

Getting Started



{KODE}{KLOUD

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The DevOps Pre-Requisite Course

2 ЭТАП

BEGINNERS



COURSE
Docker for the Absolute Beginner - Hands On

ENROLL FREE

COURSE
Ansible for the Absolute Beginners

ENROLL FREE

COURSE
Puppet for the Absolute Beginners - Hands-on - DevOps

ENROLL FREE

COURSE
Docker for the Absolute Beginner - Hands On

ENROLL FREE

COURSE
Chef for the Absolute Beginners

ENROLL FREE

3 ЭТАП

ADVANCED

COURSE
Docker - SWARM SERVICES STACK - Hands-on

ENROLL FREE

COURSE
Docker for Certified Kubernetes Application Developer (CKAD)

ENROLL FREE

COURSE
Ansible Certification Preparation Course

ENROLL FREE

COURSE

COURSE



COURSE
Docker for the Absolute Beginner - Hands On

ENROLL FREE

COURSE
Chef for the Absolute Beginners

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GO TO STEP 3

3 STAGE
ADVANCED

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COURSE
OpenShift for the Absolute Beginners

ENROLL FREE

COURSE
Certified Kubernetes Administrator (CKA) with Practice Tests



ENROLL FREE



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Common Challenges

- Issues with setting up a basic lab
 - Issues with connecting to VMs
 - Trouble with navigating Linux CLI
 - No experience working with text editors
 - Errors during installation of application/dependencies
 - Applications – Java, Python, NodeJS
 - Web Servers – Apache, NGINX
 - Databases – MySQL, MongoDB
 - Issues with networking between VMs
 - Trouble navigating JSON or YAML files
- 
- 



COURSE
Docker for the Absolute Beginner - Hands On

ENROLL FREE

COURSE
Chef for the Absolute Beginners

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↓ scroll to STEP 3

3 STAGE
ADVANCED

COURSE
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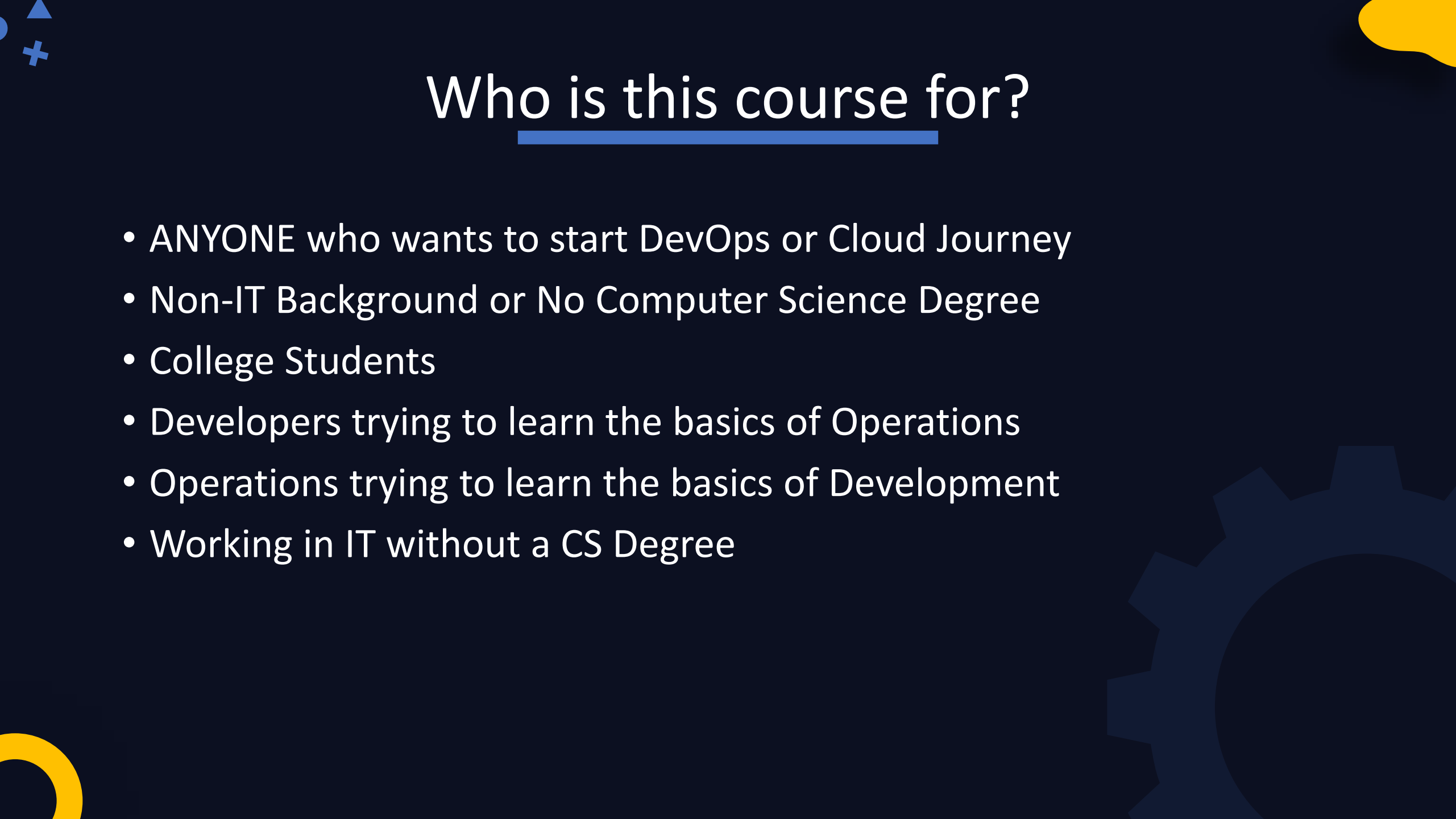
DevOps Pre-Requisite

The image shows a screenshot of the KodeKloud website. At the top, the KodeKloud logo is on the left, and navigation links for Pricing, Tech Support, Contact Us, Blog, and Login are on the right. The main content area features a large white box with the text "1 ЭТАП GET YOUR BASICS RIGHT". Below this, a button labeled "scroll to STEP 2" is visible. The "2 ЭТАП BEGINNERS" section contains a flowchart with two main categories: "CONTAINERS" and "AUTOMATION (IAC)".

- CONTAINERS** leads to a course: "Docker for the Absolute Beginner - Hands On" with an "ENROLL FREE" button.
- AUTOMATION (IAC)** leads to two courses: "Ansible for the Absolute Beginners" and "Puppet for the Absolute Beginners - Hands-on - DevOps", both with "ENROLL FREE" buttons.



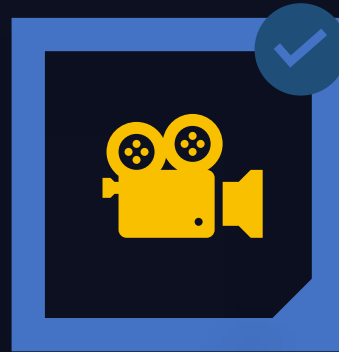
Who is this course for?

- ANYONE who wants to start DevOps or Cloud Journey
 - Non-IT Background or No Computer Science Degree
 - College Students
 - Developers trying to learn the basics of Operations
 - Operations trying to learn the basics of Development
 - Working in IT without a CS Degree
- 

Course Features



VISUAL LEARNING



DEMOS



HANDS-ON LABS



COMMUNITY SUPPORT



Terminal

localhost:80...

localhost:90...

localhost:80

localhost:30...

localhost:50...



thor@host01 /\$

01 02 03 04 05

10:22

Which java version is installed on host01 server?

1.8.0_24

13.0.1

13.0.2

11.0.0

1.7

 Hint

logs

[all categories ▾](#)
[Categories](#)
[Latest](#)
[New \(10\)](#)
[Unread \(17\)](#)
[Top](#)
[+ New Topic](#)


Category

Topics

Latest

Uncategorized

Topics that don't need a category, or don't fit into any other existing category.

67 / month

1 unread

1 new

KodeKloud Engineer



Welcome to the
[KodeKloud Engineer](#)
Community!

168 / month

9 unread

9 new

Docker for Beginners



Welcome to the Docker for Beginners Category. Feel free to post your queries on the Docker for the Absolute Beginners course here.

8 / month

2 unread



Deploy WebApplication : Not able to copy files from jumphost to other servers •

1
2h



Bonus points bug ¹
■ KodeKloud Engineer

20
3h



No Task Assigned Till Now Today ²
■ KodeKloud Engineer

16
4h



Linux Resource Limits II task failed
■ KodeKloud Engineer

8
5h



BonusPonitsRemoved

4
7h



Task failed Firewalld •
■ KodeKloud Engineer

1
8h



Install / configure mariadb

5



devops

Worldwide

Jobs

Sort by

Date Posted

LinkedIn Features

Devops in Worldwide

122,547 results

Job Alert Off



Junior DevOps Engineer Promoted

Comcast
Mount Laurel, NJ, US

3 alumni work here

58 minutes ago



DevOps Specialist Promoted

UST Global
Midlands Occidental, Inglaterra, Reino Unido

23 connections work here

1 hour ago · Easy Apply



DevOps Engineer Promoted

Rakuten Viki
Singapore, Singapore

1 day ago · 19 applicants



Devops

Citi
Pune, IN



cloud

Worldwide

Jobs

Sort by

Date Posted

LinkedIn Features

Cloud in Worldwide

381,406 results

Job Alert Off



Cloud Platform Engineer Promoted

Capgemini
Cracow, Lesser Poland District, Poland

121 connections work here

1 week ago · 24 applicants · Easy Apply



Cloud Engineer Promoted

Fannie Mae
Reston, VA, US

7 connections work here

5 days ago · 12 applicants



Cloud Solution Architect Promoted

Swiss Re
Kansas City, MO, US

6 alumni work here

6 days ago · 6 applicants

3 alumni work here

58 minutes ago



DevOps Specialist Promoted

UST Global

Midlands Occidental, Inglaterra, Reino Unido



23 connections work here

1 hour ago · Easy Apply



DevOps Engineer Promoted

Rakuten Viki

Singapore, Singapore

1 day ago · **19 applicants**



Devops

Citi

Pune, IN



60 connections work here

1 day ago · **18 applicants**



Devops

KWAN

Porto, PT

6 days ago · **1 applicant**



DevOps Specialist

Amdocs

Toronto, Ontario, Canada



33 connections work here



121 connections work here

1 week ago · **24 applicants** · Easy Apply



Cloud Engineer Promoted

Fannie Mae

Reston, VA, US



7 connections work here

5 days ago · **12 applicants**



Cloud Solution Architect Promoted

Swiss Re

Kansas City, MO, US



6 alumni work here

6 days ago · **6 applicants**



Cloud Architect

Anonymous

Dublin, IE

15 hours ago



Cloud Engineer

National Australia Bank

Melbourne, Victoria, Australia



6 connections work here

6 hours ago

1 ЭТАП

GET YOUR BASICS RIGHT



course
**DevOps
Pre-Requisites** →



course
**Linux
basics course** →



scroll to STEP 2

2 ЭТАП

BEGINNERS

CONTAINERS

AUTOMATION (IAC)



course
**Docker for the Absolute
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course
**Ansible for the
Absolute Beginners**
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course
**Puppet for the Absolute
Beginners - Hands-on -
DevOps**
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course
**Docker for the Absolute
Beginner - Hands On**



course
**Chef for the Absolute
Beginners**





Curriculum



CURRICULUM



LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML

- Linux CLI
- VI Editor
- Package Management
- Service Management

CURRICULUM

LINUX BASICS

SETUP LAB ENVIRONMENT

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APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML

- Setup Labs – Laptop or Cloud
- VirtualBox
 - Deploying VMs
 - Multiple VMs
 - Networking and Troubleshooting Network
 - Snapshots and Restore VMs
- Vagrant Basics

CURRICULUM



LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML

- Interfaces
- IP Addresses
- Routing
- DNS

CURRICULUM



LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML

- Install GIT
- GIT Repositories
- Clone source code with GIT
- Make and commit changes
- Push source code

CURRICULUM

LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML

- Who is this for?
 - Non-Developers
- Different types of applications
 - Python
 - NodeJS
 - Java
- Building and Deploying them
- Troubleshooting Applications
- Labs

CURRICULUM

LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML

- Web Frameworks
- Web Servers
- Apache HTTPD
- NGINX
- Python - Gunicorn
- NodeJS – PM2
- IPs and Ports
- SSL and TLS Security

CURRICULUM



LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML

- Who is this for?
 - Non-Developers
- Different types of databases
 - MySQL
 - MongoDB
- Web Server connectivity

CURRICULUM

LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

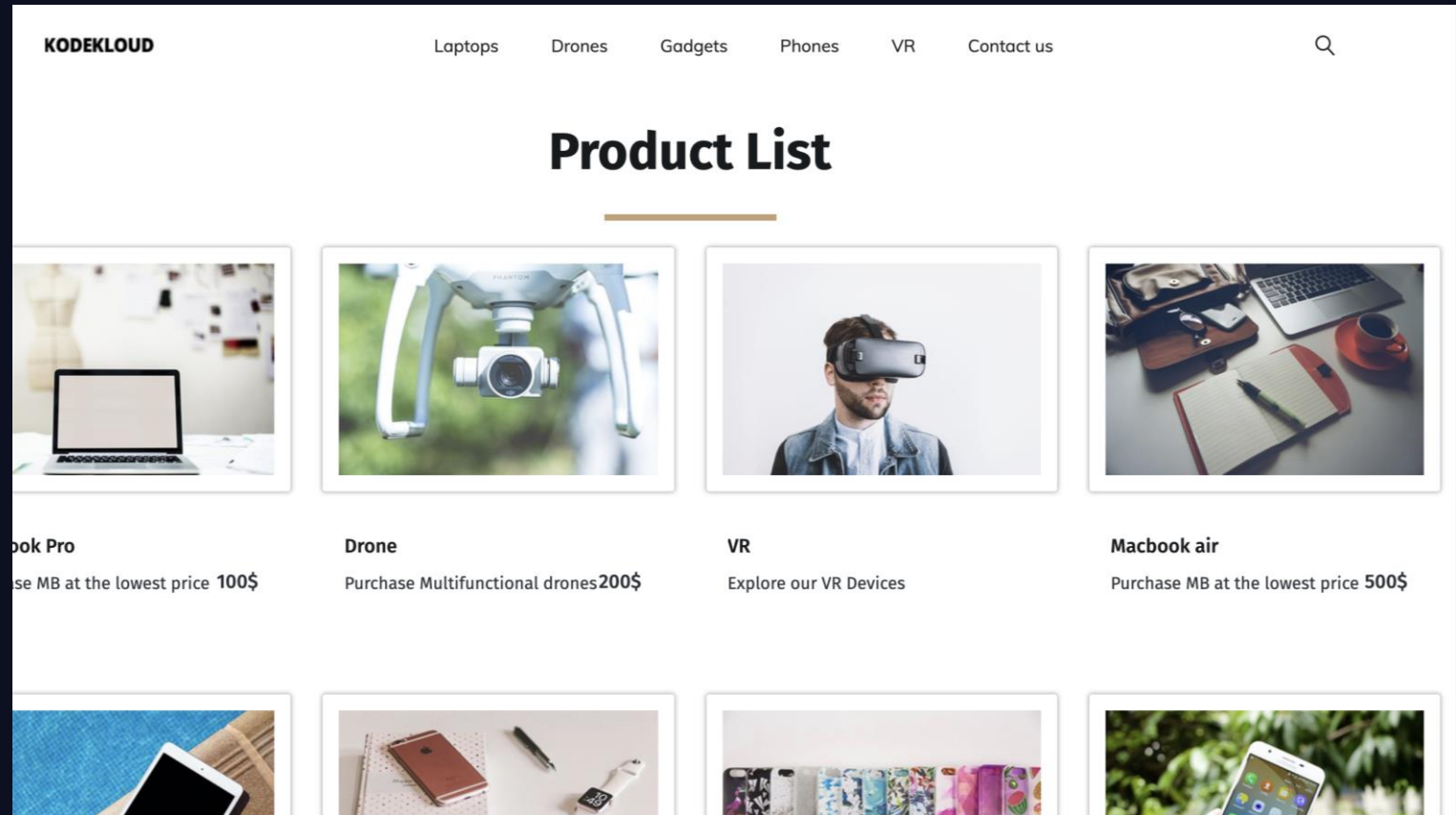
APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML



CURRICULUM



LINUX BASICS

SETUP LAB ENVIRONMENT

LINUX NETWORKING BASICS

SCM BASICS (GIT)

APPLICATION BASICS

WEB SERVERS

DATABASES

MULTI-TIER APPLICATIONS

JSON/YAML



just enough



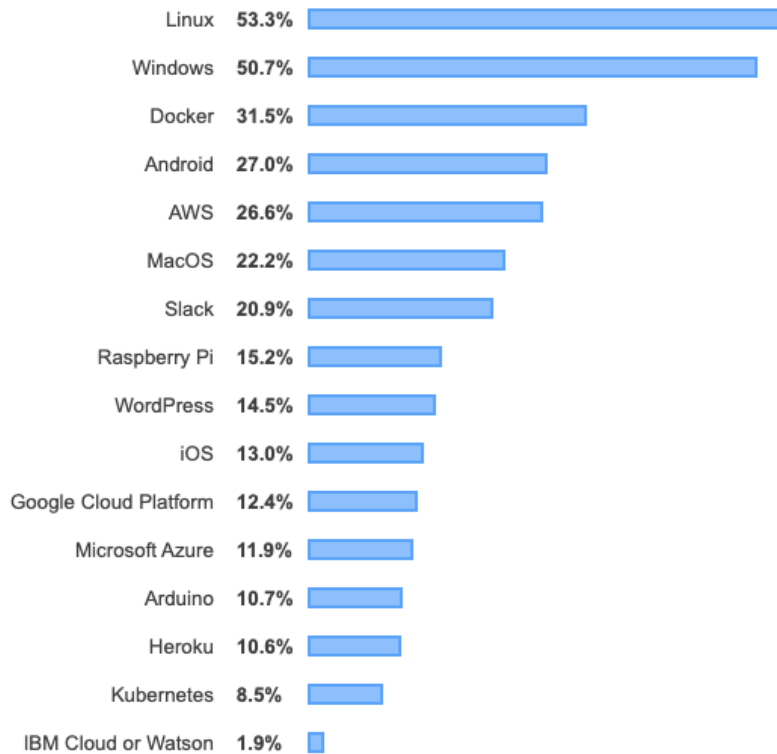
LINUX

Why Linux?

Platforms

All Respondents

Professional Developers



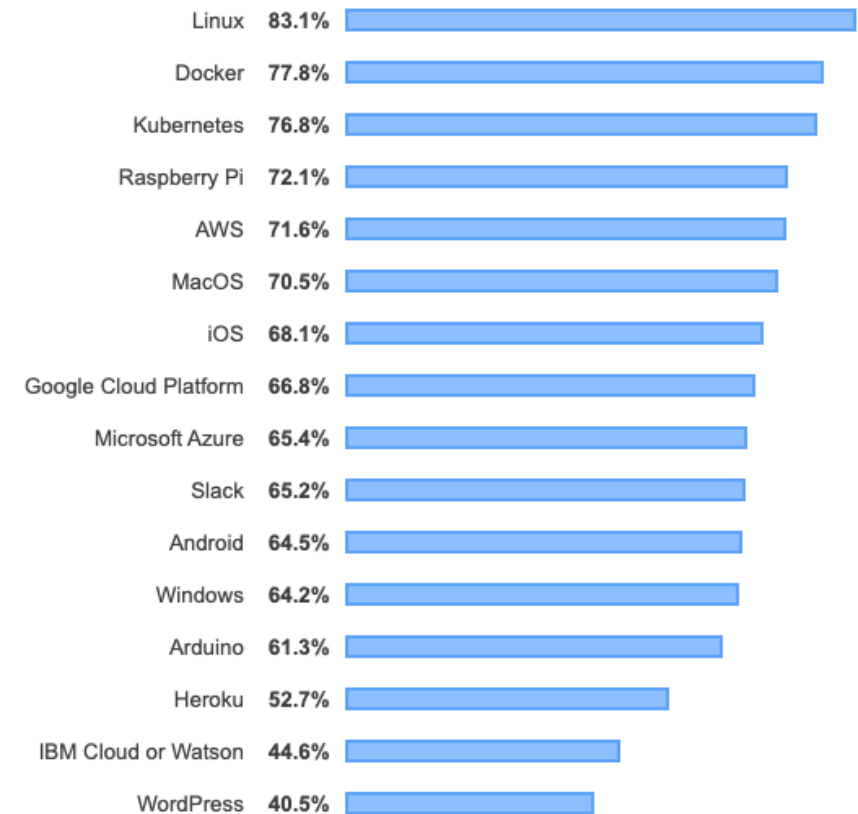
80,144 responses; select all that apply

Most Loved, Dreaded, and Wanted Platforms

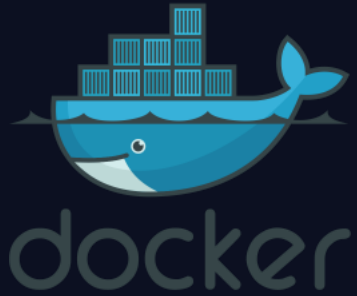
Loved

Dreaded

Wanted



Why Linux?



2013 - Docker was born
2016– Docker for Windows was born

A

Can Ansible run on Windows?

No, Ansible can only manage Windows hosts. Ansible cannot run on a Windows host natively, though it can run under the Windows Subsystem for Linux (WSL).

https://docs.ansible.com/ansible/latest/user_guide/windows_faq.html

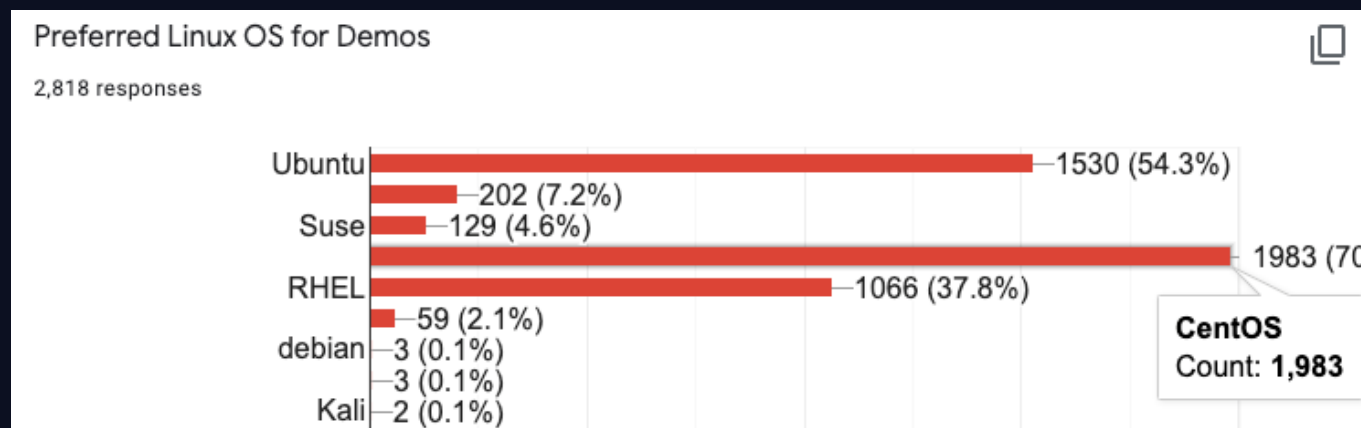


Note: The Kubernetes control plane, including the [master components](#), continues to run on Linux. There are no plans to have a Windows-only Kubernetes cluster.

[Kubernetes Documentation](#)

Linux Basics

- Linux CLI
- VI Editor
- Package Management
- Service Management



*Allowed multiple selections

Linux Basics Course

www.kodecloud.com



just enough



LINUX

Shell Types

```
echo $SHELL
```

```
/bin/bash
```

Broune Shell (Sh Shell)

C Shell (csh or tcsh)

Z Shell (zsh)

Bourne again Shell (bash)

Basic Commands

```
▶ echo Hi
```

```
Hi
```

Print to screen

```
▶ ls
```

```
File.txt my_dir1 file2.conf
```

List files & folders

```
▶ cd my_dir1
```

Change directory

```
▶ pwd
```

```
/home/my_dir1
```

Present Working Directory

```
▶ mkdir new_directory
```

Make Directory

```
▶ cd new_directory; mkdir www; pwd
```

```
/home/my_dir1/new_directory
```

Multiple commands

Commands - Directories

/tmp/asia/india/bangalore

```
▶ mkdir /tmp/asia  
▶ mkdir /tmp/asia/india  
▶ mkdir /tmp/asia/india/bangalore
```



```
▶ mkdir -p /tmp/asia/india/bangalore
```

```
▶ rm -r /tmp/my_dir1
```

```
▶ cp -r my_dir1 /tmp/my_dir1
```

Make Directory Hierarchy

Remove Directory

Copy Directory

Commands - Files

```
▶ touch new_file.txt
```

```
Hi
```

```
▶ cat > new_file.txt
```

```
This is some sample contents
```

```
CTRL + D
```

```
▶ cat new_file.txt
```

```
This is some sample contents
```

```
▶ cp new_file.txt copy_file.txt
```

```
▶ mv new_file.txt sample_file.txt
```

```
▶ rm new_file.txt
```

Create a new file (no contents)

Add contents to file

View contents of file

Copy File

Move (Rename) File

Remove (Delete) File

Labs

just a bit more



LINUX

User Accounts



matthew

```
▶ whoami
```

```
matthew
```

```
▶ id
```

```
uid=1001(matthew) gid=1001(matthew) groups=1001(matthew)
```

```
▶ su aparna
```

```
Password:
```

```
▶ ssh aparna@192.168.1.2
```

User Accounts

```
▶ ls /root
```

```
ls: cannot open directory /root: Permission denied
```

```
▶ sudo ls /root
```

```
anaconda-ks.cfg initial-setup-ks.cfg
```



matthew



root

SUDO
/etc/sudoers

Download Files

```
▶ curl http://www.some-site.com/some-file.txt -O
```

```
some-file.txt
```

```
▶ wget http://www.some-site.com/some-file.txt -O some-file.txt
```

```
some-file.txt
```

Check OS Version

```
▶ ls /etc/*release*
```

```
/etc/centos-release      /etc/os-release  /etc/system-release  
/etc/centos-release-upstream /etc/redhat-release /etc/system-release-cpe
```

```
▶ cat /etc/*release*
```

```
CentOS Linux release 7.7.1908 (Core)  
Derived from Red Hat Enterprise Linux 7.7 (Source)  
NAME="CentOS Linux"  
VERSION="7 (Core)"  
ID="centos"  
ID_LIKE="rhel fedora"  
VERSION_ID="7"  
PRETTY_NAME="CentOS Linux 7 (Core)"  
ANSI_COLOR="0;31"  
CPE_NAME="cpe:/o:centos:centos:7"  
HOME_URL="https://www.centos.org/"  
BUG_REPORT_URL="https://bugs.centos.org/"
```


- 
- 
- Wget
 - Curl
 - Cat /etc/*release*



Package Managers



RPM (Red Hat Package Manager)

```
▶ rpm -i telnet.rpm
```

```
▶ rpm -e telnet.rpm
```

```
▶ rpm -q telnet.rpm
```

Install Package

Uninstall Package

Query Package

?
?
?
?

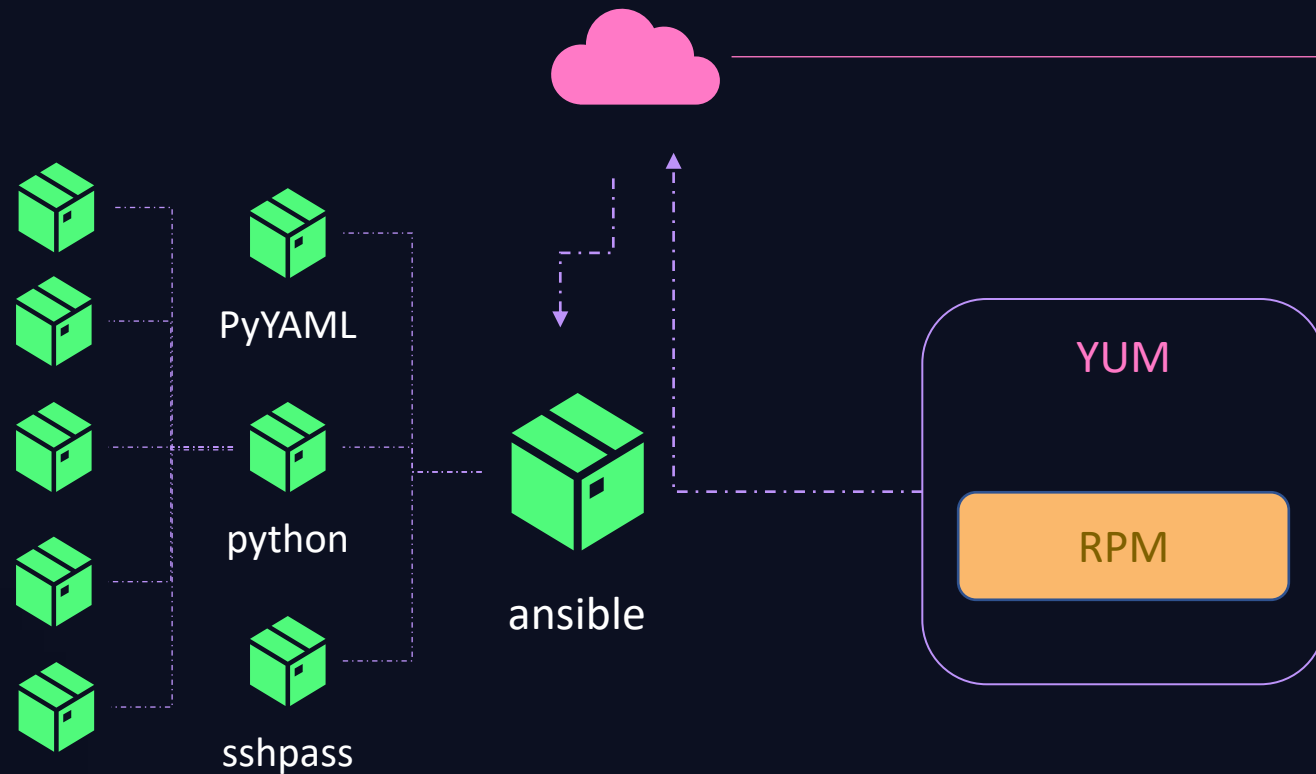


YUM

```
▶ yum install ansible
```

Install Package

/etc/yum.repos.d



YUM Repos

Extra Packages for Enterprise Linux (EPEL)

Welcome to the home of the EPEL Special Interest Group.

