

# CSCI3100: Software Engineering

## Project Requirements Specification

April 16, 2025

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## 1 Document Revision History

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Version	Revised By	Revision Date	Comments
0.1	CSCI3100 instructors	21 Jan 2025	Initial draft
0.2	CSCI3100 instructors	5 Feb 2025	Updated: - Deadline of SC2 Added: - Definition of “global database” - Definition of “licence management”

Version	Revised By	Revision Date	Comments
0.3	CSCI3100 instructors	4 Mar 2025	Updated deadline of SC3
0.4	CSCI3100 instructors	16 Apr 2025	Updated deadline of SC4, SC5, and SC6, and Documentation

## 2 Introduction

The course project aims to apply concepts from CSCI3100 Software Engineering by specifying, designing, implementing, testing, and documenting a typical software project, such as a web-based application or game. This means that having a user account alone is not sufficient for the user. Licence keys must be provided in order to fully enjoy using the system or accessing specific features. It enhances understanding of software engineering and develops essential skills in teamwork and project management.

The project includes two components: (1) documentation, detailing the design and testing processes, to be submitted progressively, and (2) software production, covering specification, design, coding, and demonstration. Documentation and implementation should be managed via a GitHub repository. A demo day at the end of the term will allow for product presentation, with complete code submitted afterward.

## 3 Scope

### 3.1 Definitions, Acronyms, and Abbreviations

(nil)

### 3.2 Project Overview

The evil-minded lecturer Kei Kaiju is seeking a software system to aid in his quest for world domination. This system must include a user interface accessible to users, which can be web-based, a desktop application, or a mobile application. There will be various interactions between the system and the user, with feedback provided through multiple channels. Any functional system that meets these requirements could contribute to Kei's nefarious plans.

### 3.3 Document Overview

This Project Requirements Specification document defines the complete requirements for the CSCI3100 course project. It outlines the scope and requirements of the project, serving as a guide for the students to understand what needs to be done and as a look-alike reference for writing the software requirements specification.

## 4 Document Conventions

## 5 Referenced Documents

Reference No.	Reference	Date	Published By	Source
Ref1	ISO/IEC/IEEE 29148:2018(E2) Systems and software engineering — Life cycle processes — Requirements engineering	2018	IEEE	<a href="#">IEEE website</a>

## 6 Assumptions and Dependencies

Assumption No.	Title	Description
A1	Project scale	Undergraduate project level
A2	Student Attitude	All students are good and eager to learn

## 7 Requirements

### 7.1 Completing the Software Development Process

It is required for every team to complete the software development process in its entirety. Proof of work must include:

1. Documentation (including the documented code).
2. The software system.
3. A journaled, auditable software development process.

Each team can adopt their own software development methodology, whether it be waterfall or any process implementing the Agile mindset. The following phases exist regardless of the chosen methodology.

### **7.1.1 Requirements Specification**

The requirements specification document must include all necessary information identified, such as requirements, features, assumptions, use cases, and a high-level overview of the system architecture at the time of submission. This information should be agreed upon by both users and developers. The document should be written in the recommended Software Requirements Specification format.

### **7.1.2 Design and Implementation**

The software system should be designed before coding. All design and implementation considerations must be documented in code and/or in a standalone developer-oriented document where appropriate. While UML diagrams are not strictly required, they are extremely useful for clearer explanations and will enhance the reader's understanding. The design and implementation document should include the key components of the software system.

### **7.1.3 Testing**

Testing is crucial. Regardless of whether test-driven development or a regular code-test cycle is adopted, testing must not be skipped. A document describing the testing process and strategies should include the following parts:

1. A test plan created during the development process for current and future developers.
2. Representative test cases.

The test plan should list components that were covered and those that were not in the testing process. Additionally, the document should detail some representative test cases designed to evaluate the key functionalities of the system, including the rationale behind their design and the testing approach used.

#### 7.1.4 Delivery

At this phase, coding should be frozen for a software release. Decisions regarding the inclusion or exclusion of certain features must be based on factors such as the completeness of those features and the extent of testing conducted. These decisions will be reflected in the release notes. User manuals, which should be developed concurrently with coding, should be finalized at this stage. Consistency between the user manuals and the product's visible behaviours must be ensured.

Additionally, the source control system must maintain a record of which versions of source files have been released.

### 7.2 Software Requirements

#### 7.2.1 Global Database

The system must employ either an SQL database (e.g., MySQL, SQLite) or a NoSQL database (e.g., MongoDB, Redis) for data storage.

