IBM Software Group

IBM Software Development Platform

Rational. software

Rational Developer Day - Segrate, 22.11.2006

ON DEMAND BUSINESS

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Agenda

- **Service Oriented Architecture Lifecycle**
- **Software Development disciplines**
  - **Requirements Management**
  - **Design and Construction**
- **Problem Determination Tools**

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- **Service Oriented Architecture Lifecycle**
- **Software Development disciplines**
  - **Requirements Management**
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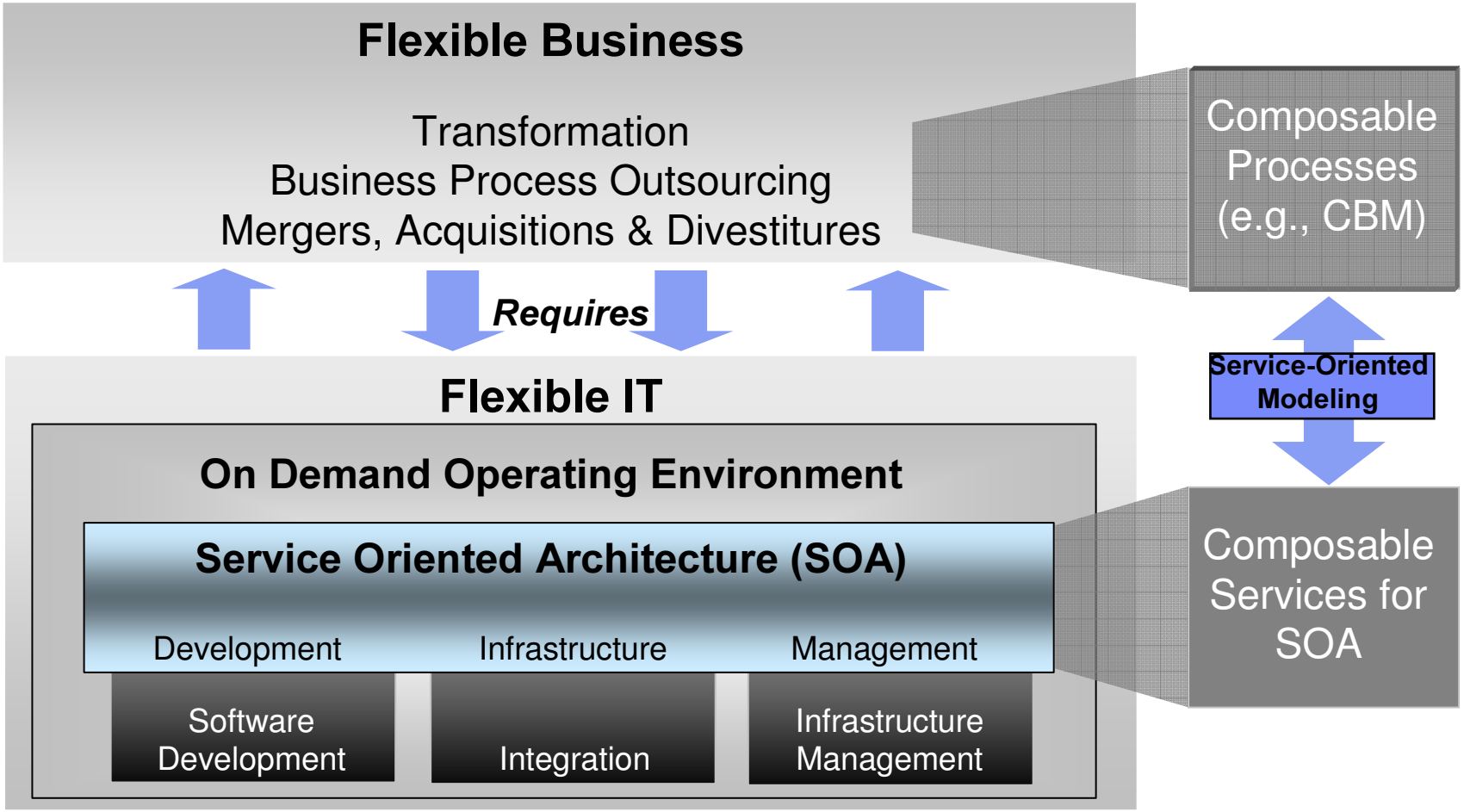
Greater flexibility is required from the business models and the supporting IT Architecture



What Is Service Oriented Architecture?

Roles

A set of services that a business wants to expose to customers and clients

Business

an architectural style which requires a service provider, requestor and a service description.

a set of architectural principles and patterns which address characteristics such as *modularity, encapsulation, loose coupling, separation of concerns, reuse, composable and single implementation*.

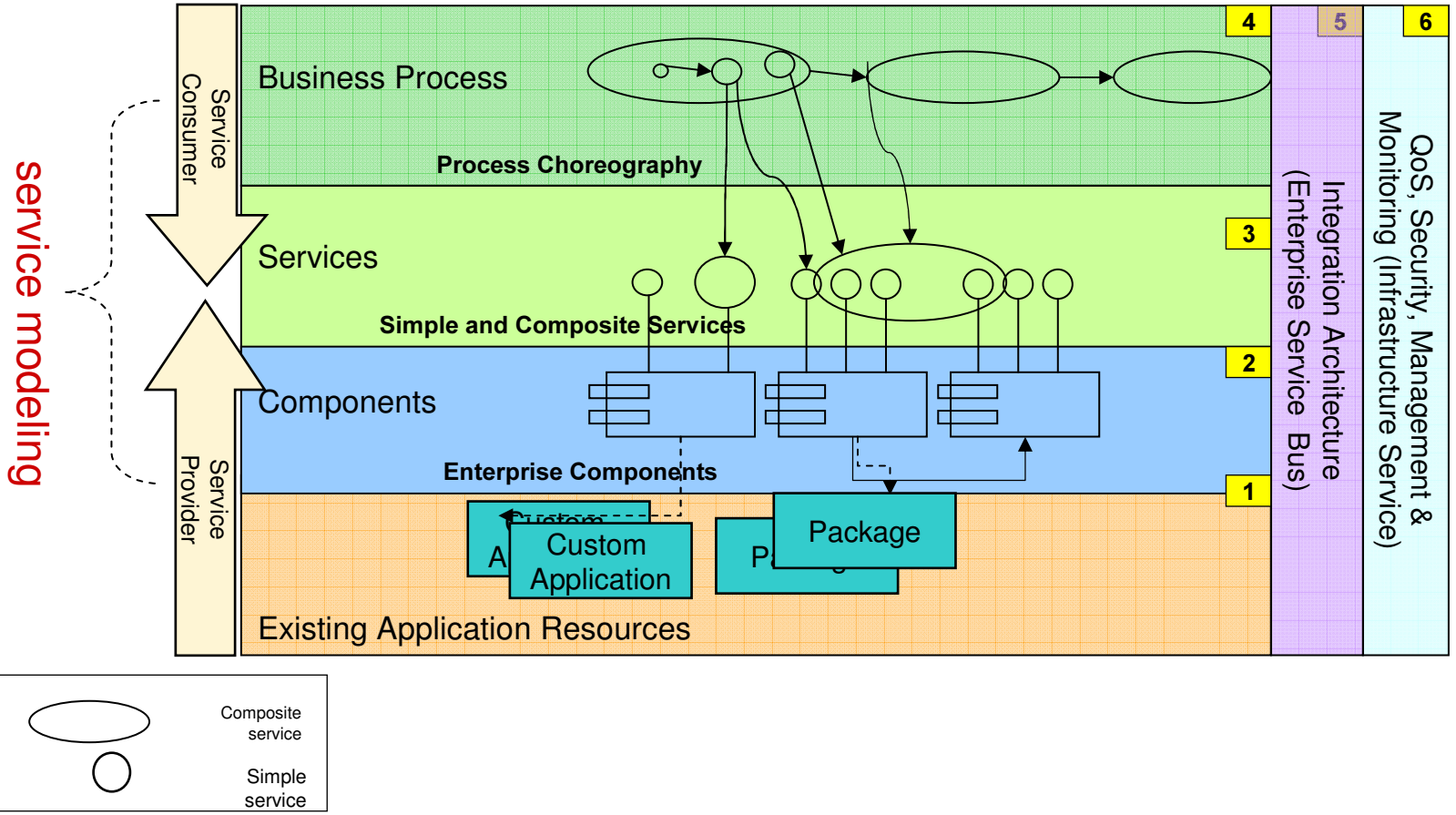
Architecture

A programming model complete with standards, tools, methods and technologies such as web services.

Implementation

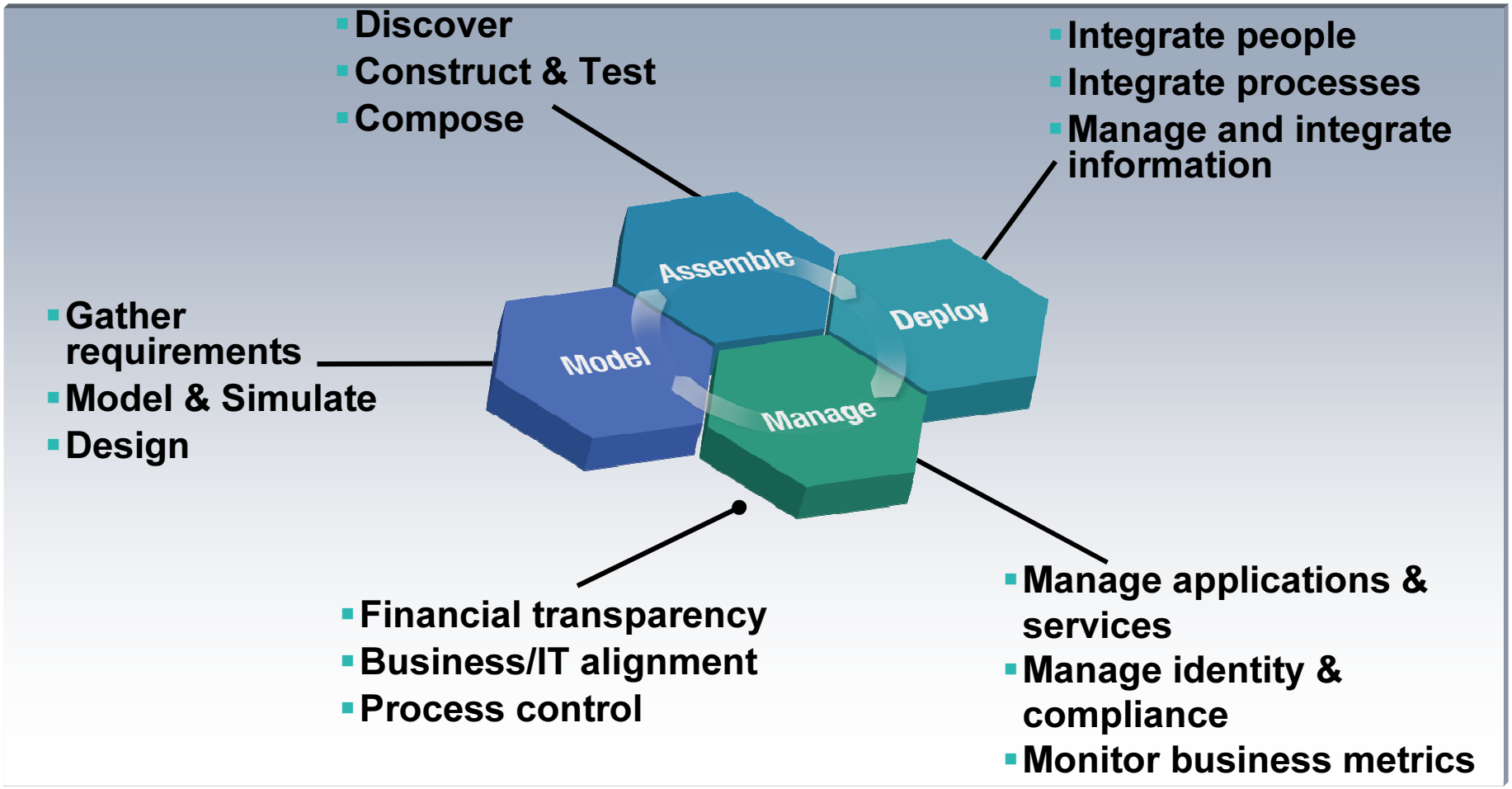
Service Oriented Architecture is based on “components”, “services” and “processes”

An SOA is composed of multiple layers. At the heart of the SOA is the Service Model that defines Services and Components that realize them

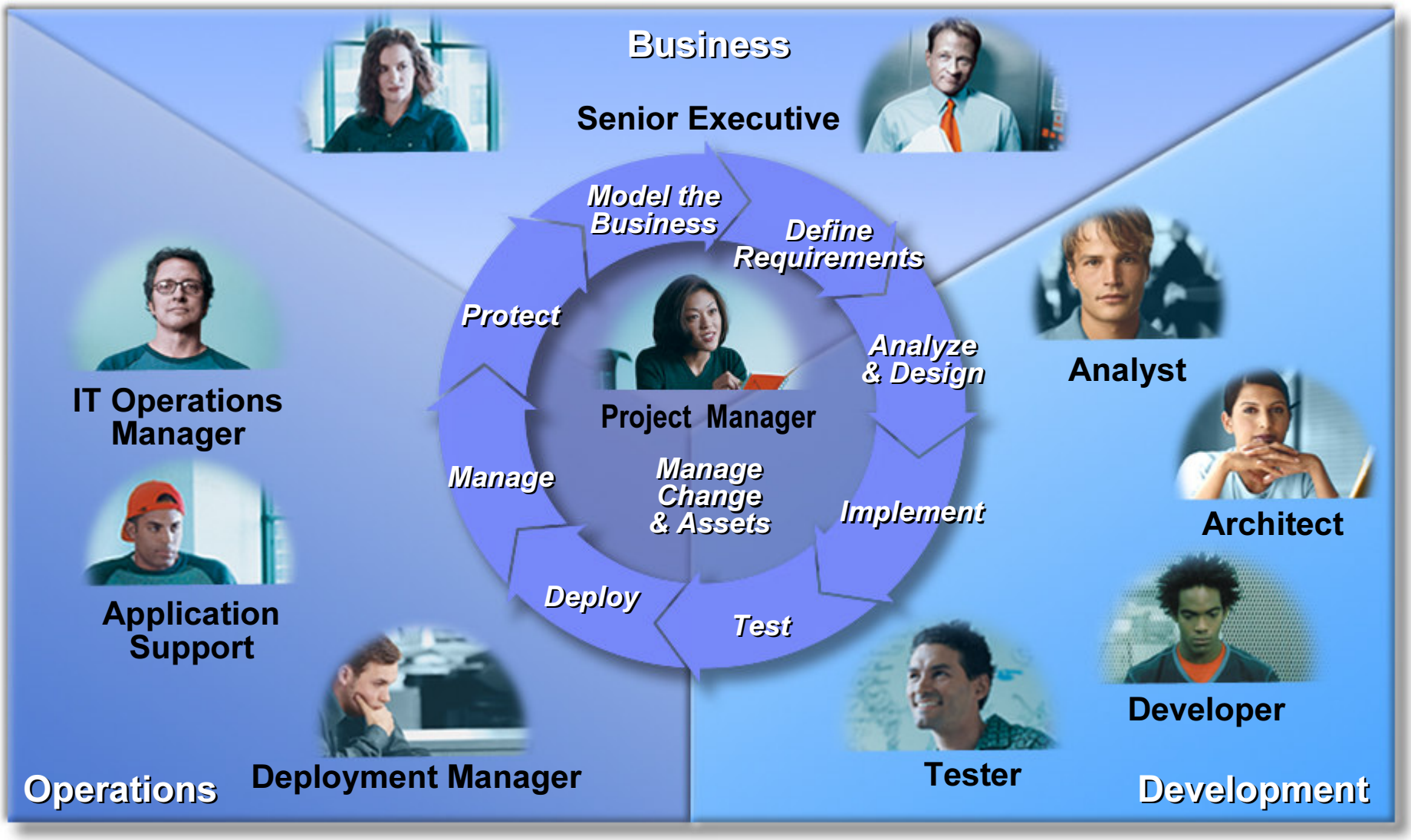


How are customers thinking technically about flexible IT through SOA?