Quickstart

- [epel-release-latest-6](#)
- [epel-release-latest-7](#)
- [epel-release-latest-8](#)

You may retrieve signed binary configuration files from one the above two links (varying by the major release number) and automatically installed by root thus:

- RHEL/CentOS 6:

```
# yum install https://dl.fedoraproject.org/pub/epel/epel-release-latest-6.noarch.rpm
```

- RHEL/CentOS 7:

```
# yum install https://dl.fedoraproject.org/pub/epel/epel-release-latest-7.noarch.rpm
```

YUM

```
▶ yum list ansible
```

Installed Packages

```
ansible.noarch      2.9.6-1.el7      @epel
```

```
▶ yum remove ansible
```

```
▶ yum --showduplicates list ansible
```

Available Packages

```
ansible.noarch      2.4.2.0-2.el7      extras
ansible.noarch      2.9.6-1.el7        epel
```

```
▶ yum install ansible-2.4.2.0
```

Labs

Services

Services

▶ `service httpd start`

Or

▶ `systemctl start httpd`

▶ `systemctl stop httpd`

▶ `systemctl status httpd`

▶ `systemctl enable httpd`

▶ `systemctl disable httpd`

Start HTTPD service

Start HTTPD service

Stop HTTPD service

Check HTTPD service Status

Configure HTTPD to start at
startup

Configure HTTPD to not start at
startup

Services

```
▶ /usr/bin/python3 /opt/code/my_app.py
```

```
* Serving Flask app "my_app" (lazy loading)  
* Environment: production  
  WARNING: This is a development server. Do not use it in a production deployment.  
  Use a production WSGI server instead.  
* Debug mode: off  
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

```
▶ curl http://localhost:5000
```

```
Hello, World!
```

```
▶ systemctl start my_app
```

```
▶ systemctl stop my_app
```

```
/etc/systemd/system
```

Services

`/etc/systemd/system`

```
▶ /usr/bin/python3 -c 'from code import app; app.run()' > my_app.py
```

```
* Serving Flask app "my_app" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: off
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

```
▶ curl http://localhost:5000
```

```
Hello, World!
```

```
my_app.service
```

```
[Service]
ExecStart=
```

```
▶ systemctl daemon-reload
```

```
▶ systemctl start my_app
```

Services

`/etc/systemd/system`

```
▶ systemctl status my_app
```

```
● my_app.service
  Loaded: loaded (/etc/systemd/system/my_app.service; static; vendor preset: disabled)
  Active: active (running) since Tue 2020-04-07 09:01:39 UTC; 2s ago
  Main PID: 5038 (python3)
  CGroup: /system.slice/my_app.service
          └─5038 /usr/bin/python3 /tmp/app/my_app.py
```

```
Apr 07 09:01:39 systemd[1]: Started my_app.service.
Apr 07 09:01:39 python3[5038]: * Serving Flask app "my_app" (lazy loading)
Apr 07 09:01:39 python3[5038]: * Environment: production
Apr 07 09:01:39 python3[5038]: WARNING: This is a development server. Do not use it in a produ...ent.
Apr 07 09:01:39 python3[5038]: Use a production WSGI server instead.
Apr 07 09:01:39 python3[5038]: * Debug mode: off
Apr 07 09:01:39 python3[5038]: * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
Hint: Some lines were ellipsized, use -l to show in full.
```

```
▶ curl http://localhost:5000
```

```
Hello, World!
```

```
my_app.service
```

```
[Service]
ExecStart= /usr/bin/python3 /opt/code/my_app.py
```

```
▶ systemctl daemon-reload
```

```
▶ systemctl start my_app
```

```
▶ systemctl stop my_app
```

Services

`/etc/systemd/system`

```
systemctl status my_app
```

```
● my_app.service
  Loaded: loaded (/etc/systemd/system/my_app.service; static; vendor preset: disabled)
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Apr 07 09:01:39 python3[5038]: * Environment: production
Apr 07 09:01:39 python3[5038]: WARNING: This is a development server. Do not use it in a produ...ent.
Apr 07 09:01:39 python3[5038]: Use a production WSGI server instead.
Apr 07 09:01:39 python3[5038]: * Debug mode: off
Apr 07 09:01:39 python3[5038]: * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
Hint: Some lines were ellipsized, use -l to show in full.
```

```
curl http://localhost:5000
```

```
Hello, World!
```

```
my_app.service
```

```
[Service]
ExecStart=/usr/bin/python3 /opt/code/my_app.py

[Install]
WantedBy=multi-user.target
```

```
systemctl daemon-reload
```

```
systemctl start my_app
```

```
systemctl stop my_app
```

```
systemctl enable my_app
```

Services

`/etc/systemd/system`

```
systemctl status my_app
```

```
● my_app.service
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Hint: Some lines were ellipsized, use -l to show in full.
```

```
my_app.service
```

```
[Unit]
Description=My python web application

[Service]
ExecStart= /usr/bin/python3 /opt/code/my_app.py
ExecStartPre=/opt/code/configure_db.sh
ExecStartPost=/opt/code/email_status.sh

[Install]
WantedBy=multi-user.target
```

```
curl http://localhost:5000
```

```
Hello, World!
```

```
systemctl daemon-reload
```

```
systemctl start my_app
```

Services

`/etc/systemd/system`

```
systemctl status my_app
```

```
● my_app.service
  Loaded: loaded (/etc/systemd/system/my_app.service; static; vendor preset: disabled)
  Active: active (running) since Tue 2020-04-07 09:01:39 UTC; 2s ago
  Main PID: 5038 (python3)
  CGroup: /system.slice/my_app.service
          └─5038 /usr/bin/python3 /tmp/app/my_app.py

Apr 07 09:01:39 systemd[1]: Started my_app.service.
Apr 07 09:01:39 python3[5038]: * Serving Flask app "my_app" (lazy loading)
Apr 07 09:01:39 python3[5038]: * Environment: production
Apr 07 09:01:39 python3[5038]: WARNING: This is a development server. Do not use it in a produ...ent.
Apr 07 09:01:39 python3[5038]: Use a production WSGI server instead.
Apr 07 09:01:39 python3[5038]: * Debug mode: off
Apr 07 09:01:39 python3[5038]: * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
Hint: Some lines were ellipsized, use -l to show in full.
```

```
my_app.service
```

```
[Unit]
Description=My python web application

[Service]
ExecStart=/usr/bin/python3 /opt/code/my_app.py
ExecStartPre=/opt/code/configure_db.sh
ExecStartPost=/opt/code/email_status.sh
Restart=always

[Install]
WantedBy=multi-user.target
```

```
curl http://localhost:5000
```

```
Hello, World!
```

```
systemctl daemon-reload
```

```
systemctl start my_app
```

Service Unit File - Docker

```
/lib/systemd/system/docker.service
```

```
[Unit]
```

```
Description=Docker Application Container Engine
```

```
Documentation=https://docs.docker.com
```

```
Bindsto=containerd.service
```

```
After=network-online.target firewalld.service containerd.service
```

```
Wants=network-online.target
```

```
Requires=docker.socket
```

```
[Service]
```

```
Type=notify
```

```
ExecStart=/usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock
```

```
ExecReload=/bin/kill -s HUP $MAINPID
```

```
Restart=always
```

```
StartLimitBurst=3
```

```
StartLimitInterval=60s
```

```
LimitNOFILE=infinity
```

```
LimitNPROC=infinity
```

```
LimitCORE=infinity
```

```
[Install]
```

```
WantedBy=multi-user.target
```


Labs

VI Editor

Working with Files

```
▶ cat > index.html
```

```
<!DOCTYPE html>
<html>
<body>

<h1>The VIM Poem</h1>

<p>The wise man said just walk this way</p>
<p>To the dawn of the light</p>
<p>The wind will blow into your face</p>
<p>As the years pass you by</p>
<p>Hear this voice from deep inside</p>
<p>It's the call of your heart</p>
<p>Close your eyes and you will find</p>
<p>The passage out of the dark</p>
<p>V-I-M</p>
<p>Will you send me an angel</p>
<p>V-I-M</p>
</body>
</html>
```

```
CTRL + D
```

VI Editor

▶ vi index.html

COMMAND
MODE

esc

INSERT
MODE

i

```
<!DOCTYPE html>
<html>
<body>

<h1>The VIM Poem</h1>

<p>The wise man said just walk this way</p>
<p>To the dawn of the light</p>
<p>The wind will blow into your face</p>
<p>As the years pass you by</p>
<p>Hear this voice from deep inside</p>
<p>It's the call of your heart</p>
<p>Close your eyes and you will find</p>
<p>The passage out of the dark</p>
<p>V-I-M</p>
<p>Will you send me an angel</p>
<p>V-I-M</p>
█
</body>
</html>
```

-- INSERT --

20,1

All

VI Editor - Command Mode

Find

/of

n

```
<!DOCTYPE html>
<html>
<body>

<h1>The VIM Poem</h1>

<p>The wise man said just walk this way</p>
<p>To the dawn of the light</p>
<p>The wind will blow into your face</p>
<p>As the years pass you by</p>
<p>Hear this voice from deep inside</p>
<p>It's the call of your heart</p>
<p>Close your eyes and you will find</p>
<p>The passage out of the dark</p>
<p>V-I-M</p>
<p>Will you send me an angel</p>
<p>V-I-M</p>

</body>
</html>
~
~
~
~
~
~
~
/of
```

8,16 All

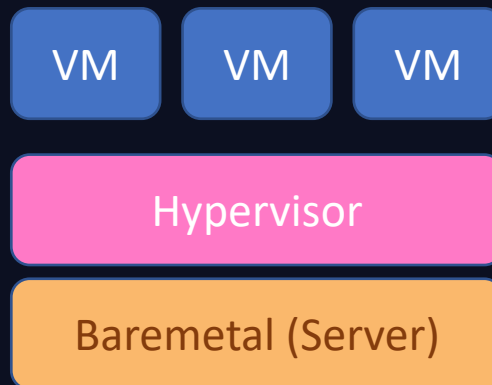


Lab Setup

Labs

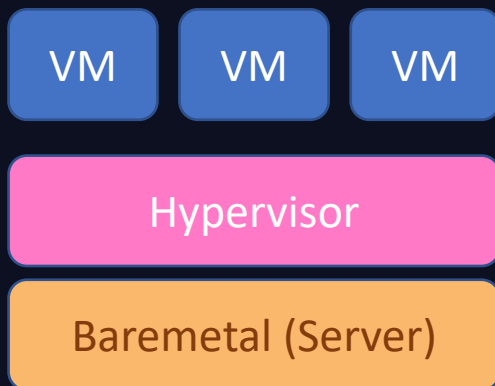
Virtualization S/W

Type 1

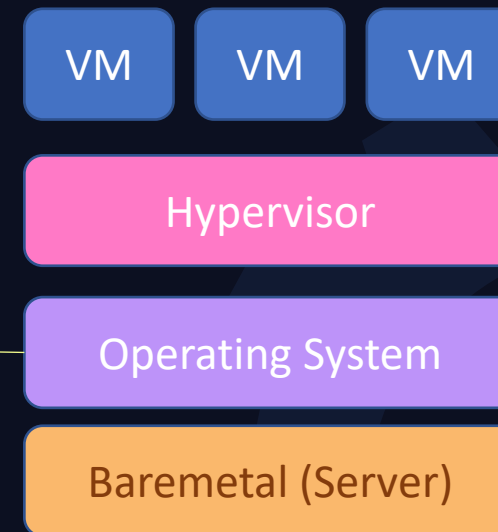


Virtualization S/W

Type 1



Type 2



Host

Virtualization S/W

- FREE
- OpenSource
- Install Anywhere – Windows, Linux, MAC
- Snapshots & Clones
- Run Multiple VMs
- Networking



Oracle VirtualBox



VMWare Workstation

- Commercial
- Install Anywhere – Windows, Linux
- Snapshots & Clones
- VMWare Player:
 - Free
 - Windows/Linux
 - One VM at a time
 - No Snapshots
- VMWare Fusion:
 - Free
 - Mac
 - One VM at a time
 - No Snapshots

Oracle VirtualBox

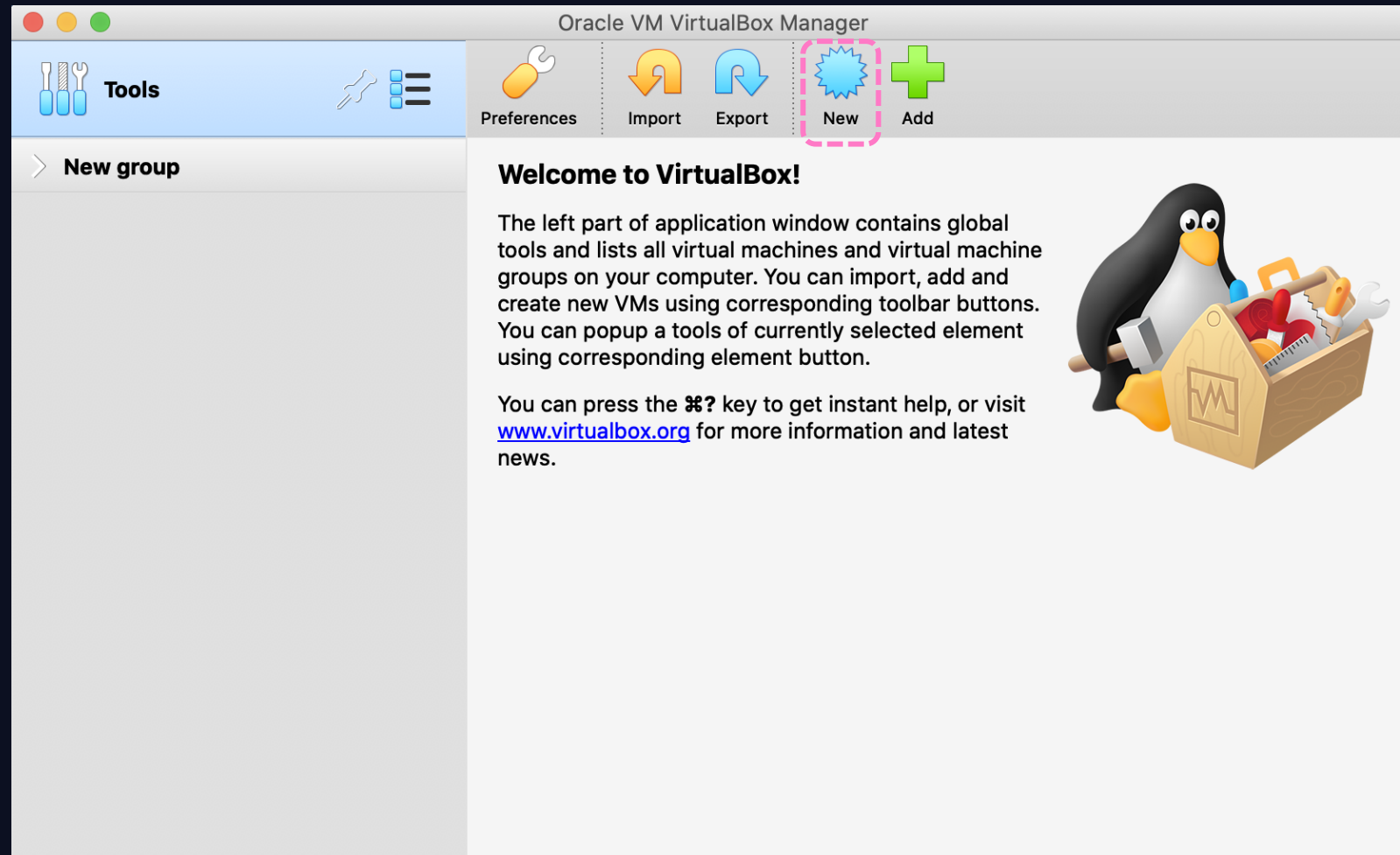
- Support:
 - Windows, MAC OS X, Linux, Solaris
- <https://www.virtualbox.org/manual/ch01.html#hostosupport>
- Resource Requirements:
 - CPU: x86 Intel or AMD
 - Memory: 512 MB
 - Disk space: 30 MB
- Recommended Resources:
 - CPU: Dual or Quadcore
 - Memory: 4 GB
 - Disk Space: 100 GB

The more the better

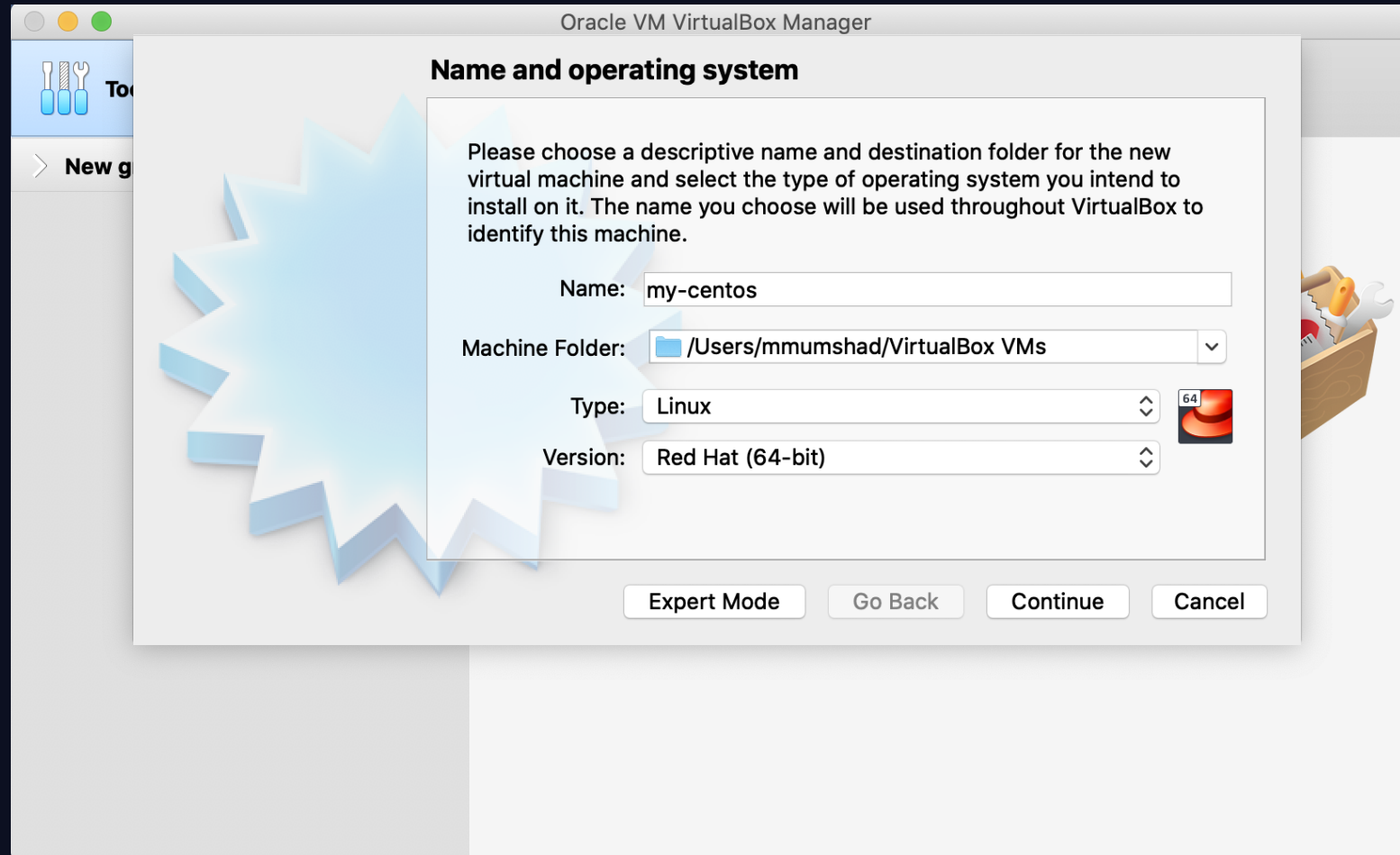
A screenshot of the Oracle VirtualBox download page. The page has a light blue header with the 'VirtualBox' logo in large, bold, dark blue letters. Below the logo is the heading 'Download VirtualBox' in a smaller, bold, dark blue font. The main content area is white with a dotted border. It contains the text: 'Here you will find links to VirtualBox binaries and its source code.' followed by a section titled 'VirtualBox binaries' in bold. Below this, it says 'By downloading, you agree to the terms and conditions of the respective license.' and provides two paragraphs of information about supported versions: 'If you're looking for the latest VirtualBox 6.0 packages, see [VirtualBox 6.0 builds](#). remain supported until July 2020.' and 'If you're looking for the latest VirtualBox 5.2 packages, see [VirtualBox 5.2 builds](#). supported until July 2020.' The final section is titled 'VirtualBox 6.1.4 platform packages' in bold, followed by a bulleted list of links: '⇒ [Windows hosts](#)', '⇒ [OS X hosts](#)', '[Linux distributions](#)', and '⇒ [Solaris hosts](#)'.

<https://www.virtualbox.org/wiki/Downloads>

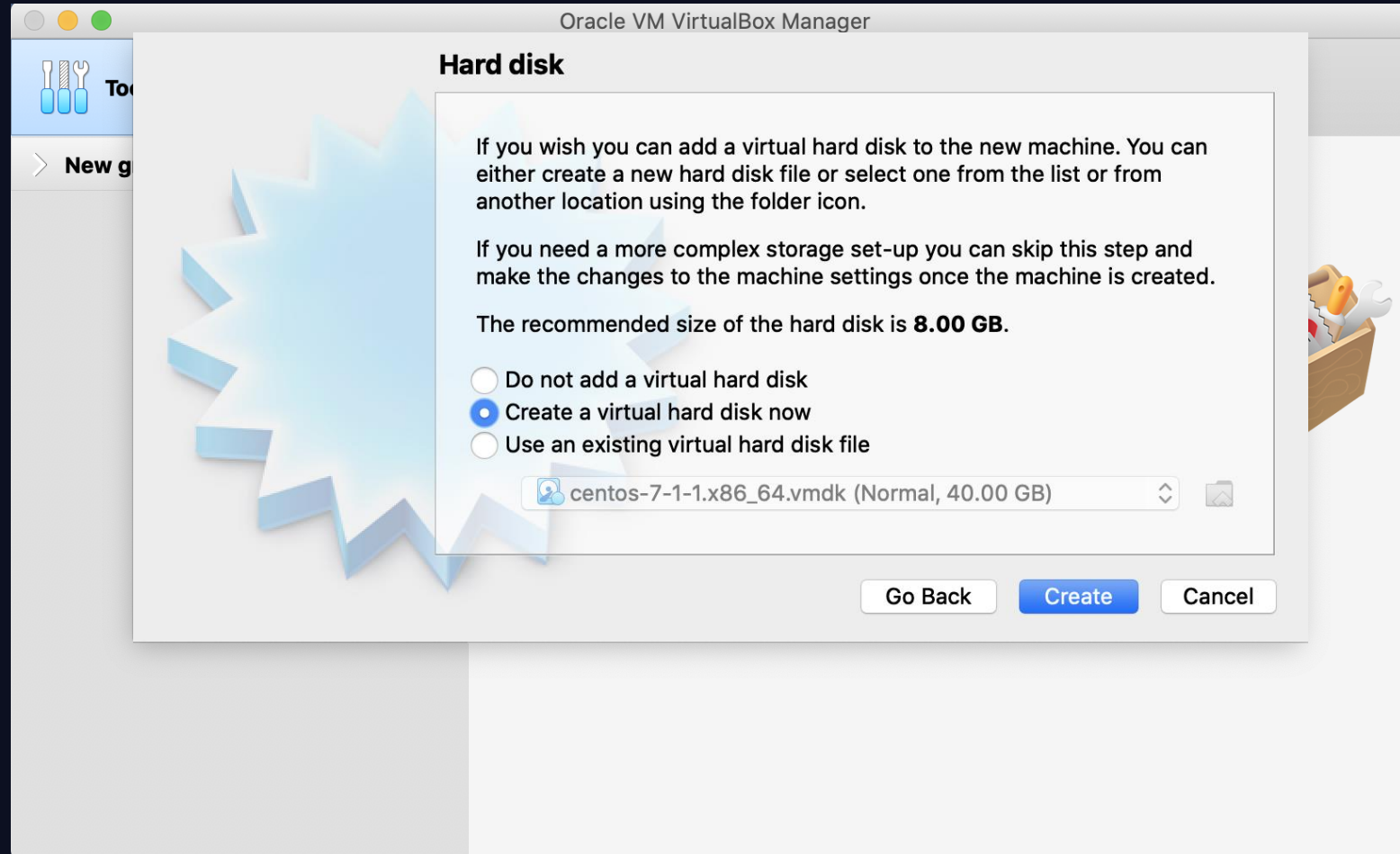
Oracle VirtualBox



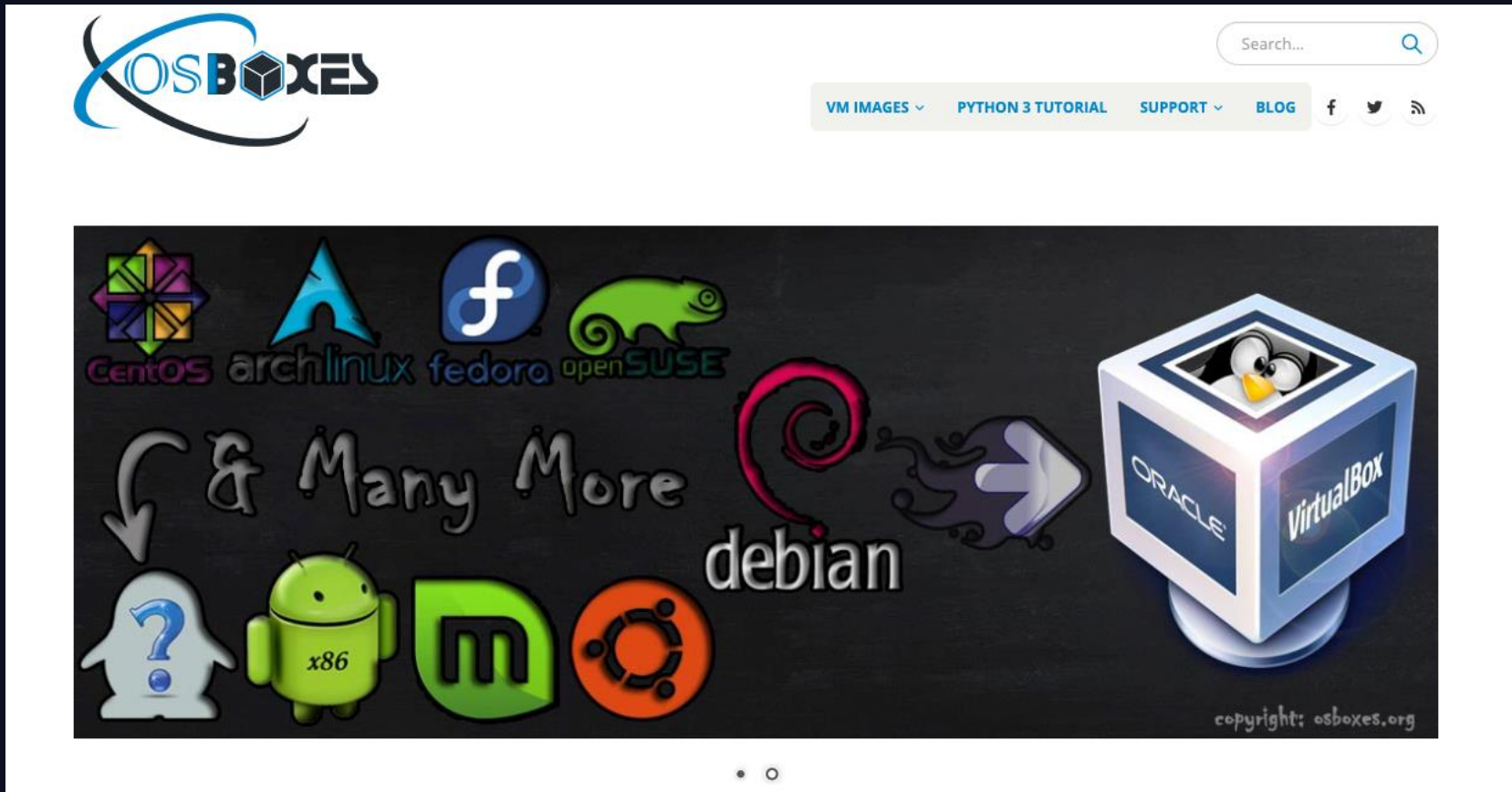
Oracle VirtualBox



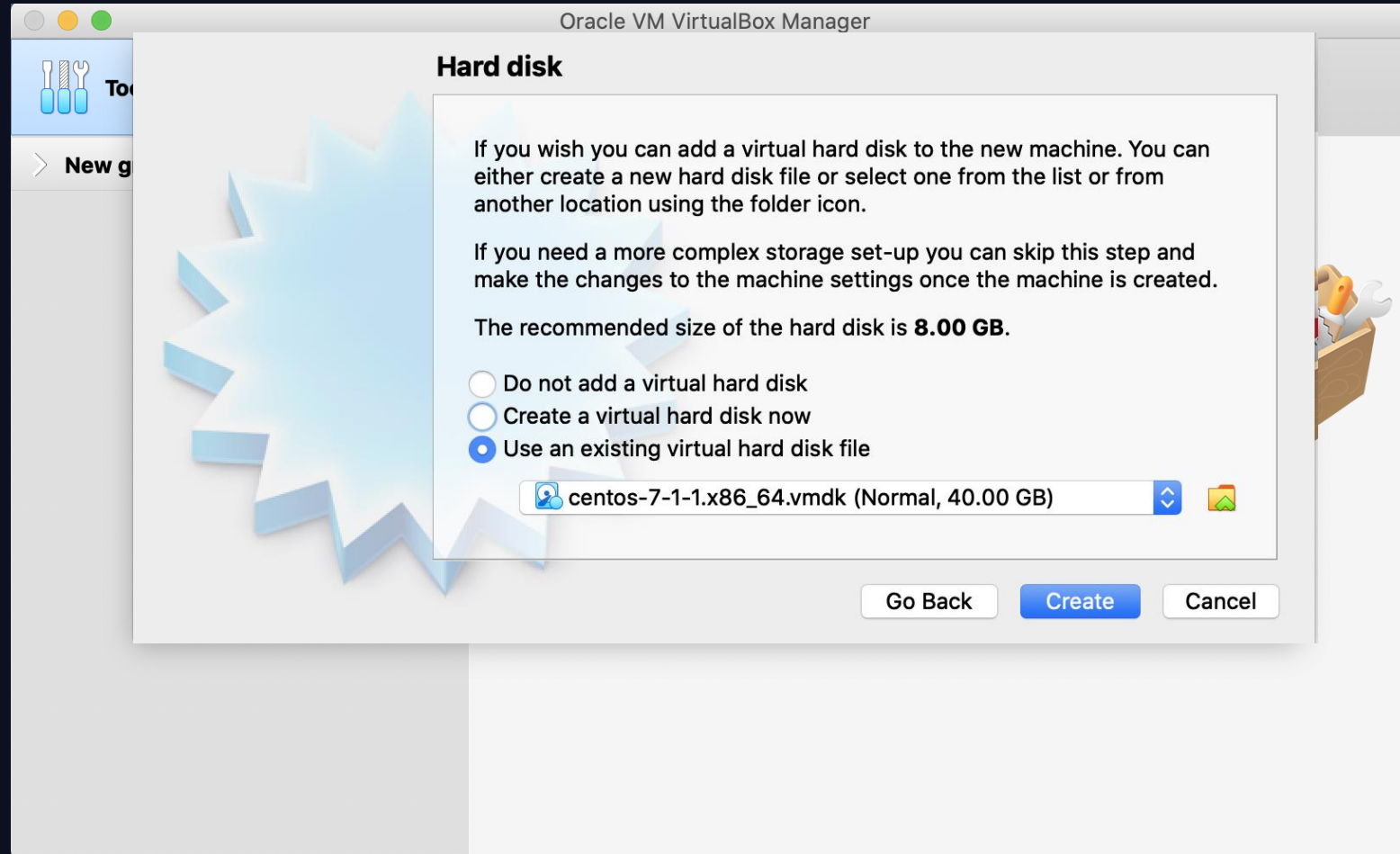
Oracle VirtualBox



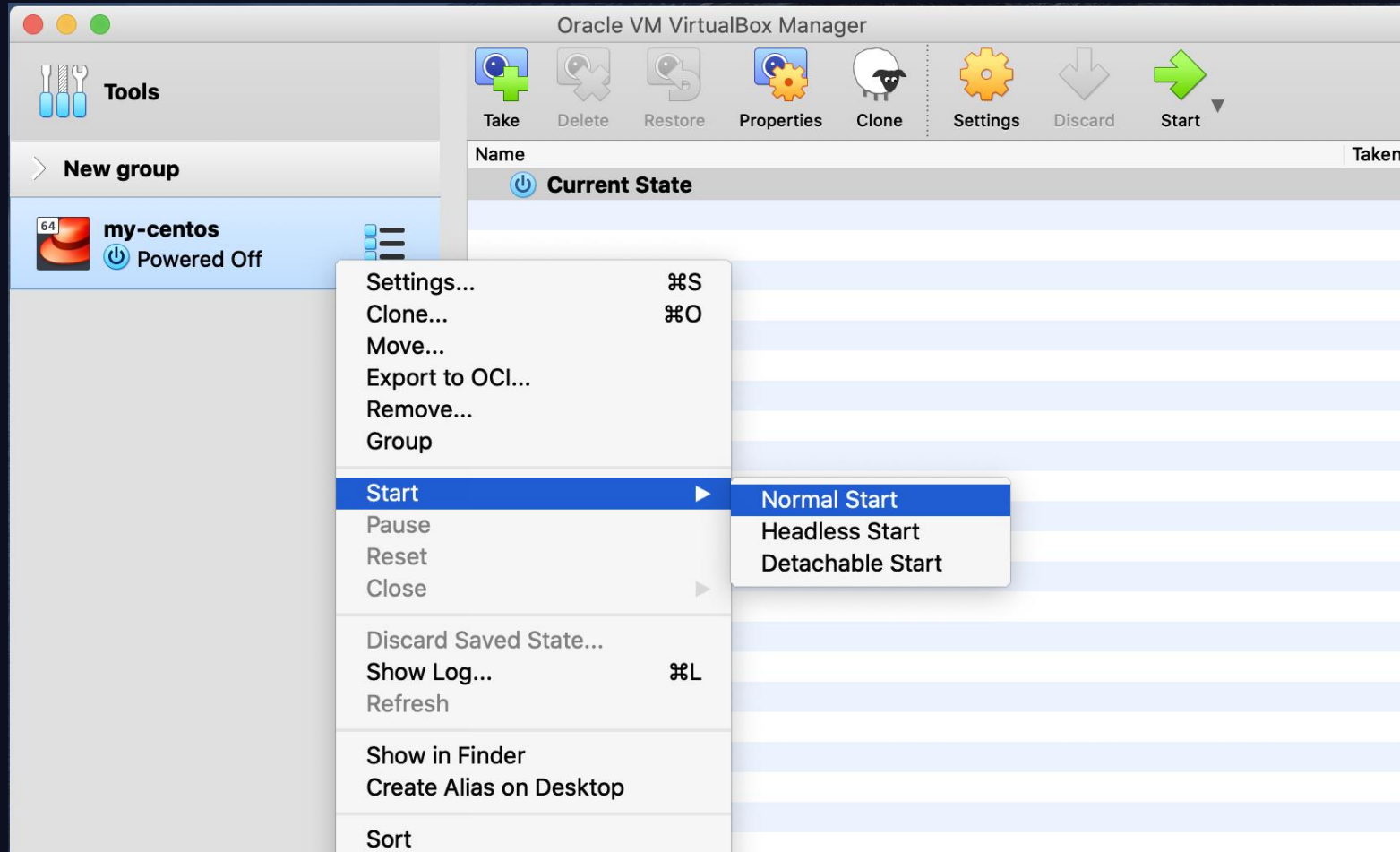
Images



Oracle VirtualBox






Start





References

- <https://communities.vmware.com/thread/579385>
 - <https://www.vmware.com/products/workstation-player.html#compare>
- 
- 
- 

Labs

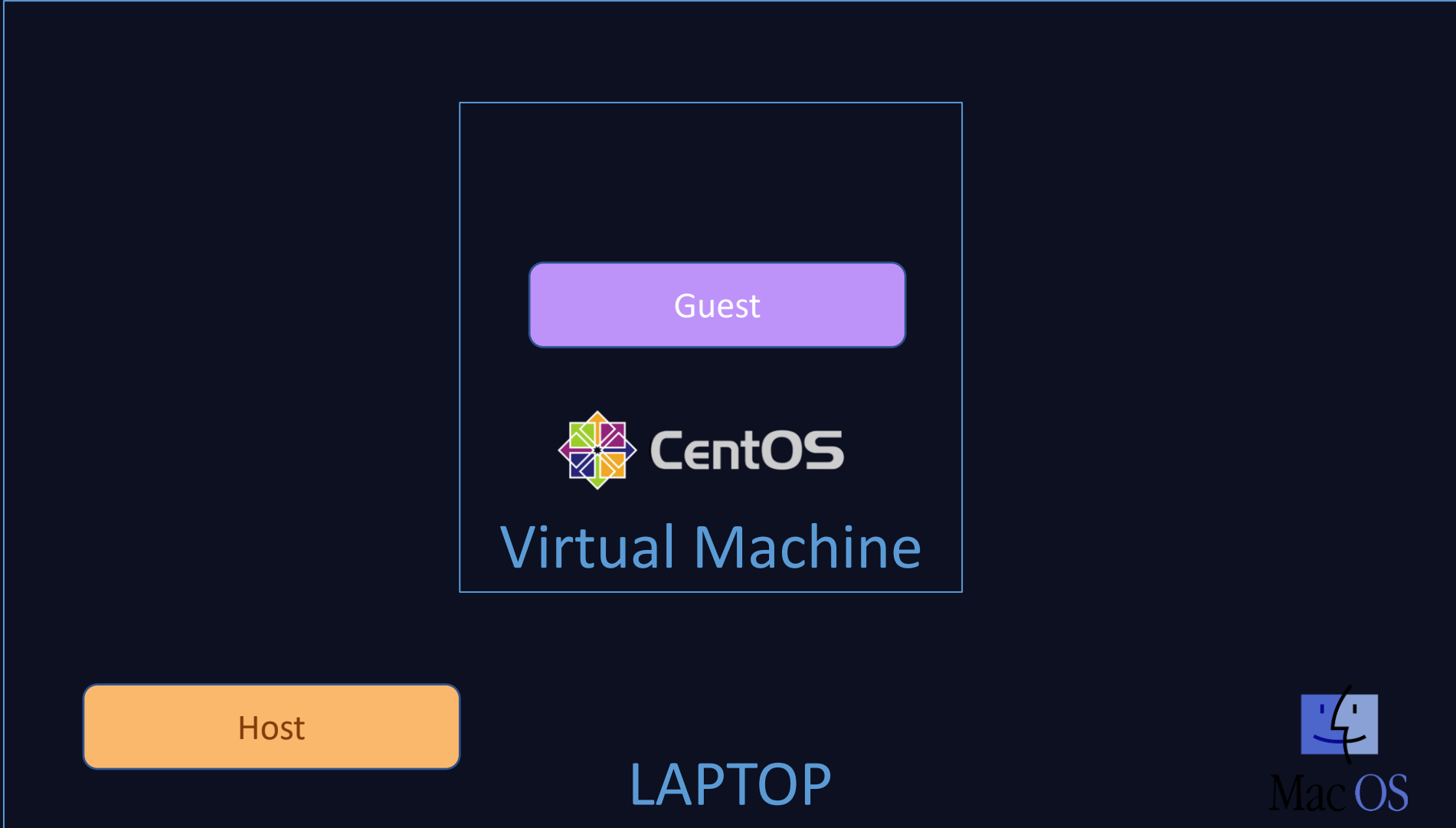


Connectivity



Frequently Asked Questions

- How do I connect to the VM?
- How do I SSH into my VM?
- Why can't I access the server on my VM?
- What's Port mapping?



