School of Computing Science and Engineering

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STUDENT RESULT MANAGEMENT SYSTEM

A Report for the Review of Project -III(BTCS3551)

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Certified that this project report “STUDENT RESULT MANAGEMENT SYSTEM” is the bonafide work of “KHITIK BHATI and **Shubham Baliyan” who carried out the project work under my supervision.**

Approval Sheet

This thesis/dissertation/report entitled“STUDENT RESULT MANAGEMENT SYSTEM” by “Khitik Bhati and Shubham Baliyan” is approved for the degree of BACHELOR OF ENGINEERING IN COMPUTER SCIENCE & ENGINEERING.

Examiners:

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Statement of Project Report Preparation

1. Thesis title STUDENT RESULT MANAGEMENT SYSTEM

2. Degree for which the report is submitted: Bachelor of Engineering in Computer Science & Engineering.

3. Project Supervisor was referred to for preparing the report.

4. Specifications regarding thesis format have been closely followed.

5. The contents of the thesis have been organized based on the guidelines.

6. The report has been prepared without resorting to plagiarism.

7. All sources used have been cited appropriately.

8. The report has not been submitted elsewhere for a degree

Signature of Student

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Acknowledgement

We hereby declare that the work, which is being presented as the Project Report entitled "STUDENT RESULT MANAGEMENT SYSTEM" in partial fulfillment for the award of degree of"Bachelorof Engineering" in Computer Science and Engineering and submitted to the department of Computer Science, GALGOTIAS UNIVERSITY, GREATER NOIDA, UTTAR PRADESH is a record of our own knowledge.

I have not submitted the matter presented in this report anywhere for the award of any other Degree.

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Student Result Management System

Abstract:

The technological development and impact of computers and internet on our lives that has been verified over time affected various sectors of activity. And almost every task today is being run through computers. Getting information and quickly turning it into a product that consumers want is the essential key to staying in business and all of this is done nowadays using computers and applications or information systems. And the education system is undeniably the backbone of the society, it focusses at preparing the young talents for the future. However, currently the process of students' result management and declaration at the Catholic University of Mozambique, is performed manually with extensive human intervention, the students' results are generated through a spreadsheet application and then printed on a paper, attached to a wall for declaration and then stored. The current research aims at creating a web-based student result management system, reducing time, effort and improving security. The methodology adopted for the elaboration of the research is based on qualitative study. The research results in the development of a multi-user system, based on web technology with MVC (Model-View-Controller) architectural pattern and developed using Java programming language with Apache Tomcat Server and MySQL Database Management System support.

Keywords: Information System; MVC; Java; Results; Students.

Introduction

The impact of computers and internet, on our lives today is probably much more than we really know. Getting information and quickly turning it into a product that consumers want is the essential key to staying in business and all of this is done nowadays using computers and applications or information systems. And the information systems will continue to change businesses and the

way we live. Many corporate leaders are using technology to manage every aspect of their organization, from product creation to customer service.
It has brought evolution in almost every field, it changed the ways of teaching, administration of activities such as e-learning, e-library and online portals where teachers and students communicate, and sharing of information has never been better. Student result declaration and management are amongst the most important activities within a university or any educational institution, since all other activities depend on it. Hence implementing an information system can be declared a significance result. The main objective of this research is to enhance and automate the management and declaration of students' results using a computerized system.

Objective

You will be creating a full-stack website that uses the student information from a database as input and generates his/her result in PDF format as output which can then be downloaded and shared. Project Context In our day-to-day life, we come across various examination results such as school exam results, competitive exam results, college semester exam results, etc. How efficiently it produces someone's result by just filling in student details! But, have you ever thought of creating one? The ones who did basically went through the hectic job of perfecting their database and then using the knowledge of front-end and back-end to do so.

Developers are known for doing stuff automatically and efficiently. Thus we can have an easier take on it, by creating a system that accepts the student details as input and generates the desired result as output.

