VERITAS Volume Manager (VxVM) for HP-UX

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Objectives

This presentation is intended to provide an understanding of the VERITAS Volume Manager (VxVM) product through a a side-by-side comparison with LVM.

Topics

We will be comparing the differences between VxVM and LVM in the following areas:

- Structure Names
- Physical Allocation
- Physical to Logical Mapping
- Striping
- Online Resizing
- RAID-5
- Mirroring

VxVM to LVM Translations

VxVM Term	LVM Term
VM Disk	Physical Volume (PV)
Private Region	PVRA/VGRA
Subdisk	Physical Extent
Plex	Logical Extent
Disk Group	Volume Group (VG)
Volume	Logical Volume (LV)

LVM: Physical Volume
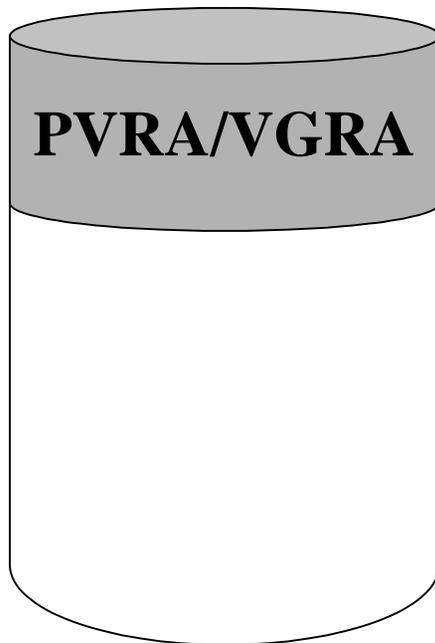
PVRA/VGRA

- Created by the addition of the LVM metadata areas (PVRA, VGRA)
- Activated when added to a VG
- Metadata records VG membership and data access information
- Referred to by the disk device identifier (i.e. /dev/dsk/c1t0d0)

