



WHITESTEIN
Technologies

The Software Agent Company

Agents Meet IT Strategies

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Goal and Outline



Goal

Present how the “state of the art technology” of Java (J2EE) application servers can be used to build reliable and scalable agent-based business applications that are compatible and “interface-able” with current systems and technologies.

Outline

1. Whitestein Technologies
2. Agents’ Challenges in the “Real IT World”
3. A Major Deployed “State of the Art” Technology: J2EE Application Servers
4. Application Server Based Agent Platform
5. Summary and Outlook



Whitestein Technologies

Mission

Whitestein's mission is to become a leading provider of advanced software agent technologies, products, solutions, and services for various applications and industries.

Activity Areas

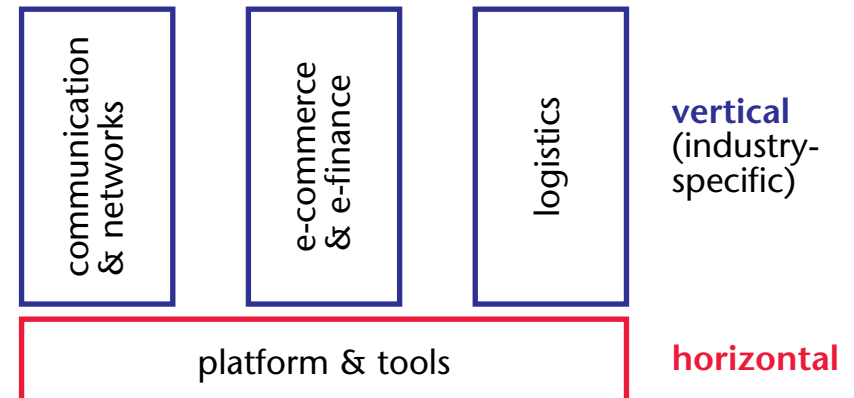
- ❑ Technology Research
- ❑ Technology Development
- ❑ Technology Application
- ❑ Technology Consulting

Organization

- ❑ Zurich, Switzerland: Competence Center
- ❑ Bratislava, Slovakia: Development Center
- ❑ Sophia Antipolis, France: R&D Center

- ❑ 45+ people

Thinking Things Technologies®





Agents' Challenges in the "Real IT World"



Status and Expectations

In practice – like all new IT concepts and technologies – software agents are being confronted with the “day-to-day IT reality”:

- ❑ Installed base of (mission critical) systems
 - *necessary for operational business – “no experiments, please!”*
- ❑ System development cannot start from scratch (on “green field”)
 - *in contrary: existing systems must survive longer than ever*
- ❑ Corporate IT strategies define (and confine) a set of approved products and technologies
 - *very important in today’s tightly calculated businesses (purchase, support, maintenance cost)*
- ❑ Existing corporate IT experience and know-how
 - *can “Yet Another New Paradigm” (software agents) be handled – or aren’t Web applications, Web services, new platforms etc. already a big enough challenge for the day-to-day IT business?*
- ❑ Large investments in current state-of-the-art technologies
 - *new technologies must leverage, add, and extend*



Status and Expectations (cont.)

