

# <ETR (Electronic Tool Rental)>

## 1.UML Use Case Model of Overall ETR(Electronic Tool Rental) System

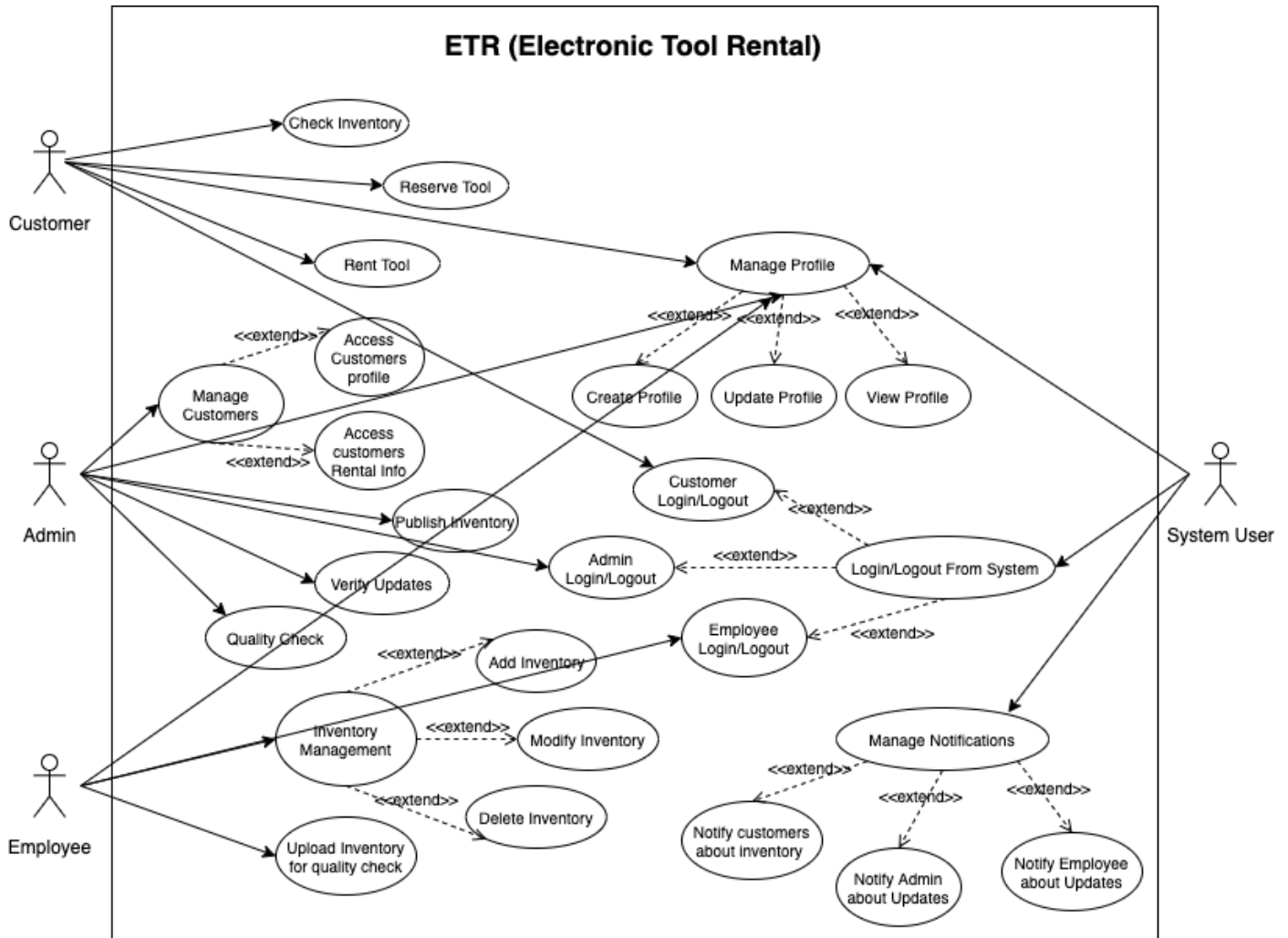


Fig 1: UML Use Case Model

## 2. Actor-Goal List

Actor	Goal
<u>Administrator</u>	<u>Manage Customers</u> <u>Manage Profile</u> <u>Publish Inventory</u> <u>Login and Logout from system</u> <u>Verify Updates</u> <u>Quality Check</u>

<u>Employee</u>	<u>Manage Profile</u> <u>Login and Logout from system</u> <u>Inventory Management</u> <u>Upload the Changes for quality check</u>
<u>Customer</u>	<u>Check Inventory</u> <u>Reserve Tool</u> <u>Manage Profile</u> <u>Rent Tool</u> <u>Login and Logout from system</u>
<u>System user</u>	<u>Manage Profile</u> <u>Login and Logout from system</u> <u>Manage Notifications</u>

## 2. Use Case Model

**Id:** UC-1

Use Case: Login and Logout from system (Admin, Employee and Customer)

### Description

Admin Login/Logout: Authorized Admin can Login to the system using valid credentials (username and Password). Admin will do all his activities in the system and do sign-out from the system after his/her work is completed.

Employee Login/Logout: Authorized Employee can Login to the system using valid credentials (username and Password). Employee will do all his activities in the system and sign-out from the system after his/her work is completed.

Customer Login/Logout: Authorized Customer can Login to the system using valid credentials (Customer No, Traffic No and File No). Admin will do all his activities in the system and do sign-out from the system after his/her work is completed.

