Configuring a LAMP

Cybersecurity

Web Development Day 3

Today’s Objectives

By the end of class, you will be able to:

- Install packages on an Ubuntu machine.
- Configure the services required to run a LAMP server.
- Analyze the security advantages/disadvantages of different server architectures.

Overview and Setup

Overview and Set-up

Many web servers on the Internet run on top of:

Linux operating system

Apache web server

MySQL database

PHP programming language

And these are the technologies most frequently targets in attacks against web server.

LAMP:
Linux Package Management with apt

Linux users have their own version of Apple / Windows Store called Personal Package Archives (PPAs)

Package Management with apt

Remember: Ubuntu uses a toll called `apt` which allows users to easily install and remove software from PPAs.

Update sources / ensure they’re downloading the most recent software available.

Install packages

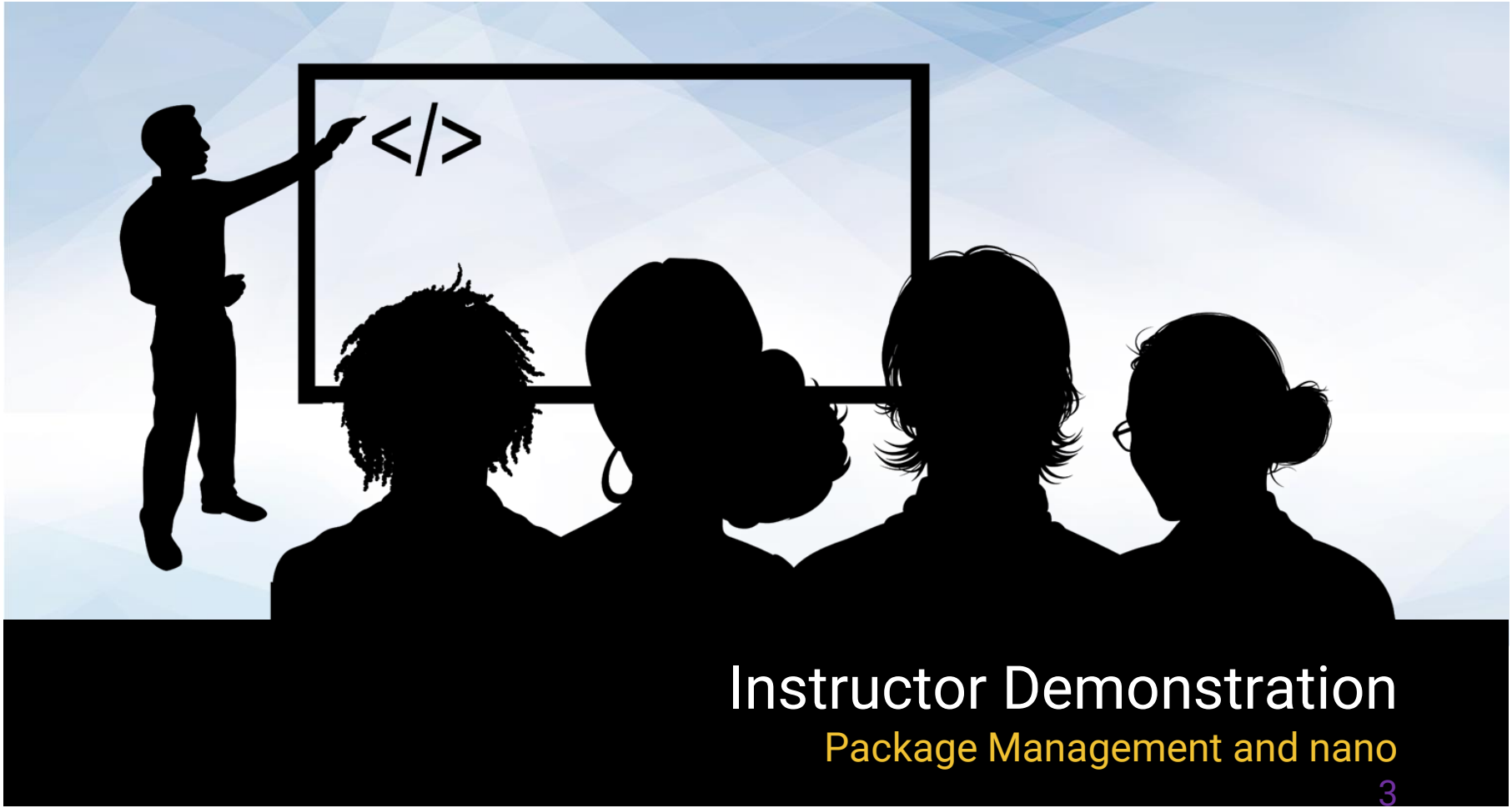
Update / patch packages

Uninstall / purge packages

Package Management and nano

In the next demo, we'll cover the covering topics

- Updating Sources
- Installing a Package
- Listing Installed Packages
- Removing Packages
- Editing Files with nano



Instructor Demonstration

Package Management and nano

Activity: Editing Files with Nano

In this activity, you will edit files using nano.

