# SCSJ3323: Software Design and Architecture

# **Software Design Document**

Version 1.0

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Department of Software Engineering and School of Computing, Faculty of Engineering

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## **Revision Page**

#### a. Overview

In this document, we introduce UTM SMART system, then we discuss the System's architectural design, detailed description of components, we also show the data design & user interface design.

#### b. Target Audience

Stakeholders, project manager and development team.

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## d. Version Control History

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### 1. Introduction

This SDD document describes the product perspective, product function, user characteristics, constraints, assumptions and dependencies, apportioning of requirements, external interface requirements, system features, performance requirements, design constraints, software system attributes and other requirements of the SMART system. The intended audience of this document is the stakeholders, project manager and development team.

#### 1.1 Purpose

This SDD document describes the product perspective, product function, user characteristics, constraints, assumptions and dependencies, apportioning of requirements, external interface requirements, system features, performance requirements, design constraints, software system attributes and other requirements of the SMART system.

#### 1.2 Scope

The proposed SMART system is web based and aims to facilitate the admission process of UTM.

The system will include:

- Module that facilitate the registration process of recruitment agents. This is because
  agents have to be registered with UTM before they can assist the prospective
  student to apply for a programme.
- Module that provide interface for registration of individual applicants for undergraduate and postgraduate studies.
- Module about monitoring system. This module is important for SRAD to keep track of the applications after they have been sent to the faculty for approval. This ensure that the applications can be processed within the planned period of time.
- Since SRAD is required to generate a statistic report regarding the student admission to the university authority. Thus, the statistic module is within the scope

- of the UTMSMART system. Administration module. Allow SRAD to process application.
- Provide a user friendly interface for the entire process of admission including the checking of admission status.
- Unlike the current version of UTM SMART, the proposed version will need to ensure that the data are synchronized across the entire system.
- Review application form to check for errors.
- Provide convenient interface for applicants to pay their application fees to the supported online banking services.

What will not be included in the system:

• The process of changing faculty after registration.

#### Goals

- Easy navigation within interface
- Performance speed
- Ease of use

#### **Objective**

- Combine registration process of undergraduate and postgraduate into one system.
- Establish progress and performance monitoring system. Applicants and agents can check and monitor the status of their application.
- An effort to implement customer relationship management (CRM) element into the system.

#### 1.3 Definitions, Acronyms and Abbreviation

• SRAD – Student Recruitment and Admission Division.

SRAD is a department of UTM that handles the applications from prospective postgraduate and undergraduate students.

• SMART – Student Management Admission and Recruitment system.

The current system that is used for admission process of prospective students. The system is new and still have some bugs. The improved version of UTM-SMART will be the proposed product of this project.

• UTM – Universiti Teknologi Malaysia

#### 1.4 References

UTM SMART manual

#### 1.5 Overview

This SDD document consists of three major parts, the introduction, overall description and specific requirements. The introduction describes the purpose of this SRS document and the scope of the SMART system. Next, the overall description section describes the overview of the entire system. This section describes the background of the requirements that aims to facilitate the understanding of target audience of this document. Lastly, the third section, specific requirements will describe the requirements specification and interfaces in more detail level. This section aims to enable the designers and testers to understand and satisfy the requirements of the system.

## 2. System Architectural Design

#### 2.1 Architecture Style and Rationale

For the proposed SMART system, the architectural style of the system is 3 layered architecture. Layered architecture separates the system and their related functionality into layers. Layers are application layer, business layer, & middleware layer. Reason we choose this system is all components of the system are independent and do not need to know other components.

#### 2.2 Architecture Model

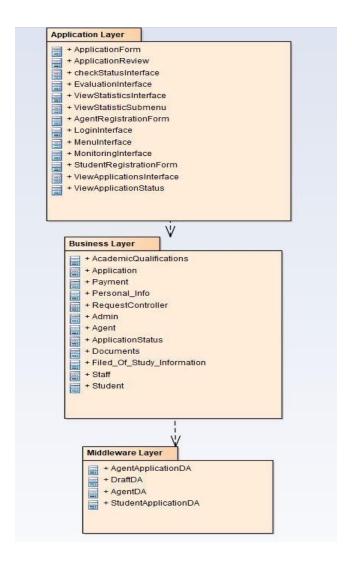


Figure 1: Architectural Diagram of SMART system

#### 2.3 Design Patterns

We have implemented two design patterns in this project which are factory method and iterator pattern. Factory method is implemented for the module register student or agent. This is because factories and interfaces allow for a lot more long term flexibility. It allows for a more decoupled and therefore more testable design. It makes your code more testable as you can mock interfaces. Therefore it is easier to extend the product construction code independently from the rest of the code. For example, In this case, the superclass will be User where the subclasses are Students and Agents. So, to add a new user type to the app, you'll only need to create a new creator subclass and override the factory method in it. With this, tight coupling between the creator and the concrete products can be avoided.

Iterator pattern is also implemented in this project especially in review application. This is because the Iterator provides ways to access elements of an aggregate object sequentially without exposing the underlying structure of the object. As the iterator encapsulates the details of working with a complex data structure, it provides the client with several simple methods of accessing the collection elements. While this approach is very convenient for the client as it hides the complexity, it also protects the collection from careless or malicious actions which the client would be able to perform if working with the collection directly. It is also because this pattern can clean up the client code and the collections by extracting bulky traversal algorithms into separate classes.

