Abstract - This paper proposes an optimal assessment system for instructors and students in the training sector in the only PSTN (public switched Telephone Network) company in Egypt It’s Telecom-Egypt that has 55000 employees and 11000000 customers. We try in this paper to achieve high efficiency by using object-oriented approach in training assessment system. Assessment area plays an important role in training sector. The student expects the professional instructor and the good Labs suitable for the training process and the management of Training sector to evaluate its performance to achieve throughput. In This paper, we focus on design phase of the assessment and exam system development incorporated by Unified Modeling Language (UML) approach which is a tool for modeling design.

Keywords: optimal assessment system, object-oriented approach, UML

1. Introduction

This research study how to reach the optimal solution to manage the distributed Telecom-Egypt’s training sector effectively. Currently this research is developing training’s assessment system particularly in the design phase. In this phase, we use UML tool to design the architecture of the system by using different UML’s diagrams.

This paper is organized as follow. Section 1 we describe our system and its problems. In section 2 the reason for using tools in our system. Section 3 we preview our analysis and data collect and requirement analysis. Section 4 constitutes the main part of this paper which is devoted to process modeling in UML. In this part the design and modeling system will be generated in the diagram. By the end of this paper, Finally we end with conclusion and a little bit about our future work.

1.1. Background Study

First, we will we explain how the traditional training systems work in Telecom-Egypt and then what are the problems in this traditional system.

Telecom-Egypt’s training sector constitutes of the four general departments As described in Fig. 1:-

1. General dept .for planning& program design, where the training Materials and courses are designed.

2. General dept. for train Executions, responsible for assigning the suitable instructor to each course.

3. General dept. Evaluations & Exams, evaluate the training process which contains materials, instructors, labs, courses for all aspects.

4. General Dept. for Regional Institutes which controls and manages all institutes over Telecom- Egypt Company in different cities and is responsible for labs where courses are executed and supports services needed for the required training equipments.

In this research we will focus on The general department of evaluations and exams that evaluate all thing in Telecom-Egypt training sector - students, instructors, courses' materials and labs -. We try to make the optimal solutions to reach the highest performance.

1.2. The training sector processes(fig2)
The training sector processes begins by the training sector’s request to other sectors for its courses that are needed to train their employees. and collect those requests from other all sectors ,then transform it to courses as shown in step 1 in figure 2. This allows to translate to step 2 which is the execution process that includes assigning instructors , allocating the institute where the course will be executed and determining the schedule of the course . After executing and finishing the course we translate to step 3. The last stage-in which the institute management distributes the feedback forms to students and instructors. When they finish filling the forms, the institute management collects it from them and sends them by fax to the main branch in Cairo. This feedback forms evaluate all training resources such as instructors, Labs, Materials and institute staff. This is in brief how the Telecom-Egypt training sector works, but this traditional system has many problems that we will try to solve it in this research:-

1. The student doesn’t trust evaluation persons who work by default in the same institute where the course is executed.
2. The large amount of evaluation form papers are sent by fax to the main branch in Cairo. (This problem represents type of balance wastage for Telecom-Egypt training sector).
3. The management can’t get some important information from its training process such as determining the best instructor, best institute management......etc.

So in this research we will solve these problems by modeling the distributed systems that solve these problems by using Unified Modeling Language (UML) and Object Oriented Analysis and Design (OOAD).

2. Why Modeling with UML ?

Modeling is about recognizing the problem and devising an appropriate approach - one of which might be to apply the UML in one or more areas to help to solve, or at least clarify, the problem. A model is an abstraction of the real thing [1]. Or Modeling provides a general skill set that can help the understanding, communication and resolution of problems [1].

When you model a system, you abstract away any details that are irrelevant or potentially confusing. Your model is a simplification of the real system. A modeling language can be anything that contains a notation (a way of expressing the model) and a description of what that notation means (a meta-model).

But why using UML when there are so many different ways of modeling, including many you could make up on your own? UML is a notation (or tool, technique, mechanism, if you prefer) that we employ towards the goal of defining and understanding a problem so that we can move forwards to identify a solution [1]. Today's technology provides amazing capabilities, and the future potential is tremendous. The application of such technologies allows us to design and implement some highly complex and capable systems. Understanding where systems are being deployed, who uses them, how new systems need to integrate with existing systems and what specific business tasks they support are the keys to implementing a successful information system[2]. The Characteristics of Unified Modeling Language in Design are listed in table 1.

