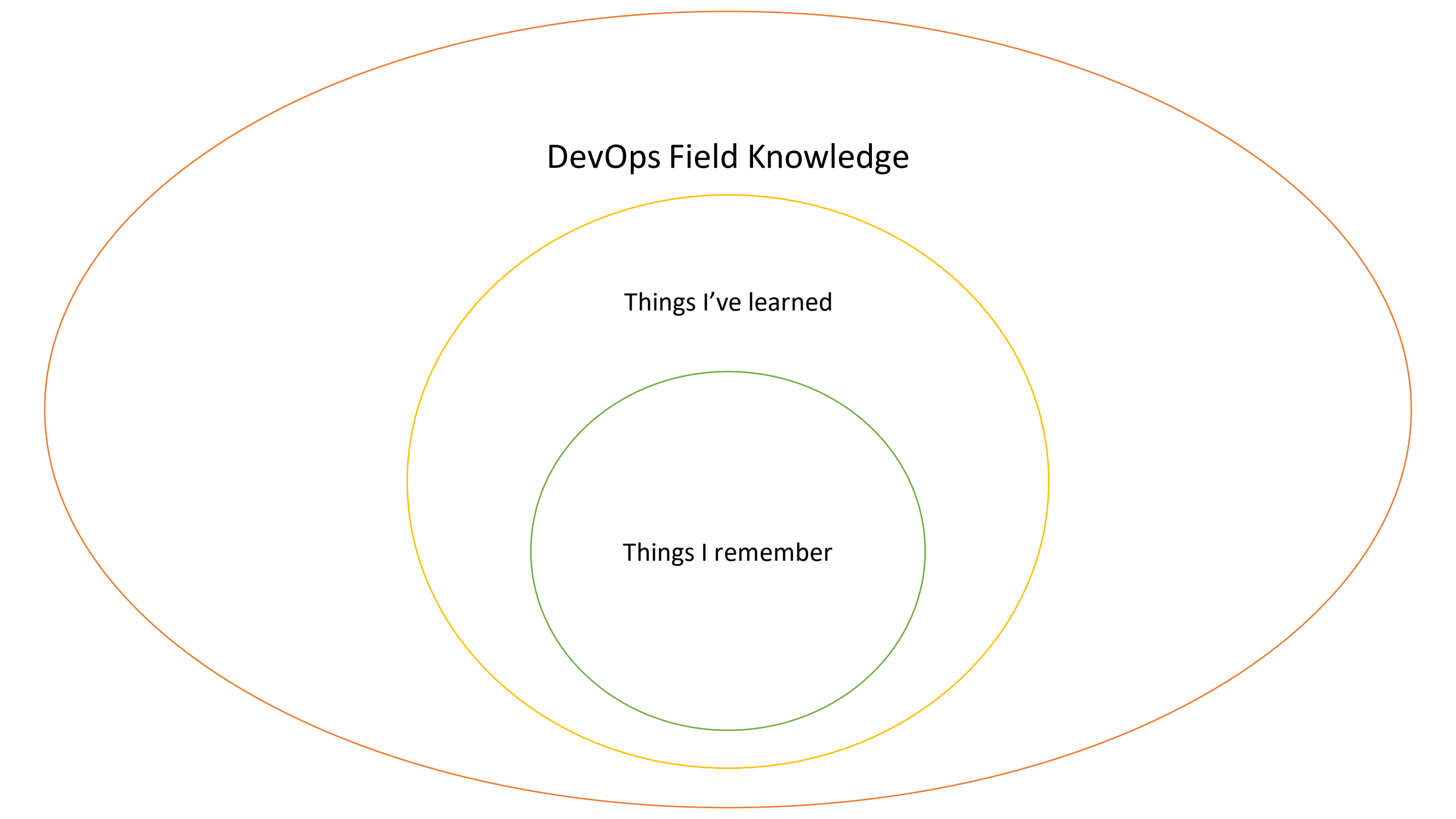


DevOps, Linux & Open Source

Srikar K.C.

July 20, 2024

DISCLAIMER: All views & opinions are my own and DO NOT reflect those of my employer.

