CHECK OUT: rsecke.github.io

TECH SYMPOSIUM

Register here:
https://techsymposium.calpolyswift.org

TECH SYMPOSIUM

A SYSTEM-ADMIN CONFERENCE FOR STUDENTS,
PROFESSIONALS, AND INQUISITIVE MINDS

MARCH 13, 2021

SPEAKERS FROM:

hp
Peraton
alluma
LAYERONE
Upstart
censys
Panasonic
Panasonic Avionics Corporation
SS&C GlobeOp
FLIP SIDE SECURITY
KEEPING THE EYE ON INTELLIGENCE

...AND MORE!

FOR MORE INFORMATION VISIT:
https://techsymposium.calpolyswift.org
REGISTER AT:
https://techsymposium2021.eventbrite.com

SWIFT

Introduction to Servers

Robinson Tran

Overview

Servers

What Are Servers?
Server Architecture
How Are Servers Used?

P2P Networks

What is Peer-to-Peer?
Examples

Syncthing

What is Syncthing?

File Syncing

How syncing works on Syncthing
Quick Demo

Cloud

What is the Cloud?
Cloud Storage
File server + Sync = THIS FRIDAY'S WORKSHOP

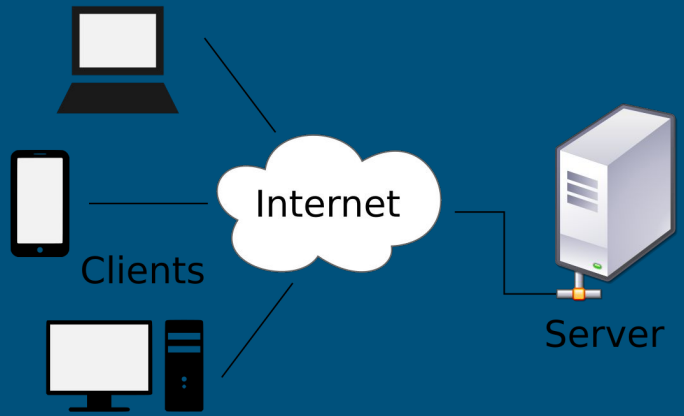
What is a Server?

TL;DR: A computer that provides a *service* to other computers (clients)

- Clients connect to a server (either on LAN or the Internet) for a *service*.
  - DNS server, Web server
- On the LAN side, clients will communicate with the server in your internal network
  - Hosting a local web server (Great way to introduce yourself to how servers work)

Server-Client Model

- A server-client model is how a server works traditionally
  - The server acts as a central location that clients can access
  - The client makes a request to the server for its resources



LAMP Stack

L - Linux (Windows, OSX)

A - Apache (Nginx)

M - MySQL (MariaDB, PostgreSQL)

P - PHP (Python)

- The foundation of Linux servers
- A LAMP stack consist of multi-layered software “stacks” that work with each other to host a *service* for clients
  - Wordpress

