

MICHIGAN STATE
UNIVERSITY

Project Plan

Design, Fly, Battle Simulator

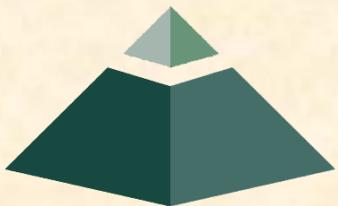
The Capstone Experience

Team Boeing

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*From Students...
...to Professionals*

Project Overview

- Flight Simulator
- Multi-player dogfights
- Separate observer with replays
- Single-player obstacle courses



Functional Specifications

- 6 Degrees of Freedom
- Realistic damage
- Accurate plane specs
- Simulate environment flight dynamics
- 3-5 propeller based aircraft
- Secure networking encryption
- Dedicated server model



Design Specifications

- Separate applications (server, sim, listener)
- Multi-player server browser
- Multiple available replays
- First person cockpit perspective
- Configurable server



Screen Mockup: Server Browser

**Design,
Battle,
Fly.**

Single Player

Multi Player

Options

EXIT

MULTIPLAYER

| Server Name | Ping | Players | Password |
|-------------|------|---------|----------|
| Server 1 | 42 | 3/6 | Yes |
| Server 2 | 67 | 6/6 | No |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Server Info

Name: Server 2
IP Address: 69.23.17.112:65432
Uptime: 4h 23m 12s
World Time: 23:30

