

Testing Real-time Avionics Software

with the

OSEE Test Environment (OTE)

April 19, 2023

Integrated Engineering Environment

- **Provides seamless integration of COTS and open-source software**

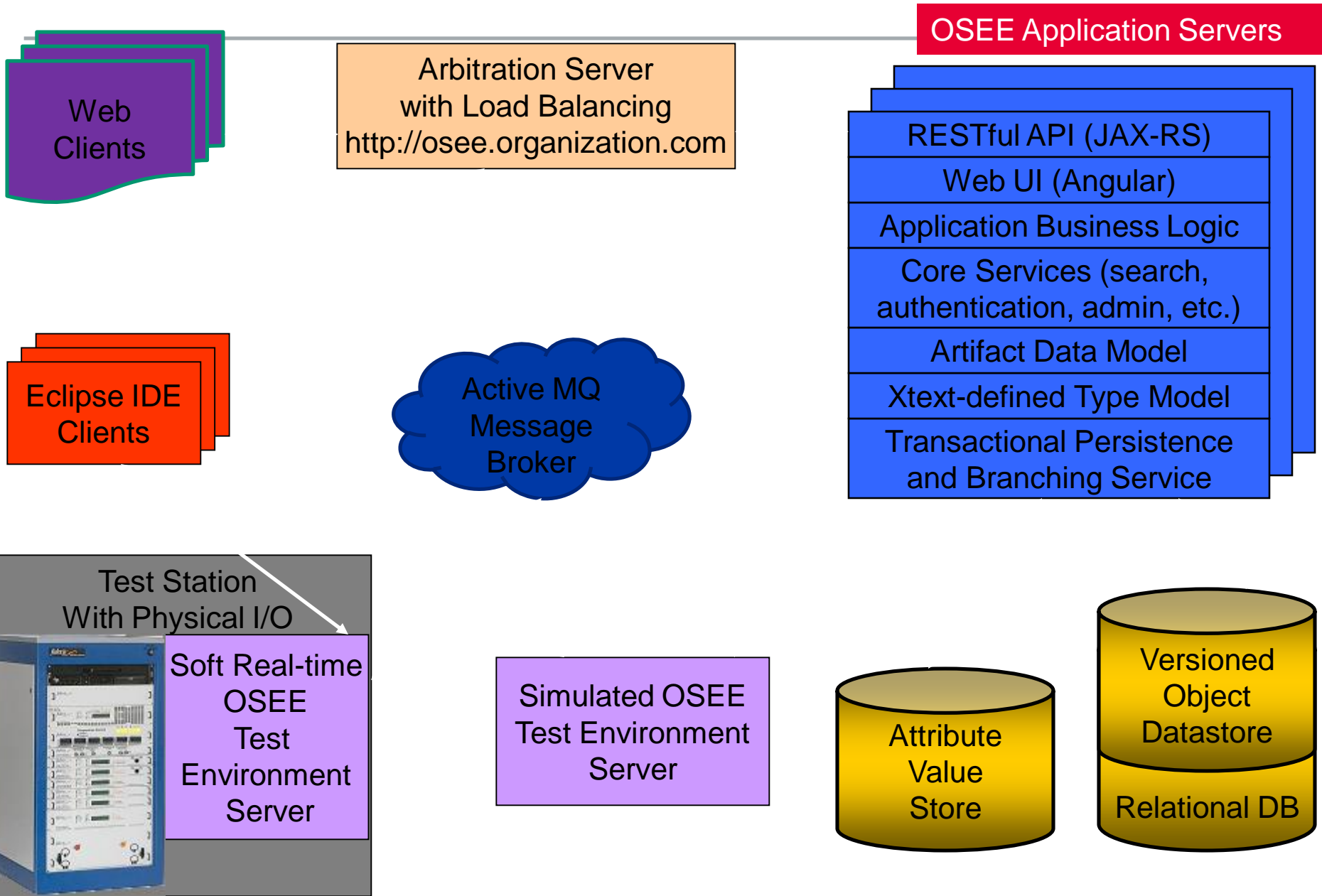
- OSEE server provides REST web services
- OSEE client built on Eclipse open source tool integration platform
- Leverages many existing open source libraries

- **Eliminate redundancy of data**

- Shared data model accessible to across full life cycle
- Integrated Product Line Engineering to eliminate redundancy of engineering data across variants and even platforms

