Project 4 Task 2 – MuscleWiki 2.0

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Overview

My distributed system provides a workout finder that allows users to select a muscle group and optional equipment and then fetches exercise ideas from a third-party API (ExerciseDB). It reshapes the data, logs usage analytics. There is a dashboard that provides logs and operational analytics via a JSP interface backed by MongoDB Atlas.

1. Native Android Application

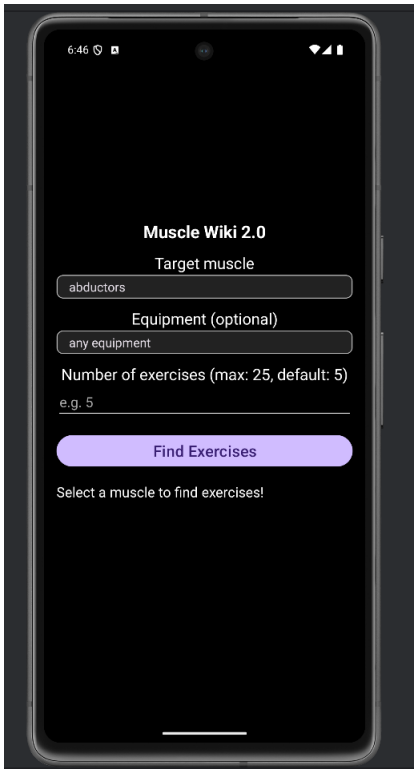
Android Studio project: MyExerciseApplication

a) Uses at least three different kinds of views:

My app uses:

- Spinner (for muscle + equipment selection)
- EditText (for exercise limit)
- Button (Search)
- TextView (status updates)
- ImageView (GIF display in dialog)
- ListView (results list)

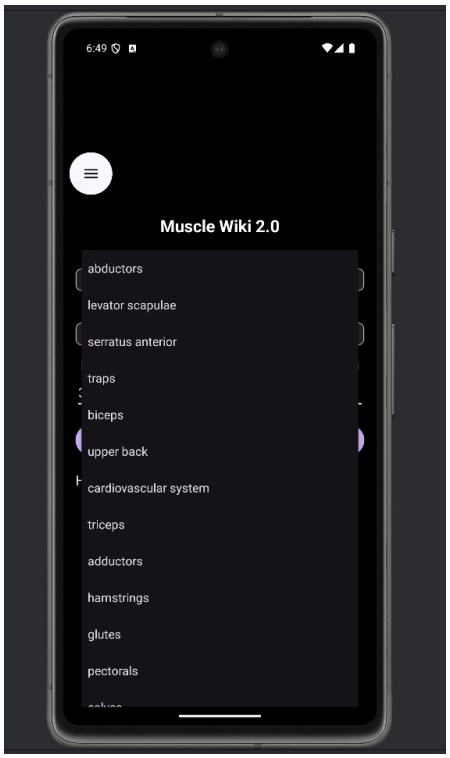
File: activity_main.xml



Before search

b) Requires input from the user:
Users select:

- Target muscle
- Optional equipment
- Number of exercises (1–25; default is 5)



Selecting muscle

c) Makes an HTTP GET request to web service
The mobile app issues this GET request:
https://fuzzy-tribble-r4654xj577gjcp9w4-8080.app.github.dev/exerciseapp/api/exercises?muscle=biceps&equipment=dumbbell&limit=3
when the muscle chosen is biceps, equipment is dumbbell and limit is 3
This is implemented in: MainActivity.java → FetchExercisesTask.doInBackground()

d) Receives and parses a JSON reply
Example of the JSON returned is:

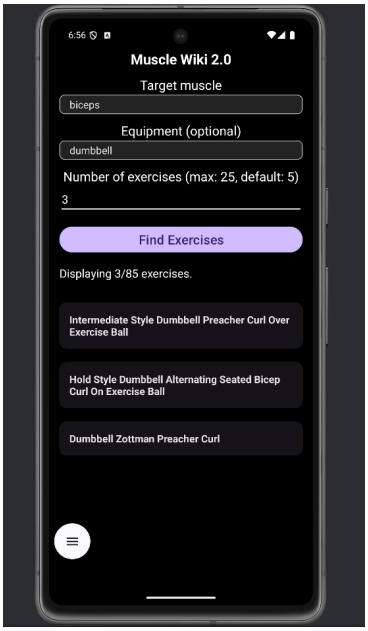
```
{
  "exercises": [
    {
      "gifUrl": "https://static.exercisedb.dev/media/QQwxa8g.gif",
      "equipments": [
        "dumbbell"
      ],
      "instructions": [
        "Step:1 Sit on an exercise ball with your feet flat on the ground and your back straight.",
        "Step:2 Hold a dumbbell in one hand with an underhand grip, resting your elbow on the exercise ball.",
        "Step:3 (intermediate variation) Keeping your upper arm stationary, exhale and curl the dumbbell up towards your shoulder.",
        "Step:4 Pause for a moment at the top, then inhale and slowly lower the dumbbell back to the starting position.",
        "Step:5 Repeat for the desired number of repetitions, then switch arms."
      ],
      "targetMuscles": [
        "biceps"
      ],
      "name": "intermediate style dumbbell preacher curl over exercise ball"
    }
  ],
  "totalExercises": 85,
  "query": {
    "muscle": "biceps",
    "limit": 1,
    "equipment": "dumbbell"
  },
  "returned": 1,
  "status": "ok"
}
```


Parsing occurs in: MainActivity.java → parseAndDisplay()

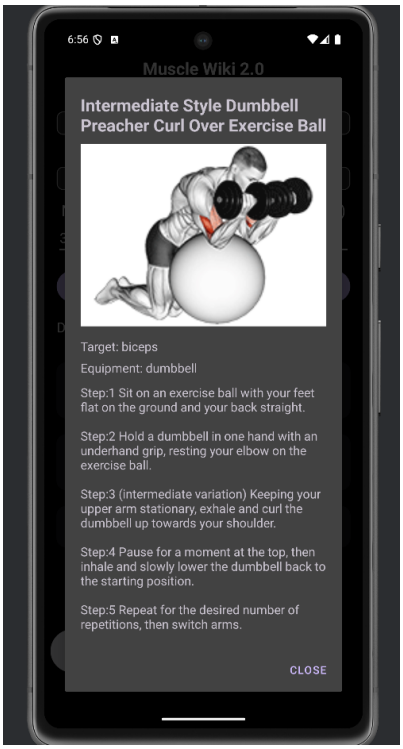
e) Displays new information

The app displays:

- Exercise cards in a ListView
- Exercise names
- GIFs loaded with Glide
- Detailed popup dialog with full instructions



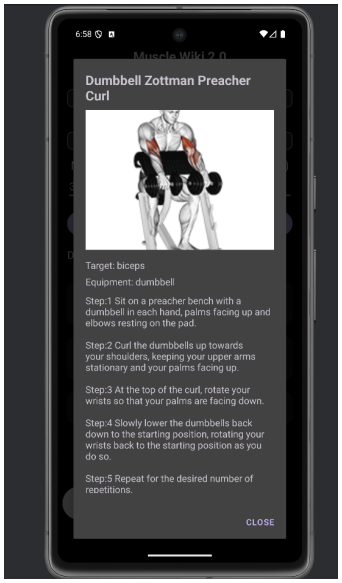
Results



After clicking on an exercise

f) Repeatable
User can repeatedly:

- Modify inputs
- Fetch results again
- Open different exercise dialogs



Choosing a different exercise

2. Web Application

MyExerciseApplicationWebService is deployed at:
https://fuzzy-tribble-r4654xj577gjcp9w4-8080.app.github.dev/exerciseapp/

a) Uses an HttpServlet to implement API
Main servlet: MyExerciseServlet.java
Path: /api/exercises
This servlet:

- Validates inputs
- Calls external ExerciseDB API
- Reshapes JSON
- Logs analytics to MongoDB
- Replies with cleaned JSON

b) Receives HTTP requests from Android
Example request:
GET /exerciseapp/api/exercises?muscle=biceps&equipment=dumbbell&limit=3
Handled in:
MyExerciseServlet.doGet()

