SOCIAL COMMERCE and ART in ECOMMERCE

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Student's Declaration and Approval

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University in Nairobi for academic credit.

Signed: ……. Date: ……...

David Onisomise Awarri 659803

This project has been presented for examination with my approval as the appointed supervisor.

Signed: ……. Date: ……

ABSTRACT

ARTHUB will be focused on drawn or painted on art. The main purpose of the system is to create a hub where local (or any) artists will be able to showcase their artwork and sell it to people who are in the market for art. It will also be a hub for recyclable materials, and will specially advertise artists who use these recyclable materials to create art.

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Chapter 1

1.0 Introduction

eCommerce is basically a "multi-vendor" marketplace which enables said vendors, to sell their products, while also giving them, and everyone else that accesses this store, the ability to buy from these vendors as well (Gupta, 2021) These vendors can oversee the running of their parts of the market at their own time and the owner of this market, in this case, the person who owns the website, can gain a commission through the sale of every item on this market place.

eCommerce has been a gamechanger in the consumer goods markets. But unlike them, art galleries, which is what artists basically depend on to sell their art, have been "reluctant to innovate through digitization" by moving their stores and displaying their art online (Bhansing, 2021). One major reason for this reluctancy is the nature of the business in these galleries, which involve social interaction between the customer and the gallery representative which happens inside these galleries (Bhansing, 2021; Arora and Vermeylen 2013). Generally, the art market is characterized as "relatively exclusive and intransparent"; this means that certain information, such as the prices of these art pieces and the entire process of sale are usually communicated and done privately (Adam 2014).

This information however, has in recent times, become available to the general public on the internet which thereby, has greatly challenged the galleries' way of conducting their business. This information has a plus though, as it allows buyers make more informed decisions (McAndrew, 2015; Samdanis, 2016). This new information has facilitated better communication and networking around the world and it has made possible performing transactions and acquisitions from anywhere. It has therefore, provided the basis for new business opportunities on the art market. This also facilitates the reach of these galleries into new markets and connects these new markets more effectively. The internet generally has facilitated global visibility of artists, thereby making it easier for buyers to access a broader range of artworks globally than what art galleries provided (Samdanis, 2016).

The past couple years have seen a big step forward in the increase of eCommerce businesses primarily concerning customer -oriented, web-based commerce dedicated to selling art. The internet is thereby a medium which can function as a kind of hub through which artists and their respective art can be discovered and bought entirely online, without any need to interact or engage with the artists nor their art physically (Katharina Bayer M.A., 2018). In spite of the ever-growing

interest of art in ecommerce, and in spite of the fact that other industries; such as film, music etc. have changed greatly from the application of the internet, the reality is that the sales in the art sector have greatly fallen short in comparison to the market in art galleries and other offline markets and the general art market has continued to struggle to move online. It has been far more difficult for the market in this sector to adjust to and attract customers to the online market than in many other industries which thereby, sets the art market apart from other eCommerce trends and developments.

1.1 The Problem Statement

Currently, there is no central site online where people who are in the market for art, can visit to go through the available artworks and purchase the ones they are interested in. Websites like Artsy, Big Cartel and Shopify do not directly provide these artists with a platform to directly sell their art and mostly work as intermediary sites mainly for art galleries and not for the artists themselves (Sidorova, 2019). They have had to rely on social media, which most people visit for entertainment and because of that, their posts about their work tends to go right over the heads of the people on those social media. It is because of this that a central hub, which can be accessed by the artists to upload their work, and the people who are on the market for art from anywhere provided they have access to the internet (Park, 2007).

1.2 Objectives

The main objective is to design and implement a website that is effective, easy to use, and vibrant where artists can share their work with the public in order to sell them to those interested.

1.2.1 Specific Objectives

i. To create a website where artists can sell their work
ii. To create a website where people can buy art
iii. To create a website which will promote recycling through art
iv. To create a website which will be a central hub for all artwork

1.3 Research Question

With the rest of the world moving on with eCommerce, there is a need to go with them in all aspects, which in this case, involves the art sector.

The only means through which artists can show their work at the moment is through social media, which due to several reasons, has made them struggle not only to show their art, but to sell it as well. A new system, which doesn't require the traditional method of artists physically interacting with potential customers in particular places, is needed in order to finally fully incorporate the art sector with eCommerce.

1.4 Justification

Artists will be able to use the system to showcase their artwork to the general public, who will not only be able to view these artworks, but also purchase them. The proposed system will help artists show their work to a wider array of potential customers. It will also solve the problem that social commerce could not in the art sector. It will provide a central hub that will allow customers to find and buy art for themselves and finally, it will specially promote recycling by advertising recyclable art.

With eCommerce continuously advancing in other sectors, it is imperative that art does to in order to keep up with the rest of the world.

1.5 Scope

This project will be an eCommerce site that is limited to selling art and given that it will be a webapp, it will be able to be accessed on all platforms (Android, iOS and PC). The starting audience will be limited to local artists within Nairobi.

Chapter 2

Literature Review

2.0 Introduction

Literature review by definition, summarizes and evaluates bodies of writing about a specific topic; in this case, art and eCommerce. This will give us a general overview of the research topic, reveal to us what has already been done on the topic, new ideas that we can even use in further broadening the research topic, and determine what parts of the research being conducted has problems (Knopf, 2006).

This then propels us to the main focus of this chapter in the form of the subjects which will be tackled, that is a review of existing systems and social commerce together with the problems they possess and possible solutions to those problems which this new system brings.

2.1 Social Commerce

The increasing popularity of social networking sites such as Facebook, Twitter and Instagram have created many new opportunities for many ecommerce businesses. Social commerce involves making use of the aforementioned sites and other social networks and infrastructure to support online interactions and user contributions to aid and/or assist in the acquisition of products and services alike. These social networks do not only provide a new platform for entrepreneurs and existing businesses, but they also raise a wide variety of new issues for ecommerce researches that require the development of theories that could become key research topics in the near future. The revolution of social media has made social commerce an extension of ecommerce and many small businesses start up on social media. Because of this, social media sites are setting new records in their growth and valuation because of their innovative business models (Liang, 2011).

The term social commerce is generally the delivery of eCommerce activities and transactions through the social media environment in the form of social networks. It is therefore, eCommerce that involves the use of social media to aid in performing transactions and activities. It is a combination of social and commercial activities and given that is on social media, it also involves and promotes social interaction without physically interacting as it is done traditionally. It can also be defined as a form of internet-based social media that allows people to actively participate in marketing and selling of products and services in online marketplaces and communities (Stephen,

2010). According to IBM, social commerce is “the concept of word of mouth applied to ecommerce, and it is the marriage of a retailer’s products and the interaction of shoppers with content” (Dennison, 2009).

It should be noted that many definitions of social commerce reflect on it as community-level participation and socioeconomic impacts in ecommerce. A social commerce website is basically a place where people can go to collaborate with each other online, get advice from trusted individuals, find goods and services, and then purchase them. In summary, social commerce has three major attributes; social media technologies, community interactions, and commercial activities (Liang, 2011).

There are two major configurations of social commerce websites. Firstly, social media sites can add commercial features that will allow for advertisements and transactions. Facebook for example, amongst several others, have opened their programming interfaces to allow commercial activities to be easily conducted amongst members in the form of a dedicated marketplace.

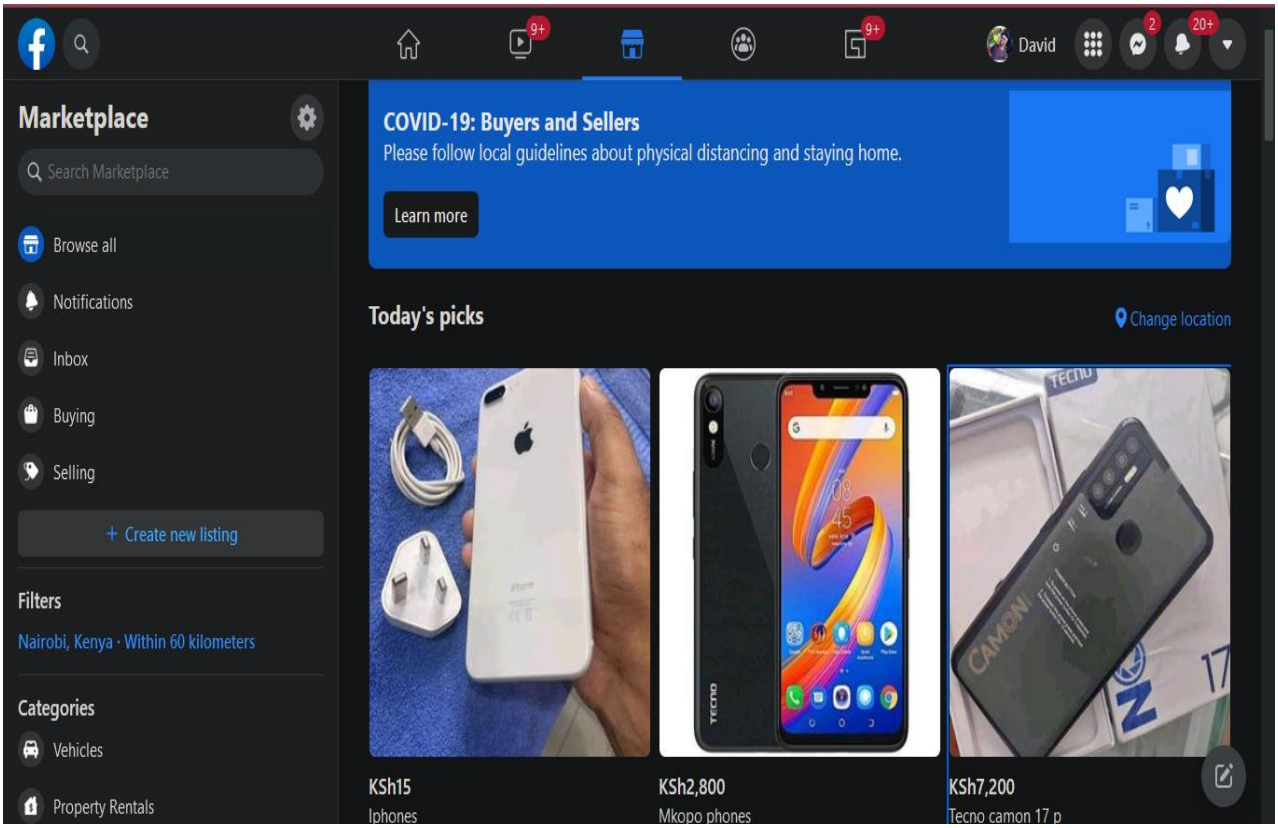


Fig. 2.1 Facebook marketplace, where users can buy or sell new and used items easily on, locally or from businesses.

Secondly, traditional ecommerce sites such as Amazon have integrated social networking capabilities to take advantage of social commerce, allowing B2C (business to customer) websites to better understand their customer needs in order to serve them better. There have been many success stories in the use of social commerce, but this has mostly been big retailers (like Coca-Cola, Starbucks, etc.) and big service providers (such as banks or airlines). There have also been many failures which have been surrounded by complaints about waste of time and money, as well as security and privacy breaches (Culnan, 2010).

The main power in social commerce lies in the very large number of users participating in social media. Word of the mouth, which is passing of information from one individual to another, play a very key role in affecting the attitudes and behaviors of the users. Therefore, taking advantage of social networking is most essential in social commerce (Liang, 2011).

Some activities so social network sites are not commercial in nature. For example, people go on social media to share their thoughts, information about particular events, pictures, or jokes for their entertainment. These activities, albeit popular, cannot be identified as social commerce because these activities do not lead to any commercial activities such as buying and selling products or changes in attitudes on certain commercial events. Therefore, it is necessary that information sharing or other activities of social media involve commercial implications and intentions. Any kind of activity that leads towards commercial benefits falls into commercial activities (Liang, 2011).

2.2 Existing Systems

This section will be focused on looking at other systems in existence which are similar to the proposed system in one way or the other. There have been several platforms that have emerged in the art market in recent years

2.2.1 Artsy

Artsy is an online art store that collaborates with renowned art galleries, auctioneers and art fairs in the art market (Payments, 2017) which makes it one of the largest online art marketplaces. “Artsy envisions a future where everyone is moved by art every day. To get there, we’re expanding

the art market to support more artists and art around the world. As the leading marketplace to discover, buy, and sell fine art, Artsy believes that the process of buying art should be as brilliant as art itself. That's why we're dedicated to making a joyful, welcoming experience that connects collectors with the artists and artworks they love. " (Artsy, 2022).

Artsy is an online platform for discovering and collecting art. It features the world's leading galleries, museum collections, foundations, artist estates, art fairs and benefit auctions all in one place. Artsy's database is ever-growing with a database of over 500,000 images of art, design and architecture by 50,000 artists that span historical, modern, and contemporary artworks, and it includes the largest online database of contemporary art. Artsy is used by people who love art, people who love to go to museums, patrons, collectors, students and educators to discover, learn about and collect art (Murray, 2017).

2.2.2 Shopify

Shopify is among the leading choice for artists looking to sell their work mainly because it has a very comprehensive range of tools and services that cater for mainstream online stores and its very user-friendly interface (Giam, 2017).

Shopify takes advantage of both mobile and social commerce progressions to make features that are appealing to both sets of users in order to reach a wider range of audience. They can sell directly on their Facebook page for example, and can also sell through their mobile app. Thus, giving them a larger target audience.

Shopify Payments is a payment processing service that allows users to accept and process payments both online and offline. It was originally introduced in 2013 in North American markets and has further expanded to several countries around the world. Shopify, just like most ecommerce sites, generates their revenue by taking a set percentage of all transactions that happen on the website.

Shopify Fulfillment, also known as Shopify Fulfillment Network, was introduced only in USA in June 2019. With the fulfillment service, clients can choose to opt to allow Shopify handle the processing and delivering of goods. The way sellers will benefit is, Shopify can leverage the size of the delivery to decrease delivery cost and time.

Shopify can be described as a platform that connects clients to ecommerce platforms rather than an ecommerce platform itself. While Shopify's main goal is to provide clients the ability to sell online, they have sought to give these clients more options, one of which is the website's Point of Sales (POS) system. Shopify's POS allows clients to blend their online and offline sales efforts into one unified front. Customer information will be held in one central location, thereby unifying all channels into a single effort (Kyle, 2022).

2.2.3 Big Cartel

Big cartel's customer base is aimed at individuals who desire a simple store to start their business, which is signified in their motto; "We believe in the artist" (Giam, 2017). They put emphasis on owning a custom website instead of setting up a marketplace as this helps develop strong brand presence and the customers praised the simplicity in its setup and management along with how affordable it is (Big Cartel, 2017).

Big Cartel is geared towards helping independent artists and retailers and through them, you can create an online store, add products and services as well as accept payments and run promotions. Big Cartel offers a free plan that allows customers list up to 5 different products and has all the tools needed to run an online store, which makes it a good option for new businesses especially those with a limited number of products.

Big Cartel offers an affordable monthly cost even at the highest tier, which is cheaper than the lowest tier for some of its competitors like Shopify. They also don't charge transaction fees and all the themes in the store are available for free (Kriss, 2022).

2.2.4 Saatchi Art

Saatchi Art is one of the best places to buy artwork online. They help connect people in the market for art with artists all around the world that suits all budgets, styles and spaces. They pride themselves on delivering world-class customer service to all of their art buyers and they say on their website; "Shopping at Saatchi Art is like visiting a museum accompanied by a curator. You can find any style you're looking for" (Saatchi Art, 2022).

