School of Computing

Year 4 Project Proposal Form

SECTION A

Project Title _Automated Software Defined Networking Platform (ASDN)___

Student Name ____Filip Nikolic_____

Student ID ____14470852_____ Stream _____

Project Supervisor Name __Brian Stone_____

[Note: It is the student's responsibility to ensure that the Supervisor accepts your project and this is only recognised once the Supervisor assigns herself/himself via the project dashboard. Project proposals without an assigned Supervisor will not be accepted for presentation to the Approval Panel.]

SECTION B

Proposal Description – using the following headings:

- General area covered by the project
- Outline of the proposed project
    - Background - where the ideas came from
    - Achievements - what functions it provides, who the users will be
    - Justification - why/when/where/how it will be useful
- Programming language(s) - List the proposed language(s) to be used
- Programming tools / Tech stack – e.g. compiler, database, web server, etc.
- Learning Challenges - List the main new things (technologies, languages, tools, etc) that you will have to learn
- Hardware / software platform - State the hardware and software platform for development
- Special hardware / software requirements - Describe any special requirements.

Make use of figures / diagrams where appropriate.

Note: The final revision of your proposal form should be converted to a **PDF** in your GitLab repo from where it will be automatically collected.

General area covered

This project will make use of two areas of computing, Machine Learning and Computer Networks. It will tightly integrate the two, in addition there will be several other technologies used, such as web-development, secure network communication, NoSql Databases, etc.

Outline of the proposed project

The platform is going to combine the two fields to automate and streamline the tasks that need to be carried out by network engineers, ultimately replacing them in many areas of work. It will focus on tackling the automation of network changes, by interpreting user requests and implementing them.

Background

The idea originated from personal experience as a network engineer. During my work, I found many shortfalls of current network automation systems, which are expensive, difficult to use and suffer from human error. After hearing similar negative experiences from my colleagues, I have decided to develop a solution of my own.

Achievements

It is an Automated Software Defined Networking (SDN) platform which will take advantage of developments in Machine Learning and Artificial Intelligence Systems. It will aid engineers in making network changes with ease and ultimately replace a need for human involvement entirely. Many of the system's users will be engineers, however will also be simple enough to be used by much less technical people.

Justification

The platform will be among the first developed in this specific manner. Apart from security applications, machine learning has not been successfully used in a network deployment environment.
By reducing human involvement and streamlining workflows that are error prone, companies can save large sums of money. In addition, it will allow engineers to focus efforts on more complex tasks with more priority.
As the system's UI is web-based it is going to allow for a much quicker and easier deployment, eliminating many OS compatibility issues.

Programming language(s)

The technologies used are part of the research phase of the project, however the main components of the project will most likely be comprised of Python, php, AngularJS, NoSQL databases and Java.

Programming tools

The system will adopt a web-based client-server model. This is due to the complexity and computing power required for such an application. A server will host the entire platform and offer a subscription based model for potential customers.