**Level:** L1, L2

### Primary Actor

Admin, Employee, Customer

### Supporting Actors

System

### Stakeholders and Interests

None

### Pre-Conditions

Should be authorized and able to login to ETR website

### Post Conditions

#### Success end condition

Admin, Employee and Customer are able to logout from the system successfully on click of logout button after all the activities are done.

#### Failure end condition:

Unable to login to ETR application due to server issue or Network connectivity issue.

### Main Success Scenario

1. All the users mentioned access ETR website
2. Login to the system using valid credentials
3. Do the necessary activities such as Publishing inventory by admin, access tutors by Customer, create by Employee etc.,
4. Logs out of the system once the activities are done.

### Extensions:

No Extensions because for login and logout their won't be any alternative scenarios

### Special Requirements

Performance Requirements-Response time for activity

ETR website should respond quickly on click of login button once users enter their credentials.

System should redirect to the requested pages of users.

Reliability: Accuracy

Only authorized users can login to the system.

For unauthorized users the system should throw an error notification.

Usability-User Friendliness

System developed in such a way that any authorized user can easily access and navigate within the pages.

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**Id:** UC-2

Use Case: Manage Profile (Create/View/Update Profile)

**Description**

**Admin:** Admin registers to the ETR system by providing personal details. After successful registration admin login to the system using username and password. Once (S)he successfully login to the system then admin can view their profile and also update any personal information if needed.

**Employee:** Employee registers to the ETR system by providing personal details. After successful registration Employee login to the system using username and password. Once (S)he successfully login to the system then the Employee can view their profile and also update any personal information if needed.

**Customer:** Customer registers to the ETR system by providing personal details. After successful registration, customers login to the system using Customer No, Traffic No and File No. Once (S)he successfully login to the system then the Customer can view their profile.

**Level:** L1, L2

**Primary Actor**

Admin, Employee, Customer

**Supporting Actors**

System

**Stakeholders and Interests**

None

**Pre-Conditions**

Should have access to ETR website

**Post Conditions**

Success end condition

Admin, Employee and Customer are able to login to the system after creating a profile.

Failure end condition:

Unable to register and create profile due to server issue or internet connectivity or invalid input.

**Main Success Scenario**

1. All the users mentioned launch ETR website
2. Click on Register as per their role
3. Enter Personal details
4. Click on CreateProfile
5. Registration successful
6. Login to the profile using credentials
7. Users are able to view and update his personal details if necessary.

**Extensions:**

Manage profile will be done from system side and it extends into 3 categories:

1. Manage Profile will give access to create profiles for all three users.
2. Or Update Profile access for all three end-users.
3. Or view their Profiles.

**Special Requirements**

Performance Requirements:-Response time and Capacity maintained

The ETR website should respond quickly to the users.

System should redirect to the requested pages of users.

After entering all user details on click of submit user should be able to register to the system.

Security Requirements:-Reliability

As soon as you click or submit all the details of the user should be stored in the database in encrypted form.

Usability:-Information Scent

System developed in such a way that any user can easily register to the system and we also provide what is the valid message needed to enter in every text box while making a reservation.

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**Id:** UC-3

Use Case: Manage Customers

**Description**

Admin manages all the activities of Customers and s(he) can check the progress of Customer.

**Level:** L1

**Primary Actor**

Admin

**Supporting Actors**

System

**Stakeholders and Interests**

Customers as the end-users of the system are interested to reserve or rent tools from the system.

**Pre-Conditions**

Should be authorized and able to login to ETR website

**Post Conditions**

Success end condition

Admin able to check the list of Customers with their activities.

Failure end condition:

Unable to find particular Customer and related activities due to connectivity issues.

**Main Success Scenario**

1. This use case begins when the admin wants to check the activities of Customer or number of Customers reserved the tool..
2. Admin will click on the Customer link in the dashboard.
3. System shows the list of Customers with their activities
4. Admin can also check the activity of a particular Customer.

**Extensions:**

Alternative scenarios for Manage Customers under Admin will be :

1. Admin can access the Customer profile like Customer name, location, rented tools etc.,
2. Admin can also access Customer data like whether system issued license, Customer progress in that particular course etc.,

**Special Requirements**

Performance Requirements: -Throughput, Resource Utilization

ETR website should respond quickly on click of Customers link in Admin Dashboard Page.

Pages should load quick, and system should redirect to the requested form

Reliability: Accuracy and Availability

Only Admin should be able to login and the system should maintain all data in encrypted form at backend. Using MVC architecture we can maintain the data privacy.

Usability:-Performance

Admin can easily find out the details of Customers with required search information.

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**Id:** UC-4

Use Case: Publish inventory

**Description**

Admin Publishes the inventory

**Level:** L1

**Primary Actor**

Admin

**Supporting Actors**

System

**Stakeholders and Interests**

Customers as the end-users of the system will check the Inventory updates and see if any new Inventory is published by the admin.

**Pre-Conditions**

Users should be authorized as Admin and able to login to ETR website.

**Post Conditions**

Success end condition

Admin is able to publish the inventory after Quality check.

Failure end condition:

Admin not able to publish the inventory due to network issues or server downtime.

**Main Success Scenario**

1. This use case begins when the admin does a Quality check of the inventory which is published by the Employee.
2. Admin updates if any minor changes needed.
3. Admin checks the Inventory and assessment.
4. Admin click on publish button under Inventory Management.
5. tools will be published successfully under the ETR website.

