Network Traffic Analyzer

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report **"Network Traffic Analyzer"** is the bonafide work of **"Deepak Kumar(22BCS12942), Pranjal Singh(22BCS13041), Kalash(22BCS14734)"** who carried out the project work under my/our supervision.

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ABSTRACT

The "Network Analyzer" system delivers a comprehensive solution for Network Traffic Analysis (NTA), enabling organizations to monitor and manage both managed and unmanaged network entities. Through the ingestion of telemetry data from network devices such as routers, switches, firewalls, and IoT devices, the system provides a real-time, holistic view of network traffic. It creates behavioral baselines by continuously analyzing data flow, identifying normal patterns, and detecting anomalies such as unauthorized access, unusual traffic spikes, or unexpected communication between devices. These capabilities enable the detection of potential security threats, including cyberattacks, malware, and insider threats. The system extends its reach beyond on-premises infrastructure to cloud environments, remote offices, and smart devices, ensuring visibility across hybrid and multi-cloud networks. Real-time anomaly detection, coupled with contextual analysis and reporting, empowers network administrators with timely insights to prevent security breaches and optimize performance. By offering deep visibility and actionable intelligence, the "Network Analyzer" enhances network security, performance management, and operational efficiency across distributed environments. Real-Time Anomaly Detection in this system establishes what is normal, it can quickly detect deviations from this baseline. NTA solutions are essential in identifying a wide range of anomalies, from simple misconfigurations or performance issues to sophisticated cyberattacks. By monitoring in real-time, the Network Analyzer provides immediate alerts when abnormal activity is detected, allowing network administrators to respond promptly to potential security incidents.

CHAPTER 1.

INTRODUCTION

1.1. Identification of Client /Need / Relevant Contemporary issue

As we know that the internet plays an important role in every individual's life and everything in this world is evolving as per the technology development. At the outset of present day period, Computers played a major role in computing and as the technology expands everything has changed and the computers became workstation computers, super computers and so on. Later developed the personal computer technology and now mobility got to be everything. Everything made simple using mobility. From last 2 decades, the utilization of personal computer devices has incredibly increased, which has led to ease of carrying out day to day activities. In addition, with the advancement of wireless technologies, wireless networks have taken over the entire world. Nowadays, business and financial transactions can be done easily and securely, anywhere and anytime. Using the Internet, connections can be established with any devices almost anywhere in the world and can share necessary information amongst them.

Traffic analysis is the process of intercepting and analyzing network traffic in order to deduce information from communication. The size of the packets exchanged between two hosts, details of the systems communicating, time and duration of communication are some of the valuable information to an attacker For example, if an enterprise's network uses resource-intensive software's like video streaming and tele-presence other than through business-critical software's, the bandwidth capacity for running business operations will be minimal. This often negatively impacts productivity, affecting all operations and often eroding revenues. That's a domino effect organization should avoid.

1.2. Identification of Problem

In the Era of Computer Technology, we need to communicate and accelerate our life with the help of Information and Technology. We all require certain types of services online, which requires less workout or interference of human being. phones can help to overcome the trouble of the customers of standing in queue and book any type of tickets. There is lack of research and functionalities in the current system as well. We are in such an era today that our most of the work has been shifted too personal computer. The development and implementation of smart software which are more effective and simpler than the current system. We feel hard to monitor with them and sometimes it may be lost. The "Network analyzer" can be monitor easily anytime from any place.

1.3. Identification of Tasks

The tasks involved in a Network Traffic Analyzer project are as follows:

1. Research and Requirement Analysis

- Analyze existing network traffic monitoring systems to identify their limitations.
- Gather requirements for developing an enhanced network traffic analyzer with a focus on ease of use, accessibility, and real-time monitoring.
- Understand user needs for an automated, smart solution for ticket booking, which can be integrated into the system.

2. System Design

- Design a network traffic analyzer with a user-friendly interface that simplifies monitoring processes.
- Develop a plan for implementing an easily accessible monitoring system that can be used from any location.
- Incorporate features that reduce the need for human intervention and automate network monitoring tasks.

3. Development of Smart Software

- Develop the core software for the network analyzer that captures and analyzes network traffic efficiently.
- Implement automated functionalities that minimize manual intervention, ensuring that the software handles tasks like traffic logging, data collection, and report generation.
- Ensure the system is accessible from multiple devices, including PCs and smartphones.

