

Managing Volume Sets

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What is Volume Management?

- Manage disk volumes
- Provides high availability by managing disk storage using volumes, volume sets, and classes
- Separates system data (operating system) from user data (databases, files, etc.)
- Non-system (user) disk failures do not bring down system

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Key Definitions

- Volume – One Logical Disk Drive
- Volume Set – Grouping of Volumes
- System Volume Set
- User Volume Set
- Master Volume
- Member Volume
- Volume Class

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System Volume Set

- Created at System Install
- Always mounted when system up
- MPEXL_SYSTEM_VOLUME_SET
- Includes Ldev 1 – Boot Disk (Master)
- Contains system files and config.
- Permanent and Transient storage
- Spool files

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User Volume Set

- Non-system volume set
- Name it yourself (up to 32 characters)
- Can be removed while system up, but not while set in use
- Minimally includes one volume (master)
- Master must be present to use
- No transient storage
- Control data on set (accounts and groups)

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Master Volume

- First volume when set created
- VSIT – Volume Set Information Table (includes volume set name, names of volumes and classes, volumes in each class)
- Contains volume label, file label table, free space map, directory root, VSIT, files
- LDEV 1 – Master of system volume set
- Contains XM log files

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Member Volume

- Optional in volume set
- Can be added while system running using Volutil
- Contains volume label, file label table, free space map, files

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Volume Classes

- Subset of volumes within a volume set
- Limit data vulnerability to specific volumes within a volume set
- Default volume class = DISC

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Planning Volume Sets

- Know your system disk configuration – drive sizes, controller types, etc.
- Know your user account structures
- Know where high volume access occurs
- Understand disk space management issues

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Listing Volume Sets

- MPE - :DSTAT ALL

```
:DSTAT ALL
LDEV-TYPE          STATUS  VOLUME          VOLUME SET - GEN
-----
 1-ST15150         MASTER  MEMBER1         MPEXL_SYSTEM_VOLUME_SET-0
 2-ST15150         MEMBER  MEMBER2         MPEXL_SYSTEM_VOLUME_SET-0
 3-ST15150         MEMBER  MEMBER3         MPEXL_SYSTEM_VOLUME_SET-0
30-SYMMETRIX      MASTER  MEMBER1         PROD-0
31-SYMMETRIX      MEMBER  MEMBER2         PROD-0
32-SYMMETRIX      MEMBER  MEMBER3         PROD-0
33-SYMMETRIX      MEMBER  MEMBER4         PROD-0
50-ST15150        LONER
51-ST15150        SCRATCH
```

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Volume States

- Master – master volume of set
- Member – member volume of set
- Loner – volumes master not mounted
- Scratch – volume ready for initialization
- Unknown – System can't recognize volume label

```
:DSTAT ALL
LDEV-TYPE      STATUS  VOLUME      VOLUME SET - GEN
-----
  1-ST15150    MASTER  MEMBER1     MPEXL_SYSTEM_VOLUME_SET-0
  2-ST15150    MEMBER  MEMBER2     MPEXL_SYSTEM_VOLUME_SET-0
 50-ST15150    LONER
 51-ST15150    SCRATCH
 52-ST15150    UNKNOWN
```

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After System Install

- After doing a system Install, you will have only one drive in use

```
:DSTAT ALL
LDEV-TYPE      STATUS  VOLUME      VOLUME SET - GEN
-----
  1-ST15150    MASTER  MEMBER1     MPEXL_SYSTEM_VOLUME_SET-0
  2-ST15150    SCRATCH
  3-ST15150    SCRATCH
 30-SYMMETRIX  SCRATCH
 31-SYMMETRIX  SCRATCH
 32-SYMMETRIX  SCRATCH
 33-SYMMETRIX  SCRATCH
```

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Using VOLUTIL

- VOLUTIL.PUB.SYS
- Used for adding user volume sets
- Used for modifying system or user volumes
- Should only be run by one user at a time
- User Capabilities CV, UV

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VOLUTIL & High Availability

- VOLUTIL used for creating software mirrored disks with Mirror/iX product
- Software mirroring not currently allowed on system volume set
- Hardware RAID-1 and RAID-5 transparent to MPE/iX

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Creating a Volume Set

■ Use VOLUTIL command NEWSSET

```
:DSTAT ALL
LDEV-TYPE          STATUS   VOLUME          VOLUME SET - GEN
-----
      1-ST15150    MASTER  MEMBER1         MPEXL_SYSTEM_VOLUME_SET-0
      30-SYMMETRIX SCRATCH

