167 MVS

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OS/390 strategy overview

INTRODUCTION

The fourth quarter of this year will mark the beginning of a series of radical changes to both OS/390 and the System/390 platform. In *MVS Update* Issue 166 July 2000, we previewed some of the new features that will be available in the September 2000 release of OS/390 Version 2 Release 10. This month we consider some of the future directions for OS/390 both Release 10 and beyond, and we will review parallel developments in the System/390 platform.

IBM has been consistent in making releases of OS/390 available at approximate six month intervals. These General Availability (GA) times provide a consistent framework for users and purchasing managers. This regularity is made possible because IBM is developing OS/390 considerably in advance of the 'next' release. Therefore, the reliability of the IBM 'previews' of the forthcoming releases can be guaranteed. However, IBM provides preview information for forthcoming releases only six months in advance. This article reviews IBM's short and long-term OS/390 strategy.

IBM'S OS/390 STRATEGY

IBM's basic strategy for OS/390 has been clear from the consistency of themes in the recent releases (see *MVS Update* for overviews of recent releases). We have noted previously that e-business enablement, Enterprise Application Integration (EAI), server consolidation, Unix System Services, and ease of use are consistently enhanced with each release. As an example, consider the consistent elements between the two latest releases of OS/390 Version 2 (Releases 8 and 9).

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The following is a summary of the principal elements of OS/390 Release 8:

- e-business enablement:
  - Security improvements in managing cryptographic keys, keyrings and certificates.
  - Crypto support for SNA communications and TN3270 users.
- Enterprise Application Integration (EAI):
  - Prerequisite for SAP R/3 Application Server on System/390.
- Server consolidation:
  - Significant print serving capability for new workloads, new clients, new protocols.
  - Enhanced print management.
- Unix System Services enhancements:
  - Support for more Unix programs (eg PERL scripts).
  - Enhancements for porting Unix programs.

The following is a summary of the principal elements of OS/390 Release 9:

- e-business enablement:
  - Standard support in WebSphere Application Server for Java Server Pages and servlets.
  - Enhanced security functions and exportability of security functions.
- Enterprise Application Integration (EAI):
  - Release 9 is a base for Customer Relationship Management (CRM) and ERP solutions such as SAP R/3 and DB.
- Server integration:
  - File and print serving for Windows workstations with Server Messaging Block (SMB).

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- Unix System Services
  - DBX debugger, addition UNIX98 functions
  - easier maintenance for TCP/IP
  - data sharing for files systems (eg HFS)

These trends will continue with Release 10 and beyond, because they mirror the requirements of large enterprises that are:

- Evaluating or deploying e-business solutions.
- Reducing functions on the PC and moving towards browser-based access.
- Investing in high-bandwidth TCP/IP networks and routers.
- Physically moving and consolidating Unix, and NT servers to larger centres to reduce management overheads.
- Bringing departmental applications to large centres and cloning the remaining ones.
- Combining central System/390, Unix and NT servers in hybrid applications (eg Web, ERP, OLTP, collaborative computing, etc).
- Integrating Web, application and database servers in major centres to provide robust services.

Therefore, the trends in OS/390 are both predictable and consistent. However, significant changes will occur in the fourth quarter of 2000, and these are linked to parallel developments in the System/390 processor.

PROCESSOR DIRECTIONS

As with OS/390 IBM has been consistent in its release dates of processor technology. Between the release of the R1 in September 1994 and the G6 in May 1999, processors have been released at alternate intervals of nine and fourteen months successively. The

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proposed release date for the next generation processor – the G7 – code-named the 'Freeway' early in the fourth quarter, indicates a much longer development cycle (around 18 months). This is because the G7 Freeway will support 64-bit addressing, and so the testing time has been considerably longer. The 64-bit G7 will mark as big a change in the mainframe world as the 3081 did twenty years ago.

64-BIT ADDRESSING

64-bit addressing provides considerable benefits for OS/390. These can be divided into improvements to real memory, integer arithmetic, and virtual memory.

Real memory:

- Improves performance by massively reducing data movement.
- Reduces costs because ES/CS movement shows non-linear growth with system size.
- Supports larger structures within the Coupling Facilities.

Integer arithmetic:

- Increases performance.
- Increases interoperability with other 64-bit platforms.

Virtual memory:

- Large virtual memory allows the exploitation of large real memory.
- Supports emerging applications such as Java and Enterprise JavaBeans (EJB).

The 64-bit addressing will be desirable for some current mainframe applications, as well as certain Unix/NT and Linux applications, and will be essential for future large MIPS systems (especially when deployment of 3000+ MIPS systems begin).

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However, users should note that although the Freeway will be released in the fourth quarter 2000, OS/390 Version 2 Release 10 does not appear to contain full support for 64-bit operations.

LONG-TERM STRATEGIES

Users will be able to exploit 64-bit addressing in the short-term future. In the longer term there are other impacts tangentially associated with the operating system that will affect users.

Usage-based pricing

A longer-term application for the G7 processor will be the support of a new usage-based pricing model. Users have long complained that the current pricing models penalize those with unused capacity or those wishing to migrate large non-System/390 applications to the mainframe. These high software costs have also been detrimental to IBM because it has prevented the company from expanding its user base into the SME (Small to Medium Enterprise) market sector.

The pricing model (in conjunction with IBM's Java, Linux, and Unix initiatives) provides further indications that IBM sees the future of the System/390 platform as the basis for applications rather than as a stand-alone operating system.

In the post OS/390 Release 10 timeframe, software pricing models will be based on the number of MIPS consumed. The key consideration for users is that metering will require both hardware and software support. Users wishing to benefit from these changes will require a G7 processor and the future release of OS/390 that supports usage-based pricing. Usage-based pricing or 'Software Value Pricing' will be of considerable benefit to users who will be able to pay for the capacity used, not the total system capacity. The financial benefits of usage-based pricing will probably mean that there will be a rapid move to the new processor, when the facility becomes available.

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WebSphere

Since its release, WebSphere has gained considerable prominence. From a strategic perspective, IBM considers WebSphere to be the successor to CICS and IMS. This is because IBM predicts that both CICS and IMS will decline over time in favour of WebSphere, which has been Web and object database-enabled from the outset. This would suggest a widespread move from OLTP to e-TP (see *MVS Update* Issue 163, April 2000, page 7).

FUTURE OS/390 REQUIREMENTS

We have seen that there is going to be considerable new functionality in forthcoming releases of OS/390, but users who wish to exploit this functionality will require future processor upgrades. We have already seen that the release of OS/390 Release 10 will require a G2 processor or higher. A big leap in processor capacity will be required in the first half of 2001 (the Release 11 timeframe), which will require a G5 processor or above. By the first half of 2002 (the Release 13 timeframe) it is probable that OS/390 will require WLM operating in Goal Mode.

CONCLUSIONS

In the short term, OS/390 will continue to enhance its position as a platform supporting e-business enablement, Enterprise Application Integration (EAI), server consolidation, Unix System Services, and ease of use. Also in the short term, OS/390 will support 64-bit addressing. In the mid-term future, associated developments in usage-based pricing will bring down costs for those users running the latest processor and operating system release. In the longer-term future, it is likely that the role of WebSphere will increase in importance at the expense of CICS and IMS.

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Copying data between MVS and PCs

INTRODUCTION

MVS files can be copied from one MVS system to another via a PC. This is commonly done (for relatively small files) when there is no other connection between the source and target MVS systems. The Xephon Website has a good example of this, distributing source code to the subscribers.

The intermediate files are stored on a PC disk or diskette, and the file transfers are done by PC software. The PC 3270 terminal emulators usually have a built-in file transfer facility, and ISPF also has had its own transfer facility (option 3.7) since Version 4.2 in 1996. I will not discuss them here. You can also use various ZIP utilities to compress and decompress the data on the PC, but I will not describe them here either.

There are two potential problems copying data:

- Character conversions
- Only sequential files can be transferred.

CHARACTER CONVERSION

You can transfer data as binary or text.

Binary

If you simply copy a file from MVS to PC in BINARY form, you will not be able to read it there because the PC treats the characters as ASCII (and they were EDCDIC on MVS). If you copy the file to a different MVS system in binary form, you will be able to read it again, but some of the special characters may not look the same if the new MVS system has a different codepage and/or character-set from the first MVS system. But, if you are transferring data between two MVS systems in the same country the codepage and character-set are usually the same.

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Remember that MVS load modules can be successfully transferred in binary form regardless of the codepage and character-set on the target system.

Text

If you copy the file as TEXT from MVS to PC then to another MVS, you can at least read it on the PC. But, some character conversions may occur on the PC, and when you transfer it to the new MVS system a second character conversion may result. Usually these conversions are reversible, but sometimes two different EBCDIC characters are converted to one ASCII character.

Thankfully, most of the common characters have the same codes for the alphabet (a-z and A-Z) and numbers (0-9). But, if you are copying data with some special characters (eg program source or ISPF panels), some of those characters may need to be manually fixed after the transfer. This is probably familiar to people who have downloaded code from the Xephon Web site.

A good practice is to copy a file containing all characters X'00' to X'FF' in order, when you are copying data from the source system. When that file is copied to the target system you can easily check which characters have changed (use EDIT or BROWSE and set HEX ON). You can then use a simple EXEC like the one shown below to fix all other text file transfers from the same source system.

```
/*============================>> REXX <<============================*/
/*  Used for translating characters which were unloaded using the    */
/*  English (UK) {850} / ASCII (285) code table, but were originally */
/*  copied using a different code table.                             */
/*                                                                   */
/*  This can be adapted as required by putting the appropriate code  */
/*  values in the two translate tables.                              */
/*  ie  TRANSLATE(string,table_out,table_in)                         */
/*  To get these values you need a file from x'00'- x'FF' created    */
/*  using the same code table as the original data.                  */
/*===================================================================*/
   Trace O
   Address TSO
  "ALLOC FI(INDD)  DA(input.file) SHR REUS"    /* <--- update DSname */
  "ALLOC FI(OUTDD) DA(output.file) SHR REUS"   /* <--- update DSname */
  "EXECIO * DISKR INDD (STEM in. FINIS"
   Say in.0 'lines read from INDD'
   Do i = 1 to in.0
```

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```
    out.i = TRANSLATE(in.i,'FF07'x,'07FF'x)
    End
"EXECIO * DISKW OUTDD (STEM out. FINIS"
Return
```

SEQUENTIAL FILES

The intermediate files on the PC must be in sequential form. If the original file is not sequential, you must convert it to/from sequential form on the MVS system.

Copying a PDS (in text mode)

The article *Convert PDS to sequential dataset* in *MVS Update* Issue 164 had a sample EXEC to convert a PDS to a sequential file (formatted for IEBUPDTE input with './ ADD NAME=memb' before the text of each member), which could later be used to recreate the PDS. But, the new PDS would have no member statistics.

Startool from Serena also has commands COMBINE and SEPARATE for this.

The new PDS can have the original member statistics, because COMBINE can create './ ADD NAME=memb string-of-member-statistics' for each member and SEPARATE will use those 'string-of-member-statistics'. IEBUPDTE can also use the output from the COMBINE command, but it ignores the statistics on the ADD cards and creates a new PDS without any member statistics.

I have often added an extra member (called $$HEX) to the start of the PDS with all characters X'00' – X'FF' before doing a text transfer. It will be the first member shown in the sequential file, and hence easily checked to see which characters have been converted in the copying.

Prepare the translation tables and dataset names in the EXEC, and run it to create a (corrected) sequential file. Then you can recreate the PDS.

A PC file transfer tool is used to copy the file, in TEXT mode. This method is good for simple text files or program code where the record length is 80 and the record format is fixed block.

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Copying a PDS (in binary mode)

Copying a PDS (in binary mode) can be used for any PDS. It uses TSO XMIT to invoke IEBCOPYto create an unloaded form of the PDS. The steps are:

1 Preallocate a sequential file: unload_dataset with DCB=(RECFM=FB,LRECL=80,BLKSIZE=3120).

2 Use ISPF option 6 to transmit the PDS to the sequential file command – XMIT sysid.userid DS (dataset) OUTDS (unload_dataset).

3 Use a PC file transfer tool to copy – unload_dataset to PC_file using binary transfer.

4 Preallocate a target sequential file – target_dataset with DCB=(RECFM=FB,LRECL=80,BLKSIZE=3120) on the target MVS.

5 Use a PC file transfer tool to copy – PC_file to target_dataset using binary transfer.

6 Use TSO RECEIVE on the target MVS to build a new PDS command: RECEIVE INDS(target_dataset) then reply with the desired PDS dataset name.

That is the preferred method for many Internet sites to supply software. All member statistics are preserved. It is the best way to copy load modules.

PDS index listing

When you are copying PDS files, it is often useful to make an index listing of the library and copy that (in text mode) as well. You can then read the index listing to see what members are in your file.

One way to create such an index listing is to list the library via ISPF option 3.4 (dataset list) and enter ‘PX’ beside the dataset name. That writes an index listing to your LIST dataset. Enter command ‘LIST’,enter ‘3’ to keep the existing list dataset, then copy it to a PC file.

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Copying VSAM

VSAM files can also be converted to sequential files, transferred in binary mode, then recreated on the target system. This can be done using IDCAMS REPRO as seen in the following:

```
//  EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
    REPRO IDS(vsam.dataset) ODS(sequential.file)
/*
```

For DB2 linear VSAM datasets you should use the DSN1COPY program instead of REPRO.

CONCLUSION

You can transfer data between MVS and PCs when it is in sequential format. Some conversion methods are described above.

You can transfer the data as text or binary:

- If you transfer as text you can read it on the PC, but may have character conversion problems.
- If you transfer as binary you cannot read it on the PC, but the EDCDIC codes will be the same on the target MVS system.

If you choose the appropriate methods described above, you can copy many different types of data from MVS to a PC and back again to another MVS system.

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Controlling tape information

INTRODUCTION

Daily DFSMShsm operations such as migration, back-up or dump, require considerable quantities of tape. These tapes have to be protected from rewriting until they contain active data. DFSMShsm allows several methods for protecting these tapes. We chose IBM's recommended methodology:

- The tape is protected by RACF in the profile HSMHSM of the TAPEVOL class.
- If Tape Manager is used, it is most practical to use the SCRATCH pool instead of defining a separate pool for DFSMShsm. This is necessary if we want to use automatic loaders or automated tape library.
- The tapes are defined without an expiration limit and we scratch them with the ARCTVEXT exit explicitly.

However, this methodology can cause some problems. For example, we noticed some information discrepancies between DFSMShsm active tapes in RACF and/or Tape Manager. These inconsistencies were often caused by mistakes made in RACF or Tape Manager administration. For example, sometimes migration, back-up and dump were interrupted with a cancel command, or the Tape Manager was stopped irregularly. We also experienced PTF problems, which caused futher discrepancies.

DFSMShsm can occupy several hundred tapes, which means that it is very hard to check these discrepancies. We made jobs that check and repair information about DFSMShsm tapes in RACF and Tape Manager. We use two different tape managers DFSMSrmm and AutoMedia (ZARA), so we prepared jobs for both. These are shown below:

- HSMKONTR – lists all ML2, BACKUP, and DUMP tapes which DFSMShsm occupies.

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- HSMEXT – extracts the serial numbers of tapes from the pervious job.
- HSMRAC – compares the RACF HSMHSM profile of the TAPEVOL class with the information from DFSMSrmm and updates RACF to settle the information.
- HSMRMM – comapares information about active tapes from DFSMSrmm with the information from DFSMShsm.
- HSMZARA – compares information about active tapes from AutoMedia(ZARA) with the information from DFSMShsm.

JOB HSMKONTR

```
//useridH  JOB CLASS=A,MSGCLASS=X,NOTIFY=&SYSUID,MSGLEVEL=(2,Ø)
//*************************************************************
//*  Job lists all DFSMShsm tapes and submit HSMEXTR job
//*  which processes the reports
//*  Note:
//*   Job is separated into two parts because DFSMShsm uses dynamic
//*   allocation for generated reports
//*************************************************************
//*****     CHANGE  userid TO YOUR USERID       <==============
//*************************************************************
//*    Deletion of work datasets
//*************************************************************
//DELWORK  EXEC PGM=IDCAMS,REGION=1M
//SYSPRINT DD   SYSOUT=*
//SYSIN    DD   *
   DELETE 'userid.HSM.#DMP.LIST'
   DELETE 'userid.HSM.#BKP.LIST'
   DELETE 'userid.HSM.#MIG.LIST'
   SET MAXCC = Ø
/*
//*************************************************************
//***  Lists all HSM tapes
//*************************************************************
//LISTHSMV  EXEC PGM=IKJEFTØ1,DYNAMNBR=6Ø
//SYSTERM   DD SYSOUT=X
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD SYSOUT=X
//SYSTSIN   DD *
   HSENDCMD WAIT LIST DVOL ODS(userid.HSM.#DMP.LIST)
   HSENDCMD WAIT LIST ML2  ODS(userid.HSM.#MIG.LIST)
   HSENDCMD WAIT LIST BVOL ODS(userid.HSM.#BKP.LIST)
/*
//#KONT1    EXEC JOB,N=HSMEXTR,D='userid.DFHSM.CNTL'
```

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JOB HSMEXTR