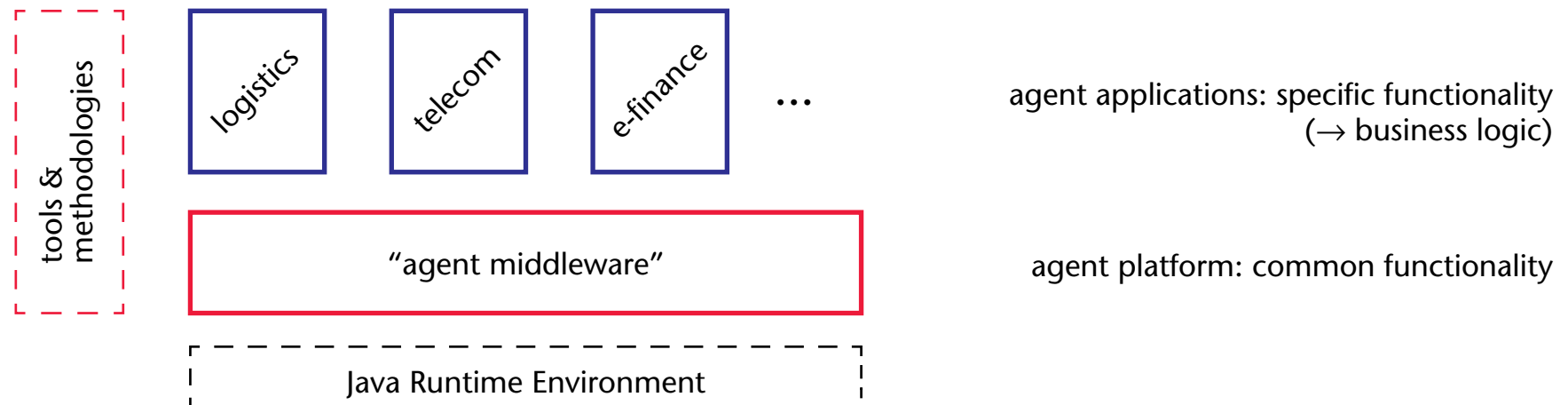
- For business applications, industry-grade platforms and tools must provide
 - *quality* (eg. reliability, performance, scalability, usefulness “in the trenches”)
 - *functionality* (eg. transactions, sessions, persistence)
 - *migration and extension* possibilities (systems, people’s know-how and experience)
 - *integration* with and *interfaces* to current products and solutions
 - *adherence* to industry standards

- The success of software agents depends to a large extent upon the fulfillment of expectations regarding
 - basic quality and functionality of agent technologies and products
 - integration into “non-agent” IT landscape
 - migration and extension of current applications with agent capabilities
 - re-use and extension of know-how



The Importance of Agent Infrastructures

- ❑ Experience shows: complex and maintainable business systems need well-engineered platforms and infrastructures ("middleware")



- ❑ Separate common platform functionality from business logic and data
- ❑ Re-use of generic functionality across systems and applications
- ❑ Stability and performance – continuously improved through product cycles/versions
- ❑ Standard and tested ways of "doing things" in the system development and maintenance



