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## 1. Introduction

### 1.1. Process Overview

The web application and the Android application will need setting up before you can use the system. To setup the web application, you will need a server with an Internet connection and an operating system capable of running a Django application and a web server (e.g., nginx, apache, etc.), and a web balancer such as gunicorn if you wish. You will then create a virtual environment to install all required dependencies, then run the Django application, plus connect it to a database. To setup the Android application, you will need to have setup the server and obtained its IP address (both local and public is fine), then you will need to rebuild the Android application with the correct IP address and token assigned in its code and deploy it on an Android device that will be placed in the library.

After setting up the web application, you can create an admin account which in turn will create librarian accounts for your librarians to access the system, and they will then create user accounts for your library users. An admin and librarian will also get access to management suite such as managing books, managing loans, managing fines, etc. Once your library users have their accounts created, they can login to explore your library and manage their own activity in the library such as viewing their borrowed books, due dates, fines, etc. Before they can start borrowing though, they will need to have enrolled their fingerprint and face. Your librarians will be able to help them with that using the web application.

For the borrowing process, the Android application you deployed will turn the device it's on into a self-service machine where your library user can authenticate themselves by simply positioning their face in view of the device's camera and scanning their fingerprint. They will then be able to scan a book's barcode or RFID tag to complete the borrowing process.

### 1.2. System Requirements

Recommend Server Hardware Requirements (assuming library has 1500 registered users at any time):

- **Operating System:** 64-bit operating system (Windows, MacOS X, Linux)
- **Processor:** Intel Core i5-7400 (or AMD Ryzen 3500) or better
- **Memory:** 8 GB or more
- **Storage:** 5 GB of free storage or more (increases with number of registered users)
- **Graphics:** None
- **Internet Connection**

Recommend Android Device Hardware Requirements (assuming library has 1500 registered users at any time):

- **Android 8.1 (Oreo)** or above
- **Processor:** Qualcomm Snapdragon 850 or above
- **Memory:** 4 GB or more
- **Storage:** 1 GB of free storage or more (increases with number of registered users)

- **Compatible Fingerprint Scanner**

## **2. Web Application – Initial Setup**

### **2.1. Server Setup**

In this part, you will setup your web application on your server. This manual will guide you through doing it on a local server, but you can follow the same process on a cloud server.

#### **Pre-requisites:**

You will need a server with Python 3.7 or later installed, an Internet connection, and a web server such as Nginx installed.

1. Create a Python virtual environment named and activate that environment (please see Installing packages using pip and virtual environments in Appendix A).
2. Check that your cmd / terminal / bash now have a (Django) prefix.
3. Download the project repo and extract the eminsce folder to a directory and cd to that directory. Example: cd D:/Server/eminsce
4. Type in the following command: pip install -r requirements.txt
5. Wait until the command has finished processing.
6. Run python manage.py runserver
7. Your server should now be running successfully on localhost.
8. Stop the server to continue with the setup.

### **2.2. Customizing web application**

Now that your web application is running, you need to customize a few things such as database. By default, Django will use SQLite which is not suitable for a library with potentially hundreds or thousands of users. You will also setup a superuser to create accounts necessary to get the system running.

#### **Pre-requisites:**

A database installed on your server, any of the following is fine: mySQL, PostgreSQL, Oracle, etc. Cloud database is also fine. It is recommended you use an IDE such as Visual Studio Code to edit the files.

1. Open the eminsce folder and edit the settings.py file inside.
2. Please change the variable SECRET\_KEY (line 25) and keep it a secret.
3. Please change the DATABASES variable (line 89). See Documentation on configuring database in Appendix A for detailed instructions.
4. Please change the TIME\_ZONE (line 121) to your timezone.
5. Please setup nginx or equivalent gateway to enable public access to your site. Depending on your operating system, please pick a server architecture that best fits your server. For example, please see Using NGINX and NGINX Plus as an Application Gateway with uWSGI and Django in Appendix A.
6. Once you have successfully setup the Django application and the server, your web

application is ready to go. Please keep note of your web application server's local/public IP address or domain name for the Android application later.

## 2.3. Creating your first admin account

Now that your server is running, you need to create an admin account to manage the system. You will create an admin (superuser) account first that has access to every part of the system then use it to create librarian accounts who will then create user accounts.

1. Open a cmd / terminal / bash window, activate your Django virtual environment and navigate to the root project directory.
2. Execute this command: `python manage.py createsuperuser`
3. Follow the instruction to create a super user. This will be your admin user.

```
(Django) PS E:\OneDrive - SIM - Singapore Institute of Management\SIM\Year 3\CSIT321 Project\Eminisce_Web_App\eminisce> python manage.py createsuperuser
System check identified some issues:

WARNINGS:
?: (urls.W005) URL namespace 'admin' isn't unique. You may not be able to reverse all URLs in this namespace
Username (leave blank to use 'bigsmoke'): johnwatson
Email address: johnwatson@mylibrary.com
Password:
Password (again):
Superuser created successfully.
```

## 3. Web Application – Admin Management

Now that you have an admin (superuser) account, you can access the management toolkit a normal librarian account has with the additional privilege to manage librarian accounts themselves.

### 3.1. Creating a new librarian account

1. Navigate to the website using your browser.
2. Login using the super user's credentials you just created.



3. In the home page, click on “Staff Account Management” button.

## Library Management

Manage User Accounts

Manage Catalog

Manage Loans

Manage Fines

Browse Catalog

View Overdue Books

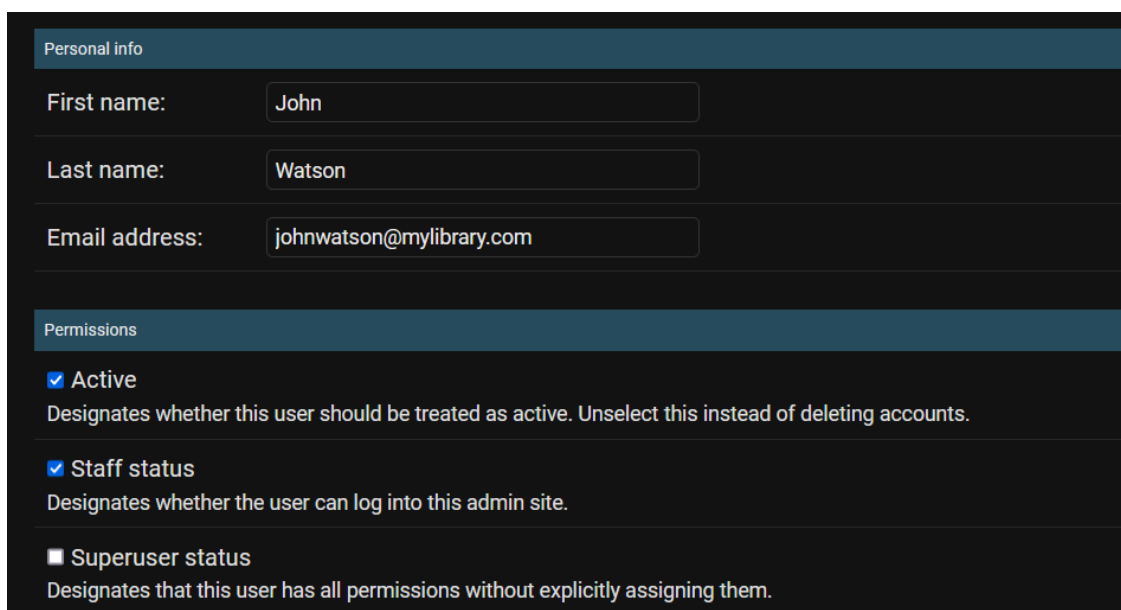
## Admin Management

Staff Account Management

- Click on the ADD USER + button on the right-hand side.

- Enter a username and password for the librarian account.

- Click “Save and continue editing”.
- On the next page, fill in the personal info of the librarian and tick “Staff status”. Tick “Superuser” status if you want to create another admin account.



The screenshot shows a user management form with two main sections: 'Personal info' and 'Permissions'.

**Personal info**

- First name: John
- Last name: Watson
- Email address: johnwatson@mylibrary.com

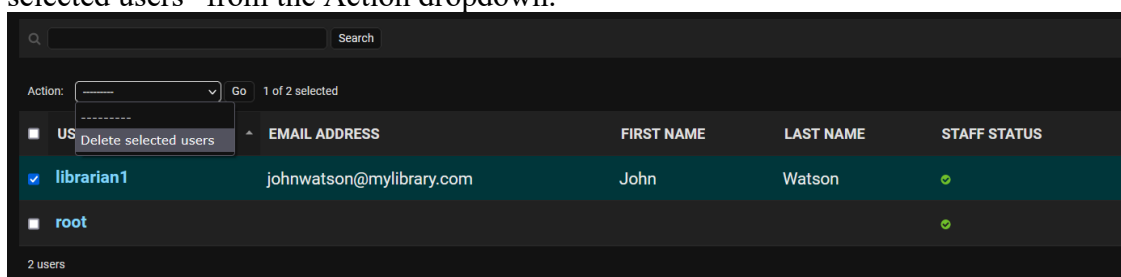
**Permissions**

- ☒ **Active**  
Designates whether this user should be treated as active. Unselect this instead of deleting accounts.
- ☒ **Staff status**  
Designates whether the user can log into this admin site.
- ☐ **Superuser status**  
Designates that this user has all permissions without explicitly assigning them.

- 10.
11. Scroll down and click Save button.
12. Congratulations, the librarian can now login using the username and password you have specified.

## 3.2. Deleting a librarian account

1. Navigate to the website and login using your admin account.
2. In the home page, click on “Staff Account Management” button
3. Tick the box to the left of a librarian account you want to delete and select “Delete selected users” from the Action dropdown.



The screenshot shows the 'Staff Account Management' interface. At the top, there is a search bar and an 'Action:' dropdown menu with a 'Go' button. Below this is a table of users.

	EMAIL ADDRESS	FIRST NAME	LAST NAME	STAFF STATUS
<input checked="" type="checkbox"/> <b>librarian1</b>	johnwatson@mylibrary.com	John	Watson	✓
<input type="checkbox"/> <b>root</b>				✓

At the bottom, it says '2 users'.

4. Press “Go” button.
5. The librarian account has been deleted.

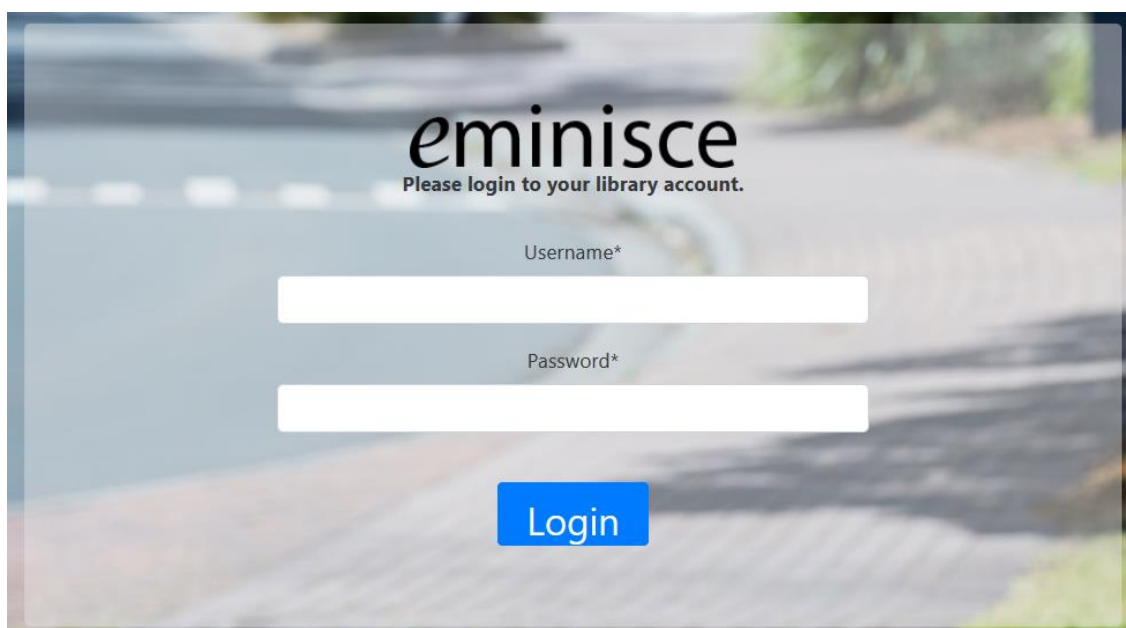
## 4. Web Application – Library Management

Librarian accounts and admin accounts have access to the same library management tool. This includes managing book catalog, managing user accounts, managing loans, managing fines.