4. Real-Time Monitoring and Alerts

- Implement real-time traffic monitoring features, allowing users to view network performance at any given moment.
- Develop an alert system that notifies users of critical issues such as abnormal traffic patterns, potential security threats, or system failures.

5. User Access and Integration

- Develop remote access features that allow users to monitor the network from different locations.
- Integrate with existing online services, such as ticket booking systems, to improve efficiency and customer experience.

- Ensure secure login mechanisms for authenticated users, providing access to network data and logs.

6. Testing and Quality Assurance

- Conduct rigorous testing of the network analyzer to ensure accurate traffic data collection and analysis.
- Perform usability testing to ensure the software is intuitive and meets user expectations for simplicity and effectiveness.
- Test remote access functionality to confirm monitoring is effective from different devices and locations.

7. Deployment and Maintenance

- Deploy the network analyzer system on target environments, ensuring compatibility with the current infrastructure.
- Provide continuous support for the system, including regular updates to improve functionality and security.
- Offer maintenance services to resolve issues promptly and ensure the system's reliability.

1.4. Timeline

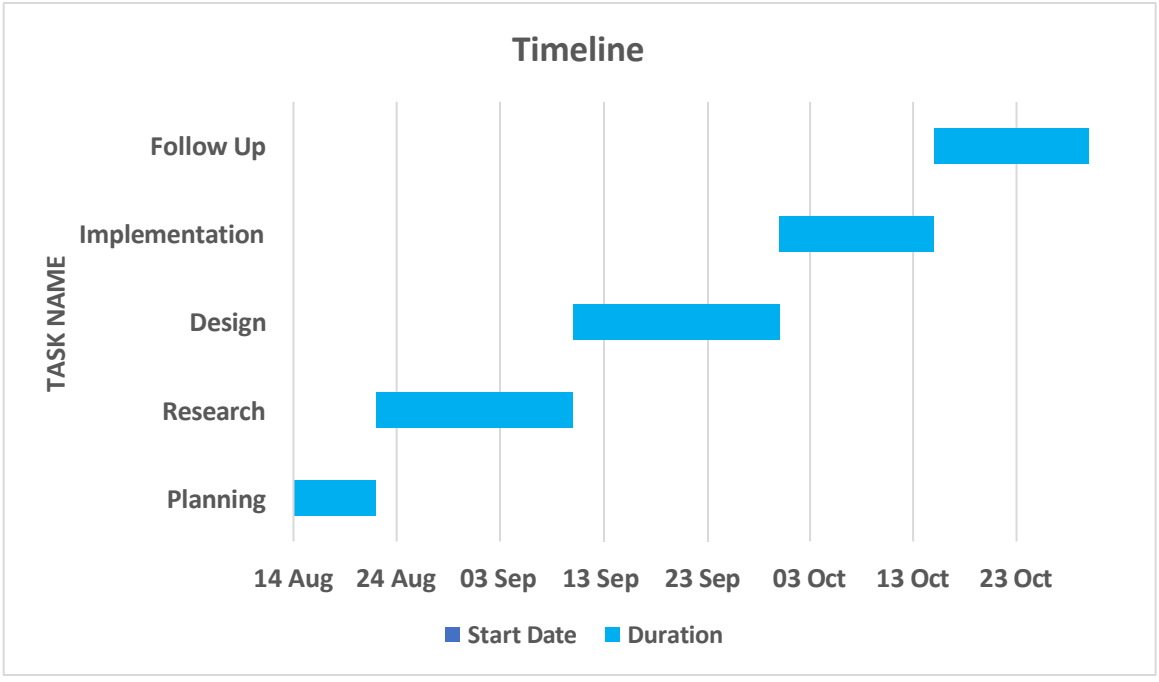


Fig 1.1

1.5. Organization of the Report

Chapter 1.1 Identification of Client /Need / Relevant Contemporary Issue/Project Scope

Issues faced and the targeted consumers for our project

Chapter 1.2 Identification of Problem

A detailed description and elaboration of the problem we aim to solve.

Chapter 1.3. Identification of Tasks

A brief description of the stages and tasks need to be completed.

Chapter 1.4. Timeline

This shows the time duration and deadlines for every phase of the project.

CHAPTER 2.

