

**Status Report**

Network Performance Evaluation of Linux Based Operating Systems in a Physical Environment

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# Version Control

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| **Date** | **Version** | **Author** | **Note** |
| 25/05/2025 | 0.1 | Win Phyo | Initial document creation. |
| 26/05/2025 | 1.0 | Larissa and Win | Inserted appropriate headers, tables, and formatting the document. |
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# Executive summary

# Project Brief

# Project Overview

project objectives, scope, approach, major milestones, and deliverables

Objectives

The goal of this project is to evaluate the performance of 3 latest Linux based Operating Systems distributions – Fedora, Ubuntu, Kali Linux. These operating systems need to be configured as software routers before running the evaluations. Tools such as D-ITG or iPerf are to be employed to generate the evaluation traffics.

Objectives to be achieved include:

* Setup a network with 4 computers, 2 clients and 2 servers (servers configured as routers)
* Use TCP and UDP as transmission protocols.
  + Evaluate on IPv4
  + Evaluate on IPv6
* Performance evaluation:
  + Each evaluation should run a minimum of ten times.
    - Evaluate for throughputs, any delays, jitter, and any packet loss.
  + Any evaluation that falls outside the 95% confidence interval needs to be re-run
* Each evaluation will range from a minimum of 128 through to 1536 Bytes to assess performance under different conditions.
* Set up physical machines with Fedora, Ubuntu, and Kali Linux distributions configured as software routers.
* Conduct performance evaluations to evaluate network throughput, delay, jitters, and packet loss for TCP and UDP transmissions on IPv4 and IPv6 protocols.
* Follow the Software Testing Life Cycle (STLC) methodology for systematically evaluating phases and activities including requirement analysis, test planning, test case development, test environment setup, test execution and test closure.

# Proposal Feedback / Recommendations

The team has carefully considered and appropriately addressed the feedback and recommendations received during our proposal presentation. Team members were assigned in pairs to work on refining the original proposals by implementing the changes for improvement. The completion work of assigned tasks was later peer-reviewed within the team to ensure the work meets the high standards of quality, accuracy and credibility following the quality assurance plan.

The following table shows the list of feedback and recommendations our team has received for the proposal.

|  |  |
| --- | --- |
| **Category** | **Feedback / Recommendation** |
| Phases (STLC) | Accurate naming of the phases according to STLC methodology |
| Work Breakdown Structure (WBS) | Show iteration between the phases for evaluation on different Linux Distros |
| Terms of Reference | Combine into one paragraph covering objective, problem, methodology, and timeline. |
| Risk Assessment | Human aspects including working relationships, loss of interest, suitability of results such as accuracy, consistency, etc., need to be considered. |
| Feasibility | Must provide the document which shows the quality assurance of the project feasibility |
| QA & Methodology | Could be clearer on how the QA plan will fit in |
| Project Schedule | Define tasks clearly for each phase; begin technical work early to reduce risk. |
| Project Scope | Be more specific about test details; correct any incorrect “out-of-scope” items. |
| Proofreading | Address typographical and grammatical errors throughout the proposal. |

# Proposal Improvement

The following table below shows the changes implemented based on the feedback and recommendations for our proposal document.

|  |  |  |
| --- | --- | --- |
| **Original Proposal** | **Revised Proposal** | **Reason for changes** |
| *Scope Statement*:  Functional Requirements  **R7.** Generate network traffic using D-ITG or iPerf  **R11.** Record throughput performance across all evaluation scenarios  **R12.** All evaluations must be run 10 times each with all evaluations at 95% confidence  **R13.** Measure network delays in all evaluation configurations  **R14.** Calculate jitter values throughout evaluations  **R15.** Track packet loss rates for all evaluation cases  **R16.** Log all evaluations | **R7.** Generate network traffic using D-ITG  **R11.** Record performance across all test scenarios for delay, jitter, throughput and packet loss  **R12.** Log all evaluations in Excel spreadsheet  **R13.** Generate visual graphs which shows average performance metrics for all packet sizes | Improved Functional requirements and removed repetitive functional requirements |
| Non-Functional requirements | **R12**. Clock across all 4 computers must be synchronised  **R13.** Finding the optimal value for packet rate  **R14.** To keep each run 10 seconds | Added relevant non-functional requirements |
| Out of Scope  **R3**. Comparison data must allow for direct analysis between operating systems  **R15**. Addressing performance issues identified during evaluation  **R17**. Troubleshooting underlying hardware issues | The 3 requirements shown on left hand side has been removed. | Removed irrelevant out of scopes |
| *Project Scope*  Each configuration will undergo 10 evaluation runs to ensure statistical validity, with additional runs conducted for any results falling outside the 95% confidence interval. | The evaluation runs involve the sender to initiate the packet sending in specified network topology to receiver. Each evaluation runs use DITG to generate traffic for 10 seconds with different packet rates and logs will be decoded to export the average performance metrics. | Added more specific details on each evaluation testing |
| Project Phases:  Requirement Analysis, Evaluation Planning, Evaluation Case Development, Evaluation Environment Setup, Evaluation Execution, Evaluation Closure. | Requirement Analysis, Test Planning, Test Case Development, Test Environment Setup, Test Execution, Test Closure. | All project phase names have been reverted to their original terminology from the STLC framework for clarity and consistency. |
| *QA/QC plan can be clearer on how it integrates with the methodology* | QA/QC Walkthrough Procedures by Project Phase table has been modified to relate back to project management methodology along with the project phases link to the QA is well | Comments based on proposal review indicated the QA plan didn't link strongly to STLC |
| High Level Work Breakdown Structure (WBS) shows the 6 phases along with the milestones. | Modified to show high level WBS that |  |
| Gantt Chart |  |  |
| Original project feasibility section did not have references to quality assurance. | To ensure the project remains feasible throughout its lifecycle, we apply structured quality assurance measures. For full details, please refer to the Quality Assurance Plan in Appendix T. This includes:  - Tool validation to confirm D-ITG work across all Linux systems.  - Structured upskilling to ensure team is prepared.  - Peer-reviewed configurations to reduce errors and ensure consistency.  - Requiring all results to meet the 95% confidence interval with re-tests for all outliers.  The QA plan has also been updated to reflect this, please refer to Appendix (**ENTER HERE)** for the full plan. | Feedback from proposal emphasised the need for quality assurance of the project feasibility. |
| QA Plan  Section 6.0  evaluation case template, router configuration checklist, evaluation log template, bug report form, peer review checklist | Router configuration checklist, evaluation log template, peer review checklist. | Evaluation Case template and Bug Report form were removed from the QA Plan to avoid duplication. Evaluation procedures are detailed in the Requirement Traceability Matrix and project phases, while all issues will be logged into the Issue Log. |

