

PILOT/MVS

Axios Products, Inc
353 Veterans Highway, Suite 204
Commack, NY 11725
Sales/Administration: (800) 877-0990 info@axiosproducts.com
Technical Support: (631) 864-3666 support@axiosproducts.com
Telecopier (Fax): (631) 864-3693 www.axios.com

Preface

This user's guide provides the information needed to perform MVS performance analysis and capacity planning using PILOT/MVS.

The user's guide describes:

- The use of PILOT/MVS as a tool to format RMF and SMF type 30 records for downloading to a Personal Computer.
- The JCL necessary to use PILOT/MVS.
- Using PILOT/MVS on a PC for performance and capacity analysis.
- Recommendations for hardware and software to run PILOT/MVS.

This publication contains information necessary for the operation of PILOT, a family of proprietary program products used for performance management and capacity planning. It provides data processing managers, system programmers, and capacity planners with information required to use this product.

Information in this publication is subject to significant change.

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This edition applies to Version 1.7 of the PILOT program products and to all subsequent versions and modifications until otherwise indicated in new editions or newsletters.

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Introduction

PILOT/MVS allows you to format RMF and SMF records for capacity planning and performance tuning of MVS systems. There are two major components that make up the PILOT/MVS software: the mainframe program that formats the data, and PC programs and spreadsheets (also referred to as templates) used for further analysis. PILOT/MVS host programs can execute as a user exit called by PILOT/SMF or as a stand-alone program. Examples of both these methods are provided in “PILOT/MVS As A Stand-alone Program” on page [39](#) and in “PILOT/MVS As A User Exit Of PILOT/SMF on page [40](#).

There are four ways to control the amount of output produced:

1. Parameters specified on the JCL EXEC card.
2. RMFCTL control cards as described for each output file.
3. Including or excluding optional DD statements for output files.
4. When invoked as an exit to PILOT-/SMF; SMF data may be reduced by DATE, TIME, PEAKTIME, or WEEKDAYS.

Job Control Language

PILOT/MVS has three input files:

SMFIN

Specifies the input file. This file is needed when PILOT/MVS runs as a stand-alone program. This DD card

should be omitted when PILOT/MVS is used as a user exit of PILOT/SMF.

RMFCTL

Specifies a control input file. This file is optional. Control cards are described with the discussion of the particular spreadsheet that it is used to control.

PARMLIB

A partitioned dataset containing the ICS used to define your report performance groups. This card is not required when the workload option is not invoked (see RMFWKLD below).

PILOT/MVS has two required and eight optional output files:

RMFCACHE

When present, PILOT provides output records formatted for PC downloading of detailed cache controller statistics. This DD statement is optional.

RMFCHAN

When present, PILOT provides output records formatted for PC downloading of detailed channel statistics. This DD statement is optional.

RMFCPU

When present, PILOT provides output records formatted for PC downloading of detailed CPU statistics. This DD statement is optional.

RMFDASD

When present, PILOT provides output records formatted for PC downloading of detailed DASD statistics by volume name, string, or a mask of volume names. This DD statement is optional.

RMFLOG

Always required. This file provides information on the data processed.

RMFOUT

Always required. PILOT produces an RMF summary spreadsheet, according to the parameters specified, formatted for PC downloading.

RMFPAGE

When present, PILOT provides output records formatted for PC downloading of detailed PAGING statistics. This DD statement is optional.

RMFPGDS

When present, PILOT provides output records formatted for PC downloading of detailed PAGE DATA SET statistics. This DD statement is optional.

RMFTSO

When present, PILOT provides output records formatted for PC downloading of detailed TSO statistics by performance group periods. This DD statement is needed when the TSO or PGN keyword is specified.

RMFWKLD

When present, PILOT provides output records formatted for PC downloading of detailed WORKLOAD statistics. This DD statement is optional. A PARMLIB DD statement is required when this data set is present.

Parameters

PILOT/MVS will format records according to the parameters passed using the “PARM” field on the EXEC JCL card. Parameters are passed differently when PILOT/MVS is invoked as a USER EXIT from PILOT/SMF. Consult the PILOT/SMF User's Guide for further information on the USER EXIT topic. An example of each method of operation is provided in this document. PILOT/MVS will process the first SYSID encountered. If multiple SYSTEMS are found, the first will be processed. An error message is written to the log with the last SYSID found which does not match the first encountered.

The PILOT/MVS parameters are described next.

{INTERVAL|HRLY|DAILY}

This parameter determines how PILOT/MVS will summarize the data for transfer to the PC. You may choose any one of the three values.

INTERVAL

If no parameters are present, this is the default. This parameter will produce one PC record for each RMF interval. The PC record will contain a field called the INTERVAL LENGTH, which will indicate, in minutes, the length of the RMF interval.

HRLY

This parameter will produce one PC record for each hour. This record is the average of each field for all intervals of that hour. The INTERVAL LENGTH field described above is replaced with NUMBER OF INTERVALS field. This

defines the number of intervals that were averaged on an hourly basis.

DAILY

This parameter will produce one PC record for each day. This record is the average of each field for all intervals of that day. The INTERVAL LENGTH field described above is replaced with NUMBER OF INTERVALS field. This defines the number of intervals that were averaged on a daily basis.

PI(xy,xy..)

This parameter will produce data for the channels specified by this keyword for the RMF Summary spreadsheet, where xx,-yy... etc. are CHANNEL IDS in a MVS/SP environment, and CHIP IDS in an XA or ESA environment.

MVS/SP:

x is the processor ID (0-4), or channel set ID.
y is the channel ID (0-F).

Example: PI(01,03,0B,11,13,1B)

This parameter will produce statistics on channels 01, 03, 0B, 11, 13, and 1B ONLY.

MVS/XA or MVS/ESA:

x is the processor ID (0-8).
y is the channel ID (0-F).

Example: PI(01,03,06,21,23,26)

This parameter will produce statistics on path IDs 01, 03, 06, 21, 23, and 26 only.

DATE

Specifies that the date be printed in MM/DD/YYYY format instead of Lotus 1-2-3

(D1) format. This option is not supported for various sample PC templates.

TSO

Specifies that a TSO report by performance group periods be generated to file RMFTSO.

PGN(xx,yy..)

Specifies that a report by control performance group periods be generated to file RMFTSO. This option will give the same information for a particular performance group(s) as described for the TSO option. This option is useful when only an IPS is specified (ICS not specified) in RMF records, or a particular set of performance group(s) is to be studied.

In addition to these parameters, several of the PILOT spreadsheets have control cards associated with their processing. These control cards are placed in the RMFCTL input stream or member. The descriptions of these control cards appear with the detailed description of the spreadsheet that they control.

The PILOT Spreadsheets

This section describes the data displayed and available in each of the 7 groups of PILOT/-MVS spreadsheets. By the way, the spreadsheets are often referred to in spreadsheet jargon as worksheets or templates. We will use the three terms interchangeably.

In several cases, the data available from your mainframe will vary based on the operating system you are using, and our templates reflect these differences. When you need to make a choice, use the SP version of the template if you are running MVS/SP. In all other cases, use the XA version of the template, which is also compatible with ESA and OS/390. Our description of the spreadsheets indicate when there is a choice to make.

Also, we know that your analysis and focus will be different when you are looking at data on a daily, weekly or monthly basis. To facilitate these types of analyses, we supply several of the templates in daily, weekly and monthly versions when using Lotus 1-2-3 as your graphical interface (not required when using EXCEL). These templates are designed to provide the same type of information with a different focus, and to use them effectively you must summarize the data appropriately. We assume that you are using the PILOT/SMF program or your own equivalent to extract the requisite RMF data.

Daily Templates

These templates have the name xxxnnDLY and are designed for use with data selected using the INTERVAL or HRLY parameter. You should plan on loading the intervals for a single shift or a full day,

but not several day's worth of very fine (short interval) detail.

Weekly Templates

These templates have the name xxxnnWLY and are designed for use with data selected using the HRLY or DAILY parameter, or using the INTERVAL parameter with a short PEAKTIME period defined. You should plan on comparing equivalent periods over a series of days, or daily averages for a week.

Monthly Templates

These templates have the name xxxnnMLY and are designed for use with data selected using the DAILY parameter, or using the INTERVAL or HRLY parameter with a short PEAKTIME period defined. You should plan on comparing equivalent periods over several weeks or months.

Of course, by varying the selection criteria (START, END and PEAKTIME) you can produce extract files that cover any desired period at any of the three levels of detail. You will select the best combination of template and extraction criteria based on the type of analysis you are performing. In general, you will use interval data and the daily templates to address questions about performance and daily scheduling, and to identify peak periods. As you move into longer time periods you will summarize on the hourly or daily level and use the weekly and monthly templates to identify periodic performance bottlenecks, to analyze trends, and to determine growth rates for capacity planning purposes.

The Installation and Overview manual contains the template and file directory. The directory contains a list of every template, a brief summary of the template's purpose, a list and brief description of all the graphs the template can produce, and a list and brief description of the printed reports available from the template. Please refer to that manual for this information.

Each of the spreadsheets is presented on the following pages, in alphabetical order. The samples were all generated using Lotus 1-2-3 Version 2.3. Whether you are using Lotus 1-2-3 or EXCEL, the information and description of the fields are the same. Only the appearance of the template will vary.

MVS123 Spreadsheet

This spreadsheet acts as a menu and template selector for your PILOT/MVS work. This template allows you to select the area of interest, specify the system you want to work with, and choose the spreadsheet to use in your analysis. All the other PILOT/MVS spreadsheets return here when you choose the Return menu choice from their main menus. You can return to the initial PILOT template by choosing AUTO123 from this template's menu.

A sample of the MVS123 template is provided in [Figure 1](#).

```

A1: '
MENU
RMFSUM  TSOSUM  I/O_MENU  PAGING  WORKLOAD  OTHER  SETUP  AUTO123
RMF Summary Data Templates
          A      B      C          D          E          F          G          H
1
2
3          P I L O T / M V S
4
5          Capacity Planning System
6
7          This is an Automated Capacity Planning / Performance Tool
8
9          1. Choose a template to view.
10         2. Do not import into this spreadsheet.
11         3. All templates return here.
12         4. Use setup to customize this template and the global
13            printer settings.
14         5. Use ALT-M to reinvoke the main menus.
15
16  PILOT (C) 1985-1993          Axios Products, Inc.
17  KLM Technical Specialties, Inc. 1373-10 Veterans Highway
18  All Rights Reserved          Hauppauge, New York 11788-3047
19                               Phone: (800) 877-0990
20                               Fax: (516) 979-0537
16-Nov-93  11:50 AM          CMD

```

Figure 1 PILOT/MVS Menu Spreadsheet

Cache Spreadsheet

The cache spreadsheet can be produced in several formats, depending on user requirements. The data, detailed by interval, hourly, or daily may be used for tracking DASD performance or capacity planning. This spreadsheet is produced when a RMFCACHE DD card is present. To eliminate this report, omit this DD card. RMF cache reporter records are used to format data. **The default SMF record type is 245.** If the record type is different, please contact technical support for a zap to use this feature. Only IBM 3880-23, 3990-03, and 3990-06 controllers are supported.

Control cards specified for the DEVICE keyword in the RMFCTL file are also used by the RMFCACHE report. See the section “DASD Spreadsheet” on page 16 for further information to reduce output or to summarize data.

The following information is provided:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

ADR

The device number of the device.

VOLSER

The Volume Serial number of the device.

SID

Storage director ID.

MDL

Cache control model ID.

I/O_CNT

The number of successful SSCHs to the device.

I/O_SEC

The number of SSCH per second.

READ

Number read operations

RD_HIT

Number of reads that were found in cache.

HIT/RD

The ratio of hits to read operations.

WRITE

Number of write operations

WRT_HIT

Number of writes that had hits in the cache.

HIT/WRT

The ratio of hits to write operations.

RD_SEQ_HIT

Number of sequential reads that were found in the cache.

HIT/SRD

The ratio of hits to sequential read operations.

WRT_SEQ

Number of sequential writes.

RD/WRT

The ratio of read to write operations.

WRT/IO

The ratio of write operations to total I/O.

FW
 Number of cache fast write operations.

FW_HIT
 Number of cache fast write operations found in cache.

HIT/FW
 The ratio of hits to cache fast write operations.

FW_SEQ
 Number of sequential cache fast write operations.

BYPASS
 Number of I/O operations that by passed cache.

ICLR
 Number of inhibit cache operations.

FW_DSTG
 Number of cache fast write operations that had to be de-staged from cache.

INTVL
 The number of seconds in the interval.

