Electronic Tool Rental

1. Actor-Goal List

Actor	Goal
System Administrator	– Sign-in – Add/modify/delete store branch – Set up branch employees' accounts by generating their login information – Add/modify/delete branch employees – Analyzes the performance of the website continuously – Ensure to take care of other issues such as troubleshooting issues, upgrading software and hardware etc. – Add/modify/delete other System Administrator – Sign-off
Branch Employees	– Sign-in – Add/modify/delete equipment list for the branch they represent – Responsible for managing the rentals of customers by adding, updating, or deleting orders, collecting items, prolonging reservations, etc. – Sign-off
Customers	– Registration – Sign-in – Add/update/delete profile information – Browse for a piece of equipment/a tool – Make a reservation – Cancel the reservation – Sign-off

2. Use Case Model

Id: **UC- 01**
Use Case: Search for a tool or equipment

Description

The user searches for an electronic tool or equipment on the ETR website and the ETR website displays the availability of the tool on a nearby branch.

Level: User-Goal

Primary Actor

Customer

Supporting Actors

Branch Employee

A database management system

Stakeholders and Interests

Project Development Team - the team in charge of implementing the features for the application

Quality Assurance Team - application testing team that thoroughly examines each feature before deploying the code to production

Project Manager - Provide assurance that the search engine functionalities are effectively developed and released on time.

Branch Manager - Manages the ETR inventory and monitors the availability of electronic tools and equipment and replenishes them according to requirements regularly

Pre-Conditions

The ETR website must be operational, the user must have internet access, and the tools and equipment information must be accessible

Post Conditions

Success end condition

End users must be provided with information on tools and equipment as well as their availability in the local store.

Failure end condition

- Displaying the message "No tool/equipment found"
- Leading users to the incorrect page
- Showing item that wasn't searched for
- Publish a page which shows “Not Found” error message

Main Success Scenario

1. The user types a keyword or the name of the required tool into a search field
2. Results of searches are displayed to the user according to the tool's availability
3. Allow the user to obtain more in-depth knowledge regarding the items being searched in addition to the location of the items.
4. Provide the rental cost in an estimate

Extensions

The other scenario is that the branch employee can search on behalf of the customer if the customer is present in the store. Also, rather than searching for the same tool, the customer can access his booking history and find previous rented tools

Special Requirements

Usability - To make browsing easier, the website should propose phrase suggestions during user typing, on the basis of the partial name or the brand name of the tool.

Availability - End users should have access to the search capability on the ETR website, which should be available 24 hours a day, 7 days a week, with little to no downtime.

Reliability - The tool should actually be on the branch where it is indicated on the display, and the search information should be true and correct.

Performance - The system needs to be rapidly responsive enough to retrieve the user's search results from the ETR website.

Id: **UC- 02**
Use Case: Make a reservation

Description

Upon finding the relevant equipment or tool in the local nearby store and accepting the rental price, users can reserve it for a certain timeframe.

Level: User-Goal

Primary Actor

Customer

Supporting Actors

Branch employee

A database management system

Stakeholders and Interests

Project Development Team - Assists with the implementation of features for the application to ensure accurate display of tools and equipment and makes sure that the reservation parameters such as start date, end date etc. are included

Quality Assurance Team - Before releasing the code to production, an application testing team carefully reviews each feature.

Project Manager - Ensure the timely development and effective release of the search engine's features.

Branch Manager - Updates the website in accordance with the availability of electronic tools and equipment

Pre-Conditions

- Users must first register in order to use their login credentials to access the ETR system.
- The user's desired tool should be indicated as being available for reservation
- Users must be at least 18 years old
- They must own a functioning, legitimate credit card

Post Conditions

Success end condition

The moment the user reserves the tool, it is marked as being unavailable to other users for the stated time frame.

Failure end condition

- The required tools cannot be reserved by the user
- Display a "Not Found" error message
- When attempting to reserve the item, it directly shows some technical issues

Main Success Scenario

1. The user can find the tool or piece of equipment they want to rent
2. The user checks the rent cost if they agree to proceed
3. The user then chooses the time period for the rental period to check the availability of the tool
4. If the user is not already logged in, the ETR System prompts them to do so for continuity
5. The user reserves the tool or equipment for the given time frame
6. Users can view the rental's total cost.
7. Upon confirmation of the reservation, the user gets a confirmatory message
8. Following that, the user is then directed to detailed instructions for picking up the rented tool

Extensions

The other scenario is that the branch employee can make a reservation on behalf of the customer if the customer is present in the store. In lieu of directly making a reservation, customers could keep the tool in their cart and decide after going to the store or, if they ask an employee for assistance, they could make a reservation

Special Requirements

Usability - It should be self-explanatory how to make a reservation

Availability - Successful login and navigation to the page where the final reservation is made should be possible for users of the ETR System.

Performance - The system must be quickly responsive in order to make reservations and notify the user

Id: **UC- 03**
Use Case: Cancel a reservation

Description

Change of mind results in cancellation of the reservation by the consumer

Level: User-Goal

Primary Actor

Customer

Supporting Actors

Branch employee

A database management system

Stakeholders and Interests

Project Development Team - Assists with the implementation of features for the application to ensure user cancellation functionality and the necessary validations for the cancellation process to be successful

Quality Assurance Team - Each feature is thoroughly examined by an application testing team before the code is put into production

Project Manager - Assure the prompt development and efficient rollout of the search engine's functionalities

Branch Manager - Upon cancellation, the reserved tools should become available to other users

ETR Marketing Team - Examine the cause of cancellations and develop a plan to reduce them as necessary.

Pre-Conditions

- The customer is signed in
- User has made a reservation.
- There has been no pickup of the tool or equipment

Post Conditions

Success end condition

Users should have the option of cancelling an existing reservation, and after that other user will be able to make reservations with this available released tool

Failure end condition

Due to validations requirements or technological limitations, customers cannot cancel a reservation that has already been made

Main Success Scenario

1. The user is signed into their account
2. A list of all past reservations is available to the users
3. Users can distinguish between an already-completed reservation and one that is still forthcoming
4. In the event that a user wishes to cancel an impending reservation, they can choose to do so (for instance, by clicking on a button)
5. Once the cancellation has been made, users receive a confirmation message

Extensions

The other scenario is that the branch employee can cancel any reservation on behalf of the customer if the customer requests, or if the tool becomes unavailable for any reason, then also the employee would cancel the reservation.

Special Requirements

Usability - Users should not encounter any issues cancelling their reservations

Security - User login information, personal information, reservation information, etc., should be secured and protected

Reliability - Users should receive notification that their reservation has been cancelled before the tool is made available for rent by other customers

Performance - The system must have sufficient speed to carry out this activity

Id: **UC- 04**
Use Case: CRUD operations on the tools catalog for their branch

Description

A branch employee has the authority to modify, add, or remove a tool or piece of equipment from the branch's inventory. Additionally, they consistently update the catalogue.

