



**Maven™**

  
**Java  
Servlets**



# Desenvolvimento de Sistemas com Java, Eclipse, Maven, Tomcat e Servlets



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# Prof. Aparecido V. de Freitas

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- ◆ **Engenharia** Plena pela Escola de Engenharia **Mauá**
- ◆ Bacharel em **Matemática** pela Fundação Santo André
- ◆ Atuou durante 15 anos como Analista e Supervisor de **TI** na área de TI da **Volkswagen** do Brasil
- ◆ Especialista na plataforma **IBM i** (desde 1993)
- ◆ Experiência na plataforma **IBM Mainframe** (15 anos)
- ◆ Professor da **USCS** desde a primeira turma do curso de Ciência da Computação (1989)
- ◆ Professor do Curso de Engenharia de Computação da Escola de Engenharia **Mauá**
- ◆ Ex-Gestor dos cursos de Computação da USCS há 13 anos (2000 a 2013)
- ◆ Ex-Professor do curso de Ciência da Computação da Universidade **Metodista**
- ◆ Ex-Professor do Curso de Matemática – Ênfase Software – **Fundação Santo André**
- ◆ Consultor e Instrutor em empresas de TI – Qualitsys Consultoria de Informática Ltda
- ◆ Certificação Internacional em Engenharia de **Requisitos** – **IREB** – CPRE
- ◆ Certificação internacional em **Testes** de Software – **ISTQB** – CTFL
- ◆ Certificação internacional em **Testes Ágeis** de Software – **ISTQB** – CTFL-AT





# Java é uma plataforma !



# Java é uma plataforma !



- ✓ Uma linguagem de Programação
- ✓ Um ambiente de Execução (JVM)
- ✓ Um conjunto de API's

# API's



- ✓ Para aplicações distribuídas (web)  
Java disponibiliza a **JEE**



## ✓ Java Enterprise Edition

ORACLE®

# Java™ Platform, Enterprise Edition (Java EE) Specification, v8


Please post comments to [javaee-spec@javaee.groups.io](mailto:javaee-spec@javaee.groups.io)





## ✓ Java Enterprise Edition

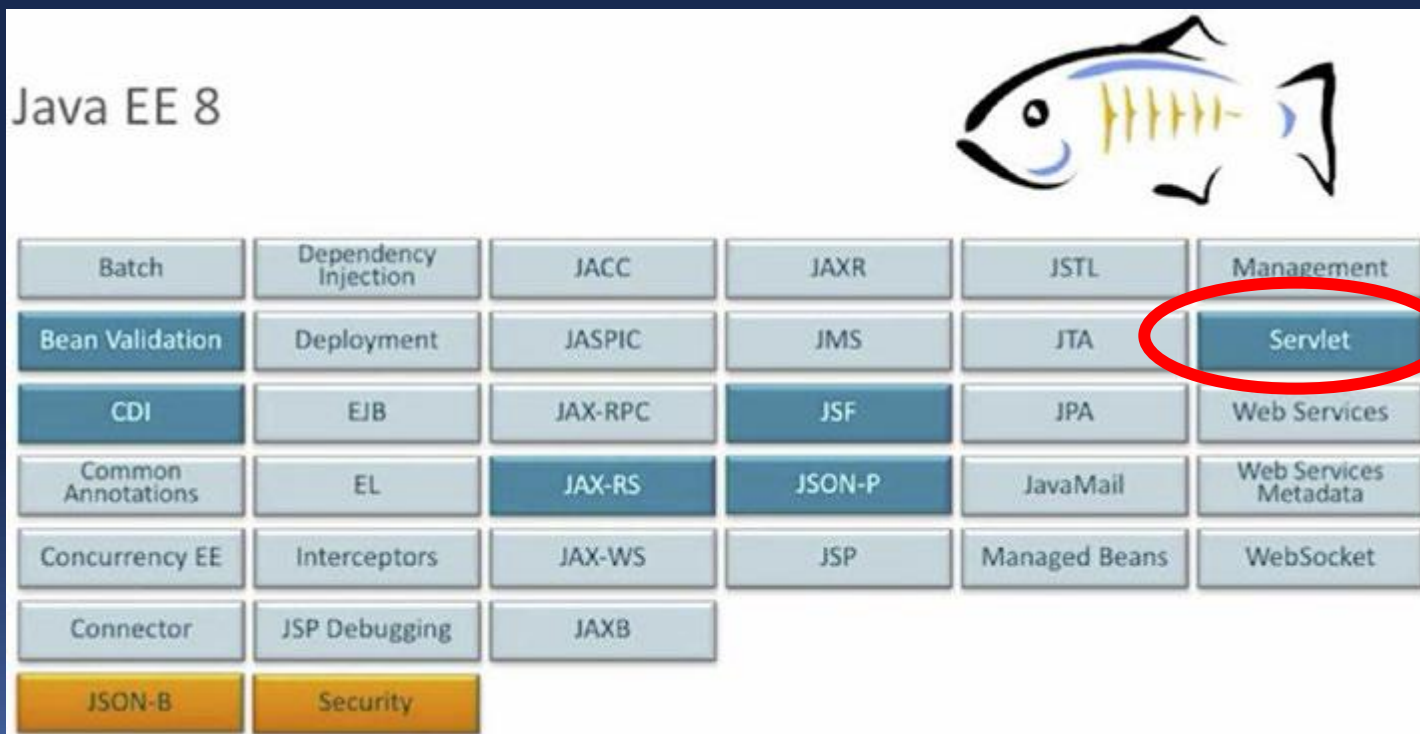
Java EE 8



Batch	Dependency Injection	JACC	JAXR	JSTL	Management
Bean Validation	Deployment	JASPIC	JMS	JTA	Servlet
CDI	EJB	JAX-RPC	JSF	JPA	Web Services
Common Annotations	EL	JAX-RS	JSON-P	JavaMail	Web Services Metadata
Concurrency EE	Interceptors	JAX-WS	JSP	Managed Beans	WebSocket
Connector	JSP Debugging	JAXB			
JSON-B	Security				

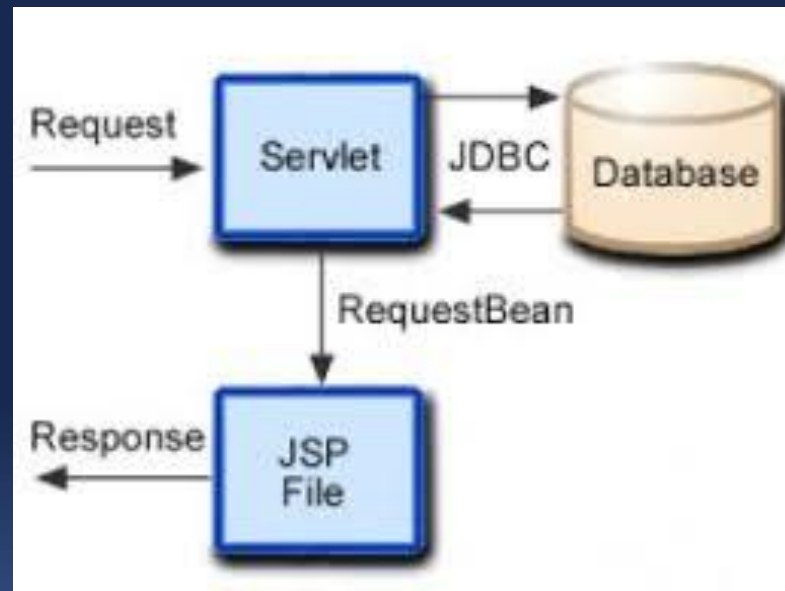


## ✓ Java Enterprise Edition



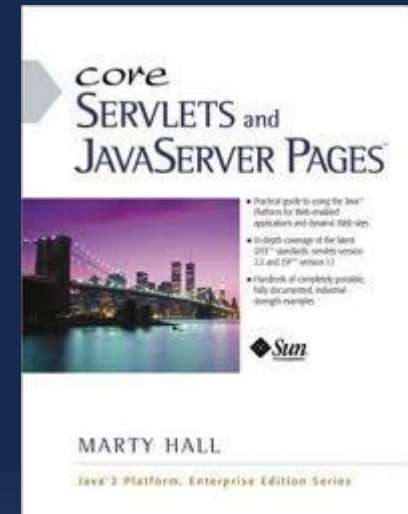
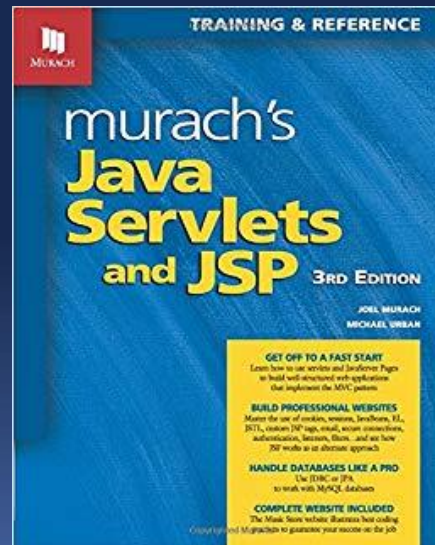


# Visão Geral da Tecnologia Servlet e JSP

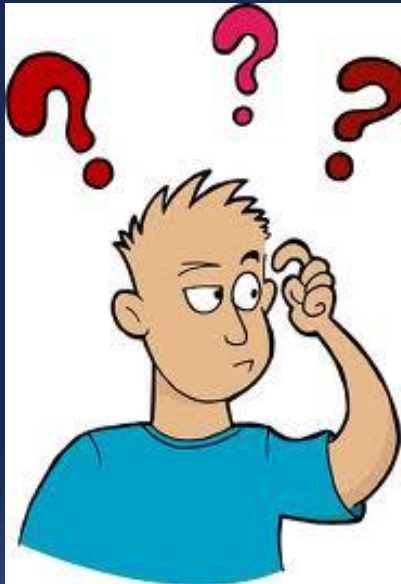


# Bibliografia

- Head First Servlets & JSP – Bryan Basham, Kathy Sierra & Bert Bates
- Core Servlets and Java Server Pages – Marty Hall
- Java Servlets and JSP – Joel Murach – 3rd Edition



