

Scheduling App

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Scheduling App

Practice School-2

Submitted in partial fulfilment of the requirements

for the degree of

Bachelor of Technology in Computer Science Engineering

By:

Mohil Gupta (2018BTechCSE029)

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CERTIFICATE

This is to certify that the Practice School-2 project work entitled "**Scheduling App**" submitted by **Mohil Gupta (2018BTechCSE029)** towards the partial fulfillment of the requirements for the degree of **Bachelor of Technology in Computer Science Engineering** of JK Lakshmipat University Jaipur is the record of work carried out by them under my supervision and guidance. In my opinion, the submitted work has reached a level required for being accepted for Practice School-II examination.



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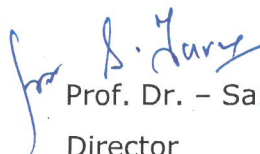
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Sincerely yours,

Mohil Gupta (2018BTechCSE029)



ABSTRACT

MTree is a Product development company based in Noida, India. Mtree has been in the business of product development services for more than 10 years. MTree is founded and led by technology professionals with extensive background in research and engineering of high technology products over the last three decades. MTree has proven capability to provide complete end to end product development services. This includes ideation as well as suggesting product feature enhancements. MTree has expertise in architecting complex software products in domains such as Networking, Enterprise Systems, E-Commerce, and Computer Vision. MTree has a strong research focus with the ability to solve some critical problems in the area of image processing, IOT and networking. These can be used to develop next generation innovative products.

Many challenges are being faced by restaurant operators, Labor management being the top one. Effective scheduling gives managers an insight as to how many employees are there to schedule for a shift at any given time. Managers have a real-time schedule that changes with the organization's needs. Scheduling software helps the restaurant operators to automate scheduling by giving them the flexibility create shift and schedules electronically and eliminating the need for manual work.

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CHAPTER 1 : INTRODUCTION

1.1 General Introduction

Information technology is changing the landscape of how businesses and workers are interacting with one another. Restaurants, Hospitality and retail were greatly impacted and hardest hit by the pandemic which has also added another layer to the scheduling complexity environment. The challenge faced by these industries is labor management. The main problem which these industries face is of over and understaffing. For a available shifts if there a more than required labor then the labor cost is increasing with no return on investment. For these businesses labor cost is one of the biggest costs. If a shift is undersataffed then the business is not metting the desired efficiency. Employees may overwork and have to be paid overtime.

Some other major problems that these industries face is that the a proper schedules is to be maintained. Managers are responsible to create schedules and shifts. The problem with this is flexibility. Employees can call in sick, they may also quit or they may not show for the shift due to a large set of reasons. Technology can help with this prevalent problem.

1.2 System Introduction

The project aims to solve hourly labor staffing problem prevalent in restaurants and, retail and hospitality. This problem is solved by automating the process using a mobile application that is provided to workers of the food chain(s). Managers can create shift(s) based on the requirements, crew can then look up at all the available shifts created by the manager. Based on the his/her schedule the crew can show interest in the shifts. Managers then select the crew which best suites the need. If the crew for some reason cannot show up, he/she can call out from it and request for someone else to cover the shift. This solves the problem of scheduling, staffing and flexibility.

