Challenges and Solutions for Developing Composite Applications on the Java™ EE Platform

Dr. Malte Kaufmann
malte.christian.kaufmann@sap.com

SAP AG

Volker Stiehl
volker.stiehl@sap.com
SAP AG

TS-0725

Goal

Learn how frameworks built on Java™ Platform, Enterprise Edition (Java EE) technology provide a methodology and toolset to efficiently develop and manage composite applications

Agenda

Composite Applications—Motivation

Composite Applications—Anatomy and Challenges

Composite Applications—Framework-based Solution

Summary

Demo

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Composite Applications—Framework-based Solution

Summary

Demo

Do You Remember…?

- Java technology on the server
- Servlets/JavaServer Pages™ technology for dynamic web pages
  - …integrating databases
  - …integrating Java technology-enabled 3rd-party systems
- UI frameworks (Struts)
- Enterprise JavaBeans™ (EJB™) technology
- Lightweight Frameworks (Spring)

✂→ Seeking for ease of development and increased productivity to reduce time-to-market

Why Composite Applications (CAs)?

- Expand reach to collaborative processes which are often paper or Excel-based and preceding or parallel to processes covered in backend systems

Business Need

- Many users work based on paper, Excel, or mail
- Volatile processes which are not tracked (not measurable)
- Processes inside current systems are not flexible enough
- Implement new processes without upgrading the existing ones

Approach

- Build Packaged Composite Applications covering these spaces
- Use SOA for integrating with backends
- Use modeling to offer the flexibility needed

End-User Requirements to CAs

- Provides end-user with a seamless intelligent experience irrespective of functional, data, and system boundaries
  - Provides a single user experience
  - Provides an intelligent user experience
  - Breaks functional and system boundaries—“No Boundaries”
  - Views the enterprise as a whole as opposed to its separate parts
  - Forces enterprise-wide system/human collaboration
  - Largely assembles a solution from existing multi-source content
  - Adaptable by business analysts

Technical Definition of CAs

Definition

An application making use of data and functions provided as services by underlying applications and combining these into user-centric processes and views, supported by its own business logic and specific user interfaces.

Synonym: Composite

End-user requirements translate into technical definition and characteristics of Composite Applications

Technical Characteristics

- Own lifecycle
- Loosely coupled with backend systems
- Backend integration via stateless service calls
- Backend independency (recommended)
- Easy to adopt/enhance for customers
- Model-driven architecture

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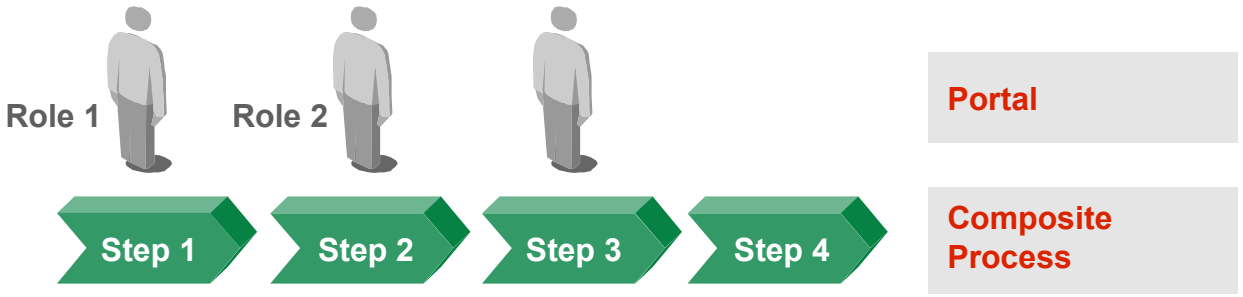
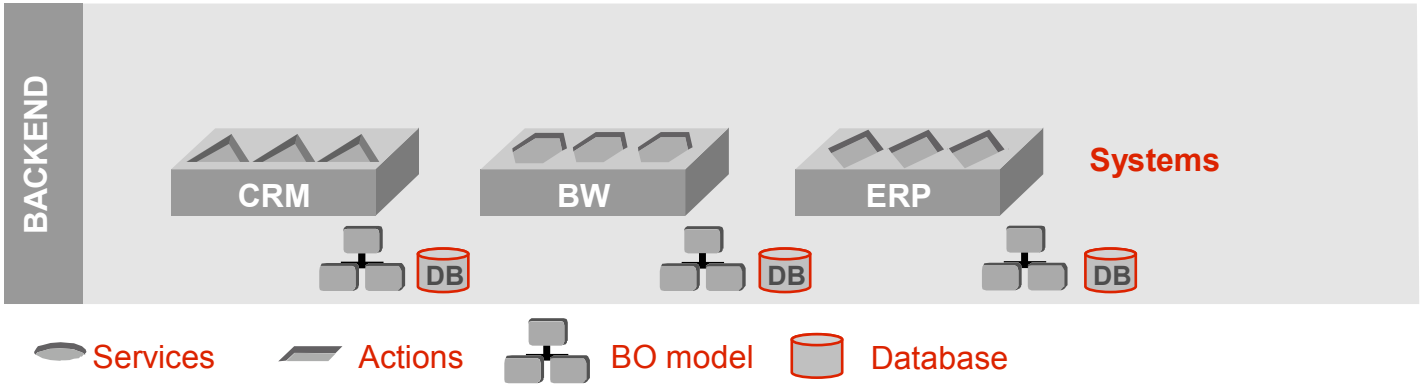
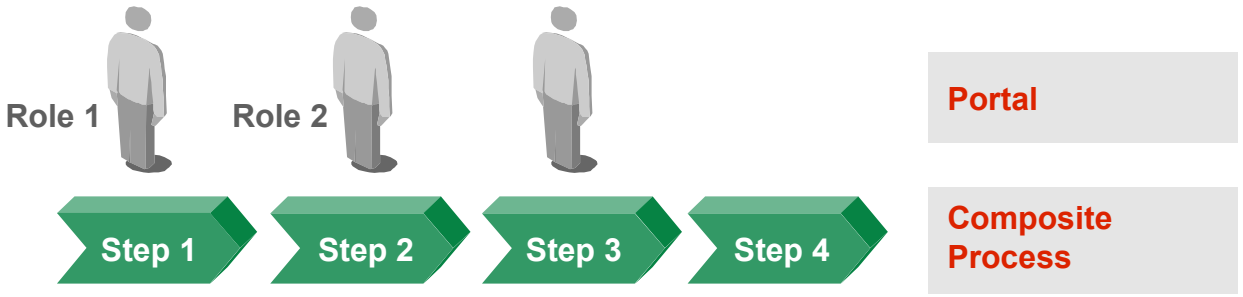
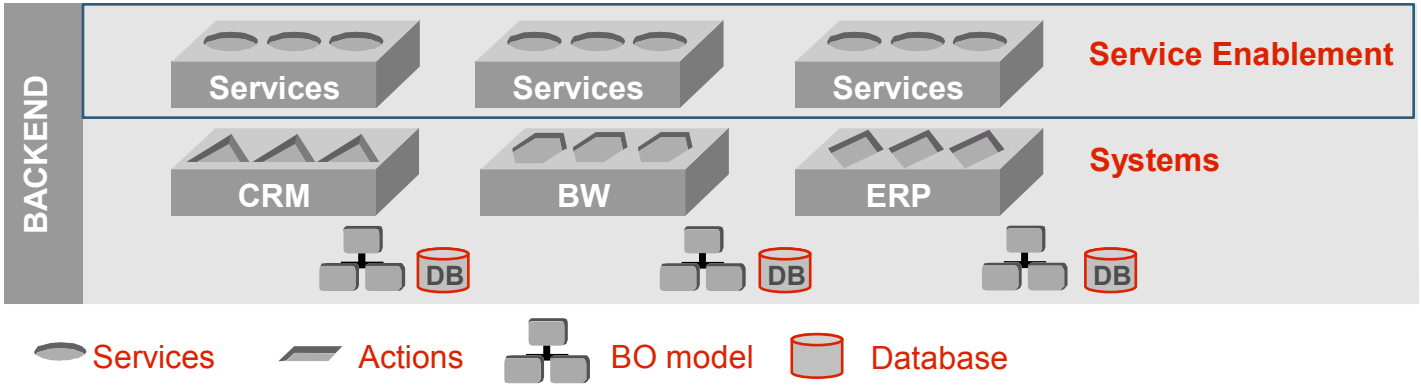


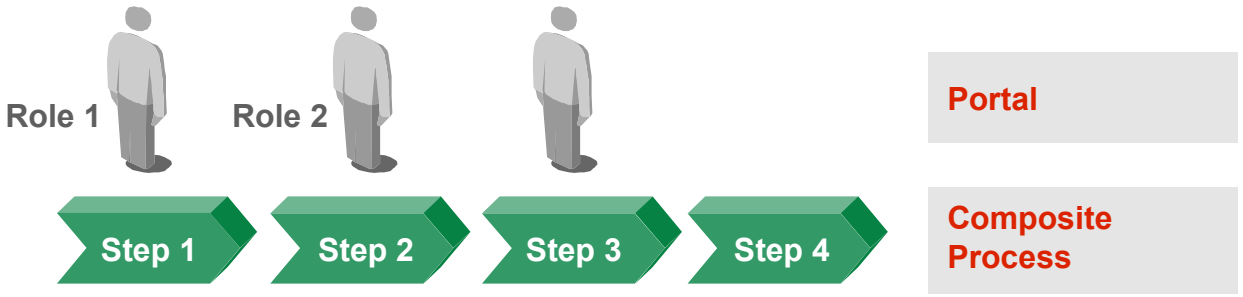
We start by thinking about a new user-centric process re-using functionality of existing systems



