

Systems Analysis & Design: An eCommerce Scenario

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System Concept

I opted to develop an e-commerce website application for local crafts centre, Art Versatile. This application will be integrated on their existing website in order to offer an opportunity for the gallery to sell and for art lovers to purchase work of art exhibited at the gallery.

Investigation

The gallery's strategic goal and objectives

The gallery's goal is to establish their brand locally, get much needed exposure and be a player in South African tourism stage. These goals all boil down to exponential growth. The objective of the gallery is about creating definitive spaces for evocative African art, to allow as many emerging African artists to showcase their work and be established.

Business need / opportunity

The e-commerce application is being designed in order for the business to reach more customers local and beyond the borders and bring convenience to customers that will impact growth. The application will help on improving the brand of the organisation as the current strategy of social media marketing is not optimally effective. It will help to simplify the business processes and make the gallery faster and efficient.

System Actors

Front-End users are the customers who will buy the work of art.

Back-End users are the gallery's staff that will deal with product and orders management.

System Capabilities

The e-commerce application will allow customers to surf the products by their categories, i.e. Oil painting, acrylic, ceramic, or wood. The products will allow to be

put on a cart, removed from a cart, if the user adds them again that must be allowed, and the application will allow products to be checked out. It will also allow the user to cancel the order if they feel like it.

Feasibility study

■ Statement of the problem

Develop an e-commerce application that will be integrated on an existing business website. It must allow its customers to browse art products offered by the business and make a purchase online.

■ Summary findings

- Economically it is feasible to implement this application as it will cost less than creating a website from scratch (R2500+).
- Technically it is feasible as there are a number of technologies with substantial support and a wide community used to develop e-commerce applications.
- Operationally the solution is feasible as the gallery staff is computer literate and already has a website and today's browsers support e-commerce applications.
- Legally the application is feasible but the gallery will be subject to more laws other than the Tax law it is already a subject to. The following laws pertain specifically to e-commerce systems:
 - ◆ The Electronic Communications and Transactions Act (ECT)– comprises of 14 sections with 99 sections, which addresses e-commerce issues such as e-government, consumer protection, privacy, cyber crime, and liabilities of service providers, amongst others. The objective of this act is to facilitate electronic transactions by creating legal confidence around such transactions. It seeks to place responsibility on businesses trading online to make use of secure payment systems.

Chapter 6 of ECT act states that online shops must provide consumers with a set of information, including the price of the product or service, contact details and the right to withdraw from an electronic

transaction before its completion. Consumers are also entitled, under certain circumstances to a “cooling off” period (7 days after the agreement) within which they may cancel certain types of transactions concluded electronically without incurring any penalty. If a customer does purchase something, they must receive their order within 30 days or get a full refund upon failure of delivery.

In regards to marketing and communication, the gallery may only send emails to customers who signed up for newsletter.

- ◆ Protection of Personal Information Act (POPIA) – to ensure customer’s personal details are treated in a legitimate and respectful manner. The Protection of Personal Information Bill states that personal information must be used explicitly-defined and lawful purposes related to a function or activity of your business. It is the business’ responsibility to ensure a customer’s information is complete, accurate, truthful and up to date.
- ◆ Ecommerce VAT Laws – according to the Value Added Tax Act of 1991, all prices charged, advertised or quoted by a vendor must include VAT. It must be levied on all online transactions at a standard rate of 15%

■ Benefits and practicality of the application

The application will allow art lovers to overcome geographical barriers and allow them to purchase products offered by the gallery any-time. This will contribute to the gallery acquiring a large customer base and realise their goal of exponential growth with minimum capital investment. E-commerce provides products’ detailed information, even the gallery staff cannot offer such detailed explanation. It is this detailed information that will give emerging artists the exposure they need. The application will further improve the brand image of the gallery, leverage the better customer service offered by the application for customer retention.

Analysis

Data gathering procedure

I conducted an interview in order to collect the data needed to formulate the system requirements.

Definition of system requirements

The e-commerce application should allow art lovers to purchase artwork that is exhibited at the Art Gallery. The application must allow customers to browse the products by category, i.e. Oil painting, acrylic, ceramic, or wood. The products should be able to be put on a cart, removed from a cart, if the user adds them again that must be allowed, and the products should be able to be checked out. It must also be within the user's capability to cancel the order if they feel like it.

