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Analyzing, Designing and Implementing a Consulting Company for Management Information Systems

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Abstract - *Nowadays, due to business diversification, globalization and growing number of different business projects, the need to support people involved in tasks related to project management is becoming increasingly important. Accurate data and time needed in the projects plans, related costs and progress are extremely important for the project managers to assure the success of the project. In this work, a Consulting Company for Management Information Systems (CCFMIS) is required to facilitate consultations in the field of MIS such as analysis of information systems, database design, development of information systems, programming and other consultation that meet their needs. The proposed CCFMIS was designed and implemented using the UML (in order to illustrate the architectural model), Microsoft Access 2016 and Visual Studio-ASP.NET programming language. In the proposed CCFMIS, the UML offers several diagrams to enable the new functions to be updated and added easily such as use cases, sequences and class diagrams, and user interfaces.*

Key Words: Consulting Company, Management Information Systems and Unified Modeling Language.

1. INTRODUCTION

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Information is a basic human need, above other needs. This is because the extent to which other needs are met, or whether they will be met at all, depends on the availability and utilization of relevant information. In every activity in life, people need information to help in making choices and in implementing, managing, planning, monitoring and evaluating their choices. Management is a high-level activity that requires corresponding availability and use of information. To execute planning, decision making, control and problem solving effectively and efficiently, managers at all levels in an organization or institution, must constantly work with relevant, strategic, timely, structured, accurate, cost-effective information. A set-up in the organization that gives managers this sort of information has been known as Management Information Systems (MIS) [1].

Management Information Systems (MIS) is a system consisting of people, data bases, machines, data models, and procedures, as its components. The system gathers data from external and internal sources of an organization; processes it and supplies management information to assist managers in the process of decision making. Thus it is safe to conclude that an information system is "a system consisting of the network of all communication channels used within an organization" [2].

Among all developments, the biggest impact on management consulting has been made by Information Systems (IS) in general and Information Technology (IT) in particular [3, 4]. It has become a major tool for management consulting companies to deal with central issues of organizations like managing information of organization in data warehouse, scenario analysis in strategic planning consulting, data driven decision making through business intelligence and data mining techniques [5].

The technological revolution influenced everything [6-25], even the methods of marketing and business applications for the real world business issues. Artificial Intelligence (AI) algorithms were used widely for solving several difficult problems such as medical image analysis [26-30], image segmentations [6, 7, 17, 31-36], Learning Management System [37-62], nurse rostering problem [63], Healthcare Monitoring [20, 64], information retrieval and patterns recognition [65-81], and river flow forecasting [82-84]. Many researchers have used the AI algorithms in data analysis, risk assessment, optimization and scheduling, cost prediction, claims and dispute resolution outcomes and decision making such as [85, 86].

The reset of the paper is organized as follow; system analysis will be described in section 2, database testing and construction will be illustrated in section 3. System implementation will be illustrated in section 4. Results will be discussed in section 5. Finally, the conclusion is presented in section 6.

2. SYSTEM ANALYSIS

The UML has been developed to offer a standardized notation to define Object Oriented Models. However, to effectively apply the UML notation, it must be employed with an Object-Oriented Analysis and Design method [87-91]. Object-Oriented analysis and design (OOAD) refers to a group of methodologies to produce business component based software. The methodology summaries the life cycle of system development identifying the deliverables and tasks in an object-oriented project [92]. Using a combination of UML notation and process, the life cycle of system development can be reduced, the system can be easily maintained, and the modules reusability can be improved.

The UML is a language used to specify, visually model [93], and document the artifacts of an Object-Oriented system under development. It denotes a number of ideas unification from various methods. UML is used in the system design to improve its reusability and maintainability. Object-oriented analysis methods offer class, use case, state chart, sequence and other diagrammatic notations for modeling [94]. UML has been employed effectively in many projects for modeling different requirements and architectures [93].

