

## **PROJ 302 - INTERNSHIP FINAL REPORT**

### **Title of the Project**

Law on the Protection of Personal Data - Business Card System

### **Student Name and ID Number**

Ömer Cem Tabar - 00025031

### **Internship Start and End Dates**

14 June 2021 - 16 August 2021

### **Company & Institution Name**

Bursa Metropolitan Municipality - Department of Smart City and Innovation

### **Internship Supervisor**

Murat ERTEKİN

### **Submission Date**

24 October 2021



**Faculty of Engineering and Natural Sciences**

## Abstract

The purpose of this final project report is to give detailed information about the process of the software development that was experienced in the Department of Smart City and Innovation of Bursa Metropolitan Municipality. A software was developed with the implementation of backend, frontend and database services for dealing with processing, storage and monitoring of the personal data within the framework of the masking system that is shared with the institution through business cards in accordance with the law on the protection of personal data (KVKK). As a result of taking part in such project, experiences have been gained in the frameworks of ASP.Net Core and Microsoft Entity Framework, in the programming languages of C#, JavaScript and React, in the technologies of HTML and CSS, and SQL Server for database management where all desired services are built upon. Within the scope of these technologies, a web service , which is integrated with the system of “e-municipality” and currently used actively in the municipality, has been developed and improved personal skills on critical thinking, problem solving, part-to-whole method and fundamental knowledge on agile development processes. Main advantage behind working as a full-stack developer and conducting such a huge project is gaining experiences in many fields and development in analysis, espousal and interpretation of the information that was attained.

## **Table of Contents**

<b>INTRODUCTION</b>	<b>4</b>
<b>COMPANY INFORMATION</b>	<b>5</b>
<b>PROJECT BACKGROUND</b>	<b>9</b>
Department Information	9
Status of the project and/or the problem at the beginning	10
Motivation and/or problem definition	11
Related literature	12
<b>INTERNSHIP PROJECT</b>	<b>14</b>
Project objective	14
My responsibilities	15
Methodology / tools	15
Expected outcome and deliverables	16
Details	16
Results	28
<b>INTERNSHIP EXPERIENCE</b>	<b>28</b>
Learning	28
Relation to undergraduate education	29
Difficulties	30
A typical day	32
<b>CONCLUSIONS</b>	<b>33</b>
<b>RECOMMENDATIONS</b>	<b>34</b>
<b>REFERENCES</b>	<b>35</b>

## 1. INTRODUCTION

I have conducted my internship as a full stack software developer between the dates 14 June, 2021 and 16 August, 2021 in Bursa Metropolitan Municipality. Aim of the software project was to develop a web service that can be integrated with the existing system in the municipality that is called “e-municipality” in order to make the process of accessing the personal data of the business people who are collaborating with the municipality through information that is gained from business cards. Development of the web service is desired since according to the law on the protection of personal data, storage and sharing of the personal data through business cards are forbidden within the public organizations and due to needs for accessing datas on business cards made the software important for the municipality. In this final report, firstly detailed information about the company, department and the status of the project will be presented which will also broaden by the motivation and description of the project as objectives. Secondly, after giving the required background information; responsibilities, details about the tool/languages/technologies that have been used in order to develop the web service and outcomes with expectations of the company will be given as a detailed process whether these expectations have met. Therewith, experiences that have been gained and difficulties during the project will be demonstrated from the perspective of the intern which specifies the relation to the undergraduate education, training and skills that were acquired and a typical day in the working environment. In the conclusion part, main points of the internship and project will be summarized with personal and professional outcomes and deliverables which will be followed by the recommendations for PROJ 302 students for the preparation for an internship and experiences in the working environment as a public governmental organization.

## 2. COMPANY INFORMATION

**Company Title:** Bursa Metropolitan Municipality

**Company Open Address:** Zafer Mahallesi, Ankara Yolu Caddesi, No:1 Bursa Metropolitan Municipality Osmangazi/Bursa

**Company Contact Telephone:** +90 0224 444 1 600

**Company Website:** <https://www.bursa.bel.tr/>

Historically, the emergence of the concept of the municipality and acquaintance of the city of Bursa with this concept started with the first laws adopted by the Ottomans regarding the city administration which was the Bursa Municipal / Specialized Law. Kadi's, who were the administrators of the districts, in addition to serving as a judge, they also served as administrators and in some ways served as the mayor of that era. The main municipal organization in Turkey was established in Istanbul by a decree on December 28, 1857. In 1867, the Municipal Law passed and 3 main municipalities were established including Bursa. The first mayor of Bursa was Sadrettin Efendi who served as mayor between 27 October 1912 and 6 April 1914. After Sadrettin Efendi, 10 mayors served until the establishment of the Turkish Republic and after the establishment of the Turkish Republic 32 mayors served until 1987. In late 1987's, Bursa Municipality became Bursa Metropolitan Municipality due to the law No. 3391. Current mayor of the Bursa Metropolitan Municipality Alinur Aktaş became the mayor of Bursa with the election held in the city council in 2017 and he is still on his duty.

After Alinur Aktaş elected, Bursa Metropolitan Municipality's vision & mission became steer for creating more contributive society and city administration for providing sustainable

services in all areas from transportation to industry, agriculture to tourism with the environmentally friendly approach and smart urbanization practises required by the era to keep the ancient city Bursa alive with its values. According to their vision & mission, Bursa Metropolitan Municipality administration regulated the principles under the light of Sustainable Development Goals suggested by UNDP and started to develop their projects more objective, participatory, environmentally sensitive, with respect to the history and culture of the city, solution oriented, transparent, accountable, providing sustainable and efficient services for the public which developed within the framework of quality.

Within the scope of vision & mission of Bursa Metropolitan Municipality, new affiliates who worked together with the municipality were established and existing affiliates were developed and organized their principles according to the new ideals. There are 9 major affiliates who work with Bursa Metropolitan Municipality which are Besaş I.C., Burulaş I.C., Burfaş I.C., Binted L.C., Bursa Culture I.C., Burkent I.C., Jeothermal I.C., Tarım I.C. and BUSKI.

Since Bursa Metropolitan Municipality is a public governmental organization, their major customers are citizens of Bursa and their main competitors are other city and county municipalities. Although municipal affiliates appear to be public organizations that work individually within themselves, each of them is working hard to ensure that the citizens of Bursa reach a better and livable future along with the municipality. For instance while Burfaş I.C. and Besaş I.C. are the main food industry providers of cheap and high quality food services for citizens, institutions and organizations, Burulaş I.C. dedicates itself to make transportation

services cheap, efficient, easily accessible and to develop new options of infrastructure for the purpose of improving existing transportation services for the citizens of Bursa.

