

**A
PROJECT REPORT ON**

Household Service Management System Urban Clamp

**SUBMITTED IN
PARTIAL FULFILLMENT OF**

DIPLOMA IN ADVANCED COMPUTING (PG-DAC)



BY

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UNDER THE GUIDENCE OF

Snehal Jadhav

AT

**SUNBEAM INSTITUTE OF INFORMATION TECHNOLOGY,
PUNE**

**SUNBEAM INSTITUTE OF INFORMATION TECHNOLOGY,
PUNE.**



CERTIFICATE

This is to certify that the project

**Household Service Management System
Urban Clamp**

Has been submitted by

**Pratik Temkar
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In partial fulfillment of the requirement for the Course of **PG Diploma in
Advanced Computing (PG-DAC AUG2015)** as prescribed by The **CDAC
ACTS, PUNE.**

Place: Pune

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Vaibhav Gade

ABSTRACT

Urban Clamp is an innovative household service management platform meant to streamline the process of booking and managing household services. Developed with a microservices architecture, it enables high scalability, flexibility, and efficient communication between services. The backend is driven **by Spring Boot, Express.js, and ASP.NET Core**, offering strong service management and secure data processing.

The platform provides role-based authentication utilizing **JWT (JSON Web Tokens)** for safe access management and an API Gateway for optimal routing of requests. To support real-time operations, Urban Clamp leverages event-driven communication using **Kafka** and enhances performance with **Redis caching**. Stripe integration ensures secure and seamless payment processing.

The frontend is designed with **Next.js, Tailwind CSS**, and **Redux Toolkit**, giving a responsive and intuitive user interface. The entire system is Dockerized for containerized **deployment on AWS**, ensuring high availability and scalability. Additionally, **Prometheus** and **Grafana** are used for real-time monitoring and performance analysis.

Urban Clamp bridges the gap between service providers and users, giving a dependable, safe, and efficient platform designed for current household service management demands.

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Chapter 1

Introduction

1.1 Introduction

In today's fast-paced world, managing household services efficiently has become a big issue for urban people. Traditional means of reserving services, such as phone calls or in-person inquiries, often lead to inconvenience, confusion, and unpredictable service quality. To address these difficulties, Urban Clamp has been designed as a comprehensive household service management platform that bridges the gap between service seekers and service providers.

Urban Clamp offers a seamless experience where customers can effortlessly book, manage, and track a wide range of domestic services, including plumbing, electrical repairs, cleaning, and more. It ensures openness, reliability, and ease for both customers and service partners. Users may browse services, schedule appointments, make payments, and provide comments, while service providers can manage their offerings, availability, and client relations efficiently.

The platform is meant to give a secure, user-friendly, and scalable solution that enhances the overall service booking experience. Urban Clamp seeks to transform household service management by making it more accessible, organized, and trustworthy for current urban lifestyles.

Chapter 2

Product Overview and Summary

2.1 Purpose

The objective of Urban Clamp is to build a uniform, efficient, and user-friendly platform that simplifies the process of booking and administering household services. In contemporary metropolitan settings, locating dependable service providers for jobs such as plumbing, electrical repairs, cleaning, and other household requirements can be laborious and frequently lacks clarity. Traditional systems rely mainly on word-of-mouth referrals, phone bookings, or fragmented platforms, resulting to variable service quality and client discontent.

Urban Clamp attempts to overcome these issues by providing a centralized platform where users can easily locate, book, and manage household services, while service partners can efficiently exhibit their offerings, manage schedules, and communicate with potential clients. The platform facilitates smooth communication between service seekers and providers, boosting confidence, transparency, and convenience for both parties.

The key objectives of Urban Clamp are:

- To connect service seekers with recognized and skilled service providers, ensuring reliability and quality.
- To streamline the household service booking process with an easy-to-use digital interface.
- To boost the efficiency of service management for partners, enabling them to handle bookings, schedules, and payments effortlessly.
- To provide a secure and transparent environment where users may track service status, make secure payments, and submit comments.

2.2 Scope

The scope of Urban Clamp encompasses the development of a comprehensive household service management platform that facilitates seamless interaction between service seekers and service providers (partners). The platform is designed to cater to the needs of urban households by offering a wide range of services such as plumbing, electrical repairs, cleaning, appliance maintenance, and more, all through a single, unified interface.

Urban Clamp aims to serve two primary user groups:

- **Users (Customers):** Individuals seeking household services can browse, book, and manage services with ease. They can track service status, make secure payments, and provide feedback.
- **Partners (Service Providers):** Professionals and businesses offering household services can register, list their services, manage bookings, set availability, and track earnings efficiently.

Key Features Within the Project Scope:

- **User Registration & Authentication:** Secure sign-up and login processes with role-based access control.
- **Service Discovery & Booking:** Easy browsing of services, real-time availability checks, and hassle-free booking.
- **Partner Management:** Service providers can manage their profiles, services, schedules, and customer interactions.
- **Booking & Scheduling:** Users can book services, reschedule, or cancel appointments with real-time status updates.
- **Secure Payment Processing:** Integrated payment gateway for secure online transactions.
- **Review & Rating System:** Users can provide feedback on services, ensuring quality control.

- Notifications: Real-time alerts and updates for bookings, payments, and service status.
- Admin Panel: Administrative tools for monitoring platform activities, managing users, services, and resolving disputes.

Out of Scope (Not Included in This Version):

- Mobile application development (currently focused on web-base platform).
- AI-based service recommendations (can be considered for future updates).
- Internationalization for multi-language support (initial version is region-specific).

Future Scope:

- Expansion into mobile applications for iOS and Android.
- Integration with smart home devices for automated service requests.
- Advanced analytics for service usage patterns and business insights.
- AI-powered recommendations for personalized user experiences.

2.3 User Classes and Characteristics

In Urban Clamp, the platform is designed to cater to multiple user groups, each with distinct roles, responsibilities, and interaction patterns. Understanding these user classes is crucial for delivering a tailored and efficient user experience. The system primarily serves the following three user classes:

1. User (Service Seekers)

These are individuals or households looking to book various household services such as plumbing, electrical repairs, cleaning, etc.

Characteristics:

- Expect a user-friendly interface for seamless booking
- Value transparency in service pricing and quality

- Require real-time updates on booking status

Key Functionalities:

- Register, log in, and manage personal profiles
- Browse available services by category
- Book, reschedule, or cancel services
- Make secure online payments
- Provide feedback and rate services

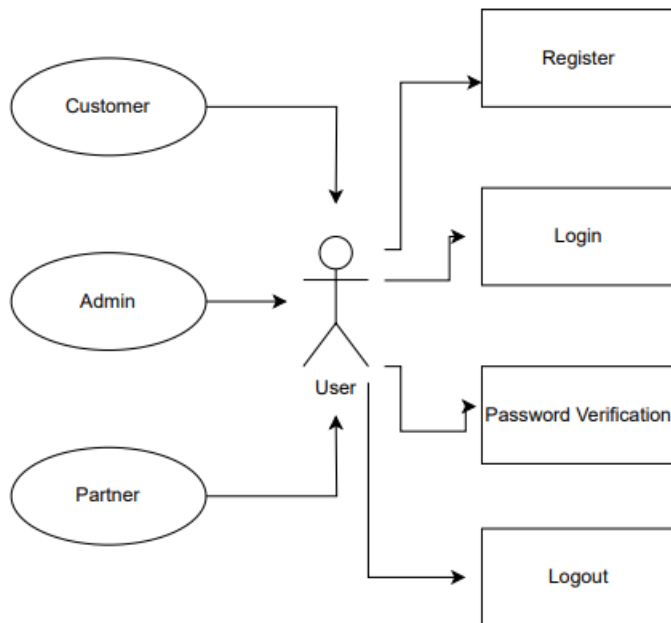


Fig. 1

2. Partner (Service Provider)

These are professionals or businesses offering household services. They can register as partners and manage their offerings through the platform.