LITERATURE REVIEW/BACKGROUND STUDY

2.1. Timeline of the reported problem

The need for efficient network traffic monitoring and analysis has been recognized globally as early as the 1990s with the rapid expansion of the internet. As networks grew more complex, issues such as bandwidth bottlenecks, unauthorized access, and inefficient use of network resources became increasingly apparent. Incidents like large-scale Distributed Denial of Service (DDoS) attacks, such as the 2000 attack on Yahoo!, Amazon, and CNN, highlighted the urgent need for real-time traffic analysis and security. Documented proof includes research publications from the early 2000s, focusing on security vulnerabilities, network performance degradation, and the need for smarter, more automated monitoring systems.

2.2. Existing Solutions

Several solutions have been proposed over the years to address network traffic analysis and monitoring challenges:

- **SNMP (Simple Network Management Protocol)**: Allows network devices to share performance and status data. However, it lacks real-time alerting and detailed traffic analysis capabilities.

- **Wireshark**: A popular network protocol analyzer that allows users to capture and analyze traffic data. While it's highly effective for packet-level inspection, it requires significant expertise to interpret the results, making it less user-friendly.

- **NetFlow and sFlow**: These tools are used to collect and monitor IP traffic information, providing detailed insights into network usage. However, they are limited by their reliance on device-level implementations and can be resource-intensive.

- **Nagios**: An open-source monitoring tool that checks network and system health. It provides notifications but lacks advanced traffic analysis features.

2.3. Bibliometric Analysis

- **SNMP**:
    - **Key Features**: Simple protocol for device management.
    - **Effectiveness**: Useful for device health monitoring.
    - **Drawbacks**: Does not offer in-depth traffic analysis or real-time alerts.
- **Wireshark**:
    - **Key Features**: Deep packet analysis, wide protocol support.
    - **Effectiveness**: Highly effective for in-depth analysis of network traffic.
    - **Drawbacks**: Requires advanced technical knowledge, not designed for real-time monitoring.
- **NetFlow/sFlow**:
    - **Key Features**: Traffic flow monitoring, detailed insights into IP traffic.
    - **Effectiveness**: Great for understanding network usage patterns.
    - **Drawbacks**: Can be resource-heavy and expensive to implement on large networks.
- **Nagios**:
    - **Key Features**: Network and system health monitoring, alert system.
    - **Effectiveness**: Good for basic monitoring and alerting.
    - **Drawbacks:** Does not provide deep traffic analysis, lacks advanced features.

2.4. Review Summary

From the review of existing literature and tools, it is evident that while there are many solutions for network monitoring, they often lack user-friendliness, real-time analysis, and accessibility from remote locations. Most tools require significant technical expertise, which limits their effectiveness for non-technical users. This project aims to address these gaps by providing a network traffic analyzer that is easy to use, remotely accessible, and capable of real-time monitoring. By simplifying the user interface and automating the analysis process, this solution will overcome many of the limitations of the current systems.

2.5. Problem Definition

The primary problem is the lack of an intuitive, real-time network traffic analyzer that allows users to monitor network performance and security from any location, without requiring deep technical knowledge. Current tools either lack real-time capabilities, are too complex for non-experts, or are not accessible remotely. The project at hand aims to create a smart, user-friendly network traffic analyzer that automates many of the technical tasks, provides real-time alerts, and can be accessed from mobile devices or computers.

What is to be done:

- Develop a network traffic analyzer that provides real-time monitoring and alerts.
- Ensure the system is accessible remotely and from multiple devices.
- Simplify the user interface for non-technical users.

How it is to be done:

- Design and implement a user-friendly interface.
- Utilize technologies such as remote access, cloud-based storage, and automation for monitoring.
- Provide visualizations for traffic analysis.

What not to be done:

- The system will not replace existing security infrastructure but complement it.
- Avoid overloading the system with complex features that may confuse the end-user.

2.6. Goals/Objectives

The primary goal of this project is to develop an accessible and smart network traffic analyzer with a focus on real-time monitoring and ease of use.

Specific Objectives:

1. **User Interface Design**: Create a simple, intuitive user interface that allows non-technical users to monitor network traffic with minimal training.
2. **Real-Time Monitoring**: Implement a system that provides real-time analysis of network traffic, with alerts for suspicious activity.
3. **Remote Access**: Ensure that the traffic analyzer is accessible from mobile devices and PCs, allowing users to monitor the network from any location.
4. **Automation**: Incorporate automation to reduce the need for human intervention in routine network monitoring tasks.
5. **Testing and Validation**: Rigorously test the system for accuracy, usability, and security, ensuring it performs well in real-world environments.

