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|  | **Qatar University**  **College of Engineering**  **Department of Computer Science and Engineering** |

Operating Systems-(CMPS 405)

**Task: Project Phase 1**

*Fall 2024*

**Project Group Members:**

Marwan Hashish ID:201701546

Abdulla Jamali ID: 202104080

Nasser Aljufairi ID: 202005009

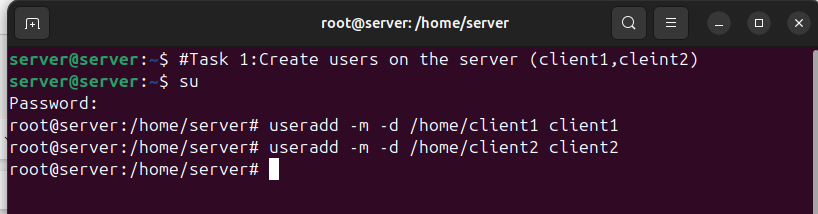
Murshed Al-Muhannadi ID: 201706102

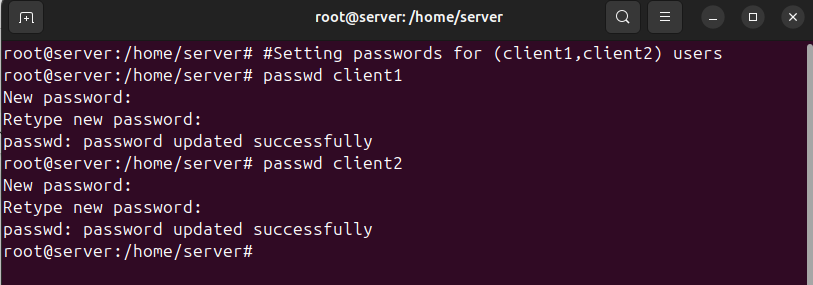
**Instructor**: ***Eng.Heba Dawoud***

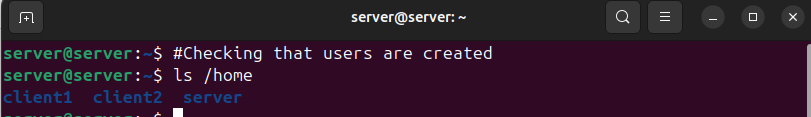
|  |  |  |
| --- | --- | --- |
| **student name** | **Student part in the Project** | **participation percentage** |
| Marwan Hashish | 1. Server-side tasks (VM1):   Configuration tasks SSH and SFTP  Shell scripts: network.sh, traceroute.sh  (70% of the server-side tasks) | 30% |
| Abdulla Jamali |  |  |
| Nasser Aljufairi | Shell scripts :system.sh |  |
| Murshed Al-Muhannadi |  |  |

**Task 1: Setup Server side (VM1)**

**-Create users on the server (client 1, client2)**

-Setting passwords for client1 & client2

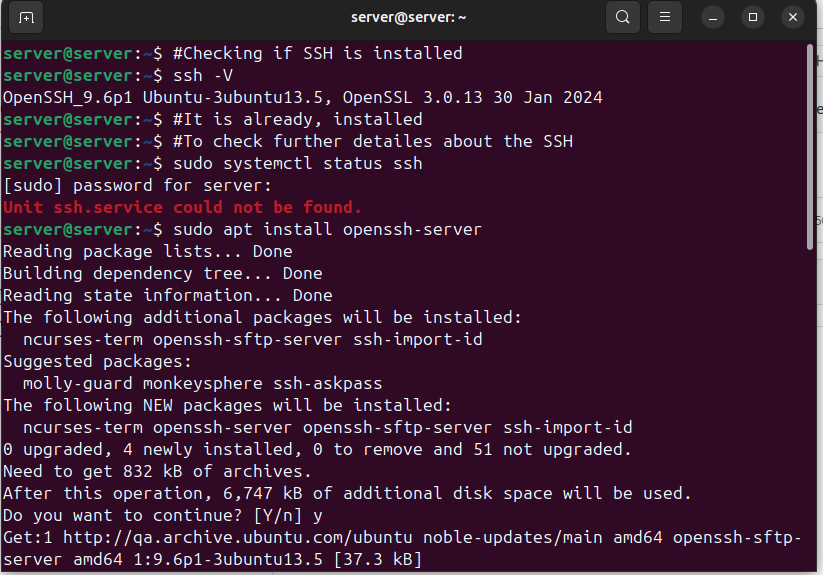
-Checking that users are created (client1, client2):

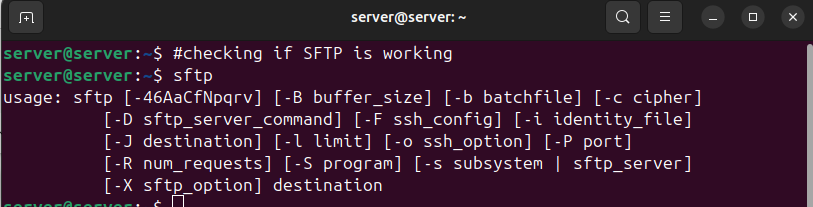


**-Install and enable SHHD**

-Checking if SSH is installed  
-The command to install SSH if it’s not installed: $ sudo apt install openssh-server