On Saatchi Art, you can sell all kinds of artwork ranging from paintings, photography, sculpture, drawings collages and a lot more. You can see your original artwork and even physical prints you

make yourself. Alternatively, you can make use of their Print-On-Demand service to sell your prints through them which gets rid of production and shipping work for the client.

When a sale is completed, the client will be notified via the email associated with their account and it will also be on their sales dashboard where details about all sales and their status will be. The customer always pays for shipping, which is automatically calculated by Saatchi based on the details about the weight, dimensions and what it will be shipped in from your location to the location of the customer.

Saatchi Art pays its clients in three ways; they can get paid by check, wire transfer, or PayPal. Payouts for sales can be requested 7 days after the client's artwork has been delivered safely to their customer and once the payout gets requested, they are usually fulfilled within 14 days (Sloan, 2021).

Saatchi Art also offers free advisory services by curators for whatever kind of art you might be looking for. The curator will personally pick 30 pieces for the customer to go through and no other sites offer such services for free.

2.3 Assessment of Strengths and Weaknesses of existing systems

2.3.1 Artsy

Being one of the bigger online art market places, artsy fails at one major thing, and that is; it focuses solely on art galleries and does not have anything to do with the artists themselves. An online art market should glorify the artists themselves together with their work. But in the case of artsy, it only glorifies the art galleries that have procured the artworks from these various artists.

Artsy is also not a free service as it was made for museums and the fees are approximately $1000 a month for galleries. The fees are different for museums, or auction houses etc. and of course for a local or independent artist, that is a bit of overkill.

The Artsy mobile app is available only on iOS which kind of restricts their customer base as android users do not have the option for an app (Menendez, 2018).

2.3.2 Shopify

Through Shopify, artists can set up a store to sell their art. But the downside is, it is not a marketplace and only links artists to third party sites like amazon and eBay for them to set up a

store and sell their work. Users also have problems putting up products on the store, and they experience crashes even when the slightest error occurs during the process of uploading an item for sale. Given that it links these sellers to third party sites, it is also difficult to find artists, which in turn, makes it difficult for the artists to find customers (Samsukha, 2021).

In the case of the POS system, it allows the possibility for mixed channel sales. That is, a customer can search for a product online and purchase it in a store, they can search for it in a store and buy it online, or they can buy it in a store and have it sent to their home address (Kyle, 2020).

2.3.3 Big Cartel

In the case of Big Cartel, they are focused mainly on providing a medium for artists to come and put their work up and not necessarily the artists or the artwork themselves. In addition, they have not given artists with room for scalability. That is; with the free plan, you can only put up 5 products. Even the highest tier plan (Diamond plan) restricts the artists to 500 products; which, depending on how much the artists grows, or how many works the artist has, could be very limiting (Kriss, Big Cartel vs. Shopify: Which Is Right for Your Business?, 2021).

Big Cartel also has restrictions on how many images you can upload with each item put up for sale. Big Cartel's competitors also offer features such as abandoned cart recovery, multiple sales channels, gift cards and loyalty programs, none of which Big Cartel has.

Big Cartel also lacks advanced customization and sales features and also minimal third-party integration. This means that Big Cartel are not the best option for larger sellers or those who want to grow their business quickly. Big Cartel also lacks in third-party integrations and some of the offers available require a payment to be made (Kriss, 2022).

2.3.4 Saatchi Art

In terms of exposure for artists, Saatchi art comes the closest as it is a website made for everything art; from the artists to the art itself. The only real downside is it does not have as much exposure as bigger sites like Artsy and Big Cartel. Also, they charge a massive 35% (Miller, 2017) in commissions, which, for local artists, could be a major hinderance.

Depending on what country it will be shipping to, there are also additional taxes and custom fees on items they purchase (Dawn, 2021).

Saatchi art will also create prints of artworks for sale instead of the actual artwork itself. The artist only has to upload a photo of the requested size and they will print and ship it. This can be a major issue as these prints are very easy to steal. And with art, once stolen, cannot actually be gotten back and will no longer yield the same value they should.

2.4 Establishing the Need for the Current Project

The art is the main point of attraction, but the potential customers are also interested in who is responsible for the work. Their personality, who they are, their passion, what inspires them, their vision and what message they are trying to convey with their art (Harjula, 2021). This project will not only provide a much-needed marketplace for the more local artists, but will also showcase all the above mentioned. It will also promote recycling and recycling through art in a bid to play a part in saving the planet.

Chapter 3

3.0 Methodology

This section is going to look at the structured process through which this project is going to be carried out.

3.1 Waterfall Methodology

As the name suggests, the waterfall methodology is a sequential process in software development where just as in a waterfall, where the water progressively falls from one altitude and keeps going down till it gets in the river, the cycle progresses sequentially from one stage to the other. In this methodology, the team only goes forward with the next stage after the previous stage is fully completed. Considerable amounts of time are spent at each stage of development till all requirements are fully met (McCormick, 2012).

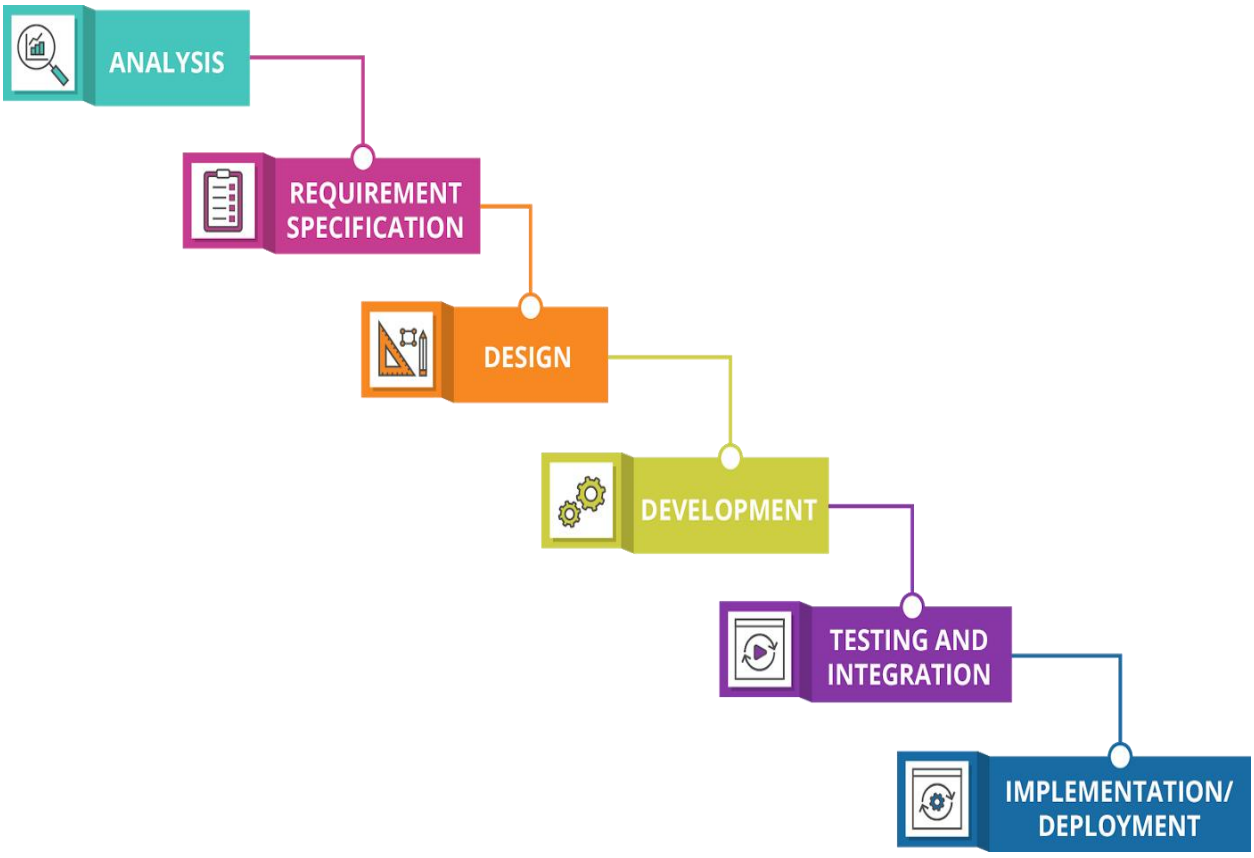
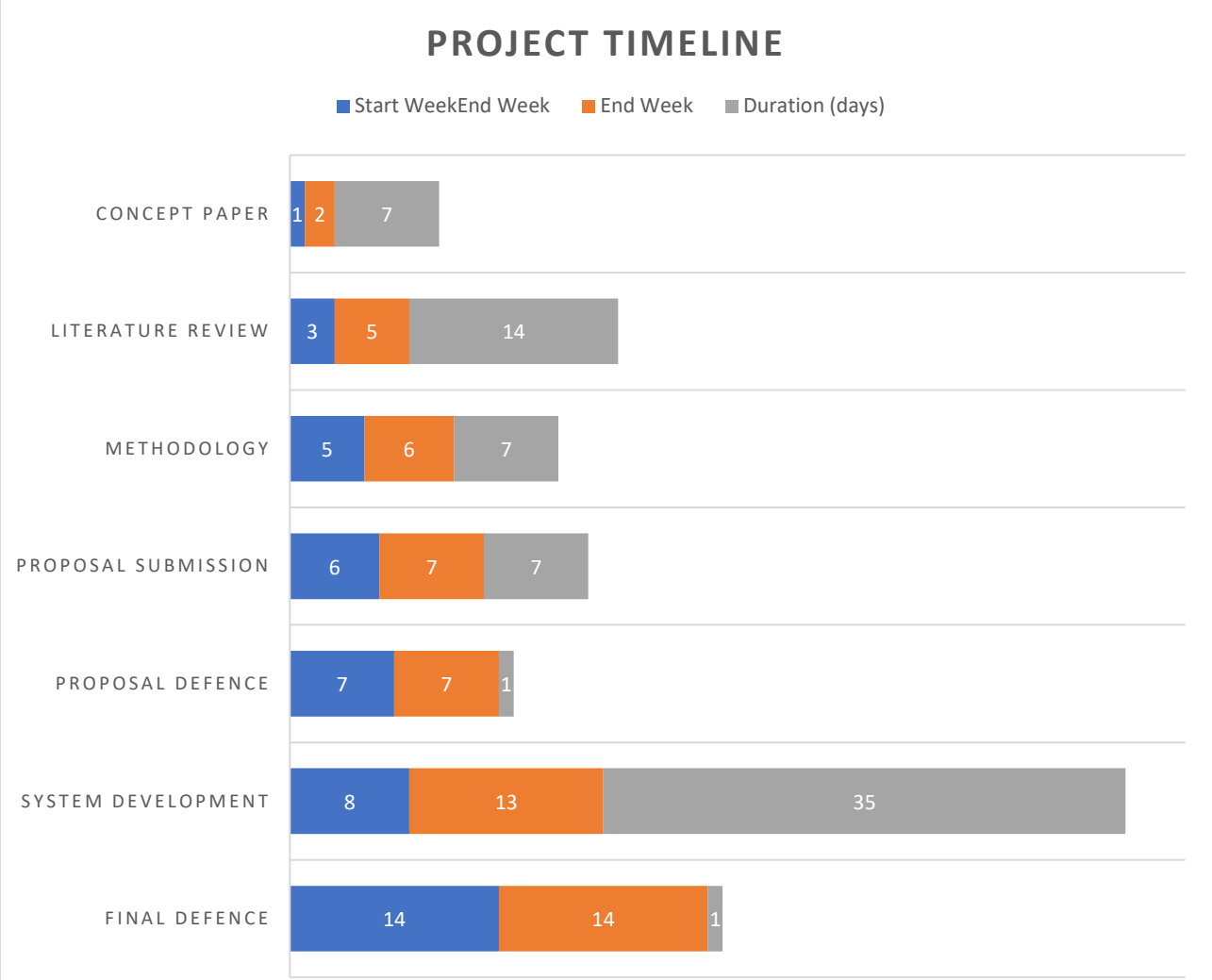


Fig 3.1 Waterfall Model

This methodology was selected due to the nature of the project and the nature of the semester the project is being taken in. the class started by writing the concept paper, then parts of the proposal (the different chapters) before finally the proposal itself. This way, we can ensure all parts are done properly before handing in the final copy of the proposal, and eventually, the final system and final document.

3.2 Timelines

The following is an estimated timeline of the entire project over the whole semester:



	Final Defence	System Development	Proposal Defence	Proposal Submission	Methodology	Literature Review	Concept Paper
Start WeekEnd Week	14	8	7	6	5	3	1
End Week	14	13	7	7	6	5	2
Duration (days)	1	35	1	7	7	14	7

Fig. 3.2 Project Timeline Gantt Chart

3.3 Budget

The following are the tools that will be used in bringing this project to fruition:

TOOL	PRICE (KSH)
LAPTOP	55000
USE OF A PRINTER	3000
VISUAL STUDIO CODE	-
XAMPP	-
INTERNET	5000
HOSTING	2000
TOTAL	65000

Fig. 3.3 Project Budget

CHAPTER FOUR

SYSTEM ANALYSIS AND DESIGN

4.0 Introduction

System analysis involves how the system will work in order for it to meet the requirements of the user while system design involves how the system is going to meet the set objectives. Together, they make up the system functional and non-functional requirements, its design constraints and stakeholders which we shall be going over in this chapter.

4.1 Architecture Design and Design Constraints

Architecture design involves plans for how the system will be distributed across multiple computers and what hardware, operating system and software will be used for each. The main objective is determining how the software components of the system will be assigned to the hardware of the system.

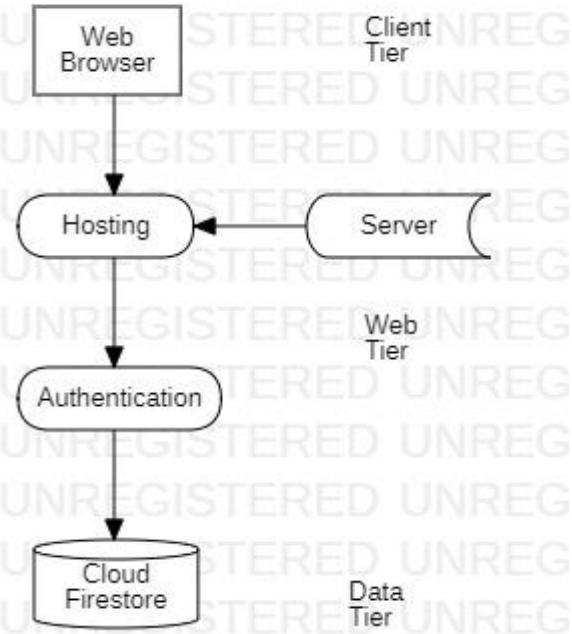


Fig. 4.1. System Architecture

Design constraints are the ones imposed on the design of the system. These are usually imposed by the customer, the organization or by external regulations. The constraints can be imposed on the hardware, software, interfaces or any part of the system. Examples could include a constraint

that the system must use a particular kind of hardware or software, or implement a specific interface protocol. Design constraints can have a significant impact on the design of the system and should be validated before imposing them on the system. One of the constraints of this system is; it must be made without the use of any frameworks and it must be done using HTML, JavaScript and CSS. This is to reduce the developer's dependency on third party code.

