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INTERNSHIP REPORT

**COMPUTERISED MANAGEMENT OF RESTAURANT SERVICES**

Internship Carried out from the 01st July to 30th September 2023

In view of obtaining a **Higher Technician Diploma (HTD)** in computer sciences option

**Software Engineering**

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**DEDICATION**

**THANKS TO MY PARENTS AND FAMILY**

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**LIST OF ABBREVIATIONS**

* **2TUP:** Two Track Unified Process
* **AICS:** AFRICAN Institute of Computer Sciences
* **API:** Application Programming Interface
* **CSS:** Cascading Style Sheet
* **DBMS:** Database Management System
* **ER:** Entity Relationship
* **ERD:** Entity Relationsip Diagram
* **HTML:** Hyper Text Markup Language
* **HTTP:** Hypertext Transfer Protoccol
* **PDM:** Physical Data Model
* **RMS;** Restaurant Mnagement System
* **SQL:** Structured Query Language
* **Mr:** Mister
* **Mrs:** Miss

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**ABSTRACT**

Restaurants play an important role in society by contributing to culture, economy, and social life, in order to facilitate management of services restaurants should have computer systems.

Most restaurants do not have computer systems which aid them to manage services properly, hence they struggle with manual order taking and processing leading to errors and delays, services are slow leading to longer wait for customers, cash handling errors where money can be stolen by employees, difficulty in tracking sales trends, customer preferences.

In this report we are proposing the design and development of a **RESTAURANT MANAGEMENT APPLICATION**. To do this, studies were conducted as well as a series of interviews with users (customers, servers, kitchen staff, managers). We used 2TUP methodology practices for the development of our application, the requirements specifications allowed us to formalize the data interaction with UML (Unified Modelling Language). In terms of structuring and storing data, we used the MySQL Relational Database Management System (RDBMS). The implementation in PHP allowed us to set up a flexible, secure, and easy to use and perfectly manage services in restaurants. By developing this application restaurants can significantly improve their operational efficiency, enhance customer satisfaction, and gain valuable insights to drive growth and profitability.

#

**RESUME**

Les restaurants jouent un rôle important dans la société en contribuant à la culture, à l'économie et à la vie sociale. Pour faciliter la gestion des services, les restaurants devraient disposer de systèmes informatiques.

La plupart des restaurants ne disposent pas de systèmes informatiques qui les aident à gérer correctement les services, ce qui les amène à lutter avec la prise de commandes et le traitement manuels, entraînant des erreurs et des retards. Les services sont lents, ce qui entraîne une attente plus longue pour les clients, des erreurs de manipulation d'argent où l'argent peut être volé par les employés, et des difficultés à suivre les tendances des ventes et les préférences des clients.

Dans ce rapport, nous proposons la conception et le développement d'une APPLICATION DE GESTION DE RESTAURANT. Pour ce faire, des études ont été menées ainsi qu'une série d'entretiens avec les utilisateurs (clients, serveurs, personnel de cuisine, gestionnaires). Nous avons utilisé les pratiques de la méthodologie 2TUP pour le développement de notre application, les spécifications des exigences nous ont permis de formaliser l'interaction des données avec UML (Langage de Modélisation Unifié). En termes de structuration et de stockage des données, nous avons utilisé le Système de Gestion de Base de Données Relationnelle (SGBDR) MySQL. L'implémentation en PHP nous a permis de mettre en place un système flexible, sécurisé et facile à utiliser pour gérer parfaitement les services dans les restaurants. En développant cette application, les restaurants peuvent améliorer considérablement leur efficacité opérationnelle, augmenter la satisfaction des clients et obtenir des informations précieuses pour stimuler leur croissance et leur rentabilité.

**GENERAL INTRODUCTION**

Restaurants are multipurposed establishments that offer much more than just food, they are places of social connection, cultural exchange, entertainment, and economic activity, serving a wide range of purposes for individuals and communities. Cameroonians go to restaurants to have an experience and they expect to be served well. Thus, it is important to manage restaurant service to enhance this experience.