Figure 2 is a sample of the Cache template.

```

A1: [W9]
MENU
IMPORT GRAPH PRINT RETURN SAVE SETUP EXIT
Loads CAC?????.PRN files for Cache reports
      A      B C      D      E F      G      H      I      J
1
2                               Spreadsheet Version
3                               CAC01DLY V1L5.0
4 Data      Template for Graphing RMF Cache (245) Records
4 Range:    11/09/92-11/13/92 1000-1144
5
6 SYSID=    GS1E PILOT/MVS (C) 1986-1992 PV1M5
7 DATE      TIME ADR VOLSER SID MDL I/O CNT I/O SEC      READ RD HIT
8 11/09/92 1000 100 PVSF01 000 03 861267 23.9 548224 518019
9 11/13/92 1144 101 PVSM30 000 03 127180 3.5 84242 70483
10 11/13/92 1144 102 PVSM34 000 03 122537 3.4 75839 58163
11 11/13/92 1144 103 PDBA02 000 03 308936 8.6 258503 212222
12 11/13/92 1144 104 PDBA05 000 03 369922 10.3 328124 160771
13 11/13/92 1144 105 PDBA07 000 03 341385 9.5 306151 194022
14 11/13/92 1144 106 PDBA09 000 03 260162 7.2 218427 113126
15 11/13/92 1144 107 PDBA11 000 03 361982 10.1 150479 48480
16 11/13/92 1144 108 PVSM38 000 03 176607 4.9 150042 121990
17 11/13/92 1144 109 PDB201 000 03 51907 1.4 45061 30583
18 11/13/92 1144 10A PDB205 000 03 9491 0.3 9024 1714
19 11/13/92 1144 10C SPOOLA 000 03 437849 12.2 118023 108516
20 11/13/92 1144 10D SPOOLB 000 03 290848 8.1 112912 103811
16-Nov-93 09:30 AM CMD
    
```

Figure 2 Cache Template

Channel Spreadsheet

The Channel spreadsheet is a detailed report, by interval, hour, or daily period, of the channel activity of the system. This spreadsheet is produced when a RMFCHAN DD card is present. To eliminate this report, omit this DD card.

MVS/SP Spreadsheet Contents

The following information is provided in the MVS/SP template:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

PID

Channel Set or CPU processor to which the channel is attached and its channel ID assigned.

I/O_CNT

Number of successful SIO instructions completed.

I/O_SEC

The SIO rate (SIO/second) on this channel.

%BUSY

The percent of time the channel was busy.

SRV_TIME

The average service time to execute a channel program on this channel. This field is omitted in the XA template.

[Figure 3](#) on page [10](#) is a sample of the MVS/SP Channel template.

```

A1: [W9]
MENU
IMPORT  GRAPHS  RETURN  SAVE  PRINT  SETUP  EXIT
Load a ".PRN" file for a Channel Summary Report
      A      B      C      D      E      F      G      H      I
1
2          Detail Channel Template MVS/SP  CHA01SP  V1L5.0
3
4  SYSID=   4381 PILOT/MVS (C) 1986-1989
5  DATE     TIME  PID  I/O CNT  I/O_SEC  SRV_TIME  %BUSY  INTVL
6  09/12/86 1345 01   6811    7.6     0.076    3.7    900
7  09/12/86 1345 02   8425    9.4     0.094    3.9    900
8  09/12/86 1345 05   4440    4.9     0.049    2.4    900
9  09/12/86 1345 06   5162    5.7     0.057    4.6    900
10 09/12/86 1345 07   1627    1.8     0.018    3      900
11 09/12/86 1345 08   1589    1.8     0.018    0.5    900
12 09/12/86 1345 09   1604    1.8     0.018    1      900
13 09/12/86 1345 0A   802     0.9     0.009    0.7    900
14 09/12/86 1400 01   8632    9.6     0.096    5      899
15 09/12/86 1400 02   8640    9.6     0.096    6.1    899
16 09/12/86 1400 05   7624    8.5     0.085    5.3    899
17 09/12/86 1400 06  10379   11.5    0.115    6.1    899
18 09/12/86 1400 07   2345    2.6     0.026    5.7    899
19 09/12/86 1400 08   1292    1.4     0.014    0.4    899
20 09/12/86 1400 09   2708    3       0.03    1.6    899
16-Nov-93 09:33 AM          CMD

```

Figure 3 MVS/SP Channel Template

MVS/XA, MVS/ESA and OS/390 Spreadsheet Contents

The following information is provided in the MVS/XA template which may also be used for MVS/ESA:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

PID

Channel Set or CPU processor to which the channel is attached and its channel ID assigned. In MVS/XA or MVS/ESA the CHIP ID is used.

%BUSY

The percent of time the channel was busy.

[Figure 4](#) on page [11](#) is a sample of the MVS/XA and above channel template.

```

A1: [W9]
MENU
IMPORT  GRAPHS  RETURN  PRINT  SAVE  SETUP  EXIT
Load a ".PRN" file for a Channel Detail Report
      A      B      C      D      E      F      G      H      I      J
1                                     Spreadsheet  Version
2                                     CHA01XA      V1L5.0
3          Detail Channel Path Summary Template MVS/XA
4
5  SYSID=  0190 PILOT/MVS (C) 1986-1989
6  DATE    TIME  PID  %BUSY  INTVL
7  09/25/86 745 00   1.8   899
8  09/25/86 745 01  17.7   899
9  09/25/86 745 02  17.2   899
10 09/25/86 745 03   3.4   899
11 09/25/86 745 04   0.4   899
12 09/25/86 745 06    17   899
13 09/25/86 745 07   3.5   899
14 09/25/86 745 08  21.6   899
15 09/25/86 745 09   6.4   899
16 09/25/86 745 0A    4   899
17 09/25/86 745 0B   1.1   899
18 09/25/86 745 0C  21.5   899
19 09/25/86 745 0D   6.5   899
20 09/25/86 745 0E   4.3   899
16-Nov-93 09:41 AM                                CMD

```

Figure 4 MVS/XA Channel Template

CPU Spreadsheet

The CPU spreadsheet is a detailed report, by interval, hour, or daily period of the CPU utilization in a PR/SM environment. This spreadsheet is produced when a RMFCPU DD card is present. To eliminate this report, omit this DD card.

The following information is provided:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

INTVL

Specifies the interval in seconds used to perform calculations.

LPAR_NAME

Specifies the name of the logical partition. For RMF versions with IBM APAR OY-36668 a partition is created by RMF to represent the amount of resources consumed by LPAR management. RMF identifies this partition as "PHYSICAL."

LPAR_NO

The logical partition number assigned by LPAR management.

PROCS

The number of logical processors assigned to this partition.

AVG_LCPU

Specifies the average logical CPU utilization of this partition. If IBM APAR OY-36668 is applied, then LPAR Management is included in the logical utilization. This field is calculated based upon the number

of logical processors assigned to the partition.

MIN_LCPU

Specifies the minimum logical CPU utilization of this partition during "hourly" or "daily" processing. If IBM APAR OY-36668 is applied, then LPAR Management is included in the logical utilization. This field is calculated based upon the number of logical processors assigned to the partition.

MAX_LCPU

Specifies the maximum logical CPU utilization of this partition during "hourly" or "daily" processing. If IBM APAR OY-36668 is applied, then LPAR Management is included in the logical utilization. This field is calculated based upon the number of logical processors assigned to the partition.

AVG_PCPU

Specifies the average physical CPU utilization of this partition. That is, the percentage of utilization of this partition across the PR/SM complex. If IBM APAR OY36668 is applied, then LPAR Management is included in the physical utilization. This field is calculated based upon the number of physical processors assigned for use by PR/SM.

MIN_PCPU

Specifies the minimum physical CPU utilization of this partition during "hourly" or "daily" processing. If IBM APAR OY36668 is applied, then LPAR Management is included in the logical utilization. This field is calculated based upon the

number of physical processors assigned for use by PR/SM.

MAX_PCPU

Specifies the maximum physical CPU utilization of this partition during “hourly” or “daily” processing. If IBM APAR OY36668 is applied, then LPAR Management is included in the logical utilization. This field is calculated based upon the number of physical processors assigned for use by PR/SM.

[Figure 5](#) is a sample of the CPU template.

```

A1: [W9]
MENU
IMPORT  GRAPH  PRINT  RETURN  SAVE  SETUP  EXIT
Load a ".PRN" file for a CPU LPAR Summary Report
      A      B      C      D      E      F      G      H      I
1
2                               Spreadsheet  Version
3                               CPU01DLY    V1L5.0
4                               CPU LPAR Template Used For Daily Activity
5  SYSID=  SYSA  PILOT/MVS (C) 1986-1992
6  DATE    TIME  INTVL  LPAR_NAME  LPAR_NO  LPRS  PPRS  AVG_LCPU  MIN_LCPU
7  01/09/92  900  4429  VMPROD    1      2     6     34.38    23.87
8  01/09/92  900  4429  PROD1     2      4     6     68.31    55.82
9  01/09/92  900  4429  PROD2     3      3     6     46.52    41.9
10 01/09/92  900  4429  SYSPGM    4      1     6     2.88     2.64
11 01/09/92  900  4429  PHYSICAL  0      6     6     1.68     1.31
12 01/09/92 1014  3599  VMPROD    1      2     6     23.02    18.4
13 01/09/92 1014  3599  PROD1     2      4     6     70.14    64.2
14 01/09/92 1014  3599  PROD2     3      3     6     59.04    55.87
15 01/09/92 1014  3599  SYSPGM    4      1     6     4.37     3.21
16 01/09/92 1014  3599  PHYSICAL  0      6     6     1.65     1.36
17 01/09/92 1114  3591  VMPROD    1      2     6     29.13    15.26
18 01/09/92 1114  3591  PROD1     2      4     6     77.29    76.28
19 01/09/92 1114  3591  PROD2     3      3     6     58.16    51.8
20 01/09/92 1114  3591  SYSPGM    4      1     6     4.02     3.13
16-Nov-93 09:45 AM                                CMD

```

Figure 5 CPU Template

DASD Spreadsheet

The DASD spreadsheet can be produced in several formats depending on user requirements. The data, detailed by interval, hourly, or daily for a time period may be used for tracking DASD performance or capacity planning. This spreadsheet is produced when a RMFDASD DD card is present. To eliminate this report, omit this DD card.

Control Cards

The DEVICE control cards may be included in the RMFCTL file. The Device keyword must start between columns 2-71 and be followed by a blank. Operand for this control card must be separated by a comma. The format of the control card follows:

```

DEVICE IDEV=(VVVVVV,...),
  EDEV=(VVVVVV,...),
  COMP=BOTH|ADDR|VOLSER,
  SPAN=Y|N,
  STRING=Y|N|O

```

```

IDEV=(VVVVVV,VVV*,...)

```

specifies the devices to be included in the RMFDASD spreadsheet. VVVVVV is a specific volume name. An "*" is used as a mask to specify generic names of packs. The asterisk can be placed anywhere in the six letter name.

```

EDEV=(VVVVVV,VVV*,...)

```

specifies the devices to be excluded from the RMFDASD spreadsheet. VVVVVV is a specific volume name. An "*" is used as a mask to specify generic names of packs. The asterisk can be placed anywhere in the six letter name.

NOTE: If a volume is specified under a generic exclude, it will not be included by a specific include.

```

SPAN=Y|N

```

summarizes each DASD record found on the input file for the entire period when "SPAN=Y." This overrides the parameters "INTERVAL" and "HRLY" on the EXEC card. For example: assume there are 100 logical DASD volumes in the complex and that RMF is set for 15 minute intervals. If 8 hours of RMF data is formatted, only a 100 records will be produced when "SPAN=Y." 3200 records would be produced for "SPAN=N." The default is "N."

```

STRING=Y|N|O

```

Groups DASD by control unit address (a CUU record for each string of DASD). Groups DASD by Logical Control Unit (LCU) for MVS/XA or ESA records. "N" is the default if this parameter is not specified. "Y" will produce output on the string and device level for the interval specified. "O" (only) will produce output on the string level.

```

COMP=BOTH|ADDR|VOLSER

```

BOTH specifies that a compare by address and volume serial number is performed to produce a record. **ADDR** means to compare by address only. **VOLSER** means only to compare by volume serial number. The default is **BOTH**.

Example:

IDEV=(IMS*,DB2*),EDEV=(IMS-TST,IMSCAT),SPAN=Y

This example creates a file to include all IMS and DB2 packs (except for IMSTST and IMSCAT). It summarizes each volume for the period selected.

MVS/SP Spreadsheet Contents

The following information is provided for MVS/SP:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

CUU

UCB address of the device.

VOLSER

The volume serial number of the device.

TYPE

The device type (3350, 3380, 3390, ...).

INTVL

The number of seconds in the interval.

I/O_CNT

The number of successful SIOs to the device.

I/O_SEC

The number of SIOs per second.

I/O_SRV

The average time in milliseconds to complete an I/O.

%BUSY

The percentage of time the device was busy.

AVG_RSP

The average time in milliseconds to complete an I/O, including all delays.

%QUE

The percentage of requests queued to the device.

%RESV

The percentage of requests reserved to the device.

%RESVD

The percentage of the requests delayed due to a reserve from another system sharing the device.

[Figure 6](#) on page [18](#) is a sample of the DASD template for MVS/SP.

```

A1: [W9]
MENU
IMPORT  GRAPHS  RETURN  SETUP  SAVE  PRINT  EXIT
Load a ".PRN" file for a DASD Summary Report
      A      B      C      D      E      F      G      H      I      J
1
2                               Spreadsheet  Version
3                               DAS01SP      V1L5.0
4                               DASD Template for MVS/SP
5
6  SYSID=   4381  PILOT/MVS (C) 1986-1989
7  DATE     TIME  ADR  VOLSER  TYPE  I/O_CNT  I/O_SEC  SRV_TIME  %BUSY  RSP
8  09/12/86 1345 1C0  SWAP01 3380   306     0.3     0.006    1.7  0.006
9  09/12/86 1345 1C1  SYSDLB 3380   110     0.1     0        0.1  0
10 09/12/86 1345 1C2  CICS15 3380  2516     2.8     0.002    3.5  0.002
11 09/12/86 1345 1C3  MVSCAT 3380  5413     6     0.028   14.4  0.028
12 09/12/86 1345 1C4  IMSDB3 3380   154     0.2     0        0.2  0
13 09/12/86 1345 1C5  SYSLIB 3380   112     0.1     0        0.1  0
14 09/12/86 1345 1C6  IMSDB1 3380   791     0.9     0        1.7  0
15 09/12/86 1345 1C7  IMSDB2 3380  1318     1.5     0        2.5  0
16 09/12/86 1345 1C8  TSO001 3380   382     0.4     0        0.9  0
17 09/12/86 1345 1C9  MIS001 3380   145     0.2     0        0.3  0
18 09/12/86 1345 1CB  MIS003 3380   473     0.5     0.001    1.3  0.001
19 09/12/86 1345 1D0  CICS16 3380   852     0.9     0        1.6  0
20 09/12/86 1345 1D1  PHILBB 3380  1124     1.2     0.001    2.1  0.001
16-Nov-93 09:49 AM                               CMD

```

Figure 6 MVS/SP DASD Template

MVS/XA, MVS/ESA and OS/390 Spreadsheet Contents

The following information is provided for MVS/XA and MVS/ESA:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

ADR

The device number of the device.

