I Love the Java Jive: J2EE for Oracle Technologists

Peter Koletzke

Technical Director &
Principal Instructor

quovera

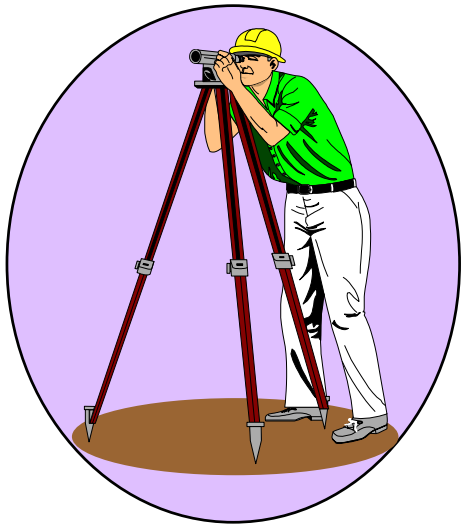
Java Mantra

Shoot me the pot
and I'll pour me a shot
A cup, a cup, a cup,
a cup, a cup!

—*The Ink Spots (1940)*

Survey

- Client/server development
  - 1-2 years?
  - More than 2 years?
- Java development
  - 1-2 years?
  - 3-8 years?
  - More than 8 years?
- JDeveloper
  - 1-2 years?
  - More than 2 years?



Agenda

- J2EE Basics
- J2EE Java Client Architectures
- J2EE Server JVM Architectures
- Oracle and J2EE

Rumor: There is a really good book about JDeveloper coming out soon.

On the Positive Side...

If we do not find
anything pleasant, at least
we shall find something new.

Si nous ne trouvons pas des choses
agréables, nous trouverons du
moins des choses nouvelles.

—Voltaire (1694-1778), *Candide*

J2EE is Simple

JAR	EIS	CLASSPATH	JSP
OC4J	J2SE	Framework	JVM
EJB	Swing	Business Tier	J2ME
AWT	JDK	Java Application	Servlet
BC4J	JRE	Web Tier	Applet
WAR	MVC	BluePrints	EAR

J2EE

- **J**ava **2** Platform, **E**nterprise **E**dition
  - Java is at v.1.4; J2EE is at v.1.4
  - Anything after v.1.1 is “Java 2”
  - Corporation-wide, web-deployed applications
- One of three “platforms”
  - Technology wrappers for the Java language
- Also J2SE
  - “Standard Edition” for desktop applications; not web-deployed; think Swing
- Also J2ME
  - “Micro Edition” for small, light applications running on PDAs, cell phones, pagers

J2EE and .NET

- J2EE is a Sun Microsystems initiative
- .NET is a Microsoft initiative
  - Features closely match J2EE
    - Preferred by some shops
  - Not as widely supported
    - Single vendor for OS (Win), database (SQL), app server (IIS), programming languages (C#), ASP
  - Has been slow to take off
  - Not portable (Java is portable)
  - Does not have Oracle's focus
    - Although there is .NET support

What is J2EE?

- J2EE is not a product
- Specifications and practices
  - Java servlet, JSP, EJB, JDBC
  - Sample “reference implementations”
    - To prove that J2EE features can be used successfully
  - Test suite to test J2EE compatibility
  - BluePrints
  - Application architecture model
- Software Development Kit (SDK)
- All on java.sun.com
  - Plus tutorials, discussion forums, FAQs

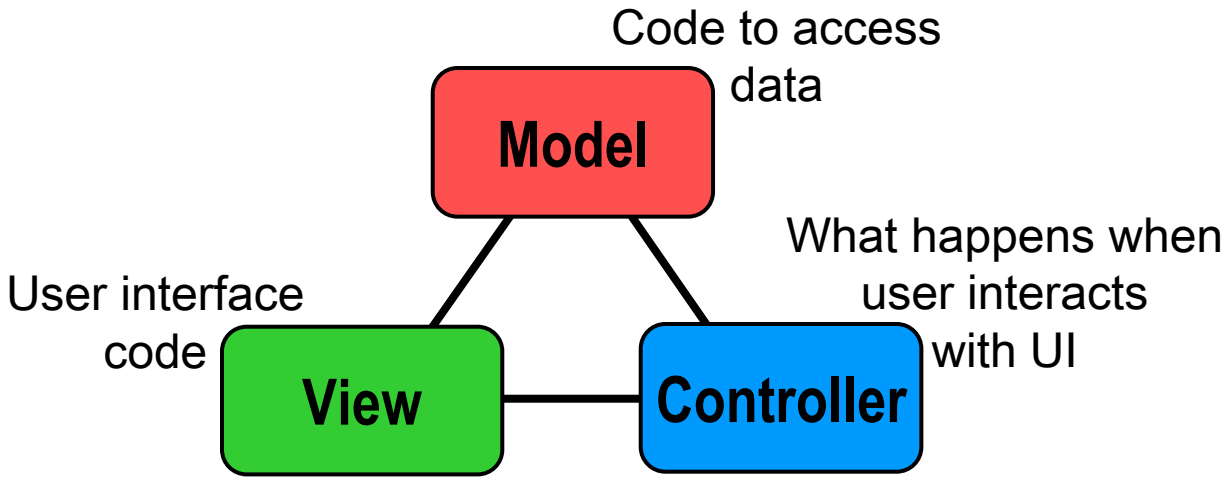
Also called JDK

J2EE BluePrints

- Guidelines – four suggested models
  - Enterprise systems
  - Wireless systems
  - High-performance systems
  - Web services
- Design patterns
  - Data Access Object , Fast-Lane Reader
  - Front Controller, Page-by-Page Iterator
  - Session Façade, Value Object
  - Popular architectural pattern is MVC