# O que são Servlets ?



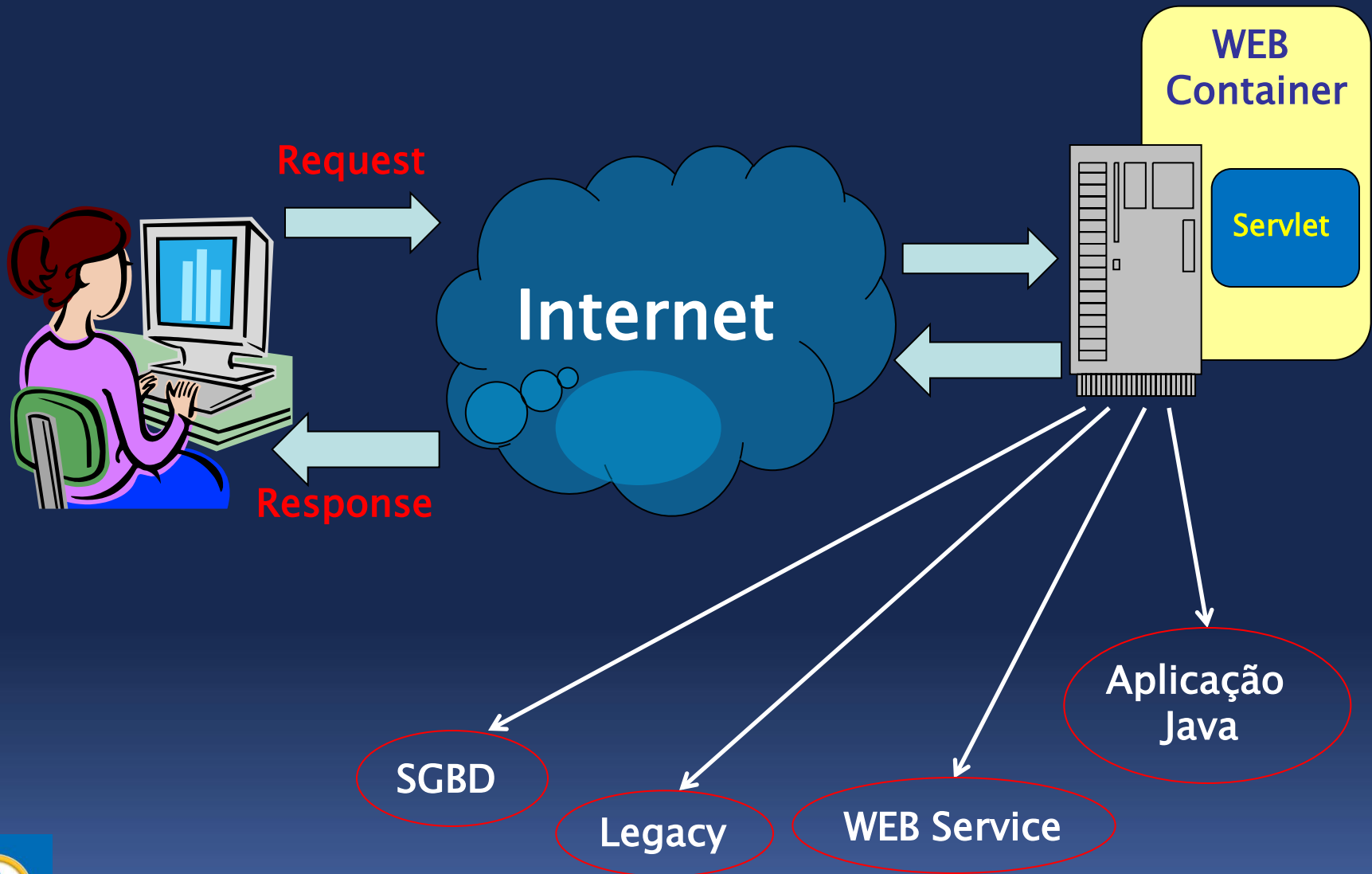


# Servlets



- ❖ São programas **CGI** escritos na Linguagem **Java**.
- ❖ Necessitam portanto da **infraestrutura** Java para serem executados;
- ❖ Rodam em **JVM** – **Java Virtual Machine**;
- ❖ O servidor que fornece a infraestrutura para se executar **Servlets** é chamado **Web Container**.
- ❖ Usados como base para diversos Frameworks: Spring, JSF, etc..
- ❖ Exemplos de Web Container: **Tomcat**, **Jboss**, **WebSphere**, **Glassfish**, etc.



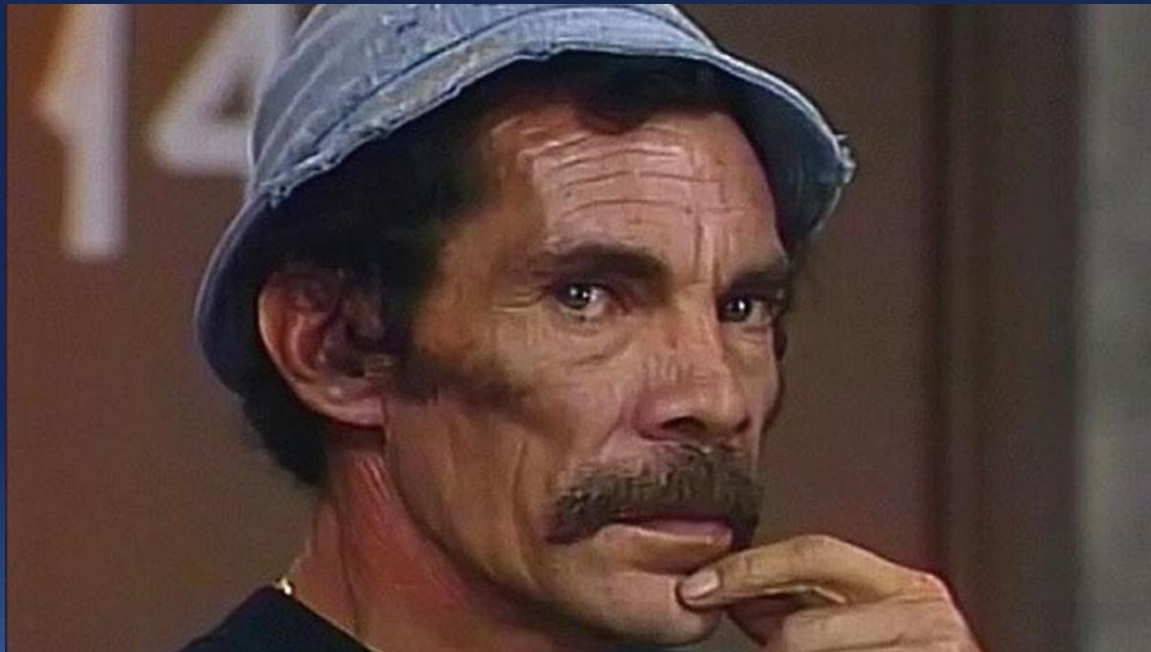




# Servlets – Tarefas

- Tratar as requisições enviadas pelo cliente
- Ler o request **HTTP** enviado pelo Browser
- Processar os dados recebidos
- Gerar resultados
- Enviar os documentos ao cliente
- Enviar o response **HTTP** para o cliente

# Como criar Servlets ?



# Como criar Servlets ?



ProjectsWorking GroupsMembers

Home / Downloads / Packages / Release / Eclipse IDE Kepler / SR2 / Eclipse IDE for Java EE Developers

Eclipse InstallerEclipse Packages

This package was released on 02/28/2014. A newer package is available [here](#).



## Eclipse IDE for Java EE Developers

### Package Description

Tools for Java developers creating Java EE and Web applications, including a Java IDE, tools for Java EE, JPA, JSF, Mylyn, EGit and others.

This package includes:

- Data Tools Platform
- Eclipse Git Team Provider
- Eclipse Java Development Tools
- Eclipse Java EE Developer Tools
- JavaScript Development Tools
- Maven Integration for Eclipse
- Mylyn Task List
- Eclipse Plug-in Development Environment
- Remote System Explorer
- Eclipse XML Editors and Tools

### Download Links

Windows 32-bit  
Windows 64-bit  
Mac OS X (Cocoa) 32-bit  
Mac OS X (Cocoa) 64-bit  
Linux 32-bit  
Linux 64-bit

Downloaded 3,692,929 Times

► Checksums...

Bugzilla

# Como criar Servlets ?



# Como incorporar Servlets no Projeto Java EE?





# Maven



# Maven

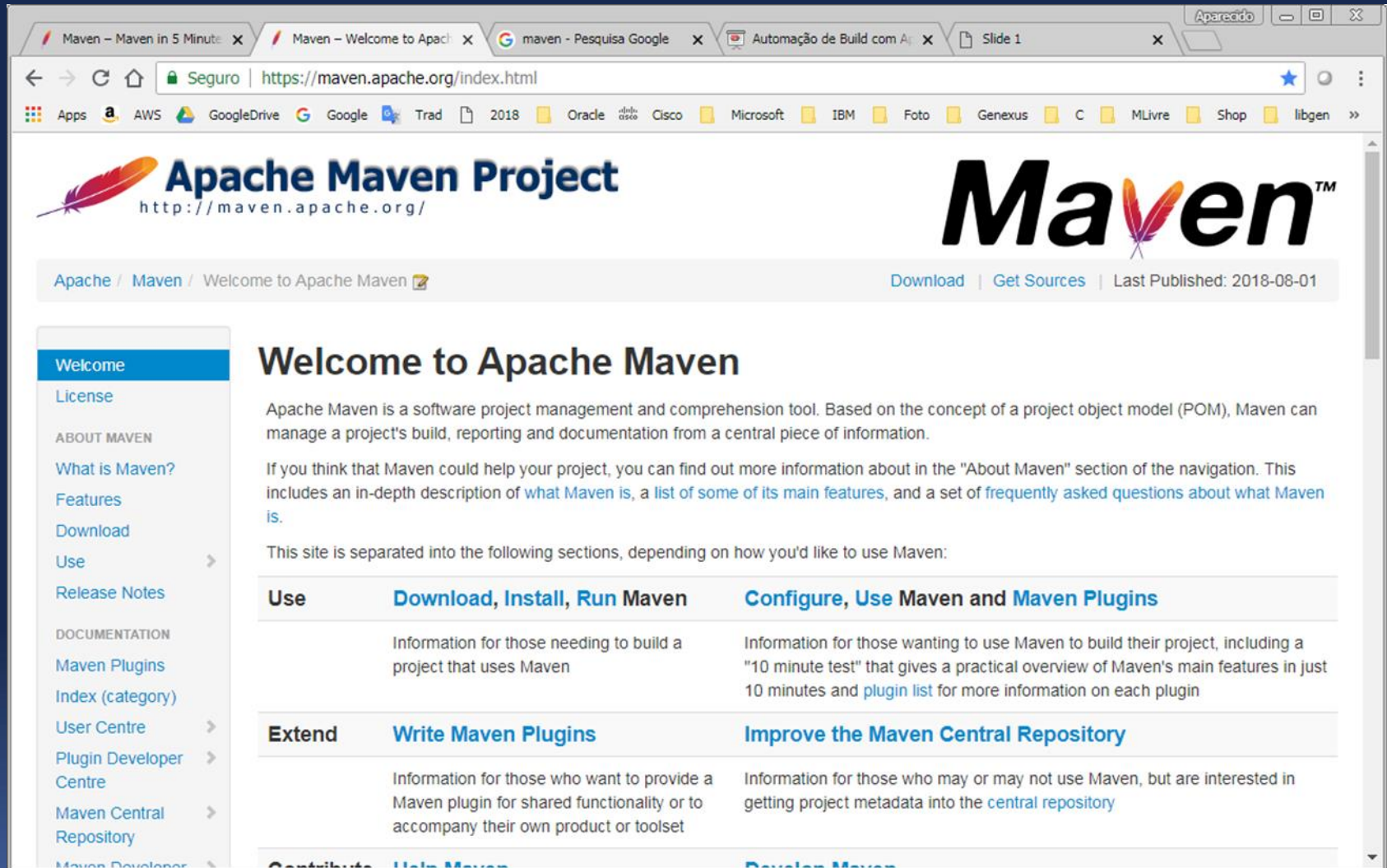
- Ferramenta de automação de build
- Gerencia o processo de desenvolvimento de produtos (artefatos) em Java (preferencialmente)
- Abordagem declarativa (diferentemente do Ant)
- Convenção sobre Configuração
- Desenvolvido pelo grupo Apache (suporte do projeto Avalon)

# Maven – Instalação

- Baixar distribuição
  - <http://maven.apache.org/download.html>
- Descompactar
- Configurar variáveis de ambiente
  - Windows
    - M2\_HOME=C:\apache-maven-3.0.4 (opcional)
    - JAVA\_HOME=<pasta de instalação do JDK>
    - PATH=%M2\_HOME%\bin;%JAVA\_HOME%\bin;%PATH%
- Testar instalação
  - PROMPT> mvn -version

```
Apache Maven 3.0.4 (r1232337; 2012-01-17 06:44:56-0200)
Maven home: C:\Program Files\Java\apache-maven-3.0.4
Java version: 1.7.0_03, vendor: Oracle Corporation
Java home: C:\Program Files\Java\jdk1.7.0_03-x64\jre
Default locale: pt_BR, platform encoding: Cp1252
OS name: "windows 7", version: "6.1", arch: "amd64", family: "windows"
```

<http://maven.apache.org/>



The screenshot shows the Apache Maven Project website in a web browser. The browser's address bar displays the URL <https://maven.apache.org/index.html>. The page features the Apache Maven Project logo on the left and a large 'Maven' title with a feather icon on the right. Below the title, there are links for 'Download', 'Get Sources', and 'Last Published: 2018-08-01'. A left sidebar contains a navigation menu with links such as 'Welcome', 'License', 'ABOUT MAVEN', 'What is Maven?', 'Features', 'Download', 'Use', 'Release Notes', 'DOCUMENTATION', 'Maven Plugins', 'Index (category)', 'User Centre', 'Plugin Developer Centre', 'Maven Central Repository', and 'Maven Developer'. The main content area is titled 'Welcome to Apache Maven' and contains a paragraph about Maven's purpose as a software project management tool. It also includes a section for 'Use' with two columns: 'Download, Install, Run Maven' and 'Configure, Use Maven and Maven Plugins'. Below this is an 'Extend' section with two columns: 'Write Maven Plugins' and 'Improve the Maven Central Repository'. The page is designed with a clean, professional layout using a blue and white color scheme.

