VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITY
UNIVERSITY OF TECHNOLOGY
FACULTY OF COMPUTER SCIENCE AND ENGINEERING

SOFTWARE ENGINEERING (CO3001)

Class: CC01 | Group: 7

A smart printing service for HCMUT students

Lecturer: Trương Thị Thái Minh

Students: Đỗ Duy Khương - 2152143
Nguyễn Đình Thiên Huy - 2152591
La Cẩm Huy - 2153379
Đinh Việt Thành - 2152966
Nguyễn Minh Khuê - 2153488
Lê Hoàng Duy - 2152040

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Contents

1 List of member & workload

ID	Student ID	Full Name	Workload	Evaluation	Note
1	2152966	Đinh Việt Thành		16.66%	Leader
2	2152143	Đỗ Duy Khương		16.66%	
3	2152591	Nguyễn Đình Thiên Huy		16.66%	
4	2153379	La Cẩm Huy		16.66%	
5	2153488	Nguyễn Minh Khuê		16.66%	
6	2152040	Lê Hoàng Duy		16.66%	

2 Requirement elicitation

2.1 Domain context of the project

2.1.1 Project Overview

In the context of our program project, our domain resides within the educational realm of HCMUT, where we are developing an online printing service catering to all students across the campus network. This system is designed with the dual purpose of enhancing students' printing experiences and facilitating administrative tasks for school departments. To empower students with seamless printing capabilities, our system offers a feature-rich interface. Students can effortlessly locate printers situated throughout the campus, and access some details like printer ID, brand, and model. They can conveniently upload their documents, select their preferred printer, and fine-tune specific print settings such as page size, single or double-sided printing, and the number of copies they wish to produce. On the administrative front, the system equips Student Printing Service Officers (SPSOs) with valuable tools to manage and regulate printing activities. SPSOs can set constraints on student printing, including maximum page allowances per semester and approved file types for upload and printing. The system also diligently logs each student's printing history, simplifying tracking for both administrators and students alike. Furthermore, the system automates the generation and storage of periodic reports, with exclusive access granted to SPSOs for review. To ensure secure access, all students are required to authenticate through the `HCMUT_SSO` service before utilizing the web and application-based printing services.

2.1.2 Key stakeholders and their needs

During development for the Student Smart Printing Service (`HCMUT_SSPS`) system, we will have several stakeholders, which include:

1. **System design and development department:**

The first group consists of the system management and control department, which is essential for maintaining and troubleshooting the system when issues arise during practical usage. They need to ensure the system is secure, reliable, and accessible to users.

2. **Student Printing Server Officer (SPSO):**

In addtion, the Student Printing Server Officer (SPSO) also plays an important role in operating the system as well as providing printing services for students. SPSO requires a tool that can manage the printing service such as allowing what types of files are allowed to be uploaded, setting configurations for the printing service, and monitoring student printing activities through a log. And periodically report which printing services are used over a period of time. Printer management functions such as adding, turning on, and turning off printers are also essential needs.

3. **Students:**

Students are also considered an important stakeholder in the system because printing services are created to support them. They require a user-friendly system that allows them to print documents efficiently and directly through the app or the web. Specifically, their needs include the ability to locate active printers on campuses and specify printing options such as paper size, number of copies, etc. As well as payment services for additional purchases amount of paper that can be used in a semester.

4. **The HCMUT_SSO authentication service:**

One of the components of the main system is the authentication service, which can facilitate easy management and usage of the app for both Students and SPSO. This helps prevent external users from using the service and causing errors. This stakeholder needs to be implemented into the system to operate smoothly, and the system must also support data input in accordance with the format specified by the authentication service.

5. **The Online payment system:**

The final component for the student printing support service is the online payment system. To limit students from using the printing service excessively, the university has provided a partial fee for exceeding the printing limit. The online payment system is also a required part of the system, and the input data must be valid for the payment functions to complete the process of purchasing additional printing paper when the printing service exceeds the limit.

2.1.3 Benefits for stakeholders

The Student Smart Printing Service project (HCMUT_SSPS) system offers significant benefits to both students and the university community. Firstly, users will enjoy enhanced convenience, with easy access to printers via the web or application, saving them valuable time and effort in the printing process. They can customize their printing preferences, including paper size, single or double-sided printing, and other properties, empowering them to optimize their printing experience and document format to suit their preferences. Additionally, the system provides a comprehensive view of their printing history, enabling users to track their usage, make informed decisions, and manage their printing costs effectively, thanks to the semester-specific page allocations provided by the school.