Model-View-Controller (MVC)

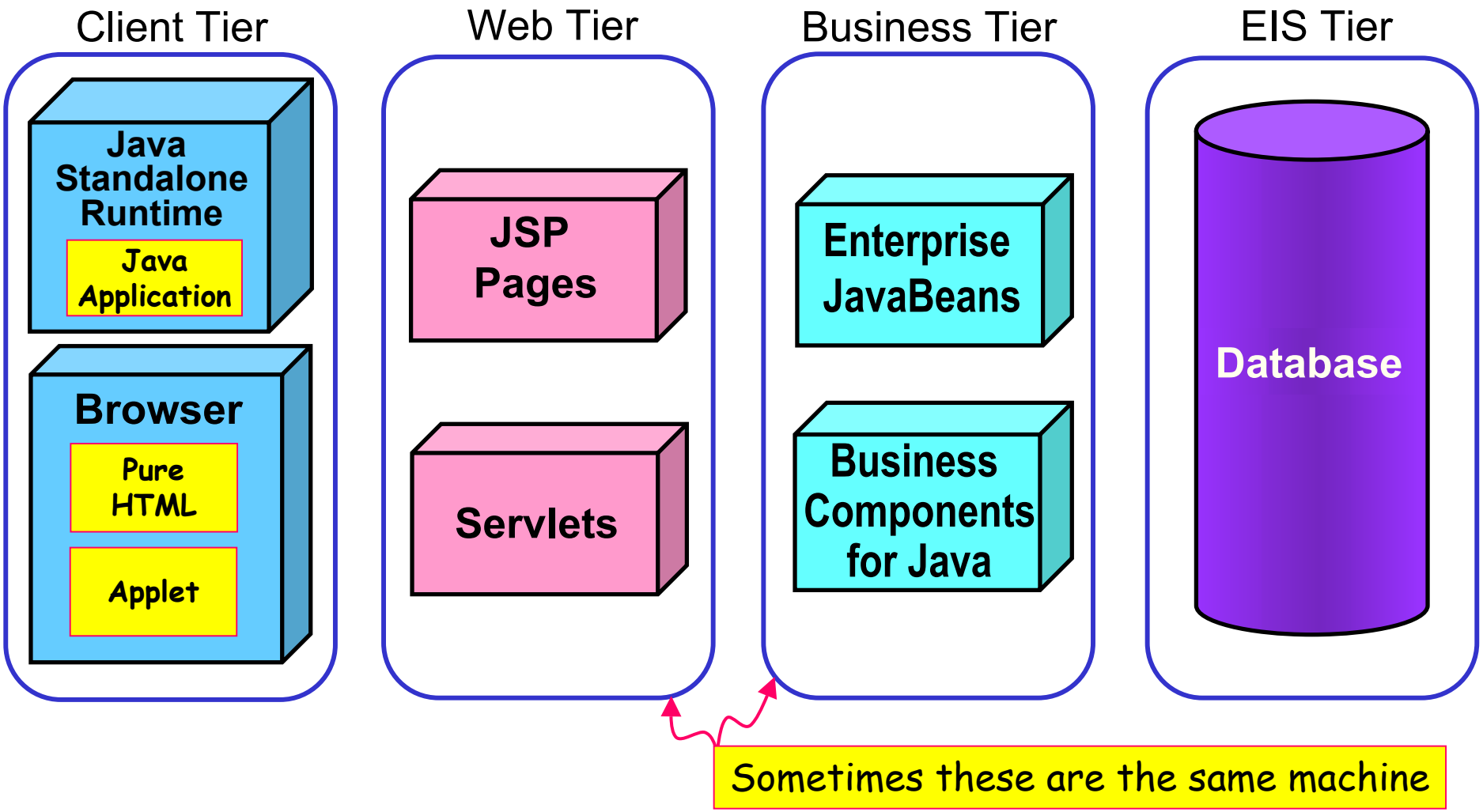
- SmallTalk strategy for interface components
- The MVC separation into layers allows you to plug in different front-end clients
- Provides ability to separate layers for development
  - Can reuse layers for new applications



Application Architecture Model

- An application resides on four logical tiers (layers)
  - Client Tier
  - Web Tier
  - Business Tier
  - EIS Tier (enterprise information system)
    - Oracle9i or other database
- Logical tiers are independent of hardware
  - Tiers could be on separate machines
  - Tiers be merged
    - For example, Web Tier and Business Tier

J2EE Tiers


Client Tier
Web Tier
Business Tier
EIS Tier
Java Standalone Runtime
Java Application
Browser
Pure HTML
Applet
JSP Pages
Servlets
Enterprise JavaBeans
Business Components for Java
Database
Sometimes these are the same machine

Agenda

- J2EE Basics
- J2EE Java Client Architectures
- J2EE Server JVM Architectures
- Oracle and J2EE

You Do Need J2EE

The superfluous, a very necessary thing.