A Major Deployed “State of the Art” Technology

Deployed “State of the Art” Technology



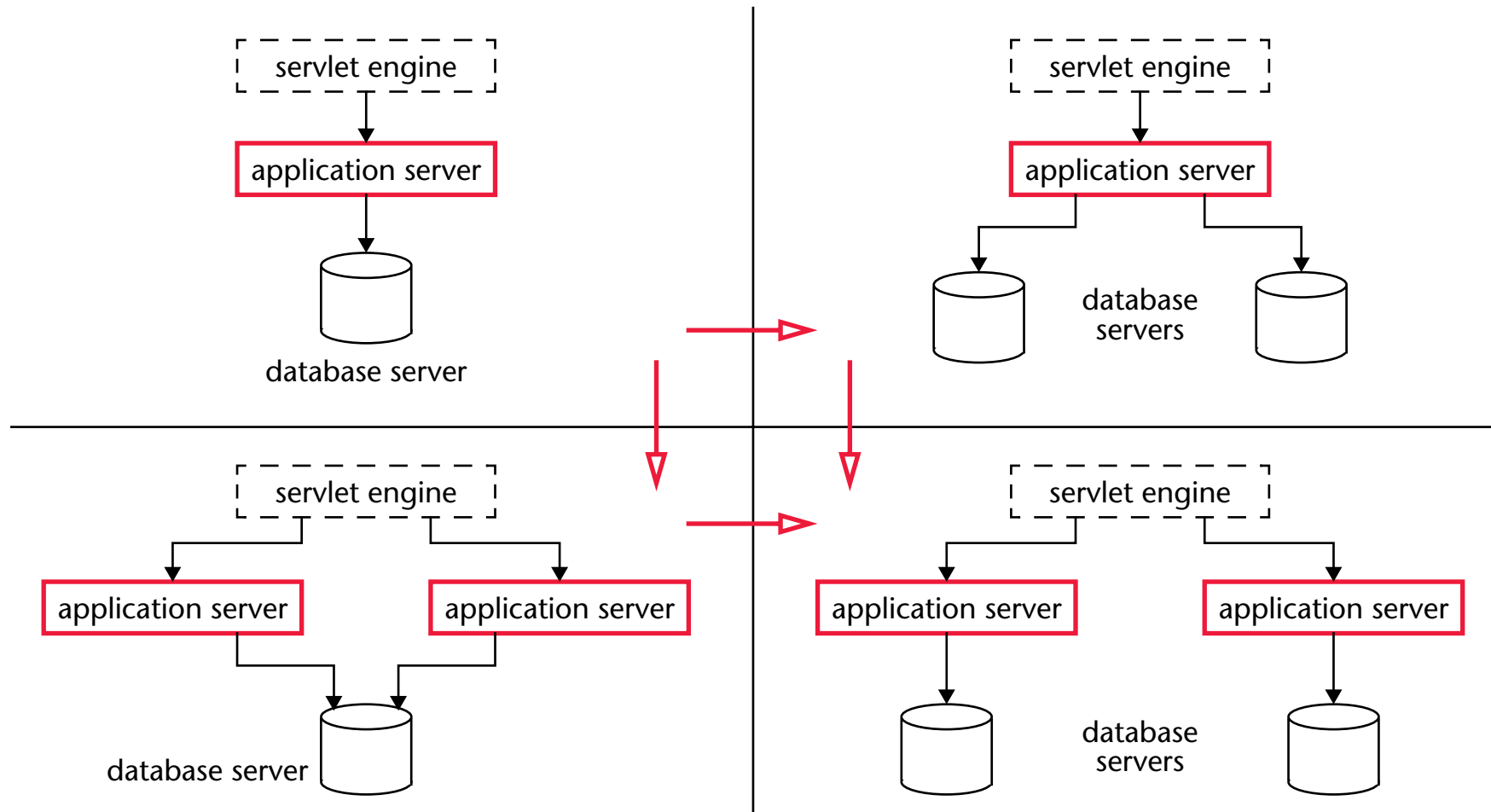
Application Servers (J2EE)

- ❑ Application servers are at the core of many modern business applications, eg. for e-commerce
- ❑ Product examples: WebSphere, WebLogic, iPlanet, HP-AS
- ❑ Platform for “EJBs”: Enterprise Java Beans – highly portable software components
- ❑ Enterprise Java Beans are a Java industry standard (J2EE)
- ❑ EJB servers are so called “CTMs” – Component Transaction Monitors, the convergence of
 - transaction monitors, eg. CICS, TUXEDO, Encina
 - distributed object services, eg. CORBA, DCOM, Java RMI
- ❑ Application servers provide the features and services to build reliable, complex, and maintainable business application, including
 - distributed objects, distributed transactions, persistence, concurrency
 - security (authentication, authorization)
 - load balancing, failover, clustering, dynamic reconfiguration, resource pooling

