Java™ Platform, Enterprise Edition 5: Even Easier With Tools

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Java™ Platform, Enterprise Edition 5—Developer's View

Closer Look at the "Ease of Use" and Where Tools Can Help

Java EE 5 has more features than the J2EE™ 1.4 platform but the ease of use is really closer to that of Java SE.

Good tools help to get even more out of it.

Agenda

NetBeans™ and Java EE Platforms

Java EE 5 Platform

Java Persistence API

Simplified Enterprise JavaBeans™ Technology

Web Applications

Web Services 2.0

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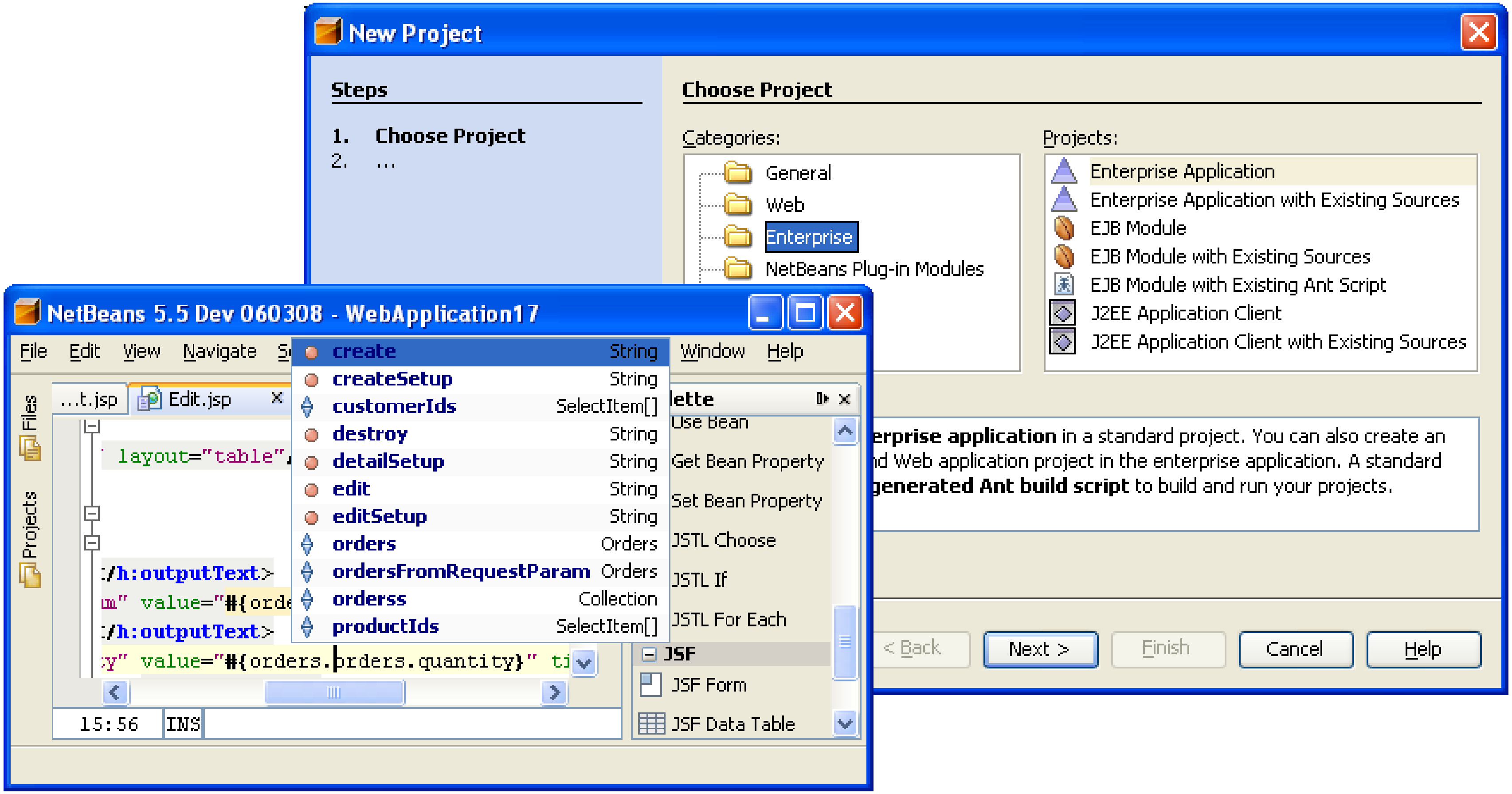
NetBeans and Java EE Platforms

What Are We Building on…

- Before 4.1: Web applications development
- 4.1 (May 2005) complete J2EE 1.4 software, Web Services
- 5.0 (Jan 2006) Better, Faster, Easier
  - More J2EE platform-based servers
  - Web Frameworks—JavaServer™ Faces technology, Struts
- Enterprise Pack: UML, XML Tools, SOA
- Profiler Pack: full featured profiler for NetBeans IDE

NetBeans 5.5 and Java EE 5 Platforms

Java Persistence API, EJB™ 3 Specification, JAX-WS 2.0, Java EE 5 SDK



erprise application in a standard project. You can also create an
nd Web application project in the enterprise application. A standard
generated Ant build script to build and run your projects.

