

# SAP J2EE Migration Kit

## Introduction

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**Motivation and Migration Kit Overview**

Migration Phases and Kit Details

A J2EE Migration Example

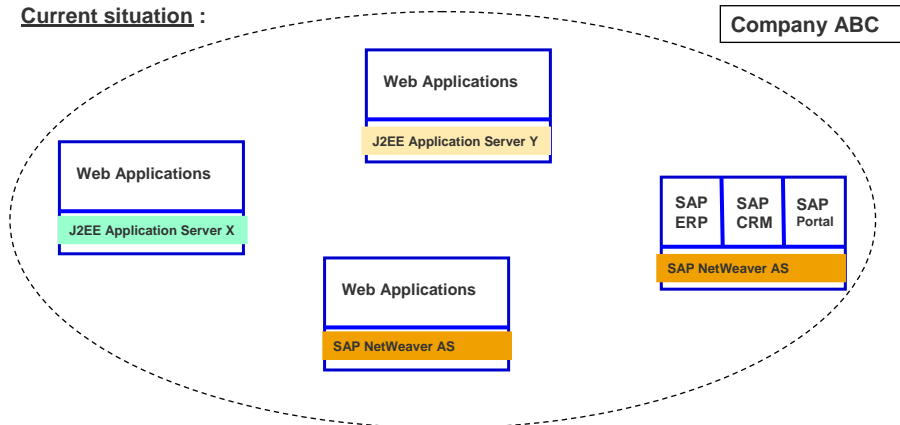
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## J2EE Migration Kit - Motivation

**Current situation :**



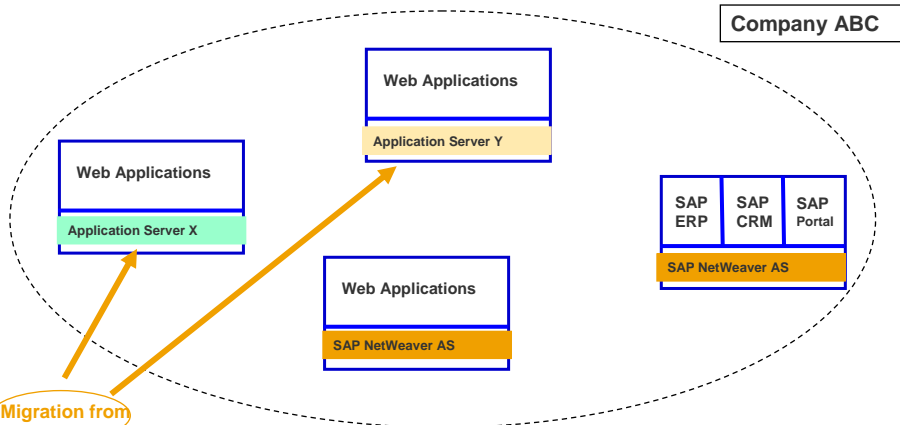
**80% of the IT budget is spent for the maintenance of many different IT systems**

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## J2EE Migration Kit - Motivation