2.1 Use Case Diagram

According to the Bhuiyan et al., [95], a use case is "the specification of a set of actions performed by a system, which yields an observable result that is typically, of value for one or more actors or other stakeholders of the system". The Use Case diagram provides a visual view of sequence of steps to achieve a task and describes the use of a system by the actors related to it [14, 15, 18, 19, 24, 96]. These actors are any external elements that interact with the system. The interactions between the system and various actors provide a way for the developers to come to a common understanding with the systems' end users and domain experts [59, 90, 93, 97]. Use Cases also help to validate the proposed system architecture and to verify the system as it evolves during development.

In the proposed CCFMIS the use case mainly consists of register as a user case, management of advisors and client case, management consulting case, manage profile case, request for consultation case, reply to the consultation case, sending a message case,.. etc. Figure 1 shows the use case diagram for the proposed CCFMIS.

Mainly 3 actors (Administrator, adviser and customer) will be interacting with the proposed system; each one can do the following:

- Administrator:
  - ✓ Management of advisers and client
  - ✓ Delete the consultation
- Adviser:
  - ✓ Register as a user
  - ✓ Management consulting
  - ✓ Manage profile
  - ✓ Reply to the consultation

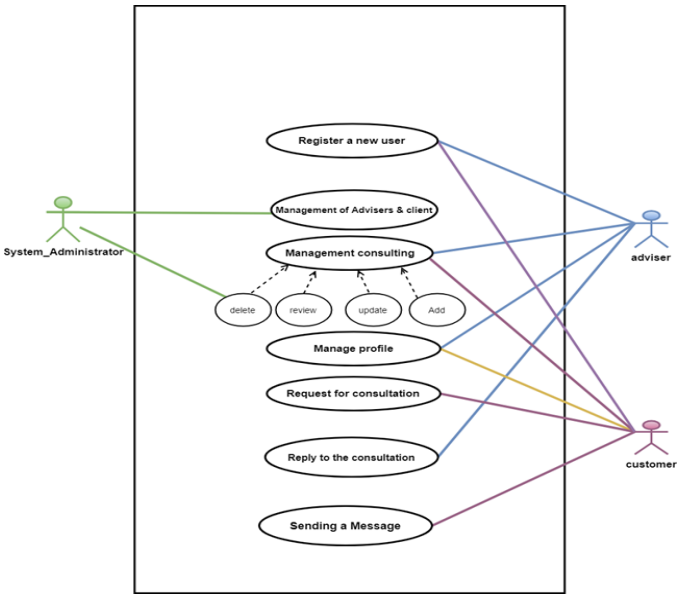

Figure -1: The use case diagram.

- Customer:
  - ✓ Register as a user
  - ✓ Management consulting
  - ✓ Manage profile
  - ✓ Request for consultation
  - ✓ Sending a message

2.2 Context Diagram

The Context Diagram (CD) is used to establish the boundaries and context of the system to be modeled; which things are outside and inside of the system being modeled, and what are the relationships of these external entities with the system. CD sometimes called a level 0 data-flow diagram is drawn in order to clarify and define the boundaries of the software system. It identifies the information flows between the external entities and system [98]. Figure 2 shows the Context Diagram for the proposed system.

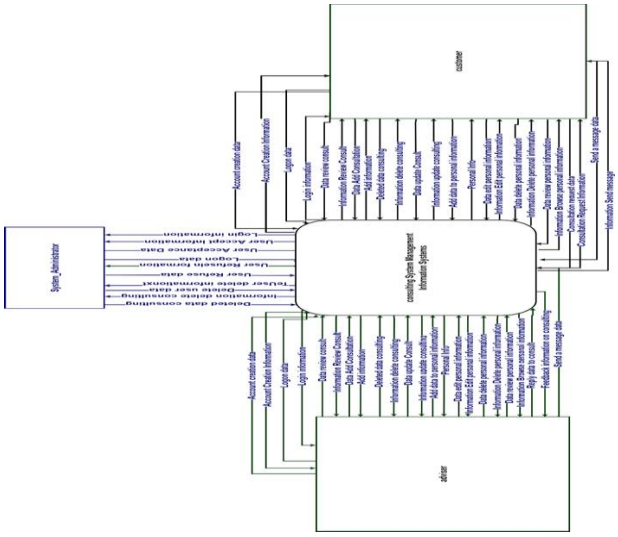

Figure -2: Context Diagram for the proposed system.