The e-commerce application must have front-end and back-end sides of an application.

Front-End

- ◆ The front-end must allow customers to register with the site in order to make a purchase. Registration will provide all the information needed for shipping and billing. The data will be stored on a cloud database that will be accessible from the back office.
- ◆ Customers must be able to surf and add products to cart. The cart is a tool that, like a shopping basket, allows customers to select the products they want and then go to the checkout page for payment.
The basket needs to be managed. This means summarising user requests within the possibilities offered by the catalogue; checking the basket and possibly cancel/modify the items placed in it; and starting the payment process for the selected products.
- ◆ Checkout/Payment – The payment system is a mechanism that facilitates dialogue between the parties involved in financial transactions: the bank, the store and the customer with their credit card.

After filling in the order, the customer will enter his/her credit card number that will take a channel that can only be accessible to their bank. The bank will then check the customer's account and decide whether or not to authorise the payment. This operation will take a few moments. If approved, the bank will perform the transaction and transfer the payment to the gallery's account. If denied, the customer will be notified that the transaction cannot be completed and the order is cancelled.

Back-End

- ◆ The back-end part must provide a product management, this is the main part of the solution and provide features required for product placement, order fulfilment, amongst others. It is key to the management of online sales.

This makes it possible to define a product through a set of standard fields such as product code, product categories, subcategories, product name and its description, sizes available i.e. wall-sized painting, price in rands and dollars.

- ◆ The solution must perform order management. An order is a card that summarises all the delivery and order information to enable correct delivery. It includes – list of products purchased; customer information; details of place of delivery; delivery time information; payment information. All this information must be summarised in a form identified by a number of reference code (order number).
- ◆ From the back office of the site gallery staff must be able to search and sort orders by customer order, order status, date, and payment.

Performance Aspects

The e-commerce site must load within 3 seconds or less. This is the latency at the load balancer – the time elapsed after a request leaves the load balancer until the

HTTP(S) header of a response is received and is measured in seconds. The database read/write latency must allow each operation to be completed in fewer than 20 milliseconds. The site must be hosted on good, reliable company.

Technical Aspects

Technical aspects to consider for this solution are:

- ◆ Web hosting. Art Versatile already has an existing active and live website, it is this website that will be used to integrate an e-commerce functionality.
- ◆ Website security is another important technical aspect in e-commerce systems. A lot of sensitive information, such as credit card numbers, phone numbers, and home addresses, will be used in the e-commerce transactions. It is vital that this information remains safe from cyber criminals. The website must have a Secure Socket Layer encryption to allow secure connections.
- ◆ The solution must have a backup, routine and automatic backups must be set up. This will allow recovery from a catastrophic data loss.
- ◆ There must be a shipping software that will automate the management of outgoing shipment of customer orders, create and print shipping labels, and import tracking information for orders, and generate automated customer emails. Aramex provides cost-effective, reliable delivery of products to online shoppers throughout South Africa and globally.
- ◆ Payment gateway that will accept payments. This is a merchant service provider that accepts online credit card payments. After a customer enters their credit card information, the payment gateway authorizes the transaction and processes the payment. The payment gateway encrypts sensitive information to ensure that the information passes securely between the customer and merchant.

The payment gateway that this solution will use is PayFast, this payment gateway offers no set-up fees or monthly fees, it charges only 2% per transaction with R2 for debit or credit cards. PayFast also offers an Instant-EFT option which they then “scrape” on their bank account, and almost immediately process the transaction. Another reason for PayFast as a payment gateway choice is that it also offers bitcoin, payD, and mobicred payments.

System Inputs and Outputs

The system inputs are the customer details used for registration and payment processing. These include customer names, address, email, account password, language, credit card number, amongst others.

Outputs include post registration output, payment processing output, and order placement output.

