

C2SIM Systems in Use

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C-BML/MSDL Servers in Use

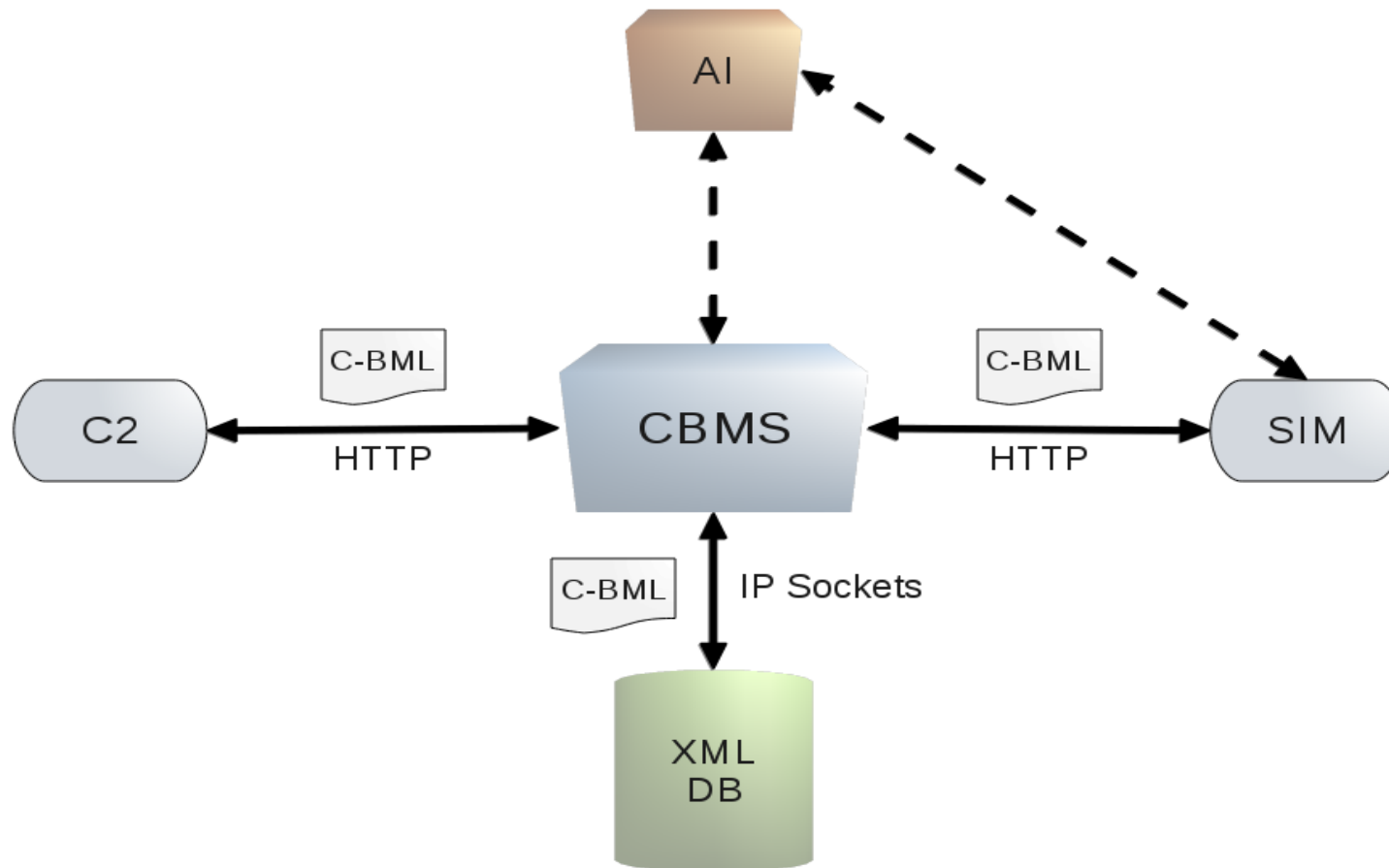
C-BML Servers in Use Today

- Coalition Battle Management Services (CBMS)
 - Developed by VMASC for JCW
- FKIE server
 - Developed by Fraunhofer for German Bundeswehr
- Ellipse server
 - Developed by AIRBUS for France/DGA
- Saab/GMU WISE/SBML
 - Re-engineered from GMU “Scripted BML Server” on Saab’s WISE high-performance platform

