

LEMP Stack Deep Dive

☰ Course Navigation

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6



Exam Preparation



Linux Academy

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Back to Main

Select the items below:

About the Course / Prerequisites

About the Training Architect

Big State College - A Case Study

Next

Course Introduction

Section 1

Getting Started

**About the Course /
Prerequisites**

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

About the Course / Prerequisites

Next

Back to Main

Course Introduction

Section 1

Getting Started

**About the Course /
Prerequisites**

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

[Back to Main](#)

LEMP Stack Deep Dive - Objectives

- What is the LEMP stack? How does it compare to a LAMP stack?
- How do you install a LEMP stack on RHEL / Ubuntu Linux?
 - How do you configure NGINX?
 - How do you configure and secure MariaDB?
- How do you deploy PHP applications using php-fpm?
 - Deploy phpMyAdmin on Ubuntu Linux

[Back](#)

[Next](#)

Course Introduction

Section 1

Getting Started

**About the Course /
Prerequisites**

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

[Back to Main](#)

LEMP Stack Deep Dive - Prerequisites

- Beginner to intermediate Linux command-line skills
- Experience with configuring web servers on Linux is a plus
- Experience with web development is a plus, but not required
 - No DBA skills required
 - No programming skills required

[Back](#)

[Next](#)

Course Introduction

Section 1

Getting Started

**About the Course /
Prerequisites**

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

LEMP Stack Deep Dive - Labs

- Install LEMP Stack on RHEL / Ubuntu Linux
- Basic Configuration of NGINX
- Generate SSL Certificates
- Advanced Configuration of NGINX
- Customize Logging in NGINX
- Configure and Secure MariaDB
- Configure php-fpm
- Deploy phpMyAdmin

[Back](#)

[Next](#)

[Back to Main](#)

Course Introduction

Section 1

Getting Started

**About the Course /
Prerequisites**

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

LEMP Stack Deep Dive

LET'S GO!

Back

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

**About the Training
Architect**

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

About the Training Architect

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites**About the Training
Architect**Big State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Tom Dean

Linux Training Architect

Over 20 years experience in Information Technology

- Focus on Linux / UNIX
- Traditional and virtualized infrastructure
- Managed teams and projects
- Exposure to many industries / environments
- Have worked with Linux since 1997
- Focus has been on RedHat distributions

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites**About the Training
Architect**Big State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Tom Dean

Linux Training Architect

Started on Apple IIs in the early 1980s:

- Programming in BASIC
- Hacking in general

Purdue University graduate:

- First exposure to UNIX on Sequent 386-based systems
- First exposure to the Internet (before WWW was widespread)

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Tom Dean

Linux Training Architect

From the Chicago area
Enjoy Dad time with my son, Tucker
Interests:

- Boating
- Obsolete electronics
- Music
- Household projects

Back

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

Back to Main

Tom Dean

Linux Training Architect

*Thank you for choosing Linux Academy as
your learning partner, and for allowing me
to assist you with your journey!*

Back

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

**Big State College - A
Case Study**

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Big State College - A Case Study

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

**Big State College - A
Case Study**

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service.

Back

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
Architect**Big State College - A
Case Study**Introduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

BSC's existing environment is a patchwork of various, often antiquated LAMP stacks. There are also lot of "rogue" LAMP stacks amongst the various schools and research institutions. All these LAMP stacks will be consolidated into the new LEMP hosting environment.

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
Architect**Big State College - A
Case Study**Introduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Motivations Driving the LEMP Project

- Security / Patching concerns
- Support concerns
- New web server features
 - Functionality / features / security
 - Development / QA / production environments
- Other challenges, current and future

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
Architect**Big State College - A
Case Study**Introduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

BSC's Requirements:

- Want to use the NGINX and the LEMP stack
- Want to consolidate the large number of independent LAMP stacks into the new LEMP environment
- Want to deploy a customized configuration for multitenancy:
 - "Home directories" with WWW, SSL certs and per-site logs
 - Virtual Hosts
 - HTTPS only: Redirect all requests to HTTPS

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

**Big State College - A
Case Study**

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Big State College has decided to employ a dual-OS strategy in the LEMP hosting environment and will be utilizing both RHEL 8 and Ubuntu Linux to host their various shared web environments and supporting applications.

Back

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

**Big State College - A
Case Study**

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

As the engineers tasked with executing this project, we will learn how to install, configure and deploy applications on top of the LEMP stack as part of building the new hosting environment.

Back

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Back to Main

Select the items below:

What is the LEMP Stack?

NGINX - The Engine of the Stack

Why MariaDB?

PHP - Follow the Script

Next

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

**What is the LEMP
Stack?**

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

What is the LEMP Stack?

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
Stack**What is the LEMP
Stack?**NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

What is a *Web Stack*?

A *Web Stack* is a set of components or technologies that, when combined, constitute a framework on which web sites live.

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

Examples of *Web Stacks*

- **LAMP / WAMP / MAMP / XAMP**
- **LEMP**: A variation on **LAMP**
- **WISA** (Microsoft) : Windows / IIS / SQL
Server / ASP.NET
- *Others*

Back

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

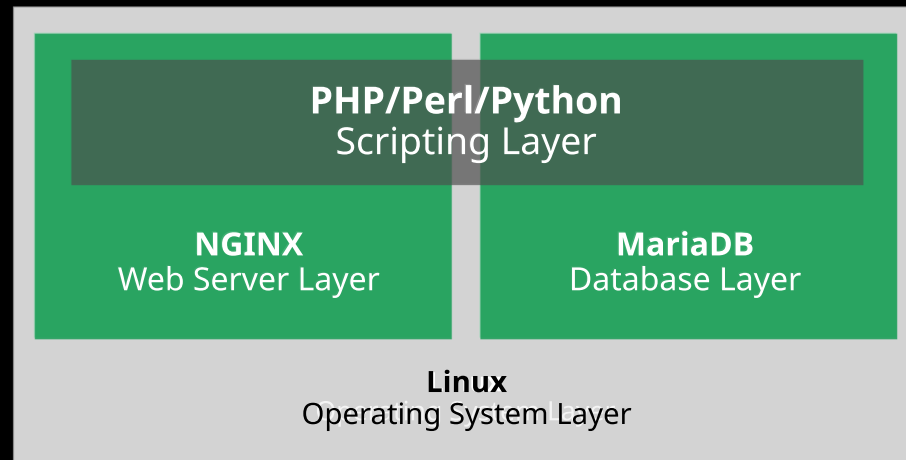
Section 3

MariaDB Basics

Section 4

Back to Main

What is the *LEMP Stack*?



Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

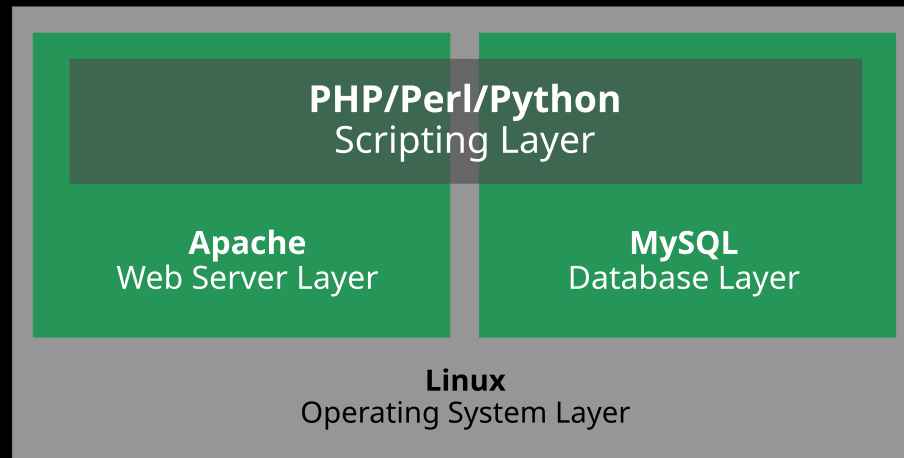
Section 3

MariaDB Basics

Section 4

Back to Main

It All Started with the *LEMP Stack*



Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

**What is the LEMP
Stack?**

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

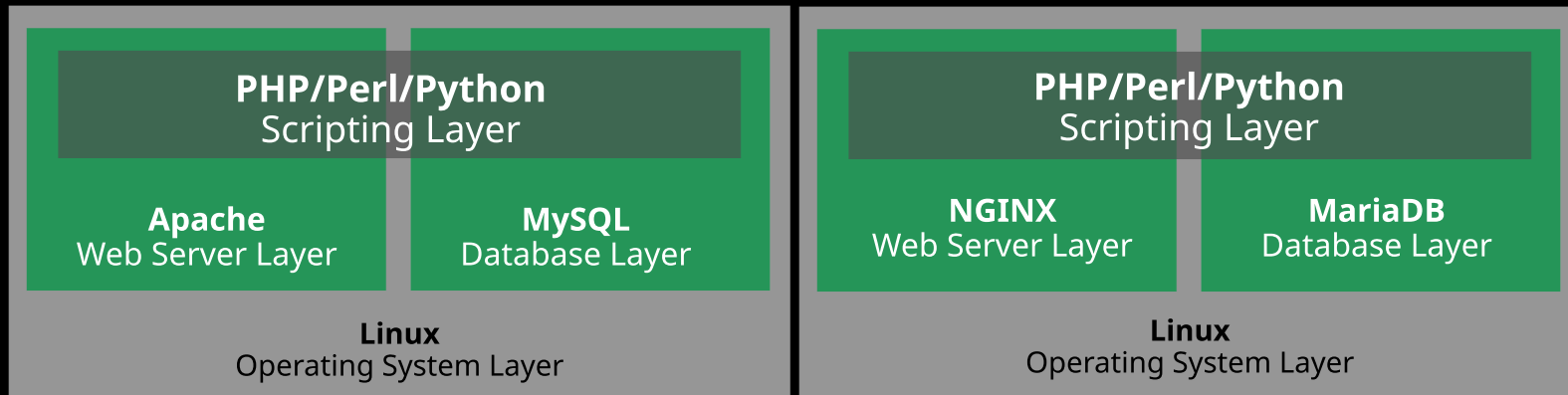
Section 3

MariaDB Basics

Section 4

[Back to Main](#)

LAMP vs LEMP



[Back](#)

[Next](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
Stack**What is the LEMP
Stack?**NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Linux - Choosing a Distribution

Considerations:

- Support needs / subscription costs
- Staffing needs / skills
- Repositories / availability
- Application support
- Hardware / hypervisor support

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
Stack**What is the LEMP
Stack?**NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

LEMP - Scalability / Fault Tolerance

- Single server or multiple servers:
 - Load balancing (NGINX)
 - Highly-available database
- NGINX and MariaDB can live on their own servers
- NGINX is known for being high performance
- NGINX can proxy other applications / websites (even Apache / IIS!)

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
Stack**What is the LEMP
Stack?**NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

LEMP - In Reality...

- Most environments are not as cut and dried as a *single stack* on a *single* server:
 - Application needs
 - Legacy environments
 - Organizational factors
 - The cloud
 - Mergers / acquisitions
 - Other factors
- The NGINX component of the stack can serve to unite all these elements

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

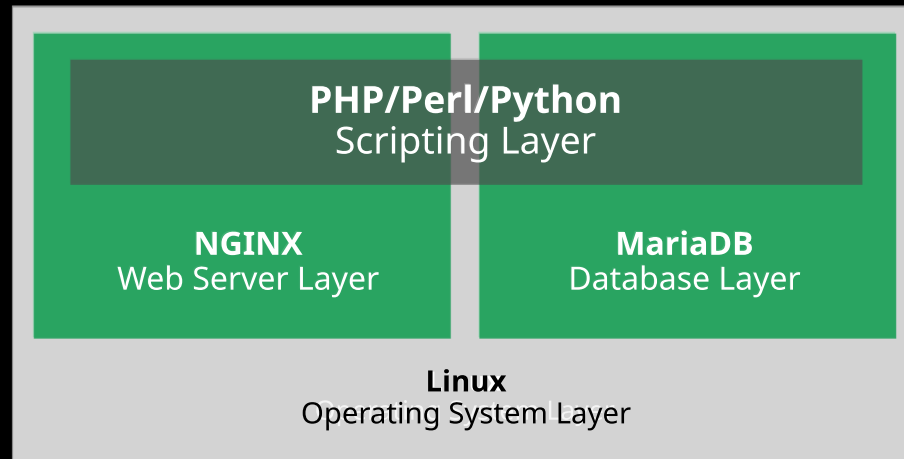
Section 3

MariaDB Basics

Section 4

Back to Main

LEMP - A New Alternative



Back

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

NGINX - The Engine of the Stack

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

NGINX

"nginx [engine x] is an HTTP and reverse proxy server, a mail proxy server, and a generic TCP/UDP proxy server, originally written by Igor Sysoev. For a long time, it has been running on many heavily loaded Russian sites including Yandex, Mail.Ru, VK, and Rambler. According to Netcraft, nginx served or proxied 25.69% of the busiest sites in October 2019. Here are some of the success stories: Dropbox, Netflix, Wordpress.com, FastMail.FM.