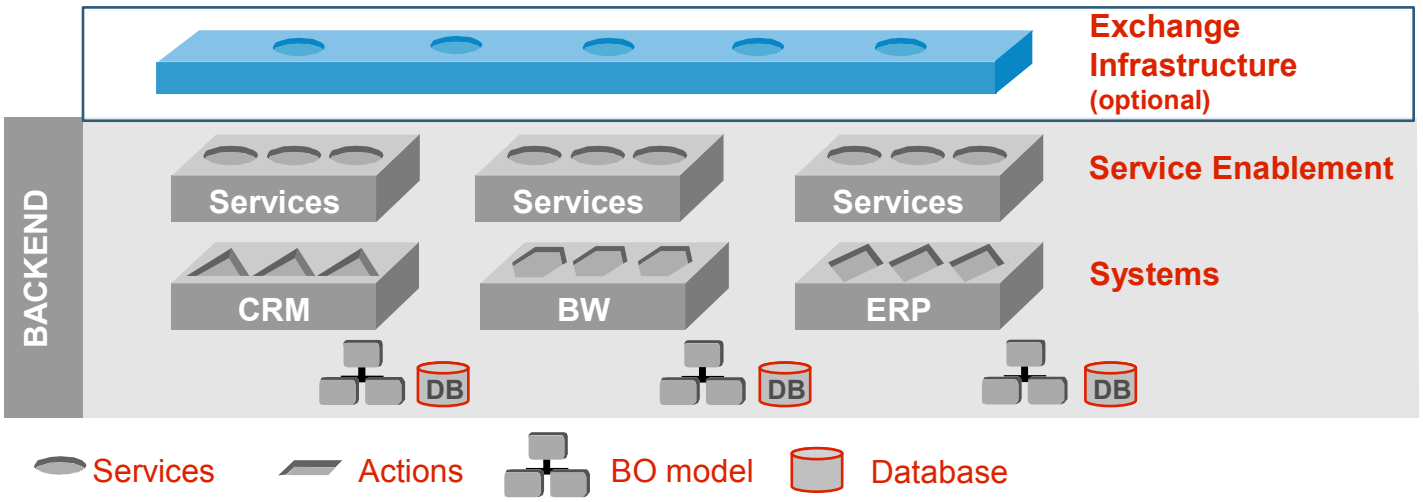


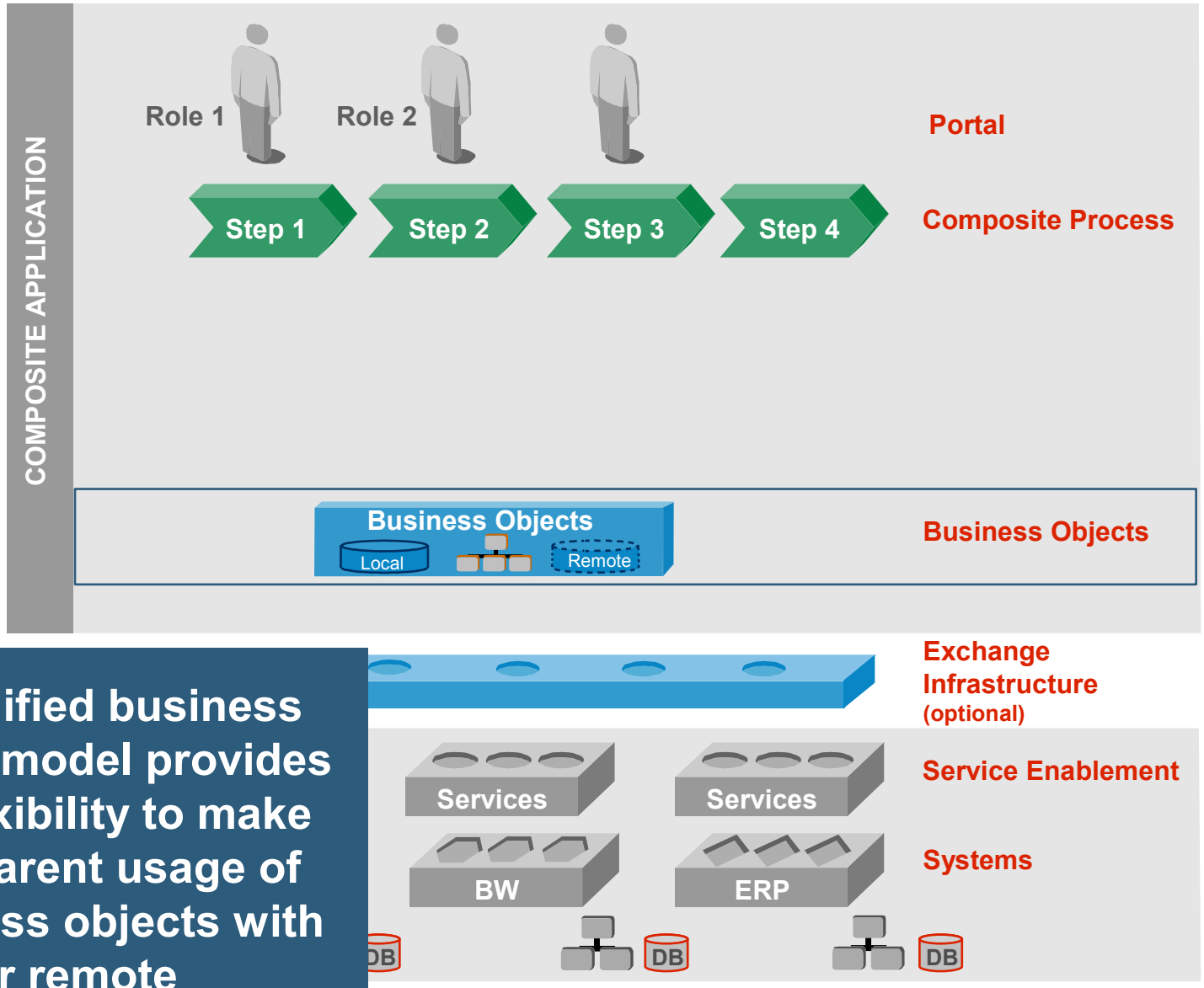
The systems have to be "service enabled" to provide their functionality in an unified way



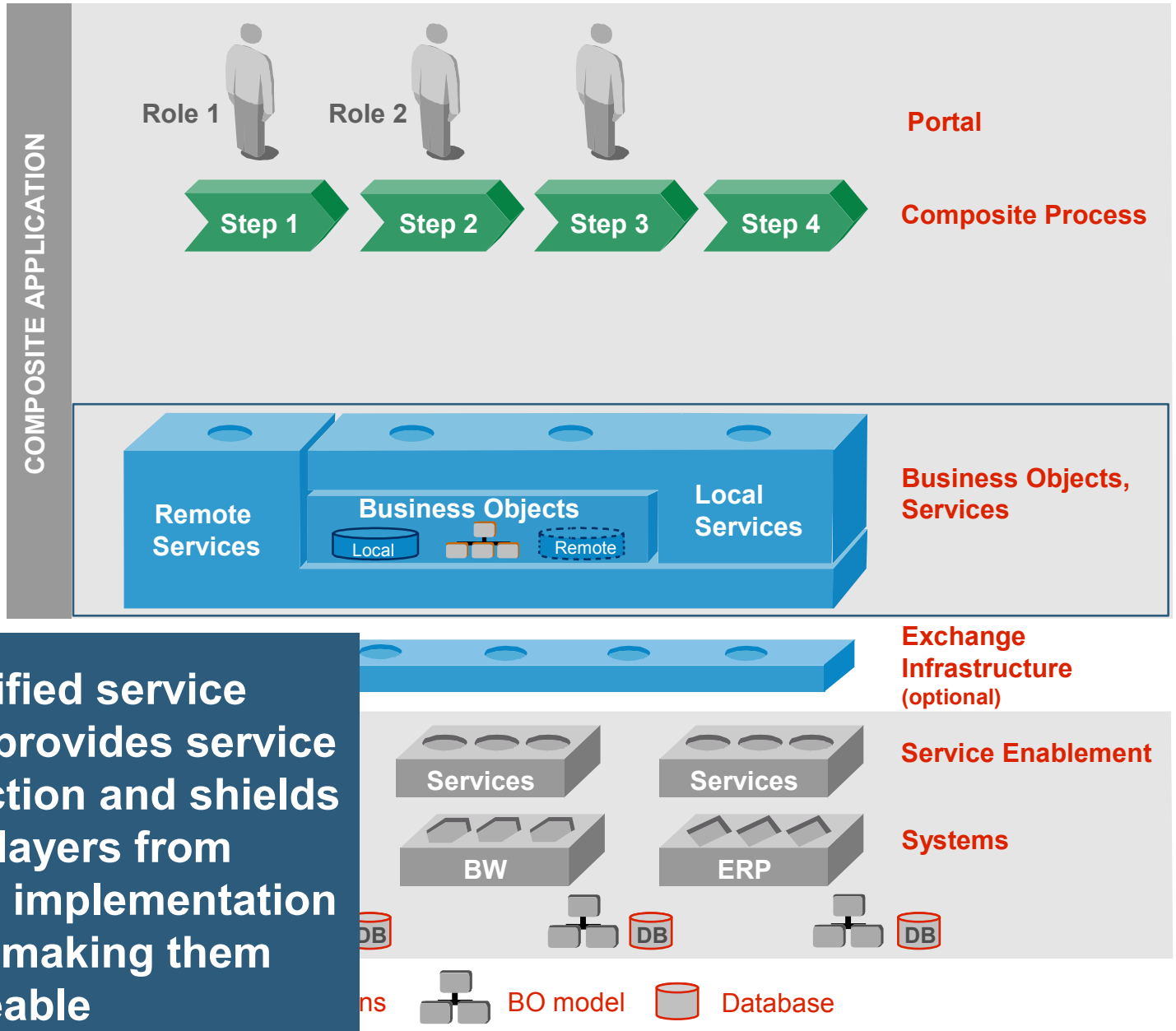


The "exchange infrastructure" acts as the messaging middleware for service communication, connectivity, transformation, and portability

