

Educational Quality Assurance Management System

Ola Mohammed Aly*, Ahmed Mohamed Nasser*, Adham Mahmoud*, Hady Hazem*, and Sameh Ghanim*

* Department of Electrical Engineering, The Egyptian Academy of Engineering and Advanced Technology (EAEAT).

Corresponding author: ola.m@eaeat.edu.eg

Abstract- Quality assurance (QA) is an important process which checks if the outputs and services meet the specified requirements, if not, it enhances these requirements for improvement. In general, increasing user confidence, honesty and developing work processes are from the advantages of using QA, which makes an educational institution a strong competitor to others. QA used to be manual in educational processes. Instead of manual process that consumes a lot of time and effort, the used system is electronic system. In Egypt, the trend is towards digital transformation. The proposed system is used by QA committee for course management. The system provides facilities for instructors to upload, update, view and view course files with necessary statistics and analysis that help to enhance courses quality. The QA committee can use them to monitor the progress of the courses, produces the program report automatically by collecting relevant grade information, student feedback analysis, Course learning outcome (CLO) achievement statistics and intelligent recommendations for course improvement wherever necessary. The objective is effective management of QA activities to improve courses, reduce Time and manpower. The Egyptian QA accreditation system based on around twelve items of Self-study Standards, we are concerned in our system for only one of them” Teaching and learning”.

Keywords- Quality Assurance system, Database, Web-based Applications, Design.

I. INTRODUCTION

A few years ago, Egypt has begun a digital transformation to facilitate the collection of information and facilitate the daily requirements in daily life. Due to this prevailing trend, EAEAT decided years ago to go in this direction to keep pace with the progress that occurred in Egypt as a result of the digital transformation.

The Academy has already started applying the learning management system (LMS) and student information system (SIS) systems to facilitate the educational process for students, and due to the difficulty of the quality process and education monitoring to maintain the level of advanced education, the Academy decided to create a website to facilitate the quality process to obtain academic accreditation.

QA is a system of operations that includes planning, quality control, quality assessment, reporting, and quality improvement to ensure that a product or service satisfies defined quality standards with a stated level of confidence. Quality has been an issue of concern for many organizations in their efforts to achieve their corporate objectives. The goal for institutions of higher education is to achieve high standards for instruction and research endeavors. In addition, there are some new technologies that have recently emerged as "Quality Assurance, Quality Rectification," which refers to the process of assessing and rectifying as one of the evidences on achievement of the goals. The importance of Quality Assurance in Higher Education with All of its components has become one of the social requirements, which presented up in All political levels to develop the graduates qualifications in order to cope with the job market needs [1].

The Egyptian QA accreditation system based on around 12 items of Self-study Standards, we are concerned in our system for only one of them” Teaching and learning”.

The proposed system target is to reduce the effort that done into the process so we want to transform the process to digital because digital process can reduce time and effort.

The Egyptian Academy of Engineering and Advanced Technology want to apply for Academic accreditation So we need to facilitate this process by collect most of Data in one place (Quality Assurance Management System) that need in progress of Academic Accreditation.

In the past, QA in the educational process was done manually, thus we will utilize digitalization in our project because manual processes take a long time and require a lot of human effort. Educational-QAMS makes it easier for the quality unit and the teaching staff to monitor educational quality and facilitate the process of creating a program report.

II. SURVEY

A. *Quality Assurance*

A product or service must pre transition quality standards with a given confidence level, and QA is a system of operations that requires careful planning, quality standards, quality criteria, reporting, and quality improvement.

The policies, processes, and systems utilized by higher education institutions to oversee and enhance the quality of their instruction and other activities are referred to as QA in higher education. Students, corporations, and government agencies are very concerned with the quality of higher education being offered, especially as the unit of resource continues to decrease. All areas of an institution's planning, students' and staff members' performance, administration, and finances are impacted by quality issues. The terminology is still very complicated, which is one of the issues with quality managerial role. Without clarifying the concepts, people are using the terminology ambiguously. Therefore, before the quality policy can continue, terminology needs to be cleared up. Here, quality management is applied to processes & procedures whereas quality management is regarded as implementing quality systems [1].

