Project Name: G-Wifi

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OVERVIEW

G-Wifi is a mobile application that can self report and also allow the users to report network performance details. This information is overlaid on our wireless network layout.

INTRODUCTION

- Organization sponsoring the app: GWU IT department
- Key Stakeholders: IT Support, IT helpdesk, Users
- Issues: No proactive system to monitor real time wireless network performance in different areas of the university, to help it support staff and helpdesk to find and resolve network issues quickly and to analyze data and generate reports.
- Interfaces between this system and other system
    - Network Access points
    - Existing help desk/support infrastructure
    - GWU user database

PROJECT DEFINITION

OBJECTIVES

Implement G-Wifi system to support George Washington University IT Department.

- Designing, building, implementing, hosting and supporting the network performance through G-Wifi
- Providing daily, easily available, reliable and accurate data
- Providing a consistent, intuitive and flexible user interface

REQUIREMENT ANALYSIS

- Weekly Scrum Meetings with the sponsor
- Interviewed Stakeholders
- Reviewed existing system and documents
- Weekly team meeting
- JAD sessions

TRANSCRIPT FOR INTERVIEWS WITH SPONSORS

Team: “What’s the expectation out of the project? And what are the requirements?”

Mark: “To create a system that benefit all students and faculty by doing periodic speed testing, tracking the network access point, collecting user data and generating reports of internet performance for maintenance purposes.”

Team: “What’s the current system used by university?”

Mark: “We don’t have any automatic system yet. Everything has been recorded manually. That’s why we want to build the application to tracking the stream of the internet on campus so we don’t have to wait the access point down, we can get notify and send support team to fix it before it’s down. “

Team: “What type of the platform you prefer to use for the system?”

Mark: “Since every targeted user have mobile devices, we are considering to design a mobile application first and then see the response and diversify in the future.’

Team: ‘Who are the stakeholders? ‘

Mark: ‘IT Support team for maintenance, IT helpdesk for customer’s service, Users include students and faculty of GWU.”

Team: “Are we only going to collect data from users?”

Mark: “We are actually going to collect data from users and the strength of network signal from access points.”

Team: “What’ s the frequency of the speed testing you’re looking forward to?”

Mark: “For accuracy purpose the more frequent the better. We are thinking that maybe doing speed testing every couple of minutes, but it may consume too much bandwidth, so it’s going to be a trade-off and you must make the decision. The smart way to do this maybe choose the frequency based on the area. The data is stored by location in database, so if there isn’t enough data, it’s time to do the speed testing. And, there are some areas you don’t have to record too much. For example, you never need to do the speed testing in elevator but you might want to do speed testing every minute in a library due to the high volume.”

Team: “For the map design, how precise you want us to describe the location and how can we achieve that?”

Mark: “Imagine two users are in the same building and one is in 4th floor and the second is in third floor. You’d better be able to distinguish their positions even though they seem to appear in the same place on the map. So, you must determine that through the access point location. So, you need to provide the access point location and the user’s location both.”

Team: “What’ s the frequency of the user’s data you’re looking forward to sending into database?”

Mark: “The data should be sent into database immediately after the user updated some data. So, we can keep tracking how frequent the user uses the app, the high-volume moment and place and some information more implicit.”

Team: “Do we need to create a separate database to collect the user data?”

Mark: “You don’t have to. You can use database of the registrar office which already containing the information of GWU students and faculty.”

Team: “What interface our system is going to interact to?”

Mark: “It will be interacting with different interfaces: access points, GWU user database, IT helpdesk\support, Cisco prime system.”

