Software Engineering Project Proposal

Course: Software Engineering (IT632)
Semester: Winter 2026
Instructor: Prof. JayPrakash

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1. Proposed Project Title

NetSight

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2. Team Members

Sr. No	Student Name	Student ID
1	Kenil Dhola	202512029
2	Harshvardhansinh Sarvaiya	202512047
3	Hardik Vachhani	202512072
4	Vivek Savaliya	202512083

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3. List of Functionalities

1. Network Identification

NetSight identifies and maintains a structured representation of the network by discovering and registering all connected devices such as routers, switches, servers, access points, and end-user devices. Each device is uniquely identified and categorized based on its role in the network. This enables the system to build an accurate and up-to-date view of the network infrastructure.

2. Network Visualization

The system provides an interactive visual representation of the entire network in the form of a topology graph. Devices are displayed as nodes and their connections as links, allowing users to easily understand how the network is structured. Visual indicators such as colors and status icons are used to represent device health (healthy, warning, critical), enabling users to quickly locate problem areas and understand network conditions at a glance.

3. Network Health Metrics

NetSight continuously monitors and analyzes key network performance metrics, including:

Latency (response time)

Packet loss

Bandwidth utilization

Device uptime and availability

These metrics are collected in real time and analyzed to determine both individual device health and overall network stability. Instead of simple up/down status, the system provides meaningful health insights such as degradation, congestion, or instability trends.

4. Alert System

The platform includes an intelligent alerting mechanism that automatically notifies users when abnormal conditions or failures are detected. Alerts are triggered based on predefined thresholds, sustained performance degradation, or device downtime. Notifications are delivered through supported communication channels, ensuring that responsible users are informed promptly and can take corrective action before issues escalate.

5. Role-Based Access Control

NetSight supports role-based access to ensure secure and organized system usage. Different user roles are defined, such as:

Administrator: Full access to network configuration, user management, and system settings

Network Engineer: Access to monitoring, analysis, and troubleshooting features

Viewer: Read-only access to dashboards and reports

This ensures data security, controlled access, and appropriate responsibility assignment.

6. Failure Prediction

Using historical network data and performance trends, netSight supports predictive analysis to identify potential failures before they occur. By analyzing patterns such as repeated overloads, rising latency, or abnormal behavior, the system estimates failure risks and highlights devices that may fail in the near future. This helps organizations take preventive action, reduce downtime, and improve overall network reliability.

