

# BRAC University Gate Entry System

Software Requirement Specification Document

Test Plan

Design Document

Code Documentation

Prepared By

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Submitted to

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# **Letter of Transmittal**

12 December, 2019

Professor Mohammad Zahidur Rahman  
Professor  
BRAC University

Subject: Proposed project paper submission

Dear Sir,

We would like to submit this document containing Software Requirement Specification Document, Test Plan, Design Document, Code Document.

This document is prepared in order to represent how we planed to implement the Gate Entry System for BRAC University.

This paper has been prapered under the guidelines of Professor Mohammad Zahidur Rahman. We hope that this document is comprehensive enough to achieve the Goals and Objectives. Lastly, we sincerely wish tha the report fulfil the relevant requirement and gets you acceptance.

Sincerely

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CSE 470

Section:1

Semester: Fall 2019

## Acknowledgement

We are thankful to our instructor of the course CSE 470. Professor Mohammad Zahidur Rahman guided us throughout the semester and helped to prepare the SRS, Test Plan, Design Document, Code Documentation correctly.

We would also like to express our gratitude to the instructors of the previous courses of the Department of Computer Science and Engineering. Previous knowledge that helped us to prepared this document by giving our best.

Lastly, we are thankful to each other to make a communicative and cooperative environment to prepare this document.

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# **Software Requirements Specification**

**for**

## **BRACU Gate Entry System**

**Version 1.0 approved**

**Prepared by**

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**December 8, 2019**

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# Revision History

Name	Date	Reason For Changes	Version

# 1. Introduction

## 1.1 Purpose

The purpose of this document is to make a proper documentation of the BRACU Gate entry system Software. This will present the detail information about the software. This document will explain the features of the system, how this system will work, how would the interfaces look like. This document will discuss about how the software will work practically. Also the constraints under which the software will operate.

This document is intended for both the stakeholders and the developers as a complete documentation and proposal for the project.

## 1.2 Document Conventions

This document follows the IEEE Software Requirement Specification template

## 1.3 Intended Audience and Reading Suggestions

This document here is for both the stakeholders and developers. This document contains all the information about the software. It has the requirements where it is discussed what this software is about to deliver. It contains user manual so that the user can understand how this software will work. All description about the codes, models and diagrams are included in this document to help them understand the system easily. This will help the developer team to improve the system easily in future.

## 1.4 Product Scope

This software system will be used as an automated gate entry system for BRAC University. The system has been designed to make the gate entry system in BRAC University easier, efficient and less time consuming.

This system is designed from the demand of making the gate entry system of BRAC University efficient. This system will make a relation between the students, faculty and staffs with the guards and the supervisor where the entry can be properly monitored. In every stage, the security of the university will be ensured. Unauthorized entry can be detected and proper action can be taken. This system will facilitate the record of every student, faculty and staff's entry which can help in any emergency situation and University can get proper information.

This system will overcome the existing system's flaws where it is time consuming while a student enters into the buildings. This will make the student entry more efficient and easy.

## 1.5 References

IEEE Template for System Requirement Specification Documents:  
<https://goo.gl/nsUFwy>

## 2. Overall Description

### 2.1 Product Perspective

The BRAC University Gate entry system is developed for every person who are authorized to enter into the university building easily. This system is designed from the need to make a better gate entry system where everything is automated.

The existing model of the University gate system is manual. For this reason, more manpower is needed to regulate the security system. To stop unauthorized entry in the university the guards need to check every person's ID card to make sure the security. It is not possible always to make sure this security efficiently. Sometimes this process takes longer time to execute.

This new gate entry system can overcome the flaws of the previous system. This system is fully automated. All the information of Students, Faculty and Staffs are already in the BRACU server. The system can access the information and can check whether the authorized persons are entering or not. While the student will punch his/her ID card in the scanner, it will scan the code in the card and match the information with the server if it exists in the server. The system will instantly show the information about the student on the screen which will be in front of the guard. This will record the entrance time of the student. When a student will leave the building, they need to scan the ID card to record the exit time.

The same process is applicable for the Faculty and Staffs.

For the guests who are invited in the university on different purpose and occasions the system can also keep track. The guests can entry themselves in the reception and will be provided a card for their entry. This will keep track of their entry and exit time. Also other information about their entry.

If any student is unable to show their ID card, the system can also take care of that situation. There will be fingerprint scanner for the student to enter into the university. This process can only be executed maximum thrice in a month so that the students always carry their ID card that is a compulsory requirement of the University authority. This will prevent the student to use fingerprint-checking entry frequently.

The guards in every entrance can only access the basic information of a student. For example name, ID, Expired Date of the ID card, Session. The Supervisor will have the access to see the entry and exit time and any further information about the entry of any specific person. The supervisor can check the validation of the ID by searching the information directly through the software. If the alternate options failed to validate a student's information this will work to verify the student and let them enter in the university.

