

# IMS DB Recovery Basics

*Session IMS-08*

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# IMS Database Recovery

Why do Databases get recovered?

They took the 'hit'

- Out of space
  - Abend U0844
- Broken
  - Mismatched Indexes
  - Pointer errors
  - Free space full
- Bad data
  - Corruption
  - Lost data

# IMS Database Recovery

How do Databases get recovered?

Data rebuild due to ***corruption***

This will require more than IMS Utilities or IMS Tools. IMS is not sensitive to data content for the most part. IMS fields can be defined as X, P or C

- X is hexadecimal as in x'F1'
- P is a Packed Decimal consisting of numbers and ending with a 'C' or other valid Packed field identifier
- C is alphanumeric character
  - IMS is not aware of the validity or context of these characters. For instance, the string DENNIS passes the alphanumeric criteria as does DEMISE. They likely have two different meanings to the application.

Recovery from Data corruption requires Application Programming participation!

# IMS Database Recovery

How do Databases get recovered?

- Backup restoration
- IMS Log data applied
- Data rebuild

# IMS Database Recovery

## Utilities for recovery data collection

- Image Copy
  - Offline
  - Online - fuzzy
- Change Accumulation
- IMS Logs – SLDS
- DBRC

# IMS Database Recovery

## Utilities for recovery Verification

- Pointer Checker
  - Validate pointers
  - Free Space values
  - Indexes
  - Logical relationships
- Dataset Space Monitor
  - Dataset usage
  - Free Space available allocated vs used

# IMS Database Recovery

## Utilities for recovery data collection

### Image Copy

- Offline copy of a Database Dataset
  - Database is Not available to users
  - Multiple Database Datasets
  - 1 or 2 Copies each
  - Writes Image Copy dataset records to DBRC

*/DBR db*

Execute DFSUDMP0

*/STA db*

# IMS Database Recovery

```

//*-----*
//*  THIS IS A BATCH JOB  ----
//*          THEREFOR
//*          THE DATABASE MUST BE /DBR'D IN ORDER FOR THIS TO RUN
//*          IF THERE IS NO /DBR THEN THE JOB WILL FAIL WITH
//*          ABEND U3303
//*-----*
//OLIC      EXEC PGM=DFSUDMP0, PARM='DBRC=Y'
//*
//STEPLIB  DD DISP=SHR, DSN=IMS.IMSB.SDFSRESL
//DFSRESLB DD DISP=SHR, DSN=IMS.IMSB.SDFSRESL
//PROCLIB  DD DISP=SHR, DSN=IMS.IMSB.PROCLIB
//DFSVSAMP DD DISP=SHR, DSN=IMS.IMSB.PROCLIB (DFSVSMB)
//IEFRDER  DD DUMMY, DCB=BLKSIZE=4096
//IMS      DD DISP=SHR, DSN=IMS.IMSB.DBDLIB
//SYSUDUMP DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//DMP1     DD DSNAME=IMS.IMSB.IVPDB3.DFSIVD3A.IC1,
//          DISP=(NEW,CATLG,DELETE), UNIT=SYSDA, SPACE=(CYL,(1,1))
//DMP2     DD DSNAME=IMS.IMSB.IVPDB3.DFSIVD3B.IC1,
//          DISP=(NEW,CATLG,DELETE), UNIT=SYSDA, SPACE=(CYL,(1,1))
//*
//SYSIN    DD *
D1 IVPDB3   DFSIVD3A DMP1           1000
D1 IVPDB3   DFSIVD3B DMP2           1000

```



# IMS Database Recovery

Utilities for recovery data collection

## Image Copy – DFSUDMT0

- Online copy of a Database Dataset
  - Database IS available to users
  - Multiple Database Datasets
  - 1 Copy only
  - Invokes DFSMS
  - Requires appropriate hardware
  - Writes Image Copy dataset information to DBRC

*No /DBR*

*Quiesce could be helpful*

# IMS Database Recovery

Utilities for recovery data collection

## Image Copy – DFSUICP0

- Online copy of a Database Dataset
  - Database IS available to users
  - Multiple Database Datasets
  - 1 or 2 Copies each
  - May be checkpointed for restart
  - Writes Image Copy dataset information to DBRC

*No /DBR*

*Quiesce could be helpful*

# IMS Database Recovery

```

// *-----*
// * Image Copy JCL -----*
// * THIS IS A BMP JOB ----
// *
// * THEREFOR
// * THE DATABSE MUST BE ONLINE IN ORDER FOR THIS TO RUN
// * NO /DBR IS REQUIRED
// * THE IC OUTPUT IS RECORDED IN THE DBRC RECON
// *-----*
// *
// *OLIC EXEC PGM=DFSUDMP0, PARM='BMP,DFSUICP0,DFSIVPC'
// *
// *STEPLIB DD DISP=SHR,DSN=IMS.IMSB.SDFSRESL
// *DFSRESLB DD DISP=SHR,DSN=IMS.IMSB.SDFSRESL
// *PROCLIB DD DISP=SHR,DSN=IMS.IMSB.PROCLIB
// *IMS DD DISP=SHR,DSN=IMS.IMSB.DBDLIB
// *SYSUDUMP DD SYSOUT=*
// *SYSPRINT DD SYSOUT=*
// *SYSUDUMP DD SYSOUT=*
// *DFSUCKPT DD DSNAME=IMS.IMSB.DFSIVPC.CKKPT,SPSCE=(TRK,(1,1))
// *DMP1 DD DSNAME=IMS.IMSB.IVPDB3.DFSIVD3A.IC1,
// * DISP=(NEW,CATLG,DELETE),UNIT=SYSDA,SPACE=(CYL,(1,1))
// *DMP2 DD DSNAME=IMS.IMSB.IVPDB3.DFSIVD3B.IC1,
// * DISP=(NEW,CATLG,DELETE),UNIT=SYSDA,SPACE=(CYL,(1,1))
// *
// *SYSIN DD *
D1 IVPDB3 DFSIVD3A DMP1 1000
D1 IVPDB3 DFSIVD3B DMP2 1000
//
// *DFSCCTL DD *
SBPACT ACTIV=COND

```

# IMS Database Recovery

Utilities for recovery data collection

## Change Accumulation – DFSUCUM0

- Consolidates Database updates from
  - Last Image Copy
  - Last Change Accumulation
- Uses Archive IMS logs – SLDS or RLDS
  - Eliminates non recovery information
- Creates a current sorted recovery log
- Writes current CA information DBRC

IMS Logs *must* be Archived

# IMS Database Recovery

## Utilities for recovery data collection

### Change Accumulation – DFSUCUM0

- Eliminating all non-database change records
- Specifying a purge date (or dates) to eliminate all database records before that date
- Sorting the acceptable database change records
- Combining all database change records that update the same database physical record

