Hanoi University of Science and Technology

School of Information and Communication Technology

Feasibility Report

Project: Online Multi-choice Exam Platform

Name	ID	Email
Lê Hoàng	20184263	hoang.l184263@sis.hust.edu.vn
Lê Minh Hiếu	20184257	hieu.lm184257@sis.hust.edu.vn
Nguyễn Huy Hoàng	20184265	hoang.nh184265@sis.hust.edu.vn
Nguyễn Viết Mạnh Khoa	20184278	khoa.nvm184278@sis.hust.edu.vn
Phí Hoàng Long	20184288	long.ph184288@sis.hust.edu.vn
Phạm Nhật Linh	20184285	linh.pn184285@sis.hust.edu.vn
Hoàng Mạnh Hà	20184250	ha.hm184250@sis.hust.edu.vn
Lê Anh Tuấn	20184322	tuan.la184322@sis.hust.edu.vn
Phạm Thành Đạt	20184242	dat.pt184242@sis.hust.edu.vn
Bùi Thanh Tùng	20184324	tung.bt1843242@sis.hust.edu.vn

Hanoi, October 2021

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

The following proposed system is intended for the professors of Hust University. The professors will be represented by Prof. H (primary client) and Prof. T. Prof H will be our primary client. The basic goal of the development team is to implement an online examination platform to replace traditional examination procedures. The new system will allow creation and management of multi choice exams online through browsers, as well as score and store them automatically. The new system will include an admin interface to monitor all operations. System reports are logged regularly to aid and improve spontaneous problems. The overall goal of the new system is to streamline, automate and enhance examination experience for both examiner and examinee.

II. PRELIMINARY REQUIREMENTS ANALYSIS

Part I - Application Overview

Objectives

The basic functionality of the system will be to provide an online platform where examiners can create and host examinations with ease. Exam reports can also be requested easily and quickly by the examinee at any time.

Business Objectives

The project aims to reduce costs, optimize examination procedure, remove unnecessary labour in traditional examinations that leads to human-related faults. It will also provide an administrative interface with detailed reports for irregularities detection.

Through this examination platform, we aim to automate tedious and repetitive tasks in traditional examination procedure. This project is expected to profoundly benefit both the examiners and examinee by reducing human-related errors and worktime.

A working prototype will be deployed, tested, and implemented in time to be deployed in this academic semester (Semester 20211)

Current Business Process and Rules

Currently, the client gives paper examinations at lecture halls and requires students to be at the location on time. The papers are then collected and marked manually by the examiners. Post-examination storage is still done manually in physical document facilities. These tasks are time-consuming and are prone to human errors. The exam storage method is difficult for querying and can damage exam papers in the long term.

The new system hopes to solve these problems by automating exam hosting and scoring, and by providing a reliable exam database.

User Roles and Responsibilities

Examinee Role: The ability to take examinations and view exam reports.

Examiner Role: The ability to create, read, update and delete exams and exam-related documents

Administrator Role: All abilities of Examinee and Examiner, and exclusive ability to create other user's accounts and view system-wide reports.

Interactions with Other Systems

The system will be built from scratch using standard web and database packages, and will only interact internally

Production Rollout Considerations

The central database design, user interface design, admin interface design, exam hosting procedure, report generation procedure and related security design are expected to be carried out in a phased manner over three months before the system is tested and put into production.

Users are expected to use this system after undergoing a short period of training.

Part II - Functional Requirements

Statement of Functionality

This software system will provide a friendly web user interface for examiners to create and host exams.

The system needs to allow retroactive editing of input (i.e. modify, insert, delete).

The system needs to allow automatic and manual data backup and export.

The software system will have different account types with different access levels so that examiners and examinees interact with specific parts of the system.

The system should be able to produce a range of reports specific to examiners and examinees needs.

