statement SYSUT2 is dynamically allocated if keyword parameter OUTDSN or OUTFILE is coded in the PARM statement.

PARM Options

The PARM parameter is required in the EXEC statement for SERCOPY. This table describes SERCOPY options that are input through the PARM parameter. **Note** that the default setting for the STATSA/STATSB/STATSE parameters (if these are not specified) is that the copied member will have the same type of statistics as the input member.

Parameter	Description
ABEND	ABEND if error is encountered.
ALIAS	Copy all alias entries for members selected.
BSAM	Perform internal copy rather than IEBCOPY.
COMPRESS(n)	Compress data using compression type n. For low compression n=2. For high compression n=7.
CSTATS	Copy existing ISPF statistics and add statistics to copied members if none exist.
EXPAND	Decompress data if compressed.
FULL	Copy all members.
INDSN(dsname)	Specifies DSN for input data set. If this parameter is specified, the input data set name is dynamically allocated. Mutually exclusive with parameter INFILE.
INFILE(ddname)	Specifies ddname for input data set. Default is SYSUT1.
LIST	List member names in IEBCOPY message output.
LMOD	Copy using IEBCOPY COPYMOD.
MEMBER(mem,...)	Specifies list of member names to be copied. If this parameter is omitted, the member names are read from SYSIN statements containing one or more member names per line in free form format. If this parameter is omitted and SYSIN is missing or empty, or if MEMBER() is specified, a FULL copy is performed. Members can be renamed during the copy operation by specifying each member name to be renamed in the following format: oldname/newname
MFS	Input is MFS data set with non-standard member names. This parameter forces the BSAM option.
NOREPL	Do not replace like named members.
OSTATS	Reset these ISPF statistics on copied members and add statistics if none exist: Changed MM VV
OUTDSN(dsname)	Specifies DSN for output data set. If this parameter is specified, the output data set is dynamically allocated. Mutually exclusive with parameter OUTFILE.

Parameter	Description
OUTFILE(ddname)	Specifies ddname for output data set. Default is SYSUT2.
PDSCOMP	Compress after copy operation.
PRINT(ddname)	Specifies ddname for output print data set. Default is SYSPRINT.
REALLOC	Reallocate if more space required.
RETRY	Retry on x37 abend (compress). This parameter is incompatible with the AUTOCMPX=YES of PDSFAST®. See "PDSFAST" on page 195
RSTATS	Initialize all ISPF statistics on all copied members, including members that did not have statistics.
STATSA	Extended ISPF stats will be turned on automatically when the line count reaches 64k.
STATSB	Basic ISPF stats will be set.
STATSE	Extended ISPF stats will be set.
USERID(tsoid)	Specifies the ID for ISPF statistics for copied members. Statistics added to members with CSTATS parameter. Statistics in all members copied with OSTATS parameter. Statistics in all members copied with RSTATS parameter. Statistics added to members with VSTATS parameter.
USTATS	Update these ISPF these statistics on copied members and add statistics if none exist: Changed Increment VV by +1 Reset MM to 00
VSTATS	Update these ISPF these statistics on copied members and add statistics if none exist: Increment VV by +1 Reset MM to 00

SYSIN Parameters

If the MEMBER keyword parameter is omitted from the PARM statement, the members copied by SERCOPY must be specified in SYSIN records.

- Member names in SYSIN records are coded in free-form format with members listed in the same record separated by spaces or comma.
- Members may be renamed in the copy process by coding the old name and new name separated by a forward slash:

```
OLDNAME/NEWNAME
```

- If the MEMBER keyword parameter is omitted from the PARM statement, and no members are specified in SYSIN records, all members in the input PDS are copied to the output PDS.

Return Codes and Error Messages

This table describes return codes for SERCOPY.

Return Code	Description
00-16	Same as IEBCOPY/IEBGENER
20	IEBCOPY/IEBGENER ABEND (completion code in R0)
24	Dynamic allocation error (SVC 99 error in R0) or open error on control statement data set
28	Input parameter syntax error

Comments

Automatic Library Reallocation

If the RETRY parameter is specified and SERCOPY encounters a space allocation problem while performing a PDS copy function (an x37 condition), it will attempt to recover by compressing the library using IEBCOPY.

If the problem persists and the REALLOC parameter is specified, SERCOPY will dynamically reallocate the target library to increase space and/or directory entries.

SERCOPY calls program SERREAL to reallocate the target data set. SERREAL determines the current size of the data set and sets new space allocations based on the following:

- If directory blocks are insufficient, they are increased 50%, plus 8 blocks.
- If directory blocks are *not* the only problem, they are increased 25%, plus 8 blocks.
- If directory blocks are sufficient, then library space is increased on a sliding scale depending on the size of the current data set:
  - If the existing data set is small (10 tracks), space is at least doubled.
  - If the existing data set is large (400 tracks), space is increased by only 20%.

The default unit for the space allocation is blocks (BLKS).

Exit program SEREX001 can be used to override the default generic device (SYSDA) or space unit (BLKS) used by SERREAL in dynamic space reallocation.

Step and JOB Enqueue

ChangeMan ZMF batch jobs file tailored from skeletons will execute one at a time if they target the same output data set with SERCOPY. You can increase the efficiency of ChangeMan ZMF batch processing by enqueuing SERCOPY output data sets at the step level.

To protect the directory of PDS libraries targeted by SERCOPY, skeleton CMN$$ENQ is imbedded in each job step that executes SERCOPY. CMN$$ENQ catalogs a work data set with DISP=(MOD,DELETE) in DD statement SYSUT3. CMN$$ENQ uses a consistent rule to create the work data set name from the SERCOPY output data set name.

Only one job is allowed to allocate the same cataloged data set name. If more than one job targets the same library with SERCOPY, only one job will be allowed to allocate the

same work data set name at a time, and all of the other jobs will be made to wait. This effectively single threads all jobs that target the same PDS with SERCOPY.

You may enqueue the SERCOPY output library at the step level by specifying the data set name in the SERCOPY PARM statement:

1 Code the SERCOPY output DSN in the PARM statement in subparameter OUTDSN:

```
//COPY1 EXEC PGM=SERCOPY,REGION=3072K,
//  PARM='&OPT,OUTDSN(dsname)'
```

The data set name specified in OUTDSN must already be catalogued.