IMS Logs *must* be Archived

# IMS Database Recovery

## Change Accumulation JCL

```
//STEP1 EXEC PGM=DFSUCUM0,PARM='CORE=512000'
//STEPLIB DD DSN=IMS.IMSB.SDFSRESL,DISP=SHR
//IMS DD DSN=IMS.IMSB.DBDLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSOUT DD SYSOUT=*
//SORTLIB DD DSN=SYS1.SORTLIB,DISP=SHR
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(2),,CONTIG)
//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(2),,CONTIG)
//SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(2),,CONTIG)
//SORTWK04 DD UNIT=SYSDA,SPACE=(CYL,(2),,CONTIG)
//SORTWK05 DD UNIT=SYSDA,SPACE=(CYL,(2),,CONTIG)
//SORTWK06 DD UNIT=SYSDA,SPACE=(CYL,(2),,CONTIG)
//DFSUCUMO DD DSN=IMS.IMSB.CUM1,DISP=OLD,
// UNIT=TAPE,VOL=SER=CUMTP1
//DFSUCUMN DD DSN=IMS.IMSB.CUM2,DISP=(NEW,KEEP),
// UNIT=TAPE,VOL=SER=CUMTP2
//DFSUDD1 DD DUMMY
//DFSULOG DD DSN=IMS.LOG1,DISP=OLD.
// UNIT=TAPE,VOL=SER=LTAPE3
// DD DSN=IMS.LOG2,DISP=OLD,
// UNIT=TAPE,VOL=SER=LTAPE4
//*
//SYSIN DD *
ID 004 DB0 *ALL 072000000000
/*
```

```
//SYSIN DD *
DB0DI32DB01071751200000
DB0DI32DB02071731500000 DDI3IA
DB1DI32DB02071731500000 DDI3OA
DB1 *OTHER
```

day 173 of year 2007 and before 1500 hours are to be eliminated

# IMS Database Recovery

## Utilities for recovery data collection

- IMS Logs – SLDS
  - Must be Archived
  - IMS SLDS information is recorded in DBRC at OLDS Archive
  - SLDS may be used for IMS
    - IMS Emergency Restart
    - Database recovery
    - Create or Update Change Accumulations
  - Reporting and Auditing

