MICHIGAN STATE
UNIVERSITY

Project Plan Presentation
3D Model for Factory Digital Twin

The Capstone Experience

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From Students…
…to Professionals

Project Sponsor Overview

- Global automotive supplier founded in 1957
- Focus on innovation & sustainability
- Produce parts in Body Exteriors and Structures, Power and Vision, Seating Systems, and Complete Vehicles

Project Functional Specifications

- Visual model showing state of Magna factory in real time

- Keeps track of and displays live data from their factories

- Allows Magna to quickly and easily see relevant aspects of a factory

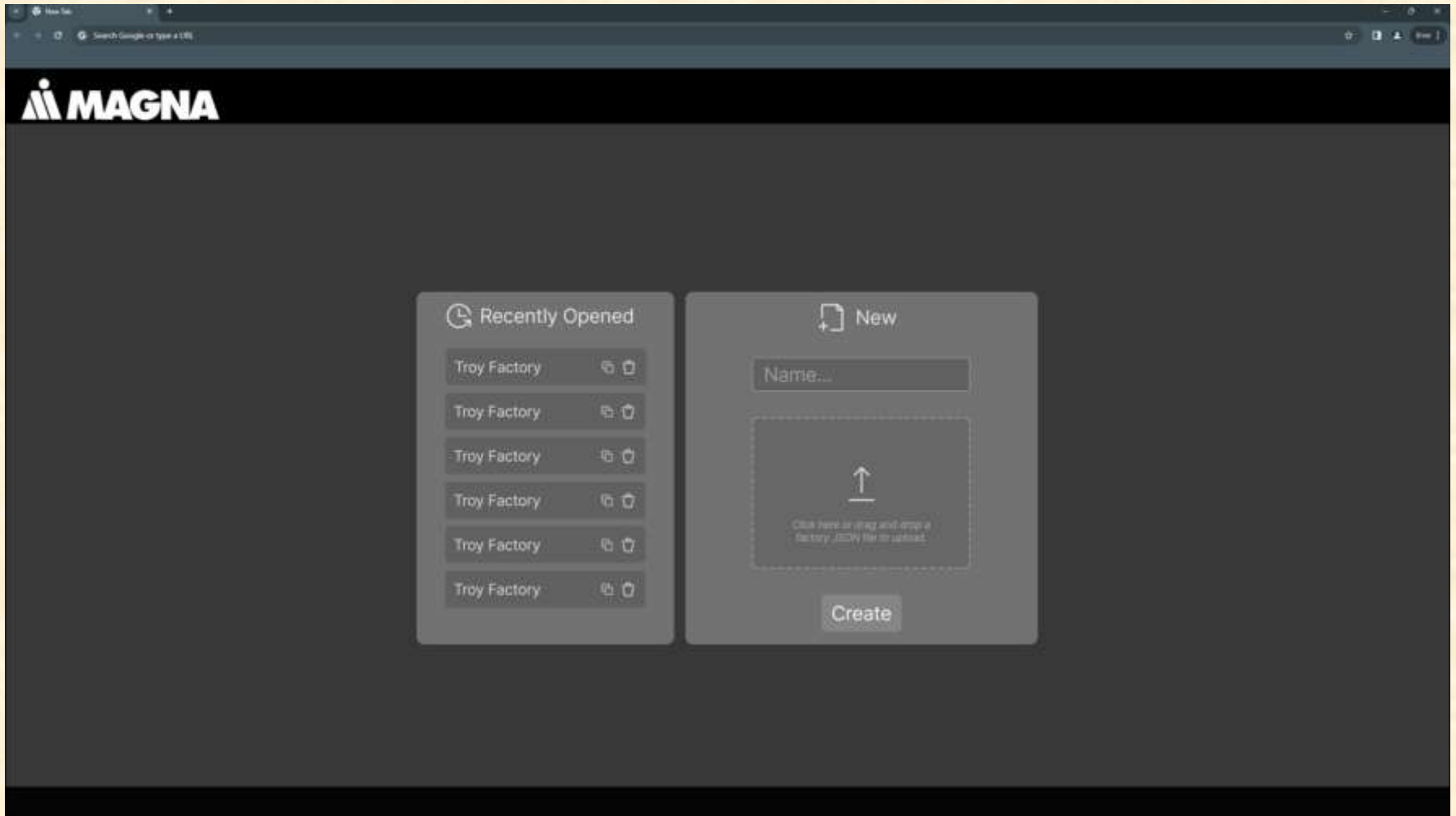- Create generalized solution to allow for expansion/scaling
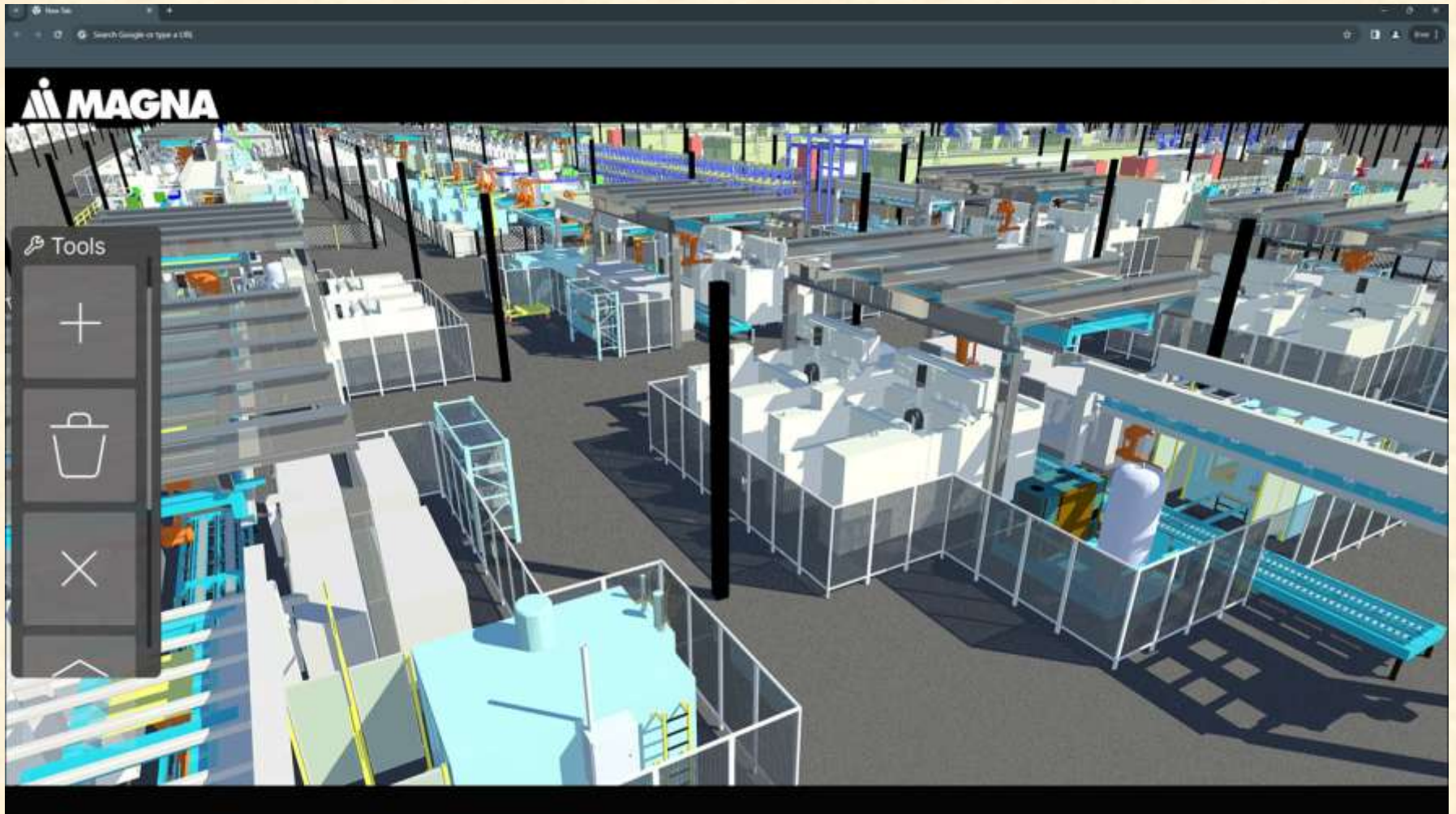
Project Design Specifications

