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Project 4 Task 2 – Book Explorer App

By Varaun Gandhi - vbgandhi

Description:

My application allows users to search for books using Google Books API. The Android app enables users to enter a search term, which is sent to a web service running on TomEE. The web service makes a request to the Google Books API, processes the response, logs the activity to MongoDB Atlas, and returns relevant book information to the Android app for display.

Here is how my application meets the task requirements:

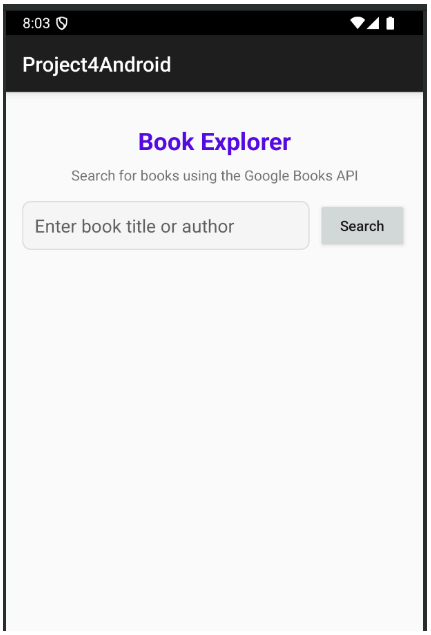
1. Implement a native Android application

The name of my native Android application project in Android Studio is: Project4Android

a. Has at least three different kinds of Views in your Layout

My application uses TextView, EditText, Button, RecyclerView, and ImageView. The layout uses ConstraintLayout to organize these elements.

Here is a screenshot of the layout before a search is performed:



8:03
Project4Android
Book Explorer
Search for books using the Google Books API
Enter book title or author
Search

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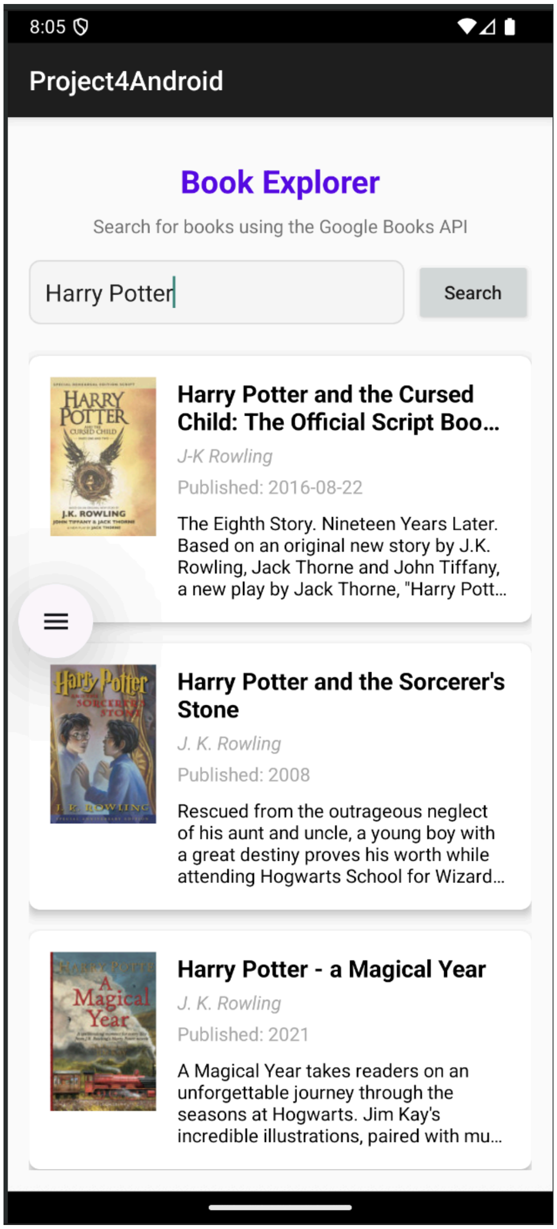
b. Requires input from the user

Here is a screenshot of the user searching for books:



Book Explorer

Search for books using the Google Books API

Harry Potter

Harry Potter and the Cursed Child: The Official Script Boo...

