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eCommerce on a High Volume Site with Nothing but Java™ Technology

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Introduction

- Challenges of E-Commerce
- Logical Architecture
- Server / Infrastructure Issues
- Typical Scenarios
- Common Bottlenecks

Challenges of E-Commerce

- Maintainability
- Predictability
- Robustness
- Performance
- Scalability
- Extensibility

Architecture Goals

- Maintainability
  - Can your current staff maintain the system in an economically feasible manner?
  - Can new people be easily trained to maintain the system?
  - Will both of the above be true in three years?

Architecture Goals

- Predictability
  - Do you understand the system's behavior under all reasonable conditions?
  - Do your users have this understanding?
  - Bosses/investors/clients hate surprises

Architecture Goals

- Robustness
  - What are the failure cases?
  - How serious is each failure case?
  - How probable is each failure case?
  - How damaging is the behavior of each failure case?
  - Are crashes entertaining? It's better to die in a boring fashion

Architecture Goals

- Performance
  - Do all “interactive” user actions take less than five seconds?
  - Have you projected the expected peak load?
  - Profile early. Profile often
  - Don’t try to squeeze performance out of each box. Leave plenty of CPU cycles free and scale to multiple servers

Architecture Goals

- Scalability
  - Decouple functional components to maximize potential scaling points
  - If something can be made stateless—make it so
  - Minimize dependencies on scarce or expensive resources by pooling and caching

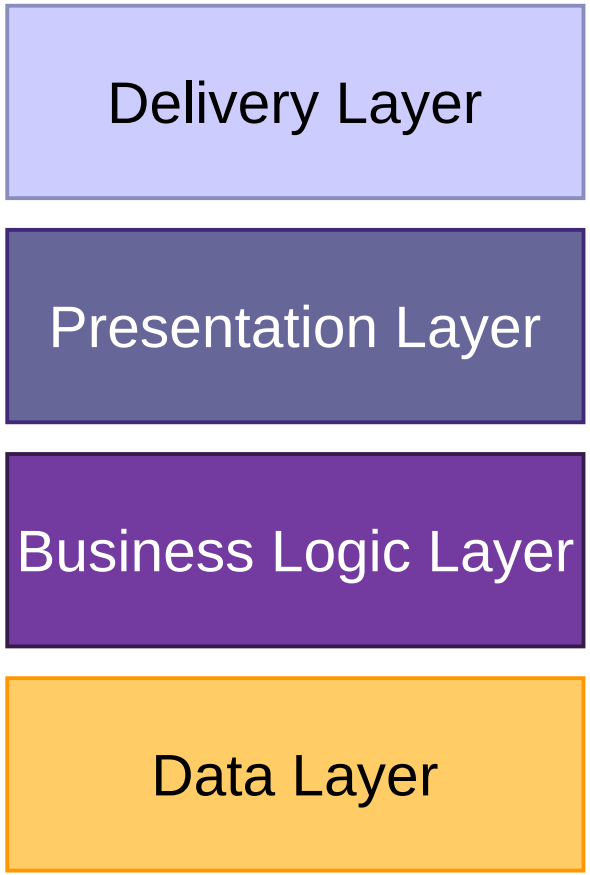
Architecture Goals

- Extensibility
  - Subsystems should be black-boxed
  - Java™ technology interfaces are the best thing that ever happened for extensibility
  - Discourage overly clever code