Apache / Maven / Welcome to Apache Maven [Download](#) | [Get Sources](#) | Last Published: 2018-08-01

## Welcome to Apache Maven

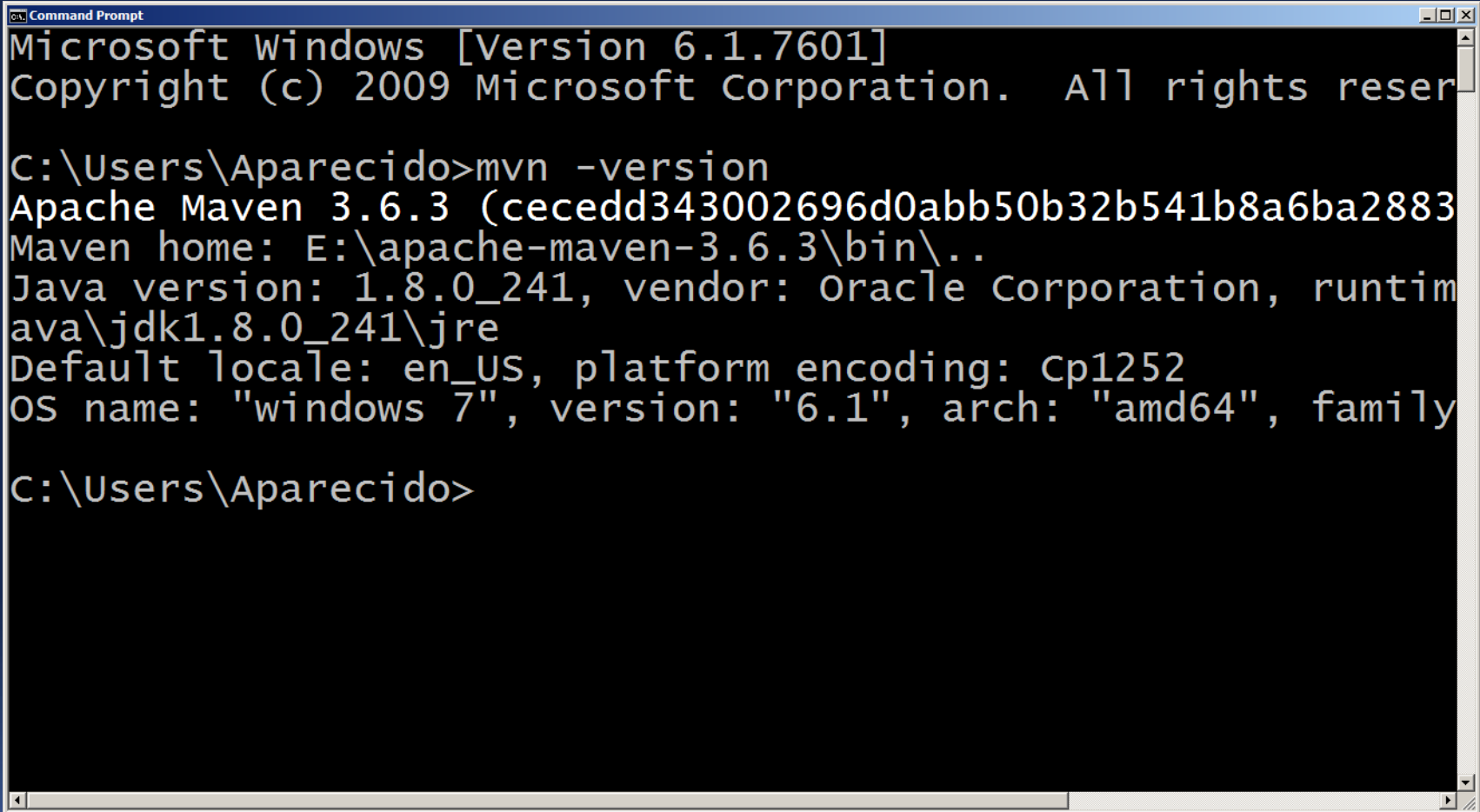
Apache Maven is a software project management and comprehension tool. Based on the concept of a project object model (POM), Maven can manage a project's build, reporting and documentation from a central piece of information.

If you think that Maven could help your project, you can find out more information about in the "About Maven" section of the navigation. This includes an in-depth description of [what Maven is](#), a [list of some of its main features](#), and a set of [frequently asked questions about what Maven is](#).

This site is separated into the following sections, depending on how you'd like to use Maven:

Use	<a href="#">Download, Install, Run Maven</a>	<a href="#">Configure, Use Maven and Maven Plugins</a>
	Information for those needing to build a project that uses Maven	Information for those wanting to use Maven to build their project, including a "10 minute test" that gives a practical overview of Maven's main features in just 10 minutes and <a href="#">plugin list</a> for more information on each plugin
Extend	<a href="#">Write Maven Plugins</a>	<a href="#">Improve the Maven Central Repository</a>
	Information for those who want to provide a Maven plugin for shared functionality or to accompany their own product or toolset	Information for those who may or may not use Maven, but are interested in getting project metadata into the <a href="#">central repository</a>

## mvn -version



```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Aparecido>mvn -version
Apache Maven 3.6.3 (cecedd343002696d0abb50b32b541b8a6ba2883)
Maven home: E:\apache-maven-3.6.3\bin\..
Java version: 1.8.0_241, vendor: Oracle Corporation, runtime:
C:\Program Files\Java\jdk1.8.0_241\jre
Default locale: en_US, platform encoding: Cp1252
OS name: "windows 7", version: "6.1", arch: "amd64", family: "windows"

C:\Users\Aparecido>
```

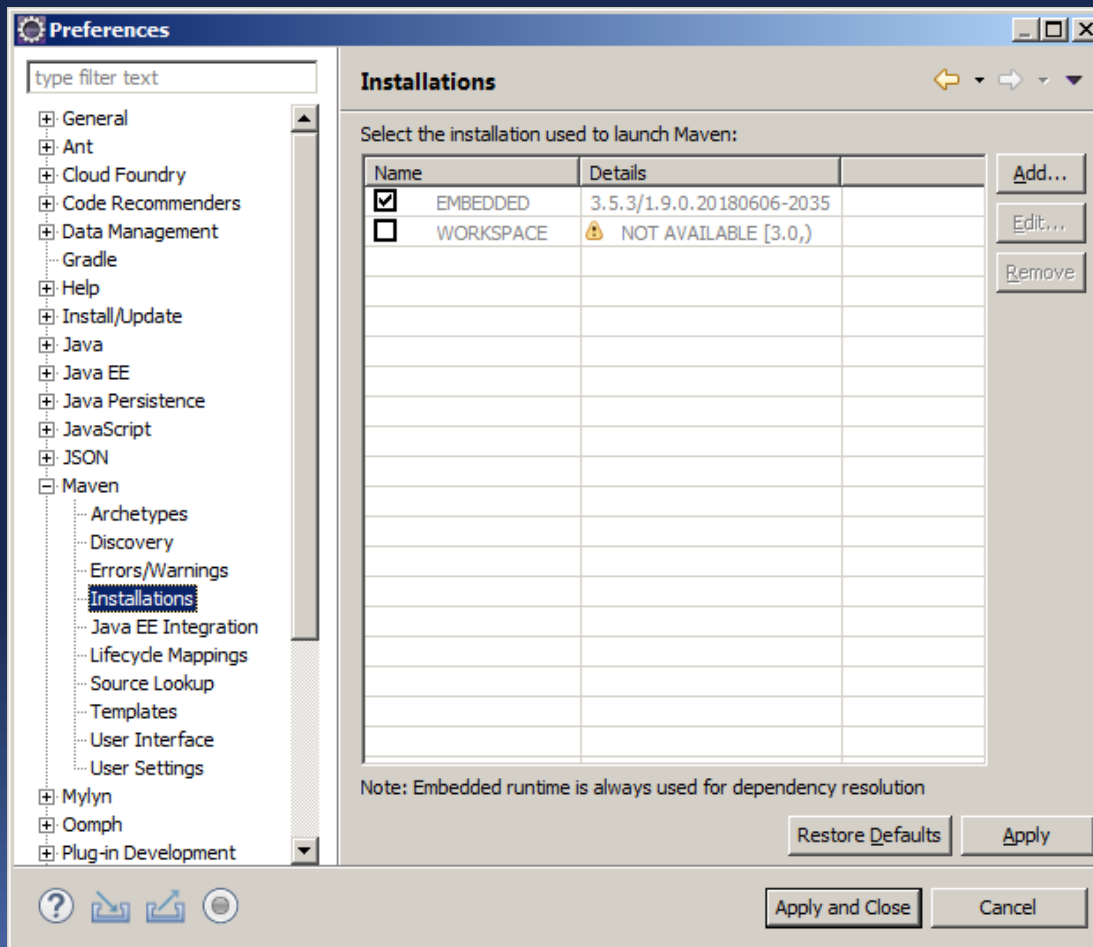


# Integração do Maven com Eclipse

- ✿ Para a integração do Maven com o Eclipse recomenda-se utilizar o plugin M2E;
- ✿ M2E é um plugin do Eclipse que faz a integração com o Maven;
- ✿ A distribuição Eclipse for **JEE Developers** já vem com o plugin **M2E** e uma instalação interna do Maven.

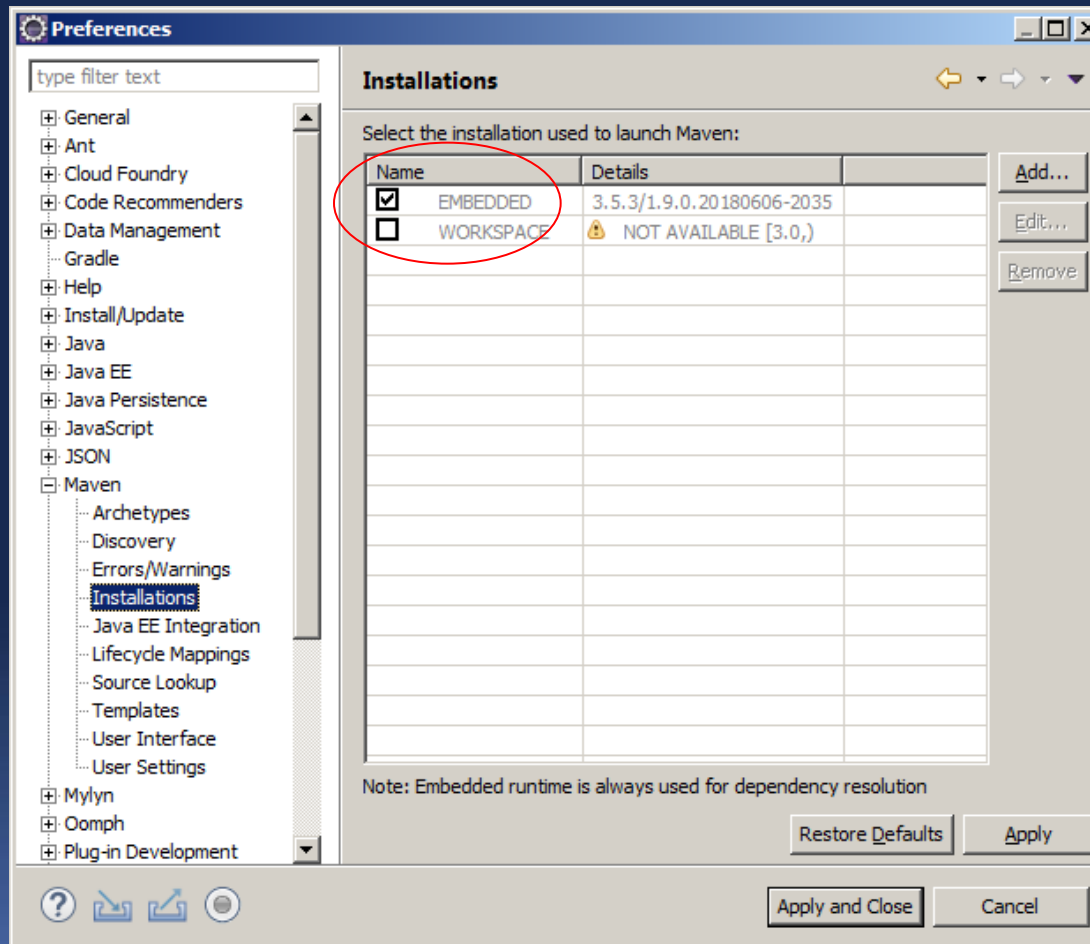
# Integração do Maven com Eclipse

- ✓ Com o plugin M2E instalado e o Eclipse aberto, acesse o menu **Window > Preferences**;
- ✓ Vá para a opção **Maven > Installations**.