Oracle VM VirtualBox Manager

Tools

Take Delete Restore Properties Clone Settings Discard Start

New group

my-centos Powered On

Name

my-centos [Running]

64

You want to:

- Continue running in the background
- Save the machine state
- Send the shutdown signal
- Power off the machine

?

Cancel OK

Show Log... %L

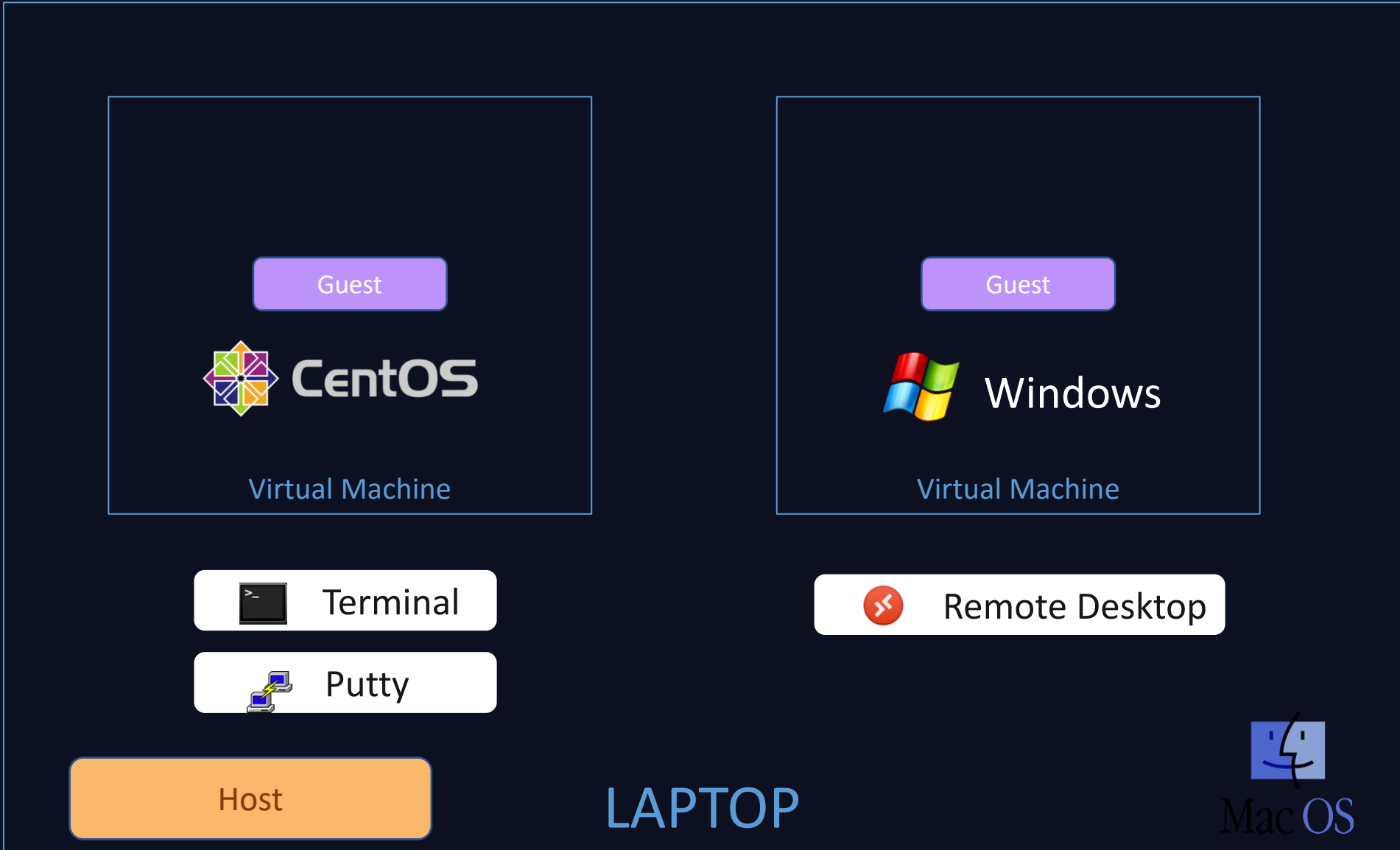
Refresh

Show in Finder

Create Alias on Desktop

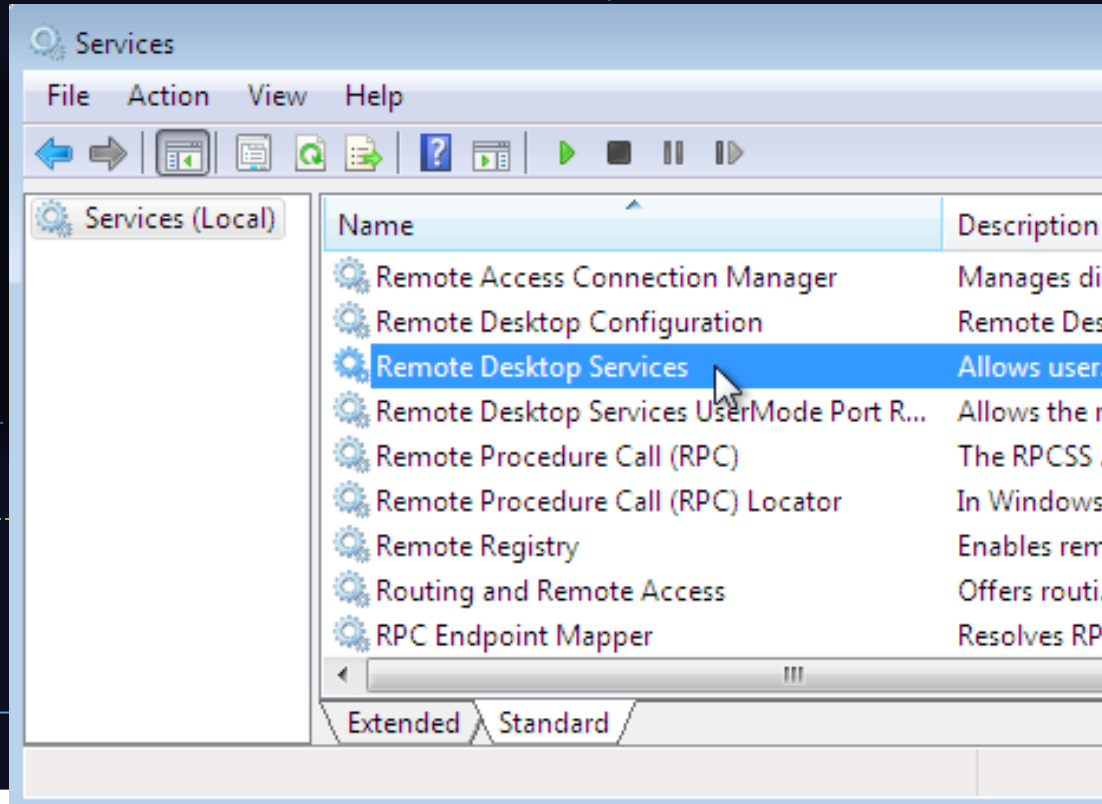
Sort

```
46.501321 [drm] opp 32
46.501913 [drm] Fifo max 0x00200000 min 0x00001000 cap 0x00000355
46.504648 [drm] DX: no.
46.506832 [drm] Atomic: yes
46.511961 [drm:vmw_host_log [vmwgfx]] *ERROR* Failed to send log
46.514731 [drm:vmw_host_log [vmwgfx]] *ERROR* Failed to send log
46.537373 fbcon: svgadrmfb (fb0) is primary device
46.562709 Console: switching to colour frame buffer device 100x37
46.563635 [drm] Initialized vmwgfx 2.14.1 20180322 for 0000:00:02.0 on minor 0
```



```
guest> service sshd status
```

```
Redirecting to /bin/systemctl status sshd.service
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2020-03-22 11:57:47 UTC; 1 day 18h ago
     Docs: man:sshd(8)
           man:sshd_config(5)
  Main PID: 2406 (sshd)
    CGroup: /system.slice/sshd.service
            └─2406 /usr/sbin/sshd -D -u0
```



 Terminal

```
host> ssh 192.168.1.10
```

Host

LAPTOP

 Remote Desktop



IP Address

```
guest> ip addr show
```

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
   link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
   inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
   inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
   link/ether 52:54:00:8a:fe:e6 brd ff:ff:ff:ff:ff:ff
   inet 192.168.1.10/24 brd 192.168.1.255 scope global noprefixroute dynamic eth0
       valid_lft 86387sec preferred_lft 86387sec
```

```
guest> ip addr add 192.168.1.10/24 dev eth0
```

Start SSH service

```
guest> service sshd status
```

Redirecting to /bin/systemctl status sshd.service

- sshd.service - OpenSSH server daemon

Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; vendor preset: enabled)
Active: **active (running)** since Wed 2020-03-25 09:29:51 UTC; 3h 53min ago
Docs: man:sshd(8)
man:sshd_config(5)

```
guest> service sshd start
```



Networking



Objectives

- Networking in VirtualBox
- Networking Adapters
- NAT
- Bridge
- Host Only
- Internet Connectivity

IP Address



ip addr show

```
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fa  
1000
```

```
link/ether 02:0e:0c:9a:00:f0 brd ff:ff:ff:ff:ff:ff
```

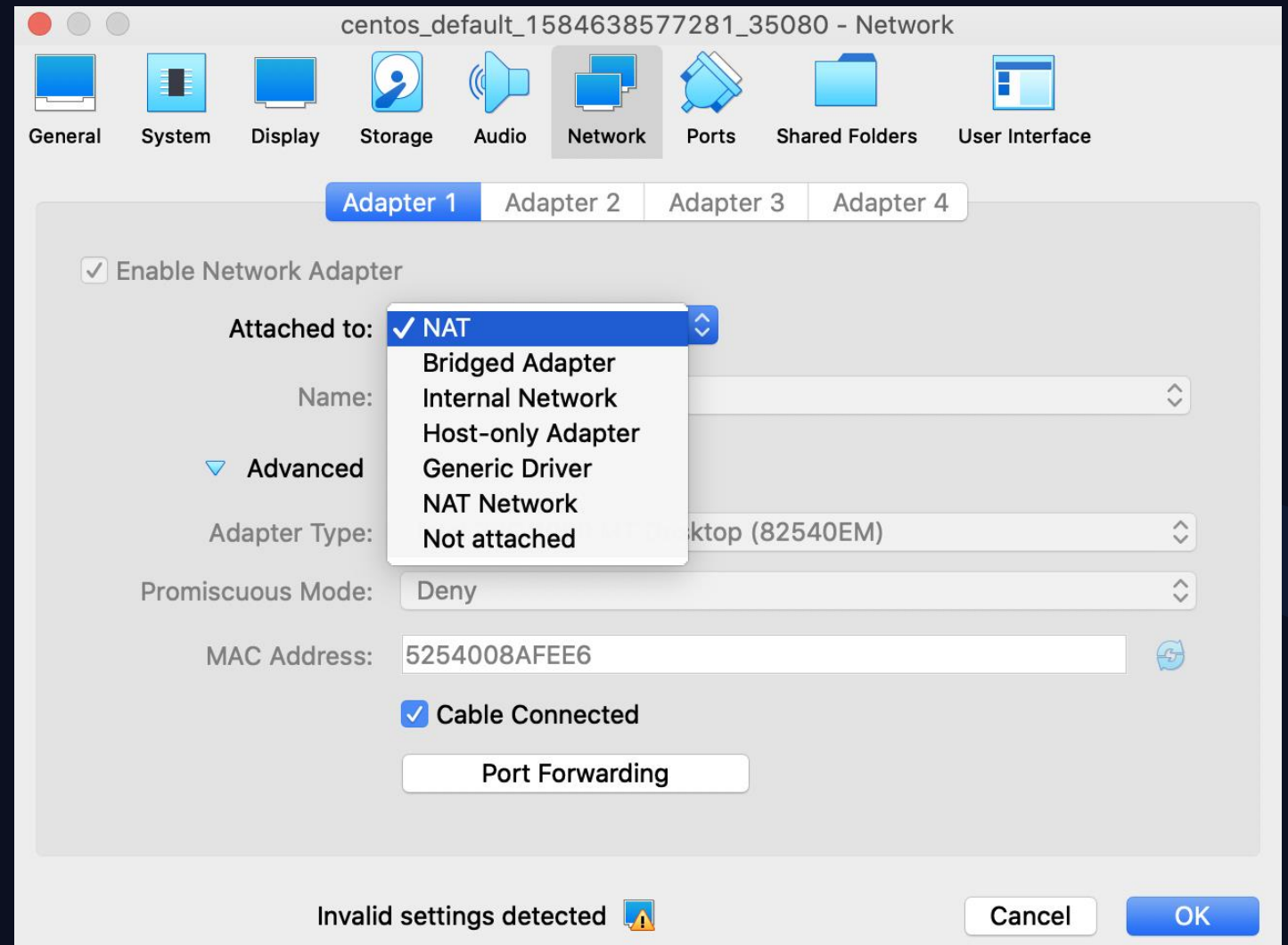
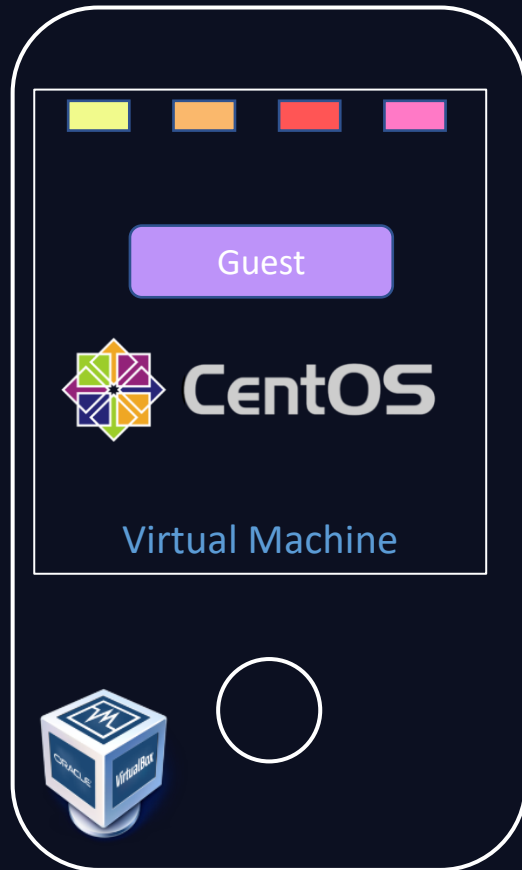
```
inet 192.168.1.5/24 brd 192.168.1.255 scope global enp0s3
```

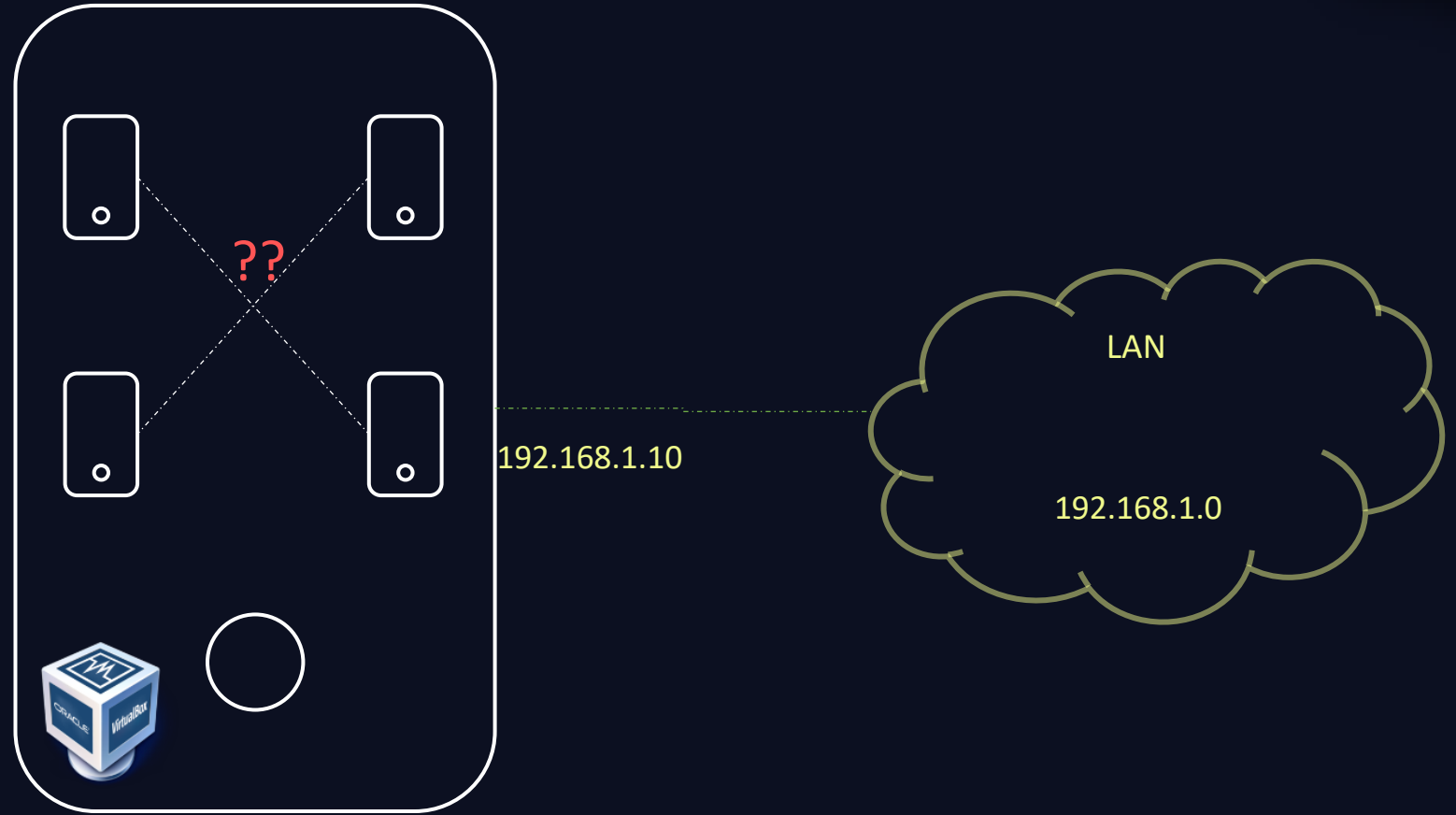
```
3: wlp0s2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fa  
1000
```

```
link/ether dc:fb:48:dd:4b:4f brd ff:ff:ff:ff:ff:ff
```

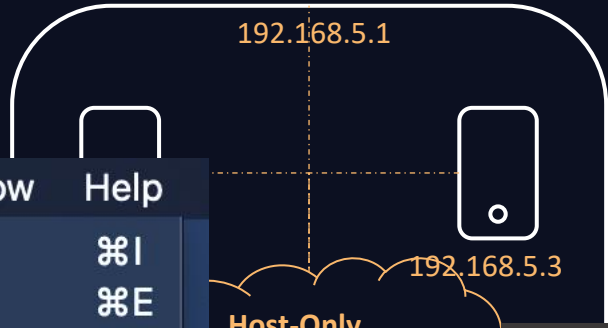
```
inet 192.168.1.6/24 brd 192.168.1.255 scope global enp0s3
```


VirtualBox Networking





+ Host Only



VirtualBox File Machine Window Help

- Import Appliance... ⌘I
- Export Appliance... ⌘E
- New Cloud VM...
- Virtual Media Mana...
- Host Network Mana...

Host Network Manager

Create Remove Properties

Name	IPv4 Address/Mask	IPv6 Address/M
vboxnet0	192.168.5.1/24	

Adapter DHCP Server

Configure Adapter Automatically

Configure Adapter Manually

IPv4 Address: 192.168.5.1

IPv4 Network Mask: 255.255.255.0

IPv6 Address:

IPv6 Prefix Length: 0

Reset Apply Close

ifconfig

```
en9: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu
ether 64:4b:f0:20:6a:6b
inet 192.168.1.10 netmask 0xfffff00 broadcast 192.168.1.255
nd6 options=201<PERFORMNUD,DAD>
status: active