Characteristics:

- Skilled individuals or businesses providing specialized services
- Require efficient tools to manage service listings and schedules
- Interested in tracking earnings, customer feedback, and performance metrics
- Focused on maintaining a strong service reputation through ratings.

Key Functionalities:

- Partner registration and profile management
- Listing and managing services with pricing and availability
- Accepting, declining, or rescheduling bookings
- Viewing customer feedback and ratings
- Tracking earnings and payment history

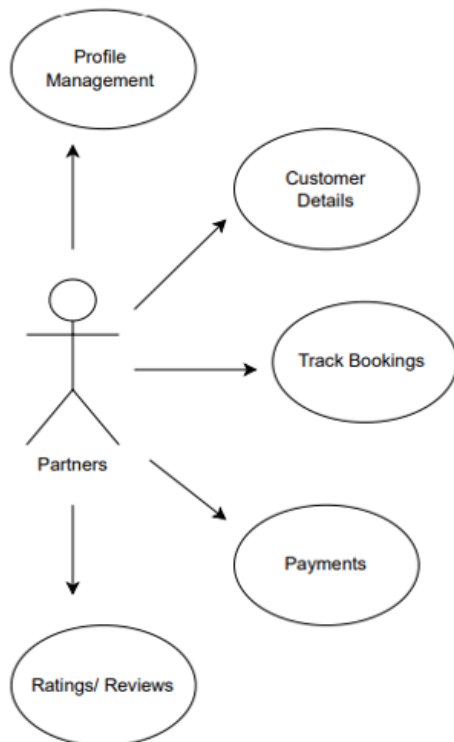


Fig. 2

3. Administrators (Admins)

Admins are responsible for overseeing the platform's operations, ensuring service quality, and managing disputes between users and partners.

Characteristics:

- Platform managers with elevated access privileges
- Responsible for monitoring user activity and ensuring compliance with platform policies
- Handle service provider verification and quality control

Key Functionalities:

- Manage user and partner accounts (approval, suspension, etc.)
- Monitor platform activities, including bookings and payments
- Review and moderate user feedback

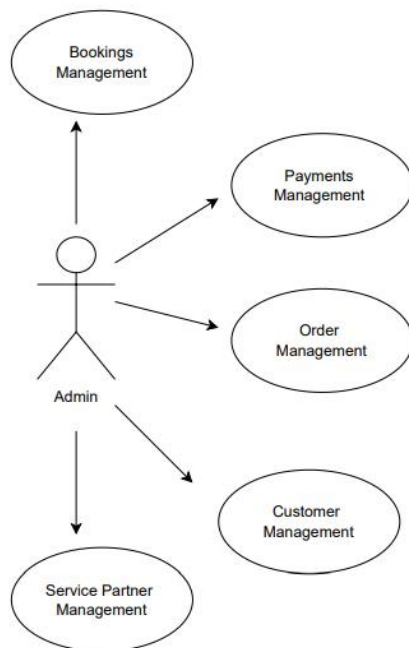


Fig. 3

Chapter 3

Requirements

3.1 Functional Requirements

Functional requirements define the core functionalities that Urban Clamp must support to meet the needs of its users, including Administrators and Customers (Service Seekers). These requirements ensure that the system performs as expected in real-world scenarios.

3.1.1 Use case for Administrator

The Administrator manages the platform, overseeing users, partners, services, and ensuring smooth platform operations.

Use Cases:

1. Manage Users:

- Add, update, or deactivate user accounts
- Approve or reject partner registrations

2. Manage Services:

- Add, update, or delete service categories and listings
- Approve new services added by partners

3. View System Reports:

- Monitor booking statistics, revenue reports, and service performance

4. Handle Disputes:

- Resolve issues between customers and service providers

3.1.2 Use Case for Customer.

The Customer uses the platform to find, book, and manage household services efficiently.

Use Cases:

1. Register and Login:
 - Sign up, log in securely, and manage personal profiles
2. Browse Services:
 - Search for services based on categories and availability
3. Book Services:
 - Schedule a service, select a preferred partner, and confirm the booking
4. Manage Bookings:
 - View, reschedule, or cancel bookings
5. Make Payments:
 - Pay securely for services through integrated payment gateways
6. Provide Feedback:
 - Rate services and write reviews based on their experience
7. Receive Notifications:
 - Get real-time updates on booking status, payment confirmation, and service reminders

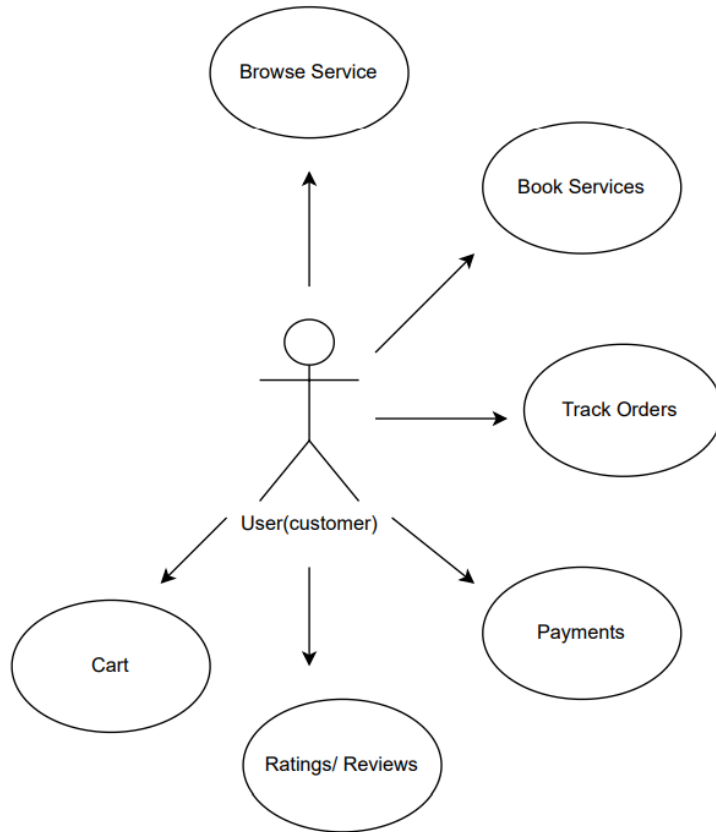


Fig. 4

3.2 Non – Functional Requirements

Non-functional requirements define the quality attributes of Urban Clamp, focusing on performance, security, usability, and reliability to ensure a seamless user experience and system efficiency.

3.2.1 Usability Requirement

- The platform should have an intuitive and user-friendly interface.
- Navigation should be simple, with clear call-to-action buttons and service categories.
- Accessible on multiple devices, including desktops, tablets, and smartphones.
- Quick onboarding process with easy registration and login functionality.

3.2.2 Performance Requirement

- The system should support high concurrency, handling at least 1,000 simultaneous users without performance degradation.
- API responses should be delivered within 1-2 seconds under normal load conditions.
- Efficient load balancing to distribute requests evenly across services.
- Optimize data retrieval using caching mechanisms like Redis.

3.2.3 Hardware and Software Requirement

- Intel Core i5 or higher (or AMD equivalent), 8 GB RAM, 512 GB SSD or larger.
- Operating Systems: MS Windows 10/11, Ubuntu 22.04.
- Database: MySQL.
- Server: Embedded Tomcat.
- Browsers: Compatible with modern web browsers.

3.2.4 Portability Requirement

- The application should be easily deployable across various cloud environments (AWS, Azure, etc.) using Docker.
- Cross-platform compatibility to ensure the frontend works on all major browsers and devices.
- Microservices should be loosely coupled for independent deployment and scaling.

