ECOLIB

Alp BOSTANCI	20210601011
Alper Özgür ŞAHİN	20210601055
Efe YOLARTIRAN	20220601079
Havvanur KARAKAYA	20210601032
Kaan OĞUZER	20220601050
Tugay AVYÜZEN	20220601005

What is the aim of our project ?

- Providing students to use their study time more effectively
- Ensuring equality in the use of study areas and prevent noise in the library
- Effective use of the desks, group study rooms and desktops

FUNCTIONAL REQUIREMENTS

- Turnstile Access Verification
- Table Availability Visualization
- User Authentication via Oasis Credentials
- Flexible Reservation Modification
- Real-time Table Vacancy Monitoring
- Reservation Confirmation and Calendar Integration
- Library Occupancy Rate Calculation

NON-FUNCTIONAL REQUIREMENTS

- Uninterrupted 24/7 Operation
- Secure Data Storage
- Automatic Crash Recovery
- Availability to Work on Different Devices
- User-Friendly Reservation Interface
- Running Smoothly

PROCESS MODEL (SCRUM)

Iterative Development:
In the first sprint, the focus will be placed on building the basic user interface for making reservations. In the next sprint, database integration to store reservations will be added. This iterative approach allows functional components to be delivered quickly and early feedback to be received.

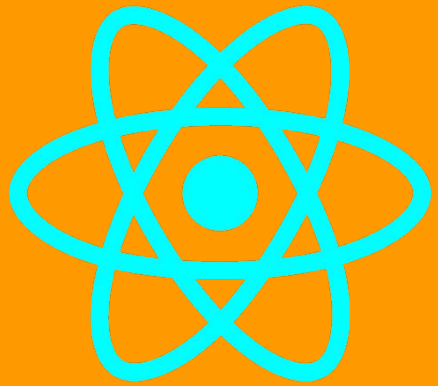
Continuous Feedback and Improvement:
After the initial reservation interface is developed, it will be shown to students and library staff to get their input. The next sprint's focus can be guided by their feedback, ensuring the system effectively meets user needs.

DEVELOPMENT OF THE PROJECT

PYTHON

- Python is chosen for its simplicity and flexibility.
- It is compatible with OpenCV for image processing tasks.

REACT NATIVE

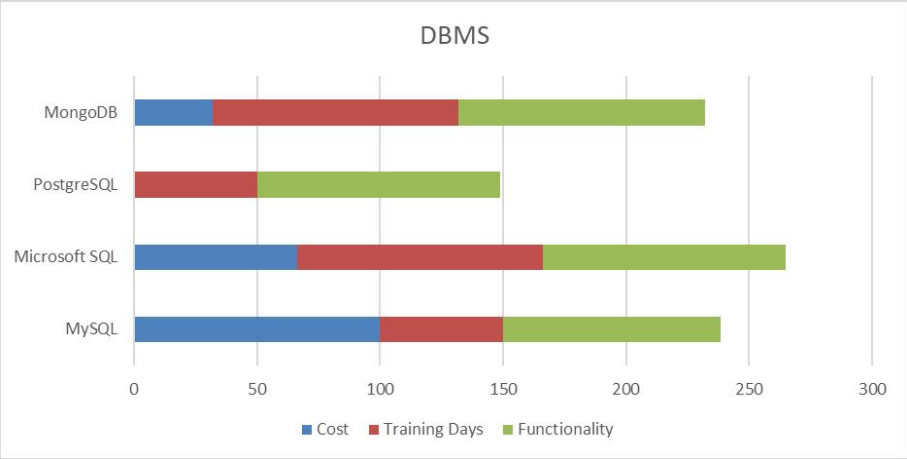


- React Native is used for developing the mobile application interface.
- It enables cross-platform development for both Android and iOS.

DATABASE MANAGEMENT TOOLS

Tool Cost/Training/Functionality Data

Tool	MySQL Standard Edition	Microsoft SQL Server	PostgreSQL	MongoDB
Cost	$2,140/y	$1,418/y	$0	$684/y
Training Days	5	10	5	10
Functionality	76	85	85	86

