

Hot Backup and Recovery at Justice Technology Systems

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Contents

SA Government Agency Applications	1
Why do we need a quiesce point in SYSJ Production IDMS?.....	3
Hot Backup.....	3
PARTIAL and FULL RECOVERY	4
Recovery From Hot Backup.....	4
Recovery Issues.....	5
Dataset Mirroring in Production SYSJ	6
IDMS Archive Journal	6
TSO REG	8
Daily Production Backup Jobs	8
Production SYSJ Daily Backup Schedule.....	12
Job Streams, Messages, Clists.....	12

Hot Backup and Recovery at Justice Technology Systems

This document outlines how Hot Backup and Database Recovery are managed in a client site, SA Government Agency.

SA Government Agency Applications

- The SYSJ (Production) and SYSK (Development) LPARs provide an environment for running the “Justice Information System” which is a suite of in-house developed applications related to the administration of criminal justice in South Australia. The applications involve data that is shared between five large South Australian Government Departments.
- The SA Government Agency runs a security application called DAMS (Decentralized Access Management System) which has components in RACF and IDMS. There is a RACF security call in all site applications to check if the user can run the application function. There is also an

associated application that is used by agency security administrators to manage passwords for users and permissions at each local work site.

- DAMS has its own started task which hooks into a support IDMS CV (IDMSQ Quality Assurance on SYSK and IDMSP Production on SYSJ). DAMS is stopped before the IDMS CV is shut down and that DAMS is restarted if the IDMSP or IDMSQ CVs are shutdown or fail once they are up.

SYSJ IDMS Production Backups (TRN Training and PRO Production) are 'Hot Backups', taken while the IDMS environment remain up, following a quick CV cycle to quiesce the database. A quiesce point is a point in time at which no transactions are accessing the target areas in update mode. Hot Backup is performed using volume backup, which requires all areas on the volume to be quiesced at the same time. This provides a suitable recovery point.

All other IDMS environment backups in SYSK (RES Research, DEV Development, PED Quality Assurance, and SIT 2nd QA) are 'Cold Backups', with the IDMS environment remain down, until the backup are completed

The following conditions apply to the backups for Development SYSK and Production SYSJ.

Full system backups done on a daily, weekly and monthly basis. This involves all volumes on the system other than paging, work, or spare volumes. No incremental backups are done.

SYSK Development Backups

- Cold backups are taken for SYSK IDMS environments at 20:00 each weeknight.
- Daily backups are run on Monday, Tuesday, Wednesday and Friday nights. These backups go to Virtual Tape, and are retained onsite.
- Weekly backups are run on Thursday night.
- Monthly backups are run the first Thursday of the month.
- The Weekly/Monthly backups go offsite the next morning.

SYSJ Production Backups

- The hot backups for SYSJ are scheduled to run daily Monday to Sunday at 3.00am.
- Weekly backups are run on Sunday at 3.00am.
- Monthly backups are run the first Sunday of the month.
- SYSJ IPL happens on first Tuesday of the month at 3.00 am except when it coincides with Daylight Saving and z/OS software upgrade
- The backups go offsite the same day, except in the case of backups taken on Sundays or Public Holidays, in which case they go offsite on the next Business Day.

DAMS

- DAMS (Decentralized Access Management System) is a SA Government Agency written and supported Security Application which has components in RACF and IDMS.
 - DAMS runs as a Started Task which hooks into a support IDMS Environment (IDMSQ on SYSK and IDMSP on SYSJ). DAMS should always be shutdown before the IDMS Environments and restarted once they are up, following either a scheduled or non-scheduled outage.

Why do we need a quiesce point in SYSJ Production IDMSP?

- If database recovery is required, the Hot Backup needs to be rollback to some quiesce point and the areas unlocked. If a specific area is affected by a user rogue program, the updated area need to be rollback up to the start of the program.
- For recovery using a file taken during a hot backup, the associated archive journal files created during the Hot Backup are required. Without these files, the Hot Backup file cannot be used.
- To ensure the availability of the archive journal files, when a copy of the Hot Backup file is sent offsite, a copy of all corresponding archive files should also be sent offsite.

In SYSJ at 3.00 am each morning a Hot Backup is taken during which the database areas that are copied are updated by transactions executing within the central version. If database recovery is required, the Hot Backup needs to be Rollback to some quiesce point and the areas unlocked. If some specific areas (may be to back-out update done by a user rogue program) the updated area need to be Rollback up to the start of the program.

To recover using a file produced during a Hot Backup, all archive journal files created while the backup was taking place must also be available; without these files, the backup file cannot be used. Although the EXTRACT JOURNAL utility statement can be used to preprocess the journal images generated during this time period, the original archive files must also be available to perform a successful recovery.

If a quiesce point is available (either established by cycling the CV or using some user-defined process) it would facilitate the Rollback of Hot Backup up to the quiesce point without involving the use of many archive journal files saving CPU and speeding up the Rollback process.

Hot Backup

A Hot Backup occurs following a quick cycle of the Production CV. This gives us a clean quiescse point (no active transactions against the databases). All files are backed up with the databases live and in use and then a journal is offloaded to mark the end of the hot backup. This currently takes about 45 minutes so if restored must include a rollback without VERIFY and a Rollforward with VERIFY to get the database files clean.

PARTIAL and FULL RECOVERY

A **full recovery** is used to restore the entire environment from backup and (if journal archives are available or a hot backup) Rollforward to a point in time. The end result of a full recovery is that the entire CV databases are in a consistent state as at a point in time.