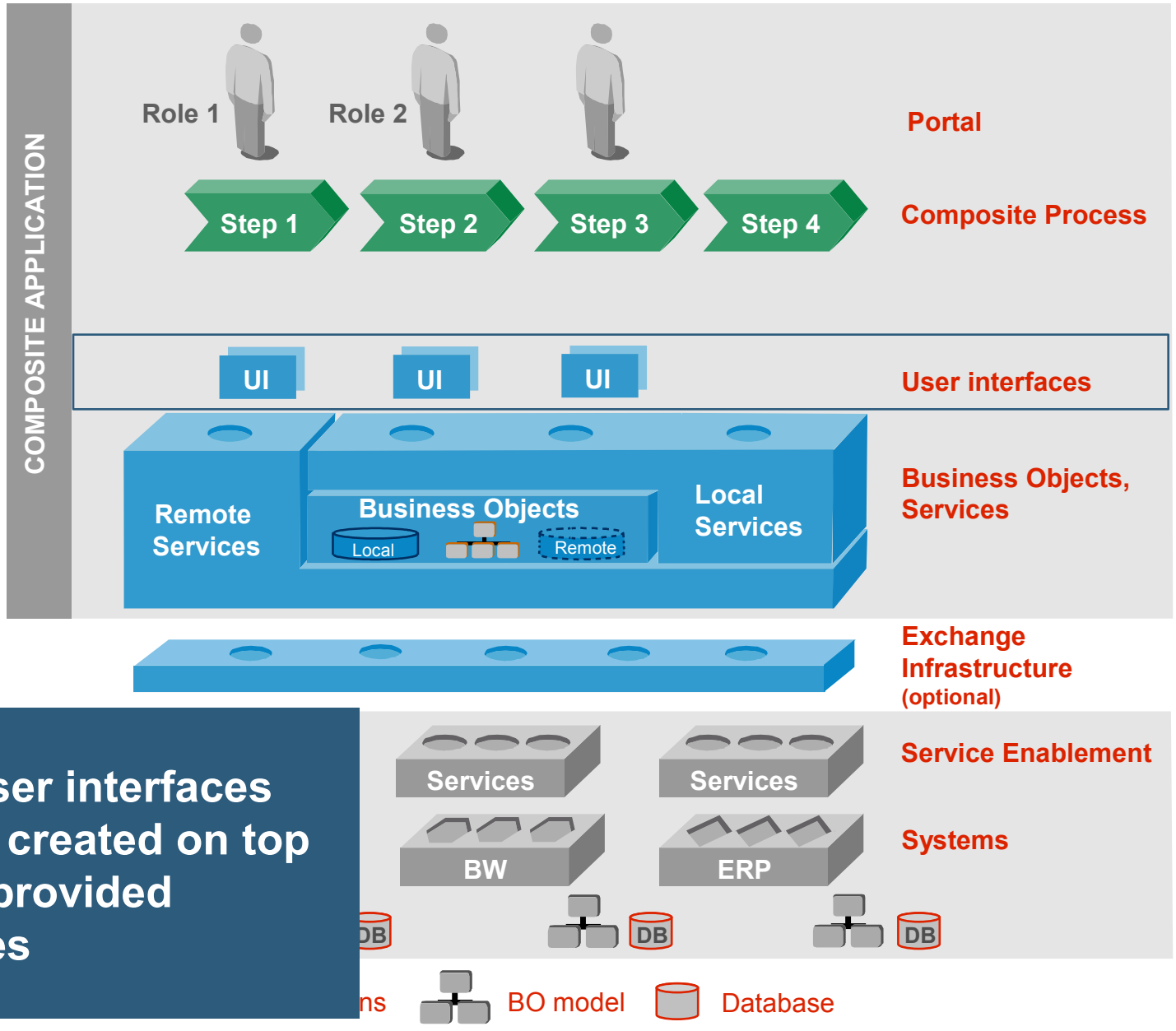




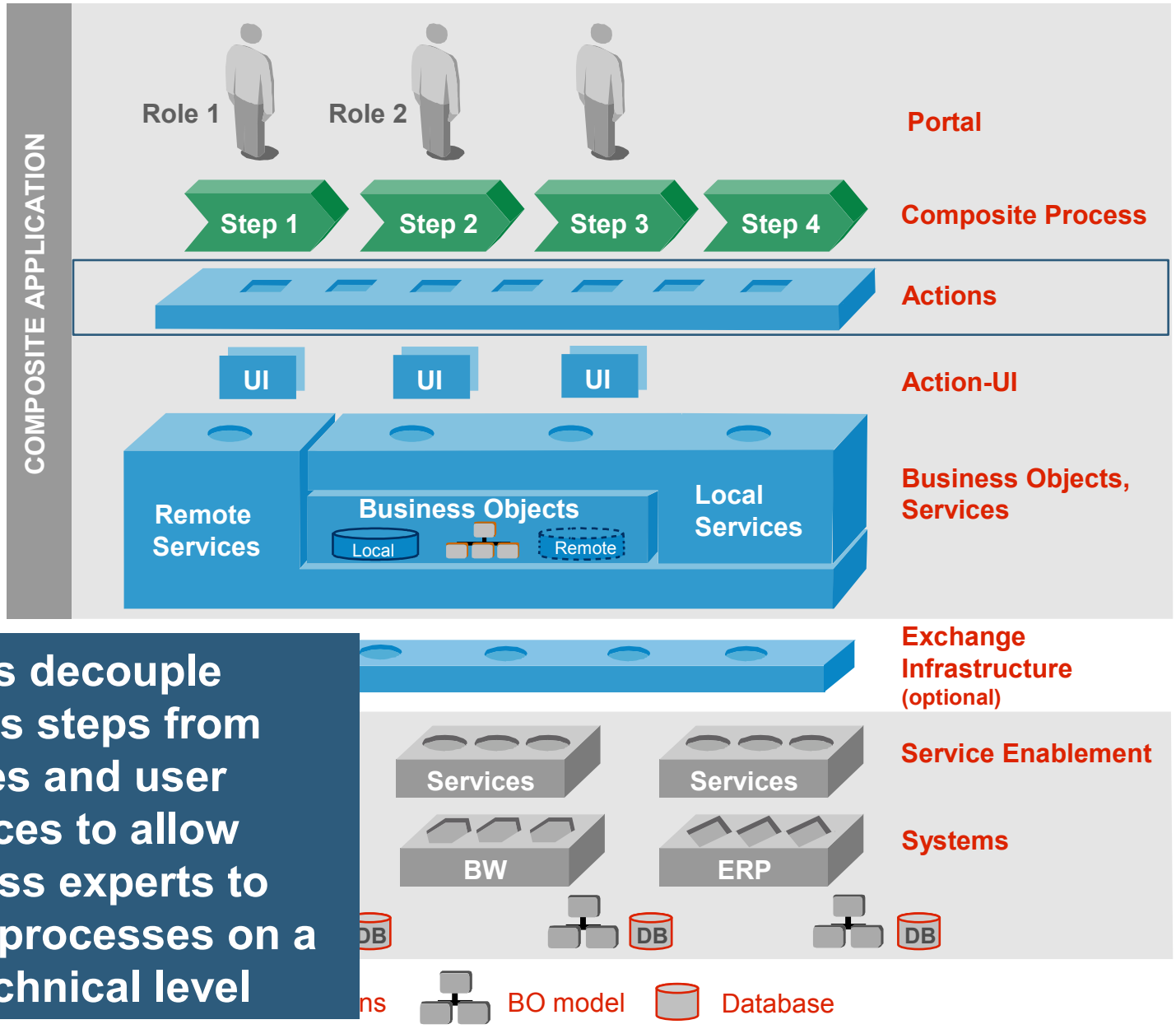
The unified business object model provides the flexibility to make transparent usage of business objects with local or remote persistency



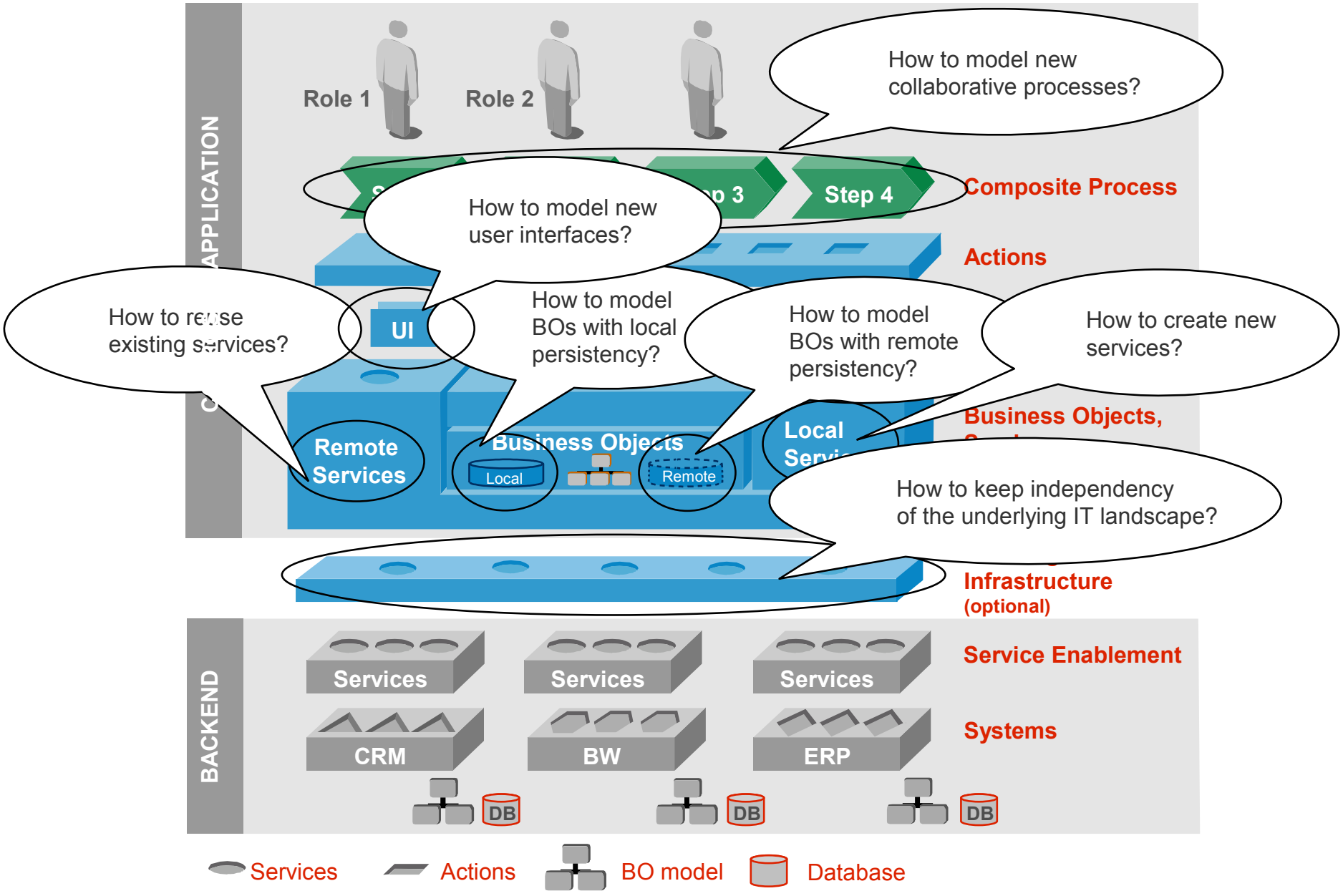
The unified service model provides service abstraction and shields higher layers from service implementation details making them replaceable