2.3 Entity Relationship Diagram (ERD)

The ERD provides a way of graphically representing the logical relationships between entities in order to create a database schema to persist those entities [14, 15, 18, 19, 23]. The ER Model was first proposed by Peter Chen of Massachusetts Institute of Technology (MIT) in the 1970s. The ERD of the system is involved seven entities (tables) which are customer, consult, adviser and system administrator. Figure 3 shows the ERD for the proposed system.

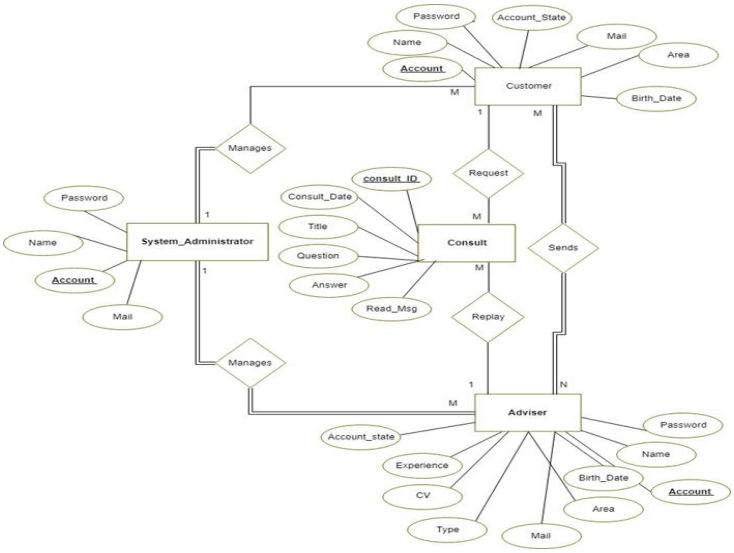

Figure -3: ERD for the proposed system.

3. Database Testing and Construction

The database testing is essential for finding errors that can affect the consistency, security, performance and reliability of the system, and it is important for system validation against the user specified requirements [99, 100]. Microsoft Access 2016 was used for database implementation. The tables below are examples of the created tables.

Table -1: Customer table

Customer

AcountNo	CustomerN	Email	Age	Area	CustomerPass	AccountSta	Account
1	امل عبدالعزيز	amal@hotmail.com	1994	الدمام	123456	مفعل	1
2	رنا محمد	rana@hotmail.com	1996	الخبر	123456	مفعل	1
3	yasser	yas@gmail.com	1994	الظهران	12341234	مفعل	1
4	احمد	hmd@hotmail.com	1995	الرياض	909090	مفعل	1
5	مريم	mma11r@hotmail.com	1986	عرعر	556677	مفعل	1
6	lamya	lulu@gmail.com	1996	مكه المكرمة	12131415	مفعل	1
7	شوق	shoog@gmail.com	1999	مكة المكرمة	123123	معطل	1

