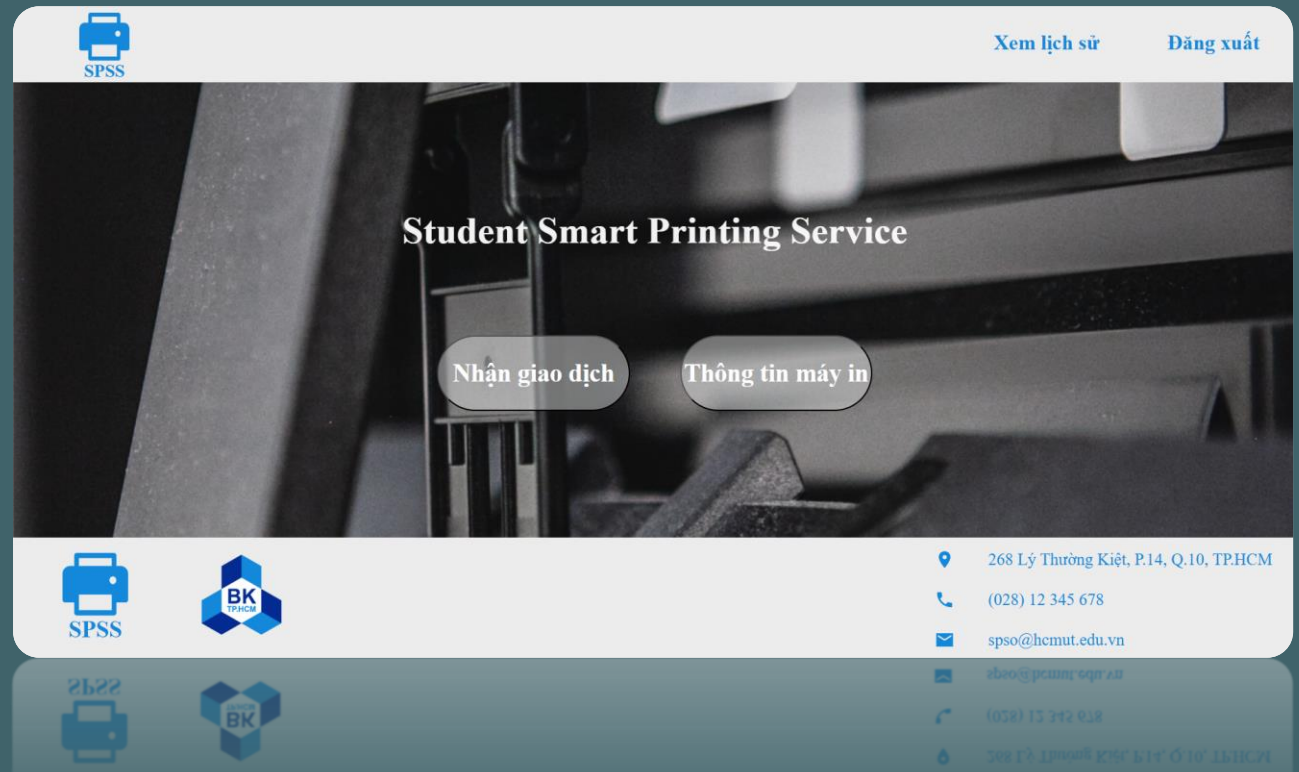


A Smart Printing Service for Students at HCMUT

Class CC01 – Group 12



Team Members

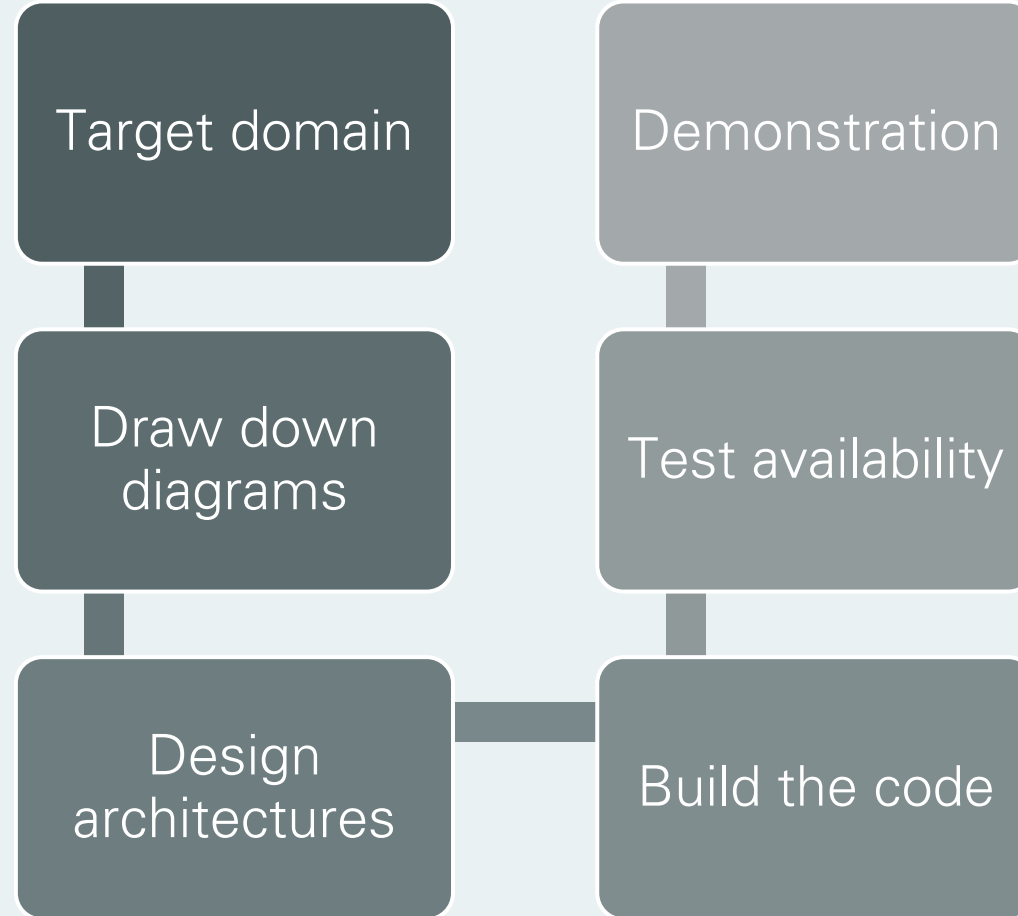
- Thai Quang Phat – 2252606
- Phan Quang Minh – 2212074
- Phan Quang Nhan – 2053286
- Phung Gia Minh Khoi – 2252381
- Thai Quang Du – 2252136

Table of Contents

- Requirements Elicitation
- Diagrams
- MVP – 1 User Interface
- Architectures
- Usability Testing
- Demonstration

Work Schedules

Planning



Requirements Elicitation

Domain Context

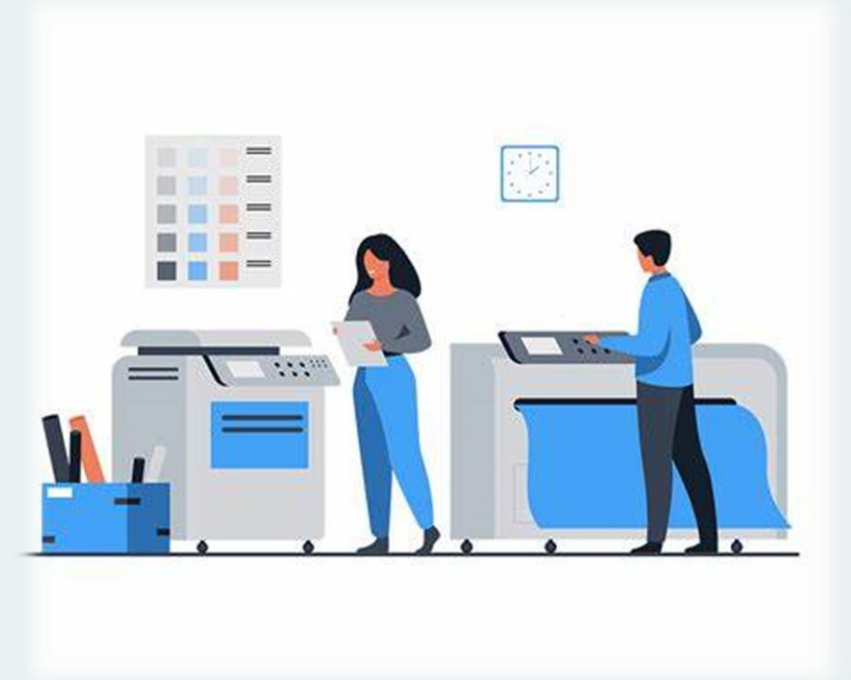
Currently, the printing needs of university students in Vietnam in general and students of Ho Chi Minh City University of Technology in particular are increasing. Hard copies of learning materials are becoming increasingly useful in the learning process of students.



Domain Context

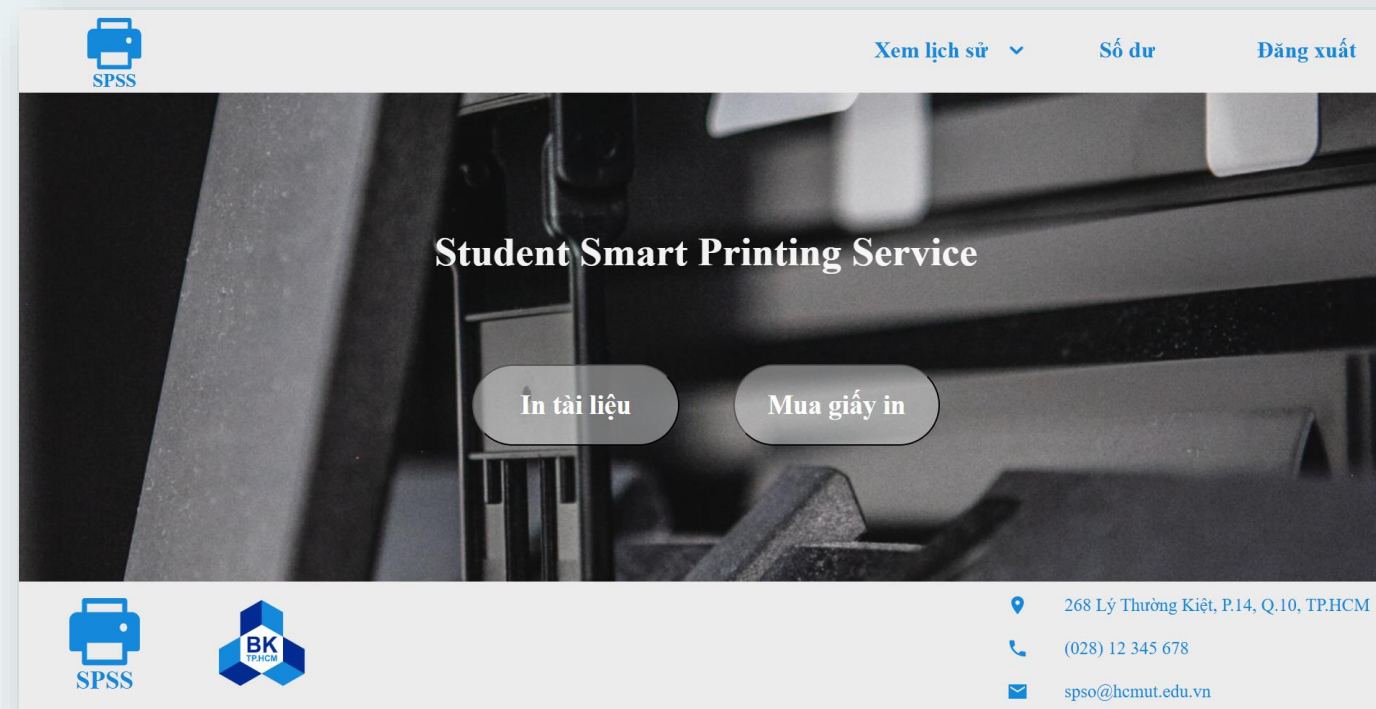
However, with the traditional method of providing printing services through printing shops, there are still some problems such as:

- Students may have to travel a long distance to get to the printing shops.
- Sending files to the printing shop through many different platforms can cause errors, making it difficult to manage.
- Printing services often do not have a price list and do not have invoices, so students cannot manage their spending on printing services.



