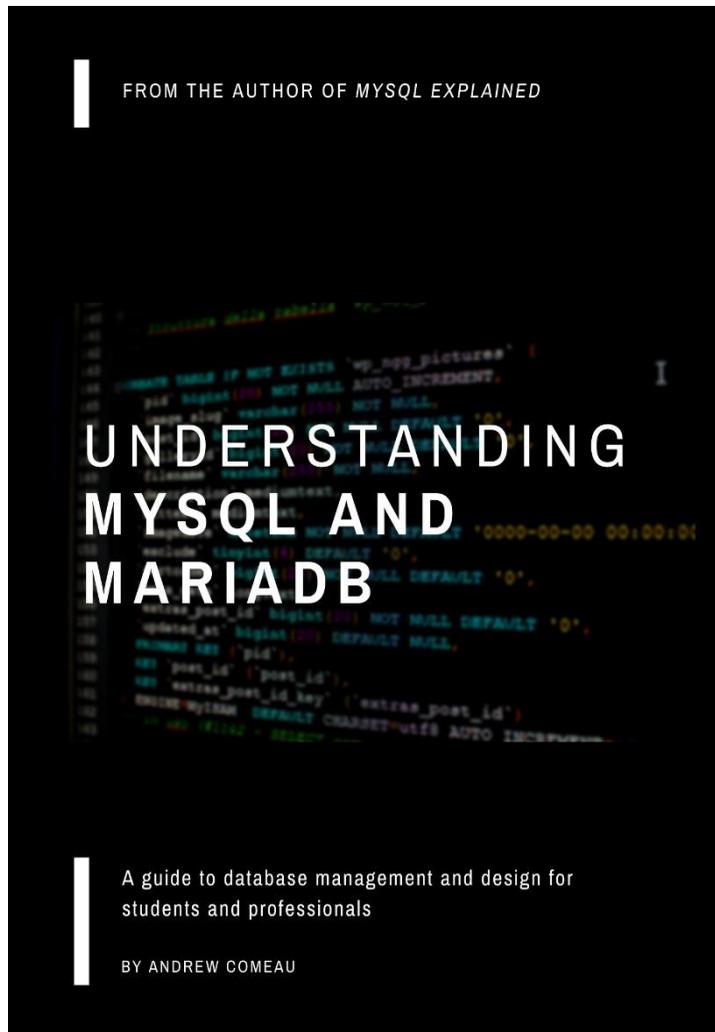


The following is a **sample chapter** from the upcoming *Understanding MySQL and MariaDB*, coming in 2020 from Andrew Comeau and Comeau Software Solutions.



If you enjoy this preview, please check back at [ComeauSoftware.com](https://www.comeausoftware.com) for more details and updates on anticipated release dates.

<https://www.comeausoftware.com/understanding-mysql-and-mariadb/>

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Installing MariaDB with XAMPP

Using MariaDB as part of a suite of web development tools

In This Lesson ...

- Understand the purpose of an Apache - MySQL - PHP (AMP) software stack
- Recognize the variations in AMP stack packages available for download
- Install an AMP stack for use in developing databases and hosting web applications

What is an AMP Stack?

As powerful as MySQL is, it's rarely used on its own. Most developers will want additional tools such as programming languages and interface tools to escape the tedium of working on the command line all the time. This is one of the reasons that MySQL is often used in combination with other tools that will enable the design of user-friendly sites.

This means either creating or downloading a ready-made **AMP stack**. AMP usually stands for "Apache-MySQL-PHP" although the P might also stand for Perl or Python. In general, it simply refers to one or more programming languages that are included with the software stack.

An AMP stack is called a stack because each tool within it addresses a different aspect of database and web development and helps support the others.

- **Apache** is a **web server** - software that can respond to requests for pages and other content within a website. These requests can come over the Internet or you can have a local server as part of your AMP stack that will enable you to test the pages you're developing on your own machine.
- **MySQL** is the database software within the stack; it stores whatever data the website uses. In many websites, this includes the content of the pages themselves.

- **PHP** is a programming language that is an essential part of most websites. Web pages use it to communicate with the database, enable user-interaction and even generate entire pages as needed.

A fourth letter often indicates the operating system on which the stack is installed; a **LAMP** would be an AMP stack installed on Linux. You might also see MAMPs (Macs) or WAMPs (Windows).

Microsoft Windows has its own web server, *Internet Information Services (IIS)*. You could use it to replace Apache in the stack which would lead to the unfortunate acronym WIMP. If you then used Microsoft SQL Server instead of MySQL, you might call it a WISP stack, but few people would know what you were talking about.

By using MySQL as part of an AMP stack, you have a complete development environment in which to explore its capabilities. The pre-configured stack that we'll be installing in this lesson also includes *phpMyAdmin*, a graphical environment for managing MySQL databases which will save you quite a bit of time over using the command line.