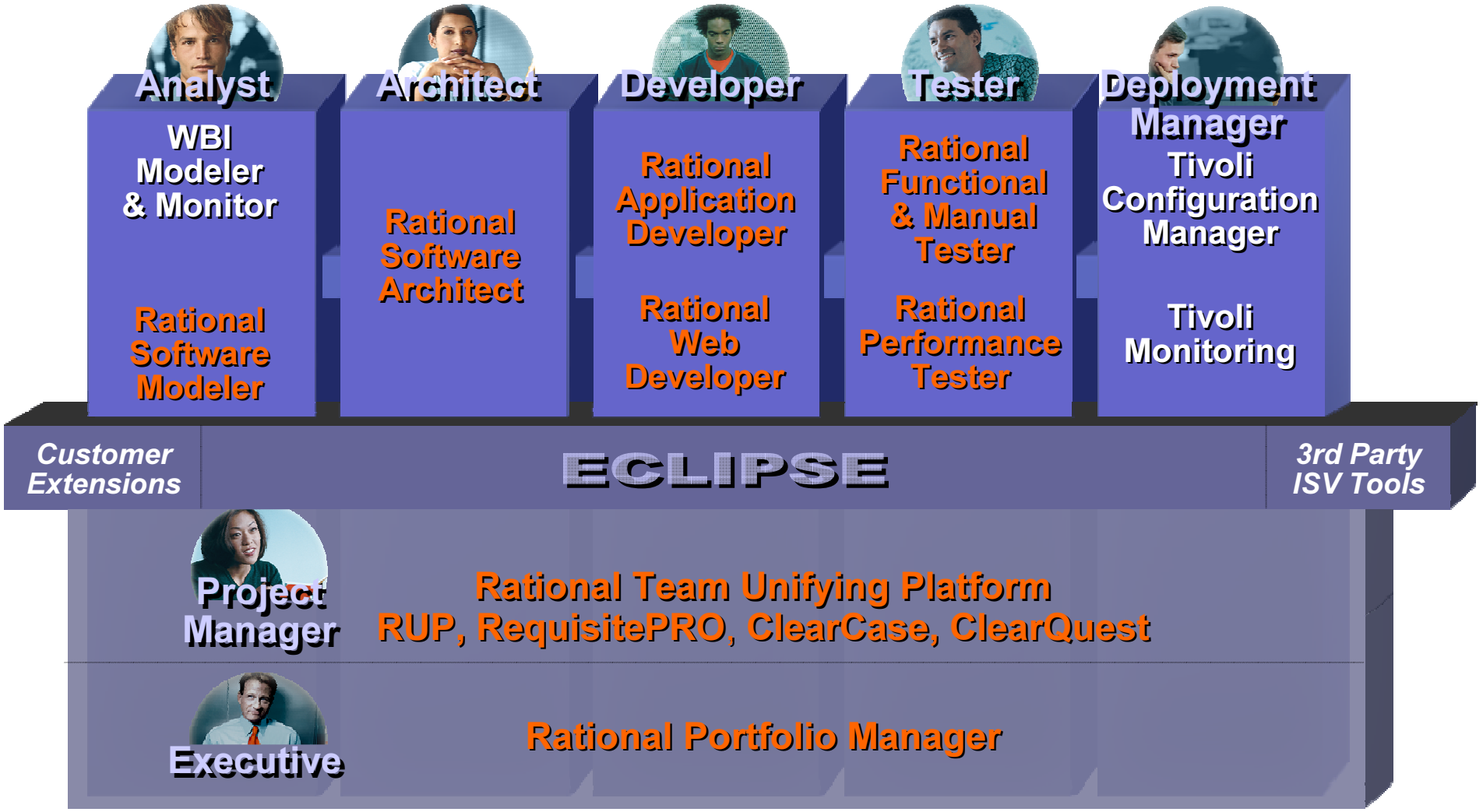
The SOA Lifecycle



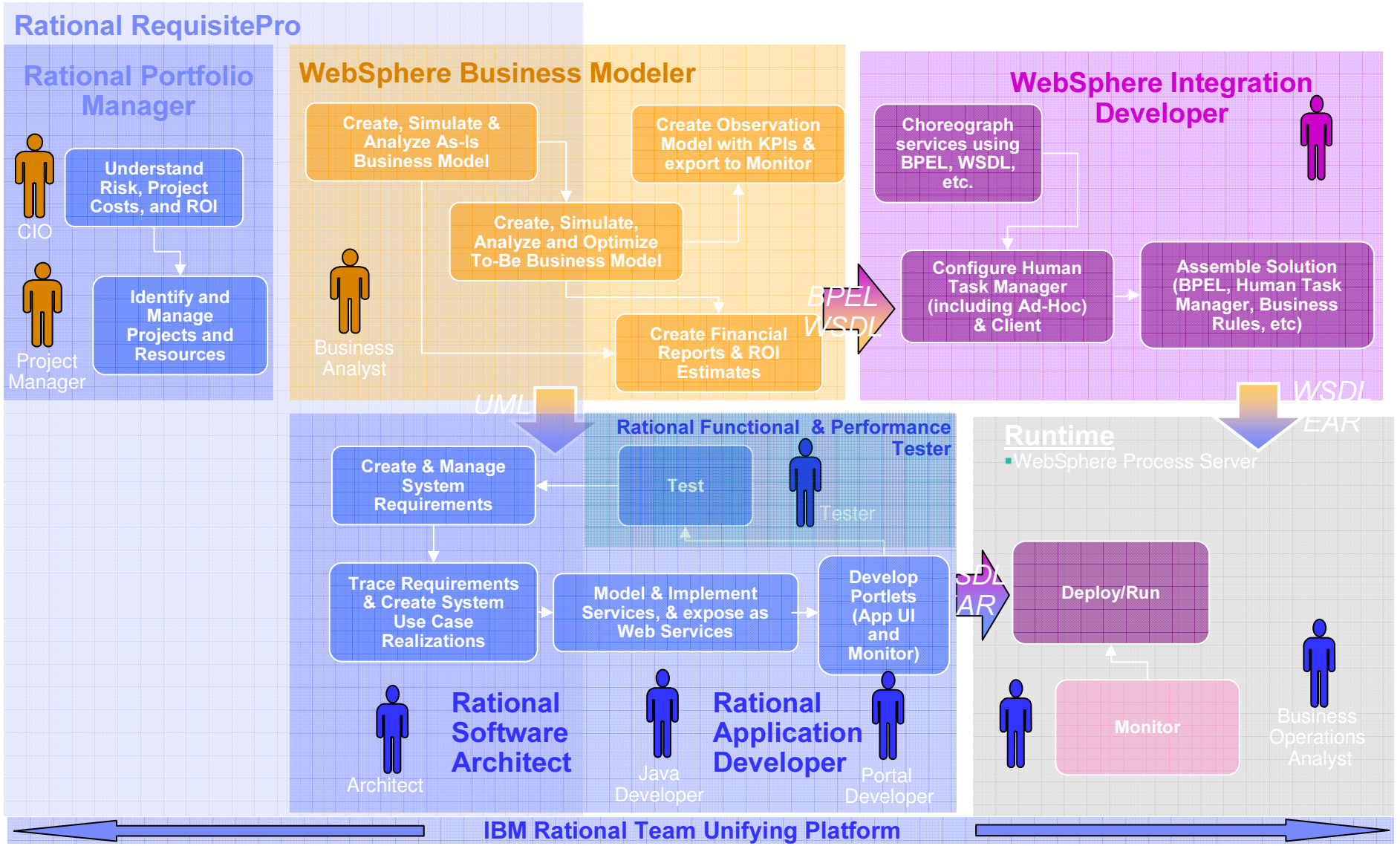
The solution: business-driven development lifecycle



Supporting business driven development lifecycle



How to Build a Process Integration solution using BDD

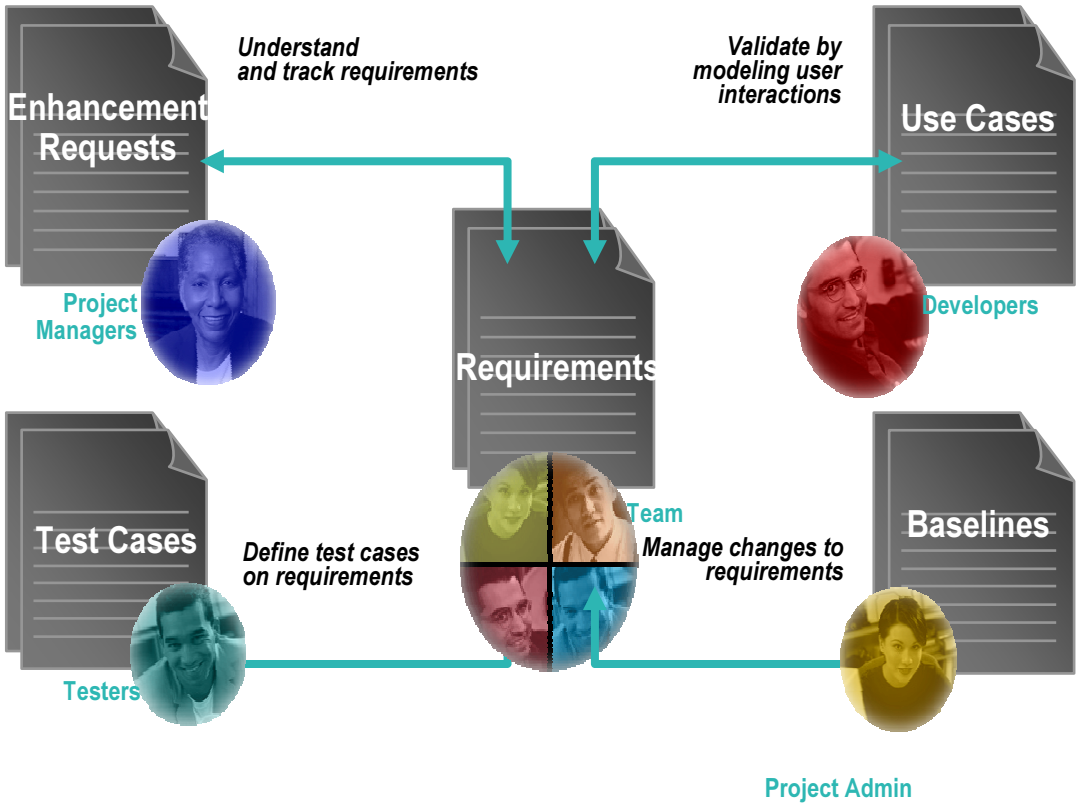


Agenda

- Service Oriented Architecture Lifecycle
- **Software Development disciplines**
  - **Requirements Management**
  - **Design and Construction**
- Problem Determination Tools

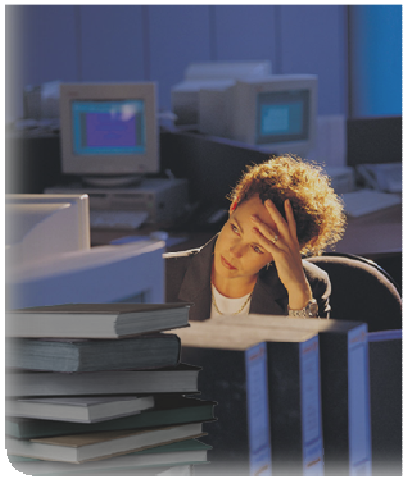
Manage Requirements

- Harvest
- Catalog
- Traceability
- Template and standard
- Tools?

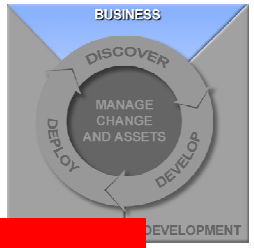


Issues In Managing Requirements

- **Understanding and using requirements**
  - Requirements are located in many documents, charts, and models
  - Requirements lack context
  - Requirements not used by designers, developers and testers
- **Organizing and reporting on requirements**
  - Requirements are not assigned priority, risk and level of effort
  - Requirements don't have any definition or type
- **Managing changes to requirements**
  - No record of relationships or origin
  - Changes are not communicated in a timely manner
  - Impact of change is not assessed or is underestimated



Unsolved RM Challenges ➔ Software Rework ➔ Cost, Delays, Quality Issues



IBM requirements & analysis offerings

Benefits

- Drive business needs throughout projects
- Ensure regulatory compliance
- Leverage existing assets and SOA architectures

Capabilities

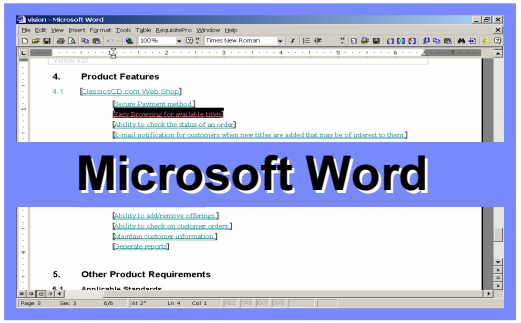
- Analyze business workflows & activities
- Capture business requirements
- Model enterprise and data architectures

Key Products	Business Analyst	Systems Analyst	DBA/ Data Analyst
IBM Rational RequisitePro	✓	✓	
IBM Rational Rose Data Modeler		✓	✓
IBM Rational Software Modeler*		✓	
IBM WebSphere Business Integration Modeler & Monitor	✓	✓	

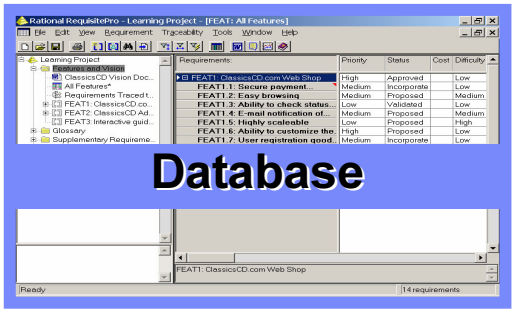
* Included in IBM Rational Professional Bundle

Managing Requirements with IBM Rational RequisitePro

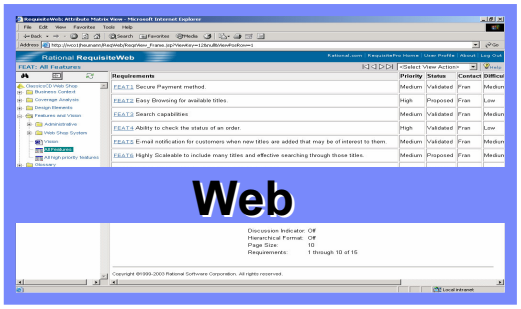
- ✓3 interfaces - work the way you want
- ✓Document-centric or database-centric - your choice



- ✓ Familiar interface
- ✓ Provides requirements context
- ✓ Highly effective for reviews



- ✓ Central repository, easy secure access
- ✓ Project and document templates
- ✓ Organize requirements with packages

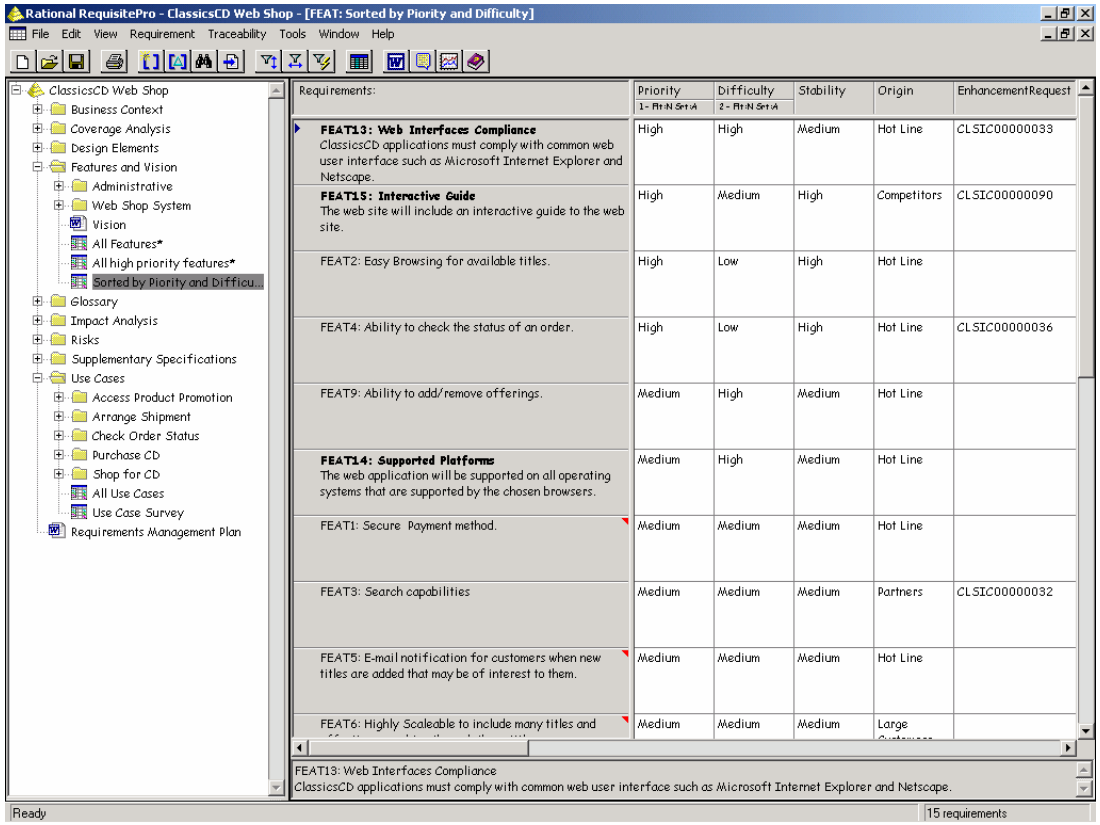


- ✓ Remote/distributed access
- ✓ No desktop installation
- ✓ New usability and performance improvements

RequisitePRO

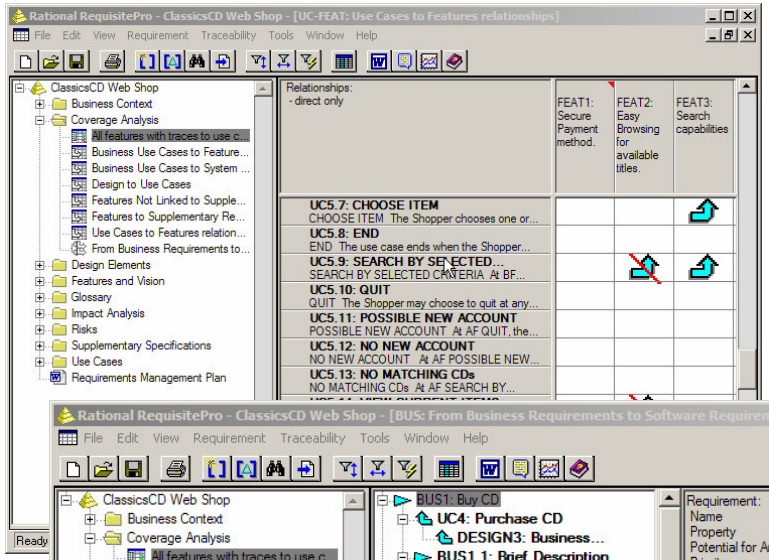
Organizing Requirements - Types, Attributes and Views

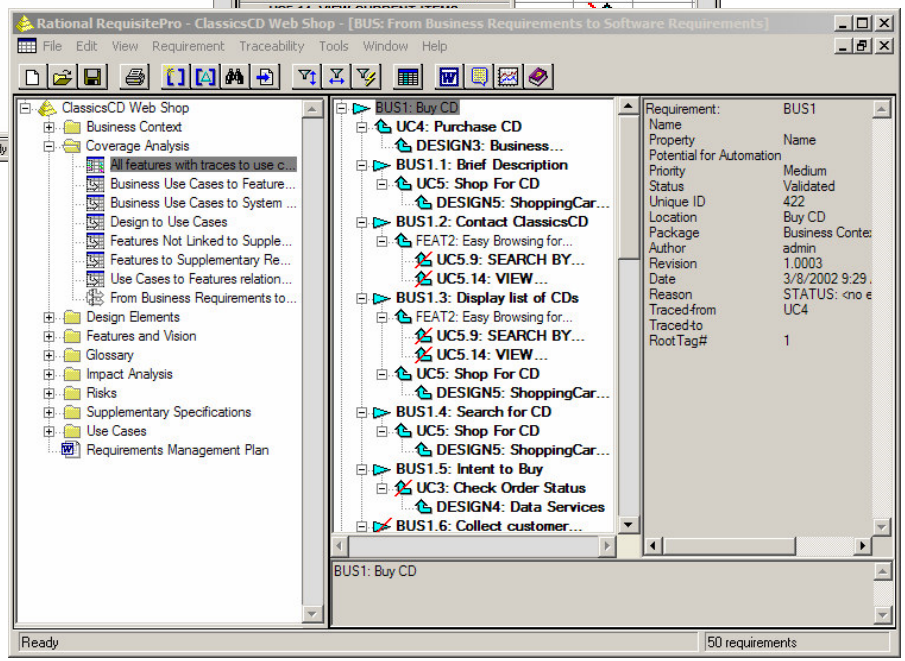
- ✓ User-defined requirement types
- ✓ User-defined attributes
- ✓ User-defined filters (views)
- ✓ Saved views



RequisitePRO

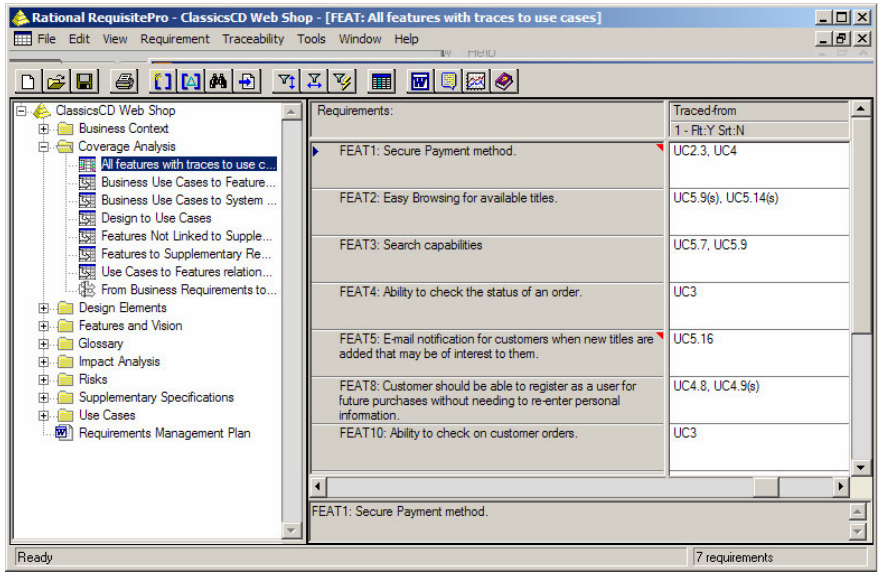
Managing Changing Requirements - Traceability