A **partial recovery** is when only a small portion of the database files are impacted it is possible to only restore a coherent group of files (e.g. databases + indexes) and if journal archives are available, recover to a point prior to the corruption. For Partial recoveries all but the affected set of databases (the rest of the CV) would be available for use. The one file (or database set of files) would be restored as copies of the original files and not be under the CV. This differs from a full recovery, as the recovery process does not affect the majority of the databases.

The basic recovery technique employed for a Partial CV recovery will be to restore selected files to a clean state, and then optionally Rollforward the individual database(s) to a point in time. A Rollforward re-applies all changes that have been made to a file by using the information in the IDMS archive journals.

For Partial recoveries all but the affected set of databases (the rest of the CV) would be available for independent update use. The one file (or database set of files) would be restored as copies of the original files and not be under the CV. The original impacted database file(s) are typically set to retrieval to stop further updates. Once the file(s) were recovered successfully and DBAN'd off to the side, they can be renamed back in under the CV.

For partial recovery there is a need to consider the possibility of logical integrity problems caused when details from the impacted database areas are used or referenced by other unaffected databases.

Recovery From Hot Backup

A Hot Backup is a backup that is performed while the database is being updated.

The recovery involves the use of both the ROLLBACK and ROLLFORWARD utility statements.

- First Identify:
 - The quiesce point that was taken at the beginning of the backup procedure.
 - The archive journal files created since this quiesce point up to and including the one created at the end of the backup procedure.
 - All archive journal files created since the quiesce point up to the point of failure.
- Run the Extract Journal Utility to extract the most recent AFTR Image for each DBKEY recorded on the archive journal created when Hot Backup started and when it is completed.
- Use the PRINT JOURNAL utility statement, or if the quiesce point was established using the DCMT QUIESCE command, examine the operating system log for the DC/UCF system on which the DCMT command was issued. Consolidate, in the sequence in which they were created, the archive journal files created between the quiesce point and the end of the backup procedure.

- Execute the RESTORE utility statement using the FILE option or another comparable utility.
- Execute the ROLLBACK utility statement specifying the HOT BACKUP option and using either the consolidated journal file or individual archive files concatenated in the sequence in which they were created.
- If the quiesce point for the affected areas does not coincide with the start of the input (or the end of the input if it was sorted in reverse sequence), use the STOP TIME parameter to identify the quiesce point.
- If STOP TIME is specified, also specify ACTIVE; otherwise specify ALL.

Recovery Issues

Issue relating to “user errors”, for example:

- Physical corruption caused by procedural problems during physical database maintenance by DBD team
 - It could be a DBD backup subsequent to the HP Hot Backup is “lost” and DBD is unable to restore to a starting point after a failed maintenance.
 - SA Government Agency would then rely on HP to restore from the Hot Backup and “roll forward” to the point where DBD would normally have been able to restore to.

Hot Backup is taken using volume backup. Hot Backup taken daily at 3.00 am allows the given database to be restored and rollback to the quiesce point (established by shutting down IDMSP) using the archive journals generated in the duration of the Hot Backup (i.e. when Hot Backup is started until it is completed). To perform a correct recovery, you must begin the recovery operation at a quiesce point for the portion of the database being recovered.

The given database area is restored from the Hot Backup tape and “ROLLBACK AREA segment-name.area-name ALL HOT BACKUP ;” using the archived journals created during the Hot backup. Normally, two of such archive journals are created in IDMSP.

Prior to the recovery, a Database Journal Extract job (“EXTRACT JOURNAL FOR DMCL COMPLETED VERIFY QUIESCE”) can be submitted to report on which database areas have activities in them and which areas are quiesced.

The EXTRACT JOURNAL utility extracts the most recent AFTR image for each dbkey recorded on an archived journal file and writes it to an extract file. The extract file can later be used as input to a ROLLFORWARD command for a “quick” recovery of a database area or file.

The ROLLFORWARD utility restores a backup copy of the database to a subsequent condition by applying after images from the journal files (starting from archive journals created during the Hot Backup up to the point of the required recovery (“ROLLFORWARD AREA segment-name.area-name STOP at date-time”))

The above recovery process requires the Hot Backup and all its related archived journals to be available.

- A second type of “user error” is logical corruption of the database caused by “rogue” program
 - Can a single run of a single batch program might be recoverable, i.e. to “rollback” an individual transaction from the IDMS Journal. The ability to do this is in question as any many updates (subsequent to the incorrect updates) could have updated the impacted record that would be rollback.
 - An application “fix” or “undo” program is required to correct only the data items in question – leaving other items alone. A single dialog might run hundreds or thousands of times and would not be recoverable except through a “fix” program

The lowest granularity of database recovery is at the area level. If the affected area has been updated by the rogue program plus hundreds other transaction, there is little choice but to write a user-fixed program. If limited data fields are affected, DMLO can be used to back-out the change. If the error involves structural change such as connecting a record to the wrong owner, user written fix is needed.

If the affected area is isolated and touched only by the rogue program, Rollback Area Stop at date-time will back-out the change or Rollforward area stopping at the date-time just prior to running the rogue program.

Dataset Mirroring in Production SYSJ

Current Disk Mirroring is designed for use with Disaster Recovery and catastrophic network issue. Its design is not suited for point in time recovery such as to recover up to a logical point to back-out changes caused by programmatic error. Daily Hot Backup continues to be taken for reasons covered in document above, i.e. establishing a quiesce point and using Hot Backup for quick Rollback / Rollforward recovery

Mirror copy of IDMSP databases and archive journals are taken in real time at a remote site for disaster recovery. Mirroring is good for failover type occurrence, disaster recovery and network issues, but not for designed for recovery up to certain point in time. Mirroring certainly doesn’t replace hot backup.

