

School of Information Technology

|  |  |
| --- | --- |
| [Address Line 1]  [Address Line 2]  New Zealand | Tel: +64 4 1234567  Fax: +64 4 1234567  name@whitecliffe.ac.nz |

Project Title

Analysis and Design Report

The Student Name

Academic Supervisor : John Doe

Industry Supervisor : Mark Smith

Submitted in partial fulfilment of the requirements for the course

IT7745 IT PROJECT

April 17, 2023

# Table of Contents

This table of content is generated automatically with the headings you use in the document. If the student uses this file, the table of contents below can be updated by right-clicking on the table and select “Update Field” option. If headings were changed, the option “Update entire table” should be chosen. Else, select “Update page numbers only” to update the changed page numbers.

[Table of Contents 2](#_Toc164331679)

[Chapter 1: Introduction 3](#_Toc164331680)

[1.1 Problem Description 3](#_Toc164331681)

[1.2 Existing Challenges 3](#_Toc164331682)

[1.3 Research Objectives 3](#_Toc164331683)

[Chapter 2: Literature Review 4](#_Toc164331684)

[2.1 Background 4](#_Toc164331685)

[3.2 Related Work 4](#_Toc164331686)

[2.3 Chapter Summary 4](#_Toc164331687)

[Chapter 3: Requirement Analysis 5](#_Toc164331688)

[3.1 Methodology 5](#_Toc164331689)

[3.2 Requirement Determination 5](#_Toc164331690)

[3.3 Use Case Analysis 5](#_Toc164331691)

[3.4 Sequence Diagram 6](#_Toc164331692)

[3.5 Chapter Summary 6](#_Toc164331693)

[Chapter 4: System Design 7](#_Toc164331694)

[4.1 System Architecture Design 7](#_Toc164331695)

[4.1.1 Nonfunctional Requirements Refinement 7](#_Toc164331696)

[4.1.2 Architectural Components 8](#_Toc164331697)

[4.2 Proposed Solution Design 8](#_Toc164331698)

[4.3 User Interface Design 8](#_Toc164331699)

[4.4 Database Design 8](#_Toc164331700)

[4.4.1 Database Schema 9](#_Toc164331701)

[4.4.2 Normalization 9](#_Toc164331702)

[4.4.3 Data Security and Integrity 9](#_Toc164331703)

[4.3 Logical Network Design 9](#_Toc164331704)

[4.4 Physical Network Design 9](#_Toc164331705)

[4.5 Chapter Summary 10](#_Toc164331706)

[Chapter 5: Agile Project Management 11](#_Toc164331707)

[5.1 Project Sprints 11](#_Toc164331708)

[5.2 Milestones 11](#_Toc164331709)

[5.3 Risk Management 11](#_Toc164331710)

[5.4 Chapter Summary 12](#_Toc164331711)

[Chapter 6: Conclusion 13](#_Toc164331712)

[References 14](#_Toc164331713)

# Chapter 1: Introduction

At the beginning of each chapter, an overview of the chapter's content is presented, providing a glimpse of what will be covered.

To maintain a smooth flow of content and ensure the report's cohesiveness, the final paragraph establishes a connection to the subsequent chapter. This linkage serves to enhance the overall connectivity of the report, facilitating a seamless transition from one section to another and contributing to a well-structured and engaging document.

## 1.1 Problem Description

Provide a clear description of the problem that your research aims to address. Clearly articulate what the problem is and why it is important to investigate. This section should succinctly introduce the main focus of your study.

Justify the significance of the problem. Explain why it is important to address this particular issue within the field of IT. You can discuss its relevance in practical applications, its impact on technology or society, or any other relevant factors that emphasize the importance of solving this problem.

## 1.2 Existing Challenges

Describe the existing challenges associated with solving the identified problem. Highlight any obstacles, limitations, or gaps in current approaches or technologies that hinder effective solutions. This section should provide context for the difficulties faced in addressing the problem.

## 1.3 Research Objectives

Detail the specific research objectives that you aim to achieve through your study. Outline the goals and aims of your research project, specifying what you intend to accomplish or investigate. This section should clearly define the scope and purpose of your research endeavors. In a common approach, research objectives are presented in the form of a bulleted list or an ordered list. Then, for each objective, there should be a paragraph discussing and explaining it to the reader. That paragraph may also discuss potential approaches to address the issues raised within the research objective.

# Chapter 2: Literature Review

The Literature Review chapter provides a comprehensive overview and analysis of existing research and literature relevant to the chosen topic of the thesis.