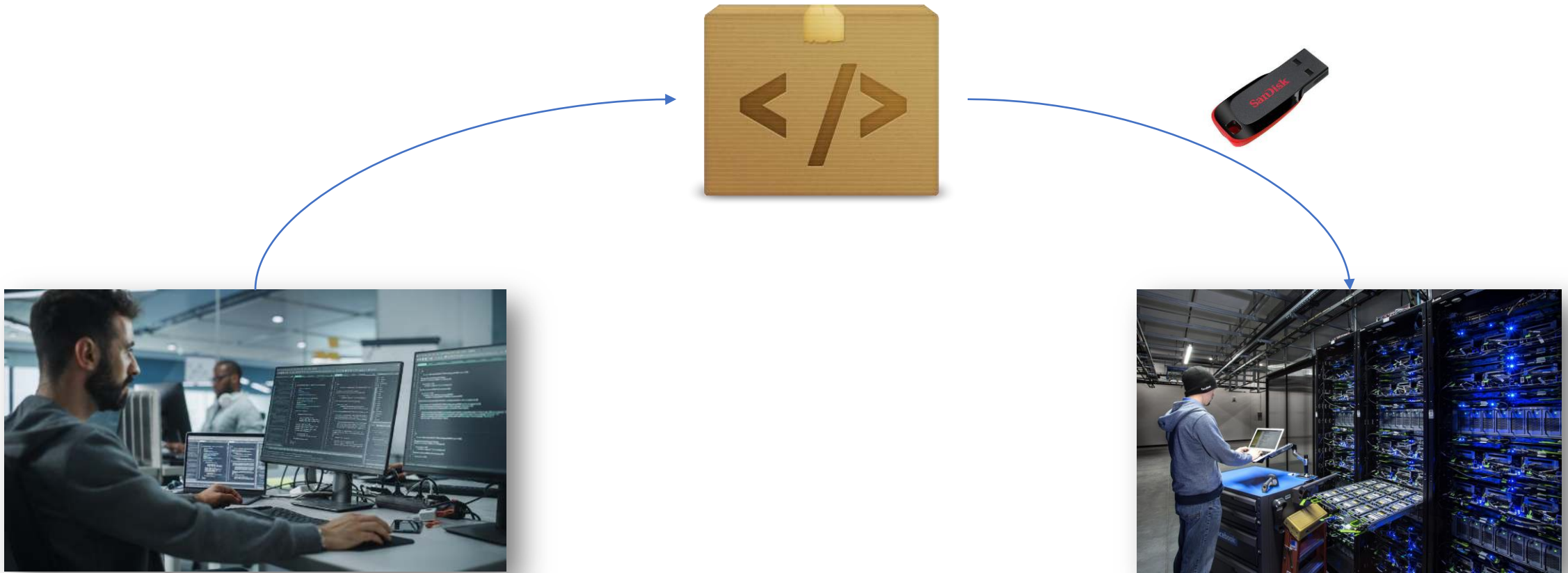


DevOps Field Knowledge

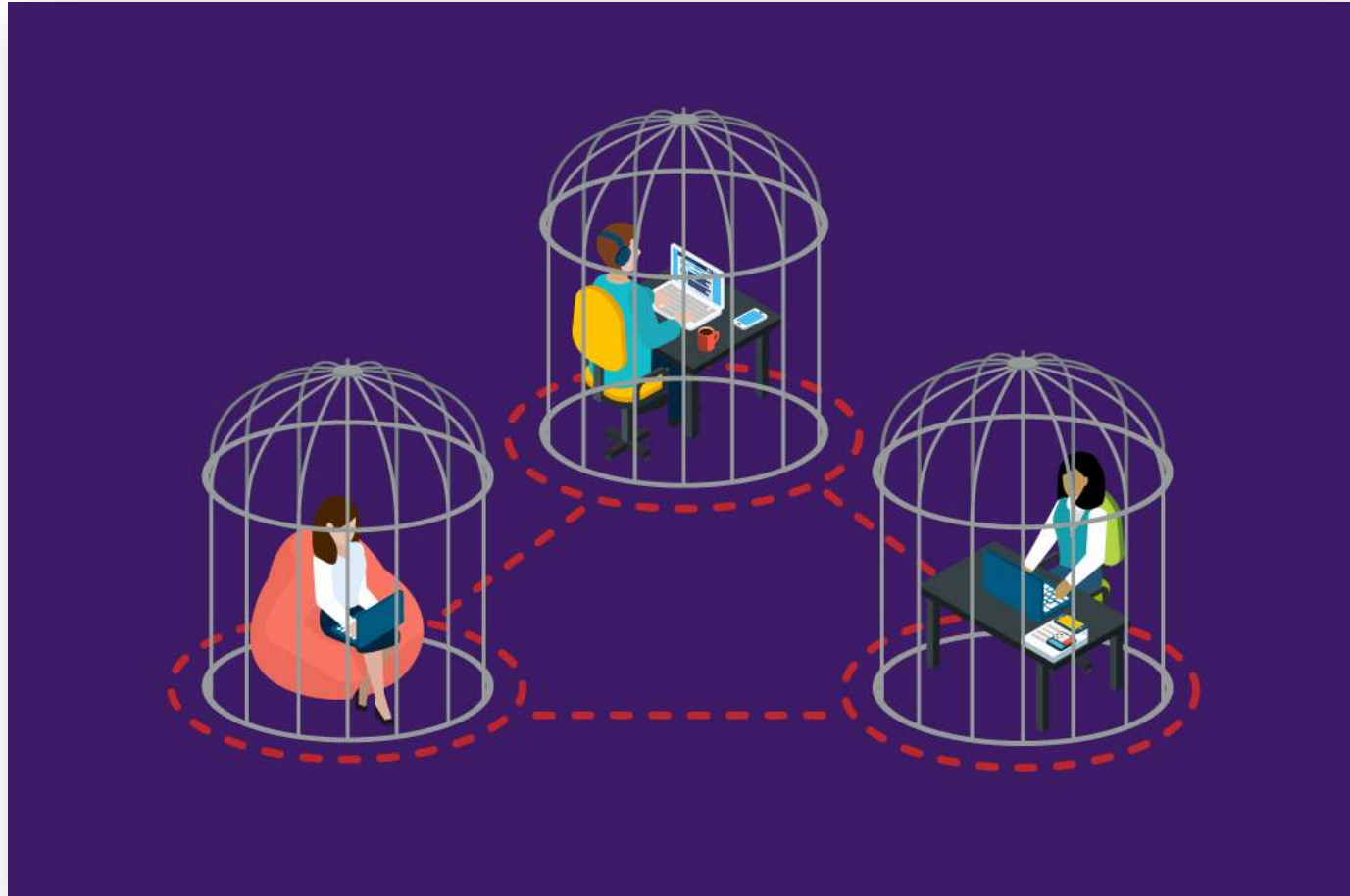
Things I've learned

Things I remember

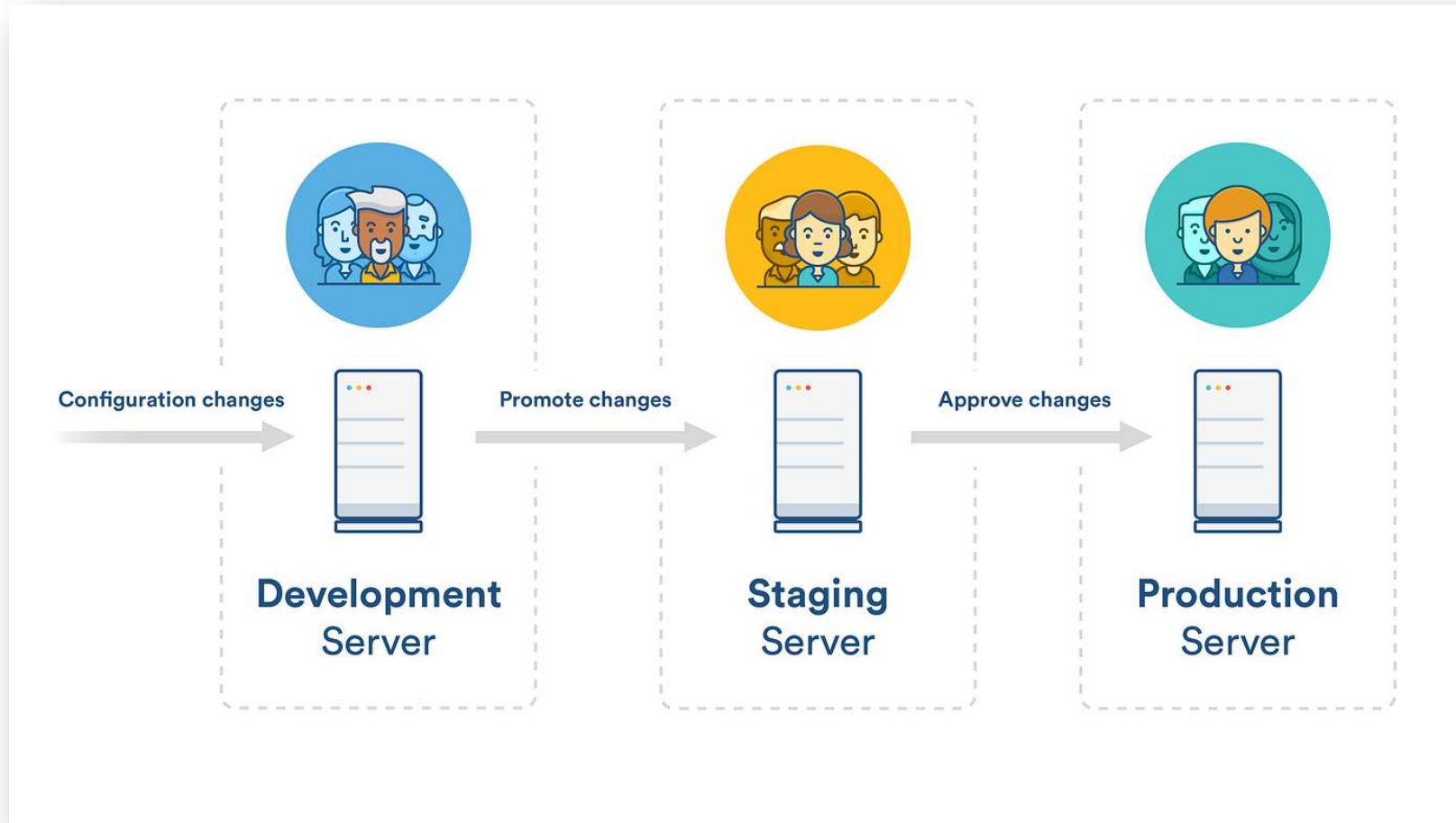
Before DevOps practices



Issue 1 – Siloed teams

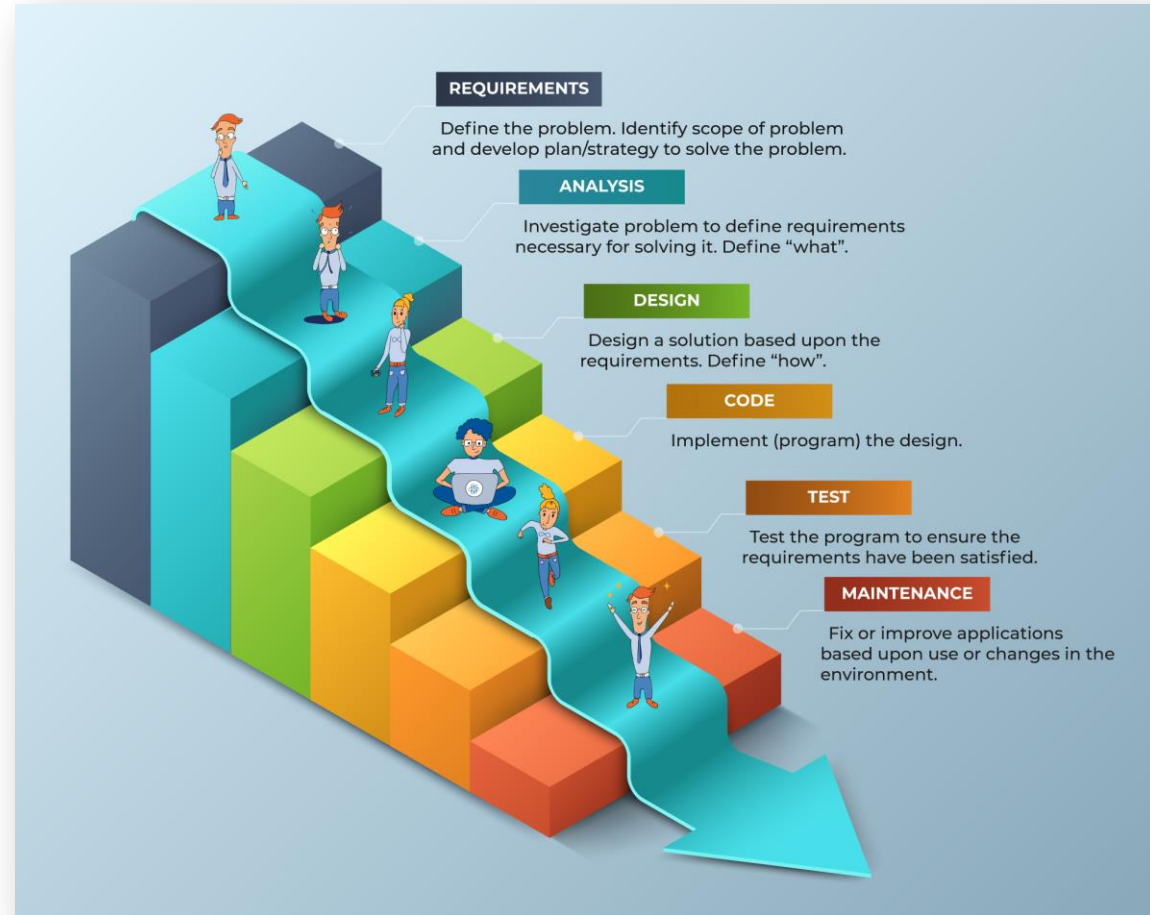


Issue 2 – Inconsistent environments



Issue 3 – Slow Deployment cycles

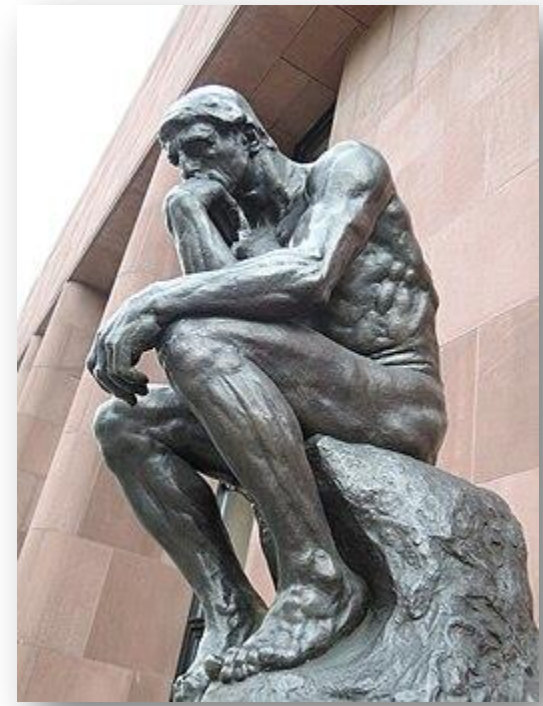
Waterfall SDLC



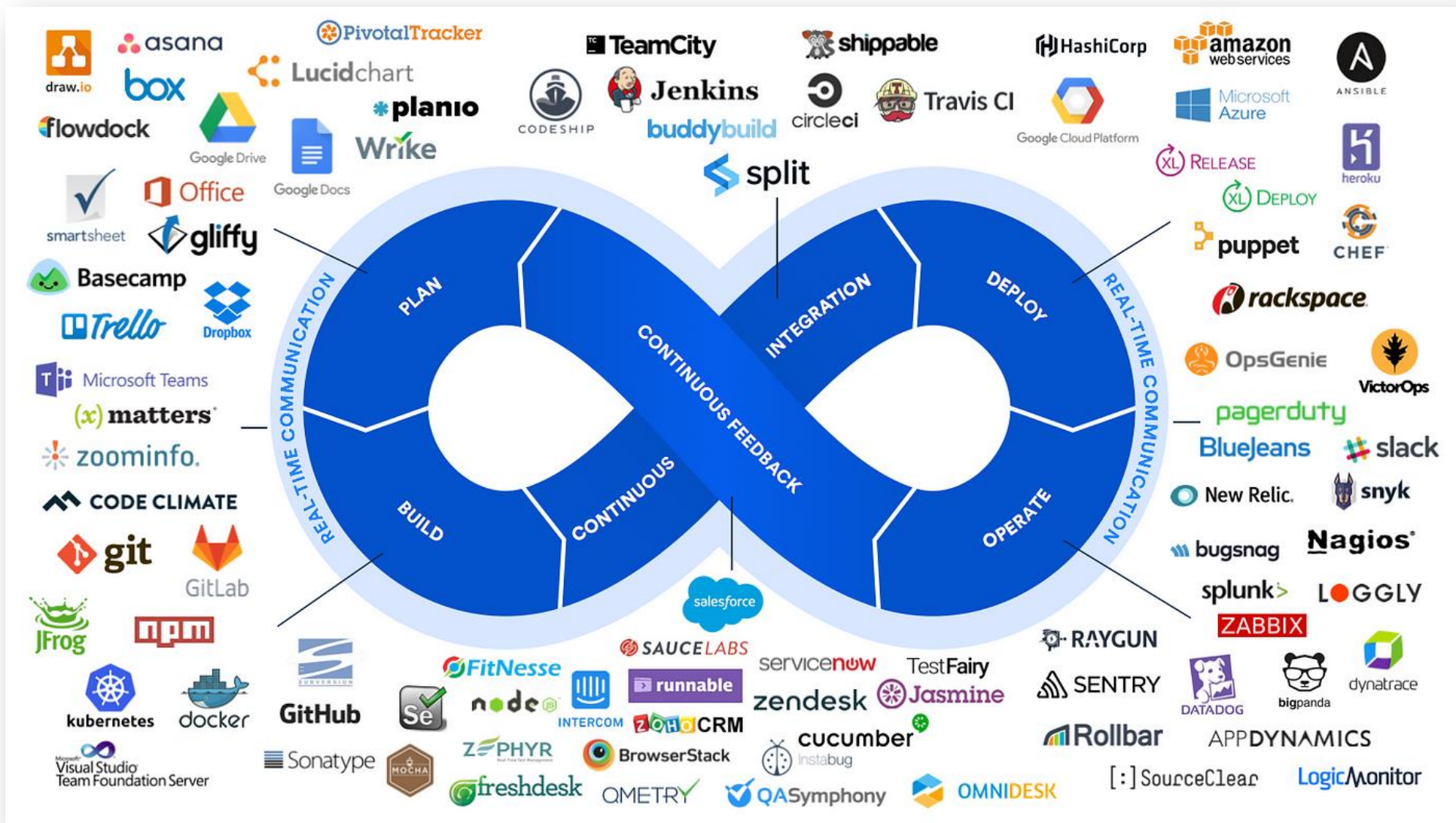
Issue 4 – Security Concerns



What is DevOps?



DevOps Tools



Agile Methodology



Agile Terminology

1. Sprint
2. Daily Stand-ups
3. Spring Planning
4. Sprint Review
5. Sprint Retrospective
6. User Stories
7. Epics
8. Backlog

Quick example

- **Project Overview**

- **Project Name:** Online Bookstore Development
- **Goal:** Develop an e-commerce platform for selling books online.
- **Team:** 5 Developers, 1 SRE (DevOps), 1 Scrum Master, 1 Product Owner

Quick example

- **Sprint 1: Setting Up Basic Features**
- **Duration:** 2 weeks
- **Sprint Planning:**
 - **User Stories:**
 - As a user, I want to create an account so that I can make purchases.
