Developing test cases for RJSC's computerization project

A Thesis

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by

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Declaration

I hereby declare that this thesis is based on the results found by our self. Materials of work found by other researcher are mentioned by reference.

Signature of Supervisor Signature of Author

Acknowledgement

It was our great pleasure to be involved and work in a real life project. Our thesis topic is “Developing test cases for RJSC’s computerization process”.

We would like to extend our sincere thank to Mr. Matin Saad Abdullah, Lecturer, CSE Dept. BRAC University, Dhaka for his valuable support to fulfill our academic assignment. Also we honor his immense contribution throughout the process of study. His contribution in the preparation of the concept paper, literature, methodology and writing this report is highly acknowledged.

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Abstract

This report is based on the project “Computerization of the Office of Registrar Joint Stock Companies and Firms”. Our client is South Asia Enterprise Development Facility (SEDF) and the system owner is Registrar of Joint Stock Companies and Firms (RJSC). We worked for Development Design Consultants Ltd (DDC) and generated use cases and test cases for RJSC’s computerization process. According to RJSC’s Business Process, The main activities of RJSC are as follows:

- Issuance of Name Clearance Certificate
- New Company Registration
- Returns Filing
- Issuance of Certified Copies of the Documents

Each activity module is divided into different sub processes. In our project we generated 42 use cases and corresponding test cases. As tester our main objective was to determine that the user requirement is fulfilled, determine that the needs have been defined and documented, verify that a reasonable process was followed, determine consistency with design and adequacy of design.

Contents

Chapter 1: Introduction

Software testing is very important in software development process. It is better to start testing as early in the software development process as possible. Delaying the start of testing activities until all development is done is a high-risk way to proceed. If significant bugs are found at that stage (and they usually are), then schedules often slip. It is not an easy job to do testing. First, testing software is a very difficult proposition; and second, testing is typically done without a clear methodology.

Haphazard methods of designing, organizing, and implementing testing activities and artifact also frequently lead to less-than-adequate test coverage. Having a straightforward plan for how testing is done can help increase coverage, efficiency, and ultimately software quality.

We work as a tester for the company Development Design Consultants Ltd. (DDCl). We work on the project “Computerization of the Office of Registrar Joint Stock Companies and Firms”. RJSC is government authority to keep record of all Firms and companies. According to RJSC’s business process, RJSC perform four main tasks.

- Name clearance Module
- Registration Module
- Returns Filing Module
- Issuance of Certified Copies Module

We develop UML for each subsystem. Use cases are basically based on unified modeling language. With the help of UML and design diagram use cases are generated. As soon use cases are developed, test cases are generated for each use case.

As a tester our main objective was to determine that the user requirement is fulfilled, determine that the needs have been defined and documented, Verify that a reasonable process was followed, determine consistency with design and adequacy of design.

Chapter 2: Project Background

2.1 Project Information

Development Design Consultants Limited (DDC), the Consultant has been awarded with the Contract by South Asia Enterprise Development Facility (SEDF) for the project named ‘Computerization of the Office of Registrar Joint Stock Companies and Firms’.

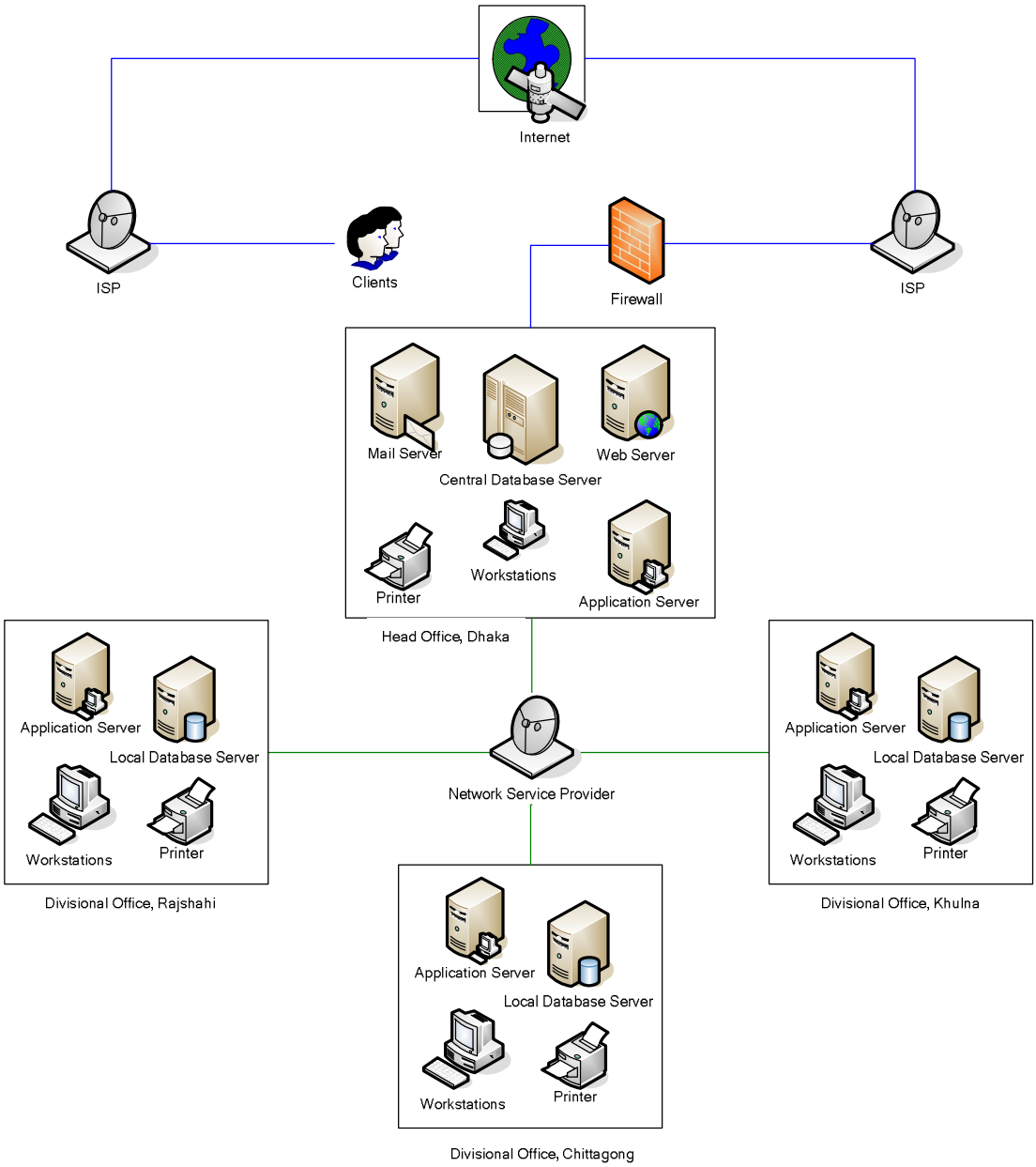
The Registrar of Joint Stock Companies and Firms (RJSC) is the sole authority that facilitates company formation for public & private companies, foreign companies, partnerships, trade organization and societies and keeps track of all ownership-related issues as prescribed by the laws in Bangladesh.

The objective of this project is to automate all functions of the Registrar of Joint Stock Companies and Firms, Dhaka as well as other divisional offices at Chittagong, Khulna and Rajshahi.

Computerization of RJSC will reduce the time necessary for company registration, increase the efficiency of the office of the RJSC, and allow more accurate and efficient provision of information about the registration and filing processes and about registered companies in Bangladesh. The automation will allow the RJSC to monitor the compliance with regulatory reporting requirements and ownership reporting. The impact will be a more conductive environment for business registration and a stronger system of corporate governance compliance, which will assist in the growth of a healthy private sector.

2.2 Overall System Architecture:

Each divisional office and head office of RJSC will be powered by a separate database server and an application server. A web server and a mail server will be set up at head office only. Each Divisional Office will be connected to the head office through fiber optics or DDN and the head office will be connected to the internet through an ISP.


Internet
ISP
Clients
Firewall
ISP
Mail Server
Central Database Server
Web Server
Printer
Workstations
Application Server
Head Office, Dhaka
Application Server
Local Database Server
Workstations
Printer
Divisional Office, Rajshahi
Network Service Provider
Application Server
Local Database Server
Workstations
Printer
Divisional Office, Khulna
Application Server
Local Database Server
Workstations
Printer
Divisional Office, Chittagong

2.3 Client Background:

The Registrar of Joint Stock Companies and Firms (RJSC) is the sole authority, which facilitates company formation for public companies and partnerships and keeps track of all ownership-related issues as prescribed by law in Bangladesh.

RJSC operates under the Ministry of Commerce, Government of the People's Republic of Bangladesh. The office was first setup at Chittagong in erstwhile East Pakistan at the eve of partition of India in 1947 with a small number of records and files of the company, society and partnership firms. The office was shifted to Dhaka in 1962. The numbers of incorporated companies are increasing day by day.

The total number of incorporated companies, societies, trade organizations, and partnership firms up to December 2004 is 101,000. The head office of the RJSC is situated at 24-25, Dilkusa C/A, Dhaka in a rented accommodation. The total approved manpower for the office is 39.

There are three divisional office in Chittagong, Khulna and Rajshahi with 8 employees in each office and headed by an assistant registrar. These offices are functioning under the central administration of the registrar.

In short the functions and activities of the office is to incorporate the company, society and partnership firms under the companies act, 1994, Societies Registration Act, 1860 and partnership Act 1932 respectively and administer and enforce the relevant statutory provisions of those acts in relation to the incorporated companies, societies and partnership firms in the country.

