GEORGE MASON UNIVERSITY
Department of Computer Science

SWE 621 - Software Modeling and Architectural Design

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Small Assignment:
Parking Deck Problem

A parking deck system manages an entry/exit gate, which opens to let a vehicle (i.e., car) into or out of the deck and closes when the car has passed through. A driver must push a button to print a parking permit. When the driver takes the parking permit, the system raises the gate. The system lowers the gate after the vehicle has passed through. A permit id and time of entry is printed on the parking permit, and is also encoded on the permit's bar code. When the vehicle leaves the parking deck, the driver inserts the parking permit into a bar code reader, which scans the bar code, and then transmits the bar code to the parking system. The parking system calculates a fee that is based on the number of hours that have elapsed since the vehicle entered the parking deck, and displays the fee to the operator and driver. The driver must pay the operator with cash or check. The operator accepts the payment, and if necessary returns change to the driver. Then, the operator enters a command to raise the gate to allow the vehicle to leave the parking deck.

You may assume that the system has the following external devices at the entry gate: a sensor to detect the presence of a car, a parking ticket printer to print the parking permit, an actuator to open and close the gate, and a sensor to detect that the car has departed. You may assume that the system has the following external devices at the exit gate: a bar code scanner to read the permit bar code id, a display to show the parking fee to the operator and driver, an actuator to open and close the gate, and a sensor to detect that the car has departed.

1) Develop use cases for the parking deck system that allow a car to enter or leave the parking deck. Draw the use case diagram showing the actors and use cases. Provide the use case descriptions for each use case, consisting of the main sequence and alternative sequences.

2) Develop a system context class diagram in UML for the parking deck system, which depicts the system and external classes that interface to the system.

3) Assume that the system contains an entity class, which maintains information about a parking permit, including permit id, entry time, exit time, and calculated parking fee. Design the entity class; define the attributes of the class. The class needs to have operations to calculate the parking fee and to create a new permit.

Describe the entity class using UML notation. Show the attributes and operations (a.k.a. methods, procedures, or functions) of the class, including input and output parameters. The operations of this class do not call any other operations. Use PDL (Program Design Language) or Pseudocode to specify the internals of each operation, i.e., use structured programming constructs for decision statements and English language for sequential statements.