# Use Case: Earthquake Statistics and Prediction

Participating Actors
The use case is initiated by a Citizen or Coordinator.

Brief Description
The use case allows the Citizen to report an earthquake event and view the earthquake's statistical data. Besides, it allows the Coordinator to post an earthquake prediction so that all citizens would receive a warning message and related details.

Assumption
The Citizen or Coordinator is logged into the system.

Flow of Events

Basic Flow

1. The use case starts when the Citizen elects to report an earthquake.
2. The system asks the Citizen to provide information about the earthquake, including the time of occurrence, event description, magnitude and the casualty (killed, injured, missing).
3. The Citizen provides all the necessary information.
4. The system validates the information and stores the reported events if it's valid.
5. The Citizen elects to view the earthquake statistical data.
6. The system asks the Citizen to select the time range of statistics.
7. The Citizen selects a time range.
8. The system shows the visualized earthquake statistical data, including the event count, magnitude's distribution histogram, location distribution on a map and the pie chart of casualty.
9. The Coordinator elects to post an earthquake prediction.
10. The system asks the Coordinator to provide the details of the predicted earthquake.
11. The Coordinator provides all the necessary details.
12. The system broadcasts the warning message and related details to every Citizen.

Alternative Flows [all mandatory]

- A1. In step 3, the Citizen can elect to stop reporting. The use case ends.
- A2. In step 4, if the information Citizen provides is invalid, the system prompts the Citizen. The use case returns to step 3.
- A3. After step 4, the Citizen can update the earthquake reports created by itself.

- A4. In step 7, if the Citizen chooses not to specify a time range, the system uses the default time range in step 8.
- A6. In step 8, if the provided time range is invalid, the system prompts the Citizen. The use case returns to step 7.
- A6. In step 9, the Coordinator can elect to stop posting. The use case ends.

Rules

- Earthquake Report Rules:
    - The earthquake's magnitude is in Richter Magnitude Scale, the valid range is 2.0 to 10.0.
    - The earthquake's description should be brief, no longer than 25 words.
- Time range Rules:
    - The end time should be later than the start time.

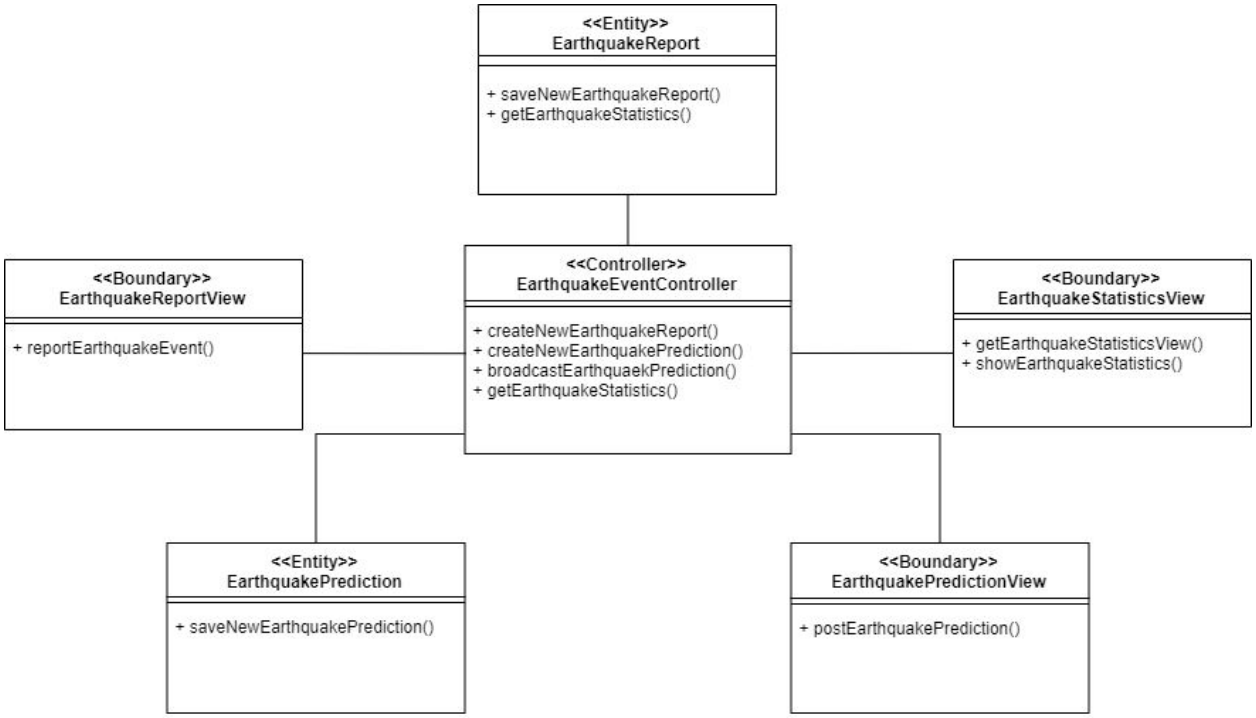
# OOA Design

**Sequence Diagram - Earthquake Statistics & Prediction**

Entity classes: EarthquakeReport, EarthquakePrediction
Boundary classes: EarthquakeReportView, EarthquakeStatisticsView, EarthquakePredictionView
Control classes: EarthquakeEventController

**Sequence Diagram Link** (It's too wide so that google doc cannot hold it):
**https://drive.google.com/file/d/1Ykx4Gd9Qc3sZ7zK8pqHJ0sYZ49JCl7md/view?usp=sharing**

## Class Diagram - Earthquake Statistics & Prediction



## Mapping between UML Diagram and Code Structure

| **Analysis Classes** | **Implementation Elements**<br>(e.g. modules, files, components, databases) |
|---|---|
| EarthquakeReportView | frontend/page/earthquake_report/* |
| EarthquakeStatisticsView | frontend/page/earthquake_statistics/* |
| EarthquakePredictionView | frontend/page/earthquake_prediction/* |
| EarthquakeEventController | src/controllers/earthquake_event.ts |
| EarthquakeReport | src/models/EarthquakeReport.ts |
| EarthquakePrediction | src/models/EarthquakePrediction.ts |