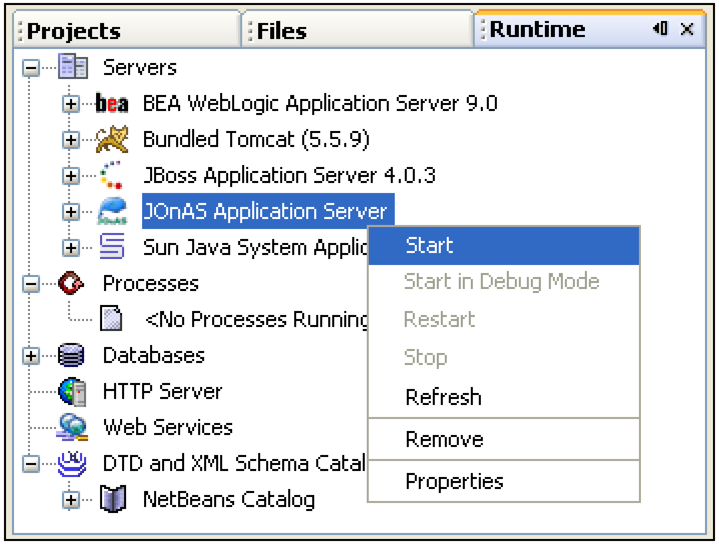
create	String
createSetup	String
customerIds	SelectItem[]
destroy	String
detailSetup	String
edit	String
editSetup	String
orders	Orders
ordersFromRequestParam	Orders
orderss	Collection
productIds	SelectItem[]

```
 layout="table"
:/h:outputText>
m" value="#{orde
:/h:outputText>
y" value="#{orders.orders.quantity}" ti
```

NetBeans and Java EE Platforms

Integrated, Everything Included “Out of the Box”

- Java EE Tutorial, Training, Support
- Sun Java System Application Server 8.1, 8.2, 9.0
- JBoss, WebLogic, WebSphere, Tomcat
- Profiling of Java EE apps
- Ant build system
- Project structure compliant with Java Blueprints



Servers
BEA WebLogic Application Server 9.0
Bundled Tomcat (5.5.9)
JBoss Application Server 4.0.3
JOnAS Application Server
Sun Java System Applic
Processes
<No Processes Running
Databases
HTTP Server
Web Services
DTD and XML Schema Catal
NetBeans Catalog

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Java EE 5 Platform

“The Focus of Java EE 5 Is Ease of Development”

- POJO—regular Java classes
  - Standard interface inheritance can be used
- Annotations versus deployment descriptors
  - Program elements annotated in the source file to control the behavior of an application
  - Better then XDoclet—annotations are language feature
  - Common Java EE, Java Persistence API, Enterprise JavaBeans™, Java APIs for XML Web Services (JAX-WS) technologies
  - Closer to code: simple version control and diff, editing
- Dependency injection
- Better default behavior and configuration

Java EE 5 Platform

- The developer works less
  - No generation of sources with XDoclet
  - No synchronization between Java programming language and XML
- The container works more
  - Annotation processing, dependency injection
- The tool
  - Less work to hide the complexity and XML descriptors
  - Does more really useful things: wizards, hints, code validation, code generation, etc.

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Java Persistence API

A Simpler Easier to Use Alternative to JDBC Software

- JDBC™ software is database centric: tables/rows/columns
- Java Persistence API is Java technology centric
  - Store Java objects in database
- A new standard based on existing successful technologies
  - TopLink, Hibernate, Kodo, Java Data Objects, CMP, etc.
  - One common API for all major ORM frameworks
  - Hibernate, TopLink, Kodo—all will implement this API
- Can be used in Java SE, web or EJB-based applications

Java Persistence API

How Does it Work?