Choosing an AMP Stack

You could create your own AMP stack from scratch, downloading each component and doing all the configuration. When you're working in a professional environment and supporting live production sites or apps, it's a good idea for the sake of having full understanding and control of the components involved. For development or educational use, however, it's much easier to download and install a ready-made AMP stack that has everything pre-configured.

Pre-configured AMP stacks often include additional tools such as graphical interfaces and control panels that make it easier to work with them. They also include the latest versions of their components and have been tested for any configuration issues which saves you some time if you just need a simple development environment to work in. Often, they can also be installed on flash drives for easy portability between machines.

There are many of these available and all of them have their own unique features. The ones listed here are all free to download and are licensed for

free use under the General Public License (GPL).

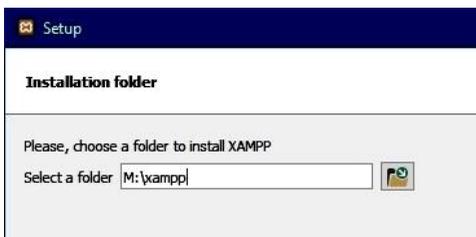
- **EasyPHP** is a popular, open source AMP stack that includes both a development environment and a production version you can use to actually host your site over the Internet from your computer.
- **WampServer** is a development server by Romain Bourdon for the Windows operating system.
- **XAMPP** is a development environment for multiple operating systems (**cross-platform**) which includes both PHP and the Perl programming language.

For this book, I will be using *XAMPP* to demonstrate the installation and use of an AMP stack. I've found XAMPP to be very simple and hassle-free and it's free to download like the others I listed. XAMPP currently includes MariaDB as its database. The main page on ApacheFriends.org prominently features the download links for Windows and other operating systems which will take you to the download page where your download should start automatically.

Windows Installation

Installation on Windows is fairly straightforward. The installer download is just over 145 MB as of this writing and is packaged in an EXE file that you can run directly from your computer.

When you run the installation program, it will take you through a series of option screens where you can choose various settings for the program. For the most part, you'll be fine selecting the default settings. The one exception might be the installation folder; the default setting is `C:\xampp`.



XAMPP can be run from a flash drive by changing the installation folder.

You can change this to any path that's most convenient for you. If you're moving around between different machines, you can install XAMPP on a flash drive so that you can take it with you. In this case, you would change the drive letter as needed.

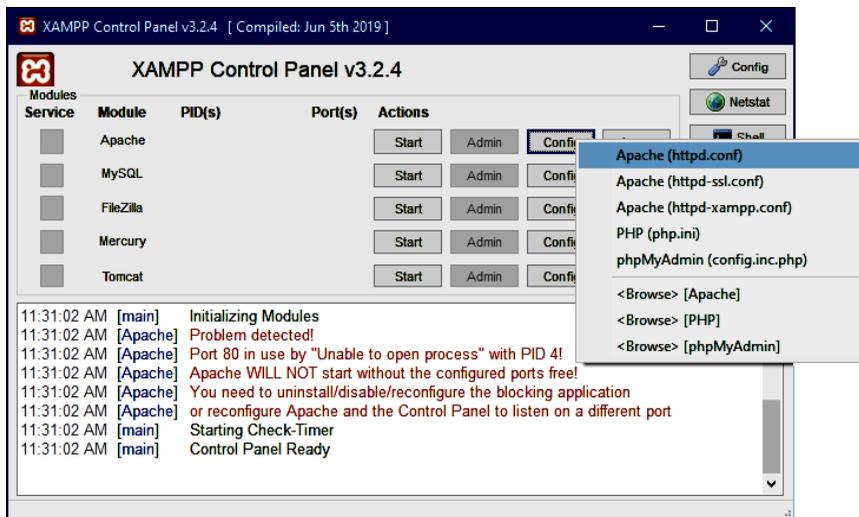
If you do decide to install XAMPP on a flash drive, remember that the **drive letter for the flash drive will need to be the same on each computer** where you run XAMPP or you will get errors when running the program. You can change the drive letter of a flash drive in the Windows Drive Management settings and that drive will retain the letter on that computer the next time you use it.

If you would like to see more detail on installing XAMPP, you can watch a video of the process titled *Create a Local WordPress Site in XAMPP* which also shows some of the configuration and how to install WordPress, a popular website design environment and content management system, inside your XAMPP installation. The link to this video is shown on this book's official page on ComeauSoftware.com and in the "For More Information" section at the end of this lesson.

Once the installation is finished, you can run XAMPP by opening the XAMPP folder and running `xampp-control.exe`. XAMPP runs best in Administrator Mode and you can set this under the file's Properties settings or by right-clicking on the file and selecting Run as Administrator each time. This will bring up the control panel shown below.