## 2.4 Use Case Diagram

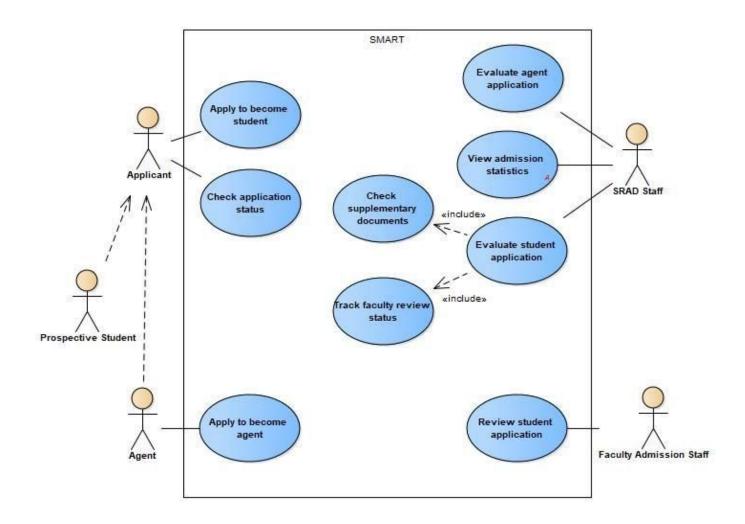


Figure 2: Use Case Diagram of SMART System

#### 2.5 Class Diagram

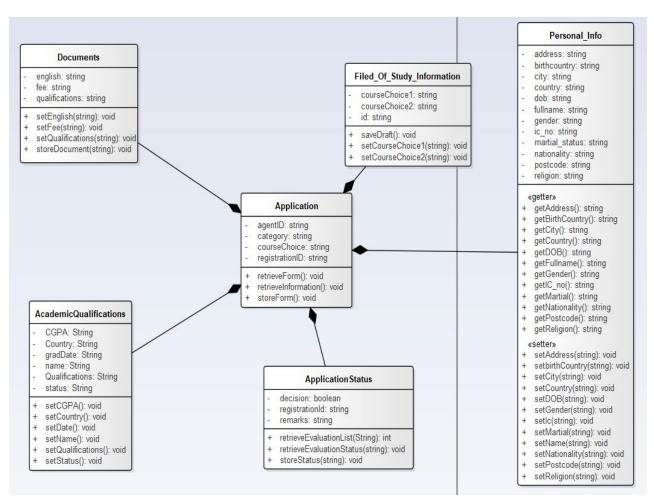


Figure 3: Class Diagram of Smart System

## 3. Detailed Description of Components

#### 3.1 Complete Package Diagram

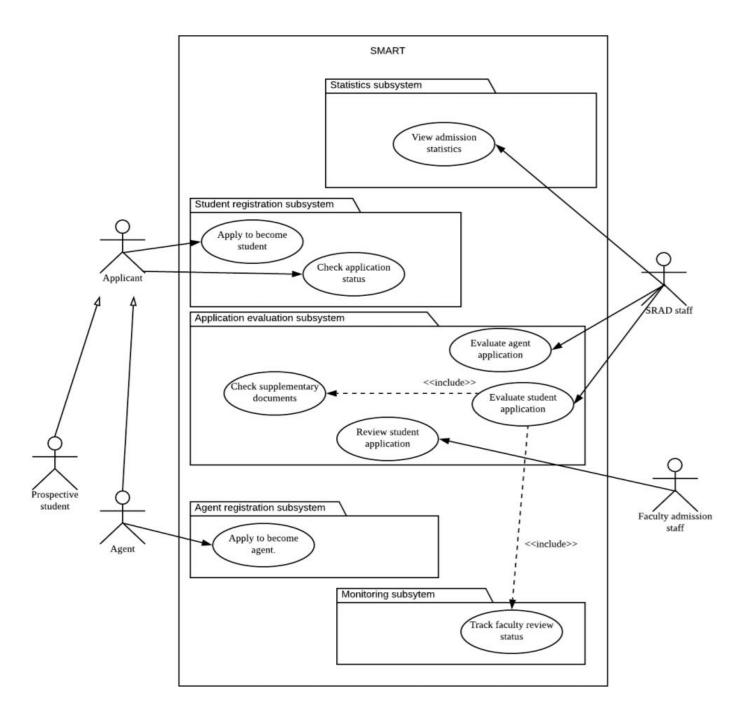


Figure 4: Package diagram for UTM SMART system

#### 3.2 Detailed Description

In UTM SMART system, there are 5 modules including student registration module, agent registration module, application evaluation module, monitoring subsystem, & statistics module. System's architecture diagram consists of 3 layers, application layer, which has all the user interfaces & interactions, middleware layer, which provides data access to the database, & business layer, which handles all requests and executes the business rules for a request.

#### 3.2.1 Module 1 : Agent registration module

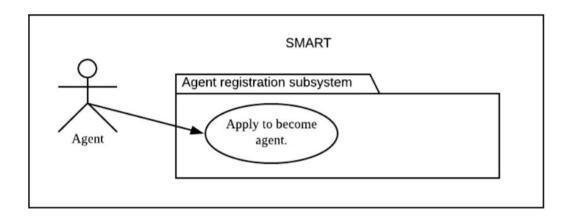


Figure 5: Agent Registration Subsystem of UTM SMART system

#### 3.2.1.1 UC001: Apply to become agent

In order to become an agent, the agent must registered and approved by SRAD. During the registration process, the prospective agents need to submit their personal information and their company profile.

## 3.2.1.1 UC001: Apply to become agent

Use case name	Apply to become agent
Use case ID	UC001
Actors	Agent
Pre conditions	The applicant decided to become an admission representative agent
Normal flow	<ol> <li>The use case begins when the prospective agent login to the SMART system.</li> <li>The system display main menu</li> <li>The prospective agent choose the "apply to become agent" on menu. If the prospective agent already submitted an agent application but still on review process.</li> <li>The system display agent application form.</li> <li>The prospective agent enter the personal information. If there are missing or invalid compulsory fields on the form, exception flow 1 is performed.</li> <li>The system store the entered information as draft.</li> <li>The system display company profile upload page</li> <li>The prospective agent upload the company profile.</li> <li>The system store the entered information as draft. 10. The prospective agent click the "submit" button</li> </ol>
Exception conditions	1. Missed or invalid compulsory fields 1.1 The system will disable the "next" button and highlight the missed compulsory fields. 1.2 The applicant fill in the missed field with relevant info. 1.3 Use case resume at normal flow 6.
post conditions	The prospective agent application form will be sent to SRAD and stored in the agent registration database.