✓ Graphical trace matrix

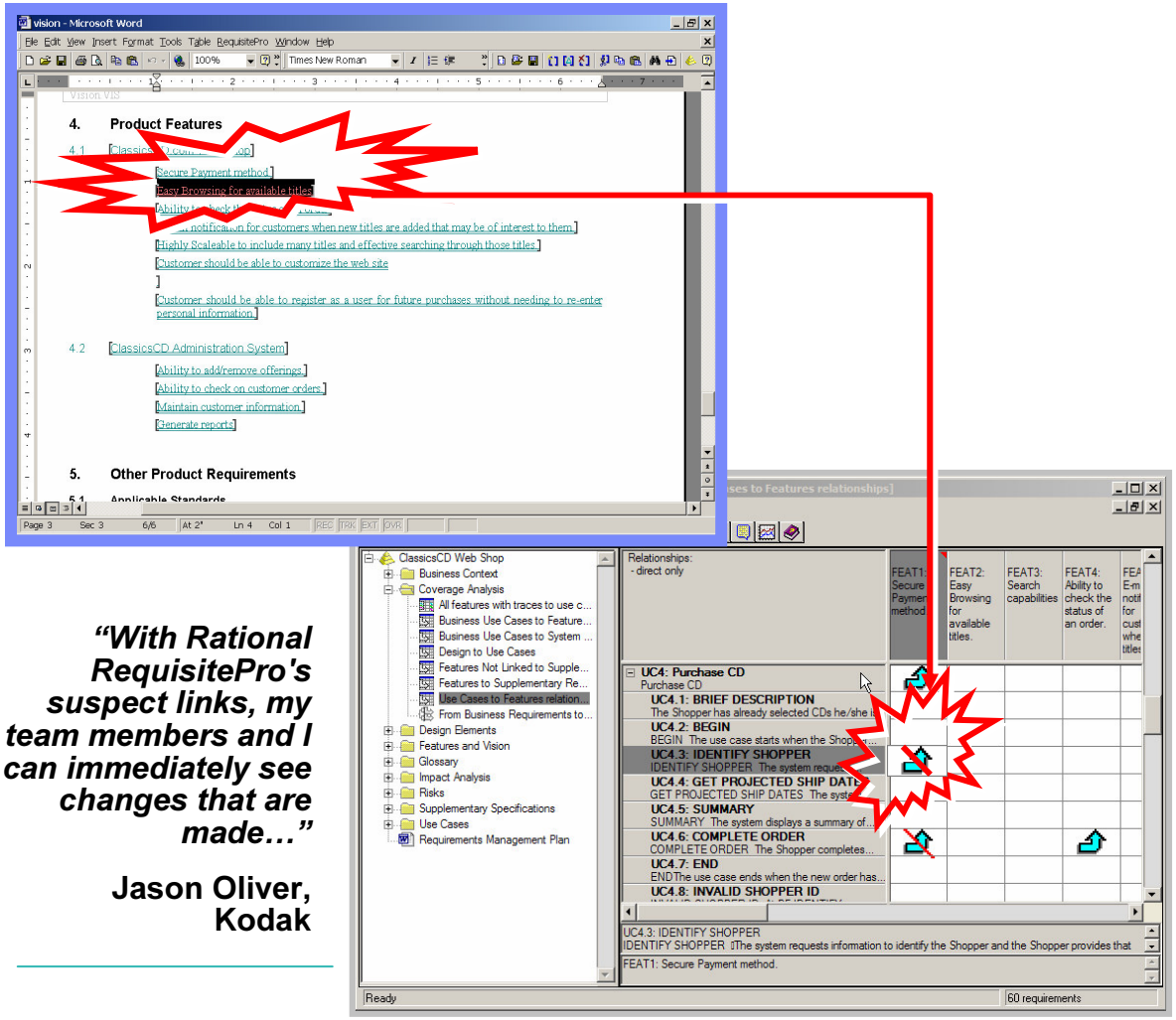
✓ Textual trace matrix



✓ Graphical trace tree

RequisitePRO

Communicating Changes and Their Impact



"With Rational RequisitePro's suspect links, my team members and I can immediately see changes that are made…"

Jason Oliver, Kodak

✓ Email notification of changes

Subject: Requirement revision - Learning Project - Use Cases: SUPP1

SUPP1: Interface guidelines

Revision #: 1.0018
Version Label:
Date Time: 2004-07-01 13:00:04
Author: Unknown
Change Description: Created trace relationship to FEAT11.
Created trace relationship from FEAT3.

Revision #: 1.0017
Version Label:
Date Time: 2004-07-01 12:59:48
Author: Unknown
Change Description: DIFFICULTY: Medium - Low.
Requirement Text Changed.
REQTEXT: The system shall follow standard interface guidelines. dfg dodgf

SUPP1: Interface guidelines

Text: The system shall follow standard interface guidelines. dfg dodgf
Package: Project Root Package\Supplementary Requirements
Location: C:\Program Files\Rational\RequisitePro\samples\Learning Project-Use Cases\Supplementary Specification.SUP
Priority:
Status: Validated
Difficulty: Low
Stability: Low
Contact:
Revision Notification: Nabil, mario

Traces from: FEAT3
Traces to: FEAT11

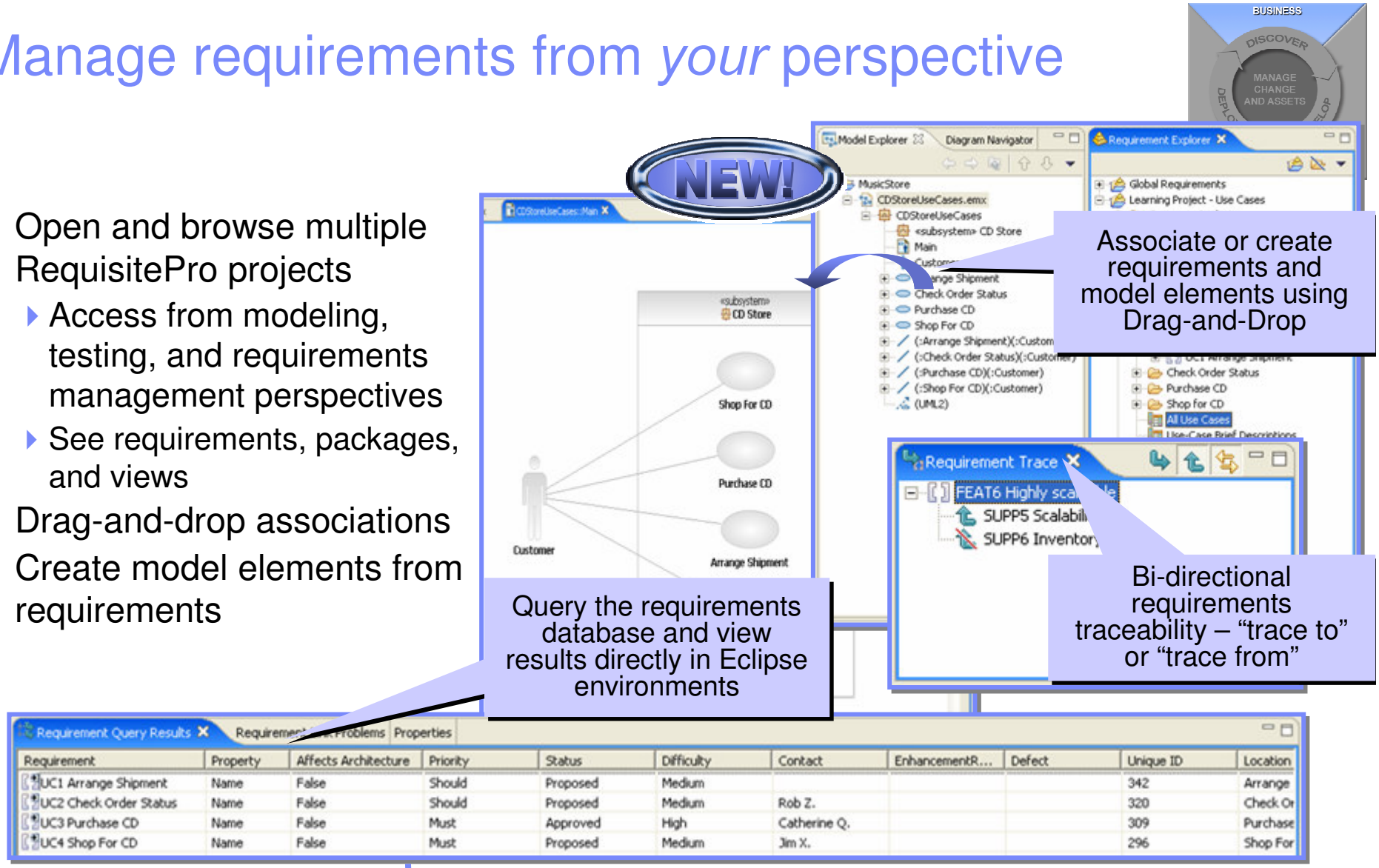
Parent: None
Children: None

✓ Suspect links

RequisitePRO

Manage requirements from *your* perspective

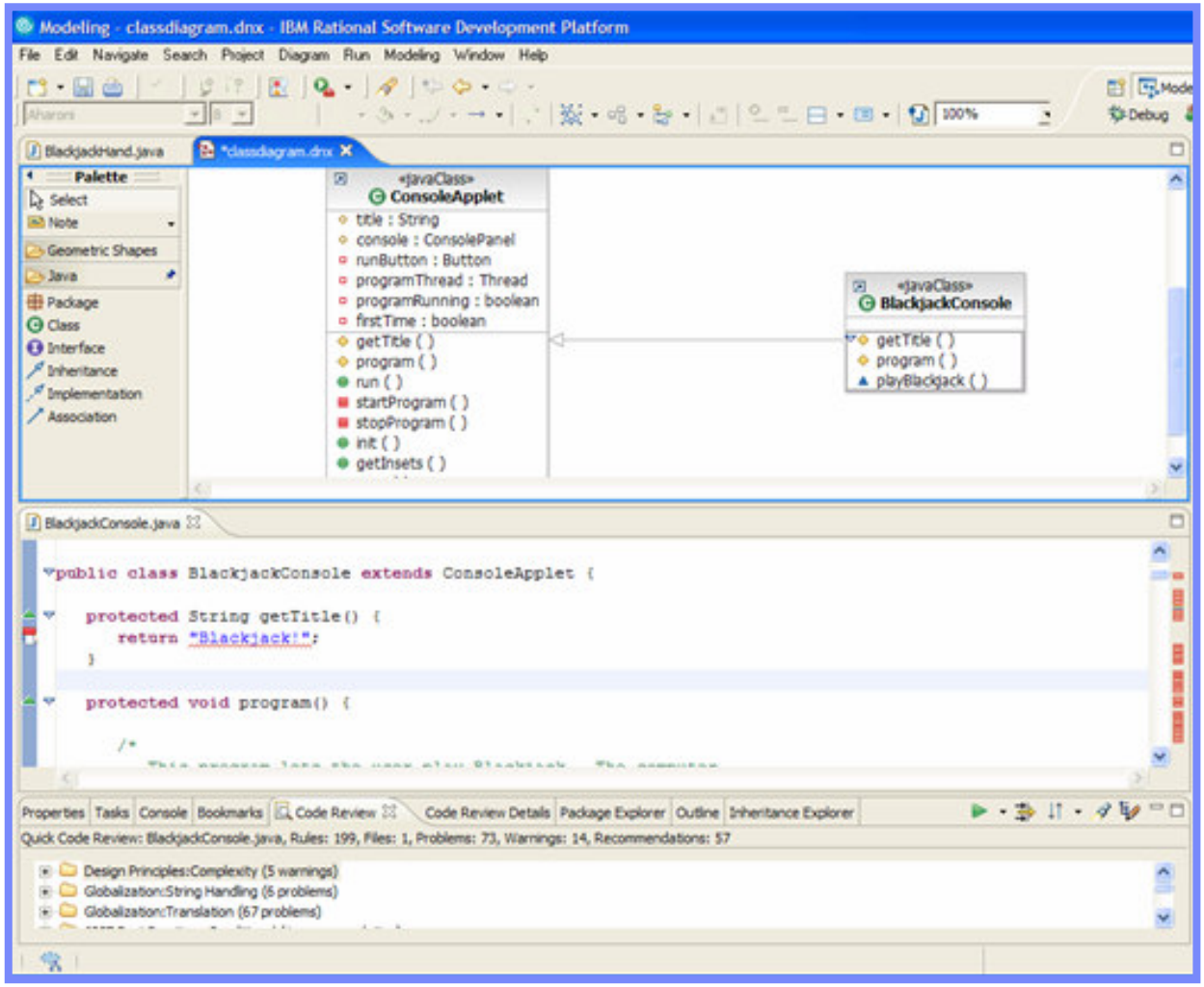
- Open and browse multiple RequisitePro projects
  - Access from modeling, testing, and requirements management perspectives
  - See requirements, packages, and views
- Drag-and-drop associations
- Create model elements from requirements



Eclipse Requirements Management Plug-in

Design & construction

- Modeling activities
- Modeling interactions
- Architecture definition and control
- Coding standard
- Quality and development
- Rapid development



IBM design & construction offerings

Benefits

- Improve productivity and time to value
- Maximize quality, robustness, reusability
- Maximize value of code and models
- Choice of development styles

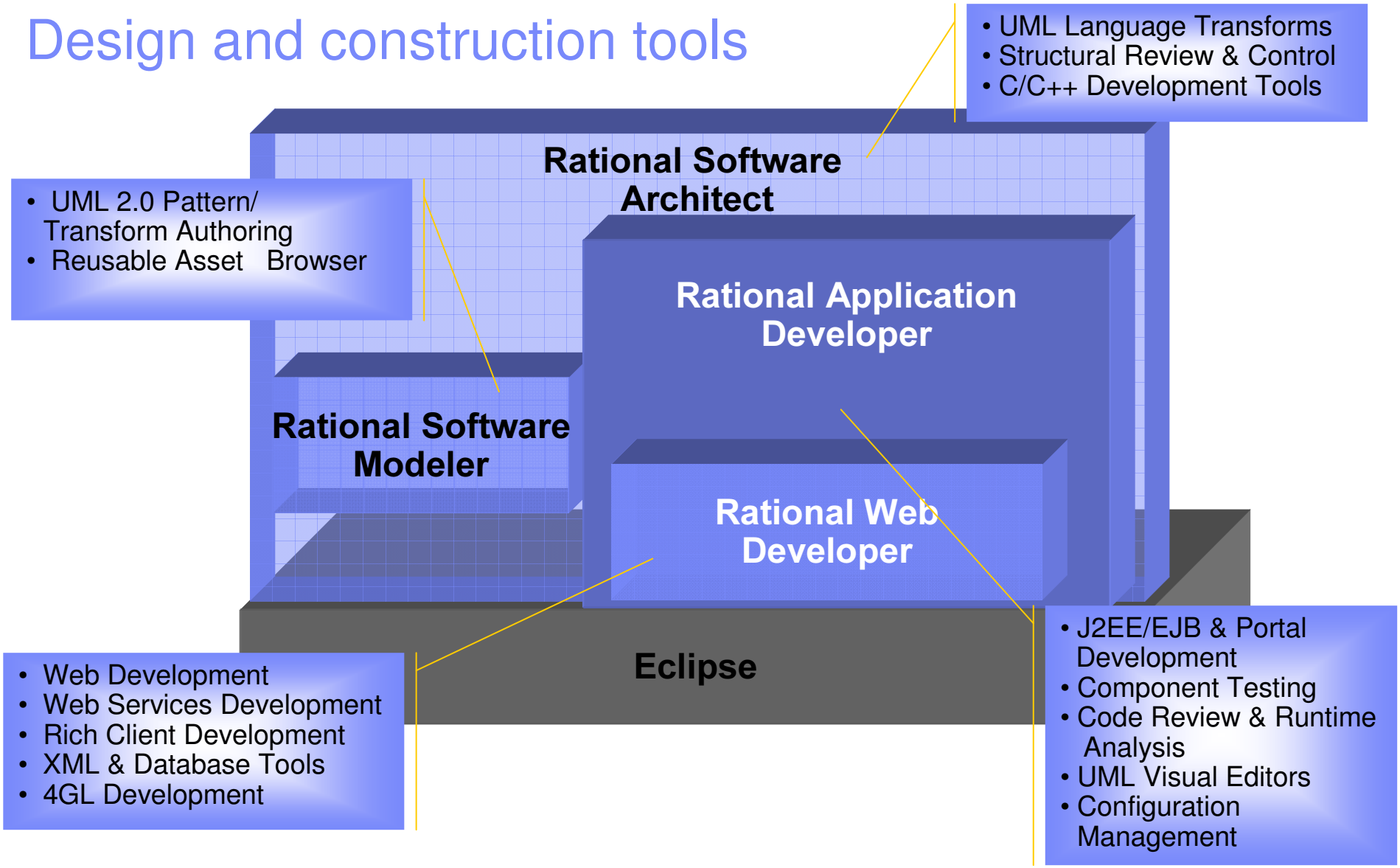
Capabilities

- Coding, developer testing & deployment
- Code visualization / editing
- Modeling, round-trip engineering, model execution
- Legacy integration
- Rapid application development

Key Products	Software Architect	Application Developer	Web & Corporate Developer	Traditional Developer
IBM Rational Web Developer for WebSphere Software*			✓	
IBM Rational Application Developer for WebSphere Software*		✓	✓	
IBM Rational Software Architect*	✓	✓	✓	
IBM WebSphere Studio Enterprise Developer				✓
IBM WebSphere Studio Asset Analyzer	✓			✓
IBM Rational Rose Technical Developer	✓	✓		

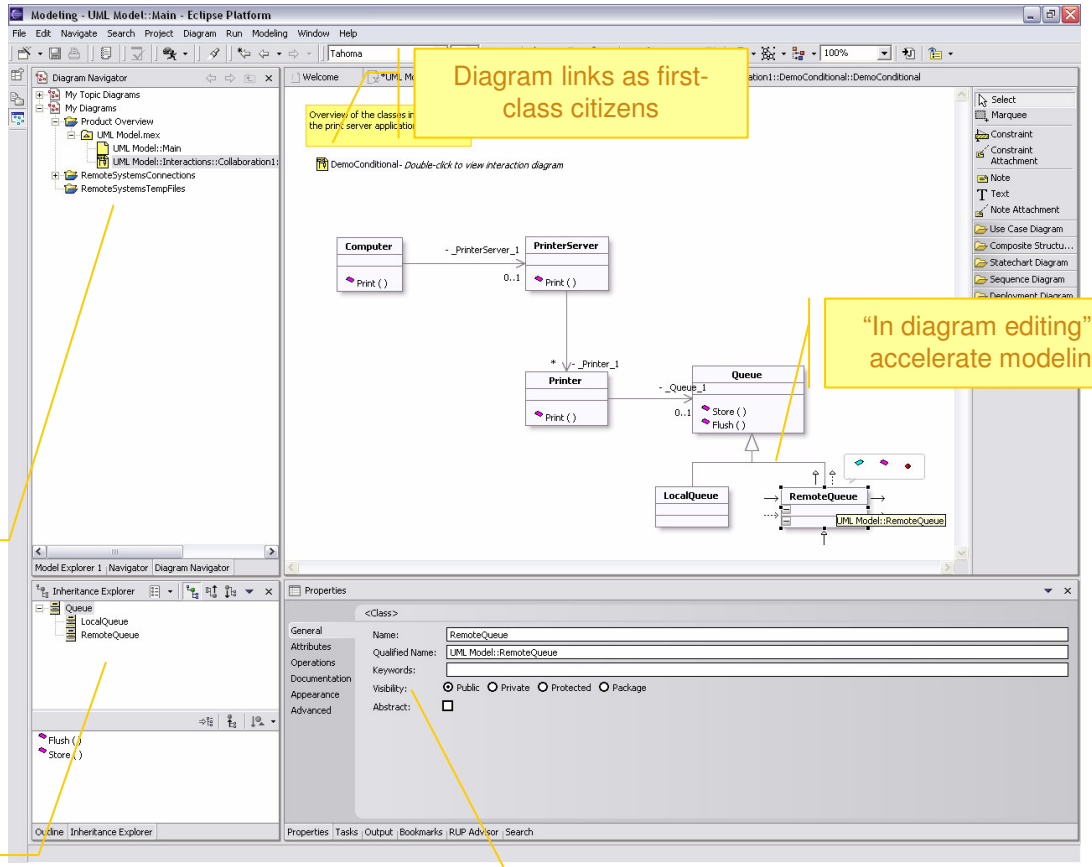
*** Included in IBM Rational Professional Bundle**