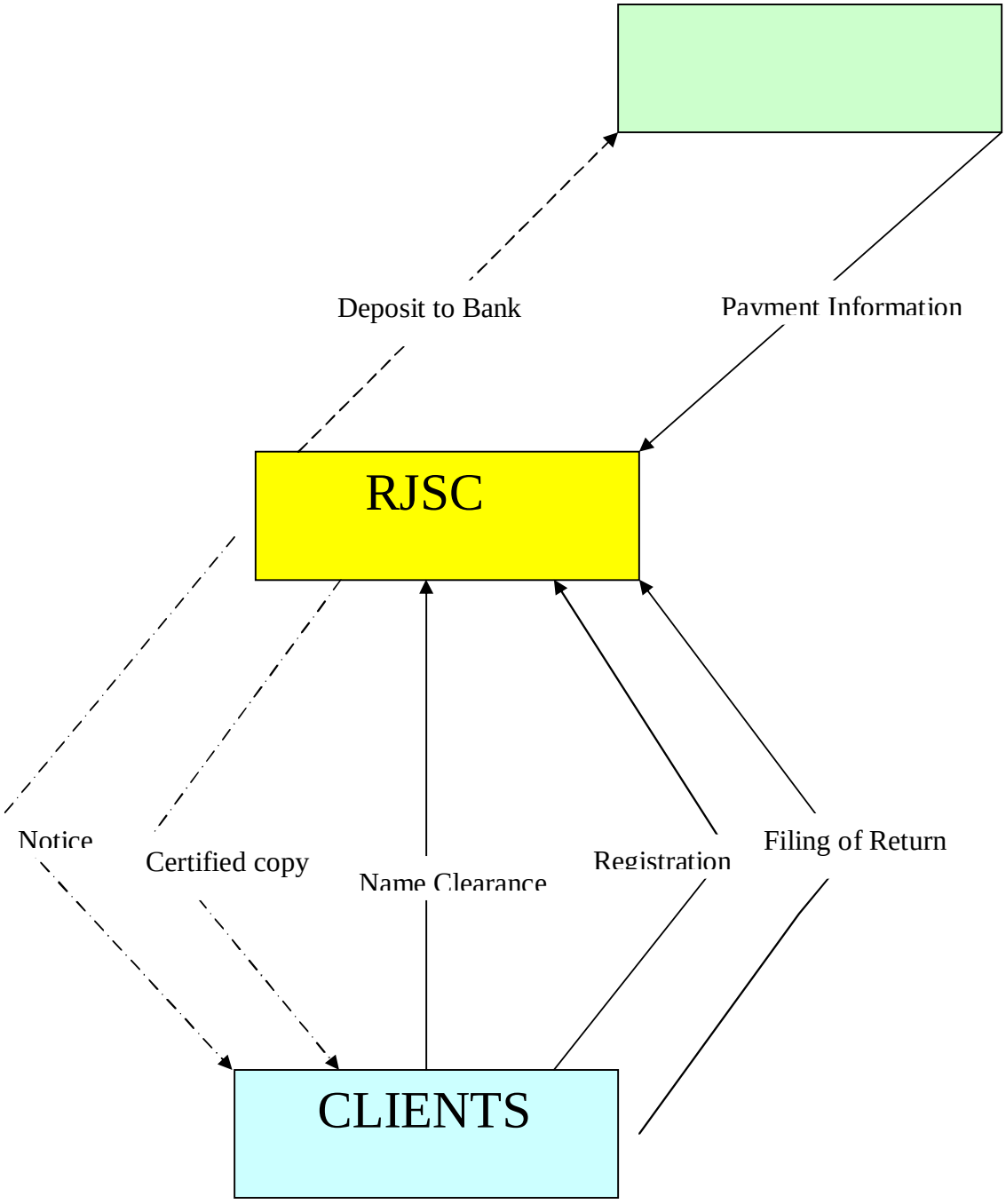


Figure: Logical View of RJSC

Chapter 3: Background Information

3.1Purpose of the Use case:

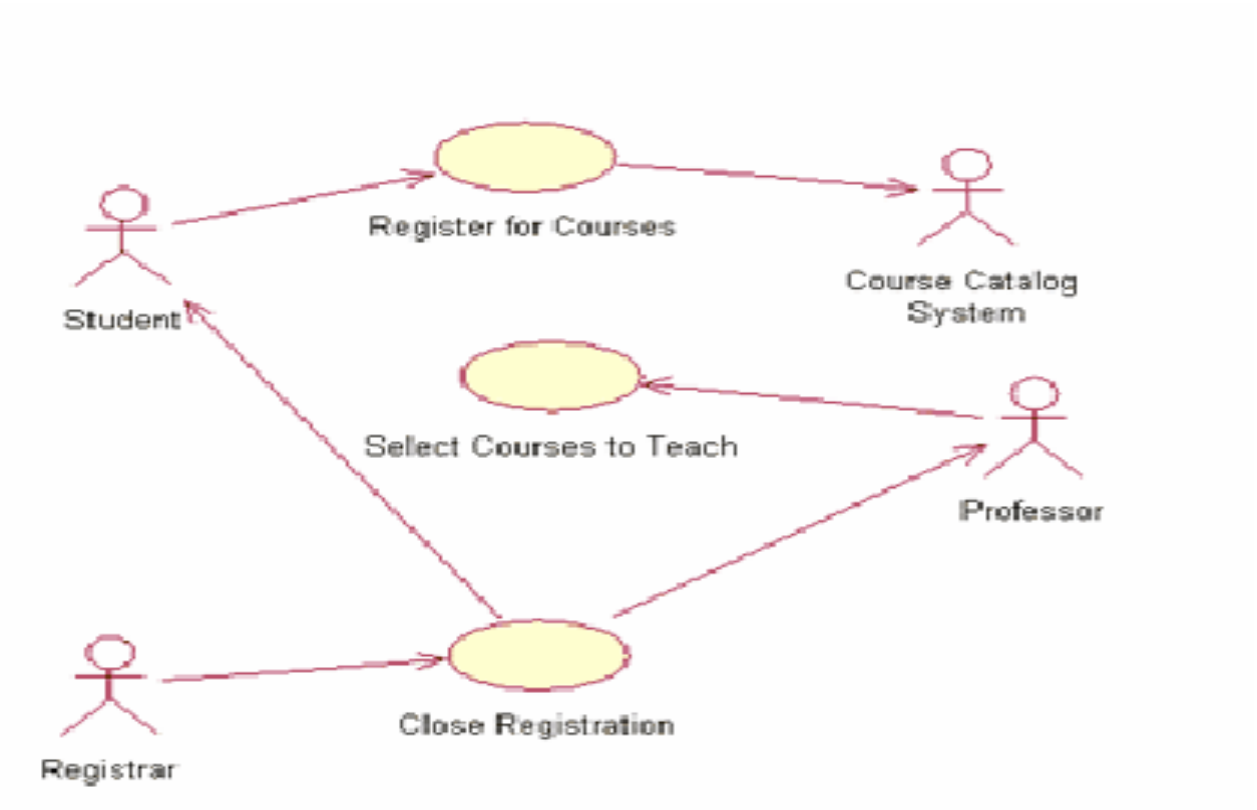
A use case captures a contract between the stakeholders of a system about its behavior. The use case describes the system's behavior under various conditions as it responds to a request from one of the stakeholders, called the primary actor. The primary actor initiates an interaction with the system to accomplish some goal. The system responds, protecting the interests of all the stakeholders. Different sequences of behavior, or scenarios, can unfold, depending on the particular requests made and conditions surrounding the requests. The use case collects together those different scenarios.

Use cases are fundamentally a text form, although they can be written using flow charts, sequence charts, Petri nets, or programming languages. Under normal circumstances, they serve to communicate from one person to another, often to people with no special training. Simple text is, therefore, usually the best choice.

The use case, as a form of writing, can be put into service to stimulate discussion within a team about an upcoming system. They might later use that the use case form to document the actual requirements. Another team might later document the final design with the same use case form. They might do this for a system as large as an entire company, or as small as a piece of a software application program. What is interesting is that the same basic rules of writing apply to all these different situations, even though the people will write with different amounts of rigor, at different levels of technical detail.

Use cases are based on the Unified Modeling Language (UML) and can be Visually represented in use-case diagrams.

Example of a Use case diagram for a University registration process:



When the use cases document an organization's business processes, the system under discussions the organization itself. The stakeholders are the company shareholders, customers, vendors, and government regulatory agencies. The primary actors will include the company's customers and perhaps their suppliers. When the use cases record behavioral requirements for a piece of software, the system under discussion is the computer program. The stakeholders are the people who use the program, the

Company owning it, government regulatory agencies, and other computer programs. The primary actor will be the user sitting at the computer screen or another computer system.

3.2 Implementation of Use Case:

The most important part of a use case for generating test cases is the flow of events. The two main parts of the flow of events are the ***basic flow of events*** and the ***alternate flows of events***. The basic flow of events should cover what "normally" happens when the use case is performed. The alternate flows of events covers behavior of an optional or exceptional character relative to normal behavior, and also variations of the normal behavior.

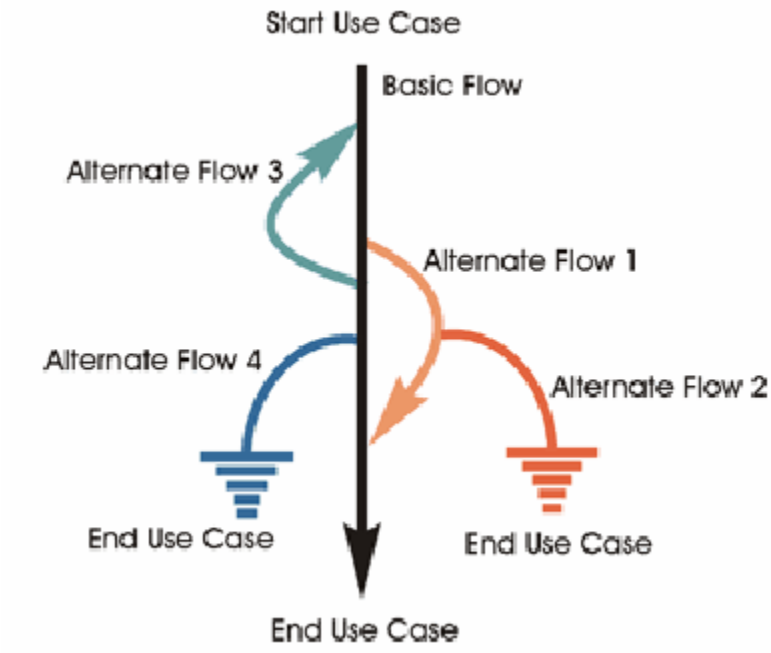


Figure: Basic Flows of events and alternative Flows of events for a Use case

Use cases are a form of writing that can be put to use in different situations, to describe

- A business' work process,
- To focus discussion *about* upcoming software system requirements, but not be the requirements description,
- To be the functional requirements for a system, or
- To document the design of the system.

They might be written in a small, close-knit group, or in a formal setting, or in a large or distributed group.

Each situation calls for a slightly different writing style. They are briefly described here:

- A close-knit group gathering requirements, or a larger group discussing upcoming requirements will write **casual** as opposed to the **fully dressed** use cases written by larger, geographically distributed or formally inclined teams. The casual form "short circuits" the use case template, making the use cases faster to write (see more on this below). All of the use cases shown above are fully dressed, using the full use case template and step numbering scheme.

- Business process people will write **business** use cases to describe the operations of their business, while a hardware or software development team will write **external, system** use cases for their requirements. The design team may write **internal**, **system** use cases to document their design or to break down the requirements for small subsystems.