Activities/Stu_nano/README

Suggested Time:
10 Minutes

LAMP:
The Apache Web Server

The Apache Web Server

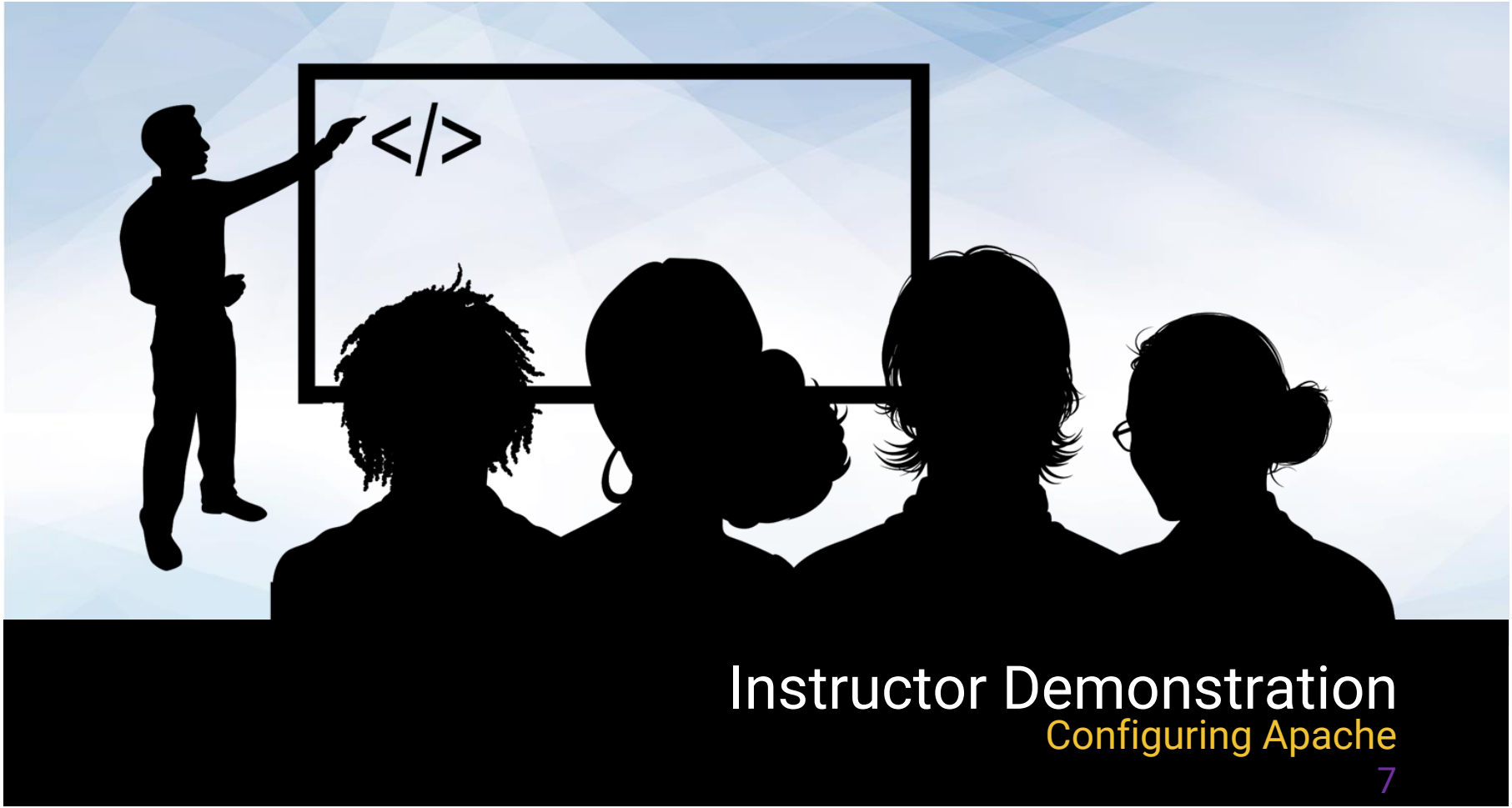
Apache is one of the most popular servers on the Internet, with over 75 million domains running some version as of August 2018.

