Software Requirements Specification

for

Project

Version 1.0 approved

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Revision History

Name of Modifier	Date	Reason for Changes	Version
Tran Anh Khoa	10/1/2024	Identical SPSO's Functional Requirements	2.0

1 Task 1: Requirement elicitation (1.1, 1.2)

1.1 Domain Context

HCMUT is a multi-disciplinary and multi-major university with emphasis on technology. It has several campuses and more than 20,000 students, including undergraduates and graduates. The university is intended to implement a smart printing system to provide printing service to its students.

The system leverages a network of printers distributed in different campus locations, allowing students to print documents by uploading files, choosing preferred printers, and specifying printing properties. The key functionalities include secure student authentication through HCMUT's SSO, logging of all printing actions, management of printer resources by the Student Printing Service Officer (SPSO), and the ability for students to monitor and manage their printing activities.

Every student receives a default number of A4-sized pages per semester, which they can use for printing, with the option to buy additional pages if needed. The system enforces printing limits based on the student's remaining page balance, and it supports online payments via university systems such as BK-Pay. Students can upload documents to the system and customize their printing options, including selection of paper size, page ranges and more.

For administration, the SPSO can configure and manage the entire printing network, including enabling/disabling printers, setting default page allocations, and defining permitted file types. Additionally, detailed printing logs and usage reports are available, ensuring transparency for both students and SPSO. The service operates through both a web app and a mobile app, offering convenience and accessibility to all users across campus.

This system is designed to streamline the document printing process, enhance accessibility, and efficiently manage printing resources for the university community.

1.2 Stakeholders and Needs

1.2.1 Students

- **Description**: Students are the main users of the system's printing service. They create print requests, upload documents, select printers, and make payments.
- **Needs**: Students need convenient and affordable access to print documents. They also required secure and convenient online payments, along with the ability to view print and page purchase history when needed.

1.2.2 Student Printing Service Officer (SPSO)

- **Description**: SPSO is responsible for managing and supervising student printing activities in the system, as well as the resources used within this

system. They ensure that everything runs smoothly and efficiently.

- **Needs**: SPSOs require useful management tools implemented in the system.

1.2.3 IT department

- **Description**:IT department is responsible for developing and supplying software and related technologies for digital printing and print management.
- **Needs**: To build and develop the smart printing service system for the university.

1.2.4 HCMUT (Ho Chi Minh City University of Technology)

- **Description**: HCMUT is the investor, implementing the system to serve students.
- **Needs**: To provide a printing service for students, making document printing easier and offering a better management system for student printing.

1.2.5 Online Payment Systems

- **Description**: The electronic payment system supports students in purchasing additional print pages easily.
- **Needs**: To integrate the payment system into the smart printing service.

1.3 Benefits of the System

1.3.1 Students

- **Benefits**: Students save time and effort using the service and can easily manage their printing requests and expenses related to printing.

1.3.2 Student Printing Service Officer (SPSO)

- **Benefits**: The SPSO benefits from streamlined resource management, allowing for easy oversight and control of printers, configurations, and printing policies, ensuring efficient operation of the service across all campuses.

1.3.3 IT department

- **Benefits**: The service generates economic advantages for the IT department, while also boosting its visibility and reputation within the university. By managing and supporting the smart printing system, IT staff gain valuable experience and enhance their technical expertise, contributing to their overall professional growth.

1.3.4 HCMUT (Ho Chi Minh City University of Technology)

- **Benefits**: Implementing a modern, efficient printing service strengthens HCMUT's reputation as a tech-savvy institution, attracting students and external partnerships. Additionally, the system generates revenue through paid services like extra printing pages, contributing to the university's financial sustainability.

1.3.5 Online Payment Systems

- **Benefits**: By integrating with the printing service, BKPay gains a consistent flow of transactions from students purchasing additional printing pages, boosting its usage and visibility.

1.4 Functional requirements:

Students:

- Students are able to upload multiple permitted document files to the system for printing.
- Students can select a printer, paper size, and configure printing properties.
- Students can view their own printing history and balance for each semester.
- Students can buy additional pages using an online payment system. .
- The system shall allow students to view printing log for a time period.
- Students can view summary of number of printed pages for each page size.
- The system shall prevent students from printing more pages than their available page balance.
- System rejects printing requests when chosen printer is overloaded and notify user about fail requests.