```
//useridH JOB MSGCLASS=X,MSGLEVEL=(2,1),NOTIFY=&SYSUID,CLASS=A
//*************************************************************
//***  CONTINUATION OF HSMKONTR JOB
//*************************************************************
//*****    CHANGE  userid TO YOUR USERID       <==============
//*************************************************************
//***   DELETION OF WORK DATASETS
//*************************************************************
//DELWORK   EXEC PGM=IDCAMS,REGION=ØM
//SYSPRINT  DD SYSOUT=X
//SYSIN     DD *
    DELETE userid.HSM.#TAPE.LIST
    SET MAXCC=Ø
/*
//*************************************************************
//*** Extracting the information from DFSMShsm tapes
//***  Serial numbers of tapes are placed from column 1 to column 6
//***  Columns 7-9 contains marker with the following values:
//***  'HM ' for ML2 tapes
//***  'HCM' for copy of ML2 tapes
//***  'HB ' for BACKUP tapes
//***  'HCB' for copy of BACKUP tapes
//***  'HD ' for DUMP tapes
//*************************************************************
//EXTRACTV EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//HSMMIG   DD DSN=userid.HSM.#MIG.LIST,DISP=SHR
//HSMBKP   DD DSN=userid.HSM.#BKP.LIST,DISP=SHR
//HSMDMP   DD DSN=userid.HSM.#DMP.LIST,DISP=SHR
//OUT      DD DSN=userid.HSM.#TAPE.LIST,DISP=(MOD,CATLG,DELETE),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=9),
//         SPACE=(TRK,(5,5),RLSE)
//TOOLIN   DD *
  COPY FROM(HSMMIG) TO(OUT) USING(SMIG)
  COPY FROM(HSMMIG) TO(OUT) USING(CMIG)
  COPY FROM(HSMBKP) TO(OUT) USING(SBKP)
  COPY FROM(HSMBKP) TO(OUT) USING(CBKP)
  COPY FROM(HSMDMP) TO(OUT) USING(SDMP)
/*
//*** EXTRACTING MIG VOLUMES
//SMIGCNTL DD *
  INCLUDE COND=(12,4,EQ,C'348Ø'),FORMAT=CH
  OUTREC FIELDS=(2,6,C'HM ')
//*** EXTRACTING COPY OF MIG VOLUMES
//CMIGCNTL DD *
  INCLUDE COND=(12,4,EQ,C'348Ø',AND,115,6,NE,C'*NONE*'),FORMAT=CH
  OUTREC FIELDS=(115,6,C'HCM')
/*
```


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```
//*** EXTRACTING BACKUP VOLUMES
//SBKPCNTL DD *
  INCLUDE COND=(11,4,EQ,C'359Ø'),FORMAT=CH
  OUTREC FIELDS=(2,6,C'HB ')
//*** EXTRACTING COPY OF BACKUP VOLUMES
//CBKPCNTL DD *
  INCLUDE COND=(11,4,EQ,C'359Ø',AND,1Ø8,6,NE,C'*NONE*'),FORMAT=CH
  OUTREC FIELDS=(1Ø8,6,C'HCB')
//*** EXTRACTING DUMP VOLUMES
//SDMPCNTL DD *
  INCLUDE COND=(16,4,EQ,C'359Ø'),FORMAT=CH
  OUTREC FIELDS=(2,6,C'HD ')
/*
//*************************************************************
//***  SORT DFHSM TAPES
//*************************************************************
//SORTC     EXEC PGM=ICEMAN
//SYSPRINT  DD SYSOUT=X
//SYSOUT    DD SYSOUT=X
//SORTIN    DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//SORTOUT   DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//SYSIN     DD *
 SORT FIELDS=(1,6,A),FORMAT=CH,WORK=1
 END
/*
//*
//*************************************************************
//***  COMPARISON OF RACF AND HSM
//*************************************************************
//HSMRACF   EXEC JOB,N=HSMRACF,D='userid.DFHSM.CNTL'
//*
//*************************************************************
//***  COMPARISON OF RMM AND HSM
//*************************************************************
//HSMRMM    EXEC JOB,N=HSMRMM,D='userid.DFHSM.CNTL'
//*
//*************************************************************
//***  COMPARISON OF ZARA AND HSM
//*************************************************************
//HSMZARA   EXEC JOB,N=HSMZARA,D='userid.DFHSM.CNTL'
//
```

JOB HSMRACF

```
//useridR JOB CLASS=A,MSGCLASS=X,NOTIFY=&SYSUID,MSGLEVEL=(2,Ø)
//*********************************************************************
//*** Job compares active tapes in DFSMShsm with the contents of the
//*** HSMHSM profile. If it notices a discrepancy it will update the
//*** RACF database to add the tapes that HSM really occupies and
//*** delete the tapes which do not have HSM datasets.
```

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```
//*** Note:
//***    Continuation of job HSMEXTR
//*********************************************************************
//*****           CHANGE  userid TO YOUR USERID       <===============
//*********************************************************************
//*** Deletion of work datasets
//*********************************************************************
//DELWORK  EXEC PGM=IDCAMS,REGION=1M
//SYSPRINT DD   SYSOUT=*
//SYSIN    DD   *
   DELETE 'userid.HSM.#RACF.HSMHSM.LIST'
   DELETE 'userid.HSM.#RACF.TAPE.LIST'
   DELETE 'userid.HSM.#RACF.DIFR.LIST'
   DELETE 'userid.HSM.##RACF.RACFUPD.LIST'
   SET MAXCC = Ø
/*
//*********************************************************************
//*** Lists RACF profile HSMHSM in TAPEVOl class
//*********************************************************************
//LISTRHSM  EXEC PGM=IKJEFTØ1,DYNAMNBR=3Ø
//SYSTERM   DD SYSOUT=X
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD DSN=userid.HSM.#RACF.HSMHSM.LIST,DISP=(NEW,CATLG),
//          DCB=(RECFM=FB,LRECL=8Ø,BLKSIZE=616Ø),
//          UNIT=SYSDA,SPACE=(TRK,(3Ø,3Ø),RLSE)
//SYSTSIN   DD *
 RL TAPEVOL HSMHSM
/*
//*********************************************************************
//*** Extracts all HSM tapes from RACF report
//*** Serial number of tapes is placed form column 1 to 6
//*** Columns 7-9 contains marker with the value 'R  ' for RACF tape
//*********************************************************************
//EXTRACTV  EXEC PGM=IKJEFT1A,DYNAMNBR=5Ø,COND=(7,LE),
//          REGION=ØM,PARM=('%HSMRACF')
//SYSPROC   DD  DSN=userid.USER.CLIST,DISP=SHR
//SYSTSPRT  DD  SYSOUT=*
//SYSPRINT  DD  SYSOUT=*
//SYSTSIN   DD  DUMMY
//FIN       DD  DSN=userid.HSM.#RACF.HSMHSM.LIST,DISP=SHR
//FOUT      DD  DSN=userid.HSM.#RACF.TAPE.LIST,DISP=(NEW,CATLG),
//          DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//          SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
/*
//*********************************************************************
//*** SORT OF DFSMSHSM TAPES EXTRACTED FROM THE RACF REPORT
//*********************************************************************
//SORTC     EXEC PGM=ICEMAN
//SYSPRINT  DD SYSOUT=X
//SYSOUT    DD SYSOUT=X
//SORTIN    DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#RACF.TAPE.LIST
//SORTOUT   DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#RACF.TAPE.LIST
```


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```
//SYSIN     DD *
 SORT FIELDS=(1,6,A),FORMAT=CH,WORK=1
 END
/*
//*********************************************************************
//*** Finding the differences between DFSMShsm and RACF
//*********************************************************************
//MKEDIF  EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//IN       DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#RACF.TAPE.LIST
//         DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//OUT      DD DSN=userid.HSM.#RACF.DIFR.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//TOOLIN   DD *
 SELECT FROM(IN) ON(1,6,CH) TO(OUT) NODUPS
/*
//*********************************************************************
//*** Generating of statements for update of RACF profile HSMHSM
//*********************************************************************
//ICETOOL EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//HSMRACF  DD DSN=userid.HSM.#RACF.DIFR.LIST,DISP=SHR
//OUT      DD DSN=userid.HSM.##RACF.RACFUPD.LIST,DISP=(MOD,CATLG),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=8Ø),
//         SPACE=(TRK,(5,5),RLSE)
//TOOLIN   DD *
  COPY FROM(HSMRACF) TO(OUT) USING(RACF)
  COPY FROM(HSMRACF) TO(OUT) USING(SHSM)
/*
//RACFCNTL DD *
  INCLUDE COND=(7,1,EQ,C'R'),FORMAT=CH
  OUTREC FIELDS=(C' RALTER TAPEVOL HSMHSM DELVOL(',1,6,C')',53X)
/*
//SHSMCNTL DD *
  INCLUDE COND=(7,1,NE,C'R'),FORMAT=CH
  OUTREC FIELDS=(C' RALTER TAPEVOL HSMHSM ADDVOL(',1,6,C')',53X)
/*
//*********************************************************************
//*** Update of HSMHSM profile
//*********************************************************************
//TSOBATCH  EXEC PGM=IKJEFTØ1,DYNAMNBR=3Ø
//SYSTERM   DD SYSOUT=X
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD SYSOUT=X
//SYSTSIN   DD DSN=userid.HSM.##RACF.RACFUPD.LIST,DISP=SHR
//
```

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JOB HSMRMM

```
//useridT JOB MSGCLASS=X,MSGLEVEL=(2,1),NOTIFY=&SYSUID,CLASS=A
//*********************************************************************
//***  Job compares DFSMShsm information with the information
//***  from DFSMSrmm. When it notices differences it will generate
//***   statements for elimination of discrepancy if it is possible.
//***
//***  The possible results of comparison are:
//***   In RMM     Belongs to HSM    In HSM        Action
//***    ACT           Y              ACT           OK
//***    ACT           Y              NO        delete from RMM
//***    ACT           N              ACT   danger - tape overwritten
//***    ACT           N              NO            -
//***    SCR                          ACT      activate in RMM
//***    SCR                          NO            -
//***  Note:
//***     Continuation of HSMEXTR job
//*********************************************************************
//*****           CHANGE  userid TO YOUR USERID       <===============
//*************************************************************
//***  Deletion of work datasets
//*************************************************************
//DELWORK  EXEC PGM=IDCAMS,REGION=ØM
//SYSPRINT  DD SYSOUT=X
//SYSIN     DD *
    DELETE userid.HSM.#RMM.SCR.LIST
    DELETE userid.HSM.#RMM.ACT.LIST
    DELETE userid.HSM.#RMM.SCRH.LIST
    DELETE userid.HSM.#RMM.ACTH.LIST
    DELETE userid.HSM.#RMM.ACTNH.LIST
    DELETE userid.HSM.#RMM.DIFA.LIST
    DELETE userid.HSM.#RMM.DIFS.LIST
    DELETE userid.HSM.#RMM.DIFW.LIST
    DELETE userid.HSM.##RMM.RMMUPD.LIST
    DELETE userid.HSM.##RMM.HSMUPD.LIST
    DELETE userid.HSM.##RMM.WORNING.LIST
    SET MAXCC=Ø
/*
//*************************************************************
//***  LISTS ALL DFSMSRMM TAPES
//*************************************************************
//TSOBATCH  EXEC PGM=IKJEFTØ1,DYNAMNBR=3Ø
//SYSTERM   DD SYSOUT=X
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD DSN=userid.HSM.#RMM.ACT.LIST,DISP=(NEW,CATLG,DELETE),
//      SPACE=(TRK,(3Ø,3Ø),RLSE),DCB=(RECFM=FB,LRECL=133,BLKSIZE=Ø)
//SYSTSIN   DD *
   RMM SEARCHDATASET OWNER(*) STATUS(PRIVATE) LIMIT(*)
/*
//TSOBATCH  EXEC PGM=IKJEFTØ1,DYNAMNBR=3Ø
//SYSTERM   DD SYSOUT=X
```


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```
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD DSN=userid.HSM.#RMM.SCR.LIST,DISP=(NEW,CATLG,DELETE),
//      SPACE=(TRK,(3Ø,3Ø),RLSE),DCB=(RECFM=FB,LRECL=133,BLKSIZE=Ø)
//SYSTSIN   DD *
   RMM SEARCHVOLUME  OWNER(*) STATUS(SCRATCH) LIMIT(*)
/*
//*******************************************************************
//*** Extracting of RMM tapes with the following characteristics:
//***   In RMM    Belongs to HSM
//***    ACT           Y
//***    ACT           N
//***    SCR
//*******************************************************************
//SELECTZH EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//HSMZACT  DD DSN=userid.HSM.#RMM.ACT.LIST,DISP=SHR
//HSMZSCR  DD DSN=userid.HSM.#RMM.SCR.LIST,DISP=SHR
//ACTHSM   DD DSN=userid.HSM.#RMM.ACTH.LIST,DISP=(NEW,CATLG,DELETE),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=9,BLKSIZE=Ø),
//         SPACE=(TRK,(1,1),RLSE)
//ACTNOHSM DD DSN=userid.HSM.#RMM.ACTNH.LIST,DISP=(NEW,CATLG,DELETE),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=9,BLKSIZE=Ø),
//         SPACE=(TRK,(1,1),RLSE)
//SCRHSM   DD DSN=userid.HSM.#RMM.SCRH.LIST,DISP=(NEW,CATLG,DELETE),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=9,BLKSIZE=Ø),
//         SPACE=(TRK,(1,1),RLSE)
//TOOLIN   DD *
  COPY FROM(HSMZACT) TO(ACTHSM)   USING(ZACT)
  COPY FROM(HSMZACT) TO(ACTNOHSM) USING(ZANH)
  COPY FROM(HSMZSCR) TO(SCRHSM)   USING(ZSCR)
/*
//ZACTCNTL DD *
  INCLUDE COND=(1,12,EQ,C'HSM.HMIGTAPE',OR,
                1,12,EQ,C'HSM.BACKTAPE',OR,
                1,8,EQ,C'HSM.COPY',OR,
                1,7,EQ,C'HSM.DMP'),FORMAT=CH
  OUTREC FIELDS=(46,6,C'AH ')
/*
//ZANHCNTL DD *
  INCLUDE COND=(1,6,NE,C'READY ',AND,
                1,1,NE,C' ',AND,
                1,1,NE,C'-',AND,
                62,1,NE,C'C',AND,
                1,8,NE,C'EDG3Ø12I',AND,
                1,4,NE,C'END ',AND,
                1,12,NE,C'HSM.HMIGTAPE',AND,
                1,12,NE,C'HSM.BACKTAPE',AND,
                1,8,NE,C'HSM.COPY',AND,
                1,7,NE,C'HSM.DMP'),FORMAT=CH
  OUTREC FIELDS=(46,6,C'A  ')
/*
```

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```
//ZSCRCNTL DD *
  INCLUDE COND=(61,1,EQ,C'S'),FORMAT=CH
  OUTREC FIELDS=(1,6,C'SH ')
/*
//*********************************************************************
//*** Active tapes which do not belong to HSM are the candidates for
//*** SCRATCH
//*** Generation of statements for resolving the following situation:
//***   In RMM    Belongs to HSM   In HSMU          Action
//***    ACT           Y           NO            delete from RMM
//*********************************************************************
//GENZSCR  EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//IN       DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#RMM.ACTH.LIST
//         DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//ACTTOSCR DD DSN=userid.HSM.#RMM.DIFS.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//RMMUPD   DD DSN=userid.HSM.##RMM.RMMUPD.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=8Ø,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//TOOLIN   DD *
   SELECT FROM(IN) ON(1,6,CH) TO(ACTTOSCR) NODUPS
   COPY FROM(ACTTOSCR) TO(RMMUPD) USING(ZSCR)
/*
//ZSCRCNTL DD *
  INCLUDE COND=(7,2,EQ,C'AH'),FORMAT=CH
  OUTREC FIELDS=(C' RMM DV ',1,6,C' RELEASE EJECT(CONVENIENCE)',4ØX)
/*
//*********************************************************************
//***  Scratch tapes which is active in HSM are candidates for
//***  activation.
//***  Generation of statements for resolving the following situation:
//***   In RMM    Belongs to HSM   In HSM              Action
//***    SCR                       ACT           activate in RMM
//*********************************************************************
//GENZACT  EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//IN       DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#RMM.SCRH.LIST
//         DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//SCRTOACT DD DSN=userid.HSM.#RMM.DIFA.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//RMMUPD   DD DSN=userid.HSM.##RMM.RMMUPD.LIST,DISP=MOD
//TOOLIN   DD *
   SELECT FROM(IN) ON(1,6,CH) TO(SCRTOACT) ALLDUPS
   COPY FROM(SCRTOACT) TO(RMMUPD) USING(ZACT)
/*
//ZACTCNTL DD *
  INCLUDE COND=(7,2,EQ,C'SH'),FORMAT=CH
```


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```
  OUTREC FIELDS=(C' RMM CV ',1,6,
                 C' RELEASEACTION(SCRATCH) STATUS(MASTER)',28X)
/*
//*********************************************************************
//*** Overwritten tape
//***  Generating of statements for resolving the following situation:
//***   In RMM    Belongs to HSM In HSM           Action
//***    ACT           N          ACT      DANGER - tape is overwritten
//*********************************************************************
//TESTWORN EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//IN       DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#RMM.ACTNH.LIST
//         DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//DIFW     DD DSN=userid.HSM.#RMM.DIFW.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//WORNING  DD DSN=userid.HSM.##RMM.WORNING.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=8Ø,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//HSMUPD   DD DSN=userid.HSM.##RMM.HSMUPD.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=8Ø,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//TOOLIN   DD *
   SELECT FROM(IN) ON(1,6,CH) TO(DIFW) ALLDUPS
   COPY FROM(DIFW) TO(WORNING) USING(ZWOR)
   COPY FROM(DIFW) TO(HSMUPD) USING(ZWOD)
   COPY FROM(DIFW) TO(HSMUPD) USING(ZWOB)
/*
//ZWORCNTL DD *
  INCLUDE COND=(7,1,EQ,C'H'),FORMAT=CH
  OUTREC FIELDS=(C'  HSEND LIST TTOC(',1,6,
                 C') ODS(userid.HSM.#RMM.TTOC.LIST)',29X)
/*
//ZWODCNTL DD *
  INCLUDE COND=(7,2,EQ,C'HD'),FORMAT=CH
  OUTREC FIELDS=(C' HSEND DELVOL ',1,6,C' DUMP(LASTCOPY,PURGE)',58X)
/*
//ZWOBCNTL DD *
  INCLUDE COND=(7,2,EQ,C'HB'),FORMAT=CH
  OUTREC FIELDS=(C' HSEND DELVOL ',1,6,C' BACKUP(PURGE)',65X)
/*
//*********************************************************************
//*** Updating of RMM database
//*********************************************************
//TSOBATCH  EXEC PGM=IKJEFTØ1,DYNAMNBR=3Ø
//SYSTERM   DD SYSOUT=X
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD SYSOUT=X
//SYSTSIN   DD DSN=userid.HSM.##RMM.RMMUPD.LIST,DISP=SHR
/*
//*********************************************************************
```

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```
//***  Updating of HSM database
//*********************************************************************
//TSOBATCH  EXEC PGM=IKJEFTØ1,DYNAMNBR=3Ø
//SYSTERM   DD SYSOUT=X
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD SYSOUT=X
//SYSTSIN   DD DSN=userid.HSM.##RMM.HSMUPD.LIST,DISP=SHR
//
```