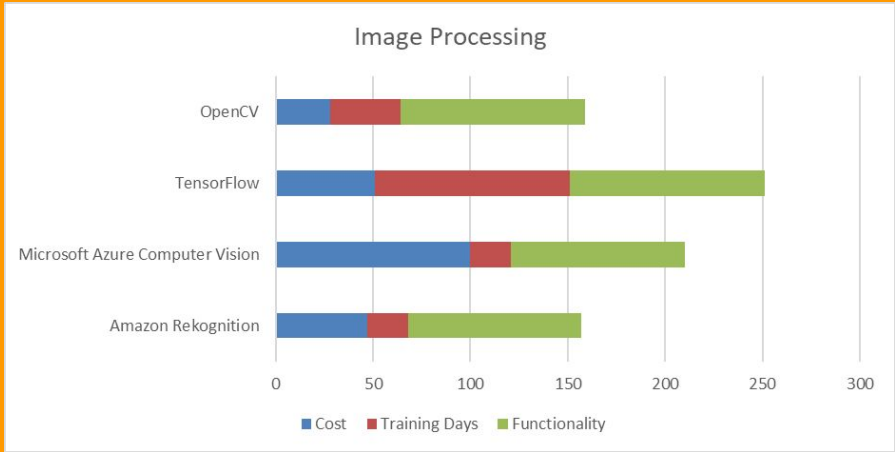


We chose PostgreSQL for its versatility, high performance, and open-source nature. It supports a wide range of data types, including images, which is crucial for our system. PostgreSQL provides robust SQL capabilities that seamlessly integrate with Python, ensuring efficient storage and retrieval of user data, reservations, and table statuses.

IMAGE PROCESSING TOOLS

Tool Cost/Training/Functionality Data

Tool	Amazon Rekognition	Microsoft Azure Computer Vision	TensorFlow	OpenCV
Cost	$2592/y	$5430/y	$2860/y	$1548/y
Training Days	3	3	14	5
Functionality	85	85	95	90



OpenCV helps us with tasks such as object detection and facial recognition, which are essential for detecting table occupancy and misuse. Its extensive documentation and community support make it a reliable choice for our project.

SOFTWARE MEASUREMENTS

Measurement Type	Description
Lines of code	It helps us to know how many lines of code has been used in project.
Number of test cases	It shows us how much tests have made by our test team while they were testing the project.
Amount of data	Images that have taken to improve image processing system.
Time-accounting data	It helps us to track actual work vs planned schedule and helps to compare overtime vs underutilization.

INTERNAL STAKEHOLDERS

Product Owner :

Defines project goals, and prioritizes features to ensure alignment with organizational objectives.

Scrum Master :

Facilitates the Scrum process, removes obstacles and ensures that the team adheres to Scrum principles and practices

Development Team :

Designs, develops, and tests the reservation system according to specifications.

EXTERNAL STAKEHOLDERS

Users (Students):

Provide feedback on the usability and effectiveness of the reservation system.

Customers (Universities) :

Provides resources, support, and requirements for the project. Ensures the project aligns with the university's goals and standards.

Library Staff :

Library staff provide information about the functioning of the library, the location of the cameras currently in use, and the structural internal layout of the library.

IT Team :

After the reservation system is delivered to the university, it ensures the integration of the system with the university databases and infrastructure and provides technical support.

PROJECT RISKS

Testing :

Risks in the testing process such as inadequate test coverage, inappropriate test environment, test data management issues and regression testing can affect software quality, delay on-time delivery and reduce customer satisfaction.

Schedule Delays :

The project schedule might be unrealistic or unexpected delays might occur due to technical challenges or resource limitations.

System Integrations :

Integrating multiple systems can lead to compatibility issues, especially when dealing with hardware components like turnstiles and cameras.

Unclear Requirements :

Incomplete or unclear requirements can lead to features that don't meet user needs or a system that is difficult to develop and maintain.

PROJECT RISKS

Stakeholder Communication:

Poor communication with stakeholders (students, library staff, administrators) can lead to misunderstandings and resistance to the new system.

Complexity of Image Processing:

Developing and implementing accurate image processing algorithms to identify occupancy and user behavior can be challenging.

Resource Constraints:

Interruption or disruption of the flow of information and resources provided for the project disrupts the continuity of the project.

Security Concerns:

The system will store student information and data on library usage. Measures need to be implemented to ensure data security and privacy.

SOFTWARE NEEDS

Database Management System (PostgreSQL):
The PostgreSQL database will be the foundation of the reservation entities.

Mobile App Development (React Native):
React Native will facilitate the creation of a mobile application interface, allowing students to perform interactions with UI.

