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# **Software Requirements Specification**

## **for**

# **A smart printing service for students at**

# **HCMUT**

**Version 1.0.0 approved**

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## **Revision History**

<b>Name</b>	<b>Date</b>	<b>Reason For Changes</b>	<b>Version</b>
Project 1	22/09/2024	Submit task 1.1 and 1.2	1.0.0
Project 1	01/10/2024	Submit task 1.3	1.0.1

# **1. Task 1: Requirement elicitation (1.1, 1.2)**

## **1.1 Domain Context**

The Student Smart Printing Service (HCMUT\_SSPO) is a web-based and mobile-based printing service that has an objective to provide students with a convenient way to print their documents with printers located around the campuses. Each printer has its own ID, brand name, printer model, short description and the location. The system allows students to print their documents by uploading their files onto the system, they can choose the printer and edit the printing properties, the permitted file types are also limited and configured by SPSO. The system also logs the printing actions for students including student ID, printer ID, file name, printing start and end time, number of pages for each paper size. Besides, SPSO can view the printing history of all students and each student can view their history. For each semester, each student will be given the default number of A4-size pages and they can buy additional printing pages through some online payment systems, each student can only print when the number of printing pages does not exceed their balance and each A3 page is equal to 2 A4 pages. Moreover, SPSO can also manage the printer states such as add, enable and disable and SPSO can also change the default number of pages, the dates the system will give the default number of pages to all students as well as change the permitted file types. SPSO can view the report monthly and annually which is stored in the system. Finally, to use the system, all users have to be authenticated by HCMUT\_SSO service.

## **1.2 Stakeholders and Needs**

Students:

- Print a document by uploading a document file onto the system
- View printing log for a time period together with a summary of number of printed pages for each page size
- Buy some more using the feature buy printing page

Student printing service officer:

- Limit and configure the permitted file types
- View the printing history of all students or a student for a time period (date to date) and for all or some printers
- Manage the printers such as add/ enable/ disable a printer

- Manage other configurations of the system such as changing the default number of pages, the dates that the system will give the default number of pages to all students, the permitted file types accepted by the system.
- View the reports of the using of the printing system

### **1.3 Benefits of the System**

For Students:

#### **1. Convenient Document Printing:**

- Students can upload documents, choose printing properties, and print at any available campus printer from anywhere using a web or mobile app.
- Flexible options for specifying paper size, number of copies, double-sided printing, etc., offer personalized printing.

#### **2. Cost Management:**

- The system tracks each student's print quota (pages) per semester, ensuring they don't exceed their allowance.
- Students can purchase additional print pages as needed via an integrated online payment system like BKPay, making the process seamless.

#### **3. Transparency and Tracking:**

- Students can access their printing history, including the number of pages printed per size and logs of all previous printing actions.
- This helps students track their usage and ensure they stay within their budgeted print quota.

#### **4. Multiple Access Points:**

- The system is accessible via both web and mobile apps, providing students flexibility in managing their printing needs regardless of location.

#### **5. Security and Authentication:**

- Integration with the university's Single Sign-On (HCMUT\_SSO) ensures that only authorized users access the system, protecting student information and transactions.

For University Administration (SPSO):

1. Centralized Printer Management:

- The SPSO can add, enable, disable, or configure printers across campuses, making printer management streamlined and ensuring better resource allocation.

2. Configurable System Settings:

- The system allows customization of key parameters such as the default print allowance for students, acceptable file formats, and important operational dates, making the system adaptable to evolving needs.

3. Comprehensive Logging and Reporting:

- All student printing actions are logged, allowing the university to monitor usage and create accurate reports on the print system's performance, enabling better resource management.
- Monthly and yearly reports are generated automatically, providing insights into system usage without manual effort.

4. Enhanced Accountability:

- The detailed logs ensure transparency, allowing the SPSO to monitor student printing history and troubleshoot any discrepancies.
- This also helps in preventing misuse or overuse of resources.

5. Efficient Payment Integration:

- The integration with an online payment system (BKPay) simplifies the process of buying additional print pages, reducing administrative overhead for managing student printing balances.

## **1.4 Functional Requirements**

Students:

1. Students can print documents by uploading files, choosing printers and specifying printing properties.
2. Students can view their own printing log
3. Students can view their number of printed pages for each page size
4. Students can buy more pages to print

5. Students can view how many pages they have left in their balance

Student Printing Service Officer (SPSO):

1. SPSO can view printing history of student(s) or printer(s)
2. SPSO can add, remove, enable, disable a printer
3. SPSO can change the number of default pages given to student each period
4. SPSO can change the date students are given pages
5. SPSO can change the permitted file types
6. SPSO can view the report of the printing system

## **1.5 Non- Functional Requirements**

The printing system is implemented as a web-based app and a mobile app.

The system is available 24/7, except for maintenance periods.