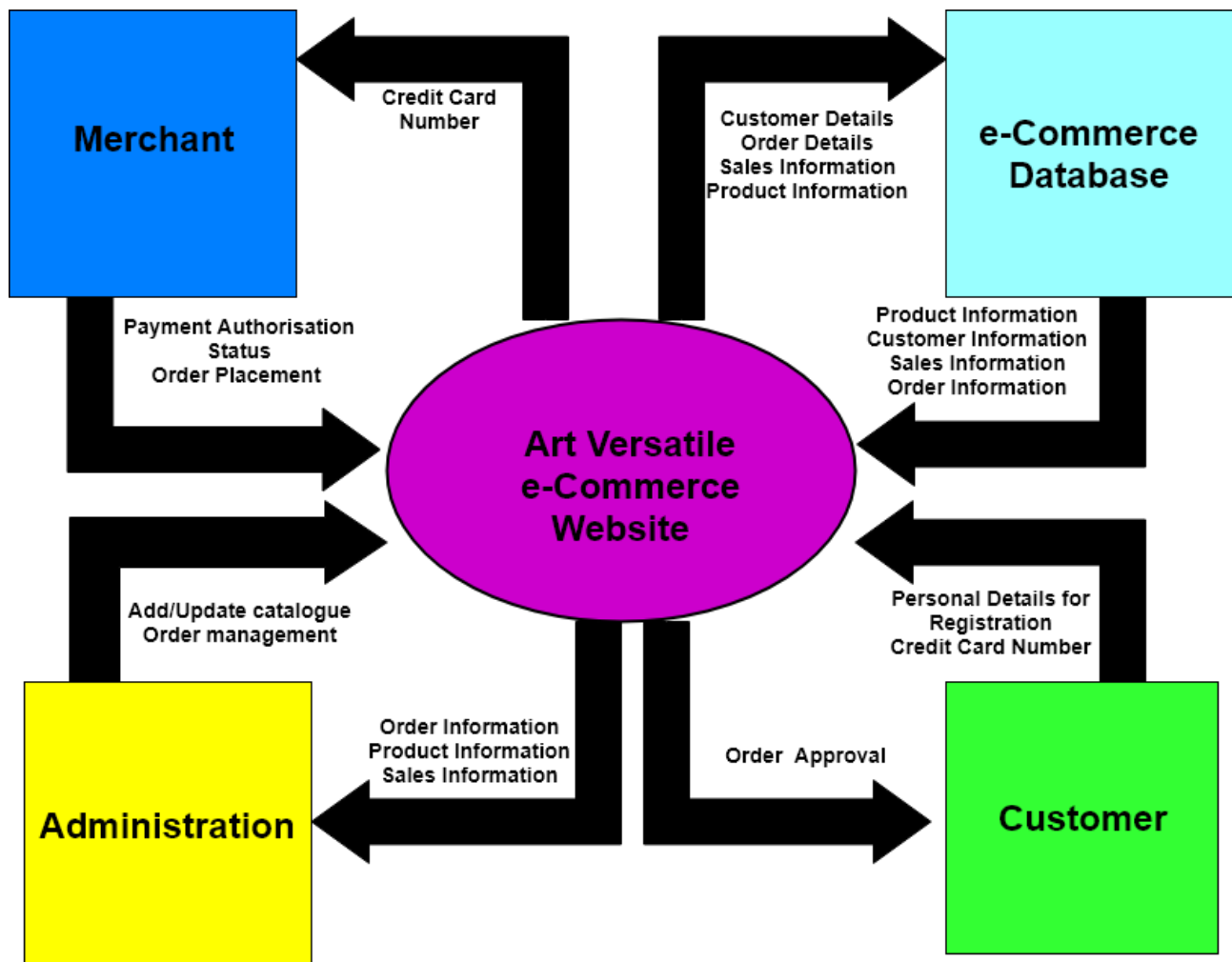
Requirements Prioritisation

In their order of importance, the prioritised requirements are:

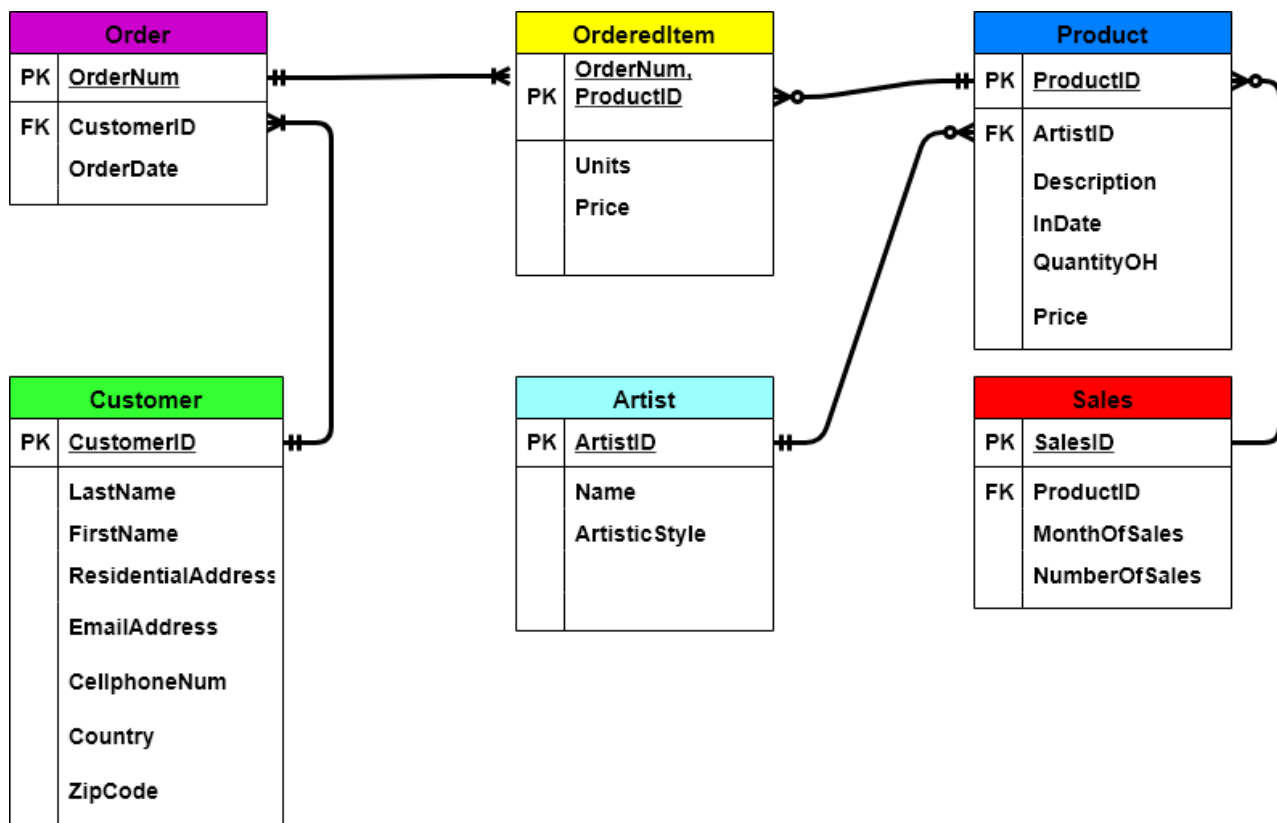
- i. Customer registration
- ii. Adding products to the cart
- iii. Checking out and payment processing
- iv. Cancelling or modifying items added to the cart
- v. Order management
- vi. Product management
- vii. Browsing products by category

