# Assessment Project Final Report

## SEC-201: Data Privacy, Security, and Integrity

### Group Member

| | First Name | Last Name | Nickname | Email Address | Role |
|---|---|---|---|---|---|
| 1 | [First name] | [Last name] | [Nickname] | [Email] | [Role] |
| 2 | [First name] | [Last name] | [Nickname] | [Email] | [Role] |
| 3 | [First name] | [Last name] | [Nickname] | [Email] | [Role] |
| 4 | [First name] | [Last name] | [Nickname] | [Email] | [Role] |
| 5 | [First name] | [Last name] | [Nickname] | [Email] | [Role] |

## General Information of the Chosen System

**System Name:** [Put your chosen system's name here]

**System Description** (40 Point)**:**

Write a section (minimum of one paragraph) to describe the chosen system. This section must describe the high-level overview of the system functionality and architecture. At least this section must answer the following questions:

- What is the chosen information processing system?
- What are the main purposes and/or objectives, in term of functionality, that the chosen system should deliver?
- What are data objects being processed in the chosen system? Are they sensitive?
- What type of system architecture is being used by the chosen system? How many components distributed in the chosen system architecture?

A contextual diagram may be optionally included in this section to illustrate an overview of the system architecture.

## Project Development Information

**Use Case Scenarios** (30 Points):

Write a section to analyze use cases of the chosen system. This section must include at least 1 use case diagram to illustrate actors, use cases, and their relations. You may use the following questions as a guideline for defining use cases:

- How many stakeholders are considered as actors or users of the chosen system?
- How actors use the chosen system to achieve their goals or needs?
- Does the chosen system have some connections with external systems?

Then, this section must also include a collection of at least 3 use case scenarios. A use case scenario can be written in the following table as a template:

| | |
|---|---|
| **Name, Description** | Brief description of the process (what is happening) in the use case. |
| **Actors** | List all actors (people, systems, etc.) associated with this use case. |
| **Pre-Condition** | What must occur before the use case begins. |
| **Post-Condition** | What has occurred because of the use case. |

| | |
|---|---|
| **Main Success Path (Primary flow)** | Description of the sequence of activities in the most completed path or flow. The main flow is the most routine path from the pre- to the post-conditions. |
| **Actor Actions** | **System Responses** |
| 1. List the actor steps here | 1. List the system steps here |
| 2. ... | 2. ... |

| | | |
|---|---|---|
| **Alternative Path** | A1 | List the description here, and the less common sequences below that get the post-conditions. Include any triggers, and where the use case resumes after this flow. |
| **Actor Actions** | | **System Responses** |
| 1. List the actor steps here | | 1. List the system steps here |
| 2. ... | | 2. ... |

| | | |
|---|---|---|
| **Exception Path** | E1 | List the description here, and the sequence of actions that prevent getting to the post-conditions. Include any triggers. |
| **Actor Actions** | | **System Responses** |
| 1. List the actor steps here | | 1. List the system steps here |
| 2. ... | | 2. ... |

**Scenarios** (Insert additional rows for each scenario)

| Scenario | Post-Conditions | Flow |
|---|---|---|
| | | |

**Work Breakdown Structure** (30 Points):

Write a section to breakdown tasks to complete the implementation of the chosen system. This section must include a hierarchical list of tasks or activities that are required to conduct during the development process. An example of a work breakdown structure is shown below:

1. Conduct a kick-off meeting with related stakeholders to identify problems and use cases.
    1.1. Arrange a meeting date and time with stakeholders.
    1.2. Prepare questions to elicit business needs and problems.
    1.3. Analyze business needs and problems to define system requirements.
2. Prepare a first draft of technical specification of the chosen system.
3. ...

You may use the following questions as a guideline to create a work breakdown structure:

- What are typical processes for software development project? Requirements? Design? Development? Testing? Deployment? Operation?
- Do we have activities to create, develop, implement, or integrate outcomes (both final and intermediate results) of the project?
- Do we have tasks or activities that cover or mitigate security, privacy, and integrity concerns?

## System Development Information

---

**System Requirements** (40 Points):

Write a section to describe about technical system requirements of the chosen system. System requirements are statements of commitment that the development team promised to deliver to the stakeholders. System requirements are typically included with both functional and non-functional requirements. System requirements must be clear and detailed enough to serve as a checklist when accepting the implemented system. This section must include a list of functional requirements and a list of non-functional requirements, using the following template:

**Functional Requirements:**

- Example: The system shall authenticate users with their credentials, including username and password.
- ...

**Non-Functional Requirements:**

- Example: The system must handle up to 100 transactions per second to transfer data between components.
- ...

**System Architecture** (20 Points):

Write a section (minimum of one paragraph) to describe the architecture of the chosen system. This section must include an architectural diagram (e.g., a deployment diagram or a data flow diagram). The diagram is required to illustrate all system components and how they communicate for data transmission. The paragraph must adequately describe the diagram so that readers with no prior knowledge of the chosen system can easily understand it.

