

The background of the slide features a photograph of a sunset or sunrise over a body of water. The sky is filled with warm, orange, and red hues, transitioning into a darker blue at the top. The water below reflects these colors. In the bottom right corner, the edge of an airplane wing and a small portion of the tail are visible, suggesting the photo was taken from an airplane window.

Video URL:

<https://youtu.be/gbNTeFkxK0Q>

FLIGHT GEAR CONCRETE ARCHITECTURE

GROUP 3 PRESENTATION



ROLES AND RESPONSIBILITIES

- LEADER: Alan Teng → Reflexion Analysis: High Level
- PRESENTER: Lucas Coster → Concrete Architecture / Reflexion Analysis
- PRESENTER: Divaydeep Singh → Subsystem Review
- Donovan Bisson → Concrete Architecture / Reflexion Analysis: Subsystem
- Antonio Sousa-Dias → Use Cases
- Zhongqi Xu → Intro, Abstract, Derivation Process, Conclusion

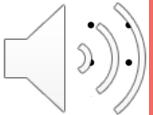
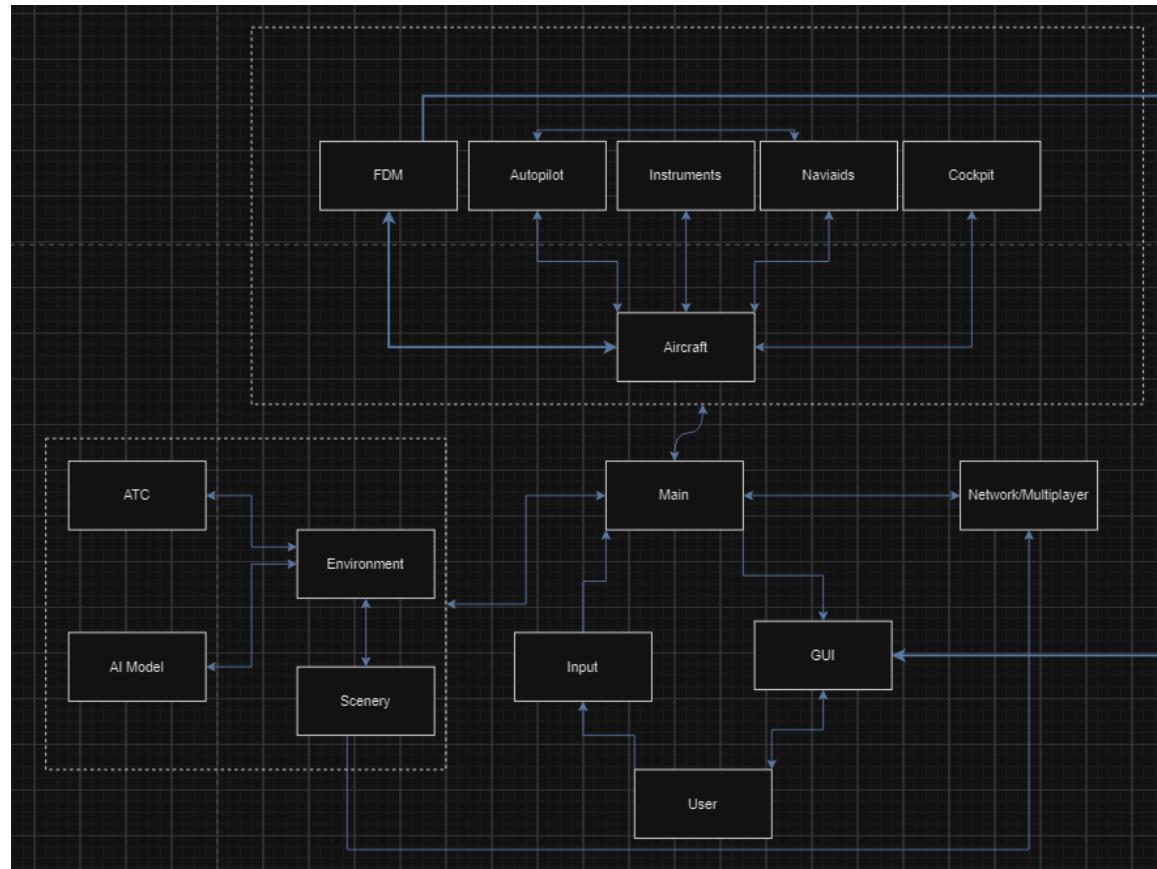
INTRODUCTION