Le superflu, chose très nécessaire.

—Voltaire (1694-1778), *Le Mondian*

About the JVM

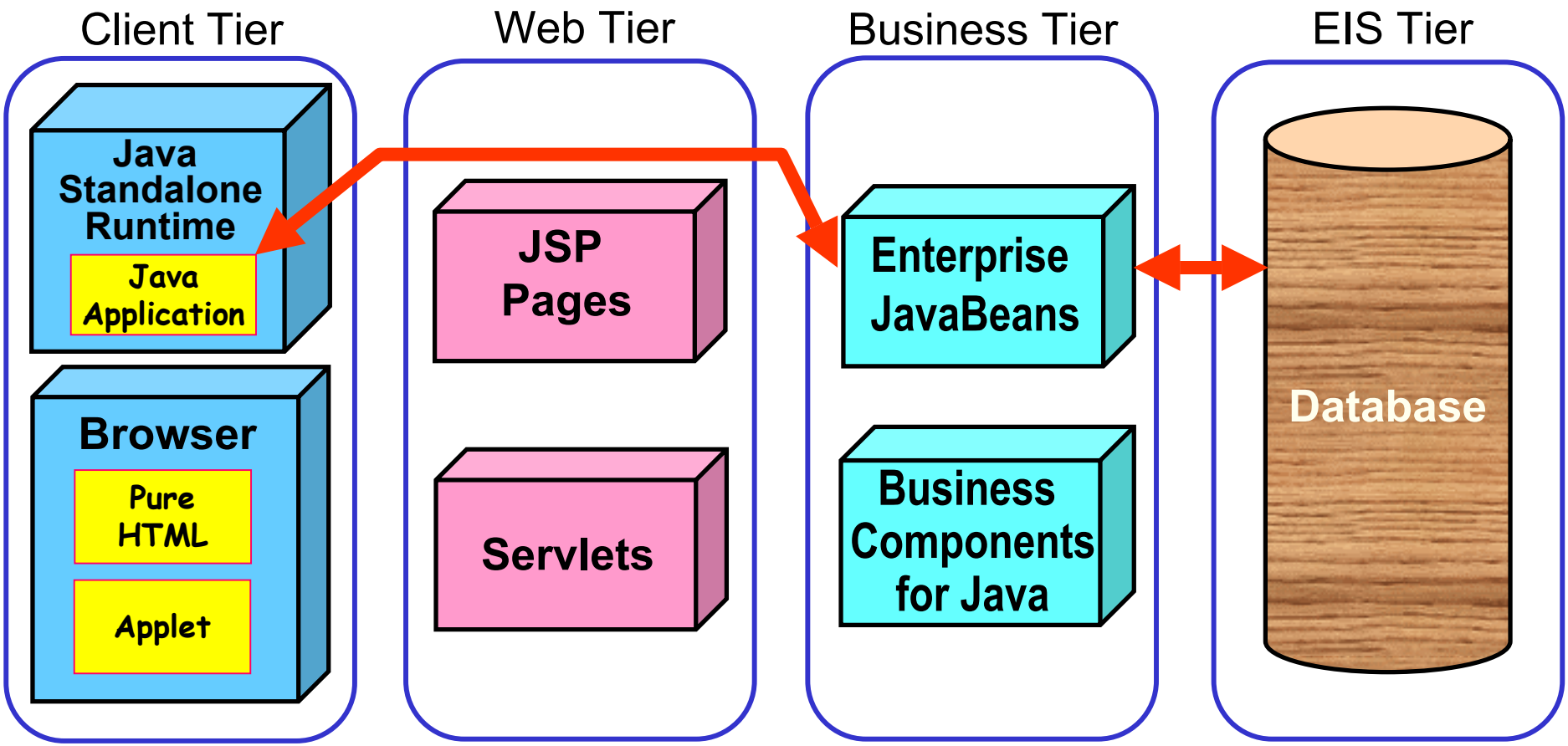
- **J**ava **V**irtual **M**achine
  - Java runtime engine
    - Java runtime environment (JRE)
    - CLASSPATH lists app files and libraries needed by JVM
  - Platform specific
    - Code is not platform specific
- Just an executable file that runs a program file
  - Separate OS process – Java client
    - Java application or applet
  - In a separate server process – JSP