LVM Physical Allocation

PVRA/VGRA
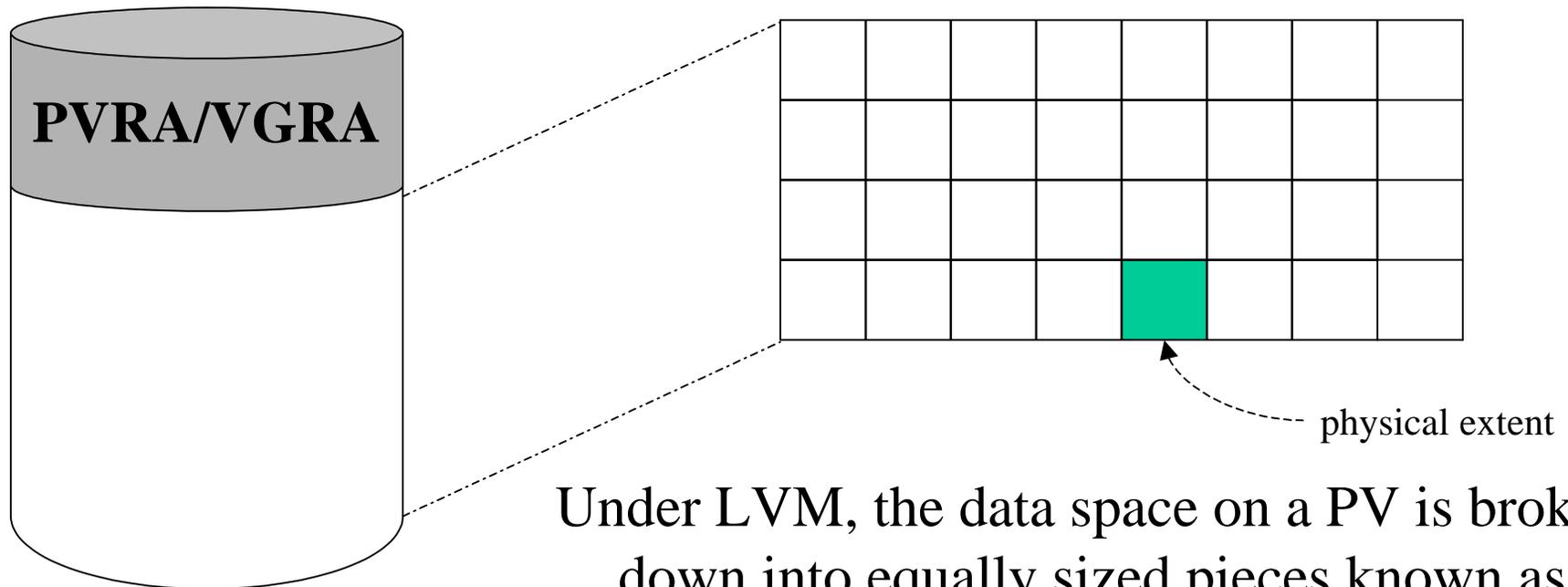
physical extent

Under LVM, the data space on a PV is broken down into equally sized pieces known as extents. All space allocation must fall on extent boundaries.

LVM: Extents

- Defined as the smallest unit of space allocatable in LVM
- PVs are made up of physical extents;
  LVs are made up of logical extents
- Extents must be used whole – no volume can have only a partial extent
- The flexible structures in LVM are achieved one-to-one mapping of physical to logical extents
- Extent size is fixed at VG creation and cannot be changed dynamically

