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TITLE:

USER REQUIREMENTS

SUBJECT:

OBJECT-ORIENTED PROGRAMMING

NRC:

1973

DELIVERY DATE:

11/11/2024

Requirements Specification

1. Introduction

1.1. Purpose

The purpose of this document is to detail the requirements of the Waiter and Cash Automation System (SAMC), designed to optimize the time at the cash register, service and order of a customer in the restaurant.
Aimed at
Managers and owners of the establishment: Improving operational efficiency and satisfaction
Staff of the establishment: Facilitating work and speeding up order taking.
Accounting system: Improving the accounting system by having a record of sales and income that is in the establishment without human error.
Customers: Improving service and optimizing time. Being main.
The document will present the description of all the characteristics of the system, with the essential requirements and criteria. With the objective of significantly reducing the time of customers in line, ordering and improving the experience.

1.2. System Scope

Waiter and Cash Automation System (SAMC).
The system consists of two parts, one for the customer or diner, and another for the establishment's staff. Where the customer will be able to enter the order from their mobile device through a QR assigned to the table that will direct them to the page where they will have the menu available by sections and will facilitate payment, where the only physical intervention will be at the time the food arrives at their table. Improving the customer's experience and comfort, while optimizing the waiting time in line and ordering food. On the other hand, the system given to the staff will be the purchase record of each customer for their table, the payment by transfer as well as the record of profits, stock and ease of the billing system. The system will not be able to do processes such as cash collections, table service and cleaning.

We will have the following objectives and improvements:
Reduction of waiting time
Improvements in the establishment's operating system

Customer satisfaction
Reduction of human error

1.3. Definitions, Acronyms and Abbreviations

Waiter and cashier automation system (SAMC)
Waiter: Restaurant staff responsible for taking orders, serving food, and processing payments.
Customer: Person who visits the restaurant to consume food and drinks.
Order: Request for food and/or drinks made by a customer.
Payment: Financial transaction made by the customer to pay for the cost of their order.

1.4. References

1.4 References
A complete list of all documents referenced in the ERS will be displayed in this subsection.

Order Management System (PMS) User Manual
Version 2.3, published by XYZ Software Solutions, 2022.

Description: This document provides detailed guidance on how to use the Order Management System, including step-by-step instructions and usage examples.
Reference used in: Section 3.2 - Functional Requirements.
Secure Payment System (SPS) Technical Specifications
Version 1.1, published by ABC Financial Services, 2023.

Description: This document details the technical specifications of the Secure Payment System, including security protocols and integrations with other systems.
Reference used in: Section 4.1 - Security Requirements.
Personal Data Protection Regulation (NPDP)
Published by the National Data Protection Agency, 2021.

Description: This document contains the rules and guidelines on the protection of personal data that systems that handle sensitive user information must comply with.
Reference used in: Section 5.3 – Compliance requirements.

1.5. Document Overview

The System Requirements Specification (ERS) document is structured as follows:

Section 1: Introduction

1.1 Purpose: Describes the purpose of the document and who it is intended for.
1.2 Scope: Defines the scope of the system to be developed and its main functionalities.
1.3 Definitions, Acronyms and Abbreviations: Provides a glossary of terms, acronyms and abbreviations used in the document.
1.4 References: Lists the documents referenced in the ERS.
1.5 Document Overview: Provides an overview of the contents and organization of the document.
Section 2: General Description

2.1 Product Perspective: Describes the context of the system, its relationship with other systems and its main components.
2.2 Product Functions: Lists and describes the main functions of the system.
2.3 User Characteristics: Defines the different types of users of the system and their characteristics.
2.4 Constraints: Lists the constraints that affect the development and operation of the system.
2.5 Assumptions and Dependencies: Details the assumptions made during the development of the system and the dependencies identified.
Section 3: Specific Requirements

3.1 Functional Requirements: Describes the detailed functional requirements of the system.
3.2 Non-Functional Requirements: Lists the non-functional requirements, including performance, security, and usability.
3.3 User Interfaces: Details the user interfaces and their features.
3.4 External Interfaces: Describes the external interfaces and the interaction of the system with other systems.
3.5 Design Requirements: Provides guidelines and design considerations for the development of the system.
Section 4: Annexes

4.1 Glossary: Provides a glossary of technical terms used in the document.
4.2 Diagrams and Models: Includes diagrams and models that help understand the design and architecture of the system.
4.3 Supporting Documentation: Lists additional supporting documents relevant to the development of the system.

2. General Description

The program will make it easier for us to take orders at the "Agachaditos de la Ajavi" restaurant. Customers will be able to choose their menu, select their payment method and the system will generate semi-accounting records. Additionally, customers will have the option to rate the restaurant's service.