The sources and documentation are distributed under the 2-clause BSD-like license. Commercial support is available from Nginx, Inc."

<https://nginx.org/en/>

Back**Next****Back to Main**

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Back to Main

Basic HTTP Server Features

- Serving static and index files, autoindexing
- Open file descriptor cache
- Load balancing and fault tolerance
- Accelerated reverse proxying with caching
- Accelerated support with caching of FastCGI, uwsgi, SCGI, and memcached servers
- Modular architecture. Filters include gzipping, byte ranges, chunked responses, XSLT, SSI, and image transformation filter. Multiple SSI inclusions within a single page can be processed in parallel if they are handled by proxied or FastCGI/uwsgi/SCGI servers
- SSL and TLS SNI support
- Support for HTTP/2 with weighted and dependency-based prioritization

<https://nginx.org/en/>**Back****Next**

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Other HTTP Server Features

- Name-based and IP-based virtual servers
- Keep-alive and pipelined connections support
- Access log formats, buffered log writing, fast log rotation, and syslog logging
- 3xx-5xx error codes redirection
- The rewrite module: URI changing using regular expressions
- Executing different functions depending on the client address
- Access control based on client IP address, by password (HTTP Basic authentication) and by the result of subrequest
- Validation of HTTP referer
- The PUT, DELETE, MKCOL, COPY, and MOVE methods
- FLV and MP4 streaming
- Response rate limiting
- Limiting the number of simultaneous connections or requests coming from one address
- IP-based geolocation
- A/B testing
- Request mirroring
- Embedded Perl
- njs scripting language

[Back](#)<https://nginx.org/en/>[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Mail Proxy Server Features

- User redirection to IMAP or POP3 server using an external HTTP authentication server
- User authentication using an external HTTP authentication server and connection redirection to an internal SMTP server
- Authentication methods:
 - POP3: USER/PASS, APOP, AUTH LOGIN/PLAIN/CRAM-MD5
 - IMAP: LOGIN, AUTH LOGIN/PLAIN/CRAM-MD5
 - SMTP: AUTH LOGIN/PLAIN/CRAM-MD5
- SSL support
- STARTTLS and STLS support

<https://nginx.org/en/>**Back****Next****Back to Main**

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

TCP/UDP Proxy Server Features

- Generic proxying of TCP and UDP
- SSL and TLS SNI support for TCP
- Load balancing and fault tolerance
- Access control based on client address
- Executing different functions depending on the client address
- Limiting the number of simultaneous connections coming from one address
- Access log formats, buffered log writing, fast log rotation, and syslog logging
- IP-based geolocation
- A/B testing
- njs scripting language

<https://nginx.org/en/>**Back****Next****Back to Main**

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

Back to Main

NGINX vs NGINX Plus

There are two versions of NGINX

- OSS NGINX (<https://www.nginx.org>)
- NGINX Plus (<https://www.nginx.com>)

NGINX Plus comes with support and additional features

- Active health checks
- Session persistence (cookies)
- DNS-Service-Discovery integration
- Cache purging API
- AppDynamic, Datalog, Dynatrace New Relic Plug-Ins
- Active-Active HA with configuration synchronization
- Key-value store
- Web application firewall (WAF) dynamic module

<https://en.wikipedia.org/wiki/Nginx>

Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Back to Main

NGINX vs Apache

NGINX

- Newer
- Better performance, serving static files:
 - Low Memory Footprint (~2.5 MB per 10k inactive HTTP keep-alive connections)
 - Approximately 4x Faster than Apache (stock configuration, serving static files)

Apache

- Mature: long track record
- More flexibility (.htaccess files)
- Ease of deployment
- Large install base

<https://en.wikipedia.org/wiki/Nginx>

Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

NGINX - Popularity

"According to Netcraft's November 2016 Web Server Survey, Nginx was found to be the second-most widely used web server across all "active" sites (18 percent of surveyed sites) and for the top million busiest sites (28 percent of surveyed sites). According to W3Techs, it was used by 38 percent of the top 1 million websites, 50 percent of the top 100,000 websites, and by 57 percent of the top 10,000 websites. According to BuiltWith, it is used on 38 percent of the top 10,000 websites, and its growth within the top 10k, 100k and 1 million segments increased. A 2018 survey of Docker usage found that Nginx was the most commonly deployed technology in Docker containers. Wikipedia uses Nginx as its SSL termination proxy."

<https://en.wikipedia.org/wiki/Nginx>

Back

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

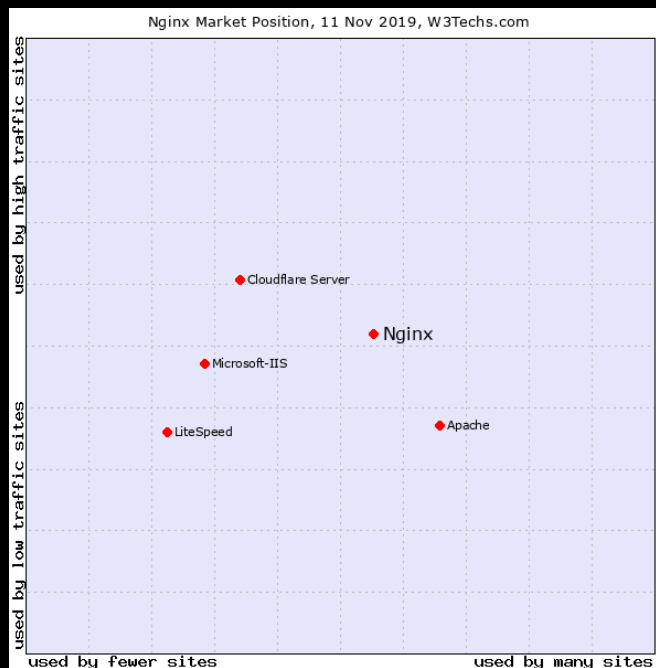
Section 3

MariaDB Basics

Section 4

Back to Main

NGINX - Market Position

<https://w3techs.com/technologies/details/ws-nginx/all/all>

Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

**NGINX - The Engine of
the Stack**

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

NGINX - Summary

- HTTP/S web server
 - Built for performance
 - Low memory overhead
- Load-balancing functionality
- Proxying / caching functionality
- Many advanced features
- Included in the standard repositories for many Linux distributions
- Growing market share

[Back](#)

[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Why MariaDB?

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack**Why MariaDB?**

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Why a Database?

What's the role of a database in the Web Stack?

Typically, web sites and applications need a place to store their data. A database management system gives developers a place to store their data and access it using SQL. The website can then use a language, such as PHP, to access this data and generate dynamic web content with it. Some examples of SQL databases are MySQL, MariaDB, SQL Server, and Oracle.

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

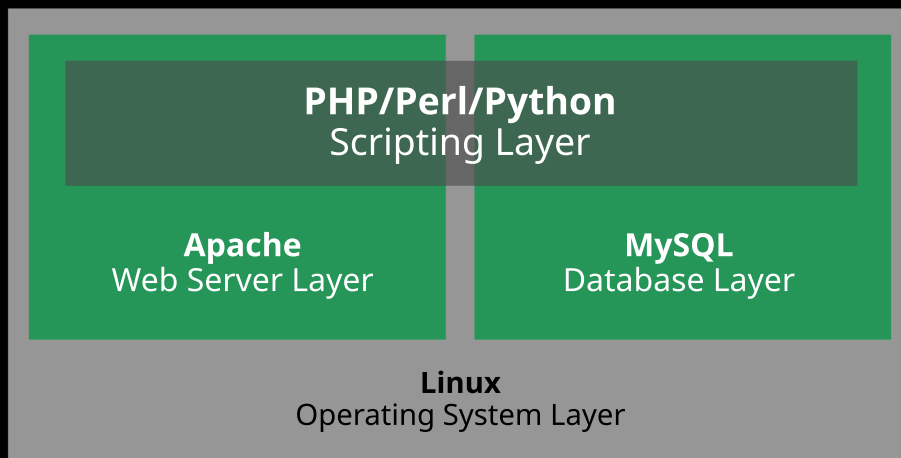
MariaDB Basics

Section 4

Back to Main

LAMP / MySQL - The Early Days

The LAMP stack has been around almost as long as the WWW. A key part of this stack is MySQL.



Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack**Why MariaDB?**

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Oracle Acquires MySQL

MySQL was originally an Open Source database project:

- First release - 23 May 1995
- Sun Microsystems acquired MySQL AB in 2008
- Oracle acquired Sun Microsystems on 27 January 2010
- The day Oracle announced the purchase of Sun, and therefore MySQL, Michael "Monty" Widenius forked MySQL, creating MariaDB

<https://en.wikipedia.org/wiki/MySQL>

Back**Next****Back to Main**

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack**Why MariaDB?**

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

About MariaDB

"MariaDB Server is one of the most popular database servers in the world. It's made by the original developers of MySQL and guaranteed to stay open source. Notable users include Wikipedia, WordPress.com and Google.

"MariaDB turns data into structured information in a wide array of applications, ranging from banking to websites. It is an enhanced, drop-in replacement for MySQL. MariaDB is used because it is fast, scalable and robust, with a rich ecosystem of storage engines, plugins and many other tools make it very versatile for a wide variety of use cases.

"MariaDB is developed as open source software and as a relational database it provides an SQL interface for accessing data. The latest versions of MariaDB also include GIS and JSON features."

[Back](#)<https://mariadb.org/about/>[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack**Why MariaDB?**

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

MariaDB vs MySQL

These two database management systems are quite different, despite MariaDB being a fork of MySQL:

- MariaDB is fully GPL licensed. MySQL offers both commercial and community licenses.
- Each handles thread pools in a different way.
- MariaDB supports a variety of different storage engines.
- MariaDB offers improved performance in many situations.

<https://kinsta.com/blog/mariadb-vs-mysql/>

Back**Next****Back to Main**

Course Introduction

Section 1

Getting Started

[About the Course / Prerequisites](#)[About the Training Architect](#)[Big State College - A Case Study](#)[Introduction to the LEMP Stack](#)[What is the LEMP Stack?](#)[NGINX - The Engine of the Stack](#)**[Why MariaDB?](#)**[PHP - Follow the Script](#)**Linux - The Foundation of the Stack**

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

[Back to Main](#)

MariaDB vs MySQL - Compatibility

The whole point of forking MySQL off into MariaDB, which is named after Michael's daughter, was to secure future access to MySQL and its further development. MariaDB was is a full binary replacement ("drop-in" replacement, so to say), that enables all users of MySQL to exchange one for the other on their systems.

MySQL is a client-server application, and both its server program `mysqld`, its client `mysql`, and auxiliary programs, like `mysqldump`, retain the same name with MariaDB.

Replacing MySQL with MariaDB is usually a seamless process for most applications and purposes, especially WordPress. Existing software, from popular CMS tools to apps like phpMyAdmin, work right out of the box, and can import/export actual data to and from one into another without any configuration changes.

[Back](#)<https://kinsta.com/blog/mariadb-vs-mysql/>[Next](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack**Why MariaDB?**

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

MariaDB vs MySQL - Compatibility

MariaDB's stated goal is to maintain compatibility with MySQL. According to the MariaDB website:

- Data and table definition files are compatible.
- All client APIs and protocols are compatible.
- Filenames, binaries, and paths are the same on MySQL and MariaDB.
- Ports and sockets are the same.
- All MySQL connectors, PHP, Perl, Python, Java, and others, work with MariaDB.
- The MySQL client package works interchangeably with MariaDB, just as with MySQL.

There are merges conducted monthly to ensure compatibility, and to get any new features and bug fixes from Oracle.

[Back](#)<https://kinsta.com/blog/mariadb-vs-mysql/>[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

MariaDB vs MySQL - Differences

Features

MariaDB has fixed a MySQL problem similar to one in Apache that Nginx addressed. Apache (and MySQL) assign threads to every client connection, and this "thread pool" is inefficient. It's like packing too much for a short vacation, instead of just picking things up (lipstick, razors, etc.) once you've arrived. MariaDB introduced its own solution to this in version 5.5

Invisible columns are MariaDB's exclusive feature from 10.3.3. They do not return results in a `SELECT *` statement, nor do they need to be assigned a value in an `INSERT` statement.

Back

<https://kinsta.com/blog/mariadb-vs-mysql/>

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

MariaDB vs MySQL - Differences

Features

MariaDB has introduced database views, a significant optimization feature that only queries necessary tables.

Some features MySQL introduced are JSON native data type, MySQL Shell in MySQL 8.0 version (which allows Javascript and Python scripting, and doesn't work with MariaDB), and SHA-256-based authentication plugin, which improves security over *mysql_native_password*.

