1

Organizzazione della Lezione

- Introduzione agli EJB
- Esempio: HelloWorld EJB
- Esempio: Book EJB
- Conclusioni

2

Un HelloWorld EJB

- Esempio HelloWorld che include
  1. Il bean (stateless)
  2. Interfaccia remota
  3. Client

3

HelloWorld Bean

- Il package del bean
- Import necessaria per lo Stateless
- Annotazione per il tipo di EJB
- Classe
- Interfaccia remota
- Metodo di business che
- restituisce un saluto al nome passato

```
package hello;
import javax.ejb.Stateless;

@Stateless
public class HelloBean
      implements HelloWorldBeanRemote {

 @Override
 public String sayHello(String name) {
   return "Hello"+name+"!";
 }

}
```


4

L'Interfaccia Remota

- Package del EJB
- Import necessaria per la annotazione
- Interfaccia remota
- Dichiarazione interfaccia
- Metodo di business per dire ciao

```
package hello;
import javax.ejb.Remote;

@Remote
public interface HelloWorldBeanRemote {

  String sayHello(String name);

}
```


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Il Client

- Package
- Import vari
- Nome client
- Lancia eccezione per la lookup
- Contesto di esecuzione
- Preleva il contesto (niente parametri: libreria client GlassFish)
- Restituendo un bean remoto
  - si fa la lookup a JNDI
  - con il nome globale
- Invocazione remota

```
package helloworldclient;
import javax.naming.Context;
import javax.naming.InitialContext;
import javax.naming.NamingException;

public class HelloWorldClient {

  public static void main(String[] args)
                              throws NamingException {
  Context ctx;
  ctx = new InitialContext();

  HelloWorldBeanRemote helloBean = (HelloWorldBeanRemote)
   ctx.lookup("java:global/HelloWorldBean/HelloBean!hello.
                HelloWorldBeanRemote");
  System.out.println("Ora invoco...");
  System.out.println(helloBean.sayHello("Ciao!"));

  }
}
```


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Pratica su NetBeans con un HelloWorld EJB

- I passi da seguire

1. Creiamo un progetto per l'EJB
2. Creiamo un progetto per il client
   - incluso la configurazione di librerie, etc.
3. Deployment ed esecuzione su server dell'EJB
4. Invocazione del servizio da parte del client

- IMPORTANTE: Il nome del progetto deve essere diverso dal nome del session bean!

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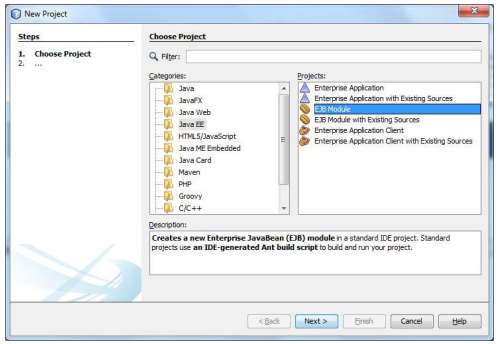
HelloWorld EJB: Tipo del Progetto

- Creazione del progetto
  1. New Project
  2. Java with Ant
  3. Java Enterprise
  4. EJB Module



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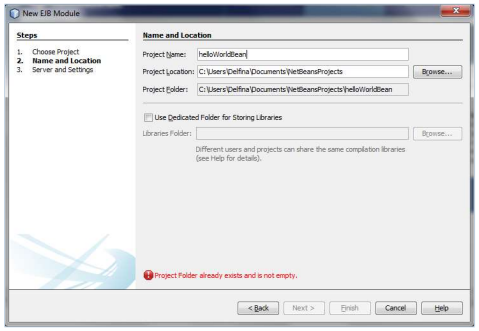
HelloWorld EJB: Nome del Progetto



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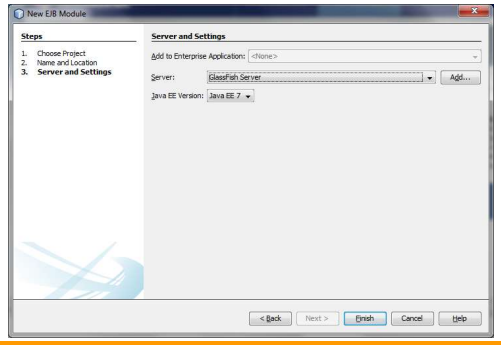
HelloWorld EJB: Setting del Progetto



