Tecnologie informatiche per il Web
IntelliJ Guide

Contents

1 Preliminaries

The tech stack is as follows:

- JetBrains IntelliJ Idea Ultimate as Java IDE and Maven as build system
  - Optionally Datagrip as SQL IDE
- MariaDB, a compatible fork of MySQL
- Tomcat as application server

OS compatibility

Although the guide has been verified on Arch Linux, since all of JetBrains' IDEs are cross-platform, apart from the installation process, commands and paths the configuration will be the same on *every* operating system.

Programs and dependencies needed – commands for Arch Linux and derivatives:

```
# from ufficial repositories
sudo pacman -S jdk21-openjdk mariadb tomcat10 maven

# from AUR
yay -S intellij-idea-ultimate-edition mariadb-jdbc
```

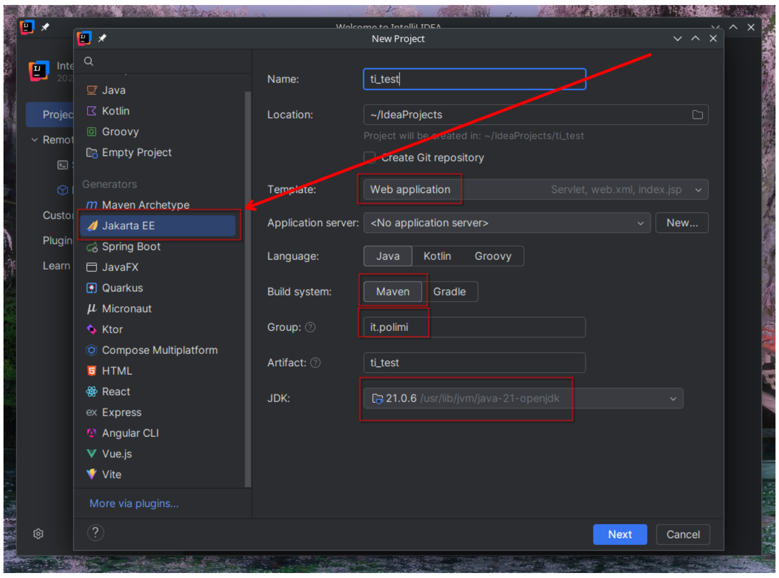
To install `yay` check the official repository.

All of Datagrip functionalities are integrated in every JetBrains' IDE, so its not stricly needed – however, if you want install Datagrip as a standalone application:

```
# from AUR
yay -S datagrip datagrip-jre
```

2 IntelliJ Idea configuration

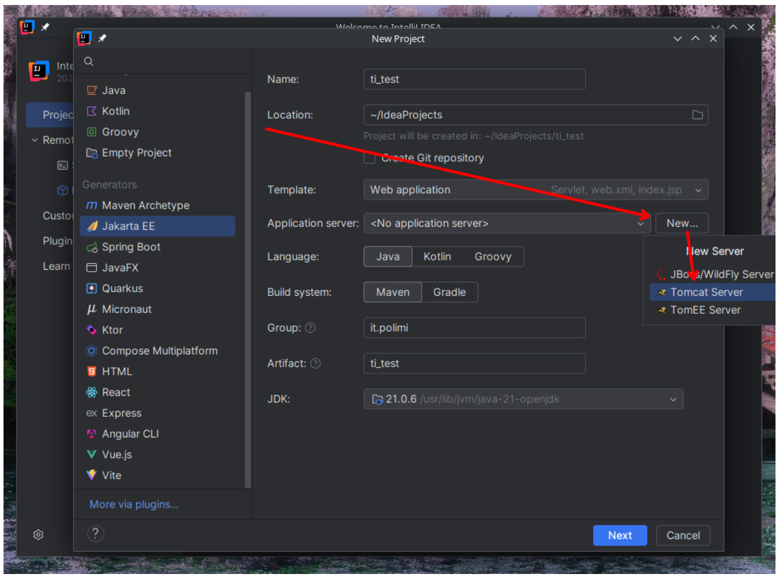
1. Create a new project with `Jakarta EE` as generator:
   - Template: web application
   - JDK: OpenJDK 21 (path: `/usr/lib/jvm/java-21-openjdk`)
   - Build system: Maven[1]


New Project

Name: ti_test
Location: ~/IdeaProjects
Project will be created in: ~/IdeaProjects/ti_test
Create Git repository
Template: Web application — Servlet, web.xml, index.jsp
Application server: <No application server>
Language: Java | Kotlin | Groovy
Build system: Maven | Gradle
Group: it.polimi
Artifact: ti_test
JDK: 21.0.6 /usr/lib/jvm/java-21-openjdk

Figure 1: IntelliJ project configuration.

