

Agenda

- What is the backend?
- What is a database?
- What is DBMS?
- Types of DBMS.
- Relational vs Non Relational Databases
- Installation of Xampp
- Connection to databases.
- Basic SQL Query.

What is backend?

Web development activities that are done at the back end of programs are referred to as back end development. Back-end development covers server side web application logic and integration and activities, like writing APIs, creating libraries, and working with system components instead of front-end development, which focuses on customer-facing services and programs. Backend developers build code that allows a database and an application to communicate with one another. Backend developers take care and maintain the back-end of a website, including databases, servers, and apps, and they control what you don't see.

Now that you know what backend development entails, look at who a backend developer is.

Who is a backend developer ?

Now that you've gotten an introduction to what is backend development, it is important to also understand what the role is all about. A backend developer's job entails focusing on website architecture, scripting, and writing code that communicates between the website's database and the user browser. Data consistency and integrity must be ensured.

You will cover the responsibilities of a backend developer in the coming sections.

Backend developer skills ?

- **Datastructures and Algorithms:** A backend developer creates code that does relational mapping to retrieve data from a database. [MySQL](#), [PostgreSQL](#), SQL SERVER, [MongoDB](#), and Oracle Database are some of the most widely used DBMS. It's crucial to have a good understanding of how they work.



Stacks



Queues



Trees and Graphs



Sorting



Searching

- **Programming Languages and Frameworks:** Programming languages and frameworks are next on the list. An in-depth understanding of backend programming languages is one of the most important skills of a backend developer. This comprises the items listed below.

- NodeJS and ExpressJS are examples of JavaScript environments.
- Java, in particular, was designed from the start to be used on the server. Spring and Java Server Faces are two popular Java frameworks.

- Python is the most widely used programming language. It's adaptable and simple to use. Backend development is done with Python frameworks like Django and Flask.
- In Windows systems, the C# language is the recommended architecture for backend programming.

PHP, Perl, and Ruby are some of the other languages available.



- **Database Management Systems:** A backend developer creates code that does relational mapping to retrieve data from a database. MySQL, SQL SERVER and PostgreSQL, MongoDB, and Oracle Database are some of the most widely used DBMS. It's crucial to have a good understanding of how they work.



- **Web Hosting Platforms:** Web hosting solutions enable you to place your product on a cloud service provider and access it via the internet. Amazon Web Services(AWS), Google Cloud Platform(GCP), Microsoft Azure and Heroku are all popular options.



Backend Developer Responsibilities

- To design effective and efficient solutions, they must first gain a thorough grasp of the website's performance demands and goals.
- Application Programming Interfaces (APIs) development and administration.
- Develop data acceptance and storage solutions for websites, particularly for those involved in payment processing.
- Write, test, and maintain development solutions for code-related problems are all part of the job.
- To identify new features, communicate effectively with developers, designers, and system administrators.
- Create a website architecture by utilizing correct product lifecycle approaches, such as Agile Scrum and frameworks.
- Organize the system logic.
- Provide remedies to difficulties with the system.
- Debug and troubleshoot apps.

What is a database?

Database is the collection of organized data which is structured and is stored electronically on a computer system. Databases can store data in the form of tables depending upon the type of database. The database's primary goal is to store a huge amount of data.

Databases are used to store a large number of dynamic websites on the Internet today. Data can then be accessed, managed, updated, regulated, or organized efficiently. For writing and retrieving data, most databases utilize structured query language (SQL).

Examples of some databases: MySQL, Oracle, MongoDB, PostgreSQL, SQL Server, etc.

What is Database Management System(DBMS) ?

A database management system is software that manages a database by storing, retrieving, and manipulating the data from a database. Oracle, MySQL etc are well-known DBMS tools. Some functions of Database Management System are:

- A database management system (DBMS) provides an interface for performing various activities such as creation, deletion, and modification of the data.
- A database management system (DBMS) allows users to design databases that meet their specific needs.
- A database management system (DBMS) is a collection of programs that respond to user commands.
- It ensures the database's safety by providing security patterns like password protections and verification to ensure access to only authorized users.
- It can be easily used using the queries.

Types of DBMS

There are several types of database management systems. Here is a list of eight common database management systems:

1. Hierarchical databases

2. Network databases
3. Relational databases
4. Object-oriented databases
5. Graph databases
6. ER model databases
7. Document databases
8. NoSQL databases

Hierarchical Databases

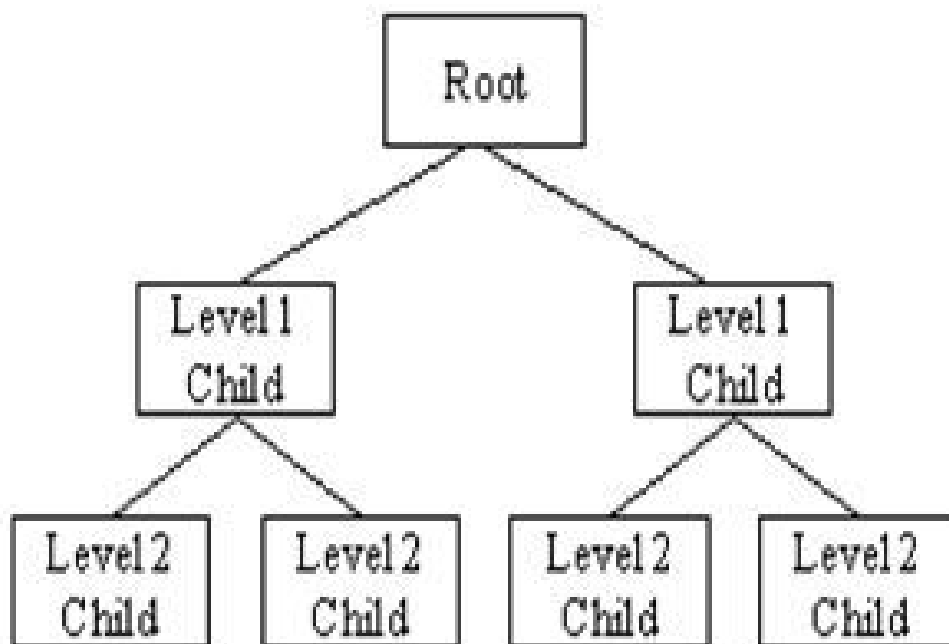
In a hierarchical database management system (hierarchical DBMSs) model, data is stored in a parent-children relationship node. In a hierarchic database, besides actual data, records also contain information about their groups of parent/child relationships.

In a hierarchical database model, data is organized into a tree-like structure. The data is stored in the form of a collection of fields where each field contains only one value. The records are linked to each other via links into a parent-children relationship. In a hierarchical database model, each child record has only one parent. A parent can have multiple children.

To retrieve a field's data, we need to traverse through each tree until the record is found.

The hierarchical database system structure was developed by IBM in the early 1960s. While the hierarchical structure is simple, it is inflexible due to the parent-child one-to-many relationship. Hierarchical databases are widely used to build high-performance and availability applications usually in the banking and telecommunications industries.

