z/OS
2.5

MVS Product Management

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 143.

Contents

Figures

Tables

x

About this document

This publication describes the product management functions that MVS™ provides: measured usage and product registration.

For measured usage, SMF collects resource usage data (primarily CPU time) on a z/OS system for any product that has identified itself and registered with SMF. The collected information, summarized by product version for an interval, is written in SMF type 89 subtype 1 records at specified intervals. (Some similar information is written in SMF type 30 records based on the SMF interval, but type 30 records include only the address space level information; system level information about a product appears only in type 89 records.)

For product registration, SMF collects data for any product that has registered with MVS—that is, identified itself and indicated that it is running on the system. The collected information, summarized by product for an interval, is written in SMF type 89 subtype 2 records at specified intervals. Optional elements that register with the system can be dynamically enabled.

Who should use this document

This publication is intended for anyone who needs to understand the IBM® S/390 Usage Pricing (also known as Usage License Charges (ULC)) support available under OS/390® or z/OS. It also describes how to change the enablement policy of IBM products and how to obtain information about products that have registered as running on a system. The intended audience includes asset managers responsible for the enablement policy for IBM products, as well as capacity planners, people responsible for planning/ scheduling or running production jobs involving SMF data, system programmers responsible for SMF related changes, and software vendors wishing to use MVS product management functions for their own products.

Note: The information and interfaces in this publication are provided to you for your use. You remain responsible for uses and results other than as provided in the *IBM Customer Agreement* and the *Attachment for S/390 Usage Pricing or Measured Usage License Charges*.

How this document is organized

This publication is organized as follows:

- Chapter 1, "Usage accounting," on page 1 provides guidance information for measured usage accounting.
- Chapter 2, "Product registration and enablement," on page 17 provides guidance information for product registration.
- Chapter 3, "Reporting product information," on page 23 describes how to use IFAURP, the reporting program for product management.
- Chapter 4, "Usage pricing examples," on page 69 contains multiple examples of how to use IFAURP for measured usage license charges.
- Appendix A, "Type-model values for IBM and non-IBM processors," on page 115 lists the supported IBM and non-IBM type and model values.
- Appendix B, "IFAURP program exit ," on page 129 describes the IFAURP program exit.

How to use this document

Some sections provide an overview of product management appropriate for all readers while other sections provide the detailed technical information required by system programmers or vendors.

z/OS information

This information explains how z/OS references information in other documents and on the web.

When possible, this information uses cross document links that go directly to the topic in reference using shortened versions of the document title. For complete titles and order numbers of the documents for all products that are part of z/OS, see *z/OS Information Roadmap*.

To find the complete z/OS library, go to IBM Documentation (www.ibm.com/docs/en/zos).

How to send your comments to IBM

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Summary of changes

This information includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations for the current edition are indicated by a vertical line to the left of the change.

Note: IBM z/OS policy for the integration of service information into the z/OS product documentation library is documented on the z/OS Internet Library under IBM z/OS Product Documentation Update Policy (www-01.ibm.com/servers/resourcelink/svc00100.nsf/pages/ibm-zos-doc-update-policy?OpenDocument).

Summary of changes for z/OS MVS Product Management for Version 2 Release 5 (V2R5)

The following content is new, changed, or no longer included in V2R5.

New

The following content is new.

- None.

Changed

The following content is changed.

- None.

Deleted

The following content was deleted.

- Information about WLM service coefficients was removed from "Measurement metric" on page 2.

Summary of changes for z/OS MVS Product Management for z/OS Version 2 Release 4 (V2R4)

This information contains no technical changes for this release.

Summary of changes for z/OS MVS Product Management for z/OS Version 2 Release 3 (V2R3)

This information contains no technical changes for this release.

Chapter 1. Usage accounting

Usage accounting covers the following major topics:

- "Overview of usage charges" on page 1

  Intended for anyone who needs to understand the basics of IBM Usage License Charges (ULC) or Measured Usage License Charges (MULC), this topic introduces the concepts behind IBM's usage license charges.

- "Usage pricing start-up guidelines" on page 4

  Intended for system programmers, this topic lists the steps you must follow to participate in usage pricing with information for those who are already collecting SMF records and those who are not. Information is also provided that may be of interest to those who are responsible for scheduling and maintaining the installation's SMF production jobs.

Overview of usage charges

IBM's goal is to provide a charging methodology that is manageable and understandable, one that minimizes administration, technical complexity, and operational impact while providing value-related charges for the customer. This methodology has the additional goal of being appropriate (and optional) for the Parallel Sysplex environment.

z/OS supports Usage License Charges that works with OS/390 Version 2 and later.

Usage License Charges (ULC) is the usage pricing option available to users of z/OS and to users of OS/390 Version 2 or later, after January 1, 1999. MVS/ESA and OS/390 Version 1 users continue to use Measured Usage License Charges (MULC) for usage pricing. OS/390 Version 2 customers who were already using MULC before January 1, 1999 may continue to use it, or switch to ULC.

> **Important:** No new MULC users will be permitted after December 1, 1998. Customers who discontinue MULC after January 1, 1999 cannot restart MULC later.

Although the eligibility and pricing structures for MULC and ULC are different, their implementation is very similar. For more information about eligibility to use ULC and MULC, see "Eligible IBM products" on page 3.

Both the ULC and the MULC pricing methodologies attempt to reduce the additional administration, technical complexity, and operational impact potentially associated with measured usage by:

- Extending the existing MVS System Management Facilities (SMF) mechanism to automatically measure product usage for any product that registers and requests the usage measurement services.
- Providing a reporting function in the form of a post-processor program that calculates and reports product usage based on the usage data measured by SMF.

It is the responsibility of each product (such as CICS® and IMS), not the installation, to identify itself to MVS and request the appropriate set of measurement functions. Because most installations already use SMF to track, report, and bill many hardware and software activities, this use of SMF takes advantage of the many SMF procedures and jobs these installations use.

System programmers activate usage measurement functions by changing SYS1.PARMLIB and using the MVS SET   SMF=xx command. These actions need only be performed once per system image, while the product specific activities must be performed once per product per system image. A summary of these activities are listed under "Usage pricing start-up guidelines" on page 4.

Measurement metric

IBM uses CPU service units (CPU SUs) as the measurement unit for reporting the processor's usage of a product. CPU service units, which include TCB and SRB times and represent a common unit of processor capacity across the entire S/390® line of processors, are based on standard performance benchmarks. Unlike CPU time, a CPU SU represents approximately the same processor capacity regardless of the model and type of processor. These CPU service units are described in *z/OS MVS Initialization and Tuning Guide* and used by system programmers to tune the system. They are also reported by IBM Resource Measurement Facility (RMF).

CPU service unit calculations

CPU service units are calculated by the usage report program based on the CPU time information collected in SMF type 89 subtype 1 records. The processor-dependent CPU SU factors used in this calculation are supplied by IBM in the usage report program. The program also contains the CPU SU factors for non-IBM processors for which both IBM and the processor manufacturer have reached agreement. The CPU SU factors are commonly referred to as *SRM constants* in *z/OS MVS Initialization and Tuning Guide*, where they have been traditionally published for IBM processors.

Unlike the system resource management (SRM) component, which uses the logical processor configuration (LPAR when using under PR/SM) to choose the appropriate CPU SU factor, the usage report program uses the CPU SU factor corresponding to the single image mode of the physical processor to calculate CPU service units. Consistently using the CPU SU factor for the physical processor allows installations to configure their processors in the logical configurations most appropriate to their data processing needs without incurring additional software charges due to the specifics of the logical configuration chosen.

Determining usage

Each participating product's initial monthly usage charge is determined as follows:

1. Once installed and enabled, the MVS usage measurement function collects the usage of each product for each hour of the day and reports this usage in SMF type 89 subtype 1 records.

2. After measuring product usage for two full months (for example, August 15 to October 14, inclusive), these usage records are passed to the usage report program, which produces a report that lists the measured usage for each product that reported its data. This program uses the following algorithm to report usage for this specific set of IBM products:

   a. The usage measurement for the highest hour within the 24 hour day is kept as a reference hour.

   b. All the reference hours for the month are compared and the fourth highest reference value is chosen as the usage value listed on the report.

   Reporting the fourth highest value, instead of the highest value, eliminates high usage measurements from exceptional business or system conditions, such as latent demand after an on-line system restart in response to a hardware or software error.

   Note: The initial measurement for MULC users beginning before December 1, 1998 was one month in duration.

3. This initial measurement is used to set the monthly charge for the initial billing period, which may vary from 3 to 14 months in duration to allow for alignment (for example, with the fiscal year).

   Note: The initial billing period for MULC users beginning before December 1, 1998 can vary from 3 to only 8 months in duration.

4. The highest monthly usage measurement (determined as described in step) recorded in the initial billing period is used to set monthly charges for a second billing period. Thereafter, monthly charges for subsequent billing periods are based on the highest monthly usage measurement recorded in the prior twelve months.

   Note: Non-initial MULC billing periods beginning prior to January 1, 1999 are 6 months in duration. If you were using MULC with a 6–month billing period before January 1, 1999, you will migrate to

12–month billing periods when your final 6–month billing period ends. By July, 1999, all non-initial billing periods for usage pricing will be 12 months long.

Usage price structure

The IBM pricing structure for those products eligible for ULC pricing consists of six usage levels and associated usage prices. These usage levels are defined by ranges of CPU service units. For more information, see the *ULC Announcement Letter*. Use the latest ULC announcements for specific product prices.

The IBM pricing structure for those products eligible for MULC pricing consists of 10 usage bands and associated usage prices. Usage bands are defined by ranges of CPU service units and are listed in the *MULC Announcement Letter*. Use the latest MULC announcements for specific product prices.

Eligible IBM products

For IBM products, usage pricing eligibility is on a per-product, per-processor basis. Installations may choose a usage pricing option for one or all of the eligible IBM products on one processor and choose a different combination of pricing options for the same products executing on a different processor. The choice is on a processor basis and applies to all z/OS images (LPARs) running on a participating processor. Product usage measurements are aggregated across all z/OS images (LPARs) executing on the processor footprint.

In a Parallel Sysplex® environment, product eligibility remains at a per-product basis, but now applies to all processors in the sysplex. When an installation chooses a usage pricing option for a product executing in a sysplex, usage measurements for that product are collected and aggregated across all processors included in the sysplex.

For the latest information and list of programs for which usage pricing charges by service units (SUs) is available, see IBM z Systems Software Contracts (www.ibm.com/systems/z/swprice/reference/exhibits/ulc.html).

Usage pricing eligibility

As of January 1, 1999, the IBM software products listed in , together with their chargeable features (if any), are eligible for usage pricing.

```
        Product            Version    Release        Program #
        -------            --------   -------------  ---------
        CICS               Version 4  1.0 and later  5655-018
        CICS TS            Version 1  1.0 and later  5655-147
        DB2 OS/390         Version 5  1.0 and later  5655-DB2
        IMS                Version 6  1.0 and later  5655-158
        MQM OS/390         Version 1  1.0 and later  5695-137
```

Figure 1. IBM software products that are eligible for usage pricing

The products shown in are also eligible for usage pricing, with their pricing based upon the measured usage of their related subsystem.

```
        Product                    Program #  Priced by
        -------                    ---------  ---------
        DB2 Admin Tool             5688-515   DB2 usage
        DataPropR Apply for MVS V5 5655-A22   DB2 usage
        DataPropR Capture for MVS V5 5655-A23 DB2 usage
        DataPropagator NR V2       5696-705   IMS usage
        -- Selector
        -- Utility
        -- RCVR
        -- Synch
```

Figure 2. IBM software products that are eligible for usage pricing, based on usage of their related subsystem

Note: Where multiple versions of a product are measured on a single processor or in a parallel sysplex environment, measurements are aggregated and charges are based on the measured usage price of the latest version.

Measured usage license charges eligibility

is a sample of IBM software products, together with the chargeable features (if any), that are eligible for Measured Usage License Charges.

```
        Product          Version    Release        Program #
        -------          ---------  -------------  ---------
        BatchPipes/MVS   Version 1  0.0 and later  5655-065
        CICS/MVS         Version 2  1.2 and later  5665-403
        CICS/ESA         Version 3  2.1 and later  5685-083
        DB2              Version 3  1.0 and later  5665-DB2
        IMS/ESA DB       Version 3  1.0 and later  5665-408
        IMS/ESA DB       Version 4  1.0 and later  5685-012
        IMS/ESA TM       Version 3  1.0 and later  5665-409
        IMS/ESA TM       Version 4  1.0 and later  5685-013
        IMS TM           Version 5  1.0 and later  5695-176
```

Figure 3. IBM software products eligible for measured usage license charges

Remember:

1. Where multiple versions of a product are measured on a single processor or in a parallel sysplex environment, measurements are aggregated and charges are based on the measured usage price of the latest version.

2. The figures in this documentation that show examples of license charges are for sample purposes only. Always consult the IBM System z® Software Pricing website for the current information.

Usage pricing start-up guidelines

Measured usage accounting takes advantage of existing SMF mechanisms to collect and report information about product usage. It consists of:

- a measurement function
- a reporting function

The reporting function analyzes the data collected for the time period represented and produces reports on each product's usage. Your installation sends these reports to IBM for usage pricing on a regular basis.

SMF start-up guidelines

The following steps indicate the major activities required to set up SMF data collection for the first time. These steps establish an SMF environment that collects both the SMF type 89 subtype 1 records required for measured usage charges and the type 89 subtype 2 records required for product registration reporting. Installations wishing to collect additional SMF records must make appropriate changes. See *z/OS MVS System Management Facilities (SMF)* for additional examples and a complete explanation of each of the following steps:

1. Allocate and format at least two SMF data sets (VSAM clusters) that are large enough to contain all the type 89 records generated between regular dumps of these data sets.

   Type 89 records require relatively small amounts of DASD space. You might start with an initial allocation of 5 tracks per day for subtype 1 and subtype 2 records, then monitor the data set and adjust the size to reflect actual usage.

2. Establish procedures and jobs to dump and clear the SMF data sets on a regular basis.

   These procedures involve dumping and clearing the SMF data sets after they have been made inactive either because they are full or because an operator entered the SWITCH SMF command. CBIPO provides sample SMF dumping procedures and corresponding jobs.

Depending on the volume of data and the size of the SMF data sets, you can run the SMF dump job daily or weekly. Because the space required to store type 89 records is relatively small, installations that collect only the type 89 record might consider scheduling weekly rather than daily dumps. The following example contains sample JCL to dump and clear one of the SMF data sets, SYS1.MANX.

```
//STEP0     EXEC PGM=IFASMFDP
//SYSPRINT DD   SYSOUT=*
//MANX     DD   DSN=SYS1.MANX,DISP=SHR
//USAGE    DD   DSN=customer.type89.dump.dataset,DISP=....
//SYSIN    DD   *
      INDD(MANX,OPTIONS(ALL))
      OUTDD(USAGE,TYPE(89))
```

Note: If you want to collect other SMF records in addition to type 89 records, do not use this JCL.

If you want to collect only type 89 subtype 1 records, change the OUTDD statement in the example as follows:

```
      OUTDD(USAGE,TYPE(89(1)))
```

3. Create an SMFPRMxx parmlib member that contains the SMF parameters you need for measured usage pricing.

The following example lists the parameters that must appear in the active SMFPRMxx member to enable measured usage pricing.

```
ACTIVE                        /* ACTIVATE SMF RECORDING     */
DSNAME(SYS1.MANX,SYS1.MANY)   /* USE DATASETS MANX AND MANY */
SYS(TYPE(89))                 /* COLLECT TYPE 89 RECORDS    */
```

Note: If you want to collect only type 89 subtype 1 records, change the SYS option in the example as follows:

```
      SYS(TYPE(89(1)))
```

Once these steps are complete, continue with the changes listed in . Note that step 1 of this next section can be bypassed, because it was already completed in this section.

Guidelines for installations already collecting SMF data

This section summarizes the series of steps that the user's installation must follow to participate in usage pricing. Customers should refer to the latest *ULC Announcement Letter* or *MULC Announcement Letter* and the *IBM Customer Agreement Attachment*, depending on their usage pricing option, for a full description of their responsibilities.

Although the following set of guidelines has been written for the IBM products that are being usage priced, this set of guidelines should work equally well for any product owners (software vendors) choosing usage pricing for their products based on the usage measurement services described under the topic "IFAUSAGE– Collecting Usage Data" in *z/OS MVS System Management Facilities (SMF)*.

Installations already collecting SMF data can use the following steps to implement usage pricing:

1. Activate the usage measurement collection function.
2. Collect SMF type 89 subtype 1 records for the required measurement period.
3. Process type 89 subtype 1 records by the usage report program.
4. Provide IBM with a copy of the Software Usage Report.

Step 1. Activate the usage measurement collection function

The installation must activate the measurement collection function on every OS/390 and z/OS image participating in usage pricing. The SMFPRMxx member of SYS1.PARLIB controls the collection process. You may be required to make changes to your current SYS parameter to activate the collection of SMF

type 89 subtype 1 records. Although you can continue to collect other types of SMF records, usage pricing only requires the collection of type 89 subtype 1 records.

Where a processor is running OS/390 or z/OS under PR/SM (or equivalent) or under VM, the measurement function must be installed and activated to record the required product usage for:

- All eligible products running in all OS/390 or z/OS LPARs
- All eligible products running in all OS/390 or z/OS systems under VM
- All copies of each eligible product, including those running on non-production LPARs or systems

All OS/390 or z/OS images running on processors designated as being a part of a parallel sysplex for the purposes of measured usage pricing must also activate the measurement function.

Note: After changing SYS1.PARMLIB and activating the measurement function, you must reinitialize all copies of DB2® before you can measure DB2 usage.

SYS and SUBSYS parameters

The SYS parameter specifies the global recording options for the entire system. The TYPE option of the SYS parameter indicates the SMF record types and subtypes SMF is to generate. To participate in usage pricing your SMF TYPE option must include record type 89 either on the STC SUBSYS statement, if it exists, or on the SYS statement. The SUBSYS statement overrides the SYS specification. An explicit example would be:

```
SYS(TYPE(0,7,30,89(1)))
```

Whenever you use the SUBSYS parameter with a TYPE option referring to STC, you must also explicitly include type 89, as in the following example:

```
SUBSYS(STC,TYPE(30,89(1)))
```

You can also include the type 89 record implicitly as part of a range, as in the following example:

```
SYS(TYPE(0:255))
```

EXITS subparameter

Although the exit names provided by your installation's current EXITS subparameter need not be changed to participate in measured usage pricing, you must insure that exit IEFU84 is not used by installation code to alter any fields in the type 89 records or suppress the writing of type 89 records.

If your installation uses exits IEFUSI or IEALIMIT to control the size of the user region assigned to a job step, IBM recommends that your exit be changed to allow the region size for program IFAURP to be set by JCL used to execute this program.

INTERVAL subparameter

The type 89 record has a default interval value of 60 minutes, which is also the maximum interval value. The type 89 record is always synchronized to the start of the hour (i.e. 00 minutes, 00.00 seconds after the hour). Under the proper conditions the SMFPRMxx INTERVAL subparameter can set the interval at which type 89 records are written. The INTERVAL subparameter can also influence the way that SMF reports task and function time, when used in conjunction with the INTVAL and SYNCVAL parameters. See for details.

If you have provided an INTERVAL, either through a numeric value or through the SMF suboption, its value is used for the type 89 interval only when that value can evenly be divided into 60 minutes. If you have used the NOINTERVAL subparameter or provided no INTERVAL parameter, the default (60-minute) interval is used for the type 89 records. Regardless of the interval value used, type 89 records are always synchronized to the start of the hour.

In the following example, the installation has set interval recording so that no more than 2 hours of accounting data is lost. This value will result in the use of 60 minutes as the interval for type 89 records.

```
INTERVAL(020000)
```

In the next example, the installation has set interval recording to 30 minutes. Because this value is both less than 60 minutes and divides evenly into 60 minutes, one or more type 89 records are written every 30 minutes synchronized to the start of the hour.

```
INTERVAL(003000)
```

INTVAL and SYNCVAL parameters

SMF provides the INTVAL and SYNCVAL parameters. The INTVAL parameter can be used to set the interval at which the type 89 records are created only when two conditions are met:

1. You have specified the SMF suboption of INTERVAL.
2. INTVAL has a value that divides evenly into 60 minutes.

Although SYNCVAL can not change type 89 record's synchronization with the start of the hour, SYNCVAL, INTVAL and INTERVAL can influence the way that SMF reports task and function related time in the type 89 record, for those products collecting task or function time. See the topic "Collecting Your Own Data Using the IFAUSAGE Macro" in *z/OS MVS System Management Facilities (SMF)* for a description of task and function time. SMF reports the exact task or function time that occurred during the measurement interval only when SYNCVAL has a value of 0, INTVAL has a value that divides evenly into 60 minutes, and the INTERVAL value divides evenly into the INTVAL value. Unless all of these conditions are true, SMF must apportion the task time that it collects across two reporting intervals, rather than precisely reporting the time in the appropriate measurement interval. (SMF always reports the time collected on an address space basis to the correct measurement interval regardless of the INTERVAL, INTVAL, and SYNCVAL parameters.)

Thus, IBM recommends that installations running OS/390 or z/OS use:

- An INTVAL value that divides evenly into 60
- A SYNCVAL of 0
- An INTERVAL parameter with the SMF option *or* an INTERVAL value that divides evenly into the INTVAL value.

Each of the examples shown in meet all the recommended conditions and will, therefore, precisely report all of a product's task and function time under the interval in which it was collected.

Table 1. Examples: Valid INTVAL, SYNCVL, and INTERVAL specifications		
Example 1	**Example 2**	**Example 3**

`INTVAL(15)`
`SYNCVAL(00)`
`INTERVAL(SMF,SYNC)`
	`INTVAL(30)`
	`SYNCVAL(00)`
	`INTERVAL(003000)`
		`INTVAL(60)`
		`SYNCVAL(00)`
		`INTERVAL(SMF,SYNC)`

SID parameter

There are no usage-related restrictions on how installations may use the SID parameter. You may assign the same system identifier to multiple OS/390 images on the same physical processor or on different processors either inside or outside a parallel sysplex.

Step 2. Collect SMF type 89 records for the required measurement period

You must collect SMF type 89 records for two full months to set the initial usage charge for any product for which usage data has not been collected before. If the first day of a product's measurement period happens to start on the first day of one month, the usage measurement period terminates at midnight of the last day of the following month. For example, if measurement starts on August 1, it ends on September 30. If the first day of a product's measurement period starts after the first day of one month

(for example, the 15th), the measurement period terminates two months later at midnight on that day minus one (in this case, the 14th). In other words, if it starts on August 15th, it ends on October 14th. This initial two-month measurement determines the product's monthly usage charge for the initial billing period. After this initial two-month measurement, you must continue to measure to establish the usage charge for each succeeding 12-month billing period.

A processor or parallel sysplex will have only one measurement period for all products associated with each of the vendors who choose to price their product using IBM's usage pricing methodology. Although each vendor's products can establish a unique measurement period, each measurement period is set by the first product(s) for which usage is collected for that vendor. The first measurement period for a product may be adjusted to align with the measurement period already established on the processor or parallel sysplex.

You can continue to use your installation's current SMF procedures for dumping and saving the type 89 records providing those procedures:

1. Collect SMF records from all OS/390 and z/OS images on a participating processor.
2. Allow for the type 89 records to be saved long enough to be processed by the usage report program, IFAURP, provided the IFAURP history file is being actively used. See "Step 3. Process type 89 records by the usage report program" on page 9 for more information about the IFAURP history file.

You might need to establish SMF procedures for non-production system images where you do not currently collect SMF data.

Your installation's current SMF collection procedures may require little or no changes to participate in measured usage pricing. Your existing SMF procedures may range from creating a unique SMF data set to contain each day's SMF records for each OS/390 and z/OS image to procedures that use a single SMF data set to contain each month's SMF records for all OS/390 and z/OS images from all processors in a data center. As long as all the required type 89 records are present, either of these extremes, as well as any of the variations in between, should meet the processing requirements of IFAURP.

IBM usage pricing note: The major requirement is that IFAURP process all type 89 subtype 1 records.

Because of the important role that type 89 records play in establishing software charges and reporting registered products, installations can choose to modify existing SMF procedures to create and maintain unique SMF data sets that contain only type 89 records. An installation can separate the type 89 records at any of several steps in the current SMF process, including the initial SMF dump step that dumps the contents of the current full SMF data set(s) to another data set created by the installation.

The job step that performs this dumping and clearing process can selectively write the type 89 records to another SMF data set. Because the type 89 records are expected to need relatively little space, many installations might decide to manage type 89 records in separate data sets. Figure 4 on page 8 contains sample JCL that shows how to write type 89 records to a separate data set as a part of the existing SMF dumping/clearing job step. **Bold face** type highlights the changes made to an existing SMF dump procedure to separate the type 89 records.

```
//STEP0    EXEC PGM=IFASMFDP
//SYSPRINT DD   SYSOUT=*
//DUMPIN1  DD   DSN=SYS1.MANx,DISP=SHR
//DUMPIN2  DD   DSN=SYS1.MANy,DISP=SHR
//DUMPOUT  DD   DSN=customer.usual.dump.dataset,DISP=.....
//USAGE    DD   DSN=customer.type89.dump.dataset,DISP=....
//SYSIN    DD   *
     INDD(DUMPIN1,OPTIONS(ALL))
     INDD(DUMPIN2,OPTIONS(ALL))
     OUTDD(DUMPOUT,TYPE(0:255))
     OUTDD(USAGE,TYPE(89))
```

Figure 4. Example: JCL to writer type 89 records to separate data set

Step 3. Process type 89 records by the usage report program

To meet the requirement to report product usage, you must use the usage report program, IFAURP, to process all the SMF type 89 records collected for the processor's or parallel sysplex's measurement period. The type 89 records for **all** the OS/390 and z/OS images (LPARs) are required for each participating processor or parallel sysplex. Note that you must not alter type 89 records before you run the usage report program to process them. There is no requirement, however, to run IFAURP on the processor on which the type 89 records were collected.

Once IFAURP processes these records, you may discard them, because IFAURP saves the usage information contained on these records in a relatively small history file. Even so, IBM recommends that the installation retain these records, perhaps on tape, for at least a year and a half to be able to process the records if necessary. A single tape/cartridge should easily accommodate all the type 89 records generated by all the OS/390 and z/OS images in a large installation over the course of a year, when the records have a BLKSIZE of 32,760.

IFAURP has been designed to accommodate the usage data collected from any mix of processor configurations. A single execution of IFAURP can handle any combination of processor configurations. A "processor configuration" can be a single OS/390 and z/OS LPAR or all the OS/390 and z/OS images for all the processors in the installation's data center, including those processors that are a part of parallel sysplexes, whenever they all share a common IBM customer number. IFAURP can also accommodate a wide variety of processing and scheduling requirements, which are often highly installation dependent. For instance, you can run IFAURP to process SMF data sets daily, weekly, monthly, or more or less often.

IFAURP recognizes duplicate SMF records, which often occur as the result of procedural errors. IFAURP bypasses all duplicate records, regardless of whether they are recognized as duplicates during a single execution of IFAURP or across multiple executions of IFAURP. The latter case might occur when unique type 89 records are processed on one execution of IFAURP, during which the appropriate usage data is placed in the history file, followed by another execution of IFAURP with the same SMF input data set. In this case, IFAURP recognizes the records on the input data set as duplicates of the data already stored in the history file.

shows IFAURP's general SMF record flow as three separate job steps. Basic processing consists of passing only the type 89 records to the SORT for sequencing purposes, then passing both the sorted type 89 records and the latest history file to IFAURP.

Figure 5. General data flow required in usage reporting
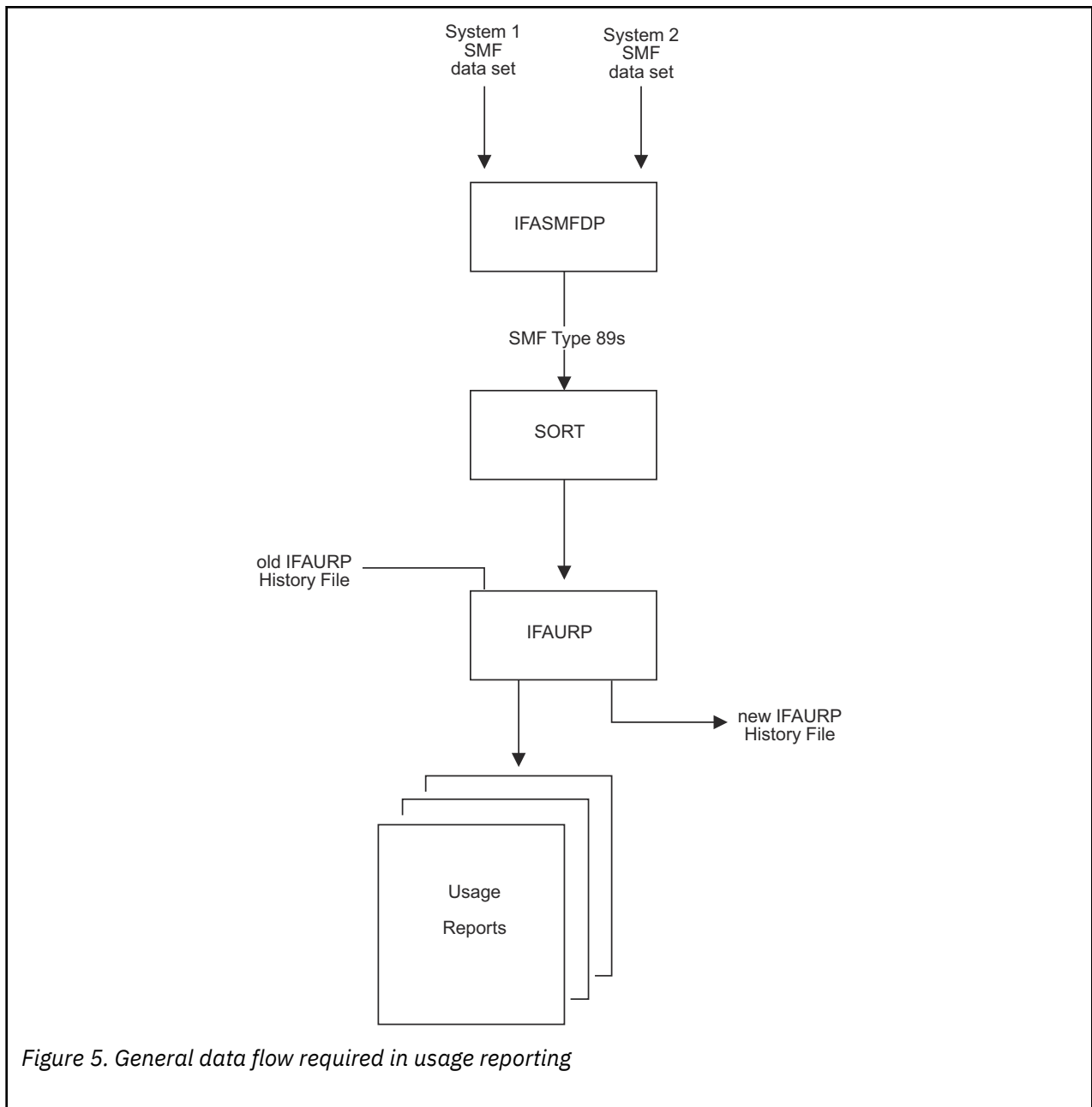
In the first step, the general purpose SMF dump utility, IFASMFDP creates an intermediate data set containing only type 89 records. This utility program can also select SMF records based on additional criteria, if necessary, such as system name (as defined by the SID parameter) and/or the date and time that the records where originally written. Installations that already save type 89s on data sets dedicated to that record type can bypass this first step. Installations can also bypass this first step, if their system SORT can select records based on the content of specific fields. DFSORT, for instance, can eliminate the need for the IFASMFDP step by selecting only the type 89 SMF records for sort processing when the following additional SORT control statement is supplied:

```
INCLUDE COND=(6,1,BI,EQ,X'59')
```

Failure to restrict SORT processing to type 89 records results in unnecessary sort processing time and sorting resources.

Note: The IFASMFDP utility adds a type 2 and 3 SMF record to the output data set, in addition to the SMF type 89 record.

Figure 6 on page 11 and Figure 7 on page 12shows sample JCL for the general case (Figure 5 on page 10). This JCL is available in SYS1.SAMPLIB member IFAUJCL. The JCL collects type 89 subtype 1 and subtype 2 records but generates only measured usage reports. See "Invoking IFAURP" on page 26 for information about how to change the JCL to generate the product registration report.

If your installation has multiple processors, you must decide how many processors to associate with a specific set of old/new history files. You can associate a single processor or all your installation's processors with a single set of old/new history files. There are only three history file processing requirements. These are:

1. All the OS/390 and z/OS images (logical partitions) on a processor must use the same set of old/new history files.

2. All the processors in a parallel sysplex must use the same set of old/new history files.

3. All processors in the same set of old/new history files must share a common IBM customer number. IBM recommends that you use the same set of old/new history files for all processors that share a common IBM customer number. This simplifies processor movement into or out of parallel sysplexes.

```
//IFAURP    JOB   'accounting information'
//*-------------------------------------------------------------------
//*  CREATE A TEMP FILE WITH ONLY SMF 89 RECORDS
//*-------------------------------------------------------------------
//IFASMFDP EXEC PGM=IFASMFDP
//SYSPRINT DD   SYSOUT=*
//DUMPIN1  DD   DSN=CUSTOMER.SYSTEM1.D94227.DISP=SHR
//DUMPIN2  DD   DSN=CUSTOMER.SYSTEM2.D94227.DISP=SHR
//DUMPOUT  DD   DSN=&&SMF89,DISP=(NEW,PASS),
//              UNIT=SYSDA,SPACE=....
//SYSIN    DD  *
     INDD(DUMPIN1,OPTIONS(DUMP))
     INDD(DUMPIN2,OPTIONS(DUMP))
     OUTDD(DUMPOUT,TYPE(89))
/*
//*-------------------------------------------------------------------
//*  SORT THE SMF 89 RECORDS INTO ASCENDING ORDER
//*-------------------------------------------------------------------
//SORT     EXEC PGM=SORT
//SYSOUT   DD   SYSOUT=*
//SORTWK01 DD   UNIT=SYSDA,SPACE=(CYL,(1),RLSE)
//SORTWK02 DD   UNIT=SYSDA,SPACE=(CYL,(1),RLSE)
//SORTWK03 DD   UNIT=SYSDA,SPACE=(CYL,(1),RLSE)
//SORTIN   DD   DSN=&&SMF89,DISP=(OLD,DELETE)
//SORTOUT  DD   DSN=&&SORT89,DISP=(NEW,PASS),UNIT=SYSDA,
//
DCB=(RECFM=VBS,LRECL=32756,BLKSIZE=4096),
//            SPACE=....
//SYSIN    DD  *
     OPTION VLSHRT
     SORT FIELDS=(5,250,CH,A)
/*
```

Figure 6. Sample JCL for the general usage report function (part 1)

```
//*-------------------------------------------------------------------
//*  PROCESS 89 RECORDS AND GENERATE USAGE REPORTS
//*-------------------------------------------------------------------
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//         DD  DSN=vendor.lib,DISP=SHR  (OPTIONAL - PROVIDED BY VENDOR)
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//vendor   DD  SYSOUT=*                 (OPTIONAL - FOR vendor's REPORTS)
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=...
//SYSIN    DD  *
*
* Customer name and address
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
           ADDRESS('155 Main Street',
                   'New London, CT 05512')
           CONTACT('Fred Tulle')
           PHONE('(203) 000-1212 ex 54'))
*
* Vendor name and address
* (sample only - IBM rep will supply to each customer)
*
  VENDOR(PRODOWNER('IBM CORP')
         NAME('IBM Branch Office')
         ADDRESS('1133 Westchester Avenue',
                 'Major City, Sample State  10604',
                 'FAX: 1-800-000-1212  ATTN: Measured Usage Pricing')
         CODE(1234567))
*
* Parallel sysplex definition and products
*
  SYSPLEX(ID(SYSPLEX1)
          PLEXDATE(19950328)
          PROCESSOR ((9021,962,33333),(9672,RX5,00166))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('CICS')
                   START(19941101,ALIGN(1)))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('IMS TM')
                   START(19941101)))  *
* Processor definition and products
*
  PROCESSOR((9021,952,01111)
            PRODUCT (PRODOWNER('IBM CORP')
                     PRODNAME('CICS')
                     START(19941103))
            PRODUCT (PRODOWNER('IBM CORP')
                     PRODNAME('TSO/E')
                     START(19941103))
            PRODUCT (PRODOWNER('IBM CORP')
                     PRODNAME('IMS TM')
                     START(19941103)))
/*
```

Figure 7. Sample JCL for the general usage report function (part 2)

shows a separate set of history files for each of the reporting entities in the data center, processor 01111 and a parallel sysplex, SYSPLEX1. Neither of the history files can contain fewer LPARs or systems than those shown in this figure.
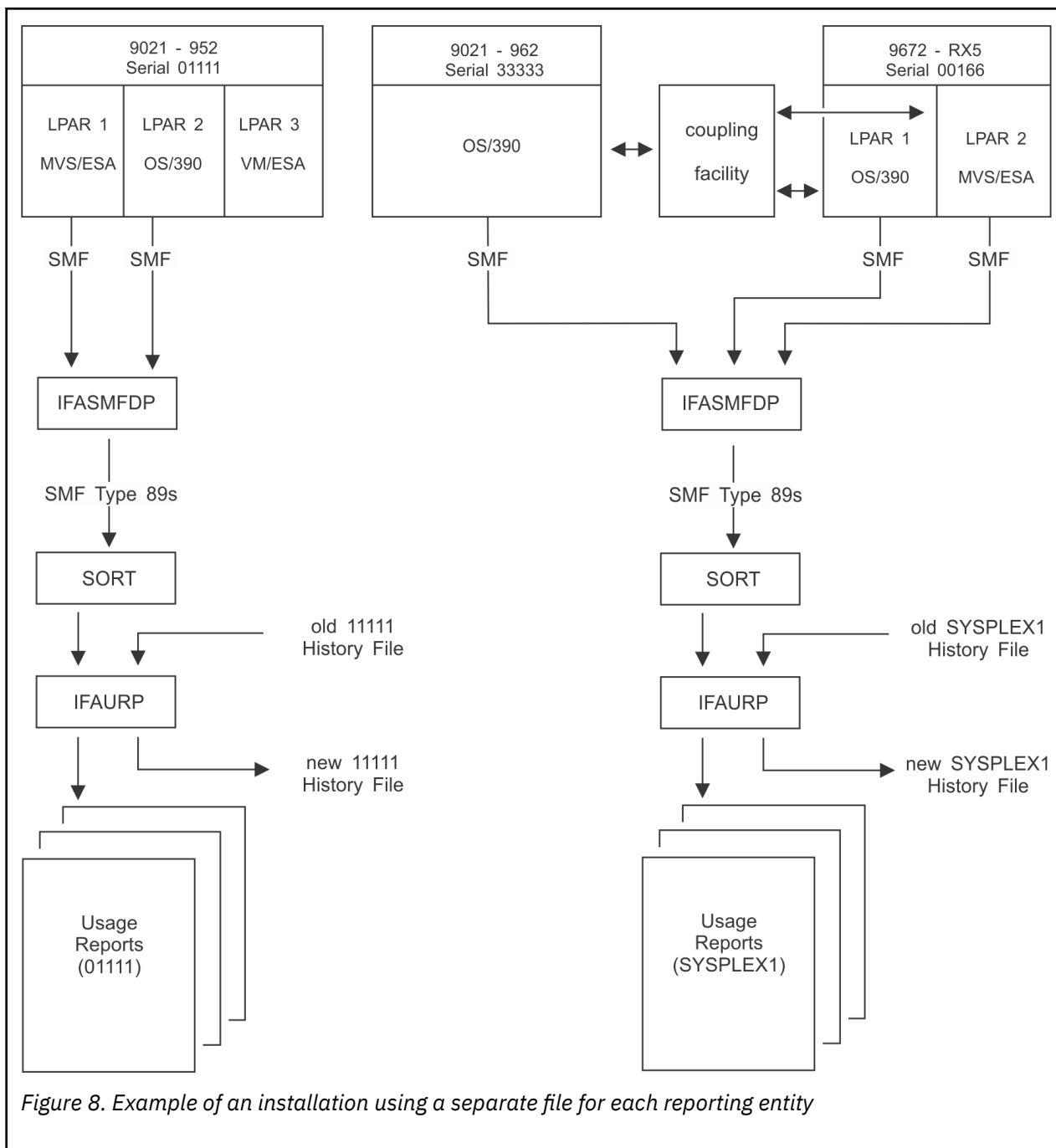
Figure 8. Example of an installation using a separate file for each reporting entity

In contrast, Figure 9 on page 14 shows a single set of history files for the entire data center. IFAURP reports the same on all the processor configurations sharing a common IBM customer number, regardless of whether you choose to maintain a separate history file for each reporting entity, or choose to maintain a single history file for the entire data center.

Note: IBM recommends installations use a single set of history files for their processors that share a common IBM customer number to simplify processor movement into or out of parallel sysplexes.

A complete description of the files, control statements, and reports generated by IFAURP appears in Chapter 3, "Reporting product information," on page 23.

Figure 9. Example of an installation using a single history file for all reporting entities (recommended)
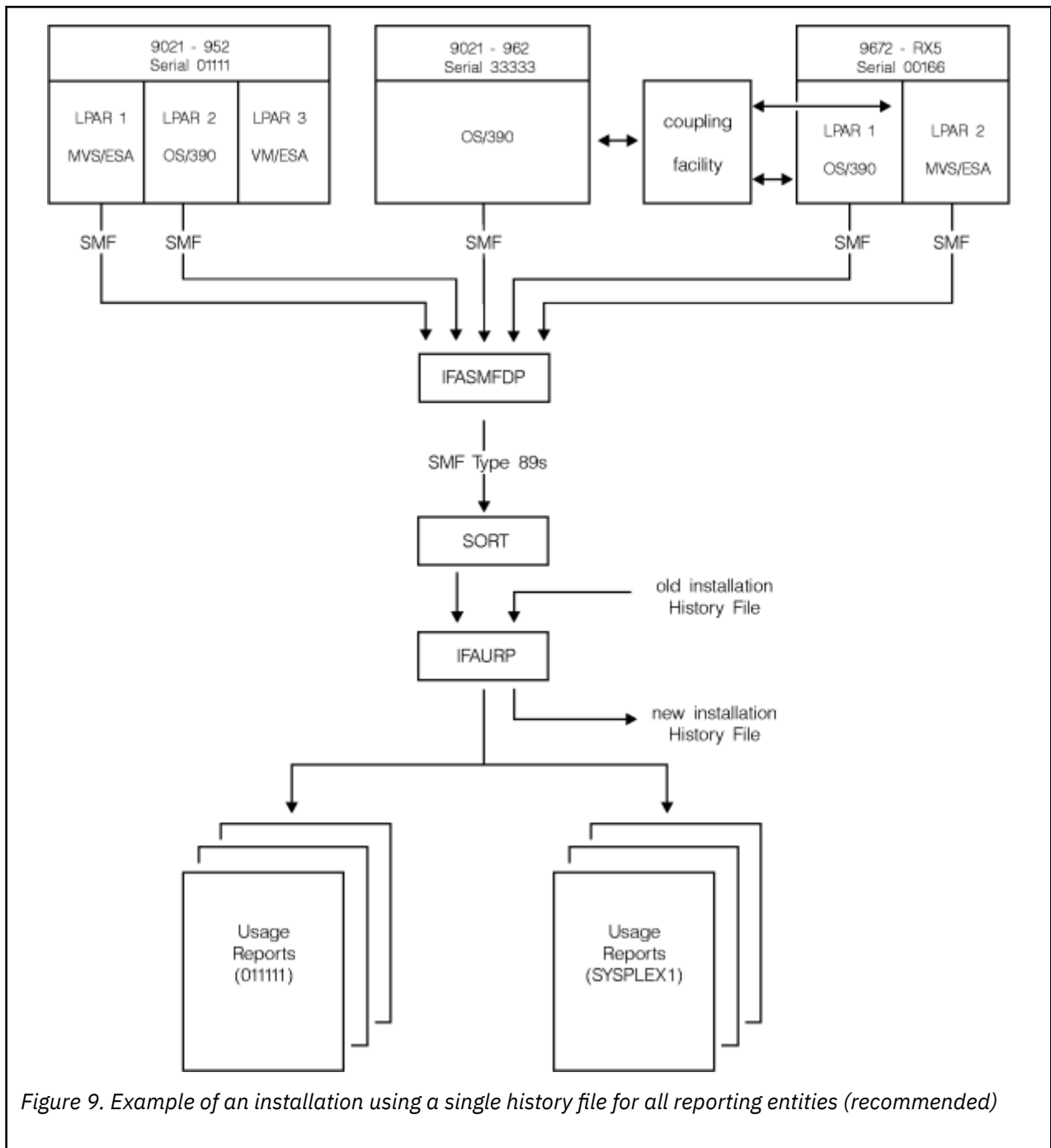
Step 4. Provide IBM with a copy of the software usage report

When you measure a product's usage for the first time, you then compare the product's GMLC (graduated monthly license charge) or PSLC (parallel sysplex license charge) price and its usage price to decide whether or not to request measured usage pricing for that product. If you choose measured usage pricing, you must both inform IBM and provide IBM with a Software Usage Report which lists that product's usage. You repeat this same process at the end of each product measurement period.

Although the usage report program generates several types of reports, you only need to send the Software Usage Report for each processor to IBM to participate in measured usage pricing. The usage report program generates Software Usage Reports by processor (or set of processors defined as a parallel sysplex) and software vendor; there is one Software Usage Report generated for each unique processor (or parallel sysplex) and software vendor combination. As a software vendor, IBM supplies each customer with a set of vendor control statements that the usage report program uses to print the IBM mailing

address and/or FAX number to which the customer must send the reports. See Chapter 3, "Reporting product information," on page 23 for additional information.

Based on instructions provided to your installation by IBM, provide the required Software Usage Reports either directly to your client representative or send them to IBM by FAX or through the mail to be received within 10 business days after the measurement period has ended. Each Software Usage Report lists the date by which it is due to IBM based on the specifics of the products being measured.

Chapter 2. Product registration and enablement

This topic has the following major sections:

- "Overview of product registration and enablement" on page 17 is intended for anyone who needs to understand the basics of product registration and enablement. This section introduces required concepts and terms.
- "IBM product enablement " on page 18 is intended for anyone, such as an asset manager, who needs general information about how to enable z/OS features. *z/OS Planning for Installation* contains specific details about enabling z/OS features.
- "Product registration startup guidelines" on page 18 is intended for system programmers. This section describes how to collect and report information about registered products running under OS/390 or z/OS, for those who are already collecting SMF records and for those who are not.

  Note: "Step 3. Process type 89 records by the usage report program" on page 21 might be of interest to those individuals responsible for scheduling and maintaining the installation's SMF production jobs.

If you are interested in information about how to use registration services in product code, see *z/OS MVS Programming: Product Registration*.

Overview of product registration and enablement

Product registration provides a common mechanism for products to:

- Register (indicate that they are running) on a particular system
- Determine what products are registered (running) on a particular system

With z/OS, products such as z/OS features, can use registration services to determine if they are enabled to run on a particular system, which requires that the product be defined appropriately in the enablement policy for the system.

The IFAPRDxx parmlib member contains the enablement policy, which the customer defines for a system.