- Depending on the level of view needed at the time, the writer will choose to describe a multisittingor **summary** goal, a single-sitting or **user goal**, or a part of a user goal, or **sub function.**
- Anyone writing requirements for a new system to be designed, whether business process or computer system, will write **black-box** use cases - use cases that do not discuss the insides of the system. Business process designers will write **white-box** use cases, showing how the company or organization runs its internal processes. The technical development team might do the same to document the operational context for the system they are about to design, and they might write white-box use cases to document the workings of the system they just designed.

In current practice, use cases are associated with the front end of the software development lifecycle and use case scenarios are used as the basis for creating test cases.

3.3 Purpose of the Test Case:

A test case is a set of test inputs, execution conditions, and expected results developed for a particular objective: to exercise a particular program path or verify compliance with a specific requirement, for example.

The purpose of a test case is to identify and communicate conditions that will be implemented in test. Test cases are necessary to verify successful and acceptable implementation of the product requirements (use cases).

We will describe a three-step process for generating test cases from a fully detailed
use case:

1. For each use case, generate a full set of use-case scenarios.
2. For each scenario, identify at least one test case and the conditions that will make it "execute."
3. For each test case, identify the data values with which to test.

These steps are described below:

Step One: Generate Scenarios

To generate test case at first Read the use-case textual description and identify each combination of main and alternate flows, the scenarios and create a scenario matrix.

Step Two: Identify Test Cases

Once the full set of scenarios has been identified, the next step is to identify the test cases. We can do this by analyzing the scenarios and reviewing the use case textual description as well. There should be at least one test case for each scenario, but there will probably be more.

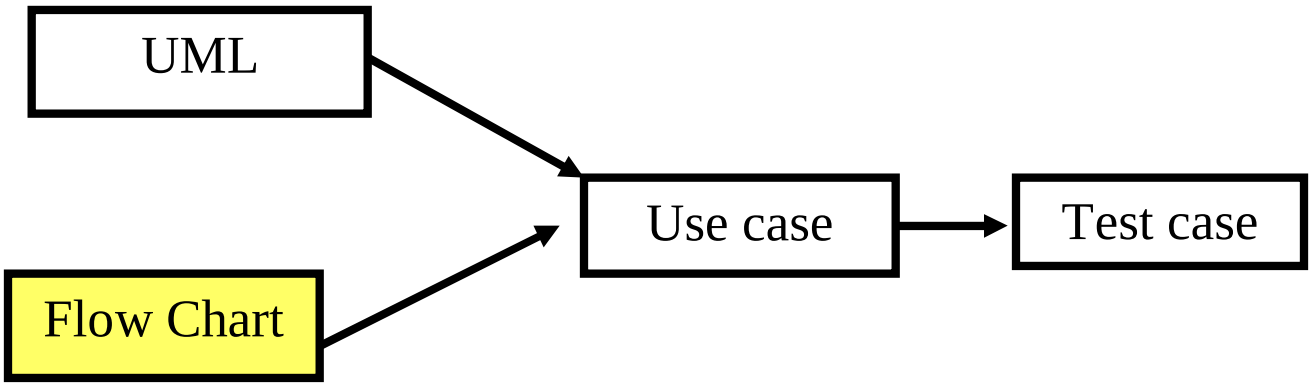
For example, if the textual description for an alternate flow is written in a very cursory way, like the description below,
3A. Unfulfilled Prerequisites, Course Full, or Schedule Conflicts
then additional test cases may be required to test all the possibilities. In addition, we may wish to add test cases to test boundary conditions.
The next step in fleshing out the test cases is to reread the use-case textual description and find the conditions or data elements required to execute the various scenarios.

Step Three: Identify Data Values to Test
Once all of the test cases have been identified, they should be reviewed and validated to ensure accuracy and to identify redundant or missing test cases. Then, once they are approved, the final step is to substitute actual data values for the *I*s and *V*s. Without test data, test cases (or test procedures) can't be implemented or executed; they are just descriptions of conditions, scenarios, and paths. Therefore, it is necessary to identify
actual values to be used in implementing the final tests.

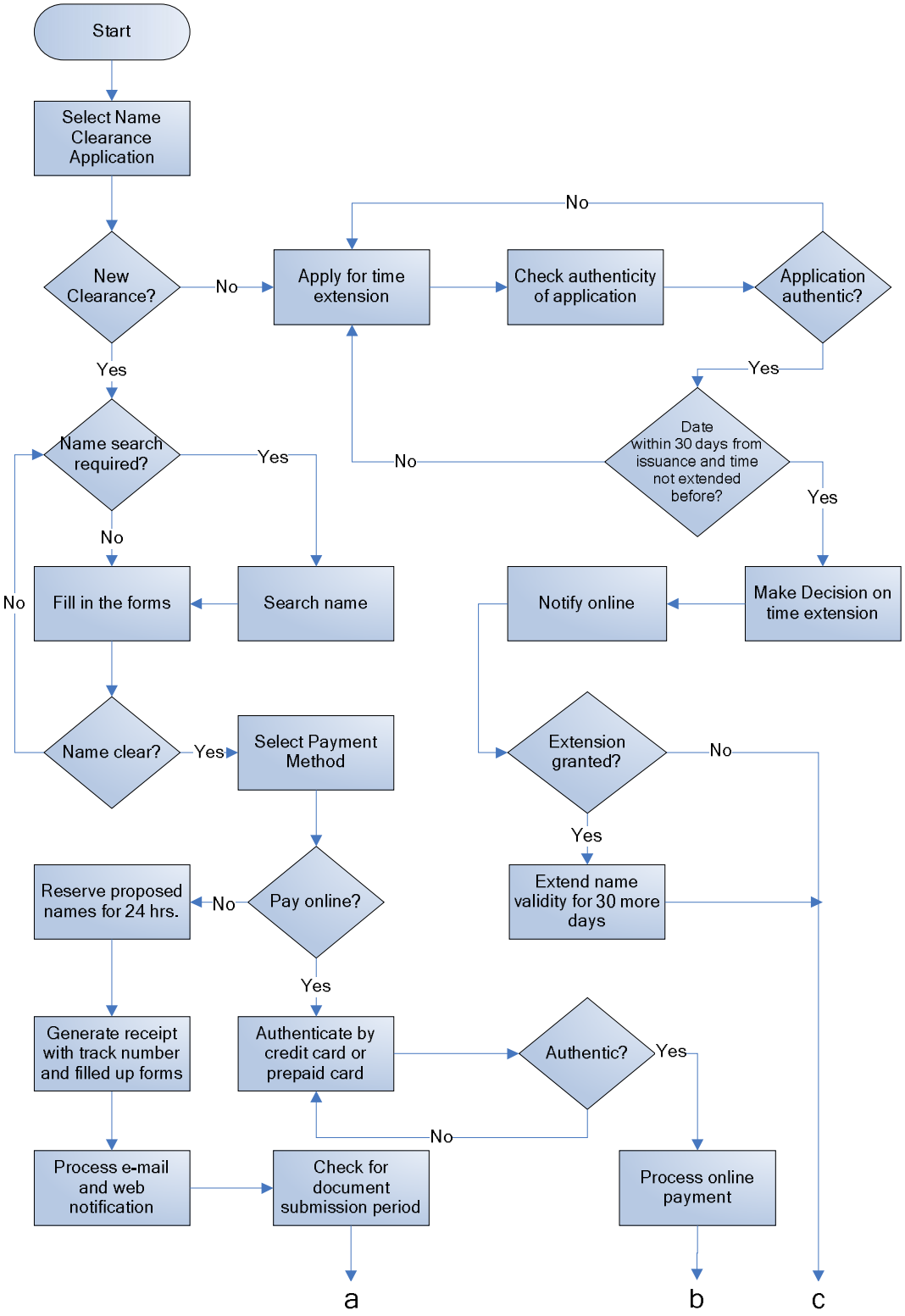
In current practice, use cases are associated with the front end of the software development lifecycle and test cases are typically associated with the latter part of the lifecycle. By leveraging use cases to generate test cases, however, testing teams can get started much earlier in the lifecycle, allowing them to identify and repair defects that would be very costly to fix later, ship on time, and ensure that the system will work reliably. Using the clearly defined methodology that is described above for generating test cases, developers can simplify the testing process, increase efficiency, and help ensure complete test coverage.