# IMS Database Recovery

Utilities for recovery data collection

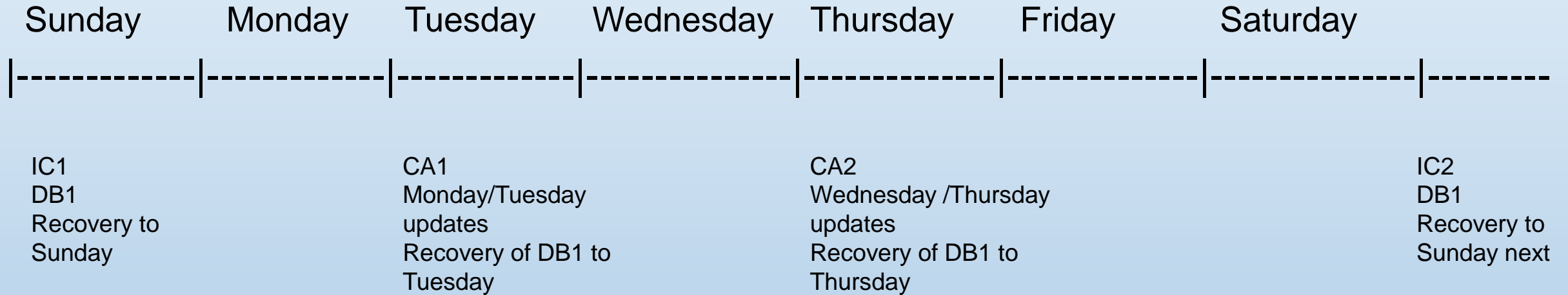
## Timeline



# IMS Database Recovery

## Utilities for recovery data collection

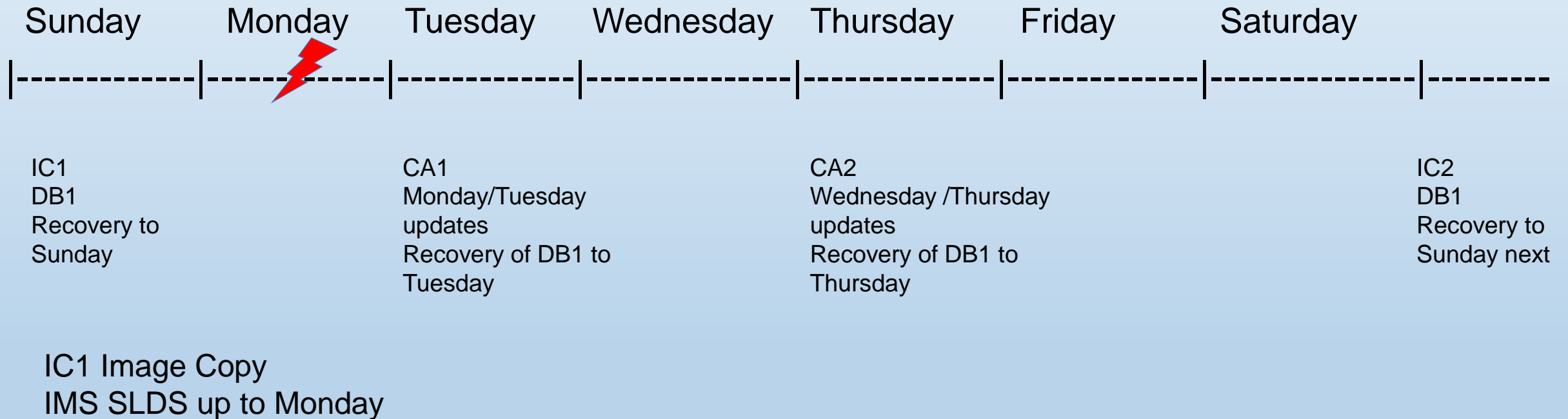
- Timelines



# IMS Database Recovery

## Utilities for recovery data collection

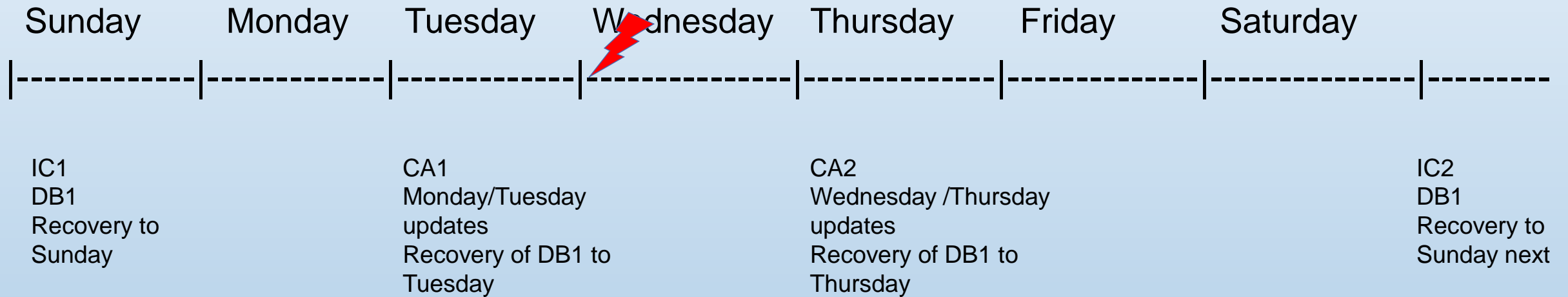
- Timelines



# IMS Database Recovery

## Utilities for recovery data collection

- Timelines



IC1 Image Copy

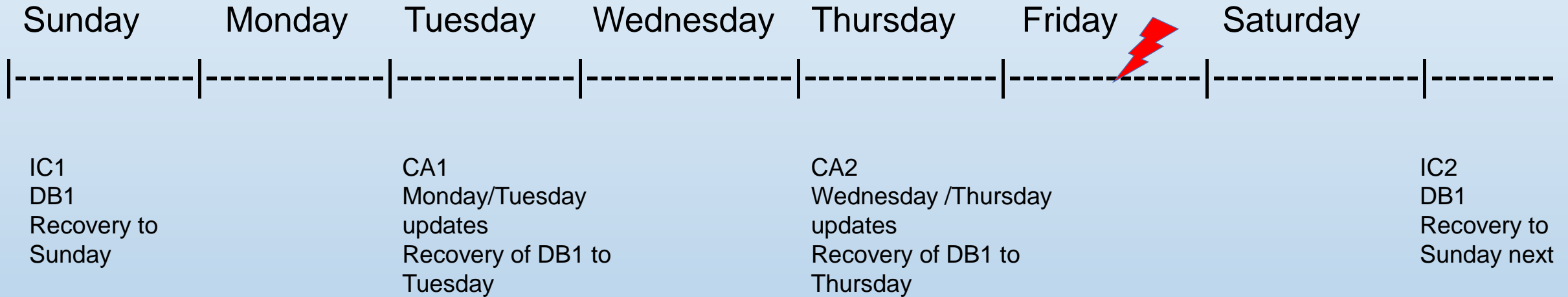
CA1 Includes Monday & Tuesday

IMS SLDS from end of CA1 to Wednesday

# IMS Database Recovery

## Utilities for recovery data collection

- Timelines



IC1 Image Copy

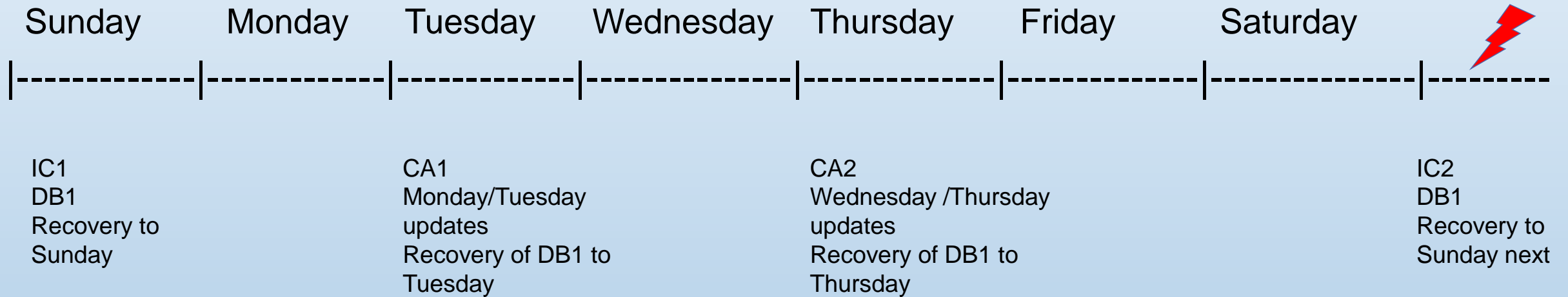
CA2 Includes CA1 & Wednesday Thursday & part of Friday

IMS SLDS from end of CA2 to Friday

# IMS Database Recovery

## Utilities for recovery data collection

- Timelines



IC2 Image Copy

Previous IC1, CA1, CA2 are superseded

# IMS Database Recovery

Making it Easier

## DBRC

Register Databases to DBRC

HALDB must be registered

Create Change Accumulation Groups - CAGRP

Application dependencies

Recovery dependencies

Create Database Dataset Group for Recovery - DBDSGRP

May contain the same members as CAGRP

# IMS Database Recovery

Making it Easier

DBRC

Use GENJCL. Commands

GENJCL.IC creates Image copy job DBDS group

GENJCL.ARCHIVE creates SLDS log record for any OLDS not archived

May need a /SWI OLDS to archive needed recovery data

GENJCL.CA for Change Accumulation

Creates JCL for a database or all members of a defined CAGRP

GENJCL.RECOV for Recovery

Creates JCL for a Recovery of a Database or Group of Databases

## Initializing a DBDSGRP

```
INIT.DBDSGRP GRPNAME (IVP) +
MEMBERS ( (DBFSAMD3, CUSDB) +
          (DBFSAMD4, LOAN) +
          (AUTODB, DFSDLR) +
          (EMPDB2, DFSEMP) +
          (IVPDB1, DFSIVD1) +
          (IVPDB2, DFSIVD2) +
          (IVPDB3, DFSIVD3A) )
```

## Listing a DBDSGRP

17.336 19:12:15.492438

LISTING OF RECON

PAGE 0002

-----  
DBDSGRP

GRPNAME=IVP

#MEMBERS=7

-DBD-

-DDN/AREA-

DBFSAMD3

CUSDB

DBFSAMD4

LOAN

AUTODB

DFSDLR

EMPDB2

DFSEMP

IVPDB1

DFSIVD1

IVPDB2

DFSIVD2

IVPDB3

DFSIVD3A

DSP0180I NUMBER OF RECORDS LISTED IS

1



# IMS Database Recovery

## GENJCL.IC

```
//DDS0027L JOB '&SYSUID',CLASS=A,MSGCLASS=H,  
//          NOTIFY=&SYSUID,REGION=0M  
//S2      EXEC PGM=DSPURX00,  
//          REGION=50M  
//STEPLIB DD DISP=SHR,DSN=IMS.IMST.SDFSRESL  
//JCLPDS  DD DISP=SHR,DSN=IMS.IMST.PROCLIB  
//JCLOUT  DD DISP=SHR,DSN=DDS0027.GENERAL.JCL(IMSTARC)  
//SYSPRINT DD SYSOUT=*  
//SYSIN   DD *  
          GENJCL.IC GROUP(IVP)  
//
```

