

Introduction to DevOps

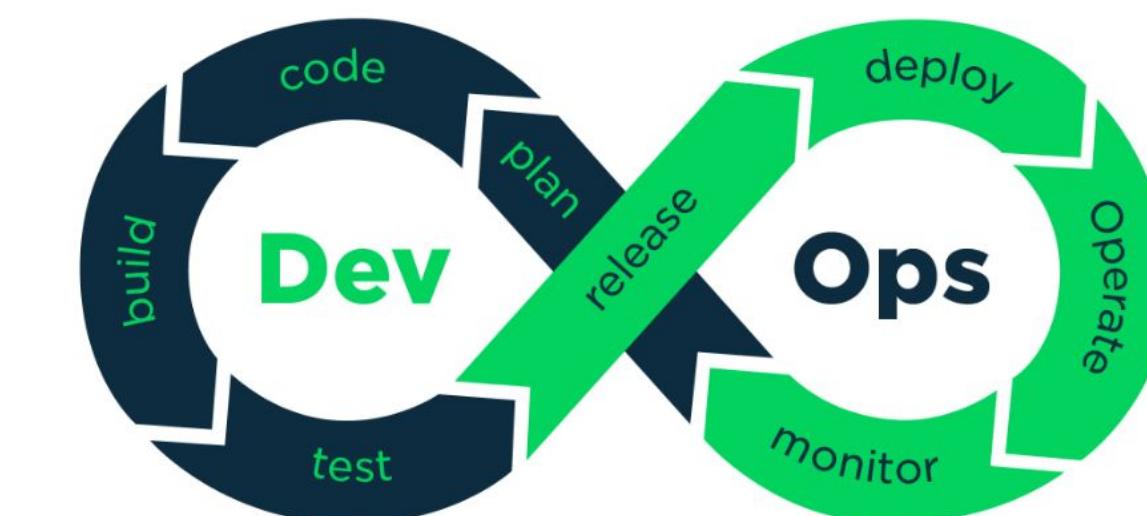
Introduction to DevOps

Agenda

- About CloudxLab
- About Authors / Instructors
- About Course
- What is DevOps?
- Why DevOps – Case Study
- Understanding Various Tools
- Hands-On with Linux and Git
- Q/As – Course / DevOps

Instructions / Notes

- Starts: **22 Mar, 7:30am PDT/PST or 22 Mar, 8pm IST**
- 2 Hours session with 10 minutes Break
- Except Instructor, everyone is on mute
- Please use the Q/A Window to Ask Questions
- The recording & slides will be shared after session
- More Info: CloudxLab.com



Sandeep Giri

Vision

Upskill engineers and IT professionals in Deep Tech – Deep Learning, Machine Learning and Big Data technologies, make them employable and future ready

Problems in Existing Solutions

Learning **Deep Tech** is hard without the right tools. Problems in existing solutions -



No Personalization –
Every user is different



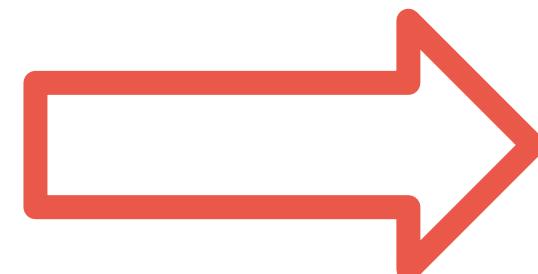
No Feedback Loop – No
yardstick to measure
improvements



No Playground for Practice
– Content alone is not
sufficient for tech courses



Plethora of content
but not engaging
enough

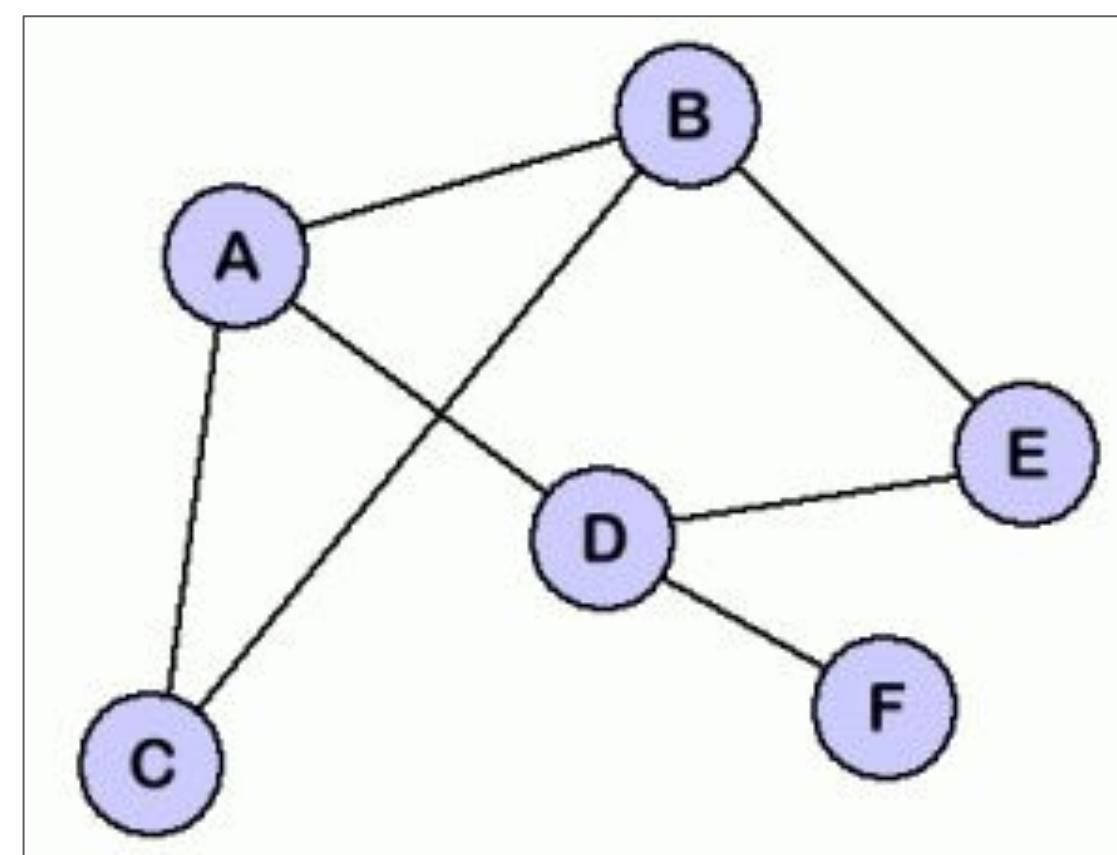


Results in High dropout
rate (**<5% completion**)

Source –
insidehighered.com

Value Proposition #1 – Knowledge Graph

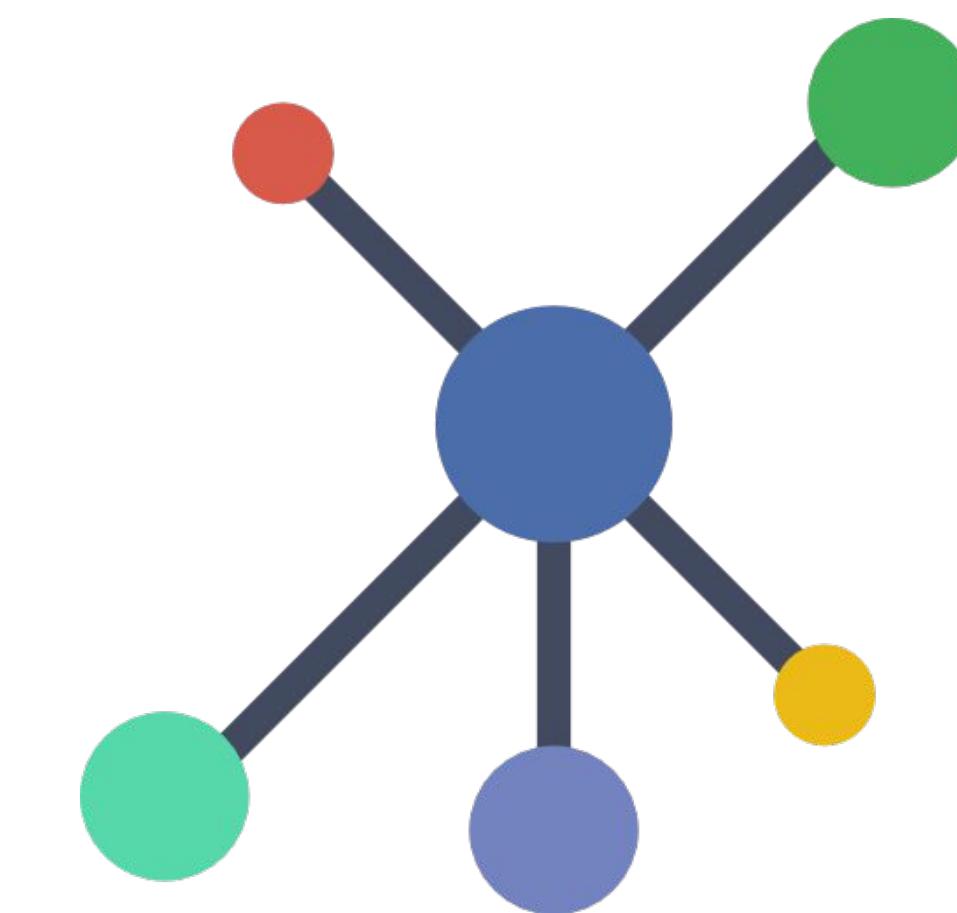
Proprietary algorithm for skill-gap analysis and providing personalized learning path to the user based on his current skills



User's Current Skill Graph



Personalized Learning Path for
Getting the Desired Job



User Acquires Required Skills
Needed for Job

Value Proposition #2 - Playground with Feedback

Playground for hands-on. System evaluates the code automatically and nudges the user by giving appropriate feedback

Content

Python - String Concatenation

In Python we can use several string operations like concatenations. Two strings can be simply concatenated using the "+" operator. For eg. to concatenate the strings "football" and "basketball" and assign it to a new variable games run `games = "football" + "basketball"`

INSTRUCTIONS

Assign a value of "Cloudx" to a variable called `first` and a value of "Lab" to a variable called `second`.