 - As a user, I want to browse books by category so that I can find books easily.
 - As an admin, I want to add new books to the inventory so that users can buy them.

Quick example

- **Tasks:**

- Implement user registration and login functionality.
- Develop a basic UI for browsing books by category.
- Create admin functionality for adding books to the inventory.

- **Daily Stand-Ups:**

- Team members discuss progress, any blockers, and plan for the day.

Quick example

- **Sprint Review:**
 - Demonstrate the following:
 - User registration and login pages.
 - Book browsing interface.
 - Admin panel for adding books.
- Collect feedback from the Product Owner and stakeholders.

Quick example

- **Sprint Retrospective:**

- **What Went Well:**

- Good collaboration among team members.
 - Completed all planned user stories.

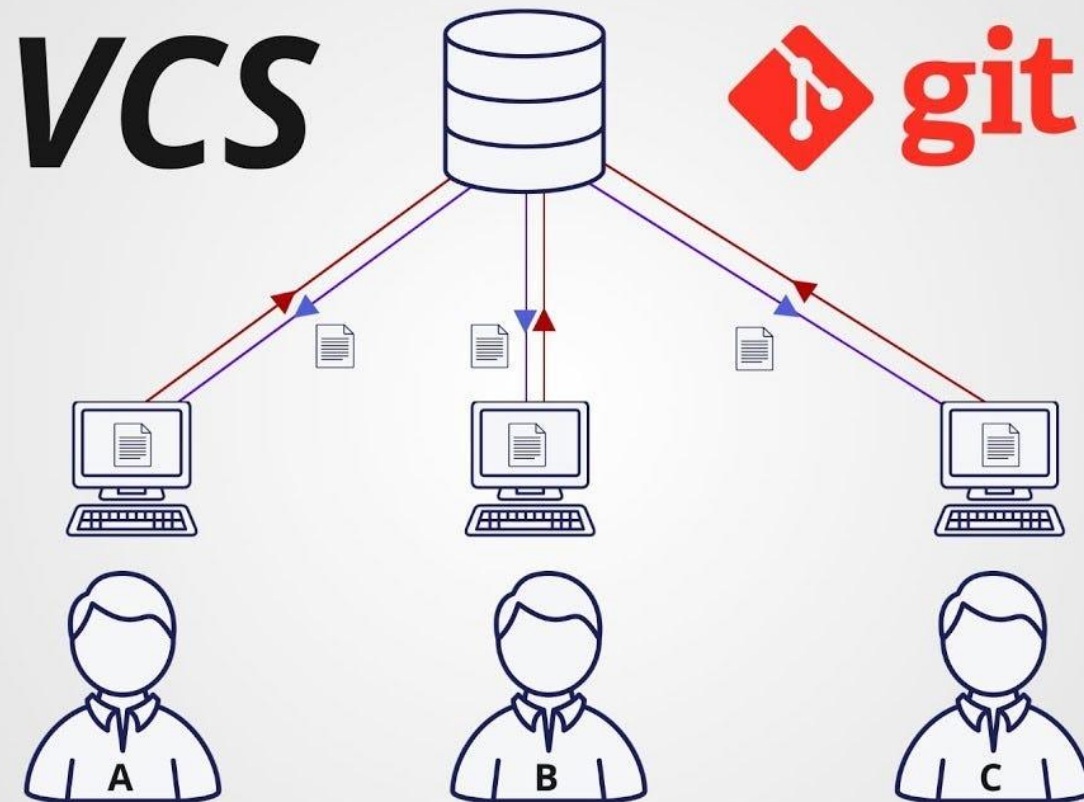
- **What Could Be Improved:**

- Improve communication with stakeholders to gather more detailed requirements.
 - Allocate more time for testing.

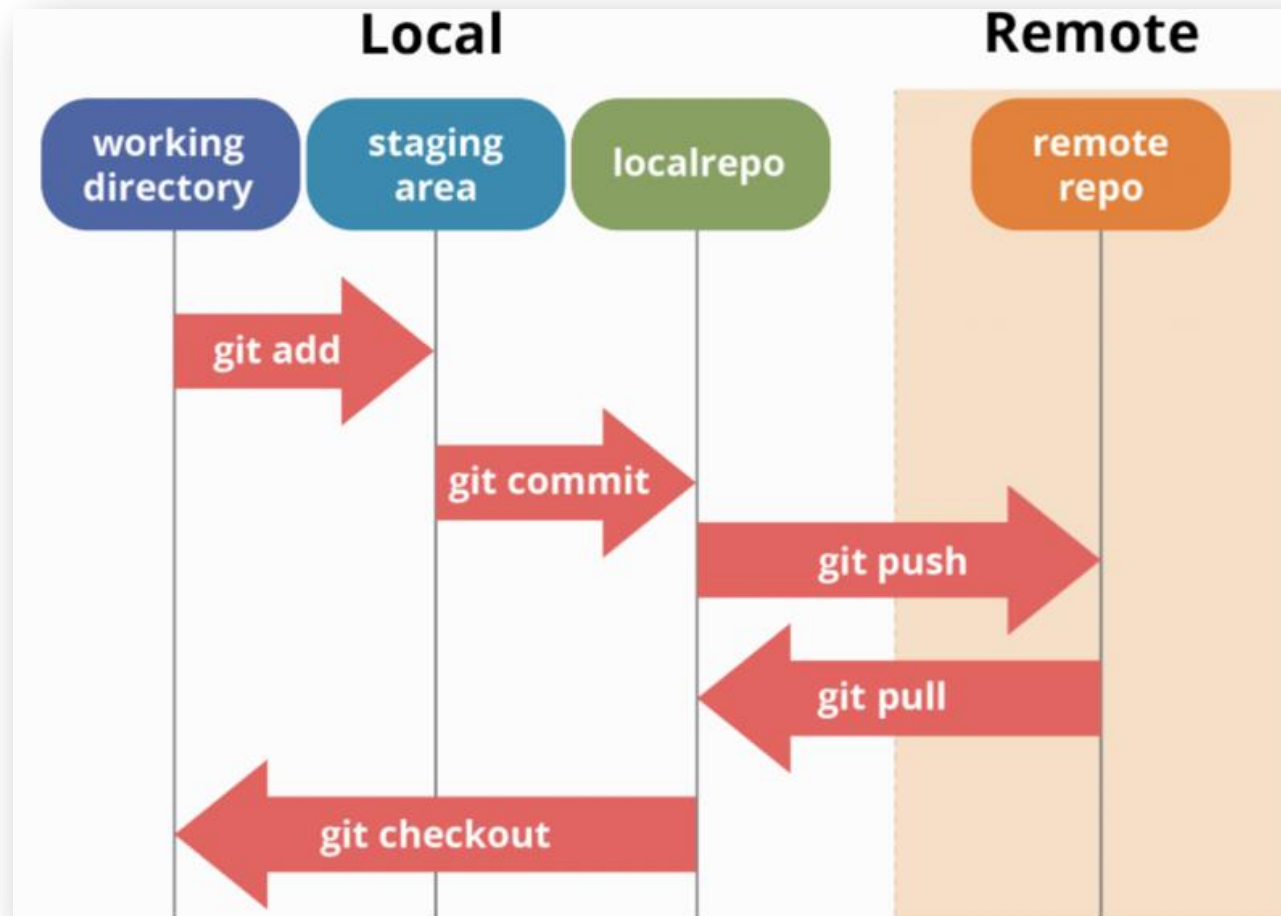
Git



What is Git?