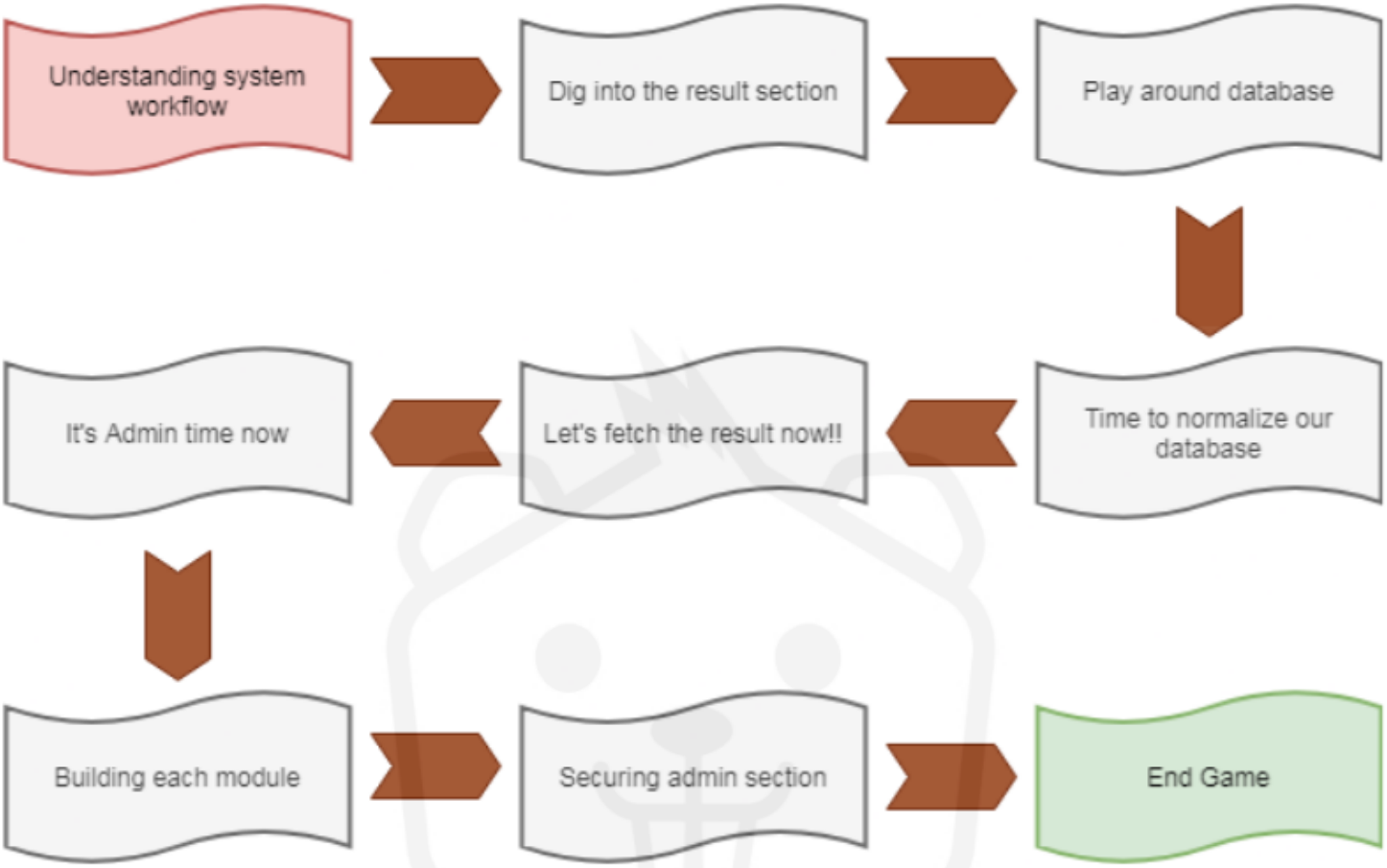
Purpose

This specification document describes the capabilities that will be provided by the software application STUDENT RESULT MANAGEMENT SYSTEM .It also states the various constraints by which the system will abide. The intended audience for this document are the development team, testing team and end users of the product

Scope

The application will manage the information about various students enrolled in this course in different years, the subjects offered during different semesters of the course, the marks obtained by the various students in various subjects in different semesters.
The application will greatly simplify and speed up the result preparation and management process.

Project Stages



High-Level Approach

- We will be following a **Top Down Approach** throughout this project i.e. starting from the end goal, back tracing to the starting point.
- This project has 3 sections that we have to implement, namely the **Result Section** for student's purposes, the **Database** for storage purposes and the **Admin Section** for administrative purposes.
- Firstly, we will be understanding the end goal of this project i.e. **Result Section**.
- Thereafter, we move towards the **Database** part starting from naive queries to optimizing it.
- Then, we will jump to the **Admin Section** for performing various activities that previously were done manually i.e. data addition and modification.
- **Authentication** for the admin section will then take place.
- Then, we will **Club** things all together into our system.

Research Significance

The computerization of the current system will have an impact on the way the students access their results and, how it is managed and generated by the institution's employees. The system will make the life much easier for the institution as they will be able to store data much better than how they were able to do earlier. The students will have a smart management of their results and will be able to keep track of their progress with an ease of access, from anywhere, anytime and any device that has an internet connection, and just by entering their respective credentials provided by the institution. Not only for the students, but for the teachers and the institution's employees managing the system as well. They will be able to keep their data organized and secure. The system will allow the teachers to grade the students even from home, then automatically perform the grades calculation, and the students could easily access and print them. This avoids the teachers from doing all the work manually, and have a better work quality and management that would reduce time, human effort and errors.

Literature Review

According to Freund et al. (2017), nowadays people interact directly with technology in fields such as education, government, finance, retail, entertainment, health care, science, travel, publishing, and manufacturing. And they also state that, educators and teaching institutions use technology to assist with education. Most equip labs and classrooms with laptops or desktops. Some even provide computers or mobile devices to students. Many require students to have a mobile computer or mobile device to access the school's network or Internet wirelessly, or to access digital-only content provided by a textbook publisher. And educators may use a Course Management System (CMS), sometimes called a Learning Management System (LMS), which is a software that contains tools for class preparation, distribution, and management. For example, through the course management system, students access course materials, grades, assessments, and a variety of collaboration tools. Many schools offer distance learning classes, where the delivery of education occurs at one place while the learning occurs at other locations. Distance learning courses provide time, distance, and place advantages for students who live far from a campus or work full time. Referencing Wallace (2015), the LMS is an information system used to track student progress, and manage educational records. Many offer other features,

such as online registration, assessment tools, collaborative technologies, and payment processing. They also offer tools for creating or importing content. And she also states that, people are so accustomed to social networking and other web applications that it is an easy step to build these tools into an online platform or environment. And referencing Wundenberg (2015), LMS characterizes a complex, often web based software system which pools multiple task specific subprograms under a shared User Interface (UI). These subprograms support, for instance:

- Allocation and organization of learning content for different learning scenarios;
- School administration;
- Information management;
- Online school business related communication.