Domain Context

The Student Smart Printing Service at HCMUT (HCM-SSPS) is designed to allow students at HCMUT to print documents through a network of printers distributed across the university's campus.



Stakeholders. Students

Students are primary users of the system. They need a reliable, easy to use system to upload, manage, and print their documents on campus, as well as the ability to track their print usage and manage their print quota.



Stakeholders. HCMUT

Student Printing Service Officer (SPSO), HCMUT Administration , BKPay. They are responsible for overseeing the system's overall functionality and alignment with institutional policies.



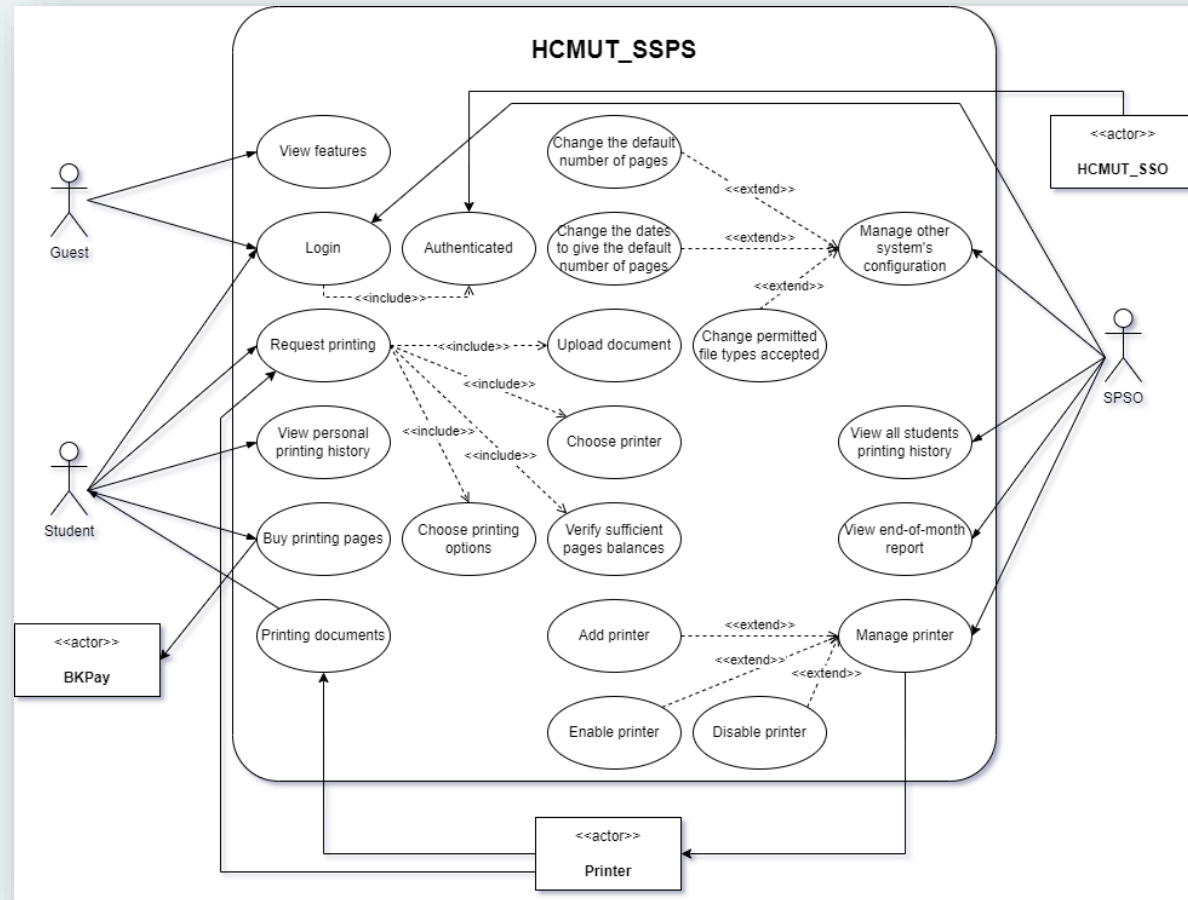
Stakeholders. Supporters

Printer provider, Guests. They provide printers to support the SPSO service, and help increase the system's income.

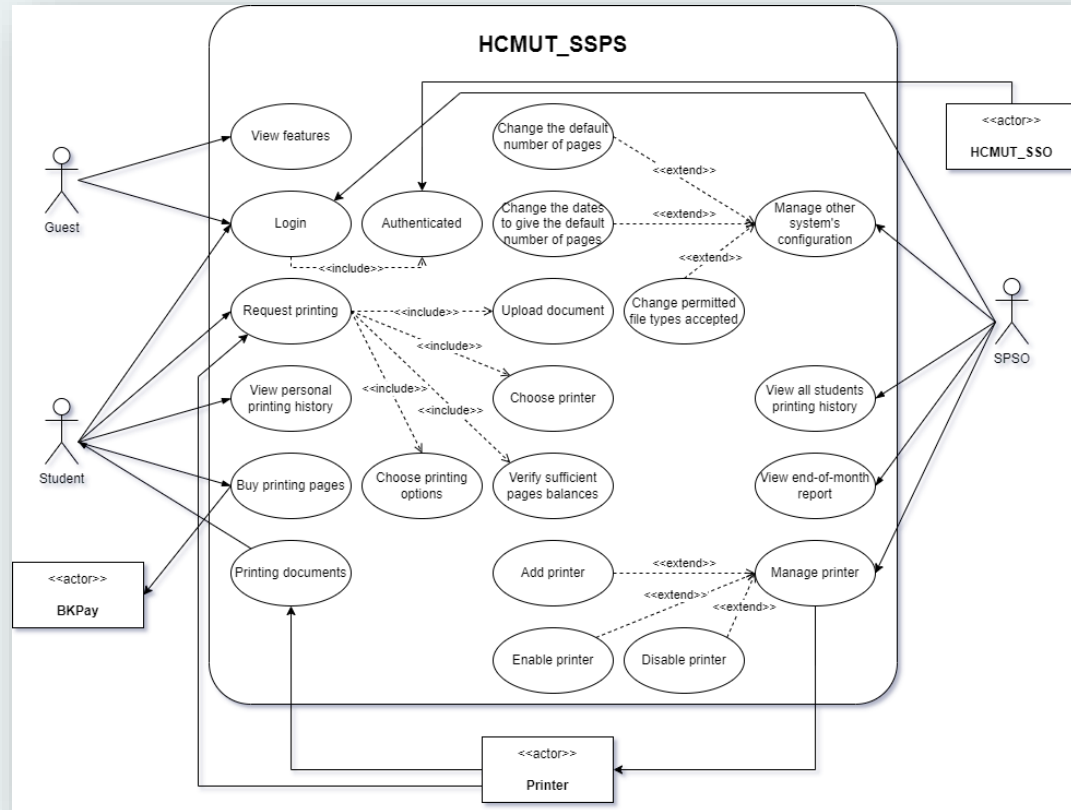


Diagrams

Use-Case diagram

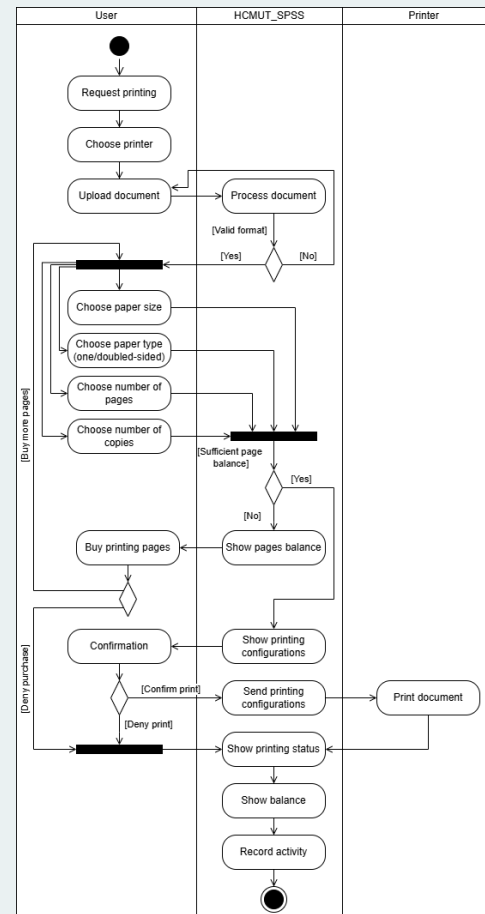
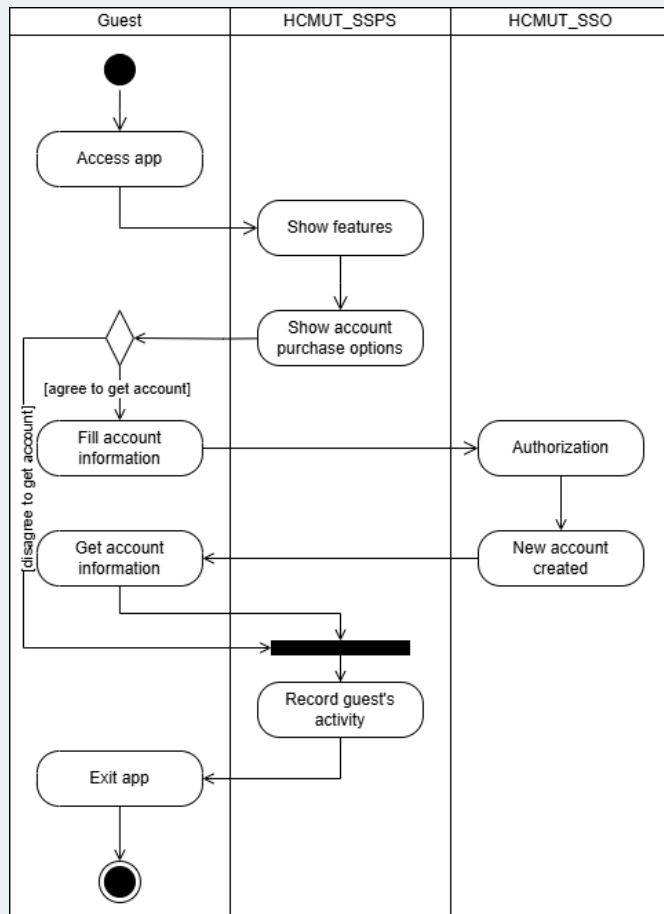