Chapter 4: Implementation

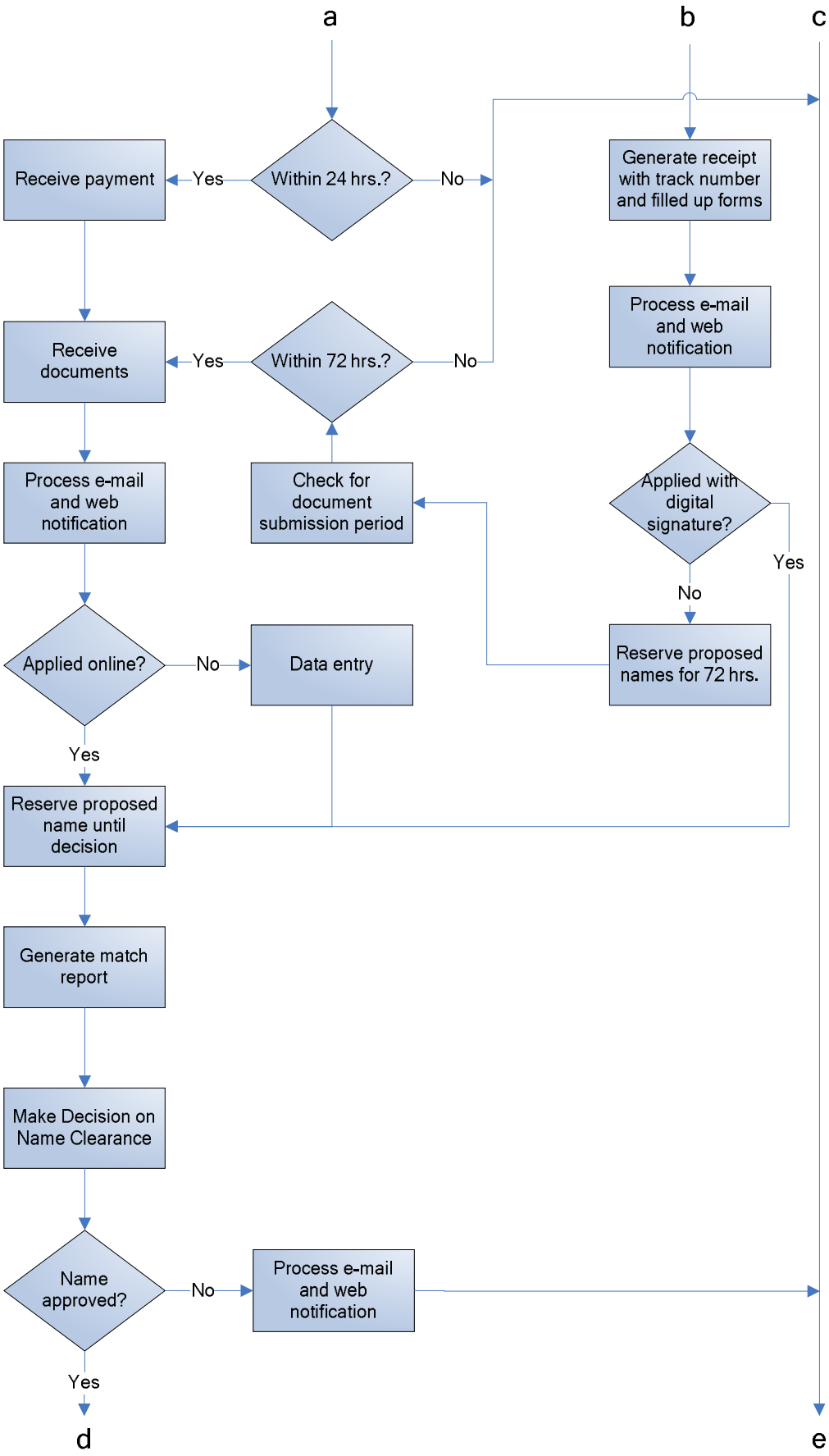
4.1 Steps In Generating Test Cases



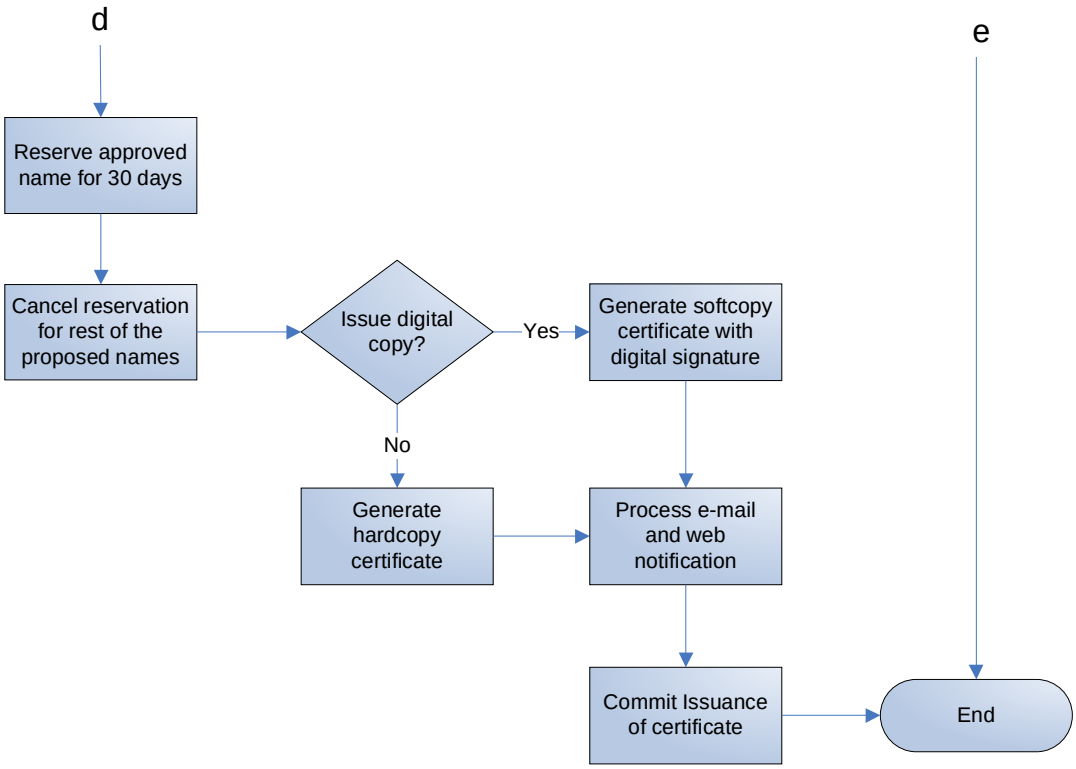
4.2 Design Diagram of Name Clearance Module


Start
Select Name Clearance Application
New Clearance?
No
Apply for time extension
Check authenticity of application
Application authentic?
No
Yes
Yes
Name search required?
Yes
No
Date within 30 days from issuance and time not extended before?
No
Yes
No
Fill in the forms
Search name
Notify online
Make Decision on time extension
No
Name clear?
Yes
Select Payment Method
Extension granted?
No
Yes
Reserve proposed names for 24 hrs.
No
Pay online?
Extend name validity for 30 more days
Yes
Generate receipt with track number and filled up forms
Authenticate by credit card or prepaid card
Authentic?
Yes
No
Process e-mail and web notification
Check for document submission period
Process online payment
a
b
c

Continued…


a
b
c
Receive payment
Yes
Within 24 hrs.?
No
Generate receipt with track number and filled up forms
Receive documents
Yes
Within 72 hrs.?
No
Process e-mail and web notification
Process e-mail and web notification
Check for document submission period
Applied with digital signature?
Yes
No
Applied online?
No
Data entry
Reserve proposed names for 72 hrs.
Yes
Reserve proposed name until decision
Generate match report
Make Decision on Name Clearance
Name approved?
No
Process e-mail and web notification
Yes
d
e

Continued…


d
e
Reserve approved name for 30 days
Cancel reservation for rest of the proposed names
Issue digital copy?
Yes
No
Generate softcopy certificate with digital signature
Generate hardcopy certificate
Process e-mail and web notification
Commit Issuance of certificate
End

4.3 UML Of Name Clearance Module

4.4 Use Case Of Apply For Name Clearance

UC1: Apply for name clearance.
Primary Actor: promoter.

Stakeholders and interest:

Promoter: wants accurate, fast search and get the receipt successfully.
RJSC: wants successful completion of name clearance process.

Post condition: Receipt has been generated successfully. E-mail has been sent and acknowledged and accordingly web notification sent.

Basic Flow:

1.Promoter browses to RJSC's web site.
2.Promoter selects name clearance application.
3.Name search is not required.
4.System displays the name clearance form.
5.Promoter enters name, address, three alternative company name and type the e-mail address twice.
6.Promoter completes filling up the form.
7.System shows a validation message.
8.Promoter selects manual payment method.
9.System reserves valid name for 24-hours.
10.System shows a reservation message.
11.System generates receipt with track number.
12.Receipt is printed.
13.System sends an e-mail and web notification to the promoter.

Extensions:

*a. At any time system fails:

To ensure recovery, the system should have back-up storage.

3a.Name search is required:

1. Promoter searches for existing names in RJSC's website.

5a.Company names are not valid:

1.System shows a message to re-enter the company names.

5b.Invalid e-mail address:

1.System requests to enter the valid e-mail address.

5c.Two e-mail address does not match:

1.System shows a message to check the e-mail address.

5d.Promoter uses special character in the name:

1.System shows an error message.

5e.Promoter does not enter any company name:

1.System shows a requesting message to enter at least one company name.

9a.Payment is not done within 24-hours:

1.Reservation will be deleted automatically.

2.E-mail will be sent to the promoter to inform that the name reservation has been canceled.

12.a. Receipt is not printed.

1.System shows an warning message.

13a.Promoter does not get the confirmation e-mail and web notification

1.Current form is canceled.

2.Promoter has to redo the process.

4.5 Test Case Of Apply For Name Clearance

Step:1 Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Successful name clearance	Basic Flow	
Scenario 2-Name Search Required	Basic Flow	3a
Scenario 3-Wrong Input by Promoter	Basic Flow	5a, 5b, 5c, 5d or 5e
Scenario 4-Late Payment	Basic Flow	9a
Scenario 5-Receipt not Printed	Basic Flow	12a
Scenario 6- Failure in e-mail confirmation and web notification	Basic Flow	13a

Step: 2 Identify Test Cases

Test Case Id	Scenario	Name	Address	Company Name	1st Email Address	**2nd Email Address**	Match two Email address	Payment within 24 hrs	Print	Email & web notify	Expected Result
TC1	Scenario 1- Successful name clearance	V	V	V	V	V	V	V	V	V	Receipt generate, email sent, web notified
TC2	Scenario 2- Name Search Required	I	V	V	V	V	V	N/A	N/A	N/A	Name exists, Search for another name OR Show Message to re-enter name (for invalid
TC3	Scenario 3- Wrong Input by Promo	V	I	V	V	V	V	N/A	N/A	N/A	Show Message to enter address
TC4	Scenario 3- Wrong Input by Promoter	V	V	I	V	V	V	N/A	N/A	N/A	Show Message to enter at least one company's name
TC5	Scenario 3- Wrong Input by Promo	V	V	V	I	V	N/A	N/A	N/A	N/A	

TC6	Scenario 3- Wrong Input by Prom	V	V	V	V	I	N/A	N/A	N/A	N/A	Show Message to re-enter 2nd email address
TC7	Scenario 3- Wrong Input by Prom	V	V	V	V	V	I	N/A	N/A	N/A	Show Message that two email address mismatch
TC8	Scenario 4- Late Payment	V	V	V	V	V	V	I	N/A	N/A	Reservation cancel, email sent to promoter to inform
TC9	Scenario 5- Receipt not Printed	V	V	V	V	V	V	V	I	N/A	Show warning message
TC10	Scenario 6- Failure in e-mail confirmation and web notification	V	V	V	V	V	V	V	V		

I – Invalid Data
V- Valid Data
N/A- Data not required

Step 3: Identify Data Values To Test

Test Case Id	Scenario	Name	Address	Company Name	1st Email Address	**2nd Email Address**	Match two Email address	Payment within 24 hrs	Print	Email & web notify	Expected Result
TC1	Scenario 1-Successful name clearance	abc	as	nb	xy	xy	yes	yes	yes	yes	Receipt generate, email sent, web notified
TC2	Scenario 2-Name Search Requir	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Browses to RJSC's website
TC3	Scenario 3-Wrong input by promo	abx	as	nb	xy	xy	yes	N/A	N/A	N/A	Show message to enter name
TC4	Scenario 3-Wrong Input by Promo	abc	l	nb	xy	xy	yes	N/A	N/A	N/A	Show Message to enter address
TC5	Scenario 3-Wrong Input by Promoter	abc	as	l	xy	xy	yes	N/A	N/A	N/A	

TC6	Scenario 3-Wrong Input by Promoter	abc	as	nb	I	xy	N/A	N/A	N/A	N/A	Show Message to re-enter 1st email address
TC7	Scenario 3-Wrong Input by Promoter	abc	as	nb	xy	I	N/A	N/A	N/A	N/A	Show Message to re-enter 2nd email address
TC8	Scenario 3-Wrong Input by Promoter	abc	as	nb	xy	xy	I	N/A	N/A	N/A	Show Message that two email address mismatch
TC9	Scenario 4-Late Payment	abc	as	nb	xy	xy	yes	I	N/A	N/A	Reservation cancels, email sent to promoter to inform
TC10	Scenario 5-Receipt not Printed	abc	as	nb	xy	xy	yes	yes	I	N/A	Show warning message
TC11	Scenario 6-Failure in e-mail confirmation and web notification	abc	as	nb	xy	xy	yes	yes	yes	I	

APPENDIX

Name Clearance Module

UC2: Apply for time extension.