# Integração do Maven com Eclipse

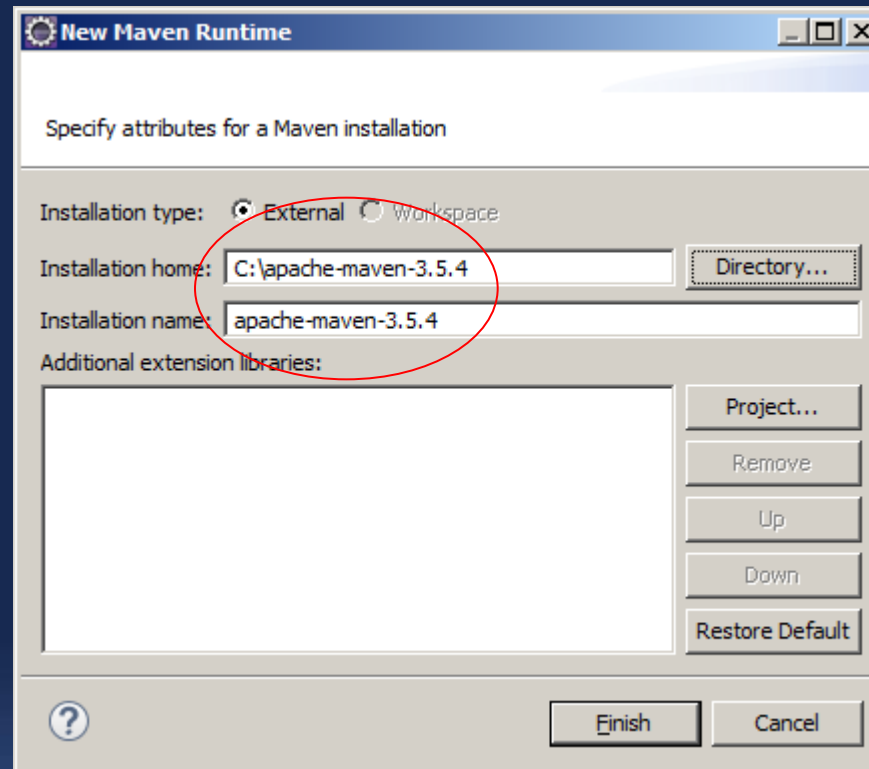
- ✓ Observe que já existe uma instalação “embarcada”, mas com uma versão desatualizada;
- ✓ Vamos adicionar o nosso Maven recentemente instalado;
- ✓ Clique em **Add...**





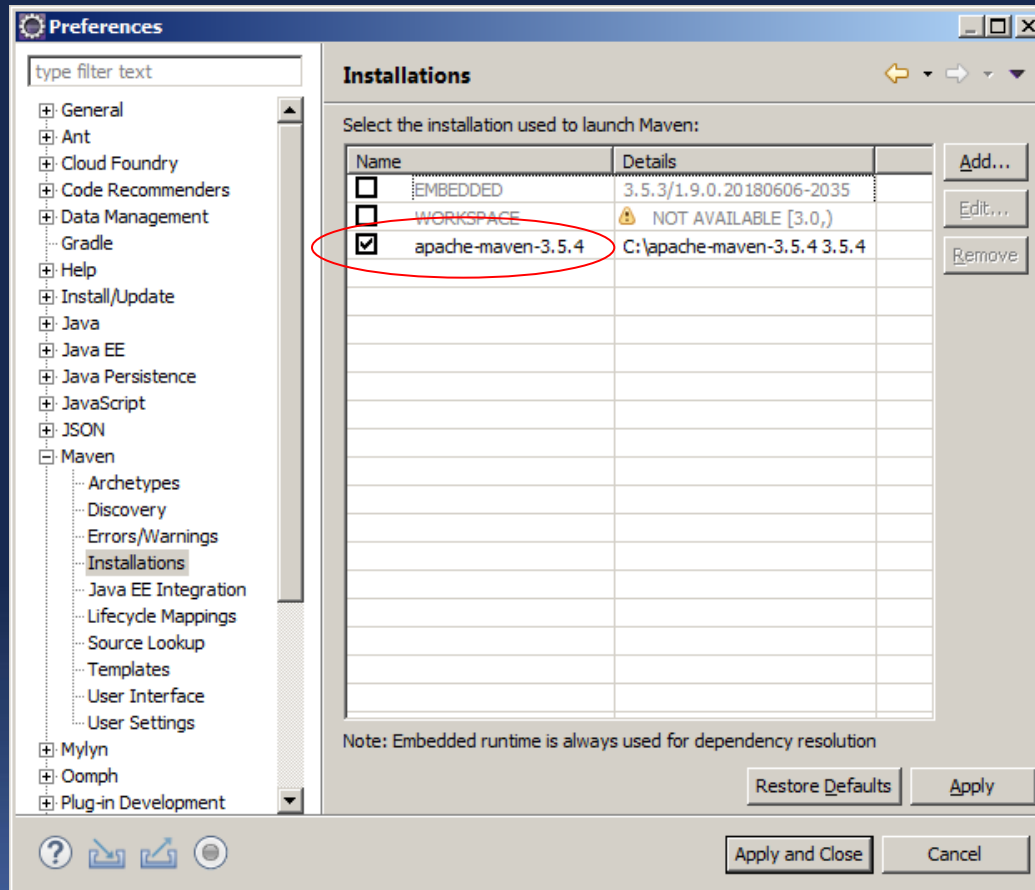
# Integração do Maven com Eclipse

- ✓ Selecione a pasta com a nossa instalação e tecle Finish.



# Integração do Maven com Eclipse

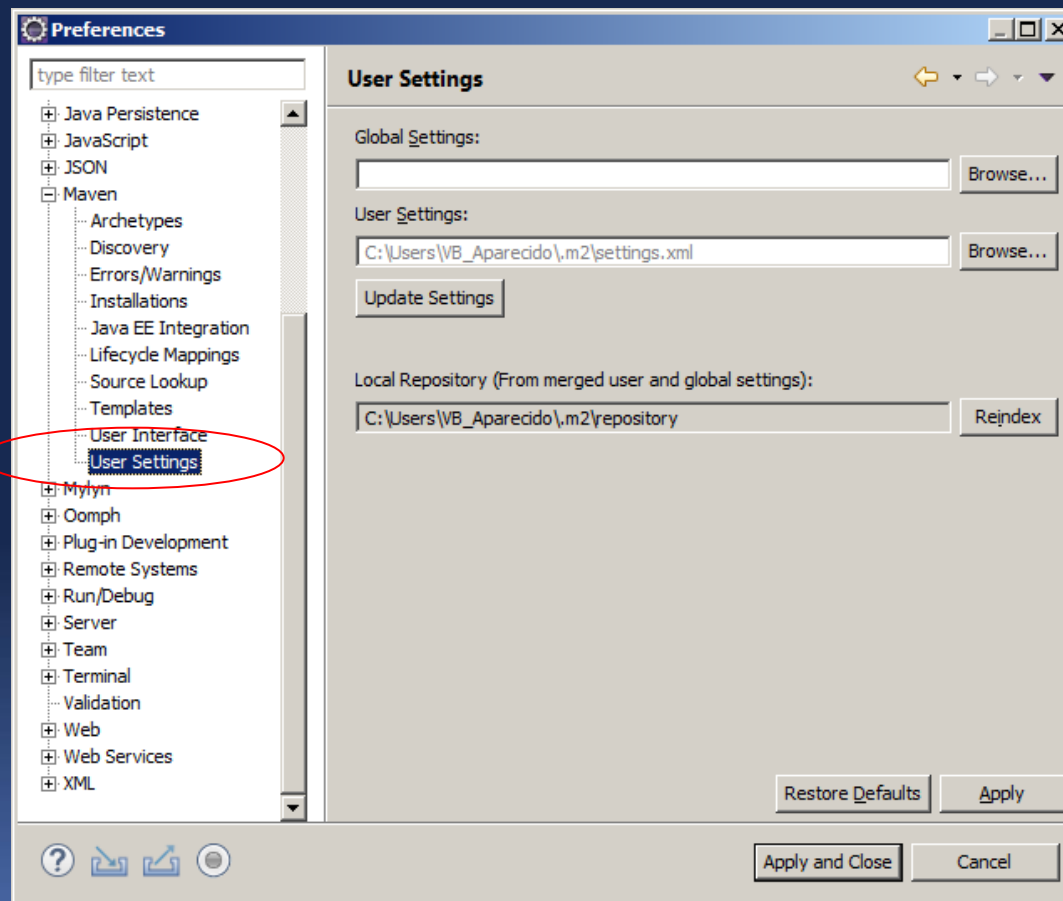
✓ Marque a nossa instalação e tecle **Apply** and **Close**.





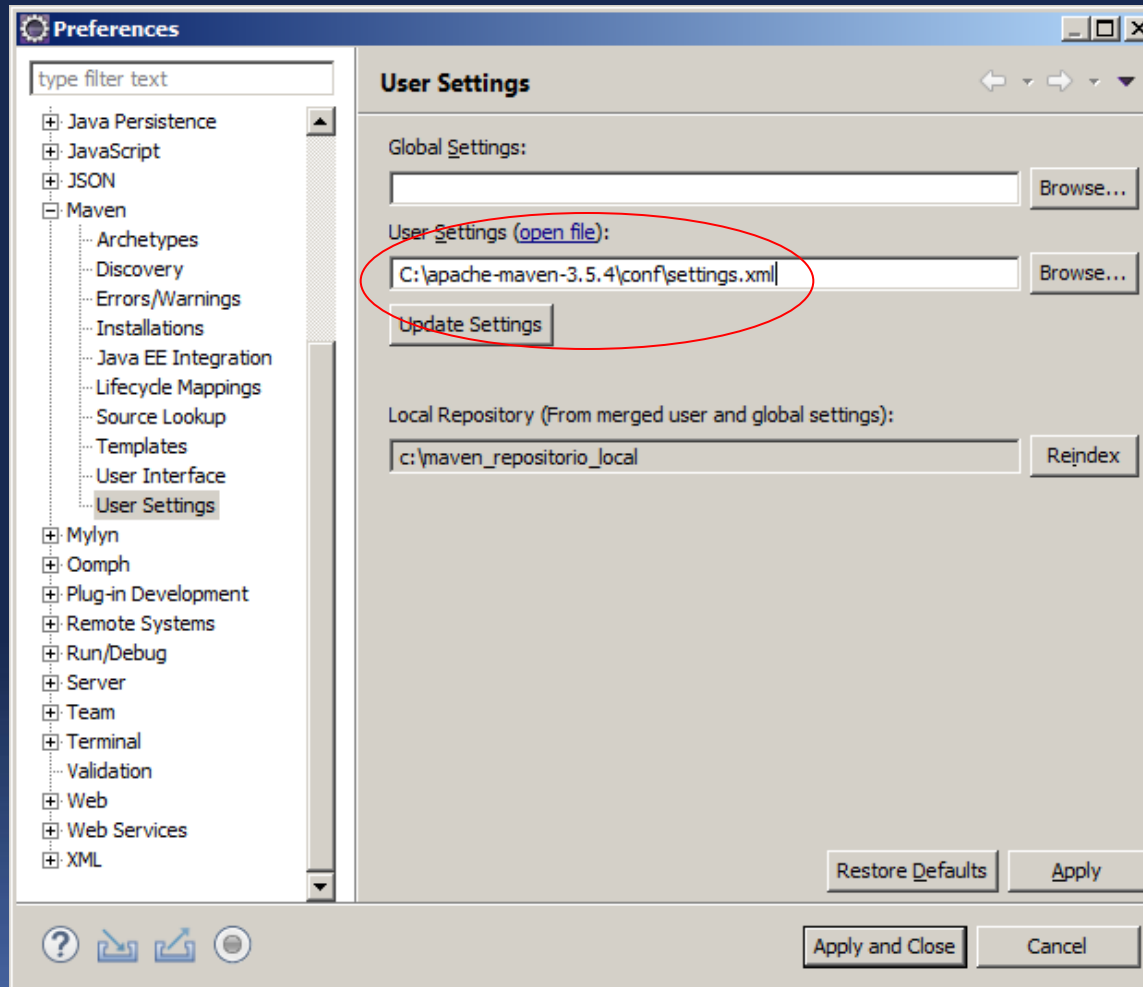
# Integração do Maven com Eclipse

- ✓ Agora vamos atualizar o arquivo de configuração do Maven;
- ✓ Vá ao menu User Settings e defina o arquivo de configuração existente no diretório onde o **Maven** foi instalado.



