UNIVERSITY of GREENWICH
Alliance with FPT Education

BTEC

Higher Nationals in Computing

Unit 30: Application Development

ASSIGNMENT 1

Assessor name: **PHAN MINH TAM**

Learner's name: Le Thai Trung Tin

ID: GCS210085

Class: GCS1005A

Subject code: 1670

Assignment due: Assignment submitted:

ASSIGNMENT 1 FRONT SHEET

Qualification	**BTEC Level 5 HND Diploma in Computing**		
Unit number and title	Unit 30: Application Development		
Submission date		**Date Received 1st submission**	
Re-submission Date		**Date Received 2nd submission**	
Student Name	1. Nguyen Le Minh Thanh 2. Le Thai Trung Tin 3. Dang Viet Minh Man 4. Nguyen Xuan Truong	**Student ID**	1. GCS210087 2. GCS210085 3. GCS210120 4. GCS210649
Class	GCS1005A	**Assessor name**	Phan Minh Tam
Student declaration I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.			
		Student's signature	

Grading grid

P1	P2	P3	M1	M2	D1

❒ **Summative Feedback:**		❒ **Resubmission Feedback:**
Grade:	**Assessor Signature:**	**Date:**
Internal Verifier's Comments:		
Signature & Date:		

ASSIGNMENT 1 BRIEF

Student Name/ID Number:	
Unit Number and Title:	**Unit 30: Application Development**
Academic Year:	**2022 – 2023**
Unit Assessor:	**Phan Minh Tam**
Assignment Title:	**Analysis and Design solution for a given problem**
Issue Date:	**06 Nov 2023**
Submission Date:	
Internal Verifier Name:	
Date:	

Submission Format:

Format: The submission is in the form of two documents/files

- An individual SRS document in PDF format. Writing must be professional.
- An individual evaluation document in PDF format. Writing must be professional.

Submission

- Students are compulsory to submit the assignment on the due date and in a way requested by the Tutor.
- The form of submission will be a soft copy posted on http://cms.greenwich.edu.vn/.
- Remember to convert the word file into a PDF file before the submission on CMS.

Note:

- The individual Assignment *must* be your work, and not copied by or from another student.
- If you use ideas, quotes, or data (such as diagrams) from books, journals, or other sources, you must reference your sources, using the Harvard style.
- Make sure that you understand and follow the guidelines to avoid plagiarism. Failure to comply with this requirement will result in a failed assignment.

Unit Learning Outcomes:

LO1 Produce a Software Design Document by analyzing a business-related problem and deduce an appropriate solution including a set of initial requirements

LO2 Use design and development methodologies with tools and techniques associated with the creation of a business application

Assignment Brief and Guidance:

Scenario: FPTBook will be a web-based software system to aid book store customers and owners to manage their book purchases and sales about simplifying and speeding up the process of selection, ordering, and purchasing books for customers as well as managing a database of users and a database of products for book store owners. The attached document can view the detailed description of those roles (Requirements.docx).

Tasks

You and your teammates (four members/team maximum) need to prepare a software design document with the following sections:

- A requirement specification that explores the problem by a set of user and system requirements, as well as determines any risks related to the successful completion of your application. You are advised to use an SRS template or modify one to complete this task.
- An evaluation section in which you research the use of software development tools and techniques and identify any that have been selected for the development of this application. You should compare them and justify your choices.
- A design section in which you use chosen tools from the previous step to produce design diagrams for your solution based on the requirement specification.

Learning Outcomes and Assessment Criteria (Assignment 1):			
Learning Outcome	Pass	Merit	Distinction
LO1	**P1** Explore a business-related problem and produce a well-defined Problem Definition Statement supported by a set of user and system requirements. **P2** Determine any areas of risk related to the successful completion of your application.	**M1** Analyse a business-related problem using appropriate methods and produce a well-structured Software Design Document that defines a proposed solution and includes relevant details on requirements, system analysis, system design, coding, testing and implementation.	**D1** Justify the tools and techniques chosen to realise a custom built website. Justify your preferred selection of tools and techniques in deducing an appropriate solution to a business related problem.
LO2	**P3** Research the use of software development tools and techniques and identify any that have been selected for the development of this application.	**M2** Compare the differences between the various software development tools and techniques researched and justify your preferred selection as well as your preferred software development methodology.	