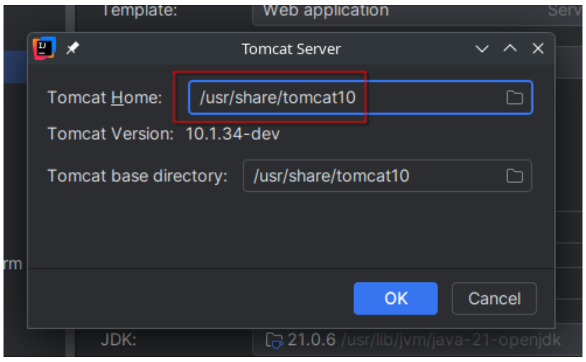
   - Application server: Tomcat (path: `/usr/share/tomcat10`)


New Project

Name: ti_test
Location: ~/IdeaProjects
Project will be created in: ~/IdeaProjects/ti_test
Create Git repository
Template: Web application — Servlet, web.xml, index.jsp
Application server: <No application server>
Language: Java | Kotlin | Groovy
Build system: Maven | Gradle
Group: it.polimi
Artifact: ti_test
JDK: 21.0.6 /usr/lib/jvm/java-21-openjdk

Figure 2: Tomcat configuration (1/2).

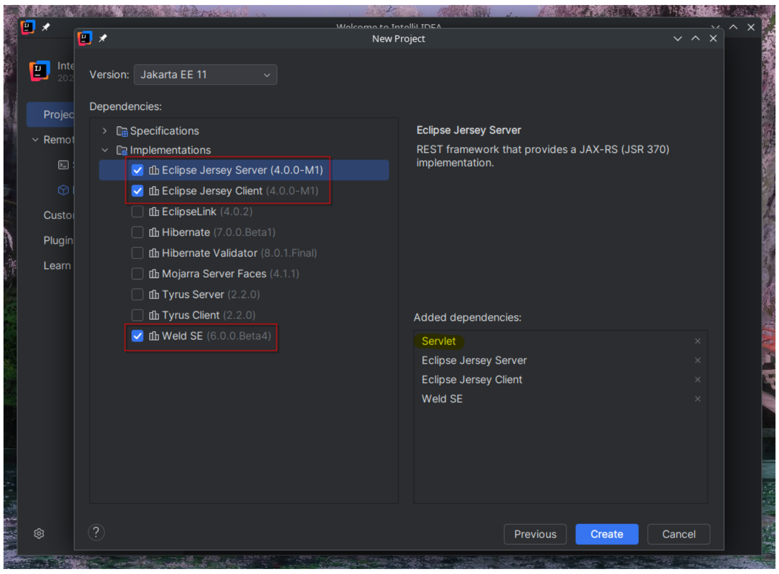
[1]In accordance with the Software Engineering course.



Tomcat Home: /usr/share/tomcat10
Tomcat Version: 10.1.34-dev
Tomcat base directory: /usr/share/tomcat10
JDK: 21.0.6 /usr/lib/jvm/java-21-openjdk

Figure 3: Tomcat configuration (2/2).

2. Check Eclipse server and client, Welde as implementations



Version: Jakarta EE 11

Dependencies:

- Specifications
- Implementations
  - [✓] Eclipse Jersey Server (4.0.0-M1)
  - [✓] Eclipse Jersey Client (4.0.0-M1)
  - [ ] EclipseLink (4.0.2)
  - [ ] Hibernate (7.0.0.Beta1)
  - [ ] Hibernate Validator (8.0.1.Final)
  - [ ] Mojarra Server Faces (4.1.1)
  - [ ] Tyrus Server (2.2.0)
  - [ ] Tyrus Client (2.2.0)
  - [✓] Weld SE (6.0.0.Beta4)

Eclipse Jersey Server

REST framework that provides a JAX-RS (JSR 370) implementation.