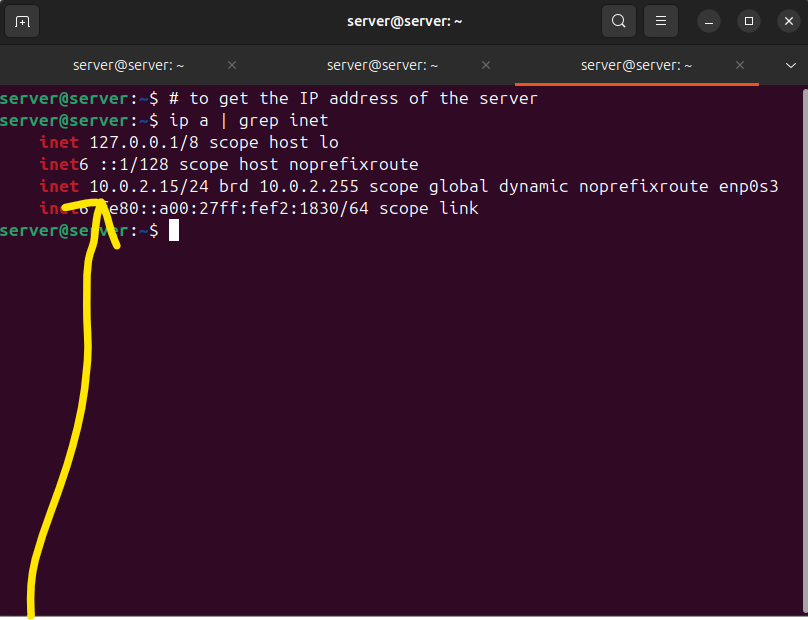
But it was already installed so no need for this step.

-Check if SFTP is working

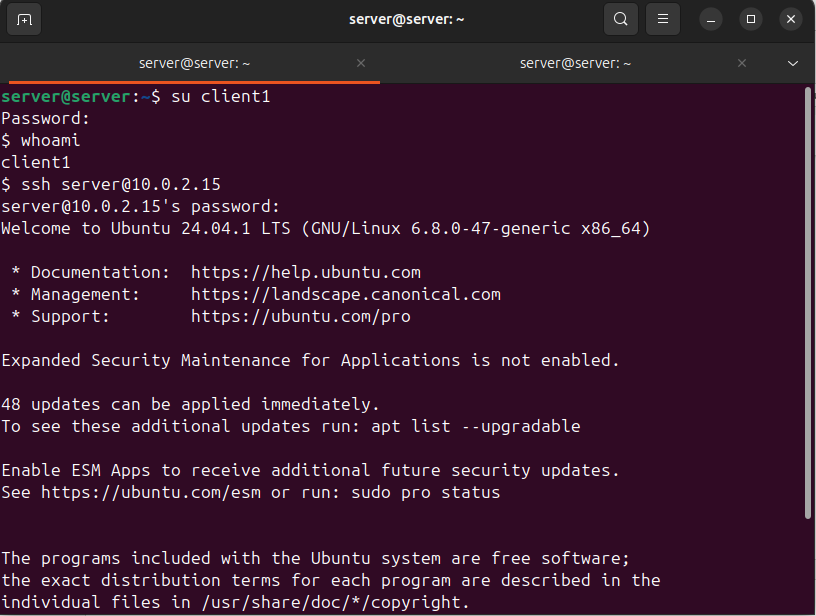


**Task 2 : Configuration**

To Get the IP of the server we did:



Accessing the server from client 1 using SSH and the ip address of the server we just retrieved:

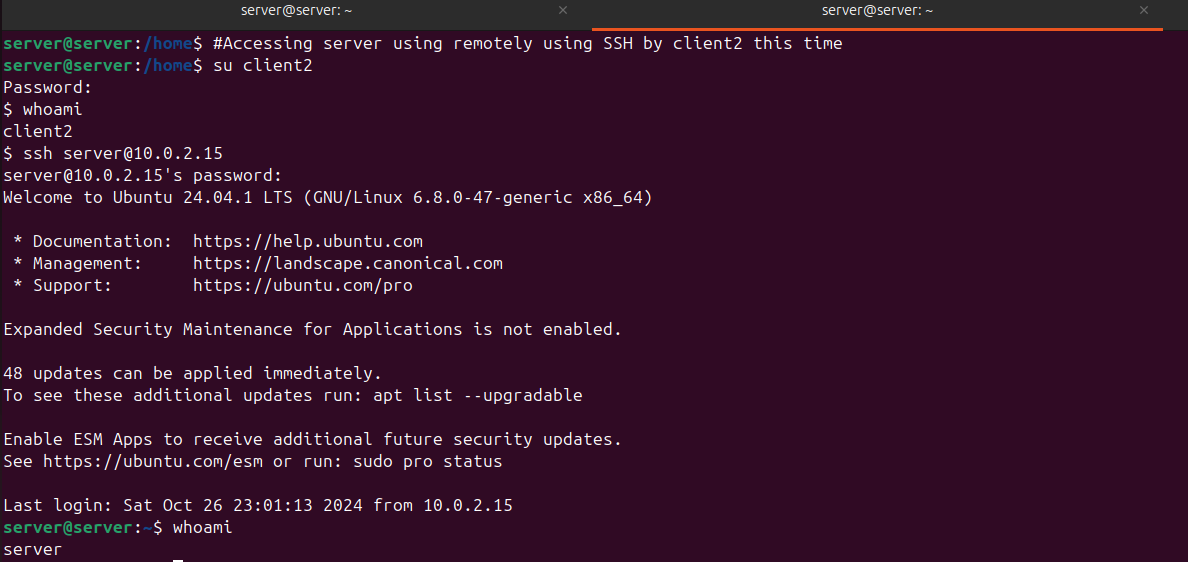


We managed to access the server using SSH (remotely) by client1 user:

A black screen with white text

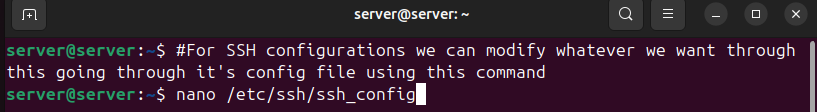
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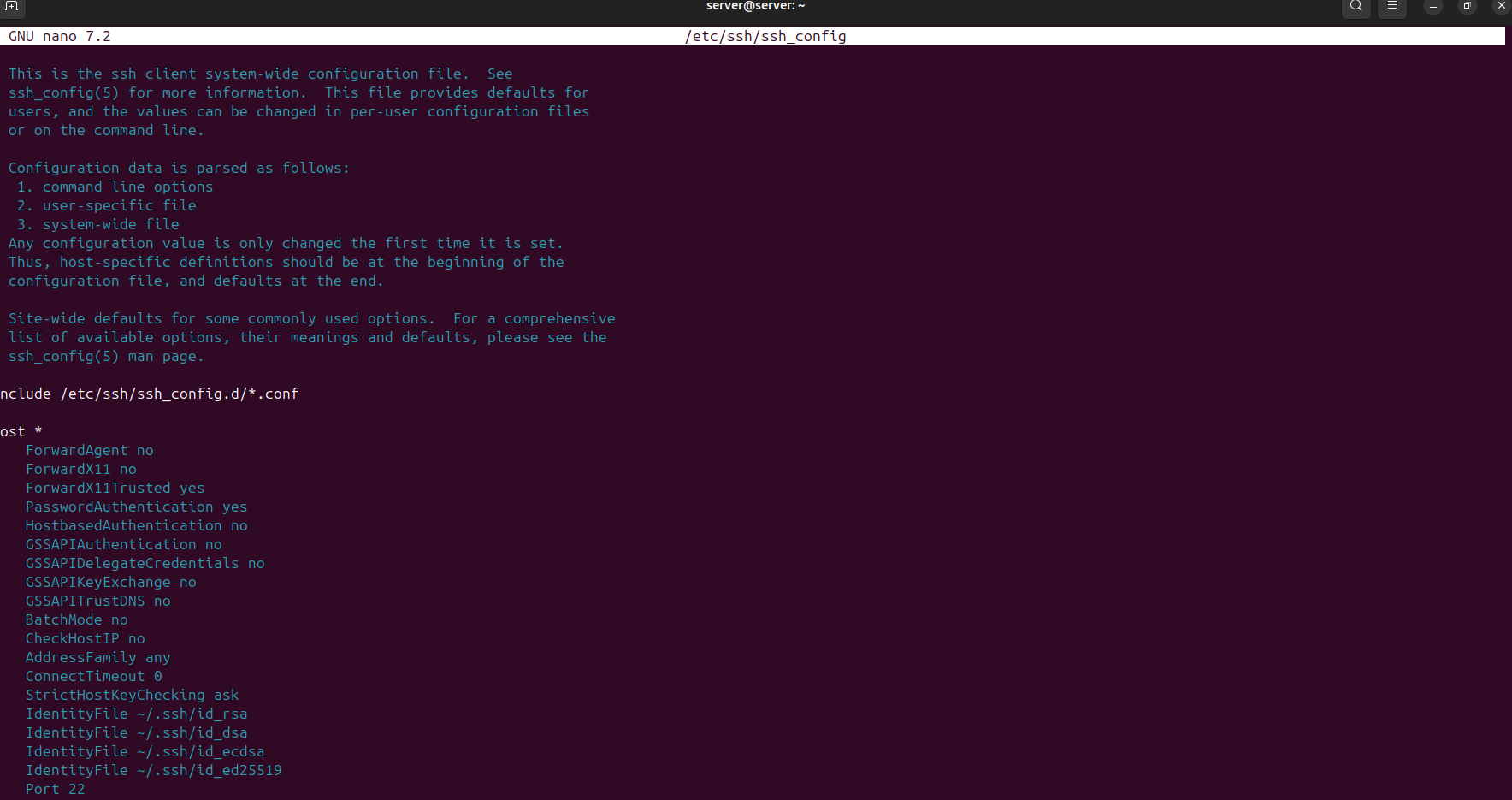
-We deduce that SSH is enabled successfully for client 1, we now will do the same for client2:



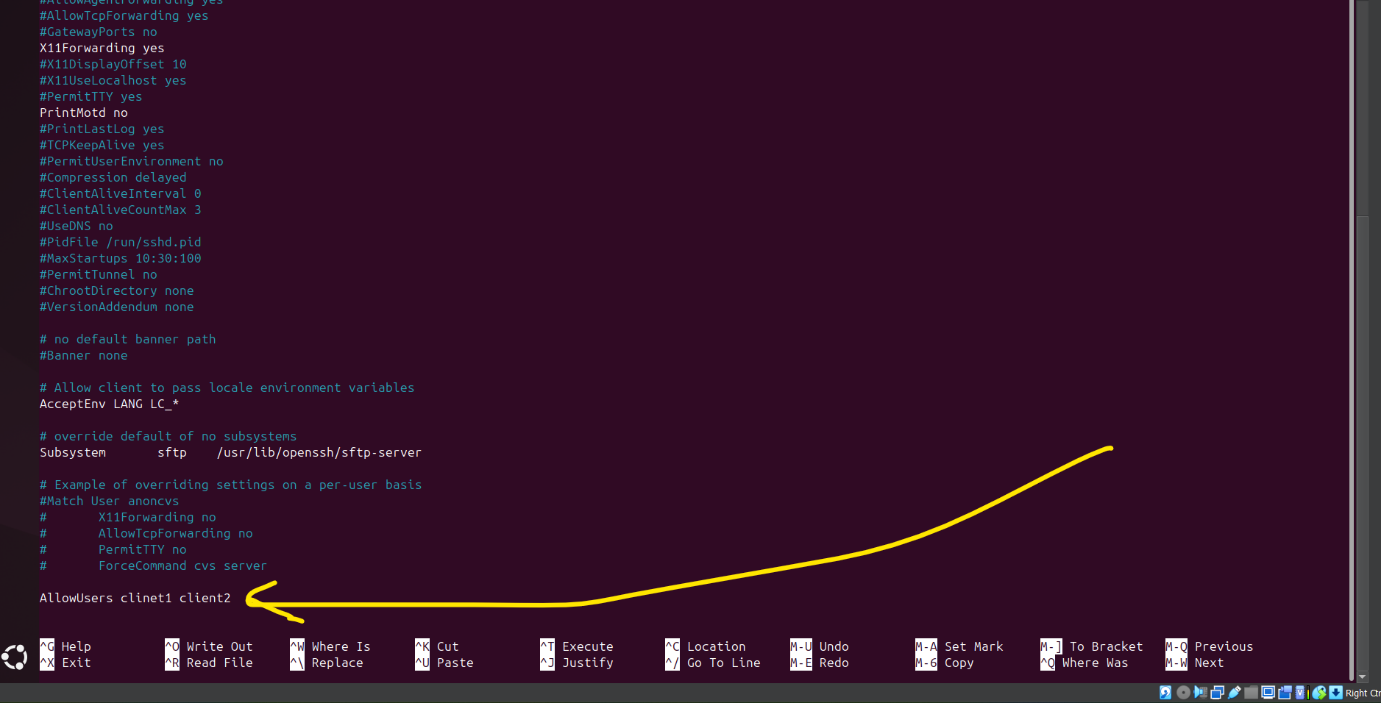
-We deduce that SSH is enabled successfully for client 2

-Mostly the configuration of SSH is done however:



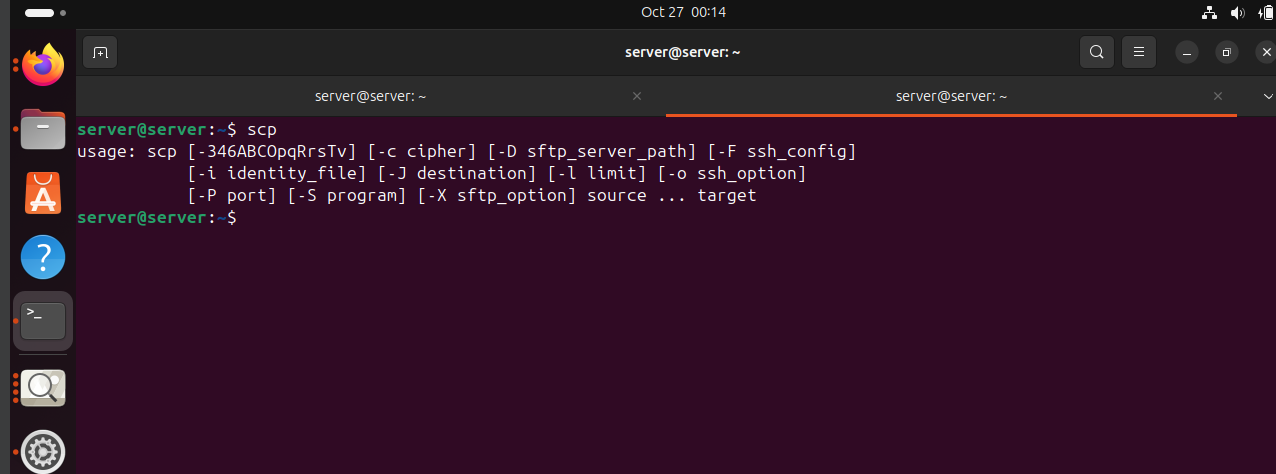


-We can enable or disable based on our needs using: sudo nano /etc/ssh/ssh\_config.



