MICHIGAN STATE
U N I V E R S I T Y

Project Plan Presentation
Switch Alignment Mobile Game

The Capstone Experience

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From Students…
…to Professionals

Project Sponsor Overview

- Founded under the Pacific Railroad Act of 1862.

- Operate over 32,000 miles of railways and 8,300 locomotives.

- Building America through efficient, reliable, and sustainable transportation.

Project Functional Specifications

- There are a lot of different switches, some of them are hard to identify.

- Misidentifying railroad switch alignment often has severe consequences.

- Union Pacific operates all over the U.S. so there are many different weather conditions.

- Many employees are moved from place to place.

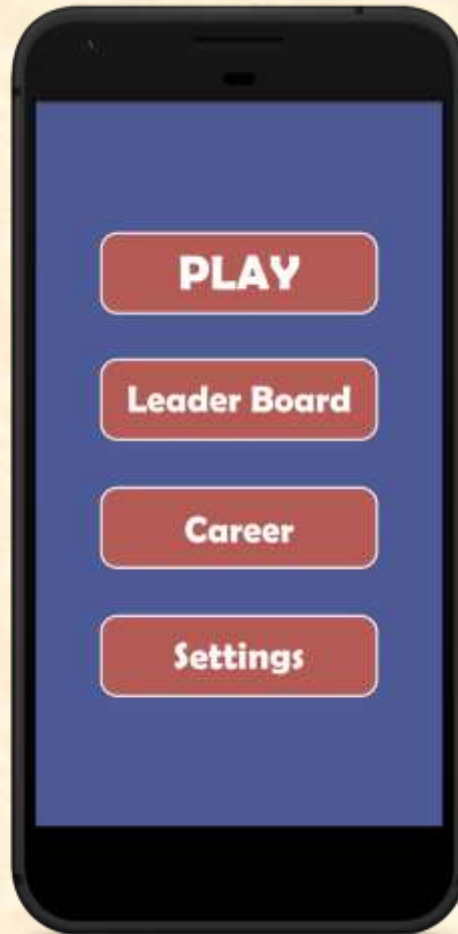- Our mobile game will be captivating and educational.

Project Design Specifications

- Train new employees to learn and practice aligning switches.

- First person view and realistic game environment.

- Random, repeatable conditions.

- Immediate feedback will be shown on screen.