vboxnet0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu
ether 0a:00:27:00:00:00
inet 192.168.5.1 netmask 0xfffff00 broadcast 192.168.5.255
```

+ Host Only



centos_default_1584638577281_35080 - Network

General System Display Storage Audio **Network** Ports Shared Folders User Interface


Adapter 1 Adapter 2 Adapter 3 Adapter 4

Enable Network Adapter

Attached to: Host-only Adapter

Name: vboxnet0

▶ Advanced

Invalid settings detected 

Cancel OK



Network Address Translation (NAT) Network

The image shows two overlapping windows from the VirtualBox application. The background window is titled "VirtualBox - Network" and has tabs for General, Input, Update, Language, Display, Network, Extensions, and Proxy. The foreground window is titled "centos_default_1584638577281_35080 - Network" and has tabs for General, System, Display, Ports, Shared Folders, and User Interface. In the foreground window, the "NAT Network" section is active, showing a list of network adapters with "NAT Network" selected. Below this, the "Attached to:" field is set to "NATNetwork" and the "Name:" field is also "NatNetwork". An "Advanced" section is partially visible at the bottom. At the bottom of the foreground window, a message reads "Invalid settings detected" with a warning icon, and "Cancel" and "OK" buttons are present.

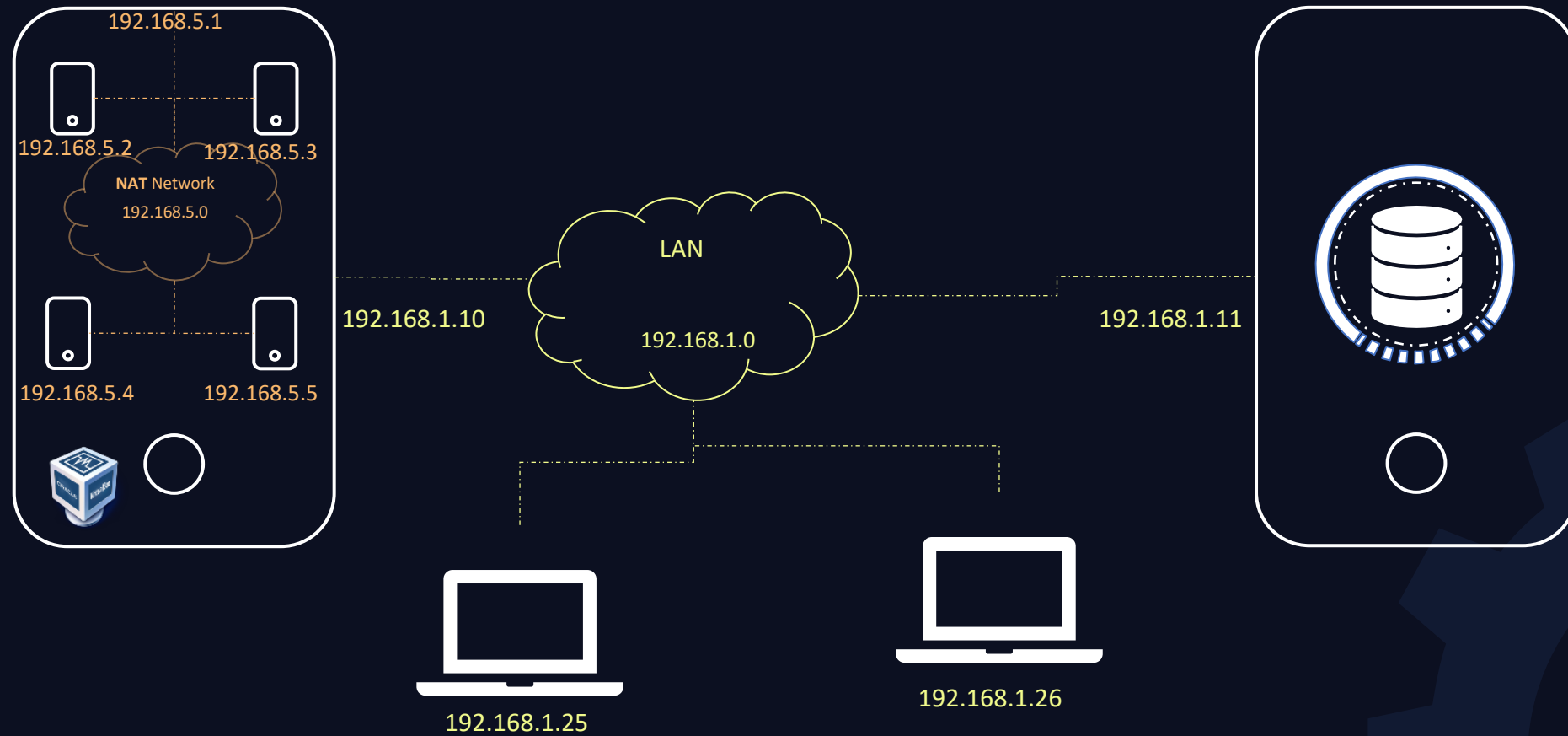
From: 192.168.5.2 To: 192.168.1.1
Read DB

Invalid settings detected 

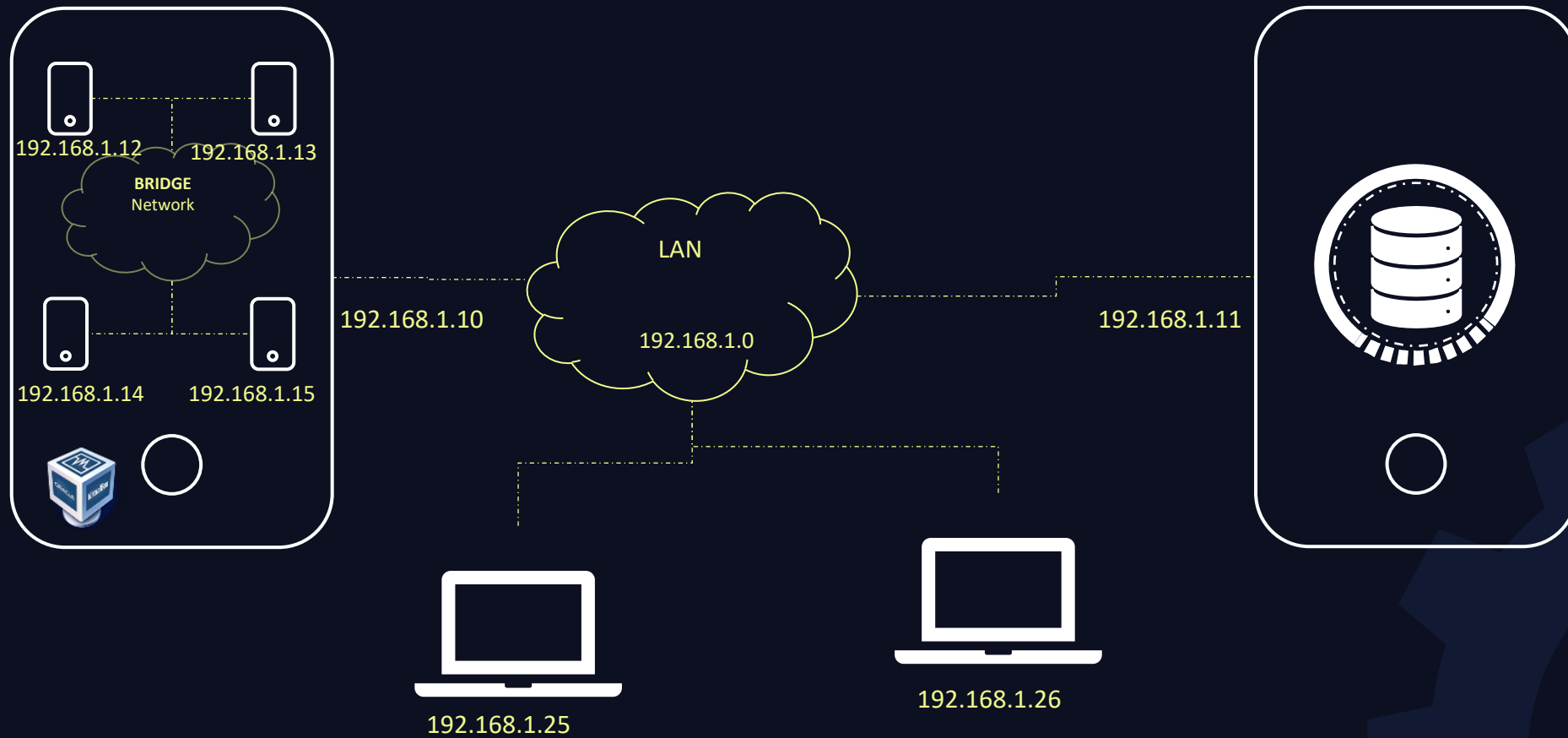
Cancel

OK

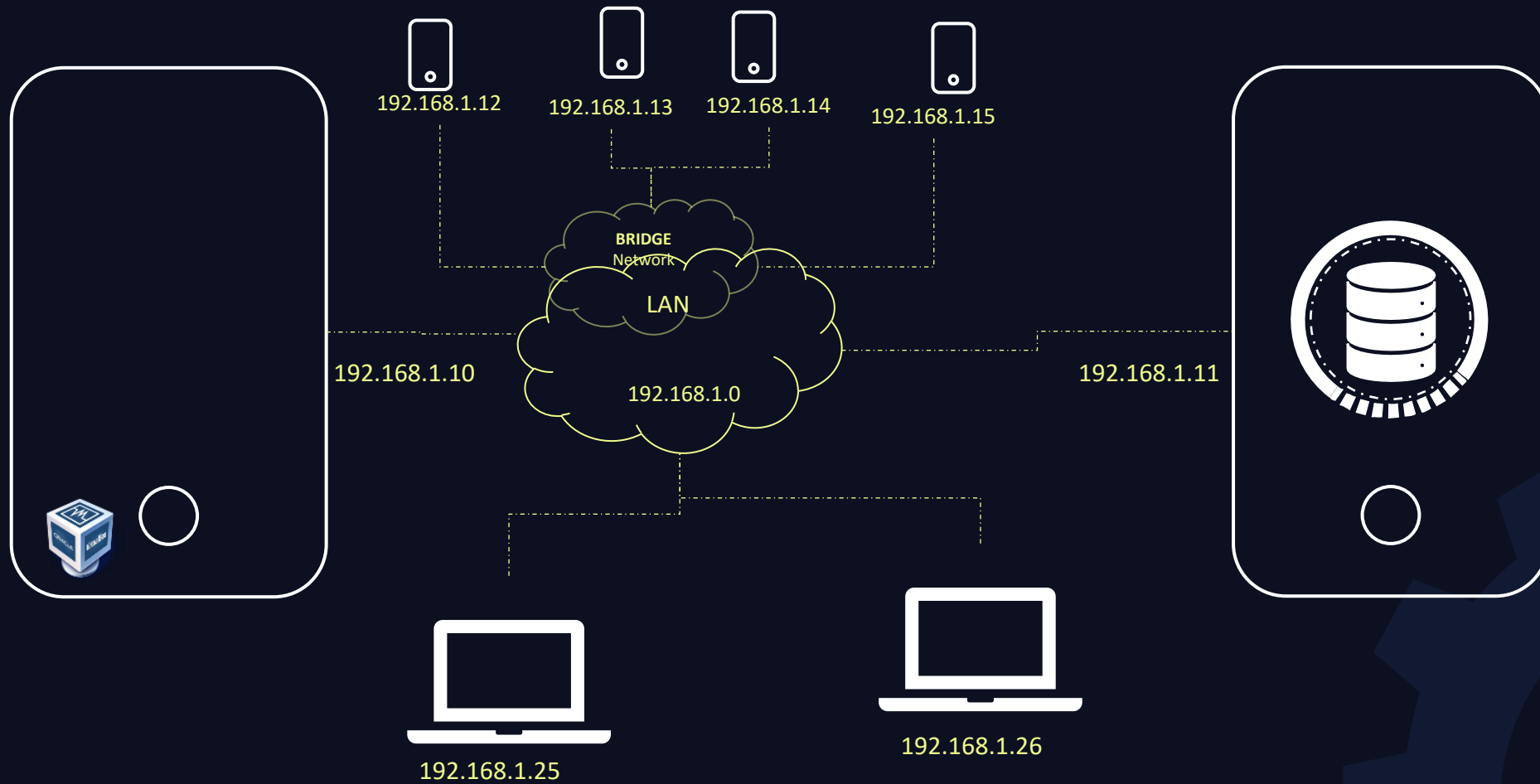
Network Address Translation (NAT)



Bridge Network

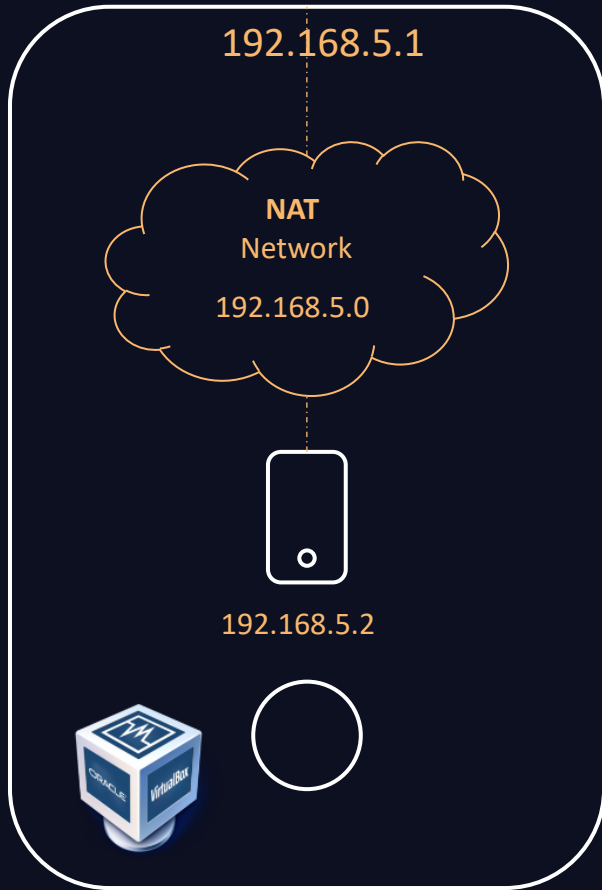


Bridge Network



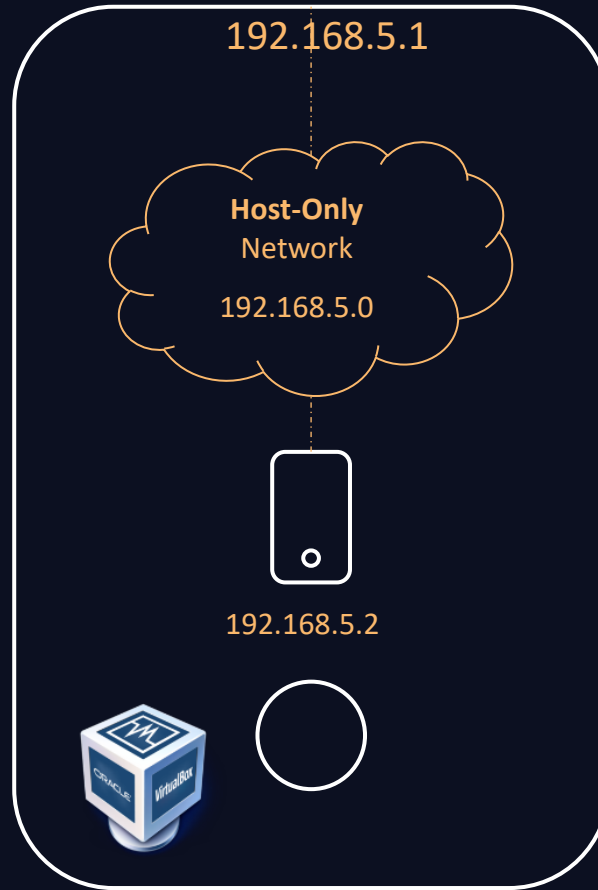
Internet Connectivity

Network Address Translation (NAT)



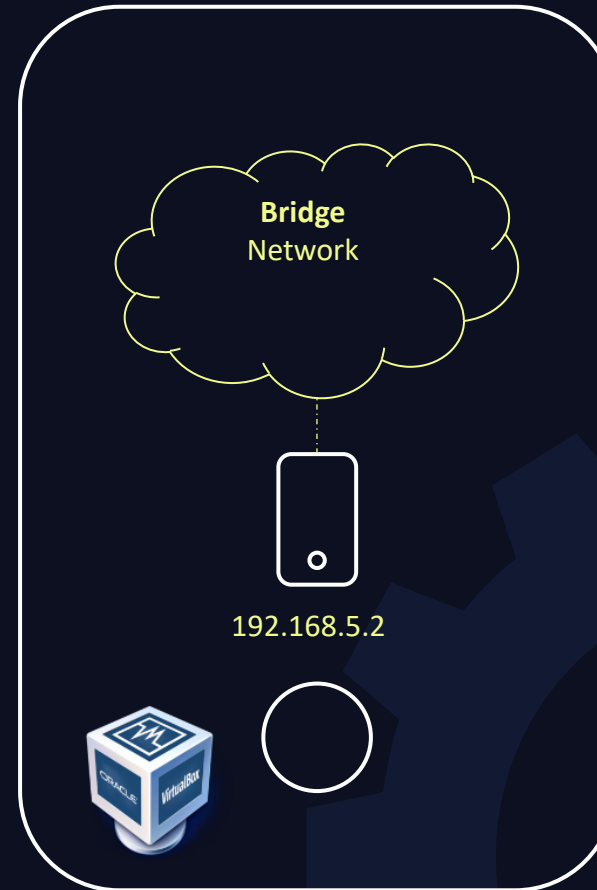
Possible

Host-Only Network



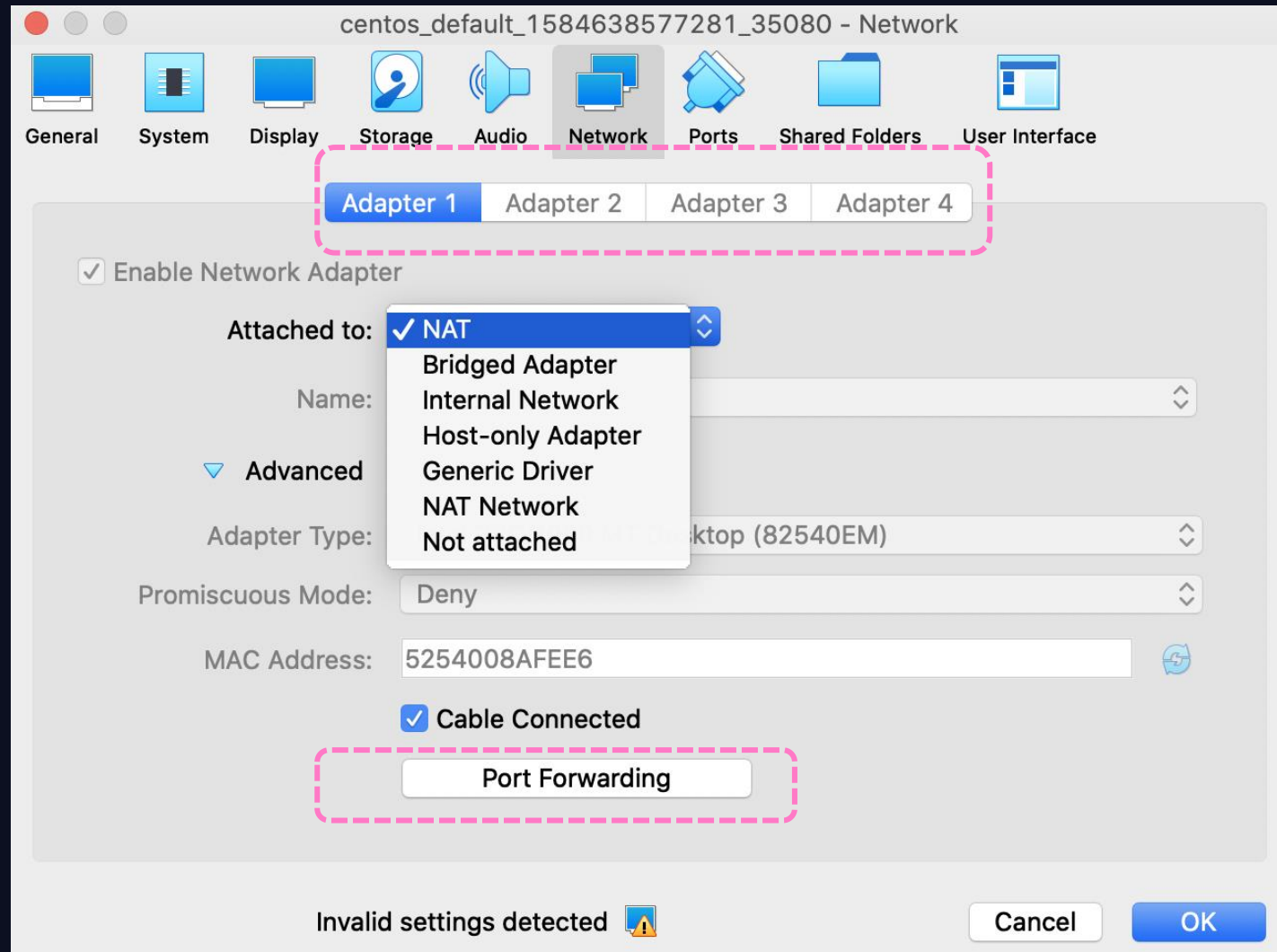
Possible with IP Forwarding

Bridged



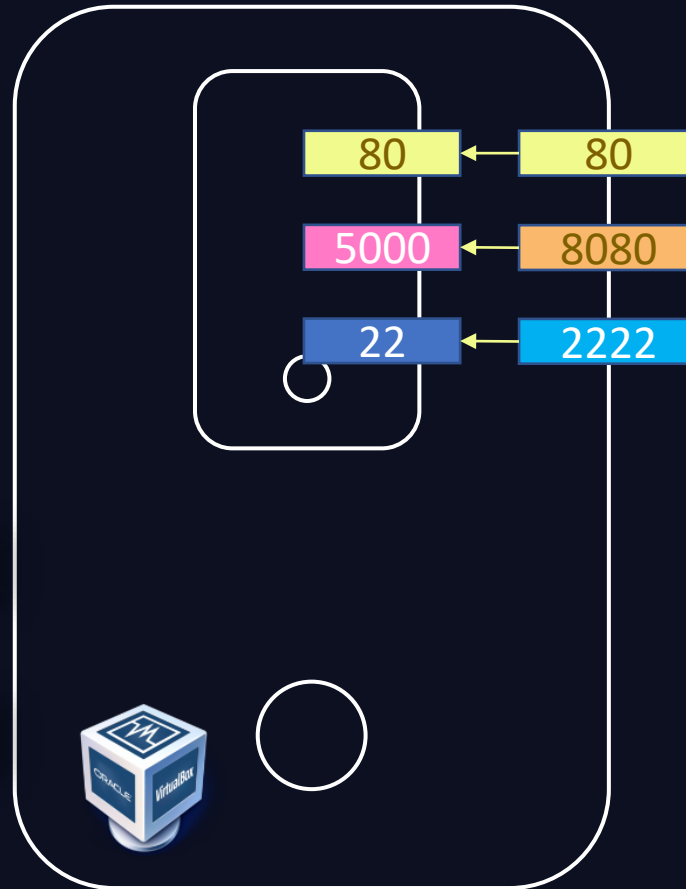
Possible

Internet Connectivity



Port Forwarding

Network Address
Translation (NAT)



```
host> ssh 192.168.1.10
```

```
host> ssh 127.0.0.1 -p 2222
```

Port Forwarding

centos_default_1584638577281_35080 - Network

General System Display Storage Audio Network Ports Shared Folders User Interface

Name	Protocol	Host IP	Host Port	Guest IP	Guest Port
Rule 1	TCP		80		80
ssh	TCP	127.0.0.1	2222		22
Rule 2	TCP		8080		5000

Cancel OK

VirtualBox Networking

Requirement	Solution
VMs must be able to reach the internet/other systems in the network	NAT
VMs must be visible in the external network	Bridged
VMs must NOT be visible in the external network and VMs must NOT be able to reach internet/other systems in the network	Host Network
VMs must be able to reach each other	Host Network
VMs must be able to reach each other and the internet but NOT visible in the external network	Host Network + NAT NAT Network

VirtualBox Networking

VM can reach internet/other systems in the network	VMs can reach each other	Host can reach VM (Without Port forwarding)	Other systems in network can reach VM	Solution
Yes	No	No	No	NAT
Yes	Yes	No	No	NAT Network
No	Yes	Yes	No	Host Network
Yes	Yes	Yes	No	Host Network + NAT
Yes	Yes	Yes	Yes	Bridged



HashiCorp

Vagrant



Vagrant

1. Download
2. Create VM
3. Create Networks
4. Configure Networking
5. Configure Port Forwarding
6. Boot up VM

▶ vagrant up

```
Bringing machine 'default' up with 'virtualbox' provider...  
==> default: Importing base box 'centos/7'...  
==> default: Matching MAC address for NAT networking...  
==> default: Checking if box 'centos/7' version '1905.1' is up to date...  
==> default: Setting the name of the VM: centos2_default_1586895892002_53453  
==> default: Preparing network interfaces based on configuration...  
default: Adapter 1: nat  
==> default: Forwarding ports...  
default: 22 (guest) => 2200 (host) (adapter 1)  
==> default: Booting VM...  
==> default: Waiting for machine to boot. This may take a few minutes...  
==> default: Machine booted and ready!
```


Getting started



HashiCorp

Vagrant

Development Environments Made Easy

Get Started

Download 2.2.7

Find Boxes



Debian

32-bit | 64-bit



Windows

32-bit | 64-bit



Centos

32-bit | 64-bit



Linux

64-bit



macOS

64-bit





Discover Vagrant Boxes

Search for boxes by operating system, included software, architecture and more



Provider any **virtualbox** vmware libvirt more ▾

Sort by **Downloads** Recently Created Recently Updated

	ubuntu/trusty64 20190514.0.0 Official Ubuntu Server 14.04 LTS (Trusty Tahr) builds (End of standard support)	virtualbox	Downloads 30,495,172	Released 5 months ago
	laravel/homestead 9.4.0 Official Laravel local development box.	hyperv parallels virtualbox vmware_desktop	Downloads 13,927,187	Released 22 days ago
	hashicorp/precise64 1.1.0 A standard Ubuntu 12.04 LTS 64-bit box.	hyperv virtualbox vmware_fusion	Downloads 6,769,100	Released about 6 years ago
	centos/7 1905.1 CentOS Linux 7 x86_64 Vagrant Box	hyperv libvirt virtualbox vmware and 3 more providers	Downloads 5,154,991	Released 9 months ago

==> default: Booting VM...

==> default: Waiting for machine to boot. This may take a few minutes...

Vagrant Commands

▶ vagrant

Usage: vagrant [options] <command> [<args>]

-v, --version Print the version and exit.
-h, --help Print this help.

Common commands:

init initializes a new Vagrant environment by creating a Vagrantfile
up starts and provisions the vagrant environment
suspend suspends the machine
resume resume a suspended vagrant machine
halt stops the vagrant machine
destroy stops and deletes all traces of the vagrant machine
status outputs status of the vagrant machine
reload restarts vagrant machine, loads new Vagrantfile configuration
snapshot manages snapshots: saving, restoring, etc.

▶ vagrant ssh

[vagrant@localhost ~]\$

Vagrantfile

```
Vagrant.configure("2") do |config|

  config.vm.box = "centos/7"
  config.vm.network "forwarded_port", guest: 80, host: 8080
  config.vm.synced_folder "../data", "/vagrant_data"
  config.vm.provider "virtualbox" do |vb|

    vb.memory = "1024"

  end

  config.vm.provision "shell", inline: <<-SHELL
    apt-get update
    apt-get install -y apache2
  SHELL
end
```



Vagrant Providers

- VirtualBox
 - VMware
 - Hyper-V
 - Docker
 - Custom
- 
- 

Review



-
- Lab
 - Linux
 - Applications
 - DB
 - Security
 - Networking
 - Storage

DevOps Pre-Requisites

Docker

Ansible

CI/CD

Kubernetes

Chef

Jenkins

CKA

Puppet

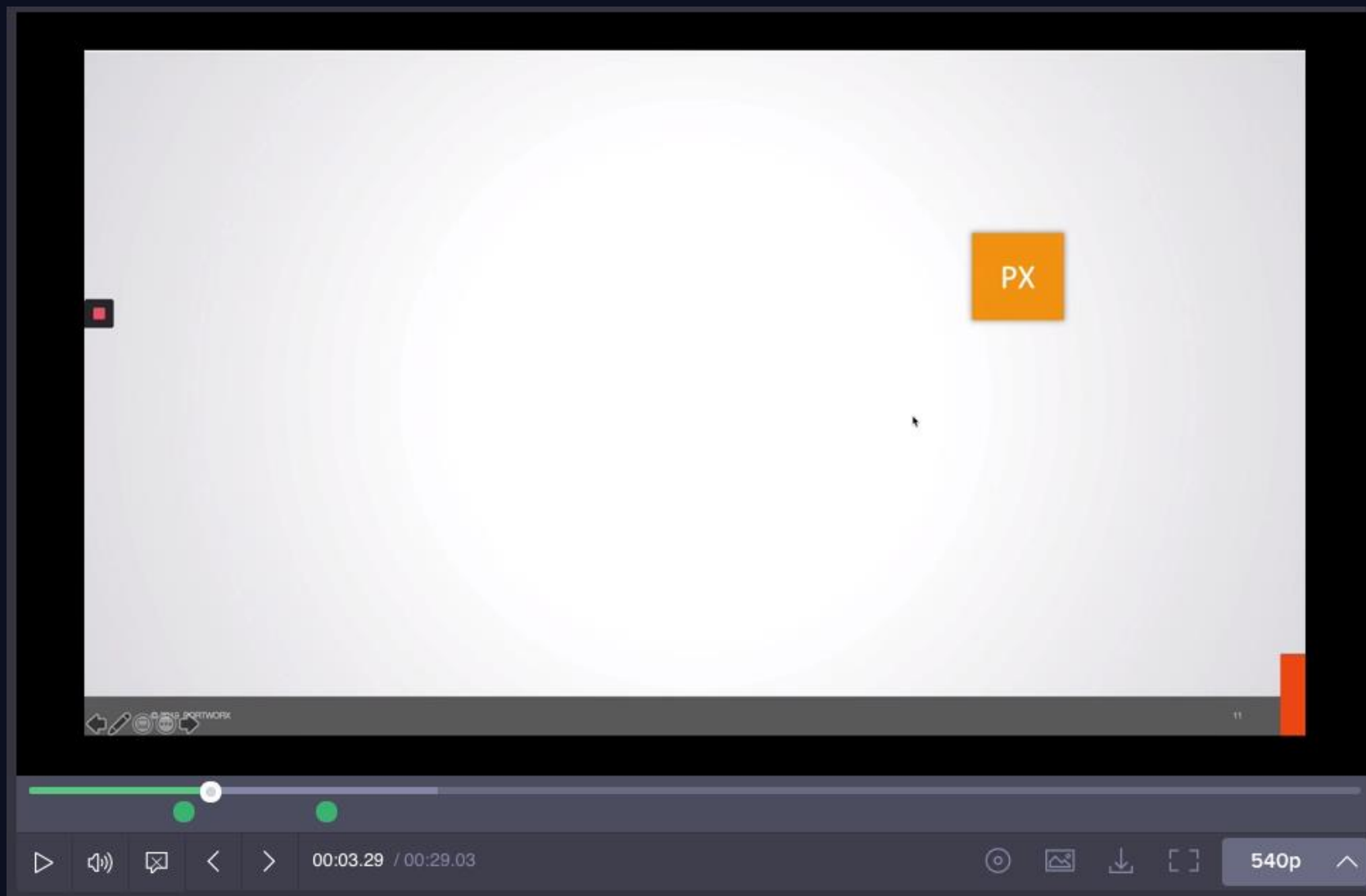
CKAD

DevOps

What to test

Check	Ignore
Facts	Delivery/Speed
Explanation	Noise
Code/Typos	Pauses/Stops
Analogies/Examples	Animation
Student/Expert	

How to Review





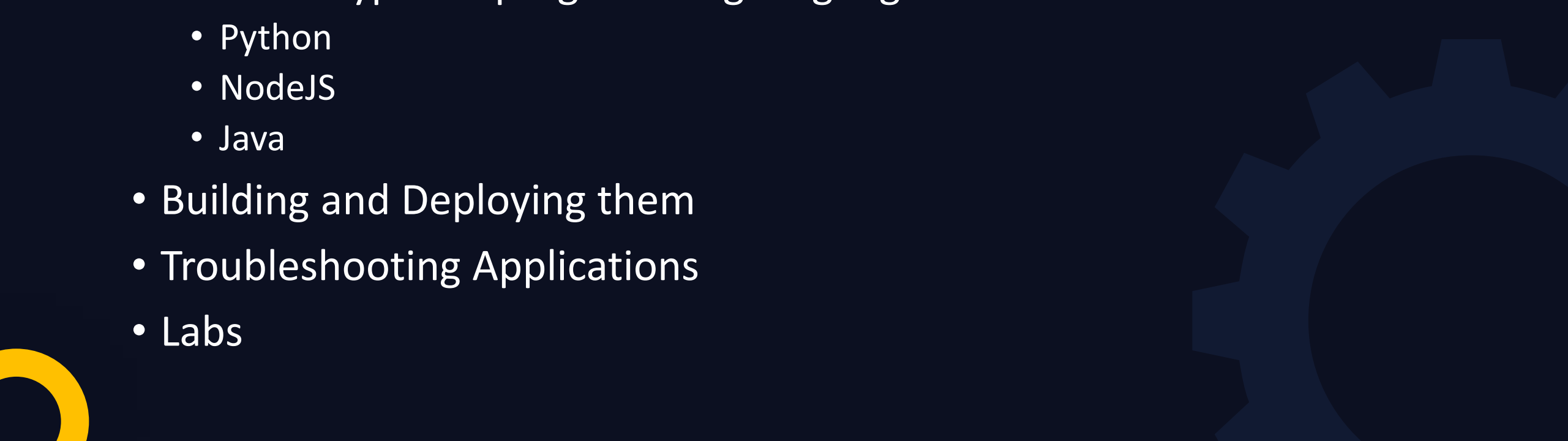
just enough

Applications



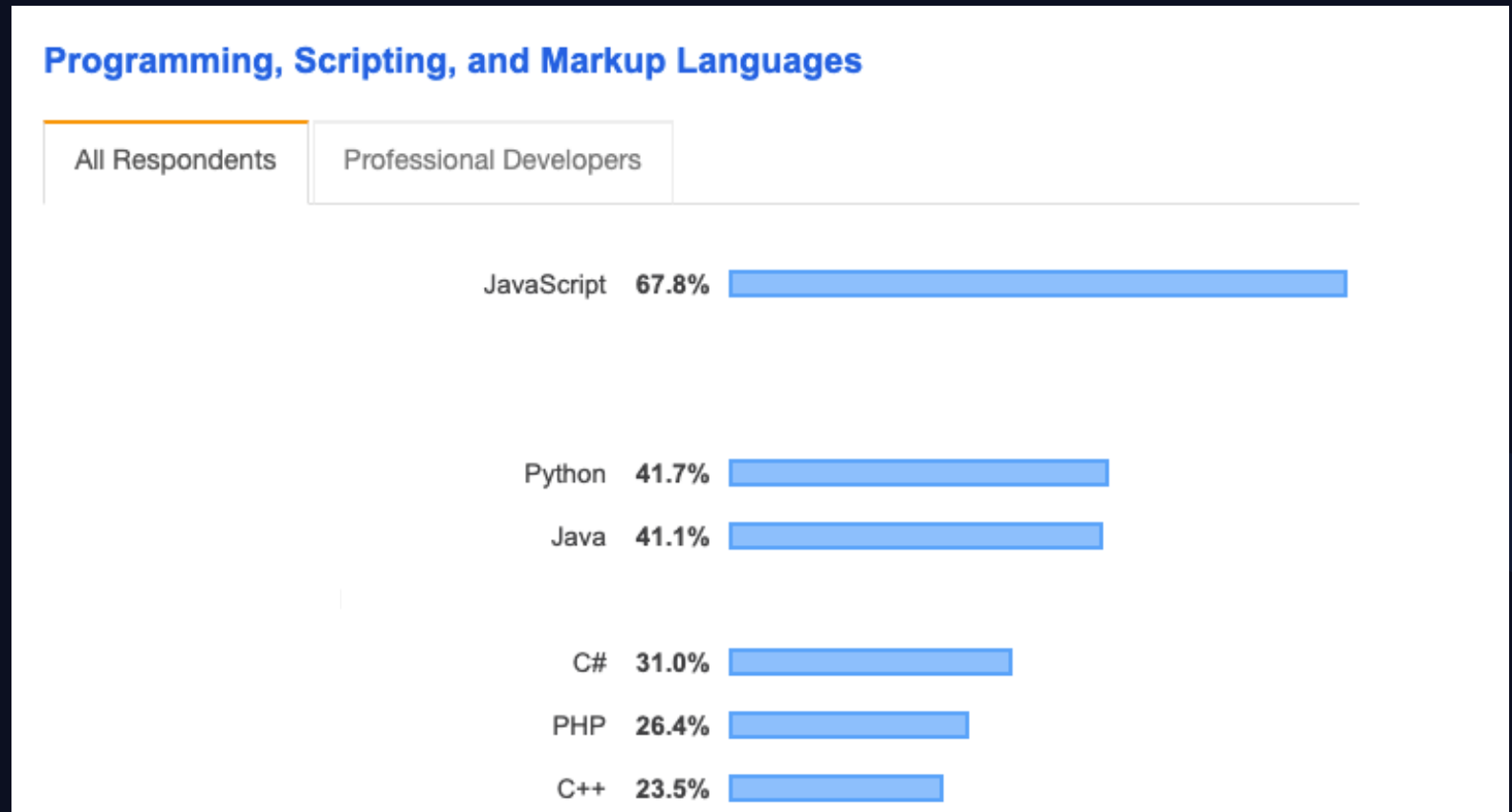


Introduction

- Who is this for?
 - Non-Developers
 - Different types of programming languages
 - Python
 - NodeJS
 - Java
 - Building and Deploying them
 - Troubleshooting Applications
 - Labs
- 

Programming Languages

- JavaScript – NodeJS
- Python
- Java



Types

Compiled

Interpreted



C

C++



python



Compiled

1. Develop Source Code

MyClass.java

```
public class MyClass {  
    public static void main(String[] args) {  
        System.out.println("Hello World");  
    }  
}
```

2. Compile

```
▶ javac MyClass.java
```

```
MyClass.class
```

3. Run

```
▶ java MyClass
```

```
Hello World
```

Interpreted

1. Develop Source Code

main.py

```
def print_message():  
    print("Hello World")  
  
if __name__ == '__main__':  
    print_message()
```

2. Run

```
▶ python main.py
```

```
Hello World
```

Code

main.py

```
def print_message():  
    print("Hello World")  
  
if __name__ == '__main__':  
    print_message()
```

Human Readable
Source Code



Machine Code

```
01101000 10111100 10000001  
01100100 01011100 00010111  
00001010 00001110 11111010  
10110001 01101000 10111100  
10000001 01100100 01011100  
00010111 00001010 00001110  
11111010 10110001 10110001
```

Machine Readable
Machine Code

Code

main.py

```
def print_message():  
    print("Hello World")  
  
if __name__ == '__main__':  
    print_message()
```



Compiler

main.pyc

```
Hello World  
1 0 LOAD_NAME 0 (dig)  
3 LOAD_NAME 1 (print)  
6 LOAD_CONST 0 ('Hello World')  
--> 12 CALL_FUNCTION 1 (1 positional, 0 keyword)  
15 PRINT_EXPR  
16 LOAD_CONST 1 (None)  
19 RETURN_VALUE
```



Interpreter

Machine Code

```
01101000 10111100 10000001  
01100100 01011100 00010111  
00001010 00001110 11111010  
10110001 01101000 10111100  
10000001 01100100 01011100  
00010111 00001010 00001110  
11111010 10110001 10110001
```

Human Readable
Source Code

Intermediary
Byte Code

Machine Readable
Machine Code

Virtual Machine



Compiler

main.pyc

```
Hello World
```

```
1 0 LOAD_NAME      0 (dig)
3 LOAD_NAME      1 (print)
6 LOAD_CONST     0 ('Hello World')
--> 12 CALL_FUNCTION 1 (1 positional, 0 keyword)
15 PRINT_EXPR
16 LOAD_CONST     1 (None)
19 RETURN_VALUE
```



Interpreter



Python VM

Machine Code

```
01101000 10111100 10000001
01100100 01011100 00010111
00001010 00001110 11111010
10110001 01101000 10111100
10000001 01100100 01011100
00010111 00001010 00001110
11111010 10110001 10110001
```

Intermediary
Byte Code

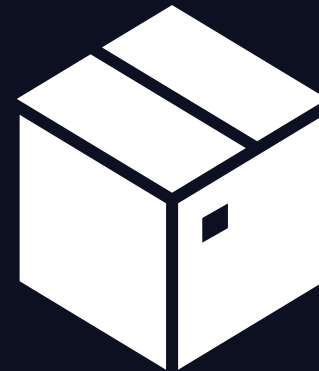
Machine Readable
Machine Code

```
python main.py
```

```
Hello World
```

Packages/Modules/Libraries

- Filesystems
- Math
- Operating system
- HTTP
- Security
- Networking





Build

- Compile
- Run Tests
- Package
- Delivery

- Check build procedure for different types of applications:
 - Python
 - Java
 - NodeJS



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NETWORKING





Networking Pre-Requisites

- Switching
- Routing
- Default Gateway
- DNS Configurations on Linux



just enough

DNS

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Introduction

About Java

- Free
- Open-source
- Huge Community



Version	Date
13	2019
12	2019
11	2018
10	2018
9	2017
8	2014
7	2011
6	2006
5	2004

Install Java

```
wget https://download.java.net....  
openjdk-13.0.2_linux-x64_bin.tar.gz
```

```
tar -xvf openjdk-13.0.2_linux-x64_bin.tar.gz  
/opt/jdk-13/bin/java -version
```