Security and User Capabilities

The software system will support three types of users. In order to access the system all the users will need to login with a password. At the administrative login level, the user will be given additional permissions such as adding or removing accounts. Data exporting and backing up can be accessed exclusively at this level. Users logged in as examiner role can create, modify and delete exams. Generating and viewing exam reports are also included in this access level. At examinee level, users can take examinations and view exam reports. Ability to view all previously taken exam results would also be provided.

Reporting

Reports for any given timeframe (daily, weekly, monthly, quarterly, and yearly) can be created using the functionalities of the system.

Non-functional requirements

The web user interface should be accessible through any major browser (i.e. Google Chrome, Microsoft Edge, Mozilla Firefox).

The system needs to be functional whenever administrators or examiners need to access it. Ease of use and efficiency would be the top criteria for ensuring success. The ability to operate normally under high load would be critical for success as well.

Optional Features

The web user interface may contain modules for sending push notifications to examinees.
Users might also be able to access exams quickly by means of generated short urls.

Usability

Usability includes functional user interface, adequate reporting, fast and efficient exam related workflow. All components will be designed with effectiveness, efficiency, and satisfaction in mind.

Scope

The scope of the system includes basic tasks that traditional examination systems cover. Examination creating, hosting and sitting are general capabilities. Administrative system tasks include account management, report generation and system backup.

The system ability to create exams limits to common types of examination (i.e. multiple choice questions, written).

The system will not provide any cheating prevention mechanism, but can integrate with existing solutions.

III. PROCESS TO BE FOLLOWED

In this project, our team has decided to follow the Agile Scrum method. Agile Scrum methodology is a project management system that relies on incremental development. Each iteration consists of two to four week sprints, where each sprint's goal is to build the most important features first and come out with a potentially deliverable product. More features are built into the product in subsequent sprints and are adjusted based on stakeholder and customer feedback between sprints.

Whereas other project management methods emphasize building an entire product in one iteration from start to finish, agile scrum methodology focuses on delivering several iterations of a product to provide stakeholders with the highest business value in the least amount of time.

Agile scrum methodology has several benefits. First, it encourages products to be built faster, since each set of goals must be completed within each sprint's time frame. It also requires frequent planning and goal setting, which helps the scrum team focus on the current sprint's objectives and increase productivity.

Process Outline

At each milestone, the team will present the most current version of the software to the clients for their testing and evaluation. Although the software will not initially be fully complete during the early presentations, it will give the clients an approximation of the functionality of the final product. Below is the proposed outline of the milestones and Sprint including what the team expects to have completed at each stage.

1st iteration (Oct 14, 2021 - Oct 26, 2021)

Requirements Document

The team will prepare a formal document that will detail the client's requirements for the software. The client will categorize these requirements into required, desired, and optional features. After the document is approved by the client, the team will design the initial user interface for the client's evaluation.

Mockups: Simple User and Administrator Interfaces

- Work with team to find project orientation and technology that will be used
- Design the main functionalities of the system and analyze functional requirements
- Start implementing some basic features of user interface:
    - Design Login Page, Sign Up Page, Exam Page, Question Page, DashBoard
    - Create Exam Page FrontEnd
    - Create Question Page FrontEnd
    - Create Login Page FrontEnd
    - Create Sign Up Page FrontEnd

2nd iteration (Oct 27, 2021 - Nov 20, 2021)

Design Document and Presentation

A formal document will be prepared that details both the design of the system and the code behind it. In describing the design of the system, the hardware and software needed from the client will be specified. Details about the program design will cover internal functionality so that the client can maintain and modify the end product in the future.

Start building some detailed functionalities such as:

- Live Exam Monitor design
- Examinee Management (add/remove) design
- Exam Progress Report design
- Exam Viewer design

3rd iteration (Nov 22, 2021 - Dec 20, 2021)

During this last period, some final features will be added to our website:
- Add/remove examinee from the exam
- Exam CRUD
- Question CRUD
- Admin Page: CRUD Exams
- Admin Page: Read Log

Final Testing Period

The team plans to reserve 2-4 weeks before the final presentation so that the client can test the product in its intended environment with real users and data. All functional requirements will have been met before this point; any changes hereafter will only cover small details, such as aspects of the user interface.