Learning Challenges

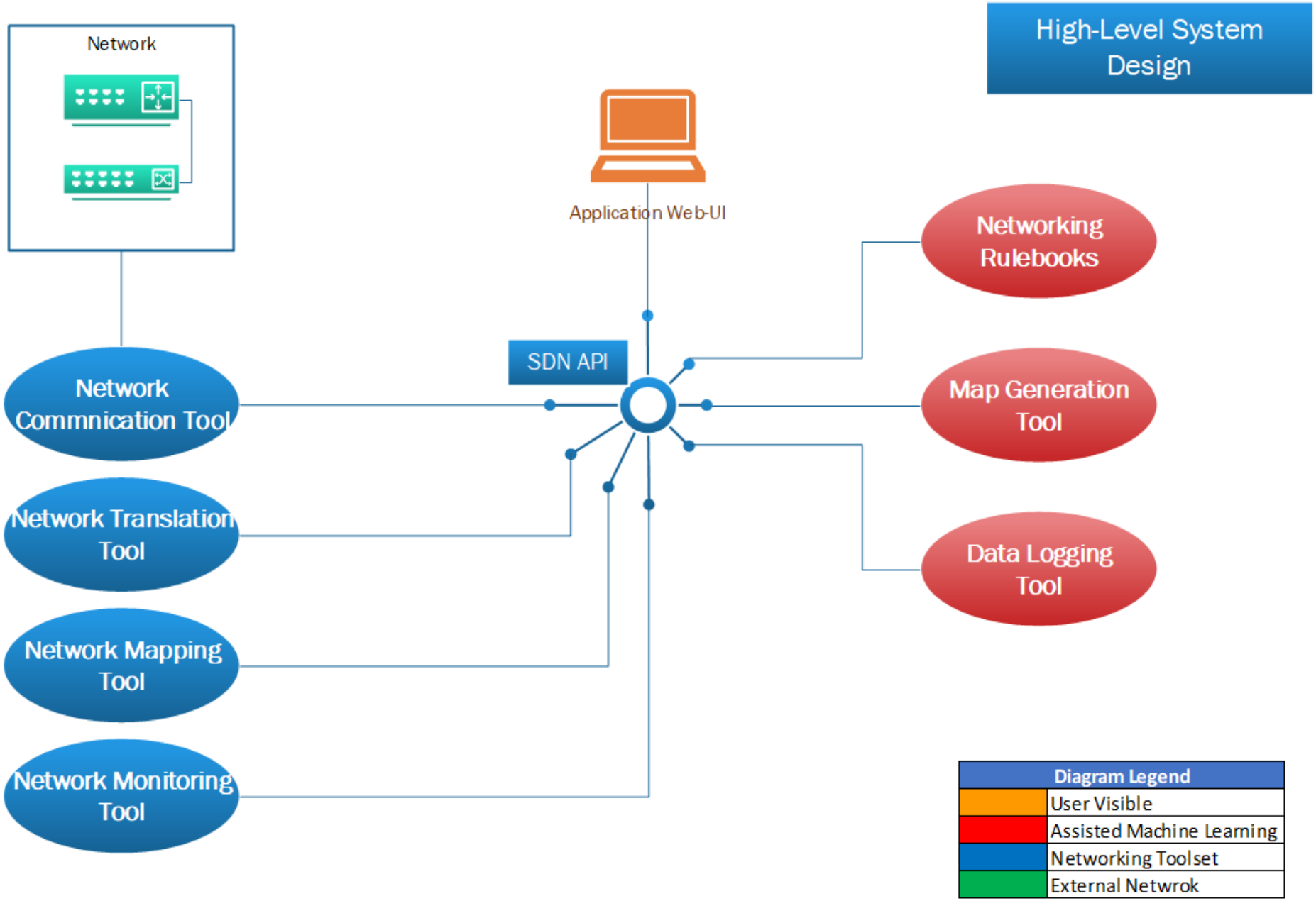
There will be many different technologies and tools which I will have to become familiar with to be able to develop and implement the project successfully.
The two most challenging ones will be to develop a standardised language for networks, allowing for different architectures and second being the correct implementation of assisted machine learning.

Hardware / software platform

From the client's point of view, most common operating systems will be supported, including mobile devices, as the Web-UI will be responsive. On the other hand, the back-end will make use of containerisation technologies like Docker, integrated with some public cloud services provided by Amazon, such as AWS and S3.

Special hardware / software requirements

There are two main special requirements, one of which is a fully functional network lab environment needed for testing and second, hundreds of different network configuration files from a variety of vendors such as Juniper Networks, Cisco allowing for the development of assisted machine learning.


High-Level System Design
Network
Application Web-UI
SDN API
Networking Rulebooks
Map Generation Tool
Data Logging Tool
Network Commnication Tool
Network Translation Tool
Network Mapping Tool
Network Monitoring Tool
Diagram Legend
User Visible
Assisted Machine Learning
Networking Toolset
External Netwrok