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Master of Science in Computer Science

Distributed Systems Manual for Laboratory Practice

Enterprise JavaBeans

PART I Environment Configuration and Execution of Examples A Simple Banking Application with EJBs

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1. Document Purpose

This document contains explanations on how to run the following programs: RMI Servers, RMI Client and Database Server.

For running the programs, a correct configuration of the running environment is necessary (path and classpath variables).

- Install Java SE (JDK) JDK8 https://www.oracle.com/java/technologies/javase/javase8-archive-downloads.html
- Install Java EE JDK7 <u>http://www.oracle.com/technetwork/java/javaee/downloads/java-ee-sdk-7-downloads-1956236.html</u>
- Install Netbeans 8.2 https://dlc-cdn.sun.com/netbeans/8.2/final/?pagelang=
- Install MySQL 5.0 and MySQL WorkBench 8.0

Set path and Path variables in the operating system

Click on Environment Variables.

Find the Path system variable and click Edit. Set the value of the variable to the directory where you have installed Java, for example:

D:\Program Files\Java\jdk1.8.0\bin

Edit environment variable		×
C:\Program Files\Java\jdk-1.8\bin		New
C:\ProgramData\Oracle\Java\javapath		
C:\Users\Admin\Desktop\ORACLE\bin		<u>E</u> dit
%SystemRoot%\system32		
%SystemRoot%		Browse
%SystemRoot%\System32\Wbem		
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\		Delete
%SYSTEMROOT%\System32\OpenSSH\		
		Movellp
		Move <u>op</u>
		Maus Daum
		Move D <u>o</u> wn
		Edit <u>t</u> ext
	OK	Cancel

Ensure that the required JDK software is installed on your system and that

the JAVA_HOME environment variable points to the JDK installation directory, not the Java Runtime Environment (JRE) software.

ironment Variables	>		
lear variables for Admin			
Variable	Value		
MOZ_PLUGIN_PATH	C:\Program Files (x86)\Foxit Software\Foxit PDF Reader\plugi		
OneDrive	C:\Users\Admin\OneDrive		
Path	C:\Users\Admin\AppData\Local\Programs\Python\Python312		
TEMP	C:\Users\Admin\AppData\Local\Temp		
TMP	Users\Admin\AppData\Local\Temp		
	New Edit Delete		
	<u>N</u> ew <u>E</u> dit <u>D</u> elete		
	<u>N</u> ew <u>E</u> dit <u>D</u> elete		
ystem variables	<u>N</u> ew <u>E</u> dit <u>D</u> elete		
ystem variables Variable	<u>N</u> ew <u>E</u> dit <u>D</u> elete		
ystem variables Variable ComSpec	New Edit Delete Value ^ C:\Windows\system32\cmd.exe ^		
ystem variables Variable ComSpec DriverData	New Edit Delete Value ^ C:\Windows\system32\cmd.exe ^ C:\Windows\System32\Drivers\DriverData ^		
ystem variables Variable ComSpec DriverData JAVA_HOME	New Edit Delete Value ^ C:\Windows\system32\cmd.exe ^ C:\Windows\System32\Drivers\DriverData ^ C:\Program Files\Java\jdk-1.8 ^		
vstem variables Variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS	New Edit Delete Value C:\Windows\system32\cmd.exe C:\Windows\System32\Drivers\DriverData C:\Program Files\Java\jdk-1.8 8		
vstem variables Variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS OS	New Edit Delete Value C:\Windows\system32\cmd.exe C:\Windows\System32\Drivers\DriverData C:\Program Files\Java\jdk-1.8 8 Windows_NT		
vstem variables Variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS OS Path	New Edit Delete Value C:\Windows\system32\cmd.exe C:\Windows\System32\Drivers\DriverData C:\Program Files\Java\jdk-1.8 8 Windows_NT C:\Program Files\Java\jdk-1.8\bin;C:\ProgramData\Oracle\Jav		
vstem variables Variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS OS Path PATHEXT	New Edit Delete Value C:\Windows\system32\cmd.exe C:\Windows\System32\Drivers\DriverData C:\Program Files\Java\jdk-1.8 8 Windows_NT C:\Program Files\Java\jdk-1.8\bin;C:\ProgramData\Oracle\Jav .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC		
vstem variables Variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS OS Path PATHEXT	New Edit Delete Value C:\Windows\system32\cmd.exe C:\Windows\System32\Drivers\DriverData C:\Program Files\Java\jdk-1.8 8 Windows_NT C:\Program Files\Java\jdk-1.8\bin;C:\ProgramData\Oracle\Jav AUDC4		
vstem variables Variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS OS Path PATHEXT	New Edit Delete Value ^ C:\Windows\system32\cmd.exe ^ C:\Windows\System32\Drivers\DriverData ^ C:\Program Files\Java\jdk-1.8 8 Windows_NT C:\Program Files\Java\jdk-1.8\bin;C:\ProgramData\Oracle\Jav COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC ~ New Edjt Delete		
variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS OS Path PATHEXT	New Edit Delete Value ^ C:\Windows\system32\cmd.exe ^ C:\Windows\System32\Drivers\DriverData ^ C:\Program Files\Java\jdk-1.8 8 Windows_NT C:\Program Files\Java\jdk-1.8\bin;C:\ProgramData\Oracle\Jav .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC ~ New Edit Delete		
variable ComSpec DriverData JAVA_HOME NUMBER_OF_PROCESSORS OS Path PATHEXT	New Edit Delete Value C:\Windows\system32\cmd.exe C:\Windows\System32\Drivers\DriverData C:\Program Files\Java\jdk-1.8 8 Windows_NT C:\Program Files\Java\jdk-1.8\bin;C:\ProgramData\Oracle\Jav .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC New Edjt Delete		

Download and install the Netbeans IDE by double clicking the executable installation file.

Download and install Java EE SDK.

If the .exe file does not start use the following command:



🛓 Java EE 7 SDK		_		×
C MAR I				
Introduction Installation Type	Introduction			7
Install Directory Update Tool				
Ready To Install Progress	Welcome to the Java EE 7 SDK installation.			
Config Results Summary	This installer will guide you through the installation process. You will s learn the latest Java EE 7 features, and you can get started with the F Java EE Tutorials. View sample application source code and then dep Server 4.0 to see them in action. You will find that Java EE 7 is a easy feature-rich platform for developing web and enterprise applications.	hortly be First Cup a loy to Gla -to-learn	able to and assFish	
Java.				
ORACLE [®]	Cancel Back	Ne	xt	-

🛓 Java EE 7 SDK		_		×
C HIND 2				
Introduction Installation Type Install Directory Update Tool Ready To Install Progress Config Results Summary	Installation Type Choose installation type. Typical Installation Installs a GlassFish Server management domain; ideal for development or non business critical use. Please make sure that the ports 4848 and 8080 are free. Custom Installation Not supported.	ıt I		
لان Java				
ORACLE.	Cancel Back	Nex	(t	

Choose directory for Glassfish:

🛓 Java EE 7 SDK		_		×
C HIMP I				
	Install Directory			
Introduction				
Installation Type				
Install Directory				
Update Tool				
Ready To Install				
Progress				
Config Results	GlassFish Server will be installed into the specified directory. You many	ay specify	а	
Summary	different directory or click the Browse to select a directory.			
	Installation Directory C:\glassfish4			
	If the specified installation directory does not exist, the installer will c	reate it for	you.	
Java-				
ORACLE [®]	Cancel Back	Ne	xt	

Click again Next:

🕌 Java EE 6 SDK			
	Update Configuration		
Welcome License Installation Directory Administration Settings Update Configuration JDK Selection Ready To Install Progress Product Registration Summary	If a connection is available, the installer will attempt to download and configure the Update Tool for this installation. Install Update Tool Proxy Host Proxy Port The Update Tool periodically checks for available updates and collects some system data. For more information about the data that is collected, see the <u>GlassFish Usag</u> Metrics page (http://wiki.glassfish.java.net/Wiki.jsp?page=UsageMetricsV3). Enable Update Tool	 e	
Sun Java	Cancel Back Next		



퉬 Java EE 7 SDK				×
C THE I	Progress			
Introduction				
Installation Type				
Install Directory	Java EE 7 SDK			
Update Tool				
Progress	Modular, Lightweight, Open			
Config Results	Modular architecture based on OSGi			
Summary	 Fast startup, less memory consumption Java EE 7 Certified 			
	Developed in Open Source			
Java ⁻	Installing GlassFish Server			
	9%Time Remaining 00:00:28			1
ORACLE				
	Cancel Back	Ne	xt	

🛓 Java EE 7 SDK Х C HHH **Config Results** Introduction The configuration has succeeded. Please see the output below. Installation Type Install Directory ۰ Domain domain1 allows admin login as user "admin" with no password. Login information relevant to admin user name [admin] Update Tool for this domain [domain1] stored at Ready To Install [C:\Users\Admin\.gfclient\pass] successfully. Make sure that this file remains protected. Progress Information stored in this file will be used by Config Results administration commands to manage this domain. Summary Command create-domain executed successfully. Starting domain Executing command :C:\glassfish4\glassfish\bin\asadmin.bat start-domain domain1 C:\glassfish4\glassfish\bin\asadmin.bat start-domain domain1 Attempting to start domain1.... Please look at the server log for more details..... ORACLE Cancel Configure again Next

실 Java EE 7 SDK			_		×
C HIND I					
	Summary				
Introduction					٦
Installation Type					
Install Directory					
Update Tool		Overall Status: Complete			
Ready To Install	Please see the <u>detailed</u>	summary report for an overview of this session,	including <u>next steps</u>	s for using	
Progress	this installation.Please se	ee the <u>log file</u> for detailed information.			
Config Results	2024-04-11-14-47-instal	I-summary html			
Summary	2024-04-11-14-47-instal	llog			
	Product Name	Status			
		Installed			
	Update Tool Bootstrap	Installed			
	GlassFish Server	Installed			
	Uninstallation Software	Installed			
2	Update Tool Bootstrap	Configured			
چن Java	GlassFish Server	Configured			
ORACLE.					_
	Cancel		Back	cit	

Only if "Overall Status" is "Complete", your installation has been performed appropriately.