The database must be “global,” meaning that all data from every part of the system should be stored within a single database. In other words, either a centralized or distributed database system can be utilized, provided that there is only one database managing all data across your software components. For example, if SQLite is used, “global” means that there cannot be more than one SQLite database file. All data must be contained within a single SQLite database file to maintain a unified system.

A homebrew database system (one that you code yourself) is permitted as long as it can perform the basic actions of SELECT, INSERT, UPDATE, and DELETE on the data. In this case, the database query method can be fully customised to meet the specific needs of the system (e.g. no query language is needed at all). Some of the [ACID](#) properties of the homebrew database system may be skipped if deemed reasonable.

#### 7.2.2 User Interface

The system should have a clear graphical or text user interface design. The UI must be consistent and easy to understand, allowing users to operate the system without assistance from developers.

#### 7.2.3 User Management

The system should have basic user management functionalities. Specifically, it must allow users to sign up, log in or log out.

#### **7.2.4 Licence Management**

The system should have basic licence management functionalities. It must allow users to use the software only if they can provide a valid licence key or licence key-file.

A licence key is a string, formatted like AAAA-BBBB-CCCC-DDDD, that users enter into the system to confirm their right to use the software or access specific features. A licence key file contains one or more licence keys, allowing the user to specify the file instead of typing all the keys. Possible licensing schemes include a single licence key for the entire system, a separate licence key for individual features, or a licence key that is valid for a specific subscription period (such as those used for services like Nxxflxx).

This means that having a user account alone is not sufficient for the user. Licence keys must be provided in order to fully enjoy using the system or accessing specific features.

#### **7.2.5 Application-Specific Functionalities Stated in the Software Requirements Specification**

The system must incorporate the functionalities outlined in the Software Requirements Specification to be submitted and perform as described in the documentation. For a group of  $n$  members,  $n - 1$  externally observable features are expected. These  $n - 1$  features are implementations of the intended functionalities of the system in addition to the basic functions of Global Database, User Interface, User Management, and Licence Management.

#### **7.2.6 Operating System and Environment**

The system must be able to run on Linux, Windows, or Android released within 5 years. For web-based applications, it must support major decent browsers, including Firefox and Chrome. The users must be able to install and set up the system without much effort.

#### **7.2.7 Code**

Code should be well documented, organized, and versioned.

#### **7.2.8 Hardware**

For web-based or desktop applications, the system must run on hardware with a quad-core x86\_64 CPU at 2GHz and 8GB of RAM. For Android applications, the requirements are a quad-core ARM CPU at 2GHz and 2GB of RAM. No advanced or dedicated GPU is required.

## 7.3 Documents

### 7.3.1 Font, Font Size, and Styles

The document must use Times New Roman, size 11 throughout.

### 7.3.2 Cover Page

The cover page must contain the following information:

- Name of the document
- Project title (you may freely name your own project)
- Document version number and revision history
- Printing date
- Group ID
- Names and SIDs of group members
- Department

### 7.3.3 Requirements Specification

The main body of the design document should not exceed 10 pages. The filename should be “Group\*\*\_Requirements\_Specification”, where \*\* is the group ID. Marks will be deducted if the format requirements are not met.

### 7.3.4 Design and Implementation

This document serves as a developer guide. The main body of the design document should not exceed 20 pages. The filename should be “Group\*\*\_Design\_Implementation”, where \*\* is the group ID. Marks will be deducted if the format requirements are not met.

### 7.3.5 Testing

The main body of the document should not exceed 15 pages. The filename should be “Group\*\*\_Testing”, where \*\* is the group ID.

### 7.3.6 Release Notes and User Manual

The main body of the document should not exceed 5 pages. The filename should be “Group\*\*\_Release\_Notes\_User\_Manual”, where \*\* is the group ID.



## 7.4 Source control

All project materials (including source code, images, flash files, database files, documentation, etc.) must be maintained using GitHub. The development history on GitHub is crucial for evaluating the project's coding phases and development process. Version control systems should be utilized to support both the development and documentation of the software system. The project must be submitted via GitHub, and submissions through any other methods will not be accepted. Course instructors will review the version control logs when assessing the coding efforts.

## 7.5 Grouping

Each project group consists of three to five members for the duration of the project. All team members must collaborate closely on the same project based on the requirements outlined in this document. Please inform the instructors if you are unable to form a group.

## 7.6 Other requirements

### 7.6.1 No Plagiarism

When designing the system, the most important feature to keep in mind is that the software product developed should require a reasonable programming effort. Joint work on any technical aspects of the project between groups or teams is not allowed. Any issues regarding project requirements should be directed to the instructors via email, in-person discussions, or tutorial sessions. This policy is in place to enforce team separation for proper credit.

