JUMPIN’ JACK, FLASH

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JUMPIN' JACK, FLASH - FLASH FOR DR

Using Flashcopy for backups at Hanes and...

AGENDA

- FlashCopy® Basics
- Site 1 – Hanes
- Site 2 – Alabama Office of Courts
- A deeper dive into Flash Copy

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- FlashCopy® Basics
- Site 1 – Hanes
- Site 2 – Alabama Office of Courts
- A deeper dive into Flash Copy
- Questions

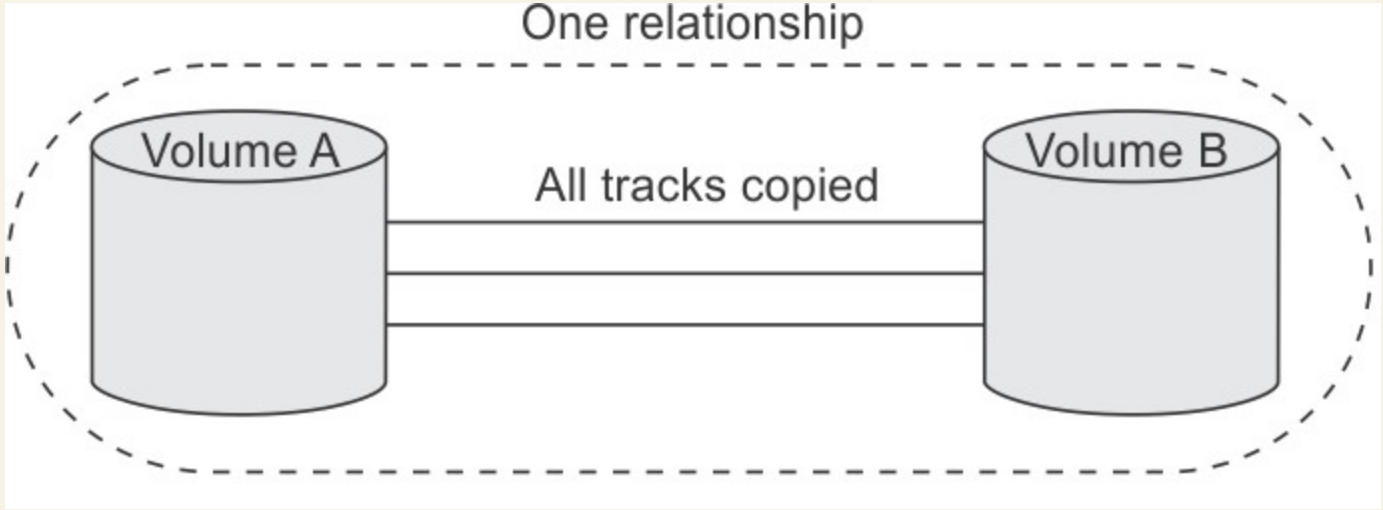
FLASHCOPY BASICS

- What is FlashCopy?
- How does it create an “instantaneous copy”?
- Is it really instantaneous?
- Restore JCL
- Gotchas

What is FlashCopy?

- A chargeable feature on the DS8K models
- It can generate “instantaneous duplicate volumes”
- The new volumes are point-in-time snapshots.
- The new volumes then can be copied to tape

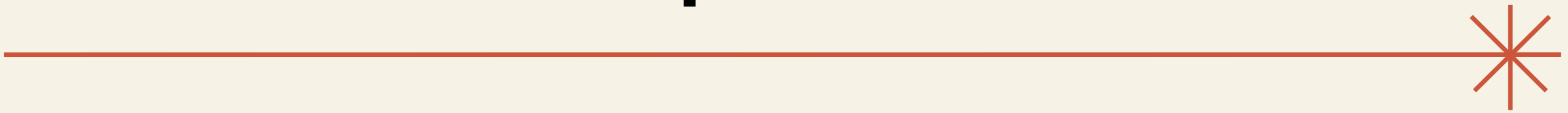
STANDARD FULL VOLUME COPY



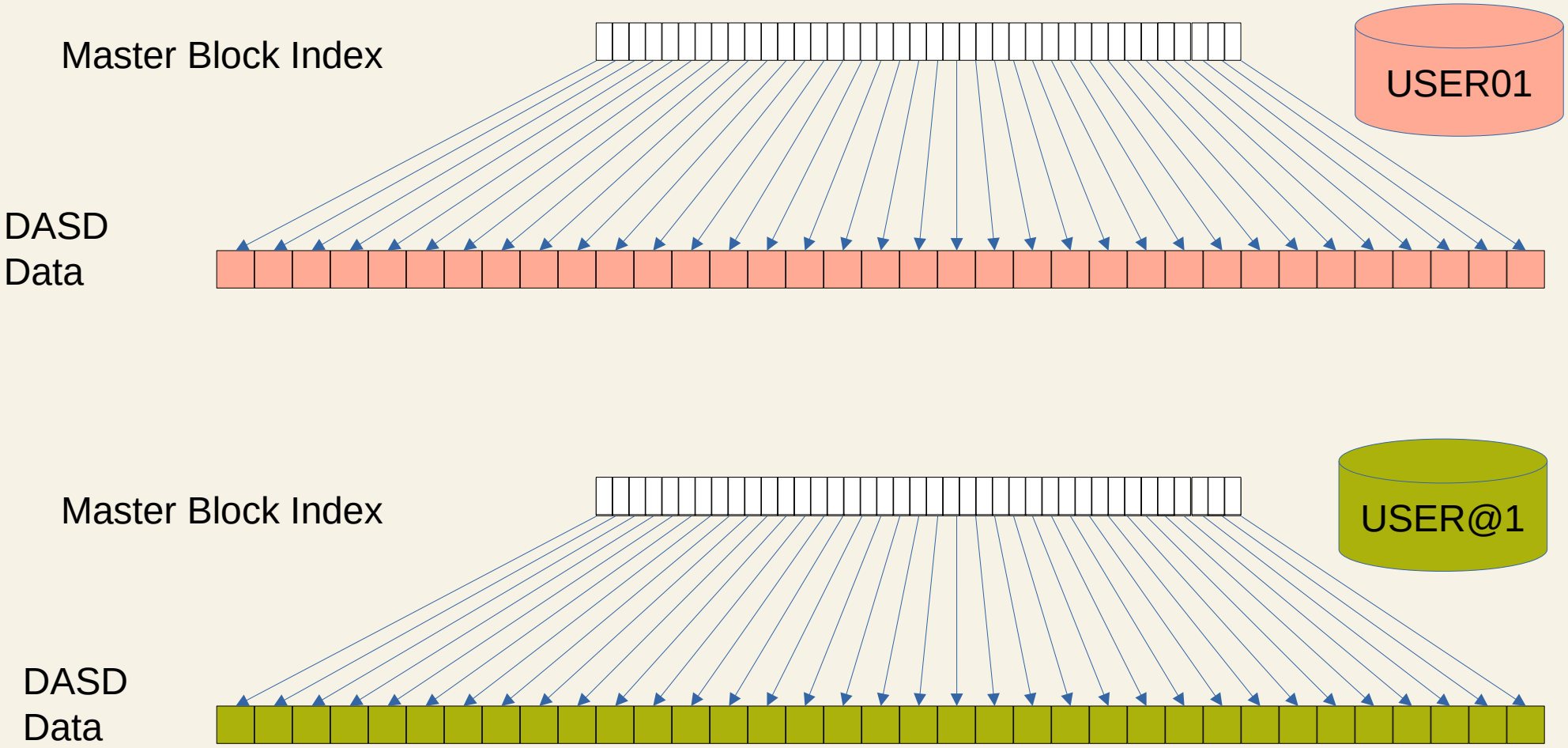
Brief mentions

- COPY vs NOCOPY
- Consistency Groups
- Cascading Copies
- Incremental/Persistent Flashcopy
- Reverse Copy
- Partial Volume Copies