Learning Management System Features

Dias, Diniz and Hadjileontiadis (2014) state that, LMS Moodle (Modular ObjectOriented Dynamic Learning Environment), a free and open-source platform based on socio constructivist perspectives developed by Dougiamas in 1999, allows users to incorporate various resources and functionalities in a modular structure. Additionally, seen as a Course Management System (CMS), Moodle can be used to manage the students' path, to monitor their performance, to create and distribute content, to organize e-activities, to evaluate, as well as to provide tools for communication, collaboration and interaction between the peers involved in the educational process. However, it is important to underline that incorporation of a wide range of activities in the LMS per se does not seem sufficient to enhance the teaching learning process. These kind of learning platforms (e.g., Blackboard, Formare, Moodle, Mohammad Gulam Lorgat © Amity University 2018 Teleformar, WebCT) should be seen as an opportunity for institutions to develop learning materials, online courses, tests and evaluations, databases and to online monitor students' progress. Furthermore, Wundenberg (2015) states that, an LMS also has to represent a number of characteristics to satisfy the stakeholders' needs:

- User friendly, intuitive design and self-explanatory functionalities;
- Adequacy for the users' levels of experience and knowledge;
- High system robustness against data-loss or system failure;
- High data security standards;
- Easy accessibility; ‘

• System flexibility for institutions' individual configurations and concept adaptations. According to Foreman (2018), an LMS differs from other information systems and it has its own features that allows schools and institutions to manage users and courses and administer the system.
• The user management features of an LMS include user account creation, authentication, user profiles, and roles and permissions.
• The course management includes managing lessons and assignments, post a course syllabus, learning goals, and schedule, provide interactive activities such as surveys, quizzes, and polls, upload and download multimedia course materials, conduct web conferences, send instructor-student messages and messages among students and establish student groups.
• The academic features are those that require special permission and, generally, are not accessible to students. They include class rosters and gradebooks, reports, analytics and statistics, and tools for developing courses and lessons in the system.
Moreover, the current research focuses on the section where the professors and students are registered into the system and are enrolled in respective subjects, allowing the professors, to grade the students and monitor their progress. And allows the students to view their own progress or results on each enrolled course

Research Methodology

A research methodology is the elaboration of a clear strategy for gathering evidence, including the specific data collection methods to be used, the kinds of evidence to be collected, and the approach for analysing the evidence (Darian-Smith & McCarthy, 2017). It is the path to solve a research problem. Hence it must be planned according to the objectives of the study.

Research Design

The research design used in this study is qualitative. Dawson (2015) states that, a qualitative research method is a scientific method of observation, used to gather nonnumerical data and that enables to conduct in-depth studies about a broad array of topics. They are more common within the field of information science and involve methods such as case studies and surveys.

Data Collection Method

Refers to the methods used to obtain and gather all the required data and information for the execution of the current research. The data was collected using both, by primary data collection methods as well as secondary sources. Primary data are the original data that has been collected specially for the purpose in mind. And data collected from the original source using one or more of the primary data collection methods such as, interviews, observations, surveys, etc. (Darian-Smith & McCarthy, 2017). In the current research most of the information were gathered through primary sources. And the methods that were used to collect the primary data are: on site observation, structured interview and document analysis. Secondary data is the one that was collected and that has already been analysed by someone else other than the user. This means that huge data sets are already out there, either completely unanalysed or ready to be analysed in new and creative ways. Furthermore, many of these data sets are inexpensive or freely available to researchers. And for an average scholar, doing secondary research on existing data can be more convenient, much faster, and less expensive than trying to do one's own primary research to collect new data (Darian-Smith & McCarthy, 2017). And the secondary data was collected through: books, thesis and internet or Web.

Data Analysis

The classification and tabulation transform the raw data collected into useful information by organizing and compiling the bits of data into graphically understandable manner, and in the current research, it was done with the help of a UML (Unified Modelling Language) modelling tool, Astah.

System Development

System development is a set of activities used to build an information system. System development activities often are grouped into larger categories called phases. This collection of phases sometimes is called the system development life cycle (SDLC), each system development phase consists of a series of activities (Freund et al., 2017). And in the current research, to develop the Web-Based Student Result Management System, the incremental model was employed, which is now the most common

approach for the development of application systems and software products. Incremental development is based on the idea of developing an initial implementation, getting feedback from users and others, and evolving the software through several versions until the required system has been developed. Rarely a complete problem solution is worked out in advance but it moves toward a solution in a series of steps, backtracking when realized that some mistake have been made. By developing the software incrementally, it is cheaper and easier to make changes in the software as it is being developed (Sommerville, 2016).

System Analysis

Systems development is mainly done in two phases, namely, system analysis and design. And this chapter focuses on analysing the research data and describing a logical view of the whole process, by modelling the data analysed in the form of diagrams to visualize the design and specifications of the system in an object-oriented manner. The analysis phase answers the questions of who will use the system, what the system will do, and where and when it will be used. During this phase, the research team investigates any current system(s), identifies opportunities for improvement, and develops a concept for the new system (Dennis, Wixom, & Tegarden, 2015). Referencing Valacich and George (2017), because analysis is a large and involved process, it is divided into two main activities to make the overall process easier to understand: • Requirements determination: a factfinding activity. • Requirements structuring: an activity that creates a thorough and clear description of current business operations and new information processing services.