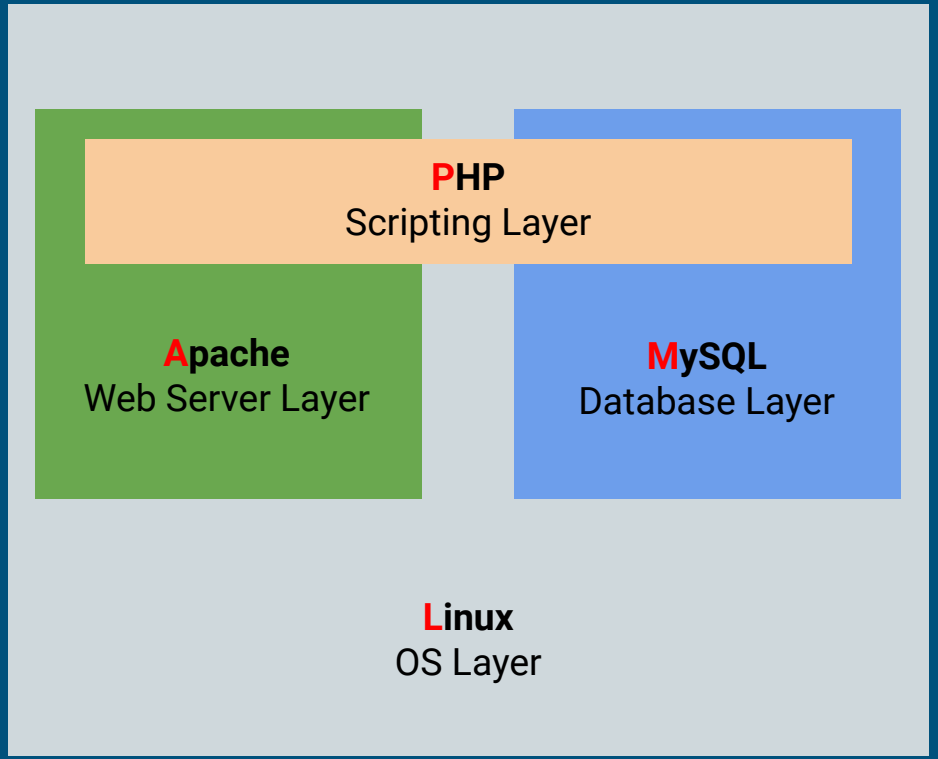
WordPress LAMP Stack

Linux: The OS that stack runs on top of

Apache: Receives/handles website requests and loads the web pages (HTML files)

MySQL: stores application data in a database

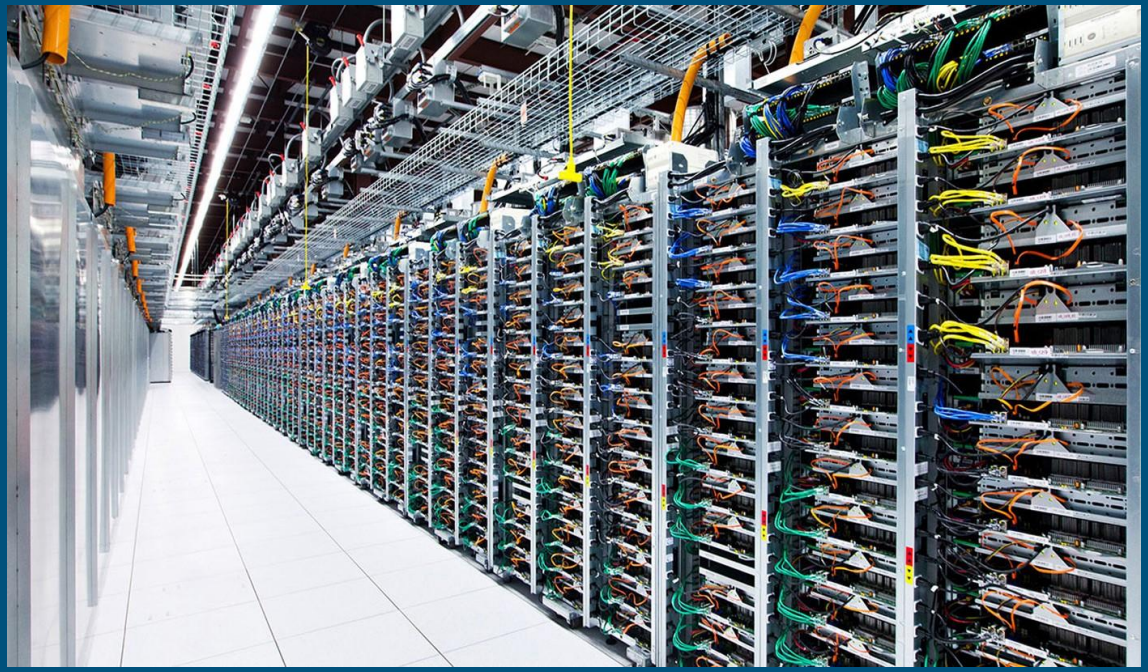
PHP: Communicates with MySQL to for dynamic, interactive web pages (PHP files)

