



TED UNIVERSITY

PROJECT ANALYSIS REPORT

CMPE 491

Senior Design Project I

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1. Introduction

In today's competitive environment, businesses tend to overlook the motivation of employees to produce products. However, businesses may increase employee motivation and overall productivity by implementing workplace gamification strategies. Today, gamification performance management has become a widely used term.

According to the research conducted by TalentLMS, 89% of employees state that gamification increases their sense of productivity at work. Furthermore, in another research, if a business utilizes gamified activities, 69% of its employees are more likely to remain longer than three years. These figures demonstrate the effectiveness of gamification in retaining company workers. In this project, we propose the development of an application that aims to increase productivity in production by increasing positive competition through gamification.

2. Current system

There is no available current system that we can utilize. We will start from scratch.

3. Proposed system

3.1 Overview

Lead the Board is a software that integrates gamification in manufacturing to offer rewards to employees for their contribution to their work. It gives managers and employees the ability to track their progress and reward employees who are bringing their full potential to the game. With 3 different user types such as admin, manager, and employee, different modules will be provided with position-unique content. Employees will earn points and badges based on metrics such as production, operation type, and difficulty level and be placed on a leaderboard. Employees who reach specified rankings will be rewarded.

The completion of the tasks by the operators will be tracked and counted through sensors. As a result, the operator will earn as many points as the task he/she performs. Also, a feed page will be constructed for everyone to share their achievements, thoughts, ideas, and comments.

3.2 Functional Requirements

- The system shall allow users to log into their account by entering their email and password.
- The first page users view in the app shall be the login page.

- The system shall allow users to reset their password by clicking on "I forgot my password." and receiving a link to their verified email address.
- Authentication of a user when user tries to log into the system.
- When the user's email or password is invalid, an error message shall appear.
- When required fields are left blank, the user shall see an error message.
- It shall have a register button that starts the registration process.
- An operator should see the registration page when they click the register command button on the login page.
- If the user already exists, it shall be reported as an error.
- System shall have 3 different user types; Admin, Manager and Operator.
- Operators shall enter the system via their mobile phones.
- Admin and managers shall enter the system via web.
- On the web, the navigation bar shall appear on the left side.
- The user's complete information is available in the account section.
- If the admin or manager wants to do deletion operation on Operations page, system will give warning.
- If the admin or manager wants to do edit point field on Operations page, system will give warning.
- If the admin or manager assigns operator to a operation that hr/she does not have the required skills to perform this operation, the system will give a warning.

3.2.1 ADMIN

- Admin shall be granted for manager actions such as registration of a new manager, deleting of an existing manager record and updating of an existing manager's information.
- Admin shall assign managers to the product (or products) that they are responsible for.
- Admin shall be granted for registration confirmation of both managers and operators.
- Admin shall be granted for product actions such as registration of a new product with name and type, deleting of an existing product record and updating an existing product's information.
- Admin shall be granted to add, delete, update necessary operation actions for each product.
- Admin shall be granted to perform badge operations such as creation of a new badge, deleting of an existing badge and necessary points to earn a badge.

- Admin shall be able to access all the details of production records, badges, points of operators.
- Admin shall be granted to add skill.
- Admin shall be granted to assign skill to operation. Records can be edited or deleted.
- Admin shall be granted to assign skill to operator. Records can be edited or deleted.
- On the admin navigation bar, there shall be options such as: Registration Requests, Manager Operations, Operator Operations, Product Operations, Product Catalogue, Budget Operations, Account, and Log Out.

3.2.2 MANAGER

- Manager shall see overall performance of their operators. (Via a list or a graph)
- Manager shall be granted to add, delete, update necessary operation actions for product/products that they assigned.
- Manager shall be granted to perform badge operations.
- Manager shall be able to access all the details of production records, badges, points of operators who are under his/her supervision.
- Manager shall assign operations to the operators.
- Manager shall assign the appropriate difficulty level and points to the product range they are responsible for.
- Manager shall be able to view records of operators and be able to edit and delete the records.
- On the manager navigation bar, there shall be options such as: Operator Operations, Tasks Operations, Product Catalogue, Operators, Account, and Log Out.

3.2.3 EMPLOYEE

- Operators shall have a profile that consists of their detailed production records, badges, earned total points and his/her ranking at the leaderboard along with full list.
- Operators shall register to the app and wait for admin or manager to accept its application.
- Operators shall log in to their account when they start operating.
- The operation detected by sensors shall be automatically written in the operator's profile as a score.

- Admin, manager and operators shall be able to see leaderboard and statistics. Also, every manager and operators shall be able to see each of their profiles.
- Everyone shall share their achievements, thoughts, ideas and comments on feed.

3.3 Nonfunctional Requirements

- The system should be stable.
- System should be protected against malicious users.
- Registration acceptance request should be able to be seen by manager in maximum 5 minutes after the request created.
- Every unauthorized request to a resource must be logged and stored for audit over the next 6 months.
- System should be easy to use for users from different background.
- System should work on various browsers such as Google Chrome, Microsoft Edge, and Opera.

3.4 System models

3.4.1 Scenarios

OPERATOR

New Operator Self Registration

- The operator opens the application.
- Login and Register buttons are displayed on the start screen.
- The operator chooses the register button.
- Registration screen appears with blank input places to enter name, surname, department, e-mail, password, repeat password.
- If the operator enters necessary information correctly, the registration request appears on the registration request page of the admin.

Login Operation

- The operator/manager opens the application
- Login and Register buttons are displayed on the start screen.
- The operator/manager chooses the login button.
- Login screen appears with blank input places to enter e-mail and password.
- If the operator/manager enters information correctly, he/she can login successfully and redirect to the feed page.
- In case the operator/manager forgot his/her password, forgot my password option can be selected and reset password mail will be sent to user's email.

Feed Operations

- After the operator/manager login/register successfully, he/she can move to feed page by choosing feed tab.
- On the feed page, the operator can use the search button and search for specific users.
- When the operator sees a new post, he/she can like the post using the like button and comment on a specific post using the comment button.
- Then, the operator can scroll down and move to next posts.

Create Post Operation

- The operator/manager opens the "Feed" tab of the application.
- If the user wants to create a new post, he/she can select (+) button.
- After the selection, the user redirected to a new page that allows user to upload a media type or write a text.
- When the user finishes his/her post contents, he/she can choose the share button and publish the post.
- After the publishment of a post, the user is redirected to the feed page.

View Badges Operation

- The operator opens the “Badges” tab of the application.
- On the badges page, the operator can see earned and in-progress badges.
- If the operator wants to share his/her badge as an achievement on the feed, the share button can be selected.
- After the selection of the share button, the operator redirected to create new post page and by choosing share button in that page, he/she publish the post.
- After the publishment of a post, the user is redirected to the feed page.

View leaderboard Operation

- The operator/manager opens the “Leaderboard” tab of the application.
- By default, the time interval is 1 week. So, user will see the statistics of recent 1 week.
- If the user wants to see a specific time interval’s statistic, he/she can enter time interval information on the necessary blank input spaces in day/month/year format.
- After the completion of entering time interval, statistics will be shown on the screen.

Operator QR Scan Operation

- Operator opens the “QR” tab of the application.
- Gives camera permissions from the allow permission pop-up.
- Operator can turn on and off the flash of the camera.
- The operator centers the QR code of the machine and takes the picture with the circle button.

Operator Assigned Task Selection

- After the successful QR code scan operation, a page with an assigned tasks list of the operator in that machine is seen.
- The operator can see a picture of the scanned machine.
- Operator sees difficulty level and points of the tasks.
- Operator chooses a task from the displayed screen.
- According to the chosen task, the Task Start/Stop screen displays.

Operation Start/Stop Tracking

- Current machine, task name, start time, completed task number, and total points acquired are displayed on the operation tracking screen.
- As the operator completes the mission, the completed tasks and points part increases and can be observed.
- The operator can click the end task button and end the current task.
- Operator sees a warning that says, "Are you sure you want to end task?".
- Operator can choose "Yes" or "No".
- If "No" option is chosen, pop-up disappears, and operation continues where it left off.
- If "Yes" is chosen, before leaving the page, a pop-up appears.
- Pop-up displays the completed task number and total points in ended operation session.
- If the operator gains a badge, a new pop-up alerts the user that the badge is gained.
- After closing all the pop-ups, the application returns to the Task selection screen.