Requirements Structuring

Valacich and George (2017) state that, “organizing, or structuring, system requirements result in diagrams and descriptions (models) that can be analysed to show deficiencies, inefficiencies, missing elements, and illogical components of the current business operation and information systems”. According to Tilley and Rosenblatt (2017), a use case diagram visually represents the interaction between users and the information system. In a use case diagram, the user becomes an actor, with a specific role that

describes how he or she interacts with the system. Systems analysts can draw use case diagrams freehand or use CASE tools that integrate the use cases into the overall system design. An activity diagram resembles a horizontal flowchart that shows the actions and events as they occur. Activity diagrams show the order in which actions take place and identify the outcome. A sequence diagram shows the timing of interactions between objects as they occur. Might be used by systems analysts to show all possible outcomes, or focus on a single scenario. The interaction proceeds from top to bottom along a vertical timeline, while the horizontal arrows represent messages from one object to another. And the Fig. 1 represents the use case diagram of the system, the Fig. 2, shows an activity diagram detailing one of the essential activities of the system, which is assigning grades to students. And Fig. 3, 4 and 5 show the system sequence diagrams of some essential scenarios.

Figure 1: Use Case Diagram

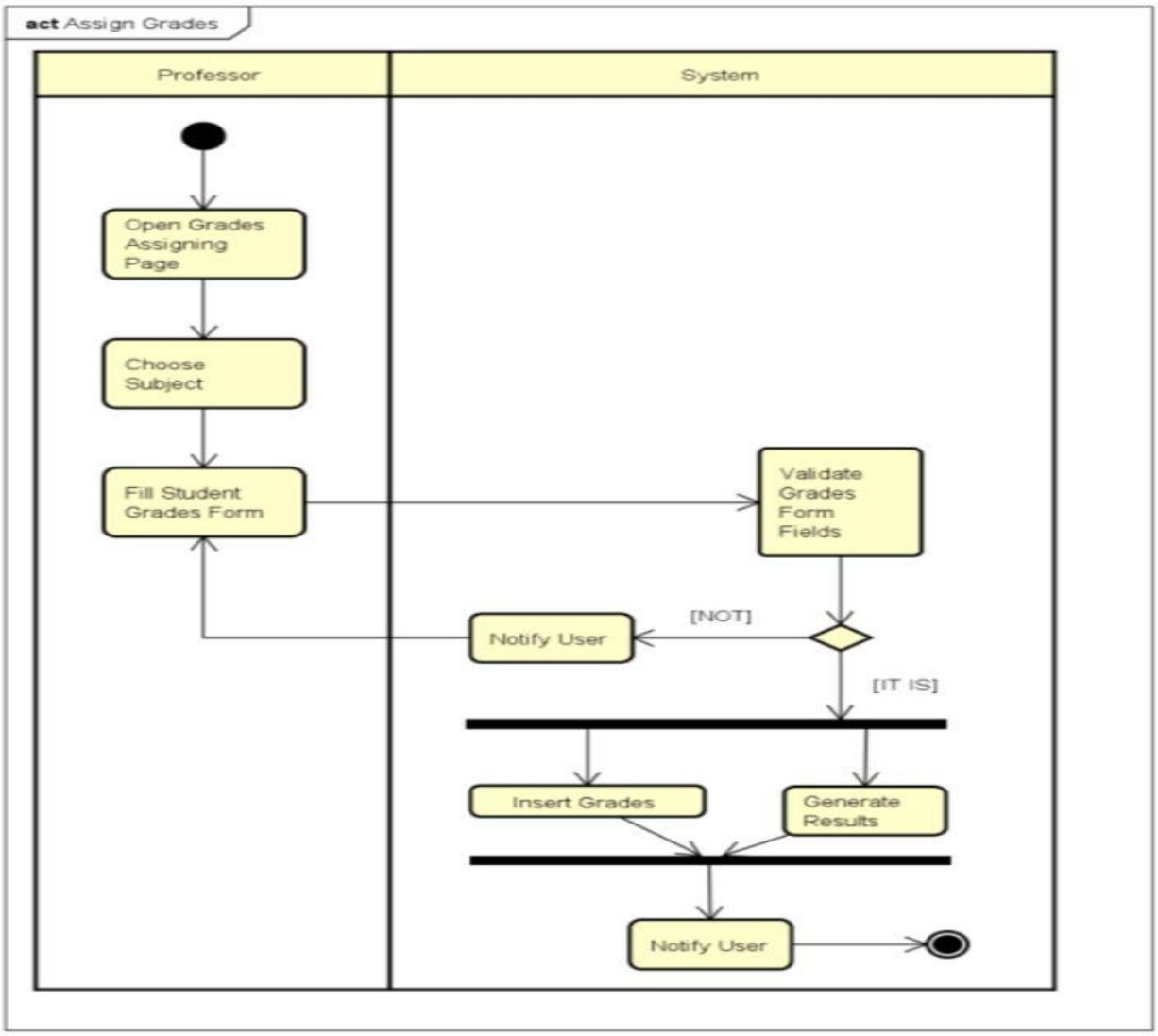


Fig. 2. Activity Diagram – Assign Grades

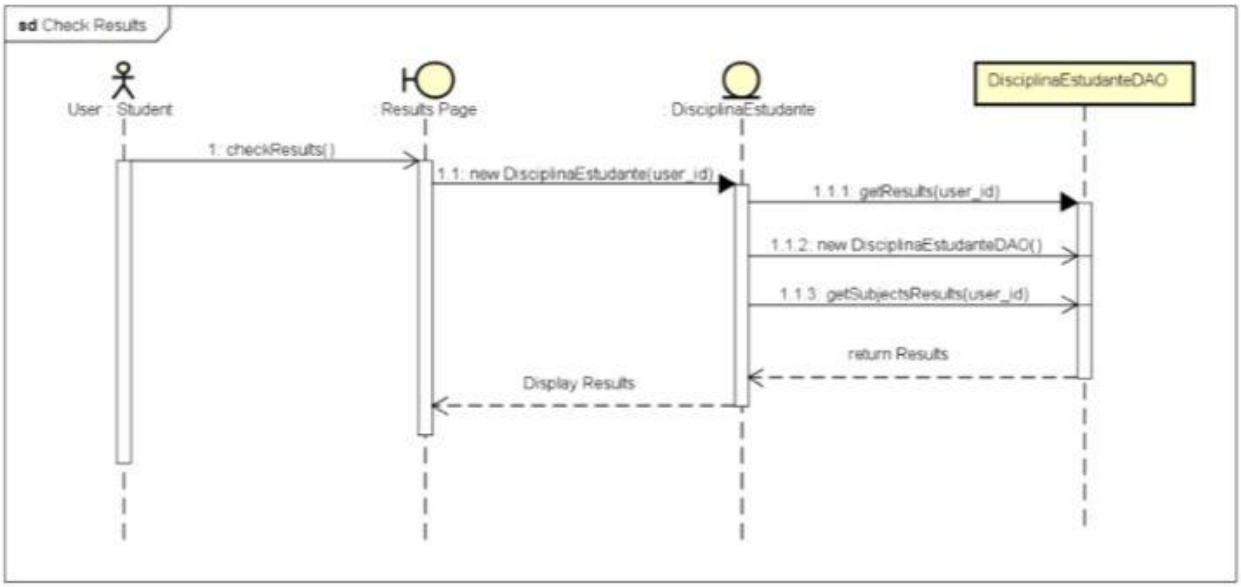
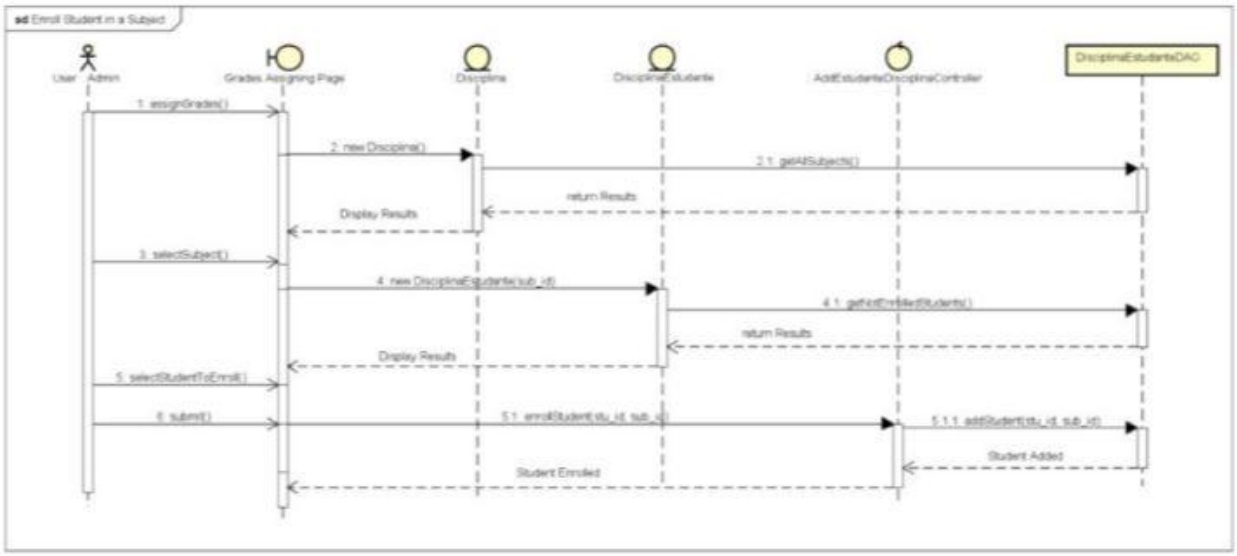