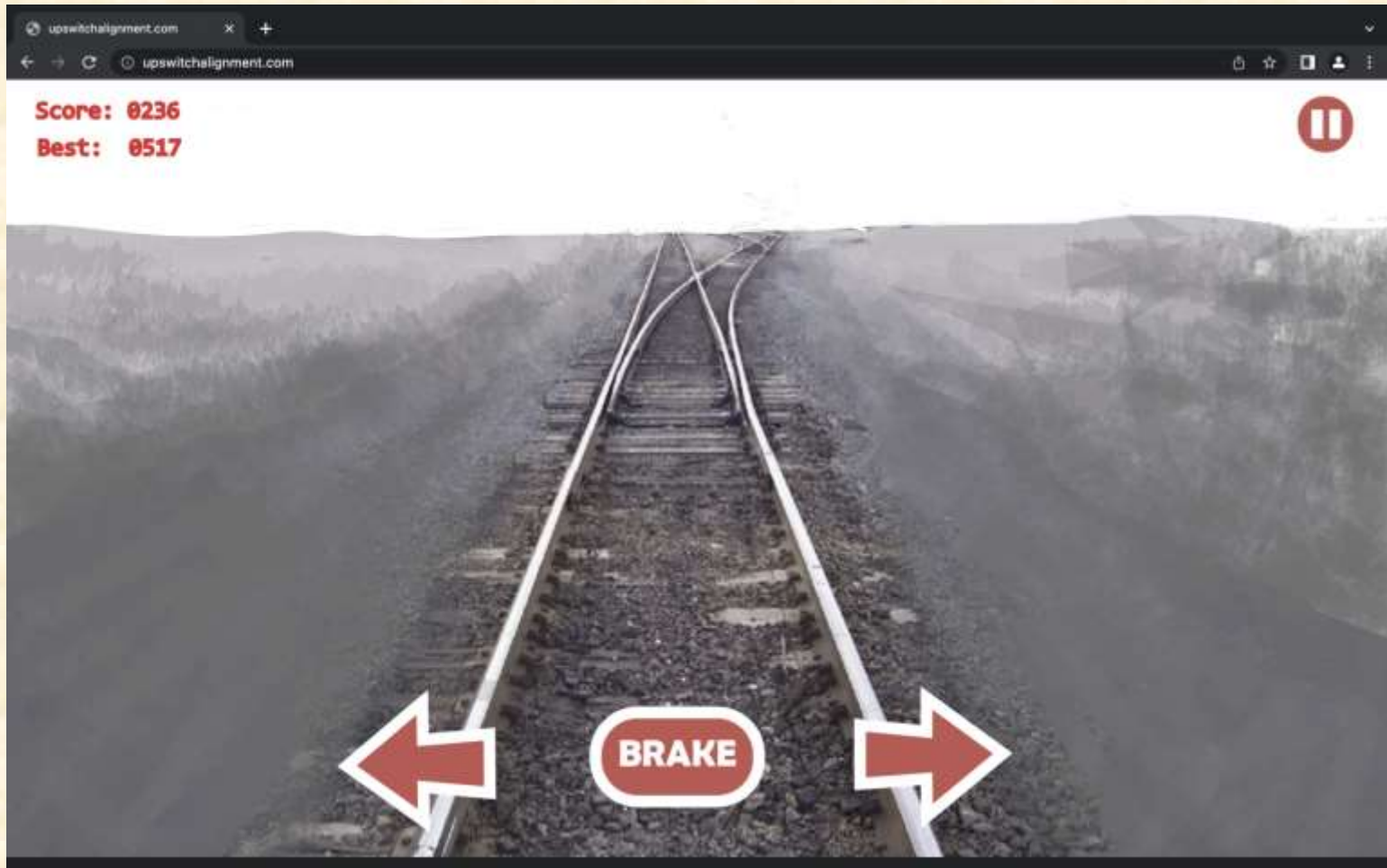# Screen Mockup: Android Application