DELIVERABLES

- Requirements Analysis, Prototyping and Solution Design
- Use Case Diagram
- Activity Diagram
- Wireframes

DEFINED METHOD OF APPROACH

The project will follow the Agile Model with the following phases:

- Scrum meetings
- Requirement Gathering and prototyping
- Design

IN SCOPE

The following services are in scope:

Design Services	▪ Planning ▪ Requirement Gathering and prototyping ▪ Design
Implementation Services	▪ Wireframes

USE CASES

The use case diagram has four actors:

1. User
2. Mobile Device
3. Backend System
4. Support Staff

The User:

The user logs into the system using mobile device. On logon, the device must send its MAC address along with the credentials, this is to enable single users to login via multiple devices. After login, the user can perform one of the following options:

1. Check Map with network performance overlay
2. Select a location and rate it
3. Select a location and add/view comments

All the above actions will require location data, which is sent by the device.

The Device:

The device is responsible for sending the MAC address during login, detecting access point to which the device is connected and generating location data which is used with all data sent to the backend system. The device also performs a speed test with a frequency dynamically determined by the backend system. Further, the device sends network quality data available on the device.

The Backend System:

The backend system is responsible for storing all data received from devices and users. This data includes (with location data):

1. User Ratings
2. User Comments
3. Speed test data
4. Network quality data

The system transforms and analyses the data, which in turn is used to:

1. Generate Map overlay
2. Determine frequency of speed testing
3. Sending push notification to devices
4. Generate Reports for use by the support staff

The backend system is also responsible for interfacing with the GWU user database and existing support and helpdesk systems.

The Support Staff:

The Support staff can generate reports or view scheduled reports to act or preventive measures to ensure fast resolution of network issues and high network performance with minimum down times.

Use Case Diagram:

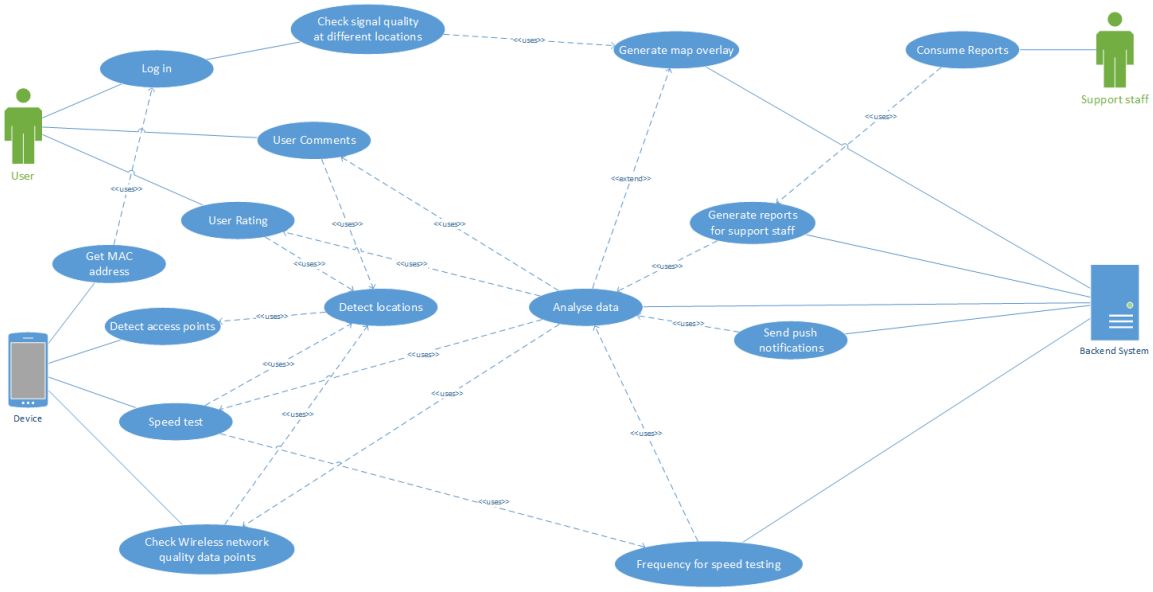

Figure 1 Use Case Diagram for the System

ACTIVITY DIAGRAMS

There are four activity diagrams describing the system:

1. User Interaction
2. Speed Testing
3. Reporting
4. Analysis

User Interaction:

The user interaction starts by the user logging in to the system. If the user is authenticated the device will be responsible for getting its MAC address. Then the device will determine location data by getting its own location using internal GPS and requesting the location of the Network Access Point to which the device is connected. The Network access point will self-report the location back to the device. The device will combine the location data into a standard format and request map data from the backend system. The backend system will generate map data

with network quality overlay for the device location provided. This data is sent back to the device which displays it to the user.