Design and construction tools



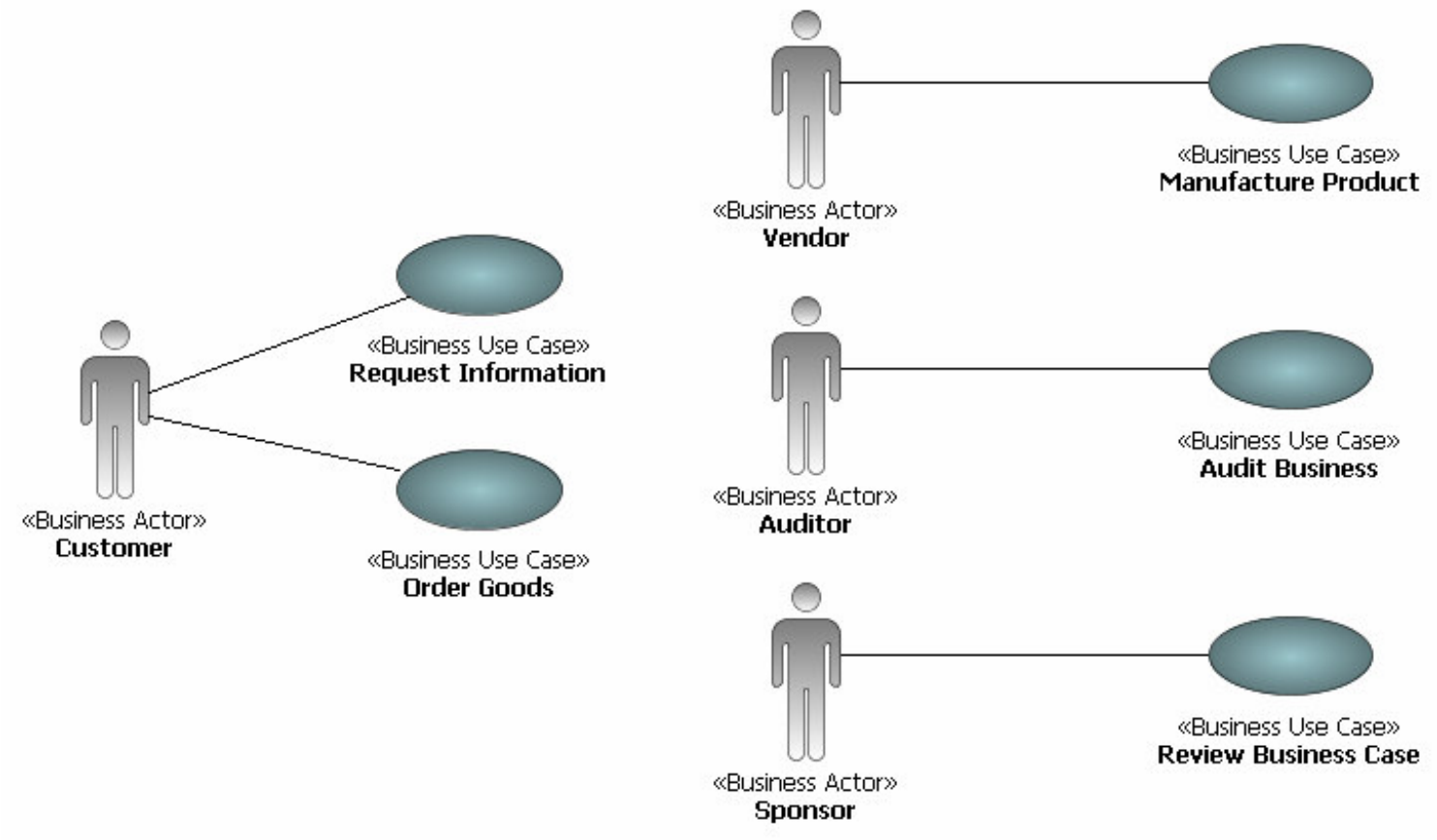
Modeling assistance

- Simplify the capture of UML models during Analysis and Design
- Use Case Modeling
- Activity Modeling
- Structural Modeling
- Interaction Modeling

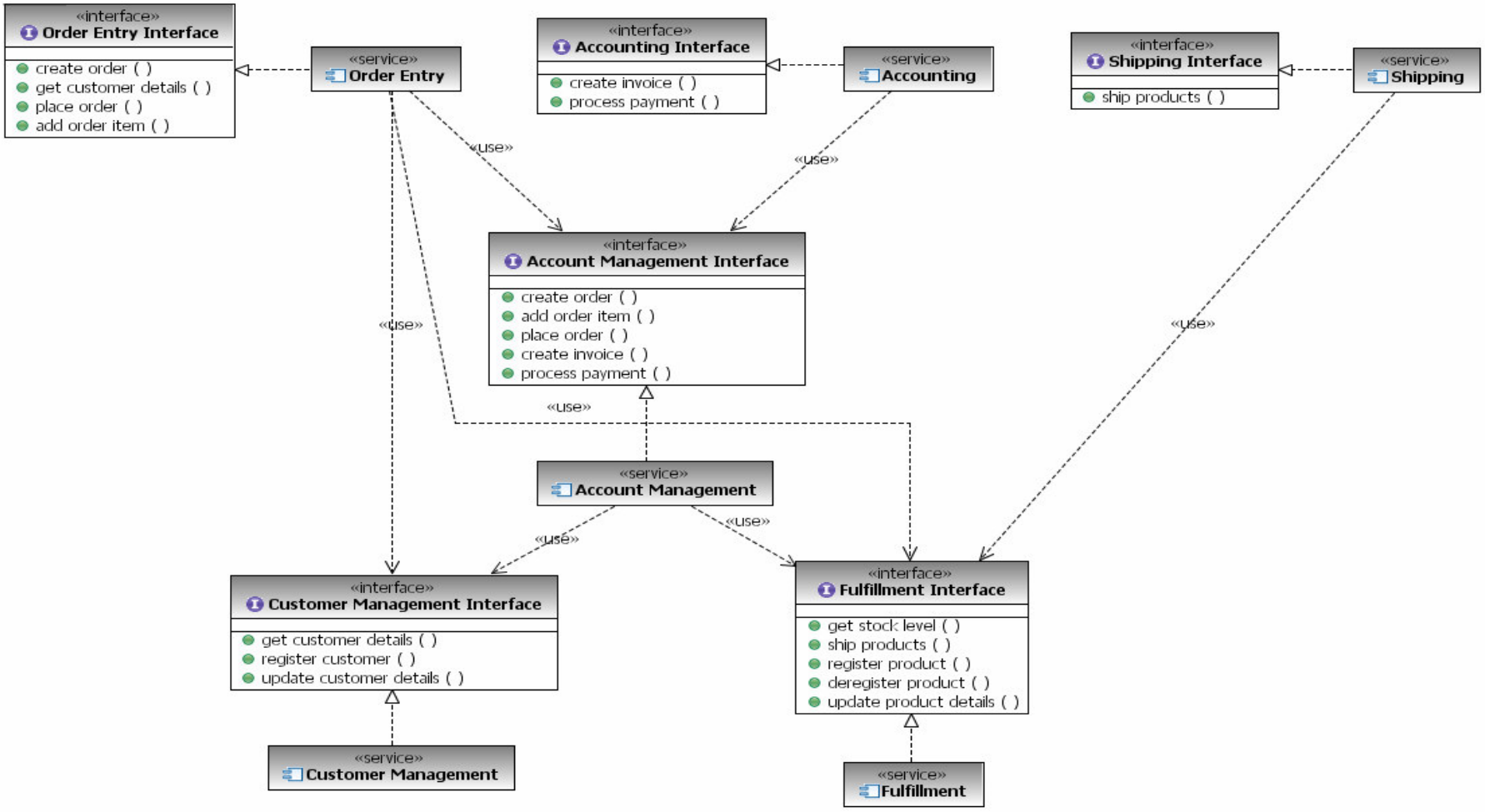


IBM Rational Software Architect

Business Use-Case Model



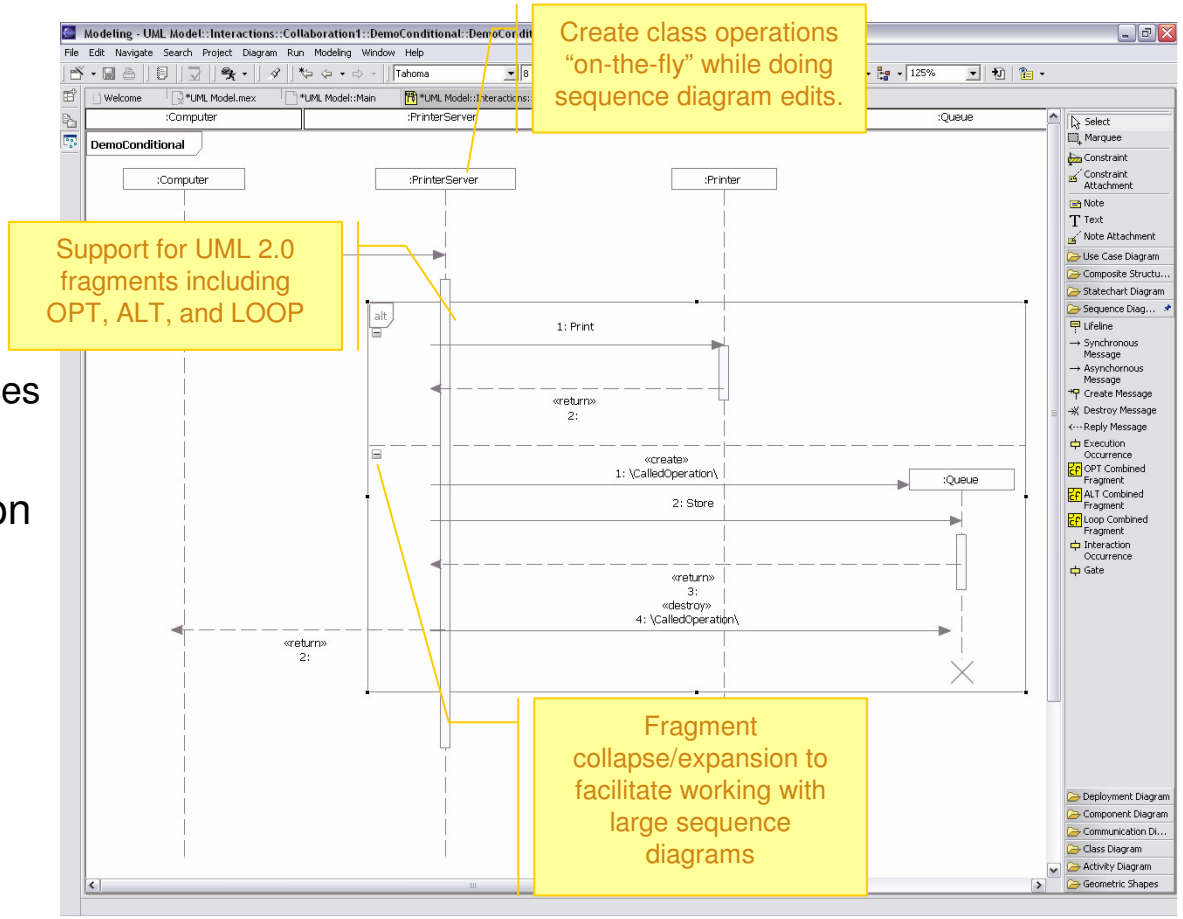
Static Design Modeling



IBM Rational Software Architect

Interaction Modeling

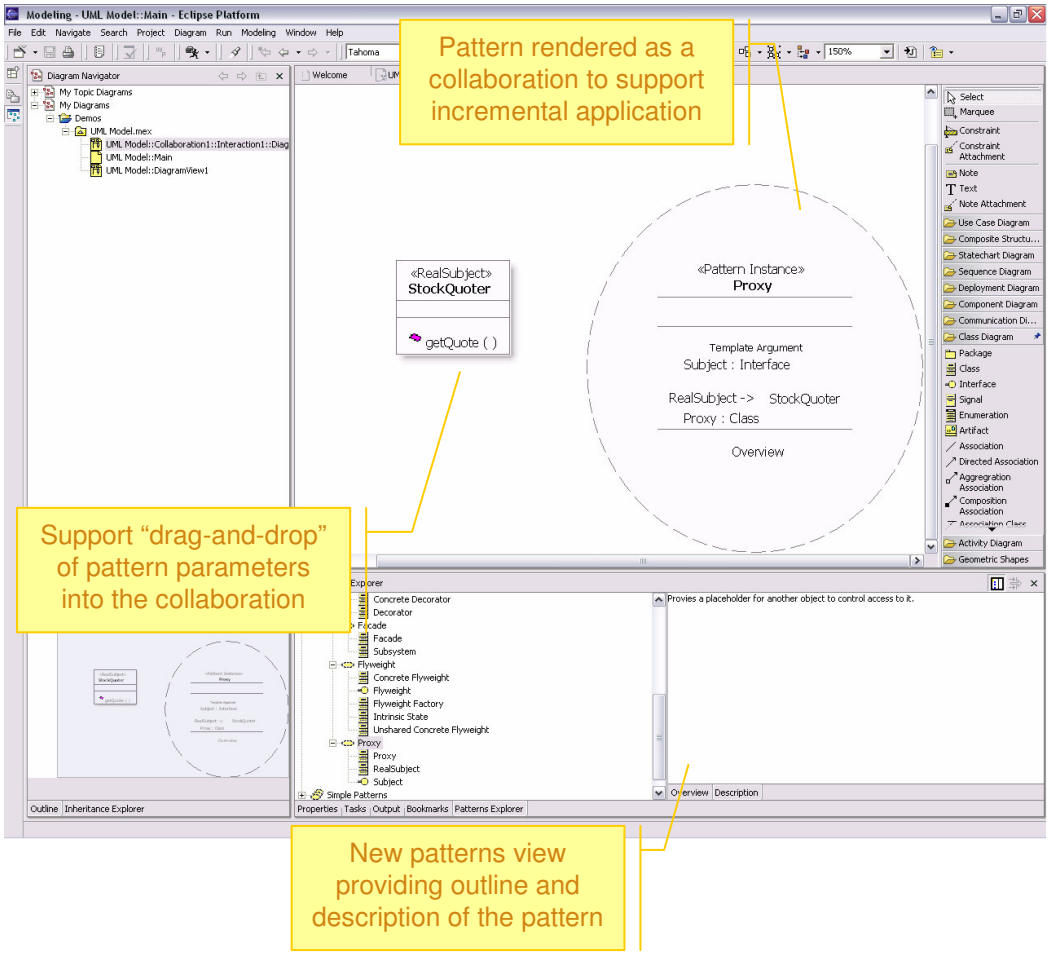
- Interactions are expressed more effectively using UML 2.0 constructs
  - Support specification of test scenarios
    - Loop, alt, opt
    - Interaction fragment references
- Interactions can be rendered as either sequence or communication diagrams
- Sequence diagram editing improvements
  - Ordering and reordering



IBM Rational Software Architect

Patterns

- Applying Patterns is very simple
  - Evolution of pattern experience based on lessons learned
  - Pattern Explorer
    - Displays known patterns
    - Displays information regarding the pattern, graphical overview, documentation, parameters, etc.
- Pattern-authoring provides greater flexibility using Open API
- All Gang of Four design patterns provided
- Additional patterns provided via RAS repository on IBM developerWorks



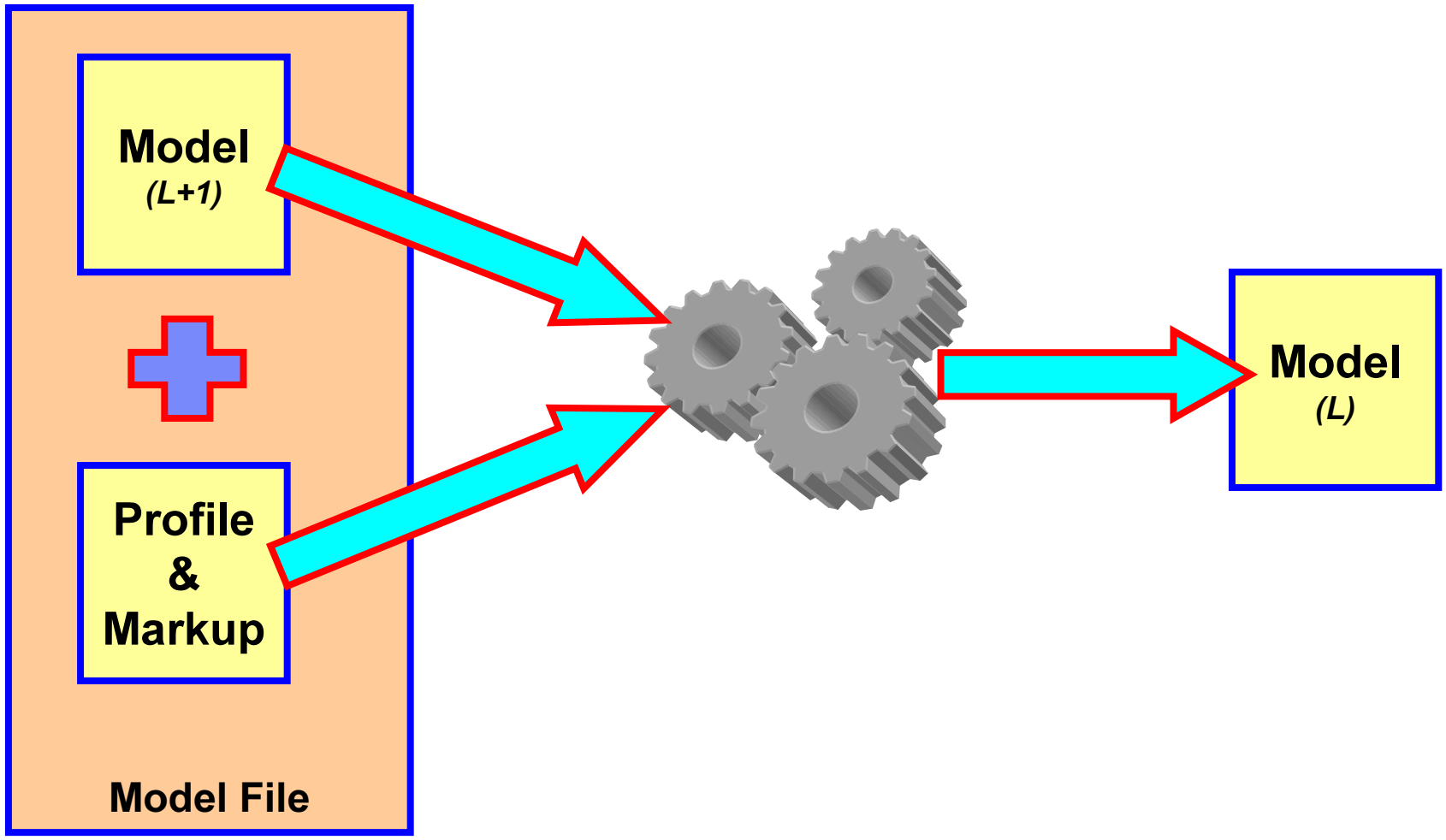
Apply a Pattern

- Pattern Explorer
  - Displays known patterns
  - Displays information regarding the pattern
    - Graphical overview, documentation, parameters, etc.
- Pattern Instances
  - Not shown in explorer – part of the UML model