2 Delete the SYSUT2 DD statement from the SERCOPY step JCL.

3 Remove the imbed for CMN$$ENQ from the skeleton that executes SERCOPY.

4 Add these two ddnames to the SERCOPY step JCL:

```
//SYSUT3 DD UNIT=SYSDA,SPACE=(CYL,(5,5))
//SYSUT4 DD UNIT=SYSDA,SPACE=(CYL,(5,5))
```

PDSFAST

If you are using PDSFAST with AUTOCMPX=YES, you must remove the RETRY parameter for SERCOPY in the skeleton JCL. You can only use one or the other compression technique (that of PDSFAST or SERCOPY).

Reporting

The SYSPRINT DD statement for SERCOPY displays output from the copy utility used to copy members from the input PDS to the output PDS.

SERPRINT - SYSOUT Compression Facility

ChangeMan ZMF has a facility that makes it possible to eliminate the paper printing and subsequent storage, and access and traceability problems of any application's SYSOUT listings. This facility gathers files destined to SYSOUT queues, concatenates them, and compresses them into a single component of a PDS. You can use this facility regardless of whether or not your shop has converted to ChangeMan ZMF.

Each listing data set normally queued to a SYSOUT class is redirected to a temporary file with accurate DCB attributes and adequate disk space to hold it. The recommended DSNAME of each passed file is &&LIST*xxx*, where LIST could be some other recognizable character string but LIST is very meaningful. For example:

```
//SYSPRINT  DD SYSOUT=*
```

could be converted to:

```
//SYSPRINT  DD DISP=(,PASS),DSN=&&LIST010,
//             UNIT=SYSDA,SPACE=(CYL,(1,2),RLSE),
//             DCB=(RECFM=FBA,LRECL=121,BLKSIZE=2420)
//* or         DCB=(RECFM=VBM,BLKSIZE=4088)
```

There could be multiple converted SYSOUT definitions per job step. The only restriction is that each temporary DSNAME must start with the same character string (LIST) and

suffixed with an alphanumeric string that makes it unique within the job. It is further recommended that the suffix be at least two numeric digits in ascending order with adequate spacing to keep it manageable. The DCB attributes of each passed file are independent of one another. Since SERPRINT is unable to handle VIO data sets, it is required that the files are allocated on non-VIO devices. To accommodate this requirement, a new variable, DEFAULT NON-VIO UNIT NAME has been added to Global Admin panel CMNGGP01. Make sure your SYSPROG/STORAGE ADMIN has designated this UNIT for NON-VIO usage.

The gathering and concatenation of each file is done by component SERPRINT. For example:

```
//SERPRINT EXEC PGM=SERPRINT,COND=EVEN,
//              PARM=('INDSN(LIST*)',
//              'OUTFILE(PRINT1,PRINT2)')
//PRINT1   DD   DISP=(,PASS),DSN=&&LIST,
//              UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
//              DCB=(RECFM=VBM,LRECL=133,BLKSIZE=23476)
//PRINT2   DD   SYSOUT=*,DCB=(RECFM=VBM,LRECL=133,BLKSIZE=23476)
```

The specification of COND=EVEN is important. Before, when spooling directly to a SYSOUT queue, you could see all that had been spooled up to the point of any surprising ABEND. With this facility, those passed file contents can only be viewed by SERPRINT's post-processing capabilities and any previous step that ABENDs would normally flush this step unless COND=EVEN has been specified.

The PARM is **critical**. It dictates the input file structure to search for and the output file or files to put the concatenation out to. There are two forms for input file structure:

```
//             PARM=('INDSN(LIST*)',...
```

and

```
//             PARM=('INFILE(STEP10.SYSPRINT,...
```

The use of INFILE is *not recommended* as it refers to procedure step names and DDNAMEs which is rather inflexible. The recommended approach is to use INDSN which dictates the low order node prefix structure to search for. The searching process involves the Scheduler Work Area (SWA) Manager above or below the XA line. Each discovered file is read and each record is converted to VBM - variable blocked machine control characters with trailing blanks truncated.

Each output file DDNAME is specified by the keyword OUTFILE in the PARM. In the recommended example above, DDNAMEs PRINT1 and PRINT2 are targets for the concatenated output. PRINT1 is passed as a sequential file to be compressed. PRINT2 is written directly to a SYSOUT queue for browsing and potential redirection to paper listing or deletion. Each concatenated file is preceded by a banner detailing where it came from. For example:

```
DDNAME: procstep.stepname.ddname
```

As suggested above, *procstep* is the step name (if any) that invoked the procedure; *stepname* is the actual step name within the JCL stream that invoked a program that wrote to DDNAME *ddname*. A trailing statistics record is written detailing records and bytes used. For example:

```
<STATS: RECS=nnnn BYTES=nnnnnnn>
```

The output file that is passed (in this case, PRINT1) is targeted for input to component SERCOPY. The example that follows is in Skeleton notation but could be modified slightly to use symbolic substitution in a cataloged procedure:

```
//COMP     EXEC PGM=SERCOPY,REGION=4M,
//  PARM='COMP,IN(SYSUT1),OUT(SYSUT2),MEMBER(&CMPNAME),REALLOC'
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  DISP=(OLD,DELETE),DSN=&&&&LIST
//SYSUT2   DD  DISP=SHR,DSN=&STGLIB.LST
```

The PARM dictates that a compress (COMP) is to be performed using file SYSUT1 as input, file SYSUT2 as output, and whatever component name substitution for &CMPNAME is file tailored. If the component already exists in the output library, it is replaced by the new one coming in. If an x37 ABEND occurs, it is intercepted internally, an IEBCOPY compress is invoked on the output library, and the compression is re-initiated. If another x37 ABEND occurs, the output library is dynamically reallocated with larger dimensions elsewhere and the compression re-initiated. Without the REALLOC keyword, no reallocation is attempted.

Beginning with release 4.1.0, the calculation method of determining the compression ratio, displayed at the end of a decompressed listing, has been changed.

