Literature Review

ABSTRACT

Our project is an idea that has emerged to find a solution to a problem many vehicle drivers complain about. Our goal is to ensure that the driver can easily find a parking space at his destination. Thus, we eliminate stress and waste of time. But it will benefit not only drivers but also parking businesses. Parking lot businesses will both introduce themselves and fill the areas that they cannot fill through our application. In short, it is a lucrative practice for both parties.

INTRODUCTION

Our project will initially be on the Android mobile application system. The main purpose of the project is to enable the driver to easily find a parking place where he will go, and to take an efficient turn with time and stress savings. Our project will be efficient not only for the driver but also for parking facilities. Seeing the car parks in the city where the driver is located or even in its vicinity as a list and making a reservation will pave the way for parking lots with little awareness in the environment. Known car parks, on the other hand, will not be confused in the crowd and will be able to control the vehicle entrance and exit with a certain order. User comments and ratings for car parks will greatly increase reliability.

COMPARISION WITH CURRENT TECHNOLOGIES

If we need to compare our project with current technologies, there is no technology that exactly matches. There may be applications that appear similar, but our perspectives are different. We can give the ParkJet application as an example. Offers parking, valet and car wash reservations. But different from our point of view, the car parks are their own car parks and the valet companies that they have agreed with can be classified as more luxurious. Our application appeals to the public. We will make an agreement with existing parking lots and gain customers, and we will also provide easy parking services to customers in convenient ways. It will be able to list the parking lots according to their comments and points, and find the closest parking garages to the destination, which does not have high reliability. The benefit of the parking companies we will deal with is that it is an application that will guide the customer to himself and even if necessary, it will be able to make campaigns and attract customers.

MAIN FINDINGS

We have stated the learning we have gained from the research we have done about the main technologies we intend to use in our project as short definitions and scopes.

1.DATABASES SQL AND NOSQL

SQL

POSTGRESQL

PostgreSQL helps developers and project managers manage and store the data they use while developing software, regardless of whether they are big or small. As it is free and open source, PostgreSQL is completely adaptable, unlike many database systems. For example, if you want to determine your own data types, you can create special functions and use the database without needing to compile it again. PostgreSQL helps developers and project managers manage and store the data they use while developing software, regardless of whether they are big or small. As it is free and open source, PostgreSQL is completely adaptable, unlike many database systems. For example, if you want to specify your own data types, you can create special functions and use them without compiling the database again.

Advantages of PostgreSQL

Affordable, no license fees, providing you with manufacturer independence.

You can install and distribute PostgreSQL to as many servers as you want.

It is localized to Turkish and has Turkish support.

It is platform independent. (http://buildfarm.postgresql.org/).

It has high security. It has high accessibility.

It has an expandable architecture. It can be scaled, flexible, expanded or shrunk according to each transaction and data size.

ACID is fully compatible.

It is easy to learn and set up. It has extensive documentation that is up-to-date, detailed, open to everyone and easy to access.

It is easy to manage, backup, maintain and monitor.

Error messages and log system are clear and understandable.

Provides low downtime in planned maintenance.

It has a safe structure that prevents making mistakes.

PostgreSQL has a very advanced query planner.

It has drivers for all modern programming languages.

Supports geographic data structures and new NoSQL unstructured data types (JSON, JSONB, XML, etc.).

Specialized open or closed code solutions can be developed using the source code.

Powered by an active community, with developers from around the world and core developers, the community provides solutions to questions and problems with fast feedback. A new version is released almost every year with innovative and up-to-date features that make commercial products jealous.

PostGIS

PostGIS is a PostgreSQL extension that adds GIS capabilities to this RDBMS. Its popularity is not just because it is "free", but because it is accepted among the world's leading GIS applications. Almost every major frontend application, PostGIS, provides hooks for a PostgreSQL enabled backend.