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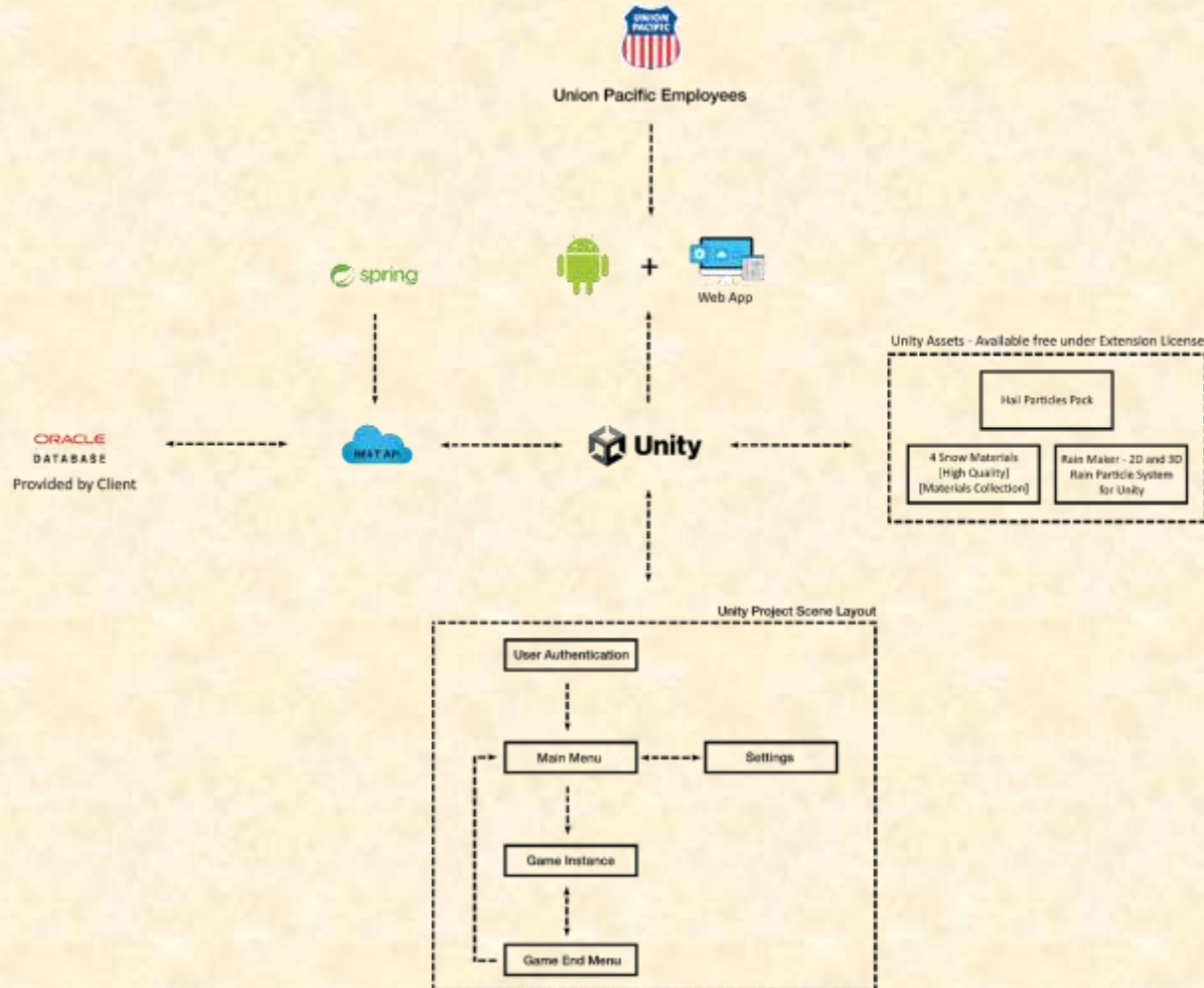