1.3 App Architecture

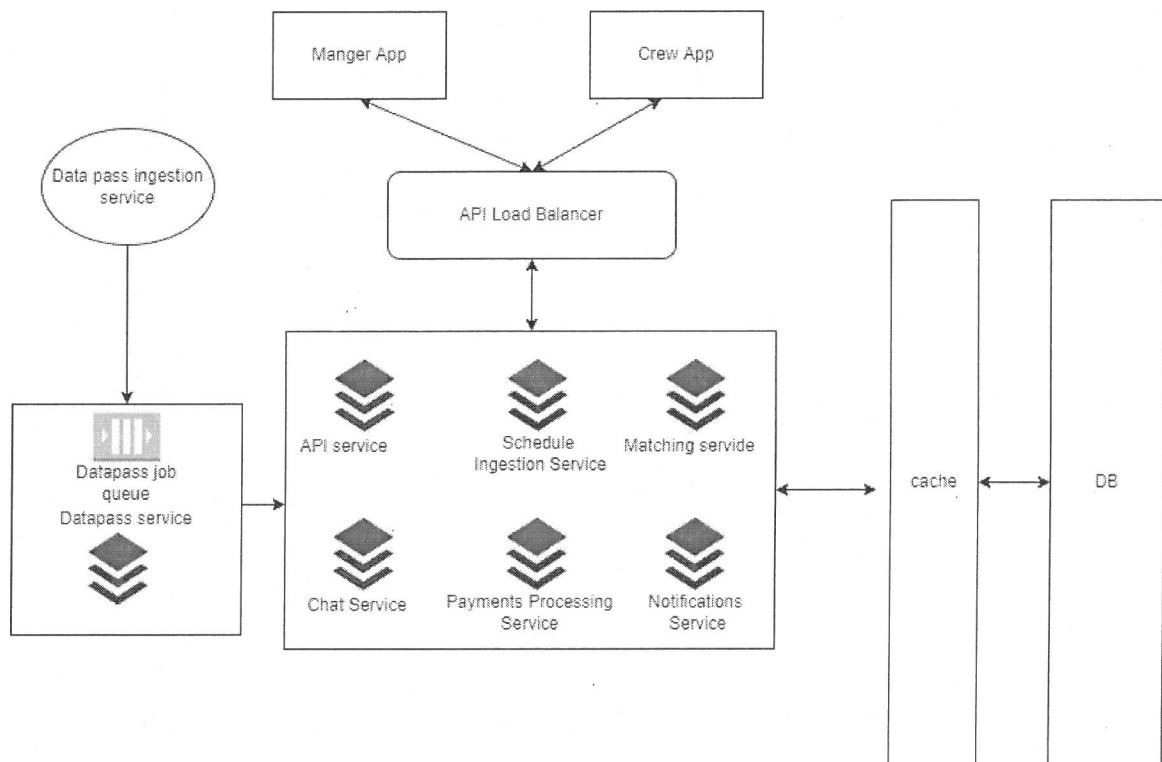


Fig 1.1 App Architecture

1.4 Technology Used

1.4.1 Backend

1. Spring Boot

Spring Boot is used to create stand-alone, production-grade Spring based Applications that we can "just run". Spring boot takes an opinionated view of the Spring platform and third-party libraries.

2. PostgreSQL

PostgreSQL is an open-source relational database management system. It acts as database which stores all the relevant data of software application. It organizes data into tables whereas relations are established using primary keys or other keys known as Foreign Keys. Structured Query Language (SQL) is used to create, modify and extract data from the relational database as well as control user access to the database.

3. Redis

Redis is an open source (BSD licensed), in-memory data structure store used as a database, cache, message broker, and streaming engine. Redis provides data structures such as strings, hashes, lists, sets, sorted sets with range queries, bitmaps, hyperloglogs, geospatial indexes, and streams.

4. Amazon Web Services

Amazon Web Services (AWS) is a set of cloud services, providing cloud-based computation, storage and other functionality that enable organizations and individuals to deploy applications and services on an on-demand basis and at commodity prices. Amazon Web Services offerings are accessible over HTTP, using REST and SOAP protocols.

Amazon Elastic Compute Cloud (Amazon EC2) enables cloud users to launch and manage server instances in data centers using APIs or available tools and utilities.

1.4.2 Frontend

React Native is a JavaScript framework for writing real, natively rendering mobile applications for iOS and Android. It's based on React, Facebook's JavaScript library for building user interfaces, but instead of targeting the browser, it targets mobile platforms. In other words: web developers can now write mobile applications that look and feel truly "native," all from the comfort of a JavaScript library that we already know and love. Plus, because most of the code you write can be shared between platforms, React Native makes it easy to simultaneously develop for both Android and iOS.

CHAPTER 2 : SOFTWARE DESIGN

2.1 Design Strategy

Software Design, is a process of implementing software solutions to one or more sets of problems. It transforms users and clients requirements into some suitable form, which helps programmer in coding and implementation.

Software design usually involves problem solving and planning a software solution. This includes both low level component and algorithm design, as well as a high level architecture design.

Moreover, software design moves the concentration from problem domain to solution drama. It tries to specify how to fulfil the requirements mentioned in Software Requirement Specifications (SRS).

Software Design Strategy is a discipline that helps firms in deciding what to make, why to make it and how to innovate contextually, both immediately and over the long term. This process involves strategic design and interplay between design and business strategy.

The software design strategy is mainly about organizing design activities during the course of design.

2.1.1 *Functional oriented design*

In function-oriented design, the system is comprised of many smaller sub-systems known as functions. These functions are capable of performing significant task in the system. The system is considered as top view of all functions.