The purpose of this report with the theme **“COMPUTERIZED MANAGEMENT OF RESTAURANT SERVICES”** will help enhance customers experience and to do this we went through all the following phases. We divided this report into 6 main parts which are shown below:-

1. **The insertion phase:** Here, we present the company in which we did our internship, and the integration of the interns into the company.
2. **Existing system**: Here, we present the present system and evaluate its advantages and most importantly its downfalls.
3. **The specification book**: Here, we identify the need of the future system users and point out different constraints of the project.
4. **Analysis phase:** Here, we choose our analysis method and provides all the diagram needed to visually represent our system both the infrastructure and the data structure.
5. **The Conception phase**: this presents the generic and detailed conception of the project and the architecture used to bring into reality our analysis.
6. **Realization phase:** In this phase, we will visualize the implementation process of the solution

# **PART ONE:**

# **INSERTION PHASE**

Preamble

The insertion phase is a part of t he internship report where we will present the detailed structure and characteristics of our enterprise where our internship was carried out.

Content

INTRODUCTION

1. WELCOME AND INTEGRATION
2. GENERAL PRESENTATION OF THE COMPANY
3. ORGANISATION OF THE COMPANY
4. HARDWARE AND SOFTWARE RESOURCES OF THE COMPANY
5. BRIEF PRESENTATION OF THE PROJECT THEME

CONCLUSION

**INTRODUCTION**

The insertion phase is a period (generally of 02 weeks) reserved for the different interns to discover and to familiarize themselves with the working environment. Here, we got to know about the staff, the different hardware and software resources used, the different departments which constitute the enterprise, how the company functions both internally and externally and we were introduced to our work space. During this period, we were also attributed an internship master often called professional supervisor and a theme. We also had a time to discuss amongst us interns on topics like what we love doing most, what we dislike, our beliefs and experiences.

1. **WELCOME AND INTEGRATRION**
2. **Welcome**

We arrived at N-TEC LABS on Monday July 2024 at 8:00am. we were welcomed, by **Mme Fongwa Blessing** the enterprise’s main Secretary, who introduced us to our work space and her collaborators. She then introduced us to the boss **Mr. Ngwanyi Joel** and our supervisor **Mme Nformi Victory.** Later on, we were logged onto the Intern portal and we were given a task to test our competence

1. **Integration**

A working day at N-TEC LABS start from 08:00am to 06:00pm. Our tasks in the company generally follow a predefined routine. Every day we were assigned tasks to carry out. There was also an opportunity to present our difficulties and challenges to everyone and receive directives.

1. **GENERAL PRESENTATION OF THE COMPANY**
2. **Geographical location**



*Figure1: Location of N-tec Labs*

1. Company’s Identification Form

|  |  |
| --- | --- |
| IDENTIFICATION FORM | |
| Company name | N-TEC LABS |
| Type of Enterprise | Institution, Digital Agency |
| President of the Company | Mr. NWANYI Joel |
| Office Telephone | (+237)651834545 |
| Website | nteclabs.com |
| Language | English and French |
| Logo | A logo with a map and a globe  Description automatically generated |

*Table 1: Company Identification form*

1. **History**

N-Tec Labs is a Cameroon based non-governmental tech start-up institute founded by **Mr. Ngwanyi Joel in** 2022 which proposes IT solutions and empowers the use of new technologies and also trains various people in Various IT domains in Cameroon.

1. **Mission**

The mission of N-Tec Labs mainly relates to the empowerment and the perpetuation of technology use. These missions include:

* Design and realization of mobile-oriented software for companies and individuals;
* Offering training in computer technologies and information technology
* Taking an active part in the sustainable development of the world through innovative solutions and virtual reality.

1. **Vision**

At N-Tec Labs, we believe that the true potential of every organization and individual can be unlocked through the harmonious fusion of analysis, development, realization, and data analytics. Our vision propels us forward, guiding us to make a lasting impact on the digital landscape and shape a future where innovation knows no bounds.

1. **Activities**

The activities of N-Tec Labs range from computer sciences, engineering, and training. We can outline the following:

* Computer Training: Hardware, Web Mastery, Secretaryship
* Software development and maintenance;
* Training in Software related fields;
* CCTV Installations
* Wired / Wireless Networking
* IT support

1. **ORGANISATION OF THE ENTERPRISE**
2. Administrative Organisation of N-Tec Labs

N-Tec Labs is administratively organized as follows;

1. The General Management

This is the decision-making department of the company. They perform some of the following functions

* Ensure the office runs properly
* Evaluate the realization of projects by the company

1. The Teaching Department

This department is in charge of the school activities of the enterprise.