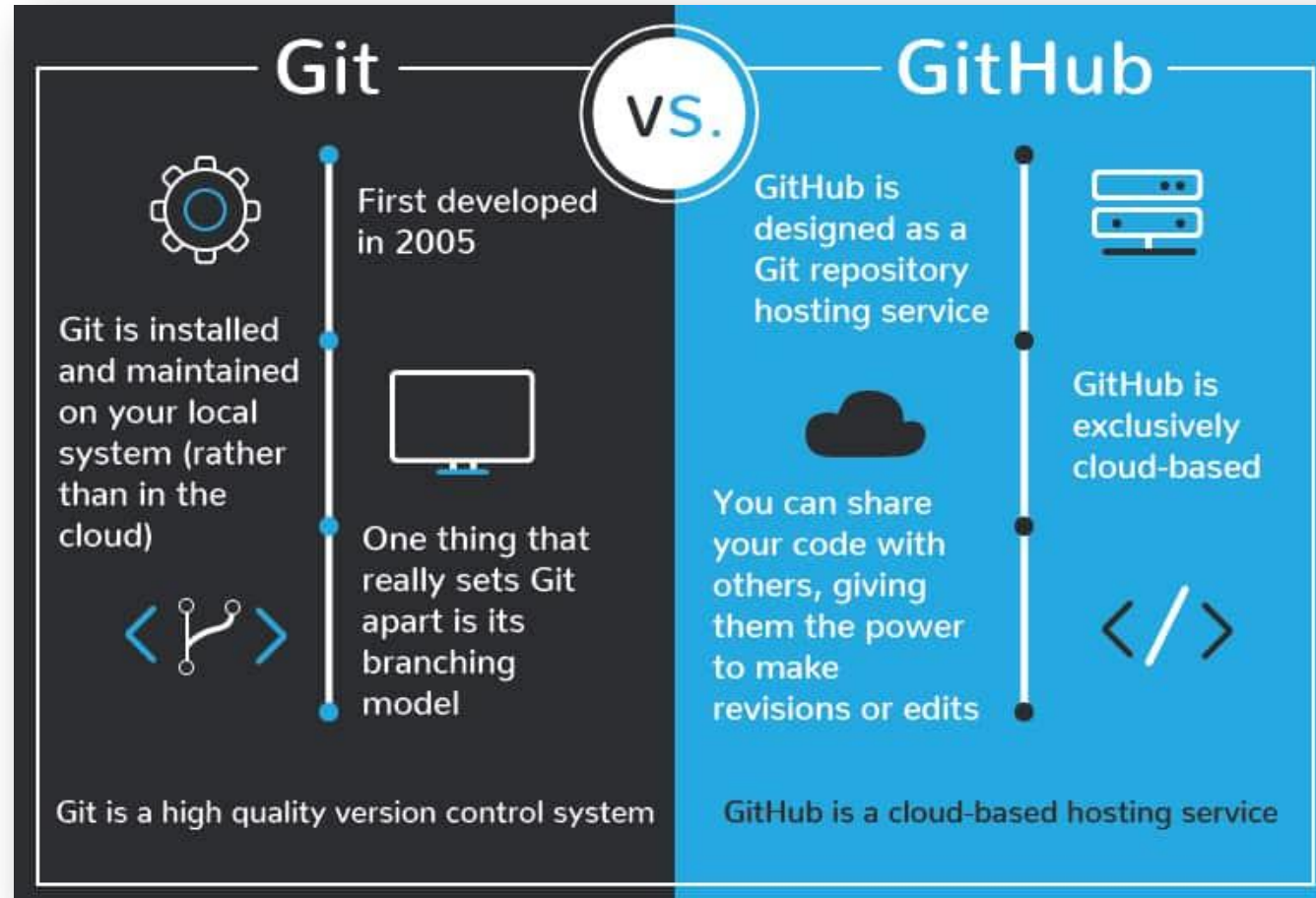
Git Workflow



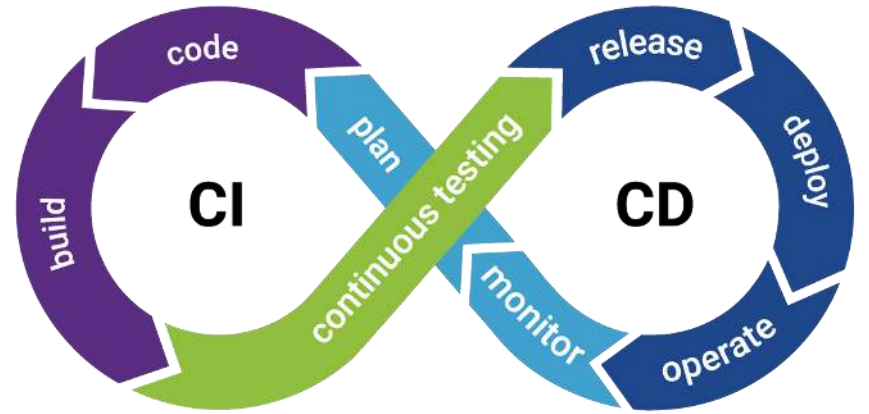
Basic Commands

- Clone: `git clone [repository_url]`
- Commit: `git commit -m "commit message"`
- Push: `git push [remote] [branch]`
- Pull: `git pull [remote] [branch]`
- Branch: `git branch [branch_name]`
- Merge: `git merge [branch_name]`
- Status: `git status`
- Log: `git log`