NOSQL

MONGODB

MongoDB is a cross platform documentation database. Stores the data in a JSON style document format. It uses internal memory to store working sets. Therefore, it has faster data access capabilities. Each record is expressed as a document in MongoDB. It is one of the most preferred NoSQL systems today in terms of driver support for many programming languages that are actively used today. Query support. While many NoSQL solutions provide access to data only through keys, MongoDB offers the opportunity to query according to the desired fields and specific ranges (range queries), as well as regular expressions. If we want to give examples of applications where Mongodb is used, Uber, Forsquere etc. We can give an example.

MongoDB Infrastructure

Aggregation: Collecting and grouping scattered data and taking necessary actions on them.

Map-Reduce support: Divide, send, collect, send. Here, the data uploaded by the user to the system is divided into parts with mappers and distributed to the required areas, so that transactions are made faster and the load transferred to each area of the system is further reduced, after the necessary actions are taken by the system, these data are brought together with Reducers and transferred to the user.

Text Search: There is a text search support in MongoDB. To do this, you can search for a string expression using the $ text function. If you ask me, this is one of the most beautiful features of mongodb, you can search and find a text whenever you want without any difficulty, you need to use the Full text search feature to do this in MsSQL in RDBMS systems, sometimes you may even have to do somersaults for this.

Data Models: MongoDB's data retention format is different from SQL. An array can contain string and integer expression. This feature is a feature that we can consider as a difference from RDBMS systems.

Replication: MongoDB to secure itself in case of any server error. There is a backup server next to the main server.

Sharding support: Ability to share large-scale data between servers. We have mentioned that performance is the top priority in MongoDB, so sometimes a single server may become

insufficient for us when the data reaches very large sizes, so by growing horizontally with new servers, the data is distributed to these servers and the load is reduced.

Geospatial Queries

MongoDB can store geospatial data as GeoJSON objects or coordinate pairs. 2 d data is kept.

CASSANDRA

There are many advantages to using Cassandra. It is possible to add more hardware to support more customers and data. Therefore, it provides scalability. What's more, it can be fault tolerant and consistently usable for critical business applications. Also, it can perform terabyte data writes faster. Because Cassandra supports big data, it is possible to store structured, semi-structured and unstructured data. Also, the user can distribute data across multiple data centers. Usually we do not encounter network bottlenecks (no network bottlenecks). Data is automatically copied / duplicated on many nodes. Apache Cassandra has flexible scalability, fast linear performance, easy distributed architecture, faster queries and transaction support, faster read and write capabilities. It was originally developed for searching messages in the Inbox on Facebook and later made open source by Facebook. Distributed structure supporting multiple data centers (It can work distributed on several different servers and geographies.) * In event monitoring applications: Many entertainment and media organizations use Cassandra to track user activities based on movies, music, albums, artists or other parameters .

* In heavy typing systems or periodic applications: Cassandra is perfect for very heavy typing systems. For example, data for each request; browser type, traffic sources, location, behavior, technology, devices, etc. in recording according to

* In Web Analytics, Social media analytics: Cassandra is used by many social media organizations to analyze data and make recommendations to their customers.

* In product catalogs and retail apps: One of the most popular uses of Cassandra is to display quick product catalog entries and searches.

* Messaging: Cassandra serves as the database backbone for numerous cell phones and message providers (Facebook, Twitter) and

* It is a database suitable for applications where data comes from different devices or sensors very quickly.

Comparison between two NOSQL

- MongoDB is a free and open source cross-platform document-oriented database system. Meanwhile, Cassandra is an open source, distributed and decentralized database for managing large amounts of data.
- Although Cassandra is column oriented, MongoDB is document oriented.
- MongaseDB is written in C, C ++ and JavaScript with Cassandra, and Java in Java.
- Cassandra has triggers, but MongoDB has not triggers.
- While Cassandra uses a selectable replication factor, MongoDB uses a master-slave replication factor.

- While Mongo DB stores data to be stored in BSON files on the disk, Apache Cassandra Node stores data inside and data centers are made up of all nodes.
- In terms of performance scalability and features, Apache Cassandra can be considered the best database in case of large amount of data to process and in terms of query execution speed and optimization.
- The advantages of MongoDB are that complex data can be easily modeled thanks to the JSON format support provided. This provides a lot of popularity for Mongo DB compared to Cassandra. Both MongoDB and Cassandra Performance databases have greater advantages depending on the requirements, and the amount of data to handle in the application decides the choice to make.

