Requirements Analysis
Task Scheduler

COMP208 Group 29
Project Title: Visual IP – an Android-based network diagnosis tool
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1. Project Description

1.1. Target audience
The target audience for our software product are mainly focused on network operators, website owners and programmers.

1.2. Mission Statement
The purpose of this project is to develop a toolkit application that have many network utilities based on Android platform, including visualized network diagnosis functions such as IP geolocation searching, Ping and Traceroute.

1.3. Mission Objectives
- Automatically display the public 'IP information' of user's mobile phone when opening the Application;

- Enable the user to enter target IP for further services;

- The system provides a user interface that allows users to choose 3 visualized network diagnosis tools: IP geolocation searching, Ping and traceroute based on given target IP address.

    o IP geolocation searching: providing the location on the map for a valid IP address which the user inputs;
    o Ping: enable users to test the reachability of a host on an Internet protocol network;
    o Traceroute: users can use traceroute to observe the route and measuring transit delays of packets across an Internet Protocol network.
    o Information and ICMP messages obtained from these three functions above will be displayed on map.

(* IP information: including network node's public IP address, organization, city, country, continent, latitude, longitude.)

2. Statement of Deliverables

2.1. Description of Anticipated Documentation
- Design Documentation, consisting of:
    o Use Case Diagram
   o UML Class Diagram

- o User Interface Design
- User Documentation, consisting of:
  - o System requirements
  - o Description of the system functionalities
  - o Instructions

2.2. Description of Anticipated Experiments

- Testing the usability of User Interface
  - o Test if the interface will switch after clicking certain buttons
  - o Test if the related input tips will be shown to users
  - o Test if the UI is attractive to most of the users
  - o Test if the text box can accept all keyboard input
- Testing the usability of Map Display
  - o Testing if all the annotations on the map have the correct location corresponding to the information given.
  - o Testing if all the annotations on the map can be clicked to access its detail information
  - o In traceroute section, testing if all the annotations on the map have connected in the correct sequence
- Testing the usability of Network Diagnosis tools
  - o Testing if the API can be correctly called and obtain data resources
  - o Testing if geolocation can be extracted from URL
  - o Testing if Ping function is implemented successfully
  - o Testing if Traceroute function is implemented successfully
  - o Testing if ICMP messages can be retrieved successfully

2.3. System Boundary Diagram

System Boundary

User — User Interface — TraceRoute / IP Searching / PING — Google Map API, eXTReMe Free IP Lookup API
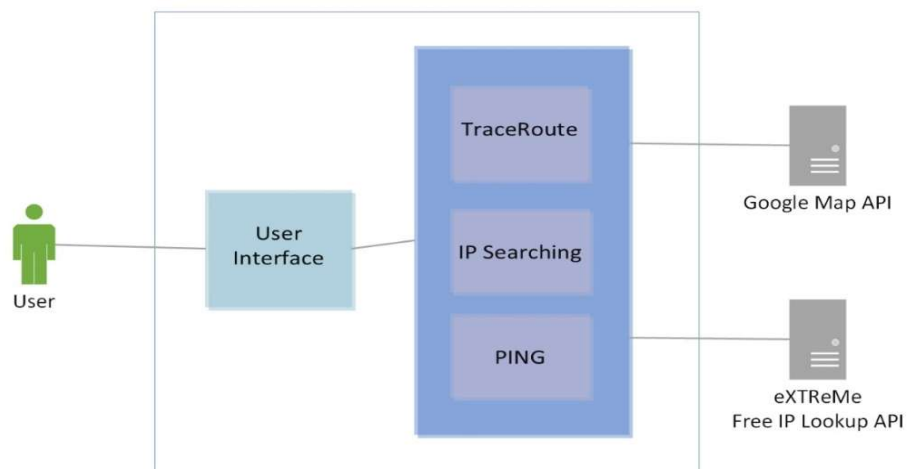
2.4. User Views

- Once open the application, users can:
  - o View their hosts' IP addresses and related information
  - o Select network diagnosis tools from the main menu
  - o Input the target IP address that they want to query
  - o Obtain information of target IP depending on which network diagnosis tool they choose