The formula for calculation of compression percentage follows:

C = (T1 - T2) / T1 *100

where:

C = compression percentage

T1 = bytes full

T2 = bytes compressed

If T1 is 1,000,000 bytes and T2 is 600,000 bytes, we get:

(1,000,000 - 600,000) / 1,000,000 = 40% compression.

In the previous compression routine, using the Huffman algorithm, number of bytes full (T1) was passed using the largest possible size of each record read BEFORE truncating to ragged right.

T1 is used as the summation of bytes into SERCOPY which already has had considerable white space stripped off - often 30%.

The only real statistic that counts is how much space is saved on the disk pack.

NOTE Alg=2 garners compression is nearly as good as the old Huffman algorithm but without the overhead of having to pass the entire file twice. The full expansion to VBM means to ragged right. Formerly, the compression statistics appended to the listing expansion were based on the full number of bytes of the flat right listing concatenation. Now compression is more accurate in that it is based on the actual number of ragged right byte summation.

Browsing Compressed Listings

The ability to browse a compressed listing is implicit within ChangeMan ZMF but can also be used outside by either a specialized CLIST or submitted batch job to decompress the component and subsequently browsing the sequential data set. We deliver a CLIST called CMNBRWCL and associated panels to perform just such a function. It is the user's responsibility to incorporate this ability into their ISPF panel mechanism. You can however simply (from within a ChangeMan ZMF session) use the command TSO %CMNBRWCL and

the selection panel CMNLSTB0 will display. Supply the Dataset and Member and you can see the decompressed listing:

```
CMNLSTB0                  Browse Compressed Listing
Command ===> ____________________________________________

Compressed listing library:

Dataset . . . . CMNTP.S6.COMM.STG6.#000001.LST_____________________
Member  . . . . COMSRS00     (blank for member selection list)
```

Also note that at the bottom of the decompressed file are statistics within banners detailing the amount of compression attained. The calculation is based on the actual number of bytes needed to hold the compressed file divided by the number of bytes in the composite decompressed file(s). For example:

```
************************************
* Compression Statistics           *
*                                  *
* Number of records:    494        *
* Bytes expanded:    36,552        *
* Bytes compressed:   8,240        *
* Compression ratio:  77.46%       *
************************************
```

There are other vendor products for storing listings on line but they do not discern which is the latest or the one that corresponds to what you have executed in production. Any kind of file that can be sent to a SYSOUT spooling can be incorporated with this mechanism.

Chapter 7

Reports

REXX programs that call XML services generate the reports that are supplied with ChangeMan ZMF. This chapter provides guidelines for the experienced REXX programmer who needs to develop new reports or customize the reports that are shipped with ChangeMan ZMF.

Overview of Online Report Generation

Global administrators, application administrators, and users can run the reports that ship with ChangeMan ZMF:

- The global administrator determines the reports that an application administrator can run. The *ChangeMan ZMF Administrator's Guide* describes the reports that global and application administrators can run and shows how to access them online.
- An application administrator determines the reports that the user can run. The *ChangeMan ZMF User's Guide* describes the reports that users can run and shows how to access them online.

You can request a report online or submit the request as a batch job. For security purposes, both methods require that the TSO userid of the requesting user be passed to the target XML service. Thus, report access is determined by the security authorization of the user who submits the report request.

The steps that the global administrator, application administrator, or user takes to generate ChangeMan ZMF reports online are:

1 The administrator or user specifies the appropriate report option and selects the desired report from an online menu:

- The global administrator selects the target report from the Report Selection List (CMNREPT6) panel (option =A.G.R.2).
- The application administrator selects the target report from the Report Selection List (CMNREPT6) panel (option =A.A.R.2).
- The ChangeMan ZMF user selects the target report from the Report Selection List (CMNREPT6) panel (option = 6.1).

2 The selected report corresponds to a member of the REXX program library. For example, report 010 corresponds to member CMN010 in the REXX program library. When the ChangeMan ZMF administrator or user selects a report to generate online, ChangeMan ZMF submits a batch job, passing it the name of the target reporting program and the reporting option (application name or pattern, package name or pattern, and so on) that the administrator or user has specified.

3 The target REXX program:

- Validates the input.
- Sets up the appropriate REXX stem variables.
- Calls the appropriate XML service, passing it the stem variable to process. The program may call more than one XML service. The XML services that the target reporting program calls are identified in the program comments.
- Formats the information returned by the target XML service and sends report output to DDname SYSTSPRT. All reports include print-control characters in column 1. Therefore, the SYSTSPRT statement in the CMN$$RPT member of the vendor-supplied CMNZMF.SKELS library and in the REPORTS member of the CMNZMF.CNTL library specify the attributes RECFM=FBA and LRECL=133.

4 You use a facility such as the Spool Display and Search Facility (SDSF) to view the report.

Submitting a Batch Job to Generate a Report

As an alternative to selecting a report to generate online through the ChangeMan ZMF client, you can submit your own batch job outside of ChangeMan ZMF to generate a report. To do so:

1. Customize the REPORTS member of the CNTL library as follows (according to the comments in member REPORTS):
   - Supply a valid JOB statement.
   - Supply the appropriate variables for the target report.
   - Specify the appropriate library names in the DD statements.
2. Submit the job.

NOTE The ChangeMan ZMF ISPF client does not have to be running, but the started task does. The batch job connects directly to the SERNET started task.

Notes on the Batch JCL

Note the following items about the JCL that is submitted for execution when you select a report to generate online in ChangeMan ZMF or submit a batch job:

- The SYSEXEC DD concatenation identifies where the REXX reporting programs are located. Not all installations have the optional REXX compiler. Therefore, the REXX source programs for the batch reports are shipped. If you have the REXX compiler at your installation, you can compile these source programs and store them in the CEXEC library if you wish. If you do, be sure to add the name of the CEXEC compiler library to the top of the SYSEXEC DD concatenation.
- You always need a SER#PARM DD statement to identify the system to which you want to connect.
- TCP/IP is used for communication across address spaces when a report is run. TCP/IP messages are written to SYSPRINT.
- Diagnostic messages are written to SERPRINT.
- Report output is written to SYSTSPRT.
- If an abend should occur when you are running a report, information about the abend is written to SERABEND and SYSABEND.