SPSO (Student Printing Service Officer)

- The system allows SPSO to view the printing history of all students or a student for a time period and for all or some printers.
- SPSO can permit and configure file types.

- SPSO can add, enable, or disable printers in the system.
- The system shall allow the SPSO to manage configurations, such as changing the default number of pages, change reset date.
- The system allows the SPSO to view the reports of the using of the printing system generated yearly and monthly by the system.

IT department

- The system should log printing actions, including student ID, printer ID, and file name.
- The system must generate monthly and yearly reports on printing activities.
- IT department must ensure system integration with online payment systems.
- IT department creates an interface where users can report technical issues related to printer integration and system errors with the detailed error description.
- IT department can keep track of issue report time, priority, whether it has been resolved.
- IT department can inform the users about scheduled maintenance/ downtime through notifications.

HCMUT (Ho Chi Minh University of Technology)

- HCMUT oversees the system's integration with the campus's authentication (SSO) and payment systems (BKPay).
- HCMUT can review monthly and yearly reports on printing activities.
- HCMUT can view the feedbacks and request IT department to fix errors for users.
- HCMUT provides students with a certain number of print pages each semester.
- HCMUT manages the allocation of resources such as printers and paper supply for the service.

Online Payment Systems

- The system allows students to buy additional pages using an online payment system.
- Online payment systems must provide secure transaction methods for students.

- Payment systems must integrate with student account balances.
- Payment systems must support refunds or corrections for failed transactions.
- The system must generate reports on payment transactions for both users and the university.

1.5 Non-functional requirements:

- The system must be available as both a web-based app and a mobile app.
- The system must handle up to 1000 concurrent users.
- The system should ensure privacy and data security for all users.
- The system should maintain uptime and provide reliable access to printing services.
- The system has an integrated timer.

2 Task 2: Use-case Diagrams (1.3)

2.1 Use-case Diagram for the Whole System

2.1.1 Actors

ID	Actor
1	User
2	Student
3	SPSO
4	Printer
5	HCMUT_SSO
6	Payment System

Table 1: Actors of a whole system.

2.1.2 Main modules

Module ID	Module Name	Note
MD001	Authenticate	
MD002	Print Documents	Important
MD003	Buy Additional Printing Pages	
MD004	View Personal Printing Logs	
MD005	View Personal Payment Logs	
MD006	Manage Configurations	
MD007	View All Payment Logs	
MD008	View All Printing Logs	
MD009	Manage Printers	
MD0010	View Reports	
MD0011	Access User Info	

Table 2: Main modules of a whole system.