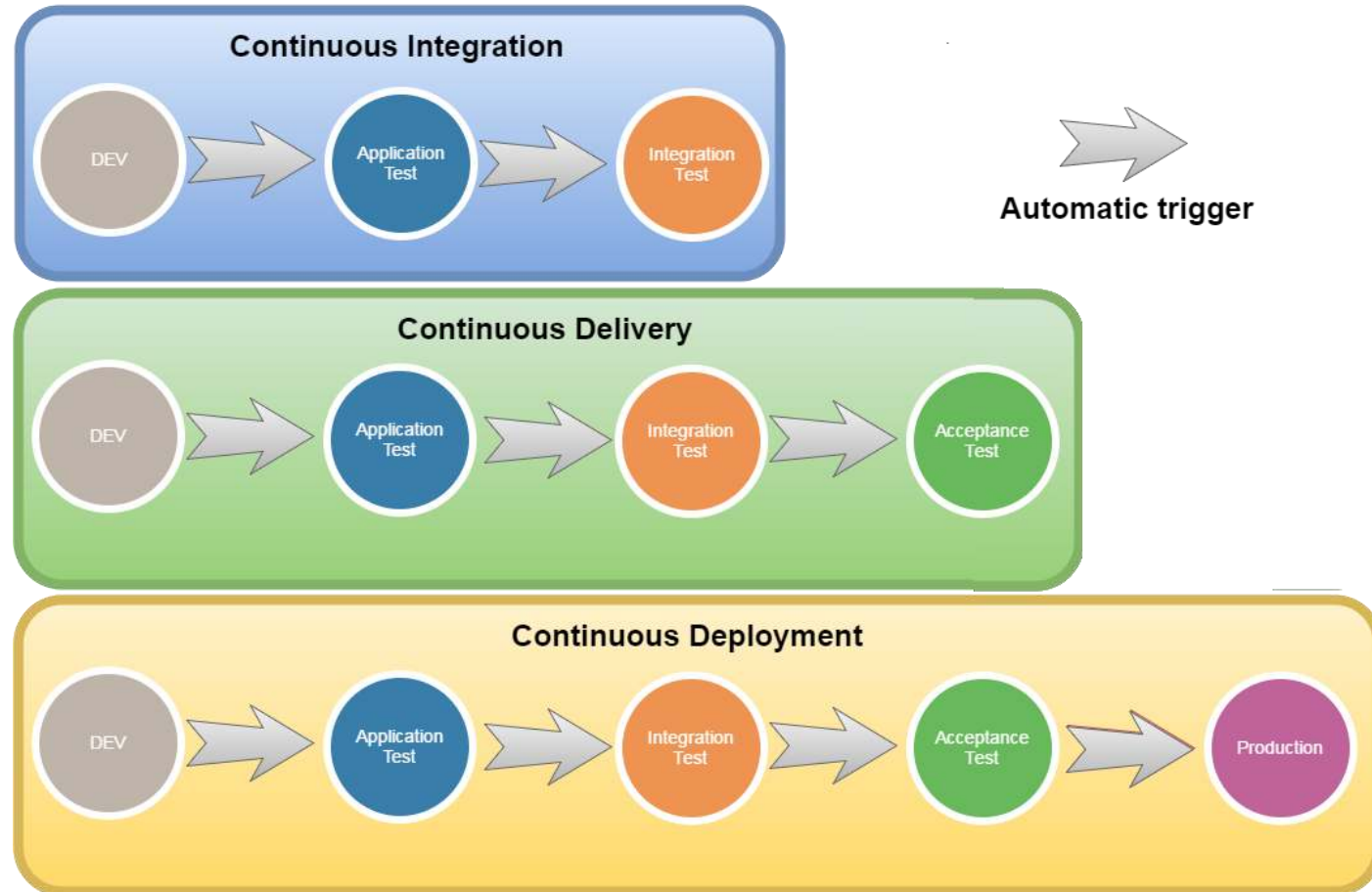
Git vs GitHub



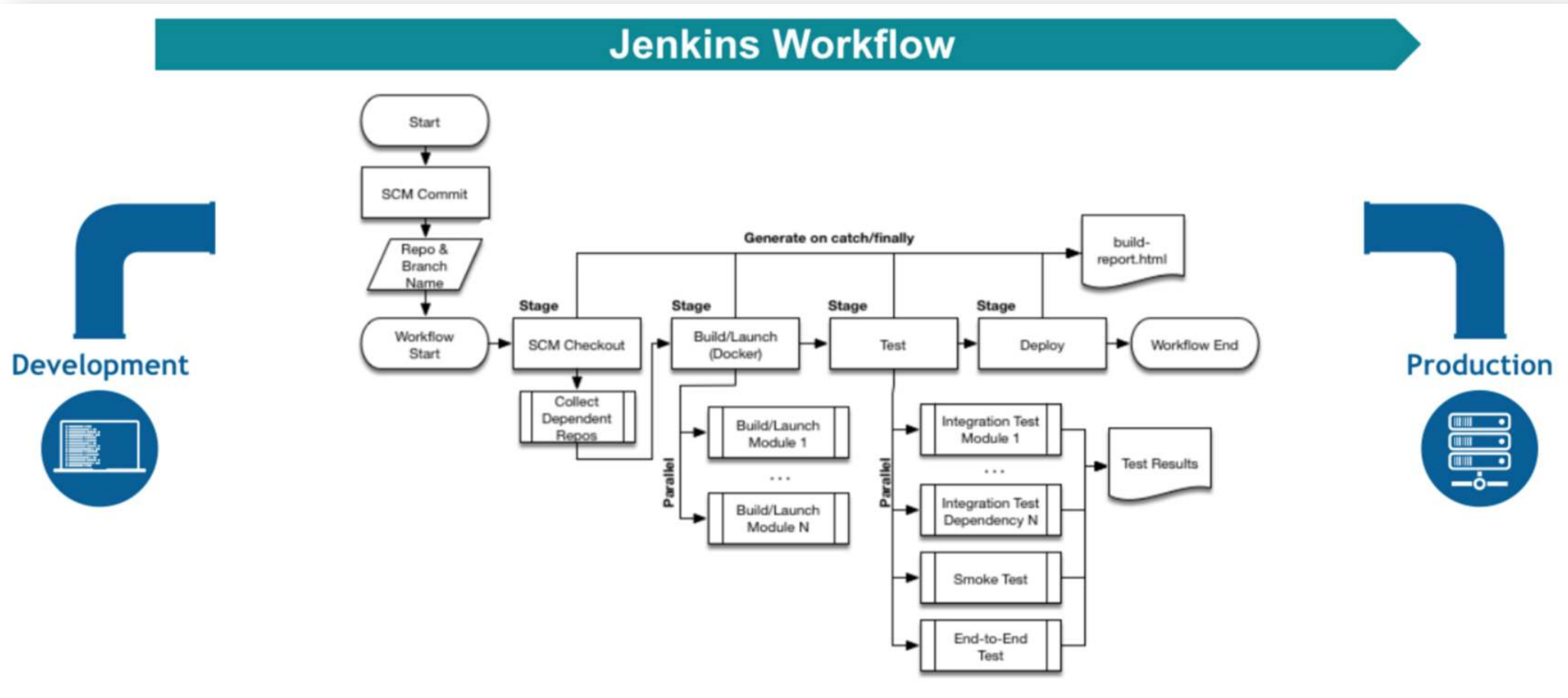
Ci/Cd



CI vs CD



Jenkins Pipeline



Jenkins UI

 **Jenkins**

Search (⌘+K) ?

Admin ? log out

Dashboard > creating-a-pipeline-in-blue-ocean > First-pull-branch >

Status

</> Changes

► Build Now

⚙ View Configuration

🔍 Full Stage View

🌊 Open Blue Ocean

🔗 GitHub

🔍 Pipeline Syntax

Build History

trend ▼

Filter builds...

#4

Aug 8, 2022, 2:14 PM

#3

Aug 4, 2022, 8:49 PM

#2

Aug 3, 2022, 2:18 PM

Branch First-pull-branch

Full project name: creating-a-pipeline-in-blue-ocean/First-pull-branch

Stage View

Average stage times:
(Average full run time: ~1h 29min)

	Declarative: Checkout SCM	Build	Test	Test	error	Deliver
#4 Aug 08 14:14 No Changes	1s	36s	36ms	1s	70ms (paused for 1h 24min)	5s (paused for 4min 24s)
#3 Aug 04 20:49 No Changes	472ms	31s	37ms	1s	249ms (paused for 3d 17h) aborted	69ms aborted
#2 Aug 03 14:18 No Changes	7min 27s					

Permalinks



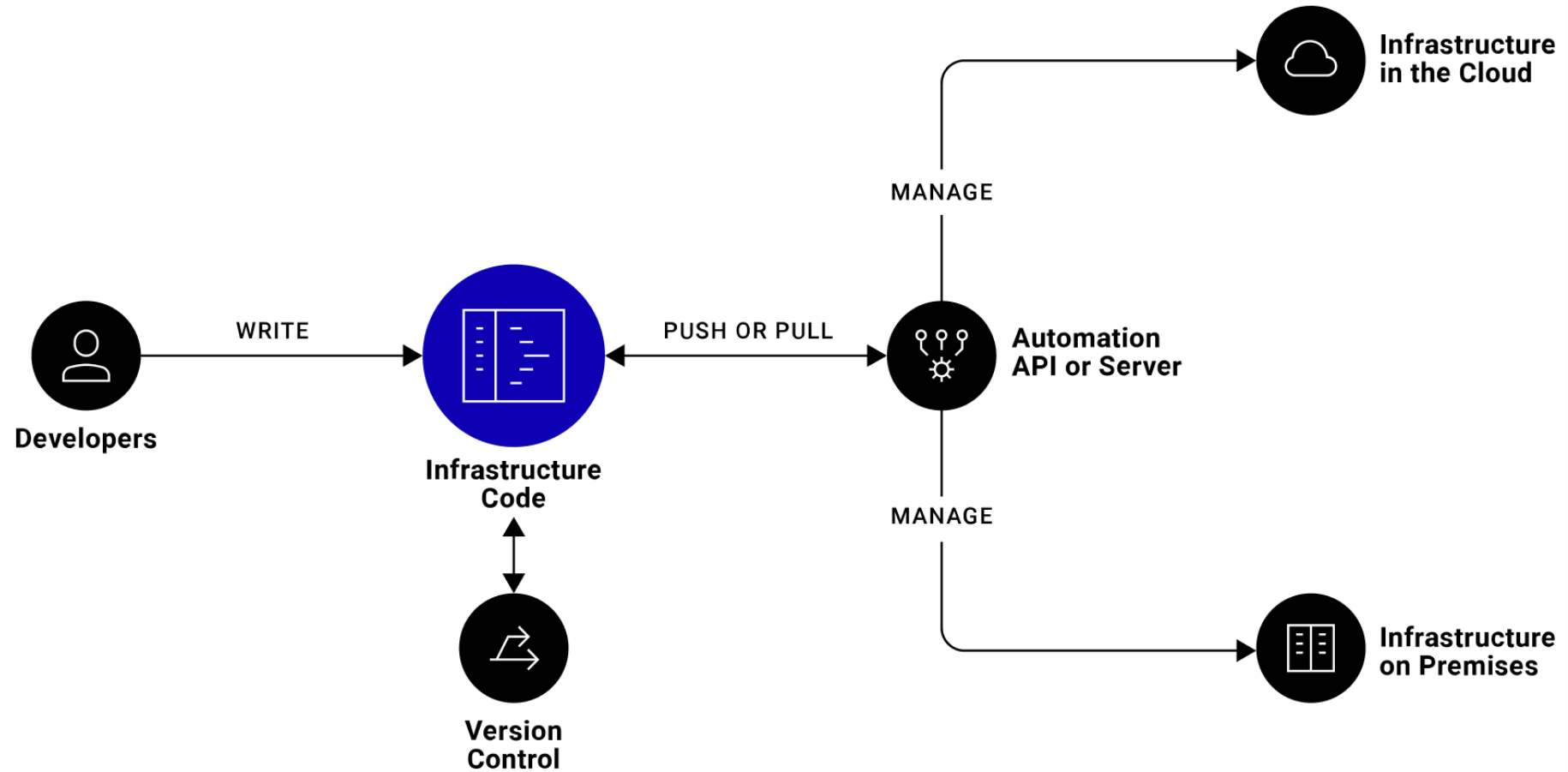
Jenkinsfile

```
Jenkinsfile (Declarative Pipeline)
pipeline { ❶
  agent any ❷
  options {
    skipStagesAfterUnstable()
  }
  stages {
    stage('Build') { ❸
      steps { ❹
        sh 'make' ❺
      }
    }
    stage('Test'){
      steps {
        sh 'make check'
        junit 'reports/**/*.xml' ❻
      }
    }
    stage('Deploy') {
      steps {
        sh 'make publish'
      }
    }
  }
}
```



Infrastructure As Code (IaC)

IaS Workflow



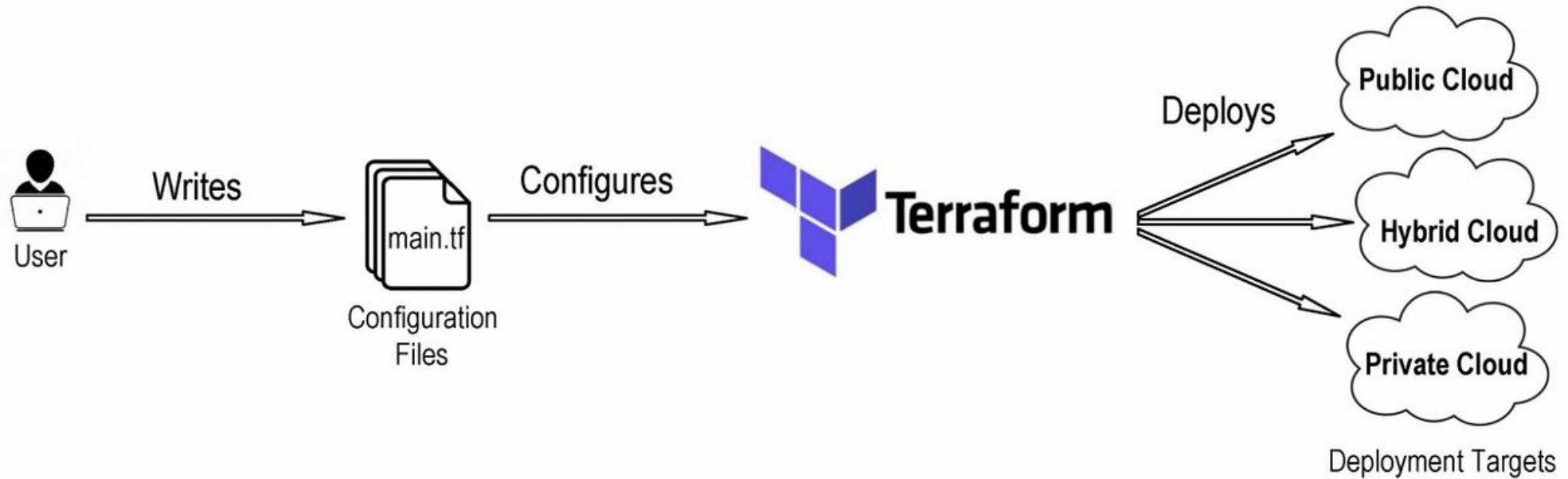
Terraform Code

```
# Configure the Google Cloud provider
provider "google" {
  project = "your-gcp-project-id"
  region  = "us-central1"
  zone    = "us-central1-a"
}
```



```
resource "google_compute_instance" "vm_instance" {
  name = "terraform-instance"
  machine_type = "f1-micro"
  initial_node_count = "3"
  boot_disk {
    initialize_params {
      image = "debian-cloud/debian-9"
    }
  }
  network_interface {
    network = google_compute_network.vpc_network.name
    access_config {
    }
  }
}
```