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ASSIGNMENT 1 ANSWERS

P1 Explore a business-related problem and produce a well-defined Problem Definition Statement supported by a set of user and system requirements

1. Introduction

A corporation asked us to finish a project to develop a website selling books. FPTBook will be a web-based software solution that will assist consumers and bookstore owners in managing book purchases by simplifying and expediting the process of selecting books, purchasing books for customers, and managing books. Manage the bookstore's user and product databases. We will proceed to construct the needed website based on clearly stated needs and difficulties that are backed by a set of user and system criteria.

1.1. Document Purpose

This document aims to explain the fundamental change to a system with different 'roles'. After consulting with the company owner, I was granted permission to add three roles to the system: admin, store owner, and customer. The company owner will provide the entire system development process for the project, including technology, usage model for development and risk management. Furthermore, since the business owner is responsible for his own development, the project will include a detailed description of the functions as well as the category of book management. The development team will have a clear design of what needs to be done and can track all the actions that occur throughout the development process if documentation is created. Additionally, the documentation will guide users and owners through the product manufacturing process, helping them better understand the system. If the product must be updated or preserved in the future, documentation will make the job easier by helping everyone understand how it was made.

1.2. Product scope

This software is designed for FPTBook business owners, including three main roles: Admin, Store Owner and Customer. The Admin role empowers users to effectively manage both employees and customers, with the option to monitor other related categories if needed. Conversely, Store Owners have the ability to make minor adjustments to products, related records, and customer details, as long as they have the customer's explicit permission. Finally, customers can seamlessly add or remove products from their cart and modify their profile. The main goal of this system is to streamline daily store operations and simplify tasks to improve efficiency.

1.3. Intended Audience and Document Overview

This project is targeted at individuals who serve as system users, including Administrators, Customers, and Store Owners. Additionally, the document is intended for those responsible for the software's development, such as software engineers, technical architects, and project managers. The document specifically addresses the design and utilization of a web-based system tailored to oversee FPTBook's purchasing and selling activities.

1.4. Definitions, Acronyms and Abbreviations

Acronyms	Meaning	Definition
ERD	Entity–relationship model	Relationships between entity sets in a database
SRS	Software requirements specification	The requirements listed in the software system.
UML	Unified Modeling Language	Object-oriented methods utilize a graphical modeling language composed of symbols to effectively construct information systems.
MVC	Model-View-Controller	A design pattern in software development that segregates pertinent program logic into three interacting components, commonly employed for the creation of user interfaces.

1.5. References and Acknowledgments

The SRS template and guidelines were graciously provided by Mr. Phan Minh Tam, our instructor from the University of Greenwich. His detailed explanations in class facilitated a thorough understanding of all the necessary documents required for the report. While the project demanded additional features and a broader comprehension, the guidance provided by our professor allowed us to tackle these challenges systematically, completing each aspect step by step. We extend our sincere gratitude to our instructor for his continuous support and efforts throughout this process.

A special acknowledgment is also extended to each team member who dedicated themselves to fulfilling their specific roles diligently during the project. Their commitment and collaboration were crucial in achieving our collective goals.

We express our gratitude to the FPT education group for providing us with the opportunity to engage in meaningful projects and encouraging our growth and creativity. This project served as a significant platform for our team to learn, gain valuable experiences, and work together with a sense of professionalism. It not only tested our capabilities but also served as a profound learning experience for the entire team.

2. Overall Description

2.1. Product overview

An effectively designed website is indispensable for businesses of all sizes, serving as a critical platform for customer interaction, product and service showcasing, and the establishment of brand identity. In today's digital era, the importance of having a robust website cannot be overstated. Recognizing this, the business owner has enlisted our team to enhance their current website with the overarching objectives of managing products, streamlining staff interactions, and elevating customer engagement. This initiative underscores a commitment to remaining at the forefront of the digital landscape and surpassing customer expectations.

Within the ecosystem of this dynamic platform, three distinct user roles play integral roles in shaping the user experience:

- Admin: Holding the highest echelon of administrative rights, the administrator wields unparalleled control over the entire website. Their purview includes the creation of new user accounts, along with the pivotal ability to add, modify, or remove books and genres, thereby ensuring the platform's vitality.
- Customer: Positioned as the primary beneficiary, customers are bestowed with rights to search, peruse, and engage in book purchase transactions. The user interface caters to their preferences, facilitating an immersive and user-friendly exploration of diverse literary offerings.
- Store Owner: Serving as a linchpin in the operational ecosystem, store owners are entrusted with the responsibility to manage and oversee client interactions. Their role contributes to the seamless functioning of the platform by ensuring the satisfaction and engagement of customers.