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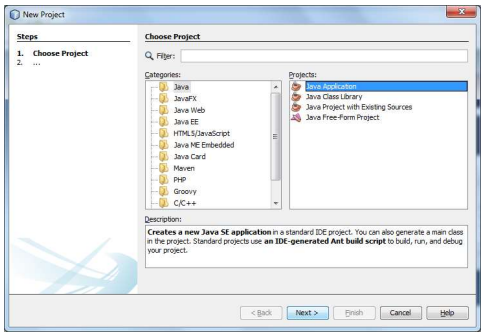
HelloWorld EJB: Client: Tipo del Progetto



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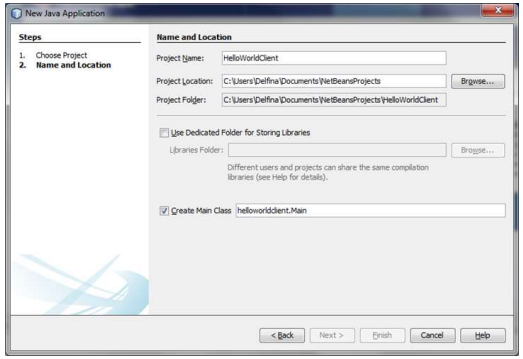
HelloWorld EJB: Client: Nome del Progetto



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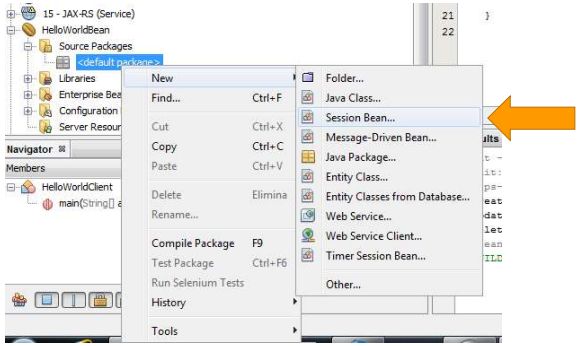
HelloWorld EJB: Creiamo un Session Bean



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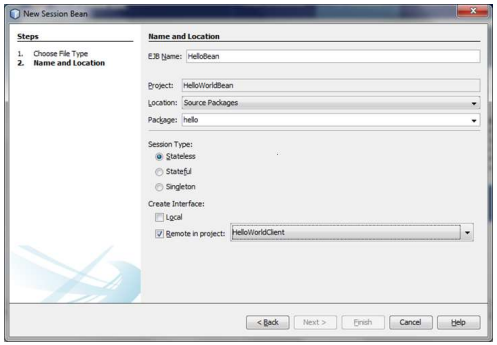
HelloWorld EJB: Parametri del Session Bean



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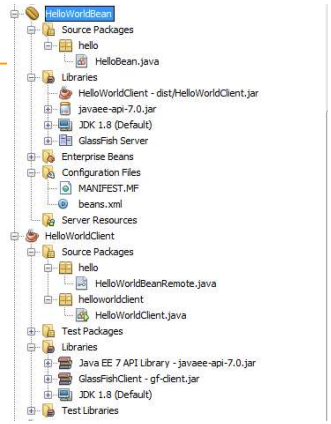
Status dei Progetti

- Due progetti
  1. Uno di tipo EJB (notare l'icona)
  2. Uno di tipo standard (client)
- Notare la presenza del package hello anche dentro il Client
- La presenza dell'interfaccia remota è spostata automaticamente solo sul client
  - al deployment il server riesce a generare automaticamente l'interfaccia remota