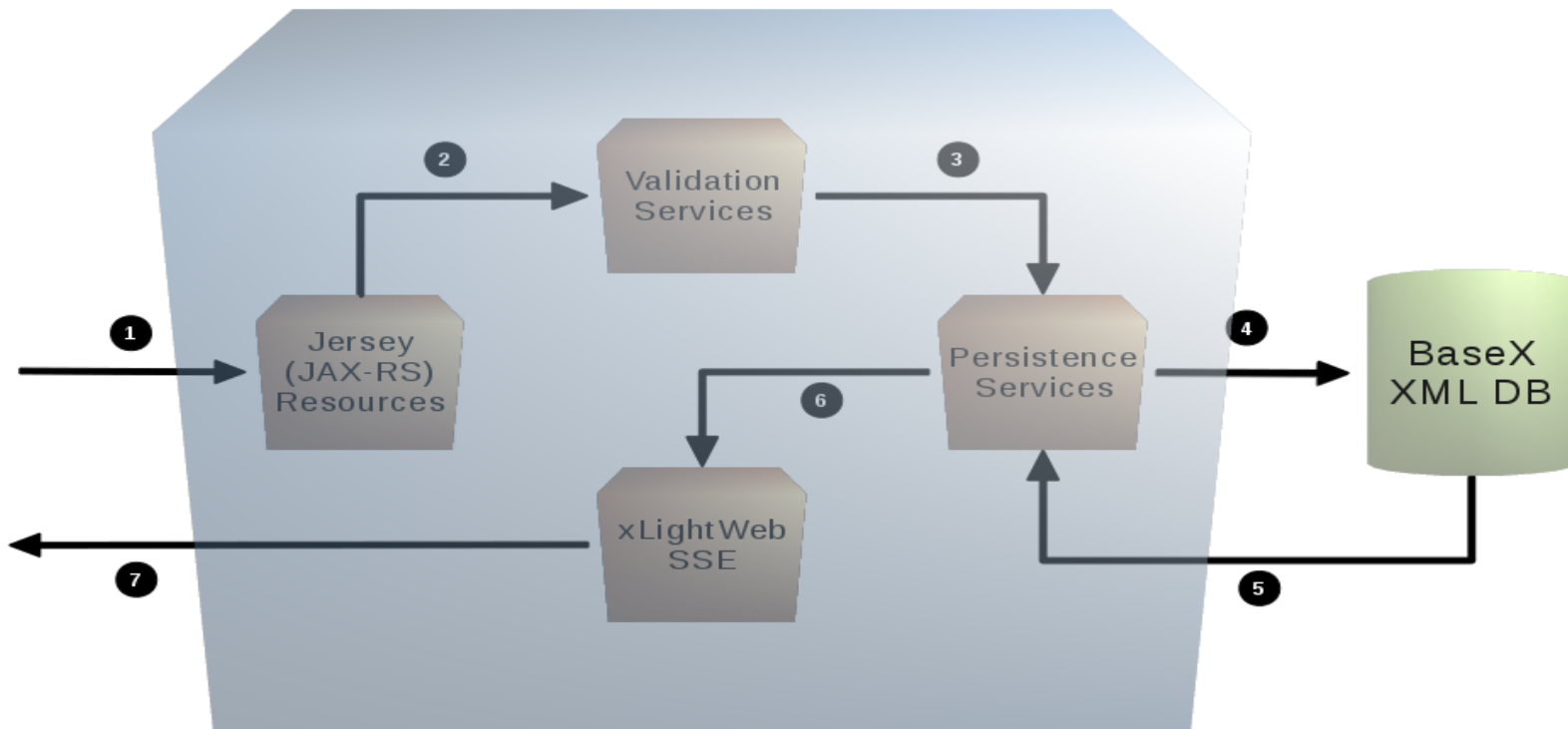
Coalition BML Services (CBMS)