Design

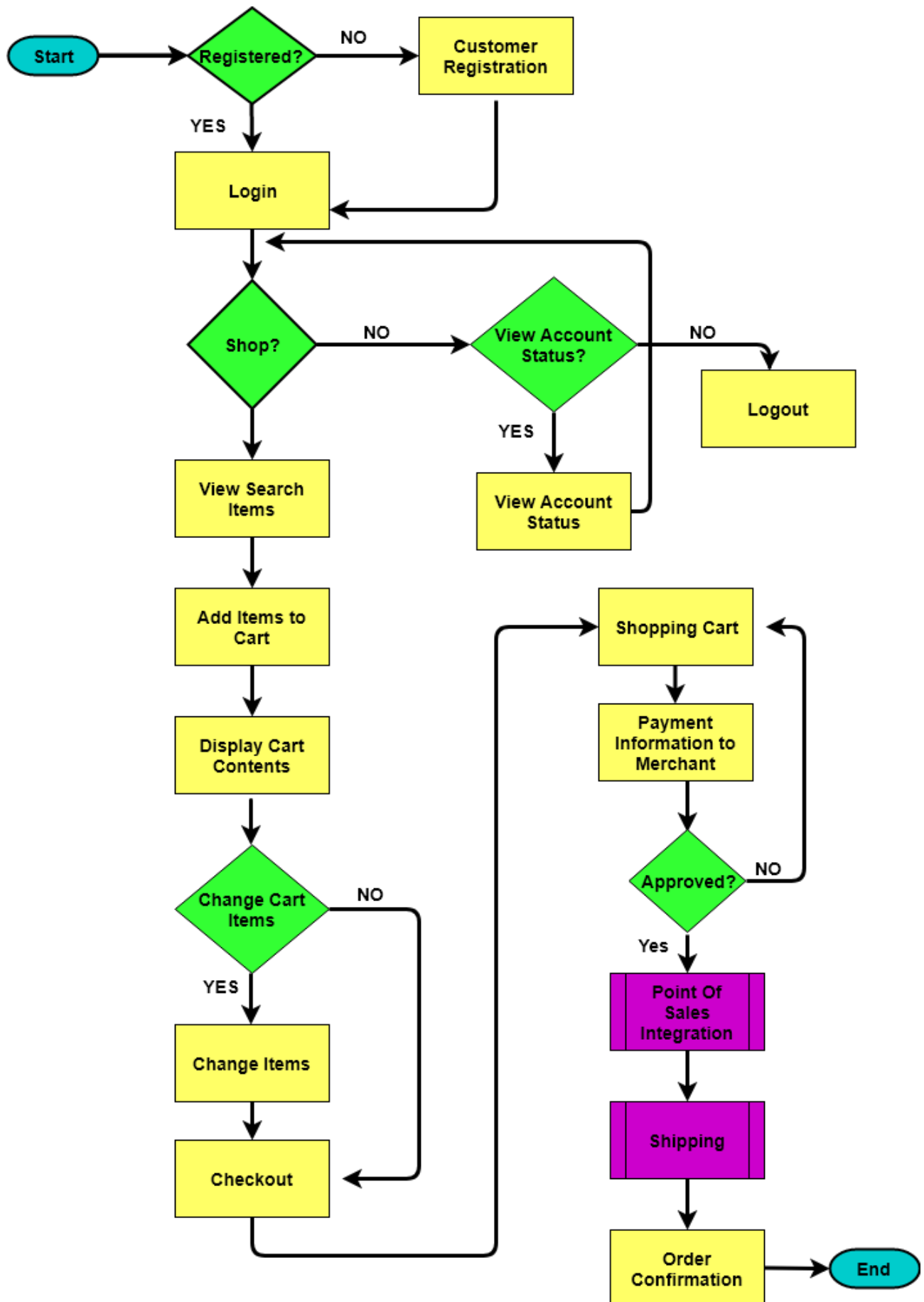
The System Context Diagram



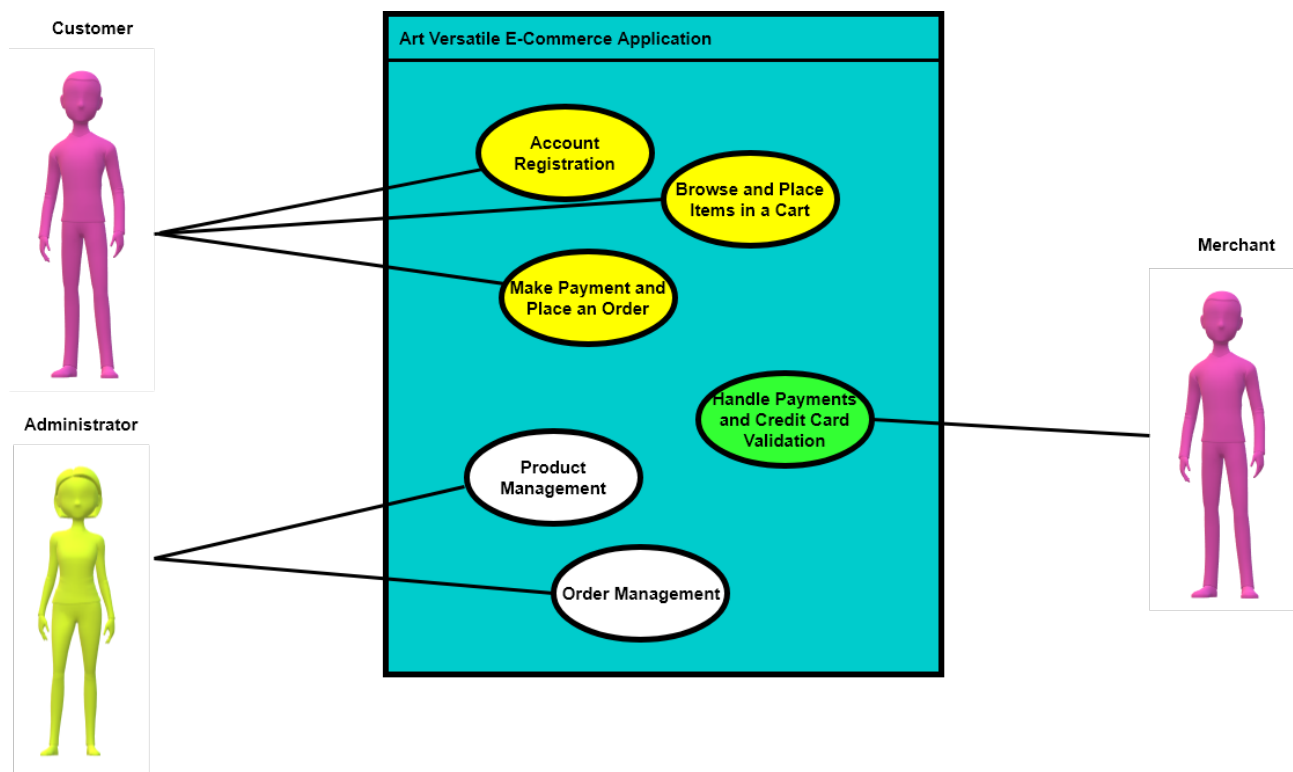
The System Database



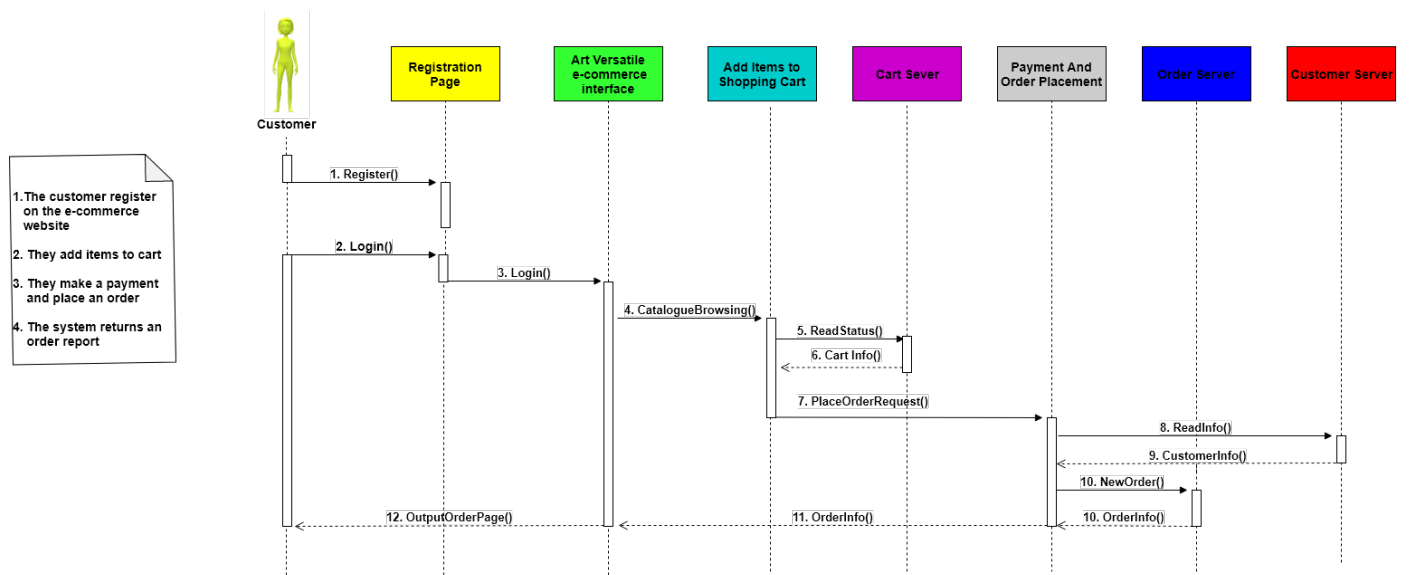
The System Flowchart Diagram



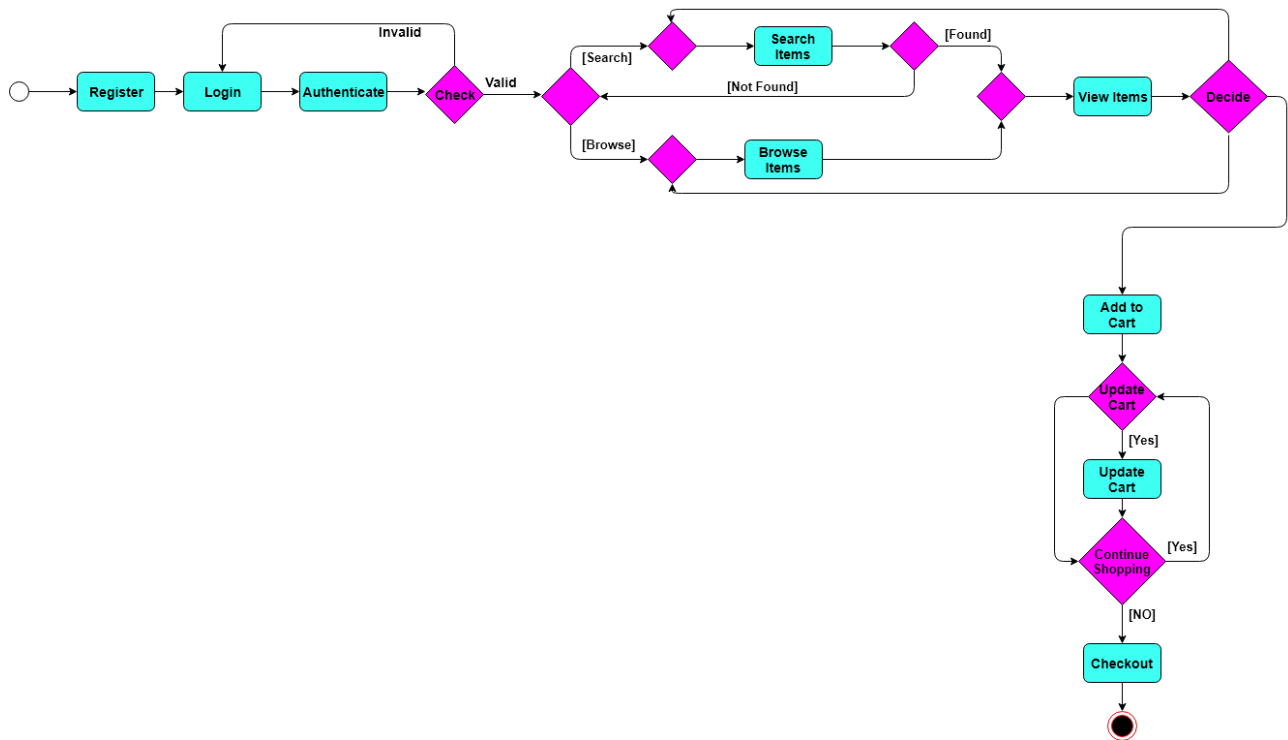
The System Use Case Diagram



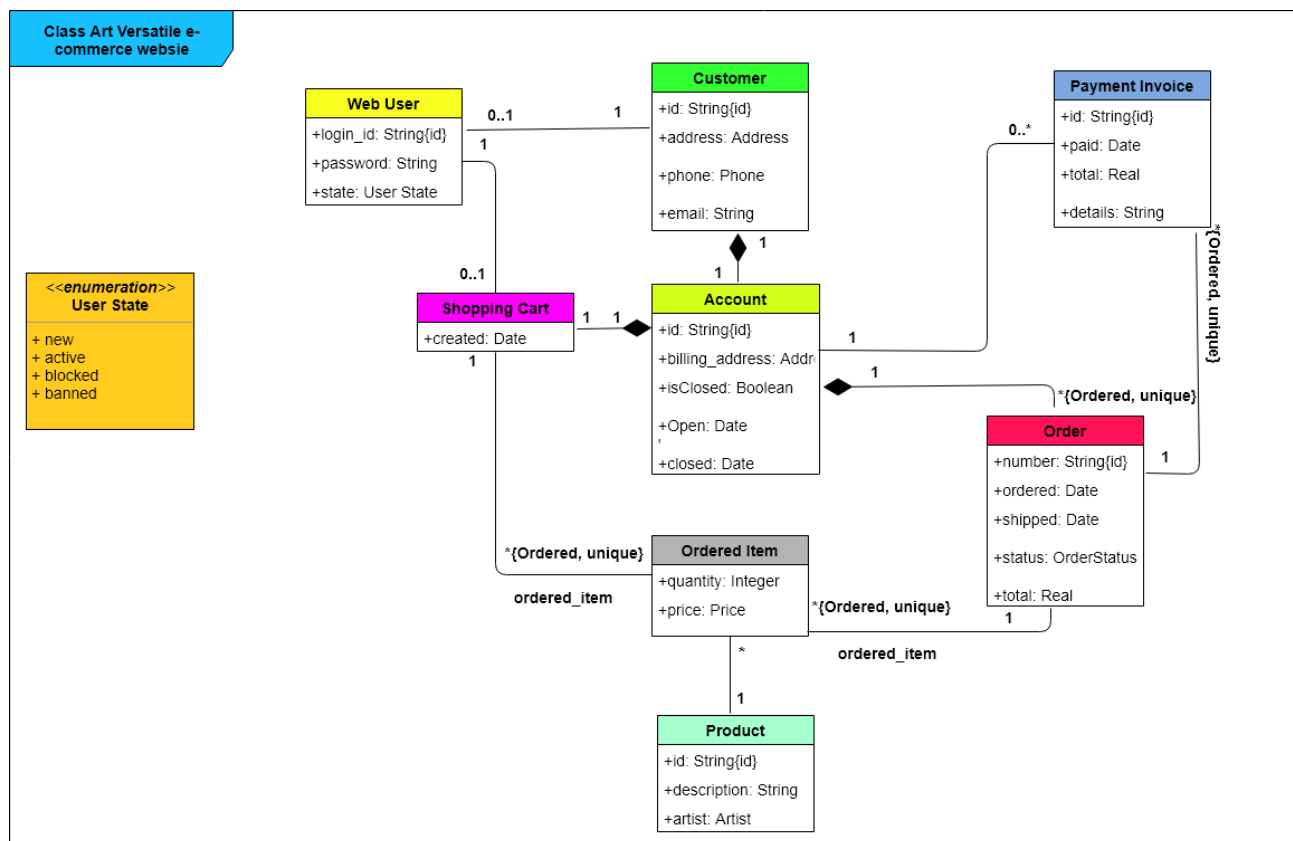
Sequence Diagram



Activity Diagram



Class Diagram



User Interface Design

Usability consideration – the application navigation must be simple and functional.

Shoppers must not be annoyed with excess clicks and menus or unrelenting categorisation. The menus and navigation options must be simple and intuitive but not over-simplified. Menus must be limited to somewhere between three and seven headers and four or fewer sub-tiers within the initial headers. Labels must be one or two-word that are direct and transparent about where they lead.

