# PAXCOM

Project report submitted in partial fulfillment of the requirement for the degree of Bachelor of Technology

in

**Computer Science and Engineering/Information Technology**

By

Himanshu 191533

Under the supervision of

Dr.Emjee Puthooran

to

Department of Computer Science & Engineering and Information Technology

**Jaypee University of Information Technology Waknaghat, Solan-173234, Himachal Pradesh**

# Candidate’s Declaration

I hereby declare that the work presented in this report entitled **“PAXCOM”** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology**,** Jaypee University of Information Technology Waknaghat is an authentic record of my own work carried out over a period from July 2022 to May 2023 under the supervision of **Dr. Emjee Puthooran** (Associate Professor in Electronics andCommunication Department) and Co-Supervisor **Mr. Praveen Modi** (AssistantProfessor (Grade 1) in CSE & IT Department

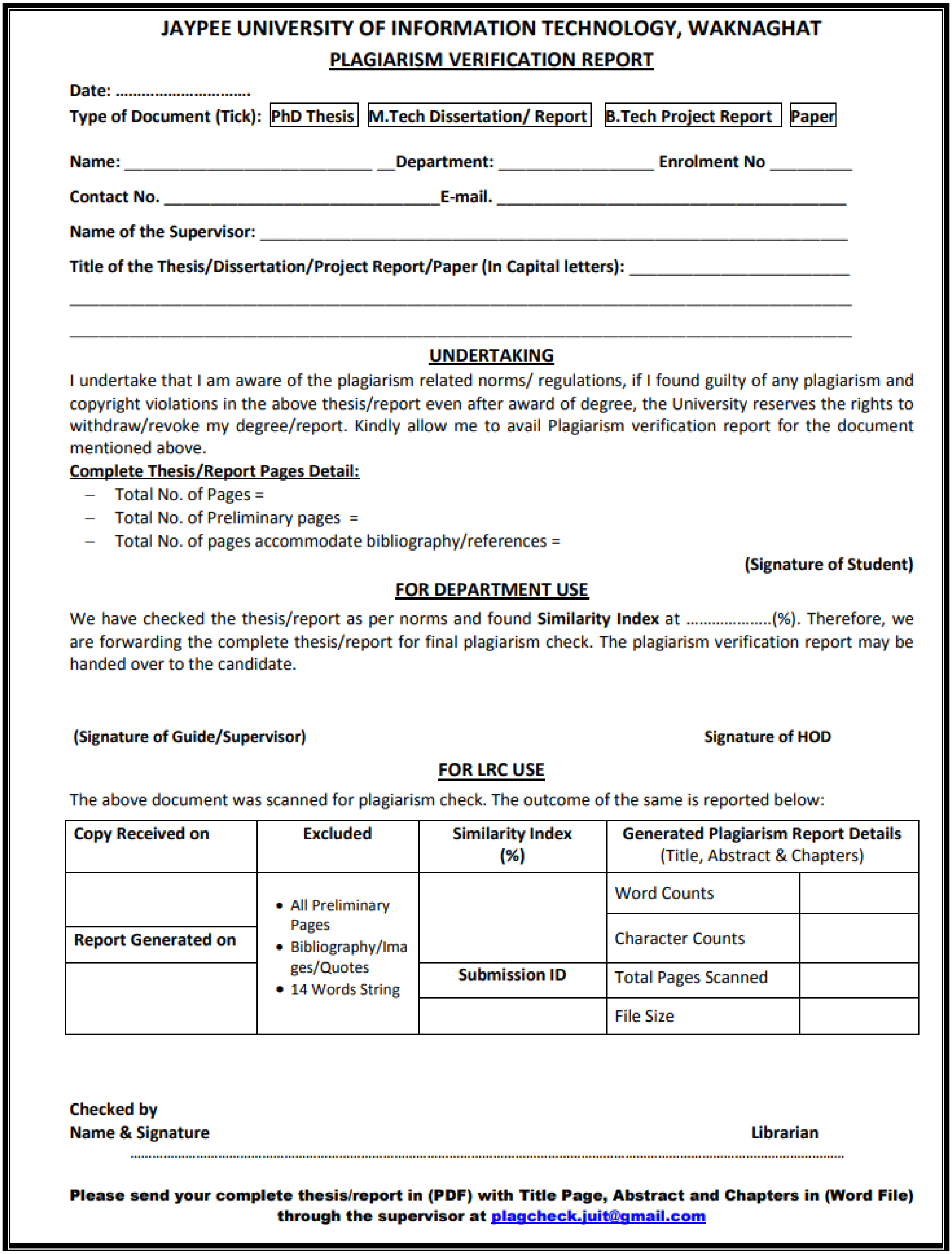
The matter embodied in the report has not been submitted for the award of any other degree or diploma.

Himanshu,191533

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

(Supervisor Signature)
Dr. Emjee Puthooran
Associate Professor
Ece Department
Dated:

(Supervisor Signature)
Mr. Parveen Modi
Associate Professor(Grade-I)
(CSE & IT) Department
Dated:



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# ACKNOWLEDGEMENT

This report is not just a result of hard work by me but there has been a joint contribution by a lot of other people who I would like to thank. I am highly indebted to my manager Mr. Kuldeep Saxena, for his continuous monitoring, providing details and her assistance in the completion of the training. I also want to thanks my guide Emjee Puthooran, Associate Professor, Department of Electronics andCommunication Engineering, and Mr. Praveen Modi, Assistant Professor(Grade I), Department of Computer Science & Engineering/InformationTechnology at Jaypee University of Information Technology (JUIT)for their guidance without which this report would not have been completed. I want to express my appreciation for Mr. Pankaj Kumar, my parents and for Jaypee University of Information technology for their kind cooperation and assistance in the completion of the training.

I also thank and appreciate my mentor and colleagues for helping in completing the Internship and people who have voluntarily helped to understand the technologies.

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# ABSTRACT

The internship was focused on learning various aspects of backend development and chatbot development. During the course of my Internship with Paxcom I was able to learn many new technologies. I created various projects during my internship period.

Through this project I was able to learn nodejs framework, MongoDB as I used it for the database, and some basics of HTML, CSS and Javascript.

Throughout my internship journey i developed several services for disbursement, agent dashboard and customer portal (Paymentus Product)

# CHAPTER 01

# INTRODUCTION

## 1.1 Introduction

An internship is a paid learning opportunity that gives students practical experience in their area of study or career goals. Students can explore and advance their careers while learning new skills through internships. My current internship at PAXCOM in Gurugram is discussed in this essay. The measures I took to help me achieve a number of my stated goals are detailed in this internship report. I was given the software engineer profile for my internship as a software engineer intern. I was required to learn about node.js, JavaScript, mongodb, and Azure cloud services over the first few months of the internship. The mentor then gave me independent live assessment tasks to complete. Immediately after this learning process is over. Following the completion of this study

## 1.2 Job Description

Software engineering is the process of creating, putting into practise, and maintaining software using engineering principles. To address the problems brought on by efforts to provide low-quality software, software engineering was developed. Problems arise when software exceeds deadlines, budgets, and quality standards. It guarantees that the software is produced consistently, accurately, on time, within budget, and in compliance with the requirements. To keep up with the rapidly evolving user demands and the environment in which the programme is to run, software engineering has become essential. Software engineering is the application of engineering ideas to the conception, implementation, and technical administration of software. Software engineering was created to solve the issues associated with low-quality software efforts. When software surpasses deadlines, budgets, and quality expectations, problems develop. It ensures that the software is created consistently, correctly, on schedule, at a reasonable cost, and in accordance with the specifications. Software engineering has become critical to keep up with the quickly changing demands of users and the context in which the program is supposed to operate.

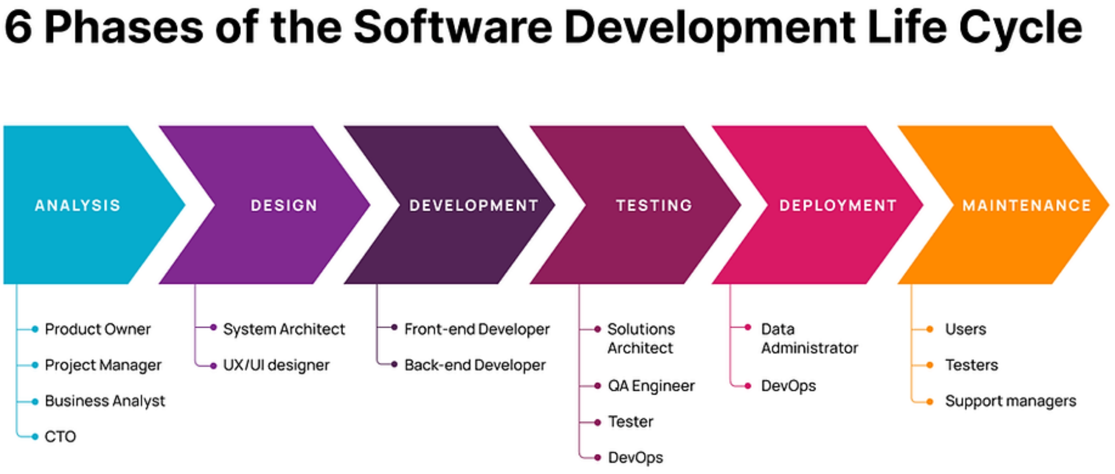


Fig 1: Software development cycle

The Software Engineer Trainee is in charge of assisting with software design and development. They collaborate with other team members to provide safe and trustworthy software solutions. This position's tasks and responsibilities are Application development (code, programming), Code debugging and testing New software applications, diagnosing, and resolving a wide range of technical obstacles collaborating with top executives identifying concerns, and providing solutions

## 1.3 Backend Development

Backend development is the most important part of web applications and services, encompassing the behind-the-scenes processes and infrastructure that enable seamless user experiences. This essential component of web development focuses on server-side operations, including server configuration, database management, and application logic. In conclusion, backend developers are responsible for building the digital architecture that supports an application's front-end interface and ensures smooth, secure, and efficient performance.