In order for the examples of this tutorial to execute you need to set the PATH with the directory of Glassfish as follows:

Click on Environment Variables:

Find the Path variable and click Edit.

Edit environment variable		×
C:\Program Files\Java\jdk-1.8\bin		New
C:\glassfish4\glassfish\bin		
C:\ProgramData\Oracle\Java\javapath		<u>E</u> dit
C:\Users\Admin\Desktop\ORACLE\bin		
%SystemRoot%\system32		Browse
%SystemRoot%		_
%SystemRoot%\System32\Wbem		Delete
%SYSTEMROOT%\System32\WindowsPowerShell\v1.	.0\	Denete
%SYSTEMROOT%\System32\OpenSSH\		
		Move <u>U</u> p
		Move D <u>o</u> wn
		Edit <u>t</u> ext
	ОК	Cancel

In the variable value add the path of Glassfish.

Download and Install MySQL Server:

After you download use MySQL Server Instance Config Wizard

MySQL Server Instance Co	nfiguration Wizard 🛛 🔀
	Welcome to the MySQL Server Instance Configuration Wizard 1.0.14.0 The Configuration Wizard will allow you to configure the MySQL Server 5.0 server instance. To Continue, click Next.
MySQL	() Cancel

Choose the detailed configuration:



Choose developer machine:

MySQL Server Instance Configuration Wizard		
MySQL Server Instance Configuration Configure the MySQL Server 5.0 server instance.	\bigcirc	
Please select a server type. This will influence memory, disk and CPU usage	je. Ins will be t of	
Server Machine Several server applications will be running on this machine. Choose this option for web/application servers. MySQL will have medium memory usage.		
🔿 Dedicated MySQL Server Machine		
This machine is dedicated to run the MySQL Database Server. No other servers, such as a web or mail server, will be run. MySQL will utilize up to all available memory.		
< Back Next >	Cancel	

Choose multifunctional:

MySQL Server Instance Configuration Wizard	K
MySQL Server Instance Configuration Configure the MySQL Server 5.0 server instance.)
Please select the database usage. Multifunctional Database	
General purpose databases. This will optimize the server for the use of the fast transactional InnoDB storage engine and the high speed MyISAM storage engine.	
 Iransactional Database Unly Optimized for application servers and transactional web applications. This will make InnoDB the main storage engine. Note that the MyISAM engine can still be used. 	
© Non-Transactional Database Only Suited for simple web applications, monitoring or logging applications as well as analysis programs. Only the non-transactional MyISAM storage engine will be activated.	
< Back Next > Cancel]

Choose Drive:

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration Configure the MySQL Server 5.0 server instance.
Press the [Modify] button to change the InnoDB datafile settings.
InnoDB Tablespace Settings
Please choose the drive and directory where the InnoDB tablespace should be placed.
Drive Info
Volume Name: -
File System: -
Diskspace Used Free Diskspace
Modify < Back Cancel

Choose decision support:

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration Configure the MySQL Server 5.0 server instance.
Please set the approximate number of concurrent connections to the server. • Decision Support (DSS)/OLAP • Select this option for database applications that will not require a high number of concurrent connections. A number of 20 connections will be assumed. • Online Transaction Processing (OLTP) • Choose this option for highly concurrent applications that may have at any one time up to 500 active connections such as heavily loaded we hervers.
Manual Setting Please enter the approximate number of concurrent connections. Concurrent connections: 15 < Back

Perform the following checks:

MySQL Server Instance Configuration Wizard
MySQL Server Instance Configuration Configure the MySQL Server 5.0 server instance.
Please set the networking options.
Enable this to allow TCP/IP connections. When disabled, only local connections through named pipes are allowed. Port Number: 3306 Add firewall exception for this port
Please set the server SQL mode.
🔽 Enable Strict Mode
This option forces the server to behave more like a traditional database server. It is recommended to enable this option.
< Back Next > Cancel

Best Support For Multilingualism: Choose this option if you want to use utf8 as the default server character set. This is a Unicode character set that can store characters from many different languages.

MySQL Server Instance Configuration Wizard	
MySQL Server Instance Configuration Configure the MySQL Server 5.0 server instance.	\bigcirc
Please select the default character set. Standard Character Set	
Hello! Makes Latin1 the default charset. This character set is suited for English and other West European languages.	
🔿 Best Support For Multilingualism	
Make UTF8 the default character set. This is the recommended character set for storing text in many different languages.	
O Manual Selected Default Character Set / Collation	
Please specify the character set to use.	
Character Set: atin1	
< Back Next >	Iancel

Set the password for root:

MySQL Server I	Instance Configurati	on Wizard	
MySQL Server	Instance Configuratio)n	
Configure che	MySQL Server 5.0 server	instance.	
Please set the	security options.		
🔽 Modify Se	ecurity Settings		
	New root password:		Enter the root password.
root	Confirm:		Retype the password.
		🔲 Enable root a	access from remote machines
🔲 Create An	Anonymous Account		
2	This option will create ar note that this can lead t	n anonymous accour 10 an insecure syster	it on this server. Please n.
		< Back	Next > Cancel

Press Execute:

MySQL Server Instance Configuration Wizard	×
MySQL Server Instance Configuration Configure the MySQL Server 5.0 server instance.	\bigcirc
Ready to execute	
Prepare configuration	
 Write configuration file 	
 Start service 	
 Apply security settings 	
Please press [Execute] to start the configuration.	
< Back Execute	Cancel

Restart the computer and the installation should be complete.

Install the MySQL Workbench.

You can create the database in two ways:

- 1. By commands in the MySQL console
- 2. By graphical user interface in MySQL Workbench

Click on local instance with the right and click Query Database.



Click with the right and select create schema.



Give a name to the database: and press Apply.



Click with the right on the Tables options and select Create Table:



Choose a name for the Table:

new_table	2					
	Name:	account			The name of the table. It is recommended to use only alpha-numeric characters. Spaces should be avoided and be replaced by $_$	
	Collation:	Schema Default		~	The charset/collation specifies which language specific characters can be stored in the table and their sort order. Common choices are Latin1 or UTF8.	
	Engine:	Server Default		~	The database engine that is used for the table. This option affects performance, data consistency and much more.	
	Comments:					
Table	Columns Ind	exes Foreign Keys	Triggers	Partitioning) Options	
DBMS fee	edback messages	will go here upon applyir	ng changes.		Apply Revert C	los

Click on Columns and add the columns for the table. At the end click Apply.

new_table							×
Column Name	Datatype	PK NN UQ	BIN UN ZF	AI Default		Column Details	
? jidaccount	INT					Collation:	
						Table Default	×
						Comments:	
							<u>^</u>
							~
J							
Table Columns Indexes	Foreign Keys Triggers	Partitioning	Options				
DBMS feedback messages will go he	ere upon applying changes.				Арр	ly Revert	Close

Following the above procedure create three tables:

Table Account Fields: IdAccount (int), Balance (float)

Table Customer Fields: idCustomer(int), Name (Varchar), surname (Varchar)

Table AccountCustomer Fields: idAccount, IdCustomer

2. Running the EJB examples

You will be given some examples that illustrate the EJBs.

