Software Modelling - UML Use Case and UML Class diagrams

Table

Description automatically generated

1. Identify the use-cases for the software. Draw the \*\*UML use-case diagram \*\*and include supporting use-case descriptions. At-least 3 scenarios must be identified.
2. Identify the objects and their respective classes. Draw the \*\*UML class diagrams \*\*and include supporting descriptions to explain the relationships. At-least 4 classes and respective relationships must be identified.
3. For all the identified classes create \*\*Python classes \*\*with the constructor, attributes, and appropriate setter/getter methods. Each class must include at-least 5 attributes. Create objects of all the identified classes and use the object’s functions to populate and display the details.

Use Cases:

* Generating receipts
* Managing vehicle information
* Managing customer information
* Calculating taxes and discounts
* Repairing vehicles

Use Case Diagram:



Billing Management System

Cashier

Customer

Mechanic

|  |  |
| --- | --- |
| Use Case: | Generating Receipts |
| Trigger: | The costumer wants to get a receipt |
| Precondition: | The customer has received services from the auto repair shop |
| Main Scenario: |  |
| 1. | The employee selects the "Generate Receipt" use-case |
| 2. | The system displays a form to enter the customer information, vehicle information, and services provided |
| 3. | The employee enters the information and clicks "Generate Receipt" |
| 4. | The system generates a receipt and displays it on the screen |
| 5. | The employee prints the receipt and hands it to the customer. |
| Exceptions: |  |
| 3a. | 1. The employee enters invalid data for customer or vehicle information. 2. The system displays an error message and prompts the employee to enter valid data. |
| 3b. | 1. The employee selects a service that is not available. 2. the system displays an error message and prompts the employee to select a valid service. |
| 4a. | 1. There is an error during the receipt generation process. 2. The system displays an error message and prompts the employee to try again. |

Use Case Description 1:

Use Case Description 2:

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| --- | --- |
| Use Case: | Manage Customer Information |
| Trigger: | The auto repair shop needs to update or add customer information to maintain accurate records. |
| Precondition: | The auto repair shop has customer information that needs to be managed. |
| Main Scenario: |  |
| 1. | The employee selects the "Manage Customer Information" use-case. |
| 2. | The system displays a list of existing customers. |
| 3. | The employee selects a customer from the list or adds a new customer. |
| 4. | The system displays a form to update or add the customer information. |
| 5. | The employee updates or adds the information and clicks "Save". |
| 6. | The system saves the information and displays a confirmation message. |
| Exceptions: |  |
| 3a. | 1. There are errors during the retrieval of existing customer information. 2. the system displays an error message and prompts the employee to try again. |
| 5a. | 1. There are errors during the update or addition of customer information. 2. The system displays an error message and prompts the employee to try again. |

Use Case Description 3:

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| --- | --- |
| Use Case: | Calculate Taxes and Discounts |
| Trigger: | The employee needs to provide the customer with an accurate invoice. |
| Precondition: | The services have been provided to the customer. |
| Main Scenario: |  |
| 1. | The employee selects the "Calculate Taxes and Discounts" use-case. |
| 2. | The system retrieves the services provided and their prices. |
| 3. | The system calculates the total cost of the services. |
| 4. | The system calculates the taxes based on the total cost and the tax rate. |
| 5. | The system applies any applicable discounts to the total cost. |
| 6. | The system displays the total cost, taxes, discounts, and the final amount to the employee. |
| Exceptions: |  |
| 2a. | 1. There are errors during the retrieval of service prices or tax rates. 2. The system displays an error message and prompts the employee to try again. |
| 3a. | 1. There are errors during the calculation of the total cost, taxes, or discounts. 2. The system displays an error message and prompts the employee to try again. |
| 6a. | 1. There are errors during the display of the total cost, taxes, discounts, and final amount. 2. The system displays an error message and prompts the employee to try again. |

The 3 scenarios:

1. James W. Jones received services from the auto repair shop, and an employee generated a receipt for him.
2. An employee added a new customer to the auto repair shop's database and updated their information.
3. An employee calculated the taxes and discounts for the services provided to a customer, and the customer received a discounted final amount.

Classes:

1. Person:

* First Name
* Last Name
* Gender
* Phone Number
* Date of Birth

1. Customer:
2. Cashier
3. Mechanic
4. Vehicle
5. Service
6. Receipt