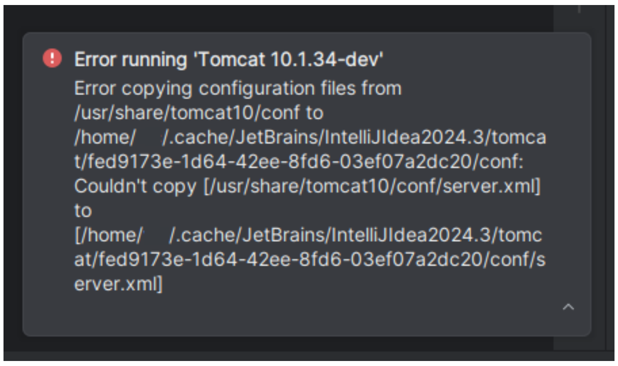
Added dependencies:

- Servlet
- Eclipse Jersey Server
- Eclipse Jersey Client
- Weld SE

Note that Servlet is already added as dependency.

Permissions error

After a test, IntelliJ could report an error stating it cannot copy /usr/share/tomcat10/conf – this maybe caused by permissions:



```
Error running 'Tomcat 10.1.34-dev'
Error copying configuration files from
/usr/share/tomcat10/conf to
/home/    /.cache/JetBrains/IntelliJIdea2024.3/tomca
t/fed9173e-1d64-42ee-8fd6-03ef07a2dc20/conf:
Couldn't copy [/usr/share/tomcat10/conf/server.xml]
to
[/home/    /.cache/JetBrains/IntelliJIdea2024.3/tomc
at/fed9173e-1d64-42ee-8fd6-03ef07a2dc20/conf/s
erver.xml]
```

Figure 4: IntelliJ error.

to fix it run:

```
sudo chmod -R 777 /usr/share/tomcat10/conf
```

2.1 Database configuration

1. Configure MariaDB

   ```
   mariadb-install-db --user=mysql --basedir=/usr --datadir=/var/lib/mysql
   mariadb-secure-installation
   ```

   and then start it:

   ```
   sudo systemctl start mariadb
   ```

   If you want to start the database server at every boot type:

   ```
   sudo systemctl enable mariadb
   ```

2. Create the user and grant *all* permissions on *all* databases:

   ```
   sudo mariadb
   MariaDB [(none)]> CREATE USER 'name'@'localhost' IDENTIFIED BY 'password';
   MariaDB [(none)]> GRANT PRIVILEGES ON *.* TO 'name'@'localhost';
   MariaDB [(none)]> quit;
   ```

   this is needed since in order to create a database *you need permission* to do so. If you want to verify:

   ```
   MariaDB [(none)]> SHOW ALL PRIVILEGES FOR 'name'@'localhost';
   ```

3. Open the database configuration from IntelliJ (above right)

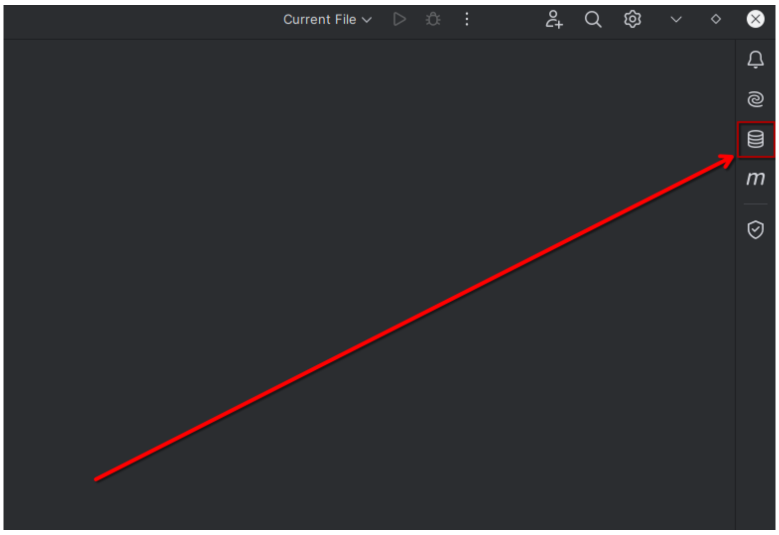


Figure 5: Database configuration in IntelliJ.

