
Group Project Documentation

Basic Cross-Platform Application

Programming with .NET

Car Parking Management

Prepared by **Group 3**

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Revision History

Name	Date	Reason For Changes	Version
Thanh Phu	19 August 2023	Update CustomerForm	1.0

1. Project Introduction

1.1 Product Perspective

The Car Parking and Booking Management project aims to optimize the parking reservation and management process. The system will be implemented through a C#.NET Windows Form application on the computer platform. The application will provide a user-friendly interface, allowing users to search for available parking spaces, view real-time status information, make reservations, and receive confirmation details. The system will also integrate an online payment mechanism for convenient payment processing. Additionally, administrators will have access to a management interface to oversee parking space listings, monitor reservations, set pricing, and generate occupancy reports. The project aims to enhance the overall parking experience for users while providing effective tools for parking space administrators to efficiently manage resources.

1.2 User Classes and Characteristics

Customer:

Customers are the primary users of the Car Parking and Booking Management system. They are individuals who need parking spaces for their vehicles. Characteristics of customer users include:

- Searching for Parking: Customers can search for available parking spaces based on their preferences such as location, date, and time.
- Viewing Parking Details: Customers can view detailed information about available parking spaces, including location, pricing, and any amenities.
- User Account: Customers can create user accounts, allowing them to manage their bookings and access booking history.
- Booking Parking: After finding a suitable parking space, customers can make reservations for specific dates and times.

- Viewing Booking History: Customers can view their booking history, including past and upcoming reservations.
- Feedback: Customers can provide feedback on their parking experience and the overall system usability.

Administrator:

Administrators are responsible for managing the overall system, overseeing parking space listings, and managing user accounts. Characteristics of administrator users include:

- Login: Administrators can access the system through secure login credentials.
- Managing User Accounts: Administrators can view a list of user account requests that are awaiting approval.
- Viewing Account Details: Administrators can access detailed information about user accounts and pending requests.
- Approving Accounts: Administrators can approve user account requests, allowing customers access to the system.
- Rejecting Accounts: Administrators can reject user account requests if they do not meet the necessary criteria.

Staff:

Staff members are responsible for handling the operational aspects of the parking management process. Characteristics of staff users include:

- Login: Staff members can access the system using their authorized credentials.
- Viewing Booking List: Staff can view a list of current booking requests.
- Viewing Booking Details: Staff can access detailed information about each booking request, including customer information and booking details.

- Approving Bookings: Staff can approve booking requests, confirming the reservation for the customer.
- Rejecting Bookings: Staff can reject booking requests if there are any issues or conflicts.

2. Database Design

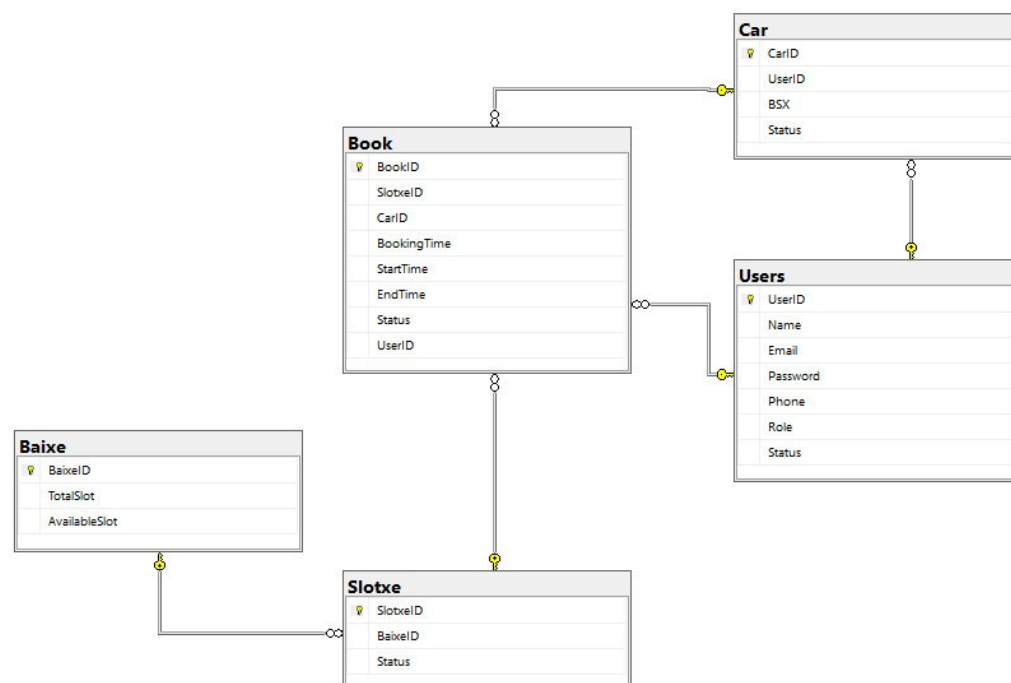


Table "Car" (Vehicle):