- Meta data in annotations
  - @Entity marks a regular Java class as an entity
  - Other annotations to specify how to map them in DB
- EntityManager stores/retrieves entities in DB
  - Create instance of an entity using new
    - Book b = new Book();
  - Use EntityManager methods to persist data
    - em.persist(b); em.merge(b); em.delete(b);
  - Query using EJB QL or SQL
    - List<Book> c = em.createQuery(“select b from Book b”). getResultList();

Java Persistence API—Example

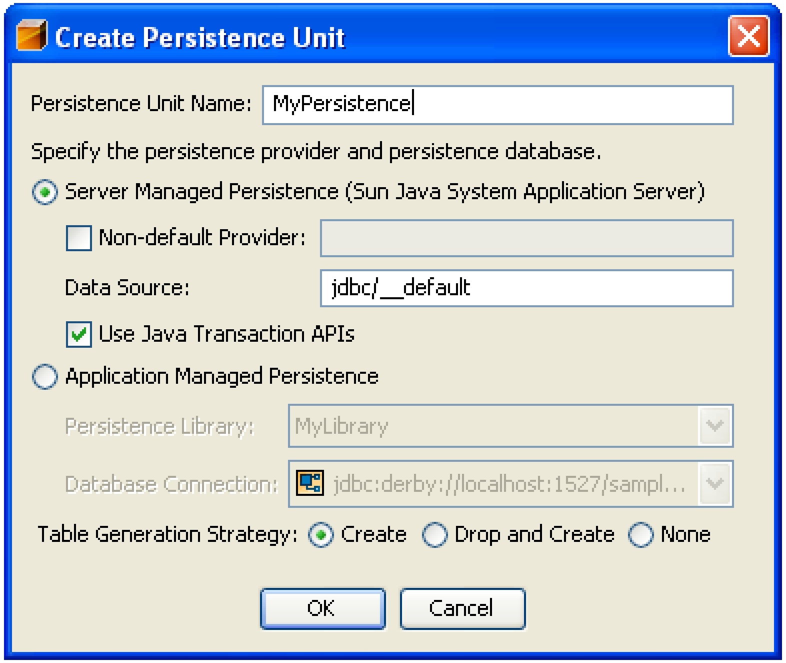
```
@Entity
public class Book {
   @Id
   @GeneratedValue(strategy = GenerationType.AUTO)
   private int id;
   private String title;
   ... // public getters and setters
}

// using entity in Java SE application
EntityManager em = ...; //obtain entity manager
Book b = new Book();
b.setTitle(“NetBeans Field Guide”);
em.getTransaction().begin();
em.persist(b);
em.getTransaction().commit();
```

Java Persistence API—Configuration

Minimum Configuration in XML—the Rest Is Annotations

- Persistence Unit
  - Where to store data
    - JDBC API connection or
    - Server data source
  - How to create tables
    - Generated by runtime or
    - Match existing tables
  - Transaction strategy
  - Vendor specific properties



Create Persistence Unit

Persistence Unit Name: MyPersistence

Specify the persistence provider and persistence database.

● Server Managed Persistence (Sun Java System Application Server)

□ Non-default Provider:

Data Source: jdbc/__default

☑ Use Java Transaction APIs

○ Application Managed Persistence

Persistence Library: MyLibrary

Database Connection: jdbc:derby://localhost:1527/sampl...

Table Generation Strategy: ● Create ○ Drop and Create ○ None

- NetBeans IDE creates persistence unit for you
  - Helps to select database, edits vendor properties, etc.

Accessing Entity Manager in Code

```
// Server environment (EJB 3.0 or Web 2.5) - use injection
@PersistenceContext(name="pu1")
EntityManager em;


// Standalone persistence (Java SE or J2EE 1.4)
EntityManagerFactory emf =
    Persistence.createEntityManagerFactory("pu1");
EntityManager em = emf.createEntityManager();

//or you can still use JNDI lookup
InitialContext ctx = new InitialContext();
EntityManager em = EntityManager)
ctx.lookup("java:comp/env/persistence/EntityManager");
```

Object Relational Mapping (ORM)

- Developer is working with objects
  - Query database and get objects
  - Save new or modified objects, etc.
- Data are automatically transformed between Java objects and database
- ORM annotations define how to map objects into tables in relational database
  - Map entity classes on existing tables
  - Control generation of database tables
  - Table/Column names and attributes, foreign keys, etc.

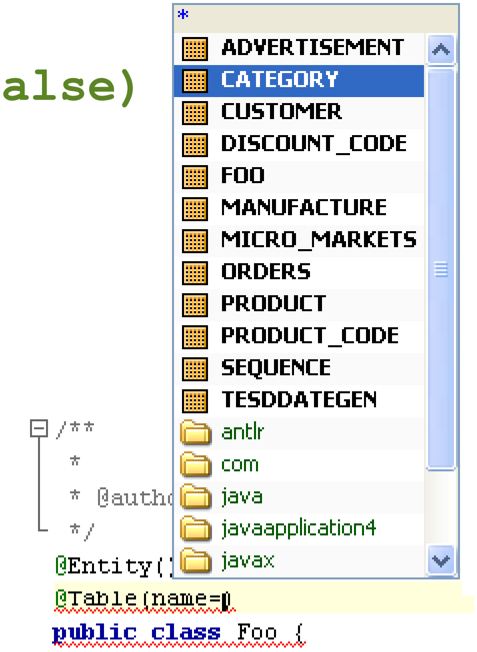
Object Relational Mappings—Example

All Mappings Have Defaults, Can Be Overridden

```
@Entity
@Table(name = "CUSTOMER")
public class Customer {
  @Id
  @Column(name = "CUSTOMER_ID",nullable = false)
  private Integer customerId;

  @OneToMany(mappedBy = "customerId")
  private Collection <Orders> orders;

  @JoinColumn(name = "DISCOUNT_CODE")
  @ManyToOne(cascade = CascadeType.ALL)
  private DiscountCode discountCode;
```