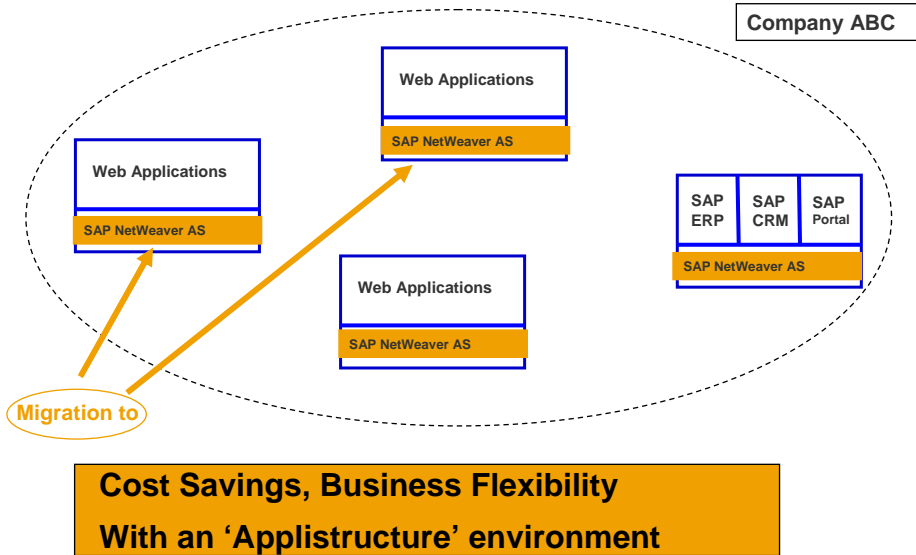


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## J2EE Migration Kit - Motivation



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## Questions the customer will have....

**Before starting a migration project, the customer needs clarification with respect to several questions.**

1. Is my current infrastructure supported?
2. How much do I have to spend for my migration efforts?
3. How long will it take to migrate?
4. Does my application lose any functionality?
5. Does my application gain extra advantages?

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## Migration Kit Goals

### The goals of the J2EE Migration Kit

- Provide a methodology
- Support in effort estimation
- Guidance during the migration assessment
- Guidance during the migration
- Tool support during the migration

### With the J2EE Migration Kit

- SAP enables partners to do migrations in a standardized way
- SAP experts are available as coach or technical expert
- SDN serves as platform for knowledge transfer  
sdn.sap.com → Forums → Web Application Server → Web AS Migration

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## Migration Kit Elements

### ■ Migration Assessment Guide

- Helps you in assessing the relevant aspects of the migration ahead

### ■ Effort Estimator

- Helps you to estimate your migration efforts during Assessment

### ■ Migration Guide

- To provide step by step guidance during the migration
- Initially created after the migration of sample applications
- Continually improved by incorporating experiences from migrations that were performed using the J2EE Migration Kit

### ■ J2EE Migration Kit Plug-in

- Automates some steps during Implementation phase

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## Roadmap

	Q1/2005	Q2/2005	Q3/2005
<b>Methodological support</b>	All vendors	All vendors	All vendors
<b>Effort estimation support</b>	BEA	BEA, ORACLE, IBM, JBoss	BEA, ORACLE, IBM, JBoss
<b>Assessment guide</b>	BEA	BEA	BEA, ORACLE, IBM
<b>Migration guide</b>	-	BEA	BEA, ORACLE, IBM
<b>NW DS support (*)</b>	BEA (25%)	BEA (50%) ORACLE (25%) IBM (25%)	BEA (80%) ORACLE (50%) IBM (50%)

(\*) % of vendor specific infrastructure that can be automatically migrated using the NW DS plug-in

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## Migration Coverage

### Which aspects are NOT covered by the J2EE Migration Kit?


- The J2EE Migration Kit concentrates on J2EE applications. Because of this, certain components are not directly addressed by the J2EE Migration Kit:
  - ◆ 3rd party Enterprise Portals
  - ◆ Data Warehouse Solutions
  - ◆ Integration Layers
- During the Migration Assessment phase, these issues together with possible solution scenarios will be discussed
- Next to the migration of the J2EE applications, migrations of other system parts might be planned as follow-up steps, for example by migrating them to NetWeaver components like SAP NW EP or SAP XI

