Assignment - 1

1. What is the Linux Operating System (OS)? Answer->

Linux is a operating system kernel that is open source and serves as the foundation for a variety of platforms from supercomputers and servers to smartphones and embedded systems. Linux operating system is functioning system

⁕⁕ The positive aspects of Linux:

* + Cost effective: there are no licensing fees , and most distribution are available for free for both download and installation.
  + Customizable : user is able to modify nearly every aspect of the system by their own needs.

⁕⁕ The negatives aspects of Linux:

* + Fewer commercial application : some commercial applications, and games , are designed mainly for windows or macOS
  + Need to learn more upfront : For user who have only used graphical user interface with no experience with command line tools.

1. Differentiate between Linux, Mac, Android, and Windows OS with at least six unique features.

Answer->

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Linux | Free and open source | Server , machine ,desktop | Many use desktop environment | Installed using package manner | Rolling released by fixed | Developers ,researches , interpreter |
| macOS | Proprietary  Unix based OS apple model | Very limited works on macOS | Aqua graphical interface | Mac app store with additional software available | Updates controlled by apple | Creative professionals whose working with apple |
| Android | Mobile, google , first open source hand set | Smartphone , smart TV , smart car | Touch screen oriented | Google play store | Updates generally done over the air | General customers, electrical user |
| Windows | Like Microsoft | Desktop, laptop | GUI include a start menu | Microsoft ware store | Automatic update | General PC users |

1. Why is Linux preferred for Mainframe Servers for legacy application? Give three out-of-the-box technical reasons.

Answer->

⁕linux is preferred because of its native CPU compatibility , incredible virtualization density and ability to directly interface with mainframe hardware

1. Massive Virtualization Density with z/VM and KVM on Linux

Using either z/VM or KVM , mainframes can run multiple isolated instances of Linux the same time on a single physical box, stacking up thousand per box . Linux has been turned to this hyper version

1. I/O (Channel Subsystems + Linux I/O Stack) Hardware Offload

IBM maintenance use channel I/O subsystems to offload networking /storage/cryptography from the CPU . with linux running on the maintance, these hardware acceleratirs are intrgrated in linux out of the box

1. Explain the structure of the Linux File System with proper diagram. Note: you can use the tree command to find it out.

Answer->

 Introduction to the Linux File System

Linux has a structure of directories beginning with a probable start of a root directory. Everything in Linux ,whether it is a file , directory , device or even hardware , is treated as file

tree/

├── bin

├── boot

├── dev

├── etc

│ ├── apache2

│ └── network

├── home

│ ├── kumya

│ └── students

├── lib

├── media

│ ├── cdrom

│ └── usb

├── mnt

├── opt

├── proc

├── sbin

├── tmp

├── usr

│ ├── bin

│ └── lib

└── var

├── log

└── mail

1. If Linux OS is open-source, how do companies like Red Hat still making money from it? Do a market study and answer properly.

Answer->

Even through linux is open source and free for every one to use , companies such as red hat make money by producing value added service instead of selling the software

 Subscription-based Support and Maintenance

Red Hat sells subscriptions for Red Hat Enterprise Linux. The subscriptions give enterprises:

* Certified and stable Linux distributions
* Regular updates, bug fixes, and security patches
* Training and certification for IT staff

This allows companies to safely use Linux in critical environments. Consulting and Professional Services

Red Hat provides consulting to help organizations:

1. Write the command to display today’s date and time (i.e., current System time).

Answer->

Display current date and time

┌──(kumya㉿sonic)-[~]

└─$ date

changes the date

┌──(kumya㉿sonic)-[~]

└─$ sudo date MMDDhhmmYYYY

Changes only time

┌──(kumya㉿sonic)-[~]

└─$ sudo date +%T -s "HH:MM:SS"

Changes only date

┌──(kumya㉿sonic)-[~]

└─$

sudo date +%F -s "YYYY-MM-DD"

changes date and time

┌──(kumya㉿sonic)-[~]

└─$ sudo date MMDDhhmmYYYY.ss

1. Which command is used to check how long the system has been running?

Answer->

┌──(kumya㉿sonic)-[~]

└─$ uptime

Output is....

17:50:12 up 5 days, 3:24, 2 kumya, load average: 0.15, 0.10, 0.05

1. What is the difference between shutdown -h now and halt?

Answer->

 shutdown -h now

This command will properly shutdown your system right now . it will stop all the running processes to shutdown cleanly and unmount all filesystems.

┌──(kumya㉿sonic)-[~]

└─$ sudo shutdown -h now

 halt

This command stops the Central Processing Unit (CPU) immediately. Depending on the system configuration, the halt command may not terminate processes properly and may not unmount filesystems before powering down.

┌──(kumya㉿sonic)-[~]

└─$ sudo halt

|  |  |  |  |
| --- | --- | --- | --- |
| **Command** | Function | Safety | Notes |
| shutdown -h now | Gracefully shuts down and halts | Safe, filesystems unmounted | Recommended for normal shutdown |
| halt | Stops the CPU immediately | Less Safe | May not unmount filesystems and server may not turn off |

1. Compare init 0 and shutdown -h. Which is safer? Why?

Answer->

 init 0

Sets the runlevel of the system to 0, which is the halt runlevel. Immediately kills all processes and halts the system. Not always a safe shutdown. Filesystems may not be unmounted.

┌──(kumya㉿sonic)-[~]

└─$ sudo init 0

 shutdown -h

Safely shuts down the system, and brings it to a halt. Sends the proper termination signals to all running processes to allow for graceful shutdown of all processes. Unmounts all filesystems before halting or powering off.

┌──(kumya㉿sonic)-[~]

└─$ sudo shutdown -h

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Feature** | Purpose | Process Termination | Filesystem Handling | User Notification | Safety |
| init 0 | Halts the system immediately | Processes may not be safely killed | Filesystems may remain mounted | No notification to logged-in users | Less safe, risk of data loss |
| shutdown -h | Gracefully shuts down and halts | Processes are safely killed | Unmounts all filesystems | Prompts all logged-in users | Safer, prevents file system corruption |

1. A system administrator accidentally powers off a Server machine without shutting it down properly. What problems can occur to the said Server?

Answer->

When a system administrator powers off the server without going through the proper shutdown process, several problems can happen:

1. Data Loss
   * Any unsaved data in memory or personal files will be lost forever.
   * The databases and applications which were running can now have incomplete transactions.
2. Filesystem Corruption
   * The filesystems will not be unmounted correctly.
   * This can result in corrupted files, missing data, and the server will not boot.
3. Application Failures
   * Any applications and services will be unstable.
   * Critical processes may not terminate as expected throwing an error next time the application starts.
4. Hardware Stress
   * Abrupt power interruptions can harm hard drives, especially old spinning disks.
   * Repeated abrupt shutdowns can shorten the life expectancy of the hardware.
5. Boot Problems
   * When the server is rebooted, it could run into filesystem check (fsck) or just never start services.
   * This will add to downtime as recovery may involve a manual step.
6. Security Risks
   * Any temporary files or caches that may contain sensitive data may be left in an inconsistent state.
   * There is a potential risk of exposing sensitive data or generating incomplete activity logs.

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