Getting Started

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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

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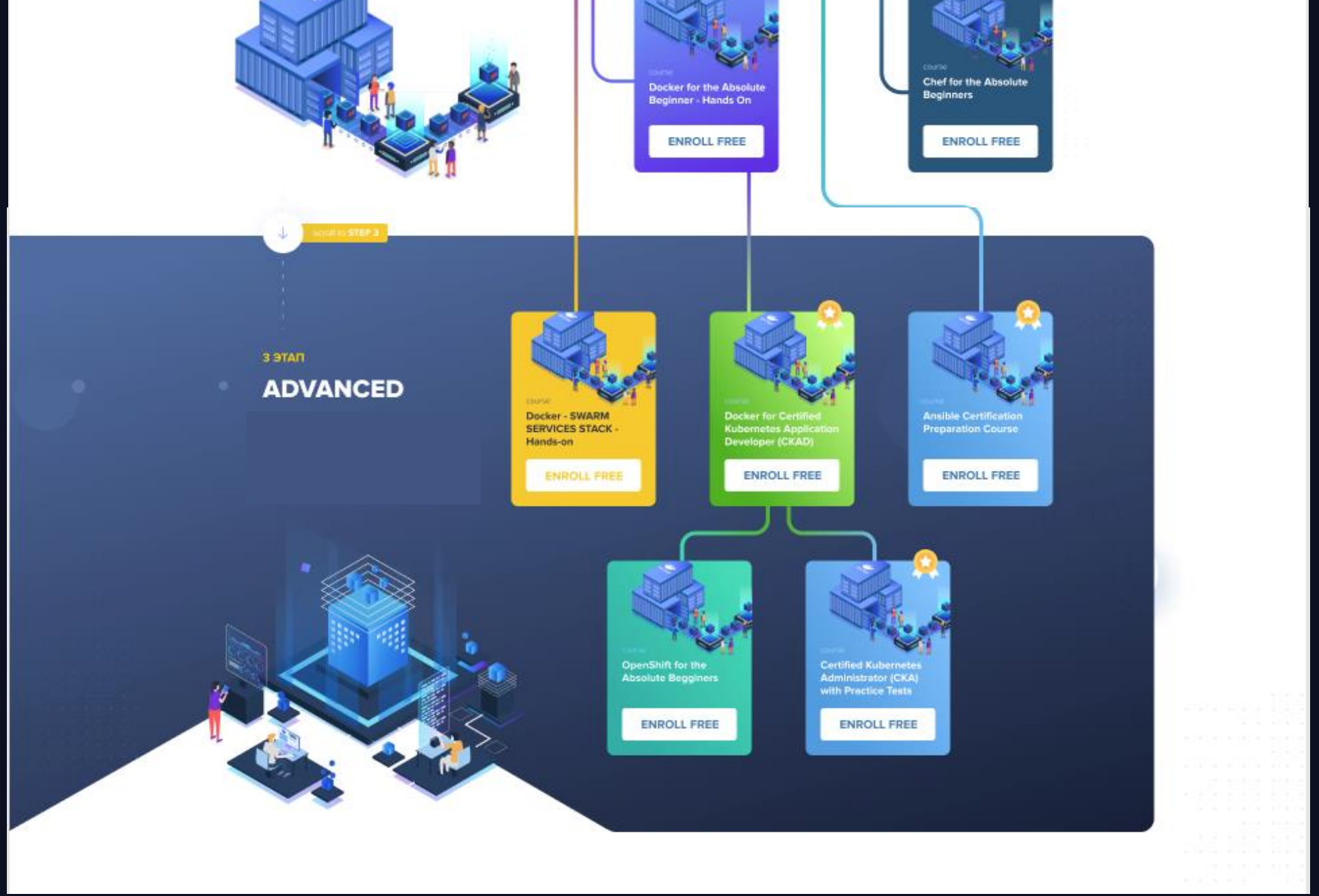
Docker for the Absolute Beginner - Hands On
ENROLL FREE
Chef for the Absolute Beginners
ENROLL FREE
scroll to STEP 3
3 ЭТАП
ADVANCED
Docker - SWARM SERVICES STACK - Hands-on
ENROLL FREE
Docker for Certified Kubernetes Application Developer (CKAD)
ENROLL FREE
Ansible Certification Preparation Course
ENROLL FREE
OpenShift for the Absolute Begginers
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Certified Kubernetes Administrator (CKA) with Practice Tests
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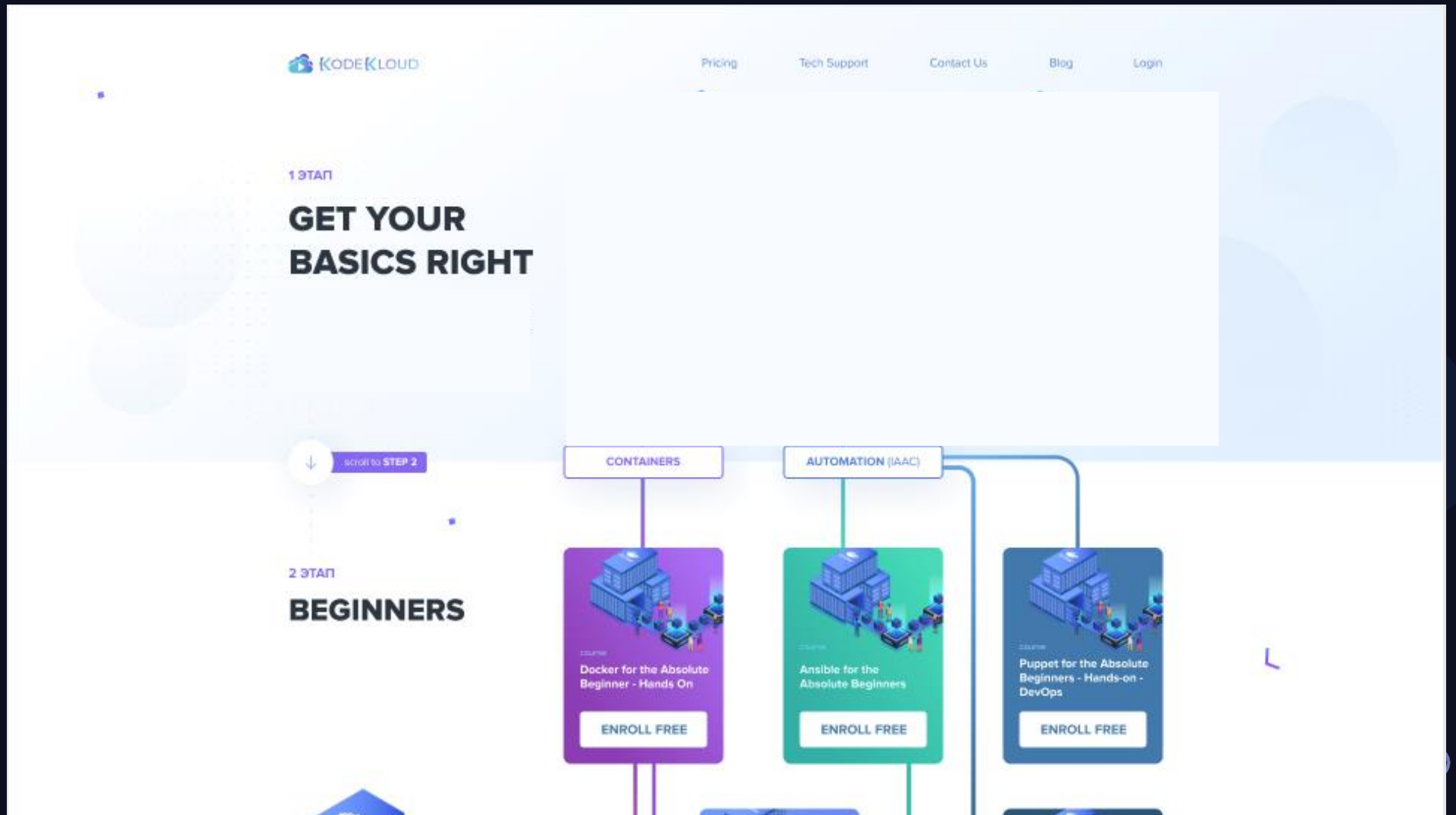
DevOps Pre-Requisite



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

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Course Features

VISUAL LEARNING

DEMOS

HANDS-ON LABS

COMMUNITY SUPPORT

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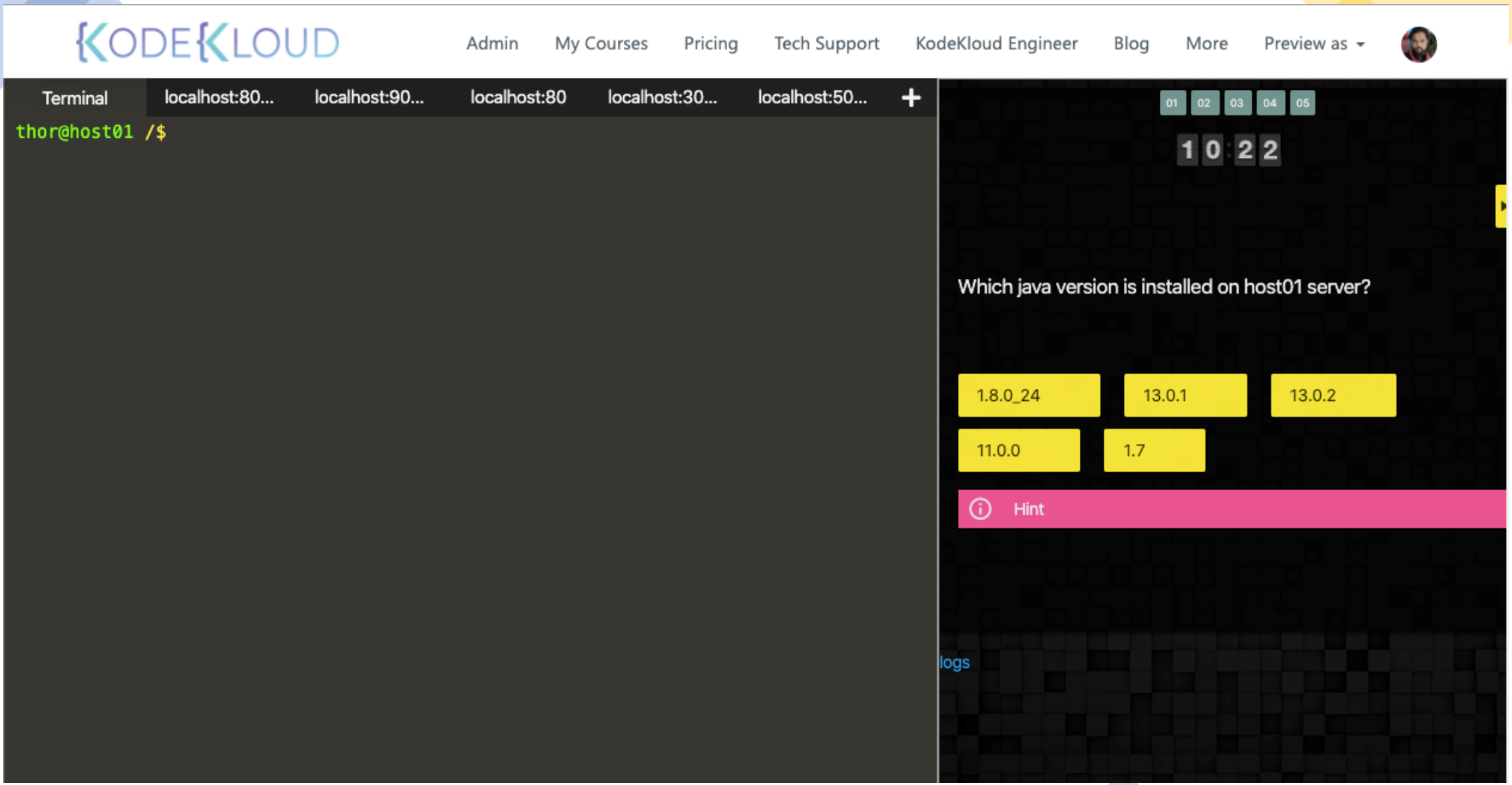
KODEKLOUD
Admin
My Courses
Pricing
Tech Support
KodeKloud Engineer
Blog
More
Preview as
Terminal
localhost:80...
localhost:90...
localhost:80
localhost:30...
localhost:50...
thor@host01 /$
01
02
03
04
05
10:22
Which java version is installed on host01 server?
1.8.0_24
13.0.1
13.0.2
11.0.0
1.7
Hint
logs

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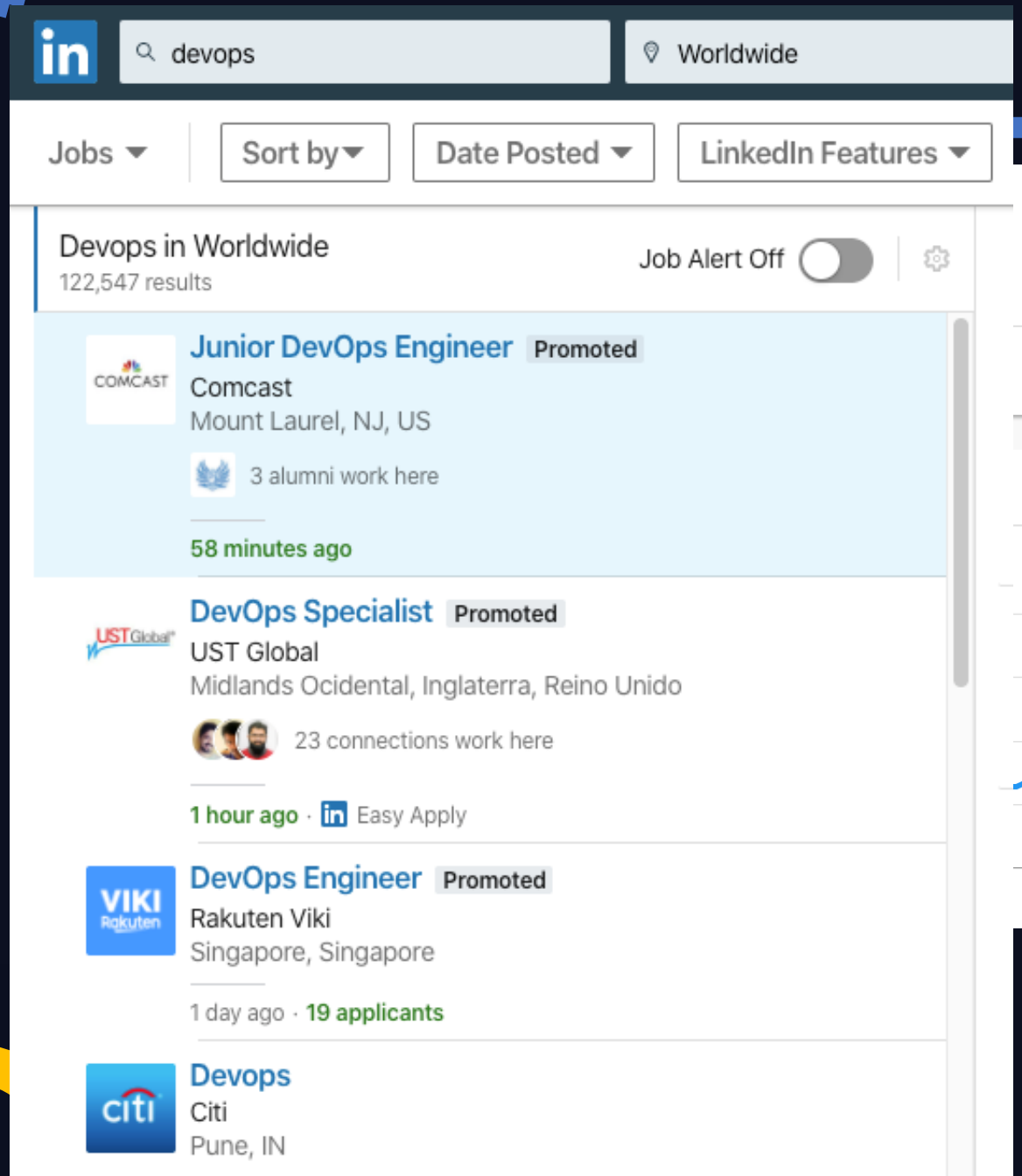
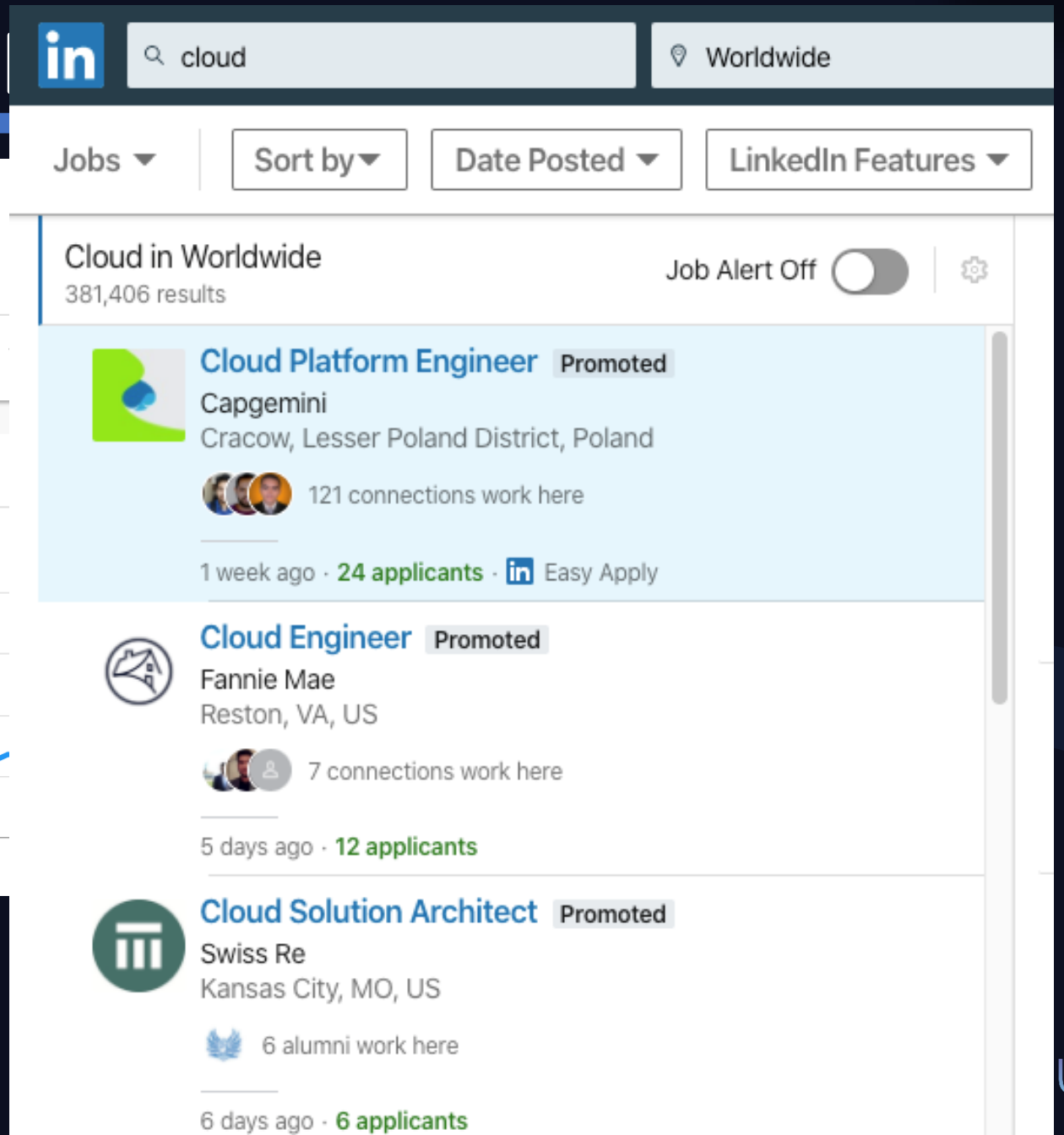
All Courses Home Pricing

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	Deploy WebApplication : Not able to copy files from jumphost to other servers • 1 2h
KodeKloud Engineer Welcome to the KodeKloud Engineer Community!	168 / month 9 unread 9 new	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
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	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 Ocidental, 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 Ocidental, 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

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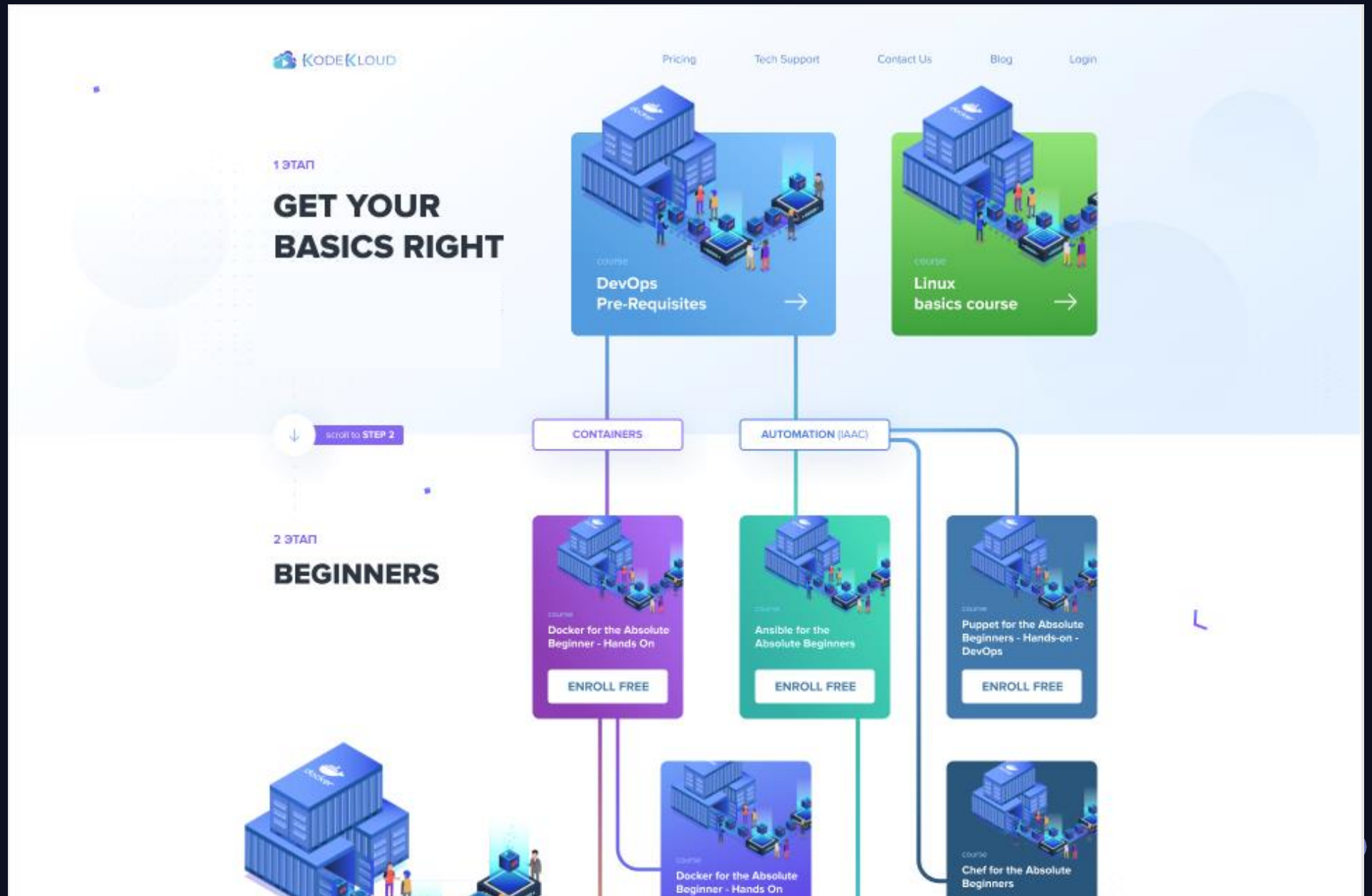

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just enough

LINUX

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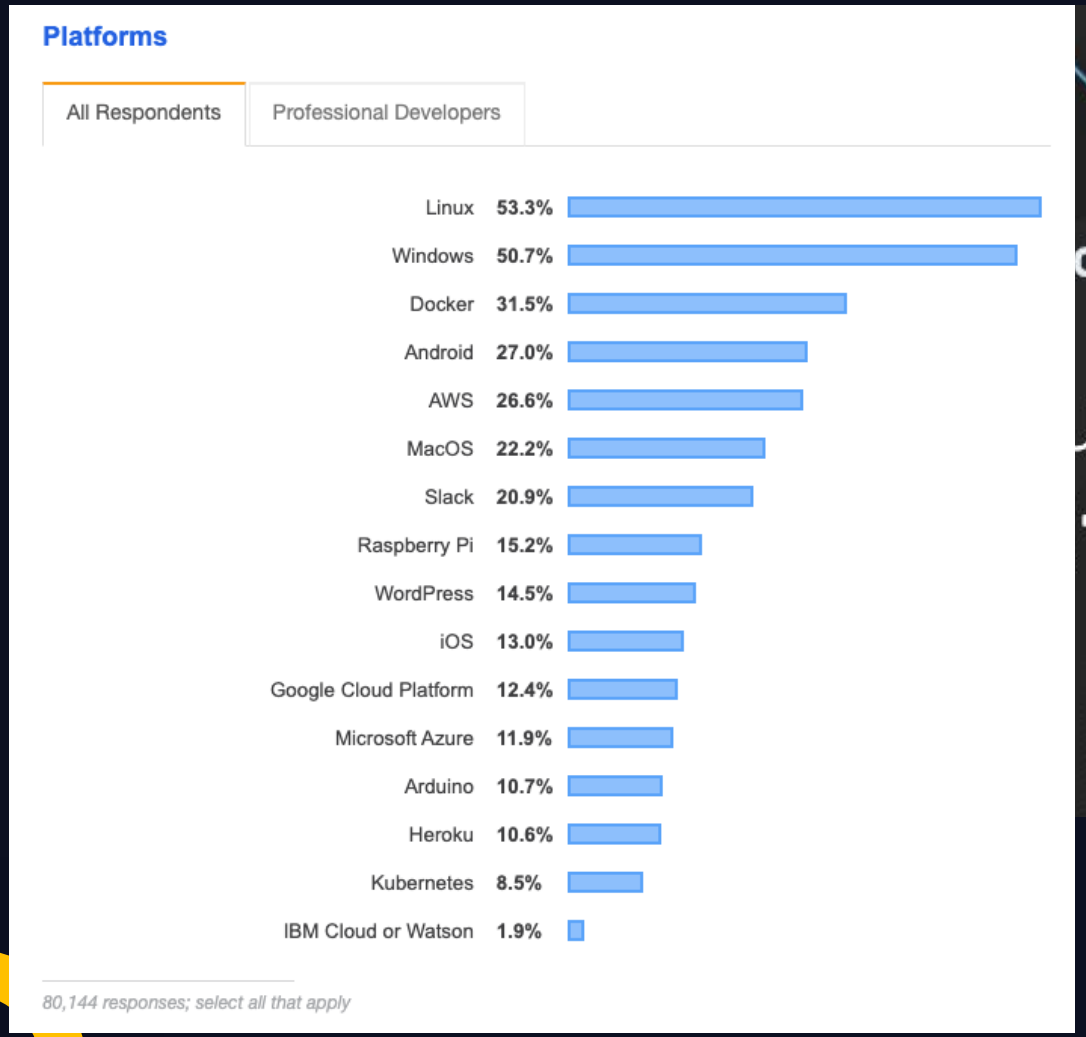
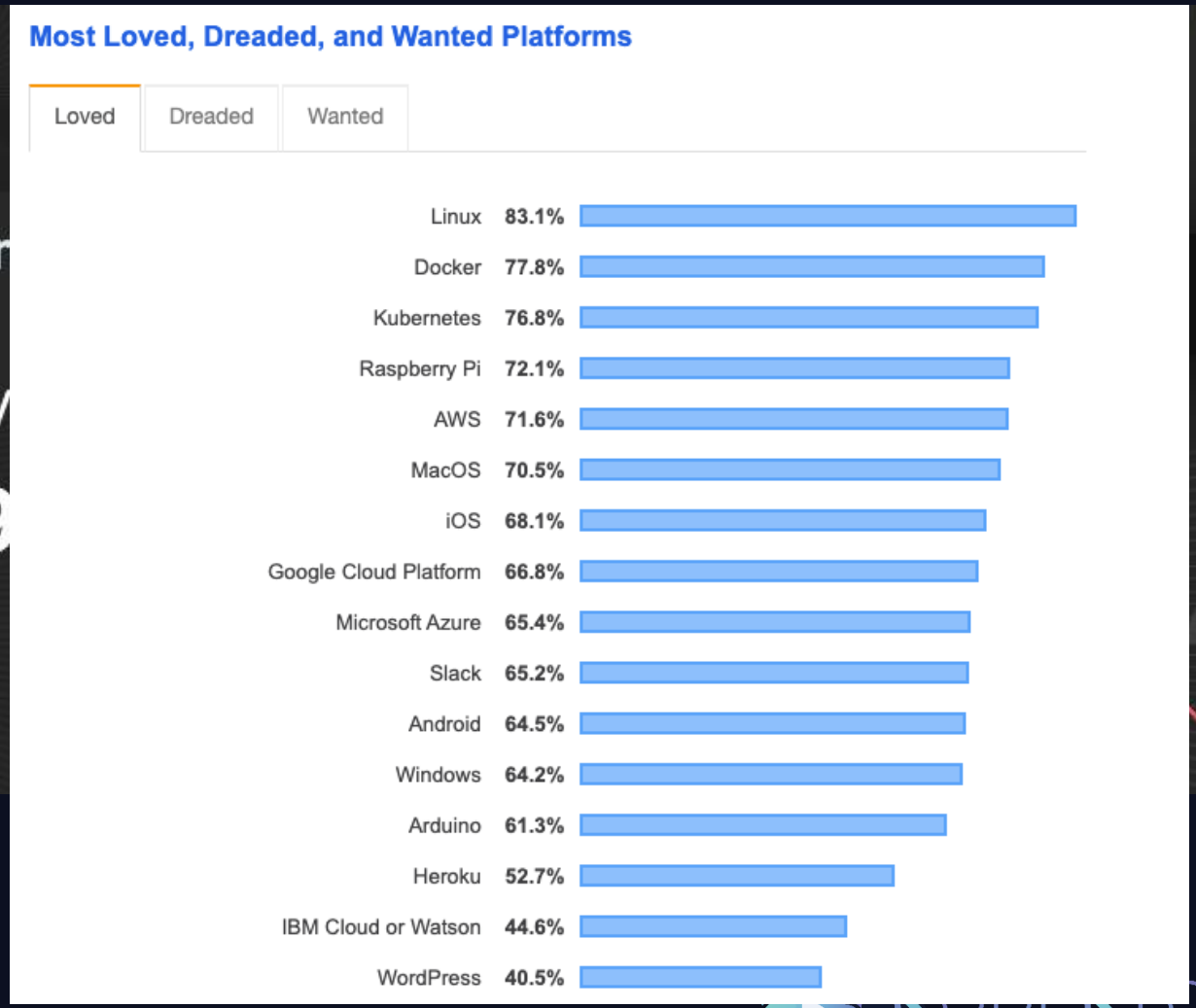
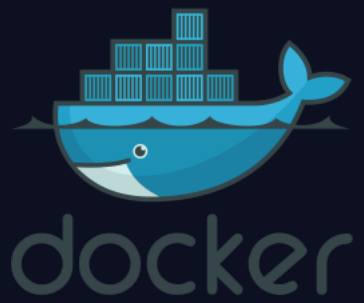
Why Linux?





https://insights.stackoverflow.com/survey/2019

Why Linux?