Store information about vehicles in the system.

Manage detailed information about each vehicle such as make, model, year of manufacture, status, photos, rental price, etc.

Provide data for car booking and booking management.

Table "Booking" (Reservation):

Track information about user bookings for car rental.

Record booking date and time, rental start date and time, rental end date and time, booking status, etc.

Manage vehicle allocation for bookings and calculate rental rates based on rental period and vehicle type.

Table "Users" (Users):

Store users' personal information in the system.

Record your name, email address, password, phone number, date of birth, etc.

Manage information related to login and personal account management.

Table "BaiXe" (Parking data for vehicles):

Keep track of information about available parking spaces for vehicles.

Record the location of the parking lot, the number of spaces available, the capacity, etc.

Support the management of parking and allocating parking for different vehicles.

Table "SlotXe" (Parking data for vehicles):

Keep track of information about available parking spaces for vehicles.

Record the location of the parking lot, the number of spaces available, the capacity, etc.

Support the management of parking and allocating parking for different vehicles.

3. System Architecture

The Car Parking and Booking Management system operates within a client-server architecture. The system is implemented as a C# .NET Windows Form application, providing a user-friendly interface for customers, administrators, and staff members. The system uses a centralized database to store user accounts, parking space information, bookings, and feedback. The following sections provide a detailed description of the system architecture and any relevant new technologies used.

Kiến trúc tổng quan:

Our parking management system will be based on a distributed, scalable and easily scalable architecture to meet growing demand. The system includes the following components:

Management system:

Control the entire system's business logic and data management, including vehicle information, customer information, parking maps, pricing, booking and payment management.

Database:

Store information about parking lots, vehicles and customers. The database can use a database management system such as MySQL or PostgreSQL.

Technologies

Windows Forms (WinForms):

Windows Forms is part of the .NET Framework and .NET Core (or .NET 5+) that allow you to create user interfaces for Windows applications. It provides components and controls to build intuitive user interfaces and interact with users.

Visual Studio:

Visual Studio is an integrated development environment (IDE) that powerfully supports C# WinForms application development. It provides tools, compilers, debuggers, and designer interfaces to easily create and manage WinForms projects.

C# Programming Language:

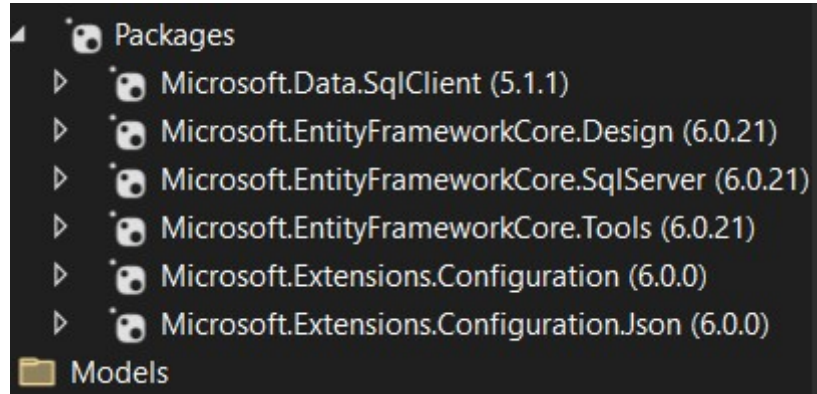
C# is the primary programming language used when developing WinForms applications. C# is the dominant language of the .NET Framework and .NET Core, and it provides an easy-to-read and powerful syntax for writing code.

.NET Framework or .NET Core/.NET 6:

To develop WinForms applications, you can use the .NET Framework (for earlier versions of Windows) or the .NET Core/.NET 6 (for newer versions of Windows). The .NET Framework is a traditional Windows application development platform, while .NET Core and .NET 6 provide cross-platform integration.