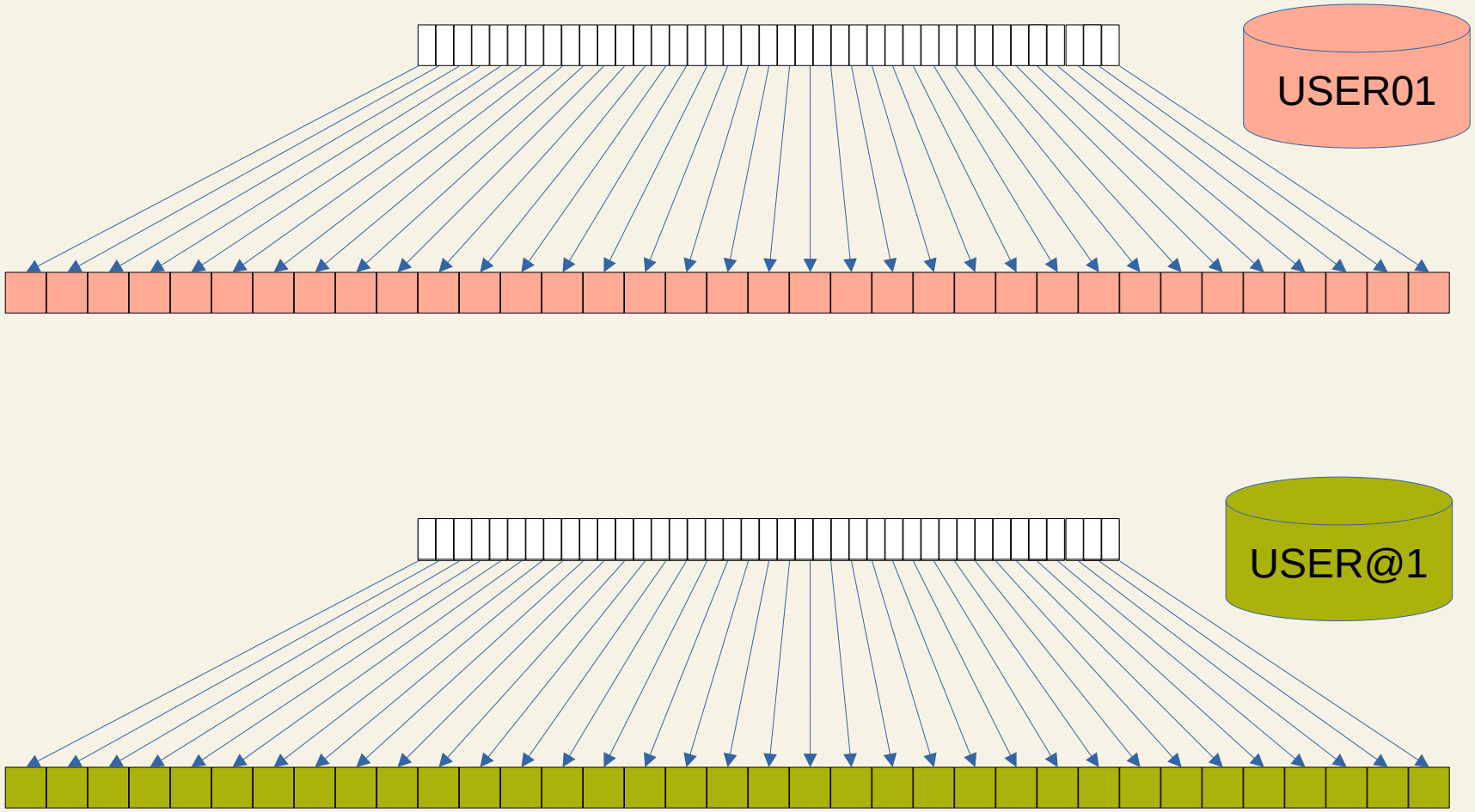
Instant Copies?



- Fact?
- Fiction?
- No, it’s Smoke and Mirrors!

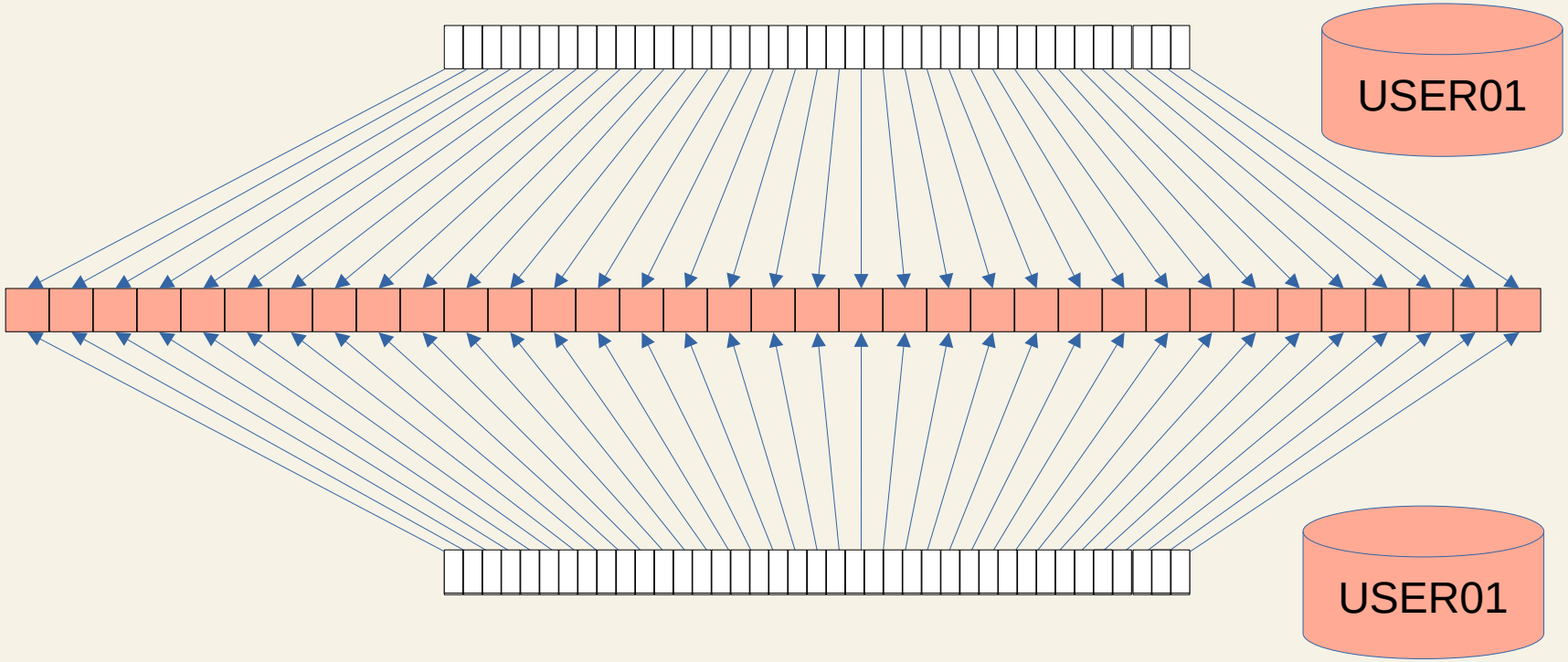


A VERY(!) simple view of how a DS8K stores data for a 3390.