```
jdk-13.0.2/bin/java -version
```

```
openjdk version "13.0.2" 2020-01-14  
OpenJDK Runtime Environment (build 13.0.2+8)  
OpenJDK 64-Bit Server VM (build 13.0.2+8, mixed mode,  
sharing)
```

```
java -version
```

```
openjdk version "1.8.0_242"  
OpenJDK Runtime Environment (build 1.8.0_242-b08)  
OpenJDK 64-Bit Server VM (build 25.242-b08, mixed mode)
```

jdk.java.net **JDK 13.0.2 General-Availability Release**
Schedule, status, & features (OpenJDK)

Documentation

- Release notes
- API Javadoc

Build 8 (2019/12/11): General Availability

- Changes in the build
- Issues addressed

Version	Name
13	13
12	12
11	11
10	10
9	9
8	1.8
7	1.7
6	1.6
5	1.5


Notes

<https://jdk.java.net/13/>



Java Development Kit (JDK)

Develop

 jdb

 javadoc

Build

 javac

 jar

Run

 JRE

(Java Runtime Environment)

 java


```
ls jdk-13.0.2/bin
```

```
jaotc  javadoc  jdeprscan  jinfo  jps    jstatd  rmiregistry
jar    javap    jdeps    jjs    jrunscript  keytool  serialver
jarsigner  jcmd    jfr     jlink  jshell    pack200  unpack200
java   jconsole  jhsdb   jmap   jstack    rmic
javac  jdb      jimage. jmod   jstat    rmid
```

Before v9

Java Development Kit (JDK)

Develop

 jdb


 javadoc

Build

 javac

 jar

Run

 java



JRE

(Java Runtime Environment)

Download JDK

.tar.gz - 188 MB

[Checksum](#)

Download JRE

.tar.gz - 39 MB

[Checksum](#)

After v9



Java Development Kit (JDK)

Develop

 jdb

 javadoc

Build

 javac

 jar

Run



JRE

(Java Runtime Environment)

 java

Labs

just enough



Build

Compile

1. Develop Source Code

MyClass.java

```
public class MyClass {  
    public static void main(String[] args) {  
        System.out.println("Hello World");  
    }  
}
```

2. Compile

```
▶ javac MyClass.java
```

```
MyClass.class
```

3. Run

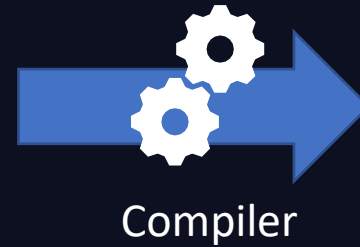
```
▶ java MyClass
```

```
Hello World
```


Compile

MyClass.java

```
public class MyClass {  
    public static void main(String[] args) {  
        System.out.println("Hello World");  
    }  
}
```



Machine Code

```
01101000 10111100 10000001  
01100100 01011100 00010111  
00001010 00001110 11111010  
10110001 01101000 10111100  
10000001 01100100 01011100  
00010111 00001010 00001110  
11111010 10110001 10110001
```

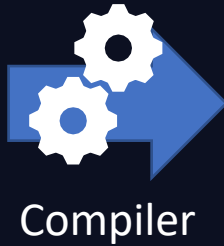
Human Readable
Source Code

Machine Readable
Machine Code

Java Virtual Machine

MyClass.java

```
public class MyClass {  
    public static void main(String[] args) {  
        System.out.println("Hello World");  
    }  
}
```



Compiler

MyClass.class

```
0: iconst_2  
1: istore_1  
2: iload_1  
3: sipush 1000  
6: if_icmpge 44  
9: iconst_2  
10: istore_2  
11: iload_2  
12: iload_1  
13: if_icmpge 31
```



JVM

Machine Code

```
01101000 10111100 10000001  
01100100 01011100 00010111  
00001010 00001110 11111010  
10110001 01101000 10111100  
10000001 01100100 01011100  
00010111 00001010 00001110  
11111010 10110001 10110001
```

Human Readable
Source Code

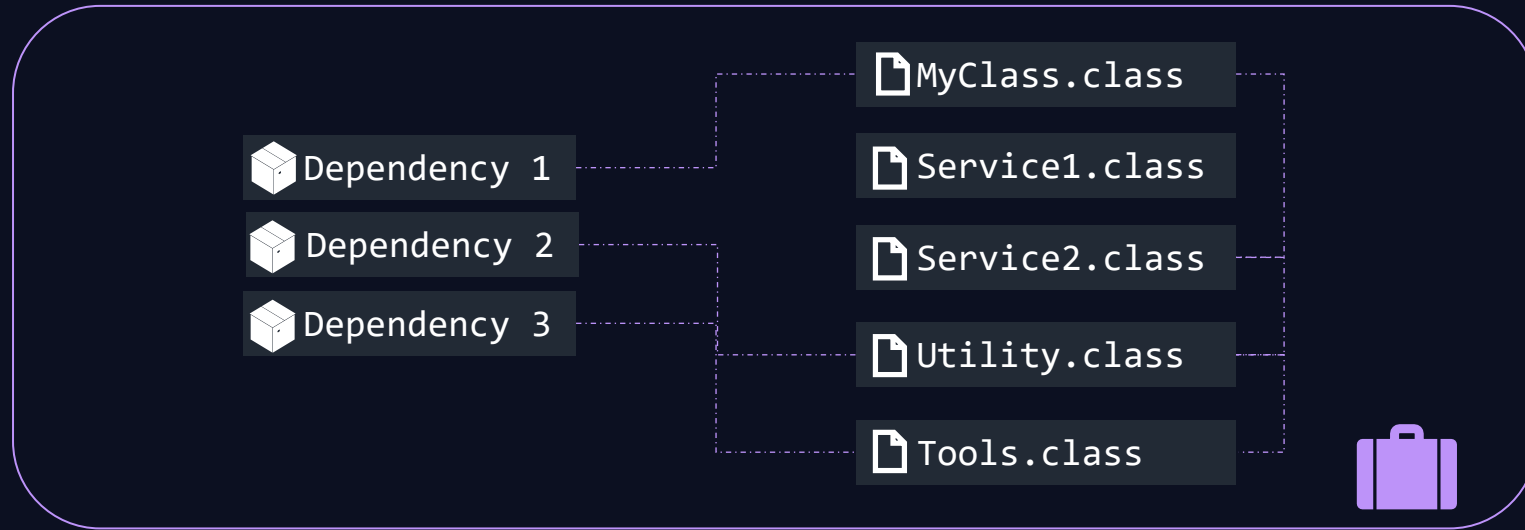
Intermediary
Byte Code

Machine Readable
Machine Code

```
▶ javac MyClass.java  
MyClass.class
```

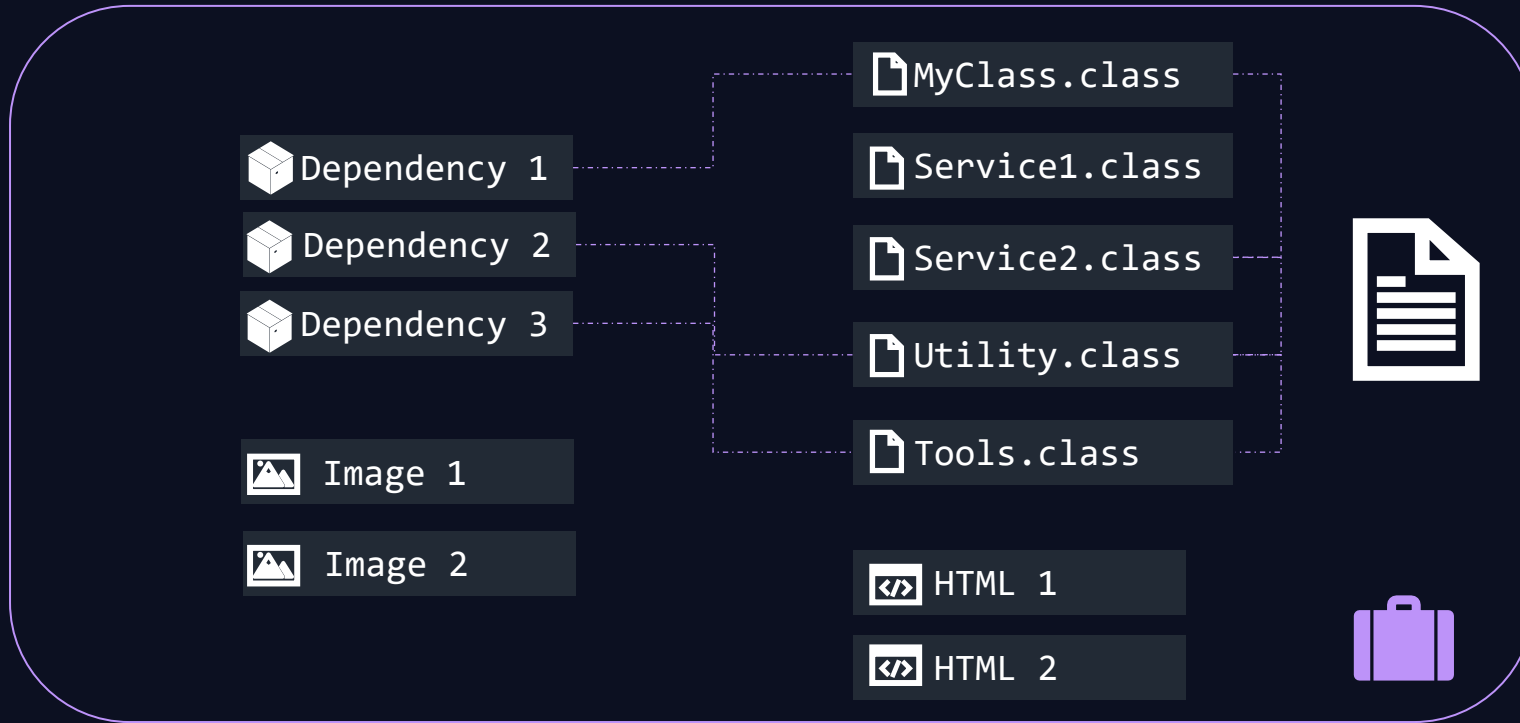
```
▶ java MyClass  
Hello World
```

Package



Java Archive
(JAR)

Package



META-INF/MANIFEST.MF

```
Manifest-Version: 1.0  
Created-By: 1.8.0_242 (Private Build)  
Main-Class: MyClass
```

Java Archive (JAR) Web Archive (WAR)

```
▶ jar cf MyApp.jar MyClass.class Service1.class Service2.class ...
```

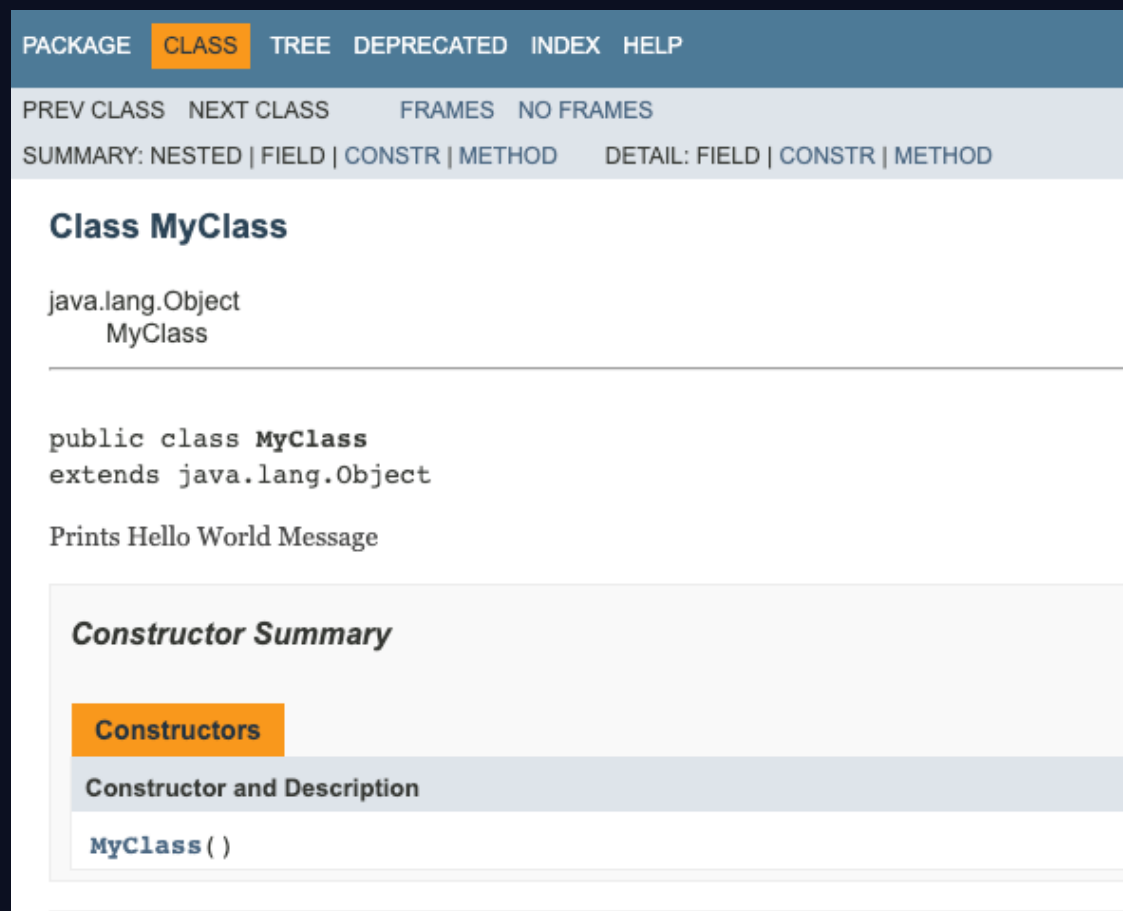
```
MyApp.jar
```

```
▶ java -jar MyApp.jar
```

```
Hello World
```

Document

```
▶ javadoc -d doc MyClass.java
```



The screenshot shows a Javadoc page for a class named `MyClass`. The page has a navigation bar at the top with links for `PACKAGE`, `CLASS` (highlighted), `TREE`, `DEPRECATED`, `INDEX`, and `HELP`. Below the navigation bar are links for `PREV CLASS`, `NEXT CLASS`, `FRAMES`, and `NO FRAMES`. A summary line reads: `SUMMARY: NESTED | FIELD | CONSTR | METHOD` and `DETAIL: FIELD | CONSTR | METHOD`.

The main content area starts with the heading **Class MyClass**. Below this, the package and class name are listed: `java.lang.Object` and `MyClass`. A horizontal line separates this from the class declaration:

```
public class MyClass
  extends java.lang.Object
```

Below the declaration, a comment is shown: `Prints Hello World Message`.

A section titled **Constructor Summary** is shown below. It contains a sub-section for **Constructors** (highlighted) with a sub-section for **Constructor and Description**. The constructor `MyClass()` is listed.

Build Process



Develop



Compile



Package



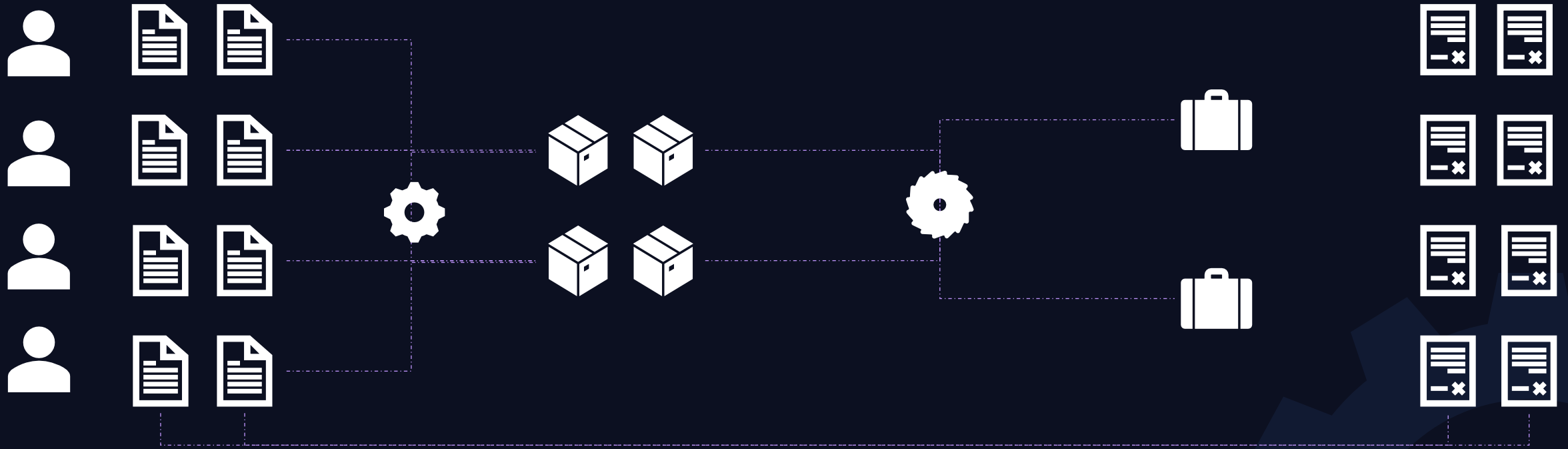
Document

```
▶ javac MyClass.java
```

```
▶ jar cf MyClass.jar ..
```

```
▶ javadoc MyClass.java
```

Build Process





Build Tools

- Maven
- Gradle
- ANT

Build Steps

1.Compile

2.Package

3.Document



Gradle

```
Branch: master ▾ docker-java-sample / build.gradle

arun-gupta upgrading the version to 3.0.6
2 contributors

45 lines (35 sloc) | 961 Bytes

1  buildscript {
2      repositories {
3          jcenter()
4      }
5
6      dependencies {
7          classpath 'com.bmuschko:gradle-docker-plugin:3.0.6'
8      }
9  }
10
11  apply plugin: 'java'
12  apply plugin: 'application'
13  apply plugin: 'com.bmuschko.docker-java-application'
14
15  import com.bmuschko.gradle.docker.tasks.container.*
16  import com.bmuschko.gradle.docker.tasks.image.*
17
```

Gradle

Classical

1. Build app: `./gradlew build`
2. Run app: `./gradlew run`



Summary

- Java
- Java Runtime Environment
- Java Development Kit
- Compiling a Java application
- Packaging a given application to JARs
- What are Build Tools?

DevOps Course



Labs

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JavaScript

amazon

Deliver to Norway

Departments

Your Amazon.com Today's Deals Gift Cards Registry Sell Help

EN Hello, Sign in Account & Lists Orders Cart

Shop 12 Days of Deals

12 Days of Deals

Spruce up the home & garden

Shop Day 11

Need help?

Learn more about shopping with Amazon

See more

Electronics Gift Guide

Top gadgets in audio, entertainment, and more

Shop now

Deals in electronics

Holiday Deals

Shop now

Sign in for the best experience

Sign in securely

jQuery



NodeJS

- Free
- Open source
- Cross Platform Compatible



[Node.js 13.x](#)

[Node.js 12.x](#)

[Node.js 11.x](#)

[Node.js 10.x](#)

[Node.js 9.x](#)

[Node.js 8.x](#)

[Node.js 7.x](#)

[Node.js 6.x](#)

[Node.js 5.x](#)

[Node.js 4.x](#)

[Node.js 0.12.x](#)

[Node.js 0.10.x](#)

Install NodeJS

NodeSource Node.js Binary Distributions



ubuntu⁺



CentOS

fedora^f

```
▶ curl -sL https://rpm.nodesource.com/setup_13.x | bash -
```

```
▶ yum install nodejs
```


NodeJS Commands

```
node -v
```

```
V13.10.1
```

```
node add.js
```

```
Addition : 15
```

```
add.js
```

```
// Returns addition of two numbers  
let add = function (a, b) {  
    return a+b;  
};  
  
const a = 10, b = 5;  
  
console.log("Addition : "+ add(a,b));
```

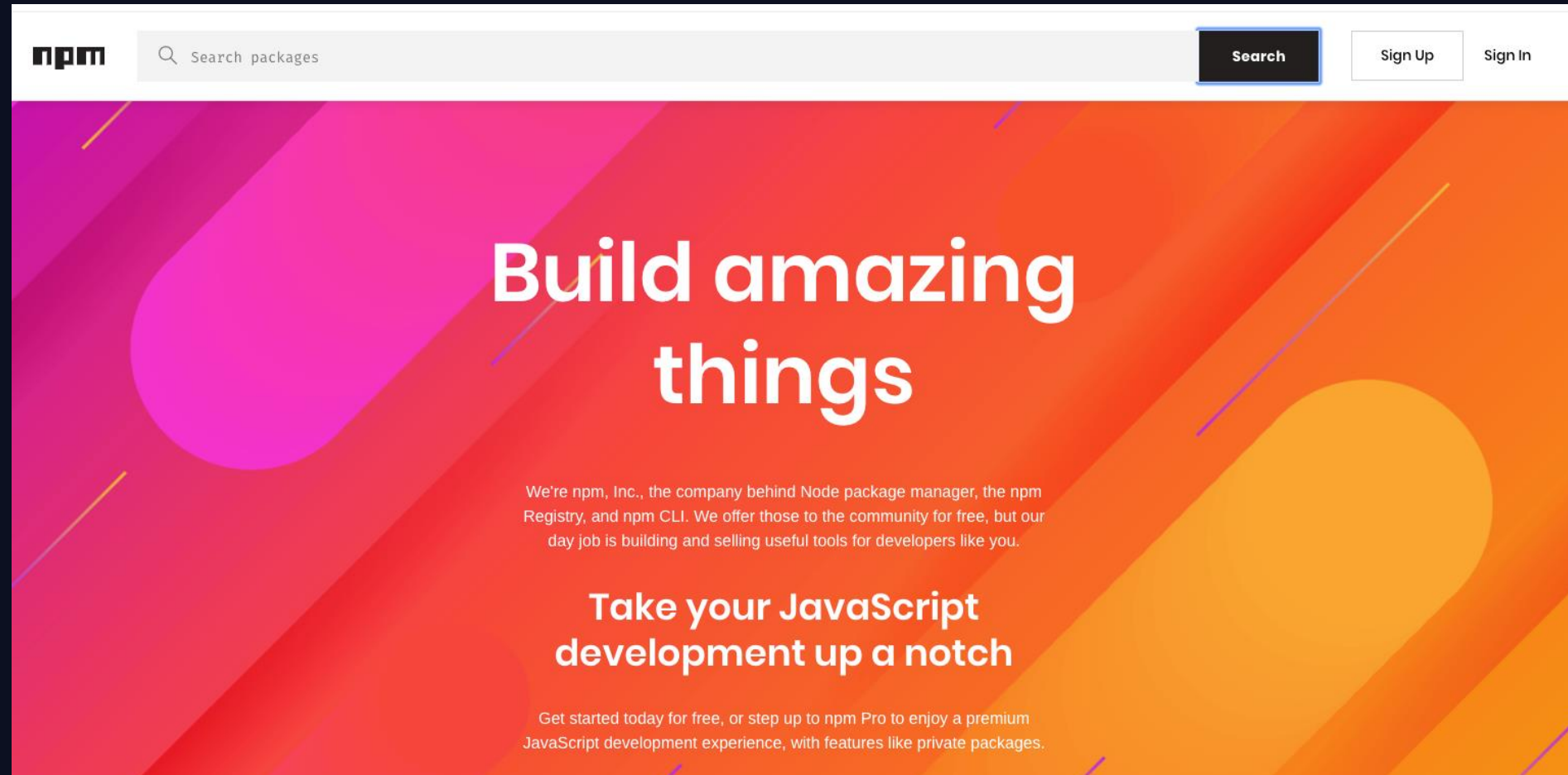
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Node Package Manager (NPM)

- Files
- Web Servers
- Databases
- Security
- Many More



NPM Commands

```
▶ npm -v
```

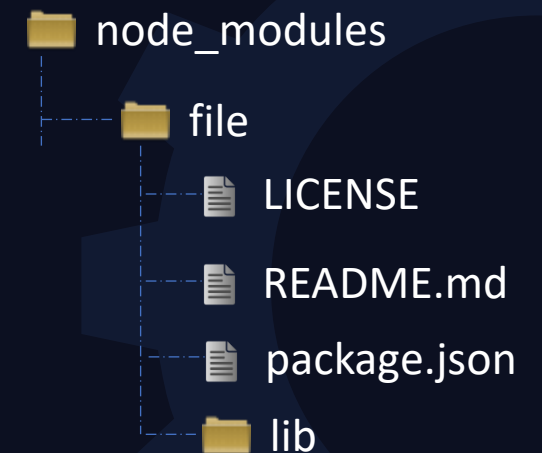
```
6.13.7
```

```
▶ npm search file
```

NAME	DESCRIPTION	AUTHOR	DATE
file	Higher level path...	=aconbere	2014-02-21
File	HTML5 FileAPI...	=coolaj86 =narf	2014-10-24
dotenv	Loads environment...	=~jcblw...	2019-10-16
fs-extra	fs-extra contains...	=jprichardson...	2019-06-28
file-loader	A file loader...	=d3viantOne...	2020-02-19

```
▶ npm install file
```

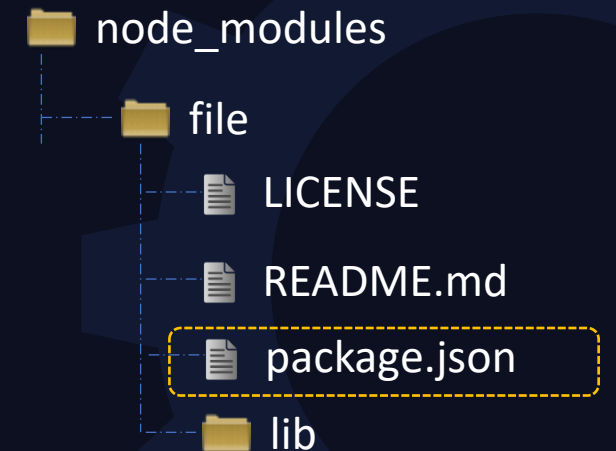
```
+ file@0.2.2
added 1 package from 1 contributor and audited 1 package in 1.072s
found 0 vulnerabilities
```



NPM Commands

package.json

```
{
  "author": {
    "name": "Anders Conbere",
    "email": "aconbere@gmail.com"
  },
  "bundleDependencies": false,
  "devDependencies": {
    "mocha": "1.9.x"
  },
  "directories": {
    "lib": "lib"
  },
  "homepage": "https://github.com/aconbere/node-file-utils#readme",
  "license": "MIT",
  "main": "./lib/file",
  "name": "file",
  "repository": {
    "type": "git",
    "url": "git+ssh://git@github.com/aconbere/node-file-utils.git"
  },
  "tags": [
    "file",
    "path",
    "fs",
    "walk"
  ],
  "version": "0.2.2"
}
```



NPM Commands

```
▶ npm install file
```

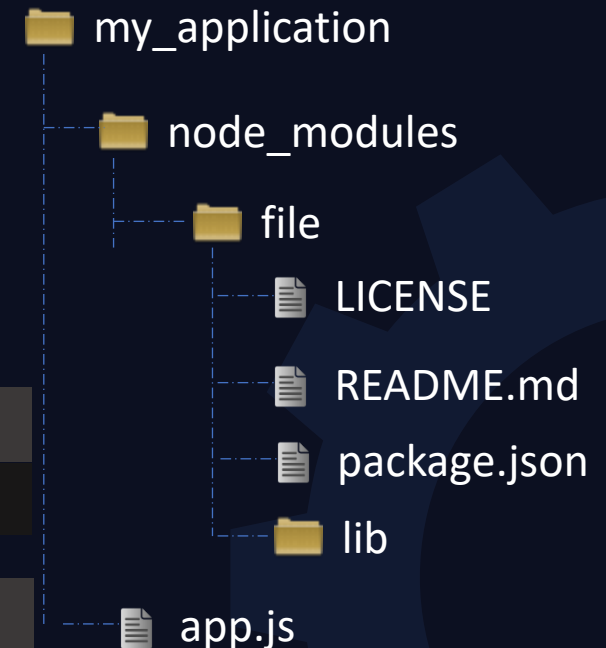
```
+ file@0.2.2  
added 1 package from 1 contributor and audited 1 package in 1.072s  
found 0 vulnerabilities
```

```
app.js
```

```
var file = require("file");  
  
file.mkdirs("/tmp/dir1")
```

```
▶ node -e "console.log(module.paths)"  
['/app/node_modules', '/node_modules']
```

```
▶ npm install file -g
```



Common Modules

Built-In Modules	
fs	To handle filesystem
http	To host an HTTP server
os	To work with the Operating System
events	To handle events
tls	To implement TLS and SSL
url	To Parse URL Strings

External Modules	
express	Fast, unopinionated, minimalist web framework
react	To create user interfaces
debug	To debug applications
async	To work with asynchronous JS
lodash	To work with arrays, objects, strings etc

```
▶ ls /usr/lib/node_modules/npm/node_modules/
```

```
▶ ls /usr/lib/node_modules/
```


Application Dependencies

package.json

```
{
  "name": "example-contentful-theExampleApp-js",
  "version": "0.0.0",
  "private": true,
  "dependencies": {
    "body-parser": "^1.18.2",
    "contentful": "^6.0.0",
    "cookie-parser": "~1.4.3",
    "dotenv": "^5.0.0",
    "execa": "^0.9.0",
    "express": "^4.16.2",
    "helmet": "^3.11.0",
    "lodash": "^4.17.5",
    "marked": "^0.3.16",
    "morgan": "^1.9.1",
    "pug": "~2.0.0-beta6"
  }
}
```

Labs

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Python

- Free
- Open source
- Cross Platform Compatible



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Community

Success Stories

News

Events

Download the latest version for Mac OS X

Download Python 3.8.2

Looking for Python with a different OS? Python for [Windows](#),
[Linux/UNIX](#), [Mac OS X](#), [Other](#)

Want to help test development versions of Python? [Prereleases](#),
[Docker images](#)

Looking for Python 2.7? See below for specific releases





Versions

- Python2 – (2000 – 2010)
 - Python3 – (2008 to Present)
- 
- 

Install

```
▶ yum install python2
```

```
▶ python2
```

```
Python 2.7.16 (default, Nov 17 2019, 00:07:27)
[GCC 8.3.1 20190507 (Red Hat 8.3.1-4)] on linux2
Type "help", "copyright", "credits" or "license"
for more information.
>>> exit()
```

```
▶ python2 -V
```

```
Python 2.7.16
```

```
▶ yum install python36
```

```
▶ python3
```

```
Python 3.6.8 (default, Nov 21 2019, 19:31:34)
[GCC 8.3.1 20190507 (Red Hat 8.3.1-4)] on linux
Type "help", "copyright", "credits" or "license"
for more information.
>>> exit()
```

```
▶ python3 -V
```

```
Python 3.6.8
```

Python Commands

```
python2 main.py
```

```
Hello World
```

```
main.py
```

```
def print_message():  
    print("Hello World")  
  
if __name__ == '__main__':  
    print_message()
```


Labs

just enough



Python Package Manager (pip)

```
▶ python2 -V
```

```
Python 2.7.16
```

```
▶ python3 -V
```

```
Python 3.6.8
```

```
▶ pip2 -V
```

```
pip 9.0.3 from /usr/lib/python2.7/site-packages  
(python 2.7)
```

```
▶ pip3 -V
```

```
pip 9.0.3 from /usr/lib/python3.6/site-packages  
(python 3.6)
```

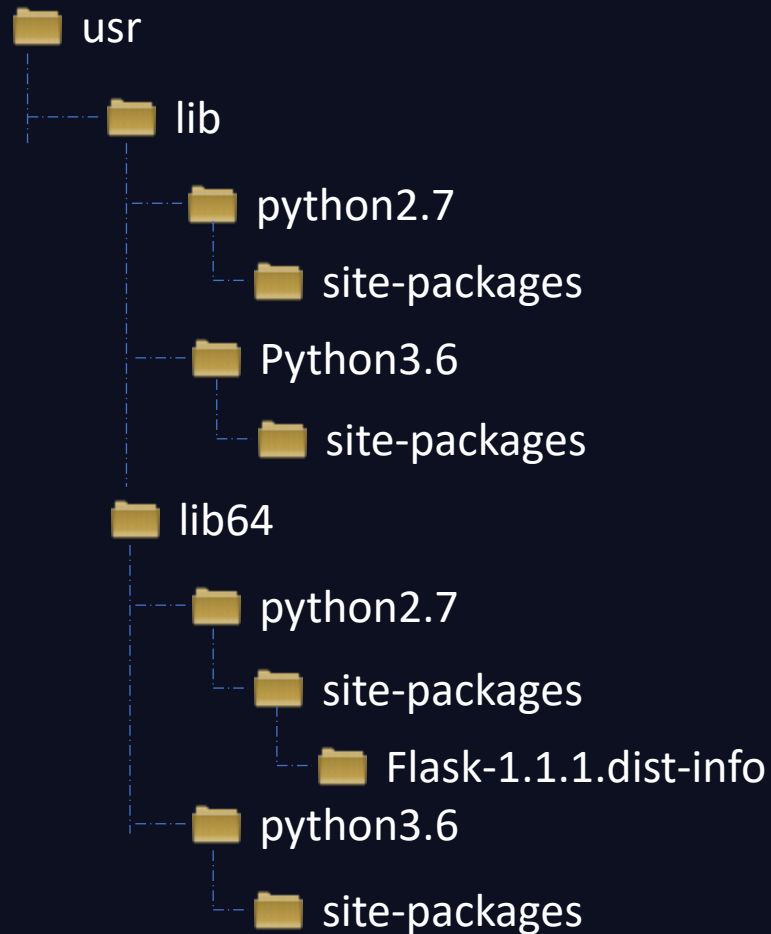
```
▶ pip -V
```