1. The Development Department

This is the heart of the company because they carry out the company’s projects. They perform some of the following functions:

* Reenforce the application standards of the company
* Write training content
* Maintenance
* Innovations

1. Functional organization of N-Tec Labs

The functional branch of N-Tec Labs is organised as follows;

PRESIDENT OF N-TEC LABS

SECRETARY

DEVELOPMENT TEAM

SUPERVISOR

INTERNS

STUDENTS

*Figure 2 : Organisation Chart of N-Tec Labs*

1. **HARDWARE AND SOFTWARE RESOURCES OF THE COMPANY**
2. **Hardware Resources**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Designation | Quantity | Characteristics |
| 1 | Mac Desktop | 4 | APPLE |
| 2 | Hp Desktop | 1 | HP |
| 3 | Star link | 1 | / |
| 4 | Printer | 2 | HP |
| 5 | Training equipment and office furniture | 22 | / |

***Table 2****: Hardware resources of N-tec labs*

### Software Resources

As an enterprise specialised in IT, N-Tec also comprises of software resources such as;

|  |  |
| --- | --- |
| Designation | Software |
| Operating system | Windows 11, Mac OS |
| Design tools | Photoshop |
| Integrated development environment (IDE) | Vs Codium |
| Text editor | Sublime text, Notepad++ |
| Database management system (DBMS) | MongoDB, PostgreSQL, MySQL |
| Web browser | Google Chrome, Microsoft Edge, Safari |
| Document editor | Microsoft Office Word |
| Presentation | Microsoft Office PowerPoint |

***Table 3****: Software resources of N-Tec Labs*

1. **BRIEF PRESENTATION OF THE PROJECT**

During our insertion phase at N-Tec Labs, we were asked to look for themes which solve a specific problem and something innovative. Our professional supervisor took some time to look into what we proposed as themes and he also proposed some theme ideas. Finally, we were assigned the theme **“RESTAURANT MANAGEMENT SYSTEM”**.

**CONCLUSION**

To end, our insertion phase into N-tec labs was a serene, warm and convenient experience with the company’s personnels. One of the things we learned during this phase was collaboration and discipline which is essential for a successful career.

**PART II:**

**SPECIFICATION BOOK**

Preamble

The primary objective of the specification book is to outline the comprehensive specifications for our project, detailing functional and non-functional requirements, UI design, system limitation, and database structures serving as the development guide.

Content

INTRODUCTION

1. CONTEXT AND JUSTIFICATION OF STUDY
2. OBJECTIVES OF THE PROJECT
3. EXPRESSION OF USER NEEDS
4. PLANNING OF THE PROJECT
5. ESTIMATION OF COST OF THE PROJECT
6. CONSTRAINTS OF THE PROJECT
7. DELIVERABLES

CONCLUSION

INTRODUCTION

**INTRODUCTION**

The Specification Book lays the vital groundwork for this software project by mapping out the vision, requirements, designs and plan that will guide us from idea to completion. This thorough documentation serves as a roadmap and compass to smoothly navigate the development journey and ensure the end goal is achieved.

1. CONTEXT AND JUSTIFICATION OF STUDY

In the modern dining experience, convenience is key, and managing a restaurant's operations goes beyond just food preparation. It involves providing seamless, fast, and personalized services to customers. However, many restaurants face challenges in keeping up with customer demands while managing orders, tracking inventory, and ensuring a smooth dining experience.

This led to a series of important reflections:

* Could there be a more efficient way to manage customer orders without overwhelming the staff?
* How can technology be used to create a personalized and fast ordering experience?
* What if there was a way to allow customers to customize their meals and track orders in real-time?
* Can restaurant owners reduce wait times and enhance customer satisfaction with a streamlined system?

These reflections inspired the creation of our "Computerised Management Of Restaurant Services." This platform is designed to bridge the gap between the restaurant and its customers by providing an intuitive, tech-driven experience that enhances both operational efficiency and customer satisfaction. From real-time order tracking to easy meal customization, the system empowers restaurants to deliver exceptional service, ensuring no customer is left waiting for the perfect dining experience.

1. OBJECTIVES OF THE PROJECT
2. GENERAL OBJECTIVES

To develop and implement an intuitive digital platform that streamlines restaurant operations and enhances the dining experience through efficient management of orders, meal customization, and customer satisfaction.