Fig. 3. Sequence Diagram – Check Results



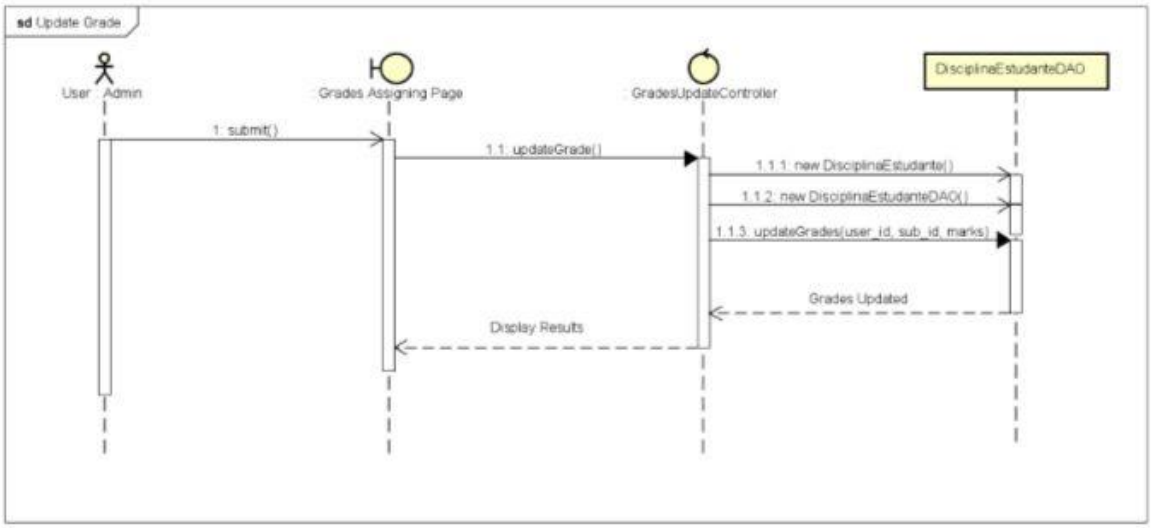


Fig. 5. Sequence Diagram – Update Grade

System Design

The purpose of the analysis phase is to figure out what the business needs and right after system analysis, started system design whose purpose is to decide how to build the same system. And according to Dennis et al. (2015), system design is the determination of the overall system architecture, consisting of a set of physical processing components, hardware, software, people, and the communication among them, that will satisfy the system's essential requirements. During the initial part of design, the business requirements for the system are converted into system requirements that describe the technical details for building the system.

Class Diagram

A class diagram shows the static structure of an object-oriented model: the object classes, their internal structure, and the relationships in which they participate (Valacich & George, 2017). And the Fig. 6, depicts exactly the structure of the system using class diagram.

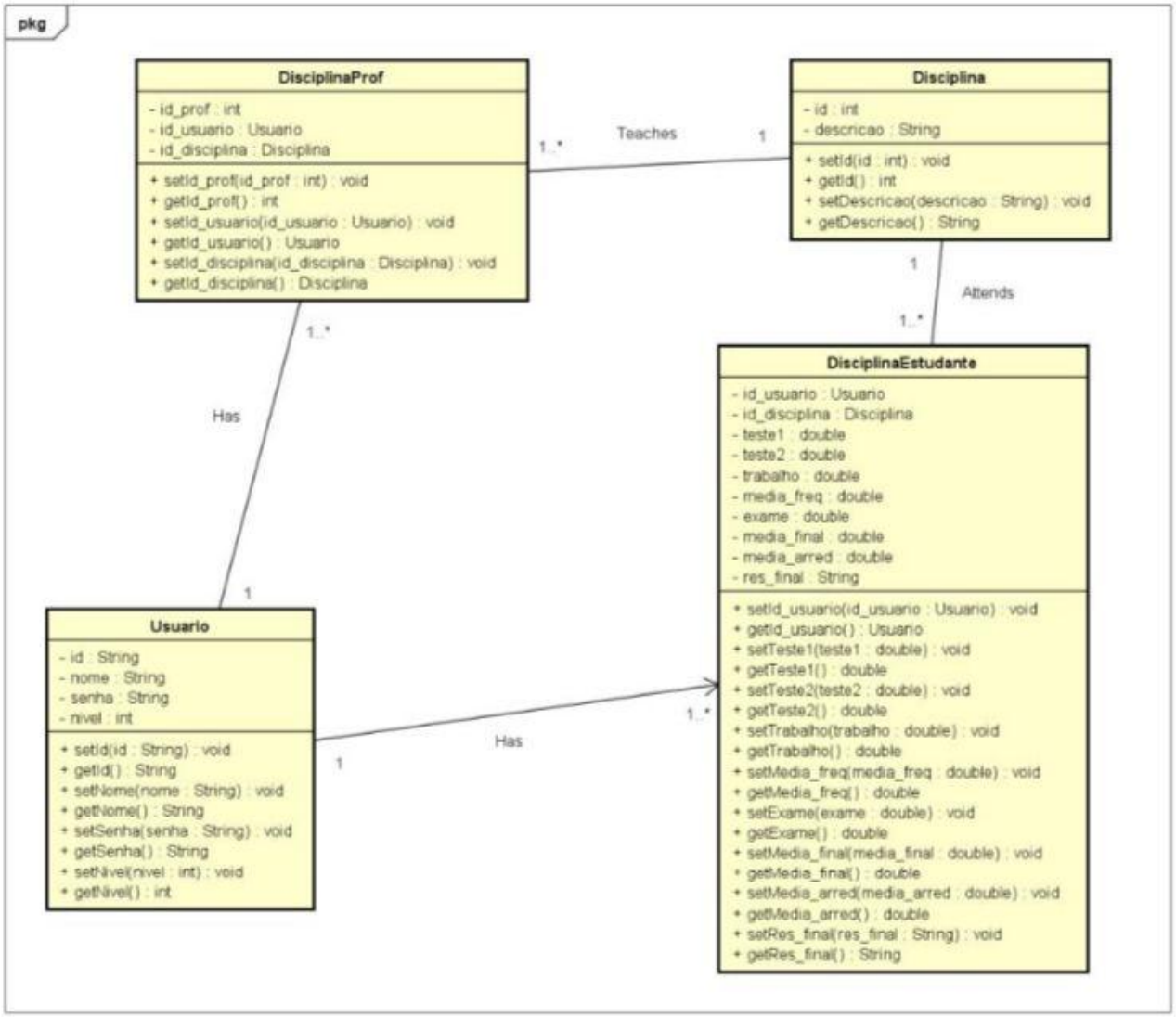


Fig. 6. Class Diagram

Database Design

From the analysis phase, a logical model of the system was created. And the following particular activity describes the proposed system's data organization, storage and management. Which is to be managed by the DBMS, a system responsible for storing, retrieving and protecting the data. These issues are important as they affect the consistency and quality of the data. The data is structured in files or tables that interact in various ways. Each table contains data about students, professors, users and subjects. According to Dennis et al. (2015), relational database is the most popular kind of database for application development today. And it is based on collections of tables with each table having a primary key, which is a field or fields whose values are unique for every row of the table and are used to identify each row or record. The tables are related to one another by placing the primary key from one table into the related table as a foreign key. Most relational database management systems (RDBMS) support referential integrity, or the idea of ensuring that values linking the tables together through the primary and foreign keys are valid and correctly synchronized.