### 2.2 Product Functions

The products Functions are given below with the Use Case and Activity Diagram:

## 2.2 Product Functions

The products Functions are given below with the Use Case and Activity Diagram:

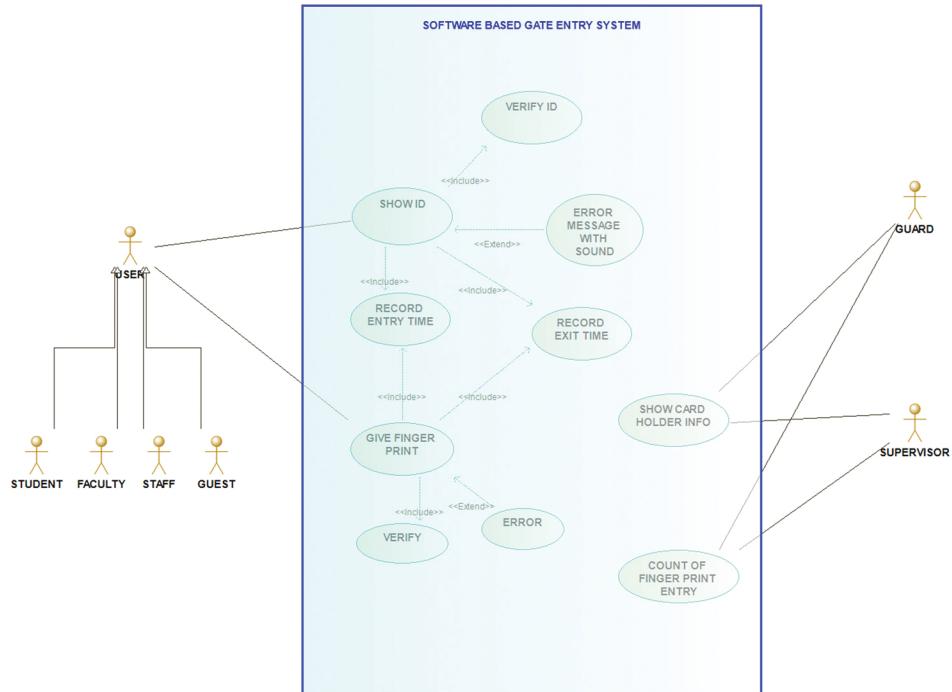


Fig: Use Case Diagram

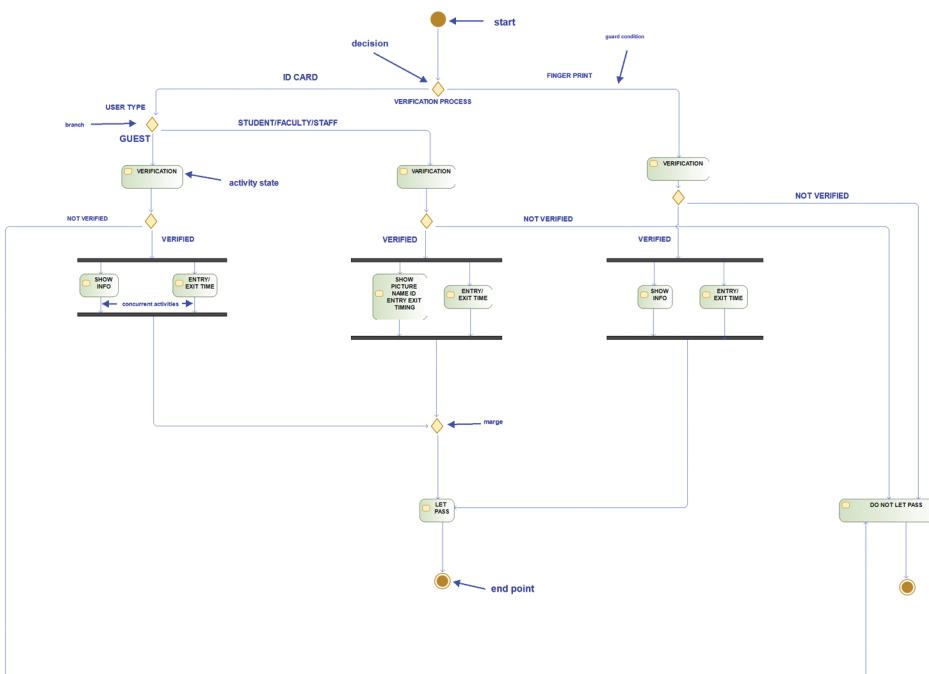


Fig: Activity Diagram

From the Guard's view the software has a Interface where the guard can see the information about the student or faculty or staff. There will be a photo of the student visible to verify. Guards and Supervisors re the secondary user. Whenever a student pass only then they see the software working and monitor it.