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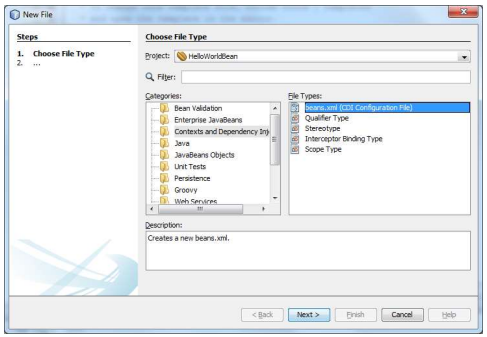
HelloWorld EJB: Creazione del file beans.xml



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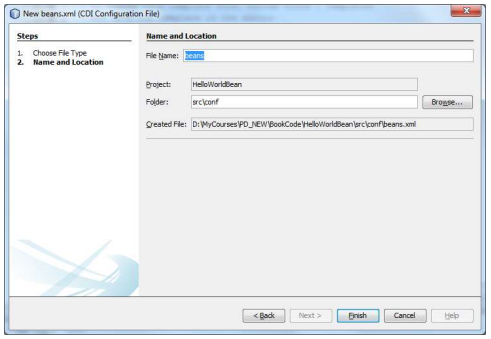
HelloWorld EJB: Nome del file beans.xml



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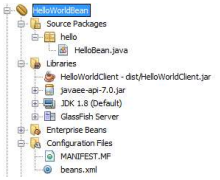
HelloWorld EJB: Bean discovery mode

- Il file `beans.xml` è «vuoto»
  - Senza di esso, il server non lo considera "iniettabile"
  - Sintomo: al deploy tutto bene, ma poi non riesce a fornirlo
  - `bean-discovery-mode`: da `annotated` deve diventare `all`




```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://xmlns.jcp.org/xml/ns/javaee"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee http://xmlns.jcp.org/xml/ns/javaee/beans_1_1.xsd"
       bean-discovery-mode="annotated">
</beans>
```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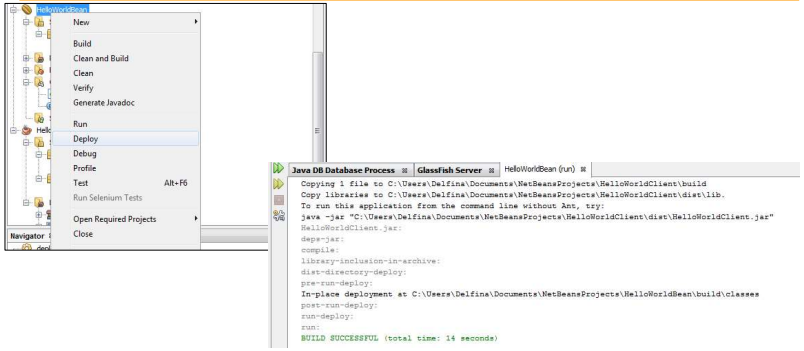
HelloWorld EJB: Deployment



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HelloWorld EJB: Log del server al deploy

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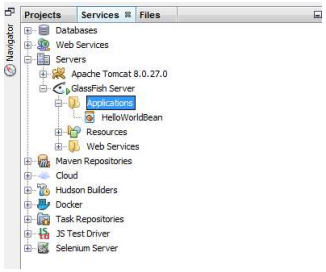
HelloWorld EJB: Situazione sul Server

- Tab *Services*, icona *Servers*
- Sotto il *GlassFish Server* si scelgono le applicazioni
- Per ciascuna applicazioni si può abilitare, disabilitare, e fare undeploy



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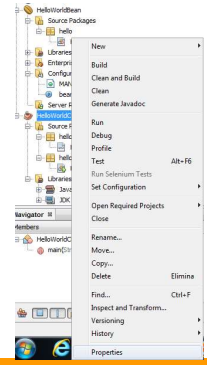
HelloWorld EJB: Il Client: La libreria

- Necessario caricare una libreria per usare con facilità GlassFish
  - non strettamente necessaria: possibile collegarsi con i parametri a qualsiasi server
  - serve a facilitare il testing
- La libreria si trova sotto la directory di GlassFish
  - sotto NetBeans
- GLASSFISH HOME/glassfish/lib/gf−client.jar