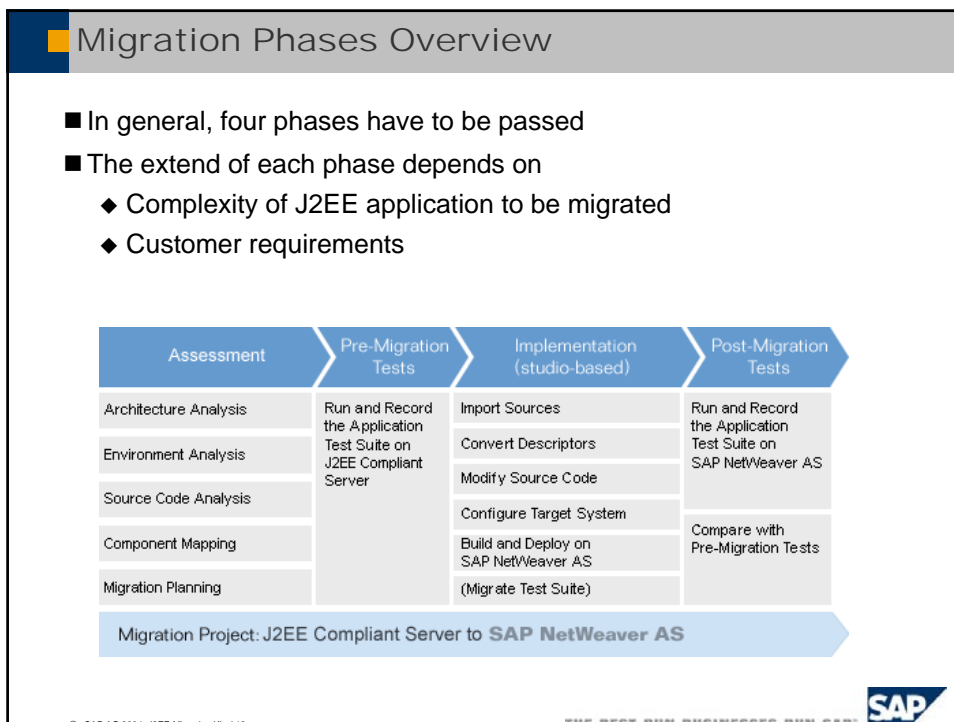
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Motivation and Migration Kit Overview
<b>Migration Phases and Kit Details</b>
A J2EE Migration Example
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## Migration Phase - Assessment

**During Assessment, many questions must be answered.**

- How to overcome J2EE incompatibilities in the application
- How to prepare an application to be migrated
- How to handle dependencies to external components
- Migrate persistence layers to SAP NetWeaver Application Server
- Dealing with your system environment
- How to setup the future build environment
- Clustering issues

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## Migration Phase - Assessment

Assessment has to manage many migration related tasks.

### Objectives

Try to get to the bottom of migration objectives. Clarify which tasks are NOT part of the migration

### Requirements

Negotiate a procedure for verification of migration results

Identify applications with strong non-functional requirements

### Architecture

Detect internal and external dependencies, especially proprietary adapter and protocols

### Environment

Find a decision between two alternatives

- migrating the build and test environment (Dev Studio, NWDI)
- stay with the existing build and test environment (ant, cvs, XDoclet..)

### Source Code

Check J2EE conformity and vendor specifics with Sun AVK, scan sources

Count J2EE components, descriptors, resources as preparation for effort est.



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## Migration Phase - Assessment

The J2EE Migration Kit comes with the Migration Assessment Guide, which leads you through the assessment phase and covers all relevant aspects of a migration

- Architecture Analysis
  - ◆ Dependencies
  - ◆ J2EE conformity tests with the SUN AVK compatibility test suite
  - ◆ Persistence
  - ◆ Clustering
- Environment Analysis
  - ◆ Development Environment
  - ◆ Test Environment
  - ◆ Build System



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## Migration Phase - Assessment

- Source Code Analysis
  - ◆ Automated static code analysis
  - ◆ Manual code review
- Component Mapping
  - ◆ Identifying components to be migrated “as is”
  - ◆ Identifying components to be mapped to NetWeaver components
  - ◆ Components to be converted or rewritten
- Migration Planning
  - ◆ Migration plan
  - ◆ Integration plan
  - ◆ Test plan
  - ◆ Risk assessment
  - ◆ Refining effort estimation



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## Migration Phase - Assessment

### Main results of Assessment phase are

- Assessment Report
  - ◆ Identification of risks
- Migration plan
  - ◆ Risk management strategy
  - ◆ Time line and resource planning for migration
- Effort Estimation Update
  - ◆ Recalculate the migration efforts.

