



IT PROJECT DOCUMENTATION

Automated Network Diagnostic
Script

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This document is part of a personal project portfolio developed during the Google IT Support Certification. All simulations and analyses were performed in a controlled lab environment. These projects serve as a complement to the course and provide an initial hands-on experience applying its concepts to real-world scenarios

I. Project Overview

Brief description of the project, context, and goals.

II. Environment Setup

Component	Details
OS	Ubuntu 22.04
Network Type	enp0s3` (internet), `enp0s8` (private LAN)
Configuration	Managed via `netplan`
Diagnostic	Via Bash scripting

III. Test Setup and Process

Script Creation

- A Bash script was written to test:

```
#!/bin/bash

echo "Local IP Address:"
ip a

echo -e "\nRouting Table:"
ip route

echo -e "\nGateway Reachability:"
ping -c 4 192.168.56.101

echo -e "\nPing to DNS (Google):"
ping -c 4 8.8.8.8

echo -e "\nDNS Resolution Test:"
dig google.com

echo -e "\nHTTP Test with curl:"
curl -I http://google.com
```

Saved as `diagnostic.sh`, made executable with:

- `chmod +x diagnostic.sh`

Manual Test Sequence for Comparison

Each command was also run manually to compare timing, output clarity, and potential errors.

Wireshark Captures

Two captures:

- `diagnostic_icmp.pcapng` — contains ICMP traffic from ping tests.
- `diagnostic_dns_http.pcapng` — captures DNS resolution and HTTP exchange.

> Filters used:

- `icmp`
- `dns or http`

4. Packet Capture and Analysis

Complementary Analysis – Network Error

During testing, a **network activation failure** occurred on interface `enp0s8`.

This was visible in GNOME as:

> ❌ Échec de connexion — L'activation de la connexion réseau a échoué.
(Due to my Vm being in French)

Key Findings:

Root Cause:

- The interface was not properly configured or persisted.
- DHCP not available on the host-only adapter.
- No static IP was defined, causing the interface to go DOWN between boots. I was working on `enp0s8` (intnet) which doesn't have internet access, later it was resolved.

V/ Resolution / Outcome

A custom Netplan file:

```
# /etc/netplan/99-config.yaml
network:
  version: 2
  renderer: networkd
  ethernets:
    enp0s8:
      addresses: [192.168.56.102/24]
```

Applied via:

`sudo netplan apply`

Observed Results

- Script successfully displayed complete diagnostic info.
- Files `diagnostic_icmp.pcapng` and `diagnostic_dns_http.pcapng` contain clean captures.
- After Netplan fix, no more interface drop or connectivity errors.

Analysis

- The script accelerates repetitive tests.
- It also serves as a **baseline** to check for anomalies during user incidents.
- Ideal for onboarding junior IT staff in Linux troubleshooting practices.

VI/ Key Takeaways & Skills Demonstrated

- Basic Bash scripting
 - Netplan configuration
 - Network troubleshooting (L1/L2)
 - Wireshark usage and filtering
 - Understanding of interface persistence issues
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VIII/ Optional Enhancements, Reflection

This project highlighted the value of scripting in repetitive diagnostics and onboarding workflows. While the current version runs effectively, future iterations could include:

- Error handling for missing tools (``dig``, ``curl``)
- Logging of output to a timestamped file for long-term issue tracking
- DNS resolver checks to adapt to environments where ``systemd-resolved`` is used

Additionally, a real connectivity failure on ``enp0s8`` emphasized the need for persistent static IP configuration using Netplan. In production environments, such issues could be prevented via automated provisioning tools.

Lastly, capture files (``pcapng``) should be considered sensitive and stored securely if they contain real-world DNS or HTTP traffic.

Video Recording Link

<https://youtu.be/kSSl6DuNohs>