Use-Case diagram



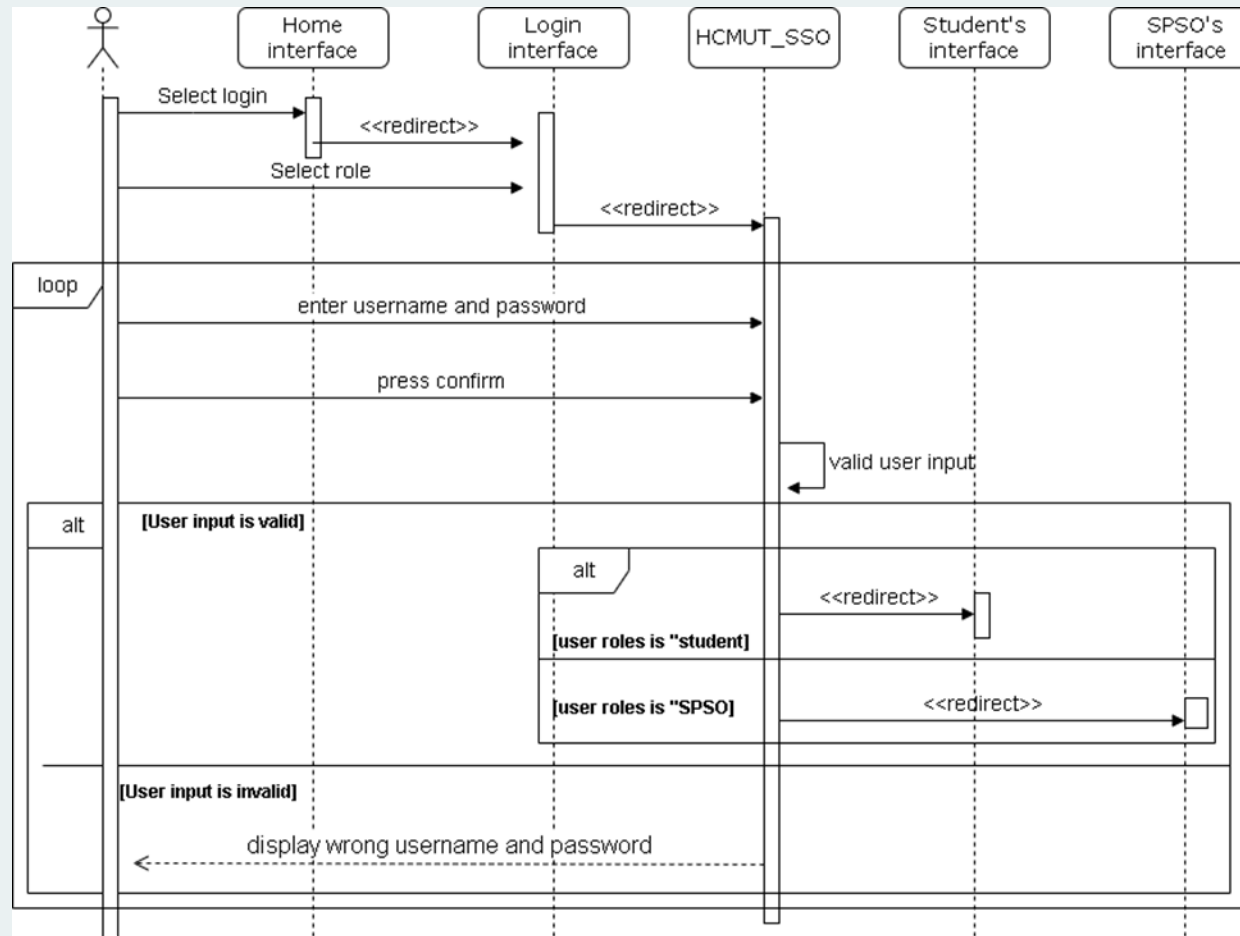
- **Guest** can view features and login to the system.
- **Student** can request printing, upload documents, choose printing options, buy pages, view printing history, and manage their account details.
- **BKPay** facilitates the purchase of pages.
- **Printer** enables the printing of documents, including adding, enabling, and disabling printers.
- **SPSO** can view students' printing histories and generate end-of-month reports. Additionally, system configurations such as default page numbers and permitted file types are managed.

Activity Diagram



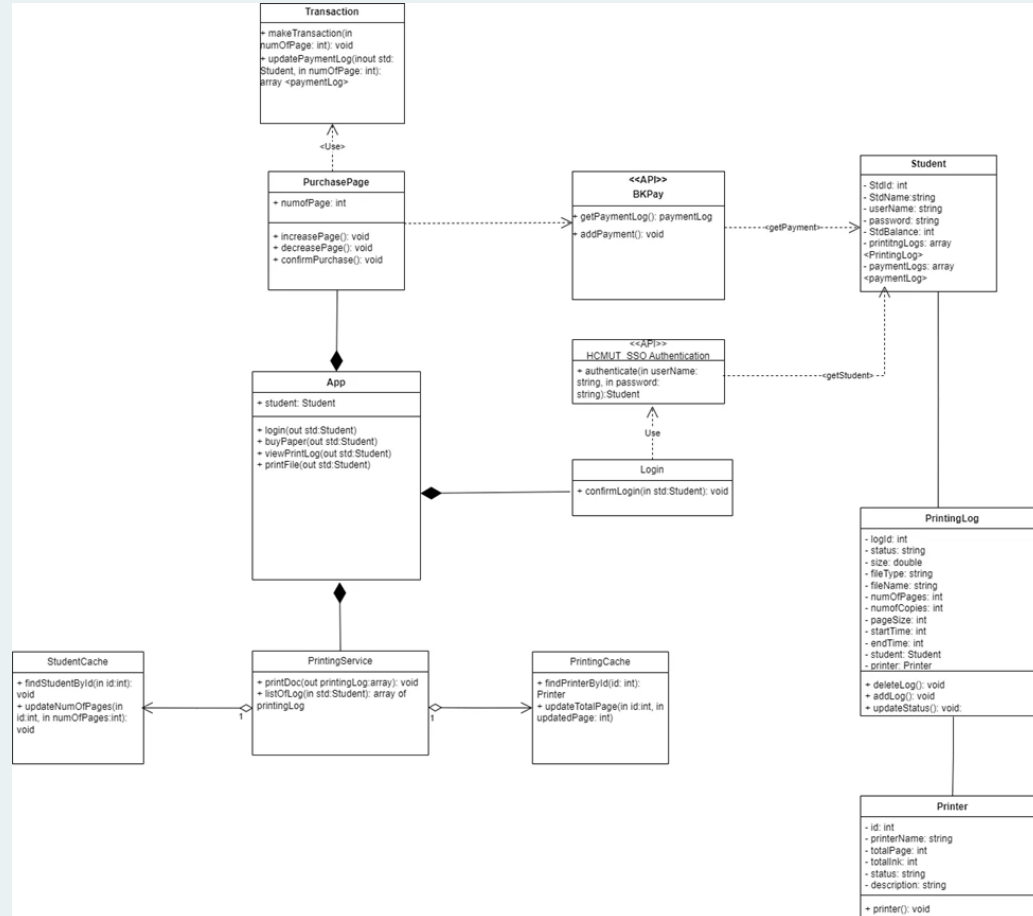
The purpose of an **activity diagram** is to model the dynamic flow of control or data in a system. It visualizes the sequence of actions or activities within a process, helping to clarify workflows, identify decision points, and highlight parallel tasks. Activity diagrams are useful for understanding, analyzing, and documenting business processes, system behaviors, and use case scenarios in both software development and process management.

Sequence Diagram



A sequence diagram illustrates how objects or components in a system interact with each other over time. It shows the order of messages exchanged between objects to carry out a specific task or process. The purpose of a sequence diagram is to visualize the flow of operations, clarify interactions between different system components, and help identify potential issues or inefficiencies in the sequence of events. It is commonly used in system design to document the behavior of a system or to analyze use cases in detail.