Our approach entails a comprehensive evaluation of the existing website, pinpointing areas for improvement, and strategically implementing enhancements. The revamped website aims to become a central hub for seamless product management, enhanced team collaboration, and user-friendly customer interactions. Central to our strategy is a focus on user-centric design, optimization of navigation, improvement of visuals, and the creation of an intuitive overall experience. The ultimate goal is to deliver a digital platform that not only addresses immediate needs but also positions the business for sustained success in the dynamic digital landscape.

2.2. Product Functionality

Within this dynamic system, the primary functions cater to three distinct user roles: the Administrator, Customer, and Store Owner. Each role is meticulously crafted to offer a unique and tailored experience, contributing to an enhanced overall system functionality.

Admin Functions:

- Authentication and Access:
    - Log in, register, and log out of the system.
- User Management:

- Add, edit, and delete accounts for all users, ensuring comprehensive control over the user base.

- Book and Genre Management:
  - Add, edit, and delete books, empowering the administrator to curate a diverse and up-to-date collection.
  - Add, edit, and delete book categories, facilitating organized categorization and easy navigation.
- Transaction Oversight:
  - View customer purchase history, providing insights into user preferences and transaction patterns.

Customer Functions:

- Authentication and Access:
  - Log in, register, and log out of the system, ensuring a personalized and secure experience.
- Book Exploration and Purchase:
  - View comprehensive book lists, genres, and detailed book information, facilitating informed decision-making.
  - Order books seamlessly, creating a straightforward and user-friendly purchasing process.
  - View the history of purchased products, enabling users to track and revisit past transactions.

Store Owner Functions:

- Book and Order Management:
  - Manage books effectively, including functions such as adding, editing, and deleting books to maintain an updated inventory.
  - View books, allowing store owners to stay informed about the available offerings.
  - View orders, providing insight into customer demands and order fulfillment.

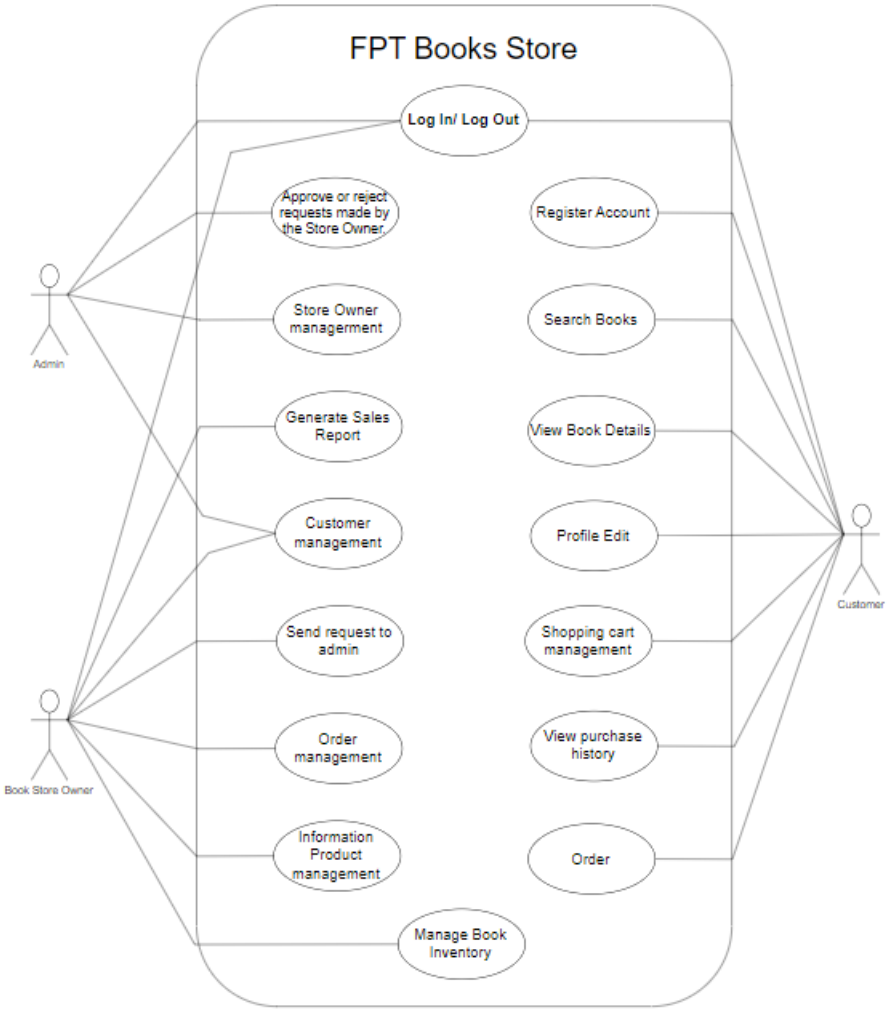
- Profile Management:
  - View and edit their profile, ensuring that store owners can maintain accurate and up-to-date information.
- Authentication and Access:
  - Log in, register, and log out of the system, ensuring secure access to store owner functionalities.