2.1.3 Use-case diagram of a whole system

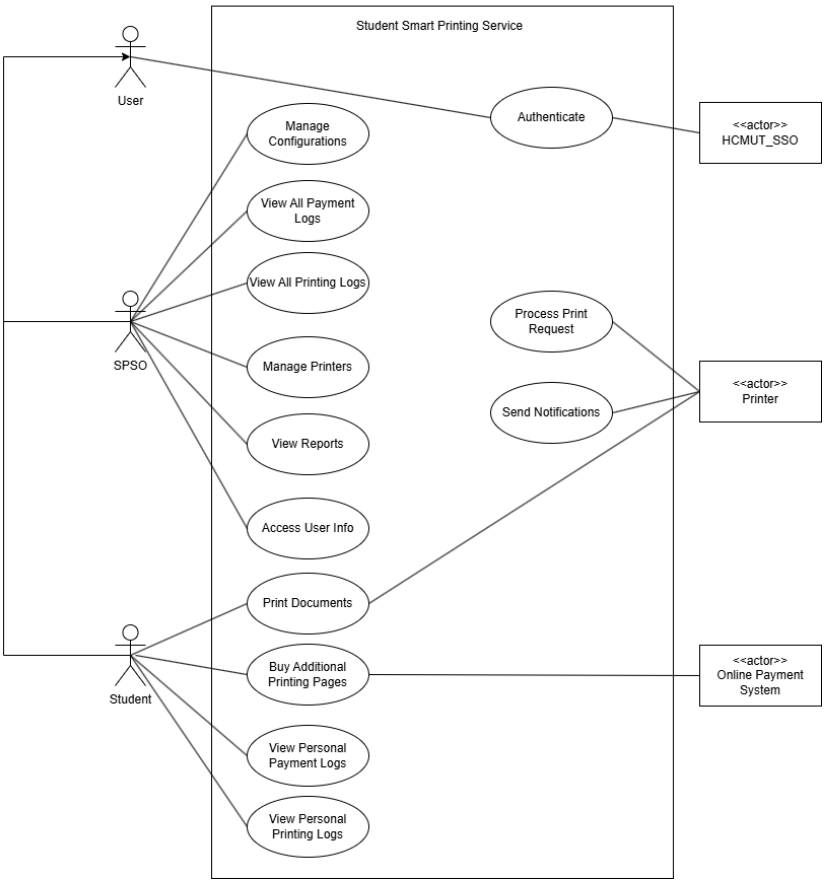

Figure 1: Whole system use-case diagram.

2.2 Use-case diagram for Print Documents Module

2.2.1 Use-case diagram for Print Documents Module

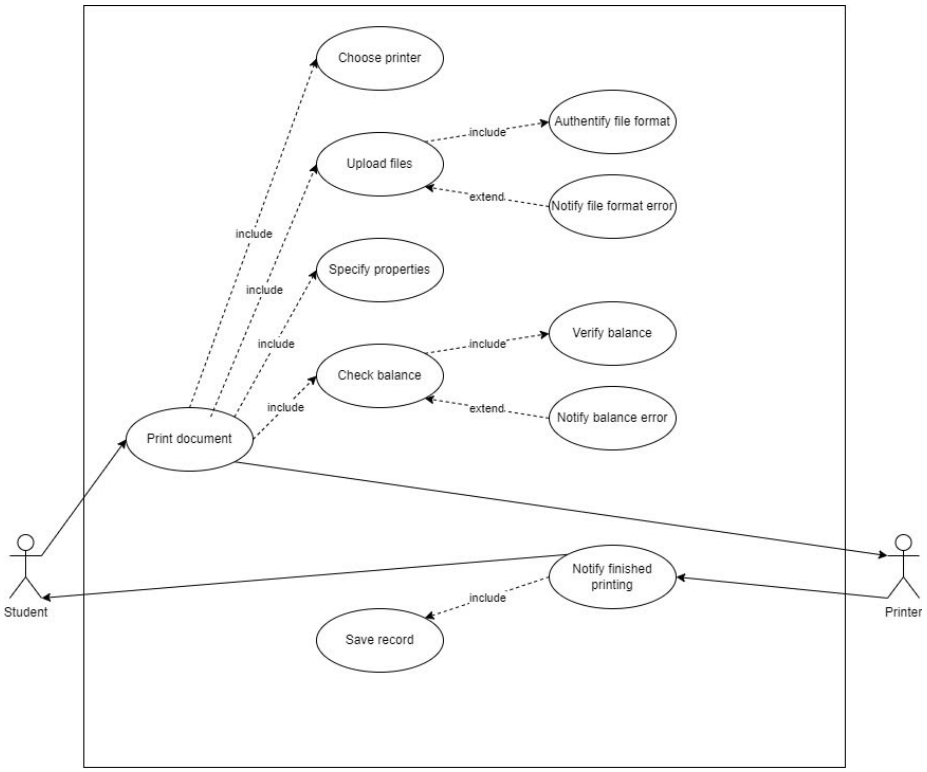

Figure 2: Print Documents use-case diagram .

2.2.2 Table for Print Documents

Use case name	Print Document
Created by	Tran Le Tien Dat
Date created	30/09/2024
Actors	Primary Actor: Student; Secondary Actor: Printer
Description	Student can print documents by choosing a printer, uploading files, setting configurations, and sending requests to the printer.
Trigger	Student indicates that he/she wants to print a document.
Pre-conditions	• User's identity has been authenticated. • User is defined as a student and assigned student functions.