Now, the user has three choices. The user can select a location, comment and rate network quality for the selected/current location. When the user selects data, the user ratings and comments for that location is requested from the back-end system, which is then displayed to the user. When the user submits data (ratings/comments) this data is stored in the backend system (database).

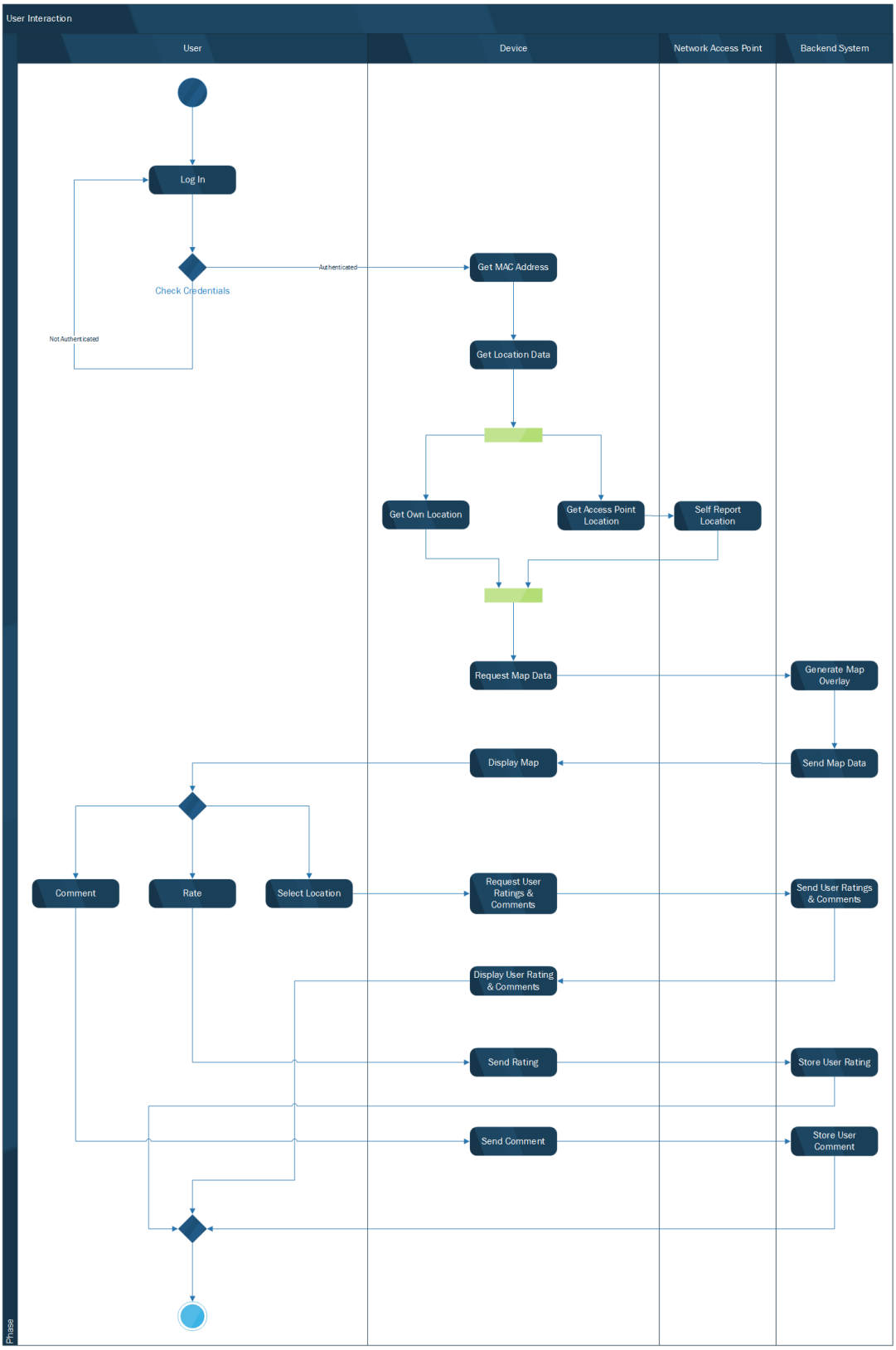

Figure 2: Activity diagram for User Interaction

User Speed Test:

The frequency for the speed test is dynamically determined by the backend system based on factors such as how much data is present for the location in a timeframe. Once the frequency is determined for a location, the backend system will initiate speed test for the devices. The device will then get the location data and then do two things:

1. Check Wireless Network Quality from the device
2. Initiate speed test: this will make the backend system to send a standard data packet. Once the data packet is downloaded the device will calculate the standard download metric data.

The Wireless Network Quality and download metric data will be combined and send to the backend system, which will store this data in the database.