-We add this option for it to only allow the users: client1, client2

-Checking the SCP is working



**Task 3: Shell Scripting**

**Network.sh script:**

# Verify and install missing network tools

if ! command -v ping &> /dev/null || ! command -v traceroute &> /dev/null; then

echo "Required network tools not found, installing..."

sudo apt-get update && sudo apt-get install -y iputils-ping traceroute

echo "Network tools successfully installed."

fi

# Function to execute traceroute if ping fails

execute\_traceroute() {

local target=$1

echo "Initiating traceroute to $target..."

./traceroute.sh "$target"

}

# Initialize counters for summary

checks\_total=0

successful\_checks=0

failed\_checks=0

# Define retry limits

retry\_limit=3

# Iterate over each target IP passed as arguments

for target in "$@"; do

echo "Checking connectivity for $target (Maximum attempts: $retry\_limit)"

checks\_total=$((checks\_total + 1))

attempt\_count=1

connection\_success=false

# Retry pinging up to retry\_limit times

while (( attempt\_count <= retry\_limit )); do

echo "Attempt $attempt\_count: Pinging $target..."

# Ping with 5-second timeout

if ping -c 1 -W 5 "$target" &> /dev/null; then

echo "$(date '+%Y-%m-%d %H:%M:%S') - Successful connection to $target." | tee -a network.log

successful\_checks=$((successful\_checks + 1))

connection\_success=true

break # Stop retries on success

else

echo "Attempt $attempt\_count failed to reach $target."

fi

attempt\_count=$((attempt\_count + 1))

done

# Execute traceroute if all attempts fail

if [ "$connection\_success" = false ]; then

echo "All attempts failed for $target. Executing traceroute..."

execute\_traceroute "$target"

failed\_checks=$((failed\_checks + 1))

fi

done

# Generate final summary report

echo "📊 Connectivity Test Summary 📊"

echo "Total Targets Tested: $checks\_total"

echo "Successful Connections: $successful\_checks"

echo "Failed Connections: $failed\_chec

**Traceroute.sh script**

#!/bin/bash

# Function to log messages to both console and log file

log\_message() {

echo "$1" | tee -a network.log

}

target\_ip=$1

log\_message "Starting traceroute to $target\_ip..."

{

echo "Displaying Routing Table:"

route -n

echo "System Hostname: $(hostname)"

echo "Performing DNS Resolution Test:"

nslookup google.com

echo "Tracing Route to Google (google.com):"

traceroute google.com

echo "Pinging Google to verify connectivity:"

ping -c 3 google.com

} | tee -a network.log

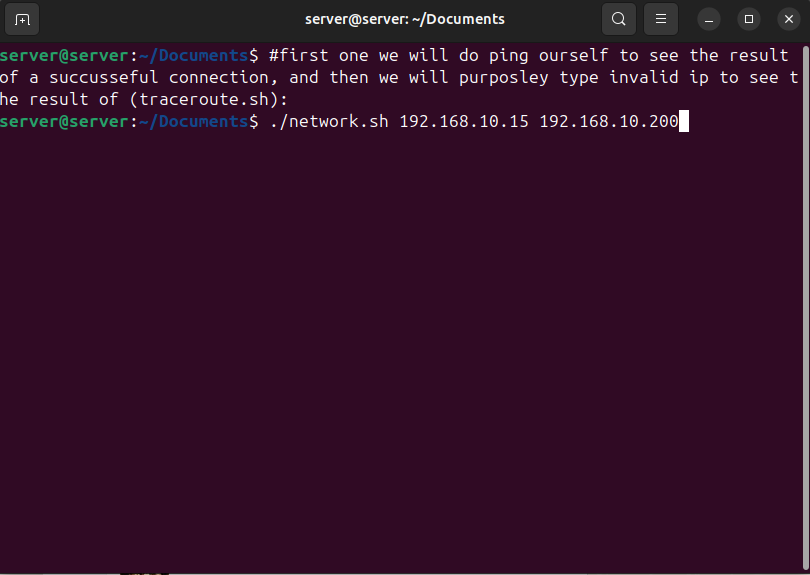
log\_message "Traceroute for $target\_ip completed. (Reboot disabled during testing phase)"