Level: User-Goal

Primary Actor

Branch Employees

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Ensure the real-time functions correctly for adding, modifying, and deleting tools from the catalog which are accessible to end users

Quality Assurance Team - Before the code is placed into production, an application testing team carefully examines each feature

Branch Manager - Ensure that the physical inventory data is accurately mapped with the information on the website

Pre-Conditions

Employees from the branch who have access privileges should be logged in to the ETR website

Post Conditions

Success end condition

Branch staff members can successfully examine, alter, add, and delete a tool or piece of equipment on the catalogue

Failure end condition

Branch personnel have trouble using the catalogue to examine, alter, add, or delete a tool or piece of equipment

Main Success Scenario

1. Branch employee is signed into their account

2. In addition to viewing the catalog, branch employees can add, modify, and delete tools in the catalogue
3. Upon successful completion of the process, a confirmation message is shown.
4. Each user immediately notices the difference as soon as the change is made

Extensions

There are no extensions because only branch employees have the authority to of this CRUD operations

Special Requirements

Usability – An autonomous and user-friendly user interface is required for managing the catalogue functioning

Security – Personal credentials of branch employees must be protected and kept secure in order to prevent unauthorized access

Integrity - The change of the tools' status should be visible to all the users

Accuracy - The branch personnel must be able to locate the accurate item in order to perform any activities on the catalog

Id: **UC- 05**
Use Case: Manage customers rentals (Rent, receive tool(s); extend, cancel rentals)

Description

Upon picking up a reservation, equipment can be marked as ‘rented’, and when the customer returns it, it can be marked as ‘returned’. By extending or canceling a reservation in the ETR System, a branch employee can alter the reservation.

Level: User-Goal

Primary Actor

Branch Employees

Supporting Actors

Customers

A database management system

Stakeholders and Interests

Project Development Team - Create features that let a branch employee add, edit, or delete a reservation's status as well as carry out numerous catalogue functionalities

Quality Assurance Team - An application testing team meticulously reviews each feature before the code is put into production

Branch Manager - Make sure that if any reservations are extended or cancelled, the information on the website is appropriately mapped to the physical inventory data

Pre-Conditions

Branches employees must be able to login using their designated roles, and the system must accommodate reservations

Post Conditions

Success end condition

Updates to the availability status of a tool can be made successfully and already existing rentals can be extended or canceled

Failure end condition

Branch personnel have trouble updating the tools availability as well as the reservation status in the catalog

Main Success Scenario

1. An employee of the branch has logged into their account.
2. The branch employee can update the status of a customer's reservation to "rented" or "returned"
3. Customer reservations can be made, extended, or declined by branch employees

Extensions

The other scenario is that customers can cancel their personal reservations if they want to.

Special Requirements

Usability – To manage the functionality of the catalogue, an independent and user-friendly user interface is needed

Security – To avoid illegal access, branch employees' personal information must be safeguarded and kept confidential

Accuracy - To carry out any actions on the reservation, the branch staff should be able to discover the relevant reservation

Integrity - All the users should be informed of the change made to the reservation

Id: **UC- 06**
Use Case: CRUD operations on branches

Description

The system administrator has the ability to inspect, add, modify, and remove branches.

Level: User-Goal

Primary Actor

System Administrator

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Implement functionalities that allow system administrators to add, modify, delete and view branches

Quality Assurance Team - Before the code is placed into production, an application testing team carefully examines each feature

Branch Employees - To make the branch operational, branch personnel can be allocated to the branch

Pre-Conditions

The ETR website should be operational and accessible, and there should be at least one system administrator account active

Post Conditions

Success end condition

System administrators have access to create, edit, delete, and view store branches successfully

Failure end condition

Facing difficulties for creating, editing, deleting, and seeing a store branch is experienced by system administrators

Main Success Scenario

1. The system administrator logs on to the system
2. A new Branch can be created by the admin
3. The admin can inspect the just generated branch
4. The branch's data can be modified by the admin. For instance, branch phone number, address etc.
5. The admin can remove the branch

Extensions

There are no extensions because only the system administrator has the authority to of this CRUD operations

Special Requirements

Usability – To manage the functionality of the catalogue, an independent and user-friendly user interface is needed

Accessibility - For any CRUD branch activities, only system administrators should have access to the ETR website

Id: **UC- 07**
Use Case: CRUD operations on branch employees

Description

The system administrator is in charge of adding, changing, and removing branch personnel

Level: User-Goal

Primary Actor

System Administrator

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Enable system administrators to add, edit, delete, and see branch personnel by implementing the necessary features

Quality Assurance Team - A team of application testers thoroughly reviews each feature before the code is put into production

Pre-Conditions

There should be at least one system administrator account available, and the ETR website should be working and reachable. Additionally, the branch should be operational before hiring new staff

Post Conditions

Success end condition

System administrators have the right to create, edit, delete, and view branch employees successfully. The new branch employee will receive a username and password that were generated by the system admin.

Failure end condition

No operations can be carried out on a branch employee, including create, amend, delete, and view

Main Success Scenario

1. The system administrator logs on to the system
2. A new branch employee can be created by the admin
3. The admin can inspect the just created employee
4. The new Branch Employee's login and password are generated by the administrator
5. The admin can modify or remove the employee

Extensions

There are no extensions because only the system administrator has the authority to of this CRUD operations

Special Requirements

Usability – User-friendly user interface is required to function

Accessibility - For any CRUD branch employee activities, only system administrators should have access to the ETR website

Id: **UC- 08**
Use Case: Create rental reports at branch level

Description

In order to analyze rental data, a report can be generated branch-by-branch on the basis of day, month, and year

Level: User-Goal

Primary Actor

System Administrator

Supporting Actors

A database management system

Reporting tool

Stakeholders and Interests

Project Development Team - Develop necessary report-creation functionalities

Quality Assurance Team - Each feature is carefully examined by a group of application testers before the code is put into production.

ETR Marketing Team - Create a strategy in order to boost the reservations based on data from the report created

Pre-Conditions

The System Administrator must be able to access the dashboard and the ETR website must be accessible online.

Post Conditions

Success end condition

Reports can be successfully produced

Failure end condition

Not being able to make reports or having data that is insufficient or inaccurate

Main Success Scenario

1. The system administrator logs on to the system
2. The admin appears on the dashboard
3. Reservation reports can be made by the system administrator for each branch, along with the date, month, and year

Extensions

There are no extensions because only the system administrator has the authority to perform this operation. But they can ensure reports are produced without the need for human intervention by performing automated batch processing

Special Requirements

Usability – User-friendly user interface is required to function. And also, stakeholders should be able to interpret generated reports with ease

Id: **UC- 09**
Use Case: User registration

Description

Using ETR's website, customers can self-register and create login credentials for logging-in in the future if they wish to rent electronics tools or equipment

Level: User-Goal

Primary Actor

Customer

Supporting Actors

Web browser

Stakeholders and Interests

Project Development Team - Create the user interface and other essential features that will enable the user to self-register

Quality Assurance Team - Each feature is carefully examined by a group of application testers before the code is put into production.

