Home Work 2 (2007-09-14)

Submission deadline: 2007-09-20

Question 1: What is difference between <<extend>>, <<include>> and use case generalization relationships in use case diagrams. Emphasize your answer by giving an example. (Bonus Point 01)

Question 2: Identify functional and nonfunctional requirements from the following description

> *The allocation of staff to production lines should be mostly automated. A process will be run once a week to carry out the allocation based on the skills and experience of operatives. Details of holidays and sick leave will also be taken into account. A first draft allocation list will be printed off by 12.00 noon on Friday for the following week. Only staff in production planning will be able to amend the automatic allocation to find-tune the list. Once the amendments have been made, the final Allocation list is printed out by 5.00 pm. The system must be able to handle allocation of 100 operatives at present, and should be capable of expansion to handle double that number.*

Question 3: Consider the following Scenarios and refine the use case diagram given on page 03. **You should create a new use case diagram**, you should point out the places where other use cases get included, extended or generalized, and mark possible extension points.

Scenario I

In order to take coffee, an employee brings his Coffee mug and places it on the Tray of Coffee machine. Employee selects "Coffee" from the menu and presses the "extra sugar" button (twice!). He/she then presses the "ok" button to signal he/she is done with placing his/her order. The Coffee machine senses that the cup is already on the tray. Employees bringing their own cups are charged 15p less for each coffee. The Coffee machine displays the amount to be paid. An employee can pay either by coins or by his Card. In case of Credit Card the Coffee machine contacts the Banking system and charges employee's account by 1,20 Euro. The Coffee machine pours the coffee into the cup.

Scenario II, Variant A

Employee just hits the ok button. The Coffee machine "Beeps!" and displays a message to choose a product first. Employee chooses "Coffee" from the menu and presses "ok" again. The Coffee machine realizes that no cup is on the tray. The Coffee machine displays the amount to be paid. Employee decides not to drink Coffee. So he/she presses the cancel button. The Coffee machine displays the main menu again. Employee then chooses "Tea" from the menu. The Coffee machine realizes that no cup is on the tray. The Coffee machine displays the amount to be paid. (1,35 Euro, since he/she did not bring his/her own cup!) Employee inserts a 2 Euro coin. The Coffee machine returns the change. The Coffee machine places a paper cup on the tray The Coffee machine pours the tea into the cup.

Scenario II, Variant B

Same as A, but the Coffee machine is out of change. (Same as II A)...

The Coffee machine displays the amount to be paid, (1,35 Euro as above) as well as a warning message kindly asking its customers to enter the exact amount, or use credit card. Employee inserts a 2 Euro coin. The Coffee machine Beeps and returns the coin. Employee reinserts the 2 Euro coin. The Coffee machine Beeps and returns the coin. Employee realizes that things will not work this way and enters her credit card

... (Proceed as I)

Scenario II, Variant C

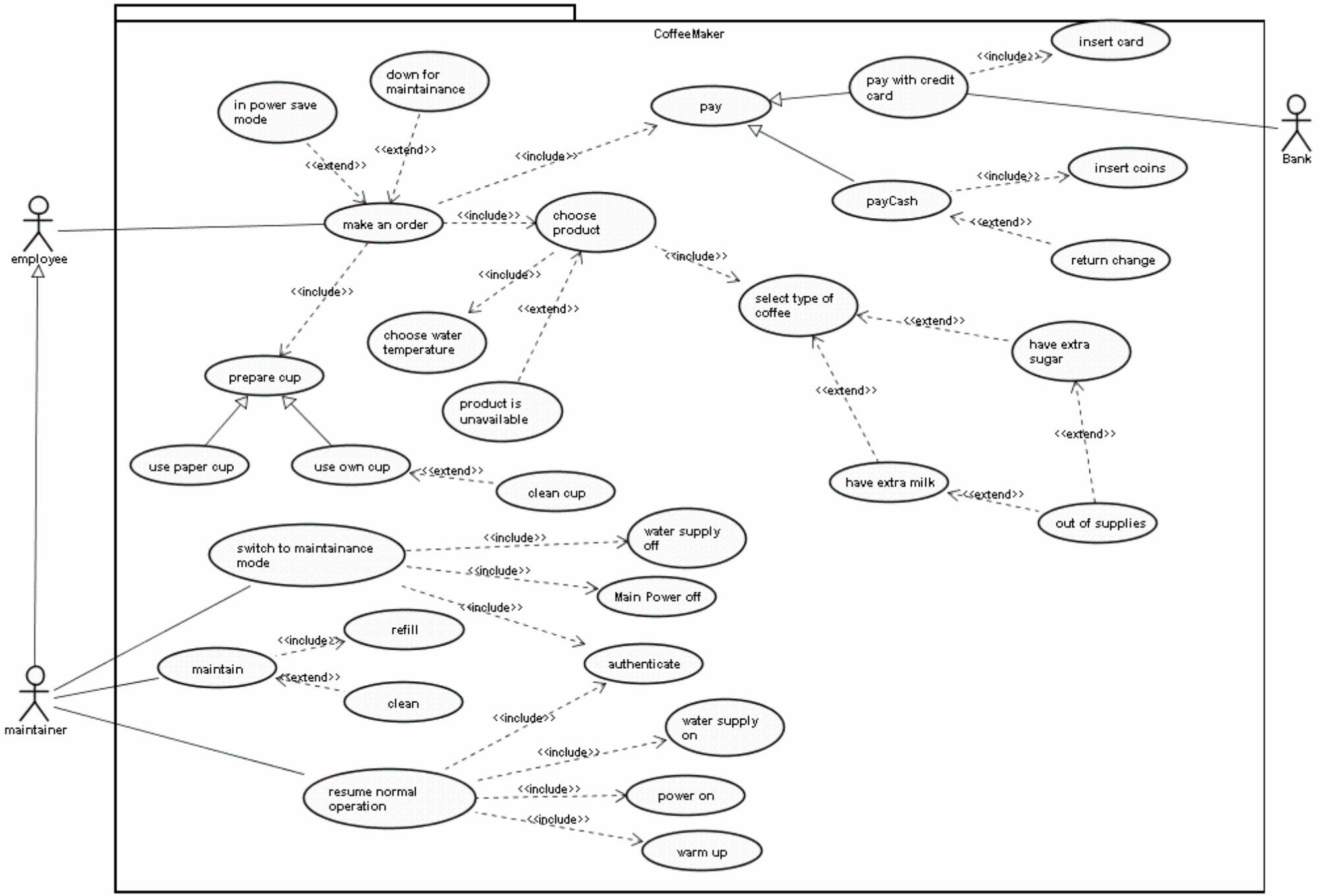
Same as A, but the Coffee machine is out of paper cups. (Same as II A)...