Using String Operations concatenate the values of the variable `first` and `second` and store the result in variable called `final`.

Submit Answer

✓ Good work! You have learned about string operations in Python.

Playground

The playground interface shows a Jupyter Notebook environment. At the top, there are fields for 'Lab username' (abhinav9884) and 'Lab password' (*****). Below the header are tabs for Notebook, Console, Files, and Notes. A navigation bar includes Trusted, Python 3, File, Edit, View, Insert, Cell, Kernel, Navigate, and Widgets. The main area displays a code cell with the following content:

```
In [1]: first = "Cloudx"
second = "Lab"
final = first + second
final
```

The output of the cell is:

```
Out[1]: 'CloudxLab'
```

Below the cell, there are three empty input fields labeled In []:

- In []:
- In []:
- In []:

Value Proposition #3 – Online Cloud Lab

Cloud-based Lab with pre-installed tools and software for practicing **AI, Machine Learning, Deep Learning, Data Science, Big Data** and related technologies

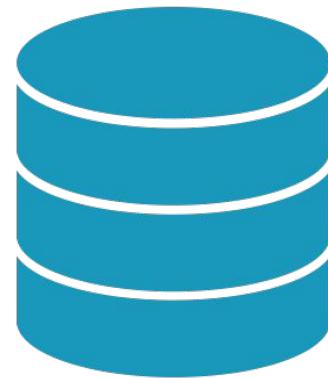
```
[abhinav9884@cxln4 ~]$ python
Python 2.7.5 (default, Apr  9 2019, 14:30:50)
[GCC 4.8.5 20150623 (Red Hat 4.8.5-36)] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> first = "Cloudx"
>>> second = "Lab"
>>> final = first + second
>>> final
'CloudxLab'
>>> █
```

Online Cloud Lab Features



Real-world Experience

Lab setup is exactly same as of setup in Enterprises. Become job ready from Day 1



Central Dataset

Upload your own dataset

Or use open source datasets available on lab



Seamless Experience

No endless downloading/ installations. No hardware, permissions or configuration issues



Any Device Anywhere

Connect from ANY browser, SSH, device or operating system

Value Proposition #4 – Social Hooks

We learn better with peers. Social proof and leaderboard increases engagement and motivation

Topic 1 - Python Foundations (32% completed)

Instructor
eict
'IT Roorkee
Electronics and ICT Academy IITR

START ►

8 Concepts | 62 Questions | 7 Assessments | 2,359 Learners

Attempted by

 Subharanjan
 Mamta
 Rajasekhar
 Apoorv
and 2,355 more

Learning Items
1 Getting Started - Setting up the environment

User Profile

About Neha
A Data Science Enthusiast and keen interest towards insights.

Location
Mumbai

Social Links
 


Neha Ponnam
Software Developer @ Majesco

Heart icon 

Member since 2 months, 3 weeks
1892 profile views
450 likes
235 followers
4,190 XP ?
Last seen 4 hours ago

Value Proposition #5 – Community

Community of 100K like-minded users help each other during their learning journey

The screenshot shows the Cloud X Lab forum interface. At the top, there is a navigation bar with the Cloud X LAB logo, a search bar, and buttons for 'Sign Up' and 'Log In'. Below the navigation bar, there are filter buttons for 'all categories', 'Latest', 'Top', and 'Categories'. The main area displays a list of forum topics. Each topic row includes the topic title, a small profile picture, a list of user initials (e.g., I, K, S), the number of replies (e.g., 23), views (e.g., 1.1k), and the last update date (e.g., 24d). The columns are labeled 'Topic', 'Replies', 'Views', and 'Activity'.

Topic	Replies	Views	Activity
How Artificial Intelligence and Machine Learning can be used for your project or work? ■ AI and ML for Managers	23	1.1k	24d
Unable to acces tokenized link while running spark on jupyter ■ Lab Support	20	1.1k	Mar '19
Yarn Resource Manager down	19	201	Oct '19
504 Gateway Time-out 504 Gateway Time-out nginx/1.12.2 ■ Lab Support	17	496	Oct '19

Value Proposition #6 – Hiring Partners

Dedicated Job Portal → Upgrade career, enhance salary & move jobs by applying to jobs posted by our hiring partners

Jobs

Data Scientist
Ank Aha - New Delhi



Posted 4 hours ago

[View Details »](#)

Data Scientist
PLAYSIMPLE - Bangalore



Posted 3 months, 1 week ago

[View Details »](#)

Senior Analyst
PLAYSIMPLE - Bangalore



Posted 3 months, 1 week ago

[View Details »](#)

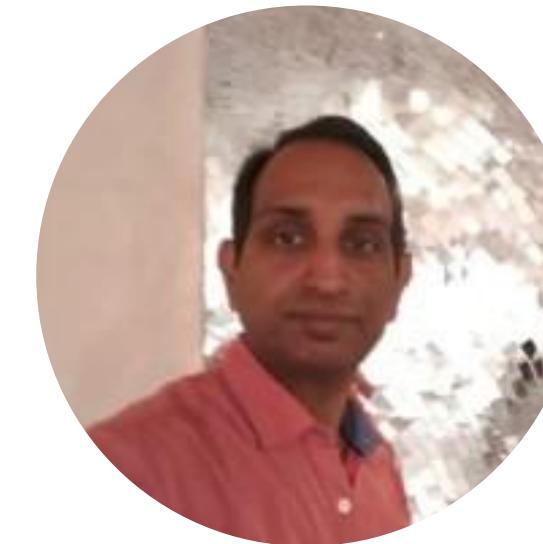
Instructors / Authors



[Sandeep Giri](#)

Founder at CloudxLab.com | AI Advisor
at Algoworks | Speaker – AI, Machine
Learning, Deep Learning, Big Data

Amazon, InMobi, D.E.Shaw
18+ Years of Exp. in Enterprise
Softwares, Machine Learning &
Churning Humongous Data



[Ashok Singh](#)

Big Data and DevOps Professional | 18+ yrs exp

Cisco Systems, DevOps Consultant
MYCOM OSI, Devops Service Delivery Manager
Wipro Technologies, Senior Software Engineer
Continuous Computing, Software Engineer
CDOT, Research Engineer
IIT Roorkee, B.Tech



[Abhinav Singh](#)

Co-Founder, CloudxLab.com | AI, ML &
Big Data | Visiting Faculty at SCMHRD

Byjus, HashCube
9+ Years of Exp. in EdTech, Game
Development & Building Product



Sandeep Giri



Feel free to add me on [linkedin](#)

About Authors

Founder



Love Explaining Technologies

Software Engineer

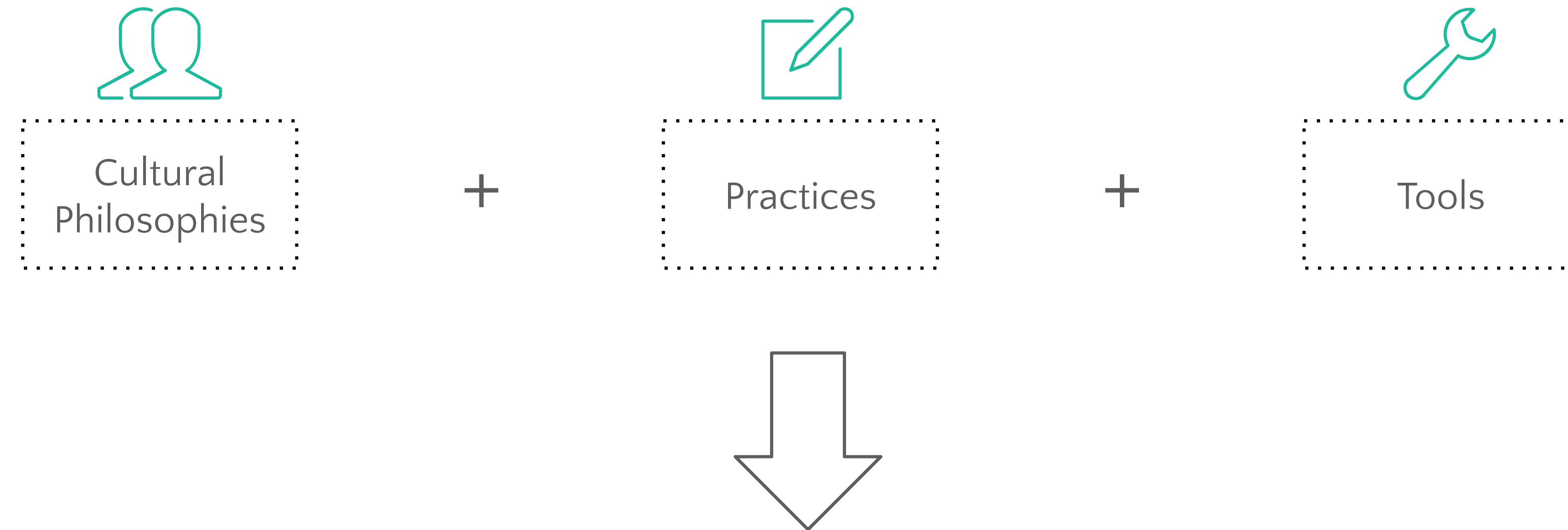


Worked On Large Scale Computing

Graduated from IIT Roorkee



What is DevOps



Why DevOps? – Scenario

How will we build a website like Amazon.com?