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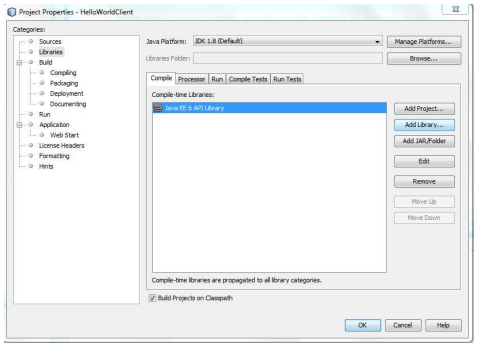
HelloWorld EJB: Setting della libreria lato client



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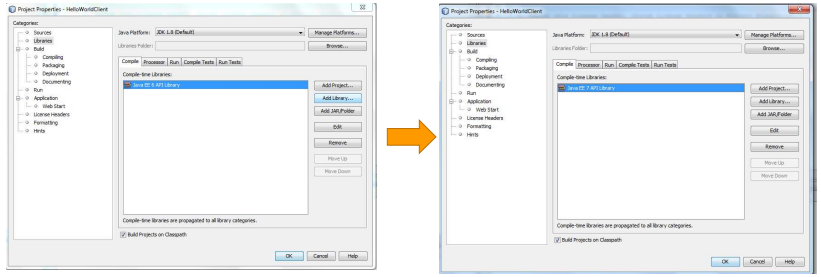
HelloWorld EJB: Se necessario cancelliamo la libreria EE6 e aggiungiamo EE 7



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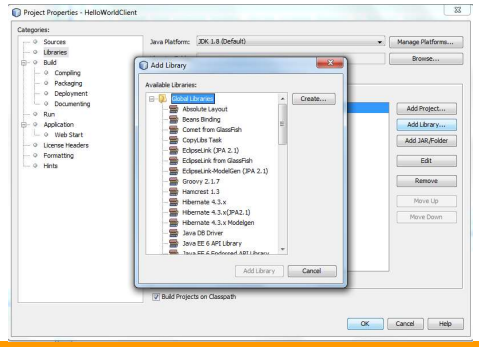
HelloWorld EJB: Creiamo una nuova libreria



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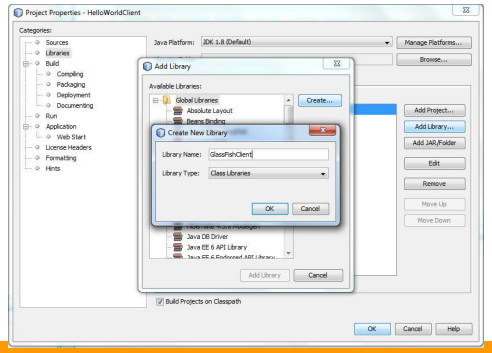
Nome della nuova libreria: GlassFishClient



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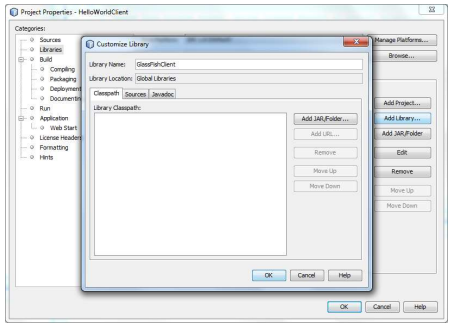
Scelta del file jar



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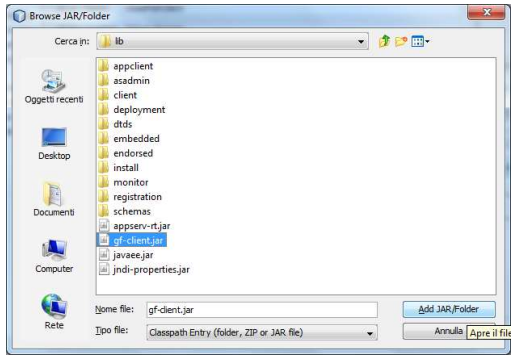
Nella directory del Server: Glassfish/LIB