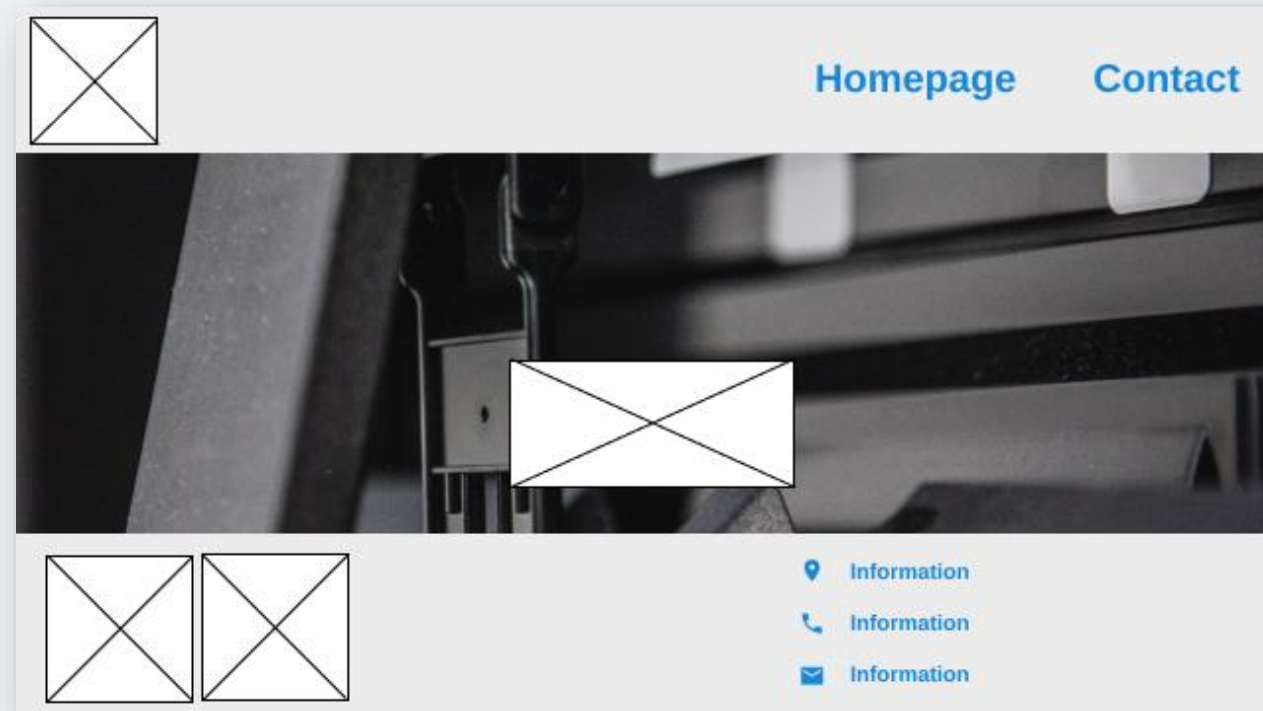
Class Diagram



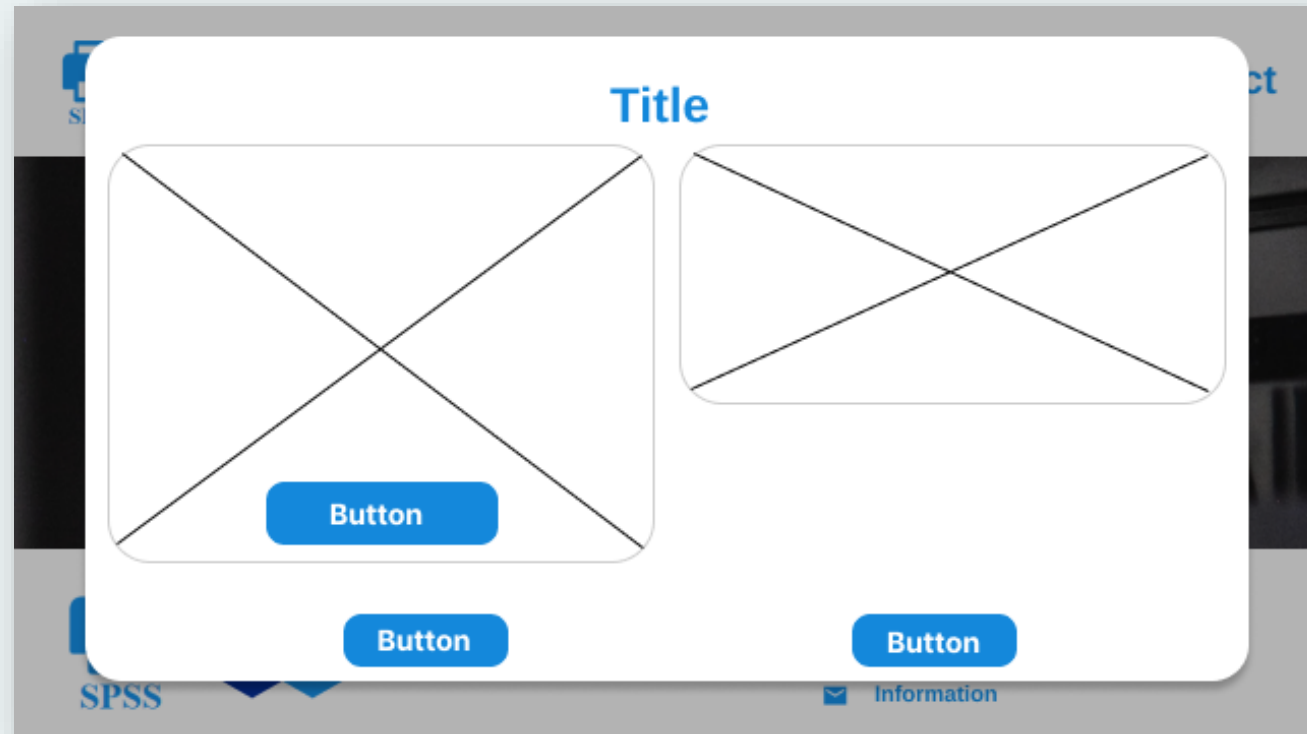
The purpose of a **class diagram** is to represent the static structure of a system by modeling its classes, their attributes, methods, and relationships. It helps to visualize the organization of a system, define the blueprint for object-oriented design, and clarify how different components interact. Class diagrams are essential for system analysis, design, and documentation, particularly in object-oriented programming.

MVP-1 User Interface

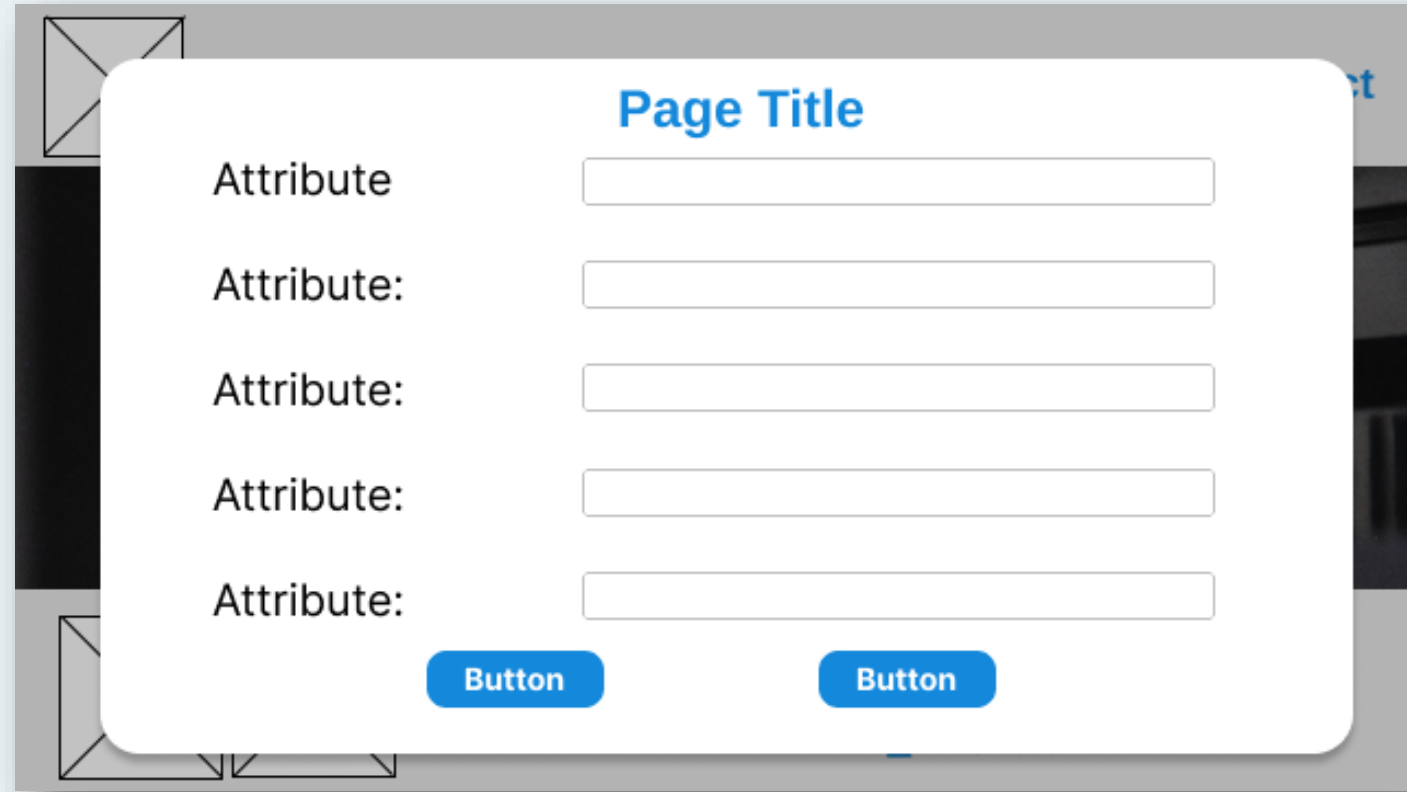
Homepage



Functional Page



Configuration Page



The image shows a configuration page dialog box. It has a title bar with the text "Page Title" in blue. Below the title bar, there are five rows, each with the label "Attribute:" followed by a text input field. At the bottom of the dialog, there are two blue buttons, each labeled "Button".

Page Title

Attribute:

Attribute:

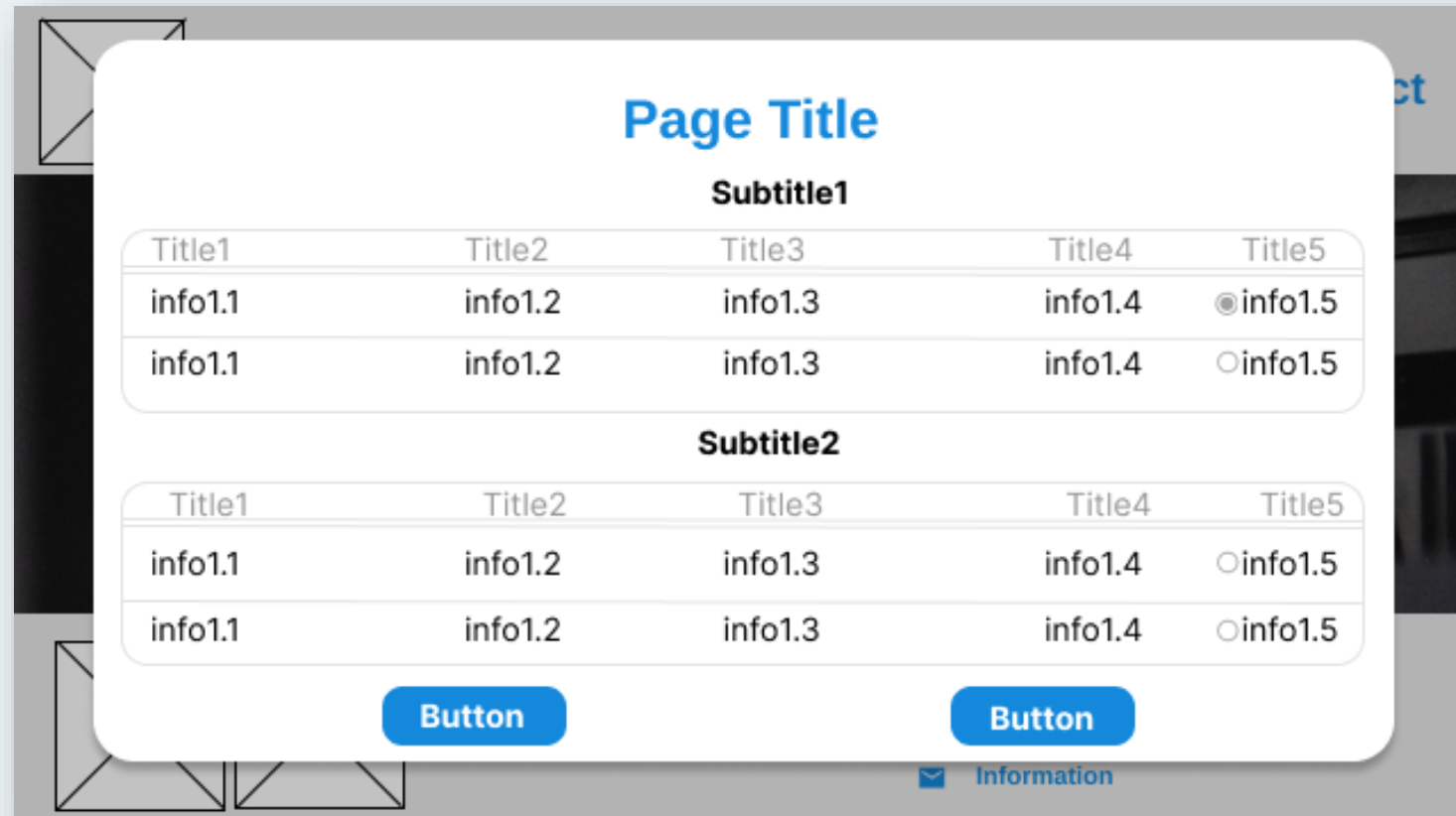
Attribute:

Attribute:

Attribute:

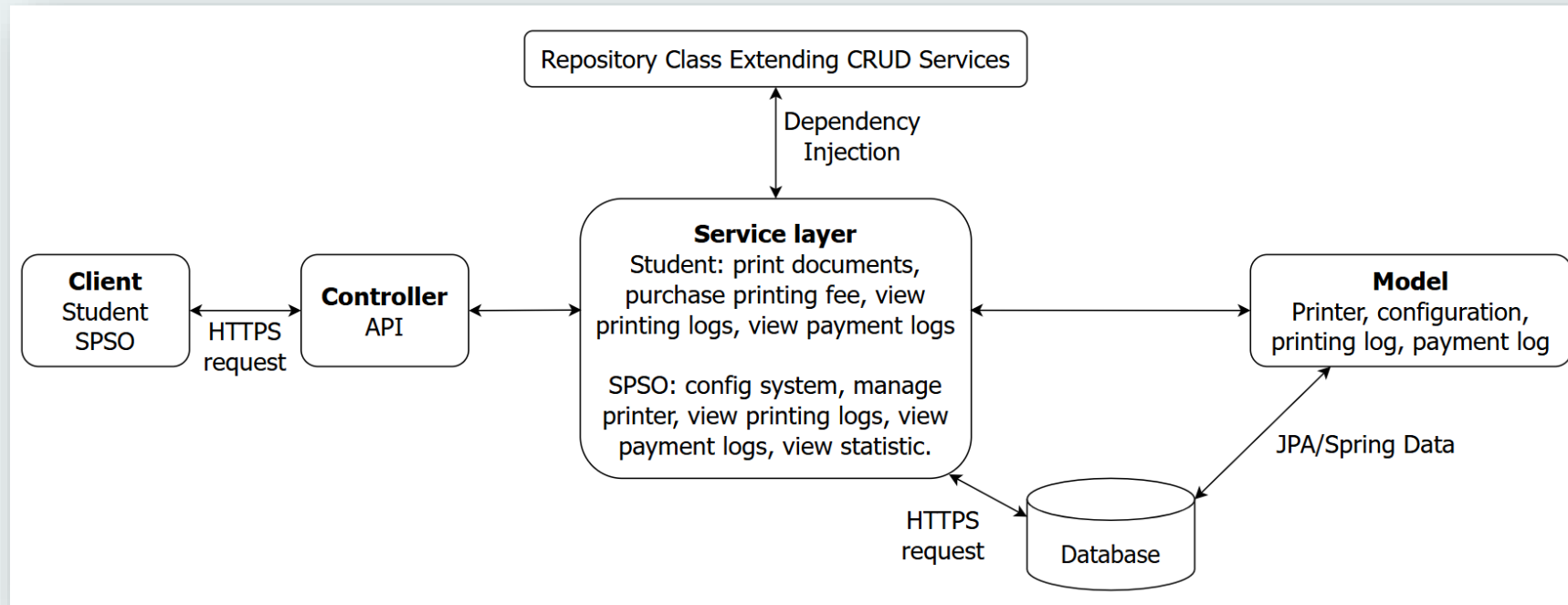
Button Button

Listing Page

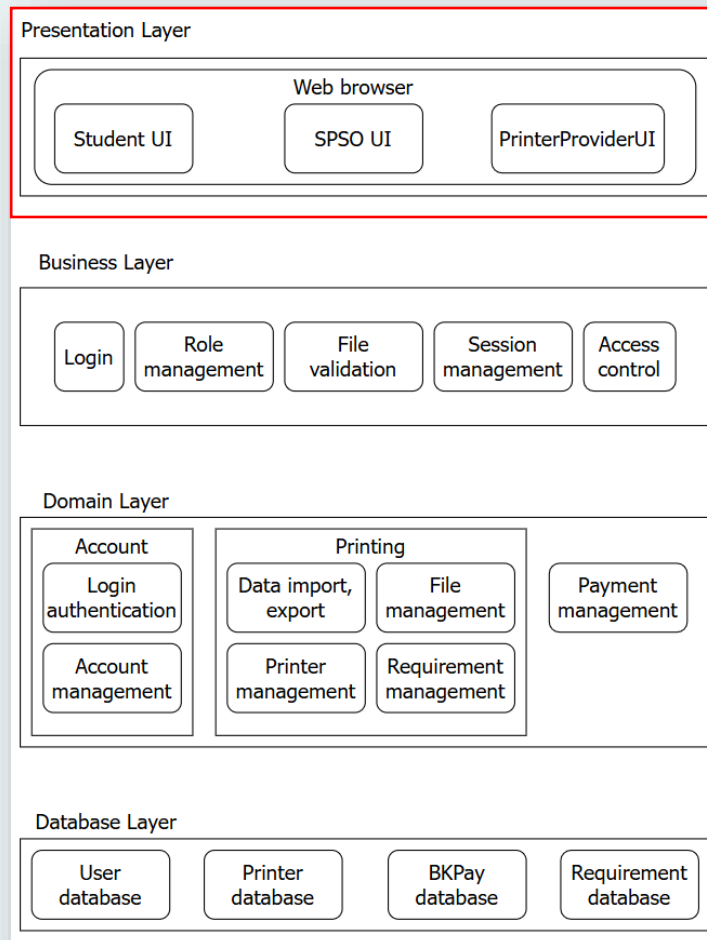


Architecture

Layered Architecture



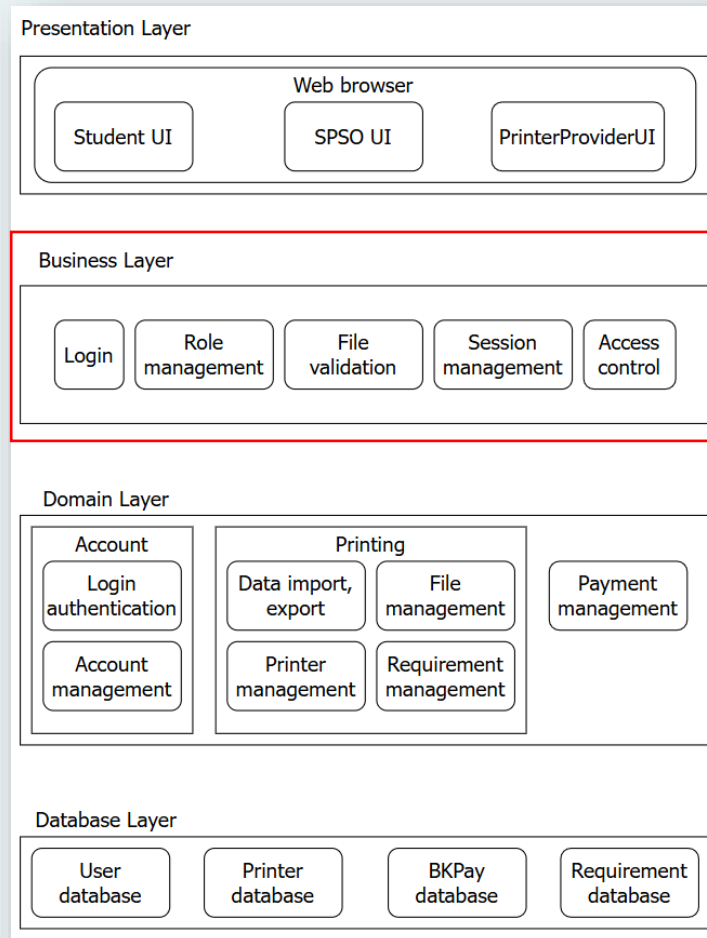
Layered Architecture



The Presentation Layer provides user interfaces tailored to specific roles.

- **Student UI** enables students to upload documents, manage printing quotas, and review printing history.
- **SPSO UI** allows Student Printing Service Officers to manage printers, view logs, configure policies, and access reports.
- **PrinterProvider UI** supports printer administrators in managing and maintaining printers. This layer depends on the Business Layer for core functions like login, file validation, session management, and access control.

Layered Architecture

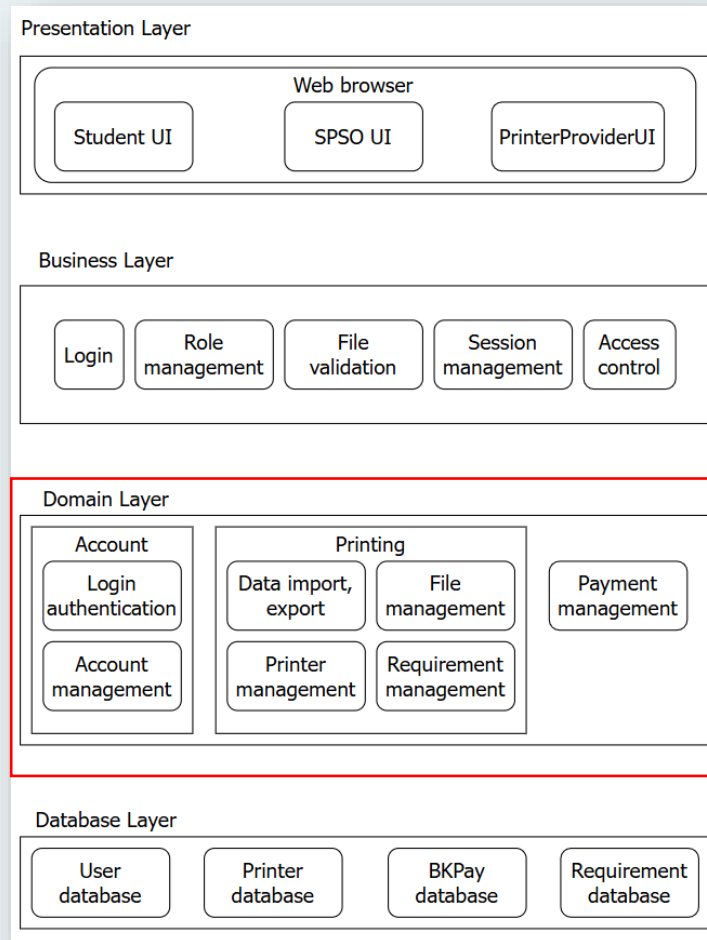


The Business Layer handles user requests, enforces rules, and manages access and sessions. Key services include

- **Login** (user authentication),
- **Role Checking** (assigning permissions),
- **File Validation** (ensuring file compliance),
- **Session Management** (secure session handling),
- **Access Control** (role-based restrictions),
- **Page Quota Management** (managing printing limits).

It collaborates with the Domain Layer for core functionalities like Account, File, and Payment Management.

Layered Architecture

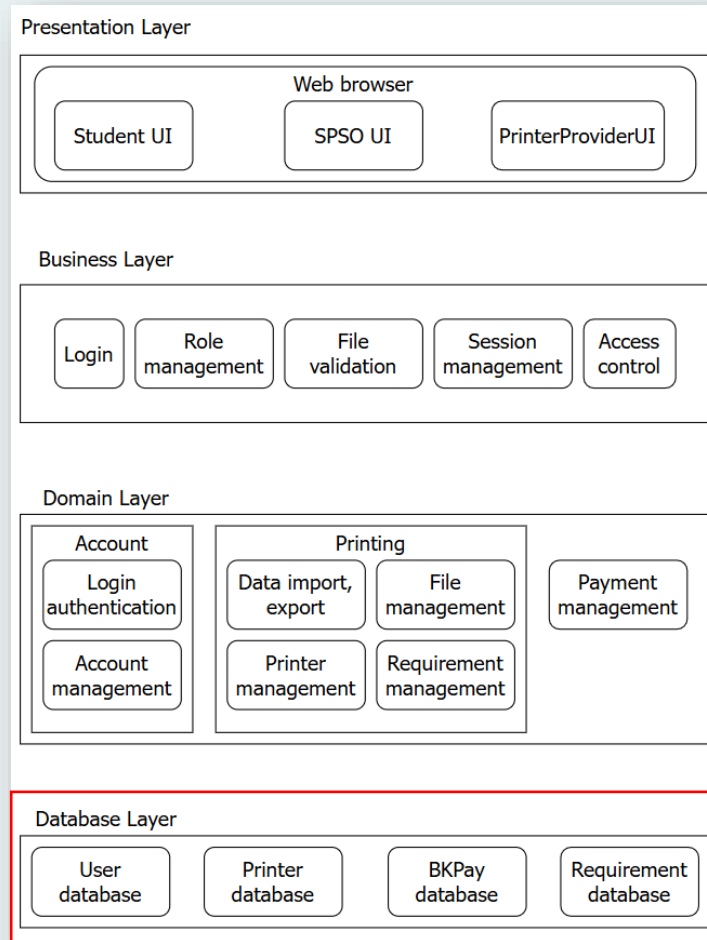


The Domain Layer contains the core business logic and operations for the printing service. Key components include

- **Login Authentication** (secure user verification),
- **Account Management** (managing profiles, quotas, and balances),
- **Data Import/Export** (file uploads and downloads),
- **File Management** (file storage and validation),
- **Printer Management** (status and configurations),
- **Requirement Management** (setting file types and quotas),
- **Payment Management** (handling transactions with BKPay).

