

COMP306 - Final Project Report

Project D

Future Gadget Lab

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Description

Project D is a database for street racing. It contains information about drivers, courses, teams, time attacks, and individual and team battles. We built a website that helps racing enthusiasts follow the latest developments. Moreover, it allows racers to track their progress and collect information about their opponents to prepare for races.

Each driving course has a name, location, length (in km), and an image.

Each team has a name, a location, and a logo.

Each driver has a name, car, sex, and profile picture.

A driver can but doesn't have to be part of a team.

When a driver races on a course, we record that. The record should include the driver who achieved the record, along with course, date, and duration in minutes.

Individual battles represent a race between two drivers. Each battle should include two records to include the driver and timing info. An individual battle can end in a draw if both drivers arrive simultaneously. Records can exist without corresponding to a battle, but a battle has to contain two records. Records without a corresponding battle correspond to a time attack on a course.

A team battle represents a match between two teams. Each team battle consists of multiple individual battles on the same course. Winning an individual battle gives the team a point. The winning team is the one with the most points. If both teams have the same points, they keep conducting more battles until the tie breaks (team battles can't be tied).

NOTE: We didn't use the idea in our project proposal. We got permission from the professor.

ER Diagram

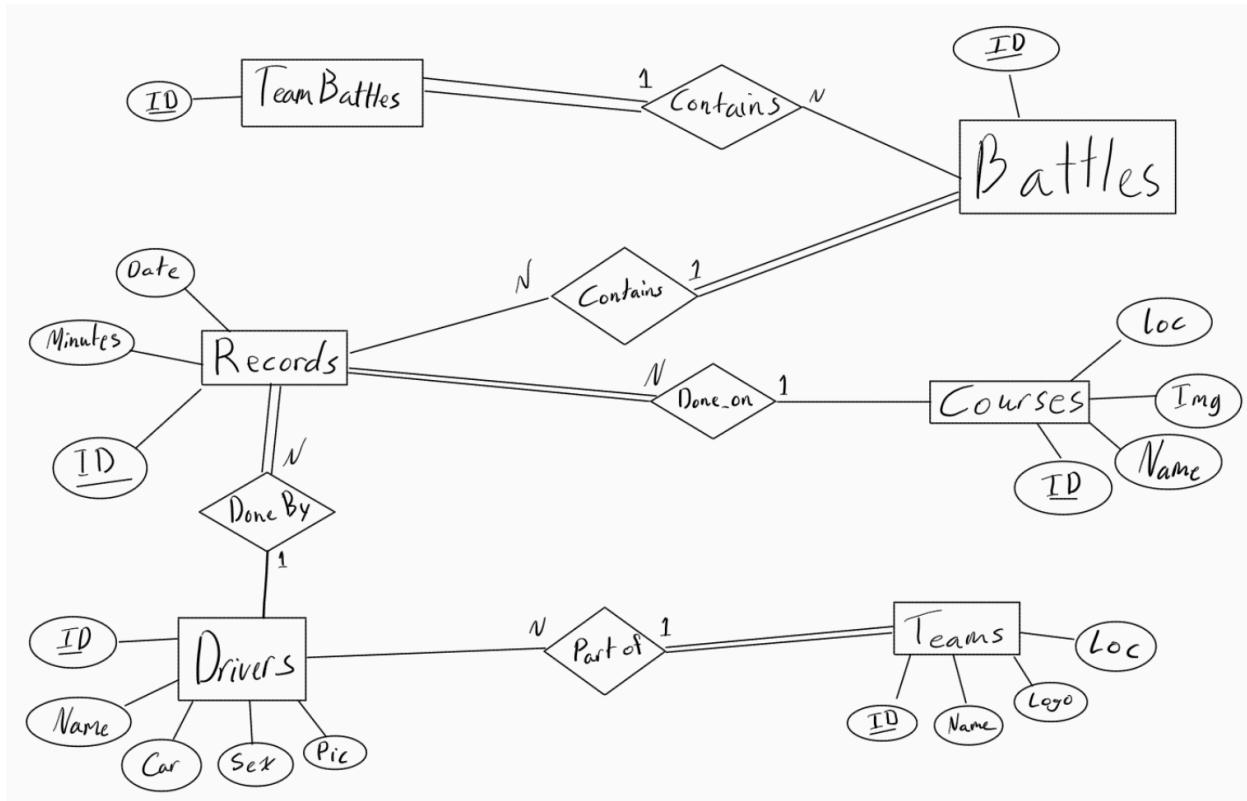


Figure 1: Project D ER Diagram

Relational Model

```
CREATE TABLE TeamBattles (
    ID: INTEGER,
    PRIMARY KEY (ID)
)

CREATE TABLE Battles (
    ID:           INTEGER,
    TeamBattlesID: INTEGER,
    PRIMARY KEY (ID),
    FOREIGN KEY (TeamBattlesID) REFERENCES TeamBattles
)

CREATE TABLE Records (
    ID:           INTEGER,
    Date:         VARCHAR(255),
    Minutes:      DOUBLE,
    BattlesID:    INTEGER,
    DriversID:    INTEGER,
    coursesID:    INTEGER,
    PRIMARY KEY (ID),
    FOREIGN KEY (BattlesID) REFERENCES Battles,
    FOREIGN KEY (DriversID) REFERENCES Drives,