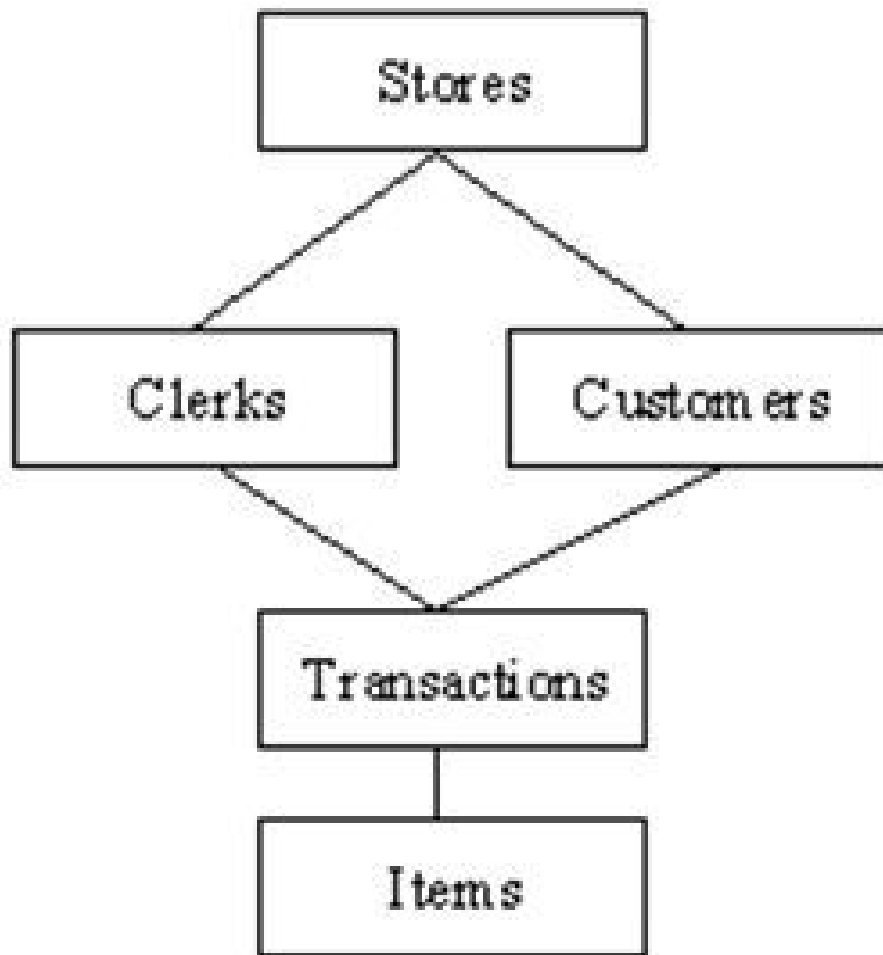
The IBM Information Management System (IMS) and Windows Registry are two popular examples of hierarchical databases.



Network Databases

Network database management systems (Network DBMSs) use a network structure to create a relationship between entities. Network databases are mainly used on large digital computers. Network databases are hierarchical databases, but unlike hierarchical databases where one node can have single parent only, a network node can have a relationship with multiple entities. A network database looks more like a cobweb or interconnected network of records.

In network databases, children are called members and parents are called occupiers. The difference between each child or member is that it can have more than one parent.

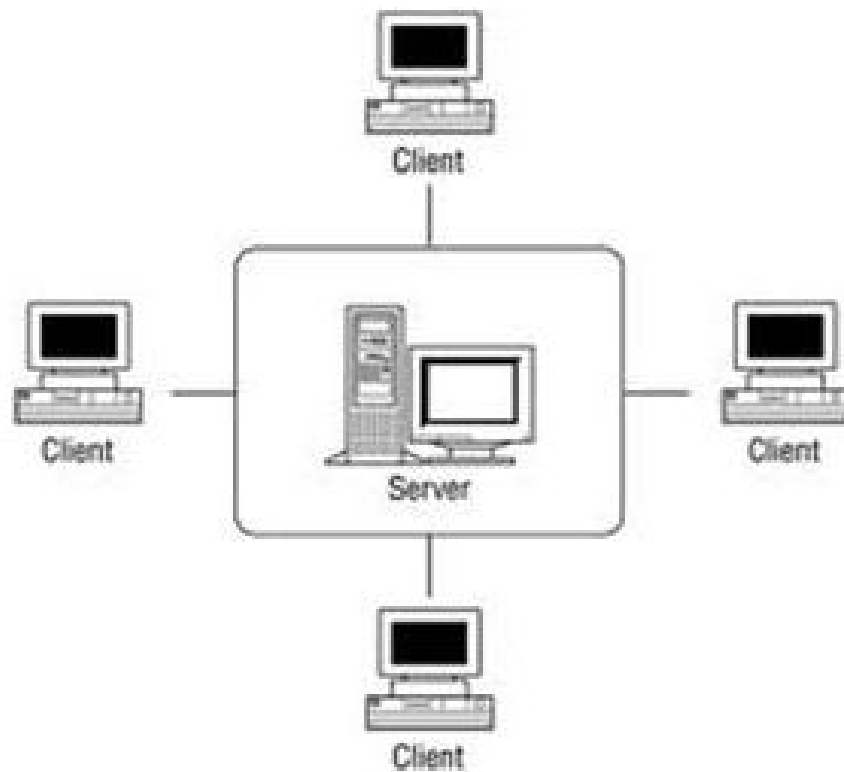


The approval of the network data model is similar to a hierarchical data model. Data in a network database is organized in many-to-many relationships. Some of the popular network databases are the Integrated Data Store (IDS), IDMS (Integrated Database Management System), Raima Database Manager, TurboIMAGE, and Univac DMS-1100.

Relational Databases

In a relational database management system (RDBMS), the relationship between data is relational and data is stored in tabular form of columns and rows. Each column of a table represents an attribute and each row in a table represents a record. Each field in a table represents a data value.

Structured Query Language (SQL) is the language used to query RDBMS, including inserting, updating, deleting, and searching records. Relational databases work on each table that has a key field that uniquely indicates each row. These key fields can be used to connect one table of data to another.

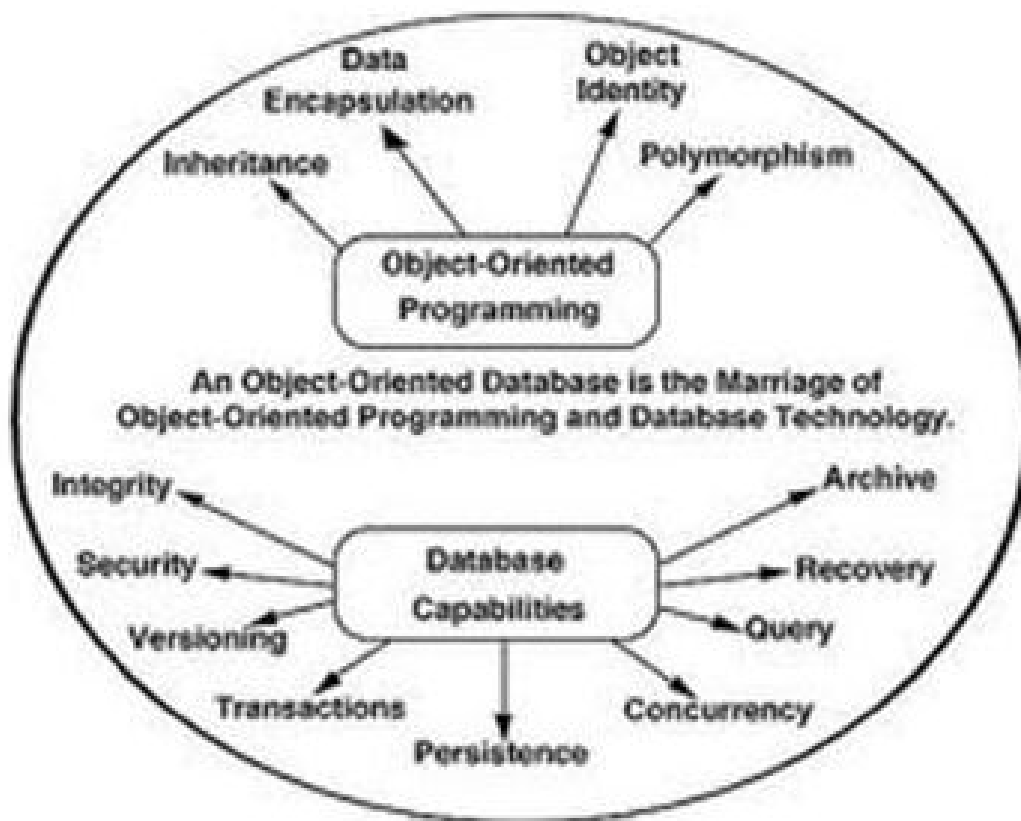


Relational databases are the most popular and widely used databases. Some of the popular DDBMS are Oracle, SQL Server, MySQL, SQLite, and IBM DB2.