CHAPTER 3.

DESIGN FLOW/PROCESS

3.1. Evaluation & Selection of Specifications/Features

The following features were identified from the literature and existing solutions:

- Real-time traffic monitoring
- Automated alerts for abnormal traffic behavior
- Remote accessibility via web or mobile devices
- User-friendly interface for non-technical users
- Detailed packet analysis
- Traffic logging and reporting
- Integration with existing security measures

After evaluating the effectiveness and necessity of these features, the ideal specifications for the network traffic analyzer would be:

- **Real-time traffic monitoring**: Critical for detecting live threats or performance issues.
- **Automated alerts**: Essential for notifying users of security breaches or network overloads.
- **Remote accessibility**: Must have, ensuring users can monitor their network from anywhere.
- **User-friendly interface**: Key to increasing usability for non-technical users.
- **Basic traffic logging**: Important for historical analysis but should be optimized to avoid excessive data storage.
- **Integration with existing security measures**: Necessary to complement existing systems.
- **Packet analysis**: Optional, as it may complicate the user experience and require expertise.

3.2. Design Constraints

- **Regulations**: The software must comply with data privacy regulations (e.g., GDPR) and avoid unauthorized data collection.
- **Economic**: The solution should be cost-effective, leveraging open-source technologies where possible.
- **Environmental**: The system must be energy-efficient to minimize the environmental impact of continuous monitoring.
- **Health**: The system should not introduce physical risks, but care must be taken in terms of user stress if the alerts are overly sensitive.
- **Manufacturability**: The design must be scalable and easily deployable on a range of systems (PCs, mobile devices, cloud servers).
- **Safety**: Data integrity and user authentication must be robust to prevent unauthorized access.
- **Professional/Ethical**: The design should follow industry best practices in security and software engineering.
- **Social & Political Issues**: The tool should be accessible globally without infringing on local laws regarding network monitoring.
- **Cost**: Must balance functionality with affordability, especially for small businesses or individual users.

3.3. Analysis of Features and finalization subject to constraints

Based on the constraints outlined:

- **Remove**: Advanced packet analysis may be removed from the final design to simplify the system and ensure usability for non-technical users.
- **Modify**: Traffic logging should be optimized to store minimal but essential data to reduce storage costs and avoid privacy concerns.
- **Add**: Include encryption of all network traffic data and strong user authentication to ensure security.

Finalized features:

- Real-time monitoring

- Automated alerts
- Remote accessibility
- User-friendly interface
- Traffic logging (optimized)
- Integration with security measures

3.4. Design Flow

Two alternative design approaches are proposed for the network analyzer project:

Alternative 1: Centralized Cloud-Based Solution

1. **Data Capture**: Install agents on the network devices to capture traffic data.
2. **Data Transmission**: Data is sent securely to a centralized cloud server for processing.
3. **Real-Time Analysis**: The cloud server performs real-time traffic analysis using AI-driven algorithms.
4. **User Dashboard**: A web-based interface provides access to the monitoring dashboard.
5. **Alerts and Reporting**: Automated alerts for suspicious traffic, and detailed logs and reports accessible from the cloud.

Alternative 2: Localized System

1. **Data Capture**: Traffic is captured locally using installed agents on network devices.
2. **Local Processing**: Traffic data is processed and analyzed on local servers.
3. **User Interface**: A desktop application provides real-time access to network activity and logs.
4. **Alerts and Reporting**: Alerts are triggered for security threats, with logs stored locally.

3.5. Design Selection

Comparison:

- **Centralized Cloud-Based Solution**:
    - **Pros**: Scalable, accessible from anywhere, real-time analysis using cloud resources.
    - **Cons**: Higher cost due to cloud infrastructure, privacy concerns with cloud data storage.
- **Localized System**:
    - **Pros**: Full control over data, cost-effective for small networks.
    - **Cons**: Limited scalability, lacks remote accessibility.

Selected Design: The **Centralized Cloud-Based Solution** is chosen due to its scalability, flexibility, and remote access, aligning with the project's goal of real-time, user-friendly traffic analysis.

3.6. Implementation plan/Methodology

1. Research and Analysis:

- The methodology began with a thorough analysis of network traffic and the challenges users face, such as bandwidth issues, security vulnerabilities, and network slowness. The team conducted primary research, including questionnaires and interviews with network administrators and software developers to identify key requirements for the tool .
- A review of existing solutions, such as Wireshark and NetFlow, provided a foundation for understanding the limitations of current tools and informed the design of the proposed system.