    FOREIGN KEY (CoursesID) REFERENCES Courses
)

CREATE TABLE Courses (
    ID:           INTEGER,
    Name:         VARCHAR(255),
    Image:        VARCHAR(255),
    Location:     VARCHAR(255),
    PRIMARY KEY (ID)
)
```

```

CREATE TABLE Drivers (
    ID:      INTEGER,
    Name:    VARCHAR(255),
    Car:     VARCHAR(255),
    Sex:     VARCHAR(255),
    Picture: VARCHAR(255),
    TeamsID: INTEGER,
    PRIMARY KEY (ID),
    FOREIGN KEY (TeamsID) REFERENCES Teams
)

CREATE TABLE Teams (
    ID:      INTEGER,
    Name:    VARCHAR(255),
    Logo:    VARCHAR(255),
    Location: VARCHAR(255),
    PRIMARY KEY (ID)
)

```

Populating The Database

There are no street racing databases available online, as you can imagine. Therefore, we wrote a simulation script (`src/seed-data/main.py`) to populate our database with synthetic data.

We generated course, driver, and team names using ChatGPT 4. Then, we fed those names to the simulation script that does the following:

1. Assign drivers to teams (some drivers stay solo).
2. Assign skill levels to drivers.
3. Assign length and difficulty levels to courses.
4. Simulate ~5000 time attacks.
5. Simulate ~1250 individual battles.
6. Simulate ~500 team battles.
7. Populate the database with the generated data.

The simulation script is rather sophisticated (i.e., we don't use uniform random results for everything). This simulation script enables us to have meaningful results in our queries later.

User Interface and Complex Queries

We created a simple website using the [Bottle Python web framework](#), [Bootstrap CSS framework](#), and [MariaDB](#) for the RDBMS.

NOTE: The project works without any issues for us. Therefore, if you face any problems running it, you might have a different version of some dependency.

The website consists of the following pages:

1. Main Page
2. Courses List Page
3. Course Info Page (1 Complex Query)
4. Teams List Page (1 Complex Query)
5. Team Info Page (4 Complex Queries)
6. Drivers List Page (1 Complex Query)
7. Driver Info Page (3 Complex Queries)
8. Records List Page
9. Record Info Page
10. Individual Battles List Page
11. Individual Battle Info Page
12. Team Battles List Page (1 Complex Query)
13. Team Battle Info Page

Main Page

The main page contains navigation links, as shown in **Figure 2**.