JOB HSMZARA

```
//useridZ JOB MSGCLASS=X,MSGLEVEL=(2,1),NOTIFY=&SYSUID,CLASS=A
//*********************************************************************
//***  Job compares DFSMShsm information with the information
//***  from ZARA. When it notices differences it will generate
//***  statements for th elimination of discrepancy, if it is possible.
//***
//***  The possible results of comparison are:
//***   In ZARA     Belongs to HSM    In HSM        Action
//***    ACT           Y              ACT             OK
//***    ACT           Y              NO       delete from ZARA
//***    ACT           N              ACT    danger - tape overwritten
//***    ACT           N              NO              -
//***    SCR                          ACT      activate in ZARA
//***    SCR                          NO              -
//***  Note:
//***     Continuation of HSMEXTR job
//*********************************************************************
//*****           CHANGE  userid TO YOUR USERID       <===============
//************************************************************
//***   Deletion of work datasets
//************************************************************
//DELWORK  EXEC PGM=IDCAMS,REGION=ØM
//SYSPRINT  DD SYSOUT=X
//SYSIN     DD *
    DELETE userid.HSM.#ZARA.SCR.LIST
    DELETE userid.HSM.#ZARA.ACT.LIST
    DELETE userid.HSM.#ZARA.SCRH.LIST
    DELETE userid.HSM.#ZARA.ACTH.LIST
    DELETE userid.HSM.#ZARA.ACTNH.LIST
    DELETE userid.HSM.#ZARA.DIFA.LIST
    DELETE userid.HSM.#ZARA.DIFS.LIST
    DELETE userid.HSM.#ZARA.DIFW.LIST
    DELETE userid.HSM.##ZARA.ZARAUPD.LIST
    DELETE userid.HSM.##ZARA.HSMUPD.LIST
    DELETE userid.HSM.##ZARA.WORNING.LIST
    SET MAXCC=Ø
/*
//************************************************************
//***  LISTS ALL ZARA TAPES
//************************************************************
```


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```
//LISTZACT EXEC ZARAUTL
//SYSUDUMP DD *
//ZARAUTL.SYSPRINT DD DSN=userid.HSM.#ZARA.ACT.LIST,DISP=(NEW,CATLG),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=133,BLKSIZE=Ø),
//         SPACE=(TRK,(5,5),RLSE)
//SYSIN    DD *
  LIST ACTIVE  $$
/*
//LISTZSCR EXEC ZARAUTL
//SYSUDUMP DD *
//ZARAUTL.SYSPRINT DD DSN=userid.HSM.#ZARA.SCR.LIST,DISP=(NEW,CATLG),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=133,BLKSIZE=Ø),
//         SPACE=(TRK,(5,5),RLSE)
//SYSIN    DD *
  LIST SCRATCH $$
/*
//*********************************************************************
//*** Extracting tapes with the following characteristics from ZARA:
//***   In ZARA    Belongs to HSM
//***    ACT           Y
//***    ACT           N
//***    SCR
//*********************************************************************
//SELECTZH EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//HSMZACT  DD DSN=userid.HSM.#ZARA.ACT.LIST,DISP=SHR
//HSMZSCR  DD DSN=userid.HSM.#ZARA.SCR.LIST,DISP=SHR
//ACTHSM   DD DSN=userid.HSM.#ZARA.ACTH.LIST,DISP=(NEW,CATLG),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=9,BLKSIZE=Ø),
//         SPACE=(TRK,(1,1),RLSE)
//ACTNOHSM DD DSN=userid.HSM.#ZARA.ACTNH.LIST,DISP=(NEW,CATLG),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=9,BLKSIZE=Ø),
//         SPACE=(TRK,(1,1),RLSE)
//SCRHSM   DD DSN=userid.HSM.#ZARA.SCRH.LIST,DISP=(NEW,CATLG),
//         UNIT=SYSDA,DCB=(RECFM=FB,LRECL=9,BLKSIZE=Ø),
//         SPACE=(TRK,(1,1),RLSE)
//TOOLIN   DD *
  COPY FROM(HSMZACT) TO(ACTHSM)   USING(ZACT)
  COPY FROM(HSMZACT) TO(ACTNOHSM) USING(ZANH)
  COPY FROM(HSMZSCR) TO(SCRHSM)   USING(ZSCR)
/*
//ZACTCNTL DD *
  INCLUDE COND=((9,12,EQ,C'HSM.HMIGTAPE',OR,
                 9,12,EQ,C'HSM.BACKTAPE',OR,
                 9,8,EQ,C'HSM.COPY',OR,
                 9,7,EQ,C'HSM.DMP'),AND,
                 66,4,EQ,C'USER'),FORMAT=CH
  OUTREC FIELDS=(2,6,C'AH ')
/*
//ZANHCNTL DD *
  INCLUDE COND=(1,1,NE,C'1',AND,
```

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```
               2,1,NE,C' ',AND,
               8,1,NE,C'-',AND,
               9,1,NE,C' ',AND,
               9,12,NE,C'HSM.HMIGTAPE',AND,
               9,12,NE,C'HSM.BACKTAPE',AND,
               9,8,NE,C'HSM.COPY',AND,
               9,7,NE,C'HSM.DMP'),FORMAT=CH
  OUTREC FIELDS=(2,6,C'A  ')
/*
//ZSCRCNTL DD *
  INCLUDE COND=(118,9,EQ,C'SCRATCHED'),FORMAT=CH
  OUTREC FIELDS=(4,6,C'SH ')
/*
//*********************************************************************
//***  Active tapes which don't belong to HSM are candidates for scratch
//***  Generating of statements for resolving the following situation:
//***   In ZARA     Belong to HSM   In HSM              Action
/***    ACT           Y              NO            delete from ZARA
//*********************************************************************
//GENZSCR  EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//IN       DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#ZARA.ACTH.LIST
//         DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//ACTTOSCR DD DSN=userid.HSM.#ZARA.DIFS.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//ZUPD     DD DSN=userid.HSM.##ZARA.ZARAUPD.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=8Ø,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//TOOLIN   DD *
   SELECT FROM(IN) ON(1,6,CH) TO(ACTTOSCR) NODUPS
   COPY FROM(ACTTOSCR) TO(ZUPD) USING(ZSCR)
/*
//ZSCRCNTL DD *
  INCLUDE COND=(7,2,EQ,C'AH'),FORMAT=CH
  OUTREC FIELDS=(C'  UPDVOL VOLSER=',1,6,C' VSTAT=S $$',67X)
/*
//*********************************************************************
//***  Scratch tapes which belong to HSM are candidates for activation
//***  Generation of statements for resolving the following situation:
//***   In ZARA     Belongs to HSM   In HSMU         Action
//***    SCR                          ACT       activate in ZARA
//*********************************************************************
//GENZACT  EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//IN       DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#ZARA.SCRH.LIST
//         DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//SCRTOACT DD DSN=userid.HSM.#ZARA.DIFA.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
```


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```
//ZUPD     DD DSN=userid.HSM.##ZARA.ZARAUPD.LIST,DISP=MOD
//TOOLIN   DD *
   SELECT FROM(IN) ON(1,6,CH) TO(SCRTOACT) ALLDUPS
   COPY FROM(SCRTOACT) TO(ZUPD) USING(ZACT)
   COPY FROM(SCRTOACT) TO(ZUPD) USING(ZAC1)
/*
//ZACTCNTL DD *
  INCLUDE COND=(7,2,EQ,C'SH'),FORMAT=CH
  OUTREC FIELDS=(C'  UPDVOL VOLSER=',1,6,C' VSTAT=A $$',47X)
/*
//ZAC1CNTL DD *
  INCLUDE COND=(7,2,EQ,C'SH'),FORMAT=CH
  OUTREC FIELDS=(C'  UPDVOL VOLSER=',1,6,
                C' EXPDT=US00002 FSEQ=1 FSTAT=A $$',28X)
/*
//*******************************************************************
//***  Overwritten tape
//***  Generation of statements for resolving the following situation:
//***   In ZARA     Belongs to HSM   In HSM      Action
//***    ACT           N              ACT    DANGER - tape overwritten
//*******************************************************************
//TESTWORN EXEC PGM=ICETOOL,REGION=1M
//TOOLMSG  DD SYSOUT=X
//DFSMSG   DD SYSOUT=X
//IN       DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#ZARA.ACTNH.LIST
//         DD UNIT=SYSDA,DISP=SHR,DSN=userid.HSM.#TAPE.LIST
//DIFW     DD DSN=userid.HSM.#ZARA.DIFW.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=9,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//WORNING  DD DSN=userid.HSM.##ZARA.WORNING.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//HSMUPD   DD DSN=userid.HSM.##ZARA.HSMUPD.LIST,DISP=(NEW,CATLG),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=),
//            SPACE=(TRK,(5,1),RLSE),UNIT=SYSDA
//TOOLIN   DD *
   SELECT FROM(IN) ON(1,6,CH) TO(DIFW) ALLDUPS
   COPY FROM(DIFW) TO(WORNING) USING(ZWOR)
   COPY FROM(DIFW) TO(HSMUPD) USING(ZWOD)
   COPY FROM(DIFW) TO(HSMUPD) USING(ZWOB)
/*
//ZWORCNTL DD *
  INCLUDE COND=(7,1,EQ,C'H'),FORMAT=CH
  OUTREC FIELDS=(C'  HSEND LIST TTOC(',1,6,
                C') ODS(userid.HSM.#ZARA.TTOC.LIST)',29X)
/*
//ZWODCNTL DD *
  INCLUDE COND=(7,2,EQ,C'HD'),FORMAT=CH
  OUTREC FIELDS=(C' HSEND DELVOL ',1,6,C' DUMP(LASTCOPY,PURGE)',58X)
/*
//ZWOBCNTL DD *
```

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```
  INCLUDE COND=(7,2,EQ,C'HB'),FORMAT=CH
  OUTREC FIELDS=(C' HSEND DELVOL ',1,6,C' BACKUP(PURGE)',65X)
/*
//*******************************************************************
//***  Update of ZARA database
//*******************************************************************
//ZARAUPD  EXEC ZARAUTL
//SYSUDUMP DD *
//SYSIN    DD DSN=userid.HSM.##ZARA.ZARAUPD.LIST,DISP=(OLD)
/*
//*******************************************************************
//***  Update of HSM database (optional)
//*******************************************************************
//HSMUPD    EXEC PGM=IKJEFT01,DYNAMNBR=30
//SYSTERM   DD SYSOUT=X
//SYSPRINT  DD SYSOUT=X
//SYSTSPRT  DD SYSOUT=X
//SYSTSIN   DD DSN=userid.HSM.##ZARA.HSMUPD.LIST,DISP=SHR
//
```

REXX HSMRACF

```
/** REXX ************************************************************/
/** Select tape volid from RACF list                              **/
/*******************************************************************/
 /* TRACE ?R */

   EOF='NO'
   reci.0=0
   reco.0=0
  "EXECIO 0 DISKR FIN (OPEN)"
  "EXECIO 0 DISKW FOUT (OPEN)"
   I=0
   CALL GET_FIN
   /* skip other information in RACF list */
   DO WHILE(EOF='NO')
      if substr(reci.1,1,20) = "OTHER VOLUMES IN SET"
      then leave;
      CALL GET_FIN
   END
   /* skip ---------- in RACF list */
   CALL GET_FIN
   /* get first record with volumes */
   CALL GET_FIN
   /* select volumes from 4. colums */
   /* until get blank rows          */
   DO WHILE(EOF='NO')
      j=0
      if substr(reci.1,1,6) ¬= ' '
```


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```
      then do
           j=j+1
           reco.j = substr(reci.1,1,6)!!"R"
           end
      else leave
      if substr(reci.1,9,6) ¬= ' '
      then do
           j=j+1
           reco.j = substr(reci.1,9,6)!!"R"
           end
      if substr(reci.1,17,6) ¬= ' '
      then do
           j=j+1
           reco.j = substr(reci.1,17,6)!!"R"
           end
      if substr(reci.1,25,6) ¬= ' '
      then do
           j=j+1
           reco.j = substr(reci.1,25,6)!!"R"
           end
       reco.Ø=j
       i=i+j
       "EXECIO "j" DISKW FOUT (STEM reco."
      CALL GET_FIN
   END
  "EXECIO Ø DISKR FIN      (FINIS)"
  "EXECIO Ø DISKW FOUT     (FINIS)"
 SAY " selected " i "tapes"
 EXIT
 GET_FIN: PROCEDURE EXPOSE RECI. EOF
  "EXECIO 1 DISKR FIN (STEM RECI.)"
   IF RC>=2
   THEN EOF='YES'
  RETURN
```

Emina Spesic and Dragon Nikolic
Systems Programmers
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Copying to compressed tape using Stack

INTRODUCTION

It would be highly beneficial for many enterprises to condense unchangeable files, such as historical data format. This would:

- Reduced off-site costs.
- Reduced future tape purchases.
- Maximize Storage Tek's Redwood/9840 and IBM Magstar tape utilization.
- Increase robotic set-up, etc.

DESCRIPTION

The program gets an input file (DDNAME SYS030), including a tape file list, allocates each file on the list dynamically (DDNAME SYS010) specifying volume it also allocates an output tape file (DDNAME SYS020) with the same name as input; copies the files using the Stack technique (multi-files), recatalogues the files with file sequence, and logs all information (DDNAME SYS050) of the copied files.

Restrictions

It cannot copy DFDSS dumped/copied files, nor multi-volume files.

Characteristics

The program can copy single/multi-file and single volumes. The input allocation happens on each new input volume or when missing a file sequence of the series (for example if you are copying the first, missing the second, and copying the third file on the tape). It works with copied concatenation files.

It works utilizing a chained scheduling technique, then it uses REGION=0K EXEC parameters.

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If the input file is not catalogued or the volume in the MVS catalog is not the same on the SYS030 file, the file recatalogue does not occur.

Even thoughDCB attributes are not specified, this program accepts the label DCB attributes and copies them to the output file. It works with SWA above 16MB.

The program will abend if a datacheck occurs on the output file and after all datachecks in input files. Anyway, the log (SYS050) will show all files on which datacheck occurs.

The other attributes are copied to output files, including creation date/ hour, expiration date, from SYS030. SYS030 lay-out is shown in Figure 1:

Position	Format	Description
001-006	X(06)	volume serial number (VOLSER)
007-007	X(01)	reserved
008-051	X(44)	absolute dataset name (DSNAME)
052-053	X(02)	data set organization (DSORG) – optional
054-056	X(03)	record format (RECFM) – optional
057-061	9(05)	block size (BLKSIZE) – optional
062-066	9(05)	logical record length (LRECL) – optional
067-072	X(06)	reserved
073-079	9(07)	creation date (AAAADDD) – optional
080-080	X(01)	reserved
081-087	9(07)	expiration date (AAAADDD) – optional
088-092	9(05)	input file sequence number (FILSEQ)
093-098	X(06)	creation hour (HHMMSS) – optional
099-100	X(02)	reserved

Figure 1: SYS030 lay-out

NA08

```
         PRINT NOGEN
         TITLE 'NAØ8 - COPIES TAPE TO TAPE, USING STACK TECHNIQUE'
NAØ8    PXENTRY RENT=NO,BASES=(13,12)       * YOUR LINKAGE CONVENTION
```

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```
*-------------------------------------------------------------------*
* THE PROGRAM GETS AN INPUT FILE (DDNAME SYSØ3Ø) INCLUDING A TAPE FILE*
* LIST, ALLOCATES EACH FILE ON THE LIST DYNAMICALLY (DDNAME SYSØ1Ø)   *
* SPECIFYING VOLUME IT ALSO ALLOCATES OUTPUT TAPE FILE (DDNAME SYSØ2Ø)*
* WITH THE SAME NAME AS INPUT, COPIES THE FILES, WITH STACK TECHNIQUE *
* (MULTI-FILES), RECATALOGS THE FILES, WITH FILE SEQUENCE AND LOGS ALL*
* INFORMATION (DDNAME SYSØ5Ø) OF THE COPIED FILES.                   *
*-------------------------------------------------------------------*
         LA    R13,Ø(R13)                  * COMPATIBILITY 31-BIT MODE
         LA    R12,Ø(R12)                  *
         OPEN  (SYSØ3Ø,,SYSØ5Ø,(OUTPUT))   *
LOOP3Ø   GET   SYSØ3Ø,WORKIN               * GET FILE LIST
         TIME  DEC                         * GET DATE/HOUR
         ST    R1,DATATIME                 *
         ST    RØ,HORATIME                 *
         MVC   RETCODE,=F'Ø'               *
         BAL   R1Ø,MONTALIN                * ALLOCATE INPUT TAPE
         CLC   RETCODE,=F'Ø'               * SUCCESSFUL?
         BNE   LOOP3Ø                      * NO, PROCESS NEXT FILE
         BAL   R1Ø,MONTALOU                * ALLOCATE OUTPUT TAPE
         CLC   RETCODE,=F'Ø'               * SUCCESSFUL?
         BNE   LOOP3Ø                      * NO, PROCESS NEXT FILE
         BAL   R1Ø,GRAVAFIT                * COPY FILE
         CLC   RETCODE,=F'Ø'               * DATACHECK IN OUTPUT?
         BZ    LOOP3Ø                      * NO, PROCESS NEXT FILE
FIM      CLOSE (SYSØ3Ø,,SYSØ5Ø)            *
         L     R1,COUNT1                   *
         LTR   R1,R1                       *
         BZ    TERMNOR                     *
         WTO ' #NAØ8.9Ø1C PROBLEMS WITH INPUT FILES',ROUTCDE=11
         ABEND 4ØØØ,DUMP                   *
TERMNOR  WTO ' #NAØ8.999I SUCCESSFUL END',ROUTCDE=11
         PXEXIT RENT=NO,RC=Ø               * YOUR EXIT CONVENTION
         EJECT
*-------------------------------------------------------------------*
*  ALLOCATE DYNAMICALLY INPUT FILE                                  *
*-------------------------------------------------------------------*
MONTALIN ST    R1Ø,SAVMTIN           *
         USING INFMJFCB,R6           * CONVERT RECORD FORMAT
         XC    RECFMIN,RECFMIN       *
         CLI   RECIN,C'F'            * RECFM = F?
         BNE   MNTVERV               *
         OI    RECFMIN,B'1ØØØØØØØ'   *
         B     MNTVERB               *
MNTVERV  CLI   RECIN,C'V'            * RECFM = V?
         BNE   MNTVERU               *
         OI    RECFMIN,B'Ø1ØØØØØØ'   *
         B     MNTVERB               *
MNTVERU  OI    RECFMIN,B'11ØØØØØØ'   * ELSE RECFM = U?
MNTVERB  CLI   RECIN+1,C'B'          * BLOCKED?
```