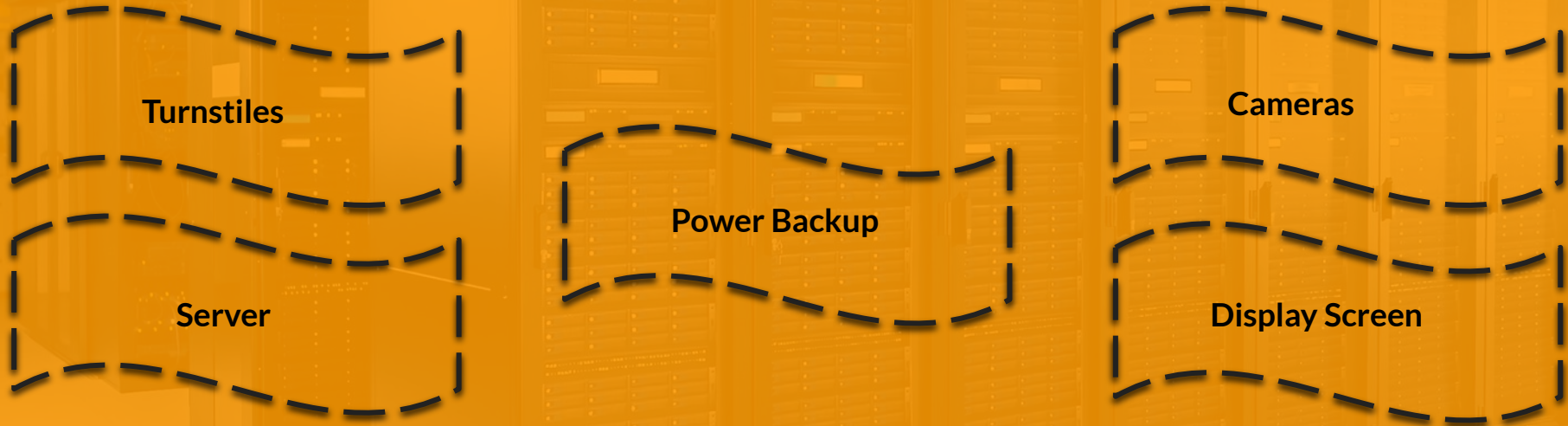
Image Processing Library (OpenCV):
OpenCV will analyze camera images to verify library visitors, determine table occupancy, identify empty tables, count people, and classify table types, working in conjunction with the reservation system.

Implementing Image Processing (Python):
Provides dynamic updates on library occupancy and table availability. This involves strategically setting up cameras, processing real-time feeds, and using machine learning models for live feedback on table availability.

Testing Softwares (Jest, Pytest):
Jest and Pytest will ensure the reliability, performance, and security of the reservation application through automated functional, load, and integration testing to validate the application's behavior under various scenarios.