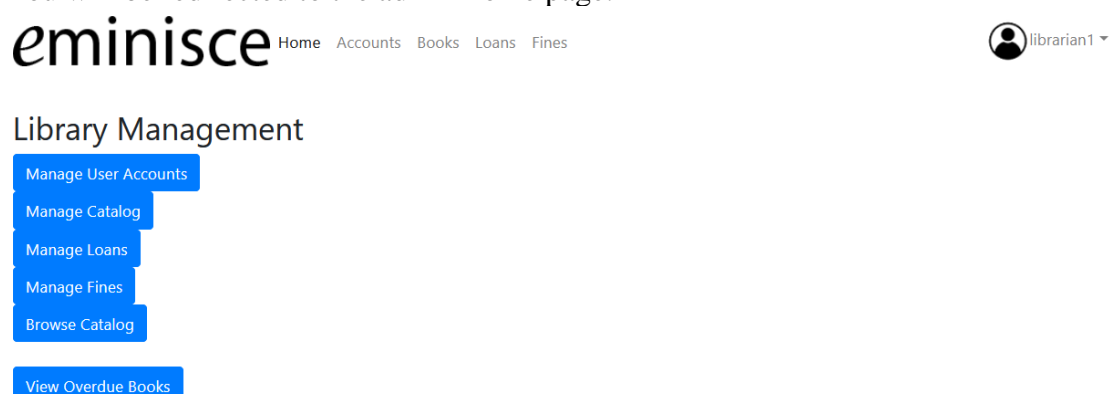
### 4.1. Login

Follow [2.3.](#) to create admin / librarian accounts if you have not already.

1. Access the website using a web browser.
2. If you are not logged in, you will be prompted to login.



3. Enter a valid username in the username field.
4. Enter a valid password in the password field.
5. Click login.
6. You will be redirected to the admin home page.



## 4.2. User Account Management

### 4.2.1. Create library user account

An admin or librarian can create normal library user accounts. Ideally, you can integrate Eminisce's database with your institution's database to automatically import student accounts who will be the main users of the library. However, there is a way to manually create Eminisce library user accounts.

1. Login either as an admin or a librarian.
2. On the home page, click on Manage User Accounts button.



## Library Management

Manage User Accounts

Manage Catalog

Manage Loans

Manage Fines

Browse Catalog

View Overdue Books

- 3.
4. On the account manage page, click on New button.

Create a new user account

## User Account Management

Import New

Search by ID Number

ID	ID Number	Full name	User Type	Enrolled Fingerprint?	Enrolled Face?	Can Borrow?
----	-----------	-----------	-----------	-----------------------	----------------	-------------

- 5.
6. Enter the required information. You can skip the fingerprint and Face recognition fields if you plan to enroll them later.

← Return

## Create a new library user account

Identification Number\*

Can be Student ID or Employee ID, used for logging in.

Password\*

Full name\*

Full name of the library user.

User type\*

▾

Fingerprint

No file selected.

(Optional) Upload fingerprint file generated from the fingerprint reader.

Face recognition

No file selected.

(Optional) Upload front facial photoshot to use with facial recognition.

- 7.
8. Press Save.

## 4.2.2. Edit library user account

1. Login either as an admin or a librarian.
2. On the home page, click on Manage User Accounts button.
3. Find the account that you want to edit, then click on the Edit button.

**eminsce** Home Accounts Books Loans Fines

## User Account Management

 Import New
 

ID	ID Number	Full name	User Type	Enrolled Fingerprint?	Enrolled Face?	Can Borrow?
1	123456	John Smith	STUDENT	X	X	<input checked="" type="checkbox"/>

4. Make changes and click the Save button.

### Editing John Smith

Identification Number\*

Can be Student ID or Employee ID, used for logging in.

Full name\*

Full name of the library user.

User type\*

Status\*

Fingerprint

 No file selected.
 

(Optional) Upload fingerprint file generated from the fingerprint reader.

Face recognition

 No file selected.
 

(Optional) Upload front facial photoshot to use with facial recognition.

This user currently does not have a facial recognition photo uploaded.

### 4.2.3. Allow / Disallow library user from borrowing

1. Login either as an admin or a librarian.
2. On the home page, click on Manage User Accounts button.
3. Find the account that you want to change privilege of, then click on the Edit button.
4. Change the Status field to either allowed or not allowed to borrow books.

[← Return](#)

## Editing test1

Identification Number\*

  
Can be Student ID or Employee ID, used for logging in.

Full name\*

  
Full name of the library user.

User type\*

 ▾

Status\*

▾  
User is allowed to borrow books  
User is not allowed to borrow books

  
(Optional) Upload fingerprint file generated from the fingerprint reader.

Face recognition

No file selected.


  
(Optional) Upload front facial photoshot to use with facial recognition.

This user currently does not have a facial recognition photo uploaded.

5. Press Save.

#### 4.2.4. Remove library user account

1. Login either as an admin or a librarian.
2. On the home page, click on Manage User Accounts button.
3. Find the account that you want to remove, then click on the Delete button.
4. Confirm that you want to delete the user by pressing the Delete button in the dialog.

eminisce [Home](#) [Accounts](#) [Books](#) [Loans](#) [Fines](#)  librarian1 ▾

### User Account Management

ID	ID Number	Full name	User Type	Enrolled Fingerprint?	Enrolled Face?	Can Borrow?
1	123456	John Smith Jr.				

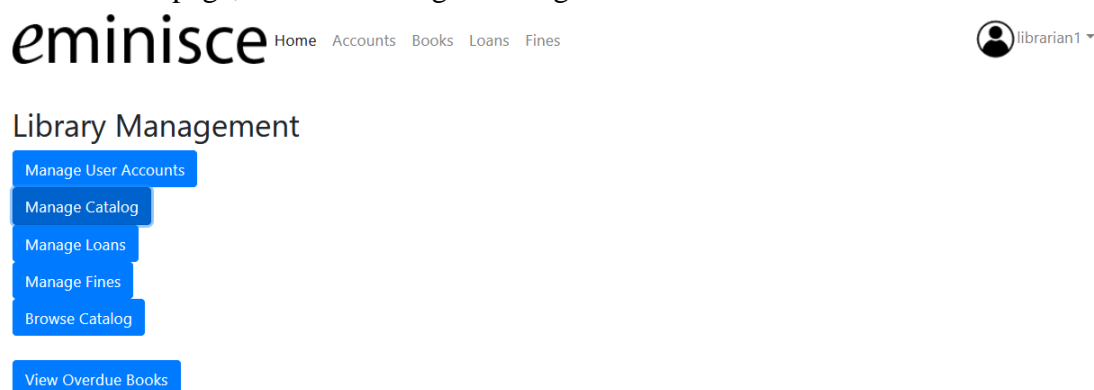
Deleting 123456

Are you sure you want to delete the user **123456** from the database? THIS CANNOT BE UNDONE.

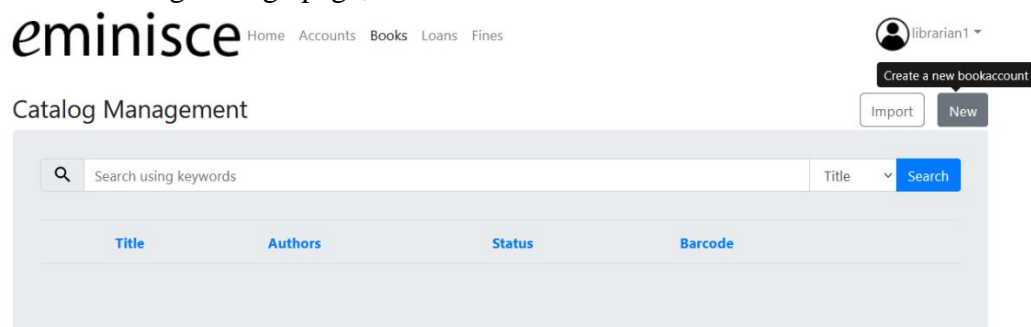
## 4.3. Book Catalog Management

### 4.3.1. Add book

1. Login either as an admin or a librarian.
2. On the home page, click on Manage Catalog button.



- 3.
4. On the catalog manage page, click on New button.



- 5.
6. Enter the required information.  
Add a new book to the catalog

The screenshot shows the 'Add a new book to the catalog' form. The form fields are as follows:

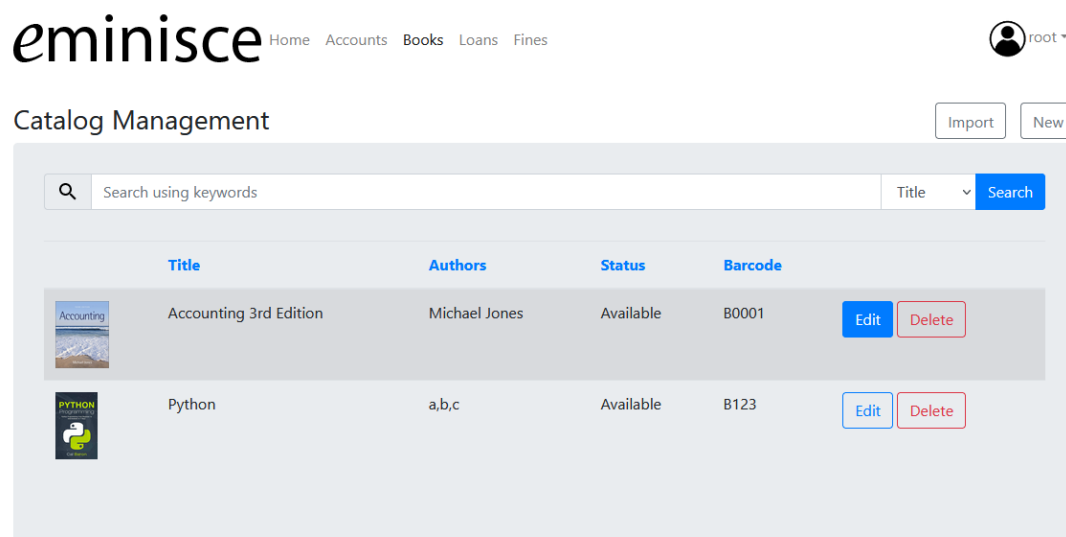
- Title\***: Accounting 3rd Edition
- Authors\***: Michael Jones
- Description\***: Maths is hard.
- Cover**: accounting\_3rd edition.jpg
- Status\***: Available
- Barcode\***: B0001

A 'Save' button is located at the bottom of the form.