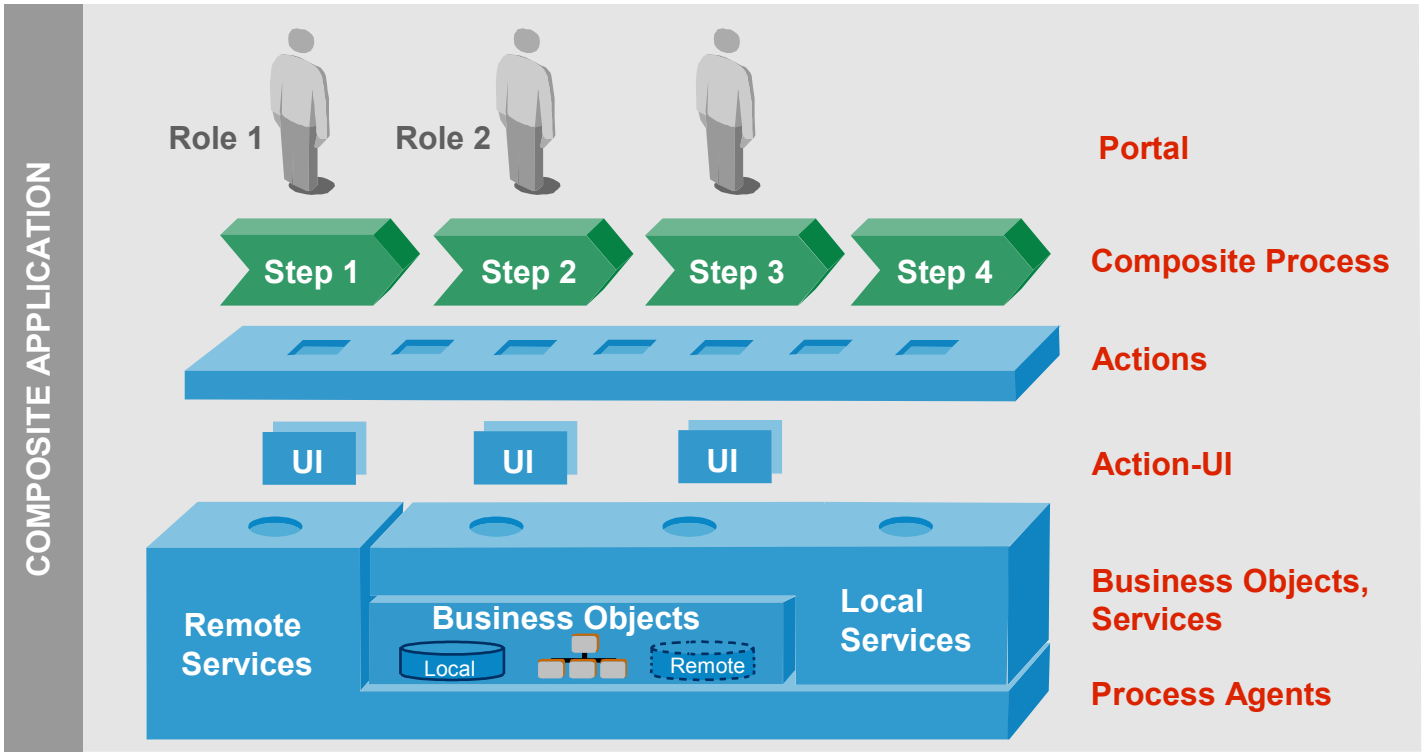


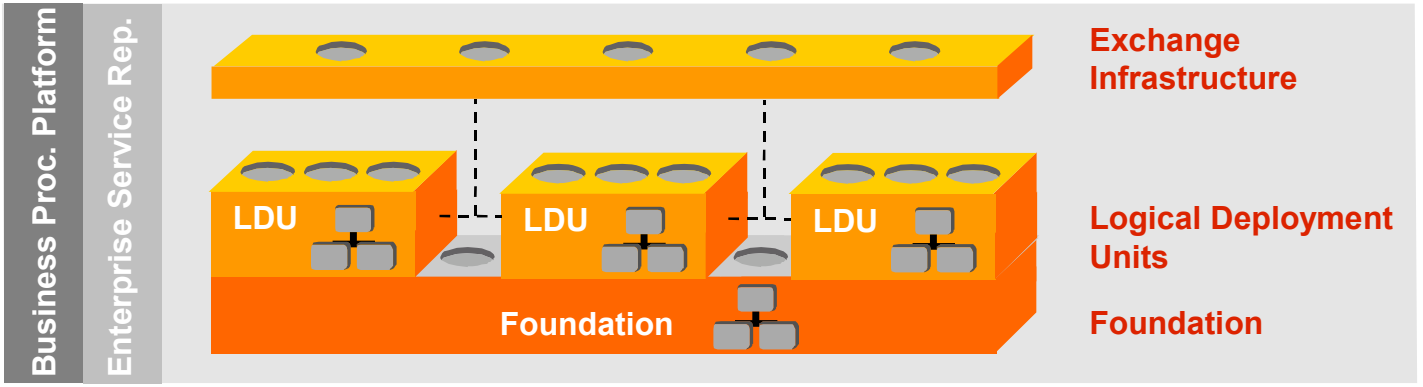
New user interfaces can be created on top of the provided services



Actions decouple process steps from services and user interfaces to allow business experts to model processes on a non-technical level


APPLICATION
Role 1
Role 2
How to model new collaborative processes?
Step 4
Composite Process
How to model new user interfaces?
Actions
How to reuse existing services?
UI
How to model BOs with local persistency?
How to model BOs with remote persistency?
How to create new services?
Remote Services
Business Objects
Local
Remote
Local Servi
Business Objects,
How to keep independency of the underlying IT landscape?
Infrastructure
(optional)
BACKEND
Services
Services
Services
Service Enablement
CRM
BW
ERP
Systems
DB
DB
DB
Services
Actions
BO model
Database





Services Actions BO model Database

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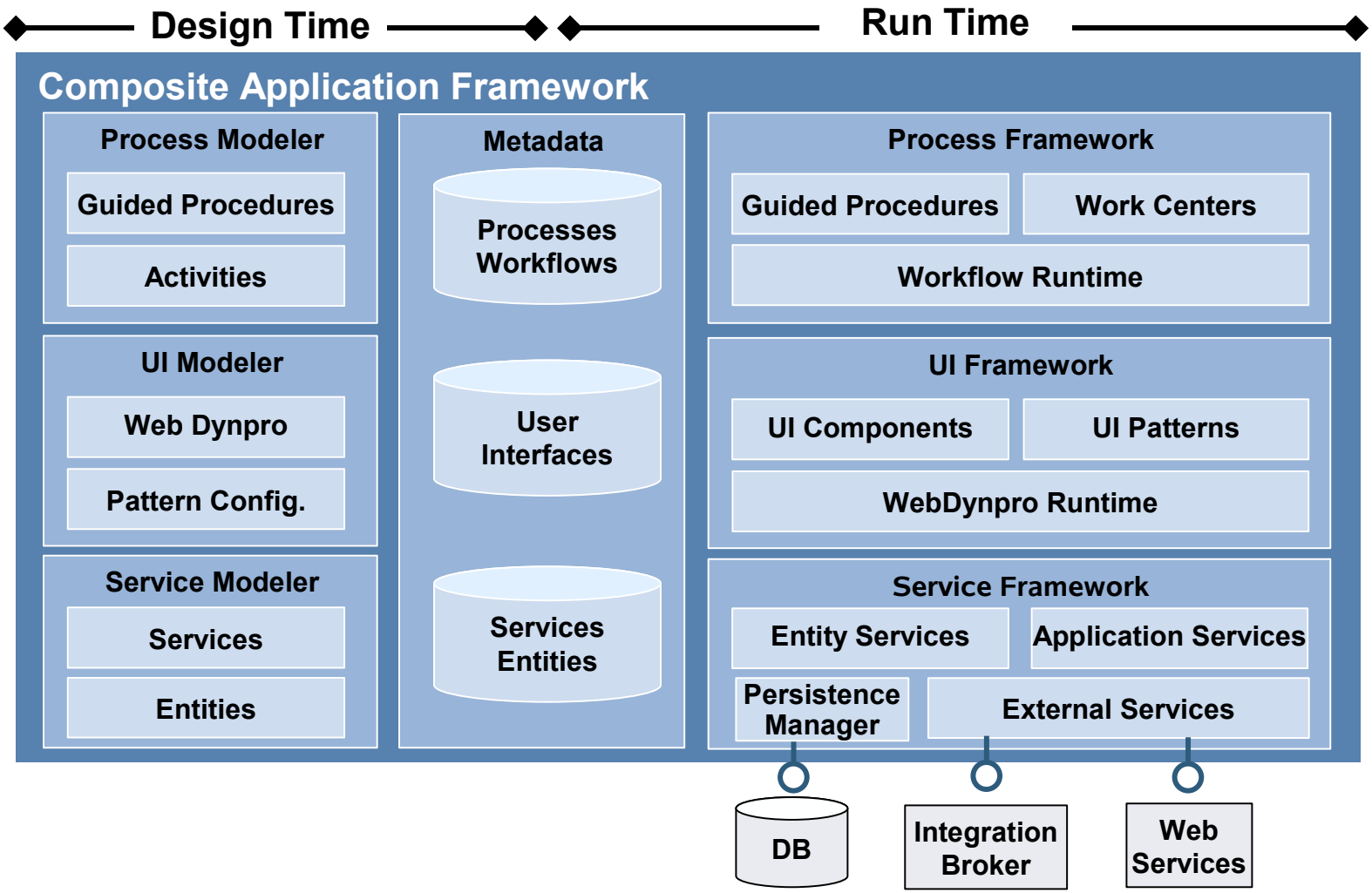
Java EE Platform-Based Solution