2.API s

What is Django and what does it do?

Django is an open source python web framework used to secure rapid development, pragmatic, easy-to-maintain, clean design and websites. The main purpose of Django Framework is to enable developers to focus on the new components of the application rather than spending time on previously developed components. Django has more features than most other frameworks on the market. Many difficulties are encountered with web development; Django allows users to focus on developing the necessary components for their applications.

What is Model View Template-MVT ?

MVT is actually Model -View-Template working principle.

Model: is the working layer that contains database operations. We model the database related to the project we will do in this layer and then use this model where we need it. Another beauty of Django is that we can create a custom database without using any SQL commands.

View: this part is completely the business logic layer. We create a bridge between these layers by accessing the required template and model. Of course, this part is related to what we do with our Python codes.

Template: It is the design presentation layer of the project. This layer contains functions such as how the page should be displayed according to the information it receives from View.

Why should I choose Django?

1- Django can be installed and used easily.
2- It provides detailed error reports. It is easier to solve the problem easily among the errors given in detail. From this point of view, the detail in the error report is more than the PHP language.
3- It has an expandable management panel. When Django is installed, an admin panel of its own comes up. At first, we can develop this panel, which is very useful in basic operations, according to our wishes and desires.
4- Django has a template that constantly renews itself.
5- Django is a framework that is at a very good level in terms of security.

What is Spring Boot?

Spring Boot is a framework that exists to develop Spring-based applications in an easy and fast way. Thanks to Spring Boot, we get rid of some details and write only the code that works for us, and this makes it very easy for us. One of the most useful aspects of Spring Boot is that it does not require XML configuration. It minimizes time loss and allows us to easily develop the application since it allows us to do your work automatically.

Why Spring Boot?

Spring library provides convenience to us while developing web applications with J2EE (Java 2 Enterprise Edition). Spring takes care of the routine for us at the back, providing speed, performance and ease of use. This gives us speed, simplicity of code and a strong infrastructure. It is very popular in corporate projects. Spring started to be developed in 2003. In applications developed before Spring, the layers were found in separate pieces from each other. Its development and management was very tiring. Thanks to Spring, it became possible to collect these layers under an application roof. Being module-based does not require us to add every sub-library.

Advantages

It brings us ready HTTP servers to easily develop and test your web applications.

It shortens development times and increases productivity.

It offers us a ready-configured option with its default configuration settings.

It provides a plugin for us to use build tools easily.

It is very easy to integrate pring Boot Application with other modules in Spring Ecosystem.

Disadvantages of the Spring Boot Framework

One of the things that users of Spring Boot do not like most is lack of control. Since Spring Boot loads extra dependencies, it can get out of control.

The Spring Boot structure is deployed directly to Docker containers and this gives us speed in the micro services section, it is not suitable for monolithic applications as the frame is constructed to be agile and light in order to gain speed.

Another disadvantage is; Various difficulties may be encountered when we want to update our old Spring code.

Notable Features of Spring Boot

To be able to create independent Spring applications.

Starters provided to facilitate build configuration.

Automatic configuration.

Code generation and no need for XML configuration.

It comes with an embedded web server (Tomcat, Jetty, Undertow).

Customization and management is simple.

What's the Difference Between Spring and Spring Boot?

It allows you to create standalone applications.

Tomcat, Jetty, Undertow come directly embedded (there is no need to deploy their war files.)

Provides starter POMs to simplify Maven configuration.

Configures Spring automatically whenever possible.

Provides production-ready features such as metrics, health checks, and externalized configuration.

There is absolutely no code creation and requirement for XML configuration.

Spring facilitates its dependencies, prevents version conflicts.

An application can be run directly from the command line without a container.

Boilerplate allows us to get rid of the stereotypes and write only the codes we need.

How Does Spring Boot Work?

Some may be asking yourselves how does Spring Boot have auto configurations and what does that really mean? It really comes down to three simple Spring Boot annotations that provide this feature:

- @SpringBootApplication
- @EnableAutoConfiguration
- @ComponentScan

Between each one of these annotations Spring Boot is able to provide default project dependencies as well as allow for defaults to overwritten.