Currently, Bursa Metropolitan Municipality has 21 unique departments and almost 3300 employees who works in a dynamic way to achieve completing the sustainable development goals suggested by the UNDP in accordance with the development plans of Bursa Metropolitan Municipality for make the city of Bursa more sustainable, liveable and prepared for a better future for citizens of Bursa. Departments of the Bursa Metropolitan Municipality are listed as below:

- Department of Smart City and Innovation
- Department of Press and Public Relations
- Department of Information Technology
- Department of External Relations
- Department of Youth and Sport Services
- Department of Rural Area Services
- Department of Culture and Social Affairs
- Department of Financial Services
- Department of Health Services
- Department of Social Services
- Department of Environmental Protection and Control
- Department of Support Services
- Department of Human Resources and Education
- Department of Fire Department Services

- Department of Local Police Services
- Department of Science Researches
- Department of Park and Garden Services
- Department of Transportation
- Department of Earthquake Risk Management and Urban Improvement
- Department of Real Estate and Expropriation
- Department of Urbanism and Zoning

As it is listed above every department has a unique work, specialized areas and projects developed in different fields. The reason why detailed information about the departments cannot be provided in this report is that during the internship period, interns and staffs only have permission to enter their departments that they have assigned due to the pandemic, and the staff members in the department that I worked in only have information about which projects they are developing in their fields and our department history. That's why I am only capable of attaching the website link in the references to give the information about the administrative structure within the Bursa Metropolitan Municipality.

### **3. PROJECT BACKGROUND**

#### **3.1. Department Information**

In Turkey, legal legislation on “Smart Cities” is coming into prominence day by day, and municipality structures have begun to be prepared in this direction. Research in this direction, infrastructure structures and municipalities that have begun to increase commitment to the “Sustainable Development Goals” suggested by UNDP which contributes to forming smart city and innovation departments in municipalities within their cities. As a result of this orientation,



the Department of Smart City and Innovation was established in 2019 as a part of Bursa Metropolitan Municipality and still actively serves the citizens of Bursa today. The Department of Smart City and Innovation, where I also had the opportunity to do my internship, has aimed to complete the sustainable development goals suggested by UNDP as shown in the Figure.2 below until 2030.

For this purpose, our department has designed and developed international and local projects accordingly both with affiliates of Bursa Metropolitan Municipality and with foreign countries.



**Figure 1: Sustainable Development Goals**



**Figure 2: Project Supervisor Murat Ertekin**

As an example of the main local and international projects can be listed as “Transforming Bursa Into Smart City” (Fund:UK), “Bursa Urban Renewal Project”(Fund:UK), “Resilience in Local Governance (RESLOG) Project”, “Digital Support for Volunteer Firefighters Project” (Erasmus+) and “INCIT-EV Project” (Fund: UFUK2020).

- Main Supervisor of the Internship
  - Murat ERTEKIN, Software Engineer, [murat.ertekin@bursa.bel.tr](mailto:murat.ertekin@bursa.bel.tr)
- Head of the Smart City and Innovation Department
  - Cüneyt TAŞKESEN, Topographical Engineer, [cuneyt.taskesen@bursa.bel.tr](mailto:cuneyt.taskesen@bursa.bel.tr)

### 3.2. Status of the project and/or the problem at the beginning

According to the Turkish Law on the Protection of Personal Data, business cards that are obtained from the meetings and interviews with outside companies, affiliates and other institutions are prohibited from being stored within the public organizations due to personal data on the business cards. For this reason, whenever a department within the municipality wanted to obtain information that belonged to a person who participated in one of the meetings, they got into the laborious and bureaucratic process. The software program that is expected to be developed is dedicated to solve this problem in order to speed up the deceleration process and make the communication between institutions more reliable and faster.

During the process of design and development of the project, it is scrutinized by the head of the departments, secretary general and mayor of the Bursa Metropolitan Municipality according to the regulations of law on the protection of personal data whether there exists a violation of the law. After the project was approved by all authorities, daily and weekly inspections were carried out by the project supervisor to ensure that the stages of the project were developed in accordance with the law in order to get approval for its transition to the next stage. In each of the project steps, a deliverable was presented to all staff members and authorities for getting feedback about whether the current status of the project design and implementation is suitable and appropriate for the municipality.

### 3.3. Motivation and/or problem definition

**Motivation:** The reason why the municipality needed to design the desired software were difficulty in accessing the contact informations of business people who are working in

cooperation with the institution from different sectors and it is prohibited to store and share the information on the business cards in any circumstances, unless the personal data is in an encrypted form, in accordance with the law on the protection of personal data.

**Project Description:** Expectation from the project is to develop a platform for dealing with processing and storage of the personal data that is shared with the institution through business cards in accordance with the law on the protection of personal data(KVKK). Functional aims of the project are:

- Ensuring that personal data that are collected from business cards will be hidden for unauthorized users which is obtained by a masked system in accordance with the designated roles within the system.
- Making the masked data visible for a predetermined amount of time if the monitoring request is approved by the user who added the business card data to the system, by the admin of the department who collected the data under its department or by the superadmin.
- Assuring that business card datas can be easily added to the system and updating, deleting or reading the data can be easily achieved.
- Creation of the user interface that is dedicated for an extensive usage within the municipality and its affiliates which is maintainable and has an appropriate and formal design.
- Creation of the system will be designed in accordance with the law on the protection of personal data.

- Integration of the backend, frontend and database services with the existing “e-municipality” system.

### **3.4. Related literature**

Since the expected outcome was a backend, database and a web service, the main method to conduct the project was Agile Development. In Agile Development, desired outcomes are listed as use cases and the problems divided into tasks and subtasks in order to satisfy the use cases. As defined in above, every desired functionality of the system was listed as use cases, and tasks and subtasks were created for weekly sprints which focused on the development of backend, database and web services.

For the backend service, as main language C# and as frameworks ASP.Net Core and Microsoft Entity Framework were preferred to use. Since I was not familiar with ASP.Net Core and Microsoft Entity Framework, trainings was held in the first two weeks of the internship by the supervisor of the project Murat ERTEKIN and each documentation of ASP.Net Core, C# and Microsoft Entity Framework was read from the repositories of Microsoft Corporation as it is referenced in the part 8. In addition to that, for the purpose of gaining profession among these languages and framework, courses were taken from uDemy with different concepts which includes Membership System with ASP.Net Core(ASP.Net Core Identity), ASP.Net Core MVC 3.0, ASP.Net Core MVC 5.0, ASP.Net Core Security Course, Systematic ASP.Net Core MVC (with detailed C# implementation) and Create ASP.Net Core Web API as stated in the references part. Lastly, SwaggerUI which was the main mock web services that is supplied by the .Net Core 5.0 was extensively used in order to check whether the APIs that were implemented works in a proper and consistent way.

For database creation usage of SQL Server was preferred since Microsoft Entity Framework has a direct connection with SQL Server in order to create the desired data tables. Moreover, SQL Server Management System was extensively used for data encryption, manipulation and simulation. Every process related with the database was learned from the supervisor Murat ERTEKIN.