2.1. Product Perspective

The program is designed to improve the order-taking experience at the "Agachaditos de la Ajavi" restaurant. Its objective is to optimize the process of selecting menus and payment methods, while generating semi-accounting records and allowing customers to rate the service received.

2.2. Product Features

- **Menu Selection:** Customers will be able to choose their dishes from a digital menu that will be found when scanning the QR code already established on each table.
- **Payment Methods:** Two payment options, cash or transfer, will be offered.
- **Semi-Accounting System:** The program will generate transaction records that will help the restaurant's accounting.
- **Service Rating:** Customers will be able to evaluate their experience, providing valuable feedback.

2.3. User Characteristics

- **Restaurant Customers:** People who visit "Agachaditos de la Ajavi" and want a digitalized ordering experience with greater ease of service in short periods of time.
- **Restaurant Staff:** Employees who will use the system to manage orders and payments for each of the tables where orders will be placed.

2.4. Restrictions

- **Device Compatibility:** The program must be compatible with cellular devices whether Android, IOS.

- **Ease of Use:** The interface must be intuitive and easy to use both for taking orders from the customer and for restaurant employees.
- **Programming language:** The language to use for the development of the program would be Java Script, for its better development.

2.5. Assumptions and Dependencies

- **Internet Access:** It is assumed that the restaurant has a stable internet connection.
- **Training:** It is considered that the restaurant staff will receive the necessary training to use the program adequately and stably.

2.6. Future Requirements

- **Updates:** New features and improvements could be added based on user feedback, in addition to obtaining updated performance when handling the program.
- **Integration:** Possible integration with other restaurant management systems in the future.

3. Specific Requirements

This section details the specific requirements necessary for the development and implementation of the automated ordering application for "Agachaditos de la Javi". The description below covers functional aspects, performance, interfaces, design constraints, attributes, and other requirements that will ensure the system meets the established objectives. These requirements aim to maximize operational efficiency, optimize customer service, and reduce costs in the restaurant, enabling an improved workflow for the ordering process.

3.1. External Interfaces

External interfaces specify the communication between the ordering system and users, other software or hardware systems, and communication interactions. The application must offer an intuitive and accessible user experience - guaranteeing a smooth transition from ordering to delivery and payment. The required external interfaces are detailed below:

- **User Interface**:

  Mobile Interface: The application must be designed to work on mobile devices with Android and iOS operating systems, allowing the customer to access the menu and place orders directly from their smartphone.
  Menu Display: By scanning the QR code, the customer will see the full menu - including options for dishes, drinks, and combos. Each dish will feature a detailed description, price, additional options, and availability status.
  Confirmation and Payment: When the order is complete, the user can confirm the order and select the payment method, with options for cash

or bank transfer. The application will display relevant information, such as the table number and a unique order code.
Service Rating: The interface will allow the customer to rate their experience at the end of the meal - facilitating the collection of feedback for service improvement.

- **Interface with Other Systems**:

  Kitchen System: The application must automatically send the order to the kitchen system, where the order details will be displayed along with the table number - allowing the kitchen staff to prepare dishes without delay.
  Billing System: The application must integrate with the restaurant's billing system, sending payment information and generating a digital receipt. This integration includes validation options for bank transfers - where the customer must present the payment receipt to the waiter.
- **Communication Interface**:

  QR Code: Each table in the restaurant will have a unique QR code that allows customers to access the restaurant's website with the menu and order options. This QR redirects automatically to the "Agachaditos de la Javi" web app, where the entire ordering process is managed.
  Real-Time Notifications: The application will send real-time notifications to the kitchen and billing system to ensure that the order is ready and that the bill is updated at each stage of the process.

3.2. Features

The system's key functions, which must be implemented to meet the restaurant's objectives, are described below.

1. **Order Registration**:
   The system must allow the customer to scan the QR code to access the menu. Once in the app, the user can select dishes and drinks, as well as customize the order with available options (e.g., side dish or ingredient changes).
   Each selected item is stored in the system with details such as quantity, chosen options, and price.
2. **Order Confirmation and Payment**:
   Once the selection is complete, the system will prompt the customer to confirm the order and select the payment method: cash or bank transfer.
   For cash payment, the system will generate a code the customer must present to the cashier upon payment.
   For bank transfer payment, the system will generate a unique order code and display the restaurant's bank details. The customer must present the transfer receipt number to the cashier to validate payment.
3. **Inventory System**:
   The system will manage a dynamic inventory that automatically updates when a dish is marked as "sold out" or available again. When

selecting a dish, the system will check the inventory in real-time and notify the customer if an item is unavailable.