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```
         BNE   MNTVERC               *
         OI    RECFMIN,B'00010000'   *
MNTVERC  CLI   RECIN+2,C'A'          * ASA CONTROL?
         BNE   MNTVERM               *
         OI    RECFMIN,B'00000100'   *
         B     MNTPRTO               *
MNTVERM  CLI   RECIN+2,C'M'          * MACHINE CONTROL?
         BNE   MNTPRTO               *
         OI    RECFMIN,B'00000010'   *
MNTPRTO  MVC   DSNALIN,DSNIN         *
         MVC   VOLALIN1,VOLIN1       * DEFAULT 1 VOLUME
         CLC   VOLIN2,=CL6' '        * IS THERE A SECOND VOLUME?
         BE    MNTMVALC              * NO
         MVC   VOLPARM,=X'0002'      *
         MVC   VOLALIN2,VOLIN2       * SPECIFY SECOND VOLUME
MNTMVALC PACK  DOUBLE,LALOCIN        *
         CVB   R1,DOUBLE             *
         LH    R2,FILSEQ             *
         LA    R2,1(R2)              *
         CR    R1,R2                 *
         STH   R1,FILSEQ             *
         BNE   MNTALOC0              *
         CLC   VOLIN1,VOLANT         * VOLUME CHANGED?
         BE    SEGALOC               * NO, 2ND. ALLOCATION SAME VOL
MNTALOC0 CLC   COUNT,=F'0'           * FIRST VOLUME MOUNTED?
         BE    MNTALOC1              * NO, DO NOT CLOSE/DEALLOC
         CLOSE DCB10                 *
         FREEPOOL DCB10              *
         LA    R1,S99PRUN            * CLOSE AND DEALLOCATE
         DYNALLOC                    * LAST FILE - KEEP
         LTR   R15,R15               *
         BNZ   CANCEL                *
MNTALOC1 L     R1,COUNT              *
         LA    R1,1(R1)              * NEW VOLUME COUNT
         ST    R1,COUNT              *
         MVC   VOLANT,VOLIN1         *
         LA    R1,S99PRMIN           *
         DYNALLOC                    * ALLOCATE A NEW INPUT FILE
         LTR   R15,R15               *
         BZ    MNTLINEX              *
         LH    R15,S99ARIN+4         *
         LTR   R15,R15               *
         BNZ   NAOALIN               *
MNTLINEX RDJFCB SYS010               * SET JFCB AREA
         LA    R6,JFCBAR10           * KEEPING COMPATIBILITY WITH
         MVC   JFCBDSNM,DSNALIN      * DYNAMIC ALLOCATION
         MVC   DSNUNIN,DSNIN         *
         MVC   JFCBFLSQ,FILSEQ       *
         OI    JFCBLTYP,JFCDSEQN     *
         MVC   JFCBNVOL,VOLPARM+1    *
```

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```
         MVC   JFCBVOLS,VOLALIN1      *
         CLC   VOLPARM,=H'1'          *
         BE    MNTEXIT1               *
         MVC   JFCBVOLS+6,VOLALIN2    *
MNTEXIT1 L     R1Ø,SAVMTIN            *
         BR    R1Ø                    *
SEGALOC  CLOSE (DCB1Ø,LEAVE)          * CLOSE LAST FILE,
         FREEPOOL DCB1Ø               * KEEPING THE VOLUME SET
         B     MNTLINEX               *
NAOALIN  MVC   MESSLG,=CL62'ERROR ALLOCRS=                '
         MVC   DSNLG,DSNALIN          *
         CVD   R15,DOUBLE             *  FILE DO NOT COPIED
         UNPK  MESSLG+14(4),DOUBLE    *  WRITE LOG
         OI    MESSLG+17,X'FØ'        *
         LA    R3,DATATIME            *
         BAL   R1Ø,CONVDATA           *
         MVC   DATALG,DATA            *
         UNPK  DOUBLE,HORATIME        *
         MVC   HORALG,DOUBLE+1        *
         MVC   DATACR,DATACIN         *
         MVC   HORACR,HORACIN         *
         MVC   MESSLG+19(6),CATVOL1   *
         MVC   ERROFIT,=C'*'          * ERROR INDICATOR
         PUT   SYSØ5Ø,LOGOUT          *
         MVC   RETCODE,=F'4'          * NEXT FILE
         B     MNTEXIT1               *
         EJECT
*-------------------------------------------------------------------*
*  ALLOCATE DYNAMICALLY OUTPUT FILE                                 *
*-------------------------------------------------------------------*
MONTALOU NOP   MNTLOUSG               * ALLOCATE ONCE OUTPUT DYNAMIC.
         USING IHADCB,R7             * TO THE NEXT FILES, ONLY
         USING IOBSTDRD,R1           * CHANGE JFCB AREA
         USING DECB,R2               *
         ST    R1Ø,SAVMTOU            *
         MVC   DSNALOU,DSNIN          * MOVE INPUT DSN TO OUTPUT
         LA    R7,DCB1Ø               *
         LA    R6,JFCBAR1Ø            *
         MVC   JFCRECFM,=B'ØØØØØØØØ'  *
         MVC   JFCBLKSI,=H'Ø'         * LRECL/BLKSIZE/RECFM
         MVC   JFCLRECL,=H'Ø'         * LIKE NO JCL - JFCB AREA
         MVC   DCB1Ø,SYSØ1Ø           *
         MVC   DCBLRECL,=H'Ø'         * LRECL/BLKSIZE/RECFM
         MVC   DCBBLKSI,=H'Ø'         * LIKE NO JCL - DCB AREA
         MVC   DCBRECFM,=B'ØØØØØØØØ'  * TO GET FROM LABEL
         OPEN  (DCB1Ø,(INPUT)),TYPE=J *
         RDJFCB SYSØ1Ø                *
         LA    R6,JFCBAR1Ø            *
         MVC   RECFMIN,JFCRECFM       * SAVE LRECL/BLKSIZE/RECFM
         MVC   BLKALOU,JFCBLKSI       * GET FROM LABEL INPUT
```


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```
         MVC   LREALOU,JFCLRECL       *
         MVC   RECALOU,RECFMIN        *
         BAL   R1Ø,TRANSFM            * TRANSFORM RECFM IN TEXT
         LH    R1,JFCBLKSI            *
         LTR   R1,R1                  * NO BLKSIZE?
         BZ    DESPDSN                * NEXT INPUT FILE
         LH    R1,JFCLRECL            *
         LTR   R1,R1                  * NO LRECL?
         BZ    DESPDSN                * NEXT INPUT FILE
         CLC   LRETENC,=CL7'ØØØØØØØ'  * EXPDT = Ø?
         BE    ALOCAOUT               * YES, BYPASS
         MVC   RETPD,LRETENC          * ELSE MOVE TO OUTPUT
         MVI   ALOCNOP,X'ØØ'          * SET ON EXPDT FLAG
ALOCAOUT LA    R1,S99PRMOU            *
         DYNALLOC                     * ALLOCATE OUTPUT FILE
         LTR   R15,R15                *
         BZ    MNTLOPEN               *
         LH    R15,S99AROU+4          *
         LTR   R15,R15                *
         BNZ   NAOALOU                *
MNTLOPEN LA    R7,DCB2Ø               *
         MVC   DCB2Ø,SYSØ2Ø           *
         MVC   DCBLRECL,LREALOU       * REPLACE DCB ATTRIBUTES
         MVC   DCBBLKSI,BLKALOU       * FROM INPUT FILE
         MVC   DCBBUFL,BLKALOU        *
         MVC   DCBRECFM,RECFMIN       *
         OPEN  (DCB2Ø,(OUTPUT))       *
         RDJFCB SYSØ2Ø                * FIND OUT 1. VOLUME MOUNT
         LA    R6,JFCBAR2Ø            *
         MVC   CATVOL1,JFCBVOLS       *
         LA    R15,Ø                  *
         MVI   MONTALOU+1,X'FØ'       * TURN DOWN 2ND ALLOCATION
MNTLOUEX L     R1Ø,SAVMTOU            *
         BR    R1Ø                    *
MNTLOUSG RDJFCB SYSØ2Ø                * 2ND FILE AND NEXT
         LA    R6,JFCBAR2Ø            *
         LH    R1,FLSEQA              *
         LTR   R1,R1                  *
         BZ    NAOQUEBR               *
         LA    R1,1(R1)               * NEXT FILSEQ
         STH   R1,JFCBFLSQ            *
         MVC   FLSEQA,=H'Ø'           *
         B     QUEBRFLS               *
NAOQUEBR LH    R1,JFCBFLSQ            *
         LA    R1,1(R1)               *
         STH   R1,JFCBFLSQ            * CHANGE FILE SEQ JCL
QUEBRFLS OI    JFCBLTYP,JFCDSEQN      *
         MVC   DSNALOU,DSNIN          * MOVE DSN TO OUTPUT
         LA    R7,DCB1Ø               *
         MVC   DCB1Ø,SYSØ1Ø           *
```

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```
         MVC   JFCBDSNM,DSNALOU       * AND JCL TOO
         LA    R6,JFCBAR1Ø            *
         MVC   JFCRECFM,=B'ØØØØØØØØ'  * LRECL/BLKSIZE/RECFM
         MVC   JFCBLKSI,=H'Ø'         * LIKE NO JCL - JFCB AREA
         MVC   JFCLRECL,=H'Ø'         *
         MVC   DCBLRECL,=H'Ø'         * LRECL/BLKSIZE/RECFM
         MVC   DCBBLKSI,=H'Ø'         * LIKE NO JCL - DCB AREA
         MVC   DCBRECFM,=B'ØØØØØØØØ'  * RECFM = U
         OPEN  (DCB1Ø,(INPUT)),TYPE=J *
         RDJFCB SYSØ1Ø                *
         LA    R6,JFCBAR1Ø            *
         MVC   RECFMIN,JFCRECFM       * KEEP LRECL/BLKSIZE/RECFM
         MVC   BLKALOU,JFCBLKSI       *
         MVC   LREALOU,JFCLRECL       *
         BAL   R1Ø,TRANSFM            * TRANSFORM RECFM IN TEXT
         LH    R1,JFCBLKSI            *
         LTR   R1,R1                  * BLKSIZE = Ø?
         BZ    DESPDSN                * NEXT INPUT FILE
         LH    R1,JFCLRECL            *
         LTR   R1,R1                  * LRECL = Ø?
         BZ    DESPDSN                * NEXT INPUT FILE
         LA    R6,JFCBAR2Ø            *
         CLC   LRETENC,=CL7'ØØØØØØØ'  * EXPDT = Ø?
         BE    MNTALOUT               * YES, BYPASS
         PACK  DOUBLE,LRETENC(4)      *
         CVB   R1,DOUBLE              *
         S     R1,=F'19ØØ'            * EXPDT RELATIVE TO 19ØØ
         PACK  DOUBLE,LRETENC+4(3)    *
         CVB   RØ,DOUBLE              * IN HEXA
         SLL   R1,16                  *
         OR    R1,RØ                  *
         STCM  R1,7,JFCBXPDT          *
MNTALOUT LA    R7,DCB2Ø               *
         MVC   DCB2Ø,SYSØ2Ø           *
         MVC   DCBLRECL,LREALOU       * REPLACE DCB ATTRIBUTES
         MVC   DCBBLKSI,BLKALOU       * OUTPUT FILE
         MVC   DCBBUFL,BLKALOU        *
         MVC   DCBRECFM,RECFMIN       *
         MVC   JFCBLKSI,BLKALOU       * JCL
         MVC   JFCLRECL,LREALOU       *
         MVC   JFCRECFM,RECFMIN       *
         OPEN  (DCB2Ø,(OUTPUT)),TYPE=J *
         LA    R15,Ø                  *
         B     MNTLOUEX               *
NAOALOU  MVC   MESSLG,=CL62'ERROR ALLOCRS=                '
         MVC   DSNLG,DSNALOU          *
         CVD   R15,DOUBLE             * WRITE LOG
         UNPK  MESSLG+14(4),DOUBLE    * ERROR ON OUTPUT FILE
         OI    MESSLG+17,X'FØ'        *
         LA    R3,DATATIME            *
```


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```
         BAL   R1Ø,CONVDATA           *
         MVC   DATALG,DATA            *
         UNPK  DOUBLE,HORATIME        *
         MVC   HORALG,DOUBLE+1        *
         MVC   DATACR,DATACIN         *
         MVC   HORACR,HORACIN         *
         MVC   MESSLG+19(6),CATVOL1   *
         MVC   ERROFIT,=C'*'          *
         PUT   SYSØ5Ø,LOGOUT          *
         MVC   RETCODE,=F'4'          *
         B     MNTLOUEX               *
DESPDSN  MVC   MESSLG,=CL62'INCOMPAT. FILE                  '
         MVC   DSNLG,DSNIN            *
         LA    R3,DATATIME            * WRITE LOG
         BAL   R1Ø,CONVDATA           * INCOMPATIBLE
         MVC   DATALG,DATA            * FILE
         UNPK  DOUBLE,HORATIME        *
         MVC   HORALG,DOUBLE+1        *
         MVC   DATACR,DATACIN         *
         MVC   HORACR,HORACIN         *
         MVC   MESSLG+19(6),CATVOL1   *
         MVC   ERROFIT,=C'*'          *
         PUT   SYSØ5Ø,LOGOUT          *
         MVC   RETCODE,=F'5'          * DESPREZA ARQUIVO
         B     MNTLOUEX               *
CANCEL   WTO   '#NAØ8.1Ø1C ERROR DESALLOC INPUT FILE',                X
               ROUTCDE=11             *
         ABEND 4ØØØ,DUMP              *
         EJECT
*-------------------------------------------------------------------*
*  COPY TAPE TO TAPE, UTILIZING STACK                               *
*-------------------------------------------------------------------*
GRAVAFIT ST    R1Ø,SAVGRVF            *
LER1Ø    LA    RØ,WK                  *  MVCL SPACES TO WK
         LA    R1,7                   *
         SLL   R1,12                  *
         LA    R1,4Ø95(R1)            *
         LR    R2,RØ                  *
         LA    R3,=A(4ØØØØØØØ)        *
         MVCL  RØ,R2                  *
         GET   DCB1Ø,WK               *  READ INPUT FILE
         PUT   DCB2Ø,WK               *  WRITE OUTPUT FILE
         B     LER1Ø                  *
ERSYSØ1Ø EQU   *                      * I/O ERROR SYSØ1Ø
         B     GLOGIOIN               *
ERSYSØ2Ø WTO   '#NAØ8.9Ø2E I/O ERROR SYSØ2Ø',ROUTCDE=11
         CLOSE DCB2Ø                  *
         FREEPOOL DCB2Ø               *
         MVC   RETCODE,=F'4'          *
         B     SAIGFITA               *
```

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```
FIM1     RDJFCB SYSØ2Ø                * INPUT EOF
         LA    R6,JFCBAR2Ø            *
         CLC   VOLSEQ,VOLSEQA         * CHANGED VOLSEQ?
         BNE   QUEBRAVS               * YES, CHECKA DSN JFCB CATALOG
ATUADSN  MVC   CATDSN,JFCBDSNM        *
         L     R1,VOLSEQ              *
         MVC   CATVOL2,=CL6' '        *
         MVC   CATFSQ1,JFCBFLSQ       *
         C     R1,=F'5'               *
         BH    CATALOGA               *
         BCTR  R1,Ø                   *
         SR    RØ,RØ                  * DESLOC. JFCBVOLS
         M     RØ,=F'6'               *
         LA    R1,JFCBVOLS(R1)        *
         MVC   CATVOL1,Ø(R1)          *
         B     CATALOGA               *
QUEBRAVS MVC   CATDSN,JFCBDSNM        *
         L     R1,VOLSEQA             *
         BCTR  R1,Ø                   *
         C     R1,=F'3'               * MORE THAN FIVE VOLUMES?
         BH    TRATAMAI               *
         SR    RØ,RØ                  * DESLOC. JFCBVOLS
         M     RØ,=F'6'               *
         LA    R1,JFCBVOLS(R1)        *
         MVC   CATVOL1,Ø(R1)          *
         MVC   CATFSQ1,JFCBFLSQ       *
         MVC   CATVOL2,6(R1)          *
         LH    R1,JFCBFLSQ            *
         STH   R1,CATFSQ2             *
         STH   R1,FLSEQA              *
         STH   R1,JFCBFLSQ            *
CATALOGA LA    R1,PARMCATL            * RECATALOG OUTPUT FILE
         BAL   R1Ø,CATL               *
         MVC   VOLSEQA,VOLSEQ         *
         MVC   MESSLG,=CL62'ARQ.GRAV.FS=     V=               '
         MVC   MESSLG+32(3Ø),=C'LRECL=XXXXX,BLKSIZE=XXXXX,    '
         MVC   MESSLG+19(6),CATVOL1   *
         MVC   MESSLG+26(6),CATVOL2   *
         LH    R1,JFCLRECL            *
         CVD   R1,DOUBLE              *
         UNPK  MESSLG+38(5),DOUBLE+5(3)
         OI    MESSLG+42,X'FØ'        *
         LH    R1,JFCBLKSI            *
         CVD   R1,DOUBLE              *
         MVC   MESSLG+58(3),RECIN     * RECFM
         UNPK  MESSLG+52(5),DOUBLE+5(3)
         OI    MESSLG+56,X'FØ'        *
         LH    R1,JFCBFLSQ            *
         CVD   R1,DOUBLE              *
         UNPK  MESSLG+12(5),DOUBLE+5(3) *
```