# Uncomment the following line to allow reboot after testing completion

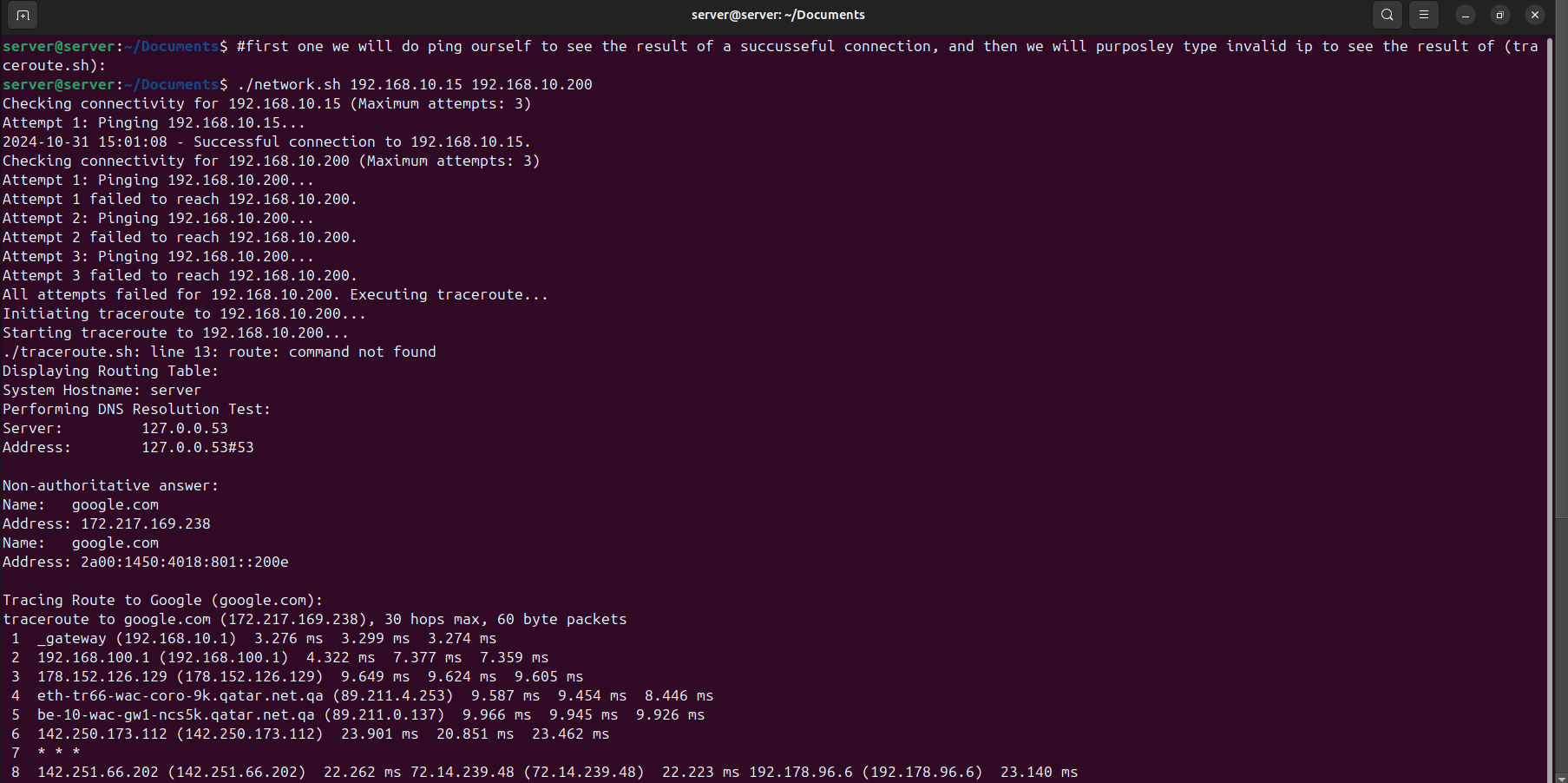
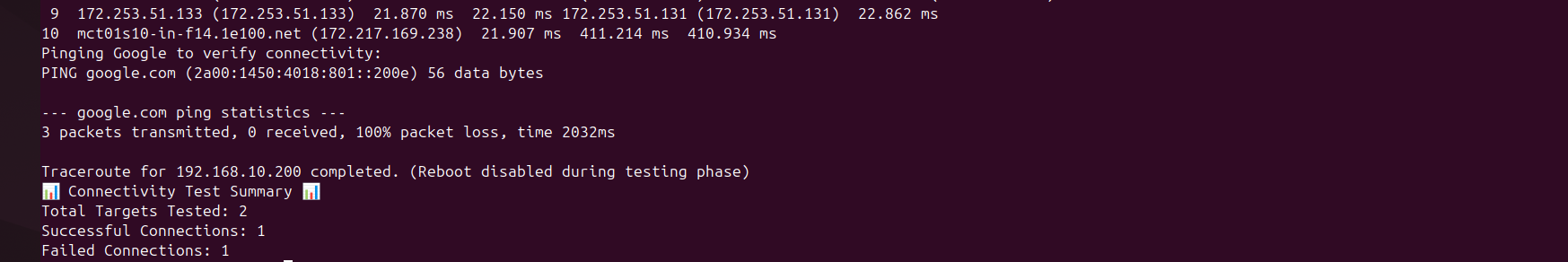
# sudo reboot