MANAGER

Adding a new operation

- The manager opens the "Operations" tab. On this page, the manager can choose product and related machine from the combo box.
- Fills the operation name input place and chooses point, difficulty level, required skill and required level of the skill.
- By clicking plus symbol, next to required level, empty required skill and level input places will appear and can add as many skills as he/she wants.
- By clicking save button, the new operation record is created and can be seen on the data grid below the page.
- By clicking the edit button, the editing page will open, and admin can edit the characteristics of the operation and clicks save button to save the record.
- If operation's point part is changed, the system will give a warning. (Editing point section may affect operator's current points!) If user clicks revise points, the point calculations will be regraded. If you click the ignore it button, points will be changed but past calculations will stay unchanged.

- When manager clicks the delete button, the system will give a warning that this operation may delete related records. Clicking yes deletes the record and no will stop the deletion operation.
- Admin can search for operation by name, operation name, difficult or point from the search box.

Task assignment

- The manager opens the “Task Assignment” tab.
- Manager chooses operator from the combo box then chooses the operations that are required to assign.
- Click the save button to complete the task assignment.
- Managers search desired record by operator name and ID, operation name or ID.
- If the operator does not have the required skills to perform this operation, the system will give a warning.
- Records can be seen on the data grid below the page.
- By clicking the edit button, the editing page will open, and the manager can edit the characteristics of the task assignment and click the save button to save the record.
- Manager clicks the delete button and deletes the desired record.

View operators

- The manager opens the “Operators” tab.
- Manager can see ID, title, first name, last name, email, last activity information of all operators that from his/her department from the data grid on the page.
- If more detail is needed, click to see detail button and the individual information page will open.

View detailed operator info

- Manager can see ID, department, first name, last name, title, ranking on the leader board, current status and the skills that she/he has on the left part of the page.
- On the right part of the page, the Manager can see the badges that the operator has, the operations that he/she is working on.
- From the table, when and how many points the operator earned, and his/her total score can be seen.

View leaderboard

- The manager opens the “Leader Board” tab and can see the current leadership status.
- By entering the date range, the manager can see the ranking on any date he/she wants.

View product catalog

- The manager opens the “Product Catalog” tab. Product records can be seen from the data grid below the page.
- Managers search desired record by searching it by name or ID from the search box.
- By clicking the edit button, the editing page will open, and the admin can edit the characteristics of the task assignment and clicks save button to save the record.
- Manager clicks the delete button and deletes the desired record.

ADMIN

Adding a new operation

- The admin opens the “Operations” tab. On this page, Admin can choose product and related machine from the combo box.
- Fills the operation name input place and chooses point, difficulty level, required skill and required level of the skill.
- By clicking plus symbol, next to required level, empty required skill and level input places will appear and can add as many skills as he/she wants.
- By clicking save button, the new operation record is created and can be seen on the data grid below the page.

- By clicking the edit button, the editing page will open, and admin can edit the characteristics of the operation and clicks save button to save the record.
- If operation's point part is changed, the system will give a warning. (Editing point section may affect operator's current points!) If user clicks revise points, the point calculations will be regraded. If you click the ignore it button, points will be changed but past calculations will stay unchanged.
- When admin clicks the delete button, the system will give a warning that this operation may delete related records. Clicking yes deletes the record and no will stop the deletion operation.
- Admin can search for operation by name, operation name, difficult or point from the search box.

Adding a new machine

- The admin opens the "Machines" tab.
- Admin fills in the required input places machine name, ID and description.
- Click "Add machine" and save machine record to the database and can be seen from the data grid below the page.
- Admin can search desired record by searching machine by name or ID from the search box.

Adding new Department

- The admin opens the "Departments" tab.
- Admin fills in the required input places Department name, ID and description.
- Click "Add Department" button and save department record to the database and can be seen from the data grid below the page.
- Admin can search desired record by searching department by name or ID from the search box.

Adding a new skill

- The admin opens the “Skills” tab.
- Admin fills the required input places skill and description.
- Click “Add Skill” button and save skill record to the database and can be seen from the data grid below the page.
- Admin can search desired record by searching skill by name and ID from the search box.

Skill assignment operation

- The admin opens the “Skill Assignment” tab.
- Admin chooses operator from the combo box then chooses the skills (it can be more than one) that the operator has.
- Click the save button to complete the skill assignment.
- Admin can search desired record by searching skill by skill name and ID, operator name and ID from the search box.
- Records can be seen on the data grid below the page.

Task assignment

- The admin opens the “Task Assignment” tab.
- Admin chooses operator from the combo box then chooses the operations that are required to assign.
- Click the save button to complete the task assignment.
- Admin search desired record by operator name and ID, operation name or ID.
- If the operator does not have the required skills to perform this operation, the system will give a warning.
- Records can be seen on the data grid below the page.
- By clicking the edit button, the editing page will open, and the admin can edit the characteristics of the task assignment and click the save button to save the record.
- Admin clicks the delete button and deletes the desired record.

View product catalog

- The admin opens the “Product Catalog” tab.
- Admin fills the required input places product name or ID.
- Click “Add Product” button and save product record to the database and can be seen from the data grid below the page.
- Admin search desired record by searching it by name or ID from the search box.
- By clicking the edit button, the editing page will open, and admin can edit the characteristics of the task assignment and clicks save button to save the record.
- Admin clicks the delete button and deletes the desired record.

Badge operations

- The admin opens the “Badge Operations” tab and can see all the created badges and their information.
- Admin clicks “Add badge” button to create a new badge and Add New Badge page will open.
- On the page that opens, admin fills in the required input places badge name, point range, description, date range and image and clicks save button to create badge.
- Time range can be selected hourly, daily, weekly, monthly or custom. To select a custom range, admin selects desired start date and finish date. A certain time range can also be entered by activating the button at the bottom left of the table.
- By clicking the edit button on the Badge Operations page, the editing page will open, and admin can edit the badge name, description, point range, image and time range of the badge from that page.
- Admin clicks save button to save changes.
- Admin clicks the delete button to delete page.

Process registration requests

- The admin opens the “Registration Requests” tab.
- All the registration requests can be seen here.
- Admin click approve to register that user to system.
- Admin click delete to delete the request.

Manager/ Operator registration

- The admin opens the “Manager Registration” or “Operator Registration” tab.
- Admin fills the required input places name, surname, ID, department and password.
- Click the save button to save it.