Project Manager - Deliver all the necessary functionality on time and in a well-designed manner

ETR Marketing Team - Analyze the total number of registered users and work on it in order to grow it for the benefit of the ETR website.

Pre-Conditions

Users should be able to access the ETR website through a quick web search in case they are unaware of its URL

Post Conditions

Success end condition

The user can successfully build their profile

Failure end condition

Users are unable to create their profile due to some technical glitch or can throw "email already exists" message

Main Success Scenario

1. Using a web browser, the user accesses the ETR website's URL.
2. The user locates a registration option.
3. The user can complete their profile information, such as email address, password, date of birth, phone number, address etc., by entering it and then clicking "Save".
4. The user sees a confirmation message stating that the profile was successfully created.

Extensions

There are no extensions because there won't be any other scenarios for registration.

Special Requirements

Usability – Simple navigation and self-explanatory user interface are ideal. The URL for the ETR website must be simple to remember and should come up in a quick web search

Security - Personal information of users to be safely stored and shielded from hacking

Availability - The ETR website needs to be reachable by end users and ought to experience minimal to no downtime while being open twenty-four hours a day, seven days a week

Id: **UC- 10**
Use Case: Customer log-in

Description

The customer can log in using their username and password after successfully registering. The dashboard will be accessible once they have successfully logged in.

Level: User-Goal

Primary Actor

Customer

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Create the user interface and other essential features that will enable the user to login successfully

Quality Assurance Team - Each feature is carefully checked by a group of application testers before the code is put into production.

Project Manager - Deliver all the necessary functionality on time and in a well-designed manner

ETR Marketing Team - Analyze the total number of signed-in users and work on it in order to grow it for the benefit of the ETR website.

Pre-Conditions

Users must have internet access with a browser enabled device as well as their login credentials to sign in successfully

Post Conditions

Success end condition

After the user's credentials have been verified, they are directed to their dashboard.

Failure end condition

Failure to login results in an error because the user's credentials could not be validated

Main Success Scenario

1. Using a web browser, the user accesses the ETR website's URL.
2. The user appears on the sign-in page.
3. The user logs in successfully after having their username and password verified
4. The user is now on their dashboard.

Extensions

There are no extensions because there won't be any other scenarios for login. If the customer does not have a registered profile, they should be directed to the registration page.

Special Requirements

Usability – The user's sign-in page should be self-explanatory

Security - Personal information of users to be safely stored and shielded from data breaches. The system administrator should investigate numerous unsuccessful login attempts.

Availability - The ETR website needs to be reachable by end users and ought to experience minimal to no downtime while being open twenty-four hours a day, seven days a week

Id: **UC- 11**
Use Case: Branch employee log-in

Description

In order to access the employee dashboard, Branch Employees should be able to log in to the ETR website using the role "branch employee"

Level: User-Goal

Primary Actor

Branch Employee

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Create the user interface and other essential features that will enable the branch employee to login successfully

Quality Assurance Team - Each feature is thoroughly examined by a group of application testers before the code is pushed into production.

Project Manager - Deliver all the necessary functionality on time and in a well-designed manner

Pre-Conditions

Branch employees must have a browser enabled device with internet access as well as their login credentials to successfully login. The System Administrator needs to assign the user id for the "branch employee" position.

Post Conditions

Success end condition

The employee dashboard is accessible to branch employees after they log in successfully using their credentials.

Failure end condition

Failure to login results in an error because of a role-related issue or a technological glitch

Main Success Scenario

1. Using a web browser, the branch employee accesses the ETR website's URL.
2. The branch employee appears on the sign-in page.
3. The branch employee logs in successfully after having their username and password verified
4. The branch employee is now on their dashboard
5. Branch personnel can then perform numerous operations for the tools catalog.

Extensions

There are no extensions because there won't be any other scenarios for login.

Special Requirements

Usability – The branch employee's sign-in page should be self-explanatory and user-friendly to navigate

Security - Personal information of branch employees to be safely stored and shielded from data breaches. They are able to change their password, which is strongly advised.

Availability - The ETR website needs to be reachable by the employees and ought to experience minimal to no downtime while being open twenty-four hours a day, seven days a week

Id: **UC- 12**
Use Case: System Administrator log-in

Description

In order to access the admin dashboard, system administrator should be able to log in to the ETR website using the role " System Administrator "

Level: User-Goal

Primary Actor

System Administrator

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Create the user interface and other essential features that will enable the system administrator to login successfully

Quality Assurance Team - Each feature is thoroughly examined by a group of application testers before the code is pushed into production.

Project Manager - Deliver all the necessary functionality on time and in a well-designed manner

Branch Employees - The system should allow the system administrator to add branches and branch employees

Pre-Conditions

There should be at least one system administrator account available, and the ETR website should be working and reachable.

Post Conditions

Success end condition

The admin dashboard is accessible to System Administrator after they log in successfully using their credentials.

Failure end condition

Failure to login results in an error because of a role-related issue or a technological glitch

Main Success Scenario

6. Using a web browser, the System Administrator accesses the ETR website's URL.
7. The System Administrator appears on the sign-in page.
8. The System Administrator logs in successfully after having their username and password verified
9. The System Administrator is now on their dashboard
10. System Administrator can then perform numerous operations regarding the branch and their employees

Extensions

There are no extensions because there won't be any other scenarios for login.

Special Requirements

Usability – The System Administrator's sign-in page should be self-explanatory and user-friendly to navigate

Security - Personal information of System Administrator to be safely stored and shielded from data breaches.

Id: **UC- 13**
Use Case: Edit User Profile

Description

Customers can enter into their accounts and update personal information on their profiles, such as phone numbers, home address etc.

Level: User-Goal

Primary Actor

Customer

Supporting Actors

System Administrator

A database management system

Stakeholders and Interests

Project Development Team - Assists with the implementation of features for the profile modification

Quality Assurance Team - Before releasing the code to production, an application testing team carefully reviews each feature.

Project Manager - Ensure the timely development and effective release of the search engine's features.

Pre-Conditions

On the ETR website, users must already have an account

Post Conditions

Success end condition

The user can change his or her own personal data successfully

Failure end condition

Fails to edit due to technical issues

Main Success Scenario

1. User logs into their profile
2. Arrives at the dashboard
3. Changes the modification
4. Saves it
5. Successful confirmation message is shown

Extensions

The other scenario is that the system administrator can edit customer details if needed on behalf of that specific customer

Special Requirements

Usability - It should be self-explanatory and user friendly

Availability – The changed modifications should be saved properly and available only to the specified customers

Security - Personal data about users should be kept safely secured and protected

Id: **UC- 14**
Use Case: CRUD operations on System Administrator

Description

The system administrator has the ability to view, add, modify, and remove another system administrator.