3. Specific Requirements

3.1 Functional Requirements

ID	Type of User	Task Perform	Goal Achieve
1	Admin	Manage user account	Manage user
2	Admin	Manage product	Adding, remove, update product from store
3	Customer	Adding product to cart	Purchase product
4	Customer	View product details	Knowing more about product
5	Customer	Choose product	Buy it
6	Customer	Registration account	Can view and buy products in the web
8	Store Owner	Manage product	Adding, remove, update product from store
9	Store Owner	Mange customer	Reset user password if they forgot their

3.2. Use case model



The diagram consists of elements:

Actors:

- Book Store Owner: Represented as a Actor labeled "Book Store Owner." It signifies a role or user interacting with the system.
- Admin: Represented as a Actor labeled "Admin." It represents another role or user in the system.
- Customer: Represented as a Actor labeled "Customer." It represents the role of a customer interacting with the system.

Use Case Actions:

The following actions are represented as elliptical shapes with labeled text inside:

- Log In/Log Out: Represents the action of a user logging into or logging out of the system.
- View Book Details: Represents the action of a user accessing detailed information about a book.
- Register Account: Represents the action of creating a new user account in the system.
- Search Books: Represents the action of searching for books within the system.
- Add Book to Cart: Represents the action of adding a book to the shopping cart.
- Order management: Represents the management of orders within the system.
- Order: Represents a specific order placed by a customer.
- Manage Book Inventory: Represents the management of the book inventory within the system.
- Generate Sales Report: Represents the action of generating sales reports.
- Customer management: Represents the management of customer-related information.
- Information Product management: Represents the management of information products.
- Shopping cart management: Represents the management of the shopping cart.
- View purchase history: Represents the action of a user accessing their purchase history.

P2. Determine any areas of risk related to the successful completion of your application.

1. Risk Assessment

	Identify and list Hazards	List Current Risk Controls	Risk Rating	List Additional Controls (if any - where current controls are not adequately managing the level of risk)
1	Cybersecurity Threats	Regular cybersecurity training for employees	High	Implement intrusion detection system (IDS)
2	Data Breach	Regular automated data backups	High	Encrypt sensitive data during storage and transmission
3	System Outages	Redundant server system implementation	Medium	Establish a backup power supply for critical servers
4	User Training Effectiveness	Comprehensive user training sessions	Medium	Conduct periodic assessments to measure training impact

Identifying and list Hazards: Enumerates potential dangers or risks associated with each recognized threat.

List Current Risk Controls: Details the current protocols in effect to oversee or alleviate the acknowledged risks.

Risk Rating: Allocates a rating to each risk according to its severity and likelihood.

List Additional Controls: Proposes additional measures or protocols if the existing ones are deemed inadequate in effectively managing the risk.

P3 Research the use of software development tools and techniques and identify any that have been selected for the development of this application

1. Design Tools

1.1 UML Definition

Unified Modeling Language (UML) is a standardized modeling language that empowers developers to define, illustrate, construct, and document software system artifacts, enhancing their robustness, security, and scalability. UML is integral to object-oriented software development, providing a means to visually represent software systems through graphic notation.