- *Aims of Quality Assurance in higher education* [1]

- 1) Boost the community's degree of confidence in the results of higher education.
- 2) Assist in the quality accreditation and certification process in accordance with the internal requirements of academic institutions.
- 3) Initiate developmental engagements with higher education institutions and encourage them to create their own quality assurance systems.
- 4) Strengthen quality assurance capability growth.
- 5) Assist in the creation and use of national reference standards for educational initiatives.
- 6) Include a long-lasting procedure that combines the institutions' systems for quality control with outside procedures for accreditation and assessment.
- 7) Promote ongoing quality progress.
- 8) Work collaboratively regionally and abroad

B. *Accreditation*

Accreditation is an affirmation and empowerment for higher education institutions to obtain a distinguished character and identity and a seal of approval that actions taken to improve quality are successful [1].

In Egypt the accreditation is approved by National Authority for Quality Assurance and Accreditation of Education (NAQAAE).

- *Universities accreditation criteria*

- 1) strategic planning
- 2) Leadership, governance, and self-management
- 3) Quality management and development
- 4) Faculty member and support staff
- 5) An administrative apparatus
- 6) Financial and material resources
- 7) Education and academic program
- 8) Students and alumni
- 9) Teaching and Learning
- 10) Scientific research and scientific activities
- 11) Social responsibility and sustainable development

12) post-graduate

- *Statistics*

The percentage of higher education institutions accredited by the Authority was 20% of the total number of institutions from the Arab Republic of Egypt [2].