Post-conditions	• The printer sends a notification that the printing process is complete. • The system saves the information of this printing session.
Normal flow	1. Student chooses a printer on demand. 2. Student uploads a file into the system. 3. Student sets properties, such as paper size, pages to be printed, one-/two-sided, number of copies, etc. 4. The system checks if the balance is sufficient to print. 5. Student sends a request to the selected printer. 6. Printer receives the information and prints the document. 7. Printer sends a notification to the student indicating that the process is complete. 8. The system saves the history to the log, including student ID, printer ID, file name, printing start and end times, and the number of pages for each size.
Alternative flows	• 2.a Student can remove or change the uploaded file.
Exceptions	• 2.b A notification is raised when the file is in the wrong format, and the system rejects that file. • 4.a The system raises an error when the balance (the number of pages left that the student can print) is not sufficient to print the file. • 5.a The printer cannot print due to overflow or technical issues and will notify an error to the student.

2.2.3 Table for Upload files

Use case name	Upload Files
Created by	Tran Gia Linh
Date created	29/09/2024
Actors	Student
Description	Student uploads documents to the system.
Trigger	When students click the "Upload Files" button after finishing choosing a printer.
Pre-conditions	Students successfully choose a printer.
Post-conditions	Documents are uploaded onto the system.
Normal flow	1. Student presses the upload button. 2. A window appears allowing the student to choose the document from their device storage. 3. Student presses the button to confirm files to upload. 4. Files are uploaded to the system. The system displays the uploading progress on the screen. 5. When the upload is finished, the system verifies whether the file type is appropriate. 6. The system displays a successful upload message when the file type is allowed.

Alternative flows	• **Student tries to upload a duplicate document:** – The system checks if the document has already been uploaded. – If a duplicate is found, the system displays a warning: "This document already exists." – The student can either overwrite the existing document, upload a new version, or cancel the operation. • **Student takes too long to upload a file:** – The system detects the timeout and cancels the upload. – The system prompts the student with a message like "Upload timed out. Please try again." – The student can then retry uploading the document. • **Student cancels upload when the file is in uploading progress:** – The student clicks a "Cancel" button during the upload process. – The system stops the upload and may display a confirmation message like "Upload canceled." – The student can either retry or exit the process.
Exceptions	• **Student tries to print unsupported file format:** – The system detects the invalid file format. – The system prompts the student with an error message, such as "Unsupported file format." • **Student tries to upload a file that exceeds the size limit:** – The system checks the file size before completing the upload. – The system displays an error message like "File size exceeds the allowed limit."

2.2.4 Table for Notify

Use case name	Notify
Created by	Tran Dinh Long
Date created	30/09/2024
Actors	Printer
Description	This use case allows students to receive notifications when the printing process is complete or when a payment is successful. The system also informs students about errors.
Trigger	• Students check information by accessing the Notification icon. • The system does not have any issues.
Pre-conditions	• Students have successfully accessed the system. • All devices are connected to the Internet. • The account is logged in as a student.
Post-conditions	• The system displays notifications to students. • If an error occurs (e.g., not enough cash to pay, out of paper, printer issues), students will be informed.
Normal flow	1. Students successfully log in and access the system. 2. Students select the option to access their notifications. 3. The system fetches the student's account information. 4. Students receive notifications from the system.
Alternative flow	• If the student's balance is low, the printer has errors, or there is not enough paper to print, a notification will be sent to students.

2.2.5 Table for Check Balance

Use case name	Check balance
Created by	Tran Duy Duc Huy
Date created	29/09/2024
Actors	Student
Description	This use case allows a student to check their available balance of printing pages before initiating a printing task. The system verifies the current balance and provides feedback to the student, notifying them if they have sufficient pages or if there is an error.
Trigger	The student selects the "Check Balance" option in the application or system before attempting to print.
Pre-conditions	• Student has logged into the system. • Login account has student permissions. • Student device has internet connection.
Post-conditions	• The system displays the current balance of printing pages to the student. • If an error occurs (e.g., insufficient balance, system issue), the student is notified of the specific problem.
Normal flow	1. Student logs into the system. 2. Student selects the option to check his/her balance. 3. The system will fetch the student's account information. 4. The system will verify the current balance of the printed pages. 5. The system will display the balance to the student.
Alternative flows	**Low balance warning:** • If the student's balance is lower than a needed number of pages to print, the system prompts the student to check their balance before proceeding to print.

Exceptions	1. **System error:** If the system is unable to retrieve the balance due to a technical issue (e.g., server downtime), the student is shown a notification of the error.