daffodil

Customer Success Story

# Daffodil enables Chalo to develop a Smart e-Ticketing System for more than 15,000 public buses across 17 cities

CHALO

**Customer:** Chalo

**Country:** India

**Industry:** Information Technology and Services

**Our Role:** Software Engineering

## About the Client

Chalo is a public transport tracking application that streams the real-time location of public transport vehicles on a mobile app. The app informs the users about the Estimated Time of Arrival (ETA) of public vehicles such as buses, metro trains, inter-city trains etc. It has been equipped in more than 15,000 public vehicles in 17 cities across India and is helping people to find out an optimal way to reach their destination on time.

| 15,000+ | 1.5M+ | 17 | $6.5M |
|---|---|---|---|
| public buses registered | downloads | cities | of funding raised |

*"Writing this to recognize and appreciate the team's effort and commitment to the project. With continuous changes and multiple dependencies, the team has managed to keep the project on track and maintain steady progress, which I would like to laud. While there is more to go, I feel confident that we will get there smoothly."*

**Vinayak Bhavnani,**
Co-founder & CEO, Zophop

# The Situation

Buses are an integral means of public transport in India. In metropolitan cities such as Mumbai and Delhi, 10-15 million people travel through public transport buses everyday. The major challenges faced by the passengers are undue waiting time at bus stops, non-refund of balance, negligence to provide seats to other passengers, etc. On the other hand, service providers experience hurdles such as fare evasion, theft of physical currency, and revenue leakages.

Chalo provides GPS tracking services for more than 15,000 public vehicles in 17 cities across India. For most of the public vehicles, a separate third-party vendor is contracted for the hardware and software solution of the system. Many a times, there is lack of synchronization between the hardware and the software, resulting in efficiencies, errors, fare evasion, and revenue leakage for service providers. In order to expand their offerings and provide a smooth ticketing experience, Chalo wanted to develop an integrated, smart and comprehensive e-ticketing solution for public transport.

However, there were major challenges associated with building a new solution. The hardware (e-ticketing machine) had a very small screen with an obsolete interface.

Moreover, it used embedded machines, which were programmed in Objective C, and the hardware varied for different cities. The software solution, which was integrated with the hardware, had several databases for managing depot-specific information. It was important to sync data from disparate hardware devices in order to build a robust e-ticketing software. Any delay in data would lead to discrepancies in fare calculation and seat allocation.

- Develop an Intelligent Transport System (ITS) with a smart ticketing module that could reserve tickets digitally or through RFID cards, automatically allocate the seat to passengers, and promote cashless payments.

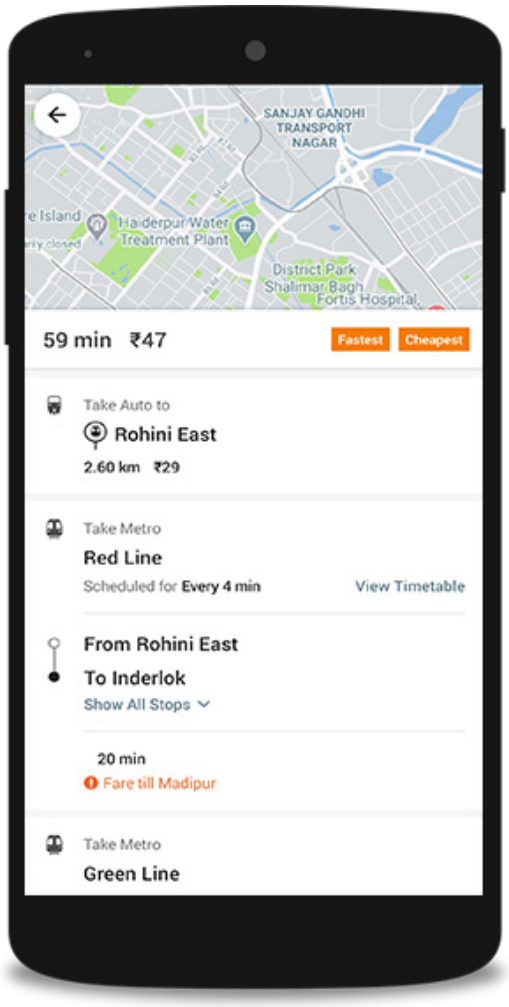
- Develop a backend system with provisions such as managing master data with information about buses, depot, city, machine data (registered e-ticketing machines), role management, scheduling information, etc.