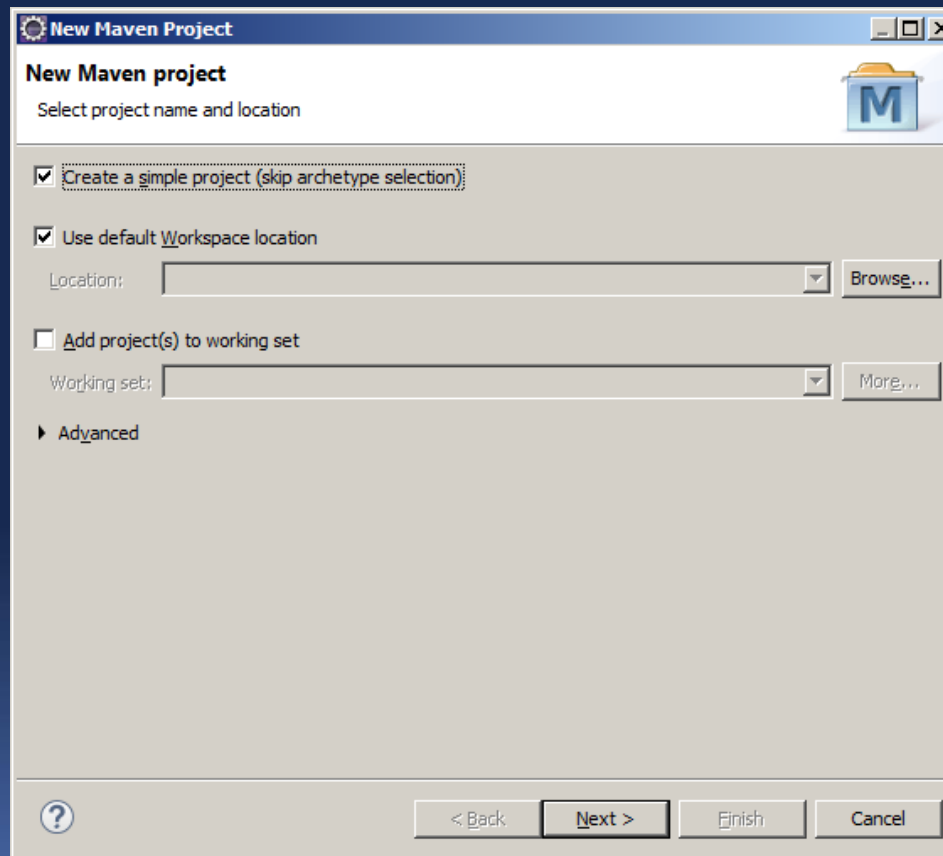
# Integração do Maven com Eclipse

- ✓ Após a definição do arquivo de configuração, tecle em Update Settings;
- ✓ Em seguida, tecle em **Apply** and **Close**.



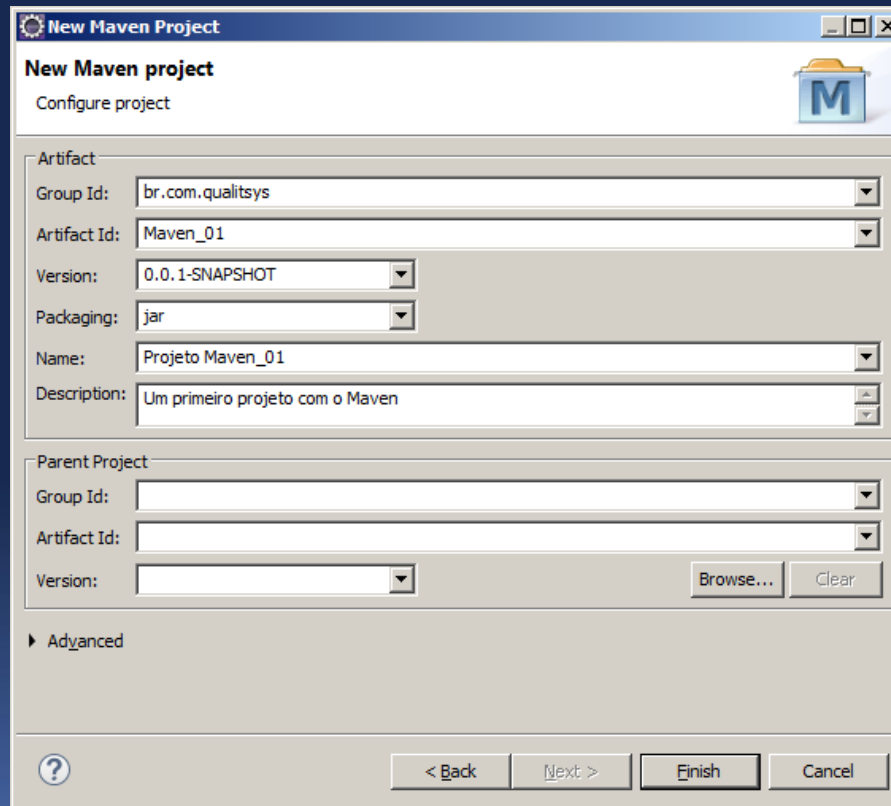
# Criação de um Projeto Maven no Eclipse

- ✓ Com o Eclipse configurado, pode-se criar um novo projeto no Eclipse;
- ✓ Acesse o menu **File > New > Maven Project**.
- ✓ Selecione a opção Create a simple Project (skip archetype selection).
- ✓ Clique em **Next >**.



# Criação de um Projeto Maven no Eclipse

- ✓ Group Id representa a organização onde o projeto será desenvolvido;
- ✓ Artifact Id corresponde ao projeto que será desenvolvido;
- ✓ Version e Packaging já deverão estar preenchidos;
- ✓ Clique em **Finish**.



**New Maven Project**  
Configure project

Artifact

Group Id:

Artifact Id:

Version:

Packaging:

Name:

Description:

Parent Project

Group Id:

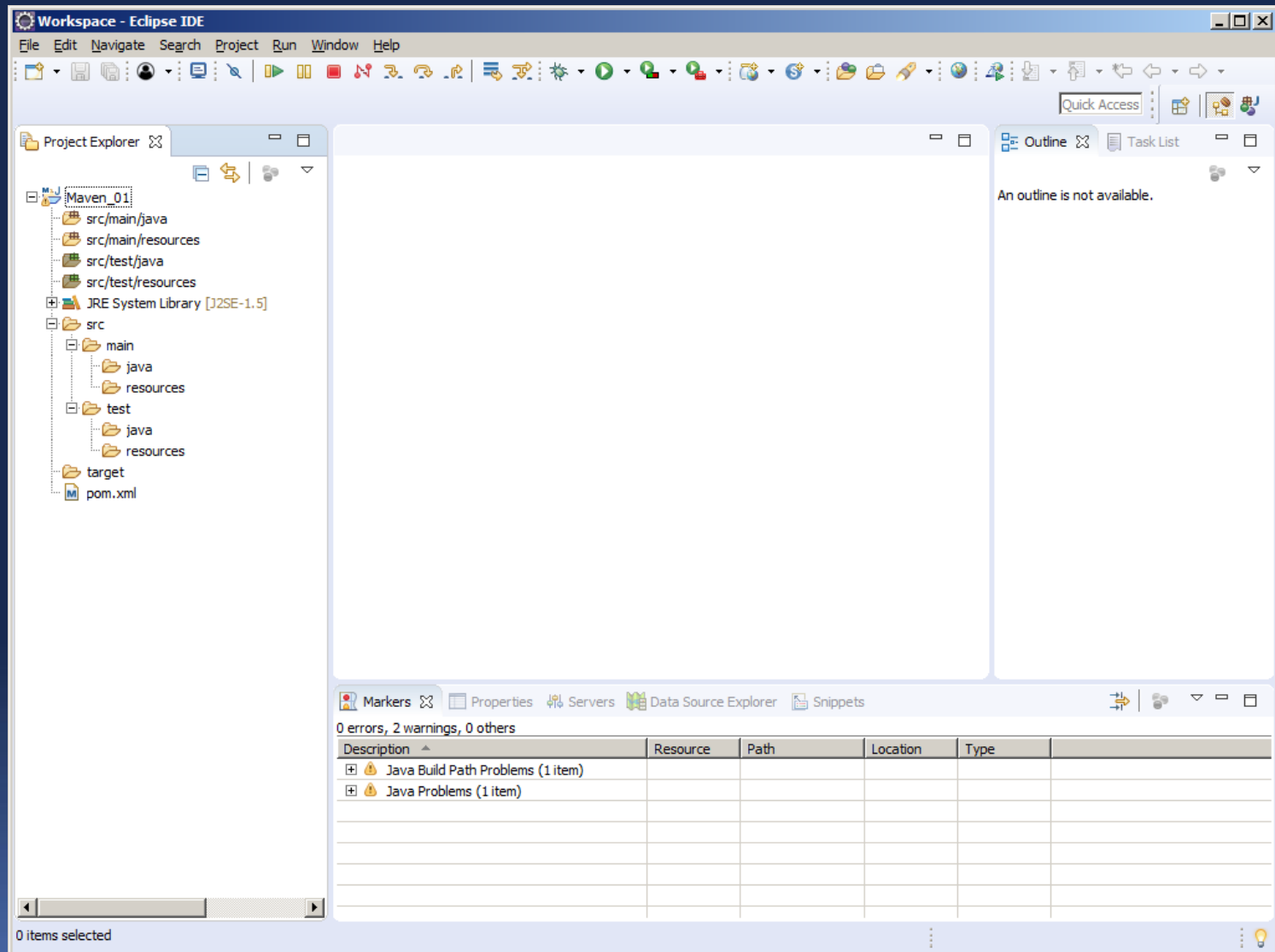
Artifact Id:

Version:

► Advanced

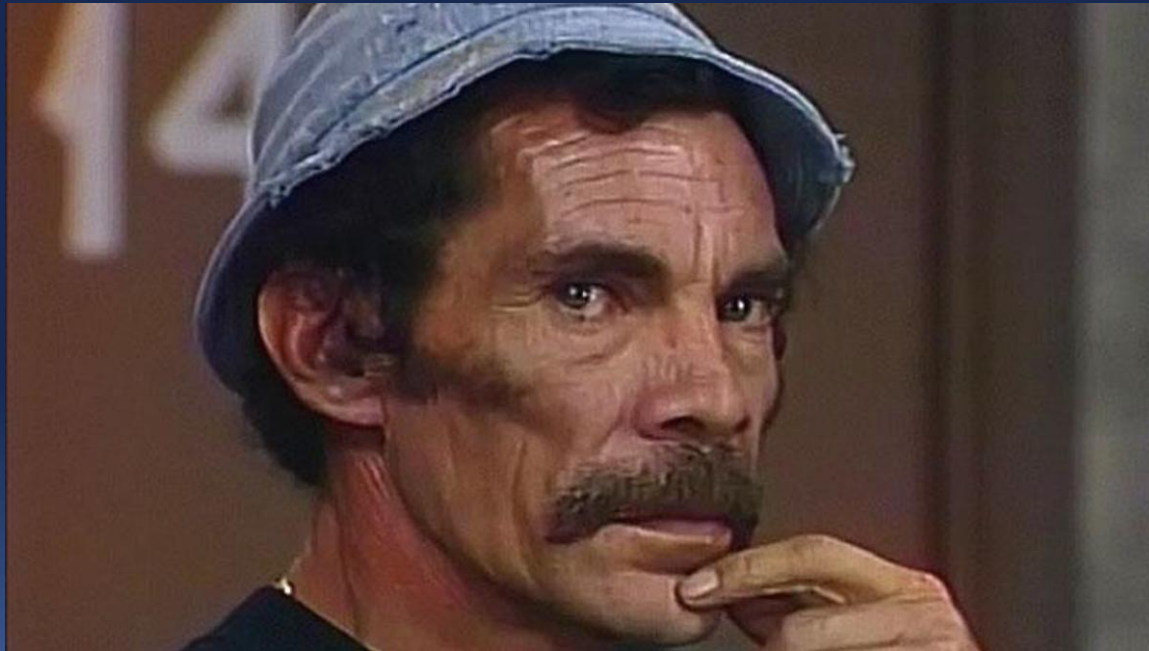
# Criação de um Projeto Maven no Eclipse

✓ Projeto Maven criado!