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```
         OI    MESSLG+16,X'FØ'        *
         LA    R3,DATATIME            *
         BAL   R1Ø,CONVDATA           *
         MVC   DATALG,DATA            *
         UNPK  DOUBLE,HORATIME        *
         MVC   HORALG,DOUBLE+1        *
         MVC   DSNLG,JFCBDSNM         *
         MVC   DATACR,DATACIN         *
         MVC   HORACR,HORACIN         *
         MVC   ERROFIT,=C' '          *
         MVC   VOLUANT,VOLIN1         * VOLUME LAST
         PUT   SYSØ5Ø,LOGOUT          * WRITE LOG INFORMATION
         CLC   CATVOL2,=CL6' '        * CHANGED VOLUME ?
         BE    SAIGRAVF               *
         MVC   CATVOL1,CATVOL2        *
SAIGRAVF CLOSE (DCB2Ø,LEAVE)          * KEEP TAPE SET
         FREEPOOL DCB2Ø               *
SAIGFITA L     R1Ø,SAVGRVF            *
         BR    R1Ø                    *
TRATAMAI C     R1,=F'4'               * MORE THAN 5 VOLUMES
         BH    MAISQ6                 *
         LA    R1,JFCBVOLS+24         * DESLOCAMENTO JFCBVOLS
         MVC   CATVOL1,Ø(R1)          *
         MVC   CATFSQ1,JFCBFLSQ       *
AMODE311 @AMODE 31                         * 31-BIT MODE
         LA    R2,SWA_EPA                  * SWA EPA
         DROP  R2                          *
         USING SWAEPA,R2                   *
         XC    SWAEPA,SWAEPA               * CLEAR AREA
         MVC   SWVA(3),JFCBEXAD            * MOVE TOKEN JFCB
         SWAREQ FCODE=RL,                  * READ/LOCATE REQUEST       X
               EPA=SWEPAPTR,               * ENTRY PARAMETER LIST      X
               MF=(E,SWAPARMS),            *                           X
               UNAUTH=YES                  *
         L     R2,SWBLKPTR                 * ADDRESS JFCB
         LA    R1,4(R2)               * DESLOC. VOLS JFCBX
         MVC   CATVOL2,Ø(R1)          *
AMODE241 @AMODE 24                    * 24-BIT MODE
         DROP  R2                     *
         USING DECB,R2                *
         LH    R1,JFCBFLSQ            *
         STH   R1,CATFSQ2             *
         STH   R1,FLSEQA              *
         STH   R1,JFCBFLSQ            *
         B     CATALOGA               *
MAISQ6   C     R1,=F'198'             *
         BH    MAISQ2ØØ               * MORE THAN 2ØØ VOLUMES
         S     R1,=F'4'               *
         LR    R9,R1                  *
AMODE312 @AMODE 31                         * 31-BIT MODE
```

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```
         LA    R2,SWA_EPA                 * SWA EPA
         DROP  R2                         *
         USING SWAEPA,R2                  *
         XC    SWAEPA,SWAEPA              * CLEAR AREA
         MVC   SWVA(3),JFCBEXAD           * MOVE TOKEN JFCB
         SWAREQ FCODE=RL,                 * READ/LOCATE REQUEST       X
               EPA=SWEPAPTR,              * ENTRY PARAMETER LIST      X
               MF=(E,SWAPARMS),           *                           X
               UNAUTH=YES                 *
         L     R2,SWBLKPTR                * ADDRESS JFCB
         SR    R8,R8                  * LOCATE    JFCBX
         D     R8,=F'15'              *
         LTR   R9,R9                  *
         BZ    MOVVOLX2               *
PROXJFX  BCT   R9,POSIJFX             *
         LTR   R8,R8                  * FIRST JFCBX
         BZ    MOVVOLX1               * YES
         ICM   R3,7,Ø(R2)             * NEXT JFCBX
         LA    R2,SWA_EPA                 * SWA EPA
         XC    SWAEPA,SWAEPA              * CLEAR AREA
         STCM  R3,7,SWVA                  * MOVE TOKEN JFCBX
         SWAREQ FCODE=RL,                 * READ/LOCATE REQUEST       X
               EPA=SWEPAPTR,              * ENTRY PARAMETER LIST      X
               MF=(E,SWAPARMS),           *                           X
               UNAUTH=YES                 *
         L     R2,SWBLKPTR                * ADDRESS JFCB
         B     MOVVOLX2               *
POSIJFX  ICM   R3,7,Ø(R2)             * NEXT JFCBX
         LA    R2,SWA_EPA                 * SWA EPA
         XC    SWAEPA,SWAEPA              * CLEAR AREA
         STCM  R3,7,SWVA                  * MOVE TOKEN JFCBX
         SWAREQ FCODE=RL,                 * READ/LOCATE REQUEST       X
               EPA=SWEPAPTR,              * ENTRY PARAMETER LIST      X
               MF=(E,SWAPARMS),           *                           X
               UNAUTH=YES                 *
         L     R2,SWBLKPTR                * ENDERECA JFCB
         B     PROXJFX                *
MOVVOLX1 MVC   CATVOL1,88(R2)         * MOVE LAST VOL JFCBX
         ICM   R3,7,Ø(R2)             * SET NEXT JFCBX
         LA    R2,SWA_EPA                 * SWA EPA
         XC    SWAEPA,SWAEPA              * CLEAR AREA
         STCM  R3,7,SWVA                  * MOVE TOKEN JFCBX
         SWAREQ FCODE=RL,                 * READ/LOCATE REQUEST       X
               EPA=SWEPAPTR,              * ENTRY PARAMETER LIST      X
               MF=(E,SWAPARMS),           *                           X
               UNAUTH=YES                 *
         L     R2,SWBLKPTR                * ADDRESS JFCB
         MVC   CATVOL2,4(R2)          *
         B     PROXJFCX               *
MOVVOLX2 LR    R9,R8                  *
```


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```
         BCTR  R9,Ø                    *
         SR    R8,R8                   *
         M     R8,=F'6'                *
         LA    R1,4(R9,R2)             *
         MVC   CATVOL1,Ø(R1)           *
         MVC   CATFSQ1,JFCBFLSQ        *
         MVC   CATVOL2,6(R1)           *
PROXJFCX LH    R1,JFCBFLSQ             *
         STH   R1,CATFSQ2              *
         STH   R1,FLSEQA               *
         STH   R1,JFCBFLSQ             *
AMODE242 @AMODE 24                     *  24-BIT MODE
         DROP  R2                      *
         USING DECB,R2                 *
         B     CATALOGA                *
MAISQ2ØØ WTO   '#NAØ8.1Ø2C MORE THAN 2ØØ VOLUME OUTPUT TAPE',          X
               ROUTCDE=11              *
         B     FIM                     *
GLOGIOIN MVC   MESSLG,=CL62'I/O INPUT ERROR                '
         MVC   DSNLG,DSNALIN           *
         LA    R3,DATATIME             *
         BAL   R1Ø,CONVDATA            *
         MVC   DATALG,DATA             * WRITE LOG
         UNPK  DOUBLE,HORATIME         * INPUT LOGICAL ERROR
         MVC   HORALG,DOUBLE+1         * SYSØ1Ø
         MVC   DATACR,DATACIN          *
         MVC   HORACR,HORACIN          *
         MVC   MESSLG+19(6),CATVOL1    *
         MVC   ERROFIT,=C'*'           *
         MVC   VOLUANT,VOLIN1          * LAST VOLUME
         PUT   SYSØ5Ø,LOGOUT           *
         L     R1,COUNT1               *
         LA    R1,1(R1)                * ERROR COUNT
         ST    R1,COUNT1               *
         B     SAIGRAVF                *
         EJECT
*-------------------------------------------------------------------------*
*  CONVERT TODAY DATE (ØCAADDD)-COMP-3 TO EBCDIC (AAAAMMDD)               *
*-------------------------------------------------------------------------*
CONVDATA ST    R1Ø,SAVCNVD
         MVC   TABMES(26),TABMES1      *
         UNPK  DOUBLE,Ø(4,R3)          *
         OI    DOUBLE+7,X'3Ø'          *
         TRT   DOUBLE,TABNUM           * NUMERIC?
         LA    R15,4                   *
         BNZ   CONVDEXT                * ERROR
         SR    R1,R1                   *
         IC    R1,Ø(R3)                * FIND OUT CENTURY
         MH    R1,=H'1ØØ'              *
         SR    RØ,RØ                   *
```

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```
         IC    RØ,1(R3)              *
         ZAP   DOUBLE,=P'Ø'          *
         SLL   RØ,4                  *
         ST    RØ,DOUBLE+4           *
         OI    DOUBLE+7,X'ØF'        *
         CVB   RØ,DOUBLE             *
         A     RØ,=F'19ØØ'           *
         AR    R1,RØ                 * ADD YEAR
         SR    RØ,RØ                 *
         ST    R1,ANO                *
         D     RØ,=F'1ØØ'            * DIVISIBLE 1ØØ?
         C     RØ,=F'Ø'              *
         BE    CENTURY               * YES, TREAT CENTURY
         L     R1,ANO                *
         SR    RØ,RØ                 *
         D     RØ,=F'4'              * BICEXTO?
         C     RØ,=F'Ø'              *
         BE    BICEXTO               * YES, TREAT YEAR BICEXTO
         B     DESCMES               *
CENTURY  L     R1,ANO                * CENTURY YEAR BICEXTO
         SR    RØ,RØ                 * HAVE TO DIVISIBLE 4ØØ
         D     RØ,=F'4ØØ'            *
         C     RØ,=F'Ø'              * BICEXTO?
         BE    BICEXTO               * YES
         B     DESCMES               *
BICEXTO  LA    R1,TABMES+24          * TREAT BICEXTO
         LA    RØ,11                 *
LOOPCV1  AP    Ø(2,R1),=P'1'         *
         BCTR  R1,Ø                  *
         BCTR  R1,Ø                  *
         BCT   RØ,LOOPCV1            *
DESCMES  LA    R1,TABMES+24          * FIND OUT MONTH
         LA    RØ,13                 * SEARCH LAST DAY
LOOPCV2  CP    2(2,R3),Ø(2,R1)       *
         BH    ACHOUCV               *
         BCTR  R1,Ø                  *
         BCTR  R1,Ø                  *
         BCT   RØ,LOOPCV2            *
         LA    R15,4                 *
         B     CONVDEXT              *
ACHOUCV  ZAP   DOUBLE,2(2,R3)        * FIND OUT DAY
         SP    DOUBLE,Ø(2,R1)        *
         UNPK  DIA,DOUBLE            *
         OI    DIA+1,X'FØ'           *
         C     RØ,=F'12'             *
         LA    R15,4                 *
         BH    CONVDEXT              *
         CVD   RØ,DOUBLE             *
         UNPK  MES,DOUBLE            * CONVERT MONTH (REG Ø)
         OI    MES+1,X'FØ'           *
```


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```
         L     R1,ANO                  *
         CVD   R1,DOUBLE               * CONVERT YEAR
         UNPK  ANO,DOUBLE              *
         OI    ANO+3,X'FØ'             *
         LA    R15,Ø                   *
CONVDEXT L     R1Ø,SAVCNVD
         BR    R1Ø
         EJECT
*-------------------------------------------------------------------------*
* RECATALOG DSNAME IF IT'S ALREADY CATALOGUED WITH SAME INPUT VOLUME  *
*-------------------------------------------------------------------------*
CATL     STM   R14,R12,SAVCATL   *
         L     R1,Ø(R1)          *
         LA    R2,Ø              *
         ST    R2,VOLCOUNT       * ZERO TO VOLCOUNT
         LA    R5,44(R1)         *
         LA    R3,VOL+2          *
LOOPVL   CLC   Ø(6,R5),=CL6' '   * LAST VOLUME
         BE    FIMVOL            *
         L     R2,VOLCOUNT       *
         LA    R2,1(R2)          *
         ST    R2,VOLCOUNT       *
         MVC   4(6,R3),Ø(R5)     * MOVE VOL-SER
         MVC   Ø(4,R3),=X'78Ø48Ø81' * DEVICE TYPE
         MVC   1Ø(2,R3),6(R5)    * FSEQ
         LA    R5,8(R5)          *
         LA    R3,12(R3)         *
         B     LOOPVL            *
FIMVOL   L     R2,VOLCOUNT       *
         C     R2,=F'1'          *
         BL    ERROVL            *
         STH   R2,VOL            *
         LR    R5,R1             *
DELIM1   MVC   DSNCAT(44),Ø(R5)  * PREPARE CAMLIST AREA
         LOCATE CAMLSTS          *
         LTR   R5,R15            * IT IS ALREADY CATALOGUED?
         BNZ   RETURN            * NO, RETURN
         CLC   VOL1+6(6),VOLIN1  * INPUT VOLUME IS THE SAME?
         BNE   RETURN            * NO, RETURN
         CATALOG CAMLSTD         * UNCATLG DSNAME
         LTR   R5,R15            * ERROR?
         BNZ   MENSAG1           * YES, RETURN
         CATALOG CAMLSTC         * RECATALOG DSNAME
         LTR   R5,R15            * ERROR?
         BNZ   MENSAG2           * YES, SEND A MESSAGE AND ABEND
         LA    R15,Ø             *
RETURN   LM    R14,R12,SAVCATL   *
         BR    R1Ø               *
MENSAG1  STM   RØ,R1,SAVERØR1
         WTO   'CATAL.9Ø1I ERROR UNCATLG',ROUTCDE=11
```

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```
         ABEND 4000,DUMP
MENSAG2  STM   R0,R1,SAVER0R1
         WTO   'CATAL.901I ERROR CATLG',ROUTCDE=11
         ABEND 4000,DUMP
ERROVL   WTO   'CATAL.901I EMPTY VOL-SER',ROUTCDE=11
         ABEND 4000,DUMP
         EJECT
*--------------------------------------------------------------------*
*        TRANSFORM RECFM IN INTERNAL TEXT                            *
*--------------------------------------------------------------------*
TRANSFM  ST    R10,SAVTRAFM          *
         TM    RECFMIN,B'10000000'   *
         BNO   CNTVERV               *
         MVI   RECIN,C'F'            * RECFM = F?
         B     CNTVERB               *
CNTVERV  TM    RECFMIN,B'01000000'   *
         BNO   CNTVERU               *
         MVI   RECIN,C'V'            * RECFM = V ?
         B     CNTVERB               *
CNTVERU  MVI   RECIN,C'U'            * THEN RECFM = U
CNTVERB  TM    RECFMIN,B'00010000'   *
         BNO   CNTVERC               *
         MVI   RECIN+1,C'B'          * BLOCKED?
CNTVERC  TM    RECFMIN,B'00000100'   *
         BNO   CNTVERM               *
         MVI   RECIN+2,C'A'          * ASA CONTROL ?
         B     CNTTRX                *
CNTVERM  TM    RECFMIN,B'00000010'   *
         BNO   CNTTRX                *
         MVI   RECIN+2,C'M'          * MACHINE CONTROL ?
CNTTRX   L     R10,SAVTRAFM          *
         BR    R10                   *
         EJECT
*--------------------------------------------------------------------*
*        EXIT TAPE MOUNT CARTRIDGE/TAPE                              *
*--------------------------------------------------------------------*
SCRTAPE  STM   R14,R12,SAVSTAP   *
         DROP  R13,R12           *
         DROP  R2                *
         USING SCRTAPE,R15       *
         USING OENTID,R2         *
         LR    R2,R1             *
         TM    OENTFLG,OENTOEOV  * CHECK OPEN
         BNO   SCREXT            * YES, EXIT
         L     R1,VOLSEQ         *
         LA    R1,1(R1)          * ADD 1 TO VOLSER
         ST    R1,VOLSEQ         * SINALIZE VOLUME CHANGED
SCREXT   LM    R14,R12,SAVSTAP   *
         LA    R15,0             * RETURN
         BR    R14               *
```