LVM Physical to Logical Mapping

volume group

vgtest

lvol1

physical volume

physical extents

c0t1d0

logical extents

logical volume

lvol2
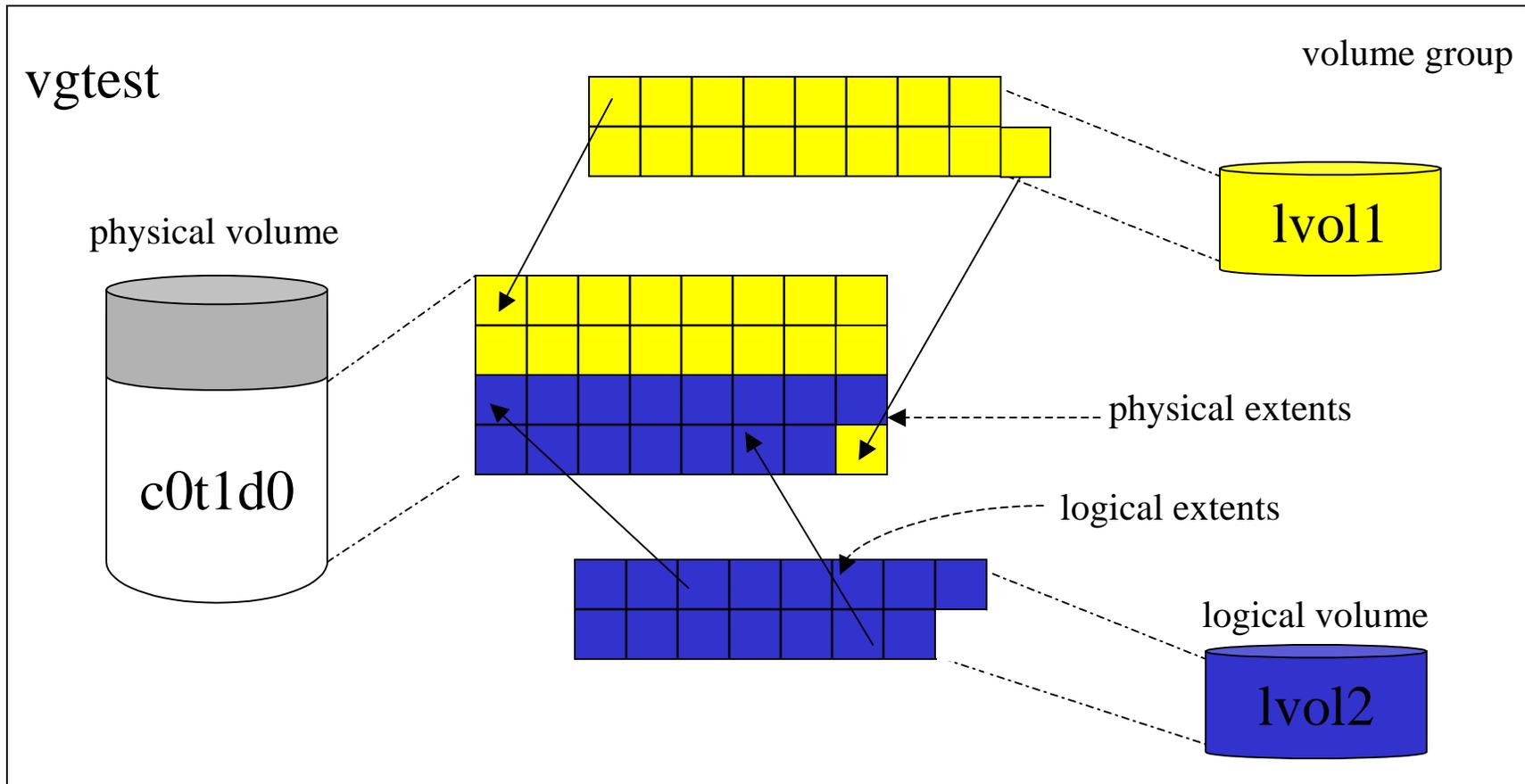
LVM: Striping

- LVM allows striping within the individual extents using a unit known as a stripe unit
- Extent-based striping is also supported
- Does not support RAID-5, RAID-0+1, RAID-1+0

LVM: Resizing

- LVs can be resized real-time
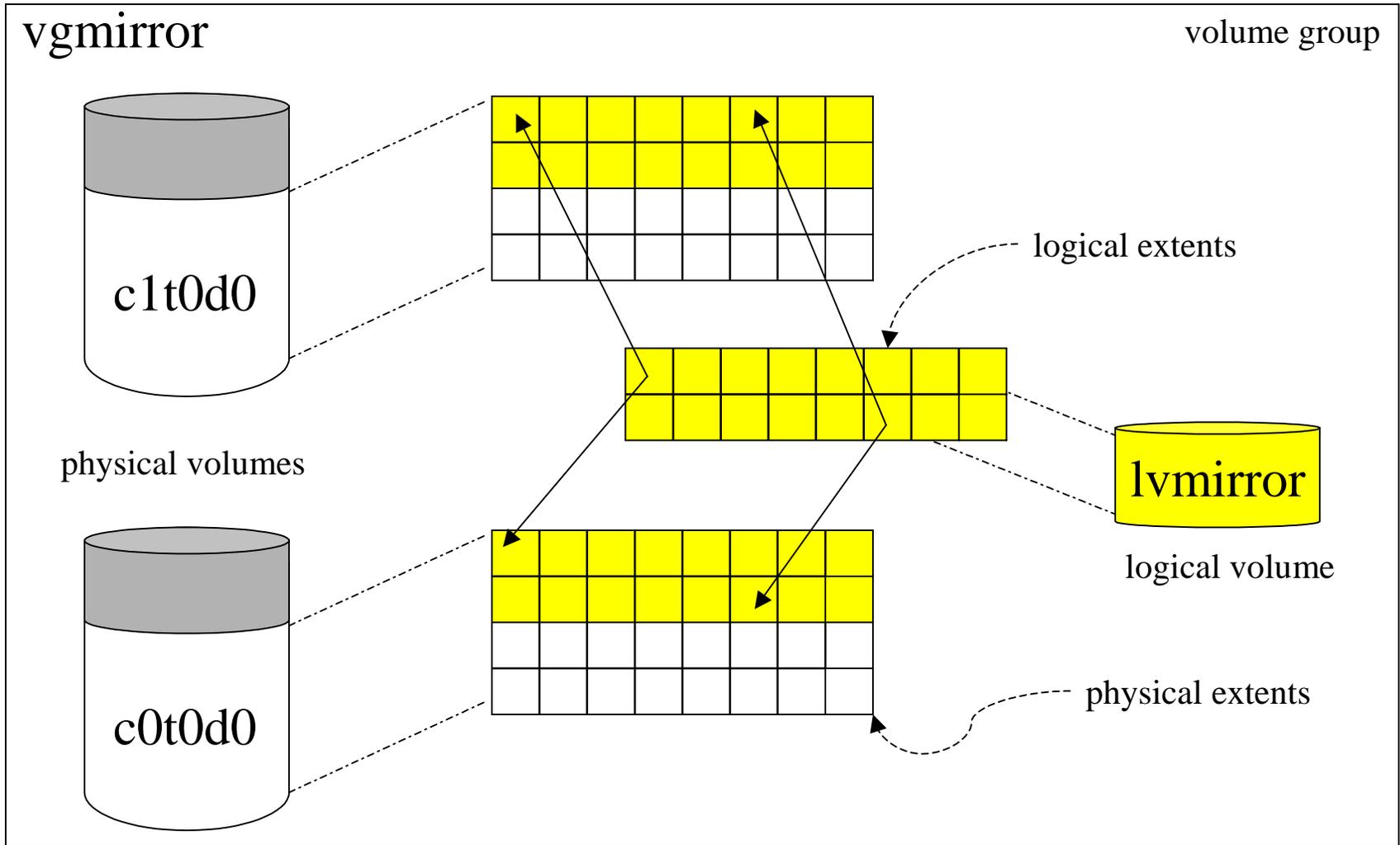- File systems contained within the LV must be resized as part of a separate command