3.2.5 Security Techniques

- Authentication & Authorization: Secure login using JWT-based role-based access control.
- Data Encryption: Encrypt sensitive data both at rest and in transit.

- Secure Payment Processing: Integrate with PCI-DSS compliant payment gateways like Stripe.
- Protection Against Threats: Implement security measures to prevent SQL injection, XSS, CSRF, and other vulnerabilities.
- Audit Logging: Track critical actions for security audits and compliance.

Chapter 4

Project Design

4.1 Data Model

The data model of Urban Clamp is designed to efficiently manage the relationships between users, partners, services, bookings, payments, and other critical entities. A well-structured data model ensures data consistency, integrity, and optimal performance across the platform.

4.1.1 Database Design

The database design follows a relational model, supporting the microservices architecture where each service can manage its own database for better scalability and maintainability. The data is organized into tables representing various entities like users, services, bookings, payments, and more.

The following table structures depict the database design.

Table 1 Users

Column Name	Data Type	Length	Allow Null
user_id	BIGINT	-	0
name	VARCHAR	50	1
email	VARCHAR	-	0
password	VARCHAR	-	1
picture	LONGBLOB	-	1
phone_number	VARCHAR	15	1
status	ENUM	-	1
gender	ENUM	-	1

user_roles		-	1
------------	--	---	---

TABLE 2 Roles

Column Name	Data Type	Length	Allow Null
role_id	BIGINT	-	Null
name	VARCHAR	50	Not null
description	VARCHAR	255	null

Table 3 Bookings

Column Name	Data Type	Length	Allow Null
booking_id	BIGINT	-	NOT NULL
user_id	BIGINT	-	NOT NULL
partner_id	BIGINT	-	NN
service_id	BIGINT	-	NN
booking_date	DATE	-	NN
time_slot	VARCHAR	-	NN
booking_status	ENUM	-	NN
amount	DOUBLE	-	NN

Table 4 Availability

Column Name	Data Type	Length	Allow Null
availability_id	BIGINT	-	NN
partner_id	BIGINT	-	NN

available_date	DATE	-	N
availability_time_slots	VARCHAR	-	N
time_slot	VARCHAR	-	N

Table 5 Categories

Column Name	Data Type	Length	Allow Null
category_id	BIGINT	-	NN
title	VARCHAR	-	NN
description	VARCHAR	-	N
picture	VARCHAR	-	N

Table 6 Partner

Column Name	Data Type	Length	Allow Null
partner_id	BIGINT	-	NN
user_id	BIGINT	-	NN
name	VARCHAR	50	N
email	VARCHAR	100	NN
location	VARCHAR	-	N
service_pin_code	VARCHAR	-	N
partner_status	ENUM	-	N

Table 7 Services

Column Name	Data Type	Length	Allow Null
service_id	BIGINT	-	NN
title	VARCHAR	-	NN
description	VARCHAR	-	N
picture	VARCHAR	-	N
duration	INT	-	n
service_status	ENUM	-	N
price	DOUBLE	-	nn
category_id	BIGINT	-	NN
partner_id	BIGINT	-	NN

4.2 Process Model

1. Database Diagram

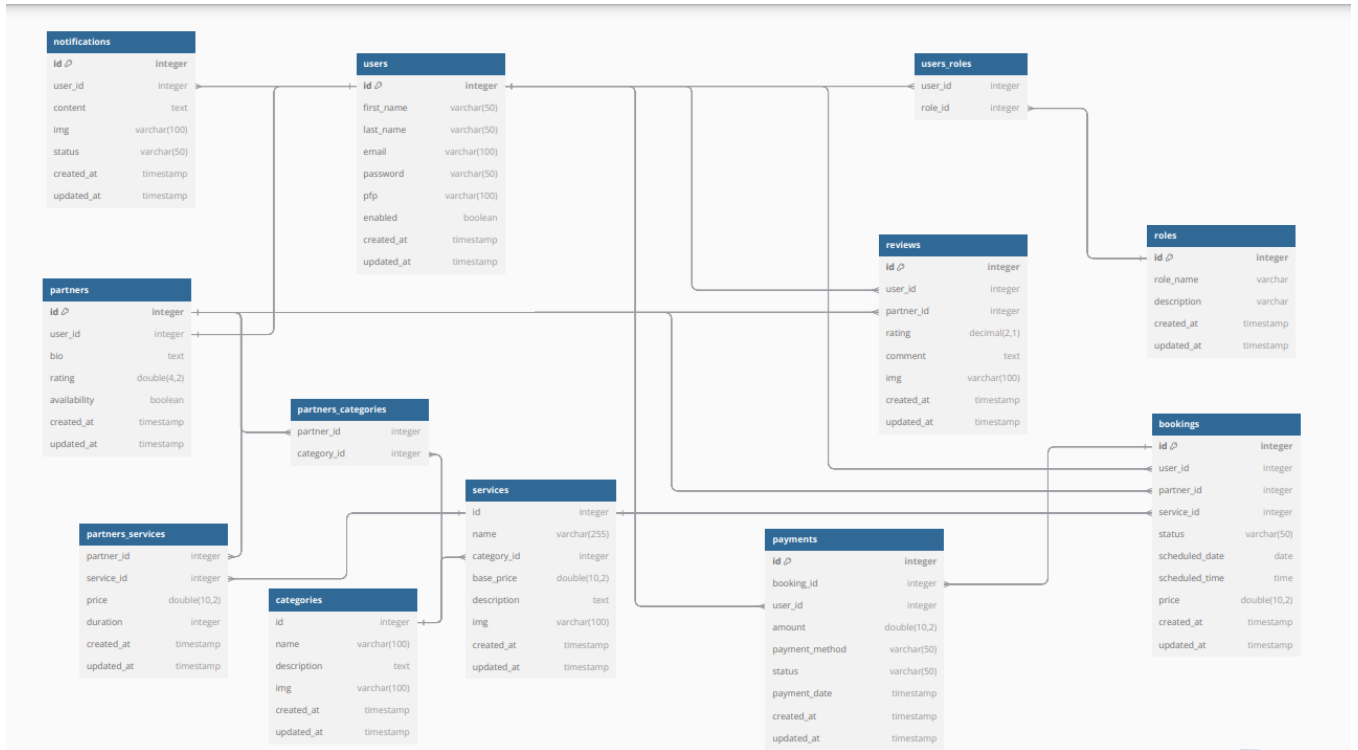


Fig. 5

2. Architectural Diagram

Given below is the architecture diagram, which illustrates that user or admin needs to register/login. In Online home services there will be four modules i.e., Booking Cart, Payment, Product details and register/login as well as two submodules i.e., User and Admin, all the data will be saved in the database. Given below is architectural diagram.

