Team GeoUnity
GeoAttendance

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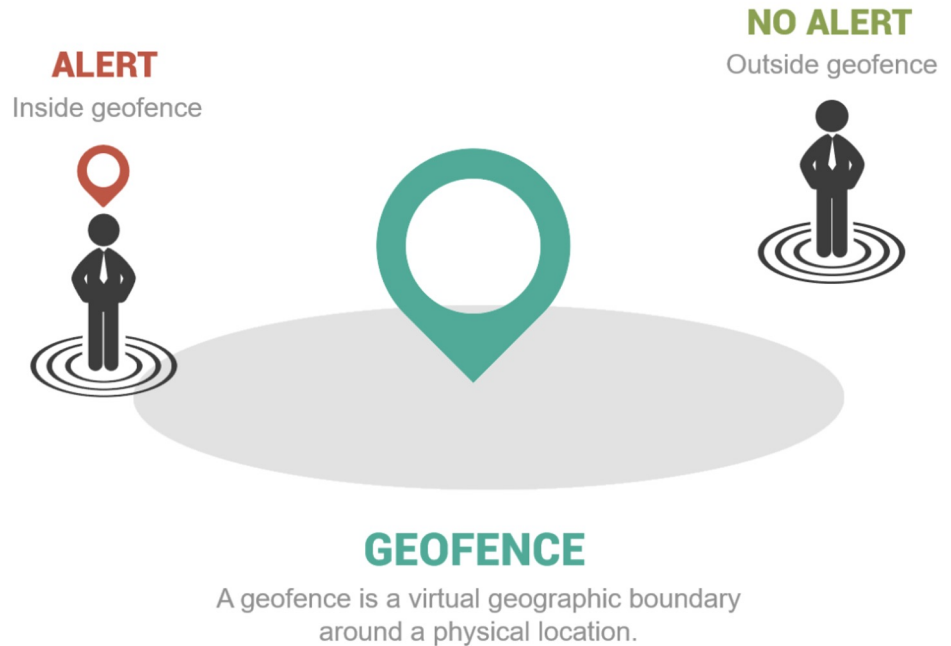
Github URL: https://github.com/bencejdanko/GeoAttendance

Project Description

GEO: short for geography or location.

FENCE: is usually a boundary line such as between you and your neighbor.

GeoAttendance leverages geofencing technology to enhance the accuracy and convenience of attendance tracking.

ALERT
Inside geofence

NO ALERT
Outside geofence

GEOFENCE
A geofence is a virtual geographic boundary around a physical location.
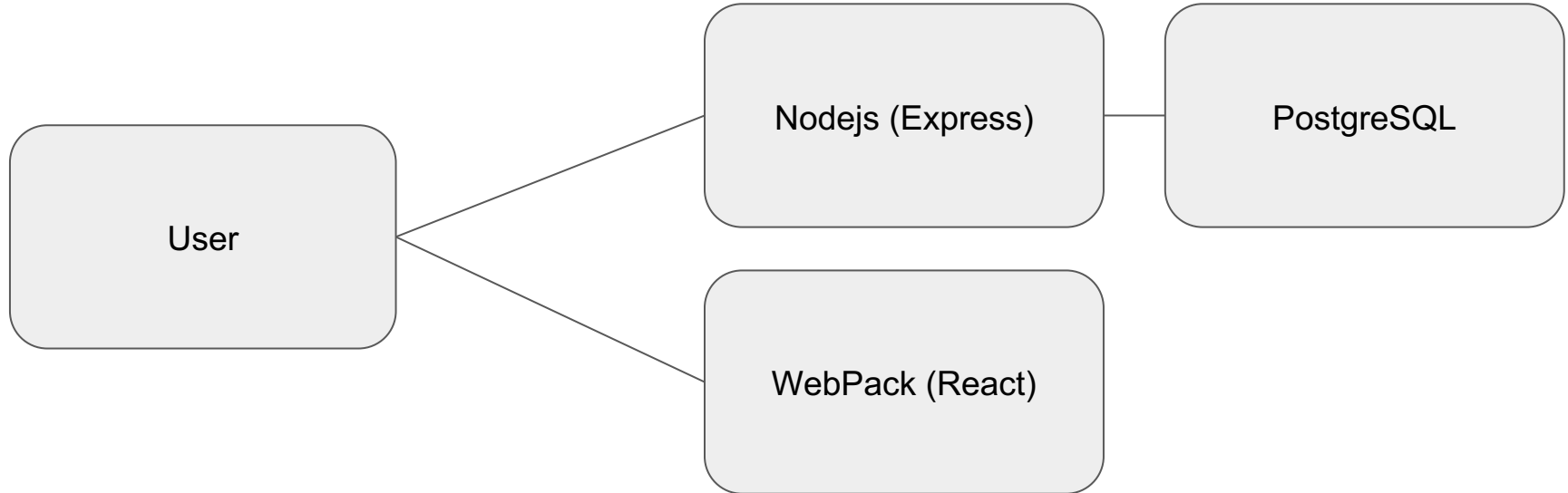
Project Description

- Users within boundaries will be able to check-in

- Upon checking-in, the users will receive an email which confirms their attendance status

- Real-time updates on attendance and historical attendance

Frontend/Backend

Technologies Used

[Frontend] HTML, CSS, React, JavaScript

[Backend] Nodejs, PostgreSQL

Algorithms/AI Schemes

GeoLib Library (https://github.com/manuelbieh/geolib)


```
isPointWithinRadius(point, centerPoint, radius)

Checks whether a point is inside of a circle or not.

// checks if 51.525/7.4575 is within a radius of 5 km from 51.5175/7.4678
geolib.isPointWithinRadius(
    { latitude: 51.525, longitude: 7.4575 },
    { latitude: 51.5175, longitude: 7.4678 },
    5000
);

Returns true or false
```

- Correctness: tested with various inputs, including points inside and outside the circle, as well as edge cases such as at the center of the circle or when the inputs are undefined.
- Also handle negative coordinates and non-integer values.

Algorithms/AI Schemes

GeoLib Library (https://github.com/manuelbieh/geolib)

```
const distance =
    Math.acos(
        robustAcos(
            Math.sin(toRad(toLat)) * Math.sin(toRad(fromLat)) +
                Math.cos(toRad(toLat)) *
                    Math.cos(toRad(fromLat)) *
                    Math.cos(toRad(fromLon) - toRad(toLon))
        )
    ) * earthRadius;
```

- Complexity: O(1) - Haversine formula - Basic arithmetic operations.

Algorithms/AI Schemes

Possible Additional Algorithms (Stretch):

- Use facial recognition technology to improve the accuracy of the attendance tracking process

- Historical attendance data
  - Calculate simple trends in attendance
  - Identify outlier students

Market Space

- Streamlines attendance tracking for professors and other hosts

- Allows attendees to easily find meeting spots through their phone, without the hassle of going through manual instructions

- Host can update events, or modify sign-ups – All attendees simultaneously track any changes or updates immediately