**Extensions:**

No Extensions because for publish inventory their won't be any alternative scenarios

**Special Requirements**

Performance Requirements:-Response time and Degradation mode

ETR website should respond quickly as Admin access website

Pages should load quickly, and the system should redirect to the requested form.

On Click or publish the status of the Inventory should change to Published immediately.

Security Requirements:

Only Admin should be able to publish the inventory for the Customers to view.

Special access will be given to the admin profile and all the data will be encrypted.

Usability:-Productivity

System should be ease-of-use such that Admin can easily publish the inventory without any issues.

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**Id:** UC-5

Use Case: Create inventory

**Description**

Admin Creates the inventory

**Level:** L1

**Primary Actor**

Admin

**Supporting Actors**

None

**Stakeholders and Interests**

Customers as the end-users of the system are interested to check the inventory created by Admin.

**Pre-Conditions**

Users should be authorized as Admin and able to login to ETR website.

**Post Conditions**

Success end condition

Admin is able to create the inventory which includes tools as per location.

Failure end condition:

Admin not able to Create the inventory due to network issue or server downtime that leads the page to load.

**Main Success Scenario**

1. This use case begins when the admin wants to create/update the inventory.
2. Admin Clicks on “+Tool” under Inventory Management
3. Admin adds the tools.
4. Admin click on the Submit button under Inventory Management.
5. Tool will be added successfully which is displayed under Manage Inventory.

**Extensions:**

No Extensions because for create inventory their won't be any alternative scenarios

**Special Requirements**

Performance Requirements: -Resource utilization

ETR website should respond quickly as Admin access website

Pages should load quickly, and the system should redirect to the requested form.

On Click of Submit the of the Inventory should be created immediately.

Reliability: Mean time Before failures

Admin should be able to create the inventory and until it is published inventory will be protected from others.

Usability-Learnability

System should be ease-of-use such that Admin can easily create the inventory without any issues.

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**Id:** UC-6

Use Case: Create inventory

**Description**

Employee Creates the inventory

**Level:** L1

**Primary Actor**

Employee

**Supporting Actors**

None

**Stakeholders and Interests**

Customers as the end-users of the system are interested to check the inventory that is created by the Employee.

**Pre-Conditions**

Users should be authorized as Employee and able to login to the ETR website.

**Post Conditions**

Success end condition

Employees are able to create the inventory which includes .

Failure end condition:

Employee not able to Create the inventory due to network issue or server downtime that leads the page to load.

**Main Success Scenario**

1. This use case begins when Employee wants to create for tools.
2. Employee Clicks on “+Slide” under Inventory Management
3. Employee creates the inventory.
4. Employees click on the Submit button under Inventory Management.
5. Tools will be added successfully which is displayed under Manage Inventory.

**Extensions:**

No Extensions because for create inventory their won't be any alternative scenarios

**Special Requirements**

Performance Requirements:- Capacity

ETR website should respond quickly as Employee access website

Pages should load quickly, and the system should redirect to the requested form.

On Click of Submit the of the Inventory should be created immediately.

Security Requirements:- Access reliability

Employees should be able to create the inventory and until it is published by Admin inventory will be protected from others.

Usability-Error tolerance

System should be ease-of-use such that employees can easily create the inventory without any issues.

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**Id:** UC-7

Use Case: Verify Updates

**Description**

Admins verify the updates.

**Level:** L1

**Primary Actor**

Admin

**Supporting Actors**

System

**Stakeholders and Interests**

Employees as the end-users of system is interested to see whether the Inventory uploaded is approved by Admin or if any changes needed

**Pre-Conditions**

Users should be authorized as Admin and able to login to ETR website.

**Post Conditions**

Success end condition

Admin is able to check the updates getting on the inventory modified by Employee.

Failure end condition:

Admin not able to verify updates on inventory due to network issue or server downtime that leads the page not to load.

**Main Success Scenario**

1. This use case begins when the admin wants to check the updates on the activities done by the Employee.
2. Admin Clicks on Comment Summary.
3. Admin verifies the status on each inventory by Employee.
4. Admin click on the View button under Action to check the updates.

**Extensions:**

No Extensions because for verify updates their won't be any alternative scenarios

**Special Requirements**

Performance Requirements:

ETR website should respond quickly as Admin access website

Pages should load quickly, and the system should redirect to the requested form.

On Click of "View" button admin should be able to see Quality checks.

Security Requirements:

Admin should be able to check updates on the inventory verified and modified by the Employee and until admin publish inventory it will be protected from others.

Usability:

System should be ease-of-use such that Admin can easily check the update on the inventory for which the admin gave comments.

---

**Id:** UC-8

Use Case: Inventory Management

**Description**

Admin: Admin manages all the activities under Inventory managements such as Creating, checking status on tools(Published/Draft/Pending), Modify inventory and delete inventory.

Employee: Employee manages all the activities under Inventory managements such as Creating, checking status on tools(Published/Draft/Pending), Modify inventory and delete inventory.

**Level:** L1

**Primary Actor**

Admin, Employee

**Supporting Actors**

System

**Stakeholders and Interests**

Customers as the end-users of the system are interested to check the tools that are published by the admin after the Employee uploads the inventory or after admin create and publish inventory.

**Pre-Conditions**

Users should be authorized as Admin and Employee and S(he) should be able to login to ETR website.

**Post Conditions**

Success end condition

Admin and Employee are able to do all the activities mentioned under Inventory Management.

Failure end condition:



End-user (Admin/Employee) not able to do activities due to network issues or server downtime that leads the page not to load.