SYSJ production environment does not lend itself for varying specific database areas to quiesce point without a CV shutdown due to non-stop Next Number Server and timer tasks such as Hunter Killer and dcmt line probing commands as well as online users and the various connections from outside IDMS (mid-range platform ObjEx) and DAMS, and the simplest way is to bounce CV to create a quiesce point.

IDMS Archive Journal

Use the archive register for the CV to determine the archive files created after the Hot Backup to use (IDMSR.ccc.ARCHIVE.REGISTER). If previous week is needed see IDMSR.ccc.ARCHIVE.REGISTER.PREVIOUS .

You will need all journals since the start of the daily Hot Backup - identified by the tag THIS IS A HOT

BACKUP – and the backup of the archive journal packs - identified by the tag DAILY BACKUP NOW COMPLETED

Using a Hot Backup example, below, G0612V00 is the archive from the CV shutdown. The Hot Backup period can be identified from the tags THIS IS A HOT BACKUP and DAILY BACKUP NOW COMPLETED and the archive journals generated during this period are G0613V00, G0613V00 and G0615V00. These journals therefore need to be put into the GENERBCK job for the rollback tape.

```
//SYSUT1 DD DSN=IDMSR.PRO.ARCHIVE.G0613V00,DISP=SHR
// DD DSN=IDMSR.PRO.ARCHIVE.G0614V00,DISP=SHR
// DD DSN=IDMSR.PRO.ARCHIVE.G0615V00,DISP=SHR
//SYSUT2 DD DSN=IDMSR.PRO.RECOVERY.ROLLBACK.DYYMMDD,
// DISP=(NEW,CATLG),
// UNIT=TAPEC,
// LABEL=(1,SL,EXPDT=99000),
// DCB=(TRTCH=NOCOMP)
```

For the ROLLFORWARD COMPLETED VERIFY we need all the archive journals up to the Rollforward point including any used in the rollback - in the example G0613V00 onward. These are concatenated into the GENERFWD job.

```
IDMSR.PRO.ARCHIVE.G0612V00 PRO 12/15/15 03:00:40 - JOURNAL_ARCHIVE
PRO 12/15/15 03:00:45 - DAILY BACKUP NOW STARTED
PRO 12/15/15 03:00:45 - THIS IS A HOT BACKUP
IDMSR.PRO.ARCHIVE.G0613V00 PRO 12/15/15 03:11:32 - JOURNAL_ARCHIVE
IDMSR.PRO.ARCHIVE.G0614V00 PRO 12/15/15 04:15:03 - JOURNAL_ARCHIVE
IDMSR.PRO.ARCHIVE.G0615V00 PRO 12/15/15 04:19:25 - JOURNAL_ARCHIVE
PRO 12/15/15 04:31:46 - DAILY BACKUP OF ARCHIVE JOURNAL J92JL1 COMPLETE
PRO 12/15/15 04:34:46 - DAILY BACKUP OF ARCHIVE JOURNAL J92JL2 COMPLETE
PRO 12/15/15 05:50:57 - DAILY BACKUP NOW COMPLETED
IDMSR.PRO.ARCHIVE.G0616V00 PRO 12/15/15 06:27:22 - JOURNAL_ARCHIVE
```

The files should be checked against the current catalog entries for the archive journal GDG to verify that all of the archived journals have been recorded in the ARCHIVE.REGISTER eg. use PDF option 3.4 specifying IDMSR.PRO.ARCHIVE

After checking these sources you should now have a list of the archive GDG entries created since the last backup. Make sure that the GDG generation numbers are in sequence (ie no numbers missing);

IEBGENER will NOT check the contents nor sequence of the journals you give it, so be careful. Archive Journals should be listed to the job in processing order (oldest first). If you make a mistake it will only be discovered if you specify the VERIFY option on your Rollforward. When recovering using a Hot Backup, the VERIFY option cannot be used for the ROLLBACK, so any mistake you make here will not be discovered and will result in an incorrectly recovered database. It is for the reason above that we initially cool the Hot Backup with a ROLLBACK ALL. A second gener creates a tape for the ROLLFORWARD COMPLETED VERIFY which then runs to the recovery point (if required).

There can be performance problems with certain tape units if compression is used, and the recovery needs to read the tape backwards. To be safe we always turn off compression using the

JCL parameter DCB=(TRTCH=NOCOMP) on the output file.

TSO REG

IDMSR.TEMP.SOURCE(TEMPREG)

```
IDMSR.PRO.ARCHIVE.G0612V00 PRO 12/15/15 03:00:40 - JOURNAL_ARCHIVE
PRO 12/15/15 03:00:45 - DAILY BACKUP NOW STARTED
PRO 12/15/15 03:00:45 - THIS IS A HOT BACKUP
IDMSR.PRO.ARCHIVE.G0613V00 PRO 12/15/15 03:11:32 - JOURNAL_ARCHIVE
IDMSR.PRO.ARCHIVE.G0614V00 PRO 12/15/15 04:15:03 - JOURNAL_ARCHIVE
IDMSR.PRO.ARCHIVE.G0615V00 PRO 12/15/15 04:19:25 - JOURNAL_ARCHIVE
PRO 12/15/15 04:31:46 - DAILY BACKUP OF ARCHIVE JOURNAL J92JL1 COMPLETE
PRO 12/15/15 04:34:46 - DAILY BACKUP OF ARCHIVE JOURNAL J92JL2 COMPLETE
PRO 12/15/15 05:50:57 - DAILY BACKUP NOW COMPLETED
IDMSR.PRO.ARCHIVE.G0616V00 PRO 12/15/15 06:27:22 - JOURNAL_ARCHIVE
```