4.1.1 User and System Requirements

User requirements are statements (and diagrams) of what services the system is expected to provide to the users of the system and the constraints under which it must operate. The user requirements could vary from broad statements of the system features to detailed features and descriptions of the system functionalities.

System requirements are requirements at system level that describes functions which the system will fulfill to satisfy the stakeholder's requirements. They are more detailed descriptions of the system functions, services and operational constraints. The system requirements document should define exactly what is to be implemented by the system.

In short, system requirements describe what the system will do while the user requirements describe what the user does with the system.

4.1.2 Functional Requirements

Functional requirements describe the functions the system must perform which helps us capture the intended behavior of the system. Basically, they are requirements that specify what the system will do (Martin, 2022). The functional requirements of the system include:

Admin

- Admin will be able to sign into the firebase console
- Admin will be able to manage users through the console
- Admin will be able to edit, add and delete users, user and product information through the console
- Admin will be able to assign the role of user and seller to registered users from the console

Registered User

All registered users will be able to:

- Login through the login page and logout using logout button
- Register as a seller
- Search for products
- View products
- Make orders
- Pay for orders

Sellers

Sellers will be able to:

- Add products
- Edit and delete existing products
- Receive payments for products

Guest User

Guest users will be able to:

- View existing products
- Search for existing products
- Register to become a user

Stripe

It will have access to the payment gateway for executing payments

4.1.3 Non-Functional Requirements

Non-functional requirements define the quality attributes of a software system and represent a set of standards used to judge the specific operation of the system. In other words, they are requirements that specify how the system performs certain functions. It describes how the system will behave and what limits there are on its functionality (Martin, 2022).

The non-functional requirements of the system include:

Performance Requirements

- The database will be able to accommodate as many new users as possible

- The application shall support multiple users at the same time

Security Requirements

- The system will restrict communication between some areas of the program. For example, a user who is not a seller will not be able to access the seller page without first registering to be a seller
- Check data integrity for login details to make sure existing emails do not get registered twice and wrong passwords are not accepted
- Passwords on the admin console for users will be encrypted in case an unauthorized user gets access to admin panel so they won't be able to gain access into any accounts

Portability Requirements

The site shall be accessed via any medium (mobile, tablet, PC, etc.)

Maintainability

The user will be able to reset all stored entries to their default.

Reliability

All data entries will be committed to the database at the time of entry

Usability

- The UI will be straightforward and easy to use
- Error prevention will be provided through spellchecks and free-text input

Availability

Data will be rebuilt on every start-up. Default values will be assigned when the site is accessed

4.1.4 Stakeholders of the System

The stakeholders in this system include people who were involved in the development and will be involved in the use of the system. Some of these include; the developer, the customers, the users buying products, and the users selling the products.

4.2 Feasibility Study of the proposed System

A feasibility study is designed to reveal whether a project is doable. It is an assessment of how practical a proposed project is and is part of the initial design stage of any project. It is performed to uncover the strengths and weaknesses of a project and can help identify and then assess the opportunities and threats present in the environment, the resources required for the project and how probable it is to succeed in that environment.

4.2.1 Technical Feasibility

Technical feasibility is determining whether the system can be developed using the existing equipment and technology available to the developer.

For this system, it is technically feasible because the hardware and software being used to develop the system include; a core i5 7^{th} gen Lenovo v510 laptop running on windows 11 pro with 12GB RAM and the code is being written on visual studio code. The above listed specs will be more than sufficient to fully develop the system in the given time.

4.2.2 Economic Feasibility

Economic feasibility is determining if there will be sufficient benefits in creating the system, i.e., it is cost acceptable or if the cost is too high.

The system is economically feasible as the hardware and software used to develop it were readily available from the start and the payments made to the cloud platforms that hold all the data were minimal. And with the site taking 15% of every sale, it will be easy to continue to run this site moving forward.

4.2.3 Operational Feasibility

Operational feasibility is how well the system will solve problems and take advantage of opportunities and how well it satisfies requirements. From when it goes live, it will be the main medium through which local artists sell their work and with proper advertisements and proper reach, it could expand beyond just this country.

4.3 Design Methodology

Design methodology gives a logical and systematic means of proceeding with the design process together with guidelines for making decisions. In this project, the waterfall methodology was employed.

4.3.1 Waterfall Methodology

The waterfall model is a sequential development process that flows through all phases of the project in order with each phase fully being completed before the next phase begins. The success of the waterfall methodology depends on the amount and quality of work done at each stage, while documenting everything in advance. Since most of the documentation is done upfront, an estimate of time needed for each stage are more accurate, which means a release date can also be accurately predicted. If parameters are changed along the way, it will hard to change the course of the project (Adobe, 2022).

4.3.2 Waterfall Methodology Stages

The waterfall model involves the following stages:

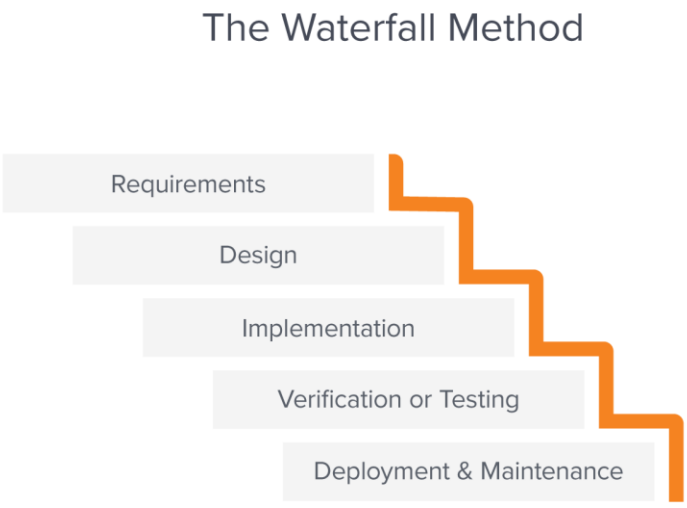


Fig. 4.2. The Waterfall Model

Requirements

In the waterfall model, it is believed that all requirements can be defined upfront and the project manager tries to get a detailed understanding of the expected requirements. These requirements are written in a single document and describes each stage of the project including its costs, risks, dependencies, and timelines for completion (Adobe, 2022).

Design

In this stage, the developers come up with a technical solution to the problems defined by the requirements including scenarios, layouts and data models. First, a logical design is created that describes the scope of the project, then that is transformed into a physical design using specific hardware/software technologies (Adobe, 2022).

Implementation

Once the design has been done, the programmers code the applications based on the already defined requirements and specifications. If significant changes are required at this stage, we will have to go back to the design phase to make those changes (Adobe, 2022).

Verification/Testing

Before a system can be released to customers, testing needs to be done to ensure it has no errors and all requirements have been completed, thereby ensuring good user experience with the system (Adobe, 2022).

Deployment/Maintenance

Once the system has been deployed and released to the customers, the maintenance phase will begin. And as defects are found by the users, a team will be assigned to fix those errors and release them in the form of version updates.

4.3.3 Advantages of the Waterfall Model

Some of the benefits include:

Developers can spot design errors during the analysis and design stages which will help prevent writing error filled codes in the implementation phase.

The total cost of the project can be accurately estimated right from when the requirements have been defined.

With this structured approach, it is easier to measure progress according to the already clearly defined milestones.

Developers who join the project in between can easily catch up since everything that needs to be done would have already been defined in the requirements document (Adobe, 2022).

4.3.4 Disadvantages of the Waterfall Model

Some of the disadvantages include:

Projects can take longer to deliver with the sequential approach than with an iterative one.

Clients don't usually fully know what they want and asking for changes in between will require going back to the previous stage to add those changes which is quite difficult to accommodate.

Clients are not involved in the design and implementation stages.

When one phase is delayed, all other phases are delayed (Adobe, 2022).

4.3.5 Conclusion

The waterfall model is adopted by project managers who are faced with projects that don't have ambiguous requirements, offer a clear picture of how things will move forward, and involves clients who are unlikely to change the scope of the project once it begins. In other words, if the project manager prefers clearly defined processes where all parameters are known upfront, then the waterfall model is the way to go (Adobe, 2022).

4.4 System Design Diagrams

A system diagram is a visual representation of a system, its components and their interactions. Paired with the documentation for the system, it can capture all the essential information of a system's design. A system is marked with a box, which represents the system's boundary and completely contains it (DesignWIKI, 2020).

4.4.1 Use Case Diagram

A use case diagram is a form of the system being developed which specifies the expected behavior of the system and not exactly how it will do them. They are denoted both by a text and visual representation of the system. It is a good way to model the system from the user's perspective and it effectively communicates a system's behavior in the user's terms (Paradigm, 2022).

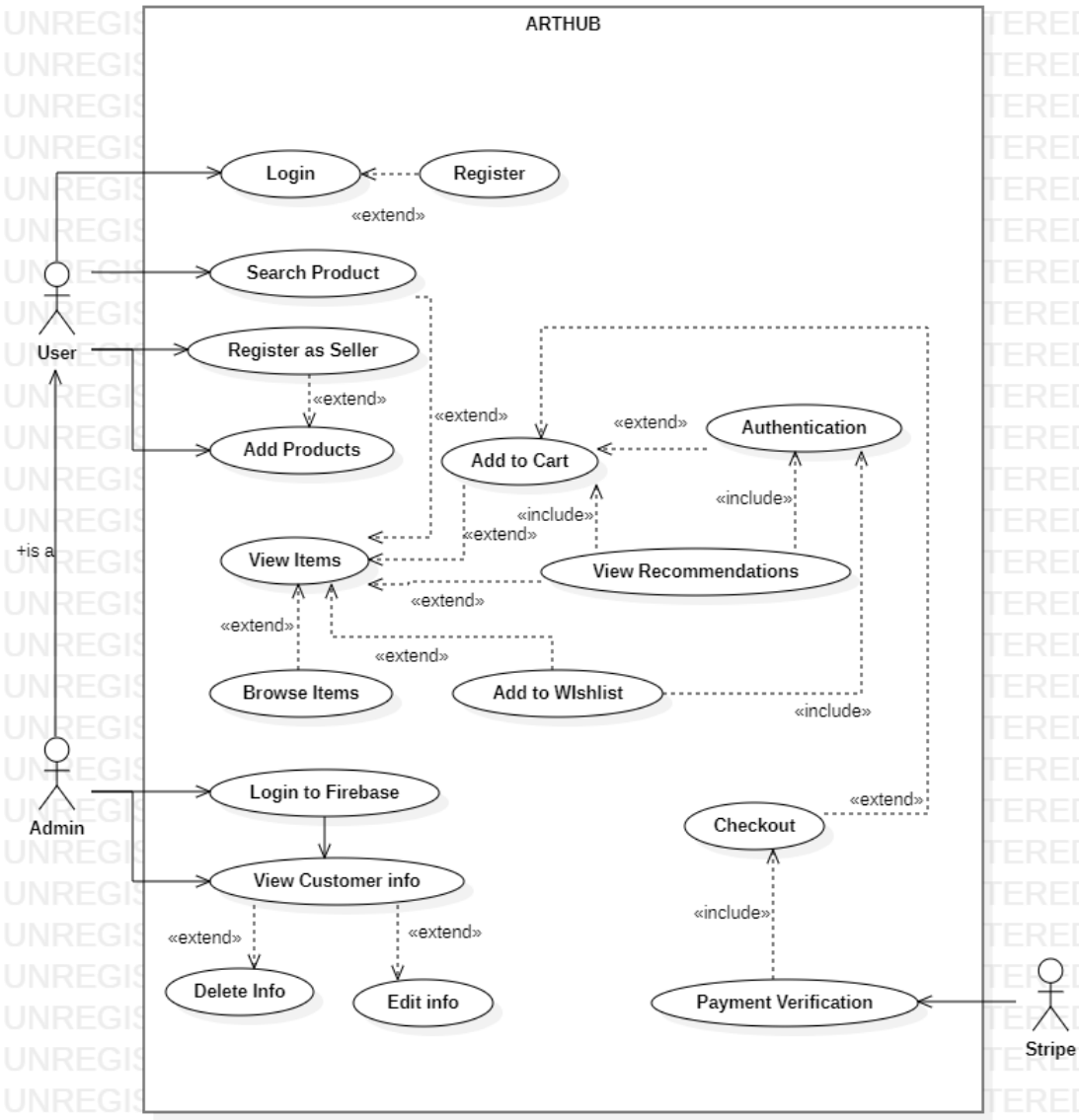


Fig. 4.3 Use Case Diagram

4.4.2 Class Diagram

A class diagram represents the static view of an application. It is not only used for visualizing, describing and documenting different aspects of the system but also for constructing executable code for the system. It describes the attributes and operations of the different classes and also the constraints imposed on the system (Tutorialspoint, 2022).

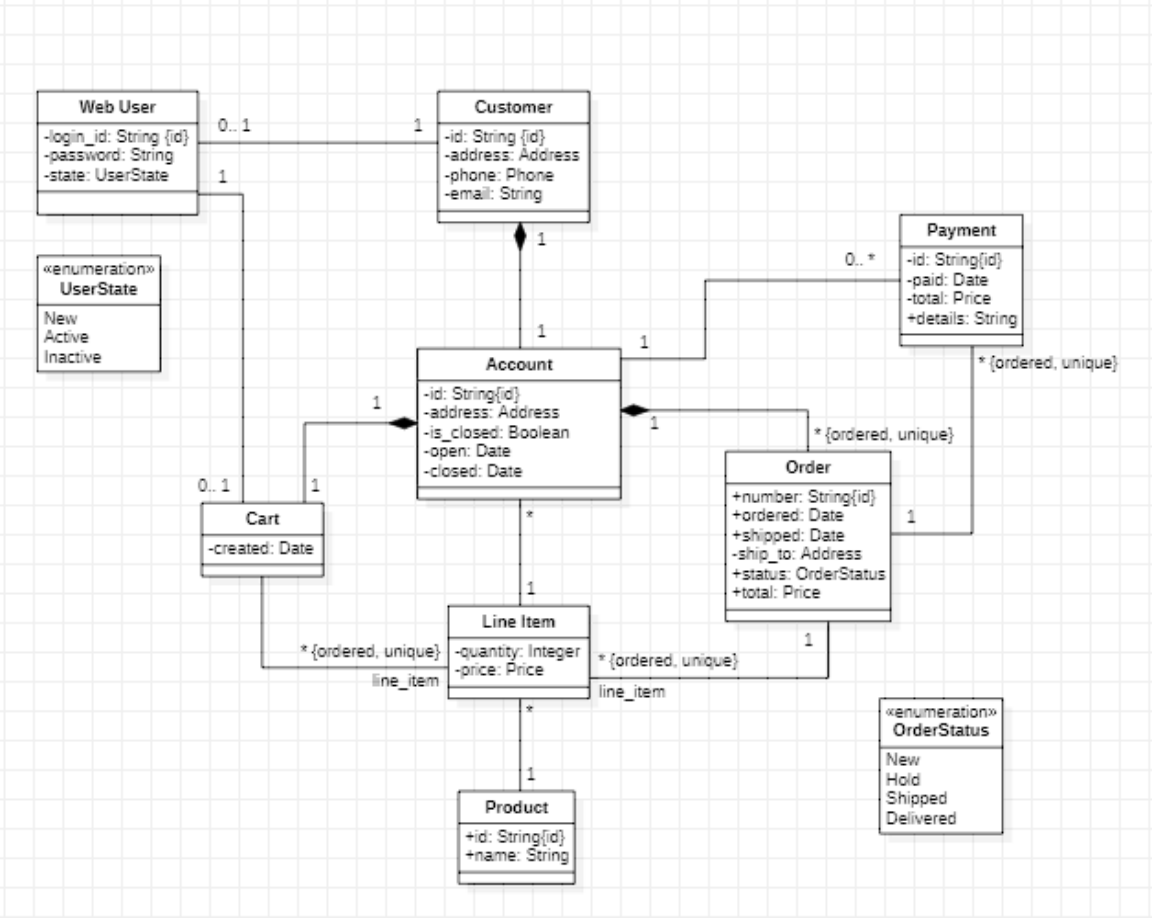


Fig. 4.4 Class Diagram

4.4.3 Activity Diagram

An activity diagram is a flowchart that represents the flow from one activity to another and each activity can be described as an operation of the system. The control flow is shown from each operation and the flow can be sequential, branched or concurrent (Tutorialspoint, UML - Activity Diagrams, 2022).