2.5.   Use Case Diagrams
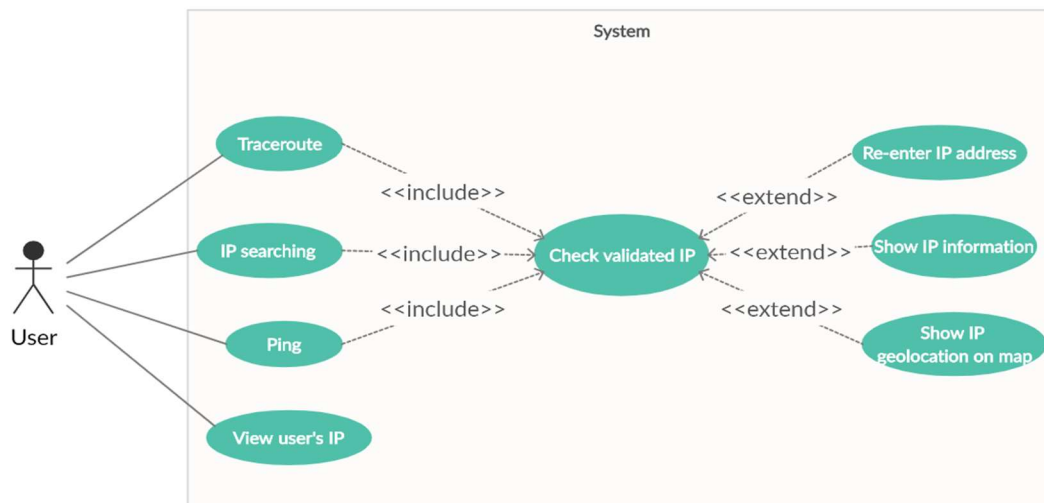
2.6.   Transaction Requirements

- Transactions related to looking up IP addresses' Geoloaction
  - Requires an API query to check whether the target IP address input by the user matches the data stored in eXTReMe database.
  - If the target IP address matches the records in database, return its geographical latitude and longitude.

2.7.   Functional Requirements

- The system should inform the user if he/she inputs an invalid IP address or domain name.
- The system should return the geolocation, city, country, continent of a valid IP address or domain name.
- The geolocation should be correctly pointed on the map.
- When using Ping tool, the system should allow user to customize numbers of packets to send.
- When using Ping tool, maximum, minimum, average delay time and packet loss percentage should be displayed.
- When using Traceroute tool, the system should allow user to customize numbers of hop limits.
- When using Traceroute tool, the IP addresses of intermediate routers should be displayed.
- When using Traceroute tool, the corresponding geolocation of IP address will be displayed on the map.

2.8.   Non-Functional Requirements

- The system should support Android systems.
- The system should be programmed in Java.
- The system development should use Android studio.
- The system provides easy-to-use user interface.
- The system should be robust with a low probability of data corruption on failure.

2.9.   System Requirements

- Network and Access requirements
  - Constant API access will be required to obtain related information of IP addresses.
- Legal issues
  - The system is to comply with the regulations set out in GDPR.

3. Conduct of the Project and Plan

3.1. Background Research

Traceroute is a computer network diagnostic command for displaying the route and measuring transit delays of packets across an Internet Protocol network [1], which is widely used for networkers to diagnose the network state. There already exists available Trace route tools, such as SolarWinds Traceroute NG, Visual Route and Path Analyzer Pro [2]. However, these online tools can only trace from their server instead of from the users' IP address. Therefore, we decided to develop an upgraded Android mobile app named 'Visual IP' which provide the user with visualized network diagnosis functions (e.g. Ping, traceroute, IP geolocation) which showed on map.