It interacts with the Database Layer for storing and retrieving user, printer, payment, and configuration data.

Layered Architecture

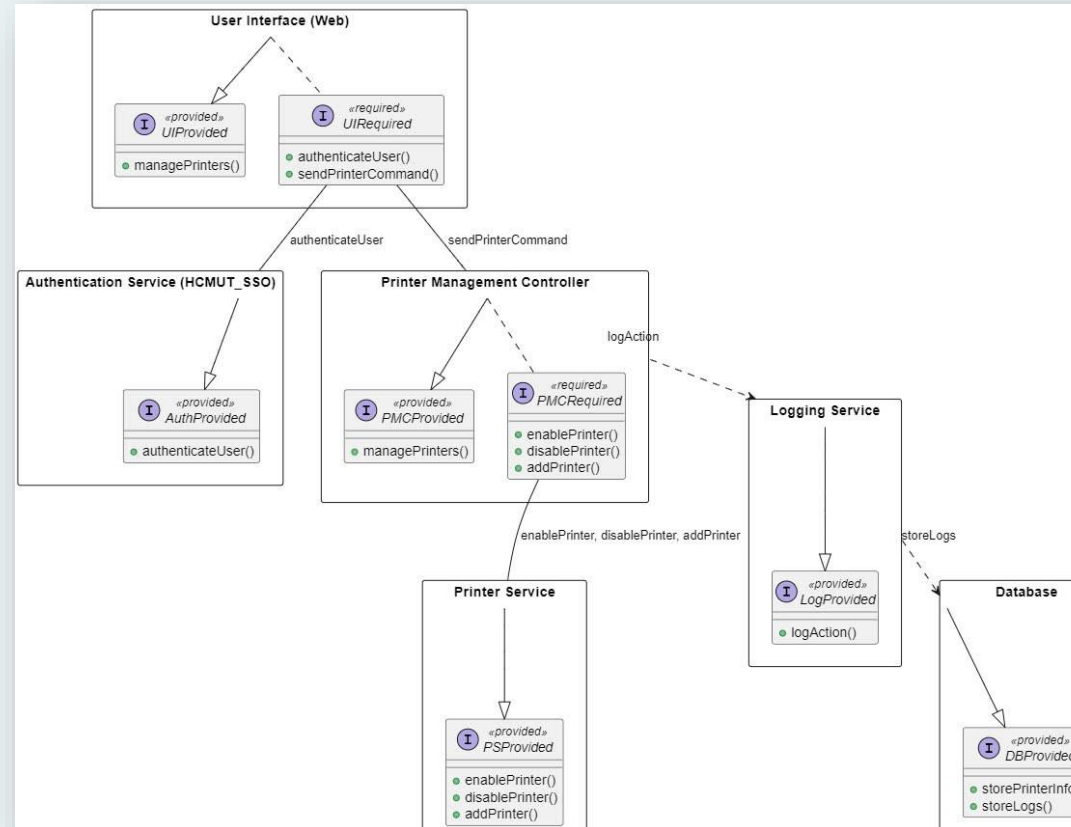


The Database Layer manages data storage and retrieval, supporting CRUD operations for system components. It includes the

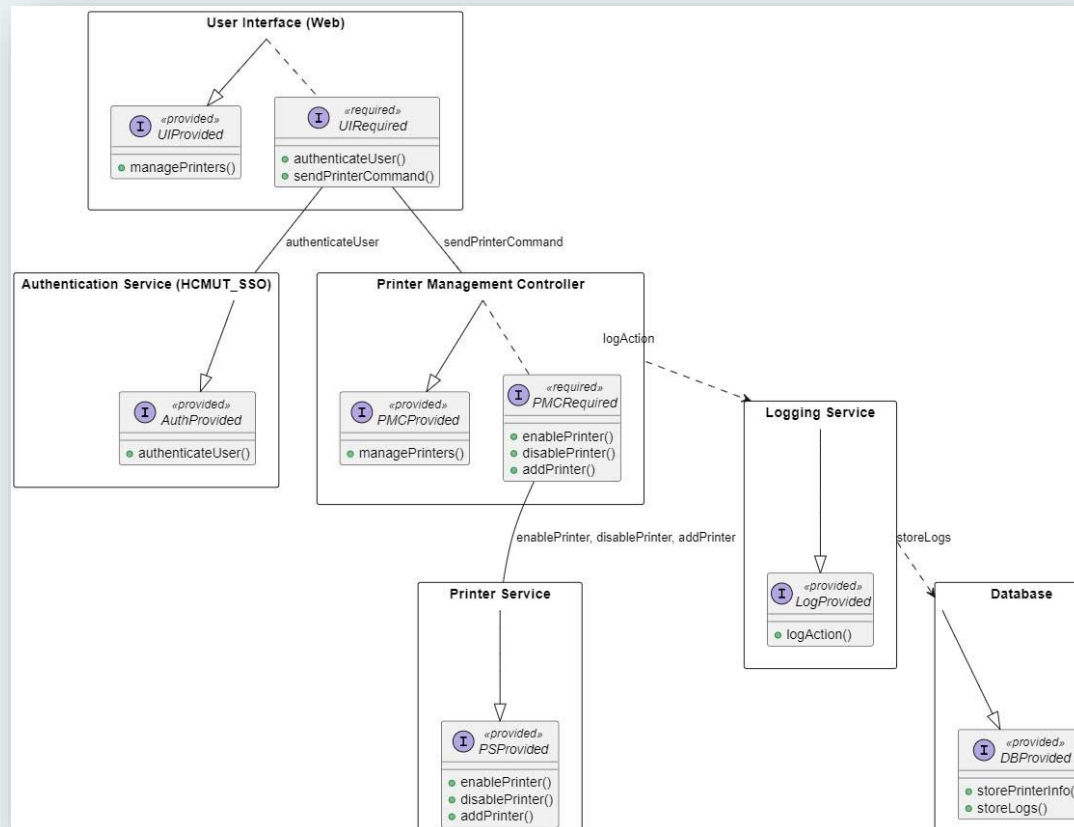
- **User Database** (user profiles, credentials, roles, quotas),
- **Printer Database** (printer details, status, configurations),
- **BKPay Database** (payment records),
- **Requirement Database** (system configurations like quotas and file restrictions),
- **File Database** (uploaded documents for printing).

This layer interacts with the Domain Layer to ensure seamless data access and functionality.

Component Architecture



Component Architecture



The **User Interface (Web)** is the system's entry point, enabling users to manage printers (`managePrinters()`) and send commands (`sendPrinterCommand()`) after authentication (`authenticateUser()`) via **HCMUT_SSO**. The **Printer Service** interacts with physical printers, executing commands to enable, disable, or add printers. The **Logging Service** records all actions (`logAction()`), storing logs and printer configurations securely in the **Database** (`storePrinterInfo()`, `storeLogs()`) for future reference and auditing.

Usability Testing

Members and Roles

The testing session took place in person with the participation of all members, including the chairperson (team leader) and the secretary. During the session, the team recorded solutions, task completion rates, comments, overall evaluations, questions, and feedback from all members.

Name	Role
Thai Quang Phat	Chairperson/Leader/Member
Phan Quang Minh	Serectary/Member
Phan Quang Nhan	Member
Phung Gia Minh Khoi	Member
Thai Quang Du	Member

Testing Methods

- Ease of finding information on the application
- Flexibility in interactions
- Accuracy in predicting which part of the application contains specific information

Task	Info Accessibility	Interaction Flexibility	Prediction Accuracy	Average
1	3	4	4	3.67
2	5	5	3	4.33
3	4	3	4	3.67
4	3	3	5	3.67
5	4	4	5	4.33
6	5	4	3	4.00
7	3	3	4	3.33

User Experience

To better understand how accessible our website is to the majority of students, we conducted a survey to gather their feedback.

PHIẾU KHẢO SÁT TRẢI NGHIỆM NGƯỜI DÙNG VỚI HỆ THỐNG IN ẤN THÔNG MINH TẠI HCMUT (SPSS)

Chào mọi người, chúng mình là nhóm 12, đến từ lớp CC01. Hiện tại chúng mình đang thực hiện đề tài xây dựng một hệ thống quản lý in ấn thông minh tại HCMUT (Student Smart Printing Service).

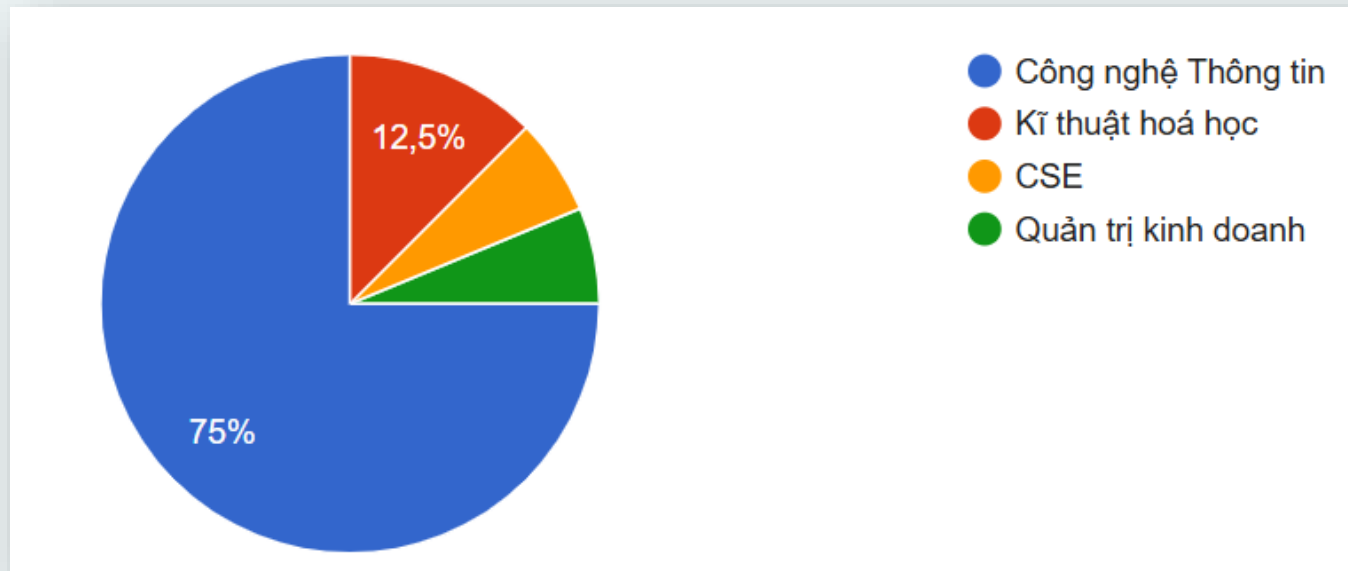
Bên dưới đây là các hình ảnh hệ thống của chúng mình, chúng mình rất mong nhận được một số góp ý của các bạn để hệ thống của chúng mình được hoàn thiện hơn. Chúng mình cảm ơn các bạn rất nhiều

phat.thaiquang2004@hcmut.edu.vn [Chuyển đổi tài khoản](#)