At the beginning of each chapter, an overview of the chapter's content is presented, providing a glimpse of what will be covered.

The chapter should contain two sections: background knowledge and related works.

All the content should come with critical analysis: the literature review should not merely summarize the findings of previous studies but critically analyses and evaluates the strengths, weaknesses, methodologies, and contributions of the existing literature. Identify gaps, inconsistencies, or controversies in the literature that the research aims to address.

## 2.1 Background

The “**Background**” section provides fundamental information on the research topic, proves its significance within the field of IT and highlights the necessity of the project.

The development process used for the project should also be discussed here. For software-related projects, the System Development Life Cycle (SDLC) should be used. In the case of networking-related projects, the Cisco PPDIOO methodology should be used instead.

## 3.2 Related Work

The “**Related Work**” section should conduct a thorough search of relevant academic databases, libraries, and other reputable sources to identify existing scholarly literature related to the research topic. The literature review should cover a broad range of relevant studies, theories, models, and concepts to ensure a comprehensive understanding of the subject matter.

## 2.3 Chapter Summary

The final section of the chapter, “**Chapter Summary**”, summarizes what discussed in the chapter and connect to the next chapter.

# Chapter 3: Requirement Analysis

The Requirement Analysis chapter identifies, analyzes, and documents the requirements of an IT solution. It helps in understanding the needs and expectations of stakeholders and forms the basis for the subsequent stages of system design and development.

At the beginning of each chapter, an overview of the chapter's content is presented, providing a glimpse of what will be covered.

This chapter should be organized into sections.

## 3.1 Methodology

The first section, “Methodology”, should explain the available methodologies or approaches for requirement analysis (e.g., interviews, JAD sessions, questionnaires, document analysis, observations, …). Then, it select one of the for the project. After that, it justifies the chosen methodologies and discuss any limitations or constraints.

## 3.2 Requirement Determination

The second section, “Requirement Determination” describes what happened in the data collection process within each selected methodology or technique. Then, it should deliver a *requirements definition*, which includes **functional requirements** and **non-functional requirements**. An example of this *requirements definition* can be found at Fig. 3-13, page 138, “System Analysis and Design” book.

A detailed discussion of obtained functional requirements and non-functional requirements needs to be provided after that.

## 3.3 Use Case Analysis

The third section, “**Use Case Analysis**”, explains and documents the interaction that is required between the user and the system to accomplish the user’s task. Use cases are created

to help the development team understand more fully the steps that are involved in accomplishing the user’s goals. Once created, use cases often can be used to derive more detailed functional requirements for the new system.

The steps to build a use case can be found in Fig. 4-5, page 157, “System Analysis and Design” book.

A sample use case can be found at Fig. 4-1, page 151, “System Analysis and Design” book. Fig. 4-3 provides another sample.

After presenting all use cases, a **chain of use cases diagram** should be delivered to provide an overview of the system we need to build. Samples for it can be found at Fig. 4-2, page 154, and Fig. 4-8, page 161.

Several other samples can be found in Chapter 4, “System Analysis and Design” book.

## 3.4 Sequence Diagram

For software and web-based projects, you can use sequence diagrams to illustrate how different objects in the system will interact to complete specific operations.

For networking projects, sequence diagrams can illustrate the sequence of messages flowing between different network entities, or the sequence of events when data packets are transmitted from one node to another, how routing decisions are made, or how other network operations are conducted.

## 3.5 Chapter Summary

The final section of the chapter, “**Chapter Summary**”, summarizes what discussed in the chapter and connect to the next chapter.

# Chapter 4: System Design

The System Design chapter focuses on proposing and documenting the design of an IT solution or software system that addresses the identified requirements.

At the beginning of each chapter, an overview of the chapter's content is presented, providing a glimpse of what will be covered.

Again, the chapter should be organized into sections.

This template provides two versions of sections 4.3 and 4.4. Depending on the specialization of your project, you should utilize only one of these two versions. For software and web-based projects, utilize **4.3 User Interface Design** and **4.4 Database Design**. Alternatively, for networking projects, use **4.3 Logical Network Design** and **4.4 Physical Network Design**. Should you require clarification or discussion regarding your specific project, please reach out to the course lecturer.

## 4.1 System Architecture Design

System architecture design defines the high-level structure and organization of the system, identifies the major components, their responsibilities, and how they interact with each other. It also considers factors such as scalability, reliability, and security.

The nonfunctional requirements developed early in the Analysis phase (Chapter 3) play a key role in architecture design. These requirements should be reexamined and refined into more detailed requirements that influence the system’s architecture.