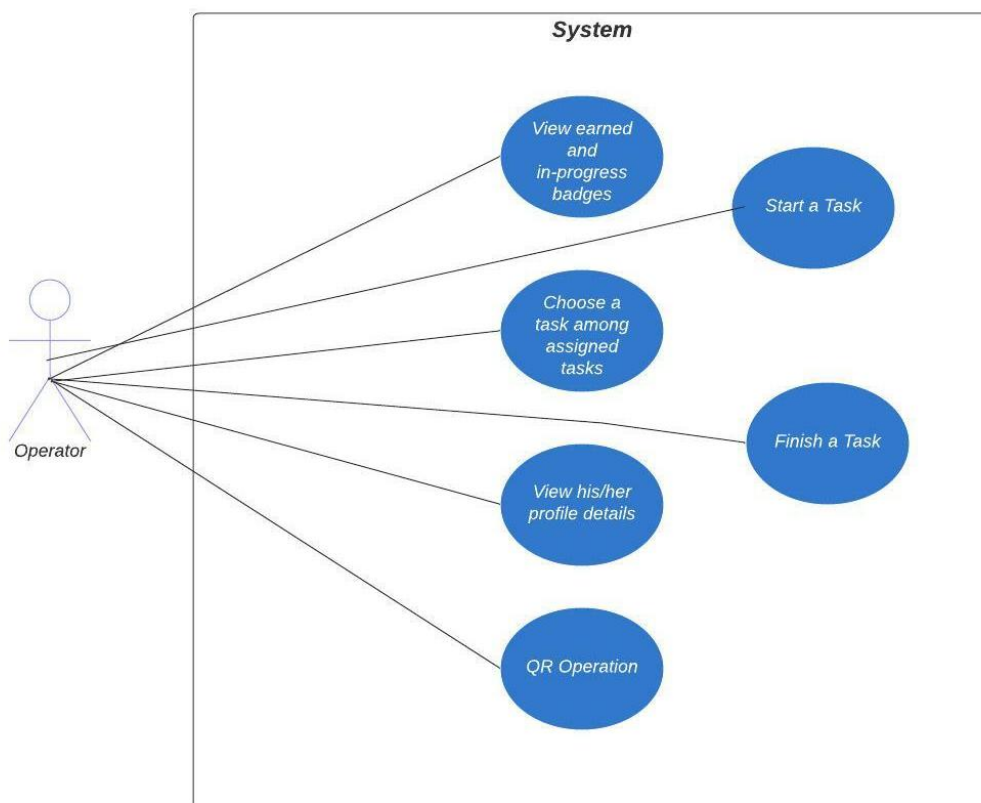
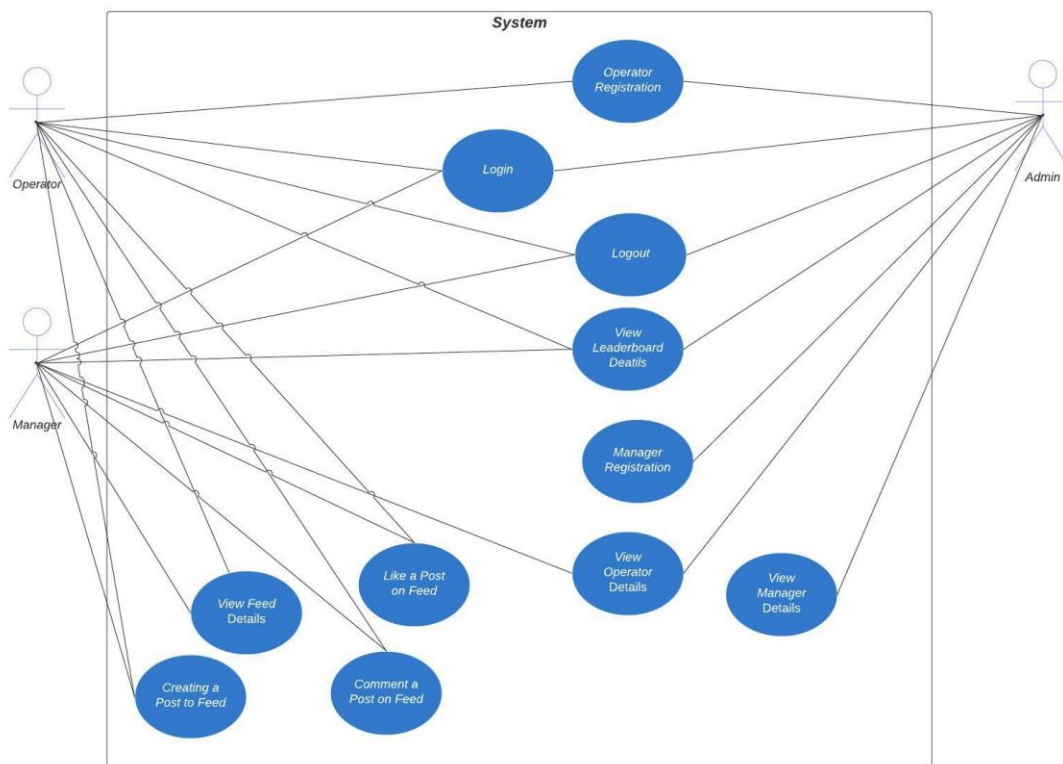
View all operators

- The admin opens the “Users” tab
- Admin can see ID, title, first name, last name, email, last activity information of all users from the data grid on the page.
- By clicking the edit button, the editing page will open, and admin can edit the information of the operator and clicks save button to save the record.
- Admin clicks the delete button and deletes the desired record.
- If more detail is needed, clicks to “see detail” button and individual information page will open.

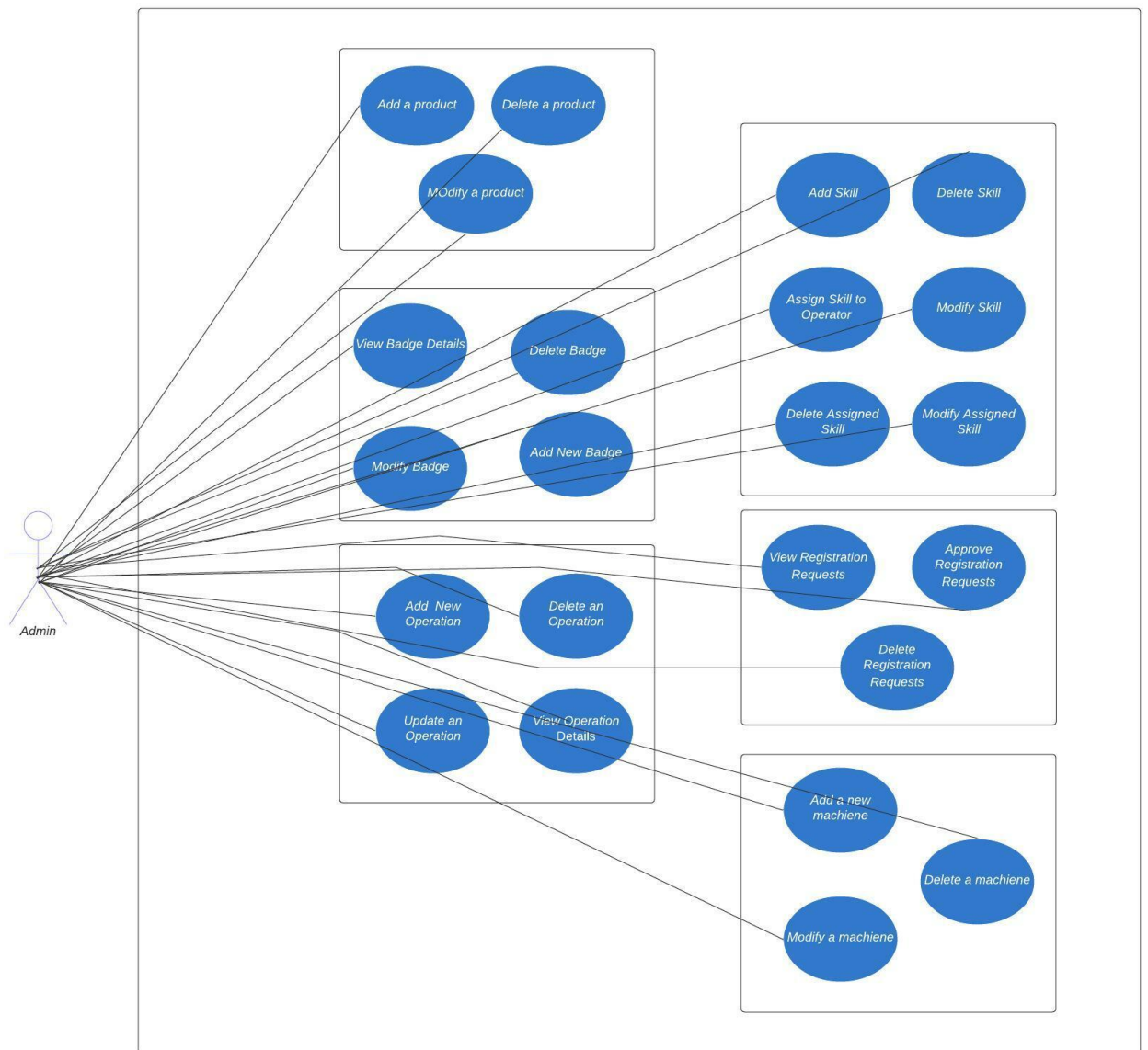
View operator info

- Admin can see ID, department, first name, last name, title, ranking on the leader board, current status and the skills that she/he has on the left part of the page.
- On the right part of the page, Admin can see the badges that the user has, the operations that he/she is working on.
- From the table, when and how many points user earned, and his/her total score can be seen.

