CMPS311 Object Oriented Modeling

- Group Project -

Milestone-1: Requirements Analysis (10%)

This is a compulsory project.. If you do not submit this, your grade will be 0 in this course.

Minimum 2 and maximum 4 members in each group

Submission Due: November 11, 2012 (Sunday) by the end of your class

Fall 2012

Objectives of the Project

The purpose of this project is to reinforce the concepts discussed in class. The project gives you the opportunity to practice the concepts and techniques taught in class on a realistic problem. The main objectives of the project are to practice the Requirements Specification, OO Analysis Modeling, and OO Design Modeling for a software solution to a problem.

Background of the Project

Mr. Ali Al-Abdullah has purchased a company called Central Doha Waste (CDW). It is a small company in Doha that supplies industrial waste bins to its customers, and then empties the bins on a regular basis.

Your team has been contracted by Mr. Ali Al-Abdullah to develop a software system for his company. Dr. Khaled Khan, who has been with Central Doha Waste (CDW) for the last ten years, prepared a description of the waste collection process. That description follows:

"The system we have at CDW at present is mostly manual. We have a computer based accounting system to manage accounts receivable, accounts payable and general accounting records. This is a standard, off-the-shelf software package called *Your Business Accounting* (YBA). CDW has three broad categories of staff:

First, there are the truck drivers who collect the waste from our customers. The trucks have hydraulic lifting forks on them that lift and empty the bins into the body of the truck.

Second, we have a driver who delivers empty bins to new customers and who collects our bins should we lose a customer.

Third, we have our administration staff. They prepare the daily work schedules for both the drivers who deliver or collect empty bins, and those who collect waste.

In addition, there are sales staff to obtain new customers and new waste collection business, but their role is not relevant in a discussion of the day-to-day waste collection activities of the company. Finally, the company has several supervisors who look after daily activities such as managing trucks and drivers. In case of emergency such as illness of drivers, or increased collection requirements, supervisors call casual drivers. The company maintains a database for such casual drivers. The payment to the casual drivers is made on daily rate basis.

We have two sizes of bins that we supply to customers. One is *two cubic meters (Small bin)*, the other is *four cubic meters (Big bin)*. When a customer takes a waste collection service with us, the agreement can be for a "regular" or "on request" service. "Regular collections" are made every specified day of the week. "On request" customers, as the name suggests, have their waste collected whenever they call and request collection. Customers can call one or two days before the collection is required.

Each day we prepare work a schedule for each collection driver. The work sheet has listed on it the names and addresses of each customer the driver must visit that day to empty their customer's bin. The customers listed are all those who have a scheduled service for the day as

well as the “on request” customers who have requested a service. The company also serves corporate clients such as industries and factories. Some special trucks are used to collect the industry wastes every day. The billing to these corporate clients is calculated on yearly basis. The rates are also different for the corporate clients.

When the driver collects the waste at the customer site, he marks the work schedule to indicate that the collection has been made. Very occasionally, the customer may have excess waste in the collection (the bin is overloaded). In such cases the driver marks the work schedule accordingly, and the customer is charged an excess waste fee for that service.

Charges to our all clients for waste collection services are calculated as follows. Each bin has a monthly rental charge. In addition, there is a collection charge each time the bin is emptied. As noted above, there may also be an excess waste fee associated with the collection service. When the driver returns his work schedule, the services that have been performed are recorded. At the end of each month, the details of each service (including excess waste fee if applicable) and bin rental fees are entered into YBA where an invoice is prepared for each customer for the month’s fees. The invoice shows the bin rental for the month and each waste collection service performed.

As far as the delivery and collection of bins is concerned, each day we prepare a work schedule of bins to be delivered to customers and bins to be returned from customers. The driver has the responsibility for deciding whether bins are taken from our yard, or whether the bin may be removed from one customer and delivered to the next. When the driver delivers or collects a bin, he marks the work schedule accordingly. The rental charges for these customers are charged on a pro-rata basis for the month of installation or removal. For example, if a bin was delivered halfway through the month, then the rental for the month would be half.

Finally we have two separate trucks that are used for waste collection and we divide the work done into two zones: " Doha North " and " Doha South ". Customers in the north of Doha are listed on the *north work schedule*, and serviced by the *Doha North* truck. Customers in the south of Doha are listed on the *south work schedule* and serviced by the *Doha South* truck. We only have one bin delivery truck for each of these two zones. Of course, we expect that our business will grow and the number of collection tracks will increase.