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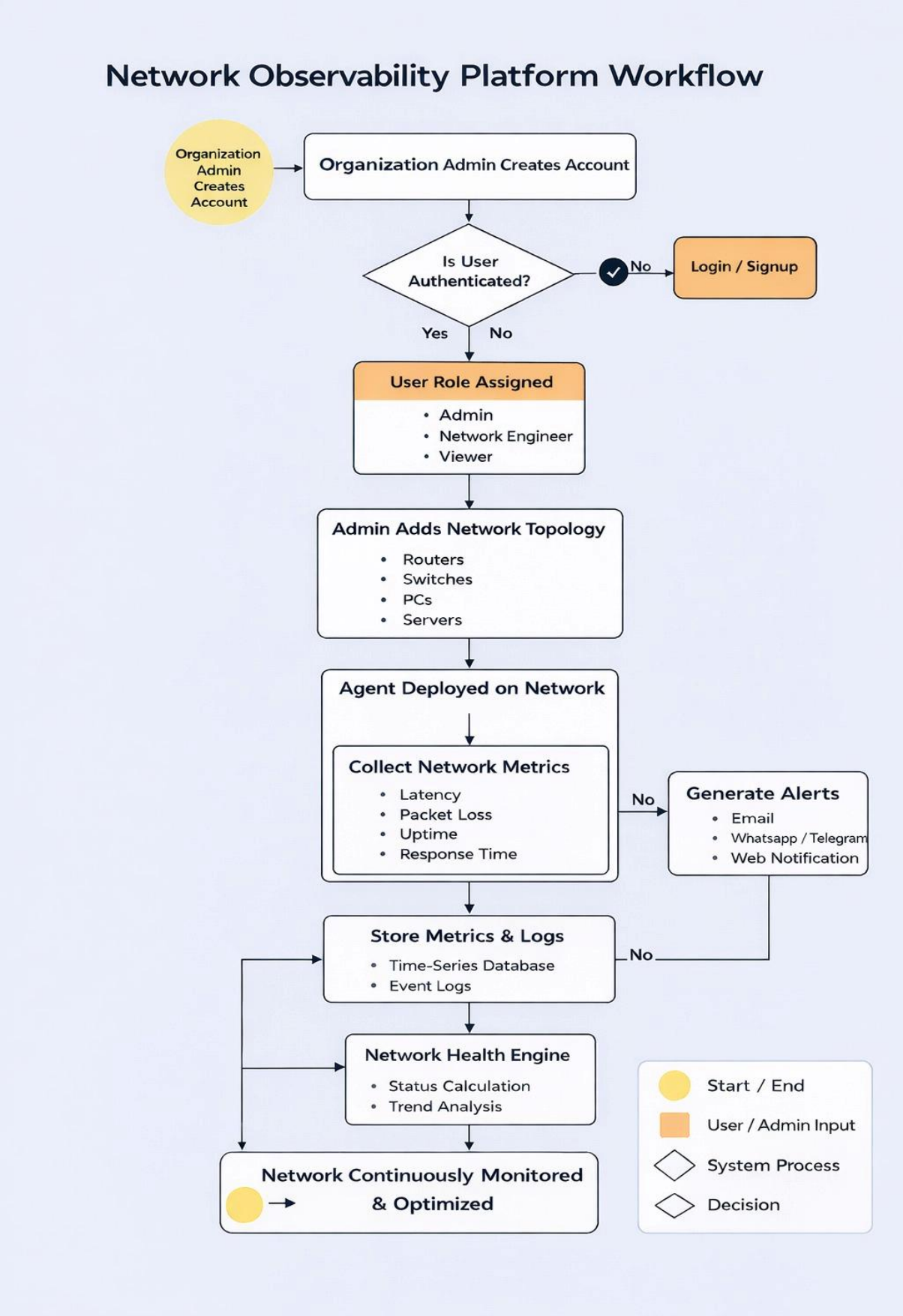
4. Block Diagram / Workflow



5. Tentative Work Distribution

Team Member	Assigned Responsibilities
Kenil	Frontend Development
Hardik	Backend Development
Harshvardhansinh	Backend Development
Vivek	Data Management

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6. Technologies to be Used

Layer	Technology
Frontend (Web Dashboard)	React.js, Next.js, HTML5, CSS3, Tailwind CSS, Chart.js / Recharts, D3.js / React Flow, Axios, Socket.IO (client)
Backend (Core System & APIs)	Node.js, Express.js, Socket.IO, Webhooks
Network Monitoring & Data Collection	ICMP (Ping), TCP Probes, SNMP, Traceroute, net-ping, net-snmp, node-cron
Database & Storage	MongoDB (topology, users, alerts, logs), TimescaleDB or InfluxDB (time-series metrics), Redis (cache)
AI & Intelligent Analysis	Python, FastAPI, Pandas, NumPy, Scikit-learn (anomaly detection), Prophet / LSTM (optional), LLM API (OpenAI or local), LangChain
Alerting & Notification	Backend alert rules, Nodemailer (Email), Twilio (SMS – optional), Slack / Microsoft Teams webhooks, In-app notifications
Authentication & Security	JWT, Role-Based Access Control (Admin / Network Engineer / Viewer), HTTPS, Rate Limiting, API Key Protection, Audit Logs
Tools / Frameworks / Dev Tools	GitHub, VS Code, Postman, Draw.io (UML diagrams)