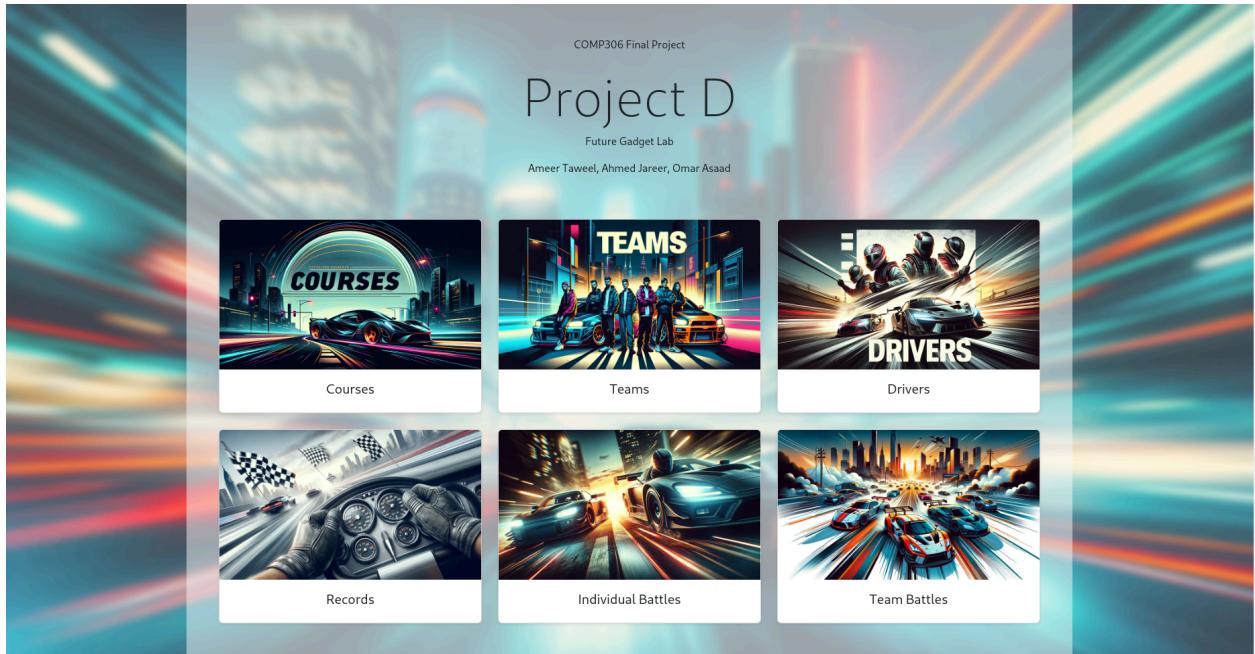


Figure 2: Screenshot of Main Page

Courses List Page

The courses list page contains a list of courses with pictures, names, and locations. Clicking a course takes you to the course info page, which shows more information about that course. **Figure 3** and **Figure 4** show the course list page.