Depending on your system, XAMPP might run without any issues. Sometimes, however, you might need to make some configuration changes in order to get things running.

MySQL and Apache both use **communication ports** in order to send and receive message as needed by the software. These ports are actually addresses within the operating system that are represented by a number such as 80 for web communication and 3306 for database software like MySQL. XAMPP will try to use these ports for MySQL and Apache. If one of them is being used by another process, the main screen will look something like the one shown below.



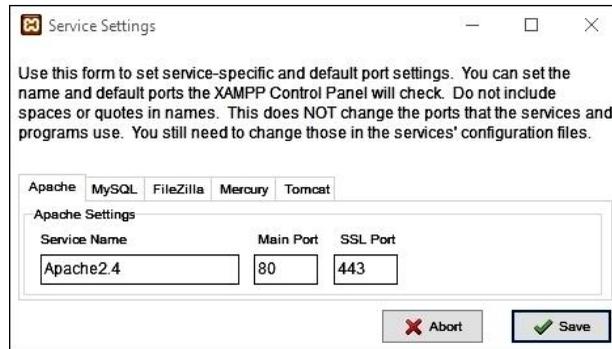
If one of the ports XAMPP requires is in use, you will need to change the configuration file.

In this example, Port 80 is in use so Apache cannot start. In the screenshot above, you can see that the **Config** button for Apache has been pressed and this has brought up a menu where the option to edit Apache's `httpd.conf` configuration file is selected. This will open the configuration file which contains an entry like the one shown below.

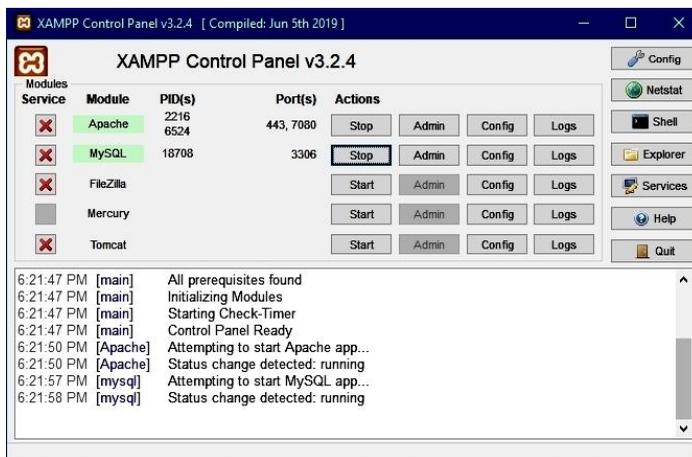
```
#
# Listen: Allows you to bind Apache to specific IP addresses and/or
# ports, instead of the default. See also the <VirtualHost>
# directive.
#
# Change this to Listen on specific IP addresses as shown below to
# prevent Apache from glomming onto all bound IP addresses.
#
#Listen 12.34.56.78:80
Listen 7080
..
```

All the lines that start with the pound sign are comments; the important one is `Listen 7080`. I've already changed this to a new port setting which will, hopefully, be unused. I typically use port 7080 when installing XAMPP and haven't had any conflicts. Once you change the port number, you will need to save the file using **CTRL-S** and close it. There is one more step.

XAMPP stores the port setting in a second location that's accessible through the XAMPP Control Panel shown in the above screenshot. In the top-right corner of the Control Panel, click on the **Config** button and you will see the following screen.



On this screen, you will need to change the Main Port setting to the same port number you used in the `httpd.conf` file and click **Save**. Notice that there's also a tab for MySQL; in the less likely event that MySQL finds its port already in use, you'll need to change it there *and* in the `my.ini` file. I usually change it to 3307 or 3308 and that resolves the issue.



Once everything is setup, you should be able to open XAMPP and start both Apache and MySQL (MariaDB) as shown in the screenshot above. You can start and stop the Apache and MySQL services at any time by clicking on the Actions button next to the Module name as shown in the above screenshot.

The Windows version of XAMPP stays resident even if you close the XAMPP Control Panel and maintains a control icon in the Windows System Tray (next to the Clock on your Task Bar). You will need to explicitly quit the app using the button on the Control Panel in order to shut it down. Apache and MySQL must also be explicitly stopped or they will remain running even if the XAMPP Control Panel is shut down.

Linux Installation

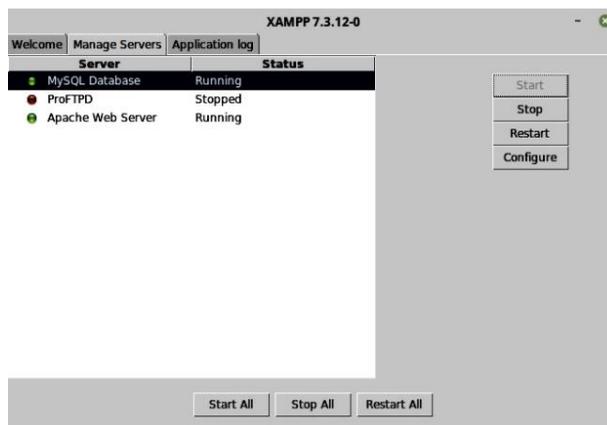
A Linux installer file is also available from the ApacheFriends.org site and the installation is as fast as, if not faster than, the Windows installation. For my testing, I used Linux Mint 19.1 which is based on Ubuntu Linux.