Deployed "State of the Art" Technology



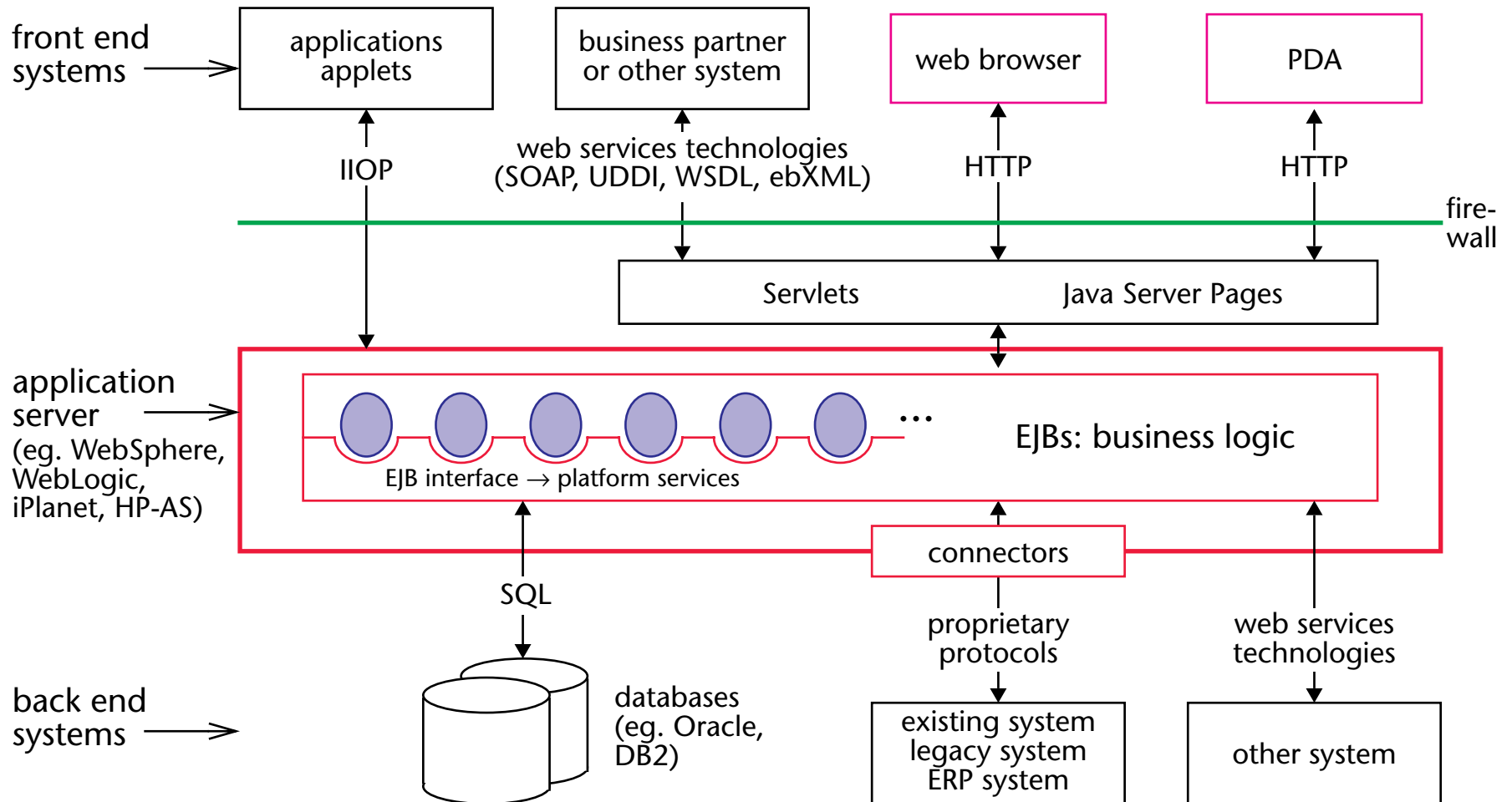
Application Servers (J2EE): Scalability, Stability, Fault Tolerance