Object-Oriented Model

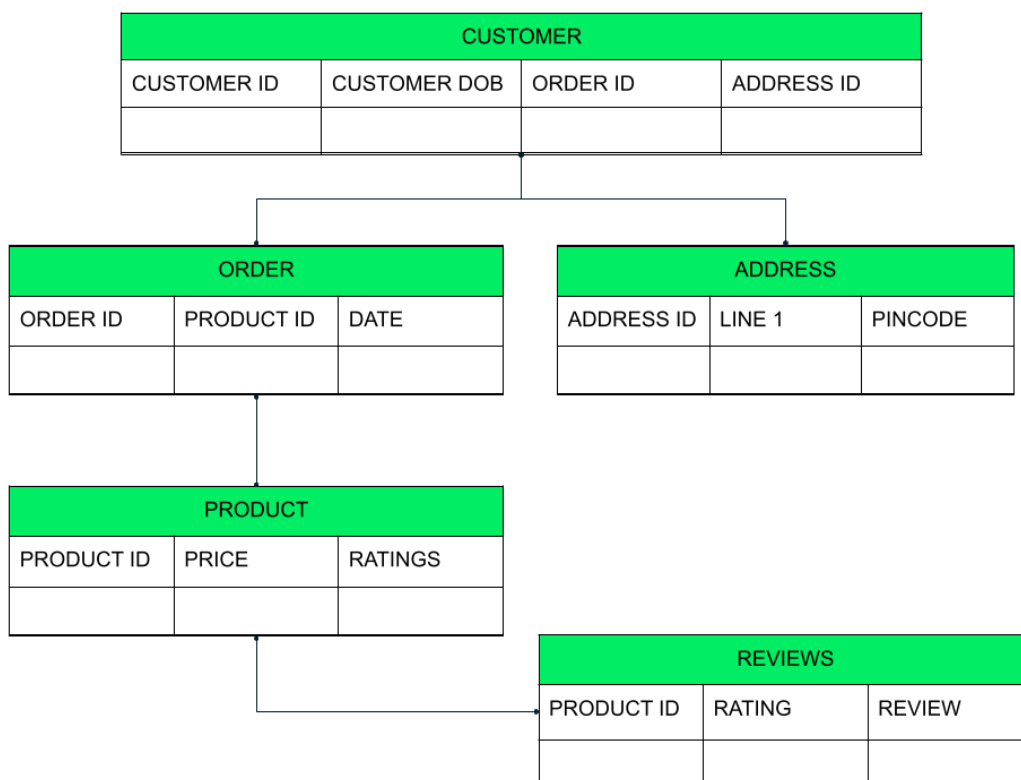
In this Model, we have to discuss the functionality of object-oriented Programming. It takes more than the storage of programming language objects.. provides full-featured database programming capabilities while containing native language compatibility. It adds the database functionality to object programming languages. Applications require less code, use more natural data modeling, and code bases are easier to maintain. Object developers can write complete database applications with a decent amount of additional effort.

The object-oriented database derivation is the integrity of object-oriented programming language systems and consistent systems. The power of object oriented databases comes from the cyclical treatment of both consistent data, as found in databases, and transient data, as found in executing program



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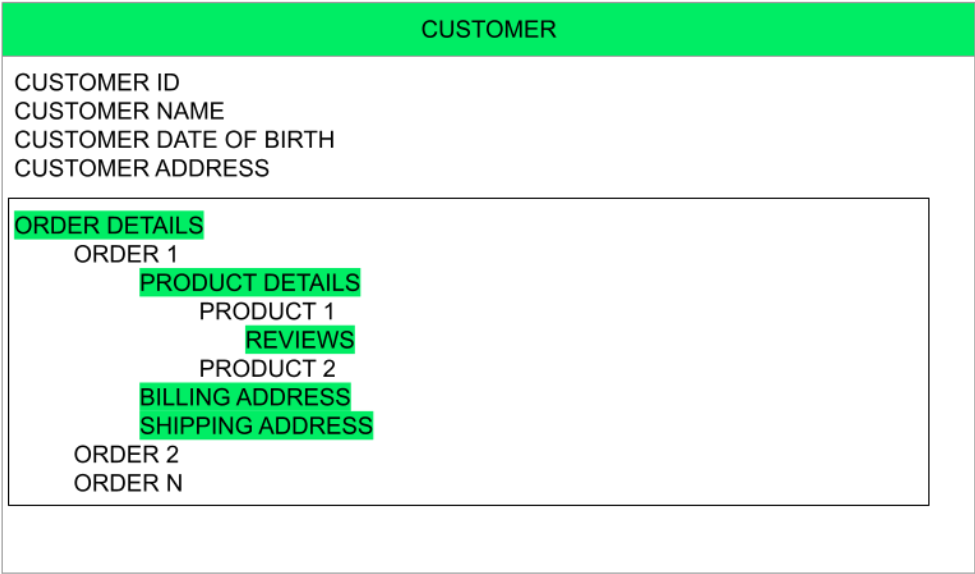
The object-oriented database derivation is the integrity of object-oriented programming language systems and consistent systems. The power of object-oriented databases comes from the cyclical treatment of both consistent data, as found in databases, and transient data, as found in executing program



What is a non-relational database?

A non-relational database, sometimes called [NoSQL](#) (Not Only SQL), is any kind of database that doesn't use the tables, fields, and columns structure data concept from relational databases. Non-relational databases have been designed with the cloud in mind, making them great at horizontal scaling.

Consider the same customer example as above. In this case, however, we are able to view all the data of one customer in a single place as a single document.



Features	Non-Relational	Relational
Availability	High	High
Horizontal Scaling	High	Low
Vertical Scaling	High	High
Data Storage	Optimized for huge data volumes	Medium to large data
Performance	High	Low To Medium
Reliability	Medium	High (Acid)
Complexity	Low	Medium (Joins)
Flexibility	High	Low (Strict-Schema)
Suitability	Suitable For OLAP and OLTP	Suitable For OLTP

XAMPP

- **Apache:** the open source web server Apache is the most widely used server worldwide for delivery of web content. The server application is made available as a free software by the Apache Software Foundation.
- **MySQL/MariaDB:** in MySQL, XAMPP contains one of the most popular relational database management systems in the world. In combination with the web server Apache and the scripting language PHP, MySQL offers data storage for web services. Current XAMPP versions have replaced MySQL with MariaDB (a community-developed fork of the MySQL project, made by the original developers).
- **PHP:** the server-side programming language [PHP](#) enables users to create dynamic websites or applications. PHP can be installed on all platforms and supports a number of diverse database systems.
- **Perl:** the scripting language Perl is used in system administration, web development, and network programming. Like PHP, Perl also enables users to program dynamic web applications.

Installing XAMPP

Our XAMPP tutorial will take you through the installation process for the software package on Windows. If you're using Linux or Mac OS X, then the steps listed below for the installation process may differ.