- CartBean: a stateful session bean that is accessed by a remote client
- CounterBean: a singleton session bean
- HelloServiceBean: a stateless session bean that implements a web service

• TimerSessionBean: a stateless session bean that sets a timer

To open an example perform these steps:

	letBe	ans ID	E 6.8			
File	Edit	View	Navigate	Source	Refactor	Run
ę	New	Projec	t	Ctrl+Shif	t+N	
1	New 1	File		Ctrl+N		
Ē	占 Ope	n Proje	ct	Ctrl+Shif	t+O	
	Оре	n Recei	nt Project		•	
	Оре	n Kenai	Project			
	Clos	e Proje	ct			
	Оре	n File				
	Оре	n Recei	nt File		•	
	Proj	ect Gro	ир		•	
	Proj	ect Proj	perties			
	Imp	ort Proj	ect		•	
	Sav	e		Ctrl+S		
	Save	e As				
Ę	Sav	e All		Ctrl+Shif	t+S	
	Pag	e Setup				
	Print	t		Ctrl+Alt+	-Shift+P	
	Print	t to HTM	4L			
	Exit					

Select the main project:

🗊 Open Projec	:t		
O	Look in: 🛅 e	ejb 🕑 🦻 📂	
My Recent	🗄 🗠 🛕 cart	Project Name:	
Documents		cart cart	
	timer counter	er Open as <u>Main Project</u>	
	+ No hellose		
Desktop	🗄 💮 timerse	ession Open Required Projects:	
		cart-app-client (cart-app-client)	
		cart-ejb (cart-ejb)	
My Documents			
My Computer			
			an Dynight
My Network	File <u>n</u> ame:	Documents and Settings\Geni\Desktop\ADV-OPSYS 2010-2011\MY SLIDES\LESSON 8\ejb\cart	en Project
Places	Files of <u>type</u> :	Project Folder	

Check the options: "Open as Main Project" and "Open Required Projects" and press the button "Open Project". The following window will appear:

Running the Cart example

The cart example represents a shopping cart in an online bookstore and uses a stateful session bean to manage the operations of the shopping cart. The bean's client can add a book to the cart, remove a book, or retrieve the cart's contents. To assemble cart, you need the following code:

Session bean class (CartBean) Remote business interface (Cart)



In order to properly execute the example perform the following steps:

Create the following file named main.xml (this file comes also together with this manual):

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Copyright 1997-2007 Sun Microsystems, Inc. All rights reserved.
$Id: main.xml,v 1.7 2007/07/18 21:50:57 msreddy Exp $ -->
```