7. Press Save.

## 4.3.2. Edit book information

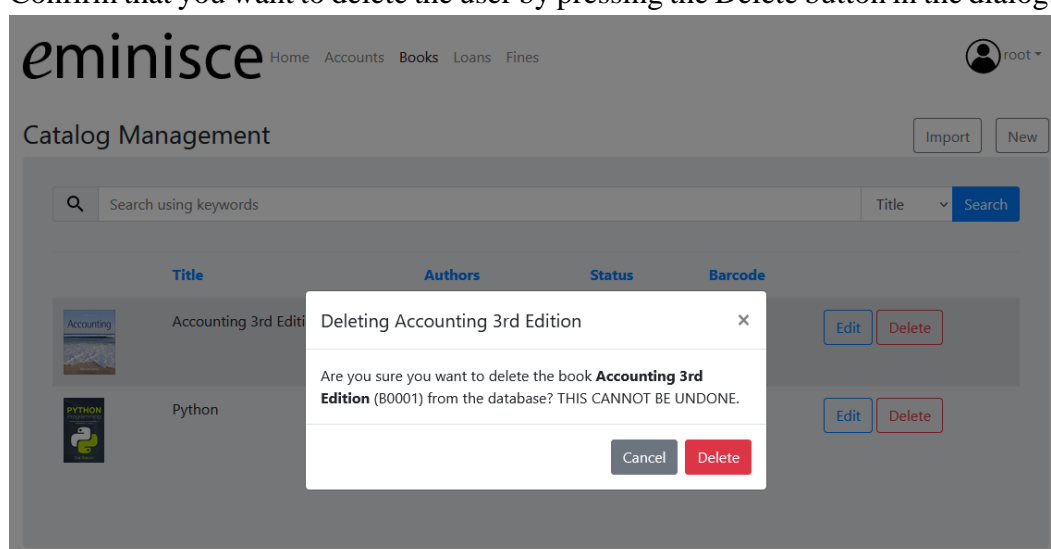
1. Login either as an admin or a librarian.
2. On the home page, click on Manage Catalog button.
3. Find the book that you want to edit, then click on the Edit button.



4. Make changes and click the Save button.

## 4.3.3. Remove book from catalog

1. Login either as an admin or a librarian.
2. On the home page, click on Manage Catalog button.
3. Find the book that you want to remove, then click on the Delete button.
4. Confirm that you want to delete the user by pressing the Delete button in the dialog.



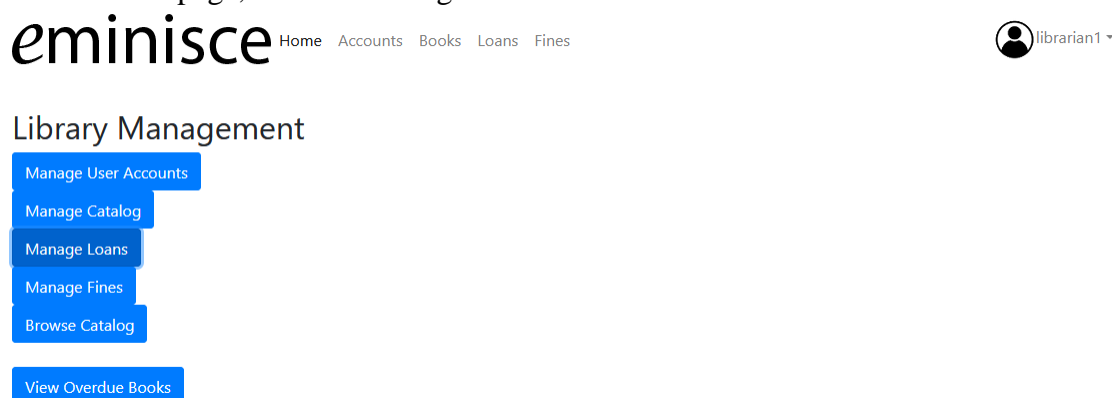
## 4.4. Loan Management

When a library user borrows a book, a loan is created and kept track of. The librarian and admin can manage loans.

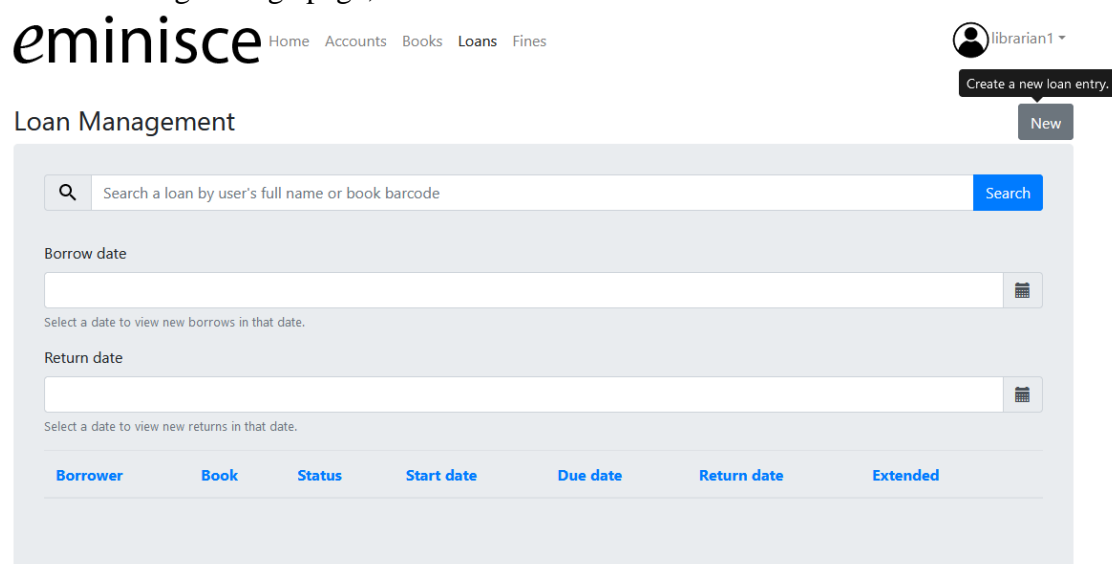
### 4.4.1. Add loan

Library users should borrow books using the self-service checkout method provided by the Eminisce Android application. However, in cases something prevents the borrowing process from being completed, a librarian or admin can manually create a new loan entry to allow the user to borrow books without going through the automated borrowing process.

1. Login either as an admin or a librarian.
2. On the home page, click on Manage Loan button.



3. On the catalog manage page, click on New button.



4. Enter the required information.

[← Return](#)

## Create a new loan entry


Borrower\*

test1 test1 ▾

Book\*


B123 Python ▾

Start Date\*

25/07/2021 22:52 

The start date of the loan.

Due Date\*

12/08/2021 22:52 

The due date of the loan.

Save


5. Press Save.

#### 4.4.2. Edit loan due date

1. Login either as an admin or a librarian.
2. On the home page, click on Manage Loan button.
3. Find the loan that you want to edit the due date of, then click on the Edit button.


## Loan Management

[New](#)

 Search a loan by user's full name or book barcode


Search

Borrow date



Select a date to view new borrows in that date.

Return date



Select a date to view new returns in that date.

Borrower	Book	Status	Start date	Due date	Return date	Extended	
test1 test1	B123 Python	ACTIVE	07/25/2021 10:52 p.m.	08/12/2021 10:52 p.m.	—	X	<div><div>Mark as returned</div><div>Edit due date</div></div>

4. Make changes and click the Save button.

[← Return](#)

## Editing loan 19

New due date\*

12/08/2021 22:52

August 2021

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

### 4.4.3. Mark loan as returned

1. Login either as an admin or a librarian.
2. On the home page, click on Manage Loan button.
3. Find the loan that you want to mark as returned, then click on the Mark as returned button.

## Loan Management

[New](#)

Search a loan by user's full name or book barcode
 [Search](#)

Borrow date

Select a date to view new borrows in that date.

Return date

Select a date to view new returns in that date.

Borrower	Book	Status	Start date	Due date	Return date	Extended
test1 test1	B123 Python	LATE	07/25/2021 10:52 p.m.	08/12/2021 10:52 p.m.	—	X

[Mark as returned](#)
[Edit due date](#)

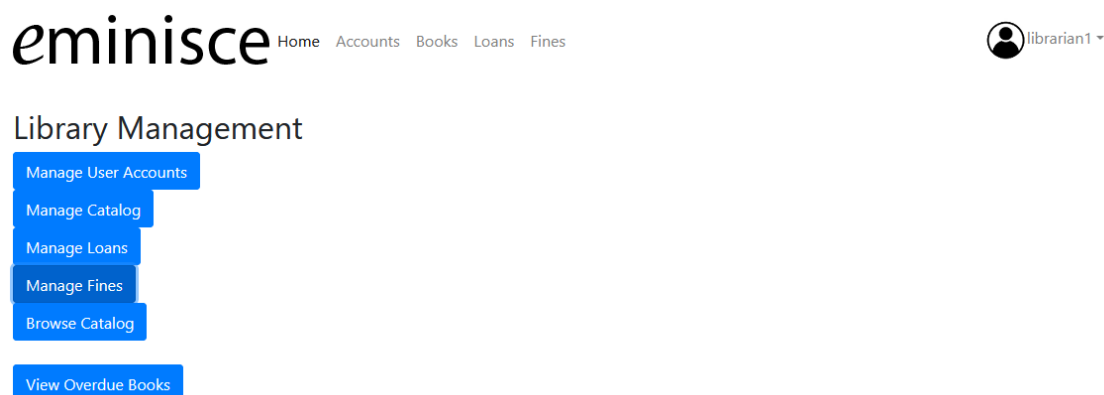
## 4.5. Fine Management

There are many situations when a user would be fined. The system keeps track of fines and allows the librarian to manage these.

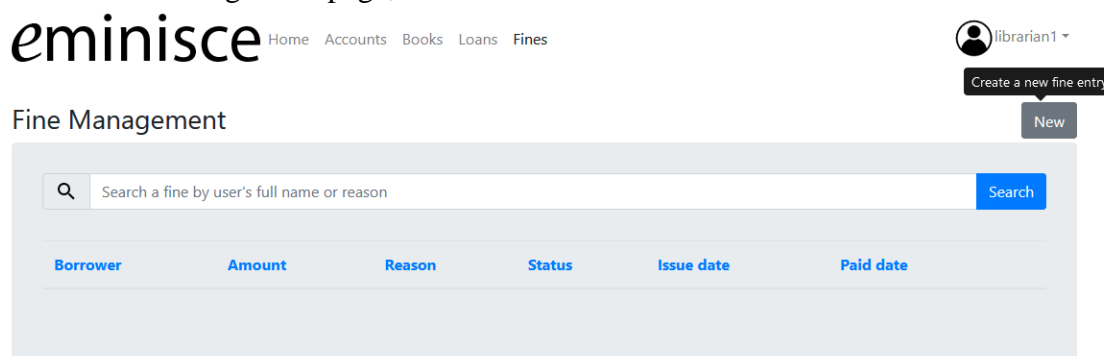


### 4.5.1. Add fine

1. Login either as an admin or a librarian.
2. On the home page, click on Manage Fine button.



3. On the fine management page, click on New button.



4. Enter the required information.

The screenshot shows the eminisce 'Create a new fine entry' form. The header is identical to the previous screenshots. Below the header, the 'Create a new fine entry' section contains a form with the following fields:
 

- Borrower\***: A dropdown menu with 'test1 test1' selected.
- Amount\***: A text input field containing '19.84'. Below it, a note reads 'Amount in SGD. Up to 2 decimal places.'
- Reason**: A text input field containing 'Reckless handling of book.'. Below it, a note reads 'Reason for the fine.'
- Issue Date\***: A date and time picker showing '25/07/2021 23:01'. Below it, a note reads 'The issue date of the fine.'