Create a New Pattern

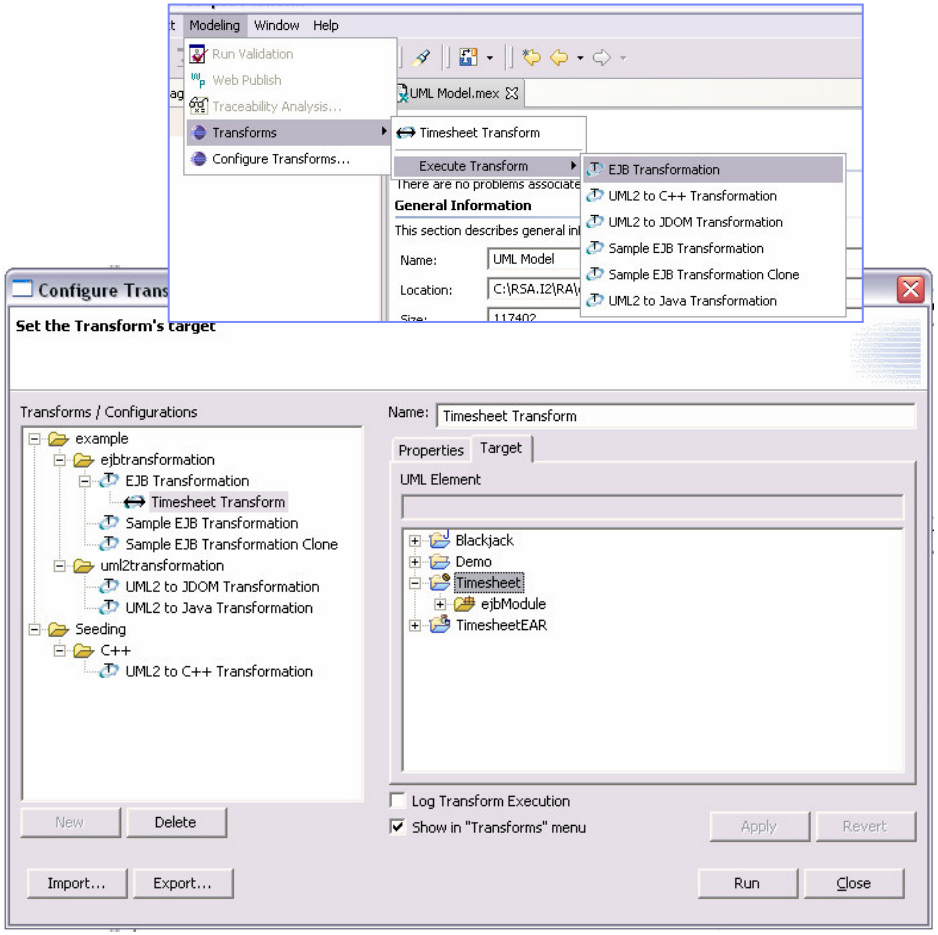
- A pattern is stored in a plugin.
  - A single plugin can contain multiple patterns
- Wizards provided for the creation of a pattern and its containing plugin.
  - Project and plugin creation
  - Pattern creation
  - Parameter definition

Transformation Model



Transformations

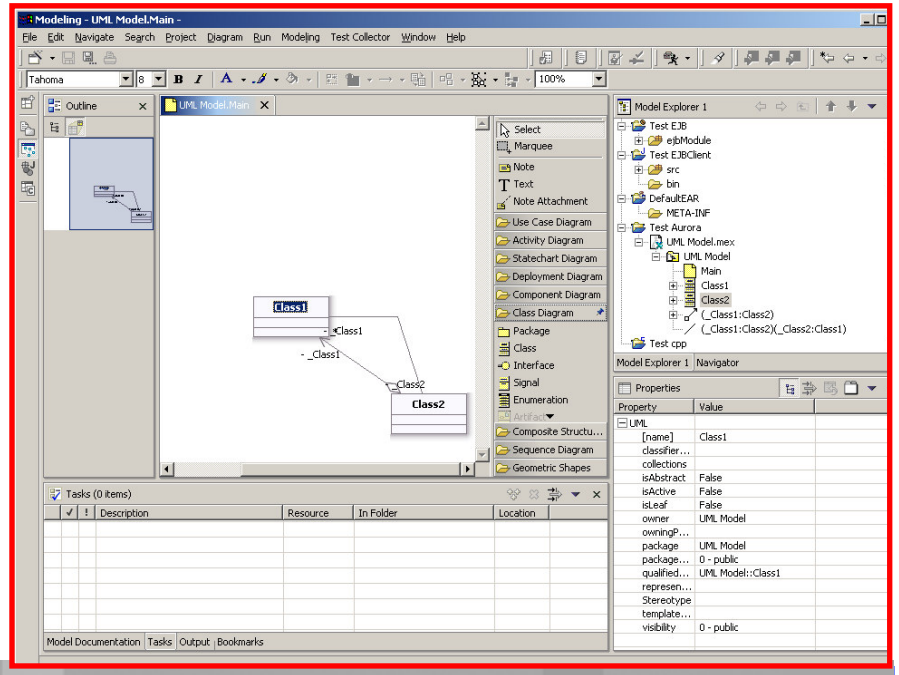
- Transformations are optimal for “batch” style computationally intensive operations
  - Model-to-model
  - Model-to-code
  - Transformation Explorer
    - Displays known transformations and their instances
    - Displays information regarding the transformation, documentation, parameters, properties, etc
- Out-of-the box code transforms
  - UML-to-J2EE/Java
  - UML-to-C++
  - Plus sample model-to-model transforms
- Transformations updated via RAS repository hosted on IBM developerWorks



Apply a Transformation

- Transformation Explorer
  - Displays known transformations and their instances
  - Displays information regarding the transformation
    - Documentation, parameters, properties, etc.

- Transformation Instances
  - Shown in explorer
  - Can be assigned to context menu



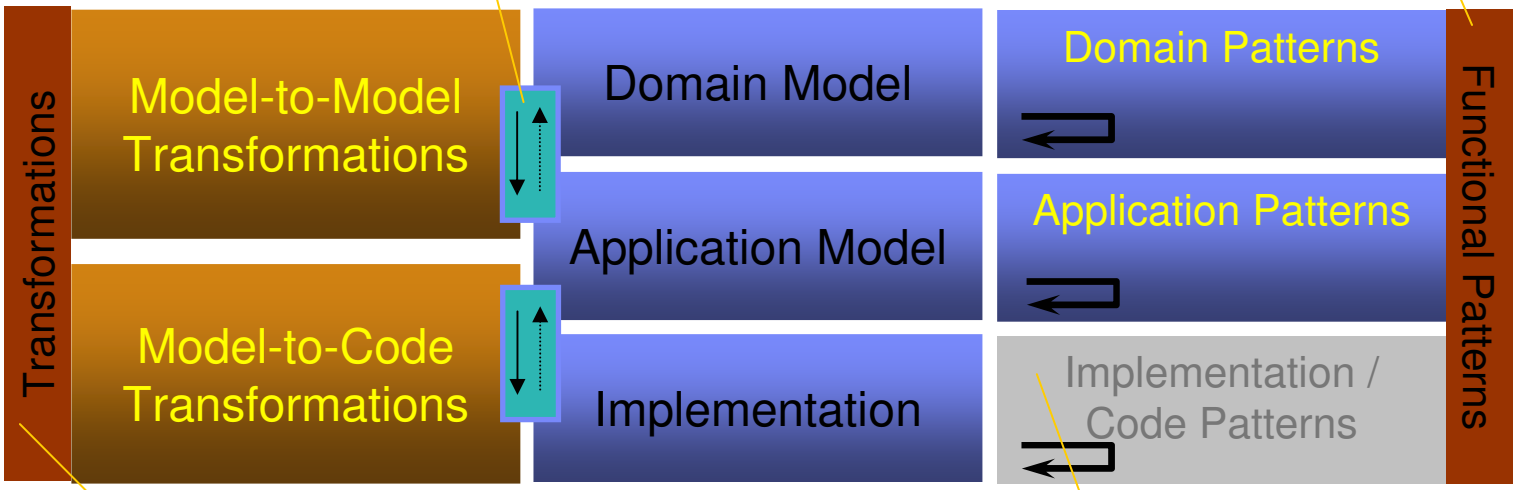
Create a New Transformation

- A transformation is stored in a plugin.
  - A single plugin can contain multiple transformations
- Wizards provided for the creation of a transformation and its containing plugin.
  - Project and plugin creation
  - Extractors
  - Rules

Patterns and Transformations

Transformations can be authored to create traceability links between the source and the target of the transformation.

Patterns can be authored/applied and used as recipes or building blocks to refine a model or implementation at its level of abstraction.



Rule/constraints-based transformations can be authored to transform models in a batch style operation. Transformations are authored using Java and the Eclipse PDE.
Transformations can leverage functional patterns when they execute.

After the Atlantic release, the patterns story will be extended to be inclusive of implementation level patterns that are relevant at the implementation level (ex.: Sun J2EE patterns).

IBM Rational Web Developer for WebSphere Software

"Web UI construction"
- Visual site layout tools
- Drag-and-drop web client construction supporting range of web client technologies:
  - HTML, JSP, Servlet
  - Struts, JSF and SDO

"EGL"
- Simplified 4GL for Web Application Development
- Text User Interface Programs Support (3270, Curses)
- VisualAge Generator -> EGL Migration Tool
- Java Runtime Targets

"Web Services Tools"
- WSDL visual editor
- UDDI Registry browser

"Rich Client UI construction"
- Java Visual Editor for rich client composition
- Supports Swing, AWT, SWT widgets

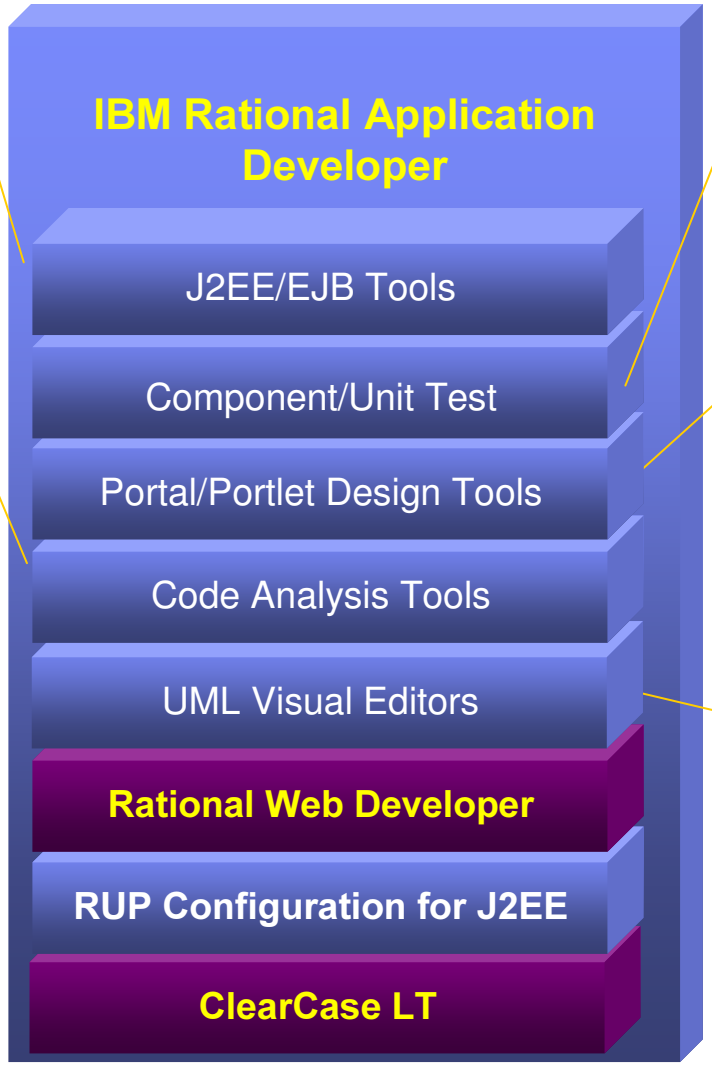
"XML Tools"
- XML and XSD tooling support

"Eclipse Java Development Tools"
- J2SE development tools
- Code completion, search, refactoring
- Extensible Team APIs to support CM integration (CVS, ClearCase, and many others)
- Plug-in Development Environment for extensibility

IBM Rational Application Developer for WebSphere Software

"J2EE/EJB Tooling"
- J2EE construction tools
- J2C Tooling
- Supports WebSphere and WebLogic
- Supports J2EE 1.3 and 1.4
- Rapid Deployment for WAS v6
- Integrated WAS test environments

"Code Analysis Tools"
- Both static code analysis and dynamic runtime analysis
- Source code analysis for rule violation detection: Java/EJB coding practices, internationalization, accessibility, architectural constraints, API deprecation
- Sequence diagram runtime trace with performance, thread and code coverage
- Advanced memory leak detection
- Remote data collection across multiple servers
- User-defined run-time probes
- Interactive reports and metrics



"Component/Unit Test"
- JUnit-based testing of Java, EJB and Web Services
- Test prioritization recommendation based on code analysis
- Automated test case generation through usage of test patterns
- Datapool editor for data-driven testing

Portal/Portlet Design Tools
- Visual Portal site and page layout tools
- Visual Portlet layout and preview
- Integrated Portal test environment

"UML Visual Editors"
- Class diagrams for Java/EJB structure
- Sequence diagrams for method body visualization
- IDEF1X/IE diagrams for Database and XML schema
- Dynamic topic diagrams
- Javadoc integration
- Visual refactoring

Rapidly build Java and J2EE applications

- Visual Editor for Java
  - Drag and drop AWT, SWT or Swing components to build Java GUIs
  - Visual tools to bind UI components to data objects
- Comprehensive support for full J2EE programming model
  - Wizards generate EJB wrapper code
  - Support for Object/Relational mapping
  - EAR packaging/deployment
  - Tools to define and test EJB, MDB
  - Built-in universal test client for EJB
  - Point-and-click wiring of JSF to EJB

Customer Benefits:

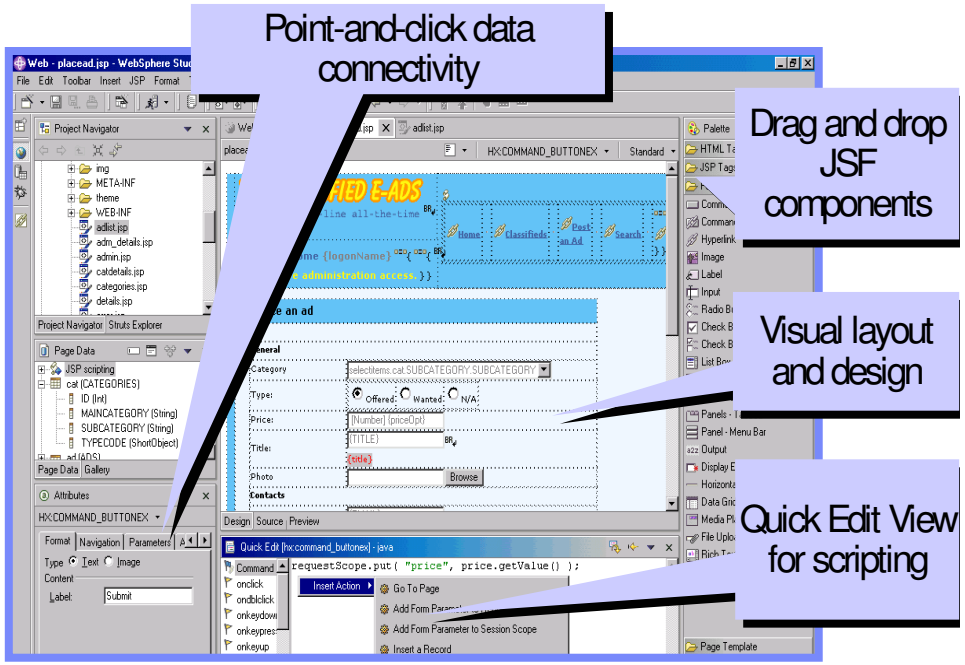
- Visual tools and wizards reduce coding
- Accelerated development and deployment

Point and click to build data-driven Web apps with rich user interfaces

- Visual tools for JavaServer Faces support
  - Drag and drop reusable UI components
  - Eliminates coding
- Visual tools for Service Data Object support
  - Single data interface for accessing backend systems/data
  - Emerging standard proposed jointly IBM and BEA

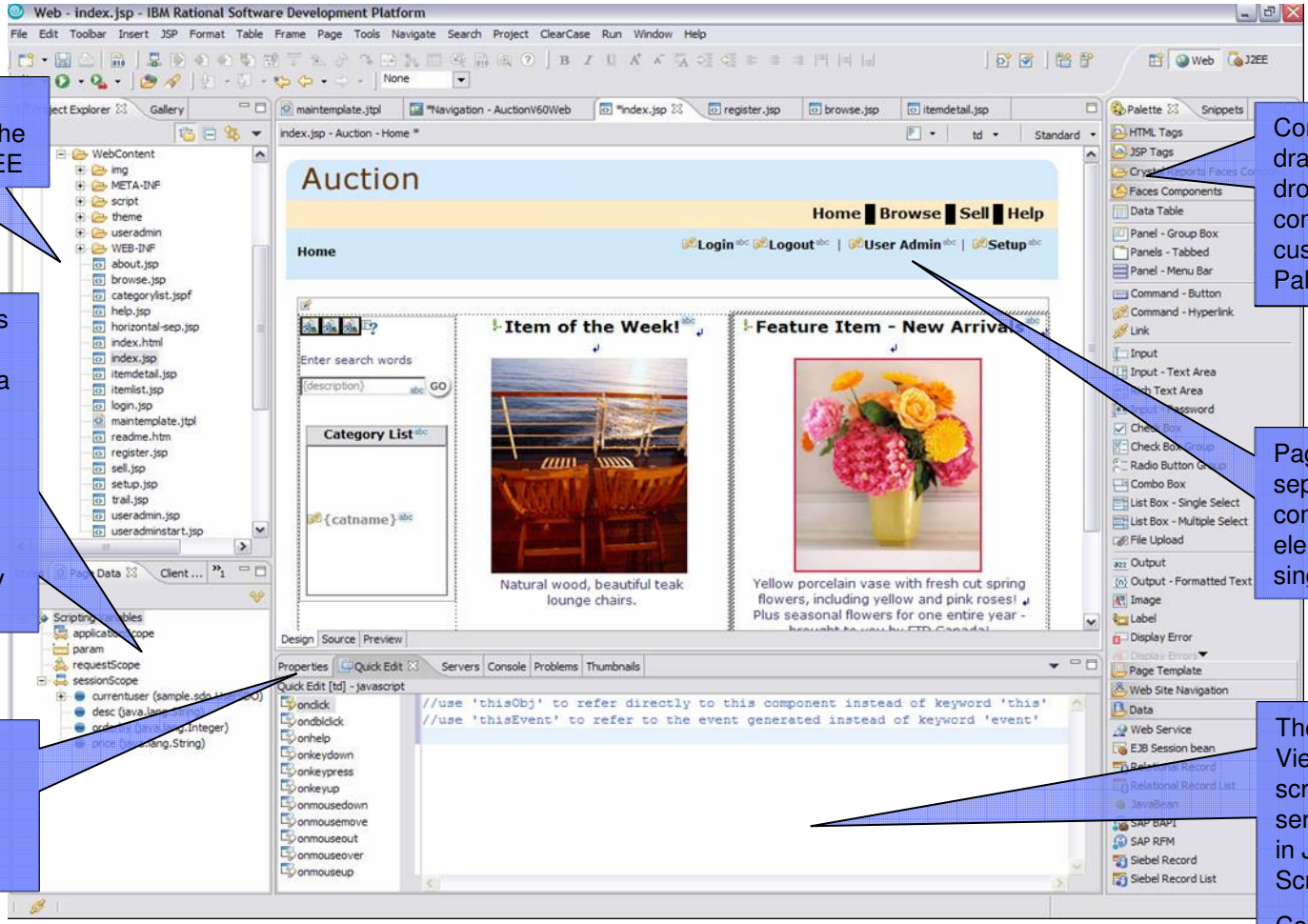
Customer Benefits:

- Highly productive, point/click experience for building dynamic data-bound Web pages
- Dramatically reduced learning curve
- Reusable components separate presentation from logic



Page Designer with JavaServer Faces support

Page Designer – New Look, JSF/SDO Enhancements



Simplified Navigator hides the complexity of J2EE

The Data View lets you configure and drag and drop data to automatically create a data bound UI

WDO accesses and updates data without writing any code!