1. SPECIFIC OBJECTIVES

In order to achieve the overarching goal, several specific objectives must be realized:

* **User-Friendly Ordering**: Design an easy-to-navigate interface where users can browse menus, customize their orders, and make real-time requests.
* **Order & Customization Management**: Implement a robust order management system that allows users to seamlessly customize meals and track orders from preparation to delivery.
* **Real-Time Notifications**: Establish a notification system that alerts customers of order status updates, ensuring clear communication between the kitchen, staff, and customers.
* **Safety & Security**: Ensure the platform maintains high standards of security to protect sensitive customer data and payment information, while making the platform accessible for all users.
* **Name of the Project**: SERVESOFT
* **Target Audience**: Restaurants and diners looking for an enhanced, tech-driven dining experience.
* **Technical Specification**: A web-based and mobile application for ordering, meal customization, and order management.

1. EXPRESSION OF USER NEEDS

This section unveils the essential requirements of the software project, serving as a vital link between the problem at hand and the proposed solution. It emphasizes the "what" instead of the "how," painting a clear picture of the project's goals. These needs are artfully divided into two categories: functional requirements, which define the system's capabilities, and non-functional requirements, which outline quality attributes that enhance user experience.

1. FUNCTIONAL NEEDS

In this context, this expresses **what** the system is supposed to do and these features are as follows:

* **Sign Up & Login for staff**: Staff must sign up and log in to access their profiles.
* **Meal Selection**: Customers can browse a comprehensive menu, categorized into different food types such as deserts, salads, beverages, and more.
* **Meal Customization**: The app offers a customizable meal ordering system, allowing users to modify dishes to their preferences (e.g., extra mayonnaise, pepper options).
* **Order Tracking & Notifications**: Once the order is placed, users receive real-time updates about the order status (in preparation, en route, delivered).
* **Reorder from Recent Orders**: Users can easily reorder meals they’ve enjoyed before from their recent order history, saving time.

1. NON-FUNCTIONAL NEEDS

In this context, non-functional needs refer to the **quality attributes** that determine how the app should operate to enhance user experience and satisfaction. These attributes are essential for the long-term success of the platform. These features include:

* **Security**: Personal information, such as staff details, addresses, and order history, should be securely stored and encrypted to ensure user privacy.
* **Performance**: The application should load quickly, even under high traffic, and ensure a smooth user experience. This includes responsive pages, fast processing of orders, and minimal downtime to avoid frustrating the customers and staff.
* **Usability**: The app must be intuitive and easy to navigate, ensuring that users can browse menus, customize orders, and place requests without confusion. A simple and clean interface will reduce complexity, encouraging repeated use.
* **Reliability**: The platform must consistently function as expected, without crashes or failures, ensuring that orders are processed and delivered correctly. A reliable system will build trust with users and meet market expectations.

1. PLANNING OF THE PROJECT
   1. ESTMATION OF RESOURCES NEEDED
2. Software Resources

|  |  |  |  |
| --- | --- | --- | --- |
| SOFTWARE | USAGE | Logo | PRICE(FCFA) |
| Microsoft 365 | Used for the creation our report and PowerPoint |  | 500,500 |
| Visual studio code | Open and free software for the coding part of the project |  | Free |
| PowerAMC | For doing the design of the diagrams to represent the structure and the interaction between the different actors |  | 150,000 |
| Google | For doing the research on the internet and testing of the application |  | Free |
| Windows 11, version 23H2 | Operating system |  | Free |
| Gantt Project | For building a gantt chart for the planning of the work |  | Free |
| MySQL | For creating database |  | Free |
| Visual Paradigm Enterprise version | For doing the design of the diagrams to represent the structure and the interaction between the different actors |  | 500,000 |
| TOTAL | **1,150,500** | | |

Table 5: Software resources of the project

1. Hardware Resources

|  |  |  |  |
| --- | --- | --- | --- |
| Material | USAGE | QUANTITY | PRICE (FCFA) |
| LAPTOP (LENOVO i5 8th Gen, SSD) | Used to build the system, type the report, create the power point, make research, etc. | 01 | 425,000 |
| USB flash disk 64gb | Used for storage and to print the report | 01 | 16,000 |
| Internet Modem | Used for internet connection | 01 | 65,000 |
| Samsung Tablet | Used for carrying research and storage | 01 | 150,000 |
| Printer HP Officejet 4630 | Used to print the scientific document | 01 | 86,550 |
| TOTAL: | **742,550** | | |