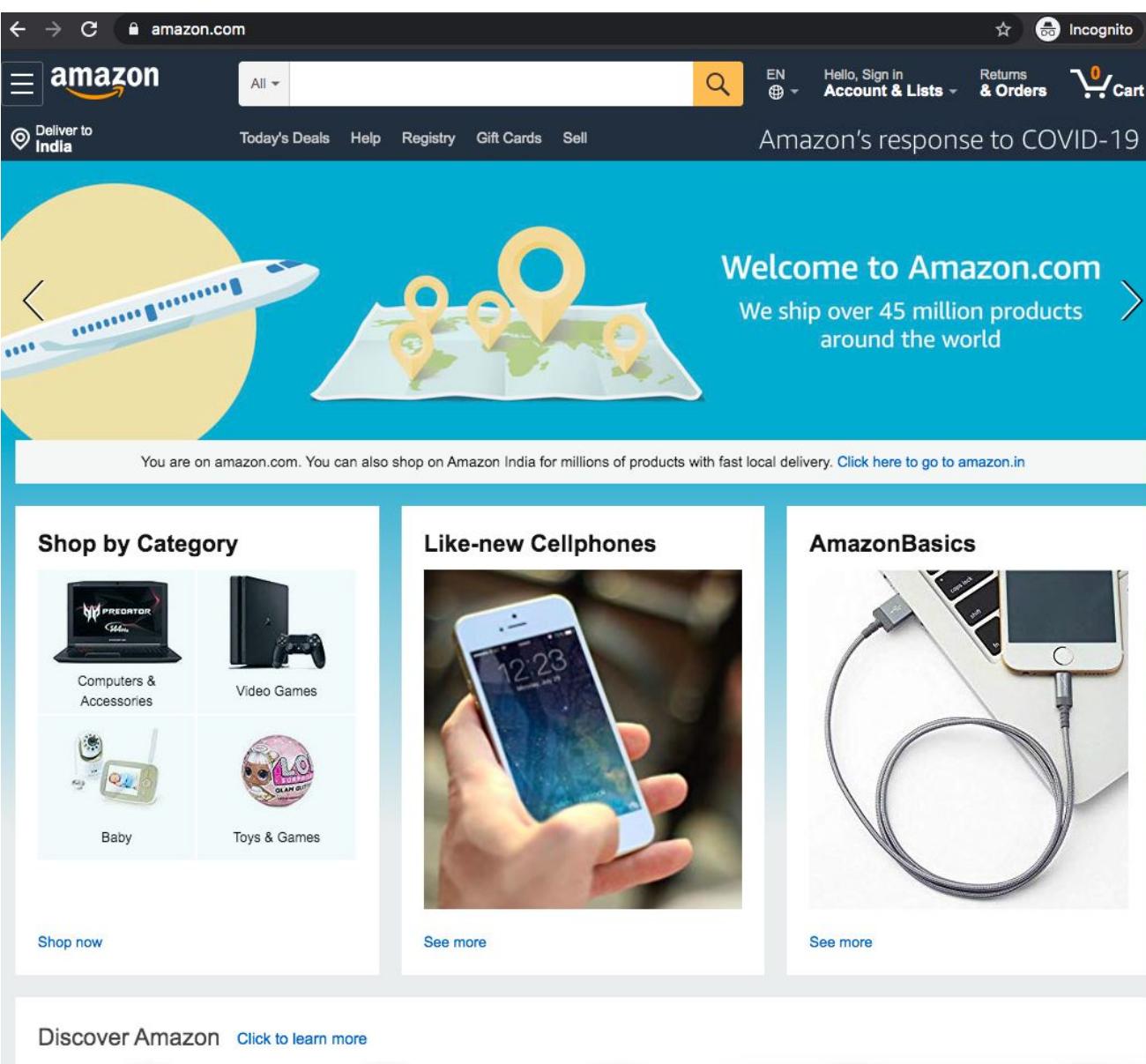
The screenshot shows a product page for a Columbia Sportswear Men's Alpine Action Jacket. At the top, there's a navigation bar with links for 'Your Amazon.com', 'Today's Deals', 'Gift Cards', 'Sell', 'Help', and a 'GREEN MONDAY' banner. Below the navigation is a search bar with the query 'jacket snowboard'. The main content area features a large image of a man wearing the jacket, with smaller thumbnail images below it. The product title is 'Columbia Sportswear Men's Alpine Action Jacket' by Columbia. It has a 4.5-star rating from 9 customer reviews. The price range is listed as '\$102.00 - \$192.21' with a note about lower prices for select options. There are dropdown menus for 'Size' and 'Color: Black', and a 'Select' button. To the right, there's a 'Share' button and social media links for Facebook, Twitter, and Pinterest. A call-to-action box says 'To buy, select Size' and 'Choose from options to the left', with 'Add to Cart' and 'Add to Wish List' buttons. Below the main image, a detailed description lists the following features:

- Shell: 100% polyester Matte melange. Lining: Omni-Heat Reflective Microtex Light. Insulation: 100% polyester microtemp XF II 100gsm
- Imported
- Omni-Heat Thermal Reflective and Insulated
- Omni-Tech Waterproof/Breathable Critically Seam Sealed
- Removable, Adjustable Storm Hood
- Adjustable, Snap Back Powder Skirt
- Drawcord Adjustable Hem

The screenshot shows the homepage of Amazon.com. The top navigation bar includes links for 'Hello, Sign in', 'Account & Lists', '>Returns & Orders', and a 'Cart' icon. A banner at the top right says 'Amazon's response to COVID-19'. The main visual features a large airplane flying over a map with several location pins. The text 'Welcome to Amazon.com' and 'We ship over 45 million products around the world' is displayed. Below this, there are three main sections: 'Shop by Category' (with sub-links for 'Computers & Accessories', 'Video Games', 'Baby', and 'Toys & Games'), 'Like-new Cellphones' (showing a hand holding a smartphone), and 'AmazonBasics' (showing a coiled cable). At the bottom, there's a 'Discover Amazon' section with a 'Click to learn more' link.

Why DevOps? – Scenario

How will we build a website like Amazon.com to serve lots of users?



- Serving huge number of users
- With so many complex features
- Delivering the bug fixes quickly

Why DevOps? - Basic Solution

How will we build a website like Amazon to serve lots of users?

Approach 1:

- Understand the requirements
- Write the perfect code once – software
- Deploy it on very powerful server
- Fire the software development team! 😊😊

Why DevOps? - Basic Solution

How will we build a website like Amazon to serve lots of users?

Approach 1:

- Understand the requirements
- Write the perfect code once – software
- Deploy it on very powerful server
- Fire the software development team! 😊😊

What challenges do you see with this approach?

Did we miss anything?

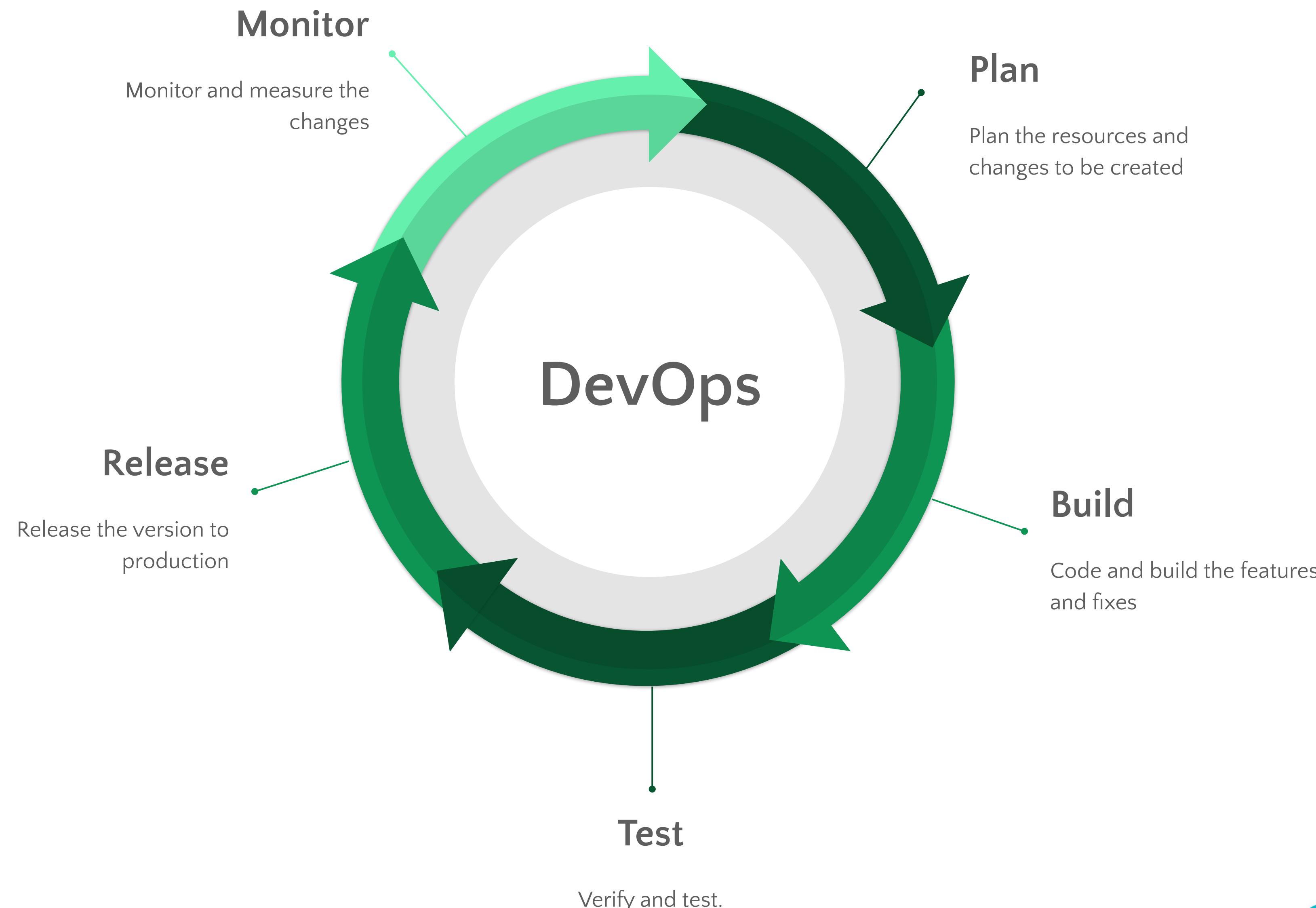
Why DevOps? - Basic Solution

How will we build a website like Amazon to serve lots of users?