c) Executes business logic

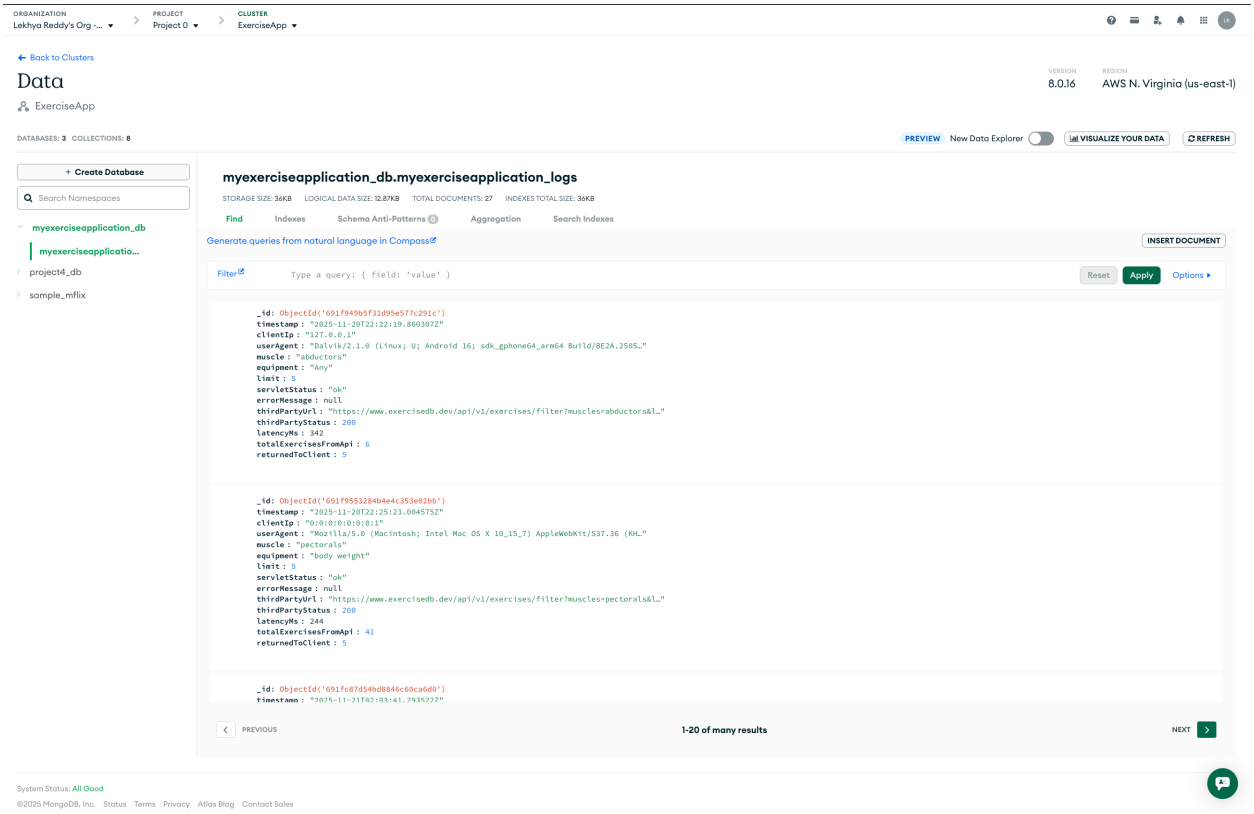
- Input validation
- Constructing ExerciseDB URL
- Fetching + parsing third-party results
- Extracting:
  - name
  - gifUrl
  - targetMuscles
  - equipment
  - instructions
  - Cleaning JSON for mobile

d) Replies using JSON
Reply structure is custom-designed: status, query, totalExercises, returned, exercises[]

4) Log useful information

timestamp: chronological ordering
clientIp: monitoring usage
userAgent: device analytics
muscle: most requested muscle group
equipment: most popular equipment
limit: usage trend

servletStatus: success or not
errrorMessage: for debugging
thirdPartyURL: traceability
thirdPartyStatus: health
latencyMs: performance monitoring
returnedToClient: result count