J-K Rowling

Published: 2016-08-22

The Eighth Story. Nineteen Years Later. Based on an original new story by J.K. Rowling, Jack Thorne and John Tiffany, a new play by Jack Thorne, "Harry Pott...

Harry Potter and the Sorcerer's Stone

J. K. Rowling

Published: 2008

Rescued from the outrageous neglect of his aunt and uncle, a young boy with a great destiny proves his worth while attending Hogwarts School for Wizard...

Harry Potter - a Magical Year

J. K. Rowling

Published: 2021

A Magical Year takes readers on an unforgettable journey through the seasons at Hogwarts. Jim Kay's incredible illustrations, paired with mu...

c. Makes an HTTP request to your web service

My application does an HTTP GET request in BookSearchTask.java. The HTTP request is:

https://urban-sniffle-94jgrj45w49hx7pr-8080.app.github.dev/book?query=[search_term]

where [search_term] is the user's search query.

The BookSearchTask performs this request asynchronously, ensuring the UI thread remains responsive.

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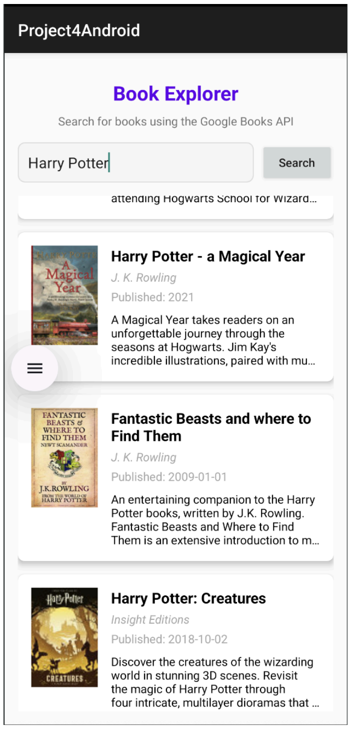
d. Receives and parses a JSON formatted reply from the web service

An example of the JSON reply is:

```
{
  "books": [
    {
      "title": "Harry Potter and the Sorcerer's Stone",
      "author": "J.K. Rowling",
      "publishedDate": "1998-09-01",
      "description": "Harry Potter has no idea how famous he is...",
      "thumbnail": "http://books.google.com/books/content?id=wrOQLV6xB-wC&printsec=frontcover&img=1&zoom=1&edge=curl&source=gbs_api"
    },
    ...
  ],
  "count": 5
}
```

e. Displays new information to the user

Here is the screenshot after book results have been returned:



Book Explorer

Search for books using the Google Books API

Harry Potter

attending Hogwarts School for Wizard...

Harry Potter - a Magical Year

J. K. Rowling

Published: 2021

A Magical Year takes readers on an unforgettable journey through the seasons at Hogwarts. Jim Kay's incredible illustrations, paired with mu...

Fantastic Beasts and where to Find Them

J. K. Rowling

Published: 2009-01-01

An entertaining companion to the Harry Potter books, written by J.K. Rowling. Fantastic Beasts and Where to Find Them is an extensive introduction to m...