NuGet Packages:

NuGet is a package manager for .NET that allows you to install and manage your project's libraries and dependencies. NuGet packages can provide additional functionality and convenience to your WinForms application.



4. Implementation

4.1. Deployment Considerations

Check Environmental Requirements:

Define the environment in which the application will operate, including operating system, .NET Framework or .NET Core version, hardware configuration, and database. Make sure the target computer meets the hardware and software requirements.

Data Preparation:

Prepare sample or basic data for application testing. Example records for tables like Car, Booking, User, CarDataYard can be created to ensure the application works as intended.

Database Deployment:

Deploy the database by running a script that creates tables, foreign keys, and inserts sample data (if needed). Make sure that the database works correctly and connect from the application.

Application Deployment:

Copy the executable and corresponding files to the target computer. Make sure that the application is deployed to the correct path and directory.

Check Data Connection:

Make sure that the application can connect to the database correctly and load the display data.

Functional testing:

Test all app functions like car booking, vehicle management, user account management, etc. Ensure functions work properly and data is stored and retrieved correctly.

Test the User Interface:

Ensure that the user interface is displayed correctly on different screens and responds well to the usage scenarios.

Performance Test:

Test the performance of the application by testing with different workloads. Make sure the application works smoothly and responds well to high-load situations.

End User Support:

Provide user guidance and support to end users to solve any problems that may arise while using the application.

Maintenance And Upgrades:

Monitor application performance post-deployment, ensure stability, and perform necessary upgrades or maintenance.

Adjust According to Feedback:

Listen to user feedback and make adjustments, bug fixes, or improvements as required.

4.2. Screenshots and explanations

Flows:

- + **Customer:** (1) Đăng ký tài khoản → (2) Login → (3) Update thông tin tài khoản → (4) → Đăng ký xe hơi → (5) view bãi để xe → (6) booking chỗ đậu xe
- + **Admin:** (1) Login → (2) Search thông tin user → (3) sửa thông tin user → (4) thêm mới user → (5) khóa tài khoản user
- + **Staff:** (1) Login → (2) view booking list → (3) approve/reject booking → (4) overview parking slot → (5) Check in a car → (6) Check out a car → (6') Show bill

Customer:



Login Success

frmCustomerScreen

frmCustomerScreen

ID Bãi xe

Tên Bãi Xe

Tổng Slot

Search By

Search Box

	Baixeld	Baixename	TotalSlot	Slotxes
▶	1	A01	10	
	2	B01	20	
•				

1. Show List of BaiXe

frmCustomerScreen

frmCustomerScreen

ID Bãi xe: 5

Tên Bãi Xe: B02

Tổng Slot: 5

Search By: BaixelD

Search Box: 5

Cập nhập hồ sơ

	BaixelD	BaixeName	TotalSlot	Slotxes
▶	5	B02	5	
*				

2. Filter BaiXe By ID

frmCustomerScreen

frmCustomerScreen

ID Bãi xe: 1

Tên Bãi Xe: A01

Tổng Slot: 10

Search By: BaixeName

Search Box: A

Cập nhập hồ sơ

	BaixelD	BaixeName	TotalSlot	Slotxes
▶	1	A01	10	
	3	A02	1	
	4	A03	2	
*				

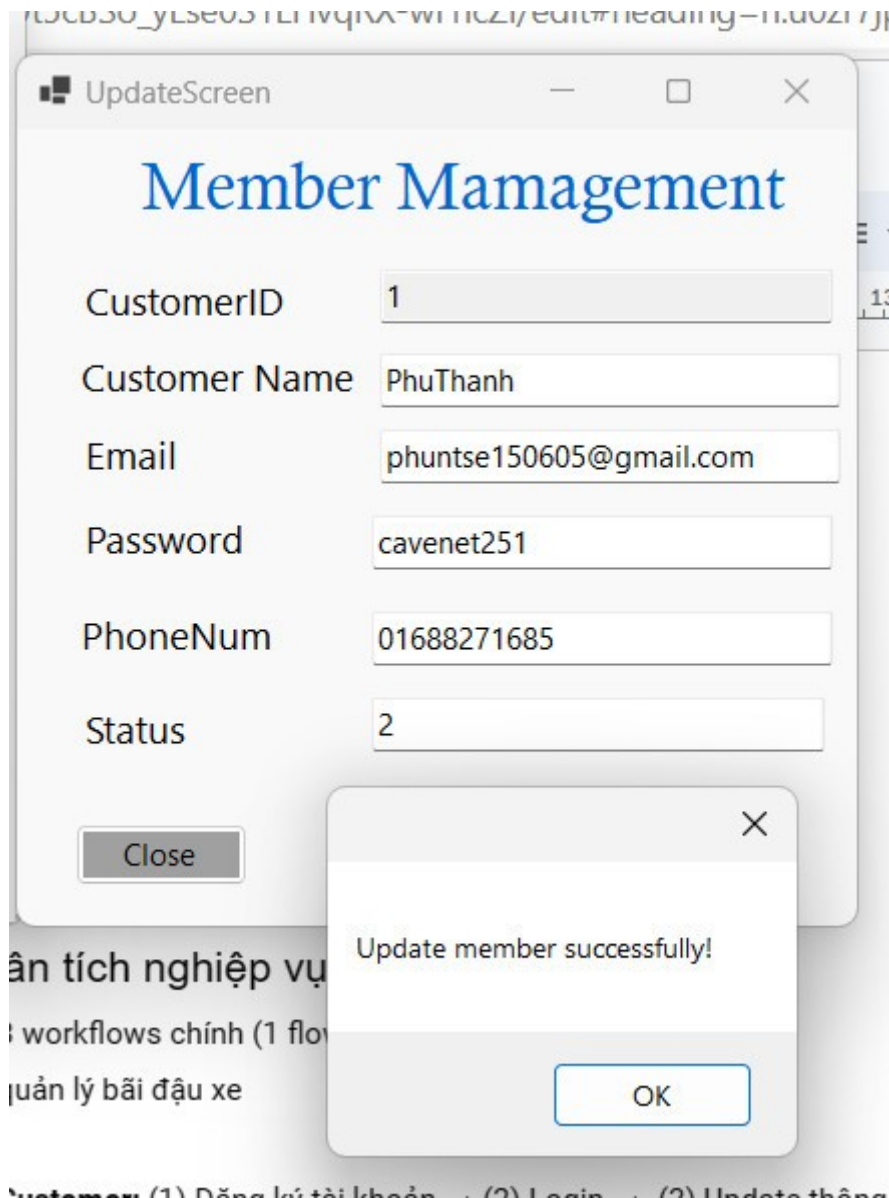
3.Filter BaiXe By Name

The screenshot displays two windows from a software application. The main window, titled 'frmCustomerScreen', contains input fields for 'ID Bãi xe' (1), 'Tên Bãi Xe' (A01), and 'Tổng Slot' (10). It also features a 'Cập nhập hồ sơ' button, a 'Search By' dropdown set to 'BaixeName', and a 'Search Box' containing the letter 'A'. Below these fields is a table with the following data:

	Baixeld	Baixename	TotalSlot	Slotxes
▶	1	A01	10	
	3	A02	1	
	4	A03	2	
*				

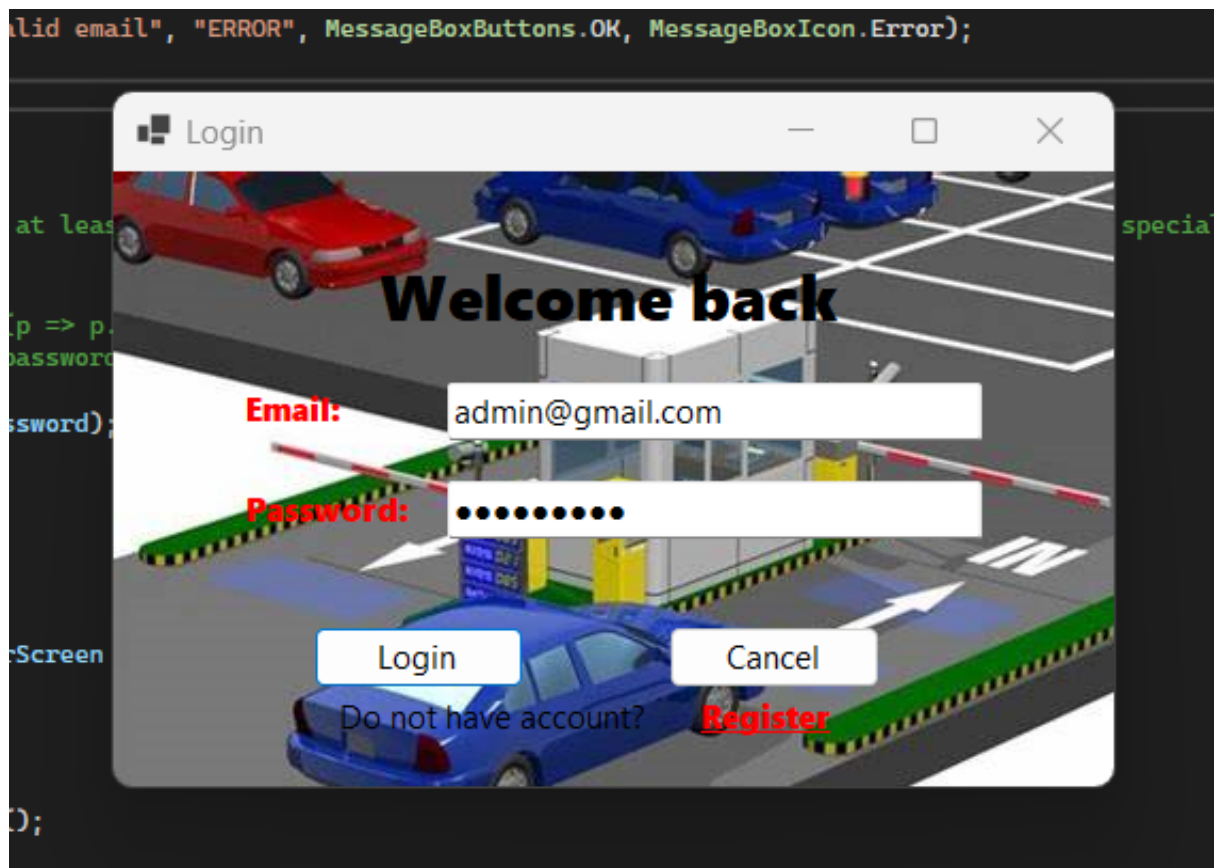
Overlaid on the right is a smaller window titled 'UpdateScreen' with the heading 'Member Management'. It contains fields for 'CustomerID' (1), 'Customer Name' (PhuThanh), 'Email' (phuntse150605@gmail.com), 'Password' (cavenet251), 'PhoneNum' (1), and 'Status' (2). At the bottom of this dialog are 'Close' and 'Update' buttons.

4.Customer View and Update Information



5. Customer Update Successfully

Admin:



Form Login

The screenshot shows a window titled "frmUserManagement" with a table of users and a form below it. The table has columns for UserId, Name, Email, Password, and Phone. The form includes input fields for UserID, Name, Email, Password, Phone, Role, and Status, along with a Search button and a text input for "Enter the user name...". At the bottom are buttons for Load, Delete, Close, Create, and Update.

	UserId	Name	Email	Password	Phone
▶	1	HoangNT	HoangNT@gm...	*****	097122789
	2	ThanhDT	ThanhDT@gmai...	*****	097998745
	3	Staff	staff@gmail.com	*****	097998778
	4	Admin	admin@gmail.c...	*****	097122678
	5	AnhBH	AnhBH@gmail....	*****	097168678
	6	VanTTN	VanTTN@gmail....	*****	097145678
	7	HuyenVTT	HuyenVTT@gm...	*****	032145678

Form fields and buttons:

- UserID:
- Name:
- Email:
- Password:
- Phone:
- Role:
- Status:
- Search:
- Load:
- Delete:
- Close:
- Create:
- Update:

Form User Management

Staff:

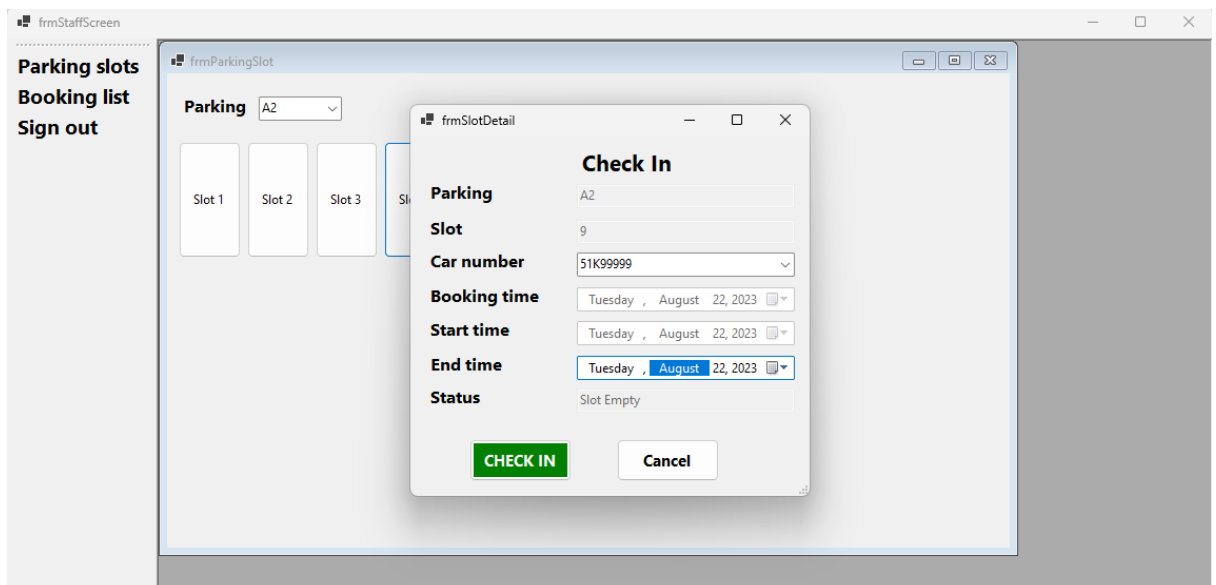
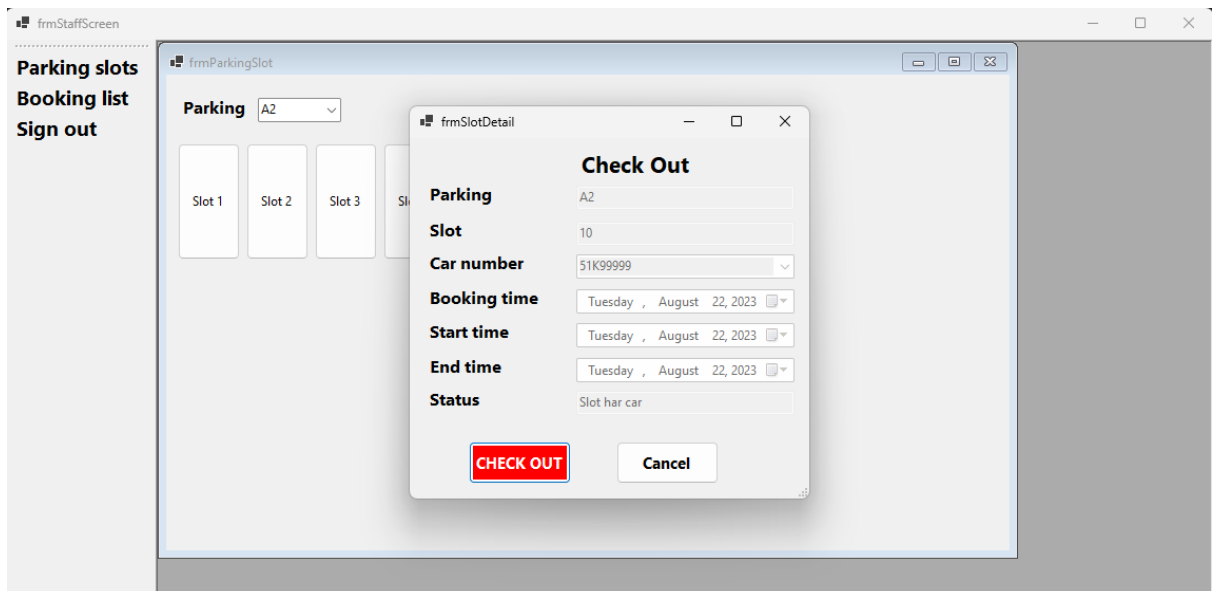
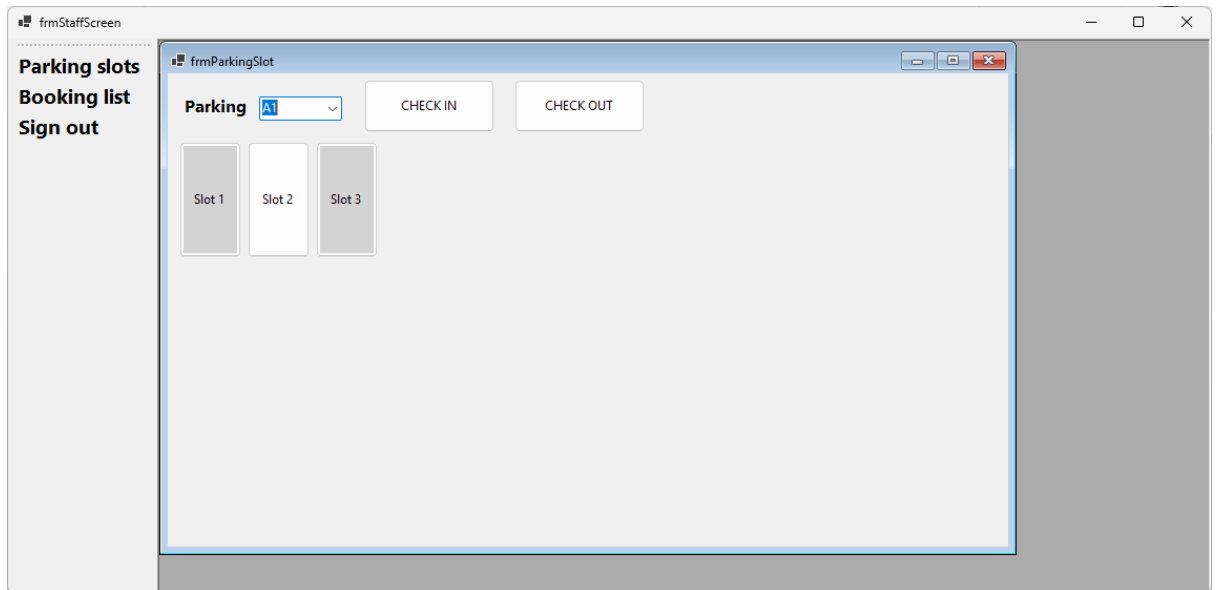
1. Main screen of Staff:

The screenshot shows a window titled "frmStaffScreen" with a sidebar menu on the left and a large main content area on the right. The sidebar menu contains the following items:

- Parking slots
- Booking list
- Sign out

The main content area is currently empty and has a light gray background.

2. Overview parking slots screen (when click Parking slots item in menu):



3. Booking list screen (When click Booking list item in menu):

The screenshot shows the 'frmBooking' window within the 'frmStaffScreen' application. The sidebar on the left contains the following menu items: 'Parking slots', 'Booking list', and 'Sign out'. The main content area is titled 'frmBooking' and includes the following elements:

- Search Filters:**
 - Booking ID: 1
 - Slot: 3
 - Car: 51K99999
 - Booking Time: Sunday, August 20, 2023
 - Start Time: Monday, August 21, 2023
 - End Time: Tuesday, August 22, 2023
 - Search By: [Dropdown]
 - Filter: [Dropdown]
 - Search button
- Table:**

	BookId	SlotId	CarId	BookingTime	StartTime	EndTime	Status	UserId
▶	1	3	1	20-Aug-23	21-Aug-23	22-Aug-23	1	1
	2	3	1	21-Aug-23	23-Aug-23	24-Aug-23	1	1
	3	3	1	01-Jan-23	25-Aug-23	26-Aug-23	2	1
- Buttons:** 'Approve' (green) and 'Reject' (red) buttons are located on the right side of the table.

4. Sign out:

The screenshot shows the 'frmStaffScreen' application with the 'Sign out' option selected in the sidebar. The main content area is a solid gray color. A modal dialog box titled 'Question' is displayed in the center, asking 'Are you sure to Sign Out?'. The dialog has a question mark icon and two buttons: 'OK' and 'Cancel'.

5. References

The provided references seem to be related to intranet and internet application development standards. These resources could potentially provide valuable guidelines for developing your Car Parking and Booking Management system, especially in terms of user interface and application development processes. It's great that you're referencing established standards to ensure a structured and well-designed system.

If you have any specific questions or need further assistance in applying the information from these references to your project, feel free to ask!