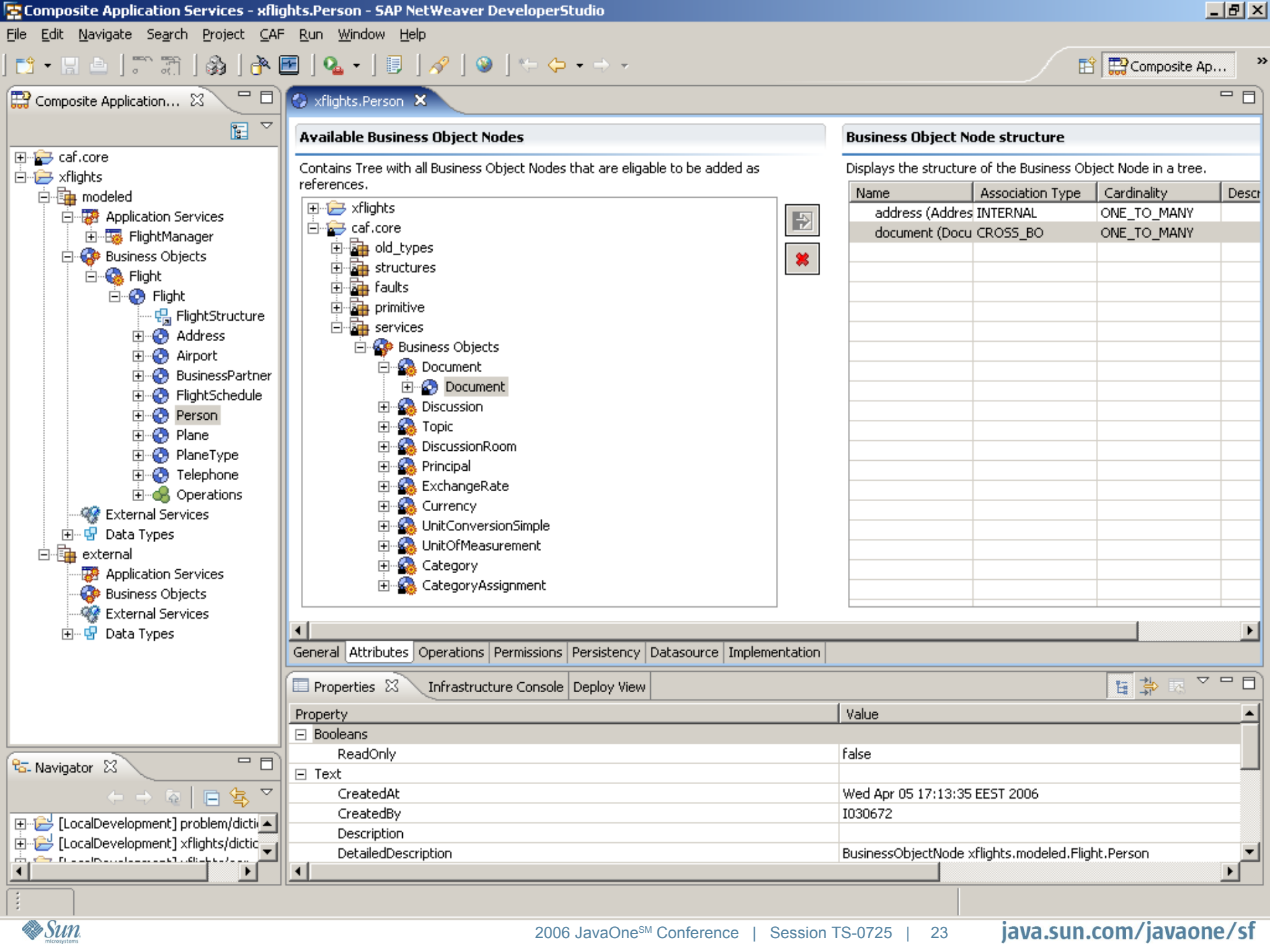


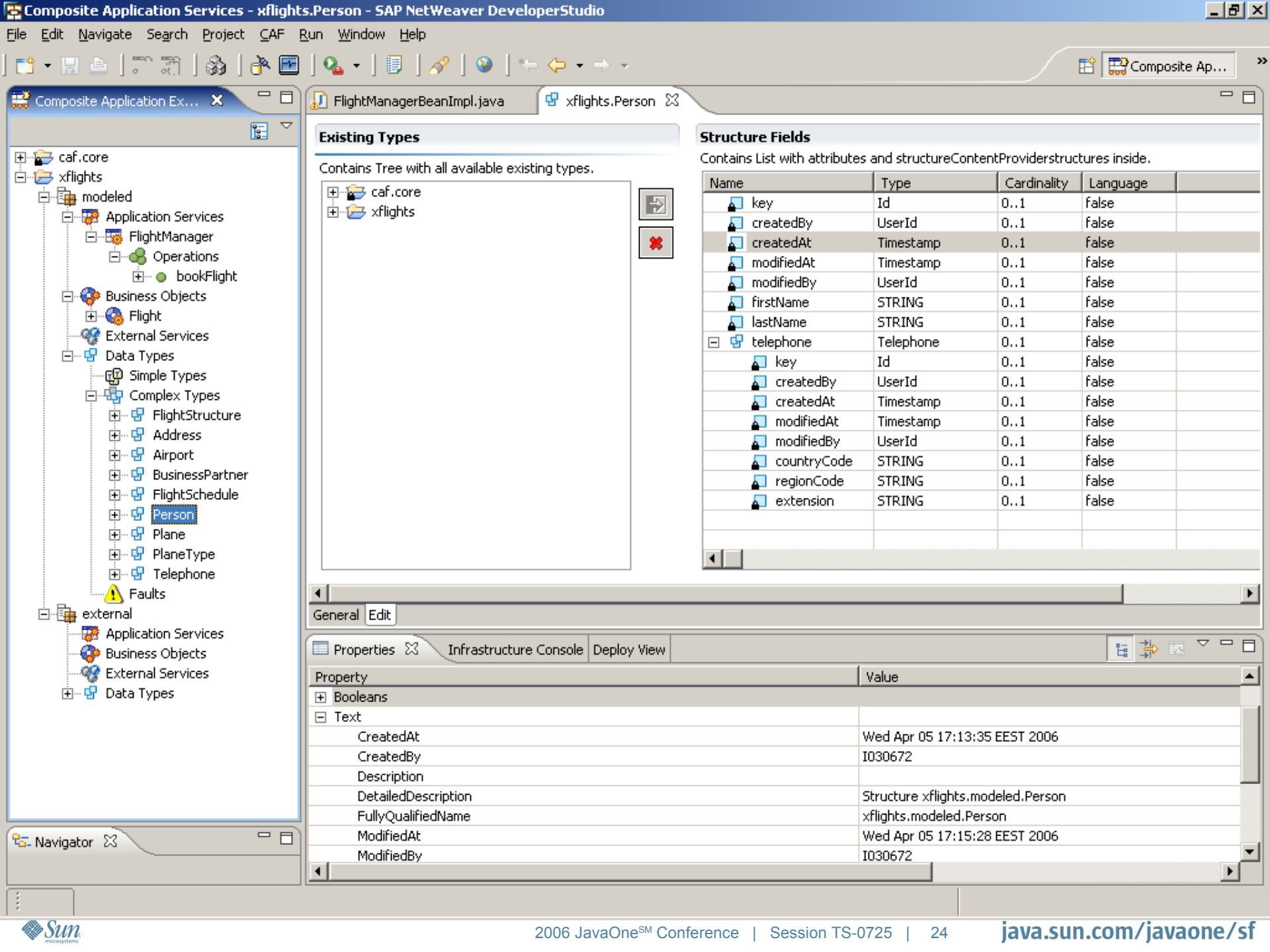
How to Build CAs From Now On?

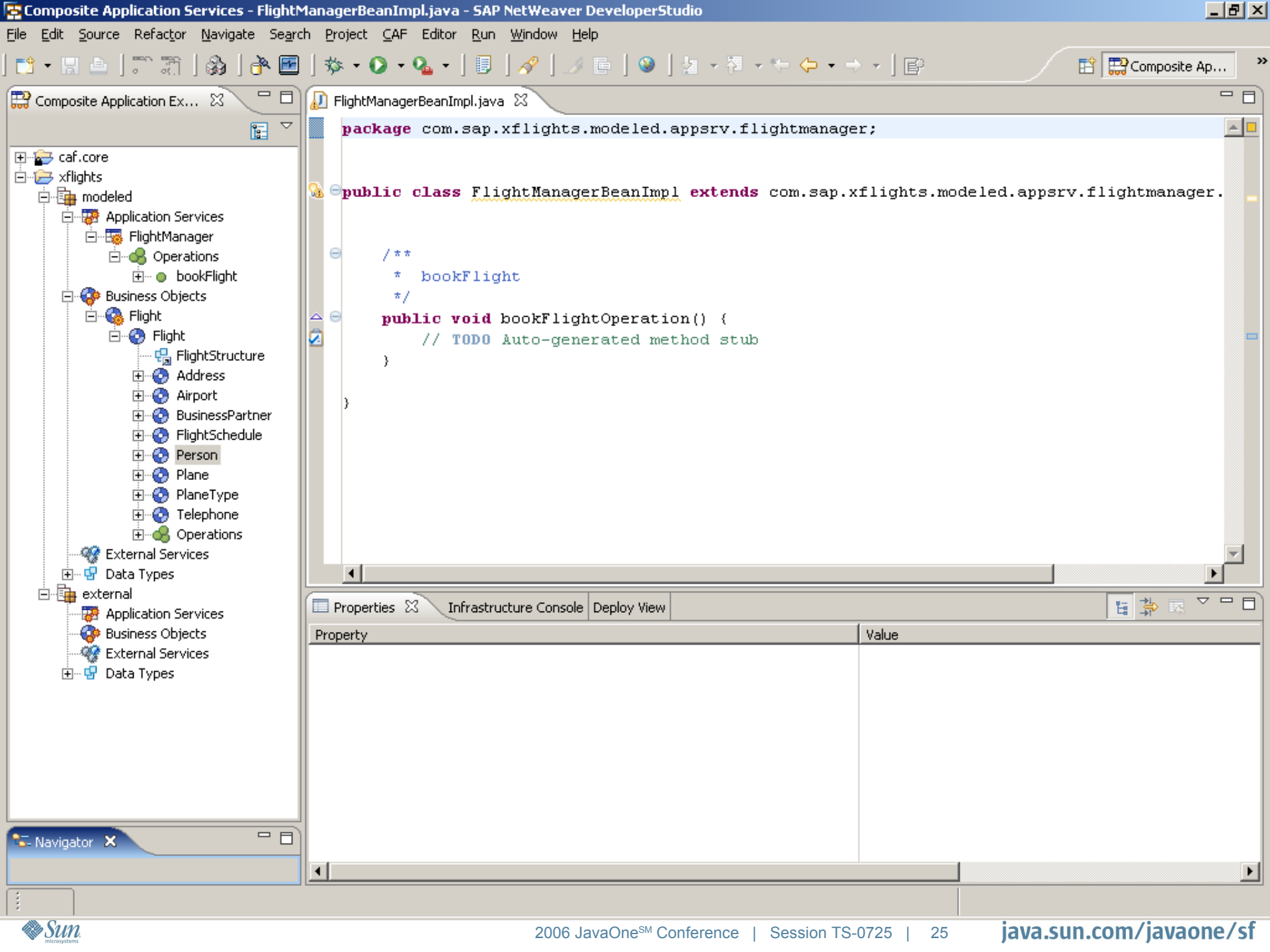
- Model (local and remote persistency, service interfaces, user interfaces, process logic)
- Generate code and tables based on platform independent metadata
- Integrate and enrich backend systems
- Reuse predefined patterns; UI templates, process patterns, services and data types

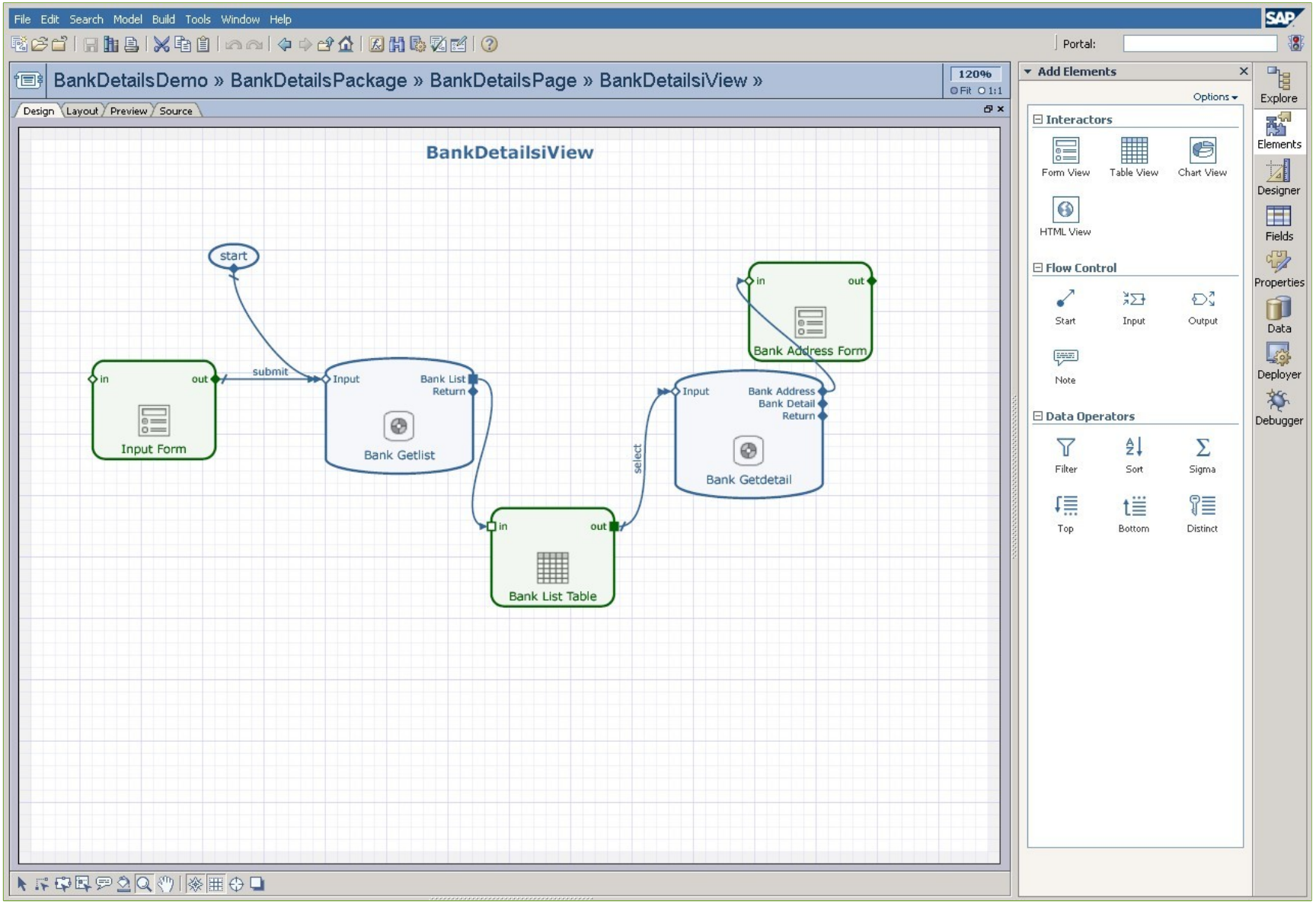
Benefits of Model-Driven Metadata-Based Development