2. Technical Research:

- The project team explored various programming languages and tools, with Python being selected for its robust network programming libraries. Python provided the necessary support for socket programming, network protocols, and traffic analysis. The decision to use Python was based on its simplicity and versatility compared to other languages like C++ .

3. **System Design**:

- The system design included both logical and physical aspects. UML diagrams, entity relationship diagrams, and architectural blueprints were created to ensure a comprehensive understanding of the system's structure before implementation .

- The system architecture was divided into multiple modules, each responsible for a specific function such as traffic capture, packet analysis, and log generation.

4. **Development and Implementation**:

- A modular approach was followed, starting with lower-priority modules such as logging and progressing to higher-priority ones like real-time traffic analysis and anomaly detection.

- Python was used to write scripts that handled traffic monitoring, packet sniffing, and traffic data storage. Integration of these modules required overcoming technical challenges like synchronization and the efficient handling of network protocols .

5. **Testing**:

- Extensive testing was conducted at multiple stages, including unit testing, integration testing, and system testing. Each module was tested individually before integrating it into the full system to ensure stability and functionality .

- User testing was also performed to gather feedback on the tool's usability and performance in real-world network environments.

6. **Final Evaluation**:

- The final project was critically evaluated to ensure that it met the initial requirements and objectives. The evaluation focused on the system's performance in analyzing real-time network traffic, detecting anomalies, and providing actionable insights to users .

CHAPTER 4.

RESULTS ANALYSIS AND VALIDATION

4.1. Implementation of solution

The implementation of the network traffic analyzer focused on utilizing modern tools and methods to effectively capture, monitor, and analyze data traversing a computer network. This process involved combining several network analysis techniques, testing procedures, and data validation methods to ensure that the system provided reliable and actionable insights for network administrators.

Network Traffic Analysis: The core of the system is built around Python, leveraging powerful libraries such as Scapy, socket, and Pyshark to capture network traffic in real time. These libraries allow the system to monitor both incoming and outgoing packets, providing detailed analysis of packet types, IP addresses, port numbers, and the protocols being used (TCP, UDP, ICMP, etc.). Python scripts were designed to filter and categorize network traffic, offering insights into performance metrics such as bandwidth consumption, latency, and error rates. By analyzing these data points, the system can detect potential bottlenecks, identify unauthorized access attempts, and monitor traffic behavior to ensure network efficiency and security.

Protocol and Packet Inspection: A critical part of the network traffic analyzer is deep packet inspection (DPI). This involves analyzing not only the headers of data packets but also their payloads to detect any anomalies or malicious content. The system was built to inspect various protocols (HTTP, DNS, FTP, etc.), allowing for a detailed breakdown of traffic types. DPI enables the network administrator to gain insights into specific applications generating traffic, such as video streaming, file transfers, or social media usage, providing control over bandwidth allocation and prioritization. By identifying resource-hogging applications, administrators can take steps to ensure that business-critical operations maintain sufficient bandwidth.

Network Topology Mapping: UML diagrams and entity-relationship (ER) diagrams were used to design the architecture of the system before development. The network topology was considered during the implementation phase, where physical and logical connections between devices (routers, switches, firewalls, etc.) were analyzed and mapped. This allowed the system to gather a clear view of how data flows through the network, aiding in the identification of network chokepoints and areas of vulnerability. Visualizing this topology helps administrators monitor how different network segments interact and pinpoint potential issues such as misconfigurations or underutilized network paths.

Real-Time Monitoring and Alerting: The system's capability to monitor traffic in real time is fundamental to ensuring quick detection of network anomalies. Traffic spikes, unusual packet sizes, or unexpected protocol usage (e.g., a rise in UDP traffic when TCP is standard for most activities) trigger alerts, notifying administrators of possible issues such as Distributed Denial of

Service (DDoS) attacks or internal misconfigurations. The use of modern Python-based automation techniques ensures that the system continuously scans and updates its traffic patterns without the need for manual intervention.

Reporting and Visualization: A key aspect of the solution is its ability to generate comprehensive reports on network usage. These reports summarize critical data, such as peak traffic times, average bandwidth usage, the number of active connections, and identified anomalies. Through graphical representations—charts, heat maps, and histograms—network administrators can visualize traffic trends, compare historical data, and make informed decisions on how to optimize the network. The automated report generation feature ensures that these insights are readily available without requiring constant monitoring from the administrator.