Challenges with first Approach:

- Software development is a continuous life long process not one time
- We must build the software in incremental phases.
- Collaboration between many software engineers is involved
- Testing needs to be the first thing not last
- Deployment needs to done with more thorough approach to multiple machines

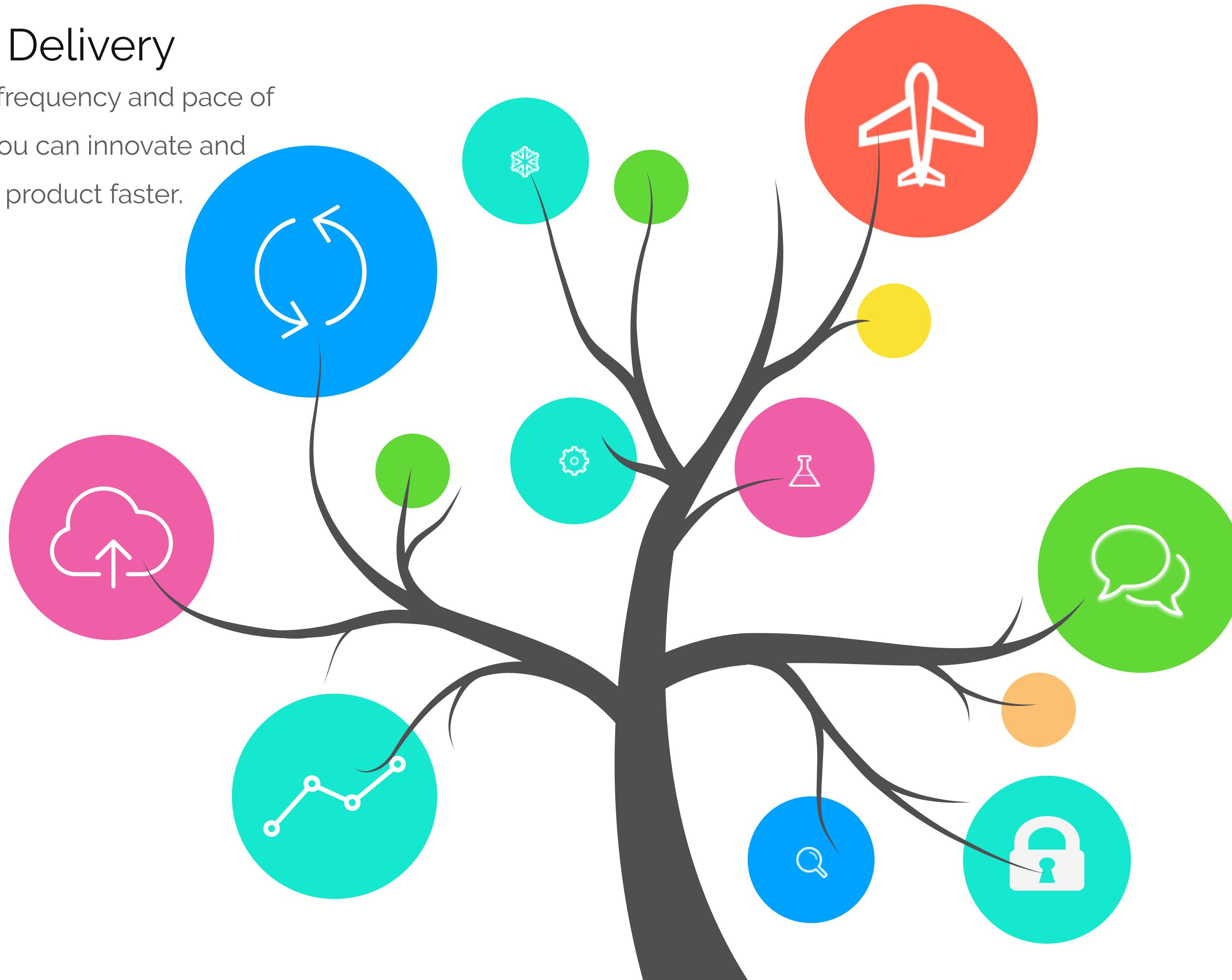
DevOps – Solution



Benefits of Devops

1. Rapid Delivery

Increase the frequency and pace of releases so you can innovate and improve your product faster.



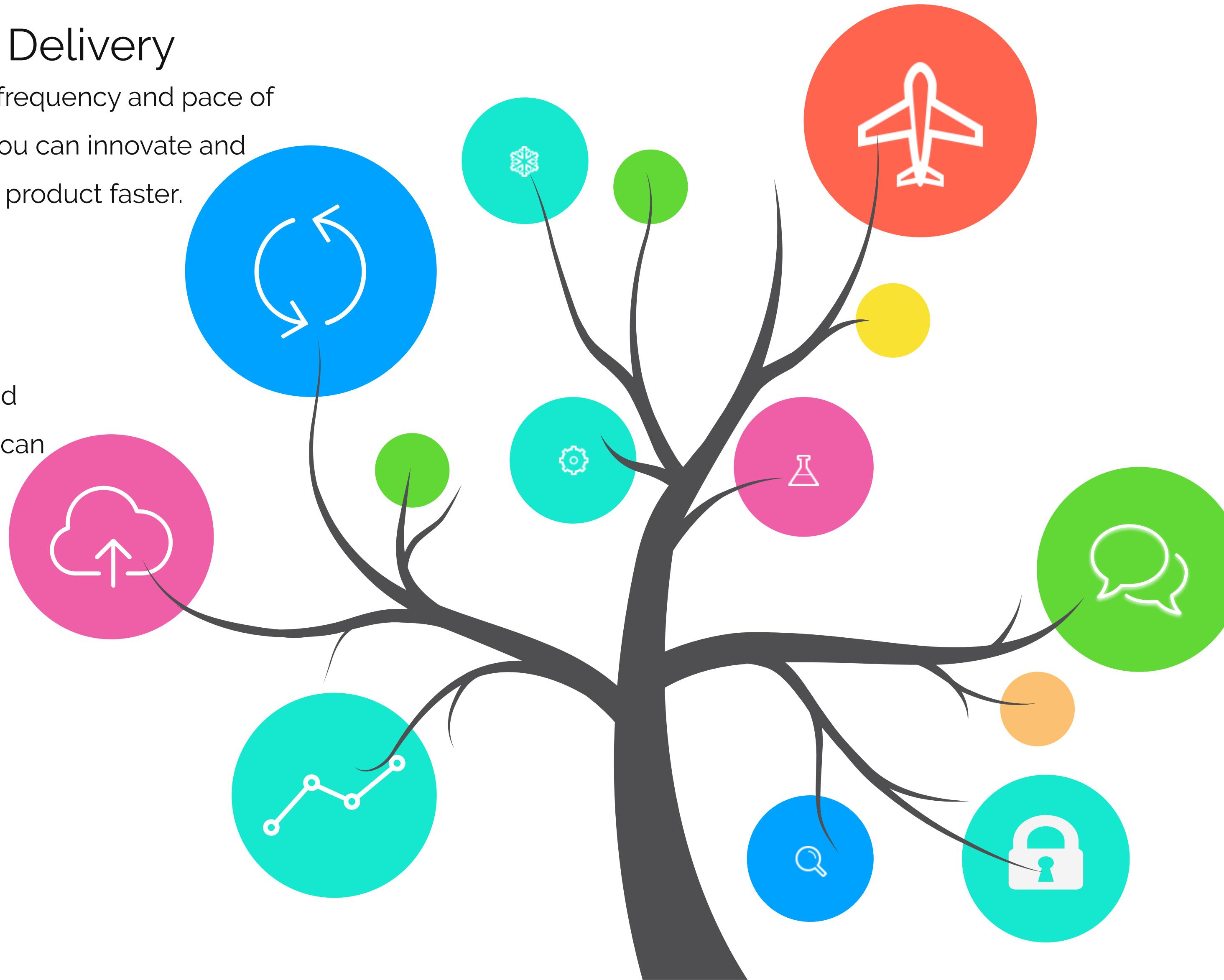
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2. Reliability

Ensure application updates and infrastructure changes so you can deliver at a more rapid pace.