```

```
:VOLUTIL.PUB.SYS
volutil: NEWSSET PROD MEMBER1 30
volutil: exit

```

```
:DSTAT ALL
LDEV-TYPE          STATUS   VOLUME          VOLUME SET - GEN
-----
      1-ST15150    MASTER  MEMBER1         MPEXL_SYSTEM_VOLUME_SET-0
      30-SYMMETRIX MASTER  MEMBER1         PROD-0

```

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Adding a Volume

■ Use VOLUTIL command NEWVOL

```
:DSTAT ALL
LDEV-TYPE          STATUS   VOLUME          VOLUME SET - GEN
-----
      1-ST15150    MASTER  MEMBER1         MPEXL_SYSTEM_VOLUME_SET-0
      2-ST15150    SCRATCH

```

```
:VOLUTIL.PUB.SYS
volutil: NEWVOL MPEXL_SYSTEM_VOLUME_SET:MEMBER2 2 100 100
volutil: exit

```

```
:DSTAT ALL
LDEV-TYPE          STATUS   VOLUME          VOLUME SET - GEN
-----
      1-ST15150    MASTER  MEMBER1         MPEXL_SYSTEM_VOLUME_SET-0
      2-ST15150    MEMBER  MEMBER2         MPEXL_SYSTEM_VOLUME_SET-0

```

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Changing a Volume

- Use VOLUTIL command ALTERVOL to modify Transient and Permanent disk space allocation for a volume

```
:DISCFREE C
LDEV :      2 -- (MPEXL_SYSTEM_VOLUME_SET:MEMBER2)
Device   | 15648672 | 12832384 ( 82%) | 2816288 ( 18%) |
Permanent | 11736504 ( 75%) | 11891328 ( 76%) | 2192480 ( 14%) |
Transient | 11736504 ( 75%) | 941056 ( 6%) | 2816288 ( 18%) |

:VOLUTIL.PUB.SYS
volutil: ALTERVOL MPEXL_SYSTEM_VOLUME_SET:MEMBER2 2 90 90

:DISCFREE C
LDEV :      2 -- (MPEXL_SYSTEM_VOLUME_SET:MEMBER2)
Device   | 15648672 | 12832384 ( 82%) | 2816288 ( 18%) |
Permanent | 14083808 ( 90%) | 11891328 ( 76%) | 2192480 ( 14%) |
Transient | 14083808 ( 90%) | 941056 ( 6%) | 2816288 ( 18%) |
```

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Opening & Closing a Volume Set

- VSCLOSE
- VSOPEN

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Create a Volume Class

- DISC is the default class name when creating a user volume set
- Use VOLUTIL command NEWCLASS
- To add a class named AP to the PROD volume set:

```
:VOLUTIL.PUB.SYS  
volutil: NEWCLASS PROD:AP MEMBER1  
volutil: SHOWCLASS PROD:AP
```

```
Volume class index: 2
```

```
Number of volumes in class: 1
```

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Placing Accounts on User Volume Sets

- Accounts must be added to both the system and user volume set
- Adding the SALES account to the PROD volume set using NEWACCT:

```
:NEWACCT SALES,MGR;CAP=AM,ND,SF,IA,BA,PH,DS,MR
```

```
:NEWACCT SALES,MGR;ONVS=PROD
```

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Placing Groups on User Volume Sets

- Groups must be created with NEWGROUP using the HOMEVS and ONVS parameters in order to be placed on a user volume set
- Adding the DATA group to the PROD volume set using NEWGROUP:

```
:NEWGROUP DATA;HOMEVS=PROD
```

```
:NEWGROUP DATA;ONVS=PROD
```

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Deleting Accounts from a User Volume Set

- Accounts must be purged from both the system and the user volume set
- Two PURGEACCT commands required

```
:PURGEACCT SALES;ONVS=PROD
```

```
:PURGEACCT SALES
```

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Deleting Groups from a User Volume Set

- Groups must be purged from both the system and the user volume set
- Two PURGEGROUP commands required

```
:PURGEGROUP DATA.SALES:ONVS=PROD  
:PURGEGROUP DATA.SALES
```

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Migrating Accounts to new User Volume Sets

