

1, URL of repository: <https://github.com/ycleo/cs6650-hw>

2.

- **Entities:**
  - i. **Album:** Represents a music album and has attributes like albumId, artist, title, year, and an image.
  - ii. **Image:** Represents the binary image data, which may be stored separately or as part of the album entity.
- **Relationships:**
  - i. Each Album has an associated Image.
- **Attributes:**
  - i. albumId: A unique identifier for each album, typically a surrogate key.
  - ii. artist: The name of the artist or band associated with the album.
  - iii. title: The title of the album.
  - iv. year: The year in which the album was released.
  - v. image: The binary image data representing the album cover or image.
  - vi. imageSize: The size of the image in bytes, for optimization and display purposes.
- **Size of Image:**
  - i. album-image.jpg (32KB)
- **Database/File Storage Solution:**
  - i. For the database, I choose MySQL.

3.

- threadGroupSize = 10, numThreadGroups = 10, delay = 2

```
Request Count: 200000 requests (GET+POST).
Wall Time: 198.723 seconds
Throughput: 1006.4260302028451 requests/second
Number of Successful Requests: 200000
Number of Failed Requests: 0
POST:
Mean Response Time: 108.132 milliseconds
Median Response Time: 95.0 milliseconds
P99 Response Time: 323.0 milliseconds
Min Response Time: 12.0 milliseconds
Max Response Time: 884.0 milliseconds
GET:
Mean Response Time: 79.432 milliseconds
Median Response Time: 62.0 milliseconds
P99 Response Time: 238.0 milliseconds
Min Response Time: 13.0 milliseconds
Max Response Time: 833.0 milliseconds
```

- threadGroupSize = 10, numThreadGroups = 20, delay = 2

```
Request Count: 400000 requests (GET+POST).
Wall Time: 325.832 seconds
Throughput: 1227.6265069115373 requests/second
Number of Successful Requests: 400000
Number of Failed Requests: 0
POST:
Mean Response Time: 142.981 milliseconds
Median Response Time: 125.0 milliseconds
P99 Response Time: 488.0 milliseconds
Min Response Time: 11.0 milliseconds
Max Response Time: 1152.0 milliseconds
GET:
Mean Response Time: 121.832 milliseconds
Median Response Time: 105.0 milliseconds
P99 Response Time: 487.0 milliseconds
Min Response Time: 11.0 milliseconds
Max Response Time: 1023.0 milliseconds
```

- threadGroupSize = 10, numThreadGroups = 30, delay = 2

```
Request Count: 600000 requests (GET+POST).
Wall Time: 612.324 seconds
Throughput: 979.873400356674 requests/second
Number of Successful Requests: 600000
Number of Failed Requests: 0
POST:
Mean Response Time: 335.908 milliseconds
Median Response Time: 203.0 milliseconds
P99 Response Time: 6789.0 milliseconds
Min Response Time: 22.0 milliseconds
Max Response Time: 21687.0 milliseconds
GET:
Mean Response Time: 245.231 milliseconds
Median Response Time: 154.0 milliseconds
P99 Response Time: 1943.0 milliseconds
Min Response Time: 15.0 milliseconds
Max Response Time: 26384.0 milliseconds
```

#### 4. Using 2 load-balanced free-tier VMs

- threadGroupSize = 10, numThreadGroups = 10, delay = 2

```
Request Count: 200000 requests (GET+POST).
Wall Time: 158.921 seconds
Throughput: 1258.4869211746718 requests/second
Number of Successful Requests: 200000
Number of Failed Requests: 0
POST:
Mean Response Time: 85.213 milliseconds
Median Response Time: 64.0 milliseconds
P99 Response Time: 315.0 milliseconds
Min Response Time: 10.0 milliseconds
Max Response Time: 742.0 milliseconds
GET:
Mean Response Time: 68.723 milliseconds
Median Response Time: 45.0 milliseconds
P99 Response Time: 305.0 milliseconds
Min Response Time: 12.0 milliseconds
Max Response Time: 885.0 milliseconds
```

- threadGroupSize = 10, numThreadGroups = 20, delay = 2

```
Request Count: 400000 requests (GET+POST).
Wall Time: 177.3 seconds
Throughput: 2256.0631697687536 requests/second
Number of Successful Requests: 400000
Number of Failed Requests: 0
POST:
Mean Response Time: 74.113 milliseconds
Median Response Time: 62.0 milliseconds
P99 Response Time: 215.0 milliseconds
Min Response Time: 13.0 milliseconds
Max Response Time: 1442.0 milliseconds
GET:
Mean Response Time: 58.632 milliseconds
Median Response Time: 49.0 milliseconds
P99 Response Time: 155.0 milliseconds
Min Response Time: 12.0 milliseconds
Max Response Time: 802.0 milliseconds
```

- threadGroupSize = 10, numThreadGroups = 30, delay = 2

```
Request Count: 600000 requests (GET+POST).
Wall Time: 282.376 seconds
Throughput: 2124.8264725047457 requests/second
Number of Successful Requests: 600000
Number of Failed Requests: 0
POST:
Mean Response Time: 114.613 milliseconds
Median Response Time: 92.0 milliseconds
P99 Response Time: 415.0 milliseconds
Min Response Time: 18.0 milliseconds
Max Response Time: 2942.0 milliseconds
GET:
Mean Response Time: 108.732 milliseconds
Median Response Time: 89.0 milliseconds
P99 Response Time: 405.0 milliseconds
Min Response Time: 10.0 milliseconds
Max Response Time: 2483.0 milliseconds
```

5.

Using 4 load-balanced free-tier VMs

- threadGroupSize = 10, numThreadGroups = 30, delay = 2

```
Request Count: 600000 requests (GET+POST).
Wall Time: 211.776 seconds
Throughput: 2833.1822302810515 requests/second
Number of Successful Requests: 600000
Number of Failed Requests: 0
POST:
Mean Response Time: 102.923 milliseconds
Median Response Time: 82.0 milliseconds
P99 Response Time: 265.0 milliseconds
Min Response Time: 14.0 milliseconds
Max Response Time: 722.0 milliseconds
GET:
Mean Response Time: 81.946 milliseconds
Median Response Time: 78.0 milliseconds
P99 Response Time: 212.0 milliseconds
Min Response Time: 11.0 milliseconds
Max Response Time: 493.0 milliseconds
```