- Developed by VMASC for JCW
 - Now US Joint Staff J-7
- Serves complete XML documents
 - Does not parse them unless schema validation is requested
 - Based on Apache open source components
 - This allows very high throughput:
 - Over 100 transactions/second
 - Put does not allow translation
- Government Open Source
 - Currently available under Distribution Agreement to USA, AUS, CAN, NZ, UK

Coalition Battle Management Services (CBMS) External Component Integration



Coalition Battle Management Services (CBMS) Subscription Service Internal Flow



CBMS Additional Capabilities

- Namespaces
 - Semantic validation using ontology
 - Schema validation
 - Filtering data for general queries and subscription Topics
 - Logging
- SOAP and REST
 - Serving MSDL
 - Government open source (Open Technology Development)

FKIE BML Server

- Developed by Fraunhofer FKIE, based on SBML Open Source, for German Bundeswehr
 - To support Germany-France BML experiments
- Document-based server so it can support any schema
 - But not translation
- Executable only available to Germany, France, Denmark, Netherlands, Spain

FKIE BML Server Additional Capabilities

- Distributed operation
- Namespaces
- Filtering for distribution by Topic
- Logging
- SOAP and RESTful interfaces

Ellipse BML Server

- Developed by AIRBUS under France/DGA support
 - To support France Joint Staff Program enabling systems connectivity effectiveness
- Implements schema IBML09+
- Executable only available to NATO partners under bilateral agreements

Ellipse BML Server Additional Capabilities

- Distributed operation
- Namespaces
- Filtering for distribution by Topic
- JMS, SOAP and RESTful interfaces

Saab/GMU WISE/SBML

- Widely Integrated Systems Environment (WISE) is Saab off-the shelf proprietary software for integration heterogeneous systems
 - BML server provided initially as transition of GMU open source SBML
 - Saab supported GMU to inform further development
- Saab plans to increase level of C-BML/MSDL integration in WISE
 - Product extension and support by Saab
 - Comprehensive, high-performance service suite
 - Lite version available free for development

WISE/SBML Capabilities

- Namespaces
- Schema validation
- Filtering data for subscription topics
- Logging/replay
- Distributed operation
- Over 10x performance of original SBML
- Schema translation
- Multithreading
- REST input
- STOMP output
- Aggregating and serving MSDL