0 items selected

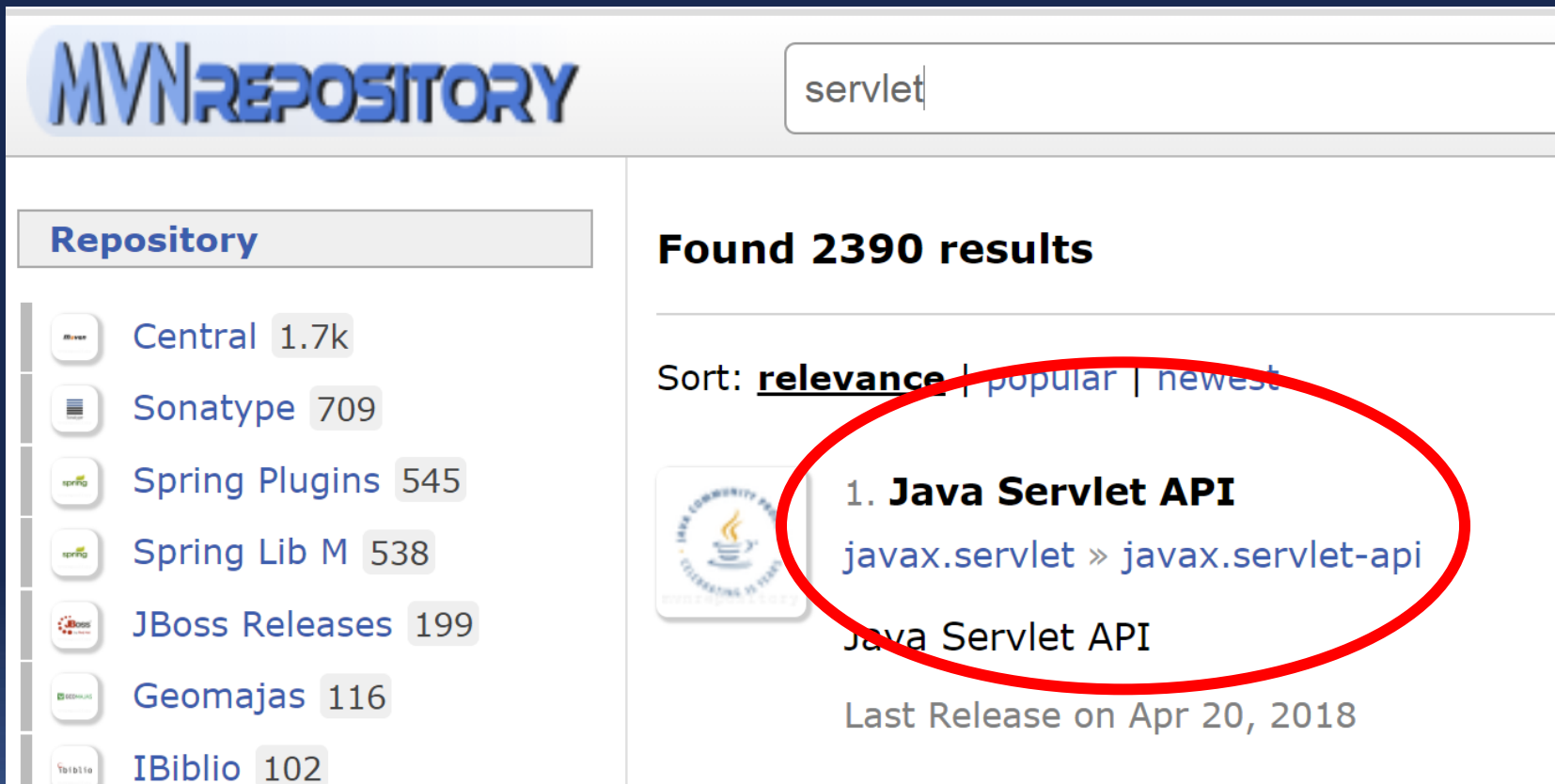
# Como incorporar a API de Servlet no Projeto ?





# Repositório Maven

<http://mvnrepository.com>



The screenshot shows the Maven Repository website. The search bar at the top right contains the text 'servlet'. On the left side, there is a 'Repository' section with a list of repositories and their artifact counts:

Repository	Count
Central	1.7k
Sonatype	709
Spring Plugins	545
Spring Lib M	538
JBoss Releases	199
Geomajas	116
IBiblio	102

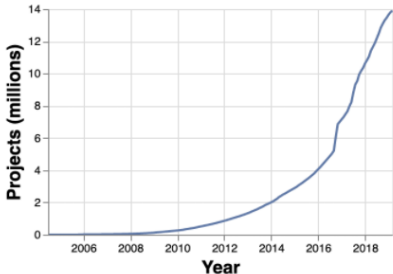
The main content area displays 'Found 2390 results'. Below this, there is a 'Sort:' section with three options: 'relevance' (which is underlined and circled in red), 'popular', and 'newest'. The first result is '1. Java Servlet API' by 'javax.servlet', with the artifact path 'javax.servlet » javax.servlet-api'. Below the artifact name, it says 'Last Release on Apr 20, 2018'.

**MVNREPOSITORY**

Search for groups, artifacts, categories

Search


**Indexed Artifacts (18.0M)**



**Popular Categories**

- Aspect Oriented
- Actor Frameworks
- Application Metrics
- Build Tools
- Bytecode Libraries
- Command Line Parsers
- Cache Implementations

Home » [javax.servlet](#) » [javax.servlet-api](#)



## Java Servlet API

Java Servlet API

**License** [CDL](#) [GPL 2.0](#)

**Categories** [Java Specifications](#)

**Tags** [standard](#) [servlet](#) [javax](#) [api](#) [specs](#)

**Used By** **13,473 artifacts**

[Central \(20\)](#) [Redhat GA \(1\)](#) [ICM \(5\)](#)

Version	Repository	Usages	Date
<a href="#">4.0.1</a>	<a href="#">Central</a>	<a href="#">2,385</a>	Apr, 20
<a href="#">4.0.0</a>	<a href="#">Central</a>	<a href="#">374</a>	Aug, 20

# XML – pom.xml

<b>License</b>	<a href="#">CDDL</a> <a href="#">GPL 2.0</a>
<b>Categories</b>	<a href="#">Java Specifications</a>
<b>Organization</b>	GlassFish Community
<b>HomePage</b>	<a href="https://javaee.github.io/servlet-spec/">https://javaee.github.io/servlet-spec/</a>
<b>Date</b>	(Apr 20, 2018)
<b>Files</b>	<a href="#">pom (15 KB)</a> <a href="#">jar (93 KB)</a> <a href="#">View All</a>
<b>Repositories</b>	<a href="#">Central</a>
<b>Used By</b>	<b>13,473 artifacts</b>

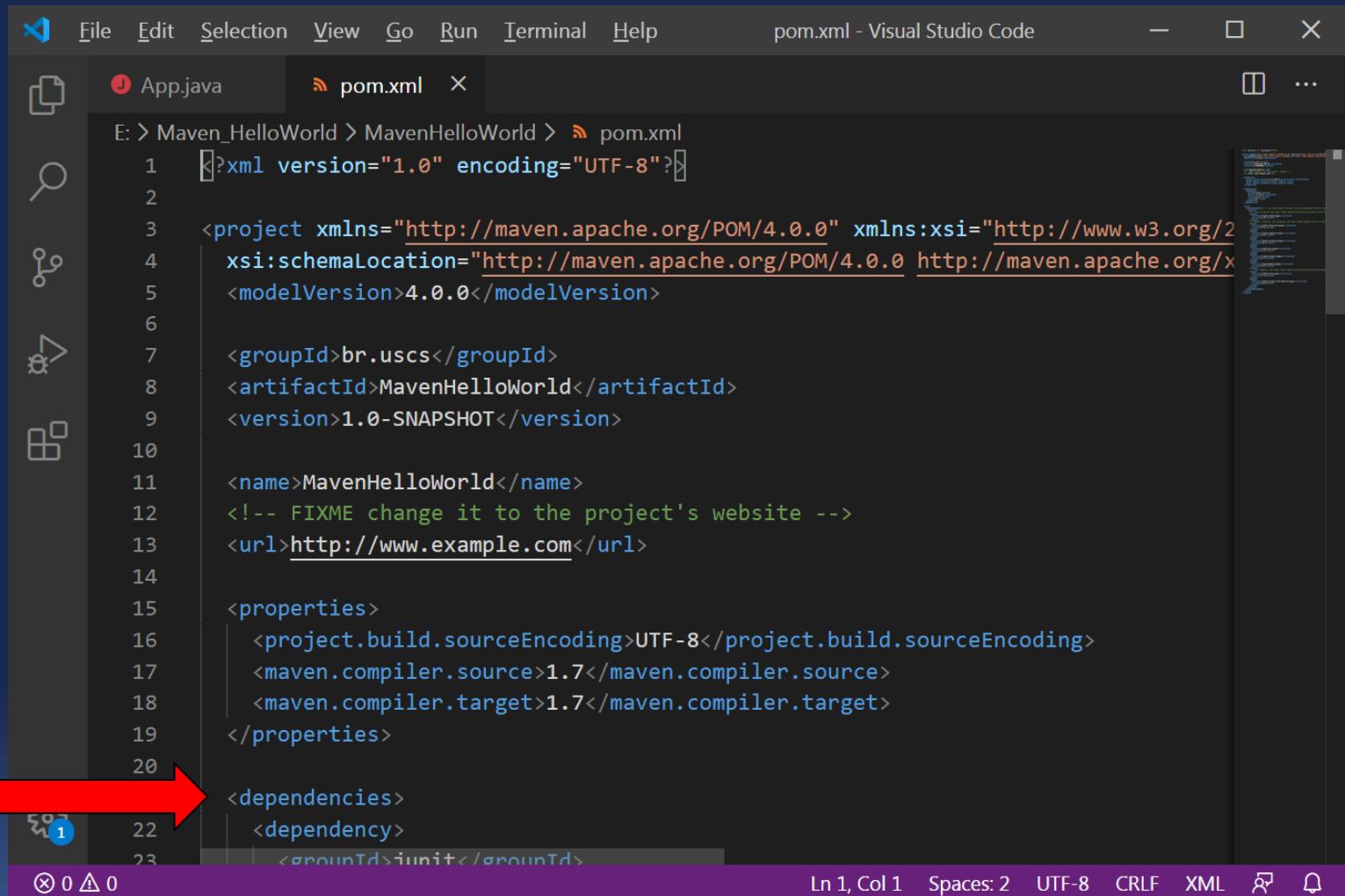
  

[Maven](#) [Gradle](#) [SBT](#) [Ivy](#) [Grape](#) [Leiningen](#) [Buildr](#)

```
<!-- https://mvnrepository.com/artifact/javax.servlet/javax.servlet-api -->  
<dependency>  
  <groupId>javax.servlet</groupId>  
  <artifactId>javax.servlet-api</artifactId>  
  <version>4.0.1</version>  
  <scope>provided</scope>  
</dependency>
```



# Adicionando uma dependência



```
E: > Maven_HelloWorld > MavenHelloWorld > pom.xml
1  <?xml version="1.0" encoding="UTF-8"?>
2
3  <project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
5    <modelVersion>4.0.0</modelVersion>
6
7    <groupId>br.uscs</groupId>
8    <artifactId>MavenHelloWorld</artifactId>
9    <version>1.0-SNAPSHOT</version>
10
11    <name>MavenHelloWorld</name>
12    <!-- FIXME change it to the project's website -->
13    <url>http://www.example.com</url>
14
15    <properties>
16      <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
17      <maven.compiler.source>1.7</maven.compiler.source>
18      <maven.compiler.target>1.7</maven.compiler.target>
19    </properties>
20
21    <dependencies>
22      <dependency>
23        <groupId>junit</groupId>
```

