

Nepal College of Information Technology
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A Lab Report
On

**Implementation and Analysis of a TCP Client-Server
Model**

*Submitted as partial fulfillment of requirement of the curriculum of
Bachelor's of Engineering in Software Engineering (6th Semester)*

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Objective:

The objective of this lab is to understand the implementation of TCP based client-server communication systems, monitor network port activity, and inspect network interface configurations. Additionally, the lab emphasizes diagnosing common issues during connection setup using command-line tools.

Lab Tasks and Execution:

1. Setup and Compilation:

The lab environment was a Fedora-based Linux system. The working directory was /Documents/rrlab2.

Commands Executed:

- `Cd /Documents/rrlab2`
- `./server 5556`
- `./client 127.0.0.1 5556`
- `Netstat -all -n | grep 5556`
- `ifconfig`

Purpose

- `cd`: Navigate to lab directory.
- `./server 5556`: Run server listening on port 5556.
- `./client 127.0.0.1 5556`: Connect client to localhost at port 5556.
- `netstat`: Check port activity and connections.
- `ifconfig`: View network interface details.

2. Tools and Scripts Used:

- `netstat`: Displayed active connections, listening ports, and network statistics.
- `ifconfig`: Showed IP configuration and statistics for each interface.
- Custom Programs:
- `daytimetcpsrv.c` (Server)
- `daytimetcpcli.c` (Client)

These were compiled prior to execution and used for TCP communication.

Output / Observations:

1. Network Activity:

- `netstat` output confirmed the server was actively listening on port 5556.
- Client connections from 127.0.0.1 were established successfully on dynamic ports such as 52154 and 48650.

Sample Output:

```
tcp 0 0 0.0.0.0:5556 0.0.0.0:* LISTEN
```

2. Client-Server Interaction:

- The server accepted incoming connections.
- The client printed timestamps, e.g., Wed Apr 30 12:49:23 2025.
- A core dump error was encountered while running the client, indicating a possible segmentation fault or invalid memory access.

3. Network Interface Details:

- ifconfig revealed two interfaces:
- enp0s3: IP 172.16.0.137, broadcast 172.16.0.255, RX/TX packets observed.
- lo (Loopback): IP 127.0.0.1, used for internal testing.
- No major errors (dropped packets, collisions, overruns) were found.

Conclusion:

This lab provided practical exposure to TCP networking fundamentals. It successfully demonstrated:

- Running and monitoring a server-client TCP connection.
- Using tools like netstat and ifconfig for diagnostics.
- Identifying runtime issues such as segmentation faults in the client code.