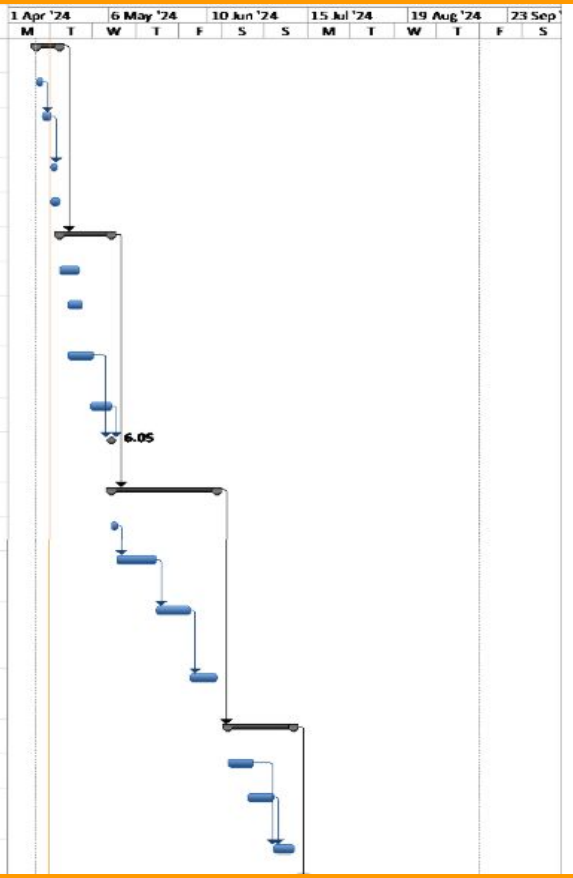
HARDWARE NEEDS

Providing comprehensive description with respect to needs in hardware



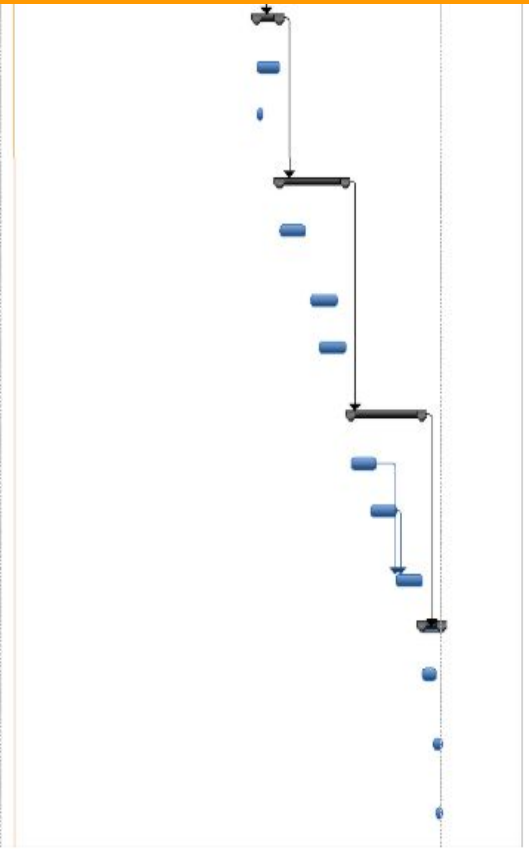
SPRINTS AND GANTT CHART

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		**Project Initiation and Planning**	**8 days**	**Thu 11.04.24**	**Thu 18.04.24**	
2		Forming Project Team and Defining Roles	2 days	Thu 11.04.24	Fri 12.04.24	
3		Conducting Stakeholder Meetings and Defining Objectives	3 days	Sat 13.04.24	Mon 15.04.24	2
4		Developing Initial Product Backlog	2 days	Tue 16.04.24	Wed 17.04.24	3
5		Setting Up Development	3 days	Tue 16.04.24	Thu 18.04.24	
6		**Database Setup and Basic System**	**12 days**	**Fri 19.04.24**	**Mon 6.05.24**	1
7		Creating PostgreSQL Database Schema	5 days	Fri 19.04.24	Thu 25.04.24	
8		Implementing User Authentication and Registration	5 days	Mon 22.04.24	Fri 26.04.24	
9		Developing Basic Reservation System Backend	7 days	Mon 22.04.24	Tue 30.04.24	
10		Development of The Frontend	5 days	Tue 30.04.24	Mon 6.05.24	
11		Integrating The Backend and Frontend of The Reservation	0 days	Mon 6.05.24	Mon 6.05.24	9;10
12		**Image Processing Integration**	**27 days**	**Tue 7.05.24**	**Wed 12.06.24**	6
13		Installing Cameras at Strategic Locations	2 days	Tue 7.05.24	Wed 8.05.24	
14		Developing Image Processing Algorithms using OpenCV	10 days	Thu 9.05.24	Wed 22.05.24	13
15		Integrating Image Processing System with Reservation System Backend	8 days	Thu 23.05.24	Mon 3.06.24	14
16		Testing Image Processing Integration and Optimizing	7 days	Tue 4.06.24	Wed 12.06.24	15
17		**Mobile App UI Development and Testing**	**17 days**	**Mon 17.06.24**	**Tue 9.07.24**	12
18		Designing Mobile App Interface	7 days	Mon 17.06.24	Tue 25.06.24	
19		Implementing Real-time Table Status Updates in Mobile App	7 days	Mon 24.06.24	Tue 2.07.24	
20		Conducting UI/UX Testing and Gathering	5 days	Wed 3.07.24	Tue 9.07.24	18;19