<https://kinsta.com/blog/mariadb-vs-mysql/>

Back

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

MariaDB vs MySQL - Differences

Storage Engines

MariaDB:

XtraDB, InnoDB, MariaDB ColumnStore, Aria, Archive, Blackhole, Cassandra Storage Engine, Connect, CSV, FederatedX, Memory storage engine, Merge, Mroonga, MyISAM, MyRocks, QGGraph, Sequence Storage Engine, SphinxSE, Spider, TokuDB and ColumnStore

MySQL:

InnoDB, MyISAM, Memory, CSV, Archive, Blackhole, Merge, and Federated

Back

<https://kinsta.com/blog/mariadb-vs-mysql/>

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

MariaDB - In the Cloud

- Amazon RDS for MariaDB - <https://aws.amazon.com/rds/mariadb/>
- Google Cloud - Cloud SQL - <https://cloud.google.com/sql/>
 - Fully managed database service for MySQL, PostgreSQL, and SQL Server.
- Azure Database for MariaDB
 - <https://azure.microsoft.com/en-us/services/mariadb/>

Many hosting providers offer hosted MariaDB as well:

- <https://mariadb.com/kb/en/library/web-hosting-providers-offering-mariadb/>

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack**Why MariaDB?**

PHP - Follow the Script

**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

MariaDB - Summary

- MariaDB was created as a response to Oracle's acquisition of Sun Microsystems, and MySQL AG, in 2010.
- MariaDB is fully open-source.
- MariaDB is a "drop-in binary replacement" for MySQL.
- There are some feature differences.
- Commercial support is available for MariaDB.

MariaDB Knowledgebase: <https://mariadb.com/kb/>

Back**Back to Main**

Course Introduction

Section 1

Getting Started

About the Course /
Prerequisites

About the Training
Architect

Big State College - A Case
Study

Introduction to the LEMP
Stack

What is the LEMP
Stack?

NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

PHP - Follow the Script

Next

Back to Main

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

PHP - Follow the Script

Lesson Objectives:

- Learn about PHP and its history
- Explore the role of PHP in the LEMP Stack
- Explore the pros and cons of PHP
- Learn about the role of PHP and php-fpm in the LEMP Stack

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Back to Main

PHP - Follow the Script

What is PHP?

PHP

- Recursive acronym for PHP: Hypertext Preprocessor
- A widely-used open source general-purpose scripting language
- Especially suited for web development
- Can be embedded into HTML
- Is executed on the server side, returns HTML
 - Code is hidden from the client

<https://www.php.net/manual/en/intro-what-is.php>**Back****Next**

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

PHP - Follow the Script

History of PHP

PHP development began in 1994 when Rasmus Lerdorf wrote several Common Gateway Interface (CGI) programs used to maintain his personal homepage.

- PHP Tools (Personal Home Page Tools) - June 1995
- FI (Forms Interpreter) - October 1995
- Personal Home Page Construction Kit
- PHP/FI - April 1996
- PHP 3.0 - June 1998
- PHP 4.0 - May 2000
- PHP 5 - July 2004
- PHP 7 - December 2015

[Back](#)<https://www.php.net/manual/en/history.php.php>[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

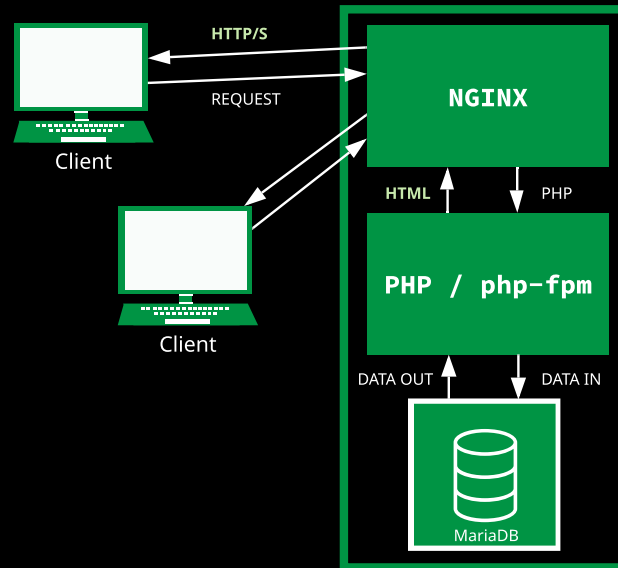
MariaDB Basics

Section 4

Back to Main

PHP - Follow the Script

PHP / PHP-FPM / LEMP



Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB Basics

Section 4

Back to Main

PHP - Follow the Script

PHP Example

```
<html>
  <head>
    <title>PHP Test Page</title>
  </head>
  <body>
    <?php echo '<p>This is a PHP Test Page!</p>'; ?>
  </body>
</html>
```

This is our example `hello.php` file. Most of the file is HTML code, in pink. The PHP code is in blue.

Back

Next

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

PHP - Follow the Script

Pros and Cons

Pros

- Low barrier to entry
 - Open Source
- Secure (HTML output)
- Wide choice of operating systems / web stacks
- Large community
- Easily embedded into HTML

Cons

- HTML experience required
- Performance
- Not optimized for desktop apps

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

Back to Main

PHP - Follow the Script

PHP Usage

"As of August 2019, PHP was used as the server-side programming language on 79.1% of websites, down from 83.5% previously, where the language could be determined. Web content management systems written in PHP include MediaWiki, Joomla, eZ Publish, eZ Platform, SilverStripe, WordPress, Drupal, and Moodle. Websites written in PHP, in the back-end and/or user-facing portion, include Facebook, Digg, Tumblr, Dailymotion, and Slack."

<https://en.wikipedia.org/wiki/PHP>

Back**Next**

Course Introduction

Section 1

Getting Started

About the Course /
PrerequisitesAbout the Training
ArchitectBig State College - A Case
StudyIntroduction to the LEMP
StackWhat is the LEMP
Stack?NGINX - The Engine of
the Stack

Why MariaDB?

PHP - Follow the Script**Linux - The Foundation of
the Stack**

Section 2

**NGINX - The Engine of the
Stack**

Section 3

MariaDB Basics

Section 4

PHP - Follow the Script

In this lesson, we:

- Learned about PHP and its history
- Explored the role of PHP in the LEMP Stack
- Explored the pros and cons of PHP
- Learned about the role of PHP and php-fpm in the LEMP Stack

[Back](#)[Back to Main](#)

Linux - The Foundation of the Stack

Installing a LEMP Stack on Linux

☰ Course Navigation

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

Select the items below:

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

Installing a LEMP Stack on RHEL 8

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

What is a *Web Stack*?

A *Web Stack* is a set of components or technologies that, when combined, constitute a framework on which web sites live.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

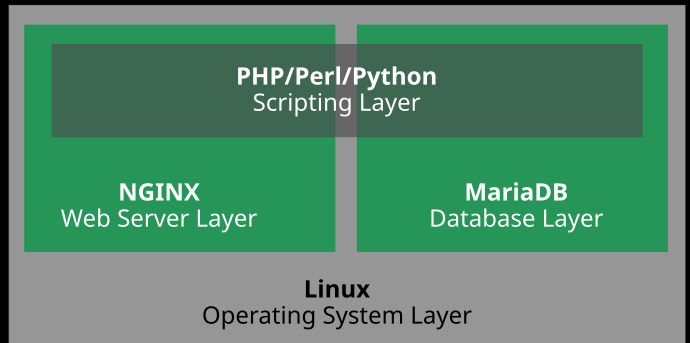
MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

What is the LEMP Stack?



Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP / RHEL 8

Some things that you'll find on RHEL 8 LEMP installations:

- The `yum` command is used to install LEMP stack components
- Services are not `enabled` and `started` when installed by `yum`. This has to be done via `systemctl`
- Default document location is `/usr/share/nginx/html`
- SELinux issues may arise with customized configurations.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 1: Install NGINX Using the Default RHEL Package Repositories

Become the **root** user:

```
sudo su -
```

Install the NGINX server using **yum**:

```
yum -y install nginx
```

Enable the NGINX server to start at boot time via **systemctl**:

```
systemctl enable nginx
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 1: Install NGINX Using the Default RHEL Package Repositories

Before we start NGINX, we want to validate the NGINX configuration:

```
nginx -t
```

Start the NGINX server using `systemctl`:

```
systemctl start nginx
```

Check the NGINX service status using `systemctl`:

```
systemctl status nginx
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 2: Configure HTTP Access Through the Firewall

Check the firewall configuration for the current state using `firewall-cmd`:

```
firewall-cmd --info-zone=public
```

Allow traffic on port 80 (HTTP) through the firewall:

```
firewall-cmd --zone=public  
--add-service=http --permanent
```

Reload the new firewall configuration to pick up the change:

```
firewall-cmd --reload
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 3: Verify Basic HTTP Functionality in NGINX

Use `curl` to verify that the default NGINX web page loads:

```
curl http://`curl v4.ifconfig.co`
```

Use a web browser to go to the default NGINX web page at http://PUBLIC_IP_ADDRESS or http://PUBLIC_DNS_ADDRESS.

The default NGINX page should be there. The public IP address and DNS of the instance is in `/home/cloud_user/server_info.txt`.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 4: Install the PHP Components

Install the PHP components using `yum`:

```
yum -y install php php-pdo php-mysqlnd  
php-gd php-mbstring php-fpm
```

You may notice that `php-fpm` is already installed. This is not an error, as `php-fpm` was installed during the creation of the lab environment.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 5: Verifying PHP Functionality in NGINX

Load the **phpinfo** page using `curl`. Notice that we are specifying a header (using the `-H` option) so that the proper virtual host is accessed:

```
curl -H "www.testdomain.local"
http://www.testdomain.local/phpinfo.php
```

You should see the **phpinfo** page for this server. If you put your server's public IP address into your `/etc/hosts` file pointing to `www.testdomain.local`, you should be able to access the **phpinfo** page at `http://www.testdomain.local/phpinfo.php` using a web browser.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 6: Install MariaDB

Install MariaDB using `yum`:

```
yum -y install mariadb mariadb-server
```

Use `systemctl` to enable and start MariaDB:

```
systemctl enable mariadb
```

```
systemctl start mariadb
```

Use `systemctl` to verify that MariaDB is installed, enabled, and running:

```
systemctl status mariadb
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on RHEL 8

Step 7: Verify the Installed Version of MariaDB

Verify the installed version of MariaDB, using `mysql`:

```
mysql -V
```

The exact version is not critical here, but we want to confirm it returns a result:

```
[root@ip-10-0-1-205 ~]# mysql -V
mysql Ver 15.1 Distrib 10.3.11-MariaDB,
for Linux (x86_64) using readline 5.1
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP / RHEL 8 - Summary

In this lesson, we:

- Installed a LEMP stack on RHEL 8
- Demonstrated NGINX serving static (HTML / Text) and dynamic (PHP) content

Now that you have a LEMP stack installed and running on RHEL 8, you can proceed with configuring NGINX and MariaDB, so you can build your website/application!

Back

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

Hands-On Lab: Installing a LEMP Stack on RHEL 8

Next

Back to Main

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

In this lab, we are going to install a LEMP stack on RHEL 8

- RHEL 8
- NGINX
- MariaDB
- PHP

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be deploying a LEMP stack on a single RHEL 8 server so we have an environment for testing LEMP concepts before deploying the new environment. Let's begin!

[Back](#)[Back to Main](#)

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

Installing a LEMP Stack on Ubuntu Linux

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

What is a *Web Stack*?

A *Web Stack* is a set of components or technologies that, when combined, constitute a framework on which web sites live.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

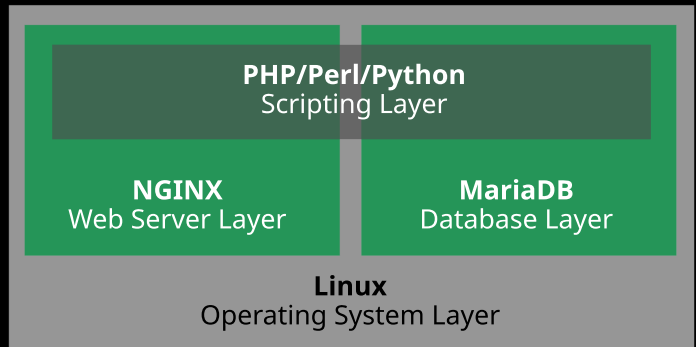
MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

What is the LEMP Stack?



[Back](#)

[Next](#)

[Back to Main](#)



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP / Ubuntu Linux

Some things that you'll find on Ubuntu Linux LEMP installations:

- LEMP stack components are installed using `apt-get` or `apt`.
- Services are enabled and started when installed via `apt-get`.
- Default NGINX configuration includes the `sites-enabled` and `sites-available` directories for virtual host configuration files.
- Default document location is `/var/www/html`

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 1: Install NGINX Using the Default Ubuntu Package Repositories

Become the **root** user:

```
sudo su -
```

Install NGINX from the Ubuntu repositories using **apt-get**:

```
apt-get -y install nginx
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 1: Install NGINX Using the Default Ubuntu Package Repositories

Check the status of the NGINX service with `systemctl`:

```
systemctl status nginx
```

The NGINX service should be **enabled** and **active**.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 2: Configure HTTP Access Through the Firewall

Check the initial status of the firewall using `ufw`:

```
ufw status
```

Open **port 80** to allow inbound HTTP traffic:

```
ufw allow 'Nginx HTTP'
```

Recheck the status of the firewall:

```
ufw status
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 3: Verify Basic HTTP Functionality in NGINX

Verify that you can load the default NGINX web page using `curl`:

```
curl http://`curl v4.ifconfig.co`
```

Use your web browser to go to the default NGINX web page at http://YOUR_PUBLIC_IP_ADDRESS or http://YOUR_PUBLIC_DNS. You should see the default NGINX page.

You can find the public IP address and DNS of your instance in the file:

```
/home/ccloud_user/server_info.txt
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 4: Install the PHP Components

Install the PHP components using `apt-get`:

```
apt-get -y install php-fpm php-mysql
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 5: Verifying PHP Functionality in NGINX

In order to test PHP, we will need to enable the www.testdomain.local site. NGINX under Ubuntu accomplishes this by using two directories, the `sites-available` and the `sites-enabled` directories. All available server blocks (configuration files for virtual hosts) are placed in `sites-available`. When you want to make a virtual host active, you create a symbolic link to the appropriate configuration file in `sites-enabled`:

```
ln -s /etc/nginx/sites-available/testdomain.local.conf  
/etc/nginx/sites-enabled/testdomain.local.conf
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 5: Verifying PHP Functionality in NGINX

We will now validate the NGINX configuration before reloading the NGINX service, using `nginx -t`:

```
nginx -t
```

If everything checks out, reload the NGINX service:

```
systemctl reload nginx
```

If you'd like to check the status of the NGINX service, use `systemctl`.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 5: Verifying PHP Functionality in NGINX

We also need to reload the `php-fpm` service.

```
systemctl restart php7.2-fpm.service
```

Verify that PHP is functioning by loading the `phpinfo` page on the `www.testdomain.local` virtual host, using the `curl` command. Note that we are providing a header for the request (via the `-H` switch) so NGINX knows to route the request to the `www.testdomain.local` virtual host.

```
curl -H "www.testdomain.local"
http://www.testdomain.local/phpinfo.php
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 5: Verifying PHP Functionality in NGINX

If you want to access the `phpinfo` page at <http://www.testdomain.local/phpinfo.php> with your web browser, add your server's public IP address, pointing to www.testdomain.local, to your computer's `/etc/hosts` file.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 6: Install MariaDB

Install MariaDB using `apt-get`:

```
apt-get -y install mariadb-server
```

Check the status of the MariaDB server using `systemctl`:

```
systemctl status mariadb
```

The server should be **enabled** and **running**.

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP Installation on Ubuntu Linux

Step 7: Verify the Installed Version of MariaDB

Check the version of MariaDB using `mysql -V`:

```
mysql -V
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

LEMP / Ubuntu Linux - Summary

In this lesson, we:

- Installed a LEMP stack on Ubuntu Linux
- Demonstrated NGINX serving static (HTML / Text) and dynamic (PHP) content

Now that you have a LEMP stack installed and running on Ubuntu, you can proceed with configuring NGINX and MariaDB so you can build your website/application!

[Back](#)

[Back to Main](#)



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux

NGINX - The Engine of the Stack

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

Hands-On Lab: Installing a LEMP Stack on Ubuntu Linux

Next

Back to Main

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux**NGINX - The Engine of the Stack**

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

In this lab, we are going to install a LEMP stack on Ubuntu Linux

- Ubuntu Linux
- NGINX
- MariaDB
- PHP

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

Installing a LEMP Stack on Linux

Installing LEMP on RHEL 8

Installing LEMP on Ubuntu Linux**NGINX - The Engine of the Stack**

Section 3

MariaDB Basics

Section 4

Working With PHP on the LEMP Stack

Section 5

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be deploying a LEMP stack on a single Ubuntu server for testing LEMP concepts before deploying the new environment. Let's begin!

[Back](#)[Back to Main](#)

NGINX - The Engine of the Stack

☰ Course Navigation

Configuring the NGINX Server

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Select the items below:

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

NGINX - Securing Virtual Hosts - HTTPS

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Resources and Documentation

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Resources and Documentation

Lesson Objectives:

- Explore the NGINX website
- <https://nginx.org>
- Documentation
- Downloads
- Security
- News

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Resources and Documentation

NGINX Website:

- NGINX website
 - <https://nginx.org>
 - Documentation
 - Downloads
 - Security
 - News

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Resources and Documentation

In this lesson, we:

- Explored the NGINX website
- <https://nginx.org>
- Documentation
- Downloads
- Security
- News

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Basic NGINX Server Configuration

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Basic NGINX Server Configuration

Lesson Objectives:

- Explore the `/etc/nginx` directory
- Explore the `nginx.conf` file
- Learn how to check the NGINX configuration using `nginx -t`
- Learn how to reload the NGINX configuration

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Basic NGINX Server Configuration

The `/etc/nginx` directory:

- Location for all configuration files:
 - `nginx.conf`
- Virtual host configuration files:
 - `conf.d` directory
 - `sites-available` directory
 - `sites-enabled` directory
- Module configuration files:
 - `conf.d` directory
 - `modules-available` directory
 - `modules-enabled` directory

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Basic NGINX Server Configuration

The `nginx.conf` file:

- Defines **global** configuration:
- Server process configuration:
 - User server runs as
 - Location of PID file
 - Performance:
 - `worker_processes`
 - `worker_connections`
- Location(s) of module and virtual host configuration files (`include`)

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Basic NGINX Server Configuration

How to check the NGINX configuration:

nginx -t

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Basic NGINX Server Configuration

Reloading the NGINX Configuration:

- Using `systemctl`:
 - **Reload** - Doesn't drop existing connections
 - **Restart** - Drops existing connections
- Using NGINX - `nginx -s`:
 - Validates the configuration before restarting

The safe bet is to execute `nginx -t` before a reload or restart

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Basic NGINX Server Configuration

In this lesson, we:

- Explored the `/etc/nginx` directory
- Explored the `nginx.conf` file
- Learned how to check the NGINX configuration using `nginx -t`
- Learned how to reload the NGINX configuration

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring Virtual Hosts

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring Virtual Hosts

Lesson Objectives:

- Explore virtual host configuration file locations
- Explore relationship between `nginx.conf` and virtual host server configuration blocks
- Review the contents of a virtual host configuration file
- Explore troubleshooting problems in virtual host configuration files

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring Virtual Hosts

Virtual Host Configuration Files:

Virtual host configuration file locations:

- `/etc/nginx/conf.d`
- `/etc/nginx/sites-available`
- `/etc/nginx/sites-enabled`

Virtual host configuration files are pulled into `nginx.conf` via `include`

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring Virtual Hosts

Virtual Host Configuration Files:

Will have a **server** block, at a minimum:

- **listen** <port>;
- **root** /some/location;
- **server_name** name(s);
- **location** <directory>;

Contains a place to "isolate" configuration for a single virtual host:

- Enable/disable single virtual host
- Easier to troubleshoot
- Easier to recover from issue(s)

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring Virtual Hosts

Troubleshooting Virtual Hosts:

Use `nginx -t` to validate server configuration ***every time!***

Errors tell the source/nature of the issue:

- What the error is
- Which file the error is located in
- Line the error is on in that file

This is why we isolate virtual host configuration files!

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring Virtual Hosts

In this lesson, we:

- Explored virtual host configuration file locations
- Explored the relationship between `nginx.conf` and virtual host server configuration blocks
- Reviewed the contents of a virtual host configuration file
- Explored troubleshooting problems in virtual host configuration files

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Configuring Custom Error Pages in NGINX

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Configuring Custom Error Pages in NGINX

Lesson Objectives:

- Discuss why we might want to use custom error pages
- Demonstrate how to configure a custom error page for a single error type
- Demonstrate how to map a custom error page for multiple error types

http://nginx.org/en/docs/http/nginx_http_core_module.html#error_page

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Configuring Custom Error Pages in NGINX

Why Custom Error Pages?

- Match "look and feel" of the site
- Provide customized information
- "Sanitize" server information
- "Catch all" for response codes that don't require a unique error page
- Configure "custom" action to one or more response codes

http://nginx.org/en/docs/http/nginx_http_core_module.html#error_page

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Configuring Custom Error Pages in NGINX

Configure a Single Error:

Custom error pages are configured using the **error_page** directive:

```
error_page 404 /testdomain_404.html;  
location = /testdomain_404.html {  
    root /var/www/html;  
    internal;  
}
```

This does the same thing, but returns a 200 status (OK) instead of 404:

```
error_page 404 =200 /testdomain_404.html;  
location = /testdomain_404.html {  
    root /var/www/html;  
    internal;  
}
```

http://nginx.org/en/docs/http/nginx_http_core_module.html#error_page

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Configuring Custom Error Pages in NGINX

Map Multiple Errors to a Page:

We can map more than one response code to a single page using the `error_page` directive, as shown here:

```
error_page 404 403 /testdomain_other_error.html;  
location = /testdomain_other_error.html {  
    root /var/www/html;  
    internal;  
}
```

http://nginx.org/en/docs/http/nginx_http_core_module.html#error_page

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Configuring Custom Error Pages in NGINX

In this lesson, we:

- Discussed why we might want to use custom error pages
- Demonstrated how to configure a custom error page for a single error type
- Demonstrated how to map a custom error page for multiple error types

http://nginx.org/en/docs/http/nginx_http_core_module.html#error_page

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Directives - Upstream / Location / Return

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Directives - Upstream / Location / Return

Lesson Objectives:

- Explore the **upstream** directive
- Explore the **location** directive
- Explore the **return** directive

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Directives - Upstream / Location / Return

*The **upstream** directive:*

The **upstream** directive defines groups of servers that can be referenced by the **proxy_pass**, **fastcgi_pass**, **uwsgi_pass**, **scgi_pass**, **memcached_pass**, and **grpc_pass** directives:

```
upstream testdomainapp {  
    server app1.testdomain.local:8085;  
    server app2.testdomain.local:8086 backup;  
    server app3.testdomain.local:8087 backup;  
}
```

By default, requests are distributed between the servers using a *weighted round-robin* balancing method.

http://nginx.org/en/docs/http/nginx_http_upstream_module.html

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Directives - Upstream / Location / Return

*The **location** directive:*

The **location** directive sets configuration depending on a request URI:

```
location / {  
    try_files $uri $uri/ =404;  
}
```

```
location ~ /\.ht {  
    deny all;  
}
```

A **location** can either be defined by a prefix string, or by a regular expression.

http://nginx.org/en/docs/http/nginx_http_core_module.html#location

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Directives - Upstream / Location / Return

*The **return** directive:*

The **return** directive stops processing and returns the specified code to a client:

```
location /downloads {  
    rewrite ^(/downloads)/(.*)$ http://downloads.testdomain.local:9084/$2 permanent;  
    return 403;  
}
```

http://nginx.org/en/docs/http/nginx_http_rewrite_module.html#return

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Directives - Upstream / Location / Return

In this lesson, we:

- Explored the **upstream** directive
- Explored the **location** directive
- Explored the **return** directive

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Rewrites - An Introduction

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Rewrites - An Introduction

Lesson Objectives:

- Explore the **rewrite** directive
- Examine some examples of the **rewrite** directive

http://nginx.org/en/docs/http/nginx_http_rewrite_module.html#rewrite

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Rewrites - An Introduction

*The **rewrite** directive:*

Changes part or all of the URL in a client request:

- To inform clients that the resource they're requesting now resides at a different location
- To control the flow of processing within NGINX:
 - *Example: To forward requests to an application server when content needs to be generated dynamically*

```
rewrite ^(/download/.*)/media/(\w+)\.?$ $1/mp3/$2.mp3 last;  
rewrite ^(/download/.*)/audio/(\w+)\.?$ $1/mp3/$2.ra last;  
return 403;
```

```
location /download/ {  
    rewrite ^(/download/.*)/media/(.*)\..?$ $1/mp3/$2.mp3 break;  
    rewrite ^(/download/.*)/audio/(.*)\..?$ $1/mp3/$2.ra break;  
    return 403;  
}
```

<https://www.nginx.com/blog/creating-nginx-rewrite-rules/>[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Rewrites - An Introduction

*The **rewrite** directive:*

Example of the **rewrite** directive, used inside a location directive that uses an external URL:

```
location /downloads {  
    rewrite ^(/downloads)/(.*)$ http://downloads.testdomain.local:9084/$2 permanent;  
    return 403;  
}
```

This **rewrite** grabs the file name after **/downloads** and sends the request to the URL:

<http://downloads.testdomain.local:9084/filename>

http://nginx.org/en/docs/http/nginx_http_rewrite_module.html#rewrite

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Rewrites - An Introduction

In this lesson, we:

- Explored the **rewrite** directive
- Examined some examples of the **rewrite** directive

http://nginx.org/en/docs/http/nginx_http_rewrite_module.html#rewrite

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Load Balancing - An Introduction

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Load Balancing - An Introduction

Lesson Objectives:

- Explore load balancing using the:
 - **upstream** directive
 - **location** directive
 - **server** directive

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Load Balancing - An Introduction

*The **upstream** directive:*

The **upstream** directive defines groups of servers that can be referenced by the **proxy_pass**, **fastcgi_pass**, **uwsgi_pass**, **scgi_pass**, **memcached_pass**, and **grpc_pass** directives:

```
upstream testdomainapp {  
    server app1.testdomain.local:8085;  
    server app2.testdomain.local:8086 backup;  
    server app3.testdomain.local:8087 backup;  
}
```

