Software Installation Guide

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1 Introduction

1.1 General information

The goal of this document is to provide a detailed guide for anybody planning to install and configure Omixon HLA Twin in their environment. The following chapters will explain the possible HLA Twin configurations and the way to configure them properly. For further information and assistance, please contact us at support@omixon.com.[1]

1.2 Disclaimer

The concurrent installation and usage of more than one version of HLA Twin is not supported by Omixon.

1 mailto:support@omixon.com.

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2 Configurations

2.1 General information

This chapter explains the three possible configurations HLA Twin can be used in. Each of them is suitable for laboratories with different throughputs.

Each configuration will require a MySQL 8 database server to be installed either locally or remotely.

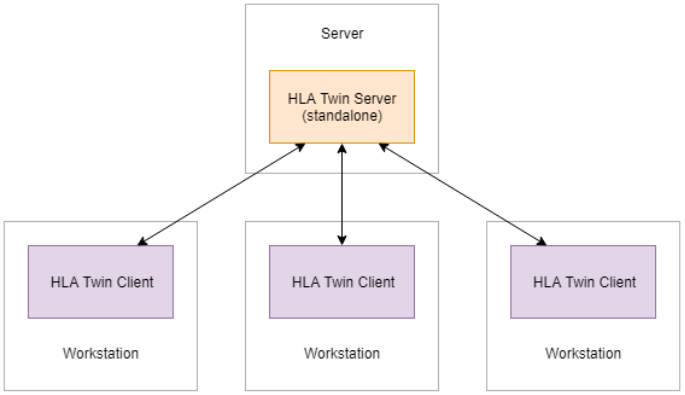
2.2 Desktop

- Suitable for smaller laboratories
- One user can be logged in at a time
- One sample can be analyzed at a time

The software runs on one computer, the users have to share the same computer to work with the software. HLA Twin has its own user management system, so it does not matter who is logged in in Windows, the user can work under their own identity in HLA Twin (this is important for audit, workflow and commenting features). If the same software is installed on another computer, the two pieces of software are unable to communicate, so the mentioned user information will be unavailable. We advise against it.

2.3 Server (standalone)

- Suitable for medium-throughput laboratories
- **Multiple users can work at the same time**
- One sample can be analyzed at a time



The HLA Twin Server (standalone):

- runs sample analyses
- prepares the information for the HLA Twin Client
- holds all user data

The HLA Twin Client

- controls the HLA Twin Server
- shows what the HLA Twin Server sends to it
- is "an empty shell"

Multiple HLA Twin Client software can connect to the HLA Twin Server at the same time.

The license is bound to the HLA Twin Server so the number of HLA Twin Clients is not limited.

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2.4 Server (distributed)

- Suitable for high-throughput laboratories
- Multiple users can work at the same time
- **Multiple samples can be analyzed at the same time (depending on the number of Typers)**

The HLA Twin Server (distributed):

- **does not** run sample analyses
- controls the HLA Twin Typer instances
- prepares the information for the HLA Twin Client
- holds all user data

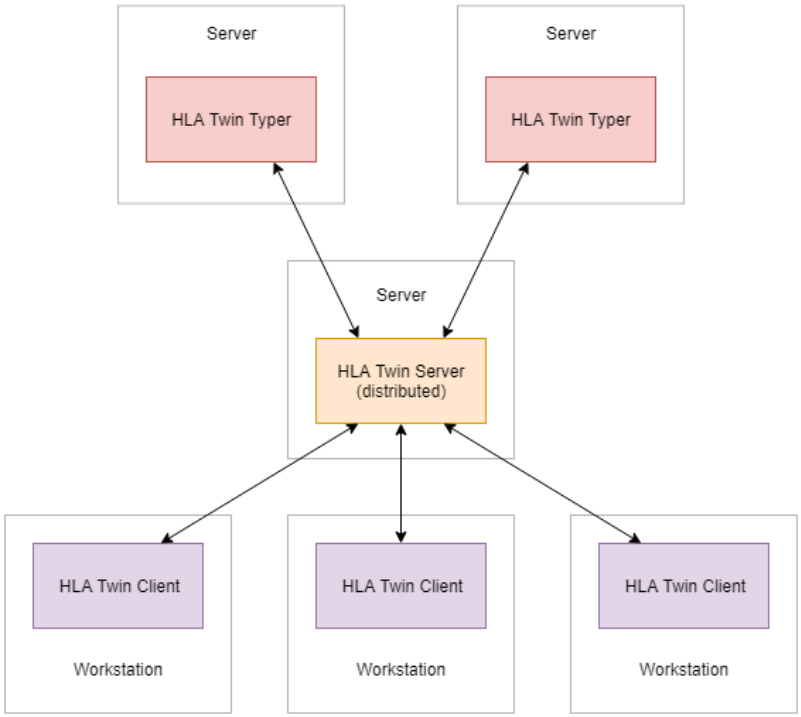
The HLA Twin Typer:

- runs sample analyses
- sends the analysis results to the HLA Twin Server

The HLA Twin Client

- controls the HLA Twin Server
- shows what the HLA Twin Server sends to it
- is "an empty shell"

Multiple HLA Twin Typers can be connected to one HLA Twin Server. An HLA Twin Server and an HLA Twin Typer instance can run on the same server.



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3 Hardware requirements

HLA Twin Desktop

- **CPU**: 64bit CPU with at least 4 physical cores (8 threads or vCPUs)
- **OS**: Any 64bit operating system
- **RAM**: At least 12 GB for the software but 16 GB is recommended
- **Video**: OpenGL 2.0 compatible video card

HLA Twin Client

- **CPU**: 64bit CPU with at least 2 physical cores (4 is recommended)
- **OS**: Any 64bit operating system
- **RAM**: At least 4 GB for the software but 6 GB is recommended
- **Video**: OpenGL 2.0 compatible video card
- **Network:** At least a 100/1000 Mbps connection

HLA Twin Server (standalone)

- **CPU**: 64bit CPU with at least 4 physical cores (8 threads or vCPUs)
- **OS**: Any 64bit operating system (OSX not supported)
- **RAM**: At least 18 GB for the software but 26.5 GB is recommended
- **Network:** At least a 100/1000 Mbps connection
- **Video**: OpenGL 2.0 compatible video card **(optional*)**

HLA Twin Server (distributed)

- **CPU**: 64bit CPU with at least 4 physical cores (8 threads or vCPUs)
- **OS**: Any 64bit operating system (OSX not supported)
- **RAM**: At least 6 GB for the software but 8 GB is recommended
- **Network:** At least a 100/1000 Mbps connection
- **Video**: OpenGL 2.0 compatible video card **(optional*)**

HLA Twin Typer (distributed)

- **CPU**: 64bit CPU with at least 4 physical cores (8 threads or vCPUs)
- **OS**: Any 64bit operating system
- **RAM**: At least 16 GB for the software but 22 GB is recommended
- **Network:** At least a 100/1000 Mbps connection
- **Video**: OpenGL 2.0 compatible video card **(optional*)**

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**The Twin Graphical User Interface (Client or Desktop) requires an OpenGL 2.0 compatible hardware and driver for the visualisation, so if you would like to use the Graphical interface on the server computer, an OpenGL 2.0 compatible hardware and driver are required.*

Storage space

Storage space requirements depend on the size of the samples and need to be calculated with regards to legal requirements for storing the data, minimum level of backup and redundancy, as well as on the expected annual volume. Omixon can assist with calculating the storage space requirements, please contact support@omixon.com[2] if you need any help.

2 mailto:support@omixon.com

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4 Database

All editions of HLA Twin will rely on an external **MySQL 8** database that you need to set up before installing HLA Twin. This is a new improvement in HLA Twin to provide a more robust and more responsive user experience.

Please follow the instructions in this chapter prior to the installation of HLA Twin.

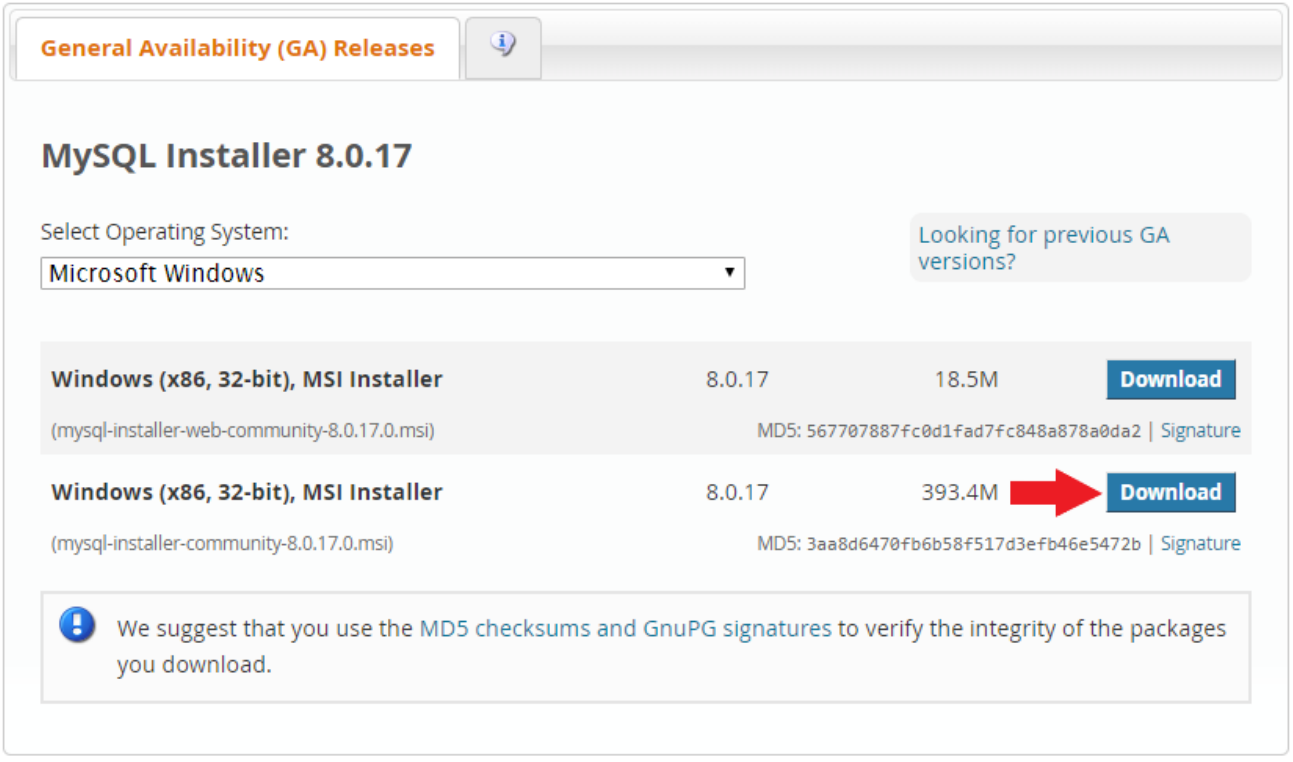
4.1 Windows

If you have a pre-existing **MySQL 8** server in your environment that you would like to use, please see Configuring a pre-existing MySQL database (see page 59). We suggest using a local instance of MySQL for HLA Twin Desktop users.

Please follow these steps to download and install MySQL 8 for Windows.

1. Go to https://dev.mysql.com/downloads/installer/

2. Download the actual version of "Windows (x86, 32-bit), MSI Installer" package. For example:



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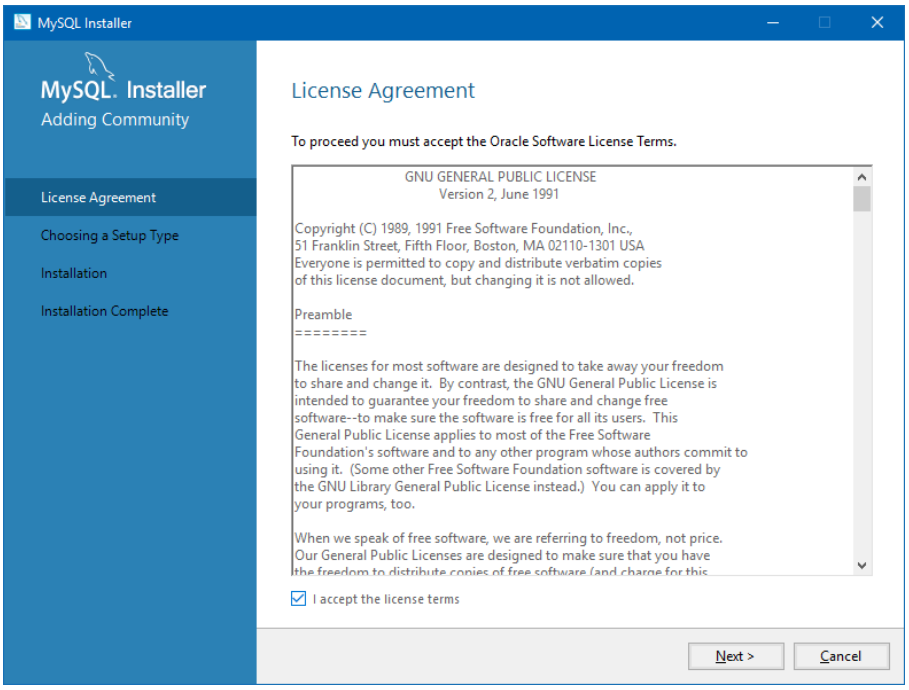
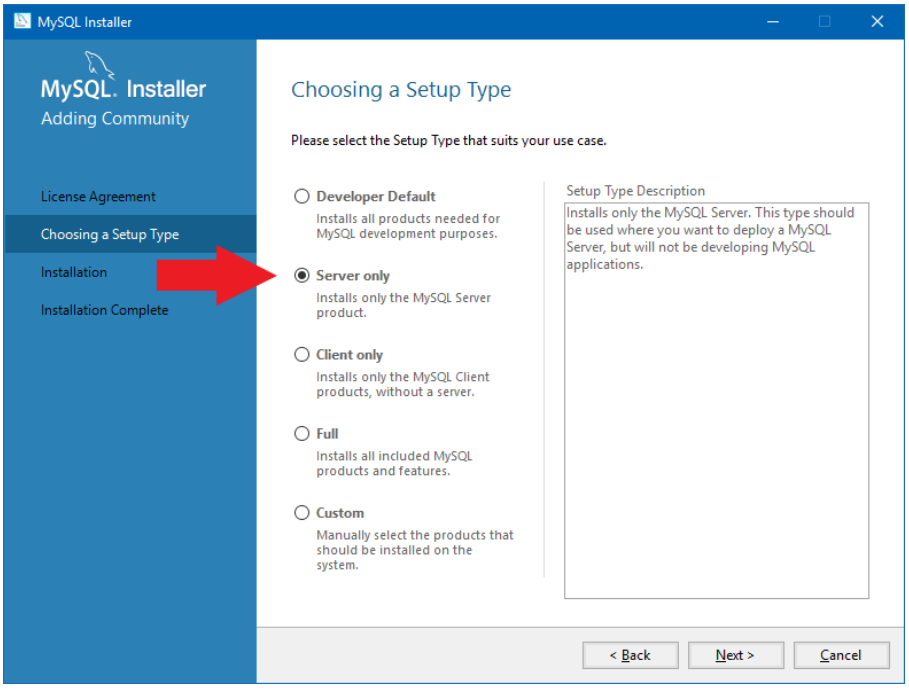
3. Once downloaded, start the installer, accept the license agreement, and click "Next"