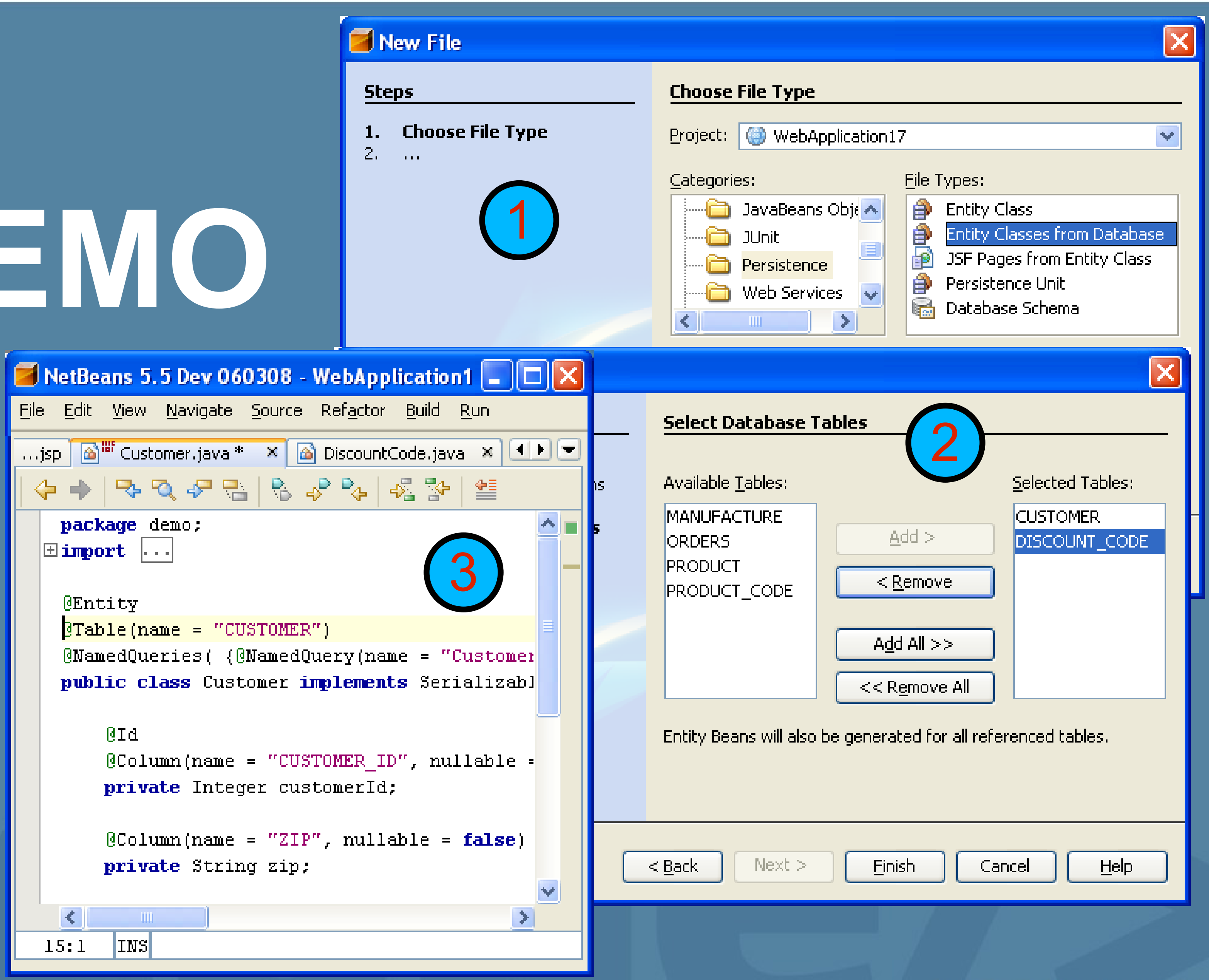
```
/**
 *
 * @autho
 */
@Entity(
@Table(name=
public class Foo {
```

Java Persistence API in NetBeans IDE

How Does NetBeans IDE Help You?