Step 1: Download

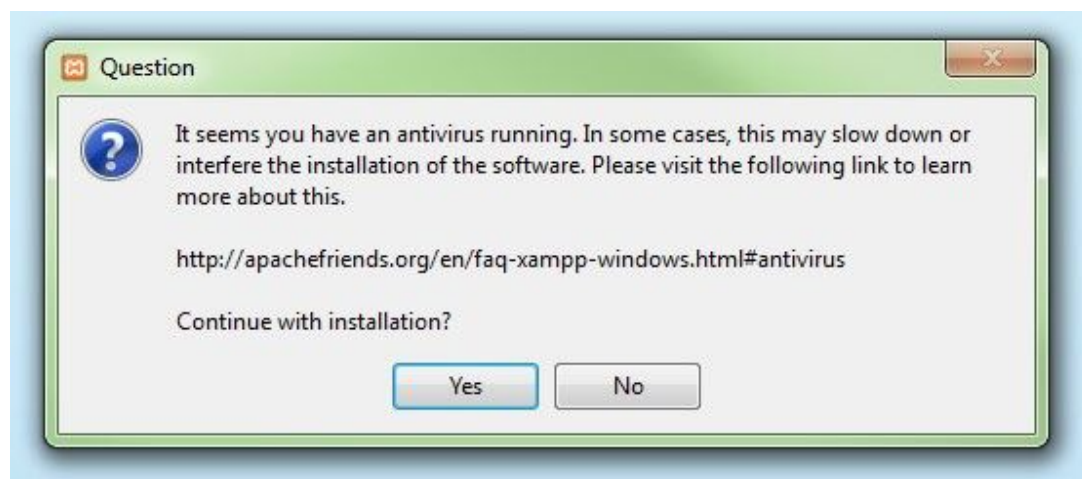
XAMPP is a release made available by the non-profit project Apache Friends. Versions with PHP 5.5, 5.6, or 7 are available for download on the [Apache Friends](#) website.

Step 2: Run .exe file

Once the software bundle has been downloaded, you can start the installation by double clicking on the file with the ending [.exe](#).

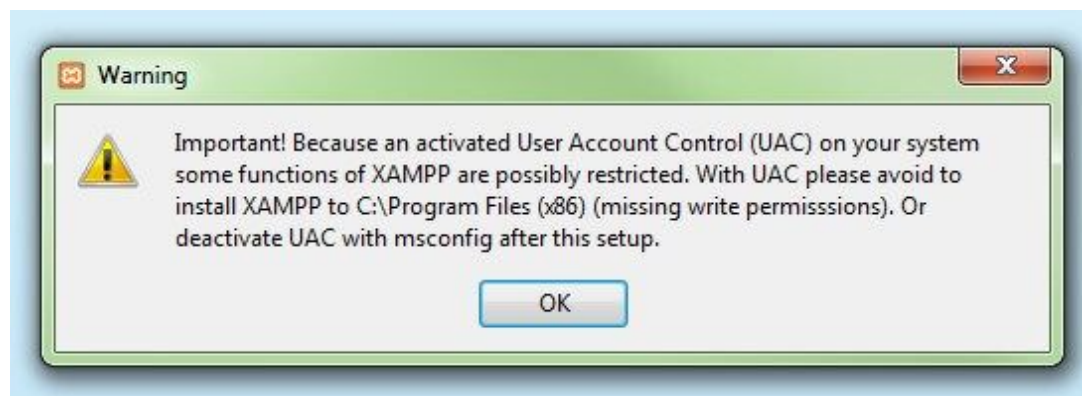
Step 3: Deactivate any antivirus software

Since an active antivirus program can negatively affect the installation process, it's recommended to temporarily pause any antivirus software until XAMPP components have successfully been installed.



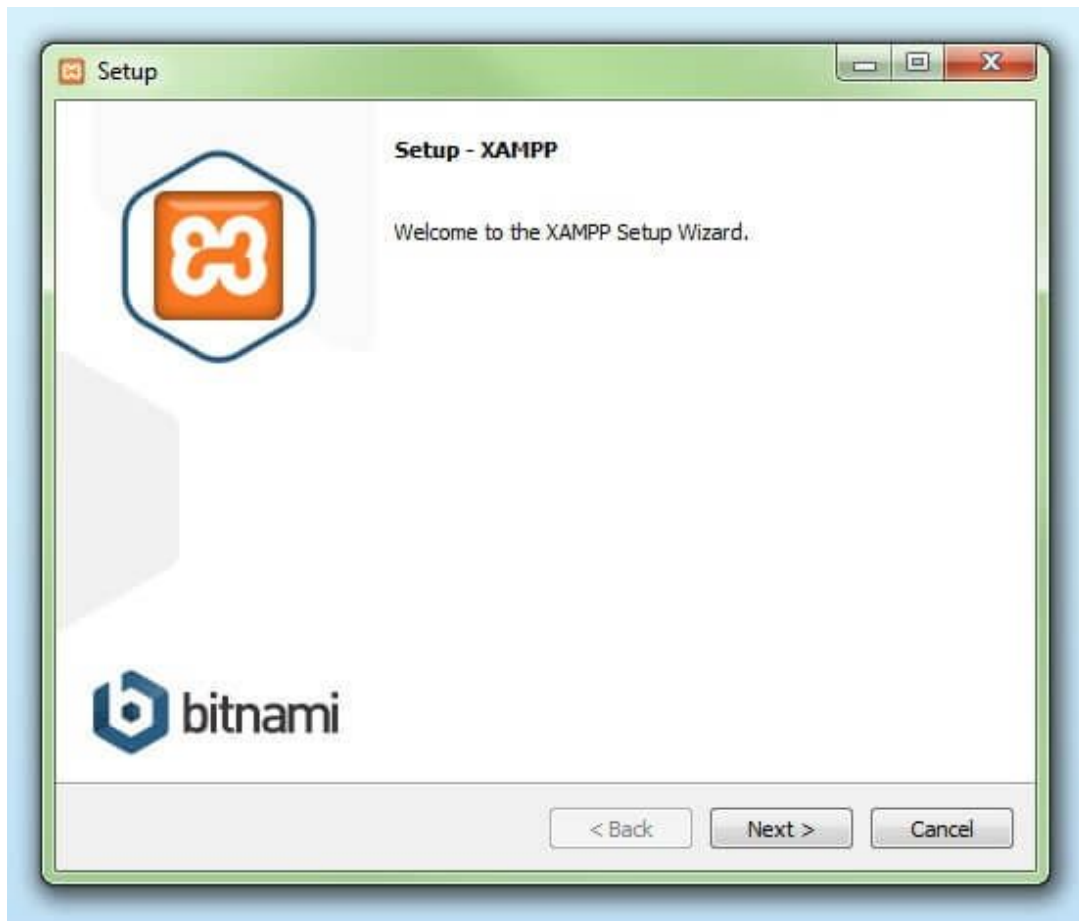
Step 4: Deactivate UAC

User Account Control (UAC) can interfere with the XAMPP installation because it limits writing access to the C: drive, so we recommend you deactivate this too for the duration of the installation process. To find out how to turn off your UAC, head to the [Microsoft Windows support pages](#).