4. Select "Server only" and click "Next"



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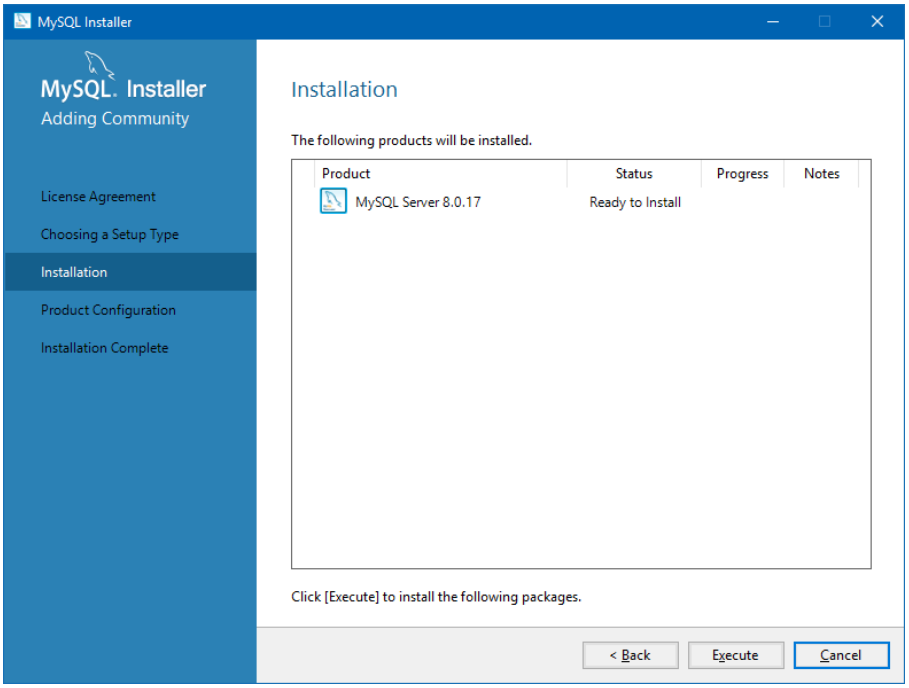
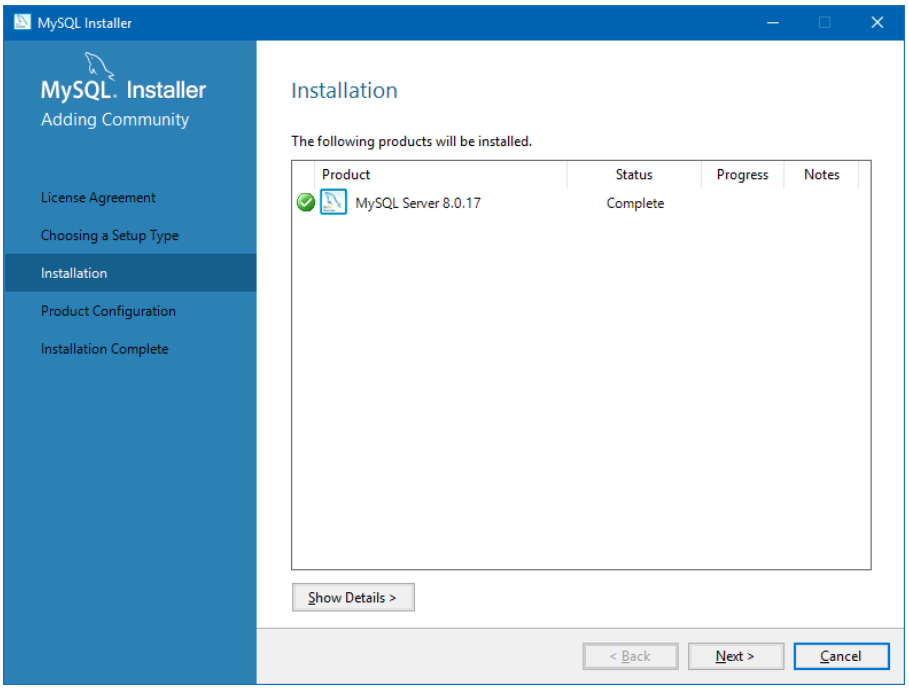
5. Click "Execute" (please note, that the installer might state that MySQL Server is not in "Ready to Install" status. Please click on it to see how to resolve the issue)



6. When the installation is done, you will see a green tick next to the MySQL icon. Click "Next", **and when the "Product Configuration" window appears, click "Next" again.**



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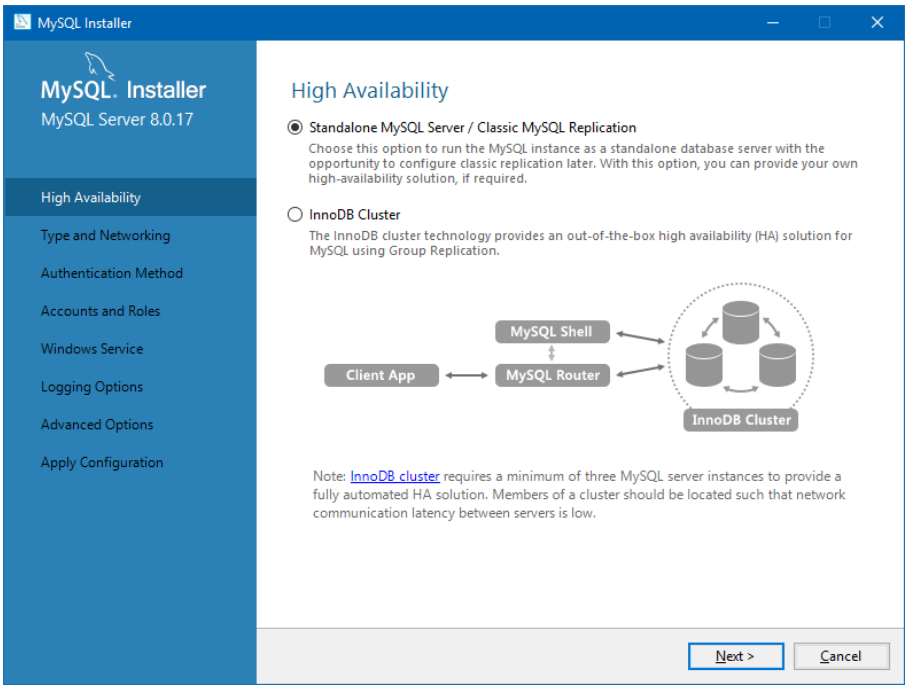
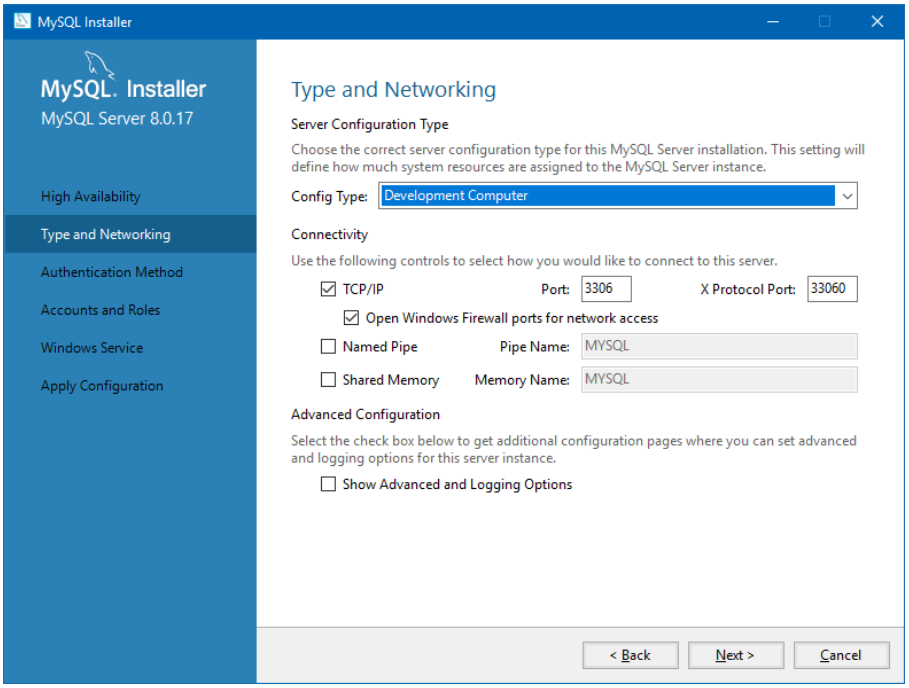
7. Select the default "Standalone MySQL Server / Classic MySQL Replication" option and click "Next"



8. Please use the default values on the "Type and Networking" screen, then click "Next"



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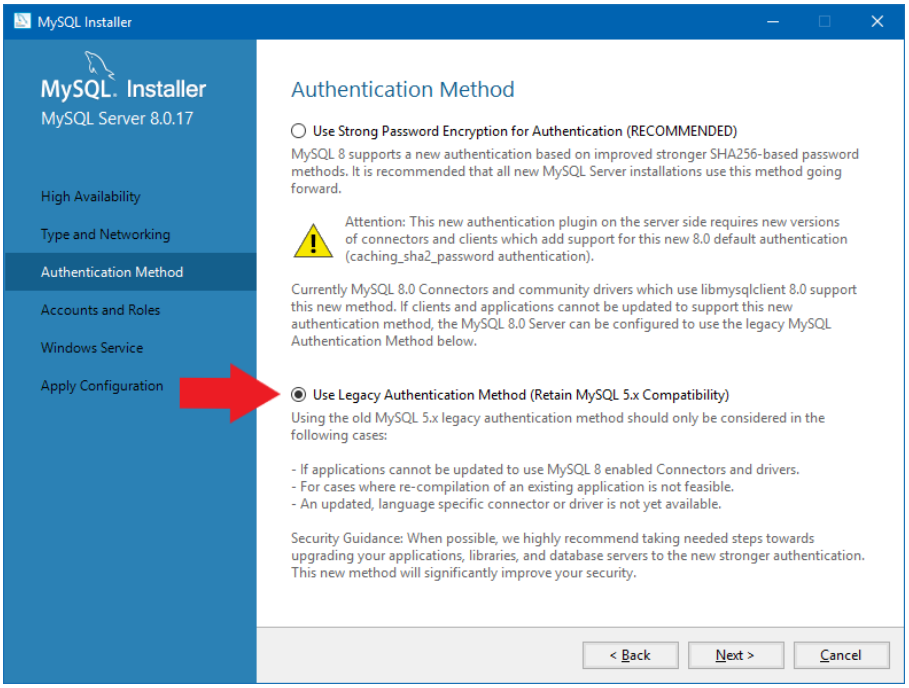
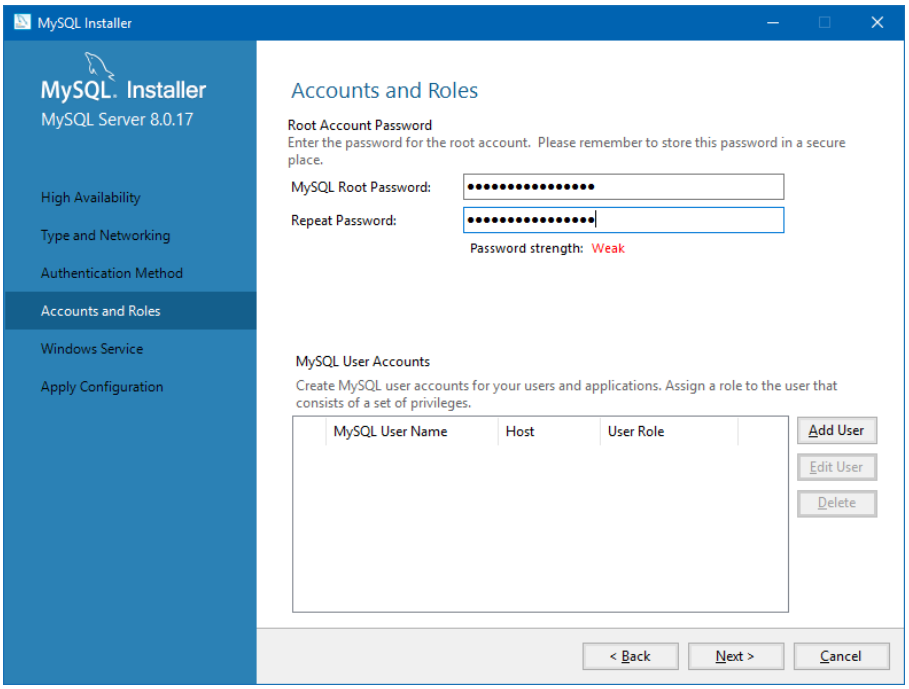
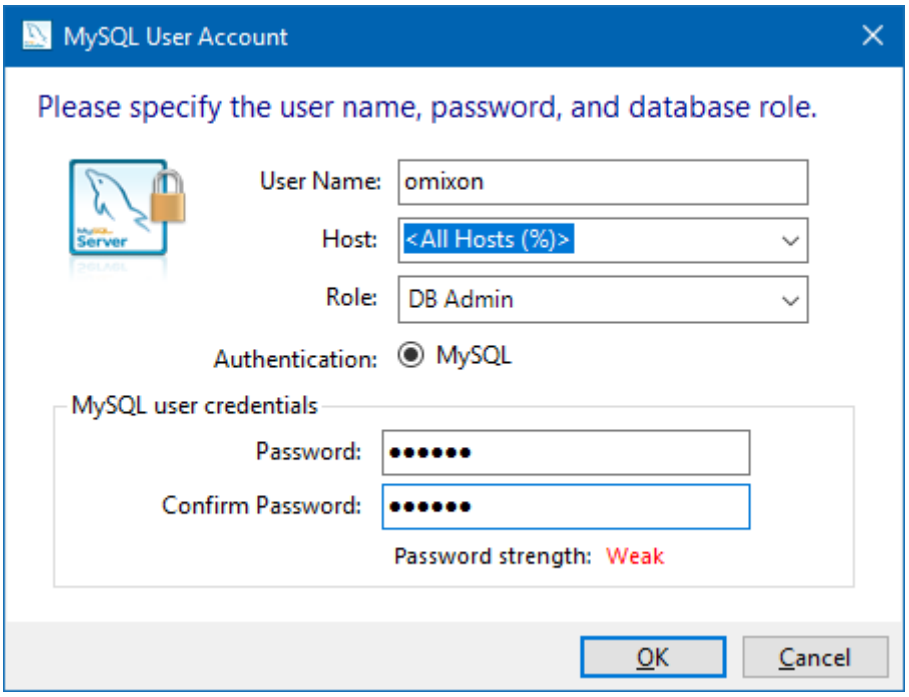
9. **Select "Use Legacy Authentication Method (Retain MySQL 5.x Compatibility), then click "Next"**



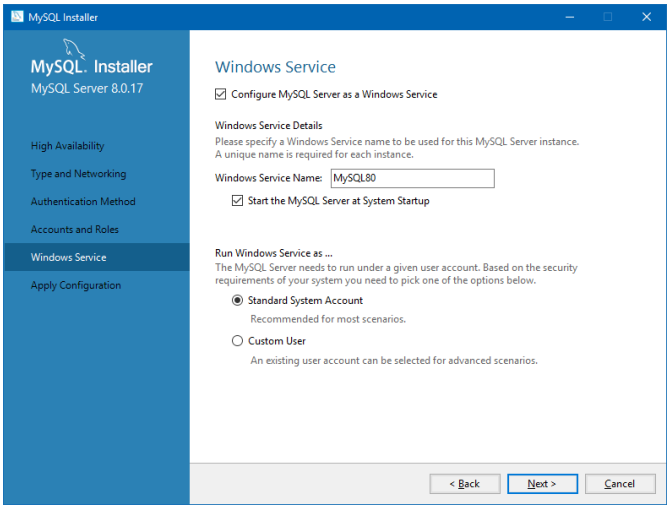
10. Specify the MySQL Root Password (**please make a note of this password)**, then click on **"Add User"**