In the function-oriented design, the system is designed according to the functionality it offers. The system is first widely observed and then each of its functions is observed to identify the sub-functions that it consists of that are responsible for performing that particular functionality.

In this type of design, there is a centralized function that consists of various functions. The software is designed in the same manner.

In the same way in software, an element may be divided further into sub-elements for performing its inner functions and it may also act as a sub-element for some other module.

However together they are responsible for providing the functionality that the entire software claims to offer.

2.2 Sequence Diagrams

2.2.1 Authentication

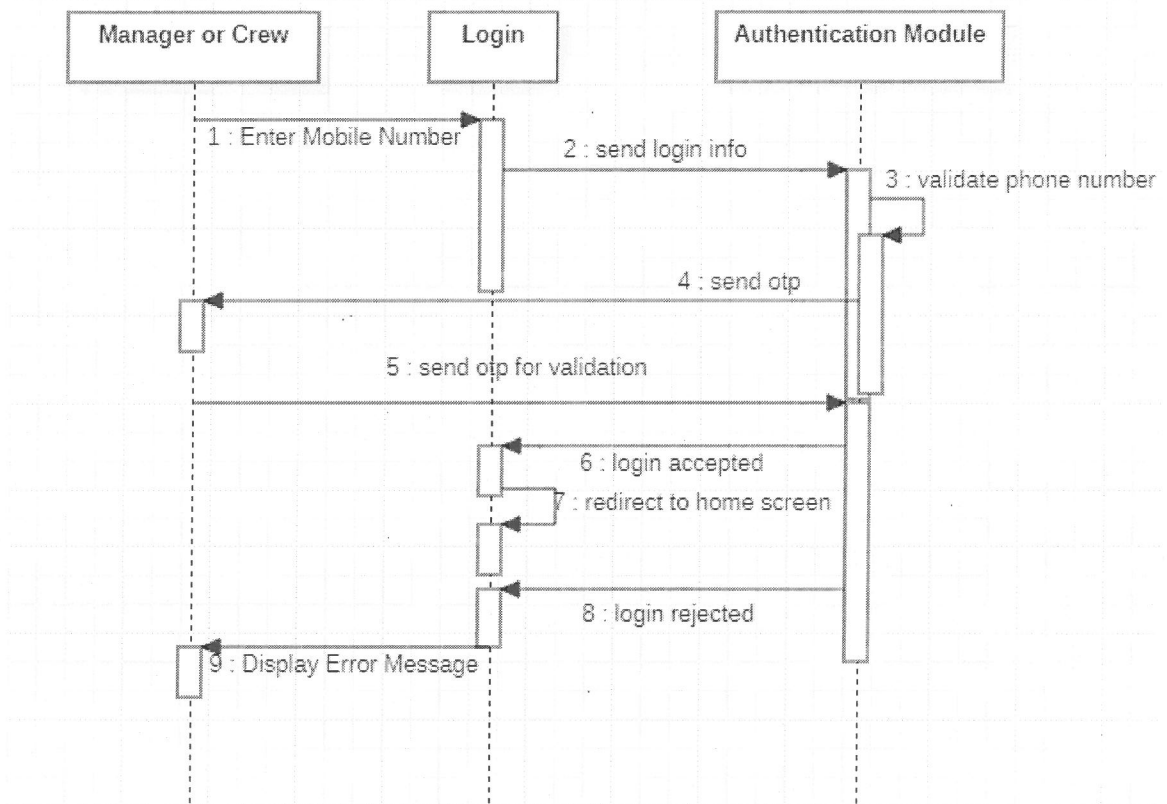


Fig 2.1 Authentication Sequence Diagram

2.2.2 Placing Shift Request

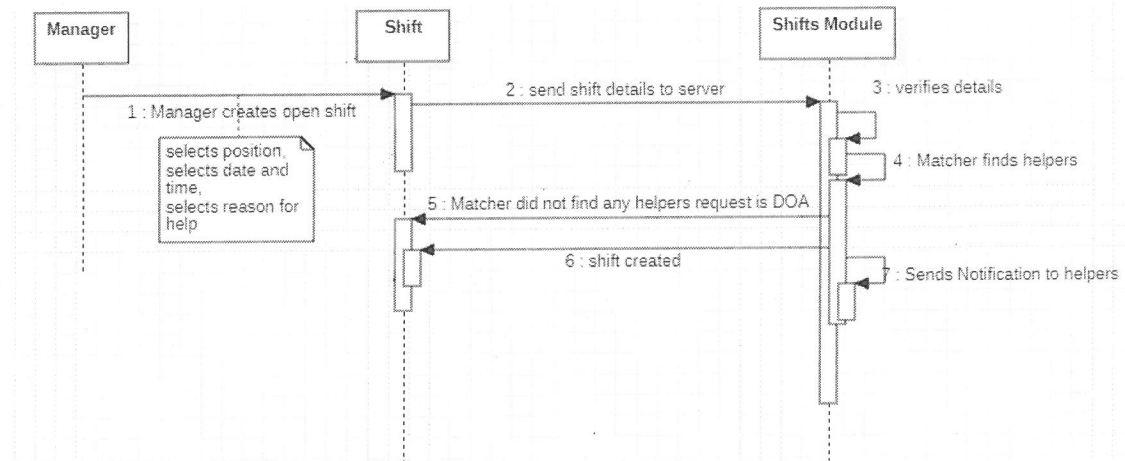


Fig 2.2 Placing Shift request

2.2.3 Shift Response

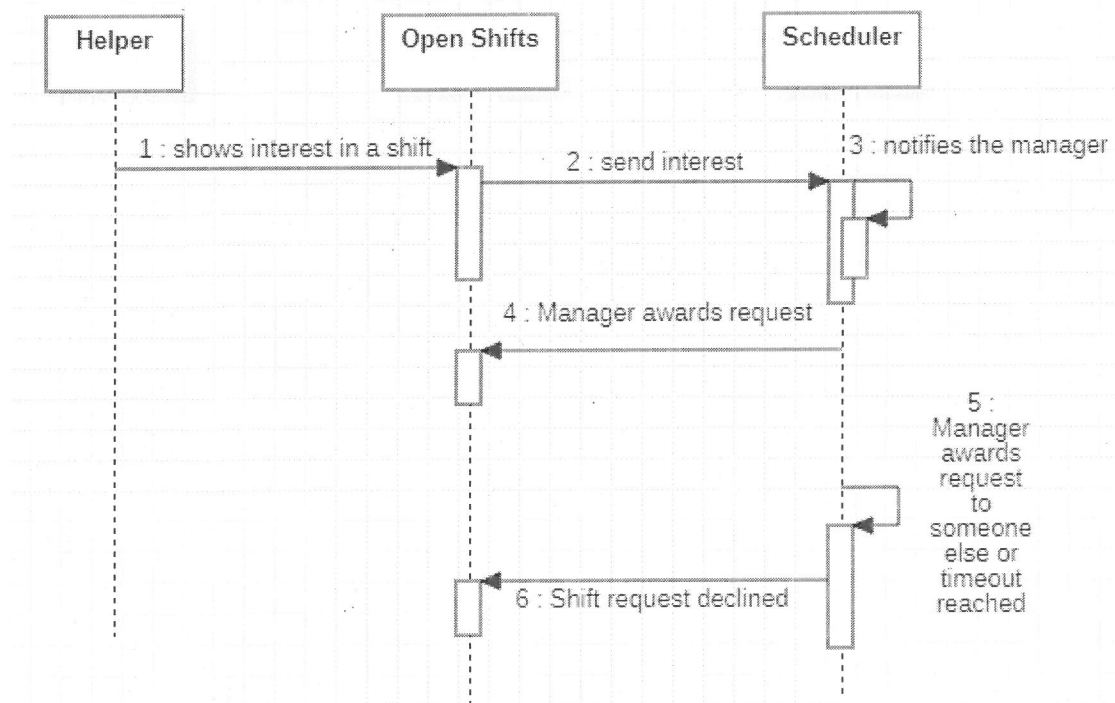


Fig 2.3 Shift scheduler

2.3 Shift Request and Response Transition State

Scheduling a shift is the main part of the application. Fig 2.4 and Fig 2.5 describes how they shift request (Placing shift by managers) and shift response (Accepting or declining the shift by helpers) is done.

2.3.1 Shift Request State Transition

1. Manager places request
2. Matcher finds matching helpers and sends them all a notification.
3. Matcher does not find any matching helpers who are available and request is DOA.
4. Manager comes back to cancel the request before matcher finds any matching helpers.
5. Last of the helpers no longer interested.
6. One or more of the helpers are interested.
7. One of the helpers is interested.
8. Manager cancels request but no helper has placed any bids.
9. Manager confirms shift to one of the helpers.
10. Manager ignores the interest and the request times out.
11. Manager cancels the request when there are outstanding interests from helpers.
12. Helper cancels a shift.
13. Manager cancels a shift.
14. All the helpers ignore the request.
15. All the helpers reject the request.
16. It Bid timeout is reached and helpers are no longer allowed to show interest.
17. Manager approves one of the helpers who is interested.
18. Manager ignores the outstanding interests from helpers.

