

# Managing Disks and File Systems

# Recap: What is a File System?

- Manage data storage – random access devices
- Hierarchical structure
- Absolute and Relative Paths

*Review your notes from Fundamentals*

# The classic “stack”

- Physical Disks are divided into partitions
- One file system is built on each partition
- Many file systems are assembled into a single file system tree

# The LVM “stack”

- Physical Disks are configured with **one**\* partition each
- Partitions are formatted as LVM Physical Volumes
- LVM Physical Volumes are assembled into LVM Volume Groups
- LVM Logical Volumes are allocated from Volume Groups
- One file system is built on each logical volume
- Many file systems are assembled into a single file system tree

*\*This is not a firm requirement, in fact Linux must break it for the boot disk*

# Partitioning

- Both LVM and 'classic' start with partitioning
- Two schemes are common on Linux systems
  - DOS
  - GPT

*\*Partitioning is not strictly required, we may use entire disks.*

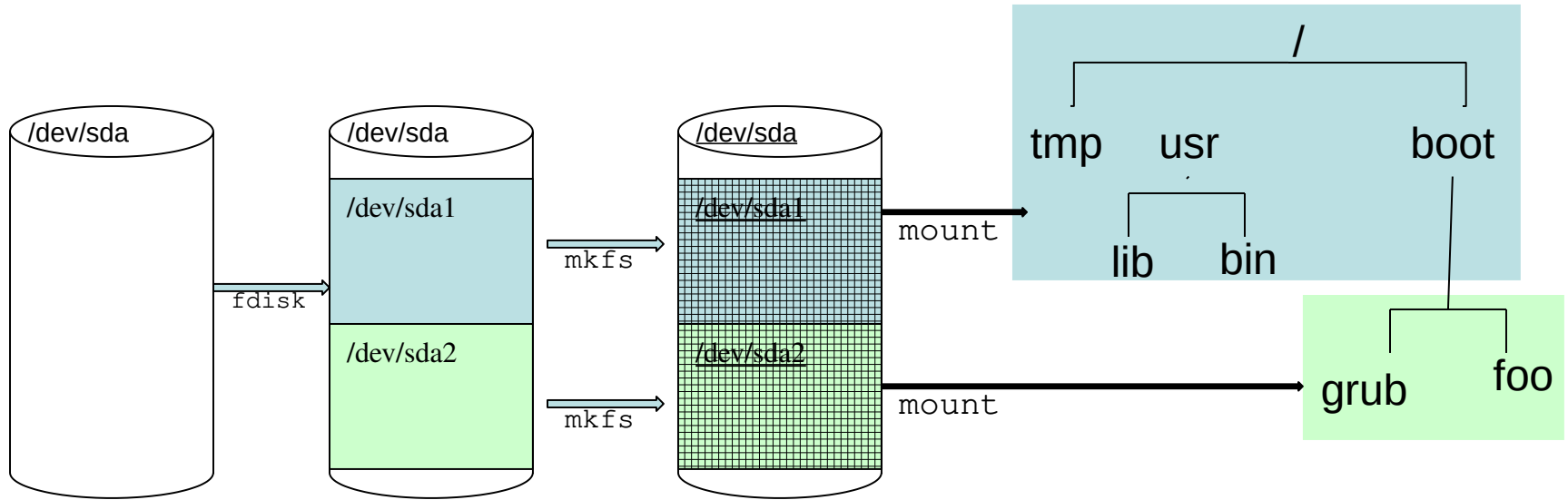
# Partitioning - DOS

- Up to 4 primary partitions or 3 primary + 12 extended
- Max disk size 2TB
- Max partition size 2TB
- Required for root disk on systems with BIOS
- Extended partitions are implemented by using one primary partition entry to hold pointers to the extended partitions (*we will see this in the lab*)