- Focus on business logic (boiler plate code will be generated)
- Abstract from technologies, frameworks, platforms, and programming languages
- Reduce
  - Complexity
  - Development time
  - Errors
- Improve
  - Flexibility and adaptability
  - Productivity
  - Quality
  - Supportability


Composite Application Services - xflights.Person - SAP NetWeaver DeveloperStudio
File Edit Navigate Search Project CAF Run Window Help
Composite Application...
caf.core
xflights
modeled
Application Services
FlightManager
Business Objects
Flight
Flight
FlightStructure
Address
Airport
BusinessPartner
FlightSchedule
Person
Plane
PlaneType
Telephone
Operations
External Services
Data Types
external
Application Services
Business Objects
External Services
Data Types
Navigator
[LocalDevelopment] problem/dicti
[LocalDevelopment] xflights/dictic
xflights.Person
Available Business Object Nodes
Contains Tree with all Business Object Nodes that are eligable to be added as references.
xflights
caf.core
old_types
structures
faults
primitive
services
Business Objects
Document
Document
Discussion
Topic
DiscussionRoom
Principal
ExchangeRate
Currency
UnitConversionSimple
UnitOfMeasurement
Category
CategoryAssignment
Business Object Node structure
Displays the structure of the Business Object Node in a tree.
Name
Association Type
Cardinality
Descr
address (Addres
INTERNAL
ONE_TO_MANY
document (Docu
CROSS_BO
ONE_TO_MANY
General
Attributes
Operations
Permissions
Persistency
Datasource
Implementation
Properties
Infrastructure Console
Deploy View
Property
Value
Booleans
ReadOnly
false
Text
CreatedAt
Wed Apr 05 17:13:35 EEST 2006
CreatedBy
I030672
Description
DetailedDescription
BusinessObjectNode xflights.modeled.Flight.Person


Composite Application Services - xflights.Person - SAP NetWeaver DeveloperStudio
File Edit Navigate Search Project CAF Run Window Help
Composite Application Ex...
caf.core
xflights
modeled
Application Services
FlightManager
Operations
bookFlight
Business Objects
Flight
External Services
Data Types
Simple Types
Complex Types
FlightStructure
Address
Airport
BusinessPartner
FlightSchedule
Person
Plane
PlaneType
Telephone
Faults
external
Application Services
Business Objects
External Services
Data Types
Navigator
FlightManagerBeanImpl.java
xflights.Person
Existing Types
Contains Tree with all available existing types.
caf.core
xflights
Structure Fields
Contains List with attributes and structureContentProviderstructures inside.
Name Type Cardinality Language
key Id 0..1 false
createdBy UserId 0..1 false
createdAt Timestamp 0..1 false
modifiedAt Timestamp 0..1 false
modifiedBy UserId 0..1 false
firstName STRING 0..1 false
lastName STRING 0..1 false
telephone Telephone 0..1 false
key Id 0..1 false
createdBy UserId 0..1 false
createdAt Timestamp 0..1 false
modifiedAt Timestamp 0..1 false
modifiedBy UserId 0..1 false
countryCode STRING 0..1 false
regionCode STRING 0..1 false
extension STRING 0..1 false
General Edit
Properties
Infrastructure Console
Deploy View
Property Value
Booleans
Text
CreatedAt Wed Apr 05 17:13:35 EEST 2006
CreatedBy I030672
Description
DetailedDescription Structure xflights.modeled.Person
FullyQualifiedName xflights.modeled.Person
ModifiedAt Wed Apr 05 17:15:28 EEST 2006
ModifiedBy I030672


Composite Application Services - FlightManagerBeanImpl.java - SAP NetWeaver DeveloperStudio
File Edit Source Refactor Navigate Search Project CAF Editor Run Window Help
Composite Application Ex...
caf.core
xflights
modeled
Application Services
FlightManager
Operations
bookFlight
Business Objects
Flight
Flight
FlightStructure
Address
Airport
BusinessPartner
FlightSchedule
Person
Plane
PlaneType
Telephone
Operations
External Services
Data Types
external
Application Services
Business Objects
External Services
Data Types
Navigator
FlightManagerBeanImpl.java
package com.sap.xflights.modeled.appsrv.flightmanager;
public class FlightManagerBeanImpl extends com.sap.xflights.modeled.appsrv.flightmanager.
/**
* bookFlight
*/
public void bookFlightOperation() {
// TODO Auto-generated method stub
}
}
Properties
Infrastructure Console
Deploy View
Property
Value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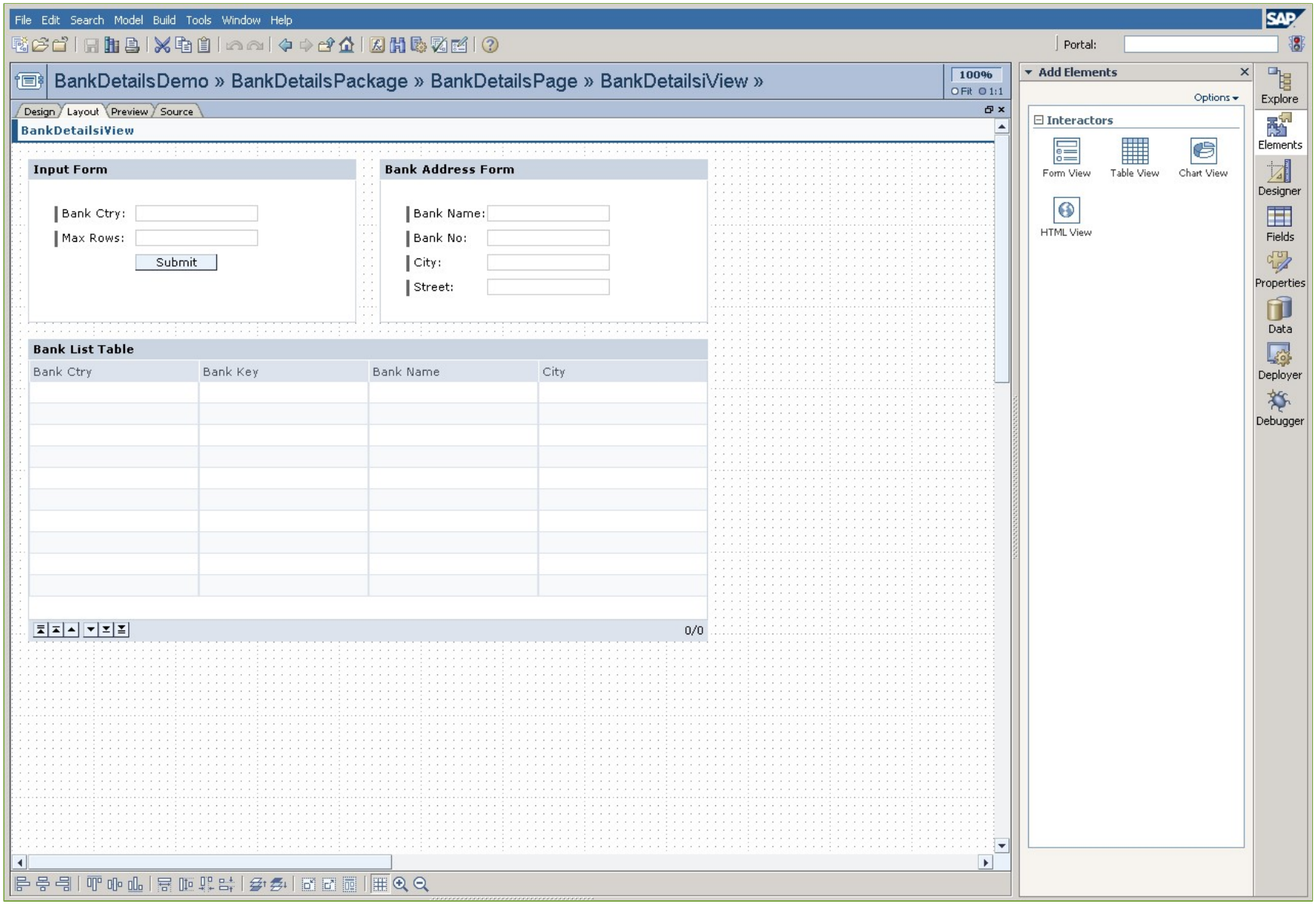
BankDetailsDemo » BankDetailsPackage » BankDetailsPage » BankDetailsiView »
120%
Fit 1:1
Design Layout Preview Source
BankDetailsiView
start
in
out
Input Form
submit
Input
Bank List
Return
Bank Getlist
in
out
Bank List Table
select
Input
Bank Address
Bank Detail
Return
Bank Getdetail
in
out
Bank Address Form
Add Elements
Options
Interactors
Form View
Table View
Chart View
HTML View
Flow Control
Start
Input
Output
Note
Data Operators
Filter
Sort
Sigma
Top
Bottom
Distinct
Explore
Elements
Designer
Fields
Properties
Data
Deployer
Debugger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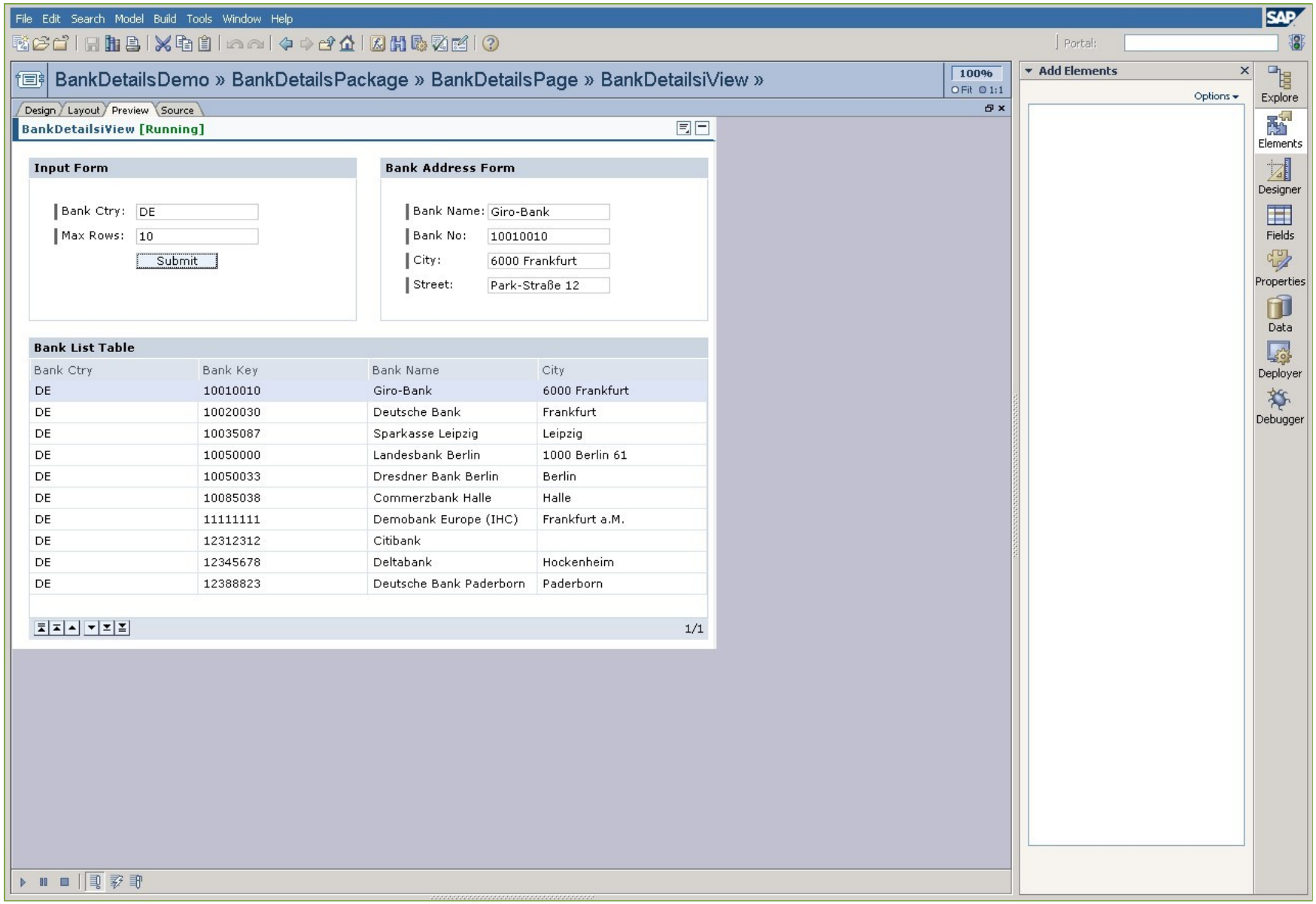
Fit 1:1
Design Layout Preview Source
BankDetailsiView
Input Form
Bank Ctry:
Max Rows:
Submit
Bank Address Form
Bank Name:
Bank No:
City:
Street:
Bank List Table
Bank Ctry
Bank Key
Bank Name
City
0/0
Add Elements
Options
Interactors
Form View
Table View
Chart View
HTML View
Explore
Elements
Designer
Fields
Properties
Data
Deployer
Debugger