## 2.4 Operating Environment

- Windows 7
- Windows 8
- Windows 10
- Mac OS X
- Linux

## 2.5 Design and Implementation Constraints

BRAC University Gate Entry System is Written in Java. In Netbeans Platform. The database has been made with MySql. The model which applied in this project is Agile method. The reason of using this method is to provide a friendly environment for the programmers to work on this project. Several plug-ins have been used in this project to make the system efficient.

## 2.6 User Documentation

The Software system is very easy to operate. As there is no user side interface so it is less complicated.

Login: there is a log in system for the authority. Both guard and supervisor has the same window. Supervisor has some extra power on the information about an entry.

In The Authority End There is only One option for Security Guards to control which is:  
Check Fingerprint: It allows the security guard to open the option for user to enter into the building using the fingerprint match. If the security guard do not allow student faculty or Staff can not use fingerprint scanner.

Another option in the Supervisor window is:

Student ID: This allows the supervisor to see any students information about the entry in the university which contains Student Name, Id, Department, Session. The more facility it has is, it can show the supervisor when a student entered and leaved the university.

## 2.7 Assumptions and Dependencies

This system is developed in Java and therefore requires Java to be installed on the user's system. It requires Java version 7 or higher. This applies to Windows and Linux users. On Mac OS X, Java is bundles with the application.

### 3. External Interface Requirements

#### 3.1 User Interfaces



Fig: Security Guard view

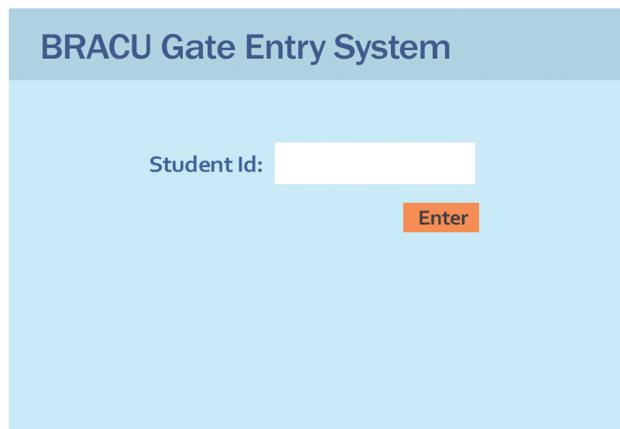


Fig: Supervisor view

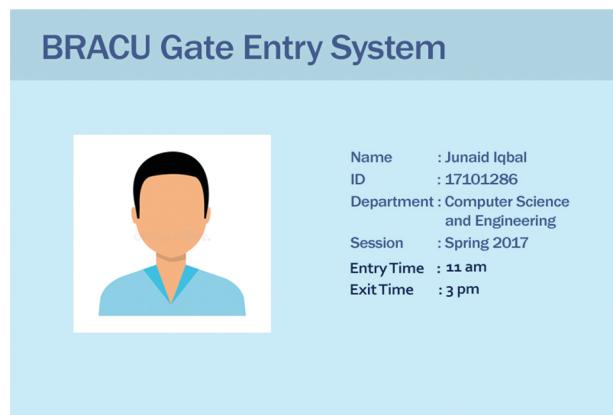


Fig: Supervisor view

### 3.2 Hardware Interfaces

There are some component which will use to construct this system. At first in the entrance there would be a ID Card scanner which will scan the QR code from the scanner and verify the student. We need a database to connect in this system to hold the student, faculty and Staff information. Also if a student fails to show his/her id there would be a fingerprint scanner to identify the student. So that the student can enter in the building.

### 3.3 Software Interfaces

BRAC University gate entry system requires Java to be installed on the system, more specifically Java version 7 or 8 for its latest release. Additional information can be found on section 2.7 of this document. The system can be connected with a MySQL, SQLite database to identify student and verify information.

### 3.4 Communications Interfaces

This System requires internet connection to get connected to the BRACU server.

## 4. System Features

Here is the features the system is providing the user which makes this system efficient.