Benefits of Devops

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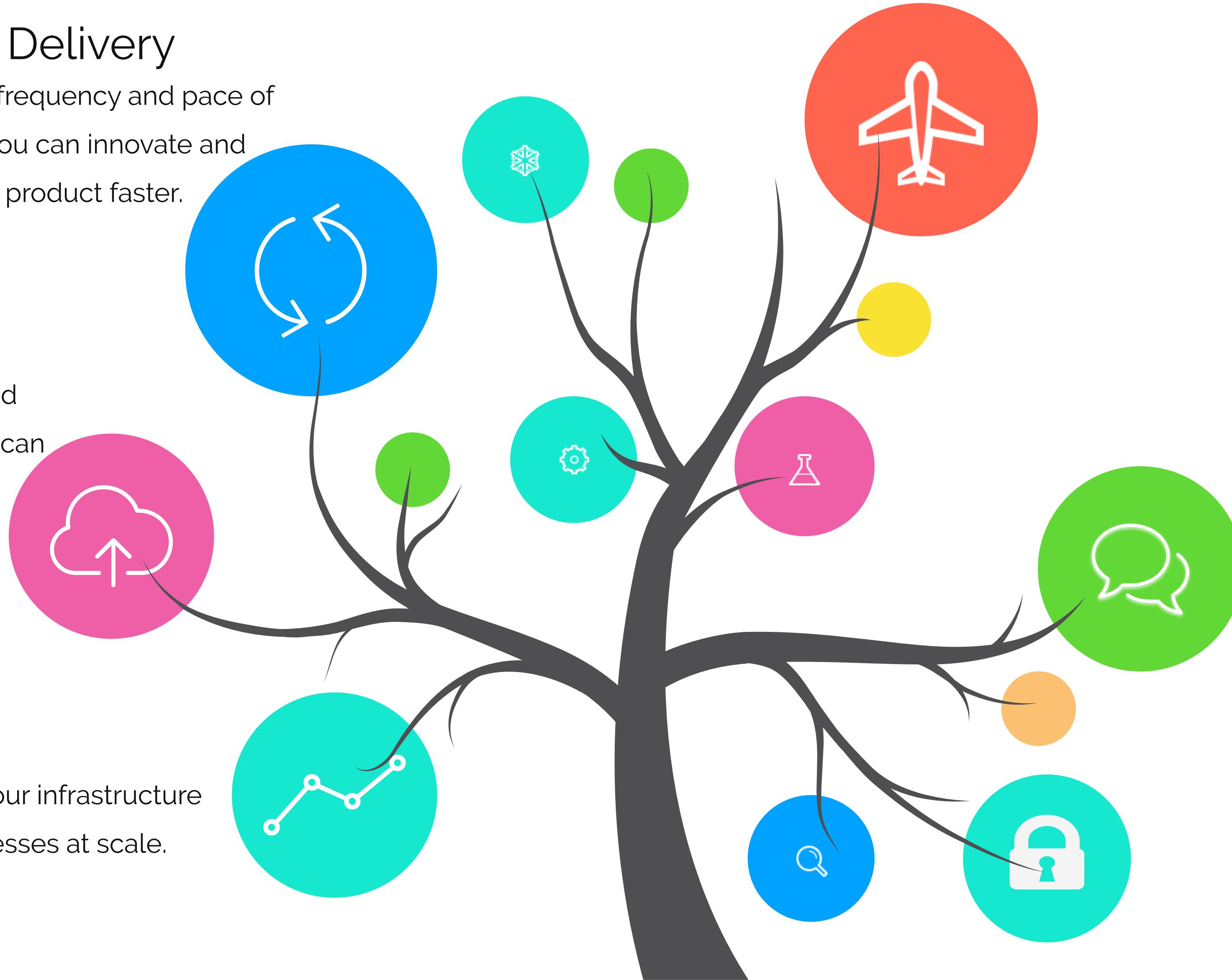
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3. Scale

Operate and manage your infrastructure and development processes at scale.



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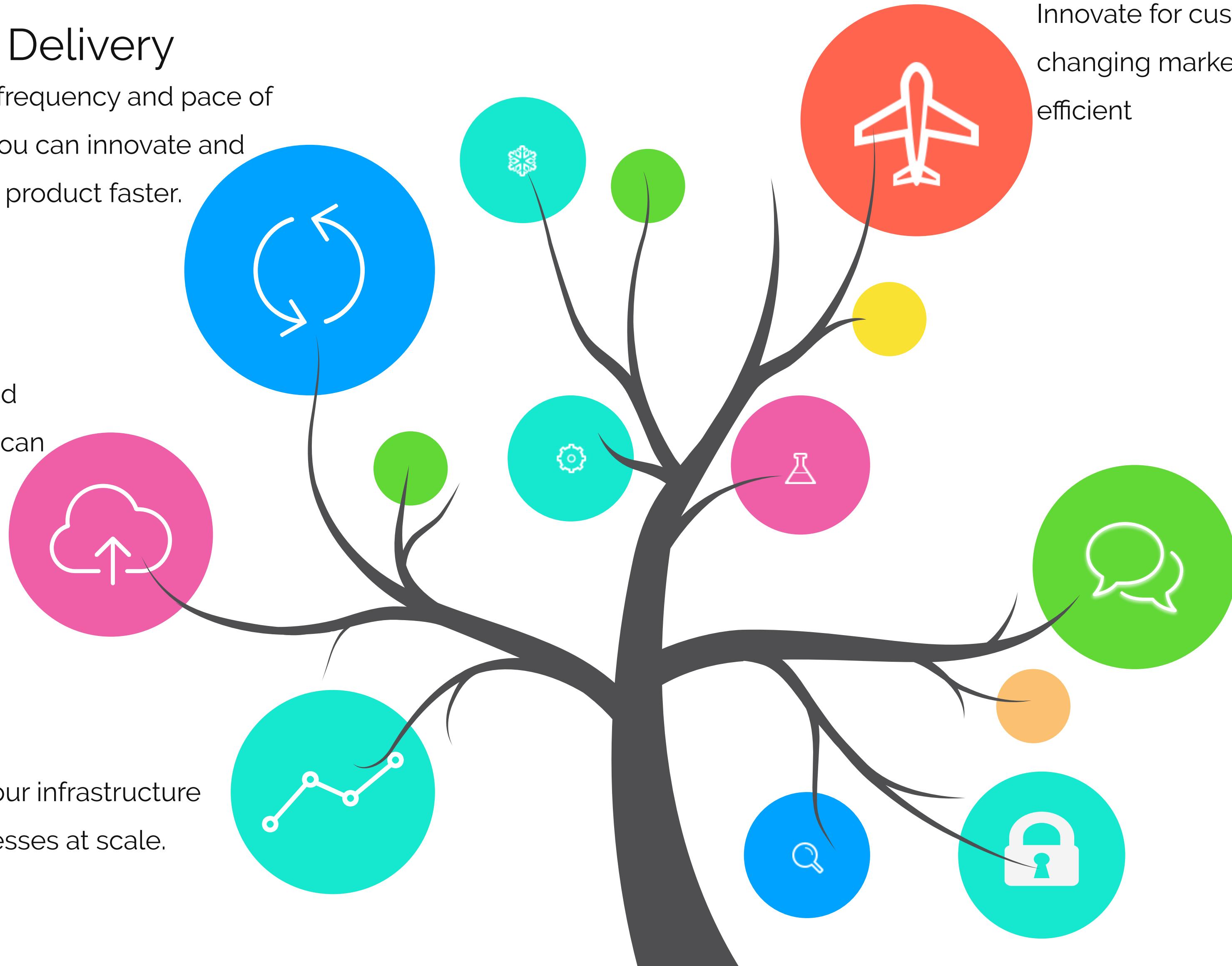
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4. Speed

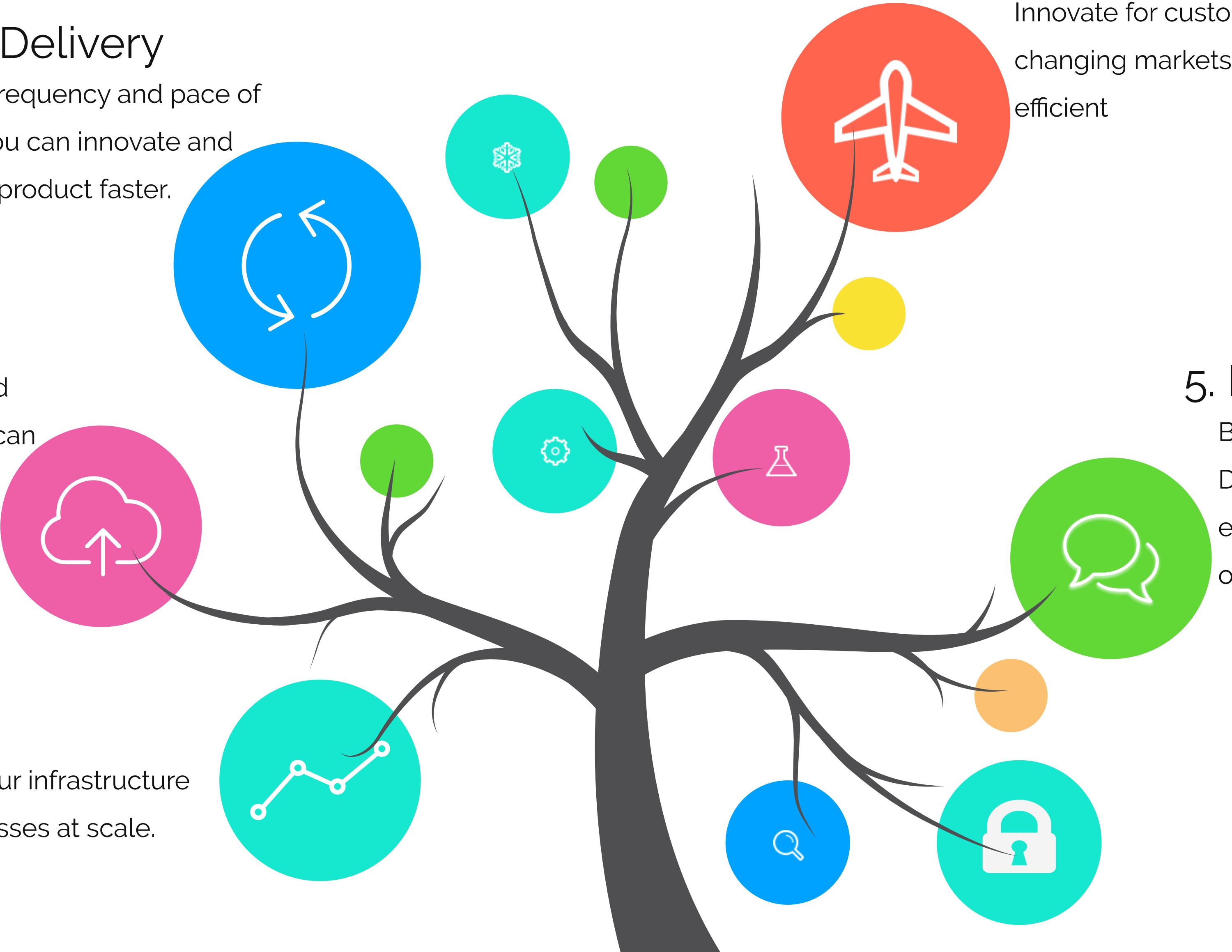
Innovate for customers faster, adapt to changing markets better, and grow more efficient



Benefits of Devops

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5. Better Collaboration

Build more effective teams under a DevOps cultural model, which emphasizes values such as ownership and accountability.