Terraform Workflow



Terraform Commands

- Init
- Plan
- Apply
- Show
- Destroy

Benefits of Terraform

- Consistency
- Version Control
- Scalability
- Automation
- Collaboration

Configuration Management

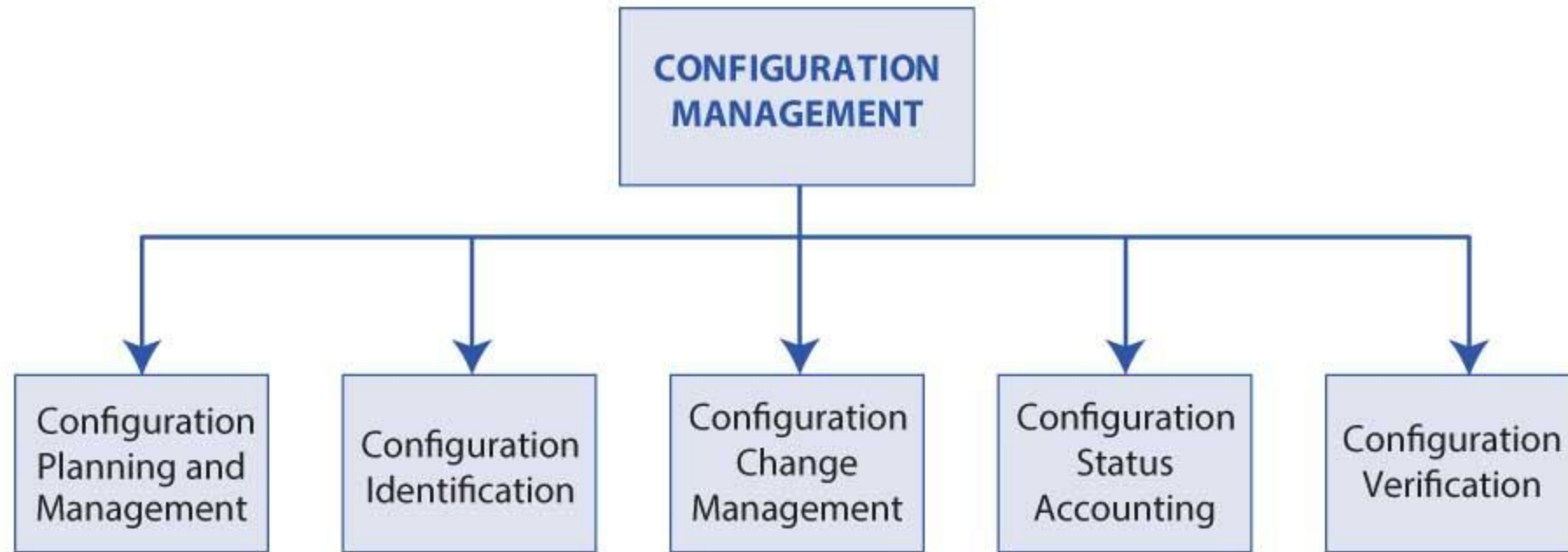
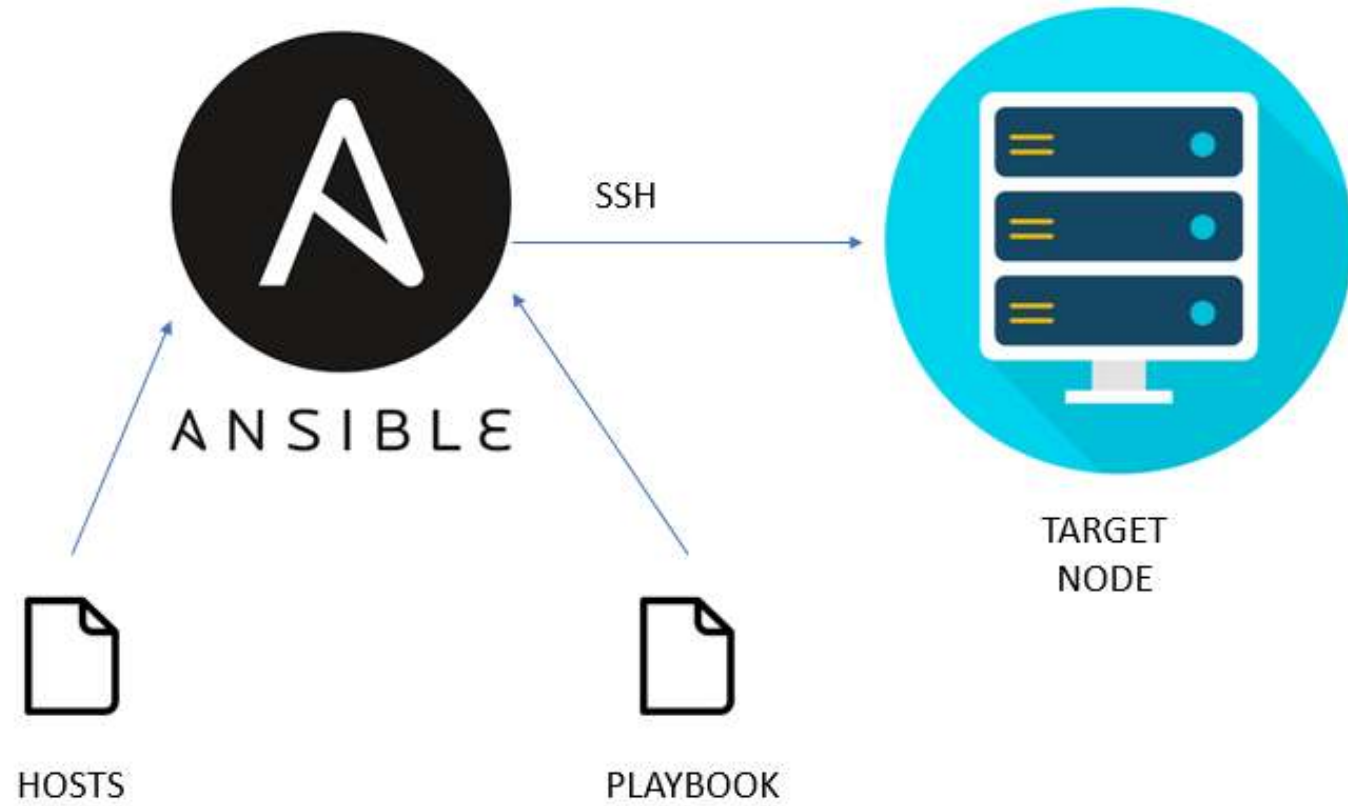


FIGURE 6.5-2 Five Elements of Configuration Management

Ansible



Ansible Hosts File



```
[webservers]
```

```
webserver1.example.com ansible_host=192.168.1.1 ansible_user=root ansible_ssh_private_key_file=~/.ssh/id_rsa  
webserver2.example.com ansible_host=192.168.1.2 ansible_user=root ansible_ssh_private_key_file=~/.ssh/id_rsa  
webserver3.example.com ansible_host=192.168.1.3 ansible_user=root ansible_ssh_private_key_file=~/.ssh/id_rsa
```

```
[webservers:vars]
```

```
http_port=80  
max_clients=200
```

Ansible playbook – webserver_setup.yml

```
---  
- name: Setup web servers  
  hosts: webserver  
  become: yes  
  
  tasks:  
    - name: Ensure Apache is installed  
      apt:  
        name: apache2  
        state: present  
        update_cache: yes  
  
    - name: Ensure Apache is started and enabled  
      service:  
        name: apache2  
        state: started  
        enabled: yes  
  
    - name: Configure Apache  
      template:  
        src: templates/apache.conf.j2  
        dest: /etc/apache2/apache2.conf
```