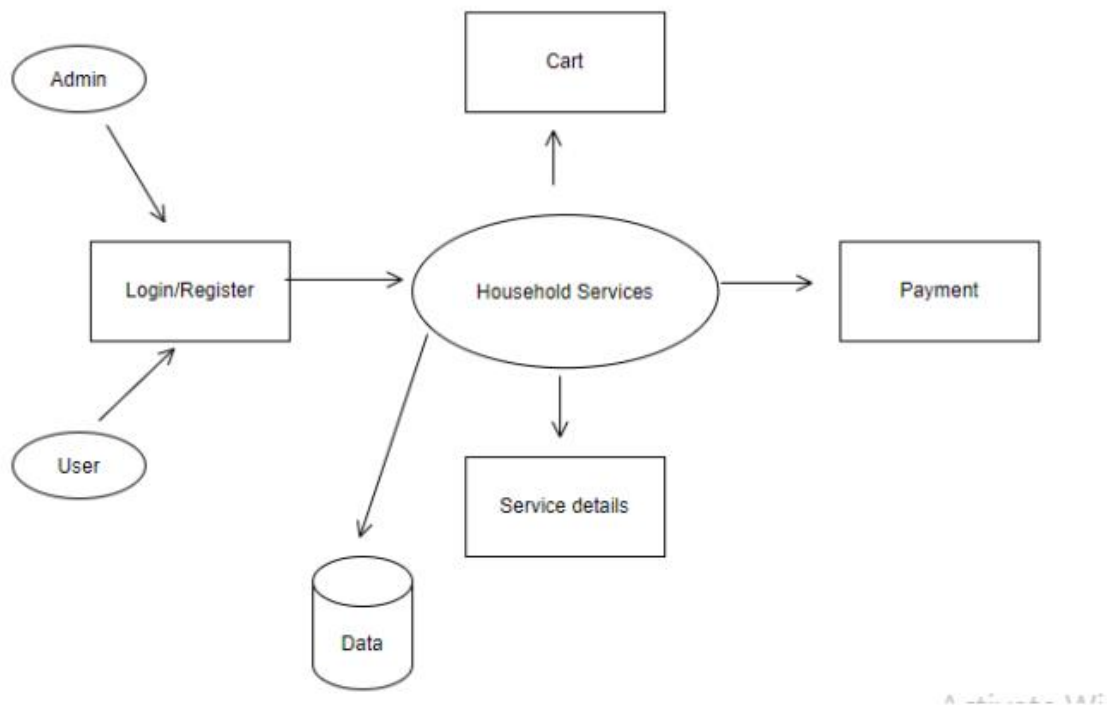


Fig. 6

3. Flow Diagram

Flow diagram is a graphic representation of the physical route or flow of people, materials, paper works, vehicles, or communication linked with a process, procedure plan, or investigation. In the second definition the meaning is limited to the portrayal of the physical path or flow.

Here the user seek permission to login and after login the user can search or view product, and the products to cart as well as examine the things in cart and proceed to payment and confirm their transaction. Given below is the flow diagram of User.

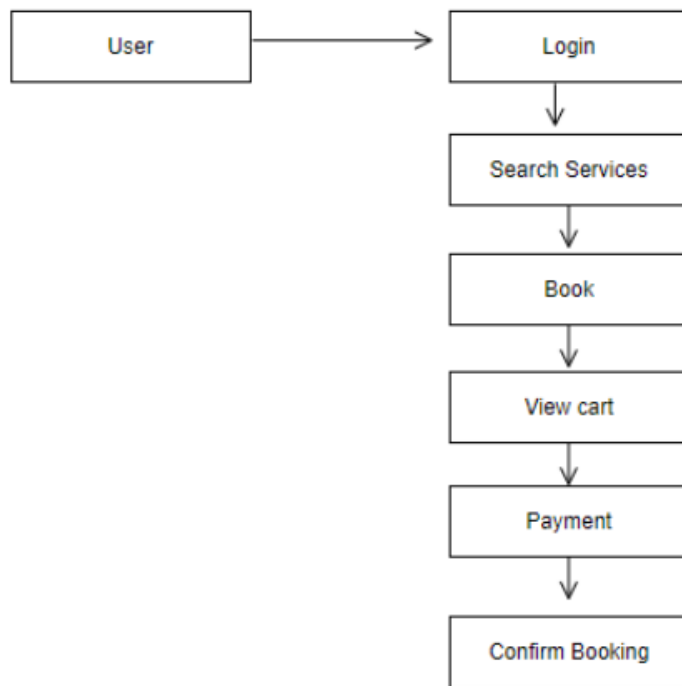


Fig 7

Chapter 5

Test Report

This test report outlines the testing approach, strategies, and results for the **Urban Clamp** household service management platform. The goal is to validate that the system meets its functional and non-functional requirements, ensuring reliability, performance, and security. **TestContainers** was used extensively for integration and end-to-end testing to create isolated, reproducible test environments.

General Testing:

SR-NO	TEST CASE	EXPECTED RESULT	ACTUAL RESULT	ERROR MESSAGE
1.	SignUp Page	Signup Successfully message	Ok	Nothing
2.	SignIn Page	Singed-In successfully Pop-up	Ok	Please Enter Username and Password Again
3.	HomePage	Displays all the facilities provided	Ok	Nothing
4.	Menu List Page	Displays all the services available	Ok	Nothing
5.	Cart Page	Give list of items added in the cart	Ok	Please Login first
6.	Customer Order history	Order history list render successfully	Ok	Failed to fetch orders
7.	Add Menu Item	Menu Added Successfully	Ok	Nothing
8.	See placed orders by customers	Placed order List view	Ok	No order Is placed
9.	Generate Token after first login	Token generated successfully	Ok	Failed to generate Token
10.	View all users list	Seeing the list of all users	Ok	Nothing
11.	Logout	Logging out the user	Ok	Nothing