Figure 10 on page 17 shows how the product code, the enablement policy, and MVS registration services fit together to determine whether a product is enabled.
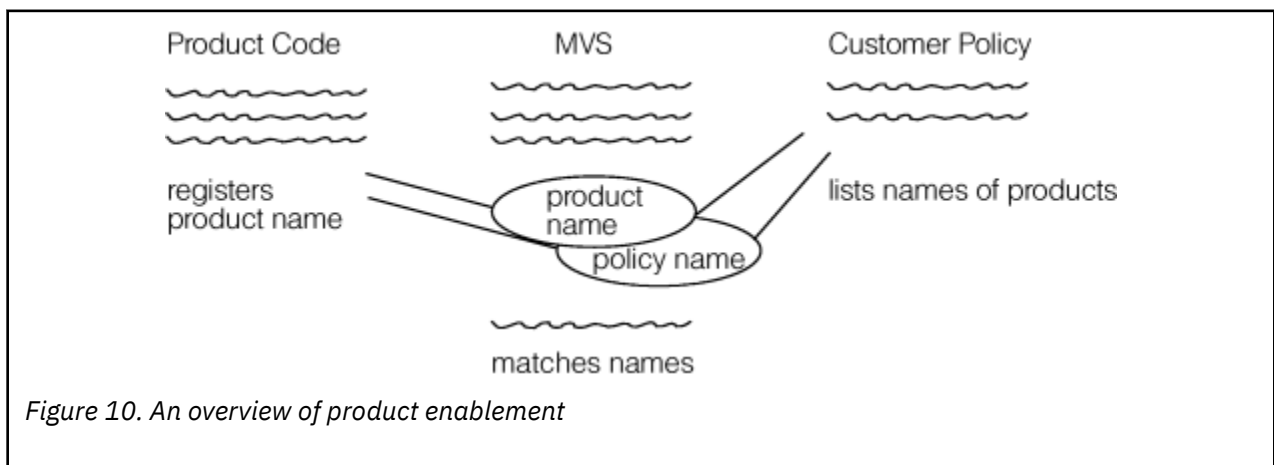
Figure 10. An overview of product enablement

As Figure 10 on page 17 shows, the product code issues the register request to indicate that it is running and check its enablement status. The customer policy in IFAPRDxx defines enablement status for products. When MVS processes the register request, it matches the product name definition in the request with the entries in the enablement policy to determine if the product is enabled on the system, then issues a return code to indicate enablement status. Based on the return code, the product continues to run or ends its processing.

IBM products that package priced optional features together with the base product, like z/OS, will use the z/OS product registration and enablement services to control access to optional features based on what the customer orders.

IBM product enablement

When you order an IBM product that packages priced optional features with the base product, IBM supplies a tailored IFAPRD00 parmlib member that enables the product and any optional features ordered with the product. Thus, any feature ordered with the product is enabled during installation when the customer copies the contents of the tailored IFAPRD00 member to an active IFAPRDxx member. If you do not order a feature, it is shipped disabled, but you can enable it at a later time.

For more information about enabling and disabling z/OS features, see _z/OS DFSMS Using Data Sets_.

The following general steps provide an overview of how to enable optional features of any IBM product that supports product enablement.

1. Make sure that your asset manager has contacted your IBM representative to alert IBM that you are starting to use the feature on a specific processor.

2. Update IFAPRDxx, the parmlib member that defines the product enablement policy for a system, to include a PRODUCT statement for the feature. For more information, see the description of IFAPRDxx in _z/OS MVS Initialization and Tuning Guide_.

3. To update the enablement policy dynamically without an IPL, issue the SET PROD operator command to specify the IFAPRDxx member(s) that define the policy. See _z/OS MVS System Commands_ for more information.

   The enablement policy change takes place immediately but does not affect any instances of features that are already executing. Also, activating a new enablement policy does not start any of the enabled features. Those features will only run when explicitly started by some other action, such as a START command.

   Be sure to change the PROD system parameter in IEASYSxx to point to the appropriate IFAPRDxx member(s); the IFAPRD00 member is not activated by default. This change ensures that the next IPL activates the correct policy.

If, after you use the feature, you want to discontinue its use, you must disable the feature — again using the IFAPRDxx member to define the policy change and the SET PROD command to activate the changed policy.

Because disabling the feature in the enablement policy does not stop the feature from running, you might have to explicitly stop the feature. For example, you might have to:

- Issue a command provided by the feature
- Issue the MVS MODIFY or MVS STOP command, as appropriate for the feature

Or, you might decide that the least disruptive way to stop a long-running feature is to IPL the system without the feature.

After you disable a feature, ask your asset manager to contact your IBM representative to alert IBM that you are discontinuing its use on a specific processor.

Product registration startup guidelines

Product registration reporting takes advantage of existing SMF mechanisms to collect and report information about product usage. It consists of:

- A collection function
- A reporting function

The reporting function analyzes the data collected for the time period represented and produces reports about registered products.

SMF startup guidelines

The following steps indicate the major activities required to set up SMF data collection for the first time. These steps establish an SMF environment that collects both the SMF type 89 subtype 1 records required for measured usage charges and the type 89 subtype 2 records required for product registration reporting. Installations wishing to collect additional SMF records must make appropriate changes. See *z/OS MVS System Management Facilities (SMF)* for additional examples and a complete explanation of each of the following steps:

1. Allocate and format at least two SMF data sets (VSAM clusters) that are large enough to contain all the type 89 records generated between regular dumps of these data sets.

   Type 89 records require relatively small amounts of DASD space. You might start with an initial allocation of 5 tracks per day for subtype 1 and subtype 2 records, then monitor the data set and adjust the size to reflect actual usage.

2. Establish procedures and jobs to dump and clear the SMF data sets on a regular basis.

   These procedures involve dumping and clearing the SMF data sets after they have been made inactive either because they are full or because an operator entered the SWITCH SMF command. CBIPO provides sample SMF dumping procedures and corresponding jobs.

   Depending on the volume of data and the size of the SMF data sets, you can run the SMF dump job daily or weekly. Because the space required to store type 89 records is relatively small, installations that collect only the type 89 record might consider scheduling weekly rather than daily dumps. The following example contains sample JCL to dump and clear one of the SMF data sets, SYS1.MANX.

```
//STEP0     EXEC  PGM=IFASMFDP
//SYSPRINT DD    SYSOUT=*
//MANX      DD    DSN=SYS1.MANX,DISP=SHR
//USAGE     DD    DSN=customer.type89.dump.dataset,DISP=....
//SYSIN     DD    *
     INDD(MANX,OPTIONS(ALL))
     OUTDD(USAGE,TYPE(89))
```

   Note: If you want to collect other SMF records in addition to type 89 records, DO NOT use this JCL.

   If you want to collect only type 89 subtype 2 records, change the OUTDD statement in the example as follows:

```
     OUTDD(USAGE,TYPE(89(2)))
```

3. Create an SMFPRMxx parmlib member that contains the SMF parameters you need for product registration reporting.

   The following example lists the parameters that must appear in the active SMFPRMxx member to enable product registration reporting.

```
ACTIVE                        /* ACTIVATE SMF RECORDING      */
DSNAME(SYS1.MANX,SYS1.MANY)   /* USE DATASETS MANX AND MANY  */
SYS(TYPE(89))                 /* COLLECT TYPE 89 RECORDS     */
```

   Note: If you want to collect only type 89 subtype 2 records, change the SYS option in the example as follows:

```
     SYS(TYPE(89(2)))
```

Once these steps are complete, continue with the changes listed in . Note that step 2 of this next section can be bypassed, because it was already completed in this section.

Guidelines for installations already collecting smf data

Installations already collecting SMF data can use the following steps to report on product registration:

1. Activate the MVS/ESA registration data collection function.

2. Collect SMF type 89 records for the required measurement period.
3. Process type 89 records through the usage report program.

Step 1. Collect information about registered products

The installation must activate the collection function on every MVS/ESA image. The SMFPRMxx member of SYS1.PARMLIB controls the collection process. You might need to make changes to your current SYS parameter to activate the collection of SMF type 89 records. Although you can continue to collect other types of SMF records, you need only type 89 subtype 2 records for product registration reporting.

SYS and SUBSYS parameters

The SYS parameter specifies the global recording options for the entire system. The TYPE option of the SYS parameter indicates the SMF record types and subtypes SMF is to generate. To report on product registration, the SMF TYPE option must include record type 89 either on the STC SUBSYS statement, if it exists, or on the SYS statement. The SUBSYS statement overrides the SYS specification. An explicit example would be:

```
SYS(TYPE(0,7,30,89))
```

Whenever you use the SUBSYS parameter with a TYPE option referring to STC, you must also explicitly include type 89, as in the following example:

```
SUBSYS(STC,TYPE(30,89))
```

In either case, you can specify 89(2) to collect only type 89 subtype 2 records.

You can also include the type 89 record implicitly as part of a range, as in the following example:

```
SYS(TYPE(0:255))
```

EXITS subparameter

Although the exit names provided by your installation's current EXITS subparameter need not be changed for product registration, insure that exit IEFU84 is not used by installation code to alter any fields in the type 89 records or suppress the writing of type 89 records.

If your installation uses exits IEFUSI or IEALIMIT to control the size of the user region assigned to a job step, IBM recommends that your exit be changed to allow the region size for program IFAURP to be set by JCL used to execute this program.

INTERVAL subparameter

The type 89 record has a default interval value of 60 minutes, which is also the maximum interval value. The type 89 record is always synchronized to the start of the hour (00 minutes, 00.00 seconds after the hour). Under the proper conditions the SMFPRMxx INTERVAL subparameter can set the interval at which type 89 records are written. The INTERVAL subparameter can also influence the way that SMF reports task and function time, when used in conjunction with the INTVAL and SYNCVAL parameters. See for details.

If you have provided an INTERVAL, either through a numeric value or through the SMF suboption, its value is used for the type 89 interval only when that value can evenly be divided into 60 minutes. If you have used the NOINTERVAL subparameter or provided no INTERVAL parameter, the default (60-minute) interval is used for the type 89 records. Regardless of the interval value used, type 89 records are always synchronized to the start of the hour.

In the following example, the installation has set interval recording so that no more than 2 hours of accounting data is lost. This value will result in the use of 60 minutes as the interval for type 89 records.

```
INTERVAL(020000)
```

In the next example the installation has set interval recording to 30 minutes. Because this value is both less than 60 minutes and divides evenly into 60 minutes, one or more type 89 records are written every 30 minutes synchronized to the start of the hour.

```
INTERVAL(003000)
```

INTVAL and SYNCVAL parameters

SMF provides the INTVAL and SYNCVAL parameters. The INTVAL parameter can be used to set the interval at which the type 89 records are created only when two conditions are met:

1. You have specified the SMF suboption of INTERVAL.
2. INTVAL has a value that divides evenly into 60 minutes.

Step 2. Collect SMF type 89 records

You can continue to use your installation's current SMF procedures for dumping and saving the type 89 records providing those procedures:

1. Collect SMF records from MVS images that you need.
2. Allow for the type 89 records to be saved long enough to be processed by the usage report program, IFAURP.

Because of the important role that type 89 records play in reporting on registered products and establishing software charges, installations can choose to modify existing SMF procedures to create and maintain unique SMF data sets that contain only type 89 records. An installation can separate the type 89 records at any of several steps in the current SMF process, including the initial SMF dump step that dumps the contents of the current full SMF data set(s) to another data set created by the installation.

The job step that performs this dumping and clearing process can selectively write the type 89 records to another SMF data set. Because the type 89 records are expected to need relatively little space, many installations might decide to manage type 89 records in separate data sets. The example that follows contains sample JCL, which shows how to write type 89 records to a separate data set as a part of the existing SMF dumping/clearing job step. **Bold face** type highlights the changes made to an existing SMF dump procedure to separate the type 89 records.

```
//STEP0    EXEC PGM=IFASMFDP
//SYSPRINT DD   SYSOUT=*
//DUMPIN1  DD   DSN=SYS1.MANx,DISP=SHR
//DUMPIN2  DD   DSN=SYS1.MANy,DISP=SHR
//DUMPOUT  DD   DSN=customer.usual.dump.dataset,DISP=.....
//USAGE    DD   DSN=customer.type89.dump.dataset,DISP=....
//SYSIN    DD   *
     INDD(DUMPIN1,OPTIONS(ALL))
     INDD(DUMPIN2,OPTIONS(ALL))
     OUTDD(DUMPOUT,TYPE(0:255))
     OUTDD(USAGE,TYPE(89))
```

Step 3. Process type 89 records by the usage report program

To report on registered products, you use the usage report program, IFAURP, to process all the SMF type 89 records collected for the measurement period. There is no requirement, however, to run IFAURP on the processor on which the type 89 records were collected.

Once IFAURP processes these records, you may discard them, because IFAURP saves the usage information contained on these records in a relatively small history file. Even so, IBM recommends that the installation retain these records, perhaps on tape, for up to a year and a half to be able to process the records if necessary. A single tape/cartridge should easily accommodate all the type 89 records generated by all the MVS/ESA images in a large installation over the course of a year, when the records have a BLKSIZE of 32,760.

IFAURP has been designed to accommodate the data collected from any mix of processor configurations. A single execution of IFAURP can handle any combination of processor configurations. A "processor

configuration" can be a single MVS/ESA LPAR or all the MVS/ESA images for all the processors in the installation's data center, including those processors that are a part of parallel sysplexes, whenever they all share a common IBM customer number. IFAURP can also accommodate a wide variety of processing and scheduling requirements, which are often highly installation dependent. For instance, you can run IFAURP to process SMF data sets daily, weekly, monthly, or more or less often.

IFAURP recognizes duplicate SMF records, which often occur as the result of procedural errors. IFAURP bypasses all duplicate records, regardless of whether they are recognized as duplicates during a single execution of IFAURP or across multiple executions of IFAURP. The latter case might occur when unique type 89 records are processed on one execution of IFAURP, during which the appropriate usage data is placed in the history file, followed by another execution of IFAURP with the same SMF input data set. In this case, IFAURP recognizes the records on the input data set as duplicates of the data already stored in the history file.

Running IFAURP to report on registered products is very similar to running IFAURP to report on measured usage. If you need more information about running IFAURP, see "Step 3. Process type 89 records by the usage report program" on page 9. Figure 6 on page 11 shows sample JCL, available in SYS1.SAMPLIB member IFAUJCL.

Note: If you use the sample JCL to report on registered products, add a PARM value to the EXEC statement for IFAURP; see "IFAURP parameter" on page 27.

Chapter 3. Reporting product information

As described in Chapter 1, "Usage accounting," on page 1 and Chapter 2, "Product registration and enablement," on page 17, product management functions extend SMF to automatically:

1. Measure product usage for any product that registers with SMF and requests the usage measurement function.
2. Collect information about products that register with MVS as running on a particular system image.

SMF also provides a reporting function, IFAURP, a postprocessor program that calculates and reports product usage and product registration, based on the data collected by SMF. This usage report program, IFAURP, is described in detail in this chapter. The major sections include:

- **IFAURP Overview:** provides a high level view of the usage report program.
- **Invoking IFAURP:** describes the JCL (DD and control statements) necessary for invoking the usage report program.
- **Types of Reports:** describes the reports produced by IFAURP, their format and the meaning of the fields.
- **IFAURP Abend and Condition Codes:** lists the possible conditions codes you might receive upon completion of IFAURP and their meanings.
- **Usage Report Program Messages:** lists the messages you might receive from IFAURP processing.

Chapter 4, "Usage pricing examples," on page 69 contains multiple examples of how to use IFAURP for usage pricing. The chapter lists the control statements and resulting reports for typical customer usage reporting scenarios.

IFAURP overview

The primary functions of the usage report program are:

- To produce the Software Usage Report required from customers who participate in IBM software usage pricing. In addition to listing the usage values for IBM usage-priced products, this report also indicates the date that the next product measurement period ends and the date that a copy of the resulting Software Usage Report must be received by IBM.
- To produce the Software Product Registration Report, which lists the products that have registered with MVS as running on the system. This report shows optional z/OS elements that your installation has enabled as well as other registered products.

The usage report program also generates several additional types of reports that are intended as customer aids in identifying abnormal conditions in the SMF data being processed by that execution of the usage report program. One additional report, the Time Period Report, assists in the scheduling aspects related to usage pricing by consolidating both the reporting dates and the measurement schedules required for all measured products, processors, and sysplexes.

In addition to reporting usage data for IBM products, the usage report program can report usage data for any software vendor who wants to measure and report the usage of products in a manner similar to IBM software usage pricing. The Software Usage Report consolidates the usage values for each vendor's products on a report unique for that vendor. Vendors can generate the same standard Software Usage Report used by IBM or can generate unique reports through the use of the IFAURP vendor exit interface.

The usage report program supports data collected from MVS/ESA-capable IBM processors and selected non-IBM processors when they are configured as stand-alone processors (i.e. not part of a parallel sysplex). The usage report program also supports 'sysplex' data collected from coupling-capable processors when they are configured as part of a parallel sysplex.

The usage report program requires a set of control statements to define the customer, the vendor, the processor configurations, and the products. This information will be supplied by three different sources: IBM, vendors, and the data center, as described in detail in "IFAURP control statements" on page 31.

The usage report program provides a control parameter. If you want to report on registered or enabled products, such as optional z/OS elements, you must supply the parameter, described in detail in "IFAURP parameter" on page 27.

To participate in usage pricing, you must process the SMF type 89 records generated on all the participating OS/390 and z/OS guests, LPARs, processors, and sysplexes over the required measurement period. To simplify this task, IFAURP can process the resulting SMF type 89 records as frequently as is convenient for the customer. The usage report program saves the usage data on a history file for use by the Software Usage Report. IFAURP can, therefore, process SMF type 89 records for multiple processors and sysplexes on a daily basis and show the most recent 12 months of the usage data on the Software Usage Report.

Determining the processors associated with a history file

If your installation has multiple processors, you must decide how many processors to process in the same old/new set of history files. You may decide to have a separate history file for each processor or a single history file for all your processors that share a common IBM customer number. Once you decide, the same processors must always be associated with the same set of history files. There are three rules you must follow to determine which processors can/must be processed in the same history file:

1. All the OS/390 and z/OS guests or LPARs on the same processor must use the same set of history files.
2. All the processors in a parallel sysplex must use the same set of history files.
3. All the processors in the same history file must share a common IBM customer number.

There are several advantages to associating as many processors as possible with a single history file. They are:

1. A single execution of IFAURP can process the records from all the processors associated with the history file.
2. A single execution of IFAURP can produce all the reports for all the processors associated with the history file.
3. It simplifies defining existing coupling capable processors as part of a new parallel sysplex.
4. The reporting dates, measurement period, and billing periods for all processors and sysplexes in the same history file, are printed on a single Time Period Report for each vendor's products.
5. The relative position of the months in the Software Usage Report is the same for all processors sharing a common history file, regardless of the earliest START data on each of the processors.

What IFAURP does

IFAURP accepts several types of inputs, performs usage calculations on all SMF input data, and produces several reports, as well as a history file, as shown in Figure 11 on page 25. There are two types of input: processing instructions and data, with some input sources capable of supporting both types of input. The customer supplies the processing instructions for selecting specific products to place under ULC or MULC by providing SYSIN control statements. Copies of all the previous active control statements are provided by the SYSHIN history file. Any control statements in the history file are overridden by the SYSIN control statements when appropriate.
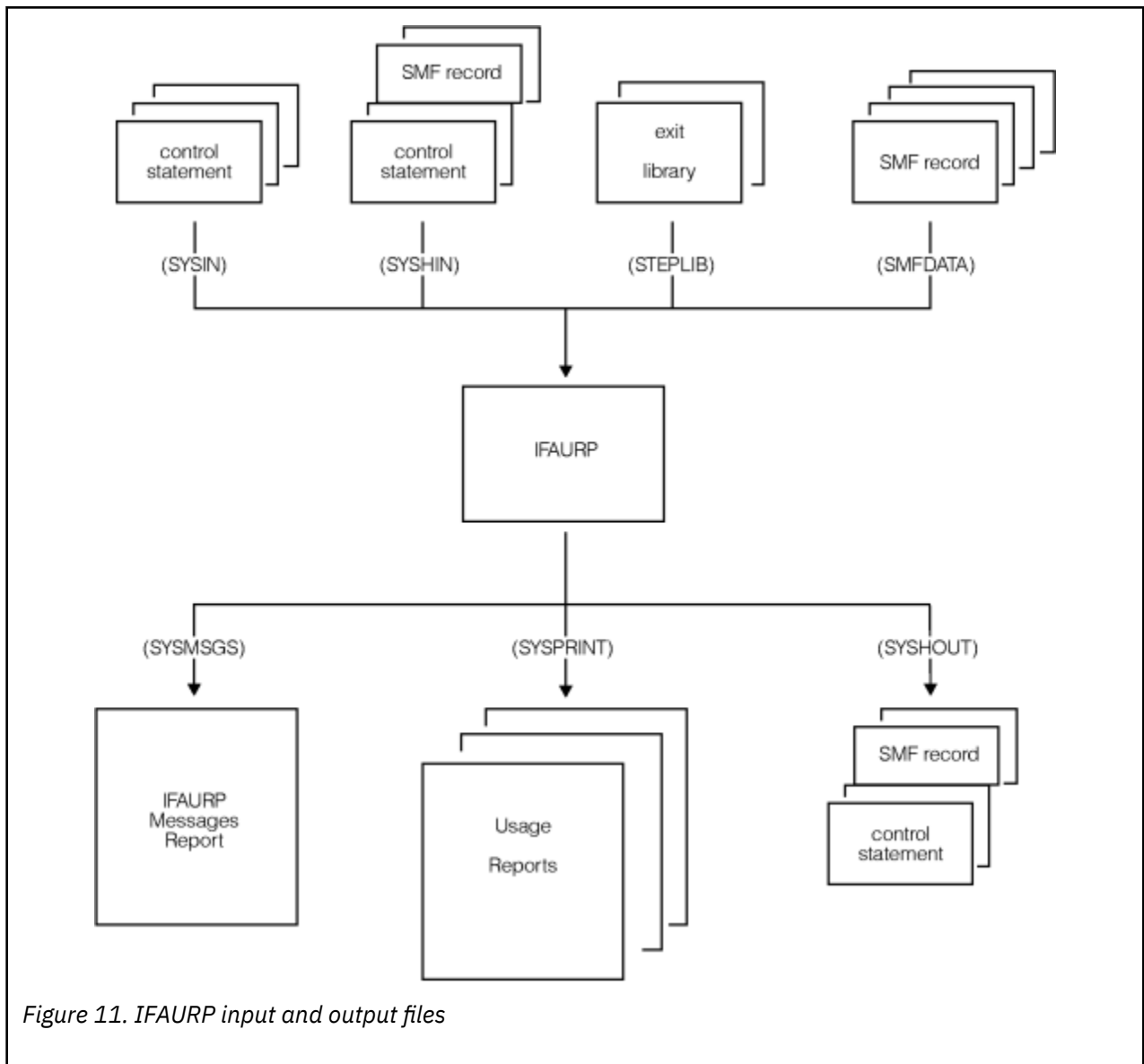
Figure 11. IFAURP input and output files

Processing control, as well as instructions, can be supplied by IFAURP vendor exits, as loaded by IFAURP from the STEPLIB library, libraries concatenated to the STEPLIB library, any libraries provided by vendors for their products, JOBLIB libraries, if provided, or libraries included in the system LNKLST concatenation. These exits can only affect the products that they are associated with. BatchPipes/MVS and MQM MVS/ESA are two IBM products that supply and require such exits. Lastly, IFAURP, itself, contains a list of all the supported processors and the SU Factors that IFAURP will use the usage calculations.

Data is provided to IFAURP by both the customer and the SMF type 89 records. The customer provides data via the control statements. This data includes descriptive and/or identifying information about the customer, vendors (including IBM) and the customer's processors. SMF data is provided by both the SMFDATA file(s), that contain sorted SMF type 89 records never before processed by IFAURP, and the SYSHIN file, that contains a sorted copy of all the SMF type 89 records that were processed by a previous execution of IFAURP. Data is also provided by the vendor exits. This data must be provided by the exit on every execution of IFAURP because it is not stored on the history file.

IFAURP produces several types of output. Error messages, copies of the control statements active for this execution of IFAURP, processing messages, and hexadecimal dumps of erroneous SMF records are all written to the SYSMSGS file. All the remaining usage reports are written to the SYSPRINT file. All the active control statements and the valid SMF type 89 records input from the SMFDATA file(s) and SYSHIN file are saved in sorted order on the SYSHOUT file.

Each execution of IFAURP uses all the instructions supplied by this and all previous executions to process all the SMF records supplied by the SMFDATA file(s) and reprocess all the data supplied by the SYSHIN file. IFAURP's philosophy, to recalculate all usage values, allows IFAURP to produce reports that reflect all the instructions and all the SMF data processed up to that execution. This philosophy provides the following benefits:

1. Allows customers multiple opportunities to correct errors related to incorrect control statements or related to missing product-specific vendor exits, without requiring all SMF data to be sorted and supplied in the SMFDATA file on every execution of IFAURP.

2. Allows customers to process sorted SMF data files out of date sequence (that is, supply missing SMF input files in a later execution of IFAURP) or process SMF files from each LPAR of a multiple LPAR processor in its own execution of IFAURP, provided the same set of history files are used by data from all LPARs on that processor. The SMF data provided for the other LPARs on later executions of IFAURP will be also be used when recalculating all the usage values for that processor.

3. Allows customers multiple opportunities to change the control statements and reprocess the same data. Examples of these situations include requesting IFAURP to calculate usage values prior to committing to the usage pricing option as described in "Example 1: Deciding which products to select for measured usage pricing" on page 71 and "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99. There may also be situations where IBM directs the customer to reprocess all the same data, using a specific set of control statements supplied by IBM.

IFAURP considerations

The customer can choose to allow IFAURP to manage the control statements and SMF data processed by each execution of IFAURP, or can choose to manage both themselves. IBM recommends that the customer use IFAURP to manage the control statements and SMF data.

The customer uses IFAURP to manage the control statements and SMF data by always producing an output history file (SYSHOUT) and using that file as input (SYSHIN) to the next execution of IFAURP. When executing IFAURP in this manner, the only control statements that are required for each execution are new control statements that haven't already been used in a previous execution of IFAURP that ended successfully (with a condition code of 00 or 04). The SMF records supplied via SMFDATA are, likewise, only those SMF records not already processed in a previous execution of IFAURP that ended with a condition code of 00 or 04. If the same records are supplied a second time, they will be excluded from processing as duplicate records. Because IFAURP uses the history file to manage the control statements and SMF data, the customer need only pass the control statements and SMF data to one successful execution of IFAURP to have both managed and used in future executions of IFAURP as appropriate. SMF data older than twenty-four months is automatically purged from the history file.

The customer can assume the responsibility for explicitly managing both the control statements and the SMF type 89 records by omitting the history files (using DUMMY for both SYSHIN and SYSHOUT DD statements). Because the Software Usage Report provides usage data for up to one year's data collected on all LPARs of a processor or parallel sysplex, all that SMF data must be processed via the SMFDATA file each time IFAURP is executed, together with the full set of control statements, that must be provided in the correct order as new products or processors are added over the year. Failure to provide a Software Usage Report that contains all the required data processed with the correct sequence of control statements will invalidate continued use of usage pricing for future billing periods.

Failure to use the IFAURP history files in the manner described places the burden of correctly managing all the SMF data and IFAURP control statements on the customer.

Invoking IFAURP

IFAURP (the usage report program) is invoked by specifying PGM=IFAURP on the execute JCL statement using JCL similar to that shown in Figure 12 on page 27.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M,PARM=ALLREPORTS
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//         DD  DSN=vendor.lib,DISP=SHR   (OPTIONAL - PROVIDED BY VENDOR)
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//vendor   DD  SYSOUT=*                  (OPTIONAL - FOR vendor's REPORTS)
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=.....
//SYSIN    DD  *
```

```
*
* Customer name and address
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
          ADDRESS('155 Main Street',
                  'New London, CT 05512')
          CONTACT('Fred Tulle')
          PHONE('(203) 000-1212 ex 54'))
```

```
*
* Vendor name and address
* (sample only - IBM rep will supply to each customer)
*
  VENDOR(PRODOWNER('IBM CORP')
         NAME('IBM Branch Office')
         ADDRESS('1133 Westchester Avenue',
                 'Major City, Sample State  10604',
                 'FAX: 1-800-000-1212  ATTN: Measured Usage Pricing')
         CODE(1234567))
```

```
*
* Parallel sysplex definition and products
*
  SYSPLEX(ID(SYSPLEX1)
          PLEXDATE(19940328)
          PROCESSOR ((9021,962,33333),(9672,RX5,00166))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('CICS')
                   START(19941101,ALIGN(1)))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('IMS TM')
                   START(19941101)))
```

```
*
* Processor definition and products
*
  PROCESSOR((9021,952,01111)
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('CICS')
                   START(19941103))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('TSO/E')
                   START(19941103))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('IMS TM')
                   START(19941103)))
/*
```

Figure 12. Sample JCL and control statements for invoking IFAURP

IFAURP parameter

The IFAURP parameter, specified in the PARM field of the EXEC statement, tells IFAURP what reports you want.The PARM field has the following syntax:

```
        PARM=USAGE|PRODUCT|ALLREPORTS|USAGEH|PROCESSORS|PCAUDIT
```

USAGE
Requests only the reports for usage pricing. USAGE is the default.

PRODUCT
Requests only the reports for registered products.

ALLREPORTS
Requests the reports for both usage pricing and registered products.

USAGEH
Requests the outage and statistics reports for data from the history file and/or the current SMF data.

PROCESSORS
Requests a report listing the processors supported by the current level of IFAURP installed on the system.

PCAUDIT
Requests the Processor Capacity Audit Report. This parameter requires that the IFAURP input data is to be sorted by date and time. See the

If you supply any other value, IFAURP issues an error message and stops processing. Correct the error and rerun the program.

IFAURP DD statements

The DD statements for the usage report program and associated file descriptions are described as follows.

STEPLIB DD statement

The STEPLIB DD statement specifies the name of the IBM load library, SYS1.SIFALIB, where the usage report program, IFAURP, resides. This library is shipped as part of z/OS. This library may contain required modules from IBM program products supporting usage pricing. All IFAURP maintenance and enhancements will be directed to this library.

If you need IFAURP to process type 89 records from multiple MVS releases, identify SYS1.SIFALIB for the most current release, OS/390. (As long as you specify the current SYS1.SIFALIB, you can run IFAURP under OS/390 or z/OS.)

Vendors who want to use IFAURP to report on their own products can supply the customer with a load library containing a vendor exit for IFAURP to invoke. Each required vendor library must be explicitly provided to the customer by the vendor together with explicit instructions describing the appropriate JCL and associated IFAURP control statements. You must concatenate these vendor load libraries with SYS1.SIFALIB on the STEPLIB DD statement. Avoid accidental name collisions with IBM modules by not placing vendor exits to IFAURP in SYS1.SIFALIB. Vendors may, alternatively, place their load modules in a pre-existing vendor load library that is already included in the LNKLST concatenation. In this case no STEPLIB DD is required for vendors.

The STEPLIB DD statement is required if SYS1.SIFALIB is not included in the LNKLST or if vendors require it for their own product exits. If vendors do provide such exits, SYS1.SIFALIB must always appear as the first STEPLIB dataset even if it is already in the LNKLST. IBM recommends omitting this library from the LNKLST because maintenance to LNKLST libraries requires a REFRESH of LLA for the maintenance to take affect. This REFRESH is often not performed because the individuals applying the maintenance are not the same individuals performing the REFRESH.

SYSUDUMP DD statement

The SYSUDUMP DD statement specifies the output class where the dump is placed in the event of an ABEND. A data set name may be used instead of a sysout class. If you specify a data set name, the

record format (RECFM) must be VBA, the logical record length (LRECL) must be 125, and the block size (BLKSIZE) must be 1632. This statement is not required. Although this DD statement is optional, IBM recommends using it to aid in problem determination.

SYSPRINT DD statement

The SYSPRINT DD statement specifies a sysout class where all product usage reports produced by IBM are written. Vendors using the usage report program to report their product's usage may use this DD statement or an alternate vendor DD statement for their reports. A data set name can be used instead of a sysout class. If you specify a data set name, the record format (RECFM) must be FBA, the logical record length (LRECL) must be 133, and the block size (BLKSIZE) must be any multiple of the logical record length. This statement is required.

Since SYSPRINT holds a variety of different reports, cutting and pasting the Software Usage Report out of SYSPRINT can be troublesome. To make things easier, you can use the optional SYSUSAGE DD statement to specify a separate sysout class where the Software Usage Report is written.

SYSUSAGE DD statement

The SYSUSAGE DD statement specifies a sysout class where all Software Usage Reports produced by IBM are written. Vendors using the usage report program to report their product's usage may use this DD statement or an alternate vendor DD statement for their reports. A data set name can be used instead of a sysout class. If you specify a data set name, the record format (RECFM) must be FBA, the logical record length (LRECL) must be 133, and the block size (BLKSIZE) must be any multiple of the logical record length. This statement is optional.

If you specify the SYSUSAGE DD statement, but the file cannot be successfully opened (example, if the DD statement is missing), you will receive message IFA303S ERROR OPENING DDNAME SYSUSAGE. Because SYSUSAGE is optional, IFAURP will continue processing even if the DD statement is missing, or if it is specified but the file cannot be successfully opened.

Vendor DD statement

The vendor DD statement specifies the sysout class where all product usage reports produced by a specific vendor are written. The decision to require this DD statement is made by the vendor, who must then communicate this requirement to the customer, as well as, provide specific instructions for this statement's use. Each vendor may require a vendor DD statement unique to them.

A data set name can be used instead of a sysout class. If you specify a data set name you must obtain the appropriate DCB information from the vendor. This statement is not required if only IBM products are being reported, and may or may not be required when vendor products are being reported.

SYSMSGS DD statement

The SYSMSGS DD statement specifies the sysout class where all messages produced by the usage report program are written. A data set name can be used instead of a sysout class. If you specify a data set name, the record format (RECFM) must be FBA, the logical record length (LRECL) must be 133, and the block size (BLKSIZE) must be any multiple of the logical record length. This statement is required.

SMFDATA DD statement

The SMFDATA DD statement specifies the name of the data set containing the sorted SMF type 89 records. These variable length SMF records must be pre-sorted into ascending character order starting at record position 5 (the first position after the 4 byte RDW) for a length of 250 characters. This statement is required, but may be a DUMMY statement under the appropriate circumstances, provided a block size is specified on the dummy statement, such as:

```
//SMFDATA DD DUMMY,DCB=BLKSIZE=4096
```

The DUMMY statement would be appropriate when another copy of a report is required using only the contents of the history file.

SYSHIN DD statement

The SYSHIN DD statement specifies the name of the data set that contains the history data created from previous invocations of the usage report program. This statement is required.

Note:

1. You must use a DUMMY statement when there is no previous history file (that is, the very first execution of usage report program). The suggested DUMMY statement is:

```
//SYSHIN DD DUMMY,DCB=BLKSIZE=4096
```

2. This statement can not specify the same physical data set as is specified by the SYSHOUT DD statement.

SYSHOUT DD statement

The SYSHOUT DD statement specifies the name of the data set that contains the history data created from the current and previous invocations of the usage report program. The history data is stored in variable length records having a maximum record length of 32756 bytes. You can allocate the data set with a RECFM=VB, LRECL=32756 and BLKSIZE=32760, or use alternate RECFM and BLKSIZE values to make more efficient use of DASD space. RECFM=VBS allows the customer to choose a BLKSIZE that can be less than 32760 and thus optimized for the specific DASD device where the file is stored. This statement is required.

Note: If you are using DFSMS you can alternatively specify BLKSIZE=0 for a system-determined block size, provided you also specify RECFM=VBS for this case.

Management of the "old file in" / "new file out" lifecycle of this data set can be simplified by using generation data groups that provide for unchanging data set names in IFAURP's JCL while the system (DFP) keeps track of the specific data set names. See "Determining the processors associated with a history file" on page 24 before creating a history file.

SYSIN DD statement

The SYSIN DD statement is used to supply the control statements required by the usage report program. You can supply these statements either through the JCL input stream as indicated in Figure 12 on page 27 or as a permanent dataset. The control statements are described in "IFAURP control statements" on page 31. This statement is required.

PCAUDIT DD statement

The PCAUDIT DD statement specifies a sysout class where the Processor Capacity Audit Report is to be written. It is required if you want to invoke the IFAURP program with the PCAUDIT parameter specified; otherwise, it is optional. You can specify a data set name instead of a sysout class. If you specify a data set name, the following values are required:

- Record format (RECFM) must be FBA
- Logical record length (LRECL) must be 133
- Block size (BLKSIZE) must be any multiple of the logical record length.

If you specify the PCAUDIT parameter when you invoke the IFAURP program, but fail to specify the PCAUDIT DD statement, or if the file specified on the PCAUDIT DD statement cannot be opened, the system generates an ABEND=S000 U0902 REASON=00000000 with message the following message:

```
IFA303S ERROR OPENING DDNAME
```

IFAURP control statements

To generate reports on registered products, CUSTOMER is the only required control statement, and NAME is the only required keyword.

The CUSTOMER statement is optional if the following are both true:

- You have used the CUSTOMER statement in a previous execution of IFAURP.
- You use a history file as input when you execute IFAURP.

Customers who are interested in usage pricing but want to quickly generate reports before making any decision on usage pricing, can do so by supplying only a CUSTOMER control statement with the NAME keyword. This single statement will allow IFAURP to process all files and generate all reports. An example of such a control statement is:

```
CUSTOMER(NAME('Acme Tulle and Dye Company'))
```

If you are collecting data on any non-IBM processor, you must supply a PROCESSOR control statement as well, or the program issues message IFA328S for each unrecognized processor.

Note: These reports will not be sufficient for usage pricing until all the necessary control statements are used.

Customers wishing to participate in usage pricing are required to supply the appropriate IFAURP control statements to provide the usage report program with information about themselves and their hardware configurations and participating usage pricing products. This information is required to resolve an ambiguous situation that might arise when multiple products, processors, and vendors are involved, because a single execution of IFAURP can generate every combination of IFAURP reports possible for the entire data center, provided all the necessary data is available in a single history file.

The supported control statements are:

- CUSTOMER
- VENDOR
- SYSPLEX
- PROCESSOR
- TRANSFER

Following is a list of those control statements that are either recommended or required by IBM for usage pricing. Once the required control statements are in a history file, those statements become optional if the history file is used as input on future executions of IFAURP.

CUSTOMER
> required

NAME
> required

ADDRESS
> recommended

CONTACT
> recommended

PHONE
> recommended

VENDOR
> required

PRODOWNER
> required and must be 'IBM CORP'

NAME
> 'IBM Corporation' or as supplied by IBM representative

ADDRESS
required and supplied by IBM representative
CODE
required
SYSPLEX
required (if PROCESSOR statement not present)
ID
required
PLEXDATE
required
PROCESSOR
required (if CLUSTER keyword not present)
CLUSTER
required (if PROCESSOR keyword not present)
PRODUCT
required
PRODOWNER
required and must be 'IBM CORP'
PRODNAME
required
START
required
PROCESSOR
required (if SYSPLEX statement not present)
(type,model,ser)
required
PRODUCT
required
PRODOWNER
required and must be 'IBM CORP'
PRODNAME
required
START
required

Notes on control statement syntax:

1. You must supply the keywords on each statement in the order shown in the syntax example.
2. Keywords themselves must be in UPPER CASE, while many of the values supplied for them need not be.
3. The keyword values enclosed within quotes can consist of any printable character in the US English EBCDIC character set, including a blank.
4. Code uppercase letters, words, and characters exactly as they appear in the syntax.
5. Lowercase letters, words, and symbols in the syntax represent variables. Substitute specific information for them.
6. An ellipsis (...) follows an item that you can code more than once. Never code ... on a control statement.
7. Brackets surround an *optional* item or items and indicate that you can code one or none of the enclosed items. Never code [or] on a control statement.

8. A vertical bar (|) indicates an exclusive OR. Never code | on a control statement. It is used between choices within braces or brackets; it indicates that you code only one of the items within the braces or brackets.

9. Braces ({ }) surround *required,* related items and indicate that you must code one of the enclosed items. Never code { or } on a control statement.

CUSTOMER control statement

The keyword values on the CUSTOMER control statement identify the customer in a meaningful way to all the customer's vendors. It is a required statement and requires the NAME keyword. The ADDRESS, CONTACT, and PHONE keywords are optional. The values supplied on this control statement appear in the heading of each report generated by this execution of IFAURP.

Note: Data specified in the CUSTOMER control statement is stored in the customer's history file. Once the CUSTOMER data is in the history file, the CUSTOMER control statement becomes optional. Any data entered in a subsequent CUSTOMER control statement will replace the data stored in the history file.

The CUSTOMER control statement must be the first control statement specified. All other control statements can be specified in any order. Sample CUSTOMER control statements can be found in examples 1, 2, 5, 6, 7, 9, 10, and 11, under .

Syntax

```
CUSTOMER(NAME('name')
        [ADDRESS('address1'[,..])]
        [CONTACT('contact')]
        [PHONE('phone')])
```

CUSTOMER(NAME(*'name'*)
Specifies the company name or similar identifier of the origin of the report. Value enclosed in quotes and is 1-40 characters in length.

ADDRESS(*'address'*)
Specifies the company address in 1-6 lines. Enclose each line in quotes and separate it from the next line by a comma. Each line is 1-40 characters in length.

CONTACT(*'contact'*)
Specifies the name of the contact for the company. Enclose the value, that can be 1-20 characters in length, in quotes.

PHONE(*'phone'*))
Specifies the phone number of the company contact. Enclose the value, that can be 1-20 characters in length, in quotes.

VENDOR control statement

Specify a VENDOR statement for each vendor who wants software usage reports produced. The VENDOR statement is required for MULC. When specified:

• The NAME, CODE, and PRODOWNER keywords are required

• The ADDRESS, EXIT, and PRINTDD keywords are optional

• EXIT can be specified without PRINTDD

• PRINTDD is only meaningful if specified with EXIT

When the VENDOR is IBM CORP, the *customer_number* parameter must be the customer number assigned by IBM. If the VENDOR is not IBM, you must contact the vendor for the correct value. The contents of the VENDOR control statement appear in the heading of the Software Usage Report. See for an example.

IBM usage pricing note: Your IBM representative will provide a vendor control statement appropriate for you.

Sample VENDOR control statements can be found in examples 1 and 2 under .

Syntax

```
[VENDOR(PRODOWNER('product_owner')
    NAME('name')
    [ADDRESS('address'[,...])]
    CODE(customer_number)
    [EXIT(exit_name)]
    [PRINTDD(vendor DD)])]
```

VENDOR(PRODOWNER(*'product_owner'*))
    Specifies the name of the product owner. The parameters specified on the PRODOWNER keyword must be the value the vendor specifies when registering for usage measurement services. Contact the vendor for the correct value. **When the vendor is IBM, the PRODOWNER must be** *'IBM CORP'*. The value is enclosed in quotes and is 1-16 characters in length.

NAME(*'name'*)
    Specifies the vendor information for its product's usage. The value is enclosed in quotes and is 1-40 characters in length.

ADDRESS(*'address'*)
    Specifies the vendor's street address. Specified as 1-6 lines. Each line enclosed in quotes and separated from the next line by a comma. Each line is 1-40 characters in length.

CODE(*customer_number*)
    customer_number is a value that is defined by the vendor to identify a particular customer. Selected reports list this number immediately after the title, "Customer No:".

    When the vendor is IBM, the parameter specified on the CODE keyword is the customer number assigned by IBM. If the vendor is not IBM, the customer should supply a value that is meaningful to that vendor. Value is 1-8 characters in length and consists of only alphanumeric and national characters.

EXIT(*exit_name*)
    Specifies the vendor *exit name* (load module name) that is supplied by the vendor. The value is 1-8 characters in length and consists of only alphanumeric and national characters. The EXIT keyword is optional and is only used at the specific direction of a vendor. This keyword is ignored when the vendor is IBM.

PRINTDD(*vendor DD*)
    Specifies the *vendor DD* used by the vendor's usage reporting exit for printing reports. See for further details. The name specified by *vendor DD* must match a JCL DD statement in the job stream. Value is 1-8 characters in length and consists of only alphanumeric and national characters. The PRINTDD keyword is optional, and when the vendor is IBM, it is ignored.

SYSPLEX control statement

The SYSPLEX control statement is optional. It is required only when the customer chooses to participate in usage pricing rather than PSLC for specific products executing across the sysplex. Usage pricing participation in a sysplex is on a product basis, so that some products may be charged by usage (on all processors defined in the sysplex) while other products in the sysplex are still free to use PSLC.

The SYSPLEX control statement defines the following information:

1. Name of the sysplex for billing purposes
2. Processors included in the sysplex

3. Date when this specific processor configuration became effective

4. Software products to be usage priced across this sysplex

With a sysplex, products are defined to the sysplex itself rather than to specific processors in the sysplex, and product usage is aggregated across all processors defined as being a part of the specified sysplex. Only coupling capable processors (such as 9121 511-based, 9021 711-based, or the 9672 Parallel Transaction Server family) are supported by the SYSPLEX control statement. Multiple SYSPLEX control statements using the same sysplex name may be specified provided the PLEXDATE values are not equal. See Figure 15 on page 58 for the layout and content of this report.

Note: When multiple physical coupled sysplexes exist and share a common processor or any CEC (central electronics complex) within a Parallel Transaction Server (9672), those processors and 9672s must be defined as constituting a single SYSPLEX for the purposes of usage pricing and defined by a single SYSPLEX. Sample SYSPLEX control statements can be found in examples 9, 10, and 11 under Chapter 4, "Usage pricing examples," on page 69.

Syntax

```
[SYSPLEX(ID(sysplex_id)
   PLEXDATE(yyyymmdd)
[CLUSTER((cluster_type,cluster_model,cluster_serial_number)[,...])]
   [PROCESSOR((type,model,serial_number)[,...])]
   [PRODUCT(PRODOWNER('product_owner')
   PRODNAME('product_name')
   [PRODFUNC('product_function' )]
   {START(yyyymmdd[,ALIGN(mm)])|STOP|RESTART|TESTDATE(yyyymmdd))}])]
```

SYSPLEX(ID(*sysplex_id*)

   sysplex_id specifies the identifier of a parallel sysplex for billing purposes. This keyword is required on the SYSPLEX control statement. The name specified on the SYSPLEX keyword in the COUPLExx member of the SYS1.PARMLIB data set can be used for this purpose. See *z/OS MVS Initialization and Tuning Reference* for information on COUPLExx. The *sysplex_id* value is 1-8 characters in length and consists of only alphanumeric and national characters.

PLEXDATE(*yyyymmdd*)

   yyyymmdd specifies the effective date of the configuration defined by this SYSPLEX control statement or the date when this sysplex configuration took effect.

   Note: Issuing a date later than IFAURP's run date will be treated as an error; IFAURP will end after issuing message IFA313S. This keyword is required on the SYSPLEX control statement. A changing sysplex configuration is indicated by multiple SYSPLEX control statements having the same sysplex_id but different PLEXDATEs with different PROCESSOR and/or CLUSTER values.

CLUSTER

   Specifies a list of groups of numbers (cluster type, model, and serial) for the Parallel Transaction Servers (9672-E0x and 9672-P0x models only) that are part of the parallel sysplex. This keyword is optional but, when specified, the type, model, and serial number are required and must be enclosed in parentheses. Each cluster specification must be separated from the next cluster specification by a comma. For example,