**Data Structure and Analysis** (30 Points):

Write a section (minimum of one paragraph) to describe about the data structure of the chosen system. This section must include (1) a list of data objects with their sensitivity, (2) a class diagram or an Entity-Relationship (ER) diagram, and (3) an example of data or an object diagram. The following template may be used to guide the writing of this section, but not limited to:

**List of Data Objects:**

| Name | Description | Sensitivity? | Personal? | Justification |
|---|---|---|---|---|
| Username | An account identifier that each user must have. | No | Yes | It can be used to uniquely identify a person. However, I don't think it is sensitive because its sole exposure would not harm the data owner. |
| ... | ... | ... | ... | ... |

**Class Diagram or Entity-Relationship Diagram:**

Insert a class diagram or an entity-relationship diagram to represent the data structure of the chosen system. You may refer to the syntax and semantics of class diagrams in the Class Diagram Tutorial, and of entity-relationship diagrams in the ER Diagram Tutorial. Afterwards, write a section (minimum of one paragraph) explaining the provided diagram to clearly depict the data structure.

**Examples of Data Objects or Object Diagram:**

Based on the data structure described in the previous section, provide examples of data objects that align with it. You may use a table to present examples or draw an object diagram to illustrate an instance of a data object. You may refer to the syntax and semantics of object diagrams in the Object Diagram Tutorial.

**Security, Privacy, and Integrity Protection Mechanisms** (50 Points):

Write a section (minimum of one paragraph) describing the data security, privacy, and integrity protection mechanisms used in the implementation of the chosen system. You may select techniques discussed during the lecture or other relevant methods. Each technique must be explained in your own words, with a clear description that allows readers with no prior knowledge of these concepts to understand them easily. You may also include figures or illustrations to enhance clarity.

**Source Code Implementation** (30 Points):

Write a section to describe each segment of the source code you implemented for the chosen system. The source code can be a simple Command-Line Interface (CLI) program demonstrating secure, privacy-preserved, and data integrity ensuring data manipulation and transmission. Each code segment must include a caption describing its purposes and how it functions.

**Example:**

```
import numpy as np
user_arr = np.array(["John1", "Smith007"])
```

This code segment shows an initialization of an array for usernames using the well-known NumPy package. This will store the array in the **`user_arr`** variable.

**Test Cases and Test Scenarios** (20 Points):

Write a section that describes at least five test cases, covering normal use cases, exceptional use cases, security use cases, privacy-preserving use cases, and data integrity use cases. This section must include all critical test cases that demonstrate that the chosen system functions properly and securely, providing sufficient evidence to convince readers of its reliability and safety.

The following table can be used as a template for each test case, but not limited to:

| | |
|---|---|
| **Test Case ID** | [Put a test case ID here, e.g., TC-001] |
| **Test Case Priority** | [Low/Medium/High] |
| **Module Name** | [Put the corresponding module in the source code implementation (or maybe a function name) here] |
| **Test Case Title, Description** | [Put the test case title and description here] |
| **Test Objectives** | [List all objectives of this test case in a bullet list format here, such as a data object must be sent as a ciphertext that is unreadable] |
| **Pre-conditions** | [List all pre-conditions that must be satisfied before executing this test case here] |
| **Post-conditions** | [List all post-conditions that must be satisfied or achieved after the test here] |
| **Invariants** | [List all invariants that must be always true throughout the process here] |
| **Test Steps or Procedures** | 1. [Step 1 goes here]<br>2. [Step 2 goes here]<br>  a. [Step 2.1 goes here]<br>  b. ...<br>3. [Step 3 goes here]<br>4. ... |

## Data Security, Privacy, and Integrity Report Documentation

**Data Security Analysis** (30 Points):

Write a section (minimum of one paragraph) analyzing the security protection of the implementation of the chosen system. This section must reflect your team's critical evaluation of the currently implemented security mechanisms, assessing whether they are sufficient or identifying areas for improvement to strengthen the overall security level. You may also discuss protections against specific types of security attacks and explain how existing mechanisms help prevent them. In addition, the analysis must address compliance with relevant security legislation to support and reinforce your evaluation.

**Data Privacy Analysis** (30 Points):

Write a section (minimum of one paragraph) analyzing the privacy preservation of the implementation of the chosen system. This section must reflect your team's critical evaluation of the currently implemented privacy mechanisms, assessing whether they are adequate to protect against re-identification or identifying areas for improvement to strengthen privacy preservation and ensure compliance with privacy legislation. You may also discuss protections against specific types of privacy attacks and suggest ways to mitigate them using the existing privacy mechanisms.

**Data Integrity Analysis** (30 Points):

Write a section (minimum of one paragraph) analyzing the data integrity of the implementation of the chosen system. This section must reflect your team's critical evaluation of the currently implemented integrity mechanisms, assessing whether the data in transit are secure and tamper-proof or identifying areas for improvement to ensure secure data transmission. You may also discuss protections against specific types of attacks that target data tampering and explain how they can be prevented using the existing mechanisms.