Level: User-Goal

Primary Actor

System Administrator

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Implement functionalities that allow system administrators to add, modify, delete and view other admins.

Quality Assurance Team - Before the code is placed into production, an application testing team carefully examines each feature

Pre-Conditions

The ETR website should be operational and accessible, and there should be at least one system administrator account active

Post Conditions

Success end condition

System administrators have access to create, edit, delete, and view another system admins successfully

Failure end condition

Facing difficulties for creating, editing, deleting, and seeing another system admin

Main Success Scenario

1. The system administrator logs on to the system
2. Can create, edit, delete and view another system admin
3. The successful confirmation message is displayed

Extensions

The other scenario is that any other system administrator can edit their details if required on behalf of that specific system administrator

Special Requirements

Usability – An independent and user-friendly user interface is needed to navigate and operate

Id: **UC- 15**
Use Case: Create User Roles

Description

Creating a variety of user roles with specific roles will allow users to access different dashboards, such as System Administrators, Branch Employees, and Users.

Level: User-Goal

Primary Actor

System Administrator

Supporting Actors

A database management system

Stakeholders and Interests

Project Development Team - Implement functionalities in order to create code for generating several user roles, and then lead users to the appropriate dashboard based on the role assigned to their user id.

Quality Assurance Team - Before the code is placed into production, an application testing team carefully examines each feature

Pre-Conditions

The ETR website should be operational and accessible, and at least one system administrator should be logged in

Post Conditions

Success end condition

System administrators have the ability to define various user roles and link user ids to them.

Failure end condition

Fails to define and create

Main Success Scenario

1. The user is logged on to the system Press the log-out option
2. Create 3 roles, i.e. User, Branch Employee, and System Administrator
3. Customers who self-register are assigned the role Customer by default.
4. System Administrator now can register for Branch Employees
5. They do the same for another System Administrator

Extensions

There are no extensions because there won't be any other scenarios.

Special Requirements

Usability – An autonomous and user-friendly user interface is needed to navigate

Security - Personal data about users should be kept safely secured and protected

Id: **UC- 16**
Use Case: Log off

Description

Users ought to be able to successfully log off of the ETR website.

Level: User-Goal

Primary Actor

System Administrator, Branch Employees, Customers

Supporting Actors

Web browser

A database management system

Stakeholders and Interests

Project Development Team - Implement functionalities in order to make the sign-off procedure safe and simple to use.

Quality Assurance Team - Before the code is placed into production, an application testing team carefully examines each feature

Pre-Conditions

The ETR website should be operational and accessible, and the user should be logged in

Post Conditions

Success end condition

Upon successful sign off, a confirmation message should appear, and the session should be terminated.

Failure end condition

User fails to sign off from the website

Main Success Scenario

4. The user is logged on to the system and chooses to log off
5. Press the log-out option
6. An end to the user's session and exit from the dashboard occur

Extensions

There are no extensions because there won't be any other scenarios for logout.

Special Requirements

Usability – An independent and user-friendly user interface is needed to sign-off

Security - Require users to log in again using credentials once the session is destroyed in order to save from data breaches