LVM: RAID-5
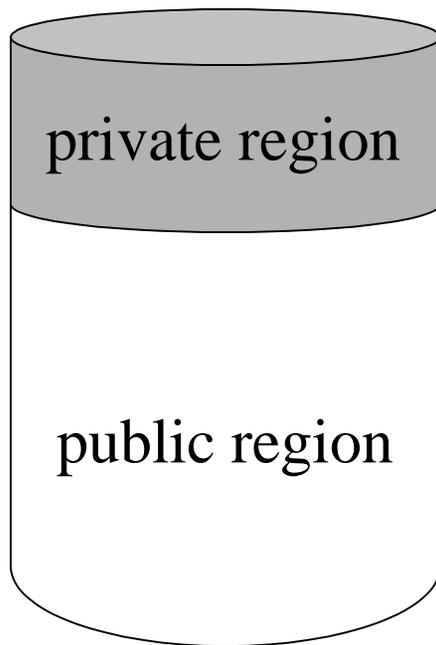
- LVM does not support RAID-5

LVM: Mirroring

- Requires MirrorDisk/UX
- Mirroring is achieved by mapping a single logical extent to multiple physical extents
- Mirrored physical extents must exist on different disk devices by default; this requirement can be overridden
- Mirrors can be "broken" so that different copies can be used independently then remirrored

Mirroring with MirrorDisk/UX

vgmirror

c1t0d0

logical extents

physical volumes

lvmirror

logical volume

c0t0d0

physical extents

VxVM: VM Disk

private region

public region

- Term "VM Disk" refers to the data space (public region) of a configured disk
- Initialized when the public and private regions are added to the disk
- Activated when added to a DG
- Private region contains a configuration database which contains all DG information
- Referred to by a "disk media name" after addition to a DG (i.e. datadg01) for ease of management

