

Comparison of Software Agent Frameworks with the J2EE Framework

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Problem

- What are the **synergies, conflicts, and interoperability challenges/potentials** between **Software Agent Frameworks** and **Web-centric, thin client, n-tier server, component frameworks** as exemplified by the **Java 2 Enterprise Platform (J2EE)** ?

Background

Software Agents

- Intense research activity, beginning transition to commercial applications
- Paradigm for peer-to-peer activity
- Reference: Multi-Agent Systems, Weiss, 1999, MIT Press

Java 2 Enterprise Framework (J2EE)

- State-of-the-art enterprise system. Web-centric n-tier component architecture (from Sun Microsystems, Inc.)
- Continued Evolution: Web-services, Connector architecture framework enhancement

Objective

- **Overall:** To elucidate potential synergies and conflicts as well as avenues for interoperability between applications that are developed for the Web-centric client-server n-tier component architecture and those that are developed as multi-agent software agent systems using
 - specifications-based approach
 - selective prototyping
- **Current Fiscal Year Objectives:**
 - Investigate Hybrid Services Architecture system
 - Investigate Data Access application

Activities

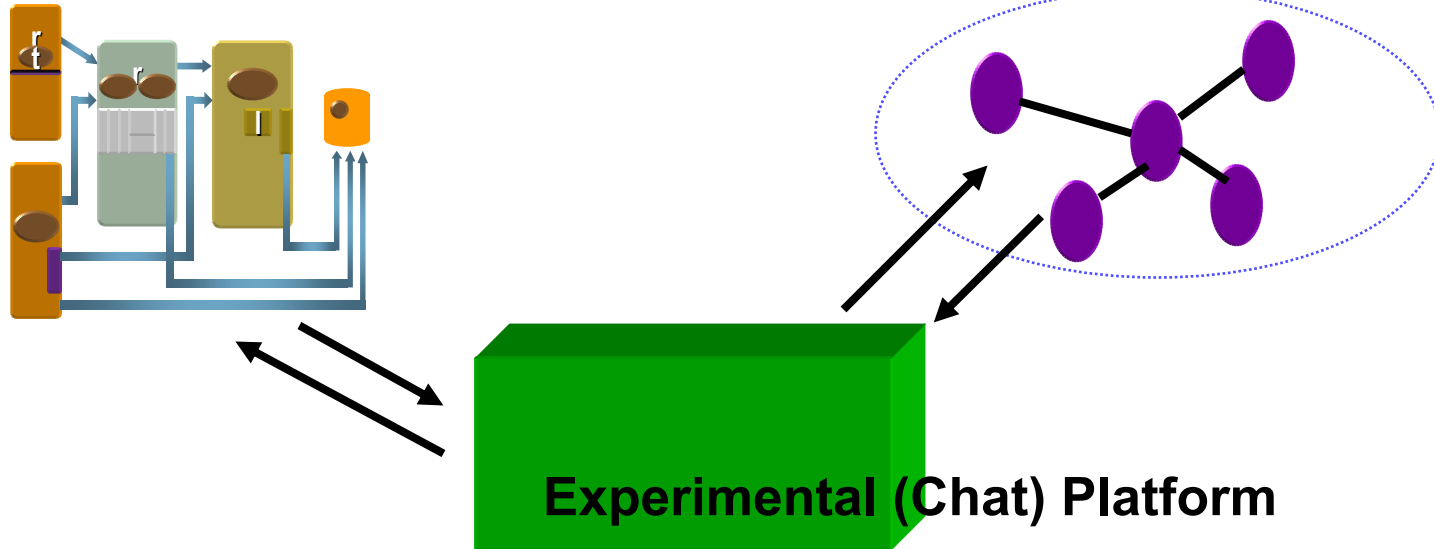
- Investigate synergies, conflicts and interoperability approaches arising in **Hybrid Service Architectures, Data Access Applications, and Transaction Applications**

that are compatible with the J2EE specifications and with the Foundation for Intelligent Physical Agent (FIPA) specifications for software agent systems.

- Develop prototypes to explore application areas. In particular, develop the J2EE-Agent Hybrid Services Architecture System components and the Data Access components.
- Undertake groundwork for
 - Agent System in Transaction with J2EE components,
 - Agents as possible components in J2EE system: limitations?
 - Modeling / simulation of agent conversations,
 - Agents in the JXTA peer-to-peer system.