By default, requests are distributed between the servers using a *weighted round-robin* balancing method.

http://nginx.org/en/docs/http/nginx_http_upstream_module.html

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Load Balancing - An Introduction

*The **location** directive:*

The **location** directive is the other part of the equation that enables the **upstream** directive:

```
location /app {
    proxy_pass http://testdomainapp;
}
```

In this example, we are using the **/app** location to front-end the **testdomainapp** server group, defined in the **upstream** directive.

http://nginx.org/en/docs/http/nginx_http_core_module.html#location

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Load Balancing - An Introduction

*The **server** directive:*

The **server** directive defines an individual server that is part of the **upstream** group:

```
upstream testdomainapp {
    server app1.testdomain.local:8085 weight=3;
    server app2.testdomain.local:8086;
    server app3.testdomain.local:8087 backup;
}
```

There are many options available to define how each server is handled in the group.

http://nginx.org/en/docs/http/nginx_http_upstream_module.html#server

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Load Balancing - An Introduction

*The **server** directive:*

Server parameters available in the non-commercial NGINX offering include:

- **weight=number** - Sets the weight of the server, **default=1**
- **max_conns=number** - Limits active connections, **default=0**
- **max_fails=number** - Maximum unsuccessful connections, **default=1**
- **fail_timeout=time** - Sets fail timeout, **default=10 seconds**
- **backup** - Marks the server as a backup server
- **down** - Marks the server as a unavailable

http://nginx.org/en/docs/http/nginx_http_upstream_module.html#server

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Load Balancing - An Introduction

In this lesson, we:

- Explored load balancing using the:
 - **upstream** directive
 - **location** directive
 - **server** directive

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL

Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Blocking Access by IP with NGINX

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL

Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Blocking Access by IP with NGINX

Lesson Objectives:

- Explore the `ngx_http_access_module` in NGINX
 - `allow` directive
 - `deny` directive

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL

Certificates Using

OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Blocking Access by IP with NGINX

Restrict Access By IP Address:

The `ngx_http_access_module` allows limiting access to certain client addresses. Rules are checked in order until the first match is found. The `allow` and `deny` directives can be used within the `http`, `server`, `location`, and `limit_except` directives:

```
location / {  
    deny 192.168.1.1;  
    allow 192.168.1.0/24;  
    allow 10.1.1.0/16;  
    allow 2001:0db8::/32;  
    deny all;  
}
```

http://nginx.org/en/docs/http/ngx_http_access_module.html

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL

Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Blocking Access by IP with NGINX

In this lesson, we:

- Explored the `ngx_http_access_module` in NGINX
 - `allow` directive
 - `deny` directive

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

Lesson Objectives:

- Create a self-signed SSL certificate using OpenSSL
- Verify our self-signed SSL certificate using OpenSSL

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

Create a Certificate Authority Private Key and Certificate:

First, we'll need a place to store our certificates:

```
mkdir -p /etc/nginx/certificates
```

```
cd /etc/nginx/certificates
```

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

Create a Certificate Authority Private Key and Certificate:

Generate a private key for the CA:

```
openssl genrsa 2048 > ca-key.pem
```

Generate the X509 certificate for the CA:

```
openssl req -new -x509 -nodes -days 365000 \
-key ca-key.pem -out ca-cert.pem
```

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

Create a Private Key and a Self-Signed Certificate for the NGINX Server:

Generate a private key and create a certificate request for the NGINX server. We will have to answer some questions:

```
openssl req -newkey rsa:2048 -days 365000 \
-nodes -keyout server-key.pem -out server-req.pem
```

Next, process the key to remove the passphrase:

```
openssl rsa -in server-key.pem -out server-key.pem
```

We should see the following: `writing RSA key.`

[Back](#)[Next](#)

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

Create a Private Key and a Self-Signed Certificate for the NGINX Server:

Generate a self-signed X509 certificate for the NGINX server from the certificate request:

```
openssl x509 -req -in server-req.pem -days 365000 \
  -CA ca-cert.pem -CAkey ca-key.pem -set_serial 01 \
  -out server-cert.pem
```

We need to allow the `nginx` user access to the certificates. Add read permissions for *group* and *other*:

```
chmod 644 *
```

[Back](#)[Next](#)

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

Verify the Self-Signed Certificate for the NGINX Server:

Let's verify that the X509 certificate was correctly generated:

```
openssl verify -CAfile ca-cert.pem server-cert.pem
```

We should see the following: `server-cert.pem: OK`.

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Creating SSL Certificates Using OpenSSL

In this lesson, we:

- Created a self-signed SSL certificate using `OpenSSL`
- Verified our self-signed SSL certificate using `OpenSSL`

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Securing Virtual Hosts - HTTPS

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Securing Virtual Hosts - HTTPS

Lesson Objectives:

- Explore the `listen` directive
- Explore the `ngx_http_ssl_module` and associated directives
- Secure a virtual host using `SSL/TLS`

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Securing Virtual Hosts - HTTPS

SSL/TLS Configuration Examples:

```
server {  
    listen                443 ssl;  
    server_name           www.example.com;  
    ssl_certificate       www.example.com.crt;  
    ssl_certificate_key   www.example.com.key;  
    ssl_protocols         TLSv1 TLSv1.1 TLSv1.2;  
    ssl_ciphers           HIGH:!aNULL:!MD5;  
    ...  
}
```

```
listen 127.0.0.1;  
listen 8000;  
listen *:8000;  
listen localhost:8000;  
listen [::]:8000;  
listen unix:/var/run/nginx.sock;
```

http://nginx.org/en/docs/http/nginx_http_ssl_module.html
http://nginx.org/en/docs/http/configuring_https_servers.html
http://nginx.org/en/docs/http/nginx_http_core_module.html#listen

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Securing Virtual Hosts - HTTPS

Verify the Self-Signed Certificate for the NGINX Server:

Verify the X509 server certificate:

```
openssl verify -CAfile
/etc/nginx/ssl/testdomain.local/ca-cert.pem
/etc/nginx/ssl/testdomain.local/server-cert.pem
```

We should see the following: `server-cert.pem: OK.`

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Securing Virtual Hosts - HTTPS

Configure the virtual host to use SSL/TLS:

Change the `listen` line to `'443 ssl'` and add the `ssl_certificate` and `ssl_certificate_key` directives:

```
server {
    listen 443 ssl;
    root /var/www/html/testdomain.local;
    server_name testdomain.local www.testdomain.local;
    ssl_certificate /etc/nginx/ssl/testdomain.local/server-cert.pem;
    ssl_certificate_key /etc/nginx/ssl/testdomain.local/server-key.pem;
    ...
}
```

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Securing Virtual Hosts - HTTPS

In this lesson, we:

- Explored the `listen` directive
- Explored the `ngx_http_ssl_module` and associated directives
- Secured a virtual host using SSL/TLS

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Optimizing Your NGINX Configuration

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Optimizing Your NGINX Configuration

Lesson Objectives:

Explore a number of parameters that can be tuned to increase NGINX performance:

- `worker_processes`
- `worker_connections`
- `open_file_cache` / `open_file_cache_valid`
- Buffer sizes
- Timeouts
- `access_log` buffering

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Optimizing Your NGINX Configuration

Load Testing:

ApacheBench

ab is a tool for benchmarking your Apache Hypertext Transfer Protocol (HTTP) server.

```
ab -c 1000 -n 100000 http://127.0.0.1/
```

<https://httpd.apache.org/docs/2.4/programs/ab.html>

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

Linux Academy

NGINX - The Engine of the Stack Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Optimizing Your NGINX Configuration

NGINX Tuning:

- `/etc/nginx/nginx.conf`
- Virtual host configuration files
- Other NGINX instances:
 - Upstream
 - Other servers
- May need to perform Linux kernel tuning if that is the bottleneck

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Optimizing Your NGINX Configuration

NGINX Tuning:

Parameters that can be tuned to increase NGINX performance:

- `worker_processes`
- `worker_connections`
- `open_file_cache / open_file_cache_valid`
- Buffer sizes
- Timeouts
- `access_log` buffering

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Optimizing Your NGINX Configuration

In this lesson, we:

Explored a number of parameters that can be tuned to increase NGINX performance:

- `worker_processes`
- `worker_connections`
- `open_file_cache / open_file_cache_valid`
- Buffer sizes
- Timeouts
- `access_log` buffering

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Hands-On Lab: Configuring the NGINX Server - HTTP Virtual Hosts / Rewrites / Custom Error Pages / Directives

[Next](#)[Back to Main](#)[Next Section](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

In this lab, we are going to explore configuring NGINX

Lab Objectives:

- Configure a HTTP virtual host
- Create a rewrite
- Configure a custom error page
- Learn how to use the upstream directive

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be configuring HTTP virtual hosts, rewrites, custom error pages, and directives on an Ubuntu Linux server.

Let's begin!

Back

Back to Main

Next Section

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Hands-On Lab: Managing SSL Certificates Using OpenSSL

Next

Back to Main

Next Section

NGINX - The Engine of the Stack

Section 3

[Configuring the NGINX Server](#)[NGINX - Resources and Documentation](#)[Basic NGINX Server Configuration](#)[NGINX - Configuring Virtual Hosts](#)[Configuring Custom Error Pages in NGINX](#)[NGINX - Directives - Upstream / Location / Return](#)[NGINX - Rewrites - An Introduction](#)[NGINX - Load Balancing - An Introduction](#)[Blocking Access by IP with NGINX](#)[Creating SSL Certificates Using OpenSSL](#)[Optimizing Your NGINX Configuration](#)[NGINX - Configuring and Customizing Log Files](#)[NGINX - Configuring / Customizing Logging](#)[MariaDB - Where the Data Lives](#)

In this lab, we are going to create an SSL certificate using OpenSSL

Lab Objectives:

- Create an SSL certificate using OpenSSL
- Validate the SSL certificate using OpenSSL

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be creating SSL certificates using OpenSSL on an Ubuntu Linux server. Let's begin!

[Back](#)

[Back to Main](#)

[Next Section](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Hands-On Lab: Configuring the NGINX Server - HTTPS Virtual Hosts / Load Balancing / IP Access Restrictions

[Next](#)[Back to Main](#)[Next Section](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

In this lab, we are going to explore configuring NGINX

Lab Objectives:

- Configure a HTTP virtual host to use HTTPS
- Configure load balancing
- Configure a virtual host to restrict access by IP address

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be configuring HTTPS virtual hosts, load balancing, and IP address restrictions on an Ubuntu Linux server.

Let's begin!

Back

Back to Main

Next Section

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Select the items below:

MariaDB - Where the Data Lives

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

Lesson Objectives:

- Learn about logs in NGINX
 - Access log
 - Error log
 - Logging defaults
- Learn how to customize logging in NGINX
- Learn about logging using **syslog**

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

Logs - NGINX Defaults:

There are two types of logs in NGINX:

- Access logs
- Error logs

Default log location is in `/var/log/nginx`.

Default `access_log` format is combined:

```
log_format combined '$remote_addr - $remote_user [$time_local] '
                    '"$request" $status $body_bytes_sent '
                    '"$http_referer" "$http_user_agent"';
```

Default `error_log` level is error.

Default log configuration in `/etc/nginx/nginx.conf`.

http://nginx.org/en/docs/http/nginx_http_log_module.html

[Back](#)[Next](#)

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

Error Logs:

Track application/server errors

Adjust logging level for more or less detail:

- More detail = larger log size
- Plan carefully, rotate/compress often!

http://nginx.org/en/docs/nginx_core_module.html#error_log

Back**Next****Back to Main****Next Section****Linux Academy**

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

Error Log Levels:

LOW --> HIGH**debug** - Debugging messages**info** - Informational messages**notice** - Notices**warn** - Warnings**error** - Errors while processing a request**crit** - Critical issues: Requires a prompt action**alert** - Alerts: Action must be taken immediately**emerg** - Emergency situation: The system is in an unusable state

Each log level includes the levels below it. The default log level is **error**.

http://nginx.org/en/docs/nginx_core_module.html#error_log

Back**Next****Back to Main****Next Section****Linux Academy**

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

Access Logs:

Track client requests

Customize the log format:

- Fields
- Order

Log format is defined here:
`/etc/nginx/nginx.conf`

http://nginx.org/en/docs/http/nginx_http_log_module.html#access_log

Back

Next

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack
Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

Logging to *syslog*:

NGINX supports sending the *access* and *error* logs to *syslog*.

server=address: Defines the address of a *syslog* server

The address can be specified as a domain name or IP address (with an optional port) or as a UNIX-domain socket path specified after the `unix:` prefix. If port is not specified, the UDP port 514 is used. If a domain name resolves to several IP addresses, the first resolved address is used.

facility=string: Sets facility of syslog messages, as defined in **RFC 3164**

Facility can be one of *kern*, *user*, *mail*, *daemon*, *auth*, *intern*, *lpr*, *news*, *uucp*, *clock*, *authpriv*, *ftp*, *ntp*, *audit*, *alert*, *cron*, or *local0*-*local7*. Default is *local7*.

severity=string: Sets severity of syslog messages for *access_log*, as defined in **RFC 3164**.