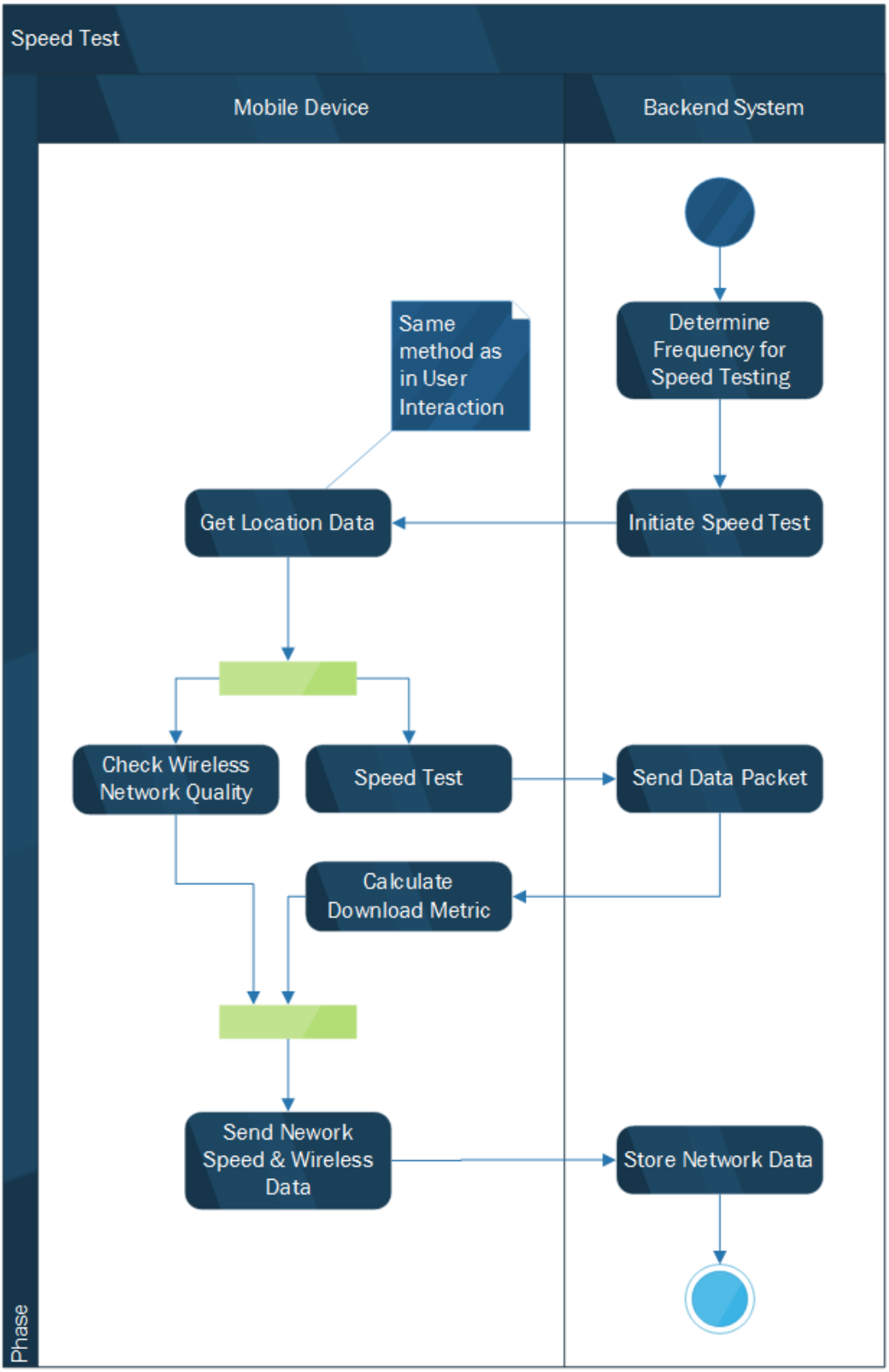

Figure 3: Activity diagram for Speed Test

Analysis:

The analysis is a continuous process in which the data stored in the database is transformed and analysed.