Property views allow easy customization of the selected component

Construct pages by dragging and dropping rich web components from a customizable Palette

Page templates separate out common page elements in a single template file

The Quick Edit View allows scripting of client or server side events in Java or Java Script.

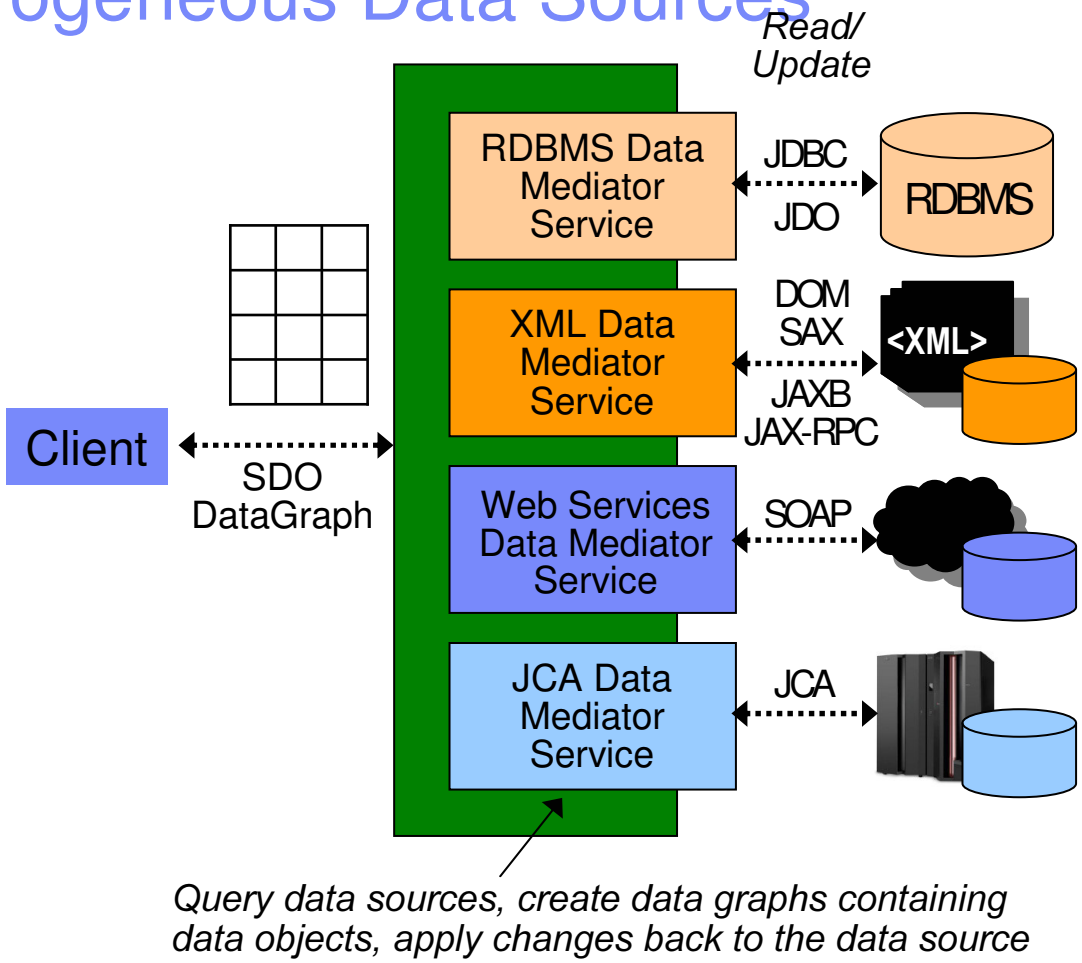
Code assist writes the code for you!

- **Web Application Development is Drag and Drop Simple!**
  - Rapid UI Creation
  - Simple Data Access with WDO/SDO
  - Instant binding of UI to Data
  - Quick Server-side event scripting (with Java Server Faces)

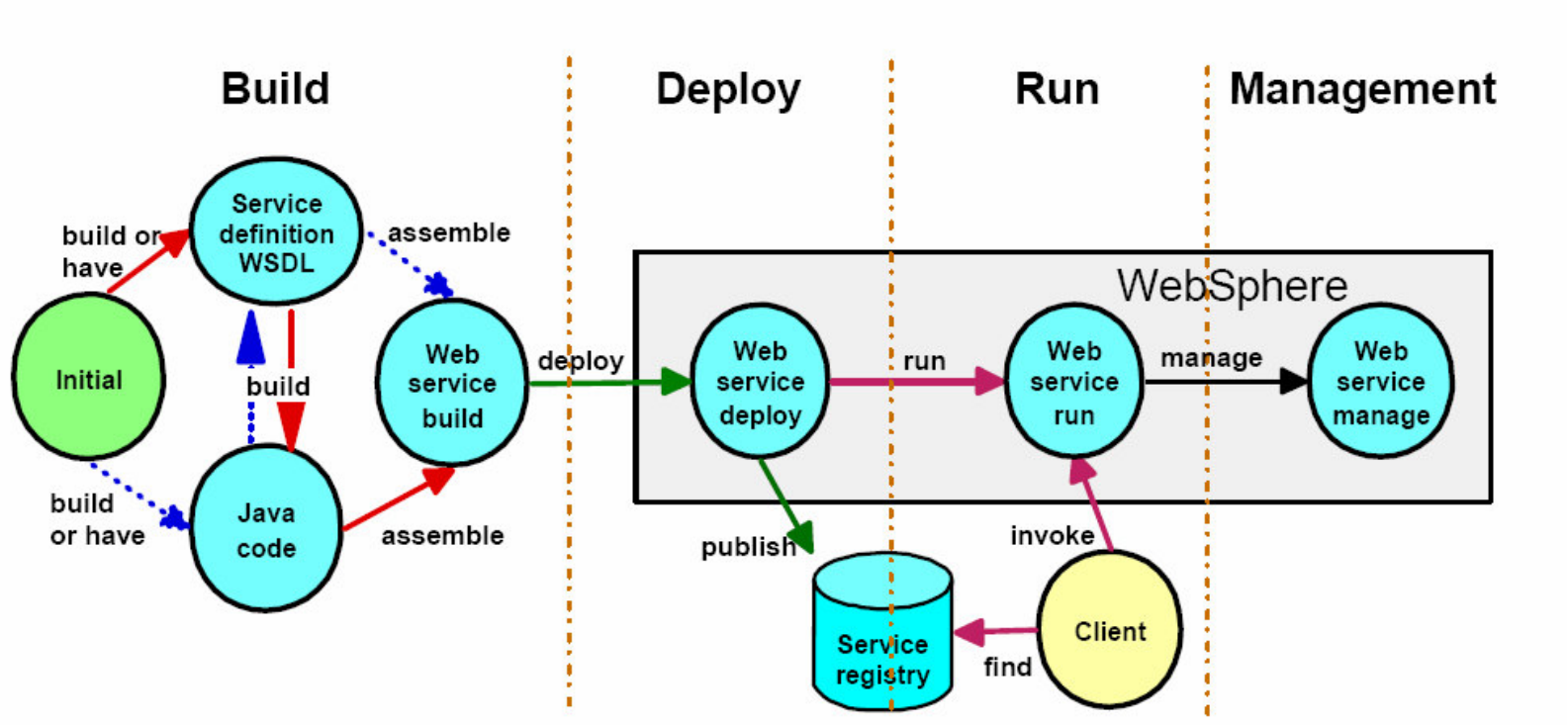
Emerging Standard

Service Data Objects (SDO): Unified Access to Heterogeneous Data Sources

- Provides a common programming interface to access data from multiple heterogeneous sources
- Supports both static and dynamic data APIs
- Supports disconnected operation
- Decouples application code from data access code
- Designed for use with tools to increase programmer productivity



Rapid Web Services Development



- **Design, Debug, Deploy, Test, Run and Manage Web Services**
  - Consume and Publish Web Services
  - Use Bottom-up or Top-down approach
  - Build Web Services from existing JavaBean, EJB, WSDL
  - Build Static or Dynamic clients

J2C Tooling Purpose

- The J2EE Connector Tooling will enable customers to create J2EE applications integrating/extending operations and data on Enterprise Information Systems.
- Benefits to Customer
  - **Shorter development time**: through rapid generation of correct EIS specific code without in-depth knowledge of underlying EIS
  - **Standardization** : through usage of resource adapters compliant with the J2EE Connector Architecture
  - **Simplification** of the development experience

J2C tooling features

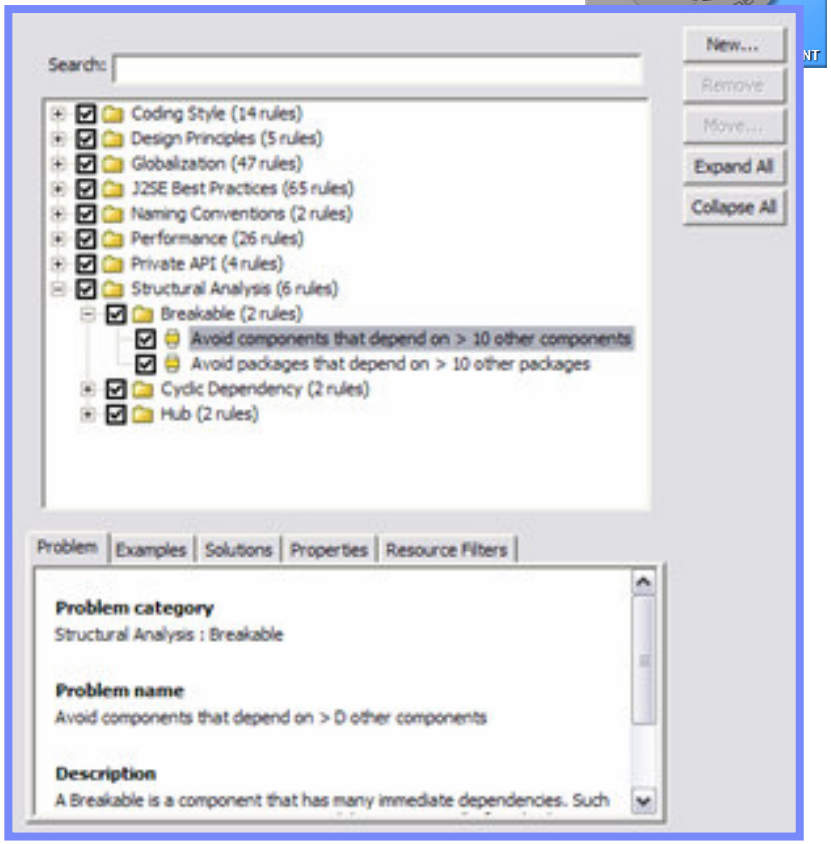
- J2C Java Bean Wizard
  - main wizard for generation of EIS specific java bean
- CICS/IMS Data Binding Wizard
  - create reusable data types for input or output into EIS transactions
- Deployable Code Creation Wizard
  - Session EJB – via ejb doclet tag
  - Web Services
  - JSP
- Add Method Snippet
- Code Assist Support
  - modification of generated Java code
  - create command beans
- Samples and Tutorials for CICS and IMS

Ensure code quality early in the lifecycle

- Automated Code Review
  - Analyzes code against provided and custom rules
  - Flags violations and offers Quick Fixes
- Component Test Automation
  - Automates test case creation and execution for Java, EJB and Web Services components
- Runtime Analysis and Profiling
  - Analyzes both remote and local code
  - Provides memory leak detection, performance profiling, thread and code coverage analysis, and call graph visualization
- Unit test and debugging for WAS, WebSphere Portal, and Tomcat and BEA WebLogic

Customer Benefits:

- Improve code quality
- Encourage use of best practices
- Increase performance/reliability
- Shorten testing cycle



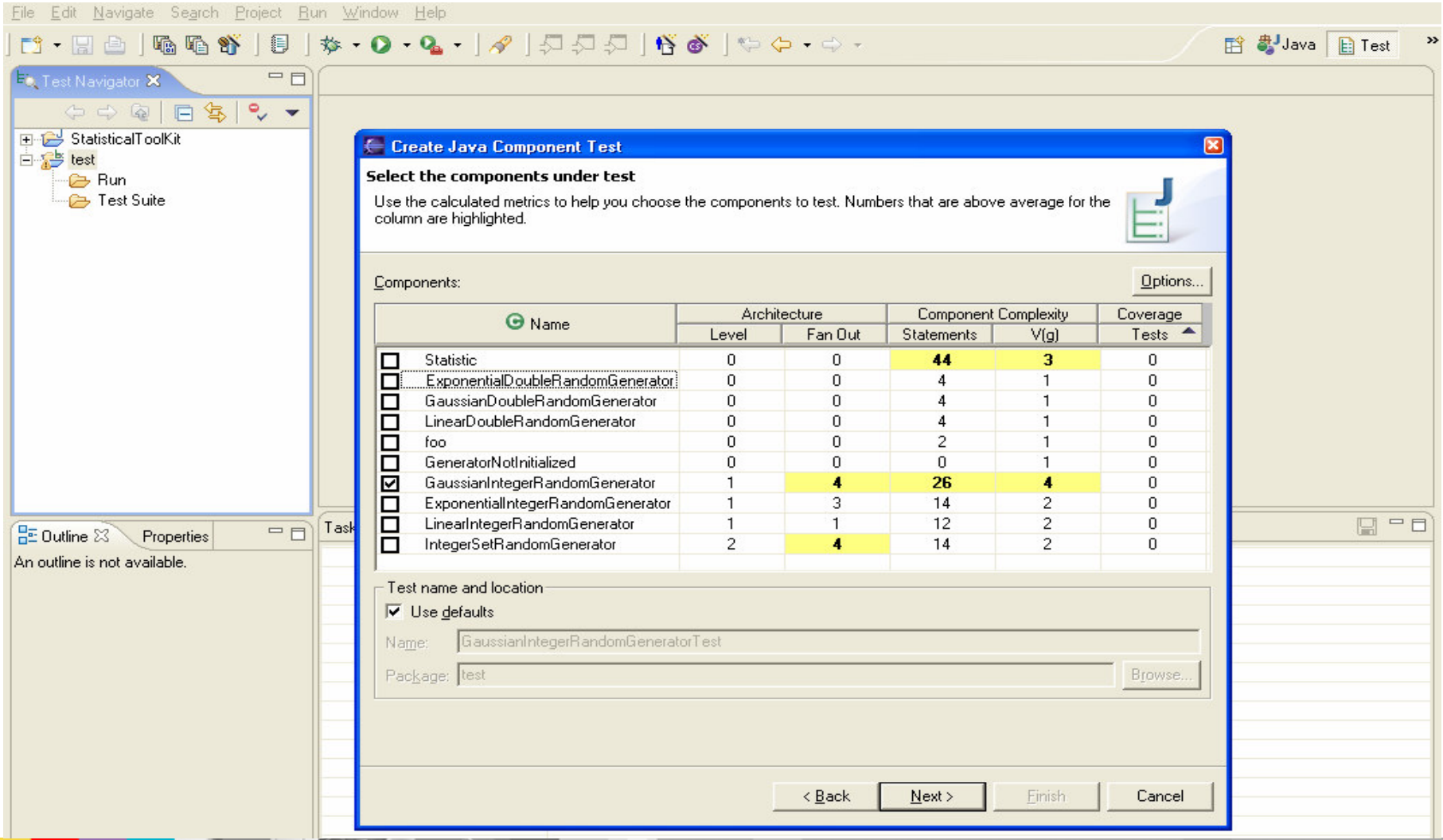
Automated Code Review

IBM Rational Application Developer for WebSphere Software

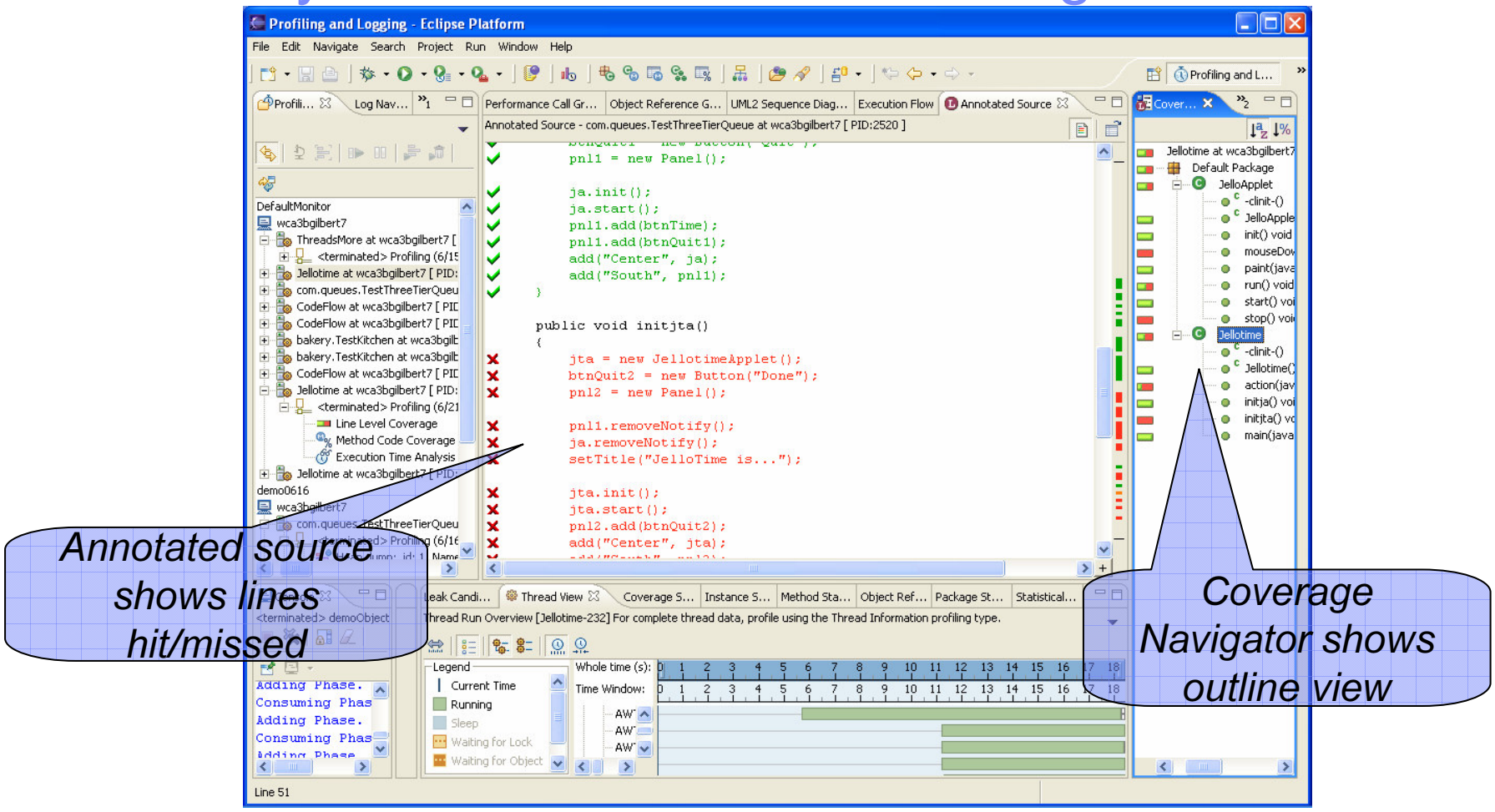
Component Test Automation Overview

- Java class, EJB and Web Services (incl. .Net) components testing
  - Based on the JUnit framework
- Provide testing guidance
  - What to test first based on static metrics
- Automated test case generation
  - Based on test patterns
- Data driven testing
- Automated regression testing
- Integrated with Code Coverage
- Change management support through integration with ClearCase & ClearQuest