LCU

The Logical Control Unit to which this device is attached.

VOLSER

The Volume Serial number of the device.

TYPE

The device type (3350, 3380, 3390,...).

INTVL

The number of seconds in the interval.

I/O_CNT

The number of successful SSCHs to the device.

I/O_SEC

The number of SSCH per second.

CONN

The average time in milliseconds the device was connected to the channel path for data transfer.

DISC

The average time in milliseconds the device was not connected to the channel path for data transfer.

RSP

The average time in milliseconds to complete an I/O including all delays.

IOSQ

The average time in milliseconds an I/O waits on the IOS queue before a SSCH can be issued.

%RESVD

The percentage of the requests delayed due to a reserve from another system sharing the device.

%RESV

The percentage of requests reserved to the device.

%UTL

The percent of time the disk was in use.

%QUE

The percentage of requests queued to the device.

PEND

The average time in milliseconds an I/O is delayed due to shared DASD or path contention. The amount of time an I/O spends in the logical control unit queue.

Q_CT

The number of requests queued to this device.

MEC

The Measurement Event Count.

[Figure 7](#) on page [19](#) is a sample of the DASD MVS/XA and above template.

```

A1: [W9]
MENU
IMPORT  GRAPH  PRINT  RETURN  SAVE  SETUP  EXIT
Load a ".PRN" file for a DASD Summary Report
      A      B      C      D      E      F      G      H      I      J
1          Spreadsheet      Version
2          DAS01XA          V1L5.0
3          DASD Template MVS/XA
4
5  SYSID= 0190 PILOT/MVS (C) 1986-1989
6  DATE    TIME  ADR  VOLSER  TYPE  LCU  I/O_CNT  I/O_SEC  CONN  DISC
7  09/25/86 745 109 MAST02 3330 002    16     0  0.00174 0.01044
8  09/25/86 745 120 CAT190 3380 003   684   0.8  0.00224 0.00004
9  09/25/86 745 121 PGC0M1 3380 003    39     0  0.00254 0.01104
10 09/25/86 745 122 MAN1   3380 003   559   0.6  0.00284 0.01174
11 09/25/86 745 123 PGLCL1 3380 003   493   0.5  0.00984 0.01464
12 09/25/86 745 130 PGLCL2 3380 003   366   0.4  0.01274 0.01694
13 09/25/86 745 131 PGLCL3 3380 003   405   0.5  0.01174 0.01874
14 09/25/86 745 132 PGLCL4 3380 003   424   0.5  0.01144 0.01504
15 09/25/86 745 133 PGLCL5 3380 003   389   0.4  0.01394 0.01794
16 09/25/86 745 134 PGLCL6 3380 003   394   0.4  0.01184 0.01924
17 09/25/86 745 135 PGLCL7 3380 003   446   0.5  0.01114 0.01604
18 09/25/86 745 136 CADPK1 3380 003  4626   5.1  0.00614 0.00054
19 09/25/86 745 137 CADPK2 3380 003    206   0.2  0.00154 0.00094
20 09/25/86 745 140 DSK190 3380 004  1927   2.1  0.00834 0.01444
16-Nov-93 09:55 AM          CMD
    
```

Figure 7 MVS/XA DASD Template

Paging Spreadsheet

The Paging spreadsheet is a detailed report, by interval, hour, or daily period, on the paging subsystem for performance or capacity planning. This spreadsheet is produced when a RMFPAGE DD card is present. To eliminate this report, omit this DD card. Two versions of this template are available; one is for MVS/SP, the other is for MVS/XA and above.

The following information is provided in both versions of the template:

DATE

Specifies the date of the data reported.

INTVL

The number of RMF intervals represented in the data.

TIME

Specifies the time of day of the data reported.

TOTAL

Total page rate (pages/second) which includes demand, swap, VIO, and system (PLPA and common) page-in and page-out operations.

DMD

Demand page rate (pages/second) PAGE-IN operations.

SWAP

Swap rate (pages/second) page-in operations.

VIO

VIO and Hyperspace rate (pages/second) for page-in and page-out operations.

SYS

System rate (pages/second) which include PLPA and common page-in and page-out operations.

RECLM

Reclaim rate of total pages (pages/sec).

SWP_RTE

Swap rate (pages/second) for page-out operations.

SWP_IN

Total pages swapped in. This field is a count of pages processed for the time period.

SWP_OUT

Total pages swapped out. This field is a count of pages processed for the time period.

NUC

Fixed frames in MVS nucleus.

MAX_CSA

Maximum number of frames allocated for CSA in MVS.

MAX_PRVT

Maximum number of frames allocated for private area storage.

AVG_FRAMES

Average number of frames allocated for private area storage.

TOT_FRAMES

Total real frames available.

MAX_SQA

Maximum number of frames allocated for SQA in MVS.

FX_CMN

Maximum number of frames fixed in CSA and LPA.

FX_PRVT

Maximum number of frames fixed for private storage.

FX_LSQA

Maximum number of frames fixed for LSQA storage.

MAX_FIXED

Maximum number of frames fixed in real memory.

The following additional fields are provided for XA, ESA and expanded storage.

AVG_UIC

The average UIC value for period being measured.

FX_BL16

Maximum number of frames fixed below the 16 megabyte boundary.

MVC_EX

The number of frames moved to expanded storage.

MIGRT

The number of frames migrated to auxiliary storage.

AVG_EXT

The average number of frames available in expanded storage.

LOW_MA

The minimum migration age for expanded storage.

HIGH_MA

The maximum migration age for expanded storage.

AVG_MA

The average migration age for expanded storage.

[Figure 8](#) on page [22](#) is a sample of the Paging template for MVS/SP. [Figure 9](#) on page [24](#) is a sample of the Paging template for MVS/XA and above.

```

A1: [W10]
MENU
IMPORT GRAPHS SAVE PRINT RETURN SETUP EXIT
Load a ".PRN" file for a Paging Summary Report
      A          B          C          D          E          F          G          H          I          J          K
1                                     Spreadsheet  Version
2                                     PAG01SP      V1L5.0
3                               PAGING Detail Template MVS/SP
4
5  SYSID=      4381 PILOT/MVS (C) 1986-1989
6  DATE       TIME INTVL TOTAL      DMD  SWAP  VIO   SYS RECLM SWP RTE SWP IN
7  09/12/86  1345  900   27      19.5  7.4   0    0.1  29.2  0.1   49
8  09/12/86  1400  899  28.6   21.5  6.8   0    0.2  32.3  0.1  51.2
9  09/12/86  1415  900   38      28.2  9.6   0    0.3  31.4  0.1  53.8
10 09/12/86  1430  899  38.6   25.7 11.2   0    1.8  26.8  0.1  52.4
11 09/12/86  1445  900  34.4   22.8 10.9  0.6   0.1  28.5  0.1  50.1
12 09/12/86  1500  899  28.8   19.7  8.8   0    0.3  27.5  0.1  52.8
13 09/12/86  1515  899  29.8   19.3 10.5   0    0    28.9  0.1  54.3
14 09/12/86  1530  900  28.2   16.3 11.5   0    0.4  20.6  0.1  58.3
15 09/12/86  1545  901  30.1   17.2 11.6  1.2   0.1   23   0.1  55.6
16 09/12/86  1600  899  25.7   15.5  10    0    0.2  18.1  0.1   62
17 09/12/86  1615  899  24.3   14.7  9.1  0.4   0.1  17.8  0.1   57
18 09/12/86  1630  899  23.7   14.6  7.9  1.1   0.1  16.1  0.1  52.4
19 09/12/86  1645  900  15.4    9.6  5.2  0.6   0    15.2  0.1  50.1
20 09/12/86  1700  899  12.5    7.8  4.7   0    0    12.3  0.1  40.8
16-Nov-93  09:58 AM                                CMD

```

Figure 8 MVS/SP Paging Template


```

A1: [W10]
MENU
IMPORT  GRAPHS  SAVE  PRINT  RETURN  SETUP  EXIT
Load a ".PRN" file for a Paging Summary Report
      A      B      C      D      E      F      G      H      I      J      K
1
2                               Spreadsheet  Version
3                               PAG01XA      V1L5.0
4                               Paging Detail Template for MVS/XA
5  SYSID=      S190 PILOT/MVS (C) 1986-1989
6  DATE      TIME INTVL TOTAL      DMD  SWAP  VIO      SYS RECLM SWP RTE SWP IN
7  11/17/89  944   900  94.3   45.3 45.1 1.7   0.6 56.2   2.5  11
8  11/17/89  959   899  93.6   44.4 46.1 1.2   0.7 51.4   2.4  11.8
9  11/17/89 1014   899 112.8   63.1 45.4 1.1   2.1 73.4   2.4  11.9
10 11/17/89 1029   900  95.3   49.3 41.2 1.3   2.2 55.5   2    12.9
11 11/17/89 1044   899 113.1   55.2 48.4 3.7    2   62    2.6  12.2
12 11/17/89 1059   899  86.2    42  38.4 2.6    0.6 49.5   2.2  10.6
13
14
15
16
17
18
19
20
16-Nov-93  10:05 AM                                CMD

```

Figure 9 MVS/XA Paging Template

Paging Data Set Spreadsheet

The Paging Data Set spreadsheet is a detailed report, by interval, hour, or daily period, of paging data set performance and capacity. This spreadsheet is produced when a RMFPGDS DD card is present. To eliminate this report, omit this DD card.

The following information is provided:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

DATA SET

The name of the page data set.

I/O_CNT

The number of successful SIOs to the page data set.

PAGES

The number of pages transferred to or from the page data set.

SRV/IO

The average service time to complete each I/O request to the data set. This value is calculated as follows:

$$\frac{\text{Samples of Page Data Set Used}}{\text{Total Samples}} \times \frac{\text{Interval}}{\text{SIO}}$$

TRANS

The average time to complete a page transfer. This value is calculated as follows:

$$\frac{\text{Samples Page Data Set Used} \times \text{Interval}}{\text{Number of Samples}} \\ \text{Number of Pages Transferred}$$

PGS I/O

The number of pages transferred per I/O.

PGS_SEC

The number of pages transferred per second.

I/O_SEC

I/Os per second to the page data set.

%IN_USE

The percentage of time the Auxiliary Storage Manager found that the data set was busy.

%MIN_SLOTS

The minimum percentage of slots allocated during the interval.

%AVG_SLOTS

The average percentage of slots allocated during the interval.

%MAX_SLOTS

The maximum percentage of slots allocated during the interval.

Figure 10 on page [26](#) is a sample of the Page Data Set template

```

A1: [W10]
MENU
IMPORT  GRAPHS  SAVE  PRINT  RETURN  SETUP  EXIT
Load a ".PRN" file for a Page Data Set Report
      A          B          C          D          E          F          G          H
1
2                               Spreadsheet      Version
3                               PGD01DLY        V1L5.0
4                               Page Data Set Detail Template for MVS/XA
5  SYSID=      S190 PILOT/MVS (C) 1986-1989
6  DATE        TIME      DATA_SET_NAME I/O_CNT  PAGES  SRV_I/O  TRANS  PGS_I/O
7   03/17/89  1230  PAGE.PLPA          22      12      0.034  0.062   0.5
8   03/17/89  1230  PAGE.LOCAL1        988     1921    0.019  0.01   1.9
9   03/17/89  1244  PAGE.PLPA          27      15      0.065  0.117  0.6
10  03/17/89  1244  PAGE.COMMON        19      12      0.053  0.083  0.6
11  03/17/89  1244  PAGE.LOCAL1       1059    2100    0.023  0.012   2
12  03/17/89  1312  PAGE.PLPA          620     485     0.027  0.035  0.8
13  03/17/89  1312  PAGE.COMMON        146     428     0.068  0.023  2.9
14  03/17/89  1312  PAGE.LOCAL1       1599    7826    0.029  0.006  4.9
15  03/17/89  1400  PAGE.PLPA          130     99      0.015  0.02   0.8
16  03/17/89  1400  PAGE.COMMON        32      23      0.094  0.13   0.7
17  03/17/89  1400  PAGE.LOCAL1        828    3484     0.03  0.007  4.2
18  03/17/89  1509  PAGE.PLPA         1482    1189     0.02  0.025  0.8
19  03/17/89  1509  PAGE.COMMON        404     657     0.03  0.018  1.6
20  03/17/89  1509  PAGE.LOCAL1       5303   23698    0.028  0.006  4.5
16-Nov-93  10:16 AM          CMD

```

Figure 10 Page Data Set Template

RMF Summary Spreadsheet

The RMF Summary spreadsheet is a detailed report, by interval, hour or daily period, of the overall system activity and performance during the time period being analyzed. This spreadsheet is produced in the RMFOUT DD card data set, which is mandatory.