# Partitioning - GPT

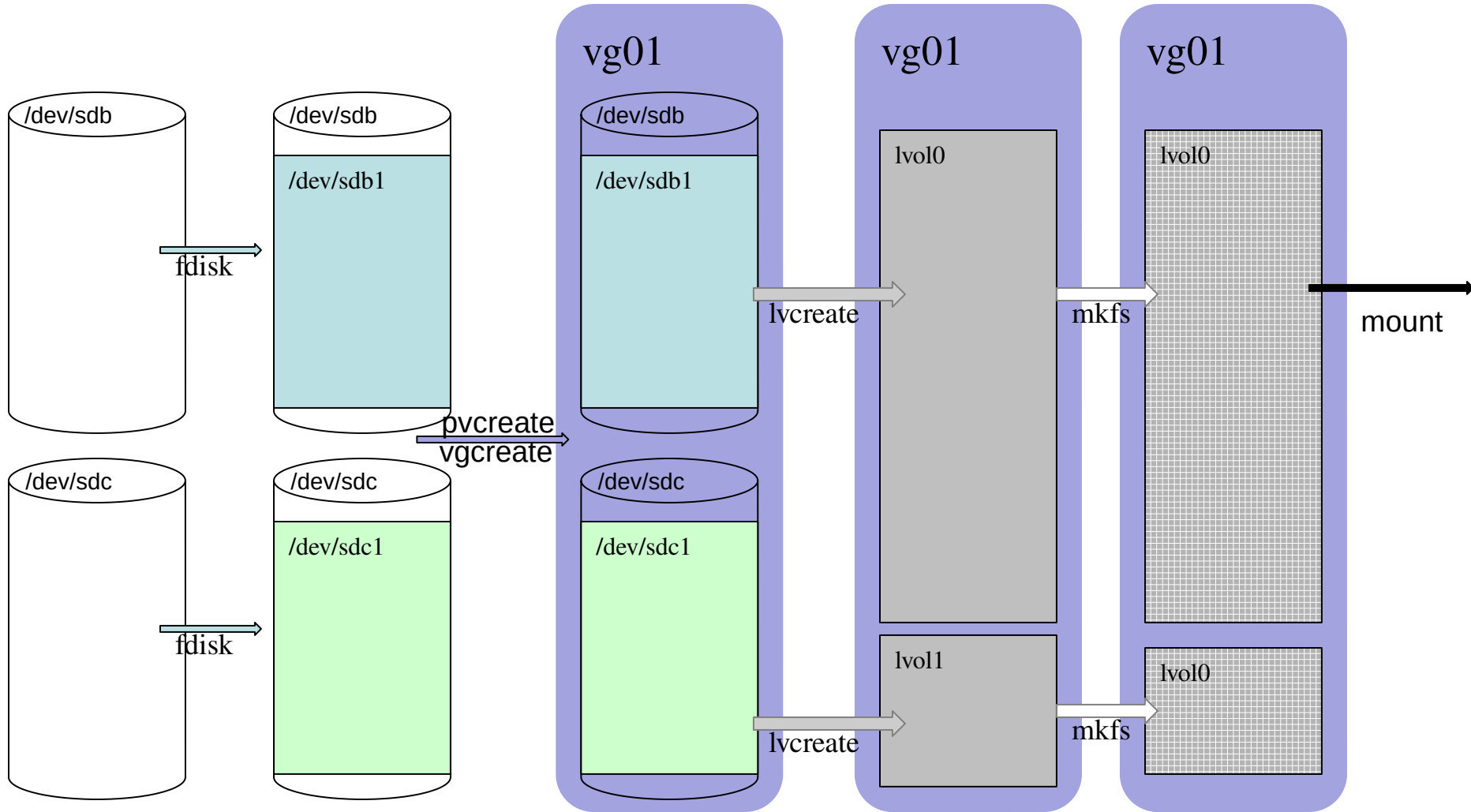
- GUID Partition Table (GUID is MSFT's name for UUID)
- Max 128 Partitions
- Max disk size 2 ZiB
- Max partition size 2 ZiB
- Required for root disk on systems with EFI

# Classic Partitioning





# LVM



# LVM – Logical Extents and Physical Extents

- Each physical disk is divided into one or more physical volumes (i.e. sda is divided into sda1, sda2)
- Each physical volume is divided into physical extents
- Each logical volume is made up of logical extents
- Each logical extent is mapped to one or more physical extents
- The O/S deals with logical volumes

# LVM – Why Bother?

- Large volume – bigger than one disk
- Flexibility
- Management tools:
  - pvmove
  - vgexport / vgimport
- Mirroring
- Has not changed significantly since the '90s

# /etc/fstab

- Lists file systems and mount points
- Read at start-up
- Read by mount command

/dev/sda2	/boot	ext4	defaults	1	2
/dev/cdrom	/local_cd	iso9660	noauto,ro	0	0
what	where	type	how	backup	check

# The mount /dev/cdrom three ways

*No /etc/fstab entry required*

```
mount -t 9660 /dev/cdrom /mount_dir
```

*/etc/fstab entry required*

```
mount /dev/cdrom
```

```
mount /media/cdrom
```

# File Consistency Check

- Very stable, mature, and safe – but...
- The `fsck` (file system check) utility checks and repairs file systems
- Required after a system crash
- Can be required periodically (`tune2fs`)

# Demonstration

- Add a disk to a VM
- Partition
- Build new file system
- Mount without /etc/fstab entry
- Mount with /etc/fstab entry