Employee chooses "Coffee" from the menu and presses "ok" again. The Coffee machine realizes that no cup is on the tray. The Coffee machine realizes that it is out of cups. It beeps and sends message to the maintainer. Employee can't proceed without cup, so he/she brings own cup places it on the tray. The Coffee machine realizes that a cup is on the tray

... (Proceed as I)

Scenario III

Maintainer of the Coffee machine receives a message about out of paper cups (Or running short on sugar or Coffee). Maintainer logs into the system using the maintenance console. (A web front-end) Maintainer authenticates as operator He presses a button "shut down for service". The Web Front End informs him that the Coffee machine is currently serving a customer and that it will shut down after processing the current order. After processing the current order, the Coffee machine beeps and shuts down main power and cuts of the water supply. But a "service" light starts blinking. (if in between) Some employee approaches the system and tries to order a coffee. He/She can't proceed with the order as main power is turned down. Maintainer arrives at the Coffee machine and opens the cover. He replaces the missing supplies and closes the cover. Maintainer logs into the system using the maintenance console and authenticates as operator again and presses the "Resume normal operation" button. The Coffee machine turns on main power and water supply and switches to warm-up mode.


CoffeeMaker
employee
maintainer
Bank
make an order
choose product
pay
pay with credit card
insert card
payCash
insert coins
return change
in power save mode
down for maintainance
choose water temperature
product is unavailable
prepare cup
use paper cup
use own cup
clean cup
select type of coffee
have extra sugar
have extra milk
out of supplies
switch to maintainance mode
water supply off
Main Power off
authenticate
maintain
refill
clean
resume normal operation
water supply on
power on
warm up
<<include>>
<<extend>>

Question 4: Consider an Academic Payroll System for a University:

There is a need to develop a new Academic Payroll (AP) system for a university. A university employs full-time and casual (contractual) academics. Employees in the Personnel Department will use the system to maintain employee information, manage leave, and make payments to the academics every fortnight. The AP system can add new employees and delete employees. It can manage annual and long-service leave as well as record any sick leave. The system must pay each academic the correct amount, on time, and by the payment method requested by an academic.

Employees in the Personnel Department will access system via a Windows-based desktop interface. However, the system will also provide a web-based access to full-time academics (called Academic Kiosk) to view their payment details, leave balances, and personal information. Some of this information, such as personal details and payment method, can be updated by academics using the web-based interface.

Academics are paid every fortnight on Wednesday. Full-time academics are paid a flat salary. Casual academics work by the hour and they are paid an hourly rate. Casual academics submit timecards that show the dates and hours worked for a particular contract number. The AP system verifies if the total hours worked so far do not exceed the number of hours agreed in the contract. The contract information is maintained by another system called Contracts Management; however the AP system stores basic information about contracts, in particular hourly rate for each contract.

Casual academics have no leave entitlements. The university deducts standard tax rates from payments made to full-time academics, but casual academics may elect to have no tax deductions taken by the university.