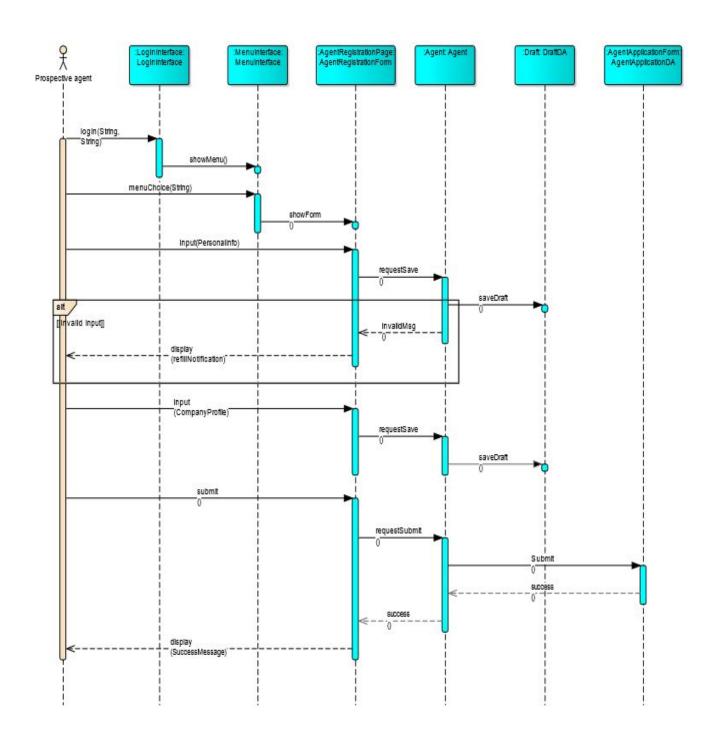


Figure 6: Sequence Diagram of Apply to become agent

#### 3.2.2 Module 2 : Student registration module

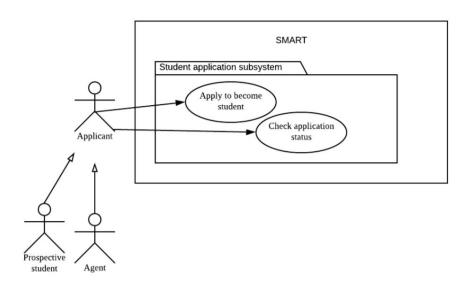


Figure 7: Student Application Subsystem of UTM SMART system

#### 3.2.2.1 UC002: Apply to become student

In order to apply for study at UTM, the prospective students have to go through the registration process. The prospective student can hire an agent to do the registration process on their behalf. During the registration, the applicant will need to choose the intake category, course choices, fill in application form, pay processing fee and upload supplementary documents. Along the process, the incomplete application form will be stored as a draft in the database. The application will only be saved into the application form database after the applicants have clicked the "save and submit" button. The application form will then enter the review process that is conducted by SRAD staff.

## 3.2.2.1 UC002: Apply to become student

Use case name	Apply to become student
Use case ID	UC002
Actors	Applicant (can be either prospective students or representative agent)
<b>Pre-conditions</b>	The application is only available during specific dates
Normal flow	<ol> <li>The use case begins when the applicant (either prospective student or representative agent) login to the SMART system</li> <li>The system display main menu</li> <li>The applicant choose the "apply to become student" on menu.</li> <li>The system display choices for admission categories.</li> <li>The applicant pick an admission category (undergraduate or postgraduate programme.)</li> <li>The system displays relevant application form.</li> <li>The applicant enter the personal information. If there are missing or invalid compulsory fields on the form, exception flow 1 is performed.</li> <li>The system stores the current form as draft.</li> <li>The applicant choose course choices.</li> <li>The system store the current form as draft</li> <li>The applicant enter academic background and upload related supplementary documents.</li> <li>The system stores the current form as draft.</li> <li>The applicant pay processing fee.</li> <li>The applicant click "submit" button to submit the application. If the processing fee is not yet paid completely. Exception flow 2 is followed.</li> </ol>
Exception conditions	<ol> <li>Missed or invalid compulsory fields         <ol> <li>The system will disable the "next" button and highlight the missed compulsory fields.</li> <li>The applicant fill in the missed field with relevant info.</li> <li>Use case resume at normal flow 8.</li> </ol> </li> <li>Not yet completely paid the processing fee         <ol> <li>The system will disable the "submit form" button and display a notice that inform the applicants to pay the processing fee.</li> <li>Applicant pay processing fee.</li> <li>Use case resume at normal flow 14.</li> </ol> </li> </ol>
Post-conditions	The prospective student application form will be stored in application form database to be reviewed by SRAD later

a) SD002 for use case UC002 : Apply to become student

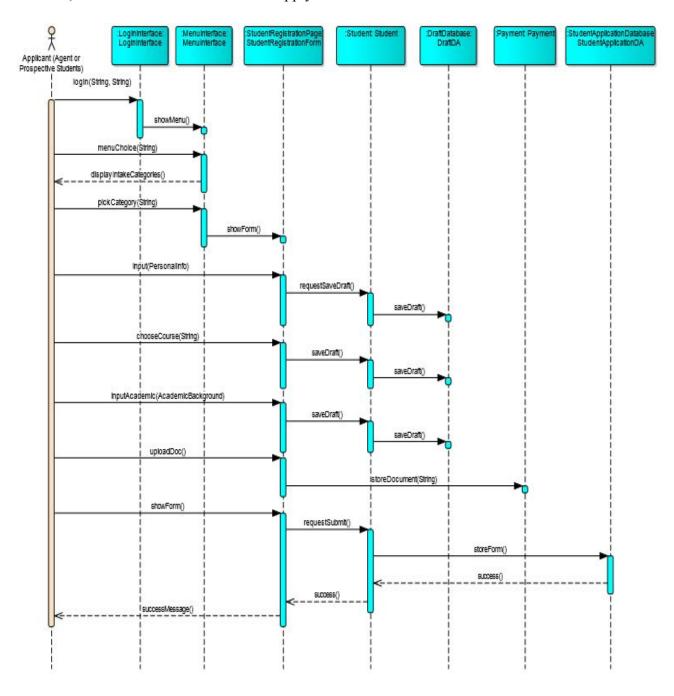


Figure 8: System sequence diagram of apply to become student

## 3.2.2.2 UC003: Check application status

Along the application review process, the prospective students or agent can view the current status of their applications. If the review process has been completed, they can view the final outcome and choose whether to accept the offer if they are shortlisted.