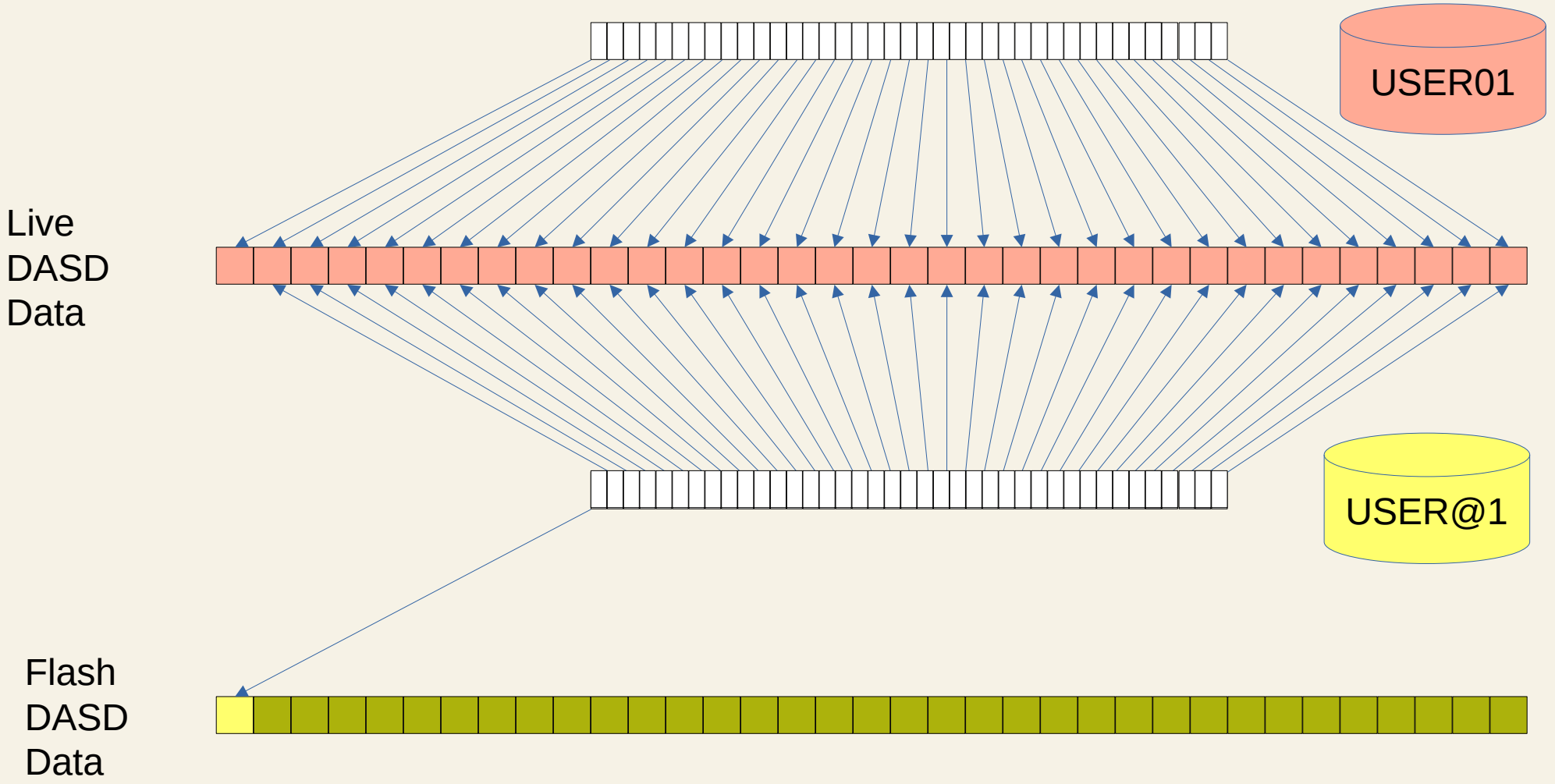
Status: Before Flash CCW

Live
DASD
Data

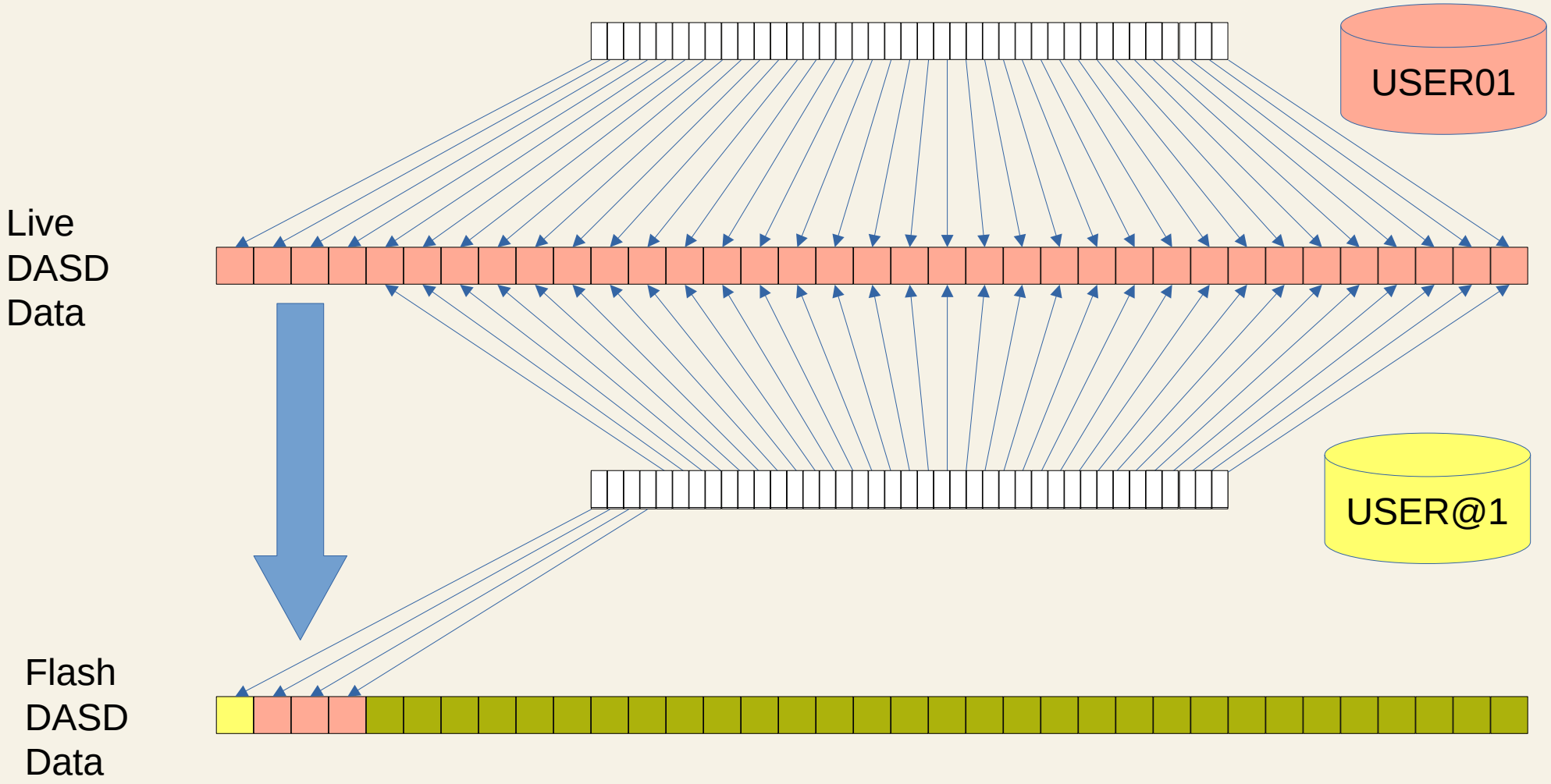


Flash
DASD
Data