In the Linux Terminal, you can start the installation with just three lines. Substitute the name of your downloaded file for the one in the lines below.

```
$ cd /home/<account>/Downloads
$ chmod +x xampp-linux-x64-7.3.12-0-installer.run
$ sudo ./xampp-linux-x64-7.3.12-0-installer.run
```

The `CHMOD` command enables the `.RUN` file to be executed before the next line runs it using the `superuser-do` command which provides root user access for carrying out the operation.

The program will be installed in the `\opt\lampp` directory and the launcher is named `manager-linux-x64.run`. You will need to open the folder with root access in order to execute the launcher.



XAMPP for Linux - Main screen

The screenshot above shows the main screen in the Linux version of XAMPP. It's quite a bit simpler than the Windows version and has fewer applications - just MySQL, Apache and the *ProFTPD* FTP server.

if you close the XAMPP Control Panel in Linux, it will exit the application but leave the servers in whatever state you had them. You will need to restart the control panel to access the servers again.

Now You Know ...

After completing this lesson and an installation of XAMPP, you should have a basic understanding of the purpose and installation of an AMP software stack. You should also have a greater perspective on the selection of tools that is available to software developers. This knowledge is important for your ability to find, evaluate and implement these tools in your daily work as a developer. The use of a pre-packaged AMP stack is also useful in testing and informal projects and can provide you with a basis of comparison when working with production AMP environments.

Taking it Further

For more experience, take some time to check out other pre-packaged AMP stacks, including EasyPHP and WAMPP. Compare the features and supported operating systems. Installing and running multiple AMPs simultaneously will probably lead to conflicts in the ports being referenced. However, they can be run one at a time and getting two or three different AMP systems to work on your computer would be valuable experience. You might also find that you prefer a different AMP stack than the one demonstrated in this lesson.

Testing Your Knowledge

1. Once you are comfortable with your own understanding of the subject, explain an AMP stack and software stacks in general as you would explain it to someone with no knowledge of databases or web servers.
2. Besides PHP, what are the other programming languages that might be included as part of an AMP stack?
3. In what situation would you prefer to manually configure an AMP environment rather than using a pre-packaged AMP stack?
4. True or False - XAMPP and other AMP stacks can be installed on removeable drives.
5. What is the purpose of a software communication port on the

computer?

6. What are the default communication ports used by Apache and MySQL?
7. What does the **sudo** command do in Linux?

Speaking the Language

Usage

Whenever using acronyms such as LAMP or WAMP, it's best to include the word "stack" for clarification. You might also hear them referred to as "systems" or "environments".

Terms to Understand

AMP Stack	MySQL
Apache	PHP
Communication Port	WAMP
LAMP	Web Server
MAMP	

For More Information

Creating a Local WordPress Site in XAMPP (Video)

<https://youtu.be/46T39i14YSk>

This video demonstrates how to install a XAMPP stack and then create a WordPress site that you can run on your local computer.

EasyPHP - <https://www.easyphp.org/>

WampServer - <http://www.wampserver.com/en/>

XAMPP - <https://www.apachefriends.org/index.html>

GNU General Public License

<https://www.gnu.org/licenses/gpl-3.0.html>

Answers to Test Questions

1. The ability to patiently explain technical concepts to those who have less experience and understanding than you is an important part of working in the I.T. field and a valuable exercise for your own education. Throughout this book, you will see questions that challenge you to put various technical concepts in laymen's terms. It's important to avoid simple repetition of the technical terms you've learned and express the ideas in ways that others can relate to.
2. The Perl and Python programming languages might also be included in an AMP stack, but PHP is the predominant choice because it is so universally used.
3. When designing an AMP stack for a professional environment where actual business-related apps will be hosted, you're more likely to manually configure the components to ensure control over the system. However, some pre-configured AMP stacks are advertised as "production-ready".
4. True. XAMPP and other AMP software bundles can be installed on flash drives or other external drives. If the software is being moved between machines, it's important to ensure that the drive has the same drive letter on each machine.
5. Software communication ports, also called TCP ports, are used to listen for and respond to requests over the network and other messages.
6. Apache listens to port 80 on the computer which is the port used for HTTP (web) traffic. MySQL and other network-based database software uses port 3306.
7. The sudo command is used to grant root user (administrator) access for a single command in the Linux terminal environment.