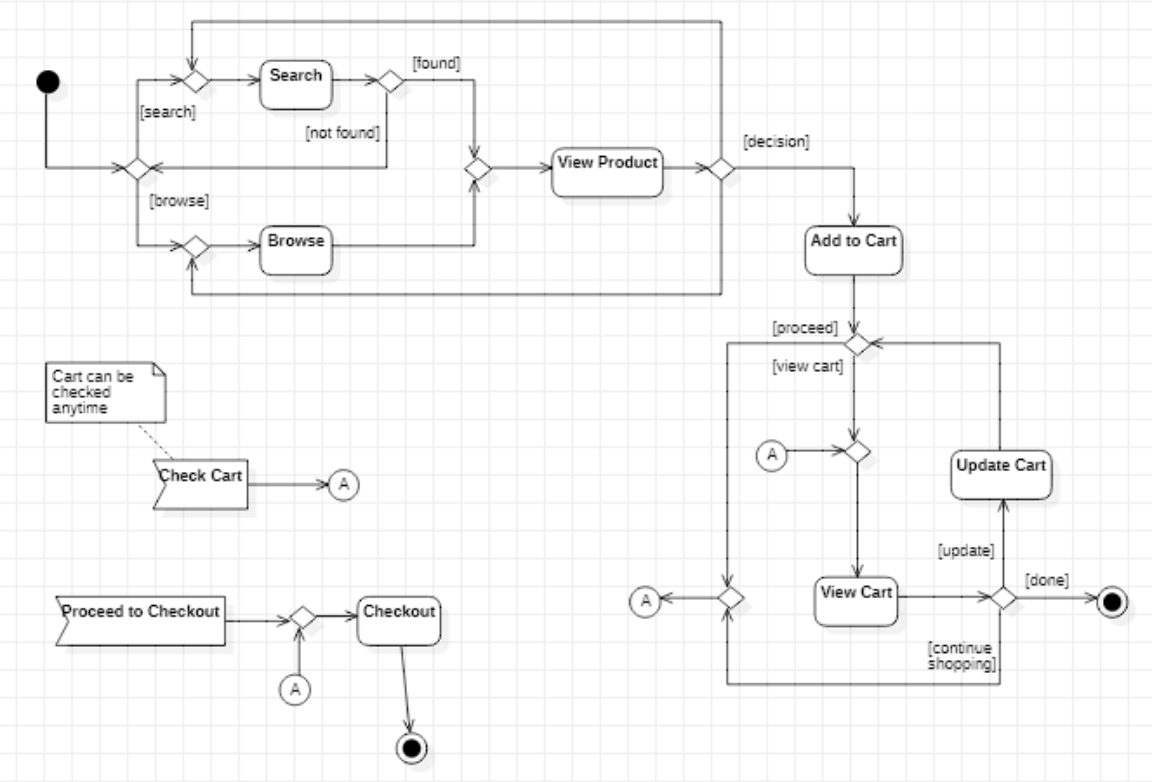


Fig. 4.4 Activity Diagram

4.4.4 Sequence Diagram

A sequence diagram focuses on processes and objects that work simultaneously and the messages exchanged between them to perform a function before its life cycle ends. It is used by developers to understand requirements for the system or to document an existing process (Lucidchart, 2022).

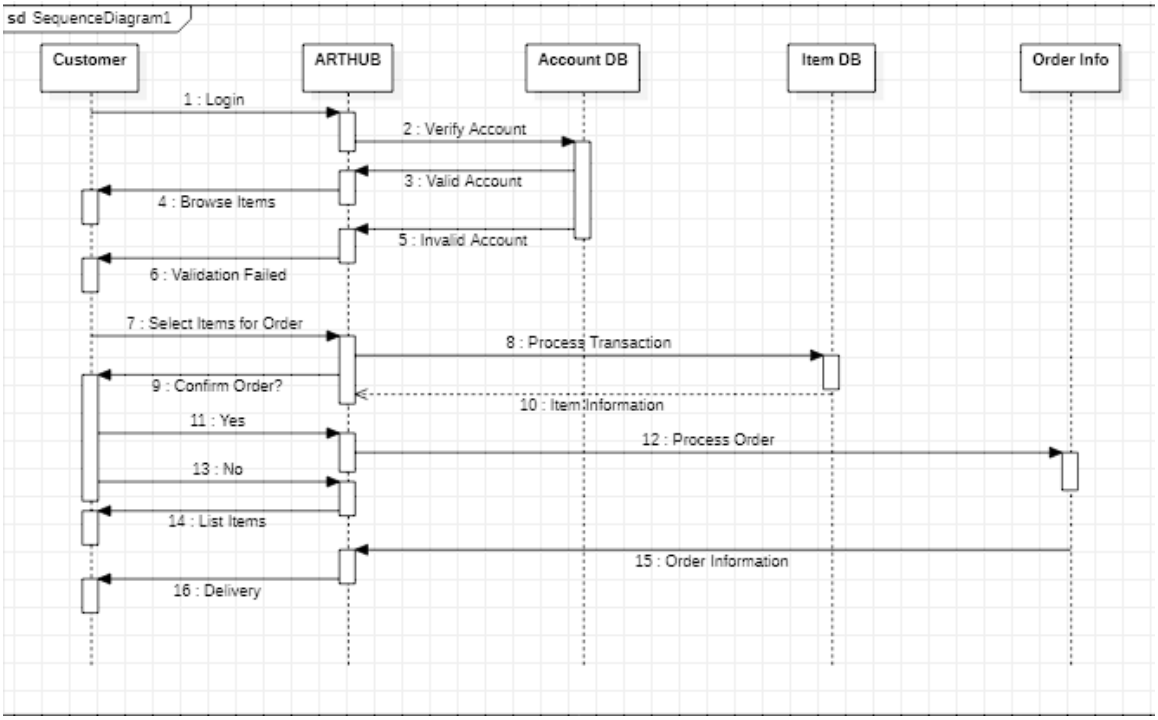


Fig. 4.4 Sequence Diagram

4.4.5 Flowchart Diagram

A flowchart is a diagram that depicts a process, system or algorithm and is used widely in multiple fields to document, plan, improve and communicate complex processes in clear, easy to understand diagrams.

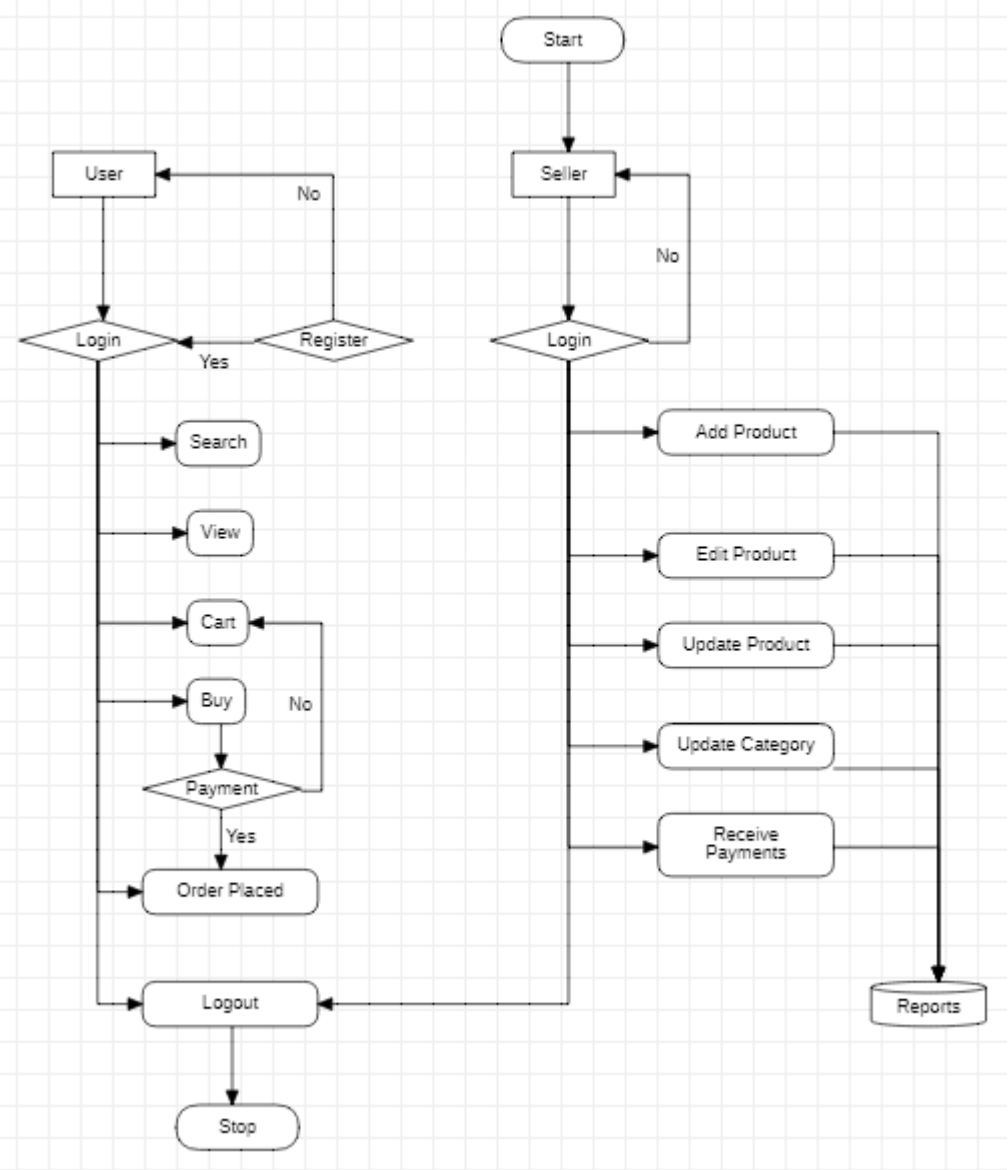


Fig. 4.5 Flowchart

4.5 Data Flow Diagrams

A data flow diagram shows the flow of information for the system and the processes within the system. It uses symbols to show data inputs, outputs and storage points and the routes between each destination.

4.5.1 DFD – Level Zero

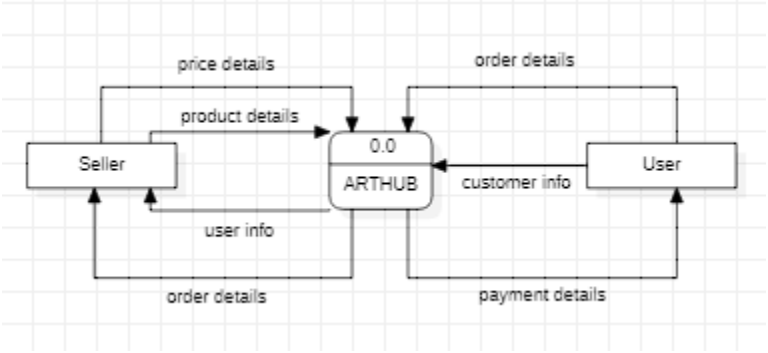


Fig. 4.6 DFD – Level Zero

4.5.2 DFD – Level One

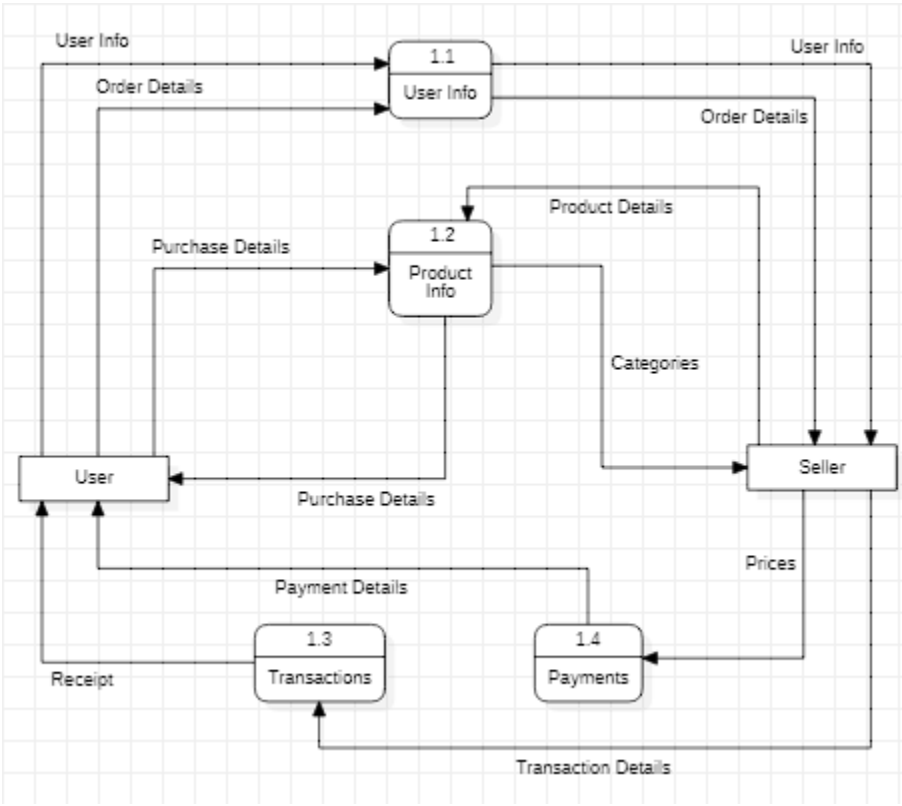


Fig. 4.7 DFD – Level One

4.5.3 DFD – Level Two

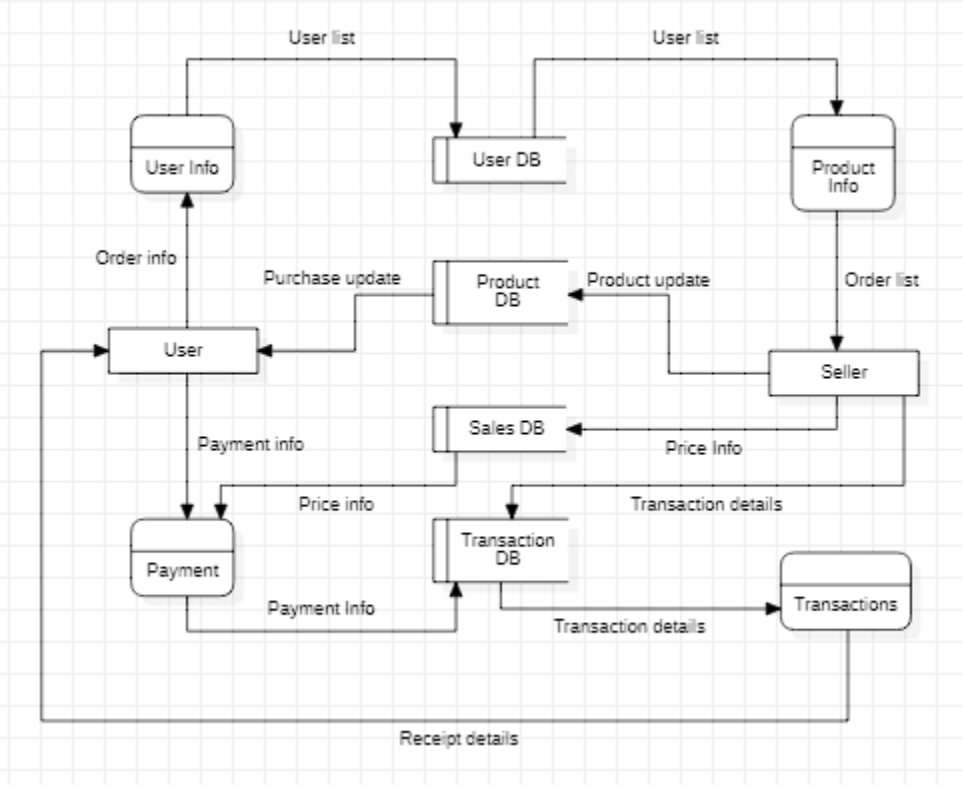


Fig. 4.8 DFD - Level Two

4.6 Database Design

Database design is a collection of tasks or processes that enhance designing, development, implementation and maintenance of data management systems. Designing a database reduces costs on maintenance, thereby improving data consistency and the designer should follow the constraints on the system and decide how the elements correlate and what kind of data will be stored in it (Javapoint, 2022).

