

## 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

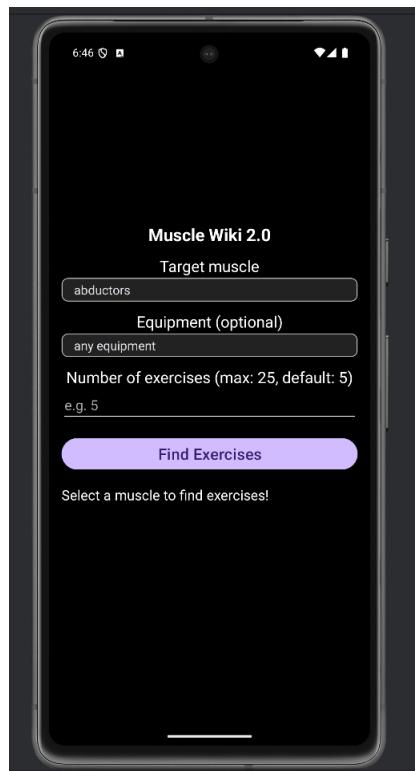
Android Studio project: MyExerciseApplication

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

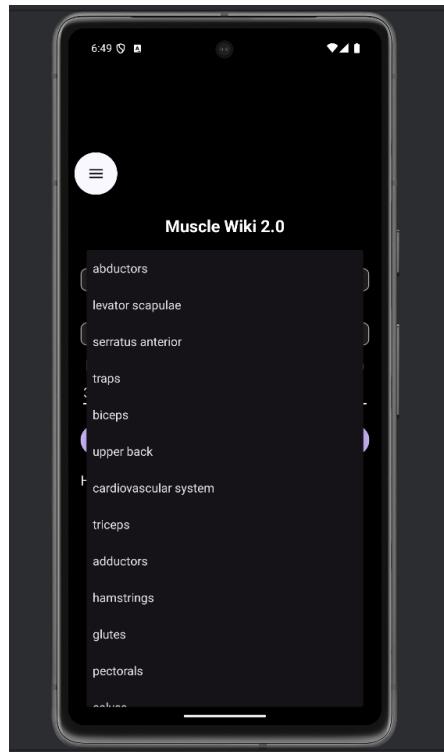


*Before search*

- 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:

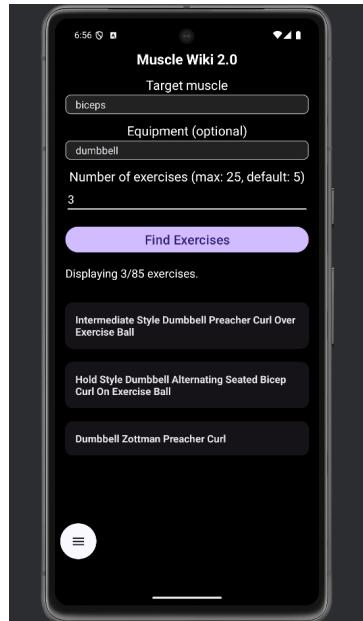
```
{
  "exercises": [
    {
      "gifUrl": "https://static.exercisedb.dev/media/Q0wxa8g.gif",
      "equipments": [
        "dumbbell"
      ],
      "instructions": [
        "Step:1 Sit on an exercise ball with your feet flat on the ground and your back straight.",
        "Step:2 Hold a dumbbell 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()

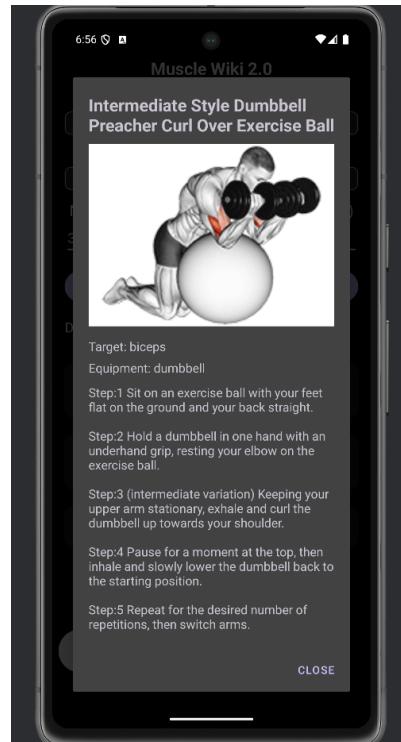
- e) Displays new information

The app displays:

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



*Results*

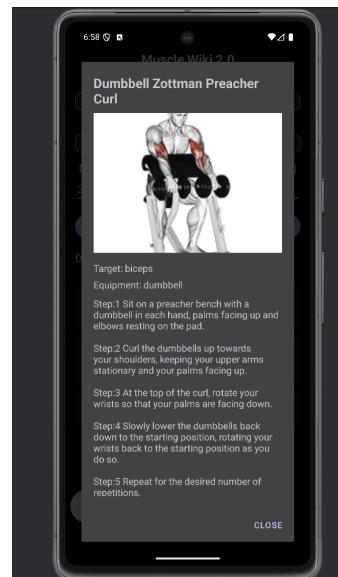


*After clicking on an exercise*

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-r4654xj577gjc9w4-8080.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  
 errorMessage: for debugging  
 thirdPartyURL: traceability  
 thirdPartyStatus: health  
 latencyMs: performance monitoring  
 returnedToClient: result count