Risiko	Die Nutzung der Web Cache Links aus Wi
Wichtung	hoch
Gegenmaßnahme	Während Migration Assessment den Zugr AS heraus klären. Eine Lösung, die verlan Applikation der Link manuell wiederherge
Aufwandserfassung	Migration Assessment → other software/ c

Risiko	Die Implementierung von Noc3, Navigation, Prod muss von Web Flow auf die Nutzung von Struts t
Wichtung	hoch
Gegenmaßnahme	Die Umstellung muss vor der eigentlichen Migrati Migrationplan notwendig.
Aufwandserfassung	Code Changes → Nr. of other classes with applic (Implementierungsaufwand)



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## Migration Phase - Pre-Migration Tests

- Run dynamic tests using the SUN AVK (if feasible!)
- Run tests to document and ensure that the original application fulfills its
  - Functional requirements
    - ◆ Functional tests (WinRunner, ...)
    - ◆ Technical tests (JUnit, HttpUnit, ...)
  - Non-functional requirements
    - ◆ Load tests
    - ◆ Performance tests
    - ◆ Recovery tests
- Update effort and risk calculations



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## Migration Phase - Implementation

- Modify the J2EE deployment descriptor files, if the SUN AVK has reported any J2EE specification problems in the original files
- Import the components into SAP NetWeaver Developer Studio, using the J2EE Migration Kit Plug-in
- Review the converted deployment descriptor files, if an automated conversion was performed by the plug-in
- Modify the source code, if needed
- Update effort and risk calculations



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## Migration Phase - Implementation

- Create all required resources like Data Sources or JMS Provider Services for the SAP NetWeaver Application Server
- Rework the build and deployment process with the tools provided by the SAP NetWeaver Developer Studio
- Migrate relevant test suites
- Build and deploy on the SAP NetWeaver Application Server



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## Migration Phase - Post-Migration Tests

- To ensure the functional requirements to the migrated application, run the migrated “pre-migration” tests. The tests should confirm the correct migration of the application
- To ensure the non-functional requirements to the migrated application, run the migrated “pre-migration” tests. The tests should confirm the correct migration of the application
- Fill out and send feedback questionnaire to SAP / SAP SI



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## J2EE Migration Kit

The J2EE migration kit guides through the entire migration process.

Assessment	Pre-Migration Tests	Implementation (studio-based)	Post-Migration Tests
Architecture Analysis	Run and Record the Application Test Suite on BEA WLS/ J2EE Compliant Server	Import Sources to MND Project Structure (using PIT)	Run and Record the Application Test Suite on SAP WebAS
Environment Analysis		Convert Descriptors (using DCT)	
Source Code Analysis		Modify Source Code	
Component Mapping		Configure Target System	Compare with Pre-Migration Tests
Migration Planning		Build and Deploy on SAP WebAS (Migrate Test Suite)	

Migration Project: BEA WebLogic Server / J2EE Compliant Server to SAP Web AS

The J2EE Migration Kit provides support for the following two phases:

- Assessment
- Implementation

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## Kit Elements

### We will now have a look at the following:

- Migration Assessment Guide
- Effort Estimation Sheet
- Migration Guide (available soon)
- Plug-In



## Migration Assessment Guide

### The Migration Assessment Guide helps to identify migration risks

- Dependencies between system components
- Dependencies to 3rd party systems
  - ◆ Personalization systems
  - ◆ eCommerce systems
  - ◆ etc.
- J2EE 1.3 specification compliance
- System environment analysis
- Code quality and complexity analysis
- Mapping source system components to SAP NetWeaver

### The Migration Assessment Guide gives process guidance

- Risk calculation
- Refined effort estimation
- Migration planning



## Migration Assessment Guide

- Documentation
- Serves as detailed check list during the Assessment phase
- Covers analysis of
  - ◆ Requirements
  - ◆ Architecture
  - ◆ Source Code
  - ◆ Environment