Analysis of a Sample REXX Reporting Program

All of the REXX reporting programs that are shipped with ChangeMan ZMF have the same structure. We describe program CMN010 in this section to illustrate how the reporting programs work and give you guidelines for customizing them if you wish. You can also use the program as a model to develop your own reporting programs.

The source code for report 010, Summary of Planned and Unplanned Packages, is in member CMN010 of the REXX program library.

Introductory Comments

The following code excerpt is typical of the introductory commentary in each reporting program. The introductory comments:

1 Have the word REXX on the first line (required in all REXX programs).

2 Identify the report number and title. In this example the report number is *CMN010* and the title is *Summary of Planned and Unplanned Packages*.

3 Identify the XML services that are called to provide information for the report. Two XML services are called in this example: PARMS and PACKAGE. See the *XML Services User Guide* for a description of the XML services that the reporting programs call.

4 Identify the parameters that the program passes to the SERXMLRC program, which handles communication between the reporting program and the target XML service.

```
/* REXX                                                               */  1
/* ****************************************************************** */
/* Copyright 2003-2012 (C) SERENA Software, Inc.                      */
/* Licensed material.  All rights reserved.                           */
/* ChangeMan is a registered trademark of SERENA (R) Software Inc.    */
/* ****************************************************************** */
/* USE OF THE SAMPLE CODE CONTAINED HEREIN IS SUBJECT TO THE TERMS    */
/* CONDITIONS OF THE LICENSE AGREEMENT LOCATED IN THE MEMBER LICENSE  */
/* ****************************************************************** */
/* Date       Author            Reason                                */
/* 2003-06-01 Serena            Original version                      */
/* ****************************************************************** */
/* REXX CMN010 Summary of Planned and Unplanned Packages              */  2
/*                                                                    */
/* This report makes use of two XML Services                          */  3
/*                                                                    */
/*   Service     Scope    Message   Description                       */
/*                                                                    */
/* 1 PARMS       APL      LIST      Obtain the list of Appl. names    */
/* 2 PACKAGE     SUMMARY  SERVICE   Obtain counts about Package types */
/*                                  and statuses                      */
/*                                                                    */
/* Parameters                                                         */  4
/*                                                                    */
/* Application name         1 to 4 character mnemonic which may       */
/*                          include the asterisk '*' character to     */
/*                          represent a wild card. If omitted '*'     */
/*                          is assumed. Omission is indicated by a '.'*/
/*                          in the parm list.                         */
/*                                                                    */
/* Subsystem letter         1 character indicative of the ChangeMan   */
/*                          system that is being reported upon. Must  */
/*                          be present. A '.' indicates the default   */
/*                          subsystem of ' ' (blank).                 */
/*                                                                    */
/* TSO userid               1 to 8 character TSO id used to perform   */
/*                          security checking. Required parameter.    */
/*                                                                    */
/* Test switch              An indicator with the value 'T' which     */
/*                          specifies that diagnostic trace           */
/*                          information is to be sent to the          */
/*                          SERPRINT DD. The default is no value      */
/*                          other words Tracing is Off.               */
/*                          Since this is the last parm a positional  */
/*                          placeholder is not required.              */
/*                                                                    */
/* ****************************************************************** */
```

Mainline Program Logic

The mainline logic of all the reporting programs is the same. Mainline program logic performs the following functions:

1 Gets the input from the user. (See "Getting User Input" on page 204.)

2 Calls a subroutine in the program to validate the user input. (See "Validating User Input" on page 204.)

3 Calls a subroutine in the program to initialize the variables that will be passed to the target XML service. (See "Initializing Variables" on page 206.)

4 Calls a subroutine to set up the XML service call. (See "Setting Up the XML Service Call" on page 207.)

5 Calls a subroutine that makes the call to the target XML service. (See "Calling the Target XML Service" on page 207.)

6 Calls a subroutine to format and print the output.

7 Calls a subroutine to disconnect from ChangeMan ZMF.

These subroutines appear in the Subroutines section of the reporting program. Selected subroutines that are called in our sample CMN010 program are described below. You may want to consider the annotations given for the code excerpts below while you are looking at a complete program source listing.

Getting User Input

The ARG instruction is used to get the user input. The variable names in the ARG instruction correspond to XML tags in the XML services that the program will be calling.

CAUTION! Be sure to use variable names in the program that differ from the XML tags to avoid double substitution of variable values.

Here's the ARG instruction used in program CMN010:

```
/* Read input parms */
arg appname subname tsoname tst .
```

The arguments are:

- The name of the target application, a pattern that identifies all applications that match the pattern, or an asterisk that identifies all applications that are defined to the target ChangeMan ZMF subsystem.
- The name of the target ChangeMan ZMF subsystem.
- The ID of the requesting TSO user.
- A test switch (optional). This switch, if present, requests that diagnostic trace information be written to the SERPRINT DDname.

Validating User Input

The program calls the common program CMN000 to validate the user input parameters.

The parameters may vary slightly from report to report but as a general rule they consist of an application name/package number, a subsystem letter, a userid and finally, a test option which should only be used under the direction of Customer Support. For example parts of the validation in CMN000 are as follows:

.

```
/* Validate Parms */

Validate_Parms:

  /* applname must be 1 to 4 characters if present */                    1

if length(applname) > 4  then
  do
    call Error_Message 'Application name too long'
  end

...

  /* subsystem must be 1 character from the approved list */             2
  subsyslt = 'ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789#@$ '
  if length(subname) > 1 | pos(subname,subsyslt) = 0 then
    do
      call Error_Message 'Subsystem Letter invalid'
    end
...

  /* userid must be present and 1 to 8 chars */                          3
  if length(tsoname) > 8 | length(tsoname) < 1 then
    do
      call error_message 'Userid invalid'
    end

...

  /* test switch must be 'T' or 'X'  if present */                       4
/* it can also be absent or denoted with placeholder '.' */

Select
  when tst='T' then nop
  when tst='X' then nop
  when tst='.' then nop
  when tst=' ' then nop
  otherwise
   do
    call Error_Message 'Test Switch invalid: must be T, X or blank'
   end
end                                                                  ...
```

In this example:

1 The application name must be from 1 to 4 characters if it is supplied.

2 The ChangeMan ZMF subsystem name must be 1 character or blank.

3 The TSO userid of the requester must be present and be from 1 to 8 characters.

4 The test switch, if passed, must have the value T or X. If you are having problems, Customer support may ask you to specify the test switch. If so, diagnostic messages are written to the SERPRINT DDname.

