



| z/TPF V1.1

TPF Users Group - Fall 2012

Title: Online Database Reorganization (ODBR)

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Venue: SCP subcommittee

AIM Enterprise Platform Software
IBM z/Transaction Processing Facility Enterprise Edition 1.1.0

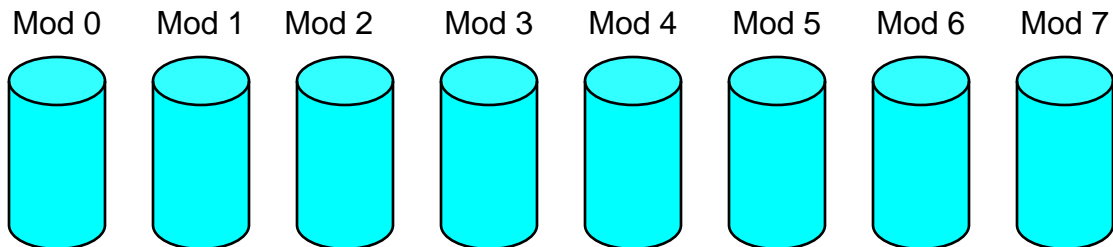
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APAR - PJ40550

- **ODBR phase 3**
 - PUT 08 APAR PJ39198 was ODBR phase 2.
- **Eliminate requirement to have a complex outage**
 - ZODBR ACCEPT can be done in Norm state.
 - All processors in the loosely coupled can be in norm state.
- **Ability to automatically pause ODBR if too many move or validation errors are discovered in a keypoint interval.**
- **Ability to stop validation when it was manually started.**
 - ZODBR VALIDATE STOP
- **Improved estimation of completion time for ZODBR START.**
- **Enhanced keypoint and control processing.**

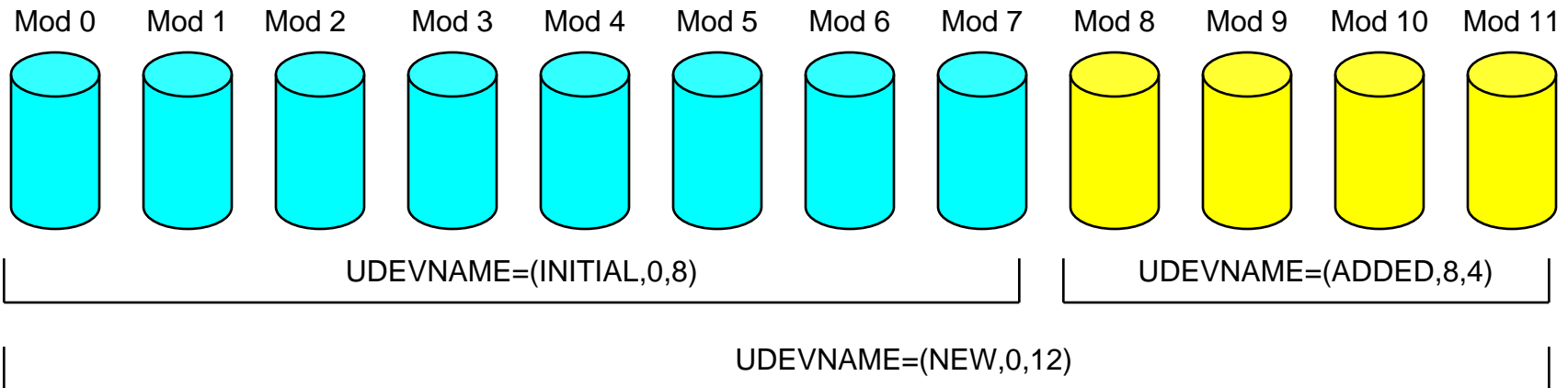
ODBR concept example

- **Initial configuration = 8 mods**
- **Horizontal record types are striped across 8 mods**