Possible values are the same as for the second parameter (level) of the *error_log* directive. Default is *info*.

[Back](#)<http://nginx.org/en/docs/syslog.html>[Next](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

*Logging to **syslog**:*

NGINX supports sending the **access** and **error** logs to **syslog**.

tag=stringSets the tag of **syslog** messages. Default is **nginx**.**nohostname**Disables adding the **hostname** field into the **syslog** message header (1.9.7).

```
error_log syslog:server=192.168.1.1 debug;  
access_log syslog:server=unix:/var/log/nginx.sock,nohostname;  
access_log  
syslog:server=[2001:db8::1]:12345,facility=local7,tag=nginx,severity=info  
combined;
```

<http://nginx.org/en/docs/syslog.html>

Back

Next



NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

NGINX - Configuring / Customizing Logging

In this lesson, we:

- Learned about logs in NGINX:
 - Access Log
 - Error Log
 - Logging defaults
- Learned how to customize logging in NGINX
- Learned about logging using `syslog`

Back

Back to Main

Next Section



Linux Academy

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Hands-On Lab: NGINX - Customizing Logging to Fit Your Needs

Next

Back to Main

Next Section

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

In this lab, we are going to customize logging in NGINX

Lab Objectives:

- Configure a custom logging location in NGINX
- Change the error log level in NGINX
- Configure custom access log formatting in NGINX

[Back](#)[Next](#)[Back to Main](#)[Next Section](#)

NGINX - The Engine of the Stack

Section 3

Configuring the NGINX Server

NGINX - Resources and Documentation

Basic NGINX Server Configuration

NGINX - Configuring Virtual Hosts

Configuring Custom Error Pages in NGINX

NGINX - Directives - Upstream / Location / Return

NGINX - Rewrites - An Introduction

NGINX - Load Balancing - An Introduction

Blocking Access by IP with NGINX

Creating SSL Certificates Using OpenSSL

Optimizing Your NGINX Configuration

NGINX - Configuring and Customizing Log Files

NGINX - Configuring / Customizing Logging

MariaDB - Where the Data Lives

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be configuring custom NGINX logging on a Ubuntu Linux server. Let's begin!

Back

Back to Main

Next Section

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Select on the items below to see each exam domains:

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

MariaDB - Resources and Documentation

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and DocumentationConfiguring and
Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

MariaDB - Resources and Documentation

Lesson Objectives:

- Explore the MariaDB websites:
 - <https://mariadb.org>
 - Downloads
 - Documentation
 - Knowledge Base
 - <https://mariadb.com/services>
 - Services
 - Training
- Explore the MySQL Documentation website:
 - <https://dev.mysql.com/doc/>

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and DocumentationConfiguring and
Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

MariaDB - Resources and Documentation

MariaDB Websites:

- <https://mariadb.org>
 - Downloads
 - Documentation
 - Knowledge Base
- <https://mariadb.com/services>
 - Services
 - Training

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and DocumentationConfiguring and
Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

MariaDB - Resources and Documentation

MySQL Documentation:

- MySQL Documentation website:
- <https://dev.mysql.com/doc/>

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and DocumentationConfiguring and
Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

MariaDB - Resources and Documentation

In this lesson, we:

- Explored the MariaDB websites:
 - <https://mariadb.org>
 - Downloads
 - Documentation
 - Knowledge Base
 - <https://mariadb.com/services>
 - Services
 - Training
- Explored the MySQL Documentation website:
 - <https://dev.mysql.com/doc/>

Back**Back to Main****Linux Academy**

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Lesson Objectives:

- Secure the default MariaDB installation using the `'mysql_secure_installation'` script
- Configure the network and the second port
- Configure firewall for MariaDB
- Configure Data-in-Transit Encryption
- Configure Data-at-Rest Encryption

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Default Installation:

- No **root** (database) password
- May have **anonymous** users
- Remote **root** (database) login enabled
- Has a **test** database that most people don't use

MariaDB provides a guide for securing MariaDB:

<https://mariadb.com/kb/en/library/securing-mariadb/>

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

*The **mysql_secure_installation** script:*

- Sets **root** (database) password
- Removes **anonymous** users
- Disables remote **root** (database) login
- Removes the **test** database that most people don't use

`mysql_secure_installation`[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Configuring the "extra port" and network:

In order to make MariaDB available outside of the localhost (127.0.0.1), we need to set the `bind-address` variable in the `/etc/mysql/mariadb.conf.d/50-server.cnf` file:

```
vi /etc/mysql/mariadb.conf.d/50-server.cnf
```

Change the following line from 127.0.0.1 to the private network address of your server:

```
bind-address = 10.0.1.223
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Configuring the "extra port" and network:

We'd also like to configure an "extra port" so we can access the server for administrative connections. This is primarily intended for situations where all threads in the thread pool are blocked, and we still need a way to access the server. However, it can also be used to ensure that monitoring systems always have access to the system, even when all connections on the main port are used.

Add the following lines in the `[mariadb]` section in `/etc/mysql/mariadb.conf.d/50-server.cnf`:

```
[mariadb]
# Second Admin Port
extra_port = 8385
extra_max_connections = 10
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Configuring the "extra port" and network:

Save the configuration file, then restart the 'mariadb' service using `systemctl`:

```
systemctl restart mariadb
```

Check the status of the `mariadb` service:

```
systemctl status mariadb
```

The `mariadb` service should be *enabled* and *active*:

```
netstat -anp | egrep "3306|8385"
```

You should see the `mariadb` service listening on both ports 3306 and 8385, on the private IP address of the server.

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Configuring the Firewall to Support MariaDB:

Check the initial status of the firewall:

```
ufw status
```

Open ports 3306 and 8385 to allow inbound MariaDB traffic:

```
ufw allow 3306
```

```
ufw allow 8385
```

Recheck the status of the firewall:

```
ufw status
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Create a Certificate Authority Private Key and Certificate:

Create a Private Key for the CA:

```
openssl genrsa 2048 > ca-key.pem
```

Generate a X509 Certificate for the CA:

```
openssl req -new -x509 -nodes -days 365000 \
-key ca-key.pem -out ca-cert.pem
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Create a Private Key and a Self-Signed Certificate for the MariaDB Server:

Create a Private Key and CA request:

```
openssl req -newkey rsa:2048 -days 365000 \
-nodes -keyout server-key.pem -out server-req.pem
```

Process the key to remove the passphrase:

```
openssl rsa -in server-key.pem -out server-key.pem
```

Generate a self-signed X509 certificate:

```
openssl x509 -req -in server-req.pem -days 365000 \
-CA ca-cert.pem -CAkey ca-key.pem -set_serial 01 \
-out server-cert.pem
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Create a Private Key and a Self-Signed Certificate for the MariaDB Client:

Create a Private Key and CA request:

```
openssl req -newkey rsa:2048 -days 365000 \
-nodes -keyout client-key.pem -out client-req.pem
```

Process the key to remove the passphrase:

```
openssl rsa -in client-key.pem -out client-key.pem
```

Generate a self-signed X509 certificate:

```
openssl x509 -req -in client-req.pem -days 365000 \
-CA ca-cert.pem -CAkey ca-key.pem -set_serial 01 \
-out client-cert.pem
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Enable TLS for the MariaDB Server:

Edit the server configuration file:

```
vi /etc/mysql/mariadb.conf.d/50-server.cnf
```

Add the following to the `[mariadb]` configuration block:

```
# SSL Configuration
ssl_cert = /etc/mysql/certificates/server-cert.pem
ssl_key = /etc/mysql/certificates/server-key.pem
ssl_ca = /etc/mysql/certificates/ca-cert.pem
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Enable TLS for the MariaDB Client:

Edit the client configuration file:

```
vi /etc/mysql/mariadb.conf.d/50-client.cnf
```

Add the following to the `[client-mariadb]` configuration block:

```
# SSL Configuration
ssl_cert = /etc/mysql/certificates/client-cert.pem
ssl_key = /etc/mysql/certificates/client-key.pem
ssl_ca = /etc/mysql/certificates/ca-cert.pem
```

Restart the MariaDB server:

```
systemctl restart mariadb
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources
and Documentation**Configuring and
Securing MariaDB****PHP - Follow the Script**

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Check that TLS is enabled on the MariaDB server:

Check SSL/TLS settings via the MariaDB client:

```
mysql -u root -p
```

```
SHOW VARIABLES LIKE 'have_ssl';
```

```
SHOW SESSION STATUS LIKE 'Ssl_cipher';
```

```
SHOW VARIABLES LIKE '%ssl%';
```

Check SSL/TLS settings using OpenSSL:

```
openssl s_client -connect YOUR_PRIVATE_IP:3306 -tls1
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Configuring Data-at-Rest Encryption:

Create the Encryption Key File:

```
mkdir -p /etc/mysql/encryption
```

```
cd /etc/mysql/encryption
```

```
for i in `seq 1 10` ; do echo $i";"openssl rand -hex 32` >> /etc/mysql/encryption/keyfile ; done
```

Encrypt the Encryption Key File:

```
openssl rand -hex 128 >  
/etc/mysql/encryption/keyfile.key
```

```
openssl enc -aes-256-cbc -md sha1 \  
-pass file:/etc/mysql/encryption/keyfile.key \  
-in /etc/mysql/encryption/keyfile \  
-out /etc/mysql/encryption/keyfile.enc
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Configuring MariaDB to Use the Encrypted Key File:

Edit the MariaDB server configuration file:

```
vi /etc/mysql/mariadb.conf.d/50-server.cnf
```

Add the following to the `[mariadb]` configuration block, then restart the MariaDB server:

```
# Encryption at Rest
plugin-load-add=file_key_management
loose_file_key_management_filename =
/etc/mysql/encryption/keyfile.enc
loose_file_key_management_filekey =
FILE:/etc/mysql/encryption/keyfile.key
loose_file_key_management_encryption_algorithm = AES_CTR
innodb-encrypt-tables
innodb-encrypt-log
innodb-encryption-threads = 4
innodb-tablespaces-encryption
innodb_default_encryption_key_id=7
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Validate Encryption is Working, Create an Encrypted Database Table:

```
mysql -u root -p
```

```
CREATE DATABASE encryption_test;
```

```
USE encryption_test;
```

```
CREATE TABLE tab1 (  
  id int PRIMARY KEY,  
  str varchar(50)  
);
```

```
SELECT NAME, ENCRYPTION_SCHEME, CURRENT_KEY_ID FROM  
information_schema.INNODB_TABLESPACES_ENCRYPTION WHERE  
NAME='encryption_test/tab1';
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Create an Unencrypted Database Table:

```
CREATE TABLE tab2 (  
    id int PRIMARY KEY,  
    str varchar(50)  
) ENCRYPTED=NO;
```

```
SELECT NAME, ENCRYPTION_SCHEME, CURRENT_KEY_ID FROM  
information_schema.INNODB_TABLESPACES_ENCRYPTION WHERE  
NAME='encryption_test/tab2';
```

Back

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Force Encryption on the DB:

```
SET GLOBAL innodb_encrypt_tables='FORCE';
```

```
SHOW VARIABLES LIKE '%innodb%';
```

```
SHOW VARIABLES LIKE '%innodb_enc%';
```

```
CREATE TABLE tab3 (  
  id int PRIMARY KEY,  
  str varchar(50)  
) ENCRYPTED=NO;
```

```
SELECT NAME, ENCRYPTION_SCHEME, CURRENT_KEY_ID FROM  
information_schema.INNODB_TABLESPACES_ENCRYPTION  
WHERE NAME='encryption_test/tab3';
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

In this lesson, we:

- Secured the default MariaDB installation using the ``mysql_secure_installation`` script
- Configured the network and the second port
- Configured the firewall for MariaDB
- Configured In-Flight Encryption
- Configured At-Rest Encryption

MariaDB provides a guide for securing MariaDB:
<https://mariadb.com/kb/en/library/securing-mariadb/>

Back**Back to Main****Linux Academy**

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

PHP - Follow the Script**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

[Next](#)[Back to Main](#)

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

PHP - Follow the Script**PHP - Follow the Script**

Section 5

Conclusion

Section 6

In this lab, we are going to secure our default installation of MariaDB

Lab Objectives:

- Secure the default MariaDB installation using the `mysql_secure_installation` script
- Configure the network and the second port
- Configure firewall for MariaDB
- Configure In-Flight Encryption
- Configure At-Rest Encryption

MariaDB provides a guide for securing MariaDB:
<https://mariadb.com/kb/en/library/securing-mariadb/>

[Back](#)[Next](#)[Back to Main](#)

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources
and Documentation**PHP - Follow the Script****PHP - Follow the Script**

Section 5

Conclusion

Section 6

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be securing our new MariaDB installation as part of deploying the new environment. Let's begin!

[Back](#)[Back to Main](#)

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Next

Back to Main



Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources
and Documentation**Configuring and
Securing MariaDB****PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Lab Objectives:

- Secure the default MariaDB installation using the 'mysql_secure_installation' script
- Configure the network and the second port
- Configure firewall for MariaDB
- Configure Data-in-Transit Encryption
- Configure Data-at-Rest Encryption

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Default Installation:

- No root (database) password
- May have anonymous users
- Remote root (database) login enabled
- Has a test database that most people don't use

MariaDB provides a guide for securing MariaDB:

<https://mariadb.com/kb/en/library/securing-mariadb/>

Back**Next****Back to Main****Linux Academy**

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources
and Documentation**Configuring and
Securing MariaDB****PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

The `mysql_secure_installation` script:

- Sets root (database) password
- Removes anonymous users
- Disables remote root (database) login
- Removes the test database that most people don't use

`mysql_secure_installation`[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Configuring the "extra port" and network:

In order to make MariaDB available outside of the localhost (127.0.0.1), we need to set the bind-address variable in the `/etc/mysql/mariadb.conf.d/50-server.cnf` file:

```
vi /etc/mysql/mariadb.conf.d/50-server.cnf
```

Change the following line from 127.0.0.1 to the private network address of your server:

```
bind-address                = 10.0.1.223
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources
and Documentation**Configuring and
Securing MariaDB****PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Configuring the "extra port" and network:

We'd also like to configure an "extra port" so we can access the server for administrative connections. This is primarily intended for situations where all threads in the thread pool are blocked, and we still need a way to access the server. However, it can also be used to ensure that monitoring systems always have access to the system, even when all connections on the main port are used.