```
      CLUSTER      ((9672,E04,12898),(9672,E02,15861),...)
```

   The values used should be those that represent the entire Parallel Transaction Server instead of the type, model and serial numbers for each of the CECs within the Parallel Transaction Server. For example,

```
 type   -   9672
 model  -    E02
 serial -  20012
```

Note: For a detailed explanation of determining the cluster type, model, and serial number, see Appendix C, "Steps for determining the CPC type, model, and serial number," on page 137.

cluster_type
One of a list of numbers (type, model, and serial) that identify the clusters that are members of the parallel sysplex. Value is 4-6 characters in length and consists of only alphanumeric and national characters. For example, 9672.

cluster_model
One of a list of numbers (type, model, and serial) that identify the clusters that are members of the parallel sysplex. The model is 3 characters in length and consists of only alphanumeric characters. *cluster_model* applies only to 9672-E0x and 9672-P0x models. For example, E02.

cluster_serial_number
One of a list of numbers (type, model, and serial) that identify the clusters that are members of the parallel sysplex. This value is 5 characters in length for the US and 7 characters in length for EMEA, Canada, and Latin America. It consists of only decimal digits. For example, 20012 (US), 1120012 (EMEA, Canada, and Latin America).

PROCESSOR
Specifies a list of coupling-capable processor numbers (type, model, and serial) that make up the parallel sysplex. For example,

```
type   -   9021        type   -   9672
model  -    982  or   model  -    R21
serial -  11249        serial -  42242
```

Note:

1. Parallel Transaction Servers (9672–E0x and 9672–P0x only) must be defined on the CLUSTER keyword. Products selected for usage pricing on this specific processor are identified by the PRODUCT keyword. Each product requires its own PRODUCT keyword.

2. To create reports using SMF data from non-IBM processors you must specify the non-IBM processors in the control statements. If you do not, the report program will not produce a valid software usage report.

type
One of a list of numbers (type, model, and serial) that identify the processors that are members of the sysplex. The value is 1-4 characters in length and consists of only decimal digits. For example, 9021. *type* must be 9672 when referring to model Rxx.

model
One of a list of numbers (type, model, and serial) that identify the processors that are members of the sysplex. The value is 1-8 characters in length and consists of any printable character in the US English EBCDIC character set. For example, 8650M-E or XL/50. *model* must be Rxx when referring to type 9672. For example, the model for a 9672-R21 is R21.

Note: A list of the currently supported IBM and non-IBM processors appears in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115. Only the *type* and *model* values listed in this table will be accepted on the IFAURP control statement as valid IBM and non-IBM values.

serial_number
One of a list of numbers (type, model, and serial) that identify the processors that are members of the sysplex. This value is 5 characters in length for the US and 7 characters in length for EMEA, Canada, and Latin America. It consists of only decimal digits. For example, 12026 (US), 0212026 (Canada, EMEA and Latin America).

Note: For a detailed explanation of determining the processor serial number, see Appendix C, "Steps for determining the CPC type, model, and serial number," on page 137.

IBM usage pricing note: The customer must ensure that the processor serial numbers supplied by these control statements agree with the processor serial numbers already registered with IBM for general software pricing.

Note: When running PR/SM, do not use the processor serial number that RMF, or a similar performance monitor, returns. Performance monitors like RMF do not return the true processor serial number; the second character of the 6-character processor serial is overlaid with the LPAR number.

PRODUCT

The PRODUCT keyword is specified for each product on this processor participating in usage pricing. When PRODUCT is specified, you must specify PRODOWNER, PRODNAME, and one of the following (START, STOP, RESTART, or TESTDATE). PRODFUNC is optional.

Note: Once type 89 records have been activated and processed for a product, that product's PRODOWNER, PRODNAME, and PRODFUNC values will automatically appear in the Software Summary Report. The values for these keywords are the same as those used by the product when it registers for usage data collection. See the heading "REQUEST=REGISTER" in the "IFAUSAGE — Collecting Usage Data" chapter of *z/OS MVS System Management Facilities (SMF)* for a description of how products register. See Figure 15 on page 58 for a sample report or contact the vendor for the correct values for these keywords.

PRODOWNER(*'product_owner'*)

Indicates the associated *'product_owner'* value that the product, itself, registered with the SMF data collection services. Every vendor provides the value for this field as a part of the VENDOR control statement that the vendor must provide to the customer. **When the vendor is IBM, the PRODOWNER must be *'IBM CORP'*.** The value is enclosed in quotes and is 1-16 characters in length.

PRODNAME(*'product_name'*)

Indicates the *'product_name'* value that the product specified when registering for usage measurement services. The value is enclosed in quotes and is 1-16 characters in length.

PRODFUNC(*'product_function'*)

Indicates the *'product_function'* value that the product specified when registering for usage measurement services. The value is enclosed in quotes and is 1-8 characters in length. Although PRODFUNC is optional, if a product registered with a product qualifier (the PRODQUAL keyword on the IFAUSAGE macro), that product MUST be specified to the usage report program with PRODOWNER/PRODNAME/PRODFUNC and PRODFUNC must match PRODQUAL.

START(*yyyymmdd*)

Specifies:

1. That the customer wishes to participate in usage pricing for this product

2. The date when the customer has met **all** the usage pricing requirements for this product on all OS/390 or z/OS guests and LPARs on all processors defined for this sysplex activated the collection of SMF type 89 subtype 1 records.

Specifying the START keyword causes the usage values for the identified product to appear in the Billing section of the software usage report. You can specify START only once per product per processor. **You cannot implement usage pricing until you specify the START keyword.**

Note: No new MULC users can start after December 1, 1998. S/390 Usage Pricing (ULC) is the only usage pricing option that you may start on or after December 1, 1998.

yyyymmdd

Specifies the date when the initial measurement period for this product begins. The initial measurement period is two months.

Note:

1. **IBM must receive your Software Usage Report within 72 days of this date.**

2. Missing dates and dates later than IFAURP's run date will be treated as an error; IFAURP will end after issuing message IFA313S.

3. The initial measurement period for MULC users beginning before December 1, 1998, was one month in duration.

Specifying this keyword starts usage pricing for the specified product and causes the following:

1. Establishes the initial and subsequent measurement periods, as well as the billing periods, for the product (and other products by the same vendor).
2. Records the start date, measurement, and billing periods in the history file.
3. Prevents a new start date from being specified for the identified product.
4. Prevents a test start date from being specified for the identified product. See the TESTDATE keyword later in this topic.

ALIGN(*mm*)
Specifies the number of the month that the initial billing period is to be aligned with. Based on the value provided, IFAURP adjusts the length of the initial billing period from 3 to 14 months based on the value provided. All subsequent billing periods will be 12 months in length. However, billing periods are on a vendor basis, so each vendor may have a billing period different from other vendors on the same processor or parallel sysplex. Once established, the same billing periods automatically apply to all of the same vendor's products added at a later date to the same processor or parallel sysplex. *mm* is 1-2 characters in length and consists of only decimal digits. ALIGN is accepted only on the first START keyword of a given product owner's products on given stand-alone processor or sysplex. ALIGN cannot be specified for subsequent products from the same vendor.

For those wishing to use ALIGN to set the end of the first 12–month "measurement" period of a Parallel Sysplex, instead of choosing an ALIGN value based on the first month of the "billing" period, choose a numeric ALIGN value as follows:

```
ALIGN = (last month of measurement period) + 2
```

If the resulting value is larger than 12, subtract 12 from that value. For example, if the last month of the measurement period is to be November:

```
ALIGN = 11 + 2 = 13, ALIGN = 13 - 12 =1
```

Note: MULC users who did an ALIGN prior to December 1, 1998, could have an initial measurement period between 3 and 8 months in duration, with subsequent billing periods 6 months in duration. These users will migrate to twelve-month billing periods at the start their first billing period that begins in 1999.

STOP
Indicates that usage pricing for the identified product is to cease. This can only happen if you previously specified START or RESTART. Specifying STOP causes the usage values for the identified product to appear in the Collection section of the Software Usage Report. STOP specifies that the identified product is not to appear in the Billing section of the Software Usage Report for the measurement period corresponding to the next billing period, based on the date the usage report program is run.

Important: If you discontinue MULC after January 1, 1999, **you cannot restart MULC later.** S/390 Usage Pricing (ULC) is the only usage pricing option that you may start after December 1, 1998, or restart after January 1, 1999.

RESTART
Specifies that the identified product is to appear in the Billing section of the Software Usage Report for the measurement period corresponding to the next billing period, based on the date the usage report program is run. Specify this keyword when you want to resume the usage pricing option for a particular product after having previously stopped it.

Note:

1. IBM will not permit a MULC restart after January 1, 1999.
2. If you have discontinued ULC, you must wait at least 12 months before IBM will permit you to restart.

TESTDATE(*yyyymmdd***)**

    Temporarily specifies the date usage pricing is to begin. TESTDATE causes the same usage values to be reported as the START keyword except that the values are reported in the Collection section of the Software Usage Report instead of the Billing section. Value is 8 characters in length and consists of only decimal digits. IFAURP rejects TESTDATE if you have previously specified START for the specified product.

PROCESSOR control statement

The contents of the PROCESSOR control statement identify processors that:

1. Have not already been defined as part of a sysplex via a SYSPLEX control statement or have been excluded from the SYSPLEX as of a specific PLEXDATE

2. Are not a CEC included under a 9672–E0x or 9672–P0x

3. Are running products that have been selected for usage pricing

Products selected for usage pricing on this specific processor are identified by the PRODUCT keyword. Each product requires its own PRODUCT keyword. Sample PROCESSOR control statements can be found in examples 1 - 7 under Chapter 4, "Usage pricing examples," on page 69.

Syntax

```
PROCESSOR((type,model, serial_number)
         [PRODUCT(PRODOWNER(product_owner)
                 PRODNAME(product_name)
                 {START(yyyymmdd[,ALIGN(mm)])|STOP|RESTART|TESTDATE(yyyymmdd))}])
```

PROCESSOR((*type,model,serial_number***)**

    Specifies a processor where products exist that are billed using measured usage pricing where *type*, *model*, and *serial_number* identify the processor. If you are collecting data on any non-IBM processor, you must supply a PROCESSOR control statement as well, or the usage report program will not produce a valid Software Usage Report.

    Note: These reports will not be sufficient for usage pricing until all the necessary control statements are used.

    Customers wishing to participate in usage pricing are required to supply the appropriate IFAURP control statements to provide the usage report program with information about themselves and their hardware configurations and participating usage pricing products. This information is required to resolve an ambiguous situation that might arise when multiple products, processors, and vendors are involved, because a single execution of IFAURP can generate every combination of IFAURP reports possible for the entire data center, provided all the necessary data is available in a single history file.

    type

        One of a list of numbers (type, model and serial) that identify the processor. Value is 1-4 characters in length and consists of only alphanumeric and national characters. For example, 9021. *type* must be 9672 when referring to model Rxx.

    model

        One of a list of numbers (type, model, and serial) that identify the processor. Value is 1-8 characters in length and consists of only alphanumeric characters. For example, *model* must be Rxx when referring to type 9672. For example, the model for a 9672-R21 is R21.

        Note: A list of the currently supported non-IBM processors appears in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115. Only the *type* and *model* values listed in this table will be accepted as valid IBM and non-IBM values.

serial_number
One of a list of numbers (type, model, and serial) that identify the processor. This value is 5 characters in length for the US and 7 characters in length for EMEA, Canada, and Latin America. It consists of only decimal digits. For example, 20012 (US), 1120012 (EMEA and Latin America).

IBM usage pricing note: The customer **must** ensure that the processor serial numbers supplied by these control statements agree with the processor serial numbers already registered with IBM for general software pricing.

Note: Performance monitors like RMF do not return the true processor serial when the processor is running PR/SM. When running PR/SM, the second character of the 6 character processor serial number has been overlaid with the LPAR number.

PRODUCT
The PRODUCT keyword is specified for each product on this processor participating in usage pricing. When PRODUCT is specified, you must specify PRODOWNER, PRODNAME, and one of the following (START, STOP, RESTART, or TESTDATE). PRODFUNC is optional.

The values specified on the PRODOWNER, PRODNAME, and PRODFUNC identify the product to be billed. The values for these keywords are the same as those used by the product when it registered for usage data collection.

Note: Once type 89 records have been activated and processed for a product, that product's PRODOWNER, PRODNAME, and PRODFUNC values will automatically appear in the Software Summary Report. See Figure 15 on page 58 for a sample report or contact the vendor for the correct values for these keywords.

PRODOWNER(*'product_owner'*)
Indicates the associated *'product_owner'* value that the product, itself, registered with the SMF data collection services. Every vendor provides the value for this field as a part of the VENDOR control statement that the vendor must provide to the customer. **When the vendor is IBM, the PRODOWNER must be *'IBM CORP'*.** The value is enclosed in quotes and is 1-16 characters in length.

PRODNAME(*'product_name'*)
Indicates the *'product_name'* value that the product specified when registering for usage measurement services. The value is enclosed in quotes and is 1-16 characters in length.

PRODFUNC(*'product_function'*)
Indicates the *'product_function'* value that the product specified when registering for usage measurement services. The value is enclosed in quotes and is 1-8 characters in length. Although PRODFUNC is optional, if a product registered with a product qualifier (the PRODQUAL keyword on the IFAUSAGE macro), that product MUST be specified to the usage report program with PRODOWNER/PRODNAME/PRODFUNC and PRODFUNC must match PRODQUAL.

START(*yyyymmdd*)
Specifies:

1. That the customer wishes to participate in usage pricing for this product

2. The date when the customer has met **all** the usage pricing requirements for this product on all OS/390 or z/OS guests and LPARs on the specified processor activated the collection of SMF type 89 subtype 1 records

Specifying the START keyword causes the usage values for the identified product to appear in the Billing section of the Software Usage Report. You can specify START only once per product per sysplex. **YOU CANNOT IMPLEMENT USAGE PRICING UNTIL YOU SPECIFY START.**

Note: No new MULC users can start after December 1, 1998. S/390 Usage Pricing (ULC) is the only usage pricing option that you may start on or after December 1, 1998.

yyyymmdd
Specifies the date when the initial measurement period for this product begins. The initial measurement period is two months.

Note:

1. **IBM must receive your Software Usage Report within 72 days of this date.**

2. Missing dates and dates later than the IFAURP run date will be treated as an error; IFAURP will end after issuing message IFA313S.

3. The initial measurement period for MULC users beginning before December 1, 1998, was one month in duration.

Specifying this keyword starts usage pricing for the specified product and causes the following:

1. Establishes the initial and subsequent measurement periods, as well as the billing periods, for the product (and other products by the same vendor).

2. Records the start date, measurement, and billing periods in the history file.

3. Prevents a new start date from being specified for the identified product.

4. Prevents a test start date from being specified for the identified product. See the TESTDATE keyword later in this topic.

Value is 8 characters in length and consists of only decimal digits.

ALIGN(*mm*)
Specifies the number of the month that the initial billing period is to be aligned with. Based on the value provided, IFAURP adjusts the length of the initial billing period from 3 to 14 months based on the value provided. All subsequent billing periods will be 12 months in length. However, billing periods are on a vendor basis, so each vendor may have a billing period different from other vendors on the same processor or parallel sysplex. Once established, the same billing periods automatically apply to all of the same vendor's products added at a later date to the same processor or parallel sysplex. *mm* is 1-2 characters in length and consists of only decimal digits. ALIGN is accepted only on the first START keyword of a given product owner's products on given stand-alone processor or sysplex. ALIGN cannot be specified for subsequent products from the same vendor.

For those wishing to use ALIGN to set the end of the first 12–month measurement period of a processor, instead of choosing an ALIGN value based on the first month of the "billing" period, choose a numeric ALIGN value as follows:

```
ALIGN = (last month of measurement period) + 2
```

If the resulting value is larger than 12, subtract 12 from that value. For example, if the last month of the measurement period is to be November:

```
ALIGN = 11 + 2 = 13, ALIGN = 13 - 12 =1
```

Note: MULC users who did an ALIGN prior to December 1, 1998, could have an initial measurement period between 3 and 8 months in duration, with subsequent billing periods 6 months in duration. These users will migrate to 12–month billing periods at the start their first billing period that begins in 1999.

STOP
Indicates usage pricing for the identified product is to cease. This can only happen if START or RESTART was previously specified. Specifying STOP causes the usage values for the identified product to appear in the Collection section of the Software Usage Report. STOP specifies that the identified product is not to appear in the Billing section of the Software Usage Report for the measurement period corresponding to the next billing period, based on the date the usage report program is run. Specify this keyword when you want to end the usage pricing option for a particular product.

Important: If you discontinue MULC after January 1, 1999, **you cannot restart MULC later.** S/390 Usage Pricing (ULC) is the only usage pricing option that you may start after December 1, 1998, or restart after January 1, 1999.

RESTART
Specifies that the identified product is to appear in the Billing section of the Software Usage Report for the measurement period corresponding to the next billing period, based on the date

the usage report program is run. Specify this keyword when you want to resume the usage pricing option for a particular product after having previously stopped it.

Note:

1. IBM will not permit a MULC restart after January 1, 1999.
2. If you have discontinued ULC, you must wait at least 12 months before IBM will permit you to restart.

TESTDATE(*yyyymmdd*)
Temporarily specifies the date usage pricing is to begin. TESTDATE causes the same usage values to be reported as the START keyword except that the values are reported in the Collection section of the Software Usage Report instead of the Billing section. Value is 8 characters in length and consists of only decimal digits. TESTDATE is not accepted if START has been previously specified for the specified product.

TRANSFER control statement

The TRANSFER control statement is used to transfer usage priced products from one processor to another. The processor the products are transferred to must be a processor where no usage priced products currently execute. Sample TRANSFER control statements can be found in example 6 under

Syntax

```
[TRANSFER((old_type,old_model,old_serial_number),
          (new_type,new_model,new_serial_number))]
```

TRANSFER
This is an optional statement. TRANSFER specifies that the processor identified by (*old_type,old_model*, *old_serial_number*) has been replaced by the processor identified by (*new_type,new_model*, *new_serial_number*).

Specify this statement if one processor is being replaced by another and all the usage products on the existing system are being transferred to the new processor. The new processor cannot already have products that are billed by usage. Specifying this statement causes the product usage data for products running on the two processors specified to be reported in the same Software Usage Report.

Note:

1. TRANSFER affects only stand-alone processors. It does not have any affect on processors that are part of a parallel sysplex.
2. The TRANSFER statement must not precede any PROCESSOR statement referring to TRANSFER's old_type,old_model,old_serial_number. The TRANSFER statement does not require that such a PROCESSOR statement be present, if that PROCESSOR statement was provided in a previous execution of IFAURP.
3. The usage report program only supports the one time transfer of a processor.

old_type
One of a list of numbers (old_type, old_model, and old_serial) that identify the processor that is being replaced. Value is 1-4 characters in length and consists of only numeric and national characters.

old_model
One of a list of numbers (old_type, old_model, and old_serial) that identify the processor that is being replaced. Value is 1-8 characters in length and consists of any character.

old_serial_number
One of a list of numbers (old_type, old_model, and old_serial) that identify the processor that is being replaced. This value is 5 characters in length for the US and 7 characters in length for Europe, Middle

East, Africa (EMEA); Canada; and Latin America. It consists of only decimal digits. For example, 20012 (US), 1120012 (EMEA and Latin America).

new_type

One of a list of numbers (old_type, old_model, and old_serial) that identify the processor that is being replaced. Value is 1-4 characters in length and consists of only numeric and national characters.

new_model

Value is 1-8 characters in length and consists of any character.

new_serial_number

The serial number consists of only decimal digits. It is the last 5 characters of the 6 character processor serial number for all IBM geographies, except EMEA and Latin America where a two character plant of manufacture precedes the 5 character serial number. For example, 11263 (US) and 0211263 (EMEA and LA).

Notes:

1. A list of the currently supported non-IBM processors is listed in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115. Only the *type* and *model* values listed in this table will be accepted as valid non-IBM values. If you specify an unsupported processor value as part of a TRANSFER, IFAURP will not produce a valid Software Usage Report.

2. Performance monitors like RMF do not return the true processor serial when the processor is running PR/SM. When running PR/SM, the second character of the 6 character processor serial number has been overlaid with the LPAR number.

3. It is not necessary to specify the TRANSFER control statement for processors with the same TYPE and SERIAL values. When IFAURP detects processors with the same TYPE and SERIAL values, TRANSFER is automatic.

IBM usage pricing note: The customer must supply the processor serial numbers on these control statements that agree with the processor serial numbers registered with IBM for participation in usage pricing.

Types of reports

IBM usage pricing note: The only report that is required for usage pricing participation is the Software Usage Report.

Seven reports are available with the usage report program:

The **IFAURP messages report** lists the IFAURP control statements and all the error messages related to this execution of IFAURP. See "The IFAURP messages report" on page 45 for an example of this report and an explanation of the fields and their meanings. You should use this report to determine what, if any, error conditions IFAURP encountered and if any errors ended the program. Be aware that early program termination does not necessarily prevent the other IFAURP reports from being generated, even though these reports may be incomplete.

IFAURP error processing will also write hexadecimal printouts of the SMF type 89 records involved in specific error conditions to the IFAURP Messages Report, as a diagnostics aid. Be prepared to provide the IFAURP Messages Report to the IBM Support Center, if requested for problem determination.

The **software usage report** is produced for each unique occurrence of a sysplex, or stand-alone processor, and vendor name. The report lists the usage of each product and product function. See "The software usage report" on page 46 for an example of the report and an explanation of the fields in the report and their meanings.

While the customer is responsible for generating and sending this report to IBM to participate in usage pricing, this report is primarily intended for IBM to use to set the usage band for participating MULC products, or the usage level for participating ULC products. (See the *MULC Announcement Letter* for a description of the usage band. See the *ULC Announcement Letter* for a description of the usage level.) You can, however, use this report to determine whether to start, continue, or stop usage pricing for the IBM products listed in the report.

The report can reflect the change that occurs when a product (like TSO/E) that was shipped and licensed separately is now covered under the z/OS license.

The **software product registration report** lists all the products that SMF type 89 records (both subtype 1 and subtype 2) indicate are in use. The report thus includes both products that have registered with SMF for usage data collection and products that have registered with MVS as running on a particular system. See Figure 14 on page 54 for an example of the report and an explanation of the fields in the report and their meanings.

The **software summary report** summarizes the processors, LPARs and products for which SMF type 89 subtype 1 records were gathered. Each time the usage report program, IFAURP, is run, the Software Summary Report is produced. See "The software summary report" on page 58 for an example of the report and an explanation of the fields in the report and their meanings. You can use this report to audit the number of SMF type 89 records that were generated by each processor or sysplex for which data was provided to IFAURP. The report also indicates a list of all the products for which usage data was processed by IFAURP execution.

When the SMF input data set contains usage data for 2 partial months (04MAR94-23APR94) the Summary, Outage and Statistics Reports are generated for both March and April beginning March 1st and ending April 30th. The data for March 1st through 6th is obtained from the history file (if the data exists in the history file). However, if the last data in the history file was collected in February, the Summary, Outage, and Statistics Reports will also contain data for February as well.

The **software outage report** is produced for each processor and LPAR. It shows the hours in the reporting period when no SMF type 89 records were found. You can use this report to check for missing data. See "The software outage report " on page 60 for an example of the report and an explanation of the fields in the report and their meanings. You can also use this report to verify that IFAURP has processed all the SMF type 89 records collected for each processor participating in usage pricing and running in single image mode or for each LPAR when running under PR/SM.

The **software statistics report** is produced for each unique occurrence of a customer-defined SYSPLEX or stand-alone processor, and product owner name. The report shows the history of the usage of each product. See "The software statistics report" on page 61 for an example of the report and an explanation of the fields in the report and their meanings. You can use this report to track the hour when the highest product usage occurred for each day on the processor or sysplex.

The **time period report** is produced for each unique occurrence of a customer-defined sysplex or stand-alone processor, product owner, product name, product function, for all products included in the Software Usage Report. It lists the measurement and billing periods and the "report due" data, by stand-alone processor and parallel sysplex name, for each product name and function for the product owner "IBM CORP" and for all other product owners. See "The time period report" on page 63 for an example of the report and an explanation of the fields in the report and their meanings. You can use this report to simplify the scheduling of usage reporting by consolidating all the report due dates, measurement period and billing period begin-end dates, for all products running on all the processors and sysplexes associated with a particular history file, into a single report.

The **valid processor report** lists the processors presently supported by your level of the usage report program. See "The valid processor report" on page 64 for an example of the report.

Note: This report lists the supported Processor Type and Model values for processors that have been announced **before March 1, 2010,** but this report does not list the supported IBM processors that have been announced after March 1, 2010. For a complete list of supported processors, see "Type-Model Values for IBM and Non-IBM Processors. in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115.

The **processor capacity audit report** shows changes that have occurred in the processor data. A new line is generated in the report for each change in Processor type, serial number, model, or SU factor. See "The processor capacity audit report" on page 65 for an example of the report.

The IFAURP messages report

The **IFAURP messages report** lists the PARM value, the control statements, and all the error messages related to this execution of IFAURP. The error messages cover syntax errors on the control statements, errors in the SMF type 89 record fields, errors related to vendor exit processing, including IBM vendor exits, and IFAURP processing errors. For diagnostic purposes, several errors cause a hexadecimal printout of the erroneous SMF type 89 records on this report. A maximum of ten erroneous records can be printed. Be prepared to provide the IFAURP messages report to the IBM Support Center, if requested, for problem determination. The IFAURP messages report is the only report written to the SYSMSGS DD. All other reports are written to the SYSPRINT DD.

```
                                          IFAURP Messages Report
                                            OCTOBER    5,1995
   IFAURP 3.1.2  H


    IFA358I IFAURP PARM: None
    IFA359I Default PARM: USAGE
    IFA306I IFAURP OPTIONS
    A  CUSTOMER(
                   NAME('Acme Tulle and Dye Company          ')
                ADDRESS(
                     '155 Main Street                   '
                    ,'New London, CT 05512              '
                    )
                CONTACT('Fred Tulle       ')
                  PHONE('(203) 000-1212 ex 54')

             ) - SYSIN   B
    A     VENDOR(
                PRODOWNER('IBM CORP       ')
                   NAME('IBM Branch Office                 ')
                ADDRESS(
                    ,'1133 Westchester Ave              '
                    ,'Major City, Sample State 10604    '
                    ,'FAX: 1-800-555-1212 ATTN: Usage Pricing '
                    )
                CODE(1234567 )

             ) - HISTORY   B
    APROCESSOR(
                    (9021,952     ,01111  )
                PRODUCT(
                    PRODOWNER('IBM CORP       ')
                    PRODNAME('CICS           ')
                    START(19950401)
                    )
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
                PRODUCT(
                    PRODOWNER('IBM CORP       ')
                    PRODNAME('BATCHPIPES/MVS ')
                    START(19950401)
                    )
             ) - HISTORY   B
  C  IFA351E VENDOR EXIT IFAUBATC IS REQUIRED BUT WAS NOT LOADED
  D  IFA340E VENDOR EXIT IFAUBATC IS DISABLED DUE TO ERROR
  C  IFA345E VENDOR EXIT IFAUMQM# REQUIRES IFAURP VERSION  1 RELEASE  3 MOD  0
  D  IFA340E VENDOR EXIT IFAUMQM# IS DISABLED DUE TO ERROR
  E  IFA327E RECORD     18292 IS A DUPLICATE.

  F REC 0000   00F80000 DE590059 B8C00095 270FE2E8  E2F1E2E3 C3400001 00000018 00000034 *.8.........n..SYS1STC ...........*
       0020   00240001 00000058 004C0001 000000A4  00540001 E2D4C640 40404040 00000001 *...............u....SMF....*
       0040   E2D7F54B F14BF040 0058CE60 0095270F  0059B8C0 0095270F D7F0F140 40404040 *SP5.1.0  .....n.......n..P01     *
       0060   0058CE60 0095270F 0059B8C0 0095270F  0000A001 0000A001 9021D510 30111100 *.....n........n............N.....*
       0080   000037AA D7F0F140 40404040 F0F0F9F0  F0F0F9F5 F2F0F0F0 F0F0F0F0 F0F1F1F1 *....P01       00900095200000000111*
       00A0   F1000000 C9C2D440 C3D6D9D7 40404040  40404040 C9D4E261 C5E2C140 40404040 *1...IBM CORP        IMS.ESA     *
       00C0   40404040 E5F4D9F1 40404040 C2C1E3C3  C8404040 F5F6F8F5 60F0F1F2 4384A000 *    V4R1    BATCH    5685.012.d..*
       00E0   00000000 00000000 00000000 00000000  00000000 00000000              *....................    *
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  D  IFA356E 10 INPUT RECORDS DUMPED.  DUMPING DISCONTINUED.
  G  IFA325I    18339 RECORDS READ.

  E  IFA349E WARNING:  NEW SMF HEADER FIELDS NOT SUPPORTED  BY THIS LEVEL OF IFAURP
```

Figure 13. IFAURP messages report

The fields in the IFAURP messages report are:

Field heading
> **Definition**

IFAURP program level H
> The version.release.modification level of program IFAURP. Several error messages reference the IFAURP level.

IFA306I IFAURP OPTIONS

The PARM value and any related messages precede the control statements. All control statements ▌
A used by this execution of IFAURP are listed in a format used by IFAURP's syntax checker. Regardless of how the original control statement was constructed, the syntax checker expands each control field to its maximum valid length and prints each field on its own line. Each control statement is followed by an indicator **B** that identifies the source of the control statement, either the SYSIN ddname in the JCL or the HISTORY file, the SYSHIN ddname in the JCL.

Except for the CUSTOMER control statement, all control statements are saved on the new history file and re-used, unless overridden by a new control statement of the same kind.

Note: Syntax errors will cause diagnostic messages only. No control statements will be listed until all syntax errors are resolved.

All other IFAnnnx messages

The remainder of this report lists several categories of messages.

- messages indicating IFAURP processing actions **D**

- messages with information about IFAURP processing **G**

- messages indicating error conditions related to SMF records or record fields **E**. IFAURP processing either ignores the error, bypasses the erroneous record, or terminates all processing depending on the type of error.

- error messages related to vendor exit requirements **C**

Some error messages related to SMF records or record fields will also result in a hexadecimal printout ▌ **F** of the erroneous SMF type 89 on this report for diagnostic purposes. A maximum of ten erroneous records will be printed on this report.

The software usage report

The software usage report is the only report required to participate in usage pricing and lists the usage of each product name and function for the product owner IBM CORP. It also lists usage for all other product owners who did not specify an exit in their control statements or whose exit return codes indicated that the record be processed by the usage report program. Following is an example of a software usage report:

```
1                      Measured Usage and S/390 Usage Pricing Charges                        PAGE   1
 IFAURP 4.1.0                          Software Usage Report                        19 FEBRUARY 2010
0------------------ Customer No: 0334455  ------------------   -------------- Software Vendor: IBM CORP   ---------------
 BETA SYSTEMS                                              IBM CORPORATION
 11 LOOKING GLASS                                         IBM BRANCH OFFICE
 FANTASY ISL, RI 12345                                    411 E WISCONSIN  AVENUE
 Contact/Phone: ALICE WONDERLAND / (555) 214-1915         MILWAUKEE, WI  53201
                                                          FAX: 1-800-000-1212  ATTN: USAGE PRICING
0- Report -    --- Measurement Period End Dates ---  | ----------------------- Parallel Sysplex BETA   -----------------------
   Due Date    End Date  Product Name(s)   Function   | Category   Type-Serial   Model            Begin-End Dates    SU Factor
   --------    --------  ---------------   --------   | ---------- ----------    ----------       ----------------   ---------
   14Feb11     31Jan11   ***ALL***                    | Machine    2094-604FE    S28              02Mar08 - 17Jan09
                                                      | 2094 CEC   2094-604FE    713              02Mar08 - 17Jan09 16985.1380
                                                      | Machine    2094-604FE    S28              18Mar08 - 07Jan09
                                                      | 2094 CEC   2094-604FE    714              18Mar08 - 07Jan09 16718.9133
                                                      | Machine    2094-604FE    S28              17Mar08 - 01Jan09
                                                      | 2094 CEC   2094-604FE    715              17Mar08 - 01Jan09 16546.0186
                                                      | Machine    2094-604FE    S28              18Jul08 - 25Oct08
                                                      | 2094 CEC   2094-604FE    716              18Jul08 - 25Oct08 16276.7040
                                                      | Machine    2094-604FE    S28              16Jul08 - 10Oct08
                                                      | 2094 CEC   2094-604FE    717              16Jul08 - 10Oct08 16096.5795
                                                      | Machine    2094-604FE    S28              19May08 - 09Oct08
                                                      | 2094 CEC   2094-604FE    718              19May08 - 09Oct08 15920.3980
                                                      | Machine    2094-604FE    S28              14Jul08 - 15Jul08
                                                      | 2094 CEC   2094-604FE    719              14Jul08 - 15Jul08 15748.0315
                                                      | Machine    2094-604FE    S28              15Jul08 - 15Oct08
                                                      | 2094 CEC   2094-604FE    720              15Jul08 - 15Oct08 15655.5773
                                                      | Machine    2094-604FE    S28              19Sep08 - 20Sep08
                                                      | 2094 CEC   2094-604FE    721              19Sep08 - 20Sep08 15564.2023
                                                      | Machine    2094-604FE    S28              15Jul08 - 11Oct08
                                                      | 2094 CEC   2094-604FE    722              15Jul08 - 11Oct08 15473.8878
                                                      | Machine    2094-5A91E    S18              02Mar08 - 01Mar09
                                                      | 2094 CEC   2094-5A91E    703              02Mar08 - 01Mar09 21192.0530
                                                      | Machine    2094-5A91E    S18              17Mar08 - 12Feb09
                                                      | 2094 CEC   2094-5A91E    704              17Mar08 - 12Feb09 20671.8346
                                                      | Machine    2094-5A91E    S18              19Sep08 - 25Oct08
                                                      | 2094 CEC   2094-5A91E    705              19Sep08 - 25Oct08 20151.1335
                                                      | Machine    2094-5A96E    S28              29Mar08 - 19Jul08
                                                      | 2094 CEC   2094-5A96E    720              29Mar08 - 19Jul08 15655.5773
                                                      | Machine    2094-5A96E    S28              02Mar08 - 18Jul08
                                                      | 2094 CEC   2094-5A96E    721              02Mar08 - 18Jul08 15564.2023
                                                      | Machine    2094-5A96E    S28              18Mar08 - 25Mar08
                                                      | 2094 CEC   2094-5A96E    723              18Mar08 - 25Mar08 15384.6154
                                                      | Machine    2094-5A96E    S28              01Apr08 - 02Apr08
                                                      | 2094 CEC   2094-5A96E    725              01Apr08 - 02Apr08 15037.5940
                                                      | Machine    2094-5A96E    S28              17Mar08 - 18Mar08
```

```
                                          |  2094 CEC     2094-5A96E    726              17Mar08 - 18Mar08 14953.2710
                                          |  Machine      2094-49A2C    S18              02Mar08 - 03Jul08
                                          |  2094 CEC     2094-49A2C    702              02Mar08 - 03Jul08 21887.8249
                                          |  Machine      2094-49A2C    S18              03Jul08 - 11Jan09
                                          |  2094 CEC     2094-49A2C    704              03Jul08 - 11Jan09 20671.8346
                                          |  Machine      2094-49A2C    S18              06Jun08 - 11Oct08
                                          |  2094 CEC     2094-49A2C    717              06Jun08 - 11Oct08 16096.5795
                                          |  Machine      2094-5A95E    S28              02Mar08 - 01Mar09
                                          |  2094 CEC     2094-5A95E    701              02Mar08 - 01Mar09 22408.9636
                                          |  Machine      2094-5A95E    S28              03Jul08 - 28Feb09
                                          |  2094 CEC     2094-5A95E    706              03Jul08 - 28Feb09 19536.0195
                                          |  Machine      2094-5A95E    S28              16Dec08 - 19Jan09
                                          |  2094 CEC     2094-5A95E    707              16Dec08 - 19Jan09 19002.3753
                                          |  Machine      2094-5A95E    S28              06Jun08 - 14Jun08
                                          |  2094 CEC     2094-5A95E    723              06Jun08 - 14Jun08 15384.6154
                                          |  Machine      2094-5A95E    S28              02Oct08 - 11Oct08
                                          |  2094 CEC     2094-5A95E    727              02Oct08 - 11Oct08 14773.7765
                                          |  Machine      2097-216C2    E40              20Jul08 - 06Feb09
                                          |  2097 CEC     2097-216C2    715              20Jul08 - 06Feb09 22253.1293
                                          |  Machine      2097-216C2    E40              08Sep08 - 02Feb09
                                          |  2097 CEC     2097-216C2    716              08Sep08 - 02Feb09 21947.8738
                                          |  Machine      2097-216C2    E40              04Aug08 - 01Mar09
                                          |  2097 CEC     2097-216C2    717              04Aug08 - 01Mar09 21709.6336
                                          |  Machine      2097-216C2    E40              22Sep08 - 28Feb09
                                          |  2097 CEC     2097-216C2    718              22Sep08 - 28Feb09 21447.7212
                                          |  Machine      2097-216C2
E40              29Sep08 - 25Oct08
                                          |  2097 CEC     2097-216C2    719              29Sep08 - 25Oct08 21220.1592
                                          |  Machine      2097-216C2    E40              16Sep08 - 30Sep08
                                          |  2097 CEC     2097-216C2    720              16Sep08 - 30Sep08 20997.3753
                                          |  Machine      2097-216C2    E40              09Oct08 - 15Oct08
                                          |  2097 CEC     2097-216C2    721              09Oct08 - 15Oct08 20779.2208
                                          |  Machine      2097-216C2    E40              13Oct08 - 14Oct08
                                          |  2097 CEC     2097-216C2    722              13Oct08 - 14Oct08 20592.0206
                                          |  Machine      2097-216C2    E40              14Oct08 - 14Oct08
                                          |  2097 CEC     2097-216C2    724              14Oct08 - 14Oct08 20227.5601
                                          |  Machine      2097-216C2    E40              19Sep08 - 11Oct08
                                          |  2097 CEC     2097-216C2    725              19Sep08 - 11Oct08 20050.1253
                                          |  Machine      2097-216C2    E40              19Sep08 - 20Sep08
                                          |  2097 CEC     2097-216C2    728              19Sep08 - 20Sep08 19631.9018
                                          |  Machine      2097-D2F72    E26              28Feb09 - 01Mar09
                                          |  2097 CEC     2097-D2F72    702              28Feb09 - 01Mar09 29906.5421
                                          |  Machine      2097-D2F72    E26              11Jan09 - 28Feb09
                                          |  2097 CEC     2097-D2F72    703              11Jan09 - 28Feb09 28933.0922
                                          |  Machine      2097-D2F62    E40              17Jan09 - 01Mar09
                                          |  2097 CEC     2097-D2F62    710              17Jan09 - 01Mar09 24316.1094
0================================================================ For Billing Purposes ==========================================
0                                              ----------------------- Monthly Chargeable Product Values -----------------------
--------------- Product ----------------   2008                                                 2009
NUMBER(S) NAME          VERSION FUNCTION    MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC   JAN | FEB   MAR
--------- --------------- -------- --------  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ---- |----  ----
                          MAX MVS/ESA LPARS:  14    14    16    18    21    17    17    17    17    17    27 |  18    14
                          PERCENT MISSING HOURS: 16  12    12    21    32    20    15    16    16    16    44 |  11    99
                                                                                                              |
5655-L82 MQM MVS/ESA       6.               40.5X 41.4  45.8  42.3  48.2  43.3  54.0  57.8< 54.3  44.6  44.3 |44.8< 11.2#   (02)
1                                           Measured Usage and S/390 Usage Pricing Charges                            PAGE    2
 IFAURP 4.1.0                                        Software Usage Report                                       19 FEBRUARY 2010
0------------------ Customer No: 0334455  ------------------    -------------- Software Vendor: IBM CORP    ---------------
 BETA SYSTEMS                                                  IBM CORPORATION
 11 LOOKING GLASS                                             IBM BRANCH OFFICE
 FANTASY ISL, RI 12345                                       411 E WISCONSIN  AVENUE
 Contact/Phone: ALICE WONDERLAND / (555) 214-1915            MILWAUKEE, WI  53201
                                                              FAX: 1-800-000-1212  ATTN: USAGE PRICING
0- Report -   --- Measurement Period End Dates ---  | ----------------------- Parallel Sysplex BETA   ------------------------
  Due Date    End Date  Product Name(s)   Function   |  Category     Type-Serial    Model            Begin-End Dates    SU Factor
  --------    -------   ---------------   --------   |  ---------    -----------    ---------------  ----------------   ---------
0  * * Product and processor information can be found on page 1 of this report.  **
0================================================================ For Billing Purposes ==========================================
0                                              ----------------------- Monthly Chargeable Product Values -----------------------
--------------- Product ----------------   2008                                                 2009
NUMBER(S) NAME          VERSION FUNCTION    MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC   JAN | FEB   MAR
--------- --------------- -------- --------  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ---- |----  ----
                          MAX MVS/ESA LPARS:  14    14    16    18    21    18    17    17    17    17    27 |  18    14
                          PERCENT MISSING HOURS: 16  12    12    21    32    20    15    16    16    16    44 |  11    99
                                                                                                              |
       X 01Feb08-31Mar08      (MQM#9501)                                                                      |
                                                                                                              |
  ----------------------------------------------------------------------------------------------------------------------
   I certify that the values circled on this report indicate months for which that product was under test allowance.
-  ---------------------------------------------   ------------------------------------------   ------------------------
   Name                                           Signature                                    Date
0=========================================================== For Collection Purposes Only ======================================
5645-001 z/OS              01.09.00 TSO/E                                          341   333   329   289   275 | 263<  120#  (01)
5645-001                   01.08.00              201#  189   243   175   208   368<                            |
       # 02Mar08                                                                                              |
                                                                                                              |
5655-M15 CICS              3.2                                                                                 |1390< 59.0#  (02)
5697-E93                   2.3               1177# 1147  1167  1102  1382  1145  1499  1914< 1436  1426  1174 |
       # 02Mar08                                                                                              |
                                                                                                              |
5635-DB2 DB2               9.1.0                   657   935   981   753   961   875   759  1004<  659   804 | 692< 1051#  (02)
5625-DB2                   8.1.0              948#                                                             |
       # 02Mar08                                                                                              |
                                                                                                              |
-=============================================================== Notes ==========================================================
0  X  - Begin-end dates of the initial measurement period
   #  - Data not collected for a full month.
   <  - Value to the left is the largest value of complete months shown.
 (01) - Not eligible for Measured Usage charges
 (02) - Hourly rate in millions of CPU Service Units (MSUs)
```

Table 2. Fields in the software usage report	
Field Heading	**Definition**
A IFAURP program level	The version.release.modification level of program IFAURP. Several error messages reference the IFAURP level.
B Execution date	The date that IFAURP was run to produce this report.
C Customer information	The customer name, number, and address, obtained from the control statements.
D Software vendor information	The product owner, obtained from the SMF type 89 record, and the name and address of the software vendor, obtained from the control statements.
E Report Due Date	For products owned by IBM CORP, the date the report must be received by IBM in order for measured usage pricing to take effect.
F Measurement Period End Dates	The end date of the current measurement period for each product name and function in the report, or ALL if all product names and functions have the same measurement period.
G Processor	Identification of the processor. For a parallel sysplex, the heading will instead show `Parallel Sysplex` and the sysplex name, obtained from the control statements, and all processors and clusters that are defined in the control statements as being part of the parallel sysplex and have reported usage, will be listed. Processors that are specified on a TRANSFER control statement will be combined in single report and will be listed under "Processor". **Category:** **Cluster** 9672 Parallel Transaction Server family in a parallel sysplex **Machine** 9672 Enterprise Server. This category represents IBM asset information associated with 9672-Rxx model processors. **9672 CEC** 9672 CEC within a Parallel Transaction Server or Enterprise Server **Standalone** All other processors **Type-Serial** The type and serial of the processor or cluster. **Model** The model number of the processor or cluster. A model value of ???????????????? indicates that IFAURP does not recognize a specified processor model. Unrecognized processors will always be listed on reports as if they are standalone, even if they are 9672 servers. You can use a report listing unrecognized processors for collection purposes, but not for billing purposes. You must correctly identify all processors on reports you submit to IBM for billing.

Table 2. Fields in the software usage report (continued)	
Field Heading	**Definition**
G **Processor (Continued)**	**Begin-End Dates** The first and last dates that usage is reported, obtained from the SYSHIN input file(s) or the history file. **SU Factor** The constant by which CPU seconds are multiplied to calculate Service Units. See "CPU service unit calculations" on page 2 for further details. **?????????** An SU factor value of ????????? appears for unrecognized processors on reports. Because the processor type-model value is unrecognized, IFAURP cannot determine the appropriate SU factor.
H **"For Billing Purposes"**	For IBM, customers use this section to indicate which products they are requesting the MULC billing option for. Customers determine which product names and functions appear in this section as the result of PRODUCT statements specifying START or RESTART. Products are listed in product name order.
I **Product information**	The identification number, name, version, and function (or qualifier) of a product, obtained from the SMF type 89 records. Some of these SMF type 89 fields are modified by IBM product-specific exits before they are formally processed by IFAURP. If more than one version appears, the monthly values will appear on the same line as the highest version run that month. In the example, the highest level of IMS DB run in April and May was 4.1, and for June, July, August, September, and October the highest level was 5.1.

Table 2. Fields in the software usage report (continued)	
Field Heading	**Definition**
J **Monthly Chargeable Product Values**	A column for each of the thirteen months or less ending with the latest end date.
	A monthly column shows, for each product name and function, the number of usage units as described by the numbered note (**M**) at the end of the line of usage values.Current IBM products report usage values for the hour that is fourth highest among the highest hours of all the days in the month.
	Special usage values will be printed as follows:
	0 When the number of usage units is less than .001
	- When no usage is present
	XXXX When the usage values are in error as indicated by the numbered note (**M**) at the end of the usage line
	ZZZZ When the usage values cannot be provided on the report because the processor model is unrecognized
	???? When the number of usage units exceeds 9999
	Note: IBM will not use reports, that contain XXXX or ???? in the "For Billing Purposes" section to set any MULC or ULC prices. IBM ignores the same errors when they appear only in the "For Collection Purposes Only" section of the report.

Table 2. Fields in the software usage report (continued)	
Field Heading	**Definition**
J **Monthly Chargeable Product Values (Continued)**	Usage values can be suffixed by one of the following symbols:
	#
	The data is for less than a complete month, either because it is for the first month that a product name and function was reported and no start date (in the PRODUCT statement) has been specified, or because it is the latest month reported and therefore presumed to be incomplete. Note that if an incomplete month has fewer than four days reported, the value shown will be for the highest day.
	Note: With IFAURP version 3.1.2 and higher, an SMF date/time stamp of midnight on the last day of the month will be accepted as an indication that data has been collected for the entire month.
	X
	A PRODUCT statement with START was specified for this product and function, and the product start date was within this month. This is the initial collection period. This value is followed by an "X" only when the initial measurement period is complete (that is, when IFAURP processes data for the day following the last day of the initial measurement period). Otherwise, the initial measurement value is followed by a "#". Note that in this case the period may cross a month boundary; see item **K**.
	<
	The value is the highest among those for the measurement period, excluding any values marked with # or X.
	The vertical bars separate measurement periods. Measurement periods are established the first time a PRODUCT statement with START is provided for this product owner and processor or sysplex, and after the initial collection period and are twelve-month periods starting the month after the end of the initial collection period.
	Note: Non-initial measurement periods beginning prior to December 1, 1998, are six months long.
K **Max MVS/ESA LPARS**	The total number of processors and LPARS for which SMF type 89 records were received in a month. Processors in single-image mode are represented by an LPAR value of 1.
	Note: In cases where a processor is replaced or updated in the middle of a month, this value will reflect the total number of LPARs that the IRAURP program detects for the whole reporting month, for each unique processor. Therefore, if at the beginning of the month, there are 4 LPARs, and one of the processors that has 2 LPARs is replaced with another processor that may now be comprised of these same 2 LPARs, the value for that month will show 6 LPARs, rather than 4.

Table 2. Fields in the software usage report (continued)	
Field Heading	**Definition**
L **Percent missing hours**	For each month, the percentage of hours for which no SMF type 89 records were received to the total number of hours. A blank in this field indicates that no hours are missing. This value (described in **L**) is calculated as follows, where *total hours* is the total number of hours for all LPARS producing SMF type 89 records: $$\frac{(total\ hours) \times 100}{24 \times (no.\ days\ in\ month) \times MVS\ LPARs}$$ The preceding calculation is different for the very first two months the START keyword is used on a processor. **Note:** 1. Initial collection periods beginning prior to December 1, 1998, were only one month in duration. The total number of hours in the month is calculated based on the earliest START date, rather than the first day of the month. 2. The last month on the report for which usage is printed is typically an incomplete month (followed by a *#*) and usually indicates a relatively large outage value. 3. Because this value is based on the number of LPARs producing SMF type 89 records during the month, and the LPAR Count is based on all LPARs that comprise each unique processor, replacing or upgrading a processor during the month will result in a higher percentage value.
M **(Note number)**	The number of the note in the Notes® section **S** that describes the size and type of the units being reported, or describes the error condition that caused XXXX to be printed in place of the usage value. The same note number might be associated with more than one product on the same report. Note numbers are dynamically assigned on a report by report basis. The note number used to describe a product's units on one processor's report may be used to describe the error condition experienced by a different product on another processor's report.

Field Heading	Definition
N *** Date range**	The initial collection period for a product name and function. Periods starting before December 1, 1998, begin with the start date obtained from the PRODUCT control statement and extend for a month, as follows: • If the start date is the first day of a month, the end date is the last day of that month. • If the start date is January 30 or 31, the end date is the last day of the following February. • Otherwise the end date is the previous day of the next month. Initial collection periods starting on or after December 1, 1998, begin with the start date obtained from the PRODUCT control statement and extend for two months, as follows: • If the start date is the first day of a month, the end date is the last day of the following month. • If the start date is January 30 or 31, the end date is the last day of the following March. • Otherwise the end date is the previous day of the second coming month. For example, if the start date is May 24, the end date would be June 23. **Note:** These dates will appear on the report only while the data in the report reflects usage on that date. For instance, if the START or TESTDATE is April 1, 1999, `* 01Apr99-31May99` appears under the product for the entire year. Once there is data in the report for June, 1999, these dates are dropped from the report.
O **Exit level**	The level of the product owner exit. When an exit is called, it may return a value indicating its level, and that value is shown here, enclosed in parentheses. IBM product exits will return an exit value.
P **Test Allowance section**	This section allows customers to circle the monthly product usage value(s) located in the "For Billing Purposes" section for those months that the specified product(s) was under test allowance. The customer representative certifying that the circled value(s) was under test allowance must sign their name and date this section. This situation is most likely to occur when the customer brings in a new version of an existing product and receives a test allowance under which to get the new product version into production.
Q **"For Collection Purposes Only"**	Products below this line are not used for usage billing, by IBM. A product name and function appears in this section before the first time a PRODUCT statement with START is provided and thereafter when a PRODUCT statement with STOP is provided. Some of these values are used for internal IBM auditing purposes and may be changed by a product-specific exit before being formally processed. Customers should be aware that the exact product name, version, and function fields that appear on this report may be different than the official fields that appear on the other IFAURP reports.
R **# Date**	For a product that no PRODUCT statement with a date has been specified, the first month that SMF type 89 records are processed is considered incomplete, and this date is that of the earliest record.

Table 2. Fields in the software usage report (continued)

Field Heading	Definition
S **Notes**	This section describes the meaning attributed to: • Each special symbol: *, #, < • Numbered notes that describe the type of usage unit (such as service units or bytes) and scale used to report them (such as millions or billions) • Numbered notes that describe error conditions for specific products • Unnumbered notes that describe error conditions that are not product-specific Error messages appearing on this report will also appear on the IFAURP Messages Report that might include additional diagnostic information. The notes appear only on the last page of multipage usage reports.
T	The product is not eligible for measured usage license charges.

Table 2. Fields in the software usage report (continued)

The software product registration report

The Software Product Registration Report contains information about the products the SMF type 89 records indicate are in use on a particular system.