A Backend Developer is responsible for setting up the server-side infrastructure that communicates with the front-end of a web application. This often involves setting up and managing servers, deploying APIs, and handling data storage and retrieval. Backend development typically requires a strong understanding of programming languages, such as Python, Java, PHP, Ruby, and Node.js, to write efficient and maintainable code. Additionally, backend developers must be proficient in working with databases such as SQL and NoSQL to store, manage, and manipulate data.

In today's technology-driven world, the demand for skilled backend developers continues to increase as businesses increasingly rely on digital platforms and services. These professionals play a crucial role in ensuring the stability, security, and scalability of applications, which directly impacts user satisfaction and overall success. Backend developers must stay up-to-date with the latest technologies and best practices to create robust and future-proof solutions.

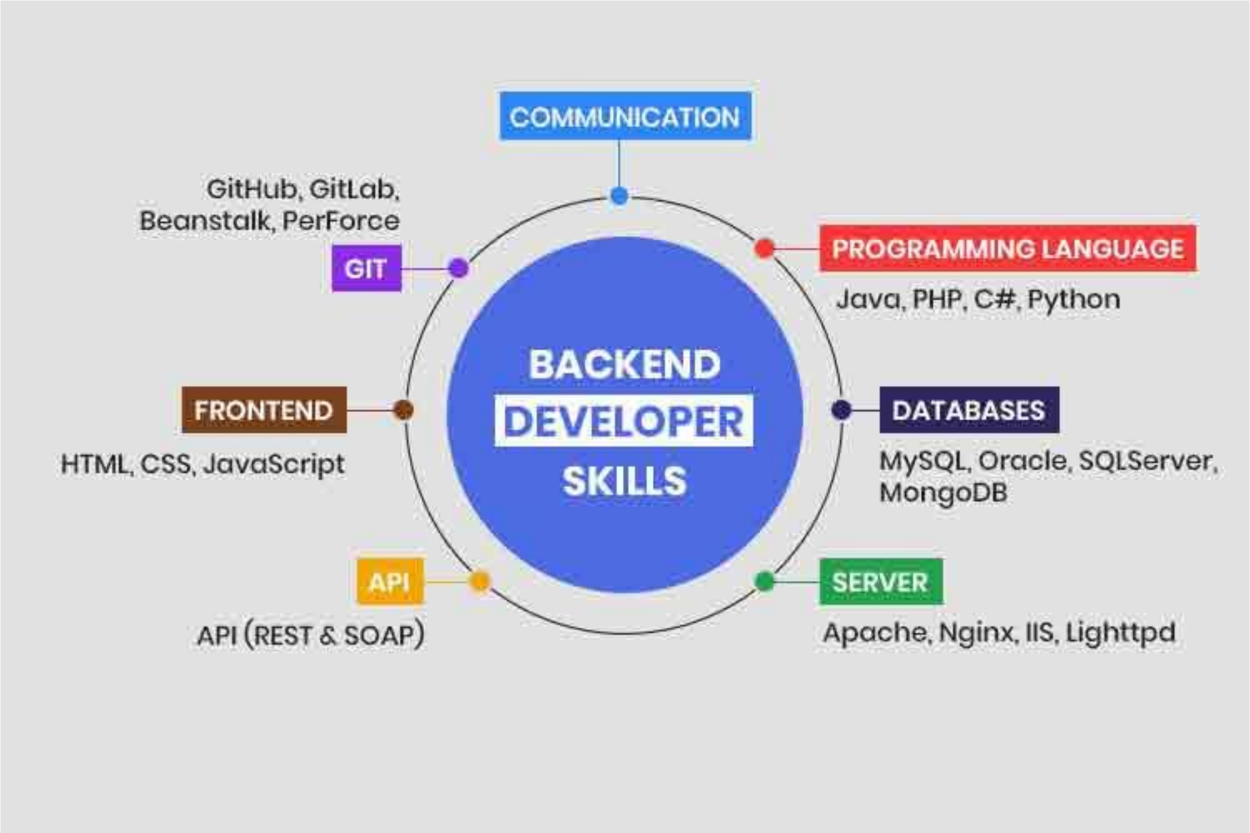
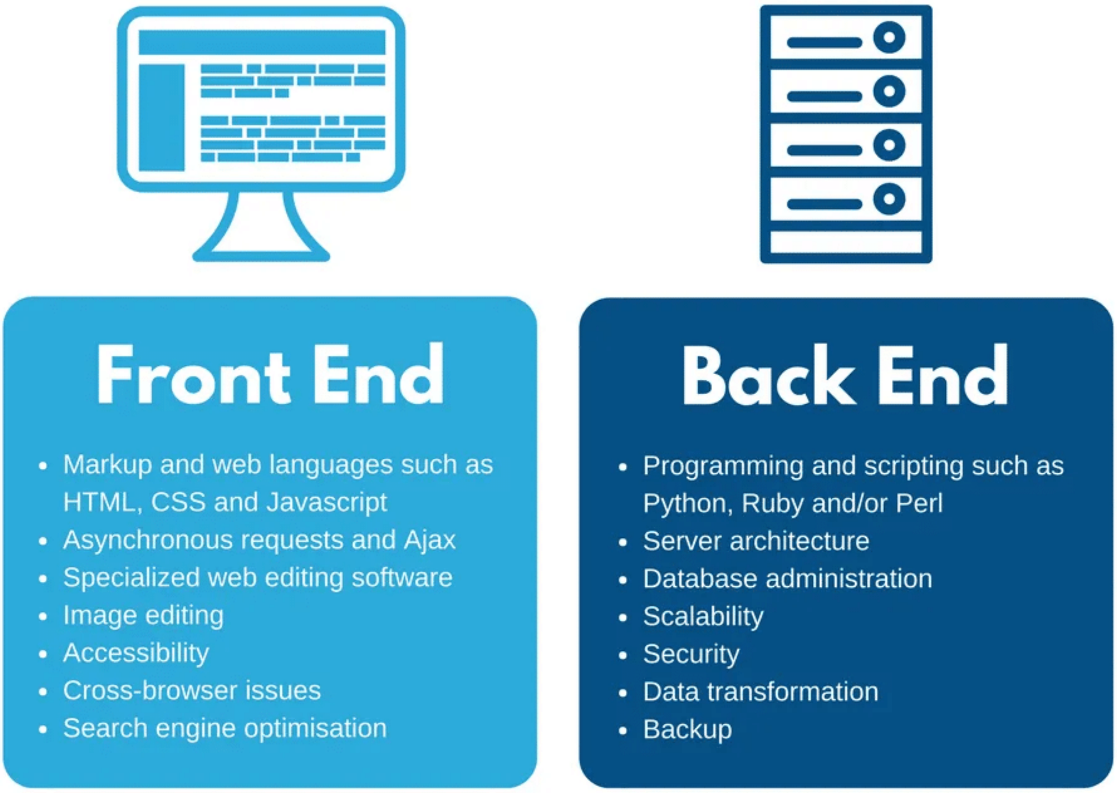


Fig 2: Backend Developer Skills

A Backend developer collaborates with front-end developers, UX/UI designers, and project managers to develop web applications that meet both functional and aesthetic requirements. Moreover, he is responsible for implementing security measures to protect sensitive user data and optimize server performance to minimize latency and ensure high availability. This multifaceted role requires strong problem-solving skills, attention to detail, and the ability to work under tight deadlines.

Furthermore, backend developers must possess excellent communication skills, as they often need to explain complex technical concepts to non-technical team members and clients. By translating the requirements of business stakeholders into effective digital solutions, backend developers play a significant role in driving innovation and maintaining a competitive edge in the digital landscape.

Backend development is an indispensable aspect of web development that focuses on creating robust, secure, and efficient server-side infrastructure. With a strong foundation in programming languages, database management, and server administration, backend developers work closely with other development teams to bring web applications to life. As the digital world continues to evolve, the demand for skilled backend developers will continue to grow, making it a promising career path for those interested in working at the intersection of technology and creativity.



**Front End**

- Markup and web languages such as HTML, CSS and Javascript
- Asynchronous requests and Ajax
- Specialized web editing software
- Image editing
- Accessibility
- Cross-browser issues
- Search engine optimisation

**Back End**

- Programming and scripting such as Python, Ruby and/or Perl
- Server architecture
- Database administration
- Scalability
- Security
- Data transformation
- Backup

Fig 3: Backend development vs Frontend development

## 1.4 Backend Developer Requirements

A crucial component in web development, the backend developer plays an essential role in designing and maintaining the server-side framework that supports an application's user interface. To thrive in this position, backend developers need a wide range of abilities and expertise that allow them to create robust, secure, and expandable web applications.

- Backend developers need proficiency in at least one server-side programming language, such as Python, Java, PHP, Ruby, or Node.js. This expertise enables them to develop organized, easy-to-maintain, and high-performance code that serves as the foundation of a web application.

- Understanding database management systems, such as SQL (e.g., MySQL, PostgreSQL, SQL Server) and NoSQL (e.g., MongoDB, Couchbase, Cassandra), is crucial for backend developers. They must be capable of designing, implementing, and optimizing database schemas, as well as executing complex queries for data storage, retrieval, and manipulation.

- Having familiarity with web technologies and frameworks, including HTTP, RESTful APIs, and WebSocket, is essential for backend developers. They should also have experience working with popular server-side frameworks, such as Django, Ruby on Rails, Express.js, or Spring Boot, to streamline development processes and enhance application performance.

- Backend developers should be comfortable using version control systems, such as Git, to manage and track changes in the source code. This skill enables them to collaborate effectively with other developers, maintain clear documentation, and revert to previous code versions when necessary.

- Having a basic comprehension of security concepts and best practices is necessary for backend developers, as they are responsible for protecting sensitive user data and ensuring the honesty of web applications. This includes implementing encryption, authentication, and authorization mechanisms, as well as safeguarding against common security vulnerabilities, such as SQL injection and cross-site scripting (XSS).

- Backend developers must possess knowledge of server configuration, maintenance, and deployment processes. They should be able to work with various server environments, such as Linux or Windows, and be familiar with cloud computing platforms, like AWS, Azure, or Google Cloud, to deploy and scale applications.

- Backend developers must possess an understanding of performance optimization techniques to ensure fast and efficient web applications. This includes implementing caching strategies, optimizing database queries, and employing load balancing techniques to handle high traffic loads.