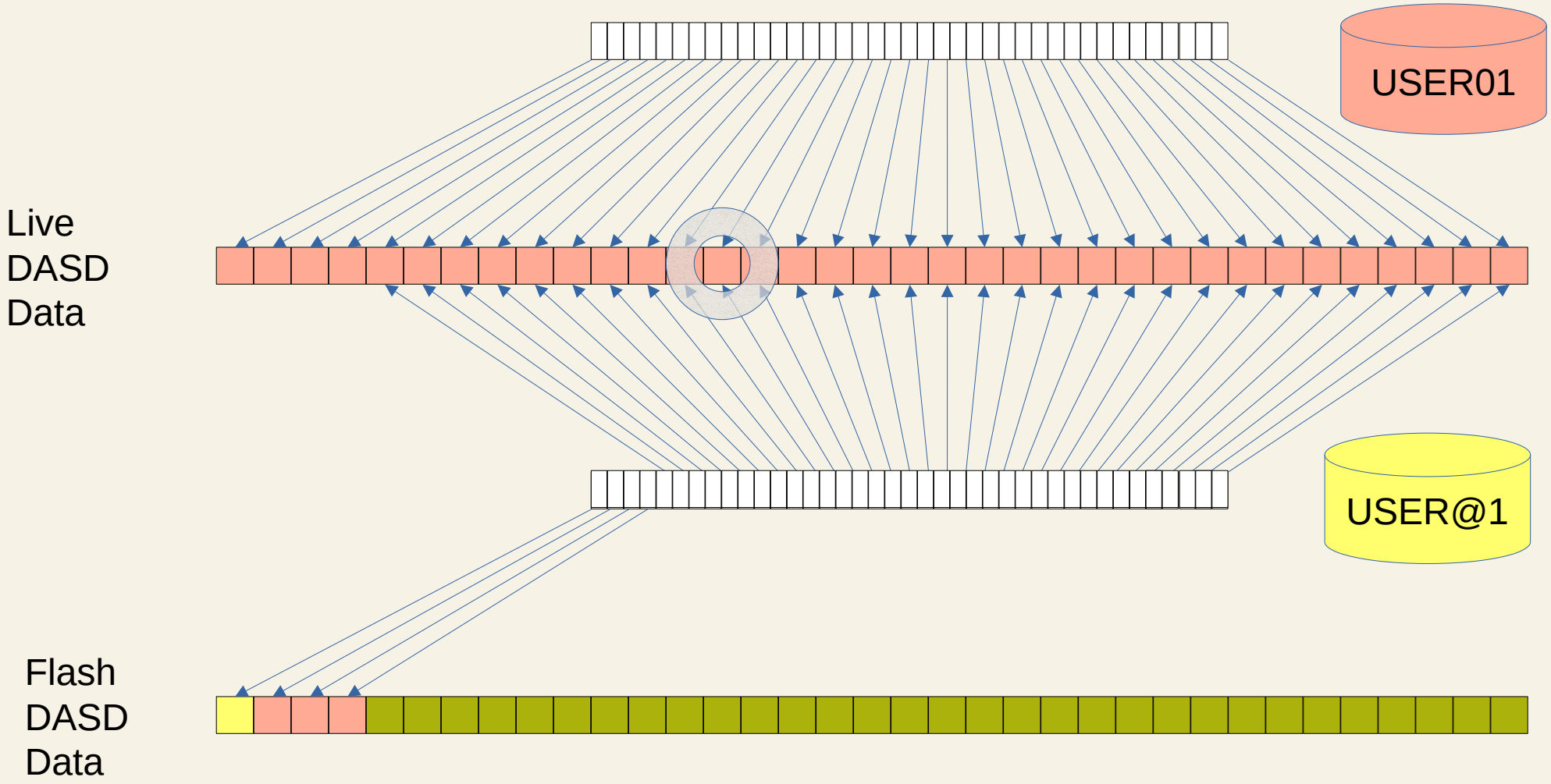
Status: Flash CCW Posted Complete. Appears as two identical volumes including VOLID.
“FL-COPY RELATION ESTABLISHED”