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

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

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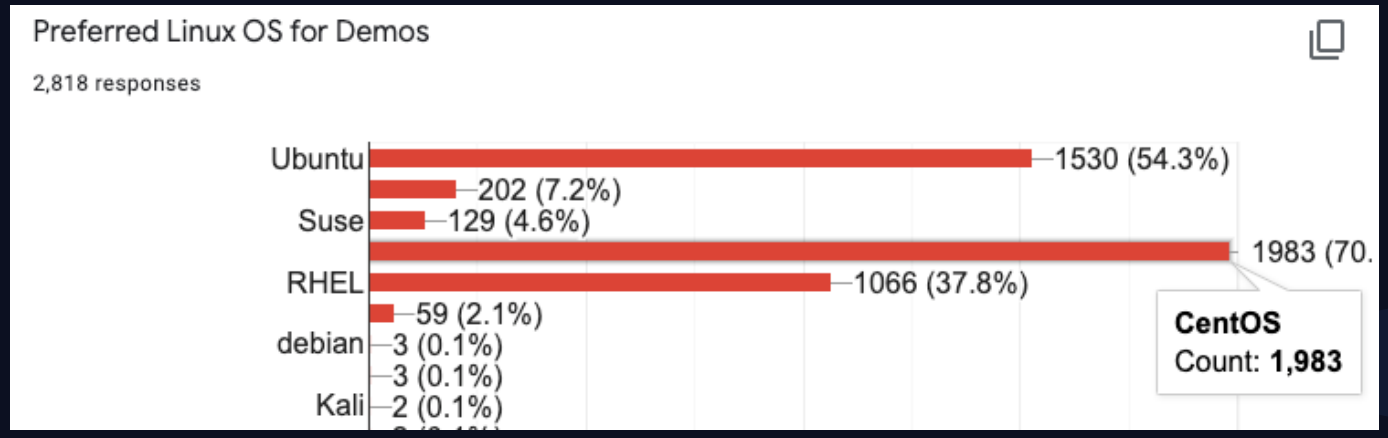
Linux Basics

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



*Allowed multiple selections

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Linux Basics Course

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Shell Types

```
echo $SHELL
/bin/bash
```

- Broune Shell (Sh Shell)
- C Shell (csh or tcsh)
- Z Shell (zsh)
- Bourne again Shell (bash)

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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

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Commands - Directories

/tmp/asia/india/bangalore

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

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

Make Directory Hierarchy

```
rm -r /tmp/my_dir1
```

Remove Directory

```
cp -r my_dir1 /tmp/my_dir1
```

Copy Directory

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Commands - Files

```
touch new_file.txt
Hi
```

Create a new file (no contents)

```
cat > new_file.txt
This is some sample contents
CTLR + D
```

Add contents to file

```
cat new_file.txt
This is some sample contents
```

View contents of file

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

Copy File

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

Move (Rename) File

```
rm new_file.txt
```

Remove (Delete) File

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User Accounts

```
whoami
matthew
```

matthew

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

```
su aparna
Password:
```

```
ssh aparna@192.168.1.2
```

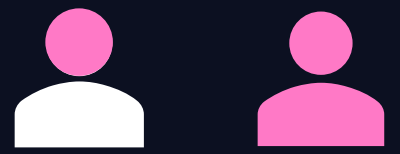
User Accounts

```
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
```

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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/"
```

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Package Managers

RPM (Red Hat Package Manager)

```
rpm -i telnet.rpm
```

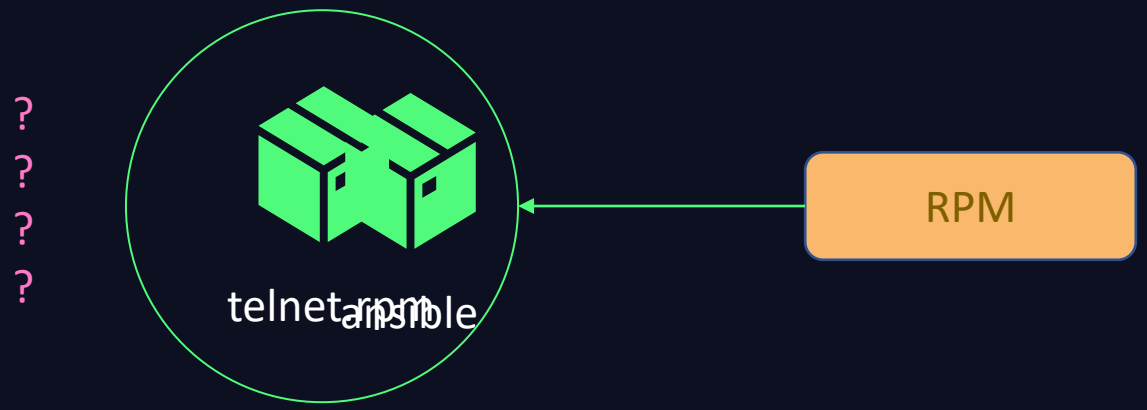
Install Package

```
rpm -e telnet.rpm
```

Uninstall Package

```
rpm -q telnet.rpm
```

Query Package



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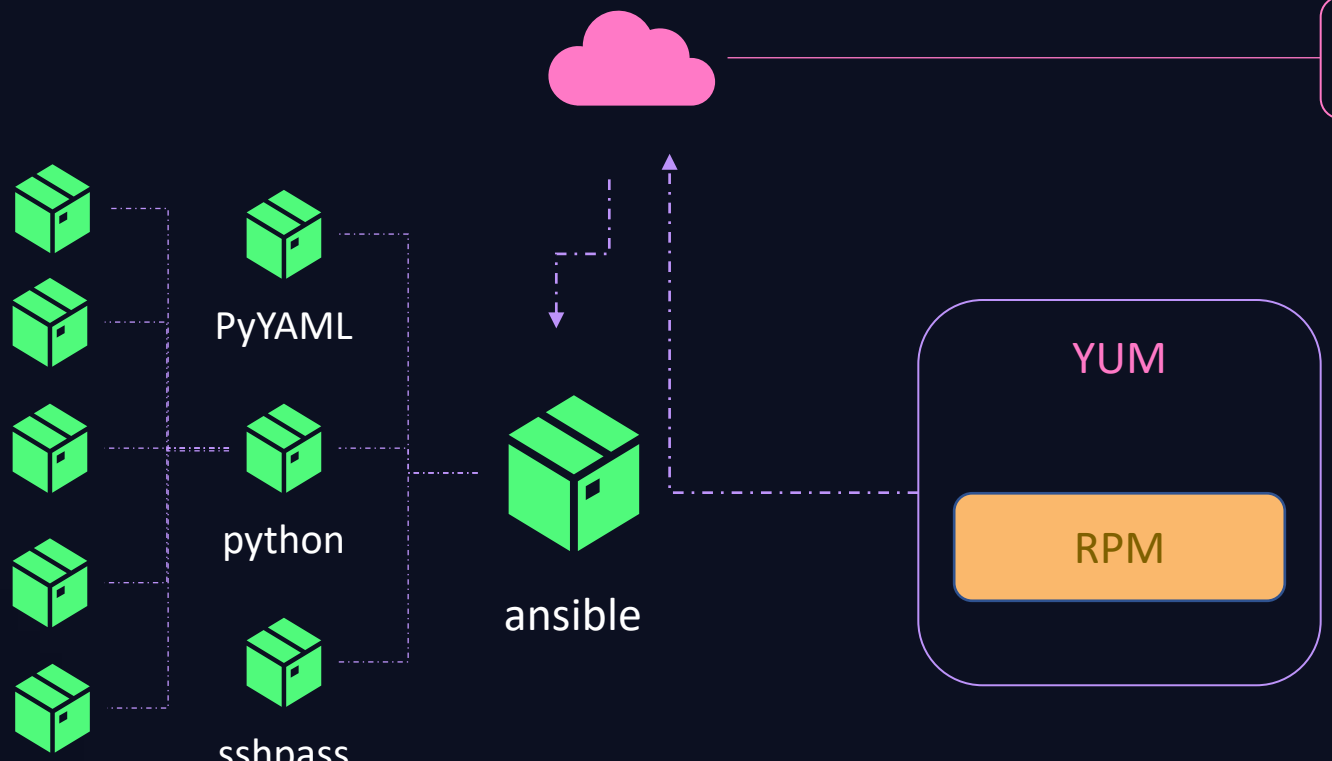
YUM

```
yum install ansible
```

Install Package

/etc/yum.repos.d



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YUM Repos

yu

repo id
base/7
extras/
mongo
mysql-
mysql-
mysql8
update

ls

CentOS
CentOS
CentOS
CentOS

ca

[extras]
name=
baseurl=

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 nu
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
```

scription

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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
```

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Services

Services

`service httpd start`	Start HTTPD service
Or	
`systemctl start httpd`	Start HTTPD service
`systemctl stop httpd`	Stop HTTPD service
`systemctl status httpd`	Check HTTPD service Status
`systemctl enable httpd`	Configure HTTPD to start at startup
`systemctl disable httpd`	Configure HTTPD to not start at startup

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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

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Services

/etc/systemd/system

```
/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!
```

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



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

```
systemctl daemon-reload
```

```
systemctl start my_app
```

```
systemctl stop my_app
```

```
systemctl enable my_app
```

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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
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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
```

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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
```

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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 your 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>
```

CTLR + D

Poem By: Meine Klaus, Schenker Rudolf

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 your 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
```

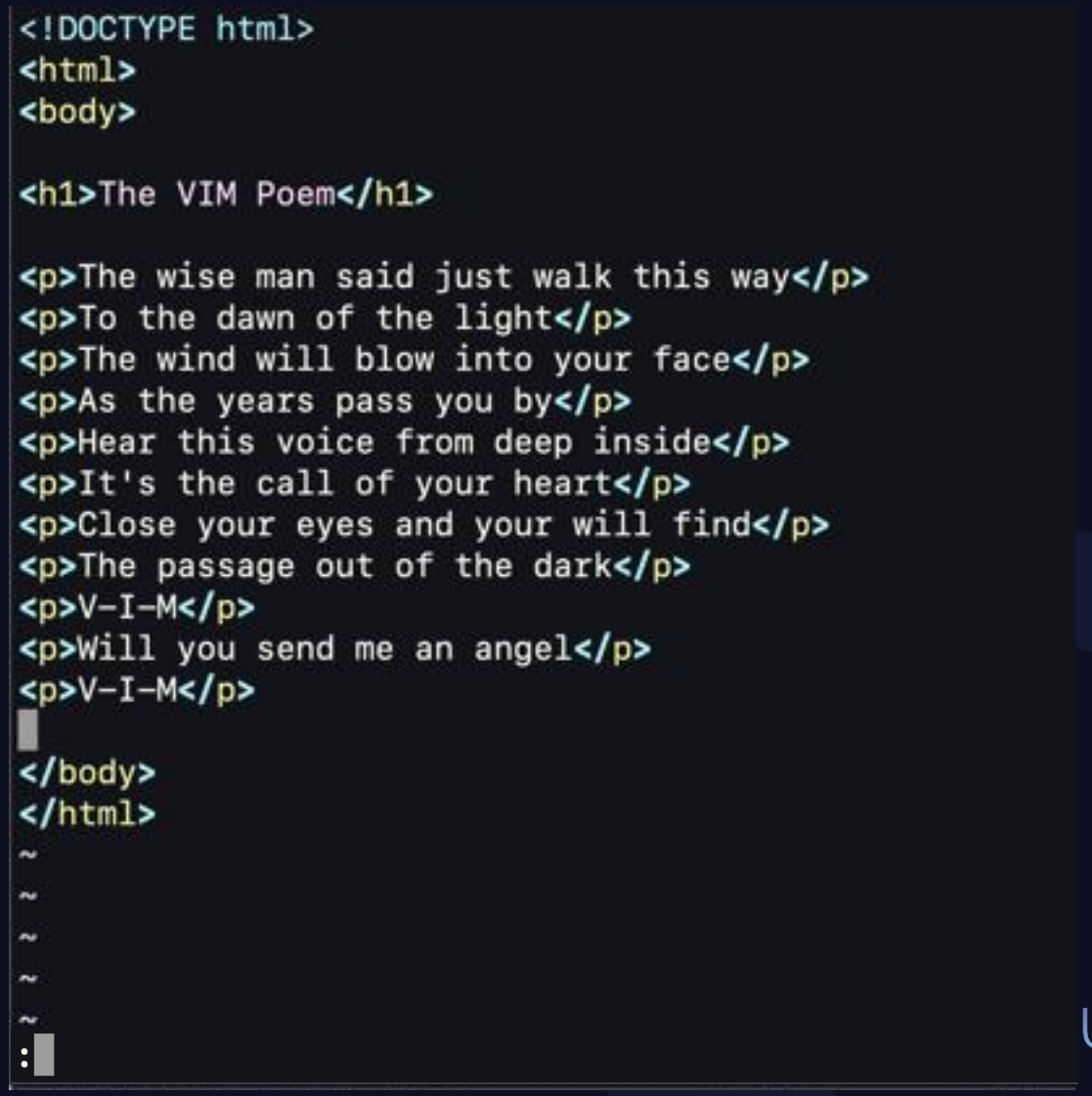
VI Editor - Command Mode

Move Around	^ < v >	K H J L
Delete	x	dd
Copy & Paste	yy	p
Scroll Up/Down	CTRL +u	CTRL +d

```
<!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 your 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>
~
~
~
~
~
"index.html" 20L, 431C                18,0-1        All
```

VI Editor - Command Mode

Command	:	
Save	:w	:w filename
Quit (Discard)	:q	
Save + Quit	:wq	

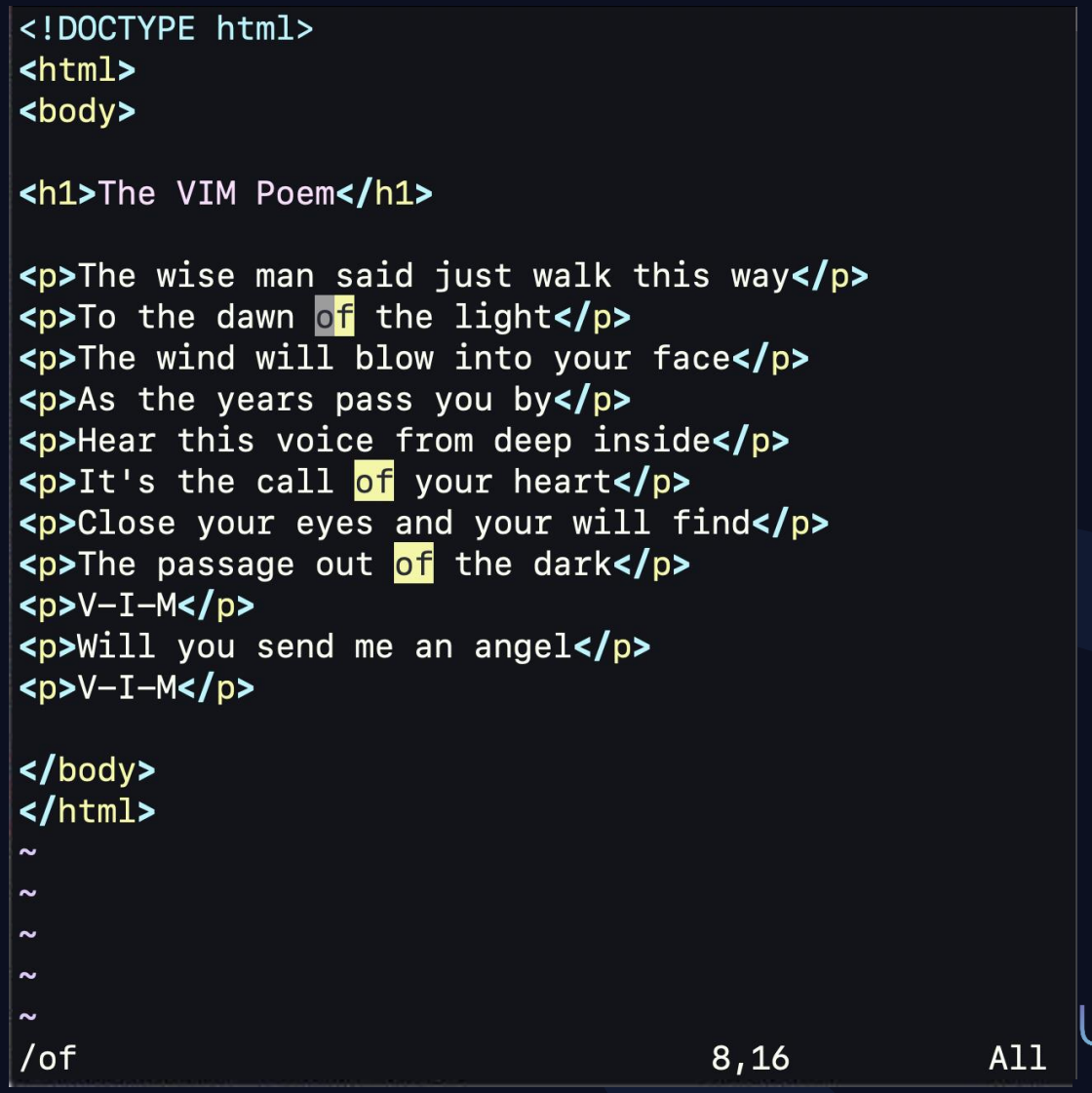


VI Editor - Command Mode

Find

/of

n



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Lab Setup

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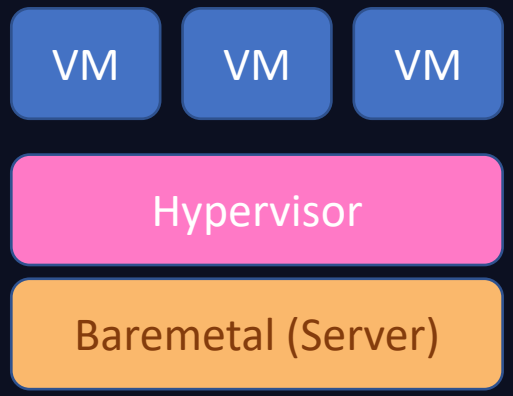
Virtualization S/W

Type 1

Microsoft Hyper-v



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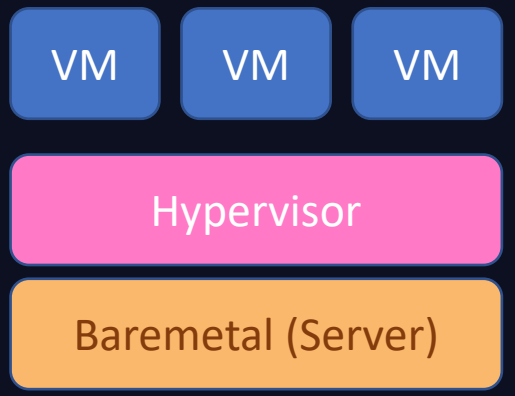
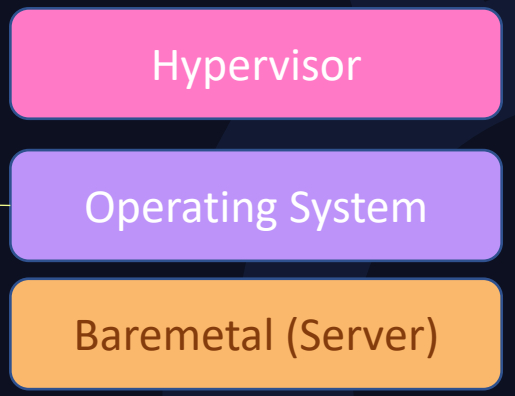
Virtualization S/W

Type 1



Host

Type 2



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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

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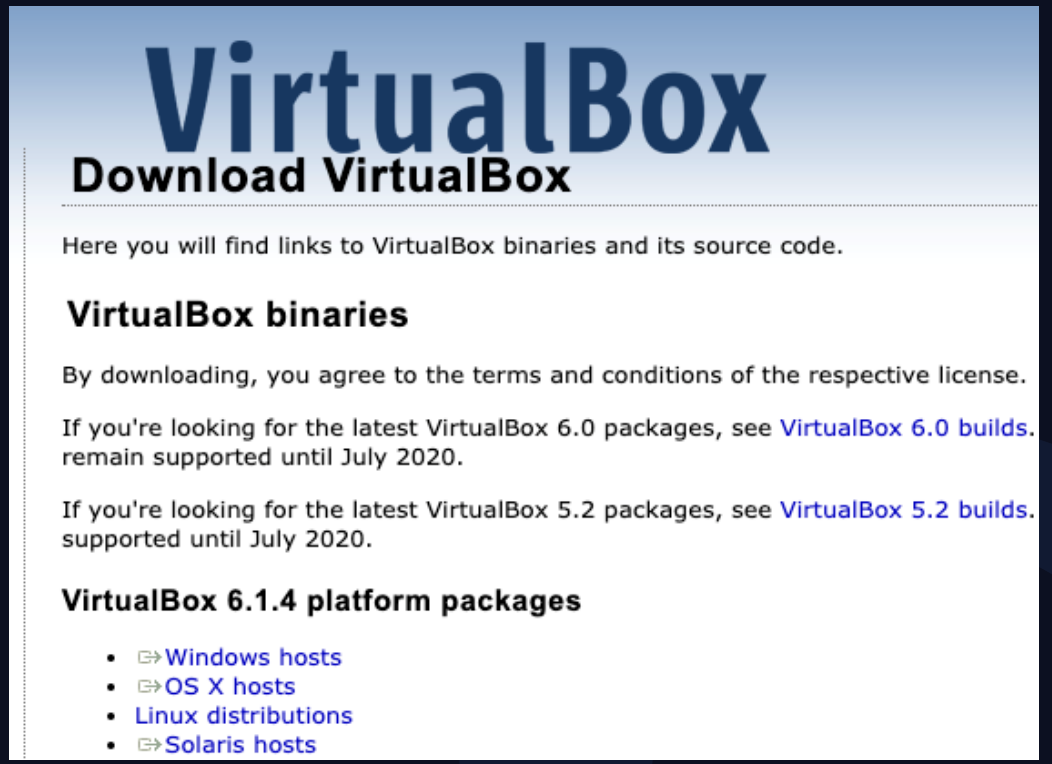
Oracle VirtualBox

- Support:
  - Windows, MAC OS X, Linux, Solaris

  https://www.virtualbox.org/manual/ch01.html#hostossupport
- 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



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

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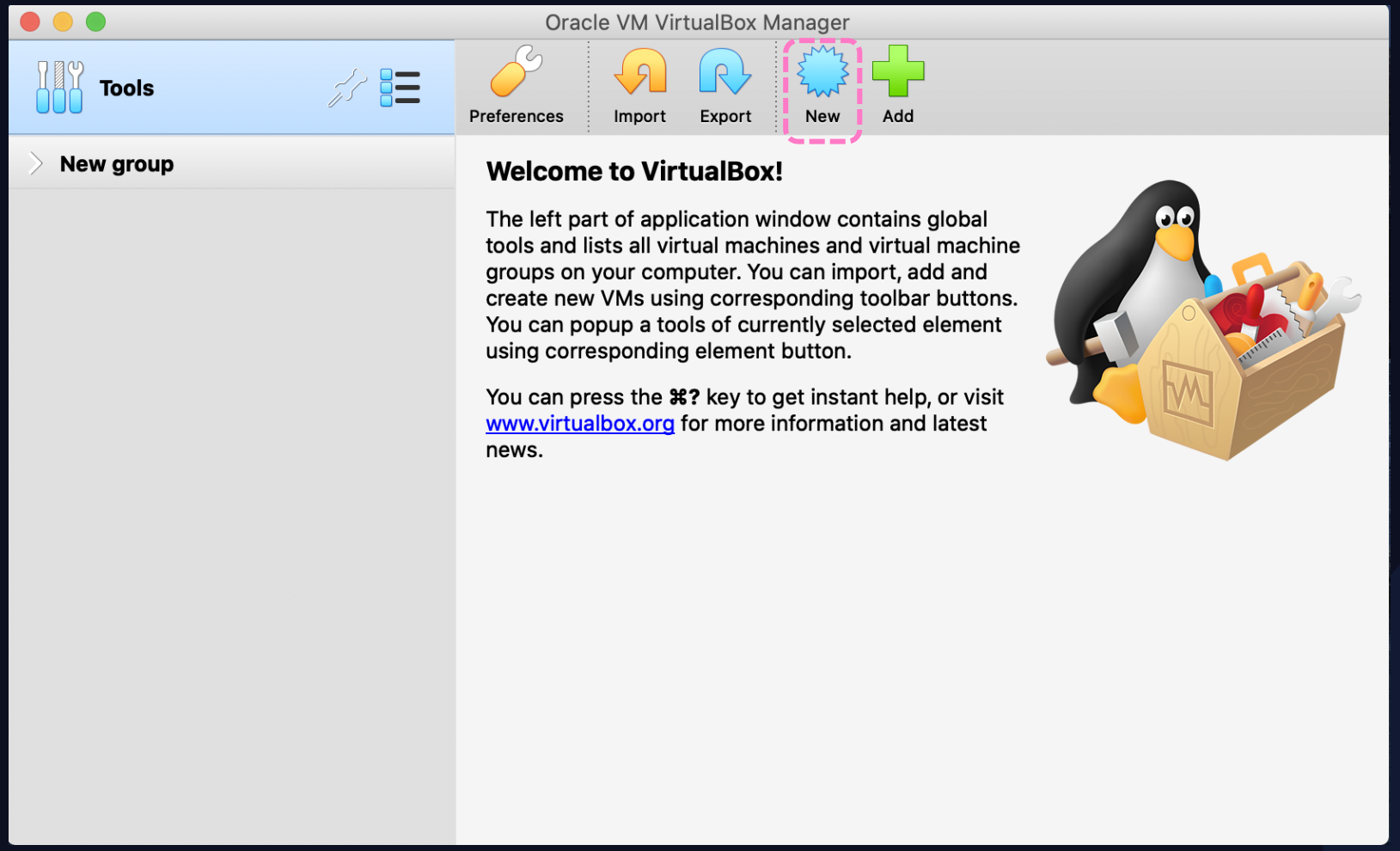
Oracle VirtualBox



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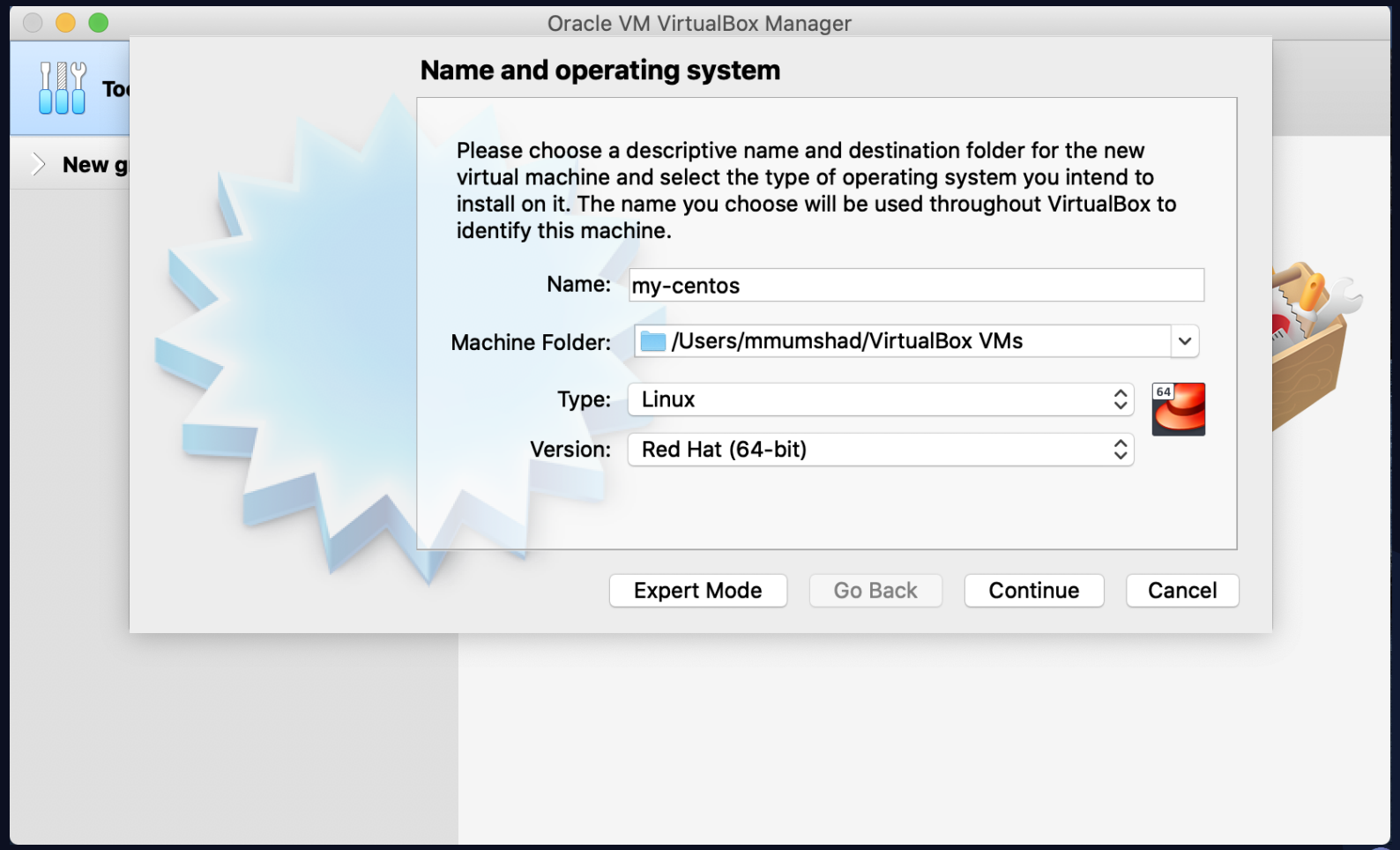
Oracle VirtualBox



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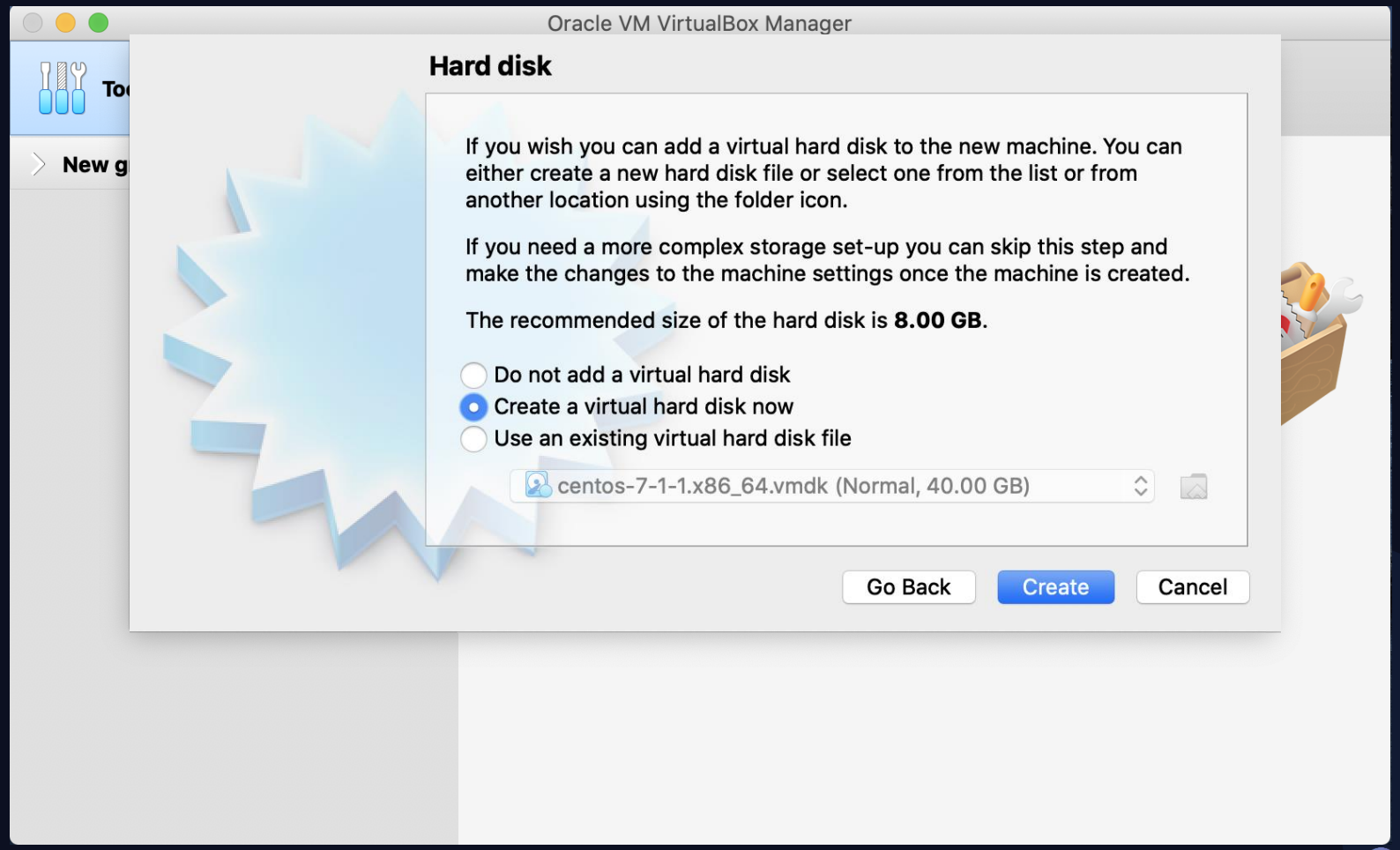
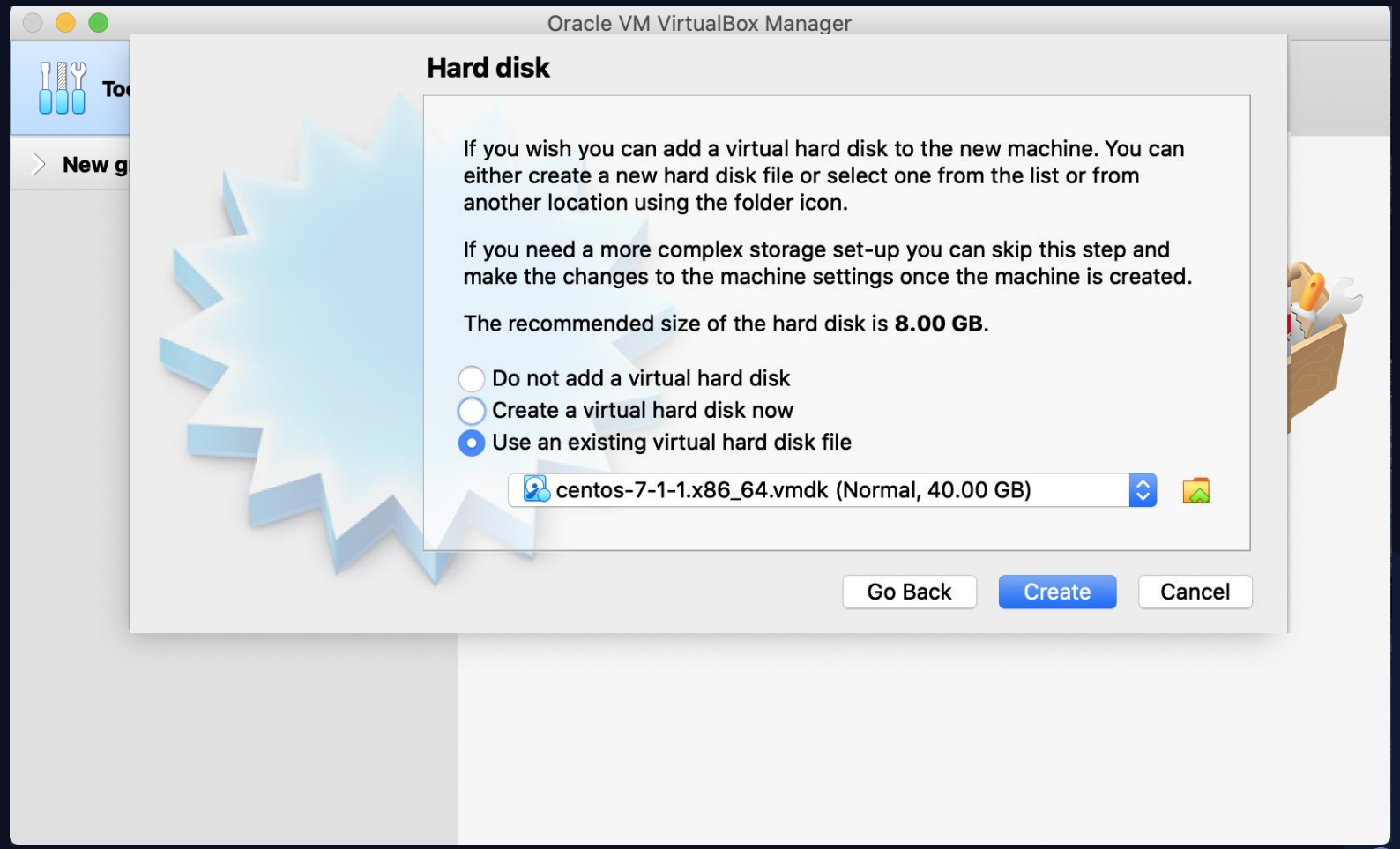
Oracle VirtualBox



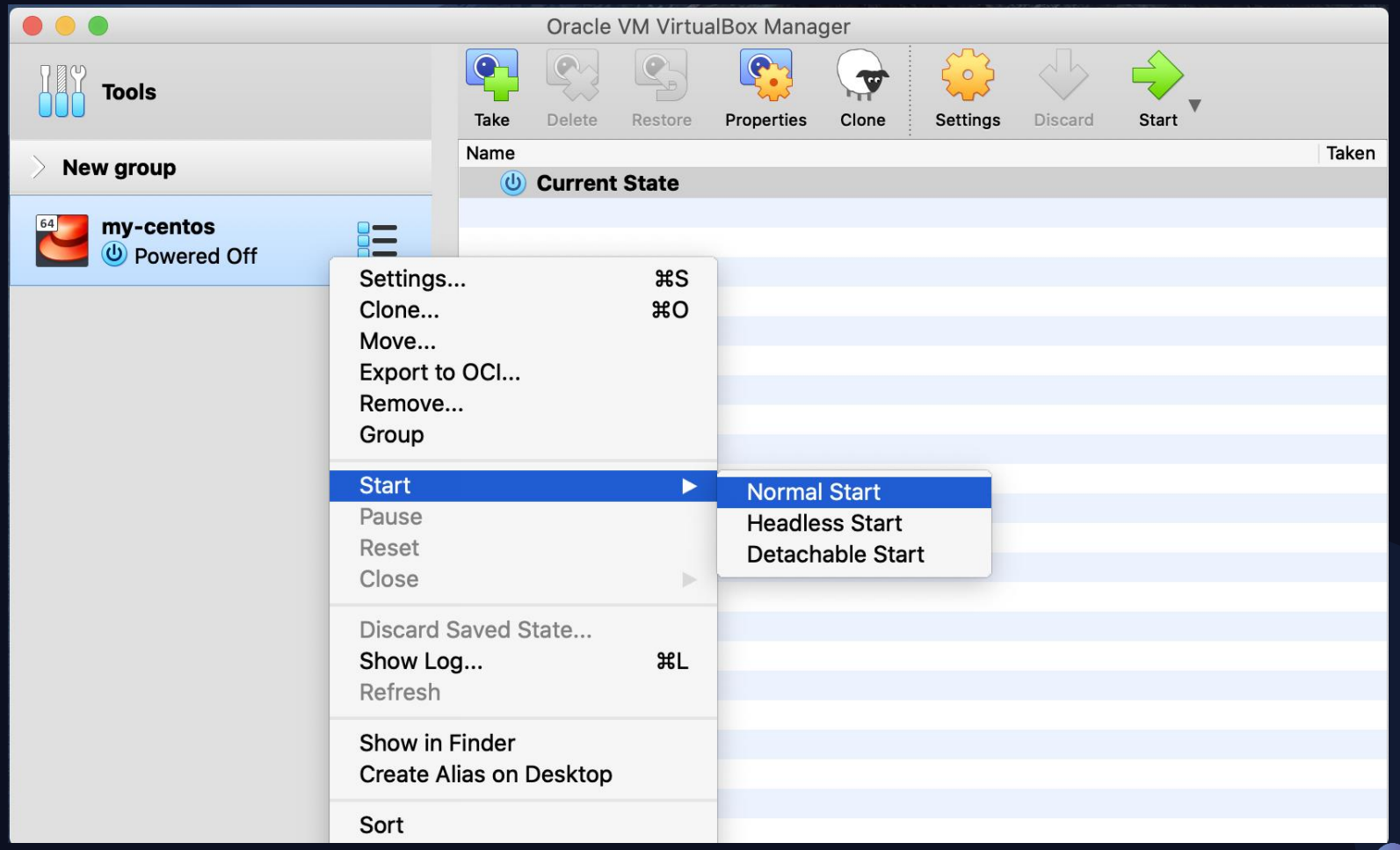
Images

https://www.osboxes.org/

Oracle VirtualBox



Start



Oracle VM VirtualBox Manager
Tools
New group
my-centos
Powered Off
Take
Delete
Restore
Properties
Clone
Settings
Discard
Start
Name
Taken
Current State
Settings... ⌘S
Clone... ⌘O
Move...
Export to OCI...
Remove...
Group
Start
Pause
Reset
Close
Discard Saved State...
Show Log... ⌘L
Refresh
Show in Finder
Create Alias on Desktop
Sort
Normal Start
Headless Start
Detachable Start

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Connectivity

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Frequently Asked Questions

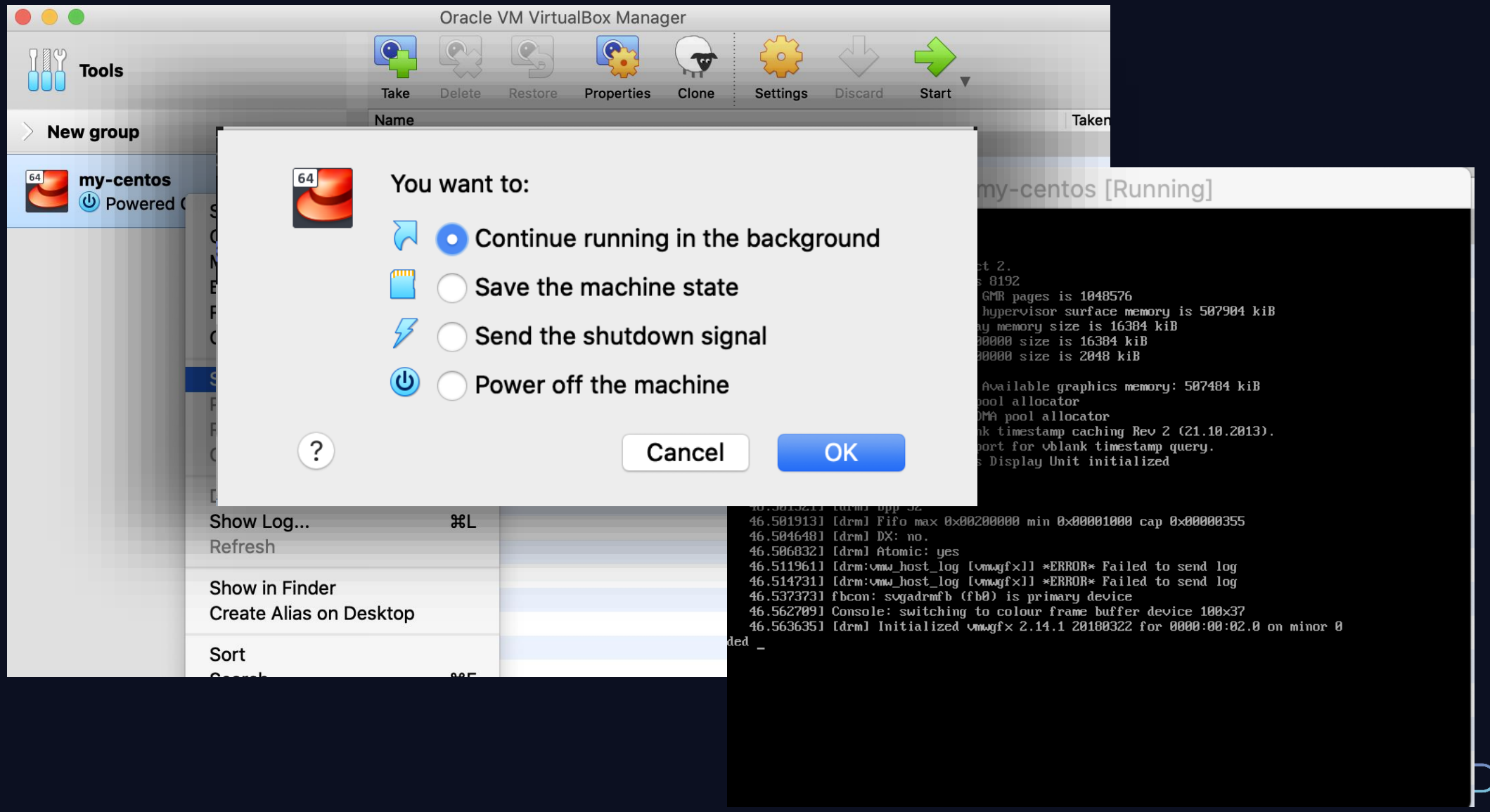
- How do I connect to the VM?
- How do I SSH into my VM?
- Why can’t I access the server on my VM?
- What’s Port mapping?

Guest

Virtual Machine

Host

LAPTOP


Oracle VM VirtualBox Manager
Tools
Take
Delete
Restore
Properties
Clone
Settings
Discard
Start
Name
New group
my-centos
Powered
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
my-centos [Running]
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

Virtual Machine

Guest

Windows

Virtual Machine

Terminal

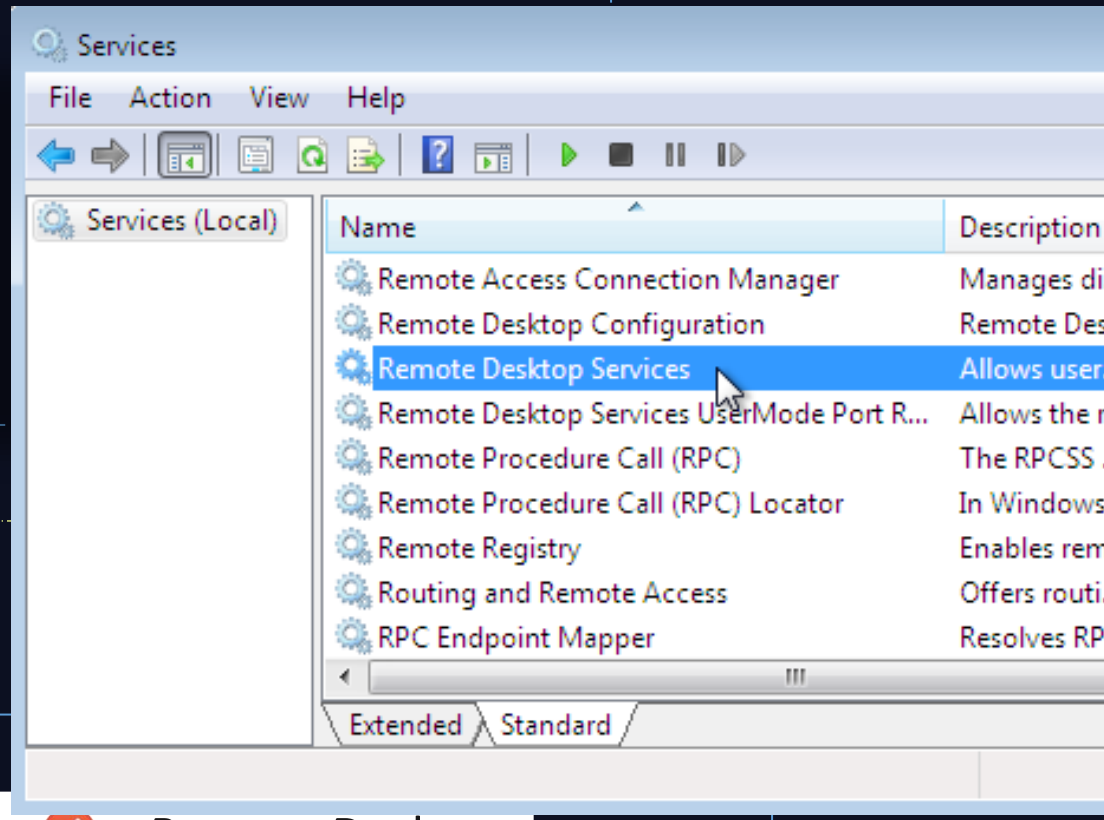
Putty

Remote Desktop

Host

LAPTOP