Linear checkout process – a checkout process must not be complicated: either a user go back or forward. No redirects.

Use of clear error indications at checkout – The error notifications must be easy for users to understand. The error message should be clear. The application must relay to the customer in clear, direct language what it is they need to do. Error messages must be noticeable by using a red highlighted or even blinking text. The error message must be next to the specific items that require correction.

Use of visual elements and consideration of different interaction preferences – choice of colours must correspond to the brand image and strengthen emotional feedback. The style setting must correspond to the nature of what is offered: reaching the website, people should instantly understand that it is selling art work.

Desirability – the application must have the look and feel which will make the experience enjoyable and make an impression on users so they will come back.

Implementation

The following are tools widely used to develop e-commerce applications, because of they are proven technologies they will also be used for developing this solution. This will decrease risk associate with the project.

- **JavaScript with CSS & HTML** - JavaScript has dynamic capabilities. It accepted and supported by almost all top web browsers. It enables to build interactive e-commerce websites. It is an essential programming language that works with HTML and CSS. JavaScript also makes websites launch super fast and provides the end users with enhanced user experience (UX).
- **PHP – PHP** is the most widely adopted among the e-commerce website developers across the globe. It is highly scalable and a language without complexity.
- **Java** – Java has robust tools to make e-commerce website developers more productive. The language is powerful in debugging, which is crucial in e-commerce website development. Java can perform on all types of web browsers.

The database technology choice is Oracle Database. This database allows for a simple database set-up with secure encryption. Oracle Cloud Platform works as a combination of open source technology and Oracle technology. This will enable this project to be built efficiently, deployed, and integrated with Art Versatile applications already in place. The nature of this solution to have a mixture of machine learning and artificial intelligence to provide a service that offers self-repairing abilities is why it is the best choice for this project.