FlightGear

Goal



CONCEPTUAL ARCHITECTURE



DERIVATION PROCESS



UNDERSTAND



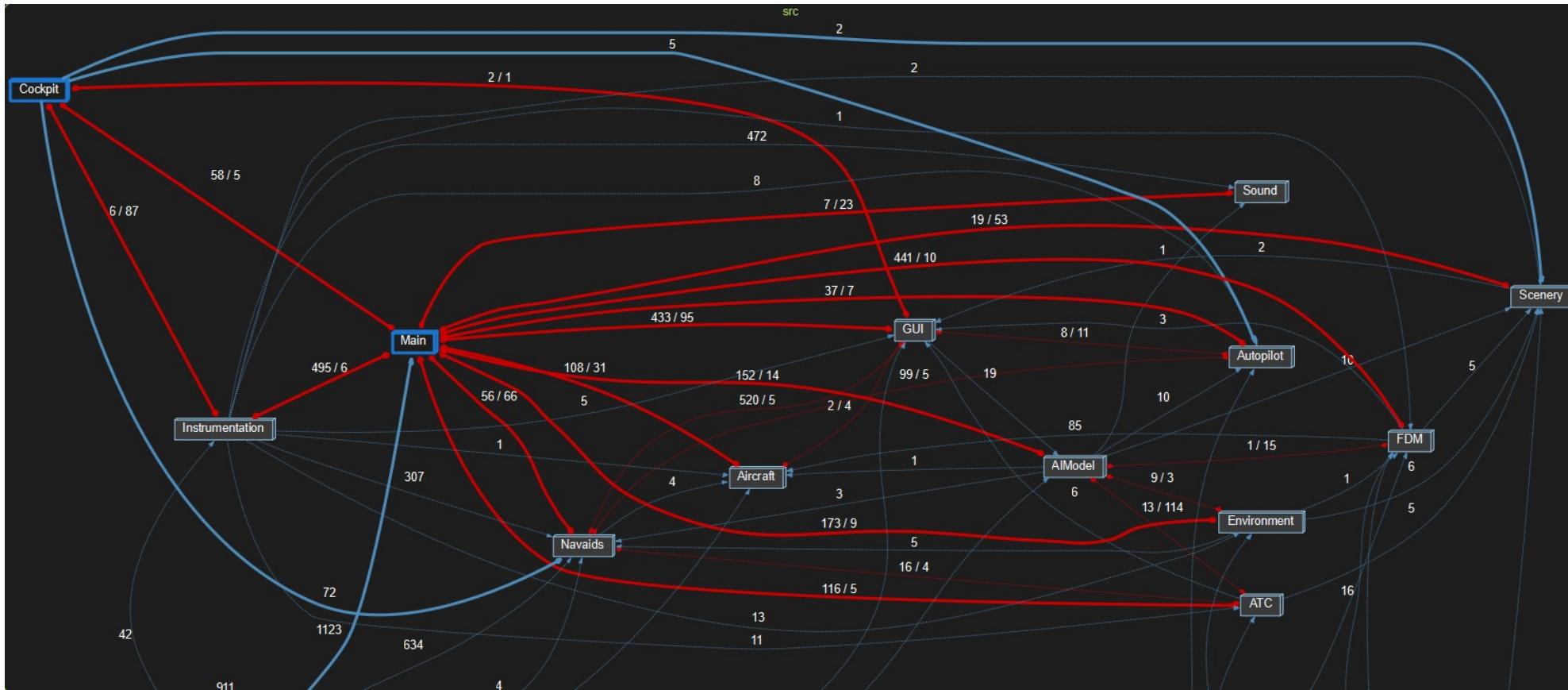
MEETINGS



RESEARCH



CONCRETE ARCHITECTURE



S U B S Y S T E M S

Navaids

Sound

FDM

Environment and Scenery

Cockpit and Instrumentation

Aircraft