```
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

Remote Desktop

```
host> ssh 192.168.1.10
```

Host

LAPTOP

MacOS

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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
```

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Networking

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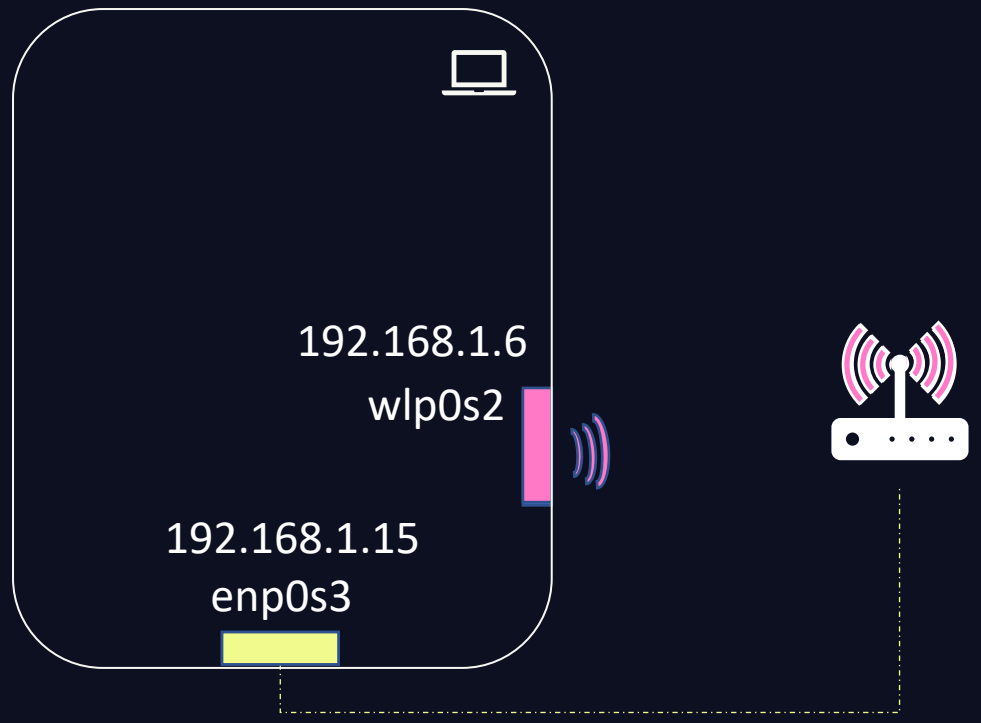
Objectives

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

IP Address

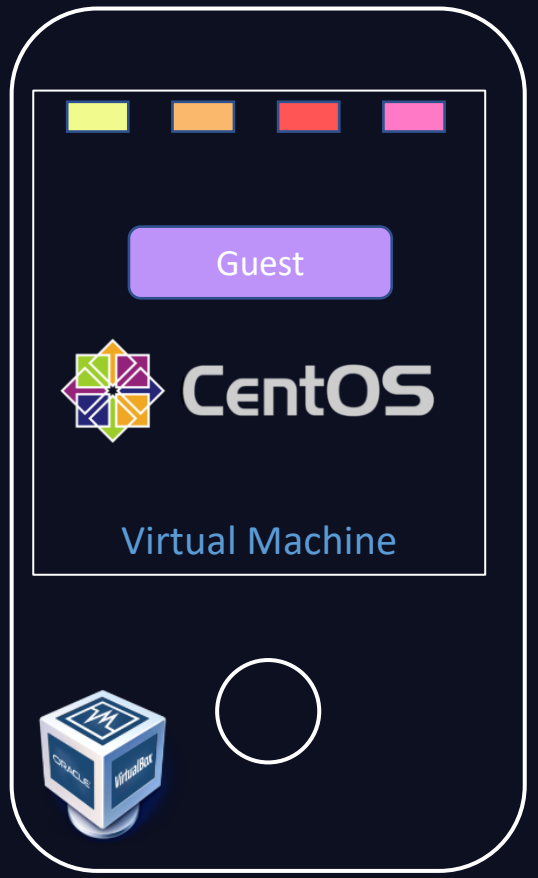


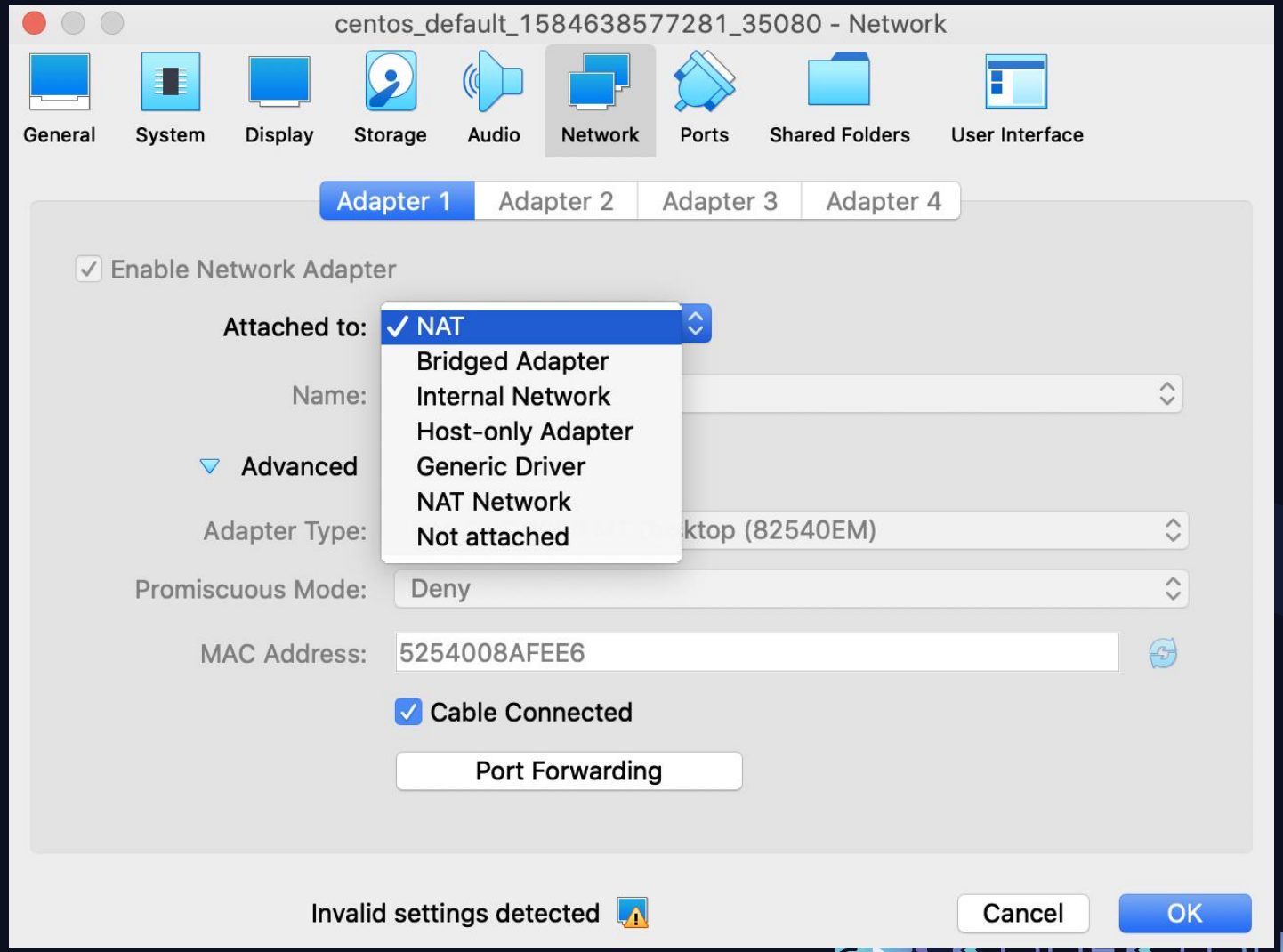

```
ip addr show
```

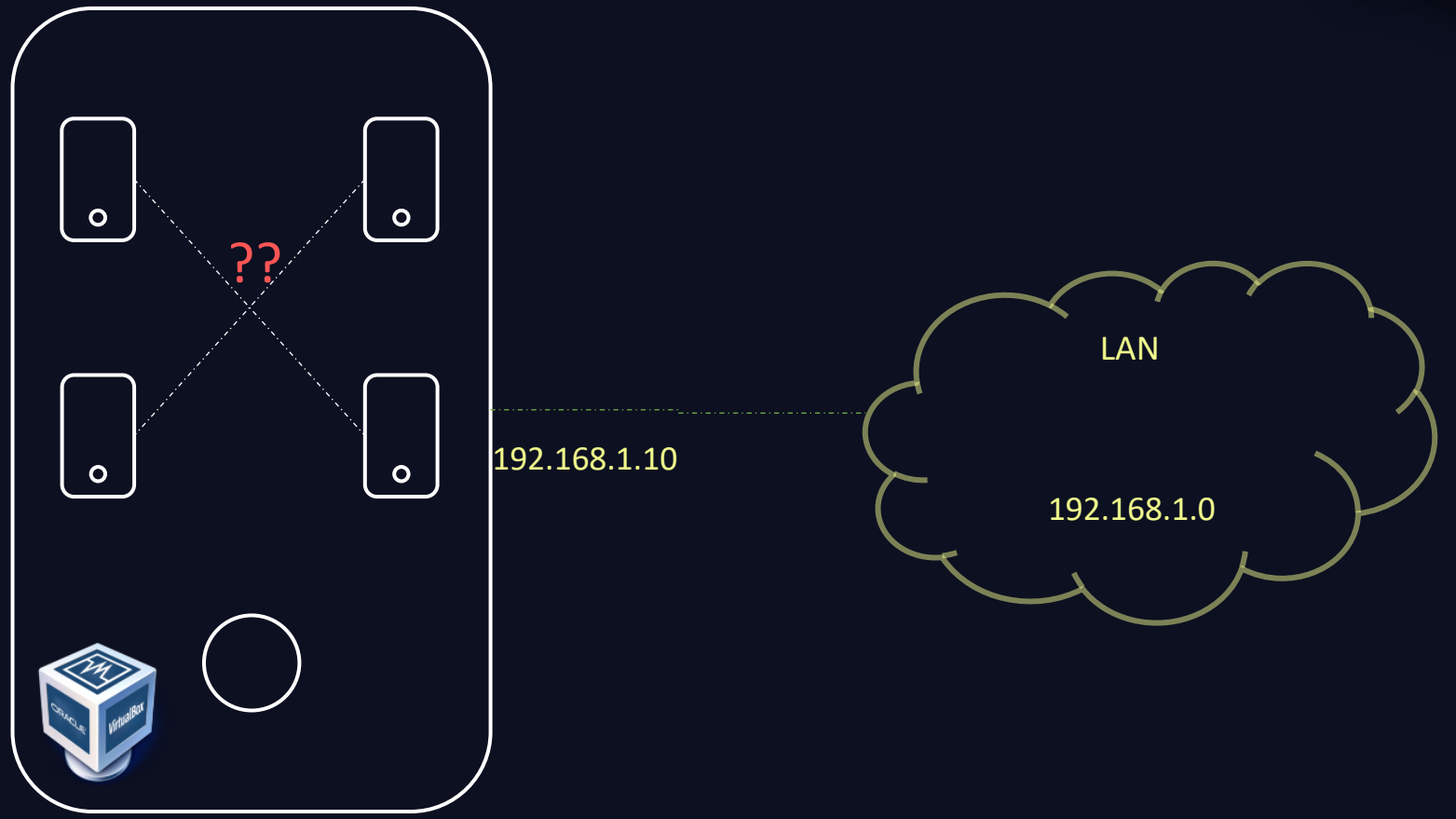
```
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fa
1000
    link/ether 02:0e:0c:9a:00:f0 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.5/24 brd 192.168.1.255 scope global enp0s3

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 192.16810.255 scope global enp0s3
```

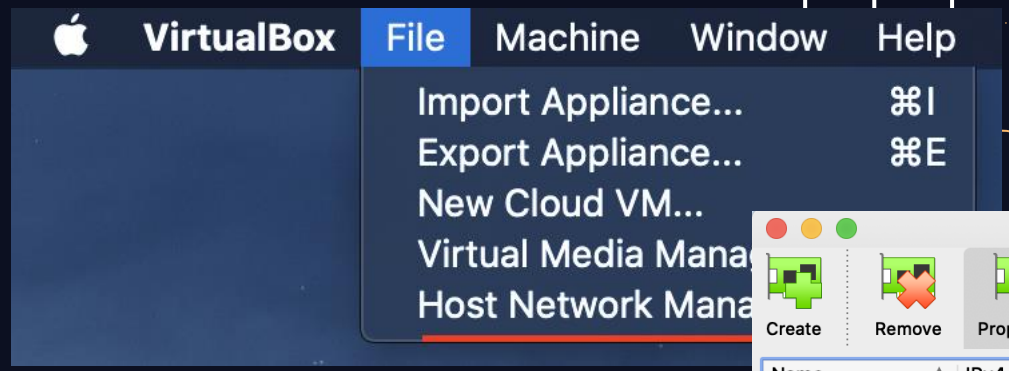
VirtualBox Networking

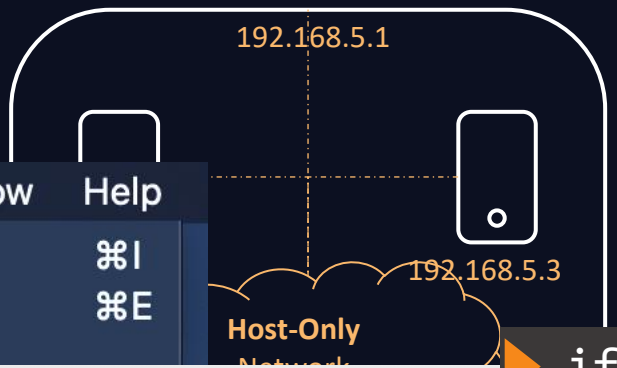


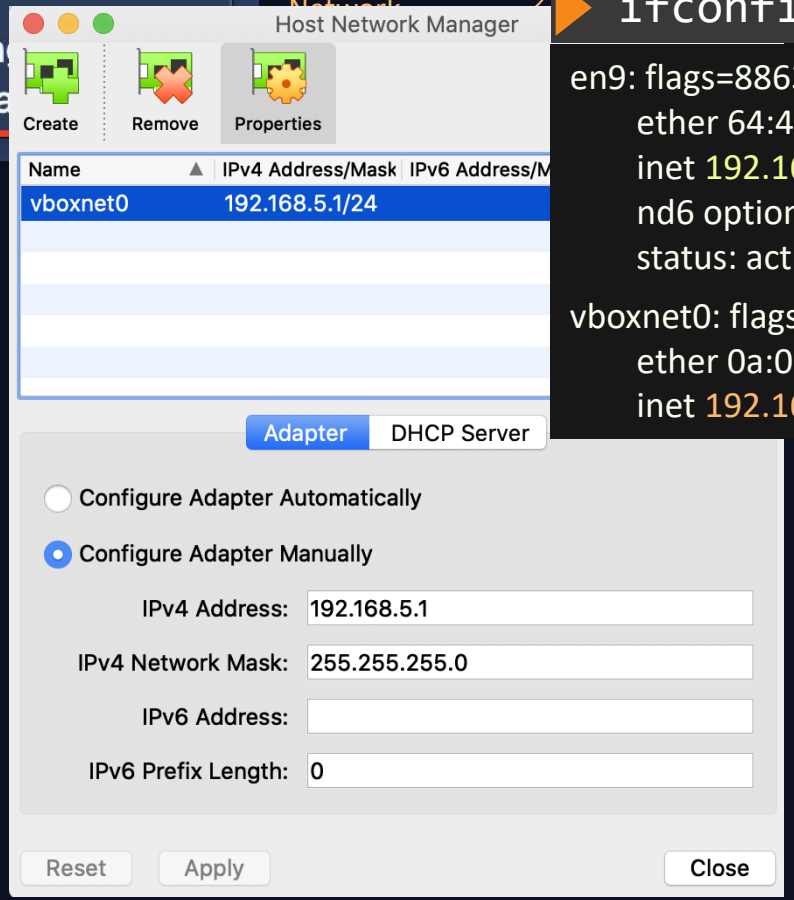



??
192.168.1.10
LAN
192.168.1.0

Host Only







`ifconfig`