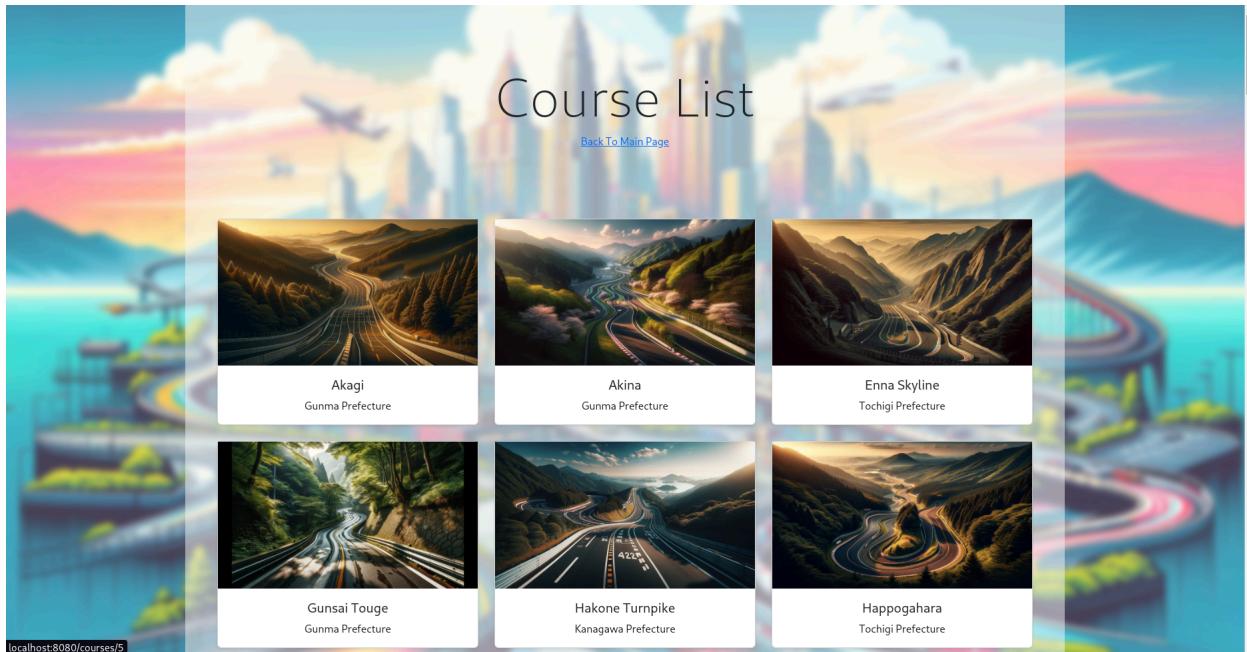


Figure 3: Screenshot of Courses List Page (Top)

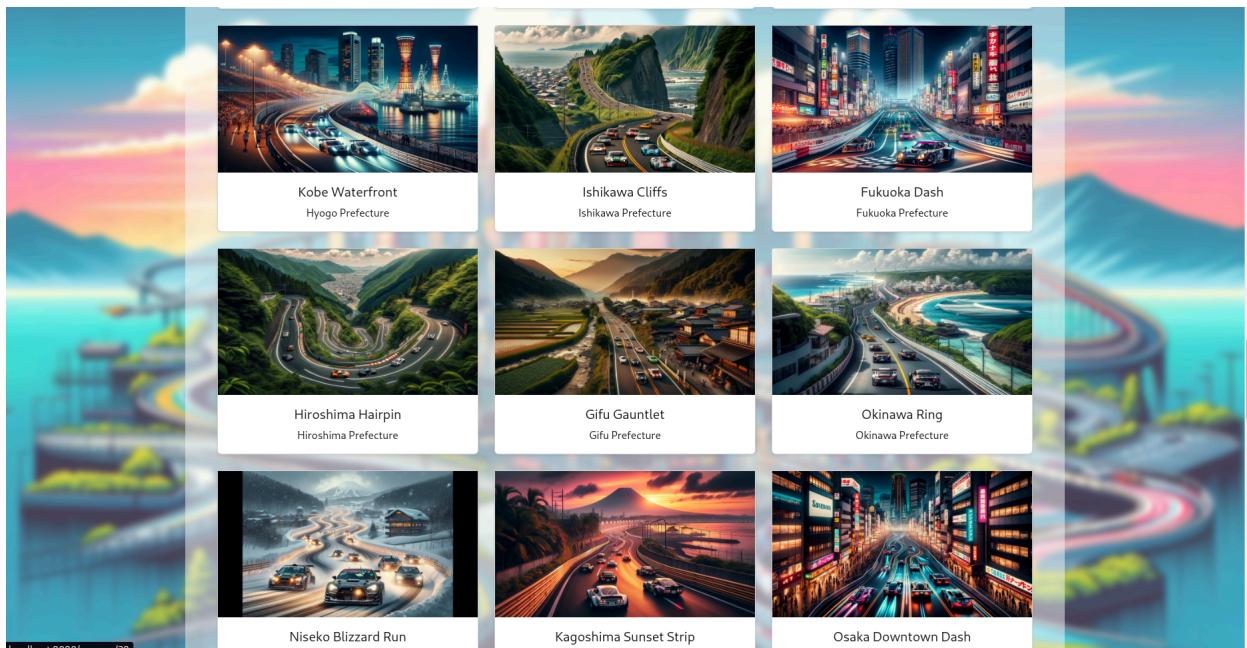


Figure 4: Screenshot of Courses List Page (After Scrolling)