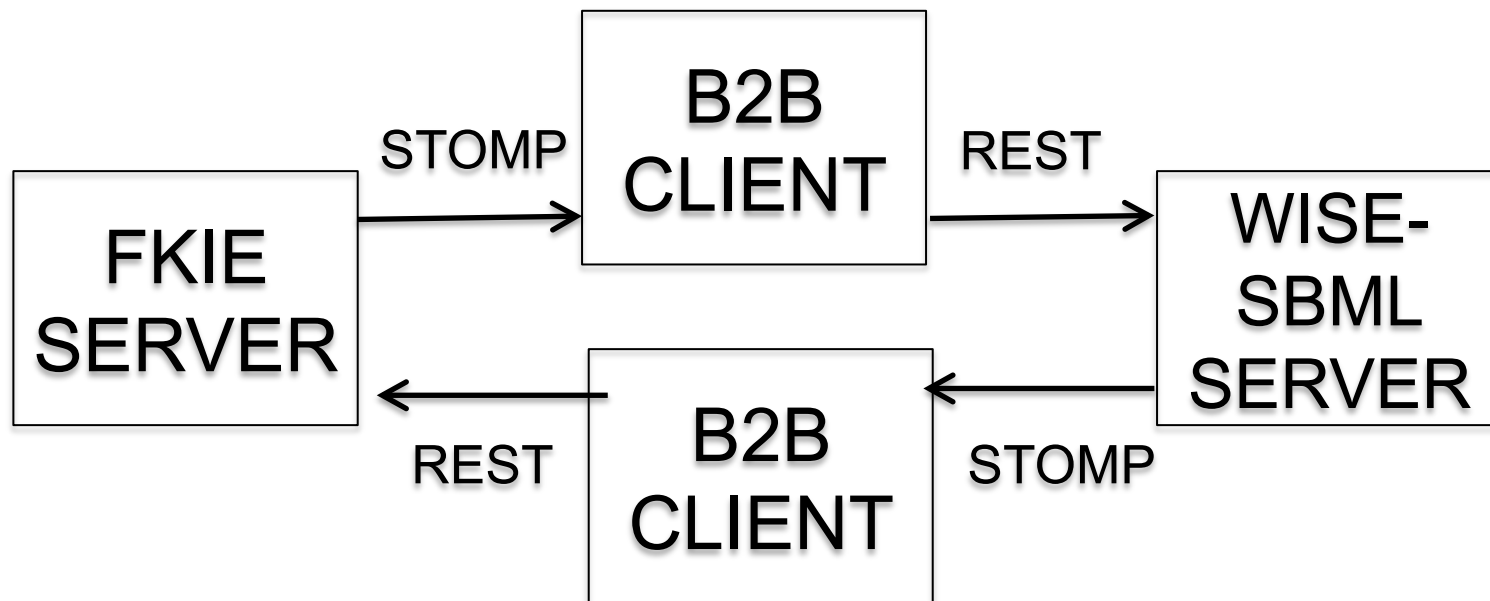
Review of Server Functions

- **Logging/replay**
 - Server writes a file showing every transaction it receives, with time stamps
 - Server is capable of replaying this file to recreate the original sequence of Orders and Reports at original time intervals
- **Distributed servers**
 - Multiple servers can be tied together to increase load capacity and geographic scope of the C2-Sim coalition

Playback and Restart

- Time-stamped server log can be replayed to reproduce the Orders and Reports in original sequence
- This is valuable for after-action review
- A related issue is the ability to checkpoint status of coalition and “rewind” to that point
 - Server aspect of this is straightforward: replay the log up to the restart point
 - High rate server process desirable to avoid waiting on server
 - C2 and simulation systems need comparable capability in order for this to be useful