```
en9: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mt
        ether 64:4b:f0:20:6a:6b
        inet 192.168.1.10 netmask 0xffffff00 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 0xffffff00 broadcast 192.168.5.255
```

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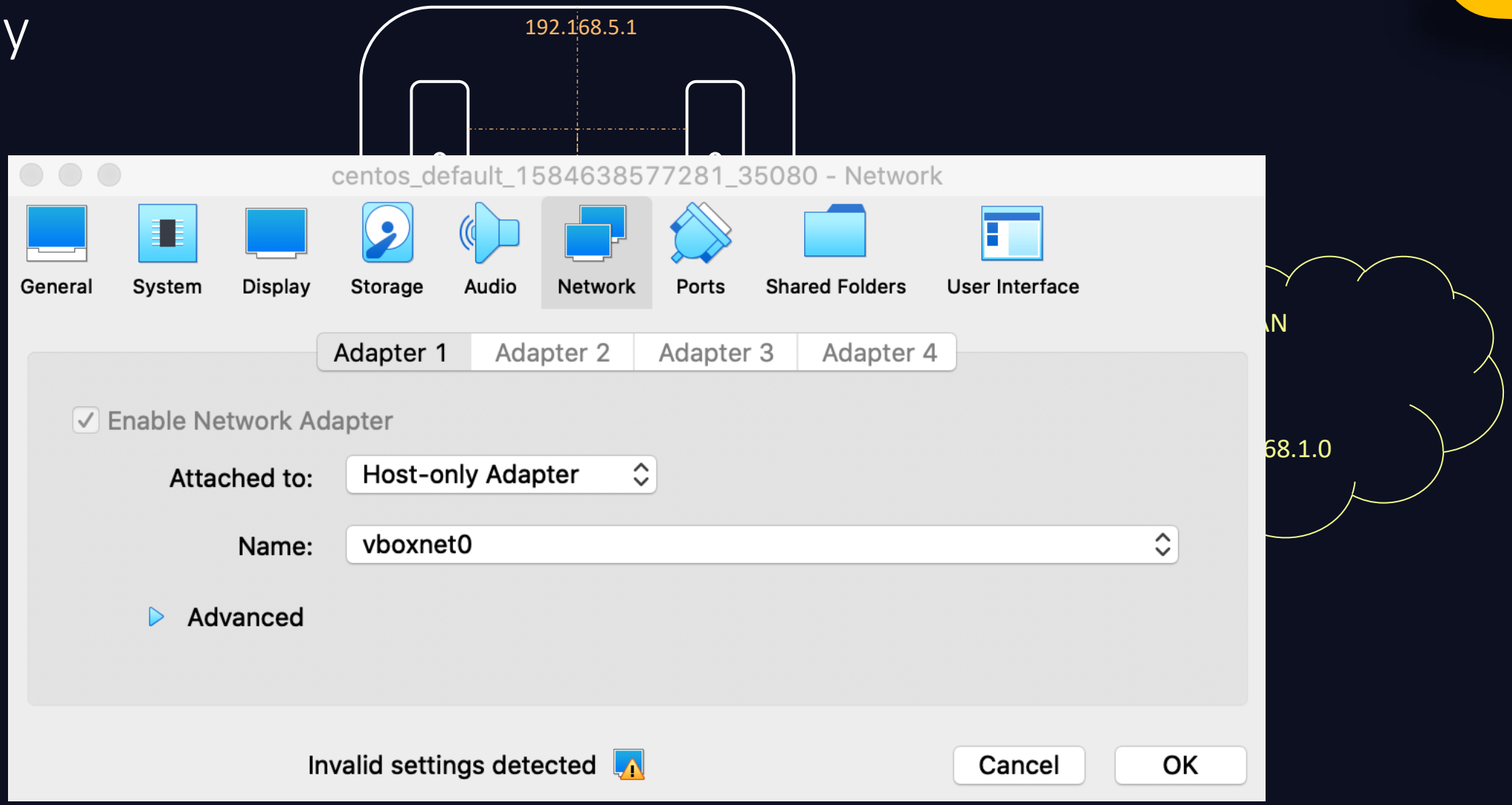
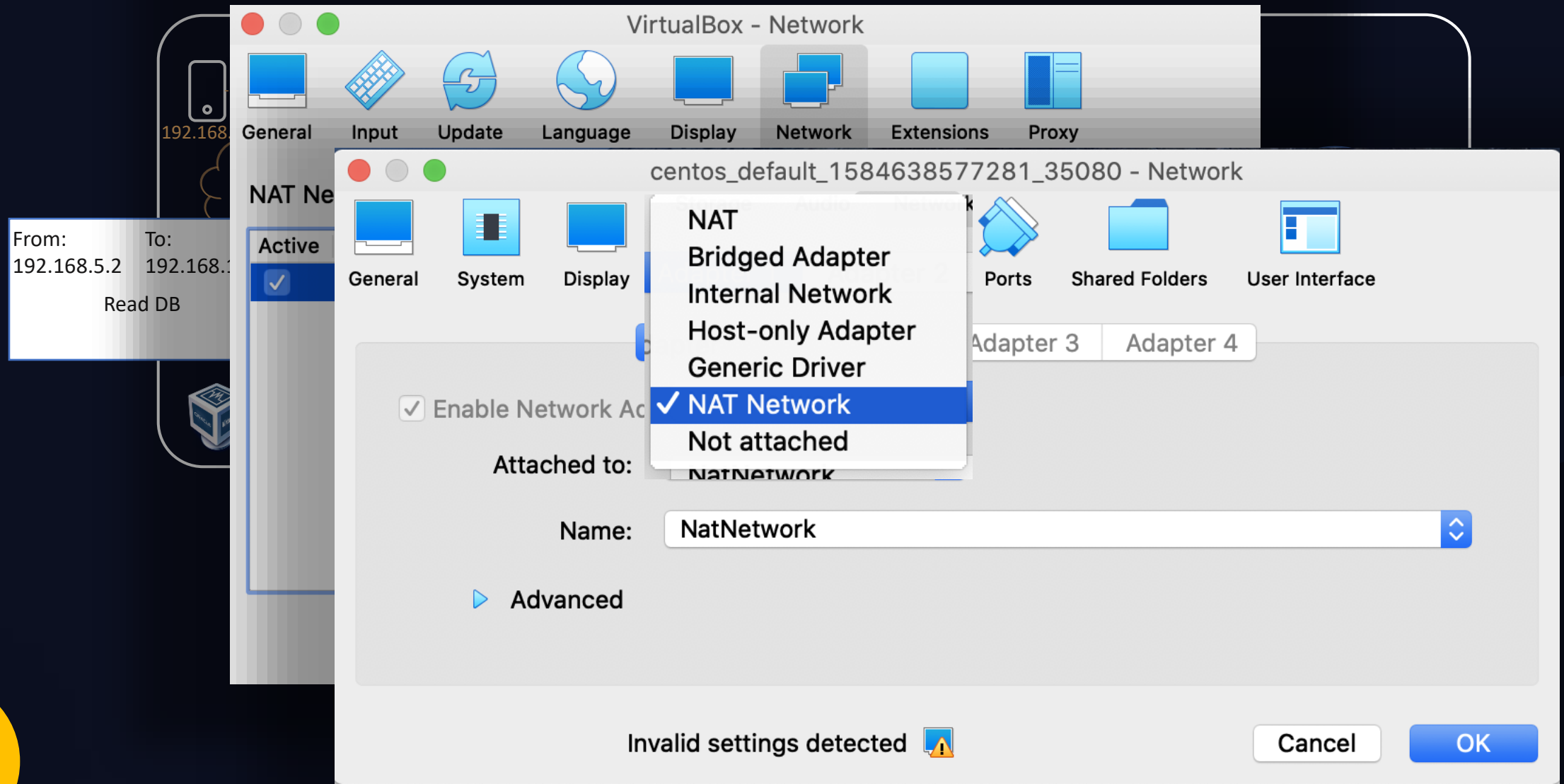
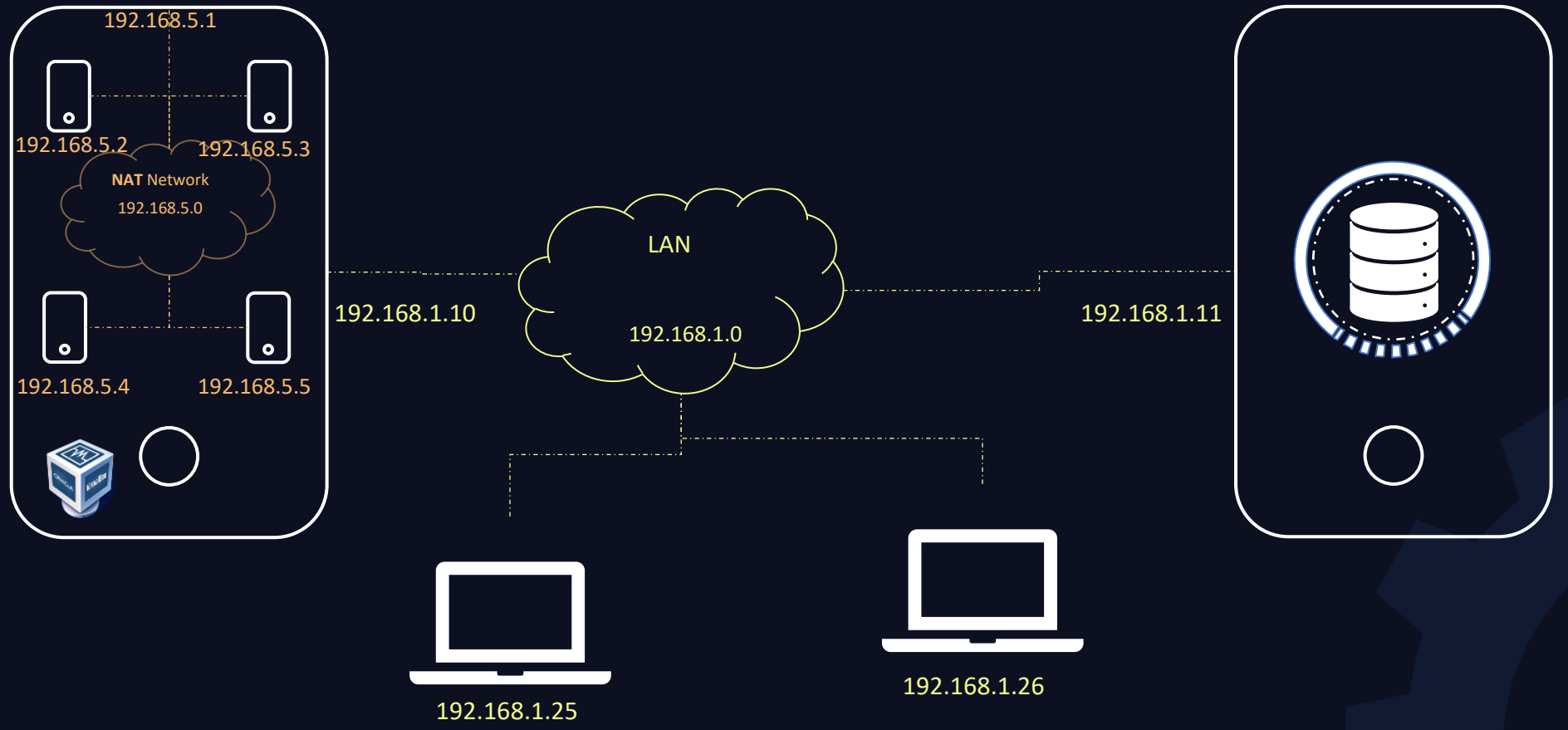
Host Only


192.168.5.1
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
68.1.0

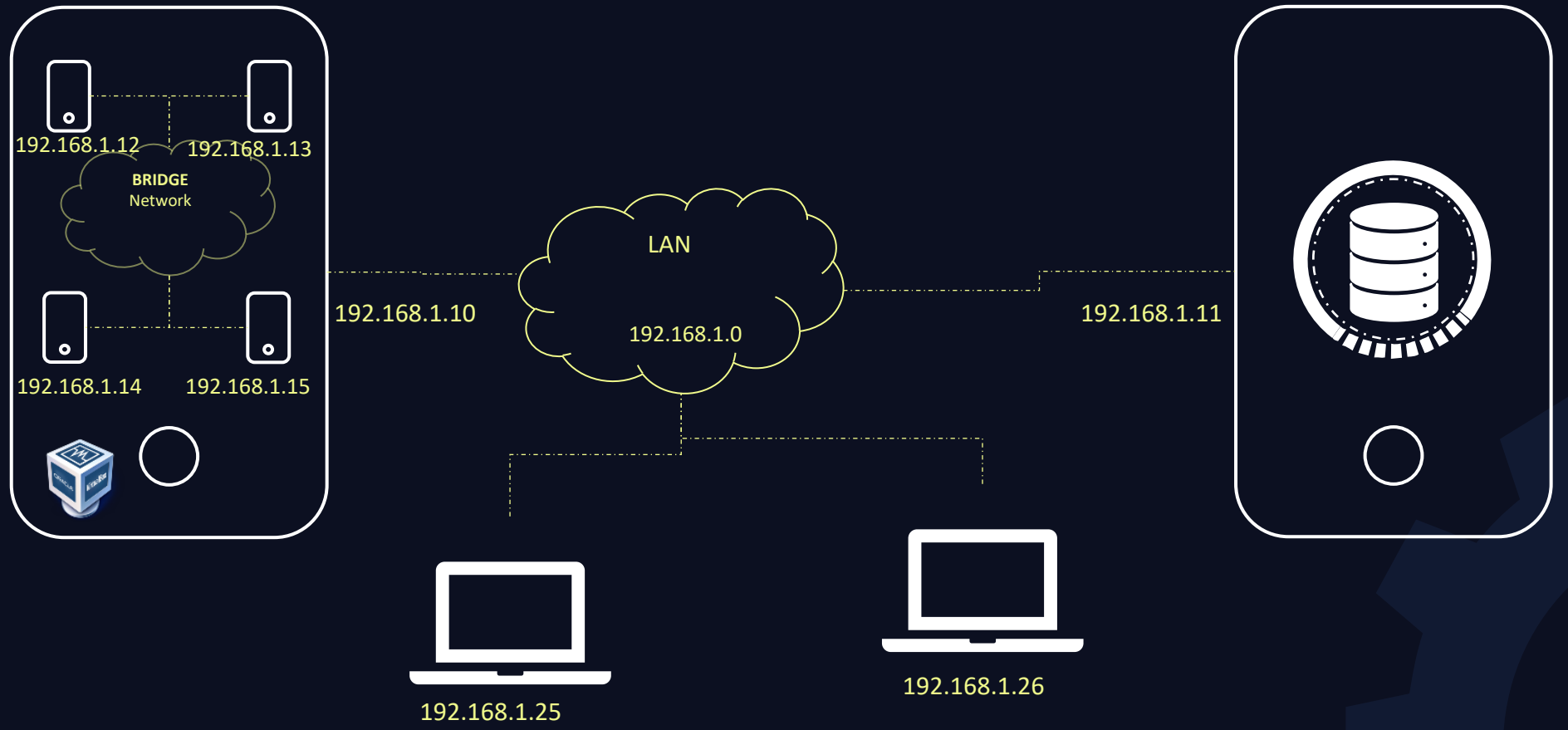
Network Address Translation (NAT) Network



Network Address Translation (NAT)



Bridge Network



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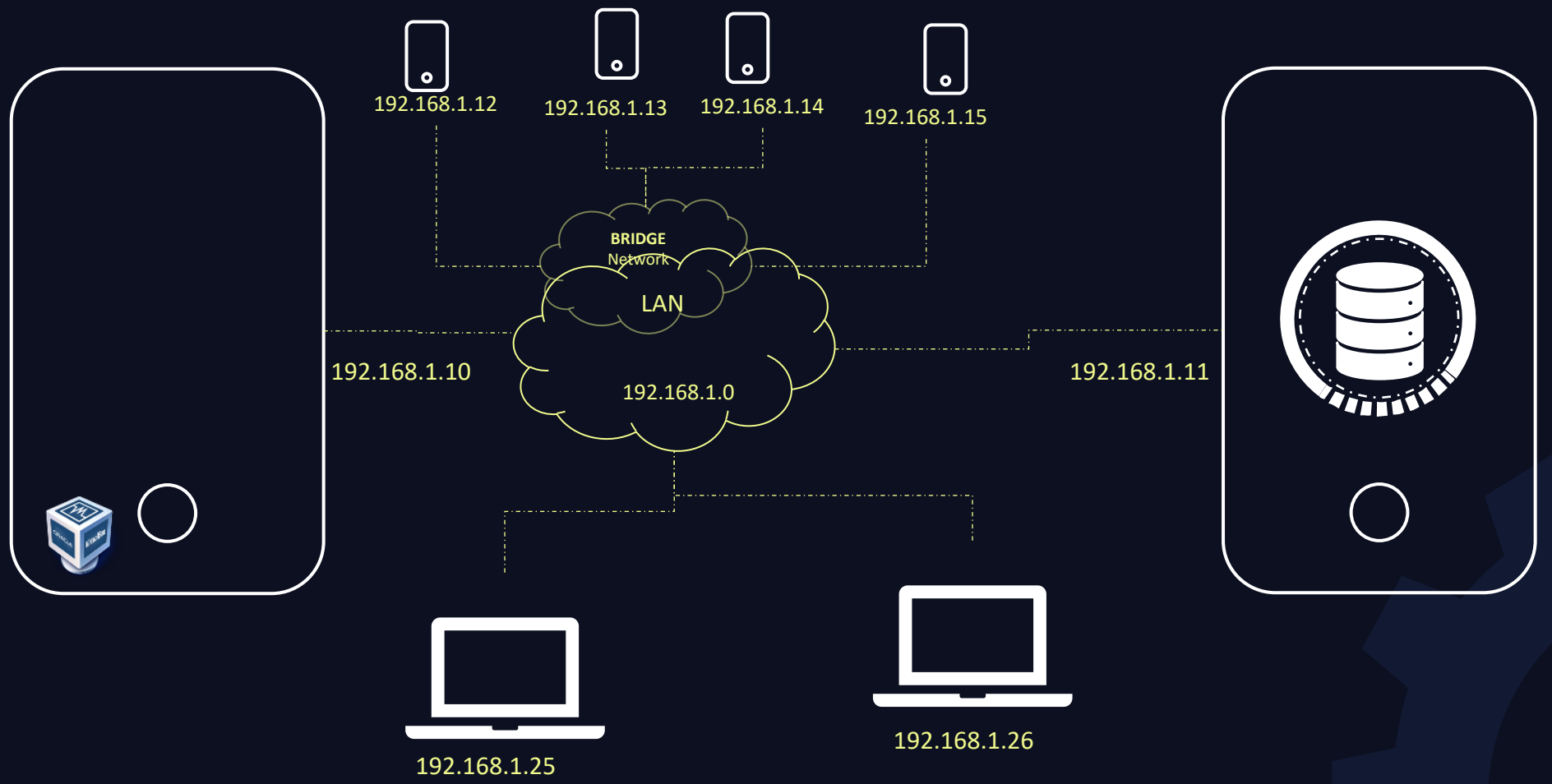
Bridge Network



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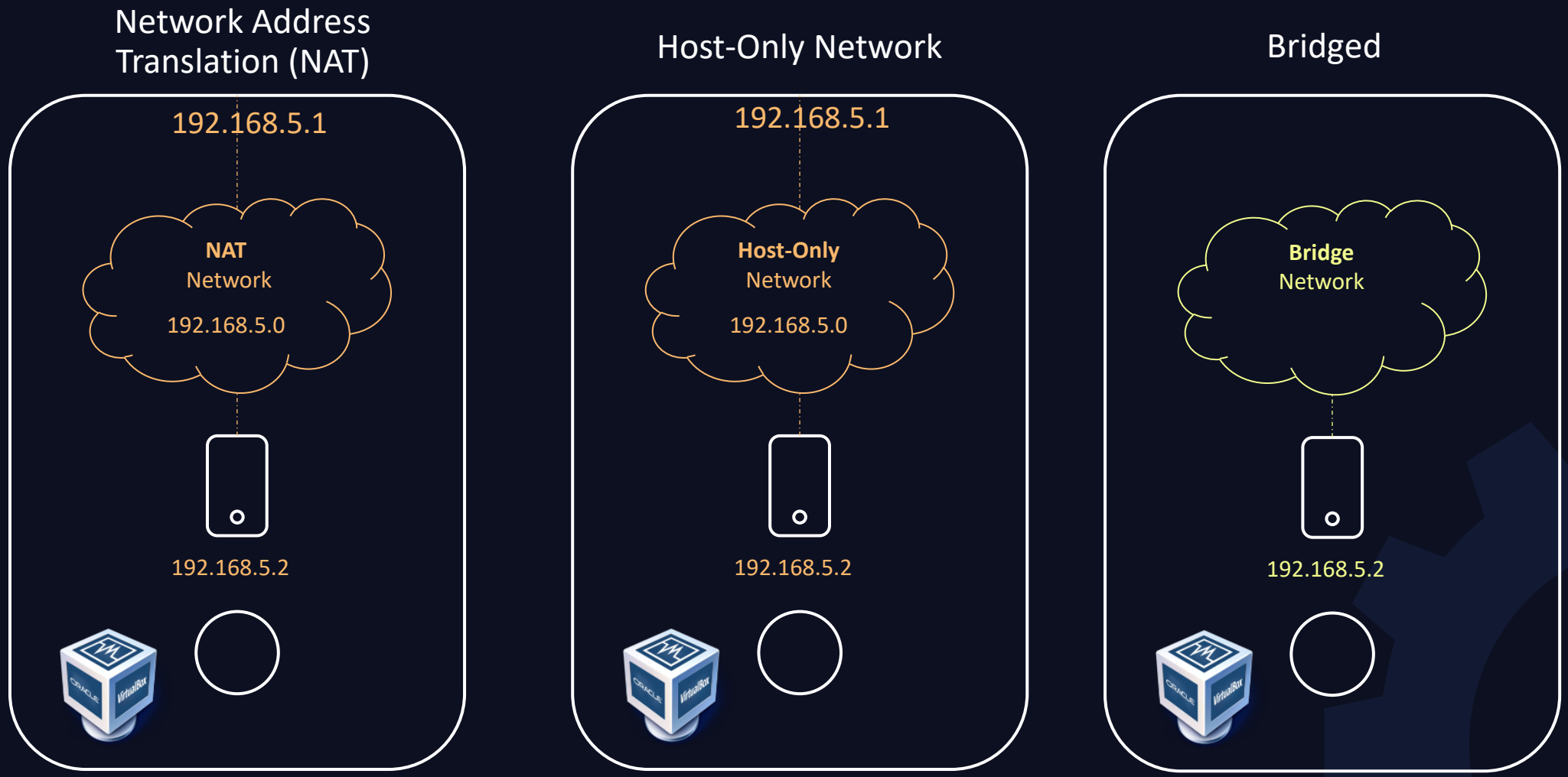
Internet Connectivity



Possible

Possible with IP Forwarding

Possible

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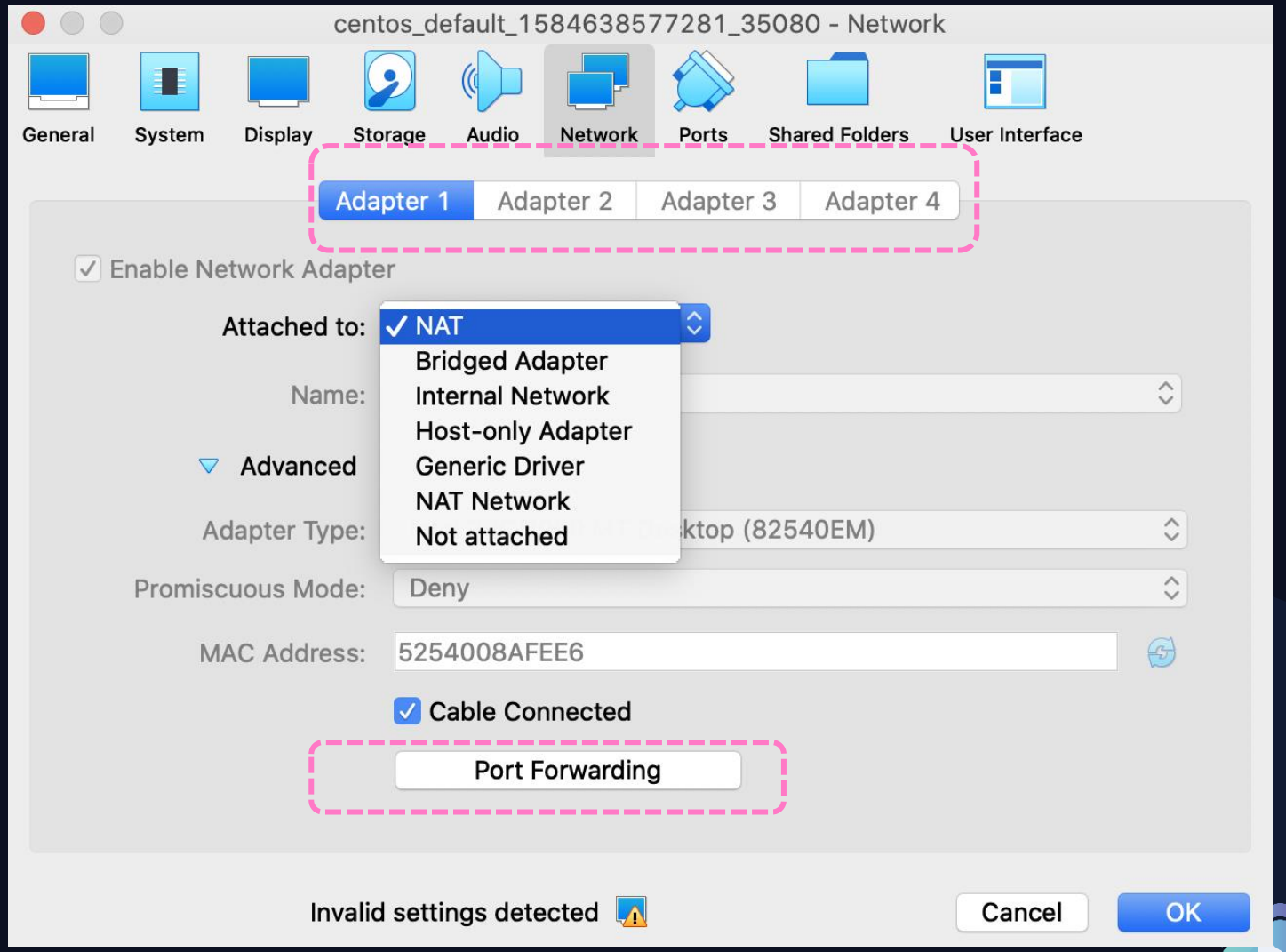
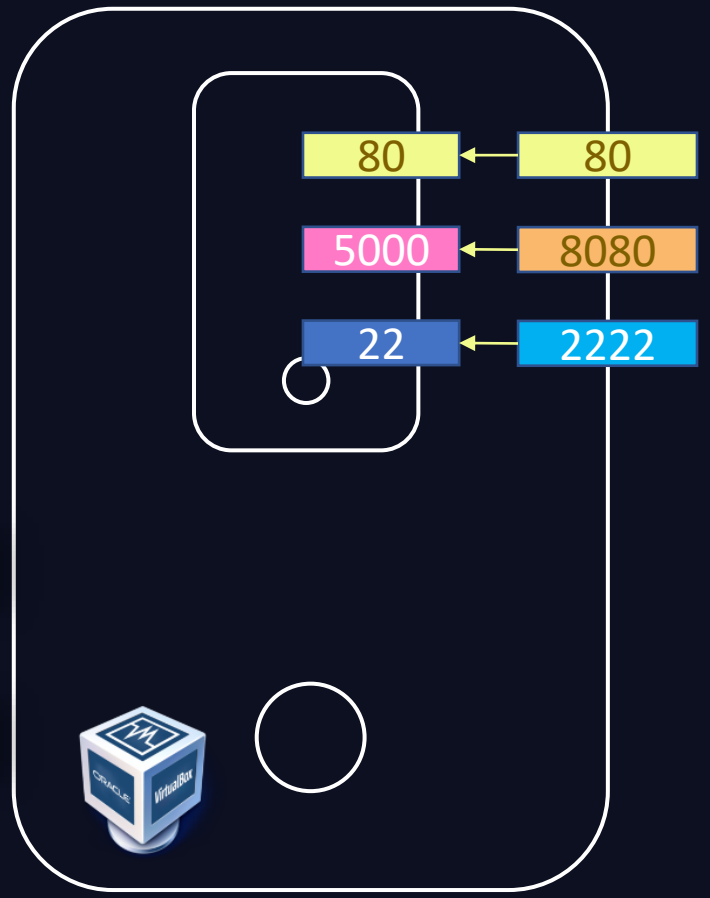
Internet Connectivity



Port Forwarding

Network Address Translation (NAT)




```
host> ssh 192.168.1.10
```

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

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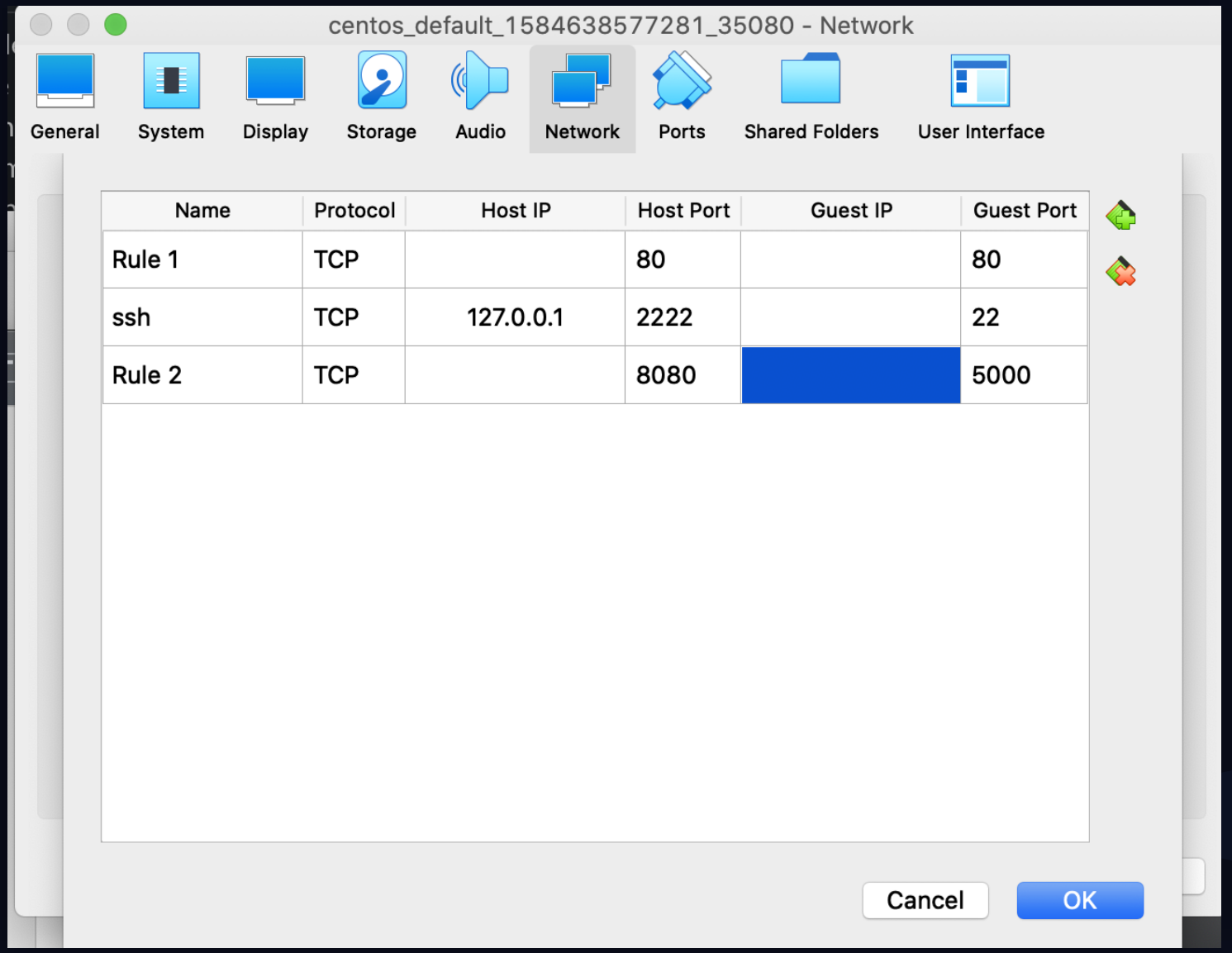
Port Forwarding



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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

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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

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HashiCorp

Vagrant

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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!
```

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Getting started

https://www.vagrantup.com/

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HashiCorp Vagrant Cloud

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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...

https://app.vagrantup.com/boxes

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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 ~]$
```

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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
```

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Vagrant Providers

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

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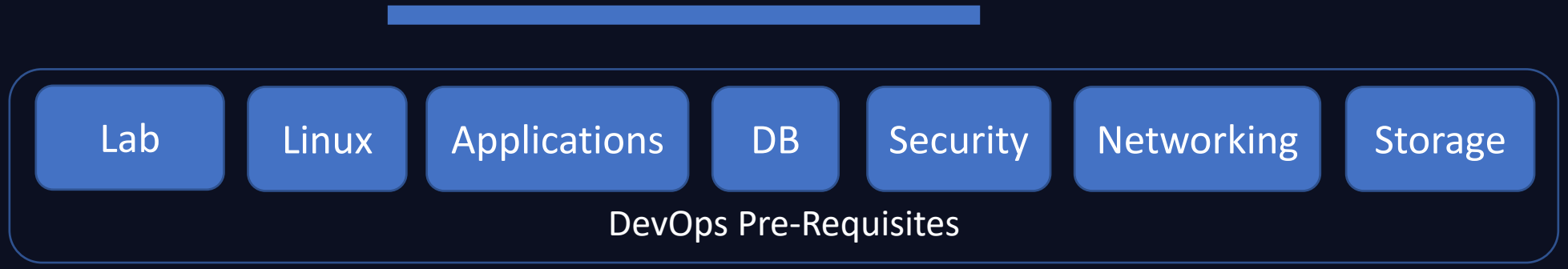
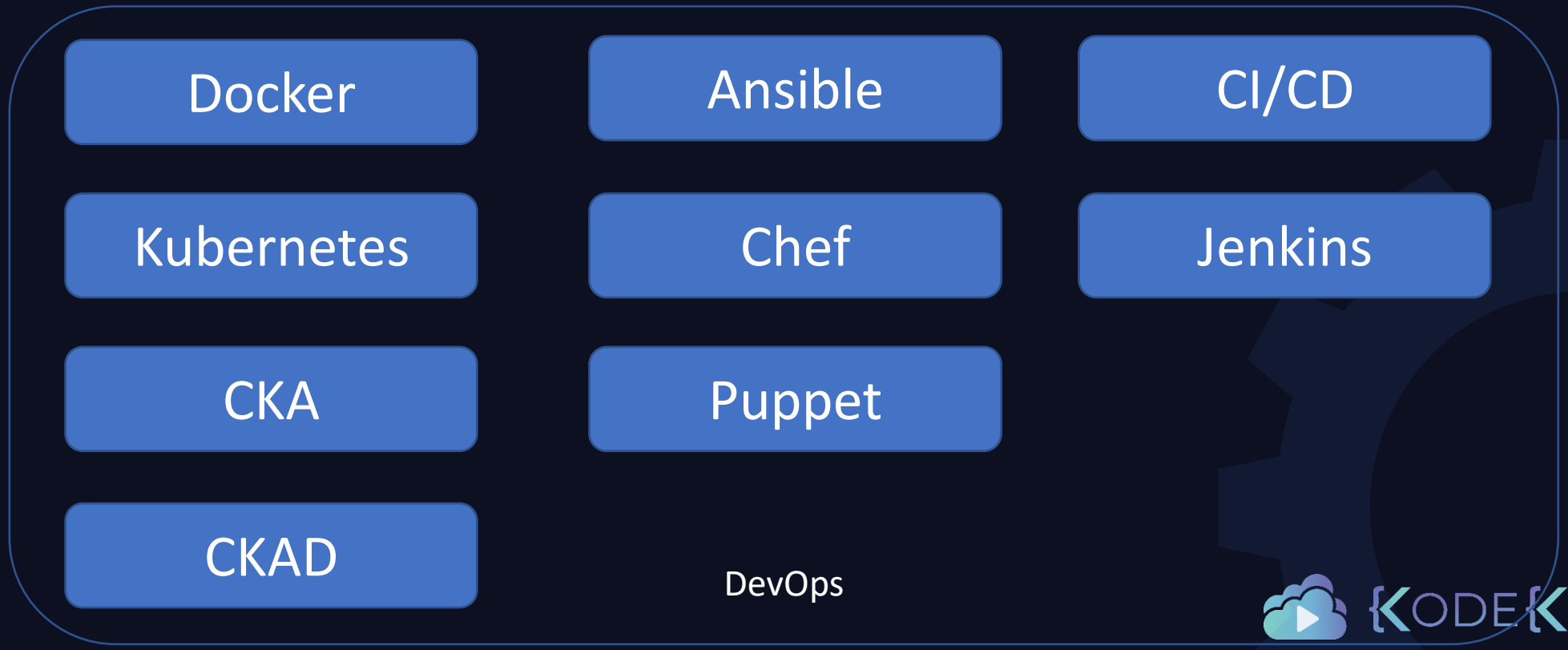
Review


Lab
Linux
Applications
DB
Security
Networking
Storage
DevOps Pre-Requisites


Docker
Ansible
CI/CD
Kubernetes
Chef
Jenkins
CKA
Puppet
CKAD
DevOps

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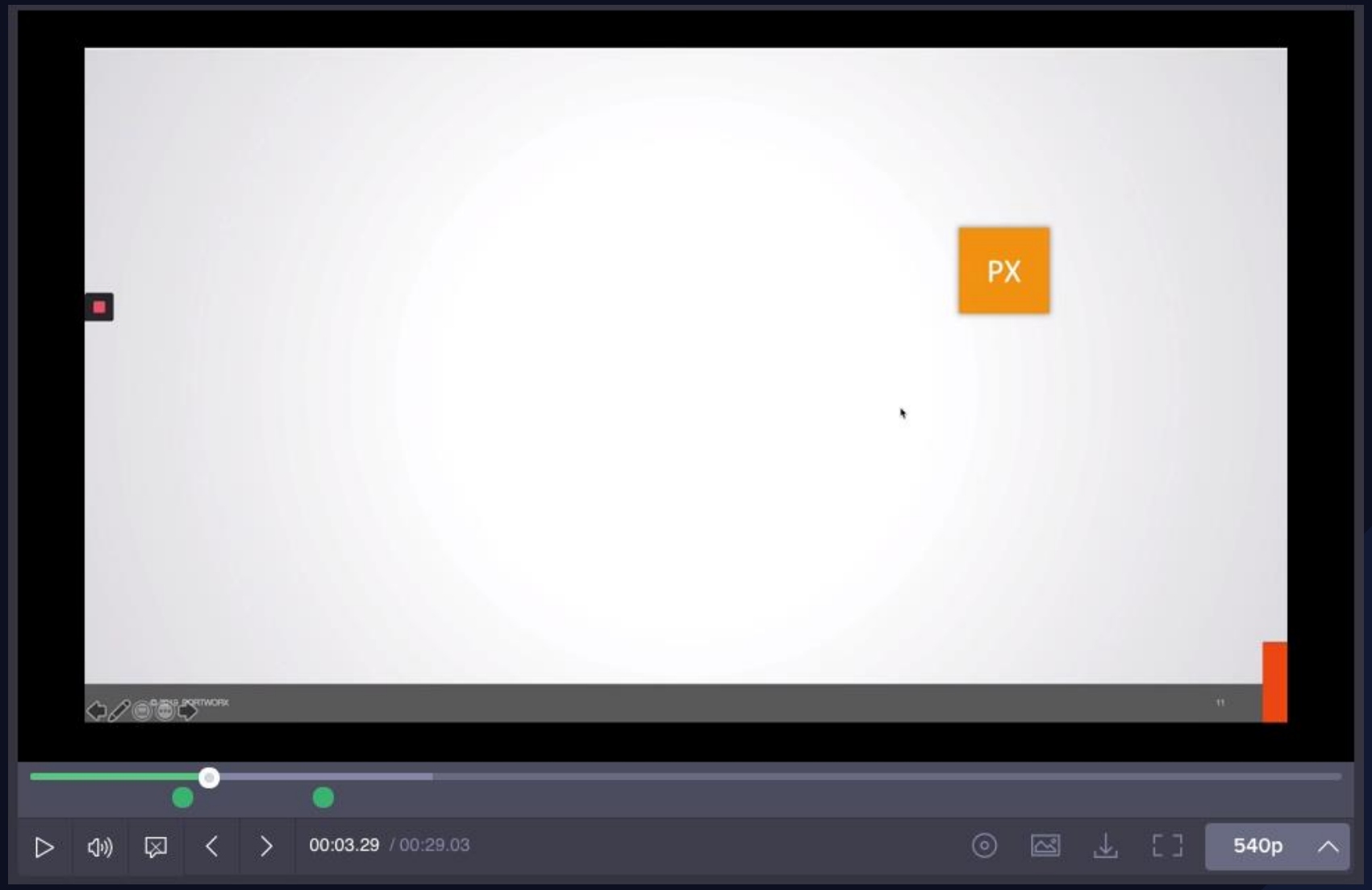
What to test