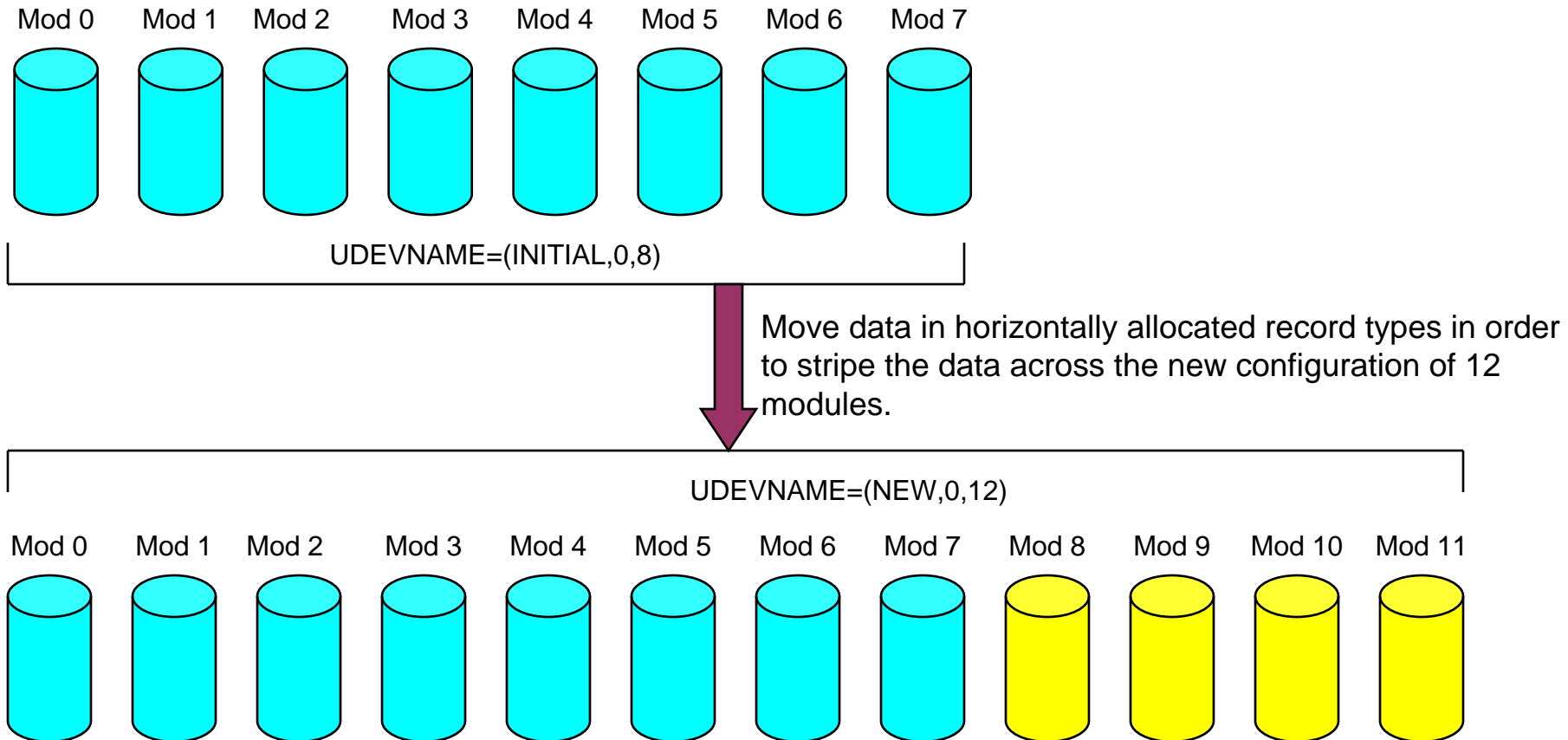
ODBR concept example

- **Add 4 mods for a total of 12 modules**
- **Create 3 UDEVs**
 - UDEV for initial configuration of 8 modules
 - UDEV for newly added 4 modules
 - UDEV for new configuration of 12 modules
- **All existing horizontal record types must use initial configuration of 8 mods**
 - Avoid data moves when DASD modules are added to z/TPF
 - Reduces risk