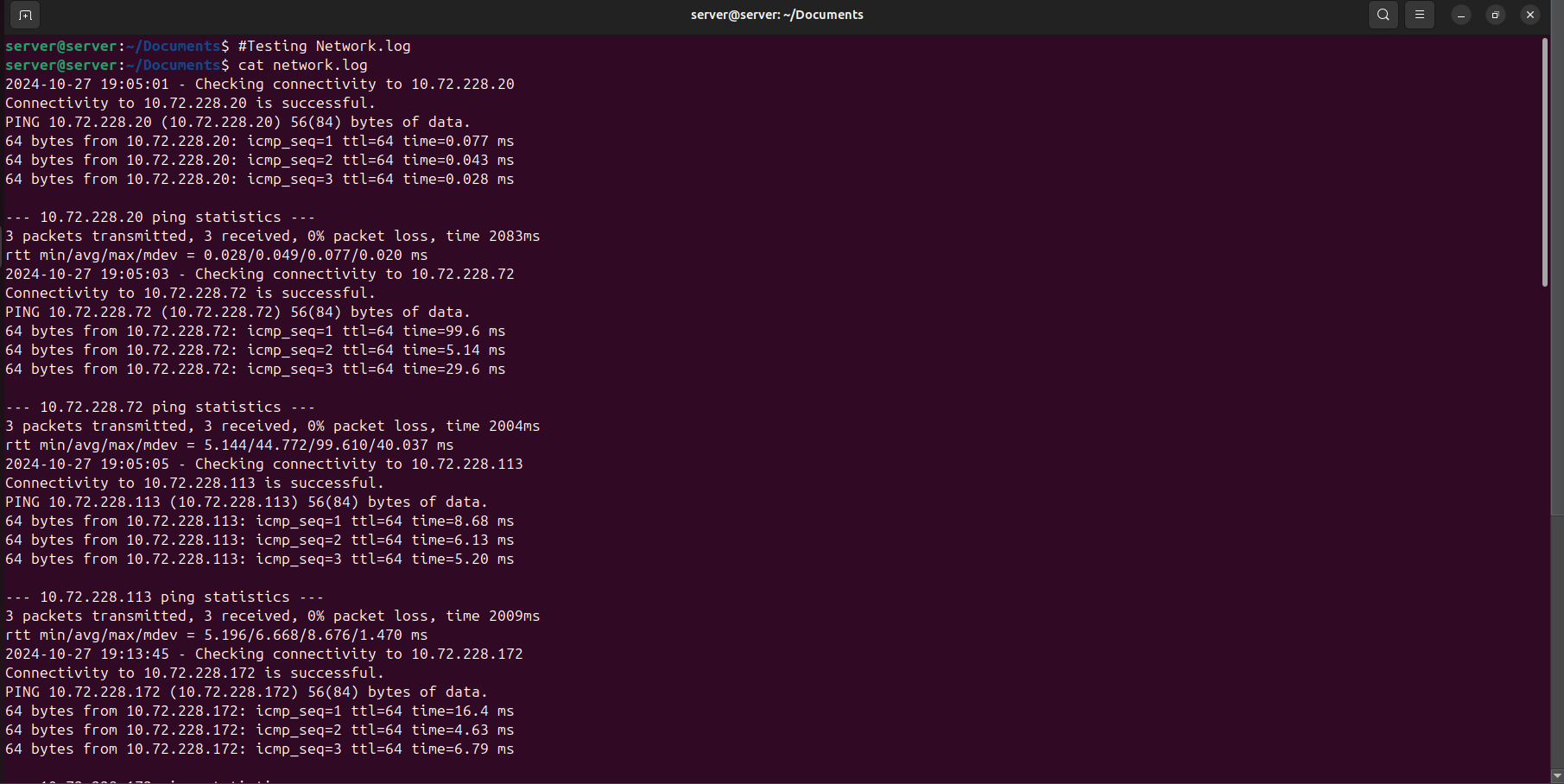
**Testing Network.sh and traceroute scripts:**

We will conduct two tests. First, we’ll ping the server itself to observe the output of the Network.sh script in the case of a successful connection. The second test will use an invalid IP address to examine the output of the traceroute.sh script.:

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**Result of running (Network.sh) & (traceroute.sh):**

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**Checking that that script logs all activities related to network connectivity:**

**System.sh script**

#!/bin/bash

# Verify and install missing network tools

if ! command -v ping &> /dev/null || ! command -v traceroute &> /dev/null; then

echo "Required network tools not found, installing..."

sudo apt-get update && sudo apt-get install -y iputils-ping traceroute

echo "Network tools successfully installed."

fi

# Function to execute traceroute if ping fails

execute\_traceroute() {

local target=$1

echo "Initiating traceroute to $target..."