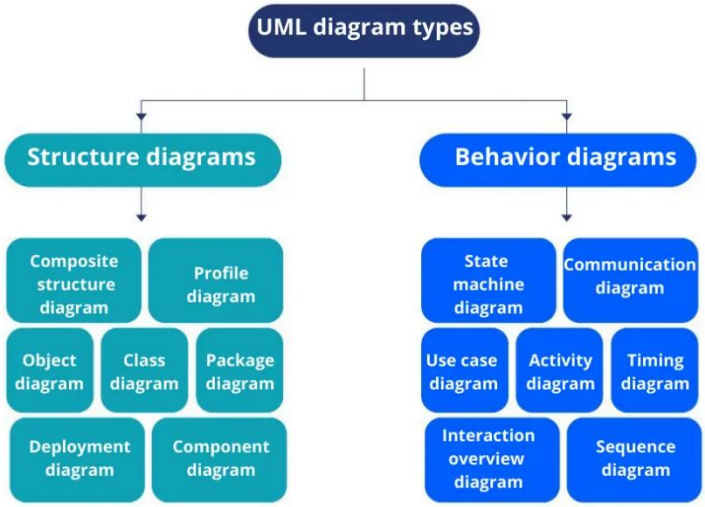
At the core of UML architecture is the meta-object facility, which establishes the framework for developing modeling languages. This framework ensures accuracy, enabling the generation of comprehensive applications. A fully executable UML can seamlessly integrate into various software development cycle procedures and be deployed across multiple platforms using diverse technologies.

UML is crafted to facilitate the creation of an expressive and readily usable visual modeling language. Additionally, it supports high-level development concepts like frameworks, patterns, and collaborations. UML encompasses various elements, including:

- Programming Language Statements
- Actors: Designate roles played by users or other systems interacting with the subject.
- Activities: Represent tasks essential for fulfilling an operation contract and are visualized in activity diagrams.
- Business Process: Encompasses a series of tasks delivering a specific service for customers, visualized through a flowchart depicting the sequence of activities.
- Logical and Reusable Software Components

1.2. Popular UML Diagram

There are two main categories: Structure Diagrams and Behavioral Diagrams



In Structural Diagrams:

- Class Diagram: Illustrates the system class, its attributes, and the relationships existing among classes.
- Component Diagram: Depicts the division of components within a software system and the dependencies among these components.
- Object Diagram: Offers a comprehensive or partial depiction of the structure of a modeled system.

In Behavioral Diagrams:

- Activity Diagram: Represents the sequential workflow of business and operational components in a step-by-step manner.
- Use Case Diagram: Describes the system's functionality by delineating actors, goals as use cases, and the inter dependencies among these use cases.

2. Development tools and technique

2.1. Programming languages and Framework

2.1.1. Programming language

Name	Logo	Description
C#		C# is a modern, object-oriented, and type-safe programming language that empowers developers to create a diverse array of secure and reliable .NET applications. For programmers acquainted with C, C++, Java, and JavaScript, C# offers immediate familiarity, given its roots in the C family of languages.
Javascript		JavaScript, alongside HTML and CSS, constitutes the fundamental programming languages underpinning the World Wide Web. As of 2022, client-side JavaScript is anticipated to be present in 98% of websites, often leveraging third-party libraries to enhance webpage behavior. Each major web browser incorporates a dedicated JavaScript engine to execute code seamlessly on users' devices.
Java		Java stands out as a widely-used programming language for developing web applications. Renowned for its object-oriented design, network-centric capabilities, and multi-platform support, Java can operate as a platform in its own right. Known for its speed, reliability, and safety, Java is a versatile programming language suitable for crafting a broad spectrum of applications, ranging from big data and server-side technologies to enterprise software and mobile apps.
Python		Python is a high-level, interpreted, and object-oriented programming language characterized by dynamic semantics. Its allure lies in its suitability for Rapid Application Development, serving well as a scripting or glue language to seamlessly integrate pre-existing components. Python's strengths include high-level built-in data structures, dynamic typing, and dynamic binding.
PHP		PHP is a widely employed open-source scripting language with a broad range of applications, particularly well-suited for web development and capable of seamless embedding into HTML.