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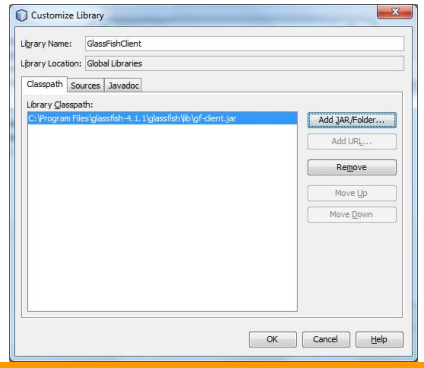
Ora possiamo aggiungerla



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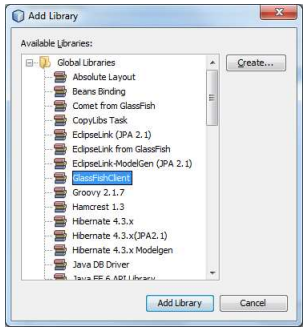
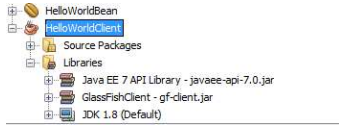
Situazione finale





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Se non carica la libreria

```
run:
Exception in thread "main" javax.naming.NoInitialContextException: Need to specify class name in env
ironment or system property, or as an applet parameter, or in an application resource file:  java.na
ming.factory.initial
        at javax.naming.spi.NamingManager.getInitialContext(NamingManager.java:662)
        at javax.naming.InitialContext.getDefaultInitCtx(InitialContext.java:313)
        at javax.naming.InitialContext.getURLOrDefaultInitCtx(InitialContext.java:350)
        at javax.naming.InitialContext.lookup(InitialContext.java:417)
        at helloworldclient.HelloWorldClient.main(HelloWorldClient.java:30)
Java Result: 1
BUILD SUCCESSFUL (total time: 0 seconds)
```


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Esecuzione del client

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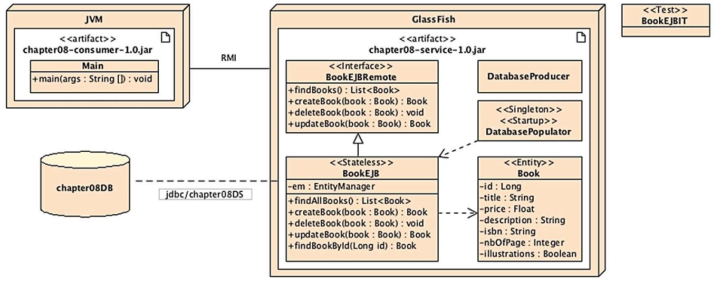
Book EJB

- Esempio di servizio Book EJB (Capitolo 8)



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Book EJB: Struttura del Progetto

- Struttura:
  - java:
    - classi Book entity, BookEJB
    - Interface BookEJBRemote
    - classi DatabasePopulator e DatabaseProducer
  - resources:
    - `persistence.xml`: file contenente le informazioni sulla *persistence unit* usata per il database Derby
    - `beans.xml`: fa trigger di CDI

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Book EJB: l'entita Book

- Annotazione entità
- Query named per trovare tutti i libri
- ID generata
  - chiave primaria
- Titolo non vuoto

```
@Entity
@NamedQuery(name = FIND_ALL, query ="SELECT b FROM Book b")
public class Book implements Serializable {
  public static final String FIND_ALL = "Book.findAllBooks";
  @Id @GeneratedValue
  private Long id;
  @NotNull
  @Column(nullable = false)
  private String title;
  private Float price;
  @Size(max = 2000)
  @Column(length = 2000)
  private String description;
  private String isbn;
  private Integer nbOfPage;
  private Boolean illustrations;

  // Constructors, getters, setters

}
```


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Book EJB: Struttura della logica di business

- EJB che gestisce le operazioni CRUD per la entità `Book`
- Metodi per:
  - trovare un libro
  - creare un libro
  - aggiornare un libro
  - cancellare un libro