Casual academics can request receiving payment notifications by mail or by email. Full-time academics do not receive payment notifications but they can use Academic Kiosk to query the system about fortnightly payments, total salaries received year-to-date, tax and other deductions, leave balances, etc. As mentioned, Academic Kiosk can be used to modify personal details and payment method

1. Identify few actors (at least 2) and their scenarios (at least 1 for each actor) and identify use cases for the problem (at least 02 use cases). These use cases should be presented as textual description (see p. 163)
2. Extend of the identified use cases with exceptions handling
3. Describe of non-functional requirements

Question 5: Consider an information system of an advertising consultancy company:

Let's call an advertising consultancy company as "Advert Consultancy Inc". The company comprises of general administration (Office manager, Personnel Assistants, Secretaries etc), Accounts (purchasing assistant, account clerks etc.), Creative (Graphics designers, editors, audio/video technicians, photographers etc.) and computing (Network support staff, operators and technicians etc.) departments.

Advert Consultancy Inc. deals with other companies and assists them in their Advertisement campaigns. Such companies are hence forward referred to as Clients. Records are kept for all Clients (currently active and previous). Client records comprise of concerned/representative person or manager from Client Company and other particulars of Clients.

Clients have ongoing advertising campaigns, which are coordinated by one representative person from Advert Consultancy Inc. Such person could be from any of the departments depending upon the nature of consultancy required by clients. Such person can potentially work on multiple projects and is answerable to his department manager.

Generally Advert Consultancy Inc only provide consultancy for Creative (creating advertisements, planning an advertisement campaign) and Accounts (feasibility of campaigns, financial consultancy in terms of budget and coverage/effectiveness of campaign) domain. Estimated cost of campaign, starting and finish date and such terms are agreed at both Client and Advert Consultancy before campaign starts. The agreement at Advert Consultancy involves the respective department directors.

Now each campaign can have a multiple advertisements, which could be of several types. For instance, newspaper/magazine, internet, TV, radio, leaflet adverts etc.

The actual cost of campaign at “Advert Consultancy Inc” is computed by staff time, resources used, advertising costs, service charges etc. The system also holds salary information. Amount of work by a staff member is calculated by timesheets which they fill out. Currently all this system is done manually. ´

Consider yourself an Analyst whose task is to model a Software System for this System.

In general the System should have:

1. Details of Client, Details of advertising campaigns active with the respective client.
2. Status and finance related details about Campaign. Details of payment for campaigns, for which we have a separate Accounts System.
3. Details of Staff working on Campaigns. Detail of all the staff in the Advert Consultancy Company. Staff pay-grades, Annual Bonus policy.
4. Advert scheduling information and Staff schedules, so that Directors/Managers can plan resources for future activities

In general the System usage should be:

1. Department Director should be able to see current active campaigns with his department; He/She should be able to check schedules of Campaign, Staff from Advert Consultancy Inc. currently involved in the campaign. He/She should be able to see their other assignments, which will help him to assign them with other clients. Of course he/she also needs to see their skill set before assigning them to a certain task.

2. Department Director uses a web-front end, which requires authorization. The front end provides a negotiation template (client information, type of campaign needed, resources, and campaign budget information, start and end time etc). Based on such template the Director performs negotiation with Clients. For that he/she needs to do '1'.

3. Once a campaign is negotiated then Client's information (some general information and some specific to Campaign like concerned person's contact information at client) is updated. Campaign might become active immediately, depending upon its negotiated start and end date.

4. Depending upon the type of campaign, nature of expertise required and importantly on availability of staff, Director will assign staff to clients. If he/she needs to assign staff member from another department then he/she has to mark a note to respective department director about his need for particular staff member. Unless the request is acknowledged he/she can't assign such staff member.

5. If a director receives a note from another department director about his need for his department staff then he can perform '1' and also consider his ongoing negotiations. Based on these he can send ACK or refuse the request by giving some comments (for instance about future potential activities of that staff member).

6. Staff also uses their web-front end to see their updates for schedules and new appointments. Moreover every staff member can see how many hours of consultancy he/she has performed. Such has further classification as in-office or out-of-office. In case of out-of-office spent hours, client should be charged extra. All such information is presented by Staff at the end of week using a Timesheet.

7. Staff's skill set is constantly improving depending upon the nature of his tasks.

8. Board of governors need to see a summary of all active campaigns, utilization of staff, and current negotiations in progress.

9. … There could be number of other things which could be done, but we limit our problem to this description only...

Now Based on example from the (p 154) **produce a full requirements elicitation document** for the System explained above. Requirements elicitation document should comprise of:

1. Glossary for the problem
2. Identified actors of the problem (at least 3 actors)
3. Identified scenarios of the problem (at least one for each actor)
4. Identified use cases for the problem (at least 03 use cases). These use cases should be presented both as UML use case diagram and as textual description (see p. 163)
5. Refinement of the use case diagrams
6. One overview use case diagram with all the base use cases and all actors
7. Extensions of the use case diagrams with exceptions handling
8. Description of non-functional requirements

NOTE: YOU MIGHT HAVE TO TAKE THE SAME PROBLEM DESCRIPTION OF QUESTION 5 FOR NEXT HOMEWORK(S) AND POTENTIALLY FOR PROJECT AS WELL. SO KINDLY DO THIS QUESTION CAREFULLY AND PROPERLY.