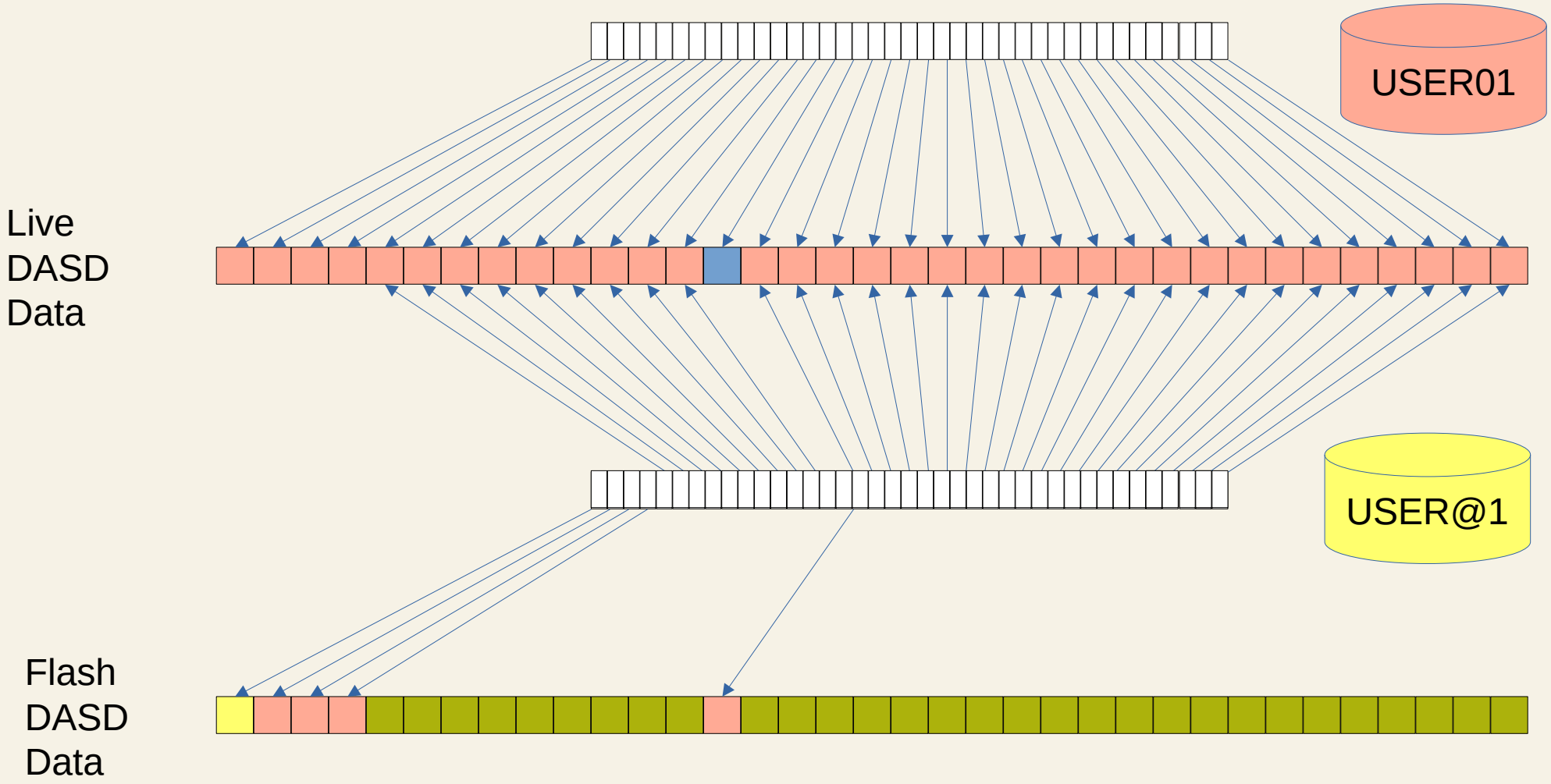
Status: VSE updates target VOLID. Now appears as two unique volumes.



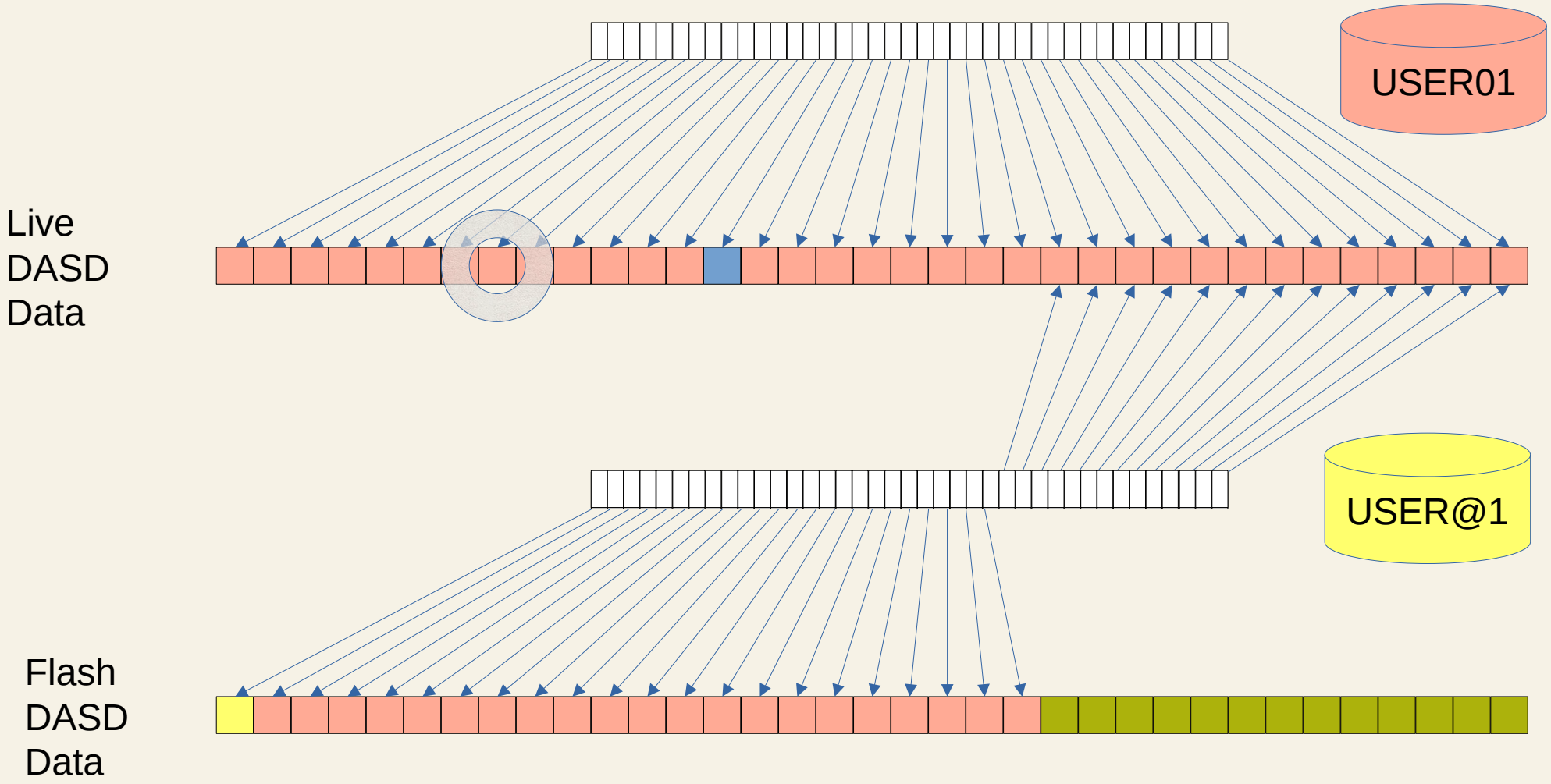
Status: FlashCopy starts actually copying data to the Flash DASD Data area.