### 4.1 Efficient and Automated Entry System

#### 4.1.1 Description and Priority

*The Student or Faculty or the staffs will punch their id card in the scanner. Scanner will match the cards information with the information in the Server. If the information matches, system will verify the student and give the guard signal to let the student go in.*

#### 4.1.2 Stimulus/Response Sequences

*At first the Qr code will be scanned. It will match the student's Name, Id and other attributes with the existing information from the server. If the information match it will show the Guard verified. Otherwise, not verified sign will be shown.*

#### 4.1.3 Functional Requirements

*The Functional Requirement of this systems are:*

- REQ-1: Must ID Card Carry
- REQ-2: Automated System
- REQ-3: Time efficient system
- REQ-4: Security Assurance
- REQ-5: Control over fingerprint scan entry
- REQ-6: Less Manpower required

## 5. Other Nonfunctional Requirements

### 5.1 Performance Requirements

The performance of the system is a major non functional requirement. Based on that there are four criteria which will determine the performance of this system:

- i. Response Time: The response time of this system is at max 2 seconds. Which means the total verification of a student can not exceed 2 seconds. The reason is the total number of the student enters in the peak time when the class starts is too high which may cause a mess if the response time exceed this limit.
- ii. Workload: At the peak hour the system can take entry of 16 entries at once. The reason is The University has 8 building so at a time at max 8 students or faculty or staffs can enter the building. As the software will be run in every other building of the university it should be able to take the load of atleast 8 entries. But to be safe and to make sure that the system will not crash the system has the ability to take the load of verifying 16 entries at a time at it's peak hour.

### 5.2 Safety Requirements

BRAC University Gate entry system has it's safety backup. The system can retrieve data if the system crash at any point. If the system crashes the software can start working from where it last worked on. It has safety backup server to retrieve the data.

### 5.3 Security Requirements

This system will work using the internet and students data would be in the server. There is no safety risk for students for identity theft. This system can encrypt the information while working so if any of the computer get hacked the hacker can not retrieve any data from the server.

### 5.4 Software Quality Attributes

There are few attributes for software quality they are: Correctness, Reliability, Robustness, Maintainability, Readability, Extensibility, Testability, Efficiency, Portability. In every sectors the software can ensure this quality as per the clients requirements.

## **6. Other Requirements**

**Appendix A: Glossary**

**Appendix B: Analysis Models**

**Appendix C: To Be Determined List**

Architecture model:

When developing software four architecture models can be used. These models are:

- MVC(Model View Control)
- Layered Architecture
- Repository Architecture
- Client-Server Architecture

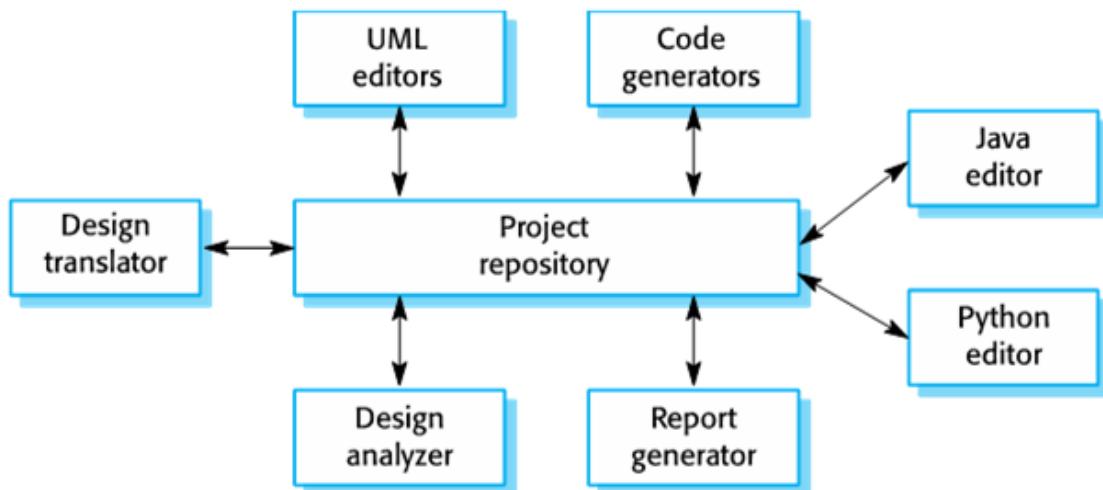
Among the models mentioned above, the architecture which will be used for our BracU Gate Entry system is the Repository model.

Repository architecture is a system that will allow several interfacing components to share the same data. Each component interfaces the same dataset that is utilized system wide. Data manipulation taking place in one component will reflect an identical representation of data in another component.

Each sub-system in our Gate Entry System maintains its own database and passes data explicitly to other sub-systems. When large amounts of data are to be shared, the repository model of sharing is most commonly used. This is an efficient data sharing mechanism, accessible to all system components. Therefore by using this model we can load and store data of a student in the central system and then allow it to be shared to all other sub-systems. This way the central system can be used to monitor all the other ones.

One of the advantages of using this model in the gate entry systems is that all the components are independent, one component does not need to know the existence of another component. Also changes that are made to one component can be propagated to another component. Moreover all the data that is being stored are simultaneously being backed up by the central system.

A diagram of the repository model is given below.