```
pip 9.0.3 from /usr/lib/python2.7/site-packages (python 2.7)
```

```
▶ pip install flask
```

Python Package Manager (pip)

```
▶ pip install flask
```



Python Package Manager (pip)

```
▶ pip install flask
```

```
▶ pip show flask
```

```
Name: Flask
Version: 1.1.1
Summary: A simple framework for building complex
web applications.
Home-page: https://palletsprojects.com/p/flask/
Author: Armin Ronacher
Author-email: armin.ronacher@active-4.com
License: BSD-3-Clause
Location: /usr/lib64/python2.7/site-packages
Requires: Werkzeug, click, Jinja2, itsdangerous
```

```
▶ python2 -c "import sys; print(sys.path)"
```

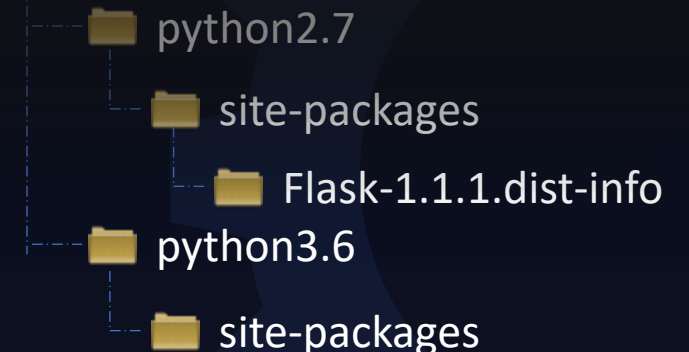
```
['/usr/lib/python27.zip', '/usr/lib64/python2.7',
'/usr/lib64/python2.7/plat-linux2',
'/usr/lib64/python2.7/lib-tk',
'/usr/lib64/python2.7/lib-old',
'/usr/lib64/python2.7/lib-dynload',
'/usr/lib64/python2.7/site-packages',
'/usr/lib/python2.7/site-packages']
```

```
main.py
```

```
from flask import Flask, request

app = Flask(__name__)

@app.route('/')
def hello():
    return 'Hello, World'
```



Requirements

```
▶ pip install flask
```

```
▶ pip install jinja2
```

```
▶ pip install markupsafe
```

```
▶ pip install Werkzeug
```

```
▶ pip install requests
```

```
▶ pip install gunicorn
```

```
▶ pip install flask jinja2 markupsafe
```

```
requirements.txt
```

```
Flask==0.10.1
```

```
Jinja2==2.7.3
```

```
MarkupSafe==0.23
```

```
Werkzeug==0.9.6
```

```
requests==2.3.0
```

```
gunicorn==18.0
```

```
▶ pip install -r requirements.txt
```

Upgrade/Uninstall Package

```
▶ pip install flask --upgrade
```

```
Installing collected packages: click, flask
Attempting uninstall: flask
  Found existing installation: Flask 0.10.1
  Uninstalling Flask-0.10.1:
    Successfully uninstalled Flask-0.10.1
Successfully installed click-7.1.1 flask-1.1.1
```

```
▶ pip uninstall flask
```

```
Found existing installation: Flask 1.1.1
Uninstalling Flask-1.1.1:
  Would remove:
    /home/vagrant/.local/bin/flask
    /home/vagrant/.local/lib/python3.5/site-
packages/Flask-1.1.1.dist-info/*
    /home/vagrant/.local/lib/python3.5/site-
packages/flask/*
Proceed (y/n)? y
  Successfully uninstalled Flask-1.1.1
```

Other Package Managers

- `easy_install`

```
▶ easy_install install app
```



- `wheels`

```
▶ pip install app.whl
```



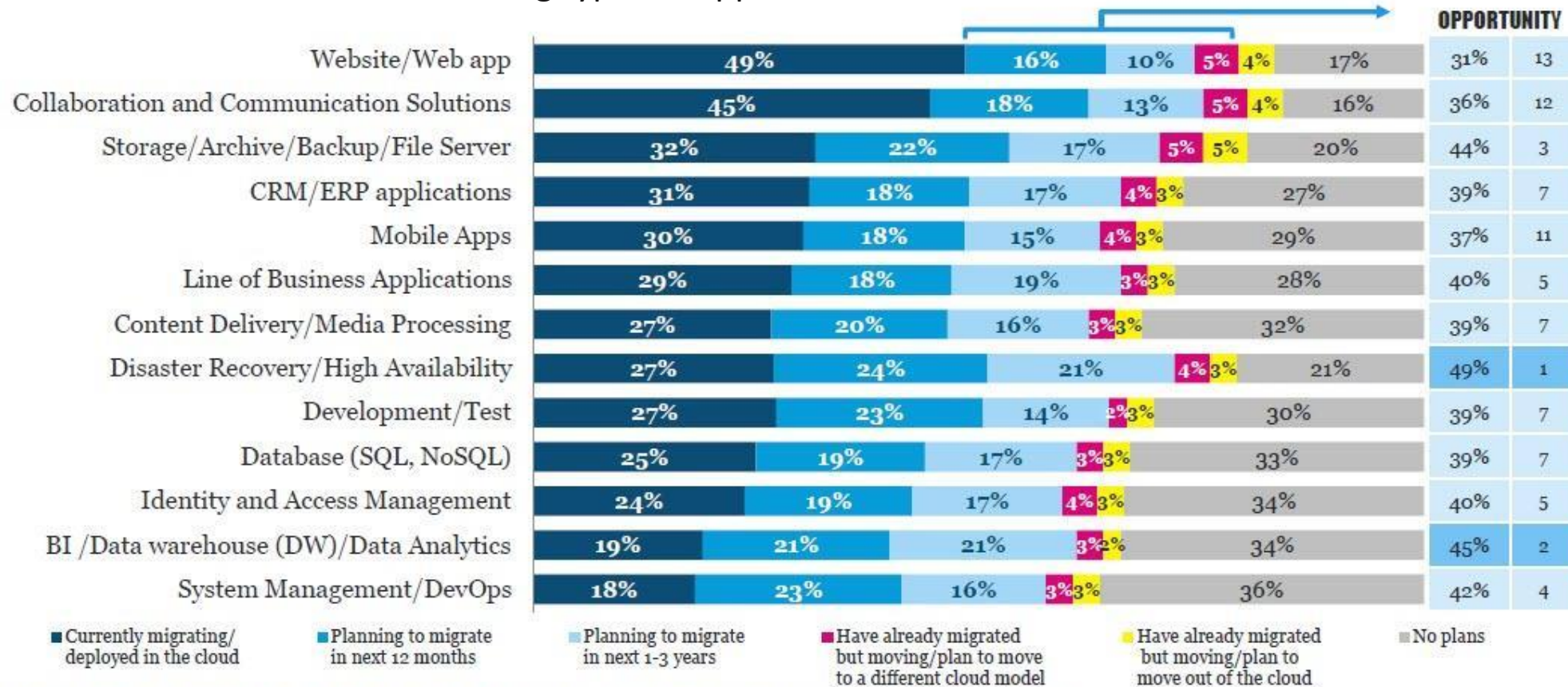
Labs

Servers



Why?

Q. Please use the scale below to describe your organization's plans for moving each of the following types of applications to the cloud



Q. Please use the scale below to describe your organization's plans for moving each of the following types of applications to the cloud.

Application Types



Desktop



Mobile



Web

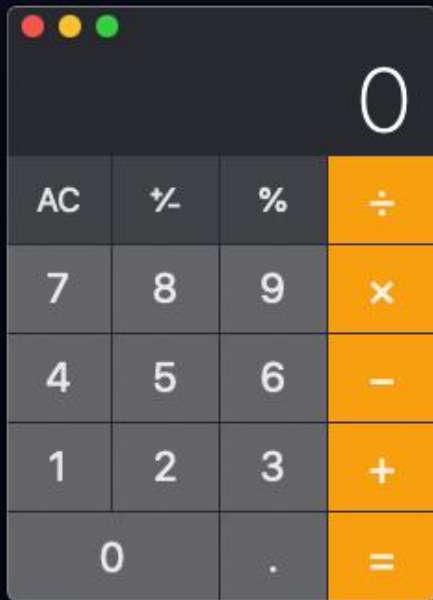


Analytics

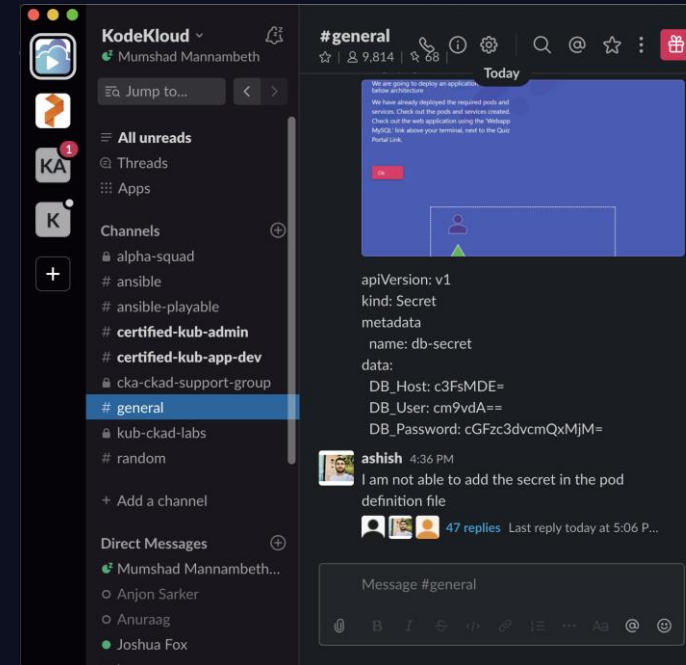


Problem Solving

Standalone vs Client-Server



Standalone Desktop

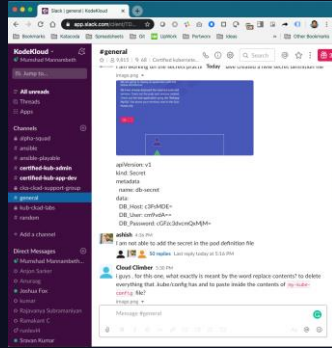


Desktop Client

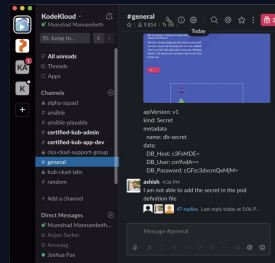


Server

Client-Server



Web Client



Desktop Client



Mobile Client



Chat Server

Servers



Chat
Server



Web
Server



Application
Server



DB
Server



Email
Server



Backup
Server



Servers



Web
Server



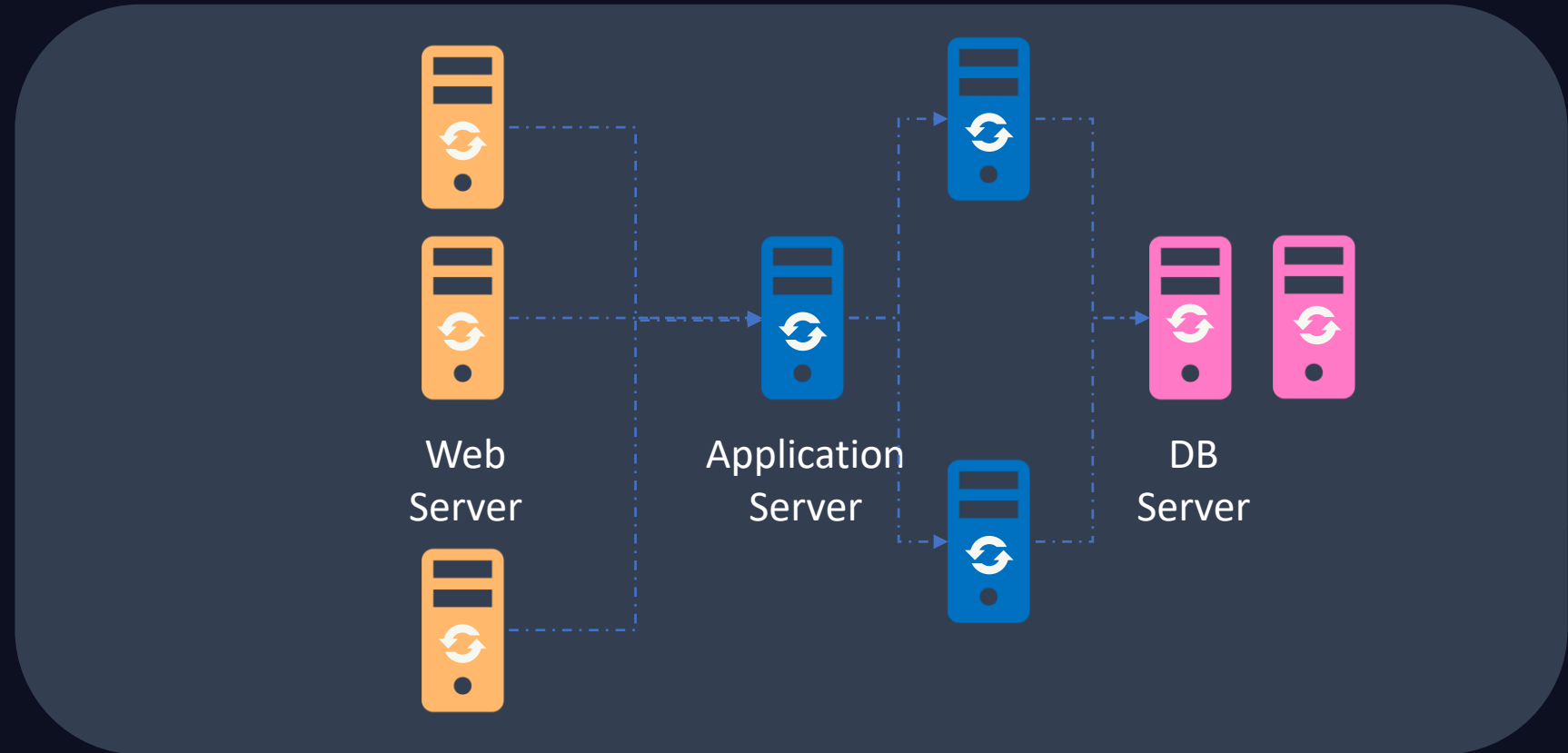
Application
Server

Servers



App Web
Server

Servers





just enough

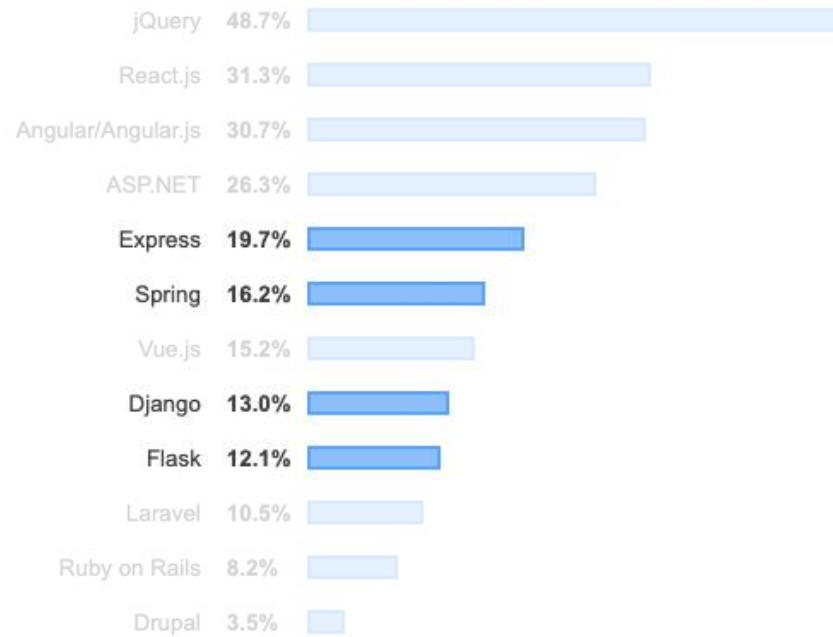
Web Frameworks & Web Servers

Web Frameworks

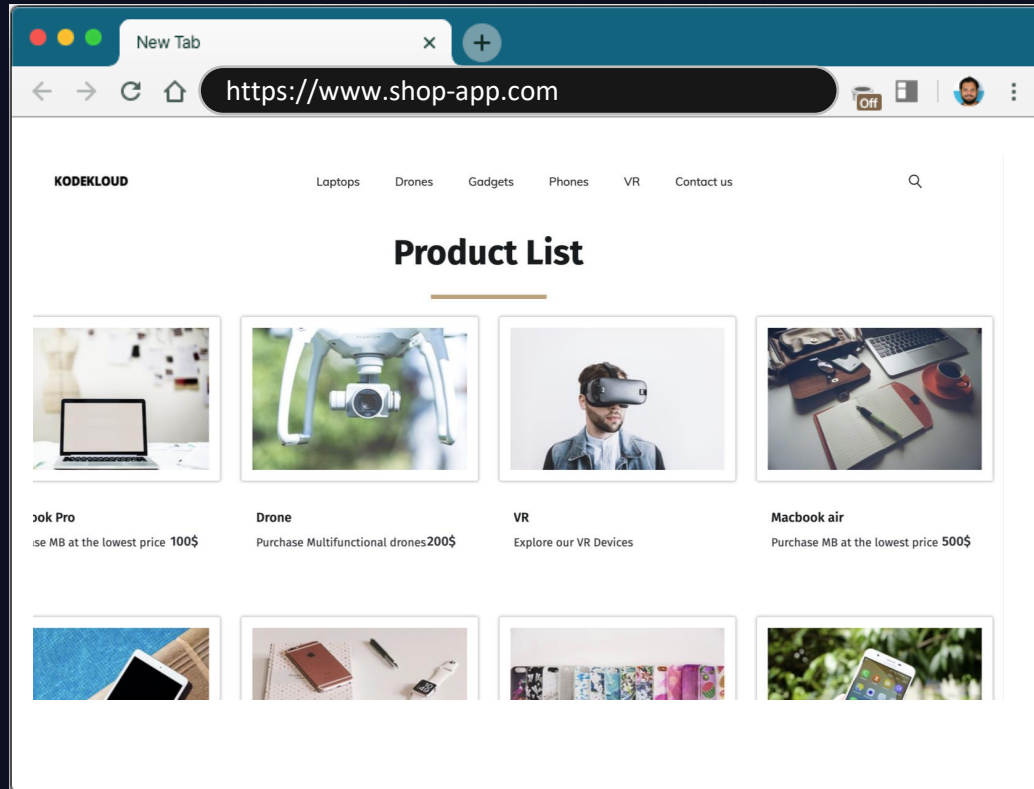
Web Frameworks

All Respondents

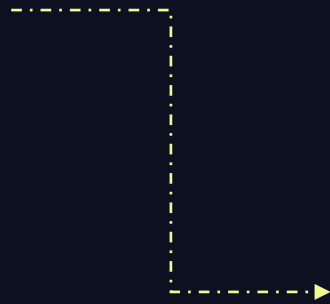
Professional Developers



Web Frameworks



REQUEST



HTML

CSS

JavaScript

RESPONSE

Python

NodeJS

Web Frameworks

app.js

```
$(document).ready(function() {  
  $.get("/products", function (data, status) {  
    displayProducts( data )  
  } );  
});
```

DemoApplication.java

```
package com.example.demo;  
  
// <code hidden>  
  
@SpringBootApplication  
@RestController  
public class DemoApplication {  
  
    public static void main(String[] args) {  
        SpringApplication.run(DemoApplication.class, args);  
    }  
  
    @GetMapping("/products")  
    public String[] getProducts() {  
        return getProductList();  
    }  
}
```

HTML

CSS

JavaScript

JAVA

Python

NodeJS

Application Code

Web Frameworks

DemoApplication.java

```
package com.example.demo;

// <code hidden>

@SpringBootApplication
@RestController
public class DemoApplication {

    public static void main(String[] args) {
        SpringApplication.run(DemoApplication.class, args);
    }

    @GetMapping("/products")
    public String[] getProducts() {
        return getProductList();
    }
}
```

demo.py

```
from flask import Flask

app = Flask(__name__)

@app.route('/products')
def hello():
    return getProductList()

if __name__ == '__main__':
    app.run()
```

demo.js

```
const express = require('express')
const app = express()

app.get('/products', (req, res) =>
    res.send(getProductList()))
```

HTML

CSS

JavaScript

JAVA

Python

NodeJS

Application Code

Web Server

DemoApplication.java

```
package com.example.demo;

// <code hidden>

@SpringBootApplication
@RestController
public class DemoApplication {

    public static void main(String[] args) {
        SpringApplication.run(DemoApplication.class, args);
    }

    @GetMapping("/products")
    public String[] getProducts() {
        return getProductList();
    }
}
```



Web
Server

HTML

CSS

JavaScript

JAVA

Python

NodeJS

Application Code

Web Server

DemoApplication.java

```
package com.example.demo;

// <code hidden>

@SpringBootApplication
@RestController
public class DemoApplication {

    public static void main(String[] args) {
        SpringApplication.run(DemoApplication.class, args);
    }

    @GetMapping("/products")
    public String[] getProducts() {
        return getProductList();
    }
}
```



Web
Server

HTML

CSS

JavaScript

JAVA

Python

NodeJS

Application Code



Apache Tomcat

8080

NGINX

80



8000

Web Server

DemoApplication.java

```
package com.example.demo;

// <code hidden>

@SpringBootApplication
@RestController
public class DemoApplication {

    public static void main(String[] args) {
        SpringApplication.run(DemoApplication.class, args);
    }

    @GetMapping("/products")
    public String[] getProducts() {
        return getProductList();
    }
}
```



Web
Server

HTML

Python

JavaScript

Application 2 Code

HTML

CSS

JavaScript

JAVA

Python

NodeJS

Application Code

HTML

NodeJS

JavaScript

Application 3 Code

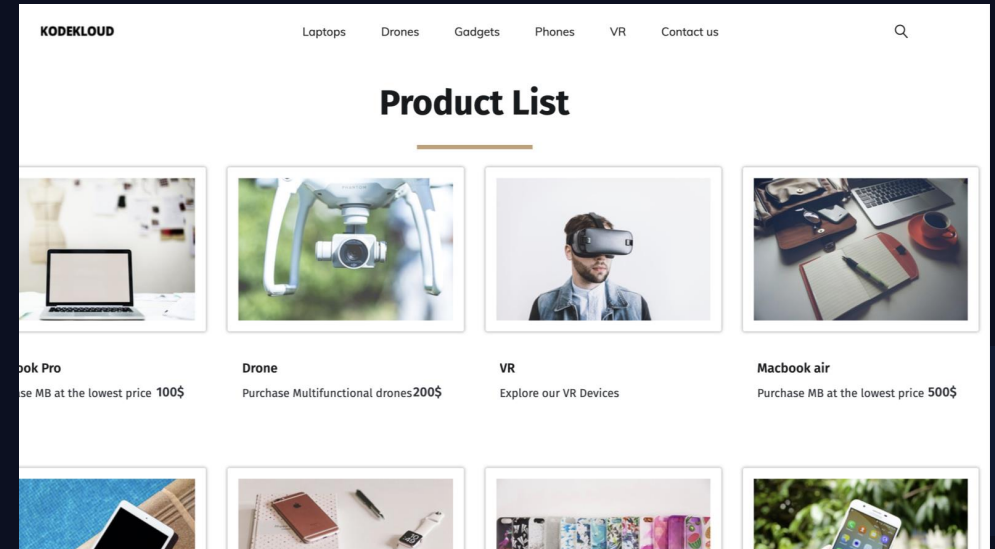
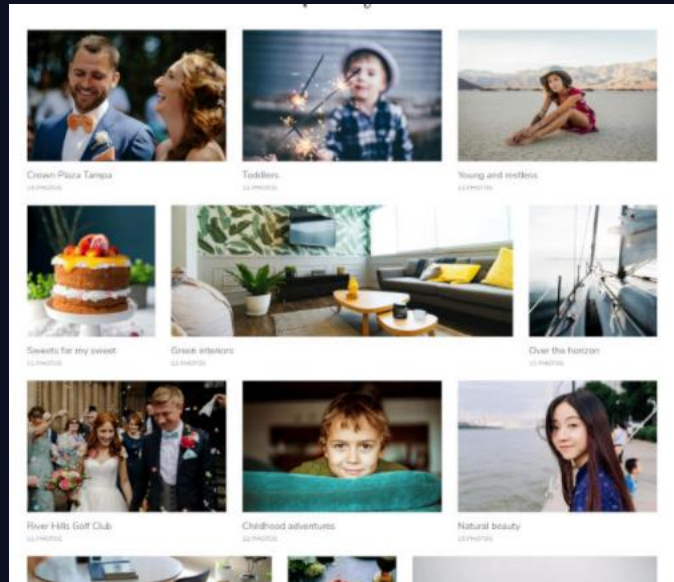


Apache Tomcat

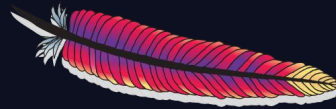
NGINX



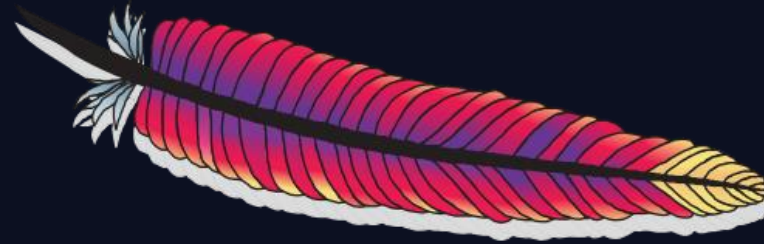
Static vs Dynamic Websites



NGINX



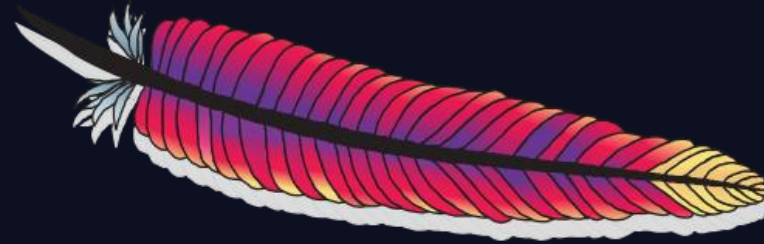
just enough



APACHE WEB SERVER

Apache Web Server

- Open source
- Web Server



Install Apache Web Server

```
▶ yum install httpd
```

```
▶ service httpd start
```

```
▶ service httpd status
```

Redirecting to /bin/systemctl status httpd.service

● httpd.service - The Apache HTTP Server

Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; vendor preset: disabled)

Active: **active (running)** since Sun 2020-03-22 12:01:42 UTC; 56s ago

Docs: man:httpd(8)

man:apachectl(8)

Main PID: 4253 (httpd)

Status: "Total requests: 0; Current requests/sec: 0; Current traffic: 0 B/sec"

```
▶ firewall-cmd --permanent --add-service=http
```



Web
Server

View Logs

```
▶ cat /var/log/httpd/access_log
```

```
:::1 -- [22/Mar/2020:13:00:38 +0000] "GET / HTTP/1.1" 403 4897 "-" "curl/7.29.0"
```

```
▶ cat /var/log/httpd/error_log
```

```
[Sun Mar 22 12:01:42.409565 2020] [core:notice] [pid 4253] SELinux policy enabled; httpd running as context system_u:system_r:httpd_t:s0  
[Sun Mar 22 12:01:42.411052 2020] [suexec:notice] [pid 4253] AH01232: suEXEC mechanism enabled (wrapper: /usr/sbin/suexec)  
AH00558: httpd: Could not reliably determine the server's fully qualified domain name, using localhost.localdomain. Set the 'ServerName' directive globally to suppress this message  
[Sun Mar 22 12:01:42.418732 2020] [lbmethod_heartbeat:notice] [pid 4253] AH02282: No slotmem from mod_heartbeat  
[Sun Mar 22 12:01:42.420272 2020] [mpm_prefork:notice] [pid 4253] AH00163: Apache/2.4.6 (CentOS) configured -- resuming normal operations  
[Sun Mar 22 12:01:42.420283 2020] [core:notice] [pid 4253] AH00094: Command line: '/usr/sbin/httpd -D FOREGROUND'  
[Sun Mar 22 13:00:38.040460 2020] [autoindex:error] [pid 4257] [client :::1:41654] AH01276: Cannot serve directory /var/www/html/: No matching DirectoryIndex (index.html) found, and server-generated directory index forbidden by Options directive  
[Sun Mar 22 13:16:36.345183 2020] [autoindex:error] [pid 4258] [client 10.0.2.2:54103] AH01276: Cannot serve directory /var/www/html/: No matching DirectoryIndex (index.html) found, and server-generated directory index forbidden by Options directive  
[Mon Mar 23 01:17:39.060209 2020] [autoindex:error] [pid 4256] [client 10.0.2.2:61535] AH01276: Cannot serve directory /var/www/html/: No matching DirectoryIndex (index.html) found, and server-generated directory index forbidden by Options directive  
[Mon Mar 23 01:20:14.131909 2020] [autoindex:error] [pid 4619] [client 10.0.2.2:61553] AH01276: Cannot serve directory /var/www/html/: No matching DirectoryIndex (index.html) found, and server-generated directory index forbidden by Options directive  
[Mon Mar 23 01:20:15.074959 2020] [autoindex:error] [pid 4255] [client 10.0.2.2:61558] AH01276: Cannot serve directory /var/www/html/: No matching DirectoryIndex (index.html) found, and server-generated directory index forbidden by Options directive
```

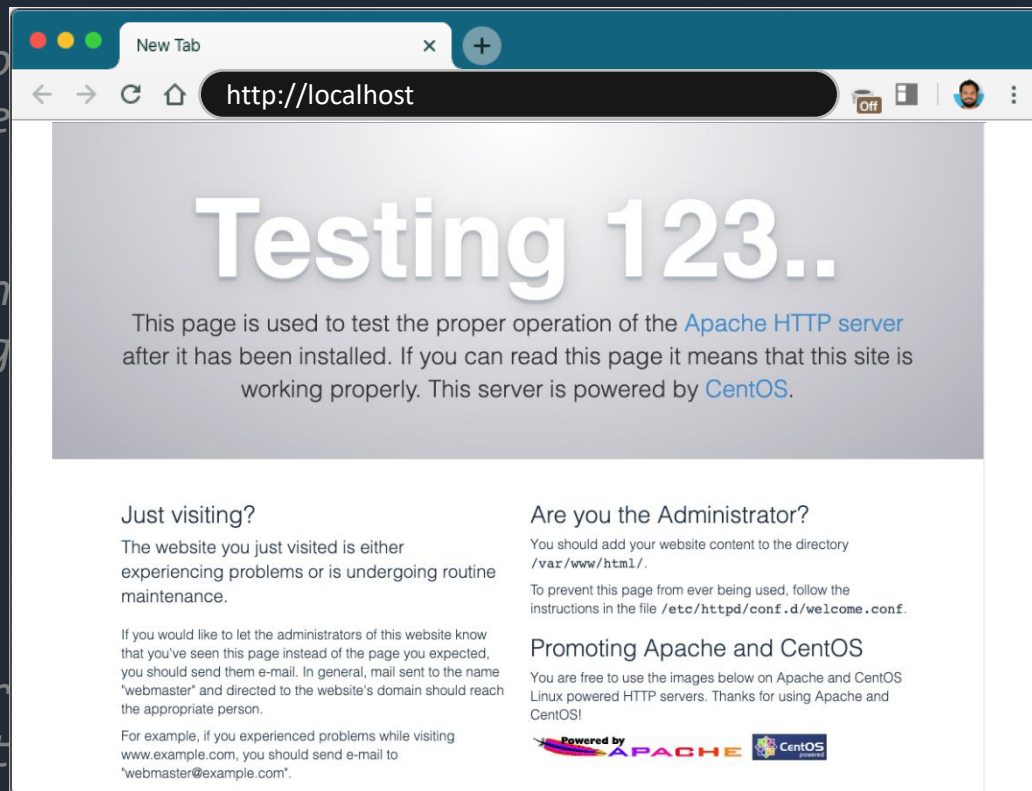


Web
Server

Config File

```
/etc/httpd/conf/httpd.conf
```

```
#  
# Listen: Allows you to bind httpd to multiple  
# ports, instead of the default port 80.  
# directive.  
#  
# Change this to Listen just with the port you  
# want to listen to, or you can uncomment this  
# to bind to multiple addresses (localhost, other  
# interfaces, wildcard IPs, or IPv6 addresses)  
# Listen 12.34.56.78:80  
Listen 80  
  
#  
# DocumentRoot: The directory where you put your web documents. By default,  
# symbolic links and aliases may be used to point to other locations.  
#  
DocumentRoot "/var/www/html"  
  