11. Type in "omixon" as the username **and the password** as well, then click "Ok" and "Next"



12. Please use the default values, and click "Next", then "Execute".



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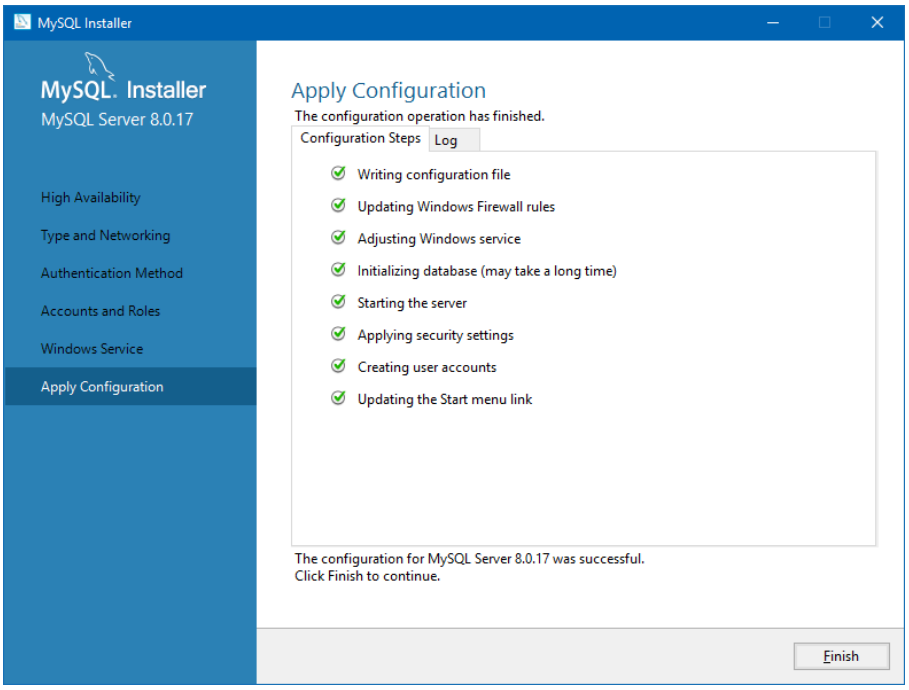
13. Click Finish when the configuration is complete, then click "Next" then "Finish".



MySQL is now configured properly. You can proceed to install HLA Twin.

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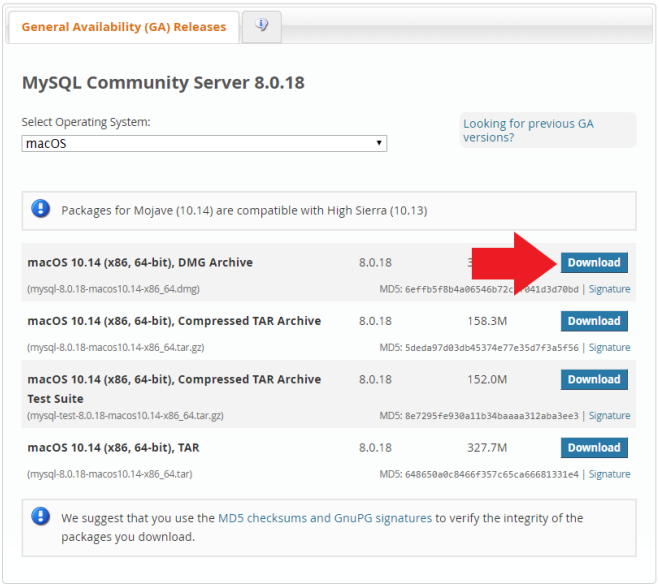
4.2 OSX

If you have a pre-existing **MySQL 8** server in your environment that you would like to use, please see Configuring a pre-existing MySQL database (see page 59). We suggest using a local instance of MySQL for HLA Twin Desktop users.

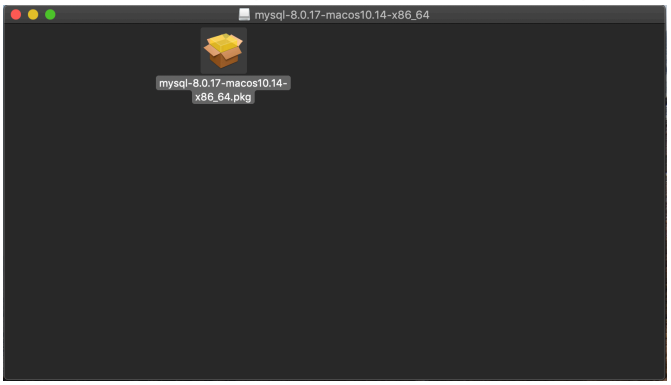
Please follow these steps to download and install MySQL 8 for OSX.

1. Go to https://dev.mysql.com/downloads/mysql/

2. Download the actual version of "macOS xx.xx (x86, 64-bit), DMG Archive" package. For example:



3. Once downloaded, open the DMG archive and open the PKG file in it



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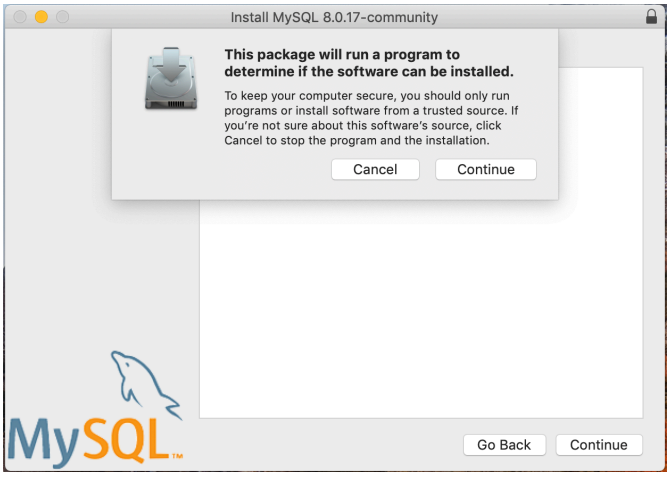
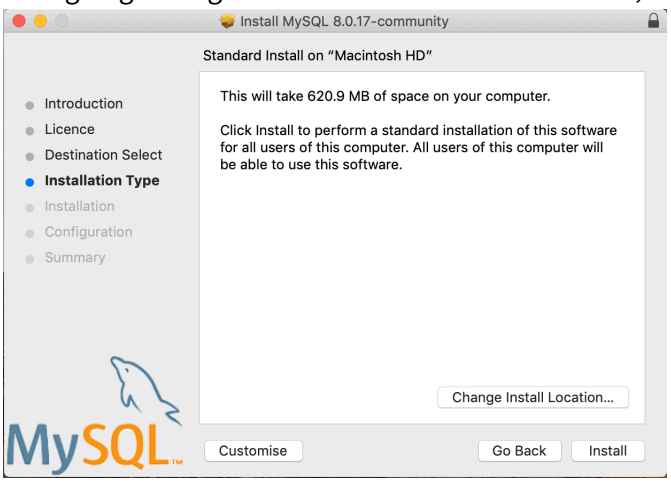
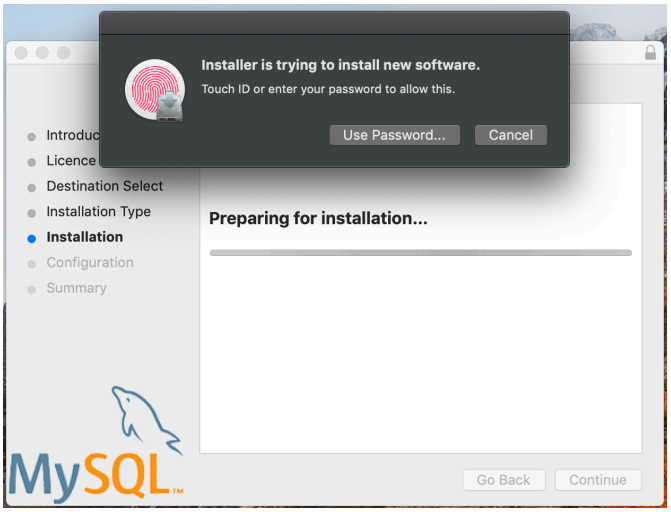
4. If you see this message, select "Continue"



5. After going through the introduction and the license, select "Install" on the "Installation Type" window



6. OSX might require authentication to continue



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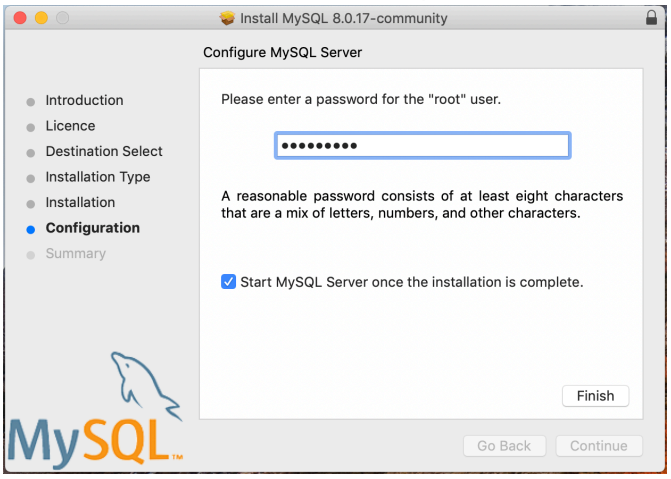
7. **Select "Use Legacy Password Encryption" and click next**

8. Specify the MySQL Root Password (**please make a note of this password**) and make sure that "Start MySQL Server once the installation is complete" is set, and click Finish



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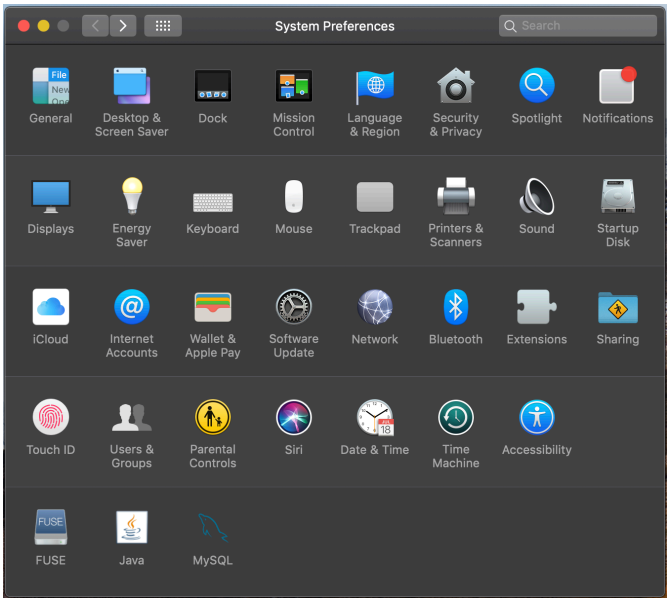
9. After the installation is done, open System Preferences (Apple menu on the top left, System Preferences option). Open MySQL in the bottom row



10. Make sure that MySQL is running (green dot next to it in the list to the left) and that the "Start MySQL when your computer starts up" box in checked to the right.

11. If everything is in order, please close this window

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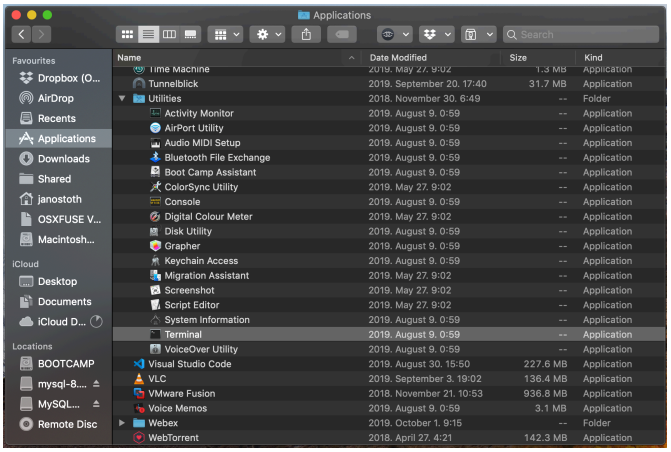
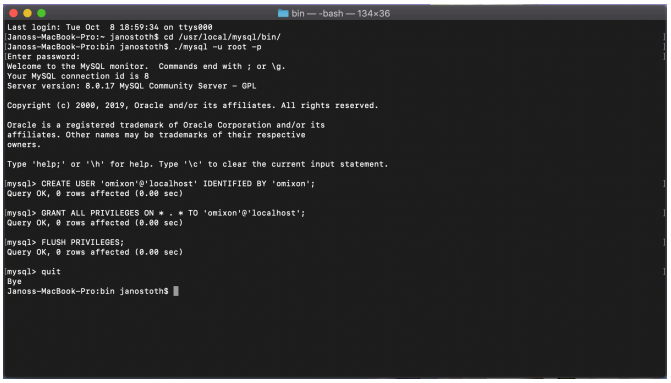
12. Open Terminal in OSX (Finder - Applications - Utilities)



13. Run the following commands in sequential order
    a. `cd /usr/local/mysql/bin`
    b. `./mysql -u root -p`
    c. type in the MySQL root password you have set in the installer
    d. `CREATE USER 'omixon'@'localhost' IDENTIFIED BY 'omixon';`
    e. `GRANT ALL PRIVILEGES ON omixon_database . * TO 'omixon'@'localhost';`
    f. `FLUSH PRIVILEGES;`
    g. `quit`



If the output looks the same as the screenshot, everything is configured properly.

You can proceed to install HLA Twin now.

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4.3 Linux

If you have a pre-existing **MySQL 8** server in your environment that you would like to use, please see Configuring a pre-existing MySQL database (see page 59). We suggest using a local instance of MySQL for HLA Twin Desktop users.

Since there are a plethora of Linux repositories with different MySQL packages, this document will only provide a list of settings you will need to look out for during configuration:

- HLA Twin only works with version 8 of MySQL
- MySQL needs to use Legacy Password Encryption
- You might need to change the password policy in MySQL for allowing HLA Twin to connect

After you have installed the MySQL 8 server, make sure that you create a new user named omixon with the following commands typed in the terminal:

1. `mysql -u root -p`
2. `CREATE USER 'omixon'@'localhost' IDENTIFIED BY 'omixon';`
3. `GRANT ALL PRIVILEGES ON omixon_database . * TO 'omixon'@'localhost';`
4. `FLUSH PRIVILEGES;`

After setting the MySQL server up, you can proceed to install HLA Twin.