Project Management and Communication: The implementation phase was supported by effective project management techniques. Gantt charts were used to schedule tasks and track progress over time. Frequent communication with stakeholders ensured that the project was on track and that feedback was incorporated as necessary. For instance, network professionals were consulted to refine system features such as traffic prioritization and anomaly detection algorithms. This iterative feedback process allowed the project to stay aligned with the real-world needs of network administrators.

Testing and Data Validation: Extensive testing was conducted to validate the system's performance in a live network environment. Multiple levels of testing were involved:

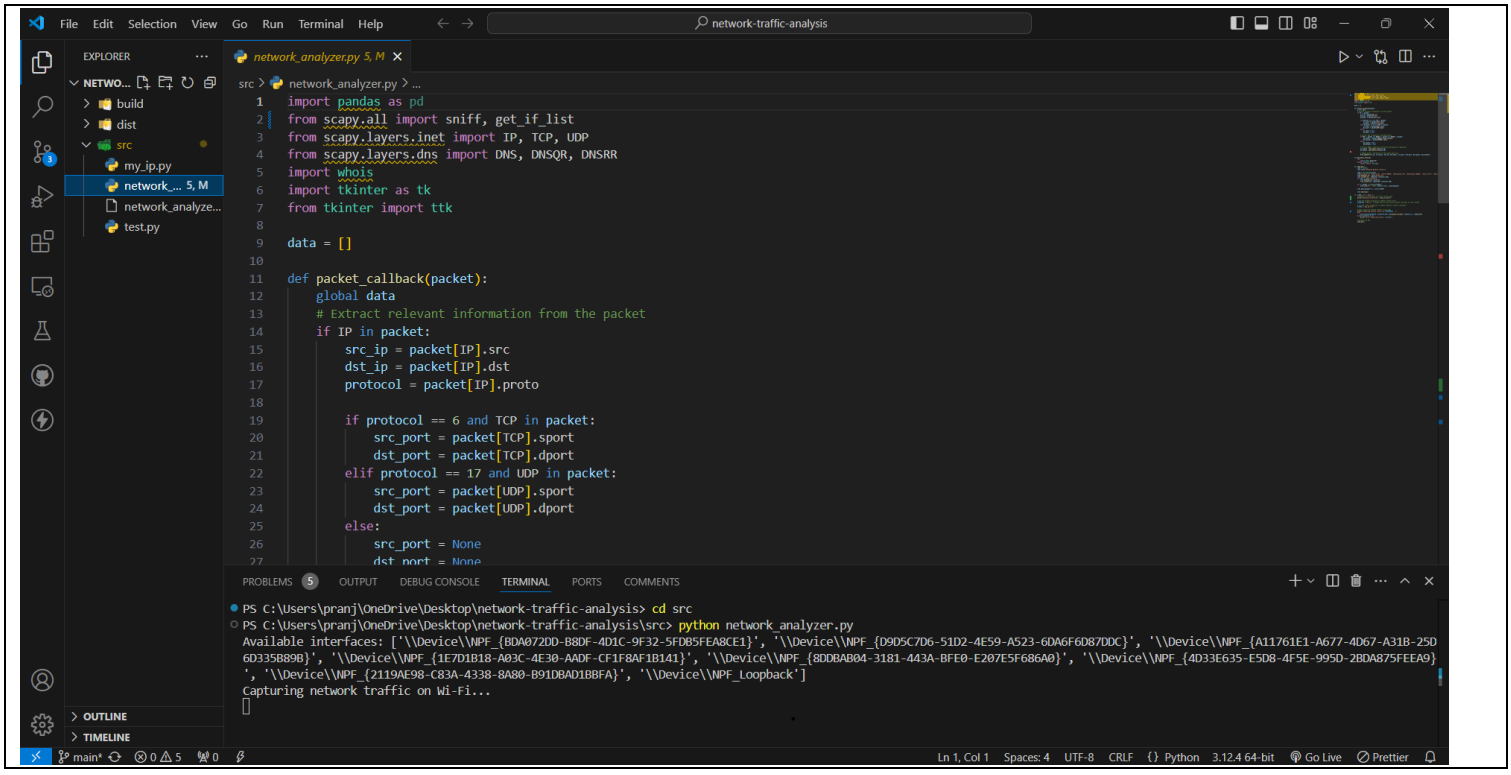
- **Unit Testing**: Each component of the system (packet capture, traffic analysis, alert generation) was tested in isolation to ensure they functioned correctly.