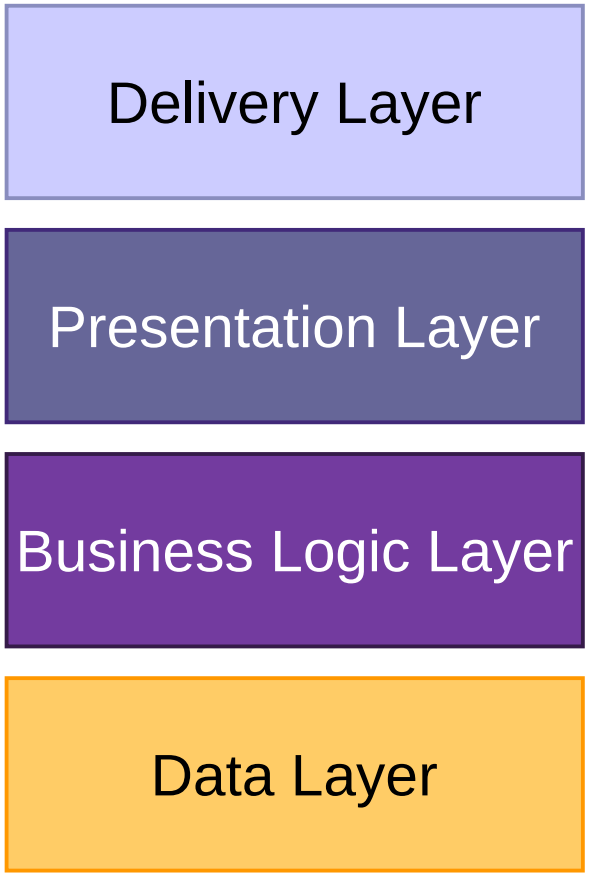
Achieving Architecture Goals

- Separate functional components
- Develop in modular pieces
- Make each task as simple as possible
- Decouple *interfaces* from *implementations*
- Maximize reuse

Logical Architecture Overview

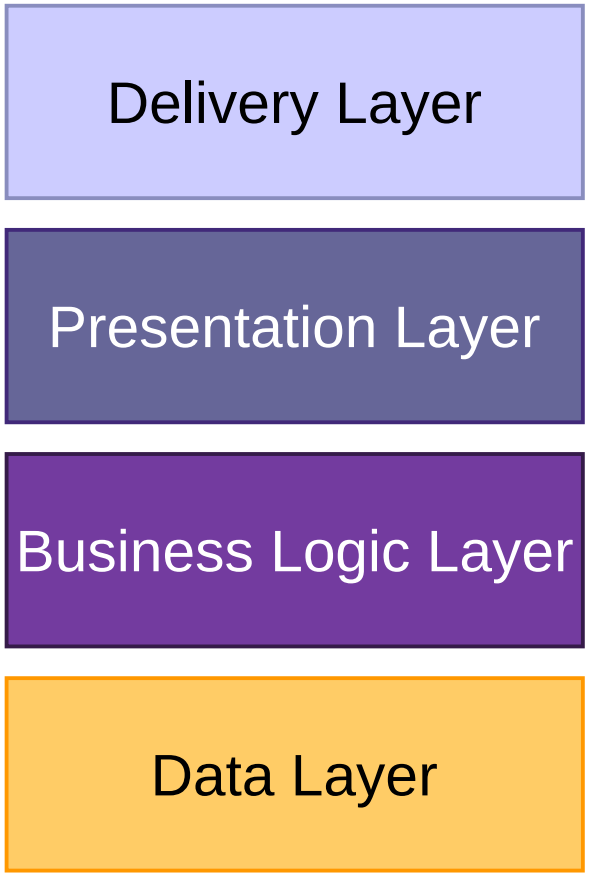


Logical Architecture Overview - Delivery



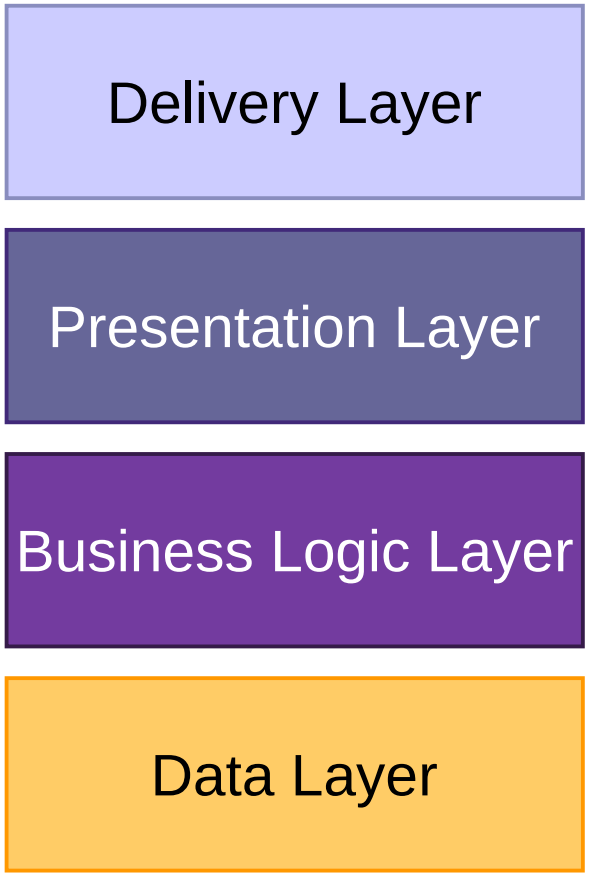
- Hand content to the user
- Must be fast and stupid
- Apache, Netscape™ Web Server, etc.