Harry Potter: Creatures

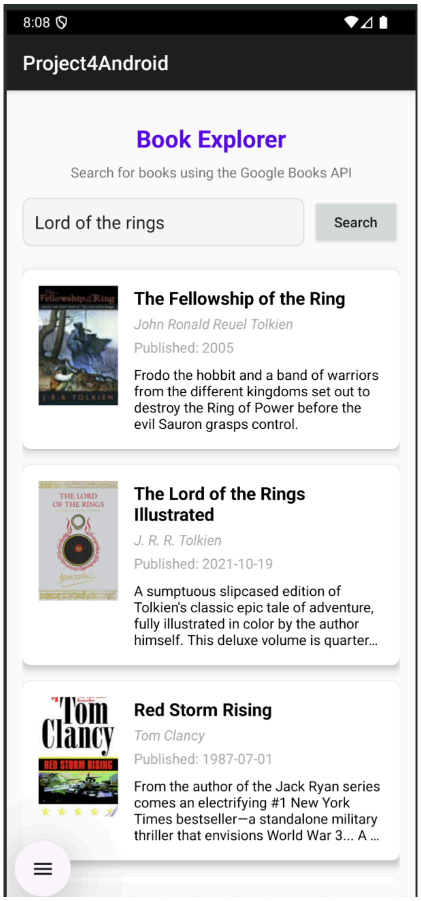
Insight Editions

Published: 2018-10-02

Discover the creatures of the wizarding world in stunning 3D scenes. Revisit the magic of Harry Potter through four intricate, multilayer dioramas that ...

f. Is repeatable (i.e. the user can repeatedly reuse the application without restarting it)

The user can enter different search terms and tap "Search" multiple times to get new results. Here is an example of another search:



Book Explorer

Search for books using the Google Books API

Lord of the rings

The Fellowship of the Ring

John Ronald Reuel Tolkien

Published: 2005

Frodo the hobbit and a band of warriors from the different kingdoms set out to destroy the Ring of Power before the evil Sauron grasps control.

The Lord of the Rings Illustrated

J. R. R. Tolkien

Published: 2021-10-19

A sumptuous slipcased edition of Tolkien's classic epic tale of adventure, fully illustrated in color by the author himself. This deluxe volume is quarter...

Red Storm Rising

Tom Clancy

Published: 1987-07-01

From the author of the Jack Ryan series comes an electrifying #1 New York Times bestseller—a standalone military thriller that envisions World War 3... A ...

2. Implement a web service

The web service is deployed on TomEE server running on my local machine.

a. Using a Servlet to implement a simple API

In my web app project:

- Controller: BookInfoServlet.java
- Dashboard: DashboardServlet.java

b. Receives an HTTP request from the native Android application

BookInfoServlet.java receives the HTTP GET request with the "query" parameter. It validates this parameter and processes the request.

c. Executes business logic appropriate to your application

BookInfoServlet.java makes an HTTP request to the Google Books API:

https://www.googleapis.com/books/v1/volumes?q=[search_term]&maxResults=5

It then parses the JSON response, extracts the relevant book information (title, author, description, etc.), and prepares a simplified response for the Android app.

d. Replies to the Android application with a JSON formatted response

The servlet formats the response to the mobile application in clean JSON format:

```
{
  "books": [
    {
      "title": "Book Title",
      "author": "Author Name",
      "publishedDate": "YYYY-MM-DD",
      "description": "Book description...",
      "thumbnail": "URL to book cover"
    },
    ...
  ],
  "count": 5
}
```

3. Handle error conditions

My application handles the following error conditions:

- Invalid user input (empty search term)
- Network connectivity issues
- Web service unavailability
- Google Books API errors
- JSON parsing errors

4. Log useful information

My application logs the following information for each request:

- Unique request ID
- Search query
- Device model and user agent
- Request timestamp
- API request and response timestamps
- Response status code
- API latency (time between request and response)

This data is useful for tracking usage patterns, identifying performance issues, and debugging problems.