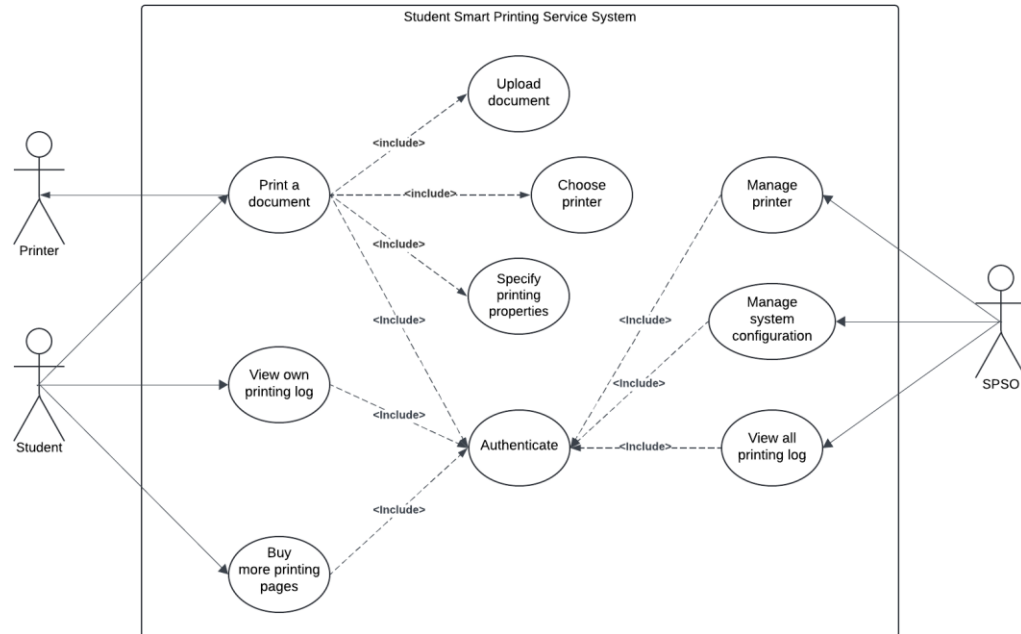
The system is available for multiple concurrent users but must ensure that each printer serves only 1 user at a time.

The HCMUT\_SSO authentication service must authenticate all users before they use the system.

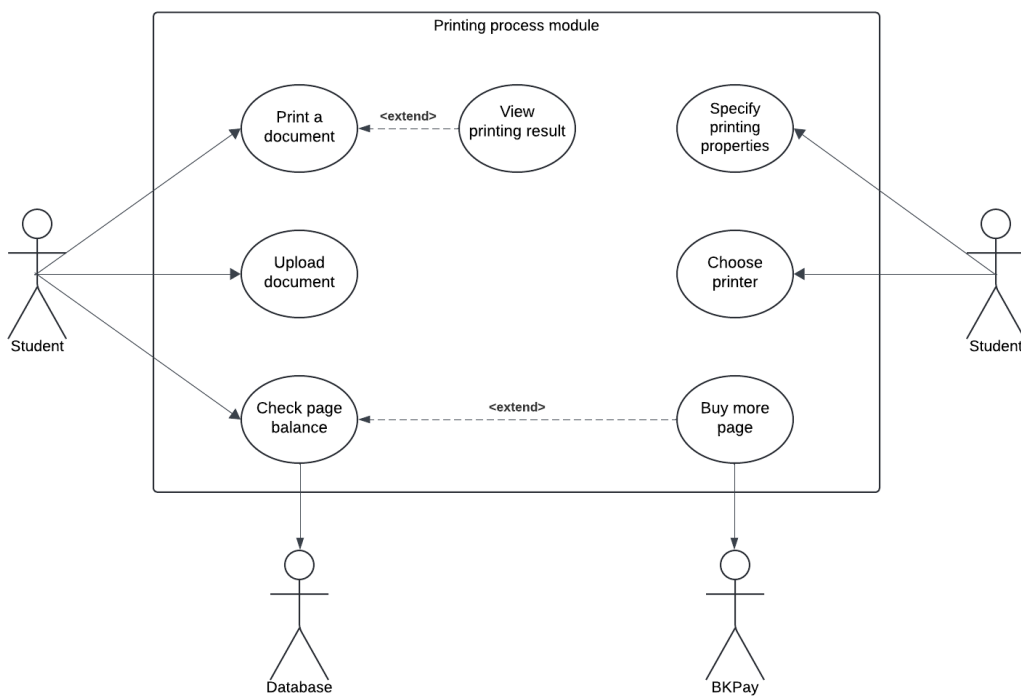
The payment method is made online, like BKPay

