

Article

E-School Information Management System (E-SIMS)

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Abstract: In order to appropriately and effectively address all of the long-standing school information problems in Iraqi schools, this study aims to build and use a requirement model as a foundation to develop an electronic school information management system (e-SIMS). Online learning and related activities were the subject of this case study, which looked at elementary schools in Iraq. It is my sincere wish that the system developers will find this model useful in gaining a better grasp of the needs for the e-school activity management system's concepts, processes, and procedures. In this study, the requirements were defined using fact-finding techniques such as observation, interviews, and requirement model analysis. This requirement model, which includes specific model diagrams, was built using Unified Modeling Language (UML). The requirement model for e-SIMS was built using a combination of visual aids like use case diagrams, class diagrams, activity diagrams, and interaction diagrams (sequence diagrams and collaboration diagrams). The model was backed up by textual information such as a use case specification and a requirements list with 51 functional and non-functional requirements. Nevertheless, the scope of this investigation is limited to capturing functional requirements. The test script technique and the prototype system were used to validate this concept. e-SIMS is an online platform that aims to improve communication between users, regardless of their location or the time of day. Findings from this research suggest an improved approach to creating e-SIMS that relevant education organizations in Iraq can use.

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1. Introduction

Building a requirements model to build a school information system and identifying the items of a problem domain and their interrelationships is the primary goal of this study. A requirement model defines how a software system will work, say Compton and Huggins [1]. According to Dennis et al. [2], a requirement is only a declaration that specifies the behavior or attributes that the system should possess. Whitten et al. [3] states that requirements might be either functional or non-functional. The developer is obligated to inform the system requirements based on the relevant user's perspective in the requirements analysis before beginning development. The requirements for the system are defined during the analysis phase with the user's needs in mind, with an emphasis on the "what" of the system [4]. During the design phase, developers pay close attention to what end users want, which is referred to as user requirements. As the system develops, user requirements get more technical and outline "how" the system will be put into action [5]. It is crucial for developers to gather all the relevant information about the system before

moving forward with development, so they should record and document all requirements using an effective technique called a requirement model. This will help them model out the requirements and understand all system requirements [6].

"Learning Management System" or "School Management System" are equivalent. Teachers can manage their students, administer tests, facilitate class discussions, and provide course materials with this tool. Either full online courses or parts of existing ones can make use of it [7]. Colleges and universities have been increasingly using CMSs (Course Management Systems) since the late 90s. After the technological revolution in education promised greater quality, learner-centered instruction and more autonomous students, universities began using content management systems (CMSs) [8], [9].

To establish such a versatile learning facility that enhances the interaction between instructors and their students, to make the learning service more accessible and user-friendly so that the majority of students can take advantage of it, and to enable students to regularly engage with the educational curriculum through the use of personal computers regardless of their location or time of day. The introduction of an online school administration system could provide this answer. The construction of an e-SIMS requirement model for Iraqi schools is the first step in achieving a comprehensive system that can meet all requirements [10].

Based on the needs of the educational organization, this study will conduct an e-SMIS requirement model for Iraqi schools[11], [12]. In order to properly record, manage, and monitor all e-school concerns, this requirement model will assist developers in developing the necessary system to assist educational organizations in implementing the e-SIMS.

Literature Review

An integrated school management system built on a centralized database is necessary to enhance the quality of school services, which in turn has a substantial influence on student accomplishment through the use of technology to modernize school infrastructure. Balcita and Palaoag [13]. Consequently, it is critical to begin with the actual needs of the school, including those of the classroom and the building's educators, when designing and implementing effective school information systems [14] and the requirements of students [15]. According to research by Durnali [16], schools that adopted e-Schools saw significant improvements in collecting, processing, storing, accuracy, analysis, and dissemination of student data compared to schools that did not. According to Yıkıcı et al.[17], the use of technology in school administration and development influences the way society mirrors changes in socioeconomic status, culture, and technology. An educational institution's student data can be better managed with the use of a Student Information System (SIS). The acronym SIMS stands for "Student Information Management System" [18]. To take advantage of the school that requires the system, information systems are developed to offer solutions and feedback that promote the efficacy of learning, teaching, and administrative goals [19]. Particularly for student records, an online information system improves the efficacy of data administration. The purpose of implementing a school management system is to ensure that students are able to complete high-quality coursework [20].

The benefits of the school management approach were demonstrated by studies conducted in Taiwan on creative information management. Students are motivated, their learning is improved, and they feel more a part of their school and class when innovative information management is in place [21]. In terms of administrative interactions, educational matters, and student report card work time, a study in Turkey showed that instructors and the principals consider the e-school system is appropriate [22]. In order to improve the quality and efficacy of administration, instruction, and student learning, schools can benefit from a built web-based information system for school management. An up-to-date information system for school management is always required [23].