DB.PDF.CLIST(REG)

```
PROC 0
  CONTROL NOMSG
/*CONTROL LIST CONLIST SYMLIST MSG
/*
/* DB.PDF.CLIST(REGISTER)
/* COPY THE PRO ARCHIVE REGISTER ACROSS TO A TEMPORARY EDIT FILE
/*
FREE FI(SYSUT1 SYSUT2 SYSPRINT SYSIN)
ALLOC FI(SYSUT1) DSN('IDMSR.PRO.ARCHIVE.REGISTER.PREVIOUS' -
                    'IDMSR.PRO.ARCHIVE.REGISTER') SHR
ALLOC FI(SYSUT2) DSN('IDMSR.TEMP.SOURCE(TEMPREG)') SHR REUSE
ALLOC FI(SYSPRINT) DUMMY
ALLOC FI(SYSIN) DUMMY
CALL 'SYS1.LINKLIB(IEBGENER)'
FREE FI(SYSUT1 SYSUT2 SYSPRINT SYSIN)
ISPEXEC EDIT DATASET('IDMSR.TEMP.SOURCE(TEMPREG)')
ISPEXEC LMINIT DATASET('IDMSR.TEMP.SOURCE') DATAID(OUT) ENQ(EXCLU)
ISPEXEC LMCOMP DATAID(&OUT)
ISPEXEC LMFREE DATAID(&OUT)
END
```

Daily Production Backup Jobs

SYSJ - ZBKUPD01-04 (Daily) ZBKUPW01-04 (Weekly) and ZBKUPM01-04 (Monthly)

So it is simply a matter of determining which backup contains the files you are after. All UserDB files currently are backed up by one of the first 3 jobs. Weekly and or Monthly backups are taken Sunday morning's

The Backup Retention Cycle for SYSJ is :

Daily backups have a retention period of 7 days

Weekly backups have a retention period of 31 days
 Monthly backups have a retention period of 186 days.
 Precautionary backups have a retention period of 7 days
 The Daily backups go offsite the same day to Recall for 6 days.
 The Weekly/Monthly backups go offsite the same day to Recall for 13 days.

JOBNAME	JobID	Owner
ZBKUPDTL	JOB05033	EDSSTC
ZBKUPD99	JOB05003	EDSSTC
ZBKUPD99	JOB05003	EDSSTC
ZBKUPD04	JOB04763	EDSSTC
ZBKUPD01	JOB04621	EDSSTC
ZBKUPD02	JOB04613	EDSSTC
ZBKUPD03	JOB04614	EDSSTC

ZBKUPD01

```
//JOBPROC JCLLIB ORDER=(SYS3.HKEEP.PROCLIB)
//*=====
/* SYSJ DAILY BACKUP JOB 1 (9840 OFFSITE) *
//*=====
//CA07RMS EXEC CA11RMS,
// TYPRUN='P'
//*JCLLIB=SYS3.HKEEP.CA7.CNTL
//STEP01 EXEC BKUPF, FILE=01, VOL=JM2OC1
//STEP02 EXEC BKUPN, FILE=02, VOL=JM2OC2
//TRNEND EXEC PGM=IEFBR14
//STEP03 EXEC BKUPN, FILE=03, VOL=JMOU01
//STEP04 EXEC BKUPN, FILE=04, VOL=JMOU02
//STEP05 EXEC BKUPN, FILE=05, VOL=JMOU03
//STEP06 EXEC BKUPN, FILE=06, VOL=JMOU04
//STEP07 EXEC BKUPN, FILE=07, VOL=JMOU05
```

SYS3.HKEEP.PROCLIB(BKUPN)

```
//*=====
/* DF/DSS VOLUME BACKUP (SUBSEQUENT STEP) *
//*=====
//BACKUP EXEC PGM=ADRDSU, REGION=4M
//DASD DD UNIT=SYSALLDA, VOL=SER=&VOL, DISP=OLD
//TAPE DD DSN=BACKUP.&SYS..&CYC..&VOL(+1), DISP=(NEW,CATLG),
// UNIT=TAPEC, LABEL=(&FILE,SL,RETPD=&RET),
// DCB=(SYS3.DSCB),
// VOL=(,RETAIN,REF=*.&FIRST..BACKUP.TAPE)
//SYSIN DD DSN=SYS3.HKEEP.SYSIN(BKUPIN), DISP=SHR
//SYSPRINT DD SYSOUT=*
***** Bottom of Data *****
```

Job Name

DICTBACK - BACKUP JISDML AND JISLOD BEFORE SHIELD SYSTEM IMPLEMENTATION

DICTREST - RESTORE JISDML AND JISLOD FOR SHIELD SYSTEM

EXTRACT - THE EXTRACT JOURNAL UTILITY EXTRACTS THE MOST RECENT AFTR
IMAGE FOR EACH DBKEY RECORDED ON AN ARCHIVED JOURNAL FILE AND
WRITES IT TO AN EXTRACT FILE.
//SYSIPT DD *
EXTRACT JOURNAL FOR DMCL
COMPLETED
VERIFY QUIESCE;
/*

GENERBCK - IEBCGEN THE ARCHIVE JOURNALS FOR ROLLBACK (HOT BACKUP)
USE STANDARD CART (TAPEC)
THIS JOB CREATES A ROLLBACK JUST FOR THE PORTION UP TO
THE END OF THE HOT BACKUP. SEE THE ARCHIVE LOG (TSO REG)
THIS IS BECAUSE THIS PORTION ROLLS BACK ANY ACTIVE TRANSACTIONS
TO THE 3.00AM SHUTDOWN QUIESCE POINT.

