LESSON 4



UNIX

Files & ZFS

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UNIX OS

LESSON 4

Files, Permissions and File Systems

The standard directory layout, permissions, links, devices, and UFS, ZFS, APFS and JFS

The Directory Layout

Path	Purpose
/etc	configuration
/usr/bin · /usr/sbin	user and admin programs
/var	logs, spool, mail
/dev	device files
/opt	third-party software
/home · /Users	home directories

- Every UNIX shares the same basic tree: slash etc for configuration, slash usr for programs, …
- Home directories vary: slash home on Linux, BSD and Solaris, slash Users on macOS, and …

01

Permissions and Ownership

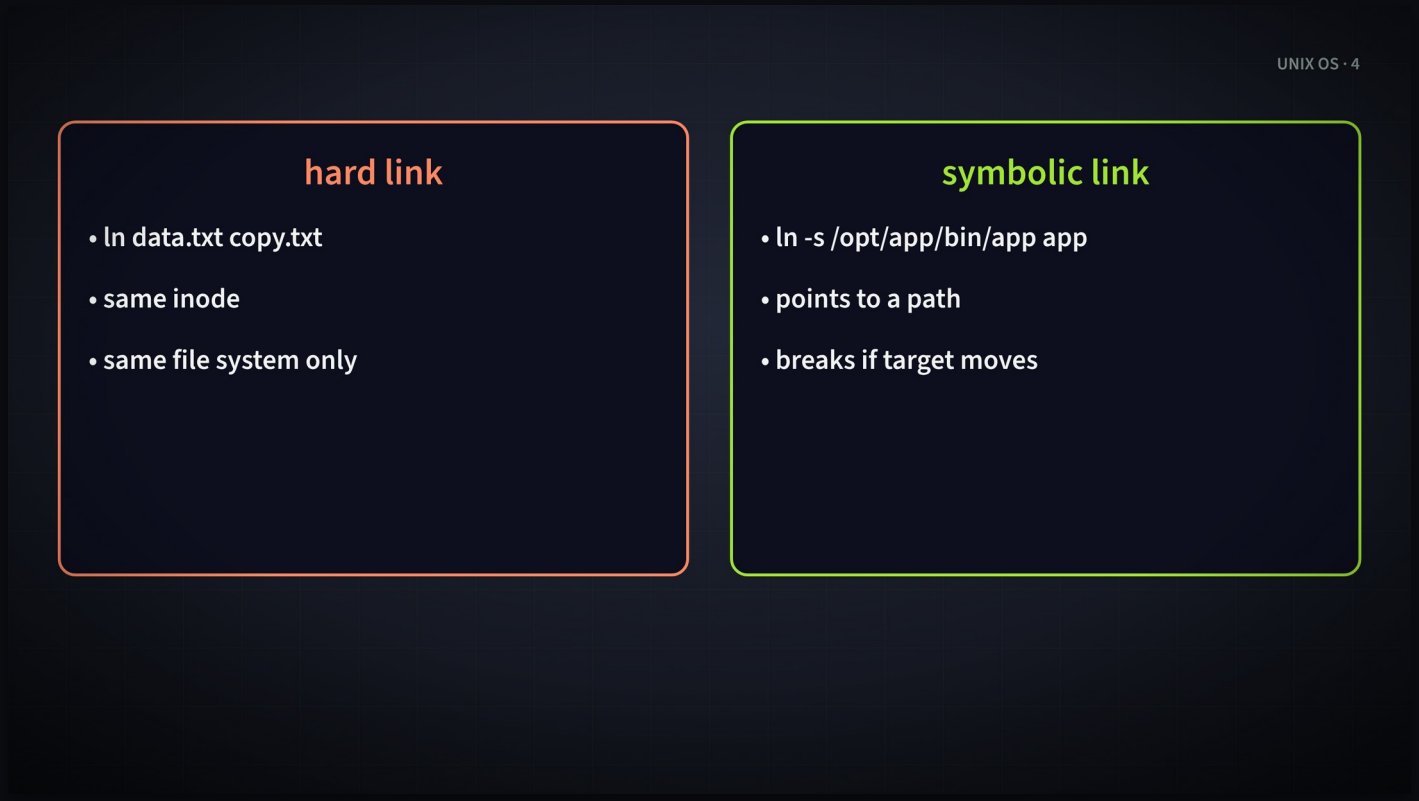
terminal

```
$ ls -l /etc/passwd
-rw-r--r--  1 root  wheel  8160 Oct 25 09:00 /etc/passwd
$ chmod 750 deploy.sh
$ chown mariam:staff report.txt
$ chmod +a "ahmad allow read" report.txt     # macOS ACL
$ setfacl -m user:ahmad:r report.txt           # Solaris / Linux ACL
```