## 2. Use case Diagrams (1.3)

### 2.1 Use case Diagram for the Whole System



### 2.2 Use case Diagram for Printing Process Module





## **2.3 The Details of Use cases in Printing Process Module**

### **1. Use case Print a document**

Use case ID	UC-PPM-01
Use case name	Print a document
Created by	Đinh Bá Khánh
Created date	01/10/2024
Actors	Student, Database, BKPay
Description	The student requests the system to print his/her documents by choosing the printer based on its ID and then specify the printing properties such as paper size, number of pages, one-/double-size, number of copies, etc. The system will check if the student has enough available number of pages and the permitted file types and then it will print the documents for the student.
Trigger	The student wants to print the documents.
Preconditions	System checked page balance. Student must log into the system based on his/her ID. Student chose the printer. Student specified printing properties. Student uploaded documents onto the system
Postconditions	Printing histories are stored in the system. Documents are printed successfully.
Normal flow	1. The student logs into the system based on his or her ID. 2. The student uploads his or her documents onto the system. 3. The system checks if the file is uploaded successfully. 4. The student specifies printing properties. 5. The system checks the balance 6. Student choose the printer. 7. The system sends the document file to the selected printer. 8. The document is printed 9. The student views the result.
Alternative flow	Alternative 1: 5a. Student does not have sufficient page balance 5b. Student buys more pages
Exception	Exception 1: 5a. Student does not have sufficient page balance

	5b. Student cancel the printing process => Use case stops
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## **2. Use case Upload document**

Use case ID	UC-PPM-02
Use case Name	Upload document
Created by	Đặng Duy Tiến
Created date	01/10/2024
Actors	Students
Description	The system allows students to upload documents for printing
Trigger	Students want to upload documents
Preconditions	Students logged in the system
Postconditions	The uploading actions is saved in the system Documents is uploaded successfully
Normal flow	1. Students log into the system 2. Students choose permitted file types 3. Students upload the documents 4. Students check the uploading action
Alternative flow	None
Exception	Exception 1: 2a. Students cancel uploading => Use case stops Exception 2: 3a. File types are not permitted => Use case stops

## **3. Use case Specify printing property**

Use case ID	UC-PPM-03
Use case name	Specify printing properties
Created by	Đào Thị Hà An

Created date	01/10/2024
Actors	Student
Description	The student configures the printing properties of the selected printer according to his/her preferences in order to print the uploaded document.
Trigger	Printer is ready to print and student wants to set the printing mode.
Preconditions	Student has logged in Student uploads the printing file of permitted type Student has chosen an available printer.
Postconditions	All (changed) properties are successfully applied to the printer.
Normal flow	1. Student selects the default settings. 2. Student submits the settings. 3. System invokes the “Check page balance” use-case (UC-PPM-05). 4. System shows the notification that all settings are valid.
Alternative flow	Alternative 1: 1a. Student changes one or more printing properties. => Continue at step 2 Alternative 2: 3a. Student buys extra printing pages => Continue at step 2 Alternative 3: 2a. Student cancels the printing process. => Use case stops
Exception	Exception 1: 3a. Student doesn't have sufficient page balance 3b. Student changes some setting => Continue at step 2

#### 4. Use case Choose printer

Use case ID	UC-PPM-04
Use case name	Choose printer
Created by	Bùi Phạm Thái An
Created date	01/10/2024
Actors	Student

Description	Student can choose which printer to use to print their document
Trigger	Student wants to print a document
Preconditions	Student has logged in Student is on printing window
Postconditions	Printer is selected
Normal flow	1. Student opens printer list 2. Student browses for printer 3. Student selects a printer 4. Student confirm the selection
Alternative flow	None
Exception	Exception 1: 3a. Student cancel the selection => Use case stops

## 5. Use case Check page balance

Use case ID	UC-PPM-05
Use case name	Check page balance
Created by	Cao Quế Phương
Created date	01/10/2024
Actors	Student, SPSS
Description	The student checks their remaining page balance for printing. The balance is displayed in terms of A4 pages, with conversions for A3 pages (1 A3 = 2 A4 pages). Students can use this information to determine if they need to purchase more pages.
Trigger	The student wants to print the documents.
Preconditions	Student has logged in The student has been allocated a page balance for the current semester.
Postconditions	The system displays the current page balance to the student, broken down by A4 pages (and A3 equivalents if applicable).
Normal flow	1. The student logs into the system. 2. The student navigates to the "Check Page Balance" feature.

	<p>3. The system retrieves the student's current page balance from the database.</p> <p>4. The system displays the remaining page balance to the student.</p> <p>5. The student can proceed with printing or purchasing additional pages.</p>
Alternative flow	<p>Alternative 1:</p> <p>5a. Student has a balance of 0 pages</p> <p>5b. System displays a message indicating that the student has no remaining pages and must purchase more to continue printing.</p>
Exception	<p>Exception 1:</p> <p>5a. System is unable to retrieve the balance</p> <p>5b. An error message is displayed</p> <p>=&gt; Use case stops</p> <p>Exception 2:</p> <p>5a. Student does not have enough page balance</p> <p>5b. The system displays an error</p> <p>=&gt; Use case stops</p>