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Subject: LINUX PROGRAMMING

Assignment: Bash Shell Scripting (Part 2)

11. What is a user-defined function in shell scripting? Explain with an example.

A user-defined function is a block of code that can be called multiple times in a script to perform a specific task.
Example:

```
#!/bin/bash
function greet() {
 echo "Hello, $1!"
}
greet Aman
```

12. Write a bash script with a function that multiply two integer numbers.

```
#!/bin/bash
multiply() {
 result=$(( $1 * $2 ))
 echo "Multiplication Result: $result"
}
echo "Enter two numbers:"
read a b
multiply $a $b
```

13. Explain how arrays (1D, 2D, and 3D) are declared in bash scripting.

Bash supports only one-dimensional arrays by default. Multi-dimensional arrays can be simulated using associative arrays or nested loops.
Example:
1D: arr=(10 20 30)
2D: arr[0,0]=1 arr[0,1]=2
3D: Can be simulated with nested loops or associative keys.

14. Write a shell script to display elements of an array.
#!/bin/bash
arr=(10 20 30 40 50)
echo "Array elements:"
for i in "${arr[@]}"; do
  echo $i
done

15. What is the purpose of cron in Linux?
Cron is a time-based job scheduler in Unix/Linux systems. It is used to run commands or scripts automatically at scheduled times or intervals.

16. Write a cron job to run a backup script every day at midnight.
To schedule a cron job, use crontab -e and add:
0 0 * * * /home/user/backup.sh
This runs the backup script every day at midnight.

17. How do you schedule a one-time job using at command?
Use the 'at' command to schedule a task once.
Example:
echo "sh /home/user/cleanup.sh" | at 10:00 PM

18. Write a script to display disk usage using df and du.
#!/bin/bash
echo "Disk Usage Information:"
df -h
echo "Directory Usage Details:"
du -h --max-depth=1

19. How can you log the output of a script using the tee command?
The 'tee' command allows output to be displayed on screen and saved to a file simultaneously.
Example:
#!/bin/bash
echo "System Info" | tee logfile.txt

20. Explain with an example how shell scripting can automate system administration tasks.

Shell scripting can automate repetitive administrative tasks like backups, monitoring, and log rotation.

Example:

```
#!/bin/bash
backup_dir="/backup"
mkdir -p $backup_dir
cp -r /home/user/Documents $backup_dir
echo "Backup completed at $(date)"
```