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

KODEKLOUD

How to Review



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just enough

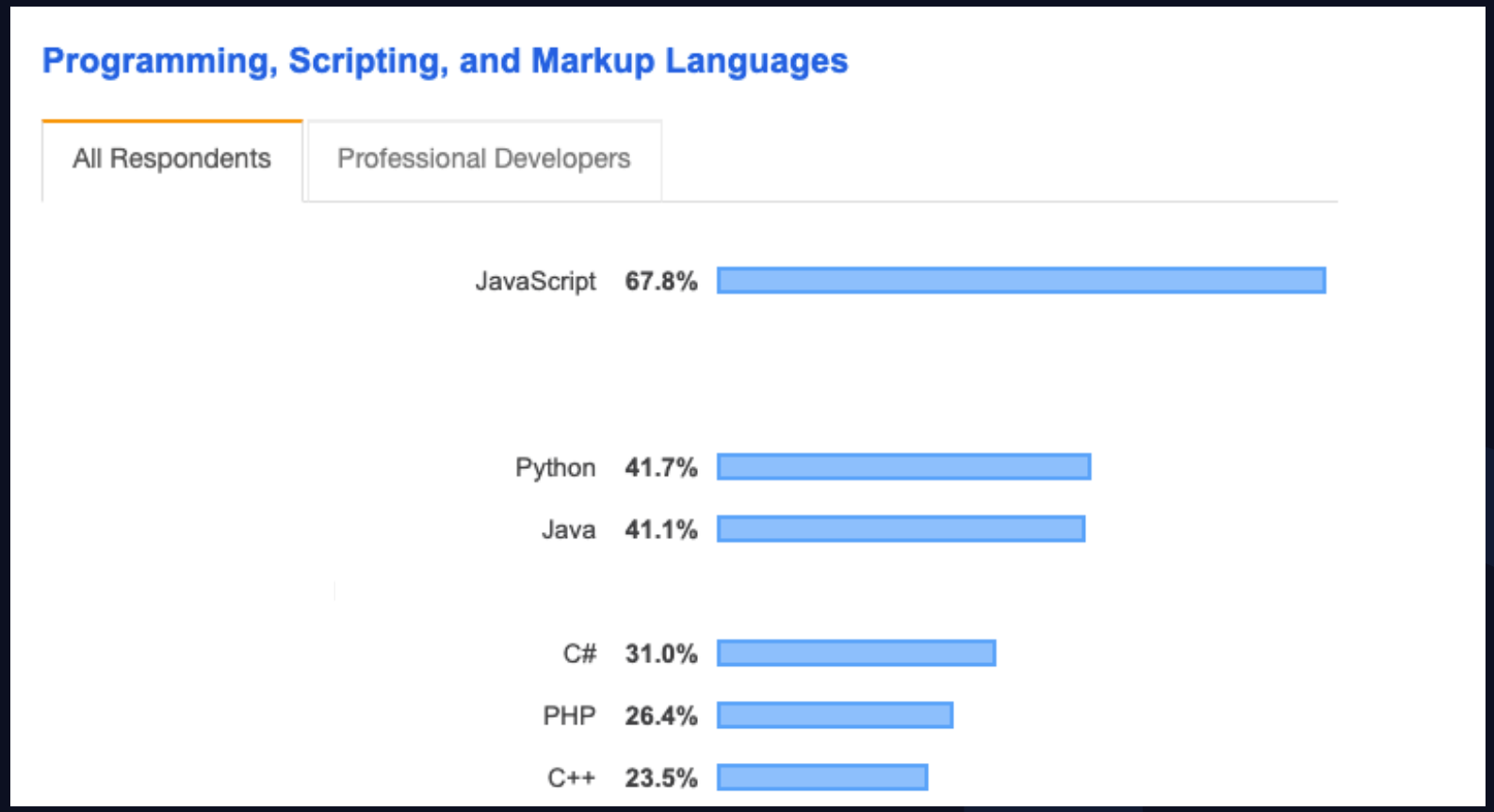
Applications

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



https://insights.stackoverflow.com/survey/2019#technology

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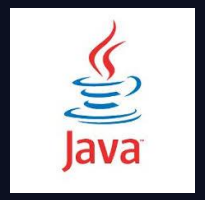
Types

Compiled	Interpreted



C

C++

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Compiled

1. Develop Source Code

MyClass.java

```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
```

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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
```

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Code

main.py

```python
def print_message():
    print("Hello World")


if __name__ == '__main__':
    print_message()
```

Compiler

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

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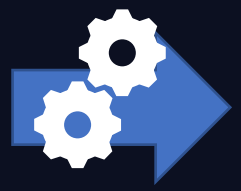
Code

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

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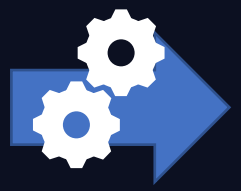
Virtual Machine



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
```

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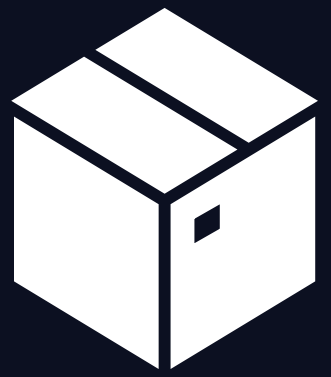
Packages/Modules/Libraries

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



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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

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Introduction

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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

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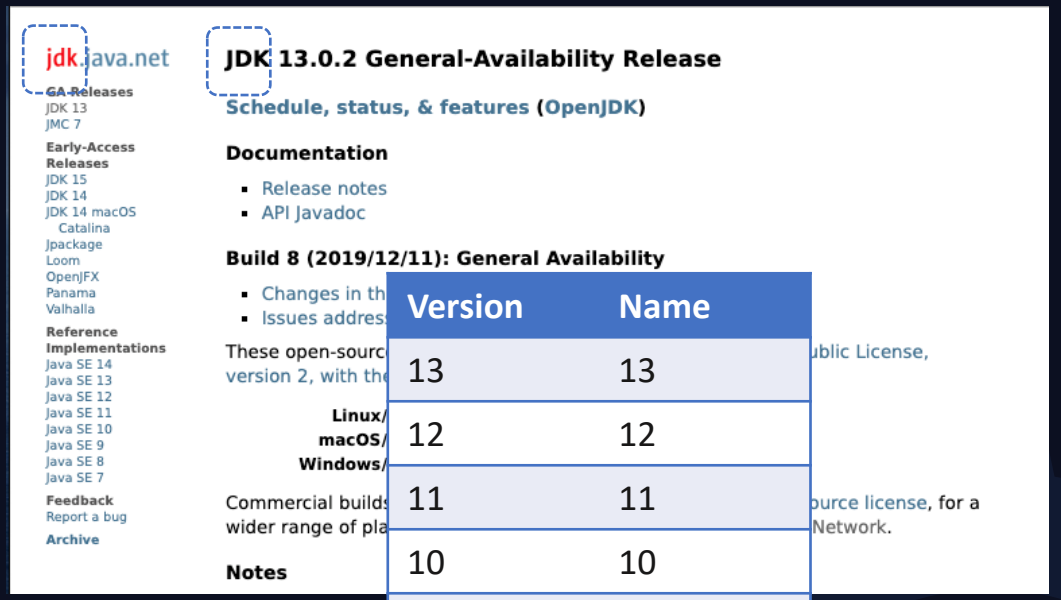
Install Java

```
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)
```



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

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

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Java Development Kit (JDK)

Develop	Build	Run
jdb	javac	JRE
javadoc	jar	(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

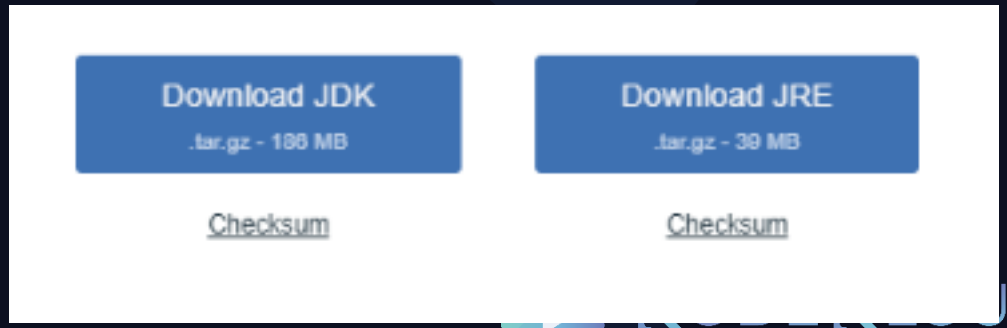
- javac
- jar

Run

- java

JRE

(Java Runtime Environment)



After v9

Java Development Kit (JDK)
Develop
jdb
javadoc
Build
javac
jar
Run
JRE
(Java Runtime Environment)
java

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Build

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Compile

1. Develop Source Code

MyClass.java

```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
```

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Compile

MyClass.java

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

Compiler

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

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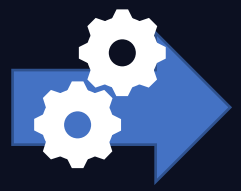
Java Virtual Machine

MyClass.java

```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

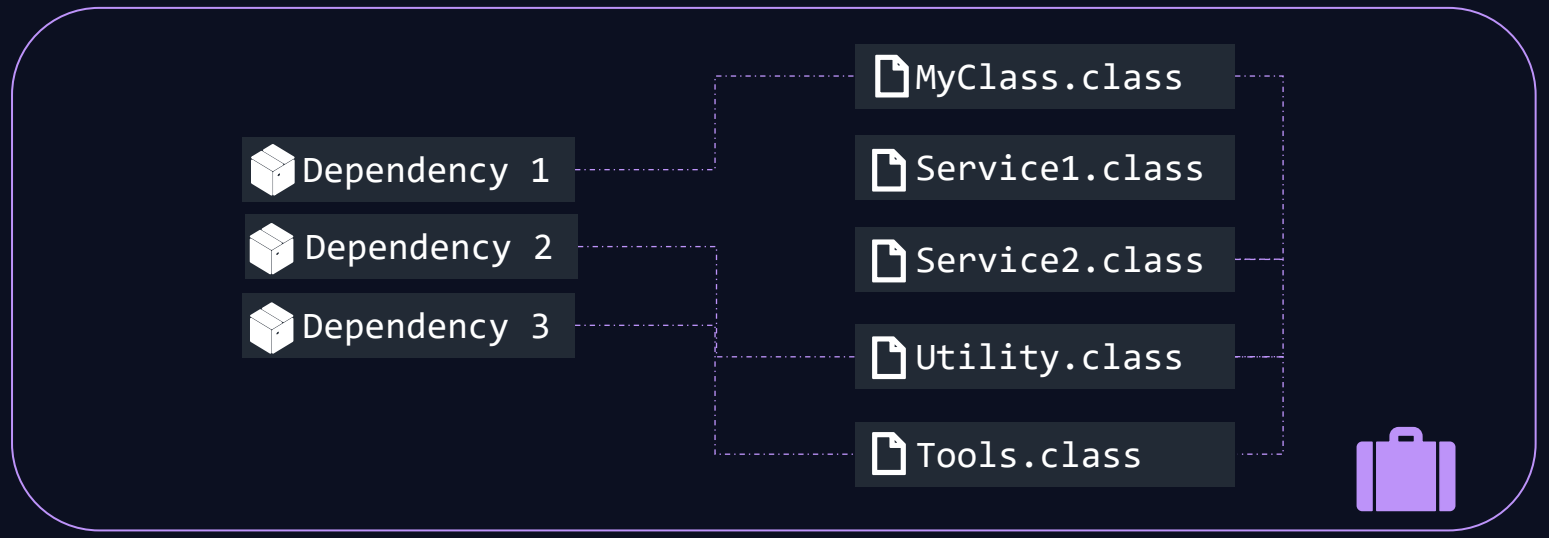
Intermediary Byte Code

Machine Readable Machine Code

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

```
java MyClass
Hello World
```

Package



Java Archive
(JAR)

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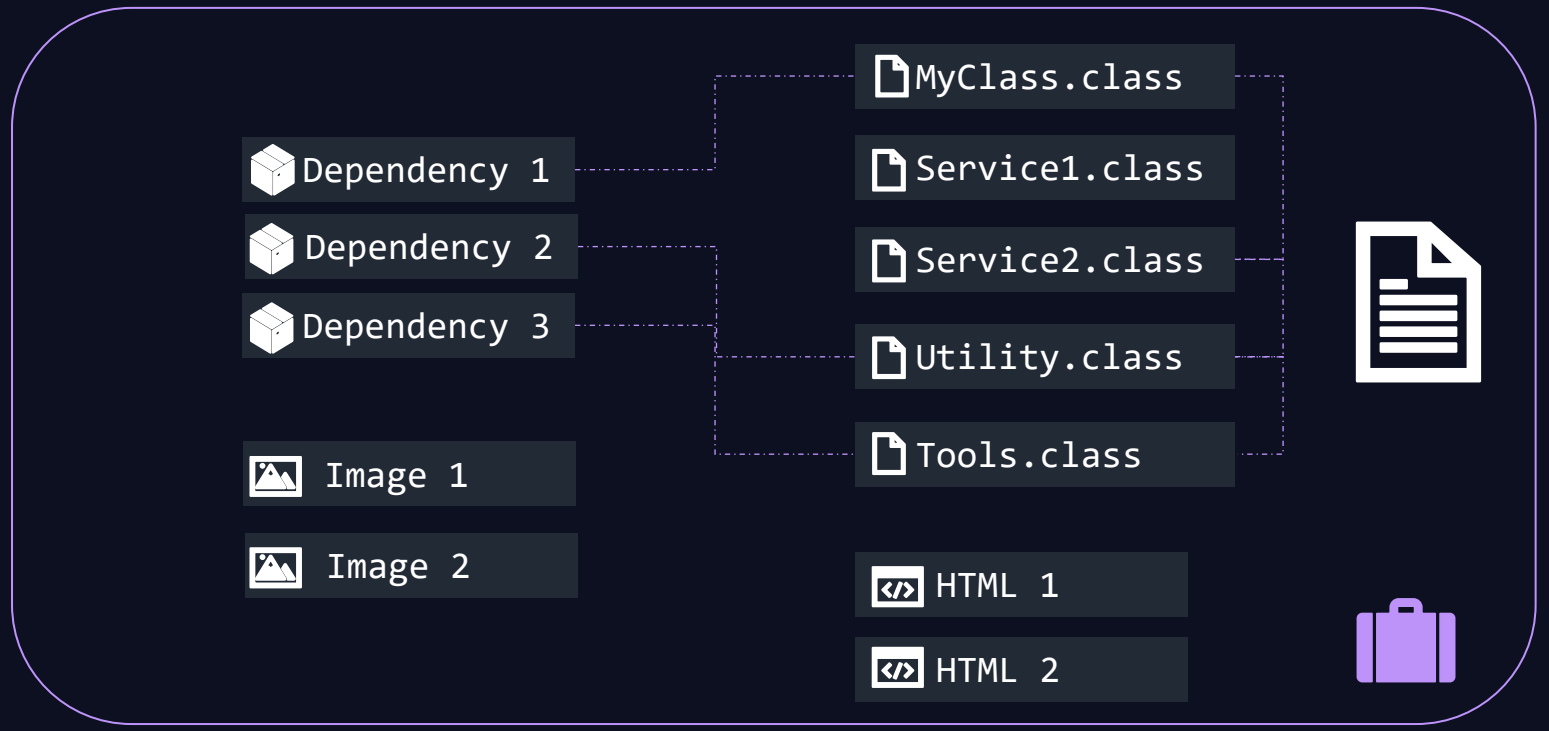
Package



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
```

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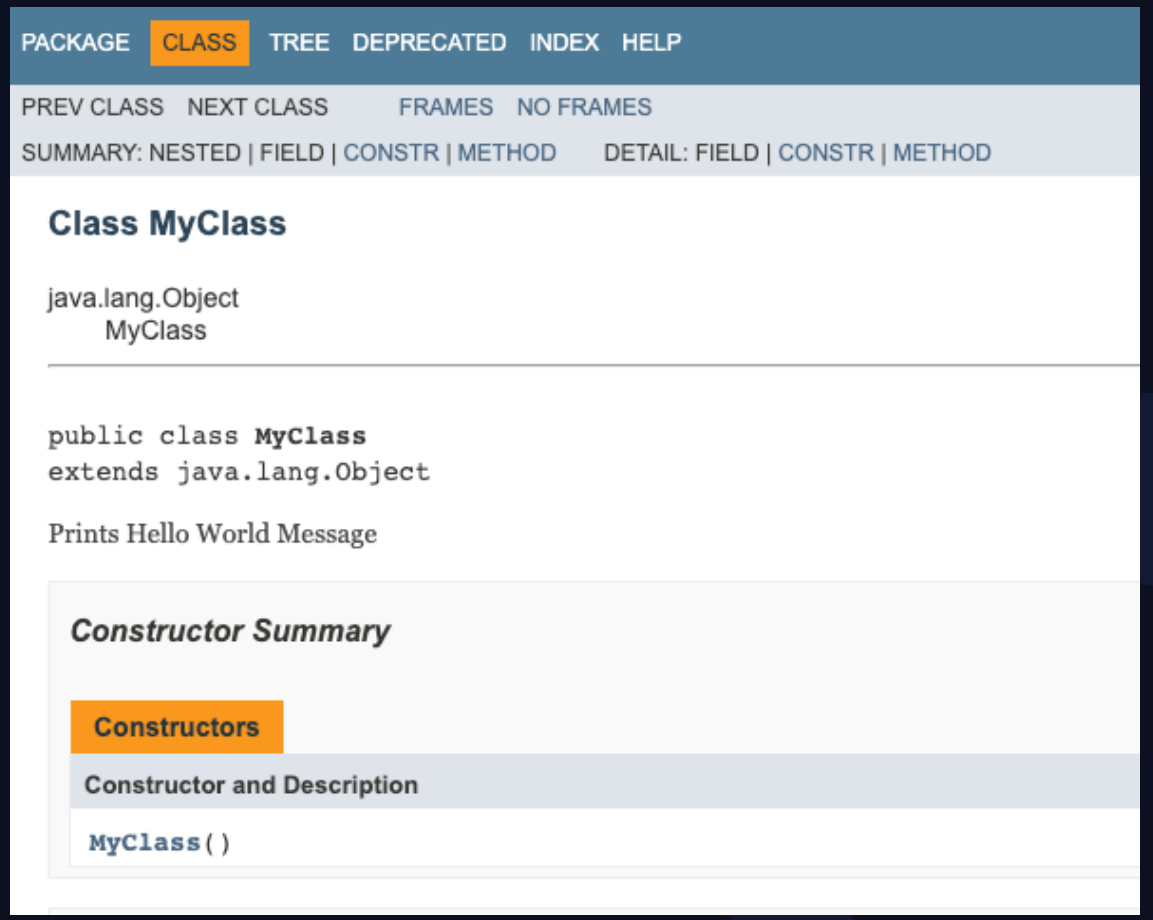
Document

```
javadoc -d doc MyClass.java
```



PACKAGE CLASS TREE DEPRECATED INDEX HELP

PREV CLASS NEXT CLASS FRAMES NO FRAMES

SUMMARY: NESTED | FIELD | CONSTR | METHOD DETAIL: FIELD | CONSTR | METHOD

Class MyClass

java.lang.Object
MyClass

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

Prints Hello World Message

Constructor Summary

Constructors

Constructor and Description
`MyClass()`

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Build Process

Develop

Compile

Package

Document

```
javac MyClass.java
```

```
jar cf MyClass.jar ..
```

```
javadoc MyClass.java
```

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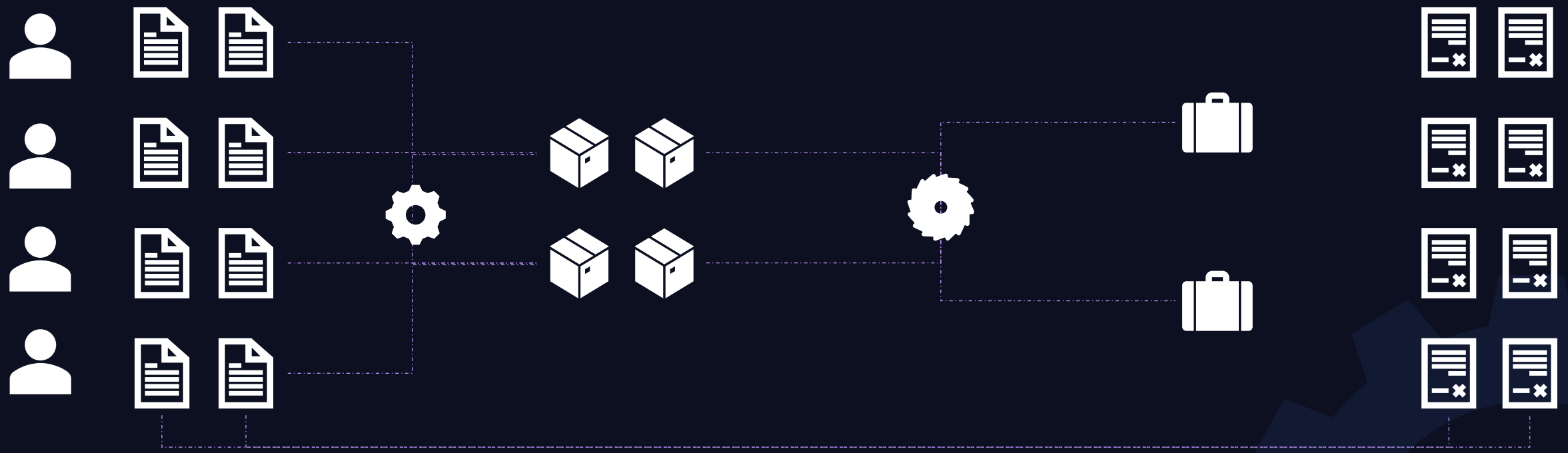
Build Process



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Build Tools

- Maven
- Gradle
- ANT

```
# Build Steps

1.Compile

2.Package

3.Document
```

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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`

https://github.com/arun-gupta/docker-java-sample

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Summary

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

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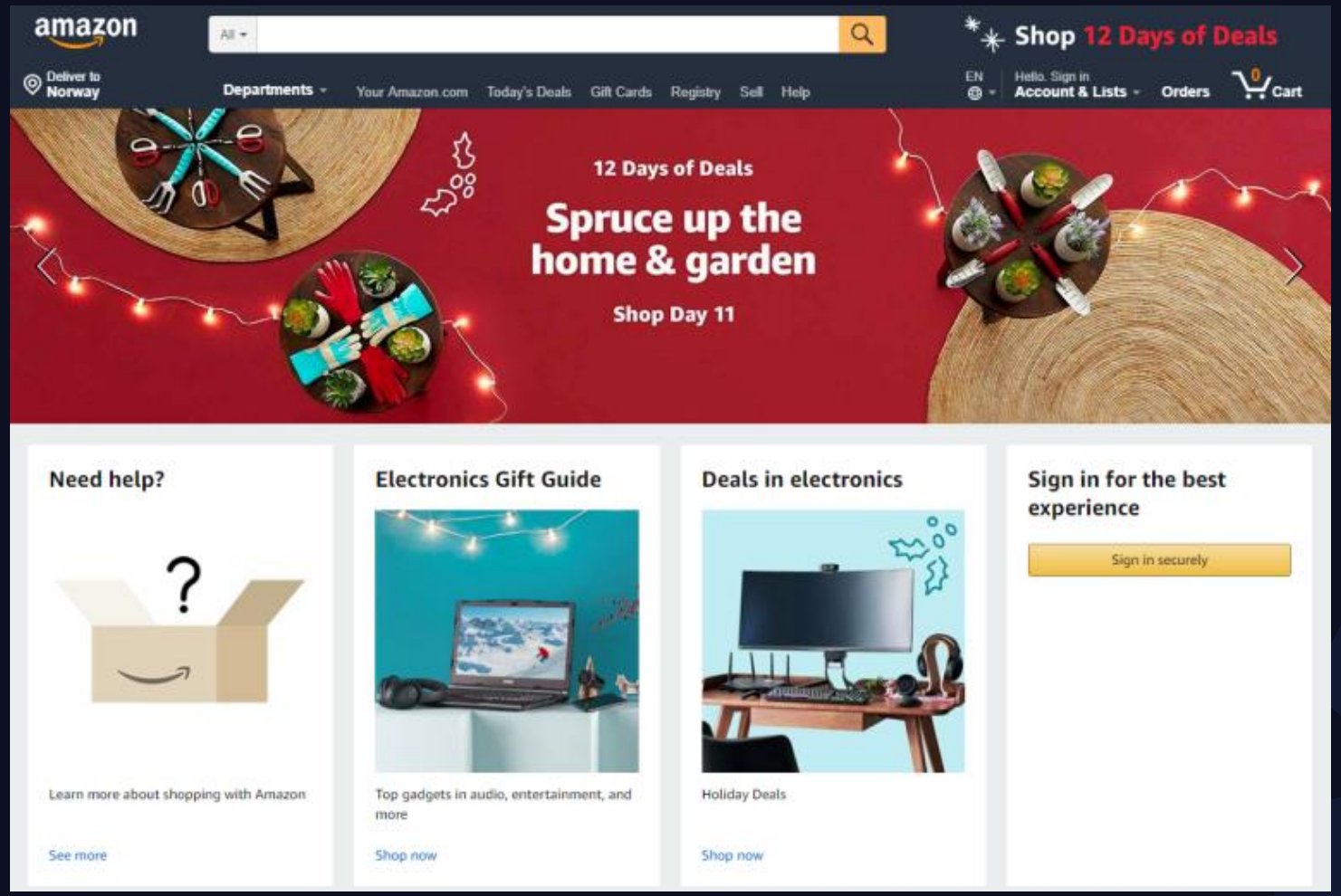
JavaScript



https://enonic.com/blog/websites-past-and-present

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

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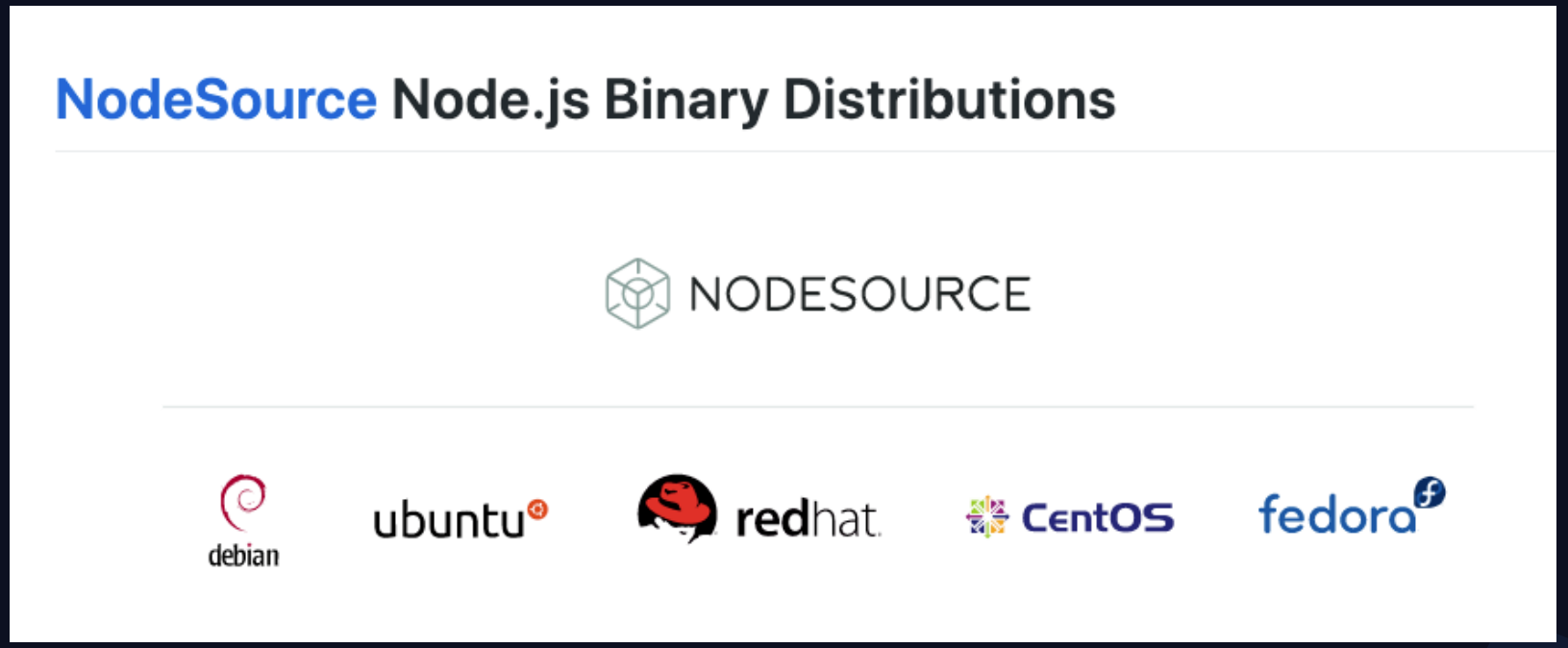
Install NodeJS




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

```
yum install nodejs
```

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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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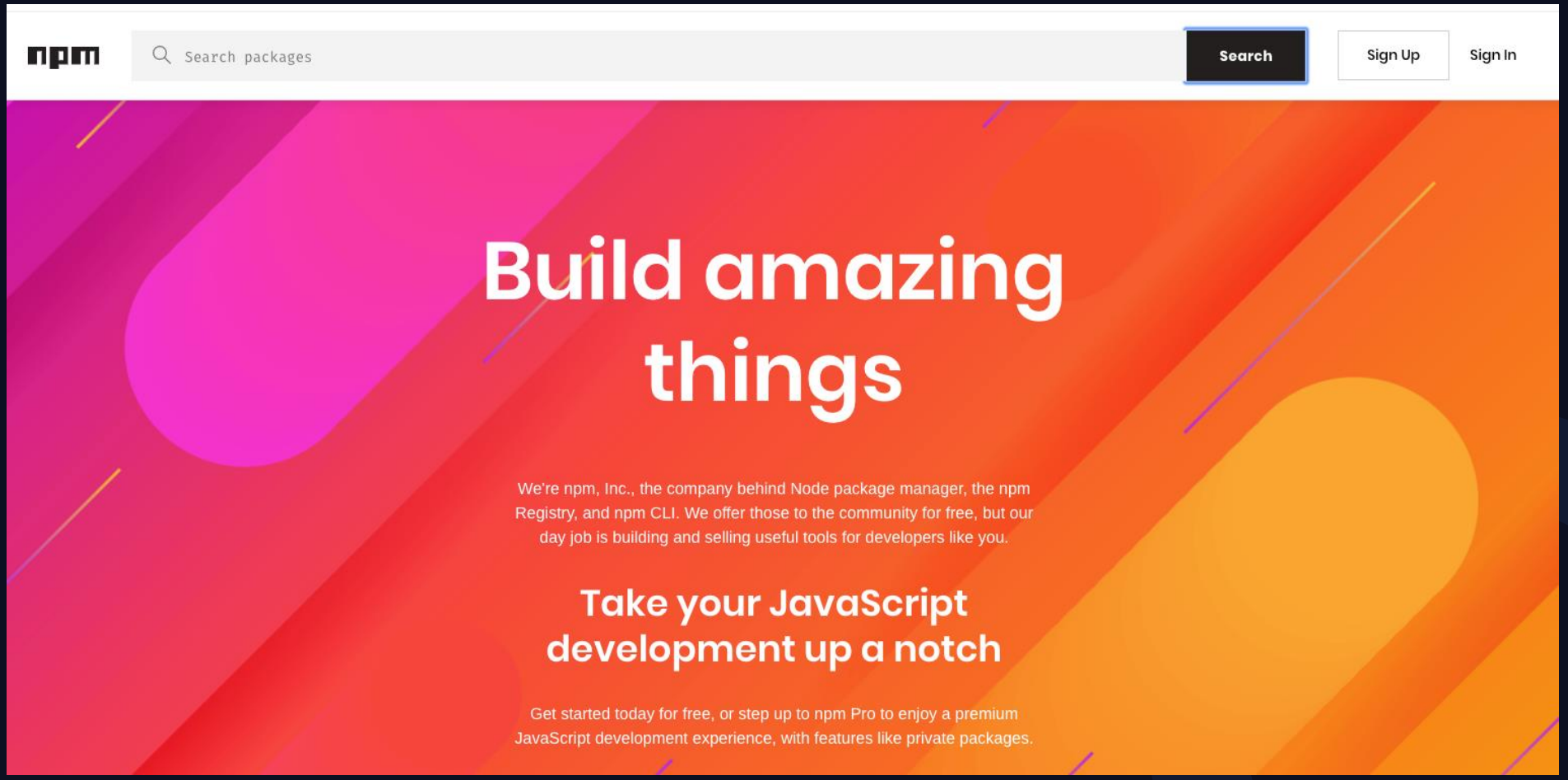
Node Package Manager (NPM)

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



https://www.npmjs.com/

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NPM Commands

```
npm -v
```

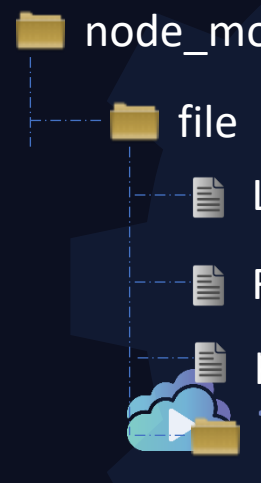
```
6.13.7
```

```
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...     | =d3viant0ne...  | 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
```



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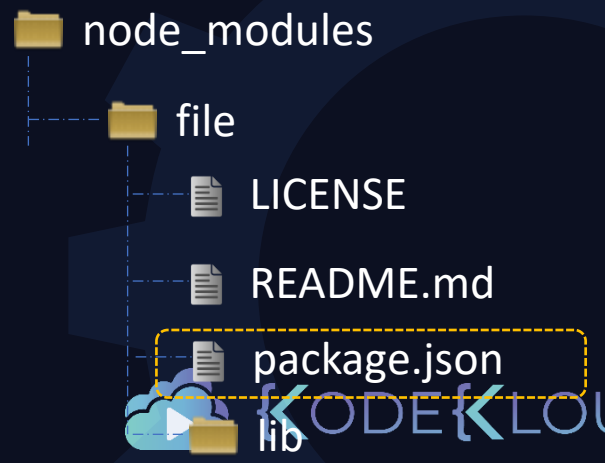
NPM Commands

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

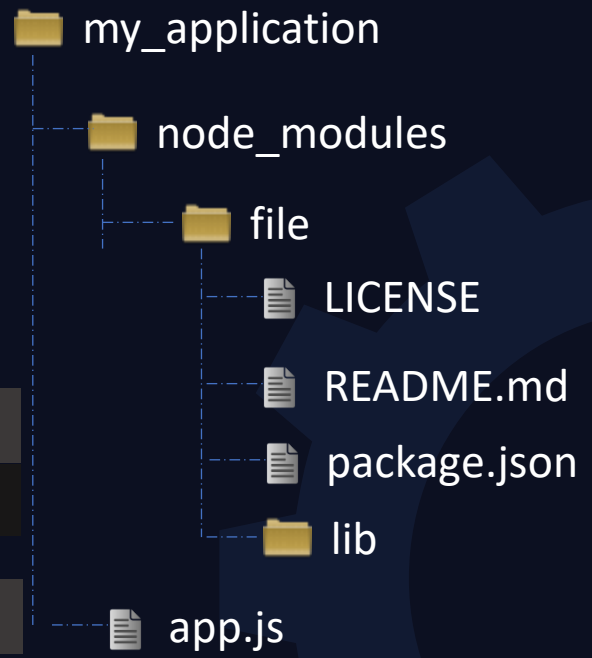
```
npm install file
```

```
+ 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
```