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Book EJB: l'EJB

- Bean stateless
- EM iniettato
- Un metodo (con validazione) per creare un libro persistente
- Un metodo (con validazione) per re-inserire un libro
  - precedentemente detached
- Interfaccia remota

```
@Stateless
@LocalBean
public class BookEJB implements BookEJBRemote
  @Inject
  private EntityManager em;
  public List<Book> findBooks() {
    TypedQuery<Book> query =
       em.createNamedQuery(FIND_ALL, Book.class);  return
    query.getResultList();
  }
  public @NotNull Book createBook(@NotNull Book book) {
    em.persist(book);
    return book;
  }
  public @NotNull Book updateBook(@NotNull Book book) {
    return em.merge(book);
  }
  public void deleteBook(@NotNull Book book) {
    em.remove(em.merge(book));
  }
}
```

```
@Remote
public interface BookEJBRemote {
  List<Book> findBooks();
  Book createBook(Book book);
  void deleteBook(Book book);
  Book updateBook(Book book);
}
```


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Book EJB: un Producer per l'Entity Manager

- Per poter iniettare un EM con un parametro (la PU) necessario scrivere un producer
  - che produce un EM
  - scegliendo la PU (e il contesto) da utilizzare
- Ecco la entità generata

```
public class DatabaseProducer {

  @Produces
  @PersistenceContext(unitName ="EJB_Lab4PU")
  private EntityManager em;

}
```


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Book EJB: il file persistence.xml

- Transazioni a carico del container
  - nessuna gestione da parte del bean
- Data source
- Tipologia DB
- Ricrea le tabelle
  - attenzione, cancella quelle esistenti

```
<?xmlversion="1.0"encoding="UTF-8"?>
 <persistence xmlns="http://xmlns.jcp.org/xml/ns/persistence"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/persistence
 http://xmlns.jcp.org/xml/ns/persistence/persistence_2_1.xsd"
 version="2.1">

 <persistence-unit name="EJB_Lab4PU" transaction-type="JTA">
  <jta-data-source>
                java:global/jdbc/EJB_Lab4DS
  </jta-data-source>
  <properties>
   <property name="eclipselink.target-database"
      value="DERBY"/>
   <property name="eclipselink.ddl-generation"
             value="drop-and-create-tables"/>
   <property name="eclipselink.logging.level"value="INFO"/>
  </properties>
 </persistence-unit>
</persistence>
```


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Come creare i dati

- Normalmente i dati vengono creati, una volta, all'inizio
- Gli EJB vengono magari aggiornati ma non vanno a ricreare i dati
  - in un esempio didattico, questo invece va fatto
- Creiamo in un DB un paio di libri
  - creiamo un EJB singleton il cui compito è quello di popolare il DB
  - quando termina (all'undeploy) viene effettuata la cancellazione del DB

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Book EJB: Creazione del DB

- Singola istanza EJB
- Definizione dei dati
  - Il driver JDBC
  - Il nome globale (JNDI)
  - Il nome del DB
- La classe
  - logica di business EJB iniettato dal container
- Appena costruito, popola il DB
  - inserendo dei libri
- Alla fine li cancella

```
@Singleton
@Startup
@DataSourceDefinition(
 className ="org.apache.derby.jdbc.EmbeddedDataSource",
 name ="java:global/jdbc/EJB_Lab4DS",
 user ="app",
 password ="app",
 databaseName ="EJB_Lab4DB",
 properties = {"connectionAttributes=;create=true"}
 )
public class DatabasePopulator {
  @Inject
  private BookEJB bookEJB;
  private Book h2g2, lord;
  @PostConstruct
  private void populateDB() {
     h2g2 = new Book("Beginning Java EE7", 35F,"Great book",
                "1-8763-9125-7", 605,true);
     lord = new Book("The Lord of the Rings", 50.4f,"SciFi",
                "1-84023-742-2", 1216,true);
     bookEJB.createBook(h2g2);
     bookEJB.createBook(lord);
  }

  @PreDestroy
  private void clearDB() {
    bookEJB.deleteBook(h2g2);
    bookEJB.deleteBook(lord);
  }
}
```