- **Integration Testing**: The components were then tested together to ensure that they interacted seamlessly. This was critical in verifying that data was captured, analyzed, and reported without delays or errors.

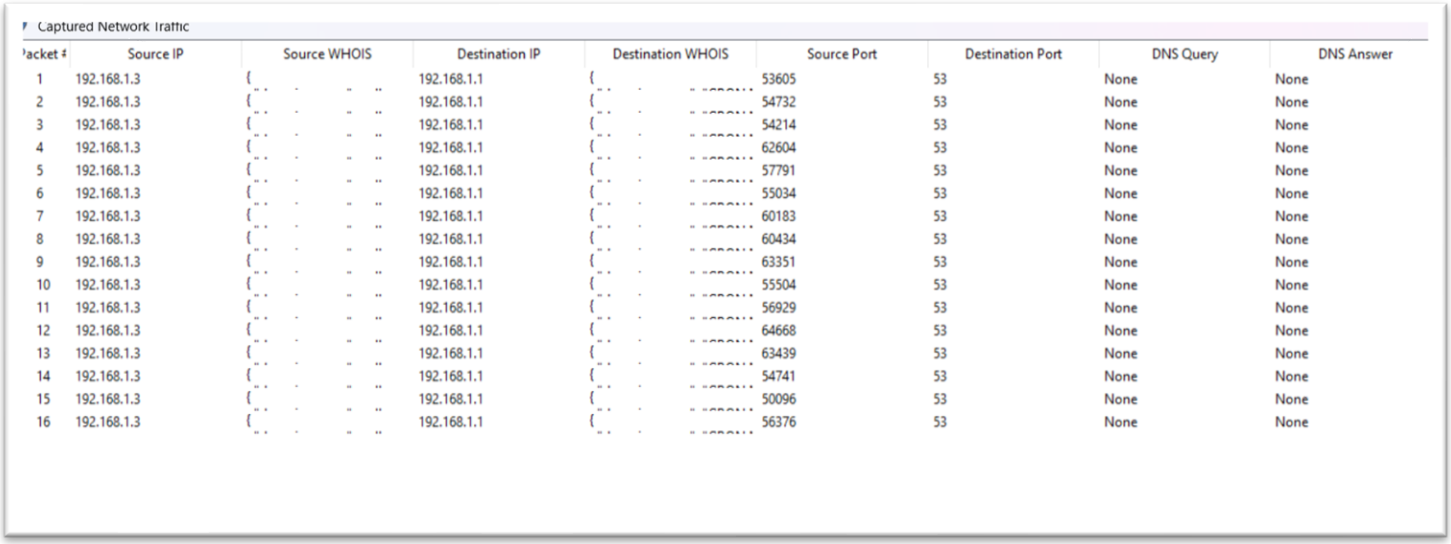
- **Performance Testing**: This included stress tests to assess the system's ability to handle high volumes of traffic during peak hours. The system was tested on both high- and low-bandwidth networks to measure response time, packet drop rates, and how quickly alerts were generated in abnormal situations (e.g., a sudden surge in traffic due to a DDoS attack).

Overall, the implementation of the network traffic analyzer brought together various computer networking principles—such as packet analysis, protocol inspection, and traffic monitoring—along with modern software tools to deliver a robust, real-time solution for managing and optimizing network performance

CODE:



OUTPUT:



Captured Network Traffic

Packet #	Source IP	Source WHOIS	Destination IP	Destination WHOIS	Source Port	Destination Port	DNS Query	DNS Answer
1	192.168.1.3	{	192.168.1.1	{	53605	53	None	None
2	192.168.1.3	{	192.168.1.1	{	54732	53	None	None
3	192.168.1.3	{	192.168.1.1	{	54214	53	None	None
4	192.168.1.3	{	192.168.1.1	{	62604	53	None	None
5	192.168.1.3	{	192.168.1.1	{	57791	53	None	None
6	192.168.1.3	{	192.168.1.1	{	55034	53	None	None
7	192.168.1.3	{	192.168.1.1	{	60183	53	None	None
8	192.168.1.3	{	192.168.1.1	{	60434	53	None	None
9	192.168.1.3	{	192.168.1.1	{	63351	53	None	None
10	192.168.1.3	{	192.168.1.1	{	55504	53	None	None
11	192.168.1.3	{	192.168.1.1	{	56929	53	None	None
12	192.168.1.3	{	192.168.1.1	{	64668	53	None	None
13	192.168.1.3	{	192.168.1.1	{	63439	53	None	None
14	192.168.1.3	{	192.168.1.1	{	54741	53	None	None
15	192.168.1.3	{	192.168.1.1	{	50096	53	None	None
16	192.168.1.3	{	192.168.1.1	{	56376	53	None	None