#### 3.2.2.2 UC003: Check application status

Use case name	Check application status
Use case ID	UC003
Actors	Applicant (can be prospective student or representative agent)
<b>Pre-conditions</b>	The application status can only be viewed after SRAD have already began to update the current application status on the system.
Normal flow	<ol> <li>The prospective students or representative agent login to the system using staff ID and password.</li> <li>The system display main menu.</li> <li>The applicant select "view application status" on menu. If the application status is not yet available exception flow 1 is followed. If the user is a student, alternative flow1 is performed while alternative flow 2 will be followed if the user is an agent. If the application review process have been finished, alternative flow 3 is followed.</li> </ol>
Alternative flow	<ol> <li>User is student</li> <li>The system will display the current status of the application review process of that particular prospective student.</li> <li>User is representative agent.</li> <li>The agent choose a prospective student from list.</li> <li>The system will display the current status of the application review process of that selected prospective student.</li> <li>If application is accepted, the student can choose to accept an offer. The system will display offer letter to the shortlisted applicant who accepted the offer.</li> </ol>
Post-conditions	The student (or through agent) will be able to know the current progress of the application review process or the final outcome of the application. Shortlisted applicants can choose whether to accept the offer

## b) SD003 for use case UC003 : Check application status

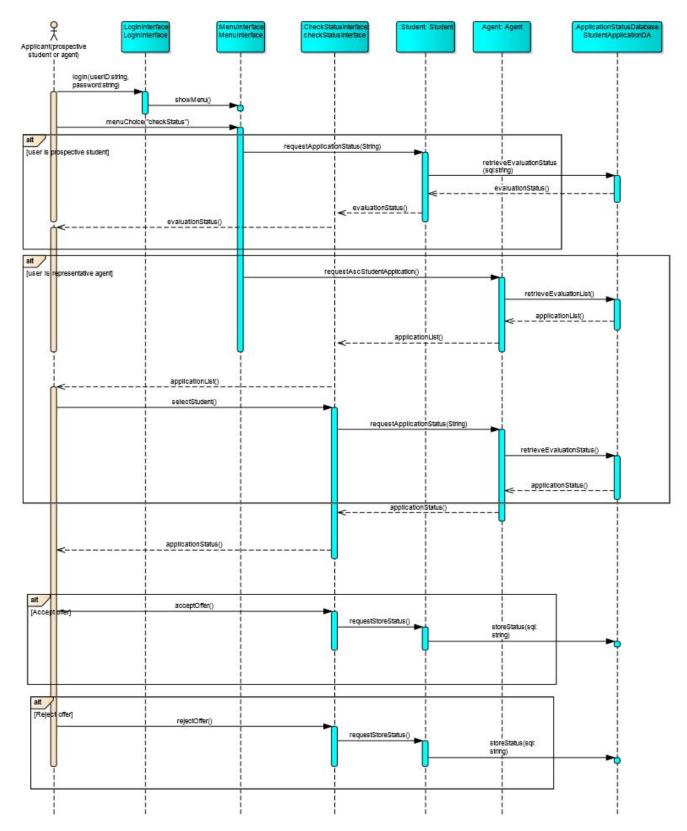


Figure 9: System sequence diagram of check application status

## 3.2.3 Module 3 : Application evaluation module

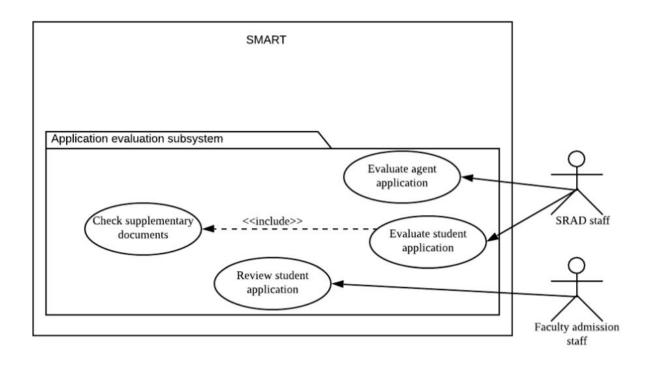


Figure 10: Application Evaluation Subsystem of UTM SMART system

## 3.2.3.1 UC004: Evaluate agent application

After the agent have submitted the application form, SRAD staff will retrieve the form from database and make a decision regarding the application. If the application is approved, SRAD will send the representative letter and certificate to the newly certified agent. Otherwise, SRAD will notify the applicant regarding the rejection.

Use case name	Evaluate agent application
Use case ID	UC004
Actors	The prospective agent must already completed and submitted the application form.
Pre-conditions	SRAD staff & prospective agent
Normal flow	<ol> <li>The SRAD staff will login to the system using staff ID and password.</li> <li>The system display main menu.</li> <li>The faculty staff select "evaluate agent applications" on menu.</li> <li>Display the list of prospective agent. If there is no pending prospective agent application, exception flow 1 is performed.</li> <li>The staff choose a prospective agent to evaluate.</li> <li>If the application is approved, alternative flow 1 is performed.</li> <li>Else alternative flow 2 is performed.</li> </ol>
Alternative flow	<ol> <li>Application is approved.</li> <li>Store the certificate and representative letter into the application status database.</li> <li>Application is rejected</li> <li>Notify the applicant regarding the rejection.</li> </ol>
Exception conditions	1. No pending prospective agent applications. 1.1 The use case ends.
Post-conditions	The application of the prospective agent will either approved or rejected by SRAD.

## a) SD004: for UC004 Evaluate agent application

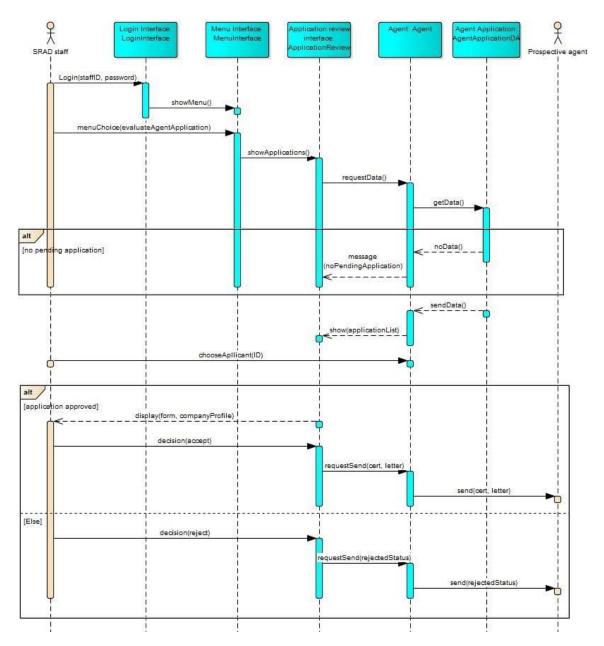


Figure 11: System sequence diagram of evaluate agent application

## 3.2.3.2 UC005: Evaluate student application

The applications from prospective students will be evaluated by SRAD. During the process, SRAD will view and evaluate the application forms. The evaluation progress, decisions will be stored into application form database. If it is approved at the SRAD level, the application will be reviewed by faculty.