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```
         DROP  R15               *
         EJECT
SAVERØR1 DS    2F                * WORKING STORAGE
SAVMTIN  DS    F                 * SAVE AREAS
SAVMTOU  DS    F                 *
SAVCNVD  DS    F                 *
SAVGRVF  DS    F                 *
SAVCATL  DS    15F               *
SAVSTAP  DS    15F               *
SAVTRAFM DS    F                 *
WORKIN   DS    ØCL1ØØ            * INPUT SYSØ3Ø - TAPE LIST
VOLIN1   DS    CL6               *
         DS    CL1               *
DSNIN    DS    CL44              *
DSOIN    DS    CL2               *
RECIN    DS    CL3               *
BLKIN    DS    CL5               *
LREIN    DS    CL5               *
VOLIN2   DS    CL6               *
DATACIN  DS    CL7               *
         DS    CL1               *
LRETENC  DS    CL7               *
LALOCIN  DS    CL5               *
HORACIN  DS    CL6               *
         DS    CL2               *
RECFMIN  DC    XL1'Ø'            *
VOLANT   DC    CL6' '            * LAST VOLUME
TABNUM   DC    24ØX'FF'          * TRANSLATE AND TEST
         DC    1ØX'ØØ'           * NUMERIC FIELDS
         DC    6X'FF'            *
LOGOUT   DS    ØCL14Ø            * LOG SYSØ5Ø
DATALG   DS    CL8               *
HORALG   DS    CL6               *
DSNLG    DS    CL44              *
MESSLG   DS    CL62              *
DATACR   DS    CL7               *
HORACR   DS    CL6               *
ERROFIT  DS    CL1               *
VOLUANT  DC    CL6' '            *
*-------------------------------------------------*
*        CONVERSION AREAS TIME AND DATE           *
*-------------------------------------------------*
DATATIME DS    F                       *
HORATIME DS    F                       *
DATA     DS    ØCL8                    *
ANO      DS    CL4                     *
MES      DS    CL2                     *
DIA      DS    CL2                     *
TABMES   DC    PL2'Ø',PL2'31',PL2'59',PL2'9Ø',PL2'12Ø',PL2'151'
         DC    PL2'181',PL2'212',PL2'243',PL2'273',PL2'3Ø4'
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```
         DC    PL2'334',PL2'365',PL2'0',PL2'0'
TABMES1  DC    PL2'0',PL2'31',PL2'59',PL2'90',PL2'120',PL2'151'
         DC    PL2'181',PL2'212',PL2'243',PL2'273',PL2'304'
         DC    PL2'334',PL2'365',PL2'0',PL2'0'  * RECURSIVITY
         DS      0F                    *
S99PRMIN DC      X'80',AL3(S99ARIN)    * DYNAMICALLY ALLOCATION SYS010
S99ARIN  DC      AL1(20)               *
         DC      X'01'                 *
         DC      XL6'0'                *
ALOCIADR DC      A(ALLOCIN)            *
         DC      XL8'0'                *
ALLOCIN  DC      A(ALINDSP),A(ALINDDN),A(ALINNDS),A(ALINVOL)
         DC      A(ALINUNIT),A(ALINSEQ),AL1(128),AL3(ALINDSN)
ALINUNIT DC      X'0015',X'0001',X'0004'
ALINUNT  DC      CL4'ROBO'             *
         DS      0F                    *
ALINVOL  DC      X'0010'               *
VOLPARM  DC      X'0001',X'0006'       *
VOLALIN1 DC      CL6' ',X'0006'        *
VOLALIN2 DC      CL6' '                *
         DS      0F                    *
ALINDSP  DC      X'0004',X'0001',X'0001'
DSPIN    DC      X'01'                 *
         DS      0F                    *
ALINNDS  DC      X'0005',X'0001',X'0001'
NDSPIN   DC      X'08'                 *
         DS      0F                    *
ALINDDN  DC      X'0001',X'0001',X'0008'
DDNALIN  DC      CL8'SYS010'           *
         DS      0F                    *
ALINDSN  DC      X'0002',X'0001',X'002C'
DSNALIN  DC      CL44' '               *
         DS      0F                    *
ALINSEQ  DC      X'001F',X'0001',X'0002'
FILSEQ   DC      X'0001'               *
         DS      0F                    * DYNAMICALLY ALLOCATION SYS020
S99PRMOU DC      X'80',AL3(S99AROU)    *
S99AROU  DC      AL1(20)               *
         DC      X'01'                 *
         DC      XL6'0'                *
ALOCOU   DC      A(ALCOU)              *
         DC      XL8'0'                *
ALCOU    DC      A(ALCOUDSP),A(ALCOUDDN),A(ALCOUDSN),A(ALCOUUNT)
         DC      A(ALCOUCAT),A(ALCOUUNC),A(ALCOUREC),A(ALCOULRE)
         DC      A(ALCOUBLK),A(ALCOUDSO),A(ALCOUSEQ)
ALOCNOP  DC      X'80',AL3(ALCOUCNT)   *
         DC      X'80',AL3(ALCOUREP)   *
         DS      0F                    *
ALCOUDDN DC      X'0001',X'0001',X'0008'
DDNALOU  DC      CL8'SYS020'           *
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```
         DS      ØF                    *
ALCOUDSP DC      X'ØØØ4',X'ØØØ1',X'ØØØ1'
DSPALOU  DC      X'Ø4'                 *
         DS      ØF                    *
ALCOUUNT DC      X'ØØ15',X'ØØØ1',X'ØØØ4'
UNITALOU DC      CL4'ROBO'             *
         DS      ØF                    *
ALCOUDSN DC      X'ØØØ2',X'ØØØ1',X'ØØ2C'
DSNALOU  DC      CL44' '               *
         DS      ØF                    *
ALCOUCAT DC      X'ØØØ5',X'ØØØ1',X'ØØØ1'
CATALOU  DC      X'Ø8'                 *
         DS      ØF                    *
ALCOUUNC DC      X'ØØØ6',X'ØØØ1',X'ØØØ1'
UNCALOU  DC      X'Ø8'                 *
         DS      ØF                    *
ALCOUREC DC      X'ØØ49',X'ØØØ1',X'ØØØ1'
RECALOU  DC      X'9Ø'                 *
         DS      ØF                    *
ALCOULRE DC      X'ØØ42',X'ØØØ1',X'ØØØ2'
LREALOU  DC      X'ØØ5Ø'               *
         DS      ØF                    *
ALCOUBLK DC      X'ØØ3Ø',X'ØØØ1',X'ØØØ2'
BLKALOU  DC      X'7FDØ'               *
         DS      ØF                    *
ALCOUSEQ DC      X'ØØ1F',X'ØØØ1',X'ØØØ2'
VOLSALOU DC      X'ØØØ1'               *
         DS      ØF                    *
ALCOUDSO DC      X'ØØ3C',X'ØØØ1',X'ØØØ2'
DSOALOU  DC      X'4ØØØ'               *
         DS      ØF                    *
ALCOUREP DC      X'ØØ6D',X'ØØØ1',X'ØØØ7'
RETPD    DC      CL7'ØØØØØØØ'          *
         DS      ØF                    *
ALCOUCNT DC      X'ØØ13',X'ØØØ1',X'ØØØ1',X'C8'
         DS      ØF                    *
S99PRUN  DC      X'8Ø',AL3(S99ARUN)    *
S99ARUN  DC      AL1(2Ø)               *
         DC      X'Ø2'                 *
         DC      XL6'Ø'                *
ALOCUN   DC      A(ALCUN)              *
         DC      XL8'Ø'                *
ALCUN    DC      A(ALINDDN),A(ALUNDSN),X'8Ø',AL3(ALCUNDSP)
ALCUNDSP DC      X'ØØØ5',X'ØØØ1',X'ØØØ1',X'Ø8'
         DS      ØF                    *
ALUNDSN  DC      X'ØØØ2',X'ØØØ1',X'ØØ2C'
DSNUNIN  DC      CL44' '               *
         DS    ØF
*    DCB AREAS - SYSØ1Ø/SYSØ2Ø UTILIZING CHANNED SCHEDULING TECHNIQUE
SYSØ1Ø   DCB   DSORG=PS,MACRF=(GM),DDNAME=SYSØ1Ø,EODAD=FIM1,           X
```

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```
                OPTCD=C,EXLST=RDJFCB1Ø,SYNAD=ERSYSØ1Ø,BUFNO=64
SYSØ2Ø    DCB   DSORG=PS,MACRF=(PM),DDNAME=SYSØ2Ø,                        X
                OPTCD=C,EXLST=RDJFCB2Ø,SYNAD=ERSYSØ2Ø,BUFNO=64
SYSØ3Ø    DCB   DSORG=PS,MACRF=GM,DDNAME=SYSØ3Ø,EODAD=FIM,                X
                RECFM=FB,LRECL=1ØØ
SYSØ5Ø    DCB   DSORG=PS,MACRF=PM,DDNAME=SYSØ5Ø,                          X
                RECFM=FB,LRECL=14Ø
          DS    ØF                      *
DCB1Ø     DS    CL1ØØ                   * COPY SYSØ1Ø DCB
DCB2Ø     DS    CL1ØØ                   * COPY SUSØ2Ø DCB
          DS    ØF
CAMLSTC   CAMLST CAT,DSNCAT,,LOCAREA    * CATALOG MACRO
CAMLSTS   CAMLST NAME,DSNCAT,,LOCAREA1 * SEARCH CATALOG MACRO
CAMLSTD   CAMLST UCATDX,DSNCAT          * UNCATALOG MACRO
DSNCAT    DC    CL44' '
LOCAREA   DS    ØD
VOL       DS    CL265
LOCAREA1  DS    ØD
VOL1      DS    CL265
          DS    ØF
DOUBLE    DS    D                     * WORKING AREA
POINTP    DC    F'Ø'                  *
COUNT1    DC    F'Ø'                  *
COUNT     DC    F'Ø'                  *
VOLCOUNT  DC    F'Ø'                  *
PARMCATL  DC    AL1(128),AL3(PARMCAT) *
PARMCAT   DS    ØCL66                 *
CATDSN    DC    CL44' '               *
CATVOL1   DC    CL6' '                *
CATFSQ1   DC    H'Ø'                  *
CATVOL2   DC    CL6' '                *
CATFSQ2   DC    H'Ø',CL6' '           *
VOLSEQ    DC    F'1'                  *
VOLSEQA   DC    F'1'                  *
FLSEQA    DC    H'Ø'                  *
RETCODE   DS    F                     * FULL WORD
SWEPAPTR  DC     A(SWA_EPA)           *
SWA_EPA   DS     XL28                 * SWA AREA MACRO
SWAPARMS  SWAREQ UNAUTH=YES,MF=L      *
RDJFCB2Ø  DS    ØF                    *
          DC    X'17',AL3(SCRTAPE)    * VOLUME MOUNT EXIT ROUTINE
          DC    X'87',AL3(JFCBAR2Ø)   * JFCB SYSØ2Ø ROUTINE
RDJFCB1Ø  DS    ØF                    *
          DC    X'87',AL3(JFCBAR1Ø)   * JFCB SYSØ1Ø ROUTINE
JFCBAR1Ø  DC    176X'Ø'               * WORK JCL AREA SYSØ1Ø
JFCBAR2Ø  DC    176X'Ø'               * WORK JCL AREA SYSØ2Ø
          LTORG
WK        DS    CL32768               * BUFFER RECORD
          DSECT
          IEFJFCBN
```


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```
         DCBD  DSORG=BS
         IHADECB
         IEZIOB
         IECOENTE
         IEFZB5Ø5 LOCEPAX=YES
         IEFJESCT
         CVT   DSECT=YES
         END
         MACRO
&NAME    @AMODE &N
         LCLA  &N1
&N1      SETA  &N
         AIF   (&N1 EQ 24).MODE24
         AIF   (&N1 NE 31).ERRØ8
.MODE31  ANOP
&NAME    L     Ø,=A(X'8ØØØØØØØ')
         LA    15,*+8
         OR    15,Ø
         BSM   Ø,15
         AGO   .EXIT
.MODE24  ANOP
&NAME    L     Ø,=A(X'ØFFFFFFF')
         LA    15,*+8
         NR    15,Ø
         BSM   Ø,15
         AGO   .EXIT
.ERRØ8   MNOTE Ø8,'SPECIFY AMODE 24 OR 31, SPECIFIED &N1'
         AGO   .EXIT
.EXIT    ANOP
         MEND
```


Executing a PL/I program from REXX

INTRODUCTION

The following program allows users to execute a PL/I program, needing DD sysprint, from REXX. It is called by a shell script, using the environment variable _bpx_batch_spawn.

The program requires OS/390 Version 2 Release 8 or higher, in addition to Unix, PL/I, and REXX.

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SHRXPLSP JCL

```
//TSHVRC  JOB (),'SHRXPLSP',TIME=144Ø,NOTIFY=&SYSUID,
//  REGION=ØM,CLASS=A,MSGCLASS=X,MSGLEVEL=(1,1),COND=(4,LT)
//*BPXBATCH SH -> SHELL SCRIPT -> REXX -> PL/1 PROGRAM -> SYSPRINT
//*IF YOU NEED TO EXECUTE PL/I PROGRAM,NEEDING DD SYSPRINT,
//* FROM REXX, CALLED BY SHELL SCRIPT, CALLED BY BPXBATCH
//* USE  _BPX_BATCH_SPAWN
//*ENVIRONMENT VARIABLE _BPX_BATCH_SPAWN=YES (FROM V2R8 ONWARDS?)
//*TO EDIT THIS MEMBER:||CAPS OFF ||UNNUM ||NUMBER OFF
//*THE FOLLOWING COPIES SHELL SCRIPT,REXX EXEC TO HFS
//*              COMPILES/LINKS SAMPLE PL/1 NEEDING SYSPRINT
//*              EXECUTES BPXBATCH
//*shdir should be executable
//*COPY SHELL SCRIPT TO HFS
//SHCOPY   EXEC PGM=IKJEFTØ1
//SYSIN    DD  *
#!/bin/sh
echo 'in '$Ø
echo 'steplib='$STEPLIB
echo 'printenv begin'
printenv
echo 'printenv end'
echo 'set begin'
set
echo 'set end'
#setting steplib in STDENV not enough!!
export STEPLIB='TSHVR2.LOAD.TEST'
echo 'steplib='$STEPLIB
echo 'calling shrxplsp.cmd'
/home/tshvr/shrxplsp.cmd
/*
//SHDIR    DD  PATH='/home/tshvr/shrxplsp.sh',
//     PATHOPTS=(OCREAT,OTRUNC,OWRONLY),PATHMODE=SIRWXU
//SYSTSPRT DD  SYSOUT=X
//SYSTSIN  DD  *
  OCOPY INDD(SYSIN)  OUTDD(SHDIR)
/*
//*
//*COPY REXX  TO HFS
//CMDCOPY  EXEC PGM=IKJEFTØ1
//SYSIN    DD  *,DLM=$$
/* REXX */
rc=Ø
/*trace i*/
do j=1 to __environment.Ø
 say '__environment.'j'='__environment.j
end
ADDRESS LINKMVS  'SHRXPLSP'
say 'ADDRESS LINKMVS rc='rc
return rc
```


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```
$$
//*
//SHDIR    DD  PATH='/home/tshvr/shrxplsp.cmd',
//     PATHOPTS=(OCREAT,OTRUNC,OWRONLY),PATHMODE=SIRWXU
//SYSTSPRT DD  SYSOUT=X
//SYSTSIN  DD  *
  OCOPY INDD(SYSIN)  OUTDD(SHDIR)
/*
//*COMPILE PL/1
//CMPL    EXEC PGM=IEL1AA
//STEPLIB  DD  DISP=SHR,DSN=IEL8.SIELCOMP
//SYSIN    DD  *
 SHRXPLSP:PROCEDURE(PARMS)
            OPTIONS(MAIN,NOEXECOPS,REENTRANT);
  DCL PARMS CHAR(*) VARYING;
  DCL SYSPRINT FILE STREAM OUTPUT;
  PUT SKIP  LIST('IN PL/I SHRXPLSP');
 END SHRXPLSP;
/*
//SYSLIN   DD  DSN=&LOADSET,DISP=(MOD,PASS),UNIT=SYSDA,
//             SPACE=(800,(500,500))
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  SPACE=(800,(500,500),,,ROUND),UNIT=SYSDA
//*LINK    PL/1
//LKED    EXEC PGM=IEWL,
// PARM='NOXREF,AMODE=31,RMODE=ANY,RENT,REUS'
//SYSLIB   DD  DISP=SHR,DSN=CEE8.SCEELKED
//SYSPRINT DD  SYSOUT=*
//SYSLIN   DD  DSN=&LOADSET,DISP=(OLD,DELETE)
//SYSUT1   DD  SPACE=(1024,(50,50)),UNIT=SYSDA
//SYSLMOD  DD DISP=SHR,DSN=TSHVR2.LOAD.TEST(SHRXPLSP)
//*EXECUTE
//BPXBATCH  EXEC  PGM=BPXBATCH,
// PARM='SH /home/tshvr/shrxplsp.sh'
//SYSPRINT DD SYSOUT=X
//STDIN    DD PATH='/dev/null'
//STDOUT   DD PATH='/home/tshvr/shrxplsp.out',
//             PATHOPTS=(OCREAT,OTRUNC,OWRONLY),PATHMODE=SIRWXU
//STDERR   DD PATH='/home/tshvr/shrxplsp.err',
//             PATHOPTS=(OCREAT,OTRUNC,OWRONLY),PATHMODE=SIRWXU
//STDENV  DD  *
_BPX_BATCH_SPAWN=YES
_BPX_SHAREAS=MUST
STEPLIB='TSHVR2.LOAD.TEST'
/*
//
```

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Keeping track of load module changes – part 2

This month we complete our look at a program that allows users to find out how many times a program has been changed since it was first link-edited. This is particlarly useful for change management purposes.