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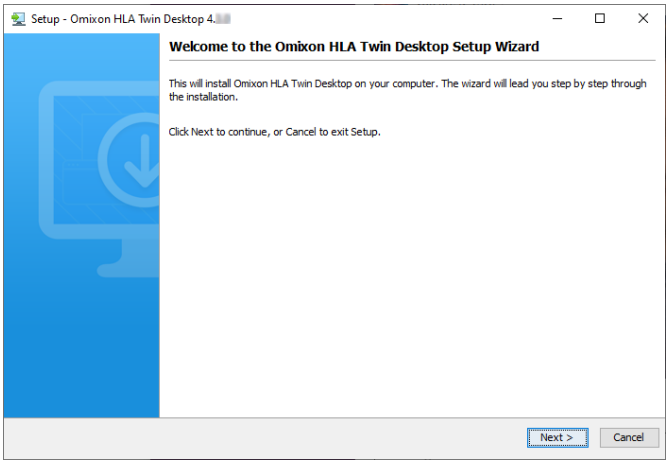
5 Desktop

5.1 Installing HLA Twin Desktop

You will need to install a MySQL 8 database server before being able to install HLA Twin! Please refer to Database chapter for installation guides. (see page 8)



1. This step depends on the operating system you are using.
   - **Windows users:** Open the installer (`omixon_hla_twin_XXX_windows-x64_with_jre-desktop.exe`)
   - **Linux users:** Open a terminal window, get permissions to the installer (`chmod +x omixon_hla_twin_xxx_unix_with_jre-desktop.sh`) then run the installer.
   - **OSX users:** Open the installer (`omixon_hla_twin_xxx_macos_with_jre-desktop.dmg`) (if you are using OSX 10.14.6 Mojave or above, you might get an error message. If so, please contact us at support@omixon.com[3])

3 mailto:support@omixon.com

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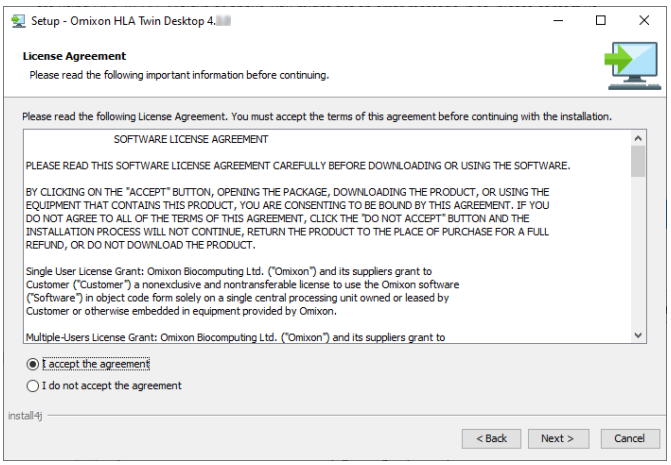
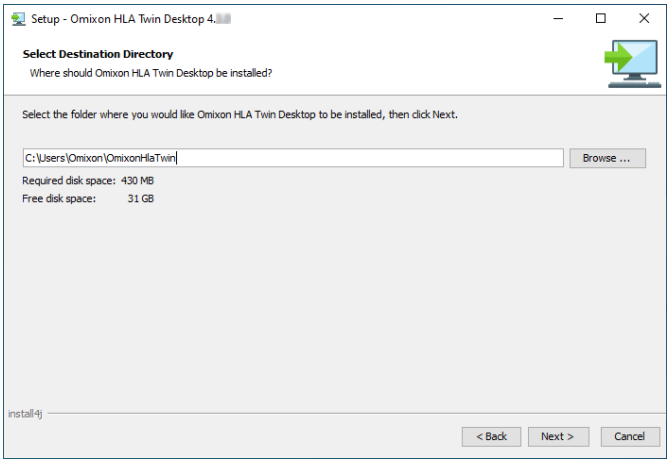
2. Accept the license agreement.



3. Select an installation folder.

   Windows users, please keep in mind that you might want to change the destination directory so other users in Windows can access the software (the same applies to the other installation folders in the next steps as well).



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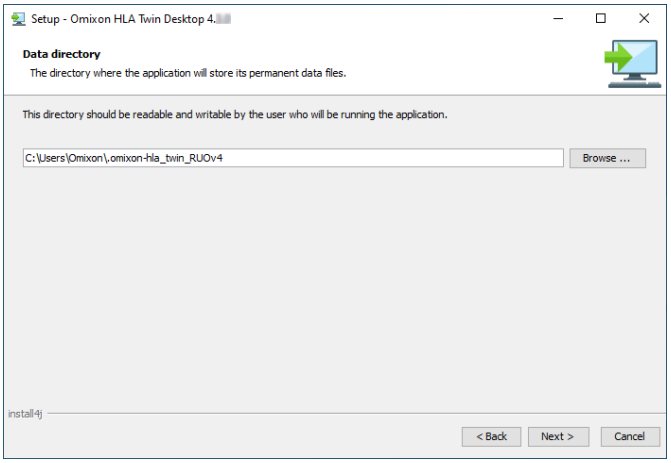
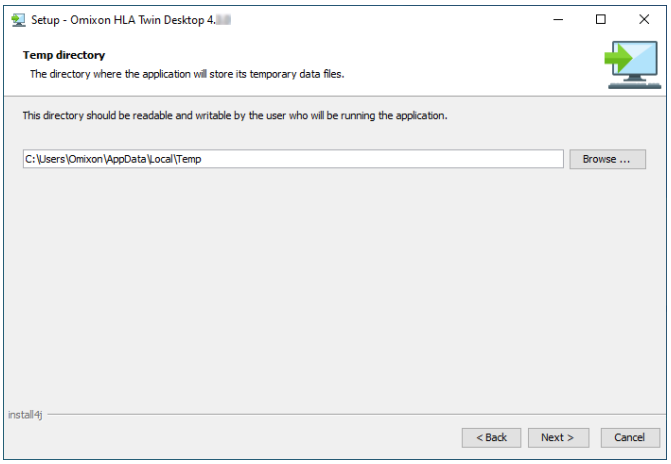
4. Select a folder for reference database files.



5. Select a folder for temporary files.



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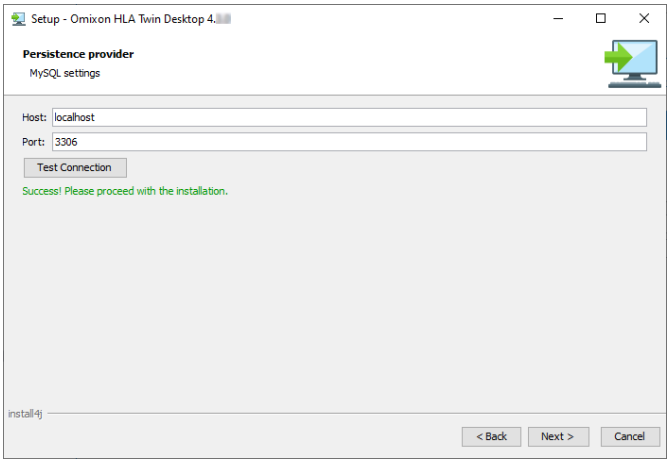
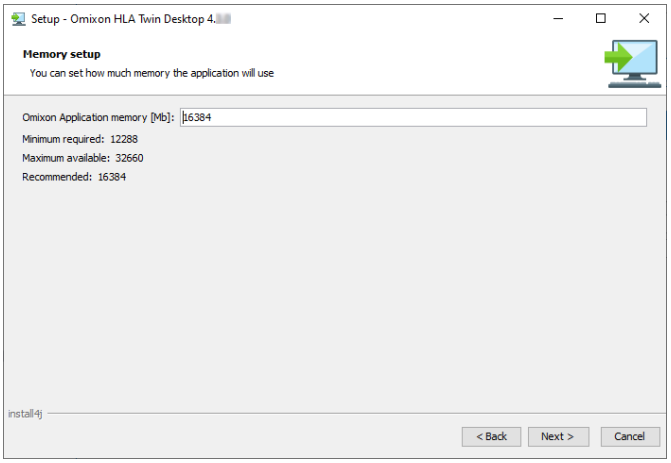
6. Specify the IP address and the port number for the MySQL database (the default settings should work fine if you have installed MySQL locally). Please refer to Database chapter for installation guides. (see page 8)

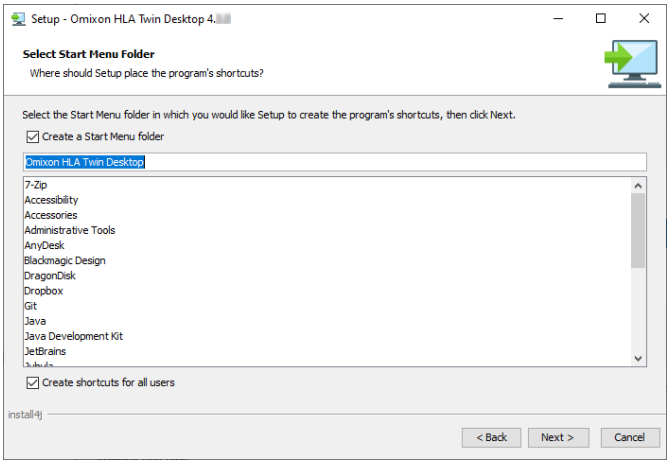


You **cannot proceed** until you get a successful connection test!

7. Configure the memory settings.



8. Select Start Menu folder.



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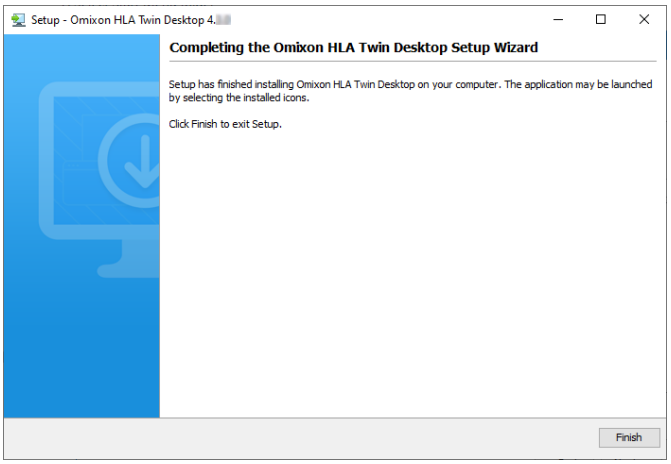
9. Click Finish.



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6 Installation and configuration

The scale of the HLA Twin version 4.9.0 update was so large, that reinstallation will be necessary for users who have HLA Twin version 3.1.3 below.

HLA Twin 4.x will be installed independently of version 3.1.3 and below, so you might keep the older version as a backup, but you can also uninstall it manually.

Each edition has different factors to consider when updating, this chapter will contain information on those besides the step-by-step installation and configuration guide.

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6.1 Server (standalone)

Notes before installation

Database: You will need to install a MySQL 8 database server **before being able to install HLA Twin**! Please refer to Database chapter for installation guides. (see page 8)

Networking: HLA Twin Server will communicate with HLA Twin Clients on ports 4380 and 4381 by default, so please make sure to allow them on your firewall.

HTTPS: For a secure connection between the HLA Twin Server and HLA Twin Clients, please follow the HTTPS configuration chapter after the installation.

Windows Service: The HLA Twin Server will run as the `Omixon HLA Twin NG Server` service in Windows, which is set to automatic startup by default.

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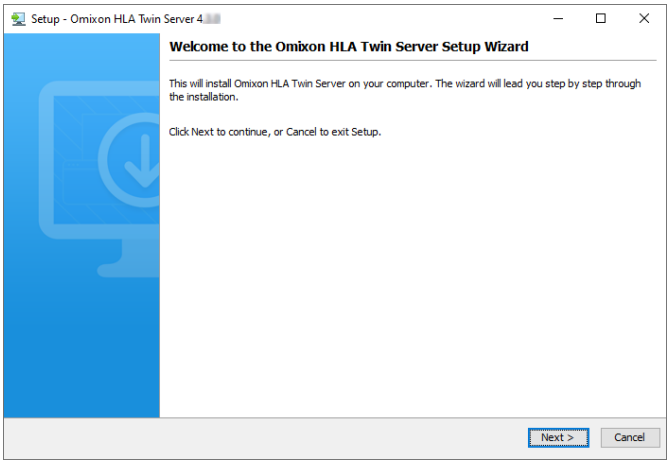
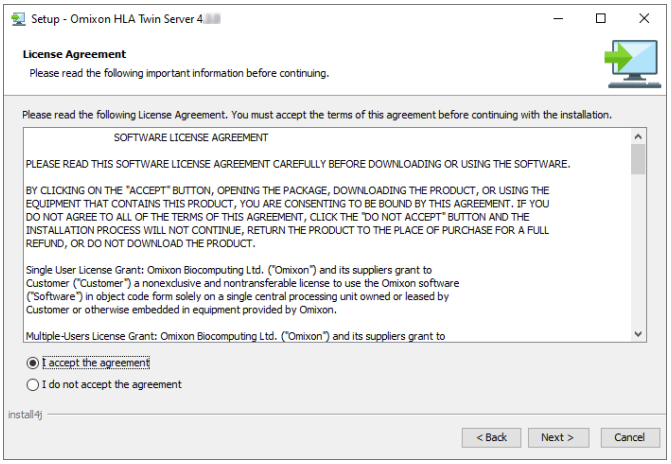
6.1.1 Installing HLA Twin Server

1. This step depends on the operating system you are using.

   - **Windows users:** Open the installer (`omixon_hla_twin_XXX_windows-x64_with_jre-serverclient.exe`)
   - **Linux users:** Open a terminal window, get permissions to the installer (`chmod +x omixon_hla_twin_xxx_unix_with_jre-serverclient.sh`) then run the installer.



2. Accept the license agreement.



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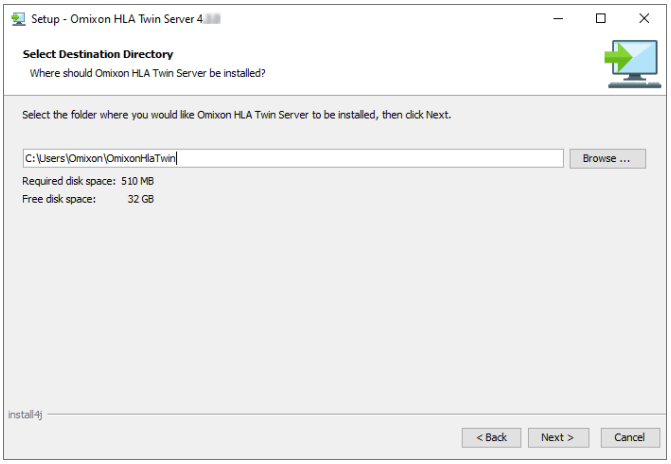
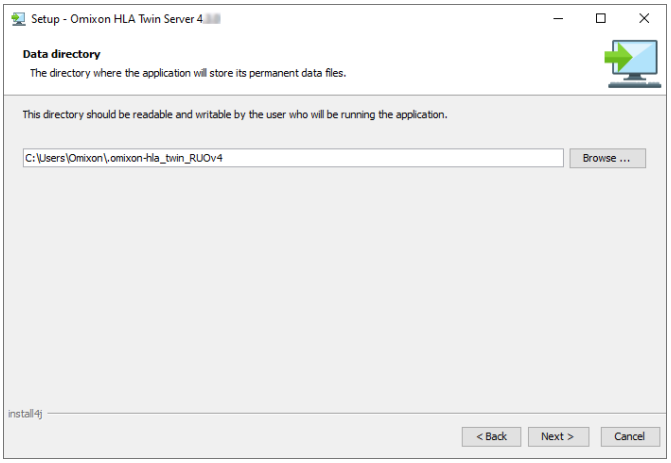
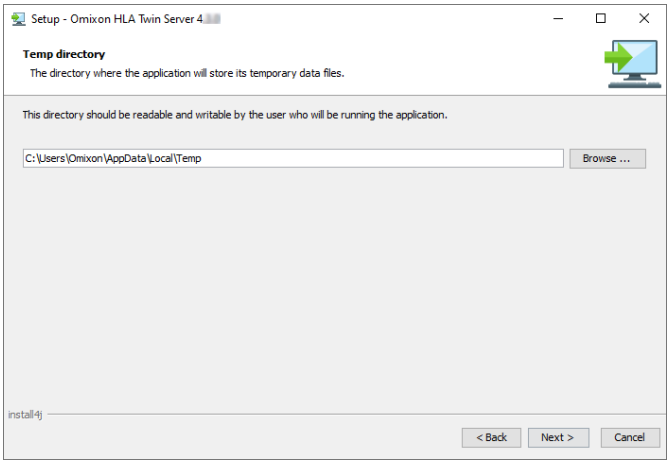
3. Select an installation folder.
   Windows users, please keep in mind that you might want to change the destination directory so other users in Windows can access the software (the same applies to the other installation folders in the next steps as well).