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Book EJB: il client

- Lancia eccezione per lookup
- Contesto per la lookup
  Lookup via JNDI
- Lista dei libri
- Creazione di un nuovo libro
  - passato all'EJB
- Cambiamento del titolo
  - e cancellazione

```
import java.util.*;
import javax.naming.*;
public class Main {
 public static void main(String[] args) throws NamingException{
   Context ctx;
   ctx = new InitialContext();
   BookEJBRemote bookEJB = (BookEJBRemote)
    ctx.lookup("java:global/EJB_Lab4/BookEJB!ejb.BookEJBRemote");
   List<Book> books = bookEJB.findBooks();
   for (Book aBook : books) {
     System.out.println("---"+ aBook);
   }
   Book book = new Book("The Hitchhiker's Guide..",12.5F,
                "Douglas Adams.", "1-24561-799-0", 354, false);
   book = bookEJB.createBook(book);
   System.out.println("###Book created:"+ book);
   book.setTitle("H2G2");
   book = bookEJB.updateBook(book);
   System.out.println("###Book updated:"+ book);
   bookEJB.deleteBook(book);
   System.out.println("###Book deleted");
 }
}
```


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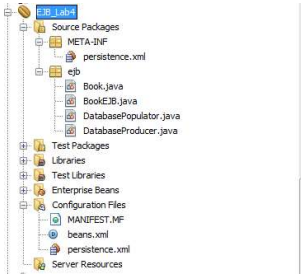
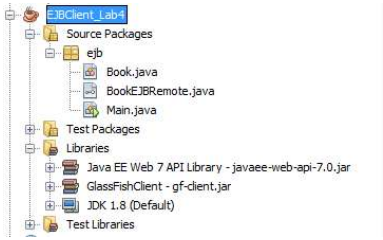
Book EJB: Pratica su NetBeans

- Due progetti





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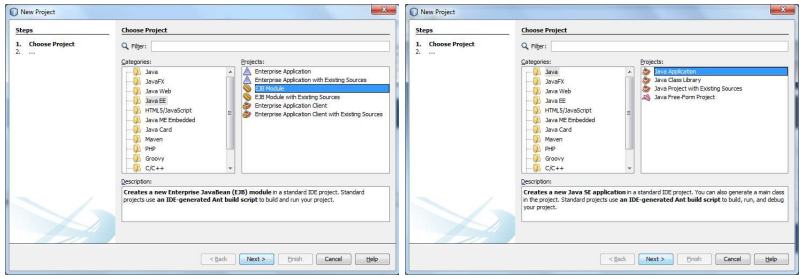
Book EJB: Passo 1: Creazione dei Progetti su NetBeans

- Seguendo i passi che abbiamo visto per HelloWorld EJB



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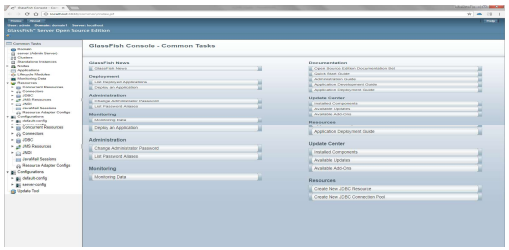
Book EJB: Passo 1: Creazione del database

- Da admin console (porta 4848)
  1. creiamo un Connection Pool
  2. creiamo un Data Source



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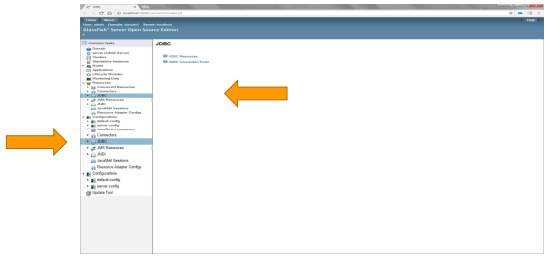
Book EJB: Passo 1: Creazione del database

- 1. Creiamo un Connection Pool
  - JBDC → JBD Connection Pool



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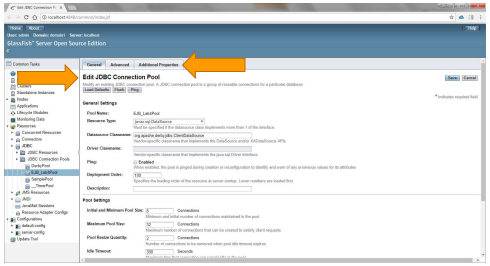
Book EJB: Passo 1: Creazione del database