MongoDB

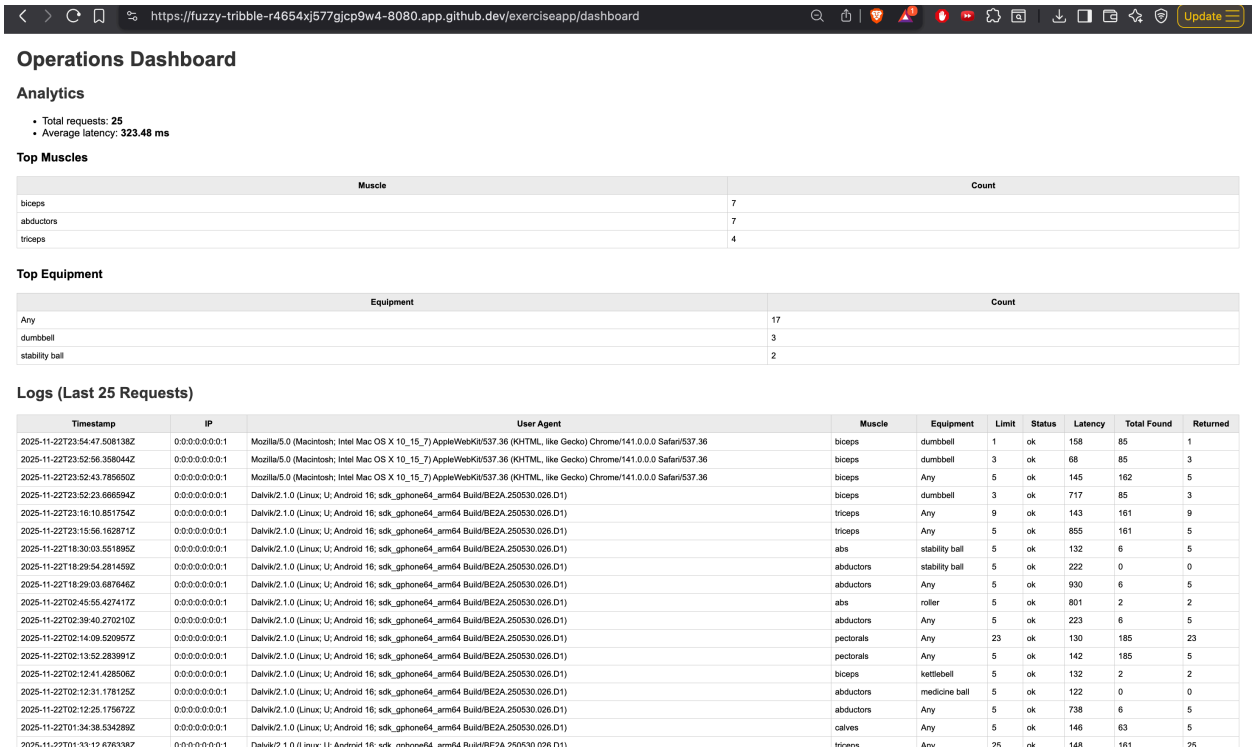
5) Store logs in MongoDB

Database: myexerciseapplication_db
Data persists across restarts

6) Display operations analytics + complete logs

Implemented in MyDashboardServlet.java and dashboard.jsp. It shows:

- Total number of requests
- Average API latency
- Top 3 muscle groups
- Top 3 equipment types
- Logs



Dashboard

7) Works in Codespaces

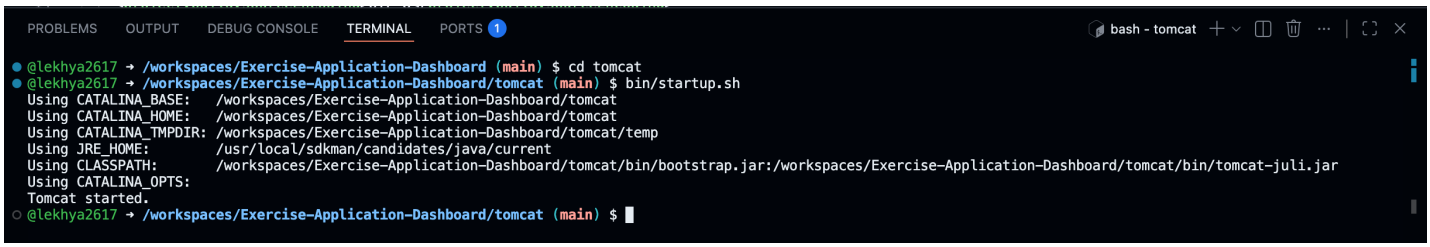
The servlet is deployed and publicly accessible via:
https://fuzzy-tribble-r4654xj577gjcp9w4-8080.app.github.dev/exerciseapp/api/exercises
Android app works when:

- The port (8080) is public
- WAR is copied/deployed
- Tomcat is running manually

The commands to be run are:

cd tomcat

bin/startup.sh



Commands to run

Make the port public