Begin this section with an overview of the architecture design, outlining its purpose and significance in the context of the project. Explain how architecture serves as the foundation for the development and implementation of the project, providing a blueprint for its structure, behavior, and interactions.

You should refer to Chapter 8 – Architecture Design, System Analysis and Design book, page 281 for more information about architecture design.

### 4.1.1 Nonfunctional Requirements Refinement

The first step is to refine the nonfunctional requirements into more detailed requirements that are then employed to help select the architecture to be used (server-based, client-based, or client–server) and the software components to be placed on each device. In a client–server architecture, one also has to decide whether to use a two-tier, three-tier, or n-tier architecture. Then the nonfunctional requirements and the architecture design are used to develop the hardware and software specification.

There are four primary types of nonfunctional requirements that can be important in designing the architecture: operational requirements, performance requirements, security requirements, and cultural and political requirements. Your report should discuss how the nonfunctional requirements are refined to these new requirements and describes the results of that process.

### 4.1.2 Architectural Components

Identify and describe the key architectural components of the system or network, including:

* For software and web-based projects: Application layer, presentation layer, business logic layer, data access layer, and data storage layer. Discuss the responsibilities and interactions of each component within the architecture.
* For networking projects: Network layers, network services, network protocols, and network devices (routers, switches, firewalls, etc.). Explain how these components collaborate to facilitate communication and data transfer within the network.

## 4.2 Proposed Solution Design

The second section, “**Proposed** **Solution Design**”, provides an overall design of the proposed solution.

*Class diagrams* are used to depict the structure and relationships among the classes or objects in a system.

In a more physical approach, the *Component diagram* describes the organization and wiring of the physical components in a system. Component diagrams are often drawn to help model implementation details and double-check that every aspect of the system's required functions is covered by planned development.

It is a best practice to include both above diagrams into your report.

Then, detailed designs for each component or module of the system are provided. Specify the functionalities, data structures, algorithms, and interactions of each component. Use appropriate modelling techniques or diagrams, such as UML diagrams or flowcharts, to illustrate the component design.

## 4.3 User Interface Design

The third section, “**User Interface Design**”, replicates the UX design process the student studied in some previous courses such as “Web Concepts”. How the whole process was done in the project should be discussed and clarified. User analysis, user personas, customer journey map, competitive analysis may be included. The final products this section needs to deliver are wireframes and prototypes.

## 4.4 Database Design

Begin with an introduction to emphasize the crucial role of database design in software and web application development. Describe how databases serve as the backbone for storing and managing data, essential for the functionality and efficiency of web and software applications.

Specify the choice of database management system (DBMS), such as MySQL, PostgreSQL, or MongoDB, and justify its selection based on project requirements. Discuss the features and capabilities of the chosen DBMS and how they align with project needs.

Include any references to textbooks, articles, or documentation consulted during the database design phase.

Ensure that the Database Design section provides sufficient detail to understand the structure, functionality, and rationale behind the database design decisions made for the project.

### 4.4.1 Database Schema

Present the logical structure of the database using Entity-Relationship Diagrams (ERDs) or similar modeling techniques, including tables/entities, their attributes, primary and foreign keys, and relationships between them.

### 4.4.2 Normalization

Explain the process of normalization and justify the normalization levels used in the database schema. Discuss how normalization helps in minimizing redundancy and improving data integrity.

### 4.4.3 Data Security and Integrity

Address data security measures such as access control, encryption, and data backup strategies.

Discuss mechanisms for ensuring data integrity, such as constraints, triggers, and transactions.

## 4.3 Logical Network Design

Begin by providing an overview of the project's network requirements and objectives. Describe the scope of the network design, including the size and complexity of the network, its intended use, and any specific performance or security requirements.

Next, outline the logical topology of the network, including the arrangement of network components such as routers, switches, and servers. Use diagrams or visual aids to illustrate the logical layout of the network, emphasizing the flow of data and communication paths between devices.

Detail the addressing scheme for the network, including IP addressing for both IPv4 and IPv6 if applicable. Specify the allocation of IP address ranges for different network segments, subnets, and devices, ensuring scalability and efficient utilization of addressing space.

Discuss the logical connectivity requirements, including the types of connections between network devices, such as point-to-point links, Ethernet connections, or wireless connections. Address network redundancy and resilience mechanisms, such as redundant links, link aggregation, and spanning tree protocols, to ensure high availability and fault tolerance.

Explain the logical security measures implemented in the network design, including access control policies, encryption methods, and intrusion detection/prevention mechanisms. Consider network segmentation and VLANs to isolate traffic and enhance security posture.