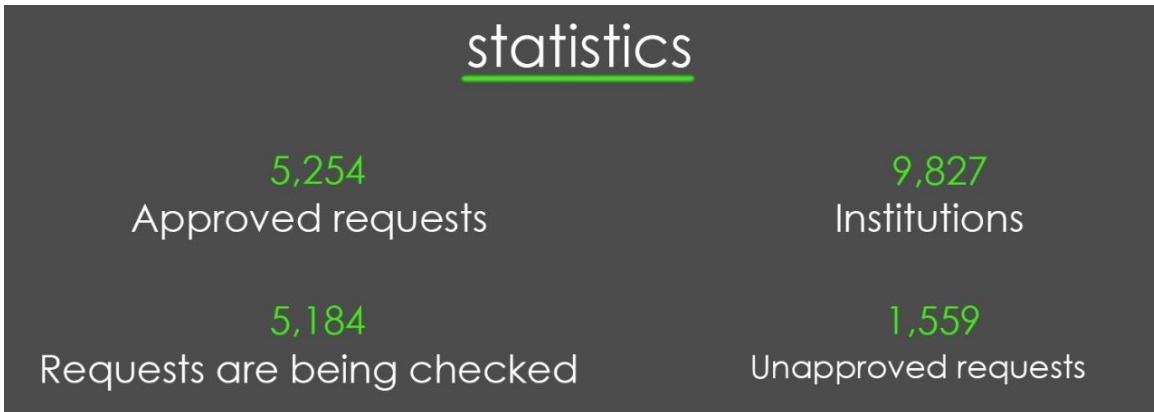


Figure 1: total statistics

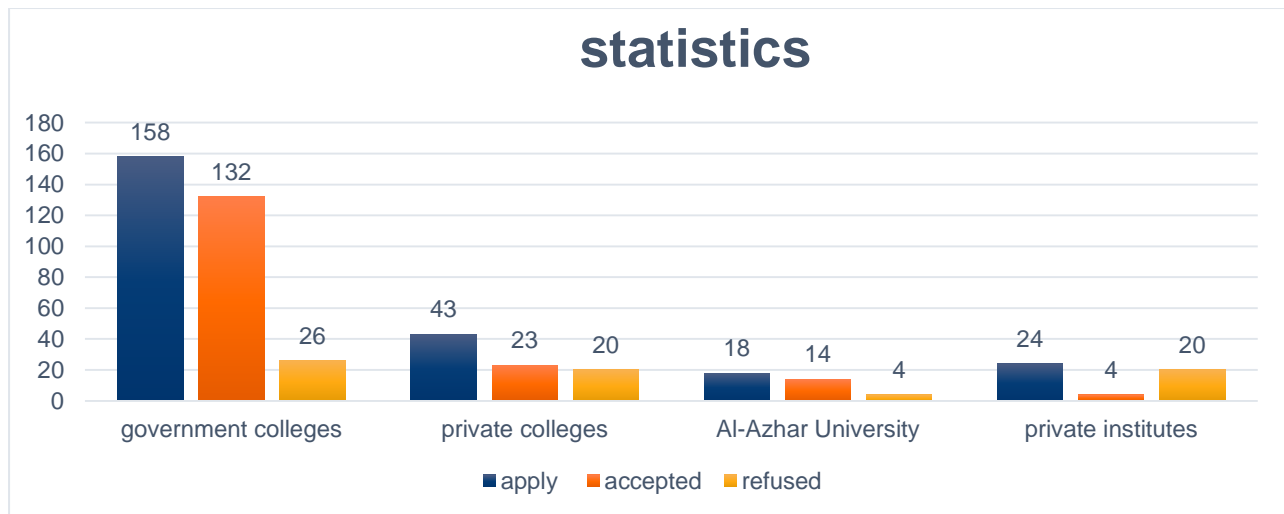


Figure 2: statistics for HE [2]

NAQAAA Standard (April 2017, Version 2) [3]	NAQAAA Standard (July 2015, Version 3) [4]
1) strategic planning	1) strategic planning
2) Leadership, governance, and self-management	2) Leadership, governance, and self-management
3) Quality management and development	3) Quality management and development
4) Faculty member and support staff	4) Faculty member and support staff
5) An administrative apparatus	5) An administrative apparatus
6) Financial and material resources	6) Financial and material resources
7) Students and alumni	7) Education and academic program
8) An education	8) Students and alumni
9) Scientific research and scientific activities	9) An education
10) Social responsibility and sustainable development	10) Scientific research and scientific activities
	11) Social responsibility and sustainable development
	12) post-graduate

C. Literature review

In 2009, in partnership with Sophia University, Mansoura University began a challenge to create the first website used in quality processes related to higher education in Egypt in 2009. The system can deal with Organization, Students and Teaching [5].

In 2010, Mansoura University and Sophia University began cooperating with the American University in the Emirates to develop the site and work to improve it. And divide this system to UML and modules [6].

In 2018, In Pakistan made web-based QA system. This system is helpful for users because of availability of application 24/7. And this paper discusses several testing tactics for web-based App. To reduce effort [7]

In 2021, In KSA, The AQASYS system is one of the best quality systems. It measures the learning quality in the selected program according to ABET and NCAAA standards. This system has many unique features; it includes automatic course report generation, it archives historical data to view at any point in time and it makes the handling of academic quality an easy task provided with reliability, security, availability, and privileged access. It was launched in institutional LAN which is a drawback [8].

III. PROPOSED SYSTEM DESIGN

The proposed system is a web-based academic quality assurance system that has the following features: -

- Instructor can easily download course specifications.
- Instructors will provide facilities to upload update and view course report.
- Annual data archiving and freezing for each course
- Instructor can upload related resources as course report, course assessment and other resources can also be managed in the system.
- Instructor can get graphical distribution of grades of his students
- Generate Course file report
- Generate the Program report automatically by collecting relevant grade information, student feedback analysis, CLO achievement statistics and intelligent recommendations for course improvement wherever necessary.