Normalization

For the logical database design, a process called normalization was used, which is a way to build a data model that has the properties of simplicity, non-redundancy, and minimal maintenance. And according to Valacich and George (2017), "Normalization is a process for converting complex data structures into simple, stable data structures." The database of the current system went through the second normal form and third normal form of normalization. A relational table is already in first normal form. Hence the normalization begins with the second normal form. And normal forms beyond third normal form exist, but they rarely are used in

business-oriented systems. Normalization is based on functional dependency, which is a constraint between two attributes in which the value of one attribute is determined by the value of another attribute. For example: suppose there is a USER table with the following attributes: ID, name, password and level. Here the ID attribute uniquely identifies the name attribute of USER table because if the user id is known, the user's name associated with it can be told.

Second Normal Form

Second normal form is satisfied if any one of the following conditions apply:

• The primary key consists of only one attribute (such as the attribute ID in relation USER).

• No nonprimary key attributes exist in the relation.

• Every nonprimary key attribute is functionally dependent on the full set of primary key attributes. For example, the following table is not in 2NF: STUDENT (UserID, Name, Password, Level, SubjectID, description) The functional dependencies in this relation are the following: UserID – Name, Password, Level UserID, SubjectID – description The primary key for this relation is the composite key UserID, SubjectID. Therefore, the nonprimary key attributes Name, Password, and Level are functionally dependent on only UserID but not on SubjectID. STUDENT table has redundancy, which results in problems when the table is updated. And now to convert a relation to second normal form, the relation is decomposed into new relations using the attributes, called determinants, that determine other attributes; the determinants are the primary keys of these relations. STUDENT table is decomposed into the following two relations: USER (UserID, Name, Password, Level) Subject (SubjectID, description)

Third Normal Form

And the third normal form (3NF) is satisfied if: It is in second normal form and there are no functional dependencies between two (or more) nonprimary key attributes (a functional dependency between nonprimary key attributes is also called a transitive Mohammad Gulam Lorgat © Amity University 2018 dependency). For example: consider the relation PROFESSOR (ProfID, SubjectCode, description) The following functional dependencies exist in the PROFESSOR relation: ProfID – ProfID, SubjectCode, description (ProfID is the primary key) SubjectCode – description (Each subject has a unique description) It is noticeable that PROFESSOR is in second normal form because the primary key consists of a single attribute (ProfID). However, description is functionally dependent on SubjectCode, and SubjectCode is functionally dependent on ProfID. As a result, there are data maintenance problems in PROFESSOR. These problems can be avoided by decomposing PROFESSOR into the two relations, based on the two determinants. These relations are the following: SUBJECT (SubjectCode, description) PROFESSOR (ProfID, SubjectCode)

Entity Relationship Diagram(ER)

An entity-relationship diagram (ERD) is a model that shows the logical relationships and interaction among system entities. An ERD provides an overall view of the system and a blueprint for creating the physical data structures (Tilley & Rosenblatt, 2017). The following figure displays a logical data representation of the current proposed system. Built with the help of MySQL Workbench, a visual or logical database design tool which provides data modeling, SQL development, and comprehensive administration tools for server configuration, user administration, backup, and much more. The first step was to identify the entities

for the current system during the analysis phase and at this stage a simplified method can be established to depict the relationships between entities. The current system database is composed of four tables representing its respective entities, “disciplina” for subjects, “usuario” for users, “disciplina_prof” for professors and their assigned subjects, and finally “disciplina_estudante” for students and the subjects they are enrolled in. And its composition can be seen in the following figure through the ERD.

Implementation:

Implementation is the stage where the theoretical design is turned into a working system. The most crucial stage in achieving a new successful system and in giving confidence on the new system for the users that it will work efficiently and effectively.
The system can be implemented only after thorough testing is done and if it is found to work according to the specification.

It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve the change over and an evaluation of change over methods a part from planning. Two major tasks of preparing the implementation are education and training of the users and testing of the system. The more complex the system being implemented, the more involved will be the systems analysis and design effort required just for implementation.

The implementation phase comprises of several activities. The required hardware and software acquisition is carried out. The system may require some software to be developed. For this, programs are written and tested. The user then changes over to his new fully tested system and the old system is discontinued.