- Good analytical skills are crucial for backend developers as they encounter complex technical problems and must develop new solutions to address them.

- Communication and Collaboration: Having strong communication and collaboration skills is critical for backend developers, as they often collaborate with front-end developers, UX/UI designers, project managers, and other members of multidisciplinary teams.

## 1.5 Backend Development Programming Languages

Backend programming languages are essential in the realm of software development, as they enable the development and administration of powerful and adaptable web applications. These languages form the foundation of the internet, ensuring smooth interaction between frontend user interfaces and server-side databases. A few of the widely-used backend programming languages consist of Python, PHP, Ruby, Java, and JavaScript (Node.js).

Fig 4: Backend development Languages – Python & node.js

Python, a flexible and highly-utilized programming language, is recognized for its straightforwardness and easy-to-read syntax. It boasts a vast collection of resources and frameworks, including Django and Flask, allowing developers to build robust web applications with little difficulty. The language's appeal has surged tremendously in the past few years, positioning it as a favored option for backend development.

JavaScript has long been a popular choice for frontend development, and its use has expanded into backend development through the advent of Node.js. This runtime environment enables developers to employ JavaScript for server-side programming, facilitating the creation of full-stack applications using only one language. Numerous frameworks, including Express.js and Koa.js, have emerged within the Node.js ecosystem, enhancing and simplifying the development experience.

Node.js backend development presents numerous advantages for both developers and organizations. Its adaptable and high-performance infrastructure, along with an extensive range of modules and libraries, makes it a fitting option for creating contemporary web applications. By adopting Node.js for backend development, companies can provide inventive and customer-focused solutions that can expand and adapt according to their requirements.

To sum up, backend programming languages play a crucial role in developing robust and interactive web applications. The selection of a language relies on aspects like project necessities, scalability demands, and the proficiency of the developer. Irrespective of the chosen language, a strong grasp of backend development concepts is vital for the effective development of web applications.

## 1.6 Objectives

The goal of the internship is to apply my technical expertise, ingenuity, and adaptability while adopting a progressive mindset to acquire new technologies and methodologies. Working alongside a diverse team, my goal is to create inventive solutions, sharpen my troubleshooting skills, and contribute to the development and implementation of top-notch software products that align with both business goals and user requirements.

# CHAPTER 02

# COMPANY DESCRIPTION

## 2.0 PAXCOM

Paxcom has the trust of some of the world's major brands and distributors, such as Britannia, Wipro, Mondelez and Pepsico, among others. In addition, Paxcom offers e-commerce solutions for product sales on India's biggest ecommerce sites like amazon, lazada, flipkart, etc. We serve a huge range of options including product intelligenc, business intelligence and audit and compliance. We assist customers with data-driven decisions on pricing, advertising strategy, positioning, and other aspects of a product. Since 2019, Paxcom has been a member of the Paymentus Corporation. Paymentus, headquartered in North America, is a leading provider of e-billing and payment solutions. Paymentus enables customers to make real-time payments to businesses through any payment channel. It offers consumers a full and comprehensive payment suite, including premier collaborations such as Amazon Pay, PayPal, and Walmart.

Paxcom makes it easier for both brand owners and dealers to simplify day-to-day operations by focusing on optimizing the market, item content/perceivability, and limited-time methodologies of data-driven examination and bits of knowledge.

Fig 5: Paxcom Logo

Paxcom's goal is to be your trusted team with a diverse range of abilities – your analysis consultant, product expert, advancement administrator, web-based industry researcher, data analyst, and expert specialist.

The organization's mission is to provide beneficial interactions to our customers that will allow them to track their competitors, screen their products, advance their content through commercial centers, increase perceivability, and promote their offers, among other things.

Paxcom was acquired by the Paymentus group a few years back, and the company's name was changed from "Paxcom" to "Paxcom India - A Paymentus Company."

Paymentus was established in 2004 as a result of a desire to change the way people pay their bills. Paymentus has grown from a vision to becoming the leading paperless electronic billing and installment arrangement available, with over 1,500 customers including some of North America's largest billers.

Paymentus consistently strives to grow stronger, faster, increasingly safer, cost-effective charging and installment phase and is identified by Deloitte as one of the fastest growing North American entities in 2011, 2013, 2014, and 2016. We are constantly on the lookout for more value for our customers, both in terms of contracts and management

There are 3 main core values which helps identify what Paxcom actually is. These are the pillars on which we employees stand on. The huge increase in number of clients has been made possible due to these values - Integrity, Fun and Ownership.

Integrity - this is one of the most important values that employees at Paxcom possess as a person with integrity draws others to them and helps identify one as dependable and trustworthy.

## 2.1 LITERATURE SURVERY

During my internship at Paxcom I learnt about various technologies like Python, Typescript, Javascript , Nodejs, FastAPI, MongoDB, Github. I also learnt about deployment services like docker

Python

Node.js serves as a robust and flexible runtime environment tailored for server-side applications. Its event-driven, non-blocking I/O model, along with its single-threaded event loop architecture, allows it to effectively manage numerous simultaneous connections. Owing to its vast array of libraries and frameworks, Node.js is a prime option for developers aiming to create scalable and high-performance applications.

Moreover, Node.js boasts an expansive ecosystem of libraries and frameworks called the npm (Node Package Manager) registry, which streamlines and expedites the development process. The npm registry offers a diverse collection of open-source packages that can be seamlessly integrated into Node.js projects, sparing developers the time and effort required to create intricate code from the ground up..

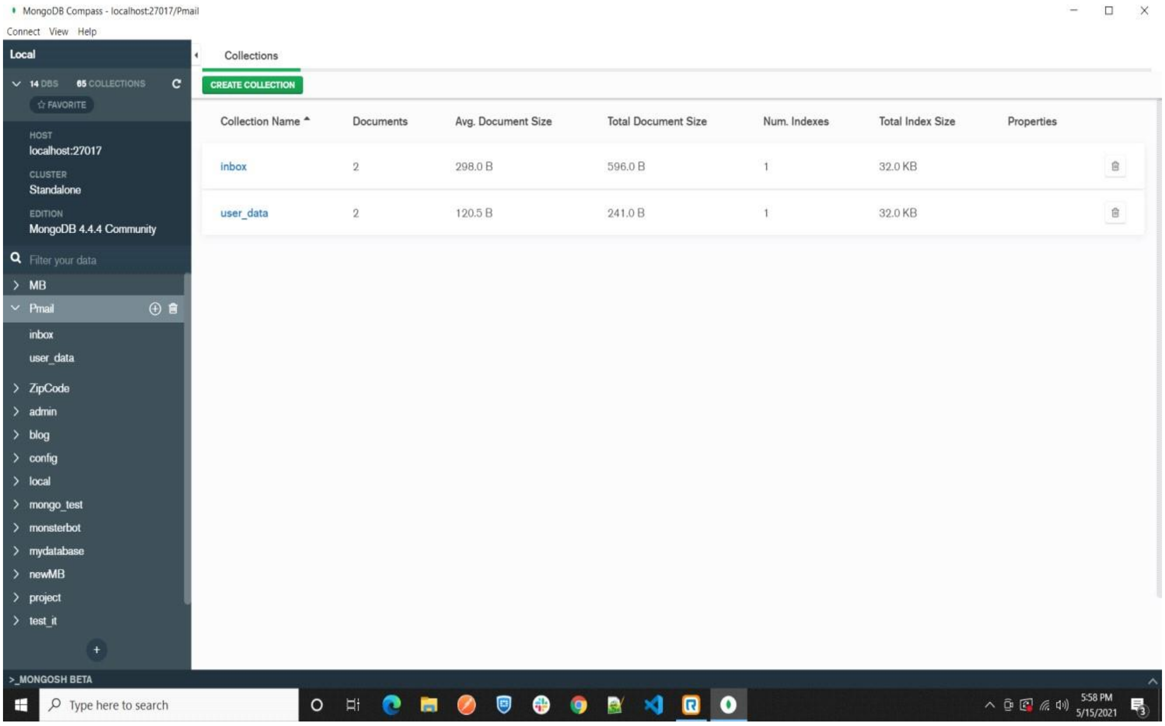
The benefits that Python is ideally suited for AI and AI companies include performance and consistency. Appropriate adaptation, Platform Independence and a global network that contributes to the overall prestige of the language. Some of the libraries I learnt about in python include numpy, pandas, os

FastAPI

Fast API is basically a high speed and modern web development framework which is used for building Application Programming Interface or APIs and is compatible with Python 3.6+. It is one of the fastest python frameworks available. FastAPI reduces approximately 40% of the errors which are caused by developers. It is highly intuitive as it has got great support for the editor. Everywhere completion. Debugging takes a lot less time. It is simple, very easy to use and understand. Docs are very easy in reading . FastAPI is brief as it reduce duplication.

## MongoDB

MongoDB is a object based database. It is a NoSQL based database. It stores the data in JSON like format. This format is now one of the most used format for data transfer. MongoDB is a document-oriented, high performing, cross-platform, scalable database. It works on the concept of records and collections. Collection is a group of documents. It will exist in a singleton record. They do not implement any schema. Documents which are inside our collection can have different fields. But generally the documents inside of a collection are used for storing same kind of data from a source. Any document is like a dictionary in python with key-value pair. MongoDB is better then the conventional row column model in many use cases. Use of such records has its own advantages: In several programming languages, documents (ie objects) match native data types. The embedded documents and arrays eliminate high cost joins. Fluent polymorphism is supported by dynamic schema. Compass is a MongoDB graphics interface. Enables users without previous knowledge of MongoDB query syntax to explore the quality of their stored data. If we explore data in the visual world, Compass GUI can be used to maximize results, manage indexes and apply document validation.