Table 6: Hardware resources of the project

1. Human Resources

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Role | Duration (Week) | Quantity | Unit Price (FCFA) | Total Price (FCFA) |
| Project manager | 08 | 01 | 250,000 | 2,000,000 |
| DevOps | 06 | 01 | 205,000 | 1,230,000 |
| Analyst | 02 | 01 | 200,000 | 4,00,000 |
| Designer | 02 | 01 | 150,000 | 300,000 |
| Developer | 04 | 01 | 100,0000 | 400,000 |
| Tester | 02 | 02 | 50,000 | 50,000 |
| TOTAL | **4,680,000** | | | |

Table 7: Hardware resources of the project

1. Overall Resources

|  |  |
| --- | --- |
| Designation | Cost (FCFA) |
| Software Resources | 1,150,500 |
| Hardware Resources | 742,550 |
| Human Resources | 4,680,000 |
| Unforeseen | 500,000 |
| Total in figures | **7,073,050** |
| Total in Words | **Seven million seventy-three thousand fifty.** |

Table 8: Overall resources of the project

* 1. ESTMATION OF RESOURCES NEEDED

|  |  |  |  |
| --- | --- | --- | --- |
| Phase | Task / Objective | Output | Duration (WEEKS) |
| Insertion Document | Collection of Information concerning the Enterprise | Insertion Report | 02 |
| Specification Book | Specification of the user’s need | Specification Book | 01 |
| Analysis | Study of the existing system, modelling user interactions | Analysis Report | 02 |
| Conception | Preliminary Conception  Detailed Conception | Conception Report | 01 |
| Realization | Implementation, Unitary tests, Integration test, development | Realization document | 01 |
| User Guide | User guide for solution | User guide | 02 |
| Presentation | Design slides showing how work was realised | PowerPoint | 01 |

Table 9: Estimation of time required for project

* 1. GANTT DIAGRAM

This diagram in planning, scheduling and monitoring the project. It was realised using the software **GANTT PROJECT.**

Figure3: Gantt Diagram

1. PROJECT CONSTRAINTS
2. Criterions Of Acceptability

The delivered product is judged acceptable if it respects the different functionalities that have been presented.

1. Time Constraint

The project will be realized within 3 months that is the time allocated by the school for the internship and realizing of the project that is from July to September

1. DELIVERABLES

Regarding this project, below lies its deliverables:

* A report composed of the following:
  + The analysis documents
  + The conception documents
  + The realisation document
  + The user guide

**CONCLUSION**

In conclusion, this section represents a crucial milestone, demonstrating the application's market value, its benefits for Cameroonians, and providing a clear timeline with cost estimates for successful project completion.

# **PART THREE:**

# **ANALYSIS PHASE**

Preamble

The main goal of the analysis phase is to thoroughly capture the users' needs, define the project’s boundaries, and obtain a clear understanding of the restaurant system being developed. To achieve this, we will utilize UML (Unified Modeling Language) combined with the 2TUP (2-Track Unified Process) methodology, which is specifically applied to analyze the system’s functionality. Content

INTRODUCTION

1. DESCRIPTION OF THE EXISTING SYSTEM
2. LIMITS OF THE EXISTING SYSTEM
3. PROBLEMATIC
4. DELIMITATION OF THE FIELD OF STUDY
5. PRESENTATION OF THE MODELING APPROACH
6. CHOICE OF THE ANALYSIS METHOD
7. MODELING OF THE PROPOSED SOLUTION

CONCLUSION

**INTRODUCTION**

Building a restaurant app is like embarking on a creative journey, where the first step is to deeply understand the existing system and set clear goals for the future. This phase goes beyond just identifying where we are but it’s about pinpointing key challenges and providing targeted solutions that enhance the dining experience. We apply innovative methodologies and advanced modeling techniques, not only to address the app's requirements but to resolve existing pain points within the system. Whether it's streamlining orders, improving customer engagement, or optimizing restaurant operations, every step of the analysis is aimed at delivering a solution that is both forward-thinking and meticulously crafted. The ultimate goal is to transform identified challenges into opportunities for creating a refined, efficient, and user-friendly app experience.