Ln 1, Col 1 Spaces: 2 UTF-8 CRLF XML

Excelente, já consigo  
criar um projeto no  
Eclipse com Maven e  
API Servlet



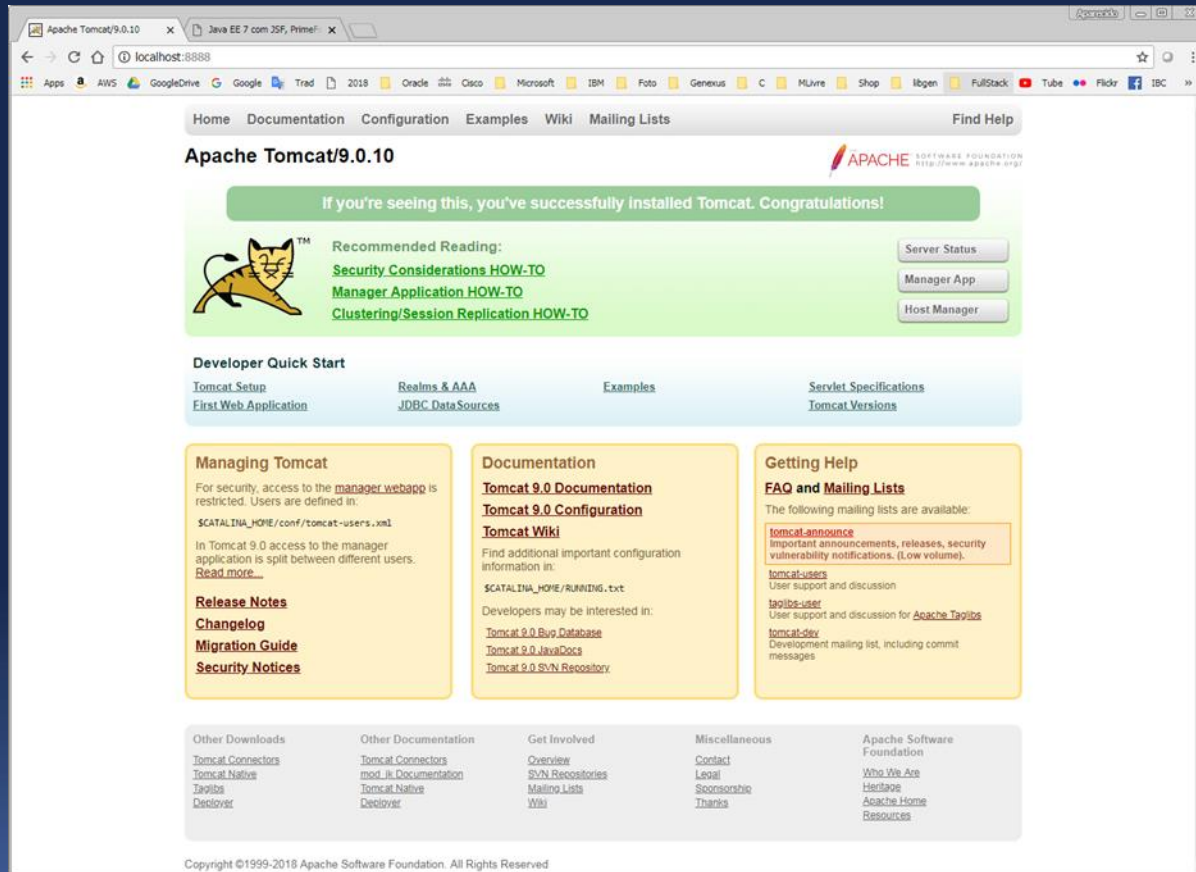
Mas, e para executar o  
Servlet ?





# Integração do Eclipse com Tomcat

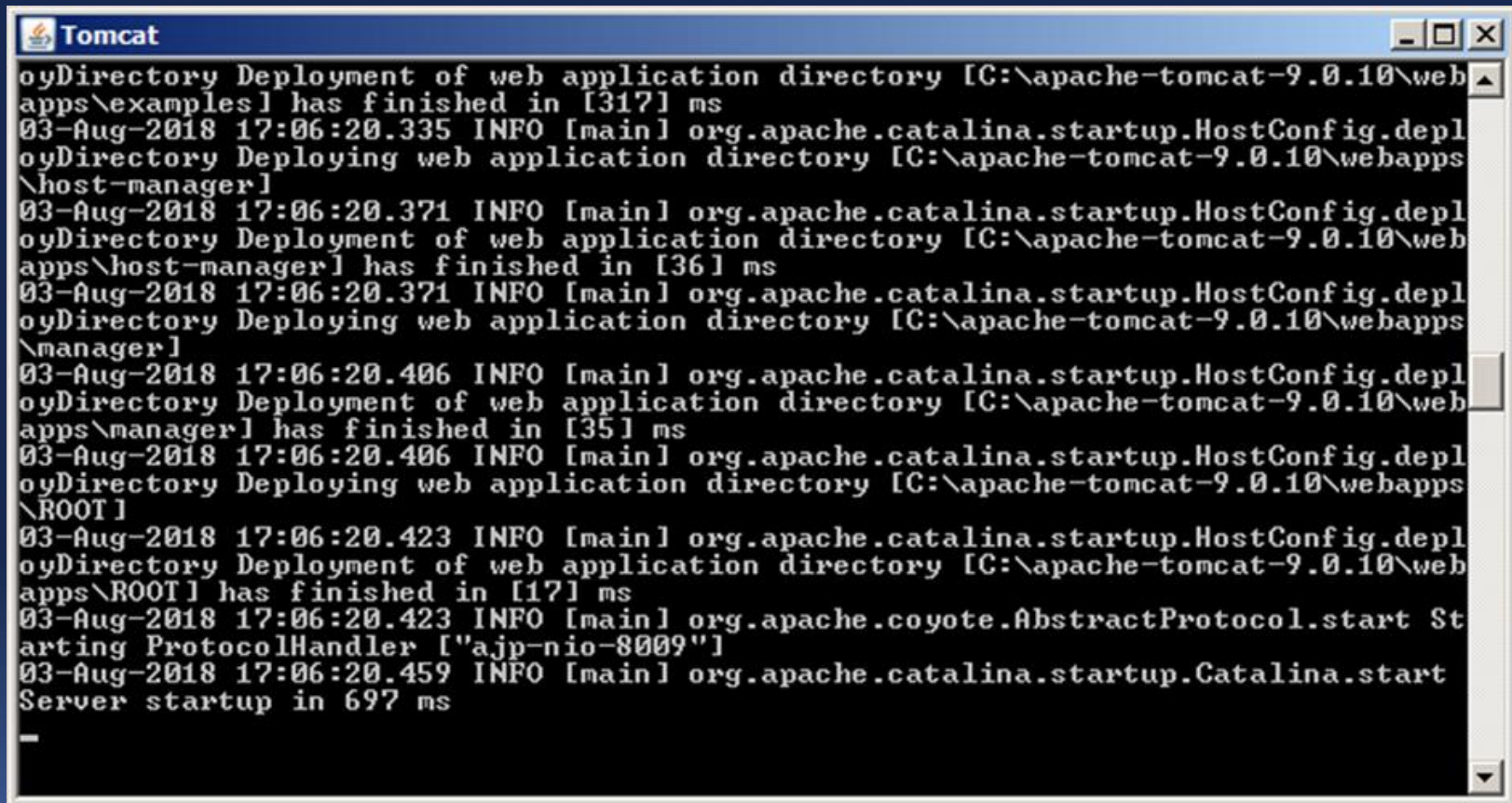
<http://tomcat.apache.org>.



The screenshot shows the Apache Tomcat 9.0.10 website in a web browser. The page has a navigation bar with links: Home, Documentation, Configuration, Examples, Wiki, Mailing Lists, and Find Help. The main heading is "Apache Tomcat/9.0.10". Below it, a green banner says "If you're seeing this, you've successfully installed Tomcat. Congratulations!". To the left of this banner is the Tomcat logo (a cat). To the right, under "Recommended Reading:", are links for "Security Considerations HOW-TO", "Manager Application HOW-TO", and "Clustering/Session Replication HOW-TO". Further right are buttons for "Server Status", "Manager App", and "Host Manager". Below the banner is a "Developer Quick Start" section with links for "Tomcat Setup", "First Web Application", "Realms & AAA", "JDBC DataSources", "Examples", "Servlet Specifications", and "Tomcat Versions". The page is divided into three main columns: "Managing Tomcat", "Documentation", and "Getting Help". The "Managing Tomcat" column contains text about security and access to the manager webapp, with links for "Release Notes", "Changelog", "Migration Guide", and "Security Notices". The "Documentation" column contains links for "Tomcat 9.0 Documentation", "Tomcat 9.0 Configuration", "Tomcat Wiki", and "Find additional important configuration information in:", with links for "SCATALINA\_HOME/README.txt", "Developers may be interested in:", "Tomcat 9.0 Bug Database", "Tomcat 9.0 JavaDocs", and "Tomcat 9.0 SVN Repository". The "Getting Help" column contains links for "FAQ and Mailing Lists", "The following mailing lists are available:", "tomcat-announce", "tomcat-users", "tomcat-dev", and "tomcat-wiki". At the bottom, there are sections for "Other Downloads", "Other Documentation", "Get Involved", "Miscellaneous", and "Apache Software Foundation".

# Integração do Eclipse com Tomcat

<http://tomcat.apache.org>.



```
Tomcat
oyDirectory Deployment of web application directory [C:\apache-tomcat-9.0.10\web
apps\examples] has finished in [317] ms
03-Aug-2018 17:06:20.335 INFO [main] org.apache.catalina.startup.HostConfig.depl
oyDirectory Deploying web application directory [C:\apache-tomcat-9.0.10\webapps
\host-manager]
03-Aug-2018 17:06:20.371 INFO [main] org.apache.catalina.startup.HostConfig.depl
oyDirectory Deployment of web application directory [C:\apache-tomcat-9.0.10\web
apps\host-manager] has finished in [36] ms
03-Aug-2018 17:06:20.371 INFO [main] org.apache.catalina.startup.HostConfig.depl
oyDirectory Deploying web application directory [C:\apache-tomcat-9.0.10\webapps
\manager]
03-Aug-2018 17:06:20.406 INFO [main] org.apache.catalina.startup.HostConfig.depl
oyDirectory Deployment of web application directory [C:\apache-tomcat-9.0.10\web
apps\manager] has finished in [35] ms
03-Aug-2018 17:06:20.406 INFO [main] org.apache.catalina.startup.HostConfig.depl
oyDirectory Deploying web application directory [C:\apache-tomcat-9.0.10\webapps
\ROOT]
03-Aug-2018 17:06:20.423 INFO [main] org.apache.catalina.startup.HostConfig.depl
oyDirectory Deployment of web application directory [C:\apache-tomcat-9.0.10\web
apps\ROOT] has finished in [17] ms
03-Aug-2018 17:06:20.423 INFO [main] org.apache.coyote.AbstractProtocol.start St
arting ProtocolHandler ["ajp-nio-8009"]
03-Aug-2018 17:06:20.459 INFO [main] org.apache.catalina.startup.Catalina.start
Server startup in 697 ms
```



# Alterando a porta padrão

A porta default do Tomcat é **8080**. Vamos alterar o arquivo server.xml que reside no diretório conf do Tomcat. Alterar para a porta 8888.

