BANP202	Semester 2 2024

Your weekly intellectual supplement

USE CASE, DOMAIN CLASS NOTATION AND CLASS DIAGRAM

CHAPETER 3, 4 and 5

Exercise 1

The following has to be analysed for structure and a domain class diagram with several objects needs to be created. Identify the classes and their UML notation for multiplicities. You must create an appropriate Domain class diagram for the ensuing system scenario.

Develop a Domain Class Diagrams that models the working of computer labs in your department. It relates Students, Lab Instructor, weekly Lab Tasks, PCs, and Software installed on the PCs. There are two types of software installed i.e. System Software and Application Software. All the PCs are connected through LAN with a server which is being operated by a Lab in charge. The Lab in charge is also responsible for installation and maintenance of System and Application Software for all the systems in the lab. Lab in charge is identified by attributes name and lab they are operating in. The Student is identified by attributes name and enrolment or registration number. The Student relates to PCs with an association of one. One PC can be utilized by one student at a time. The system contains the Lab Tasks which relates to Student with an association of one student capable of performing nothing or many tasks in the lab. The Lab instructor relates to Lab Tasks with an association where he/she performs nothing or numerous tasks like conduct lab activities and make weekly lab tasks for students. The lab instructor is identified by attributes name and course. Each PCs is assigned a host name. Knowing the host names of each and every machine is crucial to be able differentiate them. The computer software can be installed, upgraded, and removed and is identified by name as an attribute. One PCs relates to one Computer software with an aggregation of "has-a" relationship. System software and application software are the two categories of installed software they inherit from computer software with "is-a" relationship. Systems software has a target architecture and a software version as attributes. While the only attribute of the application software is the type of application.

Exercise 2

The following has to be analysed for structure and a domain class diagram with several objects needs to be created. Identify the classes and their UML notation for multiplicities. You must create an appropriate Domain class diagram for the ensuing system scenario.

You have been asked to build a management system for a group of archeologists. The group is comprised of multiple teams of researchers. Each team has a letter ID (e.g., team A, team B). Each re- searcher belongs to one of the teams, and has an ID number, a first name, and a last name. There are two types of researchers: field and lab staff. Each field staff member has a favorite region (string). Each lab researcher supports up to 2 field researchers. Some researchers may not be supported by a lab researcher. The company also manages an inventory of equipment. Researchers of any type may check out up to 3 pieces of equipment. Each piece of equipment has a serial number and replacement cost.

Exercise 3

The following has to be analysed for structure and a domain class diagram with several objects needs to be created. Identify the classes and their UML notation for multiplicities. You must create an appropriate Domain class diagram for the ensuing system scenario.

You have been contracted to build an asset-management system for a vampire-hunting company, *Stake4Less*. The organization consists of multiple teams of workers. Each team has a code name.Each worker belongs to one of the teams, and has an ID number, a first name, and a last name. There are two types of workers: hunters and support personnel. Hunters have a skill level. Each support per-son assists exactly one hunter on the team. Some hunters on the team may not be assigned a support person. The company also manages an arsenal of weapons. Workers of any type may check out up to 3 weapons from the arsenal. Each weapon has a serial number and replacement cost. There are two types of weapons in the arsenal: projectile and melee. Projectile weapons have a range, and may come with an ammo pack. An ammo pack has an ammo type, and includes some number of rounds. Melee weapons have a weight.

Exercise 4

Read the following narrative below carefully. You are required to develop a System Sequence Diagram (SSD) for Online book shop.

Nowadays online book stores are crucial since they improve the customer experience. Online book shopping allows you to save time, money, and effort.

Web-based solutions can be used to do online book searches and shopping. As customer, you are expected to draw System Sequence Diagram for searching a book online and purchasing it. The scenario is as follows:

The customer loads the search inventory and then presses the search button. The system validates the customer's search criteria and return search results.

The customer then views book description and the system confirms the book.

The customer further loads the item(s) to the shopping cart. The system confirms the cart. Finally, the checkout is performed.

Considering the scenario above and draw comprehensive system sequence diagrams (Show the actor, system and interactions, etc.).