4.6.1 Logical Data Model

A logical data model is one that describes data elements in detail and is used to develop visual understandings of data attributes, entities, keys and relationships. This model represents definitions and characteristics of data elements that stay the same throughout changes in technology (Lee, 2021).

4.6.1 Entity Relationship Diagrams

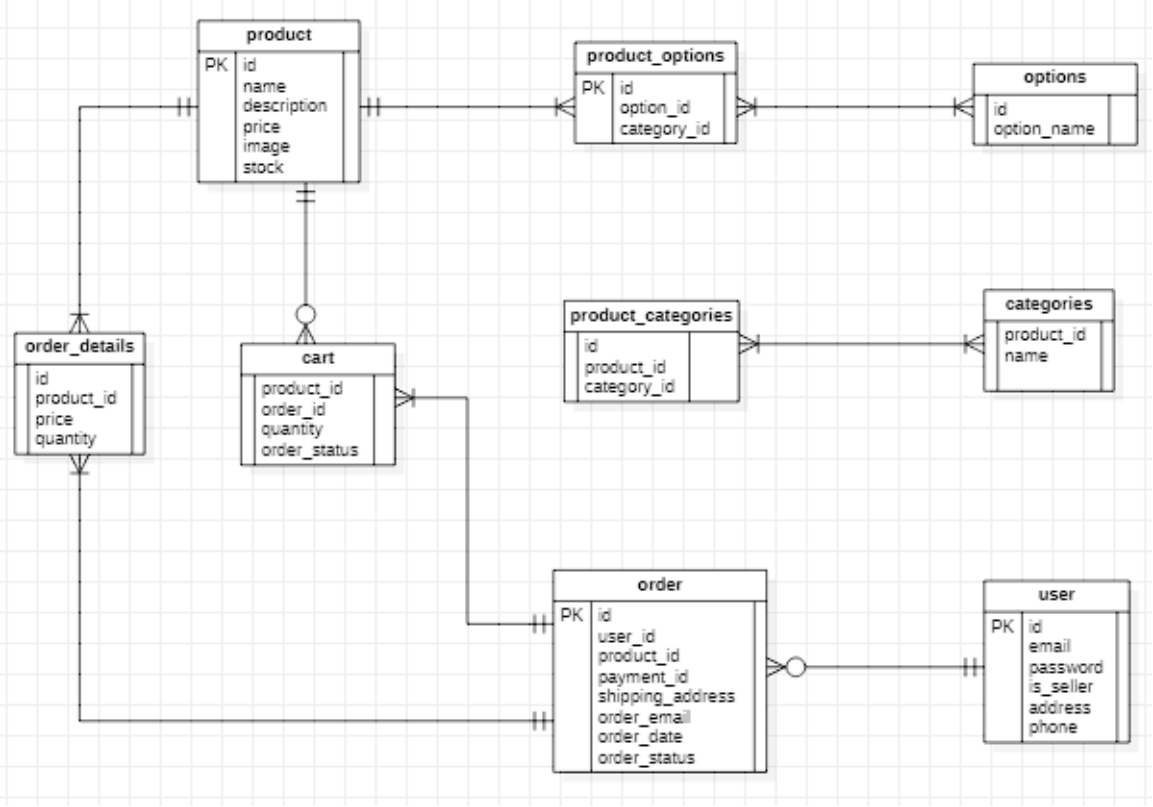


Fig. 4.9 ERD

1 Normal Form

User ID	User Name	User Phone	User Address
1	John	7272332222	USIU
1	John	7272332222	USIU
4	Jane	5637284943	Roysambu
3	Joe	9234728494	Githurai
3	Joe	9234728494	Githurai

Fig. 4.10 1 NF

2 Normal Form

User ID	Order no.
1	44
1	12

4	37
3	7
3	8

Order no.	Price
44	1000
12	1930
37	17000
7	350
8	100

Fig. 4.11 2 NF

3 Normal Form

User ID	User Name	User Zip
1	John	00600
2	Jimmy	00700
3	Joe	00800
4	Jane	00900
5	James	00100

User Zip	User County	User Town
00600	Nairobi	Nairobi
00700	Kisumu	East Kolwa
00800	Mombasa	Bamburi
00900	Mombasa	Belewa
00100	Nakuru	Naivasha

Fig. 4.12 3 NF

CHAPTER FIVE

SYSTEM IMPLEMENTATION

5.0 Introduction

System implementation is the process of making sure the system is functioning as it should and fully operational. This stage allows users handle the system to evaluate it and provide feedback. It is also a set of procedures performed to fully complete the design of the system according to specifications and to test, install and begin the use of the system. Some of the goals in this stage include; to complete the design of the approved system, to write, test and document the procedures as required by the system document, to make sure the personnel can make use of the system, and to determine if the system meets the requirements (OpenHongKong, 2016).

5.1 Database Implementation

Database implementation is the process of installing, configuring, customizing, running and testing the database on the system then integrating it with the system applications (EntInt, 2022). For this system, the Firebase Realtime Database, a cloud-hosted NoSQL database which allows users sync data between the system and users in real time, was implemented across the system. Since it is cloud based, it improves scalability on the website since any user will be able to use the system from anywhere in the world.

5.2 Interface Implementation

The user interface for the system was implemented fully using HTML, CSS, JavaScript, express, and node.js. No frameworks or libraries were used, this was to ensure the developer was able to debug the program easily since they didn't have to rely on already written code.

5.2 System Development Tools

The tools used in the development of this system include:

- Visual Studio Code
- Firefox
- Firebase Console
- AWS Console
- Stripe Console

5.2.1 Choice of Programming Language

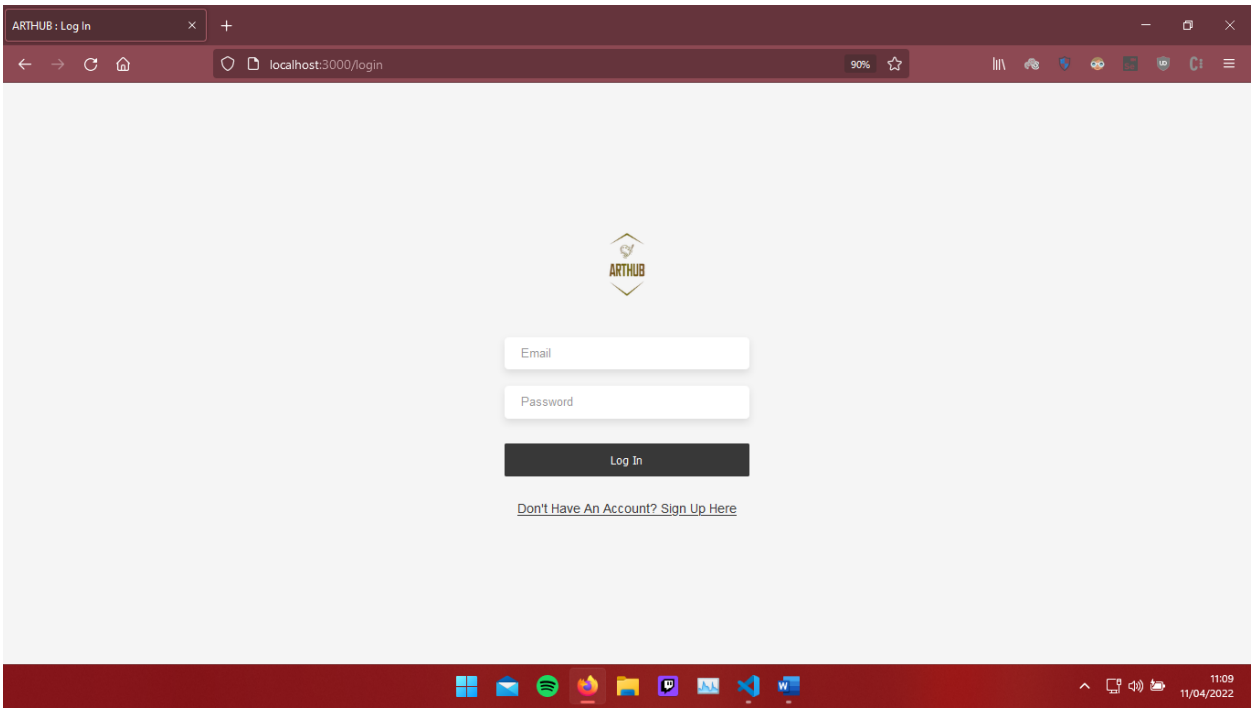
The languages used to build this system HTML, JavaScript and CSS. HTML provides us with the basic structure of the site, which is enhanced by CSS and JavaScript. CSS gives the site formatting and layout, while JavaScript controls the behavior of the different elements.

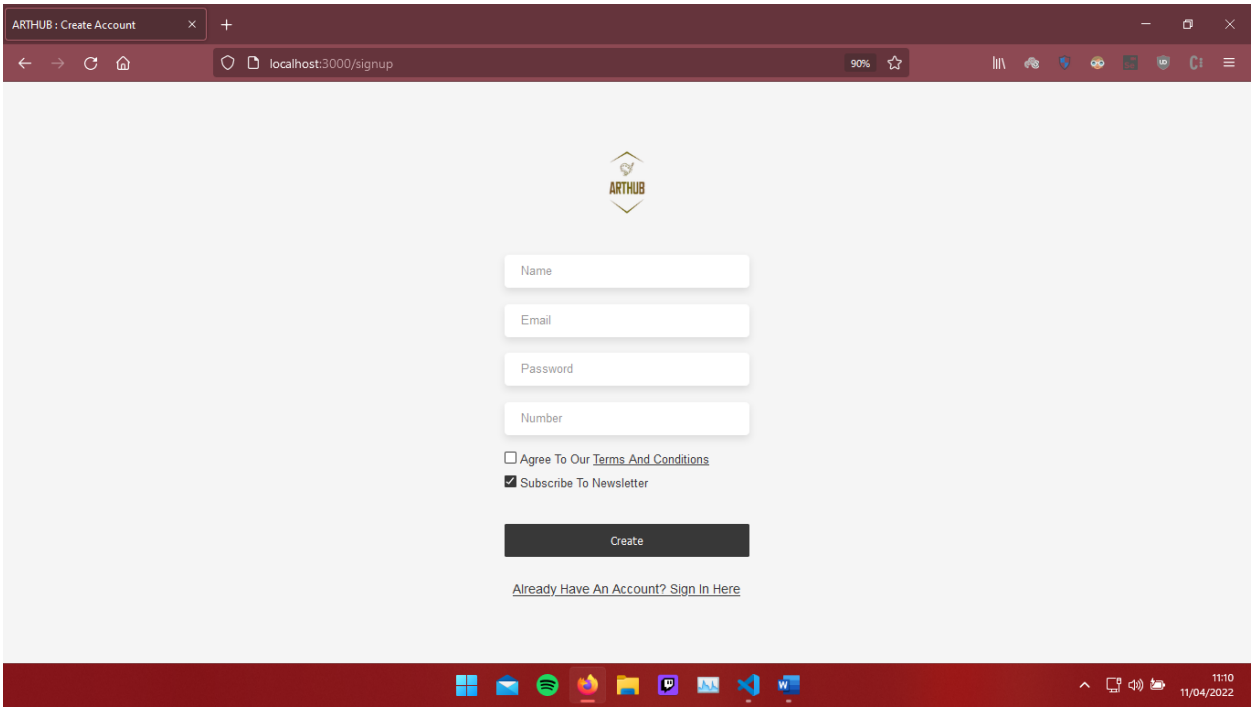
5.2.2 System Design Tools

As shown fully in the previous chapter, the design tools used to visualize this system include; a use case, DFD diagrams at different levels, ERDs till the third NF, flowcharts, activity, class and sequence diagrams.