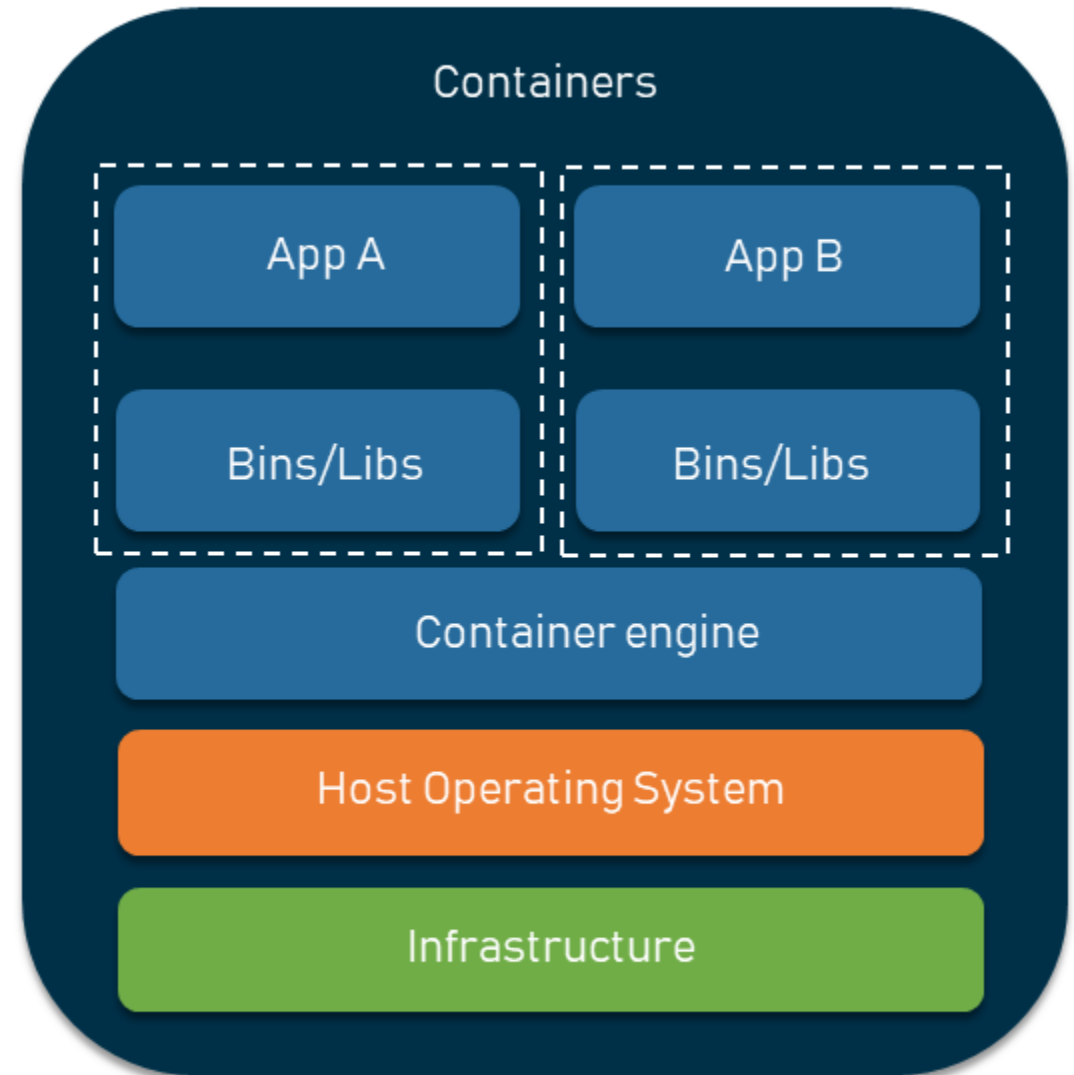
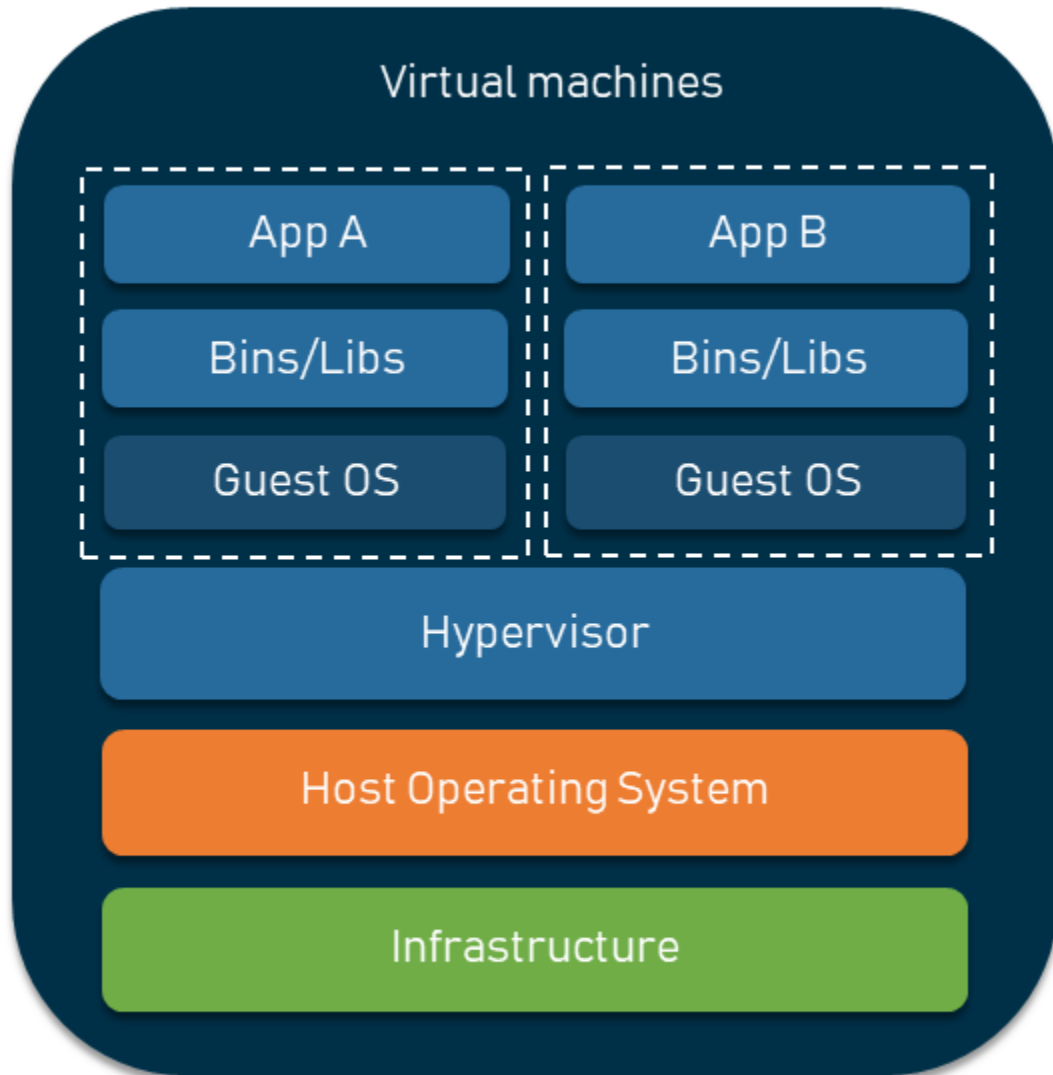
Command to execute the Playbook

```
$ ansible-playbook -i hosts webserver_setup.yml
```



Containerization

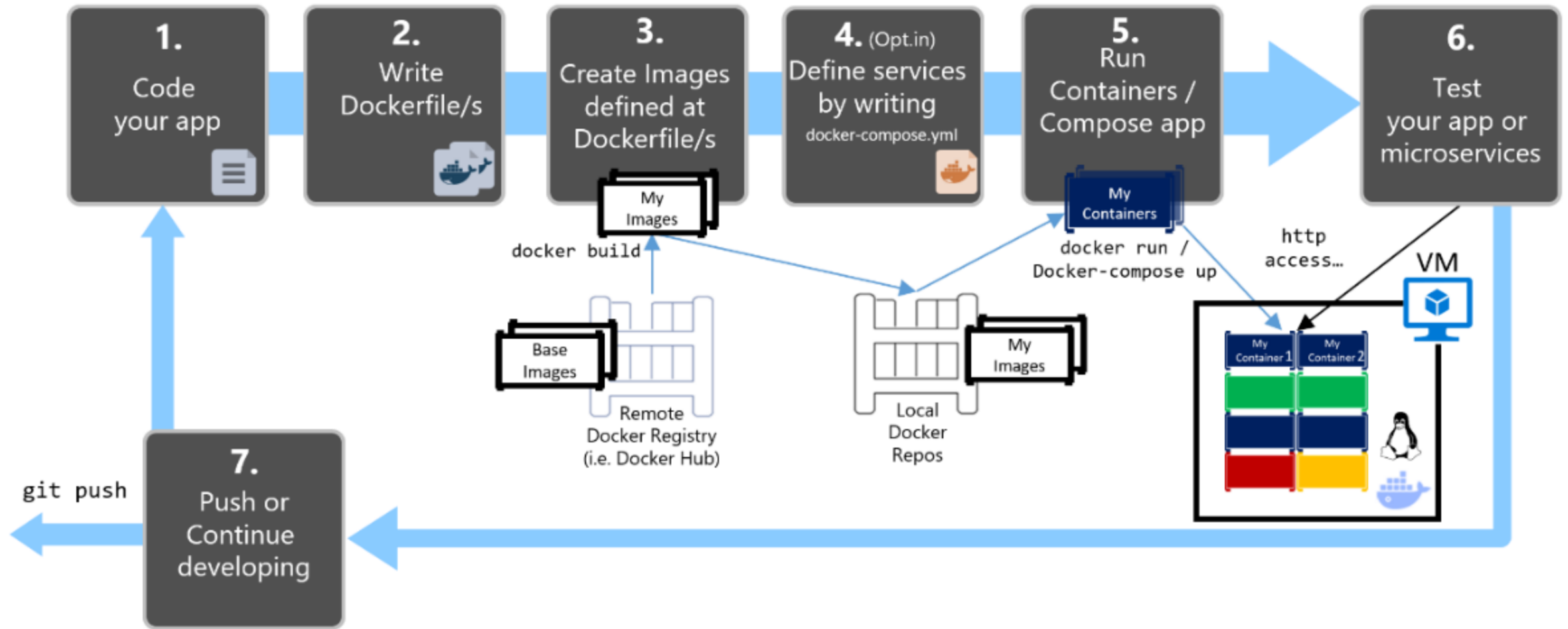
VIRTUAL MACHINES VS CONTAINERS



backend >  Dockerfile > ...

```
1 FROM node:14.16.0-alpine3.13
2
3 RUN addgroup app && adduser -S -G app app
4 RUN ["chmod", "+x", "/usr/local/bin/docker-entrypoint.sh"]
5 USER app
6
7 WORKDIR /app
8
9 COPY package*.json ./
10 RUN npm install
11 COPY . .
12
13 USER root
14 RUN ["chmod", "+x", "./docker-entrypoint.sh"]
15 RUN ["chmod", "+x", "./wait-for"]
16 USER app
17
18 EXPOSE 3001
19
20 CMD ["npm", "start"]
```

Inner-Loop development workflow for Docker apps



The Zabbix logo consists of a red rectangular box with the word "ZABBIX" in white, bold, uppercase letters. Below the word, in a smaller white font, is the text "Enterprise Class open-source monitoring software". The red box is centered within a larger light gray rectangle.

ZABBIX

Enterprise Class open-source monitoring software

Monitoring

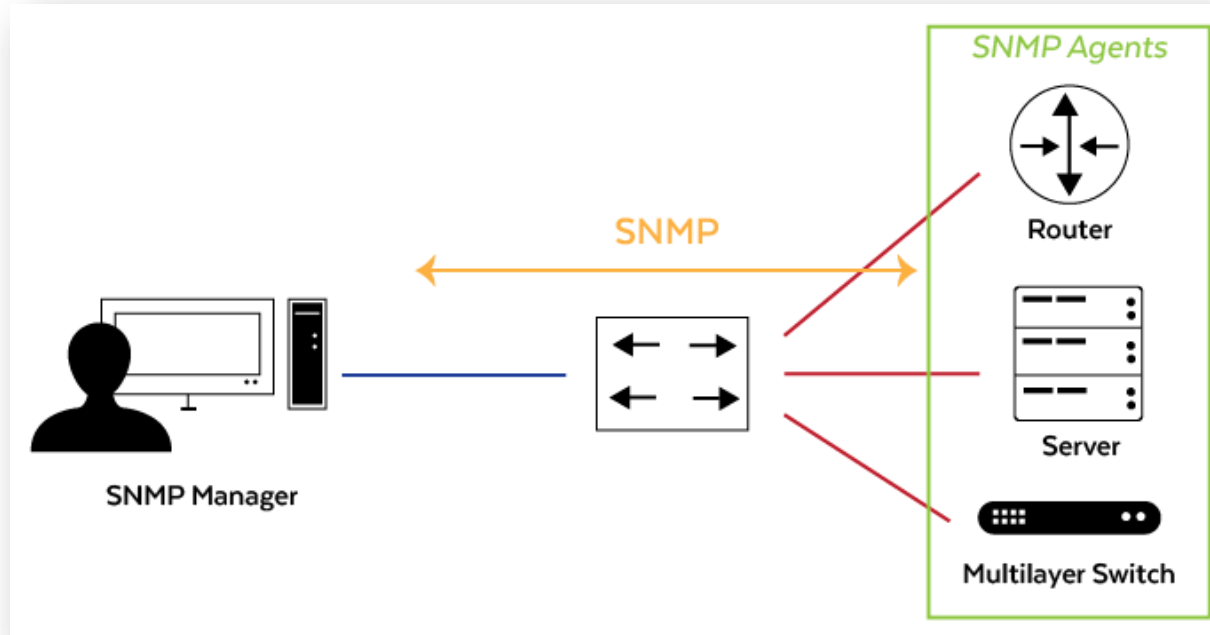
What is Zabbix?