2.1.2 Framework

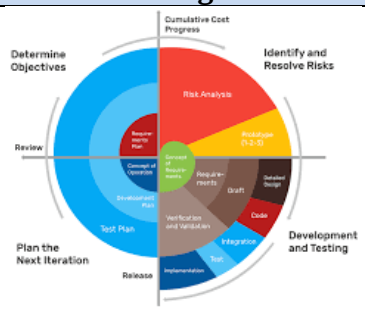
Name	Logo	Description
ASP.NET		ASP.NET, a widely adopted web development framework, is instrumental in building dynamic web applications that cater to both PC and mobile platforms. Originating from Microsoft, it provides programmers with the capability to craft vibrant websites, applications, and services.
Laravel		The open-source Laravel PHP web application framework facilitates the development of Model-View-Controller (MVC) web applications. Praised by numerous webmasters and developers, Laravel is appreciated for its clean and straightforward syntax, enabling web artisans to swiftly and elegantly create web applications. The modular packaging mechanism in Laravel further simplifies codebase maintenance.
Django		Django stands out as a reliable backend web development framework that facilitates the creation of robust online applications. Employing both the DRY pattern and "Convention over Configuration," Django equips developers with the tools and methodologies essential for building secure websites. It seamlessly incorporates security measures, making it a top choice within the web development platform landscape.
Express		Express is an open-source backend framework renowned for providing an array of features for both website and mobile development. Recognized as one of the premier web development frameworks, it stands out for its minimalistic and flexible design, tailored for backend development on Node.js.

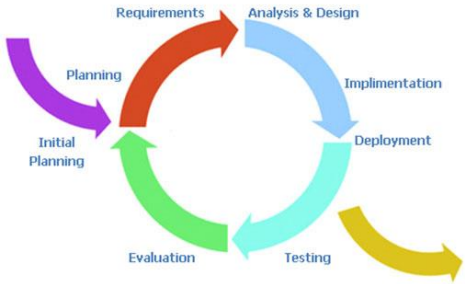
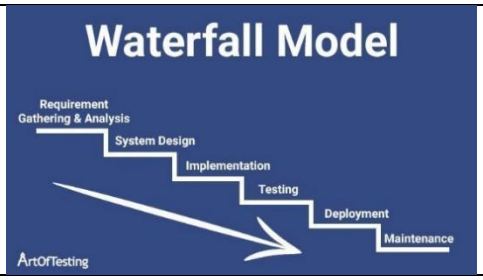
2.1.3. Database servers

Name	Logo	Description
MySQL		MySQL, an open-source relational database management system (RDBMS) built on Structured Query Language (SQL), is freely available. Renowned as one of the most widely used RDBMSs globally, it finds extensive adoption among organizations, both large and small companies, as well as developers.
MS SQL Server		Microsoft offers robust toolset support for one of the premier database software solutions, available for both on-premise and cloud deployments. Compatible with both Linux and Windows systems, MS SQL is a multimodel database supporting Structured Data (SQL), SemiStructured Data (JSON), and Spatial Data.
MongoDB		In 2009, MongoDB, the inaugural document database management system, made its debut. The challenge of loading and retrieving data from relational database management systems (RDBMSs) using object-oriented programming languages prompted the creation of MongoDB. Its purpose was to efficiently manage Document Data and address the complexities associated with this process.

2.1.4 Software Development Models

Software development models refer to the diverse processes or methodologies chosen for project development, aligning with the project's specific aims and goals. The selection of the appropriate model is crucial for the development of a software product or application. It dictates how the development and testing processes unfold. Numerous software development models or methodologies exist, including the following:

Name	Image	Description
Spiral Model		The Spiral Model is a fusion of the Iterative and Waterfall models. It incorporates four design stages, referred to as spirals, which are iteratively completed by the product under development throughout its iterations. These stages encompass: - Identification - Design - Construct (Build) - Evaluation (Risk analysis)

Iterative and Incremental Model		The Iterative model entails the implementation of multiple small requirements at the outset of the development process. Subsequently, through repeated iterations, incremental improvements are made to enhance the final product. These iterations continue until all features of the application are completed, and the product is ready for deployment.
Waterfall Model		The inaugural software project development model introduced in software development circles is the waterfall model, also known as the linear model. This model mandates the completion of each step before progressing to the next, ensuring a sequential progression without any overlapping stages.

2.1.5. IDE (Integrated Development Environment)

Name	Logo	Description
Visual Studio		Visual Studio, crafted by Microsoft, stands as an Integrated Development Environment (IDE) tailored to facilitate application development across numerous platforms and programming languages. Boasting robust features, including integrated debugging, code auto-completion, and multilingual support, Visual Studio offers a powerful toolset. It furnishes developers with a user-friendly environment to construct desktop, web, and mobile applications, seamlessly integrating with Microsoft cloud services.
IntelliJ IDEA		IntelliJ IDEA serves as a professional Integrated Development Environment (IDE) primarily designed for Java but also extending its support to various other languages. Packed with robust capabilities such as intelligent refactorings, cross-platform compatibility, and seamless integration with tools like Maven and Gradle, IntelliJ IDEA provides a comprehensive environment for effective software development.