 A 'Save' button is located at the bottom of the form.

5. Press Save.

## 4.5.2. Edit fine

1. Login either as an admin or a librarian.
2. On the home page, click on Manage Fines button.
3. Find the fine that you want to edit, then click on the Edit button.

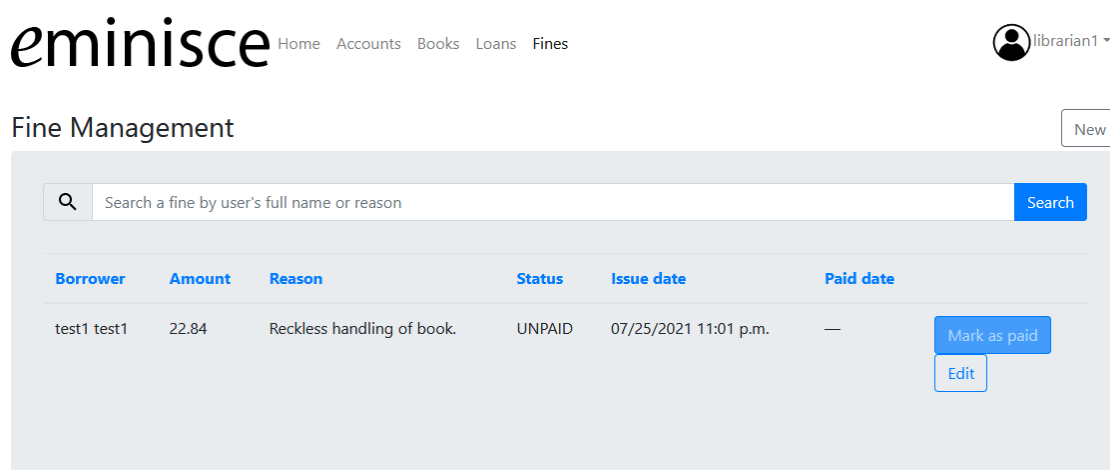
4. Make changes and click the Save button.

## 4.5.3. Mark fine as paid

In case a library user wants to pay by cash, the librarian can manually mark the fine as paid.

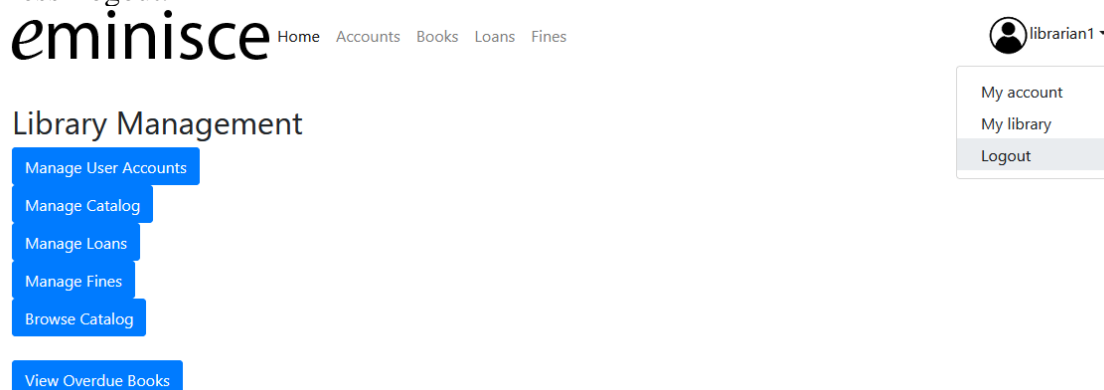
1. Login either as an admin or a librarian.
2. On the home page, click on Manage Loan button.

- Find the fine that you want to mark as paid, then click on the Mark as paid button.



## 4.6. Logout

- Click on your profile name on the top right of the website.
- Press Logout.



## 5. Authentication – Biometric Data Enrolment

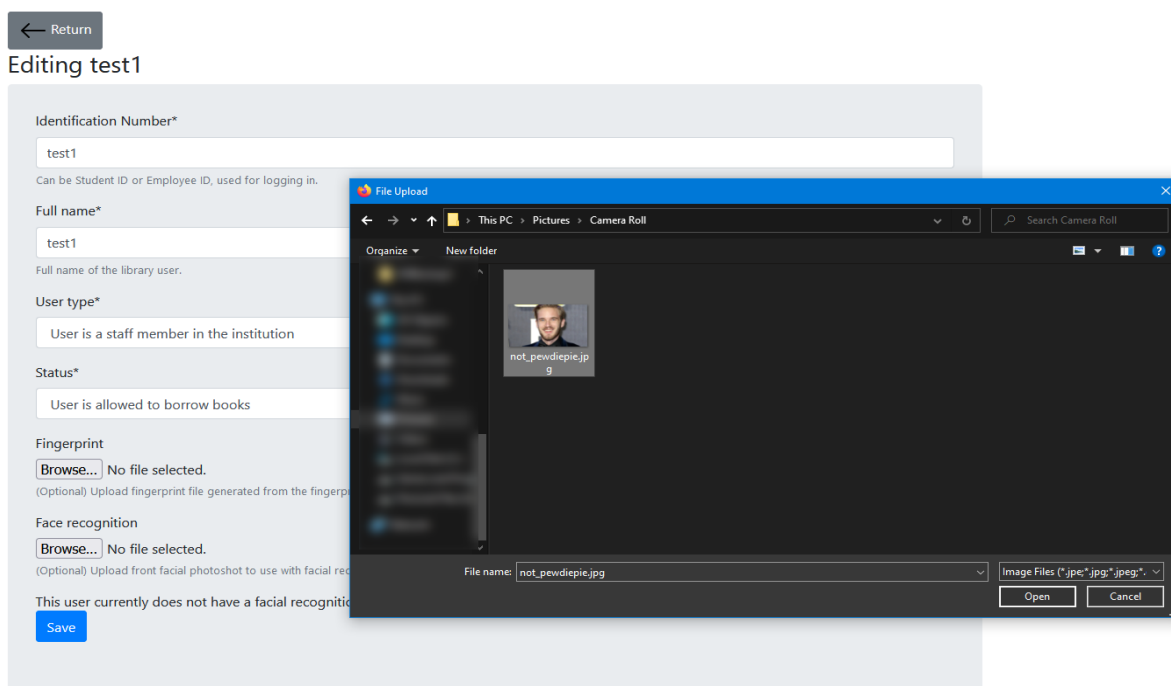
### 5.1. Enrolling User Face

To enable the use of face recognition for borrowing book card-free, the user must first have his/her face registered in the database. This process is extremely easy as it only requires a clear, upright image of the user's face. The user's face should be clearly visible and take up a large portion of the image for best recognition quality. There is no restriction on how the image is captured as long as an image file is produced to be uploaded.

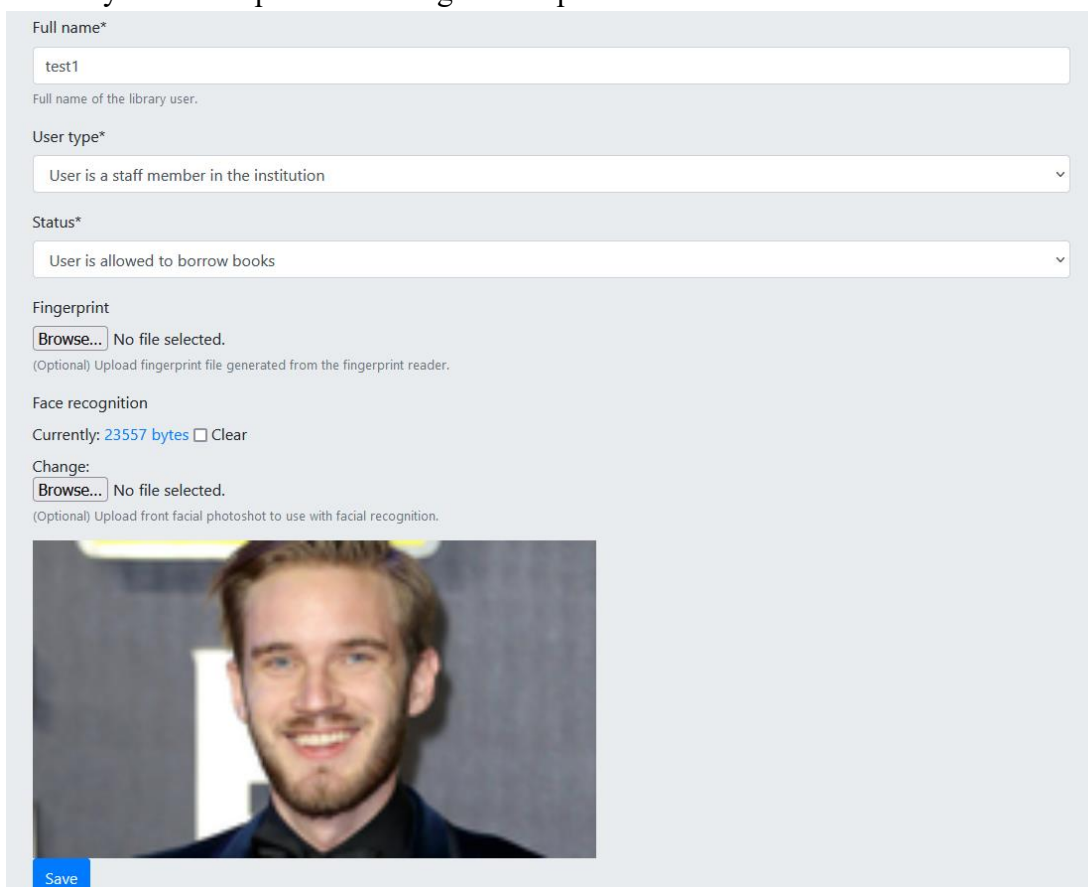
Note: Both the face and the fingerprint must be enrolled for an account before the user can make use of biometric authentication to borrow books..

- Login either as an admin or a librarian.
- On the home page, click on Manage User Accounts button.
- Find the user's account that you want to enroll for, then click on the Edit button.
- Use any camera, built-in or external, to take a clear image of the user's face.

## 5. Upload the image file to the Face Recognition field.



- 6.
7. Press Save.
8. Ensure you see the processed image of the person's face.