Course Info Page (1 Complex Query)

The course info page shows detailed information about a course:

- Name
- Picture
- Location
- Length (km)
- Top records (shortest times) achieved on the course, along with driver name, time, and date.
- All records completed on the course, along with driver name, time, and date.
- All individual battles, along with driver names, results, and dates.
- All team battles, including winner name, loser name, and date (complex query at line 55 of `src/course_info.py`).

Course Info: Osaka Downtown Dash

[Back To Courses Page](#)

Location: Osaka Prefecture

Length: 18 km

Top 3 Records:

Record	Driver	Minutes	Date
7499	Tetsuya Nakamura	8.392	2022-09-20
1093	Tetsuya Nakamura	8.394	2019-12-27
547	Kei Nakagawa	8.632	2019-06-28

Record	Driver	Minutes	Date
5499	Kyoichi Sudo	9.035	2023-12-19
11804	Kyo Matsuda	10.221	2023-11-09
11796	Kyo Matsuda	9.785	2023-11-09
11797	Haruto Nakamura	9.271	2023-11-09
11798	Takahisa Horikawa	9.783	2023-11-09
11799	Kaito Sato	10.271	2023-11-09
11800	Kenji Saito	9.253	2023-11-09
11801	Yuto Sasaki	8.855	2023-11-09
11802	Taiga Kitamura	9.148	2023-11-09
11803	Shunji Ando	9.748	2023-11-09
11805	Haruto Nakamura	9.308	2023-11-09
5372	Sora Suzuki	9.47	2023-11-08
5315	Daisuke Maeda	9.883	2023-10-17
5303	Riku Takeda	9.352	2023-10-14

Individual Battles

Team Battles

Figure 5: Course Info (Records Tab)

Course Info: Osaka Downtown Dash

[Back To Courses Page](#)

[Records](#)
[Individual Battles](#)
[Team Battles](#)

Battle	Driver 1	Driver 2	Result	Date
3095	Yuto Sasaki	Kenji Saito	Win For 1	2023-11-09
3093	Haruto Nakamura	Kyo Matsuda	Win For 1	2023-11-09
3097	Haruto Nakamura	Kyo Matsuda	Win For 1	2023-11-09
2094	Kaito Sato	Takahisa Horikawa	Win For 2	2023-11-09
3096	Shunji Ando	Taiga Kitamura	Win For 2	2023-11-09
1133	Kaito Sato	Kai Kogashiwa	Win For 1	2023-06-19
2901	Yuki Suzuki	Koji Tanaka	Win For 1	2023-04-06
2902	Yuhki Kagawa	Shota Aoki	Win For 2	2023-04-06
2900	Naoki Ogawa	Shinji Hashimoto	Win For 2	2023-04-06
2899	Sora Suzuki	Akira Kobayashi	Win For 2	2023-04-06
1075	Kyo Matsuda	Masahiro Goto	Win For 2	2023-03-23
1055	Sakamoto	Koichiro Iketani	Win For 1	2023-02-22
1012	Kazuma Kudo	Keiji Fukuda	Win For 1	2022-12-21
985	Tsubasa Kato	Takahisa Horikawa	Win For 1	2022-11-15

Figure 6: Course Info (Individual Battles Tab)

Course Info: Osaka Downtown Dash

[Back To Courses Page](#)

[Records](#)
[Individual Battles](#)
[Team Battles](#)