Key Features

- Data Collection
 - Alerting & Notification
 - Visualization
-
- Auto-Discovery
 - Templates
 - APIs

SNMP



SNMP OID	Description
<u>fgIntfBcQPackets</u> 1.3.6.1.4.1.12356.101.7.5.4.1.1	Packets conform by shaping in the interface, policy, and class.
<u>fgIntfBcQBytes</u> 1.3.6.1.4.1.12356.101.7.5.4.1.2	Bytes conform by shaping in the interface, policy, and class.
<u>fgIntfBcQPDrops</u> 1.3.6.1.4.1.12356.101.7.5.4.1.3	Packets discard by shaping in the interface, policy, and class.
<u>fgIntfBcQBDrops</u> 1.3.6.1.4.1.12356.101.7.5.4.1.4	Bytes discard by shaping in the interface, policy, and class.

SNMP

Host Templates IPMI Tags Macros Inventory Encryption Value mapping

* Host name

Visible name

* Groups

Discovered hosts ✕
type here to search

Interfaces	Type	IP address	DNS name
	Agent	127.0.0.1	
^	SNMP	127.0.0.1	

* SNMP version

* SNMP community

Max repetition count ?

☒ Use combined requests

Items

All templates / Cisco 2620 SNMPv3 Applications Items 10 Triggers 3 Graphs 2 Screens Discovery rules

Item Preprocessing

* Name

Type

* Key Select

* SNMP OID

Context name

Security name

Security level

Authentication protocol

Authentication passphrase

Privacy protocol

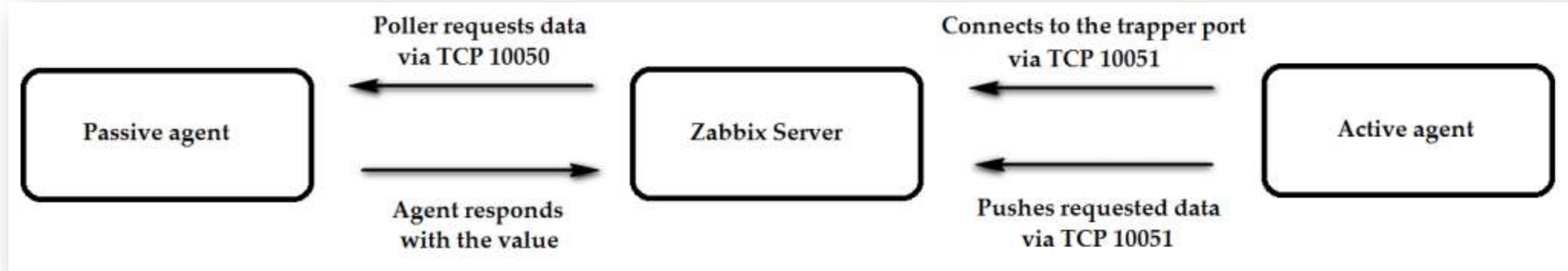
Privacy passphrase

Port

Type of information

* Update interval

Zabbix Agent

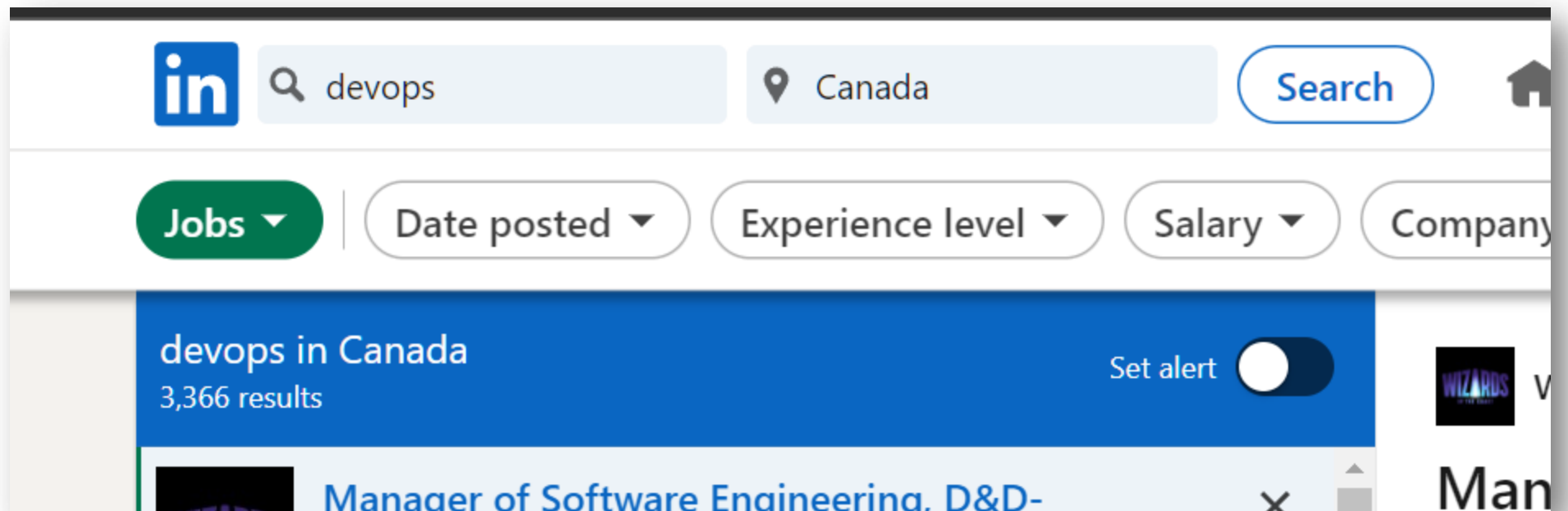


The screenshot shows the Zabbix configuration interface for a new item. The "Type" dropdown menu is open, displaying a list of available agent types. The "Zabbix agent" option is selected and highlighted in blue.

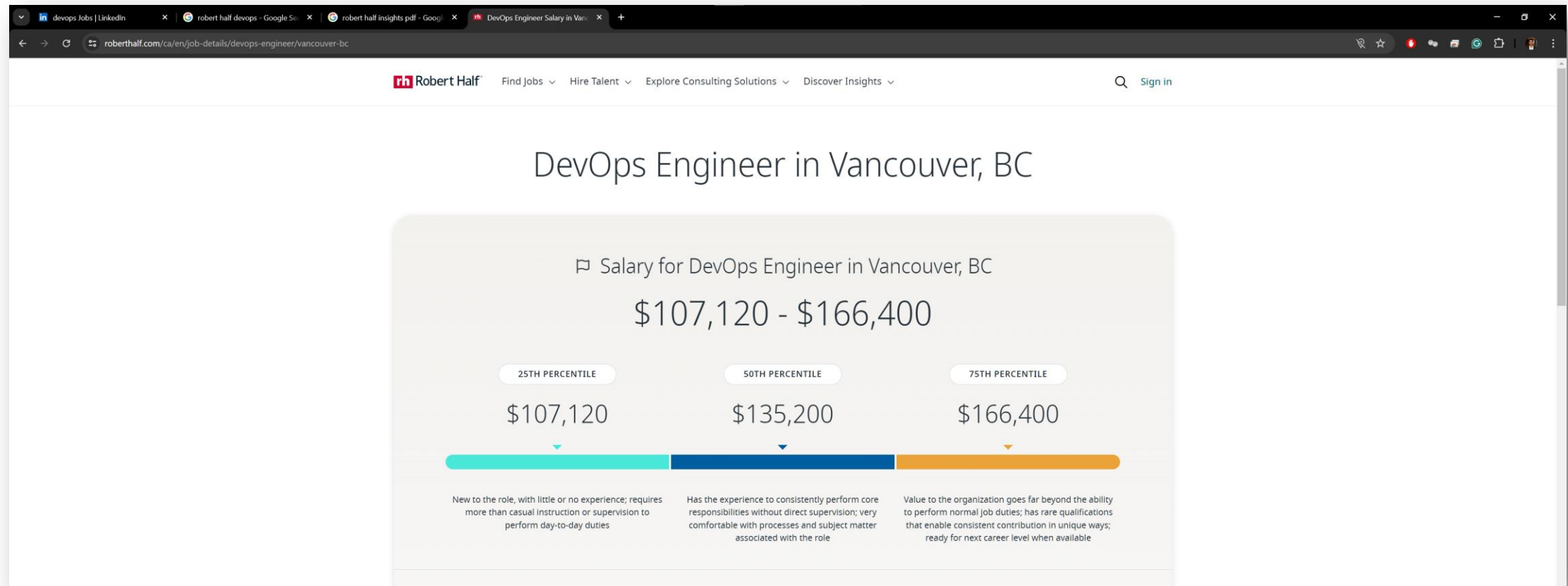
Field	Value
* Name	
Type	Zabbix agent
* Key	Zabbix agent (active)
* Host interface	SNMPv1 agent
Type of information	SNMPv2 agent
Units	SNMPv3 agent
* Update interval	SNMP trap
Custom intervals	Zabbix internal
	Zabbix trapper
	Zabbix aggregate
	External check
	Database monitor
	HTTP agent
	IPMI agent
	SSH agent
	TELNET agent
	JMX agent
	Calculated
	Dependent item

Interval	Period	Action
50s	1-7,00:00-24:00	Remove

Need in the market



Decent pay



How to break in?

- Technical Skills

1. <https://roadmap.sh/devops>
2. Projects / personal portfolio site

- Job search

1. Attend DevOps conferences
2. Practice interviews
3. Reach out on LinkedIn



*“What you do makes a difference,
and you have to decide
what kind of difference
you want to make.”*

—Jane Goodall