4. Select a folder for reference database files.



5. Select a folder for temporary files.



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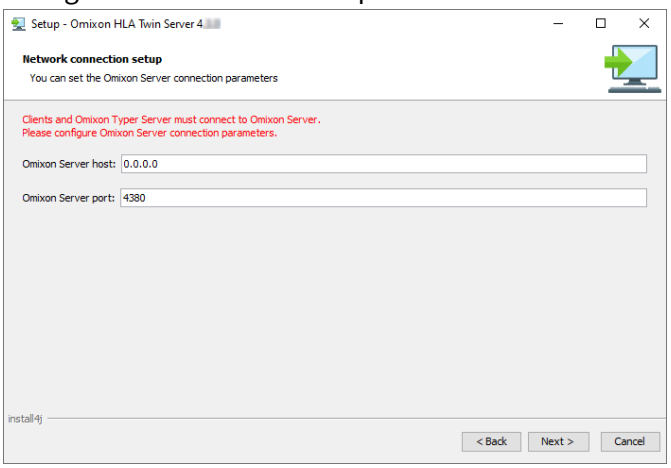
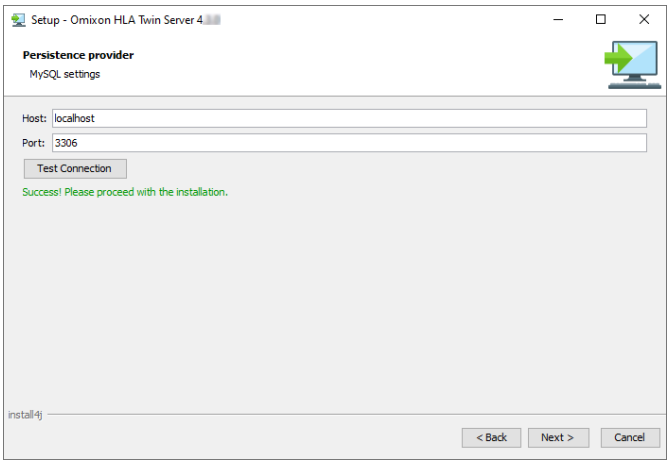
6. Configure the IP address and port number that the HLA Twin Server will use for communication (local IP).

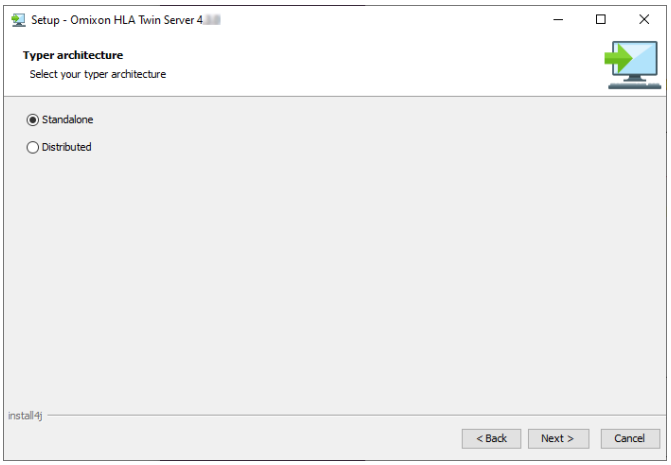


7. Specify the IP address and the port number for the MySQL database (the default settings should work fine if you have installed MySQL locally). Please refer to Database chapter for installation guides. (see page 8)



You **cannot proceed** until you get a successful connection test!

8. Select the standalone architecture (for the distributed configuration with multiple HLA Twin Typers on separate servers, please follow the Server (distributed) (see page 32) chapter).



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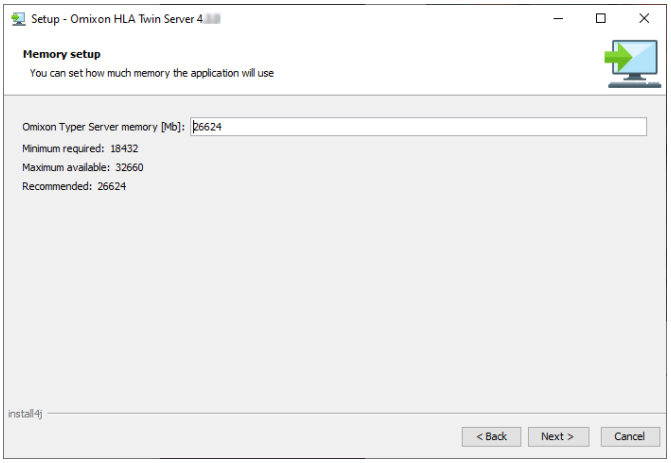
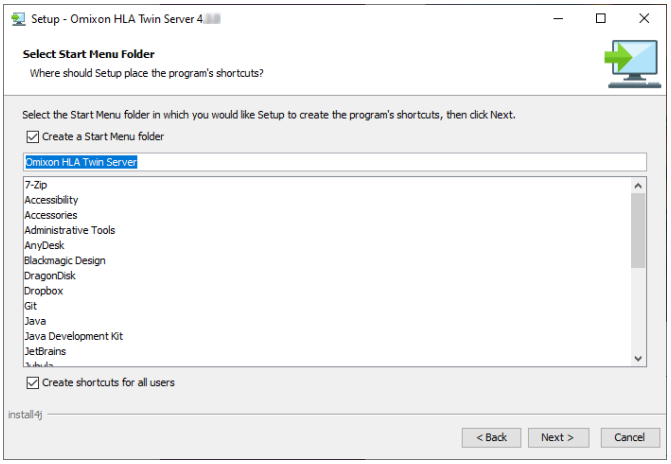
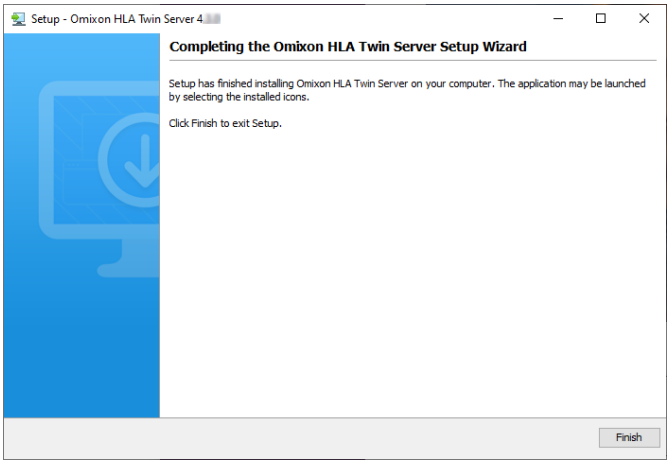
9. Configure the memory settings.



10. Select Start Menu folder.



11. Click Finish.



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6.2 Server (distributed)

6.2.1 Notes before installation

Database: You will need to install a MySQL 8 database server **before being able to install HLA Twin**! Please refer to Database chapter for installation guides. (see page 8)

Typers: Please set up the Apache Tomcat server for the HLA Twin Typers (see page 38) before installing the HLA Twin Server for a more convenient installation process. (You can install the Typers after the Server, but then you will need to perform additional configuration steps. Follow the instructions in

Adding new Typers to HLA Twin Server (see page 38) chapter.)

Networking: HLA Twin Server will communicate with HLA Twin Clients on ports 4380 and 4381 by default and with HLA Twin Typers on port 8080 so please allow them on your firewall.

HTTPS: For a secure connection between the HLA Twin Server and HLA Twin Clients AND the Apache Tomcat servers, please follow the HTTPS configuration chapter after the installation.

Windows Service: The HLA Twin Server will run as the `Omixon HLA Twin NG Server` service in Windows, which is set to automatic startup by default.

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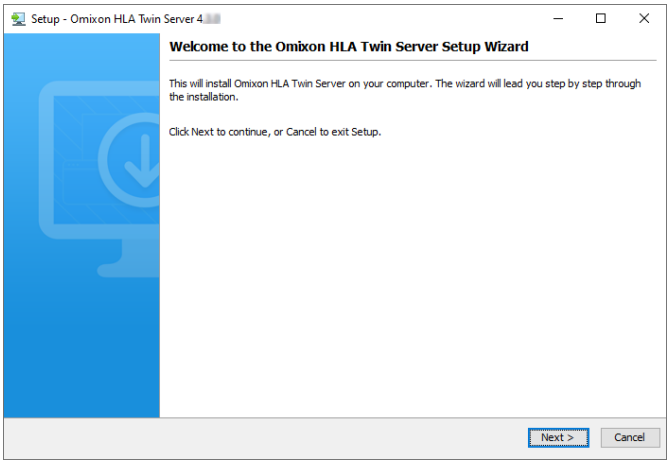
6.2.2 Installing HLA Twin Server

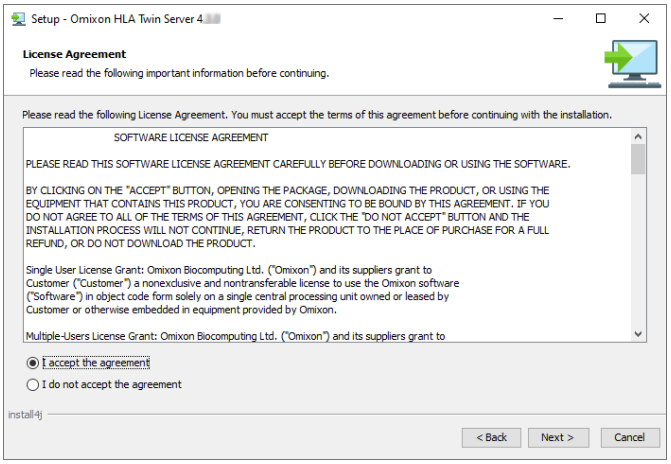
The steps below will show you how to install the HLA Twin Server version.

1. This step depends on the operating system you are using.

   - **Windows users:** Open the installer (`omixon_hla_twin_XXX_windows-x64_with_jre-serverclient.exe`)
   - **Linux users:** Open a terminal window, get permissions to the installer (`chmod +x omixon_hla_twin_xxx_unix_with_jre-serverclient.sh`) then run the installer.



2. Accept the license agreement.



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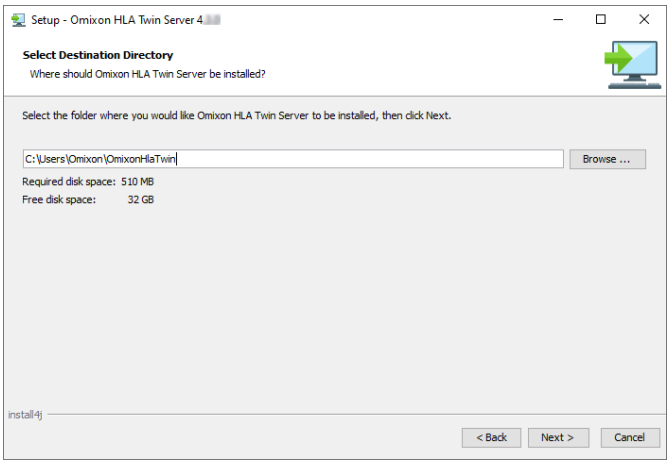
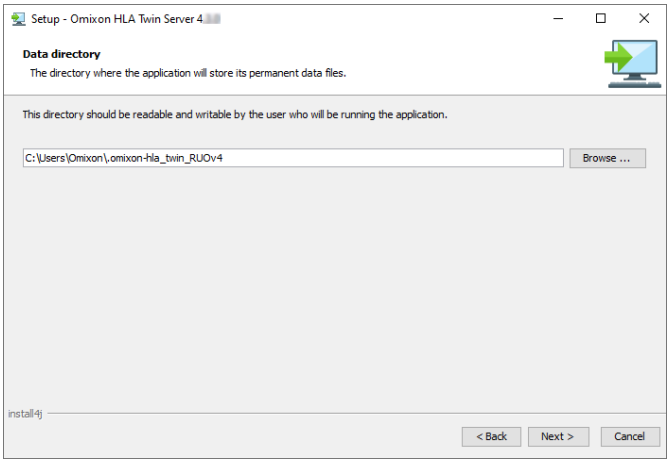
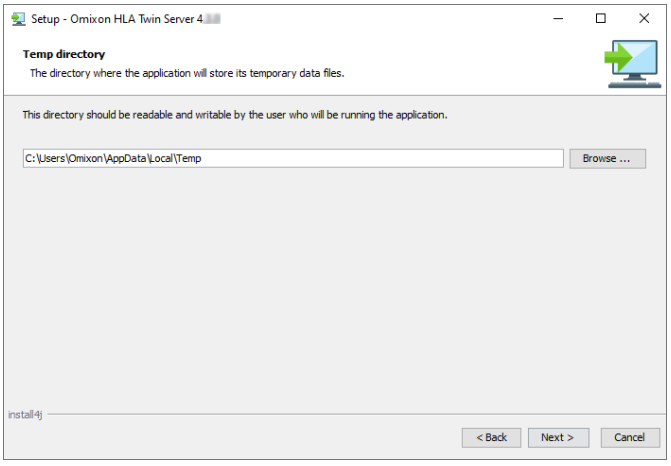
3. Select an installation folder.
   Windows users, please keep in mind that you might want to change the destination directory so other users in Windows can access the software (the same applies to the other installation folders in the next steps as well).



4. Select a folder for reference database files.



5. Select a folder for temporary files.



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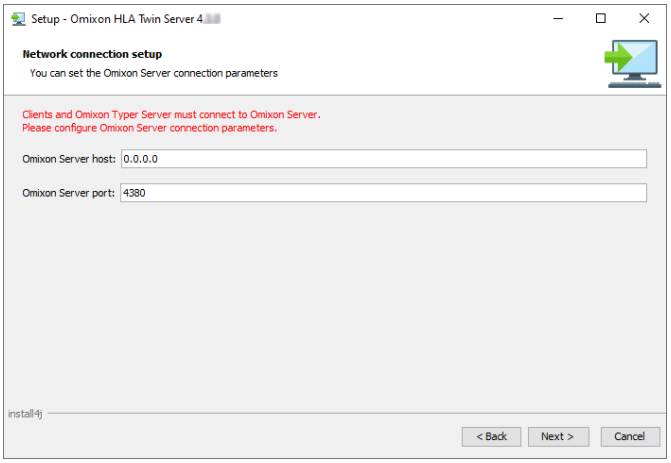
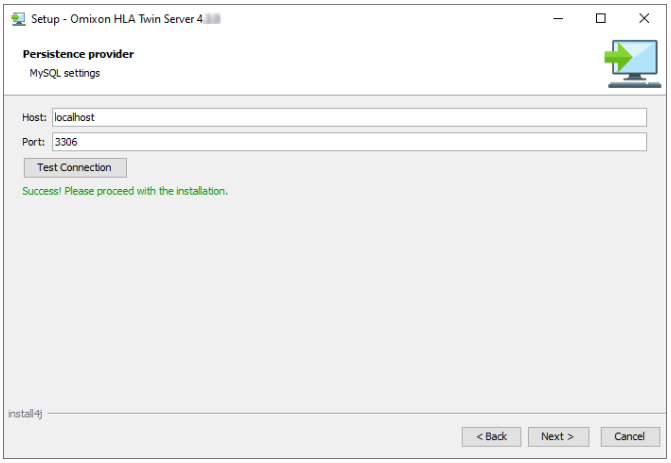
6. Configure the IP address and port number that the HLA Twin Server will use for communication (local IP).