3.2. Data Required

- Data from user input
- Data from third-party API: Google map and eXTReMe
- Data from intermediate server/router during the traceroute process

3.3. Development methods and Documentation

- Development Methods
  - Object oriented design
  - Pair-programming – our team is divided into 3 sub-groups, 2 members for each, which will be responsible for UI, network and map implementation
  - Agile development
  - Git version control
- Documentation
  - Pseudocode
  - Use-case diagram; Class diagram; Activity diagram;
  - Group portfolio

3.4. Hardware and Software Required

- Hardware
  - PC with Windows 10 OS
  - Android Mobile Phone with Android version 9.0 or above
  - Peripherals such as data cables, monitor, keyboard etc.
- Software
  - Android Studio Version - 3.5.3
 - GitHub

3.5. Software Testing Methods

- Unit Testing

- Module Testing
- System Testing
- Regression Testing

3.6. Risk Assessment

Risk	Probability	Affect
The third-party API and database are disabled	Low	Disastrous
Fail to install the application on a real mobile	Low	Serious
Key member is ill at the critical development period	Low	Serious
Great changes to the requirements	Moderate	Serious
Time to develop software is underestimated	Moderate	Serious
Development tool crashed	Moderate	Tolerable
The final product does not match requirements	High	Tolerable
Size of the software is underestimated	High	Tolerable

3.7. Gantt Chart
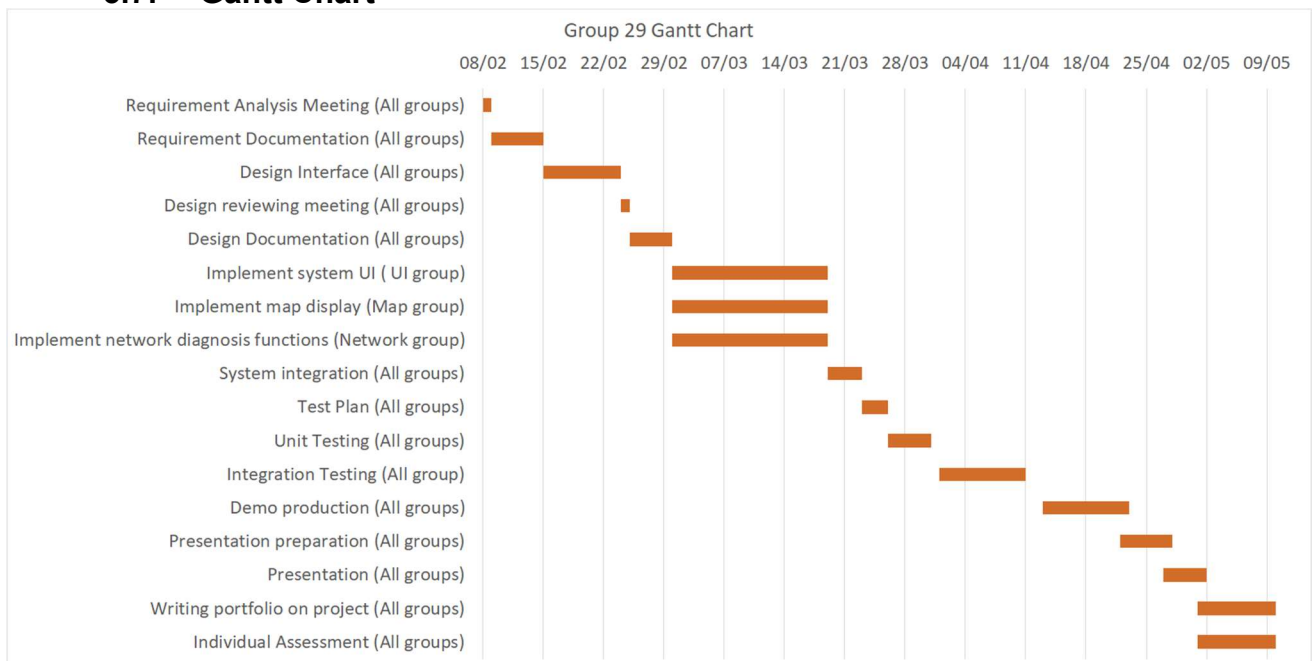
4. Bibliography

1. Margaret, R. (2018). *What is traceroute? - Definition from WhatIs.com*. [online] Available at: https://whatis.techtarget.com/definition/traceroute [Accessed 11 Feb. 2020].

2. Liku, Z. (2019). *3 Best Tools and Software for Traceroute and Tracert | Comparitech*. [online] Comparitech. Available at: https://www.comparitech.com/net-admin/traceroute-and-tracert-guide/ [Accessed 11 Feb. 2020].

5. Signatures

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