- UNIX invented the read, write and execute permissions for owner, group and others, set with …
- Many systems add access control lists for finer control: setfacl on Linux and Solaris, …

02

Hard Links and Symbolic Links



- Every file is an inode: a record of its data and permissions. A hard link is a second name ...
- ln makes hard links and ln dash s makes symbolic ones. Symbolic links can cross file ...

03

Devices

System	First disk
Linux	/dev/sda · /dev/nvme0n1
FreeBSD	/dev/ada0
macOS	/dev/disk0
Solaris	/dev/dsk/c0t0d0s0 (controller, target, disk, slice)
AIX	/dev/hdisk0

- Disks and terminals live in slash dev, and their names show the family. Linux uses sda, …
- The idea is the same everywhere: read and write the device file like any other file.

04

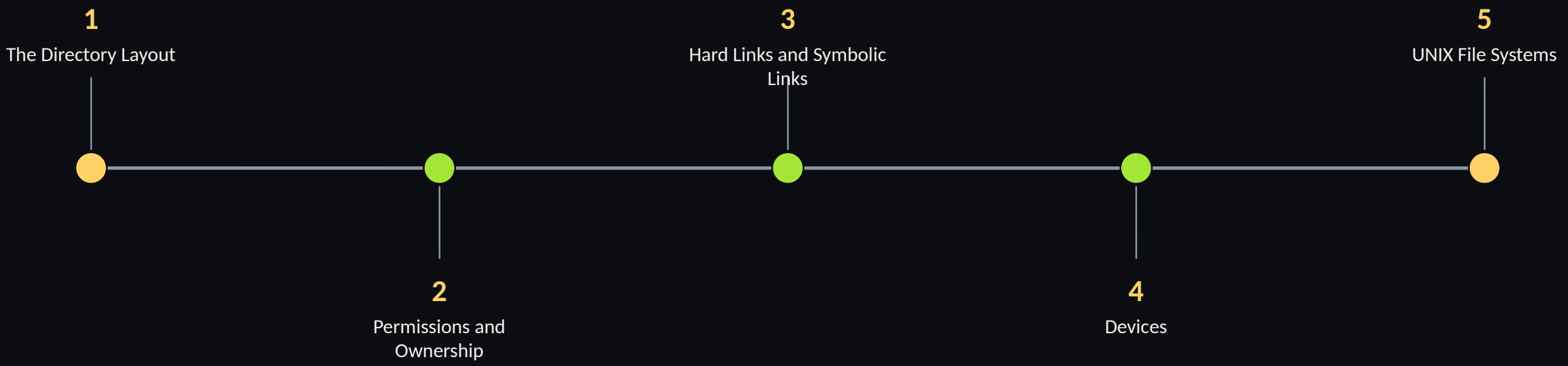
UNIX File Systems

File system	Found on	Known for
UFS	BSD, old Solaris	the classic
ZFS	Solaris, FreeBSD	checksums, snapshots, pools
APFS	macOS	SSD, clones, encryption
JFS2	AIX	journaling, large files
VxFS	HP-UX	online resize

- The classic UNIX File System, UFS, came from BSD. ZFS, created at Sun for Solaris, combines ...
- macOS uses APFS, AIX uses JFS2, and HP-UX uses VxFS.

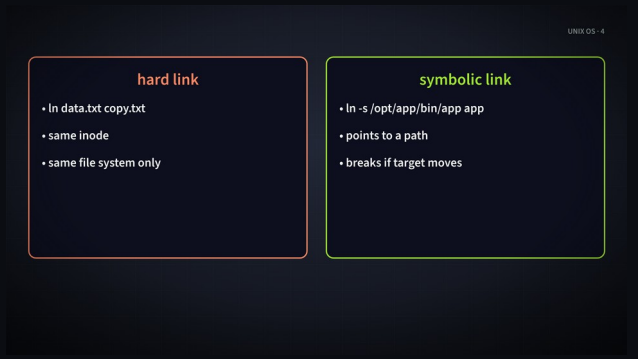
05

Lesson Map


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Sources and Further Reading





Thank you for watching

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