Project 4 WriteUp
By Yujia Wei (AndrewID: yujiawei)

Description:
My application takes an artist's name and a song, and returns the lyrics of the corresponding song.

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: LyricsFinder (in the folder named Android Application)

a. Use at Least Three Different Kinds of Views
The Android application includes the following views in the layout (activity_main.xml):

TextView: Displays labels and fetched lyrics.
EditText: Allows the user to input the artist name and song title.
Button: Initiates the fetch lyrics operation.
ScrollView: Enables scrolling to view long lyrics content.

b. Requires Input from the User
The app requires the user to input both an artist name and a song title in the EditText fields. The "Get Lyrics" button processes this input to fetch lyrics.

c. Makes an HTTP Request to the Web Service
The app sends an HTTP GET request to the web service hosted on Codespaces using the fetchLyrics() method in MainActivity.java. The URL structure includes the artist and song title as query parameters.

d. Receives and Parses an XML or JSON Formatted Reply
The application receives the response in JSON format. The lyrics are parsed from the JSON response using the org.json library and displayed in a TextView.

e. Displays New Information to the User
Fetched lyrics are displayed in the TextView within a ScrollView. The user can see and scroll through the lyrics.

f. Is Repeatable
The app allows users to fetch lyrics repeatedly without restarting. After a song's lyrics are displayed, users can enter a new artist and song to fetch other lyrics.

The following is a screenshot of the Android application

Lyrics Finder

Coldplay

Fix You|

Get Lyrics

When you try your best but you don't succeed
When you get what you want but not what you need
When you feel so tired but you can't sleep
Stuck in reverse
And the tears come streaming down your face
When you lose something you can't replace
When you love someone but it goes to waste
Could it be worse?
Lights will guide you home
And ignite your bones
And I will try to fix you
High up above or down below
When you're too in love to let it go
But if you never try you'll never know
Just what you're worth
Lights will guide you home
And ignite your bones
And I will try to fix you
Tears stream down your face
When you lose something you cannot replace
Tears stream down your face and I
Tears stream down your face
I promise you I will learn from all my mistakes
Tears stream down your face and I
Lights will guide you home
And ignite your bones
And I will try to fix you

2. Implement a Web Application Deployed to Codespaces

a. Use an HttpServlet to Implement a Simple API

The LyricsServlet is a servlet-based implementation that serves as the core API. It handles HTTP GET requests for lyrics, interacts with the third-party API (lyrics.ovh), and returns responses to the Android app.

b. Receives an HTTP Request from the Native Android Application

The LyricsServlet receives requests from the Android application containing the artist and song title parameters. These requests are logged for future analysis.

c. Executes Business Logic Appropriate to Your Application

The servlet fetches lyrics from the lyrics.ovh API using the parameters received. It processes the response and formats the lyrics, ensuring empty lines are removed for better readability.

d. Replies to the Android Application with an XML or JSON Formatted Response

The servlet sends the lyrics in a clean JSON format, with individual lines as an array of strings, making it easy for the Android application to display.

The following is a screenshot of the servlet's reply:

Pretty-print ☐

```
{"song":"Fix You","lyrics_lines":["When you try your best but you don't succeed","When you get what you want but not what you
need","When you feel so tired but you can't sleep","Stuck in reverse","And the tears come streaming down your face","When you lose
something you can't replace","When you love someone but it goes to waste","Could it be worse?","Lights will guide you home","And
ignite your bones","And I will try to fix you","High up above or down below","When you're too in love to let it go","But if you never
try you'll never know","Just what you're worth","Lights will guide you home","And ignite your bones","And I will try to fix
you","Tears stream down your face","When you lose something you cannot replace","Tears stream down your face and I","Tears stream
down your face","I promise you I will learn from all my mistakes","Tears stream down your face and I","Lights will guide you
home","And ignite your bones","And I will try to fix you"],"artist":"Coldplay"}
```

3. Handle Error Conditions - Does not need to be documented

4. Log Useful Information

Information Logged
The web service logs the following six key pieces of information for each request:

Timestamp: Tracks when the request was received.
Artist: The artist name from the request.
Song: The song title from the request.
Lyrics Length: The length of the fetched lyrics.
Client IP: The IP address of the requester.
User Agent: The client device information for analytics.
These logs are stored in a MongoDB collection (Logs) on Atlas.

Timestamp: Useful for analyzing usage trends over time.
Artist and Song: Helps identify popular queries and trends.
Lyrics Length: Used to calculate average response sizes and detect anomalies.
Client IP: Tracks geographic distribution of requests.
User Agent: Provides insight into client devices and platforms.

5. Store the Log Information in a Database
Database Setup
Connection String:
mongodb://yujiawei:distributedsystems@cluster0-shard-00-00.gu7nv.mongodb.net:27017,cluster0-shard-00-01.gu7nv.mongodb.net:27017,cluster0-shard-00-02.gu7nv.mongodb.net:27017/test?w=majority&retryWrites=true&tls=true&authMechanism=SCRAM-SHA-1

Stored Data
Each log entry contains:

_id (MongoDB ObjectId)
timestamp (Date)
artist (String)
song (String)
lyricsLength (Integer)
clientIP (String)
userAgent (String)

6. Display Operations Analytics and Full Logs on a Web-Based Dashboard
a. Unique URL for Web Interface Dashboard
The dashboard is accessible via a browser at:
https://redesigned-parakeet-69gqgrw9x59xcwq-8080.app.github.dev/dashboard-data

b. Displays at Least 3 Interesting Operations Analytics
Total Requests: Displays the total number of logged requests.
Average Lyrics Length: Calculates and displays the average length of fetched lyrics.
Most Common Client IP: Identifies the IP address with the highest number of requests.

c. Displays Formatted Full Logs
Logs are displayed in an HTML table format using the DashboardDataServlet.
Each entry includes:
Timestamp: When the request was made.
Artist: Artist name.
Song: Song title.
Lyrics Length: Length of the fetched lyrics.
Client IP: IP address of the requester.
User Agent: Client device information.

Screenshot of Dashboard

Total Requests: 9
Average Lyrics Length: 925.00 characters
Most Common Client IP: 172.17.0.1

Timestamp	Artist	Song	Lyrics Length	Client IP	User Agent
2024-11-18 04:31:11	Coldplay	Fix You	925	0:0:0:0:0:0:0:1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/131.0.0.0 Safari/537.36 Edg/131.0.0.0
2024-11-18 04:34:15	Coldplay	Fix You	925	0:0:0:0:0:0:0:1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/131.0.0.0 Safari/537.36 Edg/131.0.0.0
2024-11-18 04:34:42	Coldplay	Fix You	925	0:0:0:0:0:0:0:1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/131.0.0.0 Safari/537.36 Edg/131.0.0.0
2024-11-18 04:34:52	Coldplay	Fix You	925	0:0:0:0:0:0:0:1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/131.0.0.0 Safari/537.36 Edg/131.0.0.0
2024-11-18 04:43:52	Coldplay	Fix You	925	172.17.0.1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/130.0.0.0 Safari/537.36
2024-11-18 04:54:59	Coldplay	Fix You	925	172.17.0.1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/130.0.0.0 Safari/537.36
2024-11-18 05:06:20	Coldplay	Fix You	925	172.17.0.1	Dalvik/2.1.0 (Linux; U; Android 15; sdk_gphone64_x86_64 Build/AE3A.240806.005)
2024-11-18 05:43:17	Coldplay	Fix You	925	172.17.0.1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/130.0.0.0 Safari/537.36
2024-11-18 06:51:20	Coldplay	Fix You	925	172.17.0.1	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/130.0.0.0 Safari/537.36