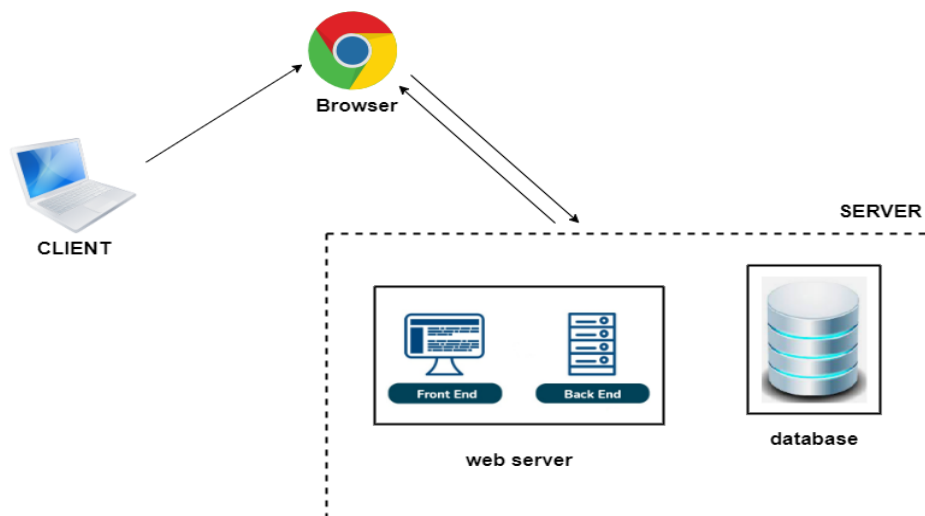


Figure 3: Structure Block diagram

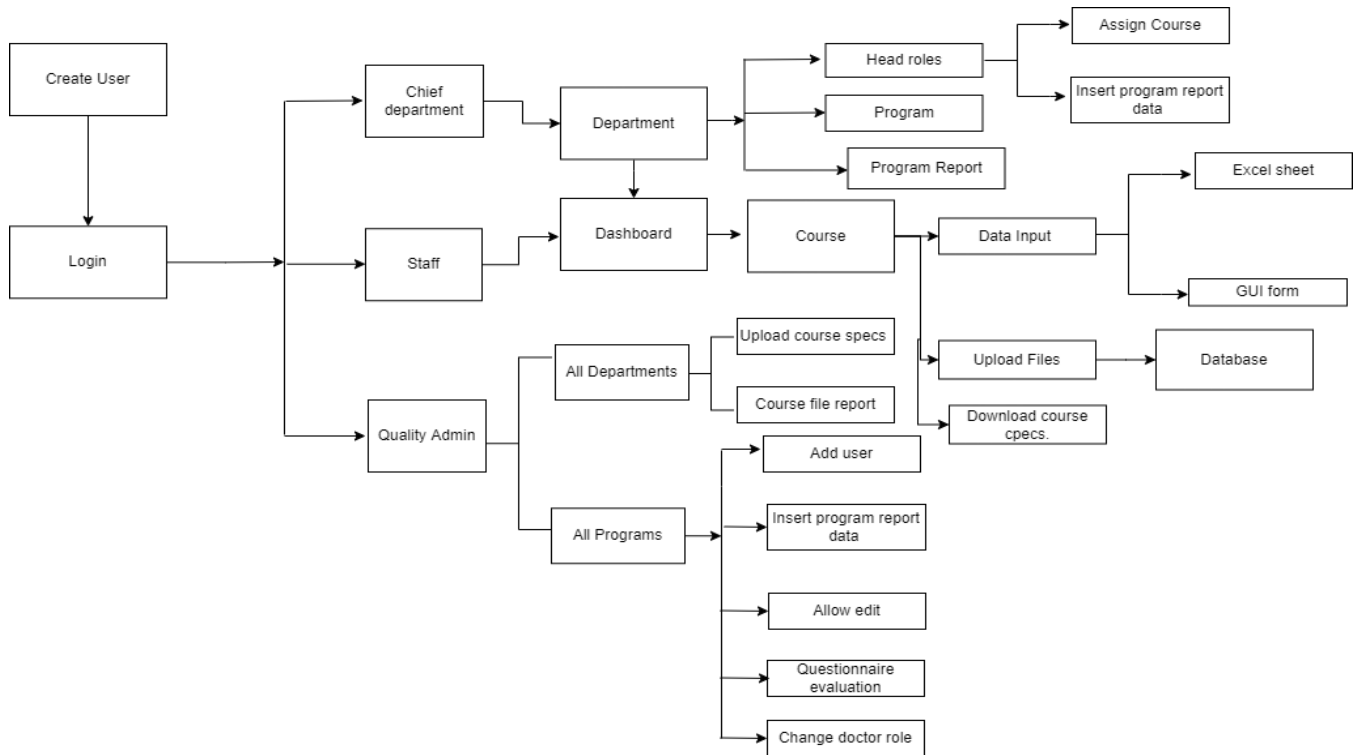


Figure 4: Block diagram

A. Modules design

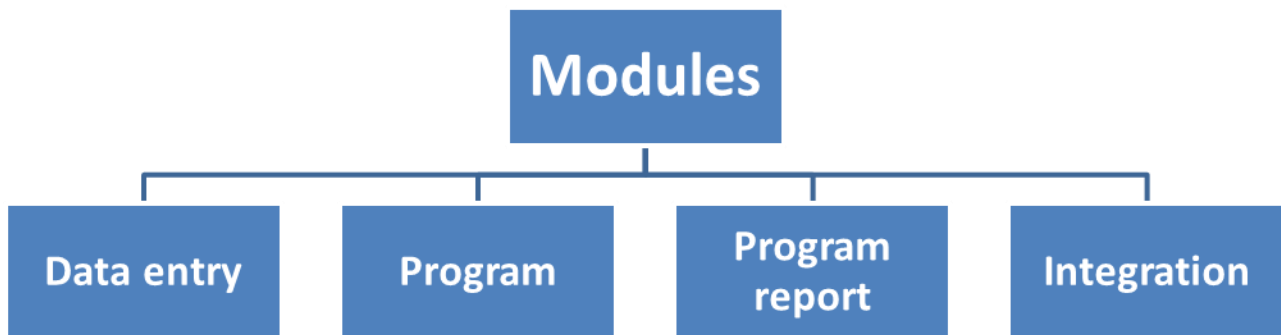


Figure 5: Modules

1) Data Entry Module

In data entry module the system collects all data which makes the system able to calculate all required calculation as following:

- Department Basic information.
- Program Basic information.
- Upload annual course files (word, pdf,)
- Uploading Grades from excel sheets.
- Program report data using GUI (Graphical User Interface) forms.

2) Program Module

Program module consists of:

- Chief Department word.
- Mission
- Vision
- Objectives of program.
- Display PLO's statements of program.

3) Program Report Module

- Display basic information of program.
- Display registered students and charts.
- Number of students in each level grade.
- Grades of the Alumni at specific academic year.
- Display Competences covered, Questionnaire evaluation and results for all courses.

4) Integration module

- Integrate With SIS system to get students result.
- Get Questionnaire evaluation for all courses.

B. Data base Design

ER diagram: An Entity Relationship (ER) Diagram is a sort of flowchart that shows how "entities" in a system, such as courses, departments, or instructor, interact with one another