ODBR data move example

- **Move records in a RAMFIL from UDEVNAME=INITIAL to UDEVNAME=NEW**



Steps in an ODBR move session

- 1) **Create FCTB**
- 2) **Load the alternate FCTB to z/TPF**
 - ZODBR LOAD
- 3) **Validate ODBR profile settings**
 - ZODBR DISPLAY PROFILE
 - ZODBR PROFILE
- 4) **Start the ODBR move session**
 - ZODBR START
- 5) **If automatic validation was not used, validate the moved records**
 - ZODBR VALIDATE
- 6) **Complete ODBR move session**
 - ZODBR ACCEPT

Create FCTB

- **Identify RAMFILs that will be moved to a new location.**
- **Identify where data will be moved.**
 - Data in alternate FCTB must be moved to an area that is defined as spare in the current FCTB.
 - Previous location for data that are moved must be defined as spare in alternate FCTB.
- **Update and build FCTB to move RAMFILs to new location**
- **Run fctbval on linux to validate that the only RAMFILs moved are the ones expected to be moved.**
- **The alternate FCTB must only be loaded to TPF using ZODBR LOAD.**
 - ZFCTB or TLD loads will not recognize that data movement must be done.

ODBR FCTB load

- **ZODBR LOAD**
 - Similar to ZFCTB LOAD.
 - Cannot run on image 1.
 - Cannot have a FCTB on the current image that was loaded by ZFCTB.
 - Track validation is done for RAMFILs that a different location (MCHR) in the alternate FCTB.
 - Creates ODBR move schedule table (OMST).
 - Recognizes which RAMFILs are being moved.
 - Two FCTBs in memory
 - Current (or base) FCTB
 - ZODBR loaded (or alternate) FCTB
 - Refer to TPF Information Center for additional information and restrictions when using ZODBR LOAD.

ZODBR LOAD example

==> ZDSMG DEF TLDF PATH-'/tmp/TLDR.out'

```
CSMP0097I 17.37.56 CPU-B SS-BSS  SSU-HPN  IS-01
DSMG0001I 17.37.56 DDNAME TLDF          DEFINED+
```

==> ZODBR LOAD TLDF

```
CSMP0097I 17.38.44 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2012I 17.38.44 LOAD REQUEST RECEIVED+
CSMP0097I 17.38.45 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2413I 17.38.45 LOAD OF ALTERNATE FCTB COMPLETED
                FOR IMAGE ZSVTC+
```

==> ZODBR DISPLAY OMST SUM

```
CSMP0097I 17.41.23 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2161I 17.41.23 DISPLAY OF ODBR MOVE SCHEDULE TABLE ENTRIES
ALTERNATE FCTB LOADED:    09/26/12 17.38.44  IMAGE ASSIGNED: ZSVTC
SPLITS:  TODO - 000008    ORDINAL:    TODO - 000 000 000 000 000 001 163  _
          COMP - 000000          COMP - 000 000 000 000 000 000 000
END OF DISPLAY+
```