**Main Success Scenario**

1. This use case begins when Admin/Employee wants to do activities using ETR website such as Adding Tools, checking status on tools (Published/Draft/Pending), Modify inventory and delete inventory.
2. Admin/Employee Clicks on Manage Inventory.
3. Admin/Employee do the activities as creating inventory etc.,
4. Admin/Employee able to check status on each inventory.

**Extensions:**

No Extensions because for Inventory Management their won't be any alternative scenarios

**Special Requirements**

Performance Requirements:-Response time

ETR website should respond quickly as Admin/Employee access website

Pages should load quickly, and the system should redirect to the requested form.

On Click of Inventory Management all the activities should be displayed appropriately.

Security Requirements:

Admin/Employee should be able to login securely without any issues.

All the inventory should be confidential.

Usability:-User friendliness

System should be ease-of-use such that Admin/Employee can easily manage all the necessary activities.

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**Id:** UC-9

Use Case: Quality Check

**Description**

Admin do Quality check on inventory uploaded by Employee

**Level:** L1

**Primary Actor**

Admin

**Supporting Actors**

Employee, System

**Stakeholders and Interests**

None

**Pre-Conditions**

Users should be authorized as Admin and S(he) should be able to login to ETR website.

**Post Conditions**

Success end condition

Admin is able to do Quality check on the inventory uploaded by an Employee.

Failure end condition:

Admin is not able to do Quality Check due to network issues or server downtime that leads the page not to load.

**Main Success Scenario**

1. This use case begins when Admin access ETR website for Quality check of inventory.

2. Employee uploads the inventory(tools)
3. Admin will check the inventory.
4. Admin Publish inventory using the Publish button.

**Extensions:**

No Extensions because for Quality check their won't be any alternative scenarios

**Special Requirements**

Performance Requirements:-Resource Utilization

ETR website should respond quickly as Admin access website

Pages should load quickly, and the system should redirect to the requested form.

On Click of Manage tools Admin should immediately navigate and check the inventory uploaded.

Security Requirements:

Admin should be able to login securely without any issues.

All the inventory should be confidential.

Usability:-Information Scent

System should be ease-of-use such that Admin can easily manage all the necessary activities and check the Quality of inventory without any navigation issues.

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**Id:** UC-10

Use Case: Upload inventory for Quality Check

**Description**

Employee Upload inventory created for Quality check by admin.

**Level:** L1

**Primary Actor**

Employee

**Supporting Actors**

Admin, System

**Stakeholders and Interests**

Customers as Stakeholders, are interested to learn the inventory that is created by Employee and published by admin after Quality check.

**Pre-Conditions**

User Should be authorized as Employee and S(he) should be able to login to the ETR website.

**Post Conditions**

Success end condition

Employees are able to upload the inventory created.

Failure end condition:

Employees are not able to upload the inventory due to network issues or server downtime that leads the page not to load.

**Main Success Scenario**

1. This use case begins when employees access ETR website for uploading inventory created for Quality check by Admin.
2. Employee creates the inventory under Inventory Management
3. Employee adds the tools in the Inventory.
4. Employee Clicks on Submit button.
5. Employee uploads inventory and checks the status.

**Extensions:**

No Extensions because for upload inventory their won't be any alternative scenarios

**Special Requirements**

Performance Requirements:

ETR website should respond quickly as Employee access website

Pages should load quickly, and the system should redirect to the requested form.

On Click of Manage tools Employee should immediately navigate and check the status of inventory uploaded.

Security Requirements:

Employees should be able to login securely without any issues.

All the inventory should be confidential.

Usability:

System should be ease-of-use such that Admin can easily manage all the necessary activities and check the status on uploaded inventory.

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**Id:** UC-11

Use Case: Reserve a tool

**Description**

Customers will reserve a tool.

**Level:** L1

**Primary Actor**

Customer

**Supporting Actors**

System

**Stakeholders and Interests**

Employees and Admins will check which Customer reserved tools and prepare documentation accordingly for that particular Customer.

**Pre-Conditions**

Users should be authorized as Customer and be able to login to ETR website.

**Post Conditions**

Success end condition

Customers are able to reserve the inventory.

Failure end condition:

Customers not able to reserve the tool due to network issues or fee payment due or not met eligibility criteria.

**Main Success Scenario**

1. This use case begins when customers access ETR website for reserving a tool.
2. Customers will pay the rental fees.
3. Customers will reserve the tools required.
4. Customers will rent the tool.

**Extensions:**

No Extensions because for reserving a tool as their won't be any alternative scenarios

**Special Requirements**

Performance Requirements:

ETR website should respond quickly as Customer access website

Pages should load quickly, and the system should redirect to the requested form.

On Click of Reserve button Customer should get success message for reserving that particular tool.

Security Requirements:

Customers should be able to login securely without any issues.

All the inventory should be confidential.

Usability:

System should be ease-of-use such that Customers can easily manage all the necessary activities and check the tools they reserved.

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**Id:** UC-12

Use Case: Manage Notifications

**Description**

Notify Admin on updates: Admin gets all notifications from the system for all the activities done by Customer and Employee

Notify Employee on updates: Employee gets all notifications from the system for all the activities done by Customer and any notifications sent by Admin on inventory uploaded.

Notify Customer about rent payment: Customer gets notifications from the system for the payment details.