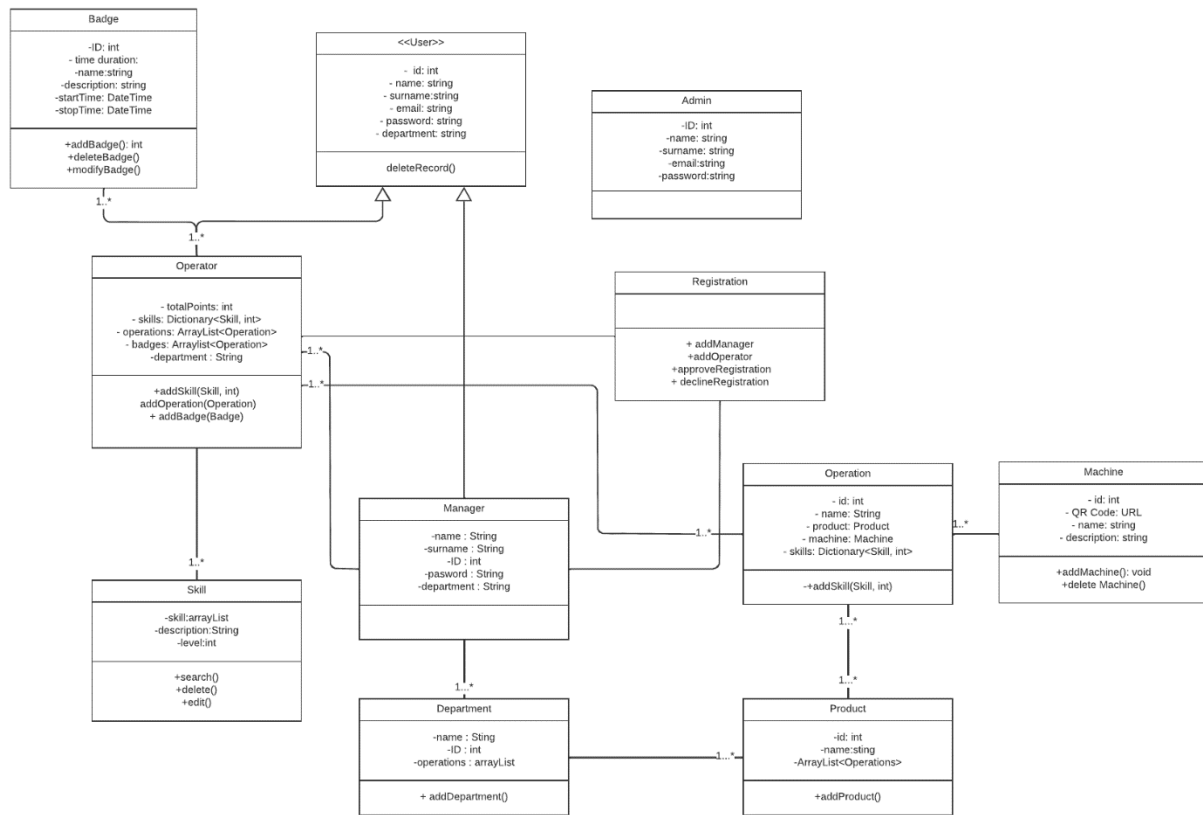
3.4.2 Use case model



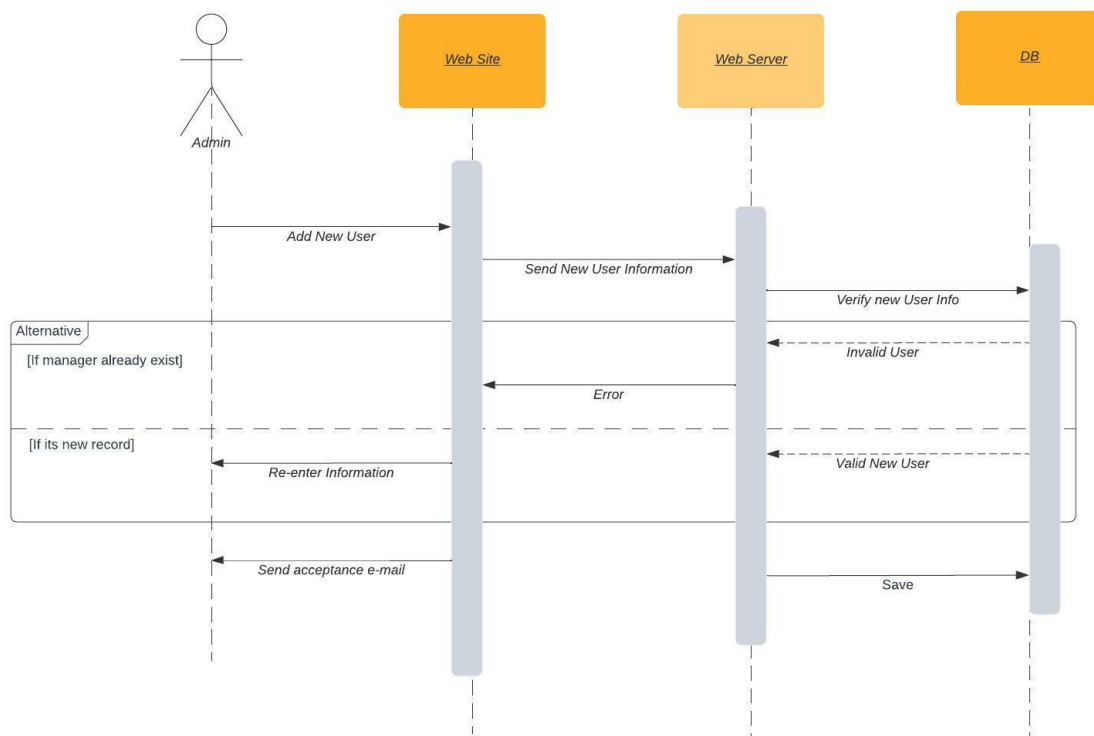
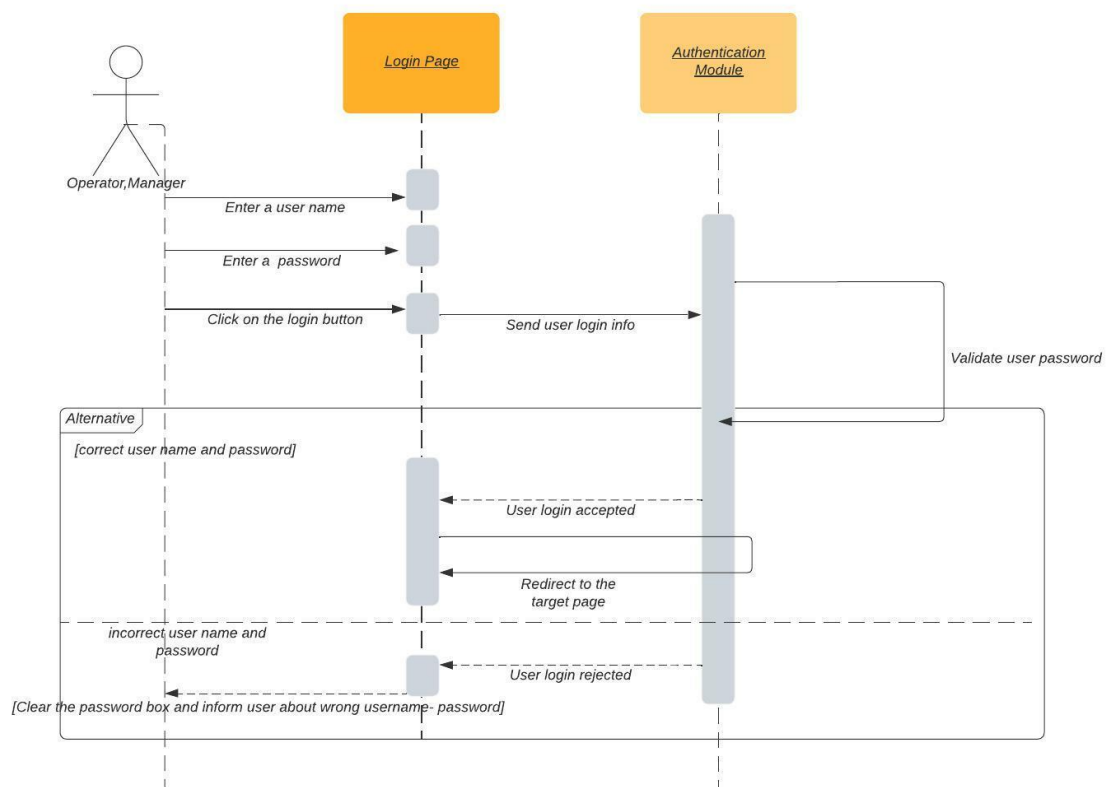