# IMS Database Recovery

```

//*
%DELETE (%IVPCIC NE '')
//IC%STPNO EXEC PGM=DFSUDMP0,PARM='DBRC=Y'
%ENDDDEL
%DELETE (%IVPCIC EQ '')
//IC%STPNO EXEC PGM=DFSUDMP0,PARM='DBRC=Y,CIC'
%ENDDDEL
//*
//*          JCL FOR IMAGE COPY.
//*
//STEPLIB DD DSN=IMS.IMSB.SDFSRESL,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
%DELETE (%RCNDSN1 EQ '')
//RECON1 DD DSN=%RCNDSN1,DISP=SHR
%ENDDDEL
%DELETE (%RCNDSN2 EQ '')
//RECON2 DD DSN=%RCNDSN2,DISP=SHR
%ENDDDEL
%DELETE (%RCNDSN3 EQ '')
//RECON3 DD DSN=%RCNDSN3,DISP=SHR
%ENDDDEL
//IMS DD DSN=IMS.IMSB.DBDLIB,DISP=SHR
%SELECT DBDS (%DBNAME,%DBDDN)
%DELETE (%DBADSAV NE 'AVAIL')
//%DBADDN DD DSN=%DBDSN,DISP=SHR
%ENDDDEL
%DELETE (%DBADSAV NE '')
//%DBDDN DD DSN=%DBDSN,DISP=SHR
%ENDDDEL
%ENDSEL
//%ICDDN1 DD DISP=OLD,DSN=%ICDSN1
%DELETE (%COPIES EQ '1')
//%ICDDN2 DD DISP=OLD,DSN=%ICDSN2
%ENDDDEL
//SYGIN DD *

```

# IMS Database Recovery

```
//STEPLIB DD DSN=IMS.IMST.SDFSRESL,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//IMS DD DSN=IMS.IMST.DBDLIB,DISP=SHR
//CUSDB DD DSN=IMS.IMST.CUSDB,DISP=SHR
//D1OU1 DD DISP=OLD,DSN=IMS.IMST.DBFSAMD3.CUSDB.IC101
//SYSIN DD *
D1 DBFSAMD3 CUSDB D1OU1
/*
//IMSTJCL JOB ACTINFO1,
// CLASS=A,
// MSGCLASS=H,MSGLEVEL=(1,1),
// REGION=0M
//*
/*
//IC2 EXEC PGM=DFSUDMP0,PARM='DBRC=Y'
/*
/* THIS JCL ORIGINATES FROM THE USER'S 'JCLPDS' LIBRARY.
/* KEYWORDS ARE REPLACED BY THE GENJCL FUNCTION OF
/* THE IMS DATA BASE RECOVERY CONTROL FEATURE.
/*
/* JCL FOR IMAGE COPY.
/*
//STEPLIB DD DSN=IMS.IMST.SDFSRESL,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//IMS DD DSN=IMS.IMST.DBDLIB,DISP=SHR
//LOAN DD DSN=IMS.IMST.LOAN,DISP=SHR
//D1OU1 DD DISP=OLD,DSN=IMS.IMST.DBFSAMD4.LOAN.IC101
//SYSIN DD *
D1 DBFSAMD4 LOAN D1OU1
/*
```

# IMS Database Recovery

## Database Recovery

DFSURDB0

IMS Utility for database recovering IMS Databases

- Inputs
  - Image Copy
  - Change Accumulation
  - IMS logs – SLDS
  - Some combination of the above
- Output
  - A correct and usable database

# IMS Database Recovery

## DFSURDB0 JCL

```
//STEP1 EXEC PGM=DFSRR00, PARM='UDR, DFSURDB0, DD32DB01'
//STEPLIB DD DSN=IMS.SDFSRESL, DISP=SHR
//DFSRESLB DD DSN=IMS.SDFSRESL, DISP=SHR
//IMS DD DSN=IMS.DBDLIB, DISP=SHR
//SYSPRINT DD SYSOUT=A
//DUMPDS DD DSN=IMS.DB1.ICOUT1, DISP=(OLD, KEEP)
//*
//DFSUCUM DD DSN=IMS.ACCUM1
//*
//DFSULOG DD DSN=IMSLOG.SLDS1, DISP=(OLD, KEEP)
// DD DSN=IMSLOG.SLDS2, DISP=(OLD, KEEP)
//*
//DBHD3B DD DSN=IMS.DBHD3B, DISP=(NEW, KEEP),
// UNIT=SYSDA, VOL=SER=DBASE2,
// SPACE=(CYL, (20, 10))
//DFSVSAMP DD DSN=IMS.PROCLIB(DFSVSMB)
//*
//SYSIN DD *
S DD32DB01 DBHD3B DUMPDS
/*
```