MongoDB Compass - localhost:27017/Pmail

HOST
localhost:27017

CLUSTER
Standalone

EDITION
MongoDB 4.4.4 Community

| Collection Name | Documents | Avg. Document Size | Total Document Size | Num. Indexes | Total Index Size | Properties |
|---|---|---|---|---|---|---|
| inbox | 2 | 298.0 B | 596.0 B | 1 | 32.0 KB | |
| user_data | 2 | 120.5 B | 241.0 B | 1 | 32.0 KB | |

Fig 5: DB Table

Git/Github

Git is a version control system or we can say VCS. Git lets us handle our project and the primary reason to use it is to keep track of the history of items that we have worked upon. During creation of a project it is easy to make errors or work on introducing a new feature into the app without disturbing the stable application or one wants to introduce a new version of the application. Here is where git comes into play. Git offers us features like branching, merging, rollback, etc which are very useful when working for a large scale project. Git also helps people to work together on a single project without disturbing each other's files. Working together as a team with Git is all the simpler. GitHub is  nothing but a remote storage for repositories. Repositories act as a storage for our application code. It is the best place to share our application code with friends, teammates, and even unknown developers around the globe. Over 31M people currently use GitHub to build awsome applications across 97M + repositories. There are numerous open source projects available on github with enormous community of developers contributing towards different projects. One such big project is the Android project which google made public and is now getting contributions from a large number of developers.

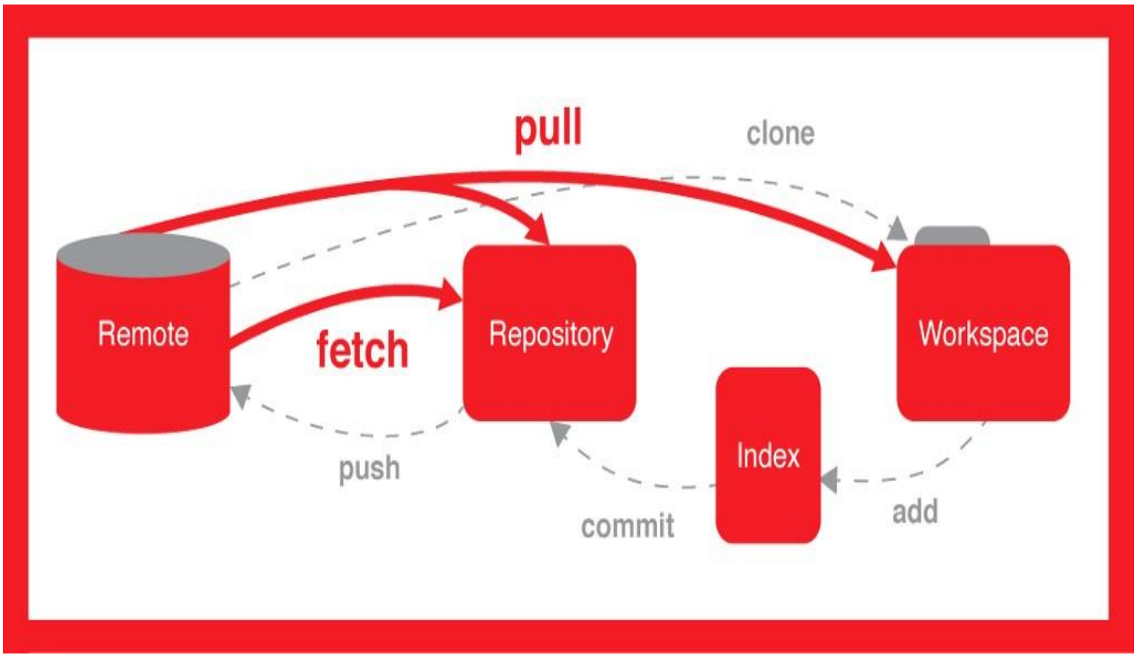


Fig 6: Paxcom Logo

Docker

Docker is a containerization platform that is available as an open source project. It allows programmers to bundle programmes into containers, which are standardised executable components that combine application source code with the operating system (OS) libraries and dependencies needed to run the code in any context. Containers have grown in popularity as enterprises move to cloud-native development and hybrid multicloud settings, making it easier to provide distributed applications.

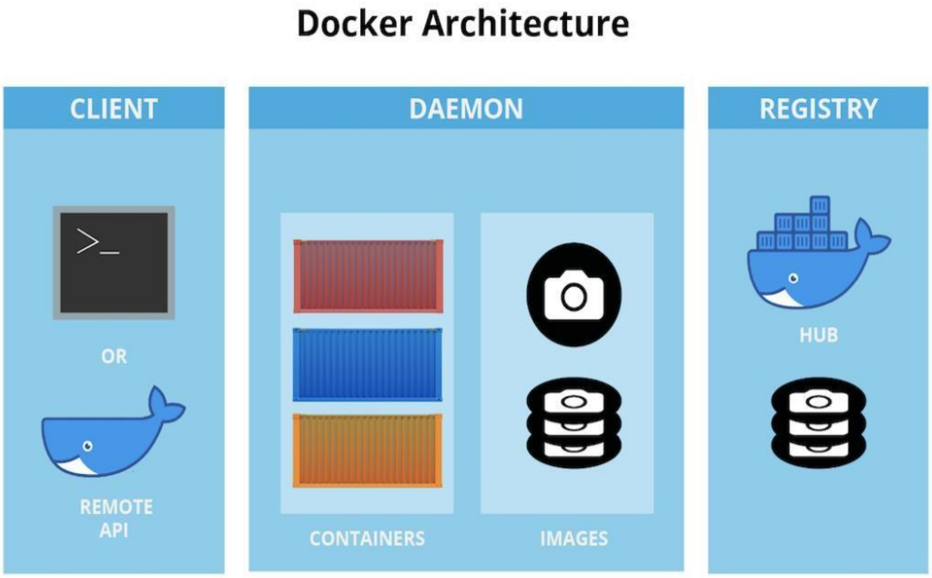


Fig 7: DOCKER Logo

JSON

Python has an integrated package called json that can be used for JSON data activity. JSON has quickly become the de facto standard for data sharing since it was first created. We can collect information through an API or store your information in a document database. JavaScript Object Notation is a complete version of JSON. This means, for saving and transmitting the details, a script.

# CHAPTER 03

# TOOLS AND TECHNOLOGIES USED

## 3.1 Node.js:

Node.js serves as a robust and flexible runtime environment tailored for server-side applications. Its event-driven, non-blocking I/O model, along with its single-threaded event loop architecture, allows it to effectively manage numerous simultaneous connections. Owing to its vast array of libraries and frameworks, Node.js is a prime option for developers aiming to create scalable and high-performance applications.

Moreover, Node.js boasts an expansive ecosystem of libraries and frameworks called the npm (Node Package Manager) registry, which streamlines and expedites the development process. The npm registry offers a diverse collection of open-source packages that can be seamlessly integrated into Node.js projects, sparing developers the time and effort required to create intricate code from the ground up.

**Improved Performance and Scalability:** Node.js takes advantage of the high-performance Google Chrome V8 JavaScript engine, known for its speed and efficiency. This allows developers to create server-side applications with quicker code execution. Moreover, Node.js employs a non-blocking, event-driven structure that enhances scalability. As a result, applications can effectively handle numerous concurrent connections, making it suitable for addressing the increasing demands of contemporary web applications.

**Strong Ecosystem and Community Support:** One of the most notable benefits of Node.js is its use of JavaScript for both front-end and back-end development. This not only simplifies the development process but also decreases the learning curve for developers, as they can now employ a single language across the entire application stack. Ultimately, this leads to greater productivity, accelerated development cycles, and a reduced likelihood of errors and discrepancies throughout the codebase.

**Effortless Synchronization with Microservices Framework:** In recent times, the microservices framework has witnessed a surge in popularity since it empowers developers to create applications as an assembly of small, independent services. Node.js is an ideal fit for this structural design, facilitating smooth integration and administration of microservices. This further boosts the application's scalability, maintainability, and adaptability.

**Enhanced Response Speed:** Node.js employs a non-blocking I/O model, which enables it to manage multiple requests simultaneously, considerably decreasing response durations. Consequently, web applications created using Node.js can provide superior user experiences by offering quicker and more seamless interactions.

Fig 08: Node.js Logo

## 3.2 Express.js

Express, commonly referred to as Express.js, is a streamlined, adaptable, and minimalist web application framework designed for Node.js. This framework simplifies the creation of web applications and APIs by offering vital tools and features necessary for web development. Express has become a favorite among developers due to its ease of use and its role in the MEAN and MERN stacks. This article explores the many benefits of employing Express and its impact on web development.

**Simple Node.js Integration:** Simple Node.js Integration: Built on the foundation of Node.js, Express makes it effortless for developers to produce server-side applications utilizing JavaScript. This smooth integration enables developers to employ one programming language for both front-end and back-end development, minimizing the learning curve and boosting productivity.

**Middleware Support:** Middleware functions play a crucial role in managing requests and responses in web applications. Express provides built-in middleware functions and permits developers to create custom middleware to expand its capabilities. This modular strategy aids in controlling application flow and maintaining a neat and organized codebase.

**Streamlined Routing Process:** Express offers a powerful and user-friendly routing mechanism, which simplifies the creation and management of routes in web applications. Its routing system is compatible with various HTTP methods and accommodates dynamic URL parameters, making it a top choice for RESTful APIs.

**Exceptional Performance:** As a minimalist framework, Express is engineered to provide remarkable performance. Its lightweight nature ensures minimal resource consumption, resulting in quicker application response times.

**Vibrant Community and Ecosystem:** Express boasts a dedicated and dynamic community that actively participates in its ongoing development and support. With a plethora of plugins and extensions at their disposal, developers can effortlessly enhance the framework's capabilities. Furthermore, the abundant resources such as tutorials, documentation, and forums make learning and problem-solving a breeze for developers.

**Diverse Template Engines:** Express is compatible with a variety of template engines, including EJS, Pug, and Handlebars, which simplifies the process of generating dynamic HTML content for developers. These template engines facilitate a clear distinction between the presentation layer and the application logic for developers.

**Adaptability and Scalability:** Express does not impose strict guidelines, granting developers the autonomy to design their applications according to their needs. This adaptability enables the creation of scalable applications capable of managing increasing traffic and resources. Furthermore, Express's modular architecture simplifies application maintenance and updating.

Fig 09: Express logo

## 3.3 REST API

Axios has emerged as a popular and reliable HTTP client library that enables developers to make HTTP requests to RESTful APIs from both browser-based applications and Node.js environments. This versatile library has several key advantages over traditional methods, such as Fetch API and XMLHttpRequest, and offers numerous features that streamline and simplify the process of requesting and managing data over the web.