Add the following lines in the `[mariadb]` section in `/etc/mysql/mariadb.conf.d/50-server.cnf`:

```
[mariadb]
# Second Admin Port
extra_port = 8385
extra_max_connections = 10
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of
the Stack

Section 2

NGINX - The Engine of the
Stack

Section 3

MariaDB - Where the Data
Lives

Section 4

MariaDB Basics

MariaDB - Resources
and DocumentationConfiguring and
Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Configuring the "extra port" and network:

Save the configuration file, then restart the 'mariadb' service using `systemctl`:

```
systemctl restart mariadb
```

Check the status of the mariadb service:

```
systemctl status mariadb
```

The mariadb service should be *enabled* and *active*:

```
netstat -anp | egrep "3306|8385"
```

You should see the mariadb service listening on both ports 3306 and 8385, on the internal IP address of the server.

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Configuring the Firewall to Support MariaDB:

Check the initial status of the firewall:

```
ufw status
```

Open ports 3306 and 8385 to allow inbound MariaDB traffic:

```
ufw allow 3306
```

```
ufw allow 8385
```

Recheck the status of the firewall:

```
ufw status
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources
and Documentation**Configuring and
Securing MariaDB****PHP - Follow the Script**

Section 5

Conclusion

Section 6

Configuring and Securing MariaDB

Create a Certificate Authority Private Key and Certificate:

Create a Private Key for the CA:

```
openssl genrsa 2048 > ca-key.pem
```

Generate a X509 Certificate for the CA:

```
openssl req -new -x509 -nodes -days 365000 \
-key ca-key.pem -out ca-cert.pem
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Create a Private Key and a Self-Signed Certificate for the MariaDB Server:

Create a Private Key and CA request:

```
openssl req -newkey rsa:2048 -days 365000 \  
-nodes -keyout server-key.pem -out server-req.pem
```

Process the key to remove the passphrase:

```
openssl rsa -in server-key.pem -out server-key.pem
```

Generate a self-signed X509 certificate:

```
openssl x509 -req -in server-req.pem -days 365000 \  
-CA ca-cert.pem -CAkey ca-key.pem -set_serial 01 \  
-out server-cert.pem
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Create a Private Key and a Self-Signed Certificate for the MariaDB Client:

Create a Private Key and CA request:

```
openssl req -newkey rsa:2048 -days 365000 \
-nodes -keyout client-key.pem -out client-req.pem
```

Process the key to remove the passphrase:

```
openssl rsa -in client-key.pem -out client-key.pem
```

Generate a self-signed X509 certificate:

```
openssl x509 -req -in client-req.pem -days 365000 \
-CA ca-cert.pem -CAkey ca-key.pem -set_serial 01 \
-out client-cert.pem
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Enable TLS for the MariaDB Server:

Edit the server configuration file:

```
vi /etc/mysql/mariadb.conf.d/50-server.cnf
```

Add the following to the [mariadb] configuration block:

```
# SSL Configuration
ssl_cert = /etc/mysql/certificates/server-cert.pem
ssl_key = /etc/mysql/certificates/server-key.pem
ssl_ca = /etc/mysql/certificates/ca-cert.pem
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Enable TLS for the MariaDB Client:

Edit the client configuration file:

```
vi /etc/mysql/mariadb.conf.d/50-client.cnf
```

Add the following to the [client-mariadb] configuration block:

```
# SSL Configuration
ssl_cert = /etc/mysql/certificates/client-cert.pem
ssl_key = /etc/mysql/certificates/client-key.pem
ssl_ca = /etc/mysql/certificates/ca-cert.pem
```

Restart the MariaDB server:

```
systemctl restart mariadb
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Check that TLS is enabled on the MariaDB server:

Check SSL/TLS settings via the MariaDB client:

```
mysql -u root -p
```

```
SHOW VARIABLES LIKE 'have_ssl';
```

```
SHOW SESSION STATUS LIKE 'Ssl_cipher';
```

```
SHOW VARIABLES LIKE '%ssl%';
```

Check SSL/TLS settings using OpenSSL:

```
openssl s_client -connect YOUR_PRIVATE_IP:3306 -tls1
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Configuring Data-at-Rest Encryption:

Create the Encryption Key File:

```
mkdir -p /etc/mysql/encryption
```

```
cd /etc/mysql/encryption
```

```
for i in `seq 1 10` ; do echo $i";"`openssl rand -hex 32` >> /etc/mysql/encryption/keyfile ; done
```

Encrypt the Encryption Key File:

```
openssl rand -hex 128 >  
/etc/mysql/encryption/keyfile.key
```

```
openssl enc -aes-256-cbc -md sha1 \  
-pass file:/etc/mysql/encryption/keyfile.key \  
-in /etc/mysql/encryption/keyfile \  
-out /etc/mysql/encryption/keyfile.enc
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Configuring MariaDB to Use the Encrypted Key File:

Edit the MariaDB server configuration file:

```
vi /etc/mysql/mariadb.conf.d/50-server.cnf
```

Add the following to the [mariadb] configuration block, then restart the MariaDB server:

```
# Encryption at Rest
plugin-load-add=file_key_management
loose_file_key_management_filename =
/etc/mysql/encryption/keyfile.enc
loose_file_key_management_filekey =
FILE:/etc/mysql/encryption/keyfile.key
loose_file_key_management_encryption_algorithm = AES_CTR
innodb-encrypt-tables
innodb-encrypt-log
innodb-encryption-threads = 4
innodb-tablespaces-encryption
innodb_default_encryption_key_id=7
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Validate Encryption is Working, Create an Encrypted Database Table:

```
mysql -u root -p
```

```
CREATE DATABASE encryption_test;
```

```
USE encryption_test;
```

```
CREATE TABLE tab1 (  
  id int PRIMARY KEY,  
  str varchar(50)  
);
```

```
SELECT NAME, ENCRYPTION_SCHEME, CURRENT_KEY_ID FROM  
information_schema.INNODB_TABLESPACES_ENCRYPTION WHERE  
NAME='encryption_test/tab1';
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Create an Unencrypted Database Table:

```
CREATE TABLE tab2 (  
    id int PRIMARY KEY,  
    str varchar(50)  
) ENCRYPTED=NO;
```

```
SELECT NAME, ENCRYPTION_SCHEME, CURRENT_KEY_ID FROM  
information_schema.INNODB_TABLESPACES_ENCRYPTION WHERE  
NAME='encryption_test/tab2';
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB

PHP - Follow the Script

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

Force Encryption on the DB:

```
SET GLOBAL innodb_encrypt_tables='FORCE';
```

```
SHOW VARIABLES LIKE '%innodb%';
```

```
SHOW VARIABLES LIKE '%innodb_enc%';
```

```
CREATE TABLE tab3 (  
  id int PRIMARY KEY,  
  str varchar(50)  
) ENCRYPTED=NO;
```

```
SELECT NAME, ENCRYPTION_SCHEME, CURRENT_KEY_ID FROM  
information_schema.INNODB_TABLESPACES_ENCRYPTION  
WHERE NAME='encryption_test/tab3';
```

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Course Introduction

Section 1

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

MariaDB Basics

MariaDB - Resources and Documentation

Configuring and Securing MariaDB**PHP - Follow the Script**

Section 5

Conclusion

Section 6

Hands-On Lab: Configuring and Securing MariaDB

In this lab, we:

- Secured the default MariaDB installation using the ``mysql_secure_installation`` script
- Configured the network and the second port
- Configured the firewall for MariaDB
- Configured In-Flight Encryption
- Configured At-Rest Encryption

MariaDB provides a guide for securing MariaDB:

<https://mariadb.com/kb/en/library/securing-mariadb/>

Now that you have a LEMP stack installed and running on Ubuntu, with NGINX configured and MariaDB secured, you can proceed with building your website/application!

[Back](#)[Back to Main](#)

Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Select on the items below to see each exam domains:

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Next

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction
Installing and
Configuring PHP-FPM

Conclusion

Section 6

PHP - Follow the Script

PHP - Resources and Documentation

PHP - Resources and Documentation

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction
Installing and Configuring PHP-FPM

Conclusion
Section 6

PHP - Resources and Documentation

Lesson Objectives:

- Explore the PHP Website
- <https://php.net>
- Documentation
- Downloads
- News

Back

Next

Back to Main



Linux Academy

PHP - Resources and Documentation

PHP Website:

- <https://php.net>
- Documentation
- Downloads
- News

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction
Installing and Configuring PHP-FPM

Conclusion
Section 6

PHP - Resources and Documentation

In this lesson, we:

- Explored the PHP Website
- <https://php.net>
- Documentation
- Downloads
- News

Back

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

PHP - An Introduction

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

PHP - An Introduction

Lesson Objectives:

- Learn how PHP and PHP-FPM fit into the LEMP Stack
- Look at some example PHP code

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

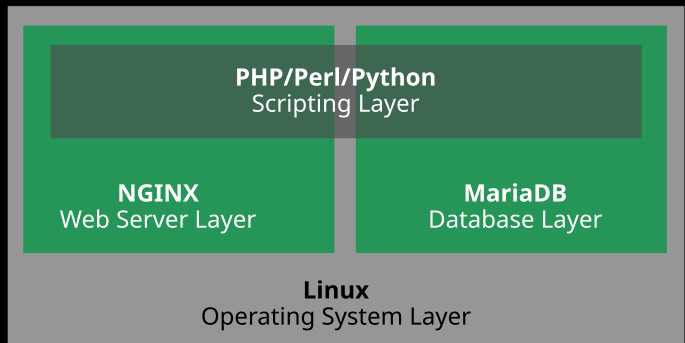
PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

What is the LEMP Stack?



Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

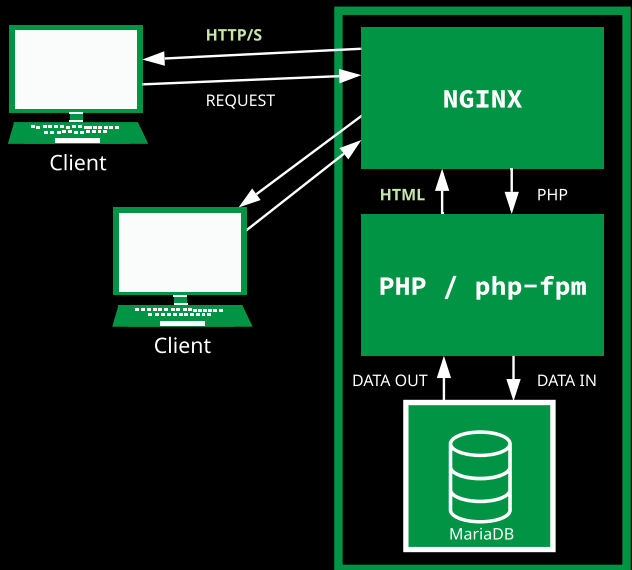
PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion
Section 6

PHP - An Introduction

PHP / PHP-FPM / LEMP



Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

PHP - An Introduction

PHP Example

```
<html>
<head>
  <title>PHP Test Page</title>
</head>
<body>
  <?php echo '<p>This is a PHP Test Page!</p>'; ?>
</body>
</html>
```

This is our example `hello.php` file.
Most of the file is HTML code, in pink.
The PHP code is in blue.

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of
the Stack
Section 2

NGINX - The Engine of the
Stack
Section 3

MariaDB - Where the Data
Lives
Section 4

PHP - Follow the Script
Section 5

Working With PHP on the
LEMP Stack

PHP - Resources and
Documentation

PHP - An Introduction

Installing and
Configuring PHP-FPM

Conclusion
Section 6

PHP - An Introduction

PHP Example

```
<html>
<head>
  <title>PHP Test Page</title>
</head>
<body>
  <?php
    // Here is a comment
    // Here is another comment
    # This is also a comment
    # Comments are fantastic!
    echo '<p>This is a PHP Test Page!</p>';
  ?>
</body>
</html>
```

This is our example `hello1.php` file. Most of the file is HTML code, in pink. The PHP code is in blue.