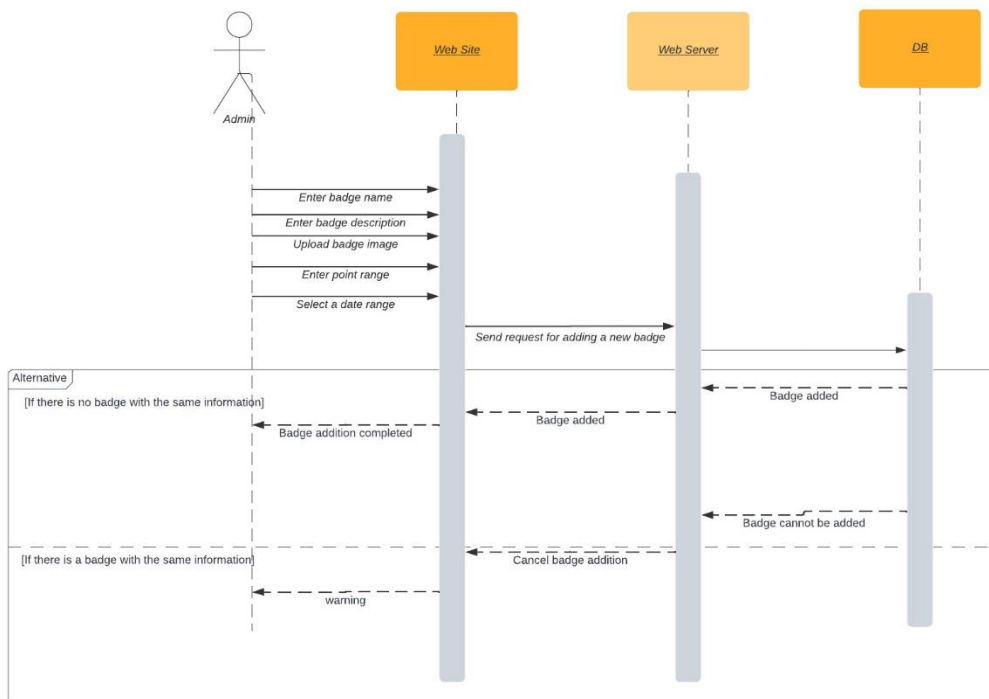
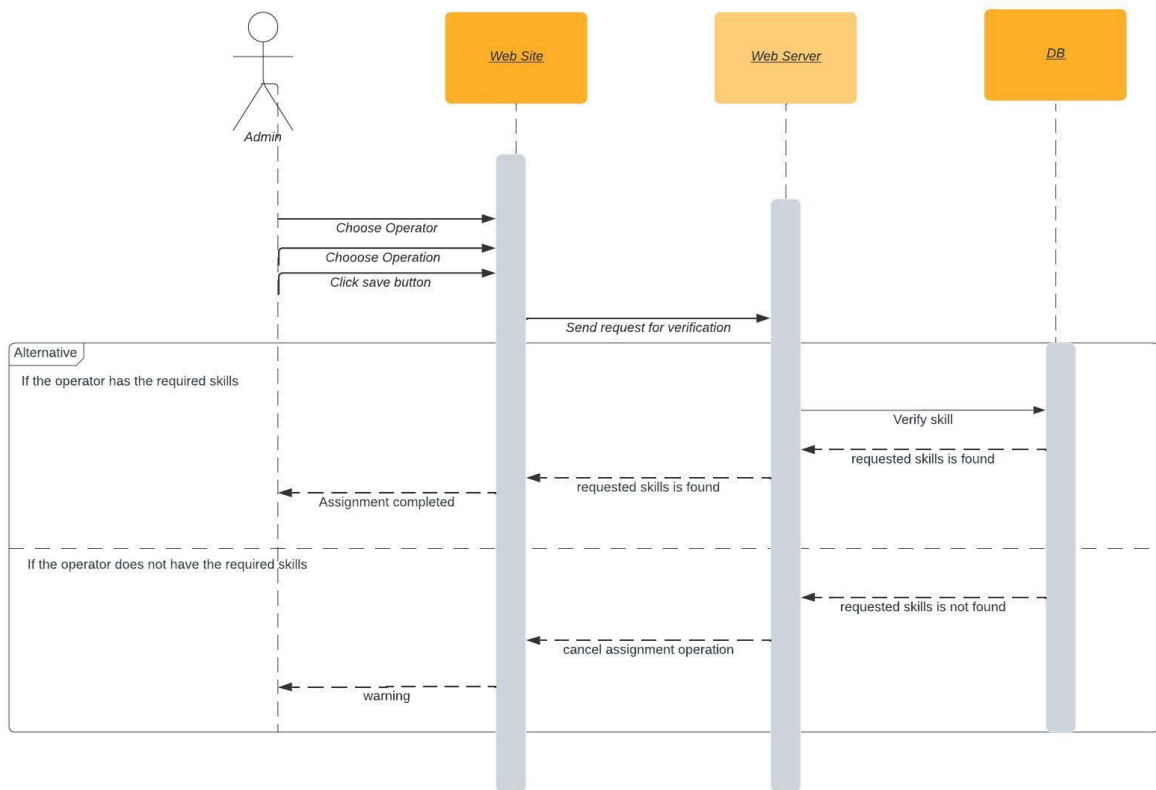