## USER INTERFACE:

The user interface of out gate entry system is restricted to administrative privileges only, this means that the person controlling the central system and the guards in charge of the gates will have an interface. The students will only be accessing the gates by scanning their identification card or fingerprints. After scanning the identification card or fingerprint the student will either be granted access or denied entry after being verified. If granted access then the information regarding the student will be recorded along with the time of entry and exit.

When a student has scanned their identification card or finger print if they get verified and granted access then the guard will be able to see default information regarding the student entering the gate at the time. However the guards will not be able to access the student information any other way directly apart from when they are entering the gate. The figure below shows what will be seen by the guard.



The administrator who will be over looking and controlling the central system will be able to access and Students' information directly and will also be able to see the entry and exit time of the student, which cannot be seen or accessed by the guards as mentioned before.

The image contains two side-by-side screenshots of the BRACU Gate Entry System.

**Left Screenshot (Student View):**

- Header: "BRACU Gate Entry System"
- Input field: "Student Id: "
- Button: "Enter"

**Right Screenshot (Administrator View):**

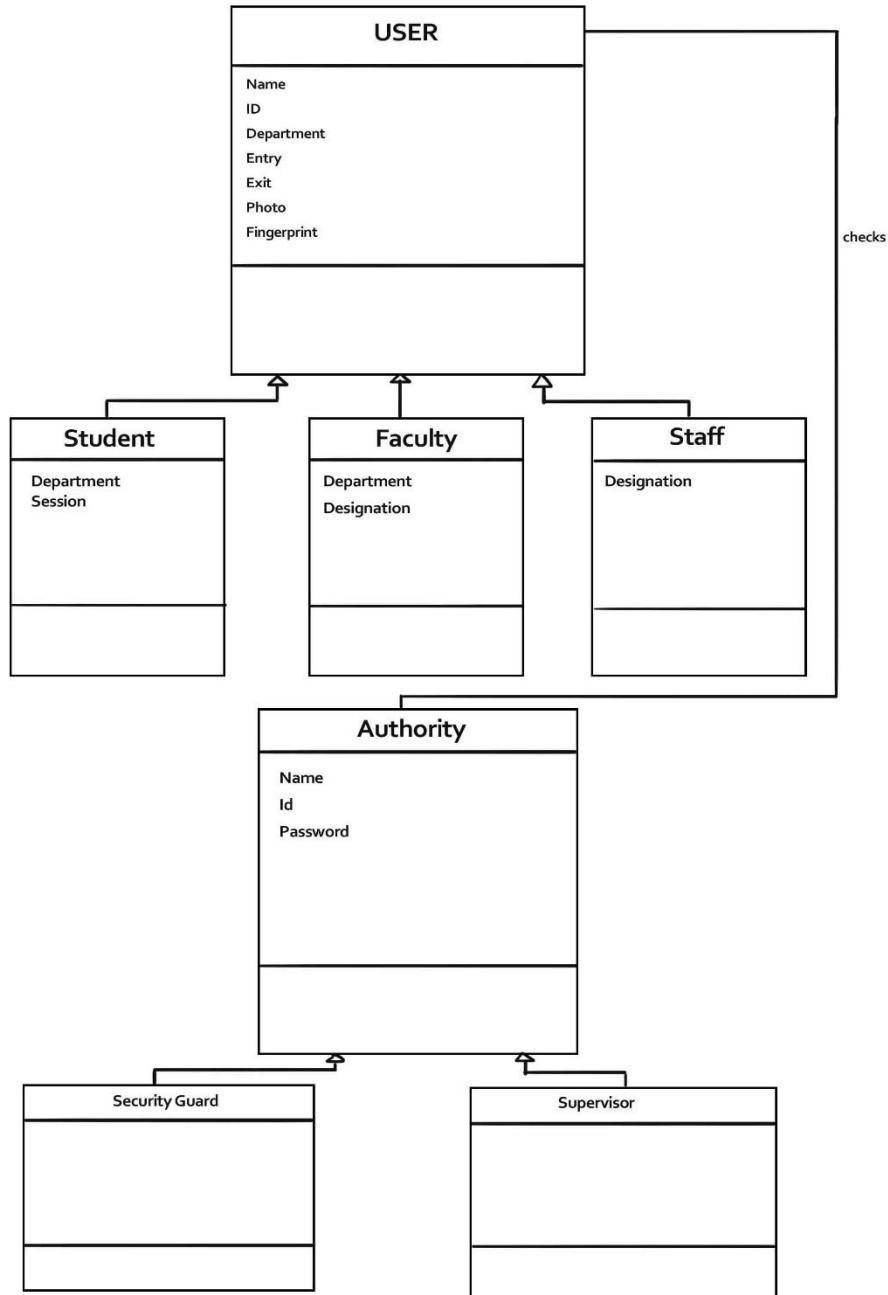
- Header: "BRACU Gate Entry System"
- Placeholder for photo: A placeholder for a student's photo.
- Student Details:
  - Name : Junaid Iqbal
  - ID : 17101286
  - Department : Computer Science and Engineering
  - Session : Spring 2017
  - Entry Time : 11 am
  - Exit Time : 3 pm