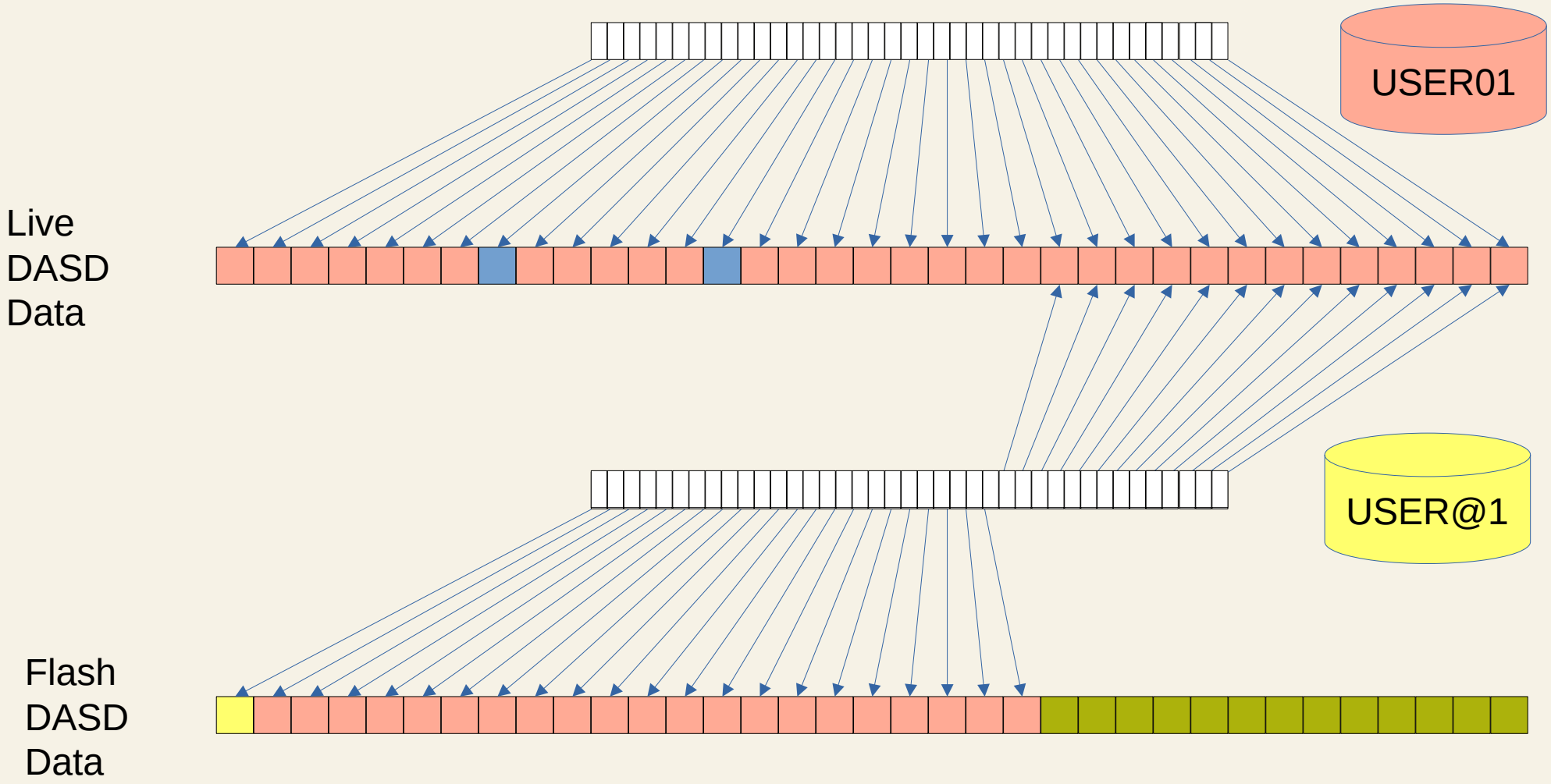
Status: An update needs to be made to the file in a block that had not been copied.



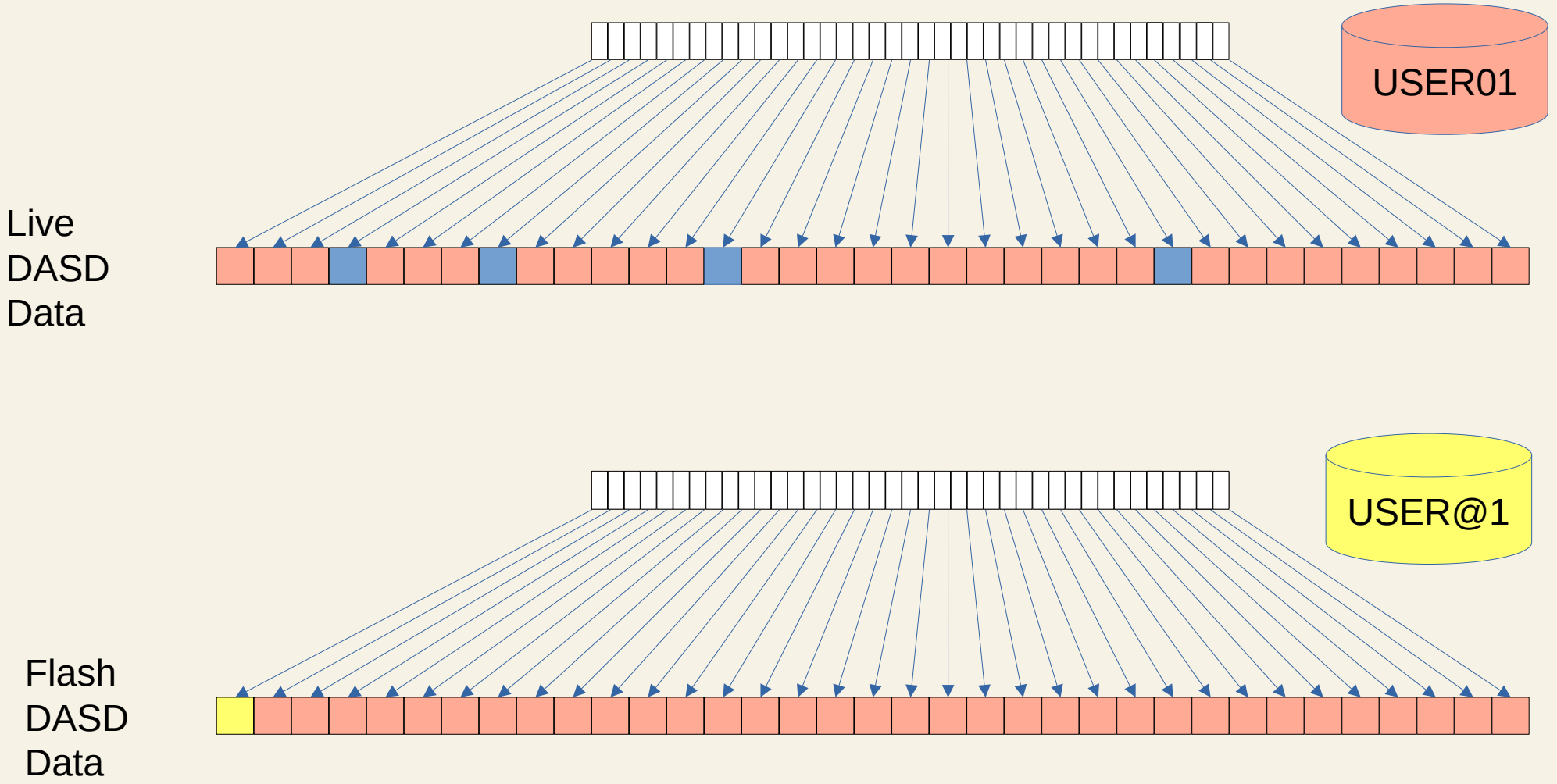
Status: An update occurred to a block in the source volume. Original Data was first copied to the target volume and the pointers updated.



Status: Copy has continued but has not finished but another record needs to be updated.



Status: Record is updated without any special actions by FlashCopy.



Status: Snap complete. VSE notified. “FL-COPY RELATION TERMINATED”

Invoking

- IDCAMS

SNAP SOURCEVOLUMES (USER01) -
TARGETVOLUMES (USER@1)

- We will discuss other ways later

Instantaneous?