We want a system that will manage the scheduling of trucks, managing drivers, payrolls for the drivers, customers, bins delivery, bins collection. It will also take care of invoice preparation and forwarding it to YBA. All financial matters such as payment made by customers and salary of employees will be managed by YBA."

Additional Information

A preliminary system study has been conducted by a company called *Silver Systems Solution Limited*. Please see the preliminary study at the end of this project description. You can use those systems functions for your project. Note that those functions may not adequate or complete.

It is likely that you will require additional information about the operations of CDW to complete this project. When a software engineer is working on a system design in industry it is common for the engineer to seek more information about the problem. For this project, your client is Dr. Khaled Khan. You can ask any question directly to him. Send him email k.khan@qu.edu.qa or see him during his office hours. In most cases, you need to make assumptions. You may also explore other sources such as internet and literature in order to know more about how a waste management company works, what are its typical core business entities, services and functions. Note, the above requirements description may be confusing or incomplete. You should also imagine how a system like this works. You MUST attach your justifications for any assumptions that you made with your project.

Tasks of Your Project

Milestone 1: Requirements Analysis

This project concentrates on the technical aspects of the software engineering process, and hence emphasizes the modeling components developed during the process. The focus of this Milestone-1 is on the requirements analysis to produce the Use case model, the Domain Model and the System Interaction models using the Unified Modeling Language (UML) and Visual Paradigm tools. The body of your Milestone 1: Requirement Analysis will consist of the following deliverables:

1. A complete use case diagram covering all major functionalities of the system and actors.

2. Propose Use case specification for most complex and key 4 use cases selected from your use case diagram. Your proposed each use case specification should include *brief description, primary actor(s), trigger, main success scenario, pre-condition(s), post-condition(s), actor action(s), system response(s), alternative flows(if any)*, etc. Use the template available from the Project folder in Blackboard.

3. Propose Actor-System Use Case Specification Table for all four of your uses case specifications proposed in the previous Task 2. Use the template available from the Project folder in Blackboard.

4. Activity diagram with swim-lanes for all four use cases proposed in Task 2.

5. Systems sequence diagrams for all four use cases.

   Any assumptions you made regarding the system description. Assignment components will be evaluated for **accuracy**, **clarity**, **relevancy, and completeness** (especially among components and among artifacts) of your document.

Please upload your solution to Blackboard as a zip file **including both** the ***Word Document*** and the ***Visual Paradigm diagram*** (.vpp file). The Word document must have all the diagrams. **Your must call the zip file: Group?-AnalysisDiagrams.zip** (Group? is your Group Number) . Example: G2**AnalysisDiagrams**.zip.

Also you must submit a hardcopy by the end of the class on the due date.

Grading scheme for Milestone-1: Requirements Analysis

Criteria	**Grading %**
Use case diagram	10
Four use case specifications using template	24
Four actor-system use case specification tables	20
Four activity diagrams with swim lanes	20
Four systems sequence diagrams	20
Assumptions, and for document accuracy, clarity, relevancy, completeness	6
Total	100

More details will be provided for the subsequent millstones:

- Milestone-2: Design Class diagram, design sequence diagram, and state diagram
- Milestone-3: Implementation, testing, and use of design patterns.

Submission requirements

Your assignment group/team MUST comply with the following submission requirements:

1. Your group should have maximum four members. You will form your own group. The members of each team must select a group leader. The group leader then sends the name and ID number of each member to Dr Khaled Khan k.khan@qu.edu.qa and copy to all members. Dr. Khan will then confirm this to all members with the group ID number.

2. Make sure that the entire team submits only one copy of the project (hardcopy and Blackboard submissions). The cover page must contain the following items:

   [Each member of the group will be required to submit a peer group evaluation with an estimate of the contribution from each member to the project. Write the percentage contribution made by each team member so that it adds up to 100%. This evaluation *may* be used to adjust the marks awarded to each team member]

   - Effort distribution of the student:

     SID:___STUDENT NAME: ___Effort given_____%
     SID:___STUDENT NAME: ___Effort given_____%
     SID:___STUDENT NAME: ___Effort given_____%
     SID:___STUDENT NAME: ___Effort given_____%

   - Course number_____

   - Submission date_____

     - DECLARATION: *We hereby certify that no part of this project or product has been copied from any other student's work or from any other sources except where due acknowledgement is made in the project. No part of this project/product has been written/produced for us by any other persons.*

3. Be aware of
   - *Submitted work must be students' own work*
   - *You cannot copy the project from other groups.*

Submission Due: November 11, 2012 (Sunday) at the end of your class.