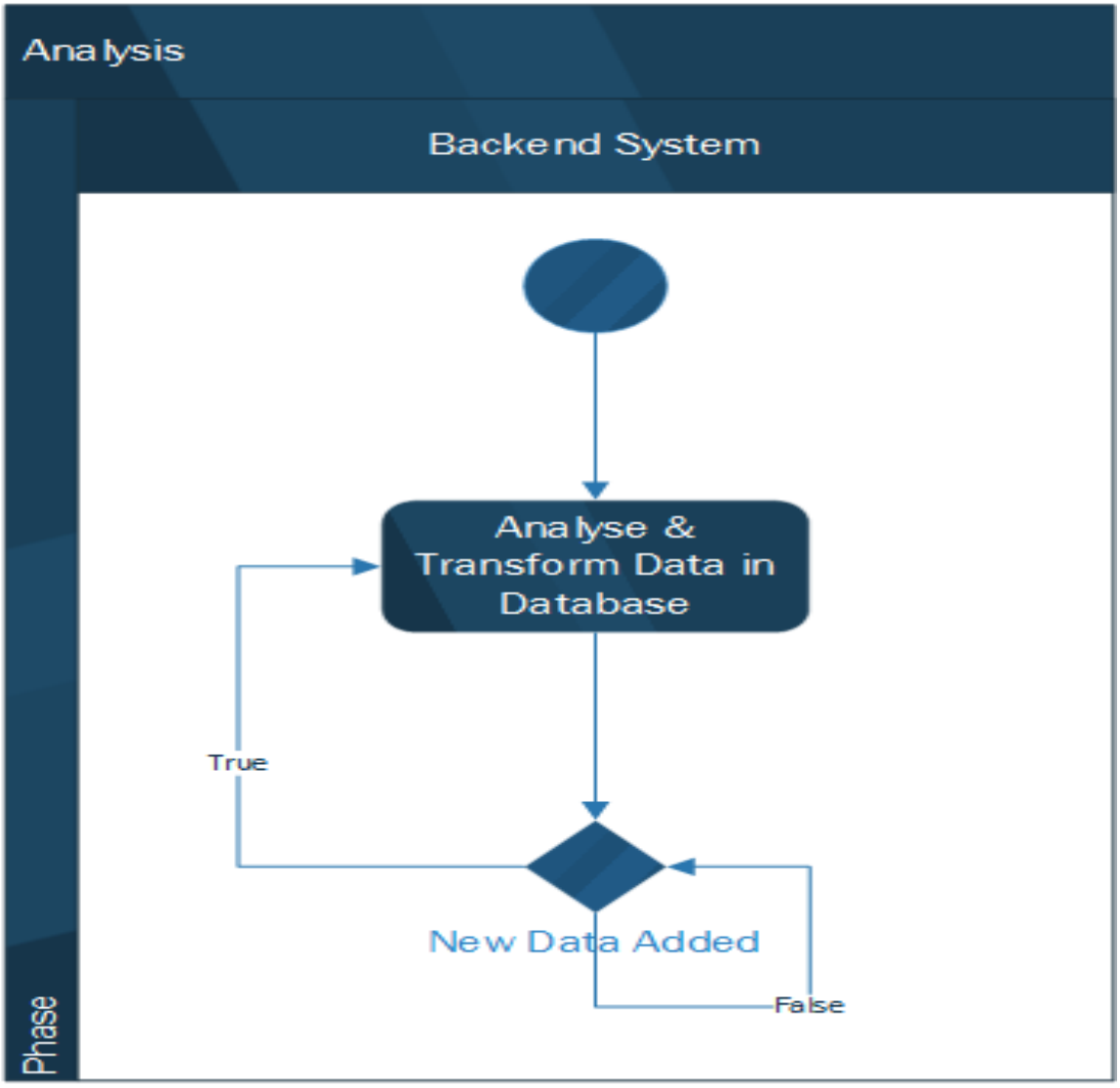

Figure 4: Activity diagram for Analysis

Reporting:

There are two ways of generating reports:

1. Scheduled Reports: These are standard reports that are generated at scheduled times
2. Requested Reports: These are customized reports that are requested by the Support Staff

The data is collected from the database and the report is generated. This report is displayed to the Support staff and stored in the system.