Let's add some comments in orange.

[Back](#)[Next](#)[Back to Main](#)

Linux Academy

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion
Section 6

PHP - An Introduction

PHP Example

```
<html>
<head>
  <title>PHP Test Page</title>
</head>
<body>
  <?php
    // Let's try some variables!
    $language = 'PHP';
    echo "This is a $language Test Page!<br>";
    echo "We love to program in $language!<br>";
  ?>
</body>
</html>
```

This is our example `hello2.php` file. Most of the file is HTML code, in pink. The PHP code is in blue. Comments are in orange.

Let's try a variable in yellow.

[Back](#)

[Next](#)

[Back to Main](#)



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

PHP - An Introduction

In this lesson, we:

- Learned how PHP and PHP-FPM fit into the LEMP Stack
- Looked at some example PHP code

Back

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

Lesson Objectives:

- Learn about the `php-fpm` service
- Explore how PHP-FPM is configured
- Install PHP-FPM on an Ubuntu Linux server
- Configure NGINX to send PHP pages to PHP-FPM for processing
- Test serving some PHP pages using NGINX and PHP-FPM

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

What is PHP-FPM?

- FPM (FastCGI Process Manager) is an alternative PHP FastCGI implementation with some additional features (mostly) useful for heavy-loaded sites.

<https://www.php.net/manual/en/install.fpm.php>

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

Install PHP-FPM:

- The **php-fpm** service can be installed from the default repositories of most major Linux distributions:

```
apt-get -y install php-fpm
```

```
systemctl status php7.2-fpm.service
```

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

Configuring PHP-FPM:

- Main file:

- `/etc/php/7.2/fpm/php-fpm.conf`

- Modules:

- `/etc/php/7.2/fpm/pool.d/*.conf`

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

Configuring NGINX to use PHP-FPM:

- With `php-fpm` now listening on a UNIX socket, we need to configure NGINX to send PHP files to it:

```
vi /etc/nginx/conf.d/default.conf
```

```
location ~ \.php$ {
    fastcgi_pass unix:/run/php/php7.2-fpm.sock;
    fastcgi_param SCRIPT_FILENAME $document_root$fastcgi_script_name;
    include fastcgi_params;
    include snippets/fastcgi-php.conf;
}
```

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

Testing PHP-FPM:

- Two PHP files on the server:

- `/usr/share/nginx/html/info.php`
- `/usr/share/nginx/html/hello.php`

We'll access these via NGINX before and after a reload to see how they are handled:

```
curl http://`cat /tmp/public_dns.txt`/hello.php
```

```
curl http://`cat /tmp/public_dns.txt`/info.php
```

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Installing and Configuring PHP-FPM

In this lesson, we:

- Learned about the `php-fpm` service
- Explored how PHP-FPM is configured
- Installed PHP-FPM on an Ubuntu Linux server
- Configured NGINX to send PHP pages to PHP-FPM for processing
- Tested serving some PHP pages using NGINX and PHP-FPM

[Back](#)

[Back to Main](#)



Linux Academy

 Course Navigation

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion
Section 6

Hands-On Lab: Installing and Configuring PHP-FPM

Next

Back to Main

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM**Conclusion**

Section 6

In this lab, we are going to install and configure php-fpm.

Lesson Objectives:

- Deploy **php-fpm** on Ubuntu Linux
- Test serving some PHP content with NGINX and **php-fpm**

[Back](#)[Next](#)[Back to Main](#)

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion
Section 6

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be deploying and configuring php-fpm on an Ubuntu Linux server for developing and testing PHP code before deploying the new environment. Let's begin!

Back

Back to Main

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Hands-On Lab: Deploying phpMyAdmin on the LEMP Stack on Ubuntu Linux

Next

Back to Main

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

In this lab, we are going to deploy phpMyAdmin.

Lesson Objectives:

- Learn about phpMyAdmin
- Deploy phpMyAdmin on a LEMP stack on Ubuntu Linux
- Explore phpMyAdmin and MariaDB

Back

Next

Back to Main

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Working With PHP on the LEMP Stack

PHP - Resources and Documentation

PHP - An Introduction

Installing and Configuring PHP-FPM

Conclusion

Section 6

Big State College (BSC) is a Large Ten Conference school in a Midwestern state. BSC is looking to deploy a centralized web hosting service using the LEMP stack.

As the engineers tasked with executing this project, we will be deploying and configuring phpMyAdmin on an Ubuntu Linux server, for managing the new MariaDB environment. Let's begin!

Back

Back to Main

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6

Final Words

LEMP - A Review

LEMP - More Resources on Linux Academy

Select on the items below to see each exam domains:

LEMP - A Review

LEMP - More Resources on Linux Academy

Next

Back to Main



Linux Academy

 Course Navigation**Linux - The Foundation of the Stack**

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6

Final Words

LEMP - A ReviewLEMP - More Resources
on Linux Academy

LEMP - A Review

[Next](#)[Back to Main](#)

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Conclusion
Section 6

Final Words

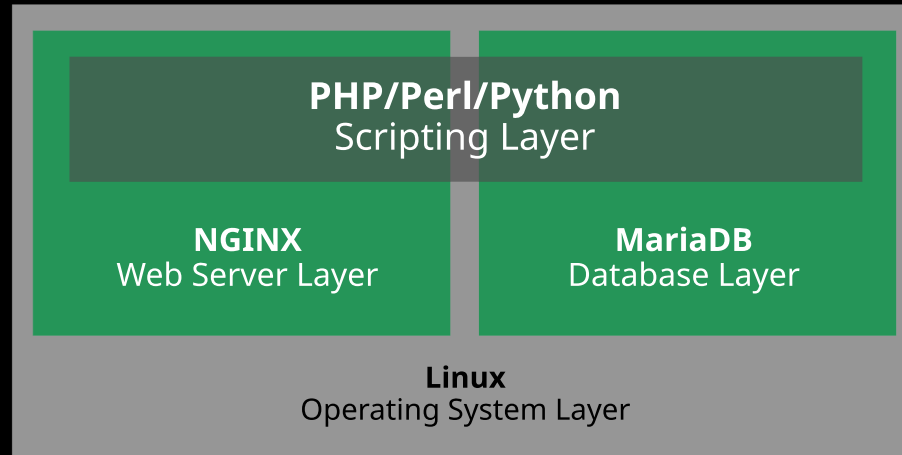
LEMP - A Review

LEMP - More Resources
on Linux Academy

[Back to Main](#)

LEMP - A Review

LEMP Stack



[Back](#)

[Next](#)

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6

Final Words

LEMP - A ReviewLEMP - More Resources
on Linux Academy

LEMP - A Review

NGINX

- HTTP/S web server
 - Built for performance
 - Low memory overhead
- Load-balancing functionality
- Proxying / caching functionality
- Many advanced features
- Included in the standard repositories for many Linux distributions
- Growing market share

[Back](#)[Next](#)[Back to Main](#)

LEMP - A Review

MariaDB

- MariaDB was created as a response to Oracle's acquisition of Sun Microsystems, and MySQL AG, in 2010.
- MariaDB is fully open-source.
- MariaDB is a "drop-in binary replacement" for MySQL.
- There are some feature differences.
- Commercial support is available for MariaDB.

[Back](#)[Next](#)

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Conclusion
Section 6

Final Words

LEMP - A Review

LEMP - More Resources
on Linux Academy

LEMP - A Review

PHP

- Recursive acronym for PHP: Hypertext Preprocessor
- A widely-used open source general-purpose scripting language
- Especially suited for web development
- Can be embedded into HTML
- Is executed on the server side, returns HTML:
 - Code is hidden from the client

Back

Next

Back to Main

Linux - The Foundation of the Stack
Section 2

NGINX - The Engine of the Stack
Section 3

MariaDB - Where the Data Lives
Section 4

PHP - Follow the Script
Section 5

Conclusion
Section 6

Final Words

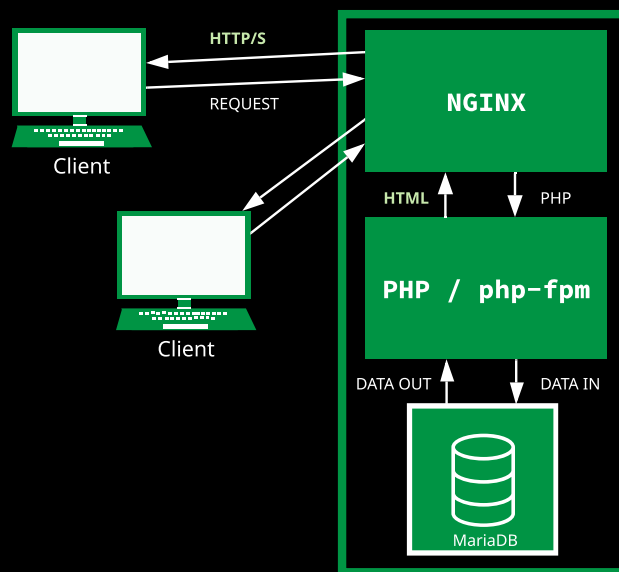
LEMP - A Review

LEMP - More Resources on Linux Academy

[Back to Main](#)

LEMP - A Review

PHP / PHP-FPM / LEMP



[Back](#)

[Next](#)

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

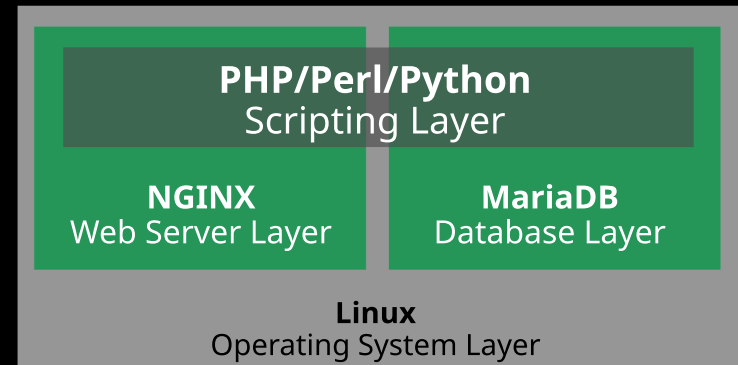
Section 6

Final Words

LEMP - A ReviewLEMP - More Resources
on Linux Academy

LEMP - A Review

THANK YOU!

[Back](#)[Back to Main](#)

**Linux - The Foundation of
the Stack**
Section 2

**NGINX - The Engine of the
Stack**
Section 3

**MariaDB - Where the Data
Lives**
Section 4

PHP - Follow the Script
Section 5

Conclusion
Section 6

Final Words

LEMP - A Review

**LEMP - More
Resources on Linux
Academy**

LEMP - More Resources on Linux Academy

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6

Final Words

LEMP - A Review

LEMP - More Resources on Linux Academy

LEMP - More Resources on Linux Academy

NGINX Web Server Deep Dive

By the time you've finished this course you will be able to:

- Read, write, and understand NGINX configuration
- Utilize NGINX as a web server, reverse proxy, and load balancer
- Build and install multiple dynamic modules to add features to NGINX
- Improve the performance of NGINX beyond the default configuration

<https://linuxacademy.com/cp/modules/view/id/169>

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6

Final Words

LEMP - A Review

LEMP - More Resources on Linux Academy

LEMP - More Resources on Linux Academy

Apache Web Server Hardening

This course covers securing the Apache web server:

- Securing an Apache web server
- Configuring a Linux firewall
- CentOS 7
- SELinux

<https://linuxacademy.com/cp/modules/view/id/404>

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6

Final Words

LEMP - A Review

LEMP - More Resources on Linux Academy

LEMP - More Resources on Linux Academy

Working with MySQL/MariaDB

In this hands-on lab, you will install MySQL/MariaDB on a CentOS 7 server. Once that is complete, you will be required to configure the server with the provided data.

<https://app.linuxacademy.com/hands-on-labs/90a5874f-a5bd-4fea-beec-5aed78ed17ce>

Back

Next

Back to Main



Linux Academy

Linux - The Foundation of the Stack

Section 2

NGINX - The Engine of the Stack

Section 3

MariaDB - Where the Data Lives

Section 4

PHP - Follow the Script

Section 5

Conclusion

Section 6

Final Words

LEMP - A Review

LEMP - More Resources on Linux Academy

LEMP - More Resources on Linux Academy

Database Administration and SQL Language Basics

In this course, we will be using MySQL to learn about administering a database, as well as the basics of the SQL language.

- The first half of the course begins with the installation of a MySQL server, then covers common administrative tasks.
- The second half of the course focuses on how to use the SQL language in order to view and manipulate data.

<https://linuxacademy.com/cp/modules/view/id/374>

Back

Next

Back to Main



Linux Academy

**Linux - The Foundation of
the Stack**
Section 2

**NGINX - The Engine of the
Stack**
Section 3

**MariaDB - Where the Data
Lives**
Section 4

PHP - Follow the Script
Section 5

Conclusion
Section 6

Final Words

LEMP - A Review

**LEMP - More
Resources on Linux
Academy**

**There is much more
content available -
search the Linux
Academy website**

[Back](#)

[Back to Main](#)



Linux Academy