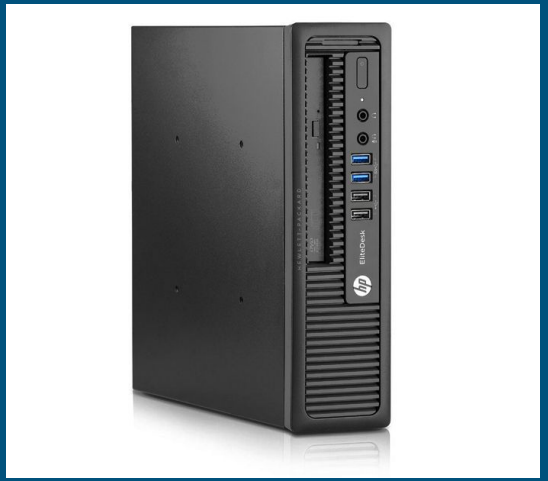


How are Servers Used?

Many use cases:

- **Datacenter**
  - AWS, Netflix, Disney, CPP SDC
- **Database server**
- **Web server** (LAMP stack)
- **Mail server**
- **File server**
  - Media server
- Your own computer





2.44%

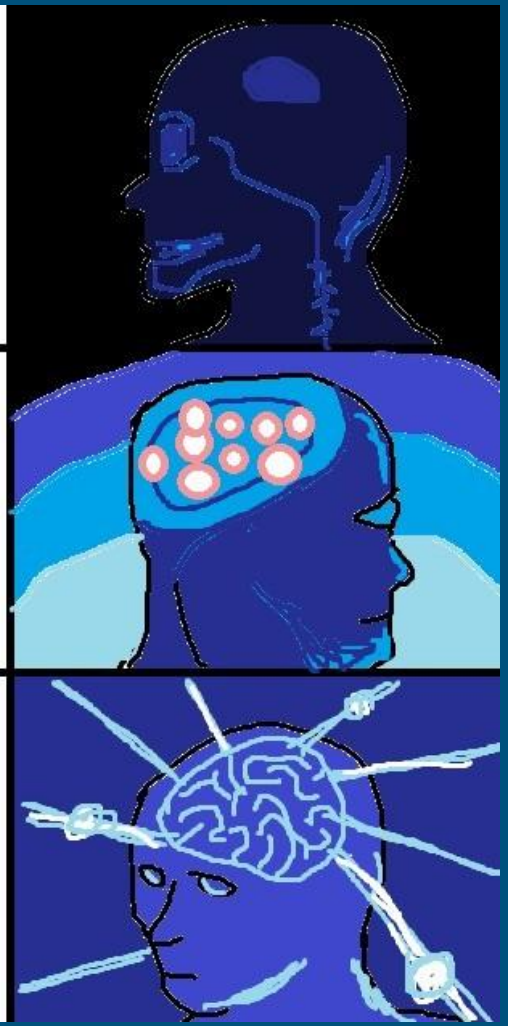
Worldwide, Linux has 2.44% of the operating system market shares.

74%

Linux runs on 74% of servers

100%

In 2020, Linux ran on 100% of the top 500 supercomputers



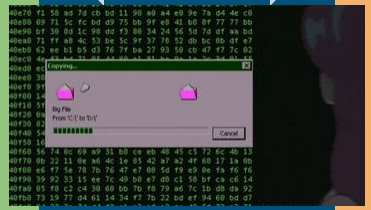
Syncthing

“Syncthing is a continuous file synchronization program. It synchronizes files between two or more computers in real time, safely protected from prying eyes.”

- Software you install that allows you to have file syncing across multiple devices
- Works by establishing a peer-to-peer network between 2 or more computers

How It Works

Syncthing



Syncthing

PC 1 (Windows/OS X/Linux)

PC 2 (Windows/OS X/Linux)

Peer-to-Peer Networks

TL;DR: 2+ connected computers (nodes) sharing resource(s)

- These nodes act as both the server/client
  - No distinction between server and client roles
- Permissions are user-based access
  - You establish what is being shared, and who it is being shared to

Example: sharing a printer over a network to something as complicated as Syncthing’s Block Exchange Protocol v1

Differences

Server-Client Model

- The server acts as a central location
- Distinct server-client role
  - Clients can only request a service
  - A server fulfills these requests
- Resources reside on the server