==> ZODBR DISPLAY OMST ALL

CSMP0097I 17.42.38 CPU-B SS-BSS SSU-HPN IS-01

ODBR2161I 17.42.38 DISPLAY OF ODBR MOVE SCHEDULE TABLE ENTRIES

ALTERNATE FCTB LOADED: 09/26/12 17.38.44 IMAGE ASSIGNED: ZSVTC

SPLITS: TODO - 000008 ORDINAL: TODO - 000 000 000 000 000 001 163 _
 COMP - 000000 COMP - 000 000 000 000 000 000 000

OMST ENTRIES

ENTRY NBR	RECORD TYPE	OWNER SSU P I	STATUS MOVE	STATUS VALIDATE	MOVE PROC
00001	#QL0QL	HPN B 001	TOD0	TOD0	_
START	ORD 000000000000000000		BASE MCHR	00510004000015	ALT MCHR 004F046A000307
END	ORD 000000000000002FC		BASE MCHR	0059000400012A	ALT MCHR 0057046A00041C
00002	#QB1LD	HPN B 001	TOD0	TOD0	
START	ORD 000000000000000000		BASE MCHR	00510007000606	ALT MCHR 0051000700060E _
END	ORD 00000000000000013		BASE MCHR	004F0007000608	ALT MCHR 004F0007000610
00003	#QB1LN	HPN B 001	TOD0	TOD0	
START	ORD 000000000000000000		BASE MCHR	00510007000608	ALT MCHR 00510007000610
END	ORD 00000000000000013		BASE MCHR	004F000700060A	ALT MCHR 004F0007000612 _
...					
...					
00007	#EHTD	HPN B 001	TOD0	TOD0	
START	ORD 000000000000000000		BASE MCHR	0055001E000107	ALT MCHR 0059001E00010B
END	ORD 00000000000000029		BASE MCHR	0057001E00010B	ALT MCHR 0047001E000204 _
00008	#HOTREC	HPN B 001	TOD0	TOD0	
START	ORD 000000000000000000		BASE MCHR	0055042D000609	ALT MCHR 004D043000050B
END	ORD 000000000000000FF		BASE MCHR	004B042D00080B	ALT MCHR 0057043000070C

END OF DISPLAY+

ODBR profile

- **Contains settings that are used during data move and validate**
 - FSC: Ability to route output messages to an FSC console
 - KEYTIME: time (in minutes) when ODBR move session control record is saved to file.
 - PATH: file system directory that contains validation and error logs.
 - STACON: specifies that status messages are sent to console
 - STARTLVL: number of ECBs used when move or validate is started.
 - STATIM: time (in minutes) when the ODBR status report is displayed.
 - VEERROR: number of errors allowed in a keypoint interval before move or validation is paused.
 - VINTVAL: specifies the interval used in validation. If 3 is specified, every third record will be validated.
 - VRETRY: number of retries before a validation error is reported.
 - VTYPE: specifies whether automatic validation is done during the move.

ZODBR DISPLAY PROFILE example

==> ZODBR DISPLAY PROFILE

CSMP0097I 17.31.09 CPU-B SS-BSS SSU-HPN IS-01

ODBR3030I 17.31.09 ODBR RUNTIME OPTIONS

CURRENT OPTIONS

PREVIOUS OPTIONS

STACON - YES

STACON - YES

STATIM - 05

STATIM - 05 _

KEYTIM - 02

KEYTIM - 02

FSC - YES

FSC - YES

STARTLVL - 0050

STARTLVL - 0050

VTTYPE - AUTO

VTTYPE - AUTO

VERROR - 001

VERROR - 001

VINTVAL - ALL

VINTVAL - ALL

VRETRY - 03

VRETRY - 03 _

CURRENT PATH /usr/IBM/odbr

PREVIOUS PATH /usr/IBM/odbr

END OF DISPLAY+

ZODBR PROFILE example

==> ZODBR PROFILE FSC-NO

CSMP0097I 17.35.08 CPU-B SS-BSS SSU-HPN IS-01

ODBR3030I 17.35.08 ODBR RUNTIME OPTIONS

CURRENT OPTIONS

PREVIOUS OPTIONS

STACON - YES

STACON - YES

STATIM - 05

STATIM - 05 _

KEYTIM - 02

KEYTIM - 02

FSC - NO

FSC - YES

STARTLVL - 0050

STARTLVL - 0050

VTTYPE - AUTO

VTTYPE - AUTO

VERROR - 001

VERROR - 001

VINTVAL - ALL

VINTVAL - ALL

VRETRY - 03

VRETRY - 03 _

CURRENT PATH /usr/IBM/odbr

PREVIOUS PATH /usr/IBM/odbr

END OF DISPLAY+

ODBR move session

- **Start a move session**
 - ZODBR START
- **Change number of ECBs used:**
 - ZODBR LEVEL
- **Display number of ECBs allowed:**
 - ZODBR DISPLAY ECBLEVEL
- **Pause:**
 - ZODBR PAUSE
- **Restart after a pause or an IPL:**
 - ZODBR RESTART

ODBR move session

- **Display status**
 - ZODBR DISPLAY STATUS
- **Display ODBR move schedule table (OMST)**
 - ZODBR DISPLAY OMST