Use case name	Evaluate student application
Use case ID	UC005
Actors	SRAD staff Faculty's admission department
<b>Pre conditions</b>	There must be pending student application that need to be reviewed
Normal flow	<ol> <li>The use case begins when the SRAD staff login to the SMART system with staff ID and password.</li> <li>The system display main menu.</li> <li>The SRAD staff choose the "evaluate student application" on menu.</li> <li>The system displays list of pending student application.</li> <li>The SRAD staff choose a pending student application to be reviewed.</li> <li>The system display application.</li> <li>SRAD staff click on "check supplementary document".</li> <li>UC004: check supplementary documents is performed.</li> <li>SRAD make decision regarding the application. If the application is approved. Alternative flow 1 will be performed. Else, alternative flow 2 will be performed.</li> <li>SRAD update application status for the prospective student to view</li> </ol>
Alternative flow	1. Application approved by SRAD 1.1 The application is send to faculty's admission department for review. 1.2 UC006: track faculty review status will be performed. SRAD will track the review progress of the faculties. 1.3 The use case return to normal flow 10.  2. Application rejected by SRAD. 2.1 The use case will return to normal flow 10.
Related use case	UC004: Check supplementary documents UC006: Track faculty review status
post conditions	The status of the application will be updated for the prospective student to check.

## b) SD005: for UC005 Evaluate student application

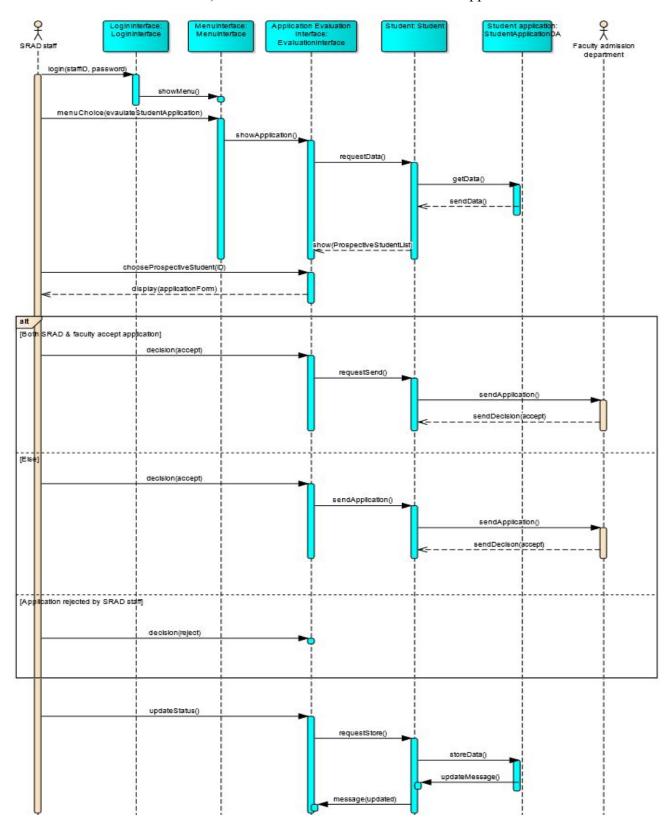


Figure 12: System sequence diagram of evaluate student application

## **3.2.3.3 UC006: Check Supplementary Documents**

The clarity and validity of supplementary documents especially the passport-sized photo will be automatically checked by the system.

Use case name	Check supplementary documents
Use case ID	UC006
Actors	SRAD staff Faculty's admission department
Pre conditions	There must be pending student application that need to be reviewed
Normal flow	<ol> <li>The SRAD staff will login to the system using staff ID and password.</li> <li>The system display main menu.</li> <li>Select "review supplementary documents" on menu.</li> <li>The system display list of prospective students that haven't have their documents checked.</li> <li>Choose a one or more prospective student application.</li> <li>The system will check the clarity and validity of the supplementary documents from the selected prospective student.</li> <li>If the document is valid alternative flow 1 is followed. Else, alternative flow 2 is followed.</li> </ol>
Alternative flow	<ol> <li>The application evaluation process can be continued by SRAD.</li> <li>The document is invalid</li> <li>SRAD will notify the student to reupload.</li> </ol>
Post conditions	The validity and clarity of the documents will be determined. The prospective student will be asked to reupload if necessary.

## c) SD006: for UC006 Check supplementary documents

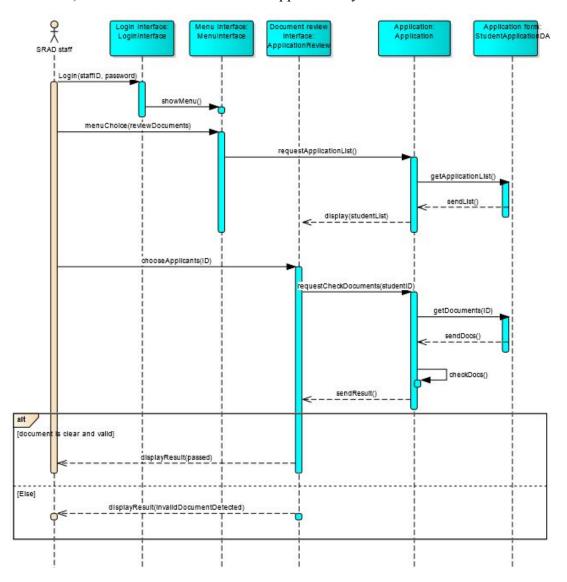


Figure 13: System sequence diagram of check supplementary documents

#### 3.2.3.4 UC007: Review student application

After the application has been evaluated and approved by the SRAD, the application will be passed over to faculty's admission department for review. In this stage, the faculty admission department will record their review progress and decision onto the system. For postgraduate applications, their progress includes assigning supervisor and record the review result of research proposal. The review progress will be saved as a log in the application status database.