Primary Actor: Promoter.

Stakeholders and Interests:

Promoter: Wants successful completion of time extension.

Preconditions: Promoters name must be present in RJSC's database

Post condition: Request for time extension is granted

Basic Flow:

1. Promoter goes to RJSC's website.
2. Select name clearance application.
3. Apply for time extension.
4. System checks for authentication.
5. System checks that the time extension application is done within ten days from the day of name issuance.
6. System checks whether the promoter has applied for time extension before.
7. System grants time extension request.
8. System sends an e-mail to the promoter.
9. System extends name validity for 30 more days.

Extension:

*a. System fails at any time:

-To ensure recovery, system must have a back-up storage.

4.1. System finds authentication failure:

-System shows an authentication failure message.

5.1. Time extension application is not done within 30 days from name issuance:

-System displays that the time for time extension application is over.

6.1 Promoter has applied for time extension before:

-System displays an authentication failure message.

7.1. System has not granted time extension request:

-System automatically terminates.

Test Case of Apply for time extension.

Step One: Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Successful time extension	Basic Flow	
Scenario 2- Authentication failure	Basic Flow	4a
Scenario 3-Late submission	Basic Flow	5a
Scenario 4-Applied for time extension before	Basic Flow	6a
Scenario 5-Request is not granted	Basic Flow	7a

Step Two: Identify Test Cases

Test Case Id	Scenario	Name	Address	Company Name	Submission on time	Applied before	Email	Validity extends	Expected Result
TC1	Scenario 1- Successful time extension	V	V	V	V	V	V	V	Time extension request has granted.
TC2	Scenario 2- Authentication failure	I	V	V	N/A	N/A	N/A	N/A	Show authentication failure message.

TC3	Scenario 2- Authentication failure	V	I	V	N/A	N/A	N/A	N/A	Show authentication failure message.
TC4	Scenario 2- Authentication failure	V	V	I	N/A	N/A	N/A	N/A	Show authentication failure message.
TC5	Scenario 3- Late submission	V	V	V	I	N/A	N/A	N/A	Time for submission the application is over.
TC6	Scenario 4- Applied for time extension before	V	V	V	V	I	N/A	N/A	Show authentication failure message.
TC7	Scenario 5- Request is not granted	N/A	N/A	N/A	N/A	N/A	N/A	N/A	System automatically terminates.

I – Invalid Data

V- Valid Data

N/A- Data not required

UC3: Accept Payment.

Primary Actor: Dealing Officer.

Stakeholders & interests:
Dealing Officer: Wants to receive payments successfully.
Promoter: Wants to pay the amount successfully.

Precondition: Dealing Officer must be authenticated.
Post condition: Receipt will be generated successfully.

Main Success Scenario:
1.Dealing Officer logs in.
2.Enter receipt number into system.
3.System checks the receipt number.
4.Dealing Officer enters amount paid.
5.System generates printable receipt.
6.Dealing Officer gives print command.
7.Receipt is printed.

Extension:
3.a. Receipt number does not match.
1.System shows an error message.
2.Reenters receipt number.
7.a. Receipt has not printed.
1.System shows a warning message.

Test Case of Accept Payment

Step One: Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Successful accept payment	Basic Flow	
Scenario 2- Authentication failure	Basic Flow	3a
Scenario 3-Receipt has not printed	Basic Flow	7a

Step Two: Identify Test Cases

Test Case Id	Scenario	Name	Address	Company Name	Match receipt number	Amount paid	Print	Expected Result
TC1	Scenario 1- Successful accept payment	V	V	V	V	V	V	Receipt has generated successfully.
TC2	Scenario 2- Authentication failure	I	V	V	V	N/A	N/A	Show authentication failure message.
TC3	Scenario 2- Authentication failure	V	I	V	V	N/A	N/A	Show authentication failure message.
TC4	Scenario 2- Authentication failure	V	V	I	V	N/A	N/A	Show authentication failure message.

TC5	Scenario 2- Authentication failure	V	V	V	I	N/A	N/A	Show authentication failure message.
TC6	Scenario 3- Receipt has not printed	V	V	V	V	V	I	Show a warning message.

I – Invalid Data

V- Valid Data

N/A- Data not required

UC4: Accept Document.

Primary Actor: Dealing Officer.

Stakeholders & interests:
Dealing Officer: Wants to receive documents successfully.
Promoter: Wants successful processing of the documents.

Precondition: Dealing Officer must be authenticated.
Post condition: Document will be generated successfully.

Main Success Scenario:
1.Dealing Officer logs in.
2.Enter document submission receipt number into system.
3.System checks the receipt number.
4.Dealing Officer marks document submission by promoter.
5.Dealing Officer write comment.
6.Gives print command.
7.System generates document submission receipt.
8.System reserves name until decision.

Extension:
3.a. Receipt number does not match.
1.System shows an error message.
2.Reenters receipt number.
7.a. Receipt has not printed.
1.System shows a warning message.

Test Case Of Accept Document

Step One: Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Successful accept document	Basic Flow	
Scenario 2- Authentication failure	Basic Flow	3a
Scenario 3-Receipt has not printed	Basic Flow	7a
Scenario 4-Document receipt has not printed	Basic Flow	12a

Step Two: Identify Test Cases

Test Case Id	Scenario	Name	Address	Company Name	Match receipt number	Amount paid	Print payment receipt	Print document receipt	Expected Result
TC1	Scenario 1- Successful accept document	V	V	V	V	V	V	V	Receipt has generated successfully.
TC2	Scenario 2- Authentication failure	I	V	V	V	N/A	N/A	N/A	Show authentication failure message.

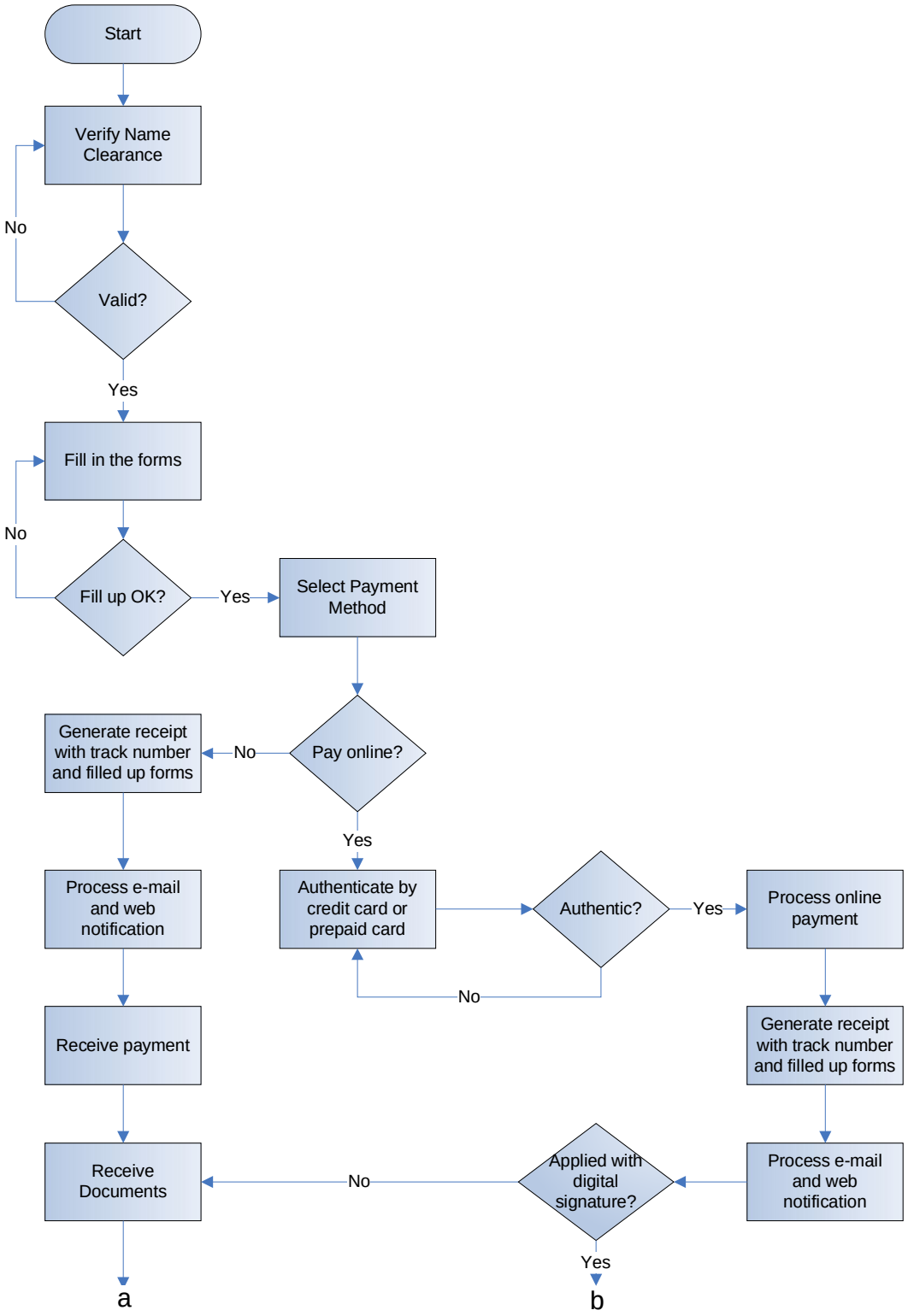
TC3	Scenario 2- Authentication failure	V	I	V	V	N/A	N/A	N/A	Show authentication failure message.
TC4	Scenario 2- Authentication failure	V	V	I	V	N/A	N/A	N/A	Show authentication failure message.
TC5	Scenario 2- Authentication failure	V	V	V	I	N/A	N/A	N/A	Show authentication failure message.
TC6	Scenario 3- Receipt has not printed	V	V	V	V	V	I	N/A	Show a warning message.
TC7	Scenario 4- Receipt has not printed	V	V	V	V	V	V	I	Show a warning message.