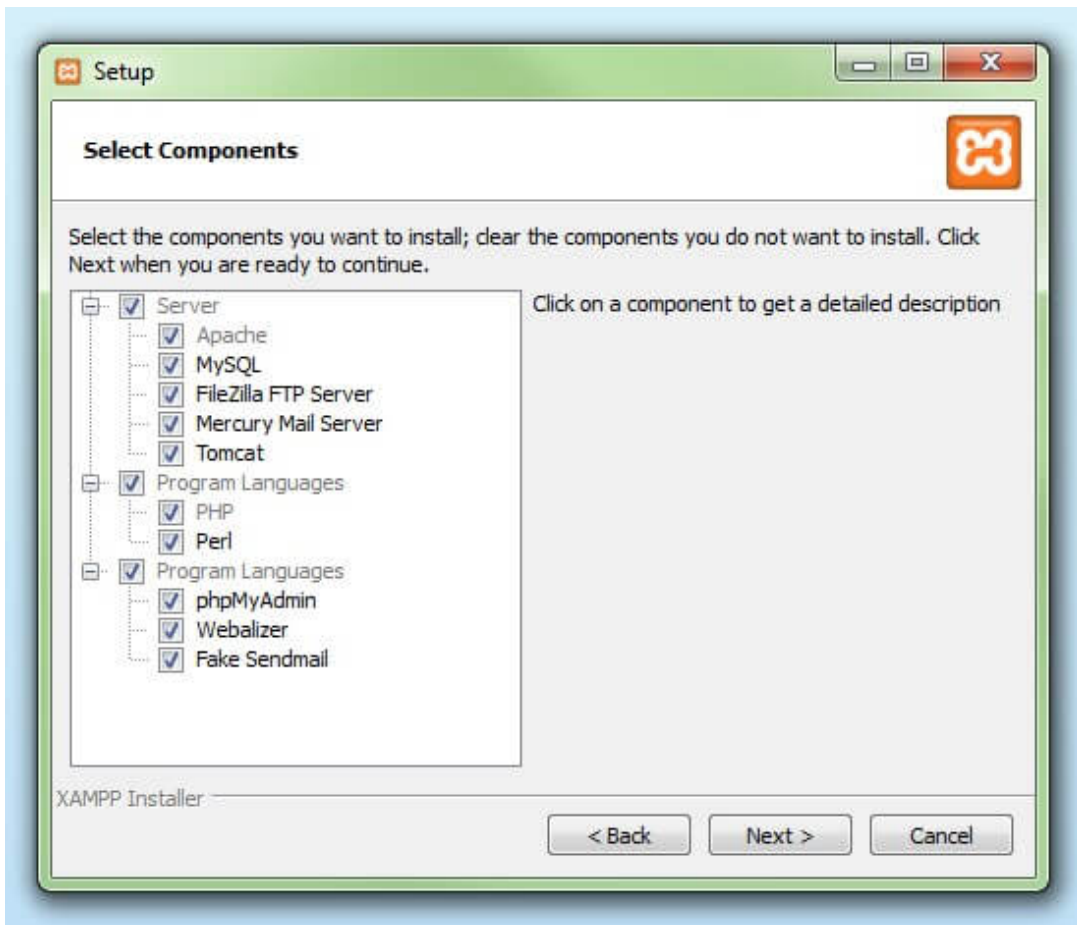
Step 5: Start the setup wizard

After you've opened the .exe file (after deactivating your antivirus program(s) and taken note of the User Account Control, the start screen of the XAMP setup wizard should appear automatically. Click on 'Next' to configure the installation settings.



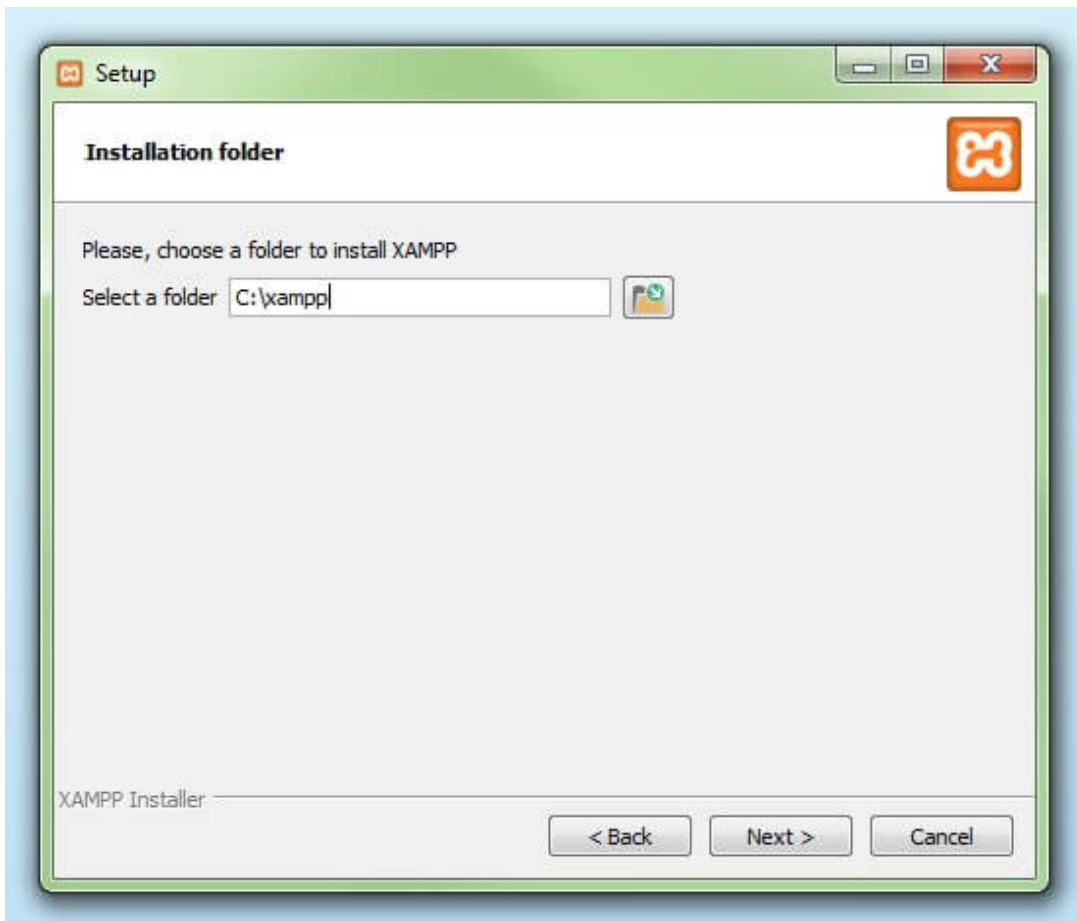
Step 6: Choose software components

Under 'Select Components', you have the option to exclude individual components of the XAMPP software bundle from the installation. But for a full local test server, we recommend you install using the standard setup and all available components. After making your choice, click 'Next'.



Step 7: Choose the installation directory

In this next step, you have the chance to choose where you'd like the XAMPP software packet to be installed. If you opt for the standard setup, then folder with the name XAMPP will be created under C:\ for you. After you've chosen a location, click 'Next'.



Step 8: Start the installation process

Once all the aforementioned preferences have been decided, click to start the installation. The setup wizard will unpack and install the selected components and save them to the designated directory. This process can take several minutes in total. You can follow the progress of this installation by keeping an eye on the green loading bar in the middle of the screen.

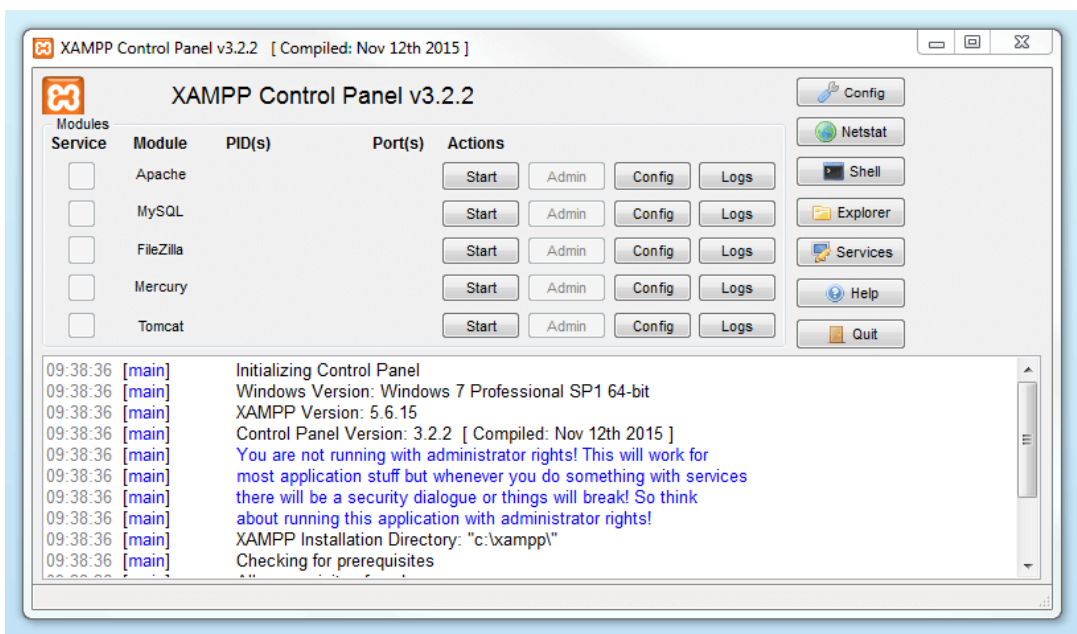


Step 9: Windows Firewall blocking

Your Firewall may interrupt the installation process to block some components of the XAMPP. Use the corresponding check box to enable communication between the Apache server and your private network or work network. Remember that making your XAMPP server available for public networks is recommended.