Diagrammatic Notations

1) **Use Case Diagram to describe the overall system**

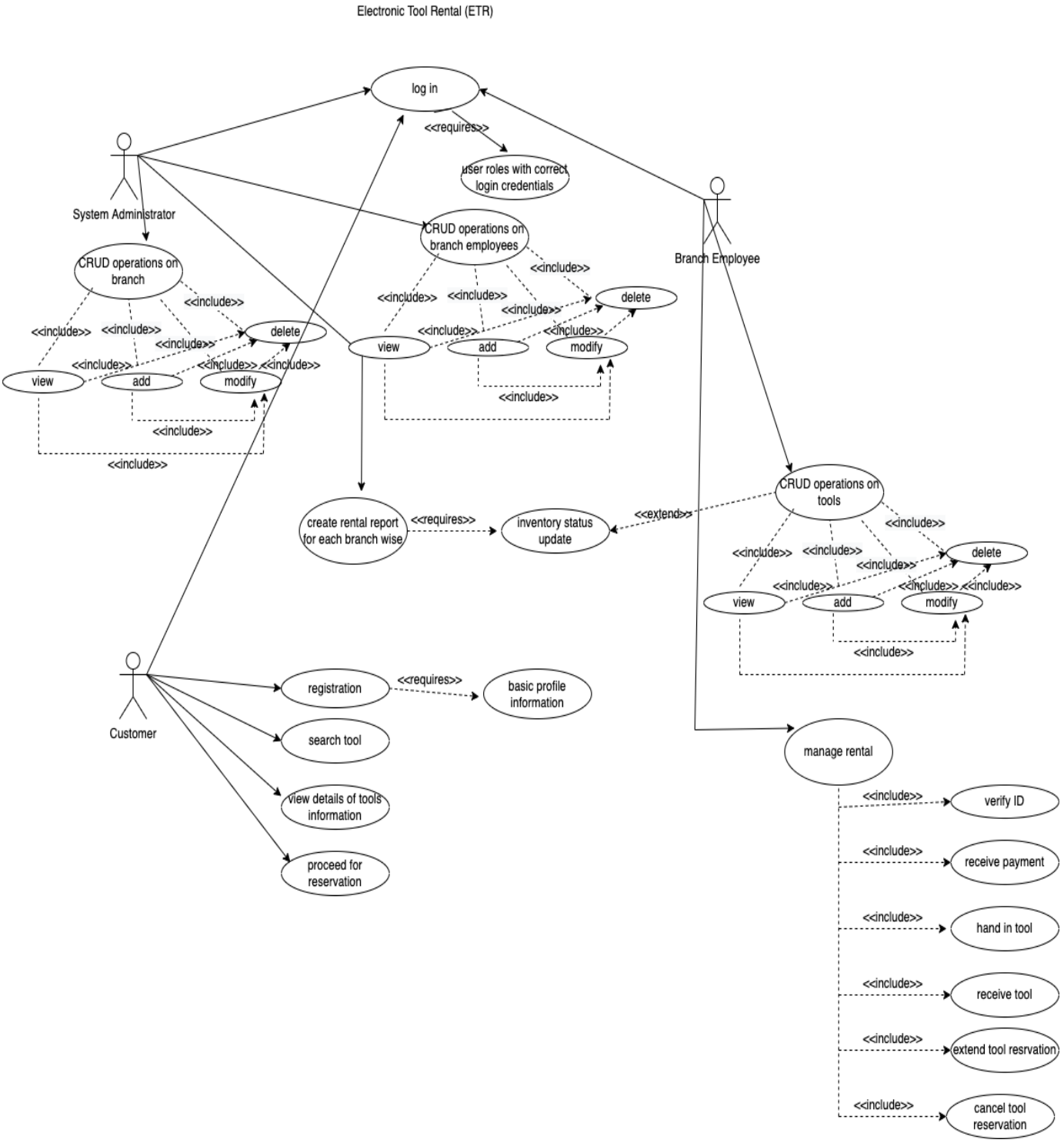

Figure 1: Use Case Diagram

2) sequence diagrams to illustrate the processes of: (1) making a reservation

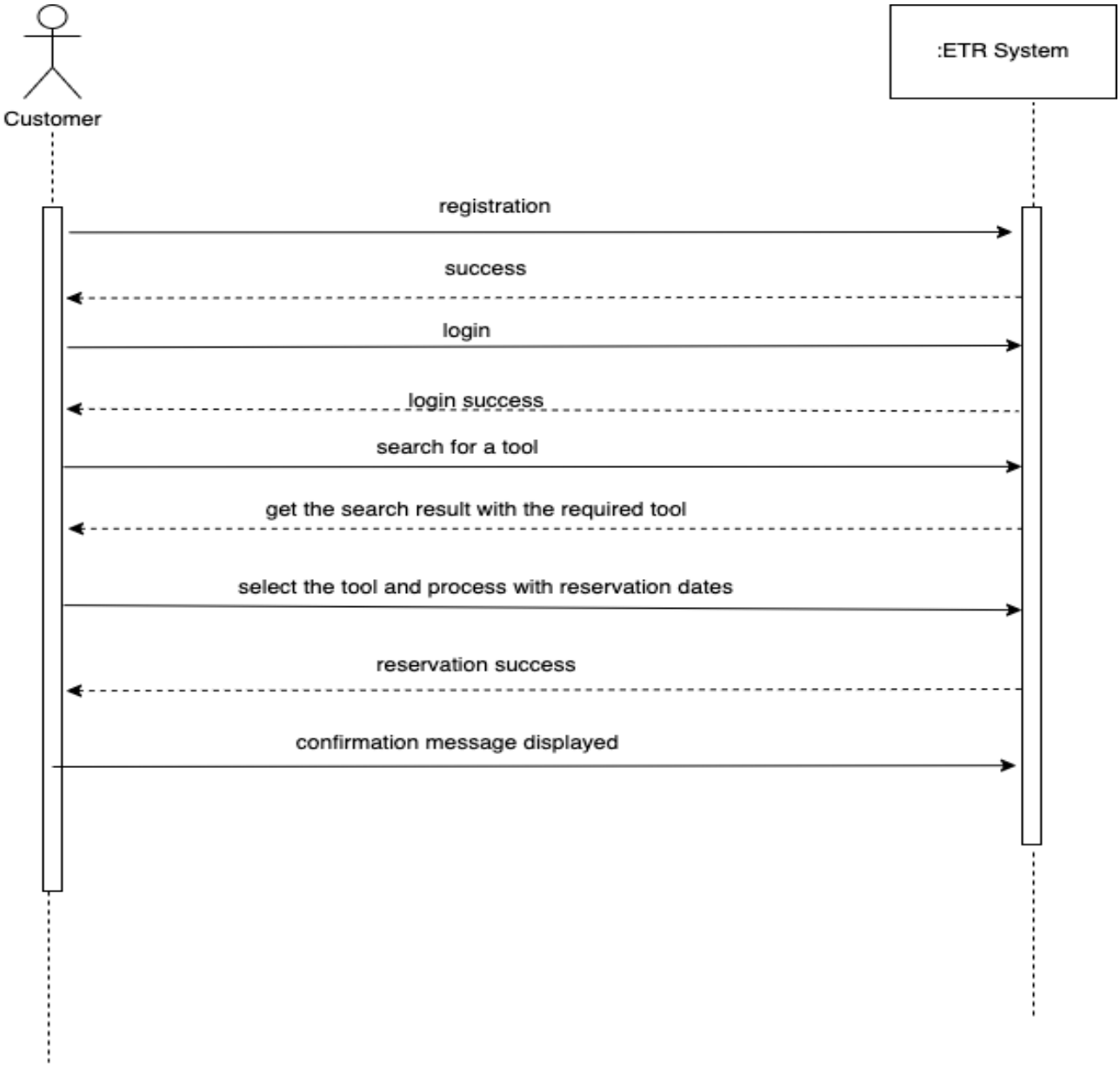

Figure 2: Sequence Diagram

2) sequence diagrams to illustrate the processes of: (2) receive a tool

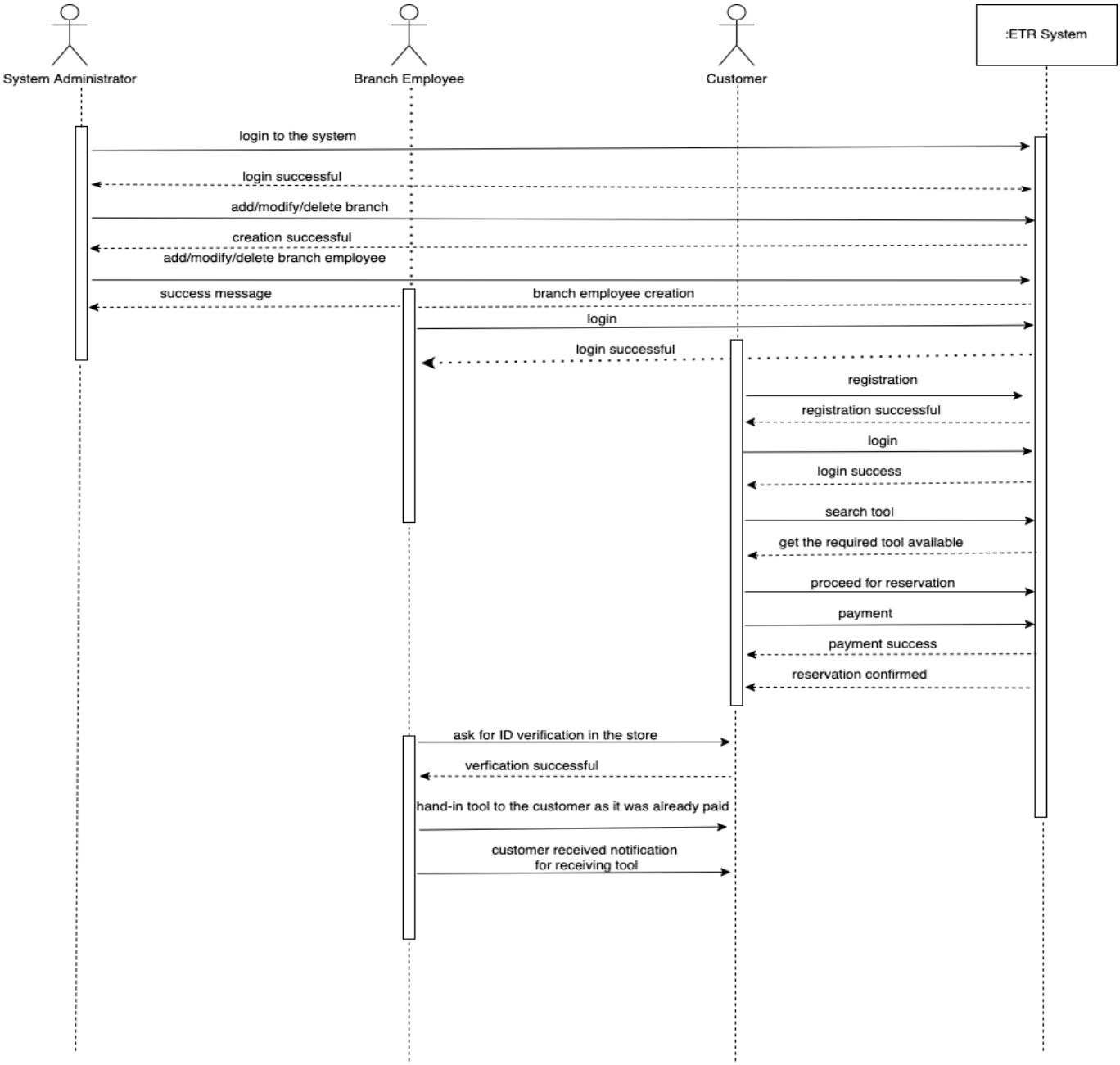

Figure 3: Sequence Diagram

3) Activity Diagram for managing customers rentals

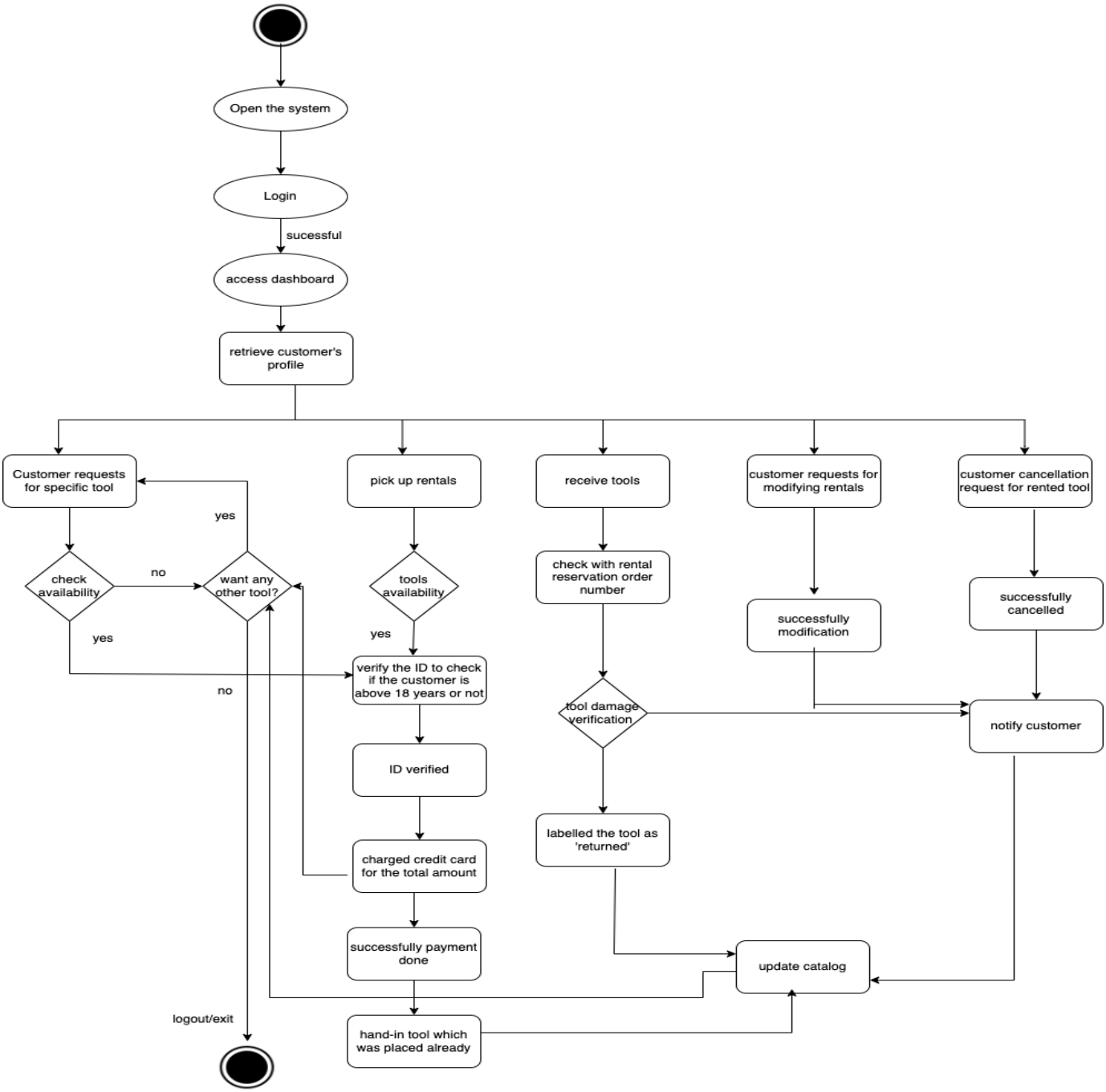

Figure 4: Activity Diagram

4) State Machine Diagram for a rental order

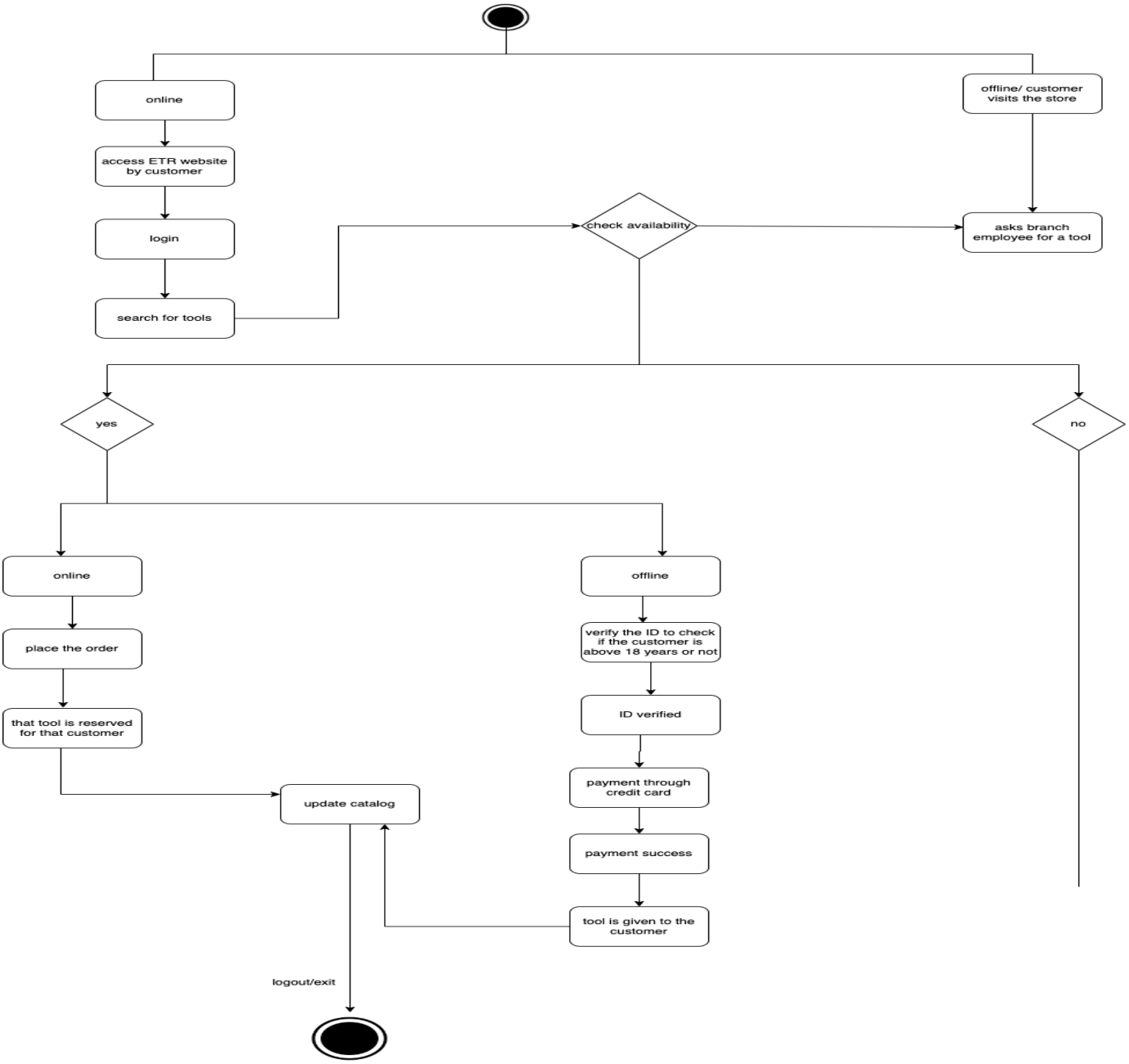

Figure 5: State Machine Diagram

SUPPLEMENTARY SPECIFICATION AND GLOSSARY

Electronic Tool Rental (ETR)

Supplementary Specification

1. Introduction

The document outlines the supplementary requirements for Electronic Rental Tool system, a web based online application that enables customers to rent electronic tools and equipment within their financial constraints. The Software Requirement Specification (SRS), which combines the use case model and supplementary specification, is used to identify the functional and nonfunctional requirements for the ETR system.

1.1 Purpose

The purpose of the Supplementary Specification document is to illustrate the requirements that cannot be deduced from a use case model easily. By capturing the system requirements that are lacking in the use-case model, it allows the use-case model to be more comprehensive. Moreover, this document provides both the functional and non-functional requirements of the Electronic Tool Rental system. Hence, in order to completely specify the functionality of the system-to-be, the Supplementary Specification Document