It is important to keep and handle school records appropriately to ensure the processing quality and records, since this is a key component of the school's leverage. Additionally, this will aid school administrators in making informed decisions and improve the adoption of useful records in classrooms, which in turn will reduce expenses, increase visibility, facilitate accountability, and facilitate the retrieval of necessary data from storage [24]. Open standards, interoperability, accessibility, cost efficiency, innovations based on statutes, and usability are the essential themes that must be presented in a school information management system [25].

2. Materials and Methods

All of e-SIMS's needs were modelled using the Object-Oriented (OO) methodology with UML notation. This approach was taken up by Whitten et al. [3] during the system analysis method's requirement analysis phase.

What follows is a list of the best practices for carrying out the study's requirement model. Put simply, it employs certain ways to acquire information and creates the requirements model for this study, all while covering the scope of the assessment for performance analysis. Also, when building an e-SIMS requirement model, the Object-Oriented technique is chosen. There are three(3) primary steps to the requirement analysis part of the system analysis approach described by Whitten et al. [3], including establishing the need, need for Analysis, and checking the requirement model, see figure 1.

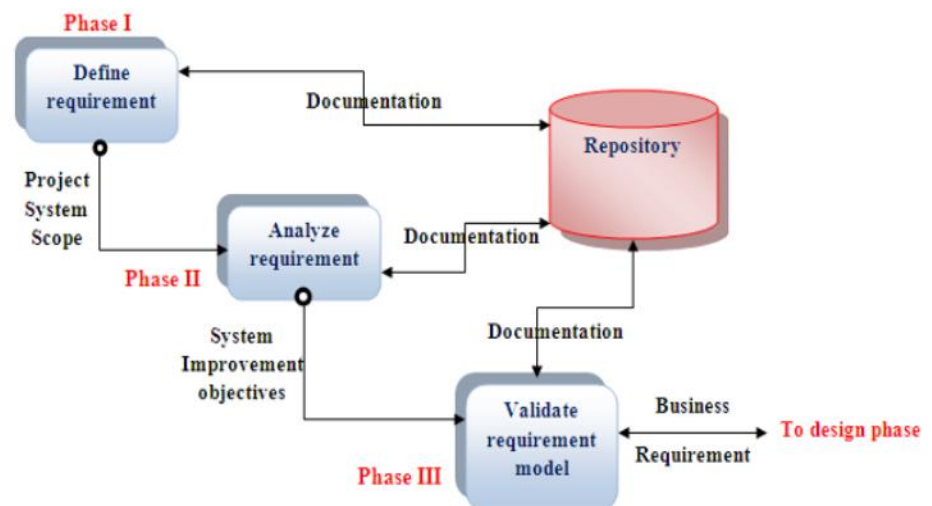


Figure 1. The requirement model's system analysis stage.

3. Results and Discussion

3.1 Requirement Phase

In this step, we use a variety of fact-finding techniques to collect relevant system information, which is crucial for building the e-SIMS requirement model. Research for the e-SIMS included looking at related websites, conducting interviews and observations, and reviewing literature that included information from prior requirement models for this model as well as existing software applications from various countries. In order to learn the user's needs and the manual system's workflow, interviews will be held.

3.1.1. Software Application

The first step in gathering data on the requirements of this system is to analyze existing software applications, which are similar to the current system. The best way to obtain this knowledge is to visit these programs and learn about the critical features they must supply for the existing system to be implemented well. The research in this paper makes use of three preexisting software programs. Two such systems exist: SIMS and the

electronic School Management System (e-SMS). The proposed e-SIMS model was developed and built using those instances as its basis.

3.2. Requirements' Phase

Following the definition of requirements through fact-finding procedures, this step entails collecting all gathered information in an orderly, intelligible, and meaningful manner. To evaluate and explain the requirements to both users and developers, it is necessary to examine the functional and user requirements. In order to prioritize demands and justify spending on any technological solution, users must have a firm grasp of requirements. Developers must have a firm grasp of the needs before they can adapt to the right technological solution. Part of the Unified Modeling Language (UML) used in this system includes requirements lists, functional requirements, and non-functional requirements. While developing a product, it is important to have thorough and consistent requirements specifications that accurately represent the needs of the end user. A requirement list can help achieve this goal. Processes, user interfaces, and data/information regarding this system are all part of the functional need. System performance-related non-functional requirements, including usability, speed, etc. Time to response, data volume, and security are all factors to be considered.

To model the user's demand, this study utilized the unified modeling language (UML), one of the most effective instruments in an object-oriented approach. Use case diagrams, class diagrams, and activity diagrams are all part of the Unified Modeling Language (UML) and can be used to define user requirements. UML also provides a general representation of the entire OO development lifecycle [26], [27].