I – Invalid Data

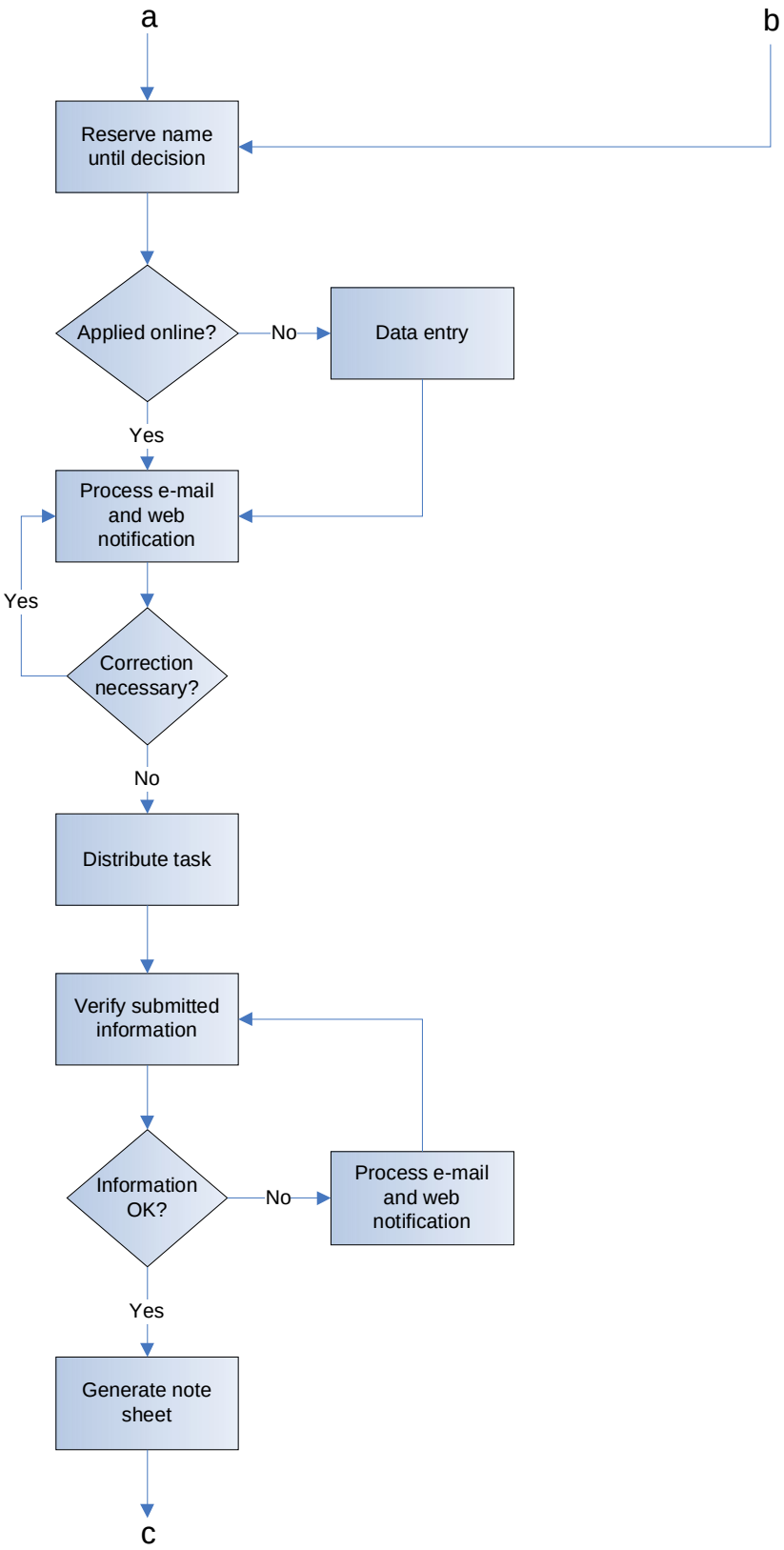
V- Valid Data

N/A- Data not required

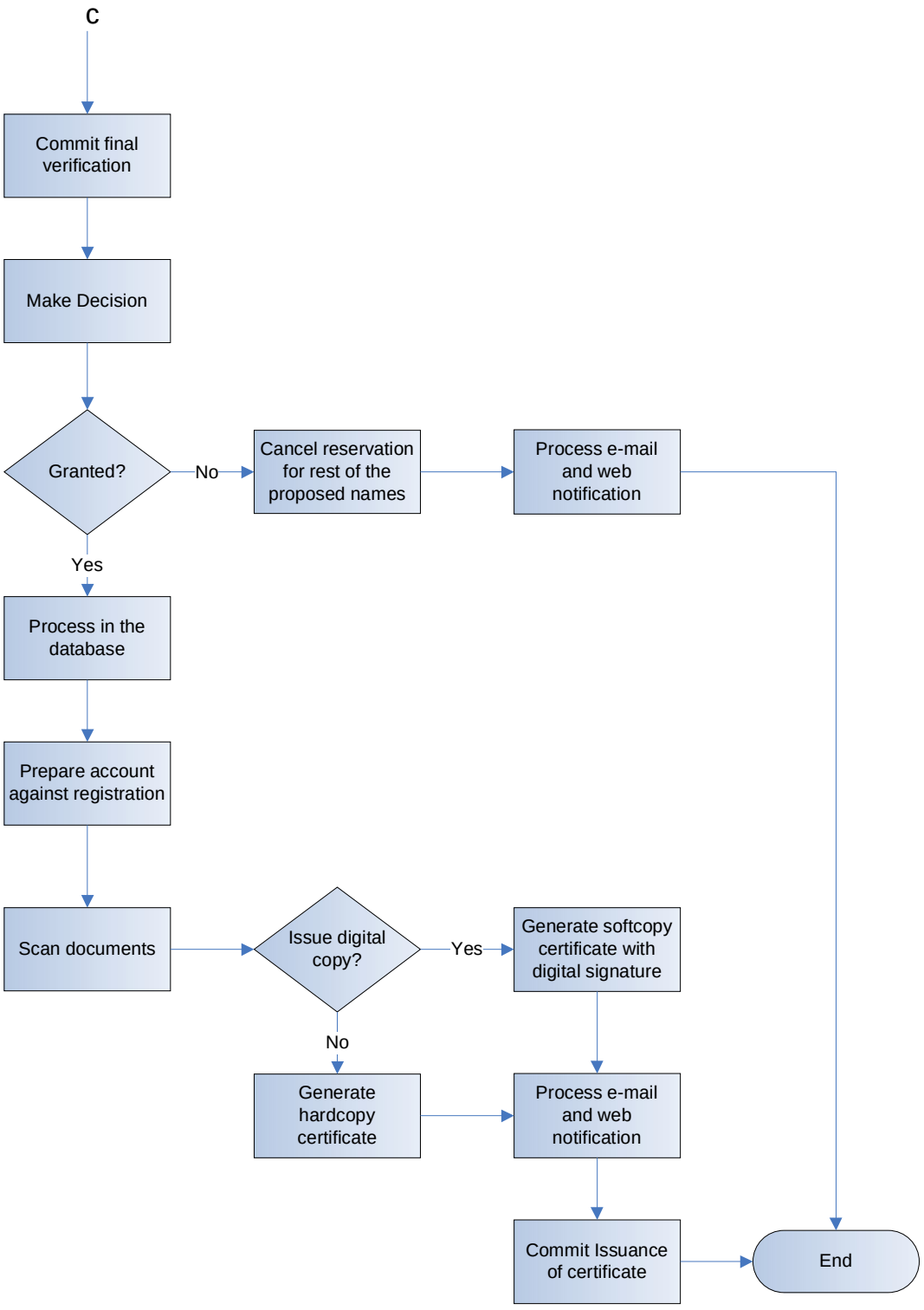
Design Diagram of Registration Module


Start
Verify Name Clearance
No
Valid?
Yes
Fill in the forms
No
Fill up OK?
Yes
Select Payment Method
Pay online?
No
Generate receipt with track number and filled up forms
Yes
Process e-mail and web notification
Authenticate by credit card or prepaid card
Authentic?
Yes
Process online payment
No
Receive payment
Generate receipt with track number and filled up forms
Receive Documents
No
Applied with digital signature?
Process e-mail and web notification
Yes
a
b

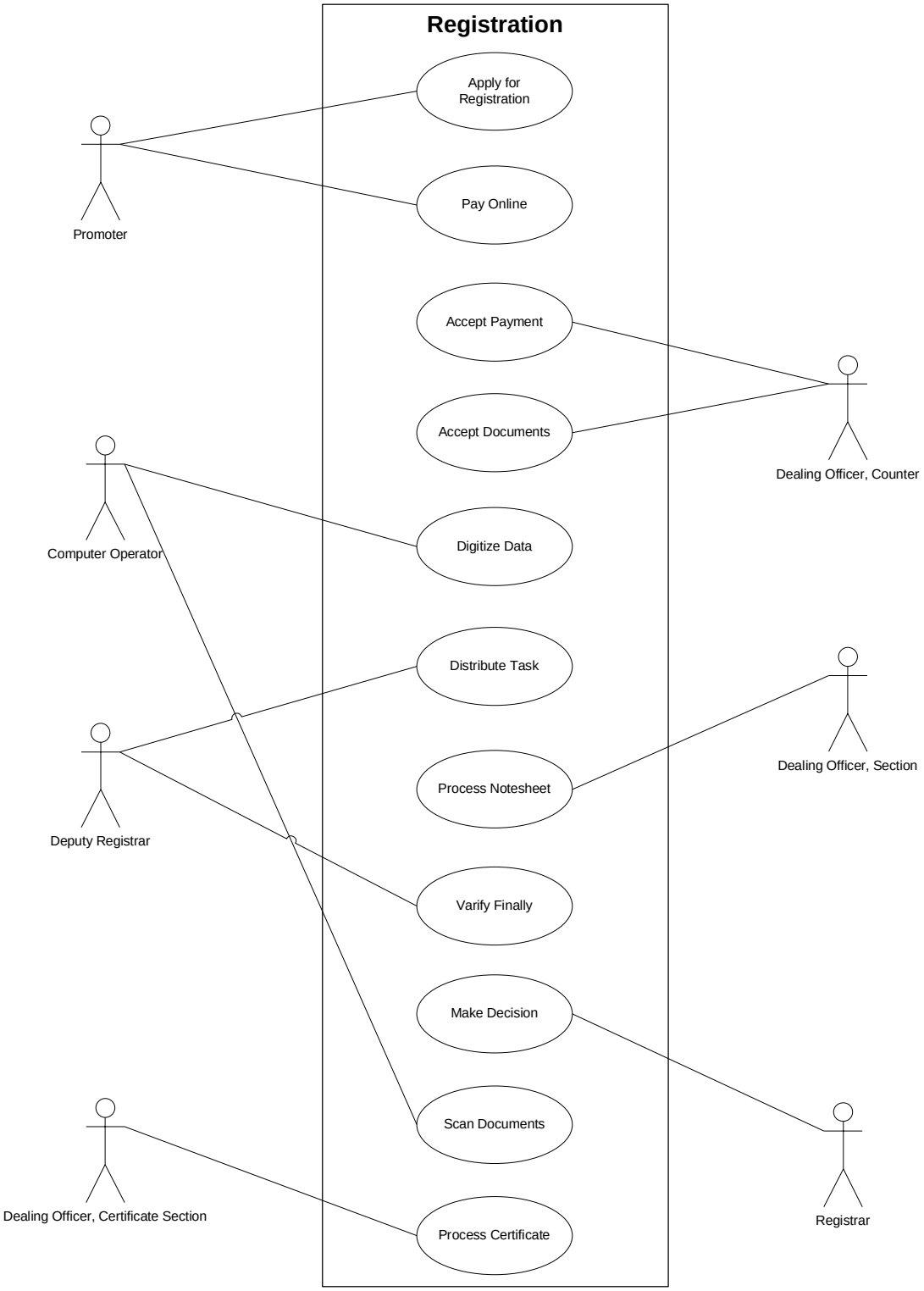
Continued…


a
b
Reserve name until decision
Applied online?
No
Data entry
Yes
Process e-mail and web notification
Yes
Correction necessary?
No
Distribute task
Verify submitted information
Information OK?
No
Process e-mail and web notification
Yes
Generate note sheet
c

Continued...