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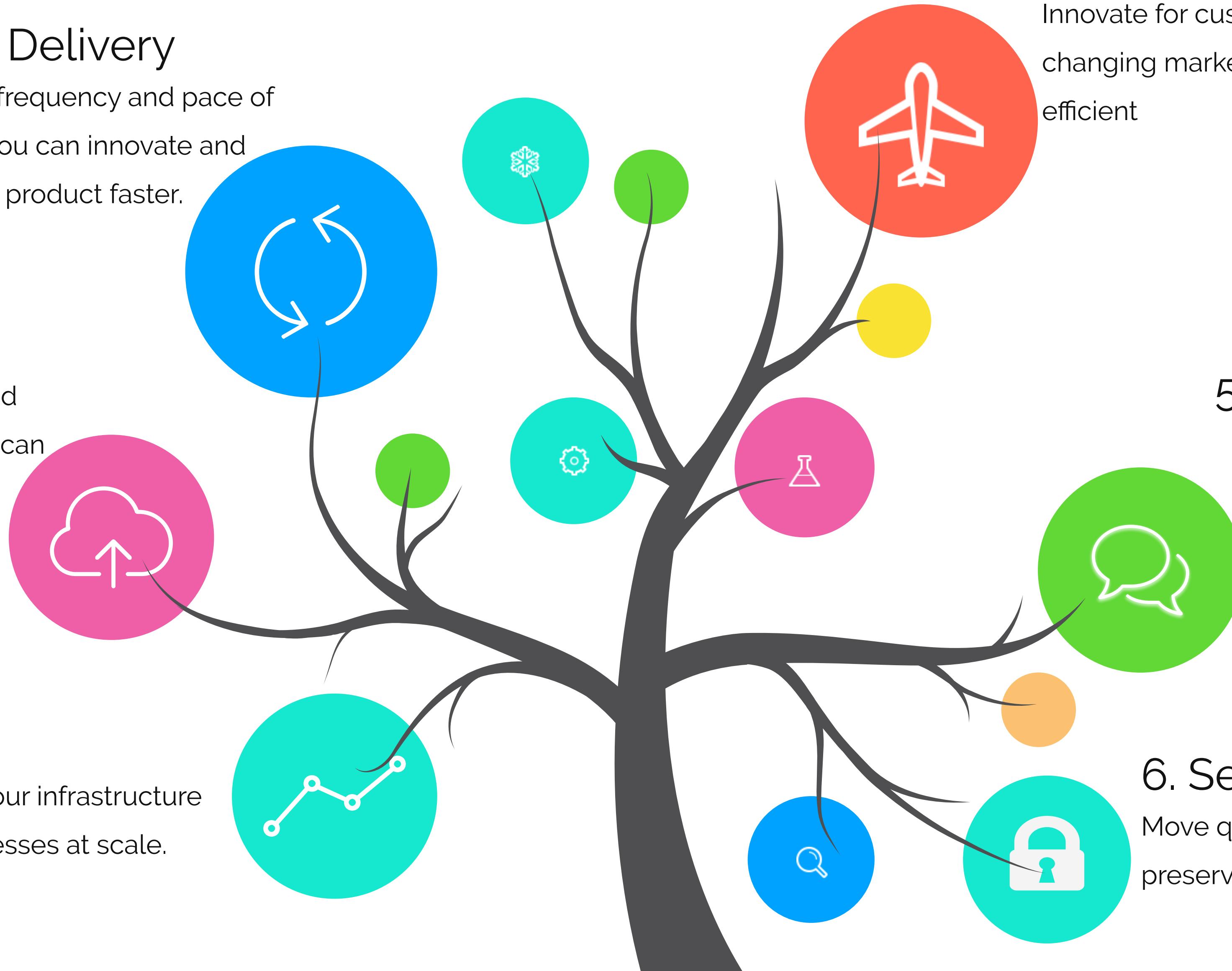
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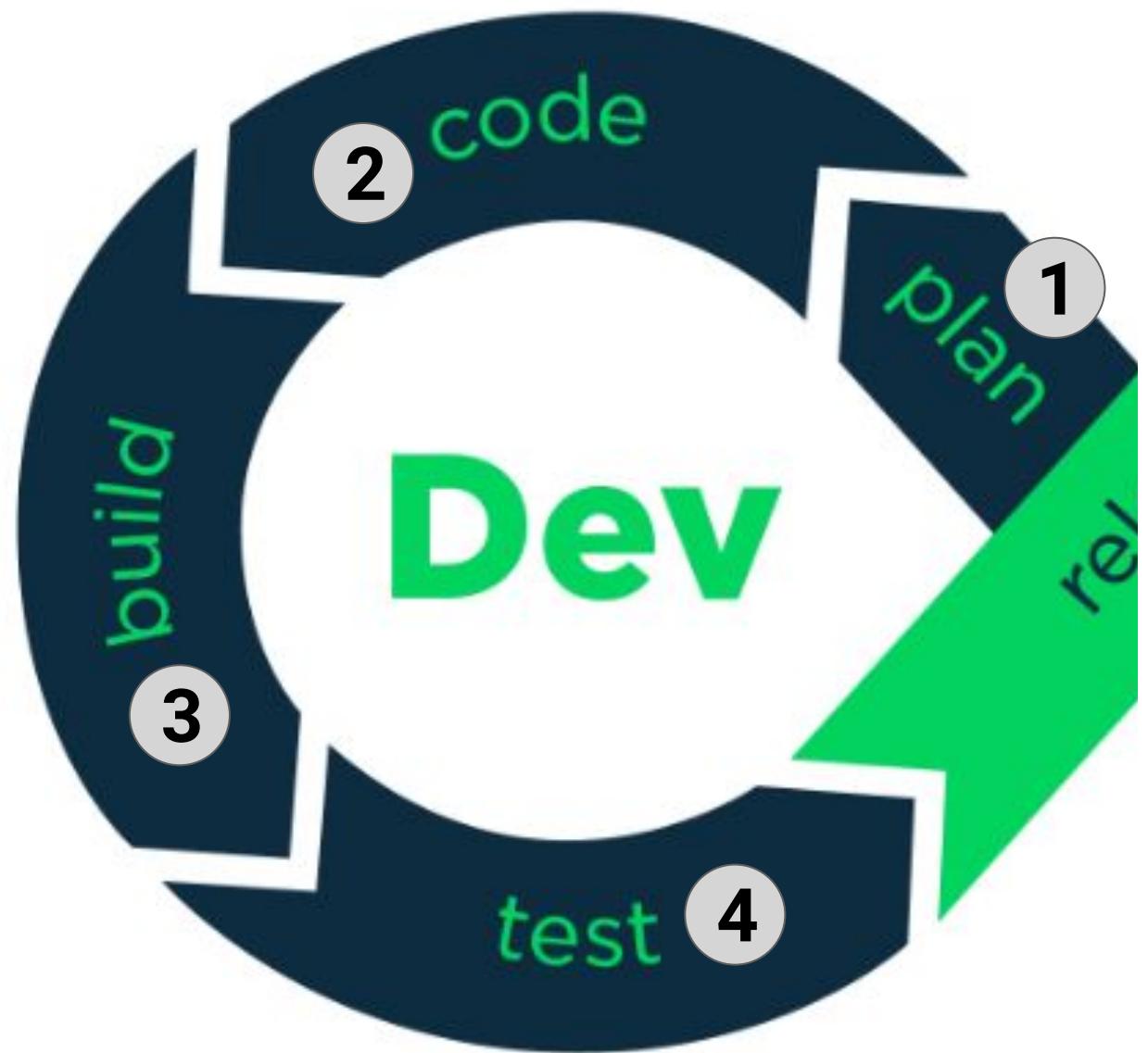
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6. Security

Move quickly while retaining control and preserving compliance.