The following information is written to the RMFOUT file, producing one PC record per RMF interval, hour or day:

DATE

Specifies the starting date of the RMF interval in Lotus 1-2-3 date format.

TIME

The time the RMF interval started.

INT

Specifies the length of the RMF interval.

JOB MAX

The maximum number of batch jobs executing during the interval.

JOB AVG

Average number of batch jobs executing during the interval.

TSO MAX

Maximum number of TSO users executing during the interval.

TSO AVG

Average number of TSO users executing during the interval.

STC MAX

Maximum number of started tasks executing during the interval.

STC AVG

Average number of started tasks executing during the interval.

SWAP RATE

Specifies the number of swap sequences per second during the interval.

DPAG RATE

Specifies the demand paging rate which is calculated as the number of page ins plus page reclaims (non-VIO, non-swap) per second. The demand paging rate is also described as the page fault rate.

DASD RATE

Specifies the DASD device activity rate calculated as the number of successful Start I/O instructions per second for all DASD devices during the interval.

TAPE RATE

Specifies tape device activity rate calculated as the number of successful Start I/O instructions per second for all tape devices during the interval.

TSO XTS

The total TSO transaction rate for all TSO performance groups and periods. This field is zero when TSO is not found.

TSO RSP

The average response time for all TSO performance groups and periods. The value is in 1000ths of a second. This field is zero when TSO is not found.

CPUA BUSY

Specifies the average percentage of time all processors were busy during the interval in a non-PR/SM environment. In a PR/SM environment this field represents the

percentage of the time the logical partition was busy. In MVS/ESA the percentage of CPU includes CPU used by LPAR management. If the partition is defined with dedicated processors the CPU calculation and meaning of this field remains the same as in a non-PR/SM environment. If the logical partition is defined with shared processors then the calculation is based upon the definition of the logical partition.

CPUL BUSY

Specifies the minimum (low) percentage of time all processors were busy during a specific interval during “HRLY” (hourly) or “DAILY” processing. This field is calculated the same as “CPUA.”

CPUH BUSY

Specifies the maximum (high) percentage of time all processors were busy during a specific interval during “HRLY” or “DAILY” processing. This field is calculated the same as “CPUA.”

PIxy BUSY

Specifies the percentage of time the physical channel or path (MVS/XA or ESA) xy belonging to this operating system was busy during the interval. This field is generated for channels associated with the operating system.

Examples:

```
//PILOTMVS EXEC PGM=SMFPC,  
  PARM='INTERVAL,  
  PI(01,11,02,12,03,13)'
```

This execution will create one PC record for every RMF interval on the input file.

[Figure 11](#) shows a sample of this spreadsheet.


```

A1: [W10]
MENU
IMPORT  GRAPHS  PRINT  RETURN  SAVE  SETUP  EXIT
Load a ".PRN" file for an RMF Summary Report
      A      B  C  D  E  F  G  H  I      J  K  L  M
1                                     Spreadsheet  Version
2                                     RMF01DLY      V1L5.0
3
4                                     RMF Summary Template
5
6  SYSID=      GS2A PILOT/MVS (C) 1986-1989
7  DATE        TIME INTJOB JOB  TSO TSO  STC  STC  SWAP DPAG DASD TAPE
8             HHMM MM  MAX  AVG  MAX  AVG  MAX  AVG  RATE  RATE  RATE  RATE
9  11/17/89   944 15  14   8  94  92  100  96  45  56  373  3
10 11/17/89  1014 15  17  10 105 102  96  93  45  73  425  2
11 11/17/89  1029 15  15   9 103 100  98  94  41  55  360  6
12 11/17/89  1044 15  15  12 104 102  96  92  48  61  362  32
13 11/17/89  1059 15  11   9 103  99  98  95  38  49  360  11
14
15
16
17
18
19
20
16-Nov-93  10:20 AM                                CMD
    
```

Figure 11 RMF Summary Template (by interval)

```
//PILOTMVS EXEC PGM=SMFPC,
  PARM='HRLY,TSO,
  PI(01,11,02,12,03,13)'
```

This execution will create one PC record for every hour by combining RMF intervals (unless the RMF interval is set to 1 hour or more) on the input file. Also note that data formatted by interval or by hour can be imported into the same template. [Figure 12](#) shows an example of this spreadsheet.

The RMF template is also provided in a weekly and monthly version. These templates contain the same data, summarized by the day (the TIME field is omitted). A sample of the monthly template is provided in [Figure 13](#) on page [31](#).

```
A1: [W10]
MENU
IMPORT  GRAPHS  PRINT  RETURN  SAVE  SETUP  EXIT
Load a ".PRN" file for an RMF Summary Report
      A      B      C      D      E      F      G      H      I      J      K      L      M
1                                     Spreadsheet      Version
2                                     RMF01DLY          V1L5.0
3                                     RMF Summary Template
4
5  SYSID=      SYSA PILOT/MVS (C) 1986-1992
6  DATE        TIME INTJOB JOB  TSO  TSO  STC  STC  SWAP DPAG DASD TAPE
7              HHMM NO  MAX  AVG  MAX  AVG  MAX  AVG  RATE  RATE  RATE  RATE
8   01/09/92   900   5   27   23 126 118 135 129 117   96 579 11
9   01/09/92  1014   4   33   28 145 141 127 123 163 158 524 10
10  01/09/92  1114   5   30   25 144 141 132 127 123 136 522 19
11  01/09/92  1214   3   25   20 129 124 135 133  62  58 528 36
12
13
14
15
16
17
18
19
20
16-Nov-93  10:23 AM                                CMD
```

Figure 12 RMF Summary Template (by hour)

```

A1: [W9]
MENU
IMPORT  GRAPHS  PRINT  SAVE  SETUP  RETURN  HELP  EXIT
Load a ".PRN" file for an RMF Monthly Summary Report
      A      B      C      D      E      F      G      H      I      J      K
1
2                      RMF Weekly/Monthly Template  RMF01MLY  V1L5.0
3
4          Calculates Averages by Day in Imported Data.
5
6          SYSID=  SYSA      PILOT/MVS (C) 1986-1992
7  Date Range  Load Time      0 Minutes  7 Seconds
8  01/09/92
9  01/14/92
10         DATE      INT  JOB      JOB      TSO      TSO      STC      STC      SWAP
11  TOTAL AVGS ->    MM/DD/YY  NO JMAX  JAVG  TMAX  TAVG  SMAX  SAVG  SWPRTE
12         01/09/92  17 29.2  24  136 131.2 132 127.7 116.25
13         01/10/92  17  31   24  136 131.2 132  133 121.25
14         01/11/92  17 28.7 24.75 136 141.7 133. 130.5 118.75
15         01/12/92  17 29.2 23.75 136  130 133.  133 123.75
16         01/13/92  17 28.7 23.75 136 131.2 132.  128 116.25
17         01/14/92  17 28.7   24  136  131 132.  128 116.25
18
19
20
16-Nov-93  10:35 AM                      CMD

```

Figure 13 RMF Weekly/Monthly Template

TSO Spreadsheet

The TSO spreadsheet is a detailed report, by interval, hour or daily period, of the TSO activity in your system. This spreadsheet is produced when the TSO parameter is coded on the EXEC statement and the RMFTSO DD card is present in the job stream. To eliminate this report, omit this DD card.

The following information is provided for each period within all TSO performance groups.

DATE

The date on which the data was recorded.

TIME

This field contains the time the interval started when the data captured was one interval. If the data was summarized by hour or day, this field contains the hour the measurement started.

INT

This field contains the length of the interval when the data captured was one interval. If the data was summarized by hour or day, this field contains the number of intervals captured.

RSP TIM

The average response time for the period during the interval in 1000ths of a second.

NUM TRAN

The number of transactions for the period during the interval.

CPU SRV

The total CPU service units for the period during the interval.

MSO SRV

The total MSO service units for the period during the interval.

I/O SRV

The total I/O service units for the period during the interval.

SRB SRV

The total SRB service units for the period during the interval.

TOT SRV

The TOTAL service units for the period during the interval.

Figure 14 on page [33](#) is a sample of the TSO template. For your convenience, a monthly version of the template is also provided.

```

A1: [W10]
MENU
IMPORT  GRAPHS  PRINT  RETURN  SAVE  SETUP  EXIT
Load a ".PRN" file for a TSO Summary Report
      A      B      C      D      E      F      G      H      I
1
2                               Spreadsheet      Version
3                               TSO01DLY      V1L5.0
4                               TSO Detail Template
5  SYSID=      4381  PILOT/MVS (C) 1986
6  PGN=      2 (3)   Period 1
7  DATE      TIME INT  RSP      NUM      CPU      MSO      I/O  SRB
8            HHMM MM   TIM      TRAN      SRV      SRV      SRV  SRV
9  09/12/86  1345 15 0.169      301      21851  16236  7845  0
10 09/12/86  1400 15 0.147      277      16701  13301  7115  0
11 09/12/86  1415 15 0.170      523      31926  22238  9760  0
12 09/12/86  1430 15 0.199      689      42697  32136  15585 0
13 09/12/86  1445 15 0.150      691      35092  28157  11805 0
14 09/12/86  1500 15 0.115      531      25672  17835  6980  0
15 09/12/86  1515 15 0.236      484      27279  18668  8585  0
16 09/12/86  1530 15 0.234      639      35164  24547  12980 0
17 09/12/86  1545 15 0.187      571      37103  29596  13725 0
18 09/12/86  1600 15 0.118      816      41443  32967  13725 0
19 09/12/86  1615 15 0.113      864      47071  36055  14765 1
20 09/12/86  1630 15 0.183      637      38887  32341  12125 0
16-Nov-93  10:41 AM      CMD

```

Figure 14 TSO Template

Workload Spreadsheet

The Workload spreadsheet is a detailed report, by interval, hour, or daily period, of workload activity for performance tuning or capacity planning. This spreadsheet is produced when a RMFWKLD DD card is present. To eliminate this report, omit this DD card. Due to the importance of workload analysis and workload tuning, refer to the technique section of this manual for more detailed information. Graphs of workload utilization can easily be produced by time or workload name. The following control cards are used by the workload component of PILOT/MVS.

Control Cards

There are two types of control cards that may be specified in the RMFCTL file. The CPU and WKLD keywords must start between columns 2-71 and are followed by a blank. Operand for these control cards must be separated by a comma. The CPU control is needed to calculate the fields derived from the SRM constants in MVS. The format of the control cards follows:

```

CPU  MODEL=name,
      SPEED={ssss.ss|AUTO},
      ICS=cc,
      PROCS=n

```

where:

CPU

Is the control card keyword. If this control card is omitted, calculations based upon processor speed will be invalid. Other fields not effected by speed will be correct.

MODEL=

Name is the CPU model (4341-12, 3090-200, 3084-QX, etc). Up to 10 characters can be specified. A listing of the current contents of this table is provided in the Techniques section of this manual. If a model does not appear in the CPU table specify a model name (not in the table) with the PROCS= and SPEED= parameters, or edit the table as described in the Techniques section.

SPEED=

The processor Maximum Service Units (MSU) values used by the SRM. Only the model name is needed if the processor is included in PILOT's internal table. Specify **SPEED=AUTO** if you are running MVS/XA or higher. The service unit constant is taken from the RMF record.

ICS=

Specifies the xx value in the member name IEAICSxx which contains the ICS that represents the data (was in effect at the time the data was recorded). The default is IEAICS00. The PARMLIB DD statement is required.

PROCS=

The number of processors for the model specified. A maximum of 8 can be specified.

```

WKLD WL=(name,pg...),
      TRIVL=Y|N,
      OTHER=Y|N

```

where:

WKLD

Is the control card keyword. If this control card is omitted, a workload will be defined for each control and report performance group found on the input file. Up to a 1,000 workloads may be defined for analysis. An ICS is required to have this function properly. When report performance groups are found, the report performance groups resource usage will be subtracted from the control performance group. The PARMLIB DD statement is required.

WL=

The name operand is the workload name, the pg's are the control or report performance group numbers describing this workload. Each workload may be defined to include one or more control or report performance groups.

TRIVL=

PILOT/MVS will create a separate workload for Trivial TSO transactions (period 1) when TRIVL=Y. PILOT/MVS uses the last 3 letters of the workload name specified to easily distinguish the workloads (eg. WL="TSO", then the trivial workload name generated will be "TSO-TVL"). This operand can be specified on any of the control cards but will only create a separate workload for TSO workloads.

OTHER=

PILOT/MVS will create a separate workload to combine all workloads not defined when OTHER=Y. All control performance groups not previously used will be combined in a workload called "OTHER." This operand can be specified on any of the control cards but will only create one separate workload.

WL is mandatory when the WKLD control card is used. The other operand are optional.

Example:

Define the workloads at XYZ Corporation.

```
CPU      MODEL=4381-2
WKLD     WL=(MVSPGN,0,5,9),
          TRIVL=Y,OTHER=Y
WKLD     WL=(PRODCICS,7)
WKLD     WL=(TSO,2,8,15)
WKLD     WL=(BATCH,1,3,6)
```

PILOT/MVS will format RMF Type 72 records for the workloads defined. PILOT/MVS will produce additional workloads for TSO trivial transactions and all other workloads not defined.