Using the use case diagram as one of many UML diagrams in its design, this model makes it simple to communicate between users and developers by outlining the software system's requirements in a straightforward manner. The system, its surroundings, and the connection between the two are all laid forth in it. During the requirements study, design, and testing phases, the diagram is utilized. It comprises of an actor and use cases. There are four distinct kinds of relationships shown in use case diagrams: association, generalization, inclusion, and extend.

The application's ideas, objects, and concepts are depicted in the class diagram. Using rectangular cells that display the class name, its properties, and its activity, as well as lines that depict the relationships between the classes, it explains the system's structure. It is not necessary to explicitly specify the inheritance relationship in the subclasses themselves; inheritance relationships show that one class may derive from another class.

A logical description of the business categories and operational tasks, an activity diagram does not provide instructions on how to carry them out. An activity diagram is a graphical representation of an application's processes, from start to finish. UML activity diagrams show the worldwide arrangement of discrete actions, or activities.

3.3. Requirement model validation

The goal of requirement model validation is to find and fix any problems (inconsistencies, omissions, or inaccurate information), not to establish that the requirement is accurate. Although the formal requirement model cannot be proved to be true, it can be used to justify a user's belief in the correctness of a defined solution. The requirement model can be validated using test script techniques and prototype systems. Following validation of the requirement model, the requirement model is constructed using UML diagrams and supplementary documentation.

3.3.1. Script Test Technique

The research here validates the create requirement model using the script test technique. To make sure all requirements have been efficiently integrated into the requirement model, this script test is helpful. Several tiers of the script test can be executed to identify application faults and to assess and confirm satisfactory performance. Also,

several individuals at various levels need to take responsibility for testing according to this method. Members of the school personnel will be chosen to test this method.

3.3.2. Sample System (prototype)

To comprehend and assist with this validation process and to showcase the e-SIMS user interface, a sample system called e-SIMS has been created for Iraqi schools. Validating system requirements is the goal of sample prototyping. Using PHP and MySQL, the prototype was created. A document known as a test script has been used to validate and verify each requirement. Its stated purpose is to ascertain the users' actual needs as soon as possible. While this prototype method has its benefits, it also has its drawbacks, such as users not being able to tell whether the interface is perfect and developers not being able to choose an effective method for information architecture. When users and developers put the prototype version into action, it can be helpful. As an added bonus, it gets more people involved in making high-quality items.

4. Testing and Evaluation

Using Iraqi schools as a case study, this section will generate the requirement model for an electronic school information management system (e-SIMS). Reviewing the current software program, conducting observations, and interviewing participants were the three fact-finding procedures that formed the basis of this study's findings and results during the requirement phase. Based on interviews with Iraqi school teachers, it is clear that a new system is needed to better manage students' demands in terms of communication, interaction, and the completion of assigned study assignments. This requirement model was built using UML notation and presented using use case specifications, a requirement list, a use case diagram, a class diagram, and an activity diagram. It was also analyzed during the requirement model phase, which discussed the model elements.

4.1. Defined Requirement Phase

The user requirements for e-SIMS were gathered using three fact gathering techniques: observation, interview, and study of the existing software program.

4.1.1. Review of the Existing Software Application

After comparing e-School Management System (e-SMS) with School Information Management System (SIMS), we discovered that both systems have some great features that help with user functionality management in the current system. We can use these features to make e-SIMS even better.

Most of these features included in e-SIMS were intended to make it easier for students and their school, particularly their teachers, to communicate and collaborate on things like course schedules and syllabi, as well as to share and receive information like homework, announcements, notes, and resources. By logging onto the system from any location with an internet connection, students may access all of the information supplied to them by their professors, including the ability to download any necessary materials or turn in their assignments on time.

4.1.2. Observation

Many educators, including students, may benefit from implementing some sort of data management system into their classrooms. There is currently no system in place to assist teachers with daily student-teacher communication and interaction through the online distribution of study-related materials such as lectures, homework, announcements, references, forums, etc. Additionally, it allows students to send daily homework, such as assignments, exercises, etc., that lecturers require, and it helps students download and read the information that teachers send to them.

When it became clear that many students were unable to attend class on a daily basis and had no reliable means of keeping in touch with teachers or completing assigned homework, problems began to arise. Consequently, due to a lack of daily communication with their professors, the majority of students either failed or stopped attending classes

altogether since they were unable to complete the study assignments assigned to them. The sole purpose of this system is to facilitate the management of academic tasks.