AI Model

ATC

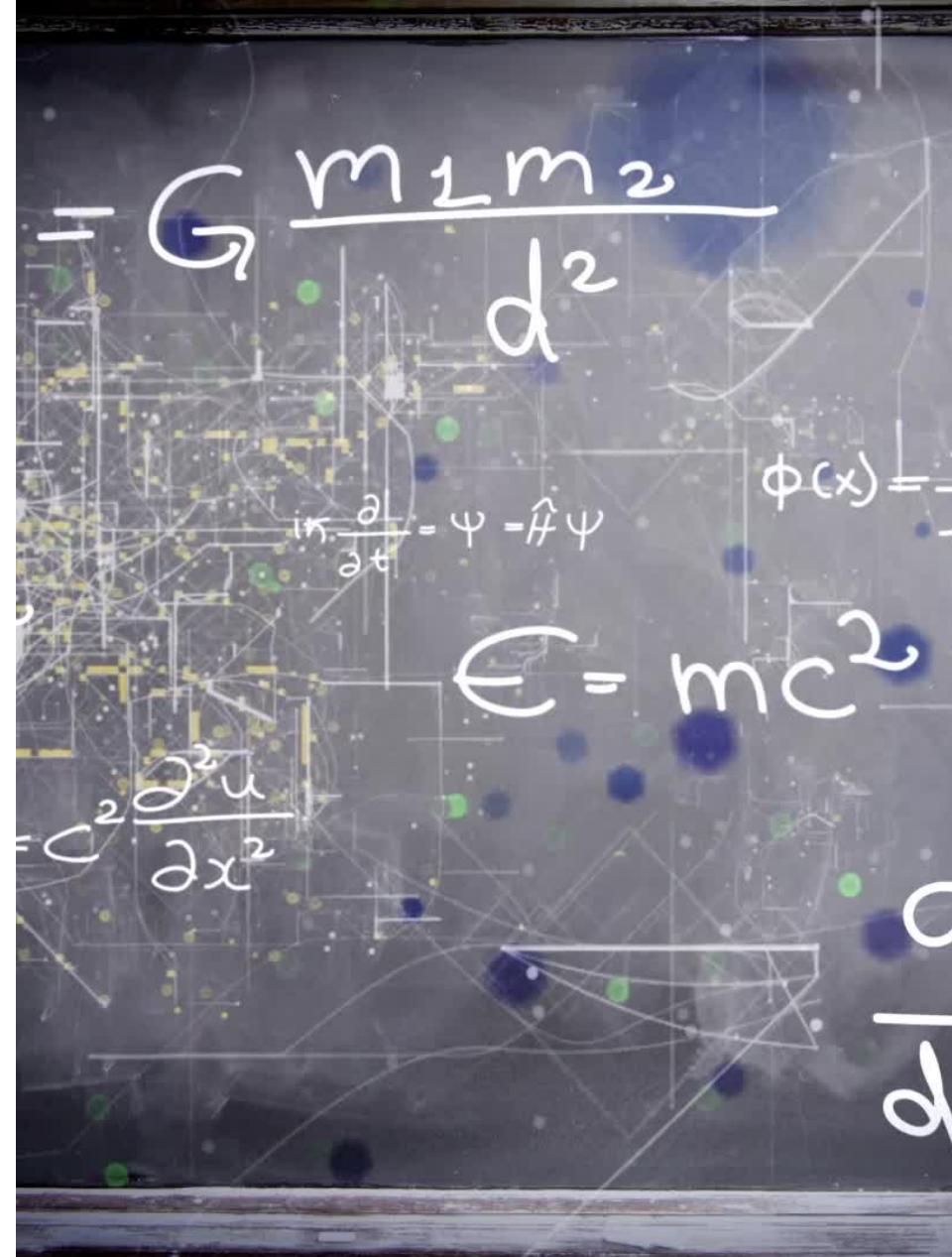
GUI

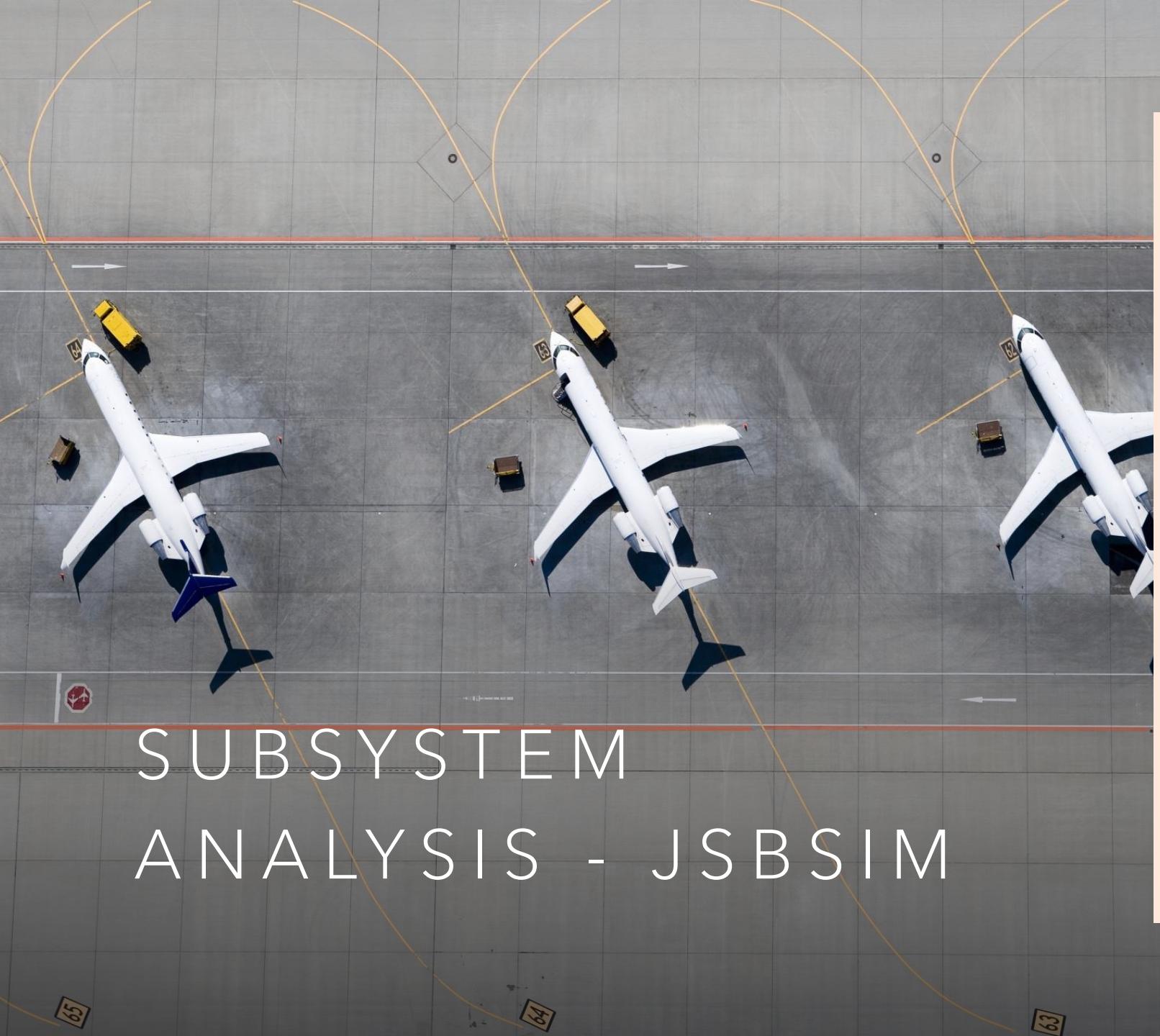
Autopilot



FDM REVIEW

- Set of mathematical equations used to calculate the physical forces acting on a simulated aircraft.
- Equations consider aircraft geometry, mass properties and atmospheric conditions.
- FlightGear comes with two integrated FDMs. JSBSim and YASim.
- JSBSim offers the highest level of detail and is used in industry, research, and education.
- YASim is ideal for hobbyists and designers for testing conceptual aircraft designs.