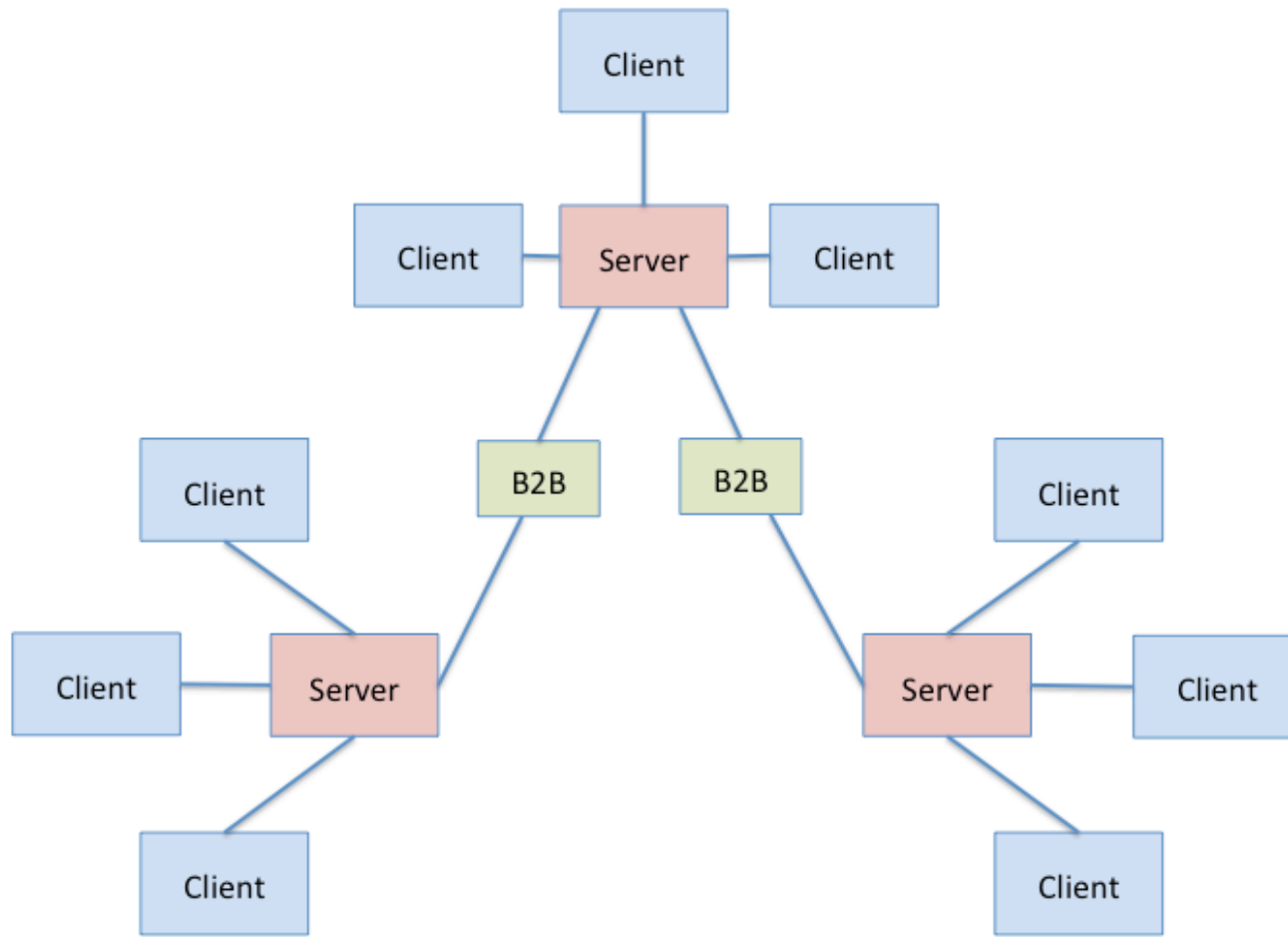
Simple Distributed Server Architecture



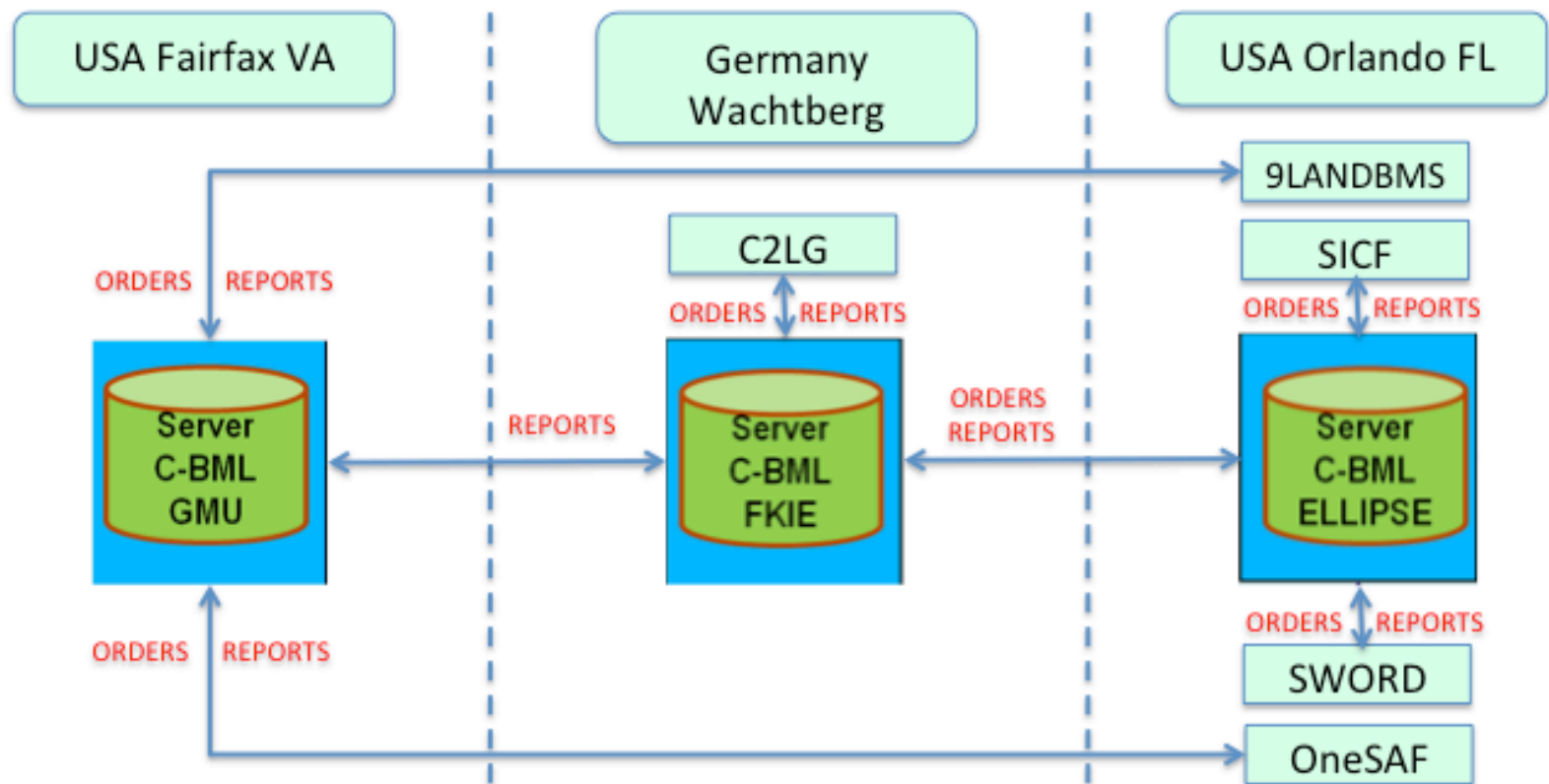
B2B: back-to-back client

More Complex Distributed Server Architecture

NOTE: Must be configured as tree



Distributed Server Demo at I/ITSEC 2014



Synchronized Distributed C2SIM Coalitions

Status Monitoring and Control

- Lesson learned in MSG-048:
 - It is impractical to coordinate multiple interoperating C2 and simulation systems with only spoken communication
- Solution: a coordinating webpage
 - Shows possible states of each coalition system
 - Master Controller provides coordinating guidance
 - Inputs can come from webpage interface
 - Or Web service client



MSG-085 Status Monitor



MASTER CONTROLLER STATUS

Scenario: scenario1

Current Order: **initialize**

Scenario MSDL status: not started

Number of observers: 4

Comment: new comment

CLIENT STATUS

Client: **C2IS1 - rpt1**

Current Status: **stopped**

Change status:

Add/change comment:

Client log out

	STOPPED	INITIALIZING	READY	RUNNING	PAUSED	COMMENT
C2IS1 rpt1	stopped					
C2IS2 rpt2	stopped					
C2IS3 rpt3	stopped					stuck
C2IS4 rpt4		setting up				how are you
C2IS5 rpt5	offline					
C2IS6 rpt6	offline					
C2IS7 rpt7	stopped					let's go