- Wizards for entity classes
  - Create new entity or convert an existing class to entity
  - Generate entity classes from an existing database
- Editor hints and error messages, verification kit
  - Detect and mark code that will compile but not run
  - Help to fix it
- Special code completion—DB tables, columns
- Helps to configure persistence unit, data sources

DEMO



Steps

1. Choose File Type
2. ...

Choose File Type

Project: WebApplication17

Categories: JavaBeans Obje, JUnit, Persistence, Web Services

File Types: Entity Class, Entity Classes from Database, JSF Pages from Entity Class, Persistence Unit, Database Schema

Select Database Tables

Available Tables: MANUFACTURE, ORDERS, PRODUCT, PRODUCT_CODE

Selected Tables: CUSTOMER, DISCOUNT_CODE

Entity Beans will also be generated for all referenced tables.

```
package demo;
import ...

@Entity
@Table(name = "CUSTOMER")
@NamedQueries( {@NamedQuery(name = "Customer
public class Customer implements Serializabl

    @Id
    @Column(name = "CUSTOMER_ID", nullable =
    private Integer customerId;

    @Column(name = "ZIP", nullable = false)
    private String zip;
```

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EJB 3.0 Specification—Simplified

- EJB beans as regular Java classes (POJO)
  - @Stateless, @Stateful, @MessageDriven annotations
  - Standard interface inheritance can be used
- Transactions, security, lifecycle—interceptors
- Dependency injections
  - Instead of using JNDI™ API to locate components and resources let the container set resources in code
- Entity beans replaced with Java Persistence API
  - In EJB module: simpler transactions, security

EJB 3.0 Specification—Example

```
@Local
public interface Calculator {
  int add(int a, int b);
}
@Stateless
public class CalculatorBean implements Calculator {
   public int add(int a, int b) {
      return a+b;
   }
}

// Calling EJBs from other EJBs or Web apps - Injection
@EJB Calculator calculator;
...
int i = calculator.add(1, 2);
```

Simplified Development

	EJB 2.1 API	EJB 3.0 API
Number of Java files	17	7
Number of XML files	9	2
Lines of code (Java language)	987	716
Lines of code (XML)	792	26

Source: Raghu Kodali

www.jroller.com/comments/raghukodali/Weblog/does_ejb_3_0_really

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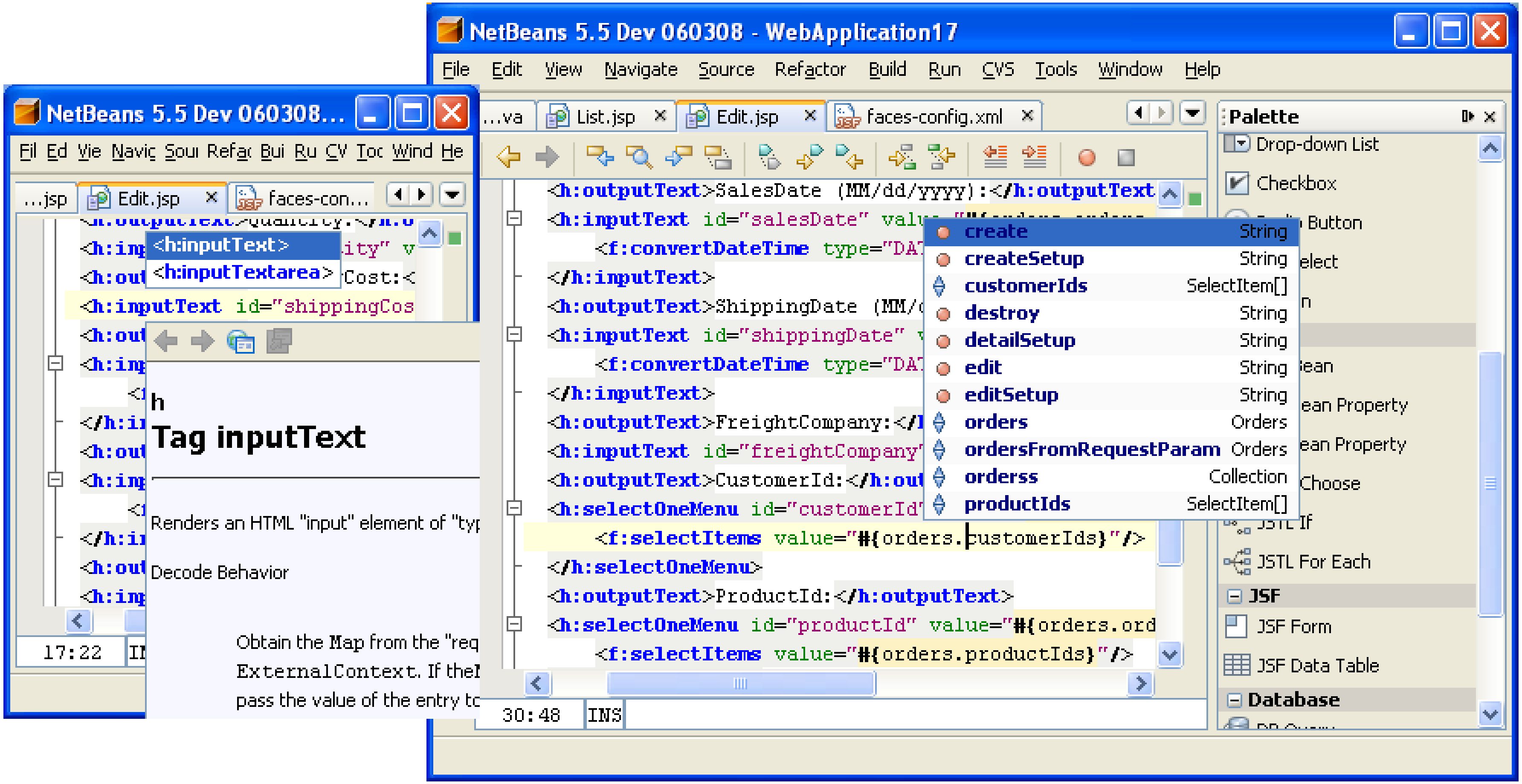
Web Apps in NetBeans IDE