@SpringBootApplication

@SpringBootApplication is used in the entry point of the application add the class it resides in needs to have to the application main method. The annotation is needed and will provide each of the other two annotations to your Spring Boot application since the @SpringBootApplication includes both inside.

@EnableAutoConfiguration

The @EnableAutoConfiguration does just that it provides each of the representing class with the Automatic Configuration capability.

@ComponentScan

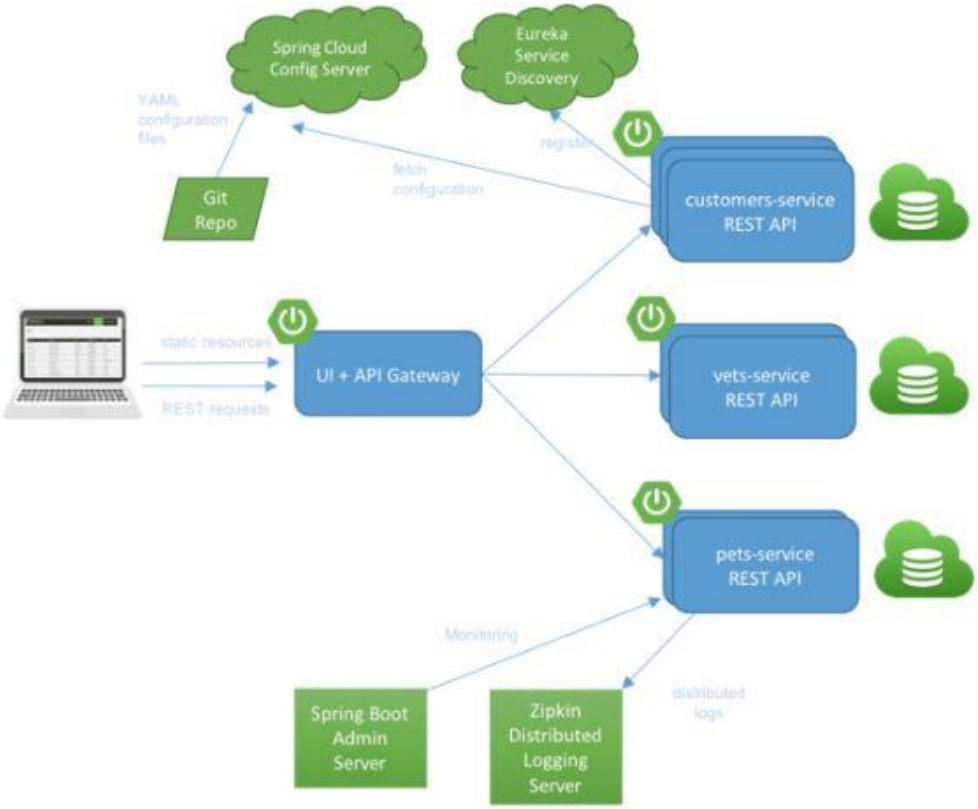
Lastly the @ComponentScan will at initialization scan all the beans and package declarations.

Spring Starter Dependencies

Not only does Spring Boot include annotations but it also uses Spring Starter Dependencies to ensure that your application starts with the correct dependencies and so you can hit the ground running so to speak.

Many times, as an application grows larger it can be hard to properly configure project dependencies, the Spring Boot Starter plugins will help facilitate the dependency management. An example of a spring starter dependencies is the Spring Boot Starter web dependency.

That can be used so that your application can have Rest Endpoints written into your application. Overall, they help streamline the development of these applications so that a team will start from a more complex point so less holes will be presented especially with larger applications.



3.AUTOMATIC NUMBER-PLATE RECOGNITION

License Plate Recognition (Reading) System is the process of detecting and separating the license plate area on the vehicle image obtained from the cameras, and reading the characters on the license plate by optical character recognition (Image Processing) methods.

It has different applications according to the project and is a system created by combining the application-specific algorithm and hardware structure.