Logical Architecture Overview - Presentation



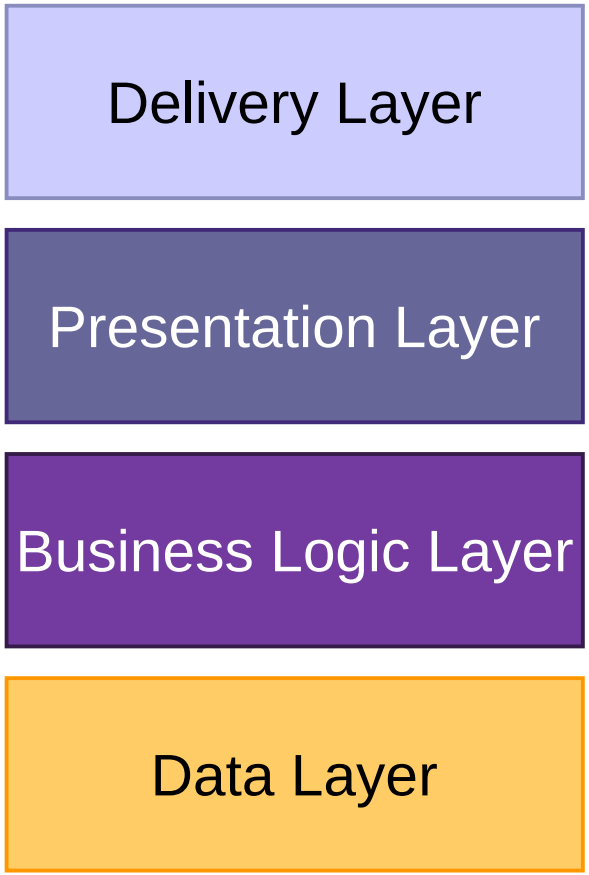
- Assemble content into final layout
- Must be flexible and easy to learn/use
- JSP™ component, XML, Servlets