Deployed "State of the Art" Technology



Application Server in Action



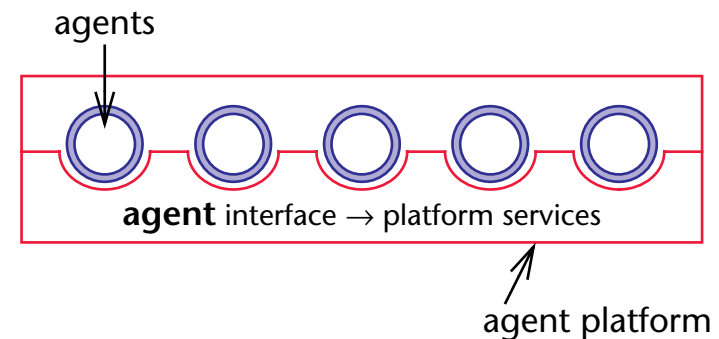
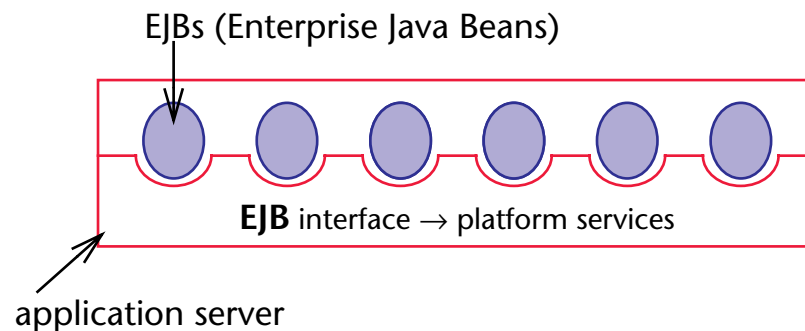


Application Server Based Agent Platform

AppServer Based Agent Platform



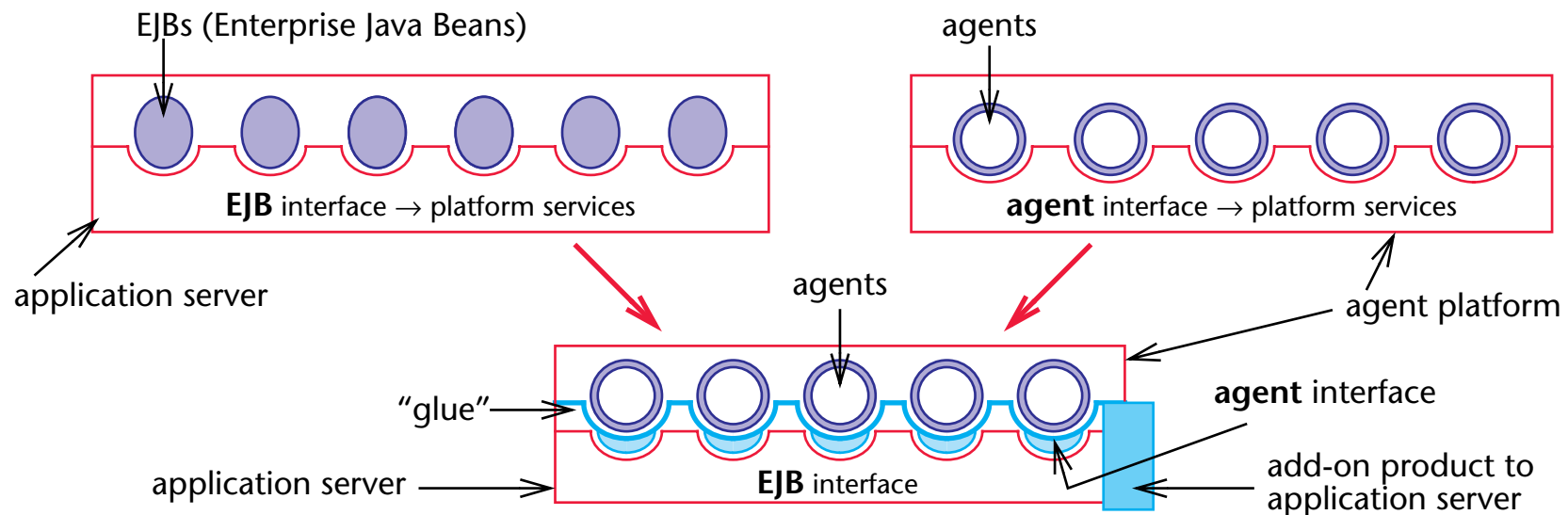
Application Servers vs. Agent Platforms



- ❑ Basic principal similarity between application servers and agent platforms
 - ❑ Application servers provide a great deal of the basic functionality of an agent platform
- concept: use the application server's
- features and services
 - stability, performance, scalability, interfaces, resource management
- to build an agent platform for business applications.