Team Battle	Winner	Loser	Date
510	Nara Neon Racers	Yokohama Night Runners	2023-11-09
454	Chiba Circuit Chargers	Kyoto Street Legends	2023-04-06
353	Emperor	Hakone Highland Speedsters	2022-04-11
311	Nagoya Nitro Ninjas	Sendai Speed Spirits	2021-10-28
303	Impact Blue	Todo School	2021-09-30
234	Sendai Speed Spirits	Kobe Carbon Crew	2021-01-20
185	Hakone Highland Speedsters	Akina SpeedStars	2020-08-03
14	Fukuoka Fast Lane Fury	Okinawa Ocean Sprinters	2019-02-05

Figure 7: Course Info (Team Battles Tab)

Teams List Page (1 Complex Query)

The teams list page contains a list of teams with pictures, names, locations, number of members, wins, and losses (complex query in `src/team_list.py`). Clicking a team takes you to the team info page, which shows more information about that team. **Figure 8** and **Figure 9** show the team list page.

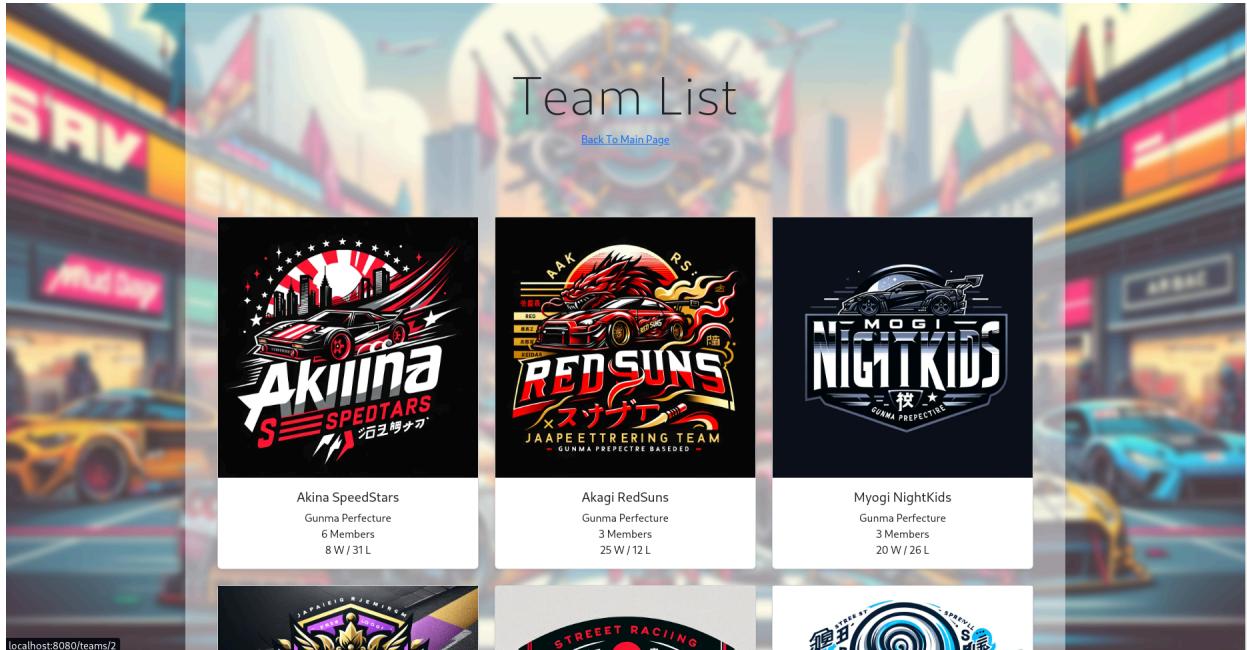


Figure 8: Screenshot of Team List Page (Top)