Screen Mockup: Web Interface
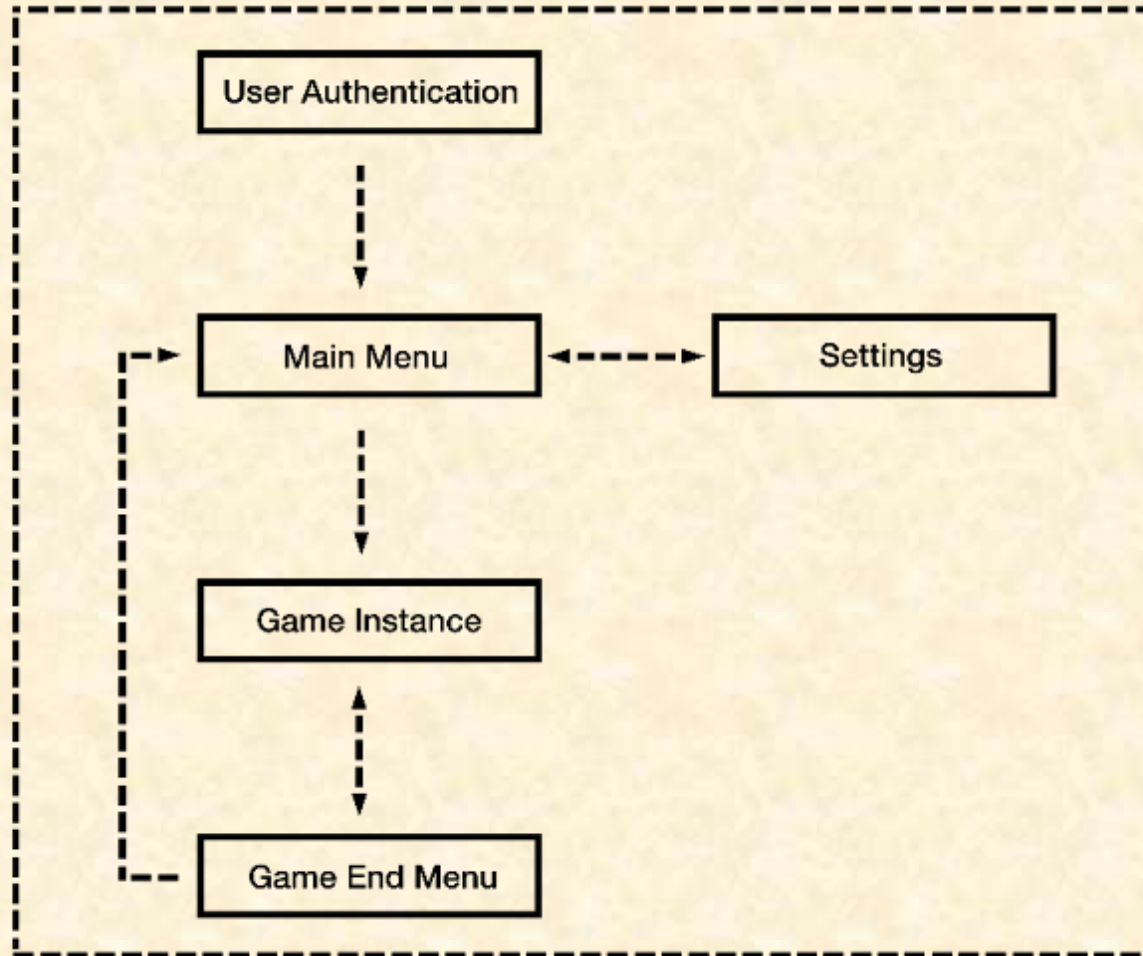
Project Technical Specifications