Application Servers vs. Agent Platforms (cont.)

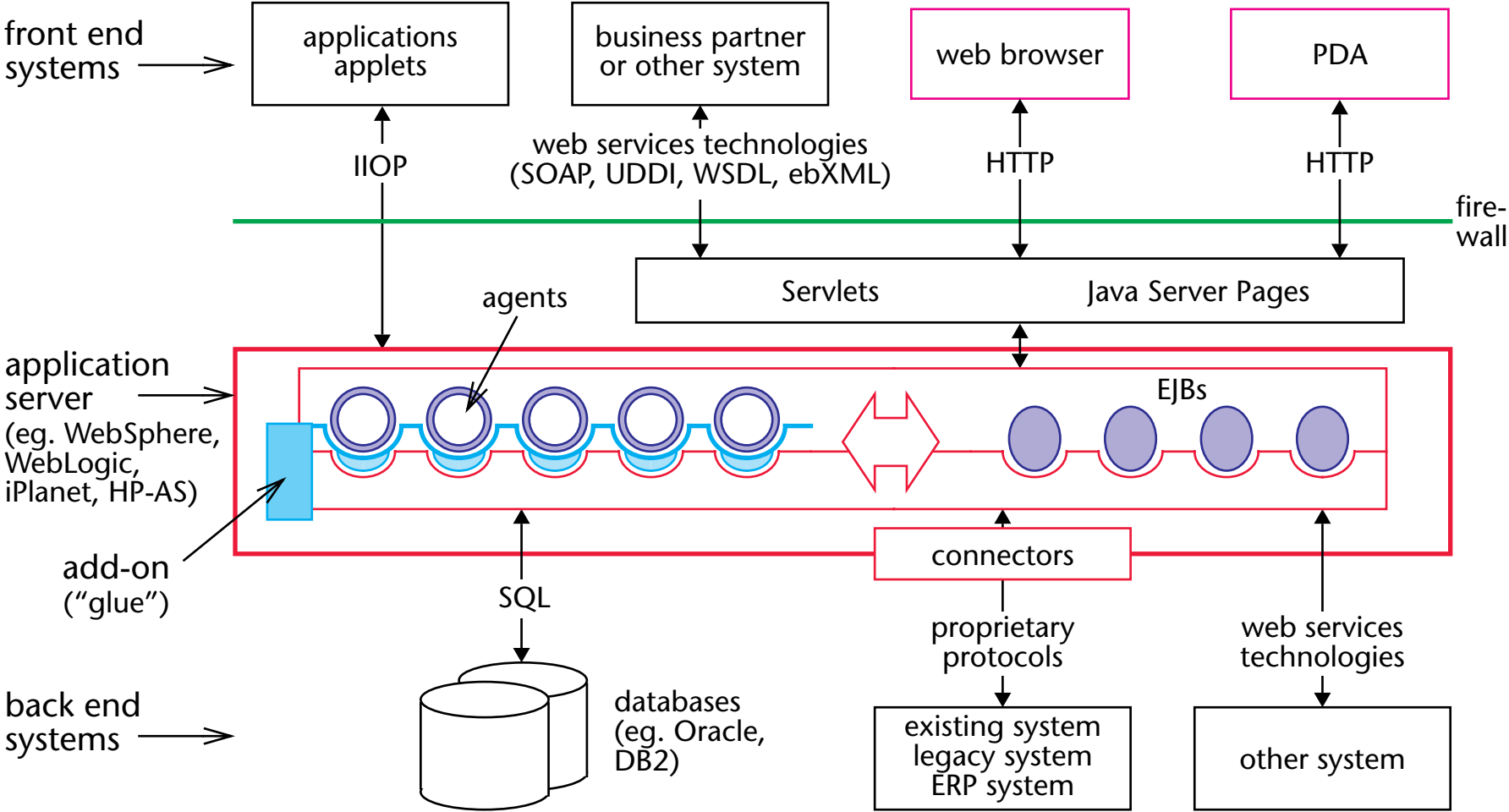


- ❑ OK, but application servers also have severe limitations regarding agent concepts, among them:
 - EJBs are purely reactive elements (not pro-active)
 - EJBs are not encapsulated and thus separated from each other
 - EJBs are not mobile
 - EJBs have technical constraints (eg. starting own threads not allowed)
- "glue" needed to build agents with EJBs