For the development of web service, mostly experiences and technologies that are gained from CS308 Software Engineering course were used. Main languages for the development were React and Javascript. Most of parts were inspired and supported from the documentation of the main websites of Material-UI(<https://material-ui.com/>), React(<https://tr.reactjs.org/>) and NodeJS(<https://nodejs.org/en/>). Apart from that dashboard design was inspired from the website <https://dev.to/> but the design was never used directly since the versions were not matched with the version of NPM. That's why similar dashboard designs were implemented accordingly using technologies such as HTML and CSS together with React. Also main page design and implementation of the sidebar component were inspired from a YouTube channel which is called "Brian Design" ([https://www.youtube.com/channel/UCsKsymTY\\_4BYR-wytLjex7A](https://www.youtube.com/channel/UCsKsymTY_4BYR-wytLjex7A)).

## 4. INTERNSHIP PROJECT

### 4.1. Project objective

Main objective of the project is to develop backend, frontend and database services to form an integrated system which enables the storage of personal data that is collected as business card information in an encrypted way and ensures the personal data that is stored as masked is

accessible for a predetermined amount of time if the request for monitoring the data is approved by department or person who has added the business card to the system.

The system should not be considered as a regular informative media system since it does not include any features related with communication and platform for personal manners. It only contains the content that is desired to be accessed and tasks of addition/deletion/update of the related business card information. Scope of the project is to create a secure system for public administrations and affiliates in order to access the information of the people who have cooperated with the municipality and its affiliates without any need for communication channels or consideration that is violating the law.

In that manner, the problem of the prohibition of the storage and sharing of personal data that is stored on business cards was planned to overcome by a software that encrypts the data within its database for keeping the personal data secured desired for the system and accessing the data taking the consideration of role based accessibility for a predetermined duration time from a website designed as in a daily usage form.

#### **4.2. My responsibilities**

- Creating use cases, tasks and subtasks in order to approach and implement the project in a professional manner.
- Collecting information and doing research from the documentations of ASP.Net Core, MVC Structure, Microsoft Entity Framework, Material-UI React, React, HTML, CSS

and SQL Server in order to gain proficiency in tools/languages to apply within the project.

- Creation of the backend service
- Making and updating the migration of information of the data tables.
- Designing and implementing the design of the admin dashboard differently according to the roles.
- Collection of the business card data and processing of the personal data to the database
- Updating the system according to the duration times and role of the users.
- Designing an encryption part for the database of the project to store the personal data information in a secure manner.
- Making tests for data integrity, system consistency and run time of the system.
- Presenting daily demos to ensure the system is consistent and appropriate with features that are implemented.

#### **4.3. Methodology / tools**

Project is conducted as a part-whole method in order to sustain the consistency of the system when a new feature or service is introduced. Project built upon an empty solution by using the IDE Visual Studio 2019 and new service or feature built upon whenever it is needed. For keeping the personal data that is maintained by the business cards, database and data tables are created from the SQL Server and kept track of SQL Server Management System. For the MVC(Model,View,Controller) structure of backend service, it is developed by using the language ASP.Net Core version 5.0, checked by Swagger API Management System whether the

system is consistent and APIs are working correctly, and Microsoft Entity Framework in order to sustain the data migration from backend to database service. For the design of user interface and frontend service React, Javascript, HTML and CSS usage was preferred which was supported with NPM(NodeJS) packages.

#### **4.4. Expected outcome and deliverables**

As stated in the project objective section, desired deliverable was the software maintained as a website which also linked to the main systems of the municipality and affiliates for storing the personal data that is collected by business cards in an encrypted format and make the desired information visible whenever a user wants to a permission for accessing in a given amount of time. Along with the deliverable, the expected outcome was to make a demo within the municipality to observe whether the system is appropriate, efficient and easily accessible for all employees within the system and added to the server of the municipality for being officially released.

#### **4.5. Details**

Internship project is conducted according to the text of the disclosure within the scope of the Law on the Protection of Personal Data No.6689 (KVKK in Turkey). For this reason, the legislation is examined within the scope of the criterias of the content of the processed personal data, for what purpose the personal data can be processed, for whom the processed data can be shared, the methods and legal reason for collecting personal data, personal rights according to law of the protection of personal data (provision no.11) and duration time for the storage of the personal data in order to determine the boundaries of the project. In this detail part of the project,



information will be presented in three parts which will include backend, database and frontend services.

Project started with the implementation of classes in other words modals as 6 different modals which are company, department, user, business card, sharing and roles. In each modal attributes are defined in different data types according to the needs of the project. The list of attributes in detail within the modals of the project as follows:

1. Attributes of the “COMPANY” include id, company name, company address; attributes of the department includes id, company name, department name
2. Attributes of the “USER” include the attributes id, name, surname, phone number, company name, department name, mail address and password
3. Attributes of the “BUSINESS CARD” include id, name, surname, company name, department name, company address, id of the of the person who added the business card, company id of the company of the person who added the business card, department id of the department of the person who added business card
4. Attributes of the “ROLE” include id, role name and attributes of the sharing includes id, company id, department id.
5. Attributes of the “SHARING” include id, company id, department id, user id

In each modal, attribute of DateTime was added which is an unique attribute for ASP.Net Core in order to keep track of the date and time of the data that is added to the system and id's were randomly generated which makes them unique except the id attribute of the role since whenever a user signed up to the system, user generated with a default role as user and id of the

default user role is appointed. After the stage of the implementation of the modals, connections with the KVKKKartvizit database that is maintained by the SQL Server have been created with the feature of Microsoft Entity Framework. After the data migration, interface repositories and repositories were implemented to conduct the CRUD operations for each modal. CRUD operations are “Create, Read, Update, Delete” which are functions to maintain the data manipulations within the database system. In repositories functions were introduced to the system according to the return types and types of the functions that operate. In accordance with the repositories, in interface repositories introduced functions were implemented in detail in order to sustain CRUD operations. Lastly, Controllers for each modal were designed which are also denoted as APIs dedicated to implement specialized functions for data manipulations which are accessible from the both Swagger UI Service and “KARTVIZIT” website that is designed and developed. Specialized functions include the data search with the given information, data deletion with the given information, data update for the whole modal and data representation of the modals. In the figures 3 and 4 below, you can see the structure of the backend service which shows the modals, interface repositories, repositories, controllers and data migration. Since the software program that is developed is being used actively nowadays by the Bursa Metropolitan Municipality, screenshots of the detailed implementation of each part of the backend were not allowed to be shared by the municipality.