## Configuração inicial:

```
<Connector port="8080" protocol="HTTP/1.1"  
    connectionTimeout="20000"  
    redirectPort="8443" />
```

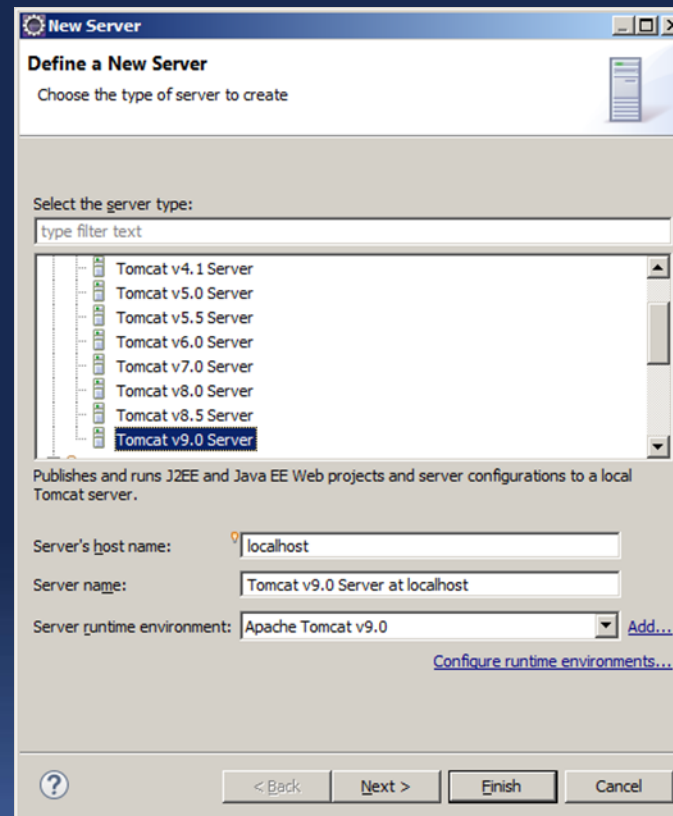
## Configuração final:

```
<Connector port="8888" protocol="HTTP/1.1"  
    connectionTimeout="20000"  
    redirectPort="8443" />
```



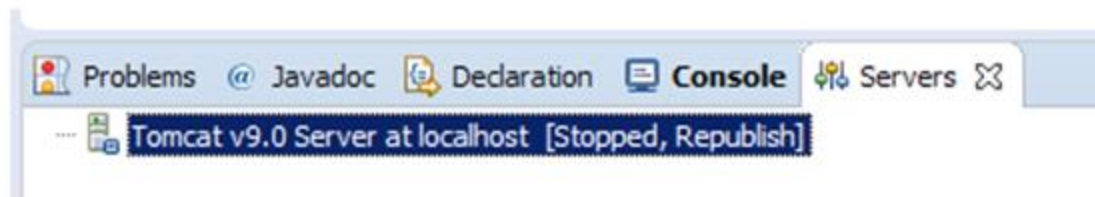
# Integrando com Eclipse

Acesse a *view* **Servers** e clique no único link que aparece para adicionar um novo servidor.



# Integrando com Eclipse

Você verá o **Tomcat** definido na aba **Servers**

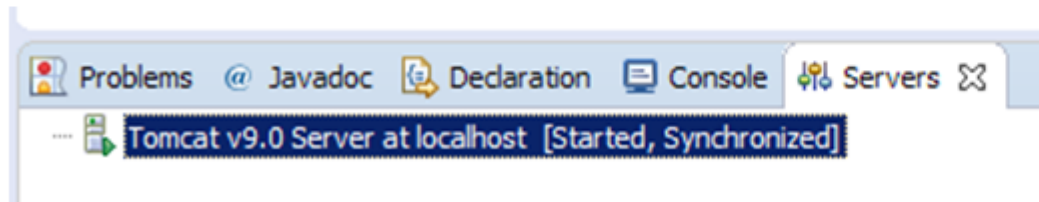


Dê um duplo clique no servidor do **Tomcat** adicionado na **view**.

# Integrando com Eclipse

Para iniciar o **Tomcat** dentro do **Eclipse**, primeiramente, confirme que o servidor não está rodando fora do Eclipse. Depois, selecione a linha que representa o servidor adicionado e com o botão direito do mouse, selecione a opção **Start**.

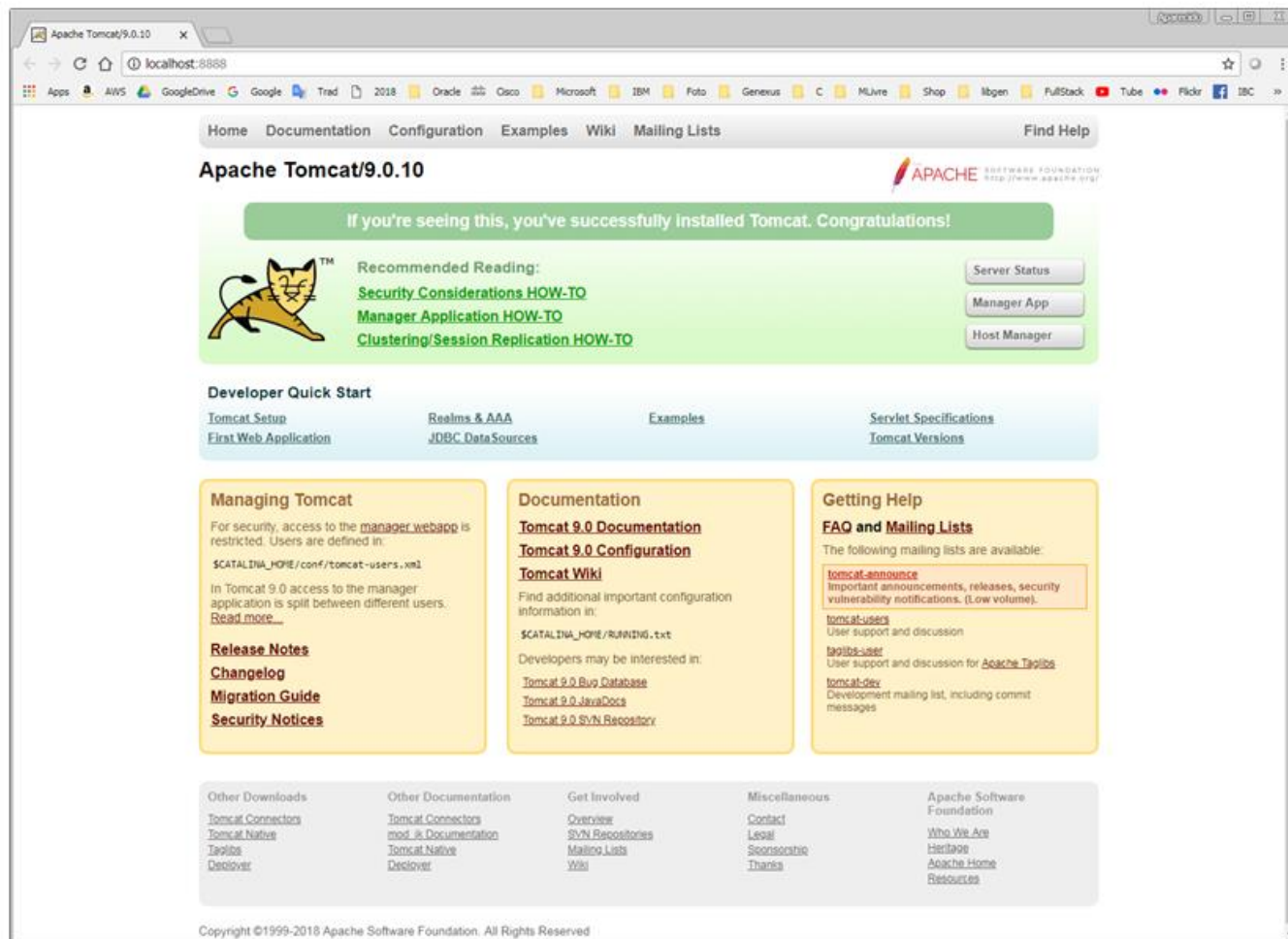
Se tudo der certo, você verá na view **Servers** que o **Tomcat** está iniciado (**Started**).





# Integrando com Eclipse

Abra um browser e acesse o endereço <http://localhost:8888>



Ok, já tenho Eclipse  
com Maven e Tomcat  
configurados



Agora posso criar um  
Servlet ?





# Estrutura básica de um Servlet

- Tipicamente um **Servlet** estende a classe **HttpServlet**.
- Usualmente sobreescrevem os métodos **doGet** e **doPost** para o tratamento de **requests**.





# Argumentos de um Servlet

- ◆ **HttpServletRequest**
- ◆ **HttpServletResponse**





# Estrutura básica de um Servlet

```
import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

public class ServletTemplate extends HttpServlet {

    public void doGet(HttpServletRequest request,
                      HttpServletResponse response)
                      throws ServletException, IOException {

        PrintWriter out = response.getWriter();

    }
}
```





# HttpServletRequest

- Permite tratar os dados de entrada.
- Exemplos: dados de forms, request headers, hostname do cliente, etc...







# HttpServletResponse

- Permite tratar os dados de saída
- Exemplos: HTTP status codes, response headers, etc...
- Possibilitam obter objetos **PrintWriter** usados para enviar documentos de volta ao cliente





# Exemplo

- **Servlet** gerando texto;
- com a IDE **ECLIPSE** e o Web Container **Tomcat**.





# Exemplo

```
package qualit;
```

```
import java.io.IOException;  
import java.io.PrintWriter;
```

```
import javax.servlet.ServletException;  
import javax.servlet.annotation.WebServlet;  
import javax.servlet.http.HttpServlet;  
import javax.servlet.http.HttpServletRequest;  
import javax.servlet.http.HttpServletResponse;
```

```
/**  
 * Servlet implementation class Atividade_01  
 */  
@WebServlet("/Atividade_01")
```





# Exemplo

```
public class Atividade_01 extends HttpServlet {  
    private static final long serialVersionUID = 1L;
```

```
public Atividade_01() {  
  
}
```

```
protected void doGet (HttpServletRequest request, HttpServletResponse response)  
    throws ServletException, IOException {
```

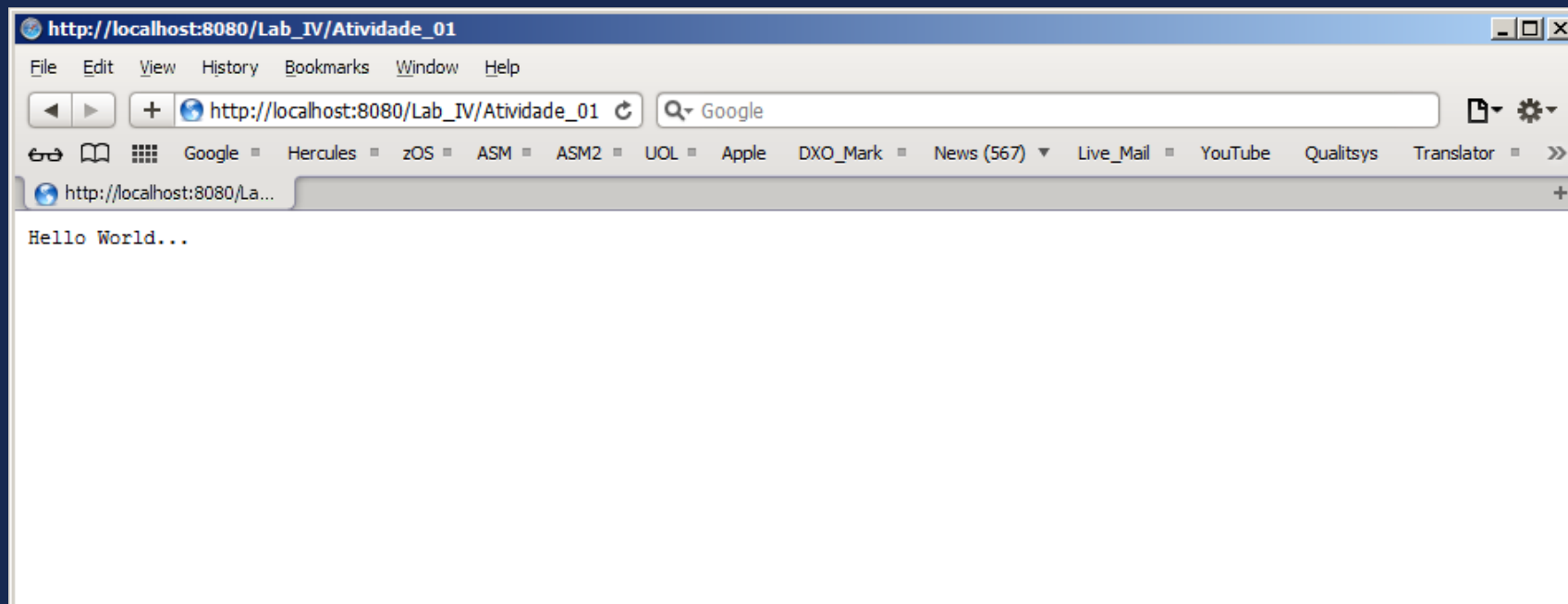
```
    PrintWriter out = response.getWriter();  
    out.println("Hello World...");
```

```
}
```





# Exemplo





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