What this means is that you need to keep an eye on how the conversation flows between the instructor and the students. Students, on the other hand, need to study up before heading to campus to complete administrative duties, take exams, and register for classes (for instance, in order to get a personal account to access the system). Unfortunately, there is currently no central database in Iraqi schools that can be used to store student records or to access and update existing ones. All registrations are handled manually here. Hence, administrative duties involving the student and instructor accounts, as well as the assignment of courses to the lecturer, must be included in this system. These responsibilities are exclusively handled by the director of administrative operations or manager in charge of the website from this end. Additionally, the analyst discovered that the evaluation system in question is completely independent, meaning that no other systems are able to access the data stored in its database. Separately, the technology is being developed to monitor course activities and teacher-student communication.

4.1.3. Interview

In order to better manage the needs of their students in terms of communication, interaction, and the follow-up of study tasks, the school requires a new system, according to interviews with a group of professors and school administrators. Table 1 displays the results from the respondents who have confirmed the necessity of having an e-SIMS system.

Table 1. The interviewee's performance on the e-SIMS.

Percentage %	Comments
94%	Agree to use an electronic school information management system (e-SIMS) that stores details about students, teachers, and administrators as well as their accounts and the classes they've taken.
6%	Disagreeing to get any computerized system can solve the management issues at the school.

Some interviewers did not embrace this system, and there are a number of reasons why, including:

1. Less face-to-face interaction between professor and student is a result of this approach.
2. In contrast, eLearning places a premium on security and quality considerations. The content's quality would be negatively impacted by any type of abuse, thus it is a top priority.

4.2. Requirement Phase

4.2.1. Requirement List for e-SIMS

One column in the requirements list shows which use cases implement each requirement's functionality [8]. Which ones satisfy the user's need have been validated.

Table 2: E-SIMS functional requirements and Table 3: E-SIMS non-functional requirements are here. Listed below are the shorthands used in the priority column:

Two types of requirements exist: mandatory requirements, which the system is obligated to do, and desirable requirements, which the system would ideally do.

The system may do something optional, denoted as "O."

Functional Requirements

Table 2. Functional requirements of e-SIMS.

No.	Use Case Name	Requirement ID	Requirement Description	Priority
	Login	e-SIMS _01		
1		e-SIMS _01_001	To authenticate user (the user must enter validate his/her user ID and password).	M
2		e-SIMS _01_002	To inform invalid password and user ID	D
	Manage Account	e-SIMS _02		
		e-SIMS _02	Add new account	M
3		e-SIMS _02_001	Add student	M
4		e-SIMS _02_002	Add teacher	M
5		e-SIMS _02_003	Add parent	M
6		e-SIMS _02_004	Banned student	D
8		e-SIMS _02_005	Banned teacher	D
9		e-SIMS _02_006	Banned parent	D
10		e-SIMS _02_007	Send mail	D
11		e-SIMS _02_008	View student	O
12		e-SIMS _02_009	View teacher	O
13		e-SIMS _02_0010	View parent	O
	Manage Classroom			
		e-SIMS _03	Manage class	M
14		e-SIMS _03_001	Add class	M
16		e-SIMS _03_002	Delete class	D
17		e-SIMS _03_003	Assign class to teacher	D
18		e-SIMS _03_004	View class	O
19		e-SIMS _04	Manage subject	M
20		e-SIMS _04_001	Add subject	M
21		e-SIMS _04_002	Assign teacher	M
22		e-SIMS _04_003	View subject	O
23		e-SIMS _05	Manage syllabus	M
24		e-SIMS _05_001	Add syllabus	M
25		e-SIMS _05_002	View syllabus	O
26		e-SIMS _05_003	Delete syllabus	D
	Manage Exam Section			
		e-SIMS _06	Manage exam	M
27		e-SIMS _06_001	Add exam	M

No.	Use Case Name	Requirement ID	Requirement Description	Priority
28		e-SIMS _06_002	Delete exam	D
29		e-SIMS _06_003	View exam	O
		e-SIMS _07	Manage marks	M
30		e-SIMS _07_001	Enter marks	M
31		e-SIMS _07_002	Delete marks	D
32		e-SIMS _07_003	View marks	O
	Manage Exam Routine and Result			
		e-SIMS _08	Exam routine	M
33		e-SIMS _08_001	Add routine	M
34		e-SIMS _08_002	View routine	O
35		e-SIMS _08_003	View result	O
36		e-SIMS _08_004	View marks	O
	Manage Education			
		e-SIMS _09		D
37		e-SIMS _09_001	View class Syllabus	O
38		e-SIMS _09_002	View class material	O
	Manage Accounting Section			
		e-SIMS _10	Manage fees	M
39		e-SIMS _10_001	Add class account	M
40		e-SIMS _10_002	Add class fee	M
41		e-SIMS _10_003	View class fee	D
		e-SIMS _11	Fees payment	M
42		e-SIMS _11_001	Pay student fee	M
43		e-SIMS _11_002	View student fee status	D
	Manage Library Section			
		e-SIMS _12	Manage library	M
44		e-SIMS _12_001	Add book	M
45		e-SIMS _12_002	View book	O
46		e-SIMS _12_003	View class library	O
	Notice Board			
		e-SIMS _13		
47		e-SIMS _13_001	Add notice	M
48		e-SIMS _13_002	View notice	D
	Message			
		e-SIMS _14		