7. Specify the IP address and the port number for the MySQL database (the default settings should work fine if you have installed MySQL locally). Please refer to Database chapter for installation guides. (see page 8)



You **cannot proceed** until you get a successful connection test!

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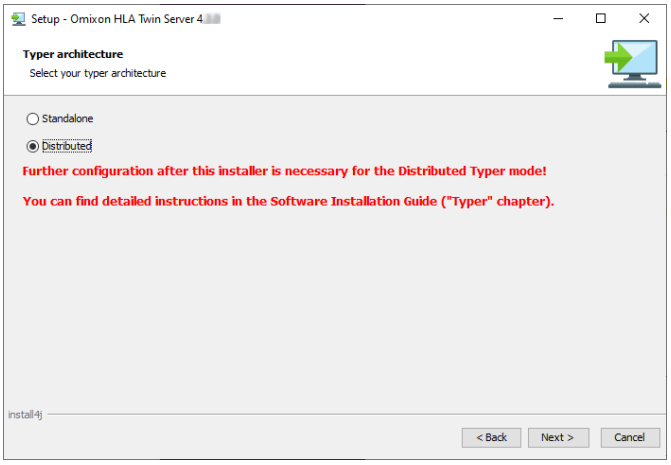
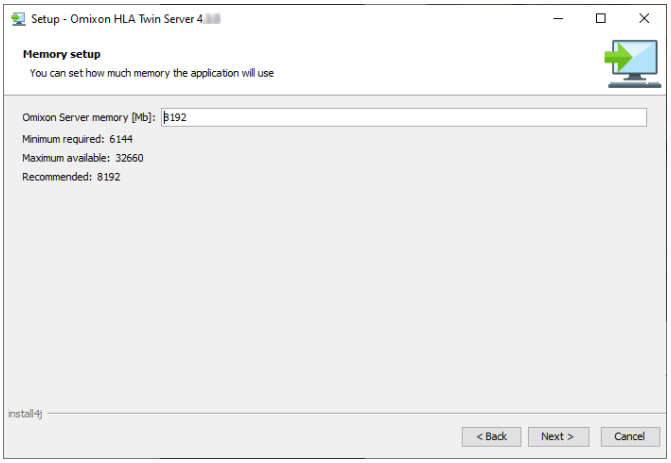
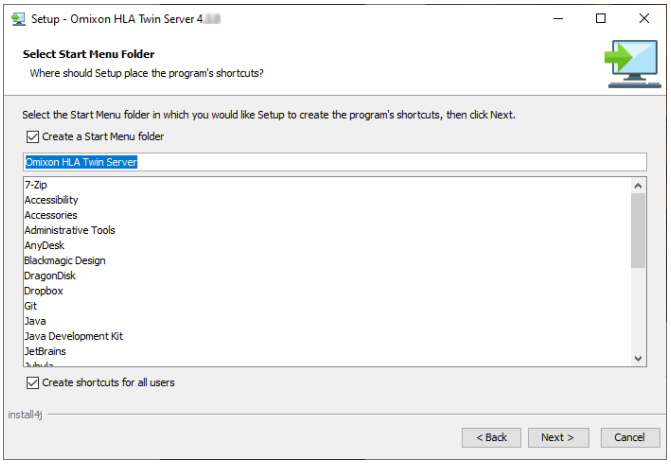
8. Select the Distributed architecture (for the standalone architecture with only one HLA Twin Type, please follow the Server (standalone) (see page 27) chapter).
   Further configuration after this installer is necessary for the Distributed Typer mode! Follow the instructions in Adding new Typers to HLA Twin Server (see page 38) chapter.



9. Configure the memory settings.



10. Select Start Menu folder.



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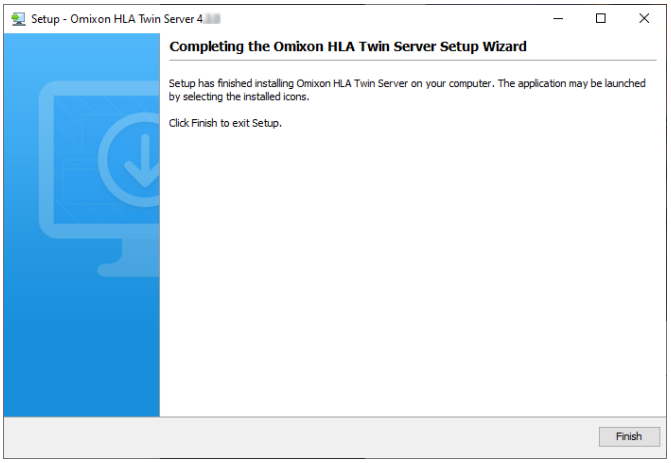
11. Click Finish.



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6.3 Typer

HLA Twin Server can have multiple HLA Twin Typer instances connected to it to perform multiple analyses at the same time. The Omixon Twin Typer does not have a separate installer, because it is contained in a WAR (Web Application Resource) package that can be deployed through an HLA Twin Server. To deploy this package, an Apache Tomcat server needs to be running on the computer where the HLA Twin Typer is to be deployed to.

6.3.1 Adding new Typers to HLA Twin Server

It is possible to add additional HLA Twin Typers to the HLA Twin Server after installation.

1. Open the typer.conf file in the HLA Twin Server installation folder with a text editor
2. Add another `${ tomcat10 }` line below the existing one(s):

   ```
   typers = [
       ${ tomcat10 } { baseUrl = "http://192.168.0.5:8080/typer1" }
       ${ tomcat10 } { baseUrl = "http://192.168.0.6:8080/newtyper" }
   ]
   ```

   Where
   a. the IP address is the address of the computer where Apache Tomcat has already been installed
   b. the port number is the port where Apache Tomcat was configured to listen on
   c. "typer1" is a customizable name for the Typer instance that will be visible in the software

3. Save the file and restart the HLA Twin Server service

Now the new IP address will be visible in the Typer Manager dashboard in HLA Twin Server.

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6.3.2 Configuring Apache Tomcat on Windows

6.3.2.1 Notes before installation

Java: Tomcat requires Java SE 17.0 or OpenJDK 17.0 installed on the server! For licensing information, please check the chapter on Java licensing (see page 59)**.**

Java SE 17.0 can be downloaded from the following link:

https://www.oracle.com/java/technologies/javase/jdk17-archive-downloads.html

Networking: HLA Twin Server will communicate with HLA Twin Typers on port 8080 so please allow them on your firewall.

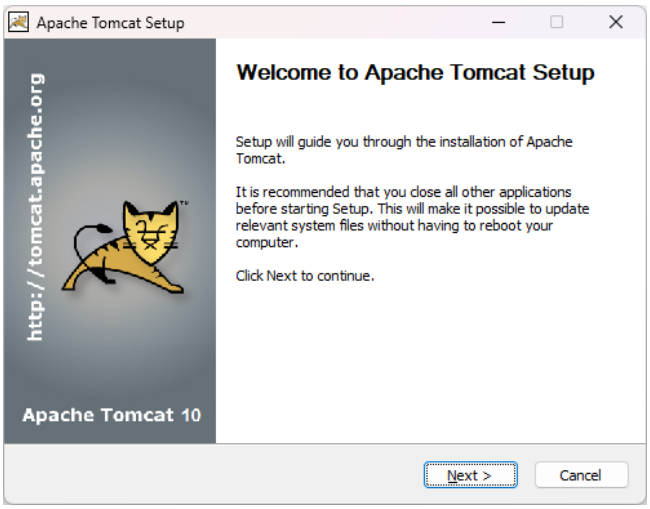
Typer deployment: After configuring Tomcat, please continue with the Deploying the Typer (see page 50) chapter.

HTTPS: For a secure connection between the HLA Twin Server and Apache Tomcat, please follow this chapter after the installation.

6.3.2.2 Installing Apache Tomcat on Windows

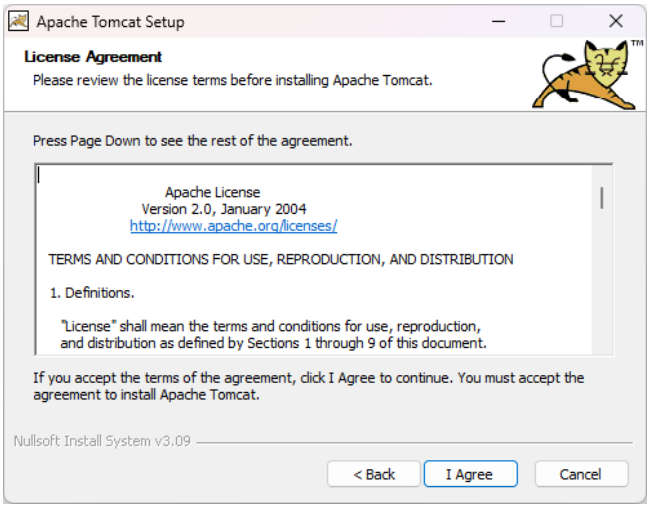
1. Download the latest distribution of Apache Tomcat 10 service installer here[4].

2. Start the installer

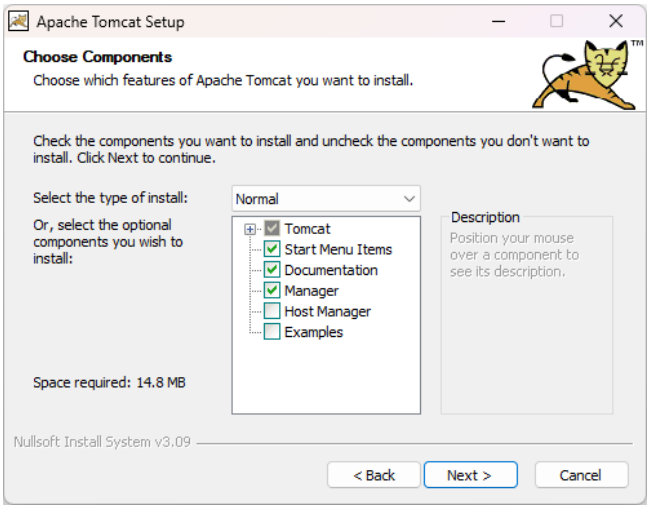


4 https://tomcat.apache.org/download-10.cgi

3. Accept the license agreement



4. Choose components and click next (we suggest the default configuration for convenience)



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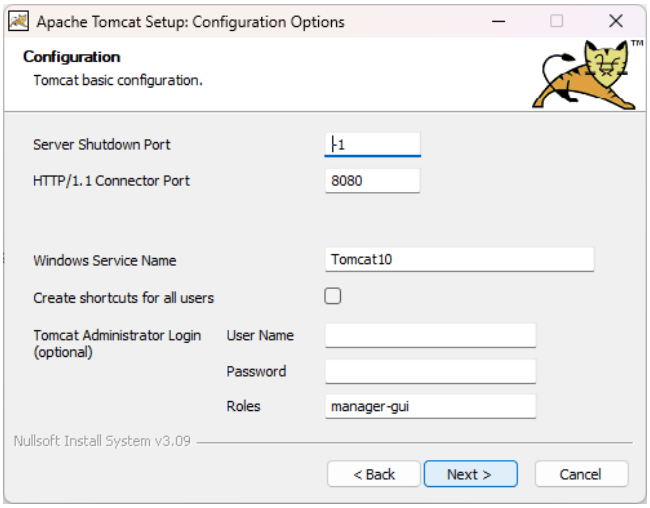
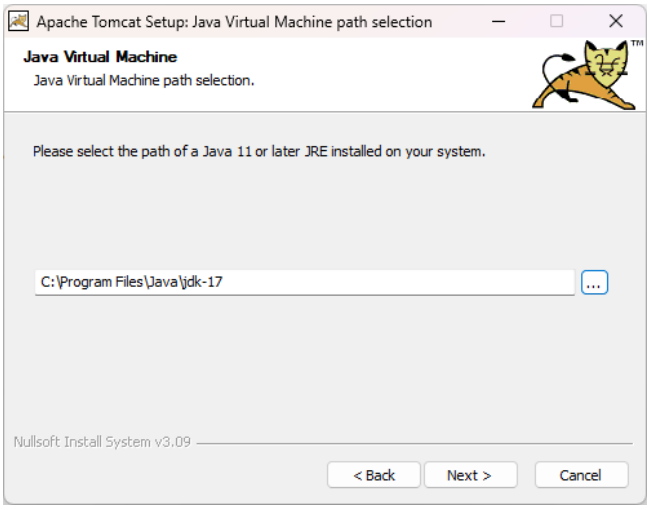
5. Configure the Tomcat server (the default configurations are suggested, but you might want to change the HTTP/1.1 Connector Port depending on which port you want to use for communication with the HLA Twin Server.



6. Select the path of the Java JRE. Please note that the 64-bit version of Java is needed. If the default path points to C:\Program Files(x86), you have the 32-bit version installed. In that case, please install the 64-bit version.



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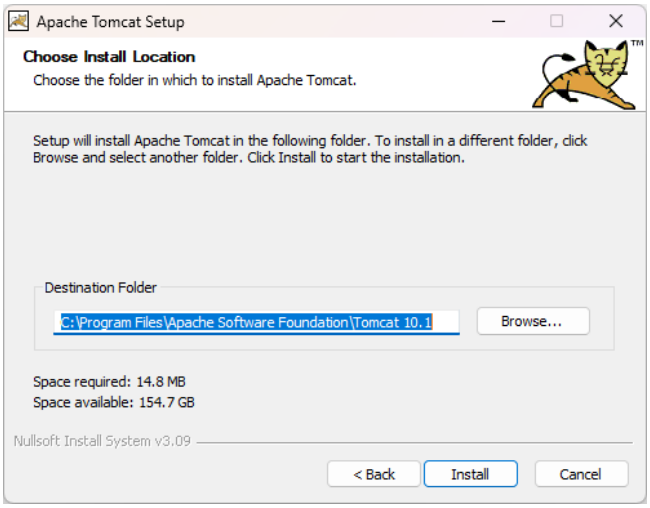
7. Select the install location

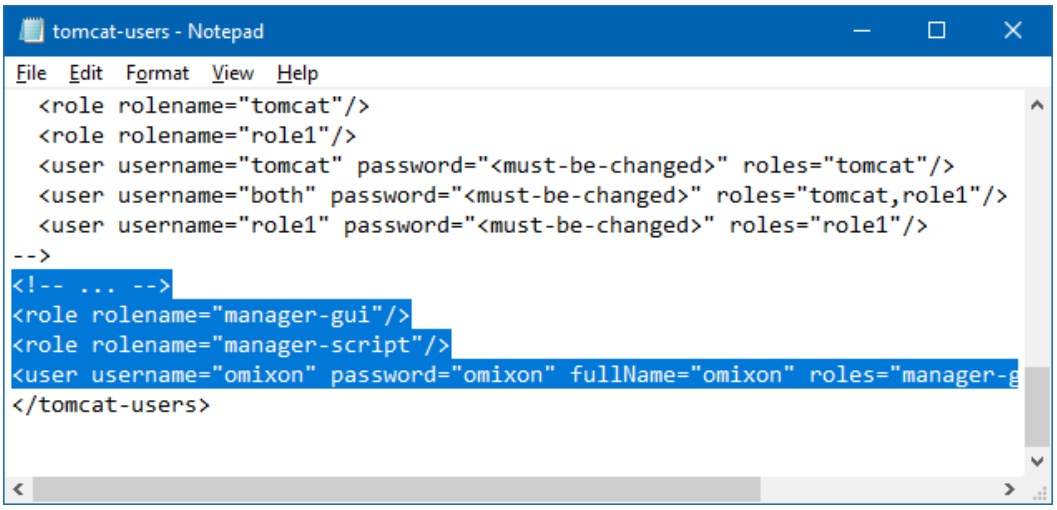


8. After the installation, restart the computer
9. After the restart, navigate to `<Tomcat root>\conf\` in File Explorer and open `tomcat-users.xml` with a text editor. **You will need admin privileges**.