```
1                                 Measured Usage and S/390 Usage Pricing Charges                                         Page   1
  IFAURP 4.1.0                           Software Product Registration Report                              1 MARCH    2010
0----------------- Customer No: 0967119  -------------------            ------------- Software Vendor: IBM CORP      ---------------
  BETA SYSTEMS                                                IBM CORPORATION
  11 LOOKING GLASS                                            IBM BRANCH OFFICE
  FANTASY ISL, RI 12345                                       411 E WISCONSIN  AVENUE
  Contact/Phone: ALICE WONDERLAND / (555) 214-1915            MILWAUKEE, WI  53201
                                                              FAX: 1-800-000-1212  ATTN: USAGE PRICING
0                        ---------------------------- Processor ----------------------------
                         Category    Type-Serial Model         Begin-End Dates
                         ----------  ---------- ---------------  -----------------
                         Machine     2097-68B84  E56            03Sep09 - 15Sep09
                         2097 CEC    2097-68B84  740            03Sep09 - 15Sep09
0                                                  ---------------- Maximum Concurrent Product Registrations -----------------
------------------------ Product ---------------------2009          2010
  Name            Feature           Version Number  L| Sep  Oct  Nov  Dec  Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep
  ---------------- ----------------- -------- -------- -|---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
                                      Max MVS/ESA LPARs:|  1    -    -    -    -    -    -    -    -    -    -    -    -
                                      Percent Missing Hours:| 98    -    -    -    -    -    -    -    -    -    -    -    -
                                                         |
  z/OS            z/OS              01.12.00 5694-A01 F|  1#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            DFSMSTVS          .   .    5694-A01 F|  1#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            INFOPRINT SERVER **.**.** 5694-A01 F|  1#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            JES2              01.12.00 5694-A01 F|  2#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            RACF              .   .    5694-A01 F|  1#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            RMF               .   .    5694-A01 F|  1#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            Security Server   .   .    5694-A01 F|  1#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            SDSF              .   .    5694-A01 F|  4#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            TCP/IP BASE       .   .    5694-A01 F|  5#   -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  z/OS            TSO/E             01.12.00 5645-001  | N/A#  -    -    -    -    -    -    -    -    -    -    -    - (
                                             # 03Sep09 |
                                                         |
  CICS                              3.1      5655-M15  | N/A#  -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
  DB2                               9.1.0    5635-DB2  | N/A#  -    -    -    -    -    -    -    -    -    -    -    -
                                             # 03Sep09 |
                                                         |
```

Figure 14. Software product registration report

Table 3. Fields in the software product registration report	
Field heading	**Definition**
A **IFAURP program level**	The version.release.modification level of program IFAURP. Several error messages reference the IFAURP level.
B **Execution date**	The date that IFAURP was run to produce this report.
C **Customer information**	The customer name, number, and address, obtained from the control statements.
D **Software vendor information**	The product owner, obtained from the SMF type 89 record, and the name and address of the software vendor, obtained from the control statements.

E **Processor**	Identification of the processor. Product registrations will be reported on a processor basis. For all other processors, the heading shows "Standalone" with the following values:
	
	• Type-Serial: the type and serial number of the processor.
	
	• Model: The model number of the processor or cluster. A model value of ???????????????? indicates that IFAURP does not recognize a specified processor model. Unrecognized processors are always listed on reports as if they are standalone, even if they are 9672 servers. You can use a report listing unrecognized processors for collection purposes but not for billing purposes. You must correctly identify all processors on reports that you submit to IBM for billing.
	
	Category:
	
	"Machine"
	    9672 Enterprise Server. This category represents IBM asset information associated with 9672-Rxx model processors.
	
	"9672 CEC"
	    9672 CEC within a Parallel Transaction Server or Enterprise Server
	
	"Standalone"
	    All other processors
	
	Type-Serial
	    The type and serial of the processor or cluster.
	
	Model
	    The model number of the processor or cluster. A model value of ???????????????? indicates that IFAURP does not recognize a specified processor model. Unrecognized processors will always be listed on reports as if they are standalone, even if they are 9672 servers. You can use a report listing unrecognized processors for collection purposes, but not for billing purposes. You must correctly identify all processors on reports you submit to IBM for billing.
	
	Begin-End Dates
	    The first and last dates for which product registration data is reported, obtained from the SYSHIN input file(s) or the history file.

Table 3. Fields in the software product registration report (continued)	
Field heading	**Definition**
F **Product information**	The product name, feature name (if any), product version.release.modification level, and product identifier obtained from the SMF type 89 subtype 1 and subtype 2 records. Some of the SMF type 89 subtype 1 fields are modified by IBM product-specific exits before they are formally processed by IFAURP.
	The TYP field indicates the licensing status of the product or feature. The product or feature provides this information during its registration:
	P
	The software license applies to the product name.
	F
	The software license applies to the product name/feature name combination.
G **Maximum Concurrent Product Registrations**	A column, one for each of the thirteen months or less ending with the latest end date, that lists the maximum number of concurrent uses of each product or feature for the month, as measured by the number of concurrent product or feature registrations. The products are listed in ascending order by product name, feature name, and version.release.modification level. When multiple product numbers or levels of the product or feature are reported for the same month, the values for each are listed on a separate line, starting with the values for the product's highest level. For multiple LPARs the value listed is for the hour at which the combined LPAR use values is the maximum.
	Note: When multiple MVS LPARs are measured, the report might overstate the maximum use value; the value listed represents the combined use values that occurred over a particular hour rather than at any single instant in time within that hour.
	Special usage values are printed as follows:
	0
	This particular version (vv.rr.mm) of the product or feature is no longer in use.
	-
	There is no usage to report.
	N/A
	Use counts are not available; the product information comes from SMF 89 subtype 1 records. Subtype 1 records collect measured usage statistics rather than use counts. The measured usage products are listed on this report so that you have a convenient place to track the use of all products.
	????
	The use count exceeds 9999
	The following symbol can follow a use value:
	#
	The data is for less than a complete month, either because it is for the first month in which a product or feature was reported or because it is the latest month reported and presumed to be incomplete.

Table 3. Fields in the software product registration report (continued)	
Field heading	**Definition**
H Max MVS/ESA LPARS	The total number of processors and LPARS for which SMF type 89 records were received in a month. A processor in single-image mode is represented by an LPAR value of 1.

I Percent missing hours	For each month, the hours for which no SMF type 89 records were received, shown as a percentage of the total number of hours. A blank in this field indicates that no hours are missing. This value (described in **I**) is calculated as follows, where `total hours` is the total number of hours for all LPARS producing SMF type 89 records:
	
	`        (total hours) X 100`
	`    24 X no. days in mo. X MVS LPARs`
	
	The preceding calculation is different for the very first two months the START keyword is used on a processor.
	
	Note: Initial collection periods beginning prior to December 1, 1998, were only one month in duration.
	
	The total number of hours in the month is calculated based on the earliest START date, rather than the first day of the month.
	
	Note: The last month on the report for which usage is printed is typically an incomplete month (followed by a #) and usually indicates a relatively large outage value.

J * Product or feature begin date	The earliest date for which product use data was collected. This date appears on the report only while the data in the report reflects product or feature use on that date. For example, if the product or feature begin date is 06/01/96, "* 01Jun96" appears for the entire year. Once there is data in the report for June, 1997, this date is dropped from the report.
K (Note number)	The number of a note in the Notes section **L** that describes any exceptional conditions encountered with the SMF type 89 records. The same note number might be associated with more than one product on the same report. Note numbers are dynamically assigned on a report by report basis. The note number used to describe a product's units on one processor's report might describe an error condition experienced by a different product on another processor's report.
L Notes	This section describes the meaning attributed to: • each special symbol: "*", "#" and "N/A" • numbered notes for specific products • unnumbered notes, which are not product-specific Error messages appearing on this report also appear on the IFAURP Messages Report, which might include additional diagnostic information. Notes appear on only the LAST page of multipage usage reports.

The software summary report

The software summary report summarizes the CECs, LPARs (logical partitions), MVS/ESA guests (under VM) and products (both IBM and others), that gather SMF type 89 records. The report includes two sections, one for subtype 1 records and one for subtype 2 records. The usage report program produces one Software Summary Report every time it runs.

Figure 15 on page 58 shows a sample report. Because the system processes all SMF Type 89 subtype 1 records, a statement explains that all the records were a single subtype and there is no section for subtype 2 records.

```
1                              Measured Usage and S/390 Usage Pricing Charges                         PAGE      1
 IFAURP 4.1.0                              Software Summary Report                               23 FEBRUARY 2010
 BETA SYSTEMS
 11 LOOKING GLASS
 FANTASY ISL, RI 12345
0Sysplex  --Machine--   -Processor-        -Type 89 Rcds- ----Hours---- ---- Date -----          Mach  Processor      System IDs
  Name    Type-Serial   Type-Serial LPAR Read   Dupl Rprtd Missing Begin      End SU Factor Model Model          Sysname
 ------------------------------------------------------------------------------------------------------------------------------
 BETA     002094-604FE  2094-604FE   1   98      0    8      88 1APR08  5APR08 16985.1380 S28    713            SYSI
                                                              1APR08  1APR08 16718.9133 S28    714
                                                              1APR08 24MAR08 16546.0186 S28    715

 BETA     002094-604FE  2094-604FE   2   68      0    5     115 1APR08  5APR08 16985.1380 S28    713            SYSA
                                                              1APR08  1APR08 16718.9133 S28    714
                                                              1APR08 24MAR08 16546.0186 S28    715

 BETA     002094-604FE  2094-604FE   3  100      0    8      88 1APR08  5APR08 16985.1380 S28    713            SYSH
                                                              1APR08  1APR08 16718.9133 S28    714
                                                              1APR08 24MAR08 16546.0186 S28    715

 BETA     002094-5A91E  2094-5A91E   1   66      0    4      92 1APR08  5APR08 21192.0530 S18    703            SYSF
                                                              1APR08 18MAR08 20671.8346 S18    704

 BETA     002094-5A91E  2094-5A91E   2   97      0    7     113 1APR08  5APR08 21192.0530 S18    703            SYSB
                                                              1APR08 18MAR08 20671.8346 S18    704

 BETA     002094-5A91E  2094-5A91E   3   14      0    2      94 1APR08  5APR08 21192.0530 S18    703            SYSJ
                                                              1APR08 18MAR08 20671.8346 S18    704

 BETA     002094-5A96E  2094-5A96E   1   97      0    8      88 1APR08  4APR08 15655.5773 S28    720            SYSE
                                                              1APR08 28MAR08 15564.2023 S28    721
                                                              1APR08 24MAR08 15384.6154 S28    723
                                                              1APR08 17MAR08 14953.2710 S28    726

 BETA     002094-5A96E  2094-5A96E   2   93      0    6      90 1APR08  4APR08 15655.5773 S28    720            SYSC
                                                              1APR08 28MAR08 15564.2023 S28    721
                                                              1APR08 24MAR08 15384.6154 S28    723
                                                              1APR08 17MAR08 14953.2710 S28    726

 BETA     002094-5A96E  2094-5A96E   3   92      0    8      88 1APR08  4APR08 15655.5773 S28    720            SYSG
                                                              1APR08 28MAR08 15564.2023 S28    721
                                                              1APR08 24MAR08 15384.6154 S28    723
                                                              1APR08 17MAR08 14953.2710 S28    726

 BETA     002094-5A96E  2094-5A96E   4   97      0    8      88 1APR08  4APR08 15655.5773 S28    720            SYSK
                                                              1APR08 28MAR08 15564.2023 S28    721
                                                              1APR08 24MAR08 15384.6154 S28    723
                                                              1APR08 17MAR08 14953.2710 S28    726

 BETA     002094-49A2C  2094-49A2C   1   15      0   10     518 1MAR08  4APR08 21887.8249 S18    702            SYSJ

 BETA     002094-49A2C  2094-49A2C   3   95      0    8      88 1APR08  4APR08 21887.8249 S18    702            SYSD

 BETA     002094-5A95E  2094-5A95E   5   68      0    4      92 1APR08  4APR08 22408.9636 S28    701            SYSY

    -     002097-68B84  2097-68B84   6   70      0   10     302 3SEP09  3SEP09 18306.6362 E56    740            D0
 ------------------------------------------------------------------------------------------------------------------------------
 Totals                                 1070     0   96    1944
-Product              Product    Product             Product    Product
 Owner                Number     Name                Version    Function
 ---------------      --------   ----------------    --------   --------
 CA                   OPSS-NYI   CA-OPS/MVS          11.05.01   Base
 CA                   OPSS-NYI   CA-OPS/MVS          11.05.01   MSF
 DTS SOFTWARE         NONE                                      ADDVOL
 IBM CORP             5694-A01   z/OS                01.08.00   z/OS
                      5694-A01                       01.12.00
 IBM CORP             5694-A01   z/OS                 . .       DFSMSDSS
 IBM CORP             5694-A01   z/OS                 . .       DFSMSHSM
 IBM CORP             5694-A01   z/OS                 . .       DFSMSRMM
 IBM CORP             5694-A01   z/OS                 . .       DFSMSTVS
 IBM CORP             5694-A01   z/OS                **.**.**   INFOPRINT SERVER
 IBM CORP             5694-A01   z/OS                01.08.00   JES2
                      5694-A01                       01.12.00
 IBM CORP             5694-A01   z/OS                 . .       RACF
 IBM CORP             5694-A01   z/OS                 . .       RMF
 IBM CORP             5694-A01   z/OS                 . .       Security Server
 IBM CORP             5694-A01   z/OS                 . .       SDSF
 IBM CORP             5694-A01   z/OS                 . .       TCP/IP BASE
 IBM CORP             5694-A01   z/OS                03.10.00   TCP/IP CICS
 IBM CORP             5645-001   z/OS                01.08.00   TSO/E
                      5645-001                       01.12.00
 IBM CORP             5697-E93   CICS                2.3
                      5655-M15                       3.1
 IBM CORP             5625-DB2   DB2                 8.1.0
                      5635-DB2                       9.1.0
 IBM CORP             5655-R45   IBM DEBUG AFS        . .       IBM-DEBUG-AFS
 IBM CORP             5655-L82   MQM MVS/ESA         6.     15    3690    798 01
```

Figure 15. Software summary report

Table 4. Fields in the software summary report	
Field Heading	**Definition**
Customer information	The customer name, number, and address, obtained from the control statements.
Sysplex Name	The name of the sysplex as obtained from the SYSPLEX control statement.
Cluster / Machine: Type-Serial	The CPC type and serial, as obtained from the SMF type 89 record.
Cluster / Machine: Model	The CPC model of the processor model as obtained from the SMF type 89 record.
Processor: Type-Serial	The CPU type and serial number of the processor as obtained from the SMF type 89 record.
Processor: Model	The CPU model number as obtained from the SMF type 89 record. Note: **Note:** A model value of ???????????????? indicates that IFAURP does not recognize a specified processor model. Unrecognized processors will always be listed on reports as if they are standalone, even if they are 9672 servers.
LPAR ID	The logical partition identifier, if any, obtained from the SMF type 89 record.
SU Factor	The constant by which CPU seconds are multiplied to calculate Service Units. See "CPU service unit calculations" on page 2 for further details. **Note:** An SU factor value of ????????? appears for unrecognized processors on reports. Because the processor type-model value is unrecognized, IFAURP cannot determine the appropriate SU factor.
Type 89 Records	Counts of the SMF type 89 records found in the input files. If the input files contain both subtype 1 and subtype 2 records, there are three sections: a general section for all records, followed by a separate section for each subtype, identified as 89-1 or 89-2 records. Record counts are shown for the following categories: **Read** Total number of records found. **Dupl** The number of records that were duplicates of others.
Hours Reported	The number of one-hour intervals in the reporting period for which at least one SMF type 89 subtype 1 record was found.
Hours Missing	The number of hours in the reporting period that no SMF type 89 subtype 1 records were found.
Date: Begin and End	The beginning and ending dates, inclusive, of the period covered by this report, and the number of days this period represents.
System ID(s)	The SYSNAMES of the MVS systems that ran on the processor or LPAR, obtained from the SMF type 89 record.

Table 4. Fields in the software summary report (continued)	
Field Heading	Definition
Product: **Owner, Number, Name, Version, Function**	The values registered by the product itself and saved on the SMF type 89 record. Some of these values are used for internal IBM auditing purposes and might be changed by a product-specific exit before they are formally processed. Customers should be aware that the exact product name, version, and function fields that appear on this report may be different than the "official" fields that appear on the other IFAURP reports.

The software outage report

The software outage report shows the hours in the reporting period when no SMF type 89 records were found. This report allows users to check for missing data. Data might be missed because of:

- A system crash or shutdown
- Termination of SMF recording
- Suppression of SMF type 89 record recording
- Omission of some system data in the input files. This case can be corrected by rerunning the usage report program with the correct data.

The outage and statistics reports are generated once for each calendar month using both the history file and any new SMF input datasets.

Note: The Software Outage Report does not identify when all the data for a system is missed. To catch that situation, review the Software Summary Report and check for the absence of a system.

```
1                          Measured Usage and S/390 Usage Pricing Charges                      PAGE      1
 IFAURP 4.1.0                           Software Outage Report                          23 FEBRUARY 2010
 BETA SYSTEMS
 11 LOOKING GLASS
 FANTASY ISL, RI 12345
0Reporting Period:   1 APRIL 2008 -  4 APRIL 2008 (4 DAYS)
0 Type-Serial: 2094-604FE                             LPAR ID:  1   MACHINE: 002094-0000000604FE        SYSPLEX ID:BETA
 MIDN |
  1AM |
  2AM |
  3AM |
  4AM |
  5AM |            *
  6AM |            *
  7AM |            *
  8AM |            *
  9AM |            *
 10AM |            *
 11AM |            *
 NOON |            *
  1PM |            *            *
  2PM |  *         *            *
  3PM |            *
  4PM |            *
  5PM |            *
  6PM |            *
  7PM |            *
  8PM |            *
  9PM |            *
 10PM |
 11PM |
      -------------------------------------------------------------------------------------------------
 DAY  | 01  02  03  04  05  06  07  08  09  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25  26  27  28  29  30
 MONTH| APR                                             APR                                                             APR
      -------------------------------------------------------------------------------------------------
  MH    22  22  22  22  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24  24
0 Footnote:  MH stands for "Missing Hours".
0           *  - Record not found.
            .  - Record not found, not expected.
            B  - Invalid record found.
```

Figure 16. Software outage report

Table 5. Fields in the software outage report	
Field heading	Definition
Customer information	The customer name, number, and address, obtained from the control statements.

Field heading	Definition
Table 5. Fields in the software outage report (continued)	
Field heading	**Definition**
Reporting Period	The beginning and ending dates, inclusive, of the period covered by this report, and the number of days this period represents.
Processor Type-Serial, LPAR ID, Cluster, or Machine Serial, and SYSPLEX ID	The processor type and serial, the logical partition identifier (if any), the machine type and serial, as obtained from the SMF type 89 record. The sysplex identifier, if any, is obtained from the SYSPLEX control statement. **PR/SM Note:** When a cluster is running in LPAR mode, the report shows, for each processor in the cluster, only the last 4 characters of the serial number, preceded by a period (such as .0111).
Midn, 1AM, etc.	A row in the table represents an hour that begins at midnight, one o'clock a.m., etc.
Day and Month	A column in the table represents a day within the reporting period At the intersection of an hour and a day and month, an asterisk appears if there were no SMF type 89 records for that hour in the input files. A 'B' indicates an invalid SMF type 89 record was found for this interval.
MH	The total number of hours that no records were found for each day in the reporting period.
*****	The record was not found
.	The record was not found and not expected
B	An invalid record was found

The software statistics report

The software statistics report shows the hour of highest usage graphically for each day in the reporting period. The usage report program produces one software statistics report for each unique occurrence of a parallel sysplex or processor, product owner, product name, and product function for all products appearing in the software usage reports. The software outage and software statistics reports are generated once for each calendar month using both the history file and any new SMF input datasets.

```
1                               Measured Usage and S/390 Usage Pricing Charges                              PAGE   2
 IFAURP 4.1.0                              Software Statistics Report                              23 FEBRUARY 2010
0------------------ Customer No: 0967119  ------------------       -------------- Software Vendor: IBM CORP       ---------------
 BETA SYSTEMS                                                       IBM CORPORATION
 11 LOOKING GLASS                                                   IBM BRANCH OFFICE
 FANTASY ISL, RI 12345                                             411 E WISCONSIN  AVENUE
 Contact/Phone: ALICE WONDERLAND / (555) 214-1915                  MILWAUKEE, WI  53201
                                                                   FAX: 1-800-000-1212  ATTN: USAGE PRICING
0                                                                  -Processor configuration-
                                        -------- Product ---------    -Standalone-    -Sysplex-
                                        Name            Function   Type-Serial       Name
                                        ---------------- --------  -----------     --------
                                        CICS                       2097-68B84
0
 32 |                                                             32
 31 |          31                                                 *
 30 |           *                                                 *
 29 |           *                                                 *
 28 |           *                                                 *
 27 |           *                                                 *
 26 |           *                                                 *
 25 |           *                                                 *
 24 |           *                                                 *
 23 |           *                                                 *
 22 |           *                                                 *
 21 |           *                                                 *
 20 |           *                                                 *
 19 |           *                                                 *
 18 |           *                                                 *
 17 |           *                                                 *
 16 |           *                                                 *
 15 |           *                                                 *
 14 |           *                                                 *
 13 |           *                                                 *
 12 |           *                                                 *
 11 |           *                                                 *
 10 |           *                                                 *
  9 |           *                                                 *
  8 |           *                                                 *
  7 |           *                                                 *
  6 |           *                                                 *
  5 |           *                                                 *
  4 |           *                                                 *
  3 |           *                                                 *
  2 |           *                                                 *
  1 |    0   0  *   0   0   0   0   0   0   0   0   0   0   0  *   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 ___|_____
 Day    1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25  26  27  28  29  30
 Month Sep                                                    Sep
 ===================================================================================================================
 0    Highest hourly usage by day:  Service units, in 1,000s.
```

Figure 17. Software statistics report

Table 6. Fields in the software statistics report	
Field Heading	**Definition**
Customer information	The customer name, number, and address, obtained from the control statements.
Reporting Period	The beginning and ending dates, inclusive, of the period covered by this report, and the number of days this period represents.
Processor Type-Serial, Sysplex name	The type and serial number for a stand-alone processor, or the sysplex name for parallel sysplex configurations.
Type-Model, Serial, Cluster and SU Factor	The model/version number and serial number. If the processor, obtained from the SMF type 89 record. If the CEC is part of a cluster, the cluster serial number is also shown. For a parallel sysplex, all the processors and clusters that are included in the SYSPLEX control statement and had usage reported are listed. **Note:** A model value of ???????????????? indicates that IFAURP does not recognize a specified processor model. Unrecognized processors will always be listed on reports as if they are standalone, even if they are 9672 servers. IFAURP will not generate a bar graph of usage values for an unrecognized processor.
Product Owner	The owner of the products in the report, obtained from the SMF type 89 record.
Product owner(vendor) information	The name and address of the owner of the product, obtained from the control statements.

Table 6. Fields in the software statistics report (continued)	
Field Heading	**Definition**
Product Name	The name of the product, obtained from the SMF type 89 record.
Product Function	The name of a function of the product name, if any, obtained from the SMF type 89 record.

The time period report

The Time Period Report lists the report due date and the measurement and billing periods by processor or parallel sysplex for each unique product-name/product-function combination for the product owner "IBM CORP". It also lists the same information for all other product owners whose product exits did not exclude their products from being processed by the usage report program.

This report is designed to show the derivation of the report due date and measurement period end date that appear in the Software Usage Reports. It is intended to simplify the scheduling of *usage* reporting by listing, on a single report, the next report due date and corresponding measurement and billing period for each measured product on all processors and sysplexes. Only those processors and parallel sysplexes using a common history file will be listed on the same report. The report entries are sorted in ascending order by report due date.

Note: The Time Period Report only lists those products that the customer has previously specified START or RESTART on a PRODUCT control statement.

```
                              Measured Usage and S/390 Usage Pricing Charges                           Page   1
IFAURP  3.1.2                             Time Period Report                                      15 JUNE 1999

------------------- Customer No: 1234567 -------------------        ----------- Software Vendor: IBM CORP       -------------
Acme Tulle and Dye Company                                          IBM Branch Office
155 Main Street                                                    1133 Westchester Avenue
New London, CT 05512                                               Major City, Sample State  10604
Contact/Phone: Fred Tulle / (203) 555-1212 ex 54                   FAX: 1-800-555-1212  ATTN: Usage Pricing

                                                                          --------- Processor configuration ----------
-Report-        -------------- Periods ----------     ------------- Product --------------     ---------- Standalone ----------      -Sysplex-
Due Date      Measurement        Billing           Number*   Name             Function    Type-Model            Serial          Name
--------      ---------------    ---------------    --------   --------------   --------    --------------------  ------------    ---------
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95              ***ALL***                    9021-952              01111
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95              ***ALL***                    9672-R21              02121
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95    5695-068  ALCS                                                               SYSPLEX1
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95    5655-065  BATCHPIPES                                                         SYSPLEX1
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95    5655-018  CICS                                                               SYSPLEX1
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95    5695-176  IMS DB                                                             SYSPLEX1
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95    5695-176  IMS TM                                                             SYSPLEX1
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95    5695-137  MQM MVS/ESA                                                        SYSPLEX1
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95    5685-025  TSO/E                                                              SYSPLEX1
20Oct95       05Aug95-06Sep95    01Sep95-30Apr95    5665-DB2  DB2                                                                SYSPLEX1
14Oct95       01Apr95-30Sep95    01Nov95-30Apr95              ***ALL***                    5995-1400A            65432


  -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -

  *  - Only the highest product number is listed in the case of multiple product versions.
```

Figure 18. Time period report

Table 7. Fields in the time period report	
Field Heading	**Definition**
Customer information	The name and address of the customer as supplied on the CUSTOMER control statements.
Vendor information	The name and address of the product owner as supplied on the VENDOR control statements.
Report Due Date	For products owned by IBM CORP, the date the report must be received by IBM in order for usage pricing to take effect. The individual report entries are sequenced into ascending date order based on the value appearing in this field.

Table 7. Fields in the time period report (continued)	
Field Heading	**Definition**
Measurement Period	The begin and end dates of the current measurement period for the product name and function specified on the same report line.
Billing Period	The begin and end dates of the billing period that corresponds to the measurement period specified previously on the same report line. The usage values collected in the corresponding measurement period will determine the usage charge for this billing period.
Product Number	The value registered by the product, itself, and saved on the SMF type 89 record. When multiple product numbers for the same product are found on the SMF type 89 records, only the highest product number is printed. When the current Report Due Date, Measurement and Billing Period fields apply to all the products for the specified processor or sysplex, this field is left blank.
Product Name	The value registered by the product, itself, and saved on the SMF type 89 record. "ALL" is printed when the current Report Due Date, Measurement and Billing Period fields apply to all the products for the specified processor or sysplex.
Product Function	The value registered by the product, itself, and saved on the SMF type 89 record. When the current Report Due Date, Measurement and Billing Period fields apply to all the products for the specified processor or sysplex, this field is left blank.
Standalone: Type-Model, Serial	The processor type, model and serial as determined by MVS at the time the product's usage was being collected and saved on the SMF type 89 records. These fields are printed for processors that are not a part of a sysplex.
	Note: A model value of ???????????????? indicates that IFAURP does not recognize a specified processor model. Unrecognized processors will always be listed on reports as if they are standalone, even if they are 9672 servers.
Sysplex Name	The sysplex name provided by the customer on the SYSPLEX control statement. The Stand-alone and Sysplex fields are mutually exclusive.

The valid processor report

The Valid Processor Report lists the processors presently supported by your level of the usage report program. The report lists type, model, and version number values for each valid processor in ascending order. This report is designed to aid you in setting up the control statements for the usage report program.

```
Type Model             Type Model             Type Model             Type Model             Type Model
---- ----------------  ---- ----------------  ---- ----------------  ---- ----------------  ---- ----------------
0400 GS412             0700 GS745             2003 125              3090 EX-520            3090 120S
0400 GS415             0700 GS754             2003 126              3090 EX-60             3090 15T
0400 GS422             0700 GS755             2003 135              3090 EX-620            3090 150E
0400 GS425             0700 GS764             2003 136              3090 EX-65             3090 150J
0400 415               0700 GS765             2003 146              3090 EX-70             3090 150S
0400 422               0700 GS774             2003 156              3090 EX-75             3090 17T
0400 425               0700 GS775             2003 2C5              3090 EX-80             3090 170J
0500 GS535             0700 GS782             2003 204              3090 EX-85             3090 170S
0500 GS535E            0700 GS784             2003 205              3090 EX-90             3090 18T
0500 GS545             0700 GS785             2003 206              3090 EX-95             3090 180E
0500 GS545E            0700 GS794             2003 207              3090 GX8110            3090 180J
0500 GS555             0700 GS795             2003 215              3090 GX8112            3090 180S
0500 GS555E            0800 GS8X5             2003 216              3090 GX8114            3090 200E
0500 GS565             0800 GS8X7             2003 224              3090 GX8210            3090 200J
0500 GS565E            0800 GS8Y5             2003 225              3090 GX8212            3090 200S
0500 GS575             0800 GS8Y7             2003 227              3090 GX8214            3090 25T
0500 GS575E            0800 GS8Z5             2003 237              3090 GX8220            3090 250J
0500 GS585             0800 GS8Z7             2003 246              3090 GX8224            3090 250S
0500 GS585E            0800 GS8Z8             2003 247              3090 GX8310            3090 28T
0500 535               0800 GS815             2003 257              3090 GX8312            3090 280E
0500 535E              0800 GS822             3000 A10              3090 GX8314            3090 280J
0500 545               0800 GS825             3000 A20              3090 GX8320            3090 280S
0500 545E              0800 GS832             3090 EX-10            3090 GX8324            3090 300E
0500 555               0800 GS835             3090 EX-100           3090 GX8412            3090 300J
0500 555E              0800 GS845             3090 EX-11            3090 GX8414            3090 300S
0500 565               0800 GS855             3090 EX-20            3090 GX8420            3090 380J
0500 565E              0800 GS857             3090 EX-210           3090 GX8424            3090 380S
0500 575               0800 GS862             3090 EX-22            3090 GX8520            3090 400E
0500 575E              0800 GS865             3090 EX-220           3090 GX8524            3090 400J
0500 585               0800 GS867             3090 EX-25            3090 GX8620            3090 400S
0500 585E              0800 GS875             3090 EX-27            3090 GX8624            3090 500E
0700 GS7X4             0800 GS877             3090 EX-30            3090 GX8724            3090 500J
0700 GS7X5             0800 GS885             3090 EX-31            3090 GX8824            3090 500S
0700 GS7Y4             0800 GS887             3090 EX-35            3090 XL-100            3090 600E
0700 GS7Y5             0800 GS895             3090 EX-38            3090 XL-50             3090 600J
0700 GS7Z4             0800 GS897             3090 EX-310           3090 XL-50M            3090 600S
0700 GS7Z5             2003 1C5              3090 EX-310A          3090 XL-60             3090 7/90-1
0700 GS714             2003 102              3090 EX-320           3090 XL-60M            3090 7/90-11
0700 GS715             2003 103              3090 EX-33            3090 XL-70             3090 7/90-2
0700 GS722             2003 104              3090 EX-35            3090 XL-70M            3090 7/90-22
0700 GS724             2003 105              3090 EX-38            3090 XL-80             3090 7/90-3
0700 GS725             2003 106              3090 EX-42            3090 XL-90             3090 7/90-4
0700 GS732             2003 107              3090 EX-420           3090 100S             3090 7/90-6
0700 GS734             2003 115              3090 EX-420A          3090 110J             3090 7/90-8
0700 GS735             2003 116              3090 EX-44            3090 120E             3090 8/80
0700 GS744             2003 124              3090 EX-50            3090 120J             3090 8/805
```

Figure 19. Valid processor report

The processor capacity audit report

The processor capacity audit report contains changes that have occurred in the processor data. The report generates a new line each change in processor type, serial number, model, or SU factor.

Requiremens for producing the report are as follows:

- The SMF type 89 data must be sorted by date and time.
- PARM='PCAUDIT'must be specified on the IFAURP EXEC statement.
- You must include a PCAUDIT DD statement in the JCL.
- The minimal required IFAURP control statements or SYSHIN file that contains data to identify the customer must be specified.

contains sample JCL for producing the processor capacity audit report:

```
//STEPSORT EXEC PGM=SORT
//SYSOUT   DD SYSOUT=*
//SORTIN   DD DSN=BORDONE.SMF89.DATA,
//            DISP=SHR
//SORTOUT  DD DSN=&&SORT89,
//            DISP=(NEW,PASS),
//            UNIT=SYSDA,
//            SPACE=(CYL,(300,50),RLSE),
//            DCB=*.SORTIN
//SYSPRINT DD SYSOUT=*
//SYSOUT   DD SYSOUT=*
//SORTDIAG DD DUMMY
//SORTWK01 DD UNIT=SYSALLDA,SPACE=(CYL,(1),RLSE)
//SORTWK02 DD UNIT=SYSALLDA,SPACE=(CYL,(1),RLSE)
//SORTWK03 DD UNIT=SYSALLDA,SPACE=(CYL,(1),RLSE)
//SYSIN    DD   *
    OPTION VLSHRT
    SORT FIELDS=(11,4,BI,A,7,4,BI,A)
/*
//STEPRPT  EXEC PGM=IFAURP,PARM='PCAUDIT'
//STEPLIB  DD DSN=SYS1.SIFALIB,DISP=SHR
//SMFDATA  DD DSN=&&SORT89,DISP=(OLD,PASS)
//SYSUDUMP DD DUMMY
//SYSMSGS  DD SYSOUT=*
//PCAUDIT  DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSUSAGE DD SYSOUT=*
//SYSHIN   DD DUMMY,DCB=BLKSIZE=4096
//SYSHOUT  DD DUMMY
//SYSIN    DD   *
  CUSTOMER(   NAME('BETA SYSTEMS          ')
           ADDRESS(
              '123 SUNNY SLOPE ROAD     '
              ,'FANTASY ISL, HW 112233 '
                 )
           CONTACT('ALICE WONDER       ')
              PHONE('(121) 555-2915    ')
           )
 /*
```

Figure 20. JCL to produce the processor capacity audit report

When you specify PCAUDIT, consider the following points:

- The processor capacity audit report is the only report that is generated by the IFAURP program, and there is no output to the SYSUSAGE or SYSPRINT DD statements.
- Output history data is generated to the file that is specified on the SYSHOUT DD statement. You can suppress this data by specifying the following JCL statement:

```
//SYSHOUT  DD DUMMY
```

is an example of the processor capacity audit report:

```
1                                  Measured Usage and S/390 Usage Pricing Charges                      PAGE    1
  IFAURP 4.1.0                              Processor Capacity Audit Report                      19 FEBRUARY 2010
  Beta Systems
  123 Sunny Slope Road
  Fantasy Isl, HW 112233
0----- Machine -----      -------- Processor ---------
    Type-Serial Model      Type-Serial Model                Begin Date-Time    End Date-Time    SU Factor   Adj Ind / Reason
  ------------ -----      ---------- -----                --------------     -------------    ---------   ---------------
  002094-604FE   S28      2094-604FE    713                02Mar08 06:00:00   02Mar08 07:00:00  16985.1380  Not reported
  002094-5A91E   S18      2094-5A91E    703                02Mar08 06:00:00   02Mar08 07:00:00  21192.0530  Not reported
  002094-5A96E   S28      2094-5A96E    721                02Mar08 06:00:00   02Mar08 07:00:00  15564.2023  Not reported
  002094-5A91E   S18      2094-5A91E    703                02Mar08 06:00:00   02Mar08 07:00:00  21192.0530  Not reported
  002094-5A96E   S28      2094-5A96E    721                02Mar08 06:00:00   02Mar08 07:00:00  15564.2023  Not reported
  002094-604FE   S28      2094-604FE    713                02Mar08 06:00:00   02Mar08 07:00:00  16985.1380  Not reported
  002094-49A2C   S18      2094-49A2C    702                02Mar08 06:00:00   02Mar08 07:00:00  21887.8249  Not reported
  002094-5A96E   S28      2094-5A96E    721                02Mar08 06:00:00   02Mar08 07:00:00  15564.2023  Not reported
  002094-5A95E   S28      2094-5A95E    701                02Mar08 06:00:00   02Mar08 07:00:00  22408.9636  Not reported
  002094-49A2C   S18      2094-49A2C    702                02Mar08 06:00:00   02Mar08 07:00:00  21887.8249   0 / 0
  002094-604FE   S28      2094-604FE    713                02Mar08 07:00:00   02Mar08 08:00:00  16985.1380   0 / 0
  002094-5A91E   S18      2094-5A91E    703                02Mar08 07:00:00   02Mar08 08:00:00  21192.0530   0 / 0
```

Figure 21. Processor capacity audit report

Table 8. Fields in the processor capacity audit report	
Field heading	**Definition**
Customer information	The name and address of the customer as supplied on the CUSTOMER control statements.
Machine Type-Serial	The CPC type and serial of the processor as obtained from the SMF type 89 record.
Machine Model	The CPC model number of the processor as obtained from the SMF type 89 record.
Processor Type-Serial	The CPU type and serial as obtained from the SMF type 89 record.
Processor Model	The CPU model number of the processor as obtained from the SMF type 89 record.
Begin Date-Time	Beginning date and time as obtained from the SMF type 89 record of the processor data since the previous change in this data.
End Date-Time	End date and time as obtained from the SMF type 89 record of the processor data before the next change in this data.
SU factor	The constant by which CPU seconds are multiplied to calculate Service Units. For more information, see "CPU service unit calculations" on page 2.
Adj Ind / Reason	The adjustment indicator and reason for a change in processor capacity. These values are obtained from the following fields in the SMF type 89 record, when the fields are present: • SMF89_Capacity_Adjustment_Ind: • SMF89_Capacity_Change_Rsn; When these fields are not present in the SMF type 89 record, the constant "Not reported" is displayed.

IFAURP abend codes and condition codes

Upon completion of the usage report program, one of the following condition codes will be set.

Table 9. The usage report program condition codes and meanings	
Condition code	**Meaning**
00	Normal return. Reports are written to the SYSPRINT data set.
04	Normal return. Reports are written to the SYSPRINT data set. Some records were ignored. See the SYSMSGS data set.
06	Normal return. Reports are written to the SYSPRINT data set. Some processors were ignored. Additionally, some records may have been ignored as well. See the SYSMSGS data set.
08	Errors were found by the usage report program. See the SYSMSGS data set for problem determination.
16	An abend condition has been encountered. See the SYSUDUMP data set for problem determination.

IFAURP produces two abend codes, described as follows:

U901

Explanation

The usage report program cannot open the SYSMSGS DD.

Source
    SMF

Detecting module
    IFAURP

System action

The usage report program ends.

System programmer response

This abend is accompanied by one or more error messages. Respond to those messages and resubmit the job.

U902

Explanation

The usage report program has encountered a critical error with the control statements or the SMF data.

Source
    SMF

Detecting module
    IFAURP

System action

The usage report program ends after writing messages to the SYSMSGS DD that identify the cause of the error.

Note: These messages appear in the IFAURP Messages Report. The new SYSHIN DD history file should be deleted as part of normal disposition processing: its third DISP keyword is DELETE.

Programmer response

Resolve the error condition indicated by the error messages written to the IFAURP Messages Report and resubmit the job. If the IBM Support Center is involved in problem resolution, be prepared to provide a copy of the IFAURP Messages Report to IBM.

Chapter 4. Usage pricing examples

In order for you to place IBM products under MULC or ULC, you must do more than sign the *IBM Customer Agreement Attachment* for the pricing option you wish to use, and collect SMF type 89 subtype 1 records from all LPARs on a processor as described in Chapter 1, "Usage accounting," on page 1. You must also post process the SMF type 89 subtype 1 records using the usage report program together with the appropriate control statements. You determine which IBM products you would like placed under MULC or ULC by placing those products in the "For Billing Purposes" section of the Software Usage Report via specific control statements. Products appearing in this section are used to signal your intent to have IBM bill these products under one of these usage pricing options. Products appearing in the "For Collection Purposes Only" will not be placed under a usage pricing option. You decide when a MULC or ULC product has met the appropriate eligibility requirement and whether or not you want it placed under a usage pricing option. The following set of examples describe the steps involved in deciding which products to place under MULC or ULC and which control statements to use to place a product in the "Billing" section, thereby requesting usage pricing for that product.

The examples in this section will only show the JCL required for the step that invokes the usage report program, IFAURP. Please refer to Figure 6 on page 11 for an example of the JCL required for the preceding SMF dump and SORT steps. In addition to the JCL and control statements, each example shows the resulting Software Usage Report and describes the important report fields.

Examples 1 through 11 apply to MULC. Examples 12 and higher apply to ULC. Note that MULC Examples 1 through 8 build on each other as a continuous progression of measured usage activities over several months, as well as a processor upgrade. Thus, later examples refer to earlier examples for explanations. Similarly, ULC Examples 12 and higher build on each other to show a progression of S/390 Usage Pricing activities. Table 10 on page 69 and Table 11 on page 70 can be used to locate the examples in this section that describe usage situations, control statements, IBM products and processor types of interest.

Table 10. Cross reference of usage situations to specific examples	
Situation	**Examples**
Using MULC	
Deciding which products to place under MULC	1
Placing products under MULC • No MULC products enabled yet • Other MULC products already enabled • After a processor upgrade	 • 2, 3, 4, 9 • 5, 6, 10 • 6
Specifying MULC products under Test Allowance	8
Stopping the MULC option	7
Upgrading a processor with existing MULC products	6
MULC and Parallel Sysplex Configurations • Defining a Parallel Sysplex for MULC • Reconfiguring a Parallel Sysplex for MULC	 • 9 • 11
Switching from MULC to ULC	14
Using ULC	
Deciding which products to place under ULC	12
Placing products under ULC	13

Table 11. Cross reference of processors control statement keywords and products

Example Type:	MULC examples											ULC examples		
Example number:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CUSTOMER control statement														
ADDRESS		X			X	X	X		X	X	X	X	X	
CONTACT		X			X	X	X		X	X	X	X	X	
NAME	X	X			X	X	X		X	X	X	X	X	
PHONE		X			X	X	X		X	X	X	X	X	
VENDOR control statement														
ADDRESS		X										X		
CODE	X	X										X		
NAME	X	X										X		
PRODOWNER	X	X										X		
PROCESSOR control statement														
ALIGN													X	
PROCESSOR			X	X								X	X	
PRODNAME	X	X			X	X	X					X	X	
PRODOWNER	X	X			X	X	X					X	X	
START		X			X	X							X	
STOP							X							
TESTDATE	X											X		
SYSPLEX control statement														
ALIGN									X					
CLUSTER									X		X			
ID									X	X	X			
PLEXDATE									X	X	X			
PROCESSOR									X					
PRODOWNER									X	X				
PRODNAME									X	X				
START									X	X				
TRANSFER control statement														
TRANSFER						X								
IBM products used in example														
ALCS									X					
BATCHPIPES					X									
CICS	X	X					X					X	X	X
DB2										X		X	X	X
IMS DB									X			X	X	X
IMS TM						X						X	X	X
MQM									X			X	X	X
TSO/E	X	X												

Example Type:	MULC examples											ULC examples		
Example number:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Type of processor used in example														
HDS-GX8524			X											
9021-952	X	X			X	X	X							
9672-E02									X	X	X			
9672-E03											X			
9672-R11									X	X	X			
9672-R44														X
9672-R61				X										
9672-R65												X	X	

Table 11. Cross reference of processors control statement keywords and products (continued)

Example 1: Deciding which products to select for measured usage pricing

shows an example of the JCL and control statements that are required to print the initial monthly usage values for specific products before placing these products under Measured Usage License Charges (MULC). This example is important because it allows you to determine the product's initial usage value without committing to MULC (that is, without using the START keyword).

Note: The sample control statements used in are not sufficient to participate in measured usage pricing. See for all the control statements required to participate in measured usage pricing.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DUMMY,DCB=BLKSIZE=16384
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
*
  CUSTOMER(NAME('Acme Tulle and Dye Company'))
*
  VENDOR(PRODOWNER('IBM CORP')
        NAME('IBM Branch')
        CODE(1234567))
*
  PROCESSOR((9021,952,01111)
          PRODUCT (PRODOWNER('IBM CORP')
                  PRODNAME('CICS')
                  TESTDATE(19950407))
          PRODUCT (PRODOWNER('IBM CORP')
                  PRODNAME('TSO/E')
                  TESTDATE(19950407)))
  /*
```

Figure 22. Example of JCL and control statements needed to print initial monthly usage values

- //STEPLIB references the IBM library, SYS1.SIFALIB, that contains IFAURP and IBM product exits. The MULC PTF cover letters for both CICS and TSO/E did not indicate that CICS or TSO/E required that an IBM vendor exit be installed either in this library or a concatenated library. Because no software vendors

have provided product exit libraries for their products in this example, it is not necessary to concatenate any vendor libraries to SYS1.SIFALIB.