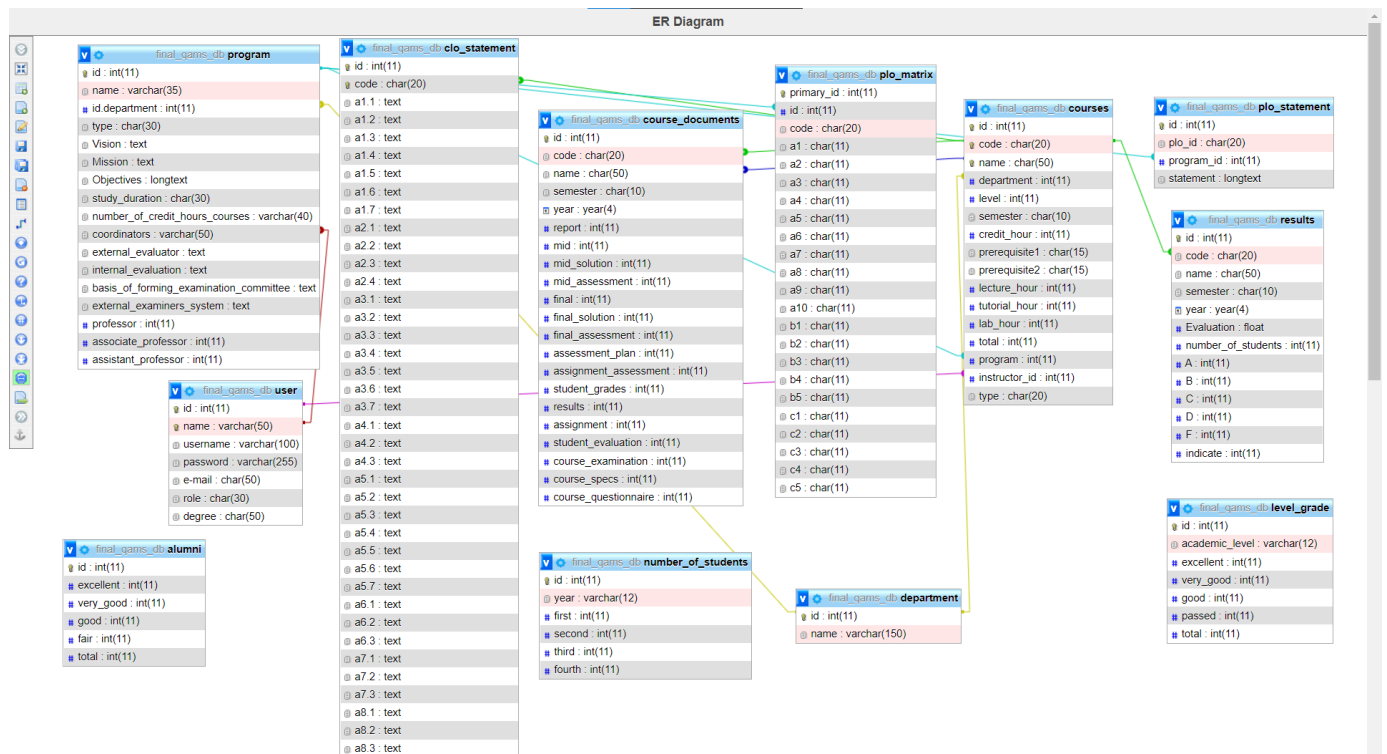


Figure 6: ER diagram

For example, *User* entity specify the role of each user on system and their personal information data such as, username, password, Role, E-mail, Academic degree.

Courses entity which specify each course basis specification and which department offers in what program, Course code, Course name, Level of course, Credit hours of each course, All prerequisites of course, Lecture hours, Tutorial hours, LAB hours, Instructor of course, Department, Program which course related.

Annual Course Documents entity archives all documents of courses which changed every year like, Course report, Midterm exam and solution, Final exam and solution, Students grades and so on.

When user need to show CLO statement should select CLO ID (a1.1) and course (ECO 111), so make query to retrieve the data (statement)

id	code	a1.1
19	ECO 111	Identify the main electrical circuit elements.
27	ECO 221	Apply mathematical models to explain/calculate cri...

Figure 7: CLO statement

D. Web-site Design

1) Front-end [9]

Primary stage is that stage where design is prepared by collecting the data for shape design, now developers can start imagining design. After finishing the previous steps, they started to code this design as a front-end Development.

Front End Development:

First part of design and here users interacts directly with application. It's defined as 'client side' of applications. It consists of everything that user experience directly: text, style and colors, videos, images, tables and graphs, buttons.

Usually, the programming languages used in front-end are HTML, CSS and JavaScript

- HTML refers for Hypertext Markup Language. Using a markup language, it is used for generating front end design of a website.
- CSS is refers for Cascading Style Sheets which simply designed language designed to make creating web pages more beauty so CSS allows developers to apply their styles to html pages.
- JavaScript is a scripting language that may be used to work its magic and make an application interactive for users. It is also used to improve an application's functionality.

2) Back-end

Backend, which refers to any area of a software product that users cannot view, is the focus of secondary phases.

The backend of a web application is its server-side. It keeps data up to date, organizes it, and makes sure that practically everything on the client side of the website runs well. To retrieve and save data, the backend interacts with the database.