The following information is provided in the workload spreadsheet:

DATE

Specifies the date of the data reported.

TIME

Specifies the time of day of the data reported.

WKLD

The workload name defined by the user. If workloads are not defined, a default name is provided by PILOT/MVS. The default name created is WLxxx, where xxx is the performance group number. No default names will be generated if OTHER=Y has been coded.

RATIO

The SRM capture ratio for this workload is defined as the total CPU (TCB+SRB) service units consumed by this workload divided by the total CPU service units

utilized by the entire system (CPU time measured by the SRM).

%CPU

The percentage of the CPU this workload utilized. This percentage includes the MVS overhead associated with this performance group. It is calculated as the SRM capture ratio multiplied by the CPU utilization of the entire system.

XTS

The number of ended transactions for this workload.

CPU_SRV

The number of TCB CPU service units for this workload.

SRB_SRV

The number of SRB CPU service units for this workload.

MSO_SRV

The number of MSO service units for this workload.

I/O_SRV

The number of I/O CPU service units for this workload.

CPU_SECS

The number of CPU seconds for this workload.

I/O_RTE

The EXCP rate (EXCPS/second) includes all I/O (including JES2) completed for this workload.

PGIN

The page-in rate: page-in/memory residence time.

MVSOVHD

The unmeasured CPU utilization not accounted for by the SRM, in service units (for example, IOS, paging, and other higher running system tasks).

TOT_CPU

The total CPU utilization from RMF Type 70 records. This is the average utilization among all processors for the machine being measured.

INTVL

The number of seconds measured for the interval, hour, or period being measured.

PG#

The performance group number(s) of the workload being processed. This field has a maximum length of 16 characters (for multiple performance groups per workload).

[Figure 15](#) on page [37](#) is a sample of the daily workload template.

A weekly and monthly version of this template are also provided. These templates summarize the detail data and provide averages. A sample of the weekly template is provided in [Figure 16](#) on page [38](#).


```

A1: [W9]
MENU
IMPORT  GRAPH  PRINT  RETURN  SAVE  SETUP  EXIT
Load a ".PRN" file for a Workload Summary Report
      A      B      C      D      E      F      G      H
1
2                               Spreadsheet Version
3                               WKL01DLY  V1L5.0
4                               Workload Template Used For Daily Activity
5  SYSID=   GS2A  PILOT/MVS (C) 1986-1989
6  MODEL-   3090-4  SU/SEC    700 #CPUS-    4      CPU-    10
7
8  DATE      TIME      WKLD  RATIO  %CPU  XTS  CPU_SRV  MSO_SRV
9  11/17/89  900  TOTALPGN  1.00  66.66  27046  76846782 120118241
10 11/17/89  900  MVS        0.17  11.33   2     11358220 23010704
11 11/17/89  900  TSO        0.11   7.33  26720   9236880 11762448
12 11/17/89  900  CICS       0.11   7.33   0     9228413 27033189
13 11/17/89  900  DB2        0.11   7.33   0     8687658 18031567
14 11/17/89  900  BATCH     0.39  25.99   285   31878741 31302854
15 11/17/89  900  NET        0.01   0.66   7     1593787  5788481
16 11/17/89  900  OTHER     0.06   3.99   32    4863083  3188998
17
18
19
20
16-Nov-93  10:55 AM                                CMD

```

Figure 15 Workload Template (Daily)

```

A1: [W11] 'Spreadsheet
MENU
IMPORT GRAPH PRINT RETURN SAVE SETUP EXIT
Load a ".PRN" file for a Workload Summary Report
      A          B          C          D          E          F          G          H
1  SpreadsheetVersion                               Load Time
2  WKL01WLY    V1L5.0                               2 Minutes
3                                                     8 Seconds
4
5  PILOT/MVS Weekly/Monthly Workload Spreadsheet
6  DATE RANGE
7  01/25/93    SYSID=   GS1E                ALT-M MAIN MENU
8  01/27/93
9
10         AVG      AVG      AVG      AVG      AVG
11         RATIO   %CPU     XTS     CPU SRV  MSO SRV
12 TOT_AVGS-->  WKLD      0.11   10.1    948     15332743 95957492
13         OVERHEAD 0.07    6.2     0       9924633 61815348
14         IDMS     0.16   14.3    0       21959821 214450700
15         DB2      0.00    0.0     0        35       11
16         CICS     0.42   38.0    0       59320288 438319777
17         TSOTVL   0.02    1.5     6679    2796213 3253358
18         TSO      0.03    2.9     1220    5160283 3609590
19         PRODBAT 0.10    8.9     283     13131681 28903607
20         TESTBAT 0.0     1.8     10      2572621 8073612
21         OTHER   0.15   13.5    23      18018212 73205601
22
23 16-Nov-93  11:06 AM                                CMD

```

Figure 16 Workload Template (weekly or monthly)

Sample Job Streams

PILOT/MVS As A Stand-alone Program

```
//PCFMT      EXEC  PGM=SMFPC, PARM=HRLY
//STEPLIB    DD    DSN=TSU01.MYLIB, DISP=SHR
//SMFIN      DD    DSN=BACKUP.SMFWKLY(0), UNIT=TAPE, VOL=SER=123456, DISP=OLD
//RMFLOG     DD    SYSOUT=A
//PARMLIB    DD    DSN=SYS1.PARMLIB, DISP=SHR
//RMFOUT     DD    DSN=TSU01.RMF01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFTSO     DD    DSN=TSU01.TSO01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFDASD    DD    DSN=TSU01.DAS01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFCHAN    DD    DSN=TSU01.CHA01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFPAGE    DD    DSN=TSU01.PAG01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFPGDS    DD    DSN=TSU01.PGD01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFWKLD    DD    DSN=TSU01.WKL01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFCACHE   DD    DSN=TSU01.PGD01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFCPU     DD    DSN=TSU01.WKL01DL1.PRN, DISP=(,CATLG), SPACE=(TRK,(4,4),RLSE)
//RMFCTL     DD    *
CPU          MODEL=4381-2
WKLD        WL=(MVSPGN,0,5,9), TRIVL=Y, OTHER=Y
WKLD        WL=(PRODCICS,7)
WKLD        WL=(TSO,2)
WKLD        WL=(HOTBATCH,3)
WKLD        WL=(BATCH,1)
```

Notes:

1. STEPLIB Used if SMFPC is not in Linklist
2. SMFIN Input data set of SMF records.
3. RMFLOG Statistics on the run.
4. PARMLIB The input library which contains the IEAICSxx and IEAIPSxx members.
5. RMFOUT Output data set for the RMF summary spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate them based on the number of CPUs and channels found on SMFIN.
6. RMFTSO Output data set for the detail TSO spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate them based on the number of TSO performance groups and periods found on SMFIN.
7. RMFDASD Output data set for the DASD spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate the DCB parameters.
8. RMFCHAN Output data set for the detail channel spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate the DCB parameters.
9. RMFPAGE Output data set for the PAGE spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate the DCB parameters.
10. RMFPGDS Output data set for the Page Data Set spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate the DCB parameters.
11. RMFWKLD Output data set for the workload spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate the DCB parameters.

12. RMFCACHE Output data set for the cache spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate the DCB parameters.
13. RMFCPU Output data set for the CPU spreadsheet. It is not necessary to specify DCB parameters, PILOT/MVS will calculate the DCB parameters.
14. RMFCTL Input control card data set. The CPU model must be specified when workload records are processed.

Refer to the file transfer section of the Installation and Overview manual for the naming conventions used by PILOT.

PILOT/MVS As A User Exit Of PILOT/SMF

```
//PCFMT      EXEC  PGM=READSMF, PARM=' SMFPC, DAILY', REGION=720K
//STEPLIB    DD    DSN=TSU01.MYLIB, DISP=SHR
//SYSUT1     DD    DSN=BACKUP.SMFWKLY(0), UNIT=TAPE, VOL=SER=123456, DISP=OLD
//SYSUT2     DD    DSN=TSU01.RMFRECS.SMF, DISP=(,CATLG), UNIT=SYSDA,
//           SPACE=(CYL, (10,1), RLSE)
//SYSPRINT   DD    SYSOUT=A
//EXCEPT   DD    SYSOUT=A
//SYSIN      DD    *
*
*      EXTRACT RMF RECORDS FOR OUR PEAK PERIOD FOR THE MONTH OF
*      FEBRUARY, SUMMARIZE THOSE INTERVALS AND PREPARE THEM FOR
*      DOWNLOADING.
*
*      START=02/01/85, END=02/28/85, SELECT=(70-74),
*      PEAKTIME=(1300,1500), NOWEEKENDS
/*
//*          NOTICE SMFIN DD CARD IS NOT USED!
//*
//RMFLOG     DD    SYSOUT=A
//PARMLIB    DD    DSN=SYS1.PARMLIB, DISP=SHR
//RMFOUT     DD    DSN=TSU01.RMF01ML1.PRN, DISP=(,CATLG), SPACE=(TRK, (4,4), RLSE)
//RMFTSO     DD    DSN=TSU01.TSO01ML1.PRN, DISP=(,CATLG), SPACE=(TRK, (4,4), RLSE)
//RMFWKLD    DD    DSN=TSU01.WKL01ML1.PRN, DISP=(,CATLG), SPACE=(TRK, (4,4), RLSE)
```

Notes:

1. STEPLIB Used if READSMF or SMFPC are not in Linklist.
2. SYSUT1 Input data set of SMF records.
3. SYSUT2 Output data set of SMF records.
4. SYSPRINT Statistics, error, and warning messages.
5. EXCEPT Error message file for invalid records.
6. SYSIN Input control cards.
7. RMFLOG Statistics on the run.
8. PARMLIB The input library which contains the IEAICSxx and IEAIPSxx members.
9. RMFOUT Output data set for the RMF summary spreadsheet. Do not specify DCB parameters, PILOT/MVS will calculate them based on the number of CPUs and channels found on SMFIN.

10. RMFTSO Output data set for the TSO spreadsheet. Do not specify DCB parameters, PILOT/MVS will calculate them based on the number of TSO performance groups and periods found on SMFIN.
11. RMFWKLD Output data set for the workload spreadsheet. Do not specify DCB parameters, PILOT/MVS will calculate them based on the number of TSO performance groups and periods found on SMFIN.

For information regarding PILOT/SMF consult the PILOT/SMF User's Guide.

RMFLOG Example

AXIOS PRODUCTS, INC. PILOT/MVS (C) 1986-1989 KLM TECHNICAL SPECIALTIES, INC.
 AXIOS PRODUCTS, INC. VERSION V1.L5.0
 HRLY,TSO,CHAN(01,02,03,04,0B,0C)

CPU SPEED=AUTO

PILOT011I 93082.21.44 MVS=SP4.2.2 SU/SEC= 2139.0 IPDS=42 ICS=42 HIGH PGN= 97

PILOT013I PARMLIB OPENED FOR SYS1.PARMLIB MEMBER IEAICS09
 SUBSYS=STC,PGN=1
 TRXNAME=TAPELIB,RPGN=15
 TRXNAME=DASDMGT,RPGN=22
 SUBSYS=JES2
 TRXNAME=PAYROLL,PGN=90
 SUBSYS=TSO,PGN=2
 USERID=CONTROL,PGN=50

PILOT012I PARMLIB SUBSYSTEM= STC TRXNAME= TAPELIB CTL= 1 RPT= 15

TOTAL RECORDS READ 66,395 SYSTEM - S191 RMF VERSION - 4.2.2

NUMBER OF CPUS	3	NUMBER OF CHANNELS	48
PR/SM PARTITION	MVSDEV	PARTITION NUMBER	2
RMFOUT LRECL	136	RMFOUT BLKSIZE	6,120
RMFTSO LRECL	238	RMFTSO BLKSIZE	5,950
RMFPGDS LRECL	156	RMFPGDS BLKSIZE	6,084
RMFPAGE LRECL	240	RMFPAGE BLKSIZE	6,000
RMFWKLD LRECL	156	RMFWKLD BLKSIZE	6,084
RMFCHAN LRECL	75	RMFCHAN BLKSIZE	6,075
RMFDASD LRECL	142	RMFDASD BLKSIZE	6,106
RMFCPU LRECL	120	RMFCPU BLKSIZE	6,120
RECORDS WRITTEN TO RMFOUT	17		
RECORDS WRITTEN TO RMFPAGE	17		
RECORDS WRITTEN TO RMFPGDS	98		
RECORDS WRITTEN TO RMFWKLD	404		
RECORDS WRITTEN TO RMFCHAN	361		
RECORDS WRITTEN TO RMFDASD	2,872		
RECORDS WRITTEN TO RMFCPU	77		
RECORDS WRITTEN TO RMFTSO	18		

CPU RECORDS READ 57

CHANNEL RECORDS READ	57
PAGING RECORDS READ	57
PGDS RECORDS READ	399
DEVICE RECORDS READ	171
WKLOAD RECORDS READ	3,249
CACHE RECORDS READ	0
TSO PGN (PERIODS)	2 (4) 97 (2)

Explanation by line (non-blank only):

1. Copyright.
2. Installation name and product version.
3. Parameter list that was passed to PILOT/MVS.
4. Control card listing.
5. Execution time stamp, processor speed, IPS, ICS and high performance group.
6. ICS source and contents (through line 14).
15. Total records found on SMFIN file, the system ID and the RMF version.
16. The total number of CPUs and channels (path IDS) found.
17. PR/SM partition information.
18. The logical record and block size of the RMFOUT file.
19. The logical record and block size of the RMFTSO file.
20. The logical record and block size of the RMFPGDS file.
21. The logical record and block size of the RMFPAGE file.
22. The logical record and block size of the RMFWKLD file.
23. The logical record and block size of the RMFCHAN file.
24. The logical record and block size of the RMFDASD file.
25. The logical record and block size of the RMFCPU file.
26. Number of records in PC format on the RMFOUT file.
27. Number of records in PC format on the RMFPAGE file.
28. Number of records in PC format on the RMFPGDS file.
29. Number of records in PC format on the RMFWKLD file.
30. Number of records in PC format on the RMFCHAN file.
31. Number of records in PC format on the RMFDASD file.
32. Number of records in PC format on the RMFCPU file.
33. Number of records in PC format on the RMFTSO file.
34. CPU records (Type 70) found on SMFIN.
35. CHANNEL records (Type 73) found on SMFIN.
36. PAGING records (Type 71) found on SMFIN.
37. PAGING DATA SET (Type 75) found in SMFIN.
38. DEVICE records (Type 74) found on SMFIN.
39. WORKLOAD records (Type 72) found on SMFIN.
40. CACHE records (Type 245) found on SMFIN.
41. TSO performance groups and the number of periods found for each group.