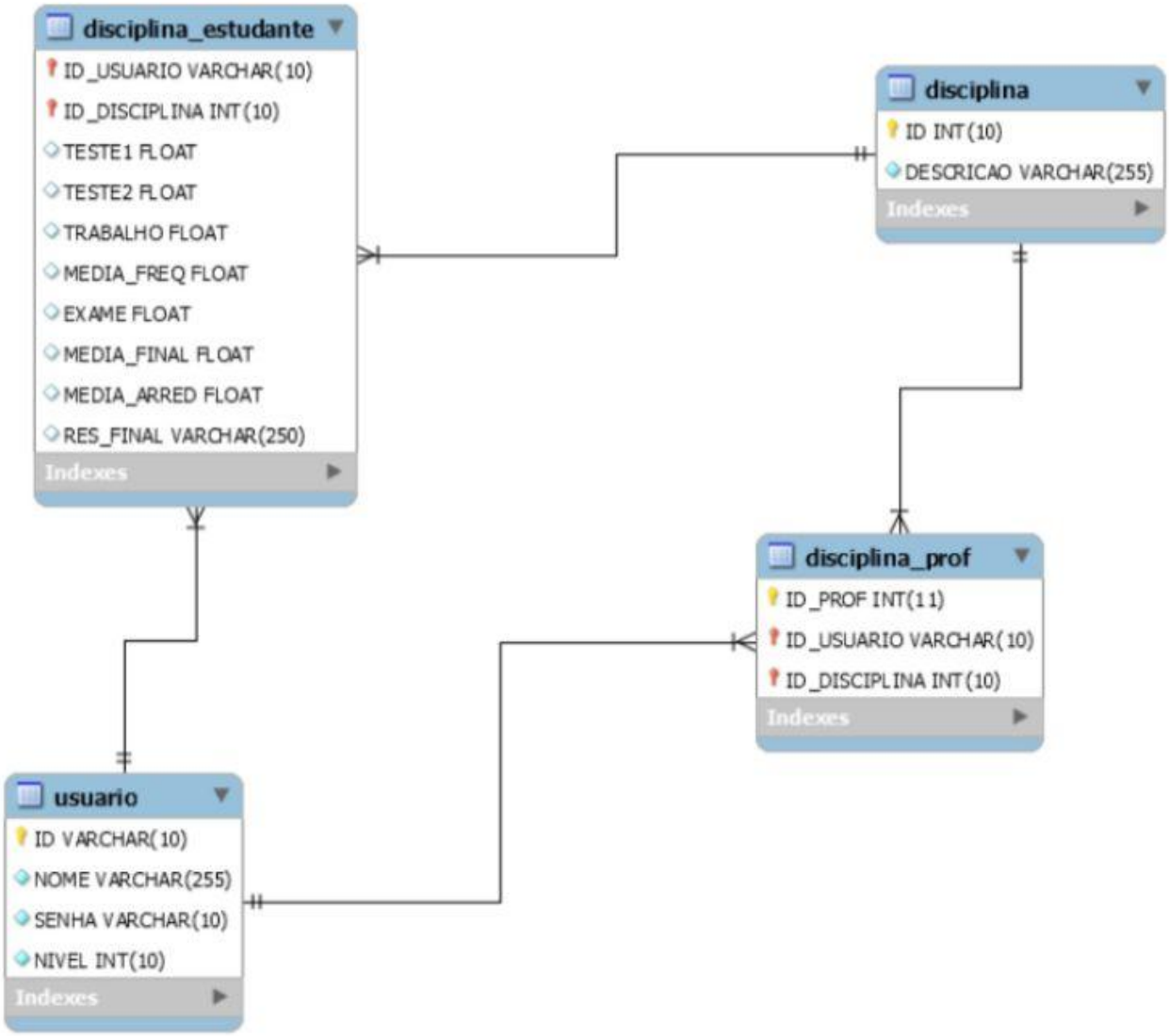


Fig. 7. Entity Relationship Diagram

FEASIBILITY STUDY:

Feasibility study is conducted once the problem is clearly understood. Feasibility study is a high level capsule version of the entire system analysis and design process. The objective is to determine quickly at a minimum expense how to solve a problem. The purpose of feasibility is not to solve the problem but to determine if the problem is worth solving.

The system has been tested for feasibility in the following points.
1. Technical Feasibility
2. Economical Feasibility
3. Operational Feasibility.

1. Technical Feasibility

The project entitles "Courier Service System" is technically feasibility because of the below mentioned feature. The project was developed in Java which Graphical User Interface. It provides the high level of reliability, availability and compatibility. All these make Java an appropriate language for this project. Thus the existing software Java is a powerful language.

2. Economical Feasibility

The computerized system will help in automate the selection leading the profits and details of the organization. With this software, the machine and manpower utilization are expected to go up by 80-90% approximately. The costs incurred of not creating the system are set to be great, because precious time can be wanted by manually.

3. Operational Feasibility

In this project, the management will know the details of each project where he may be presented and the data will be maintained as decentralized and if any inquires for that particular contract can be known as per their requirements and necessaries.

Conclusions

The present research was based on the computerization and the implementation of a sophisticated Web-Based Student Result Management System for the Catholic University of Mozambique. The main objective was to enhance and automate the management and declaration of students' results using a computerized system. A well-defined, efficient, controlled and managed information system or software based on web technology storing, processing and providing information through the internet. And the objectives were achieved by following a process model such as system analysis, design and system implementation. The system analysis was composed of two activities, requirement determination and structuring. The first activity focused on the collection of data or requirements through structured interview, work environment observation and by collecting procedures and other written documents. And the latter, performed the modelling of the collected data and processes, transforming it into UML diagrams with the aid of a UML modelling tool, Astah into a graphically understandable manner. Just as structured analysis uses DFDs (Data Flow Diagrams) to model data and processes, systems analysts use UML to describe Object Oriented systems, on which the current system is based. UML is independent of any specific programming language and can be used to describe business processes and requirements generally. Finally, the implementation or coding of the proposed system was based on the software architecture standard, MVC using Java programming language, which is based on the object-oriented paradigm.

Future Work

In near future, the system interface could be improved, with more attractive, interactive and meaningful images; Enhance the system with an email and SMS (Short Message Service) or email notifications; Enhance the current system by computerizing almost all of the services provided by the institution (online exams,

enrolment, library and others), turning it into a complete LMS; And evolve the system Mohammad Gulam Lorgat © Amity University 2018 by developing several versions through users' feedback, if a complete solution has not been worked out.

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