GENERFWD - IEBCGEN THE ARCHIVE JOURNALS FOR ROLLFWD
BUILD A RECOVERY TAPE FROM THE INDIVIDUAL ARCHIVES INCLUDING THE
HOT BACKUP CHECK TSO REG.
FOR A HOT BACKUP RECOVERY THIS SHOULD INCLUDE ALL THE
ARCHIVE GDGS CREATED DURING THE ROLLBACK AND USED FOR THE
ROLLBACK. SEE THE ARCHIVE LOG (TSO REG)
IT CAN BE OPTIONALLY RUN VERIFIED
TO A POINT IN TIME - INCLUDING THE HOT BACKUP PORTION

IDMSLOOK - PRODUCE FILE LIST FOR RESTORE CHECKING
//SYSIPT, DD *
DMCL
/*

IDMSRBCK - RUN IDMS ROLLBACK USING THE IEBCGEN CART TAPE
FOR A HOT BACKUP WE MUST COOL THE BACKUP WITHOUT VERIFY TO GET A
CLEAN POINT.
WE WILL ROLLBACK THE ENTIRE CV I.E. USING THE DMCL SYNTAX
FOR A HOT BACKUP DO NOT USE THE VERIFY SYNTAX
//SYSIPT DD *
ROLLBACK DMCL ALL HOT BACKUP ;
/*

IDMSRFWD - RUN ROLLFORWARD VERIFY USING THE IEBCGEN CART TAPE
THE SYNTAX BELOW IS FOR A FULL DATABASE RECOVERY SO YOU SHOULD
BE USING DMCL RATHER THAN FILE.
WHEN ROLLING FORWARD THE WHOLE DATABASE, SPECIFY "COMPLETED"
ROLLFORWARD WITH VERIFY CAN NOT BE USED FROM A HOT BACKUP UNLESS
A ROLLBACK (WITHOUT VERIFY) HAS BEEN RUN BEFOREHAND
ROLLFORWARD WITH VERIFY CAN BE USED FROM A COLD BACKUP
//SYSIPT DD *
ROLLFORWARD DMCL COMPLETED VERIFY;
/*
-----GENERAL NOTES ON ROLLFORWARD SYNTAX-----
ROLLFORWARD WITH VERIFY CAN BE USED FROM A COLD BACKUP TO

ROLLFORWARD THE ENTIRE CV FROM A COLD BACKUP OR
IF THE HOT BACKUP HAS BEEN COOLED WITH A ROLLBACK FIRST
ROLLFORWARD DMCL COMPLETED VERIFY
TO ROLLFORWARD THE ENTIRE CV FROM A HOT BACKUP IF THE ROLLBACK
HAS NOT BEEN PERFORMED

ROLLFORWARD DMCL COMPLETED
OPTIONAL SYNTAX

+-- STOP AT ' --- DATE ----- ' --+
 +- DATE-TIME -|
 +- TIME -----+

THE FORMAT FOR SPECIFYING THE DATE-TIME IS:

YYYY-MM-DD-HH.MM.SS.FFFFFFFF

FFFFFFF SPECIFIES THE NUMBER OF MILLIONTHS OF A SECOND PAST
PAST THE SPECIFIED SECOND. FFFFFFFF IS OPTIONAL

IDMSRJNL - RUN (FINAL) ARCHIVE JOURNAL BEFORE BEGINNING RECOVERY

INITJRNL - INITIALISE JOURNALS FOR RECOVERY CV - NOT NORMAL FOR PARTIAL

JNLABACK - BACKUP PRO ARCHIVE JOURNAL FOR SHIELD SYSTEM IMPLEMENTATION

JNLAREST - RESTORE JISDML AND JISL0D FOR SHIELD SYSTEM

OFFLONLY - OFFLOAD ACTIVE JOURNALS PRIOR TO RECOVERY
DO NOT RUN THIS JOB UNLESS YOU ARE COMMITTED
TO A ROLLFORWARD RECOVERY

THE JOURNAL NUMBER OF THE ACTIVE JOURNAL MUST BE SPECIFIED
BELOW.

REPLACE SYSJNL1 WITH THE NAME OF THE ACTIVE JOURNAL
EITHER SYSJNL1, SYSJNL2, SYSJNL3 OR SYSJNL4

//IDMSAJNL.SYSIPT DD *

ARCHIVE JOURNAL BUFFERS 20 READ SYSJNL1 ;

RBCKDICT - ROLLBACK JIS DICTIONARY

//SYSIPT DD,*,

ROLLBACK AREA JISDML.DDLML, JISL0D.DDLCL0D

ALL HOT BACKUP;

/*

RFWDDICT - ROLLFORWARD JIS DICTIONARY

//SYSIPT DD *

ROLLFORWARD AREA JISDML.DDLML, JISL0D.DDLCL0D

COMPLETED VERIFY;