lists these needs in an understandable and structured manner. It incorporates the requirements definitions that were agreed upon along with quality goals and design constraints. There are numerous quality objectives such as usability, performance, reliability etc.

1.2 Scope

The Electronic Tool Rental system created for the Concordia University software engineering department is covered by this Supplementary Specification document. For the System Requirements Specification course, the application is under the direction of Dr. Rodrigo Morales.

SRS aims to provide a general overview of ETR application and an abstract overview of the online rental shopping system. The key feature of this system is that users have the flexibility to look up the costs of tools and equipment, verify whether they are available in nearby stores, and reserve their items in advance if necessary. Moreover, all these activities can be accomplished using browser-enabled devices from anywhere.

1.3 Definitions, Acronyms and Abbreviations

Term	Description
SRS	Software Requirement Specification
CDN	Content Distribution Network
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
OS	Operating System
HTML	Hypertext Markup Language
CRUD	Create, Read, Update, Delete

1.4 References

[1] Sample reports shared by professor

[2] Professor notes and slides

[3] https://www.w3schools.com/whatis/whatis_html.asp

[4] https://www.educba.com/what-is-mysql-database/

[5] https://www.bing.com/search?q=define%20accuracy&pc=0ROY&ptag=C999N1000AF93C9BCDC7&form=CONBNT&conlogo=CT3210127

[6] https://www.bing.com/search?q=define%20reliability&pc=0ROY&ptag=C999N1000AF93C9BCDC7&form=CONBNT&conlogo=CT3210127

[7] https://www.corrosionpedia.com/definition/1539/supportability