C
Commit final verification
Make Decision
Granted?
No
Cancel reservation for rest of the proposed names
Process e-mail and web notification
Yes
Process in the database
Prepare account against registration
Scan documents
Issue digital copy?
Yes
Generate softcopy certificate with digital signature
No
Generate hardcopy certificate
Process e-mail and web notification
Commit Issuance of certificate
End

Use Case Diagram for Registration Module



Registration Module

UC1: Apply For Registration.

Primary Actor: Promoter.

Stakeholder And Interest:

Promoter: Wants successful registration.

Precondition: Promoter has completed name clearance procedure.

Postcondition: Receipt has been generated successfully.

Main Success scenario:

1.Promoter logs in.

2.Visite the registration page.

3.System verifies name.

4.System shows a validation message.

5.Promoter asks for registration form.

6.System displays the registration form.

7.Promoter fills up the registration form.

8.Promoter completes filling up the form.

9.System shows a validation message.

10.Promoter selects manual payment method.

11.System generates receipt with track number.

12.System processes an email and web notification.

Extension:

*a. At any time system fails:

To ensure recovery, the system should have back-up storage.

3.a. Name is not valid.

1. System shows an error message.

Test Case of Apply for Registration

Step One: Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Successful name clearance	Basic Flow	
Scenario 2-Invalid name	Basic Flow	3a
Scenario 3-Wrong Input by Promoter	Basic Flow	5a, 5b, 5c, 5d or 5e
Scenario 4-Late Payment	Basic Flow	9a
Scenario 5-Receipt not Printed	Basic Flow	12a
Scenario 6- Failure in e-mail confirmation and web notification	Basic Flow	13a

Step Two: Identify Test Cases

Test Case Id	Scenario	Name	Name	Address	Company Name	Email Address	Payment	Print	Email & web notify	Expected Result
TC1	Scenario 1- Successful registration	V	V	V	V	V	V	V	V	Receipt generate, email sent, web notified

TC2	Scenario 2-Invalid name	I	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Show an error message
TC3	Scenario 3-Wrong input by promoter	V	I	V	V	V	N/A	N/A	N/A	Show message to enter name
TC4	Scenario 3-Wrong Input by Promoter	V	V	I	V	V	N/A	N/A	N/A	Show Message to enter address
TC5	Scenario 3-Wrong Input by Promoter	V	V	V	I	V	N/A	N/A	N/A	Show Message to enter company name
TC6	Scenario 3-Wrong Input by Promoter	V	V	V	V	I	N/A	N/A	N/A	Show Message email address
TC7	Scenario 4-Late Payment	V	V	V	V	V	I	N/A	N/A	Reservation cancel, email sent to promoter to inform
TC8	Scenario 5-Receipt not Printed	V	V	V	V	V	V	I	N/A	Show warning message
TC9	Scenario 6- Failure in e-mail confirmation and web notification	V	V	V	V	V	V	V	I	Form cancel, redo the process

I – Invalid Data

V- Valid Data

N/A- Data not required

UC6: Accept Document.

Primary Actor: Dealing Officer.

Stakeholders & interests:

Dealing Officer: Wants to receive documents successfully.

Promoter: Wants successful processing of the documents.

Precondition: Dealing Officer must be authenticated.

Post condition: Document will be generated successfully.

Main Success Scenario:

1.Dealing Officer logs in.

2.Enter receipt number into system.

3.System shows document submission period <=24 hours.

4.Dealing Officer enters amount paid.

5.System generates printable receipt.

6.Dealing Officer gives print command.

7.Receipt is printed.

8.System shows documents to be accepted.

9.Dealing Officer marks document submission by promoter.

10.Dealing Officer write comment.

11.Gives print command.

12.System generates document submission receipt.

13.System generates match report.

14.Dealing officer gives print command.

15.Match report is printed.

Extension:

2.a. Receipt number does not match.

1.System shows an error message.

2.Reenters receipt number.

3.a. Document submission period is over.

1.System shows submission period is over.

2.Reserved name will be deleted automatically.

7.a. Receipt has not printed.

1.System shows a warning message.

12.a. Receipt has not printed.

1.System shows a warning message.

Step One: Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Successful accept document	Basic Flow	
Scenario 2- Authentication failure	Basic Flow	2a
Scenario –Document submission period is over	Basic Flow	3a
Scenario 3-Receipt has not printed	Basic Flow	7a
Scenario 4-Document receipt has not printed	Basic Flow	12a

Step Two: Identify Test Cases

Test Case Id	Scenario	Name	Address	Company Name	Match receipt number	Doc submission period<=24 hours	Amount paid	Print payment receipt	Print document receipt	Expected Result
TC1	Scenario 1- Successful accept document	V	V	V	V	V	V	V	V	Receipt has generated successfully.
TC2	Scenario 2- Authentication failure	I	V	V	V	N/A	N/A	N/A	N/A	Show authentication failure message.
TC3	Scenario 2- Authentication failure	V	I	V	V	N/A	N/A	N/A	N/A	Show authentication failure message.
TC4	Scenario 2- Authentication failure	V	V	I	V	N/A	N/A	N/A	N/A	Show authentication failure message.
TC5	Scenario 2- Authentication failure	V	V	V	I	N/A	N/A	N/A	N/A	Show authentication failure message.
TC6	Scenario 3- Document submission period is over	V	V	V	V	N/A	N/A	N/A	N/A	Reserved name will be deleted.
TC7	Scenario 3- Receipt has not printed	V	V	V	V	V	V	I	N/A	Show a warning message.
TC8	Scenario 4- Receipt has not printed	V	V	V	V	V		V	I	Show a warning message.

UC7: Process note sheet.

Primary Actor: Dealing officer.

Stakeholders and interests:

Dealing Officer: Wants accurate generation of note sheet.

Deputy Registrar: Wants all the information to be valid.

Preconditiond: Dealing officer is identified and authenticated.

Postcondition: Note sheet is generated successfully.

Basic Flow:

1.Computer operator enters name and password.

2. Logs in.

3.Selects one application.

4.Generate note sheet.

5.Saves record.

6.Sends record to deputy registrar.

7. Exits from current page.

Extension:

2.a. Invalid name.

1.System signals invalid name.

2.Requests to re-enter name.

2.b.Invalid password.

1.System signals invalid password.

2.Requests to re-enter password.

5.a. Record could not be saved.

1.System signals an error message.

2.Rejects entered data.

3.Requests for re-entering data.

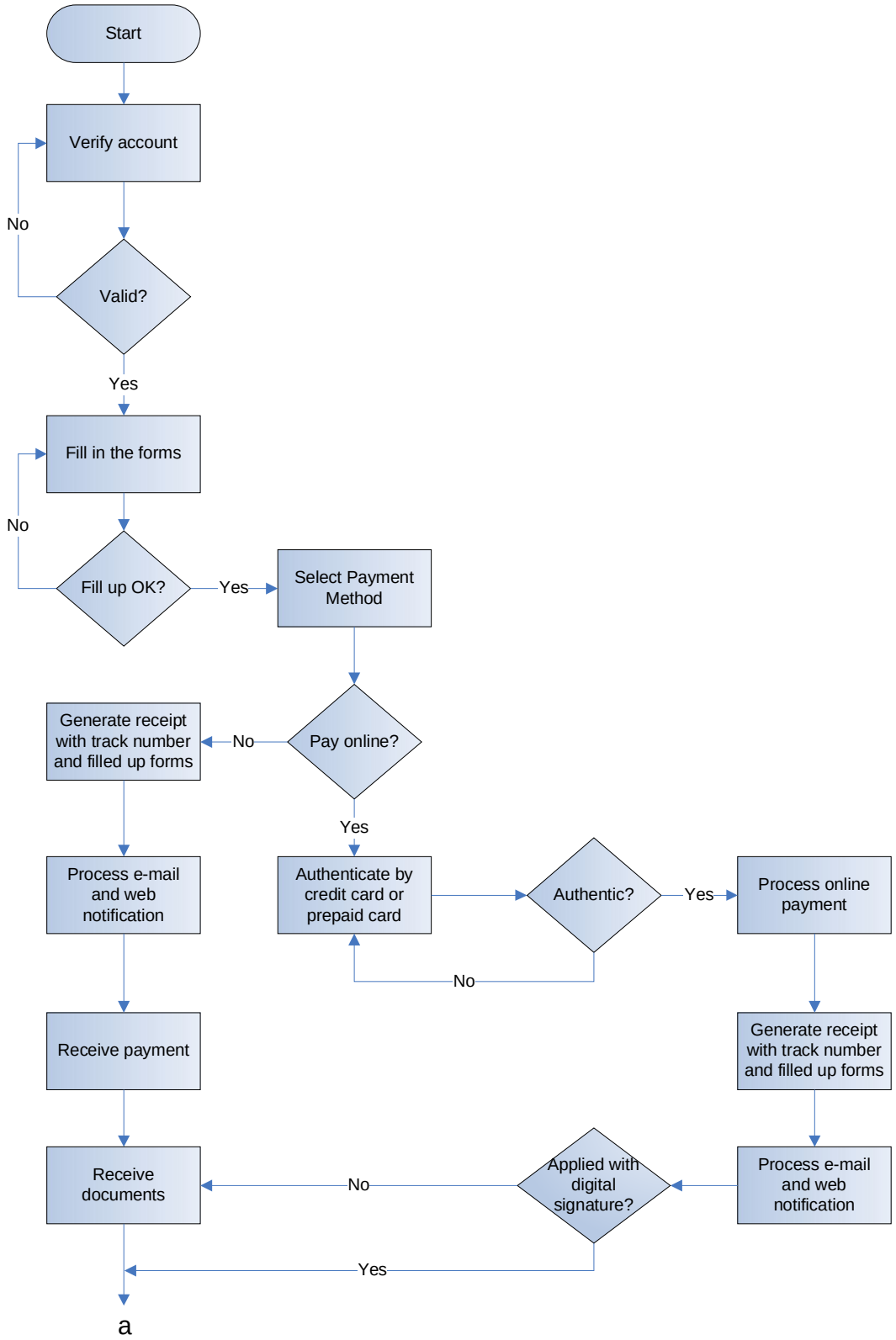
Step One: Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Successful Processing of note sheet	Basic Flow	
Scenario 2- Authentication failure	Basic Flow	2a,2b
Scenario 3-Record could not be saved	Basic Flow	5a

Step Two: Identify Test Cases

Test Case Id	Scenario	Name	Password	Save record	Expected Result
TC1	Scenario 1- Successful Processing of note sheet	V	V	V	Receipt has generated successfully.
TC2	Scenario 2- Authentication failure	I	V	V	Show authentication failure message.
TC3	Scenario 2- Authentication failure	V	I	V	Show authentication failure message.
TC4	Scenario 2- Record could not be saved	V	V	I	Show an error message.