**Adjustable timeouts and retry attempts:** Axios offers the capability for developers to set personalized timeouts for their requests, which can be beneficial in handling sluggish or unresponsive APIs. Furthermore, Axios incorporates automated retries for unsuccessful requests, enhancing the dependability of applications that depend on external services.

**Extensive customization possibilities:** Axios comes with numerous configuration settings that allow developers to optimize their HTTP requests based on particular needs. Some of these options include tailored headers, selecting the response type, URL parameters.

**Request and Response Interception:** Axios offers the capability to intercept both requests and responses, allowing developers to modify or record data before it is transmitted or obtained. This function is especially beneficial for tasks such as incorporating authentication tokens into requests, managing errors universally, or monitoring response durations.

**Automated JSON Data Conversion:** Axios seamlessly transforms JSON data into JavaScript objects and vice versa, streamlining the handling of JSON-formatted information. This characteristic removes the necessity for manual parsing and stringifying, making it more convenient for developers to engage with APIs and handle data.

**Compatibility with Client-side and Server-side:** Axios functions smoothly in both web-based applications and Node.js settings, enabling developers to utilize the same library for front-end and back-end development. This uniformity can result in a more efficient and well-organized development process.

**Abortable requests:** Axios enables developers to terminate ongoing HTTP requests. This feature can be especially valuable in scenarios where users may leave a page or abort an action before an API request finishes, avoiding excessive data consumption and boosting application efficiency.

**Promise-based:** One of the main advantages of Axios is its use of Promises. Promises offer a more organized and readable approach to handling asynchronous operations compared to traditional callbacks. With Axios, developers can easily chain multiple requests, catch errors uniformly, and ensure the proper execution order of asynchronous functions.

**Easy-to-use API:** Axios offers a simple and intuitive API that is easy to learn and implement. Its syntax is clear, making it accessible for developers of all skill levels. The simplicity of Axios allows developers to quickly integrate it into their projects and efficiently manage HTTP requests.

Fig 10: Rest API logo

## 3.4 GitHub

GitHub, an online platform launched in 2008, serves as a collaborative space for developers and significantly contributes to the expanding realm of open-source software. As a vital resource for individual developers and large organizations alike, GitHub aids in managing, sharing, and participating in software projects. This report delves into GitHub's essential features, its influence on the software development field, and its role in reducing plagiarism in programming and development.

**Managing Repositories:** The primary purpose of GitHub is to offer a centralized location for hosting and organizing code repositories. Each repository can house numerous files, folders, and branches, enabling developers to effectively arrange and sustain their projects.

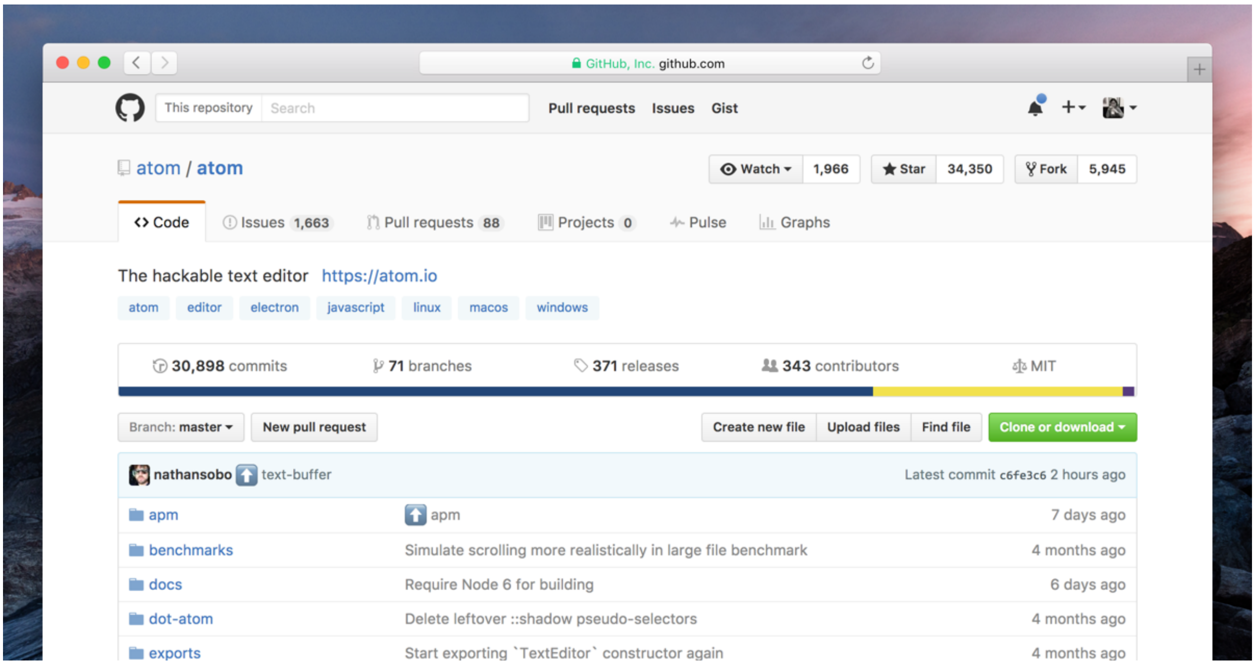
**Controlling Versions:** GitHub is built upon Git, a distributed version control system that monitors code modifications over time. This feature allows developers to cooperate on projects without jeopardizing each other's work and provides the option to revert to earlier code versions when needed.

**Tracking Issues:** GitHub incorporates a built-in issue tracking system that permits developers to report glitches, propose enhancements, and monitor progress on tasks. This functionality streamlines the development process by consolidating all relevant discussions and updates in a single location.

Fig 11: GitHub logo

### 3.4.1 Repository

A repository is a part where all of the project's files are stored. Each project has its own repository, which may be accessed through a different URL.



The hackable text editor https://atom.io

nathansobo text-buffer Latest commit c6fe3c6 2 hours ago

| | | |
|---|---|---|
| apm | apm | 7 days ago |
| benchmarks | Simulate scrolling more realistically in large file benchmark | 4 months ago |
| docs | Require Node 6 for building | 6 days ago |
| dot-atom | Delete leftover ::shadow pseudo-selectors | 4 months ago |
| exports | Start exporting `TextEditor` constructor again | 4 months ago |

Fig 12: GitHub Repository Example

### 3.4.2 Forking a Repository

When you fork an existing project, you are creating a new one. This is a fantastic tool for encouraging the development of new apps and projects. If you find a project on GitHub that you'd want to contribute to, fork it, make your modifications, and then republish it as a new repo. If the repository from which you forked to create your new project is changed, you may quickly apply changes to your existing fork.

### 3.4.3 Committing the changes

Once you've staged the files you wish to add, you're ready to commit. Whether you commit using GitHub Desktop or the command line, the commit message is critical. Use short commit messages that summarize your change. Because commit messages will guide you through your repository's history, they should be informative. In command-line commits, the following message format can be used:

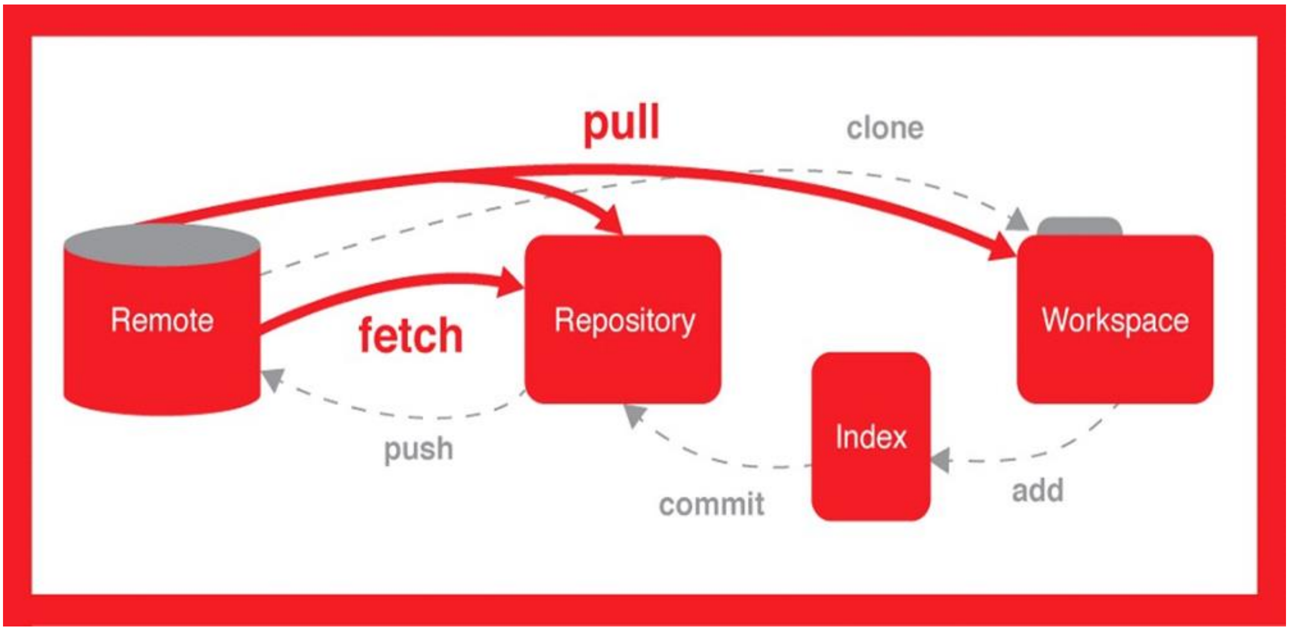


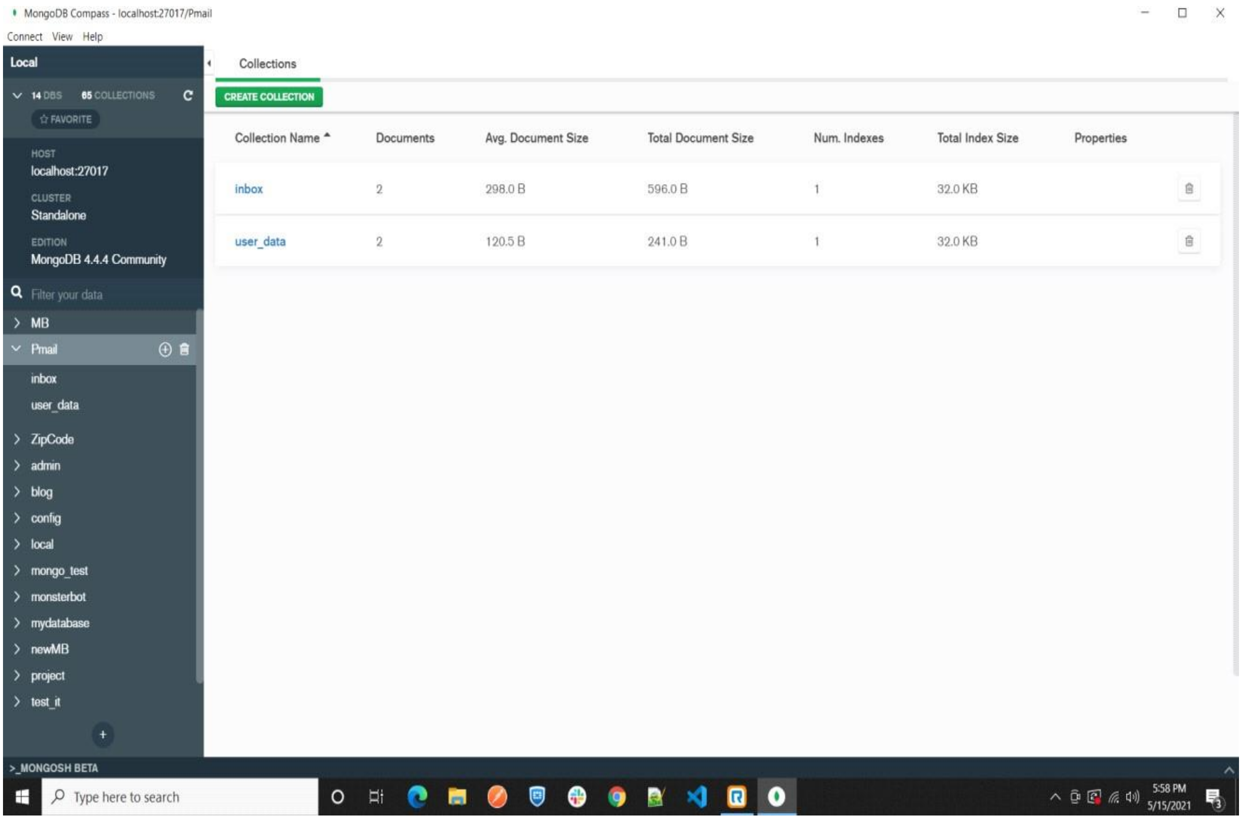
Fig 13: GitHub Commit Flow

### 3.4.4 Pull Requests

You've forked a repository, made a wonderful modification to the project, and want the original devs to notice it—and maybe incorporate it into the original project/repository. Create a pull request to do this. The original repository's authors can review your work and decide whether or not to include it in the official project. When you submit a pull request, GitHub provides an efficient communication channel between you and the primary project's maintainer.

## 3.5 MONGO DB

MongoDB is a object based database. It is a NoSQL based database. It stores the data in JSON like format. This format is now one of the most used format for data transfer. MongoDB is a document-oriented, high performing, cross-platform, scalable database. It works on the concept of records and collections. Collection is a group of documents. It will exist in a singleton record. They do not implement any schema. Documents which are inside our collection can have different fields. But generally the documents inside of a collection are used for storing same kind of data from a source. Any document is like a dictionary in python with key-value pair. MongoDB is better then the conventional row column model in many use cases. Use of such records has its own advantages: In several programming languages, documents (ie objects) match native data types. The embedded documents and arrays eliminate high cost joins. Fluent polymorphism is supported by dynamic schema. Compass is a MongoDB graphics interface. Enables users without previous knowledge of MongoDB query syntax to explore the quality of their stored data. If we explore data in the visual world, Compass GUI can be used to maximize results, manage indexes and apply document validation. The complete MongoDB Compass version is available. It contains all of MongoDB's features and features. In mongoDB my main focus was on creating a database, adding and dropping a collection, basic insert, query, update and delete operations. I also familiarized myself with the aggregation pipeline and how to use it. I also came across projections and sharding.



HOST
localhost:27017

CLUSTER
Standalone

EDITION
MongoDB 4.4.4 Community

| Collection Name | Documents | Avg. Document Size | Total Document Size | Num. Indexes | Total Index Size | Properties |
|---|---|---|---|---|---|---|
| inbox | 2 | 298.0 B | 596.0 B | 1 | 32.0 KB | |
| user_data | 2 | 120.5 B | 241.0 B | 1 | 32.0 KB | |

Fig 14: Mongo DB

Compass is a MongoDB graphics interface. Enables users without previous knowledge of MongoDB query syntax to explore the quality of their stored data. If we explore data in the visual world, Compass GUI can be used to maximize results, manage indexes and apply document validation. The complete MongoDB Compass version is available. It contains all of MongoDB's features and features.

## 3.6 DOCKER

Docker is a containerization platform that is available as an open source project. It allows programmers to bundle programmes into containers, which are standardised executable components that combine application source code with the operating system (OS) libraries and dependencies needed to run the code in any context. Containers have grown in popularity as enterprises move to cloud-native development and hybrid multicloud settings, making it easier to provide distributed applications.

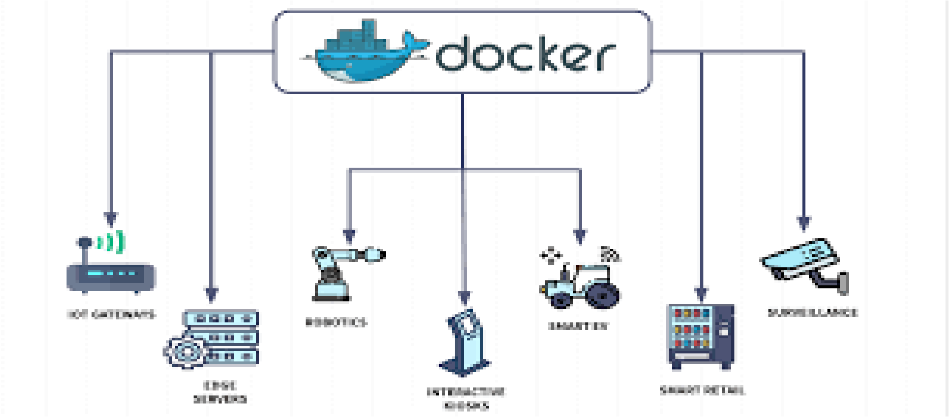


Fig 15: Docker Architecture

**Seamless Integration:** Docker Functions effortlessly integrates with numerous Docker services and third-party applications, empowering developers to build comprehensive, end-to-end solutions.

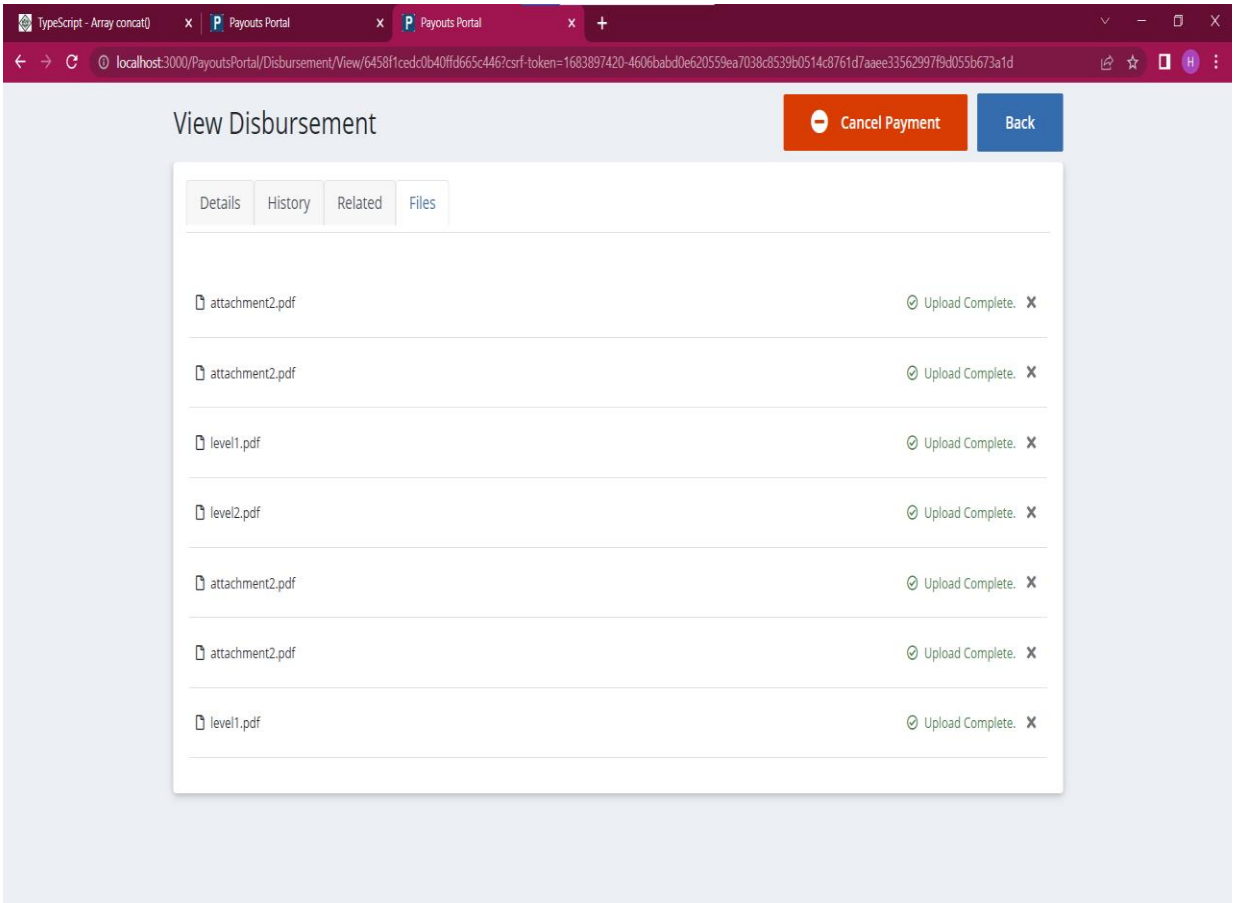
**Multilingual Compatibility:** Docker Functions provides compatibility with a variety of programming languages, such as C#, JavaScript, Python, and Java, enabling developers to utilize their favorite languages and resources.