[8] https://www.bing.com/search?q=define%20performance&pc=0ROY&ptag=C999N1000AF93C9BCDC7&form=CONBNT&conlogo=CT3210127

[9] https://www.bing.com/search?q=define%20design%20constraint&pc=0ROY&ptag=C999N1000AF93C9BCDC7&form=CONBNT&conlogo=CT3210127

[10] https://www.freecodecamp.org/news/crud-operations-explained/

2. Functionality

Below are the functional requirements that are not expressed in the use case:

2.1 Record and Fix Fallacy

In order to detect the system risk, a distinct section should be used to accumulate the errors, which are then later used to fix any loopholes created.

2.2 Payment Gateway Error

Regardless of whether a payment is successful or failed, it should always be tracked. The user should receive a receipt in pdf format in order to allow for two references to be made. One is in the user's hand, while the other is in the database.

2.3 Time Log

It is essential to keep track of time logs for information accessibility in order to verify and make smooth the process the rental reservation period placed by the user.

2.4 Remote Access

One can check and rent tools remotely through the system by connecting their device to an active internet connection.

2.5 Server Crash

Users who have access to the internet should be able to browse and rent tools and equipment from anywhere anytime. As a result, if anything goes wrong with the server or backend of the system, users will not be able to access the system.

2.6 Security Constraint

In order to stop unauthorized access, security constraints must be implemented.

2.7 Internet Accessibility

Upon logging in, the application should verify the internet accessibility and its speed, and based on this speed, it loads the content from cache or CDN.