Since UML is the language for modeling your software, it's an important part of the software development process. The UML is a very important part of developing objects oriented software and the software development process. [3] The UML represent a collection of best engineering practices that have proven successful in the modeling of large and complex system. The UML can help even non-programmer to understanding the overall functionality of the system. We choose this method because the modeling design patterns with UML have several advantages include [3]:-

- It quite naturally to object oriented modeling
- Process models can be communicated more easily in a large number of people
- UML provide a large set of diagram which can be used to define both structured and behavior of dynamic software process
- Object oriented modeling support the earlier phase of process model development
2.2. UML uses:

UML can be use in many fields such as model business Processes, model business Processes, show applications structure, describe system architecture, capture system behavior, model data structure, sketch out ideas, build a detailed specification of the system and Generate programming code [9].

2.3. Types of UML diagrams

UML defines various types of diagrams: use case diagram, class diagram, sequence diagram, activity diagram, deployment diagram, component diagram, collaboration diagram and object diagram. This paper we just focus in use case, and class diagram. The UML diagrams were recommended used as input to test cases. Use case were input functional test specification, sequence diagram were input to integration testing and class diagram were input to unit testing [4].

Use Case Diagram: - is a way to capture system functionality and requirement in UML. Use case diagram consist of name pieces of functionality, the person invoking the functionality which called as actor and possibly the element responsible for implementing the use case. Generally, use cases express the behavior of a system, model the functionality requirement of system using actors and use cases without the excessive detail which often confuses people with a less technical background [5].

Class Diagram: - shows the structure and behavior of program system. In class diagram contents using design elements such as classes, packages and objects, name, signature, and properties. There are several types of relationship in class diagrams such as association, dependency, generalization, aggregation, composition and realization. Each relationship is represented in the diagram by a difference type of arrow [5].

Activity Diagram: - is used to model workflow or business processes and internal operation. It illustrates the dynamic nature of a system by modeling the flow of control from activity to activity. An activity represents an operation on some class in the system that results in a change in the state of the system [5].

Sequence diagrams: - a very useful in elaborating and detailing the behavior of a system. This diagram show the interaction between the object involved in the use case, the actors and flows of events. On horizontal axis it shows of the object that it represented, while on vertical axis it shows the flow or sequence of the event [5].

3. System analysis

To solve the problems the first step is requirement analysis which is what customer really wants. A requirement is singular need detailing what product or service should be or do. From our interviews with the managers and from our research we analyzed and found what the requirements that telecom-Egypt Training Sector needed and we summarized them as follows:-

1. The course’s schedule sent from the main branch to the allocated institute where the course will be executed.
2. The charged person login the system using his or her account and create the course.
3. And then manage the course by enrolling students, instructors and allocating the lab into the course.
4. After enrolling students, instructors the system sends the course’s information to students and instructors automatically by emails.
5. The students login the system and evaluate the course after finishing it. These evaluation forms are stored into the database of this course.
6. The instructors login also the system and evaluate the course and put the exam’s result of the course.
7. General dept. for Evaluations & Exams in the main branch login the system and print the Summary reports for all courses in all institutes about the results and evaluation of the course.

After extracting the requirements from many interviews with management and ensure that requirements that needed already to solve the problem. We will go to another phase in our research which we will design and modeling the frame work of the distributed Telecom-Egypt Training sectors hasn’t any problems with many features such as reliability, maintainability, security and other critical issues.

3.1 The Design Phase

In order to have better performance on my case, we require for modeling and design the new
model system to reduce all the problems that we previously discussed in the paper in the background section occurring in the manually system. Therefore, the new system can be more efficient and more effective. In the design phase, we present how the process modeling in UML will be designed. This part is very important because it can reduce the cost of communication and to minimize misunderstanding which result from drawing the diagram in many different way [7]. The use case diagram will be described in section 4.1 and continued by class diagram that will be shown in section 4.2.