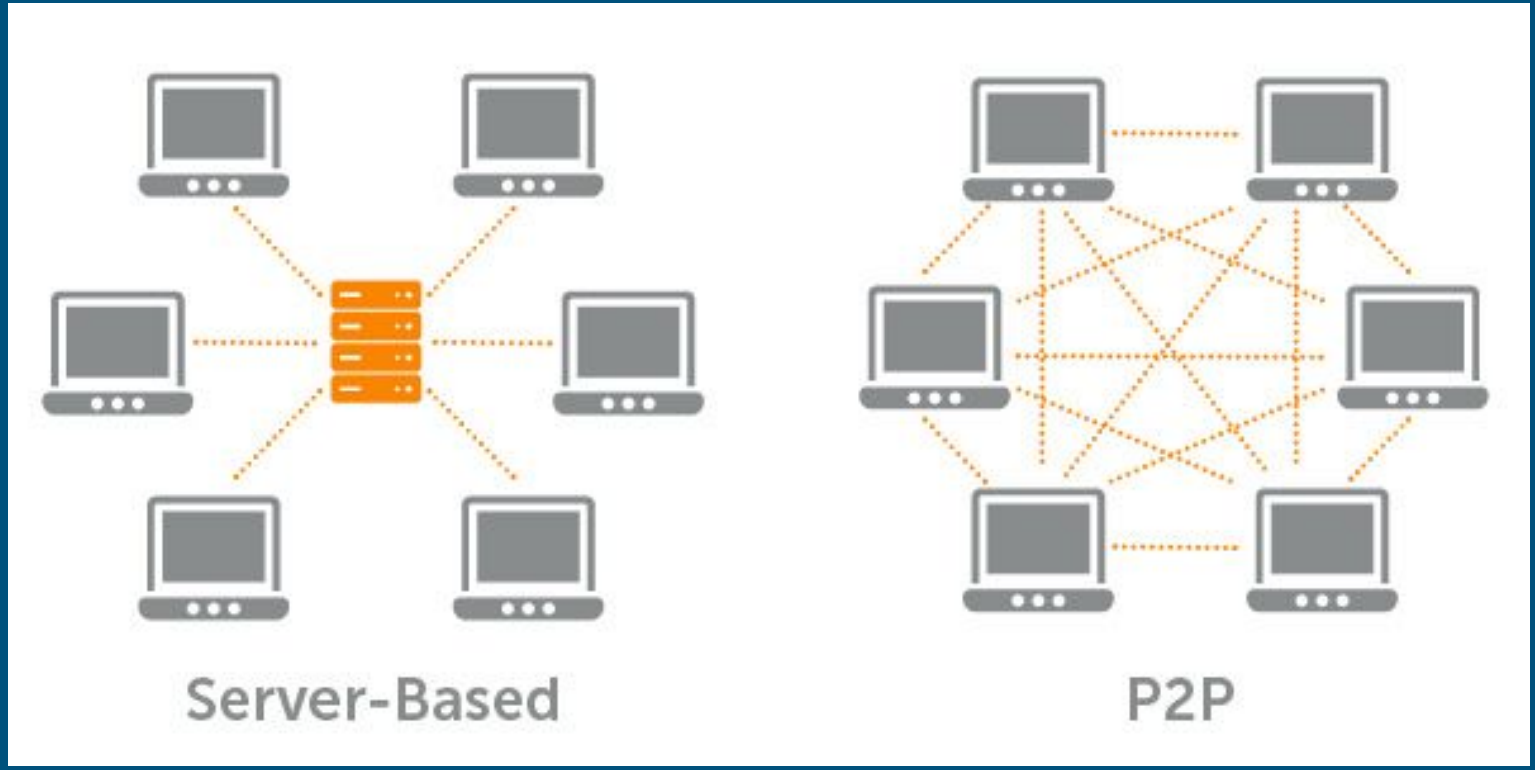
- Security is handled in one location
- Updating system software
- Enterprise level infrastructure = expertise

P2P Network

- There isn't a physical "central" location
- All peers have the same responsibilities, privileges, and act as both the server/client
- Resources shared across all nodes