Initializing Variables

The following code excerpt shows the subroutine that program CMN010 uses to initialize the variables:

```
/* Initialize Variables */

Init_Variables:

  if appname = '.' | length(appname) = 0 then /* appl name default */    1
    do
      appname = '*'
  /* end if */

  if subname = '.' | length(subname) = 0 then /* subsys default */       2
    do
      subname = ' '
    end
  /* end if */

  /* initialize grand totals */
                                                                        3
    GTSimple  = 0
    GTComplex = 0
    GTSuper   = 0
    GTPart    = 0
    GTPPerm   = 0
    GTPTemp   = 0
    GTUPerm   = 0
    GTUTemp   = 0

  /* set date /time for report header */

  headdate=date()
  headtime=time()

  /* set page counter variables */

  pchar  =' ' /* asa required, make null if not FBA */
    linect = 99 /* expire the line counter to force headings on page 1 */ 4
    lines  = 55 /* print 55 data lines per page */
    linelen = 132 /* report line length (lrecl-1) */
    pagect = 0  /* page counter */
return
```

In our sample CMN010 program:

1 The user can input a period or asterisk for the application name or leave it blank. The program treats any of these values as if the user had specified the asterisk to signify all applications that are defined in the target ChangeMan ZMF subsystem.

2 If the subsystem ID is presented to the program as a period or is not supplied, the program assumes a blank subsystem ID.

3 The program initializes the grand totals to be printed in the report.

4 The program sets up line and page counters.

Setting Up the XML Service Call

All XML services expect the calling REXX reporting program to pass a stem variable. Here's the subroutine in our sample CMN010 program that sets up the stem variable that is to be passed to the PARMS APPL LIST service. Note that the variable names used in the reporting program should differ from the XML tag names to avoid double-substitution of variable values.

```
/* Set variables for XML call */

Init_XMLStem1:
     rxrc          = 0       /* initialize our return code */
     stem          = "SER1." /* set outgoing stem name */
     SER2.         = ""      /* initialize outgoing stem */
     SER1.         = ""      /* initialize outgoing stem */
     SER1.Subsys   = subname /* subsystem name to query */
     SER1.Userid   = tsoname /* userid */
     SER1.Test     = tst     /* set test value */
     SER1.Product  = "CMN "  /* set product */
     SER1.Service  = "PARMS" /* set service*/
     SER1.Message  = "LIST"  /* set message */
     SER1.Scope    = "APL"   /* set scope   */
     SER1.applname = appname /* set application name */
                             /* set result set to return */
     SER1.includeInResult.1 = "applName"
Return
```

A userid of the following form is required on any stem that is passed for security checking:
`SER1.Userid = tsoname /* userid to use for security validation */`

You can code the *tsoname* as a string, for example, "abcdefg", or use the REXX function USERID(), which will substitute the current TSO userid or, in the case of a batch job, the TSO userid of the job submitter. SERNET will not allow the *tsoname* to differ from the real userid of the user who is executing or submitting the job.

Calling the Target XML Service

This Serxmlrc subroutine invokes the SERXMLRC program to make the target XML service call. SERXMLRC is the interface between all ChangeMan ZMF reporting programs and the target XML services. SERXMLRC is a member of the SERCOMC.LOAD library. You must use an ADDRESS instruction in REXX to link to this program through the LINKMVS host command environment.

SERXMLRC expects a REXX stem variable as input, and constructs the service request block from the information that is supplied in the stem variable.

After the target service completes execution, the reporting program checks the return code from the service call and processes the results that the service returned if the call was successful.

Note that the SERXMLRC program does not tailor the result set returned by the target XML service. Thus, the statements following the call to SERXMLRC save only the fields that the reporting program needs (the application name or names, in this example) and drops the returned stem variable to minimize the storage used by the REXX variable pool.

Here's an excerpt from the CMN010 sample program. The excerpt shows:

1 The instruction that calls the SERXMLRC subroutine in the program.

2 The code for the Serxmlrc subroutine, which invokes the SERXMLRC interface program.

3 Drop the stem variable to conserve storage.

```
/* make first xml service call */

call Serxmlrc                                                    1

/* for each application returned perform 2nd XML call */

do jx=1 to SER1.result.0
  call Init_XMLStem2               /* set up 2nd XML call */
  call Serxmlrc                    /* make 2nd XML call */
  if rxrc=0 then call Output_result /* if ok, print out result */
end

/* Print out totals */

call Output_Totals

/* terminate ZMF session */

call Disconnect

...

Serxmlrc:                                                        2
  address LINKMVS "SERXMLRC stem"
  rxrc=rc
  if rxrc<>0 then call Diagnose_Error
Return

...

/* Disconnect and set return code */

Disconnect:

 arg exitcode
 if exitcode =' ' then exitcode ='0'
 call Init_XMLstem0
 call Serxmlrc
 drop SER0.                                                      3
 exit exitcode
```

Diagnosing Errors and Formatting Report Output

The error and output-formatting subroutines in the reporting programs are fairly straightforward, so we do not comment on them here:

- Report output is written to the SYSTSPRT DDname.
- Diagnostic messages are written to the SERPRINT DDname.

Use an output display facility such as SDSF to view report output.

Disconnecting from ChangeMan ZMF

To explicitly disconnect from ChangeMan ZMF, you must issue an XML disconnect service call with the following service, scope, and message attributes:

```
<service name="        ">
<message name="DISCONCT">
<scope name="SERVICE">
```

Note that a blank is required in the service name attribute.

See the disconnect code above in the frame. You must ensure that you exit the REXX program if a nonzero return code appears in the reply message. Do not issue a second disconnect request or an infinite loop may result.

The following return codes, which signify REXX environmental errors, can originate from calls to SERXMLRC:

Return Code	Meaning
24	Error returned from the IRXEXCOM call.
28	Error in loading IRXEXCOM the first time.
32	No input stem variable was passed.