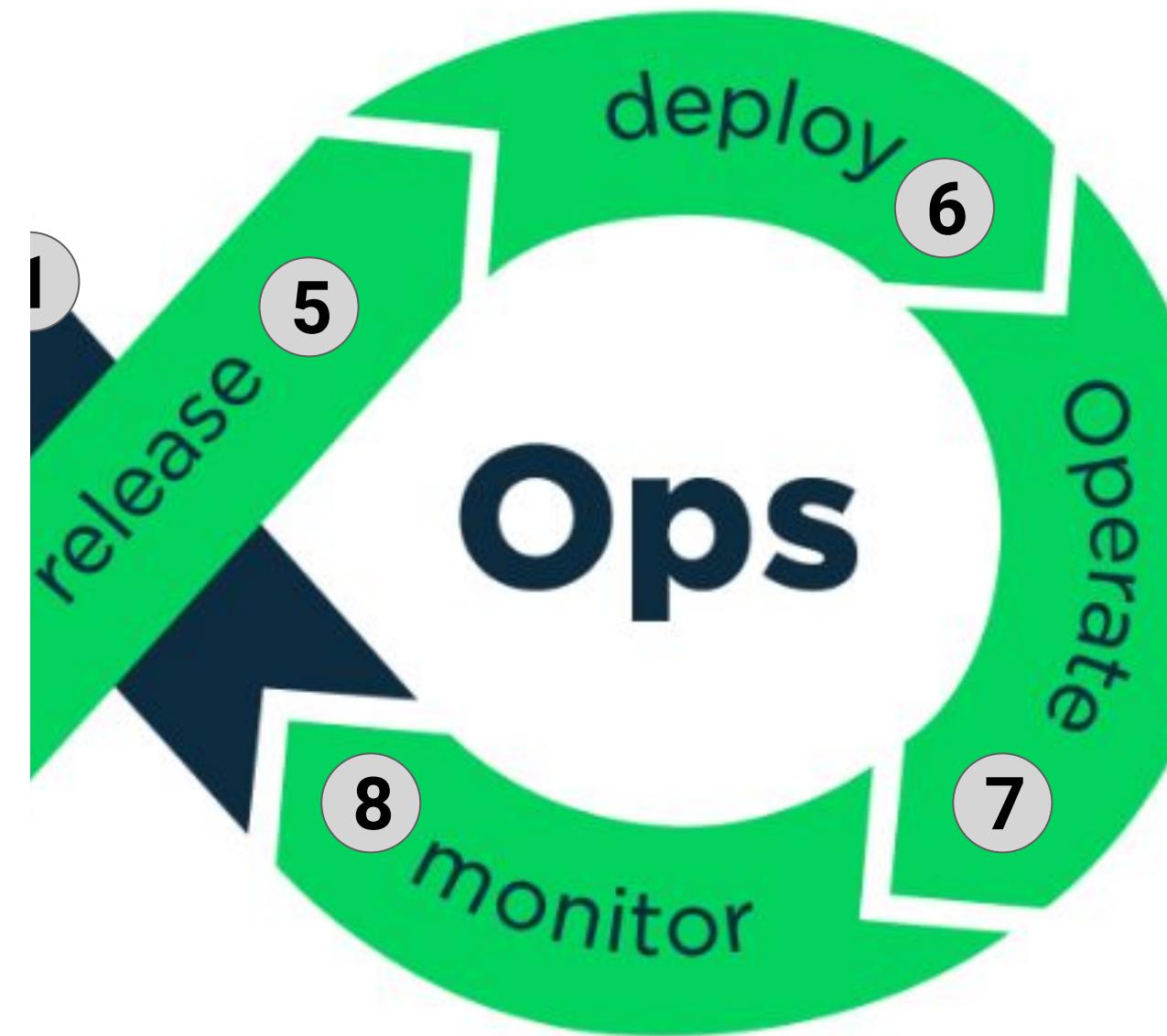
Understanding DevOps?



1. Dev

Development Phase.

Understanding DevOps?



2. Ops

Operations or Operating phase.

Understanding DevOps?



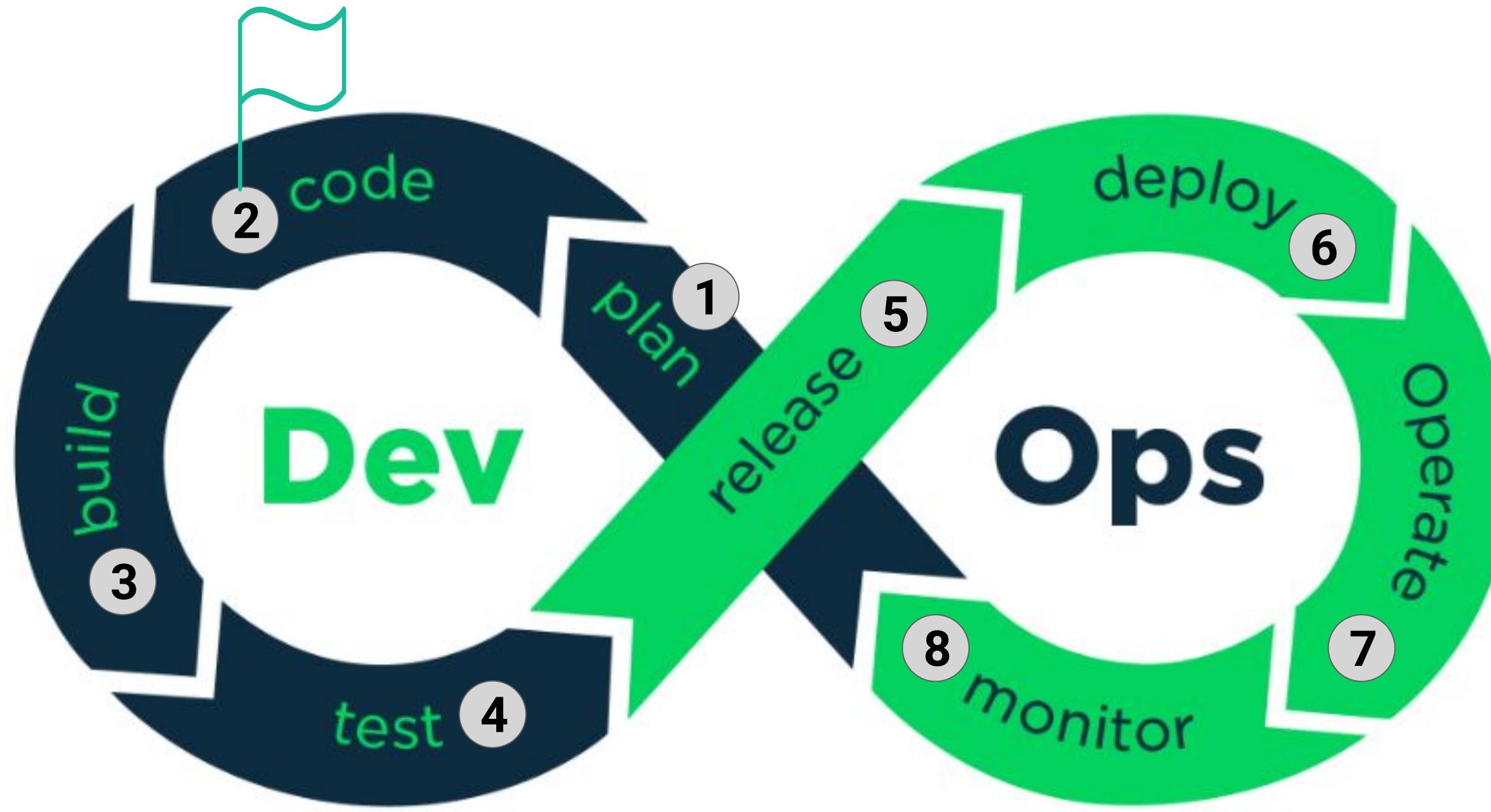
1. Plan

Planning phase involves a shorter goal planning. A scrum or agile planning is a better choice. The various tools you use are:

1. Microsoft Office, Google Docs / Sheet
2. Project Management Tools - Microsoft Project
3. Task Management tools - Asana, Jira, Mantis



Understanding DevOps?



2. Code

1. Text Editors and Integrated Dev Environments:
 - a. Sublime, Vim, Emacs ...
 - b. Eclipse, XCode, Visual Studio...

Sublime Text eclipse

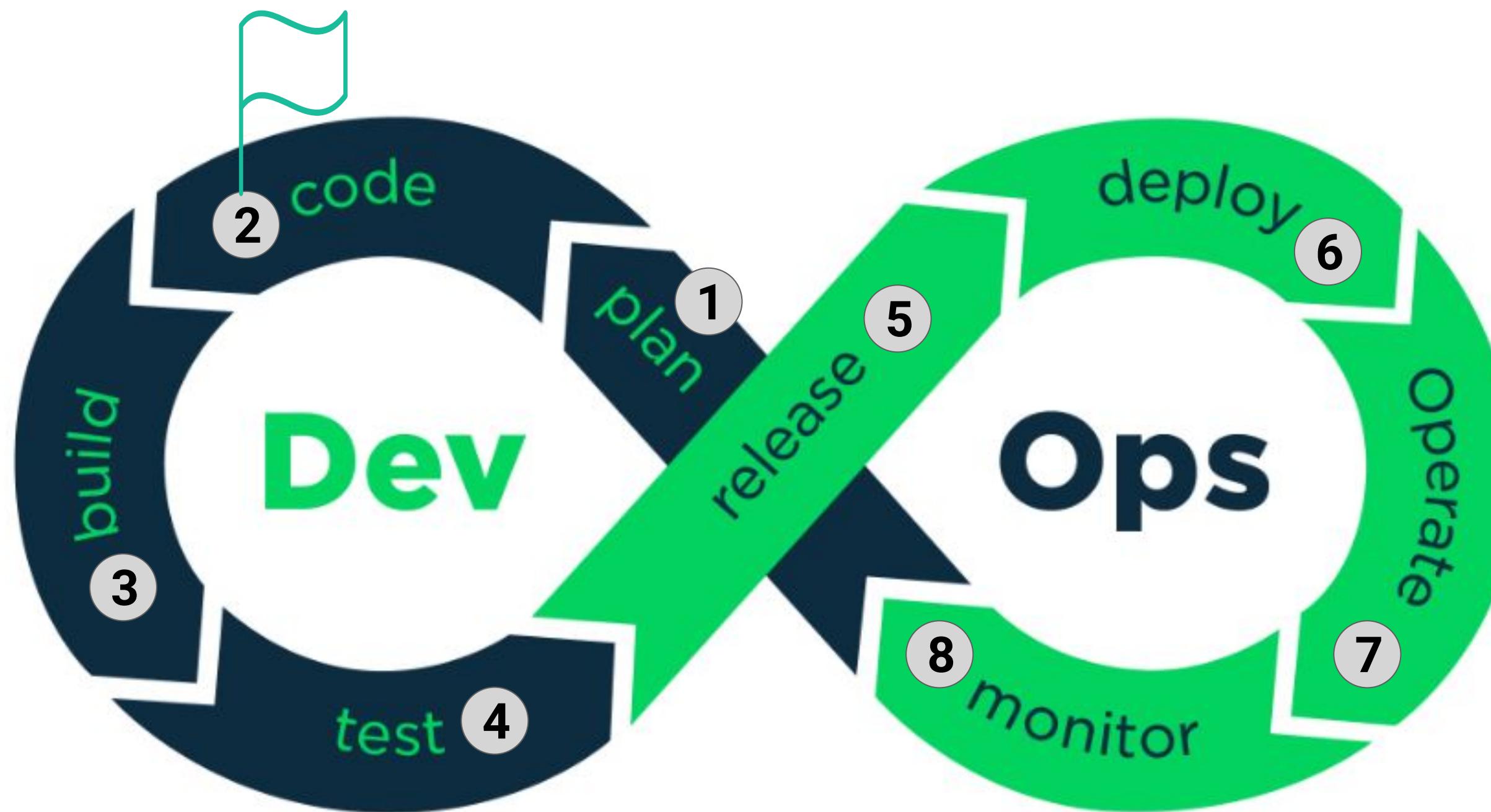


Xcode
Visual Studio Code



GitLab

Understanding DevOps?