- License Plate Recognition Software Algorithms
- Detection and separation of license plate location through camera image
- Repositioning and sizing of the plate in accordance with the next algorithms
- Normalization of image properties such as brightness, contrast
- Extracting characters from the image with character separation
- Optical character recognition
- Country specific syntax and geometric checks

Why License Plate Recognition?

- Accessing and analyzing stolen or violation information of vehicles passing through highways, bridges and toll booths
- Reducing the manpower at the entrance and exit of the parking lot, site, guardhouse and similar controlled crossing points, providing easy, fast and safe entry and exit
- Automatic access to license plate information at scales, vehicle inspection stations and similar places

License Plate Recognition System Application Areas

- Entry & Exit Points of the cities on the highway
- Places where Controlled Vehicle Passage is needed
- Bridges and Toll Booths
- Border Gates
- Highway Checkpoints
- Parking lots
- Sites
- Regulations
- Warehouses and Warehouses
- Universities
- Hospitals
- Hotels
- Scales
- Airports
- Schools
- Bus Station and Terminals

- Factories and Industrial Facilities
- Shopping malls

Benefits of Plate Recognition System

For Highways:

- Keeping city entrances and exits under control, city security
- Tracking and questioning of stolen or wanted vehicles
- Vehicle density measurements of highways
- Making strategic transportation analysis of highways
- Establishing smart traffic systems
- Traffic regulations
- Determining the transportation time of the vehicles between two points, transferring them to the information board

For Controlled Crossing Points:

- Reduces Entry - Exit / wait times
- Prevents traffic jams
- Provides security at entrances and exits
- Entry cards, vehicle tags, remote control etc. eliminates usage needs
- No operating costs
- Can be integrated with barriers and similar access control systems when necessary.
- Automatic barrier is activated for vehicles that are registered or authorized to pass.
- Audible and visual alarms are generated for vehicles that are not registered and whose passage authorization is restricted, if desired.
- Parking lot control, density measurements
- Prevent operator intervention

Main Features of License Plate Recognition System

- 98% recognition rate
- Identification time between 5 - 7 milliseconds
- Recognizing the license plate traveling at a speed of 250 km / h
- Vehicle Speed Detection Feature
- Full compliance with KGYS (MOBESE) projects
- Ability to read square, rectangular, official, military plates
- Recognizing all Latin license plates
- Optional vehicle Brand and Color recognition
- Ability to work in different light conditions day and night
- Automatically recording license plates (Plate, Date, Time and Route)
- Questioning the registered plates and reporting them with pictures
- User authorization and remote management
- Automatic querying from EGM-POLNET and local database
- Automatic barrier triggering and control

- Automatic receipt and label printing
- Parking fee automation
- Providing automatic passage of authorized (subscribed) vehicles and counting vehicles
- Obtaining information about the use of parking spaces of cars
- Integration with any database
- Easy to install and easy to use interface
- Sending and receiving information to all automations
- Mobile plate identification by mounting in the vehicle
- Functions that can be developed according to needs
- IP (Digital) cameras and high resolution operation
- Web server software (database independent)
- Platform independent server software (Linux, Windows)
- IOS and Android supported barrier triggering (Iphone, Samsung etc.)

4. COMPUTER VISION

The first studies of computer vision date back to 1970s. Computer vision is basically trying to perform tasks or functions that a person can do visually in a computerized environment. It is the process of making a decision based on the results of digital images or video images in a way that the human can decide. Computer vision uses methods of creating, processing, analyzing and making meaningful of the digital image in order to generate information numerically or symbolically on the image.

Computer Vision background covers a wide range. While performing operations on images, due to the models created with the help of statistics, physics, geometry and learning theory, each field of study requires separate expertise.

In general, these branches can be listed as follows:

Recognition

The classic problem in computer vision, image processing, and machine vision is to determine whether the image data contains a particular object, feature or activity after acquisition.

Object recognition: It is called object classification. This technology in the field of computer vision is used to find and recognize objects in any image or video. For example; We can give detection processes such as trees, people, cars and structures as an example.