## Data Base Model Design:

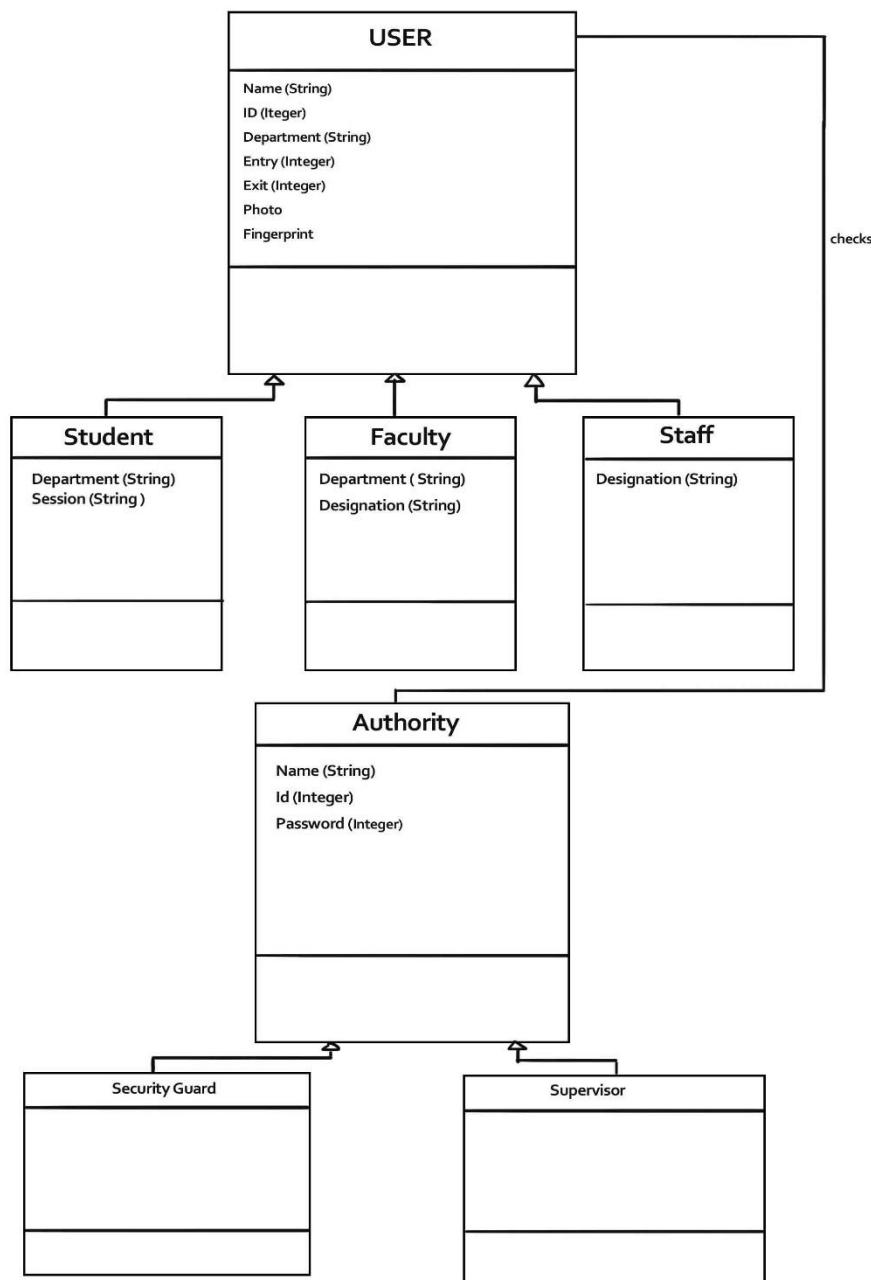
To discuss the Database model of this system there are 3 part of this Data Model Design

1. Conceptual Data Model: It shows what are in the database in our system so here we have User. It has child: Student, Faculty, Staff Again another is Authority. It has 2 child: Security Guard, Supervisor. This is the concept how the data model will work.
2. Logical Data Model: It provides further information from conceptual Model. It helps to build the Physical Model. In this model, we do not have any primary key. It is basically the logic we planned to execute.
3. Physical Data Model: This is the model we are actually working on. It has primary key to build relation among the tables in the database. In this part we made our database's table interconnected.