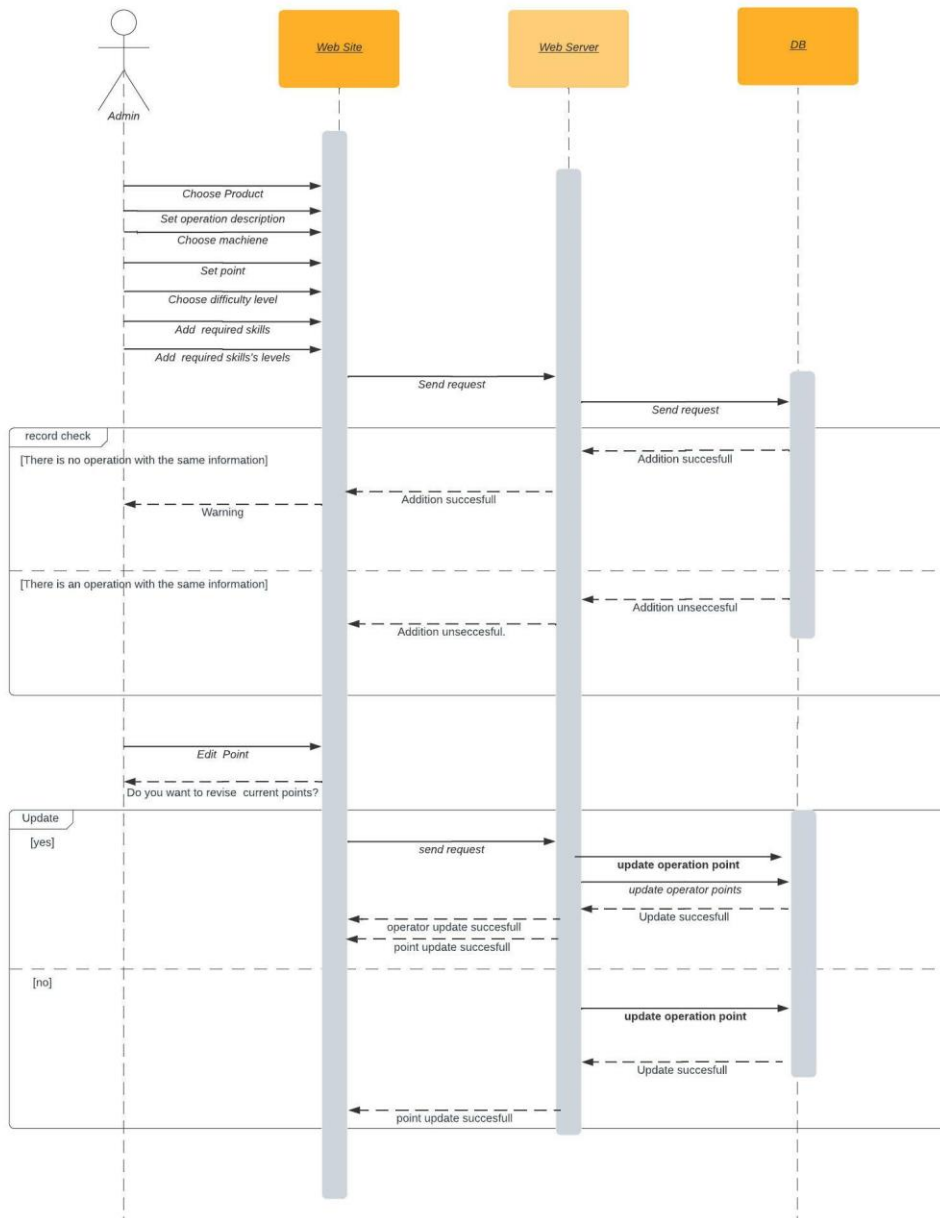
3.4.3 Object and class model



3.4.4 Dynamic models

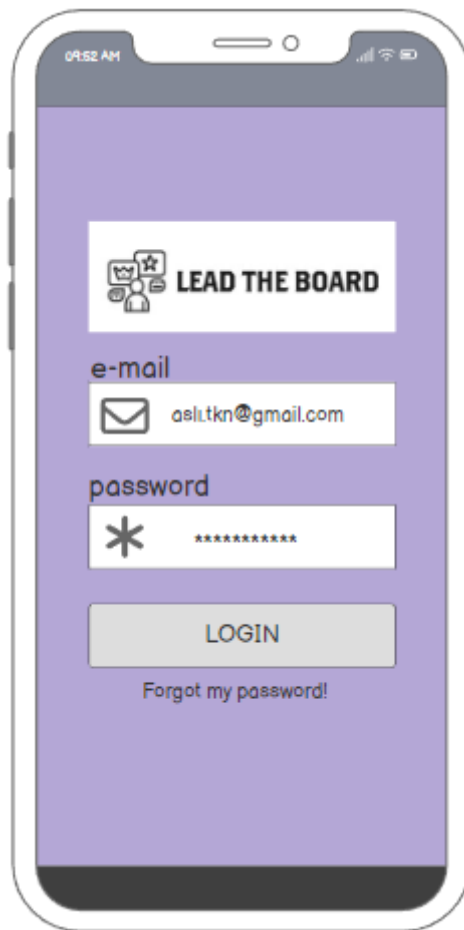






3.5 User interface - navigational paths and screen mock-ups

3.5.1 Mobile Interface For Operator



9:52 AM

 **LEAD THE BOARD**

name

Asli


surname

Tekin

department

...

e-mail

 asliTKN@gmail.com

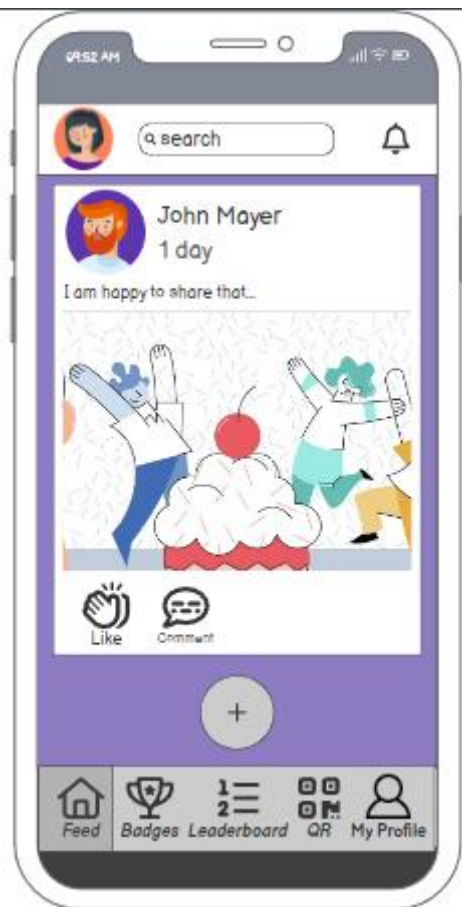
password

* *****

repeat password

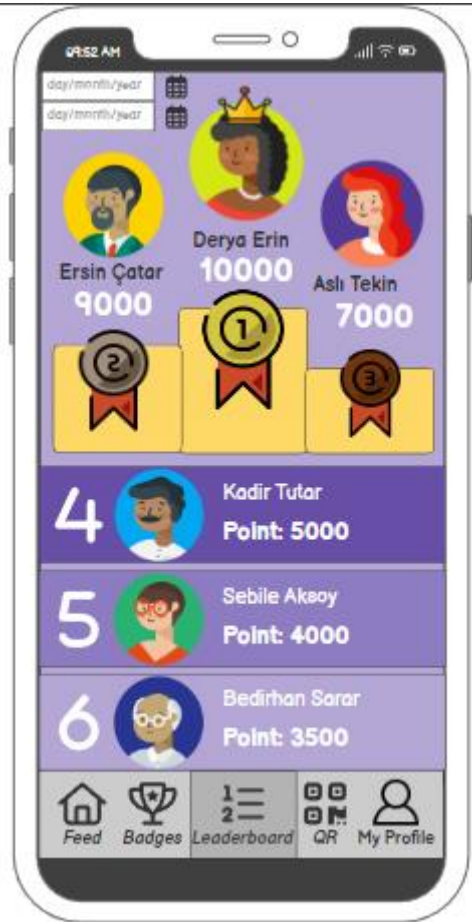
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SIGN UP