Exercise 5

Read the following narrative below carefully. You are required to develop a System Sequence Diagram (SSD) for a use case Register Student in an online University Registration System. The lifelines, input and output processes, etc. should be clearly labelled.

At the university, students are allowed to register online for all their modules for both semesters at the beginning of the year. The student logins into the system by entering their username and

password. The system validates the student information, and that the previous /and registration fees is fully paid the student.

If the student's credentials are valid, the student will be given the option to change their personal details. If changes were made, this is saved to the system. Then the student will be able to select the modules to be registered for each semester of the year. The system will validate the choice of modules, semester as well as the number of credits. If the choice is incorrect, semester code incorrect or the credits have been exceeded then an error message will appear to inform the student to make corrections. After capturing all modules correctly, the end of the process is indicated and a list of modules with the amount owing as proof of registration is provided to the student.

Exercise 6

Given the following description, create a Domain Model (in the form of a UML class diagram). Include all conceptual classes, attributes, associations, and generalization relationships mentioned in the descriptions. Label all associations and include all multiplicities.

The Pizza menu has brought families together for years around the globe. People are reluctant to shun this delicacy. Pizza's growth is based on the IT system it has offered over the years. You have been contracted to create a pizza shop system for your community.

A customer places orders. A customer has a name and phone number. There are two types of orders: pick-up and delivery. A pick-up order has a pick-up time. A delivery order has an address and deliver-by time. All orders consist of a set of items. There are two types of items: pizzas and drinks. All items have a price. A pizza has a size and a crust type. A pizza also has a number of toppings. A topping has a topping type and a price. Some pizzas are special pizzas that have a name (e.g., "Hawaiian" or "Meat Lovers"). A drink has a brand and a flavor.

Exercise 7

Given the following description, create a Domain Model (in the form of a UML class diagram). Include all conceptual classes, attributes, associations, and generalization relationships mentioned in the descriptions. Label all associations and include all multiplicities.

A company requires a payroll system. The company has three types of employees, namely, a manager, a commission worker, and an hourly worker. Information that needs to be stored for each employee is the employee's first name, surname, earnings and employee number. Additional information that must be stored for a manager is his/her monthly fixed salary; for a commission worker his/her flat salary, sales percentage and the sales made for the month; for an hourly worker the number of hours worked and the wage per piece. All employees get a medical aid contribution. In addition to this, managers get a pension as a fringe benefit. Each medical aid instance specifies the medical aid number, dependents, employee contribution and company contribution, while each pension instance specifies the pension number, beneficiaries, amount and date of retirement.

Exercise 8

The following has to be analysed for structure and a domain class diagram with several objects needs to be created. Identify the classes and their UML notation for multiplicities. You must create an appropriate Domain class diagram for the ensuing system scenario.

Nu-Serve is a service provider specializing in the installation and offers various type of WiFi packages to its customers. The packages offered include Business, Fibre and LTE. LTE provide either top-up or off-peak options.
A customer may have more than one package. A customer has a unique identity number, as well as, a name and contact details. A package may be chosen by more than one customer. For all packages, a unique package number and package duration is stored. Every package comes with a mandatory insurance. A customer's method of payment may vary by packages and it is required to record the method of payment of each customer of each customer for each particular package.
A customer can only out a contract if he has an identity document and proof of address. Itemised billing is an optional extra for only business contracts.
Based on the given scenario above, draw a domain model class diagram that shows all generalization/specialization relationships, multiplicity, association classes, attributes and the identifier key.

Exercise 9

Draw a domain model in the form of a class diagram based on the following description. Model only things that are specifically described. Include all conceptual classes, attributes, associations, and generalization relationships mentioned. Label all associations and include all multiplicities.
A system is needed for managing rental properties. Each rental property has a monthly rent price and square footage. Each rental is owned by a landlord with a name, a phone number, and an address. There are two types of rentals: home and business. Home rentals have a number of bedrooms and a number of bathrooms. Business rentals have a number of offices and a maximum occupancy. A rental may adjoin a number of other rental properties (like apartments in the same complex). If a rental property is currently rented, it will have an associated lease with the name of the renter, the renter's phone number, a start date, and an end date.