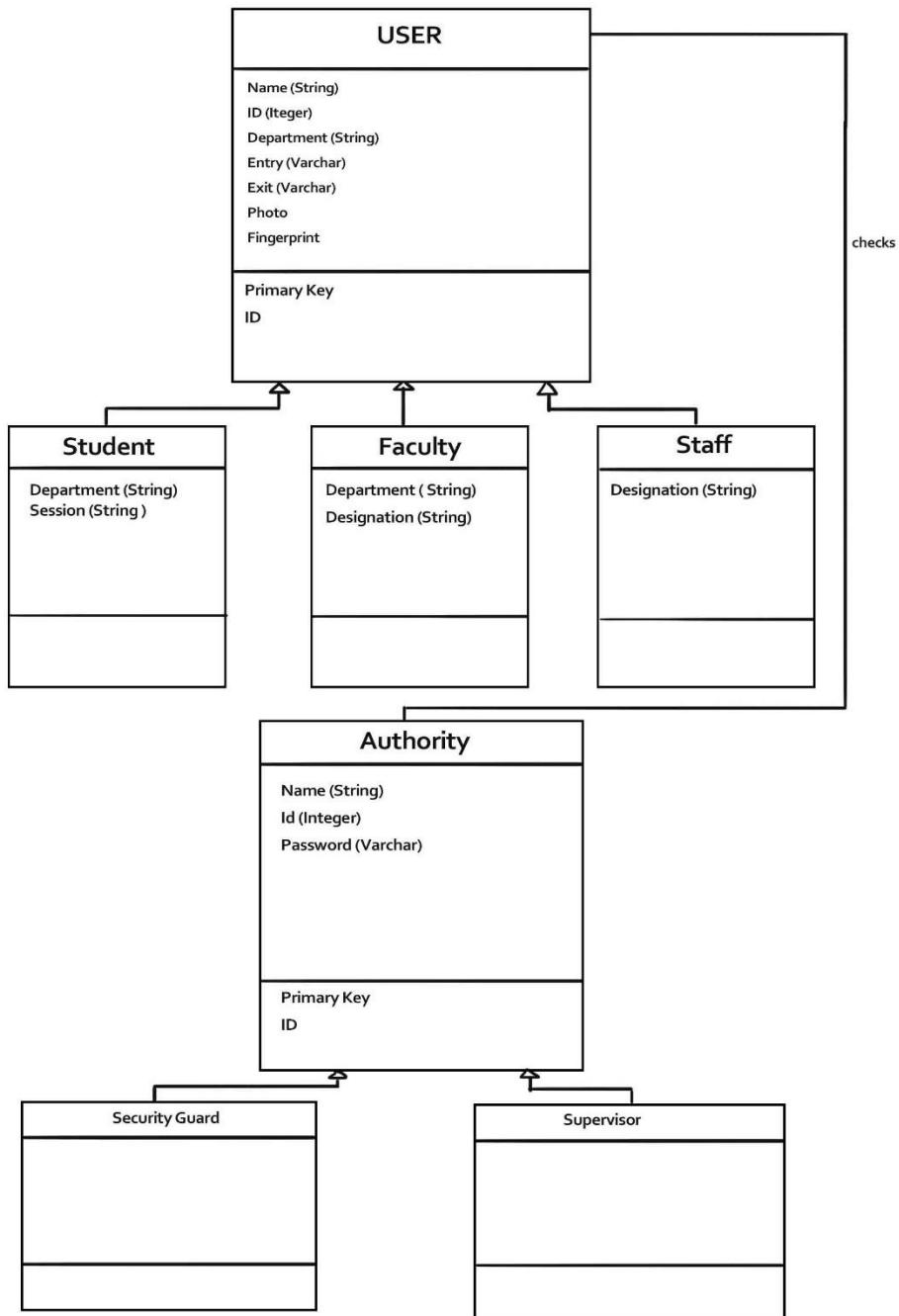
Conceptual Data Model:



Logical Data Model:



Physical Data Model:



References:

<https://cs.ccsu.edu/~stan/classes/CS410/Notes16/06-ArchitecturalDesign.html>

# **Test Plan Documentation**

**for**

## **BRACU Gate Entry System**

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**BRAC University**

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# 1. Introduction

## a. Purpose

The purpose of this document is to design a proper documentation of the Test Plan for BRACU Gate Entry System Software. The document will give an insight on how a test will be carried out in order for the software to carry out its function with the least possible failures.

## b. Intended Audience and Scope

This document is intended for developers and product testers. The information existing in this manifest will give the developers an idea of the outcome from the software, so the developers can create a software with the desired result. The testers will get an idea of how they can plan out the testing process for the software from the given document.

The test plan is designed in order to carry out a synchronized test of the software. The scope of the plan is to carry out tests on the functional and non-functional features of the software.

## c. References

The document follows the IEEE Test Plan Outline template.