4. **Table Code Assignment:**
   Each order will be registered under a unique identifier generated for the customer's specific table - enabling tracking and control of the order. This table code will be visible to kitchen staff and on the customer's interface.
5. **Notification to Kitchen**:
   Once the customer confirms the order, the system will send a detailed notification to the kitchen - indicating the table number and order content - making it easier to prepare and deliver the order quickly.
6. **Delivery and Billing**:
   The waiter will receive a notification with the order details and the assigned table code for delivery. Upon reaching the table, the waiter will deliver the order and request payment for cash orders or verify the transfer receipt for bank transfers.
7. **Service Rating**:
   Once the meal is complete, the customer can rate the service and leave a comment. This information will be stored in the database so the restaurant can review and evaluate customer satisfaction.

3.3. Performance Requirements

To ensure the system's reliability and efficiency, the following performance requirements must be met:

Concurrent User Capacity: The application must support at least 50 concurrent users without experiencing a decrease in performance or response time.

Response Time:

- Full menu loading should not exceed 2 seconds.
- Order processing time, from confirmation to sending to the kitchen, should not exceed 5 seconds.

Usage Frequency and Workload: The system must handle a flow of up to 320 orders per day, with a peak activity period between 5:00 pm and 6:00 am from monday to sunday. The system must be prepared for peak loads without affecting processing speed.

3.4. Design Constraints

The system design must consider the following constraints to ensure compatibility and security:

- **Device Compatibility**: The application must work on Android and iOS devices - adapting to various screen resolutions.
- **Security Standards:**
  Customer's personal and payment data must be encrypted during transmission to protect information.

The system must require user authentication for access to administrative and kitchen interfaces.

- **Integration with the Billing System**: The application must be compatible with the restaurant's existing billing system, including the ability to generate digital invoices and send transaction details.

3.5. System Attributes

To ensure system quality, the following attributes must be guaranteed:

Security: Only authorized personnel (kitchen and cashier) should have access to administrative functions. Authentication will be implemented via login and password.

Reliability: The application must maintain a minimum uptime of 99.9% during the restaurant's operating hours - ensuring availability for customers and staff.

Maintainability: The code structure must allow for updates and bug fixes without affecting the overall system functionality. Additionally, activity and error logs will be implemented for diagnosis.

Usability: The application should have a simple and user-friendly interface - minimizing the need for technical assistance for customers.

3.6. Other Requirements

In addition to the requirements above, the following considerations must be taken into account:

Customer Rating: The application should include a section for customers to evaluate service quality at the end of their experience, allowing the restaurant to gather feedback and continuously improve.

Multilingual Support: The application should allow the customer to switch the interface language, at least between Spanish and English, to serve a diverse clientele.

Order Traceability: The system must maintain a history of all orders placed - with the ability to analyze data on delivery times, consumption per table, and customer satisfaction trends.

4. Appendices

4.1 Input/Output Data Formats

Input Format

The system must accept user data (customers and restaurant staff) through specific interfaces. The input formats for each case are described below:

- **Customer Input:**
  - **QR Scan:** The customer scans the QR code on the table, which redirects them to the restaurant's website with the digital menu**.**
  - **Order Selection:** The customer selects menu items (starters, main courses, drinks, desserts) and specifies preferences (customization options such as additional ingredients or preparation changes).
  - **Order Confirmation:** The customer confirms their selection and chooses the payment method (cash or bank transfer).
  - **Service Rating Input:** After finishing the meal, the customer provides a rating and feedback on the service received.
- **Restaurant Staff Input:**
  - **Order Management:** The dispatcher enters the table number for each order and can check the details of the orders placed through the application interface on their device.
  - **Payment Confirmation:** The staff validates the payment when the customer has paid in cash or shown proof of bank transfer.

Output Format

The system's output is generated in different formats according to the needs of each user or process:

- **Output for the Customer:**
  - **Digital Menu:** Display of the menu with descriptions, prices, and customization options for dishes.
  - **Order Confirmation:** Detailed order with selected items, total price, table number, and unique order code.
  - **Payment Receipt:** A code generated for cash payments or the necessary bank transfer details for payment via transfer.
  - **Service Rating:** Confirmation that the rating was successfully recorded.
- **Output for the Restaurant Staff:**
  - **Order Details:** The complete order with the description of requested items, modifiers, and the corresponding table.
  - **Payment Notification:** A payment code for validation or the bank transfer information to complete the payment process.
  - **Sales Record and Inventory Reports:** Report on daily sales, completed transactions, sold dishes, and inventory status.