Use case name	Review student application
Use case ID	UC007
Actors	Faculty admission department staff
Pre conditions	There must be student applications that have been evaluated and approved by SRAD but not yet reviewed by faculty. reviewed
Normal flow	<ol> <li>The faculty staff will login to the system using staff ID and password.</li> <li>The system display main menu.</li> <li>The faculty staff select "review pending student application" on menu.</li> <li>If the application is for undergraduate intake, alternative flow 1 is followed. For postgraduate applications, alternative flow 2 is followed.</li> <li>Store the review progress into the review log.</li> </ol>
Alternative flow	1. For undergraduate application 1.1 Update review progress with evaluation remarks. 1.2 Update review progress after making the intake decision. 1.3 Use case return to normal flow 4  2 For postgraduate student 2.1 Update review progress with evaluation remarks. 2.2 Update review progress after evaluated the research proposal. 2.3 Update review progress after making the intake decision. 2.4 Update review progress after assigned a supervisor. 2.5 Use case return to normal flow 4
<b>Exception</b> flow	No pending applications.     The use case ends.
Post conditions	The decision of whether the student application is approved or rejected will be made

## d) SD007: for UC007 Review student application

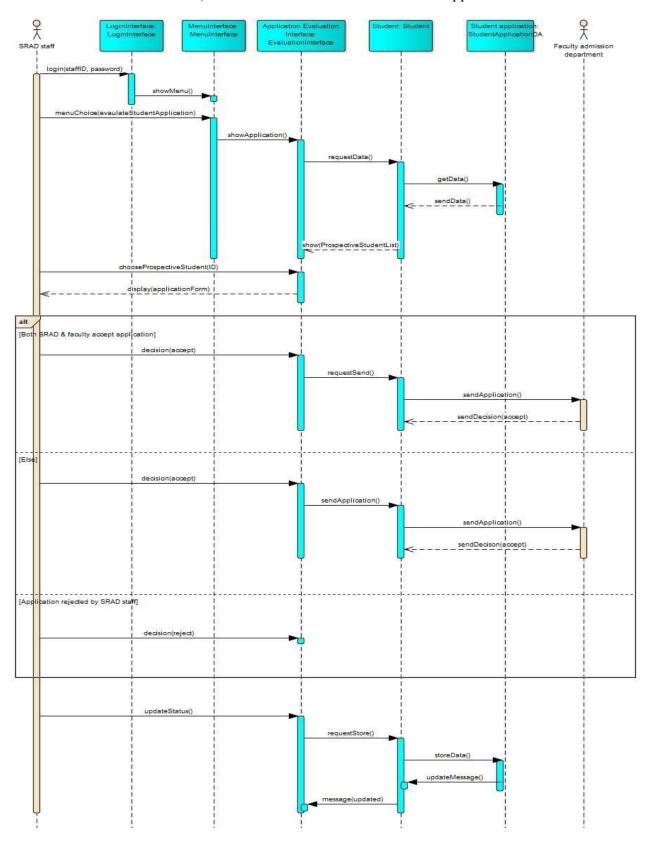


Figure 14: System sequence diagram of review student application

#### 3.2.4 Module 4: Monitoring module

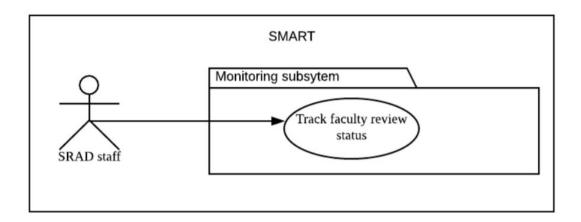


Figure 15: Monitoring Subsystem of UTM SMART system

#### 3.2.4.1 UC008: Track faculty review status

After the faculty have received the student applications from SRAD, the review process will commence. Along the review process, faculty will update the review status and the log will be stored into the application status database. SRAD can retrieve the log from the database show that they can know the progress of the faculty review progress.

## 3.2.4.1 UC008: Track faculty review status

Use case name	Track faculty review status
Use case ID	UC008
Actors	SRAD staff
Pre-conditions	The progress can only be tracked if the faculty already have updated their progress on the system. In other words, the log must be already exist in the application status database.
Normal flow	<ol> <li>The SRAD staff will login to the system using staff ID and password.</li> <li>The system display main menu.</li> <li>The SRAD staff select "track faculty review progress" on menu.</li> <li>System will display a list of pending applications that are now at the hands of faculty admission department.</li> <li>Choose a student application to check the faculty review progress</li> <li>Display the log of the faculty review process for that particular student application.</li> </ol>
Post-conditions	The faculty review progress of the application is kept tracked by the SRAD until the faculty made a decision regarding the application.

## SD008: for UC008 Track faculty review status

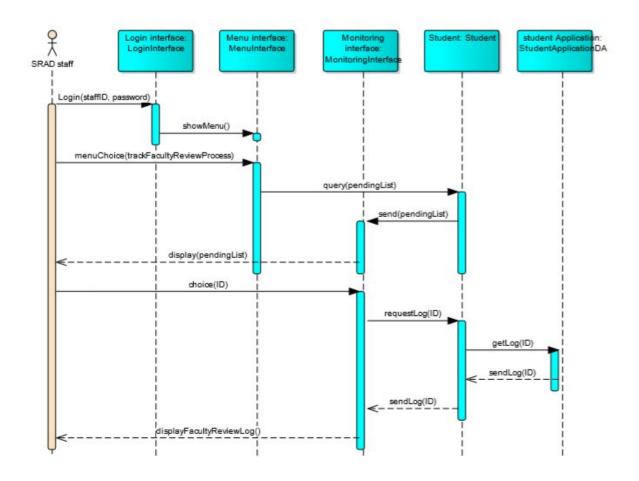


Figure 16: Sequence diagram for track faculty review status

#### 3.2.5 Module 5 : Statistic module

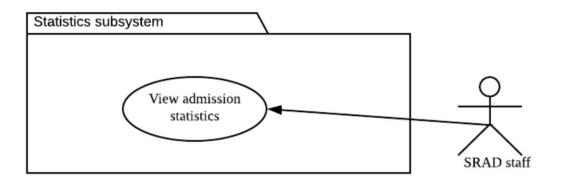


Figure 17: Statistics Subsystem of UTM SMART system

#### 3.2.5.1 UC009: View admission statistics

The number of accepted and rejected applicants across all intake categories, number of unsubmitted draft and KPI of agent can be retrieved from database and viewed as statistic. This feature only available to SRAD staff.

