SCHOOL OF COMPUTER SCIENCES
UNIVERSITI SAINS MALAYSIA
Semester II Session 2022/2023

CPT113 – Programming Methodology & Data Structures
Tutorial Week 3
Constructors and UML

Learning Outcomes:

- Demonstrate Default and Overloading Constructors
- Designing UML

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1. Create a class named **Instructor**. It contains a first_name, last_name, and an office_number, and its only constructor requires *all three* as arguments. Create a class named **Classroom**. It contains a building_number and a room_number, and its only constructor requires *both* as arguments.

   Create a class named **CollegeCourse**. A **CollegeCourse** contains an **Instructor** class, a **Classroom** class, and a number_of_credits. Its constructor requires a *first name* and *last name* of an instructor, the *instructor's office number*, a **Classroom** *building* and *room* number, and a *number of credits*.

   Each of these classes contains a function that *displays* an object's values. Draw the UML diagram of the **CollegeCourse** class only. Then, write a **main()**function that instantiates at least two **CollegeCourse** objects and displays their values.

2. A person has his cash stored $2000, $5000 and $4000 in banks-Bank A, Bank B and Bank C individually. We need to print the cash stored by him in a specific bank.

   Make a class 'Bank' with a function 'getBalance' which returns 0 with its three subclasses named as: 'BankA', 'BankB' and 'BankC'. All of these banks will included with a function that same name 'getBalance' which returns the amount deposited in that particular bank. Call the function 'getBalance' by the object of each of the three banks.

   Demonstrate the program by using constructors.

3. The owner of a small delivery company plans to have an information system that allows him to save data about his customers and deliveries. After some time studying the problem, he reached the following requirements:

   - Each customer has a VAT number, a name, a phone number and an address. There are no two clients with the same VAT number.
   - When a customer wants to send a package to another customer, he just has to login to the company website, select the customer he wants to send the package to, enter the package's weight and if the delivery is normal or urgent. He then receives a unique identifier code that he writes on the package.

- The package is then delivered by the customer at the delivery centre of his choosing. A delivery centre has a unique name and an address.
- Each client has an associated delivery centre. This delivery centre is chosen by the company and it is normally the one closest to the customer's house.
- The package is them routed through an internal system until it reaches the delivery centre of the recipient.
- The package is then delivered by hand from that delivery centre to the recipient by a courier.
- Couriers have a single VAT number, a name and a phone number. Each courier works in a single delivery centre.
- A courier is assigned to a packet as soon as the packet is introduced in the system.

Design an UML (Unified Modelling Language) diagram based on this scenario.

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