- Use the BULDACCT utility to move existing groups from the system volume set to a user volume set
- BULDACCT creates two jobs, BULDJOB1 and BULDJOB2
- BULDJOB1 contains commands to create Accounts and Groups; BULDJOB2 contains UDC information

```
:BULDACCT  
...  
...  
BULDACCT: SALES,ORDERS%VSACCT=PROD
```

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Migrating Accounts to new User Volume Sets

- Backup Account
- Run BULDACCT
- PURGEACCT
- :STREAM BULDJOB1 job
- Restore data

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Disk Space Management

- Disk space for each volume set must be managed separately
- Be careful with access to NEWGROUP command – if done incorrectly, user data may end up on system volume set
- Limit command at account level with UDCs

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Disk Space Management

- Use DISCFREE to determine free and used disk space in a volume set

```
:DISCFREE "C,,PROD"
LDEV : 30 -- (PROD:MEMBER1)
Device | 15648672 | 12832384 ( 82%) | 2816288 ( 18%) |
Permanent | 11736504 (100%) | 11891328 ( 76%) | 2192480 ( 14%) |
Transient | 11736504 (100%) | 941056 ( 6%) | 2816288 ( 18%) |
LDEV : 31 -- (PROD:MEMBER2)
Device | 15648672 | 12832384 ( 82%) | 2816288 ( 18%) |
Permanent | 11736504 (100%) | 11891328 ( 76%) | 2192480 ( 14%) |
Transient | 11736504 (100%) | 941056 ( 6%) | 2816288 ( 18%) |
```

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Disk Space Management

- Use REPORT command with ONVS= to determine what groups reside on the user volume set

```
:REPORT ?.@;ONVS=PROD
ACCOUNT      FILESPACE-SECTORS      CPU-SECONDS      CONNECT-MINUTES
 /GROUP      COUNT      LIMIT      COUNT      LIMIT      COUNT      LIMIT
MMV100      1927536      **      0      **      0      **
MMV110      2087088      **      0      **      0      **
MONTHEND    30959088      **      0      **      0      **
```

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Backups and Restores

- All major backup packages allow Backup and Restore by volume set name:
 - TurboStore
 - Orbit
 - RoadRunner
 - HiBack

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Disk Mirroring

- Software RAID-1
- Mirror/iX Software
- High-Availability
- Increased Read Performance
- volutil: NEWMIRRSET
- volutil: NEWMIRRVOL

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Splitting a Mirrored Set

- VSCLOSE *setname*;SPLIT
- VSOPEN *setname*
- STORE;SPLITVS=*setname*
- volutil: JOINMIRRSET *setname*;SOURCE=USER

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Hardware High Availability Options

- EMC Symmetrix
- HP XP Series
- AutoRAID
- Nike

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Performance Issues

- Spindle count important for high I/O production data
- In general, more smaller volumes will provide better throughput than fewer large volumes, but costs more
- Smaller drives have been discontinued
- Bigger drives are not necessarily faster

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Performance Issues

- Master volume activity can be high
- Reduce disk I/O on master to improve throughput
- Place static files on drive
- Use a smaller volume for master
- ALTERVOL permanent % below 100

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Performance Issues

- Avoid mix of different size volumes
- Disk I/O imbalances occur when large and small drives are mixed in a volume set
- Disk obsolescence makes this difficult

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Performance Issues

- Balance data after adding member volumes to avoid I/O imbalance
- Reload or Store/Restore
- DeFrag/x from Lund/Allegro
- Disc Space Manager from Bradmark
- MPEX ALTFILE command

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Hardware Considerations

- On EMC arrays, consider dedicating a mechanism for LDEV 1
- Use RAID-1 for volumes in system volume set
- Use RAID-1 for master volumes
- Use RAID-1 for high performance with critical data (avoid RAID-5 or RAID-S)

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Hints

- Use short volume set names
- Use the same size mechanisms within a volume set
- Use the same types of disks within a volume set
- Balance data after adding volumes to an existing set
- Limit access to NEWGROUP command

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Summary - Pros

- A disk failure in a user volume set will not hang or crash entire system
- System data separated from user data
- XM on master of each volume set – not all LDEV 1

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Summary - Cons

- Disk space for each volume set must be managed separately
- Reduced spindle counts could affect performance

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Resources

- [//http:docs.hp.com](http://docs.hp.com)
- Volume Management manual
- Mirror Disk/iX User's Guide
- System Management Tasks manual
- 3000-L list server
- HP: Response Center and IT Resource Center

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