* 1. DESCRIPTION OF THE EXISTING SYSTEM

The existing system refers to the framework already in place, which has led to the decision to develop a more efficient solution. The current system presents several challenges that disrupt smooth operations, making it crucial to fully understand these issues before moving forward. Through thorough research and investigation, we have identified key problems that are affecting the user experience and operational efficiency. This phase of analysis serves as foundational research to outline the framework for our proposed solution. After all possible studies carried out on the existing system we identified the following consequences of the various problems. in addition to these consequences, we provided some proposed solutions:

* 1. LIMITS OF THE EXISTING SYSTEMF THE EXISTIN

|  |  |  |
| --- | --- | --- |
| Criticism | Consequences | Proposed Solutions |
| Slow ordering process via waiter | Customers experience longer wait times, leading to frustration and dissatisfaction. | Implement an app-based ordering system allowing customers to place orders directly through their phones. |
| Limited menu visibility | Customers may not be aware of special offers or detailed dish descriptions, limiting their choices. | Provide a digital menu within the app that includes item details, pictures, and real-time specials. |
| Human error in order taking | Miscommunication between waiters and the kitchen can lead to incorrect orders or missed items. | The app automates order transmission directly to the kitchen, reducing the chances of human error. |
| Difficulty tracking customer preferences | Waiters have difficulty remembering individual customer preferences for future visits. | Use the app to store customer preferences and order history, enabling personalized recommendations. |
| Waiter availability issues | Waiters may be busy or unavailable when customers need assistance, causing delays in service. | Allow customers to request assistance or modifications through the app, ensuring quicker responses. |
| Inaccurate billing due to manual calculations | Errors in manually calculating bills can cause discrepancies and customer dissatisfaction. | Automate bill generation through the app to ensure accuracy and transparency in billing. |
| Difficulty handling large groups efficiently | Large parties may face delays in placing and receiving orders, impacting their overall dining experience. | The app can offer group ordering features, allowing multiple guests to place their orders simultaneously. |

Table 10: Limits of the existing system (criticisms, consequences and proposed solutions)

* 1. PROBLEMATIC

With the current restaurant system described and its limitations outlined, we can now confidently identify the problem, which is **“HOW CAN WE COMPUTERIZE AND FACILITATE THE MANAGEMENT OF SERVICES IN RESTAURANTS?**” This question guided the development of the new system, which aims to address, if not entirely resolve, many of the issues highlighted. By leveraging technology, the proposed solutions will enhance service speed, reduce errors, and elevate the overall dining experience, creating a more seamless and satisfying environment for both customers and staff.

* 1. DELIMITATIONS OF THE FIELD OF STUDY

In this restaurant app project, the focus will be on the following modules:

* TABLES
  + View their order history
  + Place new orders
* STAFF
  + Users can sign up and log in to their accounts
* ADMIN
  + Update menu items
  + Track restaurant reports
  + Manage user accounts
  1. PRESENTATION OF THE MODELING APPROACH
     1. SOME MODELLING TECHNIQUES

In analyzing the software project, it's essential to select a model that effectively designs and visualizes the project's structure based on its specific needs. Here, we explore various modeling techniques and discuss the chosen approach for the project's development.

1. MERISE

**MERISE** (Méthode d'Étude et de Réalisation Informatique pour les Systèmes d'Entreprise) is a structured methodology used in the development and management of information systems. Developed in France in the late 1970s, it primarily focuses on the design and modeling of data and processes within an organization. MERISE is based on the separation of data and processes, allowing for a more modular and flexible approach to system development. It separates system design into three levels: conceptual (high-level understanding of data), logical (structured data and processes), and physical (implementation). MERISE emphasizes data modeling using the Entity-Relationship model and is particularly useful for complex, data-driven projects. It’s widely used in French-speaking regions for systematic and modular software development.

1. SCRUM

Scrum is an Agile framework introduced in the early 1990s, designed to manage complex product development through collaboration, adaptability, and continuous feedback. It breaks projects into short cycles called **Sprints**, typically lasting 2-4 weeks, during which a cross-functional team focuses on delivering specific, prioritized tasks. Key roles include the **Scrum Master** (ensuring smooth process), **Product Owner** (defining and prioritizing requirements), and the **Development Team** (executing the work). Scrum also emphasizes practices like **Daily Stand-ups**, **Sprint Planning**, and **Retrospectives** to promote communication and continuous improvement. Unlike traditional methods, Scrum delivers small, testable product increments throughout development, allowing for early validation and quick adaptation to feedback.

1. UP

UP Stands for “Unified Process” it is sometimes associated with the **Rational Unified Process (RUP)** due to a particular commercial variant, is an object-oriented and use-case-driven approach to software development. These iterative and incremental framework structure the development phase into four sequential phases: **Inception (**initial planning and requirements gathering), **Elaboration (**refining the architecture and resolving high-risk elements), **Construction (**developing the bulk of the software), and **Transition (**deploying the solution to users). Throughout, UP employs the **Unified Modeling Language (UML)** as a standard notation to visualize and design system architecture. With its disciplined approach to assignments and roles, UP integrates various best practices from software engineering.