1	Introduction .....
1.1	Reporting .....
1.2	Contact Persons .....
2	Architectural Analysis .....
2.1	Dependencies between System Components .....
2.2	Third Party Dependencies .....
2.2.1	Legacy Integration .....
2.3	Persistence in the Architecture .....
2.4	J2EE Specification Verification .....
2.4.1	JNDI and Naming .....
2.4.2	JNDI and JMS .....
2.4.3	Access to Resources .....
2.4.4	Web Services .....
3	System Environment Analysis .....
3.1	Non-functional requirements .....
3.2	Development Environment .....
3.2.1	MDA/MDD Driven Projects .....
3.3	Tests .....
3.3.1	Test Environment .....
3.3.2	Unit-Tests .....
3.3.3	Load, Performance, and Stability Tests .....
3.4	Clustering .....
3.5	Databases .....
3.6	Build & Application Deployment .....
3.7	Code Analysis .....
3.7.1	Automatic Code Analysis .....
3.7.2	Manual Code Analysis .....
3.8	Component Mapping .....
3.9	Migration Planning .....
4	References .....

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## Effort Estimation Tool

The Effort Estimation Tool helps in initial effort estimation

- Best used in conjunction with an architectural analysis
- The more you know from the application the better the estimation results are .....

	Quantity	Effort (h)	Effort (d)	Risk	Man Days
<b>Project Import</b>					
No. of deployment units (jar, war, ear)	0	0.5	0.0625	1.0	0.0
<b>Deployment Descriptor Conversion</b>					
No. of deployment units of type: Entity Bean	0	0.5	0.0625	1.0	0.0
No. of deployment units of type: Session Bean	0	0.5	0.0625	1.0	0.0
No. of deployment units of type: Message Driven Bean	0	0.5	0.0625	1.0	0.0
No. of deployment units of type: Web Application	0	0.5	0.0625	1.0	0.0
No. of deployment units of type: Web Service	0	0.5	0.0625	1.0	0.0
<b>Descriptor Editing After Conversion</b>					
No. of CMP Entity Beans with relationships	0	2	0.25	1.0	0.0
No. of CMP Entity Beans with proprietary EJB QL extensions	0	4	0.5	1.0	0.0
<b>Code Changes</b>					
No. of source code lines (only consider non-generated source files)	600000	-	-	1.0	5.0
Aggregate number of JNDI registered objects (beans, resources, Web service proxies, etc.)	0	0.25	0.03125	1.0	0.0
ServiceLocator or base classes for JNDI lookups	0	1	0.125	1.0	0.0
No. of WebLogic startup classes	0	4	0.5	1.0	0.0
No. of classes using vendor-specific J2EE extensions	0	4	0.5	1.0	0.0
No. of other classes with application server dependencies (or estimate # man days)	0	4	0.5	1.0	0.0
No. of deployed Web services	0	4	0.5	1.0	0.0
No. of Web service clients (remote and serverside)	0	4	0.5	1.0	0.0
<b>Target System Configuration</b>					
No. of resources of type: Resources	0	1	0.125	1.0	0.0

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## Effort Estimation Tool

- Often (but not only) quantity based estimations
  - number of deployment units, EJBs, JNDI registered objects, .....
- Allows for risk weighting and manual effort correction

	Quantity	Defined effort (hours)	Defined effort (days)	Risk	Man-Days (estimated)	Man-Days (correct +/-)
--	----------	------------------------	-----------------------	------	----------------------	------------------------

- Estimates effort for a detailed Assessment and Implementation phase

		Estimated	Corrected
Effort for Migration Assessment	12,05 days	13,05	-1,00
Effort for Migration	77,00 days	79,00	-2,00
Total effort	89,05 days	92,05	-3,00

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## Effort Estimation Tool

### The tool estimates effort for

- Migration Assessment
- Project Import
- Deployment Descriptor Conversion
- Descriptor Editing
- Code Changes
- Target system Configuration
- Migration of external components
- General purpose tasks

Code Changes						
No. of build script lines (assuming the build script is Ant, Make or another standard)	5.000	50	6,25	1,0	6,25	
No. of JNDI registered objects (beans, resources, Web service proxies, etc.)	100	0,125	0,01563	1,0	1,56	
No. of ServiceLocator or JNDI lookup base classes	2	1	0,125	1,0	0,25	
No. of classes using vendor-specific JMX extensions	1	4	0,5	1,0	0,50	
No. of other classes with application server dependencies ( or estimate # man-days )	40	4	0,5	1,0	20,00	
No. of deployed Web services	0	4	0,5	1,0	0,00	
No. of Web service clients (remote and serverside)	0	4	0,5	1,0	0,00	