**Level:** L1, L2

**Primary Actor**

System

**Supporting Actors**

Admin, Customer and Employee

**Stakeholders and Interests**

None

**Pre-Conditions**

Should have access to ETR website

**Post Conditions**

Success end condition

System sends notifications for all the three users Admin, Employee and Customer

Failure end condition:

Unable to send notifications and due to server issue or internet connectivity

**Main Success Scenario**

1. All the users mentioned launch ETR website
2. Login to the Profile using Credentials
3. Admin checks notifications on click of Notifications button in Dashboard
4. Employee checks notifications on click of Notifications button in Dashboard
5. Customer checks notifications under Customer Profile.

**Extensions:**

No Extensions because for Manage Notifications there won't be any alternative scenarios

**Special Requirements**

Performance Requirements:-Response time

The ETR website should respond quickly to all the users.

System should immediately show the notifications received.

Usability:-User Friendliness

As soon as the user login to the system should enable the Notification button so that the user can easily find out that (S)he has received notifications.

**UML Sequence diagram to illustrate the process of creating, reviewing, and publishing new inventory**

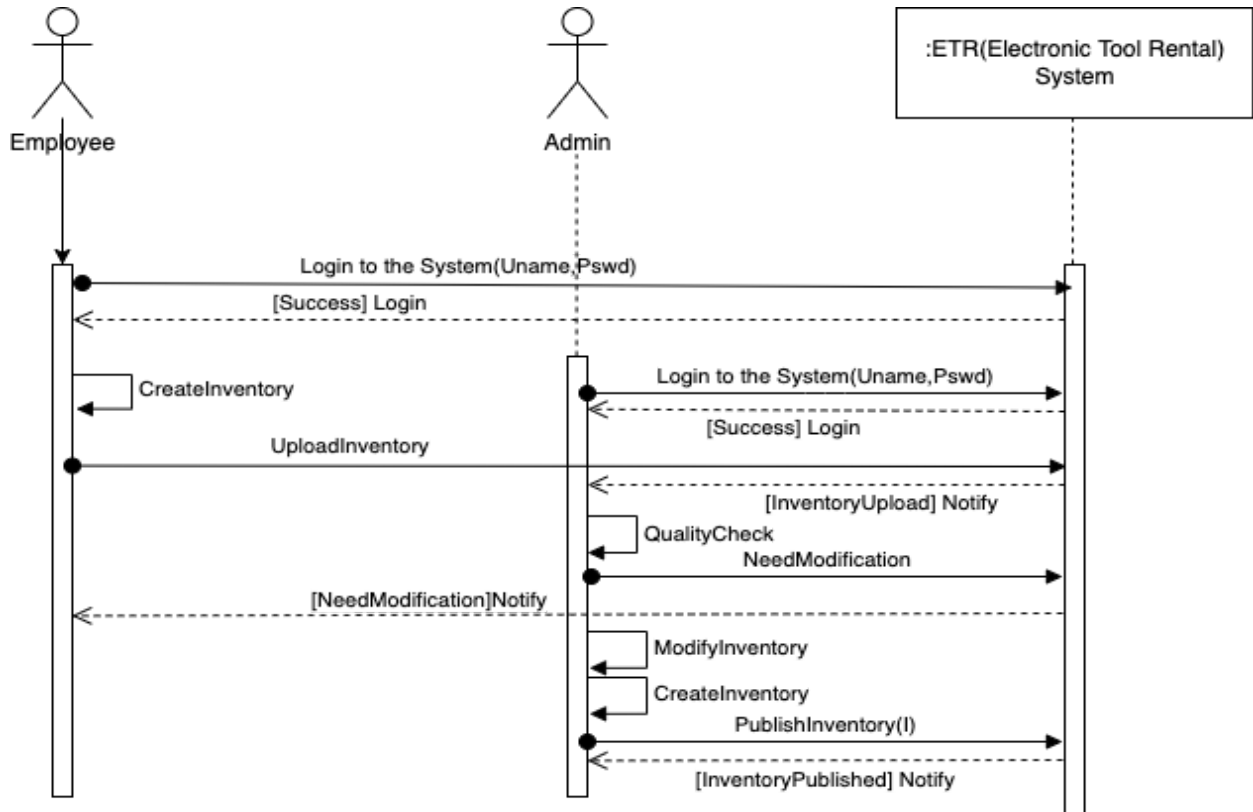


Fig 2: UML Sequence Diagram

UML Sequence diagram in the Fig 2 explains the process of creating, reviewing and publishing a new inventory in sequential process:

- 1) Here we are considering two actors and one object as ETR System as Admin and Employee. Admin is the one who checks the inventory created by an Employee and publishes inventory. Only Admin can publish inventory.
- 2) Before doing any activities Employee/Admin should Login to ETR Website using username and password.
- 3) Employee Creates the inventory for a particular location and uploads the inventory using ETR system.
- 4) Admin will get notified by the system that the Employee uploaded inventory for review.
- 5) Admin will do Quality check and if Admin wants any modification on the inventory sends comments to Employee using ETR System. (This step repeats until inventory is approved by Admin)
- 6) If inventory is all correct and approved, then Admin can Publish the inventory using the system as shown in Fig 2.
- 7) Admin can even modify or create inventory on his own and publish inventory for the Customers to watch using the system.
- 8) After inventory is published the system notifies Admin that inventory is uploaded.