- From the OS’s perspective, Yes.
- In the DS8K, No.
- About 30 minutes for a Mod-27 (at AOC).
- Another flash can not occur until complete

Instantaneous?

```
05/30-14:29:15
AR 0028 1H09I    OPER INFO  SYSXXX=30E
AR 0028          SUBSYSTEM STATUS CHANGE: FL-COPY RELATION ESTABLISHED

05/30-15:04:44
AR 0028 1H09I    OPER INFO  SYSXXX=30E
AR 0028          SUBSYSTEM STATUS CHANGE: FL-COPY RELATION TERMINATED
```

Hanes Overview

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- Hardware
  - Z15
  - DS8910 (549 3390 mod9s, 32 mod27s),
  - Visara virtual tape library (on site 20 TB and D/R 20 TB)

Hanes Overview

- Hardware
  - Z15
  - DS8910 (549 3390 mod9s, 32 mod27s)
  - Visara virtual tape library (on site 20 TB and D/R 20 TB)

- Backup methods
  - Fastcopy (system volumes)
  - CSI-EPIC (TSIDOFD/TSIDOFL)
  - Broadcom FAVER2 (VSAM)

Backup Windows

Usage	“System” volumes and volumes with VSAM data space defined
OLTP down batch	During four OLTPs’ separate downtime, a complete VSAM catalog backup with FAVER2
OLTP up “hot” FAVER2	While in operation, we take midday, complete VSAM catalog backups with FAVER2 (EXCP option) vestigial and “belt and suspenders” activity
OLTP up “hot” FlashCopy/IDCAMS backup	Implemented to reduce the data integrity risk window of “hot” backups. Using Flashcopy and IDCAMS backup at “leisure” 4 times a day
Compare hot backups	On average 10% longer with IDCAMS backup because of FAVER2’s EXCP processing. However, with a higher level of data integrity and the speed of backups, this is not as critical.

BACKUP JCL PART 1

Initiate the Flashcopy with IDCAM SNAP command mapping the source volumes to the target volumes

```
// EXEC IDCAMS,SIZE=AUTO
  SNAP SOURCEVOLUMES(VSAM01 VSAM02 VSAM03)  -
            TARGETVOLUMES(UVM@01 UVM@02 UVM@03) -
             COPY
/*
```

Export the synonym name for the target catalog clearing any previous definition

```
// EXEC IDCAMS,SIZE=AUTO
  EXPORT SNAPTGT.CATALOG DISCONNECT
       IF  LASTCC = 12 THEN -
        DO
         SET LASTCC = 0     /* IDEALLY NOT BE FOUND */
         SET  MAXCC = 0     /* GET RID OF RC = 12         */
        END
/*
```

Import Connect the target catalog name for backup step

```
// EXEC IDCAMS,SIZE=AUTO
  IMPORT CONNECT OBJECTS((SNAPTGT.CATALOG -
                                        VOLUMES(UVM@01) DEVT(3390)))  -
               CATALOG(VSAM.MASTER.CATALOG)
/*
```

BACKUP JCL PART 2

Backup VSAM target catalog

```
// DLBL IJSYSUC,'SNAPTGT.CATALOG',,VSAM
// TLBL VSMSNAP,'SNAP1.BACKUP'
// EXEC IDCAMS,SIZE=AUTO
  BACKUP (*)                    -
  SYNONYMLIST(SOURCEVOLUMES(VSAM01 VSAM02 VSAM03)    -
                      TARGETVOLUMES(UVM@01 UVM@02 UVM@03)   -
  CATALOG(USER.1.CATALOG)     -
           SYNONYMCATALOG(SNAPTGT.CATALOG))                      -
  STDLABEL(VSMSNAP)
/*
```

Repeat target catalog clean up for consistency

```
// EXEC IDCAMS,SIZE=AUTO
  EXPORT SNAPTGT.CATALOG DISCONNECT
       IF  LASTCC = 12 THEN -
        DO
         SET LASTCC = 0     /* IDEALLY NOT BE FOUND */
         SET  MAXCC = 0     /* GET RID OF RC = 12          */
        END
/*
```

RESTORE JCL

Restore SNAPPED backup to original catalog

```
// TLBL VSMSNAP,'SNAP1.BACKUP’
// EXEC IDCAMS,SIZE=AUTO
   RESTORE OBJECTS(*) CAT(USER.1.CATALOG) -
      STDLABEL(VSMSNAP) XREF
/*
```

GOTCHAS

Significant reduction in risk of hot backups	DS8910 Flashcopy imaging to target disk and it’s I/O management during the Flashcopy
	Allows a “leisure” actual backup with IDCAMS Backup/Restore. This makes use of the seamless restore with volume ids recovered
	Could use FAVER2 EXCP backup process with no incidence of in-flight updates causing issues. Needs work in the FAVER2 statements to address “psudeo” volume names
Only gap uncovered	Flashcopy will initiate at the volume level so the VSAM Catalog volume can “flash” first, then the data space volumes and the VSAM catalog disk map can change from the seconds of difference. IDCAMS Backup catches this for remediation (re-run the job).

Alabama Office of Courts

- History
- Site description
- Backup Strategy
- JCL examples

Alabama Office of Courts

- History

Alabama Office of Courts

- z12-O02 32GB (69 MSUs/ 531 Mips)
- 1 z/VSE 6.2 LPAR
- DS8870 2424-961
- 63 Mod-27 Primary, 53 Mod-27 FlashCopy)
- Visara VTLs (one on-site, one at DR site)
- 13 VSAM user catalogs (largest 12 volumes)

Alabama Office of Courts DR Issues

- Missing volumes
- System volumes only backed-up weekly
- Log only stored in BIM library, not off-platform
- Tape catalog (in-house) not backed up

Alabama Office of Courts FlashCopy Issues

- Backups were waiting until FlashCopy finished
- FlashCopy not respecting even/odd LCUs

Alabama Office of Courts DASD Issues

- Volumes were single-channel heavy
- Volume IDs were CUU address specific

Alabama Office of Courts Game Plan

- Add processes to fully back up the system
- Create a temporary DR process that could survive a real DR situation
- Perform a complete DASD reorg in stages
- Update DR processes at each stage
- Test and document final DR processes

Alabama Office of Courts DASD Reorg

- Multiple channels
- Even/Odd LCU FlashCopy Performance rule
- Common sense VOLIDs
- Quickly identifiable FlashCopy VOLIDs

Alabama Office of Courts DASD Reorg

- Multiple channels
- Even/Odd LCU FlashCopy Performance rule
- Common sense VOLIDs
- Quickly identifiable FlashCopy VOLIDs
  - DOS620 > DOS62@
  - WK1620 > WK162@

Alabama Office of Courts Current State

- Flash almost everything 3 times a day (0630, 1429, 2357)
- Create full backups each time (0640, 1440, 0005) [Labeled “AM”, “PM” and “DR”.]
- “DR” versions replicated to FL site at 0100.
- “AM” and “PM” not replicated to FL

Alabama Office of Courts RPO

- Worse case with failure at ~0255
  - 27 hours
- Best case: Failure at ~0300
  - 3 hours
- We utilize a two volume “mini-vse” system to restore