Java Client

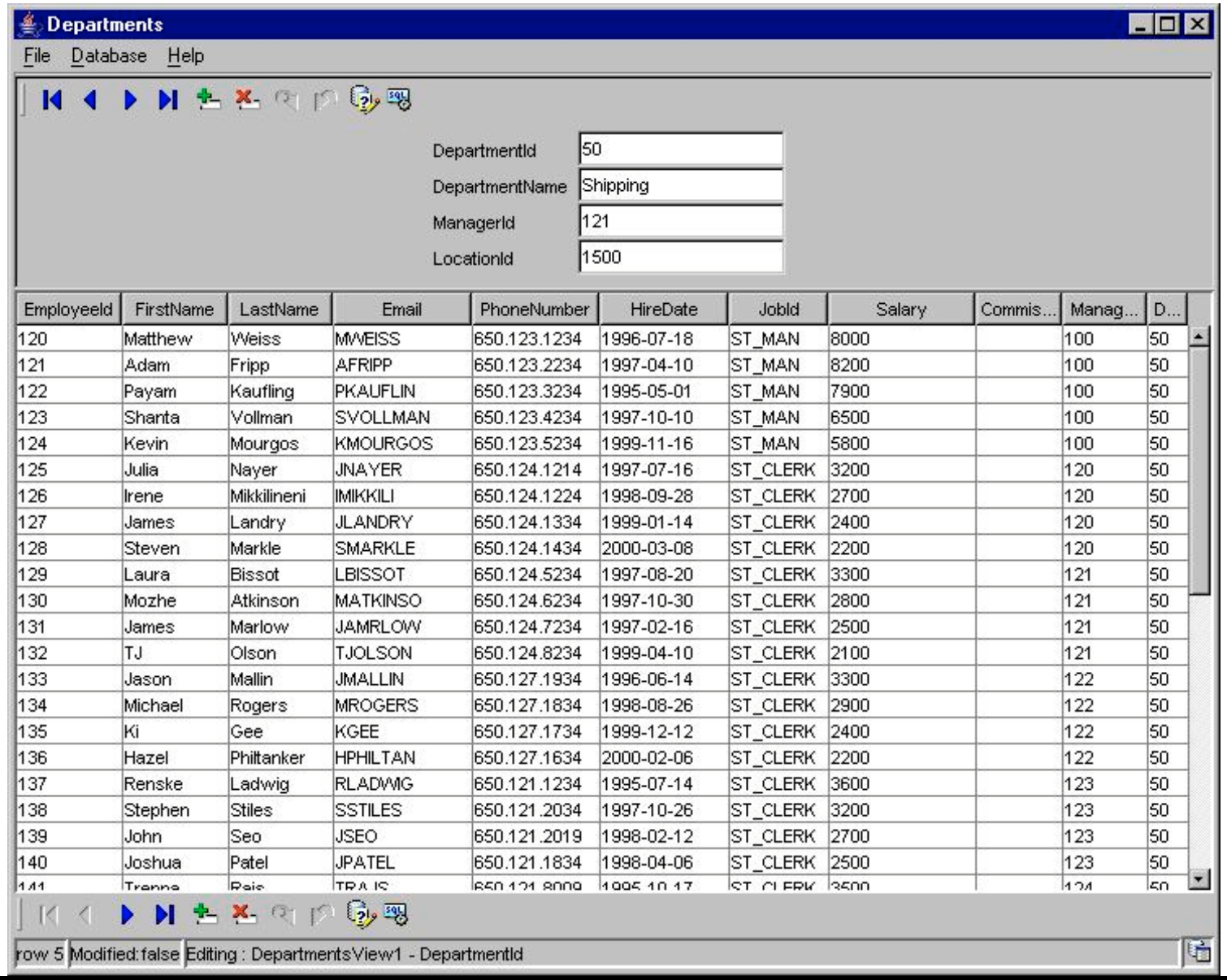
- JVM is on the client tier
  - A.k.a., “thick client,” “rich client,” or “fat client”
  - “Java application” – runs outside of browser
  - “Applet” runs JVM inside a browser session
- Swing and Abstract Windowing Toolkit (AWT) controls
  - Looks like standard Windows application
- No web tier required
  - Java Web Start (by Sun) can help you distribute a Java application through the web browser
- Business logic layer in next example is EJBs
  - Enterprise JavaBeans
    - Database table access objects – written in Java

Not used much anymore

Java Application Runtime



Java Client Application



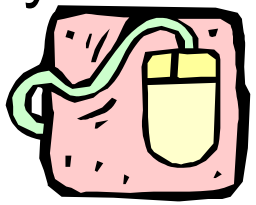
Java Application

Benefits

- No application server setup required
- Most processing is on the PC client tier
  - Good for intranet or small department solutions
  - Very responsive on the client side
- Rich GUI possibilities
  - Normal Windows interface controls
  - AWT and Swing classes

Drawbacks

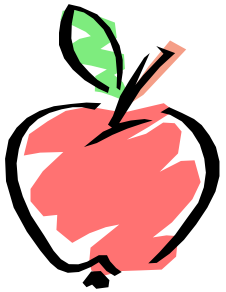
- "Thick client"
  - Needs to have JVM installed on client
  - Maintenance headache
- Not making use of the Web
  - No centralization of code or runtime environment
  - However, data layer could be on the server



How Do Applets Work?