No.	Use Case Name	Requirement ID	Requirement Description	Priority
49	Sign Out	e-SIMS _14_001	Send message	M
50		e-SIMS _14_002	View message	D
		e-SIMS _15		
51		e-SIMS _15_001	The user make log out of the system	D

Non-Functional Requirements:

The table 3 outlines the non-functional requirements of the e-SIMS system, categorized under usability, understandability, operational, performance, and security issues. Each requirement is identified with a unique ID and emphasizes system accessibility, efficiency, compatibility, real-time updates, and protection against unauthorized access to ensure optimal user experience and reliability.

Table 3. :Non-functional requirements of e-SIMS

No.	Use Case Name	Requirement ID	Requirement Description	Priority
	Usability issues	e-SIMS _20		
1		e-SIMS _20_001	must present the straitforward access.	M
2		e-SIMS _20_002	must be straitforward to use.	M
	Understandability issues	e-SIMS _21		
3		e-SIMS _21_001	should be straitforward to figure out	M
	Operational issues	e-SIMS _22		
4		e-SIMS _22_001	should have database server and connection	M
5		e-SIMS _22_002	should work over the web with all web browsers.	M
6		e-SIMS _22_003	must be current with evolving web standard.	M
	Performance issues	e-SIMS _23		
7		e-SIMS _23_001	database must be updated in real time.	M
8		e-SIMS _23_002	The system's pace should be commensurate with the technology used in order to accommodate a large number of users simultaneously.	M
9		e-SIMS _23_003	should be available 24x7.	M
	Security issues	e-SIMS _24		
10		e-SIMS _24_001	Only user name and is used	M

11	e-SIMS_24_002	Unauthorized person should not use	M
12	e-SIMS_24_003	No one can change the password without login	M

4.2.2. UML Diagram

Table 4 shows the list of UML diagrams for e-SIMS in detail.

Table 4 presents the UML diagrams associated with various e-SIMS use cases, encompassing activity, sequence, and collaboration diagrams. Key functionalities include login, account management, education, exam.

Table 4. list of UML diagram for e-SIMS

No.	Use case name	Activity diagram	Sequence diagram	Collaboration diagram
1.	Login [e-SIMS-01]	e-SIMS-A-01	Time limited	Time limited
2.	Manage account [e-SIMS-02]	e-SIMS-A-02	-	-
3.	Manage classroom [e-SIMS-03]	e-SIMS-A-03	-	-
4.	Manage exam section [e-SIMS-04]	e-SIMS-A-04	-	-
5.	Manage Exam Routine and Result [e-SIMS-05]	e-SIMS-A-05	-	-
6.	Manage Education [e-SIMS-06]	e-SIMS-A-06	-	-
7.	Manage Accounting section [e-SIMS-07]	e-SIMS-A-07	-	-
8.	Manage Library Section [e-SIMS-08]	e-SIMS-A-08	-	-
9.	Notice board [e-SIMS-09]	e-SIMS-A-09	-	-
10.	Message [e-SIMS-10]	e-SIMS-A-10	-	-
11.	Logout [e-SIMS-11]	e-SIMS-A-11	-	-

4.3. Constructed Requirement Model for e-SIMS

The following diagrams and supporting textual information constitute the requirement model were stated as below:

4.3.1 Use Case Diagram

The use case diagram for e-SIMS as shown in Figure 2 consist of twenty three (23) use case involve to construct this requirement model which are login, manage account, manage classroom, manage exam section, manage exam routine with results, manage accounting section, manage notice, manage message, manage library section, log out, usability issues, understandability issues, operational issues, performance issues, and security issues. The requirement model for e-SIMS have four actors, which are:

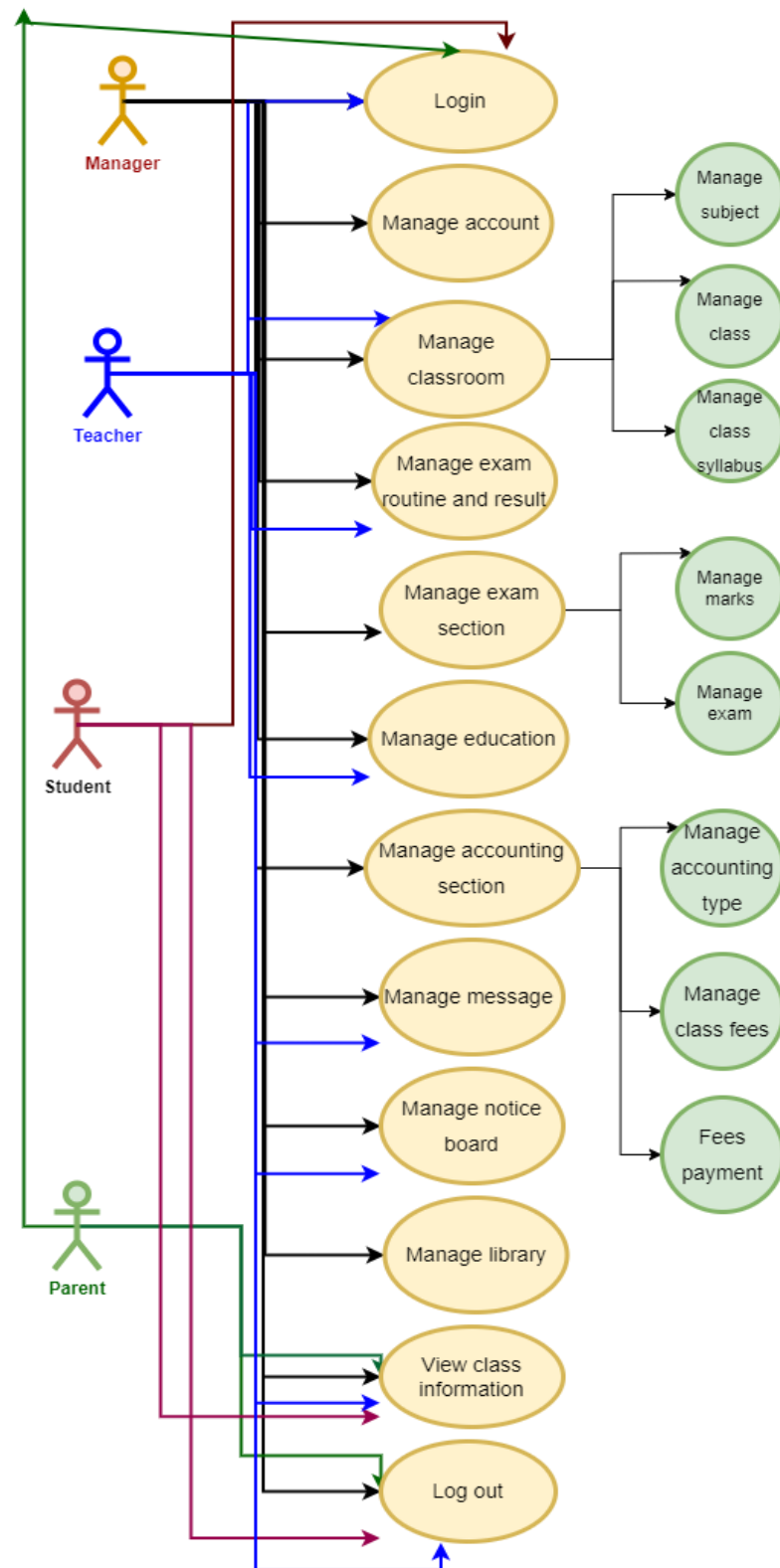


Figure 2. Use Case Diagram for e-SIMS

1. Admin or Manager: In this research, we focused on the functional requirement of the manager due to limited time. An administrator has full control on e-SIMS system. He/she can manage all the users, classroom, subjects, accounting sections, and so on. The main function requirements of administration of the website of e-SIMS as shown in table 4.3.

2. Teacher: this person responsible for the simple activities that help to solve the problems of students . In addition, the teacher can take the manager role by taking the permission from him. The main functional requirement of the teacher listed in table 4.3.
3. Student: the e-SIMS built for the purpose of help to solve the problems, which many students suffered from it, as shown in table 4.3.
4. Parent: this person can just view some activities such as view class information, as shown in table 5.

Table 5. Use Case for e-SIMS

No.	Use case name	Requirement	Sub-Requirement	Actors
1.	Manage account	Add account Update account Banned account Suspend account Send message View account general information		Manager All actors
2.	Manage classroom	Manage class Manage subject Manage class syllabus	Add class Assign class teacher Remove class teacher Add class section Assign class section to teacher Add subject to class Assign subject to teacher Update subjects View subjects Add syllabus or martials Delete syllabus Update syllabus View syllabus	Manager All actors Manager All actors
3.	Manage exam section	Manage exam Manage marks	Add exam name Delete exam View exam Insert marks Insert attendance Reset marks View marks	Manager All actors Manager All actors
4.		Exam routine	Add exam sample or routine	Manager