4. To import a MySQL dump execute the following command:

   ```
   mariadb --user name --password < dump.sql
   ```

   where `name` and `password` reference step 2.

5. Add the data source from Figure 5:
   - Select MariaDB

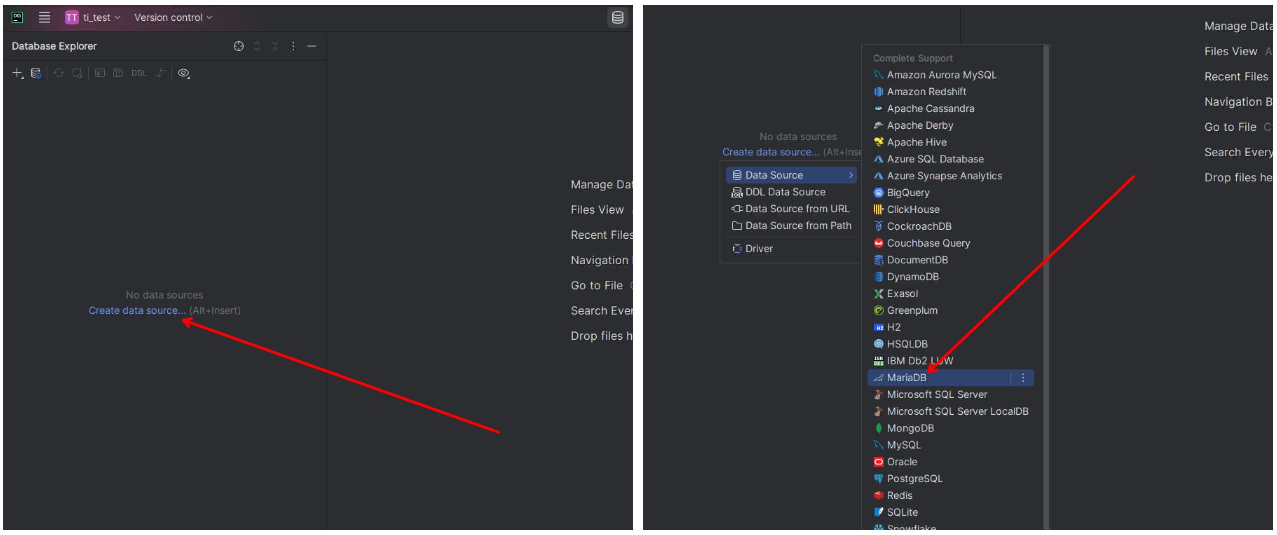
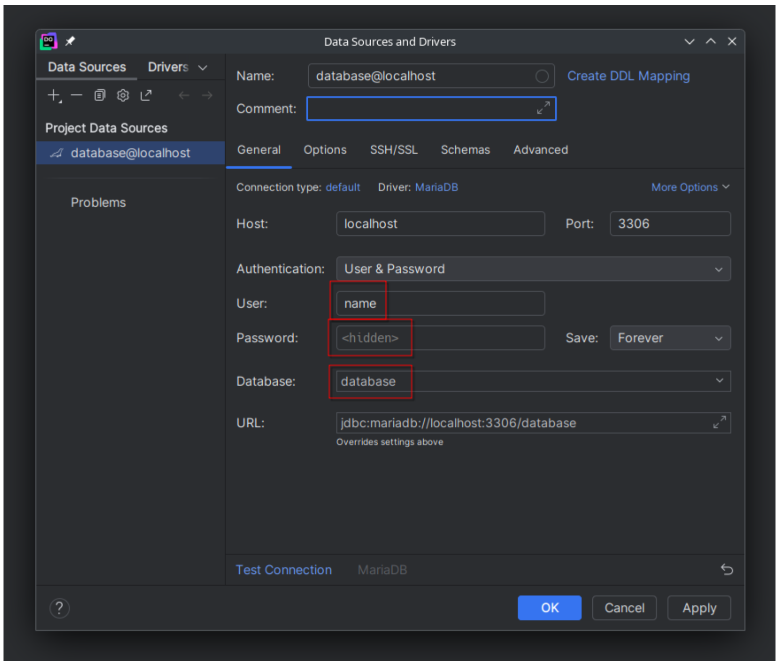


Figure 6: Selecting MariaDB as source.