None of these return codes sets a message as there may be no way to pass a message back by means of the stem variable. All other errors should pass through the STATUS*xxx* stem variable.

XML Services Called in Reporting Programs

Refer to the *ChangeMan ZMF XML Services User's Guide* for a description of the XML services that the ChangeMan ZMF reporting programs call.

Appendix A

Installation Jobs and Transaction Codes

This appendix shows how ChangeMan ZMF installation jobs run in a series that is distributed across D or DP instances and P instances (or against production libraries in a DP instance) to distribute, install baseline, backout, and revert change packages.

X Node Data Sets

When installation JCL is created for a change package, a PDS is created for each installation site. The name of the PDS follows this format:

```
devmodel.X.sitename
```

where:

devmodel	**DEV MODEL DSNAME** on the **Global Parameters - Part 6 of 7** panel (CMNGGP06)
X	Fixed node name to distinguish the library from package staging libraries.
sitename	**Site** on the ***function*:SITE INFORMATION** panel (CMNPRSTI) for the package **Note:** There will be no *sitename* node for packages residing on an A instance.

This library is often referred to as the *X node data set*.

The members in this library contain all of the jobs associated with the distribution, installation, baseline ripple, DB2 bind, backout, revert, and temporary package component delete processes for the package. Member names in the X node data set follow this naming convention:

```
applttpp
```

where:

appl	Three or four character application mnemonic
tt	Two character transaction code
pp	Last digits of the package number: ■ Two digits where the application mnemonic is four characters ■ Three digits where the application mnemonic is three characters

- The JCL in each X node data set member is file tailored from the skeleton with name CMNtt, where tt is the two character transaction code. (The name of the skeleton that is actually used may have a suffix, such as *I* if the ChangeMan ZMF IMS Option is licensed.)
- Installation jobs are often referred to by their transaction code. For example, "the 30 job" means the job for transaction code 30 that was file tailored from the CMN30 skeleton and is in X node data set member appl30pp.
- Before customization, installation job names follow the same naming convention as the X node data set members that contain them. Exit program CMNEX008 can be used to customize the job names, but the member names in the X node data set stay the same.

Since a P instance site may not be on the same LPAR or have shared DASD with the D or DP instance where the X node data set is created, a copy of each X node data set is

transmitted to its target site in the distribution phase of the package installation process. The naming convention for the transmitted production X node data set is:

```
prdmodel.X.sitename
```

where:

prdmodel	**PRD MODEL DSNAME** on the **Global Parameters - Part 6 of 7** panel (CMNGGP06)
X	Fixed node name to distinguish the library from package staging libraries.
sitename	**Site** on the ***function*:SITE INFORMATION** panel (CMNPRSTI) for the package

The contents of the production X node data set are exactly the same as the development X node data set for the same site.

Installation Jobs

The table in this section shows the installation jobs for a package created on a D or DP instance.

- Each job is described by two columns:
  - **Job** - The two character transaction code
  - **Action** - What the job does
- There are two sets of columns in the table:
  - **Development Center** - Jobs that run on the A, D, or DP instance.
  - **Production Site** - Jobs that run on a P instance.

Development Center		**Production Site**	
Job	**Action**	**Job**	**Action**
10	■ Package is audited and/or frozen. ■ Jobs are created in ...X.&node. ■ Package is approved. ■ Job 10 is submitted to initiate the distribution. ■ CMNBATCH transaction 10 says distribution initiated and status is changed to DIS. ■ Vehicle is asked to submit job 11 at remote site.		

Development Center		Production Site	
Job	**Action**	**Job**	**Action**
11	Staging libraries are sent to remote site.	10	■ Staging libraries are received including QSAM package master. ■ Job 11 is submitted.
		11	■ CMNBATCH transaction 11 overlays package records (on PM) with QSAM package master; proper node record is time stamped; status is DIS. ■ Job 14 is submitted. (Only if IEBCOPY is not used.)
		14	Job 14 requests vehicle to submit 15 at DEV site.
		17	Job 17 is submitted if external (not internal) scheduler is used.
		18	Job 18 requests vehicle to submit 19 at DEV site.
15	Job 15 is submitted. (Only if IEBCOPY is used.)		
15	CMNBATCH transaction 15 stamps acknowledgment of distribution.		
19	Notification to package creator that distribution failed.		
		21	Perform DB2 bind for production installation. (INSTALL IN PROD = YES).
		20	Job 20 is submitted to check if package was previously installed, if not, then it begins installation.
		20	CMNBATCH transaction 20 changes package status to INS.
		20	Job 24 is submitted. (Only if IEBCOPY is not used.)
		20t	If Temporary, Job 20t runs to install members into Temporary libraries.
		24	Requests vehicle to submit 25 at DEV site.
		28	Requests vehicle to submit 29 at DEV site.
25	CMNBATCH transaction 25 changes package status to INS.		
29	Notification to package creator that installation failed.		
25	If Permanent, Job 30 is submitted.		
		30	Job 30 is submitted if system environment is ALL.

Development Center		**Production Site**	
Job	**Action**	**Job**	**Action**
30	CMNBATCH transaction 30 changes package status to BAS and ripples the baseline.		
30	Delete members from promotion libraries based on promotion level and library type.		
		31	If Temporary, Job 31 runs to delete members from temporary libraries.
		31t	CMNBATCH transaction 31 changes package status to TCC (Temporary Change Cycled) and date/time stamp. Submit job 35.
		32	Performs DB2 bind for production installation (INSTALL IN PROD = NO).
		34t	Requests vehicle to submit 35t at DEV site.
35t	Package status updated to TCC and date/time stamped when all remote sites have been cycled.		
		38t	Requests vehicle to submit 39t at DEV site.
39t	Notification to package creator that the package cycle failed.		CASE: A permanent change must be backed out. Operator makes human decision to back out (full) particular package. Enters backout reasons on panel and ChangeMan ZMF instance copies package to same flat file that was sent from development center. Job 50 is submitted.
		49	Job 21 runs the DB2 bind for production backout (INSTALL IN PROD = YES).
		50	■ Backs out the change by copying back from BKUP Libraries. ■ Changes package status to BAK. ■ Job 54 is submitted if IEBCOPY is used, else job 51.
		50	If system environment is ALL, job 55 is submitted.
		51	Job 51 transmits a QSAM package master to the development center and requests a vehicle to submit job 54.