JES/2 PROCEDURE LMODPROC

```
//CHANGE      PROC OUT=,IN=
//*
//*******************************************************************
//* Procedure  : Lmodproc
//* Function   : Extracts the LMODDATES of A load library
//*              of which name is given by the user.
//* Parameters :
//*
//*    IN  : Load Library name as input.
//*   OUT  : LMOD dataset of the load library of which name is given
//*            by the parameter 'IN'.
//*******************************************************************
//*
//STEP1      EXEC PGM=AMBLIST
//*
//*******************************************************************
//*  Execute the Amblist service aid and get all the load module
//*  information.
//*******************************************************************
//*
//SYSPRINT     DD   DSN=&&IDR1,DISP=(,PASS),UNIT=SYSDA,
// SPACE=(CYL,(1,1)),DCB=(LRECL=121,BLKSIZE=27951,RECFM=FBA)
//SYSLIB       DD   DISP=SHR,DSN=&IN
//LOADLIB      DD   DISP=SHR,DSN=&IN
//SYSIN        DD   DISP=SHR,DSN=SDID.MVS.LIB.DATA(CTRL1),FREE=CLOSE
//*
//*******************************************************************
//*  Extract the necessary portions of the Amblist output by using
//*  ISPF Batch Search-for utility.
//*******************************************************************
//*
//STEP2        EXEC PGM=ISRSUPC,PARM='DELTAL,SRCHCMP,ANYC'
//SYSPRINT     DD   SYSOUT=*
//NEWDD        DD   DSN=&&IDR1,DISP=(OLD,DELETE)
//OUTDD        DD   DSN=&&IDR2,DISP=(,PASS),UNIT=SYSDA,
// SPACE=(CYL,(1,1)),DCB=(LRECL=133,BLKSIZE=3325,RECFM=FBA)
//SYSIN        DD   DISP=SHR,DSN=SDID.MVS.LIB.DATA(CTRL2),FREE=CLOSE
```


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```
//*
//*********************************************************************
//*  Build the LMOD dataset by using the PL/I program (LMODPLI). Here,
//*  the dates in the format of both Julian and Normal is written to
//*  it. Input given by the user is passed to the PL/I program.
//*
//*********************************************************************
//*
//STEP3        EXEC PGM=LMODPLI,PARM='&IN'
//STEPLIB      DD   DISP=SHR,DSN=SDIAGAS.USER.LOAD
//SYSPRINT     DD   SYSOUT=*
//GO.IN        DD   DSN=&&IDR2,DISP=(OLD,DELETE)
//GO.OUT       DD   DISP=SHR,DSN=&OUT
//*
//*********************************************************************
//*  Sort the LMOD dataset by Julian date.
//*********************************************************************
//*
//STEP4        EXEC PGM=SORT
//SYSOUT       DD   SYSOUT=*
//SORTIN       DD   DISP=SHR,DSN=&OUT
//SORTOUT      DD   DISP=SHR,DSN=&OUT
//SORTWKØ1     DD   UNIT=SYSDA,SPACE=(CYL,2Ø)
//SORTWKØ2     DD   UNIT=SYSDA,SPACE=(CYL,2Ø)
//SYSIN        DD   DISP=SHR,DSN=SDID.MVS.LIB.DATA(CTRL3),FREE=CLOSE
//*
```

CLIST SDICLMOD

```
PROC Ø

/*********************************************************************/
/*
/*  KEEPING TRACK OF LOAD MODULE CHNAGES
/*
/*  ISPF part of the utility
/*
/*  LMOD, HISTORY and TRANSACTION datasets are browsed under ISPF
/*  using 'ISPEXEC BROWSE' command.
/*
/*********************************************************************/

CONTROL NOFLUSH NOLIST NOCONLIST NOSYMLIST NOMSG
SET &SYSMSG = OFF

ISPEXEC VGET (ZCMD) PROFILE  /* Get the option chosen */
                             /* on panel SDINLIB2.    */

SELECT (&ZCMD)
   WHEN(1) DO
```

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```
      ISPEXEC DISPLAY PANEL(SDINLIB2)
      ISPEXEC VGET (ZCMD) PROFILE  /* Get the option chosen */
                                   /* on panel SDINLIB2.    */
      IF &ZCMD = 1 THEN ISPEXEC BROWSE DATASET('SDID.MVS.LIB.CHANGE1')
      IF &ZCMD = 2 THEN ISPEXEC BROWSE DATASET('SDID.MVS.LIB.CHANGE2')
      EXIT
      END

   WHEN(2) DO
      ISPEXEC DISPLAY PANEL(SDINLIB2)
      ISPEXEC VGET (ZCMD) PROFILE  /* Get the option chosen */
                                   /* on panel SDINLIB2.    */
      IF &ZCMD = 1 THEN ISPEXEC BROWSE DATASET('SDID.MVS.LIB.HISTS1')
      IF &ZCMD = 2 THEN ISPEXEC BROWSE DATASET('SDID.MVS.LIB.HISTS2')
      EXIT
      END

   WHEN(3) ISPEXEC BROWSE DATASET('SDID.MVS.LIB.SUM')

   OTHERWISE

  END /* Select end

END /* End of Clist
```

CLIST SDICLIB2

```
PROC Ø

/*********************************************************************/
/*
/*  KEEPING TRACK OF LOAD MODULE CHNAGES
/*
/*  Extract the last link-edited load modules.
/*
/*********************************************************************/

CONTROL NOCONLIST NOSYMLIST

SET &SYSMSG  = OFF

SET &BUGUN   = &SYSJDATE
SET &BUGUN   = &STR(&BUGUN)
SET &GUN1    = &SUBSTR(4:6,&BUGUN)
SET &YIL     = &SUBSTR(1:2,&BUGUN)

SET &GUN2    = &GUN1 - 1
IF &LENGHT(&GUN2)=1 THEN SET &GUN2=&STR(ØØ)&GUN2
IF &LENGHT(&GUN2)=2 THEN SET &GUN2=&STR(Ø)&GUN2
```


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```
SET &BUGUN   = &STR(&YIL)&STR(&GUN1)        /* FORMAT CONVERSION*/
SET &HAFTA   = &STR(&YIL)&STR(&GUN2)        /* 92.134  --> 92134*/

ALLOC F1(CHANGE) DA('SDID.MVS.LIB.CHANGEX') SHR
ALLOC F1(SUM)    DA('SDID.MVS.LIB.SUM') SHR

OPENFILE CHNAGE INPUT
OPENFILE SUM    OUTPUT
GETFILE  CHNAGE
SET &KUTTAR     = &SUBSTR(11.15,7CHANGE)

DO WHILE &KUTTAR >= &HAFTA
   SET &SUM = &CHNAGE
   PUTFILE SUM
                                          /* Extract last changed   */
   GETFILE CHANGE                         /* load modules           */
   SET &KUTTAR  = &SUBSTR(11:15,&CHANGE)
END

CLOSEFILE CHNAGE
CLOSEFILE SUM

FREE F1(CHANGE)
FREE F1(SUM)

END /* End of Clist
```

CLIST SDICLMOD

```
PROC Ø

/*********************************************************************/
/*                                                                   */
/* Clist    : Sdiclmod                                               */
/* Function : This CLIST gets the name of load library from the TSO  */
/*            user, prepares a JCL and submits it, then presents     */
/*            the result dataset to the user.                        */
/*                                                                   */
/*********************************************************************/
CONTROL MAIN NOCONLIST NOMSG NOFLUSH
SET &SYSMSG = OFF
/*********************************************************************/
/* Get input load dataset from the TSO user.                         */
/*********************************************************************/
WRITE Please enter the load library of which LMODDATES you want to see
READ &KITAPLIK
/*********************************************************************/
/* Verify whether it is a cataloged dataset.                         */
/*********************************************************************/
```

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```
IF &SYSDSN('&KITAPLIK') ¬= OK THEN +
      DO
        WRITE There is no such library in the system.
        EXIT
      END
/*********************************************************************/
/* If it is catalogued, then check out that it is a load library.    */
/*                                                                   */
/* The LISTDSI statement can retrieve information about a dataset.   */
/* If record format is 'U' then it is definitly a load library.      */
/*********************************************************************/
LISTDSI '&KITAPLIK'
IF &SYSRECFM ¬= U THEN +
                       DO
                         WRITE Sorry, the dataset you entered is not +
a load library.
                         EXIT
                       END
/*********************************************************************/
/* Allocate the result dataset in which LMOD DATES of library members */
/* will be written.                                                   */
/*********************************************************************/

SET &SONUC  = &SYSUID..LMOD.CHG
IF &SYSDSN('&SONUC') ¬= OK THEN +
   DO
   FREE   DA('&SONUC')
   ALLOC  FI(SON) DA('&SONUC') NEW SPACE(1,1) TRACKS VOL(SYSDA1)  +
   BLKSIZE(27966) LRECL(79) DSORG(PS) RECFM(F,B)
   END
FREE DA('&SONUC')
ALLOC  DA('&SONUC') SHR REUSE

WRITE Please wait just a few seconds. Job is being submitted. It may +
 take several minutes for big load libraries.

/*********************************************************************/
/* The procedure LMODPROC is invoked. At the end of run of this      */
/* procedure, the result file is ready to be browsed by the TSO      */
/* user. &SONUC is the result LMOD dataset.                          */
/*********************************************************************/
SUBMIT * END(ZZ)
 //&SYSUID.U JOB (&SYSUID),CLASS=A,NOTIFY=SDIAGAS,
 //             MSGCLASS=X,MSGLEVEL=(1,1),TIME=144Ø
 //PERNAS   EXEC LMODPROC,OUT='&SONUC',
 // LOAD='&KITAPLIK'
 ZZ
/*********************************************************************/
/* Wait here until the above job is finished. Then browse the LMOD   */
/* dataset.                                                          */
/*********************************************************************/
```


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```
MARTA:ISPEXEC CONTROL ERRORS RETURN

         IF &ZFBROWS = &Z THEN ISPEXEC CONTROL NONDISPL END
         ISPEXEC BROWSE DATASET('&SONUC')
         SET &RC = &LASTCC
         ISPEXEC CONTROL ERRORS CANCEL
         IF &RC = 12 THEN GOTO MARTA
/*********************************************************************/
/* The LMOD dataset is presented to the user. The user can keep      */
/* browsing it until PFØ3 key is pressed. Once he/she gets out of it */
/* it is deleted.                                                    */
/*********************************************************************/
ISPEXEC BROWSE DATASET('&SONUC')
FREE DA('&SONUC')
DELETE  '&SONUC'
END  /* End of Clist
```

PANEL SDINLIB1

```
)ATTR DEFAULT(%+_)
* TYPE(TEXT) INTENS(HIGH) COLOR(PINK) CAPS(OFF)
? TYPE(TEXT) INTENS(LOW)  COLOR(BLUE) CAPS(OFF)
> TYPE(TEXT) INTENS(HIGH) COLOR(RED)  CAPS(OFF)
)BODY
%-----------------*   KEEPING TRACK OF   %-----------------------
%                  * LOAD MODULE CHANGES  %
%SELECTION ===> _ZCMD
+
   %1 -+LMOD DATES of load modules
   %2 -+Change counts and dates of load modules
   %3 -+Load modules link edited yesterday
   %4 -+Find LMOD DATES of any load library
+
+
  % X+  Exit
+
)INIT
  &ZPRIM  = NO
  &ZCMD   = &Z
)PROC
VPUT (ZCMD)    PROFILE
  &ZSEL=TRANS( TRUNC (%ZCMD,'.')
             1,'CMD(SDICLIB1)'
             2,'CMD(SDICLIB1)'
             3,'CMD(SDICLIB1)'
             4,'CMD(SDICLMOD)'
             ' ',' '
             X,'EXIT')
  &ZTRAIL = .TRAIL
)END
```

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PANEL SDINLIB1

```
)ATTR DEFAULT(%+_)
* TYPE(TEXT) INTENS(HIGH) COLOR(PINK) CAPS(OFF)
? TYPE(TEXT) INTENS(LOW)  COLOR(BLUE) CAPS(OFF)
> TYPE(TEXT) INTENS(HIGH) COLOR(RED)  CAPS(OFF)
)BODY
%-----------------*   KEEPING TRACK OF   %----------------------
%                  * LOAD MODULE CHANGES  %
%SELECTION ===> _ZCMD
+
   %1-+ SDIAGAS.USER.LOAD
   %2-+ SDIAGAS.AGMPV.LOADLIB
   %3-+ ...
   %4-+ ...
+
+
  % X+  Exit
+
)INIT
.CURSOR = ZCMD
  &ZPRIM  = NO
 &ZCMD   = &Z
)PROC
  VPUT (ZCMD)    PROFILE
  &EBPFK = .PFKEY
)END
```

JOB NULLIFY

```
//SDIAGAS1   JOB  (SDIAGAS),MSGCLASS=X,MSGLEVEL=(1,1),
// NOTIFY=SDIAGAS
//*
//*********************************************************************
//*  Nullifies the utility sequential datasets
//*********************************************************************
//*
//ADIM1       PROC NULLF=
//STEP        EXEC PGM=IEBGEBER
//SYSPRINT    DD   SYSOUT=*
//SYSUT1      DD   DISP=SHR,DSN=NULLFILE,DCB=SDID.MVS.LIB.HISTS1
//SYSUT2      DD   DISP=SHR,DSN=&NULLF
//SYSIN       DD   DUMMY
//            PEND
//*
//ADIM2       PROC NULLF=
//STEP        EXEC PGM=IEBGEBER
//SYSPRINT    DD   SYSOUT=*
//SYSUT1      DD   DISP=SHR,DSN=NULLFILE,DCB=SDID.MVS.LIB.CHNAGE1
//SYSUT2      DD   DISP=SHR,DSN=&NULLF
//SYSIN       DD   DUMMY
```


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```
//            PEND
//*
//CALL1         EXEC ADIM1,NULLF='SDID.MVS.LIB.HISTS1'
//CALL2         EXEC ADIM1,NULLF='SDID.MVS.LIB.HISTS2'
//*
//CAGIR1        EXEC ADIM2,NULLF='SDID.MVS.LIB.CHANGE1'
//CAGIR2        EXEC ADIM2,NULLF='SDID.MVS.LIB.CHANGE2'
//CALLSUM       EXEC ADIM2,NULLF='SDID.MVS.LIB.SUM'
//*
//CAGIRX        EXEC ADIM2,NULLF='SDID.MVS.LIB.CHANGEX'
//*
//CAGIR1        EXEC ADIM2,NULLF='SDID.MVS.LIB.CHANGE1'
//CAGIR2        EXEC ADIM2,NULLF='SDID.MVS.LIB.CHANGE2'
//*
```

AMBLIST SERVICE AID CONTROL STATEMENT (CTRL1)

```
LISTIDR OUTPUT=ALL.TITLE=('LOAD MODULES CREATION DATES',27)
```

ISPF SEARCH UTILITY CONTROL STATEMENT (CTRL2)

```
SRCHFOR 'MEMBER NAME'
SRCHFOR 'OF YEAR'
```

DFSORT CONTROL STATEMENT (CTRL3)

```
SORT FIELDS=(11,5,D),FORMAT=BI
RECORD TYPE=F,LENGHT=17
END
```

DFSORT CONTROL STATEMENT (CTRL4)

```
SORT FIELDS=(1,9,A),FORMAT=CH
RECORD TYPE=F,LENGHT=79
END
```

DFSORT CONTROL STATEMENT (CTRL5)

```
SORT FIELDS=(13,5,D),FORMAT=CH
RECORD TYPE=VB,LENGHT=6Ø27
END
```

SDID.MVS.LIB.CHANGE1

This holds the LMOD dates of the load library sorted by date.

```
DENE2    98296  23.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI4 98295  22.OCTOBER   .1998 SDIAGAS.USER.LOAD
```

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```
ATALAY   98290  17.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI2 98283  10.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI3 98275  02.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI  98264  21.SEPTEMBER .1998 SDIAGAS.USER.LOAD
MERGE    98170  19.JUNE      .1998 SDIAGAS.USER.LOAD
MARTA    98152  01.JUNE      .1998 SDIAGAS.USER.LOAD
MARTAPV  98149  29.MAY        .1998 SDIAGAS.USER.LOAD
VILLER   98146  26.MAY       .1998 SDIAGAS.USER.LOAD
PDS      98141  22.MAY       .1998 SDIAGAS.USER.LOAD
DIRECT   98141  21.MAY       .1998 SDIAGAS.USER.LOAD
GUL      98138  18.MAY       .1998 SDIAGAS.USER.LOAD
TAPECOPY 98100  10.APRIL     .1998 SDIAGAS.USER.LOAD
GRAPH    90108  18.APRIL     .1998 SDIAGAS.USER.LOAD
REBLOCK  88004  04.JANUARY   .1998 SDIAGAS.USER.LOAD
TAPEMAP  86291  18.OCTOBER   .1998 SDIAGAS.USER.LOAD
TAPEMAP2 84202  20.JULY      .1998 SDIAGAS.USER.LOAD
TAPESCAN 82329  25.NOVEMBER  .1998 SDIAGAS.USER.LOAD
```

SDID.MVS.LIB.CHNAGE2

This holds the LMOD dates of the load library sorted by date.

```
ATOS     98296  23.OCTOBER   .1998 SDIAGAS.AGMPV.LOADLIB
ATOS     98168  17.JUNE      .1998 SDIAGAS.AGMPV.LOADLIB
ATOS     98148  28.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
ATOS     98146  26.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
ATOS     98141  21.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
ATOS     98146  26.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
```

SDID.MVS.LIB.CHANGE1

This holds the LMOD dates of one load library sorted by member name.

```
ATALAY   98290  17.OCTOBER   .1998 SDIAGAS.USER.LOAD
DENE2    98296  23.OCTOBER   .1998 SDIAGAS.USER.LOAD
DIRECT   98141  21.MAY       .1998 SDIAGAS.USER.LOAD
GRAPH    90108  18.APRIL     .1998 SDIAGAS.USER.LOAD
GUL      98138  18.MAY       .1998 SDIAGAS.USER.LOAD
LMODPLI  98264  21.SEPTEMBER .1998 SDIAGAS.USER.LOAD
LMODPLI2 98283  10.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI3 98275  02.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI4 98295  22.OCTOBER   .1998 SDIAGAS.USER.LOAD
MARTA    98152  01.JUNE      .1998 SDIAGAS.USER.LOAD
MARTAPV  98149  29.MAY        .1998 SDIAGAS.USER.LOAD
MERGE    98170  19.JUNE      .1998 SDIAGAS.USER.LOAD
VILLER   98146  26.MAY       .1998 SDIAGAS.USER.LOAD
PDS      98141  22.MAY       .1998 SDIAGAS.USER.LOAD
```


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```
REBLOCK  88004  04.JANUARY   .1998 SDIAGAS.USER.LOAD
TAPECOPY 98100  10.APRIL     .1998 SDIAGAS.USER.LOAD
TAPEMAP  86291  18.OCTOBER   .1998 SDIAGAS.USER.LOAD
TAPEMAP2 84202  20.JULY      .1998 SDIAGAS.USER.LOAD
TAPESCAN 82329  25.NOVEMBER  .1998 SDIAGAS.USER.LOAD
```

SDID.MVS.LIB2.CHNAGE2

This holds the LMOD dates of one load library sorted by member name.

```
ATOS1    98148  28.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
ATOS2    98168  17.JUNE      .1998 SDIAGAS.AGMPV.LOADLIB
ATOS3    98296  23.OCTOBER   .1998 SDIAGAS.AGMPV.LOADLIB
ATOS4    98141  21.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
ATOS5    98146  26.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
```

SDID.MVS.LIB.CHANGEX

Merge dataset consisting of all LMOD datasets sorted by date.

```
ATOS3    98296  23.OCTOBER   .1998 SDIAGAS.AGMPV.LOADLIB
DENE2    98296  23.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI4 98295  22.OCTOBER   .1998 SDIAGAS.USER.LOAD
ATALAY   98290  17.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI2 98283  10.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI3 98275  02.OCTOBER   .1998 SDIAGAS.USER.LOAD
LMODPLI  98264  21.SEPTEMBER .1998 SDIAGAS.USER.LOAD
MERGE    98170  19.JUNE      .1998 SDIAGAS.USER.LOAD
ATOS2    98168  17.JUNE      .1998 SDIAGAS.AGMPV.LOADLIB
MARTA    98152  01.JUNE      .1998 SDIAGAS.USER.LOAD
MARTAPV  98149  29.MAY       .1998 SDIAGAS.USER.LOAD
ATOS1    98148  28.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
ATOS5    98146  26.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
VILLER   98146  26.MAY       .1998 SDIAGAS.USER.LOAD
DIRECT   98141  21.MAY       .1998 SDIAGAS.USER.LOAD
PDS      98141  22.MAY       .1998 SDIAGAS.USER.LOAD
ATOS4    98141  21.MAY       .1998 SDIAGAS.AGMPV.LOADLIB
GUL      98138  18.MAY       .1998 SDIAGAS.USER.LOAD
TAPECOPY 98100  10.APRIL     .1998 SDIAGAS.USER.LOAD
```

SDID.MVS.LIB.HISTV1

These are the history VSAM datasets that hold the historic change dates of the load modules for one load library.