```
<!-- main.xml: this is the file that should be included by the project
    build files. It will figure out whether it is running from inside Netbeans
     or command line and include appropriate tasks.
     @Author: Inderjeet Singh -->
<project name="main" default="dummy-default">
  <condition property="common-ant-tasks-file"
           value="${ant.file}/../nbproject/build-impl.xml"
           else="${ant.file.main}/../command-line-ant-tasks.xml">
    <and>
    <isset property="netbeans.home"/>
    <available file="${ant.file}/../nbproject/build-impl.xml"/>
    </and>
  </condition>
  <import file="${common-ant-tasks-file}"/>
  <target name="dummy-default"/>
</project>
```

Copy the file under the directory of the project you want to open (The window below is switched to tab Files in Netbeans).



In the project that you are building, locate the files build.xml as follows:

<u>File Edit View Navigate Source Refactor Run Debug</u>	Pro
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Projects Files (I × Services	
⊕… 🛅 cart	
🖨 👝 cart-app-client	
📄 💼 build	
🗊 👘 🧰 dist	
mbproject	
ter	
Cart-ejb	
The sec	
i → A build.xml	

In each of these files add the following line:

<import file="../main.xml"/>



Running the examples:

Once the application is loaded you need to start the Glassfish server:

To run the application you first need to start the server. You can start the server with the following operations:

Click the tab Services in NetBeans:

🗊 NetBea	ns IDE 6.8				
File Edit V	View Navigate	e Source	Refactor	Run	Debug F
1	2 5	り (
Projects	Files	5	Ser	vices	4 0 ×
🕀 🗐 Data	abases				
🕀 🧟 Web	o Services				
E Bar	/ers				
Hud	son Builders				
Ken	ai Instances In Trackord				
H ISSU	le Trackers				
I					

Select Servers:

~							
🗊 NetBea	ans ID	E 6.8					
File Edit	View	Navigate	Source	Refactor	Run	Debug	I
1 🔁 🖆		B [9 C				
Projects		Files		Se	rvices	€ 0 ×	
	tabase:	s					
🗄 🔬 We	eb Serv	ices					
🖕 🔚 Se	rvers						
± 🥑	Glassf	Fish V3					
🗄 🖓 Hu	idson Bi	uilders					
😥 📒 Ke	nai Inst	ances					
🗄 📷 Iss	sue Trac	tkers					

Click with the right on GlassFish and select "Start"

🗊 NetBeans IDE 6.8						
File Edit View Navig	ate Source	Refactor	Run	Debug	F	
🔁 🖆 😫 🖫	56					
Projects Fi	les	Serv	vices	4 0 ×	ĺ	
🕀 🗐 Databases					l	
😥 🧟 Web Services						
Servers						
🚊 🧭 🕑 🖸 🗄						
🕀 🐞 Hudson Builders	Start				ſ	
😥 📒 Kenai Instances	Start in Debug Mode				l	
🗄 📷 Issue Trackers	Start in Profile Mode				l	
	Restart				l	
	Stop				l	
	Refresh				l	
	Remove					
	View Admi	n Console				
	View Serve	er Log				
	View Upda	te Center				
	Properties				l	
					ŀ	

In the console of NetBeans you will see:

:0	utput		₽ ×	Tasks	Java Call Hierarchy		
	Java ()B Database Process 🛛 🗙	GlassFish v3 ×				
	Apr 6	, 2011 4:31:57 PM co	m.sun.enterprise	e.glassfish.bootstrap.ASMain main	<u>^</u>		
DD	INFO: Launching GlassFish on Felix platform						
	Welcome to Felix						
	INFO:	Perform lazy SSL in	itialization for	r the listener 'http-listener-2'			
	INFO: Starting Grizzly Framework 1.9.18-k - Wed Apr 06 16:32:01 CEST 2011						
	INFO: Grizzly Framework 1.9.18-k started in: 78ms listening on port 4848						
	INFO: Grizzly Framework 1.9.18-k started in: 172ms listening on port 8080						
	INFO: The Admin Console is already installed, but not yet loaded.						
	INFO: Starting Grizzly Framework 1.9.18-k - Wed Apr 06 16:32:01 CEST 2011						
	INFO: Grizzly Framework 1.9.18-k started in: 109ms listening on port 8181						
	INFO: Grizzly Framework 1.9.18-k started in: 31ms listening on port 3700						
	INFO:	Grizzly Framework 1	.9.18-k started	in: 860ms listening on port 7676			
	INFO:	GlassFish v3 (74.2)	startup time :	Felix(3141ms) startup services(2078ms)	total(5219ms)		
	TNRO-	formereict util sear	DroveRostore /	loceloodorDrowidor = org glocefich wel	d WoldlativeteriClassFichClassIeederDrevider0f7f7 🗤		

The admin password will be required if you provided one at the installation step:

Source Ref.	actor	Run Debug Profile Team Tools	Window Help			
? (🗹 👔 👔 🗵	• 🚯 • 💮 •		Q- Search	
5 🛯 ×	Sta	rt Page 🗴 📇 build.xml [cart-ejb] 🗴	ן			
			2	🛠 NetBe	ans IDE 6.8	
	Welco		ome to NetBe	ans IDE	My NetBeans	
	Recent			S	News & Tu	
				NetBeans Poll: Where do y Share your opinion with the N	ou most often get your updates about NetBeans? tBeans Community about developer trends and topios.	
		<no proj<="" recent="" th=""><th>Authentic User Name: a</th><th>ation Required</th><th>ans Modules webservice support to create a RESTful service client inside a</th></no>	Authentic User Name: a	ation Required	ans Modules webservice support to create a RESTful service client inside a	
			Password: •	••••	I for 7.0 nunity testing program introduced a new concept of "Testing Ti tionality areas. Find out how	
	Out	tput		UK		
		Java DB Database Process 🗴 🕻	ilassFish v3 ×			
₩ ×		INFO: Loading automatic-tim INFO: Portable JNDI names f INFO: Loading ejb-embedded INFO: GlassFish v3 (74.2) s	er-ejb Applica or EJB SimpleE Application do tartup time :	tion done is 36125 ms jb : [java:global/ejb-embedde(ne is 359 ms Felix(17187ms) startup servic(d/SimpleEjb, java:global/ejb-embedded/SimpleEjb!ejb.emb es(40172ms) total(57359ms)	
	a	INFO: Binding RMI port to *	: 8686			

After this you can deploy the application that you developed by selecting "Deploy" as follows:
🗊 cart - Ne	tBeans IDE 6.8	
File Edit Vi	ew Navigate Source Refa	actor Run
ም ም (1 G 🖌 🗖	
Proj 🕫	× Files Servi	ces
Cart	Add Java EE Module	
	New 🕨	
T	Build	
🗄 🎯 cart-	Clean and Build	
🗄 🔍 🞯 cart-i	Clean	
	Run	
	Deploy	
	Debug	
	Profile	
	Set as Main Project	
	Open Required Projects	
	Close	
	Rename	
	Move	
	Copy	
	Delete	
	Find	
cart [Main]	Share on Kenai	•0 ×
	Versioning •	
	Local History	
	Properties	

You will see the following:

		module or Java application.
	;Ou	tput 🖶 👻 :Tasks
	\square	Java DB Database Process × GlassFish v3 × cart (run-deploy) ×
		cart-eib.librarv-inclusion-in-manifest:
	22	cart-ejb.dist-ear:
	-2040	pre-pre-compile:
₩ ¥		pre-compile:
		do-compile:
		post-compile:
		compile:
		pre-dist:
		post-dist:
		dist-directory-deploy:
,		pre-run-deploy:
		Initial deploying cart to D:\Documents and Settings\Geni\Desktop\ADV-OPSYS 2010-2011\MY SLID
		Completed initial distribution of cart
		post-run-deploy:
		run-deploy:
		BUILD SUCCESSFUL (total time: 5 seconds)

If you want to access the administration console of Glassfish, click as follows:



The following window will appear:





Insert the password of admin and press Login.

You are then forwarded to the console of the administration as follows:



If you want to change the settings of the server click on "Enterprise Server":

User: admin Domain: domain1 Serv	er: localhost				
Sun GlassFish [™] Enterprise Se	erver v3				
🐠 There are 56 update(s) available.					
Tree					
	General	Advanced	Administrator Password	System Properties	Monitor
E Common Tasks			· · · · · · · · · · · · · · · · · · ·		
Registration	General I	nformatio	n		
- 👵 GlassFish News	Stop Restar	t View Log F	iles		
- Enterprise Server					
► 📄 Applications	Name:		localhost		
- 🛅 Lifecycle Modules	JVM:		JVM Report		
🔻 🍟 Resources	Configurat	ion Directory:	C:/dlassfishv3/dlassfish/domains	/domain1/config	
► 📄 JDBC	Installed V	ersion:	CloseFich v9 (build 74.0)	a contraint in contraining	
🕨 👸 Connectors	nistaneu v	ersion.			
— Resource Adapter Configs	Debug:		Not Enabled		
🕨 📑 JMS Resources	HTTP Port(s):	4848 ,8181 ,8080		
-È JavaMail Sessions	llOP Port(s)	3820 ,3700 ,3920		
🕨 💼 JNDI					

If you want to see already deployed applications click on "Applications" and select the application as follows:

Home Version User: admin Domain: domain1 Serve Sun GlassFish [™] Enterprise Se There are 56 update(s) available.	er: localhost erver v3			Log
Tree <	Applicatio	ns		
Common Tasks	Applications ca	n be enterprise or web applica	tions, or various kinds of module	s.
☐ Registration ♣ GlassFish News ☐ Enterprise Server	Deployed App	lications (1) ploy Undeploy Enable	Disable Filter:	V
Applications	Name	Enabled	Engines	Action
☐ cart ☐ Lifecycle Modules	Cart	✓	[appclient, ejb]	Redeploy Restart
 Resources JDBC Connectors Resource Adapter Configs JMS Resources JavaMail Sessions JNDI Configuration 				

As you can see the Cart application has been deployed.

To run the client you simply perform Run on the project as follows:



The execution will generate the following:

	and antecony acputy.
	pre-run-deploy:
32	Undeploying
	Initial deploying cart to D:\Documents and Settings\Geni\Desktop\ADV-OPSYS 2010-2011\MY SLIDES\LESSON 8\ejb\cart\dist\gfdeplo
	Completed initial distribution of cart
	Initializing
	post-run-deploy:
	run-deploy:
	Warning: Could not find file C:\glassfishv3\glassfish\domains\domainl\generated\xml\cart\cartClient.jar to copy.
	Copying 1 file to D:\Documents and Settings\Geni\Desktop\ADV-OPSYS 2010-2011\MY SLIDES\LESSON 8\ejb\cart\dist
	Copying 4 files to D:\Documents and Settings\Geni\Desktop\ADV-OPSYS 2010-2011\MY SLIDES\LESSON 8\ejb\cart\dist\cartClient
	Apr 7, 2011 11:12:19 AM com.sun.enterprise.transaction.JavaEETransactionManagerSimplified initDelegates
	INFO: Using com.sun.enterprise.transaction.jts.JavaEETransactionManagerJTSDelegate as the delegate
	Retrieving book title from cart: Infinite Jest
	Retrieving book title from cart: Bel Canto
	Retrieving book title from cart: Kafka on the Shore
	Removing "Gravity's Rainbow" from cart.
	Caught a BookException: "Gravity's Rainbow" not in cart.
	Java Result: 1
	run-cart-app-client:
	run:
	BUILD SUCCESSFUL (total time: 24 seconds)

Running the Counter Example.

To properly build the application you need to edit the file build.xml:

🗊 counter - NetBeans IDE 6.8	
<u>File E</u> dit <u>V</u> iew <u>N</u> avigate <u>S</u> ource Ref <u>a</u> ct	tor <u>R</u> un <u>D</u> ebug <u>P</u> rofile Tea <u>m</u> <u>T</u> ools <u>W</u> indow <u>H</u> elp
1 🔁 🔚 🖣 🦻 🥐 🗌	
Projects Files 4 × Services	🗟 CounterBean.java 🗴 📇 build.xml [counter] 🗙
⊡… 🔂 counter	☞ 통 • 킹 • 킹 ፡ 킹 · 킹 · 킹 · 킹 · 킹 · 킹 · 킹 · 킹 · 킹 ·
i → ····· → ···· → ···· → ···· → ···· → ····· → ······	3 some examples of how to customize the build
🖶 🧰 src	4 < (If you delete it and reopen the project it will be recreated.)>
🗄 🛁 web	5 < By default, only the Clean and Build commands use this build script>
🛱 🖓 📩 build.xml	6 < Commands such as Run, Debug, and Test only use this build script if>
🗄 🚟 main.xml	7 the Compile on Save feature is turned off for the project
	8 You can turn off the Compile on Save (or Deploy on Save) setting
	9 < in the project's Project Properties dialog box>
	10 - <project basedir="." default="default" name="counter"></project>
	<pre>11 <description>Builds, tests, and runs the project counter.</description></pre>
	<pre>12 <import file="main.xml"></import></pre>

You should add to this file the following line again after copying the file main.xml:

<import file="main.xml"/>

Once you Deploy the application you can check the status in the admin console:

Home Version User: admin Domain: domain1 Server: localhost								
Sun GlassFish [™] Enterprise Server v3								
There are 56 update(s) available.								
Tree	< ^	nulications						
🔲 Common Tasks	Common Tasks Applications can be enterprise or web applications, or various kinds of modules.							
- 💽 Registration	De	eployed Applications ((2)					
Enterprise Server	₽	B Deploy	Und	deploy Enable Disable	F	Filter: 🔽		
+ 🛅 Applications		Name 4	t4	Enabled 🔩	E	ngines	14	Action
– 🝵 cart		counter		 Image: A second s	[ej	jb, web]		Launch Redeploy Restart
🖵 🍵 counter		cart		v	[ap	ppclient, ejb]		Redeploy Restart

To run the application click on Run as follows:

	:ounte	r - Ne	etBeans I	DE 6.8							
=ile	Edit	View	Navigate	Source	Refactor	Run	Debug	Profile	Team	Tools	Winc
ę	1		5	१ (~	r r	¥ 🕨	3
P	. ∢0 :	× Fil	es	Service	:s 🚺 🚳	Counte	rBean.ja	va x	📇 build	.×ml [co	unter]
	⊕ co ⊕…€∂	unte Wet_	New				-	ou ma	J 🞝 🕅) 🔥
	😐 - 🛅	Sou	Build				! s	some e	xampl	es of	ho
	🖻 🕞 🧰	Libr	Clean an	d Build			! (lf yo	u del	ete i	lt a:
	±[3	Con	Clean				! E	By def	ault,	only	7 th
			Generate	e Javadoo			! C	Comman	ıds su	ch as	3 Ru:
			Run				! t	che Co Zou ao	mpile	on t	jave = + b.
			Deploy				· i	ou ca 'n the	n cur proj	n ull	. um s Pri
			Debug				broje	ect na	me="c	ounte	er" (
			Profile				<	lescri	ption	>Buil	.ds,
			Test RES	Tful Web	Services		< i	mport	file	="mai	n.x
			Test		4	Alt+F6					