- Create a 3D model representing a factory floor
- Ability for users to dynamically adjust model to their requirements
- Visuals are driven by empirical data
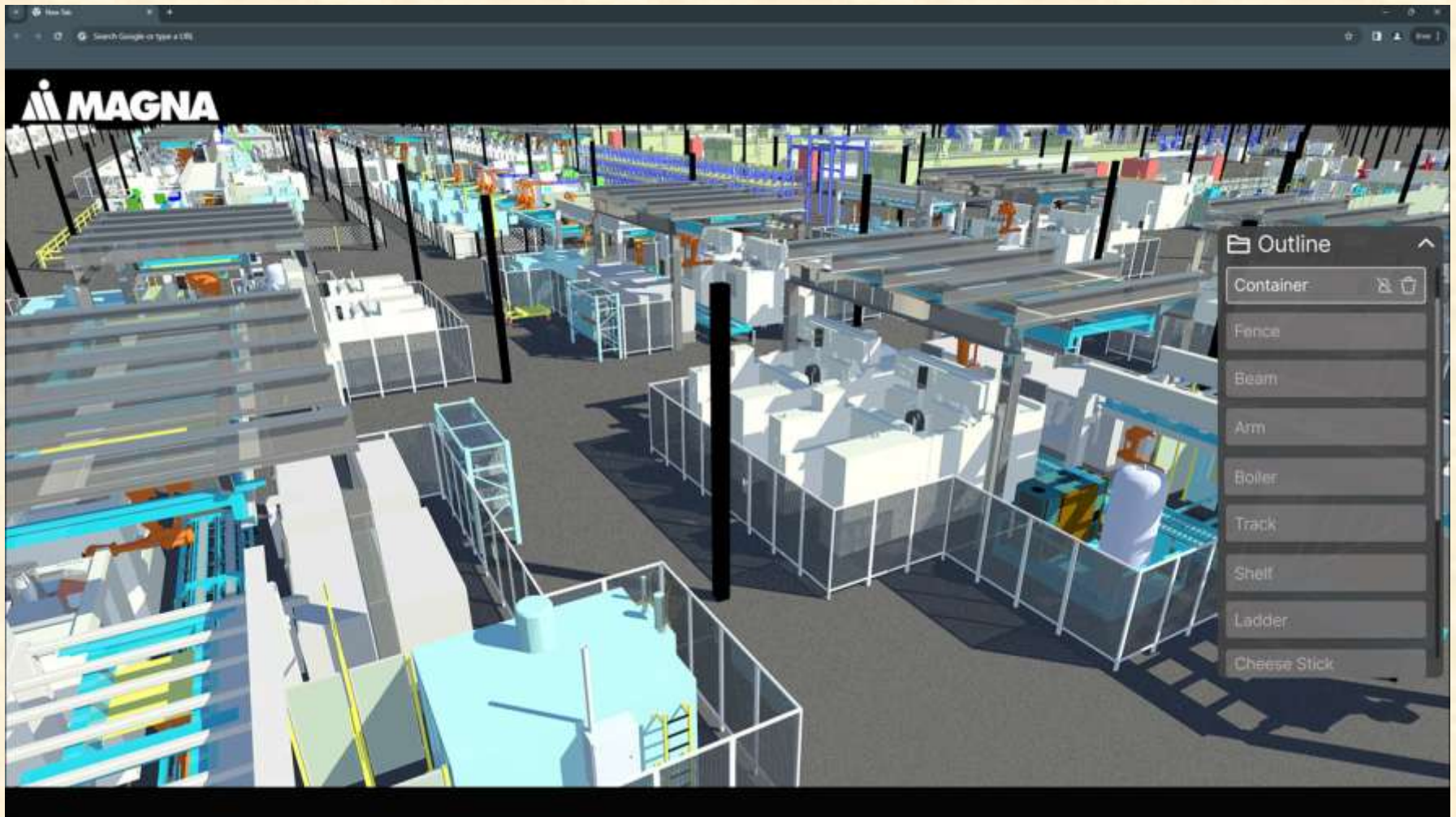- Integrate the project seamlessly with the processes currently employed by Magna
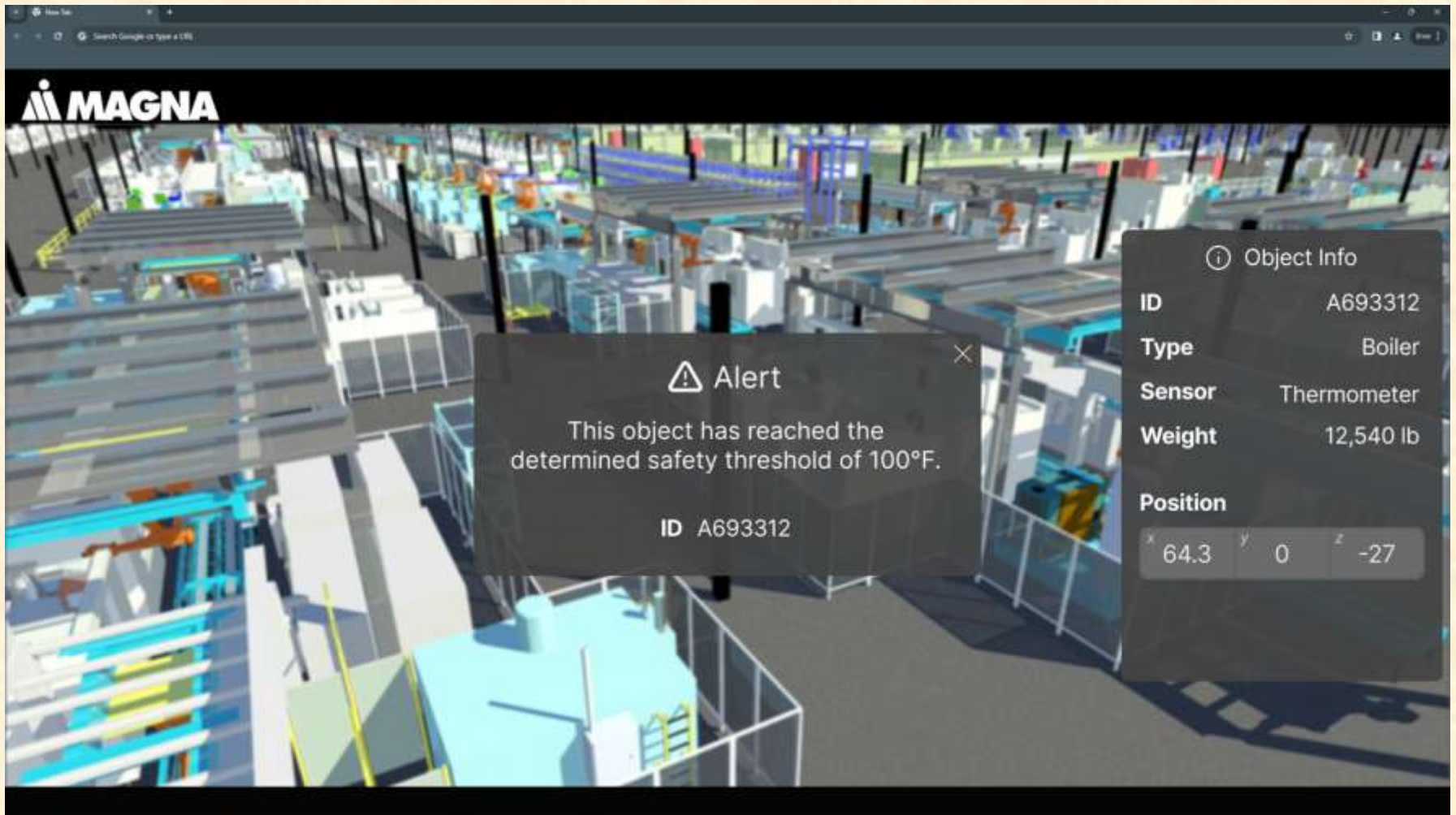
Screen Mockup: Setup Wizard