Alabama Office of Courts Recovery

- Stand-alone restore mini-system
- IPL mini-system
- Run job to restore needed jobs to Power Queue
- Run initialize volume job
- Run job to restore 6 base volumes

Alabama Office of Courts Recovery

- IPL recovered ‘partial’ system, stopping IPL as soon as BIM-Edit is up
- Will come up temporarily with bad product key
- Use BIM-Edit to run rest of restore jobs
- Fix vendor product keys
- Re-IPL to bring up system fully
-

Alabama Office of Courts FlashCopy JCL

```
// EXEC IDCAMS,SIZE=AUTO
 EXPORT Y.SNAP.USER.CAT1 DISCONNECT
 SET MAXCC = 0
 SNAP SOURCEVOLUMES (USER01 USER02 USER03 USER04 USER05 USER06) -
      TARGETVOLUMES (USER@1 USER@2 USER@3 USER@4 USER@5 USER@6)
 IMPORT CONNECT OBJECTS ((Y.SNAP.USER.CAT1 VOL(USER@1) DEVT(3390)))
/*
```

-

Alabama Office of Courts Backup JCL

```
// EXEC IDCAMS,SIZE=AUTO
 BACKUP (*) -
     EXCLUDE (VSAMTUNE.HISTORY.*    ) -
     BUFFERS(8)    BLKSZ(65535)     STDLABEL(BACKUP) -
   NOCOMPACT -
     SYNONYMLIST( -
     SOURCEVOLUMES (USER01 USER02 USER03 USER04 USER05 USER06) -
     TARGETVOLUMES (USER@1 USER@2 USER@3 USER@4 USER@5 USER@6) -
     CATALOG(USER.CAT1) -
     SYNONYMCATALOG (Y.SNAP.USER.CAT1))
 IF LASTCC > 8 THEN SET MAXCC = 16
/*
```

Alabama Office of Courts Restore JCL

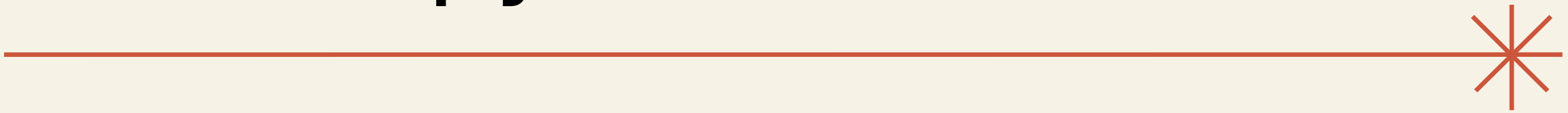
```
// DLBL IJSYSUC,'USER.CAT1',,VSAM
// EXEC IDCAMS,SIZE=AUTO
 RESTORE OBJECTS(*) -
         STDLABEL(BACKUP) -
           BUFFERS(8) -
         XREF
/*
```

Alabama Office of Courts Non-VSAM JCL

```
// EXEC IDCAMS,SIZE=AUTO
 SNAP SOURCEVOLUMES (DOS620 WK1620 LIBS01 VEN001 BIM001 DS8A2D) -
      TARGETVOLUMES (DOS62@ WK162@ LIBS@1 VEN@01 BIM@01 CMT@01
/*
// EXEC FCOPY,SIZE=2M
DUMP VOLUME IV=DOS62@ LIST OPTIMIZE=5 NOPROMPT NOREWIND
/*

// ASSGN SYS005,DISK,VOL=DOS620,SHR
// EXEC FCOPY,SIZE=2M
RESTORE VOLUME OV=DOS62@ NV=DOS620 LIST NOPROMPT NOREWIND
/*
```

A Deeper Dive Into FlashCopy



Ways to invoke FlashCopy

IDCAMS

- Via the SNAP command
- Pros
  - Runs is standard batch job JCL
  - Standard return codes can be process when using just one step
  - Best when using BACKUP/RESTORE commands to create tape backups
- Cons
  - NOCOPY/DDSR are the only FlashCopy options supported

VSE/Fast Copy

- Via the COPY ALL or COPY VOLUME command
- Pros
  - Runs is standard batch job JCL
  - Automatically uses FastCopy if available on the DS8000
- Cons
  - If FastCopy not available, it will use CPU cycles without warning.
  - NOCOPY/DDSR are the only FlashCopy options supported

IXFP Console Command

- Via the COPY ALL or COPY VOLUME command
- Pros
  - Provides many options including partial copies by cylinder ranges
- Cons
  - Console command with limited use by batch jobs as it is an asynchronous command and the batch jobs can not see a return code
  - Target volume must be DVCDN

What is the status?

- The status of a FlashCopy relationship can be displayed via the IXFP STATUS,cuu command

```
ixfp status 300
AR 0015 IXFP70I NO FLASH-COPY FUNCTION ESTABLISHED OR PENDING
ixfp snap,300:500
ixfp status 300
AR 0015 IXFP71I 300 IS A SOURCE  VOLUME OF A FL-COPY RELATION
AR 0015 IXFP72I      96.60% OF VOLUME REMAIN TO BE COPIED
AR 0015 IXFP71I 500 IS A TARGET  VOLUME OF A FL-COPY RELATION
AR 0015 IXFP72I      96.60% OF VOLUME REMAIN TO BE COPIED
```

ICKDSF

- Via the FLASHCPY and PPRCOPY commands
- Pros
  - Supports everything FlashCopy
- Cons
  - Manual is poor in documenting VSE usage

```
// ASSGN SYS010,C0B,SHR                SOURCE VOLUME
// ASSGN SYS011,C0E,SHR                TARGET VOLUME
// EXEC ICKDSF,SIZE=AUTO,PARM='NOREPLYU'
 FLASHCPY SYSNAME(SYS010) QUERY RELATIONS
 FLASHCPY SYSNAME(SYS011) QUERY RELATIONS
/*
```

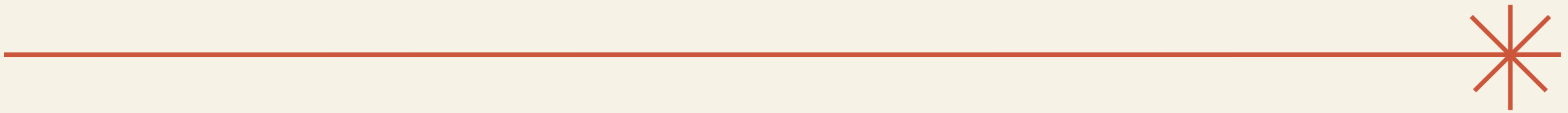
FlashCopy CCWs

- Only documented in restricted manuals
- CCW 18 PSF (Perform Subsystem Function
  - Suborder 46 Query Relationship
  - Suborder 47 Query
  - Suborder 48 Establish
  - Suborder 49 Withdraw
- Other CCWs must be issued to extract the information needed to build the information needed for each of these CCWs

FlashCopy Concerns

- If running under z/VM, make sure you understand the limitations
  - Use full-volume mini-disks or dedicated devices
  - Mini Disk Caching can be an issue
  - Consider using z/VM Flashcopy commands instead
- While IDCAMS SNAP allows multiple volumes, both IO traces and an error condition seen by Steve indicate that IDCAMS does not use consistency groups (Freeze and Thaw) when specifying multiple volumes

Questions?



Contact Information

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