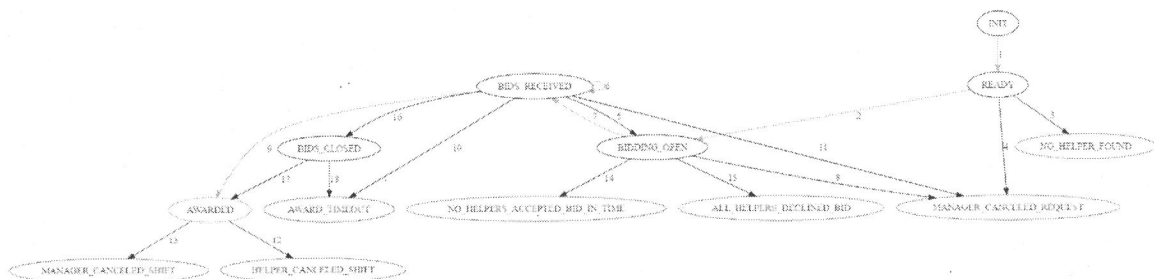


Fig 2.4 Request transition diagram

2.3.2 Shift Response State Transition

1. Matcher sends request to this helper.
2. Helper shows interest in request.
3. Helper rejects request.
4. Helper ignored the request and bid timeout has been reached.
5. Manager awarded the request to this helper.
6. Manager awarded the request to someone else.
7. Helper cancels the interest before the manager awards the shift to them.
8. Helper canceled a shift that was awarded to them.

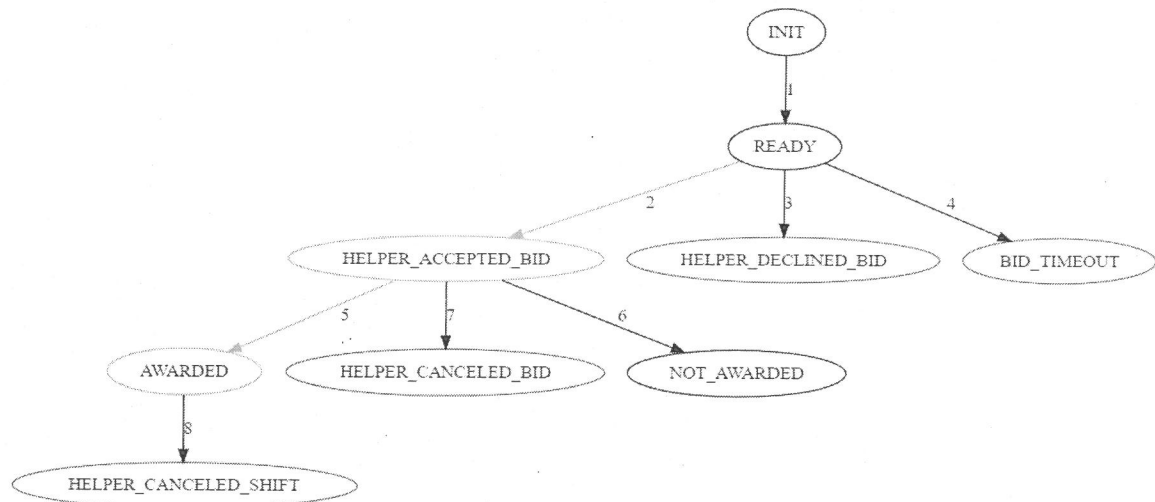


Fig 2.5 Response transition diagram

CHAPTER 3 : CONCLUSION

Saving time is important, this scheduling mobile application solves this problem by matching an employee's skill and availability to the proper shift. The app removes the labor intensive task of constantly rebuilding schedule(s), all the schedules and shifts can be created and distributed electronically.

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TO WHOM IT MAY CONCERN

"This is to certify that Mohil Gupta is working as an intern at MTree Software from 03/01/22 to 03/07/22 .

During the internship he is working on developing a scheduling app using React Technology.

For MTree Software Pvt. Ltd.

Madhav Kar


(Authorized Signatory)