```

{
  "_id": ObjectId("691f955284b4e4c353e92bb"),
  "timestamp": "2025-11-21T02:22:25.084575Z",
  "clientIp": "127.0.0.1",
  "userAgent": "Dalvik/2.1.0 (Linux; U; Android 16; sdk_gphone64_arm64 Build/BE2A.2505..",
  "muscle": "abductors",
  "equipment": "Any",
  "limit": 5,
  "servletStatus": "ok",
  "errorMessage": null,
  "thirdPartyUrl": "https://www.exercisedb.dev/api/v1/exercises/filter?muscles=abductors&l..",
  "thirdPartyStatus": 200,
  "latencyMs": 342,
  "totalExercisesFromApi": 6,
  "returnedToClient": 5
}

{
  "_id": ObjectId("691fc07d54bd8846c89ca6d9"),
  "timestamp": "2025-11-21T02:03:41.798527Z",
  "clientIp": "127.0.0.1",
  "userAgent": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML..",
  "muscle": "pectoralis",
  "equipment": "body weight",
  "limit": 5,
  "servletStatus": "ok",
  "errorMessage": null,
  "thirdPartyUrl": "https://www.exercisedb.dev/api/v1/exercises/filter?muscles=pectoralis&l..",
  "thirdPartyStatus": 200,
  "latencyMs": 241,
  "totalExercisesFromApi": 41,
  "returnedToClient": 5
}