4.2 Cost Analysis Results

Implementation Costs

The costs associated with the implementation of the SAMC include both software development and the necessary hardware for its operation. Below are the approximate costs:

- **Software Development:**
    - **Development Cost:** The estimated cost for software development and customization is $0 since it is a project.
    - **Software Licenses:** The system will not require licenses for technology use as it will use open-source software.
- **Required Hardware:**
    - **Devices for Staff:** Two or more tablets will be needed for the restaurant staff to manage orders, with an estimated cost of $200 per device.
    - **Wi-Fi Access Points:** To ensure stable connectivity at all tables, two Wi-Fi access points will be required in the restaurant, with an estimated cost of $50 per access point.
- **Total Estimated Cost:**
    - The total estimated cost for the implementation of the SAMC system, including development, hardware, and training, is $250.

Estimated Implementation Benefits

- **Reduction in Human Errors:** A 95% reduction in order errors is expected due to the automation and validation of product selection.
- **Improved Staff Efficiency:** The automation of the ordering process will reduce customer service time by 25%.
- **Inventory Optimization:** Integration with the inventory system will allow better control and automatic updates of product availability, potentially reducing stock losses by 15%.
- **Increased Customer Satisfaction:** A 20% increase in customer satisfaction is expected due to reduced wait times and ease of payment.

4.3 Programming Language Restrictions

The SAMC automation system is designed to be compatible with mobile devices and should be developed using programming languages that ensure compatibility between Android and iOS platforms. Below are the technical restrictions on the languages and tools to be used:

Recommended Languages and Frameworks

- **Frontend:**
    - **JavaScript:** The main language for developing the web interface for both customers and staff.
    - **HTML5/CSS3:** For content structuring and UI design on mobile and desktop versions.
- **Backend:**

    - **Node.js:** For the backend server development, which will handle user requests and responses, and integrate with the database system and external kitchen and billing systems.

Platform Restrictions

- The system must be fully responsive, meaning it must adapt correctly to different screen sizes on both Android and iOS smartphones.

Security

- **Data Protection:** All sensitive data, such as payment information, must be encrypted to prevent theft.
- **Authentication:** The system must require staff to log in (sign in) to access important functions, such as managing orders or payments.

Data Input/Output Formats

This section describes the expected formats for data input and output, including screen and list displays. The following formats help define how data is shown to the user and received by the system:

Menu Display (Output):

The menu screen shows all dishes, combos, and drinks. Each item will display its name, description, price, and a note indicating availability (e.g., “Available” or “Sold Out”).

Interactive Features: Customers can filter menu items by category, such as “Combos” or “Drinks”.

Error Handling: If an item is unavailable, the system will notify the customer by marking it as "Sold Out".

Order Confirmation Screen (Input/Output)

Format: When an order is completed, a summary screen shows all selected items, their quantities, and the total price. The customer will have options to confirm the order or go back to make changes.

Payment Method (Input): The customer can choose between “Cash” or “Bank Transfer”. Based on this choice, the system will generate a unique code for cash payments or display bank transfer information for bank payments.

Service Rating Screen (Input)

Format: After the meal, the customer can provide feedback through a rating screen with options to rate the service and leave a comment.

Cost Analysis Results

This section outlines a basic cost analysis, showing how the system is designed to balance development costs and benefits:

Initial Development Cost: This covers the development of the web and mobile applications, with expenses for software licenses and other tools necessary for coding and testing. Costs include access to MongoDB Atlas for database management.
Operational Costs: The system will require ongoing operational expenses for server hosting and database storage. Using MongoDB Atlas offers scalability, where costs can increase or decrease based on the data storage and activity.
Expected Benefits: By reducing service times, increasing customer satisfaction, and lowering manual ordering errors, the system aims to recover development costs within the first year of operation.

Programming Language and Environment Constraints

To help new developers get started, the system will use tools and technologies compatible with Java, NetBeans, and MongoDB Atlas. Below are the primary programming language and environment constraints:
Programming Language: Java is the primary language for implementing this system. Students can use Java JDK 23 with NetBeans 23 as their Integrated Development Environment (IDE).
Database: MongoDB Atlas will be used for database management. It is a cloud-based NoSQL database that stores data in collections, which is easy to access and scalable for web applications.
Development and Testing: NetBeans provides a simple interface for Java development, allowing students to create, test, and debug the application code effectively.
System Design: For simplicity, the system will follow a layered structure. Key classes might include Order, Menu, Customer, and Inventory, each with attributes and methods following OOP principles.