## 4.4 Physical Network Design

Start by translating the logical design into a physical implementation plan. Describe the physical layout of network components, including their placement, cabling infrastructure, and equipment rack configurations.

Specify the hardware requirements for network devices, such as routers, switches, firewalls, and access points, considering factors like performance, scalability, and compatibility with existing infrastructure. Address power and cooling requirements for network equipment, ensuring proper environmental conditions for optimal operation.

Discuss the selection of network cables and connectors, considering factors like transmission speed, distance limitations, and environmental conditions. Detail the routing of network cables, including cable pathways, termination points, and cable management techniques to ensure organization and accessibility.

Describe the implementation of network security measures at the physical layer, such as physical access controls, surveillance cameras, and environmental monitoring systems. Address considerations for disaster recovery and business continuity, including redundant power supplies, backup generators, and off-site storage facilities.

## 4.5 Chapter Summary

The final section of the chapter, “Chapter Summary”, summarizes what discussed in the chapter and link to the next chapter.

# Chapter 5: Agile Project Management

The goal of the "Agile Project Management" chapter is to provide a comprehensive overview of how Agile methodologies are applied to manage your project. If you are not very familiar with Agile, the book “*The Mini Book of Agile*”, which can be found here https://learning.oreilly.com/library/view/the-mini-book/9781803238715/, will give you an idea about it.

Start with a brief overview of Agile Project Management and its importance in modern project execution. Explain how Agile methodologies differ from traditional project management approaches.

Then come the sections of the chapter. These sections outline specific details of how your project will be managed using Agile methodologies.

## 5.1 Project Sprints

Define the project's work intervals known as "sprints." Explain that sprints are time-boxed periods during which specific tasks are completed.

Outline the duration of each sprint, typically ranging from one to four weeks, and explain how tasks are prioritized and allocated within sprints.

Provide details on what will be accomplished in each sprint. This could include deliverables, features, or functionalities to be developed.

## 5.2 Milestones

Identify key stages of the project or significant achievements, known as milestones. These milestones help track progress and ensure alignment with project goals.

Describe each milestone and its significance in the project timeline. Milestones could include completion of major deliverables, testing phases, or stakeholder reviews.

## 5.3 Risk Management

Discuss potential risks that may impact the project's success. Risks could include technical challenges, resource constraints, or external factors.

Outline strategies for identifying, assessing, and mitigating risks throughout the project lifecycle.

Provide specific examples of risk mitigation strategies tailored to the project's context. These could include contingency plans, risk transfer, or risk acceptance.

Emphasize the importance of ongoing risk monitoring and communication among project stakeholders.

## 5.4 Chapter Summary

Summarize the key points discussed in the Agile Project Management chapter. Reinforce the benefits of Agile methodologies in promoting flexibility, adaptability, and collaboration in project execution.

# Chapter 6: Conclusion

This chapter does not need to be divided into sections. All topics can be organized in the form of paragraphs. Two main topics that should be covered in this chapter are:

* **Summary**: Recap the the tasks you have done for this report, your approach, and the results you obtained.
* **Challenges and limitations**: Discuss issues you faced in the project, and how you addressed them. You can refer your project plan in the proposal to see how your progress matches your plan. Please do not adjust the plan to make everything perfect. We do not expect perfectness here, but to have a precise view of what happened and look for improvements in the future.

# References

Citations play a crucial role in academic writing, including in your report. It is expected that you have a lot of citations in your report, especially in the Introduction and Literature Review chapters. Usually, citations are used when you include an idea that is not originally yours and you took it from another source.

Citations provide evidence for the claims and arguments presented in your report. They demonstrate that your ideas are grounded in existing research and literature, adding credibility to your work. Additionally, citations acknowledge the work of other researchers and authors whose ideas and findings you have used in your report. This is essential for academic integrity and avoiding plagiarism.

The purpose of this section is to provide a **list of references** that have been cited in the report. Instead of manually inputting the references, students can utilize the reference management tool in Microsoft Word or third-party tools like Zotero or EndNote. These tool will help generate the reference list automatically and manage it in an easier and more systemic way.

References should be in APA or IEEE format. Please use only one format type in your document.

To learn more about working with these tools, refer to the links provided below:

* For Zotero: <https://www.youtube.com/watch?v=wIWIy1CF874>
* For Microsoft Word built-in tool: <https://www.youtube.com/watch?v=N2yWk0Dlpt4>
* For EndNote: <https://www.youtube.com/watch?v=wYbyCfkNOdM>