File Edit Search Model Build Tools Window Help
Portal:
BankDetailsDemo » BankDetailsPackage » BankDetailsPage » BankDetailsiView »
100%
Fit 1:1
Design Layout Preview Source
BankDetailsiView [Running]
Input Form
Bank Ctry: DE
Max Rows: 10
Submit
Bank Address Form
Bank Name: Giro-Bank
Bank No: 10010010
City: 6000 Frankfurt
Street: Park-Straße 12
Bank List Table
Bank Ctry | Bank Key | Bank Name | City
DE | 10010010 | Giro-Bank | 6000 Frankfurt
DE | 10020030 | Deutsche Bank | Frankfurt
DE | 10035087 | Sparkasse Leipzig | Leipzig
DE | 10050000 | Landesbank Berlin | 1000 Berlin 61
DE | 10050033 | Dresdner Bank Berlin | Berlin
DE | 10085038 | Commerzbank Halle | Halle
DE | 11111111 | Demobank Europe (IHC) | Frankfurt a.M.
DE | 12312312 | Citibank |
DE | 12345678 | Deltabank | Hockenheim
DE | 12388823 | Deutsche Bank Paderborn | Paderborn
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Add Elements
Options
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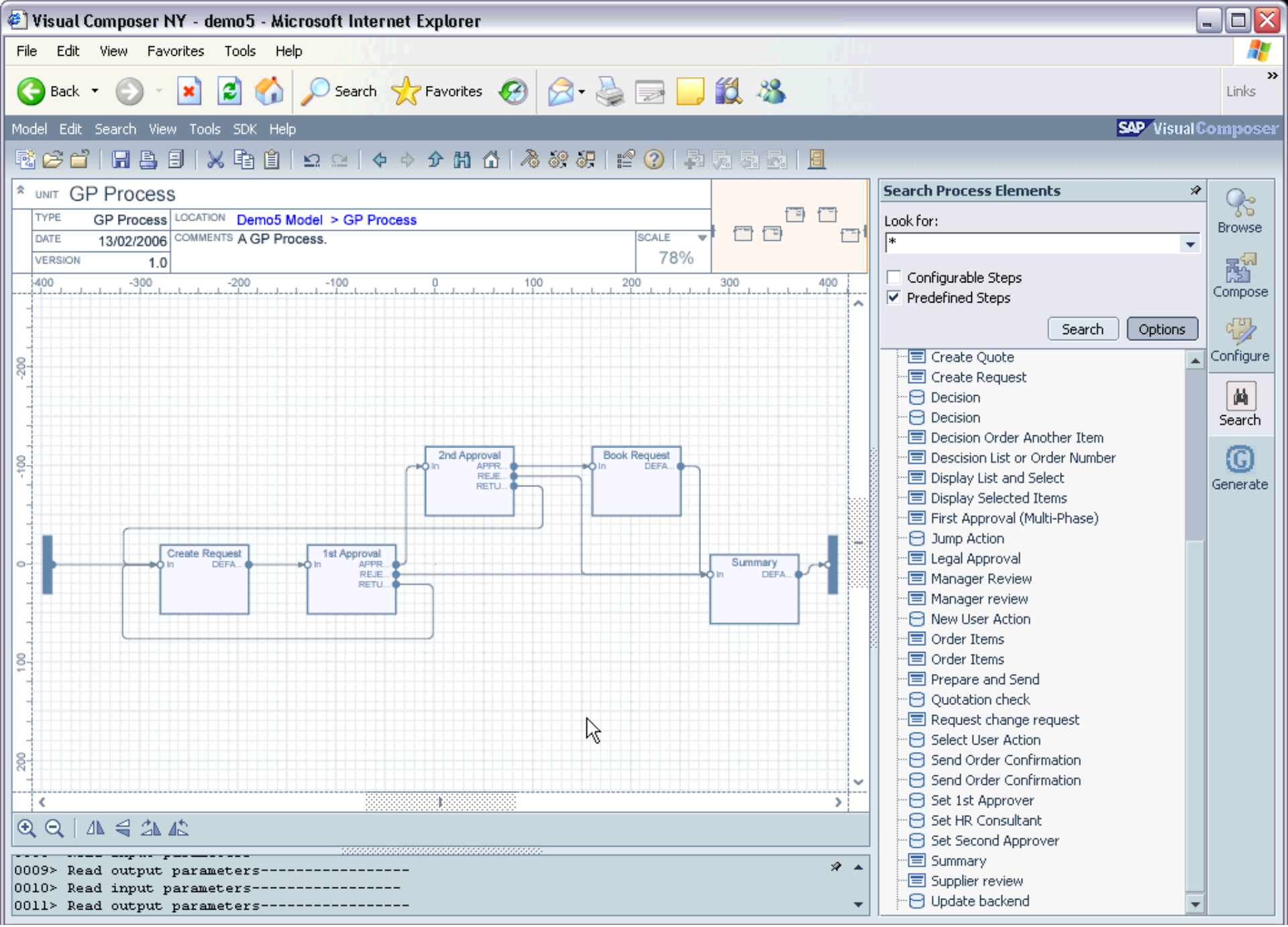
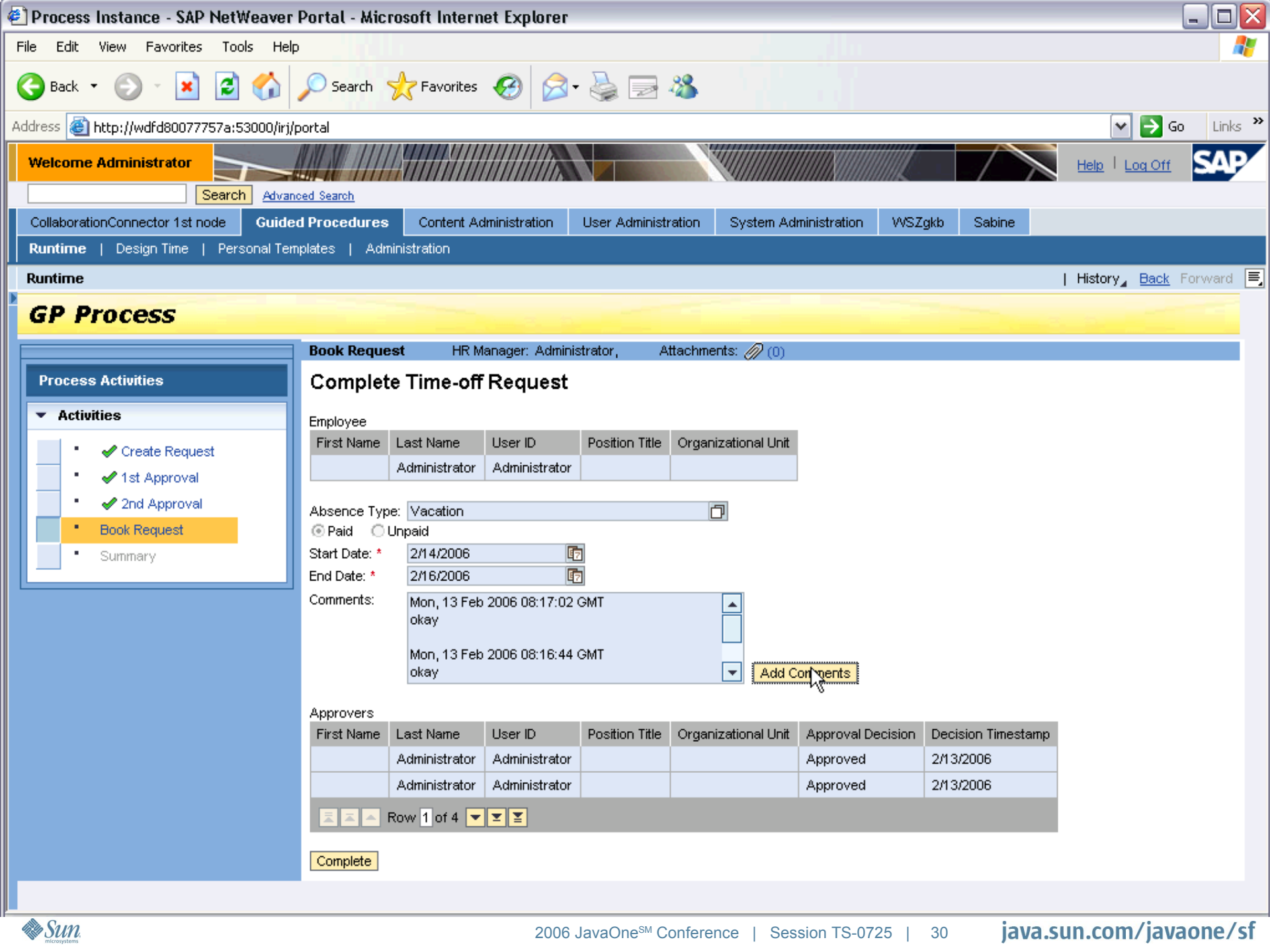
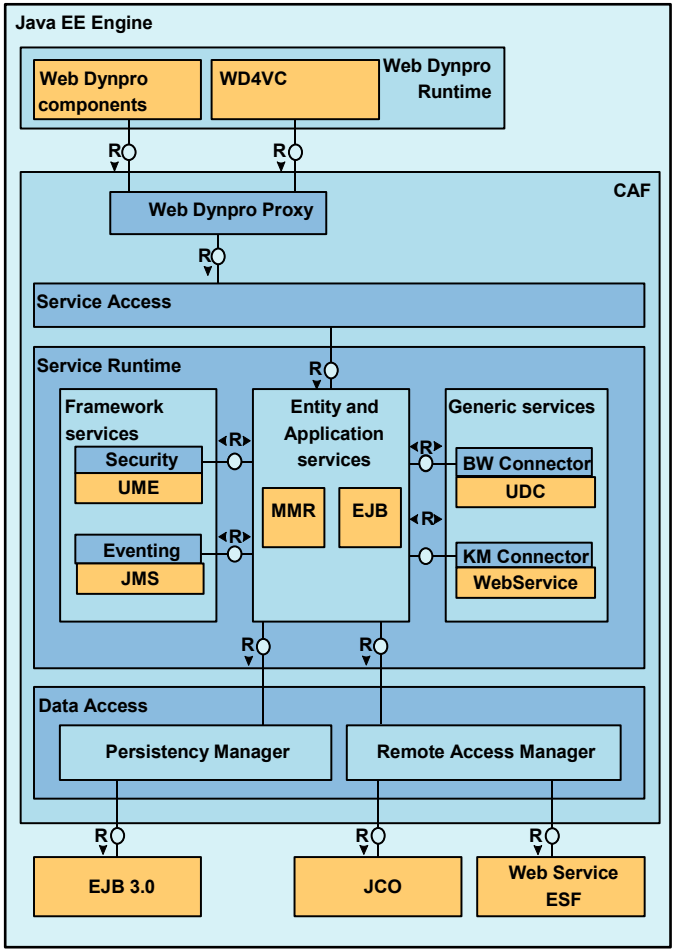
Data
Deployer
Debugger