Development Center		Production Site	
Job	**Action**	**Job**	**Action**
54	■ Reads flat package and transmits reasons. ■ Updates backout reasons into correct package.		
55	Job 55 is submitted to reverse ripple the baseline if all remote sites are backed out.		
55	Status is changed to BAK; * node record is date and time stamped.		
		56	Job 32 runs the DB2 bind for production backout (INSTALL IN PROD = NO).
		58	Job 58 requests vehicle to submit 59 at DEV site.
59	Notification to package creator that package backout failed.		
		64	Job 64 requests vehicle to submit 65 at DEV site.
65	Status is changed to DEV.		

Other CMNBATCH Transaction Codes

The following table shows other CMNBATCH transaction codes that occur on the development center and production site.

CMNBATCH Transaction	Explanation
05	Submits a job based on: ■ STE=site ■ NOD=node ■ SUB=jobname
65	Reverts package back to development: ■ Reset general component freeze flag ■ Reset all major date/time stamps ■ Set revert date/time stamp at remote site
80	■ Promotes or demotes a package ■ Checks out components with or without package association
90	Activates a component
92	Deletes staging libraries
93	Resynchronizes the implementation calendar
94	Deletes change package records
96	Decrements the Implementation Calendar when packages are deleted
99	This transaction is invoked to notify you any time there is a job failure.

Appendix B

Analyzing ZMF ISPF Skeletons

This appendix shows how ChangeMan ZMF ISPF skeletons are imbedded in other skeletons. ISPF file tailoring processes this hierarchy of skeletons to build ChangeMan ZMF job JCL.

This chapter is intended to provide information that will help customers modify ChangeMan ZMF base product functions and build custom functions to support change management processes at their company.

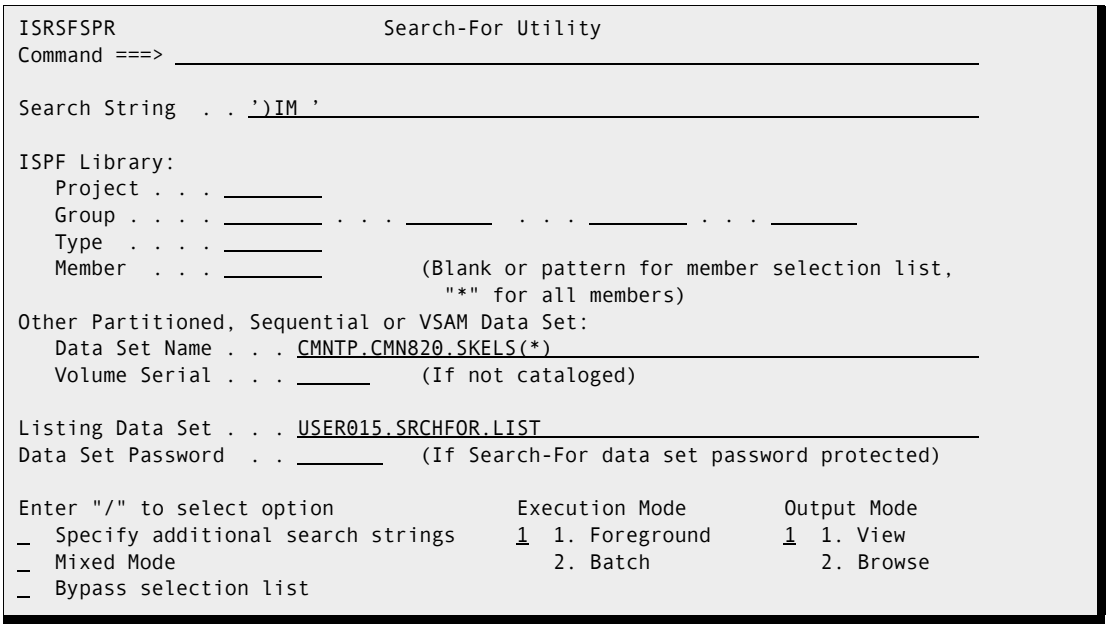
Introduction

This chapter presents information to help you analyze skeletons. The initial information you may want may be obtained from the $$$INDEX member, followed by the comments within each skeleton (where it is present).

Analyzing Skeleton Imbeds

The information in this chapter was assembled by analyzing skeleton libraries using the ISPF Search-For Utility (=3.14).

You can analyze skeleton imbeds yourself by searching skeleton libraries for ')IM ', the operator in the ISPF skeleton imbed statement in column 1:



The following panel shows a snippet of the results of a search:

```
1  ISRSUPC   -   MVS/PDF FILE/LINE/WORD/BYTE/SFOR COMPARE UTILITY- ISPF FOR z/OS
  LINE-#  SOURCE SECTION                    SRCH DSN: USER015.CMN820.SKELS


  CMN$$ACB                    --------- STRING(S) FOUND ----------------

       1  //*)IM CMN$$ACB
      30  //*)IM CMN$$ACB END

  CMN$$ARE                    --------- STRING(S) FOUND ----------------

       1  //*)IM CMN$$ARE
     245  )IM CMN$$XVP
     247  //*)IM CMN$$ARE END

  CMN$$ASM                    --------- STRING(S) FOUND ----------------

       1  //*)IM CMN$$ASM
      26  )IM CMN$$SYC
      63  )IM CMN$$OPT
      64  //*)IM CMN$$ASM END

  CMN$$ASN                    --------- STRING(S) FOUND ----------------

       1  //*)IM CMN$$ASN
      13  )IM CMN$$SPR
      36  )IM CMN$$XVP

  CMN$$AUD                    --------- STRING(S) FOUND ----------------

       1  //*)IM CMN$$AUD
      20  )IM CMN$$SPR
     120  )IM CMN$$SPR
     156  )IM CMN$$SEX
     176  //*)IM CMN$$SPR
     203  )IM CMN$$XVP
```

Notice that many ChangeMan ZMF skeletons begin with a JCL comment containing the skeleton name (unless they require a jobcard, when that has to come first):

```
//*)IM CMN$$ASM
```

Alternatively they may have a skeleton comment to the same effect, i.e.

```
)CM IM CMNJLCIC
or
)CM )IM CMNJLDB2
```

You will need to read the comments in the skeleton, as there may be relevant instructions, i.e.

```
)CM APPLY THE FOLLOWING IMBED TO APPLY PACKAGE SCRATCH/RENAMES
)CM TO THE TARGET PROMOTION LIBRARIES
)CM
)CM )IM CMN$$PSR
```

The only effective includes are the ones that start in column 1, e.g. lines 245, 26, 63, 13, 36, 20, 120, 156 and 203 above.