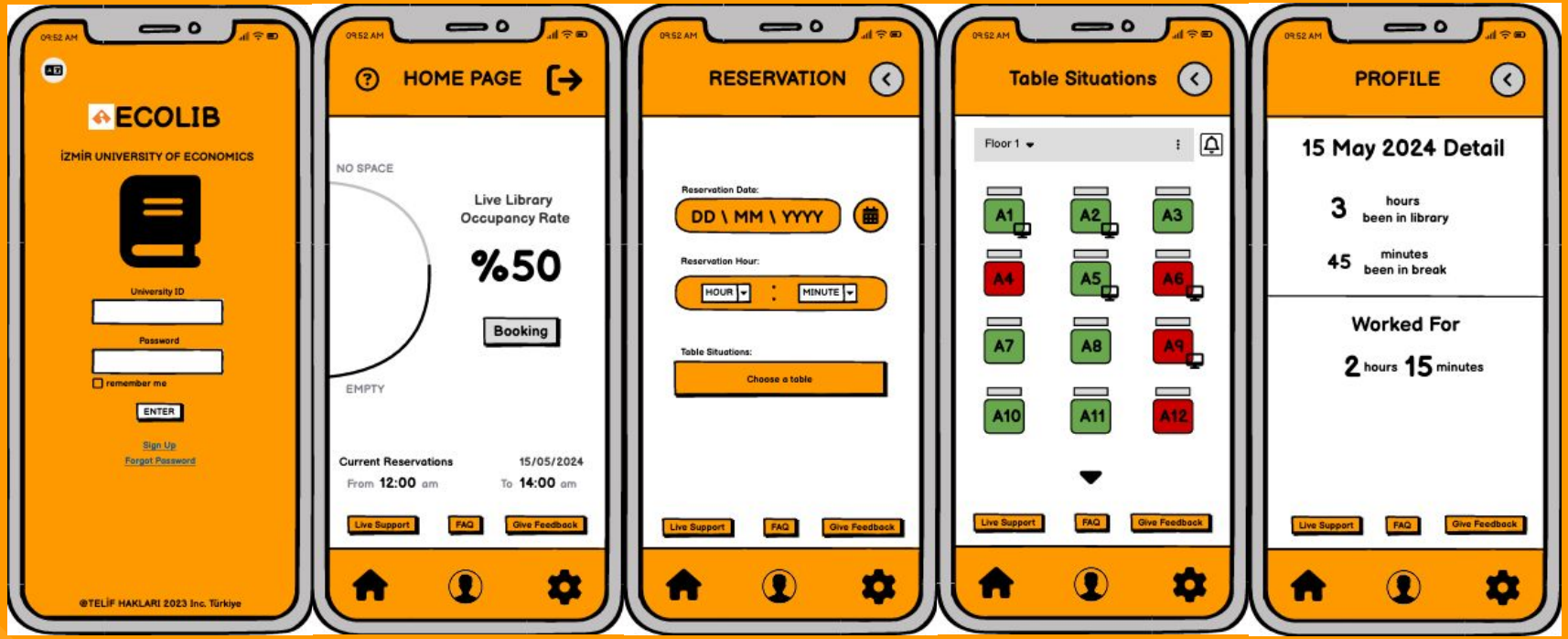


SPRINTS AND GANTT CHART

21		**Hardware Setup and Integration**	**6 days**	**Wed 10.07.24**	**Wed 17.07.24**	**17**
22		Integrating Turnstiles with Reservation	6 days	Wed 10.07.24	Wed 17.07.24	
23		Installation of Screens at The Library Information Desk	2 days	Wed 10.07.24	Thu 11.07.24	
24		**Testing and Quality Assurance**	**17 days**	**Thu 18.07.24**	**Fri 9.08.24**	**21**
25		Developing Automated Testing Scripts (Jest, Pytest)	7 days	Thu 18.07.24	Fri 26.07.24	
26		Performing Functional Testing	7 days	Mon 29.07.24	Tue 6.08.24	
27		Conducting Load Testing and Performance Analysis	7 days	Thu 1.08.24	Fri 9.08.24	
28		**Documentation and Final Adjustments**	**19 days**	**Mon 12.08.24**	**Thu 5.09.24**	**24**
29		Preparing User Guides and Documentation	7 days	Mon 12.08.24	Tue 20.08.24	
30		Finalizing System Adjustments and Feature Enhancements	7 days	Mon 19.08.24	Tue 27.08.24	
31		Performing Final System Testing and Bug	7 days	Wed 28.08.24	Thu 5.09.24	29;30
32		**Deployment and Post-Deployment**	**5 days**	**Fri 6.09.24**	**Thu 12.09.24**	**28**
33		Deploying Reservation System to Production Environment	3 days	Fri 6.09.24	Tue 10.09.24	
34		Monitoring Post-Deployment System Performance	3 days	Tue 10.09.24	Thu 12.09.24	
35		Organizing Training Sessions for Library	2 days	Wed 11.09.24	Thu 12.09.24	



GUI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HOME PAGE
NO SPACE
EMPTY
Live Library Occupancy Rate
%50
Booking
Current Reservations
15/05/2024
From 12:00 am
To 14:00 am
Live Support
FAQ
Give Feedback
RESERVATION
Reservation Date:
DD \ MM \ YYYY
Reservation Hour:
HOUR
MINUTE
Table Situations:
Choose a table
Table Situations
Floor 1
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
PROFILE
15 May 2024 Detail
3 hours been in library
45 minutes been in break
Worked For
2 hours 15 minutes


THANK YOU
FOR LISTENING