DUMPDS = Image Copy dataset

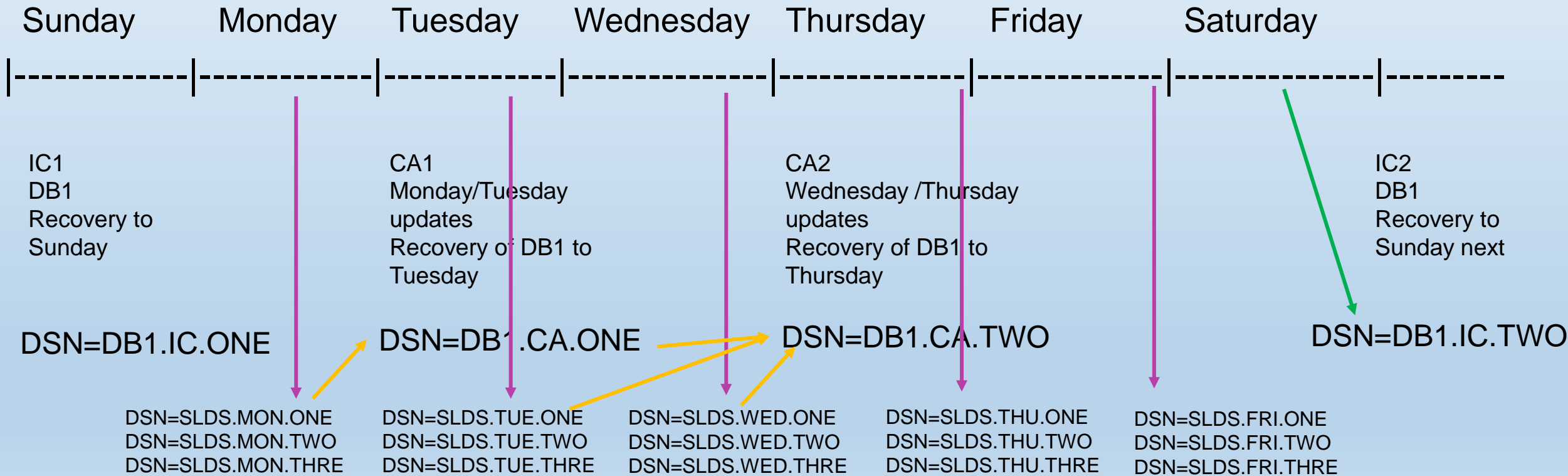
DFSUCUM = Current Change Accumulation

DFSULOG = SLDS from the latest CA to the point of recovery

# IMS Database Recovery

## Utilities for recovery data collection

- Timelines



# IMS Database Recovery

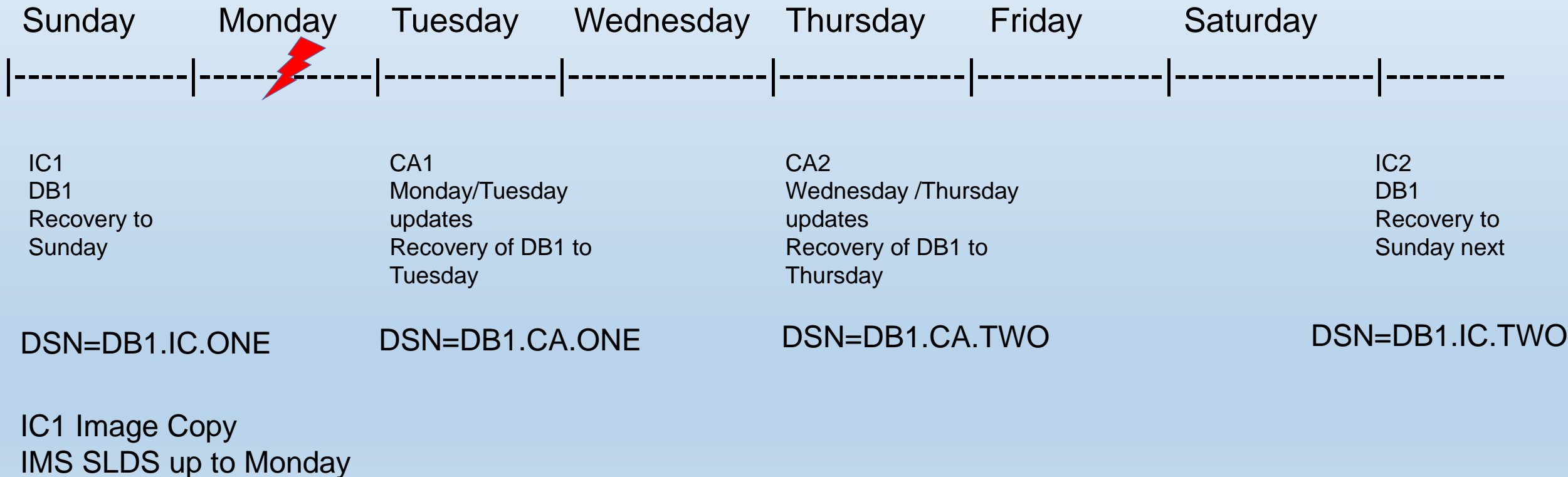
```
//STEP1 EXEC PGM=DFSRRRC00, PARM='UDR, DFSURDB0, DD32DB01'
//STEPLIB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//DFSRESLB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//IMS DD DSN=IMS. IMSB. DBDLIB, DISP=SHR
//SYSPRINT DD SYSOUT=A
//DUMPDS DD DSN=IMS. DB1. ICBOUT1, DISP=(OLD, KEEP)
//*
//DFSUCUM DD DSN=IMS. ACCUM1
//*
//DFSULOG DD DSN=IMS. IMSBLOG. SUNDAY, DISP=(OLD, KEEP)
// DD DSN=IMS. IMSBLOG. MONDAY, DISP=(OLD, KEEP)
// DD DSN=IMS. IMSBLOG. TUESDAY, DISP=(OLD, KEEP)
//*
//DBHD3B DD DSN=IMS. IMSB. DBHD3B, DISP=(NEW, KEEP),
// UNIT=SYSDA, VOL=SER=DBASE2,
// SPACE=(CYL, (20, 10))
//DFSVSAMP DD DSN=IMS. IMSB. PROCLIB (DFSVSMB)
//*
//SYSIN DD *
S DD32DB01 DBHD3B DUMPDS
/*
```

IMS Logs from the Image Copy to current.

# IMS Database Recovery

## Utilities for recovery data collection

- Timelines





# IMS Database Recovery

```
//STEP1 EXEC PGM=DFSRR00, PARM='UDR, DFSURDB0, DD32DB01'
//STEPLIB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//DFSRESLB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//IMS DD DSN=IMS. IMSB. DBDLIB, DISP=SHR
//SYSPRINT DD SYSOUT=*
//DUMPDS DD DSN=DB1. IC. ONE, DISP= (OLD, KEEP)
//*
//DFSUCUM DD DSN=DUMMY
//*
//DFSULOG DD DSN=SLDS. MON. ONE, DISP= (OLD, KEEP)
// DD DSN=SLDS. MON. TWO, DISP= (OLD, KEEP)
// DD DSN=SLDS. MON. THRE, DISP= (OLD, KEEP)
//*
//DBHD3B DD DSN=IMS. IMSB. DBHD3B, DISP= (NEW, KEEP) ,
// UNIT=SYSDA, VOL=SER=DBASE2,
// SPACE= (CYL, (20, 10) )
//DFSVSAMP DD DSN=IMS. IMSB. PROCLIB (DFSVSM0B)
//*
//SYSIN DD *
S DD32DB01 DBHD3B DUMPDS
/*
```