Final Documentation and Presentation

Documentation for the final version of the product will be presented to the client so that the end product can be maintained and extended. This will include information on all required

features, which will be fully implemented. The documentation will also cover any desired and optional features that have also been implemented. The team will also provide a demonstration of the system and training so that the client can understand how the user interface is intended to be used.

Final System

The final system will include all features that the team and the client have agreed are required, including some functionalities like: let client to create their own questions for other users, allow examinee to control the process of examining, allow student to choose and submit their answers and their point will be returned to them immediately after they submit their assignments.

IV.   SUGGESTED DELIVERABLES

Important Work-Products:

To deliver the right demand solution that suitable for the client's need - a digital and (semi-) automated solution to their current system, work-products that need to be delivered to the customer:

(1) Periodic Status Reports: Treat the client as one of the team members throughout the software development process by periodically reporting to the client then retrieve feedback that will maintain process visibility and make the client more assured about the team's responsiveness to their needs. Periodic status reports will detail the feasibility of the project and ensure exact requirements, its design, and ultimately, its final form and implementation. These will be written documents that are presented to the client and any other individuals the client identifies.

(2) Periodic Presentations: Beside periodic status reports which will ensure requirements, design, and final reports, there will be periodic presentations where the team will demonstrate different aspects of the software system in development. Different presentations may concentrate on specific areas of the client's need. (Ex:the user interface) . In turn, feedback will be critical to these presentations, so that the team can understand completely how the system meets the client's needs.

(3) Computerized, Web-based System for Reference Statistics:This system will be the core deliverable for the client which consist of a coded, web-based tool that have four major properties

      (a) Reference Data Entry
      (b) Retroactive Editability
      (c) Report Generation
      (d) System Backups

(4) Good Faith Requirements Agreement: After the project requirements have been discussed and reviewed with the client, a requirements agreement will be presented to the client to clarify exactly what the project intends to accomplish from this the client will know which features and objectives the team intends to deliver.

(5) Documentation for Use and Mechanics The client will be provided documentation both explaining how to use our system and describing its underlying mechanics. The client has expressed interest in gaining familiarity with the system, and the documentation will be useful for reference needs.

(6) Demonstration and Client Training: In addition to documentation, the client has requested training for their staff to use the system. The team will satisfy this need by providing demonstrations of the system. On the other hand, allocating time after the final system is finished to train the clients in the use of our system. The demonstration will consist of performing routine tasks that have been identified by the client, and the training will either consist of group instruction led by team members or one-on-one training with the client.

V. TECHNICAL FEASIBILITY

Requirements:

(1) Centralized data repository
(2) Multiple levels of access to the system
(3) Simultaneous users and input
(4) Easy access
(5) User-friendly exam editing
(6) Administrative interface
(7) Automatic report generation
(8) Automatic score generation
(9) Security

In conclusion, there is at least one technically feasible solution to the proposed system. This feasible system would consist of a centralized PostgreSQL database, a FastAPI (Web) server, and a React web interface. The combination of these freely available software products and the team's own coding will satisfy the client's requirements.

To further test the feasibility of this possible system, the team must consider that the clients expect roughly 50-70 users to be able to simultaneously access the system. With the limited number of end-users, the hardware limitation should not be a problem.

Finally, it should be noted that the final system delivered to the client may be different from the technically feasible one described herein. The purpose of this exercise was to determine if the project itself was feasible at all. Future concentration on the requirements of the system will be made and an optimal architecture will be adopted.

VI. VISIBILITY

The team will make efforts to maximize the visibility of the system and the development process. This will ensure that the project is being developed in line with client specifications. Any deviations from those specifications can also be caught early and corrected through client feedback. Various visibility methods the team intends to use are described below.