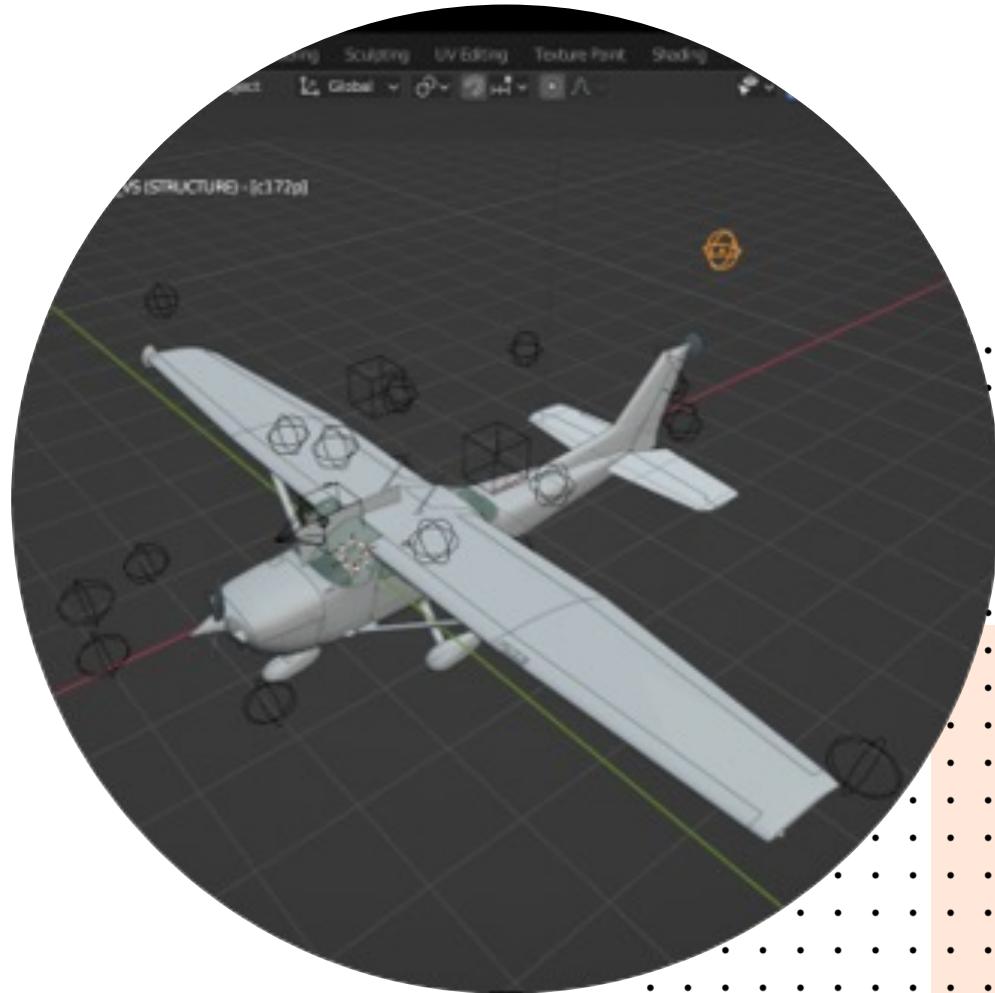
SUBSYSTEM ANALYSIS - JSBSIM

- JSBSim models aerodynamic and propulsive forces as a function of flight conditions and aircraft state.
- Follows an object-oriented architecture.
- Written entirely in C++ and consists of 70+ classes.
- Classes are divided into subdirectories based on function.
- Specific model classes are derived from a set of base classes.



SUBSYSTEM INTEGRATION

- JSBSim executive class orchestrates flight dynamics simulation.
- XML files define the physical characteristics of the aircraft.
- FlightGear communicates with FDM through data exchange protocol.
- FlightGear provides environmental data.