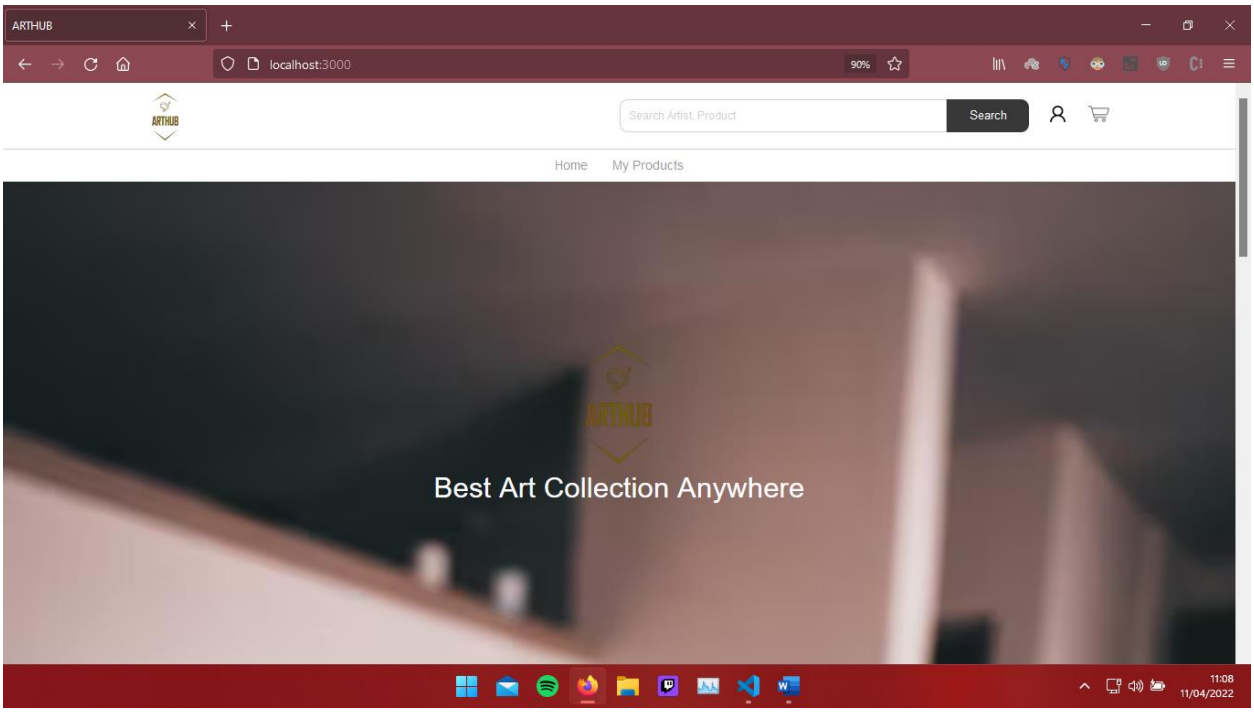
5.3 Sample Screenshots and Descriptions

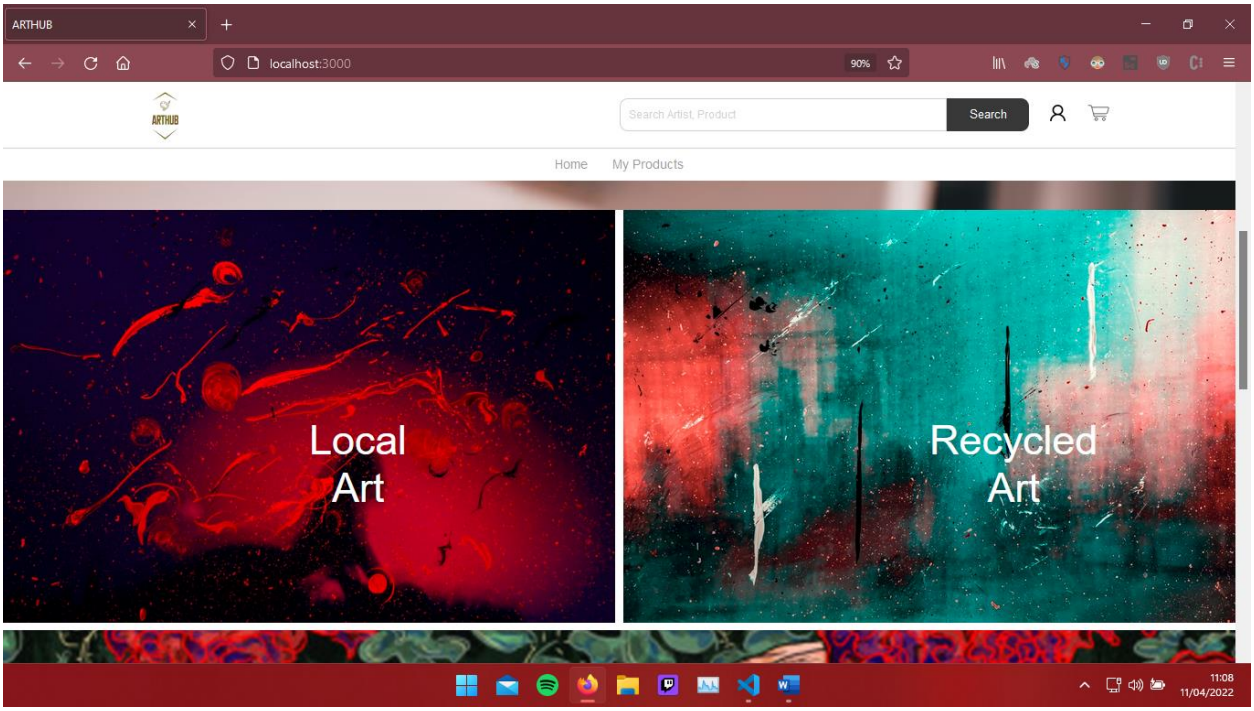
Login/Signup

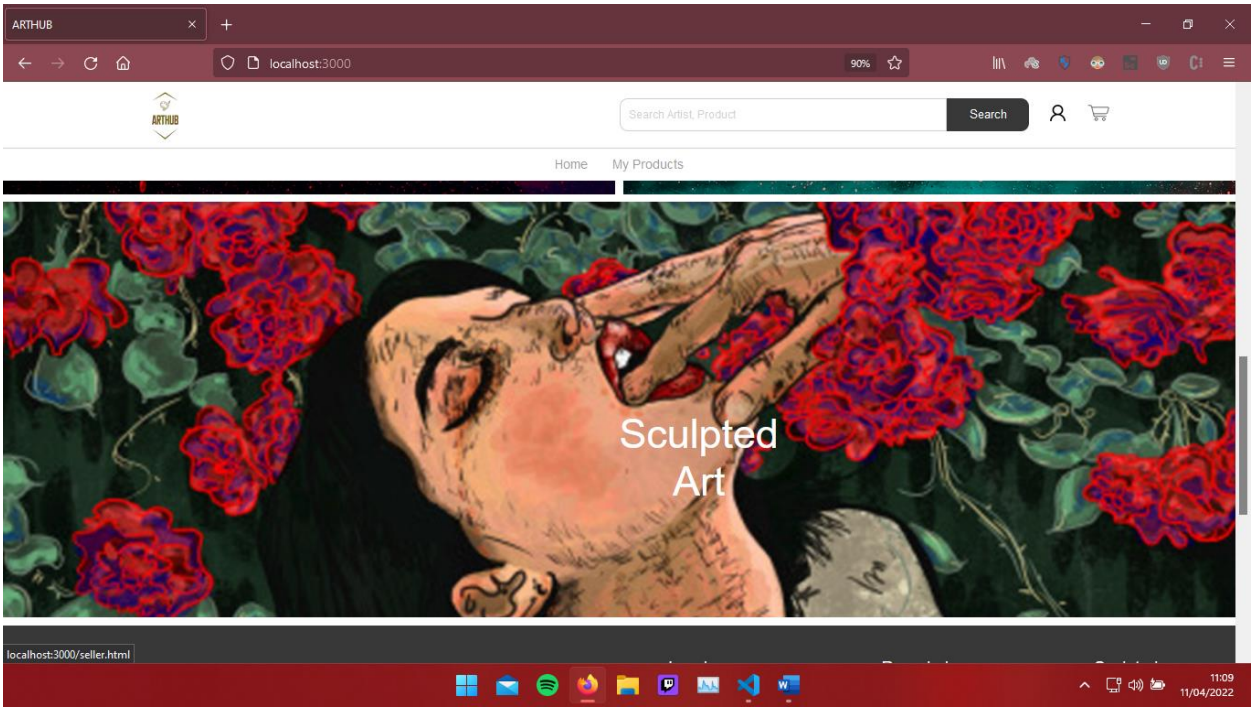



ARTHUB : Create Account
localhost:3000/signup
90%
ARTHUB
Name
Email
Password
Number
Agree To Our Terms And Conditions
Subscribe To Newsletter
Create
Already Have An Account? Sign In Here
11:10
11/04/2022

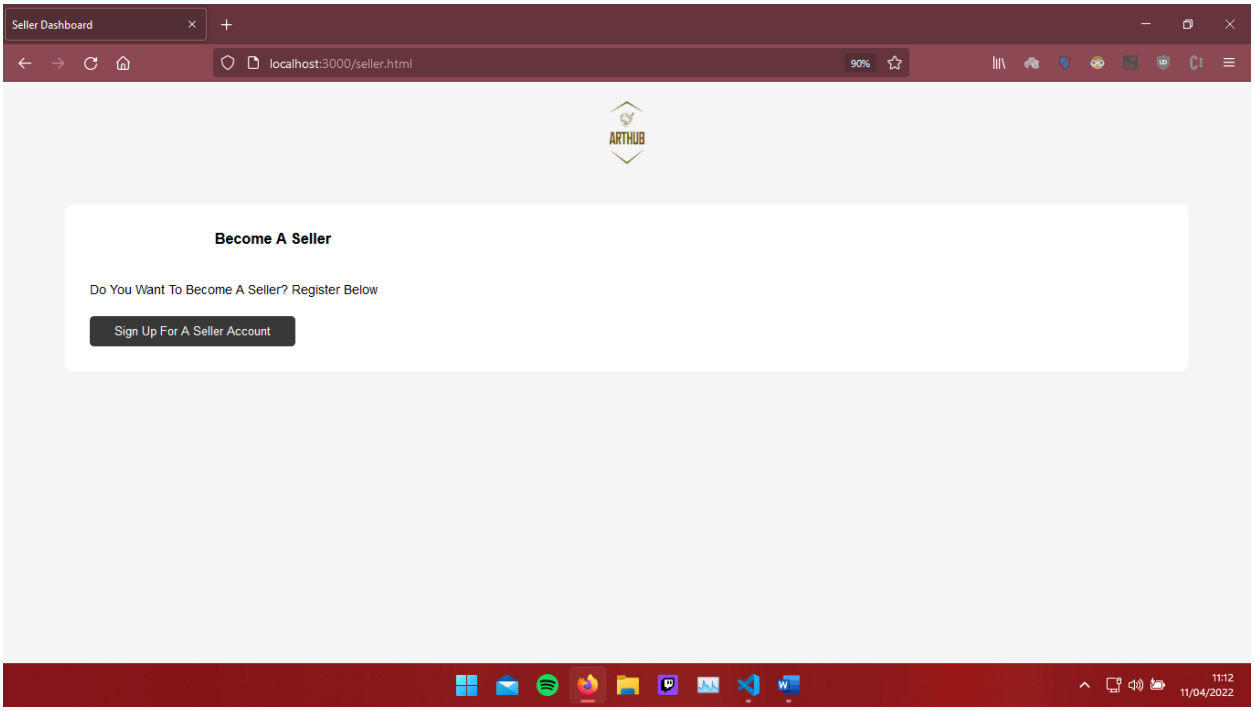
Homepage

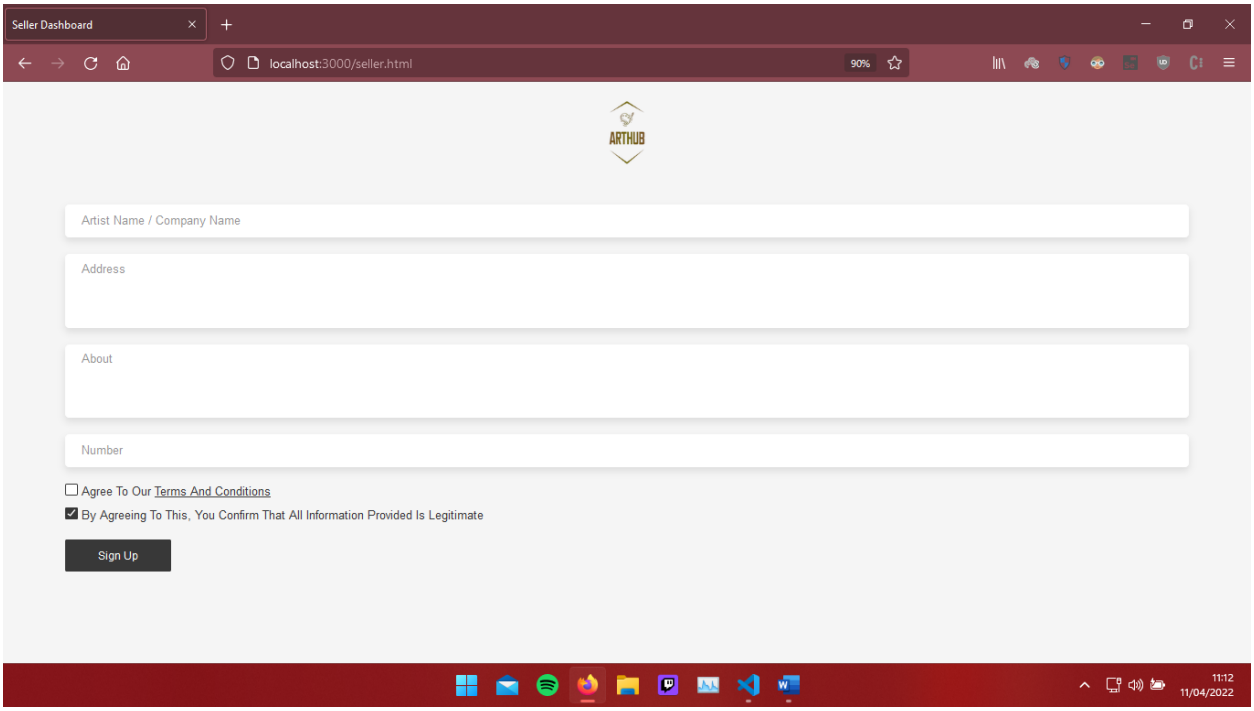

ARTHUB
localhost:3000
90%
ARTHUB
Search Artist, Product
Search
Home
My Products
ARTHUB
Best Art Collection Anywhere
11:08
11/04/2022