ODBR move session

- **Shadow copy**
 - When a file is done on a record in the OMST, the file is written to the current location and to the alternate location.
 - Current location = MCHR in current FCTB
 - Alternate location = MCHR in ZODBR loaded (or alternate) FCTB
 - ZODBR START begins shadow copy
 - ZODBR ACCEPT ends shadow copy

ODBR move session

- **Record relocation lock (RRL)**
 - When move processing moves records in a RAMFIL, a normal file of a record in that RAMFIL does the following:
 - Obtain an RRL lock.
 - Writes the updated record to the current and alternate (MCHR) locations.
 - Releases the RRL lock.
 - Move processing does the following:
 - Obtains the RRL lock;
 - Retrieves the record;
 - Files the record to the alternate location; and then
 - Releases the RRL lock.
 - Purpose is to guarantee integrity of data move.

ZODBR START example

==> ZODBR START

```

CSMP0097I 17.48.33 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2012I 17.48.33 START REQUEST RECEIVED+
CSMP0097I 17.48.33 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2200I 17.48.33 ODBR MOVE SESSION STARTED+
CSMP0097I 17.48.33 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR3030I 17.48.33 ODBR RUNTIME OPTIONS
CURRENT OPTIONS                                PREVIOUS OPTIONS
-----
STACON      - YES                               STACON      - YES
STATIM      - 05                               STATIM      - 05 _
KEYTIM      - 02                               KEYTIM      - 02
FSC         - NO                               FSC         - YES
STARTLVL    - 0050                             STARTLVL    - 0050
VTYPE       - AUTO                             VTYPE       - AUTO
VERROR      - 001                              VERROR      - 001
VINTVAL     - ALL                              VINTVAL     - ALL
VRETRY      - 03                               VRETRY      - 03 _
CURRENT PATH /usr/IBM/odbr
PREVIOUS PATH /usr/IBM/odbr

END OF DISPLAY+

```

ZODBR examples of status messages

```

CSMP0097I 17.48.33 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2180I 17.48.33 ODBR STATUS REPORT
ALTERNATE FCTB LOADED:    09/26/12 17.38.44  IMAGE ASSIGNED: ZSVTC
SPLITS:  TODO - 000008      ORDINAL:      TODO - 000 000 000 000 000 001 163
          COMP - 000000      COMP - 000 000 000 000 000 000 000  _
MOVE SESSION:    ACTIVE      SHADOW COPY:    ACTIVE
STARTED:  09/26/12 17.48.33  COMPLETED: 09/26/12 17.48.33  ESTIMATED
PRIME PROC:  B              MOVE PROCS:  B
ACTIVE PROC: B              ECB ALLOWED: 0050          CUR ECBS:    0000
END OF DISPLAY+

```

```

CSMP0097I 17.48.33 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2251I 17.48.33 MOVE COMPLETE
  OMST SLOT  RECTYPE  SSU  P  I  START ORD          END ORD
  0000000002  #QB1LD  HPN  B  001  0000000000000000  0000000000000013+

```

```

CSMP0097I 17.48.33 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2251I 17.48.33 MOVE COMPLETE
  OMST SLOT  RECTYPE  SSU  P  I  START ORD          END ORD
  0000000003  #QB1LN  HPN  B  001  0000000000000000  0000000000000013+

```

ZODBR example of end of move session

```
CSMP0097I 17.48.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2250I 17.48.34 ODBR MOVE SESSION COMPLETED ON PROCESSOR B+
```

```
CSMP0097I 17.48.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2253I 17.48.34 ODBR MOVE SESSION COMPLETE+
```

```
CSMP0097I 17.48.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2180I 17.48.34 ODBR STATUS REPORT
ALTERNATE FCTB LOADED: 09/26/12 17.38.44 IMAGE ASSIGNED: ZSVTC
SPLITS:  TODO - 000008   ORDINAL:  TODO - 000 000 000 000 000 001 163
          COMP - 000008   COMP - 000 000 000 000 000 001 163  _
MOVE SESSION:  MOVE COMPLETED   SHADOW COPY:  ACTIVE
STARTED: 09/26/12 17.48.33   COMPLETED: 09/26/12 17.48.34
PRIME PROC:  B   MOVE PROCS:  B
END OF DISPLAY+
```