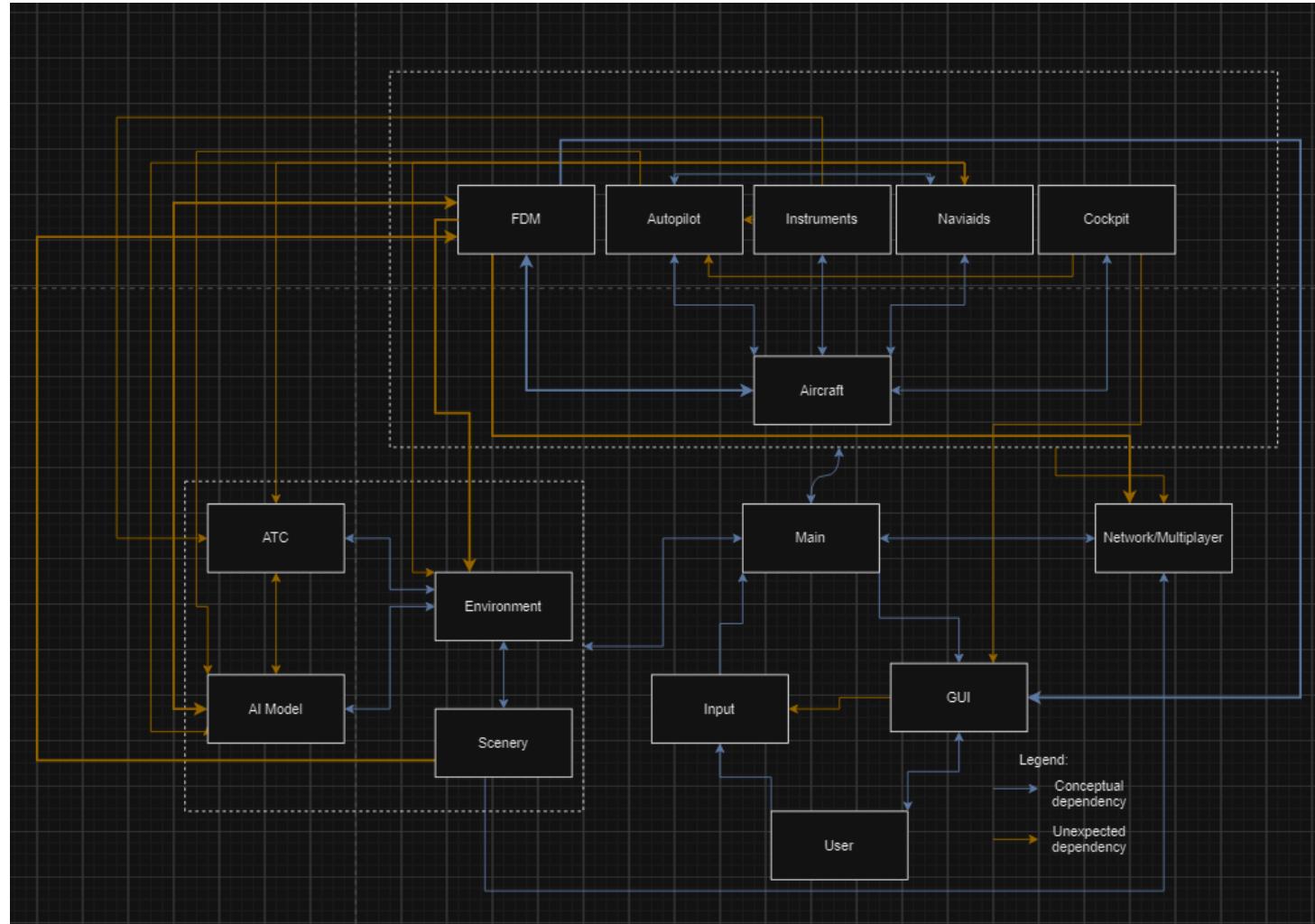
CONCURRENCY AND TEAM ISSUES

- Lack of Code Consistency
- Multiple Different Programmers
- Coding Styles and Comments