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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/
```

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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"
  }
}
```

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Python

- Free
- Open source
- Cross Platform Compatible

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Download

https://www.python.org/downloads/

Versions

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

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Install

```
yum install python2
```

```
yum install python36
```

```
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()
```

```
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()
```

```
python2 -V
```

```
Python 2.7.16
```

```
python3 -V
```

```
Python 3.6.8
```

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Python Commands

```
python2 main.py
Hello World
```

main.py

```python
def print_message():
    print("Hello World")


if __name__ == '__main__':
    print_message()
```

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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
```

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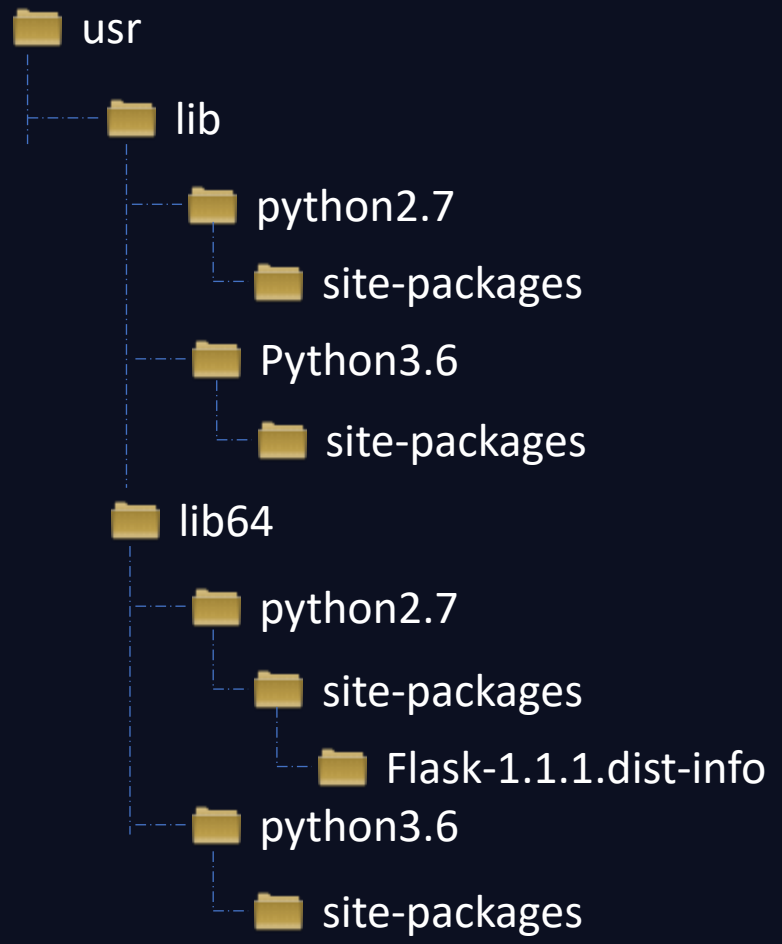
Python Package Manager (pip)

```
pip install flask
```



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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'
```

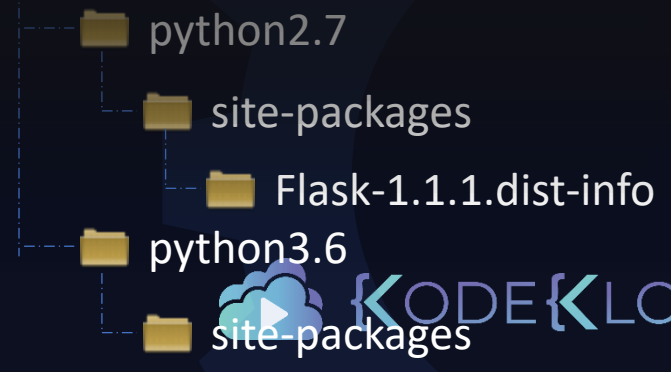
usr

main.py

```
from flask import Flask, request

app = Flask(__name__)

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



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Requirements

```
pip install flask
```

```
pip install jinja2
```

```
pip install markupsafe
```

```
pip install Werkzeug
```

```
pip install requests
```

```
pip install gunicorn
```

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 flask jinja2 markupsafe
```

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

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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
```

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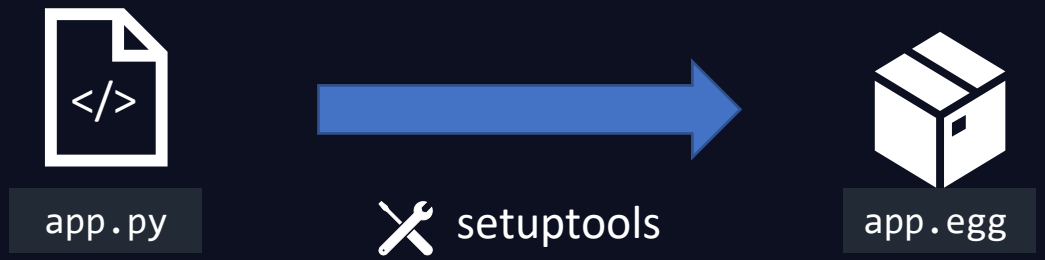
Other Package Managers

- easy_install

```
easy_install install app
```



- wheels

```
pip install app.whl
```

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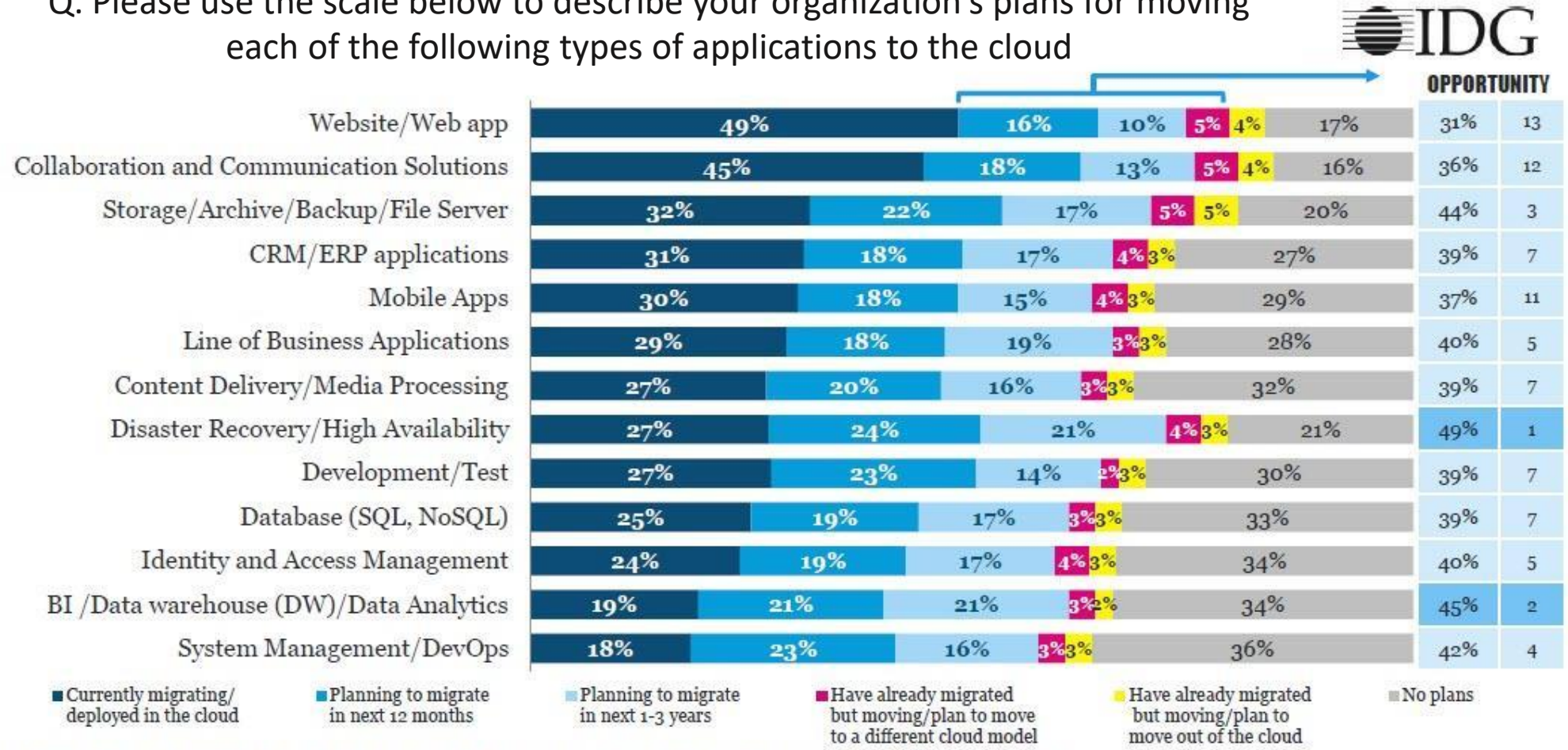
Servers

KODEKLOUD

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.

IDG Communications, Inc.

Source: 2018 IDG Cloud Computing Survey

24

Application Types

Desktop

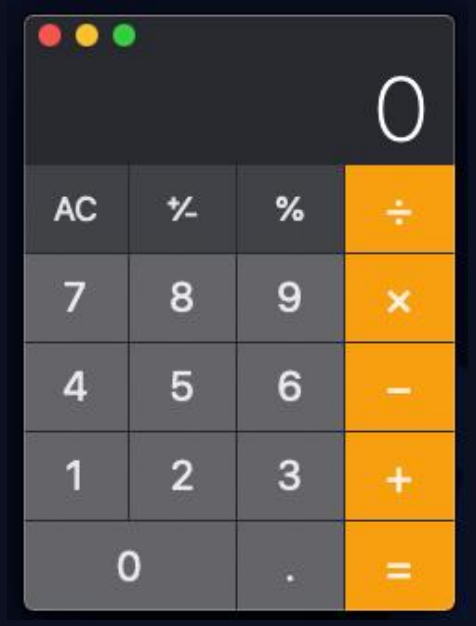
Mobile

Web

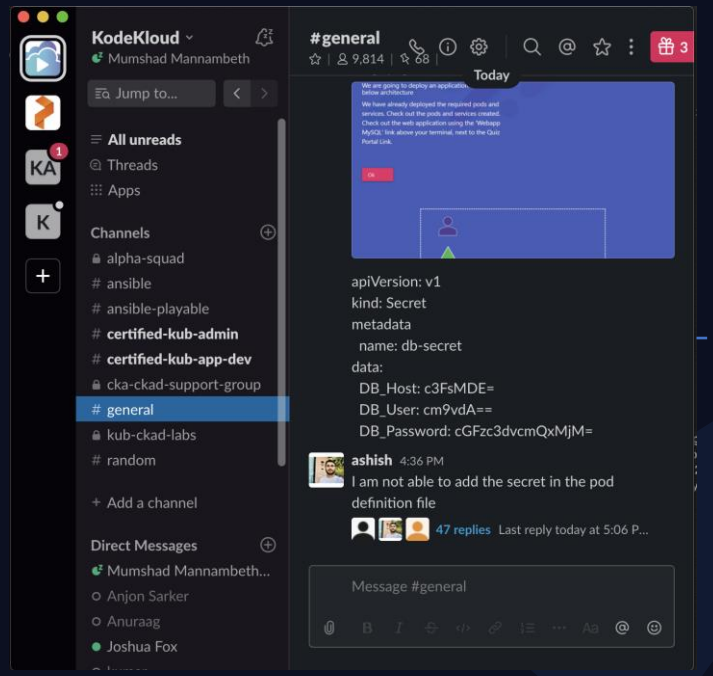
Analytics

Problem Solving

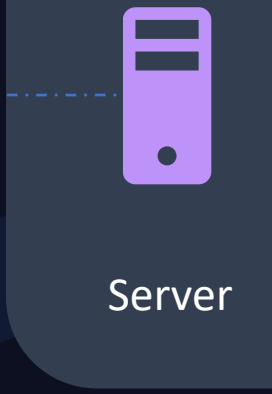
Standalone vs Client-Server



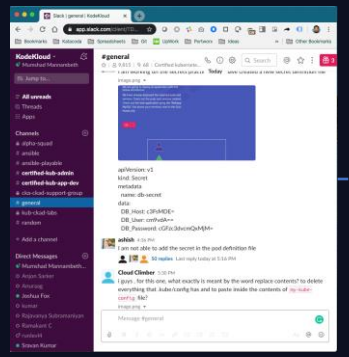
Standalone Desktop



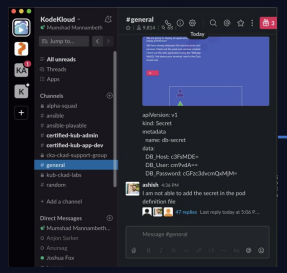
Desktop Client



Client-Server

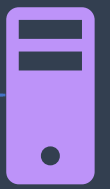


Web Client



Desktop Client

Mobile Client



Chat Server

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Servers

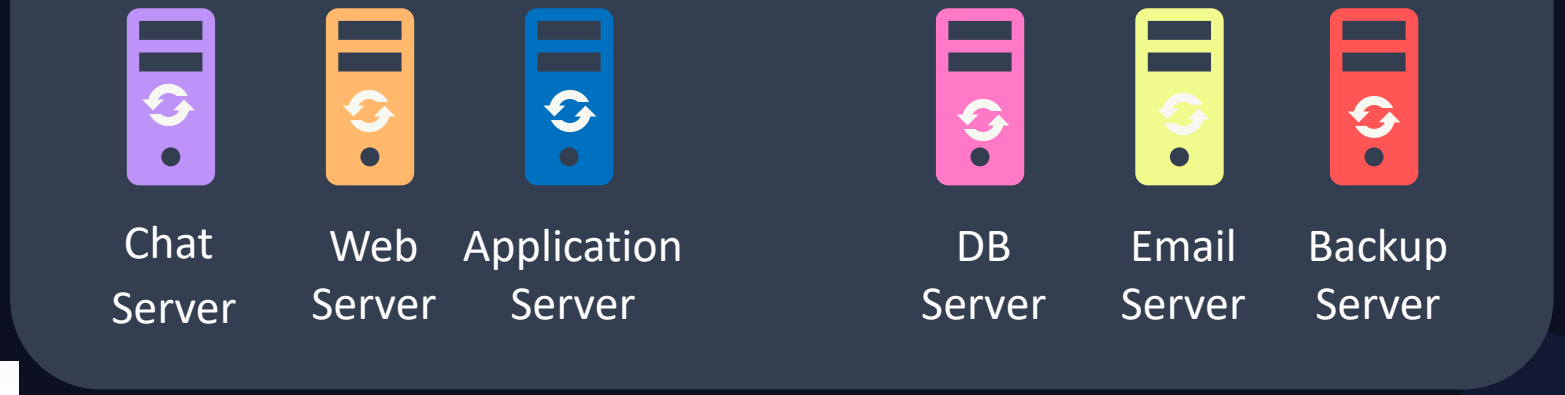

Photo by Gareth Halfacree

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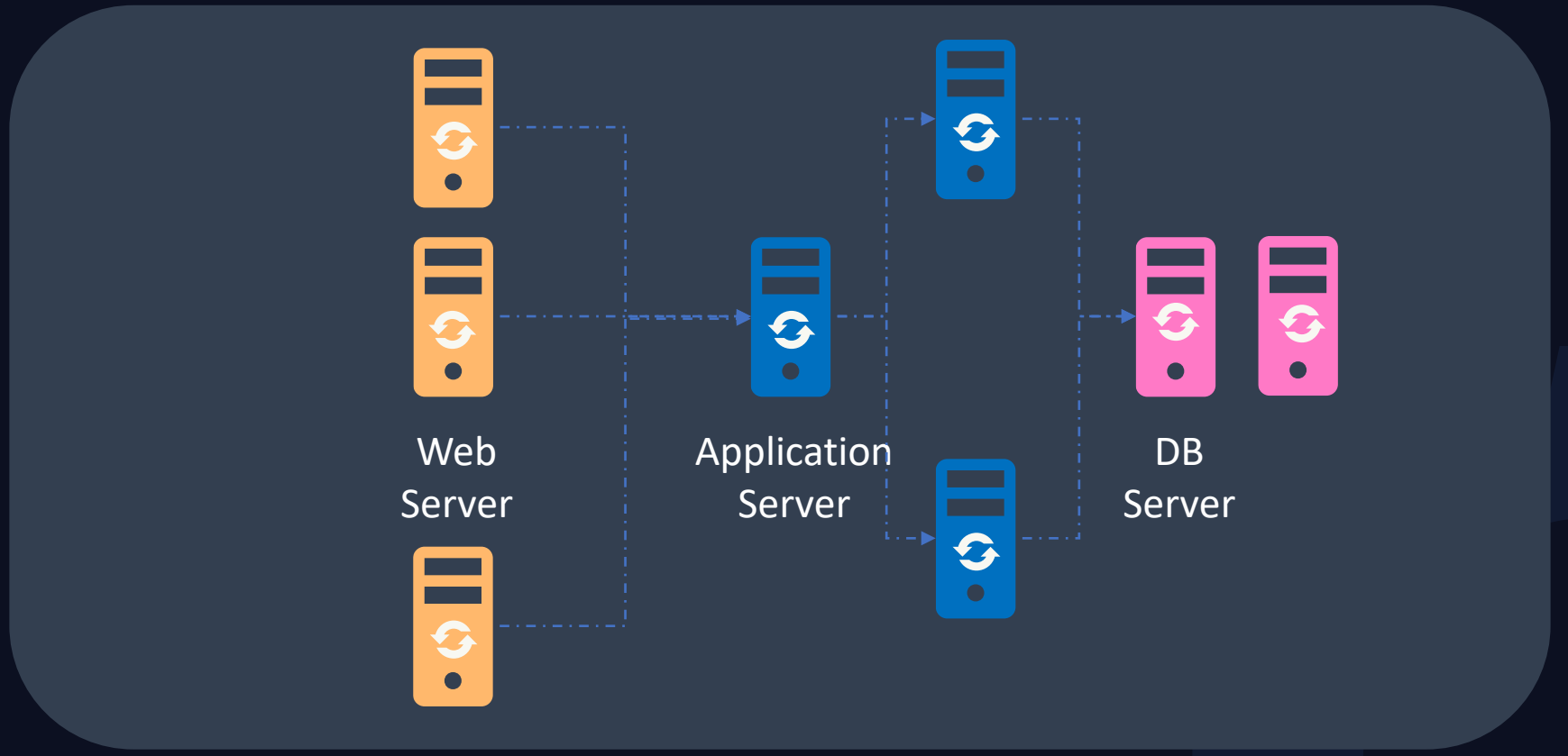
Servers

Servers

Application
Web
Server

Servers



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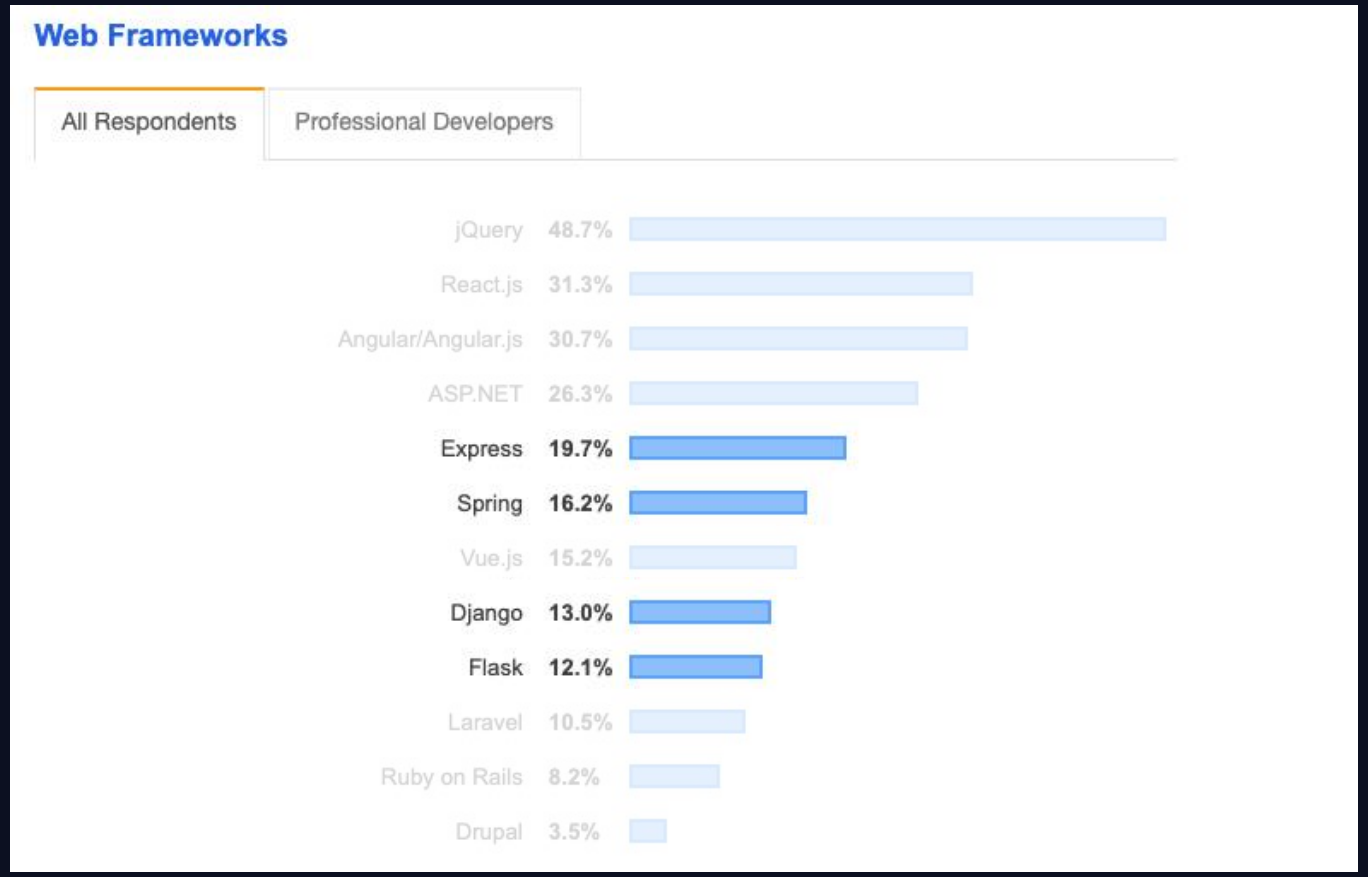
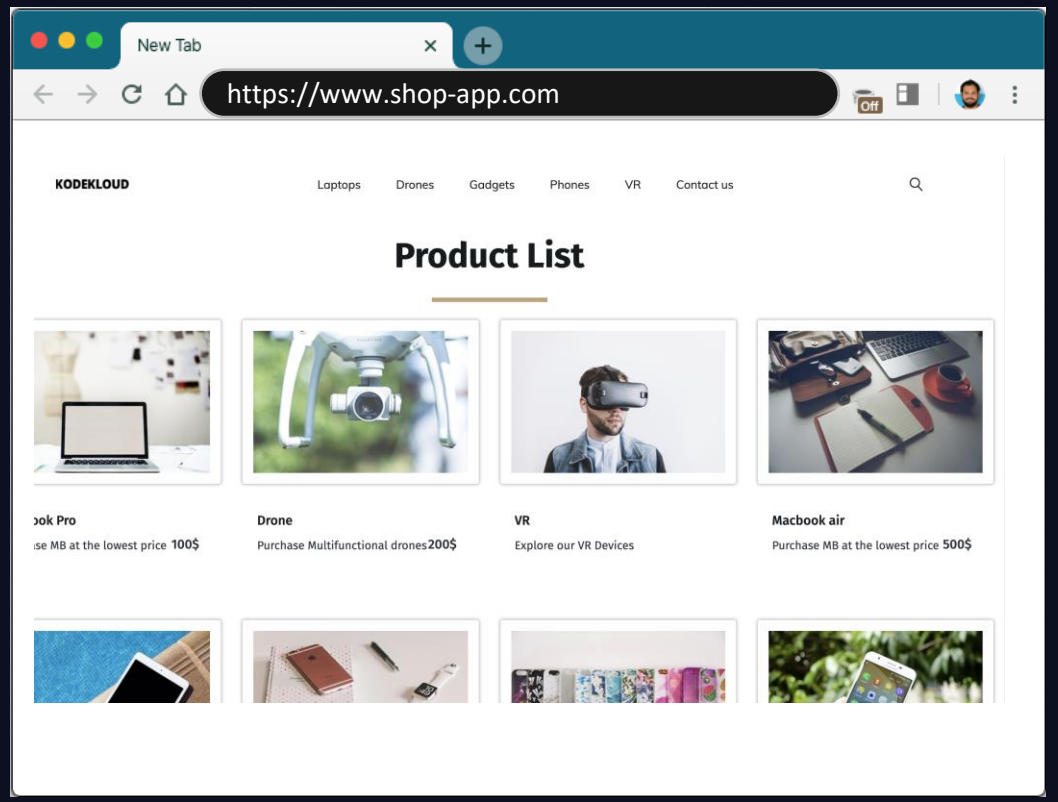
Web Frameworks & Web Servers

Web Frameworks



https://insights.stackoverflow.com/survey/2019

Web Frameworks



REQUEST

Web Server

HTML

CSS

JavaScript

RESPONSE

Python

NodeJS

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Web Frameworks

app.js

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

DemoApplication.java

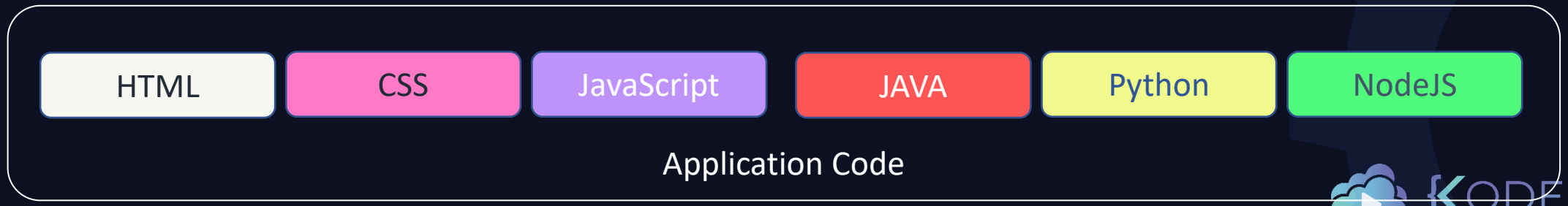
```
package com.example.demo;

// <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();
    }
}
```



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Web Frameworks

DemoApplication.java

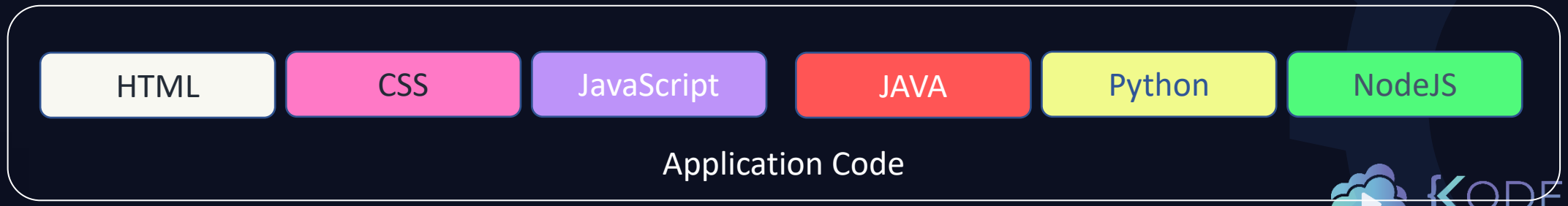
```java
package com.example.demo;

// <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

```python
from flask import Flask

app = Flask(__name__)

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

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

demo.js

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

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



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Web Server

DemoApplication.java

```java
package com.example.demo;

// <code hidden>

@SpringBootApplication
@RestController
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    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

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Web Server

DemoApplication.java

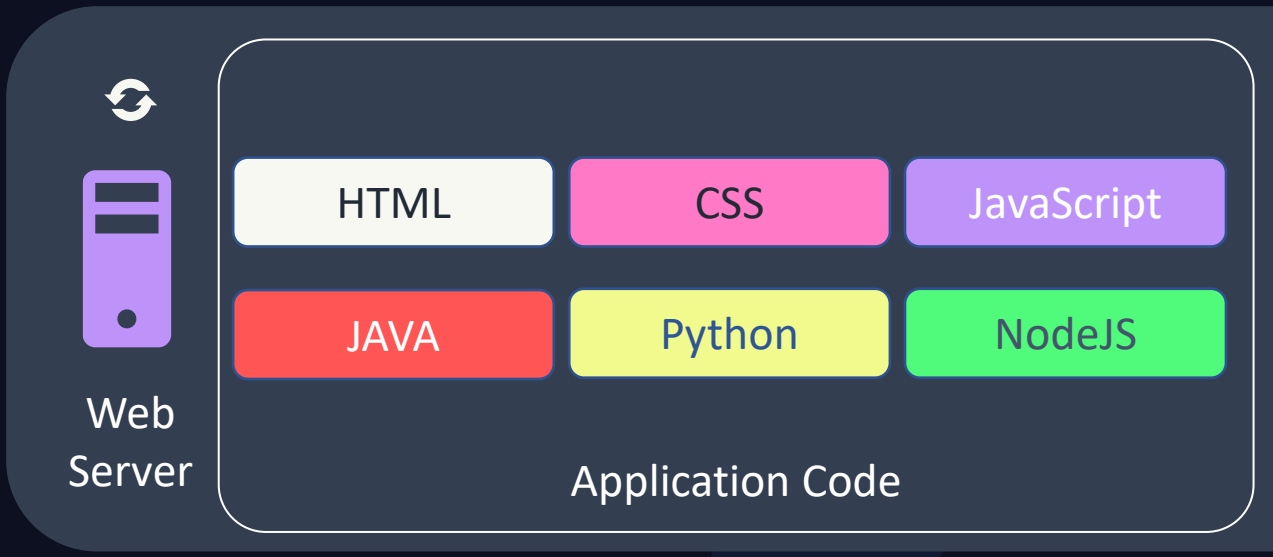
```java
package com.example.demo;

// <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

DemoApplication.java

```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 | Python | JavaScript

Application 2 Code

HTML | CSS | JavaScript

JAVA | Python | NodeJS

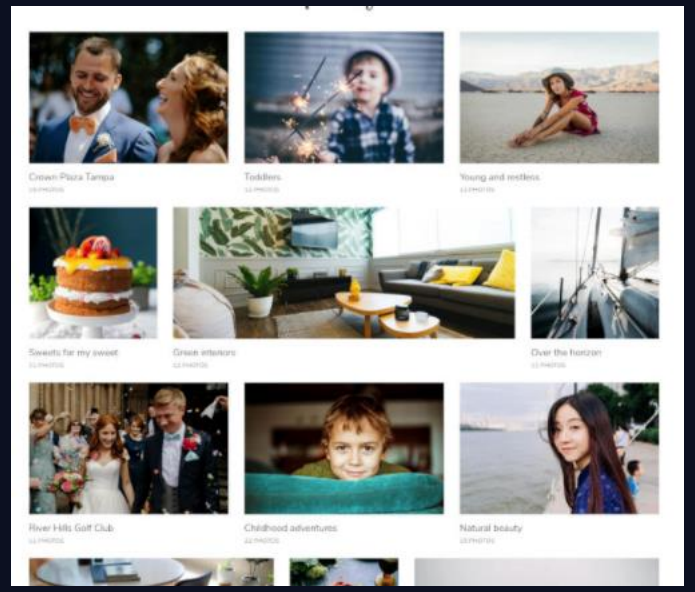
Application Code

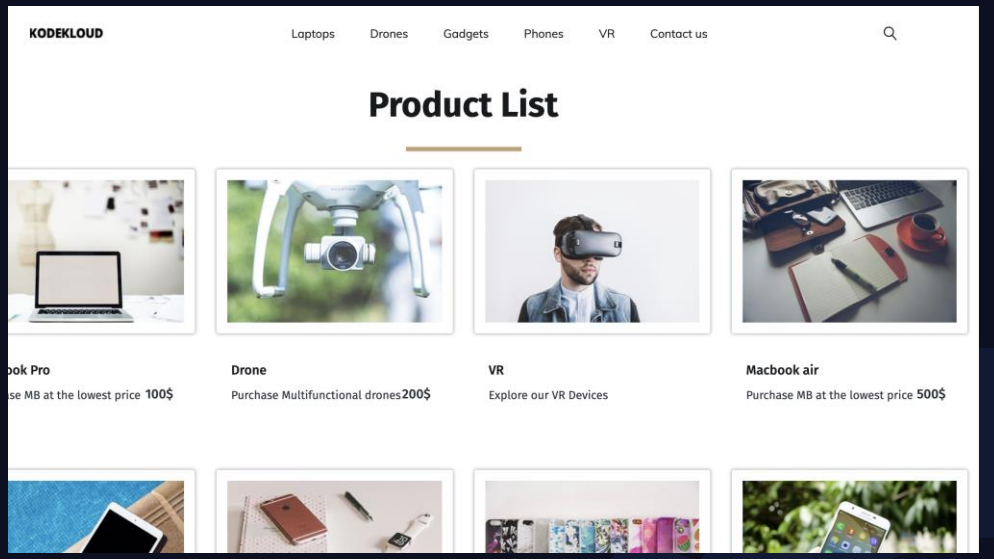
HTML | NodeJS | JavaScript

Application 3 Code

NGINX

Static vs Dynamic Websites





NGINX

Apache Tomcat

uWSGI

KODEKLOUD

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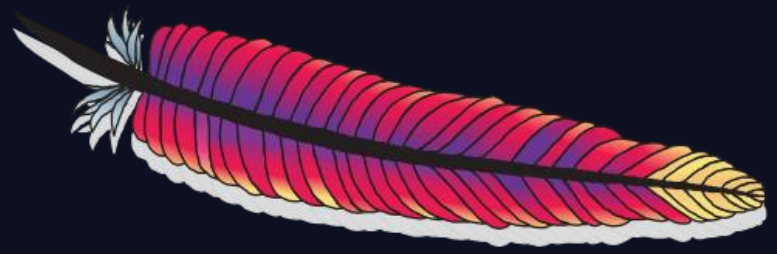