Design Diagram of Issuance of Certified Copies Module



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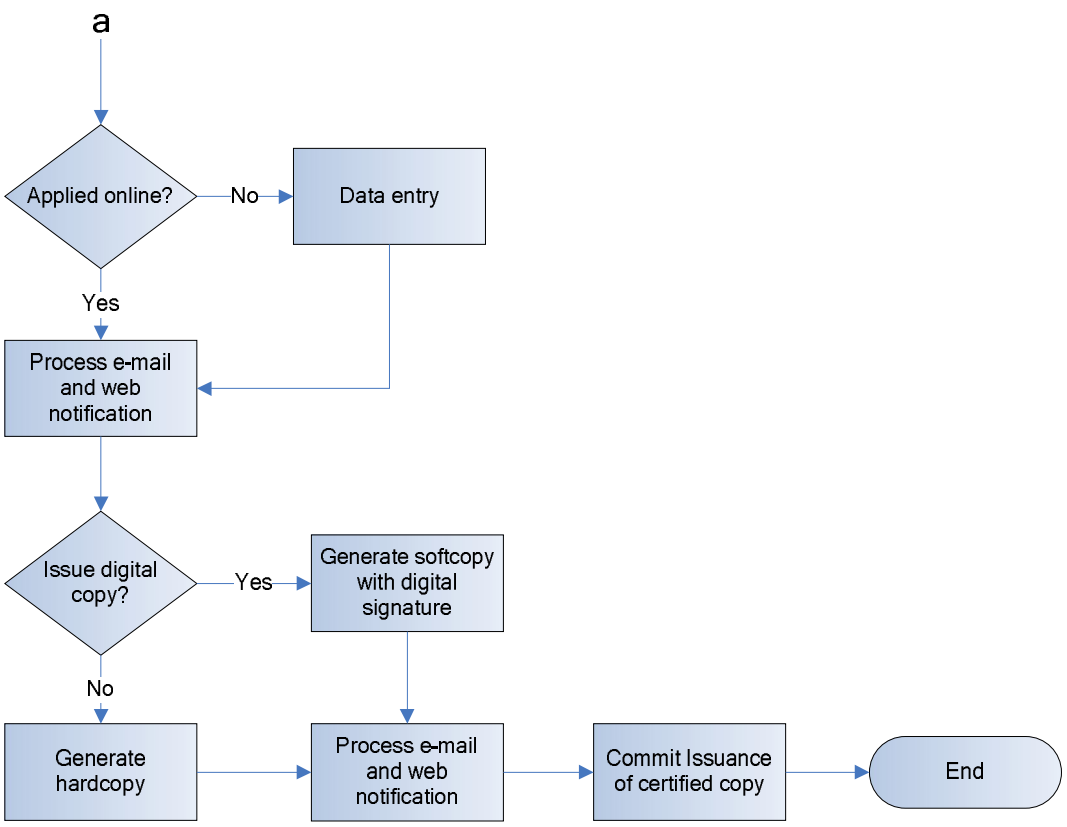
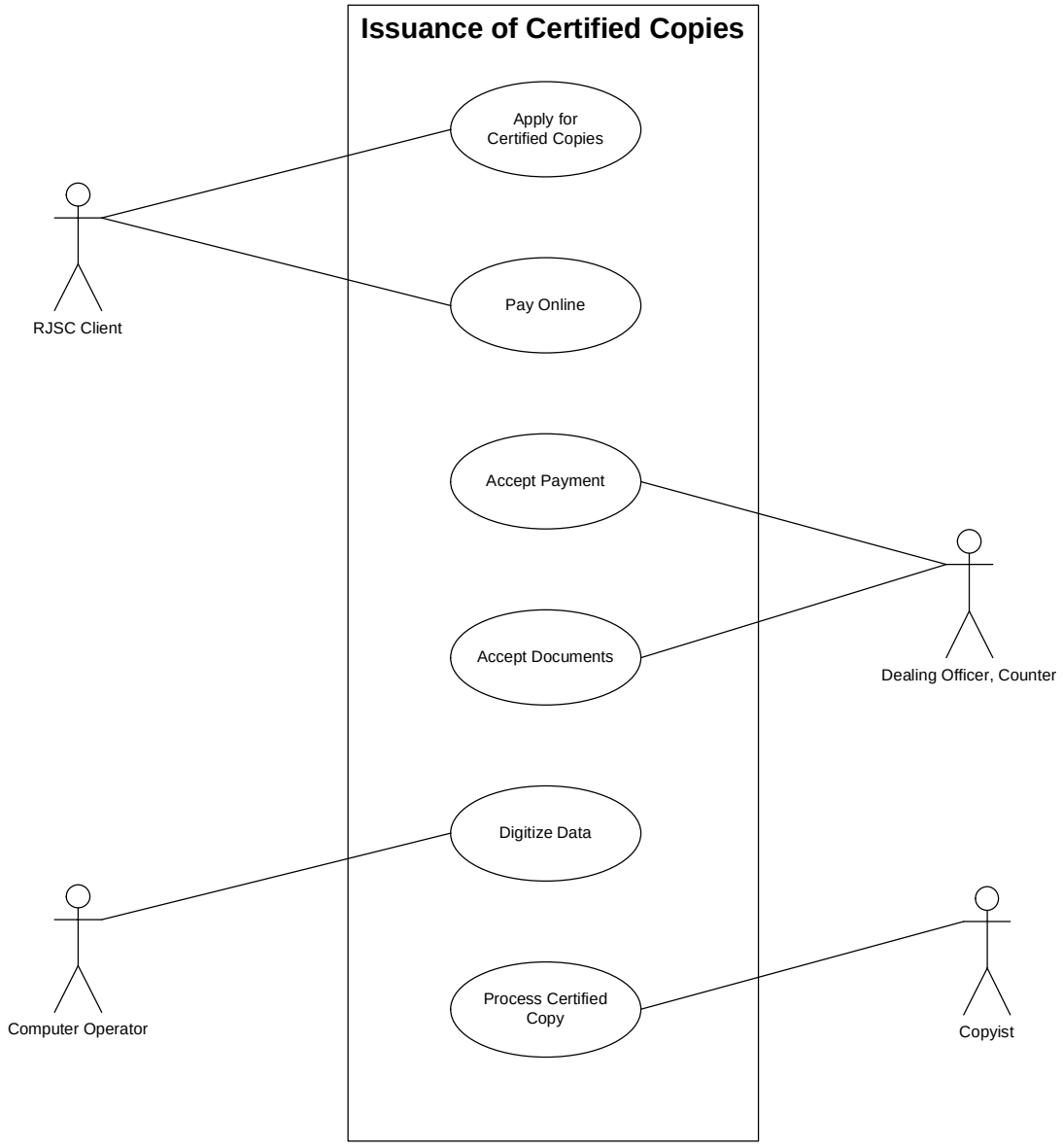

a
Applied online?
No
Data entry
Yes
Process e-mail and web notification
Issue digital copy?
Yes
Generate softcopy with digital signature
No
Generate hardcopy
Process e-mail and web notification
Commit Issuance of certified copy
End

Use Case Diagram for Issuance of Certified Copies Module



Issuance Of Certified Copies Module

UC1: Apply for Certified copies.

Primary Actor: Client

Stakeholders and interests:

Client: Wants to get the certified copies.

Copyist: Wants to check the documents in the approved manner.

Deputy Registrar: Wants errorless document from the Copyist.

Preconditions: Client must be registered.

Postconditions: Certified copies are generated successfully. Client gets the certified copies.

Basic Flow:

1. Client browses to the RJSC's web site.
2. Selects application form from the web site to apply for certified copies.
3. Fills up the form by mentioning type of the document.
4. Submits the application form.
5. Exits from the web site.

Extensions:

3.a. Document type does not match.

1. System shows a message to re-type the document type.

3.b. Blank in the submitted application form.

1. System shows a message to fill up all the blanks.

3.c. Document does not exist.

1. Client prepares the document.
2. Submits the document.
3. Apply for certified copies.

4.a. Application form could not be submitted.

1. Rejects all the entry.
2. Client goes back to the beginning and completes the whole process.

Step One: Generate Scenarios

Scenario	Starting Flow	Alternate
Scenario 1- Certified copies are generated successfully	Basic Flow	
Scenario 2-Invalid document	Basic Flow	3a, 3b
Scenario 3-Document does not exist	Basic Flow	3c
Scenario 4-Error in submission of the form	Basic Flow	4a

Step 2: Identify Test Cases

Test Case Id	Scenario	Name	Address	Company Name	Email Address	Registration ID	Type of the document	Expected Result
TC1	Scenario 1- Certified copies are generated successfully	V	V	V	V	V	V	Clint gets the certified copies
TC2	Scenario 2- Invalid document	V	V	V	V	V	I	Document type does not match
TC3	Scenario 3- Invalid document	I	V	V	V	V	V	Invalid name
TC4	Scenario 4- Invalid document	V	I	V	V	V	V	Invalid address
TC5	Scenario 5- Invalid document	V	V	I	V	V	V	Invalid company name
TC6	Scenario 6- Invalid document	V	V	V	I	V	V	Invalid e-mail address
TC7	Scenario 7- Invalid document	V	V	V	V	I	V	Invalid registration ID
TC8	Scenario 8- Document does not exist	I	I	I	I	I	I	Client has to prepare the document
TC9	Scenario 9-Error in submission of the form	I	I	I	I	I	I	Client has to re do the process