Silver Systems Solutions Limited

123 Goodness Street
Doha

October 1, 2012

To
Mr. Ali Al-Abdullah
Managing Director
Central Doha Waste
Doha
State of Qatar

Preliminary System Report

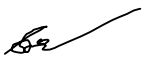
Dear Mr. Al-Abdullah,

We have pleasure in presenting our report for your use. We have investigated the business requirements in your waste service business and recommend that you retain Your Business Accounting (YBA) as the accounting package in your business. It is meeting your current requirements and until such time as you need to expand to a multi-user accounting environment, you should continue to do so.

However, improvement can be made in the information systems of your business through development of computer based processing of the records of services provided to your customers through your industrial waste service. As there are no off-the-shelf solutions available to meet these needs we suggest that a software development team be engaged to undertake the design of the information system required. We believe that the recent graduates from Qatar University who have completed software engineering course could design this system. The system developed should provide an interface to YBA for the invoicing of customers and management of accounts.

We have attached a copy of our Preliminary Systems Report on the work that we have undertaken on this project.

Yours faithfully,



(Ahmed Ibrahim)
Project Manager

Silver System Solutions Limited

123 Goodness Street
Doha

CENTRAL DOHA WASTE : PRELIMINARY INVESTIGATION REPORT

Our requirements elicitation process for the industrial waste collection functions at CDW has provided the following requirements specification.

Overview Statement

The purpose of the development project for CDW is to create a computer based information system to be used in the management and control of the industrial waste collection functions in the company.

Customers

The client (and sponsor) for this project is Central Doha Waste.

Goals

In general terms, the goals of the system are to provide automated record keeping and reporting for the industrial waste collection service of CDW. In so doing the system will provide enhanced functionality in work schedule management and analysis reporting. More specifically the goals include:

- Automation of the creation of work schedules (service and bin installation/removal)
- Preparation of regular workload analysis
- Preparation of regular installation/removal analysis reporting
- Generation of billing data for YBA

Some Identified Use Cases:

(This section is not complete. It will require further development in the next stage of the development)

Use case:	Prepare daily work schedule
Actors:	Administrator
Type:	Primary
Description:	The administrator initiates this use case each day. Each customer record is examined to determine whether or not a waste removal service is scheduled for the customer for today. Scheduled services are collected and formed into a service work schedule. Ad hoc service requests for the day are added. The use case ends when the service work schedule is complete.

Use case:	Prepare on-request service schedule
Actors:	Customer, administrator
Type:	Primary
Description:	This use case begins when a customer calls to request an ad hoc waste collection service. The customer advises the day on which the service should occur. The use case ends when the service request has been recorded.

Use case:	Prepare install/removal schedule
Actors:	Administrator
Type:	Primary
Description:	The administrator initiates this use case each day. The records of new customer services and terminating customer services are examined and installation and removal of bins for the day are identified. (Note: the creation and maintenance of the records of new customer services and terminating customer services is outside the boundary of this project). The installation/removal services are collected and formed into an installation/removal work schedule. The use case ends when the schedule is complete.

Use case:	Maintain customer record
Actors:	Administrator
Type:	Secondary
Description:	This use case begins when the administrator is advised of a customer change. The change may be a new customer, alteration to an existing customer's data, or a customer terminating its association with CDW. The use case ends when the customer's record is up to date.

Use case:	Maintain customer waste service record
Actors:	Administrator
Type:	Secondary
Description:	This use case begins when the administrator is advised of a change to a customer's waste collection service. The change may be the addition of a new customer service, alteration to an existing service, or a termination of a service. The maintenance will refer to quantity and size of bin, or service day and frequency, or both. The use case ends when the customer's service record is up to date.

Use case:	Prepare customer service summary
Actors:	Administrator
Type:	Secondary
Description:	This use case begins at month end. The customer service records for services performed are accessed. Statistics are produced for each customer of the services provided. The use case ends when the service summary report is complete.

Use case:	Prepare installation/removal summary
Actors:	Administrator
Type:	Secondary
Description:	This use case begins at month end. The bin installation and removal records are accessed. Statistics are produced for each bin size of the bin movements. The use case ends when the installation/removal summary

report is complete.

Use case:	Forward billing data to YBA
Actors:	Administrator
Type:	Primary
Description:	This use case is initiated by the administrator. Customer installed bin records (for rental charges) and customer service records (for service charges) are accessed and billing records created. The use case ends when the billing records have been sent to the YBA system.

Note: The use cases and systems functions that were prepared by Silver System Solutions Pty Ltd might have some flaws or incomplete. It is required that the project development team corrects those problems, if there is any.