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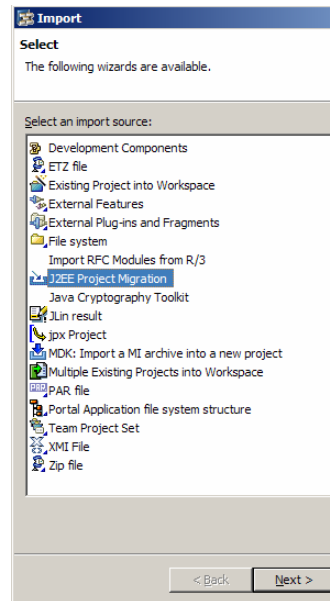
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## J2EE Migration Kit Plug-In

### The J2EE Migration Kit Plug-In facilitates the migration of J2EE components

- Import your projects into SAP NetWeaver Developer Studio



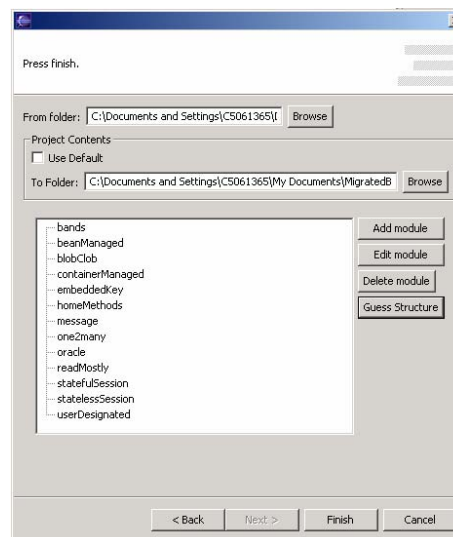
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## J2EE Migration Kit Plug-In

- Automatic detection of the J2EE components to be migrated to SAP NW
- Automatic creation of SAP NW Dev. Studio project definitions
- Automatic migration of components to SAP NW
- Automatic conversion of deployment descriptors to SAP NW
- Current BEA coverage is around 25% and increasing
- Support for registering the components that were not found



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## J2EE Migration Kit Plug-In

### ■ Installation

- To be installed as a “normal” Eclipse plug-in
- Works with SAP NetWeaver Developer Studio 2.0.7 and higher

### ■ Supported J2EE platforms

- BEA WebLogic Server 7.0 / 8.1

### ■ Functionality

- Supports Java, Web and EJB (session and entity bean) modules
- See SAP\_J2EE\_Migration\_Kit\_PlugIn\_UserGuide.doc



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**A J2EE Migration Example**

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## J2EE Migration by example

### Migration of the BEA example applications from BEA WebLogic to SAP NetWeaver Application Server

- Importing the J2EE modules as projects into SAP NetWeaver Developer Studio, using the J2EE Migration Kit Plug-in
- Making the necessary changes to code and deployment descriptors
- Deploying and running the migrated application



## Demo

### Demonstration – Migration of an example J2EE components

- Stateless Session Bean



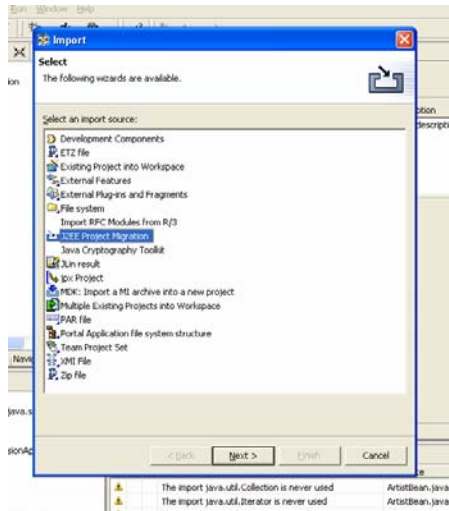
**Slide 34**

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**HGU8** Image with PC or something else ...  
Dr. Halil-Cem Gürsoy, 12/6/2004