Step 10: Complete installation

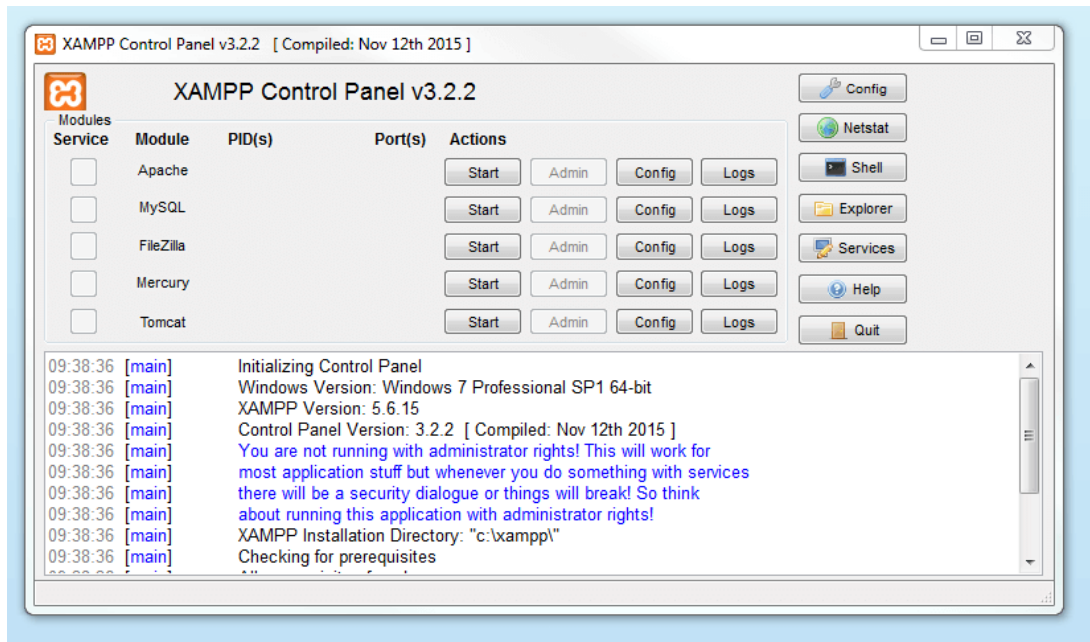
Once all the components are unpacked and installed, you can close the setup wizard by clicking on 'Finish'. Click to tick the corresponding check box and open the XAMPP Control Panel once the installation process is finished.



The XAMPP Control Panel

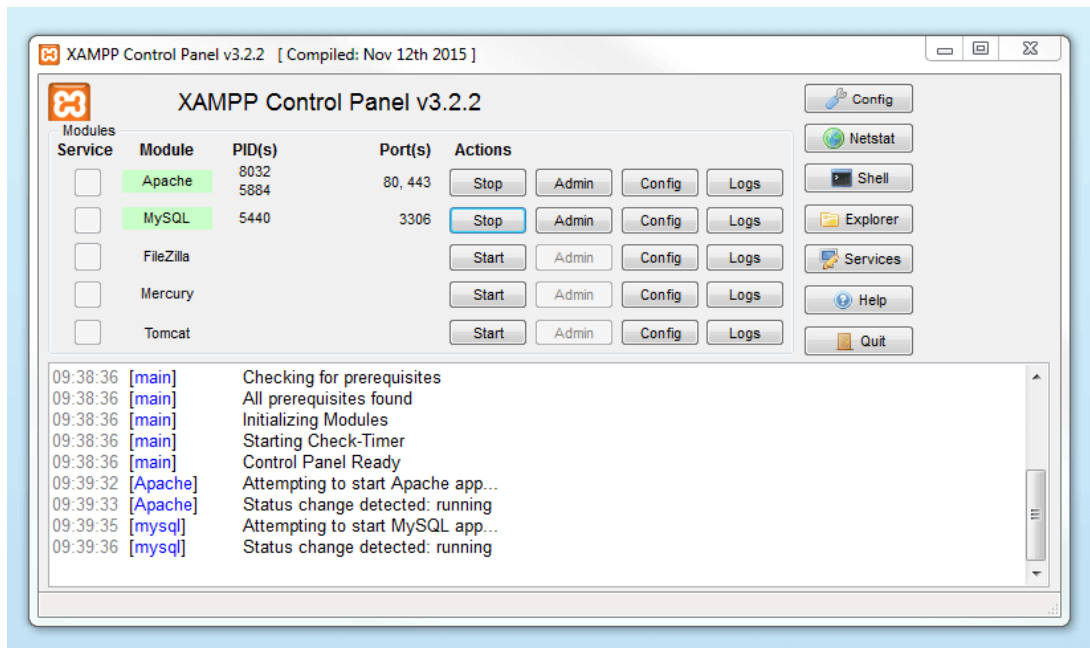
Controls for the individual components of your test server can be reached through the XAMPP Control Panel. **The clear user interface** logs all action and allows you to start or stop individual modules with a single. The XAMPP Control Panel also offers you various other buttons, including:

- **Config:** allows you to configure the XAMPP as well as the individual components
- **Netstat:** shows all running processes on the local computer
- **Shell:** opens a UNIX shell
- **Explorer:** opens the XAMPP folder in Windows Explorer
- **Services:** shows all services currently running in the background
- **Help:** offers links to user forums
- **Quit:** closes the XAMPP Control Panel



Starting modules

Individual modules can be started or stopped on the XAMPP Control Panel through the corresponding buttons under 'Actions'. You can see which modules have been started because their names are highlighted green under the 'Module' title.



If a module can't be started as a result of an error, you'll be informed of this straight away in red font. A **detailed error report** can help you identify the cause of the issue.

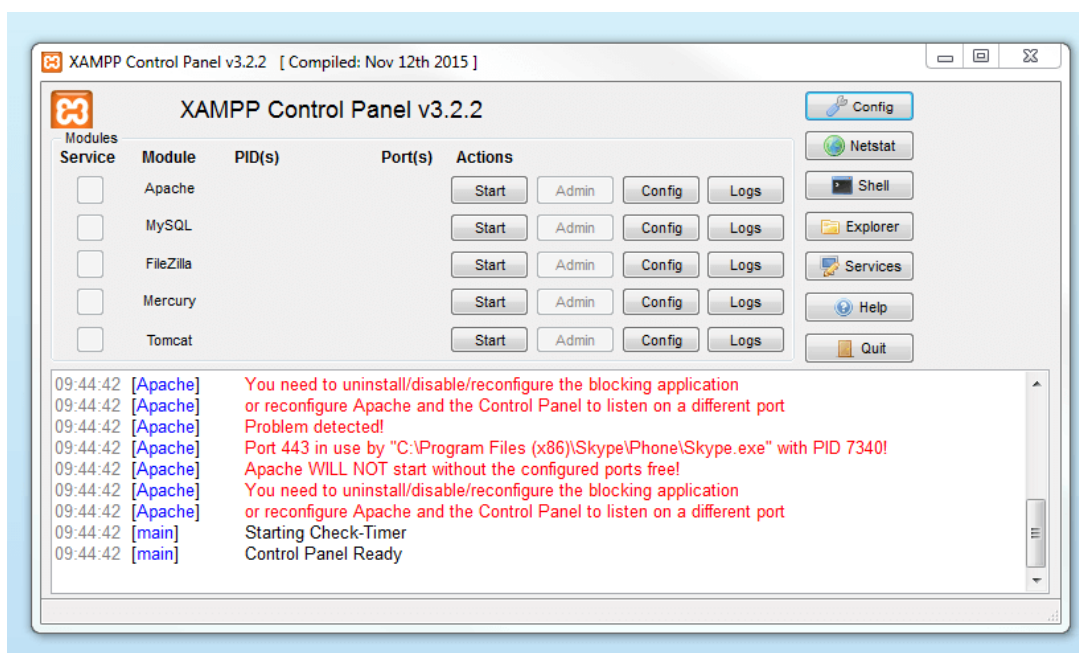
Setting up XAMPP

A common source of error connected with Apache is **blocked ports**. If you're using the standard setup, then XAMPP will assign the web server to port 80 and the SSL port 443. The latter of these particularly is often blocked by other programs. In the example above, it's likely that the Tomcat port being blocked, meaning the web server can't be started. There are three ways to solve this issue:

- **Change the conflicting port:** Let's assume for the sake of example that the instant messenger program Skype is blocking SSL port 443 (this is a common problem). One way to deal with this issue is to change Skype's port settings. To do this, open the program and navigate via 'Actions', 'Options', and 'Advanced', until you reach the 'Connections' menu. You should find a box checked to allow Skype access to ports 80 and 443. Deselect this checkbox now.
- **Change the XAMPP module port settings:** Click the Config button for the module in question and open the files *httpd.conf* and *httpd-ssl.conf*. Replace port number 80 in *httpd.conf* and port number 443 in *httpd-ssl.conf* with any free ports, before saving the file data. Now click on the general Config button on the right-hand side and select 'Services and Ports Settings'. Customize the ports for the module server to reflect the changes in the *conf* files.

End the conflicting program:

The simplest way to avoid port conflicts in the short term is to end the conflicting program (Skype in this case). If you restart Skype after your XAMPP module servers are already running, it will select a different port and your issue will be resolved.



Module administration

You have an 'Admin' option located on the Control Panel for every module in your XAMPP.

- Click on the Admin button of your Apache server to go to the web address of your web server. The Control Panel will now start in your standard browser, and you'll be led to the **dashboard of your XAMPP's local host**. The dashboard features numerous links to websites for useful information as well as the open source project [BitNami](#), which offers you many different applications for your XAMPP, like WordPress or other content management systems. Alternatively, you can reach the dashboard through *localhost/dashboard/*.



XAMPP Apache + MariaDB + PHP + Perl

Welcome to XAMPP for Windows 5.6.15

You have successfully installed XAMPP on this system! Now you can start using Apache, MariaDB, PHP and other components. You can find more info in the FAQs section or check the HOW-TO Guides for getting started with PHP applications.

Start the XAMPP Control Panel to check the server status.

Community

XAMPP has been around for more than 10 years – there is a huge community behind it. You can get involved by joining our [Forums](#), adding yourself to the [Mailing List](#), and liking us on [Facebook](#), following our exploits on [Twitter](#), or adding us to your [Google+](#) circles.

Contribute to XAMPP translation at translate.apachefriends.org.

Can you help translate XAMPP for other community members? We need your help to translate XAMPP into different languages. We have set up a site, translate.apachefriends.org, where users can contribute translations.

Install applications on XAMPP using Bitnami

Apache Friends and Bitnami are cooperating to make dozens of open source applications available on XAMPP, for free. Bitnami-packaged applications include Wordpress, Drupal, Joomla! and dozens of others and can be deployed with one-click installers. Visit the [Bitnami XAMPP](#) page for details on the currently available apps.

[Blog](#)[Privacy Policy](#)CDN provided by [fastly](#)

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You can use the Admin button of your database module to open phpMyAdmin. Here, you can manage the databases of your web projects that you're testing on your XAMPP. Alternatively, you can reach the administration section of your MySQL database via localhost/phpmyadmin/

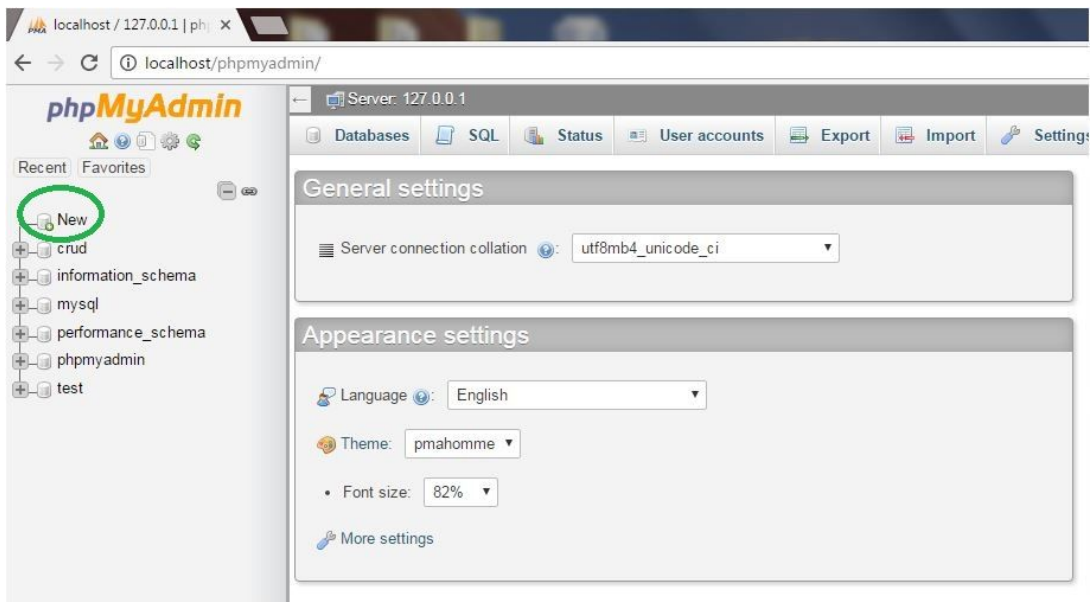
The screenshot shows the phpMyAdmin web interface. On the left is a sidebar with a tree view of databases: 'information_schema', 'mysql', 'performance_schema', 'phpmyadmin', and 'test'. The main content area is divided into several panels. The 'General settings' panel shows 'Server connection collation' set to 'utf8mb4_unicode_ci'. The 'Appearance settings' panel shows 'Language' set to 'English (United Kingdom)', 'Theme' set to 'pmahomme', and 'Font size' set to '82%'. The 'Database server' panel lists server details: 'Server: 127.0.0.1 via TCP/IP', 'Server type: MariaDB', 'Server version: 10.1.10-MariaDB - mariadb.org binary distribution', 'Protocol version: 10', 'User: root@localhost', and 'Server charset: UTF-8 Unicode (utf8)'. The 'Web server' panel lists: 'Apache/2.4.17 (Win32) OpenSSL/1.0.2d PHP/5.6.15', 'Database client version: libmysql - mysqlnd 5.0.11-dev - 20120503 - Sld: 3c688b6bbc30d36af3ac34fdd4b7b5b787fe5555 \$', 'PHP extension: mysqli', and 'PHP version: 5.6.15'. The 'phpMyAdmin' panel shows version information: 'Version information: 4.5.1, latest stable version: 4.7.0', and links to 'Documentation', 'Wiki', 'Official Homepage', 'Contribute', 'Get support', and 'List of changes'.

