Module 4M21: Software Engineering and Design

OBJECT ORIENTED DESIGN

Examples Paper 1

Straightforward questions are marked †
Tripos standard (but not necessarily Tripos length) questions are marked ∗

1. Figure 1 shows a class diagram describing part of some software to provide a display at bus stops. Draw a sequence diagram showing what happens when the `UpdateBusLocation` function is called on `BusStopDisplay`. Assume that `time_to_stop` is calculated as 300.

2.∗ A property management agency that helps landlords to let their properties, collect rent and manage the day-to-day running of the property has developed a software system that allows the company to process payments. The agency charges the landlord a commission fee which depends on the property. The system can be used to debit rent amount from the bank account of a tenant, credit the commission amount to the agency's account and credit the landlord's bank account.

   (a) Design the system described above. Provide an illustration of the design with the help of a Class Diagram.

   (b) Draw a Sequence Diagram to demonstrate a scenario for processing a payrun for a single property.

3.∗ A second-hand records shop sells Vynil Records as well as CDs and Video Games. The shop has recently implemented a Stock Management System to provide the following functionality:

   − keep a catalogue of all items in stock, including information about each Record, CD and Video Game such as artist, title and others, as well as the amount the shop acquired the item at and the amount the shop is selling it for. The catalogue can provide a list of items for sale sorted by title or price.
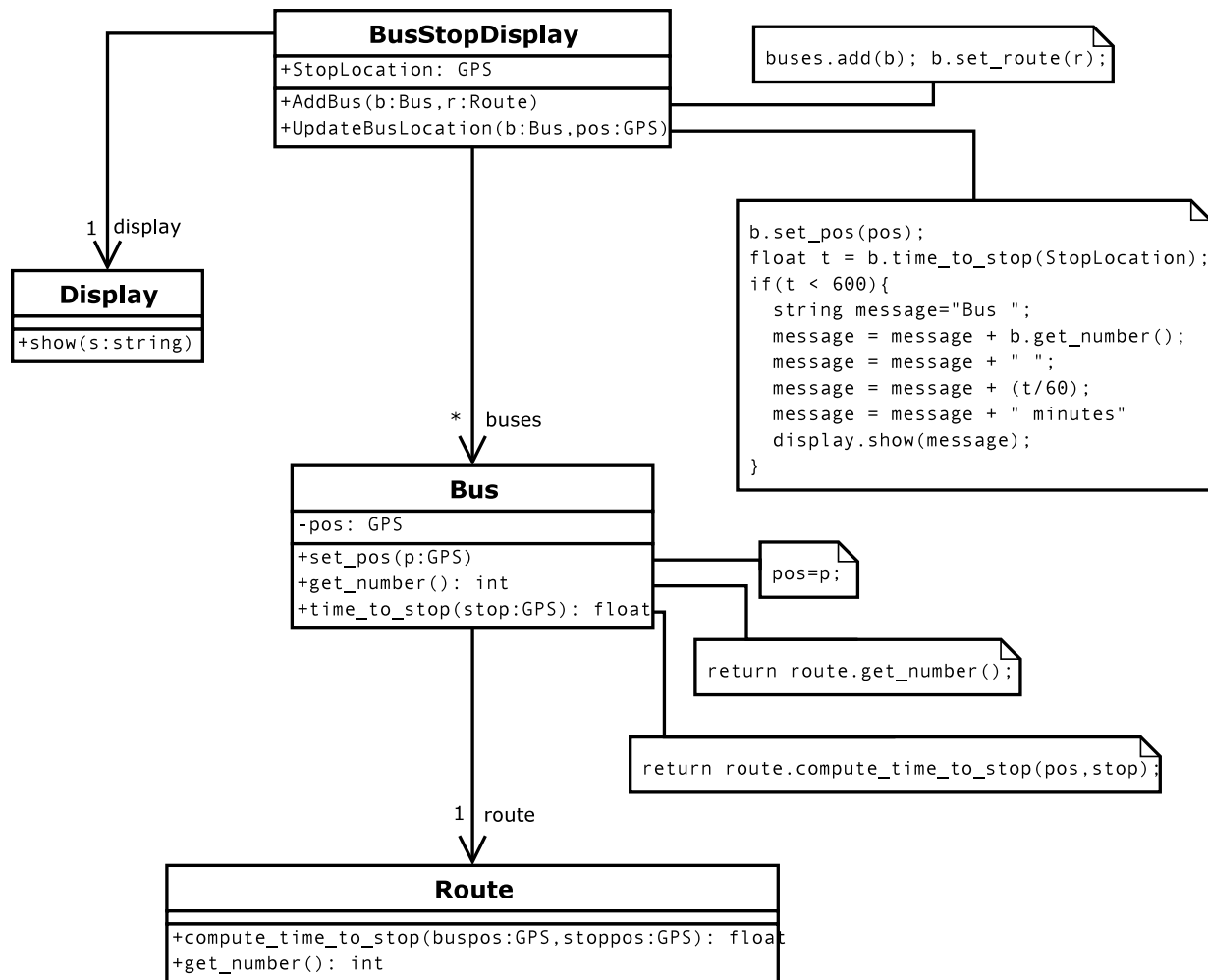
Figure 1: Bus Stop Display class diagram

– register both the newly acquired items for sale and sales of already existing items. Each individual sale can include multiple items and the profit for each sale is calculated as the difference between the cost of all items included in the sale and the sell price of all items included in the sale.

(a) Design the system described above. Provide an illustration of the design with the help of a Class Diagram.

(b) Draw the Sequence diagram for the scenario of executing a sale of a single CD and calculating the profit on this sale.