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```
KEY OF RECORD - ATALAY
ATALAY   0004 98148.. 98283 98285 98290
KEY OF RECORD - DENE2
DENE2    0003 98168.. 98295 98295 98296
KEY OF RECORD - DIRECT
DIRECT   0001 98141
KEY OF RECORD - GRAPH
GRAPH    0001 90108
KEY OF RECORD - GUL
GUL      0001 98138
KEY OF RECORD - LMODPLI
LMODPLI  0001 98264
KEY OF RECORD - LMODPLI2
LMODPLI2 0010 98264.. 98265 98266 98269 98272 98273 98275 98280 98282 98283
KEY OF RECORD - LMODPLI3
LMODPLI3 0007 98264.. 98265 98266 98269 98272 98273 98275
KEY OF RECORD - LMODPLI4
LMODPLI4 0002 98264.. 98265
KEY OF RECORD - MARTA
MARTA    0001 98152
KEY OF RECORD - MARTAPV
MARTAPV  0001 98149
KEY OF RECORD - MERGE
MERGE    0001 98170
KEY OF RECORD - PDS
PDS      0001 98141
KEY OF RECORD - REDLOCK
REDLOCK  0001 88004
KEY OF RECORD - TAPECOPY
TAPECOPY 0001 91100
KEY OF RECORD - TAPEMAP
TAPEMAP  0001 86291
KEY OF RECORD - TAPEMAP2
TAPEMAP2 0001 84202
KEY OF RECORD - TAPESCAN
TAPESCAN 0001 82329
KEY OF RECORD - VILLAR
VILLAR   0001 98146
IDC0005I NUBER OF RECORDS PROCESSED WAS 19
```

SDID.MVS.LIB.HISTV2

These are the history VSAM datasets that hold the historic change dates of the load modules for one load library.

```
KEY OF RECORD - ATOS1
ATOS1    0001 98148
KEY OF RECORD - ATOS2
ATOS2    0001 98168
```


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```
KEY OF RECORD - ATOS3
ATOS3    0003 98170.. 98295 98296
KEY OF RECORD - ATOS4
ATOS4    0001 98141
KEY OF RECORD - ATOS5
ATOS5    0001 98146
IDC0005I NUBER OF RECORDS PROCESSED WAS 5
```

SDID.MVS.LIB.HISTS1

This is the history sequential dataset. It is the sequential copy of the HISTV VSAM datasets. They are used to present the user contents of VSAM datasets under ISPF.

```
$MEMBER $COUTN$DATES
$====== $==== $========
LMODPLI2  0010 98264.. 98265 98266 98269 98272 98273 98275 98280 98282 98283
LMODPLI3 0007 98264.. 98265 98266 98269 98272 98273 98275
ATALAY    0004 98148.. 98283 98285 98290
DENE2     0003 98168.. 98295 98295 98296
LMODPLI4 0002 98264.. 98265
DIRECT    0001 98141
GRAPH     0001 90108
GUL       0001 98138
LMODPLI   0001 98264
MARTA     0001 98152
MARTAPV   0001 98149
MERGE     0001 98170
PDS       0001 98141
REDLOCK   0001 88004
TAPECOPY 0001 91100
TAPEMAP   0001 86291
TAPEMAP2 0001 84202
```

SDID.MVS.LIB.HISTS2

This is the history sequential dataset. It is the sequential copy of the HISTV VSAM datasets. These are used to present the user contents of VSAM datasets under ISPF.

```
$MEMBER $COUTN$DATES
$====== $==== $========
ATOS3    0003 98170.. 98295 98296
ATOS1    0001 98148
ATOS2    0001 98168
ATOS4    0001 98141
ATOS5    0001 98146
```

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SDID.MVS.LIB.SUM

This is a transaction dataset. It contains the recently updated load modules. By using this dataset, HISTV VSAM datasets are updated daily.

```
ATOS     98296  23.OCTOBER   .1998 SDIAGAS.AGMPV.LOADLIB
DENE2    98296  23.OCTOBER   .1998 SDIAGAS.USER.LOAD
```

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Maintaining a profile in ISPF/PDF

INTRODUCTION

PDF's PROFILE has a lot to do with how the screen behaves when you work with a file.

Each file type has a separate PROFILE. The file type is usually determined from the last segment of the filename. For instance, if the filename is 'A.B.C.JCL', then the file type is 'JCL'. This can be overridden on the ISPF selection screen where you specified the file you wished to work with.

```
+-------------------------------------------------------------------------------+
|                                                                               |
|  ---------------  EDIT - ENTRY PANEL  ----------------- |
|  COMMAND ===>                                                                 |
|                                                                               |
|  ISPF LIBRARY:                                                                |
|                                                                               |
|     PROJECT ===> ISPFDEMO                                                     |
|                                                                               |
|     GROUP   ===> MYLIB     ===> MASTER    ===>           ===>                |
|                                                                               |
|     TYPE    ===> PLI                                                          |
|                                                                               |
|     MEMBER  ===> _              (Blank or pattern for member selection list)  |
|                                                                               |
|  OTHER PARTITIONED OR SEQUENTIAL DATASET:                                     |
```

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```
|
|     DATASET NAME   ===>
|
|     VOLUME SERIAL  ===>          (If not cataloged)
|
|  DATA SET PASSWORD ===>          (If password protected)
|
|
|  PROFILE NAME      ===>          (Blank defaults to data set type)
|
|
|  INITIAL MACRO     ===>          LMF LOCK  ===> YES (YES, NO or NEVER)
|
|
|  FORMAT NAME       ===>          MIXED MODE ===> NO     (YES or NO)
|
+-------------------------------------------------------------------------------+
```

While in an application, such as EDIT, enter ‘PROF’ or ‘PROFILE’ on the command line. Something similar to the following lines will appear under the command line:

```
File  Edit  Confirm  Menu  Utilities  Compilers  Test  Help
 ------------------------------------------
 EDIT       MLNABK.LIB.COBOL(MS175) - 01.07               Columns 00007 00078
 Command ===>                                                Scroll ===> CSR
 ****** ***************************** Top of Data ******************************
 =PROF> ....COBOL (FIXED - 80)....RECOVERY ON....NUMBER ON COB.................
 =PROF> ....CAPS ON....HEX OFF....NULLS ON STD....TABS ON ;....SETUNDO REC......
 =PROF> ....AUTOSAVE ON....AUTONUM OFF....AUTOLIST OFF....STATS ON..............
 =PROF> ....PROFILE LOCK....IMACRO NONE....PACK OFF....NOTE ON..................
 =TABS> -   *                          *         *         *
 =COLS> -1---+---2---+---3---+---4---+---5---+---6---+---7---+-
 000100  IDENTIFICATION DIVISION.
 000200  PROGRAM-ID.          MMS175IM
 000300  DATE-COMPILED.  06/04/98
```

What does it mean? We will consider the elements individually and elaborate on the more interesting ones:

- COBOL (FIXED - 80) – the last part of our dataset name was COBOL, so this profile defaulted to that. ‘FIXED - 80’ is obvious.
- RECOVERY ON – if your session is interrupted by a network problem or mainframe malfunction, the next time you log on and try to get into this function (EDIT), a special screen will come up

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asking if you want to resume editing your member. If you choose 'yes', the session will resume where you left off. It will not include any changes you made since the last time you pressed <Enter> or some other interrupt, such as a PF key, but it will have all your other changes (remember, the mainframe does not know what you are doing on the screen until you press <Enter> or a PF key). You can change the setting of RECOVERY by entering 'RECOVERY OFF' or 'RECOVERY ON' on the command line.

- NUMBER ON COB – COBOL numbering is on (notice the numbers to the left of the code below our profile). Possible settings (on the command line) are NUMBER ON COB, NUMBER ON STD (numbers in cols 73-80), NUMBER OFF, or UNNUM (remove numbers and set NUMBER to OFF).

```
=PROF> ....CAPS ON....HEX OFF....NULLS ON STD....TABS ON ;....SETUNDO REC......
```

- CAPS ON/OFF – if caps are 'ON', entered text will be changed to caps when you press <Enter> or a PF key. Existing lower-case text would not be changed. If caps are 'OFF', text will be recorded as entered (upper/lower case).
- HEX ON/OFF – see the discussion on 'Hex' at the close of the article.
- NULLS ON STD – trailing blanks on a line, except for the first one, will be nulls (hex '00') rather than spaces (hex '40'). Spaces take up space and get in the way of inserting characters; nulls don't. Items entered to the right of a null-filled line will left shift to the end of the existing line when <Enter> is pressed, space-filled lines will stay where they are put. If you press 'End' to erase to end of line, you always create nulls until <Enter> is pressed, then this setting tells the computer what to do with the deleted area: leave as nulls or convert to spaces. Using the 'Delete' key produces nulls to the right of the line as it left-shifts. If the field is entirely empty, it is written as all spaces.

  ON ALL – specifies that all trailing blanks and all-blank fields are written as nulls.

  OFF – specifies that trailing blanks in each data field are written as spaces.

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- TABS ON – tabbing is on and the logical tab character is ';' (a semi-colon). You can enclose the character in quotes, although this is not necessary unless a quote or a comma (,) is used as the tab character.

  TABS OFF – turns tabs mode off, which means that logical tabs cannot be used. Attribute bytes are deleted from all hardware tab positions.

  TABS STD – activates all hardware tab positions (asterisks) that contain a blank or null character. The editor inserts attribute bytes, which cannot be typed over, at these positions. STD is the default operand.

  TABS ALL – causes an attribute byte to be inserted at all hardware tab positions. Characters occupying these positions are blanked out and the attribute bytes cannot be typed over.

- SETUNDO REC – enables the 'UNDO' command by saving changes in the recovery file ('REC' or 'RECOVER') or memory ('STG', 'STORE', 'STOR', or 'STO'). Command line settings: 'SETUNDO REC', 'SETUNDO OFF', 'SETUNDO STO', etc. If RECOVERY is ON, SETUNDO OFF is the same as SETUNDO REC. If RECOVERY is OFF, it will be turned on by this command:

```
=PROF> ....AUTOSAVE ON....AUTONUM OFF....AUTOLIST OFF....STATS ON.............
```

- AUTOSAVE ON – automatically saves your file and changes when you exit the session, for example, entering 'END' on the command line, pressing PF3, etc. Entering 'CAN' on the command line will leave the session without saving your changes. If AUTOSAVE is OFF, you will have to enter 'SAVE' on the command line before you exit the session.

- AUTONUM OFF – when you insert new lines they will be numbered between the existing lines until the computer runs out of numbers, then as many lines as necessary after the new work will be renumbered to accommodate the inserts. You will have to enter 'RENUM' on the command line to refresh the numbers. When this is ON inserted lines will cause all following line

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numbers to be re-sequenced using the default scheme (number by 100s in the case of COBOL numbering).

- AUTOLIST ON/OFF – this sends a source listing into the ISPF list dataset when you end the edit session (assuming you made changes and saved them). The disposition of the ISPF list dataset depends upon your settings. It will be printed, saved, or deleted when you log off from ISPF.
- STATS ON – update statistics will be generated for this file. This is the information you see when you list the contents of a PDS, such as 'Created' date, 'Changed' date, 'Size', etc:

```
=PROF> ....PROFILE LOCK....IMACRO NONE....PACK OFF....NOTE ON.................
```

- PROFILE LOCK – when you issue this command, the profile attributes are locked. Any changes made after that will be forgotten when the session ends. Changes during subsequent sessions will also be forgotten when the session is over. If the profile is UNLOCKed, changes made to the profile's attributes will remain and be available the next time that particular profile is used.
- IMACRO NONE – the IMACRO primary command saves the name of an initial macro in the current edit profile. The editor runs an initial macro after it reads but before it displays data. The macro might initialize empty data sets, define program macros, or initialize PF keys. A complete discussion of initial macros is beyond the scope of this article.
- PACK OFF – the PACK primary command sets pack mode, which controls whether the data is to be stored in packed format.
- NOTE ON – the NOTES primary command sets note mode, which controls whether notes are displayed when a dialog development model is inserted into the data. This is used in conjunction with the MODEL command and is beyond the scope of this article.

```
=COLS> -1---+---2---+---3---+---4---+---5---+---6---+---7---+-
```


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- COLS – just what it looks like. Enter COLS in the line command area to get this line anywhere in the screen. It will stay there until cleared.

Another command that is very nice is HILITE. If you have a colour terminal (3270 emulation, etc) it will change the colour of key words in your code. It will not work with PROCOMM or any other terminal that emulates a monochrome terminal.

The HILITE primary edit command is used to change colour highlighting settings. HI and HILIGHT are valid synonyms:

- HILITE RESET – reset defaults (AUTO, ON, Find and Cursor on).
- HILITE ON – set program colouring on (without logic highlighting).
- HILITE OFF – set program colouring OFF.
- HILITE AUTO – let ISPF determine the language.
- HILITE <lang> – force the language.
- HILITE LOGIC – turn on IF and DO logic matching.
- HILITE IFLOGIC – turn on IF logic matching only.
- HILITE DOLOGIC – turn on DO logic matching only.
- HILITE NOLOGIC – turn off all logic matching.
- HILITE FIND – toggle highlighting FIND strings.
- HILITE CURSOR – toggle highlighting of the phrase with the cursor.
- HILITE PAREN – toggle matching of parentheses.
- HILITE SEARCH – finds the first unmatched END, ELSE, }, or) between the first line in the file, and the first line being displayed. For END, ELSE or } highlighting, you must have the LOGIC enabled. The search for mismatched only occurs for lines above the last displayed line, so you may need to scroll to the bottom of the file.

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- HILITE DISABLE – disables all highlighting and removes the action bar. (Note: the DISABLE setting is not retained between edit sessions.)
- HILITE – with no operands it presents a dialog that allows you to change various colouring options.

In many cases, the ISPF editor can determine the language of the file you are editing. If you want to override the automatic language determination, specify the language you want on the HILITE command. Valid language names are:

```
AUTO    ASM  C       COBOL   DTL      IDL     JCL     PANEL
PASCAL  PLI  OTHER   REXX    BOOK     SKEL    DEFAULT
```

Example:

```
COMMAND ===> hi cobol
```

This will turn on logical highlighting for COBOL program code.

OTHER is a pseudo-language similar to PL/I but with only very basic keywords (DO, END, SELECT, WHEN, IF, THEN, ELSE, etc). OTHER can be used on many languages such as CLIST. OTHER also does not support any compiler directives. DEFAULT is used when AUTO is specified, but no language can be determined.

You can use the edit PROFILE command to see the colouring status. If a language was explicitly selected, the language will be highlighted in RED. Otherwise it will be WHITE.

CLEANING UP THE SCREEN

To get rid of all profiles, tab lines, or column lines, enter ‘RESET’ on the command line. Entering ‘D’ in an individual line command area will clear that line only.

The HELP command has a lot of information on Profile commands although they are sometimes a bit difficult to navigate through. Remember, in HELP you can make use of up (PF7), down(PF8), left (PF10), and right (PF11), as well as <Enter> to navigate through screens. If a screen has +More, <Enter> will get the next screen. <Enter> will often navigate you through everything in a topic.

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The dreaded message comes up:

```
-CAUTION- Data contains invalid (non-display) characters. Use command
  ===> FIND P'.' to position cursor to these
```

So you enter ‘f p'.' ’ in the command line and the browser (or whatever you’re using) positions you to the offending line in the list. Now, how to find out what’s really there?

Enter ‘HEX’ on the command line and the listing will be converted to three lines and a blank line for each original line that was there (with a lot fewer lines per page). The lines will be: the original line in regular characters, followed by two lines of hex, each hex equivalent directly beneath the original character, for example:

```
ABCD EFG 123
CCCC4CCC4FFF00000000 etc.
12340567012300000000
```

When you are finished, enter ‘HEX OFF’ and things will return to normal.

You can use Hex any time you need to see the hex equivalent of something. If you are in EDIT mode, you can edit the hex equivalent lines to produce characters not on your keyboard or to modify packed decimal or binary fields.

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Systems Programmer (USA)

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IBM has announced the High Level Assembler for MVS,VM and VSE Release 4. Among the new features are the capability whereby Assembler options can be specified in an external file and the PROCESS OVERRIDE statement allows the setting of fixed options for a source module.

There are two new options: CODEPAGE, which supports the creation of Unicode character constants from EBCDIC data, and the NOTHREAD option, which allows users to specify that the location counter should be reset to zero for each control section, which helps with program debugging and address computation.

The XATTR statement lets users assign attributes to external symbols, to assist with using DLLs, and there are new DC constant types, including; R – PSECT address, for use with programs using constructed reentrancy, CU – Unicode character constant, FD – doubleword aligned 8-byte fixed-point constant, AD – Doubleword aligned 8-byte address constant; and AMODE and RMODE statements are enhanced.

The new release comes with various usability enhancements: literal operands are always entered in the literal pool, providing more uniform behaviour of attribute references to literal operands; message wording is said to be improved and more information is provided about any operands involved.

Contact your local IBM representative for further information.

http://www.ibm.com

* * *

Tivoli has announced Version 7.0 of its workload schuduler (TWS), which provides a single point of control for open workload management and uses open interfaces to enable communications with OS/400, OS/390, Unix, and Windows environments. The Extended Agents enable management of workloads on non-TWS platforms and ERP applications.

There is a new Java-based GUI console that can simultaneously manage both TWS and OPC networks and there's support for ten languages. Management of systems across multiple time zones is improved by attributing the appropriate time zone to each workstation. It now logs changes made to the TWS database or plan to a log file for auditing and security purposes.

The new Job Scheduling Console is for configuring, viewing, and modifying all aspects of workload planning at a site. It also allows scheduling of jobs and job streams to create a plan for job execution, using the different TWS job dependency types. Finally, it can monitor and modify the execution of all jobs and job streams, by adding, modifying, or deleting jobs or job streams in the plan.

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