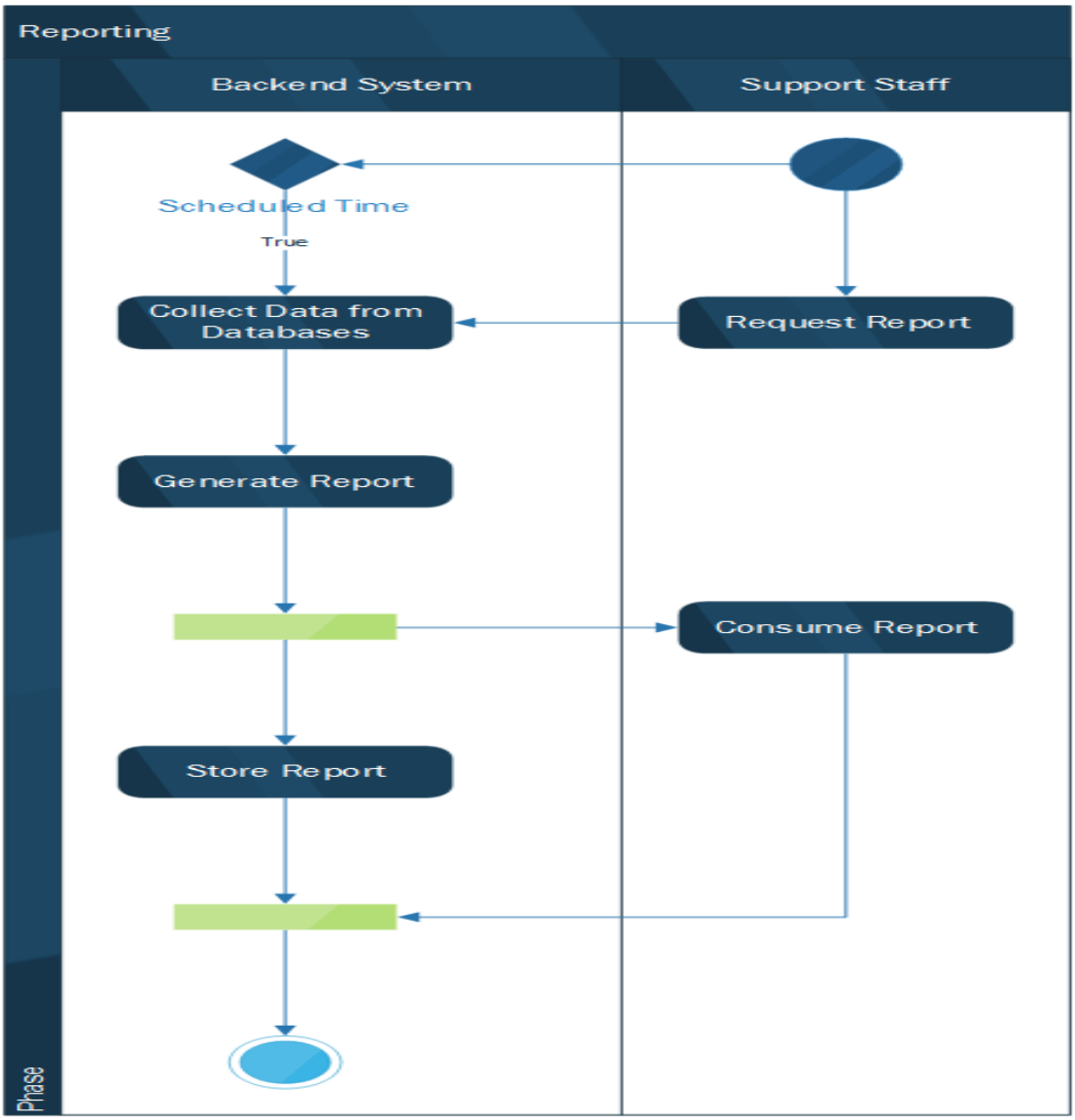

Figure 5: Activity diagram for Reporting

IMPLEMENTATION RECOMMENDATIONS

Phase	Deliverable
Planning	Implementation plan including project plan
Requirements Gathering	Requirements Specification Document (including Use Cases)
Prototyping	Wireframes

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PROPOSED SOLUTION AND IMPLEMENTATION RECOMMENDATION

Proposed Solution

The proposed solution contains two components:

1. Front end Mobile Application
   The front end mobile application will be installed in the user's devices and will be downloadable from the application store. It will be responsible for all the display of network signal, user interactions and generating and sending network quality metrics to the backend system.
   Its major functions will include:
   - Authentication
   - Displaying map with network quality overlay
   - Capturing user ratings and comments
   - Background speed testing

   The implementation recommendations are:

   - Operating System: iOS, Android, Windows Phone
   - Programming languages: Objective-C, Java, C# visual studio
   - The application will be launched first as a beta version to selected users within the university, then it will be released on the application store

2. Backend Server and Database

The backend server will be responsible for hosting a web service that is consumed by the mobile application, storing and retrieving transactional data, analysing the data and generating reports. Further it will be responsible for interfacing with other systems like the existing help desk system and user database.
The major functions include:

- Web service
- Db server
- Analysis
- Interface with external systems

The implementation recommendations are:

- Stack:
    - Operating System: Linux (Open Source)
    - Web Server: Apache (Open Source)
    - Programming Language: PHP
    - Database: Mongo DB (NoSQL for analysis for large amounts of network data)
- Architecture: MVC (Model View Controller) framework for high maintainability and flexibility.

Alternatives:

The front-end application can also be made for laptops (Windows and MAC) which would extend the user base.

Content of Weekly Status report:

- Key Accomplishments for the Week
- Status report for the week (Planned Vs. Actual)
- Key decisions for the week
- Plan for next week
- Risks /issues

DOCUMENT CONTROL

DOCUMENT INFORMATION

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APPROVERS

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