## 3.2.5.1 UC009: View admission statistics

Use case name	View admission statistics
Use case ID	UC009
Actors	SRAD staff
Pre-conditions	SRAD decided to view the admission statistic.
Normal flow	<ol> <li>The SRAD staff will login to the system using staff ID and password.</li> <li>The system display main menu.</li> <li>The faculty staff select "view admission statistic" on menu.</li> <li>The system will display the types of statistics. If admission statistic is chosen, alternative flow 1 is followed. If agent KPI statistic is chosen alternative flow 2 is followed.</li> </ol>
Alternative flow	<ol> <li>SRAD staff want to view admission statistic.</li> <li>System display the intake categories.</li> <li>SRAD staff choose an intake category.</li> <li>SRAD staff want to view agent KPI statistic.</li> <li>System display the list of representative agent.</li> <li>SRAD staff choose an agent.</li> <li>The system will display the KPI statistic of the selected agent</li> </ol>
Post-conditions	The statistics that required by SRAD will be displayed.

## SD009: for UC009 view admission statistic

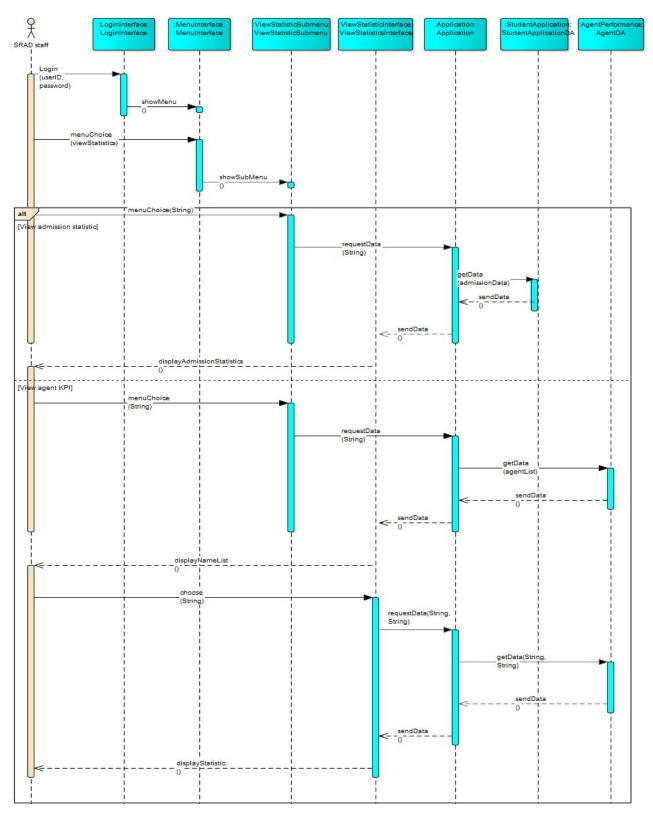


Figure 18: Sequence diagram for view admission statistics

## 4. Data Design

## 4.1 Data Description

All applications after submission are stored into the system database. The UTM SMART database consist of 6 entities, Admin, Agent, Application, Payment, Staff, Student.

## **4.2 Data Dictionary**

Entity	Type	Description
Agent	Class	Since the prospective agents are required to submit their company profile alongside with their application form during registration, these attributes will be included into the prospective agent application class. This class inherits the attributes and methods from application class.
Application	Class	The application is a parent class refers to all applications including prospective agent application and prospective student application. The attributes and methods of this class is inherited for prospective agent application class and prospective student application class. This class includes the common attributes between the two types of applications.
Faculty Admission Staff	Class	This class receives user application from Staff class, it reviews the application then send back the application with its decision of accepting or denying the user application. This class stores the application received from Staff & store with it the application status
Payment	Class	This class stores payment details of applicants from applications
Staff	Class	This class refers to the details of the SRAD staff who evaluate the application forms. The class includes the ID and contact information of the staff.
Student	Class	This class includes all the attributes about the things that need to be submitted by the prospective students. The attributes are the application form and file name of the supplementary documents like passport-sized photo, qualification document etc. This class inherits the attributes and methods from application class.

### 5. User Interface Design

#### 5.1 Overview of User Interface

In order to use the SMART system, the user need to login with their credentials, that is, user ID and password. Upon successful login, the system shall display a menu that only shows functions that is relevant to the logged in users. For example, staff can view pending application list and start evaluating the application while applicants (student or agent) can only choose to initiate a new student registration and agent registration or view application status.

For student registration, the interface consists of application form, processing fee payment interface and document upload interface. While, the registration interface for prospective agent shall consist of application form and interface for them to upload their company profile.

For SRAD staff, the system shall provide interface for them to record down their remarks and decision during the evaluation. Furthermore, the system shall also provide an interface that allow the SRAD staff to monitor the status of faculty review progress. The interface will consist of a timeline that shows the checkpoints of review progress. The SRAD staff can click on the checkpoint to view the log of that progress.

Moreover, the system shall also provide an interface that enable applicants to check the status of their submitted application. The interface will consist of a progress bar and shows the date of completed processes. Finally, the system also provide an interface for SRAD staff to view statistics like admission statistics and agent KPI

## 5.2 Screen Images

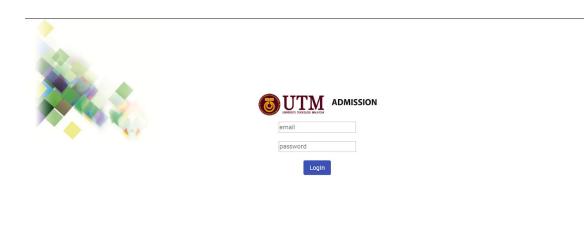


Figure 19: Interface of the Login Page

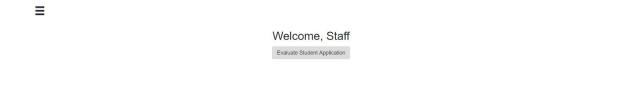


Figure 20: Main menu for SRAD staff

### **→**DEVALUATE STUDENT APPLICATIONS

REGISTRATION ID	FULL NAME	QUALIFICATIONS	STATUS	
006B9DE4-534E-4ACD-BAE1-04B80BC93D97	wong	Degree	APPROVED	Evaluate
B3A8A28C-9661-49BF-AE7C-B7BA9308A450	sing	PMR	REJECTED	Evaluate
BF7153E2-15AC-4356-8F41-AD70186AB469	hua	Intermediate	PENDING	Evaluate
7BB6C9C8-DBE4-4ECE-B7EE-51A1F4E0AA97	123	STPM	REJECTED	Evaluate
4412C9D1-A05E-428F-A058-B067752660F0				Evaluate