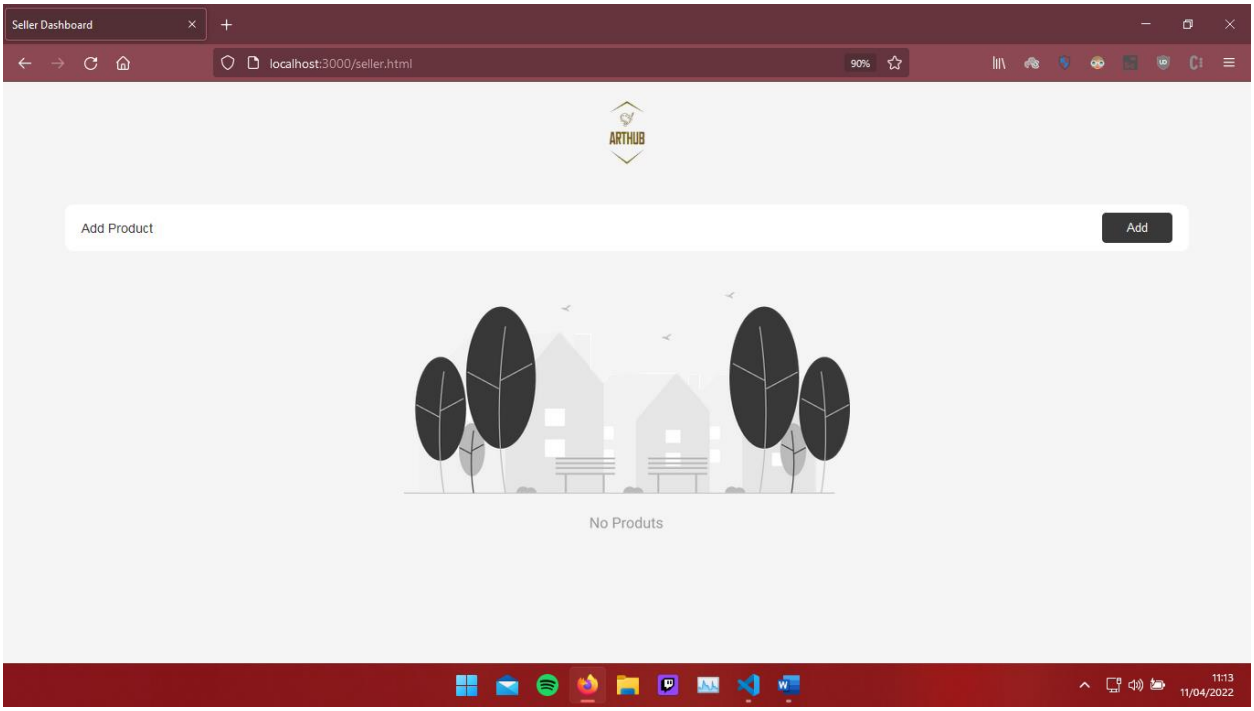


Seller Registration Page

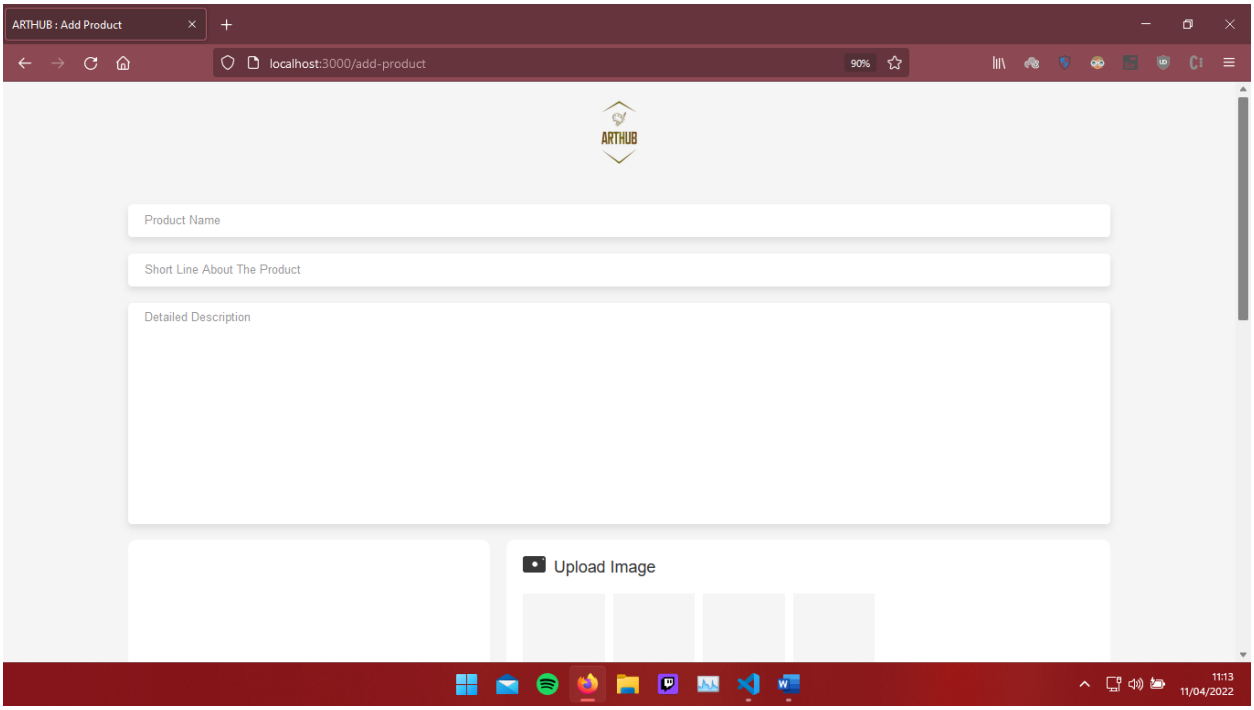


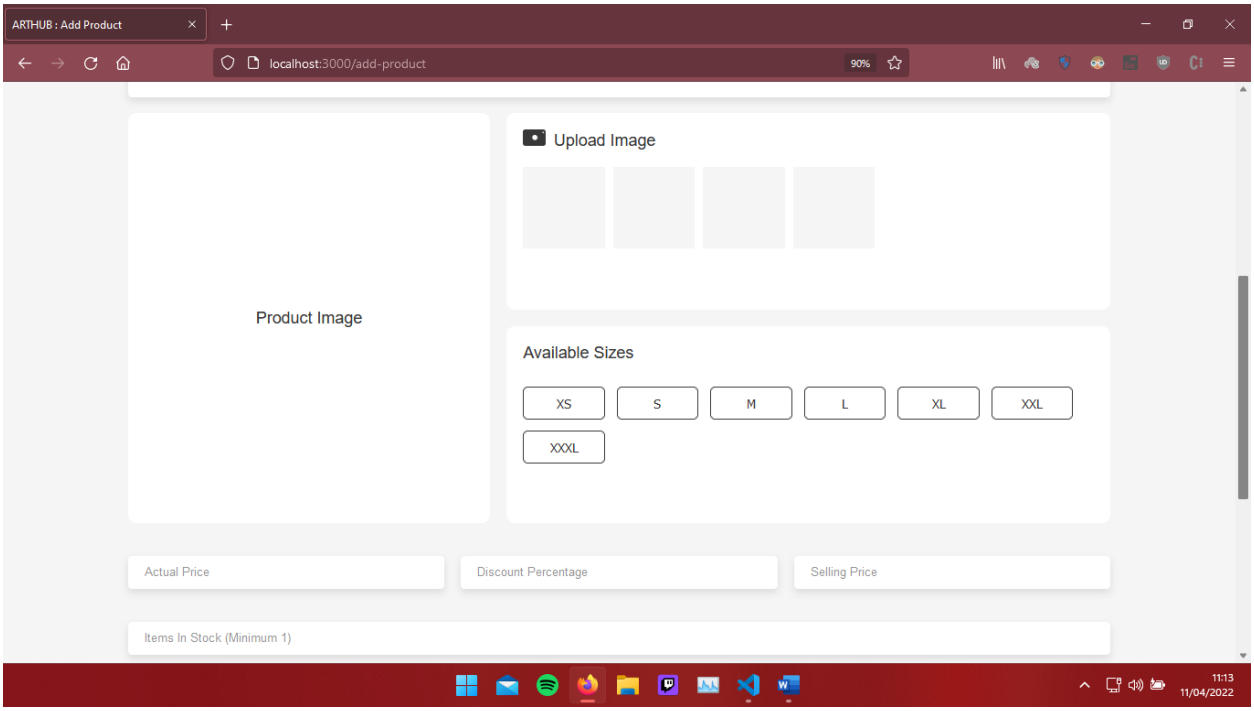


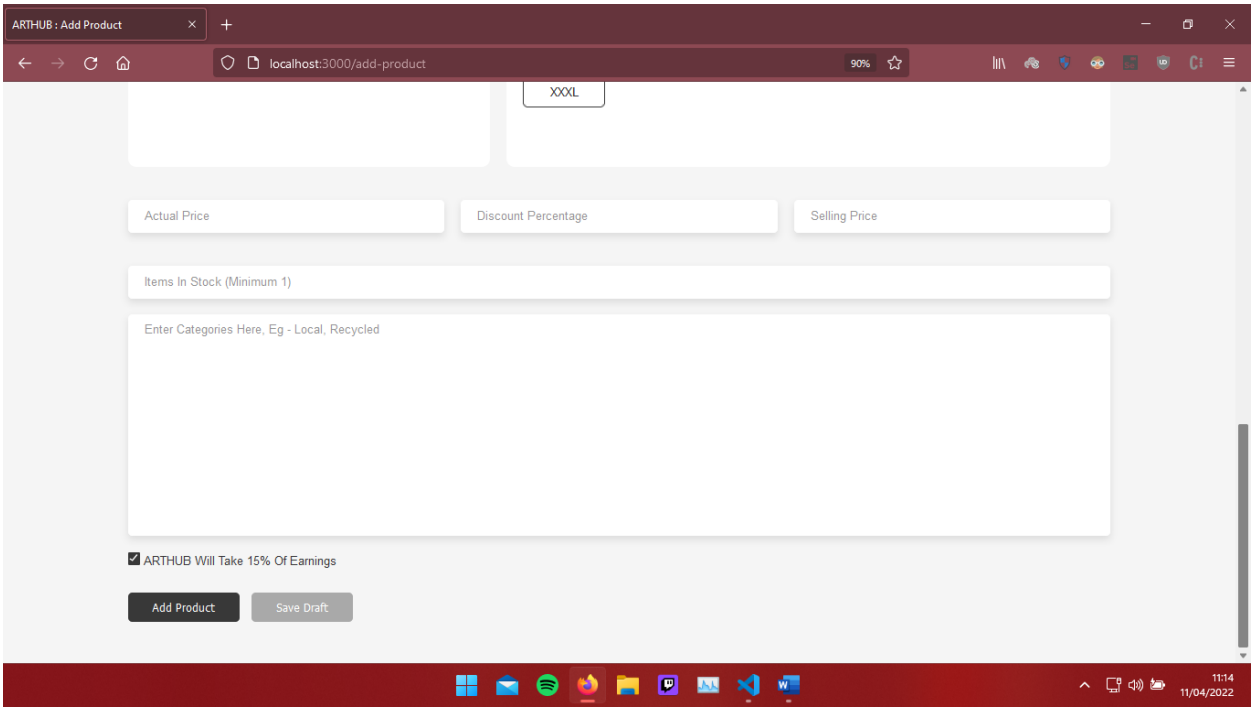
Seller Products page



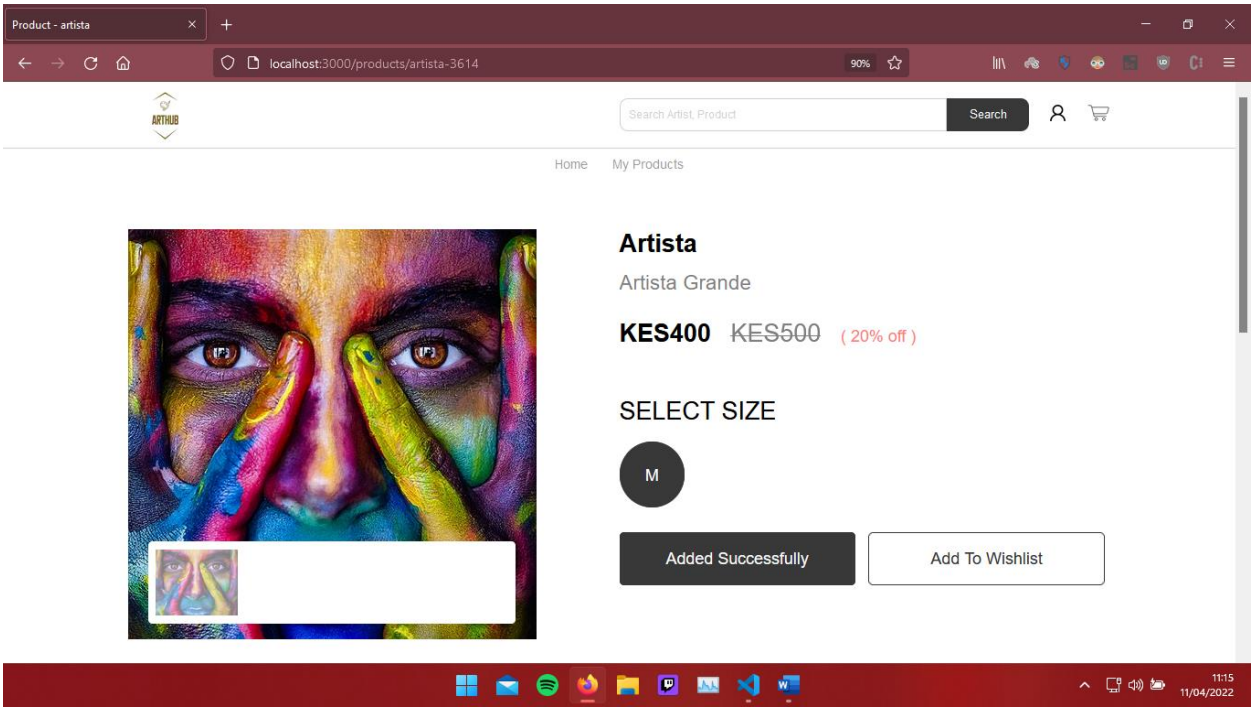
Adding a Product

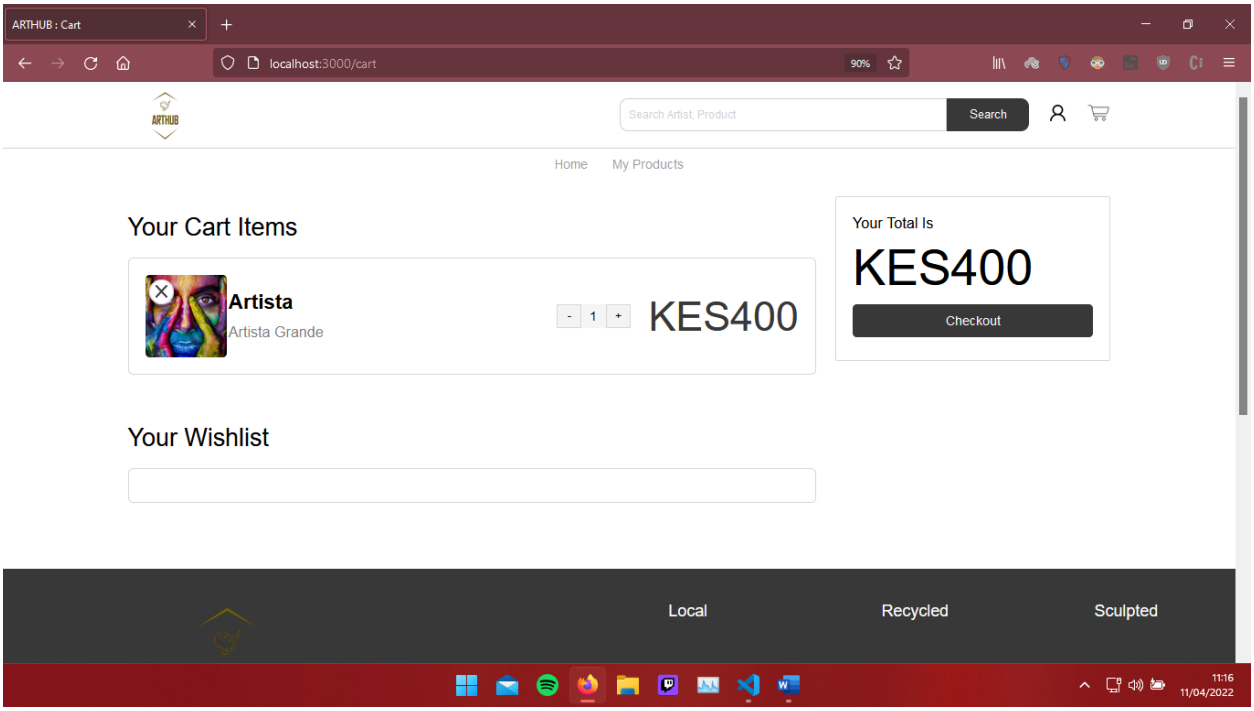






Purchasing a product


Product - artista
localhost:3000/products/artista-3614
90%
ARTHUB
Search Artist, Product
Search
Home
My Products
Artista
Artista Grande
KES400
KES500
(20% off)
SELECT SIZE
M
Added Successfully
Add To Wishlist
11:15
11/04/2022