VxVM Physical Allocation

private region

public region

VM Disk
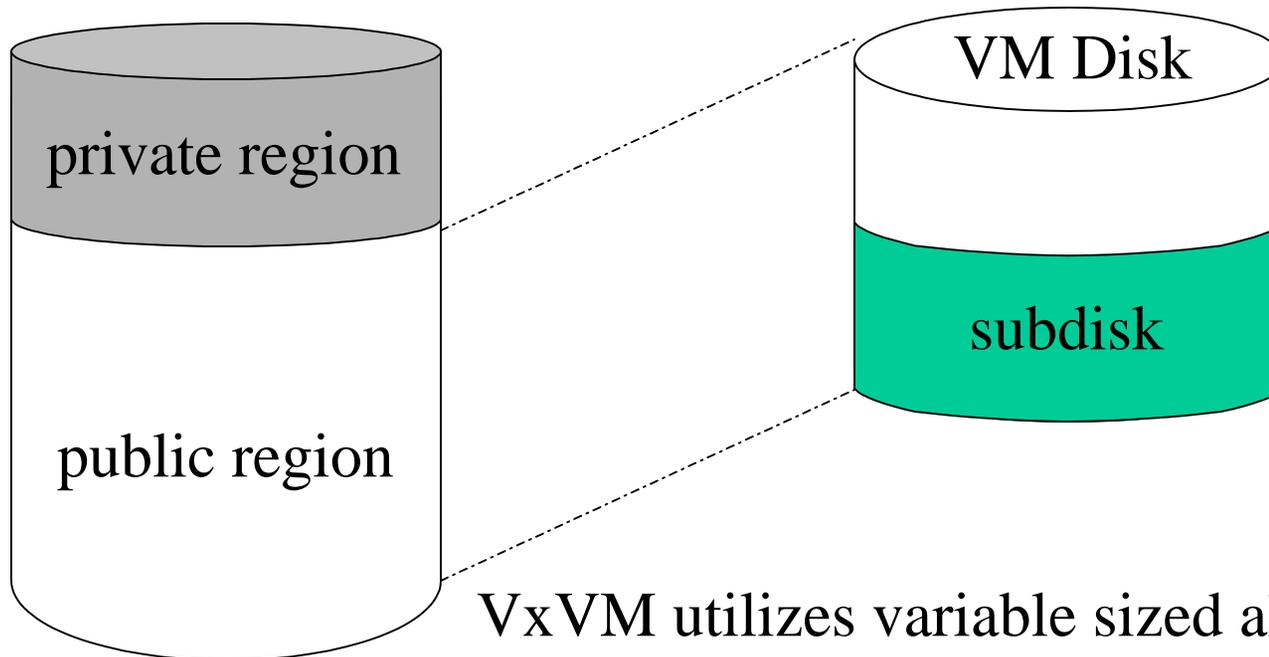
subdisk

VxVM utilizes variable sized allocation units called subdisks. These structures are defined by an offset into the public region and a length for flexibility in space allocation.
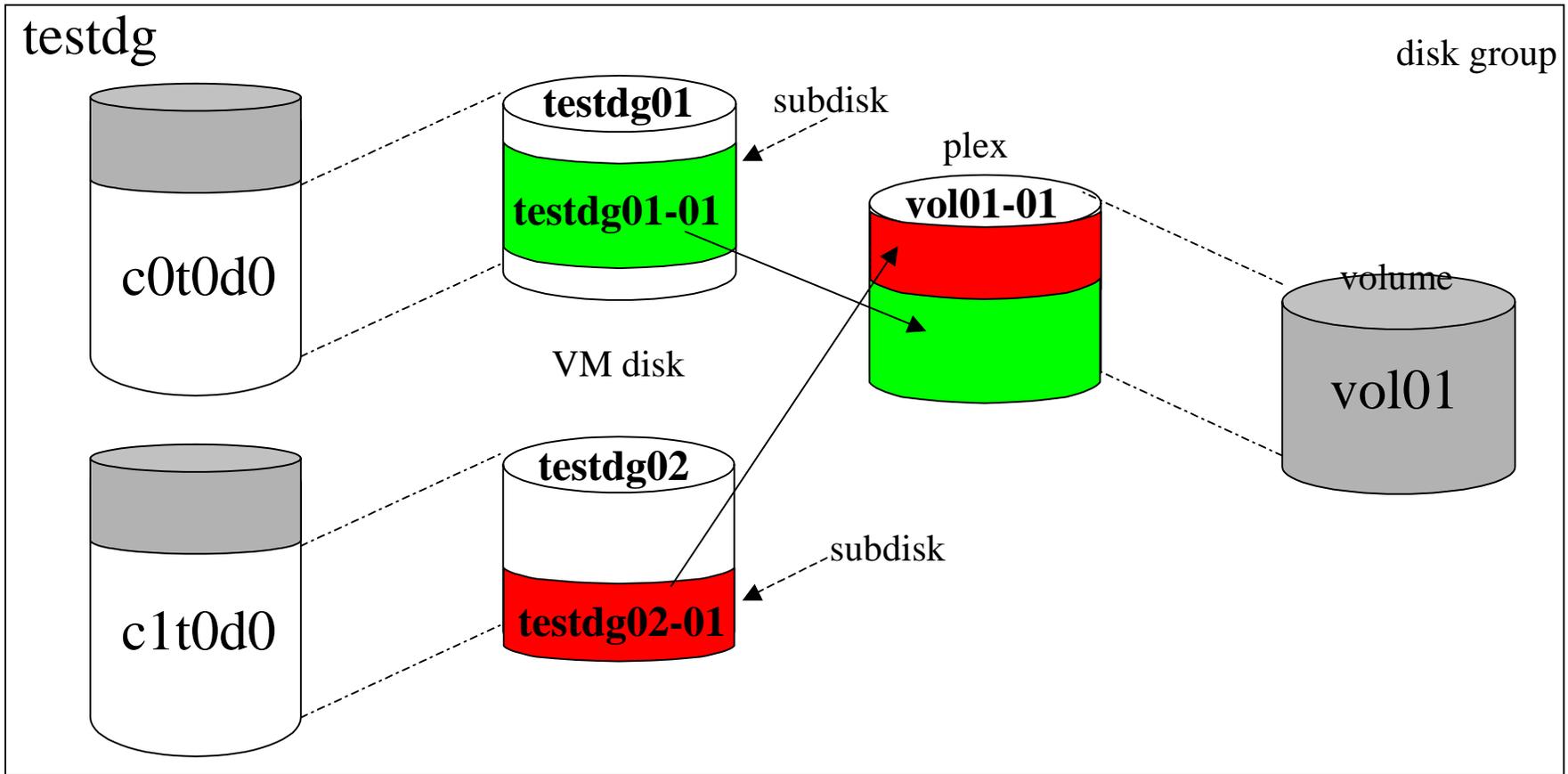
VxVM: Subdisks and Plexes