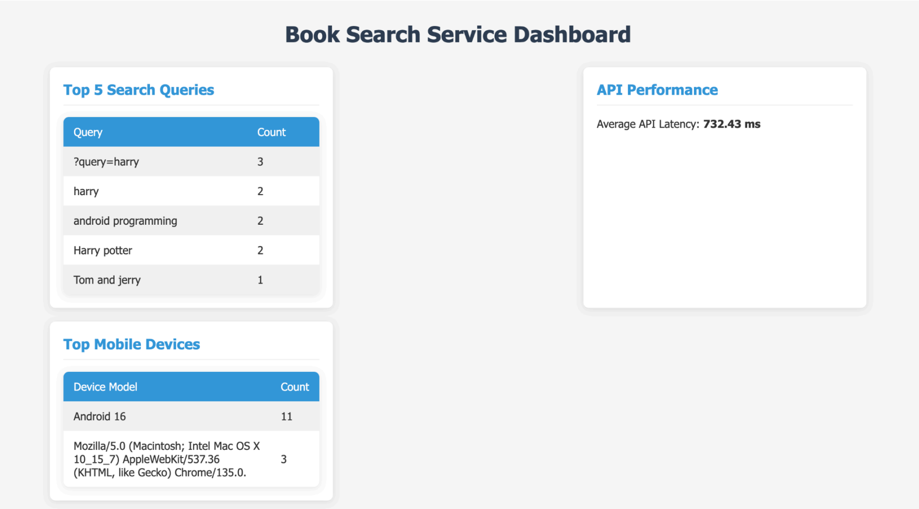
5. Store the log information in a database

The log information is stored in MongoDB Atlas. The connection string is:

mongodb+srv://[username]:[password]@cluster0.yy9zrki.mongodb.net/?retryWrites=true&w=majority&appName=Cluster0

6. Display operations analytics and full logs on a web-based dashboard

Here is a screenshot of the dashboard showing analytics and logs:



Book Search Service Dashboard

Top 5 Search Queries

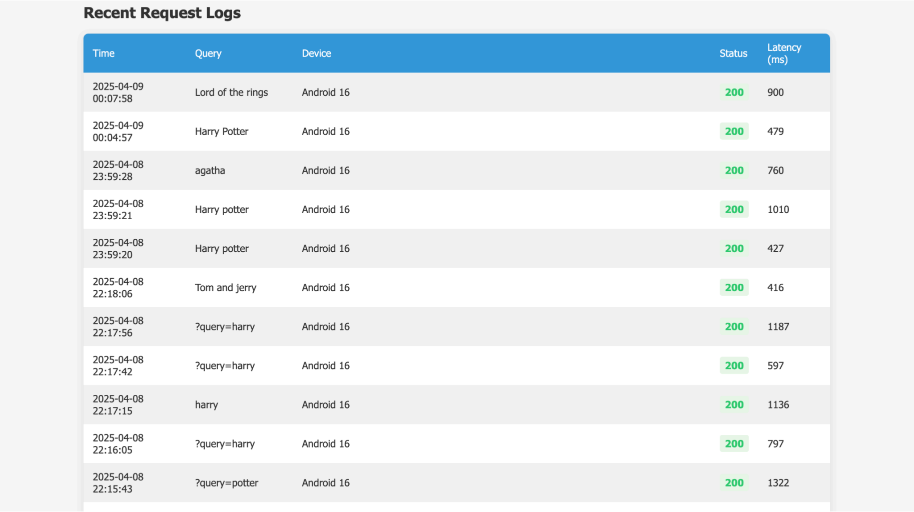
Query	Count
?query=harry	3
harry	2
android programming	2
Harry potter	2
Tom and jerry	1

API Performance

Average API Latency: **732.43 ms**

Top Mobile Devices

Device Model	Count
Android 16	11
Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/135.0.	3



Recent Request Logs

Time	Query	Device	Status	Latency (ms)
2025-04-09 00:07:58	Lord of the rings	Android 16	200	900
2025-04-09 00:04:57	Harry Potter	Android 16	200	479
2025-04-08 23:59:28	agatha	Android 16	200	760
2025-04-08 23:59:21	Harry potter	Android 16	200	1010
2025-04-08 23:59:20	Harry potter	Android 16	200	427
2025-04-08 22:18:06	Tom and jerry	Android 16	200	416
2025-04-08 22:17:56	?query=harry	Android 16	200	1187
2025-04-08 22:17:42	?query=harry	Android 16	200	597
2025-04-08 22:17:15	harry	Android 16	200	1136
2025-04-08 22:16:05	?query=harry	Android 16	200	797
2025-04-08 22:15:43	?query=potter	Android 16	200	1322

The dashboard displays:

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- Top search queries
- Average API latency
- Device distribution
- Chronological log of all requests