Communication

Team meetings and Outlook emails would be the primary form of open communication to keep the clients updated with the progress of the project. Regular meetings will be held with the client to discuss progress and for purposes of two-way feedback. The team will also meet as a whole at least once a week to assure all members are caught up and understand their roles and jobs.

Intermediate Deliverables and Presentations

Live demonstrations: The client will be given demonstrations of the progress through presentations at the client site and at the monthly presentations corresponding to each major phase in the project

Presentations: Slideshows of design layouts of screens, reports and demos of working functions, and the system will be shown to the client to keep them updated with the team's progress

Reports: The clients will also be presented with copies of the documentation, which record details at each phase in the software development process. These progress reports will also enable them to be well aware of the details of the project from their perspectives.

VII. RISK ANALYSIS

Time Risks

Time risk can appear for 2 main reasons. The working flow while totally online causes lack of communication, causing a decrease in efficiency. Then the test team cannot begin the work until the developers finish their milestone deliverables and a delay in those can cause cascading delays.

Resource Risks

Resource risk can be caused by the following problems. The work overloaded of key members of new members loaded from another function in a later stage can significantly slow down the project. Skill related risk could be the major problem. Fresh members may lead to unexpected delays.

Functionality Risks

Functionality risk can be caused by misunderstanding the requirement of the user. It appears somewhere between "What the customer wants" and "What we give them". Currently there are some potential huge risks of functionality. Issues that fall under this category include

developing a user interface that is not user-friendly or not well-liked by the client, or producing functions that have limited sustainability.

Risk Management/ Minimization

This project manages risk by using Project Management tool (JIRA) to help control, minimize delays and pending tasks. The principal plan is to develop and practice good management strategies. The team will constantly review our progress and modify goals if necessary to deliver a satisfactory system on time.

VIII.   BUSINESS CONSIDERATIONS

On determining the feasibility of the Online Exam Platform project, there are several business considerations that must be taken into account, including but not limited to: disclosure of trade secrets and sensitive information, copyright and trademark issues, and other patent-related concerns.

Trade secrets and sensitive information

The project is under a lot of discussion and development, so there are no trade secrets or sensitive information that will be dealt with within the implementation of our system. However, some common security methods will still be implemented to protect users from malicious attackers.

Copyrights and Trademark

The project is being completed for holding any contests and/or examinations whose format includes multiple-choice questions in any organizations. A preliminary agreement is as follows:

Our team, which consists of the following members: Nguyen Huy Hoang, Le Hoang, Le Minh Hieu, Phi Hoang Long, Nguyen Viet Manh Khoa, Pham Nhat Linh, Hoang Manh Ha, Bui Thanh Tung, Pham Thanh Dat, Le Anh Tuan, will give a limited license to Hanoi University of Science and Technology, Global ICT Program. This limited license will allow all potential web developers to clone and modify the system for educational and practice purposes only, still our team members will help support with any technical problems but no responsibilities will be taken for any other versions not developed and/or owned by our team. We also reserve the right to present the demo of the platform to future employers and showcase the system as a work created by each team member. No trademark is planned related to the platform, so this is not considered as an issue.

Patents

No parts of the platform are expected to be eligible for any patent applications. However, if there are ones to be patentable in the future, then our team will automatically reserve the rights to manage any legitimate patents, while clients should gain non-exclusive rights to use the system, and other developers have the full right to clone and make modification of their own systems regardless of any patent rights held by out team.

IX. CONCLUSION

From the results of the feasibility study, the team finds that the Online Multichoice Exam Platform project is feasible in terms of technicality, the skill of team members, and time. Given the time constraint of one semester, the team believes the scope of the project is manageable and that the client's requirements can be satisfactorily fulfilled upon system completion. The team members also process adequate skills to implement the system and are familiar with hardware and software that may be used in this project. The conclusion of the feasibility report is to go ahead with this software development project.