## Stateless Session Bean - Import

Import wizard in action



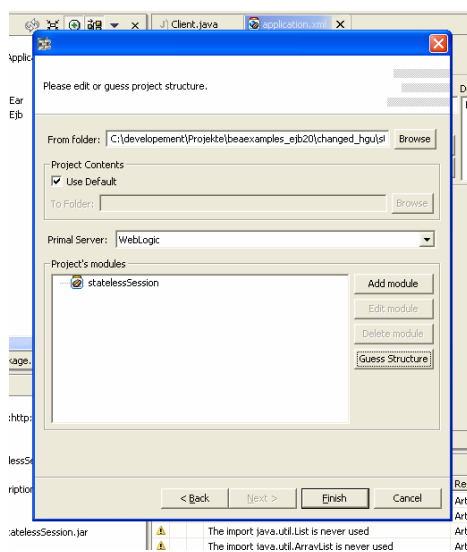
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## Stateless Session Bean - Import

Import wizard in action



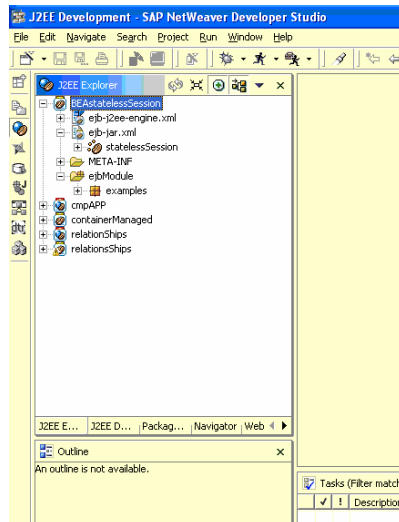
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## Stateless Session Bean - Import

The import is done



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## Stateless Session Bean – Code Changes

### Code adjustments

- In `Client.java` replace the Initial Context Factory Implementation

```
private Context getInitialContext() throws NamingException {
    try {
        // Get an InitialContext
        Hashtable h = new Hashtable();
        h.put(Context.INITIAL_CONTEXT_FACTORY,
            "com.sap.engine.services.jndi.InitialContextFactoryImpl");
    }
}
```

- In `TraderBean.java` remove the leading "/" from the JNDI name

```
public void ejbCreate () throws CreateException {
    log("ejbCreate called");
    try {
        InitialContext ic = new InitialContext();
        Integer tl = (Integer) ic.lookup("java:comp/env/tradeLimit");
    }
}
```

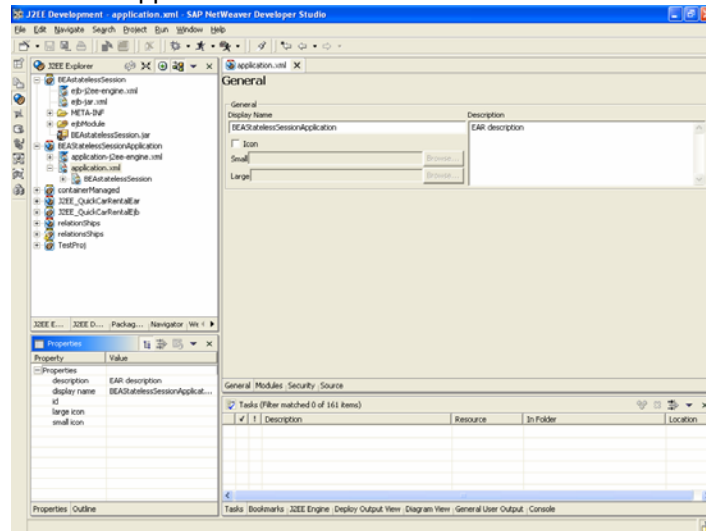
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## Stateless Session Bean – Build

