Project Milestone 2: Functional Requirements and ER Design

Project: Research Lab Equipment Booking System

Team: Johnjacobjames Erdman, Cole Logan, Shaylin Smith, Asa Fischer

Functional Requirements Using User Stories

User Registration

As a user, I want to register for an account so I can use our site.

User Verification

As a user, I want my credentials checked at login so that unauthorized access isn't allowed.

Login and Logout

As a user, I want to log in so that my information is saved and accessible.

As a user, I want to log out so that my account isn't used when I am not using it.

View Equipment Details

As a user, I want to be able to view available equipment so that I can choose which one I want.

As an admin, I want to be able to make my equipment available for viewing so that users can reserve them.

Search Equipment

As a user, I want to be able to search for equipment so that I can find the equipment I need.

Reserve Equipment

As a user, I want to reserve equipment so that I can have access to it when I need it.

As an admin, I want my equipment to be up for reservation so that users can borrow it and use it as needed.

Cancel Reservations

As a user, I want to cancel my reservation so that I do not keep the equipment reserved when I am not using it.

Usage Logs

As an admin I want to track the equipment usage so I can maintain logs for accountability.

Admin Approval

As an admin, I want to approve equipment use so that trusted users can use the equipment.

As an admin, I want to deny equipment use so that untrusted users cannot use equipment.

View Usage Analytics

As an admin, I want to view usage analytics so that I can recognize patterns and improve efficiency.

Equipment Maintenance Schedule

As a user, I want equipment to only be available when it is in working condition so that I don't accidentally reserve a broken piece of equipment.

As an admin, I want to ensure equipment is only up for reservation when in working condition so that users don't accidentally reserve a broken piece of equipment.

User Profile Management

As a user, I want to be able to manage my profile so that it shows accurate information.

Notification System

As a user, I want notifications so that I can be informed and up to date.

Booking Confirmation

As a user, I want confirmation notifications so that I know that my equipment has been booked.

Supplying

As a supplier, I want to supply equipment so that users can use reserve new equipment.

Identify Key Entity Sets and Relationships

Key Entity Sets:

- User
- Admin
- Equipment
- Reservations
- Supplier

Relationships:

User – Creates – Reservation

- Connectivity Type
    - One to Many
- Participation Constraints
    - User is Partial
    - Reservation is Total

User – Has – Equipment

- Connectivity Type
    - One to One
- Participation Constraints
    - User is Partial
    - Equipment is Partial

Admin – Approves – Reservation

- Connectivity Type
    - One to Many
- Participation Constraints
    - Admin is Partial
    - Reservation is Total

Reservation – Contains – Equipment

- Connectivity Type
    - Many to Many
- Participation Constraints
    - Reservation is Total
    - Equipment is Partial