./traceroute.sh "$target"

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# Initialize counters for summary

checks\_total=0

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# Define retry limits

retry\_limit=3

# Iterate over each target IP passed as arguments

for target in "$@"; do

echo "Checking connectivity for $target (Maximum attempts: $retry\_limit)"

checks\_total=$((checks\_total + 1))

attempt\_count=1

connection\_success=false

# Retry pinging up to retry\_limit times

while (( attempt\_count <= retry\_limit )); do

echo "Attempt $attempt\_count: Pinging $target..."

# Ping with 5-second timeout

if ping -c 1 -W 5 "$target" &> /dev/null; then

echo "$(date '+%Y-%m-%d %H:%M:%S') - Successful connection to $target." | tee -a network.log

successful\_checks=$((successful\_checks + 1))

connection\_success=true

break # Stop retries on success

else

echo "Attempt $attempt\_count failed to reach $target."

fi

attempt\_count=$((attempt\_count + 1))

done

# Execute traceroute if all attempts fail

if [ "$connection\_success" = false ]; then

echo "All attempts failed for $target. Executing traceroute..."

execute\_traceroute "$target"

failed\_checks=$((failed\_checks + 1))

fi

done

# Generate final summary report

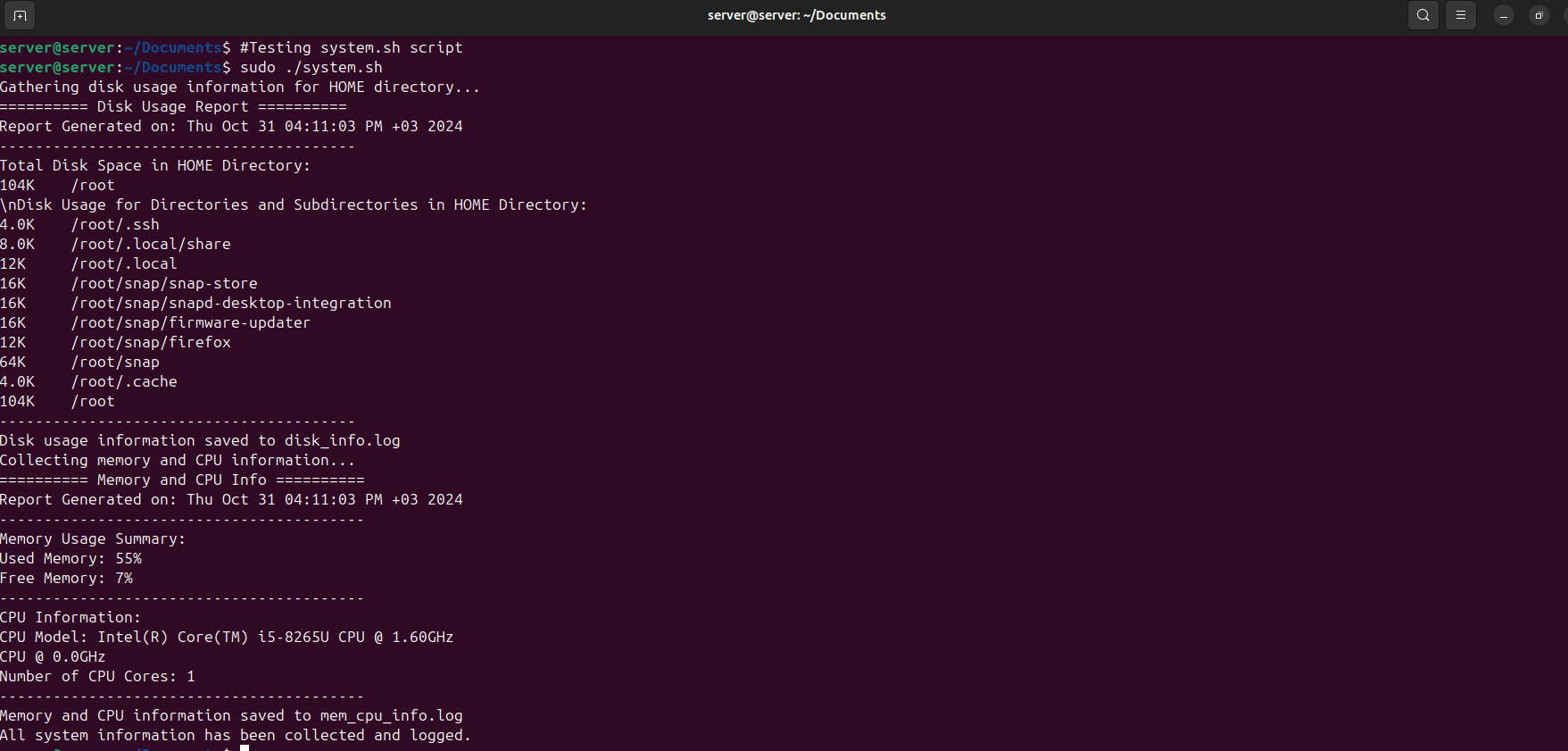
echo "📊 Connectivity Test Summary 📊"

echo "Total Targets Tested: $checks\_total"

echo "Successful Connections: $successful\_checks"

echo "Failed Connections: $failed\_checks”

**Testing system.sh script:**

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