- Unity 3D Project - A Unity 3D Project will be used to carry out of frontend aspects of the project.

- Oracle Database - A database hosted by Oracle will be used to store all Union Pacific data necessary for the game.

- Spring - We will use Spring to create a REST API to allow for communication between the frontend elements in Unity and the backend elements in the Oracle Database.

- Zebra Phone – The app has to be functional on the Zebra phone, which is the phone provided to Union Pacific Employees.

Project System Architecture

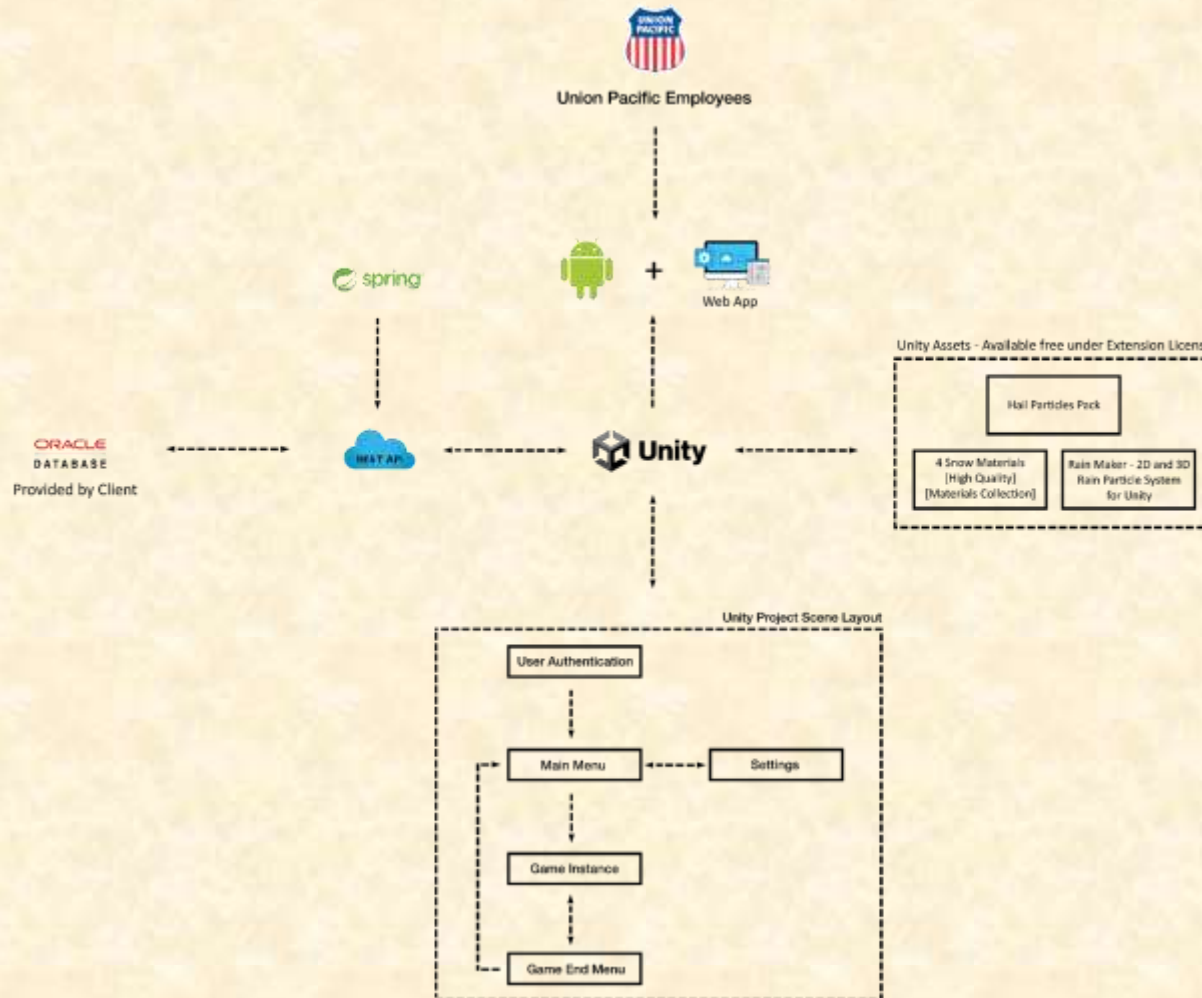# Project System Architecture

Project System Architecture

Unity Assets - Available free under Extension License

Hail Particles Pack

4 Snow Materials
[High Quality]
[Materials Collection]

Rain Maker - 2D and 3D
Rain Particle System
for Unity

Project System Architecture

Project System Components

- Hardware Platforms
  - Zebra Phone: All Union Pacific employees are provided a Zebra phone.
- Software Platforms / Technologies
  - Oracle Database: Oracle Database will be used for all backend purposes of this project.
  - Spring: Spring will be used to create a REST API to enable communication between our Oracle Database backend and Unity 3D frontend.
  - Unity: Unity 3D will be used to create the switch alignment simulation.

Project Risks

- REST API is compatible with both the client's preferred database and Unity framework.
  - A REST API is necessary in order to communicate between the client's database and the Unity project.
  - Create a REST API capable of communicating with an SQL database and determine how to utilize it in Unity to call queries.
- Incorporating snow in the terrain.
  - There are no free snow models on the unity store.
  - Create our own models to show snow on the tracks or acquire models with proper licensing from a free source.
- Game performance when running on Zebra phone.
  - Team Union Pacific does not have a Zebra phone; and clients can not provide one in a short time.
  - We will use Unity device simulator and test the game on our own Androids.
- Scalability of database and queries based on employees active.
  - If the scale of database is too large, the project will cost more.
  - Team Union Pacific will talk to clients and make sure the cost is not out of their price range.

Questions?