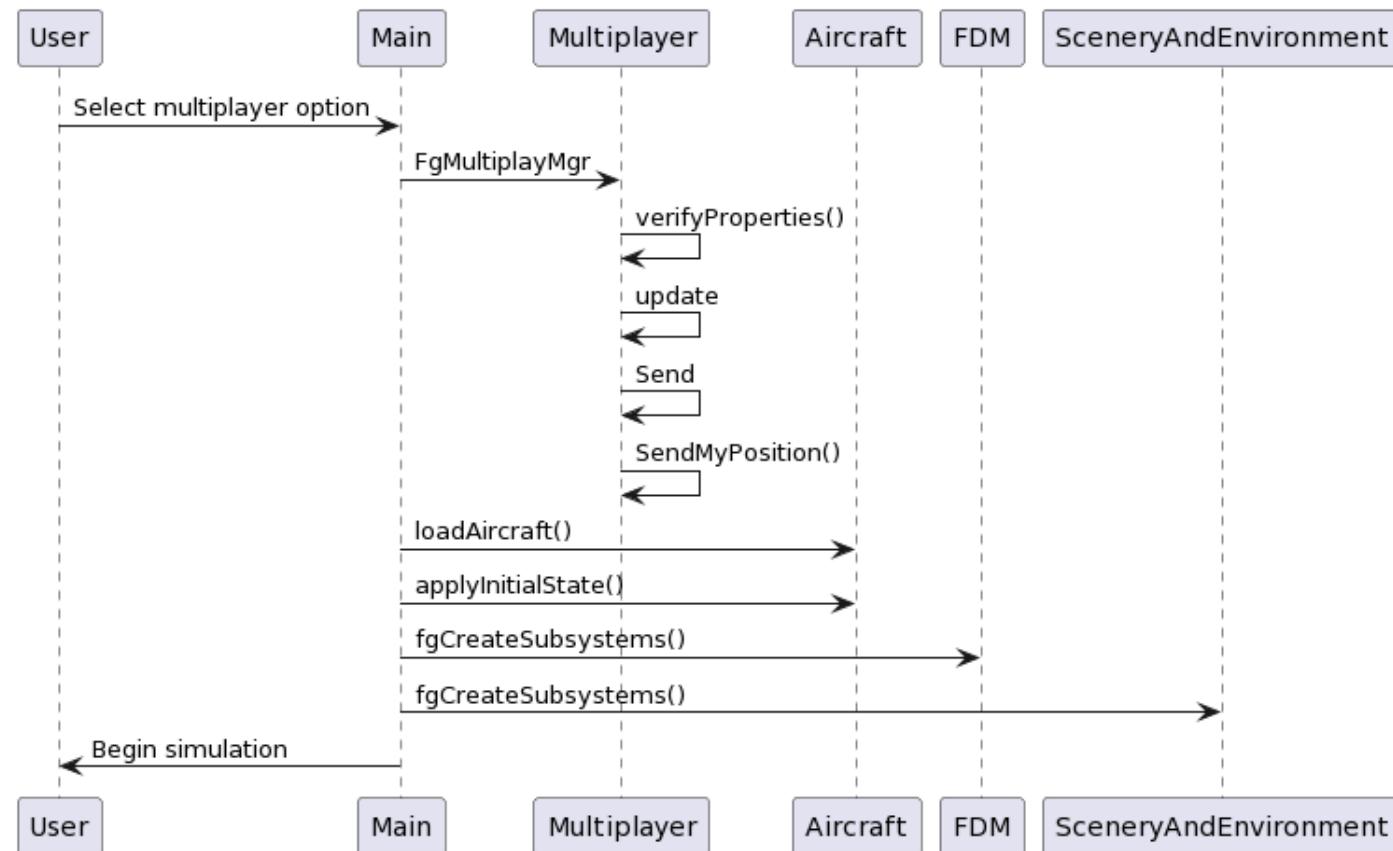


REFLEXION ANALYSIS

- We found unexpected connections between different submodules as seen in the diagram.
- Most of these connections are used to reduce latency in order to avoid critical simulation failures.