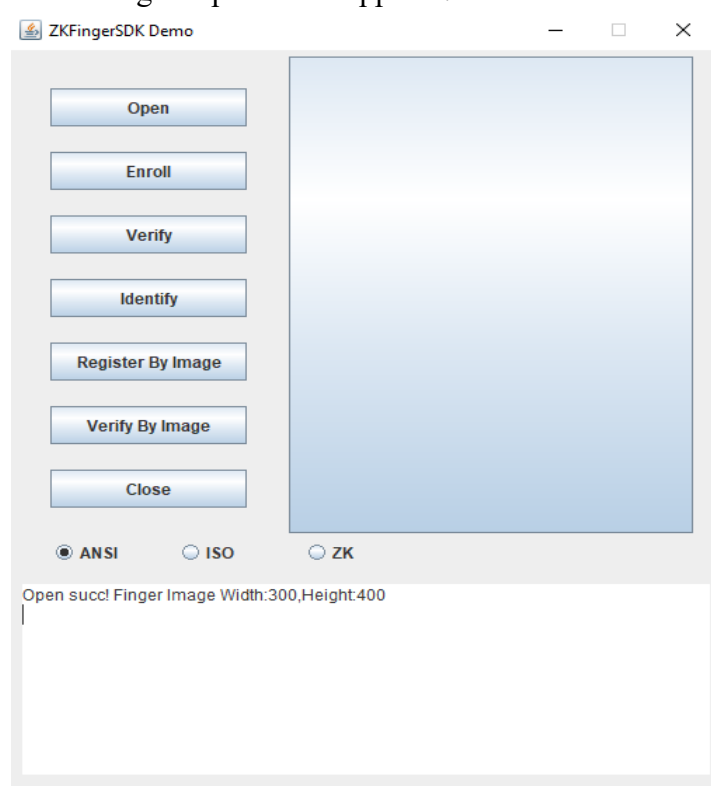
## 5.2.Enrolling Fingerprint

To enable the use of fingerprint scanning for borrowing book card-free, the user must first have his/her fingerprint registered in the database. This requires the librarian / admin to have a compatible fingerprint scanner connected and the appropriate driver installed. You can install the driver in the folder Fingerprint folder in the repo by running *driver\_setup.exe*. Additionally, Java JDK and SE of at least version 12 must be installed on the staff's computer. The user must be present with the staff to capture his/her fingerprint on the spot.

First, please install ZKFingerSDK Driver for Windows 10. After installing the driver, please find the Fingerprint folder the file ZKFinger\_Windows.jar file. If you are unable to run it, please check that you installed the required Java version and the driver correctly.

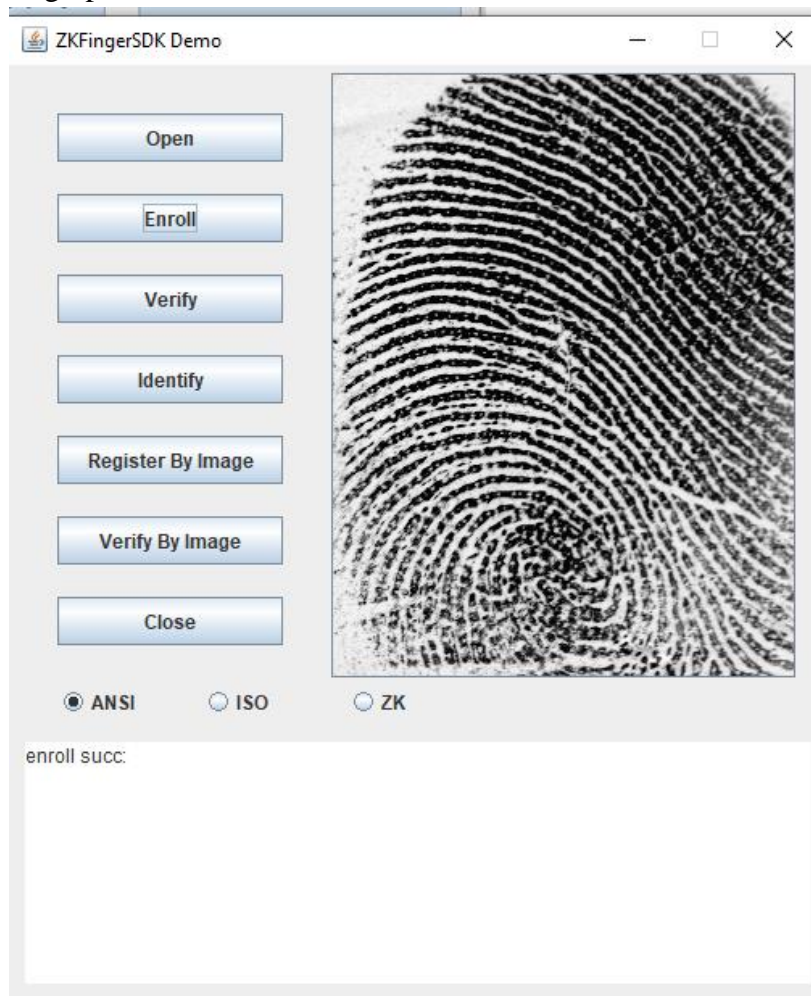
Note: Both the face and the fingerprint must be enrolled for an account before the user can make use of biometric authentication to borrow books.

1. Login either as an admin or a librarian.
2. On the home page, click on Manage User Accounts button.
3. Find the user's account that you want to enroll for, then click on the Edit button.
4. Open the file ZKFinger\_Windows.jar file and click on "Open" button. Verify that the message "Open succ" appears.

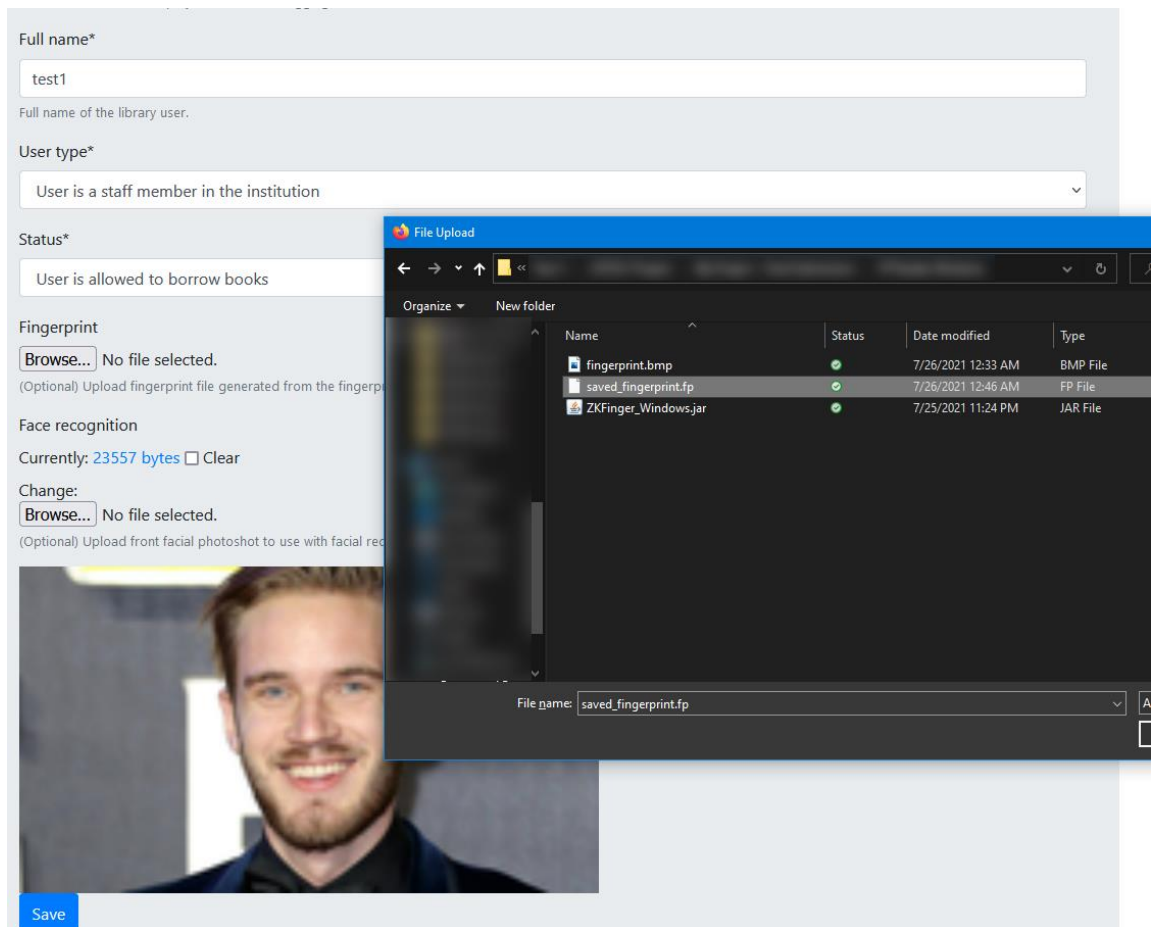


5. Press the Enroll button.
6. Instruct the user to press his/her fingerprint on the scanner 3 times.
7. Once successful, you should see the message "enroll succ" and an image of the

fingerprint. Now



8. Check the folder the jar is in (in our case the Fingerprint folder), there should be a file called saved\_fingerprint.fp and a fingerprint image.
9. Upload the saved\_fingerprint.fp file to the Fingerprint field.



10. Press Save button.

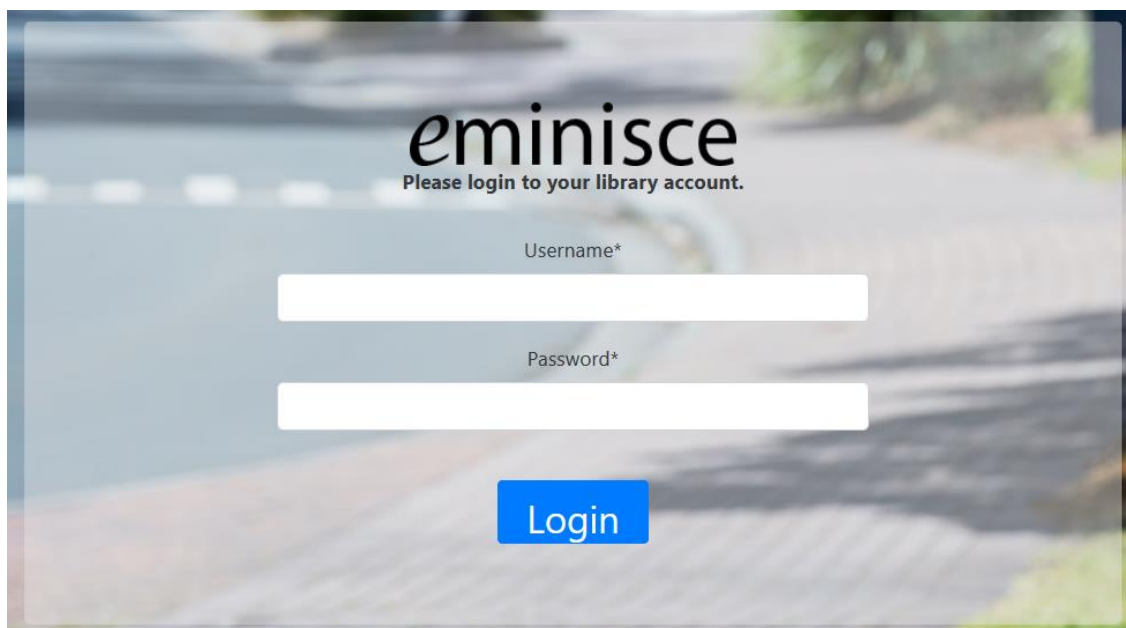
## 6. Web Application – Library User

Library users can login to the web application to manage their own activity in the library. They can also browse the catalog and view book information.

### 6.1. Login

Follow [4.2.1.](#) to create library user accounts before the user is able to login.