Visual Composer NY - demo5 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Links
Model Edit Search View Tools SDK Help
SAP Visual Composer
UNIT GP Process
TYPE GP Process
LOCATION Demo5 Model > GP Process
DATE 13/02/2006
COMMENTS A GP Process.
VERSION 1.0
SCALE 78%
2nd Approval
Book Request
Create Request
1st Approval
Summary
0009> Read output parameters----------
0010> Read input parameters----------
0011> Read output parameters----------
Search Process Elements
Look for:
*
Configurable Steps
Predefined Steps
Search
Options
Create Quote
Create Request
Decision
Decision
Decision Order Another Item
Descision List or Order Number
Display List and Select
Display Selected Items
First Approval (Multi-Phase)
Jump Action
Legal Approval
Manager Review
Manager review
New User Action
Order Items
Order Items
Prepare and Send
Quotation check
Request change request
Select User Action
Send Order Confirmation
Send Order Confirmation
Set 1st Approver
Set HR Consultant
Set Second Approver
Summary
Supplier review
Update backend
Browse
Compose
Configure
Search
Generate


Process Instance - SAP NetWeaver Portal - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://wdfd80077757a:53000/irj/portal
Go Links
Welcome Administrator
Help | Log Off
Search Advanced Search
CollaborationConnector 1st node
Guided Procedures
Content Administration
User Administration
System Administration
WSZgkb
Sabine
Runtime | Design Time | Personal Templates | Administration
Runtime
History Back Forward
GP Process
Process Activities
Activities
Create Request
1st Approval
2nd Approval
Book Request
Summary
Book Request HR Manager: Administrator, Attachments: (0)
Complete Time-off Request
Employee
First Name Last Name User ID Position Title Organizational Unit
Administrator Administrator
Absence Type: Vacation
Paid Unpaid
Start Date: * 2/14/2006
End Date: * 2/16/2006
Comments:
Mon, 13 Feb 2006 08:17:02 GMT
okay
Mon, 13 Feb 2006 08:16:44 GMT
okay
Add Comments
Approvers
First Name Last Name User ID Position Title Organizational Unit Approval Decision Decision Timestamp
Administrator Administrator Approved 2/13/2006
Administrator Administrator Approved 2/13/2006
Row 1 of 4
Complete

Java EE Platform—Ideal Platform for CAs

- Lightweight service runtime leveraging Java EE platform capabilities
  - MOF-based metadata repository
  - Service implementation as session beans
  - Persistency framework based on EJB 3.0 specification
  - Connectivity framework
    - Web Services, synchronous and asynchronous
    - Reliable messaging
    - Java Connector Architecture
  - Eventing and notification framework based on Java Message Service
  - Standard-based interfaces for clients
    - Services accessible as session beans from Java-based UIs
    - Services accessible as Web Services, published in UDDI registry



Upcoming Standards and Initiatives

- Service Data Objects (SDO)
  - Specification for a programming model that unifies data programming across data source types
- Service Component Architecture (SCA)
  - Specification which describes a model for building applications and systems using a SOA
- BPEL4People
  - Describes how the WS-BPEL language needs to be extended to cover user interactions with business processes
- Enterprise Services Community Process
  - A SAP initiated first cross-industry community process for enterprise services

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- Composite Applications empower companies to drive innovative business processes by leveraging existing IT investments
- Composite Application Frameworks (like SAP CAF) provide a methodology and toolset to efficiently develop and manage composite applications—following SOA principles
- Metadata-based modelling tools help developers to abstract from technologies, frameworks, and programming languages and at the same time improve flexibility, productivity, and quality

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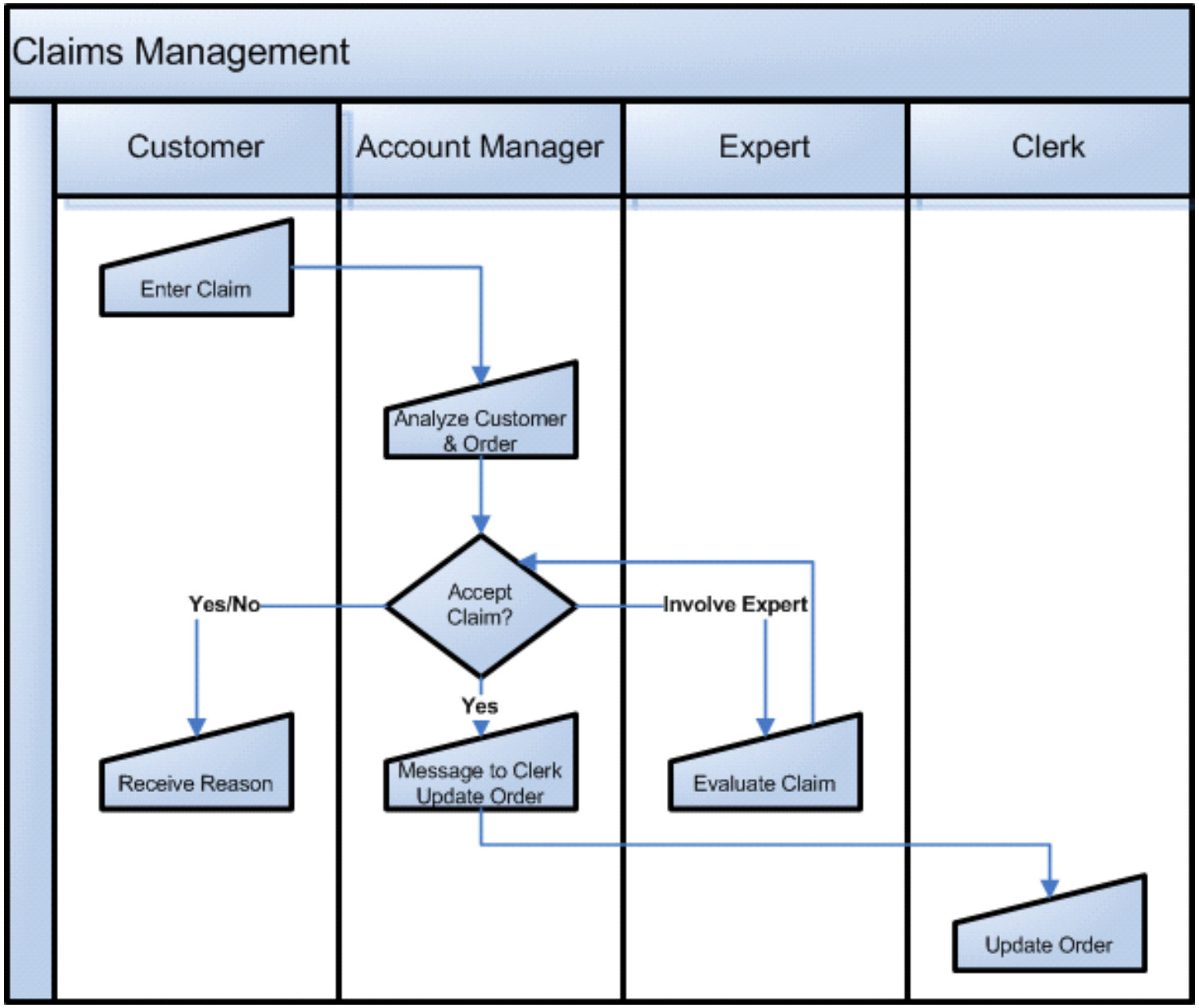
Claims Management
Customer
Account Manager
Expert
Clerk
Enter Claim
Analyze Customer & Order
Accept Claim?
Yes/No
Involve Expert
Yes
Receive Reason
Message to Clerk Update Order
Evaluate Claim
Update Order

DEMO

Building a Composite Application—
Highlights

For More Information

- SAP

  http://www.sap.com

- SAP Composite Application Framework on SDN

  https://www.sdn.sap.com/irj/sdn/developerareas/xapps?rid=/webcontent/uuid/7b9b3834-0801-0010-6a9a-dc53e0db37f2

- Enterprise Services Community Process

  http://www.sap.com/solutions/netweaver/newsevents/Press.epx?PressID=5005

Q&A

Dr. Malte Kaufmann, SAP AG
Volker Stiehl, SAP AG

Challenges and Solutions for Developing Composite Applications on the Java™ EE Platform

Dr. Malte Kaufmann

malte.christian.kaufmann@sap.com

SAP AG

Volker Stiehl

volker.stiehl@sap.com

SAP AG

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