APACHE WEB SERVER

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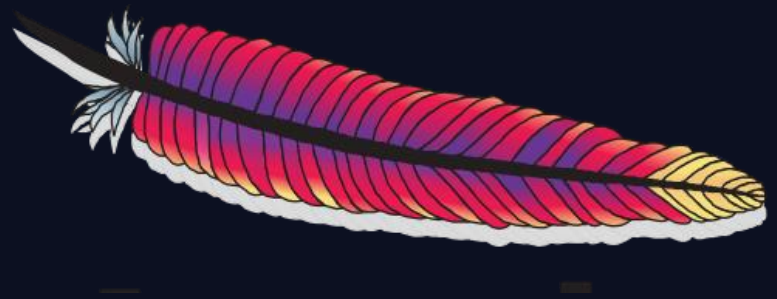
Apache Web Server

- Open source
- Web Server



Install Apache Web Server

```
yum install httpd
```

```
service httpd start
```

Web Server

```
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
```

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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_heartmonitor
[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

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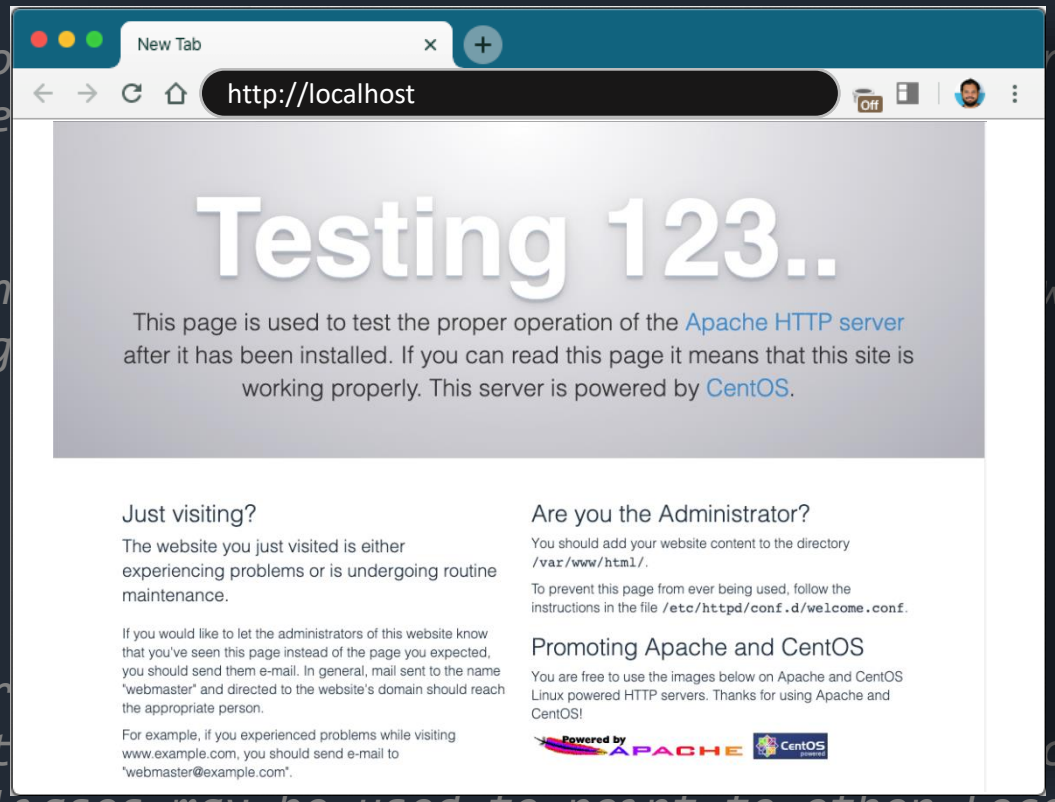
Config File

/etc/httpd/conf/httpd.conf

```
#
# Listen: Allows you to                                    nd/or
# ports, instead of the
# directive.
#
# Change this to Listen                                    w to
# prevent Apache from g
#
#Listen 12.34.56.78:80
Listen 80

#
# DocumentRoot: The dir
# documents. By default                                    ctory, but
# 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

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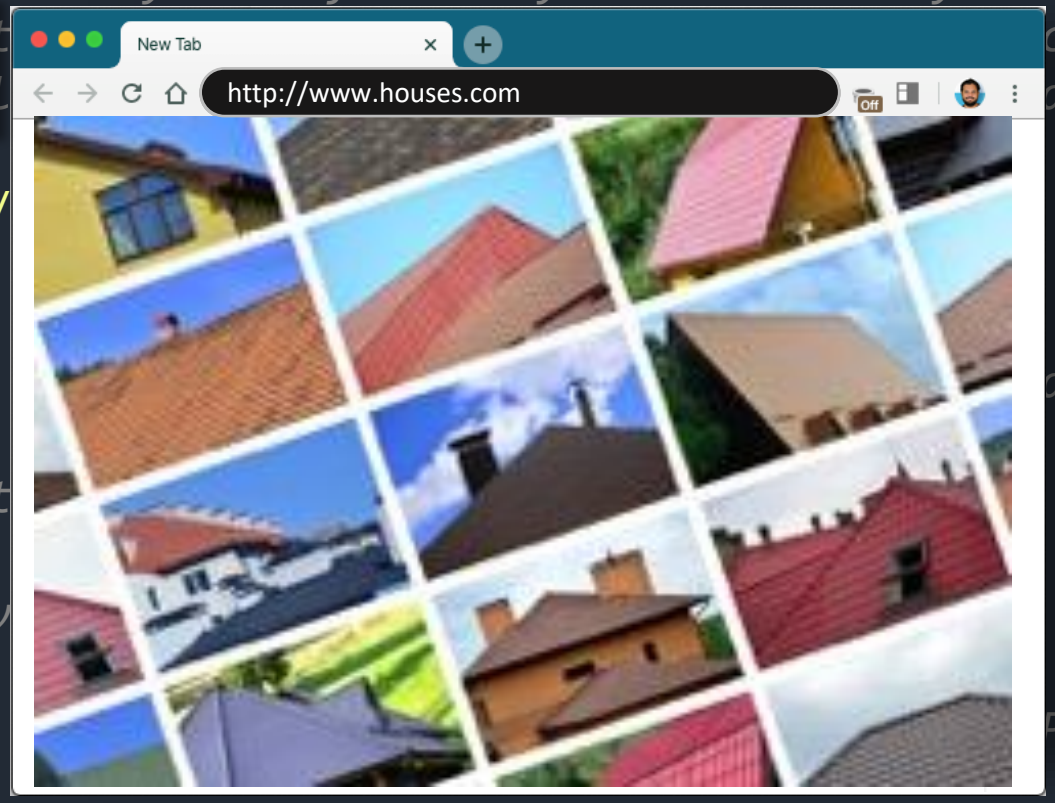
DNS Name	IP Address
www.houses.com	192.168.1.10

/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
```



Web Server

80

Default HTTP Port - 80

HTML

CSS

JavaScript

Document Root
/var/www/html

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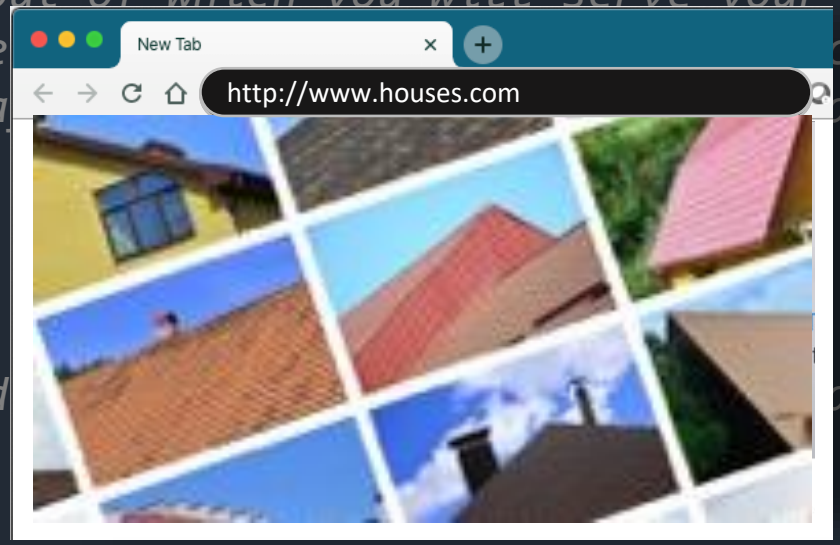
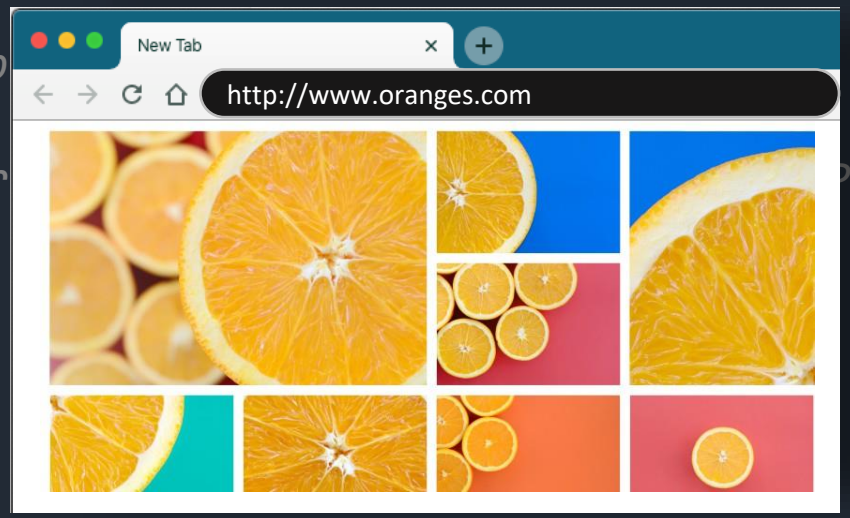
Config File

```
#
#Listen 12.34.56.78:80
Listen 80

#
# DocumentRoot: The directory out of which you will serve your
# documents. By default, all re                    ctory, but
# symbolic links and aliases ma                    ations.
#
DocumentRoot "/var/www/html"

#
# ServerName gives the name and                    dentify
itself.
# This can often be determined                     you
specify
# it explicitly to prevent prob
#
# If your host doesn't have a r                    address
here.
#
#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

KODEKLOUD

Config File

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

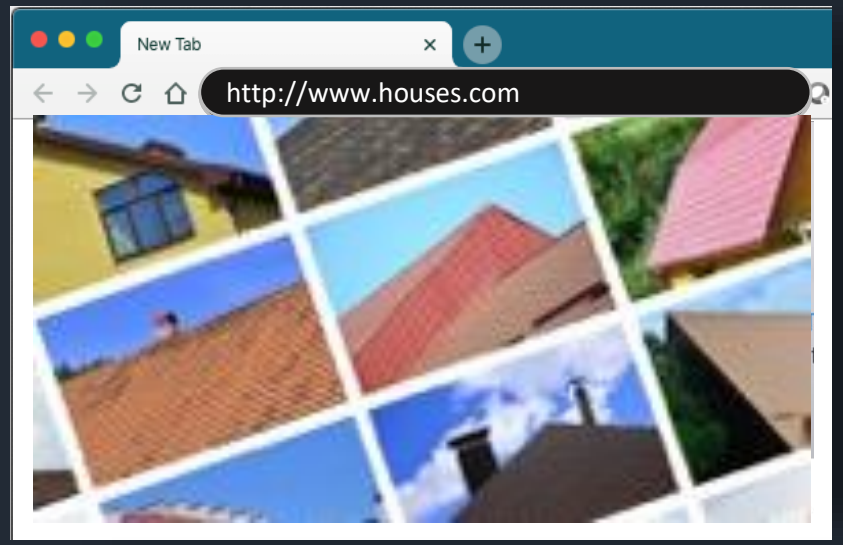
/etc/hosts

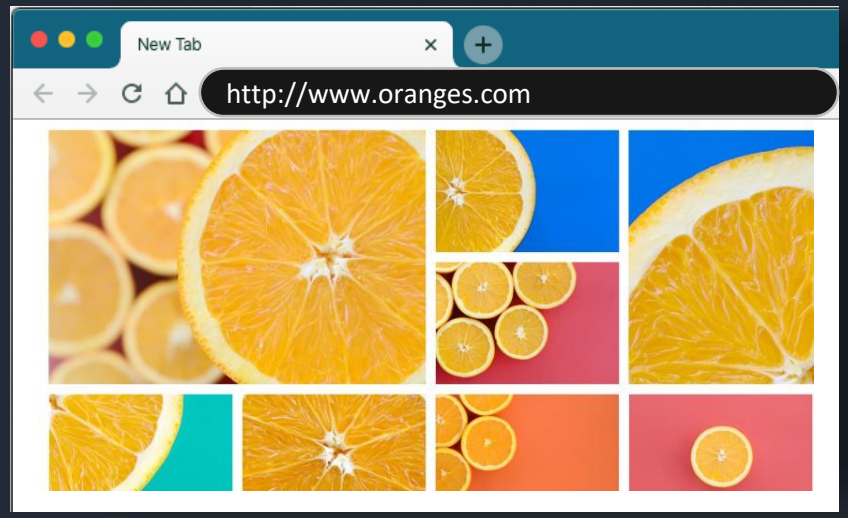
```
# Host Database
127.0.0.1       localhost
127.0.0.1       www.houses.com
127.0.0.1       www.oranges.com
```

```
</VirtualHost>
```

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

```
service httpd restart
```





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

KODEKLOUD

```
#
#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>
```

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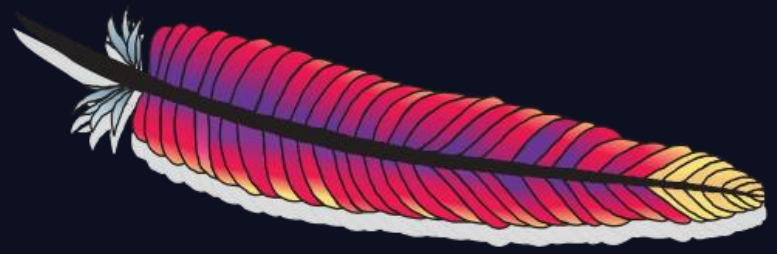

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APACHE TOMCAT

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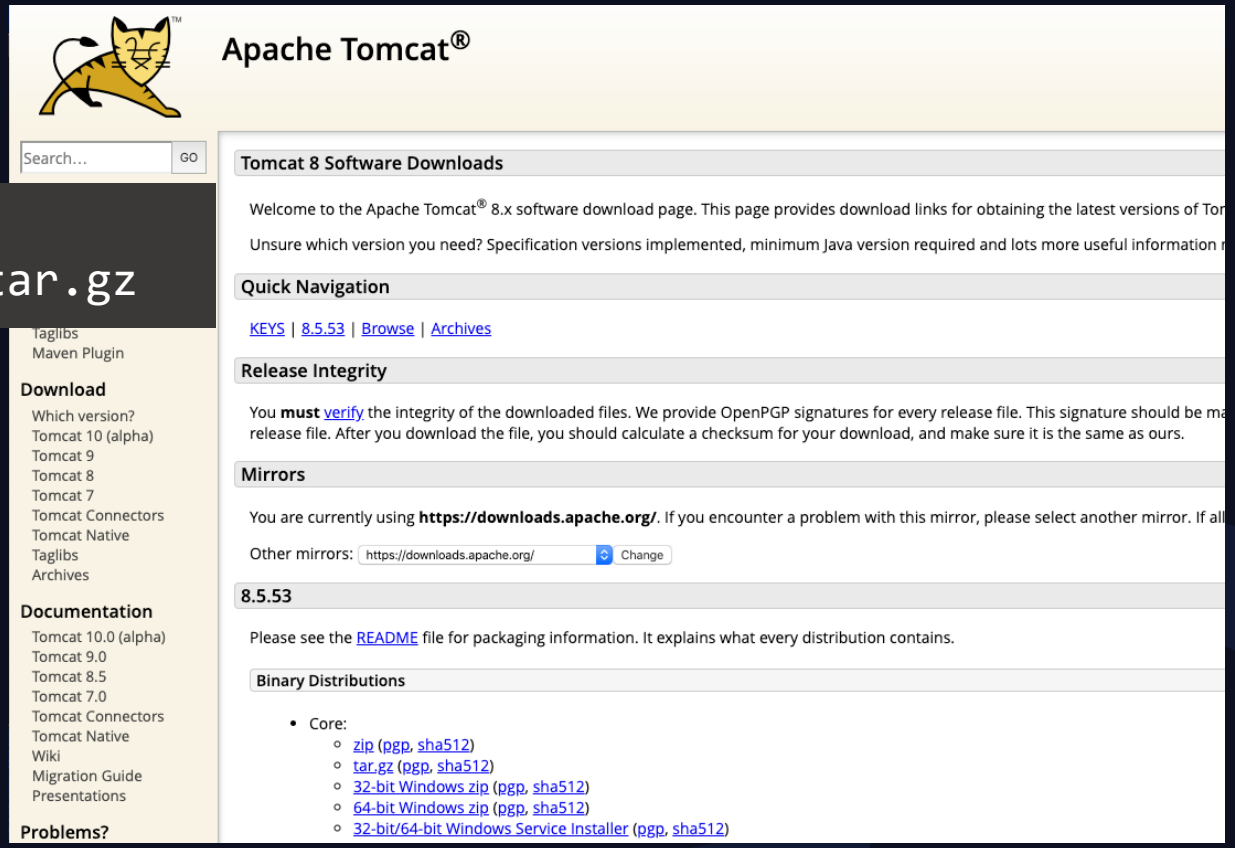
Install Apache Tomcat

```
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
```



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

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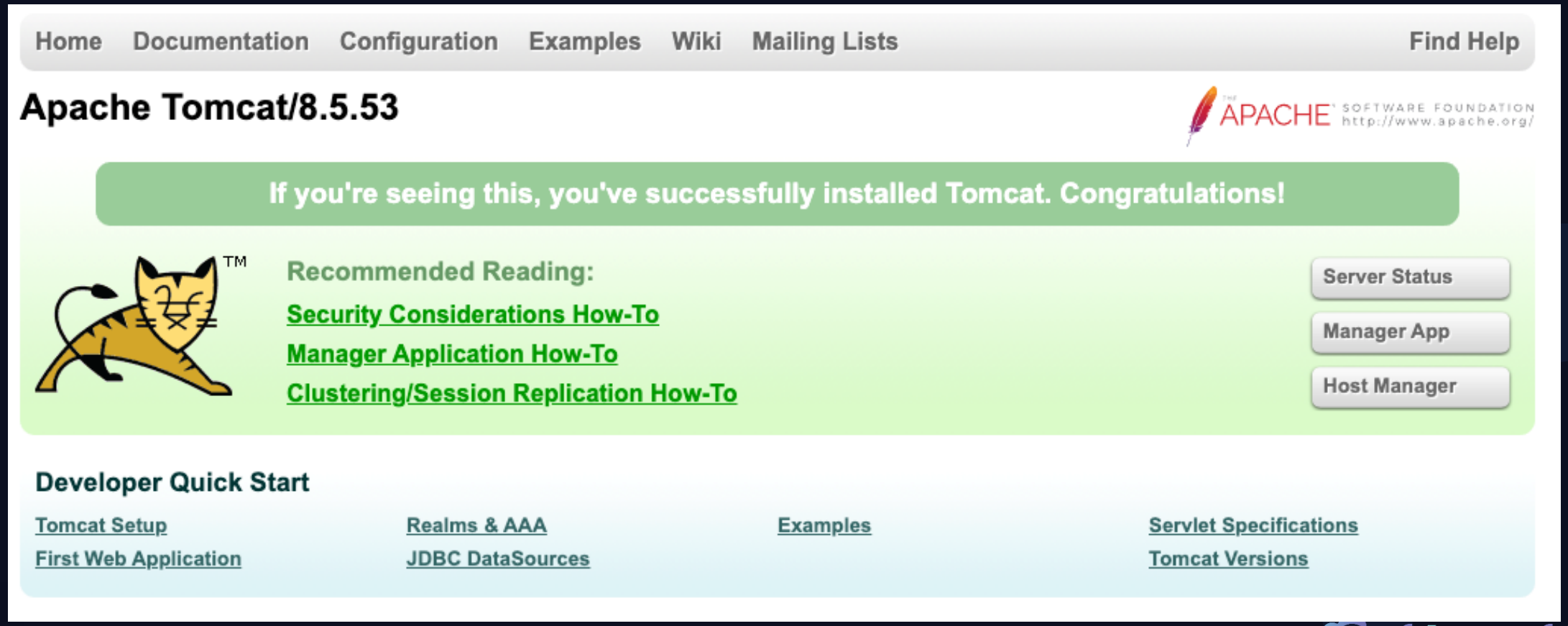
View Server

https://localhost:8080



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
```

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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" />
```

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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
```

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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
```

```
jar -cvf app.war *
```

```
mvn package
```

```
gradle build
```

app.war

HTML | CSS | JavaScript | JAVA

Application Code

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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
```

HTML | CSS | JavaScript | JAVA

Application Code

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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
```

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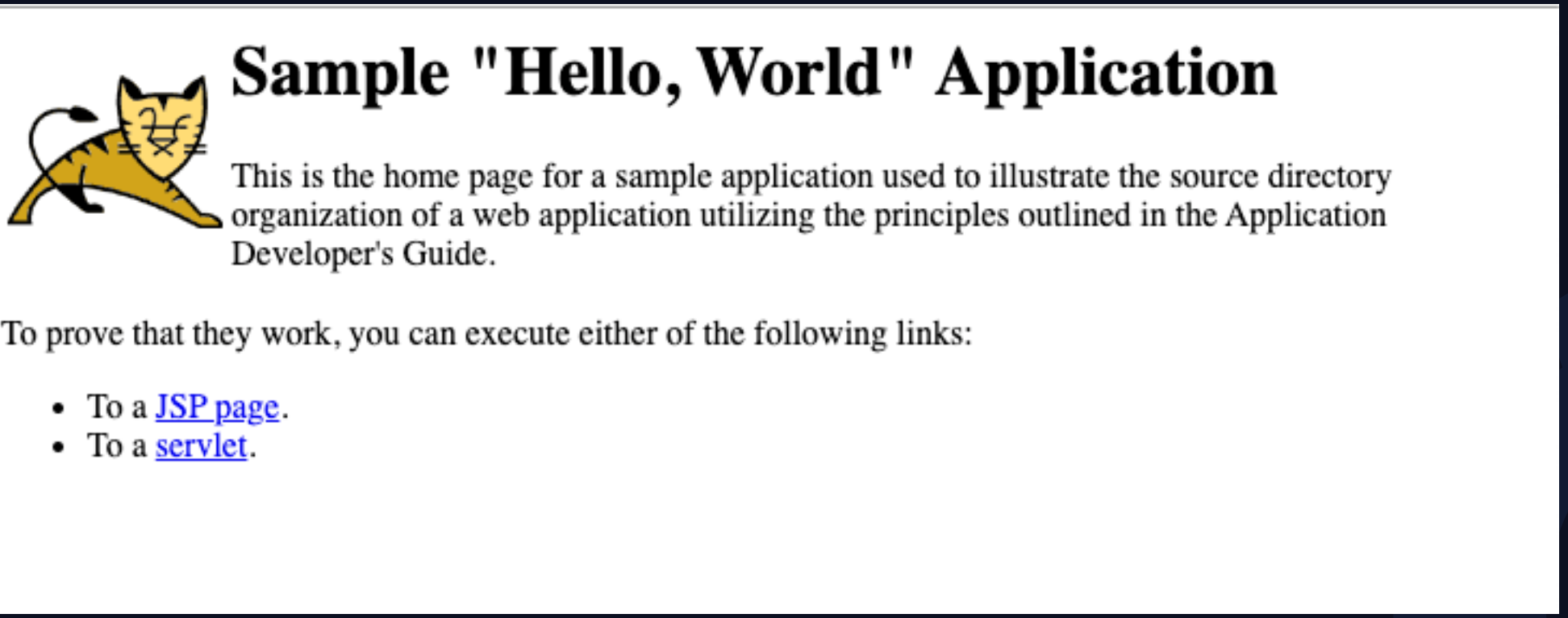
View Sample Application

https://localhost:8080/app



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just enough

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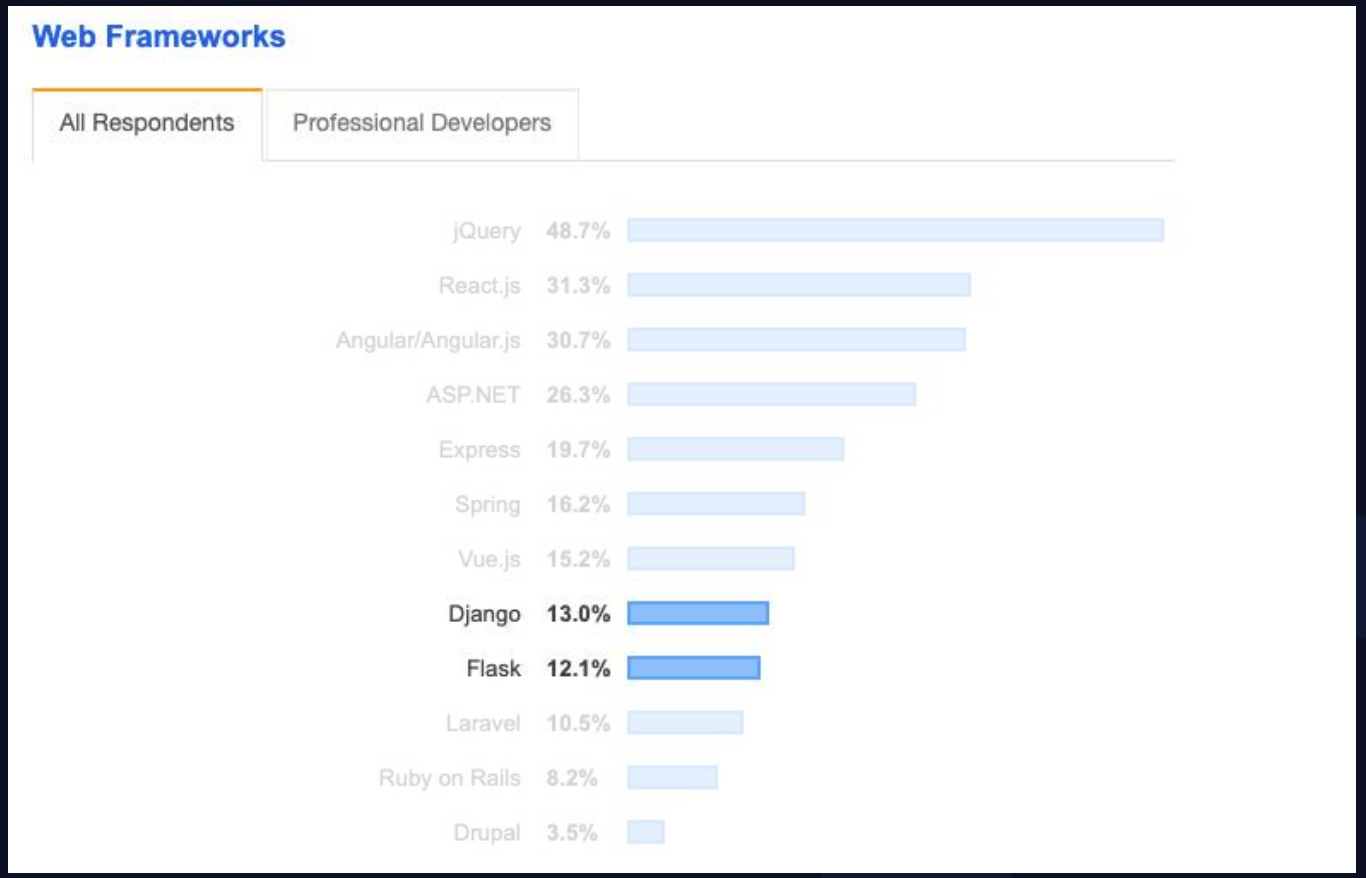
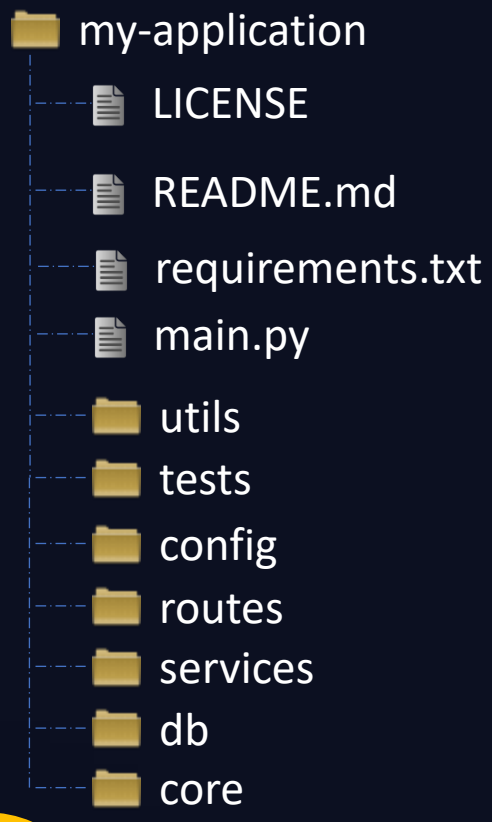
Web Frameworks



https://insights.stackoverflow.com/survey/2019

Project Structure



main.py

```python
from flask import Flask

app = Flask(__name__)

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

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

```
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)
```

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Production Deployme

- Gunicorn
- uWSGI
- Gevent
- Twisted Web

main.py

```python
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
```

https://flask.palletsprojects.com/en/1.1.x/deploying/wsgi-standalone/

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Express.js

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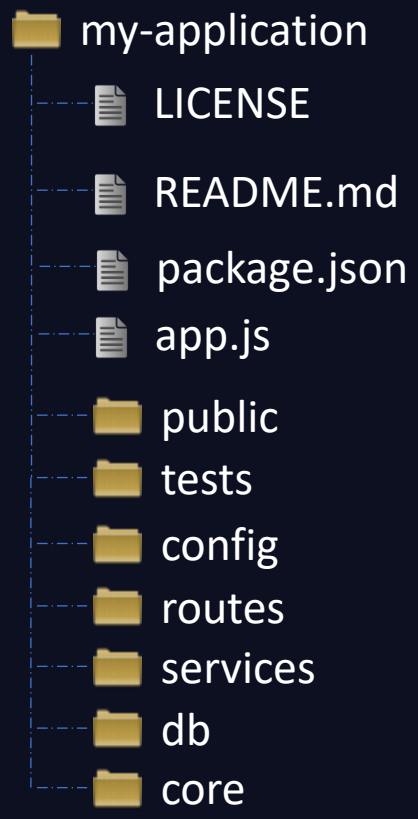
Project Structure



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);
```

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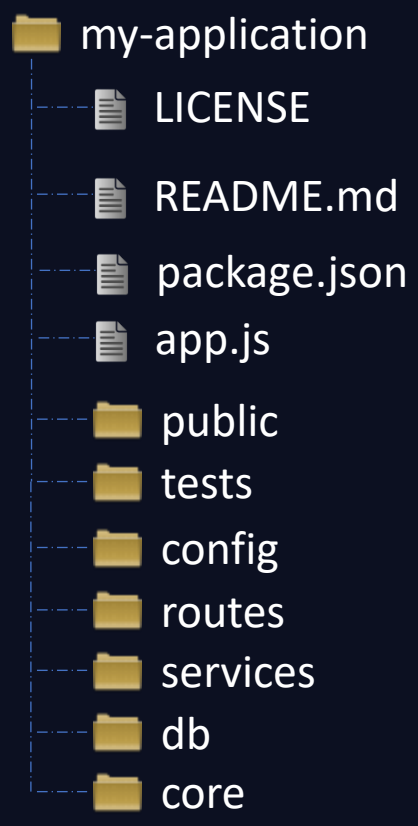
Project Structure




```
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"
  }
}
```

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Project Structure

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

```
npm install
```

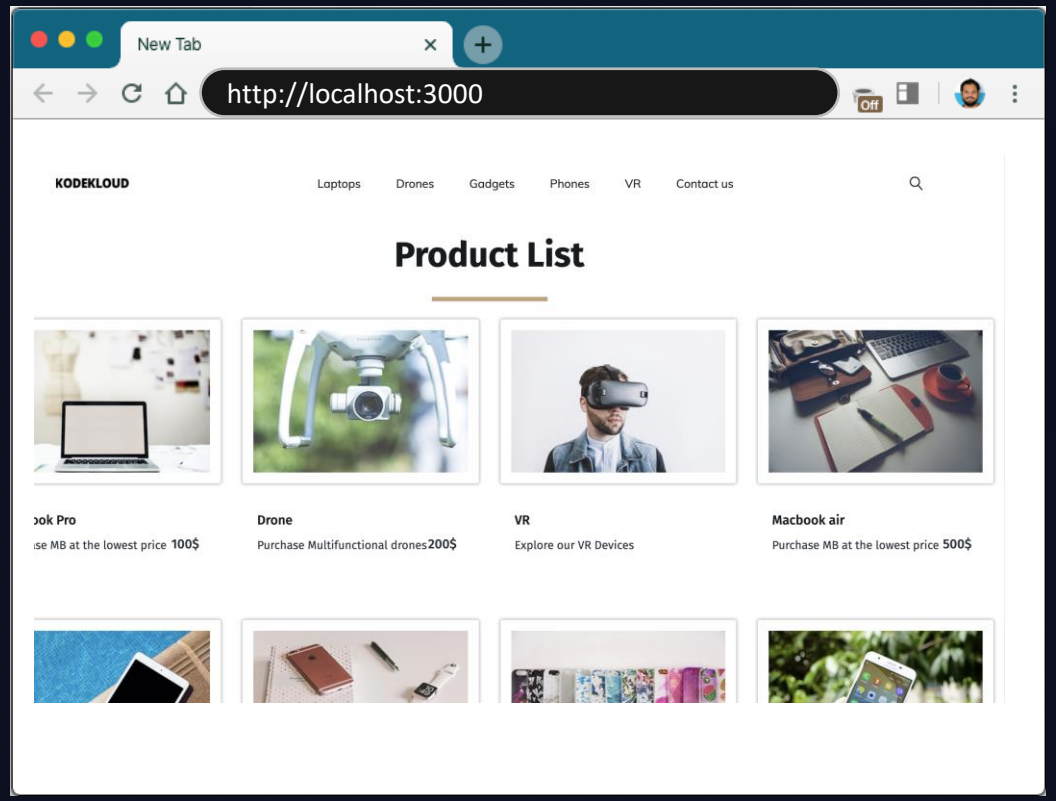
```
node app.js
```