- `user`, `password` from step 2
- Name of the database from step 5 – to check available databases:

```
sudo mariadb
MariaDB [(none)]> SHOW DATABASES;
MariaDB [(none)]> quit;
```



Name: database@localhost
Comment:
Connection type: default Driver: MariaDB
Host: localhost Port: 3306
Authentication: User & Password
User: name
Password: <hidden> Save: Forever
Database: database
URL: jdbc:mariadb://localhost:3306/database

Figure 7: Adding the database.

Repeat step 4 and 5 for each dump.

2.2 Configure MariaDB connection

Add the following to pom.xml:

```xml
<dependency>
 <groupId>org.mariadb.jdbc</groupId>
 <artifactId>mariadb-java-client</artifactId>
 <version>3.4.1</version>
</dependency>
```

and synchronize Maven, which then downloads all the necessary files. Last but not least, verify the connection by creating the ConnectionTester class:

```java
import java.sql.*;

public class ConnectionTester {
  public static void main(String[] args) throws SQLException,
  ClassNotFoundException {
    final String DATABASE = "database";
    final String USER = "name";
    final String PASSWORD = "password";
    Connection connection = null;

    // Load the JDBC driver
    try {
        Class.forName("org.mariadb.jdbc.Driver");
        System.out.println("Driver loaded");
    } catch (ClassNotFoundException e) {
        System.err.println("Driver not found");
        e.printStackTrace();
    }
    try {
        connection = DriverManager.getConnection
                ("jdbc:mariadb://localhost:3306/" + DATABASE, USER, PASSWORD);
        System.out.println("Database connection successful");
        connection.close();
    } catch (Exception e) {
        System.err.println("Connection failed");
        e.printStackTrace();
    }
  }
}
```

by editing DATABASE, USER and PASSWORD accordingly.

3 Convert Eclipse projects

Briefly the steps are:

1. Figure out the dependencies and their versions
   - This applies both to libraries (such as thymeleaf) and Java JDK
2. Paste the `/src` directory from the original project ZIP
3. Add Tomcat run configuration
4. Configure `web.xml` database connection

Start by adding the dependencies to the `pom.xml`:

```xml
<dependencies>
    <!-- Jakarta EE servlet (jsp, jstl) -->
    <dependency>
        <groupId>org.glassfish.web</groupId>
        <artifactId>jakarta.servlet.jsp.jstl</artifactId>
        <version>2.0.0</version>
    </dependency>
    <dependency>
        <groupId>jakarta.servlet.jsp.jstl</groupId>
        <artifactId>jakarta.servlet.jsp.jstl-api</artifactId>
        <version>2.0.0</version>
    </dependency>
    <!-- Thymeleaf -->
    <dependency>
        <groupId>org.thymeleaf</groupId>
        <artifactId>thymeleaf</artifactId>
        <version>3.1.3.RELEASE</version>
    </dependency>
    <!-- Apache Commons -->
    <dependency>
        <groupId>org.apache.commons</groupId>
        <artifactId>commons-lang3</artifactId>
        <version>3.17.0</version>
    </dependency>
</dependencies>
```

And to set the JDK version:

```xml
<properties>
    <!-- Properties set for Java 21 -->
    <maven.compiler.source>21</maven.compiler.source>
    <maven.compiler.target>21</maven.compiler.target>
    <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
</properties>
```

Search them on the Maven repository with the following URL scheme:

`https://mvnrepository.com/artifact/groupId/artifactId`.