{
  "_id": ObjectId("691fc07d54bd8846c89ca6d9"),
  "timestamp": "2025-11-21T02:03:41.798527Z"
}
  
```

PREVIEW New Data Explorer    VERSION 8.0.16    REGION AWS N. Virginia (us-east-1)    VISUALIZE YOUR DATA    REFRESH

INSERT DOCUMENT

Filter Type a query: { field: 'value' }    Reset    Apply    Options ▾

DATABASES: 3 COLLECTIONS: 8

myexerciseapplication\_db.myexerciseapplication\_logs

STORAGE SIZE: 36KB LOGICAL DATA SIZE: 12.8KB TOTAL DOCUMENTS: 27 INDEXES TOTAL SIZE: 36KB

Find Indexes Schema Anti-Patterns Aggregation Search Indexes

Generate queries from natural language in Compose

1-20 of many results

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

## Operations Dashboard

### Analytics

- Total requests: 25
- Average latency: 323.48 ms

### Top Muscles

Muscle	Count
biceps	7
abductors	7
triceps	4

### Top Equipment

Equipment	Count
Any	17
dumbbell	3
stability ball	2

### Logs (Last 25 Requests)

Timestamp	IP	User Agent	Muscle	Equipment	Limit	Status	Latency	Total Found	Returned
2025-11-22T23:54:47.508138Z	0:0:0:0:0:1	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/141.0.0.0 Safari/537.36	biceps	dumbbell	1	ok	158	85	1
2025-11-22T23:52:56.358044Z	0:0:0:0:0:1	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/141.0.0.0 Safari/537.36	biceps	dumbbell	3	ok	68	85	3
2025-11-22T23:52:43.785650Z	0:0:0:0:0:1	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/141.0.0.0 Safari/537.36	biceps	Any	5	ok	145	162	5
2025-11-22T23:52:23.666594Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	biceps	dumbbell	3	ok	717	85	3
2025-11-22T23:16:10.851754Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	triceps	Any	9	ok	143	161	9
2025-11-22T23:15:56.162871Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	triceps	Any	5	ok	855	161	5
2025-11-22T18:30:03.551895Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	abs	stability ball	5	ok	132	6	5
2025-11-22T18:29:54.281459Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	abductors	stability ball	5	ok	222	0	0
2025-11-22T18:29:03.687648Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	abductors	Any	5	ok	930	6	5
2025-11-22T02:45:55.427417Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	abs	roller	5	ok	801	2	2
2025-11-22T02:39:40.270210Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	abductors	Any	5	ok	223	6	5
2025-11-22T02:14:09.520957Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	pectoralis	Any	23	ok	130	185	23
2025-11-22T02:13:52.283991Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	pectoralis	Any	5	ok	142	185	5
2025-11-22T02:12:41.428506Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	biceps	kettlebell	5	ok	132	2	2
2025-11-22T02:12:31.178125Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	abductors	medicine ball	5	ok	122	0	0
2025-11-22T02:12:25.175672Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	abductors	Any	5	ok	738	6	5
2025-11-22T01:34:38.534289Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	calves	Any	5	ok	146	63	5
2025-11-22T01:33:12.476307Z	0:0:0:0:0:1	Dalvik/2.1.0 (Linux; U; Android; 16; sdk_gphone64_arm64 Build/BE2A.250530.026.D1)	triceps	Any	95	rk	148	161	95

## Dashboard

## 7) Works in Codespaces

The servlet is deployed and publicly accessible via:

<https://fuzzy-tribble-r4654xj577gcp9w4-8080.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

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS 1
bash - tomcat + □ └ ... ×
● @lekhya2617 → ~/workspaces/Exercise-Application-Dashboard (main) $ cd tomcat
● @lekhya2617 → ~/workspaces/Exercise-Application-Dashboard/tomcat (main) $ bin/startup.sh
Using CATALINA_BASE: /workspaces/Exercise-Application-Dashboard/tomcat
Using CATALINA_HOME: /workspaces/Exercise-Application-Dashboard/tomcat
Using CATALINA_TMPDIR: /workspaces/Exercise-Application-Dashboard/tomcat/temp
Using JRE_HOME: /usr/local/sdman/candidates/java/current
Using CLASSPATH: /workspaces/Exercise-Application-Dashboard/tomcat/bin/bootstrap.jar:/workspaces/Exercise-Application-Dashboard/tomcat/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
○ @lekhya2617 → ~/workspaces/Exercise-Application-Dashboard/tomcat (main) $
```

Commands to run

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL	PORTS 1		
Port	Forwarded Address	Running Process		Visibility	Origin	
● 8080	<a href="https://fuzzy-tribble-r46...">https://fuzzy-tribble-r46...</a>	/usr/local/sdkman/candidates/java/current/bin/java -Dj...	<input checked="" type="radio"/> Public	Auto Forwarded		
	<a href="#">Add Port</a>					

*Make the port public*