Code Quality Assurance: Component Test Automation

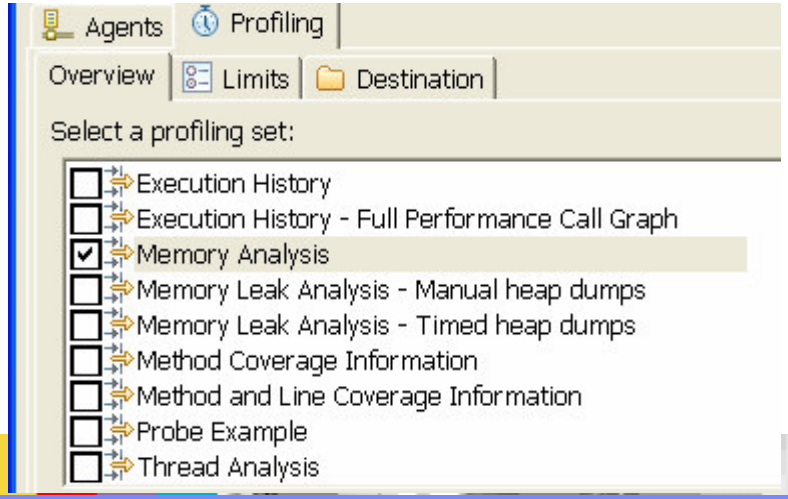


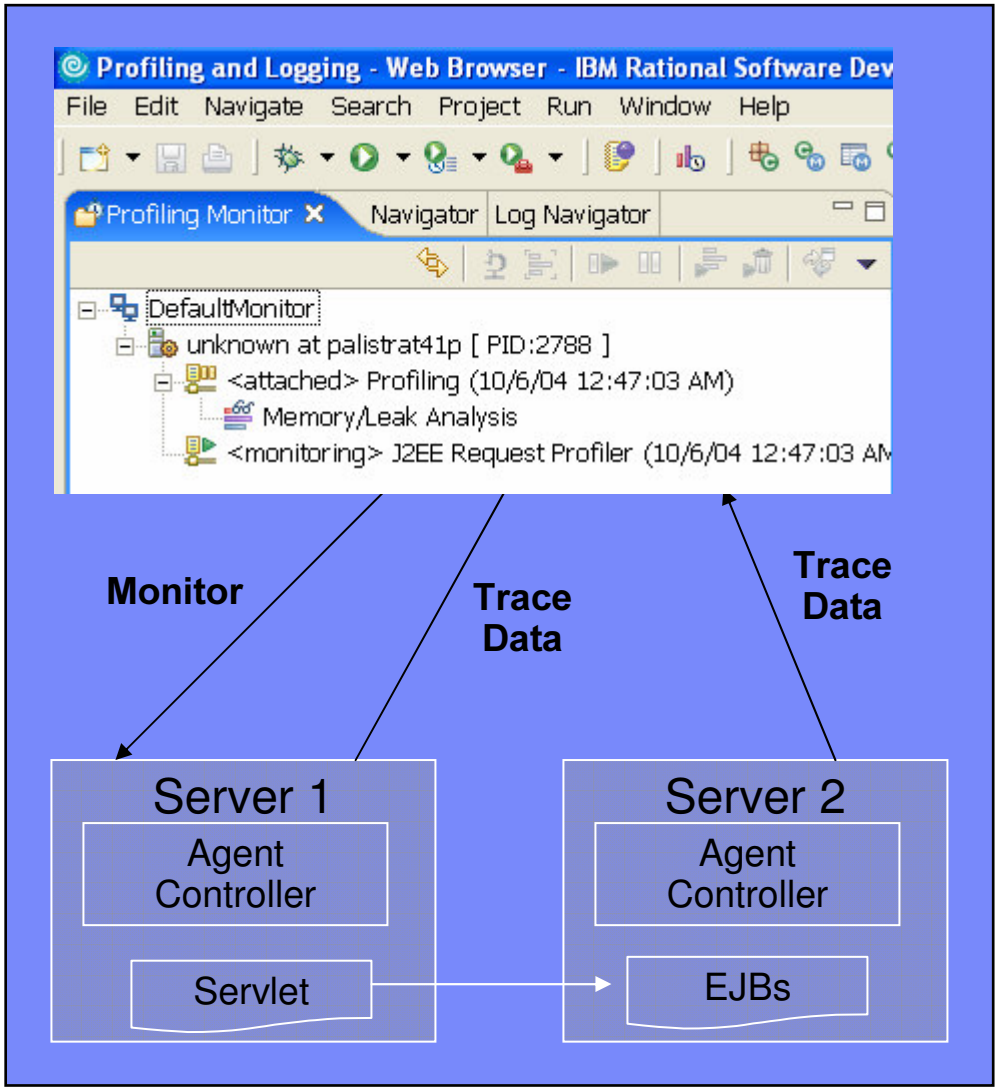
Code Quality Assurance: Code Coverage



Code Quality Assurance: Runtime Analysis

- Built-in tools helps developer isolate and fix performance problems
- Advanced sequence diagrams
  - Performance CallGraph
  - Line Level Code Coverage
  - Advanced Memory Leak Analysis
  - Dynamic User Defined Probes
  - Thread Analysis
- Profiling tools can seamlessly trace across multiple servers





Agenda

- Service Oriented Architecture Lifecycle
- Software Development disciplines
  - Requirements Management
  - Design and Construction
- **Problem Determination Tools**

When a problem occurs, what do you do?

- Priority #1: Recover
  - Get systems back up and running
- Priority #2: Figure out what happened
  - Locate the root cause

The impact can be extensive

Why am I having these database events? Everything seems ok.

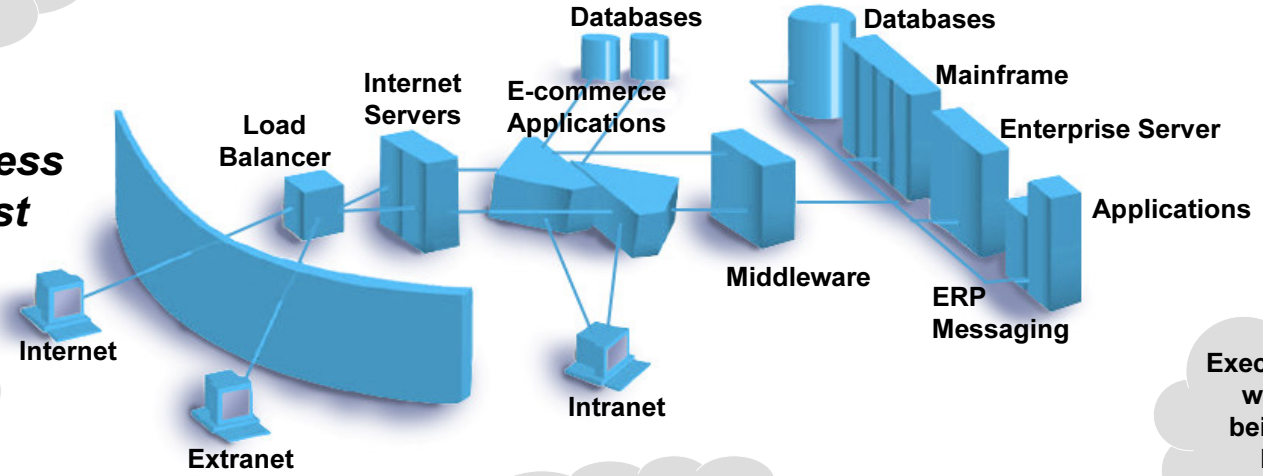
IT Operations

The database server is in trouble. I'll create an incident as soon as I can and work on it. I hope no one is affected.

DB Specialist

Why are these application transactions taking so long?

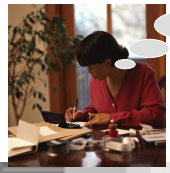
Business Analyst



So many calls, so many incidents. I don't know what to tell customers.

Help Desk

We are behind in order processing. Why?

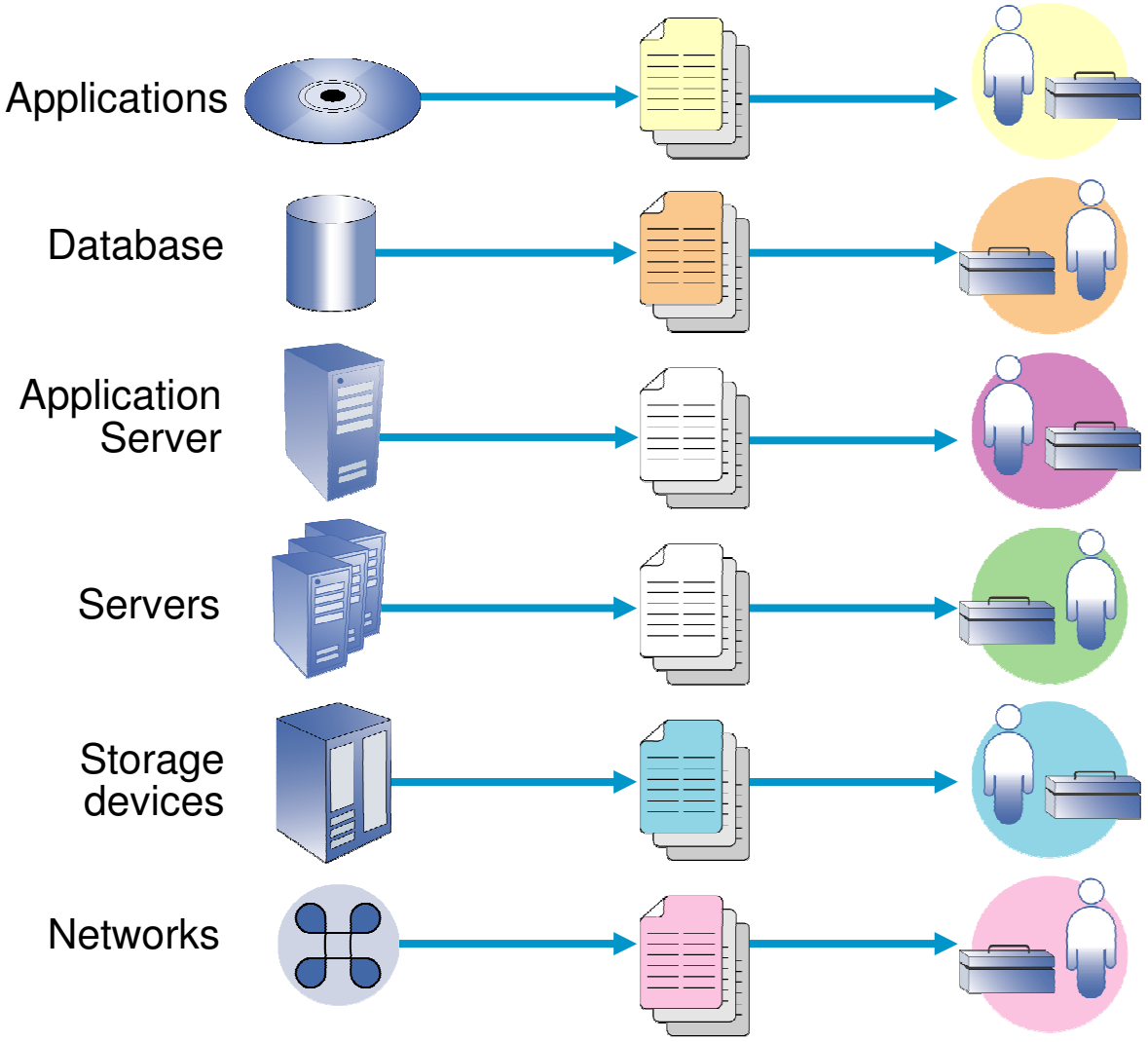


Business Executive

Executives are upset with orders not being processed. I need to tell them why.

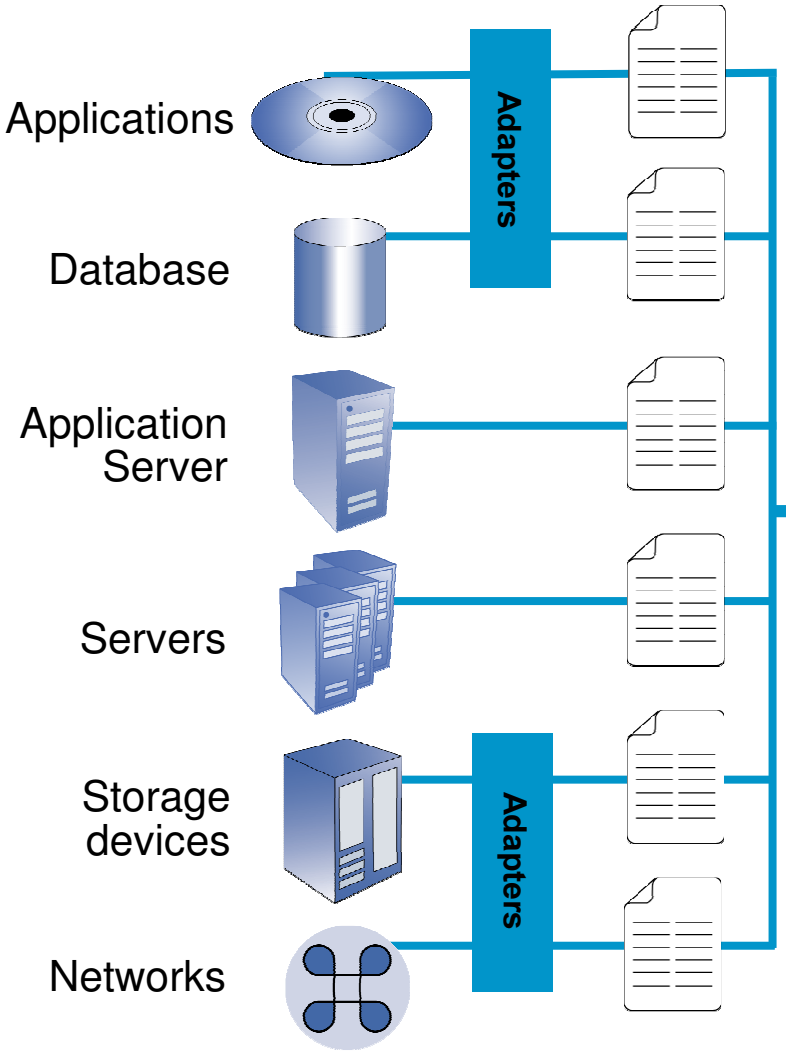
IT Manager

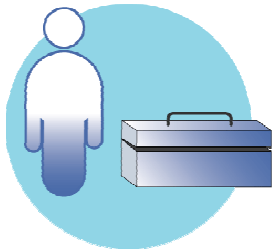
Log format today



- **Disparate pieces and parts**
- **Tools focused on individual products**
- **No common interfaces among tools**
- **No synergies in building tools OR in creating log entries**

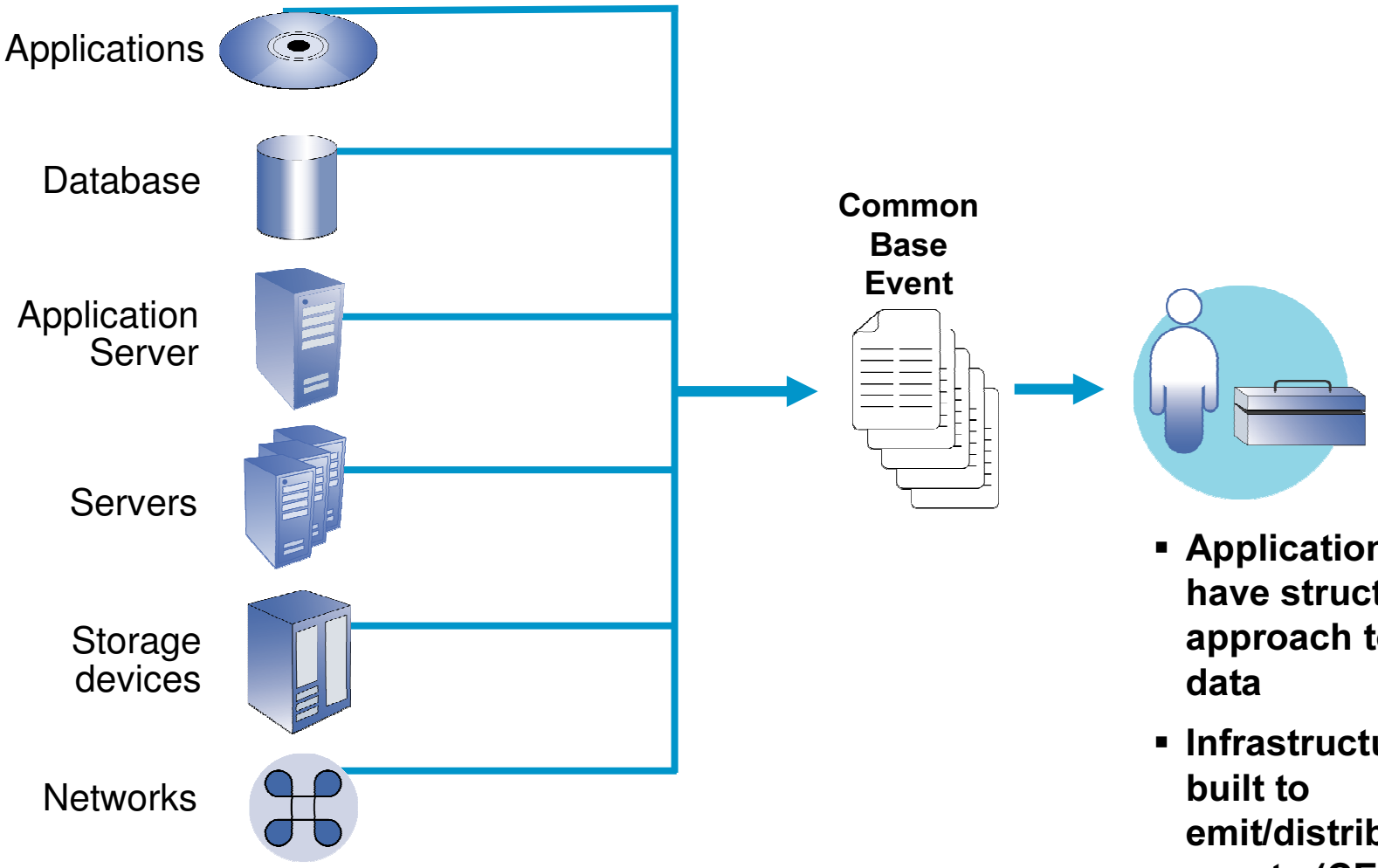
Log format tomorrow





- **Log adapters**
- **Common formats for log files**
- **Common set of tools**
- **Common interfaces among tools**

Log format in an ideal world

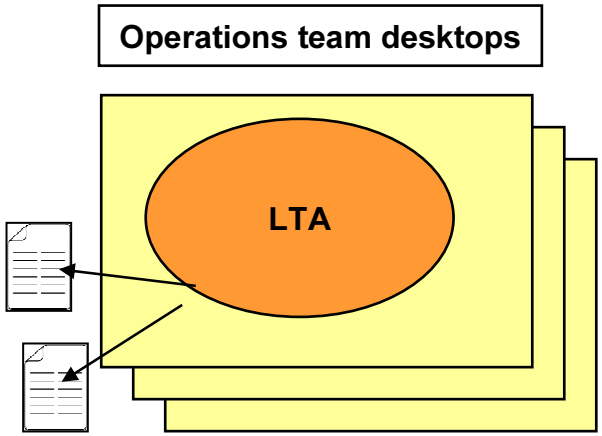


- **Application developers have structure approach to logging data**
- **Infrastructure can be built to emit/distribute/persist events (CEI)**