- 1. Creiamo un Connection Pool
  - JBDC → JBD Connection Pool → Edit JBDC Connection Pool → Additional Properties



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Book EJB: Passo 1: Creazione del database

- 1. Creiamo un Connection Pool
  - JBDC → JBD Connection Pool → Edit JBDC Connection Pool → Additional Properties

Pool Name: EJB_Lab4Pool

Additional Properties (6)

Add Property | Delete Properties

Select	Name	Value
	ServerName	localhost
	PortNumber	1527
	Password	APP
	ConnectionAttributes	;create=true
	User	APP
	DatabaseName	EJB_Lab4DB

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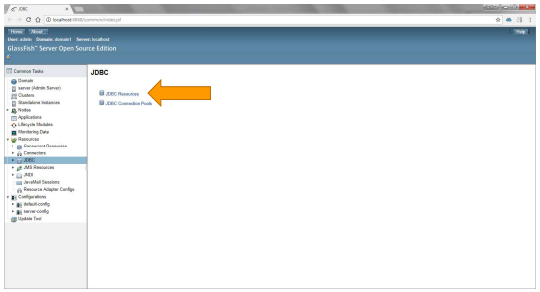
Book EJB: Passo 2: Creazione del database

- 2. Creiamo un Data Source



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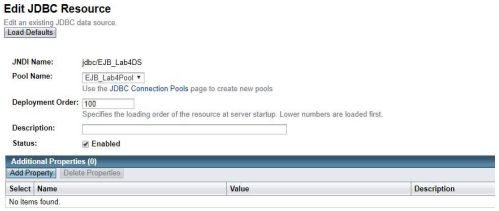
Book EJB: Passo 2: Creazione del database

- 2. Creiamo un Data Source



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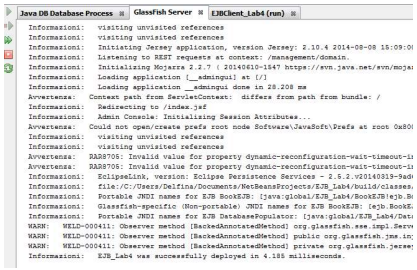
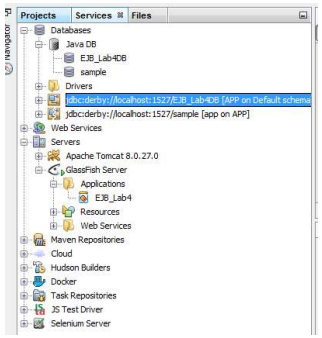
Book EJB: Passo 3: Compilazione e deploy





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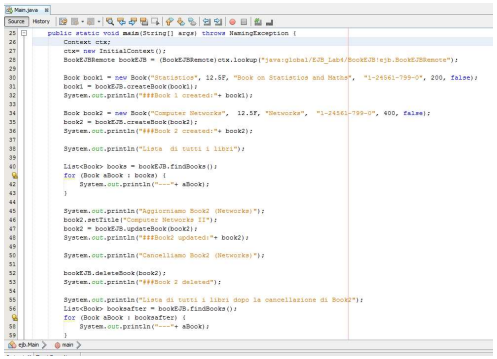
Book EJB: Passo 4: Esecuzione

- Codice client da eseguire



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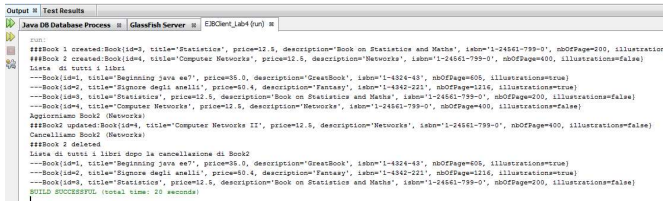
Book EJB: Passo 4: Esecuzione

- Output client



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Possibili errori

- Nome del progetto diverso dal nome del bean
- Ricordarsi del beans.xml

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Conclusioni

- Introduzione agli EJB
- Esempio: HelloWorld EJB
- Esempio: Book EJB
- Conclusioni

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