Highlight

Prototype Data Access Experiment Systems



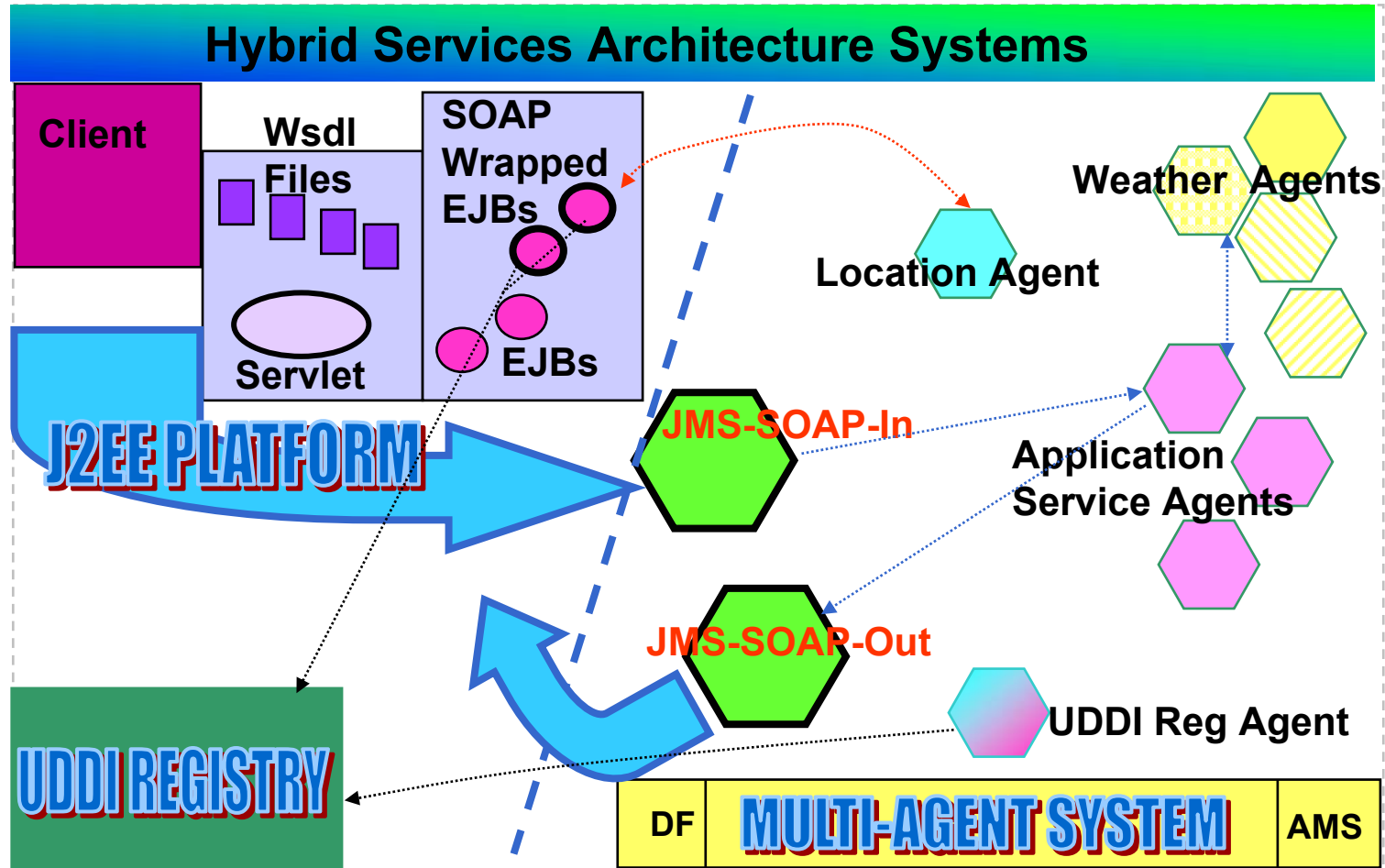
*Reports:

“Performance Study of FIPA-OS Agent Development Environment,”

“Comparison of Software Agent Frameworks and the J2EE Platform through the Data Access Experiment,” and

“Web Services and the Hybrid Service Architecture”

Demonstration



Impacts

- **Presentation** “Interoperation of the J2EE Platform with Software Agents via Messaging,” accepted for Java One 2002 Conference, March 2002.
- **Tech Transfer** of JMS Comms Agent to open source FIPA-OS developer community; hosted on Source Forge at <http://fipa-os.sourceforge.net/contributions.htm>
- **Collaboration** with “High Confidence Software Containers” MOIE project (G. Vecellio, PI); agents as components in J2EE
- **MITRE Edge article** “Software Agent Systems Meet Web-Centric Component Architecture” (In Review)
- **Initial participation** in **FIPA Standards** activities on software agents and web services

Future Plans

•Research Efforts

- Investigate transactions spanning frameworks, tie-in with web services and agent systems,
- Investigate FIPA agents as peers on the JXTA platform,
- Model agent conversation in support of performance assessment of the hybrid service architecture,
- Investigate issues involving the intersection of FIPA Specifications and the J2EE component model specifications (with High Confidence Software MOIE)

•Standards Efforts

- Participate in FIPA standards development on agents and web services

• Dissemination

- Internal: Project Web-site <http://rcf.mitre.org/~mlyell> , mailing list, MITRE Technical Report documents
- External: Presentation at appropriate conference venues, papers