Backend developers used PHP language to handle with data, they stored data like text, numbers, images, charts, and files. The server-side scripting language PHP was created primarily for building websites [9].

3) Final stage

At this stage, we have tested website and all its features to guarantee that they are running properly and then we published website on the Internet [9].

IV. RESULTS

system is divided into 3 types of users and program report.

First type of user is Admin (Quality unit employee) and he has several roles like Add user, add Questionnaire evaluation, add and update program report data and finally he can change role of teachers.

second type of user is Chief department he can assign course for each doctor, view course file report, add program report data and view general course report

Final type of user is teacher which can download course specs, upload annual course file and upload students' grades and get chart of students' grade distribution.

Program report data is like an output of system because user can view all data related to program like Basic information, registered student, alumni, Competency Cover, LOS evaluation, and result of all courses

A. Type of Users

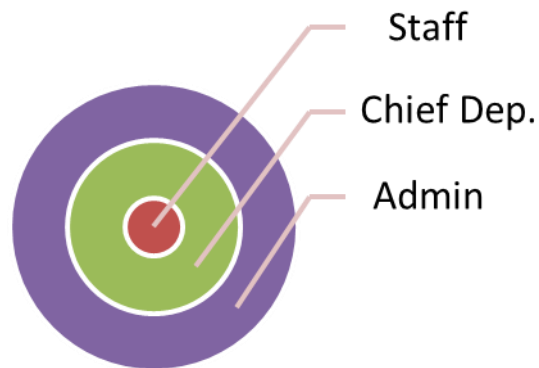


Figure 8: Types of users

1) Admin

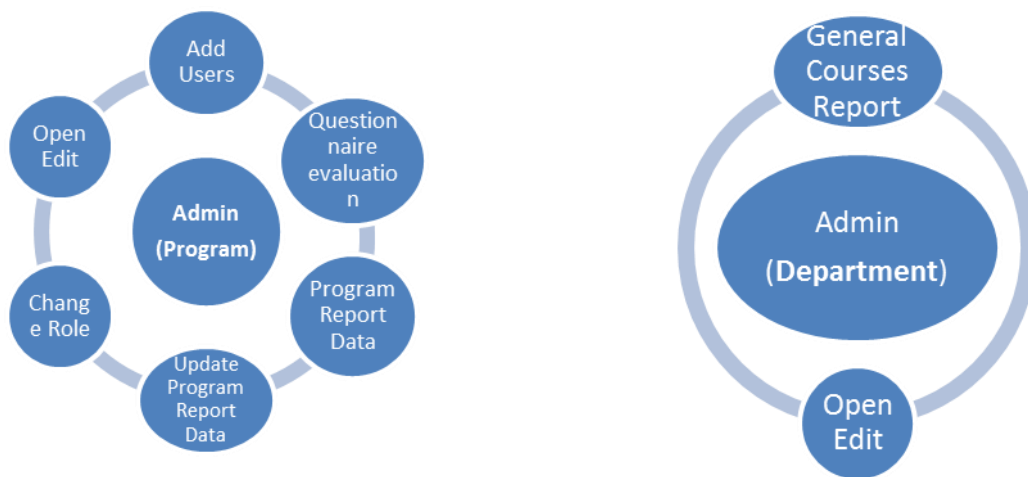


Figure 9: Add user

The image shows two side-by-side web forms. The left form is titled '+ Add User' and contains the following fields: 'User name :', 'Course Instructor :' (with a dropdown menu showing 'Dr. Mohamed Safy Moussa'), 'Course Year :' (with a dropdown menu showing '2020 / 2021'), and 'Role' (with a dropdown menu showing 'Head'). A blue 'Submit' button is at the bottom. The right form is titled '+ Questionnaire evaluation' and contains the following fields: 'questionnaire evaluation :', 'Course :' (with a dropdown menu showing 'Calculus I & Algebra'), and a blue 'Submit' button at the bottom.