RSTRDICT - RESTORE JISDML AND JISL0D FROM DAILY / WEEKLY HOT BACKUP

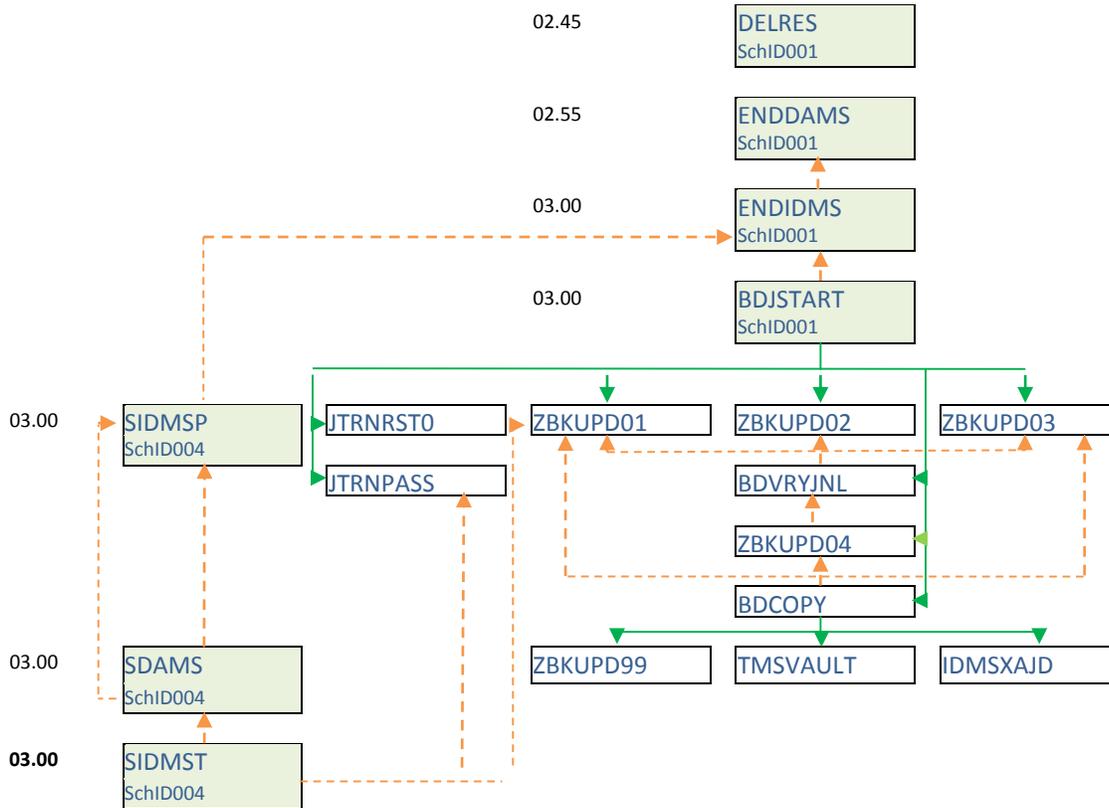
UNLKDICT - RUN UNLOCK AREA COMMANDS

UNLOCK JISDML AND JISL0D SEGMENT

UNLOCK AREA JISDML.DDLML, JISL0D.DDLCL0D

Production SYSJ Daily Backup Schedule

Monday to Saturday



Job Streams, Messages, Clists

Which program puts out these messages

```
IDMSR.PRO.ARCHIVE.G0684V00 PRO 12/16/15 03:00:39 - JOURNAL_ARCHIVE
PRO 12/16/15 03:00:57 - DAILY BACKUP NOW STARTED
PRO 12/16/15 03:00:57 - THIS IS A HOT BACKUP
IDMSR.PRO.ARCHIVE.G0685V00 PRO 12/16/15 03:11:40 - JOURNAL_ARCHIVE
IDMSR.PRO.ARCHIVE.G0686V00 PRO 12/16/15 04:18:59 - JOURNAL_ARCHIVE
PRO 12/16/15 04:32:14 - DAILY BACKUP OF ARCHIVE JOURNAL J92JL1 COMPLETE
PRO 12/16/15 04:36:24 - DAILY BACKUP OF ARCHIVE JOURNAL J92JL2 COMPLETE
PRO 12/16/15 05:49:43 - DAILY BACKUP NOW COMPLETED
IDMSR.PRO.ARCHIVE.G0687V00 PRO 12/16/15 06:31:47 - JOURNAL_ARCHIVE
```

The program is TSO Batch

As to the jobs that run the program:

- BDJSTART has steps to record the backup started and backup type messages

- ZBKUPD04 has steps to record the backups of the journal volumes
- ZBKUPD99 has a step to record the backup finished message

```

SYS3.HKEEP.CA7.CNTL(BDJSTART)
//JOBPROC JCLLIB ORDER=(SYS3.HKEEP.PROCLIB)
//LOGGING EXEC BKLOG,SYSIN=LDSTART
//LOGGING EXEC BKLOG,SYSIN=DBAHOT

```

```

SYS3.HKEEP.PROCLIB(BKLOG)
/*=====
/* BACKUP LOGGING STEP
/*=====
//LOGGING EXEC PGM=IKJEFT01,REGION=2M
//SYSPROC DD DSN=SYS3.HKEEP.CLIST,DISP=SHR
//SYSTSPT DD SYSOUT=*
//SYSTSIN DD DSN=SYS3.HKEEP.SYSIN(&SYSIN),DISP=SHR