- Java EE 5: JavaServer Pages™/Servlet 2.5, JavaServer Faces 1.2 technologies
  - Injection of resources in web apps,
- Advanced JavaServer Pages specification editor
  - Code completion for JavaServer Pages, JavaServer Faces, Java Standard Tag Library technologies and any tag libraries added by the user
  - Integrated documentation in a similar Javadoc™ tool format
  - Expression language code completion
  - HTML, JavaServer Pages and JavaServer Faces component palette

Web Apps—JavaServer Pages/ JavaServer Faces Technology Editing



```
<h:outputText>SalesDate (MM/dd/yyyy):</h:outputText
<h:inputText id="salesDate" valu
    <f:convertDateTime type="DA
</h:inputText>
<h:outputText>ShippingDate (MM/c
<h:inputText id="shippingDate" v
    <f:convertDateTime type="DA
</h:inputText>
<h:outputText>FreightCompany:</h
<h:inputText id="freightCompany"
<h:outputText>CustomerId:</h:out
<h:selectOneMenu id="customerId"
    <f:selectItems value="#{orders.customerIds}"/>
</h:selectOneMenu>
<h:outputText>ProductId:</h:outputText>
<h:selectOneMenu id="productId" value="#{orders.ord
    <f:selectItems value="#{orders.productIds}"/>
```

create	String
createSetup	String
customerIds	SelectItem[]
destroy	String
detailSetup	String
edit	String
editSetup	String
orders	Orders
ordersFromRequestParam	Orders
orderss	Collection
productIds	SelectItem[]

```
<h:inputText id="shippingCos
```

<h:inputText>
<h:inputTextarea>

h

Tag inputText

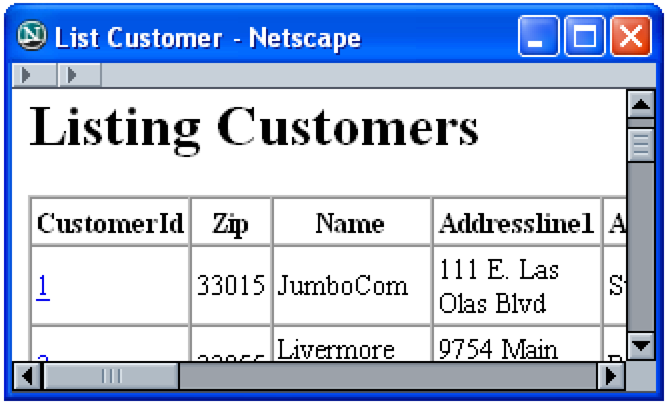
Renders an HTML "input" element of "typ

Decode Behavior

Obtain the Map from the "req ExternalContext. If the pass the value of the entry to