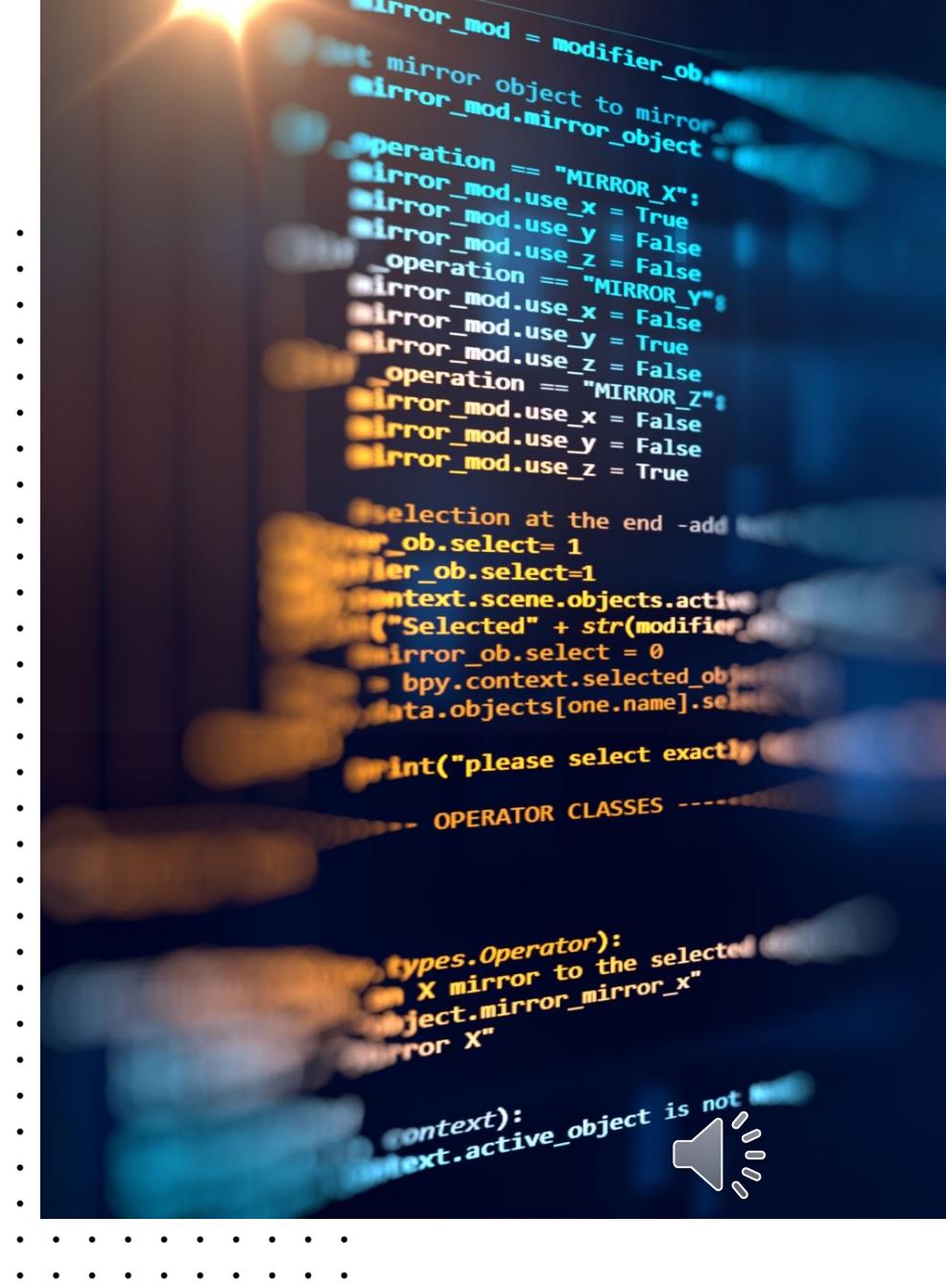


USE CASE



LESSONS LEARNED

- Discrepancies
- Open-Source Software
- Lack of Consistency



CONCLUSION

- Concrete Architecture
- Reflexion Analysis
- FDM Review