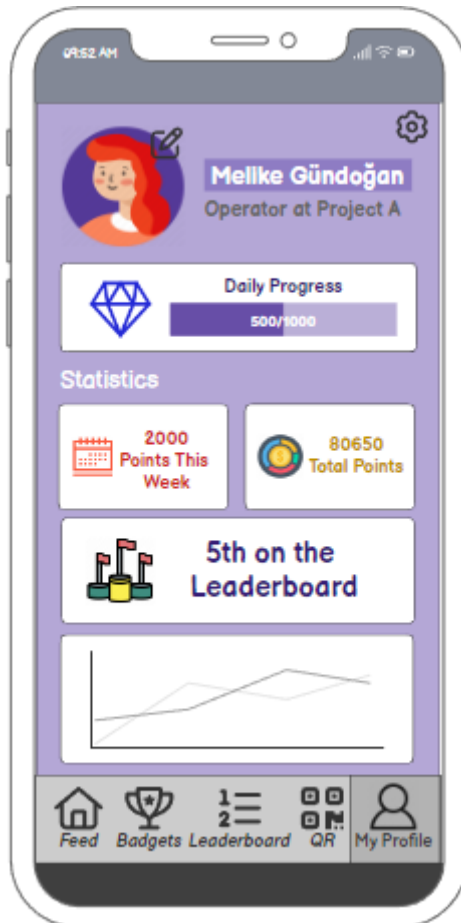




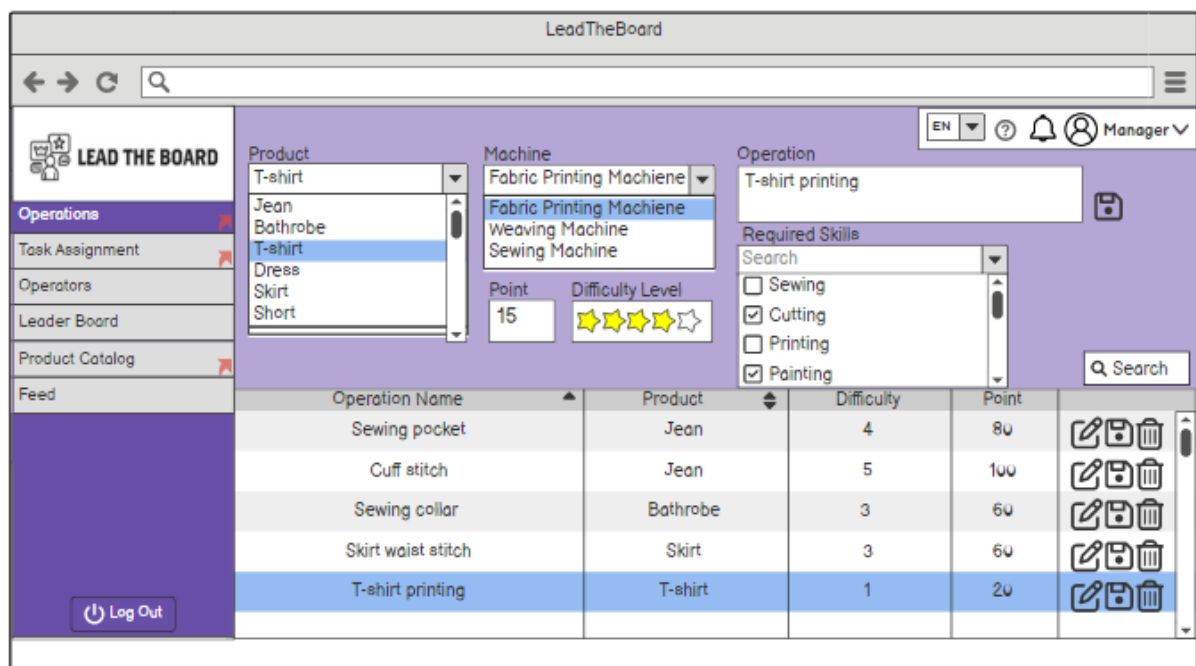
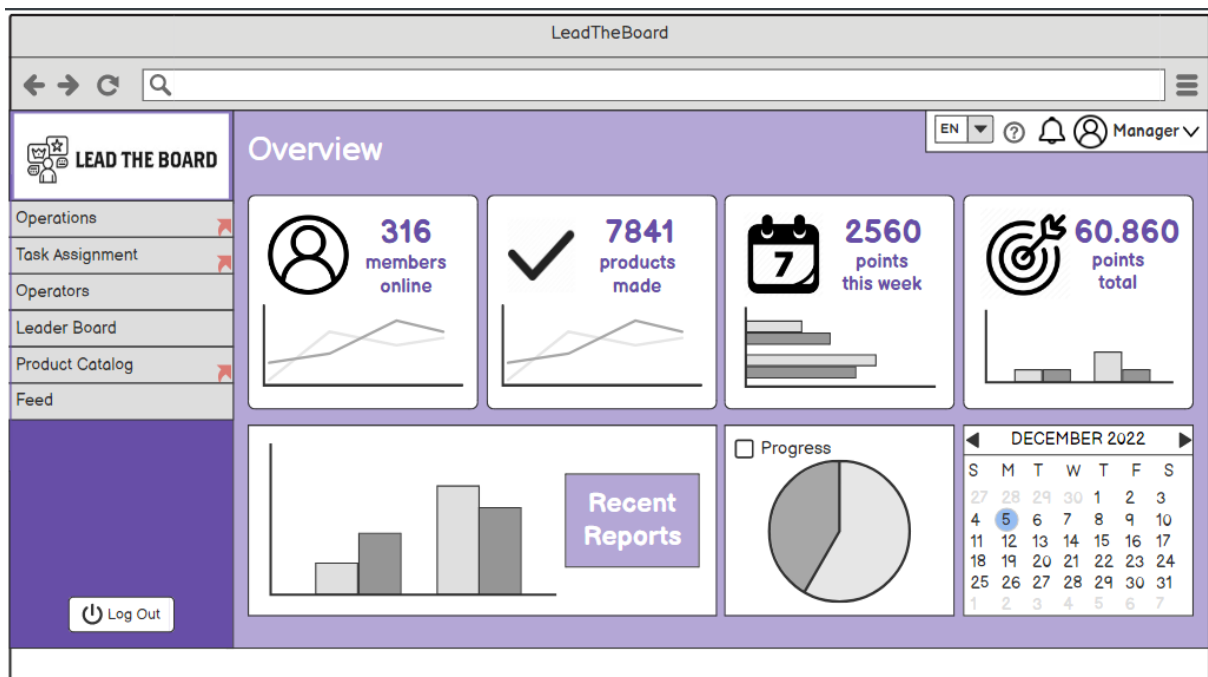








3.5.2 Web Interface for Manager



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LEAD THE BOARD

Operations

Task Assignment

Operators

Leader Board

Product Catalog

Feed

Log Out

Operator

Ahmet Demir

Ahmet Demir

Selen Asmali

Abdurrahman Kasa

Operation

Search

☐ Sewing pocket

☒ T-shirt printing

☐ Skirt waist stitch

☒ Cuff stitch

🔍 Search

Operator	Operation	
Selen Asmali	Sewing pocket	✎ 📄 🗑
Ahmet Demir	Cuff stitch	✎ 📄 🗑
Abdurrahman Kasa	Skirt waist stitches	✎ 📄 🗑
Selen Asmali	T-shirt printing	✎ 📄 🗑

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LEAD THE BOARD

Operations

Task Assignment

Operators

Leader Board

Product Catalog

Feed

Log Out

Operator

Ahmet Demir

Ahmet Demir

Selen Asmali

Abdurrahman Kasa

Operation

Search

☐ Sewing pocket

☒ T-shirt printing

🔍 Search

Operator	Operation	
Selen Asmali	Sewing pocket	✎ 📄 🗑
Ahmet Demir	Cuff stitch	✎ 📄 🗑
Abdurrahman Kasa	Skirt waist stitches	✎ 📄 🗑
Selen Asmali	T-shirt printing	✎ 📄 🗑

ALERT

Selected operator is not authorized for this task!