			Set as M	ain Projec	t		_ </th <th><in< th=""><th>port</th><th>file=</th><th>"nb</th></in<></th>	<in< th=""><th>port</th><th>file=</th><th>"nb</th></in<>	port	file=	"nb
			Open Re	quired Pro	ojects		->				
			Close				_ </td <td></td> <td></td> <td></td> <td></td>				
		-	Rename.				_				
			Move								
			Copy				in Data	abase P	rocess	×	lassr
			Delete								
		-	Find				_modul	e-jar: ar:			
			Share on	Kenei			jar:				
; COI	unter [Mair	Versionin	n chairte			ry-in	clusio	n-in-a	rchiv	e:
			Local Hist	torv		,	ry-in	clusio	n-in-m	anife	st:
		-	20001105	,			le-is	ns:			
			Propertie	s			, T				

You will see the following:

🥹 counter - A singleton session bean example Mozilla Firefox	
<u>Eile E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
C C X 🟠 📽 🗋 http://localhost:8080/counter/ 🟠 - Soogle	> S
🖻 Most Visited 📋 Getting Started 🔊 Latest Headlines	
📄 counter - A singleton session bean e 🔶	~
This page has been accessed 1 time(s). Hooray!	
Done	

I you press Refresh the number of access will grow everytime you access the page:

👻 counter - A singleton session bean example Mozilla Firefox	
<u>File E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
C × ☆ ♥ ☐ http://localhost:8080/counter/ ☆ ▼ 3 Google	🔎 🔒
🔎 Most Visited 📄 Getting Started 🔊 Latest Headlines	
📄 counter - A singleton session bean e 🔸	~
This page has been accessed 2 time(s).	
Hooray!	
Done	
👻 counter - A singleton session bean example Mozilla Firefox	
Counter - A singleton session bean example Mozilla Firefox File Edit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
Counter - A singleton session bean example Mozilla Firefox File Edit View History Bookmarks Tools Help C X Image: Complex state of the	
Counter - A singleton session bean example Mozilla Firefox File Edit View Higtory Bookmarks Tools Help C X Image: Complex to the state of the state	
Counter - A singleton session bean example Mozilla Firefox File Edit View Higtory Bookmarks Tools Help C X Image: Complex session bean example Mozilla Firefox Image: Complex session bean example Mozilla Firefox Most Visited Image: Complex session bean example Mozilla Firefox Image: Complex session bean example Mozilla Firefox Image: Complex session bean example Mozilla Firefox Image: Complex session bean example Mozilla Firefox Image: Complex session bean example Mozilla Firefox Image: Complex session bean example Mozilla Firefox	
 Counter - A singleton session bean example Mozilla Firefox File Edit View Higtory Bookmarks Tools Help C X A T This page has been accessed 3 time(s). 	
 Counter - A singleton session bean example Mozilla Firefox File Edit View Higtory Bookmarks Tools Help C X A C A C A C A C A C A C A C A C A C	
Counter - A singleton session bean example Mozilla Firefox File Edit Yiew Higtory Bookmarks Tools Help Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started Image: Started I	

Even if you close the window and access it again with Ru,n you will see that the application still continues to count the access:



This page has been accessed 4 time(s).

Hooray!

Only if you restart the application, the counter will restart from zero. You can restart the application from the admin console as follows:

Deployed Applications (2)								
₽	B Deploy	Un	deploy Enable Disable	ļ	Filter: 🗹			
	Name	t 4	Enabled	4	Engines	14	Action	
	counter		✓		[ejb, web]		Launch Redeploy Restart	
	cart		✓		[appclient, ejb]		Redeploy Restart	

Click Restart and you will see in yellow "The application has been restarted":



If you access the page again, by doing "Run" under Netbeans or "Launch" in the above window you will see:

🕹 counter - A singleton session bean example Mozilla Firefox								
Eile Edit View History Bookmarks Iools Help								
C × ☆ ♥ ▲ http://localhost:8080/counter/ ☆ ▼ 3 Google	🔎 🔒							
🙋 Most Visited 📄 Getting Started 🔊 Latest Headlines								
📄 counter - A singleton session bean e 🔸	~							
This page has been accessed 1 time(s).								
Hooray!								
Done								

Running the Converter:

To properly build the application you need to edit the file build.xml:



You should add to this file the following line again after copying the file main.xml:

<import file="main.xml"/>

Once you Deploy the application you can check the status in the admin console:

User: admin Domain: domain1 Server: localhost							
Sun GlassFish [™] Enterprise Se	Sun GlassFish [™] Enterprise Server v3						
🕏 There are 56 update(s) available.							
Common Tasks	Common Tasks Applications can be enterprise or web applications, or various kinds of modules.						
- Registration							
- 占 GlassFish News	De	eployed Applications	: (3)				
Enterprise Server	∎¥	B Deploy	Un	deploy Enable Disable	Filter:		
Applications		Name	14	Enabled 🔩	Engines 🔩	Action	
– 🖶 cart		converter		✓	[ejb, web]	Launch Redeploy Restart	
– 🗃 converter	[ejb, web]	Launch Redeploy Restart					
□ cart ✓ [appclient, ejb] Redeploy Restart							

You can launch the application either by doing "Run" under Netbeans or "Launch" in the above window and you will see the following:

🕹 Servlet ConverterServlet - Mozilla Firefox 📃 🗖	×
<u>File E</u> dit <u>V</u> iew History <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
🔇 💽 - C 🗙 🏠 📽 📋 http://localhost:8080/converter 🏠 - 🚼 - Google 🔎 🔚	2
🔎 Most Visited 📄 Getting Started 流 Latest Headlines	
Servlet ConverterServlet +	-
Submit Reset	- III
	~
Done	

If you enter an amount and press "Submit" you will get the following:



The application now is alive at this address:

🖉 Se	Servlet ConverterServlet - Mozilla Firefox								
∃ile	<u>E</u> dit	⊻iew	History	<u>B</u> ookr	marks	<u>T</u> ools <u>H</u> elp			
<	>	- C	×		¥.	http://localhost:8080/converter	🖒 🔹 Google		
2 M	Most Visited 📋 Getting Started 🔝 Latest Headlines								

Running the HelloService example:

To properly build the application you need to edit the file build.xml:



You should add to this file the following line again after copying the file main.xml:

<import file="main.xml"/>

Once you Deploy the application you can check the status in the admin console:

User: admin Domain: domain1 Server: localhost								
Sun GlassFish [™] Enterprise Se	Sun GlassFish [™] Enterprise Server v3							
There are 56 update(s) available.	🤣 There are 56 update(s) available.							
Tree Common Tasks	A Ap	pplications plications can be enterprise	or web applications, o	ır variou	is kinds of modules.			
- 🖪 Registration	De	ploved Applications (4)				_		
GlassFish News	E¥	B Deplay Unda	eploy Enable Disa	able	Filter:			
+ 🛅 Applications		Name 🔩	Enabled	÷+	Engines	+	Action	
– 🖶 cart		helloservice	 Image: A set of the set of the		[ejb, webservices]		Redeploy Restart	
eigh, web] Launch Redeploy Restart							Launch Redeploy Restart	
Image: Balloservice Image: Counter Image: Counter								

To Test the Service without a Client

The GlassFish Server Administration Console allows you to test the methods of a web service endpoint. To test the sayHello method of HelloServiceBean, follow these steps.

1. Open the Administration Console by opening the following URL in a web browser:

http://localhost:4848/

- 2. In the left pane of the Administration Console, select the Applications node.
- 3. In the Applications table, click helloservice.

	Common Tasks									
	🔁 Registration	Edit Applie	cation							Save
	SlassFish News	Modify an existin	ng application	or module.						
	Enterprise Server									
Ŧ	Applications	Name:	helloservice							
	– 🗃 cart	Status:	Enabled							
	- 🗃 converter	Description:								
	- 🗟 helloservice	Description.								
	a counter	Location:	file:/D:/Docu /build/iar/	ments%20and%20S	ettings	Geni/Desktop/ADV-OPSYS%	%2020	110-2011/MY%20SLIDES/LE	sso	v%208/ejb/helloserv
	Lifecycle Modules	Librarias	/bana/jan/							
Ŧ	📔 Resources	Libraries.								
	▶ 📄 JDBC									
	Connectors	Modules and	d Componen	ts (2)						
	- Resource Adapter Configs	Module Nam	e 🛧	Engines	±4	Component Name	14	Туре	14	Action
	JMS Resources	helloservice		[ejb, webservices]						
	- avaMail Sessions	helloservice				HelloServiceBean		StatelessSessionBean		View Endpoint

4. In the Modules and Components table, click View Endpoint.

	ee <	Web Service Endneir	at Information					
	Common Tasks	View details about a web service endpoint.						
	Registration							
	- SolassFish News	Application Name:	helloservice					
,		Tester:	/HelloServiceBeanService/HelloServiceBean?Tester					
		WSDL:	/HelloServiceBeanService/HelloServiceBean?wsdl					
	- 🗟 converter	Endpoint Name:	HelloServiceBean					
	- 🗃 helloservice	Service Name:	http://helloservice.ejb.javaee.tutorial.sun.com/					
	a counter	Port Name:	HelloServiceBeanPort					
	- Lifecycle Modules	Deployment Type:	109					
1	PResources	Implementation Type:	EJB					
	 JDBC Connectors 	Implementation Class Name:	com.sun.tutorial.javaee.ejb.helloservice.HelloServiceBean					
	Resource Adapter Configs	Endpoint Address URI:	/HelloServiceBeanService/HelloServiceBean					
	 JMS Resources 	Namespace:	com.sun.tutorial.javaee.ejb.helloservice.HelloServiceBean					
	- 🛅 JavaMail Sessions	Description:						

5. On the Web Service Endpoint Information page, click the Tester link:

/HelloServiceBeanService/HelloServiceBean?Tester

A Web Service Test Links page opens.

6. On the Web Service Test Links page, click the non-secure link (the one that specifies port 8080).

A HelloServiceBeanService Web Service Tester page opens.

🕙 HelloServiceBeanService Web Service Tester - Mozilla Firefox	
<u>File E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
🕢 💽 🗸 😪 😵 📋 http://localhost:8080/HelloServiceBeanService/HelloServiceBean?Te: 😭 🚽 🔀 - Google	P 🔒
🙍 Most Visited 📄 Getting Started 🔝 Latest Headlines	
HelloServiceBeanService Web Servic 🔸	~
HelloServiceBeanService 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 java.lang.String com.sun.tutorial.javaee.ejb.helloservice.HelloServiceBean.sayHello(java.lang.String) sayHello ()	
public abstract void com.sun.tutorial.javaee.ejb.helloservice.HelloServiceBean.helloServiceBean() helloServiceBean ()	
	~

7. Under Methods, type a name as the parameter to the sayHello method.

🕙 HelloServiceBeanService Web Service Tester - Mozilla Firefox	
<u>File E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
💽 💽 🗸 😪 🐨 📋 http://localhost:8080/HelloServiceBeanService/HelloServiceBean?Te: 😭 🚽 Google	P 🔒
🖻 Most Visited 📄 Getting Started 🔝 Latest Headlines	
HelloServiceBeanService Web Servic 🔶	-
HelloServiceBeanService Web Service Tester	~
To invoke an operation, fill the method parameter(s) input boxes and click on the button labeled with the method name.	;
Methods :	≡
public abstract java.lang.String com.sun.tutorial.javaee.ejb.helloservice.HelloServiceBean.sayHello(java.lang.String) sayHello (MIREMENGJES)	
public abstract void com.sun.tutorial.javaee.ejb.helloservice.HelloServiceBean.helloServiceBean() helloServiceBean ()	>
Done	

8. Click the sayHello button.

The ${\tt sayHello}$ Method invocation page opens. Under Method returned, you'll see the response from the endpoint.

Wethod invocation trace - Mozilla Firefox Eile Edit View Higtory Bookmarks Tools Help	×
Eile Edit View History Bookmarks Tools Help	
🕥 💽 🕈 😋 👻 👔 http://localhost:8080/HelloServiceBeanService/HelloServiceBean?Te: 🏠 🚽 Google 🖉 🔎	
🙆 Most Visited 📄 Getting Started 🔊 Latest Headlines	
Method invocation trace	-
sayHello Method invocation	<
Method parameter(s) Type Value	11
java.lang.String MIREMENGJES	,
Method returned	
java.lang.String : "Hello, MIREMENGJES."	
SOAP Request	*
Done	

Running the timer application:

To properly build the application you need to edit the file build.xml:



You should add to this file the following line again after copying the file main.xml:

<import file="main.xml"/>

Once you Deploy the application you can check the status in the admin console:

User: admin Domain: domain1 Serve	r: loc	alhost							
Sun GlassFish [™] Enterprise Server v3									
🕏 There are 56 update(s) available.									
Tree Common Tasks	Aj Apj	oplications	or web applications, or variou	s kinds of modules.					
☐ Registration ♣ GlassFish News ☐ Enterprise Server	Registration Deployed Applications (5) GlassFish News Eterprise Server Enterprise Server Eterprise Server								
Applications		Name 🔩	Enabled 🔩	Engines 🔩	Action				
- 📄 Lifecycle Modules		helloservice	✓	[ejb, webservices]	Redeploy Restart				