Table 8

Chapter 6

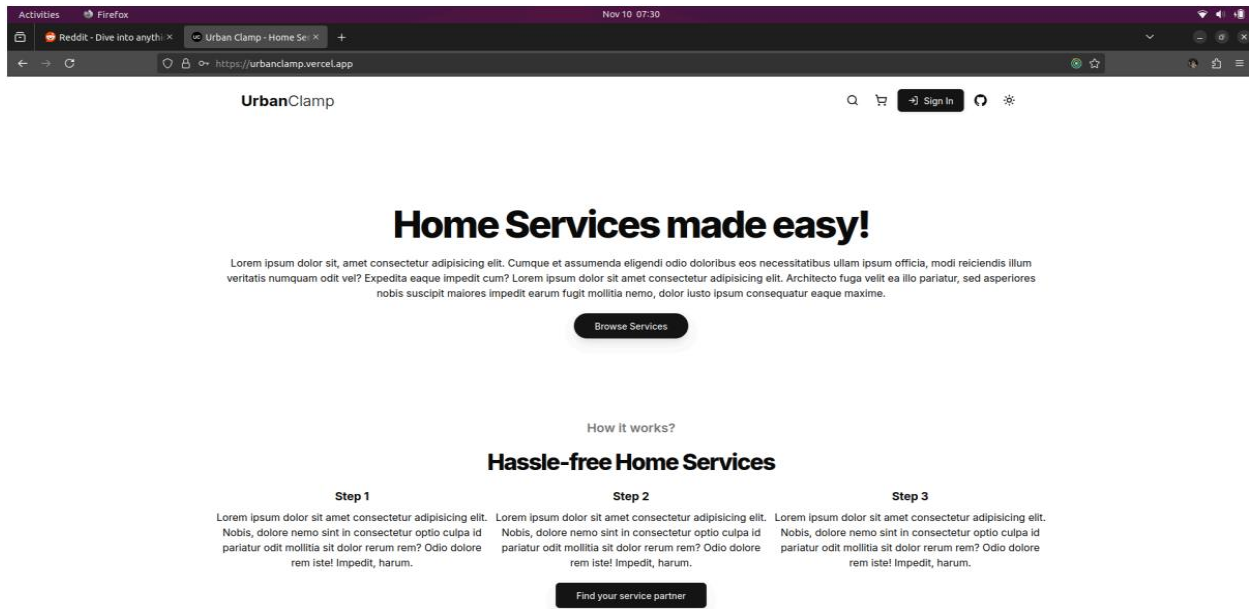
Project Related Statistics

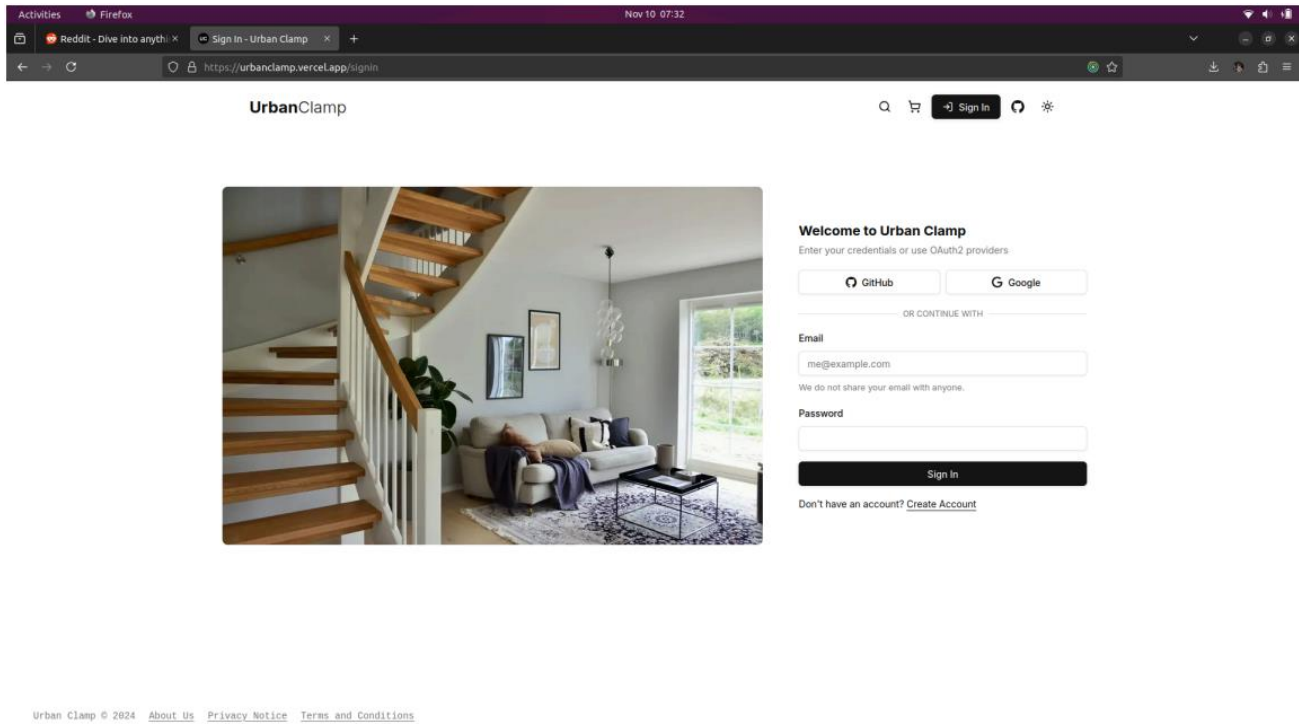
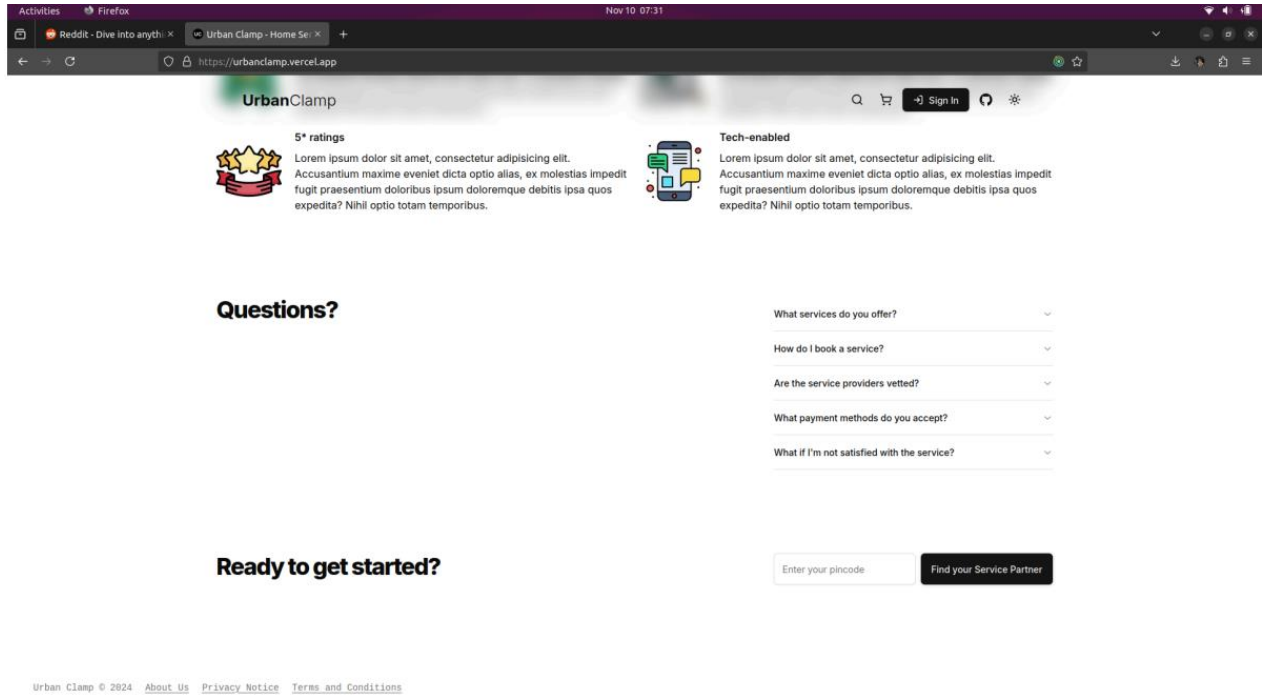
Timeline of the project:

DATE	WORK PERFORMED	SLC PHASE	ADDITIONAL NOTES
1 Jan 2025	Project Allotment and User Requirements Gathering	Feasibility Study	Our team met the client Mr.Nitin Kudale (CEO,SIITPune) to know his requirements.
5 Jan 2025	Initial SRS Document Validation and Team Structure Decided	Requirement Analysis (Elicitation)	The initial SRS was presented to the client to understand his requirements better.
8 Jan 2025	Designing the use- cases, Class Diagram, Collaboration Diagram, E-R Diagram, and User Interfaces	Analysis & Design Phase	-
11 Jan 2025	Implementation of Web Application and Window Application Started	Coding phase	Class Libraries developed and Implemented
15 Jan 2025	After Ensuring Proper Functioning the Required Validations were Implemented	Coding and Testing Phase	Module Integration was done
25 Jan 2025	Project was tested by respective team members and project coordinator	Testing Phase	-
5 Feb 2025	Automated Test cases written	Testing Phase	Test Cases for user service created
10 Feb 2025	Errors found were removed	Debugging	The Project was completed for evaluation

Table 9

UI of Urban Clamp:





UrbanClamp

Sign In

Create Account

Enter your details to create a new account

First Name Last Name
John Doe

Email
me@example.com

We do not share your email with anyone.

Password

Confirm Password

☐ Accept Terms and Conditions [Read T&C](#)

Create Account

Already have an account? [Sign In](#)



UrbanClamp

Sign In

Home services at your doorstep!

What are you looking for?