Web Apps—JavaServer Faces Technology Generation

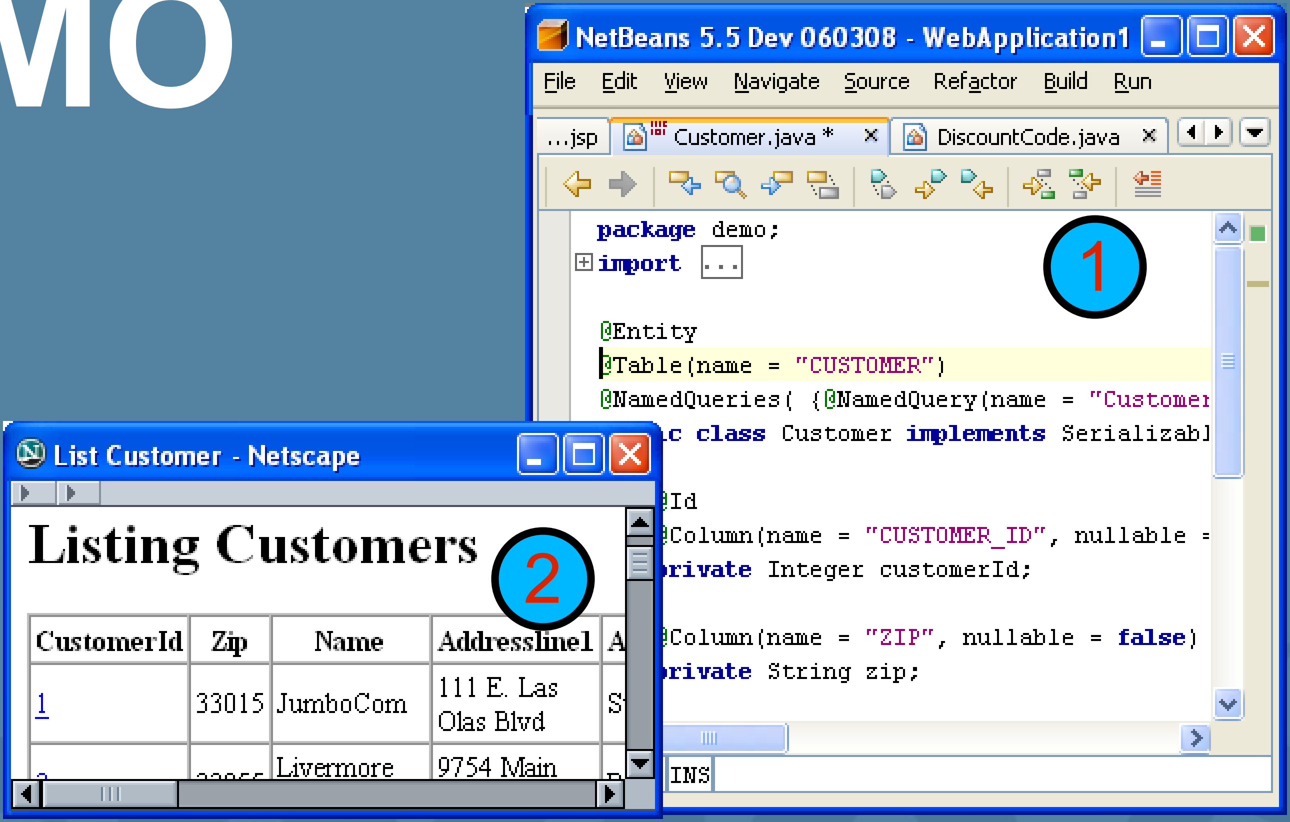
- Generation of JavaServer Faces applications
  - Start with Java Persistence API entity classes
  - Generates JavaServer Faces pages—list, detail, edit, create
  - JavaServer Faces managed bean: controller and access to entities
  - JavaServer Faces converters for entities
  - Creates navigation rules
  - Code is easy to read/change
- Helps to learn the patterns
- Gets you started quickly
- Compare to Ruby On Rails…



Listing Customers

CustomerId	Zip	Name	Addressline1	A
1	33015	JumboCom	111 E. Las Olas Blvd	S
		Livermore	9754 Main	

DEMO


NetBeans 5.5 Dev 060308 - WebApplication1
File Edit View Navigate Source Refactor Build Run
...jsp
Customer.java *
DiscountCode.java
1
INS
List Customer - Netscape
2

```
package demo;
import ...

@Entity
@Table(name = "CUSTOMER")
@NamedQueries( {@NamedQuery(name = "Customer
c class Customer implements Serializabl

Id
Column(name = "CUSTOMER_ID", nullable =
rivate Integer customerId;

Column(name = "ZIP", nullable = false)
rivate String zip;
```

Listing Customers

CustomerId	Zip	Name	Addressline1	A
1	33015	JumboCom	111 E. Las Olas Blvd	S
[illegible]	[illegible]	Livermore	9754 Main	[illegible]