Logical Architecture Overview - Business Logic



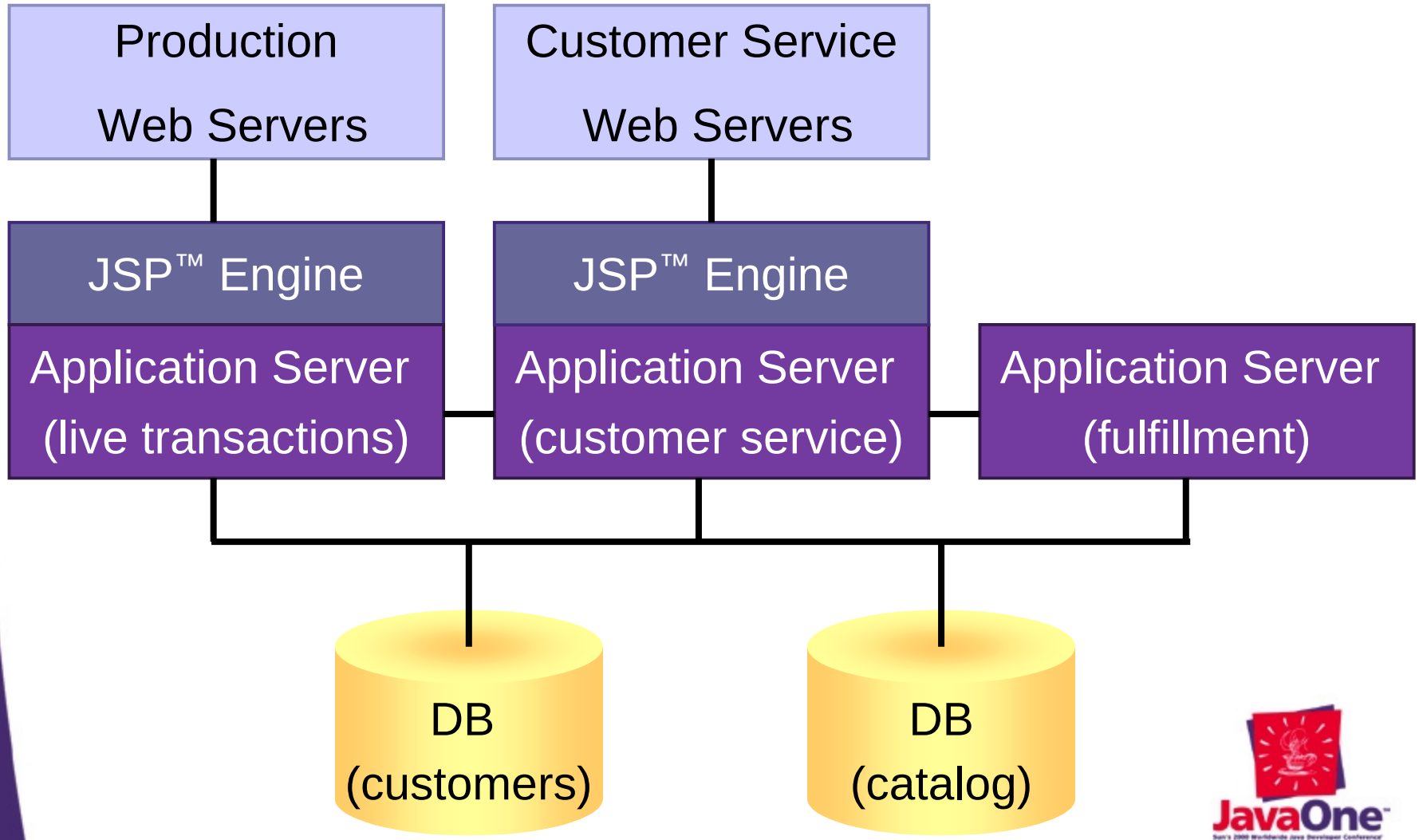
- Handles processing and integration
- Must be powerful and extensible
- EJB™ component, traditional app servers