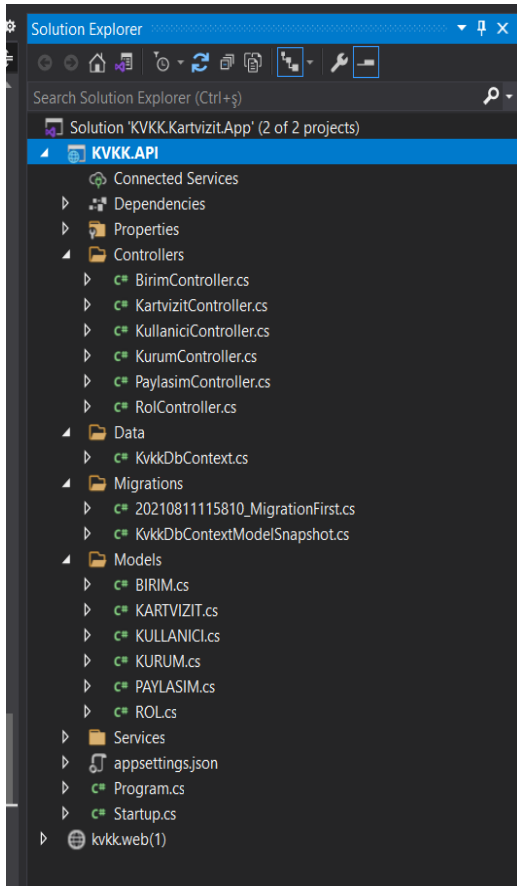


Figure 3: Modals & Migration & Controllers

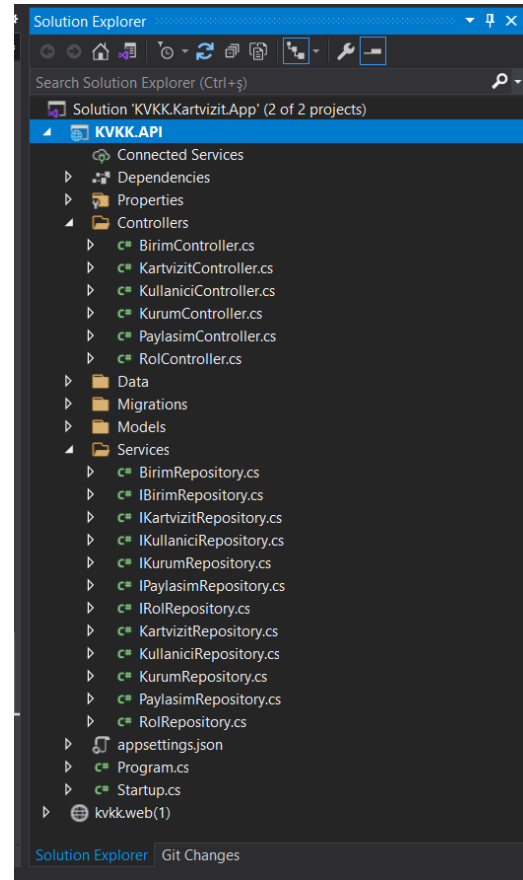
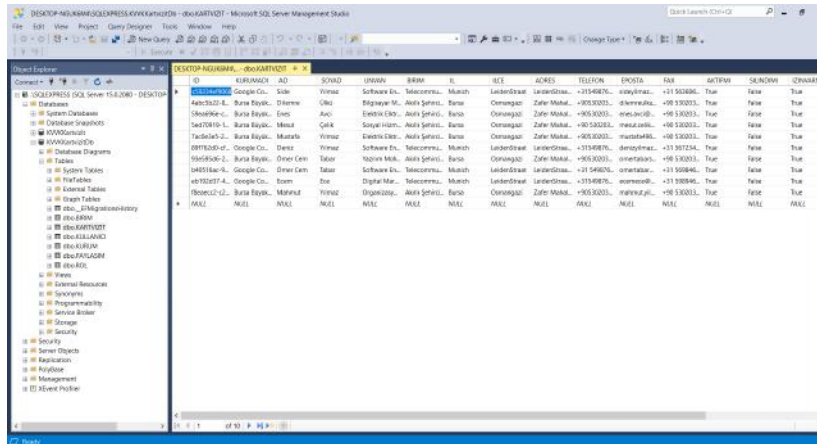


Figure 4: Controllers & Interface Repositories & Repositories

For the second part of the project KVKKKartvizit Database has been created in order to keep track of the storage, manipulation and encryption of the data. As explained in the first project step, after the creation of modals migration was held in order to create the data tables. Since the database has been created automatically by the Microsoft Entity with the desired data tables, only the process of making relations and the adjustments were held for data tables by using SQL Server Management System. In the SQL Management System, some encryption applications were applied to the attributes and adjusted accordingly in order to increase the consistency of the data. An example of the structure of the database and business card data table is shown below in Figure 5.



ID	KURUMGECMIS_AD	SORNO	UYRUK	BIRIM	T	MCL	AKNO3	TOSLON	ENUSTA	KAN	MCTON	OLUNON	OLUNKAN
44035221-E	Bursa Eyalet	1	Yinece	Software Ekl.	Telecomms.	March	Landendras	Landendras	+31548676	enayimac...	+31503886	True	True
44035221-E	Bursa Eyalet	2	Ordu	Edgway M.	Avia Servis	Bursa	Omurgat	Zahar Mahal	+30530033	damenah...	+30530033	True	True
44035221-E	Bursa Eyalet	3	Ant	Enayimac	Avia Servis	Bursa	Omurgat	Zahar Mahal	+30530033	enayimac...	+30530033	True	True
44035221-E	Bursa Eyalet	4	Qik	Sayar Hatt	Avia Servis	Bursa	Omurgat	Zahar Mahal	+30530033	menah...	+30530033	True	True
44035221-E	Bursa Eyalet	5	Yinece	Enayimac	Avia Servis	Bursa	Omurgat	Zahar Mahal	+30530033	menah...	+30530033	True	True
44035221-E	Bursa Eyalet	6	Yinece	Software Ekl.	Telecomms.	March	Landendras	Landendras	+31548676	enayimac...	+31503886	True	True
44035221-E	Bursa Eyalet	7	Tatar	Nayimac	Avia Servis	Bursa	Omurgat	Zahar Mahal	+30530033	menah...	+30530033	True	True
44035221-E	Bursa Eyalet	8	Tatar	Software Ekl.	Telecomms.	March	Landendras	Landendras	+31548676	enayimac...	+31503886	True	True
44035221-E	Bursa Eyalet	9	Tatar	Software Ekl.	Telecomms.	March	Landendras	Landendras	+31548676	enayimac...	+31503886	True	True
44035221-E	Bursa Eyalet	10	Tatar	Software Ekl.	Telecomms.	March	Landendras	Landendras	+31548676	enayimac...	+31503886	True	True

**Figure 5: Snapshot of SQL ServerManagement System**

For the last part of the project, a frontend service was developed as a website. The website includes four main pages which are the main entrance page, sign up page, sign in page and a dashboard page which consist of transitions to the different small pages that are accessible from the sidebar. In the creation of the website and pages main programming languages were JavaScript and React and for the design parts HTML, CSS and NodeJS were used as technologies. Main entrance page was designed identical for all users who are trying to connect to the system which includes a brief video about the Bursa Metropolitan Municipality, navigational topbar with buttons of sign up and sign in that enables the navigation to the related pages and navigational bottom bar which includes the links of the social media accounts of Department of Smart City and Innovation and Bursa Metropolitan Municipality. Sign up and Sign in pages are designed in an easy to use manner with appropriate design since the only function of these pages are validation and authorization of the user related data that is entered and collection of the data whenever a new user needs to be created. Screenshots of the main entrance, sign up and sign in pages were given in the figures 6,7 and 8 below respectively in order to visualize the information given above.