1. Access the website using a web browser.
2. If you are not logged in, you will be prompted to login.



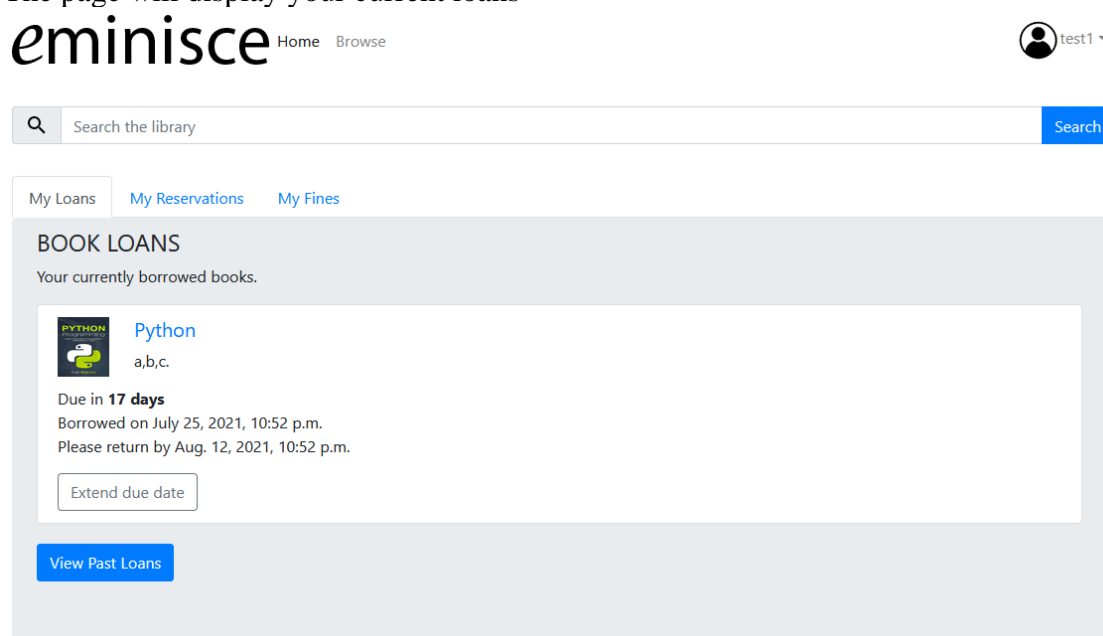
The login page features the 'eminisce' logo at the top, followed by the text 'Please login to your library account.' Below this are two input fields: 'Username\*' and 'Password\*'. A blue 'Login' button is positioned below the password field. The background is a blurred image of a paved path.

3. Enter a valid username in the username field.
4. Enter a valid password in the password field.
5. Click login.
6. You will be redirected to the library user home page.

## 6.2. View current books borrowed

If you are not currently borrowing any books, a short text informing you of that will appear. If any of your current borrowed books are overdue, the page will warn you of the fact.

1. Login as a library user.
2. On the home page, click on My Loans tab.
3. The page will display your current loans



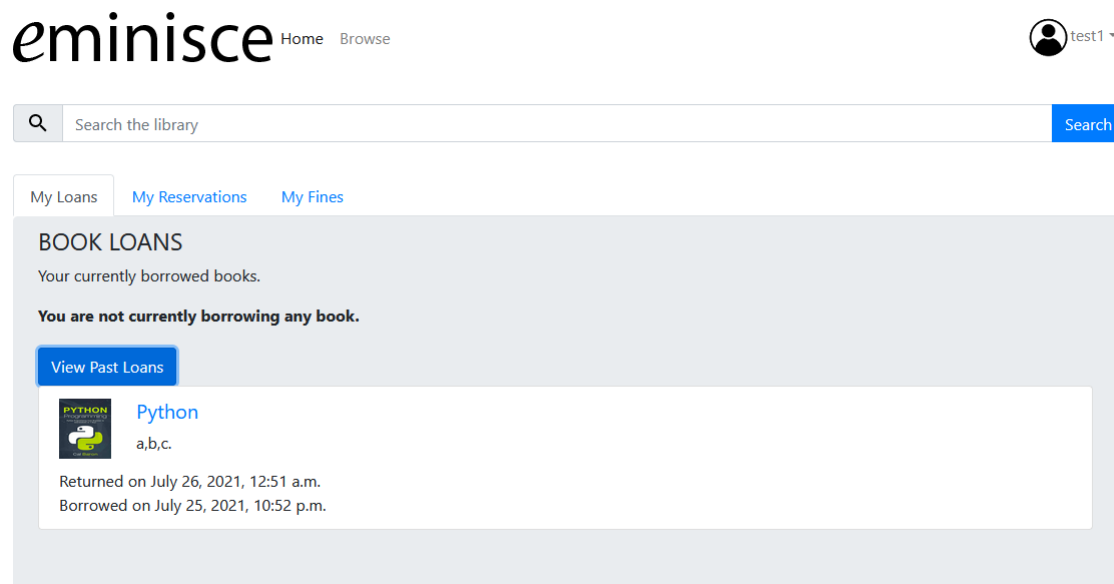
The user home page displays the 'eminisce' logo and navigation links 'Home' and 'Browse'. A user profile icon labeled 'test1' is in the top right. Below is a search bar with the placeholder 'Search the library' and a blue 'Search' button. A tabbed interface shows 'My Loans' as the active tab, with 'My Reservations' and 'My Fines' as options. The 'BOOK LOANS' section is titled 'Your currently borrowed books.' and contains a card for a book titled 'Python' by 'a,b,c.'. The card shows 'Due in 17 days', 'Borrowed on July 25, 2021, 10:52 p.m.', and 'Please return by Aug. 12, 2021, 10:52 p.m.'. An 'Extend due date' button is at the bottom of the card. A blue 'View Past Loans' button is located below the card.



### 6.3. View past books borrowed

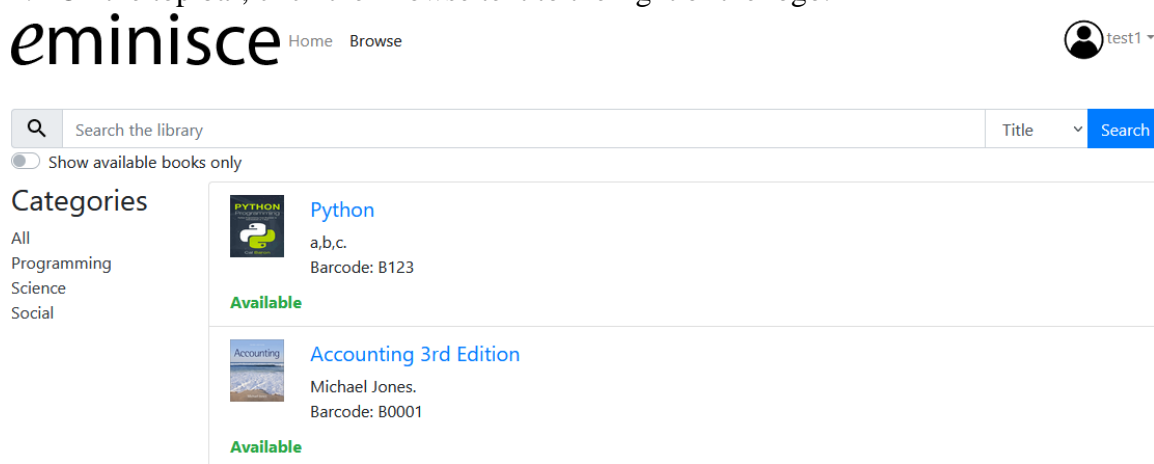
If have not borrowed any book in the past, a short text informing you of that will appear.

1. Login as a library user.
2. On the home page, click on My Loans tab.
3. Click on the View Past Loans button.



### 6.4. Browse catalog

1. Login as a library user.
2. On the top bar, click the Browse text to the right of the logo.




### 6.5. View book description

You can also quickly view a book's description by clicking on the book's name if it is blue (e.g., when viewing loans).


1. Login as a library user.
2. On the top bar, click the Browse text to the right of the logo.

## 3. Select a book to view its description.

**eminisce** [Home](#) [Browse](#)

 test1 ▾

[← Return to catalog](#)



Python  
a,b,c

Available at Tay Eng Soon Library Course 21 Days (004 HOS)

### Details

Title:	Python
Author:	a,b,c
Creation Date:	2019
Language	English
Description	Python

### Availability


Barcode	Type	Policy	Description	Status
B123	Book	21 Day Loan		Item in place

## 6.6. Reserve book


When viewing a book's description, you can choose to reserve a book. You can only reserve books that are currently unavailable. You will be informed of the expected date of which the book will become available and the latest date after which if you have not picked up a book, it will no longer be reserved for you.

1. Choose the book that you want to reserve.
2. In its description page, scroll down to the Reserve section.
3. Choose its barcode and press Submit.

**eminisce** [Home](#) [Browse](#)

 test1 ▾

[← Return to catalog](#)



Python  
a,b,c

Currently unavailable. You can reserve this book.

### Details

Title:	Python
Author:	a,b,c
Creation Date:	2019
Language	English
Description	Python

### Availability

Barcode	Type	Policy	Description	Status
B123	Book	21 Day Loan		Item unavailable


### Reserve It Now

▾

## 6.7. View current reserved books

If you are not currently reserving any book, a short text informing you of that will appear.


1. Login as a library user.
2. On the home page, click on My Reservation tab.
3. The page will display your current reservations

 Search the library

Search

[My Loans](#) [My Reservations](#) [My Fines](#)


**BOOK RESERVATIONS**  
Your currently reserved books.  
Reserved items to be collected at **Xpress Collect(Blk B L1 Interactive Lounge)**

 **Python**  
a,b,c.  
Expected availability date: From **Aug. 16, 2021, 12:02 a.m.**  
Pickup before: **Aug. 17, 2021, 12:02 a.m.**

## 6.8. View current fine outstanding amount

If you have unpaid fine, you will be able to view the total outstanding amount you have to pay here. The outstanding amount is the sum of all the individual unpaid fines you have.

1. Login as a library user.
2. On the home page, click on My Fines tab.
3. The page will display your current fine info.

 Search the library

Search

[My Loans](#) [My Reservations](#) [My Fines](#)

**FINES**  
Here you can view your outstanding fines. You can choose to pay them online here or pay by cash at the librarian's desk.  
**OUTSTANDING: \$22.84**  
[PayPal](#) [PayLah](#) [eNETS](#) [Credit / Debit Card](#)  
[View Fines](#)

## 6.9. View fines detail

1. Login as a library user.
2. On the home page, click on My Fines tab.
3. Click View Fines button.

**eminisce** Home Browse

Search the library Search

My Loans My Reservations **My Fines**

**FINES**  
Here you can view your outstanding fines. You can choose to pay them online here or pay by cash at the librarian's desk.

**OUTSTANDING: \$28.34**

PayPal PayLah eNETS Credit / Debit Card

**View Fines**

	<b>\$5.50</b> <b>Reason:</b> Late return of book.. Issued on July 26, 2021, 12:12 a.m. <b>Unpaid.</b>
	<b>\$22.84</b> <b>Reason:</b> Reckless handling of book.. Issued on July 25, 2021, 11:01 p.m. <b>Unpaid.</b>

## 6.10. Pay fines

Note that you can only pay for all unpaid fines at once, not any individual fine.

1. Login as a library user.
2. On the home page, click on My Fines tab.
3. Choose any of the methods to pay your fine.

Transaction successful. You have paid all your fines.

**eminisce** Home Browse

Search the library Search

My Loans My Reservations **My Fines**

**FINES**  
Here you can view your outstanding fines. You can choose to pay them online here or pay by cash at the librarian's desk.