🔻 🥁 Resources		converter	✓	[ejb, web]	Launch Redeploy Restart				
		counter	✓	[ejb, web]	Launch Redeploy Restart				
Connectors		timersession	✓	[ejb, web]	Launch Redeploy Restart				
Resource Adapter Configs	cart		✓	[appclient, ejb]	Redeploy Restart				

You can launch the application either by doing "Run" under Netbeans or "Launch" in the above window and you will see the following:

🥙 timer - An EJB timer service session bean example Mozilla Firefox	
<u>File Edit View His</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
C X 🟠 📽 🗋 http://localhost:8080/timersession/ 🏠 🔹 🚼 Google	🦻 🔒
🙍 Most Visited 📄 Getting Started <u>ଲ</u> Latest Headlines	
📄 timer - An EJB timer service session 🔸	-
Timer page The last programmatic timeout was: never.	
The last automatic timeout was: never Set a programmatic timer here. Set Timer Refresh	
Done	

Press button Set Timer to set timer:

🥹 timer - An EJB timer service session bean example Mozilla Firefox	
<u>File Edit Vi</u> ew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
C X 🏠 📽 📄 http://localhost:8080/timersession/timer-client.» 🏠 🔹 Google	P S
🙍 Most Visited 📋 Getting Started <u>ଲ</u> Latest Headlines	
📄 timer - An EJB timer service session 🔸	~
Timer page The last programmatic timeout was: never. The last automatic timeout was: Thu Apr 07 12:38:00 CEST 2011 Set a programmatic timer here. Set Timer Refresh	
Done	

Press Refresh:

🥹 timer - An EJB timer service session bean example Mozilla Firefox				
<u>File Edit Vi</u> ew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp				
C X 🏠 📽 📄 http://localhost:8080/timersession/timer-client.× 🏫 🔹 🚼 - Google	🔎 🔒			
🙍 Most Visited 📋 Getting Started <u>ଲ</u> Latest Headlines				
📄 timer - An EJB timer service session 🔸	~			
Timer page The last programmatic timeout was: Thu Apr 07 12:38:10 CEST 2011. The last automatic timeout was: Thu Apr 07 12:38:00 CEST 2011				
Set a programmatic timer here. Set Timer Refresh				
Done				

Press Refresh again:

🥹 timer - An EJB timer service session bean example Mozilla Firefox	
<u>F</u> ile <u>E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
C X 🏠 📽 📄 http://localhost:8080/timersession/timer-client.» 🏠 🔹 Google	P S
🙍 Most Visited 📋 Getting Started <u>ଲ</u> Latest Headlines	
📄 timer - An EJB timer service session 🔸	-
Timer page The last programmatic timeout was: Thu Apr 07 12:38:10 CEST 2011. The last automatic timeout was: Thu Apr 07 12:39:00 CEST 2011 Set a programmatic timer here. Set Timer Refresh	
Done	

Automatic timeout has changed.

3. Developing a simple EJB application for bank managing

In order to create an EE Application perform the following steps in NetBeans:

Go to new in Netbeans:

	etBeans IDE 7.2	And Party Street, Street, or other	
File	Edit View Navigate	Source Refacto	or Run [
2	New Project	Ctrl+Shift+N	
*	New File	Ctrl+N	Start
2	Open Project	Ctrl+Shift+O	Start
	Open Recent Project		• •
	Close Project		
	Open File		_
	Open Recent File		•
	Project Group		•
	Project Properties		
	Import Project		•
	Export Project		•
	Save	Ctrl+S	
	Save As		
	Save All	Ctrl+Shift+S	
	Page Setup		
	Print	Ctrl+Alt+Shift+	P
	Print to HTML		
	Exit		

Select Java Class Library as follows:

New Project		×
Steps	Choose Project	
 Choose Project 	Categories: Java JavaFX JavaFX Java Web Java EE Java Card Java AE Maven HP HP C/C++ C/C++ NetBeans Modules Mavels Mavels	Projects: Java Application Java Class Library Java Project with Existing Sources Java Free-Form Project
	Description: Creates a new Java SE library in a sta main dass. Standard projects use an IDE- your project. < Back	ndard IDE project. A Java SE library does not contain a generated Ant build script to build, run, and debug Next > Einish Cancel Help

Select Java Class Library and then click Next:

New Java Class Library			×
Steps	Name and Locat	tion	
1. Choose Project 2. Name and Location	Project <u>N</u> ame:	EntAppTest	
	Project Location:	C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\WY SLIDES\LESSON 8\WETBEANS 7.2	Browse
	Project Fol <u>d</u> er:	NYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\MY SLIDES\LESSON 8\WETBEANS 7.2\EntAppTest	
	Use Dedicated	Folder for Storing Libraries	
	Libraries Folde		Browse
		Different users and projects can share the same compliation libraries (see Help for details).	
		< Back Next > Einish Cancel	Help

Choose path of the project:

Click Finish.

You will see the following window:



Creating the Enterprise Application

Now you need to create an enterprise application and an EJB module. When you create an EJB, the EJB should be created as part of an enterprise application and packaged as an EAR archive and deployed in to the server.

Choose File > New Project

New Project		×
Steps 1. Choose Project 2	Choose Project Categories:	Projects: Constraint of the second straint
	Samples Description: Creates a new enterprise application project and Web application project in the e IDE-generated Ant build script to build < Back	in a standard project. You can also create an EJB module enterprise application. A standard project uses an d and run your projects.

Select Enterprise Application in the Java EE category. Click Next.

0	New Enterprise Application			×
St	eps	Name and Loca	tion	
1. 2.	Choose Project Name and Location	Project <u>N</u> ame:	EntAppTestEJB	
3.	Server and Settings	Project Location:	C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\WY SLIDES\LESSON 8\WETBEANS 7.2	Browse
		Project <u>F</u> older:	C: IDISK D'UNYT\COURSESIMSCIADVANCED OP. SYS\2012-2013IMY SLIDESILESSON 8INETBEANS 7.2IEntAppTestEJB	
		Use <u>D</u> edicated	d Folder for Storing Libraries	
		Libraries Folder:		Browse
			Different users and projects can share the same compilation libraries (see Help for details).	
			< <u>B</u> ack Next > Einish Cancel	Help

Then do the following:

New Enterprise Application	X
Steps	Server and Settings
Choose Project Name and Location Server and Settings	Server: GlassFish Server 3.1.2 Java EE Version: Java EE 6 Enable Contexts and Dependency Injection
	⊻] Set Source Level to 6 Recommendation: Source Level 6 should be used in Java EE 6 projects.
	Create EJB Module: EntAppTestEJB-ejb Create Web Application Module: EntAppTestEJB-war
	< Back Next > Finish Cancel Help

If you do not have the Glassfish server selected you may do the following. Click Add...

Add Server Instance	e and hellings	x
Steps	Choose Server	
1. Choose Server 2	Server: Amazon Beanstalk Apache Tomcat GlassFish Server 3+ JBoss Application Server Oracle WebLogic Server	
	Name: GlassFish Server 3+	
	< Back Next > Einish Cancel Help	

Click Next.

Add Server Instance	×
Steps	Server Location
1. Choose Server	Installation Location:
3. Domain Name/Location	C:\Program Files\glassfish-3.1.2.2 Browse
	Download Now I have read and accept the license agreement (dick)
	A No usable default domain. Use Next to create a personal domain.
	<pre>< Back Next > Einish Cancel Help</pre>

Choose in Browse the directory of Glassfish.

Click Next.

Add Server Instance	
Steps	Domain Location
 Choose Server Server Location Domain Name/Location 	 Register Local Domain Domain: C:\Users\Biba\personal_domain To select an existing domain, select its name from the drop-down list. If the domain's name does not appear in the list, you can type the path to the domain directly. To create a new domain, type the name in the field or type the name of a nonexistent directory. Use default ports
	Register Remote Domain Host Name: Admin Port: 4848 Target:
	Create domain at C:\Users\Biba\personal_domain
	< Back Next > Einish Cancel Help

Click Finish. The following window will appear:

New Enterprise Application				
Steps	Server and Settings			
 Choose Project Name and Location Server and Settings 	Server: GlassFish Java EE Version: Java EE 6 ↓ Enable Context V Set Source Leve Recommendation:	s and Dependency Injection al to 6 Source Level 6 should be used in Java EE 6 projects.	Add	
	Create EIB Module:	EntánnTextF18-eih		
	Create Web Application Module:	EntAppTestEDB-war		
		< <u>B</u> ack Next > Einish Cancel	Help	

Click Finish. Netbeans starts creating the project. This operation may take a while depending on the resources of the machine.

Once the project is correctly installed you will see the following under projects:

D EntAppTestEJB - NetBeans IDE 7.2					
<u>File E</u> dit <u>V</u> iew <u>N</u> avigate <u>S</u> ource Ref <u>a</u> ctor <u>R</u> un <u>I</u>					
1 🔁 🔚 🖣 🦻 🥐 🗌 💷					
Services Projects % Files					
EntAppTest Source Packages Image: So					

Creating the Session Bean

We will create now a session bean in the EJB module project. We will also create a remote interface for the session bean in the Class Library project. Do the following:

Right-click the EJB module project and choose New > Session Bean.

🕞 EntAppTestEJB-ejb - NetBeans IDE 7.2					
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help					
1 1 1 1 1 1	9 C	-	ĩ	📸 🕨 🚯 • 🚯 •	
Services Projects EntAppTest Source Packages	Files	Start Page	88		
Libraries Libraries JDK 1.7 (Defa EntAppTestEJB EntAppTestEJB-ejb	ault)				
	New	•	• 🔊	Session Bean	
	Build Clean and Build Clean Verify Generate Javadoc Run Deploy Debug Profile Test	Alt+F6	Image: System state sta	Java Class Java Package Java Interface Message-Driven Bean Entity Class Entity Classes from Database Web Service Web Service Client Other	
	Open Required Projec Close Rename Move Copy	cts	It fau fau fau fau fau	Java Call Hierarchy Search Ilt port 4848 for Admin. alt port 8080 for HTTP Inst alt port 7676 for JMS. alt port 3700 for IIOP. alt port 8181 for HTTP_SSL. alt port 3820 for IIOP_SSL. alt port 3920 for IIOP_MUT(

In the following window select the name and type of the session bean as follows:
New Session Bean	×	J
Steps	Name and Location	
 Choose File Type Name and Location 	EJB <u>N</u> ame: BankBean	
	Project: EntAppTestEJB-ejb	
	Location: Source Packages	
	Package: Bank.ejb	
	Session Type: Stateless Stateful Singleton Create Interface: Local Remote in project: EntAppTest	
	< Back Next > Finish Cancel Help	

Click Finish and you will see the following:



Adding the Methods

Now we need to add the methods in the session bean. Do the following:

Right-click in the editor of BankBean and choose Insert Code and select Add Business Method as follows:



Projects % Files	Start Pa	age 🕺 🛃	🔊 🖗 BankBean.java 🛛 🕺					
ppTest	Source	History	🕼 🗟 • 📓 • 💆 💀 🗗	n 🖓 🖓	R 9 9 0 F			
Source Packages		/*						
📔 Bank.ejb		* To	change this template	choose Tools	a Templates			
🔤 BankBeanRemote.java	3	* and	open the template in t	the editor.	o rempraceo			
ibraries	4	*/	open one oempidoe in	une caroor.				
Java EE 6 API Library - javaee-api-6.0.	5	packag	e Bank.ejb;					
JDK 1.7 (Default)	6							
.ppTestEJB	7 🖃	import	javax.ejb.Stateful;					
.ppTestEJB-ejb	8							
Source Packages	9 🖵	/**						
Bank.ejb	10	*						
🚳 🖉 BankBean.java	11	* @au	thor Biba					
ibraries	12	*/			-			
Enterprise Beans	13	@Stat	Navigate	•				
Configuration Files	14	publi	Show Javadoc	Alt+F1	nkemote {			
Server Resources	16		Find Usages	∆lt+F7	click in editor			
	17			ALTI	d")			
	18	<u> </u>	Call Hierarchy					
	19		Insert Code	Alt+Insert				
	20		Fix Imports	Ctrl+Shift+I				
	21	3	Refactor	•				
	22		Format	Alt + Shift + E				
			Tomac	Alt+Shirt+I				
			Run File	Shift+F6				
			Debug File	Ctrl+Shift+F5				
			Test File	Ctrl+F6				
			Debug Test File	Ctrl+Shift+F6				
	Run Focused Test Method							
	Output	Output	Debug Focused Test Method					
	Us	ing det	Run Into Method					
		-			-			



The following windows appears. Write the name of the method: "initialize" and return type void.

Add Busin	ess Method			×
<u>N</u> ame: Return <u>T</u> ype: Parameters	initialize void Exceptions			Browse
Name		Туре	Final	Add Remove Up Down
Use in Interfa	ce: 🔘 Local 🧕) R <u>e</u> mote 💿 <u>B</u> oth		OK Cancel

After you click Ok you will see:



After you save all in Netbeans in the BankBeanRemote you will see:



We do the same for the other method "getCustomerID".

Add Business	Method			×
Name	tCustamentD			
Name: ge	tcustomerid			
Return <u>Type</u> : int				Browse
Parameters Ex	ceptions			
Name		Туре	Final	Add
idAccount		int		Remove
				Цр
				Do <u>w</u> n
Use in Interface:	🔿 Local 🖉	Remote 🔿 Both		
ose in interface.	O Eocca			
				OK Cancel

You will have the following:



Now write the code of the methods as follows:

```
4 L */
 5
     package Bank.ejb;
 6
 7 import java.util.HashMap;
 8 L import javax.ejb.Stateful;
 9
10 - /**
11
12
      * @author Biba
     */
13
14
     @Stateful
15
     public class BankBean implements BankBeanRemote {
16
17
         // Add business logic below. (Right-click in editor and choose
         // "Insert Code > Add Business Method")
18
19
         HashMap custAndAccounts = new HashMap();
20
21
ً
         @Override
23 -
         public void initialize() {
24
25
                  // put some customers inside
26
27
                  custAndAccounts.put(1, 1);
28
                  custAndAccounts.put(2, 1);
29
30
         }
31
         @Override
٢
33 -
         public int getCustomerID(int idAccount) {
34
             return (Integer)custAndAccounts.get(idAccount);
35
         }
36
37
38
     }
30
```

We now have an enterprise application with a simple EJB that is exposed through a remote interface. We also have an independent class library that contains the EJB interface that can be distributed to other developers. Developers can add the library to their projects if they want to communicate with the EJB that is exposed by the remote interface and do not need to have the sources for the EJB. When we modify the code for the EJB, we only need to distribute a JAR of the updated class library if any of the interfaces change.

When we use the Add Business Method dialog, the IDE automatically implements the method in the remote interface.

Creating the Application Client

We will now create an enterprise application client. When creating the application client, the project needs the Java class library as a library in order to reference the EJB.

When you run the enterprise application, the IDE will package the application client and the Java class library JAR in the EAR archive. Library JARs must be packaged in an EAR with the application client if you want to access the JARs from the application client.

Do create the application client do the following:

Choose File > New Project and select Enterprise Application Client in the Java EE category.



Click Next.

	New Enterprise Application Client	:		×
St	eps	Name and Loca	tion	
1.	Choose Project	Project <u>N</u> ame:	EntAppTestClient	
3.	Server and Settings	Project Location:	C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\MY SLIDES\LESSON 8\NETBEANS 7.2	Browse
		Project <u>F</u> older:	C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\MY SLIDES\LESSON 8\NETBEANS 7.2\EntAppTestClient	
			d Ender for Station Libertian	
		Libraries Folder:	u ronden for storing Libraries	Browse
			Different users and projects can share the same compilation libraries (see Help for details).	
			< Back Next > Einish Cancel	Help

Click Next.

New Enterprise Application Clien	t		×
Steps	Server and Set	ttings	
1. Choose Project 2. Name and Location	<u>A</u> dd to Enterprise	Application: <pre>{</pre>	•
3. Server and Settings	Server:	GlassFish Server 3.1.2	A <u>d</u> d
	Java EE Version:	Java EE 6 🔻	
		Enable Contexts and Dependency Injection	
		Set Source Level to 6	
		Recommendation: Source Level 6 should be used in Java EE 6 projects.	
	Main <u>C</u> lass:	entapptestclient.BankUser	
		< <u>B</u> ack Next > Einish Cancel	Help

Click Finish.

Adding the Class Library

The class library that contains the remote interface now needs to be added to the classpath of the project to enable the application client to reference the EJB. The class library project is open, so you can use the Call Enterprise Bean dialog to help you generate the code to call the EJB.

Go to BankUser and clink on the editor:



Select Insert Code and then Call Enterprise Bean:



The following appears:

Call Enterprise Bean	Call Enterprise Bean								
Select an enterprise bean fr	om open projects.								
EntAppTestEJB-ej	b								
<u>R</u> eference Name:	BankBean								
Referenced Interface:	No interface	C Local	<u> <u> R</u>emote </u>						
	ОК	Cancel	<u>H</u> elp						

Click Ok.

You will see the following:

```
Start Page 🛛 🔊 BankBean.java 📽 🐼 BankBeanRemote.java 🛪 🚳 BankUser.java 📽
          History | 🕼 💀 - 🗐 - 🔍 🖓 🖓 🚰 🌍 | 🔗 😓 | 😫 🖄 | 👄 💷 | 🏙 🚅
              Source
               4
               5
                    package entapptestclient;
               6
te.java
               7 - import Bank.ejb.BankBeanRemote;
               8 L import javax.ejb.EJB;
ry - javaee-api-6.0.
               9
              10 - /**
              11
              12
                     * @author Biba
              13
                    */
              14
                   public class BankUser {
                        @EJB
              15
              16
                        private static BankBeanRemote bankBean;
              17
                        /**
              18 -
              19
                         * @param args the command line arguments
              20
                         */
                        public static void main(String[] args) {
              21 -
              22
                            // TODO code application logic here
              23
              24
              25
              26
                        }
              27
                    }
              28
```

Now you may add the following code to the methods:

```
5
     package entapptestclient;
 6
7 - import Bank.ejb.BankBeanRemote;
 8 L import javax.ejb.EJB;
 9
10 - /**
11
      * @author Biba
12
     */
13
     public class BankUser {
14
15
         @EJB
         private static BankBeanRemote bankBean;
16
17
            public BankUser(String[] args) {
18 -
  L
19
         }
20
21 -
        /**
22
         * @param args the command line arguments
         */
23
24 -
         public static void main(String[] args) {
            BankUser client = new BankUser(args);
25
             client.start();
26
27
   L
         }
28
         public void start() {
29 -
30
                 bankBean.initialize();
31
                 int account = 1;
32
                 System.out.println("-----");
33
                 System.out.println("Bank User Started.");
34
                 System.out.println("Executing the query to the bean");
                 System.out.println("The Customer with account " + account + " is: "
35
36
                         + bankBean.getCustomerID(account));
                 System.out.println("-----");
37
38
39
     }
```

Save all in Netbeans.

Running the application

You first need to start the Glassfish Server as follows:

NetBeans IDE 7.2	
ile Edit View Navigate Source	Refactor Run Debug Profile Team To
🎦 🚰 🖶 🦻 🤁	· · · · · · · · · · · · · · · · · · ·
Services 🛛	
Databases Web Services Servers	
GlassFish Server 3.1.7	Start
Cloud Hudson Builders F OTB OTB OTB OTB OTB OTB OTB OTB	Start in Debug Mode Start in Profile Mode Restart Stop Refresh Remove View Domain Admin Console View Domain Server Log View Domain Update Center Properties

In the above click Start

You first need to deploy the Enterprise Application. Right-click the EntAppTestEJB enterprise application and choose Deploy.

🕀 🕞	Libraries			
🕀 🕞	Test Libraries			
🕀 尾	Configuration F	Files		
···· 📭	Server Resource	ces		
≟ ▲ Ent/ ≟ ◎ Ent/	AppTestEJE AppTestEJE Source Pac	Add Java EE Module New	•	
	Bank.e Bank.e Libraries Enterprise Configurat	Build Clean and Build Clean Verify		
	Server Kes	Run		
		Deploy		
		Debug Profile		
		Open Required Projects Close		
٠		Rename		
EntAppTes	tEJB - Nav	Maria		
		Move		
		Сору		
	<no td="" v<=""><td>Delete</td><td>Delete</td><td></td></no>	Delete	Delete	
P 🐻 Outp	ut 🖳 Ja	Find Versioning History	Ctrl+F	
	A	Descention		

If you check the administration panel of the server you will see the following:

	Ар	plications		ninus kinde of modules. Destad en er		ation or modulo by clicking on the colored liv
erver)	Depl	oyed Applications (5)	, or v	anous kinos of modules. Restart an ap	plica	auon or module by clicking on the reload in
ances	87 8	Deploy Undeploy Enable	Dis	able Filter:		
		Name	tų.	Enabled	4	Engines
		EntAppTestEJB		✓		ear, ejb
es		converter		✓		ejb, web
1		counter		✓		ejb, web
		helloservice		✓		ejb, webservices
		timersession		 Image: A set of the set of the		ejb, web
lapter Configs						

Now you can now deploy the application client by clicking with the right of the mouse and clicking on Deploy:

cts	5 ×		
EntAppTest			
EntAppTestClien EntAppTestEJB	New	۰.]
EntAppTestEJB-(Build		
	Clean and Build		
	Clean		
	Verify		
	Generate Javadoc		
	Run		
	Deploy		
	Debug		
	Test	Alt+F6	
	Open Required Projects Close		
	Rename		
	Move		
	Copy		
	Delete	Delete	
	belete	Delete	
	Find	Ctrl+F	
	Inspect and Transform		
	Versioning	+	
	History	•	

Now you can now deploy the application client by clicking with the right of the mouse and clicking on Deploy:

You will see in Glassfish:

GlassFish [™] Server Open Source Edition							
۲							
Common Tasks	Ар	plications					
- 🚱 Domain	Appli	cations can be enterprise or web applications, or vario	ous kinds of modules. Restart a	in applicati	on or module by clicking		
server (Admin Server)	Depl	oyed Applications (6)					
Standalone Instances	87 8	Deploy Undeploy Enable Disable	Filter:				
▶ 🖪 Nodes		Name 14	Enabled	Ť4	Engines		
Applications		EntAppTestClient	 Image: A set of the set of the		appclient		
- 🛟 Lifecycle Modules		EntAppTestEJB	✓		ear, ejb		
- 🔤 Monitoring Data		converter	✓		ejb, web		
🔻 😝 Resources		counter	✓		ejb, web		
► 📄 JDBC		helloservice	✓		ejb, webservices		
► A Connectors		timersession	✓		ejb, web		
음 Resource Adapter Configs							
► Connectors ☐ Resource Adapter Configs ► ➡ IMS Resources		umersession	v		ejo, web		

Now you can now run the application client by clicking with the right of the mouse and clicking on Run:



You will see the following execution:

```
Output
Java DB Database Process 🖇 GlassFish Server 3.1.2 🕺 EntAppTestClient (run) 🖇
Redeploying C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\MY SLIDES\LESSON 8\NETBEANS 7.2\
   Initializing...
post-run-deploy:
응읍 run-deploy:
   Copying 1 file to C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\MY SLIDES\LESSON 8\NETBEAN
   Copying 2 files to C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\MY SLIDES\LESSON 8\NETBEF
   Warning: C:\DISK D\UNYT\COURSES\MSc\ADVANCED OP. SYS\2012-2013\MY SLIDES\LESSON 8\NETBEANS 7.2\Ent
   _____
   Bank User Started.
   Executing the query to the bean
   The Customer with account 1 is: 1
   ------
   run:
   BUILD SUCCESSFUL (total time: 14 seconds)
   I.
```