SMFPC30

Introduction

SMFPC30 allows users to format SMF Type 30 records prior to downloading to a PC for capacity planning and performance tuning on the job or application level. SMFPC30 can execute as a user exit called by PILOT/SMF or as a stand-alone program.

SMFPC30 has two input files:

SMFIN

Specifies the input file. This file is needed when SMFPC runs as a stand-alone program. This DD card should be omitted when SMFPC30 is used as a user exit of PILOT/SMF.

SMFCTL

Specifies a control file to group applications for workloads by job names. This file is required.

SMFPC30 has at least two output files:

SMFLOG

Always required. This file provides information on the data processed.

SMF30

Summary file for each workload defined as a group.

DDname

Where “DDname” is a unique file specifying the output records formatted for PC downloading for a particular group (workload). It is required when “DETAIL=Y”

is specified for a group. Up to 100 files may be specified.

SMFPC30 will format SMF Type 30 records for downloading to a Personal Computer.

Control Cards and Parameters

The SMFPC30 keywords and parameters may appear between columns one and seventy-one inclusive. The statement may be continued to the next card and no special continuation character is required.

Comments may be specified on any control card by placing an asterisk in column one making the entire card a comment, or by leaving at least one blank on any control card and entering the comment after column seventeen. If the asterisk is omitted or incorrectly specified the step will be terminated with a completion code of 16.

Example:

```
GROUP=(TSOTECH,TECH01*,
        TECH02*,TECH05*) GET TECH IDS
```

Note that the parameters start in column two and that “GET TECH IDS” is a comment.

```
GROUP=(DDname,name1,...),
        DETAIL=Y|N,
        TYPE=ALL|TSO|BATCH|CICS|IMS|
        DB2|IDMS
```

GROUP

Specifies a group of jobs (STC, TSO, or Batch) that are considered an application,

system, or workload. Up to one hundred groups may be specified.

An asterisk (“*”) may be used as a “wild card” anywhere in the job name to indicate that any character will match. When it appears at the end of the job name, all characters in that position and all positions to the right are considered to match the template.

For example:

```
JOB=(*KM*,P*,X***123)
```

will choose any job with “KM” for 2nd and 3rd characters, jobs that start with “P”, and jobs that start with “X” and end with “123”.

DDname

Specifies the group name and a unique data set when `DETAIL=Y` is coded. SMF type 30 records are formatted to be download to a PC. Only one DDname may be specified for each group.

name1

Parameters name1,name2... etc. are job names or account numbers specified with a mask. Up to fifty name entries per group may be specified.

DETAIL

When `DETAIL=Y` is coded the workload is to be written to the DDname. `DETAIL=N` is useful when processing large amounts of data. Only the summary file is needed.

TYPE

Specifies this group's type for further summarization on the PC. The default

“ALL” will not attempt to separate jobs/accounts by type. If two groups have the same account or job mask, the type keyword can separate TSO and Batch by utilizing the TPUT/TGET count field in the SMF type 30 record.

For example:

```
GROUP=(CICS,PCICS*,TCICS*,
        BKUPCICS),
        DETAIL=Y,TYPE=CICS
```

This control card will cause SMFPC30 to write formatted SMF records to a file “CICS”. All jobs that begin with PCICS, TCICS, and with the full name of BKUPCICS will be selected.

```
GROUP=(TSO,1844*),DETAIL=N,
        TYPE=TSO
GROUP=(TSOBAT,1844*),DETAIL=N,
        TYPE=TSO
GROUP=(CICS,1900*),DETAIL=N,
        TYPE=CICS
GROUP=(OTHER,*),DETAIL=Y,
        TYPE=ALL
```

The control cards will cause SMFPC30 to write formatted SMF records to selected files. All account numbers that begin with 1844 will go in either workload TSO or TSOBAT. A workload called CICS will capture account numbers beginning with 1900. Records not matching the prior groups will be collected in the group called “OTHER”. This group will be written to the file “OTHER”. This group can be used to find a new job or account number not being represented in the desired workload.

Parameters On The EXEC JCL Card

GDATE

Specifies that the date be printed in MM/DD/YY format instead of Lotus 1-2-3 (D1) format. This parameter is not supported for the summary file (SMF30).

JOB

Specifies that workload group selection will be done by job name. This is the default if no parameter is specified.

ACC

Specifies that workload group selection will be done by account number. The position and length of the account field is specified in the RDSMFMAC during PILOT system installation. Refer to the PILOT installation instructions for further information.

JCL

SMFPC30 is run as a stand-alone program.

```
//PCFMT      EXEC   PGM=SMFPC30,REGION=720K
//STEPLIB    DD   DSN=TSU01.MYLIB,DISP=SHR
//SMFIN      DD   DSN=BACKUP.SMFWKY.G0001V00,UNIT=TAPE,VOL=SER=123456,
//           DISP=OLD
//SMFLOG     DD   SYSOUT=A
//SMF30      DD   DSN=TSU01.S30SUM.PRN,DISP=(,CATLG),
//           SPACE=(TRK,(14,4),RLSE)
//GLSYSTEM   DD   DSN=TSU01.T30GLPC.PRN,DISP=(,CATLG),
//           SPACE=(TRK,(4,4),RLSE)
//APSYSTEM   DD   DSN=TSU01.T30APPC.PRN,DISP=(,CATLG),
//           SPACE=(TRK,(4,4),RLSE)
//ARSYSTEM   DD   DSN=TSU01.T30ARPC.PRN,DISP=(,CATLG),
//           SPACE=(TRK,(4,4),RLSE)
//FASYSTEM   DD   DSN=TSU01.T30FAPC.PRN,DISP=(,CATLG),
//           SPACE=(TRK,(4,4),RLSE)
//MISC       DD   DSN=TSU01.T30MISC.PRN,DISP=(,CATLG),
//           SPACE=(TRK,(14,4),RLSE)
//SMFCTL     DD   *
*   COLLECT BATCH JOBS FOR GL,AP, AR,FA AND COLLECT THE REST
*   IN A MISCELLANEOUS FILE
*   GROUP=(GLSYSTEM,GL*,BKUPGL*,PRODGL*)
*   GROUP=(APSYSTEM,AP*,BKUPAP*,PRODAP*)
*   GROUP=(ARSYSTEM,AR*,BKUPAR*,PRODAR*)
*   GROUP=(FASYSTEM,FA*,BKUPFA*,PRODF*)
*   GROUP=(MISC,*)
```

1. STEPLIB Used if SMFPC30 is not in Linklist
2. SMFIN Input data set of SMF records.
3. SMFLOG Statistics on the run.
4. SMF30 Output summary file. **This file must be present!**

5. DDnames Output data sets are optional.

GLSYSTEM

APSYSTEM

ARSYSTEM

FASYSTEM

MISC

5. SMFCTL Control card data set

Spreadsheet

The following information is provided for each workload in the summary output file:

SDATE

Specifies the first date found for this workload in Lotus 1-2-3 date format (D1,D2,D3).

EDATE

Specifies the last date found for this workload in Lotus 1-2-3 date format (D1, D2,-D3).

WKLD

The workload name for this group.

JOBS

The number of jobs in this workload.

ABENDS

The number of jobs that abended in this workload.

EXCPS

The total number of I/O's for this workload.

CPUT

The amount of CPU time accumulated under the TCB, in CPU minutes (problem state).

SRBT

The amount of CPU time accumulated under supervisor mode, in CPU minutes.

3350

The total EXCPS (I/O) to 3350 devices.

3380

The total EXCPS (I/O) to 3380 devices.

3390

The total EXCPS (I/O) to 3390 devices.

TAPE

The total EXCPS (I/O) to TAPE devices.

OTHER

The total EXCPS (I/O) to other devices. This includes any device not mentioned above, in addition to terminal I/O.

MOUNTS

The total number of tape mounts during job execution. This does not include non-specific tape mounts (i.e. due to swap, etc.).

CPU_SU

The total number of CPU service units accumulated.

SRB_SU

The total number of SRB service units accumulated.

IOC_SU

The total number of I/O service units accumulated.

MSO_SU

The total number of MSO service units accumulated.

ELAPSED

The average accumulated wall time a job took to execute, in minutes.

TYPE

The workload type which can be used to further summarize the data.

I/O SERVICE

The total number of I/O service units the job accumulated.

ACCOUNT NUMBER
The job's account number.

MSO SERVICE
The total number of MSO service units the job accumulated.

CLASS
Job class of job submitted (A-Z, 1-9).

SRB SERVICE
The total number of SRB service units the job accumulated.

Figure 17 is an example of the Summary template.

```

A1: [W9]
MENU
IMPORT  GRAPH  PRINT  RETURN  EXIT  SAVE  SETUP
Load a ".PRN" file for a Type 30 SMF Report
      A          B          C          D          E          F          G          H
1
2                               Spreadsheet Version
3                               S3001DLY   V1L5.0
4                               SMF Type 30 Records Summary Template
5  GROUP=SUMMARY      AXIOS PRODUCTS, INC                AXIOS PRODU
6  SDATE      EDATE      WKLD      JOBS  ABENDS      EXCPS      CPUT  SRBT
7  03/08/88  03/08/88  TSO        41    14      67055      5.97  0.87
8  03/08/88  03/08/88  TSOBAT    89     5    208579    13.72  1.1
9  03/08/88  03/08/88  SYS       20     1    21700     2.22   0
10 03/08/88  03/08/88  OTHER    22     5    40150     3.98  0.59
11
12
13
14
15
16
17
18
19
20
16-Nov-93  11:12 AM                                CMD
    
```

Figure 17 SMFPC30 Summary Template

The following information is provided for each group specified in the detail output:

Specifies the time of day the job was initiated by the system (HH.MM).

DATE STARTED
Specifies the date the job was initiated by the system in Lotus 1-2-3 date format (D1, D2, D3).

DATE ENDED
Specifies the date the job terminated in Lotus 1-2-3 date format (D1, D2, D3).

TIME STARTED

TIME ENDED
Specifies the time of day the job terminated (HH.MM).

JOBNAME

The name specified on the job card.

SYSID

The SMF identification of the system on which the job ran.

CC=

The completion code of the job.

PG

The performance group of the job.

ELAPSED MINS

The accumulated wall time the job took to execute, in minutes.

EXCPS

The total EXCPS (I/O) for the job.

VIRT

The amount of virtual storage (Private Area) the job actually used.

SYS

The amount of virtual storage used for system use other than the Private Area (LSQA and Common).

CPU_TCB MINS

The amount of CPU time the job accumulated under the TCB, in CPU minutes (problem state).

CPU_SRB MINS

The amount of CPU time the job accumulated under supervisor mode, in CPU minutes.

3350 EXCPS

The total EXCPS (I/O) to 3350 devices.

3380 EXCPS

The total EXCPS (I/O) to 3380 devices.

3390 EXCPS

The total EXCPS (I/O) to 3390 devices.

TAPE EXCPS

The total EXCPS (I/O) to TAPE devices.

OTHER EXCPS

The total EXCPS (I/O) to other devices. This includes any device not mentioned above, in addition to terminal I/O.

TAPE MOUNTS

The total number of tape mounts during job execution. This does not include non-specific tape mounts (i.e. due to swap, etc.).

TOTAL SERVICE

The total number of service units the job accumulated.

CPU SERVICE

The total number of CPU service units the job accumulated.