- //SYSMSGS references the file where the IFAURP Messages Report is written. This report lists the control statements processed by the usage report program and all error messages issued during its execution. This report should be used to assess the validity of all the other reports produced by this execution of the usage report program.

- //SYSPRINT references the file where all the other reports are written.

- //SMFDATA references a file of SMF type 89 records that were sorted before this step. These type 89 records contain usage data for CICS, IMS TM and TSO/E starting on April 2, 1995, and were collected from 4 different LPARs on the customer's 9021-952 processor.

- //SYSHIN must be specified as DD DUMMY, because this is the first time that the customer has run IFAURP and thus no history file exists.

- //SYSHOUT references a history file named MULC.HISTORY.#1234567 that is created as a result of this job step. The last qualifier, #1234567, designates the IBM customer number for the processor from which the usage data was collected. In this example MULC.HISTORY.#1234567 is a Generation Data Group (GDG) and will be assigned the full name of MULC.HISTORY.#1234567.G0001V00. See *z/OS DFSMS Using Data Sets* for a detailed explanation of GDGs. This new history file will contain the control statements used for this execution and the usage data of the SYSHIN file and the SMFDATA files. Once these SMF type 89 records have been processed and their data saved on this history file, the original type 89 records are no longer required as input to future executions of IFAURP.

- //SYSIN references the IFAURP control statements required to provide customer and vendor descriptions, as well as, to specify processors, sysplexes and products to be selected for MULC.

- **CUSTOMER** This control statement is required and must precede all other control statements.

  NAME
  This keyword identifies the customer as 'Acme Tulle and Dye Company' to the software vendor (IBM). This keyword is required.

- **VENDOR** This control statement associates the product usage being reported on SMF type 89 records with a specific vendor. Each vendor should supply the information required for each keyword on this control statement to the customer.

  PRODOWNER
  This keyword specifies the value used by the vendor to identify all their products on type 89 records. "IBM CORP" appears because IBM identifies all its products with this value. This keyword is required.

  NAME
  This keyword identifies the name of the software vendor. Because the customer was still evaluating MULC, they chose to use an abbreviated name. This keyword is required.

  CODE
  This value represents the customer number under which all of the processors on the following PROCESSOR or SYSPLEX control statements are known to IBM (that is, all the processors for which usage data has been placed in this history file). Processors with different customer numbers must be placed in separate history files.

- **PROCESSOR** This control statement identifies the specific processor and products on that processor to be reported on.

  (9021,952,01111)
  This field is used to identify the specific processor for which the remainder of the keywords in this example apply. In the US the last 5 digits of the processor serial number are used to identify the processor. Outside the US this 5 digit serial number must be prefixed with a two digit manufacturing location.

  PRODUCT
  Each product, CICS and TSO/E, requires its own set of PRODOWNER, PRODNAME and TESTDATE keywords.

PRODOWNER

All IBM products require the value "IBM CORP" for this field.

PRODNAME

Identifies the product that the customer wants to see the calculated MULC usage value. Because the customer had satisfied the MULC conditions for CICS and TSO/E, both of these products were eligible for MULC and could be used as a valid PRODNAME value. The MULC PTFs for IMS TM, however, had not yet been installed and activated on all LPARs on this processor and so IMS TM is not yet eligible for MULC.

TESTDATE

The value of 19950407 signifies the fact that the customer would like to understand the usage for a product without actually starting Measured Usage License Charge billing. To ensure that the usage values correspond to the values that MULC would use, use a TESTDATE keyword value that is the same as the value used on the START keyword. The customer can determine the value used on the START keyword as follows:

1. The customer has met all the MULC requirements by that date. April 7th was the first day after which the customer had applied and activated the CICS and TSO/E MULC PTFs on all LPARs on the specified processor and was collecting type 89 records from those LPARs.

2. The date value is no earlier than 42 days before the date that this report was run. This is important, because dates earlier than 42 days can not meet the IBM requirement that it receive the Software Usage Report within 10 business days after the end of the measurement period (START date + 28-31 measurement days + 14 calendar days = 42-45 days).

```
                                      Measured Usage Software Report                               Page   1
IFAURP  1.2.0                             Software Usage Report                                    08 May 1995

------------------- Customer No: 1234567 -----------------         ------------  Software Vendor: IBM CORP    --------------
Acme Tulle and Dye Company                                         IBM Branch
Contact/Phone:

- Report -   --- Measurement Period End Dates ---  | -------------------------- Processor ----------------------------
 Due Date    End Date  Product Name(s)   Function   |  Category   Type-Model  Serial      Begin-End Dates    SU Factor
 --------    --------  ----------------  --------   |  ----------  ----------  ------------ -----------------  ---------
                                                    |  Standalone  9021-952    011111      02Apr95 - 07May95  2565.3359

================================================= For Collection Purposes Only =======================================

                                    ----------------------- Monthly Chargeable Product Values ---------------------
------------------- Product --------------- 1995                                          1996
NUMBER(S) NAME           VERSION FUNCTION  APR    MAY    JUN    JUL    AUG    SEP    OCT    NOV    DEC    JAN
FEB    MAR
--------  ---------------- ------- -------- -----  -----  -----  -----  -----  -----  -----  -----  -----  -----  -----  -----
                          MAX MVS/ESA LPARS:    4     4    -      -      -      -      -      -      -      -      -
                          PERCENT MISSING HOURS:  12    80    -      -      -      -      -      -      -      -      -

5685-083 CICS             3.2           2.67*  2.46#   -      -      -      -      -      -      -      -      -   (01)
         * 07Apr95-06May95

5665-013 IMS TM           4.1           0.73   0.81#   -      -      -      -      -      -      -      -      -   (01)
5665-409                  3.1
         # 02Apr95

5685-025 TSO/E            2.4          .093*  .078#    -      -      -      -      -      -      -      -      -   (01)
         8 07Apr95-06May95

  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -

============================================================ Notes =================================================

   *   - Begin-End Dates of first month's usage data
   #   - Data not collected for a full month.
   <   - Value to the left is the largest value of complete months shown
  (01) - Hourly rate in millions of CPU Service Units (MSUs)

      This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 23. Software usage report generated for Example 1

Description and analysis of the software usage report generated by Example 1

The "Customer No" section only contains the customer name as provided on the CUSTOMER control statement. The customer number is listed as provided by the CODE value from the VENDOR statement.

The "Software Vendor" section contains the vendor name, "IBM CORP" as registered by each product shown on this report. The vendor name "IBM Branch" was printed as provided by the VENDOR control statement's NAME keyword.

The "Report Date Due" section and "Measurement Period End Dates" section are blank because no START keywords were used to select specific products to participate in MULC usage.

The "Processor" section indicates the processor for which the type 89 records were collected. The Begin-End Dates field indicate the earliest date (02Apr95) and last date (07May95) for which the data collected on this processor has been processed by IFAURP.

The "For Collection Purposes Only" section appears immediately after the "Processor" section and replaces the "For Billing Purposes" section, because no START keywords were used to select specific products to participate in measured usage. Use of the keyword TESTDATE causes a range of dates to be listed for both CICS and TSO/E. These dates are prefixed by an *, and indicate the begin-end dates of the initial monthly measurement for each product. The begin date was provided by the TESTDATE value of 19950407. The end date was calculated by the program.

The CICS usage value under the April column is followed by an *, which indicates that this value represents the initial monthly usage value of 2.67 MSUs that will be attributed to CICS, if the START keyword were used instead of the TESTDATE keyword. An * after the value under the April column indicates that measurement period, 07Apr95-06May95, is complete. This happens when the program processes type 89 records for the day following the last day of the initial measurement period. A "#" is used to indicate that the initial measurement period is incomplete.

The TSO/E usage value under the April column is followed by an *, which indicates that this value represents the initial monthly usage value of .093 MSUs that will be attributed to TSO/E, if the START keyword was used instead of the TESTDATE keyword. An * after the value under the April column indicates that initial measurement period is complete as in the CICS example.

Usage values are also listed for IMS TM but none are followed by an * and only a single date is listed for IMS TM. These differences from the CICS and TSO/E products are due to the fact that no PRODUCT control statement was supplied for IMS TM. Because the IMS TM MULC PTFs have not yet been activated on all this processor's LPARs, the customer has correctly determined that IMS TM does not meet the MULC requirements at this time. The date listed for IMS TM represents the first date for which IMS TM data was seen by the usage report program. Because usage data was collected for two different versions of IMS TM, both versions and product order numbers are listed but their aggregate usage is reported against the higher version.

Example 2: Placing a product under the measured usage option

shows JCL and control statements that are used to place CICS and TSO/E under the MULC option, by reporting the usage values for both products in the "Billing" section of the Software Usage Report.

This example is a follow-up to the previous example where the CICS and TSO/E usage values were reported in the "Collection" section of the Software Usage Report. The customer has decided to place both products under the MULC option and will use the same date for the START keyword that was used for TESTDATE in the previous example. Because the usage values for all products are recalculated on each execution of the usage report program, using the same date will result in the calculation of the same usage values, because the identical measurement period was chosen.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DUMMY,DCB=BLKSIZE=4096
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
           ADDRESS('155 Main Street',
                   'New London, CT 05512')
           CONTACT('Fred Tulle')
           PHONE('(203) 555-1212 ex 54'))
*
  VENDOR(PRODOWNER('IBM CORP')
         NAME('IBM Branch Office')
         ADDRESS('1133 Westchester Avenue',
                 'Major City, Sample State  10604',
                 'FAX: 1-800-555-1212  ATTN: Usage Pricing')
         CODE(1234567))
*
  PROCESSOR((9021,952,01111)
            PRODUCT (PRODOWNER('IBM CORP')
                     PRODNAME('CICS')
                     START(19950407))
            PRODUCT (PRODOWNER('IBM CORP')
                     PRODNAME('TSO/E')
                     START(19950407)))
  /*
```

Figure 24. Example JCL and control statements used to place CICS and TSO/E under MULC option

- //STEPLIB references the IBM library, SYS1.SIFALIB, which contains IFAURP and IBM product exits. The MULC PTF cover letters for both CICS and TSO/E did not indicate that CICS or TSO/E required that an IBM vendor exit be installed either in this library or a concatenated library. Because no software vendors have provided product exit libraries for their products in this example, it was not necessary to concatenate any vendor libraries to SYS1.SIFALIB.

- //SYSMSGS references the file where the IFAURP Messages Report is written. Use this report lists the control statements processed by the usage report program and all error messages issued during its execution. Use this report to assess the validity of all the other reports produced by this execution of the usage report program.

- //SYSPRINT references the file where all the other reports are written.

- //SMFDATA has been specified as DD DUMMY, because all the SMF type 89 records have already been processed on a previous execution of IFAURP. If this example showed the first time that IFAURP was run, this DD statement must point to a data set containing SMF type 89 records.

- //SYSHIN references the previous copy of the history file, because it contains all the usage data collected since April 2, 1995. If this was the first time run of IFAURP, this DD statement must be specified as DD DUMMY.

- //SYSHOUT references a history file named MULC.HISTORY.#1234567 that is created as a result of this job step. The last qualifier, #1234567, designates the IBM customer number for the processor from which the usage data was collected. MULC.HISTORY.#1234567 is a generation data group (GDG) and will be assigned the full name of MULC.HISTORY.#1234567.G0002V00. This new history file will contain the control statements used for this execution and the usage data of the SYSHIN file and the SMFDATA file(s).

- //SYSIN references the IFAURP control statements required to provide customer and vendor descriptions, as well as, to specify processors, sysplexes and products to be selected for MULC.

- **CUSTOMER** This control statement is required and must precede all other control statements. The customer has provided values for the NAME, ADDRESS, CONTACT and PHONE keywords.

- **VENDOR** Because the customer will send this Software Usage Report to IBM, he obtained the PRODOWNER, NAME and ADDRESS values for this control statement from his IBM client representative.

  CODE
  This value represents the customer number under which all of the processors on the following PROCESSOR or SYSPLEX control statements are known to IBM (that is, all the processors for which usage data has been placed in this history file). Processors with different customer numbers must be placed in separate history files.

- **PROCESSOR** This control statement identifies the specific processor and products to be reported on.

  (9021,952,01111)
  This field is used to identify the specific processor for which the remainder of the keywords apply. In the US the last 5 digits of the processor serial number are used to identify the processor. Outside the US this 5 digit serial number must be prefixed with a two digit manufacturing location.

  PRODUCT
  Each product, CICS and TSO/E, requires its own set of PRODOWNER, PRODNAME and TESTDATE keywords.

  PRODOWNER
  All IBM products require the value 'IBM CORP' for this field.

  PRODNAME
  Identifies each product for which the customer wants the calculated MULC usage value. Because the customer was interested in CICS and TSO/E, these were the values entered on a specific set of PRODUCT parameters.

  START
  This keyword actually begins processing the associated product as a measured usage product by listing the product and its usage values in the "Billing" section of the Software Usage Report. The value of 19950407 signifies the fact that the customer has met both key requirements of the START keyword on that date:

  1. April 7th was the first full day that the customer had applied and activated the CICS and TSO/E MULC PTFs on all LPARs on the specified processor and was collecting type 89 records from those LPARs. While the customer could have selected a date later than April 7th for the START value, any START value earlier than that date would have been invalid, because the MULC PTFs would not have been activated for either CICS or TSO/E on all LPARs on that processor.

  2. The date value is no earlier than 42 days of the date that this report was run. This is important, because dates earlier than 42 days can not meet the IBM requirement that it receive the Software Usage Report within 10 business days after the end of the measurement period (START date + 28-31 measurement days + 14 calendar days = 42-45 days).

  ALIGN
  Because this execution contained the first product to START on this processor, the customer could have used the ALIGN keyword with the first PRODUCT statement. However, because the customer had no reason to request that his billing period be aligned to any specific month, this keyword was not used.

```
                                    Measured Usage Software Report                                    Page   1
    IFAURP  1.2.0                        Software Usage Report                                  08 May 1995

------------------- Customer No: 1234567 -----------------          ----------- Software Vendor: IBM CORP      -------------
Acme Tulle and Dye Company                                 IBM Branch Office
155 Main Street                                            1133 Westchester Avenue
New London, CT 05512                                       Major City, Sample State  10604
Contact/Phone: Fred Tulle  (203) 555-1212 ex 54           FAX: 1-800-555-1212  ATTN: Usage Pricing

- Report -    --- Measurement Period End Dates ---  | ------------------------- Processor ----------------------------
Due Date    End Date  Product Name(s)   Function    | Category    Type-Model  Serial       Begin-End Dates   SU Factor
--------    --------  ---------------   --------    | ----------  ----------  -----------  ----------------- ---------
20May95     06May95   ***ALL***                     | Standalone  9021-952    01111        02Apr95 - 07May95 2565.3359

=================================================== For Billing Purposes =========================================================
                                                ----------------------- Monthly Chargeable Product Values --------------------
------------------- Product --------------- 1995                                          1996
NUMBER(S) NAME           VERSION FUNCTION | APR    MAY    JUN    JUL    AUG    SEP | OCT    NOV    DEC    JAN
FEB    MAR|
--------  --------------- -------- -------- |-----  -----  -----  -----  -----  ----- |-----  -----  -----  -----  -----  ----|
                       MAX MVS/ESA LPARS:|    4      4      -      -      -      -   |   -      -      -      -      -      -  |
                   PERCENT MISSING HOURS:|   12     80      -      -      -      -   |   -      -      -      -      -      -  |
                                         |                                          |                                         |
5685-083 CICS           3.2               | 2.67*  2.46#    -      -      -      -   |   -      -      -      -      -      - |01)
         * 07Apr95-06May95               |                                          |                                         |
                                         |                                          |                                         |
5685-025 TSO/E          2.4               | .093*  .078#    -      -      -      -   |   -      -      -      -      -      - |01)
         * 07Apr95-06May95               |                                          |                                         |
----------------------------------------------------------------------------------------------------------------------------------
I certify that the values circled on this report indicate months for which that product was under test allowance.

------------------------------------------          ------------------------------------------      ----------------------
 Name                                               Signature                                       Date

============================================= For Collection Purposes Only =======================================================
                                         |                                          |
5665-013 IMS TM         4.1               | .732   .821#    -      -      -      -   |   -      -      -      -      -      -  (01)
5665-409                3.1               |                                          |
         # 02Apr95                        |                                          |

===================================================== Notes =======================================================

   *  - Begin-End Dates of first month's usage data
   #  - Data not collected for a full month.
   <  - Value to the left is the largest value of complete months shown
 (01) - Hourly rate in millions of CPU Service Units (MSUs)

     This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 25. Software Usage Report Generated for Example 2

Description and analysis of the software usage report generated by Example 2

The "Customer No" section contains the customer number that corresponds to the processor listed in the "Processor" section of the report. This value was provided using the CODE keyword on the VENDOR statement. A valid customer number must be provided to participate in MULC. The remainder of the customer fields printed in this section were provided by the customer on the NAME, ADDRESS, CONTACT and PHONE keywords on the CUSTOMER statement.

The "Software Vendor" section contains the vendor name, "IBM CORP" registered by each product shown on this report. The vendor name, address and FAX number that are listed were taken from the VENDOR control statement.

The "Report Date Due" section lists a date of 20May95 by which IBM must receive a copy of this report, in order for the customer to start measured usage pricing on CICS and TSO/E. This date is calculated by the program as 14 calendar days after the measurement period's end date. A date will appear in this section only when the START keyword has been used for at least one product on this processor.

The "Measurement Period End Dates" section lists the last date in the current measurement period for the product listed to its right. If the measurement end date applies to all products in the "For Billing Purposes" section, a value of "***ALL***" is printed. This section lists the next measurement period end date for every product in the "For Billing Purposes" section.

The "Processor" section indicates the processor for which the type 89 records were collected and for which the usage data is being reported. The Begin-End Dates field indicate the earliest date, 02Apr95, and last date, 07May95, that the data collected on this processor has been processed by IFAURP. The usage data for all products owned by the company listed in the "Software Vendor" section, (for example, IBM CORP), will be printed on this report.

The "For Billing Purposes Only" section is printed because a START keyword was used for both CICS and TSO/E. Note that when multiple processors share the same set of history files, the first processor with usage data determines the first month in the row of months listed under the "Monthly Chargeable Product

Values" section. The "Monthly Chargeable Product Values" subsection shows three sets of vertical bars: before April, between September and October and after March. These vertical bars signify the 6 month measurement periods calculated by the program based on the START date for the first product started on this processor.

The range of dates listed for both CICS and TSO/E and prefixed by an *, indicate the begin-end dates of the initial monthly measurement for each product. The begin date was provided via the START value of 19950407. The end date was calculated by the program.

The CICS usage value under the April column is followed by an *, which indicates that this value represents the initial monthly usage value of 2.67 MSUs that will used to set the usage band for the initial CICS measured usage billing period. An * after the value under the April column indicates that the initial measurement period, 07Apr95-06May95, is complete. A # would indicate that the initial measurement period was still incomplete, and not yet eligible for measured usage pricing.

The TSO/E usage value under the April column is followed by an *, which indicates that this value represents the initial monthly usage value of .093 MSUs that will be used to set the usage band for the initial TSO/E measured usage billing period.

The "For Collection Purposes Only" section, that lists the usage data that is being collected but not being used for measured usage pricing, contains the IMS TM usage values. The IMS values are printed here because no PRODUCT control statement was provided for IMS TM; the MULC PTFs for IMS TM were not yet activated on every LPAR on this processor.

In this example, type 89 records were being collected for both CICS and TSO/E starting on April 2, 1995. However this report will only show one value for each month the product was collecting usage data. Because both CICS and TSO/E values already appear under the month of April in the "For Billing Purposes" section, neither product's pre-MULC usage from April 2 to April 6 will be shown in this section.

In order to place both CICS and TSO/E under the MULC option, IBM must receive a copy of the Software Usage Report that was described in this example by May 20, 1995, as indicated in the "Report Due Date" section.

Note: The START keyword will cause the measurement and associated billing periods for these products on this processor to be listed on the Time Period Report.

Example 3: Identifying non-IBM processors for measured usage

The following example is identical to "Example 2: Placing a product under the measured usage option" on page 74 except that the processor involved in not an IBM processor. Several non-IBM processors identify themselves to MVS as IBM type 3090 or 9021 processors. As a result, the SMF type 89 records collected on these processors incorrectly identifies the usage data as being collected on a specific type-model IBM processor. Because type-model determines the SU factor to be used to calculate the service unit values reported for each product, the correct type-model information must be provided by the customer on the PROCESSOR control statement. Otherwise, the usage values on the Software Usage Report are invalid. Supported type-model values are listed in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115.

The report printed for "Example 2: Placing a product under the measured usage option" on page 74 could have represented data collected on a HDS-GX8524 processor. If the data was from such a processor, the customer must substitute the following PROCESSOR control statement for the sample statement used in Example 2:

```
PROCESSOR((9021,GX8524,01111)
```

If that were done, the following Software Usage Report would have been produced. Notice that the processor's Type-Model value appears as HDS-GX8524. In this particular case the SU Factor listed on the report did not change, except for rounding, but that is not true for all cases of non-IBM processors.

```
                              Measured Usage Software Report                              Page   1
      IFAURP  1.2.0                    Software Usage Report                           08 May 1995

-------------------- Customer No: 1234567 -----------------      ------------ Software Vendor: IBM CORP    --------------
Acme Tulle and Dye Company                                       IBM Branch Office
155 Main Street                                                  1133 Westchester Avenue
New London, CT 05512                                             Major City, Sample State  10604
Contact/Phone: Fred Tulle  (203) 555-1212 ex 54                 FAX: 1-800-555-1212  ATTN: Usage Pricing

 - Report -    --- Measurement Period End Dates ---  |  ------------------------- Processor ----------------------------
 Due Date    End Date  Product Name(s)    Function    |  Category    Type-Model   Serial        Begin-End Dates    SU Factor
 --------    --------  ---------------    --------    |  ----------  ----------   ----------    -----------------  ---------
 20May95     06May95   ***ALL***                      |  Standalone  HDS-GX8524  01111          02Apr95 - 07May95  2565.39

============================================== For Billing Purposes =============================================
                                 ----------------------- Monthly Chargeable Product Values ---------------------
                                 1995                                              1996
------------------ Product -------------- |  APR    MAY    JUN    JUL    AUG    SEP | OCT    NOV    DEC    JAN
NUMBER(S) NAME           VERSION  FUNCTION |
FEB    MAR
-------- ---------------- -------- -------- |----- ----- ----- ----- ----- ----- |----- ----- ----- ----- -----
                    MAX MVS/ESA LPARS:|    4      4     -      -      -      -   |   -      -      -      -      -      -
                    PERCENT MISSING HOURS:|   12     80     -      -      -      -   |   -      -      -      -      -      -
                                          |                                      |
5685-083 CICS            3.2      | 2.67*  2.46#    -      -      -      -   |   -      -      -      -      -      - (01)
          * 07Apr95-06May95       |                                      |
                                          |                                      |
5685-025 TSO/E           2.4      | .093*  .078#    -      -      -      -   |   -      -      -      -      -      - (01)
          * 07Apr95-06May95       |                                      |
-----------------------------------------------------------------------------------------------------------------
I certify that the values circled on this report indicate months for which that product was under test allowance.

 -------------------------------------------    -------------------------------------------    -----------------------
 Name                                           Signature                                      Date

========================================= For Collection Purposes Only =========================================
                                          |                                      |
5665-013 IMS TM          4.1      | .732   .821#    -      -      -      -   |   -      -      -      -      -      - (01)
5665-409                 3.1      |                                      |
          # 02Apr95               |                                      |
                                          |                                      |
===================================================== Notes =====================================================
   *  - Begin-End Dates of first month's usage data
   #  - Data not collected for a full month.
   <  - Value to the left is the largest value of complete months shown
  (01) - Hourly rate in millions of CPU Service Units (MSUs)

      This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 26. Software Usage Report Generated for Example 3

Example 4: Identifying 9672-Rxx processors for measured usage

The following example is identical to "Example 2: Placing a product under the measured usage option" on page 74 except that the processor involved is an IBM 9672-Rxx model processor. This example is included because the 9672-Rxx models are treated like "standalone" processors, rather than like the 9672-E0x and 9672-P0x clusters. Valid 9672-Rxx type-model values are listed in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115.

If "Example 2: Placing a product under the measured usage option" on page 74 was for a 9672-R61 processor, all the sample JCL and control statements listed in Example 2 would be equally valid, except for the PROCESSOR control statement. All 9672-Rxx models must be identified on the PROCESSOR control statement using their CEC serial number. Although the 9672-Rxx models have a CEC Node Descriptor, like the 9672-E0x clusters, the serial numbers provided by the Node Descriptor should not be used (instead, see Appendix C, "Steps for determining the CPC type, model, and serial number," on page 137). Valid 9672-Rxx type-model values are listed in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115. The customer must substitute the following PROCESSOR control statement, if the processor was a 9672-R61.

```
PROCESSOR((9672,R61,00381)
```

If that were done, the following Software Usage Report would have been produced.

```
                                 Measured Usage Software Report                            Page   1
    IFAURP  1.2.0                    Software Usage Report                             08 May 1995

    ------------------  Customer No: 1234567  -----------------       -----------  Software Vendor: IBM CORP     -----------
    Acme Tulle and Dye Company                                        IBM Branch Office
    155 Main Street                                                   1133 Westchester Avenue
    New London, CT 05512                                              Major City, Sample State  10604
    Contact/Phone: Fred Tulle  (203) 555-1212 ex 54                   FAX: 1-800-555-1212  ATTN: Usage Pricing

    - Report -   --- Measurement Period End Dates ---  | ------------------------ Processor ----------------------------
    Due Date    End Date  Product Name(s)   Function   |  Category   Type-Model  Serial       Begin-End Dates     SU Factor
    --------    --------  ---------------   --------   |  ----------  ----------  ------------  -----------------   ---------
    20May95     06May95   ***ALL***                    |  Machine     9672-R61    04156        02Apr95 - 07May95
                                                       |  9672 CEC    9672-R51    00381        02Apr95 - 07May95   455.8405

    ================================================= For Billing Purposes =========================================

                                           ------------------------ Monthly Chargeable Product Values ---------------------
    -----------------  Product --------------- 1995                                              1996
    NUMBER(S) NAME              VERSION FUNCTION | APR   MAY   JUN   JUL   AUG   SEP | OCT   NOV   DEC   JAN
    FEB    MAR  |
    --------  ---------------  -------- -------- |----- ----- ----- ----- ----- ----- |----- ----- ----- ----- ----- ----- |
                        MAX MVS/ESA LPARS:|   4     4     -     -     -     - |  -     -     -     -     -     - |
                        PERCENT MISSING HOURS:|  12    80     -     -     -     - |  -     -     -     -     -     - |
                                            |                                      |                                      |
    5685-083 CICS         3.2           | 2.67* 2.46#   -     -     -     - |  -     -     -     -     -     - |01)
             * 07Apr95-06May95          |                                      |                                      |
                                            |                                      |                                      |
    5685-025 TSO/E        2.4           | .093* .078#   -     -     -     - |  -     -     -     -     -     - |01)
             * 07Apr95-06May95          |                                      |                                      |
    ------------------------------------------------------------------------------------------------------------------------
    I certify that the values circled on this report indicate months for which that product was under test allowance.

    ------------------------------------------   --------------------------------------------   -----------------------
    Name                                         Signature                                      Date

    =========================================== For Collection Purposes Only ===============================================
                                            |                                      |
    5665-013 IMS TM       4.1           | .732  .821#   -     -     -     - |  -     -     -     -     -     - (01)
    5665-409              3.1           |                                      |
             # 02Apr95                      |                                      |
    ================================================ Notes ==============================================================

       *  - Begin-End Dates of first month's usage data
       #  - Data not collected for a full month.
       <  - Value to the left is the largest value of complete months shown
      (01) - Hourly rate in millions of CPU Service Units (MSUs)

          This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 27. Software usage report generated for Example 4

9672-R61 analysis of the software usage report generated by Example 4

The "Processor" section identifies the 9672-R61 for which the type 89 records were collected and for which the usage data is being reported. Two entries are printed for the 9672-R61. The first is identified as a "Machine" and represents the asset to which IBM licenses software on that processor. The second entry represents the actual CEC, as it was identified on the PROCESSOR control statement. See "Example 2: Placing a product under the measured usage option" on page 74 for a description of all the other fields on this report.

Example 5: Placing an additional product under MULC

In the following example the customer has installed BatchPipes/MVS on a processor on which CICS and TSO/E are already being billed under measured usage and has chosen to place BatchPipes® under MULC. In this example, the customer executed IFAURP on a date after the product's initial measurement period has ended.

This example builds on "Example 2: Placing a product under the measured usage option" on page 74 where the customer started measured usage pricing for CICS and TSO/E and is still unable to place IMS TM under the MULC option, because the IMS MULC PTFs have not yet activated on all LPARs on the processor.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
          ADDRESS('155 Main Street',
                  'New London, CT 05512')
          CONTACT('Fred Tulle')
          PHONE('(203) 555-1212 ex 54'))
*
*    VENDOR statement used earlier is still in effect
*
  PROCESSOR((9021,952,01111)
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('BATCHPIPES/MVS')
                   START(19950522)))
*
*    PRODUCT stmts for CICS and TSO/E used earlier are still in effect
*
/*
```

- //STEPLIB references the IBM library, SYS1.SIFALIB, which contains IFAURP and IBM product exits. The MULC PTF cover letter for BatchPipes indicates that IFAURP 1.2.0 (OW11350) is required to process BatchPipes usage data and a BatchPipes-specific IBM vendor exit must be installed in SYS1.SIFALIB. However, in the first Software Usage Report produced for this example the customer neglects to install the required IBM vendor exit.

- See "Example 2: Placing a product under the measured usage option" on page 74 for information about both //SYSMSGS and //SYSPRINT files.

- //SMFDATA references a daily SMF dump file containing the type 89 records for June 24th.

- //SYSHIN references the current version(0) of history file MULC.HISTORY.#1234567, which contains the previous control statements, as well as, all the usage data that has been previously processed.

- //SYSHOUT references a the newest version (+1) of the history file, MULC.HISTORY.#1234567, that is be created as a result of this step. The last qualifier, #1234567, designates the IBM customer number for the processor from which the usage data was collected. See "Example 2: Placing a product under the measured usage option" on page 74 for additional information on this history file.

  See "Example 2: Placing a product under the measured usage option" on page 74 for an explanation of the remaining DD statements.

- **CUSTOMER** This control statement is required and must precede all other control statements. The customer has provided values for the NAME, ADDRESS, CONTACT and PHONE keywords.

- **VENDOR** This control statement is no longer necessary, because it has already been processed and its values saved in this history file in the previous example.

- **PROCESSOR** This control statement identifies the specific processor and products for which action is to be taken.

  (9021,952,01111)
     This field is used to identify the specific processor for which the remainder of the keywords apply. In the US the last 5 digits of the processor serial number are used to identify the processor. Outside the US this 5 digit serial number must be prefixed with a two digit manufacturing location.

  PRODUCT
     This set of control statements defines only the product being added.

     PRODOWNER
        All IBM products require the value IBM CORP for this field.

PRODNAME

Only BATCHPIPES/MVS is required, because the PRODNAME control statements for CICS and TSO/E have been saved on the history file by "Example 2: Placing a product under the measured usage option" on page 74 and will be automatically reprocessed on this execution. Note that the entire upper case name, 'BATCHPIPES/MVS', is required as the PRODNAME value.

START

This keyword actually triggers IFAURP to begin processing BatchPipes as a measured usage product by listing the product and its usage values in the "Billing" section of the Software Usage Report. The value of 19950522 signifies the fact that the customer has met both key requirements of the START keyword on that date. See the START keyword in "Example 2: Placing a product under the measured usage option" on page 74 for additional information.

Note: The ALIGN option is not available to BatchPipes because the measurement periods for this entire processor have already been determined by the defaults taken by the first measured usage product on this processor (CICS).

```
                                 Measured Usage Software Report                          Page   1
   IFAURP  1.2.0                    Software Usage Report                              25 June 1995
   ------------------ Customer No: 1234567 -----------------      ----------- Software Vendor: IBM CORP   ------------
   Acme Tulle and Dye Company                                     IBM Branch Office
   155 Main Street                                                1133 Westchester Avenue
   New London, CT 05512                                           Major City, Sample State  10604
   Contact/Phone: Fred Tulle  (203) 555-1212 ex 54                FAX: 1-800-555-1212  ATTN: Usage Pricing

   - Report -   --- Measurement Period End Dates ---  |  ------------------------ Processor ------------------------------
   Due Date     End Date  Product Name(s)   Function   |  Category    Type-Model  Serial       Begin-End Dates     SU Factor
   --------     --------  ---------------   --------   |  ---------   ----------  ------------  -----------------   ---------
   14Oct95      30Sep95   ***ALL***                    |  Standalone  9021-952    01111         02Apr95 - 24Jun95   2565.3359

   =============================================== For Billing Purposes =============================================================

                                            ------------------------ Monthly Chargeable Product Values ---------------------
   ----------------- Product -------------- 1995                                                 1996
   NUMBER(S) NAME          VERSION FUNCTION | APR   MAY   JUN   JUL   AUG   SEP | OCT   NOV   DEC   JAN
   FEB    MAR  |
   --------- --------------- -------- -------- |----- ----- ----- ----- ----- ----- |----- ----- ----- ----- ----- ----- |
                        MAX MVS/ESA LPARS:|  4     4     4     -     -     -  |  -     -     -     -     -     -  |
                        PERCENT MISSING HOURS:| 12    10    24     -     -     -  |  -     -     -     -     -     -  |
                                            |                                    |                                    |
   5685-083 CICS            3.2             | 2.67* 2.46< 2.44#   -     -     -  |  -     -     -     -     -     - |02)
            * 07Apr95-06May95               |                                    |                                    |
                                            |                                    |                                    |
   5685-025 TSO/E           2.4             | .093* .078< .078#   -     -     -  |  -     -     -     -     -     - |02)
            * 07Apr95-06May95               |                                    |                                    |
   ----------------------------------------------------------------------------------------------------------------------------------
   I certify that the values circled on this report indicate months for which that product was under test allowance.

   -----------------------------------------    -------------------------------------------    ------------------------
   Name                                         Signature                                      Date

   =============================================== For Collection Purposes Only =====================================================
                                            |                                    |                                    |
   5655-065 BATCHPIPES/MVS  HTMT100 PSP1-BTS|  -    XXXX* XXXX#   -     -     -  |  -     -     -     -     -     -
   |01)
           # 21May95                         |                                    |                                    |
                                            |                                    |                                    |
   5665-013 IMS TM          4.1             | .732  1.22< 1.24#   -     -     -  |  -     -     -     -     -     - |02)
   5665-409                 3.1             |                                    |                                    |
           # 02Apr95                         |                                    |                                    |
                                            |                                    |                                    |
   ===================================================== Notes ======================================================================

     *  - Begin-End Dates of first month's usage data
     #  - Data not collected for a full month.
     <  - Value to the left is the largest value of complete months shown
   (01) - IFA351E VENDOR EXIT IFAUBATC IS REQUIRED BUT WAS NOT LOADED.
   (02) - Hourly rate in millions of CPU Service Units (MSUs)

         This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 28. Software usage report generated for Example 5 without a BatchPipes vendor exit installed

Analysis of the software usage report generated by Example 5 without a BatchPipes exit

The only aspect of this specific report that will be discussed concerns the fact that BatchPipes was not reported in the "Billing" section even though the customer supplied a valid PRODNAME control statement and BatchPipes data was processed by the usage report program.

BatchPipes differs from the other IBM measured usage products in several ways. Rather than measuring and reporting its usage in millions of CPU service units (MSUs), BatchPipes measures and reports its usage in 'GigaBytes read' as a better indication of BatchPipes usage. As a consequence, BatchPipes requires that a BatchPipes-specific vendor exit be installed and invoked by the usage report program. This BatchPipes exit modifies several registration fields of the BatchPipes usage section of the SMF type

89 record and provides directions to the usage report program for calculating and reporting BatchPipes usage. The exit also provides the definition of BatchPipes usage that will be placed in the "Note" section at the end of the report. Because these notes are assigned alphabetically by product name, BatchPipes was assigned note number (01). The other IBM measured usage products appearing on the report will continue to share the usage definition for MSUs, that will be assigned note number (02).

Because BatchPipes required a vendor exit, but the customer did not install one in this example, the appropriate registration fields in the usage data were not properly modified, and the usage report program reported the BatchPipes data as some other product for which no START had been issued. As a result, this data appears in the "Collection" section with the product name BATCHPIPES/MVS but with unusual values for the version and function fields. However, based on special fields in the SMF type 89 records, the usage report program was able to determine that this usage data did require an IBM product exit that minimally was required to provide directions for the calculation and reporting of the data. Because no exit was provided, the usage report program printed XXXX for this product's usage values and used note (01) to describe the error condition encountered for the product.

Other IBM products that also require product-specific vendor exits cause the usage report program to react in much the same way when those product-specific exits are not installed or not accessible during the execution of IFAURP. The general result is that the usage report program seems to ignore the START keyword for the product, that then appears in the "Collection" section of the report, usually with unusual version and function values. Note, however, that the usage report program can not always determine that a product-specific vendor exit is required and thus will not always print XXXXs in place of the product's usage values nor print a specific exit-related error message for a product that is missing its required product-specific vendor exit.

If the customer were to install the proper BatchPipes vendor exit as documented in the BatchPipes' PTF cover letter and rerun the usage report program, the following Software Usage Report would be generated.

```
                                    Measured Usage Software Report                                   Page   1
    IFAURP  1.2.0                       Software Usage Report                                   25 June 1995
    ------------------ Customer No: 1234567 -----------------        ------------ Software Vendor: IBM CORP   --------------
    Acme Tulle and Dye Company                                       IBM Branch Office
    155 Main Street                                                  1133 Westchester Avenue
    New London, CT 05512                                             Major City, Sample State  10604
    Contact/Phone: Fred Tulle  (203) 555-1212 ex 54                  FAX: 1-800-555-1212 ATTN: Usage Pricing

    - Report -     --- Measurement Period End Dates ---  |  ------------------------- Processor ----------------------------
    Due Date    End Date  Product Name(s)    Function     |  Category   Type-Model   Serial      Begin-End Dates     SU Factor
    --------    --------  ---------------    --------     |  ----------  ----------  ------------  -----------------   ---------
    05Jul95     21Jun95   BATCHPIPES/MVS                  |  Standalone  9021-952    01111         02Apr95 - 24Jun95   2565.3359
    14Oct95     30Sep95   CICS                            |
    14Oct95     30Sep95   TSO/E                           |

    ================================================== For Billing Purposes =================================================

                                      ------------------------- Monthly Chargeable Product Values ---------------------
    ----------------- Product --------------- 1995                                        1996
    NUMBER(S) NAME          VERSION  FUNCTION |  APR    MAY    JUN    JUL    AUG    SEP  | OCT    NOV    DEC    JAN
    FEB    MAR  |
    --------  --------------  --------  -------- |----- ----- ----- ----- ----- ----- |----- ----- ----- ----- ----- ----- |
                             MAX MVS/ESA LPARS:|   4      4      4      -      -      -  |  -      -      -      -      -      -  |
                             PERCENT MISSING HOURS:|  12     10     24      -      -      -  |  -      -      -      -      -      -  |
                                                 |                                       |                                       |
    5655-065 BATCHPIPES/MVS   1.0            |   -    .312*  .354#    -      -      -  |  -      -      -      -      -      -  |01)
             * 22May95-21Jun95      (BATC9501)|                                       |                                       |
                                                 |                                       |                                       |
    5685-083 CICS             3.2            |  2.67*  2.46<  2.44#    -      -      -  |  -      -      -      -      -      -  |02)
             * 07Apr95-06May95               |                                       |                                       |
                                                 |                                       |                                       |
    5685-025 TSO/E            2.4            |  .093*  .078<  .078#    -      -      -  |  -      -      -      -      -      -  |02)
             * 07Apr95-06May95               |                                       |                                       |
    -----------------------------------------------------------------------------------------------------------------------------
    I certify that the values circled on this report indicate months for which that product was under test allowance.

    ------------------------------------------       -------------------------------------------     ------------------------
    Name                                             Signature                                       Date

    ============================================= For Collection Purposes Only ==============================================
                                                     |                                       |
    5665-013 IMS TM          4.1            |  .732   1.22<  1.24#    -      -      -  |  -      -      -      -      -      -  |02)
    5665-409                 3.1            |                                       |                                       |
             # 02Apr95                       |                                       |                                       |
    =================================================== Notes ================================================================

      *  - Begin-End Dates of first month's usage data
      #  - Data not collected for a full month.
      <  - Value to the left is the largest value of complete months shown
    (01) - Hourly rate in GigaBytes read (1 GB= 1,000,000,000 bytes)
    (02) - Hourly rate in millions of CPU Service Units (MSUs)

         This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 29. Software usage report generated for Example 5 with a BatchPipes exit installed

Analysis of the software usage report generated by Example 5 with a BatchPipes exit

See <u>"Example 2: Placing a product under the measured usage option" on page 74</u> for an explanation of the "Customer No", "Software Vendor" "Processor" and "Collection" sections.

The "Report Date Due" section lists a date of 05Jul95 by which IBM must receive a copy of this report, in order for the customer to start measured usage pricing on BatchPipes. This date is calculated by the program as 14 calendar days after the current measurement period's end date. The "Report Date Due" for both CICS and TSO/E are listed in this section as 14Oct95.

The "Measurement Period End Dates" section lists the last date in the current BatchPipes measurement period as 21Jun95, which is four days earlier than the execution date of this report.

The "For Billing Purposes Only" section lists up to the last 12 months of product usage alphabetically in product name order. The BatchPipes usage is, therefore, printed before the CICS usage. The range of dates listed for BatchPipes (and prefixed by an *), indicates the begin-end dates of the initial monthly measurement for BatchPipes. The begin date was provided via the START value of 19950522. The program calculates the end date.

The BatchPipes usage value under the May column is followed by an *, which indicates that this value represents the initial monthly usage value of .312 MSUs that will used to set the usage band for the initial BatchPipes measured usage billing period. An * after the value under the May column indicates that the initial measurement period, 22May95-21Jun95, is complete and that the customer should provide a copy of this report to IBM as per his client representative's instructions. A # would indicate that the initial measurement period was still incomplete and the product not yet eligible for measured usage pricing.

The BatchPipes vendor exit passes eight characters of 'level' information, BATC9501, back to IFAURP, which prints it in parentheses under the function column. These eight characters are used to indicate which level of vendor exit has been installed and invoked by the usage report program. All IBM products that require product-specific vendor exits also provide eight characters of 'level' information.

The current usage values for CICS and TSO/E are also listed in this section of the report. The measurement period for BatchPipes, after the initial month, will be synchronized to the measurement period already established on that processor by the first product START. The next measurement period for all three products will end September 30th.

In order the place BatchPipes' under the MULC option, a copy of the Software Usage Report that was described in this example IBM must receive by IBM by July 5, 1995, as indicated in the "Report Due Date" section. The fact that CICS and TSO/E also appear in the "Billing" section does not matter, because both of these products have already had their MULC prices set previously.

Note: The START keyword will cause the measurement and associated billing period for BatchPipes on this processor to be listed on the Time Period Report.

Example 6: Upgrading a processor with MULC products and adding another

In this example the customer is upgrading a processor from a 9021-952 to a 9021-972 over the space of several hours on August 14th and would like to continue participating in measured usage pricing for CICS, BatchPipes and TSO/E on the new processor. The customer can "transfer" all of these products from the old to the new processor via a TRANSFER control statement after the upgrade is complete. IFAURP will maintain the same product measurement periods on the new processor. TRANSFER, itself, does not require that a Software Usage Report be sent to IBM at the time of the processor upgrade. The existing product measurement periods, alone, will determine when the next Software Usage Report is due for this upgraded processor.

The customer will also place IMS TM under usage pricing immediately after the upgrade has completed, because the MULC PTFs have finally been applied and activated on all IMS TM versions on all LPARs on the processor.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
           ADDRESS('155 Main Street',
                   'New London, CT 05512')
           CONTACT('Fred Tulle')
           PHONE('(203) 555-1212 ex 54'))
*
* Transferring all products on a processor upgrade
*
  TRANSFER((9021,952,01111),(9021,972,02222))
*
* Starting a new MULC product immediately after the upgrade
*
  PROCESSOR((9021,972,02222)
           PRODUCT (PRODOWNER('IBM CORP')
                    PRODNAME('IMS TM')
                    START(19950815)))
/*
```

- See "Example 2: Placing a product under the measured usage option" on page 74 for an explanation of the //STEPLIB, //SYSMSGS and //SYSPRINT files.
- //SYSHOUT references the newest version (+1) of the history file, MULC.HISTORY.#1234567 that will be created as a result of this job step. The last qualifier, #1234567, designates the IBM customer number for the processor from which the usage data was collected. Note that IFAURP requires that the SMF type 89 records from both the old and new processor must be processed and reside on the same set of history files. Failure to use the same set of history files as the original processor will result in no usage values being listed for the new processor.

  See Examples 2 and 5 for an explanation of the other DD statements used in this example.

- **TRANSFER** This control statement will transfer all the products participating on measured usage pricing from one processor to another processor only as part of a processor upgrade. The second processor can not already be participating in MULC before the transfer. There must be no overlap between product usage on both processors. Because no overlap of usage exists between the original and replacement processors, dates are not required for this control statement.

  Note: This TRANSFER statement must precede any PROCESSOR statements that may be required to START a product on the upgraded new processor. If the TRANSFER statement is not executed prior to new PROCESSOR statements (when such statements exist in the same execution of the usage report program), the TRANSFER statement will fail, because the new processor will have started a MULC product prior to the TRANSFER and violate the TRANSFER conditions.

  (9021,952,01111)
  This set of values represents the processor that is being discontinued.
  (9021,972,02222)
  This set of values represents the processor that is replacing the first processor.

- **PROCESSOR** This control statement is not required for the products that have already been started on the original processor. It is included in this example only because the customer wants to place a new product under the MULC option. This control statement identifies the new processor and product for which action is to be taken.

  (9021,972,02222)
  This field is used to identify the specific processor for which the remainder of the keywords apply. In the US the last 5 digits of the processor serial number are used to identify the processor. Outside the US this 5 digit serial number must be prefixed with a two digit manufacturing location.

PRODUCT

This set of control statements defines only the product being added.

PRODOWNER

All IBM products require the value 'IBM CORP' for this field.

PRODNAME

Only 'IMS TM' is required, because CICS, BatchPipes and TSO/E have already been transferred from the TRANSFER statement.

START

This keyword actually triggers IFAURP to begin processing IMS TM as a measured usage product by listing the product and its usage values in the "Billing" section of the Software Usage Report. The value of 19950815 signifies the fact that the customer has met both key requirements of the START keyword on that date. See the START keyword in for additional information.