This project should be considered as if there is only one team—namely, your team—accountable for the entire development. Plagiarism in any aspect of the project is strictly prohibited. While reusing existing designs or code (such as from open-source projects) is allowed, clear attribution is required for any reused code. This means that any code not authored must be attributed at the beginning of each submitted file. Professional tools will be employed to verify the percentage of existing code in the project.

It is important to note that excessive reuse of existing code may result in a significant deduction of the project mark.

### 7.6.2 No Free-rider

Although the project grade is generally assigned to the entire team rather than individuals, each team member must understand that a significant portion of their final project grade depends on teamwork. Failures to cooperate with other team members and to contribute an

equitable amount of effort can lead to undesirable outcomes, particularly if other team members raise complaints about non-participating members. Cases of free-riding will be investigated on project demo day, where group members can report free-riders. The course instructors will verify the validity of the complaints with all team members.

## 7.7 List of Requirements

Requirement No.	Title	Description
R1	Completing the Software Development Process	
R1.1	Requirements Specification	A process that produces the requirements and a software requirements specification document
R1.2	Software Design and Implementation	Design, implementation, and documentation
R1.3	Testing	Practices of testing during development, along with a document describing such practices
R1.4	Delivery	User manual and release notes
R2	Functional Software System	A working system whose functionalities are consistent with the listed requirements and specifications
R3	Software Requirements	
R4	Documentation	
R5	Auditable Software Development Process	Meeting minutes, edits history, and issue tracking system logs that can serve as evidence of the development process
R6	Source control	Versioned code and documentation in GitHub
R7	Grouping	3-5 people
R8	No Plagiarism	
R9	No Free-rider	

(Some requirements are not expanded)

## 8 Schedule

Schedule No.	Phase Deliverables	Weighting	Duration	Due Date (23:59)
SC1	Team Formation			22 Jan 2025

Schedule No.	Phase Deliverables	Weighting	Duration	Due Date (23:59)
SC2	First Version of Requirements Specification	10%	2	10 Feb 2025
SC3	First Version of Design And Implementation	15%	4	11 Mar 2025
SC4	Final Version of Requirements Specification	5%	8	9 May 2025
	Final Version of Design And Implementation	10%	8	9 May 2025
SC5	Software System (Demo)	45%	1	12,13 May 2025
SC6	Testing Document	10%	8	9 May 2025
	Release Notes & User Manual	5%	8	9 May 2025
	Total	100%	15 weeks	

## 9 Grading Criteria

### 9.1 Documentation

Documentation will be graded based on the clarity. “Clarity” indicates whether the software can be recreated by following the documentation. Marks will be deducted if the format requirements are not met. Exceeding the page limit is acceptable if it is justifiable.

### 9.2 Software System

Grading Criteria No.	Functionality	Requirements	Points
GS1	Architecture, Design and Implementation		
GS1.1	Software Architecture	Scalable	4
GS1.2	Design and Implementation	Scalable	4
GS1.3	Consistency	Consistent with the Requirements Specification	4
GS1.4	Usability	Easy to use	2
GS2	Global Database		

Grading Criteria No.	Functionality	Requirements	Points
GS2.1	Database integration	A global database is integrated for certain purposes such as user management, licence management, and system configuration	4
GS3 GS3.1	User Interface Graphical or Text UI	An user interface for users to interact with the system	6
GS4 GS4.1	User Management Signup	Able to create new user profiles	2
GS4.2	Login and logout	Users can use the core functions only after login via login credentials	2
GS5 GS5.1	Licence Management Authorization by key or key-file	Allow the system to be used only when valid key or key-file is provided	4
GS6	Code Documentation	Useful to other developers	4
GS6 GS6.1	Application-specific Requirements Every one of the $n - 1$ application-specific features	Make the system complete	$\frac{9}{n-1}$

### 9.3 Auditable Software Development Process

Marks for the documentation and the software system will be deducted if the software development process is not properly recorded.

## 10 Submission Policies

### 10.1 Documentation

Project documents must be submitted alongside signed VeriGuide receipts, following the same submission process as homework. The policy for late submissions, including the VeriGuide receipt, is consistent with the homework policy. Detailed information regarding this policy will be available on the course website.

Furthermore, while the use of AI tools is permitted for this project, it is essential to explicitly cite or acknowledge these tools in the submissions to ensure transparency and maintain academic integrity.

### 10.2 Source Code

Instructions for submitting code to GitHub will be announced shortly.