# COMP3000

# Computing Project

# 2020/2021

**Project Title:**

NetManager: NetworkConfiguration & Management Tool with Enhanced Security

## Links:

**Source Code:** <https://github.com/jwhite96/COMP3000>

**Backlog:** <https://tasks.office.com/live.plymouth.ac.uk/en-US/Home/Planner/#/plantaskboard?groupId=434e3152-1419-4e0c-b2c3-c4e0d0d4a459&planId=JwVQaMjgi06AWHtSP1mLf5YABBy3>

## Project Vision:

The continued growth in IT and the increase in users has led to larger and more complex networks making the management of these systems a challenge for networking professionals. Traditionally configuring a network requires direct access to the network hardware and configuring each device manually. This is both time consuming and prone to human error. A possible solution to this problem is Software-Defined Networking (SDN) which separates the data and control plane creating one centralised controller for the network. This allows for programmatically efficient configuration and easier management of the network. SDN can be used to build software applications that automatically configure networks, monitor network status and manage networks dynamically.

NetManager is a network configuration and management tool (NCM) for automatic configuration of a network and dynamic management of a network topology. This application will assist networking professionals in monitoring and controlling their networks as well as enforcing security policies by automatically implementing network security features (e.g. access lists, port security etc.). NetManager will include an easy to use graphical interface that utilises a Python programmed API that will gather information and pass commands to and from the network hardware. From the GUI, users will be able to view the network topology, monitor network performance, manually and automatically make configuration changes and implement network security features. This application will also feature an auditing system for logging recent activities such as device updates, configuration and/or topology changes and known security threats allowing system administrators to maintain greater control over their networks.

Applications using the software defined networking architecture are becoming more widely used in modern networks today. They greatly improve the speed and efficiency of network configuration, monitoring and management. Using programming to automate many networking processes and features allows one centralised controller to oversee and control the entire network providing increased network performance and improved scalability.

## Risk Plan:

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Risk ID** | **Risk Category** | **Risk Description** | **Impact Score (1-5)** | **Likelihood %** | **Risk Rating** | **Risk Response** | **Contingency Plan** |
| **Project Execution** | | | | | | | |
| R1 | Project Execution | Project too complicated/difficult to complete | 5 | 25% | 1.25 | Risk Avoidance | Thorough technical analysis and prototyping |
| R2 | Project Execution | Run time performance issues | 3 | 25% | 0.75 | Mitigation | Code optimization and software changes to improve performance. |
| R3 | Project Execution | MVC compatibility issues | 3 | 40% | 1.2 | Mitigation | Adequate testing during each development stage to check each component is compatible |
| R4 | Project Execution | Project not within scope | 3 | 25% | 0.75 | Risk Avoidance | Ensure project is still within scope during supervisor meetings |
| R5 | Project Execution | Changes to different technologies during development | 2 | 35% | 0.7 | Mitigation | Integrate new technology where possible into existing project |
| **Personnel Risk** | | | | | | | |
| R6 | Personnel | Insufficient knowledge to complete system requirements | 4 | 25% | 1 | Risk Avoidance | Ensure enough research is carried out before development begins (mostly during sprint zero) |
| R7 | Personnel | Unexpected illness or personal issues | 2 | 30% | 0.6 | Mitigation | Alter current schedule and pushback tasks into next sprints if required |
| **Schedule Risk** | | | | | | | |
| R8 | Schedule | Unexpected server downtime/maintenance | 1 | 50% | 0.5 | Acceptance | *None* |
| R9 | Schedule | Time constraints due to other commitments | 3 | 30% | 0.9 | Mitigation | Improved planning and alteration to current schedule |
| R10 | Schedule | Issues related to the COVID-19 Pandemic | 2 | 60% | 1.2 | Mitigation | *Dependant on restrictions and changes* |
| **Compliance Risk** | | | | | | | |
| R11 | Compliance | Potential copyright infringement with similar products | 1 | 25% | 0.25 | Acceptance | As this is project is for educational purposes this risk can be accepted but will still need to be taken into consideration during development and/or before any real-world deployment |
| R12 | Compliance | Unintentional regulatory noncompliance’s | 1 | 10% | 0.1 | Acceptance | *Same as above* |
| **Loss** | | | | | | | |
| R13 | Loss | Accidental loss of work | 3 | 20% | 0.6 | Mitigation | Create multiple backups to keep loss to a minimum |
| R14 | Loss | Theft/Fraud | 4 | 10% | 0.4 | Acceptance | *Same as above* |

## Risk Plan Key:

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| --- | --- |
| **Risk Category** | **Definition** |
| Project Execution | Risks affecting the development of the project e.g. systems, technologies, code etc. |
| Personnel | Risks affecting the human aspect of the project |
| Schedule | Risks that could affect the schedule and cause time delays during development |
| Compliance | Risks associated with failure to meet regulatory/industry standards and/or legal requirements |
| Loss | Risks related to the loss of work, hardware or data |

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| **Risk Response** | **Definition** |
| Risk Avoidance | Eliminating the risk before it occurs |
| Mitigation | Reducing the damage caused if this risk occurs |
| Acceptance | Accepting the risk if it occurs |

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| **Probability Level** | **Range** |
| High | Greater than 50% |
| Significant | 30-50% chance |
| Moderate | 10-29% chance |
| Low | Less than 10% chance |

## Keywords:

Network, Networking, Network Management, Network Configuration, Network Monitoring, Python, Software Defined Networking, Network Security, Routing, Switching, IP Addressing, GNS3, Cisco, Wireshark