UML Activity diagram for renting a tool from the perspective of Customer

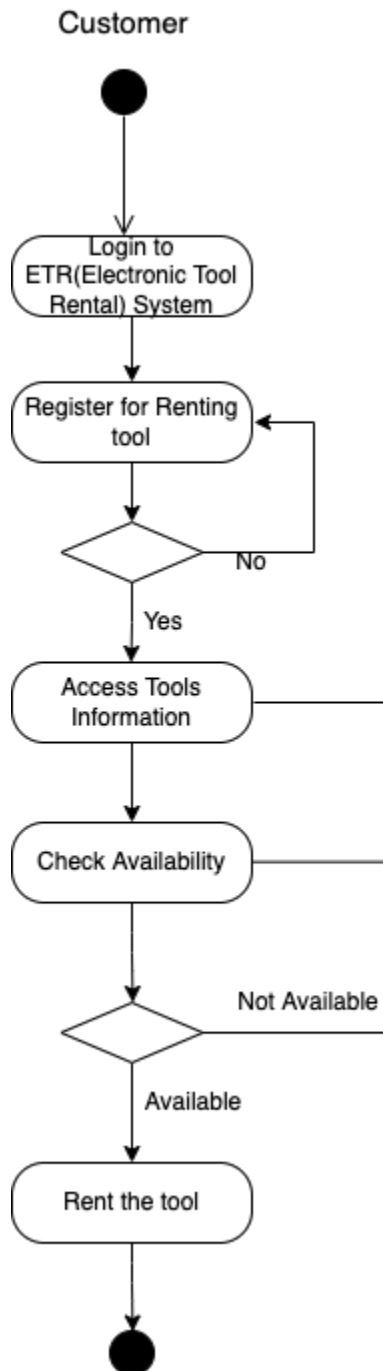


Fig 3: UML Activity Diagram

UML Activity diagram in the Fig 3 for renting a tool from the perspective of Customer:

- 1) Activity diagram shows both sequential and parallel processes. Here Customer will first login to ETR System using Customer No, Traffic No and File No.
- 2) Before accessing tools, customers first need to reserve the tools.
- 3) If Customers reserve the tool, then (S)he can access the course material otherwise Customer cannot access unless reservation is done.
- 4) Customers can now access the reserved inventory and rent them.

# <ETR (Electronic Tool Rental)> Supplementary Specification

## 1. Introduction

The basic purpose of this document is to present the detailed requirements of ETR(Electronic Tool Rental) Application. Admin, Employee and Customer are the main parts of the system. By building this system we will facilitate all the three mentioned actors. Through this system the Customer can rent a tool present in his location online. Employees can easily upload the inventory and the admin will do Quality check and publish the inventory after approval the Customers can reserve them.

Admin is the one who can manage all the inventory that an employee has uploaded and will do Quality check on the inventory. Admin can edit, comment, approve, publish inventory uploaded by employees and manage the customer records.

### 1.1. Purpose

The purpose of ETR(Electronic Tool Rental) Software requirement specification is to describe the main functionality of Renting the tools online.

The document is used to continuously update to reflect the changes to requirements during the implementation and utilization of the online inventory management system so that an accurate baseline of actual requirements is available at any time and the document will be up-to-date.

### 1.2. Scope

SRS document is intended for providing an abstract overview of the online learning system and general overview of the entire ETR project. It will give access to Admin and Employee to share the data related to inventory creation and publishing. Only admin can publish the inventory for customers. The Scope of this document:

Functional and Non-Functional requirements

Stakeholders

ETR System

Customer

Administrator

Employee

### 1.3. Definitions, Acronyms and Abbreviations

#### Definition:

Administrator	A person who can manage activities of other two end users(Employee and Customer). S(he) have authority to Database
Employee	A person who create lesson inventory and Quiz and upload it to the system for approval from Admin
Customer	A person who accesses a system for electronic tool rental

ETR functionalities for end-users:

This software will provide the following functionalities for end users who use the system:

1) Administrator:

System gives access to admin to manage and access the data of employees and customers.

Admin can maintain records of Customers and provide solutions if users face any problem related to accessing inventory.

- 2) Employee:  
Employees can create the inventory and then upload it using the system. Employees can manage the inventory created like S(he) can delete or edit. Employees can check customer tool reservation status.
- 3) Customer:  
Customers can reserve and rent the tools present in their location..

Abbreviations:

SRS	System Requirement Specification
PHP	Hypertext Preprocessor
ETR	Electronic Tool Rental System

#### 1.4. References

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- [2] [https://docs.google.com/document/d/1YZ0Vsh5\\_8XxlZ3qEUEih3\\_KKnflz83iJFojfAYUf-gs/edit](https://docs.google.com/document/d/1YZ0Vsh5_8XxlZ3qEUEih3_KKnflz83iJFojfAYUf-gs/edit)
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- [6] <https://techwhirl.com/writing-software-requirements-specifications/>
- [7] <https://winatalent.com/blog/2020/05/what-are-functional-requirements-types-and-examples/>

## 2. Functionality

Below are the functionalities that are not expressed in use case:

- ✓ Business rules
- ✓ System Design language
- ✓ Transaction corrections, adjustments and cancellations
- ✓ Behavior of system
- ✓ Archiving
- ✓ Submit Ratings
- ✓ Backup and recovery
- ✓ Authorization levels

### 2.1. Business Rules

ETR application is a system-to-be that manages Admin, Employee and Customer activities sequentially.

All the end-users (Admin, Employee, Customer) in the system initially have to register and while each login user will be provided by captcha verification.

System is developed in such a way that employees can only upload the inventory, Customer can check the availability of a tool in a particular location and can reserve it and Admin in other words Quality analyst who validates the inventory uploaded by Employee and publishes it.

Admin can create the inventory, modify inventory, delete and publish inventory for Customers.



Disable the quality check tab under comment summary for Admin if the Employee is modifying the inventory.