Pest Control	Massage Therapy	Interior Design
Washing Machine Repair	Refrigerator Repair	Microwave Repair
Plumbing	Tile & Grout Cleaning	Laptop & Computer Repair

View all services

4.8
Service Rating

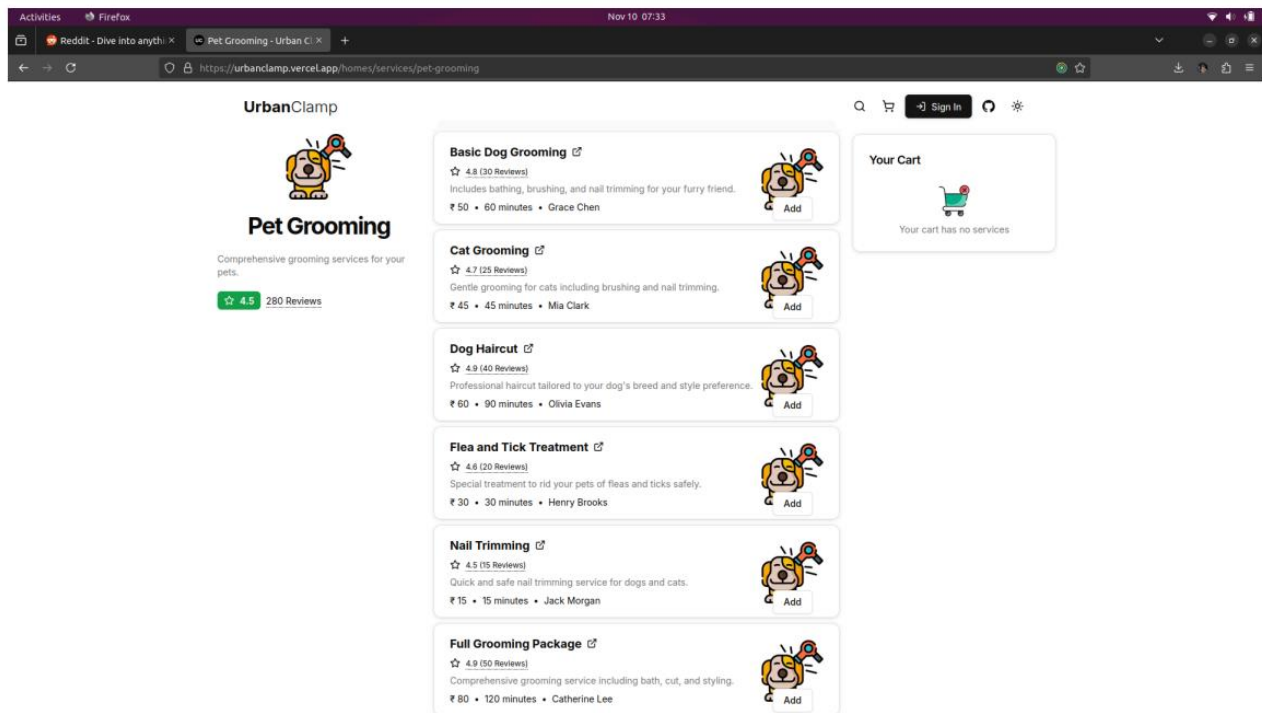
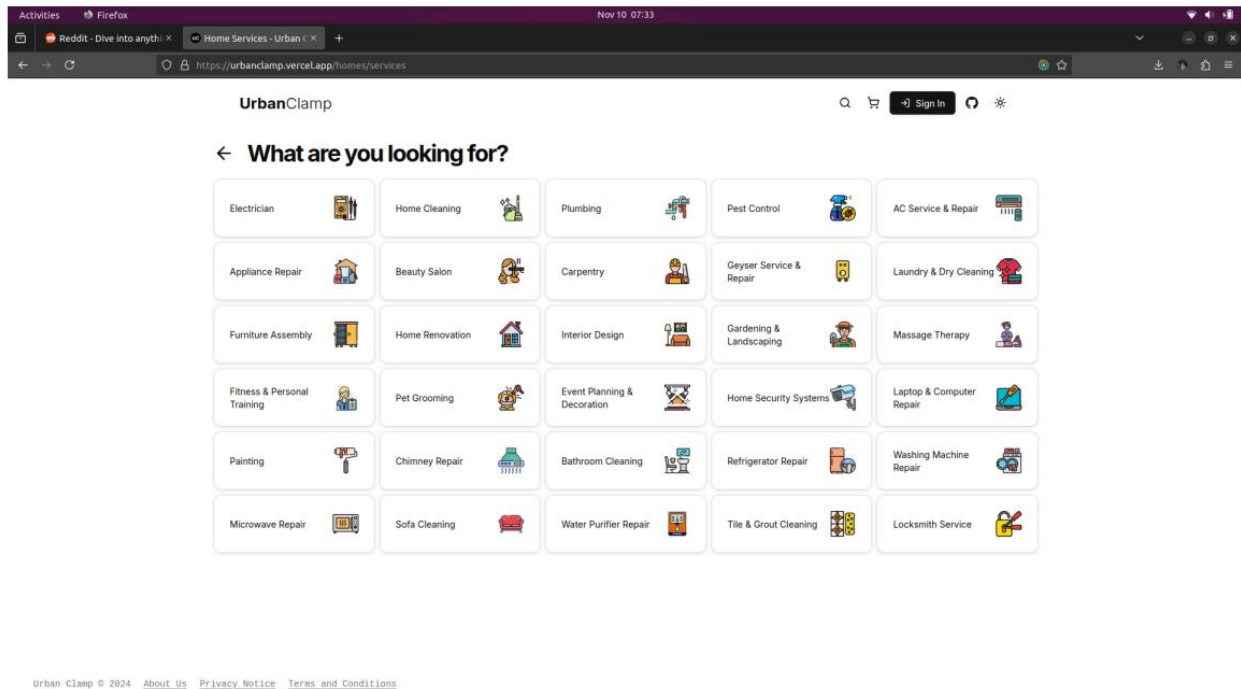
12M+
Customers Globally