- Security of each node
- Updating individually
- Loose structure, easier to manage
- Compatibility issues
- Cheaper (no need for separate server)

Comparison

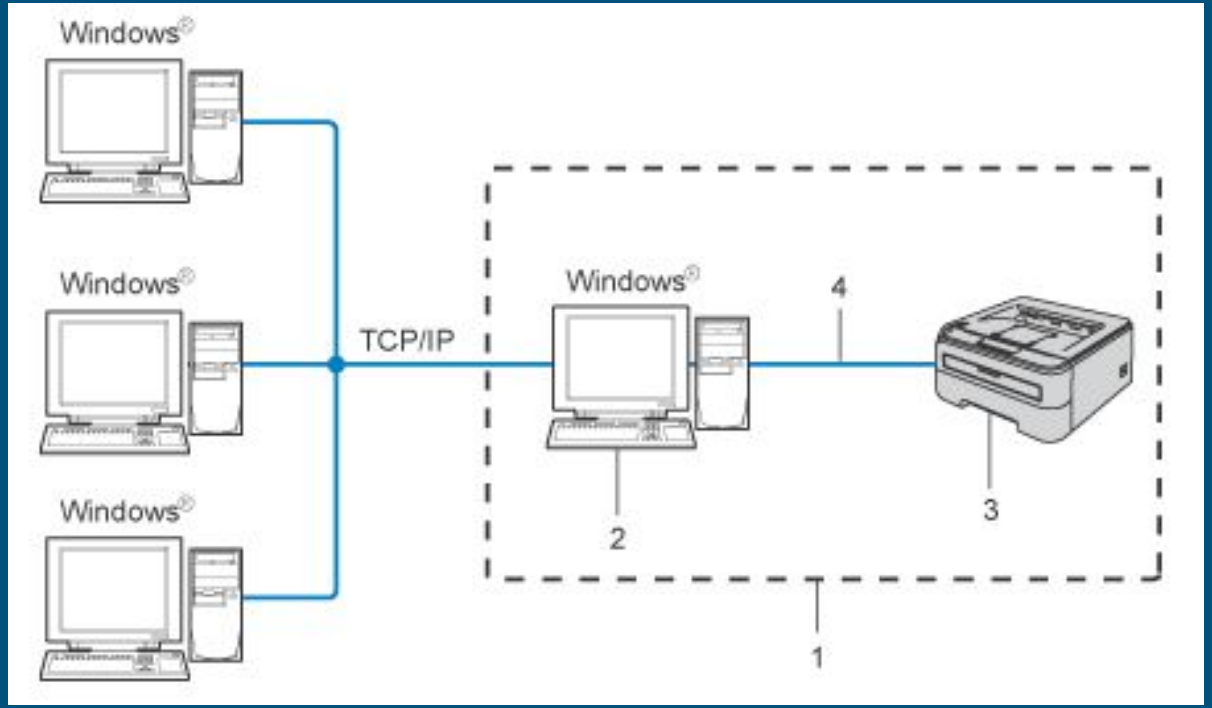


Printer Sharing

- Works by using a peer-to-peer network to share the printer
- The printer is connected to one computer, and its resources can be shared in your local network so that other devices don’t need to be physically connected to the printer
    - Wireless printers takes care of this though

Printer Sharing/File Sharing???