   Add the following before </tomcat-users>

tomcat-users.xml

```
<role rolename="manager-gui"/>
<role rolename="manager-script"/>
<user username="omixon" password="omixon"
fullName="omixon" roles="manager-gui,manager-script"/>
```



   Save the file.

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10. Navigate to `<Tomcat root>\conf\Catalina\Localhost\` and create a new document with the name `manager.xml`. **You will need admin privileges**.
    If you are unable to create the file in this location, create it somewhere where you have rights to create a file then copy it over to the specified location.

    The contents of the file should be the following:

    manager.xml

    ```
    <Context privileged="true" antiResourceLocking="false">
    <Valve className="org.apache.catalina.valves.RemoteAddrValve" allow="^.*$" />
    </Context>
    ```

    Save the file.
11. Navigate to `<Tomcat root>` \webapps\manager\WEB-INF\ in File Explorer and open web`.xml` with a text editor. **You will need admin privileges.**
    Set the max file size and max requested size to at least 150MB (see the example below).

    web.xml

    ```
    <servlet>
    <servlet-name>HTMLManager</servlet-name>
    <servlet-class>org.apache.catalina.manager.HTMLManagerServlet</servlet-class>
    <multipart-config>
    <max-file-size>154857600</max-file-size>
    <max-request-size>154857600</max-request-size>
    <file-size-threshold>0</file-size-threshold>
    </multipart-config>
    </servlet>
    ```
12. Open Tomcat Manager ("Configure Tomcat" in the Start Menu)

13. Open the Java tab and change the Maximum memory pool value.
    - Minimum value: 20480 MB
    - Recommended value: 24576 MB

    Please keep in mind that Windows will require at least 2 GB memory to efficiently!
14. Start (or Restart) the Tomcat service in the General tab.

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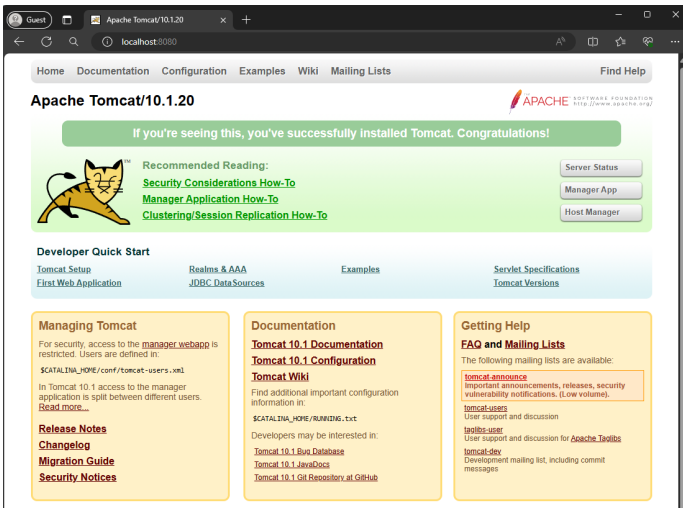
To test if Tomcat is up and running, open a web browser and try to reach http://localhost:8080[5] (or the port number you have selected). You should see the following site if Tomcat is running:



To test if the Tomcat server is reachable from another computer, you can also try this method with the server's IP.

Typer deployment: After configuring Tomcat, please continue with the Deploying the Typer (see page 50) chapter.

5 http://localhost:8080/

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6.3.3 Configuring Apache Tomcat on Linux distributions

6.3.3.1 Notes before installation

Java: Tomcat requires OpenJDK 17.0 installed on the server!

Networking: HLA Twin Server will communicate with HLA Twin Typers on port 8080 so please allow them on your firewall.

Typer deployment: After configuring Tomcat, please continue with the Deploying the Typer (see page 50) chapter.

HTTPS: For a secure connection between the HLA Twin Server and Apache Tomcat, please follow this chapter after the installation.

6.3.3.2 Installing Apache Tomcat on Linux

1. Create a new user for Tomcat

bash

```
sudo useradd -r -m -U -d /opt/tomcat -s /bin/false tomcat
```

2. Download the latest distribution of Apache Tomcat 10 core. You can find the link here[6].

```
wget LINK -P /tmp
```

3. Extract the downloaded archive to `/opt/tomcat`

bash

```
sudo tar xf /tmp/apache-tomcat-10*.tar.gz -C /opt/tomcat
```

4. Create a symlink for handling different versions of Tomcat more easily

```
sudo ln -s /opt/tomcat/apache-tomcat-10.* /opt/tomcat/latest
```

5. Change the ownership of the directory to the user and group tomcat

6 https://tomcat.apache.org/download-10.cgi

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bash

```
sudo chown -RH tomcat: /opt/tomcat/latest
```

6. The scripts inside the bin folder must have the executable flag

bash

```
sudo sh -c 'chmod +x /opt/tomcat/latest/bin/*.sh'
```

7. We want Tomcat to run as a service, so we need to create a new unit file.

bash

```
sudo nano /etc/systemd/system/tomcat.service
```

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The contents of this file should be the following. Be careful with line breaks while copying this: the line that ends with dev/urandom needs to have the next line (-Djava.awt...) after it. Also, the CATALINA_OPTS and its parameters (the -XX parameters) should be in the same line.

tomcat.service

```
[Unit]
Description=Tomcat 10 servlet container
After=network.target

[Service]
Type=forking

User=tomcat
Group=tomcat

Environment="JAVA_HOME=/usr/lib/jvm/default-java"
Environment="JAVA_OPTS=-Djava.security.egd=file:///dev/urandom
-Djava.awt.headless=true"

Environment="CATALINA_BASE=/opt/tomcat/latest"
Environment="CATALINA_HOME=/opt/tomcat/latest"
Environment="CATALINA_PID=/opt/tomcat/latest/temp/tomcat.pid"
Environment="CATALINA_OPTS=-Xms512M -Xmx24576M -server -XX:+UseParallelGC
-XX:+CrashOnOutOfMemoryError -XX:+HeapDumpOnOutOfMemoryError
-XX:+PrintGCDetails -XX:+PrintGCTimeStamps -XX:+PrintGCDateStamps
-Xloggc:gc.log -XX:+PrintReferenceGC -XX:+PrintTenuringDistribution
-XX:+PrintGCApplicationStoppedTime -XX:+UseGCLogFileRotation
-XX:NumberOfGCLogFiles=10 -XX:GCLogFileSize=10M"

ExecStart=/opt/tomcat/latest/bin/startup.sh
ExecStop=/opt/tomcat/latest/bin/shutdown.sh

[Install]
WantedBy=multi-user.target
```

Please note that the -Xmx value is the memory configuration for the software. The minimum value is 20480 MB but we recommend 24576 MB. Keep in mind that Linux will require at least 2 GB of memory to work efficiently.

8. Reload the system manager

bash

```
sudo systemctl daemon-reload
```

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9. Edit the following file with a text editor: `/opt/tomcat/latest/conf/tomcat-users.xml`

   Add the following before </tomcat-users>

   tomcat-users.xml

   ```
   <!-- ... -->
   <role rolename="manager-gui"/>
   <role rolename="manager-script"/>
   <user username="omixon" password="omixon" fullName="omixon" roles="manager-gui,manager-script"/>
   ```

   Save the file!
10. Navigate to `/opt/tomcat/latest` `/conf/Catalina/Localhost/` and create `manager.xml` (add the folders manually if they are missing).
    The contents of the file should be the following:

    manager.xml

    ```
    <Context privileged="true" antiResourceLocking="false">
    <Valve className="org.apache.catalina.valves.RemoteAddrValve" allow="^.*$" />
    </Context>
    ```

11. Navigate to `/opt/tomcat/latest/` webapps/manager/WEB-INF/ and open web `.xml` with a text editor. Set the max file size and max requested size to at least 150MB (see the example below).

    web.xml

    ```
    <servlet>
    <servlet-name>HTMLManager</servlet-name>
    <servlet-class>org.apache.catalina.manager.HTMLManagerServlet</servlet-class>
    <multipart-config>
    <max-file-size>154857600</max-file-size>
    <max-request-size>154857600</max-request-size>
    <file-size-threshold>0</file-size-threshold>
    </multipart-config>
    </servlet>
    ```

12. Start the Tomcat service

    bash

    ```
    sudo systemctl start tomcat
    ```

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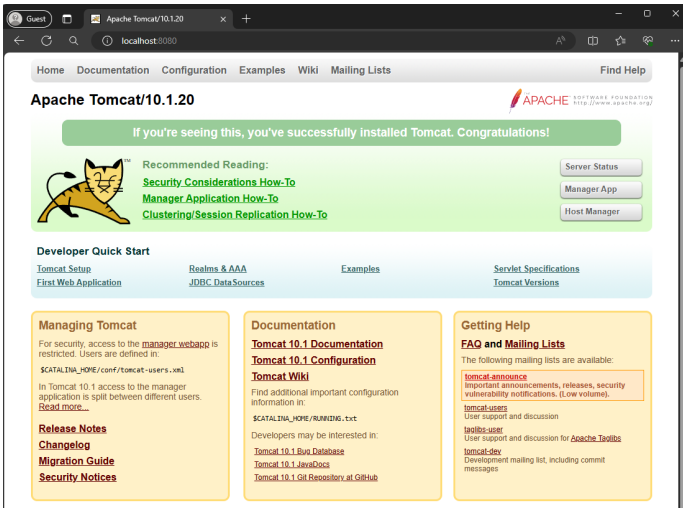
- To check the status of the Tomcat server, run `sudo systemctl status tomcat`
- To have Tomcat run on startup, run `sudo systemctl enable tomcat`

To test if Tomcat is up and running, open a web browser and try to reach http://localhost:8080/ (or the port number you have selected). You should see the following site if Tomcat is running:



To test if the Tomcat server is reachable from another computer, you can also try this method with the server's IP.

Typer deployment: After configuring Tomcat, please continue with the Deploying the Typer (see page 50) chapter.

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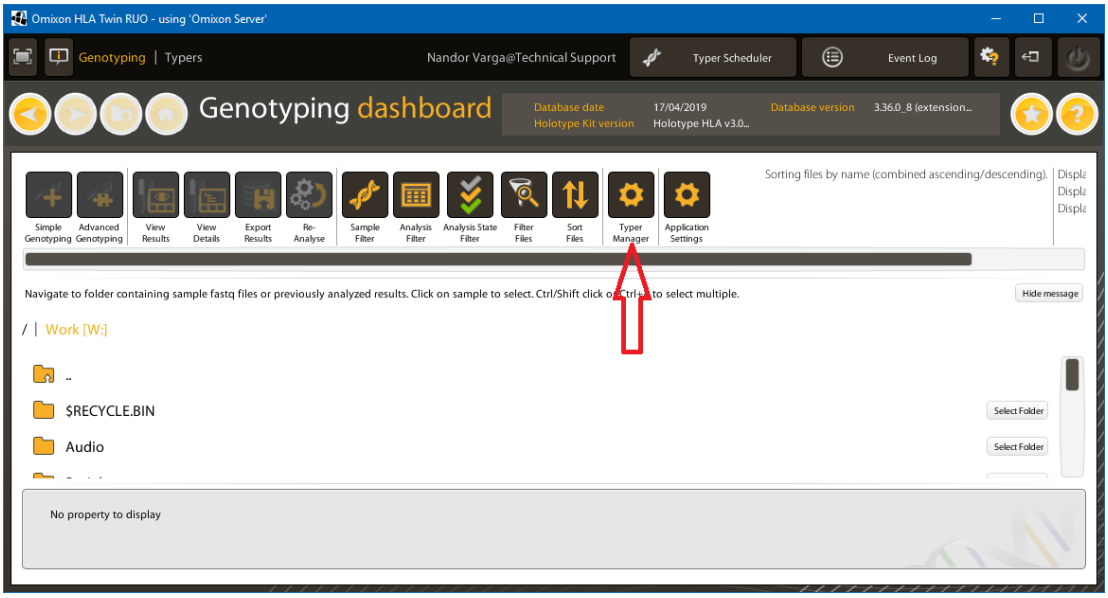
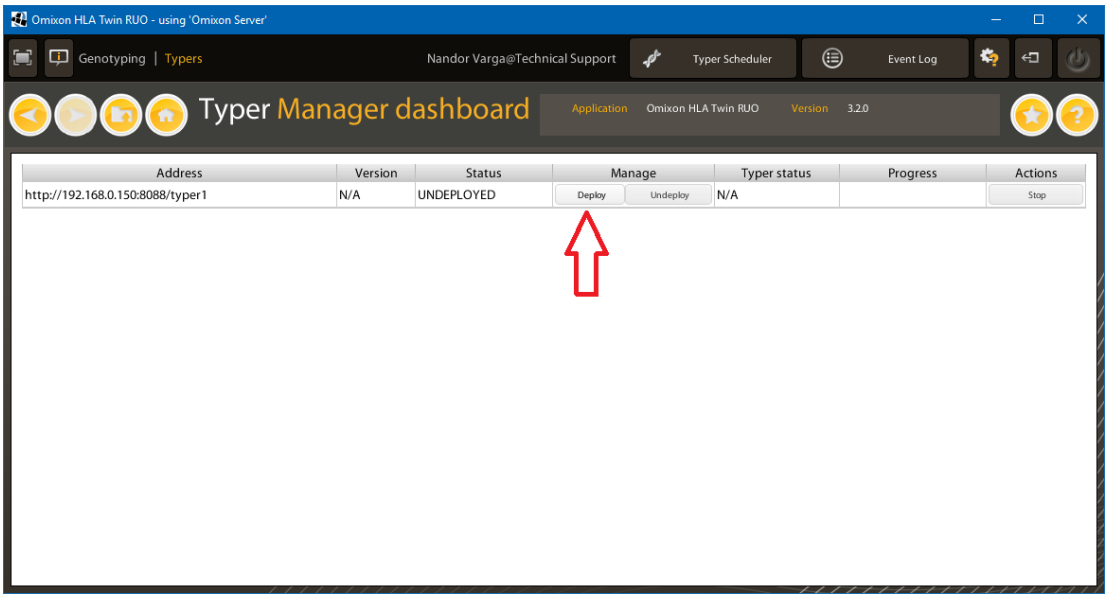
6.3.4 Deploying the Typer

After you have configured the Apache Tomcat server in the previous chapter, you need to deploy the HLA Twin Typer WAR from the HLA Twin Server.