Identification: It is the recognition process on only one instance of an object to be targeted. As an example, we can call it recognizing the feature of any type of house structures (chimney shapes of drone-drawn houses).

Detection: It is also known as the detection system. Basically, it is the scanning of digital image videos for a specific condition based on simple and fast calculations. As an example, we can give a drone that explores the forest to detect a fire.

Content-based Image Retrieval: It performs the process of finding all images with a certain content in a large set of images. For example, in order to organize a complex dataset according to its content, we can say that it is the process of analyzing and classifying the content such as human, animal, house and car.

Pose estimation: It is the estimation of the position or direction of the target object on the image taken from the camera. As an example of this system, while face recognition systems are used in identity verification, the user is interactively told to close his / her eyes and move his / her head and the accuracy is confirmed by estimating the pose. You can look at the rotation matrix or quaternion for the pose estimation.

2D Code Reading: It is the process of reading 2D codes such as data matrix and QR codes.

Facial Recognition: Face recognition is a technology that can identify or verify a person from a digital image or video source. It is also defined as a Biometric Artificial Intelligence-based application that can uniquely identify a person by analyzing patterns according to the person's facial tissues and shape.

Shape Recognition Technology: It is also known as pattern recognition. It is the automatic recognition of patterns and regularities in data. Pattern recognition is closely related to artificial intelligence and machine learning, with applications such as data mining and knowledge discovery in databases (KDD), and are often used interchangeably with these terms.

Motion:

It is more concerned with the motion prediction in which an image sequence is processed. Examples of such tasks:

Egomotion: Identification of the camera from a sequence of images produced by the 3D rotation and flip camera. In the field of computer vision, egomotion means predicting the movement of a camera according to a solid scene. Egomotion prediction is important in autonomous robot navigation applications.

Tracking: Usually the process of following the movements of a smaller point of interest or set of objects in the image sequence. These can be vehicles, people or other assets. Tracking systems are widely preferred in areas such as security and surveillance. For example, with border surveillance systems in military UAVs, tracking and monitoring illegal crossings at the border.

Optical Flow: It is used to determine how the point moves according to the image plane for each individual point in the image. It is also used for many areas such as object segmentation, contact time information and brightness.

5. CLOUD COMPUTING

It means the computer that ensures that all kinds of documents and files we need can be accessed from anywhere. It means that information, documents, presentations, files collected on a single server can be accessed from anywhere on the internet. In this way, companies have a more flexible structure. Cloud computing services, which make it possible for personal data and documents to be accessible from anywhere, not only for companies, eliminates material requirements such as hard disks and external carriers.

What's the advantage?

Cloud computing, which eliminates problems such as storing files and accessing files, makes it possible to use smart technologies that come into our lives more actively and efficiently. Presentation files no longer need to be in your bag, computer or on an external disk. Thanks to cloud computing services, the document you want is at hand without being dependent on any device.

Services such as Google Dirve, Box.com, and Microsoft Cloud are the best examples of cloud computing. Cloud computing, which makes it possible to eliminate file and data losses, enables you to access your data 24/7 without interruption. Moreover, the fact that this is not a matter dependent on any device expresses the greatest feature of cloud computing.

Firms that invest in cloud computing services attempt to set up this system from a to z within their own structure, making it necessary to meet a great cost and hardware requirement. Therefore, using this service in the form of leasing would be the right behavior in terms of making the costs more affordable.

Information cloud services, which are separated as Public Cloud or Private Cloud, ensure that the information is open to everyone, and on the contrary, it also has a structure that only authorized persons can access. Cloud computing, which will enable companies and individuals to be more flexible, has already taken its place among the technology that makes life easier with its paid and free options.

CONCLUSION

Although we have some ideas that we plan to add to our project in the future, we will now move on to the main topic and develop a parking reservation system. There are two different entrances in our project, the first for drivers and the second for parking lot businesses. Drivers will be able to easily book from the listed car parks and save the time spent searching for a place and will also be a solution to traffic congestion, the parking company will be able to follow and confirm the reserve, and the parking lot owner will be able to track the number of vehicles entering and exiting during the day and the time the vehicles stay.

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