### Create a J2EE Application



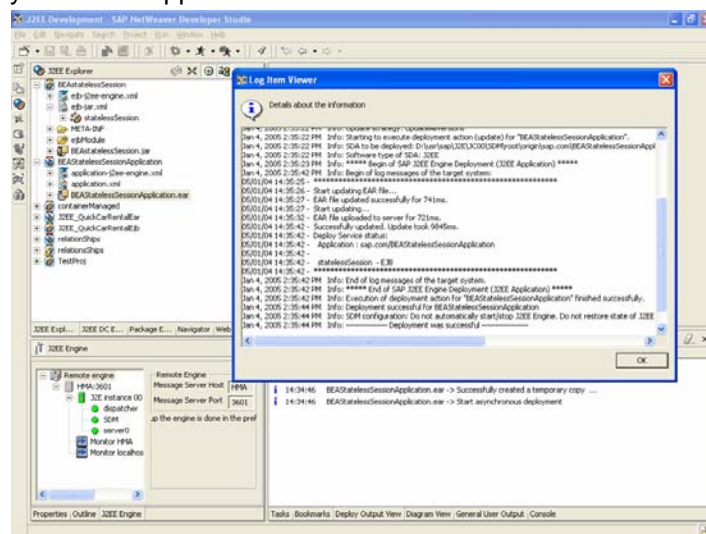
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## Stateless Session Bean – Deploy

### Deploy the J2EE Application



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## Stateless Session Bean – Run

Run the test client `Client.java` as a Java Application with settings:

- Program Arguments
  - ◆ `<hostname>:<p4port>` i.e. `localhost:50004`
- Additional libraries in the class path
  - ◆ `sapj2eeclient.jar`
  - ◆ `exception.jar`
  - ◆ `logging.jar`

Output:

```
Beginning statelessSession.Client...
```

```
Creating a trader  
Buying 100 shares of BEAS.  
Buying 200 shares of MSFT.  
Buying 300 shares of AMZN.  
Buying 400 shares of HWP.  
Selling 100 shares of BEAS.  
Selling 200 shares of MSFT.  
Selling 300 shares of AMZN.  
Selling 400 shares of HWP.  
Removing the trader
```

```
End statelessSession.Client...
```

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A J2EE Migration Example

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## SAP Services

**SAP provides many J2EE migration related services, from spot consulting to long term assistance and the complete management of your migration projects.**

- Full migration project management
- Full migration project execution
- Initial migration effort estimation
- Complete migration assessment
- Realization of the actual migration
- Coaching the actual migration
- J2EE Migration Kit related training

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## Cooperation & Synergy with SAP Partners

**Cooperation between SAP Consulting and the SAP Partners is key to ensure success in a migration project**

### SAP :

- knowledge & expertise on the SAP NetWeaver AS
- advice on how best to benefit of the SAP NetWeaver infrastructure
- know-how transfer on the SAP NetWeaver infrastructure

### Partner :

- knowledge on the source application and its functional & technical environment
- knowledge & expertise on the original J2EE platform
- validation of the migrated application



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## Migration References

Many SAP customers have already successfully ported J2EE applications to the SAP Web Application Server

A few examples:

- Airbus
- Siemens Business Services
- Wacker Chemie
- CEPSA
- Drogeriemarkt
- HLP
- Star/trac



SIEMENS



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## Resources

### Resources

- [SAP NetWeaver Application Server SDN Section](http://sdn.sap.com)  
<http://sdn.sap.com> -> Web Application Server
- [SAP NetWeaver Application Server SDN Forum](http://sdn.sap.com)  
<http://sdn.sap.com> -> Forums -> Web Application Server
- [SAP J2EE Migration Kit SDN Forum](http://sdn.sap.com)  
<http://sdn.sap.com> -> Forums -> Web Application Server -> WebAS Migration

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## Contact persons

### ■ Contact persons

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## Summary

- The J2EE Migration Kit supports you in migrating your existing J2EE applications to the SAP NetWeaver Application Server and the SAP NetWeaver Platform.
  - ◆ Effort Estimation
  - ◆ Migration Assessment
  - ◆ Migration Methodology, Guidance and tool support



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