To build the application and deploy it you also need:

```
<build>
    <plugins>
        <plugin>
            <artifactId>maven-compiler-plugin</artifactId>
            <version>3.13.0</version>
        </plugin>
        <plugin>
            <artifactId>maven-war-plugin</artifactId>
            <version>3.2.3</version>
        </plugin>
    </plugins>
</build>
```

Pick the correct versions

Be sure to check for the correct versions. To do so, open the Eclipse's file `.classpath` and search in it. For example:

```
<?xml version="1.0" encoding="UTF-8"?>
<classpath>
  <classpathentry kind="con" path="org.eclipse.jdt.launching.JRE_CONTAINER/org.eclipse.jdt.internal.debug
  .ui.launcher.StandardVMType/JavaSE-21">
    <attributes>
      <attribute name="module" value="true"/>
    </attributes>
  </classpathentry>
  <classpathentry kind="src" path="src/main/java"/>
  <classpathentry kind="con" path="org.eclipse.jst.j2ee.internal.web.container"/>
  <classpathentry kind="con" path="org.eclipse.jst.j2ee.internal.module.container"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/apache-commons-lang.jar"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/mysql-connector-j-8.0.32.jar"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/attoparser-2.0.7.RELEASE.jar"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/javassist-3.29.0-GA.jar"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/ognl-3.3.4.jar"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/slf4j-api-2.0.16.jar"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/thymeleaf-3.1.3.RELEASE.jar"/>
  <classpathentry kind="lib" path="src/main/webapp/WEB-INF/lib/unbescape-1.1.6.RELEASE.jar"/>
  <classpathentry kind="con" path="org.eclipse.jst.server.core.container/org.eclipse.jst.server.tomcat
  .runtimeTarget/Apache Tomcat v10.1">
    <attributes>
      <attribute name="owner.project.facets" value="jst.web"/>
    </attributes>
  </classpathentry>
  <classpathentry kind="output" path="build/classes"/>
</classpath>
```

If you look closely, you'll see that the dependencies of this project are:

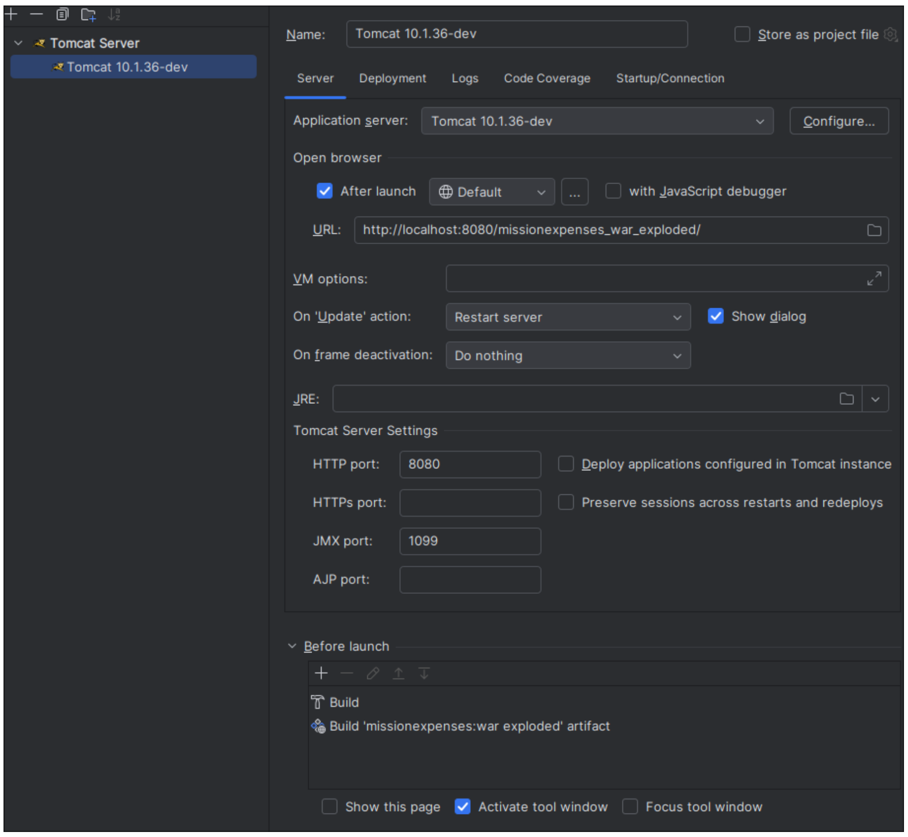
- Java 21
- mysql-connector-j-8.0.3
- attoparser-2.0.7.RELEASE
- javassist-3.29.0-GA
- ognl-3.3.4
- slf4j-api-2.0.1
- thymeleaf 3.1.3.RELEASE
- unbescape-1.1.6.RELEASE
- Tomcat v10.1