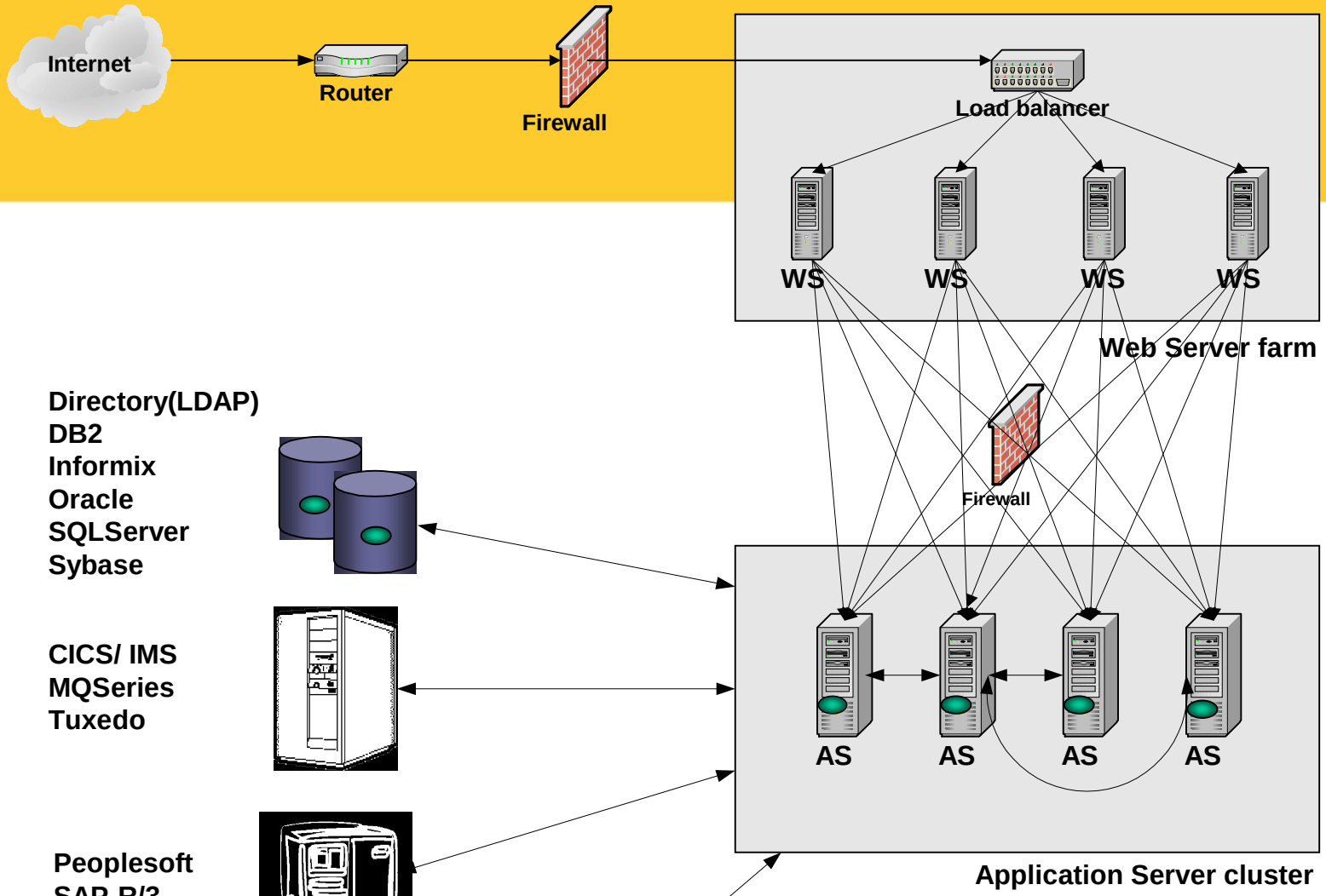
Logical Architecture Overview - Data



- Stores and retrieves all persistent data
- Must be fast and 100% reliable
- Oracle, Sybase, etc.

Sample Logical Architecture




Internet
Router
Firewall
Load balancer
WS
WS
WS
WS
Web Server farm
Directory(LDAP)
DB2
Informix
Oracle
SQLServer
Sybase
Firewall
CICS/ IMS
MQSeries
Tuxedo
AS
AS
AS
AS
Application Server cluster
Peoplesoft
SAP-R/3
Messaging, E-Commerce Suite,
ECXpert, CA/ CRL, *Custom*

Server / Infrastructure Issues

- **Web Server scenario**
- **Need for Enterprise Application Server**
  - High Availability / Fail over
    - State and Session Using Distributed and Centralized approaches.
  - Reliability
    - Transaction Integrity
  - Security
    - Use of SSL, Role based security, ACL
  - Integration – common integration platform
    - Legacy apps

Server / Infrastructure Issues

- **Need for Enterprise Application Server (cont.)**
  - The J2EE™ Platform
    - Standard for writing business logic in portable components
      - Abstraction introduces overhead
  - Intra server Load Balancing