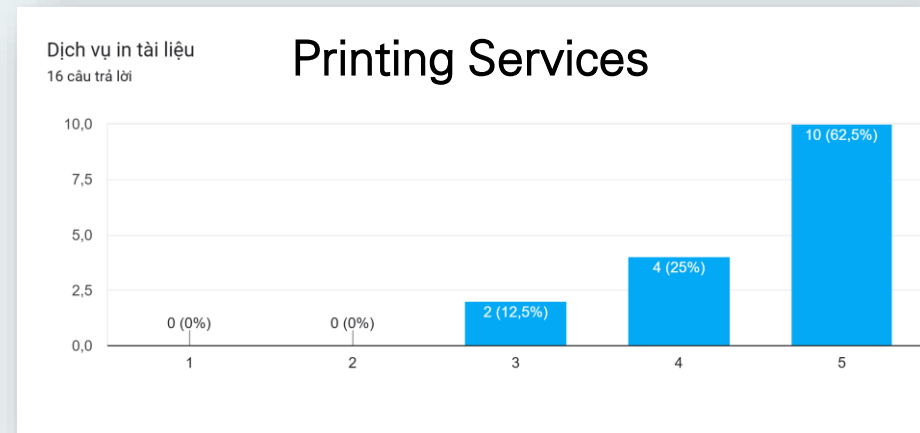
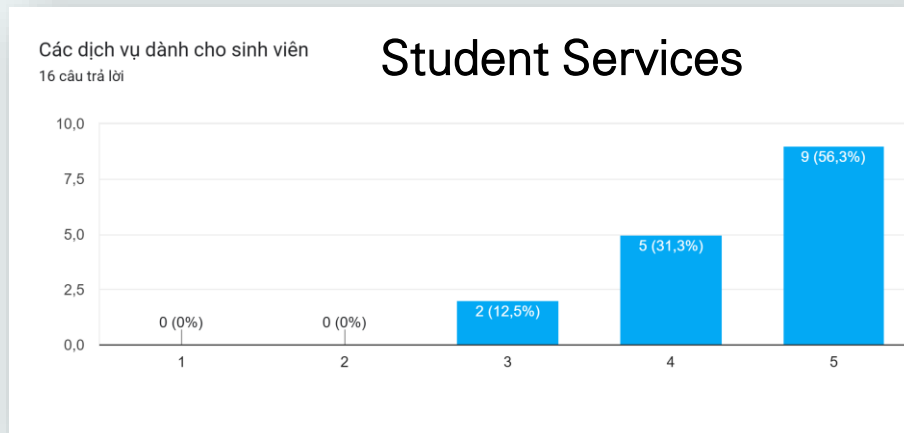
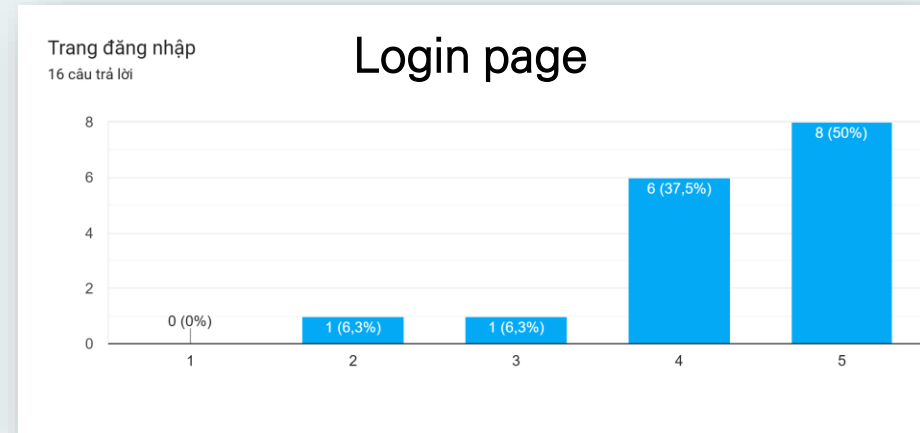
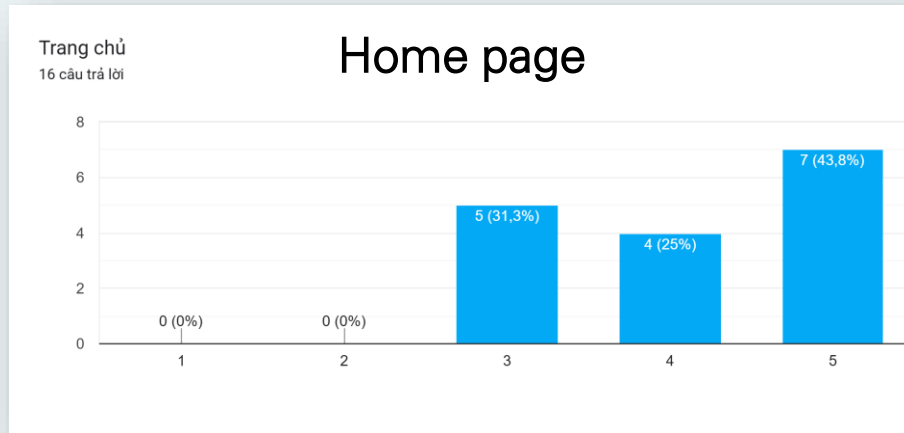
* Biểu thị câu hỏi bắt buộc

Major Students

The majority of students who attended the survey are professioned in information technology (IT), this can be seen as a non benefit since we need feedbacks from students who doesn't have much knowledge of software engineering, only then we can have more general feedbacks.



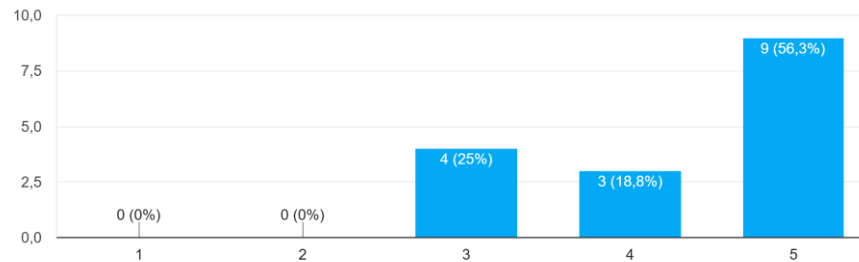
Results



Results

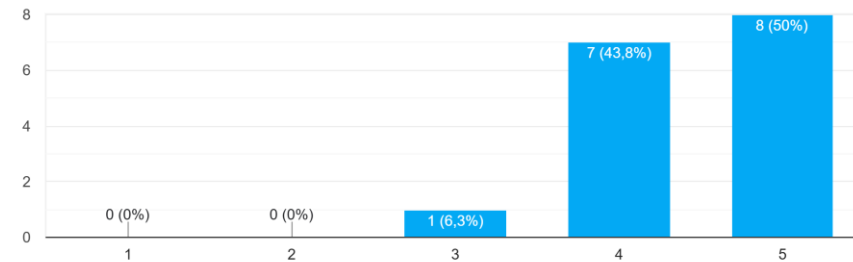
Chọn máy in
16 câu trả lời

Choose Printers



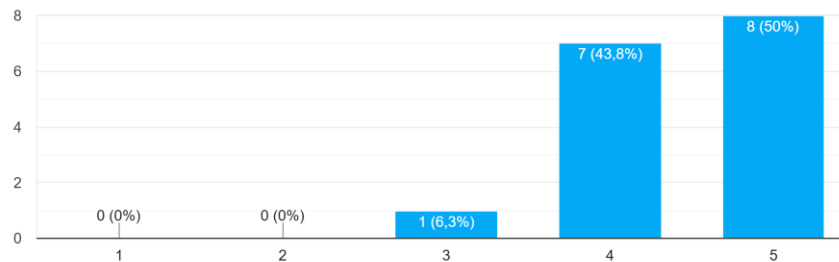
Cài đặt thông số giấy in
16 câu trả lời

Configure paper



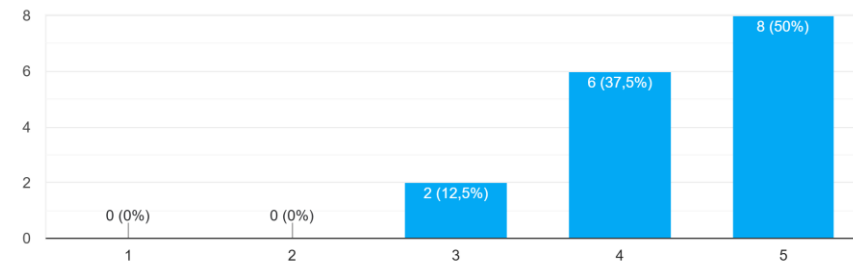
Xem lịch sử tài liệu đã in
16 câu trả lời

View Printing History



Xem lịch sử mua thêm giấy
16 câu trả lời

View Purchase History

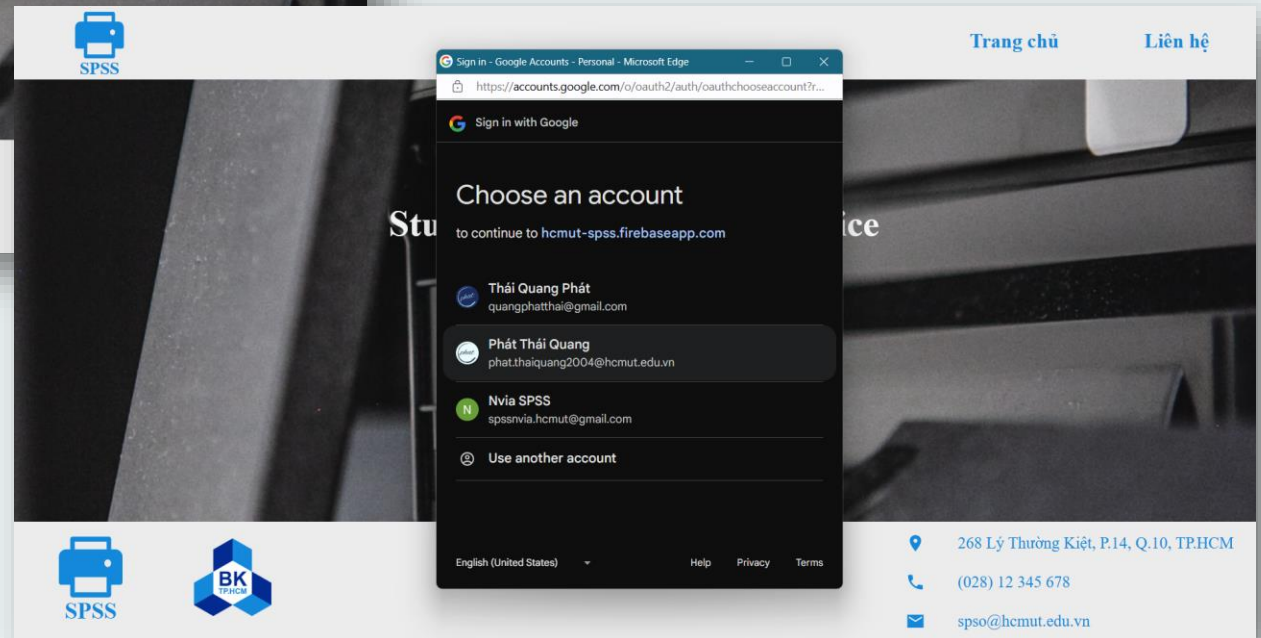
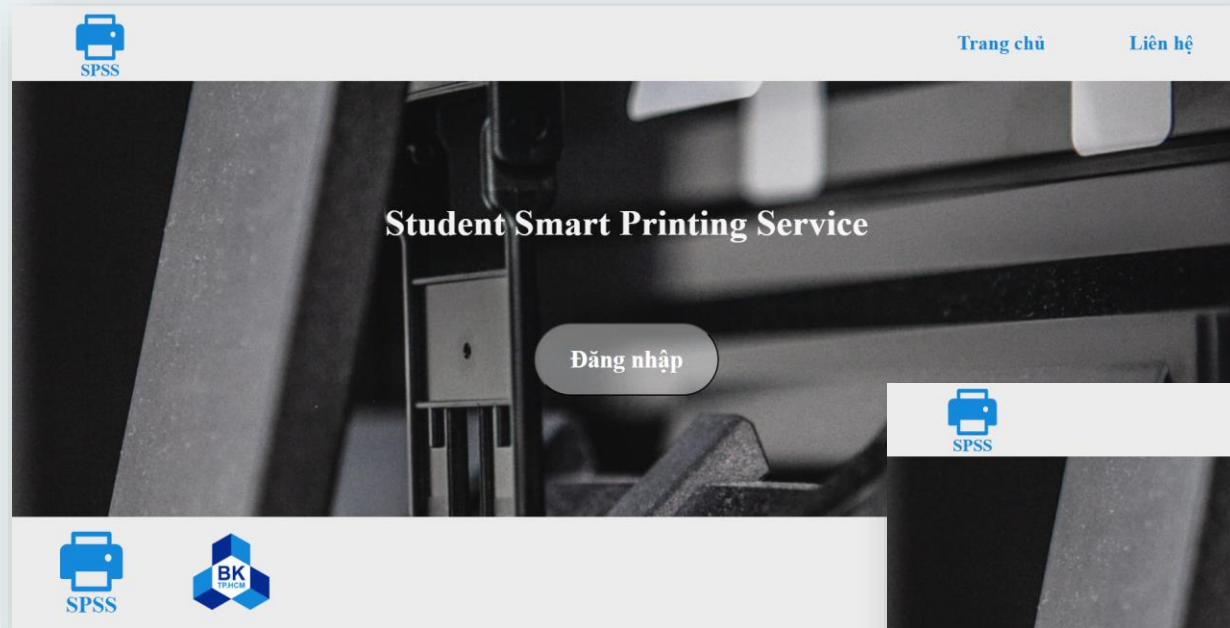