- Defined as address spaces within a DG used to create volumes
- Subdisks represent the mapping in the physical space; Plexes represent the mapping in the virtual space
- Subdisks are represented by an offset on its VM disk and a length for maximum flexibility
- Subdisks are defined in units of sectors
- Plexes are made up of one or more subdisks
- The address space of the plex maps directly to the underlying subdisk address space

VxVM: More Plexes

- Plexes are classified as concatenated, striped, RAID-5, or log types
- Plexes with missing or unresponsive subdisks are known as *sparse* plexes (as opposed to a healthy *complete* plex)
- A volume must have at least one complete plex to be active
- Log plexes can be added to RAID-5 or mirrored volumes to enhance recovery operations
- Online relayout or conversion of plex types is supported

VxVM Physical to Logical Mapping

testdg

disk group

testdg01

subdisk

plex

vol01-01

c0t0d0

testdg01-01

volume

VM disk

vol01

testdg02

subdisk

c1t0d0

testdg02-01

VxVM: Striping

- VxVM stripes by interleaving pieces of the individual subdisks within a plex
- Supports RAID-0+1 and RAID-1+0 when combined with the mirroring functionality

VxVM: Resizing

- Volumes can be resized real-time
- The command vxassist can be used to resize just the volume
- The command vxresize will adjust both the volume and the file system within

VxVM: RAID-5

- VxVM supports the use of RAID-5 plexes in volumes
- Cannot be combined with other types of plexes or mirrored
- RAID-5 plexes are created with an additional log plex by default

VxVM: Mirroring

- Mirroring is a feature of the base VxVM product – no additional licenses required
- Mirroring is achieved creating additional plexes within a single volume (up to 31 plexes)
- Mirrored physical extents must exist on different disk devices; this requirement cannot be overridden
- Mirroring options can instruct VxVM to mirror across disk devices or controllers
- Mirror plexes can be concatenated or striped; mirroring of RAID-5 plexes is not allowed

VxVM: Volume Snapshots

- Mirrors can be "broken" so that different copies can be used independently then remirrored through a feature called "volume snapshots"
- The volume snapshot feature adds a new plex to a volume and then creates a new volume from the additional plex
- VxVM maintains an association between the original and snapshot volumes while separated
- Fast Mirror Resync (FMR), an optional licensed feature, can speed up resynchronization of snapshot volume

Mirroring with VxVM

testdg disk group

VM disk   VM disk

plex   plex

volume

subdisk

subdisk