## 2. Assumptions while testing

Software testing is a spontaneous process. One cannot simply plan out the whole thing without any limitations related to the process. However, assumptions can be made in order to counter the obstacles that are to be followed.

One of the first assumptions related to the project is the Test environment. The Test environment should be available by the start date prescribed in the schedule and it is to be approved by the head of the Test Team. Also, the software should pass out the unit and integration test by the developer team before reaching the Test environment by the start date of the project given in the schedule. After passing through initial testing and reaching the Test environment, only then the software can be ready to get a proper test. For the gate entry system, the software needs to pass through the unit and integration testing by the developers, then the initial version of the software is to be handed to the Test Team for further verification to be carried out.

One assumption that is integral to testing is the validation of all the preceding documents. It can be assumed that the client and the developers had good communication among them, as a result the Software Requirements Specification(SRS) document that is provided by the client and the developers are valid. Also, the design documentation of the software that is provided is well grounded too.

Another assumption that plays a crucial role in testing is the involvement of certain key project members. Skills, availability and performance of the key project members will give a basic idea of how the project would yield the desired result. When the gate entry system software is handed to the Test Team, the members who are the most skilled will start out the test by reading this manifest. Their availability and performance will decide whether or not the testing process is on schedule.

Other assumptions which will also be important while testing are results which come out from the testing, the time frame by which the testing process is to be done, resources which are available to the team and the activity performance of the whole team.

### 3. Test Case

Test Case ID	Test Scenario	Test Steps	Test Data	Expected Results	Actual Results	Pass/Fail
BUGES_01	Check identity of person with valid ID card	1. Punch in ID card 2. Wait for response to enter	<valid ID card code scanned> <green signal, allowed in premises>	Student should	As expected	Pass
BUGES_02	Check identity of person with invalid ID card but valid fingerprint	1. Punch in ID card	<invalid ID card code scanned>	Student should enter	As expected	Pass
		2. Wait for response to enter	<yellow signal, stage 2, input fingerprint>			
		3. Punch in fingerprint	<valid fingerprint scanned>			
		4. Wait for response to enter	<green signal, allowed in premises>			
BUGES_03	Check identity of person with invalid ID card and also invalid fingerprint	1. Punch in ID card	<invalid ID card code scanned>	Student should not enter	As expected	Pass
		2. Wait for response to enter	<yellow signal, stage 2, input fingerprint>			
		3. Punch in fingerprint	<invalid fingerprint scanned>			
		4. Wait for response to enter	<red signal, not allowed>			

### 4. Features to be tested

The primary reason why software testing is necessary is to make sure that the features enlisted in the SRS are working without any obstacles. Features can be divided into two primary requirements: functional and non-functional requirements.

#### a. Functional Requirements

- **Priority Testing:** The target of testing is to have an efficient and automated entry system. We have to ensure that the test carried out on the functional features meet the desired goals, i.e. when punching the id card in the scanner, the scanner must match the information of the card with that of the server. In order for it to work, the developers must make sure that the necessary information is present in both the card and the server.
- **Response Sequence:** The response sequence is also to be maintained. After scanning the Qr code, it will be matched with the information in the server. If it is

matched, then verification will be complete. If this sequence is not followed, then we can assume that there might be a fault in the system.

- **Other:** Features which also need to be tested include time efficiency, automated system and security assurance.

## b. Non-Functional Requirements

- **Response Time and Workload:** Among the non-functional requirements, one of the key aspects is the performance of the system. Of all the performance, two of them is of utmost importance: response time and workload. The testing team has to make sure that the response time does not exceed by 2 seconds, otherwise it will create a disorder during peak time. Also, the workload should also be maintained. While testing, if the system cannot take the load of multiple intakes, then it is necessary to change the workload to keep up with the increased inputs.
- **Safety and Security Requirements:** In safety requirements, the testing team has to make sure that in case of an emergency, i.e. if the system crashes, then there should exist a backup server which can work while the issue is being sorted out. In security requirements, the testing team needs to keep in mind that the data of a student that is in the server is encrypted, so that in a case of a cyber theft, no information gets stolen in the process.
- **Software Quality Attributes:** The quality of the software is also very important in the non-functional features. These attributes include correctness, reliability, robustness, maintainability, readability, extensibility etc. After testing, the results should be according to the requirements provided by the clients in the SRS.

## 5. List of Deliverables

Here in this section we are discussing about what is the result of the testing

Before Testing:

Before testing, this system might had some errors which would cause serious problem in real life implementation. But fortunately there were no bug in the system.

During Testing:

During testing there was a chance to have bugs in the code. Since this is not too complicated no error found in the testing phase which can create big problems in future.

After Testing:

As the system responded as we expected this would respond, after the testing we also have no problem after the testing process.