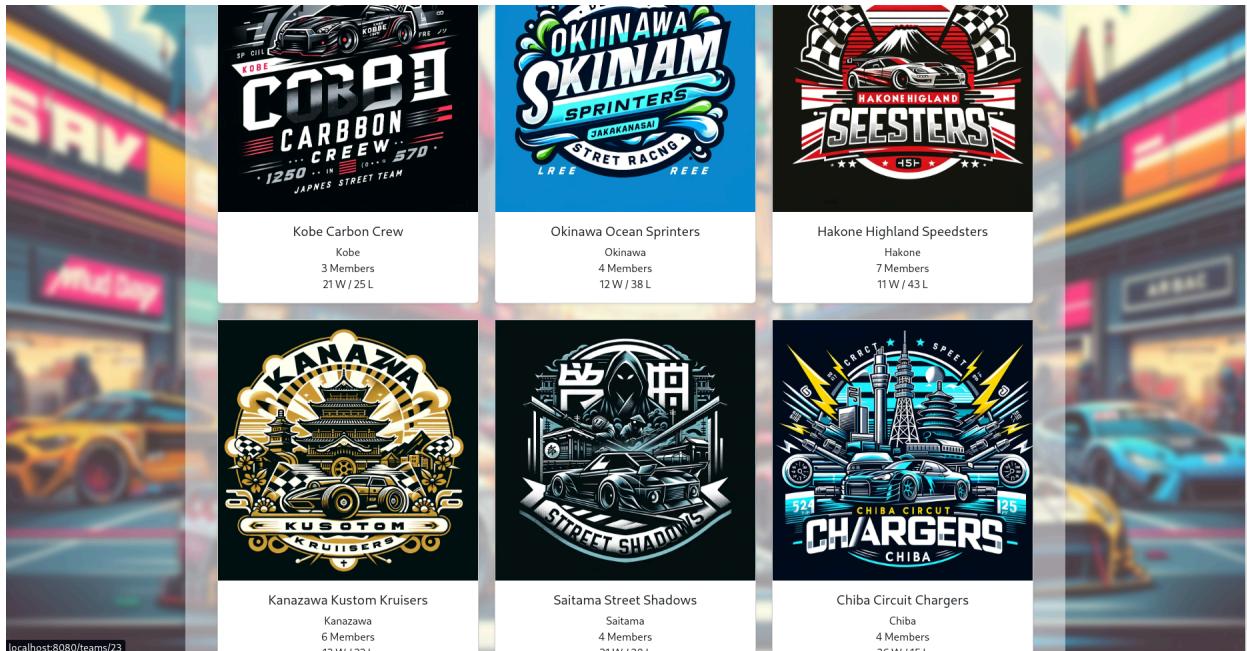


Figure 9: Screenshot of Team List Page (After Scrolling)

Team Info Page (4 Complex Queries)

The team info page shows detailed information about a team:

- Name
- Picture
- Location
- Total wins and losses (complex query).
- Member information.
- All Team Battles (complex query).
- Total wins and losses on each course (complex query).
- Total wins and losses against each other team (complex query).

You can find the complex queries in `src/team_info.py`.

The screenshot displays the 'Team Info: Emperor' page. At the top, there is a navigation link 'Back To Teams Page'. Below the title, there is a large image of a racing car with the word 'EMPEROR' on its side. To the right of the image is a table titled 'Members' with four columns: 'Name', 'Car', and 'Gender'. The table contains three rows of data:

Name	Car	Gender
Kyoichi Sudo	Mitsubishi Lancer Evolution III	Male
Seiji Iwaki	Mitsubishi Lancer Evolution IV	Male
Eiji Kubo	Nissan Skyline GT-R R32	Male

Below the table, the text 'Location: Tochigi Prefecture' and '34 W / 8 L' is displayed. The background features a stylized graphic of a Japanese character.

Figure 10: Team Info (Members Tab)