No.	Use case name	Requirement	Sub-Requirement	Actors
5.	Manage exam routine and result		Update exam routine	Manager Teacher
			View exam routine	All actors
			View exam result or marks	All actors
			Add class syllabus or materials	Manager Teacher
6.	Manage education accounting section		View class syllabus	All actors
			Update class syllabus	Manager Teacher
			Delete class syllabus	Manager Teacher
			View study materials	All actors
			Manage accounting type	Manager
			Add account type	
			Delete accounting	
			View accounting	All actors
			Manage class fees	Manager
			Add class fees	
			Delete class fees	
			View class fees	All actors
7.	Manage library		Fees payment	All actors
			Pay student class fee	
			Get payment status	
8.	Manage notice board		View fees	
			Add class library books	Manager
			Delete class library books	
9.	Manage message		View class library books	All actors
			Add notice to student	Manager
			Delete notice	
			View notice	All actors
			Send messages	All actors
10.	Login		View messages	
			Delete messages	
			Print messages	
11.	Logout		Enter validate his/her username and password.	All actors
			Log out or exit from the system	All actors

No.	Use case name	Requirement	Sub-Requirement	Actors
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4.3.2. Class Diagram

Twelve diagrams make up the class diagram that is dependent on the e-SIMS database. You can see the relationships between the three components of this class diagram boundary, controller, and entity and utilizes the relations between them.

4.3.3. Activity Diagram

The given activity diagram for e-SIMS includes nine separate diagrams that were custom-built for each use case. Put simply, an activity diagram is attached to each use case.

5. Validated Requirement model

The goal of requirement validation is to ascertain whether or not the stated requirements adequately address the actual needs of the stakeholders [6]. To ensure the prototype meets all functional requirements, it is tested by the same group that was interviewed. While it's true that having two reviewers is preferable to having none at all. Managerial, instructional, parental, and student-student interactions should be the exclusive purview of the e-SIMS system, in their view.

5.1. Test Script Technique

To ensure the study's functionality, the test script technique and a prototype system were employed. Eleven actual users of the present e-SIMS system, including school administrators and instructors, filled out the test script. They consist of five (4) principals and seven (7) educators with a combined experience of more than eight (8) years in the education field. The system (prototype) grants varying degrees of authority to each actor type.

5.1.2. Sample System (Prototype)

During this validation step, a prototype system is improved to demonstrate the user interface to validate the test script method. Involvement of all parties in the e-SIMS process allowed the sample system (prototype) to demonstrate that all requirements were met.

4. Conclusion

In order to accomplish the three goals outlined in the preceding chapter, this study built a requirement model for e-SIMS that was tailored to the needs of Iraqi elementary schools. The purpose of this research was to learn about the class material and create an acceptable and applicable requirement model so that we could build a full system for this e-SIMS later on. In addition, educational institutions and people will receive the most benefit from this model with the least amount of effort required. Therefore, educational organizations who are serious about efficiently managing their demands will find this study's concept to be a good fit.

Obstacles and Limitations

Below are some of the challenges and limitations that were encountered while completing the e-SIMS study, despite the fact that the development of the requirement model resulted in an application that was mostly beneficial for managing class activities:-

- A sample of elementary schools in Iraq will serve as the case study.
- The exclusive means of communication and interaction between students and their schools have been designated as online class activities.
- Limited time allocated for creating a fully operational prototype system.
- The emphasis on functional requirements means that the non-functional requirements are missed in this study.