Supplier – Supplies – Equipment

- Connectivity Type
    - Many to Many

- Participation Constraints
    - Supplier is Partial
    - Equipment is Total

Conceptual Design – Entity-Relationship (ER) Diagram

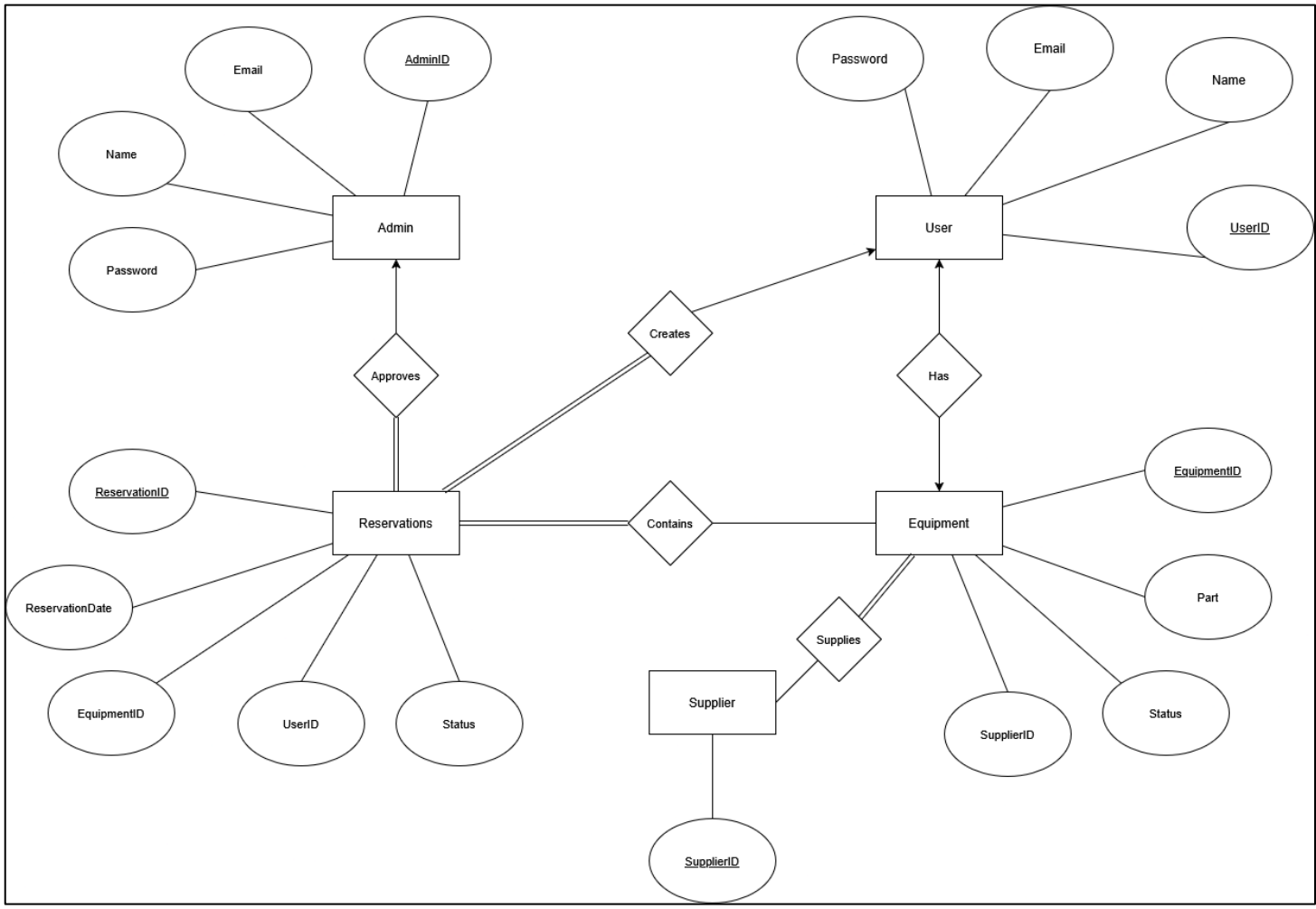

FIG. 1: ENTITY-RELATIONSHIP DIAGRAM

Explanation and Justification of Design

In our project there will be users who can create reservations for equipment, so a user can have many reservations, but the reservations cannot overlap. A user can only have one piece of equipment at a time. This is to prevent a user from reserving all of the equipment. An admin looks over a set of equipment and will approve an equipment reservation. The admins have a set of equipment, so when one is returned or requested, they can make sure that it is not broken. For each equipment a supplier will supply it.

The design of our ER Diagram aligns with our functional requirements by representing how users, admins, and suppliers will interact with the database system. Each user defined role (user, admins, suppliers) has actions that they can use to affect the database system. The ER Diagram simplifies these actions into a singular diagram. Each of these actions are represented by relationships between an entity using an action, and an entity being affected by an action. So, these include approvals by admins, reservation creations by users, and suppliers supplying equipment.

We have made a few assumptions with our design for the database system. The main assumption is that all users can only reserve one set of equipment at a time to prevent a user from reserving all the equipment in the database. Our other assumption is that the database has only one admin that approves reservations. This is mainly to simplify the admin entity, but also because the actual implementation of admins would be contained to one “admin account” anyways that anyone with admin access would use.