[Figure 18](#) on page [52](#) is an example of the Detail Template.

```

A1: [W9]
MENU
IMPORT PRINT RETURN EXIT SAVE SETUP
Load a ".PRN" file for a Type 30 SMF Report
      A          B          C          D          E          F          G          H          I
1
2                               SpreadsheetVersion
3                               T3001DLY    V1L5.0
4          SMF Type 30 Record Detail Template
5  GROUP=OTHER          AXIOS PRODUCTS, INC          AXIOS PRODU
6  DATE      TIME      DATE      TIME  JOBNAME  SYSID  CC=   PG   ELAPSED
7  STARTED  STARTED  ENDED    ENDED
8  09/12/86  15.53  09/12/86  15.53  MONREPO  4381  0000   1    0.00
9  09/12/86  15.53  09/12/86  15.53  MONREPO  4381  0000   1    0.00
10 09/12/86  15.47  09/12/86  15.54  CICSFCTB 4381  0000   1    7.04
11 09/12/86  15.54  09/12/86  15.54  MONREPO  4381  0000   1    0.05
12 09/12/86  15.57  09/12/86  15.57  SYSG001T 4381  S0C4   1    0.21
13 09/12/86  15.57  09/12/86  15.57  SYSG001T 4381  S0C4   1    0.13
14 09/12/86   5.00  09/12/86  16.03  TESTCDCB 4381  0000   5   663.14
15 09/12/86  16.28  09/12/86  16.28  MONREP01 4381  0000   1    0.09
16 09/12/86  16.24  09/12/86  16.31  CICSFCTB 4381  0000   1    7.01
17 09/12/86  16.05  09/12/86  16.32  TESTCDCB 4381  0000   5   27.27
18 09/12/86  16.33  09/12/86  16.33  SYSG001T 4381  S0C4   1    0.17
19 09/12/86  16.45  09/12/86  16.45  SYSG001T 4381  S0C4   1    0.10
20 09/12/86  16.33  09/12/86  16.46  TESTCDCB 4381  S222   5   12.84
16-Nov-93  11:29 AM          CMD

```

Figure 18 SMFPC30 Detail Template

Modeling MVS Using PILOT/MVS

Introduction

The simulator SIMMVS provides an innovative and interactive tool for capacity planning and performance analysis of complex environments. The simulator basically works (dispatches workloads) in much the same matter as a multi-tasking operating system.

The difference between modeling an entire MVS system as opposed to just a CICS environment is that CICS is, for the most part, a single-task workload. MVS workloads, such as batch and TSO, on the other hand, are multi-task workloads.

Modeling an MVS environment can be accomplished by using the following methodology and the PILOT/MVS simulator program.

The value of using a simulator is that it will take the average arrival rate of the transactions and produce random values above and below the average rate to behave more like a typical online environment. Using a simulator will provide non-linear results. In the past, this technique would use an enormous amount of resources and time. Today personal computers can be used to run a simulator obtaining good results.

The results of the simulator is a snapshot of the CPU utilization of each processor, the response times for each transaction or request processed, the number of transactions or requests processed, and the queue length for each workload.



SIMMVS has two components: a mainframe model generator; and the actual simulator which executes on the PC.


To prepare the simulation data from your current system's RMF data, you must run the Model Generator program, SIMBUILD. This program is documented in the next chapter of this manual. The SIMBUILD program will create a file (SIMOUT) which you then down-load to your personal computer. This file contains the simulation data describing your current system and is the basis for all modeling activities.

Parameters

After the base line model is created on the mainframe, it must be downloaded to the PC. For further information on downloading, refer to file transfer section in this guide. Refer to the Methodology and Model generator sections of this guide for base line models. After you have run the SIMBUILD program and you have down-loaded the SIMOUT data file to the PILOT directory of your personal computer (with the file extension .SIM), you are ready to run simulations.

To start SIMMVS on the PC:

1. Ensure that you are in the correct DOS directory:
CD 
2. To change directories:
CD \PILOT  .

3. To execute the simulator SIMMVS type:
SIMMVS  .
4. Enter the first screen option (C)olor or
(M)onochrome.

Parameter Selection Screen

TITLE FOR THIS RUN:

This is a 40 character field to describe the model simulation.

TOTAL RUN TIME (sec):

The total elapsed time to be simulated. The default is 180 seconds. This should be enough time to model most environments. More time may be required to simulate a low volume (small transaction rate) with CPU's of MIP rates 3 or less. If you have difficulty calibrating the model, increase this value. NOTE: the program is simulating a CPU wall second, this may in fact take more or less actual time to generate the results.

TIME INTERVAL (SEC):

The time slice chosen to take a snapshot to simulate the given environment. The smaller the value the more accurate the results. The recommended values are:

CPU SPEED	VALUE
> 3 MIPS but < 7 MIPS	.0001
Greater than 7 MIPS	.0005

This value should be adjusted for the processor. The model will be more accurate as this value approaches zero, but the actual run time of the simulator will increase.

OF INTERVALS/REPORT:

The number of time slices before a status line is written to the terminal. This is used to monitor the execution of the simulator. The default is 200.

CPU DESCRIPTION:

The CPU model name of the processor. A table of models and speeds are provided. This field can be edited for processors not yet included in the table.

CPU SPEED(mips):

The machine instructions per second of the processor chosen. This field represents the speed per processor, not the combined speed of multiple processors.

OF CPUs:

The number of processors for the CPU model.

OF WLS:

The number of workloads to model. Only workloads with higher priorities need to be entered even though a lower priority workload may be the particular workload to be modeled. Lower priority workloads below the workload of interest need not be modeled.

PAGE PACK SERVICE TIME

The average service time, in seconds, for all paging devices for the system on which the workloads execute.

PAGE PACK BUSY

The average percent busy of all paging devices for the system on which the workloads execute.

Function Key Definitions

F1 - HELP

Help screens with brief descriptions of fields.

F2 - NEXT

Page forward to the workload definition screen.

F3 - SAVE

Save the current values in a configuration file.

F4 - RETRIEVE

Retrieve a previously saved configuration file.

F5 - CPUTABLE

Pick a new CPU to run with the model.

F10 - END PGM

End execution and return to DOS.

Workload Definition Screen

Workload Parameters

You must define the workloads to be simulated. You can give the workloads any name you like, but it would be best to use the names as they appear in the SIMBUILD data file. Remember, you set the workload names when you define the workloads to SIMBUILD. TSO should be defined as "TSO Trivial" and "TSO Medium and Long" workloads. The model generator will produce a separate workload for trivial transactions if "TRIVL=Y" is specified on the TSO workload definition. Code the parameter at the end of the WKLD control card which defines the TSO workload.

WORKLOAD

The name assigned to each workload. This name can be typed by you, created by the SIMBUILD program from the control cards entered, or created by the SIMBUILD program from the Control Performance Group number.

PRTY

The dispatching priority assigned to a workload (1-20) with 1 being the first to be dispatched.

PATH LNTH

This is defined differently for batch workloads and transaction driven workloads such as CICS and TSO. The model generator will calculate the **Path Length** based on the interval instead of the transaction when the number of transactions per second is less than .01. This means that we will measure the CPU consumption of the workload as a function of time and not as a transaction rate. That is why the "ARRIV RATE" will be set to 1.0 for these types of workloads.

ARRIV RATE

The arrival rate of transactions or requests for service.

The following parameters account for the delays a workload may encounter while processing a transaction or request.

I/O RATE

The average number of EXCPs completed per transaction or request.

PF RATE

The **Page Fault Rate** will usually be zero for batch jobs and TSO trivial transactions. However, for TSO workloads, a swap usually occurs when a TSO user changes

periods. This gives us our next rule of thumb, which is: use the number of pages per swap as the page fault rate for TSO medium and long transactions. This value can be found in the PILOT/MVS Paging Detail template, in the field named "SWAP."

DSK SERV and DSK BUSY

Disk service and utilization are supplied by the model generator program when the DISK parameter is coded on a given workload.

OF TERMINALS

This parameter is used as the maximum multi-programming level for each workload. Use the "MAX TSO" and "MAX JOB" values from the PILOT/MVS RMF Summary report that matches the time interval that is being modeled. Set the value for the "SYS OVHD" workload to "1". If you create a workload for PGN 0 and other high-dispatched address spaces such as JES or VTAM, group them into one workload and set the "# OF TERMINALS" to the number of address spaces included in the workload and set the multi-task workload indicator. If you reach the multi-task indicator limit, then set the "# OF TERMINALS" equal to "1" and set the single task indicator. When TSO is defined as two workloads, calculate the "# OF TERMINALS" parameter using the ratio of trivial transactions to the number of medium and long transactions.

For example:

The RMF Summary shows that MAX TSO and AVG TSO are 10 and 9, respectively.

The Workload template shows 589 TSO trivial transactions and 66 TSO medium and long transactions.

The total transactions = $589 + 66 = 655$.

The ratio of trivial TSO = $589/655 = .8992366$, which is 89.92%.

The ratio of medium plus long TSO = $66/655 = .1007634$, which is 10.07%.

Try these values first:



OF TERMINALS for trivial TSO = 9;
OF TERMINALS for medium and long TSO = 1.

Usually 90% of all TSO transactions are trivial, but when the volume is low, as in the example above, a value of 8 and 1 (average TSO) would be the second value to model.

S-single task or M-multi task

TSO and batch workloads should be defined as "M" for multi-task system as opposed to "S" for single task systems such as CICS. The limit is three for multi-task workloads.

Executing The Model

After all parameters are provided, the simulator is started by pressing the  function key when the workload definition screen is displayed. Once the model simulator initializes and begins execution, a series of messages is displayed. Each message provides information about the current snapshot of the model execution. An intermediate report can be generated by pressing . This is recommended in order to verify the model parameters are correct. For example, a number which should have been entered as .025 and was incorrectly entered as .250 will have a significant effect on the results obtained.

TO FREEZE THE DISPLAY PRESS or**!!!**

After the intermediate report is reviewed, execution is resumed by pressing the space bar. The intermediate report and the final report have the same format. A sample of the intermediate or final report is provided in Appendix A on page [69](#).

Methodology

The following methodology can be used to create a capacity plan for an online environment. The purpose of this function is to predict future hardware requirements due to the increase in workload resource consumption. This is only one component of a complete capacity management discipline. Creating models are useful when the analyst knows the questions. A complete approach to capacity management and performance management are discussed in the techniques section of this manual.

Workload Characterization

First, one needs to understand the present resource consumption of the workload being modeled and other workloads that use a significant amount of resources. We begin by developing profiles of the current workload resource usage. This will help you determine the resources required by these workloads in the future. The model generator will build a profile of the workloads you have defined (SIMBUILD program). In order to profile these workloads, various sources of data must be analyzed. Using PILOT/MVS and PILOT/SMF together will provide the data needed for this process.

Creating the Base Line Model

The second step in the methodology is the creation of a base line model. This means defining the input values such that the simulator will act like the current environment. Although the input to the simulator contains average values (such as average path length, average arrival rate, etc.), the simulator uses a randomizing technique so that different values are chosen for each sample or time slot. Over time, the average values for these parameters will approach the values you chose as your input. This technique is required to simulate real systems with random patterns of demand and service requests.

Identify Peak Periods

A time frame to model must be chosen. Choosing a time frame of 24 hours will not give an accurate picture of the system's behavior during times of peak usage. Since most on-line systems show an uneven pattern of demand and performance, it would not be productive to average these peaks and valleys over 24 hours. Most systems are at their peak usage only once or twice a day and these periods are generally an hour or less in duration. If you choose to model a long period of time where resource consumption is not consistent, then some additional analysis must be done to account for the peak periods during that time frame. Sometimes it is useful to see how a system will run during non-peak times as well as during peak periods. If this is required, then two models should be used and analyzed separately. Peak period time frames can be identified through the use of the other PILOT/MVS features. Once your peak periods have been identified, you need to measure average resource consumption

during these periods. At least 5 days (a week) of data, preferably 20 days (a month) should be summarized to get this data.

Tracking Data

Much of the data required as input to the simulator is reported by PILOT/MVS. By analyzing trends and variations in this data over several peak periods you will be better able to choose the proper input. Reviewing response times and online system behavior during peak times makes the calibration step easier.

Model Generator

The model generator can generate most of the parameters required as input to the simulator.

Calibrating the Model

Calibrating the model means testing the model's ability to predict the current environment. This is done by comparing the base line values to the results from the simulator. For example, the CPU utilization of the workload generated by SIMMVS should match the CPU utilization as measured from PILOT/MVS. The total CPU usage from the simulator will match only if all workloads were grouped as "OTHER" in the workload for the model generator. The results should be within 10%. If the results vary by more than 20%, first ensure that the input parameters and CPU usage were measured correctly. A misplaced decimal point or wrong use of units (i.e., transactions per minute instead of per second) will certainly invalidate the model.

The PILOT/MVS Workload template will calculate the %CPU with the MVS overhead distribution based on the capture ratio. The overhead value will be used to calibrate the model for "SYS OVHD." To calculate "%CPU_RAW" (meaning minus MVS overhead):

$$\%CPU_RAW = (CPU_SEC * 100) / INTVL$$

or

$$\%CPU_RAW = (CPU_SRV / (MSU * CPU_COEFF)) / INTVL * 100$$

where:

CPU_SEC

CPU seconds used by the workload during the interval being measured.

INTVL

The number of seconds in the interval.

CPU_SRV

The TCB plus SRB service units for the interval being measured.

MSU

The maximum service units per second for the processor (SRM constant).

Simulator Workload Spreadsheet

The template **WKL01SIM** can be used to calculate the values you need to calibrate the model.

PL_TRAN

The Path Length of the workload determined by the number of transactions, when the transaction rate is above .01. This value should match the value produced by the model generator. TSO and CICS

workloads Path Lengths should be calculated using this method.

PL_SEC

The Path Length of the workload determined by interval, when the number of transactions per second is below .01. This value should match the value produced by the model generator for long running batch and CICS workloads when CICS data is not used as input into the model generator.

CPUR

The average measured CPU time for the workload by transaction.

CPUR_SEC

The average measured CPU time for the workload per second.

TRANS/SEC

The number of transactions per second during the interval.

TSO response times can be compared to the TSO template for the interval being modeled.

The key fields for calibration are the %CPU and CPUR values of the simulation at the end of the run. The closer these values are, the more accurate is the model.