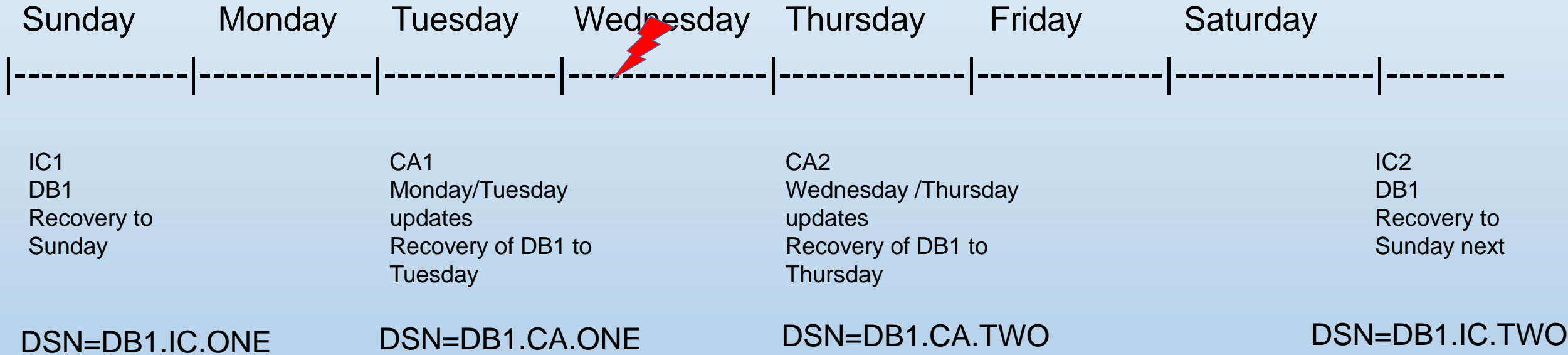
**DSN=DB1.IC.ONE**

DSN=SLDS.MON.ONE  
 DSN=SLDS.MON.TWO  
 DSN=SLDS.MON.THRE

# IMS Database Recovery

## Utilities for recovery data collection

- Timelines



IC1 Image Copy

CA1 Includes Monday & Tuesday

IMS SLDS from end of CA1 to Wednesday

# IMS Database Recovery

```
//STEP1 EXEC PGM=DFSRR00, PARM='UDR, DFSURDB0, DD32DB01'
//STEPLIB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//DFSRESLB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//IMS DD DSN=IMS. IMSB. DBDLIB, DISP=SHR
//SYSPRINT DD SYSOUT=*
//DUMPDS DD DSN=DB1. IC. ONE, DISP=(OLD, KEEP)
//*
//DFSUCUM DD DSN=DB1. CA. ONE
//*
//DFSULOG DD DSN=SLDS. TUE. ONE, DISP=(OLD, KEEP)
// DD DSN=SLDS. TUE. TWO, DISP=(OLD, KEEP)
// DD DSN=SLDS. TUE. THRE, DISP=(OLD, KEEP)
// DD DSN=SLDS. WED. ONE, DISP=(OLD, KEEP)
//*
//DBHD3B DD DSN=IMS. IMSB. DBHD3B, DISP=(NEW, KEEP),
// UNIT=SYSDA, VOL=SER=DBASE2,
// SPACE=(CYL, (20, 10))
//DFSVSAMP DD DSN=IMS. IMSB. PROCLIB (DFSVSMB)
//*
//SYSIN DD *
S DD32DB01 DBHD3B DUMPDS
/*
```

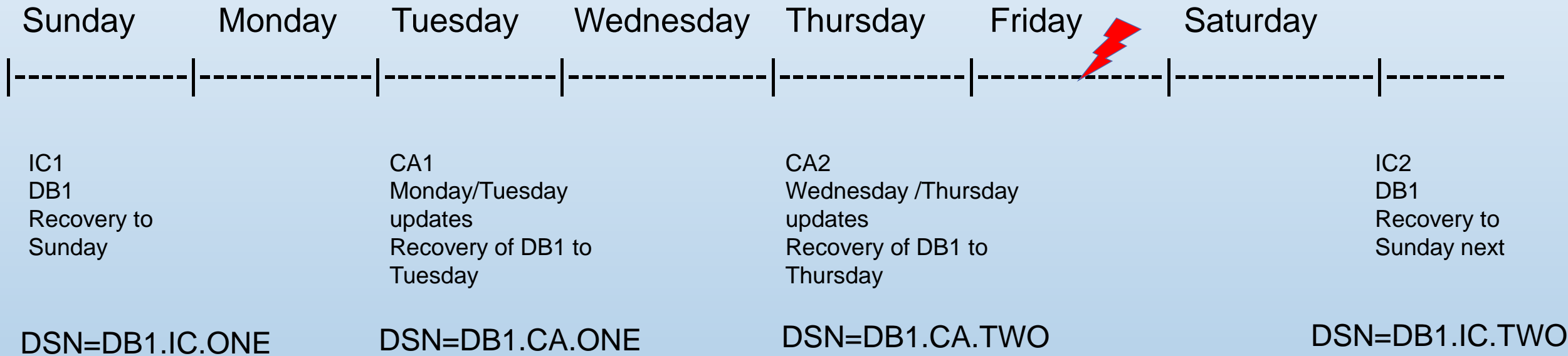
**DSN=DB1.IC.ONE**  
**DSN=DB1.CA.ONE**

DSN=SLDS.TUE.ONE  
 DSN=SLDS.TUE.TWO  
 DSN=SLDS.TUE.THRE

# IMS Database Recovery

## Utilities for recovery data collection

- Timelines



IC1 Image Copy

CA2 Includes CA1 & Wednesday Thursday & part of Friday

IMS SLDS from end of CA2 to Friday

# IMS Database Recovery

```
//STEP1 EXEC PGM=DFSRRC00, PARM='UDR, DFSURDB0, DD32DB01'
//STEPLIB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//DFSRESLB DD DSN=IMS. IMSB. SDFSRESL, DISP=SHR
//IMS DD DSN=IMS. IMSB. DBDLIB, DISP=SHR
//SYSPRINT DD SYSOUT=*
//DUMPDS DD DSN=DB1. IC. ONE, DISP=(OLD, KEEP)
// *
//DFSUCUM DD DSN=DB1. CA. TWO
// *
//DFSULOG DD DSN=SLDS. FRI. ONE, DISP=(OLD, KEEP)
// DD DSN=SLDS. FRI. TWO, DISP=(OLD, KEEP)
// *
//DBHD3B DD DSN=IMS. IMSB. DBHD3B, DISP=(NEW, KEEP),
// UNIT=SYSDA, VOL=SER=DBASE2,
// SPACE=(CYL, (20, 10))
//DFSVSAMP DD DSN=IMS. IMSB. PROCLIB (DFSVSMB)
// *
//SYSIN DD *
S DD32DB01 DBHD3B DUMPDS
/*
```