1. Printer sharing
2. Print Server
3. Printer
4. Internet connection



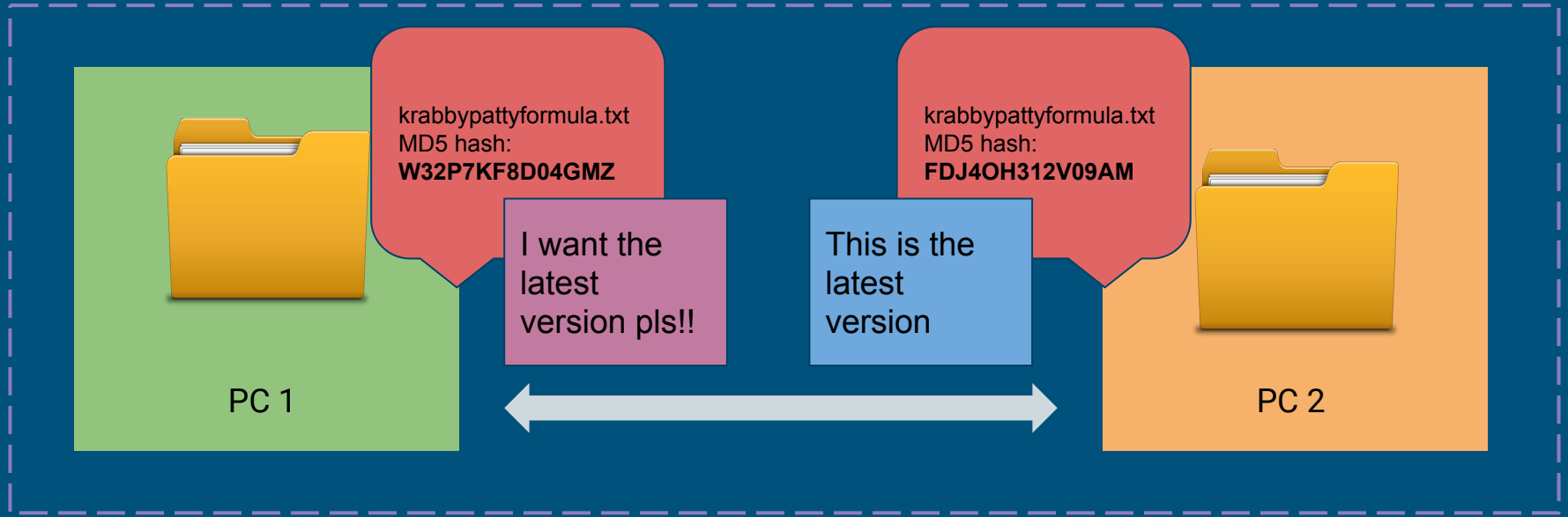
Block Exchange Protocol v1

Syncthing's very own protocol to make file syncing work

The Block Exchange Protocol (BEP) is used between two or more devices thus forming a cluster. Each device has one or more folders of files described by the local model, containing metadata and block hashes. The local model is sent to the other devices in the cluster. The union of all files in the local models, with files selected for highest change version, forms the global model. Each device strives to get its folders in sync with the global model by requesting missing or outdated blocks from the other devices in the cluster.

File Synchronization

- Allows data to up to date in two or more locations
  - The data will be the same wherever it is accessed

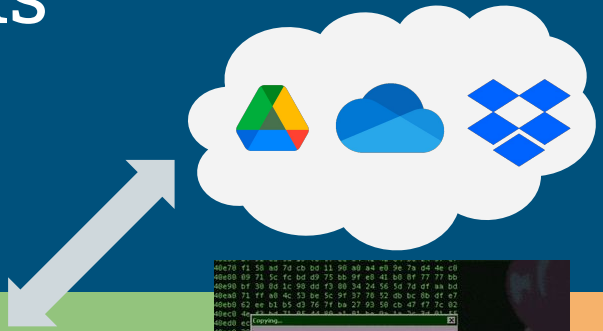


The Cloud

The Cloud is computing resources that use the Internet to provide clients services

- TL;DR: It is a bunch of servers that holds data
- End users don’t need to do anything. It just works
- Easy access across all your devices
- On demand availability

How It Works



PC 1 (Windows/OSX/Linux)

PC 2 (Windows/OSX/Linux)

Trade-offs

	Sync	Privacy	Accessibility	Simple to Use?	Availability	FREE
Cloud Storage Provider 	✓	✗	✓	✓	✓	✗
Self-hosted File Server	✓	✓	~	~	✗	✓

How is This Useful?

This is what we're going to be focusing on on Friday

- A file server is a central storage area that hosts files for clients to access
- We are going to to be using a combination of these concepts to create your own "cloud" that can also sync files to other devices without the need of your typical cloud services
    - You get to be in control of your data and privacy

rsecke.github.io rsecke.github.io rsecke.github.io rsecke.github.io