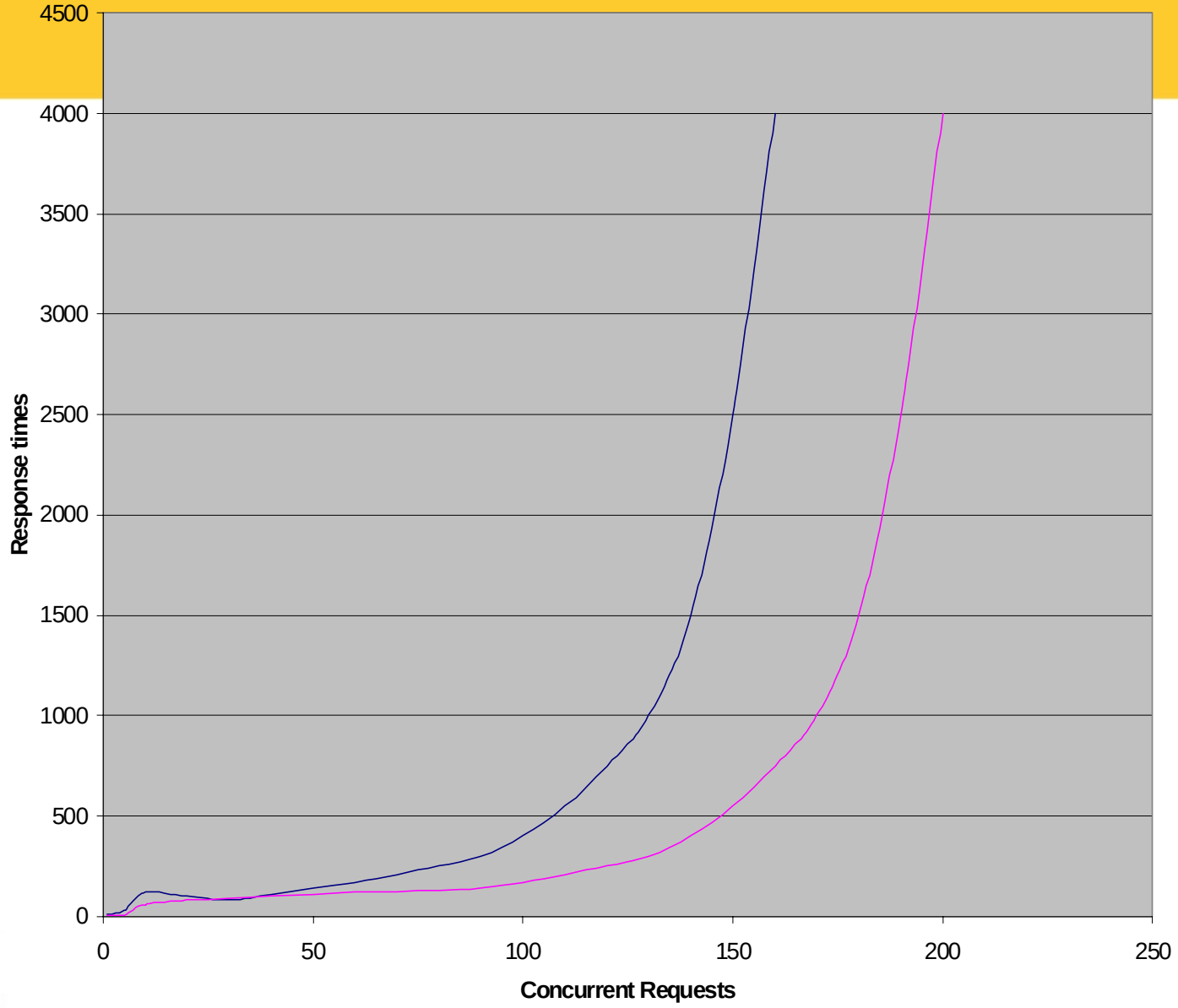
Server / Infrastructure Issues

- **Steps to ensure Scalability**
  - Environment for load testing and monitoring
    - Individual components
    - Services
    - Full blown system
      - Sizing, estimates, 20% margin
  - Sizing is an Iterative process

Server / Infrastructure Issues

- **Steps to ensure Scalability (cont.)**
  - Scaling guidelines
    - Using faster hardware, accelerators
    - Clustering hardware/ servers
    - Pooling connections and objects
    - Target and plan hardware specific to their usage
      - Web Servers
      - Application Servers
      - Database Servers
    - Faster Network Bandwidth

Scaling with additional Server



Typical Scenarios and common bottlenecks

- **Typical Scenarios**
  - Portal application
  - Finance and Banking application
  - E-Store application