```
                              Measured Usage Software Report                        Page    1
IFAURP  1.2.0                    Software Usage Report                             16 Aug 1995
------------------ Customer No: 1234567 -----------------  ----------- Software Vendor: IBM CORP   -------------
Acme Tulle and Dye Company                                IBM Branch Office
155 Main Street                                           1133 Westchester Avenue
New London, CT 05512                                      Major City, Sample State  10604
Contact/Phone: Fred Tulle  (203) 555-1212 ex 54           FAX: 1-800-555-1212  ATTN: Usage Pricing

 - Report -   --- Measurement Period End Dates ---  |  --------------------------- Processor ----------------------------
 Due Date   End Date  Product Name(s)    Function    |  Category    Type-Model  Serial        Begin-End Dates     SU Factor
 --------   --------  ---------------    --------    |  ----------  ----------  ------------  -----------------    ---------
 28Sep95    14Sep95   IMS TM                         |  Standalone  9021-952    01111         02Apr95 - 15Aug95    2565.3359
 14Oct95    30Sep95   BATCHPIPES/MVS                 |  Standalone  9021-972    02222         15Aug95 - 15Aug95
2384.1454
 14Oct95    30Sep95   CICS                           |
 14Oct95    30Sep95   TSO/E                          |

=============================================== For Billing Purposes ==================================================

                           ------------------------- Monthly Chargeable Product Values ----------------------
----------------- Product --------------- 1995                                        1996
NUMBER(S) NAME         VERSION FUNCTION | APR   MAY   JUN   JUL   AUG   SEP | OCT   NOV   DEC   JAN
FEB   MAR  |
-------- -------------- ------- -------- |----- ----- ----- ----- ----- ----- |----- ----- ----- ----- ----- ----- |
                       MAX MVS/ESA LPARS:|   4     4     4     4     4     - |   -     -     -     -     -     - |
                       PERCENT MISSING HOURS:|  12    10    14    24    54     - |   -     -     -     -     -     - |
                                         |                                   |                                    |
5655-065 BATCHPIPES/MVS   1.0            |   -  .321* .389< .370 .375#    - |   -     -     -     -     -     - |01)
           * 15Aug95-14Sep95             |                                   |                                    |
                                         |                                   |                                    |
5685-083 CICS             3.2            | 2.67* 2.46  2.96< 2.52 13.59#   - |   -     -     -     -     -     - |02)
           * 07Apr95-06May95             |                                   |                                    |
                                         |                                   |                                    |
5665-013 IMS TM           4.1            |   -     -     -     -   1.76#    - |   -     -     -     -     -     - |02)
5665-409                  3.1            |                                   |                                    |
           * 15Aug95-15Sep95             |                                   |                                    |
                                         |                                   |                                    |
5685-025 TSO/E            2.4            | .093* .078  .094< .087 .091#    - |   -     -     -     -     -     - |02)
           * 07Apr95-06May95             |                                   |                                    |
------------------------------------------------------------------------------------------------------------------------
I certify that the values circled on this report indicate months for which that product was under test allowance.

 ----------------------------------------    -------------------------------------------    ------------------------
 Name                                        Signature                                      Date

=============================================== For Collection Purposes Only ==========================================
                                         |                                   |                                    |
5665-013 IMS TM           4.1            | .732  1.22  1.34  1.55<    -     - |   -     -     -     -     -     - |02)
5665-409                  3.1            |                                   |                                    |
           # 02Apr95                     |                                   |                                    |
                                         |                                   |                                    |
=============================================== Notes =================================================================

  *  - Begin-End Dates of first month's usage data
  #  - Data not collected for a full month.
  <  - Value to the left is the largest value of complete months shown
(01) - Hourly rate in GigaBytes read (1 GB= 1,000,000,000 bytes)
(02) - Hourly rate in millions of CPU Service Units (MSUs)

      This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 30. Software usage report generated for Example 6

Description and analysis of the software usage report generated by Example 6

See for an explanation of the "Customer No", "Software Vendor", and "For Collection Purposes Only" sections.

The "Report Date Due" section now indicates a date of 28Sep95 for IMS TM, due to the START date of 19950815. This is the date by which IBM must receive the Software Usage Report with IMS TM usage to place IMS TM under the MULC option. The next due date for BatchPipes, CICS and TSO/E, however, continues to be listed as 14Oct95. This is the same date that was calculated for the original processor.

The TRANSFER process did not change this date. Although the customer had to transfer the product licenses from the old to the new processor, use of this control statement, by itself, does not require that the resulting Software Usage Report be sent to IBM.

The "Measurement Period End Dates" section lists the last date for the current IMS TM measurement as 14Sep95. The end dates for all the other products remain as 30Sep95. This date also hasn't changed from the date set for the previous processor.

The "Processor" section is different as a result of the TRANSFER control statement. This section now lists both the old and new processors together with the Begin-End dates for which usage data has been processed for each. The 9021-952 processor will continue to appear on this report until September of 1995 when all the data that it generated will be too old (more than 12 months) to appear.

The "For Billing Purposes Only" section lists the usage values from both of these processors as if the usage was from a single processor. Because TRANSFER only supports a non-overlap upgrade, none of the values listed should be the aggregate of both processor's usage. All the values before August 15th are from the 9021-952. All the values after August 15th are from the 9021-972. The values for the 15th are from one or the other of these processors.

Because a PRODUCT control statement started IMS TM after the TRANSFER control statement, IMS TM usage values are printed in the "Billing" section starting with the month (August) provided as the START date. The range of dates listed for IMS TM and prefixed by an "*" , indicate the begin-end dates of the initial monthly measurement for IMS TM. The begin date was provided via the START value of 19950815. The end date was calculated by the program.

The IMS TM usage value under the August column is followed by an "#", which indicates that the initial measurement period was still incomplete, and additional measurement data must be collected and processed prior to sending this Software Usage Report in to IBM.

The current usage values for BatchPipes, CICS and TSO/E are also listed in this section of the report. After the initial month, IMS TM's measurement period will be synchronized to the measurement period already established on that processor by the first product START. The next measurement period for the remaining three products will end September 30th.

In order to place IMS TM under the MULC option, a copy of the Software Usage Report that was produced as a result of processing all the SMF type 89 records up to and including September 15th must be received by IBM by September 28, 1995, as indicated in the "Report Due Date" section. The fact that BatchPipes, CICS and TSO/E also appear in the "Billing" section does not matter, because all of these products have previously had their MULC prices set.

Note: The START keyword will cause the measurement and associated billing period for IMS TM on this processor to be listed on the Time Period Report.

Example 7: Stopping measured usage on a product

In the following example the customer has already generated the appropriate Software Usage Report that must be provided to IBM to set the usage bands for the second billing period. No special control statements were required. This report was simply generated as the result of processing the usual SMF type 89 records that were produced on October 5th. Because no special JCL or control statements were required, none will be shown here.

```
                              Measured Usage Software Report                              Page   1
    IFAURP  1.2.0                   Software Usage Report                         05 October 1995

------------------- Customer No: 1234567 -----------------    ----------- Software Vendor: IBM CORP   --------------
Acme Tulle and Dye Company                                    IBM Branch Office
155 Main Street                                               1133 Westchester Avenue
New London, CT 05512                                          Major City, Sample State  10604
Contact/Phone: Fred Tulle  (203) 555-1212 ex 54              FAX: 1-800-555-1212  ATTN: Usage Pricing

- Report -    --- Measurement Period End Dates ---  |  ------------------------ Processor ----------------------------
 Due Date     End Date  Product Name(s)   Function   |  Category    Type-Model  Serial      Begin-End Dates    SU Factor
 --------     --------  ---------------   --------   |  ----------  ----------  ------------ -----------------  ---------
 14Oct95      30Sep95   ***ALL***                    |  Standalone  9021-952    01111       02Apr95 - 14Aug95  2565.3359
                                                     |  Standalone  9021-972    02222       14Aug95 - 04Oct95  2384.1454

=================================================== For Billing Purposes ======================================================

                                          ------------------------ Monthly Chargeable Product Values  ---------------------
----------------- Product --------------- 1995                                               1996
NUMBER(S) NAME          VERSION FUNCTION | APR    MAY    JUN    JUL    AUG    SEP | OCT    NOV    DEC    JAN
FEB    MAR   |
-------- --------------- -------- -------- |----- ----- ----- ----- ----- ----- |----- ----- ----- ----- ----- ----- |
                    MAX MVS/ESA LPARS:|   4      4      4      4      4      5 |   5      -      -      -      -      - |
                    PERCENT MISSING HOURS:|  12     10     14     24     13     10 |  91      -      -      -      -      - |
                                          |                                          |                                       |
5655-065 BATCHPIPES/MVS  1.0              |   -      -      -      -   0.35*  0.44<|0.43#    -      -      -      -      - |01)
         * 15Aug95-14Sep95     (BATC9501)|                                          |                                       |
                                          |                                          |                                       |
5685-083 CICS            3.2              | 2.67*  2.46   2.96<  2.50   14.9   21.9<|23.31#   -      -      -      -      - |02)
         * 07Apr95-06May95                |                                          |                                       |
                                          |                                          |                                       |
5695-176 IMS TM          5.1              |                                   2.43<| 1.98#    -      -      -      -      - |02)
5665-013                 4.1              |   -      -      -      -   1.79*       |                                       |
5665-409                 3.1              |                                          |                                       |
         * 08Jun95-07Jul95                |                                          |                                       |
                                          |                                          |                                       |
5685-025 TSO/E           2.4              | .093*  .078   .094<  .085   0.61   .086 | .079#    -      -      -      -      - |02)
         * 07Apr95-06May95                |                                          |                                       |
--------------------------------------------------------------------------------------------------------------------------
I certify that the values circled on this report indicate months for which that product was under test allowance.


  ------------------------------------------      -----------------------------------------     ------------------------
  Name                                            Signature                                     Date

================================================ For Collection Purposes Only ==================================================
                                          |                                          |                                       |
5665-013 IMS TM          4.1              | .732   1.22   1.34   1.55<    -      - |   -      -      -      -      -      - |02)
5665-409                 3.1              |                                          |                                       |
         # 02Apr95                        |                                          |                                       |
                                          |                                          |                                       |
==================================================== Notes =====================================================================

   *  - Begin-End Dates of first month's usage data
   #  - Data not collected for a full month.
   <  - Value to the left is the largest value of complete months shown
 (01) - Hourly rate in GigaBytes read (1 GB= 1,000,000,000 bytes)
 (02) - Hourly rate in millions of CPU Service Units (MSUs)

       This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 31. Software Usage Report Generated for Example 7 before STOP

Description of the software usage report generated by Example 7 before STOP

See for an explanation of the "Customer No", "Software Vendor" and "For Collection Purposes Only" sections.

The "Processor" section continues to show two processors. See the previous example for an explanation.

The "Measurement Period End Dates" section indicates that the last measurement period has just ended for all the products listed in the "Billing" section.

The "Report Due Date" section indicates that this report is due to IBM very shortly based on a comparison with the execution date of the report.

The "For Billing Purposes" section now lists all the usage values for the measurement period that terminated on September 30th as indicated by the vertical bars "|" between September and October. Because there is no "#" in the September column of usage values, the customer has completed processing all the data for the last day in September, and IBM will accept this report as a means of setting the usage bands for the next billing period.

After reviewing the CICS usage values on the report the customer notes that the expected increase in the CICS workload did take place after the processor upgrade as planned. Due to the large increase in the workload, the customer decides to discontinue measured usage on CICS before sending this report to IBM. The customer does this by notifying their IBM client representative of their wish to discontinue the MULC option for CICS and processing the following control statement against the history file that contains the data for this processor prior to sending the Software Usage Report to IBM.

```
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
          ADDRESS('155 Main Street',
                  'New London, CT 05512')
          CONTACT('Fred Tulle')
          PHONE('(203) 555-1212 ex 54'))
*
  PROCESSOR((9021,972,02222)
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('CICS')
                   STOP))
/*
```

The resulting Software Usage Report follows:

```
                              Measured Usage Software Report                                Page   1
     IFAURP  1.2.0               Software Usage Report                               05 October 1995

     ------------------- Customer No: 1234567 -----------------       ----------- Software Vendor: IBM CORP    --------------
     Acme Tulle and Dye Company                                       IBM Branch Office
     155 Main Street                                                  1133 Westchester Avenue
     New London, CT 05512                                             Major City, Sample State  10604
     Contact/Phone: Fred Tulle  (203) 555-1212 ex 54                  FAX: 1-800-555-1212  ATTN: Usage Pricing

     - Report -   --- Measurement Period End Dates --- |  -------------------------- Processor ----------------------------
     Due Date    End Date  Product Name(s)   Function   |  Category   Type-Model  Serial      Begin-End Dates    SU Factor
     --------    --------  ---------------   --------   |  ----------  ----------  ----------  -----------------  ---------
     14Oct95     30Sep95   ***ALL***                    |  Standalone  9021-952    01111       02Apr95 - 14Aug95  2565.3359
                                                        |  Standalone  9021-972    02222       14Aug95 - 04Oct95  2384.1454

     ============================================== For Billing Purposes ===============================================

                                        ------------------------- Monthly Chargeable Product Values ---------------------
     ----------------- Product --------------- 1995                                           1996
     NUMBER(S) NAME         VERSION FUNCTION | APR    MAY    JUN    JUL    AUG    SEP | OCT    NOV    DEC    JAN
     FEB     MAR  |
     -------- -------------- ------- -------- |-----  -----  -----  -----  -----  ----- |-----  -----  -----  -----  ----- -----
                           MAX MVS/ESA LPARS:|   4      4      4      4      4      5 |   5      -      -      -      -      - |
                           PERCENT MISSING HOURS:|  12     10     14     24     13     10 |  91      -      -      -      -      - |
                                                |                                        |
     5655-065 BATCHPIPES/MVS  1.0            |   -      -      -      -    0.35*  0.44<|0.43#    -      -      -      -      - |01)
              * 15Aug95-14Sep95   (BATC9501)|                                        |
                                             |                                        |
     5685-083 CICS            3.2            | 2.67*  2.46   2.96<  2.50   14.9   21.9<|   -      -      -      -      -      - |02)
              * 07Apr95-06May95             |                                        |
                                             |                                        |
     5695-176 IMS TM          5.1            |                                  2.43<| 1.98#    -      -      -      -      - |02)
     5665-013                 4.1            |   -      -      -      -    1.79*       |                                       |
     5665-409                 3.1            |                                        |                                       |
              * 08Jun95-07Jul95             |                                        |                                       |
                                             |                                        |                                       |
     5685-025 TSO/E           2.4            | .093*  .078   .094<  .085   0.61   .086 | .079#    -      -      -      -      - |02)
              * 07Apr95-06May95             |                                        |
     ---------------------------------------------------------------------------------------------------------------------------
     I certify that the values circled on this report indicate months for which that product was under test allowance.


     ------------------------------------------      ------------------------------------------------       ----------------------
     Name                                            Signature                                              Date

     ============================================== For Collection Purposes Only ===================================================
                                                |                                        |
     5685-083 CICS            3.2            |   -      -      -      -      -      - |23.31#    -      -      -      -      - |02)
              * 02Apr95                       |                                        |                                       |
                                             |                                        |                                       |
     5665-013 IMS TM          4.1            | .732   1.22   1.34   1.55<    -      - |   -      -      -      -      -      - |02)
     5665-409                 3.1            |                                        |                                       |
              # 02Apr95                       |                                        |                                       |
     ============================================== Notes ===================================================================

     *  - Begin-End Dates of first month's usage data
     #  - Data not collected for a full month.
     <  - Value to the left is the largest value of complete months shown
     (01) - Hourly rate in GigaBytes read (1 GB= 1,000,000,000 bytes)
     (02) - Hourly rate in millions of CPU Service Units (MSUs)

         This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 32. Software usage report generated for Example 7 after STOP

Description of the software usage report generated by Example 7 after STOP

CICS usage values for April to September remain in the "For Billing Purposes", because CICS was under the MULC option for those months. However, starting with the October value all CICS usage values will be reported in the "For Collection Purposes Only" section of the report to indicate to IBM that CICS is no longer under measured usage pricing for the next six month billing period.

Note: The STOP keyword, affects the usage values related to the next billing period, relative to the execution date of the usage report program in which STOP was processed. If STOP had been processed on or before September 30, for instance, the CICS usage values for April through September would have been placed in the "Collection" section, because they all correspond to the billing period that starts

November 1st. The relationship between the measurement and corresponding billing periods for each processor are provided on the Time Period Reports.

Example 8: Measured usage products under test allowance

This example is a simple extension of the previous example. After discontinuing CICS usage, the customer notices that the IMS TM usage values on the report in Figure 32 on page 89 indicate that IMS TM version 5.1 was installed and started testing in September. Realizing that IMS TM version 5 is under test allowance for September and October, the customer:

1. Circles the IMS TM usage values under the months of September and October.
2. Prints his or her name and signs and dates in the section immediately after the usage values, thereby certifying that IMS TM is under test allowance.
3. Sends the marked up report to IBM as per the instructions provided by IBM.

Example 9: Starting measured usage on a Parallel Sysplex

In this example the customer has diversified and entered the transaction processing business. The customer will support these activities by adding a 9672-R11 processor, with the hardware coupling feature installed, and a Parallel Transaction Server (9672-E02) to his existing data center. The customer has coupled these new processors and configured them as a parallel sysplex. Based on a review of the sysplex's usage determined via the TESTDATE parameter of the SYSPLEX control statement, the customer has decided to place ALCS, IMS DB and MQM under measured usage pricing. Although CICS is also in the sysplex its usage is too high to place under measured usage pricing. The customer will also take the IBM recommendation and process the type 89 records from these processors using the existing set of history files. The end result is that the Software Usage Reports for both the 9021-972 processor (from "Example 7: Stopping measured usage on a product" on page 87) and SYSPLEX1 (in this example) will be generated every time IFAURP is run against this history file.

```
//IFAURP    EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
          ADDRESS('155 Main Street',
                  'New London, CT 05512')
          CONTACT('Fred Tulle')
          PHONE('(203) 555-1212 ex 54'))
*
*    VENDOR stmt used earlier automatically applies to these processors
*
  SYSPLEX(ID(SYSPLEX1)
          PLEXDATE(19950920)
          PROCESSOR((9672,R11,00333))
*
          CLUSTER((9672,E02,04166))
*
          PRODUCT (PRODOWNER('IBM CORP')
                  PRODNAME('ALCS')
                  START(19950920,ALIGN(11)))
*
          PRODUCT (PRODOWNER('IBM CORP')
                  PRODNAME('IMS DB')
                  START(19950920))
*
          PRODUCT (PRODOWNER('IBM CORP')
                  PRODNAME('MQM MVS/ESA')
                  START(19950920)))
  /*
```

- //STEPLIB references the IBM library, SYS1.SIFALIB, which contains IFAURP and IBM product exits. The MULC PTF cover letters for ALCS and IMS DB did not indicate that either required that an IBM vendor exit be installed either in this library or a concatenated library. However, IMS DB does require IFAURP 1.2.0 (OW11350) to process IMS DB usage data. The MULC PTF cover letter for MQM does indicated that an MQM-specific vendor exit, CSQ8UBEX, must be installed and used by the usage report program. The customer used the SMP/E sample supplied with CSQ8UBEX to add a DDDEF for SIFALIB and ++MOVE CSQ8UBEX to SYS1.SIFALIB. Because no software vendors have provided product exit libraries for their products in this example, it is not necessary to concatenate any non-IBM vendor libraries to SYS1.SIFALIB.
- //SYSMSGS references the file where the IFAURP Messages Report is written. This report lists the control statements processed by the usage report program and all error messages issued during its execution. This report should be used to assess the validity of all the other reports produced by this execution of the usage report program.
- //SYSPRINT references the file where all the other reports are written.
- //SMFDATA references the latest SMF type 89 records being processed by IFAURP.
- //SYSHIN references the current version(0) of history file MULC.HISTORY.#1234567, which contains all the usage data collected and processed so far. Because these additional processors have the same IBM customer number as the original 9021-972 processor, the customer has followed IBM's recommendation and used the existing set of history files to process all three processors.

  Note: If these additional processors were associated with a different IBM customer number, these processors would require a new set of history files (such as MULC.HISTORY.#0101010) unique to them. The value 0101010 is the other customer number.
- //SYSHOUT references a the newest version (+1) of the history file, MULC.HISTORY.#1234567, that is created as a result of this step.
- **CUSTOMER** This control statement is required and must precede all other control statements. The customer has provided values for the NAME, ADDRESS, CONTACT and PHONE keywords.
- **VENDOR** Because the VENDOR control statement has already been used for the original processor, no new VENDOR statement is required. If a new set of history files were used, a new VENDOR control statement would be required in this example.
- **SYSPLEX** This control statement defines the processor configuration for a parallel sysplex named SYSPLEX1, as well as its effective start date.

  ID
  > The customer has chosen to name the parallel sysplex SYSPLEX1.

  PLEXDATE
  > The processor configuration defined as SYSPLEX1 had an effective date of September 20, 1995.

  CLUSTER
  > This field identifies the specific Parallel Transaction Server (9672,E02,04166) that is defined as being part of SYSPLEX1. For a detailed explanation of determining the cluster serial number, see Appendix C, "Steps for determining the CPC type, model, and serial number," on page 137.

  PROCESSOR
  > This field identifies the specific coupling-capable processor (9672,R11,00333) that has the coupling hardware installed and that is defined as being part of SYSPLEX1. See "Example 4: Identifying 9672-Rxx processors for measured usage" on page 79 for a 9672-Rxx processor used as a standalone processor (not a part of a Parallel Sysplex).

  > **Note:** All 9672-Rxx models must be identified on the PROCESSOR control statement using their CEC serial number. Although the 9672-Rxx models have a CEC Node Descriptor, like the 9672-E0x clusters, do not use the serial numbers provided by the Node Descriptor. For a detailed explanation of determining the processor serial number, see Appendix C, "Steps for determining the CPC type, model, and serial number," on page 137.

  PRODUCT
  > Each product, ALCS, IMS DB, and MQM, requires its own set of PRODOWNER, PRODNAME and START keywords. Because CICS usage was judged to be too high to include under measured usage

pricing, no PRODUCT statement was supplied for CICS. Note that the products are associated with SYSPLEX1, not the individual processors or clusters.

PRODOWNER

All IBM products require the value 'IBM CORP' for this field.

PRODNAME

Identifies the product that the customer wishes to place under the measured usage pricing option. Because the customer was interested in ALCS, IMS DB and MQM, the appropriate PRODNAMEs for these products were entered on a specific set of PRODUCT control statements.

START

This keyword actually triggers IFAURP to begin processing the associated product as a measured usage product by listing the product and its usage values in the "Billing" section of the Software Usage Report. The value of 19950920 signifies the fact that the customer has met both key requirements of the START keyword on that date:

1. September 20th was the first day after which the customer had applied and activated the ALCS, IMS DB and MQM MULC PTFs on all LPARs on the specified processors and was collecting type 89 records from those processors. The customer could have specified any date after September 19th.

2. The date value is no earlier than 42 days of the date on which this report was run. This is important, because dates earlier than 42 days can not meet the IBM requirement that it receive the Software Usage Report within 10 business days after the end of the measurement period (START date + 28-31 measurement days + 14 calendar days = 42-45 days).

ALIGN

The customer chose to align the long term measurement periods of SYSPLEX1 with the current long term measurement period of his original processor. Aligning the processors in this way means that the customer can send IBM the Software Usage Reports for all of the processors at the same time, because they will all have the same "Report Date Due". Because the ALIGN parameter is used to set the beginning of the "billing" period, the customer used the Time Period Report to determine the start of the next "billing" period for his original processor and found that it started on November 1st. Because ALIGN only applies to the first product to select measured usage on a processor, it is specified only for ALCS.

```
                                     Measured Usage Software Report                          Page   1
    IFAURP  1.2.0                        Software Usage Report                            21 October 1995

    ------------------- Customer No: 1234567  -----------------        ----------- Software Vendor: IBM CORP    --------------
    Acme Tulle and Dye Company                                         IBM Branch Office
    155 Main Street                                                    1133 Westchester Avenue
    New London, CT 05512                                               Major City, Sample State  10604
    Contact/Phone: Fred Tulle  (203) 555-1212 ex 54                    FAX: 1-800-555-1212  ATTN: Usage Pricing

    - Report -   --- Measurement Period End Dates ---  |  --------------------- Parallel Sysplex: SYSPLEX1 ----------------
    Due Date     End Date  Product Name(s)   Function   |  Category   Type-Model  Serial       Begin-End Dates     SU Factor
    --------     --------  ---------------   --------   |  ----------  ----------  ------------  -----------------   ---------
    02Nov95      19Oct95   ***ALL***                    |  Machine    9672-R11    04387        20Sep95 - 20Oct95
                                                        |  9672 CEC   9672-R11    00333        20Sep95 - 20Oct95     660.6656
                                                        |  Cluster    9672-E02    04166        20Sep95 - 20Oct95
                                                        |  9672 CEC   9672-S2x    00721        20Sep95 - 20Oct95     627.6233
                                                        |  9672 CEC   9672-S2x    00723        20Sep95 - 20Oct95     627.6233

    =============================================== For Billing Purposes ==============================================

                                                  ------------------------- Monthly Chargeable Product Values ---------------------
    ----------------- Product --------------- 1995
    NUMBER(S) NAME         VERSION FUNCTION | APR   MAY   JUN   JUL   AUG   SEP | OCT   NOV   DEC   JAN
    FEB    MAR   |                                                                       1996
    -------- -------------- ------- -------- |----- ----- ----- ----- ----- ----- |----- ----- ----- ----- ----- ----- |
                            MAX MVS/ESA LPARS:|  -     -     -     -     -     6  |  6     -     -     -     -     -   |
                            PERCENT MISSING HOURS:| -   -     -     -     -    11 | 39     -     -     -     -     -   |
    5685-083 ALCS         02.01.01          |  -     -     -     -     -  .872*| .964#    -     -     -     -     -  |01)
             * 20Sep95-19Oct95              |                                  |                                    |

    5695-176 IMS DB        5.1              |  -     -     -     -     -   2.22*| 2.17#    -     -     -     -     -  |01)
    5665-012               4.1              |                                  |                                    |
             * 20Sep95-19Oct95             |                                   |                                    |

    5695-137 MQM MVS/ESA   2.1              |  -     -     -     -     -  .523*| .788#    -     -     -     -     -  |01)
             * 20Sep95-19Oct95   (MQM#9501)|                                  |                                    |

    ----------------------------------------------------------------------------------------------------------------------
    I certify that the values circled on this report indicate months for which that product was under test allowance.

     ------------------------------------------     ------------------------------------------     ------------------------
     Name                                          Signature                                       Date

    ================================================== For Collection Purposes Only =====================================
                                            |                                  |                                    |
    5685-083 CICS          3.3              |  -     -     -     -     -  15.8<| 16.8#    -     -     -     -     -  |01)
             # 20Sep95                      |                                  |                                    |
                                            |                                  |                                    |
    ================================================= Notes ==============================================================

      *  - Begin-End Dates of first month's usage data
      #  - Data not collected for a full month.
      <  - Value to the left is the largest value of complete months shown
    (01) - Hourly rate in millions of CPU Service Units (MSUs)

        This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 33. Software usage report generated for Example 9

Description and analysis of the software usage report generated by Example 9

The "Customer No" section contains the customer number that corresponds to the cluster and processor listed in the "Parallel Sysplex" section of the report. This value was provided via the CODE keyword on the VENDOR statement. A valid customer number must be provided to participate in MULC. The remainder of the customer fields printed in this section were provided by the customer on the NAME, ADDRESS, CONTACT and PHONE keywords on the CUSTOMER statement.

The "Software Vendor" section contains the vendor name, "IBM CORP", registered by each product shown on this report. The vendor name, address and FAX number that are listed were taken from the VENDOR control statement.

The "Report Date Due" section lists a date of 02Nov95 by which IBM must receive a copy of this report, in order for the customer to start measured usage pricing on SYSPLEX1 for ALCS, IMS DB and MQM. This date is calculated by the program as 14 calendar days after the measurement period's end date. A date will appear in this section only when the START keyword has been used for at least one product on SYSPLEX1.

The "Measurement Period End Dates" section lists the last date in the current measurement period for the corresponding product. This section lists the next measurement period end date for every product in the "For Billing Purposes" section. "***ALL***" indicates that the measurement end date applies to all products in the "For Billing Purposes" section.

The "Parallel Sysplex" section identifies the 9672-R11 and parallel transaction processor (9672-E02) for which the type 89 records were collected and for which the usage data is being reported. Two entries are printed for the 9672-R11. The first is identified as a "Machine" and represents the asset to which IBM licenses software on that processor. The second entry represents the actual CEC, as it was identified

on the PROCESSOR control statement. Multiple processor entries are also printed for the 9672-E02 processor. The first entry is identified as a "Cluster" and represents the processor, as it was identified by the customer on the CLUSTER control statement. The following entries are identified as "9672 CEC"s and represent the individual CECs within the 9672-E02. Note that these 9672-Sxx CECs are not valid model values on PROCESSOR or CLUSTER control statements.

The Begin-End Dates field indicate the earliest date, 20Sep95, and last date, 20Oct95, for which the data collected on this processor has been processed by IFAURP. The usage data for all products owned by the company listed in the "Software Vendor" section, (IBM CORP), will be printed on this report.

The "For Billing Purposes Only" section is printed because a START keyword was used for ALCS, IMS DB and MQM. Note that the first processor that uses a set of history files determines the first month in the row of months listed under the "Monthly Chargeable Product Values" section. Because the type 89 records from SYSPLEX1 are being processed on the same set of history files as the original processor in "Example 1: Deciding which products to select for measured usage pricing" on page 71, the first month displayed under the "Monthly Chargeable Product Values" is exactly the same as the first month established for the original processor. The relative positions of these months is the same for all Software Usage Reports generated from a common set of history files.

The "Monthly Chargeable Product Values" subsection shows three sets of vertical bars: before April, between September and October and after March. These vertical bars signify the 6 month measurement periods calculated by the program based on the ALIGN date for the first product started on this processor.

The range of dates listed for ALCS, IMS DB and MQM, prefixed by an "*", indicate the begin-end dates of the initial monthly measurement for each product. The begin date was provided via the START value of 19950920. The end date was calculated by the program.

The ALCS usage value under the September column is followed by an "*", which indicates that this value represents the initial monthly usage value of .872 MSUs that will used to set the usage band for the initial ALCS measured usage billing period. An "*" after the value under the September column indicates that the initial measurement period, 20Sep95-19Oct95, is complete. (A "#" would indicate that the initial measurement period was still incomplete, and not yet eligible for measured usage pricing.)

The IMS DB usage value under the September column is followed by an "*", which indicates that this value represents the initial monthly usage value of 2.22 MSUs that will be used to set the usage band for the initial IMS DB measured usage billing period.

The MQM usage value under the September column is followed by an "*", which indicates that this value represents the initial monthly usage value of .523 MSUs that will be used to set the usage band for the initial MQM measured usage billing period.

Note: The MQM-specific vendor exit passes eight characters of 'level' information, MQM#9501, back to IFAURP, which prints it in parentheses under the function column. These eight characters are used to indicate which level of vendor exit has been installed and invoked by the usage report program. All IBM products, which require product-specific vendor exits, will also provide eight characters of 'level' information.

Example 10: Adding a measured usage product to a Parallel Sysplex

In the following example the customer has chosen to install DB2 and its MULC PTFs on several processors in SYSPLEX1 and would like to start measured usage pricing for DB2. ALCS, IMS DB and MQM are already being priced under measured usage on SYSPLEX1. This example builds on "Example 9: Starting measured usage on a Parallel Sysplex" on page 90.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
          ADDRESS('155 Main Street',
                  'New London, CT 05512')
          CONTACT('Fred Tulle')
          PHONE('(203) 555-1212 ex 54'))
*
*    VENDOR statement used earlier is still in effect
*
  SYSPLEX(ID(SYSPLEX1)
        PLEXDATE(19950920)
        PRODUCT (PRODOWNER('IBM CORP')
                 PRODNAME('DB2')
                 START(19951025)))
/*
```

See for an explanation of the DD statements.

- **CUSTOMER** This control statement is required and must precede all other control statements. The customer has provided values for the NAME, ADDRESS, CONTACT and PHONE keywords.
- **VENDOR** This control statement is no longer necessary, because it has already been processed and its values saved in this history file in the previous example.
- **SYSPLEX** This control statement is required to identify the specific sysplex for which the request is to occur.

    ID
    Because DB2 was installed on a processor and cluster defined as SYSPLEX1 in the previous example, SYSPLEX1 is the value that must be used for this keyword.

    PLEXDATE
    The SYSPLEX control statement requires the PLEXDATE keyword. The same date should be used as was used originally to define SYSPLEX1.

    Note: CLUSTER and PROCESSOR are only required when defining a new sysplex or a making a change to an existing sysplex; they are not required for adding a product to the sysplex.

PRODUCT
Because ALCS, IMS DB and MQM have used the START keyword earlier for SYSPLEX1, they are no longer required on this set of control statements.

    PRODOWNER
    All IBM products require the value 'IBM CORP' for this field.

    PRODNAME
    Only DB2 is required.

    START
    This keyword actually triggers IFAURP to begin processing DB2 as a measured usage product on SYSPLEX1 by listing the product and its usage values in the "Billing" section of the Software Usage Report. The value of 19951020 signifies the fact that the customer has met both key requirements of the START keyword on that date. See the START keyword in for additional information.

    ALIGN
    The ALIGN option is not available to DB2, because the measurement periods for this entire processor have already been determined by the ALIGN value already set by ALCS when SYSPLEX1 was defined.

```
                                   Measured Usage Software Report                           Page   1
        IFAURP  1.2.0                    Software Usage Report                        28 November 1995

        ------------------ Customer No: 1234567 ----------------      ----------- Software Vendor: IBM CORP    --------------
        Acme Tulle and Dye Company                                    IBM Branch Office
        155 Main Street                                               1133 Westchester Avenue
        New London, CT 05512                                          Major City, Sample State  10604
        Contact/Phone: Fred Tulle  (203) 555-1212 ex 54              FAX: 1-800-555-1212  ATTN: Usage Pricing

        - Report -    --- Measurement Period End Dates ---  |  --------------------- Parallel Sysplex: SYSPLEX1 -----------------
        Due Date    End Date  Product Name(s)   Function     |  Category   Type-Model  Serial       Begin-End Dates      SU Factor
        --------    --------  --------------    --------     |  ----------  ----------  ------------  -----------------    ---------
        08Dec95     24Nov95   DB2                            |  Machine    9672-R11    04387        20Sep95 - 27Nov95
        14Mar96     28Feb96   ALCS                           |  9672 CEC   9672-R11    00333        20Sep95 - 27Nov95    660.6656
        14Mar96     28Feb96   IMS DB                         |  Cluster    9672-E02    04166        20Sep95 - 27Nov95
        14Mar96     28Feb96   MQM MVS/ESA                    |  9672 CEC   9672-S2x    00721        20Sep95 - 27Nov95    627.6233
                                                             |  9672 CEC   9672-S2x    00723        20Sep95 - 27Nov95    627.6233

        =============================================== For Billing Purposes ===========================================

                                                      ------------------------ Monthly Chargeable Product Values ---------------------
        ----------------- Product --------------- 1995                                            |          1996
        NUMBER(S) NAME         VERSION FUNCTION | APR    MAY    JUN    JUL    AUG    SEP  | OCT    NOV    DEC    JAN
        FEB    MAR   |
        --------  -------------  -------  -------- |-----  -----  -----  -----  -----  ----- |-----  -----  -----  -----  -----  ----- |
                                MAX MVS/ESA LPARS:|   -      -      -      -      -      6  |  10     9      -      -      -      -  |
                                PERCENT MISSING HOURS:|  -     -      -      -      -     11  |  21    22      -      -      -      -  |

        5685-083 ALCS          02.01.01         |   -      -      -      -      -   .872* | .968<  1.04#    -      -      -      -  |01)
                * 20Sep95-19Oct95               |                                        |                                         |

        5685-DB2 DB2           3.1.1            |   -      -      -      -      -      -   | .967*  .944#    -      -      -      -  |01)
                * 25Oct95-24Nov95               |                                        |                                         |

        5695-176 IMS DB        5.1              |   -      -      -      -      -   2.22* | 2.17<  2.34#    -      -      -      -  |01)
        5665-012               4.1              |                                        |                                         |
                * 20Sep95-19Oct95               |                                        |                                         |

        5695-137 MQM MVS/ESA   2.1              |   -      -      -      -      -   .523* | .792<  .731#    -      -      -      -  |01)
                * 20Sep95-19Oct95    (MQM#9501)|                                        |                                         |

        ------------------------------------------------------------------------------------------------------------------------
        I certify that the values circled on this report indicate months for which that product was under test allowance.

        ---------------------------------------    ---------------------------------------   ----------------------
        Name                                       Signature                                 Date

        ================================================ For Collection Purposes Only ========================================
                                                 |                                        |                                         |
        5685-083 CICS          3.3              |   -      -      -      -      -   15.8< | 16.9<  15.9#    -      -      -      -  |01)
                # 20Sep95                        |                                        |                                         |
                                                 |                                        |                                         |
        =================================================== Notes ===============================================================

         *  - Begin-End Dates of first month's usage data
         #  - Data not collected for a full month.
         <  - Value to the left is the largest value of complete months shown
        (01) - Hourly rate in millions of CPU Service Units (MSUs)
             This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 34. Software usage report generated for Example 10

Description and analysis of the software usage report generated by Example 10

See "Example 9: Starting measured usage on a Parallel Sysplex" on page 90 for an explanation of the "Customer No", "Software Vendor", and "Processor" sections.

The "Report Date Due" section lists a date of 08Dec95 by which IBM must receive a copy of this report, in order for the customer to start measured usage pricing on DB2. This date is calculated by the program as 14 calendar days after the current measurement period's end date. The next "Report Date Due" for ALCS, IMS DB and MQM are listed in this section as 14Mar96.

The "Measurement Period End Dates" section lists the last date in the current DB2 measurement period as 24Nov95, which is four days earlier than the execution date of this report.

The "For Billing Purposes Only" section lists up to the last 12 months of product usage alphabetically in product name order. The range of dates listed for DB2 and prefixed by an "*", indicate the begin-end dates of the initial monthly measurement for DB2. The begin date was provided via the START value of 19951025. The end date was calculated by the program.

The DB2 usage value under the October column is followed by an "*", which indicates that this value represents the initial monthly usage value of .967 MSUs that will used to set the usage band for the initial DB2 measured usage billing period. An "*" after the value under the October column indicates that the initial measurement period, 25Oct95-24Nov95, is complete and that the customer should provide a copy of this report to IBM as per his client representative's instructions. A "#" would indicate that the initial measurement period was still incomplete, and not yet eligible for measured usage pricing. The current usage values for ALCS, IMS DB and MQM are also listed in this section of the report.

Note that the measurement period following DB2's initial month's measurement, will be synchronized to the measurement period already established on that sysplex when the first product was started. The next measurement period for all three products will end February 28, 1996.

Example 11: Adding or removing processors from a Parallel Sysplex

The following example indicates what the customer needs to do to add another Parallel Transaction Processor (9672-E03) to the configuration defined in the previous example and remove a processor (9672-R11) from the same configuration on the same day. Note that there is no requirement to keep the total number of processors and clusters the same as was done in this example.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DSN=&&SORT89,DISP=(OLD,DELETE)
//SYSHIN   DD  DSN=MULC.HISTORY.#1234567(0),DISP=OLD
//SYSHOUT  DD  DSN=MULC.HISTORY.#1234567(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
*
  CUSTOMER(NAME('Acme Tulle and Dye Company')
          ADDRESS('155 Main Street',
                  'New London, CT 05512')
          CONTACT('Fred Tulle')
          PHONE('(203) 555-1212 ex 54'))
*
*    VENDOR statement used earlier is still in effect
*
  SYSPLEX(ID(SYSPLEX1)
          PLEXDATE(19951212)
          CLUSTER((9672,E02,04166),(9672,E03,04177)))
/*
```

See "Example 9: Starting measured usage on a Parallel Sysplex" on page 90 for an explanation of the DD statements.

- **CUSTOMER** This control statement is required and must precede all other control statements. The customer has provided values for the NAME, ADDRESS, CONTACT and PHONE keywords.
- **VENDOR** This control statement is no longer necessary, because it has already been processed and its values saved in this history file in the previous example.
- **SYSPLEX** This control statement is required to identify the specific sysplex for which the request is to occur.

  ID
  SYSPLEX1 is the value that must be used for this keyword, in this example, because the original sysplex configuration was defined with this name.

  PLEXDATE
  The date (19951212) on which the new configuration takes affect.

  CLUSTER
  The following two clusters are defined as being a part of the newest SYSPLEX1 configuration: (9672,E02,04166) and (9672,E03,04177).

  PROCESSOR
  Because the 9672-R11 is being removed from SYSPLEX1, no PROCESSOR parameters are needed.

  Note: Redefining the sysplex does not, in itself, require any changes to the products running on the sysplex. Because ALCS, DB2, IMS DB and MQM will continue to run in SYSPLEX1, no PRODUCT keywords are necessary.

```
                                  Measured Usage Software Report                              Page   1
     IFAURP  1.2.0                   Software Usage Report                         14 December 1995

------------------  Customer No: 1234567  ----------------        -----------  Software Vendor: IBM CORP      -------------
Acme Tulle and Dye Company                                  IBM Branch Office
155 Main Street                                             1133 Westchester Avenue
New London, CT 05512                                        Major City, Sample State  10604
Contact/Phone: Fred Tulle  (203) 555-1212 ex 54            FAX: 1-800-555-1212  ATTN: Usage Pricing

- Report -   --- Measurement Period End Dates ---  |   --------------------- Parallel Sysplex: SYSPLEX1 -----------------
Due Date    End Date  Product Name(s)   Function   |   Category   Type-Model   Serial     Begin-End Dates      SU Factor
--------    --------  ---------------   --------   |   --------   ----------   ------     ----------------     ---------
14Mar96     28Feb96   ***ALL***                    |   Machine    9672-R11     04387      20Sep95 - 11Dec95
                                                   |   9672 CEC   9672-R11     00333      20Sep95 - 13Dec95    660.6656
                                                   |   Cluster    9672-E02     04166      20Sep95 - 13Dec95
                                                   |   9672 CEC   9672-S2x     00721      20Sep95 - 13Dec95    627.6233
                                                   |   9672 CEC   9672-S2x     00723      20Sep95 - 13Dec95    627.6233
                                                   |   Cluster    9672-E03     04177      12Dec95 - 13Dec95
                                                   |   9672 CEC   9672-S2x     00781      12Dec95 - 13Dec95    627.6233
                                                   |   9672 CEC   9672-S3x     00782      12Dec95 - 13Dec95    587.9759
                                                   |   9672 CEC   9672-S3x     00783      12Dec95 - 13Dec95    587.9759

================================================= For Billing Purposes ================================================

                                  ------------------------ Monthly Chargeable Product Values ---------------------
----------------- Product --------------- 1995                                                       1996
NUMBER(S) NAME          VERSION  FUNCTION | APR    MAY    JUN    JUL    AUG    SEP  | OCT    NOV    DEC    JAN
FEB    MAR  |
--------  --------------  ------- -------- | -----  -----  -----  -----  -----  ----- | -----  -----  -----  -----  -----  ----- |
                      MAX MVS/ESA LPARS:|   -      -      -      -      -      6  | 10      9      9      -      -      -  |
                      PERCENT MISSING HOURS:|   -      -      -      -      -     11  | 21     18     60      -      -      -  |
                                        |                                           |
5685-083 ALCS            02.01.01       |   -      -      -      -      -   .872*| .968   1.14<  1.53#    -      -      -  |01)
         * 20Sep95-19Oct95              |                                           |
                                        |                                           |
5685-DB2 DB2             3.1.1          |   -      -      -      -      -      -  | .967*  .947<  1.07#    -      -      -  |01)
         * 25Oct95-24Nov95              |                                           |
                                        |                                           |
5695-176 IMS DB          5.1            |   -      -      -      -      -   2.22*| 2.17   2.39<  2.37#    -      -      -  |01)
5665-012                 4.1            |                                           |
         * 20Sep95-19Oct95              |                                           |
                                        |                                           |
5695-137 MQM MVS/ESA     2.1            |   -      -      -      -      -   .523*| .792<  .733   .798#    -      -      -  |01)
         * 20Sep95-19Oct95   (MQM#9501)|                                           |
                                        |                                           |
----------------------------------------------------------------------------------------------------------------------
I certify that the values circled on this report indicate months for which that product was under test allowance.

 ------------------------------------------    --------------------------------------    -----------------------
 Name                                          Signature                                 Date

================================================ For Collection Purposes Only =========================================
                                        |                                           |
5685-083 CICS            3.3            |   -      -      -      -      -   15.8<| 16.9<  15.9   16.1#    -      -      -  |01)
         # 20Sep95                      |                                           |
                                        |                                           |
================================================= Notes ===============================================================

   *  - Begin-End Dates of first month's usage data
   #  - Data not collected for a full month.
   <  - Value to the left is the largest value of complete months shown
 (01) - Hourly rate in millions of CPU Service Units (MSUs)

      This report is documented in the publication "MVS/ESA Support for Measured Usage License Charges" GC28-1098.
```

Figure 35. Software usage report generated for Example 11

Description and analysis of the software usage report generated by Example 11

The Parallel Sysplex section now indicates that the data on the Software Usage Report comes from three processors.

1. 9672-R11 for the period 20Sep95 to 11Dec95

2. 9672-E02 for the period 20Sep95 to 13Dec95

3. 9672-E03 for the period 12Dec95 to 13Dec95

If the SYSPLEX1 definition isn't changed again, no additional usage data will be reported for the 9672-R11 on SYSPLEX1's Software Usage Report.

The change in configuration had no effect on the "Report Due Date" and "For Billing Purposes" sections. The products being measured are defined to the sysplex, not processors or clusters in the sysplex, and are, therefore, independent of the changes to the configuration, though the actual usage values will reflect the product usage on all the processors in the configuration.