**OUTSTANDING: \$0**

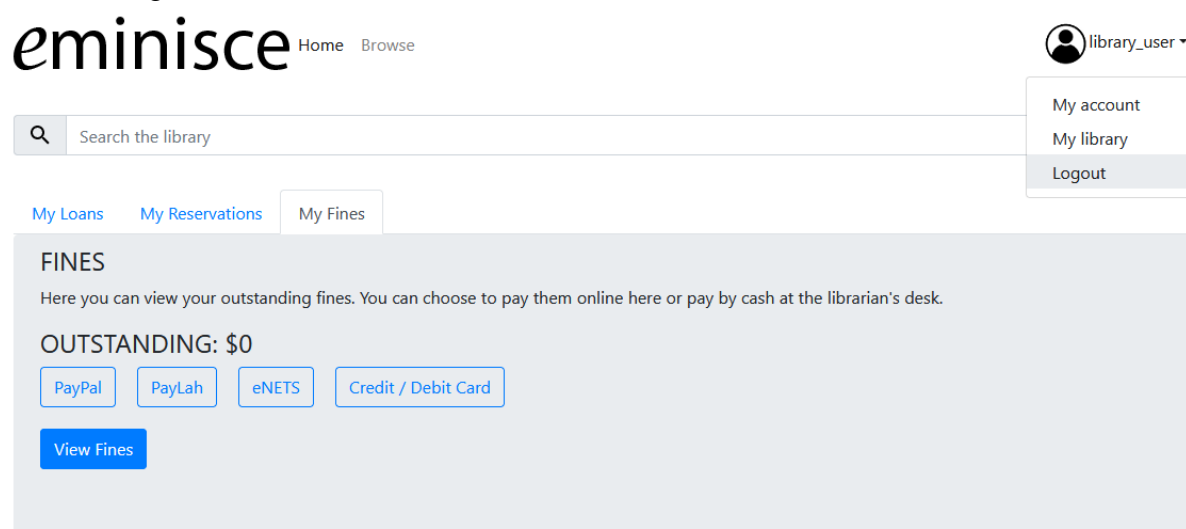
PayPal PayLah eNETS Credit / Debit Card

**View Fines**

	<b>\$5.50</b> <b>Reason:</b> Late return of book.. Issued on July 26, 2021, 12:12 a.m. Paid on July 26, 2021, 1:13 a.m.
	<b>\$22.84</b> <b>Reason:</b> Reckless handling of book.. Issued on July 25, 2021, 11:01 p.m. Paid on July 26, 2021, 1:13 a.m.

## 6.11. Logout

1. Click on your profile name on the top right of the website.
2. Press Logout.



## 7. Android Application – Initial Setup

### 7.1. Building the Android Application for your environment

Before the Android application can connect to your web server, we need to create an account that the Android application will use to represent itself as to get access to the database. The account will not have a password and thus cannot login, but instead will have an access token.

To generate an account with a token, please open a new Django shell by running this command at the root directory of your web application with the Django virtual environment activated: `python manage.py shell`, create a new user (without a password), then getting a token for that user by running the following code:

```
from django.contrib.auth.models import User
usr = User.objects.create(username='<username>')
usr.set_unusable_password()
usr.save()
from rest_framework.authtoken.models import Token
token = Token.objects.create(user=usr)
print(token.key)
```

Where `<username>` is your desired username. Example: `checkoutmachine1`.

Upon running this, the last line will be your token key. Please copy it and keep it safe.

```
(Django) PS E:\OneDrive - SIM - Singapore Institute of Management\SIM\Year 3\CSIT321 Project\Eminisce_Web_App\eminisce> python manage.py shell
Python 3.8.6 (tags/v3.8.6:db45529, Sep 23 2020, 15:52:53) [MSC v.1927 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
(InteractiveConsole)
>>> from django.contrib.auth.models import User
>>> usr = User.objects.create(username='checkoutmachine1')
>>> usr.set_unusable_password()
>>> usr.save()
>>> from rest_framework.authtoken.models import Token
>>> token = Token.objects.create(user=usr)
>>> print(token.key)
be95042f3931086fee4c4c2f9f8a4be19993989d <-- Please copy this and keep it a secret
```

For more details, please visit the link [Django REST Framework Authentication](#) in Appendix A.

To be able to use the Android application for setting up the self-service borrowing machine, you must first build the Android application. You will need Android Studio of at least version 2020.3.1 installed and its required Java version.

Open the downloaded repo folder in Android Studio and make the following changes:

- In **MainActivity.java**: Find line 90 and replace the variable `BASE_URL` with the address of your web application. If you have not setup your web application server, please do so by following [2.1](#).
- In **server/JsonBioApi.java**: Find line 12 and replace the authorization token with your own token generated in the earlier step.
- In **Methods.java**: Find line 12 and line 16 and replace the authorization token with the token you just generated.

Now please build the APK file by running Build > Generate Signed Bundle / APK... and deploy it on an Android device which will be used as the customer-facing self-service machine for borrowing books.

It is recommended that you secure your Android device to prevent theft and turn on Kiosk mode to prevent users from exiting the app.

### 7.2. Connect Fingerprint Scanner

After you have built and installed the APK file on your Android device, please connect a compatible Fingerprint Scanner to your Android device.

### 7.3. (Optional) Connect RFID Reader

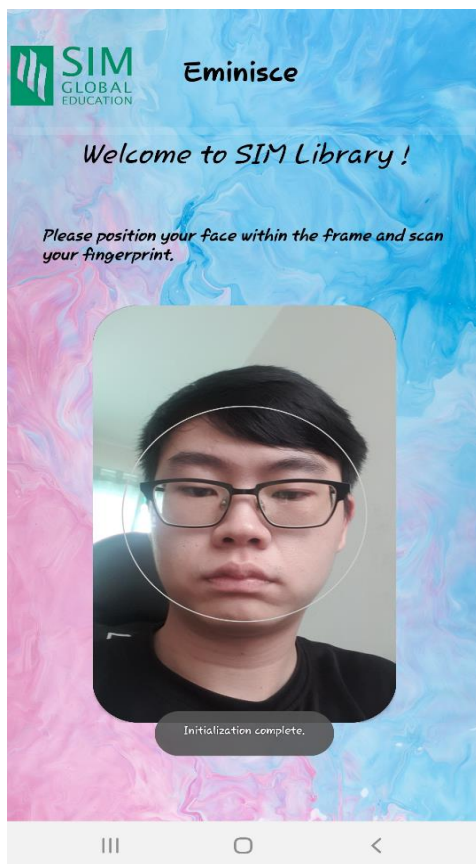
Eminisce supports the optional connection of an RFID reader (wirelessly via local Wi-Fi network only). To connect your wireless RFID reader, make sure both the Android device and the RFID reader are connected to the same local Wi-Fi network. Obtain the IP address of your Android device by going to the Wi-Fi settings and choosing Advanced Network Details (the option might be different on your Android device), and setup your RFID reader to connect to that IP address using the port [6942](#)

### 7.4. Verifying readiness of the app

After you have installed the app on your Android device and connected a compatible fingerprint scanner, please launch the app and confirm that the app displays a message saying “Fingerprint Sensor Started Successfully.”.

The first time you launch the app, it will connect to the URL of your Django server to download biometric data. In subsequent launches, you will have the choice of redownloading the data or loading the already downloaded data. If you have changes to any of your user’s biometric data in the database, please choose to redownload the

data. To verify the loading of serialized data or redownloading of data is successful, please confirm that the app displays a message saying “Initialization complete.”.



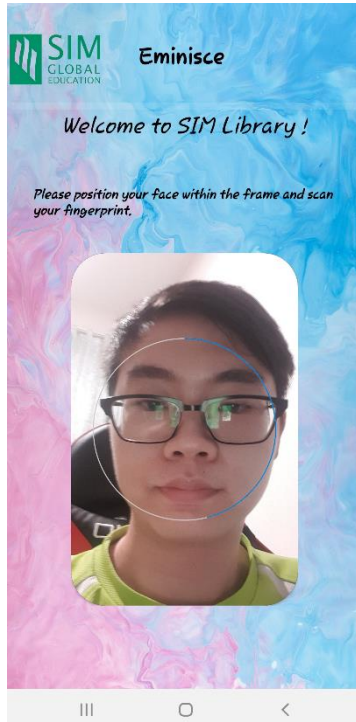
## 8. Android Application – Library User Borrowing

### 8.1. Biometric Authentication

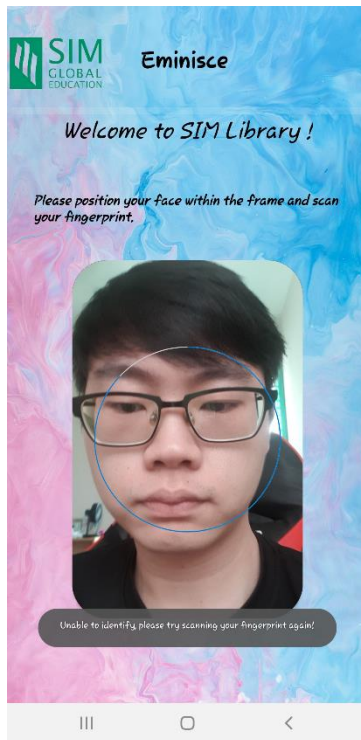
To make things more efficient and convenient for the user, we implemented a biometric authentication feature to allow the user to start the process of borrowing a book much simpler.

1. Please stand in front of borrowing machine.
2. Place your face within the circle on the screen and your finger onto the fingerprint reader.





3. If the user's facial and fingerprint data is valid, the machine will transition to the borrowing page. If the facial and fingerprint data is not valid for whatever reason, the system will prompt the user to re-scan their face and fingerprint.



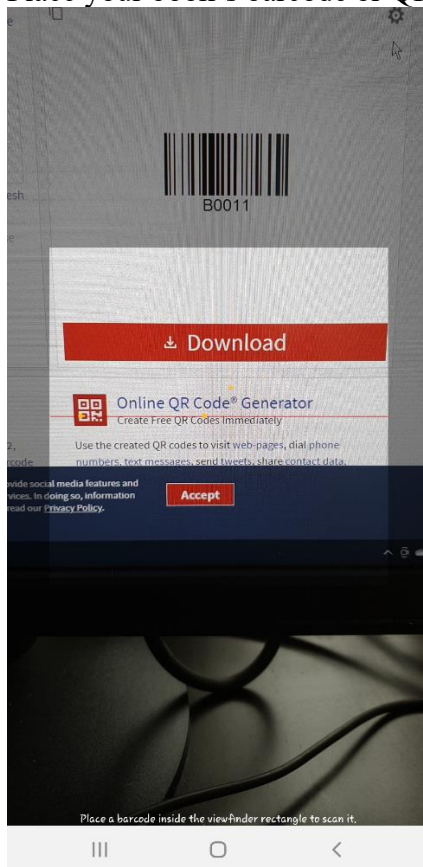
## 8.2. Book borrowing Page (Barcode / QR code scanning)

This page is the page where the user can scan his book either by barcode or QR code. Once the user has scanned the book the book's title and author's name will be displayed out for the user to check if it is the correct book the user plans to borrow. Once the user is ready to borrow the books,

1. To scan the barcode or QR code of the book, press the scan button on the screen and the application will turn on the camera.