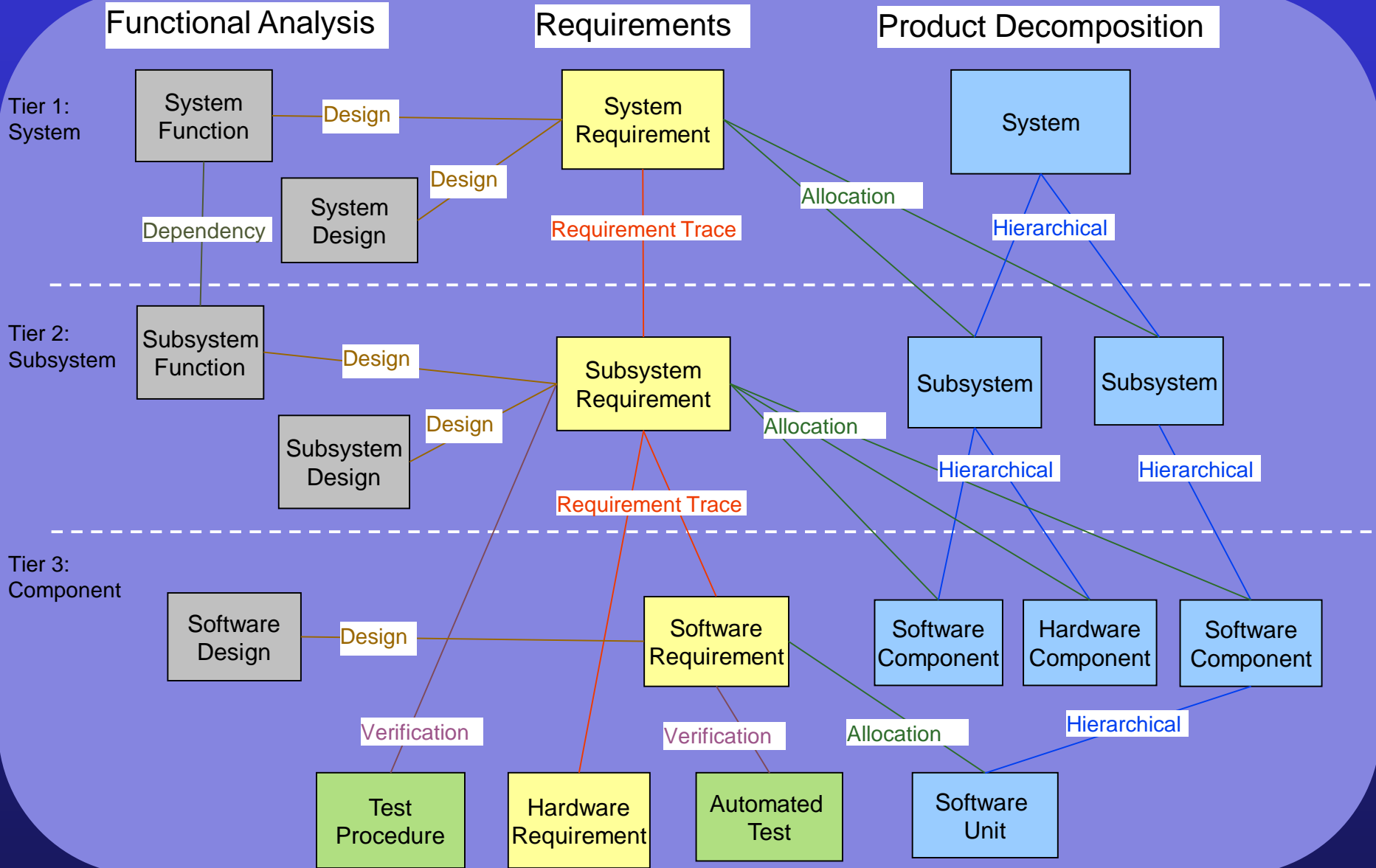
- **Eliminate redundancy of engineering effort**

- Product Line Engineering provides strategic, systematic reuse
- Advanced automated testing reduces repeated verification efforts





Systems Engineering Data Model



Hardware-in-the-loop Testing

- Lab test station provides same interfaces as the real aircraft (1553 Mux, GB Ethernet, video, serial, analogs, discrete signals)
- Breakout panels allows for low level debugging using logic and protocol analyzers
- Aircraft Mission Processor running software under test
- Linux server runs Java test environment, emulators, and test scripts

Single Environment for all testing levels

- **Reuse Test Environment and Scripts**

- Single environment supports desktop testing, integration labs, production acceptance testing, and aircraft testing
- Run same Java test scripts (without recompiling) at all levels

- **Single Java test script can support multiple major configurations of the unit under test**

- **Developer friendly Test Script API allows non-software developers to write test scripts**

Advantages of Open Systems Approach

- **Lower cost hardware with latest performance and technologies, support and easier future upgrades**
- **Lower operating system cost – only support costs**
- **Lower development environment costs – open source Eclipse Java IDE instead of high cost proprietary tools**
- **Eclipse/Java is a more productive software development environment than C**

System Safety and Structural Coverage

- **System safety report leverages end-to-end traceability**
- **Uses MIL-STD-882E**
 - IDAL
 - Software Control Category
 - Severity Category
 - Software Criticality Index
- **Structural Coverage Analysis**
 - Software Criticality Index identifies level of needed SCA