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Web Services 2.0

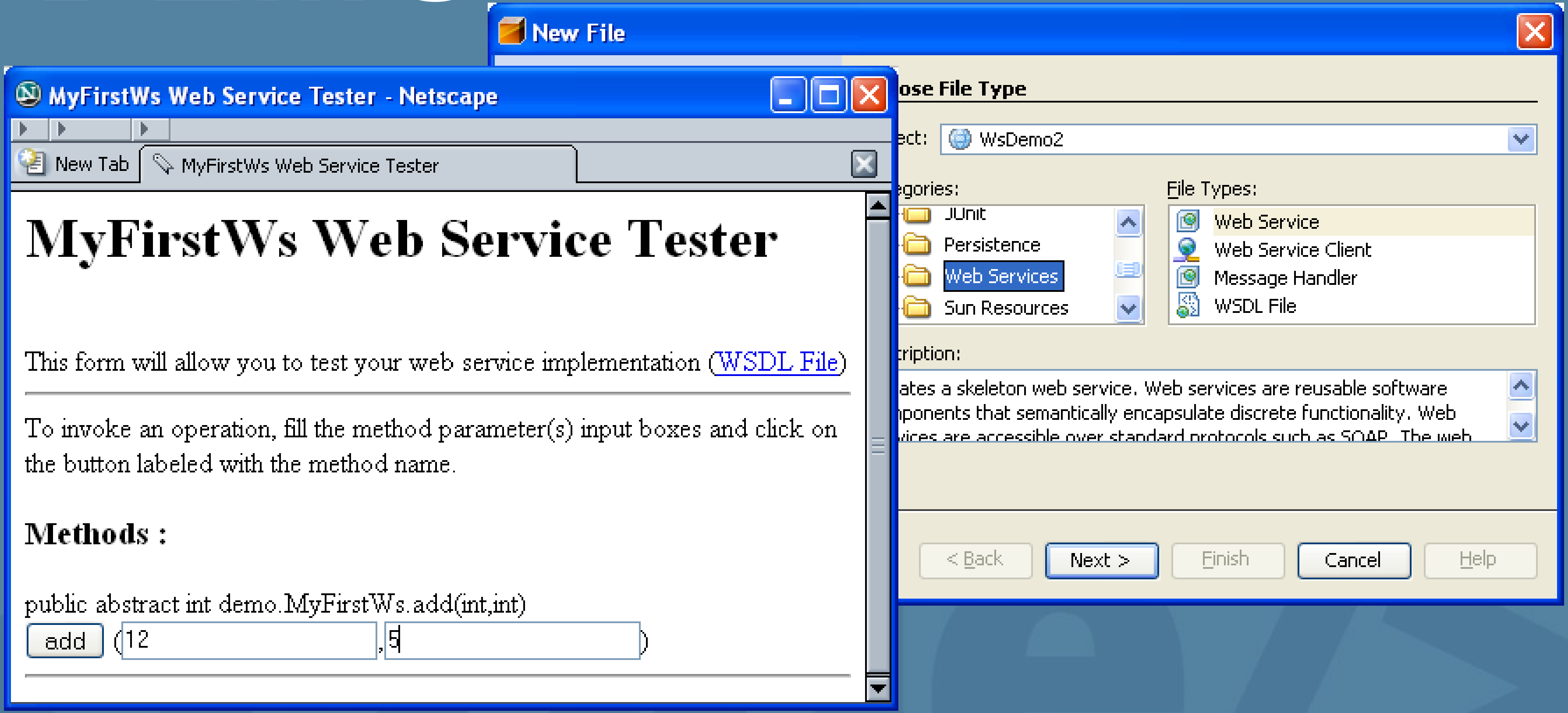
- Web Services is a regular Java class (POJO)
  - @WebService, @WebMethod, @WebClient
  - Use injection to call web services
  - Asynchronous web services
- Web Service client in Java SE 6 platform

```
@WebService()
public class Calculator {
    @WebMethod()
    public int add(int a, int b) {
        return a + b;
    }
}
```

Web Services 2.0 in NetBeans IDE

- Wizards for web services and web service clients
  - Start from annotated Java classes
  - Start from WSDL and XML schema
- Editor: special code verification and hints for web services
- Testing of web services in application server

DEMO



ates a skeleton web service. Web services are reusable software nponents that semantically encapsulate discrete functionality. Web vices are accessible over standard protocols such as SOAP. The web

MyFirstWs Web Service Tester

This form will allow you to test your web service implementation (WSDL File)

To invoke an operation, fill the method parameter(s) input boxes and click on the button labeled with the method name.

Methods :

public abstract int demo.MyFirstWs.add(int,int)

add (12 ,5)

Summary

- Java EE 5 platform = Developer's life is easier
  - POJO, annotations, dependency injection
  - Java Persistence API—standard for ORM in Java SE, Web and EJB platforms
  - Simplification of EJB specification and Web Services
- NetBeans IDE helps you to be more productive
- NetBeans 5.5 software supports Java EE 5 platform

TODAY!

For More Information

- NetBeans and Java EE platforms at JavaOne^{SM} conference
  - BOF-2807: Java™ Persistence API in the NetBeans™ IDE
  - BOF-2835: Creating an IDE for Your Favorite Web Framework
  - BOF-2549: Debugging and Profiling J2EE/Java EE 5 Applications
- Learn more at
  - http://j2ee.netbeans.org/
  - http://java.sun.com/javaee/5/

Q&A