An Apache service runs on the Linux host and listens for HTTP requests on port 80.

Upon receiving a request, the service finds the resource on the local file system and sends it to the client.

Note: Apache is simply a *service (daemon)* running on a Linux Machine

Responses essentially contain files stores on the server.



Instructor Demonstration

Configuring Apache

Activity: Configuring Apache

In this activity, you follow simple steps to install Apache2.

Activities/Stu_Install_and_Configure_Apache/README

Suggested Time:
15 Minutes

Times Up! Let’s Review.

Configuring Apache

Take a Break!

LAMP:
PHP: Hypertext Processor

PHP

PHP is a server-side programming language, meaning it runs on the web. (As opposed to a client-side language that runs in a browser.)

PHP is used by over 78% of websites whose programming is know.

Majority of the sites targets by hackers run PHP applications.

PHP has grown so popular because it is very user-friendly.

While it is the most ubiquitous server-side language on the web, it is slowly declining in popularity to languages such as Python, JavaScript, and Ruby

Activity: Configuring PHP

In this activity, you will install and configure PHP.

Activities/Stu_Install_and_Configure_PHP/README

Suggested Time:
10 Minutes

LAMP:
The MySQL Database

MySQL

MySQL is a database commonly used to store data from web application. Rather than listen to requests from clients like web browsers / end users:

01 A client requests data through an application.

02 The application service receives the request.

03 The service receives the data from MySQL.

04 MySQL responds to the service with data.

05 The application service responds to the original client with data, and any other information,

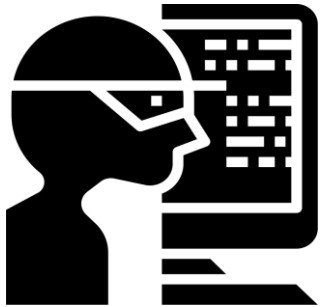
MySQL: Security and Databases

Databases are often the target of attacks due to the valuable information stored within them.

Two of the most common categories of attacks against databases are:

SQL Injections: Attackers “trick” web applications into retrieving sensitive data.

Vulnerability Exploits: Attackers hack into and attack the MySQL server directly.



Activity: Configuring MySQL

In this activity, you will install and configure MySQL and answer some relevant questions.

Activities/Stu_Install_and_Configure_MySQL/README

Suggested Time:
15 Minutes

Server Architecture

In real deployments, it's unwise to keep the database and application/web server on the same machine.

Next, we'll look at server architectures and cover the advantages and disadvantages of different arrangements of machines and services

Types of Architecture

Familiarity with basic server architecture provides insight into each's security profile.

- Single Host
- Dual Host
- Web Farm without Database Cluster
- Web Farm with Database Cluster
- Web Farm with Application Servers
- Web Farm with Load-Balanced Application

Single Host and Dual Host

When a single host runs both the web server and the database:

- Advantages: Simple to set up

- Disadvantages: Doesn’t scale, insecure, single point of failure.

In dual host setups, one host runs a web server and another runs a database.

- Advantages: More secure than a single host architecture

- Disadvantages: Still doesn’t scale well, still has single point of failure.

Web Farm with and without Database Cluster

Without Database Cluster: In a web farm, requests go through a load balancer, then to one of many web servers. The web servers then make requests to the database.

- Advantages: Scales better, availability is improved
- Disadvantages: only slightly more secure than previous architectures, confidentiality and Integrity still at risk.

Without Database Cluster: Same as a web farm, but with multiple databases instead of just one.

- Advantages: Same as without, but with better availability.
- Disadvantages: Same as without.

Web Farm with Application Servers / (with Load Balanced)

With Database Cluster: In a **Web Farm with Application Servers**,

1. requests go through a load balancer;
2. then to a Web Server, which handles HTTP requests;
3. and then from the Web Server to an **Application Server**, which is another server that figures out how to fulfill the HTTP requests.

- Advantages: Much more secure than previous set-ups

- Disadvantages: Complicated due to two firewalls and separate application servers from web servers.

Activity: Design Problems

In this activity, you will consider the implications of different server architectures.

Activities/Stu_Design_Problems/README

Suggested Time:
20 Minutes

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By the end of class, you will be able to:

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Any Questions?