Enable/Disable Edit or Delete functionalities for Employees if the inventory of a particular location is published by Admin.

To access the ETR website all users should be registered into the system for their roles.

## **2.2. System Design language**

This section contains the framework that contains all the reusable components. For instance Admin and Employee both have access for creating the inventory in this case we can write one functionality and can reuse this function in another section.

Due to reusing components the system will maintain consistency and Reliability throughout the development life cycle which further leads to increase in productivity.

Software programming languages used to develop systems are MySQL, PHP, HTML, CSS and cloudinary for storing the inventory.

Hardware requirements are Windows, LINUX or MAC OS with proper internet connectivity.

## **2.3. Transaction Corrections, adjustments, and Cancellations**

All the transactions made by Customers will be recorded irrespective of success or failure.

All payment activities of Employee and Customers will be stored and authorized.

Transaction's entry will be made, changes will be tracked, delete history of transaction, Cancellation and error checking.

## **2.4. Behaviors of system**

System is developed in such a way that all the activities of end users will be done in a sequential manner. Customer cannot bypass the next inventory until (S)he finishes the current reservation.

Employees can edit or delete inventory until and unless Admin publishes the inventory. Once Inventory is published, the Employee cannot make any changes further.

System will not allow a Customer to rent a tool until S(he) pays the rental fee. When an Employee is busy with one of the lessons no other Employee/admin should be given access to controls of the inventory tab.

System is developed in such a way that once a tool is clicked by Admin/Employee then (S)he can check inventory information in the right side panel.

## **2.5. Archiving**

Over the time period System's data grows beyond storage capacity, In such conditions the system is developed in such a way that it will archive the existing old data and store it in another storage capacity which will not be used frequently by users.

## **2.6. Submit ratings**

System will provide feedback form for the users to submit their ratings on the usage/regarding online learning/Employee feedback/system performance feedback.

All the ratings submitted will be stored and if there are any negative reviews then the team will work on to improve or enhance the application accordingly.

### **2.7. Backup and recovery**

Due to vulnerability or some other issues all of sudden system data gets erased. In such a scenario the system will have a functionality to recover the data which is lost due to system crash.

For this we will maintain replicas of each data in another storage server that helps users not to face any issues related to data.

### **2.8. Authorization levels**

System will assign certain access levels for the users who use the system, and these functions are called CRUD (Create, Read, Update, or Delete) operations. These functions are already discussed in the previous sections that explain accessibility of particular functions for particular users.

## **3. Usability**

ETR system shall allow users to access the system from the internet using HTML, CSS or its derivative technologies. Since all users are familiar with general usage of browsers, the ETR system uses a web browser as an interface so no specific training is required. The system is user friendly and self-explanatory. Below are the related usability requirements that we have used in our UCM for all the three end-users:

- ✓ Learnability
- ✓ Performance
- ✓ Productivity
- ✓ User Friendliness
- ✓ Error Tolerance
- ✓ Information Scent
- ✓ Customization and Personalization

### **3.1. Learnability**

All the functionalities in the system will be easy to learn for the end-users even if they are using it for first time. Admin and Employee can easily learn how to create and modify the inventory. Customer can easily learn how to go through the website to reserve and rent a tool.

### **3.2. Performance**

Each End-user can easily reserve and rent tools using the ETR system. The UI is so easy that all the customers can complete the renting process easily.

### **3.3. Productivity**

ETR applications may be used by all the three end-users at the same time so users will be worried at some point that the system server will be down and the productivity will fall. But our application will maintain the productivity throughout the activities carried out by Admin, Customers, Employee.

### **3.4. User Friendliness**

System will be so user friendly and gains attraction for the customers to reserve and rent a tool. With more interactive and attractive tools will develop the ETR Application.

### **3.5. Error Tolerance**

System will immediately react to the errors that are created by the user and display prompt messages through which that particular error will be resolved by following steps.

### **3.6. Information Scent**

ETR Application system will provide information at each and every step on how to do that particular task and the user can easily find help at all levels of activities that (S)he can perform.

### **3.7. Customization and Personalization**

Users can customize their profile, modify and also personalize the web login which will make users more interested to reserve the tools and do activities while the system is in use.

## **4. Reliability**

ETR Application should be very reliable due to the confidential data available and damages an incorrect and incomplete data can do.

- ✓ Availability
- ✓ Mean Time Before Failures(MTBF)
- ✓ Mean time to Repair(MTTR)
- ✓ Accuracy
- ✓ Maximum bugs or defect rate
- ✓ Access Reliability

### **4.1. Availability**

The system is available 100% for the user and is used 24 hours a day and 365 days a year. The system shall be operational 24 hours a day and 7 days a week.

### **4.2. Mean time Before Failures**

The system will be developed in such a way that it may fail once in a year.

### **4.3. Mean time to repair**

Even if the system fails, the system will be recovered back up within an hour or less.

### **4.4. Accuracy**

The accuracy of the system is limited by the accuracy of the speed at which the Customer can use the system without any worry.

### **4.5. Maximum bugs or defect rate**

Maximum bugs that will be reported by users will be one or two in a year.

### **4.6. Access Reliability:**

The accuracy of the system is limited by the accuracy of the speed at which the Customer can use the system without any worry.

## **5. Performance**

ETR system application shall be based on web and has to be run from a web server. The product may take initial load time depending on internet connection strength which also depends on the media from which the product is run. The performance shall depend upon hardware components of the client/customer. Below are some of the performance related aspects of ETR application

- ✓ Response time for activities
- ✓ Throughput
- ✓ Capacity
- ✓ Degradation modes
- ✓ Resource utilization

### **5.1. Response time for activities**

Each response will be less than 30 seconds for the activities performed by the user in the system.

