2. Student Handout

Networking Basics and System Monitoring: Student Handout

Welcome to the session on **Networking Basics and System Monitoring**. This guide will provide you with a concise overview of essential networking commands, configuring network interfaces, managing network services, monitoring system performance, and log management. Use this handout as a reference to practice and reinforce your understanding.

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1. Basic Networking Commands

1.1 `ifconfig`

- **Purpose**: Configure network interfaces and view IP addresses.
- **Example 1**: Display all network interfaces.

```
ifconfig
```

- **Example 2**: Assign an IP address to an interface.

```
sudo ifconfig eth0 192.168.1.100 netmask 255.255.255.0
```

- **Example 3**: Bring an interface up or down.

```
sudo ifconfig eth0 up
sudo ifconfig eth0 down
```

1.2 `ping`

- **Purpose**: Test connectivity between devices.
- **Example 1**: Ping a website to check connectivity.

```
ping google.com
```

- **Example 2**: Ping a local device using its IP address.

```
ping 192.168.1.1
```

- **Example 3**: Limit the number of ping requests.

```
ping -c 4 google.com
```

1.3 `netstat`

- **Purpose**: Display network statistics and active connections.
- **Example 1**: Show all active connections and listening ports.

```
netstat -an
```

- **Example 2**: Display routing table information.

```
netstat -r
```

- **Example 3**: Show network interface statistics.

```
netstat -i
```

1.4 `ssh`

- **Purpose**: Securely connect to another computer over a network.
- **Example 1**: Connect to a remote server.

```
ssh user@remote-server
```

- **Example 2**: Use a specific port for SSH connection.

```
ssh -p 2222 user@remote-server
```

- **Example 3**: Execute a command on a remote server.

```
ssh user@remote-server 'ls -l'
```

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2. Configuring Network Interfaces and Troubleshooting Connectivity Issues

2.1 Configuring Network Interfaces

- **Example 1**: Assign an IP address using `ifconfig`.

```
sudo ifconfig eth0 192.168.1.100 netmask 255.255.255.0
```

- **Example 2**: Use the `ip` command to assign an IP address.

```
sudo ip addr add 192.168.1.100/24 dev eth0
```

- **Example 3**: Remove an IP address from an interface.

```
sudo ip addr del 192.168.1.100/24 dev eth0
```

2.2 Troubleshooting Connectivity Issues

- **Example 1**: Check physical connections and network cables.
- **Example 2**: Verify IP address assignment with `ifconfig`.

```
ifconfig
```

- **Example 3**: Ping the gateway to check connectivity.

```
ping 192.168.1.1
```

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3. Managing Network Services

3.1 Starting, Stopping, and Checking the Status of Services

- **Example 1**: Start a service.

```
sudo systemctl start apache2
```

- **Example 2**: Stop a service.

```
sudo systemctl stop apache2
```

- **Example 3**: Check the status of a service.

```
sudo systemctl status apache2
```

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4. Monitoring System Performance

4.1 CPU, Memory, and Disk Usage

- **Example 1**: Monitor CPU usage with `top`.

```
top
```

- **Example 2**: Check memory usage with `free`.

```
free -h
```

- **Example 3**: View disk usage with `df`.

```
df -h
```

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5. Using System Monitoring Tools

5.1 `htop`

- **Example 1**: Launch `htop` to view real-time system performance.

```
htop
```

5.2 `iotop`

- **Example 1**: Monitor disk I/O usage.

```
iotop
```

5.3 `vmstat`

- **Example 1**: Display system performance summary.

```
vmstat
```

5.4 `dstat`

- **Example 1**: Use `dstat` for comprehensive system monitoring.

```
dstat
```

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6. Log Management and Analysis

6.1 Viewing Logs with `tail` and `grep`

- **Example 1**: View the last few lines of a log file.

```
tail /var/log/syslog
```

- **Example 2**: Search for errors in a log file.

```
grep "error" /var/log/syslog
```

- **Example 3**: Continuously monitor a log file.

```
tail -f /var/log/syslog
```

6.2 Understanding Log Rotation

- **Example 1**: Check log rotation configuration.

```
cat /etc/logrotate.conf
```

- **Example 2**: Manually rotate logs.

```
sudo logrotate /etc/logrotate.conf
```

- **Example 3**: View rotated log files.

```
ls /var/log/
```

Conclusion

This handout provides a summary of key networking and system monitoring concepts. Practice using these commands and tools to gain confidence in managing and troubleshooting network

and system performance.