# Project Status

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| --- | --- | --- | --- |
| Tasks/ Milestones | Planned Completion | Actual Status | Explanation |
| Project Proposal | 11/04/25 | Completed on Time | Proposal was successfully submitted by scheduled date. The project's objectives, methodology and scope were clearly outlined. |
| Installation of OS and Testing Tools (iPerf, D-ITG) |  | Completed | Virtual machines were set up and all three Linux operating systems were installed to assess performance. |
| Initial iPerf Testing on Ubuntu (IPv4) |  | Completed | iPerf for TCP and UDP under IPv4 was used to do sample test runs on Ubuntu. |
| Setting up and configuring the test environment |  | Completed | To begin testing, test environments were set up, updated, and connected to the internet. |
| Begin IPv4 Testing |  |  |  |
| Mid-Sem Review |  |  |  |

# Team Contribution & Skills learnt

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| --- | --- | --- |
| **Team Members** | **Tasks Completed** | **Skills learnt** |
| Thomas Robinson |  |  |
| Win Phyo | * Team contract * Scope statement * WBS * Meeting minutes * Proposal presentation slides * Scripting * IPv4 TCP Ubuntu running evaluations | * Bash scripting |
| Nathan Quai Hoi | * Stakeholder Register * Stakeholder Management Plan * Network Diagram * Gantt Chart * Multiple Contributions to Proposal Document * Configuration of PCs/Routers * Data Analysis of the D-ITG data (On Excel) | * Hardware / Configuration Ubuntu Router * Bash scripting to automate runs * Initial Project Management Skills * Excel formula knowledge to help automate calculations |
| Zafar Azad | * Issue log v1 * Risk register v1 * Methodology comparison * Methodology breakdown * Project Phases * Octave graphing * Ipv6 digt script | * Ipv6 digt scripting * Hardware setup ubuntu * Octave |
| Larissa Goh | * Risk Register v1 & v2 * Issue Log v1 & v2 * Quality Assurance Plan v1 & v2 * Milestone Report v1 * Labour Breakdown * Meeting Minutes (enter which ones later) | * Bash scripting * Matlab * Linux Familiarity |
| Charmi Patel | * Communication Plan V1 * Estimated Cost breakdown * Proposal Presentation slides * Conflict Resolution Plan * Project Status |  |
| Kylie Afable | * Proposal Presentation Slides * Project Feasibility * Meeting Minutes |  |

# Recommendation on Team Performance Improvement

The following list shows the recommendations for improving our team performance and maintaining consistent collaboration with open and respectful communication.

* Encourage team members to be more active and engaging in our online discord server to enhance communication and improve collaboration.
* Improved work allocation to allow equal sharing of workload
* Encourage team members to take initiative in doing tasks or ask what needs to be done.
* Encourage team members to provide updates on tasks they have been assigned so that everyone knows what is being done and can assist if needed.

# Summary of client and mentor meetings

During our first phase, our team planned to have regular weekly meetings with the client and mentor. We transitioned to fortnightly meetings from the second phase onwards. In total, we conducted 6 meetings with the client and mentor with the total duration of 6 hours. This is slightly less than expected as our kick-off meeting in week 2 was pushed to week 3, as the time scheduled conflicted with our workshop 1. To reflect upon our time schedule for meetings with the client, our team plans to schedule meetings in advanced, and …