Configure the `src/main/webapp/WEB-INF/web.xml` as follows:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="4.0">
  <display-name>$PROJECT_NAME</display-name>
  <context-param>
    <param-name>dbUrl</param-name>
    <param-value>jdbc:mariadb://localhost:3306/$DATABASE_NAME</param-value>
  </context-param>
  <context-param>
    <param-name>dbUser</param-name>
    <param-value>$DATABASE_USER</param-value>
  </context-param>
  <context-param>
    <param-name>dbPassword</param-name>
    <param-value>$DATABASE_PASSWORD</param-value>
  </context-param>
  <context-param>
    <param-name>dbDriver</param-name>
    <param-value>org.mariadb.jdbc.Driver</param-value>
  </context-param>
  ...
</web-app>
```

All the variables **must be the same** as the ones used in subsection 2.1.

Finally paste the `/src` directory from the desired project and configure Tomcat. This can be done by adding the configuration in top right corner:



Name: Tomcat 10.1.36-dev

Application server: Tomcat 10.1.36-dev

Open browser

[✓] After launch   Default   [ ] with JavaScript debugger

URL: http://localhost:8080/missionexpenses_war_exploded/

VM options:

On 'Update' action: Restart server   [✓] Show dialog

On frame deactivation: Do nothing

JRE:

Tomcat Server Settings

HTTP port: 8080   [ ] Deploy applications configured in Tomcat instance

HTTPs port: [ ] Preserve sessions across restarts and redeploys

JMX port: 1099

AJP port:

Before launch

Build

Build 'missionexpenses:war exploded' artifact

[ ] Show this page   [✓] Activate tool window   [ ] Focus tool window

Figure 8: Tomcat run configuration.

An example can be seen in the `tomcat_config.xml` file.

Optimize the conversion

Since these steps are the same for every project, I'd suggest to create a `template` folder which houses the `pom.xml` file along with the Tomcat configuration. This way, to convert a project you will only have to create a new directory and then paste in it the `src/` folder and the contents of `template`.

Follow the standard structure

Finally, the directory tree will have to look like:

```
src/
|-- main/
|   |-- java/
|   |   `-- it.polimi.tiw
|   |-- resources
|   `-- webapp
`-- test/
    |-- java/
    |   `-- it.polimi.tiw
    |-- resources
    `-- webapp
LICENSE.txt
README.md
pom.xml
```

In accordance with the Maven standard directory layout.

This is **not optional**: for instance, in some projects there's a `resources` folder which is NOT located in the correct path; once the project will be deployed, Java will look for the `src/main/resources` folder and will not find it. IntelliJ won't throw an error.

4 Datagrip configuration

1. Follow step 1, 2 from subsection 2.1
2. Create a new project in Datagrip

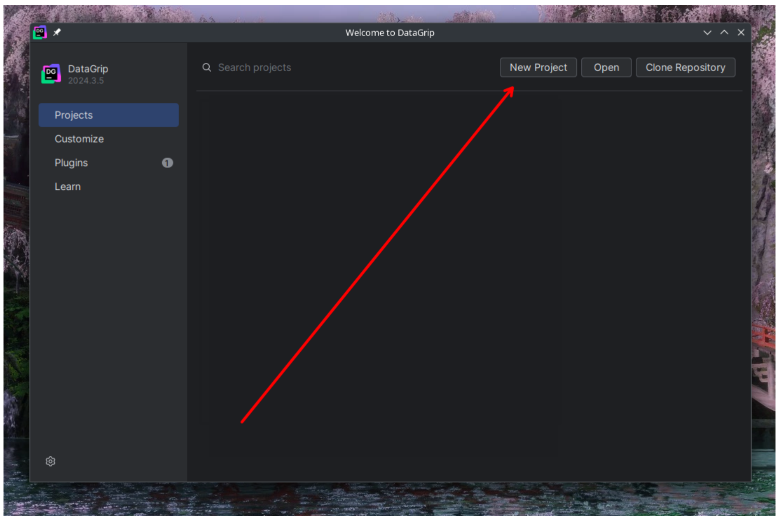


Figure 9: Creating a new project in Datagrip.

3. Follow the remaining steps from subsection 2.1