GETTING STARTED
WITH
FILE SYSTEMS

➢ FILE SYSTEMS:

- Before the partition can be used, however you need to create a filesystem for each one.
- Red Hat Enterprise Linux supports a variety of file systems.
- Each type of file system solves different problems and their usage is application specific.
- The supported file systems include local on-disk file systems XFS and ext4, network and client-and-server file systems NFS and SMB, as well as a combined local storage and file system management solution, Stratis.
- You can perform several operations with a file system such as creating, mounting, backing up, restoring, checking and repairing, as well as limiting the storage space by using quotas.

TYPES OF FILE SYSTEMS:

- At the most general level, available file systems can be grouped into the following major types:

DISK OR LOCAL FS:

- Local file systems are file systems that run on a single, local server and are directly attached to storage.
- The local file systems are: xfs, ext4/3/2…etc.

XFS FS:

- XFS is a default file system in RHEL.
- XFS is a highly scalable, high-performance, robust, and mature 64-bit journaling file system that supports very large files and file systems on a single host.

EXT4 FS:

- The ext4 file system is the fourth generation of the **ext** file system family.
- ext4 driver can read and write to ext2 and ext3 FS's, but ext4 FS's format is not compatible to ext2 & ext3.
- Support limits for ext4 fs and file sizes are lower than those on XFS.

COMPARISON OF XFS AND EXT4:

- XFS is the default file system in RHEL. This section compares the usage and features of different file systems.

File System	Max Supported Size	Max File Offset	Max Subdirectories (per directory)	Max Depth of Symbolic Links	ACL Support
Ext2	8TB	2TB	32,000	8	Yes
Ext3	16TB	2TB	32,000	8	Yes
Ext4	16TB	16TB[a]	Unlimited[b]	8	Yes
XFS	100TB	100TB[c]	Unlimited	8	Yes

JOURNALING:

- It can help speed up recovery if there is a disk failure because journaling file systems keep a “journal” of the file system’s metadata.
- It can check drivers faster during the system boot process.

NOTE: The journaling feature isn’t on older file systems such as ext2.

→ **Creating a file system using xfs:**

#mkfs.xfs -f /dev/nvme0n1

→ **Creating a file system using ext family:**

#mkfs.ext4/3/2 /dev/nvme0n1

NETWORK FILE SYSTEMS:

- Network file systems, also referred to as client/server file systems, enable client systems to access files that are stored on a shared server. This makes it possible for multiple users on multiple systems to share files and storage resources.
- Network file systems are:
  - The most common **client/server file system** for RHEL customers is the **NFS** file system. RHEL provides both an NFS server component to export a local file system over the network and an NFS client to import these file systems.
  - RHEL also includes a **CIFS** client that supports the popular Microsoft SMB file servers for Windows interoperability. The userspace Samba server provides Windows clients with a Microsoft SMB service from a RHEL server.

SHARED STORAGE FILE SYSTEMS:

- Shared storage file systems, sometimes referred to as cluster file systems, give each server in the cluster direct access to a shared block device over a local **storage area network (SAN).**
- Shared storage file systems are:
  - Red Hat Enterprise Linux provides the **GFS2** file system. GFS2 comes tightly integrated with the RHEL High Availability Add-On and the Resilient Storage Add-On.
  - Red Hat Enterprise Linux supports **GFS2** on clusters that range in size from 2 to 16 nodes.

VOLUME-MANAGING FILE SYSTEMS:

- Volume-managing file systems integrate the entire storage stack for the purposes of simplicity and in-stack optimization.
- Volume-managing file systems are:
  - Red Hat Enterprise Linux 8 provides the Stratis volume manager as a Technology Preview. Stratis uses XFS for the file system layer and integrates it with LVM, Device Mapper, and other components.

SWAP FILE SYSTEM:

- A swap file is a system file that creates temporary storage space on a solid-state drive or hard disk when the system runs low on memory. The file swaps a section of RAM storage from an idle program and frees up memory for other programs.

ISO 9660 FILE SYSTEM:

- This industry standard media format was originally designed to specify the volume and file structures of **compact-disk read-only memory (CD-ROM)** optical disks, and is a read-only media format.
- The ISO 9660 format is used currently on CD and DVD read-only media.

/PROC FILE SYSTEM:

- Proc file system (procfs) is a virtual file system created on the fly when the system boots and is dissolved at the time of system shutdown. It contains useful information about the processes that are currently running.

MS-DOS & VFAT FILE SYSTEM:

- The FAT File System was initially used on PC operating systems such as MS-DOS and early versions of Microsoft Windows. Still, it is widely used on USB memory sticks or memory cards for file storage. It is simple, robust and offers good performance especially in embedded applications.
- A **virtual file allocation table (VFAT)** is an extension to the file allocation table (FAT) from Windows 95 and onward for creating, storing and managing files with long names.

NTFS FILE SYSTEM:

- New Technology File System (NTFS) is a proprietary journaling file system developed by Microsoft.
- It superseded File Allocation Table (FAT) as the preferred filesystem on Windows and is supported in Linux and BSD as well.