Table -2: Advisors table

Advisor

AcountNr	AdvisorNan	Type	Age	Email	Area	Experience	CV	AdvisorPas	AccountSta	Accour
1	ايمان حمد	تحليل وتصميم	1997	eman@hotmail.com	محلل نظم - الشركة العربية المتحدة		CV\1.pdf	123456	مفعل	
2	منيره عبد الهادي	برمجة	1999	uneera@hotmail.com	مبرمجة بجامعة الامام عبدالرحمه الرياض		CV\2.pdf	123456	مفعل	
3	ريم فهد	شبكات	2000	reem@gmail.com	تركيب وصيانة شبكات البيانات الرياض		CV\3.pdf	123456	مفعل	
4	abdulaziz	برمجة	1982	dulaziz20@gmail.com	dammam	العمل لدى شركة سابك لمدة ٦	CV\4.pdf	102030	مفعل	
5	عبدالله	تحليل وتصميم	1988	abbdd@gmail.com	الجبيل	العمل في شركة ارامكو في قسم	CV\5.pdf	11223344	مفعل	
6	sara malek	برمجة	1990	Saa12@hotmail.com	الشرقية-الخبر	العمل في شركة ارمكو	CV\6.pdf	123123	مفعل	
7	لدى	تحليل وتصميم	1993	naadaa@hotmail.com	الظهران	خبرة في قواعد البيانات	CV\7.pdf	987654321	معطل	

Table -3: Consulting table

Consult

Consult_ID	Consult_Date	Tiltle	Question	Answer	ReadMsg	AcountNo	AcountNr
2	14/03/40	حدثت مشكلة في دة برمجة عناوين الشبكةبرمجة برمجة شبكات		bbb	نعم	1	2
3	14/03/40		اريد المساعدة لعمل تطبيق للاطفال يعمل على تك تطبيق للاطفال	لم يتم الرد	لا	2	2
4	23/03/40		وعليكم السلام ورحمه السلام عليكم اريد ان اتقدم باستشاره بخصوص اه لعمل ابليكيشن		لا	3	6
5	23/03/40		السلام عليكم ورحمة الله وبركاته عندي مشكلة في استفسار بالراوتر	لم يتم الرد	لا	5	3

4. SYSTEM IMPLEMENTATION

This section shows the proposed work's artifacts in addition to the implementation which came after the system analysis and design. The system analysis and configuration results of the proposed system are presented. The programming languages utilized in this work are Visual Studio-ASP.NET programming languages. The programming languages are chosen relying on the languages features which make them more suitable for this work. In the proposed system, the user starts with the registration in the system (as shown in figure 4); after that the system offers the user a form for login and the user has to enter the information required as shown figure 5. If the information is found correct by the system search in the database, it displays to the user the system homepage and allows the user to make use of the proposed system. However, if it's not valid, the user will be redirected to the login page. Figure 6 shows the main customer interface.

Figure -4: Registration interface.

Figure -5: Log in interface.

Figure -6: Main customer interface.

5. RESULTS AND DISCUSSION

The proposed system has been tested in order to measure its usability, where the proposed system was tested by operating on Google Chrome, Internet Explorer and Mozilla Firefox with the local host server. Twenty five students evaluated the system prototype from Imam Abdulrahman Bin Faisal University (IAU). After given a brief explanations about how to use the system, the students have been tested the proposed system and answer the survey questionnaire (contains 10 questions measured by 5-point Likert Scale). The aim of the proposed survey is to measure the user satisfaction about the proposed system to prove its usability. The results obtained shows that high percentage of the students approve that the CCFMIS is usable, useful and achieved the main project target (see table 4).

Table -4: The results of data collected from the 20 students

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Strongly disagree										
Disagree										
Neutral	5	4	6	4	3	4	3	4	3	4
Agree	8	11	8	7	10	10	13	13	12	13
Strongly agree	12	10	11	14	12	11	9	8	10	8

6. CONCLUSION

This paper highlights the best practices in building and designing a Consulting Company for Management Information Systems (CCFMIS). In this work, we designed and implemented a CCFMIS using the UML, Microsoft Access 2016 and Visual Studio-ASP.NET programming language. In the proposed CCFMIS, the UML offered several diagrams to enable the new functions to be updated and added easily such as use case, sequence and class diagrams, and user interfaces. The proposed CCFMIS will help to facilitate consultations in the field of MIS through a website such as analysis of information systems, database design, development of information systems, programming and other consulting that meet their needs.

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