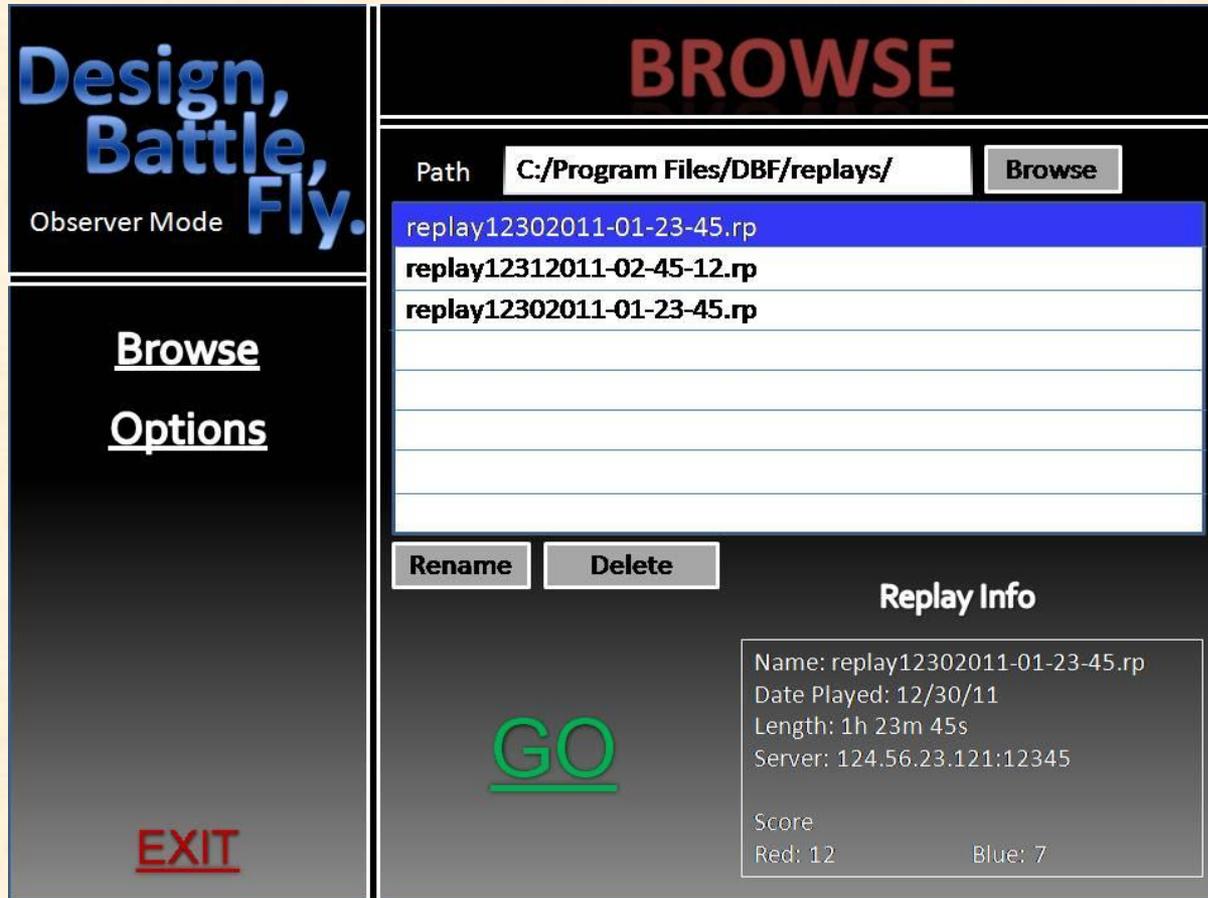
Score
Red: 17 Blue: 13

Player List

- Player 1
- Player 2
- Player 3
- Player 4
- Player 5
- Player 6



Screen Mockup: Server Browser



Screen Mockup: Server Browser



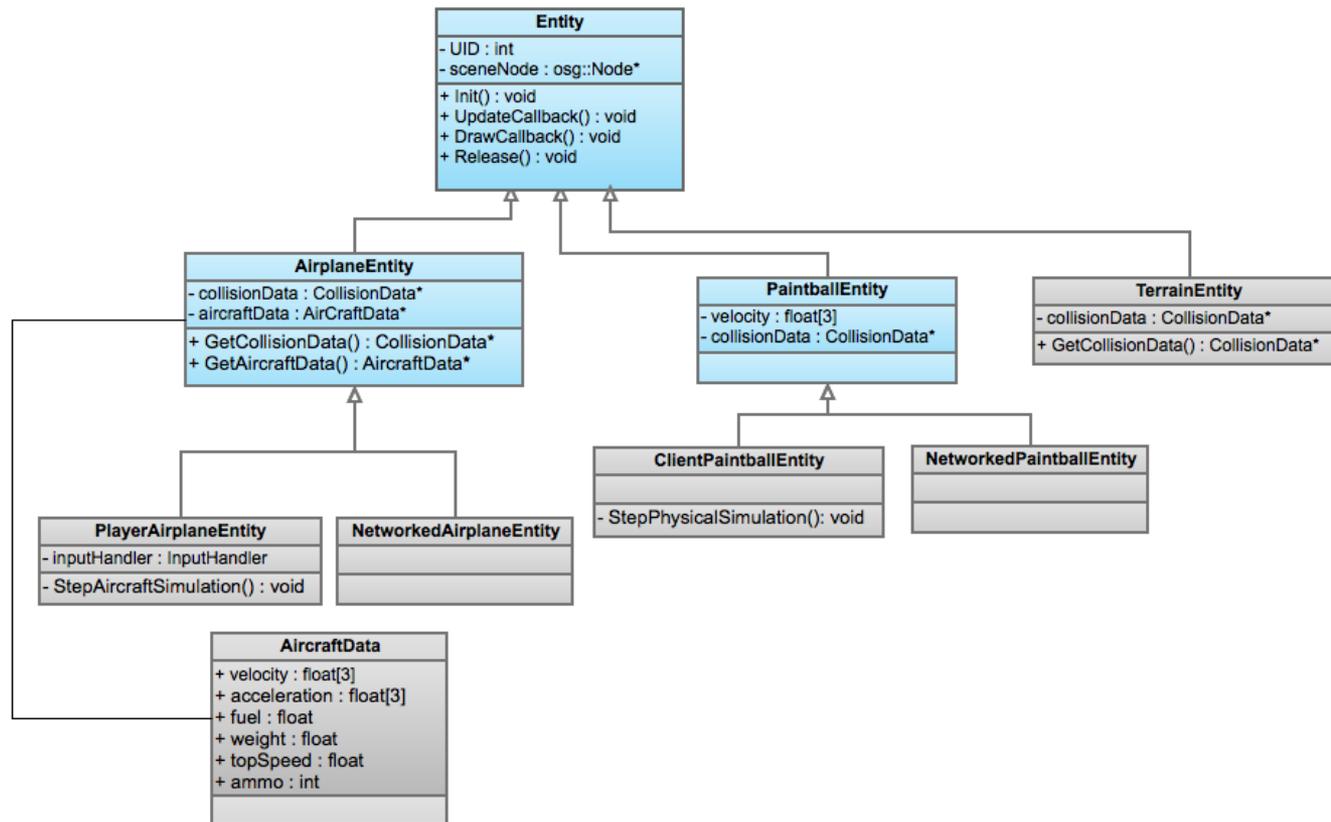
Technical Specifications

- Scene graph model
- Collision representations
- Aircraft damage
- Authoritative server
- Networked data log