Basic SQL

Step 1

First of all start your XAMPP or WAMPP server. Then go to the link bar of your browser and type

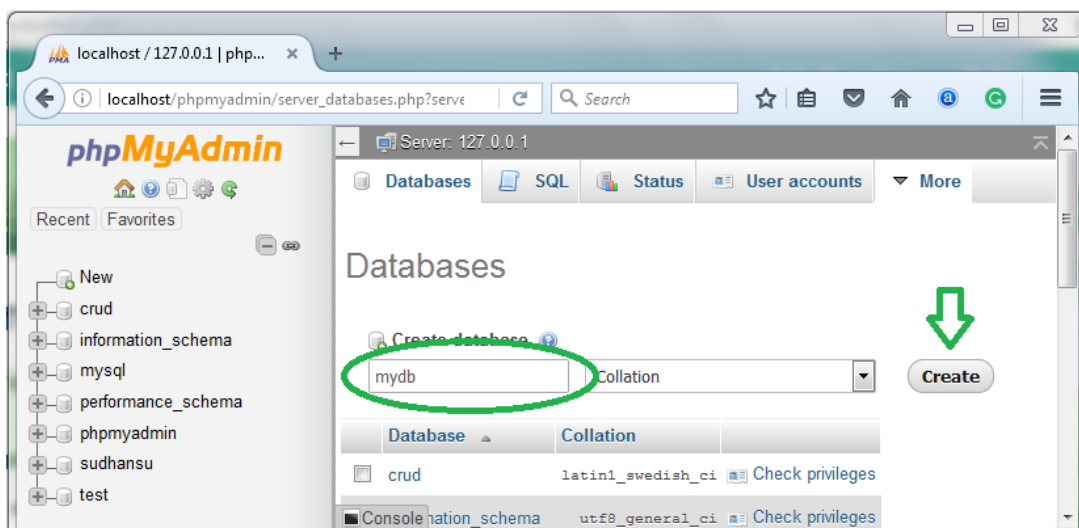
localhost/phpmyadmin and click enter. Then you find a page like this



Then click on the new button that is available on the sidebar of that page.

Step 2

After click on the new button you find a page like that



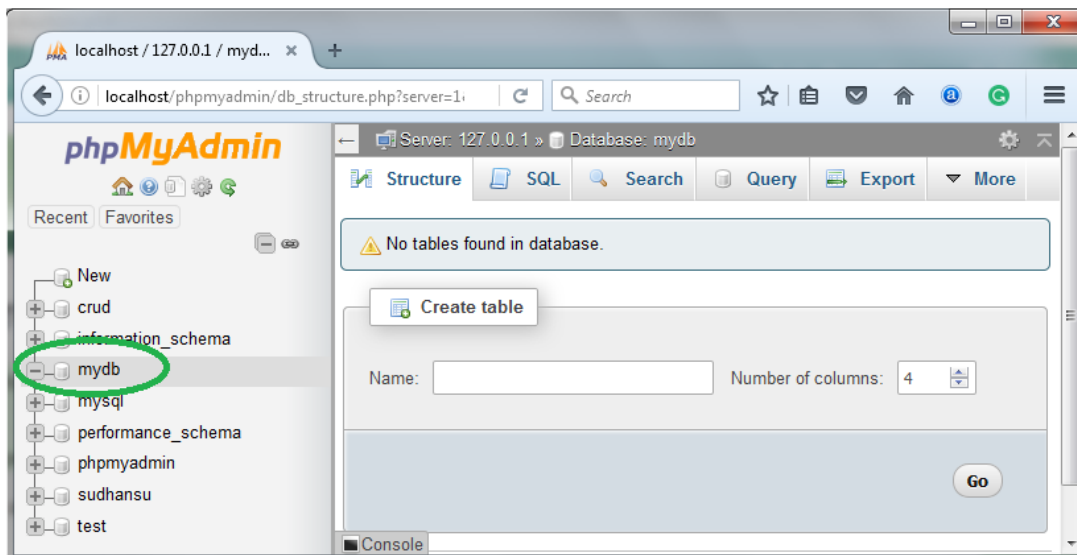
Here put a name of your own choice on the create database field and click on the **create** button and you get a successful message on the screen then you create database successfully and will appear in the database list.

Now we are going to see how to **create a table in PhpMyAdmin** under the database that we have created currently.

Note: You can't create table if you not have a database so first create database.

Step 3

Click on the database name in which under you create a table. After click on the database name you find a page like that.



Here you have two options to create a table: the first one is using **structure** and the second one is using **SQL**. If you want to create a table in the structure option, then put your table name in the create table name field and choose columns and click on the go button.

Now we are going to see how to **create a table in PhpMyAdmin** under the database that I have created currently.

Note: You can't create a table if you don't have a database, so first create a database.

Step 4

To create new tables inside a database, open the phpMyAdmin tool, click on the **Databases** tab and click on the name of the desired database.



On the new page that opens, you will see a list of all the current tables inside the database and a section named 'Create table'. In that section, in the 'Name' field, input the desired new name of the table and then select the number of columns that the table should have via the 'Number of columns' drop-down. When ready, click on 'Go' to create the table.



On the next page, you can configure the structure of the columns in the new table. The different fields there are:

- **Name** – The name of the column;
- **Type** – The type of data, which will be stored in the corresponding column. More details about the possible choices can be found in the official [MySQL Data Types](#) documentation;
- **Length/Values** – The length of the field;
- **Default** – With this option, you can specify if the fields in the column would have a default value. This is useful when you want to have timestamps for the entries in each row;
- **Collation** – The data collation for each of the fields;
- **Attributes** – assign any special attributes to the fields;

- **Null** – Define whether the field value can be *NULL*. More about the *NULL* value can be found in the [MySQL documentation](#);
- **Index** – Set the Index of the row. More information about the MySQL column indexes can be found in the [MySQL documentation](#);
- **AI** – Short for Auto Increment. If this option is enabled then the values in the fields of the column will be auto incremented;
- **Comments** – Here add comments, which will be included in the database SQL code.

After you configured the different columns, specify the **Collation** and **Engine** of the new table via their respective drop-downs.
When ready, click on **Save** to create the new table.

Structure

Attributes	Null	Index	AI	Comments	Virtuality	Move column
<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Preview SQL

Save

Step 5

To add records inside a database table, open the table with phpMyAdmin and click on the **Insert** tab.

Server: localhost » Database: dbuz5kdk24xzd » Table: wp_commentmeta

Browse

Structure

SQL

Search

Insert

Export

Import

Operations

Triggers

Column	Type	Function	Null	Value
meta_id	bigint(20) unsigned	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
comment_id	bigint(20) unsigned	<input type="text"/>	<input type="checkbox"/>	0
meta_key	varchar(255)	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="text"/>
meta_value	longtext	<input type="text"/>	<input checked="" type="checkbox"/>	<div></div>

Go

Enter the desired data in the corresponding fields and click on **Go** to store it. You can see the newly inserted record by clicking on the **Browse** tab.

Conclusion

That's it guys. In this module we looked at all the basics about what backend is what databases are and also setup our SQL environment. In ne modules we will cover SQL CRUD operations and much more!

Interview Questions

What is DBMS?

DBMS is a collection of programs that facilitates users to create and maintain a database. In other words, DBMS provides us an interface or tool for performing different operations such as the creation of a database, inserting data into it, deleting data from it, updating the data, etc. DBMS is a software in which data is stored in a more secure way as compared to the file-based system.

What is RDBMS?

RDBMS stands for Relational Database Management Systems. It is used to maintain the data records and indices in tables. RDBMS is the form of DBMS which uses the structure to identify and access data concerning the other piece of data in the database. RDBMS is the system that enables you to perform different operations such as- update, insert, delete, manipulate and administer a relational database with minimal difficulties. Most of the time RDBMS use SQL language because it is easily understandable and is used for often.

What are NoSQL Databases?

Non-Relational Databases are also called No-SQL databases, that doesn't require any table, fields, or records. This type of database has existed since the 1960s, but the term No-SQL was coined in the late 90's and early 21'st century.

NoSQL databases are completely different from SQL databases and work differently. It has to deal with semi-structured or unstructured data. Rather than containing tables, it consists of files within various folders. They can possess any kind of data, whether JSON, XML, etc. So, creating and managing data in NoSQL is easy and faster.

Facebook(Meta) is a very popular example of using NoSQL databases.

There are various types of Non-relational databases like:

- Documents Databases.
- Graph Databases.
- Wide Column Databases.
- Key-value Databases.

Thank You !