Conclusion

The results show that our service aligns well with students' interests, indicating strong potential for user adoption. Among the features, the printing functionality stands out as the most favored, reinforcing its importance as the system's core feature. However, the login page received the lowest score, suggesting it garners less student interest and requires improvement to enhance user experience.

Demonstration

Homepage and Login



Student Printing Service

Tải tài liệu lên

↑

Kéo thả file tại đây

-OR-

Tải lên file

Tài liệu đang được xử lý

inhan.pdf

Uploading

Chọn tài liệu

Xác nhận

Hủy

Chọn máy in

Cơ sở 1: Lý Thường Kiệt, P.14, Q.10

Tên máy in	Mã máy in	Vị trí	Trạng thái	Chọn
Laser Brother HL-L2321D	BK-LTK-001	B1-110	Available	<input checked="" type="radio"/> Xác nhận
Samung SL-M2070FW	BK-LTK-011	C5-304	Available	<input type="radio"/> Xác nhận
Sony UP-X398MD A6	BK-LTK-007	A3	Available	<input type="radio"/> Xác nhận

Cơ sở 2: Di An, Bình Dương

Tên máy in	Mã máy in	Vị trí	Trạng thái	Chọn
Samung SL-M2070FW	BK-LTK-011	H1-311	Available	<input type="radio"/> Xác nhận
Laser Brother HL-L2321D	BK-LTK-001	H6-602	Unavailable	<input type="radio"/> Xác nhận
Sony UP-X398MD A6	BK-LTK-007	H3-506	Available	<input type="radio"/> Xác nhận

Xác nhận

Quay lại

Tải tài liệu lên

↑

Kéo thả file tại đây

-OR-

Tải lên file

Tài liệu đang được xử lý

inhan.pdf

Completed

Chọn tài liệu

Xác nhận

Hủy

Tùy chỉnh thông số in

Xem trước

Số bản: 1

Kích thước: A4

In từ trang: 1 đến 10

Hướng in: ☒ Dọc ☐ Ngang

Canh lề (Inch)

Trái: 1 Phải: 1

Trên: 1 Dưới: 1

Số trang/1 mặt: 1

Lưu tài liệu trong vòng 7 ngày ☐

Xác nhận

Quay lại

42

Buying Printing Pages

Mua giấy in

Khổ giấy: A4 ▾

Số lượng: 0


Giá tiền: 0 VNĐ

Thêm

Giỏ hàng

Khổ giấy	Số lượng	Giá tiền (VNĐ)
A4	10	10000
A5	4	2000

Xác nhận Quay lại



Xem lịch sử ▾ Số dư : 100000 VNĐ Đăng xuất

Viewing Print and Purchase History

Lịch sử giao dịch in

🔍 Tìm tên tài liệu

Thời gian	Mã giao dịch	Mã máy in	Tên tài liệu	Số trang	Trạng thái
Mon Dec 02 2024 18:03:23	xCueh	BK-LTK-001	index.pdf	85(A4)	Received

Bạn đã in 85 trang g

Quay lại

Lịch sử mua giấy in

🔍 Tìm mã số

Thời gian	Mã giao dịch	Số trang	Giá tiền	Trạng thái
Mon Dec 02 2024 18:09:19	TWcPW	10	10000 VNĐ	Unpaid
Mon Dec 02 2024 18:09:19	nClee	5	5000 VNĐ	Unpaid

Quay lại

spso@hcmut.edu.vn


Viewing Student's Printing Activity

Lịch sử in

🔍 Tìm lịch sử giao dịch

Thời gian	Mã giao dịch	Mã máy in	Tên tài khoản	Tên tài liệu	Số trang	Trạng thái	Chi tiết giao dịch
17:00:24 18/11/2023	T-Pr-001	BK-LTK-001	Lê Duy Anh	Software-Engineer-Document.docx	100	Received	Xem chi tiết
08:30:29 29/10/2023	T-Pr-010	BK-LTK-001	Nguyễn Trần Bảo Ngọc	Data-Structure-and-Algorithms-Textbook.pdf	100	Printed	Xem chi tiết
20:00:01 05/10/2023	T-Pr-100	BK-LTK-001	Lê Phương Các	Introduction-to-Artificial-Intelligence-Slide.pptx	100	In progress	Xem chi tiết

Quay lại

 spso@hcmut.edu.vn

View Past Printings and Configuration

Lịch sử giao dịch

Thời gian	Tên sinh viên	Mã dịch vụ	Máy in	File	Số trang	Xác nhận	Trạng thái	Đã nhận
17:00:24	Thái Quang Phát phat.thai04	T-Pa-001	BK-LTK-001	sample.pdf	100	<input checked="" type="radio"/> Có <input type="radio"/> Không	<input checked="" type="radio"/> Đã in <input type="radio"/> Chưa in	<input checked="" type="radio"/> Có <input type="radio"/> Không
08:30:29	Thái Quang Du du.thai04	T-Pa-001	BK-LTK-001	sample.pdf	80	<input checked="" type="radio"/> Có <input type="radio"/> Không	<input type="radio"/> Đã in <input checked="" type="radio"/> Chưa in	<input type="radio"/> Có <input checked="" type="radio"/> Không
20:00:01	Nguyễn Văn A a.nguyen04	T-Pa-002	BK-LTK-001	sample.pdf	150	<input checked="" type="radio"/> Có <input type="radio"/> Không	<input type="radio"/> Đã in <input checked="" type="radio"/> Chưa in	<input type="radio"/> Có <input checked="" type="radio"/> Không

Quay lại

Điều chỉnh thông số in

Chọn ngày: 10/10/2024

Giá mặc định: 1000 VND / trang

Số file mặc định: 20 / kỳ

Thêm loại file: .docx

Số file tối đa: 5 / lần

Xác nhận Quay lại

View Printers, Status and Adding

Danh sách máy in

Mã máy in	Tên máy in	Địa điểm	Ngày nhập	Công ty	Tình trạng
BK-LTK-001	Samsung Printer Pro	A4-503 LyThuongKiet	11/10/2004	Samsung	Tốt
BK-LTK-002	Apple Printer Pro	A3 LyThuongKiet	11/09/2010	Apple	Ok
BK-DA-003	Logitech Printer Ultra	H6-501 DA	11/09/2010	Logitech	Tốt
BK-DA-004	Huawei Printer Plus	H6-503 DA	10/10/2022	Huawei	Tốt

Cài đặt máy in

Mã máy in	Tên máy in	Địa điểm	Ngày nhập	Công ty	Tình trạng	Trạng thái
BK-LTK-001	Samsung Printer Pro	A4-503 LyThuongKiet	11/10/2004	Samsung	Tốt	<input checked="" type="radio"/> Cho sử dụng <input type="radio"/> Ngưng sử dụng
BK-LTK-002	Apple Printer Pro	A3 LyThuongKiet	11/09/2010	Apple	Ok	<input type="radio"/> Cho sử dụng <input checked="" type="radio"/> Ngưng sử dụng
BK-DA-003	Logitech Printer Ultra	H6-501 DA	11/09/2010	Logitech	Tốt	<input checked="" type="radio"/> Cho sử dụng <input type="radio"/> Ngưng sử dụng
		H6-503 DA	10/10/2022	Huawei	Tốt	<input type="radio"/> Cho sử dụng <input checked="" type="radio"/> Ngưng sử dụng

Quay lại

Thêm máy in

Mã máy in:

Tên máy in:

Vị trí: at

Công ty:

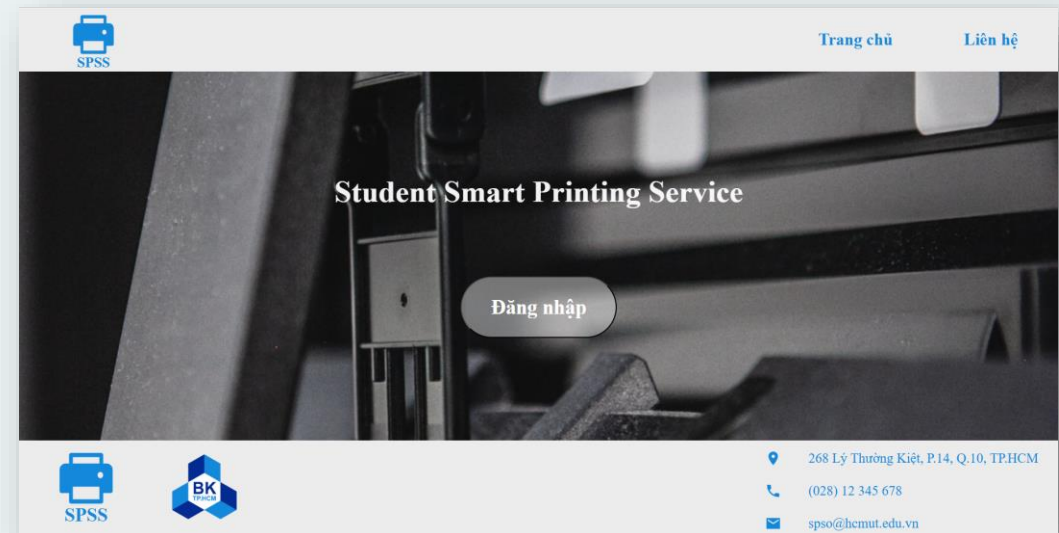
Ngày nhập:

Xác nhận Quay lại

Conclusion

Conclusion

Building the Student Smart Printing System web application taught us valuable skills in teamwork, agile development, and using modern web technologies like React and Firebase. I gained hands-on experience in user authentication, role-based access, debugging, and optimizing performance. This project strengthened our problem-solving abilities and highlighted the importance of communication and iterative development.



Thank you
for your
attention