```

```

SYS3.HKEEP.SYSIN(LDSTART)
DBABKLG PRO BDJSTART
DBABKLG TRN BDJSTART

```

```

SYS3.HKEEP.CLIST(DBABKLG)
/*=====*/
/* WRITE BACKUP COMPLETE ENTRY IN ARCHIVE JOURNAL REGISTER */
/*=====*/
PROC 2 CV JOB
CONTROL MAIN MSG
SET &TEMP = &SUBSTR(1:2,&JOB)
SET &BFREQ = UNKNOWN
IF &TEMP = BD THEN SET &BFREQ = DAILY
ELSE IF &TEMP = BM THEN SET &BFREQ = MONTHLY
ELSE IF &TEMP = BP THEN SET &BFREQ = PRECAUTIONARY
ELSE IF &TEMP = BW THEN SET &BFREQ = WEEKLY
SET &VOLN = &SUBSTR(3:8,&JOB)
SET &TEMP = &SUBSTR(4:8,&JOB)
SET &BINFO = UNKNOWN
IF &TEMP = START THEN SET &BINFO = &STR(NOW STARTED)
ELSE IF &TEMP = ENDED THEN SET &BINFO = &STR(NOW COMPLETED)
ELSE SET &BINFO = &STR(OF ARCHIVE JOURNAL &VOLN COMPLETE)
ERROR +
DO
IF &LASTCC = 12 THEN DO
CALL 'SYS3.HKEEP.LOAD(WAIT)' '02'
GOTO ALLOCDS
END
WRITE ALLOC CONDITION CODE WAS - &LASTCC
GOTO THEEND
END

```

ALLOCD:-

```
ALLOC DD(ARCLOG) DSN('IDMSR.&CV..ARCHIVE.REGISTER') MOD REUSE
OPENFILE ARCLOG OUTPUT
SET &HEADER = &STR(&CV &SYSDATE &SYSTIME)
SET &ARCLOG = &STR(&HEADER - &BFREQ BACKUP &BINFO)
PUTFILE ARCLOG
CLOSEFILE ARCLOG
FREE DD(ARCLOG)
```

EXIT:-

EXIT

SYS3.HKEEP.SYSIN(DBAHOT)

```
DBABKTYP PRO HOT
DBABKTYP TRN HOT
```

SYS3.HKEEP.CLIST(DBABKTYP)

```
/*=====*/
/* WRITE BACKUP TYPE ENTRY IN ARCHIVE JOURNAL REGISTER */
/*=====*/
```

```
PROC 2 CV BKTYP
CONTROL MAIN MSG
```

ERROR +

```
DO
IF &LASTCC = 12 THEN DO
CALL 'SYS3.HKEEP.LOAD(WAIT)' '02'
GOTO ALLOCD
END
WRITE ALLOC CONDITION CODE WAS - &LASTCC
GOTO THEEND
END
```

ALLOCD:-

```
ALLOC DD(ARCLOG) DSN('IDMSR.&CV..ARCHIVE.REGISTER') MOD REUSE
OPENFILE ARCLOG OUTPUT
SET &HEADER = &STR(&CV &SYSDATE &SYSTIME)
SET &ARCLOG = &STR(&HEADER - THIS IS A &BKTYP BACKUP)
PUTFILE ARCLOG
CLOSEFILE ARCLOG
FREE DD(ARCLOG)
```

EXIT:-

EXIT

ZBKUPD04

```
// SET SYS=SYSJ,CYC=DAILY,RET=6,FIRST=STEP01
//STEP01 EXEC BKUPF,FILE=01,VOL=JM1PP1
//STEP02 EXEC BKUPN,FILE=02,VOL=JM1SP1
//STEP03 EXEC BKUPN,FILE=03,VOL=JXWTS1
//STEP04 EXEC BKUPN,FILE=04,VOL=JXWTS2
//STEP05 EXEC BKUPN,FILE=05,VOL=JMPRD1
//STEP06 EXEC BKUPN,FILE=06,VOL=JX2JL1
```

```
//STEP07 EXEC BKUPN,FILE=07,VOL=JX2JL2
//STEP08 EXEC BKUPN,FILE=08,VOL=J92JL1
//JNLLOG EXEC BKLOG,SYSIN=LDJ92JL1
//STEP09 EXEC BKUPN,FILE=09,VOL=J92JL2
//JNLLOG EXEC BKLOG,SYSIN=LDJ92JL2
//STEP10 EXEC BKUPN,FILE=10,VOL=J9OU01
```

```
SYS3.HKEEP.SYSIN(LDJ92JL1)
DBABKLG PRO BDJ92JL1
DBABKLG TRN BDJ92JL1
```

```
ZBKUPD99
```

```
//*=====
//* SYSJ DAILY BACKUP - BRS JOB (MUST RUN LAST) *
//*=====
//          SET  SYS=SYSJ,CYC=DAILY,EJECT=EJECTD,RET=6
//BRS      EXEC BRS,VDISP=MOD
//DISKMAP EXEC DISKMAP
//LOGGING EXEC BKLOG,SYSIN=LDENDED
//EJECT    EXEC EJECT
```

```
IDMSPJNL
```

```
//*****
//** OFFLOAD JOURNAL FILES
//*****
//ARCHIVE EXEC IDMSAJNL,CV=PRO,SYSIDMS=SYSIDMSP
//**
//*****
//** FAILURE
//*****
//FAIL IF ( ABEND OR RC > 4 ) THEN
//FAIL      EXEC TSOBATCH
//TSOBATCH.SYSTSIN DD *
EX 'IDMSR.COMMON.SRCLIB(DBAJNLLG)' 'PRO JOURNAL_ARCHIVE_***FAILED***'
/*
//TSOBATCH.ARCLOG DD DSN=IDMSR.PRO.ARCHIVE.REGISTER,DISP=MOD
//**
//OPSMMSG EXEC OPSMSG,MESSAGE=JNLNPRO
//**
//*****
//** SUCCESS
//*****
// ELSE
//**
//SUCCESS EXEC TSOBATCH
//TSOBATCH.SYSTSIN DD *
EX 'IDMSR.COMMON.SRCLIB(DBAJNLLG)' 'PRO JOURNAL_ARCHIVE'
/*
//TSOBATCH.ARCLOG DD DSN=IDMSR.PRO.ARCHIVE.REGISTER,DISP=MOD
```

```

// ENDIF
//*
//*****
//** NOTIFY CA7 OF SUCCESS
//*****
//*
//CA7POST IF ( RC < 4 ) THEN
//CA7POST EXEC CA7SVC,
//      PARM='D=CA7.IDMSP.JNL,, '
//      ENDIF
/*