REFERENCES

- [1] K. Compton, J. Huggins, W. Shen, M. Guizani, and Z. Yang, "Execution of a Requirement Model in Software Development," in *Proceedings of the ISCA 13th International Conference on Intelligent and Adaptive Systems and Software Engineering*, Nice, France, Jul. 2004, pp. 203-208.
- [2] A. Dennis, B. H. Wixom, and D. Tegarden, *Systems Analysis and Design: An Object-Oriented Approach with UML*, 2nd ed., New York, NY: John Wiley & Sons, Inc., 2005.
- [3] J. L. Whitten, L. D. Betley, and K. C. Diltman, *System Analysis and Design Method*, 5th ed., Boston, MA: McGraw-Hill Education, 2001.
- [4] K. Demir, "School management information systems in primary schools," *The Turkish Online Journal of Educational Technology – TOJET*, vol. 5, no. 2, pp. 1303-6521, 2006.
- [5] M. S. Sambasivam and K. Kavitha, "School Information Management System," *International Journal of Computer Techniques*, vol. 4, no. 2, pp. 58-64, 2017.
- [6] J. Wang and D. Liu, "Design and implementation of school management system," in *Proceedings of the 2nd International Conference on Computer and Automation Engineering (ICCAE)*, vol. 5, no. 1, 2010, pp. 50-102.
- [7] F. Team, "flutter.io," Google, May 13, 2017. [Online]. Available: <https://flutter.dev/>. [Accessed: Dec. 2, 2022].
- [8] A. Dennis, B. H. Wixom, and D. Tegarden, *Systems Analysis and Design: An Object-Oriented Approach with UML*, 5th ed., Wiley, 2015.
- [9] C. Staff, "Guide to Programming Languages," Nov. 2, 2021. [Online]. Available: <https://www.computerscience.org/resources/computer-programming-languages/>. [Accessed: Feb. 19, 2022].
- [10] Q. Salam, "Concepts and design of a database system," 2021.
- [11] M. G. Murugan, "Student information system," *International Journal for Research in Applied Science and Engineering Technology*, vol. 8, no. 4, pp. 9-12, 2020. [Online]. Available: <https://doi.org/10.22214/ijraset.2020.4002>.
- [12] A. Ribeiro and L. Domingues, "Acceptance of an agile methodology in the public sector," *Procedia Computer Science*, vol. 138, pp. 621-629, 2018.
- [13] R. E. Balcita and T. D. Palaoag, "Building a framework for the integration of school management systems (BFISMS)," *International Journal of Information and Education Technology*, vol. 10, no. 6, pp. 55-459, 2020. [Online]. Available: <https://doi.org/10.18178/ijiet.2020.10.6.1406>.
- [14] S. Reddy and R. Rathna, "Android-based student management system," *EasyChair Preprint*, no. 3018, 2020.
- [15] A. Breiter and D. Light, "Data for school improvement: Factors for designing effective information systems to support decision-making in schools," *Journal of Educational Technology & Society*, vol. 9, no. 3, pp. 206-217, 2006.
- [16] M. Durnali, "The contributions of e-school, a student information management system, to the data processes, environment, education, and economy of Turkey," in *Proceedings of the Asian Conference on Technology in the Classroom*, 2013, pp. 170-184. [Online]. Available: http://papers.iafor.org/wp-content/uploads/papers/actc2013/ACTC2013_0233.pdf.
- [17] B. Yıkıcı, M. Bastas, F. Altınay, G. Dagli, and Z. Altınay, "The role of technology for school management and development," *Revista Inclusiones*, vol. 6, pp. 100-115, 2019.
- [18] M. G. Murugan, "Student information system," *International Journal for Research in Applied Science and Engineering Technology*, vol. 8, no. 4, pp. 9-12, 2020. [Online]. Available: <https://doi.org/10.22214/ijraset.2020.4002>.
- [19] Y. Kurniawan and A. Andika, "Development of web-based school management information system: A case study approach," *International Journal of Mechanical Engineering and Technology*, vol. 10, no. 2, pp. 652-661, 2019.
- [20] K. W. Dewantara, I. N. Piarsa, and P. W. Buana, "Website-based high school management information system," *International Journal of Computer Applications Technology and Research*, vol. 8, no. 11, pp. 420-424, 2019. [Online]. Available: doi: 10.7753/ijcatr0811.1003.
- [21] P. C. Chen, T. S. Lan, Y. H. Lan, and H. Y. Hsu, "Dynamic effect of knowledge management system on school management," *Journal of Theoretical and Applied Information Technology*, vol. 61, no. 2, pp. 249-253, 2014.
- [22] M. Polat and I. B. Arabaci, "Evaluation of e-school applications as a management information system," *Elementary Education Online*, vol. 12, no. 2, pp. 320-333, 2013. [Online]. Available: <https://doi.org/10.17051/io.49201>.

-
- [23] M. I. J. Pavlović, S. Randić, and L. Paunović, "Information technologies in the contemporary school management system," *Emerald Emerging Markets Case Studies*, vol. 4, no. 6, 2014. [Online]. Available: <https://doi.org/10.1108/EEMCS-11-2012-0195>.
 - [24] G. M. Akinloye, E. O. Adu, and O. A. Ojo, "Record-keeping management practices and legal issues in the school system," *The Anthropologist*, vol. 28, no. 3, pp. 197-207, 2017. [Online]. Available: doi: 10.1080/09720073.2017.1335832.
 - [25] A. Strickley, "A baseline for a school management information system," in *Information Technology and Managing Quality Education*, A. Tatnall, O. C. Kereteletswe, and A. Visscher, Eds. Berlin: Springer, 2011, vol. 348, pp. 62-74. [Online]. Available: doi: 10.1007/978-3-642-19715-4_7.
 - [26] L. A. Swinney, "Why faculty use a course management system (blackboard) to supplement their teaching of traditional undergraduate courses," Unpublished doctoral dissertation, The University of North Dakota, 2004.
 - [27] M. Shah, "Impact of management information systems (MIS) on school administration: What the literature says," *Procedia-Social and Behavioral Sciences*, vol. 16, pp. 2799-2804, 2014.