Team Info: Emperor																																																																										
Back To Teams Page																																																																										
Members	Team Battles	Performance Per Course	Performance Per Team																																																																							
	<table><thead><tr><th>Team Battle</th><th>Against</th><th>Result</th><th>Date</th></tr></thead><tbody><tr><td>533</td><td>Saitama Street Shadows</td><td>Loss</td><td>2024-01-18</td></tr><tr><td>519</td><td>Todo School</td><td>Win</td><td>2023-12-05</td></tr><tr><td>473</td><td>Hiroshima Heatwave Racers</td><td>Win</td><td>2023-06-10</td></tr><tr><td>472</td><td>Myogi NightKids</td><td>Win</td><td>2023-06-08</td></tr><tr><td>462</td><td>Impact Blue</td><td>Win</td><td>2023-05-01</td></tr><tr><td>449</td><td>Todo School</td><td>Win</td><td>2023-03-14</td></tr><tr><td>431</td><td>Myogi NightKids</td><td>Win</td><td>2023-01-04</td></tr><tr><td>429</td><td>Saitama Street Shadows</td><td>Loss</td><td>2023-01-02</td></tr><tr><td>421</td><td>Todo School</td><td>Win</td><td>2022-11-01</td></tr><tr><td>412</td><td>Akagi RedSuns</td><td>Win</td><td>2022-10-10</td></tr><tr><td>380</td><td>Hiroshima Heatwave Racers</td><td>Win</td><td>2022-06-21</td></tr><tr><td>358</td><td>Yokohama Night Runners</td><td>Win</td><td>2022-04-29</td></tr><tr><td>353</td><td>Hakone Highland Speedsters</td><td>Win</td><td>2022-04-11</td></tr><tr><td>350</td><td>Okinawa Ocean Sprinters</td><td>Win</td><td>2022-04-07</td></tr><tr><td>344</td><td>Hakone Highland Speedsters</td><td>Win</td><td>2022-03-25</td></tr><tr><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td></tr></tbody></table>	Team Battle	Against	Result	Date	533	Saitama Street Shadows	Loss	2024-01-18	519	Todo School	Win	2023-12-05	473	Hiroshima Heatwave Racers	Win	2023-06-10	472	Myogi NightKids	Win	2023-06-08	462	Impact Blue	Win	2023-05-01	449	Todo School	Win	2023-03-14	431	Myogi NightKids	Win	2023-01-04	429	Saitama Street Shadows	Loss	2023-01-02	421	Todo School	Win	2022-11-01	412	Akagi RedSuns	Win	2022-10-10	380	Hiroshima Heatwave Racers	Win	2022-06-21	358	Yokohama Night Runners	Win	2022-04-29	353	Hakone Highland Speedsters	Win	2022-04-11	350	Okinawa Ocean Sprinters	Win	2022-04-07	344	Hakone Highland Speedsters	Win	2022-03-25	Team Battles	Performance Per Course	Performance Per Team	
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...																																																																						

Figure 11: Team Info (Team Battles Tab)

Team Info: Emperor		
Back To Teams Page		
Members	Team Battles	Performance Per Course
		
Course	Wins	Losses
Enna Skyline	1	0
Momiji Line	1	0
Myogi	1	0
Nagao	0	1
Odawara Pikes Peak	0	1
Shomaru Pass	1	0
Tsuchisaka	1	0
Usui Pass	0	1
Yahitsu	1	0
Fujimi Kaido	1	0
Saitama Circuit	1	0
Nikko Mountain Run	0	1
Otaru Coast Route	1	0
Chiba Bayshore	1	0
Matsumoto Ridges	1	0

Figure 12: Team Info (Performance Per Course Tab)

Team Info: Emperor		
Back To Teams Page		
Team	Wins	Losses
Enna Skyline	1	0
Momiji Line	1	0
Myogi	1	0
Nagao	0	1
Odawara Pikes Peak	0	1
Shomaru Pass	1	0
Tsuchisaka	1	0
Usui Pass	0	1
Yabitsu	1	0
Fujiimi Kaido	1	0
Saitama Circuit	1	0
Nikko Mountain Run	0	1
Otaru Coast Route	1	0
Chiba Bayshore	1	0
Matsumoto Ridges	1	0

Figure 13: Team Info (Performance Per Team Tab)

Other Pages

I will not include screenshots for the rest of the pages because it would make the report too long. But I will include them in my submission in the `screenshots` sub-directory.

How To Run

- Run MariaDB
- Go to `src/seed-data` and run `python3 main.py populate -s 1 -f`
- The script will populate the `projectd` database
- Go to `src` and run `python3 main.py` to run the server.