# CHAPTER 04

# LIVE PROJECT

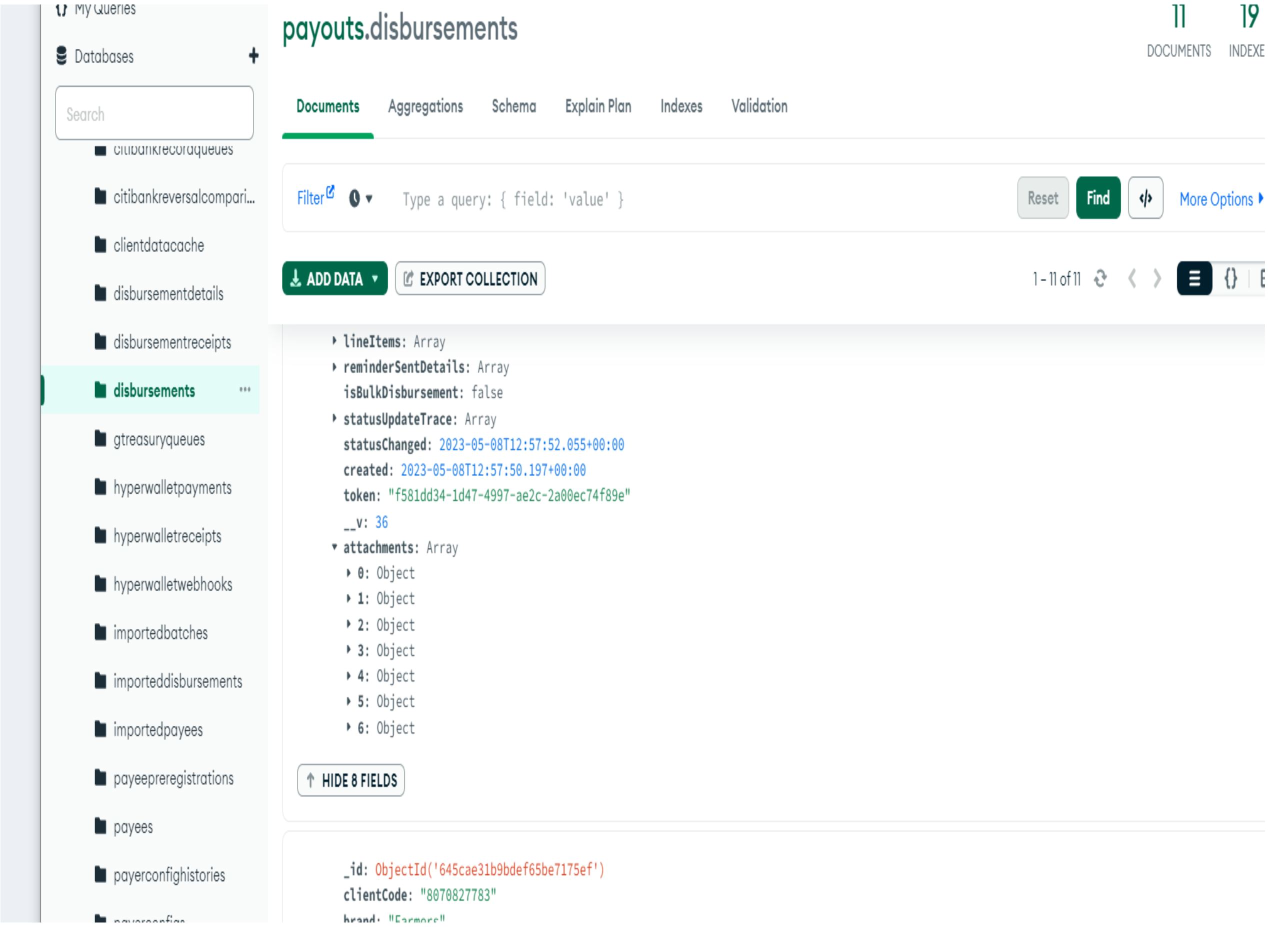
## 4.1 Payload :

In payload service, we have created a disbursement service and through this service we create a new entry for biller which includes the detail of the biller


TypeScript - Array concat()
Payouts Portal
Payouts Portal
localhost:3000/PayoutsPortal/Disbursement/View/6458f1cedc0b40ffd665c446?csrf-token=1683897420-4606babd0e620559ea7038c8539b0514c8761d7aaee33562997f9d055b673a1d
View Disbursement
Cancel Payment
Back
Details
History
Related
Files

| | |
|---|---|
| attachment2.pdf | Upload Complete. |
| attachment2.pdf | Upload Complete. |
| level1.pdf | Upload Complete. |
| level2.pdf | Upload Complete. |
| attachment2.pdf | Upload Complete. |
| attachment2.pdf | Upload Complete. |
| level1.pdf | Upload Complete. |

Fig 16: Disbursement Attachments



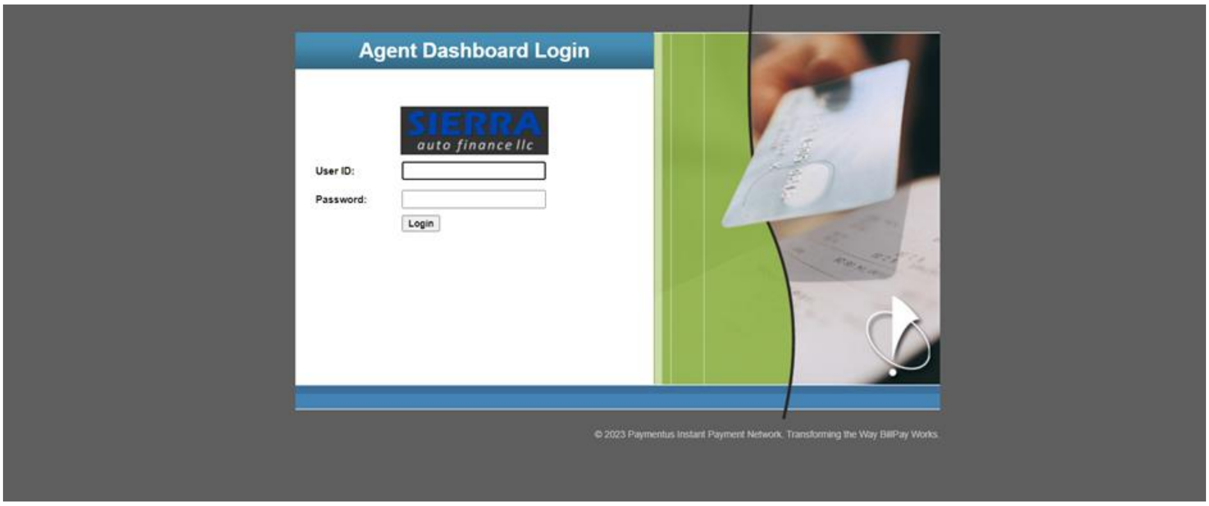
```
▸ lineItems: Array
▸ reminderSentDetails: Array
  isBulkDisbursement: false
▸ statusUpdateTrace: Array
  statusChanged: 2023-05-08T12:57:52.055+00:00
  created: 2023-05-08T12:57:50.197+00:00
  token: "f581dd34-1d47-4997-ae2c-2a00ec74f89e"
  __v: 36
▾ attachments: Array
  ▸ 0: Object
  ▸ 1: Object
  ▸ 2: Object
  ▸ 3: Object
  ▸ 4: Object
  ▸ 5: Object
  ▸ 6: Object
```

```
  _id: ObjectId('645cae31b9bdef65be7175ef')
  clientCode: "8070827783"
  brand: "Farmers"
```

Fig 17: Disbursement Data (Dummy Data)

## 4.2 AGENT DASHBOARD:

Agent Dashboard is a web based portal that enables all Paymentus clients (also known as billers) to manage and monitor their customers' payments. Some of the main features of the Paymentus Agent Dashboard include the ability to add and manage users, look up payment schedules, make payments manually on behalf of the customers, and generate payment reports. In other words, AD allows them to manage and monitor their customers' payments and accounts. Note that not every biller has access to every feature available in the Agent Dashboard. Each biller has a specific set of configuration options that control which features and functionality are available to them and their customers across other Paymentus products such as Customer Portal, IVR, Kiosk and One Time Payment Flow. As a result, the Agent Dashboard may look different from one biller to the next