Screen Mockup: Tool Menu

Screen Mockup: Outline Menu
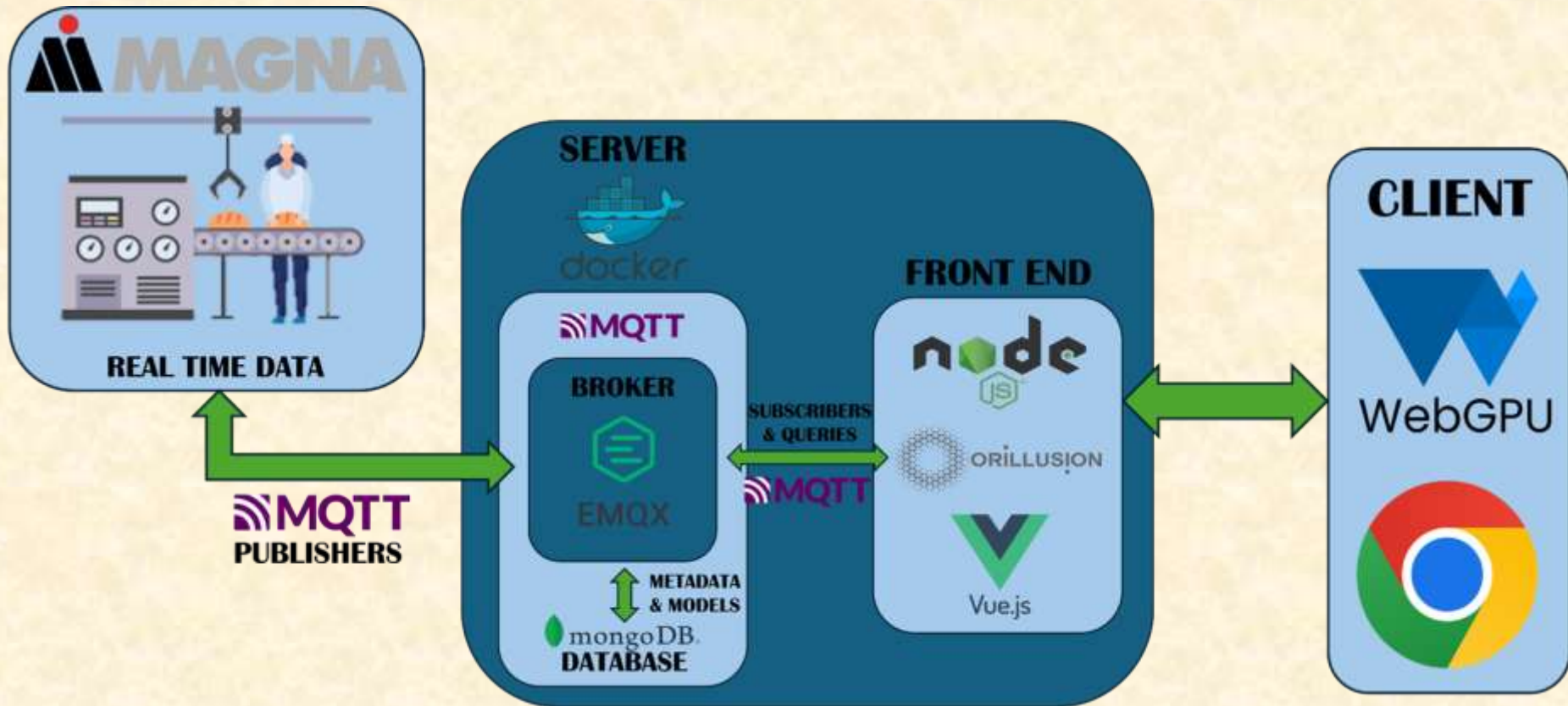
Screen Mockup: Alert Pop-up