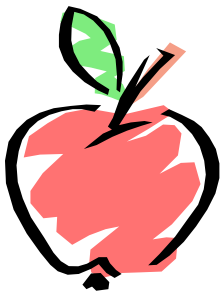
- Somewhat similar to Java application
  - Runtime is a JVM inside the client browser
    - Does not run outside of the browser
    - Application starts from a browser link
  - Same Swing and AWT controls
- Centralized code distribution
  - Applet code is downloaded from server
  - Is cached on client for subsequent loads
- Runs in security model of browser
  - Limited by some firewalls
  - Cannot read and write to client's file system

very "Forms-like"



Applet Considerations

- Before Java Web Start, applets offered Java runtime in the browser
  - Centralized code distribution
    - Java Web Start does that now
- Limited now because of browser security limitations
  - The choice for rich client is “swinging” back to Java applications
  - Small browser add-ins still use applets – stock ticker
- In short:
  - Applets are “way last year” (whatever)



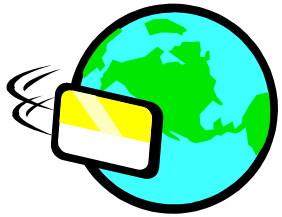
Agenda

- J2EE Basics
- J2EE Java Client Architectures
- J2EE Server JVM Architectures
- Oracle and J2EE

Server JVMs

- Host process that runs Java code
  - Allows multiple connections to one process
  - Different threads, but same process
- Called a “container” process
  - Runs the JVM and some special functionality
  - Container for Web Tier code
    - For JSP and servlets
    - Tomcat is a free container from Jakarta
  - Container for Business Tier code
    - For Enterprise JavaBeans
  - Oracle Containers for J2EE (OC4J)
    - Oracle9i (10g) Application Server containers
    - Runnable separately – outside of iAS

Forms 9i/10g runs in this



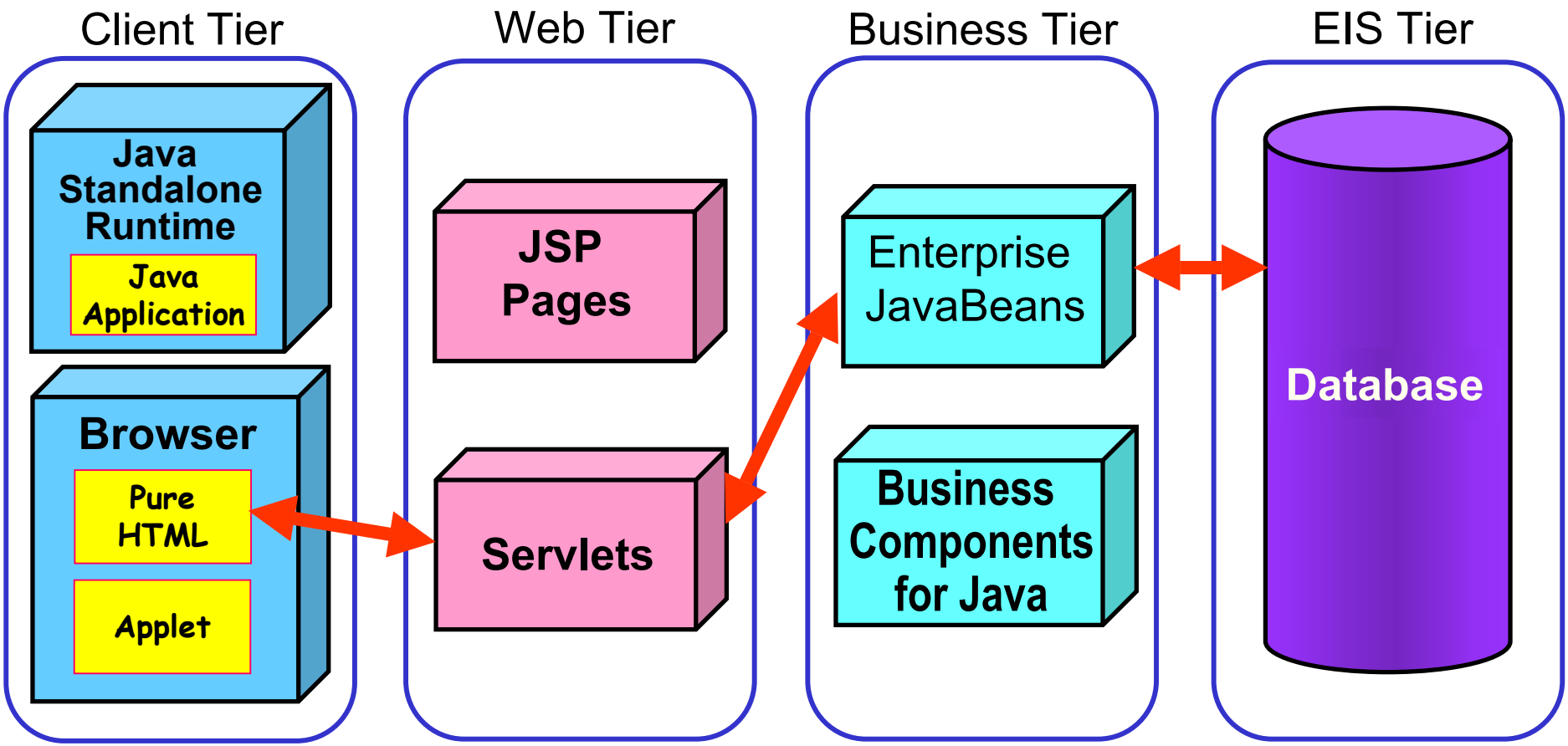
Servlets

- HTTP servlet
  - Runtime is on the web tier
    - Coded in Java only – no HTML
  - Runs in a container
    - Contains print statements that output an HTML page:

      ```
      out.println("<html>")
      ```
  - HTML controls
    - Looks like a web page
- Thin client
  - HTML on the client
  - JVM is on the application server

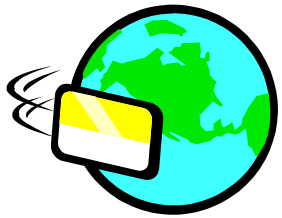
Can include Java calls to the database.

Servlet Runtime

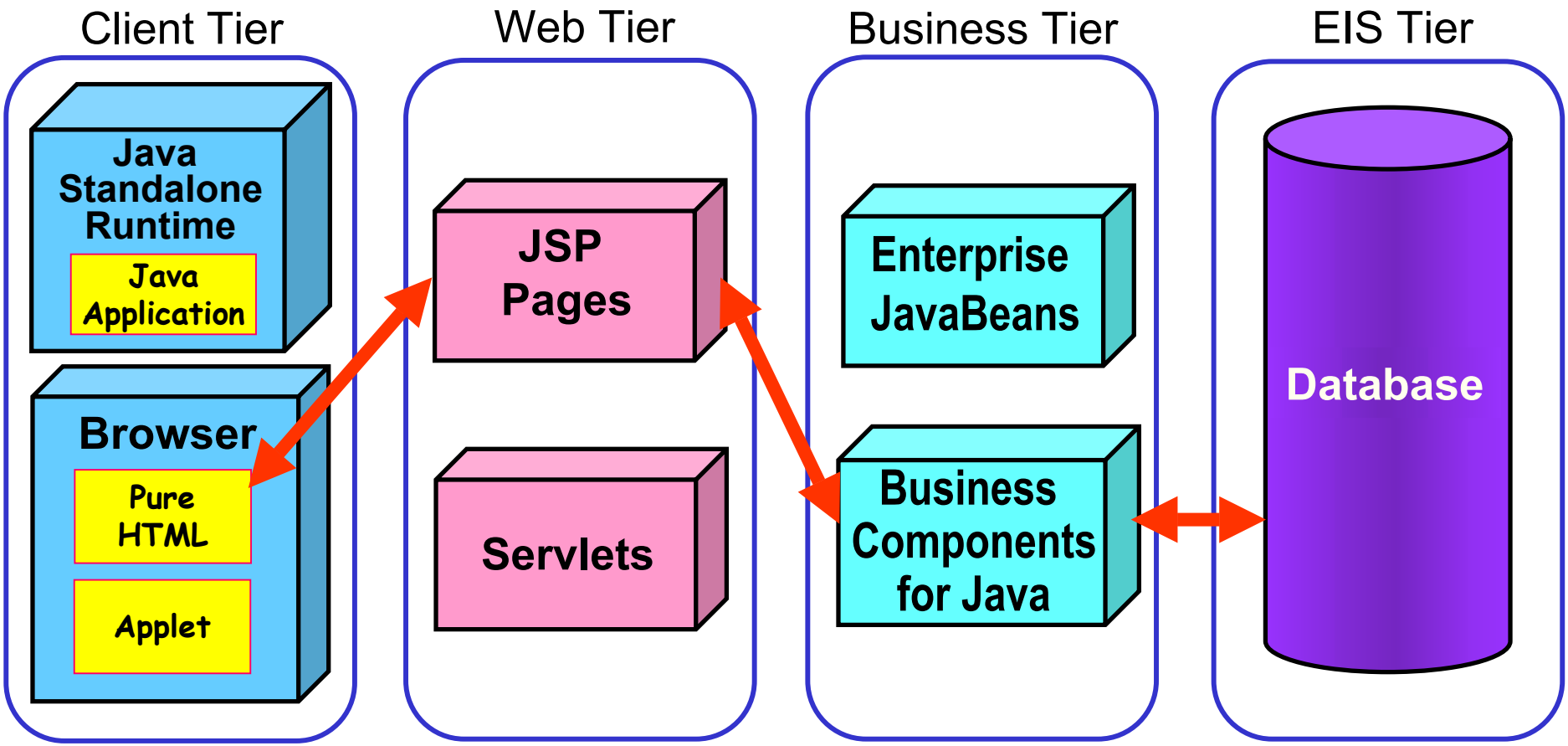


JSP Application

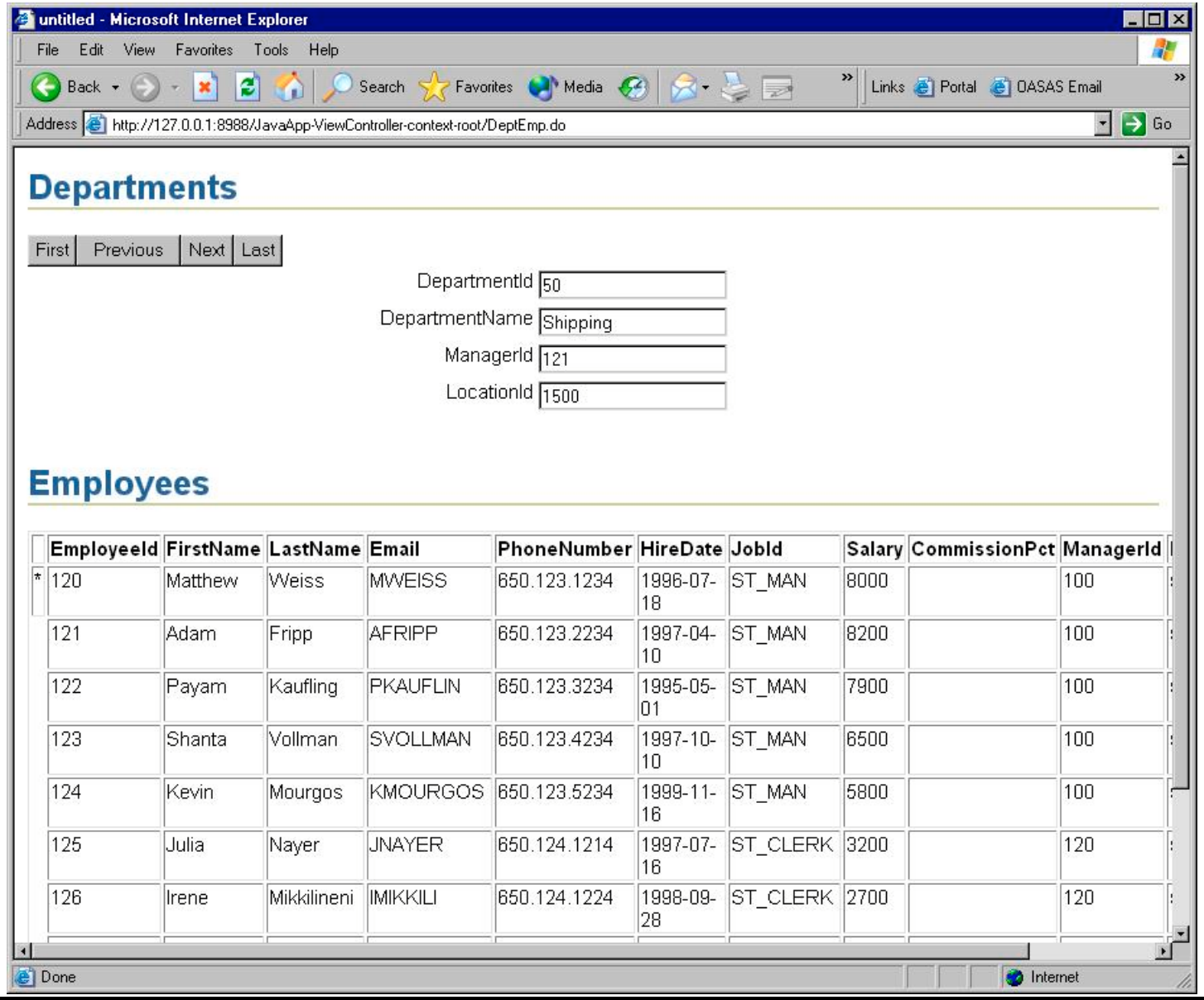
- JavaServer Pages technology is an extension of servlet technology
  - From Sun Microsystems, as are servlets
  - JSPs can also output HTML
  - Also runs on the web tier server
- Contain some static HTML (e.g., **<BODY>**)
  - Contain some JSP tags and Java code that creates dynamic content
  - May, optionally contain JavaScript
- When JSP is run, it creates a servlet
  - Usually UI-oriented: generate HTML
- JSPs are arguably easier to develop than servlets
- Files have .jsp extension



JSP Runtime


Client Tier
Web Tier
Business Tier
EIS Tier
Java Standalone Runtime
Java Application
Browser
Pure HTML
Applet
JSP Pages
Servlets
Enterprise JavaBeans
Business Components for Java
Database

JSP Application



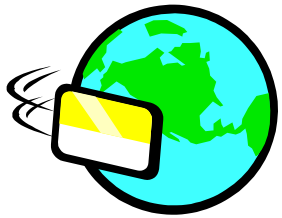
JSP Applications

Benefits

- Thinner client
  - No memory and disk space to run a JVM
- Centralized installation of runtime and code
  - Scalable because it is a true web server solution
  - Intranet-enabled
- HTML layout is kept separate
  - Different people can work on the design
- Pre-built classes to display data
  - JDeveloper tag libraries

Drawbacks

- AWT and Swing not available
  - Limited to HTML display
  - Some equivalent controls in tag libraries
- Architecture is a bit more complex
  - Application server
  - JSP container process
- Additional languages
  - HTML
  - JavaScript
  - JSP tags



When to Use Which Style

- Use Java applications when:
  - You need Windows-like controls
  - You don't have a web server
  - It is an internal application
- Use applets when:
  - You have a web server
  - You need centralized code-distribution
  - It is an internal application
- Use JSPs when:
  - You want to sell cat food on the Web
  - You want a light client and HTML output
- Terminal server is another option
  - Runs Java application
  - Citrix Winframe or MetaFrame

Agenda

- J2EE Basics
- J2EE Java Client Architectures
- J2EE Server JVM Architectures
- Oracle and J2EE

The World View

In this best of all
possible worlds …
everything is for the best.