```

```

IDMSR.COMMON.SRCLIB(DBAJNLLG)
PROC 2 CV TEXT
/* CONTROL MSG FLUSH CONLIST SYMLIST LIST
OPENFILE ARCLOG OUTPUT
ATTR CATLIST LRECL(137) RECFM(V B A) DSORG(PS) BLKSIZE(3151)
ALLOC DD(SYSDVAL) NEW SPACE(10) TRACKS USING(CATLIST)
LISTC ENT('IDMSR.&CV..ARCHIVE') CATALOG('SYS3C.ICFCAT.IPCCATJ1') +
      OUTFILE(SYSDVAL)
OPENFILE SYSDVAL
WRITE &SYSDVAL
READDVAL W1 W2 W3 W4
IF &STR(&W2) = &STR(BASE) OR &STR(&W2) = &STR(SYSTEM) THEN DO
      GOTO LOOP
      END
SET KEEP=&STR(&W4)
GOTO LOOP
THEEND: +
CLOSFILE SYSDVAL
CLOSFILE ARCLOG
FREE DD(SYSDVAL ARCLOG)
EXIT
LOOP: +
ERROR DO
      IF &LASTCC = 400 THEN DO
            SET &ARCLOG = &STR(&KEEP &CV &SYSDATE &SYSTIME - &TEXT)
            PUTFILE ARCLOG
            GOTO THEEND
            END
      END
GETFILE SYSDVAL

```

If an Archive Journal job fails and leave the disk journal, SYSJNL1, in the Offload status, you need to re-submit the archive journal job to complete the archive.

A message will be logged in TSO REG as RESTART_ARCHIVE to differentiate from JOURNAL_ARCHIVE

IDMSR.PRO.ARCHIVE.G0690V00 PRO 12/16/15 08:31:12 - JOURNAL_ARCHIVE
IDMSR.PRO.ARCHIVE.G0699V00 PRO 12/16/15 08:31:12 - RESTART_ARCHIVE
IDMSR.PRO.ARCHIVE.G0700V00 PRO 12/16/15 08:31:12 - JOURNAL_ARCHIVE

```
IDMSR.PRO.PRODJCL(JNLREST)
***** Top of Data *****
//IDMSPJNL JOB (SN753S,DB), 'PJNL RESTART', CLASS=P, MSGCLASS=Y,
//          MSGLEVEL=(1,1)
//JOBPROC JCLLIB ORDER=(IDMSR.PROCLIB)
//*****
//**
//**  RESTARTS A JOURNAL ARCHIVE THAT FAILED
//**
//*****
//**  YOU'LL NEED TO KNOW WHICH JOURNAL FAILED.
//**
//**  1) CHANGE    SYSJNL1  TO THE NAME OF THE FAILED JOURNAL (SYSJNLX)
//**
//**  2) SUBMIT THE JOB
//**
//**  3) CHECK THE OUTPUT AND THE ENTRY IN THE ARCHIVE LOG
//**
//*****
//AJNLJOB EXEC IDMSAJNL, CV=PRO, SYSIDMS=SYSIDMSP
//IDMSAJNL.SYSIPT DD *
//CONNECT TO SYSTEM;
//ARCHIVE JOURNAL BUFFERS 20 RESTART SYSJNL1;
//*
//*
//SUCCESS EXEC TSOBATCH, COND=( (0, NE, AJNLJOB.IDMSAJNL) )
//TSOBATCH.SYSTSIN DD *
//EX 'IDMSR.COMMON.SRCLIB(DBAJNLLG)' 'PRO RESTART_ARCHIVE'
//*
//TSOBATCH.ARCLOG DD DSN=IDMSR.PRO.ARCHIVE.REGISTER, DISP=MOD
//*
//*
//FAIL EXEC TSOBATCH, COND=( (0, EQ, AJNLJOB.IDMSAJNL) , EVEN)
//TSOBATCH.SYSTSIN DD *
//EX 'IDMSR.COMMON.SRCLIB(DBAJNLLG)' 'PRO RESTART_ARCHIVE_**FAILED***'
//*
//TSOBATCH.ARCLOG DD DSN=IDMSR.PRO.ARCHIVE.REGISTER, DISP=MOD
//*
//*
//OPSMMSG EXEC OPSMSG, MESSAGE=JNLNOPRO,
//          COND=( (0, EQ, AJNLJOB.IDMSAJNL) , EVEN)
```