Project Technical Specifications

- Front End
  - Factory will be viewed in Orillusion JS
  - Website will be structured with Vite & Vue JS Package
- Back End
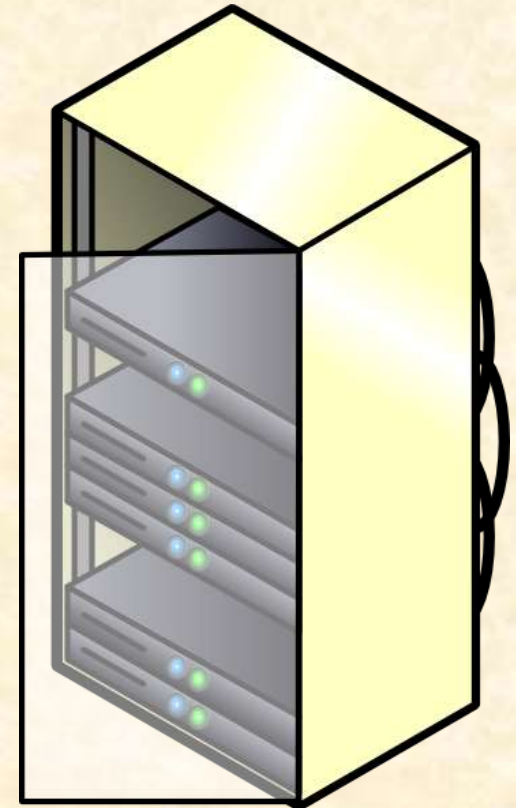 - Backend will be used with MongoDB and Mongoose

Project System Architecture

Project System Components

- Hardware Platforms
  - Server running Dockerfile
  - Varying user browsers and platforms
- Software Platforms / Technologies
  - Orillusion (Web GPU)
  - Vue JS
  - Vite JS
  - EQMX MQTT Broker
  - Docker
  - MongoDB
    - JSON
    - .GLTF/ .GLB Model files

Project Risks

Risks

- Graphical Elements and User Experience on Lower End Devices
  - Our limited experience to 3D rendering and WebGPU may impact the final look and experience. We also must take into account for minimum specifications to run it
  - We've been looking over documentation for all libraries and prototyping ideas
- Unfamiliar with MQTT Protocol and Interactions
  - Our lack of familiarity may pose risk in the development of achieving real-time state changes, which may impact project functionality
  - Have contact with a Front-End Developer that created the MQTT Broker for Magna and we're also reading documentation
- No Live Data Feed or Current Data Architecture
  - Absence of a live data feed may hinder the development of real-time features
  - Create a mock database and create a simulation of real-time data that will feed to the MQTT Broker
- Previous Project Design Unusable
  - Unable to use due to poor code management and documentation
  - Identify areas that may help speed up our initial design process

Questions?

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