#
```



Web
Server

80

Default HTTP Port - 80

Document Root
/var/www/html

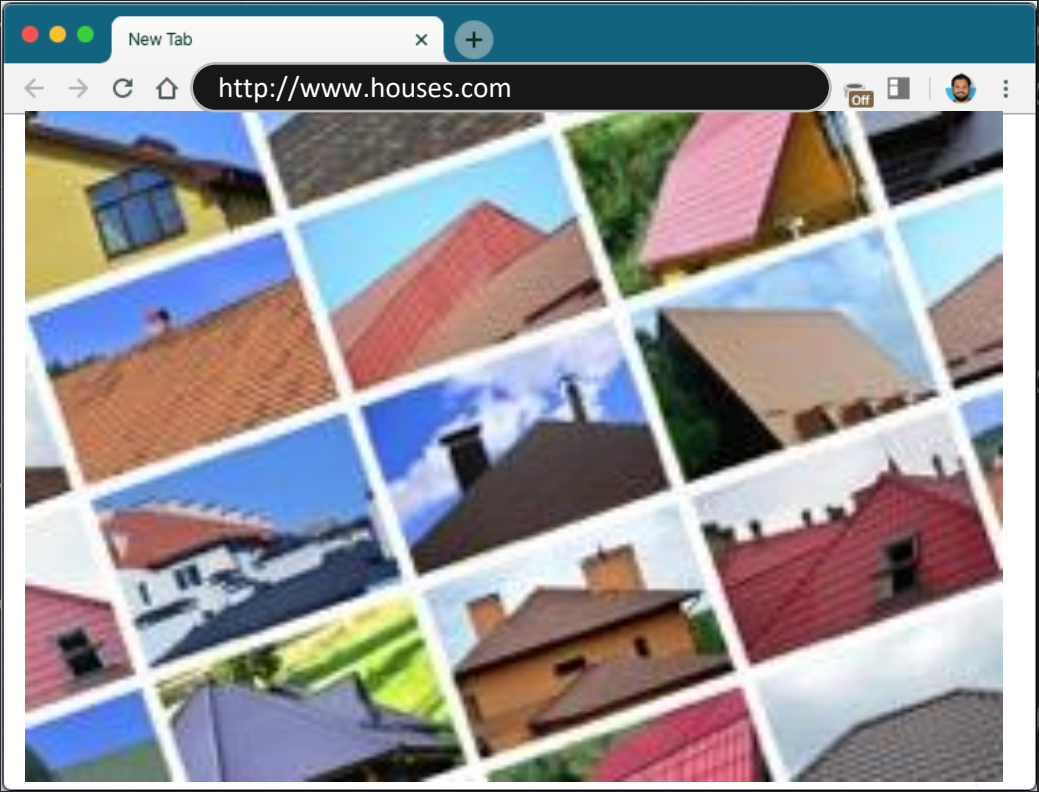
DNS Name	IP Address
www.houses.com	192.168.1.10

```

/etc/hosts
# Host Database
127.0.0.1 localhost
127.0.0.1 www.houses.com
#
DocumentRoot "/var/www/"
#
# ServerName gives the
itself.
# This can often be det
specify
# it explicitly to prev
#
# If your host doesn't
here.
#
#ServerName www.example.com:80
ServerName www.houses.com:80

```

The directory out of which you will serve your



Web Server
80

Default HTTP Port - 80

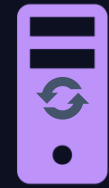
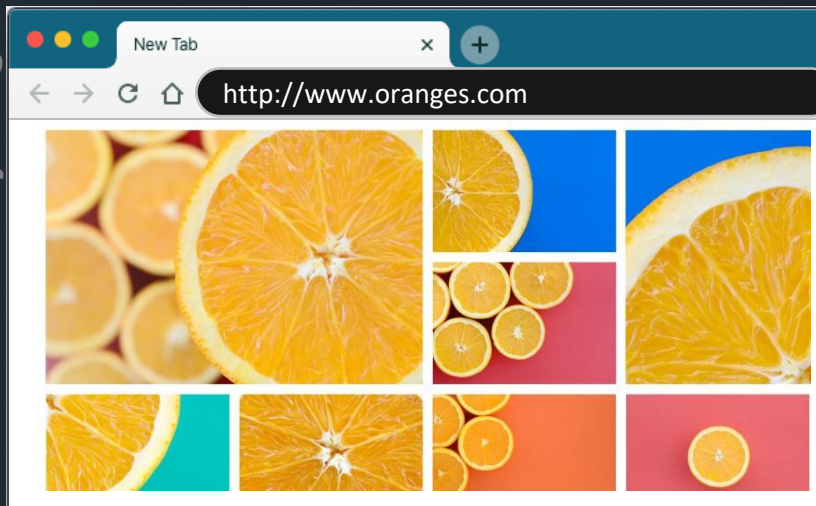
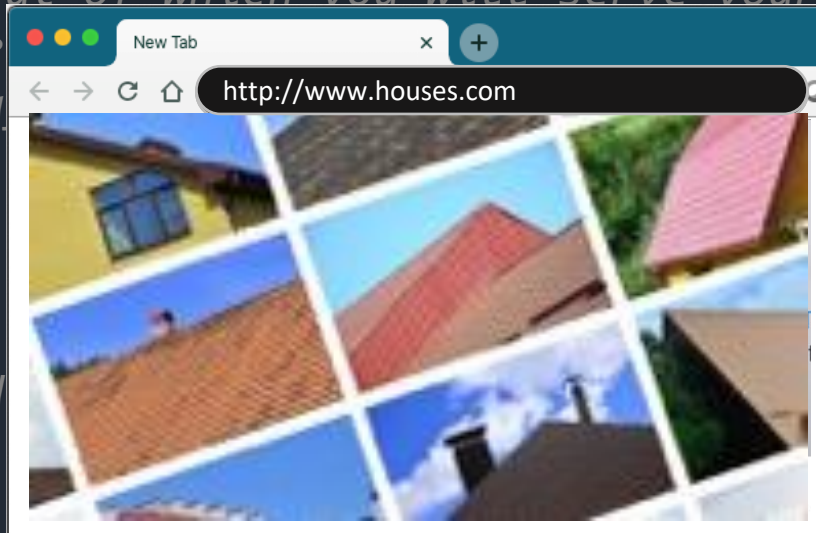
- HTML
- CSS
- JavaScript
- Document Root
/var/www/html

Config File

```
# # prevent Apache from getting into all bound IP addresses.
#
#Listen 12.34.56.78:80
Listen 80

#
# DocumentRoot: The directory out of which you will serve your
# documents. By default, all requests will be served from
# symbolic links and aliases made by means of the Alias directive.
#
DocumentRoot "/var/www/html"

#
# ServerName gives the name and port number of the current server,
# itself.
# This can often be determined by asking http://$HTTP_HOST/ what
# it explicitly to prevent problems.
#
# If your host doesn't have a reverse DNS record, you may wish to
# set this to the IP address of the host.
#
#ServerName www.example.com:80
ServerName www.houses.com:80
```



Web
Server

HTML

CSS

JavaScript

Server: www.houses.com
Document Root: /var/www/houses
VirtualHost

HTML

CSS

JavaScript

Server: www.oranges.com
Document Root: /var/www/oranges
VirtualHost

Document Root
/var/www/html

DNS Name	IP Address
www.houses.com	192.168.1.10
www.oranges.com	192.168.1.10

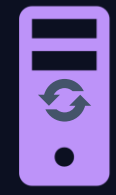
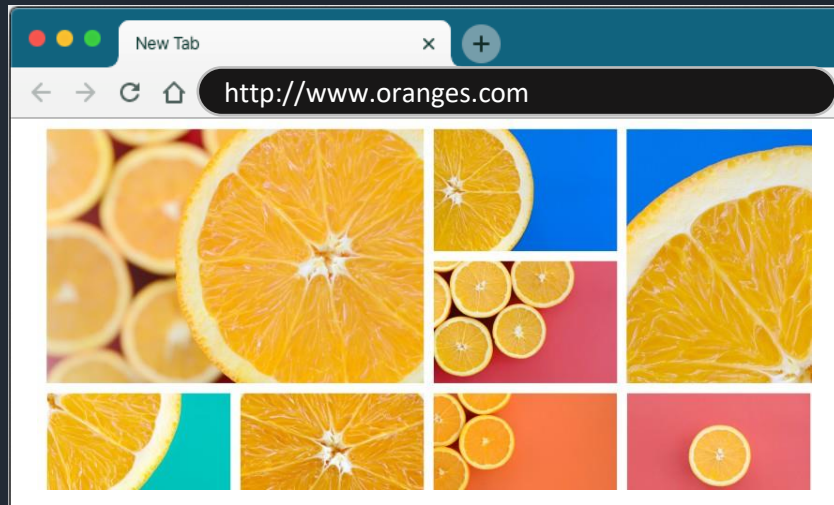
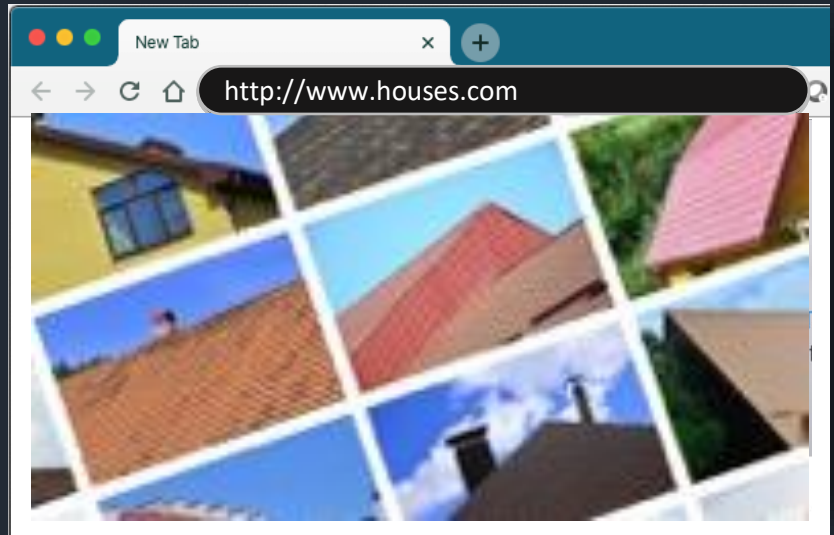
/etc/hosts

```
# Host Database
127.0.0.1 localhost
127.0.0.1 www.houses.com
127.0.0.1 www.oranges.com
```

</VirtualHost>

```
<VirtualHost *:80>
  ServerName www.oranges.com
  DocumentRoot /var/www/oranges
</VirtualHost>
```

Config File



Web Server

HTML

CSS

JavaScript

Server: www.houses.com
Document Root: /var/www/houses
VirtualHost

HTML

CSS

JavaScript

Server: www.oranges.com
Document Root: /var/www/oranges
VirtualHost

▶ service httpd restart

Document Root /var/www/html

```
#  
#ServerName www.example.com:80  
ServerName www.houses.com:80
```

Config File

```
Include conf/houses.conf  
Include conf/oranges.conf
```

```
/etc/httpd/conf/houses.conf
```

```
<VirtualHost *:80>  
  ServerName www.houses.com  
  DocumentRoot /var/www/houses  
</VirtualHost>
```

```
/etc/httpd/conf/oranges.conf
```

```
<VirtualHost *:80>  
  ServerName www.oranges.com  
  DocumentRoot /var/www/oranges  
</VirtualHost>
```

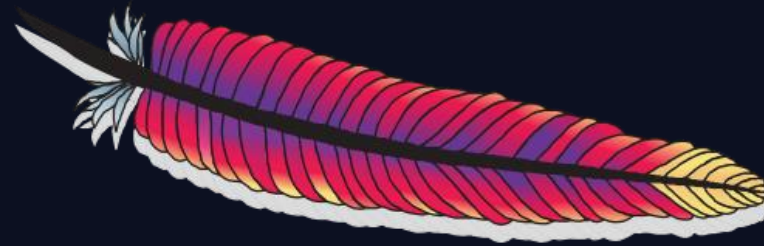
Labs



References

- <https://www.digitalocean.com/community/tutorials/how-to-install-the-apache-web-server-on-centos-7>
- 
- 

just enough



NGINX

just enough



APACHE TOMCAT

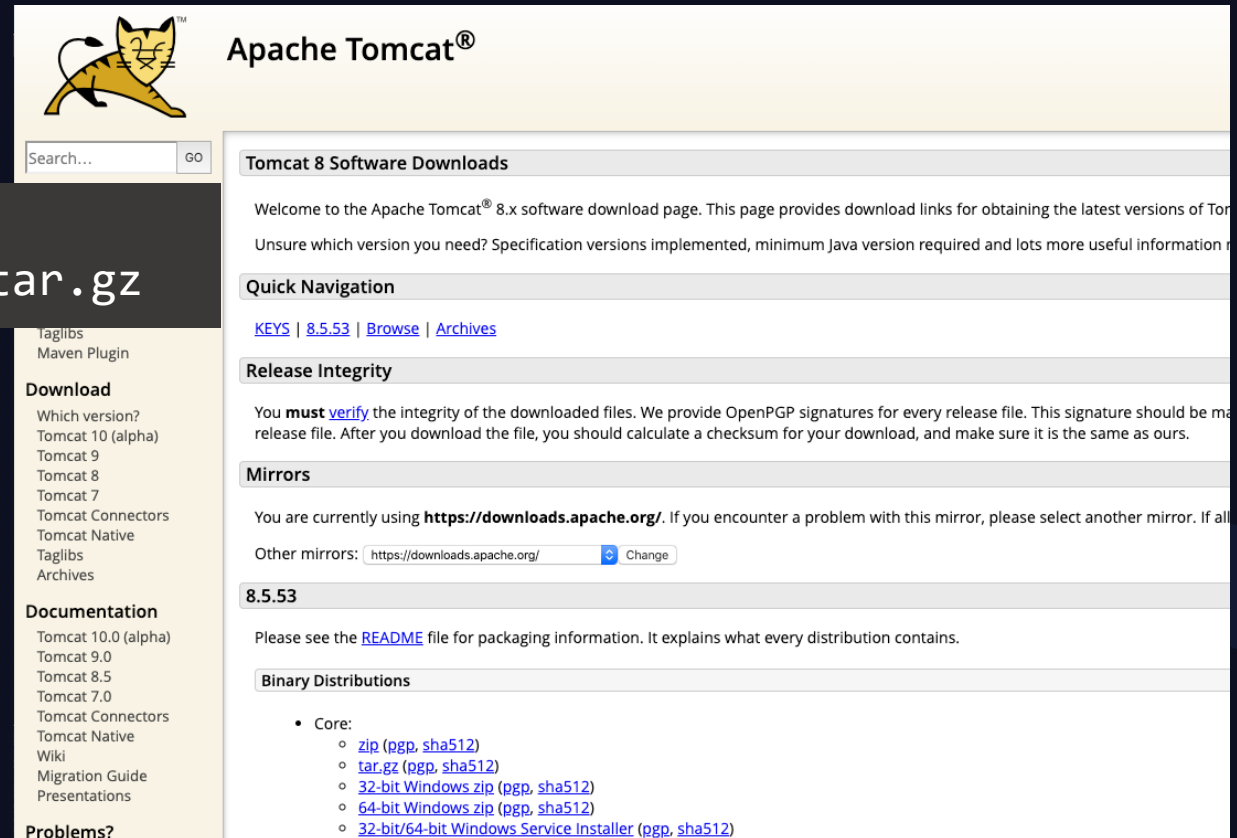
Install Apache Tomcat

```
▶ yum install java-1.8.0-openjdk-devel
```

```
▶ wget https://downloads.apache.org/tomcat/tomcat-8/v8.5.53/bin/apache-tomcat-8.5.53.tar.gz
```

```
▶ tar xvf apache-tomcat-8.5.53.tar.gz
```

```
▶ ./apache-tomcat-8.5.53/bin/startup.sh
```



The screenshot shows the Apache Tomcat website's download page for version 8.5.53. The page features the Tomcat logo (a yellow cat) and the text "Apache Tomcat®". Below the logo is a search bar and a "GO" button. The main content area is titled "Tomcat 8 Software Downloads" and includes a welcome message, a "Quick Navigation" section with links for "KEYS", "8.5.53", "Browse", and "Archives", a "Release Integrity" section, a "Mirrors" section with a dropdown menu for "Other mirrors" (currently set to "https://downloads.apache.org/"), and a "Binary Distributions" section listing various download options for the "Core" distribution, including zip, tar.gz, 32-bit Windows zip, 64-bit Windows zip, and 32-bit/64-bit Windows Service Installer. A sidebar on the left contains navigation links for "Taglibs", "Maven Plugin", "Download", "Documentation", and "Problems?".


<http://tomcat.apache.org/download-80.cgi>

View Server


https://localhost:8080

Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/8.5.53



If you're seeing this, you've successfully installed Tomcat. Congratulations!



Recommended Reading:
[Security Considerations How-To](#)
[Manager Application How-To](#)
[Clustering/Session Replication How-To](#)

Server Status
Manager App
Host Manager

Developer Quick Start

Tomcat Setup	Realms & AAA	Examples	Servlet Specifications
First Web Application	JDBC DataSources		Tomcat Versions

Apache Tomcat Directory

```
ls -l apache-tomcat-8.5.53
```

```
-rw-r----- 1 19318 Mar 11 10:06 BUILDING.txt
-rw-r----- 1 5408 Mar 11 10:06 CONTRIBUTING.md
-rw-r----- 1 57011 Mar 11 10:06 LICENSE
-rw-r----- 1 1726 Mar 11 10:06 NOTICE
-rw-r----- 1 3255 Mar 11 10:06 README.md
-rw-r----- 1 7136 Mar 11 10:06 RELEASE-NOTES
-rw-r----- 1 16262 Mar 11 10:06 RUNNING.txt
drwxr-x--- 2 4096 Mar 18 10:17 bin
drwx----- 2 4096 Mar 11 10:06 conf
drwxr-x--- 2 4096 Mar 18 10:17 lib
drwxr-x--- 2 4096 Mar 11 10:03 logs
drwxr-x--- 2 4096 Mar 18 10:17 temp
drwxr-x--- 7 4096 Mar 11 10:04 webapps
drwxr-x--- 2 4096 Mar 11 10:03 work
```

```
catalina-tasks.xml
catalina.bat
catalina.sh
ciphers.bat
ciphers.sh
configtest.bat
configtest.sh
daemon.sh
digest.bat
digest.sh
setclasspath.bat
setclasspath.sh
shutdown.bat
shutdown.sh
startup.bat
startup.sh
tool-wrapper.bat
tool-wrapper.sh
version.bat
version.sh
```

Apache Tomcat Directory

```
ls -l apache-tomcat-8.5.53
```

```
-rw-r----- 1 19318 Mar 11 10:06 BUILDING.txt
-rw-r----- 1 5408 Mar 11 10:06 CONTRIBUTING.md
-rw-r----- 1 57011 Mar 11 10:06 LICENSE
-rw-r----- 1 1726 Mar 11 10:06 NOTICE
-rw-r----- 1 3255 Mar 11 10:06 README.md
-rw-r----- 1 7136 Mar 11 10:06 RELEASE-NOTES
-rw-r----- 1 16262 Mar 11 10:06 RUNNING.txt
drwxr-x--- 2 4096 Mar 18 10:17 bin
drwx----- 2 4096 Mar 11 10:06 conf
drwxr-x--- 2 4096 Mar 18 10:17 lib
drwxr-x--- 2 4096 Mar 11 10:03 logs
drwxr-x--- 2 4096 Mar 18 10:17 temp
drwxr-x--- 7 4096 Mar 11 10:04 webapps
drwxr-x--- 2 4096 Mar 11 10:03 work
```

```
catalina.policy
catalina.properties
context.xml
jaspic-providers.xml
jaspic-providers.xsd
logging.properties
server.xml
tomcat-users.xml
tomcat-users.xsd
web.xml
```

```
<!-- A "Connector" represents an endpoint
by which requests are received
and responses are returned. Documentation at :
Java HTTP Connector: /docs/config/http.html
Java AJP Connector: /docs/config/ajp.html
APR (HTTP/AJP) Connector: /docs/apr.html
-->
<Connector port="8080" protocol="HTTP/1.1"
connectionTimeout="20000"
redirectPort="8443" />
<!-- A "Connector" using the shared thread pool-->
<!--
<Connector executor="tomcatThreadPool"
port="8080" protocol="HTTP/1.1"
connectionTimeout="20000"
redirectPort="8443" />
```

Apache Tomcat Directory

```
▶ ls -l apache-tomcat-8.5.53
```

```
-rw-r----- 1 19318 Mar 11 10:06 BUILDING.txt
-rw-r----- 1 5408 Mar 11 10:06 CONTRIBUTING.md
-rw-r----- 1 57011 Mar 11 10:06 LICENSE
-rw-r----- 1 1726 Mar 11 10:06 NOTICE
-rw-r----- 1 3255 Mar 11 10:06 README.md
-rw-r----- 1 7136 Mar 11 10:06 RELEASE-NOTES
-rw-r----- 1 16262 Mar 11 10:06 RUNNING.txt
drwxr-x--- 2 4096 Mar 18 10:17 bin
drwx----- 2 4096 Mar 11 10:06 conf
drwxr-x--- 2 4096 Mar 18 10:17 lib
drwxr-x--- 2 4096 Mar 11 10:03 logs
drwxr-x--- 2 4096 Mar 18 10:17 temp
drwxr-x--- 7 4096 Mar 11 10:04 webapps
drwxr-x--- 2 4096 Mar 11 10:03 work
```

```
catalina.2020-03-18.log
catalina.out
host-manager.2020-03-18.log
localhost.2020-03-18.log
localhost_access_log.2020-03-18.txt
manager.2020-03-18.log
```

Apache Tomcat Directory

```
▶ ls -l apache-tomcat-8.5.53
```

```
-rw-r----- 1 19318 Mar 11 10:06 BUILDING.txt
-rw-r----- 1 5408 Mar 11 10:06 CONTRIBUTING.md
-rw-r----- 1 57011 Mar 11 10:06 LICENSE
-rw-r----- 1 1726 Mar 11 10:06 NOTICE
-rw-r----- 1 3255 Mar 11 10:06 README.md
-rw-r----- 1 7136 Mar 11 10:06 RELEASE-NOTES
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drwxr-x--- 2 4096 Mar 18 10:17 bin
drwx----- 2 4096 Mar 11 10:06 conf
drwxr-x--- 2 4096 Mar 18 10:17 lib
drwxr-x--- 2 4096 Mar 11 10:03 logs
drwxr-x--- 2 4096 Mar 18 10:17 temp
drwxr-x--- 7 4096 Mar 11 10:04 webapps
drwxr-x--- 2 4096 Mar 11 10:03 work
```

```
▶ jar -cvf app.war *
```

```
▶ mvn package
```

```
▶ gradle build
```



app.war

HTML

CSS

JavaScript

JAVA

Application Code

Web Frameworks

```
▶ ls -l apache-tomcat-8.5.53
```

```
-rw-r----- 1 19318 Mar 11 10:06 BUILDING.txt
-rw-r----- 1 5408 Mar 11 10:06 CONTRIBUTING.md
-rw-r----- 1 57011 Mar 11 10:06 LICENSE
-rw-r----- 1 1726 Mar 11 10:06 NOTICE
-rw-r----- 1 3255 Mar 11 10:06 README.md
-rw-r----- 1 7136 Mar 11 10:06 RELEASE-NOTES
-rw-r----- 1 16262 Mar 11 10:06 RUNNING.txt
drwxr-x--- 2 4096 Mar 18 10:17 bin
drwx----- 2 4096 Mar 11 10:06 conf
drwxr-x--- 2 4096 Mar 18 10:17 lib
drwxr-x--- 2 4096 Mar 11 10:03 logs
drwxr-x--- 2 4096 Mar 18 10:17 temp
drwxr-x--- 7 4096 Mar 11 10:04 webapps
drwxr-x--- 2 4096 Mar 11 10:03 work
```

```
▶ jar -cvf app.war *
```

```
▶ mvn package
```

```
▶ gradle build
```



app.war

META-INF

WEB-INF

hello.jsp

images

index.html

HTML

CSS

JavaScript

JAVA

Application Code

Verify

```
▶ cat ~/apache-tomcat-8.5.53/logs/catalina.out
```

```
18-Mar-2020 10:43:32.769 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application
directory [/home/vagrant/apache-tomcat-8.5.53/webapps/ROOT] has finished in [13] ms
18-Mar-2020 10:43:32.769 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deploying web application
directory [/home/vagrant/apache-tomcat-8.5.53/webapps/manager]
18-Mar-2020 10:43:32.783 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application
directory [/home/vagrant/apache-tomcat-8.5.53/webapps/manager] has finished in [14] ms
18-Mar-2020 10:43:32.784 INFO [main] org.apache.coyote.AbstractProtocol.start Starting ProtocolHandler ["http-nio-8080"]
18-Mar-2020 10:43:32.789 INFO [main] org.apache.catalina.startup.Catalina.start Server startup in 407 ms
18-Mar-2020 11:21:23.503 INFO [localhost-startStop-2] org.apache.catalina.startup.HostConfig.deployWAR Deploying web application archive
[/home/vagrant/apache-tomcat-8.5.53/webapps/app.war]
18-Mar-2020 11:21:23.560 INFO [localhost-startStop-2] org.apache.catalina.startup.HostConfig.deployWAR Deployment of web application archive
[/home/vagrant/apache-tomcat-8.5.53/webapps/app.war] has finished in [57] ms
```


View Sample Application

<https://localhost:8080/app>



Sample "Hello, World" Application

This is the home page for a sample application used to illustrate the source directory organization of a web application utilizing the principles outlined in the Application Developer's Guide.

To prove that they work, you can execute either of the following links:

- To a [JSP page](#).
- To a [servlet](#).

Labs

just enough



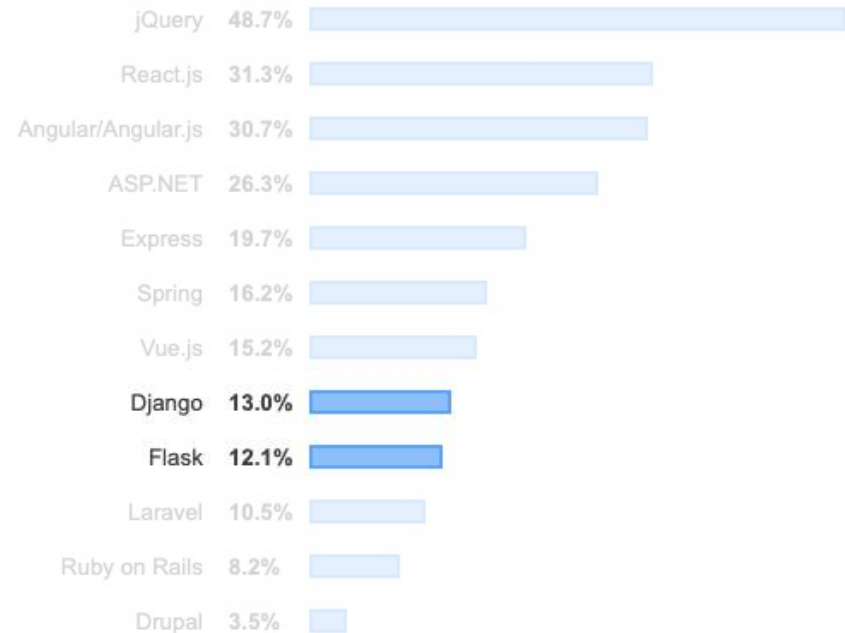
Web Frameworks

The Django logo, featuring the word "django" in a white, lowercase, sans-serif font on a dark green rectangular background.

Web Frameworks

All Respondents

Professional Developers



Project Structure

- my-application
 - LICENSE
 - README.md
 - requirements.txt
 - main.py
 - utils
 - tests
 - config
 - routes
 - services
 - db
 - core

```
▶ pip install -r requirements.txt
```

```
▶ python main.py
```

```
* Serving Flask app "main" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: off
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

main.py

```
from flask import Flask

app = Flask(__name__)

@app.route('/')
def hello():
    return 'Hello, World!'

if __name__ == '__main__':
    app.run()
```

Production Deployme

- Gunicorn
- uWSGI
- Gevent
- Twisted Web

```
main.py
from flask import Flask

app = Flask(__name__)

@app.route('/')
def hello():
    return 'Hello, World!'

if __name__ == '__main__':
    app.run()
```

```
▶ gunicorn main:app -w 2
```

```
[2020-03-10 09:53:29 +0000] [2916] [INFO] Starting gunicorn 20.0.4
[2020-03-10 09:53:29 +0000] [2916] [INFO] Listening at: http://127.0.0.1:8000 (2916)
[2020-03-10 09:53:29 +0000] [2916] [INFO] Using worker: sync
[2020-03-10 09:53:29 +0000] [2919] [INFO] Booting worker with pid: 2919

[2020-03-10 09:53:29 +0000] [2921] [INFO] Booting worker with pid: 2921
```

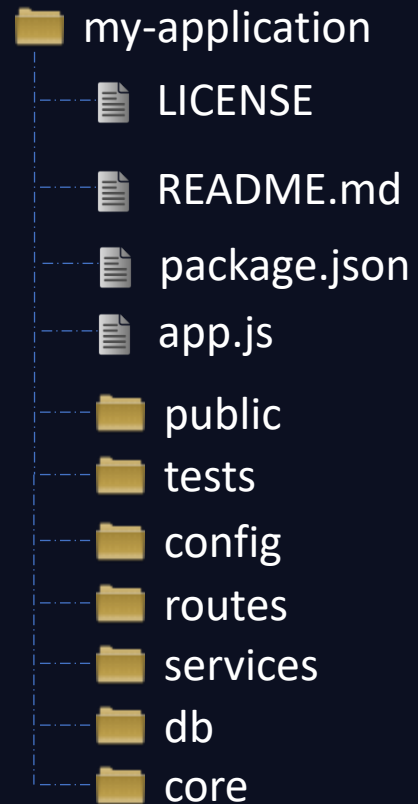
Labs

just enough



Express.js

Project Structure



app.js

```
const express = require('express')
const app = express()

app.get('/products', (req, res) =>
  res.send(getProductList()))

app.use(express.static(path.join(__dirname, 'public')));

app.listen(3000);
```

Project Structure

- my-application
 - LICENSE
 - README.md
 - package.json
 - app.js
 - public
 - tests
 - config
 - routes
 - services
 - db
 - core

▶ npm install

▶ node app.js

▶ npm run start:dev

package.json

```
{
  "name": "my-application",
  "version": "0.0.0",
  "private": true,
  "dependencies": {
    "dotenv": "^5.0.0",
    "execa": "^0.9.0",
    "express": "^4.16.2"
  },
  "scripts": {
    "debug": "node debug app.js",
    "start": "NODE_ENV=production node app.js",
    "start:dev": "NODE_ENV=dev node app.js",
    "test:e2e": "node tests/run-e2e-test.js",
    "test:unit": "jest tests/unit",
    "test:unit:watch": "jest tests/unit --watch"
  }
}
```

Project Structure

- my-application
 - LICENSE
 - README.md
 - package.json
 - app.js
 - public
 - tests
 - config
 - routes
 - services
 - db
 - core

▶ npm install

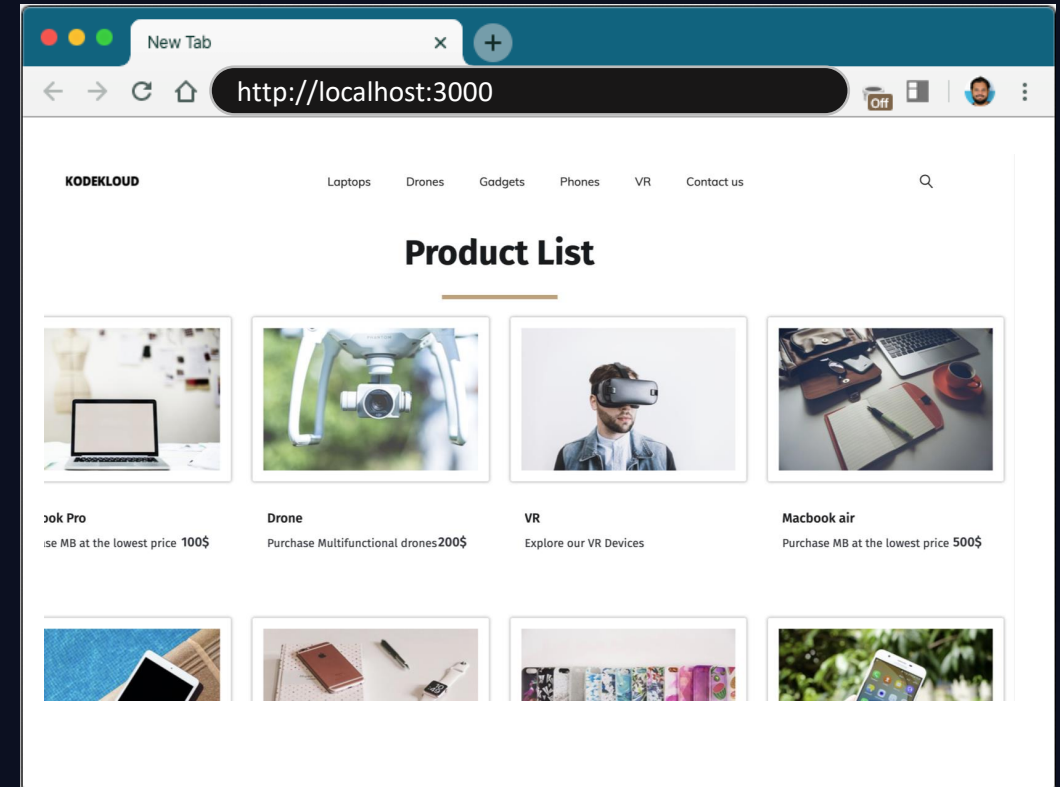
▶ node app.js

▶ npm run start:dev

supervisord

forever

pm2



pm2



PM2

P(rocess) M(anager) 2
Runtime Edition

npm package 4.2.3 node >=8.10.0 build passing

PM2 is a production process manager for Node.js applications with a built-in load balancer. It allows you to keep applications alive forever, to reload them without downtime and to facilitate common system admin tasks.

```
▶ pm2 start app.js
```

```
▶ pm2 start app.js -i 4
```