Example 12: Deciding which products to select for S/390 usage pricing charges

The following example illustrates the IFAURP JCL and control statements required to produce a preliminary Software Usage Report for obtaining a S/390 Usage price quote from IBM without actually placing any of the products under S/390 Usage Pricing Charges.

Note: IBM will only provide S/390 Usage Pricing Charges price quotes when the IFAURP report level is 3.1.0 or higher and the products appearing on the report have usage values which are followed by an asterisk (*). The IFAURP report level is printed at the top left corner of the Software Usage Report.

Customers can estimate whether or not S/390 Usage Pricing Charges will save them money over PSLC by using the Software Usage Report to determine whether any initial product usage values (those followed by an * on the report) are less than 25% of the processor's or Parallel Sysplex's capacity. An individual processor's capacity can be calculated from the "SU Factor" listed in the Processor section of the Software Usage Report as follows:

```
Processor capacity = SU factor x 3600 x number of CPs in the processor model
                                    1,000,000
```

For the 9672-R65 in this example, the numbers are:

```
2378.4748 x 3600 x 6 / 1,000,000 = 51.4 MSUs
```

Products whose usage is less than 12.8 MSUs (51.4 x .25) are likely to receive a pricing benefit under S/390 usage pricing charges.

Table 12. LPAR and software configuration for 9672-R65 #04984

LPAR Number	Operating System	CICS	DB2	IMS DB	IMS TM	MQM
1	OS/390 V1	V4.1	V4.1 (DB2 Admin)	-	-	V1.2
2	OS/390 V1	-	-	V5.1	V5.1 (ETO)	-
3	OS/390 V2	V4.1	V4.1 (DB2 Admin)	V6.1	V6.1 (ETO)	V1.2

S/390 Usage Pricing requires two months of usage measurement data, from all system images (LPARs and VM guest systems) on the processor for which S/390 Usage Pricing is being requested, to set the initial S/390 Usage Pricing Charges price for each of the requested products. If any of the usage is from a Parallel Sysplex then the measurement data must be from all the system images in the Parallel Sysplex. In this example the customer has a 9672-R65 processor which is not in a Parallel Sysplex and from which the customer has collected at least the required 2 months of usage data plus 1 day of additional usage data, which will be reported separately as the third and incomplete usage values (ones followed by a '#' on the report).

Note: The sample control statements used in this example are not sufficient to participate in S/390 Usage Pricing, since the keyword TESTDATE was used instead of START. See for all the control statements required to actually request S/390 Usage Pricing Charges for one or more products in this example.

```
//IFAURP   EXEC PGM=IFAURP,REGION=0M
//STEPLIB  DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS  DD  SYSOUT=*
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DSN=USAGE.SORTED89.DECJAN99,DISP=(OLD,KEEP)
//SYSHIN   DD  DUMMY,DCB=BLKSIZE=16384
//SYSHOUT  DD  DSN=USAGE.HISTORY.PHILA(+1),DISP=(NEW,CATLG,DELETE),
//             DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//             UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
```

```
//SYSIN    DD  *
 CUSTOMER(NAME('Liberty Bell Services')
          ADDRESS('22 Clapper Plaza',
                  'Philadelphia, Pa. 19101')
          CONTACT('Bennet Franklin')
          PHONE('(610) 555-1212'))
 *
 VENDOR(PRODOWNER('IBM CORP')
        NAME('IBM Corporation')
        ADDRESS('Philadelphia Branch Office',
                'FAX: (610) 555-IBM1  Attn: Sally Sales')
        CODE(0012345))
 *
 PROCESSOR((9672,R65,04984)
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('CICS')
                   TESTDATE(19981201))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('IMS DB')
                   TESTDATE(19981201))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('IMS TM')
                   TESTDATE(19981201))
          PRODUCT (PRODOWNER('IBM CORP')
                   PRODNAME('MQM MVS/ESA')
                   TESTDATE(19981201)))
 /*
```

Note: Complete descriptions of IFAURP's JCL and control statements are provided in "Invoking IFAURP" on page 26.

- //STEPLIB references the IBM library, SYS1.SIFALIB, that contains IFAURP and the IFAURP reporting exits supplied with some IBM products, like MQM. The installation logic for MQM requires that MQM's CSQ8UBEX module and its IFAUMQM# alias be copied from MQM's .SCSQLOAD library to the SYS1.SIFALIB library. This must be done or the Software Usage Report will not list the MQM usage values correctly. Because no software vendors have provided product exit libraries for their products in this example, it is not necessary to concatenate any vendor libraries to SYS1.SIFALIB.

- //SYSMSGS references the file where the IFAURP Messages Report is written. This report lists the control statements processed by the usage report program and all error messages issued during its execution. This report should be used to assess the validity of all the other reports produced by this execution of the usage report program.

- //SYSPRINT references the file where all the other reports are written, including the Software Usage Report.

- //SMFDATA references a file of SMF type 89 records that were sorted before this step. See Figure 6 on page 11 for sample JCL for the sort step and sample sort control statements. SMF type 89 records consist of subtype 1 records which contain the usage data for usage products and subtype 2 records which were introduced with OS/390 and contain registration statistics for products using z/OS Product Registration Services. These registration statistics are printed on IFAURP's Software Product Registration Report. The SMF type 89-2 records can be substantially larger than the SMF type 89-1 records and are not required to generate the Software Usage Report. All these examples will cover only the use of SMF type 89-1 records.

  In this example all of the SMF type 89-1 records, which have been collected from the 9672-R65 (04984) processor for December 1, 1998 to and including February 1, 1999, have been merged and sorted for the customer's three OS/390 V2 LPARs into the the sorted file named USAGE.SORTED89.DECJAN99. The Software Usage Report program must see at least one hour's usage more than the initial measurement period to consider the initial measurement period complete and place asterisks * after the initial measurement values. The usage data beyond the measurement period will be reported separately under a different month.

  Note: This sorted usage data is being saved since it may optionally be used in "Example 13: Placing products under S/390 usage pricing charges" on page 105.

- //SYSHIN must be specified as DD DUMMY, because this is the first time that the customer has run IFAURP and thus no history file exists.

- //SYSHOUT references the IFAURP output history file named USAGE.HISTORY.PHILA that is created as a result of this job step. The last qualifier, PHILA, designates the customer's data center location for the processor from which the usage data was collected. In this example USAGE.HISTORY.PHILA is a generation data group (GDG) and will be assigned the full name of USAGE.HISTORY.PHILA.G0001V00. See *z/OS DFSMS Using Data Sets* for a detailed explanation of GDGs. This new history file will contain the control statements used for this execution and the usage data of the SYSHIN file and the SMFDATA files. Once these SMF type 89-1 records have been processed and their data saved on this history file, the original type 89-1 records are no longer required as input to future executions of IFAURP.

  Note: you can optionally choose to DUMMY this file when generating the Software Usage Report for the initial price quote, provided you keep the USAGE.SORTED89.DECJAN99 file as input to , which indicates how to actually request OS/390 Usage Pricing Charges.

- //SYSIN references the IFAURP control statements required to provide customer and vendor descriptions, as well as, to specify the processor and products to be selected for S/390 Usage Pricing Charges.

- **CUSTOMER** This control statement is required and must precede all other control statements.

  NAME
  > This parameter supplies the customer name to each vendor and is required for IFAURP to execute. IBM recommends that customers use the name by which they are known to IBM for this field.

  ADDRESS, CONTACT, PHONE
  > These parameters provide the customer's mailing address, the name of the customer representative to be contacted if IBM has questions about the report and the contact's phone number.

  > **Note:** The customer provided all these parameter values in this example, since it is easy enough to do when creating the original control statement. Supplying all the CUSTOMER parameters for the price quote eliminates the risk that these parameters will be missing from any of the follow on reports which must be sent to IBM.

- **VENDOR** This control statement associates the product usage being reported on SMF type 89-1 records with a specific vendor. Each vendor should supply the information required for each keyword on this control statement to the customer. Since this example is for IBM products, all the VENDOR information will be for IBM.

  PRODOWNER
  > This parameter specifies the value used by the vendor to identify all their products on type 89-1 records. "IBM CORP" appears because IBM identifies all its products with this value. This keyword is required.

  NAME
  > This parameter identifies the name of the software vendor. This parameter is required and should be supplied by your IBM client representative.

  ADDRESS
  > This parameter provides the vendor's mailing address and or telephone or FAX number. This information should be supplied by your IBM client representative.

  CODE
  > This value represents the customer number under which all of the processors on the following PROCESSOR or SYSPLEX control statements are known to IBM (that is, all the processors for which usage data has been placed in this history file). Processors with different customer numbers must be placed in separate history files.

- **PROCESSOR** This control statement identifies the specific processor and products for which a pricing quote is being requested. Since this example is for a processor that not in a Parallel Sysplex, the PROCESSOR statement is used instead of the SYSPLEX statement.

  (9672,R65,04984)
  > This field is used to identify the specific processor for which the remainder of the subparameters on this PROCESSOR control statement apply.

Note: You must obtain the type and model values from Appendix A, "Type-model values for IBM and non-IBM processors," on page 115. Hitachi processors must use a model value for the appropriate Hitachi processor (for example, PILOT65). In the United States, the last 5 digits of the processor serial number are used to identify the processor. Outside the United States, this 5–digit serial number must be prefixed with a 2–digit manufacturing location.

PRODUCT

CICS, IMS and MQM are all eligible for S/390 Usage Pricing Charges on the 9672-R65, because at least one LPAR has OS/390 V2 and CICS, IMS and MQM each have an eligible S/390 Usage Pricing Charges version (such as CICS V4, IMS V6 and MQM V1). Since IMS V6 is being used, usage from IMS V5 and IMS V6 will be aggregated and the aggregated usage will be used to set the S/390 Usage Pricing Charge for IMS V6. There will be no charge for IMS V5, since its usage is being charged for under IMS V6. IMS TM's ETO feature will also be placed under S/390 Usage Pricing, whenever the base IMS TM feature is placed under S/390 Usage Pricing Charges. In this example, DB2 does not qualify for S/390 Usage Pricing since the customer is running DB2 V4.1. DB2 eligibility for S/390 Usage Pricing starts with DB2 V5.

Each product for which a S/390 Usage Pricing Charges price quote is being requested (for example, CICS, IMS DB, IMS TM and MQM MVS/ESA) requires its own set of PRODOWNER, PRODNAME and TESTDATE keywords.

Note:

1. Although IMS DB and IMS TM are base features of the same product, each can be placed on S/390 Usage Pricing independently of the other; therefore, each requires its own control statement.

2. Each product feature (for example, IMS TM ETO) must have the same pricing option has its base product. Such features, however, do not appear on PRODUCT control statements.

3. TSO/E is a part of z/OS and not separately priced. Therefore, TSO/E is not eligible for S/390 Usage Pricing Charges.

PRODOWNER

All IBM products require the value "IBM CORP" for this field.

PRODNAME

Identifies each product that the customer wants to request an S/390 Usage Pricing price quote for. Since it is only for a price quote. the customer has chosen all of their eligible S/390 Usage Pricing products.

TESTDATE

The value of 19981201 signifies the fact that the customer would like to obtain the usage value, and might also want a price quote, for a product without actually starting S/390 Usage Pricing Charges billing. To ensure that the usage values correspond to the values that S/390 Usage Pricing would use, use a TESTDATE value that is the same as the value that would be used for the START parameter. The value used for the START parameter can be determined as follows:

1. The customer has met all the S/390 Usage Pricing requirements by that date.

   a. December 1, 1998 is the earliest initial measurement start date which can be used to place a product under S/390 Usage Pricing Charges.

   b. SMF data must be collected from all of the OS/390 and z/OS LPARs on the processor on or before the START date.

   c. If DB2 is being placed under S/390 Usage Pricing Charges, all copies of DB2 on that processor must be restarted, after SMF type 89-1 record collection has been activated on all the OS/390 and z/OS LPARs on that processor.

2. The START value is no earlier than 72 days before the date that this report was run. This is important, because START dates earlier than 72 days can not meet the IBM requirement that IBM receive the Software Usage Report within 10 business days after the end of the measurement period (START date + 28+30 measurement days (2 months) + 14 calendar days = 72 days).

Note: Some IBM geographies will accept the usage collected during a new product's last month under test allowance for the first month of the 2–month initial measurement period.

```
                        Measured Usage and S/390 Usage Pricing Charges                    PAGE   1
IFAURP 3.1.2                          Software Usage Report                           2 FEBRUARY 1999

------------------ Customer No: 0012345 ------------------        ------------- Software Vendor: IBM CORP      ---------------
Liberty Bell Services                                             IBM Corporation
22 Clapper Plaza                                                  Philadelphia Branch Office
Philadelphia, Pa. 19101                                          FAX: (610) 555-IBM1  Attn: Sally Sales
Contact/Phone: Bennet Franklin / (610) 555-1234

- Report -     --- Measurement Period End Dates ---  |  --------------------------- Processor ----------------------------
 Due Date     End Date  Product Name(s)   Function    |  Category    Type-Model   Serial      Begin-End Dates    SU Factor
 --------     --------  ----------------  --------    |  ----------  ----------   ----------   -----------------  ----------
                                                      |  Machine     9672-R65     04984        01Dec98 - 01Feb99  2378.4748
                                                      |  9672 CEC    9672-R65     04984        01Dec98 - 01Feb99  2378.4748

====================================================== For Collection Purposes Only ======================================================

                                      ----------------------- Monthly Chargeable Product Values -----------------------
---------------- Product -----------------   1998 1999
NUMBER(S) NAME         VERSION FUNCTION   DEC  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
-------- ---------------- -------- --------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
                        MAX MVS/ESA LPARS:    3    3    3   -    -    -    -    -    -    -    -    -    -
                        PERCENT MISSING HOURS: 10   9   90   -    -    -    -    -    -    -    -    -    -

5655-018 CICS         4.1                9.91 10.4X 10.7#   -    -    -    -    -    -    -    -    -    -      (01)
           X 01Dec98-31Jan99

5695-DB2 DB2          4.2.1              10.2# 9.90 9.75#   -    -    -    -    -    -    -    -    -    -      (01)
           # 01Dec98

5655-158 IMS DB       6.1                30.2X 28.5 28.4#   -    -    -    -    -    -    -    -    -    -      (01)
5695-176              5.1
           X 01Dec98-31Jan99

5655-158 IMS TM       6.1                8.97X 8.95 8.77#   -    -    -    -    -    -    -    -    -    -      (01)
5695-176              5.1
           X 01Dec98-31Jan99

5695-137 MQM MVS/ESA  1.2                5.50X 5.34 4.57#   -    -    -    -    -    -    -    -    -    -      (01)
           X 01Dec98-31Jan99       (MQM#9501)

5647-A01 OS/390       02.04.00 TSO/E     22.8# 20.7 21.9#   -    -    -    -    -    -    -    -    -    -      (02)
           # 01Dec98


=========================================================== Notes =============================================================

   X  - Begin-end dates of the initial measurement period
   #  - Data not collected for a full month.
   <  - Value to the left is the largest value of complete months shown.
  (01) - Hourly rate in millions of CPU Service Units (MSUs).
  (02) - Not eligible for Measured Usage charges
```

Figure 36. Software usage report generated for Example 12

Description and analysis of the software usage report generated by Example 12

The IFAURP report level appears in the upper-left corner of the report and indicates that the level is 3.1.0. This is the minimum IFAURP level required to support S/390 Usage Pricing Charges. The "Customer No" section contains the customer name, address, contact and phone number as provided by the subparameters of the CUSTOMER control statement. The customer number that is listed was provided by the CODE value from the VENDOR statement.

The "Software Vendor" section contains the abbreviated vendor name, IBM CORP as registered by each product shown on this report. The vendor name and address appear as provided by the values supplied on the VENDOR control statement's NAME and ADDRESS parameters.

The "Report Date Due" section and "Measurement Period End Dates" section are blank because no START keywords were used to select specific products to participate in S/390 Usage Pricing Charges.

The "Processor" section lists the specific IBM processor (9672-R65 #04984) for which usage values are being listed on this report. The Begin-End Dates field indicate the earliest date (01Dec98) and last date (01Feb99) for which the data collected on this processor has been processed by IFAURP.

The "For Collection Purposes Only" section appears immediately after the "Processor" section and replaces the "For Billing Purposes" section, because no START keywords were used to select specific products to place under S/390 Usage Pricing Charges. Use of the keyword TESTDATE causes a range of dates to be listed for all the products for which a PRODUCT statement was supplied: CICS, IMS DB, IMS TM and MQM MVS/ESA. These dates are prefixed by an X, and indicate the begin-end dates of the initial 2 month measurement for each product. The begin date was provided by the TESTDATE value of 19981201, while the end date was calculated by the program. The products are listed alphabetically in this section in product name order.

Note: Product features (such as IMS TM ETO) and dependent or companion usage products (such as DB2's DB2 Administration Tool) do not appear on these reports; however, the usage value listed for their corresponding usage product is used to set the feature's S/390 Usage price and can be used to set the dependent or companion product's S/390 Usage price.

All the products for which a PRODUCT statement was provided have usage values which are followed by an X either in the December column or the January column. The X signifies:

1. IFAURP considers the initial 2 month measurement period complete.
2. The usage value immediately to the left of the X is the value to be used to set the S/390 Usage Pricing Charges price for that product.
3. The usage values for the first two months correspond to the initial measurement period that is preceded by an X and listed just below the product name.

The CICS usage value under the January column is followed by an X, which indicates that this value represents the initial usage value of 10.4 MSUs that would be used to determine the S/390 Usage Pricing Charges price for CICS, if the START keyword were used instead of the TESTDATE keyword. Since 10.4 MSUs is less than 25% of the capacity of the processor (calculated earlier in this example to be 12.8 MSUs), the S/390 Usage Pricing Charge for CICS is likely to be less than the PSLC charge.

An X after the CICS usage value under January indicates that the measurement period, 01Dec98-31Jan99, is complete. This happens when the program processes type 89-1 records for the day following the last day of the initial measurement period. If a # appears in the December or January columns the initial measurement is considered to be incomplete, and IBM will not provide usage prices. The usage value of 10.7 in the February column indicates all the usage processed for February and is not used to determine the initial usage price, since it is outside the initial measurement period of 01Dec98-31Jan99.

Note: All usage values appearing in the February column will be followed by a # until usage data from the month of March is encountered.

Since the customer has DB2 and has collected DB2 usage, the DB2 usage is automatically listed on this report, even though DB2 V4 is not eligible for S/390 Usage Pricing Charges. Usage for S/390 Usage Pricing Charges products and MULC products will appear on the same Software Usage Report so that customers having both types of products only need to submit a single Software Usage Report per processor (or per Parallel Sysplex).

Note: Products that are not already under MULC billing prior to January 1, 1999, can not be placed under MULC, since MULC is withdrawn effective on that date.

Although DB2 usage values are listed for the months of December, January and February, none of these values are followed by an X, since a DB2 PRODUCT statement was not provided. IBM will not provide price quotes for products whose usage values are not followed by an X.

Note: The December value is followed by a # and the 01Dec98 date listed just below the DB2 product name is preceded by a #. These two #s indicate the earliest date on the usage records processed for the month of December.

IMS DB usage is listed as the aggregated usage of both IMS DB V5.1 and V6.1. Although the IMS product consists two base features, IMS DB and IMS TM, each of these base features records usage separately and can be placed under S/390 Usage Pricing Charges independently of each other. The IMS DB value listed in the December column, 30.2, is followed by an X and would be used to establish the S/390 Usage Pricing Charge for IMS DB V6.1. Since 30.2 MSUs is greater than 25% of the capacity of the processor (calculated earlier in this example to be 12.8 MSUs), the S/390 Usage Pricing Charge for IMS DB will be higher than the PSLC charge.

IMS TM usage is also listed as the aggregated usage of both IMS TM V5.1 and V6.1. The IMS TM value listed in the December column, 8.97 is followed by an X and would be used to establish the S/390 Usage Pricing Charge for IMS TM V6.1 and for IMS TM's ETO feature. Since 8.97 MSUs is less than 25% of the capacity of the processor (calculated earlier in this example to be 12.8 MSUs), the S/390 Usage Pricing Charges for IMS TM and IMS TM's ETO feature will both be less than their PSLC charges.

The MQM usage value which will be used to establish the S/390 Usage Pricing Charge is in the December column, since that value (5.50) is the MQM value followed by an X. The Begin-End dates listed for MQM are followed by the value MQM#9501. This value represents the value of the MQM report exit that was invoked by IFAURP and used when processing MQM usage data. See the discussion for the //STEPLIB JCL statement earlier in this example for additional information about this exit. Since 5.50 MSUs is less than 25% of the capacity of the processor (calculated earlier in this example to be 12.8 MSUs), the S/390 Usage Pricing Charges for MQM will be less than the PSLC charge.

The usage value for the TSO/E component of OS/390 V2 is also listed on this report, because TSO/E continues to report usage even though TSO/E is now included with OS/390 and not priced as a separate feature, as is indicated by its footnote number printed on the far right of the TSO/E usage line.

Since the usage values for CICS, IMS TM and MQM for the initial measurement period (the usage values followed by an X), were less than 25% of the processor's capacity, these products are likely to cost less under S/390 Usage Pricing Charges than under PSLC. IBM will provide a price quote for each of these products if the customer sends a copy of this Software Usage Report to IBM and requests such a price quote.

Example 13: Placing products under S/390 usage pricing charges

The following JCL and control statements are used to place CICS, IMS TM and MQM under S/390 Usage Pricing Charges by reporting the usage values for all three products in the "Billing" section of the Software Usage Report.

This example is a follow-up to "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99, where CICS, DB2, IMS DB, IMS TM and MQM usage values were reported in the "Collection" section of the Software Usage Report. Those values were used to determine whether any of those products would benefit from S/390 Usage Pricing. The Software Usage Report generated by Example 12 was sent to IBM with a request for a S/390 Usage Pricing Charges price quote for each product whose usage value was followed by an "X". Based on the price quote, the customer has decided to place CICS, IMS TM and MQM under S/390 Usage Pricing Charges. In order to do that, the customer must create another Software Usage Report for those products; but this time, those products must appear in the "Billing" section of the report. The customer must send that report to IBM, together with a signed *IBM Customer Agreement Attachment for S/390 Usage Pricing*, within 10 business days after the last day of the initial measurement period.

Because a preliminary Software Usage Report was generated in "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 to obtain a price quote, the control statements and usage data used by that report will be used as a starting point to generate the initial Software Usage Report required by IBM to actually place products under the S/390 Usage Pricing Charges option. The primary IFAURP control statement changes are to:

1. Remove the PRODUCT statements for products which should not be under S/390 Usage Pricing Charges due to the relatively high S/390 Usage Price.

2. Change all the TESTDATE keywords on the remaining PRODUCT statements to the START keyword. Changing the TESTDATE keyword to START and retaining the same dates guarantees that the usage values that appeared in the "Collection" section of the report due to the TESTDATE keyword will now appear in the "Billing" section of the report due to the START keyword.

3. Add an ALIGN parameter to force all new "Billing" periods to start on July 1st.

Note: Most of the JCL statements and control statements in this example are based on "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 and the reader will be referred back to specific sections of Example 12, when the explanation for the parameters being referenced are the same as those used in Example 12.

The sample JCL and IFAURP control statements which will generate the required Software Usage Report are as follows:

```
//IFAURP    EXEC PGM=IFAURP,REGION=0M
//STEPLIB   DD  DSN=SYS1.SIFALIB,DISP=SHR
//SYSMSGS   DD  SYSOUT=*
```

```
//SYSUDUMP DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMFDATA  DD  DUMMY,DCB=BLKSIZE=16384
//SYSHIN   DD  DSN=USAGE.HISTORY.PHILA(0),DISP=SHR
//SYSHOUT  DD  DSN=USAGE.HISTORY.PHILA(+1),DISP=(NEW,CATLG,DELETE),
//            DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=16384),
//            UNIT=SYSDA,SPACE=(CYL,(2,2),RLSE)
//SYSIN    DD  *
 CUSTOMER(NAME('Liberty Bell Services')
         ADDRESS('22 Clapper Plaza',
                 'Philadelphia, Pa. 19101')
         CONTACT('Bennet Franklin')
         PHONE('(610) 555-1212'))
*
*   VENDOR statement used earlier is still in affect
*
 PROCESSOR((9672,R65,04984)
            PRODUCT (PRODOWNER('IBM CORP')
                    PRODNAME('CICS')
                    START(19981201,ALIGN(07)))
            PRODUCT (PRODOWNER('IBM CORP')
                    PRODNAME('IMS TM')
                    START(19981201))
            PRODUCT (PRODOWNER('IBM CORP')
                    PRODNAME('MQM MVS/ESA')
                    START(19981201)))
 /*
```

Note: Complete descriptions of IFAURP's JCL and control statements are provided in "Invoking IFAURP" on page 26.

- //STEPLIB See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

- //SYSMSGS See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

- //SYSPRINT See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

- //SMFDATA has been DUMMYed because the usage data that was saved on Example 12's history file will be used to generate the Software Usage Report required to place the requested products under S/390 Usage Pricing Charges. This can be done, because the preliminary Software Usage Report generated for Example 12 contained usage values which were followed by "X" indicating that usage data was provided for the entire initial measurement period.

  If the customer chose not to create an output history file when generating the preliminary Software Usage Report, the following //SMFDATA statement should be used instead. See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a complete description of the following //SMFDATA statement.

  ```
  //SMFDATA  DD  DSN=USAGE.SORTED89.DECJAN99,DISP=(OLD,KEEP)
  ```

- //SYSHIN uses Generation Data Group notation to read the last copy of IFAURP's history file. There should be no problem if this file contains additional usage data, since that data will be reported under the month of February and will not change the usage values for the months of December and January, which were listed on the preliminary Software Usage Report, and which will now be used to set the S/390 Usage Pricing Charges for the products appearing in the "Billing" section.

  If the //SMFDATA file uses the USAGE.SORTED89.DECJAN99 file, instead of being DUMMYed, the //SMFDATA statement should be DUMMYed.

  Note: IFAURP will automatically detect and ignore duplicate usage data if the //SMFDATA file contains any data that was already placed in IFAURP's history file and the //SYSHIN file is not DUMMYed.

- //SYSHOUT See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

- //SYSIN See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

- **CUSTOMER** This control statement is required for every execution of IFAURP and must precede all other control statements.

  NAME
  See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

  ADDRESS, CONTACT, PHONE
  See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

- **VENDOR** This control statement is not required if the IFAURP history file, which was generated for "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99, is used for //SYSHIN, since the VENDOR information is saved on the history file and will be retrieved from that history file on this execution of IFAURP.

  If the //SMFDATA file uses the USAGE.SORTED89.DECJAN99 file, and the //SYSHIN file is DUMMYed, a VENDOR statement must be supplied. See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description of the VENDOR statement.

- **PROCESSOR** This control statement identifies the specific processor and products for which S/390 Usage Pricing Charges are being requested. Since the PRODUCT parameters will be different than those used to generate the preliminary Software Usage Report in "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99, the PROCESSOR statement together with its related PRODUCT parameters are required to override the PRODUCT parameters in the history file, if the preliminary history file is input to //SYSHIN.

  (9672,R65,04984)
  See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a description.

  PRODUCT
  Use the PRODUCT statements used for CICS, IMS and MQM in "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99, to request S/390 Usage Pricing Charges. Do not use PRODUCT statements for DB2 and IMS DB, since DB2 V4 is not eligible for S/390 Usage Pricing Charges and the S/390 Usage Price is higher than IMS DB's PSLC price.

  PRODOWNER
  All IBM products require the value "IBM CORP" for this field.

  PRODNAME
  Identifies each product that the customer wants to place under S/390 Usage Pricing Charges.

  START
  Replace the TESTDATE keyword, which was used to generate the preliminary Software Usage Report described in "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 and used to request a price quote from IBM, with the START keyword to request that the associated product actually be placed under S/390 Usage Pricing charges. Use the same date as was used for the TESTDATE parameter so that the same initial usage values are produced in the "Billing" section of the report as were produced in the "Collection" section of the preliminary report. See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 for a discussion on choosing the TESTDATE and START parameter values.

  ALIGN
  This optional parameter allows customers to choose the month to which all 12 month "Billing" periods will be synchronized. This parameter can only be used once, to establish the start of the second "Billing" period for a processor which does not yet have a "Billing" period established. Once such a "Billing" period is established, it can not be changed. All products on the processor are synchronized to the same "Billing" period on that processor, regardless of when the individual products may have STARTed their initial measurement period.

  The first "Billing" period on a processor is always established by the product with the earliest START date or by the first PRODUCT control statement, when several PRODUCT control statements all have the same START date. The first "Billing" period (the months for which the S/390 Usage Price set by the initial measurement apply) starts on the first day of the month in which the initial measurement

period ends and continues for the next 11 months by default. The customer can change the month on which the initial "Billing" period ends and the second "Billing" period starts by using the ALIGN parameter to specify the month on which the second "Billing" period should start. The second and all succeeding "Billing" periods are 12 months long.

All processors, including those in a Parallel Sysplex, which share the same IFAURP history file are also synchronized to the "Billing" period established for the product with the earliest START date encountered in the history file. IBM recommends that customers use the same IFAURP history file for all processors in the same data center (which have the same IBM customer number) so that all Software Usage Reports are due to IBM on exactly the same date, and can be generated by a single execution of the IFAURP program.

In this example the customer wished to align the S/390 Usage Pricing Charges so that the new "Billing" period would always start on July 1. The ALIGN value of "07" on the first PRODUCT statement (such as CICS) will force such an alignment.

```
                              Measured Usage and S/390 Usage Pricing Charges                        PAGE   1
IFAURP 3.1.2                            Software Usage Report                                    6 FEBRUARY 1999

------------------- Customer No: 0012345 -------------------       -------------- Software Vendor: IBM CORP       ---------------
Liberty Bell Services                                             IBM Corporation
22 Clapper Plaza                                                  Philadelphia Branch Office
Philadelphia, Pa. 19101                                          FAX: (610) 555-IBM1  Attn: Sally Sales
Contact/Phone: Bennet Franklin / (610) 555-1234

- Report -    --- Measurement Period End Dates ---  |  ---------------------------- Processor ----------------------------
 Due Date    End Date  Product Name(s)   Function    |  Category    Type-Model   Serial      Begin-End Dates     SU Factor
 --------    --------  ---------------   --------    |  ----------  -----------  -----------  -----------------   ---------
 14Feb99     31Jan99   ***ALL***                     |  Machine     9672-R65     04984        01Dec98 - 01Feb99   2378.4748
                                                     |  9672 CEC    9672-R65     04984        01Dec98 - 01Feb99   2378.4748

=================================================== For Billing Purposes =======================================================

                                              ----------------------- Monthly Chargeable Product Values -----------------------
---------------- Product ----------------    1998 1999
NUMBER(S) NAME           VERSION FUNCTION     DEC  JAN  FEB  MAR  APR  MAY | JUN  JUL  AUG  SEP  OCT  NOV  DEC
--------- ---------------  ------- --------   ---- ---- ---- ---- ---- ---- |---- ---- ---- ---- ---- ---- ----
                          MAX MVS/ESA LPARS:    3    3    3    -    -    - |   -    -    -    -    -    -    -
                          PERCENT MISSING HOURS: 10    9   90    -    -    - |   -    -    -    -    -    -    -
                                                                          |
5655-018 CICS             4.1             9.91 10.4X 10.7#   -    -    - |   -    -    -    -    -    -    -   (01)
          X 01Dec98-31Jan99                                               |
                                                                          |
5655-158 IMS TM           6.1             8.97X 8.95  8.77#   -    -    - |   -    -    -    -    -    -    -   (01)
5695-176                  5.1                                             |
          X 01Dec98-31Jan99                                               |
                                                                          |
5695-137 MQM MVS/ESA      1.2             5.50X 5.34  4.57#   -    -    - |   -    -    -    -    -    -    -   (01)
          X 01Dec98-31Jan99    (MQM#9501)                                 |
                                                                          |
-------------------------------------------------------------------------------------------------------------------------------
  I certify that the values circled on this report indicate months for which that product was under test allowance.


   ----------------------------------------------   ----------------------------------------------   -----------------------
   Name                                             Signature                                        Date

=================================================== For Collection Purposes Only ==============================================
5695-DB2 DB2              4.2.1           10.2# 9.90  9.75#   -    -    - |   -    -    -    -    -    -    -   (01)
          # 01Dec98                                                       |
                                                                          |
5655-158 IMS DB           6.1            30.2X 28.5  28.4#   -    -    - |   -    -    -    -    -    -    -   (01)
5695-176                  5.1                                             |
          X 01Dec98-31Jan99                                               |
                                                                          |
5647-A01 OS/390           02.04.00 TSO/E 22.8# 20.7  21.9#   -    -    - |   -    -    -    -    -    -    -   (02)
          # 01Dec98                                                       |
                                                                          |
=================================================== Notes =====================================================================

   X  - Begin-end dates of the initial measurement period
   #  - Data not collected for a full month.
   <  - Value to the left is the largest value of complete months shown.
 (01) - Hourly rate in millions of CPU Service Units (MSUs).
 (02) - Not eligible for Measured Usage charges
```

Figure 37. Software Usage Report generated for Example 13

Description and analysis of the software usage report generated by Example 13

The IFAURP report level appears in the top left corner of the report and indicates that the level is 3.1.0. This is the minimum IFAURP level required to support S/390 Usage Pricing Charges. The "Customer No" section contains the customer name, address, contact and phone number as provided by the subparameters of the CUSTOMER control statement. The customer number that is listed was provided by the CODE value from the VENDOR statement.

The "Software Vendor" section contains the abbreviated vendor name, IBM CORP as registered by each product shown on this report. The vendor name and address appear as provided by the values supplied on the VENDOR control statement's NAME and ADDRESS parameters.

The "Report Date Due" section contains the date 14Feb99. This date is calculated by IFAURP based on the START date of the products appearing in the "Billing" section of the report. This is the date by which IBM must receive this Software Usage Report (based on START dates of 01Dec98). IBM will not accept this report after 14Feb99 for setting the S/390 Usage Pricing Charges for the products in the "Billing" section of the report.

The "Measurement Period End Dates" section contains the date 31Jan99. This date is also calculated by IFAURP based on the START date of the products appearing in the "Billing" section and represents the last full day for which usage measurement data must be processed by IFAURP. At least one additional hour of usage data beyond this date must be processed by IFAURP before IFAURP considers the measurement data complete for the initial measurement period.

The "Processor" section lists the specific IBM processor (9672-R65 #04984) for which usage values are being listed on this report. The Begin-End Dates field indicate the earliest date (01Dec98) and last date (01Feb99) for which the data collected on this processor has been processed by IFAURP.

The "PERCENT MISSING HOURS" section indicates the percentage of usage hours for which no SMF type 89-1 records were processed by IFAURP for the month indicated. This percentage is based on the number of LPARs listed on the line immediately above this section. The Software Outage Report lists the specific hours, which IFAURP considers missing, by LPAR. IBM is likely to require an explanation when this value is higher than 20%. The report's values of 10% and 9% are acceptable for the initial measurement period (December and January). Since IBM will not use the values listed under the month of February, the percent missing hours listed for that month (90%) will be ignored.

The "Billing" section of the report contains a list of all the products, which have a PRODUCT statement with a START parameter and which have usage to report. The products in this section are listed alphabetically by product name. The vertical bars between the months of May and June indicate that:

1. The measurement period immediately after the initial two month measurement period ends the last day of May 1999.

2. The second billing period starts July 1, 1999 (1 full calendar month after the last day of the previous measurement period). This is done to give the customer time to generate the next required Software Usage Report and to give IBM time to set the S/390 Usage Pricing Charges for the next billing period, while the customer is still being charged the price established for the initial billing period.

The start of the second billing period was established by the ALIGN value of 07 (July), as provided by the customer. If an ALIGN parameter was not provided, IFAURP would have established a default 12 month initial billing period which would have placed vertical bars before the month of December 1998 and between the months of November and December 1999.

The X, which appears in the "Billing" sections, has the following significance:

1. IFAURP considers the initial 2 month measurement period complete.

2. The usage value immediately to the left of the X is the value to be used to set the S/390 Usage Pricing Charges price for that product.

3. The usage values for the first two months correspond to the initial measurement period that is preceded by an X and listed just below the product name.

Because CICS V4 is being used and OS/390 V2 is being used on at least one LPAR on this processor sometime during the initial measurement period, CICS is eligible for S/390 Usage Pricing Charges. The CICS usage value under the January column (10.4 MSUs) is followed by an X, which indicates that IBM will use this value to establish the S/390 Usage Price for CICS V4, for CICS's initial billing period. Because IFAURP lists the end date for CICS's initial measurement collection as 31Jan99, CICS's initial S/390 Usage Pricing billing period starts on January 1, 1999 (the first day of the month in which the measurement ends), and the billing period ends June 30, 1999 (per the ALIGN value of 07). If the customer licensed any CICS priced features on this processor, those priced features would also be placed under S/390 Usage Pricing Charges for the same billing period. The feature price would be set based on the CICS usage value.

Because IMS TM V6 is being used and OS/390 V2 is being used on at least one LPAR on this processor sometime during the initial measurement period, IMS TM is eligible for S/390 Usage Pricing Charges. The IMS TM usage is listed as the aggregated usage of both IMS TM V5.1 and V6.1. The IMS TM usage value listed in the December column (8.97) is followed by an X and will be used to establish the S/390 Usage Pricing Charge for IMS TM V6 and for IMS TM's ETO feature. Under S/390 Usage Pricing, IBM does not charge for the IMS TM V5 base feature. Since IMS TM has the same START date as CICS, it has the same initial measurement end date and, therefore, the same initial billing period.

Note: Although IMS DB and IMS TM are both base features in the same product, they collect usage separately and can be placed under S/390 Usage Pricing Charges independently of each other. In this example IMS TM has been placed under S/390 Usage Pricing, while IMS DB has not.

Because OS/390 V2 is being used on at least one LPAR on this processor sometime during the initial measurement period, MQM is eligible for S/390 Usage Pricing. The MQM usage value which IBM will use to establish MQM's S/390 Usage Pricing Charge is in the December column, since that value (5.50) is the MQM value which is followed by an X. Like IMS TM, MQM has the same START date as CICS, which means that it has the same initial measurement end date and, therefore, has the same initial billing period.

Note: The Begin-End dates listed for MQM is followed by the value MQM#9501. This value represents the value of the MQM report exit that was invoked by IFAURP and used when processing MQM usage data. See the discussion for the //STEPLIB JCL statement in for additional information about this exit.

The "Collection" section of the report contains the usage values for all the products which collect usage but do not have PRODUCT statements with START parameters. IBM will not provide S/390 Usage Pricing Charges for products appearing in this section of the report. DB2 is listed in this section and is not eligible for S/390 Usage Pricing Charges, because it is not an eligible DB2 version.

Since IMS DB V6 is being used and OS/390 V2 is being used on at least one LPAR on this processor sometime during the initial measurement period, IMS DB is eligible for S/390 Usage Pricing. IMS DB appears in the "Collection" section because the customer did not provide the required IMS DB PRODUCT statement with a START parameter, since the OS/390 Usage Price for IMS DB was higher than its PSLC price as determined in .

Note: The IMS DB usage value for December (30.2) is followed by an X and IMS DB has a set of Begin-End dates listed immediately below its name. This occurred due to the IMS DB PRODUCT statement with a TESTDATE parameter that was used in and saved on IFAURP's history file. If the //SYSHIN file is DUMMYed and no PRODUCT control statement is provided for IMS DB, the IMS DB usage value in the December column will be followed by a # and only a Begin date will be listed.

The usage value for the TSO/E component of OS/390 V2 is also listed on this report, because TSO/E continues to report usage even though TSO/E is now included with OS/390 and not priced as a separate feature, as indicated by its footnote number printed on the far right of the TSO/E usage line.

Note: This Software Usage Report must be received by IBM no later than February 14th, together with a signed *IBM Customer Agreement Attachment for S/390 Usage Pricing* in order for IBM to use this report to place the requested products under S/390 Usage Pricing Charges.

Example 14: Migrating from MULC to S/390 usage pricing charges

Customers with existing MULC products can migrate those products to S/390 Usage Pricing, if those products meet the S/390 Usage Pricing requirements, or they can continue those existing products on MULC. The choice is the customer's. MULC products which do not qualify for S/390 Usage Pricing Charges can either remain on MULC or can be changed to another billing option like PSLC.

No IFAURP control statements are required to transition an existing MULC product to S/390 Usage Pricing Charges. The optional transition takes place at the customer's request at either of two times:

1. For existing MULC products that do not meet the S/390 Usage Pricing requirements on January 1, 1999, the transition can take place on the month in which the product does meet the S/390 Usage

Pricing requirement, subject to the billing restrictions in the customer's IBM geography. The usage value used to set the S/390 Usage Pricing Charge is the same usage value that was already used to set the MULC price for the current "Billing" period.

2. For existing MULC products that meet the S/390 Usage Pricing requirements on January 1, 1999, the transition takes place at the first MULC "Billing" period which starts in 1999. The usage value used to set the S/390 Usage Pricing Charge will be the same usage value that would be used to set the product's MULC price (the highest of the 6 usage values for that product's prior 6–month MULC measurement period).

Note: In all cases where the customer migrates to S/390 Usage Pricing Charges, the customer must request S/390 Usage Pricing from IBM and submit a signed *IBM Customer Agreement Attachment for S/390 Usage Pricing* to IBM, if they have not already done so.

Description and analysis of the software usage report for products not eligible for S/390 Usage Pricing

The sample software usage report in Figure 38 on page 111 will be used to illustrate several different transition scenarios, where the existing MULC products do not meet the S/390 Usage Pricing requirements on January 1, 1999.

```
                          Measured Usage and S/390 Usage Pricing Charges                        PAGE   1
  IFAURP 3.1.2                          Software Usage Report                               2 OCTOBER 1999

  ------------------- Customer No: 1234567 ------------------    -------------- Software Vendor: IBM CORP    ---------------
  Acme Tulle and Dye Company                                     IBM Branch Office
  155 Main Street                                                1133 Westchester Avenue
  New London, CT 05512                                           Major City, Sample State  10604
  Contact/Phone: Fred Tulle  (203) 555-1212 ex 54               FAX: 1-800-555-1212  ATTN: Usage Pricing

  - Report -    --- Measurement Period End Dates ---  |  ---------------------------- Processor ----------------------------
   Due Date     End Date   Product Name(s)   Function  |  Category    Type-Model    Serial      Begin-End Dates    SU Factor
  --------     --------   ---------------   --------   |  ----------  ----------   -----------  ------------------  ---------
  14Apr00      31Mar00    ***ALL***                    |  Machine     9672-R44     04347        08Mar98 - 01OCT99   2038.21748
                                                       |  9672 CEC    9672-R44     04347        08Mar98 - 01OCT99   2038.21748

  ================================================== For Billing Purposes ==========================================================
                                                 --------------------- Monthly Chargeable Product Values ----------------------
  ---------------- Product ----------------   1998            1999
  NUMBER(S) NAME             VERSION FUNCTION  | OCT   NOV   DEC   JAN   FEB   MAR | APR   MAY   JUN   JUL   AUG   SEP   OCT
  -------- ---------------  ------- --------   |----  ----  ----  ----  ----  ----|----  ----  ----  ----  ----  ----  ----
                            MAX MVS/ESA LPARS: |   3     3     3     3     3     3 |   3     3     3     3     3     3     3
                            PERCENT MISSING HOURS: | 12    14    10     8    10    11 |  12    10     9     7     9    12    91
                                                |                                  |
  5655-018 CICS             4.1               |3.11X 3.08  3.13< 3.11  3.12  3.09 |3.09  3.10  3.09  3.14< 3.10  3.09  3.06#    (01)
                                                |                                  |
  5655-158 IMS TM           6.1               |  -     -     -     -     -   1.20 |1.21  1.24  1.21  1.26< 1.22  1.24  1.22#    (01)
  5695-176                  5.1               |1.22X 1.20  1.18  1.20  1.22<      |
                                                |                                  |
  5695-137 MQM MVS/ESA      1.2               |  -     -     -     -     -     -  |  -   .859  .862X .865  .868  .871< .862#    (01)
           X 01May99-30Jun99      (MQM#9501)  |                                  |
                                                |                                  |
  ----------------------------------------------------------------------------------------------------------------------------------
    I certify that the values circled on this report indicate months for which that product was under test allowance.


    ------------------------------------------------    ----------------------------------------------    ------------------------
    Name                                                Signature                                          Date

  ============================================ For Collection Purposes Only ========================================================
  5655-158 IMS DB           6.1               |  -     -     -     -     -   6.38 |6.37  6.27  6.29  6.32  6.39< 6.38  6.35#    (01)
  5695-176                  5.1               |6.18# 6.19  6.39< 6.32  6.31       |
                                                |                                  |
  5647-A01 OS/390           02.06.00 TSO/E    |  -     -     -     -   1.29  1.66 |1.63  1.56  1.43  1.69< 1.62  1.61  1.23#    (02)
  5645-001                  01.03.00          |1.23# 1.78< 1.54  1.61            |
                                                |                                  |
  =================================================== Notes ========================================================================
     X  - Begin-end dates of first month's usage data
     #  - Data not collected for a full month.
     <  - Value to the left is the largest value of complete months shown.
    (01) - Hourly rate in millions of CPU Service Units (MSUs).
    (02) - Not eligible for Measured Usage charges
```

Figure 38. Software usage report for products not eligible for S/390 usage pricing on January 1, 1999

The IFAURP report level, which appears in the top left corner of the report, indicates that the level is 3.1.0. This is the minimum IFAURP level required to support S/390 Usage Pricing Charges.

This report shows the last MULC six-month measurement period that will be supported (October 1, 1998 to March 31, 1999). Starting with the first MULC billing period beginning in 1999 (May 1, 1999 on this report), the measurement and billing periods become 12 months long. The dates listed in the "Report Due Date" and "Measurement Period End Dates" sections are set for 12-month measurement periods.

This report will be reviewed on a monthly basis to indicate when each product becomes eligible for S/390 Usage Pricing Charges. Whenever a product becomes eligible, the customer must inform IBM if they want to transition that product to S/390 Usage Pricing Charges and submit the *IBM Customer Agreement Attachment for S/390 Usage Pricing*.

- **January 1999**

  – January 1, 1999 is the earliest date a customer may place eligible products under S/390 Usage Pricing Charges.

  – No products on this report qualify for S/390 Usage Pricing Charges, because the customer in this example does not have OS/390 V2 licensed and installed in January.

- **February 1999**

  – The customer has OS/390 V2 licensed and installed, satisfying a key S/390 Usage Pricing Charges requirement.

  – CICS is eligible for S/390 Usage Pricing Charges, because it is a qualified CICS product level (V4) and the OS/390 V2 requirement has been met. Because CICS V4 is already under MULC, the customer can choose to keep CICS under MULC or switch to S/390 Usage Pricing. If the customer chooses to switch, they must inform IBM of their decision. No new Software Usage Report is required. The S/390 Usage Price for CICS will be based on the CICS usage value already set by the previous MULC measurement period.

  – IMS V5 is not an eligible IMS version for S/390 Usage Pricing Charges.

- **March 1999**

  – Both IMS V6 base features (DB and TM) are licensed and installed. Both are eligible for S/390 Usage Pricing Charges whenever they come off of test allowance. Since IMS DB V5 has usage which is too high for MULC, it is likely that its usage will also be too high for S/390 Usage Pricing Charges, but the customer should verify that.