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LEAD THE BOARD

Operations

Task Assignment

Operators

Leader Board

Product Catalog

Feed

Log Out

Choose date range

day / month / year

day / month / year

10000

Aslı Güneş

10000

9000

Serhan Batar

7000

Saliha Tutar

4

Ahmet Demi

Point: 5000

5

Sebile Aksoy

Point: 4000

6

Erkan Kuzu

Point: 3500

LeadTheBoard

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LEAD THE BOARD

Operations

Task Assignment

Operators

Leader Board

Product Catalog

Feed

Log Out

5801

Jean

8 681158 278125

5812

Bathrobe

8 681158 278125

5813

Skirt

8 681158 278125

5814

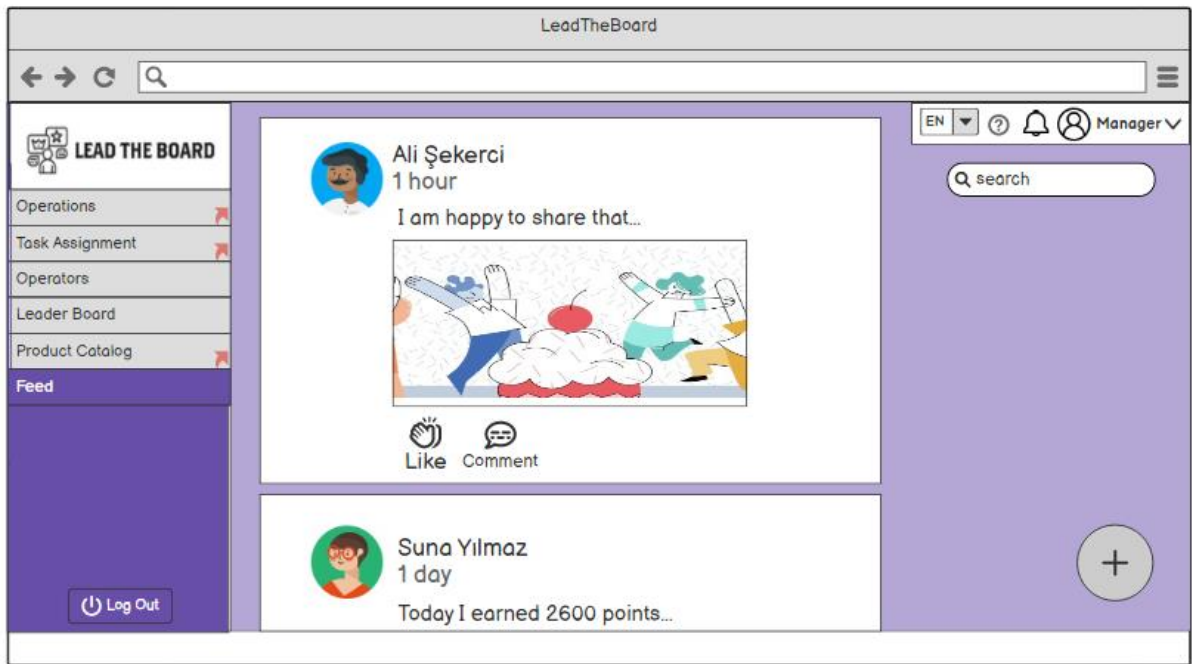
Short

8 681158 278125

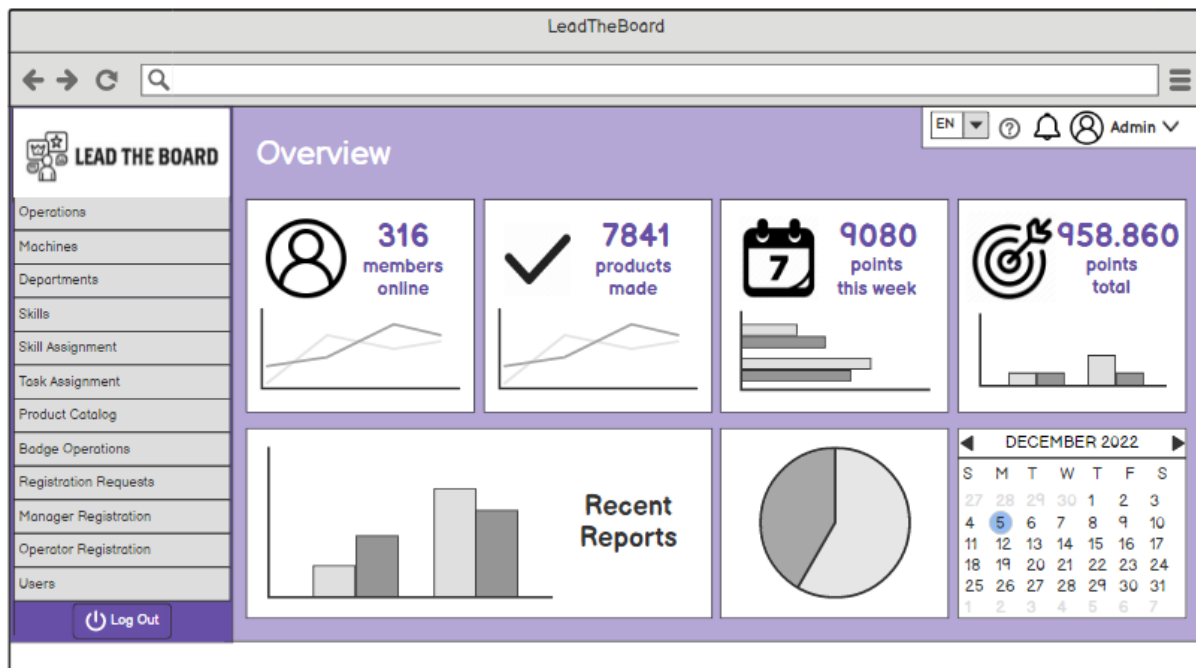
5815

Dress

8 681158 278125



3.5.3 Web Interface for Admin



The configuration section allows administrators to define operations by selecting a product, machine, and operation name. It also includes fields for required skills and difficulty levels. Below this is a table listing all configured operations with their associated products, difficulties, and points.

Product	Machine	Operation	Required Skill	Required Level
T-shirt	Fabric Printing Machine	T-shirt printing	Cutting	3
Jean	Fabric Printing Machine			
Bathrobe	Weaving Machine			
T-shirt	Sewing Machine			
Dress				
Skirt				
Short				

Operation Name	Product	Difficulty	Point
Sewing pocket	Jean	4	80
Cuff stitch	Jean	5	100
Sewing collar	Bathrobe	3	60
Skirt waist stitch	Skirt	3	60
T-shirt printing	T-shirt	1	20

LeadTheBoard

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LEAD THE BOARD

Operations

Machines

Departments

Skills

Skill Assignment

Task Assignment

Product Catalog

Badge Operations

Registration Requests

Manager Registration

Operator Registration

Users

Log Out

Q search

Name	Position	Approval
Deniz Bayar	Operator	<button>Approve</button> <button>Delete</button>
Abdurrahman Kasa	Operator	<button>Approve</button> <button>Delete</button>
Selen Asmalı	Operator	<button>Approve</button> <button>Delete</button>
Ahmet Demir	Operator	<button>Approve</button> <button>Delete</button>
Ali Şanlı	Operator	<button>Approve</button> <button>Delete</button>
Aysel Gündoğdu	Operator	<button>Approve</button> <button>Delete</button>
Ertem Kazan		
Sinan Keser		
Erkan Sağ		

Requests X

An employee registration request has been made

[see details](#)

Requests X

An employee registration request has been made

[see details](#)

LeadTheBoard

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EN ? 🔔 👤 Admin ▾

LEAD THE BOARD

Operations

Machines

Departments

Skills

Skill Assignment

Task Assignment

Product Catalog

Badge Operations

Registration Requests

Manager Registration

Operator Registration

Users

Log Out

REGISTRATION

Name

Deniz

Surname

Bayar

ID

2319

Department

Password

LeadTheBoard


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LEAD THE BOARD

Operations

Machines

Departments

Skills

Skill Assignment

Task Assignment

Product Catalog

Badge Operations

Registration Requests

Manager Registration

Operator Registration

Users

Log Out

REGISTRATION

Name

Ahmet

Surname


Demir

ID

6483

Department

Password



LeadTheBoard


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EN ? 🔔 👤 Admin ▾

LEAD THE BOARD

Operations

Machines

Departments

Skills

Skill Assignment

Task Assignment

Product Catalog

Badge Operations

Registration Requests




























Manager Registration

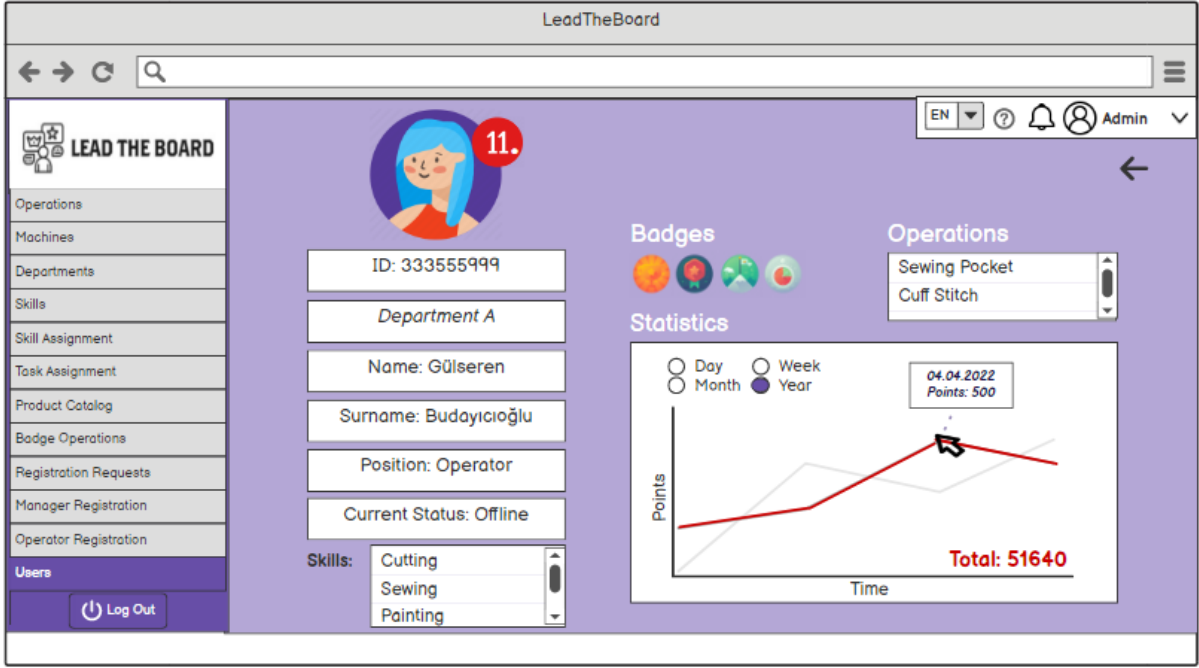
Operator Registration

Users

Log Out

🔍 search an user

ID	Title	Firstname	Lastname	Email	Last Activity	Edit
5801	Manager	Aslı	Tekin	aslıTKN@gmail.com	April 21 2022	   see detail
5812	Manager	Derya	Erin	d.ERIN@hotmail.com	April 21 2022	   see detail
5813	Manager	Abdullah	Yeryatan	abd.YATAN@yahoo.com	April 19 2022	   see detail
5814	Operator	Erkan	Kuzu	erkan.kuzu@gmail.com	April 19 2022	   see detail
5815	Operator	Ersin	Çatar	catar_ersn@hotmail.com	April 20 202	   see detail
5816	Manager	Kadir	Tutar	kadir.tutarligmail.com	April 20 202	   see detail
5817	Operator	Sebile	Aksoy	sebile.aksoy@yahoo.com	April 18 2022	   see detail
5818	Operator	Kadriye	Altınlı	kadriye.altınlı@yahoo.com	April 18 2022	   see detail
5819	Manager	Bedirhan	Sarar	bedirhan.sarar@hotmail.com	April 18 2022	   see detail



4. Glossary

- DB: Database
- QR: Quick Response

5. Reference

- Lucidchart. (2020, May 13). *Types of UML diagrams*. Intelligent Diagramming Lucidchart. <https://www.lucidchart.com/blog/types-of-UML-diagrams>
- *UML sequence diagram tutorial*. (n.d.). Lucidchart. <https://www.lucidchart.com/pages/uml-sequence-diagram>
- *Functional vs non functional requirements*. (2020, April 29). GeeksforGeeks. <https://www.geeksforgeeks.org/functional-vs-non-functional-requirements/>