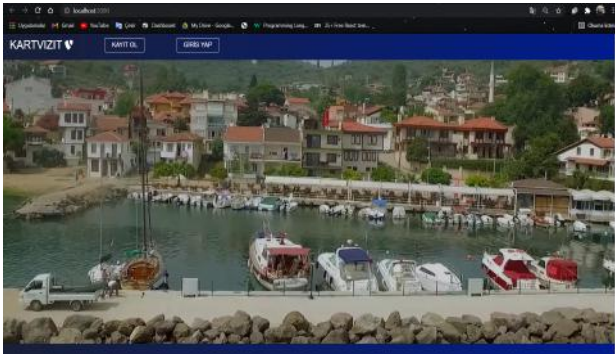


Figure 6: Main Entrance Page



Figure 7: Sign Up Page

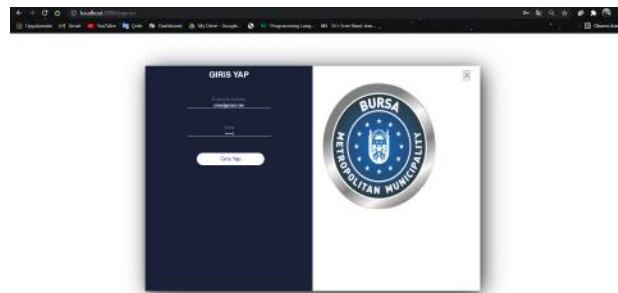


Figure 8: Sign In Page

As explained in the backend service part, there are roles in the system which are regular user, admin and super admin. After the authorization and validation of the mail address and password from the database, navigation was handled differently since the features are enabled for the users according to their roles. That is why 3 different admin dashboard systems were designed. Even if the main page of the dashboards are similar, the contents of the links on sidebars were differing. So, contents of the sidebars distributed as follows:

1. For regular users there were links of Dashboard, User Profile, Add Business Card, My Business Cards, All Business Cards and My Request List

2. For admins there were links of Dashboard, Add Business Card, Business Card Storage, All Users, Business Card Table and Request List
3. For super admins there were links for Dashboard, Add Institution & Department, All Business Cards, All Users and All Requests

When navigation is handled, all users from different roles navigate to main dashboard page which include indications of the number of institutions, departments, users and business cards which are existed in the database, an informative tab which listed the provisions of the law on the protection of personal data(KVKK), and information of the developer and authorities who are collaborated in the development process of the system as shown in the Figure 9 . It is preferred to explain the small pages while supporting the explanation with snapshots of these pages.

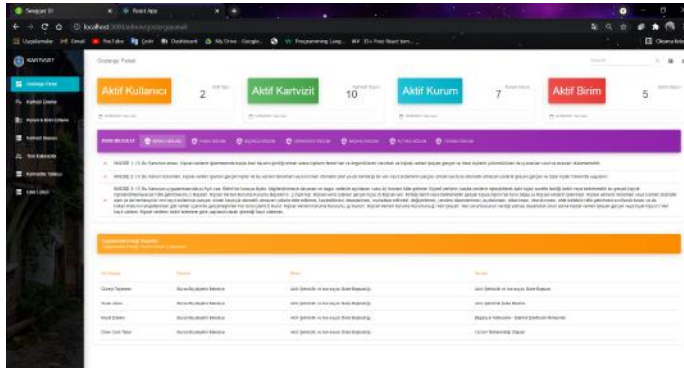


Figure 9: Dashboard Page

Links of the content for the regular users that is contained in the sidebar as follows:

1. In Figure 10, the link of the user profile was designed as a page that enables the users to change their personal data which includes name, surname, institution, department, mail address, password and phone number.
2. In Figure 11, the link of the add business card was designed as a page that enables the users to add information that is collected as business card data which mostly includes company name, department name, position of the person within the institution, name, surname, email address, address of the company and phone number.
3. In Figure 12, the link of the My Business Cards was designed as a page that includes representation of the business cards which are added to the system by that user and business cards that passed the process of requested & approved process as in real life format.
4. In Figure 13 and Figure 14, the link of the All Business Cards was designed as a page that includes representation of all business cards that are collected within the system. However, since the system is constructed on a masking system, if the person does not have an authorization for accessing the detailed personal data, by not flipping the card in order to show the back of the card, the system was not displaying the personal data such as phone number, mail addresses etc. By flipping it meant that an animation was designed for displaying the data on the front and back of the card. If the person is not authorized to display the back of the card a warning was displayed as “you are not authorized to display this information”.

5. In Figure 15, the link of the My Request List was designed as a page that enables the user to check their display requests for business cards by that user on a table with all details that is maintained by the modal “SHARING”.

Figure 10: User profile page  
which enables the user to update  
the information

Figure 11: Adding a business card tab

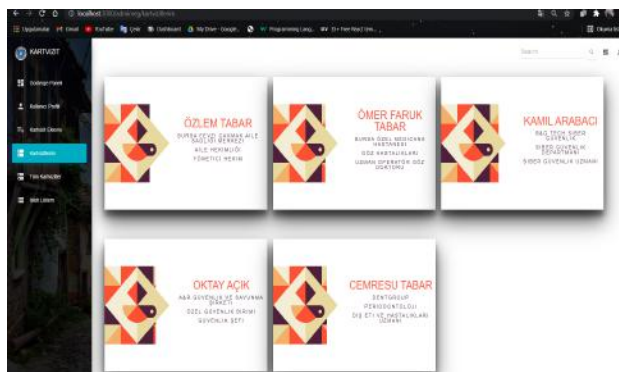


Figure 12: My Business Cards Tab

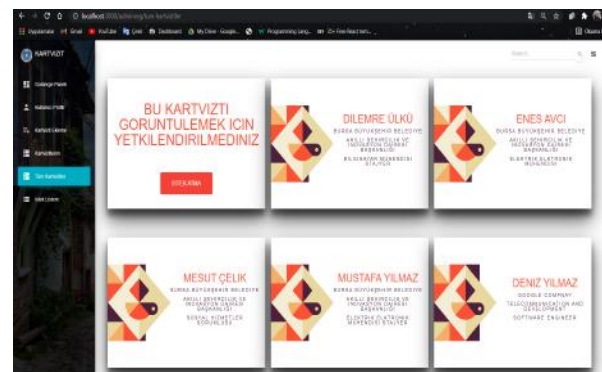
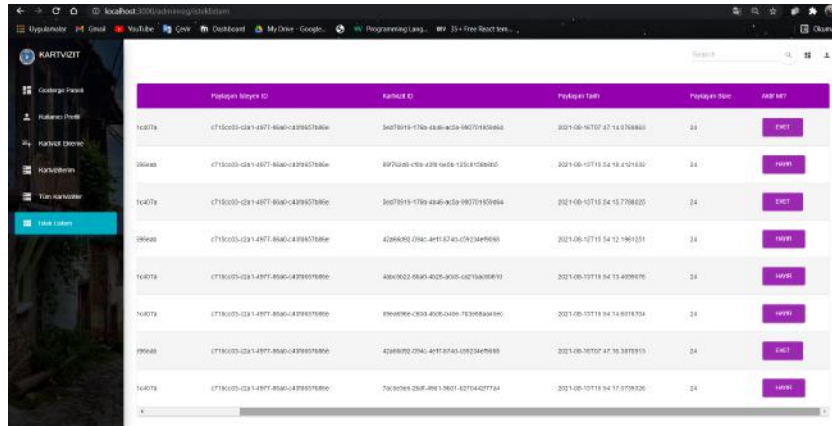