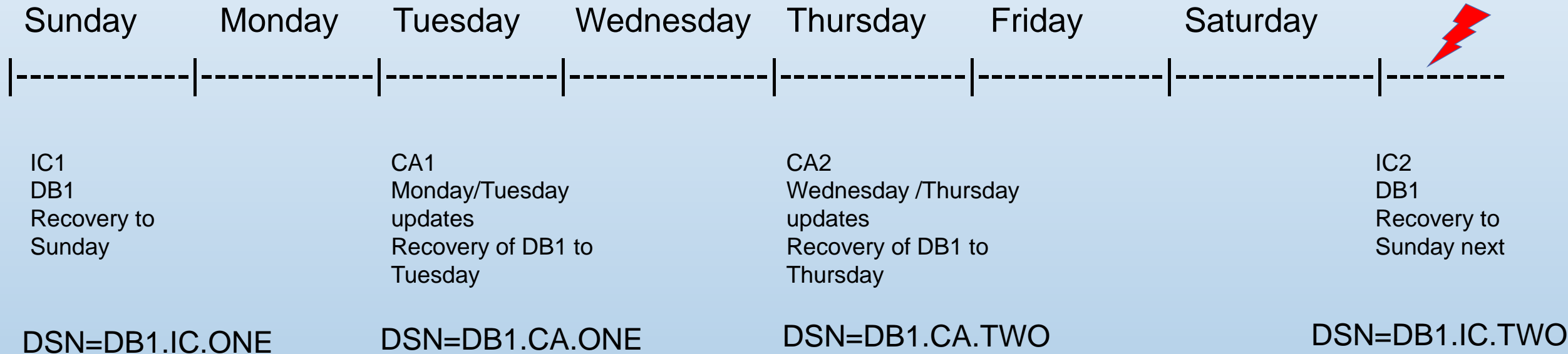
**DSN=DB1.IC.ONE**  
**DSN=DB1.CA.TWO**

DSN=SLDS.FRI.ONE  
DSN=SLDS.FRI.TWO

# IMS Database Recovery

## Utilities for recovery data collection

- Timelines



IC2 Image Copy  
Previous CA1, CA2, SLDS no longer required


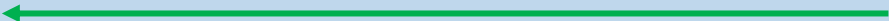
# IMS Database Recovery

```
//STEP1 EXEC PGM=DFSRR00, PARM='UDR, DFSURDB0, DD32DB01'  
//STEPLIB DD DSN=IMS.IMSB.SDFSRESL, DISP=SHR  
//DFSRESLB DD DSN=IMS.IMSB.SDFSRESL, DISP=SHR  
//IMS DD DSN=IMS.IMSB.DBDLIB, DISP=SHR  
//SYSPRINT DD SYSOUT=*  
//DUMPDS DD DSN=DB1.IC.TWO, DISP=(OLD, KEEP)  
//*  
//DFSUCUM DD DUMMY  
//*  
//DFSULOG DD DUMMY, DISP=(OLD, KEEP)  
//*  
//DBHD3B DD DSN=IMS.IMSB.DBHD3B, DISP=(NEW, KEEP),  
// UNIT=SYSDA, VOL=SER=DBASE2,  
// SPACE=(CYL, (20, 10))  
//DFSVSAMP DD DSN=IMS.IMSB.PROCLIB(DFSVSM0B)  
//*  
//SYSIN DD *  
S DD32DB01 DBHD3B DUMPDS  
/*
```

DSN=DB1.IC.TWO

# IMS Database Recovery

## Database Reorganization

1. */DBR database*  Maybe Image Copy here
2. Unload the Database
3. Delete and redefine the Database Dataset
4. Load the Database  Maybe Image Copy here too
5. */STA or UPDATE database*



# IMS Database Recovery

Abend Scenario

Abend U0844

ALMOST the same reorganization process

1. */DBR database*
  2. Unload the Database
  3. Delete and redefine the Database Dataset  
With a **LARGER** size
1. Load the Database
  2. */STA or UPDATE database*

No space is available in the database, or the data set is defined as DSNAME=NULLFILE or DD DUMMY

# IMS Database Recovery

## Preparation

## Practice Practice PRACTICE

Find a sandbox or test environment to exercise the process

1. Restore an Image Copy
2. Recover with an Image Copy
3. Recover with an Image Copy and SLDS
4. Recover with an Image Copy and Change Accum
5. Recover with an Image Copy, Change Accum and SLDS
6. After each process, verify using a Pointer Checker tool to validate a usable database
7. After any Recovery Always run a NEW Image Copy to establish the next point of Recovery

# IMS Database Recovery

Preparation

Practice Practice PRACTICE

1. After any Recovery Always run a NEW Image Copy to establish the next point of Recovery

# IMS Database Recovery

## Recovery

This is the one task that cannot be failed at

# IMS Database Recovery

Improve the chances of good recoveries

Recommendations

A DLI job and an Online system using the same Database.  
Even if only one at a time  
It is a Data sharing environment

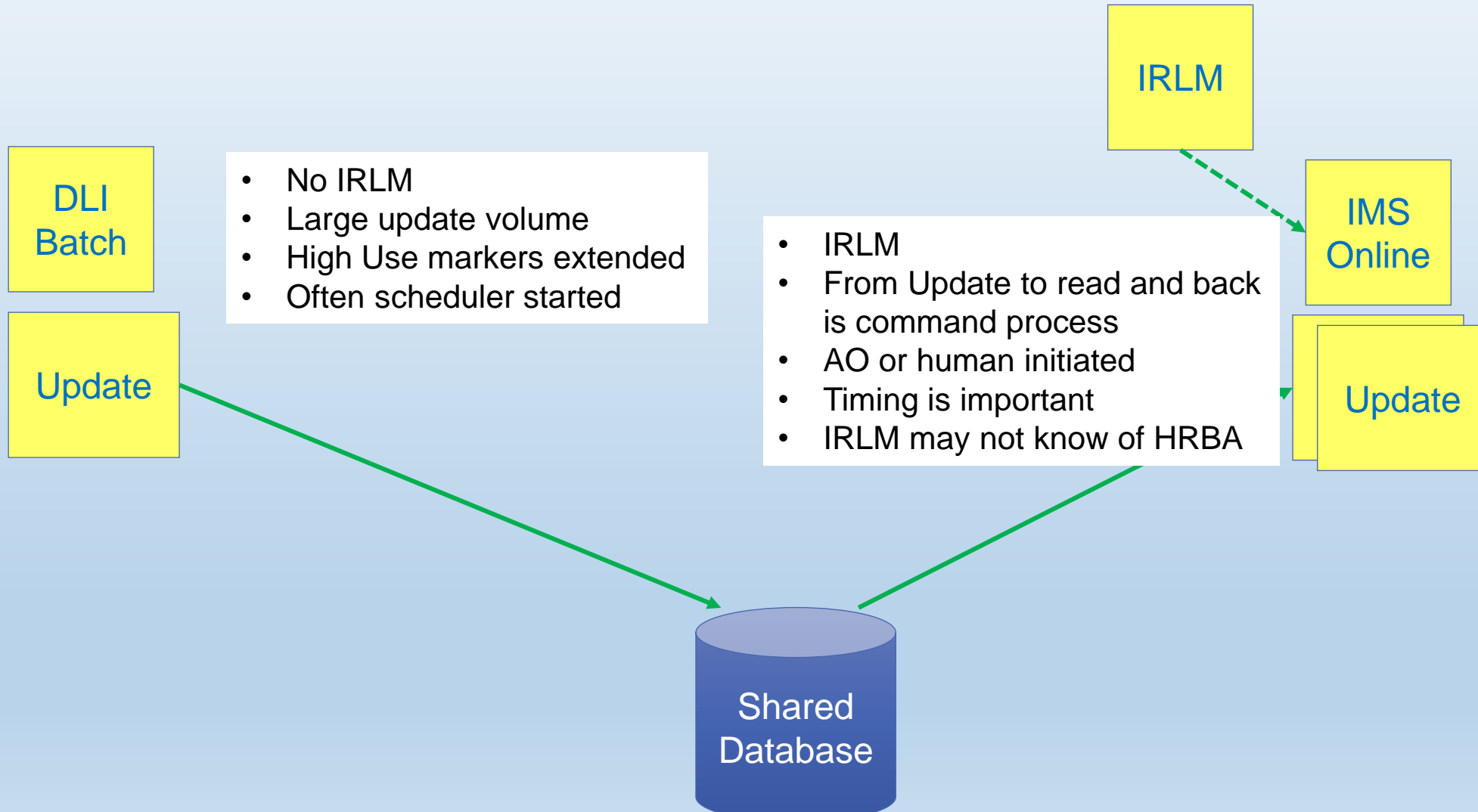
Use IRLM

Register Databases in DBRC Recons

If you have tooling – Use it!