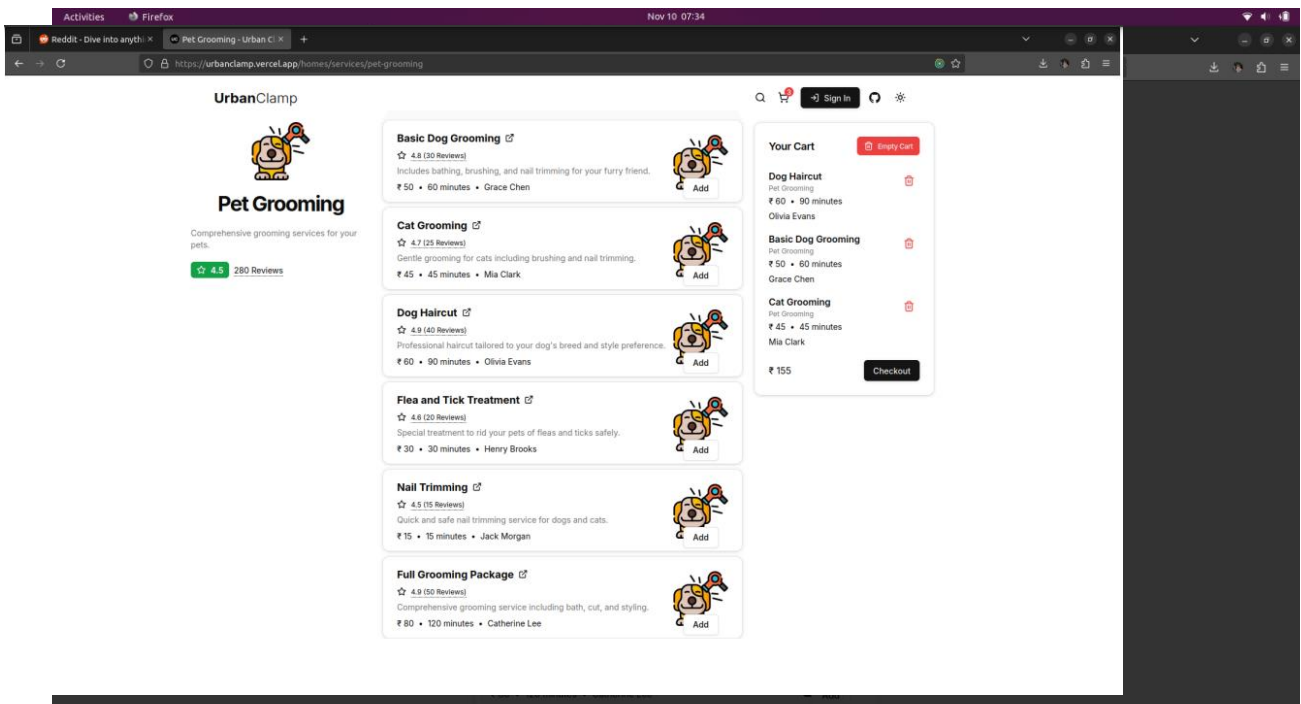
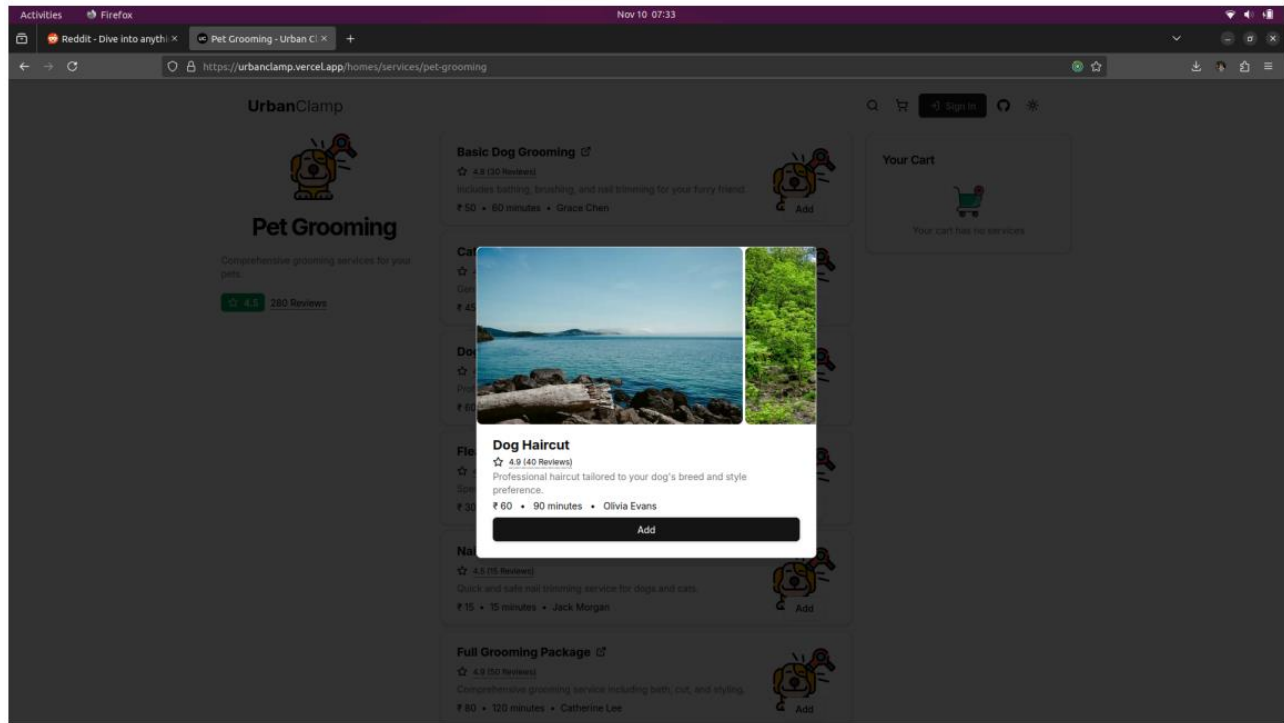


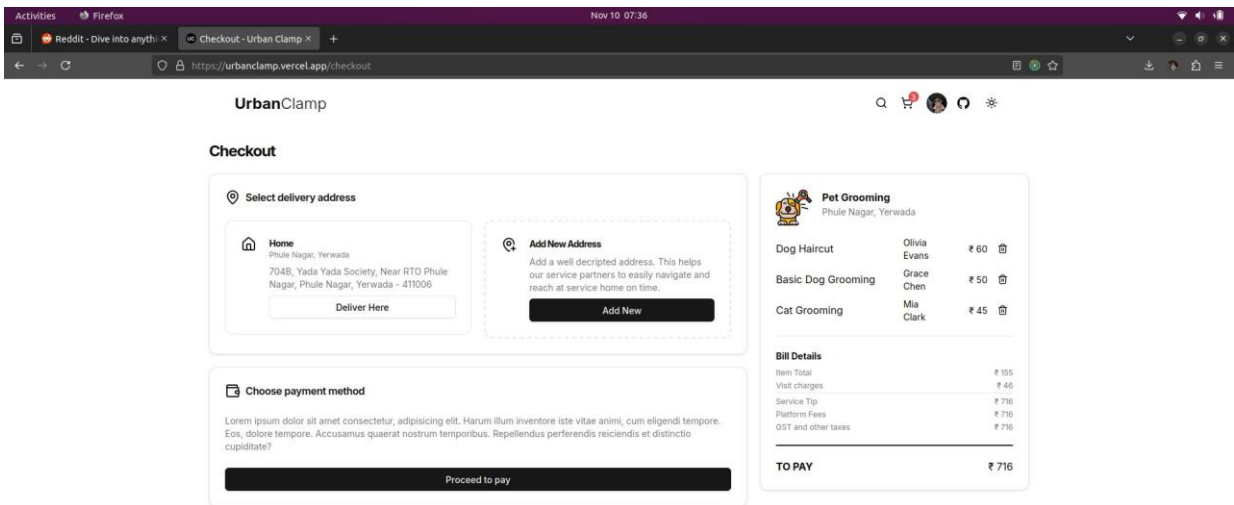
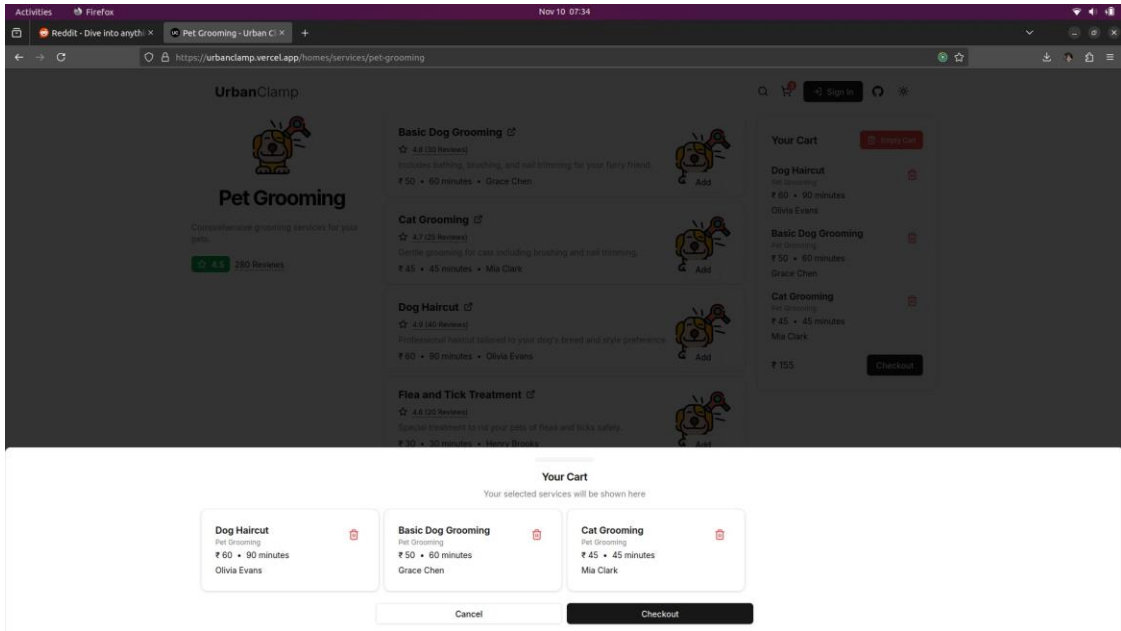
New and noteworthy