Figure 14: Warning for unauthorized user

Figure 13: All Business Card View



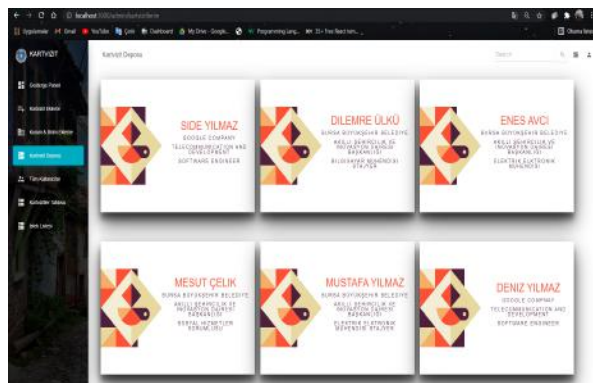


Request Steps ID	Contact ID	Request Title	Request Date	Request Status
16879	4716c05-c24-4871-89ac-439957989e	3ed7819-1789-43b6-9c5a-9807193984	2021-08-10T07:47:14.578889	24
16880	4716c05-c24-4871-89ac-439957989e	8970245-4789-4289-8a58-1258798885	2021-08-10T13:54:18.474132	24
16879	4716c05-c24-4871-89ac-439957989e	3ed7819-1789-43b6-9c5a-9807193984	2021-08-10T13:54:15.778805	24
16880	4716c05-c24-4871-89ac-439957989e	4286492-094c-4d17-8745-0523487855	2021-08-10T13:54:12.1981251	24
16879	4716c05-c24-4871-89ac-439957989e	8067622-0945-4025-9035-04279805912	2021-08-10T13:54:13.499876	24
16879	4716c05-c24-4871-89ac-439957989e	8988956-0834-4005-0406-78398844940	2021-08-10T13:54:14.6018708	24
16880	4716c05-c24-4871-89ac-439957989e	4286492-094c-4d17-8745-0523487855	2021-08-10T07:47:16.5878913	24
16879	4716c05-c24-4871-89ac-439957989e	76c8058-284f-4961-9807-827044227734	2021-08-10T13:54:17.078820	24

**Figure 15: My  
Request List Tab**

Links of the content for the admin that is contained in the sidebar as follows:

1. In Figure 16, the link of the Business Card Storage was designed as a page that includes the representation of the business cards that is added to the system by all department members which is the same as the department of the person who is the current admin on the system.
2. In Figure 17, the link of the All Users was designed as a page that includes the users of the system from the same department as a table which enables the admin for reviewing the information of other users and business card counts added to the system by them.
3. In Figure 18, the link of the Request List is a page that includes the requests that came to the department's business cards that are added to the system and admin is able to approve the requests.
4. Rest of the links and pages are the same as it is designed for regular users.



**Figure 16: Business  
Card Storage Tab**

Figure 17: All Users Tab

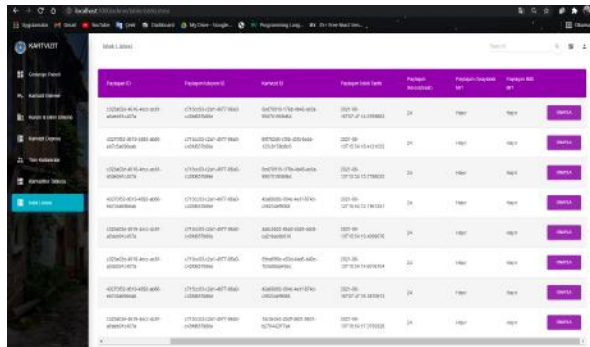
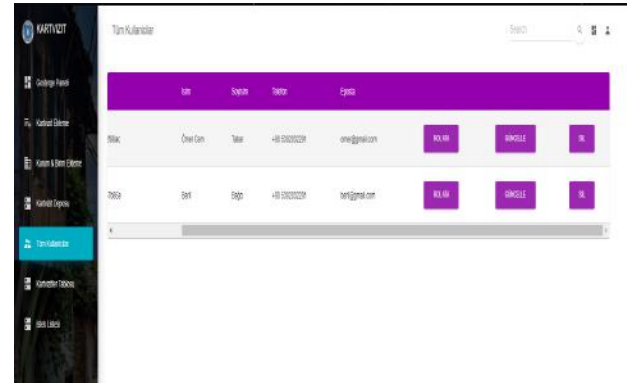
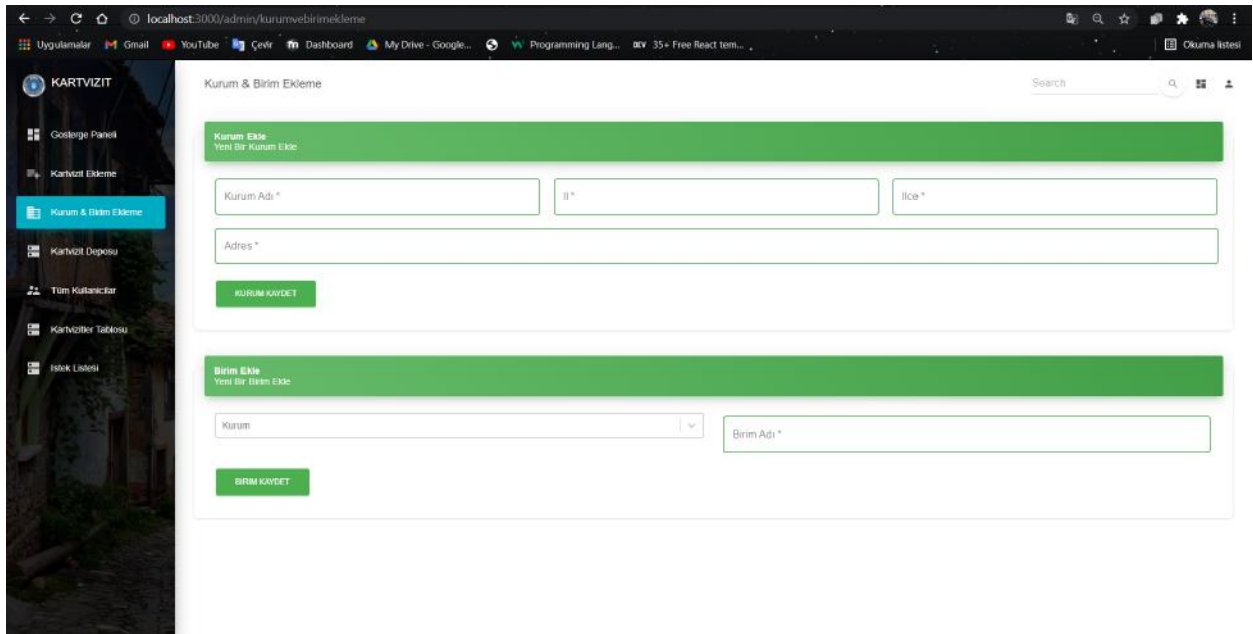


Figure 18: Request List Tab for Admin

Links of the content for the super admin that is contained in the sidebar as follows:

1. In Figure 19, the link of the Add Institution & Department was designed as a page that enables adding new institutions and departments to the system.
2. The link of the All Business Cards was designed as a page that includes all business cards in the system that is fully visible in the format of business cards in real life which are designed with the animation the same as the other user roles.
3. The link of the All Users was designed as a page that includes a data table that shows the information about all users who are currently active in the system and enables the user deletion and update tab in order to change roles of the users.