ZODBR VALIDATE example

==> ZODBR VALIDATE ALL

```
CSMP0097I 17.58.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2012I 17.58.34 VALIDATE REQUEST RECEIVED+
```

```
CSMP0097I 17.58.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2800I 17.58.34 VALIDATE BEGINS FOR ALL+
```

```
CSMP0097I 17.58.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2802I 17.58.34 VALIDATE ENDED
```

OMST	SLOT	RECTYPE	SSU	P	I	START	ORD	END	ORD
0000000001	#QL0QL	HPN	B	001	000000000000000000	00000000000002FC+			

```
CSMP0097I 17.58.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2802I 17.58.34 VALIDATE ENDED
```

OMST	SLOT	RECTYPE	SSU	P	I	START	ORD	END	ORD
0000000002	#QB1LD	HPN	B	001	000000000000000000	0000000000000013+			

```
CSMP0097I 17.58.34 CPU-B SS-BSS SSU-HPN IS-01
ODBR2801I 17.58.34 VALIDATE COMPLETED FOR ALL+
```

Complete ODBR session

- **ZODBR ACCEPT**
 - Replace the FCTB.
 - The alternate FCTB becomes the current FCTB.
 - The previous base FCTB is no longer in memory or on file.
 - After ZODBR ACCEPT there is only one FCTB.
 - Flushes moved records from VFA.
 - Recalculates MCHR of moved records in the following areas:
 - Record hold table (RHT) entries
 - Virtual file access (VFA) buffers
 - Asynchronous queue entries.
 - Moves MPLF locks.
 - Ends shadow copy.

ZODBR ACCEPT example

==> ZODBR ACCEPT

```
CSMP0097I 18.02.17 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2012I 18.02.17 ACCEPT REQUEST RECEIVED+

CSMP0097I 18.02.17 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2344I 18.02.17 ACCEPT PROCESSING STARTED FOR CPU B+

CSMP0097I 18.02.17 CPU-B SS-BSS  SSU-HPN  IS-01
VFAC0002I 18.02.17 DELAY FILING OF VFA BUFFERS BEGINNING
                DELAY FILE BUFFERS                                0+

CSMP0097I 18.02.17 CPU-B SS-BSS  SSU-HPN  IS-01
ODBR2325I 18.02.17 VFA UPDATED - ACCEPT CONTINUES+

CSMP0097I 18.02.17 CPU-B SS-BSS  SSU-HPN  IS-01
VFAC0015I 18.02.17 DELAYED FILES ENABLED +

CSMP0097I 18.02.17 CPU-B SS-BSS  SSU-HPN  IS-01
VFAC0004I 18.02.17 DELAY FILING OF VFA BUFFERS COMPLETED
                DELAY FILE BUFFERS                                0
                DELAY FILE BUFFERS PROCESSED                     0+
```

ZODBR ACCEPT example continued

```
CSMP0097I 18.02.17 CPU-B SS-BSS SSU-HPN IS-01
ODBR2328I 18.02.17 ALL MOVING LOCKS ARE SET IN NEW LOCATION - ACCEPT CONTINUES +

CSMP0097I 18.02.17 CPU-B SS-BSS SSU-HPN IS-01
ODBR2345I 18.02.17 ACCEPT PROCESSING COMPLETED FOR CPU B+

CSMP0097I 18.02.17 CPU-B SS-BSS SSU-HPN IS-01
ODBR2329I 18.02.17 ALL MOVING LOCKS HAVE BEEN PURGED FROM THEIR OLD LOCATIONS +

CSMP0097I 18.02.17 CPU-B SS-BSS SSU-HPN IS-01
ODBR2326I 18.02.17 ACCEPT PROCESSING COMPLETE FOR IMAGE ZSVTC+
```


Abort ODBR session

- **ZODBR CANCEL**

- Ends the current ODBR move session.
- It is possible to restart the current ODBR move session using the same FCTB.
 - ZODBR START

- **ZODBR DELETE**

- Permanently ends the current ODBR move session.
- Deletes the FCTB that was loaded using ZODBR LOAD.

The End

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