

Lab A2: Filesystems, Storage, and LVM on Red Hat Enterprise Linux

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Objective

The objective of this lab is to understand and implement enterprise-grade storage management on Red Hat Enterprise Linux (RHEL). The lab focuses on disk identification, partitioning, Logical Volume Manager (LVM) configuration, filesystem creation, and persistent mounting. Emphasis is placed on safe storage practices commonly used in production environments.

Lab Environment

The lab was conducted using the following setup:

Operating System: Red Hat Enterprise Linux

Administration Node: `rhel-admin`

Server Node: `rhel-server1`

Access Method: SSH from administration node

All storage-related operations were performed on the server node (`rhel-server1`). The administration node was used only for access and verification.

Enterprise Context

In enterprise environments, application data is stored on dedicated disks separate from the operating system. This approach improves system reliability, simplifies maintenance, and reduces the risk of data loss. Logical Volume Manager (LVM) is commonly used to provide flexible storage management, allowing volumes to be resized or reorganized without service disruption.

Tasks Performed

Disk Identification and Preparation

A secondary virtual disk was added to the server node to simulate a dedicated data disk. The disk was identified using standard Linux tools, ensuring that the system disk was not modified.

Partitioning and LVM Configuration

The new disk was partitioned and prepared for use with LVM. A physical volume was created, followed by a volume group to pool available storage. Logical volumes were then allocated for different purposes, representing project data and backup storage.

Filesystem Creation and Mounting

Each logical volume was formatted with the XFS filesystem. Dedicated mount points were created and the filesystems were mounted accordingly. Persistent mounting was configured to ensure availability after system reboots.

Verification

The configuration was verified by inspecting disk layout, LVM structure, and mounted filesystems. The following screenshots provide evidence of successful implementation.

```
ayoubesco@localhost:~$ ssh root@192.168.1.19
root@192.168.1.19's password:
Web console: https://localhost:9090/ or https://192.168.1.19:9090/

Last login: Thu Dec 25 19:03:13 2025
root@localhost:~# lsblk
NAME      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda        8:0    0   15G  0 disk
└─sda1     8:1    0    1M  0 part
└─sda2     8:2    0    1G  0 part /boot
└─sda3     8:3    0   14G  0 part
  ├─rhel-root 253:0    0 12.5G  0 lvm  /
  └─rhel-swap 253:1    0  1.5G  0 lvm  [SWAP]
sdb        8:16   0   10G  0 disk
sr0       11:0    1 1024M  0 rom
```

Figure 1: Disk layout showing system disk and additional data disk

Lessons Learned

This lab demonstrated the importance of separating system and data storage in Linux servers. Using LVM provides flexibility and scalability, which are critical requirements in enterprise systems. Proper verification steps are essential to ensure that storage configurations are correct and persistent.

Conclusion

Through this lab, enterprise storage management concepts were successfully applied on Red Hat Enterprise Linux. The resulting configuration reflects common practices used in production

```

root@localhost:~# pvs
  PV          VG      Fmt  Attr PSize   PFree
  /dev/sda3    rhel    lvm2 a--  <14.00g     0
  /dev/sdb1    vg_data lvm2 a--  <10.00g <2.00g
root@localhost:~# vgs
  VG      #PV #LV #SN Attr   VSize   VFree
  rhel      1   2   0 wz--n- <14.00g     0
  vg_data   1   2   0 wz--n- <10.00g <2.00g
root@localhost:~# lvs
  LV        VG      Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%
Sync Convert
  root      rhel    -wi-ao---- <12.50g
  swap      rhel    -wi-ao----  1.50g
  lv_backups  vg_data -wi-a-----  3.00g
  lv_projects  vg_data -wi-a-----  5.00g

```

Figure 2: LVM physical volumes, volume groups, and logical volumes

```

root@localhost:~# df -h
Filesystem           Size  Used Avail Use% Mounted on
/dev/mapper/rhel-root 13G  2.4G  11G  19% /
devtmpfs              4.0M   0  4.0M  0% /dev
tmpfs                 1.5G   0  1.5G  0% /dev/shm
tmpfs                 610M  8.3M  602M  2% /run
tmpfs                 1.0M   0  1.0M  0% /run/credentials/systemd-
journald.service
/dev/sdb2             960M 329M  632M  35% /boot
/dev/mapper/vg_data-lv_backups 3.0G  90M  2.9G  3% /backups
/dev/mapper/vg_data-lv_projects 5.0G 130M  4.9G  3% /projects
tmpfs                 1.0M   0  1.0M  0% /run/credentials/getty@tt
y1.service
tmpfs                 305M  4.0K  305M  1% /run/user/0
root@localhost:~# 

```

Figure 3: Mounted filesystems and disk usage

environments, including safe disk handling, flexible volume management, and reliable filesystem mounting.