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IFT 365 – Applied Programming Language for Information Technology

Coding Project – Planning Worksheet

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Instructions: Answer the following questions using complete sentences. You should use these questions to have a written discussion about the application you are going to design for the topic you submitted for Coding Project – Topic Approval.

1. Application Goal
Describe the goal of your application in one or two sentences.

The goal of my application, titled "Network Monitoring Tool," is to monitor and log detailed network traffic data on my home network, providing real-time insights into network speeds, device usage, and bandwidth consumption through a local desktop dashboard. The tool will include visualized data trends, automated alerts, and summary reports.

2. What features/function will I have?
List the features and functions and a brief description of each. Be sure to include why that feature or function is important. You will need to have seven to eight features or functions listed.

- Customizable Local Dashboard
    - A desktop-based dashboard built with fyne library, where users can view metrics like speed trends and device usage. Metrics will be organized in a user-friendly layout, with an option to refresh data on demand.
- Device-Level Analytics
    - Tracks bandwidth usage for each device on the network, displaying which devices are consuming the most data.
- Historical Data Visualization
    - Provides visual graphs of network metrics over time, allowing users to see trends in speed, latency, and usage.
- Cross-Platform Compatibility
    - The application will be compatible with Windows, macOS, and Linux, allowing users to run the local dashboard on multiple operating systems.
- Real-Time Alerts for Speed or Latency Drops
    - Sends local notifications when network performance drops below user-defined thresholds for speed or latency.
- Automated Weekly Summary Reports
    - Generates periodic summary reports of key metrics and saves them to the local system for review. These can be set for weekly or monthly intervals.

- Bandwidth Allocation Recommendations
  - Analyzes device-level data to suggest bandwidth optimization strategies, such as shifting heavy usage to off-peak hours.
- ISP Comparison Data Logging
  - Tracks actual network speeds versus the ISP's advertised speeds, allowing users to verify their service.

3. What information do I need?

List where you will obtain the data for the features and functions you listed above. If the data is from a website, list its URL. Do not just answer that you will google it. List out this information separately for each feature or function you listed above.

- *Network Speeds*
  - *Data Source: Speedtest API by Ookla*
  - *https://www.ookla.com/speedtest-sdk*
- *Customizable Local Dashboard*
  - *Built in (https://fyne.io/)*
- *Device-Level Analytics*
  - *Data Source: gopacket (for packet capturing and analysis)*
  - *Link: https://www.devdungeon.com/content/packet-capture-injection-and-analysis-gopacket*
- *Historical Data Visualization*
  - *Data Source: Chart*
  - *Link: https://blog.logrocket.com/visualizing-data-go-echarts/*
- *Cross-Platform Compatibility*
  - *Data Source: Go's Cross-Compilation*
  - *You can build binaries for Linux, Apple and Windows with Go.*
- *Real-Time Alerts for Speed or Latency Drops*
  - *Data Source: notify*
  - *Link: https://pkg.go.dev/github.com/nikoksr/notify*
- *Automated Weekly Summary Reports*
  - *Data Source: go-cron*
  - *Link: https://pkg.go.dev/github.com/go-co-op/gocron*
- *Bandwidth Allocation*
  - *Data Source: gopacket*
  - *Link: https://www.devdungeon.com/content/packet-capture-injection-and-analysis-gopacket*
- *ISP Comparison Data Logging*
  - *Data Source: Speedtest API by Ookla*
  - *Link: https://www.ookla.com/speedtest-sdk*

4. How will your project make use of user input?
Describe how you plan to make use of user input in your application. Describe what information you will want to collect from your users and the importance of each piece of information. Describe what you will do with the information once you have collected it.

- Alert Thresholds: Users can set minimum acceptable speeds and latency levels for alerts.
- Logging Frequency: Users choose how frequently data should be logged, such as hourly or daily.
- Report Frequency: Users select between daily, weekly, or monthly summary reports. This customization makes the application adaptable to each user's preferences and needs, making it a user-centered network monitoring solution.

5. What external libraries or packages do you plan to use, and why??
Describe any external libraries or packages you plan to incorporate into your application. Explain the purpose of each and how they will contribute to the functionality or efficiency of your project.

- Gopacket: Captures and analyzes network packets, allowing for device tracking and bandwidth usage calculations.

- fyne (for desktop-based dashboard): Provides a cross-platform GUI framework to build a user-friendly desktop dashboard for real-time network monitoring.
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- chart : Creates visual graphs, allowing users to view trends and historical network data in an intuitive format.
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- go-cron: Automates recurring tasks like logging, report generation, and alerts on a set schedule.
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- Notify: Sends local notifications for real-time alerts, allowing users to receive immediate feedback if performance drops.
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- net/http: Allows the application to interact with external APIs, such as speed test services, to measure and log actual network speeds.
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- Logrus: Delivers advanced logging capabilities, which can be useful for debugging and keeping detailed logs.
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- go-pdf: Generating PDF for reports
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- cobra: CLI support

- cloud.google.com/go/storage: For cloud based storage which will be transferred monthly