Phase 1: Log Adapters and Log and Trace Analyzer

- Normalization of native log data into single format (CBE)
- Single UI for viewing multiple log files
- Search/Filter capabilities across log files
- Remote import capabilities
- Complex correlation of multiple log files
- Reporting mechanism for central logging service (syslog, database)
- Filtering of large log data (time based filtering)

Local collection of log data only



LTA could run on a server with display exported to admin desktop

Local collection of log data only (pros/cons)

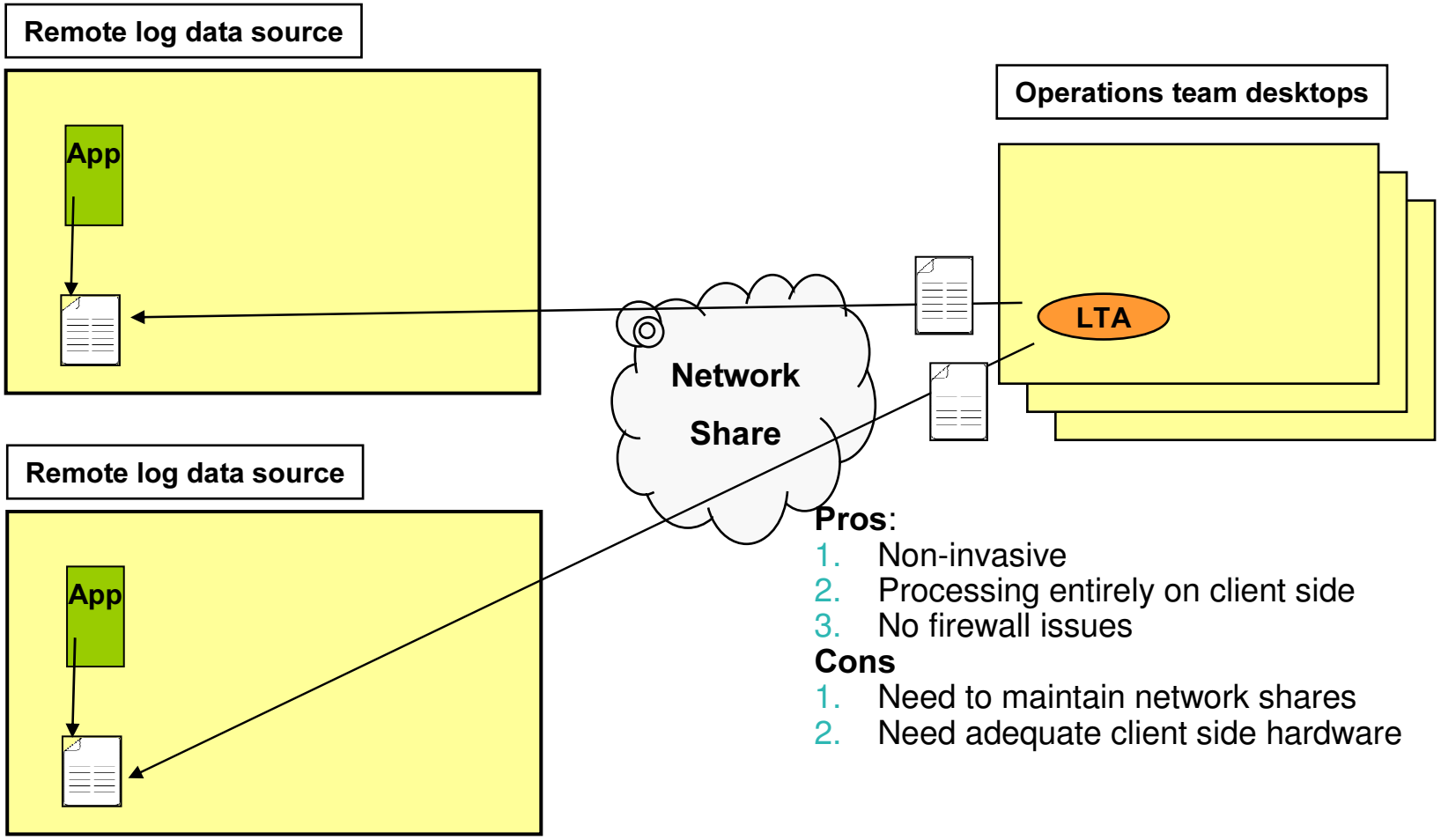
PROS

- Non-invasive solution
- Adds to current problem determination process
- Custom parsers added to only administrator's desktop
- Fast to deploy

CONS

- No integrated remote import capability
- Local files may be out-of-sync with actual log files
- Processing occurs exclusively on admin desktop

Remote collection of log data using network shares



Pros:

1. Non-invasive
2. Processing entirely on client side
3. No firewall issues

Cons

1. Need to maintain network shares
2. Need adequate client side hardware

Remote collection of log data using network shares

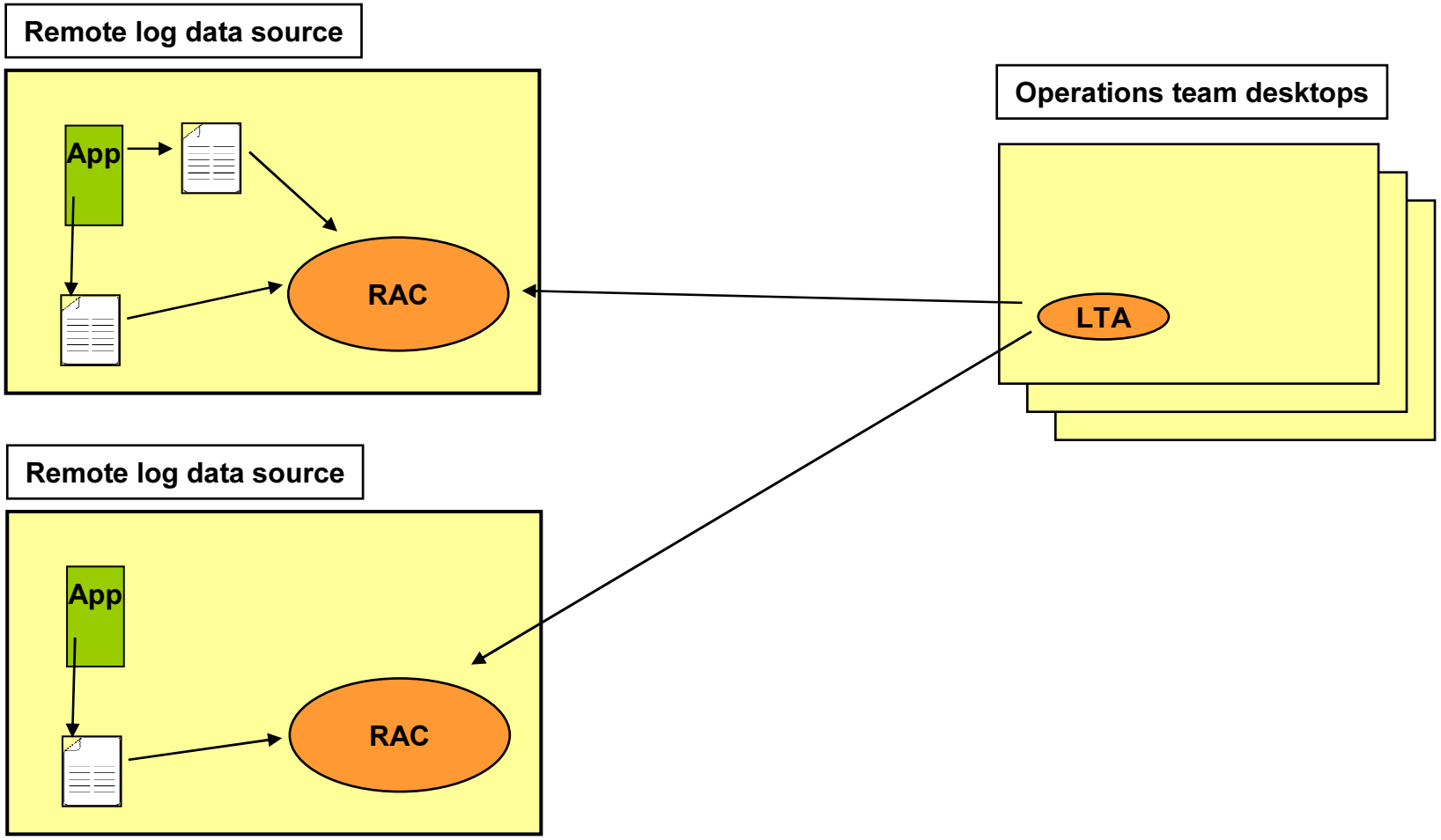
PROS

- Non-invasive solution
- Access to current log data
- Custom adapters added to admin desktop only
- Log data not copied to admin desktop
- No firewall issues beyond network share capabilities

CONS

- No integrated remote import capability
- Processing occurs exclusively on admin desktop
- Overhead of maintaining network shares
- Security concerns

Remote collection of log data using RAC



Remote collection of log data using RAC

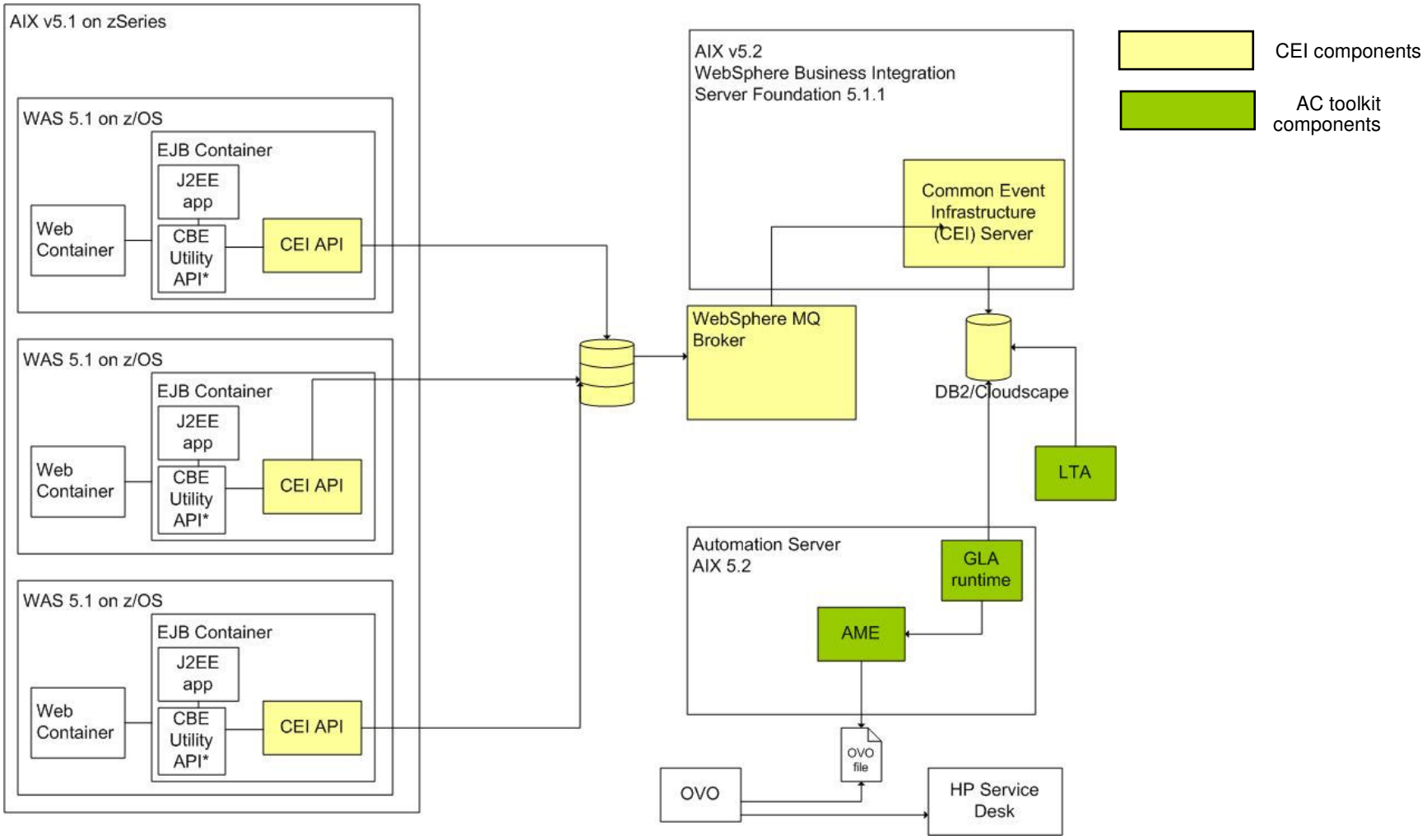
PROS

- Integrated tooling for remote file access
- Access to current log data
- Distributed processing (conversion on remote machines)
- One RAC can access multiple log files

CONS

- RAC needs to be installed on all remote machines
- RAC needs to be installed as root/administrator
- Firewall issues (LTA/RAC comm uses non-standard ports)
- Increased CPU utilization of production servers
- Custom parsers added to client and remote machines

Phase 2: Using CEI



Using the Common Event Infrastructure

- Current available infrastructure for customers who are building an enterprise logging service, or are writing new applications.
- CEI provides a mechanism to create, populate, distribute and persist Common Base Events.
- Currently ships under WebSphere Business Integration Server Foundation 5.1.1
- J2EE as well as J2SE emitters are available (compatible with WAS 5.1.x)
- Reliable messaging from emitters to CEI server using MQ (supports embedded MQ as well as external JMS providers)
- Event repository could be Cloudscape or DB2

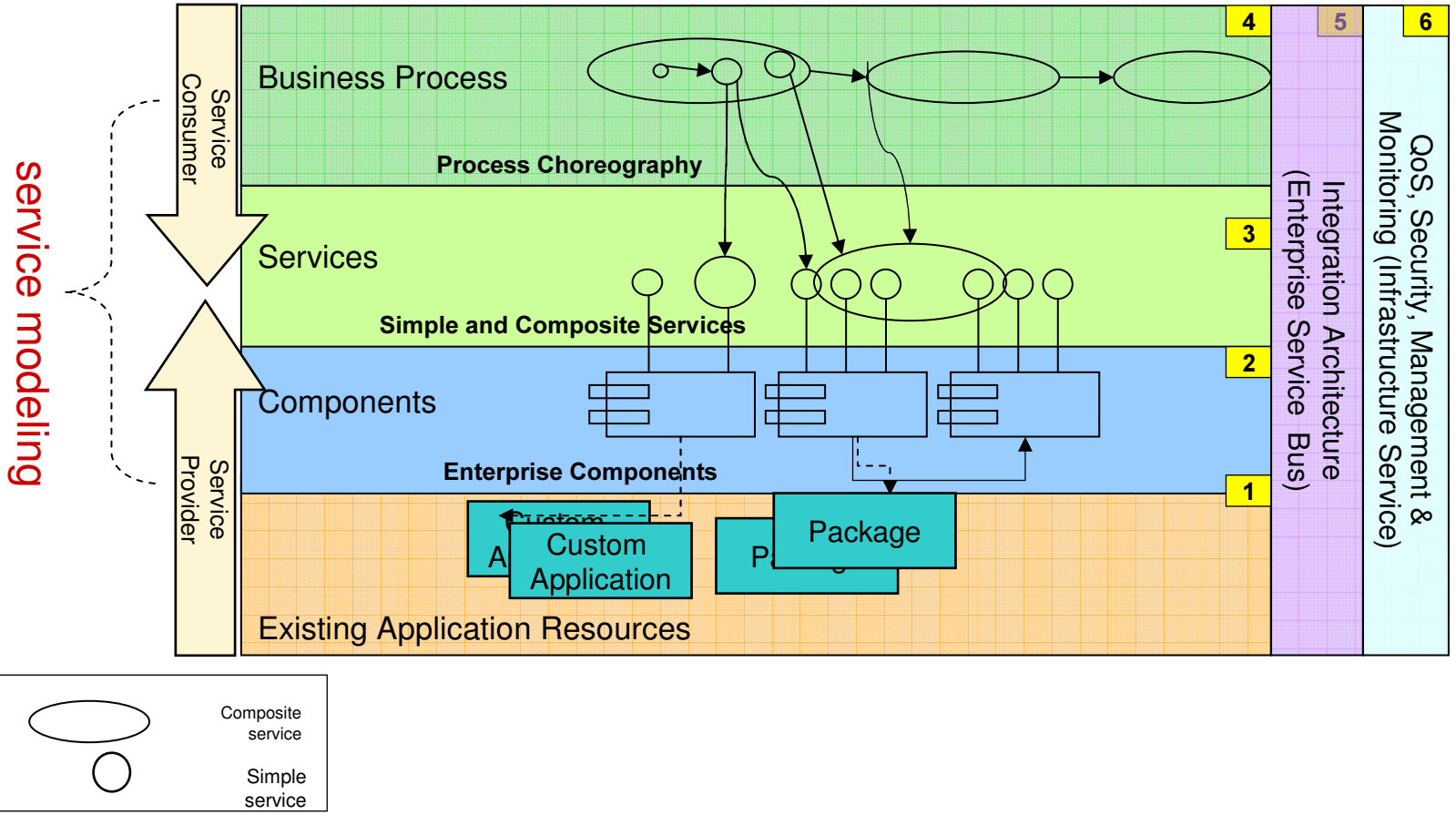
Reference

- Download the Autonomic Computing Toolkit components
  - www.ibm.com/developerworks/autonomic
- Search www.ibm.com/developerworks for articles on GLA, LTA, AME

BACKUP SLIDES

Service Oriented Architecture is based on "components", "services" and "processes"

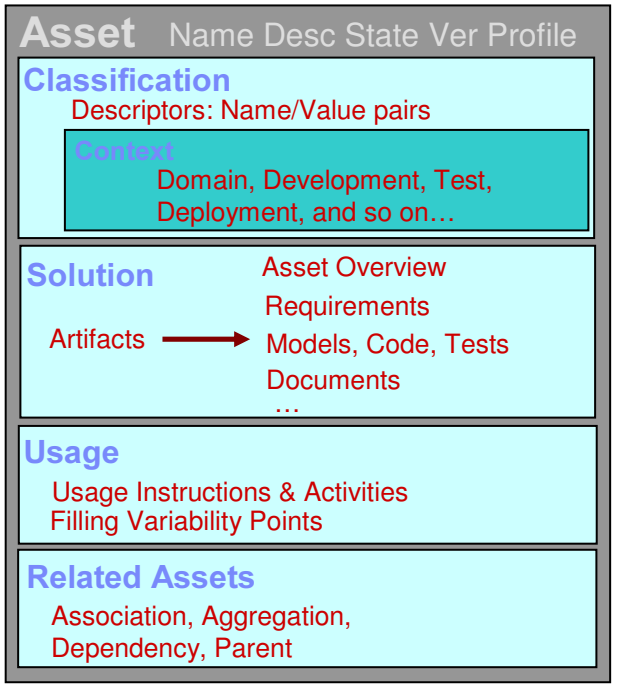
An SOA is composed of multiple layers. At the heart of the SOA is the Service Model that defines Services and Components that realize them



Reusable Asset Specification (RAS)

- A standard way to package assets
- Describes the structure and nature of asset meta data
- Reduces the friction on reuse transactions
  - Thru standard, consistent packaging

- Each asset is described using these sections
  - Classification
  - Solution
  - Usage
  - Related Assets



Adopted as OMG standard in 2004