1. Open an HLA Twin Client and connect to the HLA Twin Server
2. Open Typer Manager



3. Click on Deploy for the server you want to set up an HLA Twin Typer. This will take approximately a minute (the HLA Twin Server sends the WAR file to the Tomcat server)



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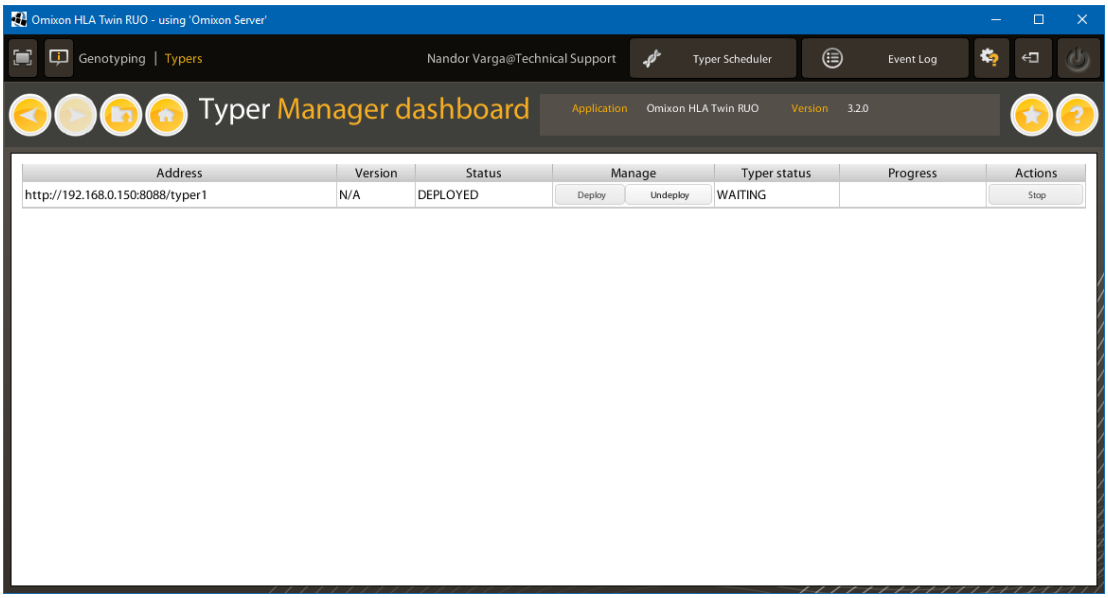
4. If the deployment was successful, you will see the following:



Now HLA Twin is ready for analysis.

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6.4 Client

Notes before installation

Networking: HLA Twin Server will communicate with HLA Twin Clients on ports 4380 and 4381 by default, so please make sure to allow them on your firewall.

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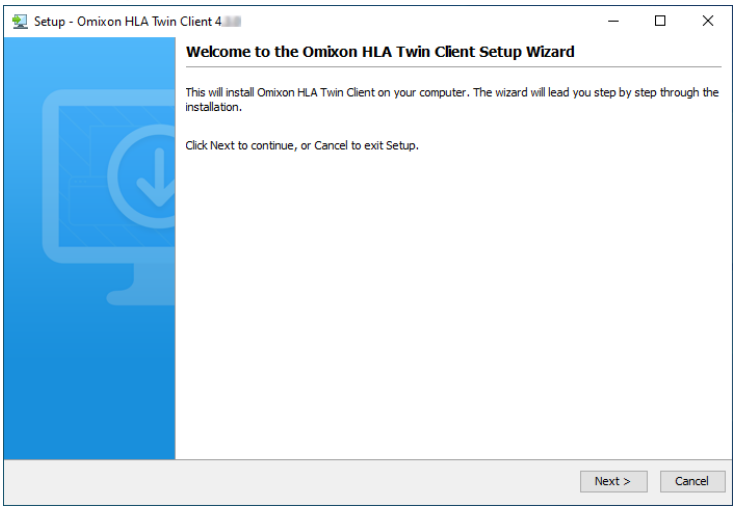
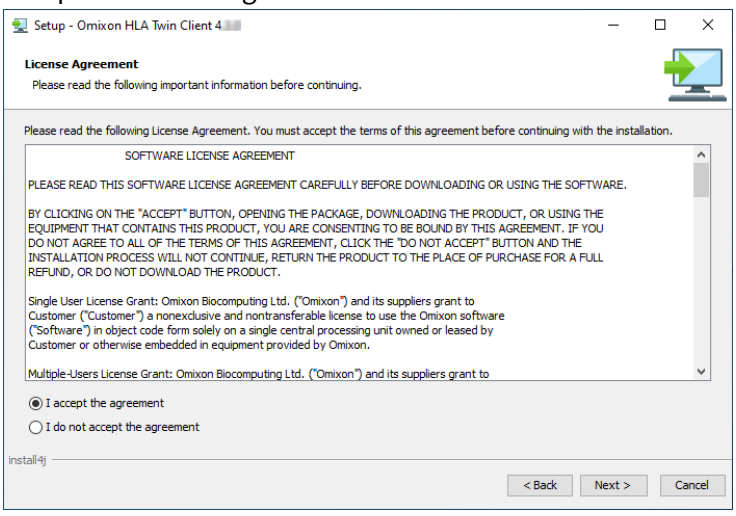
6.4.1 Installing HLA Twin Client

1. This step depends on the operating system you are running.

   - **Windows users:** Open the installer (`omixon_hla_twin_XXX_windows-x64_with_jre-client.exe`)
   - **Linux users:** Open a terminal window, get permissions to the installer (`chmod +x omixon_hla_twin_xxx_unix_with_jre-client.sh`) then run the installer.
   - **OSX users:** Open the installer (`omixon_hla_twin_xxx_macos_with_jre-client.dmg`) (if you are using OSX 10.14.6 Mojave or above, you might get an error message. If so, please contact us at support@omixon.com[7])



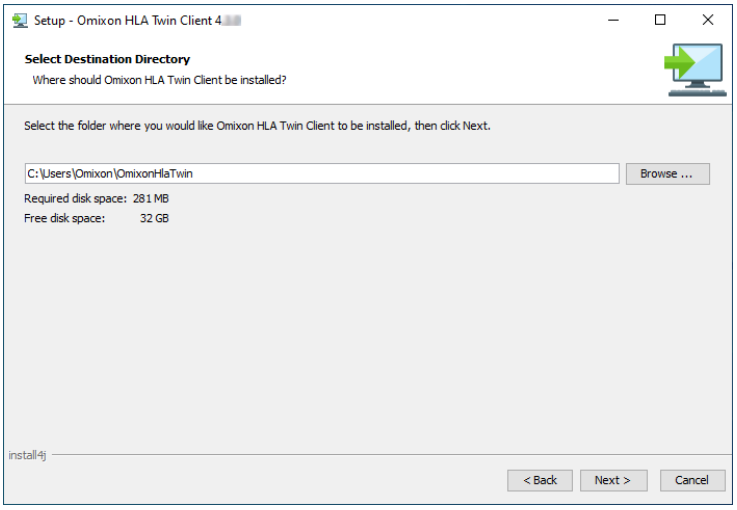
2. Accept the license agreement.



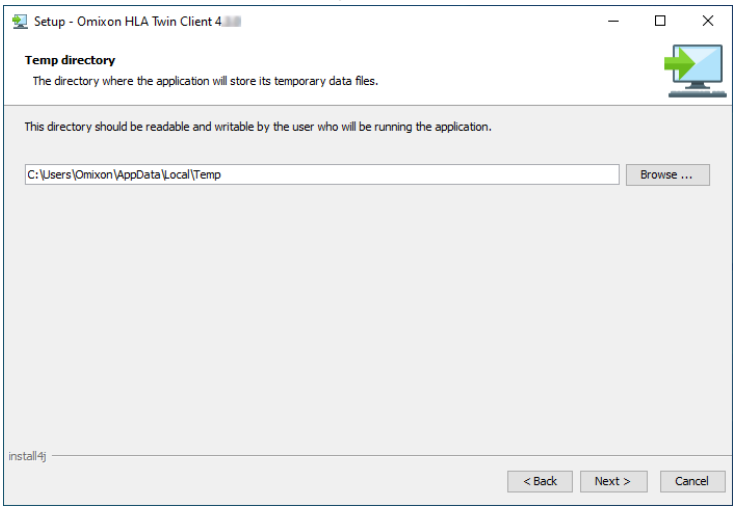
7 mailto:support@omixon.com

3. Select an installation folder.

   Windows users, please keep in mind that you might want to change the destination directory so other users in Windows can access the software (the same applies to the other installation folders in the next steps as well).



4. Select a folder for temporary files.



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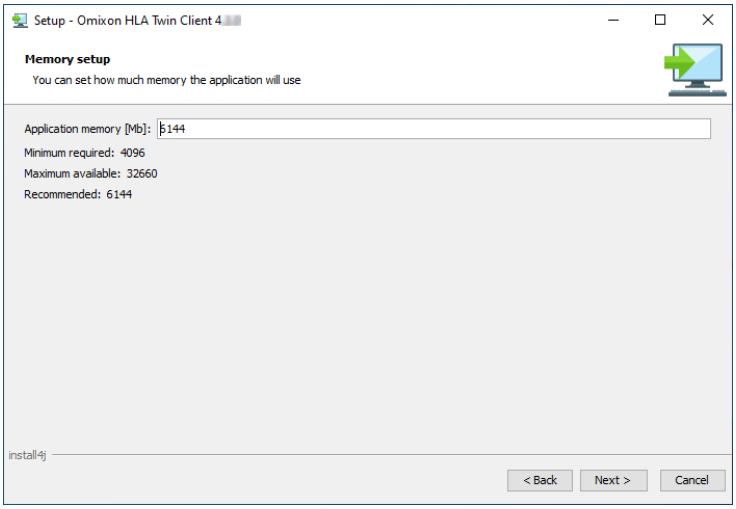
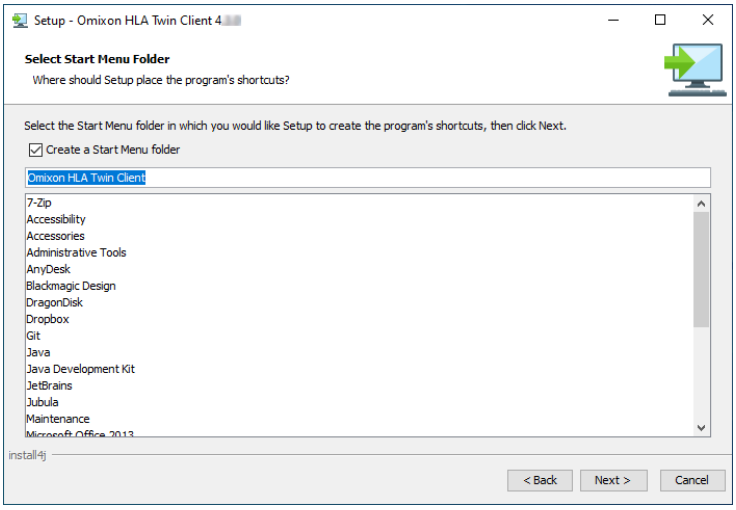
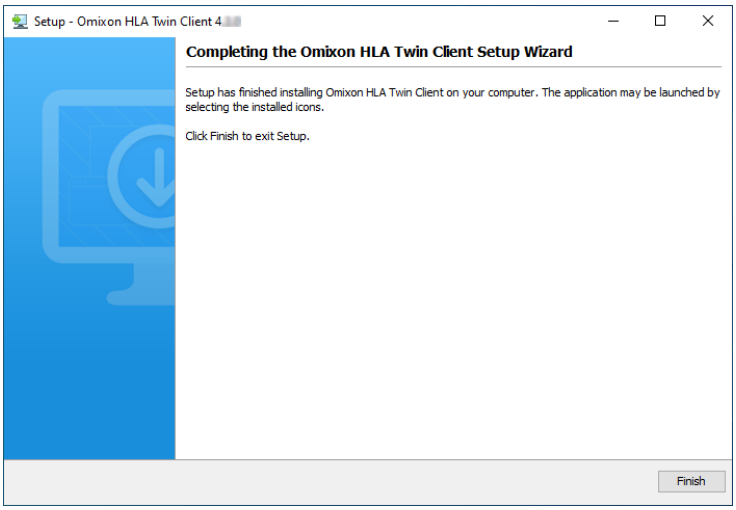
5. Configure the memory settings.



6. Select Start Menu folder.



7. After the installation finishes, click on Finish.



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6.5 HTTPS configuration

In a client-server architecture edition, the software supports secure SSL communication between the components of the software. The software achieves secure communication with the use of public and private keys that are stored in a Java Keystore file.

The `keytool` command in this section uses the **Keytool** application of Java. The software comes with a built-in Java Runtime Environment (JRE), so this application should already be on the computer. Navigate to the `<Omixon Software installation folder>\jre\bin` folder using the Command Prompt (or the Terminal on Linux).

Password

In the following chapters we are going to use the same password 'changeit' everywhere. Please update this password to your own secure password.

Self-signed certificates

In the following chapters we are going to show you how to generate self-signed certificates. Self-signed certificates are generally NOT SECURE, therefore we do not recommend you to use these files in production environment. Ask your own Certificate Authority to generate the necessary secure certificates. This description is only meant to show you how you can set-up the application components in possession of the secure key stores.

Hostname verification

In the following chapters we are creating certificates for 'localhost' servers. If your server is hosted in a different network you must change the scripts. You can also decide to skip hostname verification by setting *disableHostnameVerification* property to true but we strongly recommend you not to do this!

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6.5.1 Client-Server Communication

6.5.1.1 Generate Key-Stores

Run the following script to generate the necessary files.

Description

The script:

1. Generates server keystore which contains the server's certificate and private key
2. Exports the certificate into a separate file
3. Generates client truststore that contains the server's certificate

Script

```
keytool -genkey -v -alias omixon-server -keyalg RSA -keysize 2048 -keystore omixon-server.pfx
-validity 365 -keypass changeit -storetype PKCS12 -storepass changeit -dname "CN=Server,
OU=Software, O=Omixon Ltd." -ext SAN=dns:localhost,ip:127.0.0.1,ip:0.0.0.0

keytool -export -keystore omixon-server.pfx -alias omixon-server -file omixon-server.cer
-keypass changeit -storepass changeit

keytool -keystore omixon-client.truststore.pfx -alias omixon-server -import -file omixon-
server.cer -storetype PKCS12 -storepass changeit -noprompt
```

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6.5.1.2 Configure Components

You have to specify the necessary files and passwords in the ***vmoptions*** configuration file of the Client and Server components.

Client

```
omixon.truststore=<folder of the generated files>/omixon-client.truststore.pfx
omixon.truststore.password=changeit
omixon.ssl.disableHostnameVerification=false
```

Server

```
server.ssl.enabled=true
server.ssl.key-store-type=PKCS12
server.ssl.key-store=<folder of the generated files>/omixon-server.pfx
server.ssl.key-store-password=changeit
server.ssl.key-alias=omixon-server
```

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7 Configuring a pre-existing MySQL database

HLA Twin Server has the ability to store its internal database (containing user data, reference databases, and audit information) in an already existing **MySQL 8** database. This way you would not need to set up a separate MySQL server for HLA Twin.

Please note that the responsiveness of the HLA Twin UI will depend on the network speed between MySQL and HLA Twin.

Your MySQL server needs to use **Legacy Password Encryption** for HLA Twin to interface with it.

You need to create a new user in your pre-existing database to allow HLA Twin to use it. For this, run the following commands:

1. `CREATE USER 'omixon'@'localhost' IDENTIFIED BY 'omixon';`
2. `GRANT ALL PRIVILEGES ON omixon_database . * TO 'omixon'@'localhost';`
3. `FLUSH PRIVILEGES;`

Now HLA Twin will be able to create its own database in MySQL.

8 Additional guides

8.1 Java licensing

This section describes options for customers that use the distributed typer (see page 38) configuration of HLA Twin, more specifically the JRE that is needed for Apache Tomcat.

Oracle has changed its licensing scheme[8] for Java SE on April 16, 2019. Because of this, commercial usage of Java SE is limited to versions prior to the licensing change.

An open-source alternative that is up to date and supported by Apache Tomcat is OpenJDK[9]. For easy installation, we suggest downloading a prebuilt installer from AdoptOpenJDK[10] (OpenJDK 8 with HotSpot JVM).

8 https://www.oracle.com/technetwork/java/javase/overview/oracle-jdk-faqs.html
9 https://jdk.java.net/
10 https://adoptopenjdk.net/

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