AppServer Based Agent Platform



AppServer-based Agent Platform in Action

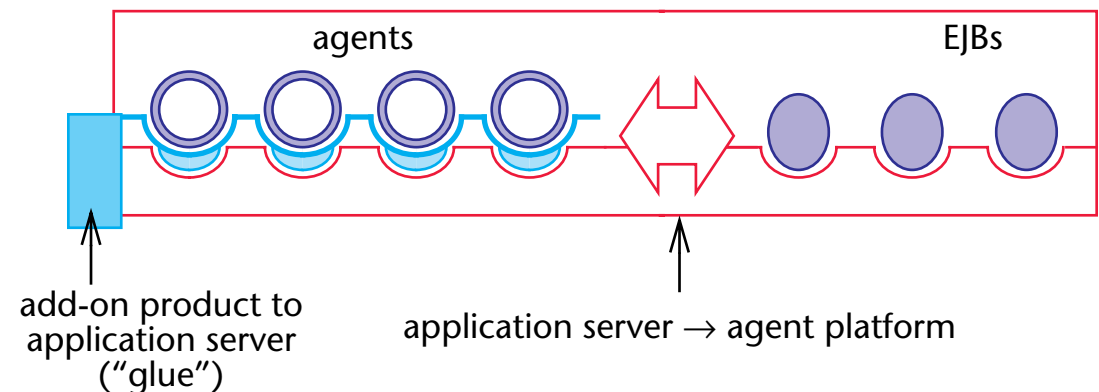


AppServer Based Agent Platform



Whitestein's Focus

- ❑ Whitestein works on this “glue” add-on products for commercial application servers like WebSphere, WebLogic, iPlanet, HP-AS (plus open source – JBoss)
- ❑ Add-on product turns application server into a high performance agent platform – blended with a “normal” application server → enabling applications based on “EJBs plus agents”
- ❑ Platform prototypes up-and-running
- ❑ Test cases: implementation/porting of real agent-based applications
- ❑ Specific AOSE tools (plug-ins) for Eclipse and NetBeans planned (AOSE: agent-oriented software engineering)
- ❑ EJB standard version 2



AppServer Based Agent Platform



Advantages

- ❑ Compatibility of agents with current technologies, standards, and products
- ❑ Current business systems can be enhanced with agent capabilities
- ❑ Business systems can be constructed with “*agents where agents belong*” – ie. with the right mix of conventional and agent technologies
- ❑ Agent-based systems easily interface to conventional systems (J2EE Connector Architecture)
- ❑ Agent applications profit from stability, scalability, and performance of industry-grade application servers, databases, messaging systems

Application Focus

- ❑ Business applications (type “application server based applications,” eg. in e-commerce)
- ❑ Trust among agents and between agents and agent platform
- ❑ Limited agent mobility



Summary and Outlook

Summary and Outlook



- ❑ In practice, agents meet an existing IT world:
 - installed base of business systems
 - professional, industry-grade systems and products
 - standards
- ❑ Agent platforms clearly need
 - the ability of integration with this IT world
 - to meet expectations regarding reliability, stability, performance, security
- ❑ J2EE application servers (like WebSphere, WebLogic, iPlanet, HP-AS)
 - “natively” provide a great deal of the basic qualities and the functionalities needed by an agent platform
 - but have certain limitations and constraints that need to be overcome by “clever engineering” in order to build agent-based business applications
- ❑ Application server based agent platforms have the potential to support the breakthrough of the agent paradigm in practice



Contact

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