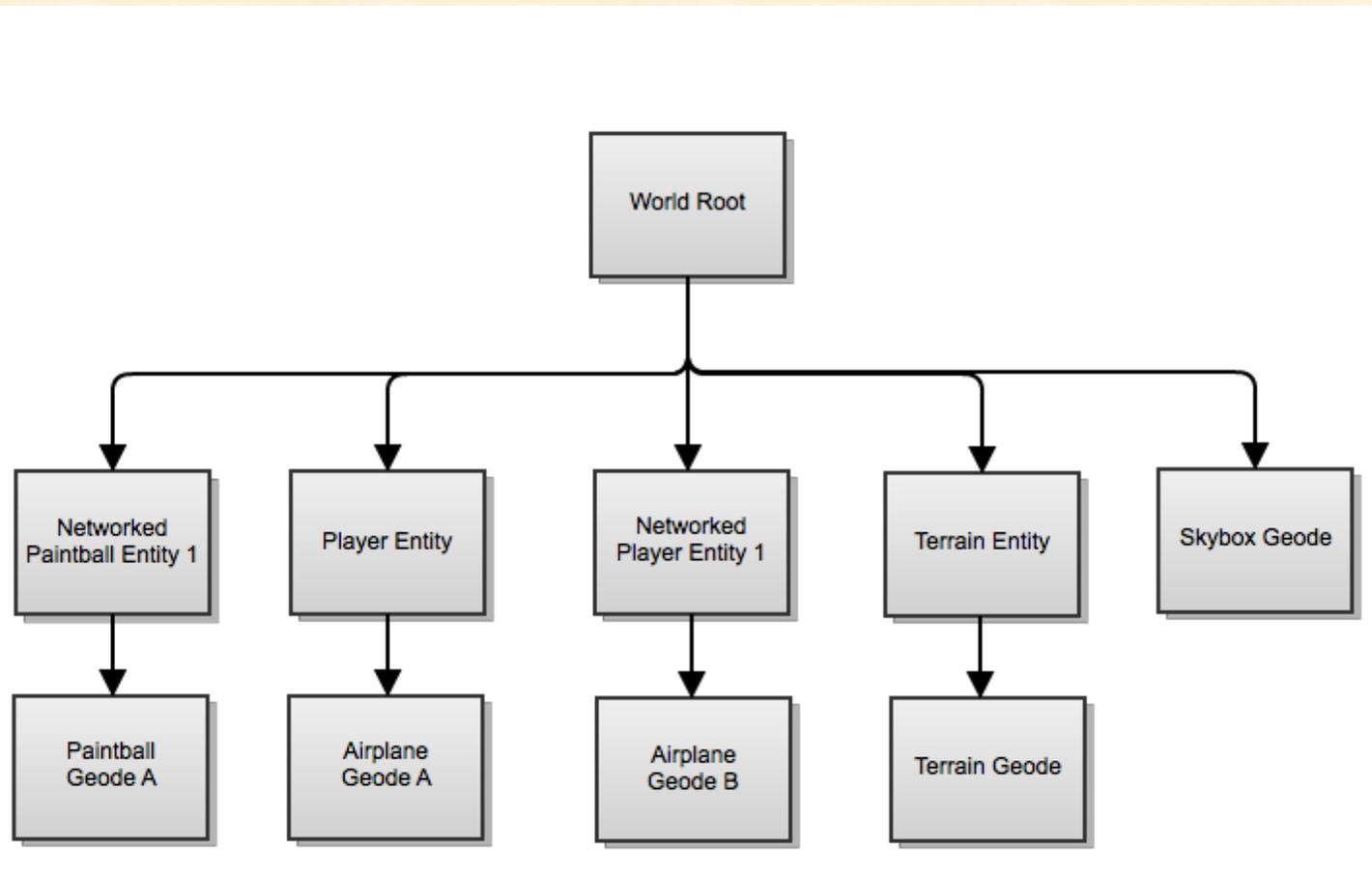


System Architecture

DFB Entity Class Diagram



System Architecture: Sample Hierarchy



System Components

- Hardware Platforms
 - Standard graphics acceleration
 - Dedicated server
- Software Platforms / Technologies
 - Windows XP/Vista/7
 - QT Creator IDE
 - OpenSceneGraph
 - SVN/Jenkins



Testing

- Start with local simulation
- Single client-server communication
- Multiple clients connected
- Multiple clients interacting (User experience testing)
- Replay from logged network data: start to finish
- Integration testing



Risks

- Physical Simulation
 - Large amount of factors impacting flight model
 - Dedicated researcher, bottom-up approach
- Networking/Encryption
 - Very little previous experience within group
 - Previous Boeing projects as resource
- Replays
 - Time slider could be difficult to implement
 - Using logged server data, continuous playback easier
- Scope
 - Multiple vastly different modules
 - Mitigated by prioritized planning