2.8 Backup and Recovery

Sometimes, data on the system is suddenly deleted because of a vulnerability or some other issue. During such scenarios, the system will be capable of recovering data lost as a result of a failure. The purpose of this is to ensure that users do not encounter any data-related problems because replicas will be kept on another storage server.

2.9 Rating

The application should have a rating option which will help the ETR website team to improve as well as enhance their service accordingly.

3. Usability

A product's usability defines how effectively and conveniently it can help users achieve specific objectives and requirements.

3.1 Effortless access to functionality

Depending on the kind of user logging in, the system will navigate to several dashboards. For that kind of user, each dashboard will provide a set of specific functionalities.

3.2 A responsive user interface

It can be easily accessed, regardless of the device type, which allows the user to enter the system and access the functions assigned to them.

3.3 Browser-enabled Device

Due to the fact that ETR is a website, all stakeholders must have a device that can access a browser.

3.4 Operating Systems Supported

Operating systems such as Mac OS, Windows, and Linux are supported by the application.

3.5 Server issue

To ensure its continued safe operation, the system should routinely scan all of its host servers and the servers on which it is installed. Standard web and transmission protocols should be followed by the server.

4. Reliability

Various reliability requirements should be addressed in this section:

4.1 Availability

The application shall be always 100% available for end users, unless maintenance is scheduled during a specified period.

4.2 Mean Time Between Failures (MTBF)

For the ETR system, the Mean Time Between Failures will meet or surpass 99.99% uptime.

4.3 Mean Time To Repair (MTTR)

The system will be repaired and operational again in an hour or less even if it crashes. The system must be in normal operation with an error rate under 1/1000 while undergoing maintenance.

4.4 Accuracy

Continuous testing of the system's implementations is necessary to make sure that it can foresee some required characteristics that have already been evaluated and used. In the user's opinion, this will make those benefits stand out.

4.5 Bugs or Defect Rate

Small bugs ought to exist in the system. From a system perspective, minor bugs are small problems, such as a button that isn't working or a reference that is incorrect, that can be fixed in a few hours. Critical bugs, on the other hand, are problems with system functionality that require more than one working day to fix.

5. Performance

The performance traits of the ETR system are described in this section:

5.1 Response Time

A maximum of 3 seconds would pass before the system responded. For the purpose of lowering latency, it would be beneficial to implement a caching mechanism.

5.2 Concurrent Users

Up to 2000 concurrent users shall access the main database simultaneously through the system, and up to 10,000 concurrent users shall access the local servers simultaneously through the system.

5.3 Capacity

For the same user, it would be beneficial if the system enabled several sessions. So, one person can use Chrome and Safari simultaneously to access the website.

5.4 Throughput

The system's throughput is governed by the device's internet connection speed. A 25 Mbps connection is thought to be extremely good for browsing and other internet activities. The recommended throughput is high.

5.5 Resource Utilization

Low memory and disc space on the user's device shall be used by the system. In addition to storing a cookie file on the user's device, a remote database will house all of the system's data. Users will thereby receive what they need in the appropriate way, with the least amount of time, money, and resources wasted.

6. Supportability

This section outlines the requirements that will improve the system's capacity to be supported or maintained:

6.1. User Software

The System shall be accessible to the User through browser software that is commercially available. There won't need to be any specialized software installed on the user's device.

6.2. Coding Standard

Developers must define and adhere to coding standards. The standards and principles governing programming practices, techniques, and methodologies must be included in the definition.

6.3. Naming Conventions

The project's naming convention needs to be consistent. All of the constants used in the project should be written in capital letters, and many other things like the function name should begin with d_function_name. It is important to use naming effectively so that its meaning may be inferred just from its name.

6.4. Maintenance Utilities

Even if there are no new features being added, the application needs to undergo routine maintenance. Engineers can improve data consistency and response time by clearing the system cache, associated files, and storage in this fashion.

6.5 Configuration Management Tool

This system's source code must be kept up to date in a configuration management tool.

7. Design Constraints

The design constraints for the system being built are all listed in this section:

7.1 Programming Language

The system will be created using PHP, Java, and Python for the backend and HTML, JavaScipt, and JQuery for the frontend. The data will be kept in a MySQL database.

7.2 Design Architecture

Website development should take screen size into consideration and provide desktop and mobile views. The largest mobile screen size will never go over a particular size. All portable, hand-held gadgets have this limitation by design. Almost all mobile sets have a vertical screen orientation by default, in contrast to the horizontal orientation of all desktop and laptop screens.

7.3 Standard Development Tools

Version control and code deployment are done using GitHub whenever there are updates. Jenkins which is a configuration management tool used for continuous integration and deployment that is linked to GitHub via the project repository. JIRA board is used to organize, monitor, and control all system development processes. We can learn and share information on Stack Overflow that will be useful to others.

7.4 Web Based Product

Neither memory nor web browsers are required, but the computers must have web browsers like Internet Explorer, Chrome, etc. The product must be stored in a way that allows the client to easily access it. It should not take more than 3 minutes for the product to load. In order to use the product, users must have a basic knowledge of computer skills.

7.5 Integrating a payment gateway

The system that will facilitate online transactions and allow users to pay money for the things they wish to rent must incorporate a payment gateway.

7.6 Hardware Requirements

It is recommended that any computer with a processor that is greater than 486 be used to run the ETR system.

8. Online User Documentation and Help System Requirements

- Detailed instructions for using the ETR within the system are given to the user. In order to deploy online user support, specific links and search fields must be made available in the system so that users may look for and receive assistance.
- The user can ask for assistance from the AI chatbot 24*7.

9. Glossary

- **Accuracy:** the level of conformity to the proper value or standard of the output of a measurement, calculation, or specification
- **Design Constraint:** certain limitations imposed on the design solution
- **Performance:** the period of time that an action, task, or function is carried out or accomplished
- **Reliability:** the degree of dependability in the accuracy of a measurement, calculation, or specification.
- **Supportability:** the extent to which the system design elements and logistical resources are scheduled to meet the system requirements

- **HTML:** A standardized system of text file tagging called Hyper Text Markup Language is used to create font, color, visual, and hyperlink effects on web pages.
- **MySQL:** This Open Source relational database management system runs on almost every platform (including UNIX, Linux, and Windows) and stores all backend data.
- **CRUD operation:** The four fundamental actions that each software programme should be able to carry out are referred to as CRUD: Create, Read, Update, and Delete. Users must be able to create data, access it in the UI by reading it, update or edit it, and delete it.

Task 0: Logging:

Tasks	Section	Time(Hours)
1	Vision Document	2
2	Requirements Analysis and Risk Analysis	2
3	Rebuttal document	1
4	Use Case Model	5
5	Supplementary Specification	3
Total 13 hours		