```
npm run start:dev
```

supervisord

forever

pm2



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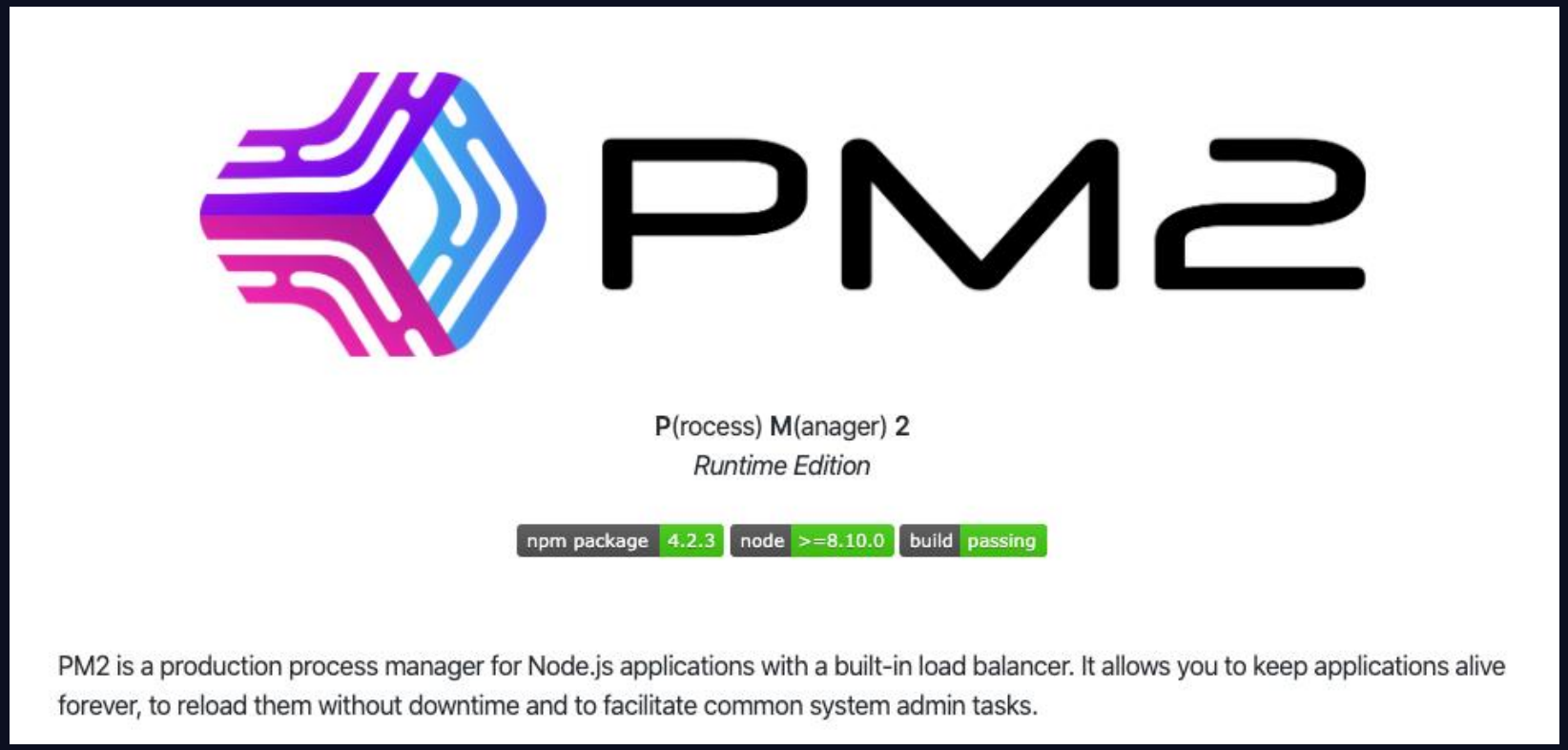
pm2




```
pm2 start app.js
```

```
pm2 start app.js -i 4
```

https://github.com/Unitech/pm2

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IP Addresses and Ports From a Web Application Perspective

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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?

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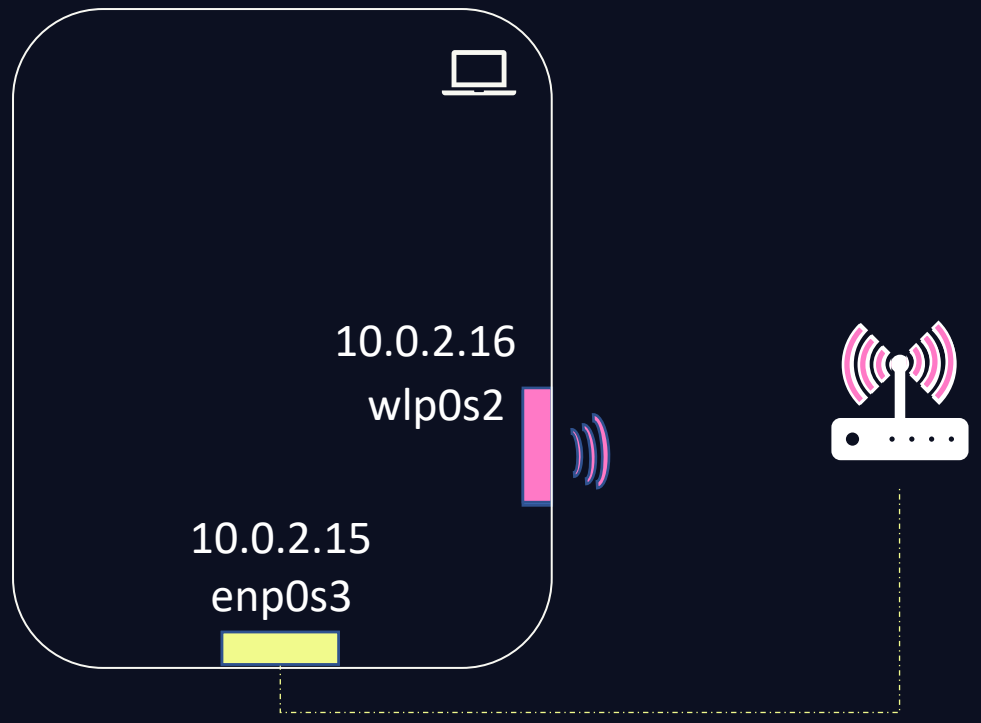
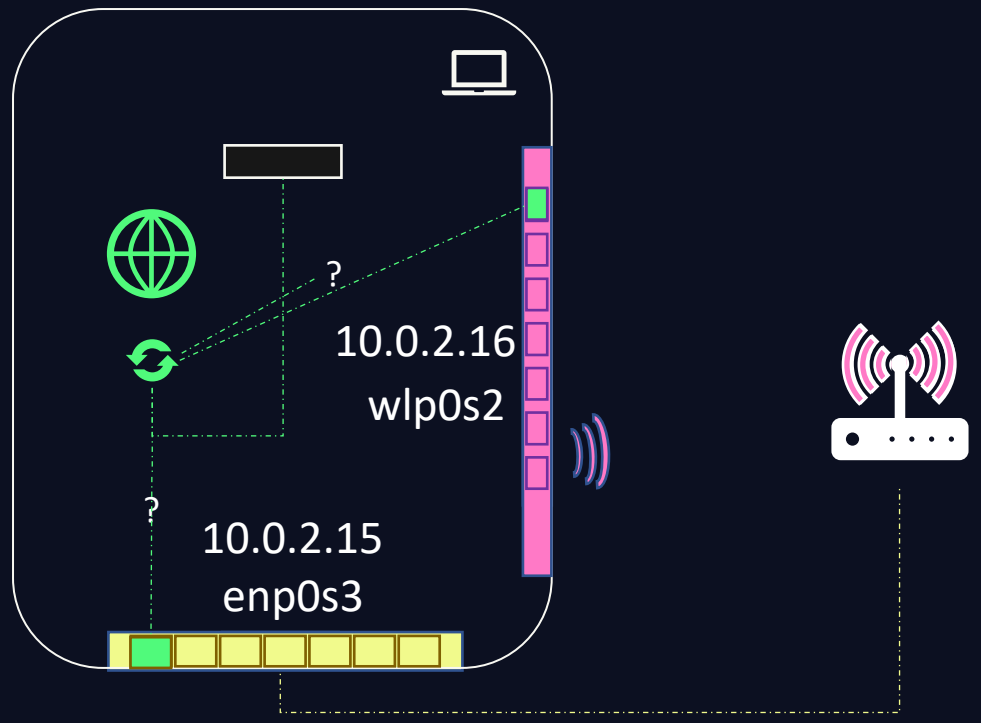
IP Address




```
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



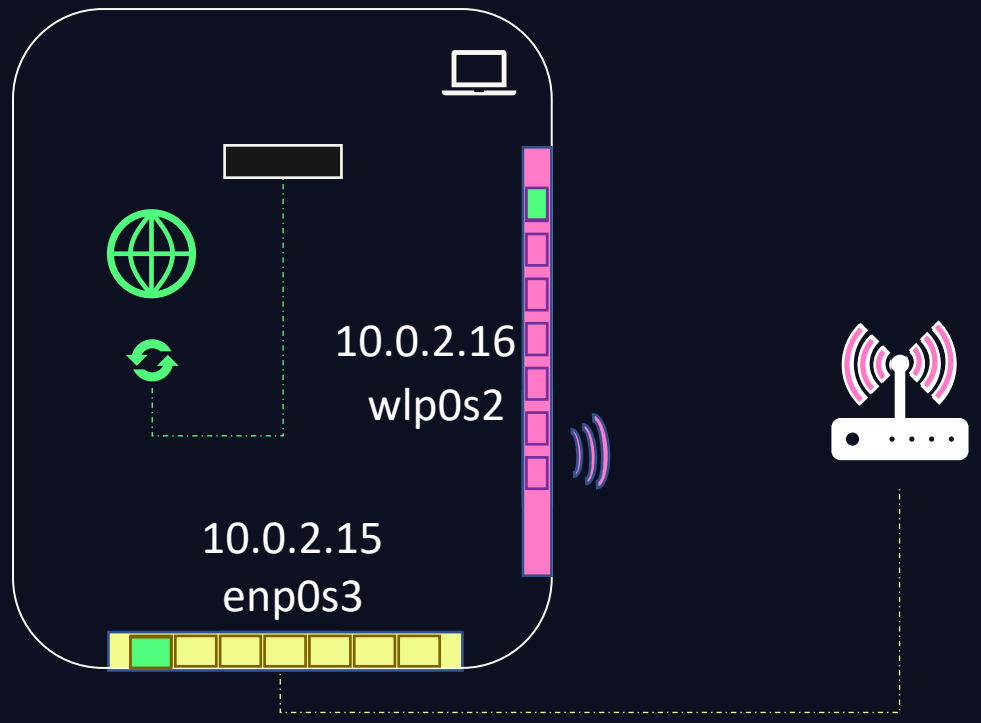
main.py

```
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

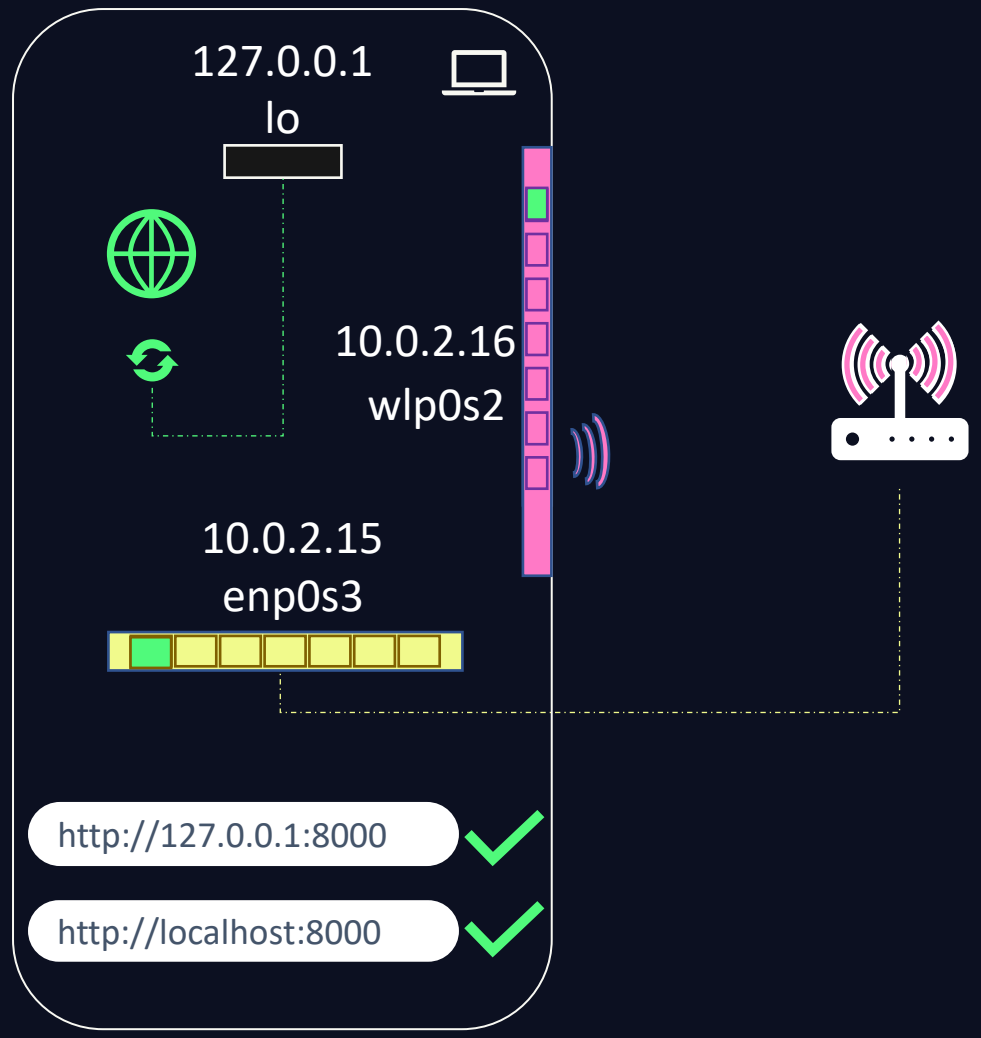
Ports




```
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
```

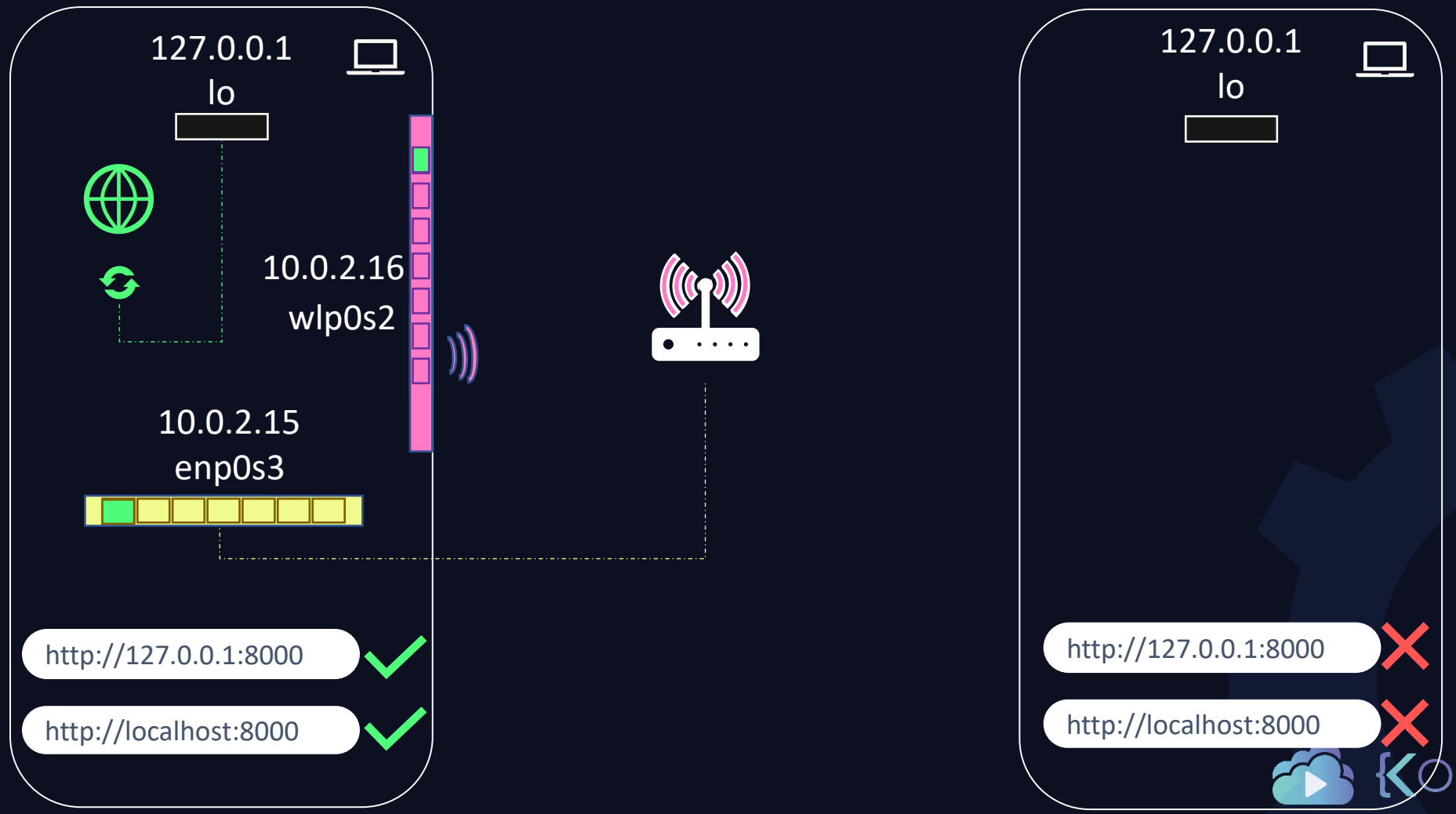
Ports




```
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


127.0.0.1
lo
10.0.2.16
wlp0s2
10.0.2.15
enp0s3
http://127.0.0.1:8000
http://localhost:8000
127.0.0.1
lo
http://127.0.0.1:8000
http://localhost:8000

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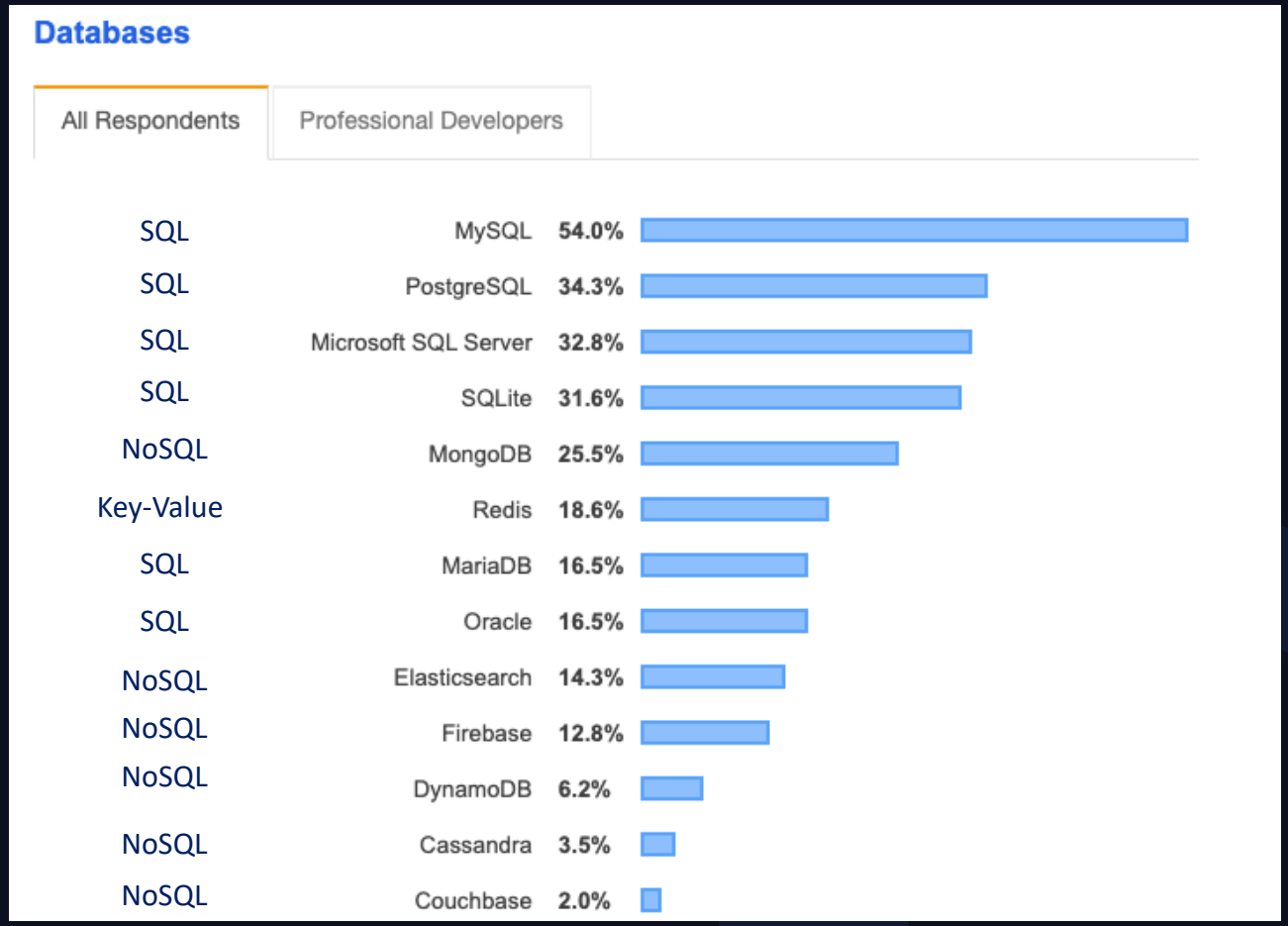
Databases

Databases

- MySQL
- MongoDB
- Redis



https://insights.stackoverflow.com/survey/2019#technology

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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

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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

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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

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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"
}
```

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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		B

Row

```
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

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SQL vs NoSQL

```sql
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"
}
```


KODEKLOUD

SQL vs NoSQL

MySQL

PostgreSQL

Microsoft
SQL Server

mongoDB

Amazon DynamoDB

cassandra

just enough

KODEKLOUD

MySQL

- Open source
- Fast
- Reliable
- SQL

Community

Commercial

https://www.mysql.com/products/

KODEKLOUD

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
```

https://dev.mysql.com/doc/refman/8.0/en/linux-installation-yum-repo.html

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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%pFlE77m
2020-03-19T17:57:41.582829Z 0 [System] [MY-010116] [Server] /usr/sbin/mysqld (mysqld 8.0.19) starting as process 4162
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%pFlE77m
```

```
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)
```

Create User

```
mysql -u root -pg/io%pFlE77m
```

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

user

'username'@'host'

password

Create User

```
mysql -u root -pg/io%pFlE77m
```

```
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!
```

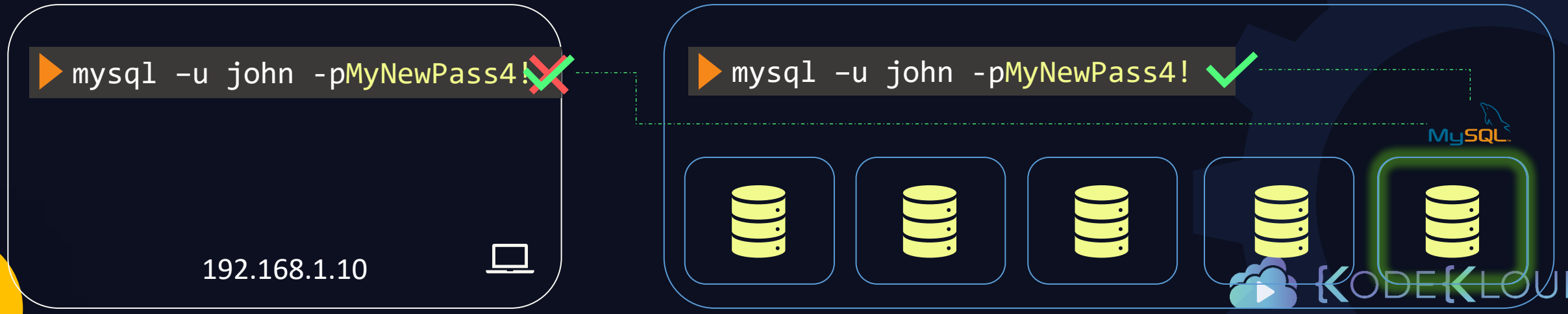
Create User

```
mysql -u root -pg/io%pFlE77m
```

```
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!';
```



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

KODEKLOUD

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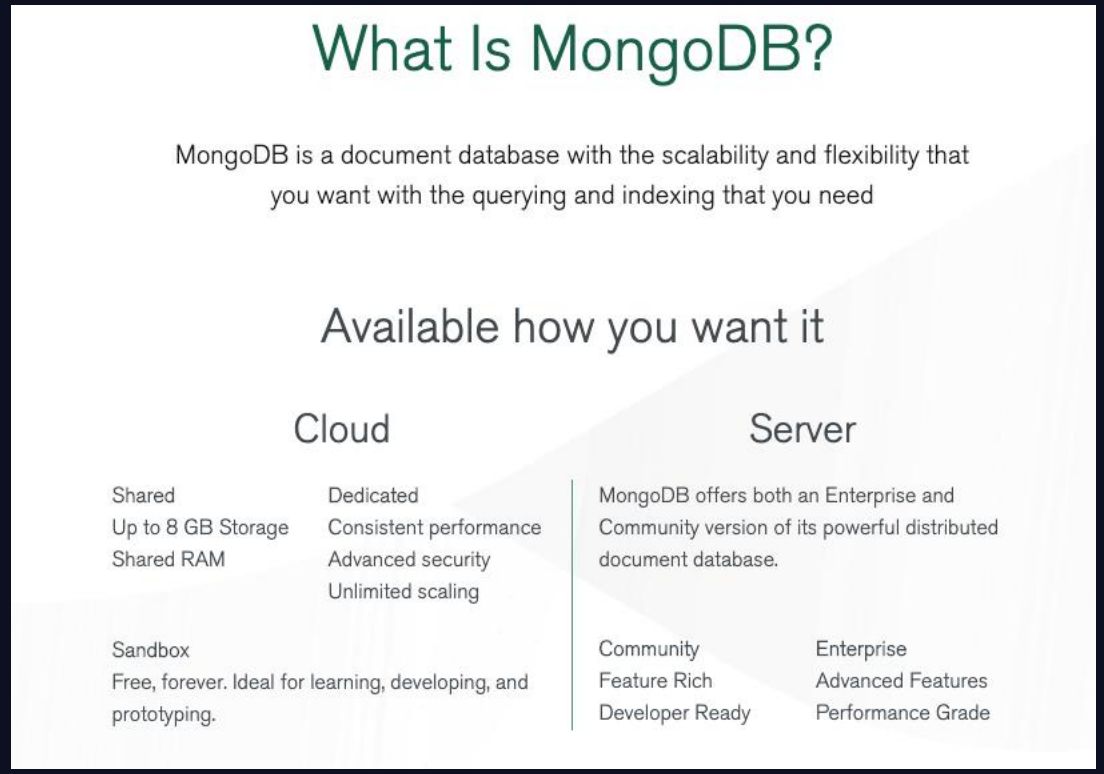
just enough

KODEKLOUD

MySQL

- Open source
- NoSQL
- Scalable
- High Performance



Community

Enterprise

https://www.mongodb.com/what-is-mongodb

KODEKLOUD

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"
}
```

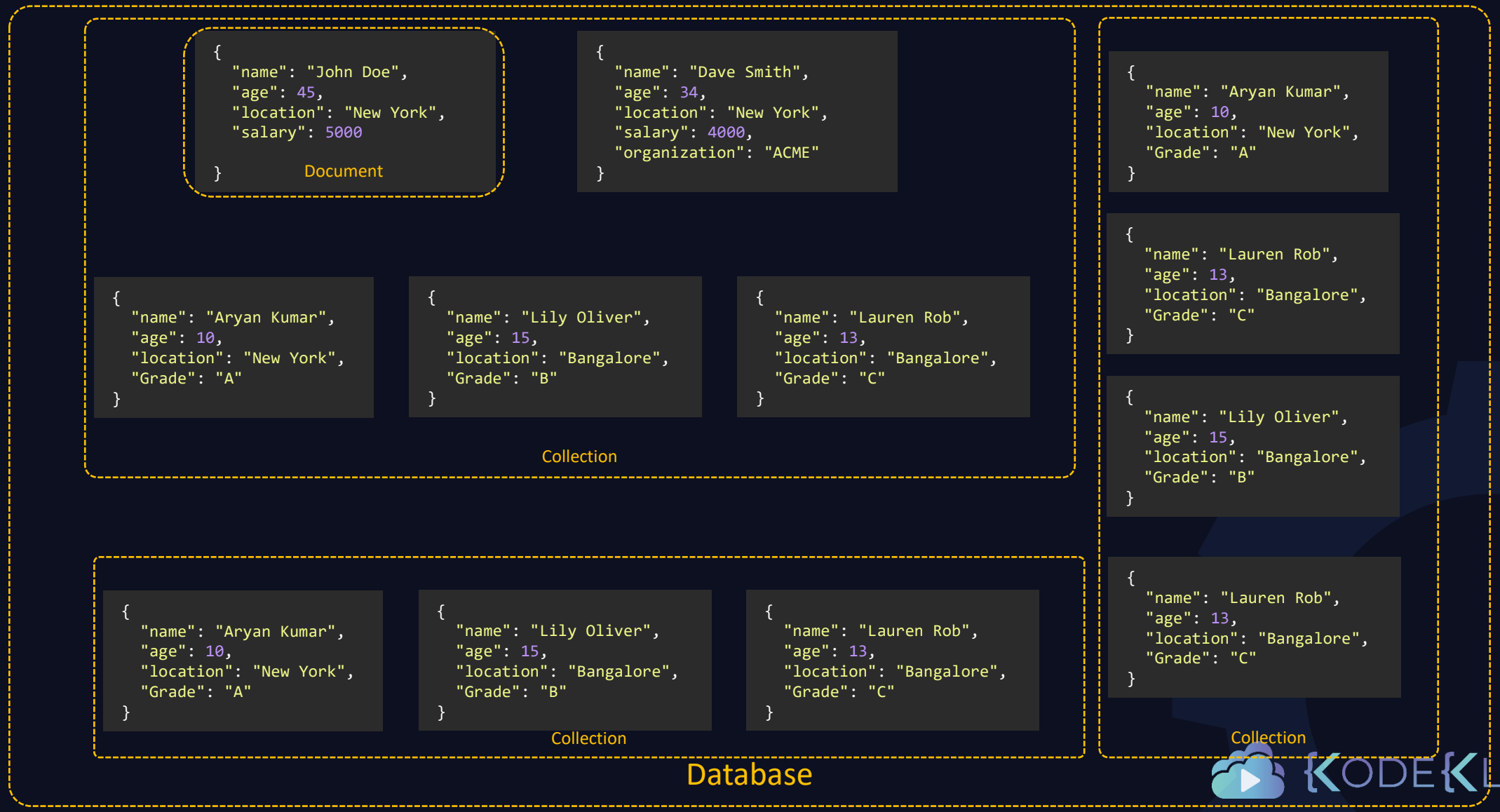
```
{
  "name": "Lily Oliver",
  "age": 15,
  "location": "Bangalore",
  "Grade": "B"
}
```

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

Collection

KODEKLOUD

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": "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

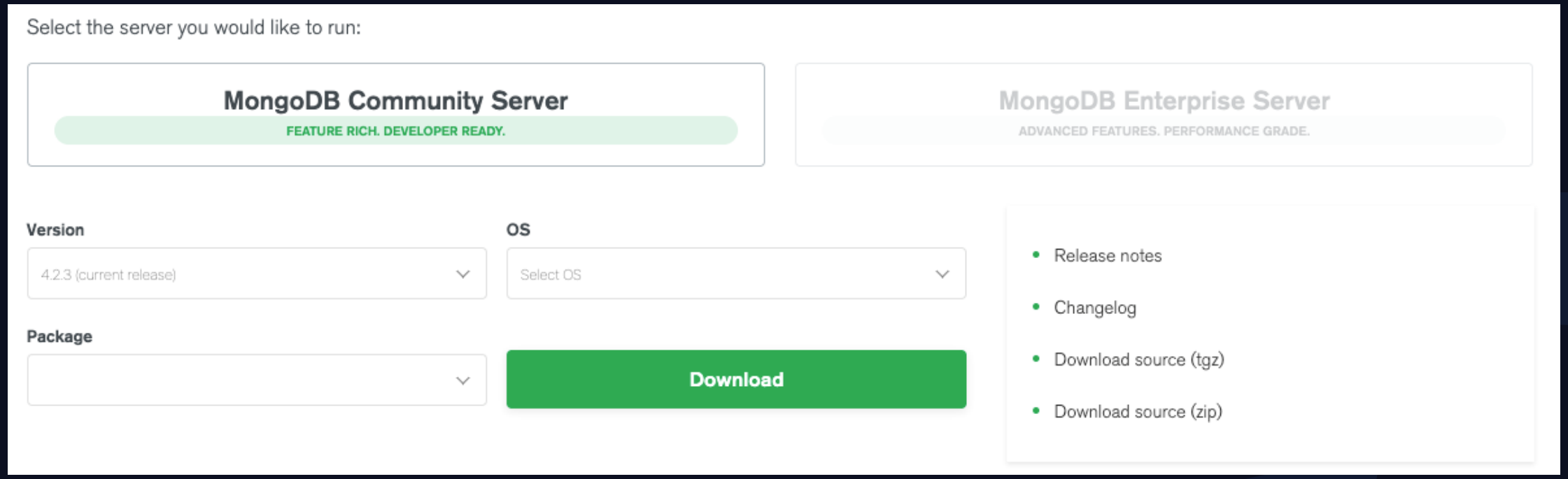
MongoDB offers both an Enterprise and Community version of its powerful distributed document database.

Community
Feature Rich
Developer Ready

Enterprise
Advanced Features
Performance Grade

KODEKLOUD

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**:

copy

```
[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
```

```
yum install mongodb-org
```

https://docs.mongodb.com/manual/tutorial/install-mongodb-on-red-hat/

KODEKLOUD

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/mongodb (code=exited, status=0/SUCCESS)
  Process: 4220 ExecStartPre=/usr/bin/chown mongod:mongod /var/run/mongodb (code=exited, status=0/SUCCESS)
  Process: 4219 ExecStartPre=/usr/bin/mkdir -p /var/run/mongodb (code=exited, status=0/SUCCESS)
 Main PID: 4227 (mongod)
   CGroup: /system.slice/mongod.service
           └─4227 /usr/bin/mongod -f /etc/mongod.conf
```

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