2.1.6 Conclusion

Category	Software Used
Operating System	Windows
Programming Language	C#
IDE	Visual studio
Framework	ASP.NET
Database	SQL SERVER
Software Development Models	Waterfall Model

We opted to use Visual Studio 2022 as the IDE for my application, and Windows as the operating system. The programming language chosen was C#, with the subsequent installation of the ".NET Framework" package. Additionally, My SQL Server was selected as the database.

Reasons for choosing the aforementioned software for my application include:

Robust IDE: Visual Studio 2022 offers a powerful Integrated Development Environment with features such as debugging, code editing, testing suites, and intelligence. This efficiency-enhancing toolkit enables faster and higher-quality code development.

Built-in Web Application Templates: Visual Studio provides built-in web application templates, allowing developers to swiftly create various web apps, including ASP.NET, web forms, MVC, and more. This streamlines the development process and supports a variety of web application architectures.

A. Language used for web development:

- **High Performance:** C# stands out as a compiled language, surpassing the speed of interpreted languages like PHP. Its superior performance makes it particularly well-suited for high-traffic applications requiring swift response times.
- **Strongly Typed Language:** C# boasts strong typing, detecting errors at compile time for easier debugging and maintenance. This robust type checking capability helps prevent common programming mistakes.
- **Object-Oriented Programming (OOP):** C# embraces Object-Oriented Programming (OOP) principles, enabling developers to organize code in a logical and comprehensible manner. OOP facilitates the creation of reusable objects, abstract data structures, and the implementation of inheritance and polymorphism.

B. Here are some reasons why we use Microsoft SQL Server:

- **High Performance:** SQL Server provides the ability to affect database engine performance through a number of configuration options at the SQL Server Database Engine level. With Azure SQL Database, Microsoft performs most, but not all, of these optimizations.
- **Scalability:** Multiple threads to persist memory-optimized tables SQL Server 2014 (12.x) had a single offline checkpoint thread that scanned the transaction log for changes to memory-optimized tables and persisted them in checkpoint files (such as data and delta files). In machines with a larger number of cores, the single offline checkpoint thread could fall behind.
- **Security:** The platform for SQL Server includes the physical hardware and networking systems connecting clients to the database servers, and the binary files that are used to process database requests.
- **Business continuity through Azure:** Help ensure uptime with fully managed disaster recovery in the cloud through federation in Azure SQL Managed Instances. Seamlessly copy data to and from the cloud.
- **Seamless analytics on on-site operational data:** Drive near real-time insights by breaking down the barriers between operational and analytics stores. Analyze all your data using both Spark and SQL runtimes in the cloud with Azure Synapse Link.
- **Industry-leading performance and usability:** Leverage performance and availability for faster queries and help ensure business continuity. Accelerate query performance and tuning without code changes. Ensure write-intensive environments run smoothly for users across multiple locations.

C. Why we use Waterfall model for this application.

Sequential and Predictable Progress: The Waterfall model adheres to a sequential approach, mandating the completion of each phase before progressing to the next. This ensures a predictable and meticulously structured development process.

Clear Project Documentation: Comprehensive documentation is a cornerstone of the Waterfall model, with each phase requiring thorough documentation. This practice results in clear and detailed records at every stage, fostering better understanding, facilitating maintenance, and aiding in future development.

Well-Defined Requirements: The Waterfall model places a strong emphasis on gathering and thoroughly documenting requirements at the project's inception. This strategic approach contributes to establishing a clear understanding of client expectations and the overall project scope.

Stability in Scope: Given the challenge of incorporating changes post-phase completion, the Waterfall model is well-suited for projects with a stable and well-defined scope. This characteristic minimizes

the likelihood of scope creep during the development lifecycle.

Ease of Management: The linear and sequential nature of the Waterfall model simplifies project management. This structure allows for straightforward progress tracking, streamlining the management of tasks, timelines, and resource allocation.

Ideal for Small to Medium-Sized Projects: Tailored for small to medium-sized projects with well-defined and stable requirements, the Waterfall model offers a systematic and methodical approach to development. This makes it particularly well-suited for projects of moderate scale and complexity.

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