CHAPTER 5.

CONCLUSION AND FUTURE WORK

5.1. Conclusion

The development of the network traffic analyzer has provided significant insights into the functioning and management of modern computer networks. The system was designed to effectively monitor real-time network traffic, detect anomalies, and generate detailed reports. It met the anticipated goals, particularly in simplifying the complexities of network monitoring and making it accessible to both technical and non-technical users.

The **expected results** were largely achieved:

- The system successfully captured and analyzed traffic in real-time, providing a clear view of network activity across various layers. This was vital for identifying both normal network behavior and unusual patterns indicative of potential threats or performance bottlenecks.
- Alerts were generated automatically when the system detected anomalies such as sudden spikes in traffic or unauthorized access attempts. These alerts were useful in helping network administrators respond promptly to potential security incidents.
- Comprehensive traffic reports were generated, allowing users to understand which devices, applications, or services were consuming the most bandwidth. These reports could be used to optimize resource allocation, troubleshoot slow network performance, or ensure network security compliance.

5.2. Future Work

As network infrastructures continue to grow in complexity, it is essential to enhance and expand the capabilities of the network traffic analyzer to adapt to evolving demands. The following **modifications and future improvements** are recommended to ensure the system remains relevant and effective in more complex network environments:

1. Modifications to Improve Performance:

- **Data-handling optimization**: Implement a more efficient algorithm for data packet processing, particularly during peak network traffic periods. By optimizing how packets are captured, processed, and logged, the system can reduce latency and improve real-time monitoring, even in high-traffic environments.

- **Scalability improvements**: As network environments grow, the traffic analyzer should scale accordingly. One solution is to leverage **cloud-based infrastructure** that can dynamically adjust to network size, bandwidth, and data volume. This would eliminate many of the performance bottlenecks seen during peak times.

2. Change in Approach:

- **Predictive analytics through machine learning**: Modern networks are becoming more dynamic, with unpredictable traffic patterns that can be difficult to manage with traditional monitoring tools. Incorporating **machine learning** models into the traffic analyzer can enhance its ability to predict network behavior. By analyzing historical traffic data, the system can forecast future traffic trends, enabling network administrators to plan ahead and allocate resources accordingly. This predictive capability can also help in proactive **network security**, allowing the system to detect potential threats before they escalate.

- **Network self-healing**: Future iterations of the system could incorporate autonomous network management features. By combining predictive analytics with automation, the system could automatically adjust network parameters, such as bandwidth allocation, to optimize performance without human intervention.

3. Suggestions for Extensions:

- **Integration with Quality of Service (QoS) policies**: To better manage network traffic, especially in environments where certain applications require higher bandwidth or lower latency (e.g., VoIP, video conferencing), the system could be extended to support **Quality of Service (QoS)** policies. These policies would allow administrators to prioritize specific types of traffic, ensuring that critical services always receive the bandwidth they need while less important traffic is deprioritized.

- **Third-party integration**: Extending the system to **integrate with other network management tools** would offer a more holistic view of network performance. For example, integrating the traffic analyzer with a **Security Information and Event Management (SIEM)** system could enhance both monitoring and security, providing real-time insights and alerts for potential threats. This would ensure the system is not only reactive but also proactive in addressing potential security concerns.

- **Mobile and IoT Device Monitoring**: With the growing use of **mobile devices and IoT** (Internet of Things) devices, the network traffic analyzer should be extended to handle and analyze traffic from a wide variety of devices. These devices generate unique traffic patterns and often pose security risks, making it critical to ensure they are properly monitored.

- **Cloud and Multi-cloud support**: As businesses continue to adopt multi-cloud strategies, the traffic analyzer could be enhanced to monitor traffic across multiple cloud environments.

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