4. The link of the All Requests was designed as a page that includes a data table that shows the request which came from all users within the system and super admin is enabled to approve, delete and change the status of the requests.
5. Super admin is also enabled for other applications that are conducted by both regular users and admins.



**Figure 19: Tab for adding Institutions & Departments**

However, since some tabs include personal data, snapshots of some tabs are prohibited for the role of the super admin.

As a conclusion, the general idea behind the interchangeable dashboard designs relied on the roles of the user that is entered into the system. In the designed tabs, the main idea was to access the business card data, requesting for reveal and authorization to make the data visible in accordance with the capabilities of the roles.

#### **4.6. Results**

Project was completed within 40 days between the dates June 14, 2021 and August 16, 2021. Backend, frontend and database services are fully functional in order to be implemented in Bursa Metropolitan Municipality and actively used today. As a result, the process of reaching the personal data about the business people who collaborated with the municipality became easier, secure and actions are connected to a visible system for legal evidence. During the last week of my internship, after I did the demo of software to the authorities and my supervisor, services were uploaded to the Bursa Metropolitan Municipality server and started to be used by the staff members of my department. Nowadays, all departments within the municipality started to use the system and for upcoming months the municipality is thinking of sharing the software with its affiliates.

### **5. INTERNSHIP EXPERIENCE**

#### **5.1. Learning**

Internship at Bursa Metropolitan Municipality showed that I have the strength and ability to work and gain experience in many areas as a full-stack developer in a short period of time. While working together with colleagues from different ethnic backgrounds and specialized in different areas within the municipality, their efforts to emphasize the importance of working as a team, for a citizen and for a sustainable future within the framework of municipalism made me realize that I should create awareness of my profession not only to achieve good deeds in my field and my career, also on behalf of humanity. Apart from that, since the duration of my internship was longer than other interns and started early, it allowed me to become a senior among the interns and made me one of the main advisors within their projects. My involvement

was not only in my project which was dedicated to my field, but also projects of other interns and staff members of the department of smart city and innovation which contributed to develop my critical thinking, constructive and creative interpretation skills and my ability to create effective solutions.

Before my software engineering internship, I devoted myself to work in the data science field. But because of both the courses I have taken in my junior year and the fact that gaining experience on software development in real life made me start drawing my career on software development. The main reason for this change was the long-running projects whether with great teams or as an only developer and realization of how our life is surrounded by software programmes which makes our lives easier.

## **5.2. Relation to undergraduate education**

The base method that I have used during my internship project as a software developer was Agile Development Process. In accordance with the information and skills that I have learned from CS308 (Software Engineering), I have extracted the requirements of the project as use cases, tasks and subtasks, and classify them accordingly by giving them importance points in order to pack and put them to handle respectively. By adopting this method I was able to change the importance of the use cases, construct tasks and subtasks accordingly whether the change is needed and create a sprint for faster development in a given limited time.

Another experienced technique that I have used during my internship was using software design patterns while I was designing my backend service. As given in the C308 lectures I have analysed and studied commonly occurring problems to use different pattern options in order to

make the models and controllers work in a concurrent and efficient manner. During the process of designing the repositories, controllers and relational database, I managed to improve my critical thinking and be more open minded to other experienced developers' design ideas that I have never seen and experienced before.

However, even if I managed to finish and design all the required services for accomplishing the given tasks, I am not fully skilled at being a full stack developer since university courses have only scratched the surface of most of the programming languages for developing desired backend and frontend services. It is true that Sabancı courses are preparing students for business life by giving the fundamentals of programming languages, tools and related frameworks but there may be more courses which focus on the alternative languages with commonly used frameworks both for backend and frontend service development.

### **5.3. Difficulties**

The most important burden during the internship was working alone as a software engineer in a huge project creation. I had never experienced being a full-stack developer before my internship since we were responsible for only one part of the project while we were working with a team during our university courses. My expectation from the project was to be able to complete such a large project in a “from part to whole” form with other trainees who have identified their areas and are specializing in these areas. Despite this, it has been easier than I expected to overcome such a big obstacle. The reason for this was to motivate myself in order to imagine myself working in a team and prepare my steps considerably and finish the project step by step in accordance with the rankings that I have made by myself.

Another burden was to work with ASP .Net Core in order to create my backend service. During my education, I have never faced any project or software that its backend service developed by C#, ASP .Net Core and Microsoft Entity Framework and in the beginning I was prejudiced by a thought that ASP .Net Core and C# are not the best options to develop backend service. But I learned that many public and governmental organizations are developing such services with using ASP .Net Core since the engineers and IT professionals got used to C# language and would not prefer any other language in order to develop such huge projects. This time I was subjected to an accelerated training primarily by my supervisor in order to overcome my second obstacle. He helped me to start my project by teaching me the fundamentals of ASP .Net Core, C# and Microsoft Entity Framework within the scope of the main supplier for a backend service and helped me to find documentations and related projects whose backend services built by C# and ASP .Net Core. In addition to accelerated training, I started to take online courses that are relatable to my project steps in order to improve myself day by day and specialize in C#, ASP .Net Core and Microsoft Entity Framework.

Last burden was the preference of the frontend service for the user interface. Since ASP .Net Core based on the structure Model-View-Controller, when I have finished my Model and Controller part for my backend service my supervisor preferred develop an interface whether with C# powered by HTML and CSS or AngularJS for the View part. Since I had experience with React powered by HTML and CSS, I suggested using my preferred languages and developing my frontend service accordingly. However, my supervisor did not have any

experience about developing a web service with React and insisted on using one of his options. After I showed my previous projects which are developed by React, my supervisor let me build my frontend service with React, HTML and CSS.

#### **5.4. A typical day**

Except for the first day of the internship in the department of smart city and innovation, every day starts with a general meeting which focuses on whether the previous day's tasks had been completed or not. In these meetings which were attended by all department employees, both staff and interns were giving a presentation about the current status of their projects to the head of the department and project supervisors. After the meeting analysis was conducted and it was seen at what stage the works were, the interns and staff were leaving the meeting with their project supervisors to their offices to continue to work on their projects if their projects did not arrive at the end stage. In the offices, interns are able to ask their questions about the current project step and problems during the process if it exists while their supervisors also work on their own project. In addition to that, project supervisors were helping to construct the next step of the project to work on that day and planning the upcoming tasks in detail. After the daily tasks were finished, everyday the head supervisor of the interns in the department was conducting a competition between interns about creating department wise daily project ideas . Before the day ends, interns and head supervisor were meeting in the main office to grade those daily project ideas of their colleagues from the perspective of a company manager whether it is applicable or not, to gain experience about the real life bureaucratic process of the project creation and for analysing the ideas of probable competitors .