When modeling TSO, the response times produced by the Simulator can be compared to the response times in the PILOT/MVS TSO Detail Template for the interval being modeled.

Forecasting Future Hardware Requirements

After the model is calibrated, you are ready to play the “What if...” game. There are

two categories of questions capacity planners are most often asked. They are direct hardware questions (easiest to answer) and application growth questions. This section will deal with hardware questions. Refer to the Techniques Section for application growth questions. Regardless of the initial question, all capacity planning issues reduce to the following questions: “What impact will this have on my current environment?”; “Will this affect response time?” and “By how much?”; and finally, “How much longer will it be before I will be out of capacity?”. Unless you can answer these questions you will find yourself putting out fires instead of planning to meet your company's business needs with data processing solutions.

Identify Resource Utilization by Business Usage

Forecasting existing workload growth and its impact on current hardware configurations is the most time-consuming process of forecast analysis. There are two approaches you can take. First, study historical data and look for patterns in workload volume growth. If you have the data, look at what happened when a new on-line application was implemented. Did the transaction rate go up? How much? Similarly, look at the effects caused by adding new users or new terminals for existing applications. Historical data is often the most reliable measure of predicting future trends. Second, talk to end users, development groups, and strategic planners for future business needs (refer to technique section of this manual). The latter approach is more time-consuming but may yield better results. The first approach can yield good results if historical data is maintained and you are familiar with the company's growth patterns. A combination of the two approaches may be used to obtain good

results. PILOT/MVS can be used to analyze data from a year ago to be compared to the volume usage today. Also notice the resource consumption of the system at the time. PILOT/MVS's workload analysis makes this task trivial. Do not be discouraged if your first predictions are wrong. Instead, study why they are inaccurate and adjust those factors into your next forecast analysis. For example, take notes on when new applications are implemented. Did the application use as much resources as planned? Did the user do twice as many transactions as anticipated? These are usually the causes of inaccurate forecasts.

Adding A New CPU

This is the most significant change to a computer configuration that will yield the greatest impact on capacity and performance. In addition to the speed of the computer, usually the amount of memory is also increased. Sometimes additional channels and strings are added, thus giving better I/O response times for workloads. Each of these will be discussed separately. After the model is calibrated, a new CPU can be chosen from the list of processors provided with the simulator or a processor can be added if the MIP speed is known. There are different MIP speeds reported for the same machines from various sources. The main difference in the reported speeds is the relative performance of the computer to be considered 1 MIP. The table used by the simulator is compiled from each vendor and other public information sources. The relative speed at which the model was calibrated should be the same as the machine being replaced in the model. Now execute the simulator with the new processor. One of the advantages of the simulator is that machines can be compared with the same

MIP speed and a different number of processors. For example, a 6.6 MIP uni-processor will yield better results than a 6.6 machine with two processors if only one big CICS region accounts for majority of the resource consumption. This of course is only one factor, memory, and I/O still need to be analyzed as well as cost.

Adding New Memory

Modeling memory is one of the most difficult task because there are a number of factors that effect memory management in a processor. These factors include:

- User storage fences via IPS parameters.
- Program working set sizes.
- Multiprograming levels.
- Paging data set placement.
- The number of Paging data sets.
- OPT SRM parameters.

Each of the above mentioned parameters can cause bottlenecks in the system and may cause a system to appear to be out of capacity. Usually this is the first sign of a machine's need to be tuned. As mentioned earlier performance bottlenecks are a separate issue and are not addressed in this section. The simulator's parameters for modeling memory changes are the page fault rate (demand) for each workload and the service time and the utilization of the paging subsystem.

The approach is simple, but effective results are obtained. Each workload must be reviewed in the baseline model. Predicting a paging rate is difficult but some basic assumptions can be made. Memory today is bought in at least 4 megabyte increments which can have a significant impact on

overall performance. Aside from storage fences, the higher a workload's dispatching priority, the more likely the effect of real memory will be to reduce the paging rate. This is obvious because the pages will be referenced more often and not be candidates to be paged out. As the paging rate overhead is reduced, the utilization and service times should improve. Be conservative in reducing the paging rates and paging subsystem parameters in relationship to the amount of memory being added. For example: your main workload being modeled is experiencing a page fault rate of 12 pages per second; the paging subsystem has an average service time of 40 ms.; and 35 percent utilization (3350's). Further, assume the machine is a 4381-2 with 12 megabytes of memory and you wish to add 4 megabytes (total of 16 megabytes). A conservative approach to this upgrade would be to reduce the page rate in half and the service time to some reasonable values such as 30 ms, 20 percent utilization. This is only one configuration, other solutions can be easily modeled. Model at least three possible scenarios with new memory to get good results.

Changing DASD Devices

The simulator can be used to model DASD changes on workloads. Modeling an upgrade of DASD can be done by changing the average service times and utilization of the devices of the workloads effected by the change. Do not change the I/O rate of the workload; this can skew your results. Do not forget to change the paging subsystem's parameters if it is upgraded as well. The methodology is similar to that of the paging subsystem mentioned in the last section. In general, when upgrading to a faster device, the service times can be reduced. If a device is being changed from a single density to

double density, the utilizations and service times will probably increase due to the nature of the architecture. If two single density devices with utilizations of 20% used in random access (online data bases) are combined to a double density drive, the utilization will more than double. There will be a significant increase in the amount of arm movement over the previous configuration. These are some of the factors one must consider when modeling DASD.

Model Generator

Introduction

The program SIMBUILD will generate a model for the simulator SIMMVS. The model generator will use control cards and RMF records as input. The output of the model generator must be down-loaded to the PC in order for SIMMVS to process it.

Creating a Baseline Model

This step is straight forward if all the data is available for the time frame being analyzed. First, the peak period(s) must be identified. This can be done by using PILOT/MVS to choose the correct time period and at least 5 days (1 week) of data, preferably 20 days (1 month). Tracking the data and choosing the trend as the input into the simulator is of prime importance. The model generator can generate most of the parameters for the simulator.

SIMBUILD Parameters

SIMBUILD is a mainframe program to create model parameters for PILOT/MVS' SIMMVS and PILOT/CICS' SIMCICS programs. The more information available as input for a workload, the less manual input required.

There are three control card functions that may be specified in the SIMCTL file. The CPU and WKLD keywords must start between columns 2 and 71 and be followed by a blank. Operand for these control cards

must be separated by a comma. The CPU control is needed to calculate the fields derived from the SRM constants in MVS.

The format of the control cards follows.

```

CPU MODEL=name,
SPEED=ssss.ss,
PROCS=nn,
MIPS=mmmm.m,
ICS=nn

```

where:

CPU

Is the control card keyword. If this control card is omitted, calculations based upon processor speed will be invalid. Other fields not effected by speed will be correct. Only the model name is needed if the processor is included in the PILOT's internal table.

MODEL

Is the name of the CPU model (i.e., 4341-12,3090-200,3084-QX, etc). Up to 8 characters can be specified. A list the models in the supplied table is provided in the Techniques Section of this manual. When you use the name of a supplied model, the other parameters are obtained from the table automatically.

SPEED

The processor SU value used by the SRM.

PROCS

The number of processors for the model specified.

MIPS

Millions of instructions per second for this processor.

ICS

The suffix value for the IEAICSxx member to be processed. This member is read from the PARMLIB DD statement and is used to relate RPGN (Report Performance Group Numbers) to the associated CPGN (Control Performance Group Numbers) when the workloads are characterized.

WKLD **WL**=(name,pg...),
OTHER={Y|N},
APPLID=aaaaaaaa,
JOBNAME=jjjjjj,
PRTY=nn,
DISKS=(vol1,vol2,...)

where:

WKLD

Is the control card keyword. If this control card is omitted, a workload will be defined for each control performance group. Up to 1,000 workloads may be defined for analysis.

WL

The name operand is the Workload name and the pg values are the Performance Group numbers describing this workload.

OTHER

SIMBUILD will create a separate workload to combine all workloads not defined when OTHER=Y. All performance groups not previously used will be combined in a workload called "OTHER". This operand can be specified on any of the control cards but will only create a one workload.

PRTY

The dispatching priority (1-20) of this task. Two or more workloads can have the same priority.

APPLID

VTAM APPLID used to identify CICS regions when SMF 110 records are input into the model generating program. The four character TCT ID is used to identify CICS regions when The Monitor records are used for input.

DISKS

Where vol1, vol2,... are the disk packs used by the workload. Disk pack names can be generic by specifying an '*'. This parameter is used to calculate the average device service time and average device utilization.

PEAK TIME=(HHMM,hhmm),
WKDAYS={Y|N}

where:

PEAK

Is the control card keyword.

TIME

The start and end time of the peak period being processed across the entire input file. This parameter is optional.

WKDAYS

This parameter controls the inclusion of weekends to average the values across the input file. The default is "Y", meaning to *omit* weekend data.

SIMBUILD JCL

The example below shows the creation of a baseline model using RMF, SMF, and TMON data as input into the module generator program SIMBUILD. Each file type must be separate. The RMF records must be read first so that the program SIMBUILD can build a table in storage and match the CICS data to the RMF control performance groups. Ensure that the time period of the input data from RMF matches the CICS monitor data. Please note that RMF records are handled by the RMF start interval time stamp. A separate step using PILOT/SMF prior to model generation is recommended to select the correct RMF intervals using the "TIME=M" parameter.

```
//BUILD JOB
//SIMCICS EXEC
PGM=SIMBUILD,REGION=1500K
//STEPLIB DD
DSN=PILOT.V1M5.LOADLIB,DISP=SHR
//SMFIN DD
DSN=RMF.DATA,DISP=SHR (SMF 70-75)
//PARMLIB DD
DSN=SYS1.PARMLIB,DISP=SHR
//SIMOUT DD DSN=TSU.MODEL.FILE,
//
DISP=(,CATLG),SPACE=(TRK,1),
// UNIT=SYSDA
//SIMLOG DD SYSOUT=*
//SIMCTL DD *
*
* Create baseline model for a CICS/IMS
environment.
*
CPU MODEL=4381-2
WKLD WL=(MVSPGN,0,5,9),PRTY=1
WKLD WL=(PRODCICS,07),PRTY=2,
APPLID=NODE25,
DISKS=(VSAM1,INV*,PAY*)
WKLD WL=(PRODIMS,08),PRTY=2,D
ISKS=(IMS*),
```

```
DISKS=(IMSRES,IMSQ*)
WKLD
WL=(IMSREG1,09),PRTY=3,(IMSDB*),
DISKS=(IMS0*,INV*,MFG*)
WKLD
WL=(IMSREG2,10),PRTY=3,(IMSDB*),
DISKS=(IMS0*,MFG*,INV*)
PEAK TIME=(1400,1600)
/*
```

1. Job card.
2. EXEC card with the program name.
3. STEPLIB provides the name of the PILOT load library if it is not in the system's LINKLIST.
4. SMFIN is the input file for RMF type 70-75 records.
5. PARMLIB is the library that contains the ICS identified by the ICS= control card parameter. The member IEAICSxx may be stored in any library; SYS1.PARMLIB is only used here as an example.
6. SIMOUT is the output file formatted for SIMMVS on the PC. This file must be downloaded to the PC.
7. SIMLOG contains a log of the processing performed.
8. SIMCTL is the control file for input parameters.

Appendix A

The following is a sample of the Simulator report. The format of the intermediate and final reports is the same.

PILOT/SIMMVS

TITLE FOR THIS RUN: PILOT/SMF SIMULATOR DEMO

TOTAL RUN TIME (sec): 180

TIME INTERVAL (sec): 5.019996

OF INTERVALS PER REPORT: 200

CPU DESCRIPTION: 3081-KX

CPU SPEED (mips): 7.8

OF CPUs: 2

OF WLs: 2

PAGE PACK SERVICE TIME (sec): .018

PAGE PACK BUSY: .2

WORKLOAD	PRTY	PATH	LENGTH	ARRIV RATE	I/O RATE	PF RATE	DSK SERV	DSK BUSY	# OF TERMINALS
1 PRODCICS	1		250000	20.0	25	1	.0200	.2600	0
2 TESTCICS	2		350000	10.0	20	7	.0350	.2500	0

***** RESULTS *****

TIME USED (sec): 34.97 CPU 1 = 53.99 CPU 2 = 54.25

Workload	X Count	CPU (%)	Page Flts	CPUR	NQ	Resp(C)	Resp(I)
1 PRODCICS	721	69.32	40	0.0336	1	0.12	0.68
2 TESTCICS	324	38.93	253	0.0419	0	0.13	0.93

Notes

1. Time Used

The total run time.

CPU_n The CPU utilization of each processor. When modeling multi-processors the percent busy may not be even. Extensive design in the model attempts to even out the usage across all processors. When modeling light loads the first processor may show a higher value when the model execution time is very short. The actual percent busy on a live system would be even due to the micro code in multi processors.

2. Workload

The workload and its priority.

X Count The number of requests or transactions processed. If X Count is divided by the time used, the result should equal the arrival rate.

CPU% The percentage of all processors kept busy to execute the workload.

Page Flts The total number of page faults for the workload during simulation.

CPUR The CPU time (in seconds) the workload used for this configuration.

NQ The total number of requests that had to be queued during the simulation.

Resp(C) The average internal response time used to process one request or transaction within the CPU.

Resp(I) The average response time used to process the I/O for a request or transaction.

The last two fields, added together, yield the average total internal response time for a request or transaction within the workload.

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