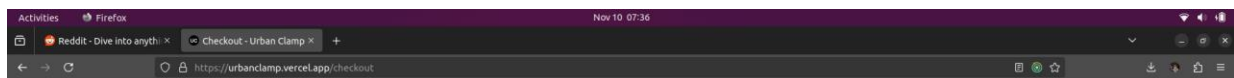
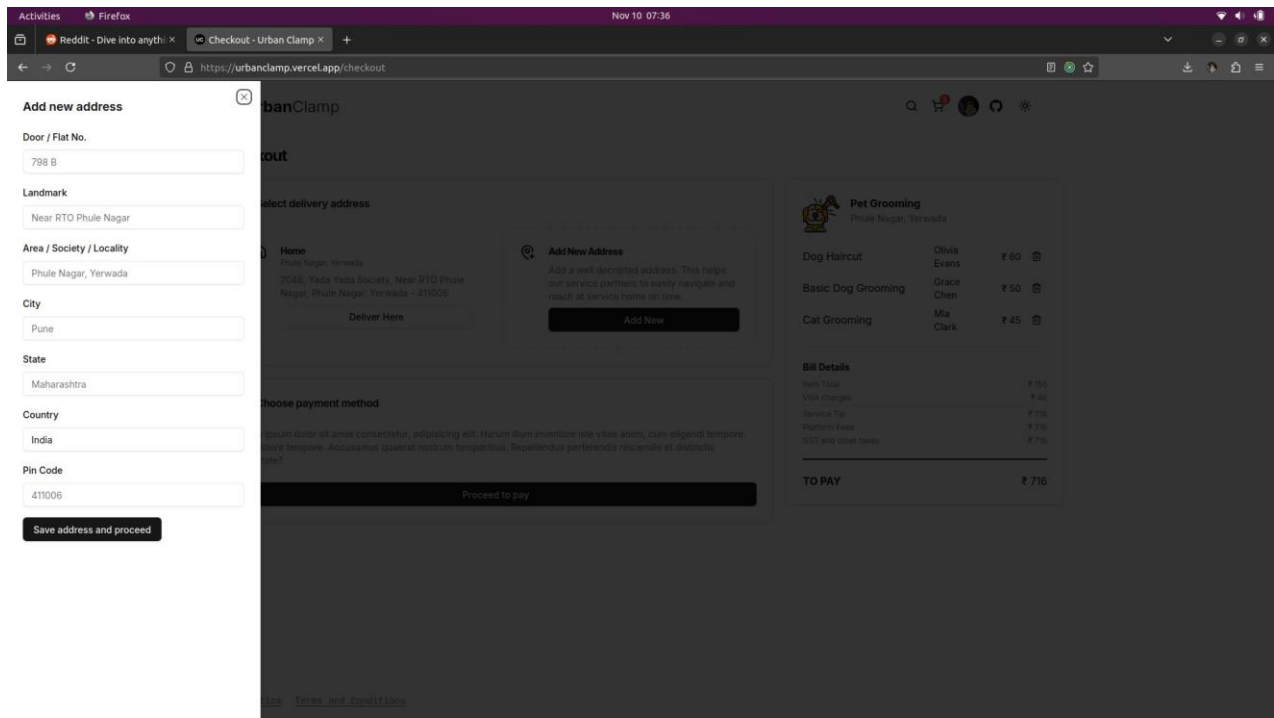
See All

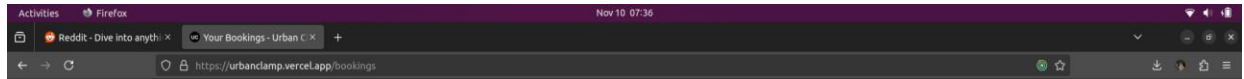




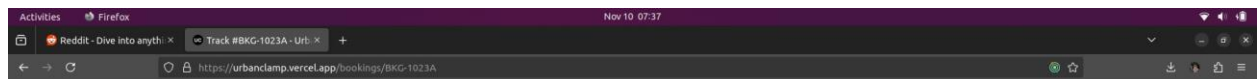








Track/View	Booking ID	Status	Service Title	Service Category	Booking Date	Partner Name	Price
Track	BKG-1023A	booked	Deep Home Cleaning	Home Cleaning	2023-11-02	Alice Johnson	2500 ...
Track	BKG-1024B	processing	Full Body Massage	Beauty Salon	2023-11-03	Catherine Lee	1500 ...
View	BKG-1025C	complete	Electrical Repairs	Electrician	2023-11-05	David Kim	500 ...
View	BKG-1026D	failed	Bathroom Leak Repair	Plumbing	2023-11-06	Bob Smith	1200 ...
Track	BKG-1027E	success	Air Conditioner Servicing	AC Service & Repair	2023-11-07	David Kim	800 ...
Track	BKG-1028F	booked	Sofa Deep Cleaning	Sofa Cleaning	2023-11-08	Grace Chen	600 ...
Track	BKG-1029G	processing	Cockroach Pest Control	Pest Control	2023-11-10	Leo Garcia	1000 ...
View	BKG-1030H	complete	Haircut and Styling	Beauty Salon	2023-11-11	Isabel Torres	700 ...
Track	BKG-1031I	booked	Room Painting Service	Painting	2023-11-12	Kelly Brown	3000 ...
Track	BKG-1032J	success	Furniture Assembly	Carpentry	2023-11-13	Frank Wilson	900 ...



Booking ID
#BKG-1023A

booked

Service Category
Home Cleaning

Service Title
Deep Home Cleaning

Booking Date
2023-11-02

Booking Time
10:00 AM

Service Delivery Address
123 Maple Street, Springfield

Price
₹ 2500

Service Partner
Alice Johnson

Chapter 7

Conclusion

The development of **Urban Clamp**, a comprehensive household service management platform, represents a significant step toward modernizing and streamlining the way users access and manage household services. This project has been designed to bridge the gap between service seekers and service providers, ensuring convenience, reliability, and efficiency through a robust technological foundation.

Urban Clamp effectively leverages a **microservices architecture**, enabling scalability, flexibility, and independent management of different system modules. The integration of advanced technologies such as **JWT-based authentication**, **API Gateway**, **Kafka** for event-driven communication, **Redis caching** for performance optimization, and **Stripe** for secure payment processing enhances the platform's functionality. Additionally, the deployment of services using **Docker** on **AWS** ensures high availability, while monitoring tools like **Prometheus** and **Grafana** maintain system reliability.

Throughout this project, key functional and non-functional requirements were identified and implemented to support critical operations such as user management, service booking, payment processing, and real-time notifications. The detailed system architecture, data models, process models, and database designs have been meticulously crafted to ensure data integrity, security, and seamless performance.

Key Achievements:

- Development of a secure, scalable, and user-friendly platform
- Efficient service management for both users and service providers
- Real-time event processing and notification system
- Secure and reliable payment integration

- Deployment of microservices for improved system performance

Challenges Overcome:

- Managing inter-service communication in a distributed architecture
- Ensuring data consistency across multiple microservices
- Implementing robust security measures for authentication and transactions
- Optimizing system performance under high user loads

Future Scope:

- Development of mobile applications for iOS and Android to extend platform accessibility
- Integration of AI-based service recommendations for personalized user experiences
- Advanced analytics for business insights and service optimization
- Multi-language support to cater to a wider audience
- Expansion to support international service providers and users

Final Remarks:

Urban Clamp stands as a scalable, secure, and efficient platform designed to address the growing demands of household service management in urban environments. The project has not only provided technical insights into microservices architecture, event-driven systems, and secure payment processing but also demonstrated the importance of user-centric design in delivering real-world solutions. With continuous improvements and feature expansions, Urban Clamp has the potential to evolve into a leading platform in the household services industry.