1. DYNAMIC SYSTEMS DEVELOPMENT METHOD (DSDM)

**DSDM (Dynamic Systems Development Method)** is one of the earliest Agile methodologies, introduced in the 1990s as part of the Agile Alliance. It is designed to help organizations deliver high-quality software solutions quickly and efficiently, while ensuring flexibility and collaboration throughout the development process. The core focus of DSDM is on meeting business objectives through a balanced approach that emphasizes **collaboration**, **timely delivery**, and **adaptability.**

* + 1. PRESENTATION OF UML, 2TUP AND ERD
       1. UML

**UML (Unified Modeling Language)** is a standardized, versatile modeling language used extensively in software engineering and system design. Introduced in the 1990s by pioneers Grady Booch, Ivar Jacobson, and James Rumbaugh, UML was created to offer a consistent framework for visualizing, designing, and documenting software systems.

Since its inception, UML has evolved into an indispensable tool for software architects, developers, business analysts, system engineers, and stakeholders. It facilitates clear communication and precise documentation across various aspects of software development.

UML 2.O comprises of 13 diagrams categorized into two main groups

1. **Structural Diagrams**: These diagrams represent the static aspects of a system, illustrating its components and their relationships. Diagrams in this category include:
   * + - Class Diagram
       - Component Diagram
       - Composite Structure Diagram
       - Deployment Diagram
       - Package Diagram
       - Object Diagram
2. **Behavioral Diagrams**: These diagrams depict the dynamic aspects, showcasing how the system behaves and interacts over time. Diagrams in this category include:
   * **Use Case Diagram**
   * **Sequence Diagram**
   * **State Machine Diagram**
   * **Activity Diagram**
   * **Communication Diagram**.
   * **Interaction Overview Diagram**.
   * **Timing Diagram**

With its comprehensive set of diagram types, UML provides a robust foundation for understanding and managing complex software systems, ensuring clarity and coherence throughout the development process. However, it is important to note that UML is not a modeling methodology on its own. To effectively apply UML, it needs to be associated with a structured approach, such as the Unified Process (UP). While there are several variations of the Unified Process, our modeling approach for this project will be the 2TUP (Two-Track Unified Process). This methodology will guide our conceptualization and ensure a systematic approach throughout the project.

* + - 1. COMPARISON BETWEEN UML AND MERISE

|  |  |  |
| --- | --- | --- |
| Aspect | UML (Unified Modeling Language) | MERISE |
| Primary Focus | General-purpose modeling language for software engineering. | Methodology for designing and managing information systems, with a focus on data and processes. |
| Diagram Types | 14 diagram types, including Class, Use Case, Sequence, and Activity diagrams. | 6 main diagrams, including Context Diagram, Data Flow Diagram, and Entity-Relationship Diagram. |
| Modeling Paradigms | Object-oriented, emphasizing objects and their interactions. | Entity-relationship and process-oriented, focusing on data modeling and process flow. |
| Level of Abstraction | Provides various levels of abstraction from high-level overviews to detailed designs. | Focuses more on data and process modeling with a less diverse set of diagrams. |
| Use Case Focus | Strong emphasis on use cases and user interactions. | Less emphasis on use cases, more focus on data and process modeling. |
| Methodological Approach | Iterative and incremental approach to software development. | More structured and sequential approach, particularly for data analysis and system design. |

Table 11: Comparison of MERISE and UML

This comparison highlights the differences in focus, methodology, and application between UML and MERISE. UML is a broader, internationally recognized modeling language with a focus on object-oriented design, while MERISE is more specialized for data and process modeling, with strong roots in French methodologies.

* + - 1. TWO TRACK UNIFIED PROCESS (2TUP)

In software development, both the process model and the tools for capturing and communicating requirements are crucial for project success. The **2TUP (Two-Track Unified Process)** model provides a strategic approach by integrating conceptual and technical aspects into a structured, Y-shaped flow. This model divides the development process into two parallel tracks: the **Functional Branch** focusing on defining what the system should do, and the **Technical Branch** concentrating on how it will be implemented. These branches converge in the **Realization Branch**, where both tracks are integrated to achieve the final system.



Figure 4 Two-Track Unified Process

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