  If IMS TM V6 comes off of test during March, the customer must decide between S/390 Usage Pricing Charges and PSLC. MULC is not available for IMS V6, because MULC is no longer being offered for products not already under MULC effective January 1, 1999. IMS V6 is considered a different product than IMS V5 (they have different IBM product numbers). Since both MULC and S/390 Usage Pricing Charges automatically aggregate usage across different versions of a product, both IMS TM V5 and IMS TM V6 must be under the same usage option (MULC or S/390 Usage Pricing). That means that the customer must switch both the IMS TM V5 and V6 products to either S/390 Usage Pricing (no charge feature for IMS TM V5) or PSLC. MULC is no longer an option for either version of IMS TM, whenever IMS TM V6 comes off of test allowance.

  If the customer chooses to place IMS TM V6 under S/390 Usage Pricing Charges, they must notify IBM of that choice; but, they do not need to send a Software Usage Report to IBM, since the S/390 Usage Price for IMS TM V6 will be based on the IMS TM V5 usage value already set by the previous MULC measurement period.

- **May 1999 - June 1999**

  – MQM has come off of test allowance and has STARTed its initial S/390 Usage Pricing Charges measurement on May 1, 1999. Since MQM was not under MULC prior to January 1, 1999, it can not be placed under MULC after January 1, 1999. The only usage pricing option for MQM is S/390 Usage Pricing Charges. Based on this report, MQM's S/390 Usage Price was set based on the MQM usage value followed by the X (.862) and was effective on June 1, 1999 (the first day of the month in which the initial measurement period ended). The customer is required to create a Software Usage Report containing the initial measurement period for MQM and send that report to IBM no later than July 14, 1999.

  See "Example 12: Deciding which products to select for S/390 usage pricing charges" on page 99 and "Example 13: Placing products under S/390 usage pricing charges" on page 105 for additional instructions on placing new products under S/390 Usage Pricing Charges.

  Note: Some IBM geographies will accept the usage collected during a new product's last month under test allowance for the first month of the two-month initial measurement period.

Description and analysis of the software usage report for products eligible for S/390 Usage Pricing

The sample software usage report in will be used to illustrate several different transition scenarios, where the existing MULC products meet the S/390 Usage Pricing requirements on January 1, 1999.

```
                         Measured Usage and S/390 Usage Pricing Charges                      PAGE   1
IFAURP 3.1.2                            Software Usage Report                           2 OCTOBER 1999

------------------- Customer No: 1234567 -------------------        -------------- Software Vendor: IBM CORP      ---------------
Acme Tulle and Dye Company                                          IBM Branch Office
155 Main Street                                                     1133 Westchester Avenue
New London, CT 05512                                                Major City, Sample State  10604
Contact/Phone: Fred Tulle  (203) 555-1212 ex 54                    FAX: 1-800-555-1212  ATTN: Usage Pricing

- Report -    --- Measurement Period End Dates ---  |  ---------------------------- Processor ----------------------------
 Due Date    End Date  Product Name(s)   Function    |  Category     Type-Model   Serial      Begin-End Dates    SU Factor
 --------    --------  ----------------  --------    |  ----------   ----------   ------      ---------------    ---------
 14Apr00     31Mar00   ***ALL***                     |  Machine      9672-R44     04347       08Mar98 - 01OCT99   2038.21748
                                                     |  9672 CEC     9672-R44     04347       08Mar98 - 01OCT99   2038.21748

================================================== For Billing Purposes ==================================================

                                          ----------------------- Monthly Chargeable Product Values -----------------------
---------------- Product ----------------  1998            1999
NUMBER(S) NAME           VERSION FUNCTION  | OCT   NOV   DEC   JAN   FEB   MAR | APR   MAY   JUN   JUL   AUG   SEP   OCT
-------- ---------------  ------- --------  |----  ----  ----  ----  ----  ---- |----  ----  ----  ----  ----  ----  ----
                        MAX MVS/ESA LPARS:  |  3     3     3     3     3     3  |  3     3     3     3     3     3     3
                        PERCENT MISSING HOURS: | 12   14    10     8    10    11  | 12    10     9     7     9    12    91
                                           |
5655-018 CICS             4.1              |3.11X 3.08  3.13< 3.11  3.12  3.09 |3.09  3.10  3.09  3.14< 3.10  3.09  3.06#   (01)
                                           |
5655-158 IMS TM           6.1              |  -     -     -     -     -   1.20 |1.21  1.24  1.21  1.26< 1.22  1.24  1.22#   (01)
5695-176                  5.1              |1.22X 1.20  1.18  1.20  1.22<      |
                                           |
5695-137 MQM MVS/ESA      1.2              |  -     -     -     -     -     -  |  -   .859  .862X .865  .868  .871< .862#   (01)
         X 01May99-30Jun99     (MQM#9501)  |                                   |
                                           |
-----------------------------------------------------------------------------------------------------------------------
  I certify that the values circled on this report indicate months for which that product was under test allowance.


  ----------------------------------------------   ----------------------------------------------  -------------------------
  Name                                             Signature                                       Date

================================================== For Collection Purposes Only ==================================================
5655-158 IMS DB           6.1              |  -     -     -     -     -   6.38 |6.37  6.27  6.29  6.32  6.39< 6.38  6.35#   (01)
5695-176                  5.1              |6.18# 6.19  6.39< 6.32  6.31       |
                                           |
5647-A01 OS/390     02.06.00 TSO/E         |  -   1.78< 1.54  1.61  1.29  1.66 |1.63  1.56  1.43  1.69< 1.62  1.61  1.23#   (02)
5645-001            01.03.00               |1.23#                              |

============================================== Notes ==============================================

  X  - Begin-end dates of first month's usage data
  #  - Data not collected for a full month.
  <  - Value to the left is the largest value of complete months shown.
(01) - Hourly rate in millions of CPU Service Units (MSUs).
(02) - Not eligible for Measured Usage charges
```

Figure 39. Software usage report for products which are eligible for S/390 usage pricing on January 1, 1999

The IFAURP report level, which appears in the top left corner of the report, indicates that the level is 3.1.0. This is the minimum IFAURP level required to support S/390 Usage Pricing Charges.

This report shows the last MULC 6-month measurement period that will be supported (October 1, 1998 to March 31, 1999). Starting with the first MULC billing period beginning in 1999 (May 1, 1999 on this report), the measurement and billing periods become 12 months long. The dates listed in the "Report Due Date" and "Measurement Period End Dates" sections are set for 12-month measurement periods.

The key months on this report will be reviewed to indicate when each product becomes eligible for S/390 Usage Pricing Charges. Whenever a product becomes eligible, the customer must inform IBM if they want to switch that product to S/390 Usage Pricing Charges and submit the signed attachment referenced earlier in this example.

- **January 1999**

  - January 1, 1999 is the earliest date a customer may switch eligible products to S/390 Usage Pricing Charges.

  - The customer in this example is already using OS/390 V2 prior to January 1, 1999, satisfying a key S/390 Usage Pricing Charges requirement.

  - Even though CICS V4 is meets the eligibility requirements, it can not be switched to S/390 Usage Pricing Charges until the start of the first billing period in 1999, since it is eligible for S/390 Usage Pricing on January 1, 1999.

    – IMS V5 is not an eligible IMS version for S/390 Usage Pricing Charges.

- **March 1999**

    – See the March discussion for .

- **May 1999**

    – The customer can switch CICS V4 from MULC to S/390 Usage Pricing Charges at the start of the first billing period to begin in 1999 (May 1, 1999 on this report), or can continue CICS V4 under MULC. If the customer chooses to switch CICS, they must inform IBM of their decision together with the Software Usage Report that is due to IBM by April 14, 1999 for the previous MULC measurement period. The S/390 Usage Price for CICS will be based on the CICS usage value for the previous (MULC) measurement period which ended March 31, 1999.

- **May 1999 - June 1999**

    – See the "May 1999-June 1999" discussion for .

Appendix A. Type-model values for IBM and non-IBM processors

This section identifies the processors that IFAURP will support.

This section includes the following topics:

Supported IBM processors

For IBM processors that are supported by IFAURP and that were announced after March 1, 2010, see the processors listed prior to the IBM System z10® Enterprise Class (z10 EC) family of processors in Supported IBM processors (www.ibm.com/systems/hardware/browse/z/index.html). Note that the processors with blanks in the WLC column of the processor table do not support z/OS systems.

For IBM processors that are supported by IFAURP and that were announced before March 1, 2010, see the following lists of processors.

IBM System z10 servers

For the 2097 processor type, IFAURP supports the following model values:

401	509	705	725	745
402	510	706	726	746
403	511	707	727	747
404	512	708	728	748
405	601	709	729	749
406	602	710	730	750
407	603	711	731	751
408	604	712	732	752
409	605	713	733	753
410	606	714	734	754
411	607	715	735	755
412	608	716	736	756
501	609	717	737	757
502	610	718	738	758
503	611	719	739	759
504	612	720	740	760
505	701	721	741	761
506	702	722	742	762
507	703	723	743	763
508	704	724	744	764

IBM System z9® Enterprise Class (z9® EC) servers

For the 2094 processor type, IFAURP supports the following model values:

401	601	709	725	741
402	602	710	726	742
403	603	711	727	743
404	604	712	728	744
405	605	713	729	745
406	606	714	730	746
407	607	715	731	747
408	608	716	732	748
501	701	717	733	749
502	702	718	734	750
503	703	719	735	751
504	704	720	736	752
505	705	721	737	753
506	706	722	738	754
507	707	723	739	
508	708	724	740	

IBM System z9 Business Class (z9 BC) servers

For the 2096 processor type, IFAURP supports the following model values:

A01	F02	O04	T01	W04
A02	G01	P02	T02	X01
A03	H01	P03	T03	X02
B01	I01	P04	T04	X03
B02	J01	Q02	U01	X04
B03	K04	Q03	U02	Y01
C01	L03	Q04	U03	Y02
C02	L04	R01	U04	Y03
C03	M03	R02	V01	Y04
D01	M04	R03	V02	Z01
D02	N02	R04	V03	Z02
D03	N03	S01	V04	Z03
E01	N04	S02	W01	Z04
E02	O02	S03	W02	
F01	O03	S04	W03	

IBM z990 servers

For the 2084 processor type, IFAURP supports the following model values:

301	308	315	322	329
302	309	316	323	330
303	310	317	324	331
304	311	318	325	332
305	312	319	326	
306	313	320	327	
307	314	321	328	

IBM z900 GA3 servers

For the 2064 processor type, IFAURP supports the following model values:

2C1	2C5	2C9	213
2C2	2C6	210	214
2C3	2C7	211	215
2C4	2C8	212	216

IBM z900 Servers

For the 2064 processor type, IFAURP supports the following model values:

101	106	111	116	1C5
102	107	112	1C1	1C6
103	108	113	1C2	1C7
104	109	114	1C3	1C8
105	110	115	1C4	1C9

IBM z890 Servers

For the 2086 processor type, IFAURP supports the following model values:

110	170	260	350	440
120	210	270	360	450
130	220	310	370	460
140	230	320	410	470
150	240	330	420	
160	250	340	430	

IBM z800 Servers

For the 2066 processor type, IFAURP supports the following model values:

001	004	0B1
002	0A1	0C1
003	0A2	0E1

IBM S/390 Parallel Enterprise Servers - Generation 6

For the 9672 processor type, IFAURP supports the following model values:

X17	X67	XY7	Z47	Z97
X27	X77	XZ7	Z57	ZX7
X37	X87	Z17	Z67	ZY7
X47	X97	Z27	Z77	ZZ7
X57	XX7	Z37	Z87	

IBM S/390 Parallel Enterprise Servers - Generation 5

For the 9672 processor type, IFAURP supports the following model values:

R16	R76	RD6	Y36	Y96
R26	R86	RX6	Y46	YX6
R36	R96	T16	Y56	
R46	RA6	T26	Y66	
R56	RB6	Y16	Y76	
R66	RC6	Y26	Y86	

IBM S/390 Parallel Enterprise Servers - Generation 4

For the 9672 processor type, IFAURP supports the following model values:

R15	R45	R75	RA5	RX5
R25	R55	R85	RB5	RY5
R35	R65	R95	RC5	

IBM S/390 Parallel Enterprise Servers - Generation 3

For the 9672 processor type, IFAURP supports the following model values:

R14	R44	R74	RA4	RX4
R24	R54	R84	RB4	RY4
R34	R64	R94	RC4	

IBM S/390 Parallel Enterprise Servers

For the 9672 processor type, IFAURP supports the following model values:

R11	R31	R51	R63	RA2
R12	R32	R52	R72	RX3
R21	R41	R53	R73	
R22	R42	R61	R83	

IBM 9672 Clusters

For the 9672 processor type, IFAURP supports the following model values. You can specify these model and type values only on a CLUSTER control statement.

E01	E04	E07	P02
E02	E05	E08	P03
E03	E06	P01	

IBM 9221 processors

For the 9221 processor type, IFAURP supports the following model values:

120	170	201	421
130	191	211	
150	200	221	

IBM 9121 processors

For the 9121 processor type, IFAURP supports the following model values:

180	311	480	522	622
190	320	490	570	732
210	411	511	610	742
260	440	521	621	

IBM 9021 processors

For the 9021 processor type, IFAURP supports the following model values:

330	620	740	832	952
340	640	820	860	962
500	660	821	900	972
520	711	822	941	982
580	720	831	942	9X2

IBM 3000 processors

For the 3000 processor type, IFAURP supports the following model values:

A10
A20

IBM S/390 Multiprise 3000 servers

For the 3000 processor type, IFAURP supports the following model values:

H30	H70
H50	H75
H55	P30

IBM S/390 Multiprise 2003 servers

For the 2003 processor type, IFAURP supports the following model values:

102	116	156	215	247
103	124	1C5	216	257
104	125	203	224	2C5
105	126	204	225	
106	135	205	227	
107	136	206	237	
115	146	207	246	

IBM 3090 processors

For the 3090 processor type, IFAURP supports the following model values:

15T	120J	180J	280J	400J
17T	120S	180S	280S	400S
18T	150E	200E	300E	500E
25T	150J	200J	300J	500J
28T	150S	200S	300S	500S
100S	170J	250J	380J	600E
110J	170S	250S	380S	600J
120E	180E	280E	400E	600S

IBM 4381 processors

For the 4381 processor type, IFAURP supports the following model values:

90E
91E
92E

Supported Amdahl processors

IFAURP supports the following Amdahl processor type values.

Amdahl millennium global servers

For the 0400 processor type, IFAURP supports the following model values:

415	GS412	GS425
422	GS415	
425	GS422	

For the 0500 processor type, IFAURP supports the following model values:

535	555E	585	GS545E	GS575
535E	565	585E	GS555	GS575E
545	565E	GS535	GS555E	GS585
545E	575	GS535E	GS565	GS585E
555	575E	GS545	GS565E	

For the 0700 processor type, IFAURP supports the following model values:

GS714	GS754	GS7Y4	GS745	GS795
GS724	GS764	GS7Z4	GS755	GS7X5
GS734	GS774	GS715	GS765	GS7Y5
GS742	GS784	GS725	GS775	GS7Z5
GS744	GS794	GS732	GS782	
GS752	GS7X4	GS735	GS785	

For the 2000 processor type, IFAURP supports the following model values:

GS2010A	GS2028E	GS2055A	GS2087A	GS2118E
GS2011A	GS2031C	GS2055C	GS2088A	GS2121C
GS2011C	GS2032A	GS2057A	GS2088E	GS2122C
GS2012A	GS2032C	GS2058A	GS2092C	GS2124E
GS2012C	GS2034A	GS2058E	GS2094E	GS2125A
GS2013A	GS2034E	GS2061C	GS2095A	GS2125C
GS2013C	GS2035A	GS2062C	GS2095C	GS2127A
GS2014A	GS2035C	GS2063A	GS2097A	GS2128A
GS2014C	GS2037A	GS2064A	GS2098A	GS2128E
GS2014E	GS2038A	GS2064E	GS2098E	GS2132C
GS2015A	GS2038E	GS2065A	GS2100C	GS2134E
GS2015C	GS2041C	GS2065C	GS2101C	GS2135C
GS2017A	GS2042A	GS2067A	GS2102C	GS2138E
GS2018A	GS2042C	GS2068A	GS2103A	GS2142C
GS2018E	GS2043A	GS2068E	GS2104A	GS2144E
GS201AA	GS2043C	GS2072A	GS2104E	GS2145C
GS2021A	GS2044A	GS2072C	GS2105A	GS2148E
GS2021C	GS2044E	GS2074E	GS2105C	GS2152C
GS2022C	GS2045A	GS2075A	GS2107A	GS2154E
GS2023A	GS2045C	GS2075C	GS2108A	GS2155C
GS2023C	GS2047A	GS2077A	GS2108E	GS2158E
GS2024A	GS2048A	GS2078A	GS2112C	GS2162C
GS2024E	GS2048E	GS2078E	GS2114E	GS2164E
GS2025A	GS2052A	GS2082C	GS2115A	GS2165C
GS2025C	GS2052C	GS2084E	GS2115C	GS2168E
GS2027A	GS2053A	GS2085A	GS2117A	
GS2028A	GS2054E	GS2085C	GS2118A	

Amdahl Omniflex processors

For the 1000 processor type, IFAURP supports the following model values:

1015
1025
1035

Amdahl 5890 processors

For the 5890 processor type, IFAURP supports the following model values:

180E	300E	600E
190E	390E	
200E	400E	

Amdahl 5990 processors

For the 5990 processor type, IFAURP supports the following model values:

250	700	1400
350	790	
500	1100	

Amdahl 5995 processors

For the 5995 processor type, IFAURP supports the following model values:

Note: The "-E" suffix indicates "with EPF."

250A	2550M-E	4570M	6650M	8671M
350A	2570M	4650M	6650M-E	10660M
500A	3550M	4650M-E	6670M	10670M
700A	3550M-E	4670	7670M	12670M
790A	3570M	5570	8650M	
1100A	4550M	5670	8650M-E	
1400A	4550M-E	6570M	8670M	

Supported Hitachi Comparex processors

IFAURP supports the following Comparex processor type values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, 9021, or 9672, the IFAURP reports will print a *type* value of CPX.

Comparex 3090 7/90 processors

For the 3090 processor type, IFAURP supports the following model values:

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of CPX.

7/90-1	7/90-4	7/90-11
7/90-2	7/90-6	7/90-22
7/90-3	7/90-8	

Comparex 3090 8/xx processors

For the 3090 processor type, IFAURP supports the following model values:

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of CPX.

8/80	8/87	8/91	8/94
8/81	8/89	8/92	8/95
8/83	8/90	8/93	8/96
8/85	8/90S	8/93S	8/98

Comparex 3090 8/8xx processors

For the 3090 processor type, IFAURP supports the following model values:

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of CPX.

8/805	8/820	8/850	8/880
8/810	8/830	8/860	8/890
8/815	8/840	8/870	

Comparex 3090 9/9xx processors

For the 3090 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of CPX.

9/910	9/930	9/950
9/920	9/932	9/960
9/922	9/940	

Comparex 3090 99/xxx processors

For the 3090 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of CPX.

99/711	99/811	99/831	99/942	99/972
99/721	99/821	99/832	99/952	99/982
99/731	99/822	99/941	99/962	

Comparex 9021 8/8x processors

For the 9021 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of CPX.

8/80	8/85
8/81	8/87
8/83	8/89

Comparex 9021 8/8xx processors

For the 9021 processor type, IFAURP supports the following model values

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of CPX.

8/805	8/820	8/850	8/880
8/810	8/830	8/860	8/890
8/815	8/840	8/870	

Comparex 9021 9/xxx processors

For the 9021 processor type, IFAURP supports the following model values:

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of CPX.

9/810	9/825	9/840	9/922	9/940
9/815	9/822	9/910	9/930	9/950
9/820	9/830	9/920	9/932	9/960

Comparex 9021 99/xxx processors

For the 9021 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of CPX.

99/711	99/811	99/831	99/942	99/972
99/721	99/821	99/832	99/952	99/982
99/731	99/822	99/941	99/962	

Comparex 9021 M2000xxx processors

For the 9021 processor type, IFAURP supports the following model values

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of CPX.

M2000115	M2000313	M2000415	M2000525	M2000728
M2000211	M2000315	M2000418	M2000528	M2000825
M2000213	M2000323	M2000423	M2000625	M2000828
M2000215	M2000325	M2000425	M2000628	
M2000225	M2000413	M2000428	M2000725	

Comparex 9672 C2000xxx processors

For the 9672 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9672, the IFAURP reports will print a *type* value of CPX.

C2000113	C2000313	C200042D	C200072B	C2000A24
C2000114	C2000314	C2000524	C200072C	C2000A25
C2000126	C2000324	C2000526	C200072D	C2000A26
C2000128	C2000325	C2000528	C2000824	C2000A2A
C200012A	C2000326	C200052A	C2000826	C2000A2B
C200012C	C2000327	C200052C	C200082A	C2000A2C
C200012D	C2000328	C200052D	C200082B	C2000A2D
C2000213	C200032A	C2000624	C200082C	C2000B2A
C2000214	C200032C	C2000626	C200082D	C2000B2B
C2000225	C200032D	C200062A	C2000924	C2000B2C
C2000226	C2000424	C200062C	C2000926	C2000B2D
C2000228	C2000426	C200062D	C200092A	C2000C2C
C200022A	C2000428	C2000724	C200092B	C2000C2D
C200022C	C200042A	C2000726	C200092C	C2000D2C
C200022D	C200042C	C200072A	C200092D	C2000D2D

Comparex 9672 Trinium processors

For the 9672 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9672, the IFAURP reports will print a *type* value of CPX.

M3002009	M3005009	M3008008	M300A009	M300D009
M3003009	M3006008	M3008009	M300B008	M300E009
M3004008	M3006009	M3009008	M300B009	M300F009
M3004009	M3007008	M3009009	M300C008	M300G009
	M3007009	M300A008	M300C009	

Other supported Hitachi processors

IFAURP supports the following Hitachi processor type values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, 9021, or 9672, the IFAURP reports will print a *type* value of HDS.

Hitachi 3090 GX processors

For the 3090 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of HDS.

GX8110	GX8214	GX8314	GX8420	GX8624
GX8112	GX8220	GX8320	GX8424	GX8724
GX8114	GX8224	GX8324	GX8520	GX8824
GX8210	GX8310	GX8412	GX8524	
GX8212	GX8312	GX8414	GX8620	

Hitachi 9021 GX processors

For the 9021 processor type, IFAURP supports the following model values:

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of HDS.

GX6110	GX6425	GX8214	GX8320	GX8520
GX6115	GX8110	GX8220	GX8324	GX8524
GX6210	GX8112	GX8224	GX8412	GX8620
GX6215	GX8114	GX8310	GX8414	GX8624
GX6225	GX8210	GX8312	GX8420	GX8724
GX6325	GX8212	GX8314	GX8424	GX8824

Hitachi 9021 Skyline processors

For the 9021 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of HDS.

SKY-11	SKY-52	SKY-225	SKY-417	SKY-725
SKY-21	SKY-62	SKY-313	SKY-425	SKY-727
SKY-22	SKY-72	SKY-315	SKY-427	SKY-825
SKY-31	SKY-82	SKY-325	SKY-525	SKY-827
SKY-32	SKY-211	SKY-327	SKY-527	
SKY-41	SKY-213	SKY-413	SKY-625	
SKY-42	SKY-215	SKY-415	SKY-627	

Hitachi 9672 Pilot processors

For the 9672 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9672, the IFAURP reports will print a *type* value of HDS.

PILOT14	PILOT29S	PILOT48T	PILOT77	PILOTA5
PILOT14S	PILOT29T	PILOT49S	PILOT78S	PILOTA7
PILOT15	PILOT34	PILOT49T	PILOT78T	PILOTA8S
PILOT15S	PILOT35	PILOT55	PILOT79S	PILOTA8T
PILOT17	PILOT35H	PILOT57	PILOT79T	PILOTA9S
PILOT18E	PILOT36	PILOT58R	PILOT85	PILOTA9T
PILOT18R	PILOT37	PILOT58S	PILOT87	PILOTB5
PILOT19S	PILOT38E	PILOT58T	PILOT88S	PILOTB8S
PILOT19T	PILOT38R	PILOT59S	PILOT88T	PILOTB8T
PILOT24	PILOT38S	PILOT59T	PILOT89S	PILOTB9S
PILOT24S	PILOT38T	PILOT65	PILOT89T	PILOTB9T
PILOT25	PILOT39S	PILOT67	PILOT95	PILOTC9S
PILOT25S	PILOT39T	PILOT68S	PILOT97	PILOTC9T
PILOT26	PILOT45	PILOT68T	PILOT98S	PILOTD9S
PILOT27	PILOT47	PILOT69S	PILOT98T	PILOTD9T
PILOT28E	PILOT48E	PILOT69T	PILOT99S	
PILOT28R	PILOT48S	PILOT75	PILOT99T	

Hitachi 9672 Trinium processors

For the 9672 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9672, the IFAURP reports will print a *type* value of HDS.

TRIN2008	TRIN5008	TRIN8008	TRINB008	TRINE008
TRIN2009	TRIN5009	TRIN8009	TRINB009	TRINE009
TRIN3008	TRIN6008	TRIN9008	TRINC008	TRINF008
TRIN3009	TRIN6009	TRIN9009	TRINC009	TRINF009
TRIN4008	TRIN7008	TRINA008	TRIND008	TRING008
TRIN4009	TRIN7009	TRINA009	TRIND009	TRING009

Supported National Advanced Systems processors

IFAURP supports the following National Advanced Systems processor type values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090 or 9021, the IFAURP reports will print a *type* value of NAS.

National Advanced Systems 3090 EX processors

For the 3090 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of NAS.

EX-10	EX-31	EX-50	EX-90	EX-320
EX-11	EX-33	EX-60	EX-95	EX-420
EX-20	EX-35	EX-65	EX-100	EX-420A
EX-22	EX-38	EX-70	EX-210	EX-520
EX-25	EX-40	EX-75	EX-220	EX-620
EX-27	EX-42	EX-80	EX-310	
EX-30	EX-44	EX-85	EX-310A	

National Advanced Systems 3090 XL processors

For the 3090 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 3090, the IFAURP reports will print a *type* value of NAS.

XL-50	XL-60M	XL-80
XL-50M	XL-70	XL-90
XL-60	XL-70M	XL-100

National Advanced Systems 9021 EX processors

For the 9021 processor type, IFAURP supports the following model values.

Note: Although the IFAURP PROCESSOR control statements require a *type* value of 9021, the IFAURP reports will print a *type* value of NAS.

EX-10	EX-30	EX-42	EX-420
EX-11	EX-31	EX-44	EX-520
EX-20	EX-33	EX-210	EX-620
EX-22	EX-35	EX-220	
EX-25	EX-38	EX-310	
EX-27	EX-40	EX-320	

Appendix B. IFAURP program exit

IFAURP provides an exit that vendors may use to produce customized reports **for their products** other than the standard software usage report produced by IFAURP. See "Types of reports" on page 43 for a description of the reports produced.

IBM usage pricing note: This section is intended for vendors who want to code this exit for their own products.

There are various reasons why you might want to code your own exit, such as to:

- Modify usage data for the vendor's products to be reported by the usage report program
- Delete usage data for the vendor's products so that it does not appear in the report created by the usage report program.
- Process usage data for the vendor's products to generate a report suitable for the needs of the vendor.

To produce your own usage reports you provide a vendor exit to the usage report program. Vendors must provide their customer with any vendor-unique information needed to run the usage report program. This includes the exit load module name and DD name on the VENDOR control statement when the user runs the report program. See "VENDOR control statement" on page 33.

Overview of IFAURP

The usage report program, IFAURP, makes no distinction between IBM and vendor data appearing in the SMF type 89 records. All usage data passed to IFAURP (data not excluded from IFAURP processing by a vendor exit) is processed the same and appears on all the reports generated by IFAURP. The Software Usage Report does, however, create separate reports for each unique vendor/processor or vendor/sysplex combination.

Every SMF type 89 usage data section not excluded by the vendor exit and passed to IFAURP is processed as follows:

1. Type 89 record fields SMF89UCT and SMF89USR are summed and used as the basis for the product's usage. No support currently exists for processing the resource data field (SMF89URD).
2. Product usage is aggregated for each hour as follows:
   a. Usage for products having identical SMF89UPO (PRODOWNER), SMF89UPN (PRODNAME), and SMF89UPQ (PRODQUAL) fields is aggregated and printed as a single value, even though the SMF89UPV (PRODVERS) and SMF89UPI (PRODID) fields for the products differ.

      Note: The value found in SMF89UPQ is not considered to be part of the match criteria when the product name (SMF89UPN) is "DB2".

   b. When multiple type 89 records are produced for the same collection interval (for example, the SMF89ISD, SMF89IET, and SMF89IED fields), the appropriate usage data sections are summed into the correct collection interval. Duplicate SMF type 89 data usage sections are detected and ignored prior to the vendor exit.

   c. Product usage is aggregated across all LPARs on a processor or across all processors defined to a sysplex.
3. Product usage is converted into CPU Service Units. The fourth highest hourly CPU Service Unit value for each month, for which usage data has been found, is printed on the Software Usage Report. This value is printed in millions of SUs with the smallest printed value being 1,000 SUs per hour. If the number of service units is less than .001, a zero (0) appears in the report. If there is no usage present, a dash (-) appears in the report. Usage data for up to the last 12 months is printed on the report.
4. Product names and usage values for vendors is printed in the "Billing" or "Collection" section of the Software Usage Report following the same conditions as IBM products.

Exit routine environment

A usage exit receives control in the following environment:

- Enabled for interrupts
- In problem state with PSW key 8
- In AMODE 31
- Primary ASC mode
- In the address space of the job running the usage report program
- With no locks or ENQs held

Note: All control parameters passed to the exit are addressable in the primary address space

Exit recovery

IBM strongly recommends that you set up an ESTAEX recovery routine to handle errors that might occur during the execution of a usage exit.

If you do not provide recovery for the exit, or if the exit routine's error percolates beyond its recovery routine, a system recovery routine will get control. In both cases, the exit is disabled and does not receive control again during the current invocation of the usage report program.

Exit routine processing

The usage report program calls usage exits at three points in processing:

1. Initialization (input function code UPRMFC=1)
2. Record processing (input function code UPRMFC=2)
3. Termination (input function code UPRMFC=3).

IFAURP opens the files referenced by the SYSPRINT and SYSMSGS DD statements before calling the usage exits for initialization. Other handling requirements for the SYSPRINT and SYSMSGS output files include:

- The usage exits MUST NOT close them
- The QSAM access method must be used to write them
- All output lines must be 133 characters long with the first character an ASA print character

Initialization

Before any SMF records are processed, the usage report program calls the usage exit to perform any necessary initialization. Typical initialization actions performed by a usage exit include allocating a work area and opening the data set referenced by the vendor PRINTDD keyword, if specified. The "user data" field (UPRMUD) in the usage exit parameter list generally holds a pointer to the work area allocated by the usage exit.

If the usage exit is to process type 89 subtype 2 records, its initialization processing must set bit UPRM89SU of flag field UPRMFLG1. Otherwise, IFAURP calls the usage exit only to process type 89 subtype 1 records, and IFAURP processes subtype 2 records without invoking the usage exit.

Record processing

"Record Mapping" in *z/OS MVS System Management Facilities (SMF)* shows that each SMF type 89 record contains one or more usage sections. Each usage section contains a field representing the product owner. Although MVS generates SMF type 89 records when there is no product usage, the records do not have a usage section and are not passed to the usage exits.

Note: The usage exits get control before the report program analyzes the usage sections.

Termination

The usage report program calls the usage exit to perform any final actions for that exit before closing the data files and exiting. Those final action may include freeing the work area allocated during initialization, printing the remaining lines of a report, and closing the data set referenced to by the vendor PRINTDD keyword, if specified.

Programming considerations

There are no default usage exits.

All input to the usage exit is read-only except for:

1. In UPRM area

   a. UPRMUD

      The usage exit can store it own data in this field. Typically, the address of an exit-specific work area is stored in this field during exit initialization.

   b. UPRMIVER

      This field returns the version level of the currently executing copy of IFAURP. If the exit has a dependency on the capabilities supported by a specific IFAURP version, release or modification level, the exit can verify whether or not those capabilities are present by checking all of these level related fields. To facilitate dealing with downleveled copies of IFAURP, the exit can update these same fields with the earliest version.release.mod level of IFAURP the exit requires. If the current executing level of IFAURP is less than the level the exit requires, IFAURP will issue message IFA345E and take the actions described by this error message.

   c. UPRMIREL

      This field returns the release level of the currently executing copy of IFAURP. See UPRMIVER for additional information.

   d. UPRMIMOD

      This field returns the modification level of the currently executing copy of IFAURP. See UPRMIVER for additional information.

   e. UPRMDFCD

      This field contains the code indicating which SMF type 89 usage fields that IFAURP is to process. The default value is 3. The exit must update this code if it wants IFAURP to process a different field or combination of fields.

      Value
         Description

     1
         SMF89UCT (TCB) converted to SUs

      .... ..1.
         SMF89USR (SRB) converted to SUs

      .... .1..
         SMF89URD (resource units)

         Note: IFAURP uses SMF89URT to determine how to process the contents of this field when chosen by the exit.

      Supported values are X'01' through X'04'. IFAURP will issue an error message and disable any exit returning an unsupported value in this field.

   f. UPRMDSCD

      This field contains the scale to be used to report the usage values on the Software Usage Report. Supported values are X'6' and X'9'. A scale of X'6' prints the value 123,000 as '.123'. The exit must update this field if it wants its usage units reported in a power of ten different than

the default value of 6. IFAURP will issue an error message and disable any exit returning an unsupported value in this field.

g. UPRMFNOT

This field points to a pair of footnote related fields. The contents of these fields must be updated by the exit, if the exit wishes to provide its own footnote for the usage values for the product (specific SMF89UPO/SMF89UPN/SMF89UPQ combination) currently being pointed to by UPRMREC. The structure of the fields are as follows:

footnote length	footnote text (1 to 124 characters)
0	2

(126)

i.e.	29	Hourly rate in GigaBytes read
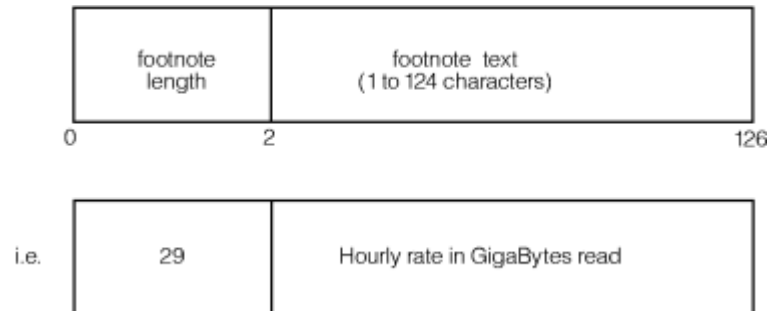
Only footnote length values of 1 to 124 are supported. IFAURP will issue an error message and disable any exit returning an unsupported value in the length field.

h. UPRMMETR

This field points to a pair of metric-related fields. The exit must update the contents of these fields, if it wants to provide its own metric instead of using "service units" to reflect the usage reported on the Software Statistics Report. This metric text being passed should not include a scaling factor, because the Software Statistics Report already provides its own scale (such as using "bytes" instead of "gigabytes"). The structure of the fields are as follows:

metric length	metric text (1 to 24 characters)
0	2

(26)

i.e.	5	Bytes
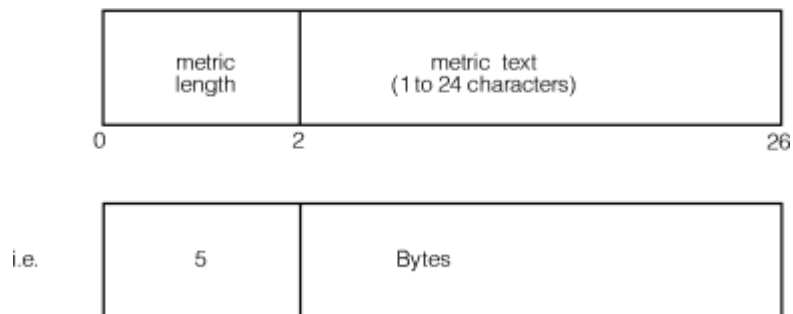
Only metric length values of 1 to 24 are supported. IFAURP will issue an error message and disable any exit returning an unsupported value in the length field.

i. UVCCEXTL

This field contains the Exit Level Identifier, 8 bytes of printable information that describes the code level of the usage exit (for example, IMSXV100 for IMS Exit Version 1.0.0). This value should be set on the initialization call to the usage exit. The value appears in the Usage Report.

j. UPRMFLG1

This field contains flag bit UPRM89SU. Set this bit to 1 during exit initialization to request that type 89 subtype 2 records be passed to the exit routine.

2. In SMF Type 89 record (pointed to by UPRMREC)

All fields in the usage data section except for SMF89UPO (product owner).

If a vendor provides a usage exit, the following programming standards must be observed:

• The exit must follow standard linkage conventions
• The exit must be serially reusable.

Macro instructions and restrictions

Register 1 points to a word that contains the address of UPRM.

Registers at entry

When the vendor exit receives control, the general purpose registers contain the following:

Register
    Contents

0
    Does not contain any information for use by the vendor exit.

1
    Points to a word that contains the address of UPRM.

2-12
    Does not contain any information for use by the vendor exit.

13
    Address of a standard 72-byte save area.

14
    Return address.

15
    Entry point address.

When the vendor exit receives control, the ARs contain no information for use by the vendor exit.

Parameter descriptions

When the exit gains control, register 1 points to the address of a UPRM parameter list. depicts the organization of the UPRM parameter list and its related structures. For IFAUCCC, IFAUMCC, IFAUOCC, IFAUPCC, IFAUPRM, IFAUSID, and IFAUVCC, see *z/OS MVS Data Areas*.

Figure 40. IFAURP exit parameter list

Return specifications

A return code from the usage exit indicates how processing is to continue for the current SMF type 89 record. The exit can choose to:

1. Instruct the usage report program to process the current record
2. Instruct the usage report program to ignore the current record
3. Instruct the usage report program to stop calling the exit
4. Instruct the usage report program to process the current record and call the usage exit again with the same record.

Registers at exit

Upon return from usage exit processing, the register contents must be:

Register
  Contents

0
  Not applicable

1
  Address of input parameter list

2-14
  Restored to original contents

15
  One of the following return codes:

  Return code
    Explanation

  0
    Requests usage report program to process current SMF type 89 record.

  4
    Requests usage report program to ignore current SMF type 89 record.

  8
    Requests the usage report program to disable the exit. Usage report program will process the current SMF type 89 record.

  12
    Requests usage report program to process current SMF type 89 record **and** call exit again with same (original, unchanged) record.

Appendix C. Steps for determining the CPC type, model, and serial number

1. Issue the DISPLAY M=CPU operator command.

   Result: Message IEE1741 displays a response similar to the following example:

   ```
   IEE1741 03.53.08 DISPLAY M 707
   PROCESSOR STATUS
   ID  CPU              SERIAL
   0    +               0301049672
   1    +               1301049672
   2    +               2301049672
   3    +               3301049672
   4    +               4301049672
   5    +               5301049672
   6    +               6301049672
   7    +               7301049672

   CPC ND = 009672.XZ7.IBM.02.000000050104
   CPC SI = 9672.XZ7.IBM.02.0000000000050104
   CPC ID = 00
   ```

2. The CPC type is the four digits in field 1 of the CPC SI descriptor. If the CPC SI descriptor is not displayed, use the last four digits in field 1 of the CPC ND descriptor.

   Example: In the sample output from step 1, the CPC type is 9672:

   ```
   CPC SI =  9672 .XZ7.IBM.02.0000000000050104
   ```

3. For IBM machines, the CPC model number is the three characters in field 2 of the CPC SI descriptor. If the CPC SI descriptor is not displayed, use the three characters in field 2 of the CPC ND descriptor. (For non-IBM machines, the model number must be obtained from the manufacturer. This model number must appear in Appendix A, "Type-model values for IBM and non-IBM processors," on page 115.)

   Example: In the sample output from step 1, the CPC model is XZ7.

   ```
   CPC SI = 009672. XZ7 .IBM.02.0000000000050104
   ```

4. To find the serial number, start by taking the first six digits of any entry in the SERIAL column and drop the first digit, resulting in a 5-digit number.

   Example: In the sample output from step 1, that number is 30104.

   ```
   ID  CPU              SERIAL
   0    +               0 30104 9672
   ```

   • If you are a customer in EMEA, Latin America, or Canada, proceed to step 5.
   • For all other customers, the 5-digit number found in step 4 is your serial number.

5. If you are a customer in EMEA, Latin America, or Canada, take the two digits from field 4 of the CPC ND entry and add them to the beginning of the number obtained in step 4 to get your 7-digit serial number.

   Example: In the sample output from step 1, the two digits from field 4 of the CPC ND entry are 02.

   ```
   CPC ND = 009672.XZ7.IBM. 02 .000000050104
   ```

   Adding these digits to the beginning of the number obtained in step 4 makes the 7-digit serial number 0230104.

Appendix D. Accessibility

Accessible publications for this product are offered through IBM Documentation (www.ibm.com/docs/en/zos).

If you experience difficulty with the accessibility of any z/OS information, send a detailed message to the Contact the z/OS team web page (www.ibm.com/systems/campaignmail/z/zos/contact_z) or use the following mailing address.

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> Attention: MHVRCFS Reader Comments
> Department H6MA, Building 707
> 2455 South Road
> Poughkeepsie, NY 12601-5400
> United States

Accessibility features

Accessibility features help users who have physical disabilities such as restricted mobility or limited vision use software products successfully. The accessibility features in z/OS can help users do the following tasks:

- Run assistive technology such as screen readers and screen magnifier software.
- Operate specific or equivalent features by using the keyboard.
- Customize display attributes such as color, contrast, and font size.

Consult assistive technologies

Assistive technology products such as screen readers function with the user interfaces found in z/OS. Consult the product information for the specific assistive technology product that is used to access z/OS interfaces.

Keyboard navigation of the user interface

You can access z/OS user interfaces with TSO/E or ISPF. The following information describes how to use TSO/E and ISPF, including the use of keyboard shortcuts and function keys (PF keys). Each guide includes the default settings for the PF keys.

- *z/OS TSO/E Primer*
- *z/OS TSO/E User's Guide*
- *z/OS ISPF User's Guide Vol I*

Dotted decimal syntax diagrams

Syntax diagrams are provided in dotted decimal format for users who access IBM Documentation with a screen reader. In dotted decimal format, each syntax element is written on a separate line. If two or more syntax elements are always present together (or always absent together), they can appear on the same line because they are considered a single compound syntax element.

Each line starts with a dotted decimal number; for example, 3 or 3.1 or 3.1.1. To hear these numbers correctly, make sure that the screen reader is set to read out punctuation. All the syntax elements that have the same dotted decimal number (for example, all the syntax elements that have the number 3.1)

are mutually exclusive alternatives. If you hear the lines `3.1 USERID` and `3.1 SYSTEMID`, your syntax can include either USERID or SYSTEMID, but not both.

The dotted decimal numbering level denotes the level of nesting. For example, if a syntax element with dotted decimal number 3 is followed by a series of syntax elements with dotted decimal number 3.1, all the syntax elements numbered 3.1 are subordinate to the syntax element numbered 3.

Certain words and symbols are used next to the dotted decimal numbers to add information about the syntax elements. Occasionally, these words and symbols might occur at the beginning of the element itself. For ease of identification, if the word or symbol is a part of the syntax element, it is preceded by the backslash (\) character. The * symbol is placed next to a dotted decimal number to indicate that the syntax element repeats. For example, syntax element *FILE with dotted decimal number 3 is given the format `3 \* FILE`. Format `3* FILE` indicates that syntax element FILE repeats. Format `3* \* FILE` indicates that syntax element `* FILE` repeats.

Characters such as commas, which are used to separate a string of syntax elements, are shown in the syntax just before the items they separate. These characters can appear on the same line as each item, or on a separate line with the same dotted decimal number as the relevant items. The line can also show another symbol to provide information about the syntax elements. For example, the lines `5.1*, 5.1 LASTRUN, and 5.1 DELETE` mean that if you use more than one of the LASTRUN and DELETE syntax elements, the elements must be separated by a comma. If no separator is given, assume that you use a blank to separate each syntax element.

If a syntax element is preceded by the % symbol, it indicates a reference that is defined elsewhere. The string that follows the % symbol is the name of a syntax fragment rather than a literal. For example, the line `2.1 %OP1` means that you must refer to separate syntax fragment OP1.

The following symbols are used next to the dotted decimal numbers.

? indicates an optional syntax element
The question mark (?) symbol indicates an optional syntax element. A dotted decimal number followed by the question mark symbol (?) indicates that all the syntax elements with a corresponding dotted decimal number, and any subordinate syntax elements, are optional. If there is only one syntax element with a dotted decimal number, the ? symbol is displayed on the same line as the syntax element, (for example `5? NOTIFY`). If there is more than one syntax element with a dotted decimal number, the ? symbol is displayed on a line by itself, followed by the syntax elements that are optional. For example, if you hear the lines `5 ?, 5 NOTIFY`, and `5 UPDATE`, you know that the syntax elements NOTIFY and UPDATE are optional. That is, you can choose one or none of them. The ? symbol is equivalent to a bypass line in a railroad diagram.

! indicates a default syntax element
The exclamation mark (!) symbol indicates a default syntax element. A dotted decimal number followed by the ! symbol and a syntax element indicate that the syntax element is the default option for all syntax elements that share the same dotted decimal number. Only one of the syntax elements that share the dotted decimal number can specify the ! symbol. For example, if you hear the lines `2? FILE, 2.1! (KEEP), and 2.1 (DELETE)`, you know that (KEEP) is the default option for the FILE keyword. In the example, if you include the FILE keyword, but do not specify an option, the default option KEEP is applied. A default option also applies to the next higher dotted decimal number. In this example, if the FILE keyword is omitted, the default FILE(KEEP) is used. However, if you hear the lines `2? FILE, 2.1, 2.1.1! (KEEP), and 2.1.1 (DELETE)`, the default option KEEP applies only to the next higher dotted decimal number, `2.1` (which does not have an associated keyword), and does not apply to `2? FILE`. Nothing is used if the keyword FILE is omitted.

* indicates an optional syntax element that is repeatable
The asterisk or glyph (*) symbol indicates a syntax element that can be repeated zero or more times. A dotted decimal number followed by the * symbol indicates that this syntax element can be used zero or more times; that is, it is optional and can be repeated. For example, if you hear the line `5.1* data area`, you know that you can include one data area, more than one data area, or no data area. If you hear the lines `3*, 3 HOST, 3 STATE`, you know that you can include `HOST, STATE`, both together, or nothing.

Notes:

1. If a dotted decimal number has an asterisk (*) next to it and there is only one item with that dotted decimal number, you can repeat that same item more than once.
2. If a dotted decimal number has an asterisk next to it and several items have that dotted decimal number, you can use more than one item from the list, but you cannot use the items more than once each. In the previous example, you can write HOST STATE, but you cannot write HOST HOST.
3. The * symbol is equivalent to a loopback line in a railroad syntax diagram.

+ indicates a syntax element that must be included

The plus (+) symbol indicates a syntax element that must be included at least once. A dotted decimal number followed by the + symbol indicates that the syntax element must be included one or more times. That is, it must be included at least once and can be repeated. For example, if you hear the line 6.1+ data area, you must include at least one data area. If you hear the lines 2+, 2 HOST, and 2 STATE, you know that you must include HOST, STATE, or both. Similar to the * symbol, the + symbol can repeat a particular item if it is the only item with that dotted decimal number. The + symbol, like the * symbol, is equivalent to a loopback line in a railroad syntax diagram.

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Index

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