3.2 Use case diagram

A use case illustrate the overall function in the system and how the system should be respond in condition to a request of the user requirement. Human interact with this system in different roles as: student, instructor and institute management, Assessment management, Exams management, trainers management. For further explanation, our new system is described into use case diagrams as shown in table 2.

2.1. Class Diagrams

Class diagram represent the structure and global of program, showing classes, interfaces, and their relationships. They help software developer by abstracting implementation details and presenting view of the program lines of code. Class diagram would help software maintainers to understand programs architecture and to locate places requiring modifications during maintenance [7]. Here we present our class diagram in entire system.

4. Conclusion and Future Work

Software design approach has been applied simply to produce a software solution for a given problem. To produce high quality software we need to thorough understand the requirements that satisfy the user’s needs. This paper has presented the initial part of design phase that uses case and class diagram. In future work, the proposed design will be extended to sequence and activity diagram. With a full automation system, we believe that the efficiency of assessment and exam system in telecommunication companies will be improved.

References

[1] learning UML 2.0 By kim Hamilton, Russell Miles April 2006
[5] the development of reservation scheduling system: a design phase, rozana Diana ahmad rusli,anurulhuda firdaus mahd azmi,azeti darleena eri,b & nuzulha khilwani ibrahim,a
[8] Proceedings of the 2006 ACC/IEEE international symposium on empirical software engineering,

Table 1: The Characteristics of Unified Modeling Language in Design.

<table>
<thead>
<tr>
<th>It's concise</th>
<th>The entire language is made up of simple and straightforward notation.</th>
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<tr>
<td>It's comprehensive</td>
<td>It describes all important aspects of a system.</td>
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<tr>
<td>It's scalable</td>
<td>Where needed, the language is formal enough to handle massive system modeling projects, but it also scales down to small projects, avoiding overkill.</td>
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<tr>
<td>It's built on lessons learned</td>
<td>UML is the culmination of best practices in the object-oriented community during the past 15 years.</td>
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<tr>
<td>It's the standard</td>
<td>UML is controlled by an open standards group with active contributions from a worldwide group of vendors and academics, which fends off &quot;vendor lock-in.&quot; The standard ensures UML's transformability and interoperability, which means you aren't tied to a particular product.</td>
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Table 2: Clarification for the functions of Figures 3, 4, 5, 6.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Description</th>
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<tbody>
<tr>
<td>Institute management (fig 3)</td>
<td>The main actor who starts the event by creating a course in his or her institute, and manage it by enrolling students and instructors and he or she can also create an account for students.</td>
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<tr>
<td>Instructor (fig 4)</td>
<td>This person who will teach the course and he starts his role by logging into the system after institute management enrolls him or her into the course, he or she do evaluation of the course and put the exam’s results, view his or her historical course and he or she changes his profile.</td>
</tr>
<tr>
<td>Student (fig 4)</td>
<td>This person is a trainee of the course, he starts his role by logging into the system after institute management enrolls him or her to the system, he or she do evaluations of the course, view his or her historical courses and change also his profile.</td>
</tr>
<tr>
<td>Assessment management (fig 5)</td>
<td>This person starts his role after the course finishing, and he views the courses’ evaluation in all institutes and print the summary report which indicate the evaluate of instructor, lab, course’s materials, staff and he or she can also change his profile.</td>
</tr>
<tr>
<td>Exam management (fig 5)</td>
<td>This person starts his role after the course finishing, and he views the courses exams’ result from all institutes and print the summary report which indicate the final exam’s result and he or she can also change his profile.</td>
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<tr>
<td>System administrator (fig 6)</td>
<td>This person responsible for environmental system especially in handling database system. System administrator will generate the new variable and can change the value of variable in update database function. Generally, system maintenance can achieve all function in use case such as login/logout, update form, view Telecom-Egypt training Sector data and manage it.</td>
</tr>
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</table>
Figure 1 Training sector structure

Figure 2 training processes
Figure 3: Course management

Figure 4: Course evaluations
Figure 5  Evaluation and Exams management

Figure 6 Registration Systems Management
Figure 7  Telecom-Egypt Training Sector class Diagram