Use IRLM anyway!

# IMS Database Recovery



# IMS Database Recovery

Preparation

Practice Practice PRACTICE

# IMS Recovery Solution Pack



# IMS Recovery Solution Pack – Components

- Combines powerful IMS Tools to provide all the capabilities needed to backup and recover your IMS standard full function, HALDB, and Fast Path databases
- Includes the following components:
  - IMS Recovery Expert
  - IMS High Performance Image Copy
  - IMS High Performance Change Accumulation
  - IMS Database Recovery Facility
  - IMS Database Recovery Facility / Extended Functions
  - IMS Index Builder
  - Recovery Sensor

# IMS Recovery Solution Pack – Components

- IBM IMS Recovery Expert
  - IMS tool that significantly improves/automates the management of IMS Database Backups and Recoveries via an ISPF interface
    - Single point of control to manage and generate JCL for recoveries
  - Provides features to automate and manage traditional DR processes
  - Provides the capability to create “**System Level Backups**”
  - Simplifies your database recovery process by eliminating the need to run a separate recovery job for each database data set requiring recovery
  - Identifies Recovery Points (RECONs and Quiet Time Analysis)
  - Creates Recovery Points (DB Quiesce)
  - Identifies whether you are prepared to do a recovery (health check)
  - Recovers IMS and DB2 to same consistent timestamp

# IMS Recovery Solution Pack – Components



- IBM IMS Database Recovery Facility
  - IMS Tool which provides fast and efficient recoveries of IMS databases
  - Simplifies database recoveries (referred to as DRF)
    - Automatically stops and starts databases being recovered
    - Combines all operations into one step/job by invoking other tools
      - IMS Index Builder
      - IMS Fast Path Advanced Tool - Build Index function (see FP Solution)
      - IMS High Performance Image Copy
      - IMS High Performance Pointer Checker (see other Solutions)
    - Processes input data in parallel when recovering multiple database data sets
      - Single pass of the change accumulation and log data sets
    - Doesn't require change accumulation prior to recovery
    - Allows you to recover to different database data sets for testing purposes
    - Supports various types of recoveries (TSR, PITR, PITCA, LASTIC, LASTPITCA)

# IMS Recovery Solution Pack – Components



- IBM IMS Database Recovery Facility: Extended Functions
  - Provides multiple functions for assisting with recovery-related tasks
  - Useful at both Local and Disaster Recovery Sites for identifying recovery related issues
  - Inspects data from RECONs, System Catalogs, and ITKB repositories to ensure database environment is recoverable
  - Each Extended Function performs a specific operation

# IMS Recovery Solution Pack – Components

- IBM IMS High Performance Image Copy
  - IMS tool that performs high-speed creation of image copy data sets (referred to as HPIC)
  - Reduces runtime by creating image copies in parallel
  - Enables you to set defaults for the runtime environment
  - Uses dynamic allocation for both the databases and image copies
  - Reduces database unavailability during Image Copy process
    - Leverages Flashcopy, Snapshot, and Concurrent Copy technologies
  - Minimizes CPU Utilization and Elapsed Times
  - Reduces manual intervention by using an IMS command interface
  - Reduces operational costs by stacking the output image copies

# IMS Recovery Solution Pack – Components



- IBM IMS Index Builder
  - IMS Tool that allows you to rebuild/initialize IMS indexes, rather than recover or reorganize them using traditional unload/reload processes
  - Creates multiple indexes (or specific indexes) in one job step
  - Eliminates the need to image copy indexes
  - Primary indexes do not need to exist to run the scan method
  - Provides better performance for Prefix Resolution by extracting/saving data
  - Uses both parallel sort/load when more than one index is being built
  - Scans HALDB partitions in parallel
  - Issues IMS commands to prevent updates to the databases

# IMS Recovery Solution Pack – Components

- IBM IMS High Performance Change Accumulation
  - IMS tool that performs high-speed creation of change accumulation datasets (referred to as HPCA)
  - Improves the performance of change accumulation operations by running multiple change accumulation groups in parallel and streaming the output to each group simultaneously
  - Supports Batch and Concurrent Image Copies as input
  - Can create Point-in-Time Change Accumulations (LOGTIME=)
  - Processes multiple CAGRPs in parallel reading logs only once saving I/O, CPU resources, and elapsed time
  - Runs significantly faster than basic Change Accumulation Utility
  - Used by IMS Database Recovery Facility when recovering databases

- System Level Backups
  - Special Backup Resource available only with IMS Recovery Solution Pack: IMS Recovery Expert
  - Often referred to as a “**SLB**”
  - Requires IMS Database Recovery Facility and other integrated IMS tools to perform recoveries from an SLB (included in solution pack)
  - Backs up an entire IMS system “nearly instantaneously” with little or no impact to the active IMS subsystems
  - Allows high-speed creation of image copy data sets for multiple database data sets simultaneously
  - Supports efforts to reduce storage costs by utilizing one backup for multiple purposes
  - Reduces use of CPU, I/O, and tape resources in backup processes



- System Level Backups (cont'd)
  - Uses Fast Replication (IBM, EMC, Hitachi)
    - Uses Storage processor instead of Host CPU
    - Uses Background copy for physical copy
  - Multiple volumes backed up simultaneously and almost instantaneously
  - Can take the place of 1000's of image copies
  - User chooses whether to backup the entire IMS system or only the database data sets
  - Contains all IMS data sets at consistent point in time
  - Can include only the IMS Database Data Sets when used for Local IMS Application Recovery only
  - Image Copies can be created “upon request”
    - Pseudo ICs can be registered in DBRC

- System Level Backups (cont'd)
  - Normal SLB can include a single IMS system or multiple IMS systems in a data sharing environment
  - Combined SLB allows for a single backup of multiple IMS or IMS and DB2 subsystems to a consistent point in time
    - Useful for coordinated DR
  - SLBs effectively contain image copies (batch or concurrent) for all databases associated with the system(s)
  - IMS Recovery Expert can validate, at execution time, that all databases will be included in the SLB

*Thank You*

# URLs for IMS Tools

## IMS Tools Product Documentation

<https://www.ibm.com/support/pages/ims-tools-product-documentation#imsdbrf-lib>

## IBM IMS High Performance Pointer Checker for z/OS

[https://www.ibm.com/docs/en/SSAVJ2\\_3.1.0/pdf/fabpuc1b.pdf](https://www.ibm.com/docs/en/SSAVJ2_3.1.0/pdf/fabpuc1b.pdf)

## IBM IMS Recovery Solution Pack for z/OS

[https://www.ibm.com/docs/en/SSS8TR\\_2.1.0/pdf/frxocb13.pdf](https://www.ibm.com/docs/en/SSS8TR_2.1.0/pdf/frxocb13.pdf)