By searching backward through JCL generated by file tailoring from ChangeMan ZMF skeletons, you can get information about the hierarchy of imbeds that was used by ISPF file tailoring to build the JCL. However, there is no way to tell from the JCL comments if a skeleton was imbedded in a previously listed skeleton or if both were imbedded in another skeleton and processed serially.

This JCL fragment from a stage job shows that skeletons CMN$$DSN, CMN$$JBL, CMNCOB2, CMN$$VAR, CMN$PARM, and CMN$$WRT were processed by ISPF file tailoring to build the JCL. In fact, skeletons CMN$$VAR and CMN$$XSC are imbedded in procedure skeleton CMNCOB2, and skeleton CMN$PARM is imbedded in CMN$$VAR.

```
000010 //*
000011 //*)IM CMN$$DSN
000012 //*)IM CMN$$JBL
000013 //JOBLIB   DD DISP=SHR,DSN=CMNTP.CMN812.C6.LOAD
000014 //         DD DISP=SHR,DSN=CMNTP.SER812.C6.LOAD
000015 //         DD DISP=SHR,DSN=CMNTP.CMN812.LOAD
000016 //         DD DISP=SHR,DSN=CMNTP.SER812.LOAD
000017 //*)IM CMNCOB2
000018 //*)IM CMN$$VAR
000019 //*  USROP01 = Y
000020 //*)IM CMN$PARM
000021 //* SEL  =  AND OBJLIB = Y
000022 //*)IM CMN$$XSC
000023 //SERCOPY EXEC PGM=SERCOPY,    *** COPY ACPSRCEE FROM STAGING
000024 //             REGION=3M,
000025 //             PARM=('INDSN(CMNTP.S6.ACTP.STG6.#000032.SRC)',
000026 //             'MEMBER=ACPSRCEE')
000027 //SYSPRINT DD  DISP=(,PASS),DSN=&&LIST00,
000028 //             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE),
000029 //             DCB=(RECFM=FBM,LRECL=121,BLKSIZE=0)
000030 //ABNLIGNR DD  DUMMY
000031 //SYSUT2   DD  DISP=(,PASS),DSN=&&SOURCE(ACPSRCEE),
000032 //             UNIT=SYSDA,SPACE=(CYL,(1,2,1),RLSE),
000033 //             DCB=(DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=0)
000034 //SYSUT3   DD  UNIT=SYSDA,SPACE=(CYL,(5,5))
000035 //SYSUT4   DD  UNIT=SYSDA,SPACE=(CYL,(5,5))
000036 //*)IM CMN$$WRT
000037 //WRITE   EXEC PGM=CMNWRITE,   *** PARSE/EXPAND COMPONENT ACPSRCEE
000038 //             COND=(4,LT),
000039 //             PARM=('SUBSYS=6,USER=USER015',
000040 //             '')
000041 //*)IM CMN$$SPR
000042 //SER#PARM DD  DISP=SHR,DSN=CMNTP.SER812.C6.TCPIPORT
000043 //SYSPRINT DD  DISP=(,PASS),DSN=&&LIST10W1,
000044 //             UNIT=SYSDA,SPACE=(CYL,(5,5),RLSE)
000045 //*)IM CMN$$SYC
000046 //SYSLIB   DD  DISP=SHR,DSN=CMNTP.S6.ACTP.STG6.#000032.CPY
000047 //         DD  DISP=SHR,DSN=CMNTP.S6.V812.BASE.ACTP.CPY
```

Note also that there is often logic to determine if a skeleton is used, and that a given skeleton may appear several times in the calling skeleton, for example CMN$$CBL which includes CMN$$SPR, which for the first include of CMN$$SPR is subject to 5 separate)SEL statements:

```
000005 )SEL &STORMNS EQ P OR &SKLBLVL EQ 0 AND &STORMNS NE L
000006 )SEL &STORMNS EQ P OR &SKLBLVL EQ 0 AND &STORMNS NE A
000007 )SEL &STORMNS EQ P OR &SKLBLVL EQ 0 AND &STORMNS NE V
000008 )SEL &STORMNS NE H
- - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  - 82 Line(s) not Displayed
000091 )SEL &LIBORG EQ LIB
- - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  9 Line(s) not Displayed
000101 )IM CMN$$SPR
- - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  - 40 Line(s) not Displayed
000142 )ENDSEL &LIBORG EQ LIB
000143 )ENDSEL &STORMNS NE H
000144 )ENDSEL &STORMNS EQ P OR &SKLBLVL EQ 0 AND &STORMNS NE V
000145 )ENDSEL &STORMNS EQ P OR &SKLBLVL EQ 0 AND &STORMNS NE A
000146 )ENDSEL &STORMNS EQ P OR &SKLBLVL EQ 0 AND &STORMNS NE L
```

Another point to be aware of is the use of JCL IF-THEN-ELSE constructs which will also affect execution at run time of the JCL. See near the end of CMN$$ILD:

```
)CM  DELETE CMNBAT90 OUTPUT IF WE GET ILOD CONFLICT - CLEAR IT OUT
)CM   FOR CMN99 STEP
)CM
//CHKVILOD IF (VFYILOD&L#N..RUN = TRUE) THEN
//DLTILOD&L#N EXEC PGM=IEFBR14,
//             COND=(8,GT,VFYILOD&L#N)
//BAT90CTL DD  DISP=(MOD,DELETE,DELETE),
//             UNIT=SYSDA,SPACE=(CYL,0),
//             DCB=(DSORG=PS,RECFM=FB,LRECL=80,BLKSIZE=0),
//             DSN=&&&&BAT90CTL
//CHKVILOD ENDIF
```

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