## 6. CONCLUSIONS

Major points of this internship process was improving myself in the field of software development, increasing my capacity and capability to find solutions to the problems during the process of development, improving my critical thinking skill during the creation of the fundamentals of project management which are planning of the use cases, tasks and subtasks to be handled, completing the project properly even if it was not worked in a huge scrum team, gaining the skills about being a full-stack developer, and applying and experiencing the every step of a proper agile development process. Moreover, as an intern having received training from the experts in the field of occupational health and safety, first aid and personal data protection law for being experienced to integrate the information that is learned in business life.

Apart from the internship process, the main points of the project was:

1. To be aware of the law on the protection of personal data and to learn the provisions in detail
2. To be open to new tools, technologies and programming languages in the software development process and to be able to use these technologies effectively after a sufficient experience and research
3. Being skilled in terms of designing an user interface and application of the web service,
4. To learn the fundamentals of database creation and management
5. To learn encryption and decryption processes and systems for keeping safe and secure the personal data
6. To be experienced about the Model-View-Controller structure of the backend service

In conclusion, a maintainable and suitable software is developed and started extensively used within the municipality which is an proudful outcome since it shows that you have done your work as it is expected and increased your profession in software development. Also, working with an expert in the field of software engineering gave me an opportunity to see from the perspective of a person who is developing software as his occupation and bureaucratic processes, legal aspects within the process of work and being responsible for all of your actions that are taken in each step.

## **7. RECOMMENDATIONS**

First of all, my biggest suggestion to students who will take the PROJ 302 course is to do a voluntary internship before and experience the interviews, aptitude exams and working environments without any enforcement. Since the internship searching process is stressful and needs to be experienced, doing voluntary internships will make students more comfortable during the interviews and in aptitude exams. In addition to that, preparing a good CV is one of the most significant steps of the internship searching process. Apart from the fact that a professional CV has a significant role within the process, every university student, especially engineering students, must have CVs that are professionally prepared and constantly updated. That is why my second suggestion is while you are experiencing the university environment make daily or yearly list of the activities that you have experienced, projects that you have done, systems and tools that you have used, social activities that you have participated and courses that you have took with the evidence of the date and certificate since in today's business life the university GPA, the quality of the graduated university and infrastructure created as a result of the education that a student take are not the only eloquent qualifications for a better job and

career. Improving social communication skills, setting up a business network and development in the social field during the education years became more vital in the working environment. That's why if a student is not sufficient or has a profession about preparing a CV, make sure that you are working with an academic writing fellow.

About the working environments, I can say that being an intern means a person should always be open to new ideas and criticism. Due to the changing ethnic background depending on the place of internship conducted, the point of view of the people who you are working with may not always meet your expectations. A student should try to be as focused on their work as possible, proceed their work in a planned manner, be punctual and compliant with other people. And at the same time, as an advice, every event that is either good or bad should be considered as an experience. Such experiences in our career and social life, have a crucial role to become prepared and experienced for the future by ensuring that characters and thoughts of the students are structured.

## 8. REFERENCES

- The World Wide Web (www) Documentation

Bursa Metropolitan Municipality. (2017). Administrative Structure of Bursa Metropolitan Municipality. Retrieved June 14, 2021 from <https://www.bursa.bel.tr/idari>

- The World Wide Web (www) Documentation

Material-UI v5, (2019), Documentation of Material-UI. Material-UI. Retrieved June 18, 2021 from <https://material-ui.com/>

- The World Wide Web (www) Documentation

React, (2021). Documentation of React Components. React. Retrieved June 18, 2021 from <https://tr.reactjs.org/>

- The World Wide Web (www) Documentation

NodeJS, (2020), Documentation of NodeJS, NodeJs, Retrieved June 17, 2021 from <https://nodejs.org/en/>

- Video

Brian Design, (2020).” React Sidebar with Dropdown Menu Tutorial - Create Sub Navigation”, Brian Design Youtube Channel, watched on June 30, 2021 from [https://www.youtube.com/watch?v=mN3P\\_rv8ad4](https://www.youtube.com/watch?v=mN3P_rv8ad4)

- Video

Brian Design, (2020). “ React Website Tutorial - Beginner React JS Project Fully Responsive”, Brian Design Youtube Channel, watched at July 1, 2021 from <https://www.youtube.com/watch?v=I2UBjN5ER4s>

- Template - Github Repository

MatX React, (2020). MatX React Admin Dashboard Template. MatX React, Retrieved July 1, 2021 from <https://github.com/uilibrary/matx-react>

- The World Wide Web (www) Documentation

Roth D., Anderson R., Luttin S. (2020). Introduction to ASP.Net Core. Microsoft Corporation.

Retrieved June 14, 2021 from

<https://docs.microsoft.com/tr-tr/aspnet/core/introduction-to-aspnet-core?view=aspnetcore-5.0>

- The World Wide Web (www) Documentation

Microsoft Corporation. (2019). Documents for Microsoft Entity Framework. Microsoft

Corporation. Retrieved June 18, 2021 from <https://docs.microsoft.com/tr-tr/ef/>

- The World Wide Web (www) Documentation

Material-UI SAS. (2018). Documents for Material-UI React. Material-UI SAS. Retrieved June 21, 2021 from <https://mui.com/>

- The World Wide Web (www) Online Course

Çakıroğlu, F. (2021). Membership System with ASP.Net Core(ASP.Net Core Identity) Course.

Retrieved June 21, 2021 from <https://www.udemy.com/> , Finished the course at 29 June, 2021

- The World Wide Web (www) Online Course

Karahan, Z. (2021). ASP.Net Core MVC 3.0 Course. Retrieved June 21, 2021 from

<https://www.udemy.com/> , Finished the course on July 1, 2021.

- The World Wide Web (www) Online Course

Karahan, Z. (2021). ASP.Net Core MVC 5.0 Course. Retrieved June 21, 2021 from

<https://www.udemy.com/> , Finished the course on June 30, 2021.

- The World Wide Web (www) Online Course

Çakıroğlu, F. (2021), ASP.Net Core Security Course. Retrieved June 21, 2021 from <https://www.udemy.com/> , Finished the course on July 9, 2021.

- The World Wide Web (www) Online Course

Şener, C. (2021), Systematic ASP.Net Core MVC (with detailed C# implementation) Course. Retrieved June 23, 2021 from <https://www.udemy.com/> , Finished the course on July 14, 2021.

- The World Wide Web (www) Online Course

Almasi, P. (2020), Create ASP.Net Core Web API Course. Retrieved June 23, 2021 from <https://www.udemy.com/> , Finished the course on June 21, 2021.