From the perspective of the Student Printing Service Officers (SPSOs), the system streamlines the management of the printing environment. SPSOs can efficiently monitor and adjust system configurations in line with the school's policies. They gain access to detailed logs and reports, simplifying the tracking of student printing activities and facilitating data-driven decision-making. Furthermore, SPSOs oversee financial transactions related to additional printing page purchases, ensuring sound financial management.

For HCMUT_SSO authentication service, this system serves as third-party software that utilizes the login functionalities provided by the university for student management. It facilitates easier access to the authentication API, eliminating the need for students to understand and authenticate using command-line prompts. It offers a user-friendly interface and environment for students.

As for the online payment system, it will serve as a bridge for transferring funds between students' bank accounts and the university's accounts, making it more convenient and time-saving for students to make payments. This eliminates the need to visit payment offices to complete transactions. Similar to the authentication system, the application will become a tool to assist students in using payment functions and formatting input data for payment APIs.

2.2 Functional and non-functional requirements

Based on the provided project description, we can infer the following functional and non-functional requirements for the Student Smart Printing Service (HCMUT_SSPS):

2.2.1 Functional requirements

1. **For Students:**

- Students should be able to log in to the application.
- Students should be able to upload document files for printing.
- Students should be able to choose a printer from the available options.
- Printing properties such as paper size, pages to be printed, one/double-sided printing, and number of copies should be selectable.
- Students should be able to view their printing history for a specified time period, including a summary of the number of printed pages for each page size.
- Each student should have a default number of A4-size pages for printing each semester.
- Students should be able to purchase additional pages through an online payment system.

2. **For Student Printing Service Officer (SPSO):**

- The system should log printing actions, including student ID, printer ID, file name, printing start and end time, and number of pages for each page size.
- The SPSO should be able to view the printing history (log) of all students or a specific student for a specified time period and for all or selected printers.
- The SPSO should be able to add, enable, and disable printers.
- Permitted file types for printing should be limited and configurable by the SPSO.
- The SPSO should be able to configure system settings, such as the default number of pages, dates for providing default pages to students, and permitted file types.
- The reports of the using of the printing system are generated automatically at the end of each month and each year and are stored in the system, and can be viewed by the SPSO anytime.

3. **HCMUT_SSO authentication service:**

- The HCMUT_SSO authentication service requests the student's username and password for logging into the application.
- All users have to be authenticated by the HCMUT_SSO authentication service before using the system.

4. **Online payment system:**

- The system should deduct the appropriate number of pages from a student's account balance when printing, considering A3 pages as equivalent to two A4 pages.
- The feature "Buy Printing Pages" of the system allows students to purchase additional pages, and they can make the payment through online payment systems like the university's BKPay system.

2.2.2 Non-Functional requirements

1. **Usability:**

- The users should be able to use the web effectively after 1-2 hours of training.
- The system should be available in both English and Vietnamese.
- The web should have 2 interfaces for students and SPSO.
- The system should have an intuitive and easy-to-use interface for students to navigate and interact with. To evaluate, we are using Usability Score (e.g., measured through user surveys or usability testing), and the target is at least 85% of users should rate the interface as "easy to use" or "very easy to use" in user satisfaction surveys.

2. **Performance:**

- Time for login should be less than 5 seconds.
- The system should provide quick responses when students perform actions like file uploads, printer selection, and specifying printing properties. The metric to evaluate it would be using Average Response Time (measured in milliseconds). The system should respond to user actions within 5 seconds on average.

3. **Reliability:**

- The failure rate of real-time access is 0.005 (5 fail access out of 1000 access).
- The system must work at all time.

4. **Security:**

- Alert for server infiltration.
- The integrity of data should be ensured, such as user information and other critical data, and minimize the risk of data loss or corruption.

5. **Scalability:**

- The system should be able to handle a large number of concurrent print requests, especially during peak times. To satisfy this requirement, we can use some metrics, for example, Concurrent Request Handling Capacity (measured as the maximum number of simultaneous print requests),...