Figure 21: Interface of staff's evaluation page

Name:wong

I/c:134515-45-3143

Address:a

DOB:12/5/1212

Qualifications : Degree

Application Status: APPROVED

@Accept

**Reject** 

Submit

Figure 22 Interface for staff to accept or reject the application

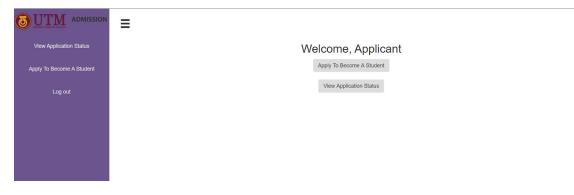


Figure 23: Main page for applicant

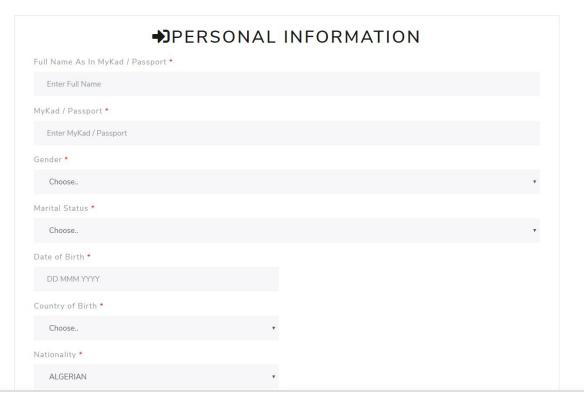


Figure 24: First registration page of applicant

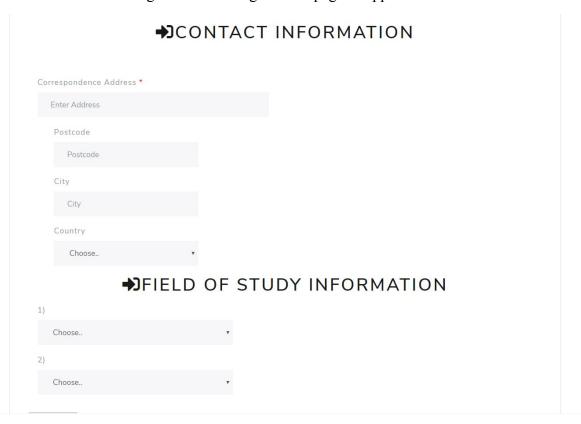


Figure 25: Second registration page of applicant

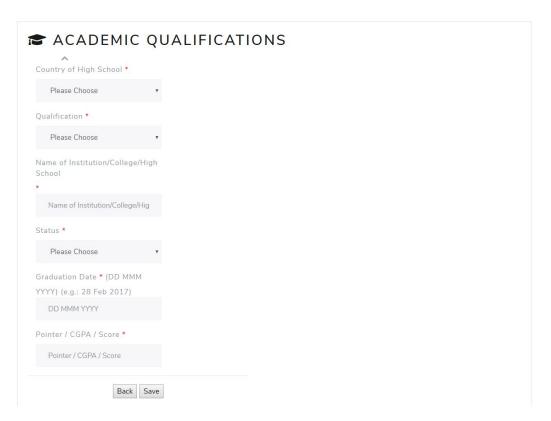


Figure 26: Third registration page of applicant

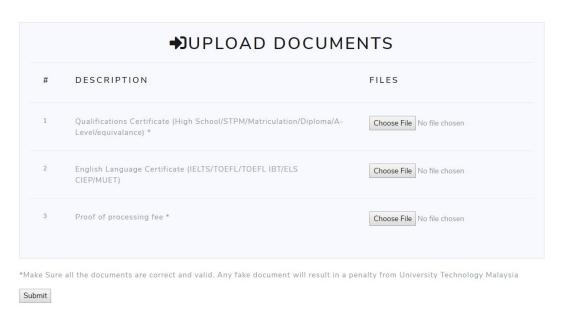


Figure 27: Upload document page of applicant

#### **→**STUDENT APPLICATIONS

ID	FULL NAME	IC NO	GENDER	DOB	
006B9DE4-534E-4ACD-BAE1-04B80BC93D97	wong	134515-45-3143	1	12/5/1212	View
B3A8A28C-9661-49BF-AE7C-B7BA9308A450	sing	855554-34-3456	1	12/4/1997	View
BF7153E2-15AC-4356-8F41-AD70186AB469	hua	954403-14-3333	Р	13/5/1995	View
7BB6C9C8-DBE4-4ECE-B7EE-51A1F4E0AA97	123	970612-13-4135	р	12/6/2011	View
4412C9D1-A05E-428F-A058-B067752660F0					View
16EB3ECA-8452-41C2-A74F-4F4E06C6A868					View
	Back				

Figure 28: View application page of applicant

Name:wong

I/c:134515-45-3143

Address:a

DOB:12/5/1212

Qualifications : Degree

Application Status: APPROVED

Accept

Reject

Submit

Figure 29: Interface for applicant to accept or reject the application

# 6. Requirements Matrix

	Module 1	Module 2	Module 3	Module 4	Module 5
UC001: Apply to become agent	X				
UC002: Apply to become student		X			
UC003: Check application status		X			
UC004: Evaluate agent application			X		
UC005: Evaluate student application			X		
UC006: Check supplementary documents			X		
UC007: Review student application			X		
UC008: Track faculty review status				X	
UC009: View admission statistics					Х

	SD001	SD002	SD003	SD004	SD005	SD006	SD007	SD008	SD009
Module 1	X								
Module 2		X	X						
Module 3				X	X	X	X		
Module 4								X	
Module 5									X

	Student	Agent	SRAD	Faculty Admission Staff	SMART
SD001		X			X
SD002	X	X			X
SD003	X	X			X
SD004			X		X
SD005			X		X
SD006			X		X
SD007			X	X	X
SD008			X		X
SD009			X		X