- **Common bottlenecks**

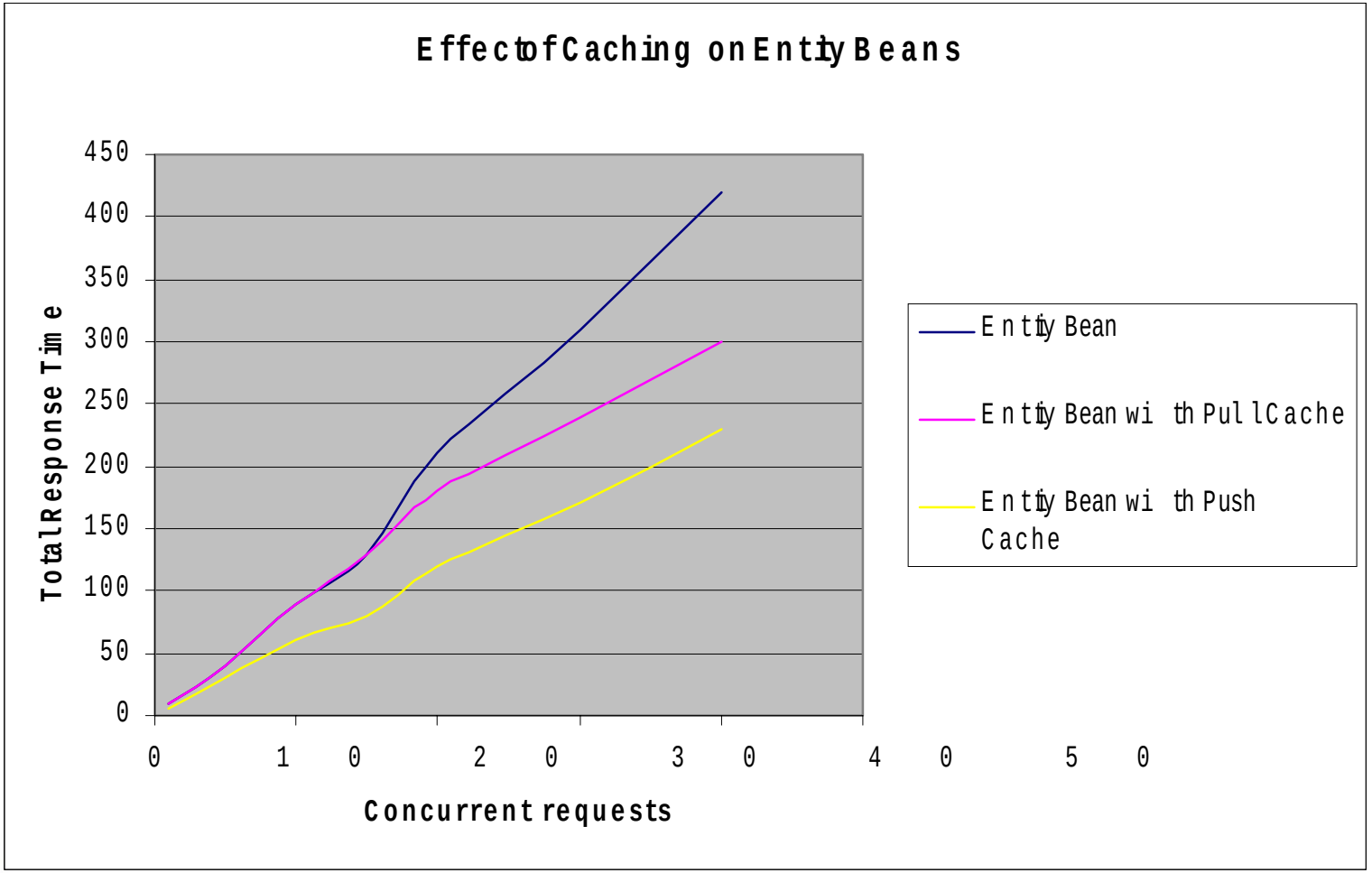
Portal Application

- Personalization/ Authentication (LDAP vs RDBMS)
- Quick Response time
- Concentrated Content
- Channels (Internal and External)
- Integration with other applications (E-Commerce)

Portal Application (cont.)

- **Caching (Portal means Caching.)**
  - Application server level
  - Application level
  - Service/Component level
  - Push vs Pull mechanisms of refresh

Caching with Entity Beans



Finance and Banking

- **A few mainframes/ legacy systems**
- **Reliability of data and transactions**
- **Problems associated with Messaging Middleware**
  - Bottleneck with bursts of data
- **Problems associated with Transaction Middleware**
  - Single threaded Middleware and driver

E-Store

- Catalog (LDAP Vs RDBMS)
- Transaction Granularity and Complexity (Local/ Global)
- Workflow, synchronization of data (Meta Directory)
- e.g. Discount rules built into LDAP
- Query optimizations

Common Bottlenecks

- Size of Session, Stateful session bean
- Locks, synchronized, static, wait, blocking
- Object creation, file handles and garbage collection
- Number of threads, use of threads in application server
- Rowset Vs ResultSet

Common Bottlenecks (cont.)

- **Myth about the J2EE platform**
  - Entity beans/JDBC
  - Stateless session bean vs helper class
- **Enterprise JavaBeans™ Architecture**
  - Multiple JVMs
  - High Load
- **Entity Beans**
  - Legacy and BMP
  - DB table relationship
- **Web Server Files**

Tools for Identifying Bottlenecks

- Profiling tools
- Load Generation tools
- Monitoring tools
- Analysis tools

More Information

http://JavaWiz.com/

- This presentation's slides and servlet engine benchmark results

http://www.iplanet.com/

- Sun-Netscape Alliance application servers

http://java.sun.com/j2ee/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