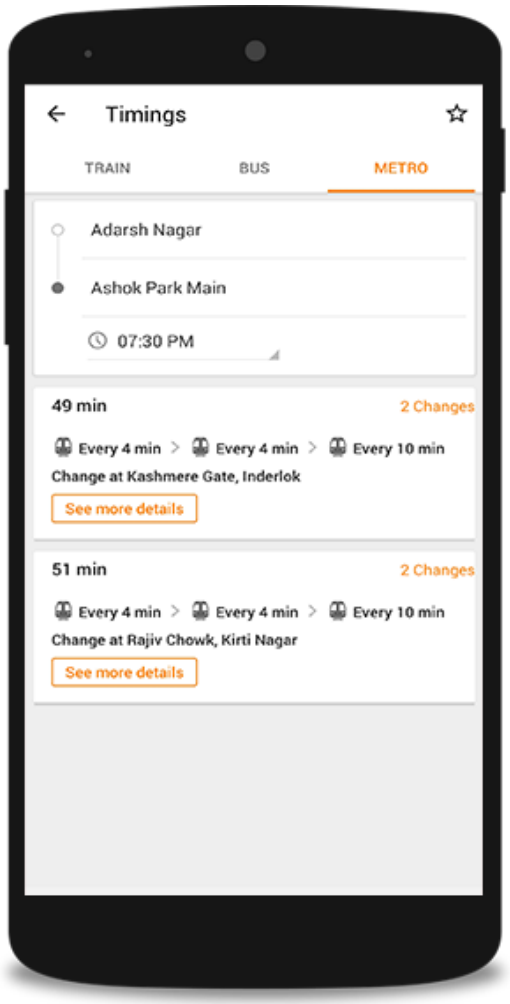
- Develop a Daily Operation Activity (DOA) module had all depot-specific operations such as waybill creation, loading waybill to the device, daily report of fare collection, etc.

# The Solution

Team Daffodil started with an evaluation of the existing hardware and software solutions to understand their shortcomings and listed the scope of improvement in the newer ones. On understanding the shortcomings of the solution, team Daffodil recommended replacing the older hardware with new Android-based e-ticketing hardware. Also, to keep the ITS and DOA in sync, a single backend solution was created that was integrated with the hardware to automate the fare collection process.

Daffodil developed a comprehensive Automated Fare Collection System that consisted of a backend solution for routes management, stop management, duty and waybill allocation, reports for ticket and revenue collection. This backend solution was integrated with an Android-based e-ticketing solution, which was designed with an intuitive user experience to support seamless ticketing & reports creation services.




By using the e-ticketing device, the conductors can log in with credentials, mark their duty, start a trip, manage ticket issues (normal passenger, concession tickets, luggage ticket, etc.), manage stage of a trip, end a trip, create new trips (to manage halts), etc.

The data collected in the ticketing device is synced with the backend solution on a regular basis. In the new solution, the machine is connected to the backend portal using a WiFi connection (which was earlier done using a serial cable and took around 5 minutes for transferring the data from e-ticketing machine to the web portal).

POS ticketing devices also support RFID cards. The conductors can issue RFID cards to the passengers and recharge them. The passengers can also buy tickets using these RFID cards. Along with this, an e-ticketing system was introduced for the users of the Chalo app through mPass and mticket. The passengers (users of the Chalo app) can generate mTicket (which is valid for 1 hour) and mPass (which is valid for 24 hours). These eTickets for the Chalo app are available as QR codes. To ensure that these QR codes aren't shared between multiple users (and misused), the QR codes get refreshed every minute.

For stringent security measures, the KIOSK mode on Android was enabled. This ensured that the conductor doesn't run any other application on it or could perform any activity on the machine (like closing the wifi/network), other than the predefined ones.

To eliminate the dependency to be in the depot for syncing the e-ticketing machine reports into the backend solution, the entire solution was moved on cloud (Amazon Web Services). This gave anywhere access to the backend.

# The Impact

With Daffodil as their technology partner, Chalo has been successfully able to provide e-ticketing solutions for 15,000+ public and private buses listed with their business. Counting on Daffodil's technology support, Chalo is also planning to integrate e-ticketing for other modes of public transport such as trains, metro, ferry, auto rickshaws, taxis and more. The dashboard developed by Daffodil updates the operators about the status of data that flows to the server (real-time data, delayed data etc.) along with live location of the vehicles with details such as vehicle number, last arrived, delay, packet status, lat/long, etc. There are 15,0000+ GPS devices installed in different cities across India where each GPS device sends a location packet every 5 seconds.

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# Technology Stack

- Java
- Spring Boot
- PostgreSQL 10.10
- Angular
- Android OS
- Amazon Web Services

# About Daffodil

Daffodil Software is a software engineering partner to 100+ organizations across the globe and has been helping them in making their software products more robust, teams more productive and processes more efficient. Our ability to look beyond technologies to deliver innovative solutions with scale and speed has been lauded by our clients as well as the tech community worldwide.

Since our inception, we have invested in organic growth; building on our engineering capabilities, organizational processes, and culture required to deliver a truly collaborative ecosystem for solving technology challenges. At the core of Daffodil lies a culture rooted in innovation, learning and a result-oriented mindset.

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