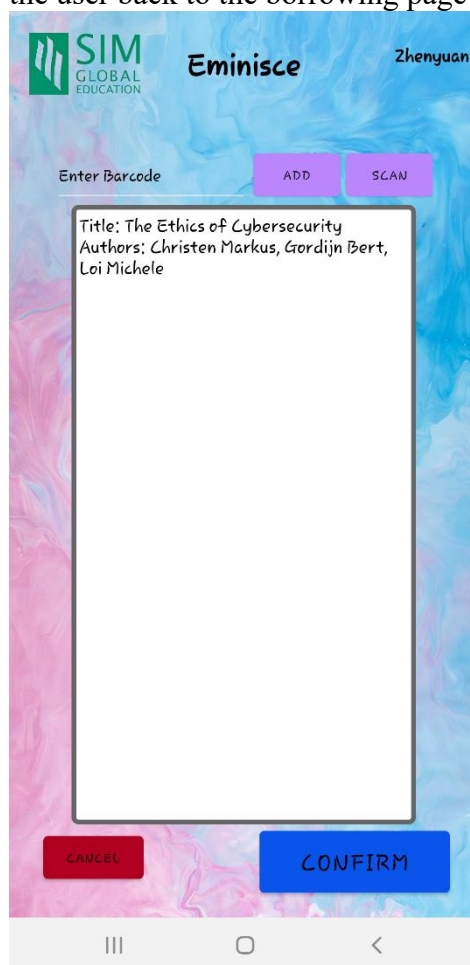


2. Place your book's barcode or QR code within the scanner box



3. Once the reader detects and read the barcode or QR code, the application will bring

the user back to the borrowing page and the book's information will be displayed.



### 8.3. Book borrowing Page (RFID scanning)

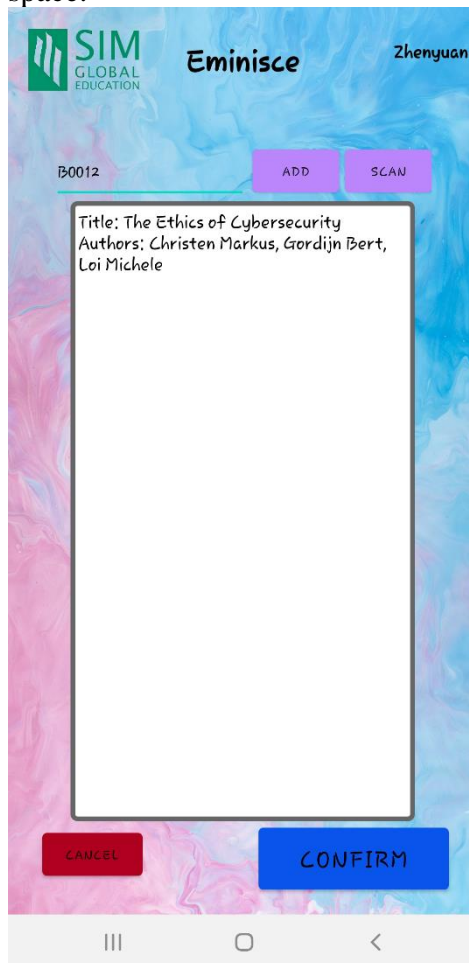
This page is also the page where the user can also scan his book by RFID. Once the user has either scanned the book the book's title and author's name would be displayed out for the user to check if it is the correct book the user plans to borrow. Once the user is ready to borrow the books,

1. To scan the RFID of the book, just place the book close to the machine and the RFID reader will read the book RFID tag and display the book's information onto the screen.

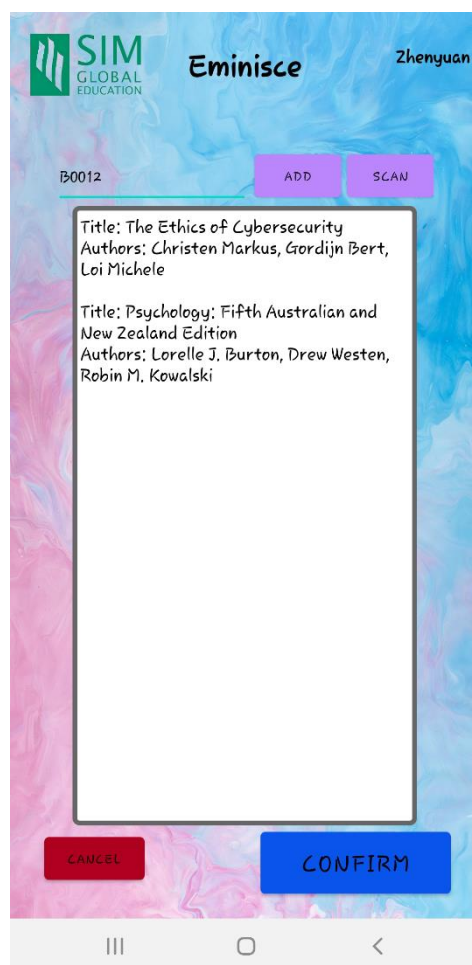
### 8.4. Book borrowing Page (Manually entering Book Barcode)

This page is also the page where the user can also manually type in the book ID in case of a damaged barcode/QR code or malfunctioning camera. Once the user has manually typed in the book ID, the book's title and author's name would be displayed out for the user to check if it is the correct book the user plans to borrow. Once the user is ready to borrow the books,

1. To add the book ID manually, first type in the book ID in the “Enter barcode” text space.



2. Press the add button next to the text space and the book information would be automatically displayed on the screen.

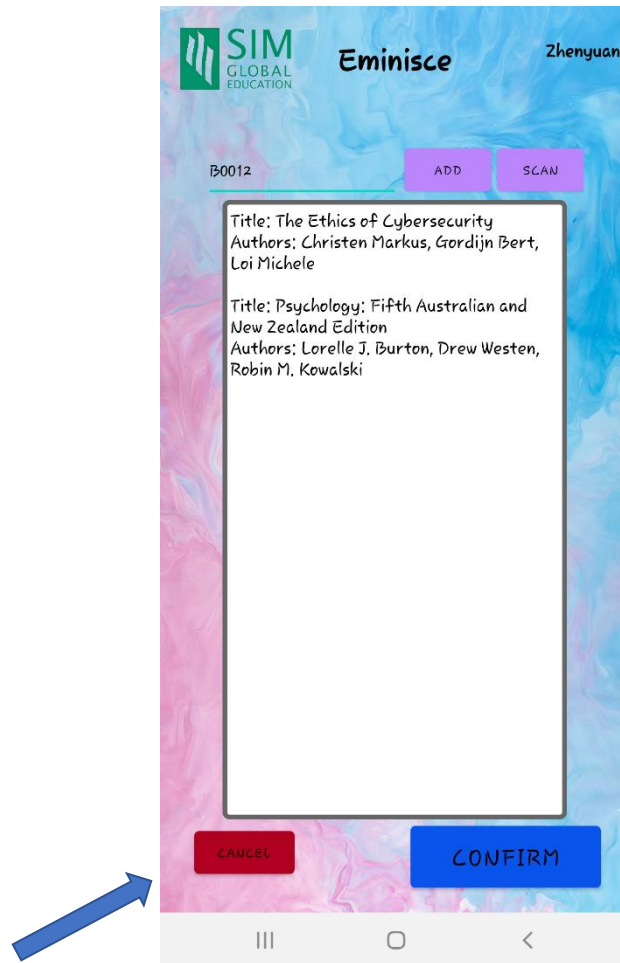


### 8.5. Book borrowing Page (Cancelling borrowing process)

If the user wants to cancel the borrowing process, the user will just have to press the cancel button at the bottom left of the screen. The system will then bring the user back to the authentication page which the user would then have to re-authenticate themselves to start the borrowing process once more.

1. Press the cancel button located at the bottom left of the screen.





2. System will bring user back to the authentication page.

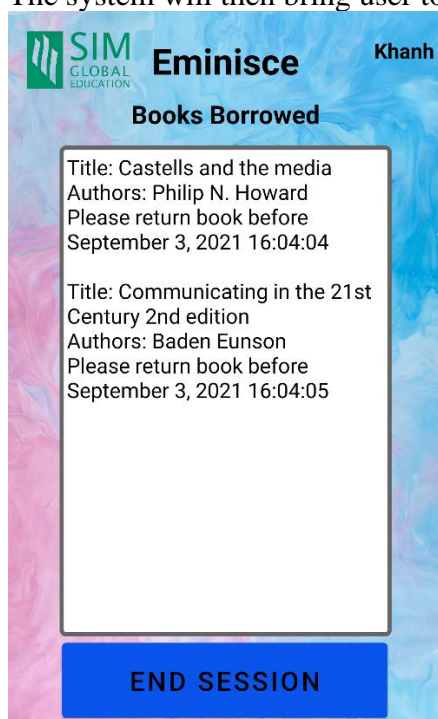
## 8.6. Book borrowing Page (Confirming loan of Book)

After the user has confirmed that the books displayed on the screen are the books the user wants to borrow, the user will have to press the confirm button located at the bottom of the screen. The system will then borrow the books under the user's account and ID. The system will then bring the user to the checkout page.

1. Press the confirm button located at the bottom right of the screen.



2. The system will then bring user to the checkout page.

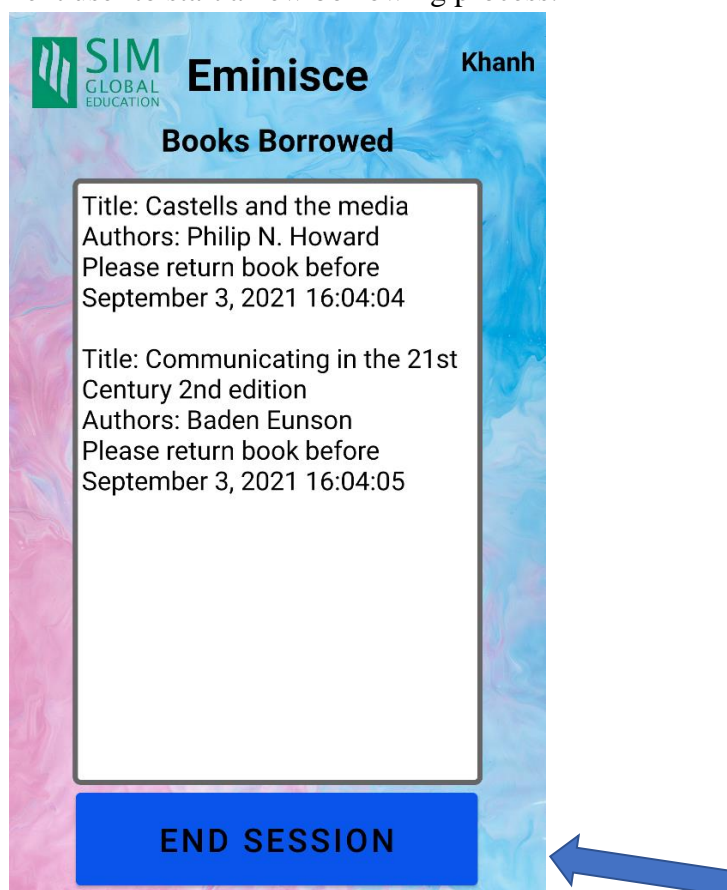


## 8.7. Check-Out Page (Ending Session)

Once the system has borrowed the books, the book's title, author, and the due date of when to return the book, will be displayed on the check-out page, allowing the user



to view the books he had borrowed and their due dates. The user can then end the borrowing process by pressing the “End Session” button located at the bottom of the screen which would bring the screen back to the authentication page to allow the next user to start a new borrowing process.



## Appendix A

### Helpful links

Installing packages using pip and virtual environments  
<https://packaging.python.org/guides/installing-using-pip-and-virtual-environments/>

Documentation on configuring database <https://docs.djangoproject.com/en/dev/ref/databases/>

Using NGINX and NGINX Plus as an Application Gateway with uWSGI and Django  
<https://docs.nginx.com/nginx/admin-guide/web-server/app-gateway-uwsgi-django/>

Django REST Framework Authentication <https://www.django-rest-framework.org/api-guide/authentication/>