Labs





IP Addresses and Ports From a Web Application Perspective





FAQ

- What IP Address and Port should I use?
 - localhost vs 127.0.0.1 vs IP Address
 - Why can't I connect to my server?
 - HTTP or HTTPS?
- 
- 

IP Address



ip addr show

```
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fa  
1000
```

```
link/ether 02:0e:0c:9a:00:f0 brd ff:ff:ff:ff:ff:ff
```

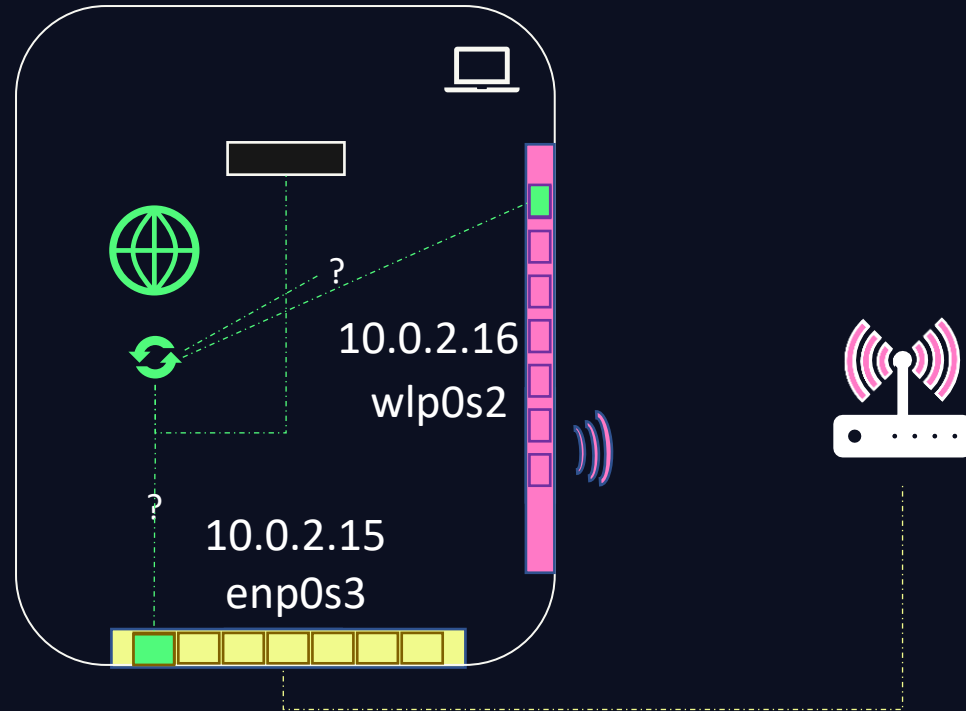
```
inet 10.0.2.15/24 brd 10.0.2.255 scope global enp0s3
```

```
3: wlp0s2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fa  
1000
```

```
link/ether dc:fb:48:dd:4b:4f brd ff:ff:ff:ff:ff:ff
```

```
inet 10.0.2.16/24 brd 10.0.2.255 scope global enp0s3
```


Ports



main.py

```
from flask import Flask

app = Flask(__name__)

@app.route('/')
def hello():
    return 'Hello, World!'

if __name__ == '__main__':
    app.run(port=8000 , host='127.0.0.1')
```

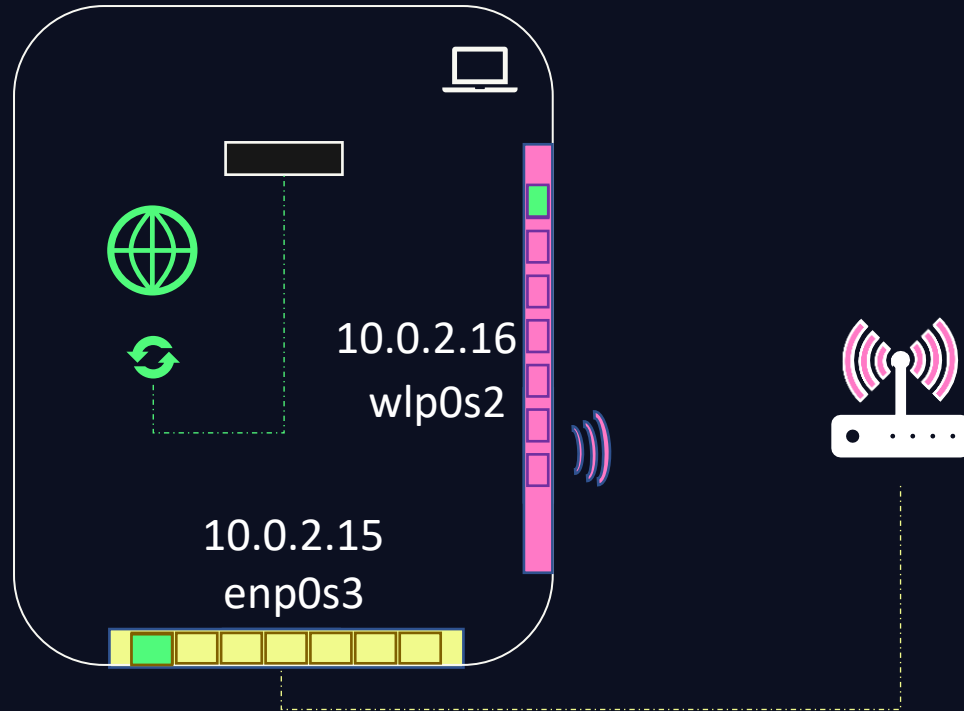
<http://10.0.2.15:8000>



<http://10.0.2.16:8000>



Ports



ip addr show

```
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc  
1000
```

```
link/ether 02:0e:0c:9a:00:f0 brd ff:ff:ff:ff:ff:ff
```

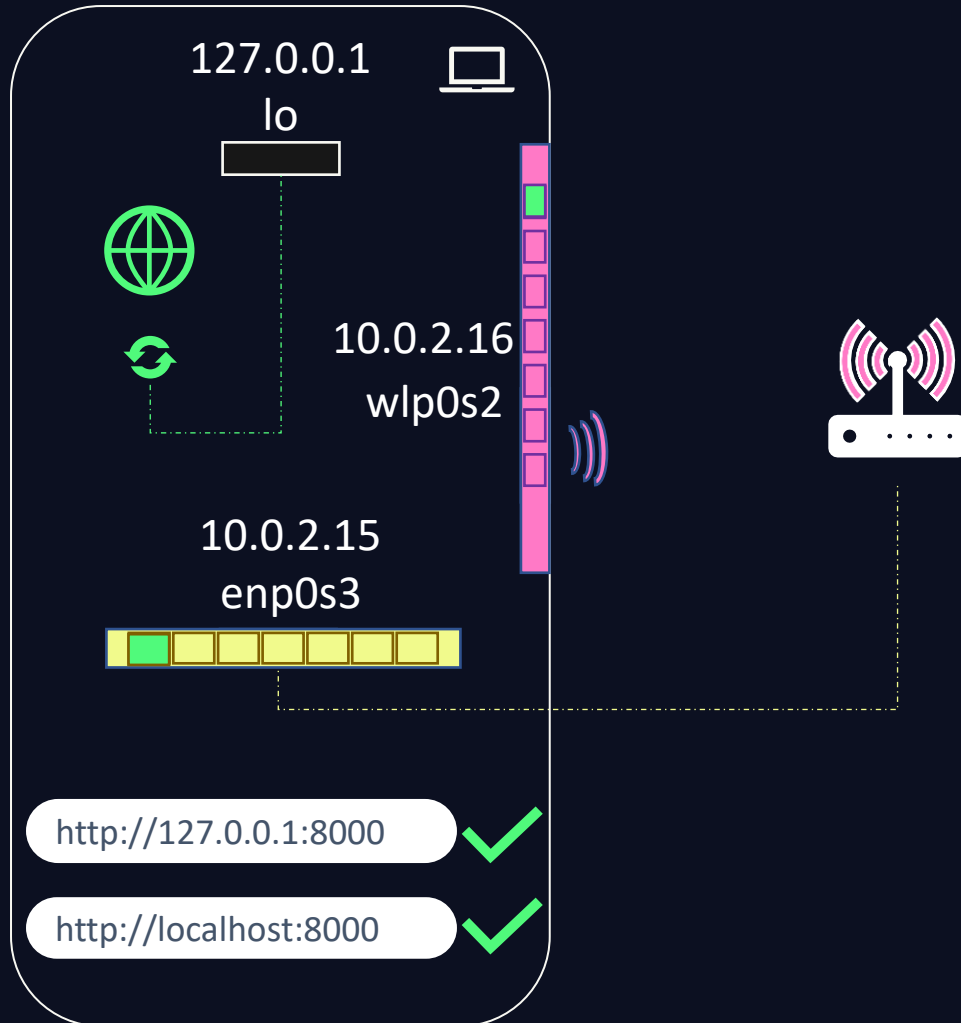
```
inet 10.0.2.15/24 brd 10.0.2.255 scope global enp0s3
```

```
3: wlp0s2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc  
1000
```

```
link/ether dc:fb:48:dd:4b:4f brd ff:ff:ff:ff:ff:ff
```

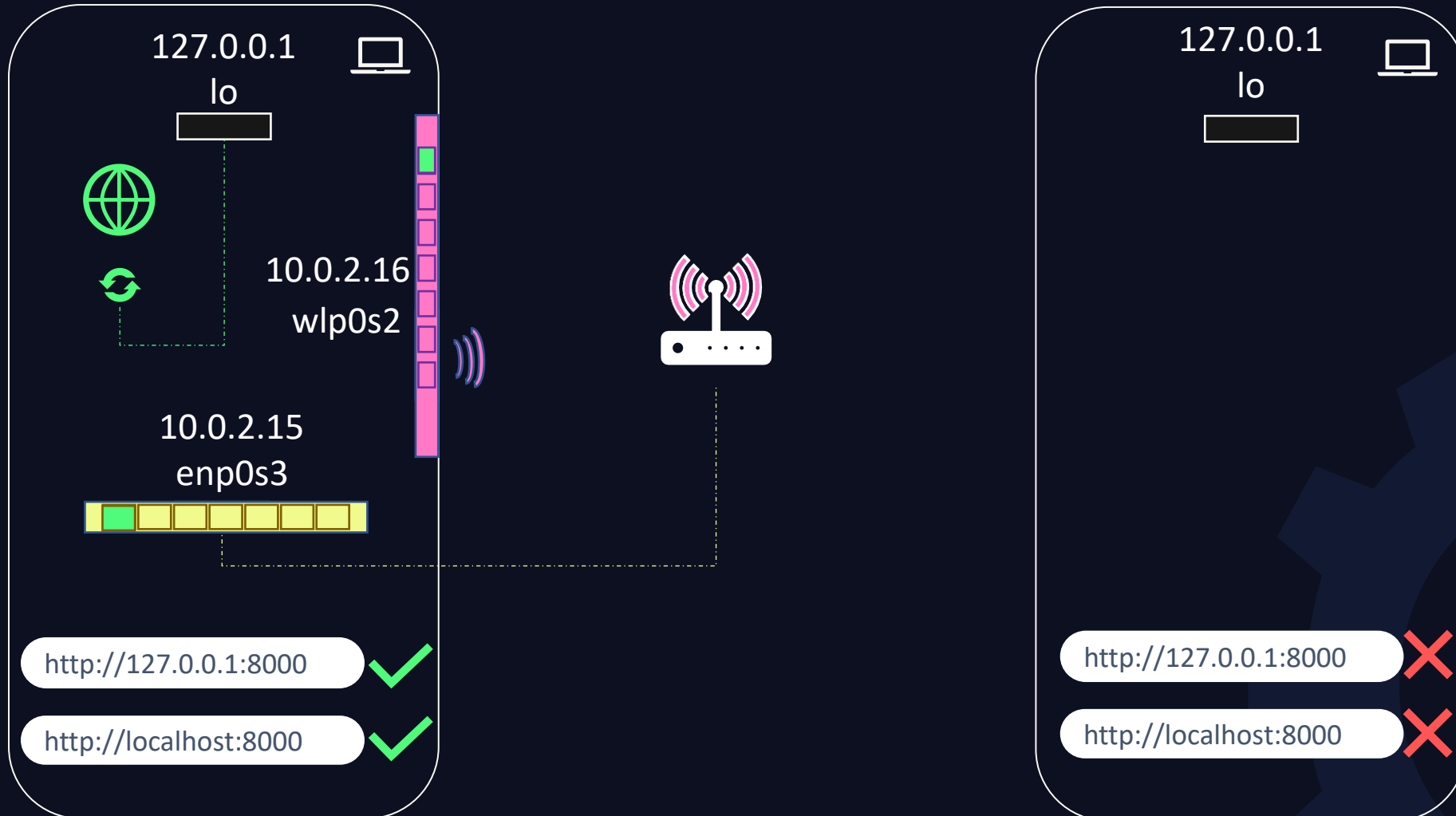
```
inet 10.0.2.16/24 brd 10.0.2.255 scope global enp0s3
```

Ports



```
ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state U
   link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
   inet 127.0.0.1/8 scope host lo
      valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc
   1000
   link/ether 02:0e:0c:9a:00:f0 brd ff:ff:ff:ff:ff:ff
   inet 10.0.2.15/24 brd 10.0.2.255 scope global enp0s3
3: wlp0s2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc
   1000
   link/ether dc:fb:48:dd:4b:4f brd ff:ff:ff:ff:ff:ff
   inet 10.0.2.16/24 brd 10.0.2.255 scope global enp0s3
```

Ports



Labs



Databases

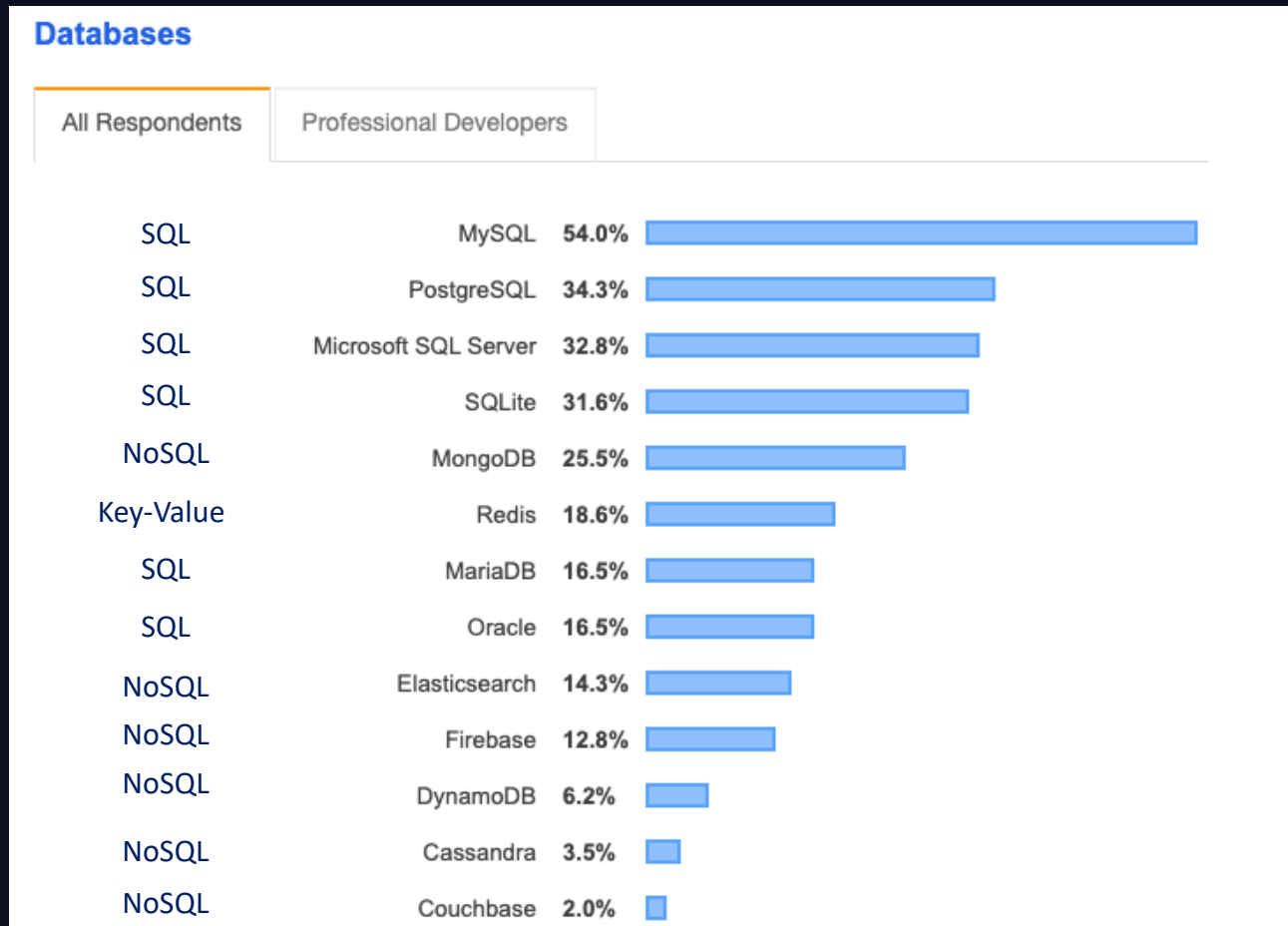


Why?



Databases

- MySQL
- MongoDB
- Redis



SQL

Tabular/Relational Databases

Name	Age	Location	Salary	Grade
John Doe	45	New York	5000	
Dave Smith	34	New York	4000	
Aryan Kumar	10	New York		A
Lauren Rob	13	Bangalore		C
Lily Oliver	15	Bangalore		B

NoSQL

Key	Value
Name	John Doe
Age	45
Location	New York
Salary	5000

Key	Value
Name	Dave Smith
Age	34
Location	New York
Salary	4000

Key	Value
Name	Aryan Kumar
Age	10
Location	New York
Grade	A

Key	Value
Name	Lauren Rob
Age	13
Location	Bangalore
Grade	C

Key	Value
Name	Lily Oliver
Age	15
Location	Bangalore
Grade	B

NoSQL

Key	Value
Name	John Doe
Age	45
Location	New York
Salary	5000

Key	Value
Name	Dave Smith
Age	34
Location	New York
Salary	4000
Organization	ACME

Key	Value
Name	Aryan Kumar
Age	10
Location	New York
Grade	A

Key	Value
Name	Lauren Rob
Age	13
Location	Bangalore
Grade	C

Key	Value
Name	Lily Oliver
Age	15
Location	Bangalore
Grade	B

NoSQL

```
{  
  "name": "John Doe",  
  "age": 45,  
  "location": "New York",  
  "salary": 5000  
}
```

```
{  
  "name": "Dave Smith",  
  "age": 34,  
  "location": "New York",  
  "salary": 4000,  
  "organization": "ACME"  
}
```

```
{  
  "name": "Aryan Kumar",  
  "age": 10,  
  "location": "New York",  
  "Grade": "A"  
}
```

```
{  
  "name": "Lily Oliver",  
  "age": 15,  
  "location": "Bangalore",  
  "Grade": "B"  
}
```

```
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

SQL vs NoSQL

```
SELECT * from persons where AGE > 10
```

Table

Name	Age	Location	Salary	Grade
John Doe	45	New York	5000	
Dave Smith	34	New York	4000	
Lauren Rob	13	Bangalore		C
Lily Oliver	15	Bangalore	Row	B

```
db.persons.find( { age: { $gt: 10 } } )
```

```
{  
  "name": "John Doe",  
  "age": 45,  
  "location": "New York",  
  "salary": 5000  
}  
  
{  
  "name": "Dave Smith",  
  "age": 34,  
  "location": "New York",  
  "salary": 4000,  
  "organization": "ACME"  
}
```

```
{  
  "name": "Aryan Kumar",  
  "age": 10,  
  "location": "New York",  
  "Grade": "A"  
}  
  
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

```
{  
  "name": "Lily Oliver",  
  "age": 15,  
  "location": "Bangalore",  
  "Grade": "B"  
}
```

Document

SQL vs NoSQL

```
SELECT * from persons where age > 10
```

```
db.persons.find( { age: { $gt: 10 } } )
```

Name	Age	Location	Salary	Grade
John Doe	45	New York	5000	
Dave Smith	34	New York	4000	
Lauren Rob	13	Bangalore		C
Lily Oliver	15	Bangalore		B

```
{  
  "name": "John Doe",  
  "age": 45,  
  "location": "New York",  
  "salary": 5000  
}
```

```
{  
  "name": "Dave Smith",  
  "age": 34,  
  "location": "New York",  
  "salary": 4000,  
  "organization": "ACME"  
}
```

```
{  
  "name": "Lily Oliver",  
  "age": 15,  
  "location": "Bangalore",  
  "Grade": "B"  
}
```

```
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

SQL vs NoSQL



just enough



MySQL

- Open source
- Fast
- Reliable
- SQL



The screenshot shows the MySQL Editions page. On the left is a navigation menu with the following items:

- MySQL Editions
- MySQL Enterprise Edition
- MySQL Standard Edition
- MySQL Classic Edition
- MySQL Cluster CGE
- MySQL Embedded (OEM/ISV)
- MySQL Community Edition

Below the menu is a circular logo with a yin-yang design, labeled 'SQL' in the orange half and 'NoSQL' in the blue half.

The main content area is titled 'MySQL Editions' and contains the following text:

MySQL is the world's most popular open source database. Whether you are a fast growing web p deliver high performance, scalable database applications.

[Learn more about Oracle MySQL Cloud Service »](#)

MySQL Community Edition is the freely downloadable version of the world's most popular open

- [Learn more about the MySQL Community Edition](#)
- [Download the MySQL Community Edition](#)

Commercial customers have the flexibility of choosing from multiple editions to meet specific bu

- [MySQL Standard Edition](#)
- [MySQL Enterprise Edition](#)
- [MySQL Cluster Carrier Grade Edition](#)

ISVs, OEMs and VARs can learn more about [MySQL as an Embedded Database](#)

Community

Commercial

Install

```
▶ wget https://dev.mysql.com/get/mysql80-community-release-el7-3.noarch.rpm
```

```
▶ rpm -ivh mysql80-community-release-el7-3.noarch.rpm
```

```
▶ yum install mysql-server
```

```
▶ service mysqld start
```

```
▶ service mysqld status
```

Redirecting to /bin/systemctl status mysqld.service

● mysqld.service - MySQL Server

Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled; vendor preset: disabled)

Active: **active (running)** since Thu 2020-03-19 17:57:44 UTC; 1min 12s ago

Docs: man:mysqld(8)

<http://dev.mysql.com/doc/refman/en/using-systemd.html>

Process: 4135 ExecStartPre=/usr/bin/mysqld_pre_systemd (code=exited, status=0/SUCCESS)

Main PID: 4211 (mysqld)

Status: "Server is operational"

CGroup: /system.slice/mysqld.service

└─4211 /usr/sbin/mysqld

Validate

```
▶ cat /var/log/mysqld.log
```

```
2020-03-19T17:57:37.375709Z 0 [System] [MY-013169] [Server] /usr/sbin/mysqld (mysqld 8.0.19) initializing of server in progress as process 4162
2020-03-19T17:57:39.467035Z 5 [Note] A temporary password is generated for root@localhost: g/io%pF1E77m
2020-03-19T17:57:41.582829Z 0 [System] [MY-010116] [Server] /usr/sbin/mysqld (mysqld 8.0.19) initializing as process 4217m
2020-03-19T17:57:43.812826Z 0 [Warning] [MY-010068] [Server] CA certificate ca.pem is self signed.
2020-03-19T17:57:44.021160Z 0 [System] [MY-010931] [Server] /usr/sbin/mysqld: ready for connections. Version: '8.0.19' socket: '/var/lib/mysql/mysql.sock' port: 3306 MySQL
Community Server - GPL.
2020-03-19T17:57:44.245102Z 0 [System] [MY-011323] [Server] X Plugin ready for connections. Socket: '/var/run/mysqld/mysqlx.sock' bind-address: '::' port: 33060
2020-03-19T18:04:21.190127Z 8 [Warning] [MY-013360] [Server] Plugin sha256_password reported: "sha256_password" is deprecated and will be removed in a future release.
Please use caching_sha2_password instead'
```

```
▶ mysql -u root -pg/io%pF1E77m
```

```
mysql: [Warning] Using a password on the command line interface can be insecure.
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 11
Server version: 8.0.19
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

```
mysql>
```

Validate

```
mysql> ALTER USER 'root'@'localhost' IDENTIFIED BY 'MyNewPass4!';
```

mysql_secure_installation

```
mysql> SHOW DATABASES;
```

```
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
```

4 rows in set (0.00 sec)

```
mysql> CREATE DATABASE school;
```



Validate

```
mysql> USE school;
```

```
mysql> CREATE TABLE persons  
(  
  Name varchar(255),  
  Age int,  
  Location varchar(255)  
);
```

```
mysql> SHOW TABLES;
```

```
+-----+  
| Tables_in_school |  
+-----+  
| persons          |  
+-----+  
1 row in set (0.00 sec)
```

```
mysql> INSERT INTO persons values  
  ( "John Doe", 45, "New York");
```

```
mysql> SELECT * FROM persons;
```

```
+-----+-----+-----+  
| name  | age | location |  
+-----+-----+-----+  
| John Doe | 45 | New York |  
+-----+-----+-----+  
1 row in set (0.00 sec)
```



MySQL

Create User

```
mysql -u root -pg/io%pF1E77m
```

```
mysql> CREATE USER 'john'@'localhost' IDENTIFIED BY 'MyNewPass4!';
```



user

'username'@'host'



password



Create User

```
mysql -u root -pg/io%pF1E77m
```

```
mysql> CREATE USER 'john'@'localhost' IDENTIFIED BY 'MyNewPass4!';
```

```
mysql> CREATE USER 'john'@'192.168.1.10' IDENTIFIED BY 'MyNewPass4!';
```

'username'@'host'

```
mysql -u john -pMyNewPass4! ❌
```

192.168.1.10



```
mysql -u john -pMyNewPass4! ✅
```



MySQL

Create User

```
mysql -u root -pg/io%pF1E77m
```

```
mysql> CREATE USER 'john'@'localhost' IDENTIFIED BY 'MyNewPass4!';
```

```
mysql> CREATE USER 'john'@'192.168.1.10' IDENTIFIED BY 'MyNewPass4!';
```

```
mysql> CREATE USER 'john'@'%' IDENTIFIED BY 'MyNewPass4!';
```

```
mysql -u john -pMyNewPass4! ❌
```

192.168.1.10



```
mysql -u john -pMyNewPass4! ✅
```



MySQL

Privileges

```
mysql> GRANT <PERMISSION> ON <DB.TABLE> TO 'john'@'%';
```

```
mysql> GRANT SELECT ON school.persons TO 'john'@'%';
```

```
mysql> GRANT SELECT, UPDATE ON school.persons TO 'john'@'%';
```

```
mysql> GRANT SELECT, UPDATE ON school.* TO 'john'@'%';
```

```
mysql> GRANT ALL PRIVILEGES ON *.* TO 'john'@'%';
```

```
mysql> SHOW GRANTS FOR 'john'@'localhost';
```

```
+-----+
| Grants for john@localhost          |
+-----+
| GRANT USAGE ON *.* TO `john`@`localhost` |
| GRANT SELECT ON `school`.`persons` TO `john`@`localhost` |
+-----+
2 rows in set (0.00 sec)
```

Privileges

ALL PRIVILEGES	Grant all access
CREATE	Create databases
DROP	Delete databases
DELETE	Delete rows from table
INSERT	Insert rows into table
SELECT	Read/Query tables
UPDATE	Update rows in table

Labs

just enough



MySQL

- Open source
- NoSQL
- Scalable
- High Performance

What Is MongoDB?

MongoDB is a document database with the scalability and flexibility that you want with the querying and indexing that you need

Available how you want it

Cloud

Shared
Up to 8 GB Storage
Shared RAM

Dedicated
Consistent performance
Advanced security
Unlimited scaling

Sandbox
Free, forever. Ideal for learning, developing, and prototyping.

Server

MongoDB offers both an Enterprise and Community version of its powerful distributed document database.

Community
Feature Rich
Developer Ready

Enterprise
Advanced Features
Performance Grade

Community

Enterprise

MongoDB

```
{  
  "name": "John Doe",  
  "age": 45,  
  "location": "New York",  
  "salary": 5000  
}
```

Document

```
{  
  "name": "Dave Smith",  
  "age": 34,  
  "location": "New York",  
  "salary": 4000,  
  "organization": "ACME"  
}
```

```
{  
  "name": "Aryan Kumar",  
  "age": 10,  
  "location": "New York",  
  "Grade": "A"  
}
```

```
{  
  "name": "Lily Oliver",  
  "age": 15,  
  "location": "Bangalore",  
  "Grade": "B"  
}
```

```
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

Collection

MongoDB

```
{  
  "name": "John Doe",  
  "age": 45,  
  "location": "New York",  
  "salary": 5000  
}
```

Document

```
{  
  "name": "Dave Smith",  
  "age": 34,  
  "location": "New York",  
  "salary": 4000,  
  "organization": "ACME"  
}
```

```
{  
  "name": "Aryan Kumar",  
  "age": 10,  
  "location": "New York",  
  "Grade": "A"  
}
```

```
{  
  "name": "Lily Oliver",  
  "age": 15,  
  "location": "Bangalore",  
  "Grade": "B"  
}
```

```
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

Collection

```
{  
  "name": "Aryan Kumar",  
  "age": 10,  
  "location": "New York",  
  "Grade": "A"  
}
```

```
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

```
{  
  "name": "Lily Oliver",  
  "age": 15,  
  "location": "Bangalore",  
  "Grade": "B"  
}
```

```
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

Collection

```
{  
  "name": "Aryan Kumar",  
  "age": 10,  
  "location": "New York",  
  "Grade": "A"  
}
```

```
{  
  "name": "Lily Oliver",  
  "age": 15,  
  "location": "Bangalore",  
  "Grade": "B"  
}
```

```
{  
  "name": "Lauren Rob",  
  "age": 13,  
  "location": "Bangalore",  
  "Grade": "C"  
}
```

Collection

Database

MongoDB



Install

What Is MongoDB?

MongoDB is a document database with the scalability and flexibility that you want with the querying and indexing that you need

Available how you want it

Cloud

Shared
Up to 8 GB Storage
Shared RAM

Dedicated
Consistent performance
Advanced security
Unlimited scaling

Sandbox
Free, forever. Ideal for learning, developing, and prototyping.

Server

MongoDB offers both an Enterprise and Community version of its powerful distributed document database.

Community
Feature Rich
Developer Ready

Enterprise
Advanced Features
Performance Grade

Install

Select the server you would like to run:

MongoDB Community Server

FEATURE RICH. DEVELOPER READY.

MongoDB Enterprise Server

ADVANCED FEATURES. PERFORMANCE GRADE.

Version

4.2.3 (current release) ▼

OS

Select OS ▼

Package

▼

Download

- [Release notes](#)
- [Changelog](#)
- [Download source \(tgz\)](#)
- [Download source \(zip\)](#)

Install

1 Configure the package management system (yum).

Create a `/etc/yum.repos.d/mongodb-org-4.2.repo` file so that you can install MongoDB directly using yum:

```
[mongodb-org-4.2]
name=MongoDB Repository
baseurl=https://repo.mongodb.org/yum/redhat/$releasever/mongodb-org/4.2/x86_64/
gpgcheck=1
enabled=1
gpgkey=https://www.mongodb.org/static/pgp/server-4.2.asc
```

copy

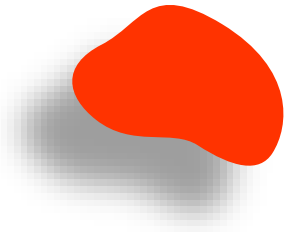
```
▶ yum install mongodb-org
```

Start DB Service

```
▶ systemctl start mongod
```

```
▶ systemctl status mongod
```

```
● mongod.service - MongoDB Database Server
  Loaded: loaded (/usr/lib/systemd/system/mongod.service; enabled; vendor preset: disabled)
  Active: active (running) since Sat 2020-03-21 18:43:53 UTC; 1min 46s ago
    Docs: https://docs.mongodb.org/manual
  Process: 4224 ExecStart=/usr/bin/mongod $OPTIONS (code=exited, status=0/SUCCESS)
  Process: 4222 ExecStartPre=/usr/bin/chmod 0755 /var/run/mongod (code=exited, status=0/SUCCESS)
  Process: 4220 ExecStartPre=/usr/bin/chown mongod:mongod /var/run/mongod (code=exited, status=0/SUCCESS)
  Process: 4219 ExecStartPre=/usr/bin/mkdir -p /var/run/mongod (code=exited, status=0/SUCCESS)
 Main PID: 4227 (mongod)
  CGroup: /system.slice/mongod.service
          └─4227 /usr/bin/mongod -f /etc/mongod.conf
```



Getting Started



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