ARTHUB : Cart
localhost:3000/cart
90%
ARTHUB
Search Artist, Product
Search
Home
My Products
Your Cart Items
Artista
Artista Grande
- 1 +
KES400
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KES400
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Your Wishlist
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Recycled
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11:16
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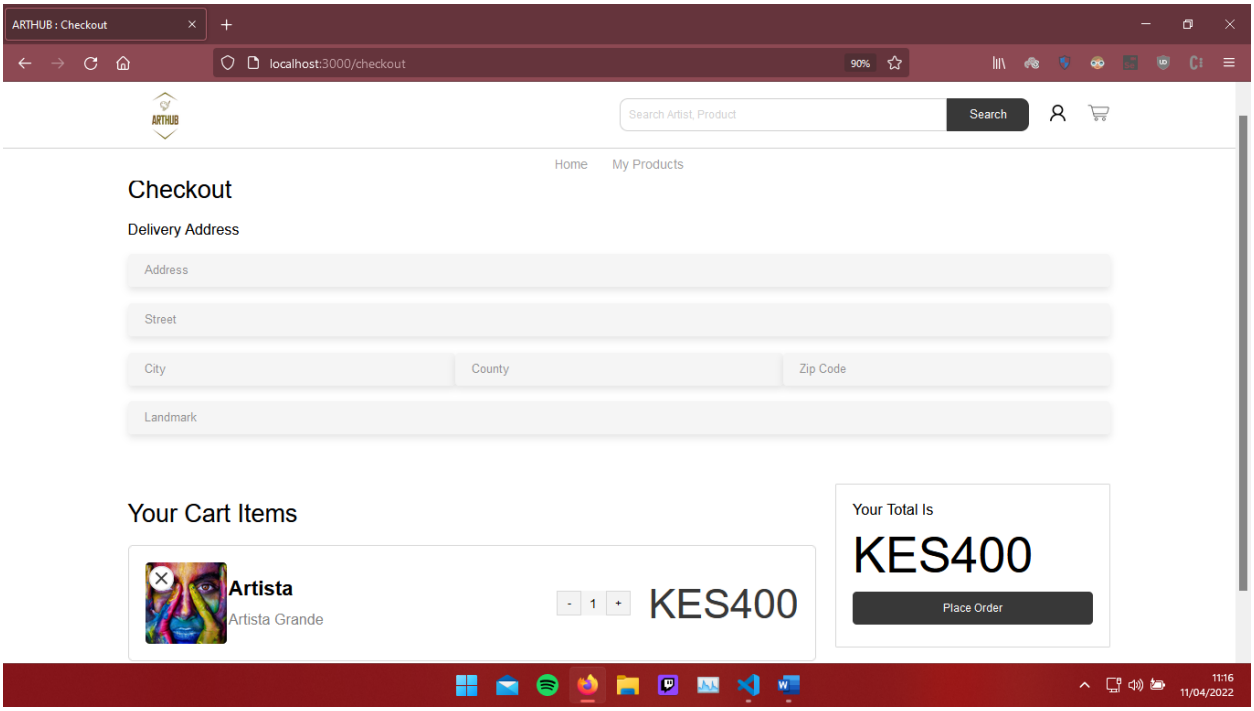
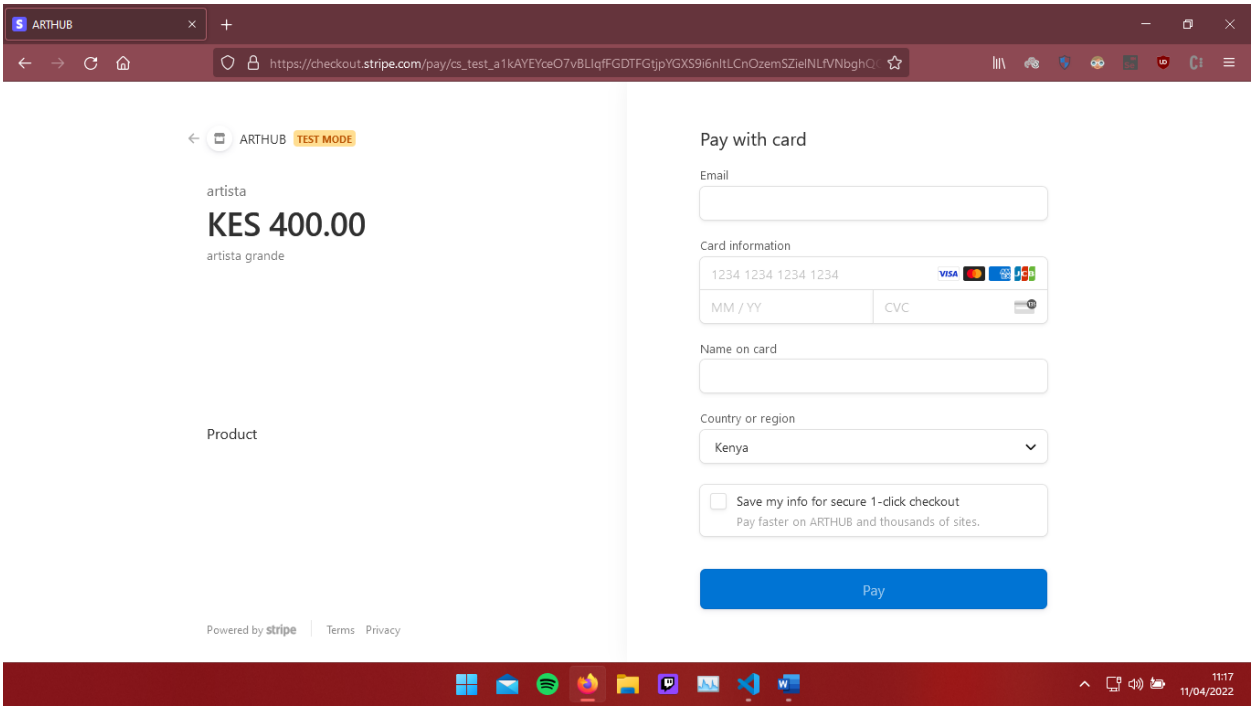
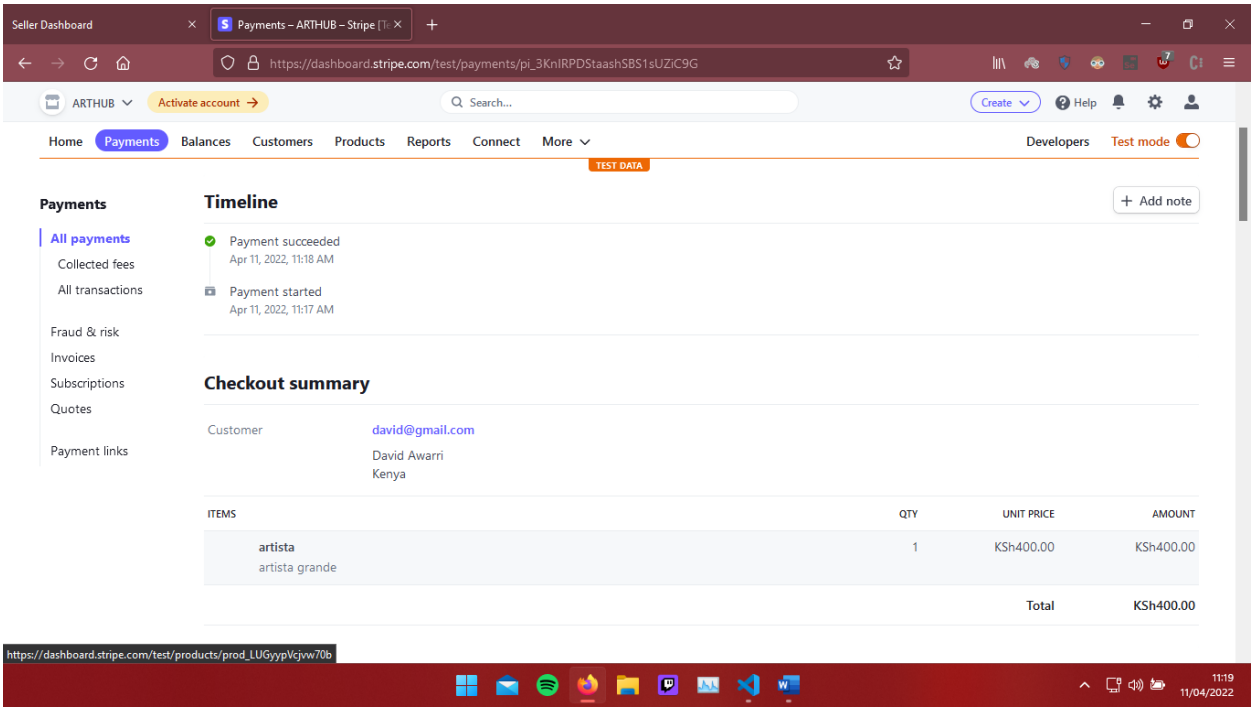


Stripe Checkout and Dashboard





5.4 System Changeover

System changeover is the part concerned with the smooth shift from the normal way of doing things to another and mitigating the disruption of business activities during this changeover. This system shall be using the phased implementation; which is a method where one part of the system that needs changing gets changed on its own. Once that part has been changed, the other parts can follow and all lessons learned while changing the first will be used to ensure the success of the changeover for the rest of the system parts.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.0 Summary and Conclusion

In the first chapter, ecommerce in general was introduced and later expanded on in terms of the art sector which is the main focus of this project. It gave the problem statement, which is to have a central site where local artists can put up their artwork for sale to be purchased by those interested. The objectives which were met by the system, were listed in order, both main and specific objectives followed by the research question and the scope of the project which is to make a site that's accessible on all platforms which will begin locally in Kenya.

The second chapter focused on the literature review which looked at existing systems, the way the worked, their strengths and weaknesses and finally, pointed out the need for this current system.

In the third chapter, the methodology through which the system followed, the waterfall methodology, and the timelines through which each step was done and the budget were listed.

In the fourth chapter, the system analysis was done which listed the functional and nonfunctional requirements, stakeholders, and feasibility study of the system was performed and outlined in detail. The system design was also done in the form of diagrams which include use case, class, activity, sequence, DFDs, ERDs and flowchart diagrams showing the structure of the system and also the design of the database.

In chapter five, the implementation phase was outlined which showed how the database and interfaces were implemented and also screenshots showing how they were implemented and how they work. The system changeover and how it will be done, in this case, through phased implementation, and how it will be done, was outlined.

And finally, in the sixth chapter, the entire document has been summarized and recommendations for possible improvements in the future will be listed down below.

6.1 Recommendations

In conclusion, I shall be listing some of the possible improvements that can be made on the system in the future.

Firstly, for this system, the admin makes use of multiple dashboards, which includes stripe and firebase, to manage all user and purchase information. A recommendation would be to create a dashboard on the frontend of the website where the admin can login and access to get all the information provided by firebase and stripe all on one central dashboard on the website.

Another recommendation would be to add a seller review section, where buyers can rate and write reviews about artists and their artwork to help other customers gauge whether or not to buy the product.

Next, a new payment option in the form of the Mpesa can be added to help more local buyers who might not have access to cards make purchases on the site.

Another future update would be to handle products running out of stock with a popup or a notification alerting the user that the product they are trying to purchase is out of stock and also to show how many products are available in stock.

The payment option can also be handled dynamically. That is, when a user registers to become a seller, they can dynamically set up their own stripe payment method so that they can receive their money directly and the commission can be automatically deducted from it.

A form of receipt to the buyer can also be generated and a dashboard dedicated to each user's previous transactions can also be created. Right now, the receipt only exists on the admin stripe panel and should be displayed to the client in this manner.

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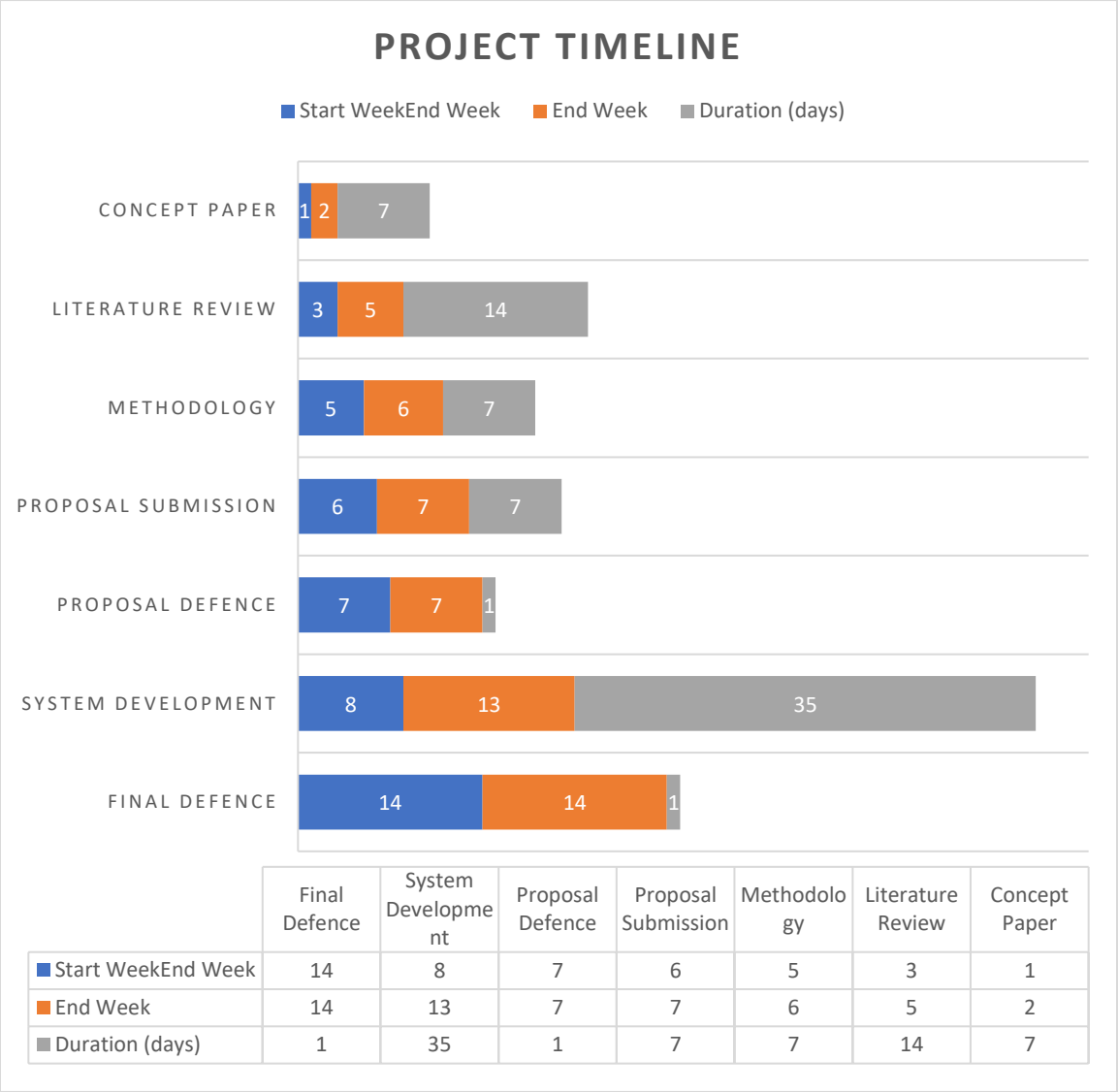
Appendices

Gantt Chart



	Final Defence	System Development	Proposal Defence	Proposal Submission	Methodology	Literature Review	Concept Paper
Start WeekEnd Week	14	8	7	6	5	3	1
End Week	14	13	7	7	6	5	2
Duration (days)	1	35	1	7	7	14	7