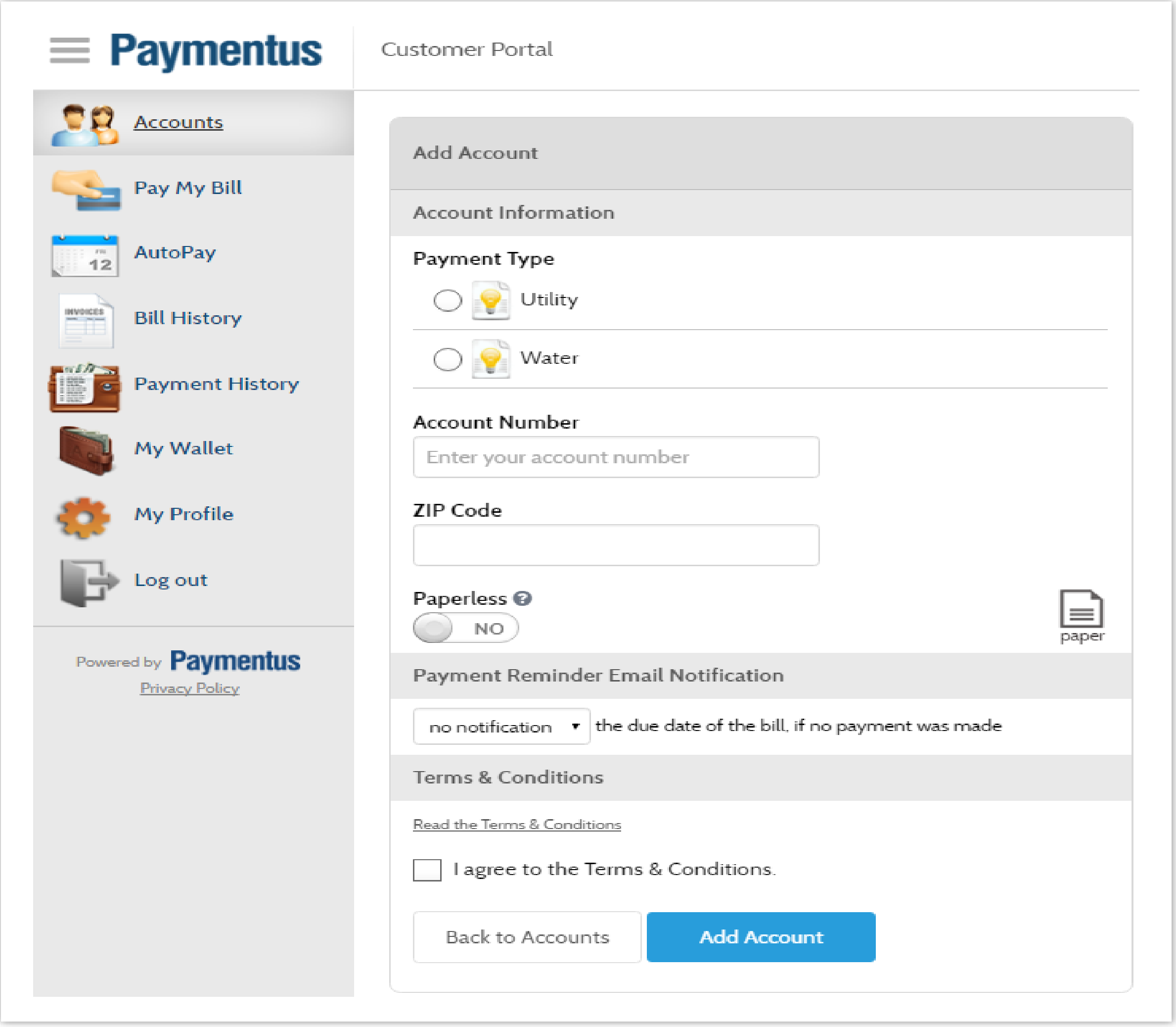


© 2023 Paymentus Instant Payment Network. Transforming the Way BillPay Works.

Fig18: AD

## 4.3 COUSTOMER PORTAL

The Paymentus Customer Portal offers many useful and advanced features to make bill payment an easy process for a consumer. Customer Portal is the main channel that we encourage billers to offer to their customers. It is a website that billers link to from their own sites. Customers can manage their payments, as well as account preferences, such as whether to receive paper or email billing statements. A customer can link their CP profile to multiple accounts or services that they have with a particular biller as well as manage all their bills from this one portal. They can also set up recurring payments.



Add Account

Account Information

Payment Type

○ Utility

○ Water

Account Number

Enter your account number

ZIP Code

Paperless

NO

paper

Payment Reminder Email Notification

no notification ▾ the due date of the bill, if no payment was made

Terms & Conditions

Read the Terms & Conditions

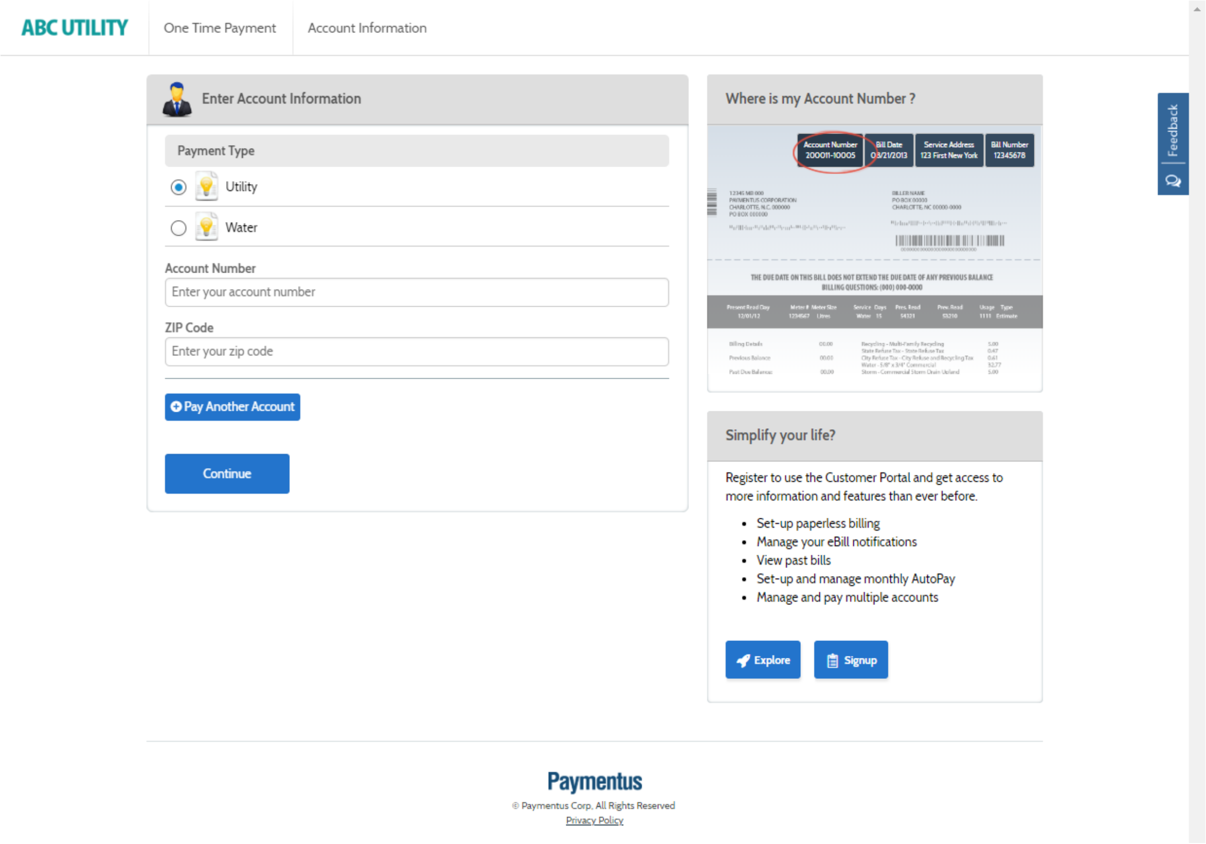
☐ I agree to the Terms & Conditions.

Fig 19: Coustomer Portal

## 4.4 ROTP

ROTP stands for responsive one time payment and is the successor to One Time Payment (OTP). Just like OTP before it, ROTP is a website that customers can access to make a bill payment without having to register with an online account.

You may have already noticed there is a distinct difference in styling between the previous three examples. AD and OTP use an older, tabular style of website design, whereas CP uses newer CSS3 standards of web design. Similarly, ROTP is the newer, improved version of OTP. The responsive refers to the idea of responsive web design, which basically means that the website is built using newer design philosophies that allow the viewer to use any size browser or any device to seamlessly use the page without the coder having to explicitly cater to those options.



ABC UTILITY | One Time Payment | Account Information

Enter Account Information

Payment Type

● Utility

○ Water

Account Number

Enter your account number

ZIP Code

Enter your zip code

Pay Another Account

Continue

Where is my Account Number ?

| Account Number | Bill Date | Service Address | Bill Number |
|---|---|---|---|
| 200011-10005 | 03/21/2013 | 123 First New York | 12345678 |

12345 MB 000
PAYMENTUS CORPORATION
CHARLOTTE, N.C. 000000
PO BOX 000000

BILLER NAME
PO BOX 00000
CHARLOTTE, NC 00000-0000

THE DUE DATE ON THIS BILL DOES NOT EXTEND THE DUE DATE OF ANY PREVIOUS BALANCE
BILLING QUESTIONS: (000) 000-0000

| Present Read Day | Meter # | Meter Size | Service | Days | Pres. Read | Prev. Read | Usage | Type |
|---|---|---|---|---|---|---|---|---|
| 12/01/12 | 1234567 | Litres | Water | 15 | 54321 | 53210 | 1111 | Estimate |

| | | | |
|---|---|---|---|
| Billing Details | 00.00 | Recycling - Multi-Family Recycling | 5.00 |
| | | State Refuse Tax - State Refuse Tax | 0.47 |
| Previous Balance | 00.00 | City Refuse Tax - City Refuse and Recycling Tax | 0.61 |
| | | Water - 5/8" x 3/4" Commercial | 32.77 |
| Past Due Balance | 00.00 | Storm - Commercial Storm Drain Upland | 5.00 |

Simplify your life?

Register to use the Customer Portal and get access to more information and features than ever before.

- Set-up paperless billing
- Manage your eBill notifications
- View past bills
- Set-up and manage monthly AutoPay
- Manage and pay multiple accounts

Paymentus

© Paymentus Corp. All Rights Reserved
Privacy Policy

Fig 5: ROTP DASHBOARD

# CHAPTER 05

# CONCLUSION

## 5.1 Conclusion

Finally, this internship has been a fantastic and gratifying experience. I can honestly state that my time with PAXCOM was quite useful to me. Needless to say, the technical aspects of my work aren't ideal and might be improved with more time. As someone with little prior expertise with Backend Development and overall Software Development, I believe the time I spent learning and comprehending was well spent, as it aided in the creation of a completely functional app service. Time management and self-motivation are two of the most important principles I've learnt.

## 5.1 Future Work

As a result, any features and technologies I develop in the future will have a huge impact on E-bills by technologically elevating them and supporting them in easily Comment Replying through Generative AI and Data Analytics. As a consequence, further work will be done in the future to create a better Productivity tool for billing , as well as a more accurate and more Personalized Dashboard.