### **5.2. Throughput**

More than 20000 requests will be processed by system simultaneously without lag within a minute per one server database.

### **5.3. Capacity**

System can handle approximately 30000 requests sent by the user from the front end and send responses within a time frame.

### **5.4. Degradation modes**

System is developed in such a way that degradation will never occur and if it also occurs it might occur once in a year.

### **5.5. Resource utilization**

Servers and all other resources will be properly utilized so that users will never face issues of storage from the frontend to backend.

## **6. Supportability**

The required characteristics of the system that inherent will enable system elements to allow effective and effective sustainment. Below are some of the aspects:

- ✓ System platform
- ✓ Coding standards
- ✓ Configuration Management Tool

### **6.1. System Platform**

This is an PHP MVC based project with MYSQL database structure. Here we are using HTML5,CSS3, Angular for frontend which is easy for access, PHP as a middleware to connect to backend MySQL server. We are using clouinary for storing inventory.

### **6.2. Coding Standards**

HTML 5,CSS 3 along with Angular 4+ will make application frontend as standalone/Stable. Moreover, to reduce the risk of vulnerabilities we use PHP to transfer the data from the frontend and process it towards the server/backend. It also improves security as the frontend and backend tier will not have direct connection.

### **6.3. Configuration Management Tool**

The source code developed for this system shall be maintained in configuration management tools.

## **7. Design Constraints**

ETR uses PHP MVC model and below are some of the constraints related to design documentation:

- ✓ Standard development Tools
- ✓ Budget
- ✓ Software languages
- ✓ Architecture and Design
- ✓ Web based Product

### 7.1. Standard development tools

GitHub is used for version controlling and deploying code whenever there are changes. Jenkins used as Configuration management tool for Continuous integration and deployment which will be connected with GitHub using project repository link. JIRA board to plan, track and manage all the development activities of the system. Stack overflow where we can learn and share knowledge which will be helpful for others.

### 7.2. Budget

We use Project budget tools to estimate the total cost of a project. Develop and deploy the project within the budget.

### 7.3. Software languages

This is an PHP MVC based project with MYSQL database structure. Here we are using HTML5,CSS3, Angular for frontend which is easy for access, PHP as a middleware to connect to backend MySQL server. We are using cloudinary for storing inventory.

### 7.4. Architecture and Design

Website developed should be fit to the screen and it should have both mobile and desktop view. The biggest screen size of a mobile can never increase beyond a certain size. This is an inherent constraint of all hand held, mobile devices. While the orientation of all desktops / laptop screens is horizontal, the default screen orientation of almost all mobile sets is vertical.

### 7.5. Web based Product

There are no memory requirements and the computers must be equipped with web browsers such as Internet explorer, chrome etc.,. The product must be stored in such a way that allows the client easy access to it. Response time for loading the product should take no longer than five minutes. A general knowledge of basic computer skills is required to use the product.

## 8. Online User Documentation and Help System Requirements

As the System-to-be is Electronic Tool Rental online help system becomes a critical component of the system which will provide:

Specific guidelines to a user for using the ETR within the system.

To implement online user help certain links and search fields shall be provided in application so that users can search and take help.

## 9. Glossary

**Accuracy:** the degree to which the result of a measurement, calculation, or specification conforms to the correct value or a standard.

**Design Constraint:** those constraints that are imposed on the design solution

**E-learning:** learning conducted via electronic media, typically on the internet.

**Supportability:** degree to which system design characteristics and planned logistics resources meet system requirements

**Performance:** time that the action or process of carrying out or accomplishing an action, task, or function.

**Reliability:** the degree to which the result of a measurement, calculation, or specification can be depended on to be accurate.

**Cloudinary:** Cloudinary is an end-to-end image- and video-management solution for websites and mobile apps, covering everything from image and video uploads, storage, manipulations, optimizations to delivery. With Cloudinary, you can easily upload images and videos to the cloud and automate smart manipulations of those media without installing any other software.

**Acronyms:**

<MVC> **Model-View-Controller** is a software design pattern commonly used for developing user interfaces that divide the related program logic into three interconnected elements. Using which security and reliability will be maintained.

<PHP> **Hypertext Preprocessor** is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML

<HTML5> **Hypertext Markup Language revision 5** (HTML5) is markup language for the structure and presentation of World Wide Web inventories.

<CSS3> **Cascading Style Sheets level 3** is a computer language for laying out and structuring web pages (HTML or XML). This language contains coding elements and is composed of these “cascading style sheets” which are equally called CSS files

<MySQL> “My” is the name of co founder Michael Widenius's daughter and “SQL” is **Structured Query Language** is an open-source relational database management system (RDBMS) which is used to store all backend data.

**Task 0: Logging:**

Have used Trello board for Vision document and google for requirement\_analysis\_and\_risk\_analysis both times are logged and appended for respective documents. Below is the time spent for D3:

S.No	Document	Time taken	Comments
1	Vision Document	5 hours	Time taken for modification
2	Rebuttal documents (Vision document changes form)	3 hours	For adding comments received from reviewers.
3	Requirements evaluation and risk analysis	3 hours	For addressing comments from reviewer and modification of document
4	UCM (Use Case Map)	8 hours	Created new document
5	SRS (System Requirement Specification)	6 hours	Created new document
Total time		25 hours	