Figure: 10: Questionnaire evaluation

2) *Chief*

B. *Department*



Figure: 11: Chief Department roles

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1) *Staff*

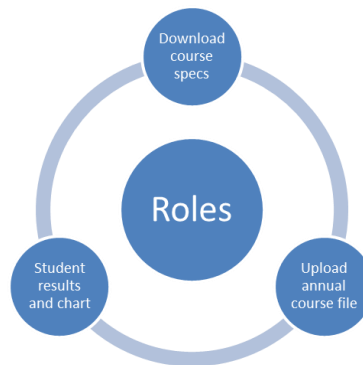


Figure 3 Staff roles

2) *Program Report*



Figure 4 Program report features

V. SECURITY

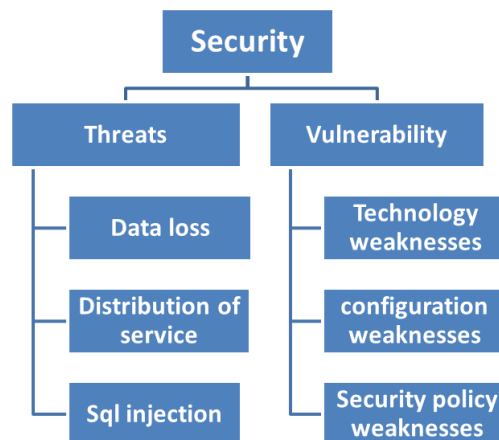


Figure 5 Security types

Cyber security nowadays is very important and plays major roles in web-development to protect website against attacks

1) *Vulnerability*

A threat is anything harmful that could occur to your assets [10].

2) *Threats*

A vulnerability is the weakness that increases the probability of occurrence of a threat. Vulnerability could occur due to several reasons; poor design, insecure coding and configuration mistakes [11].

3) *Attacks*

An attack is the action of performing a threat. Sending malicious inputs to an application and flooding a network to deny its service are examples of an attack [12].

Any system can be attacked in more than one way. Part of this attack is done on the server, and the server is protected by a firewall that addresses many attacks. The other part is on the site and this is addressed by coding. System is solved two of attacks SQL injection and query string attack. Firewall of server protect a whole system from other attack

- *SQL injection attacks*

A SQL injection attack occurs when an attacker submits information that has been intentionally formulated to a website, which results in misinterpretation and unintentional actions. The website interprets the submitted data as a SQL command, after that it is executed. If the command is to modify entries, delete, lost or stolen the whole database, it results in disasters, therefore it is important to prevent SQL injection attacks.

Examples

1) Blind SQL injection (not display error)

Used command `` or sleep (second) -- -` (make delay for period of time)

2) Error based

Used command `` or 1=1 -- -` (stole all data in table)

For usage in a SQL statement, the `mysql_escape_string` function escapes special characters in a string.

Escapes special characters while taking into account the connection's current character set so that it can be used safely in a mysql query (). This function must be used to input binary data.

`mysql_escape_string ()` calls MySQL's library function `mysql_escape_string`, which prepends backslashes to the following *characters*: `\x00`, `\n`, `\r`, `\,`, `'`, `"` and `\x1a`.

With very few exceptions, this function must always be used to secure data before submitting a query to MySQL.

- *Query string attack*

Attacker Change to another user by predicting page name in URL

```

function Cheack_Login()
{
    if (!isset($_SESSION['username'])) {
        header("Location: logboot.php");
    }
}

function Islogin()
{
    if (isset($_SESSION['username'])) {
        header("Location: index.php");
    }
}

function Cheack_admin()
{
    if ($_SESSION['role'] == 'admin') {
        header("Location: admin.php");
        die();
    }
}

```

Figure 6 Function to prevent SQL injection

VI. CONCLUSION

A Quality Assurance system (QAS) is a software system that instructors will provide facilities to upload, update and view course files (portfolio). Archive data for each course, Get Archived data of pervious years easily, can easily download course specification, can upload related resources as course report, course material, course assessment and other resources can also be managed in the system, can get graphical distributions of grade of his students. Generate the course report automatically to help the quality committee and the external evaluator.

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