Dans ce meilleur
des mondes possibles …
tout est au mieux.

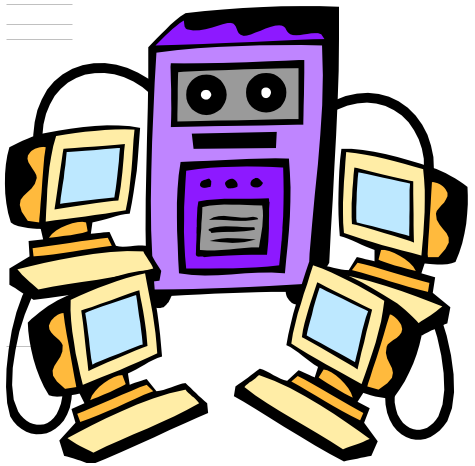
—Voltaire (1694-1778), *Candide*

J2EE Database Support

- 10g, 9i, and 8i databases fit into application architecture as the EIS Tier
- Stored Java code
  - Database can store Java classes
  - Database can run Java classes with built-in JVM
  - Classes can act in triggers or stored code
    - Like PL/SQL procedures, packages, and functions
  - Can call Java from PL/SQL and PL/SQL from Java

J2EE App Server Support

- Oracle App Server 10g (Oracle9iAS) **is** a J2EE server
  - Full web server
  - Handles standard archive files (WAR and EAR)
- Forms Developer runtime can be a servlet
  - Slightly outside of the J2EE model, otherwise
- OC4J
  - Business Tier container
    - EJB container
    - TopLink: object-relational mapping tool
    - ADF Business Components (more later)
  - Web Tier container
    - Servlet and JSP container



J2EE Development Support

- iAS supplies Java runtime and development libraries
- Oracle Portal supports deployment of J2EE code
- Based on Apache, a standard J2EE server
- iDS (development suite) contains Oracle JDeveloper

What is JDeveloper?

- Supports all development for J2EE
  - Release 10g (9.0.5) currently (10.2 next major release)
  - Different styles of deployment
  - E.g., Java application, applet, JSP, servlet, EJB
  - Can deploy directly to a J2EE server
- 3GL code generator and organizer
  - Some 4GL aspects
  - Lots of wizards that create starting code
- Easy development, debugging, deployment
- The best way to create ADF Business Components
  - ADF implements J2EE design patterns

What is ADF BC?

Previously called BC4J

- Application Development Framework Business Components (ADF BC) is a framework for JDBC access to a database
  - *JDBC*: Java Database Connectivity
  - *Framework*: Predetermined development path and set of classes that are easily extended and customized and that contain a large amount of out-of-the-box functionality.
    - Java frameworks often access XML files that define the specifics of the application
- ADF BC classes access XML application files
- ADF BC classes are extendable
  - Add your own code to supplement or replace the behavior of the base classes
  - Makes it easier to connect Java to Oracle database

JDeveloper J2EE Deployment

- Creates standard deployment archive files
  - JAR – Java Archive (like a ZIP file of Java classes)
  - WAR – Web Application Archive
  - EAR – Enterprise Application Archive (that contain other JAR files)
  - EJB JAR – For Enterprise JavaBeans
  - “One click deployment” to iAS, WebLogic, JBoss, Tomcat
- Includes a J2EE-compliant container server
  - OC4J
  - Use it for testing code and deployment packages
  - Run the Embedded OC4J Server from within JDeveloper – starts up the browser
  - Run it outside of JDeveloper

Summary

- J2EE provides pre-built patterns and proven best practices
- Many deployment options
  - Java client - When you need Windows-like controls and fast data-entry forms (Java applications and applets)
  - JSPs and servlets - For e-commerce and wide distribution
- Oracle's direction is tied to J2EE
- Oracle products support J2EE design, development, and deployment
  - Database, iAS, JDeveloper
  - ADF BC (BC4J)

Final Voltaire Wisdom

The secret of being a bore
is to tell everything.

Le secret d'ennuyer
est celui de tout dire.

—Voltaire (1694-1778), *Sept Discours en Vers sur l'Homme*

Coming "soon"

↑ Also co-authored with Avrom Faderman ↑

- **Books co-authored with Dr. Paul Dorsey**
- **Personal web site:**

`http://ourworld.compuserve.com/homepages/Peter_Koletzke`

quovera

http://www.quovera.com

- **Founded in 1995 as Millennia Vision Corp.**
- **Profitable for 7+ years without outside funding**
- **Consultants each have 10+ years industry experience**
- **Strong High-Tech industry background**
- **200+ clients/300+ projects**
- **JDeveloper Partner**
- **More technical white papers and presentations on the web site**