2. Code

1. Text Editors and Integrated Dev Environments:
 - a. Sublime, Vim, Emacs ...
 - b. Eclipse, XCode, Visual Studio...
2. Source Code Management (SCM) Tools
 - a. Git - Best Choice, Older: SVN, CVS
 - b. Server - GitLab, GitHub or own.

Sublime Text eclipse

Xcode

Visual Studio Code

Vim

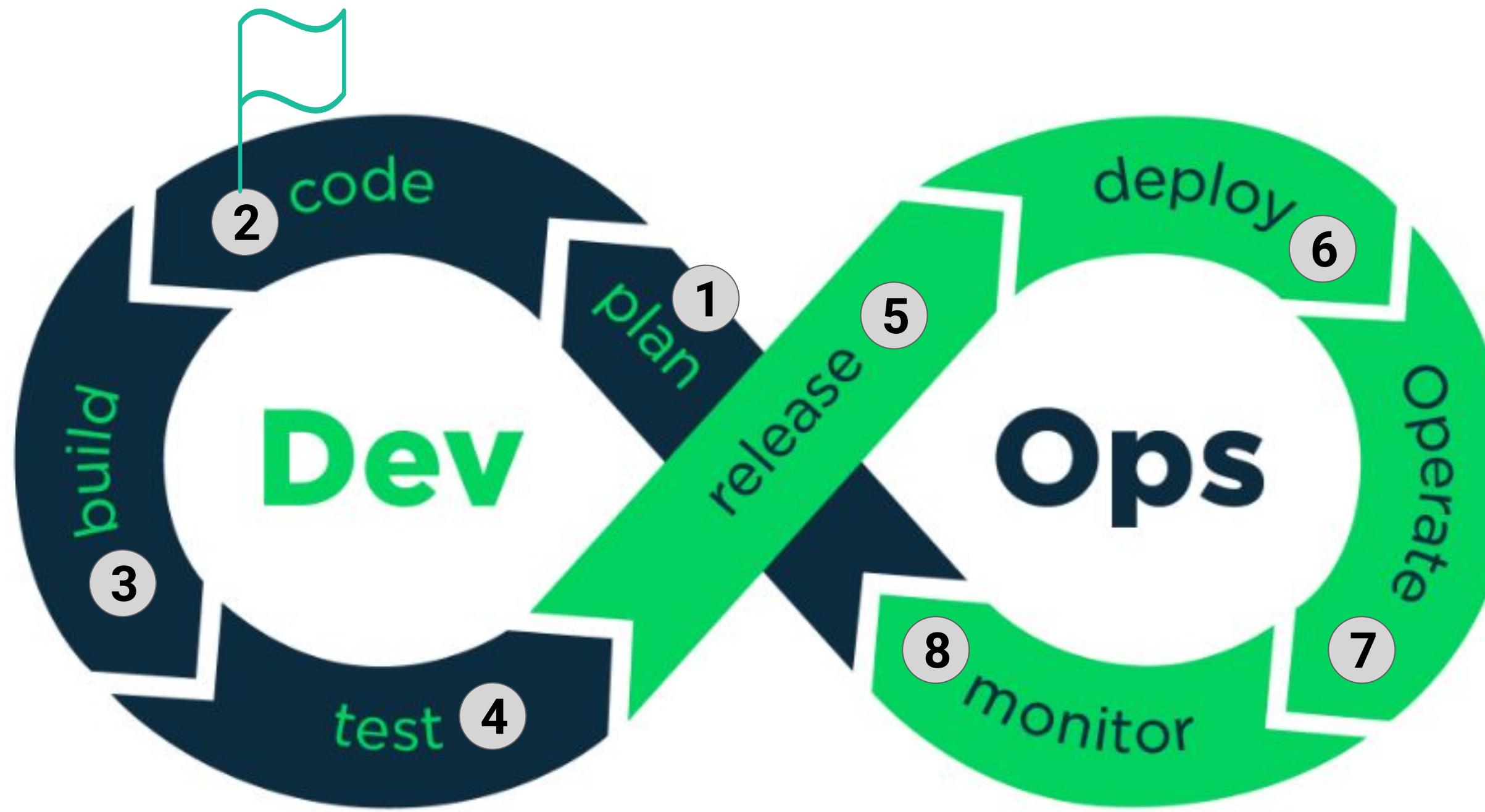
git

GitHub



GitLab

Understanding DevOps?



Sublime Text



eclipse



Xcode

Visual Studio Code

Vim

git



GitHub

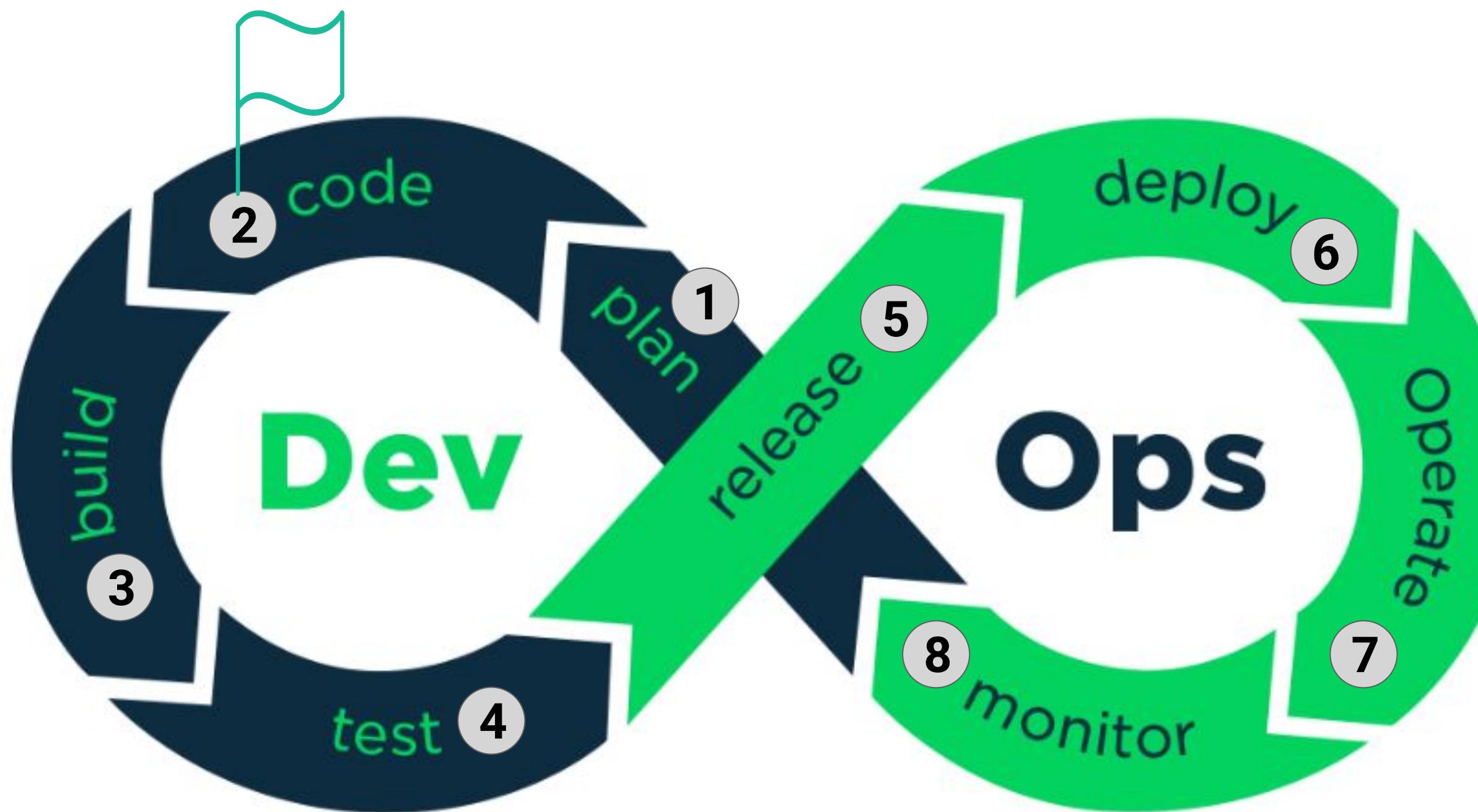


GitLab

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 - b. Eclipse, XCode, Visual Studio...
2. Source Code Management (SCM) Tools
 - a. Git - Best Choice, Older: SVN, CVS
 - b. Server - GitLab, GitHub or own.
3. Unit Test Case Libraries - depends on language
 - a. See [List_of_unit_testing_frameworks](#)
 - b. Used in "Test" phase too

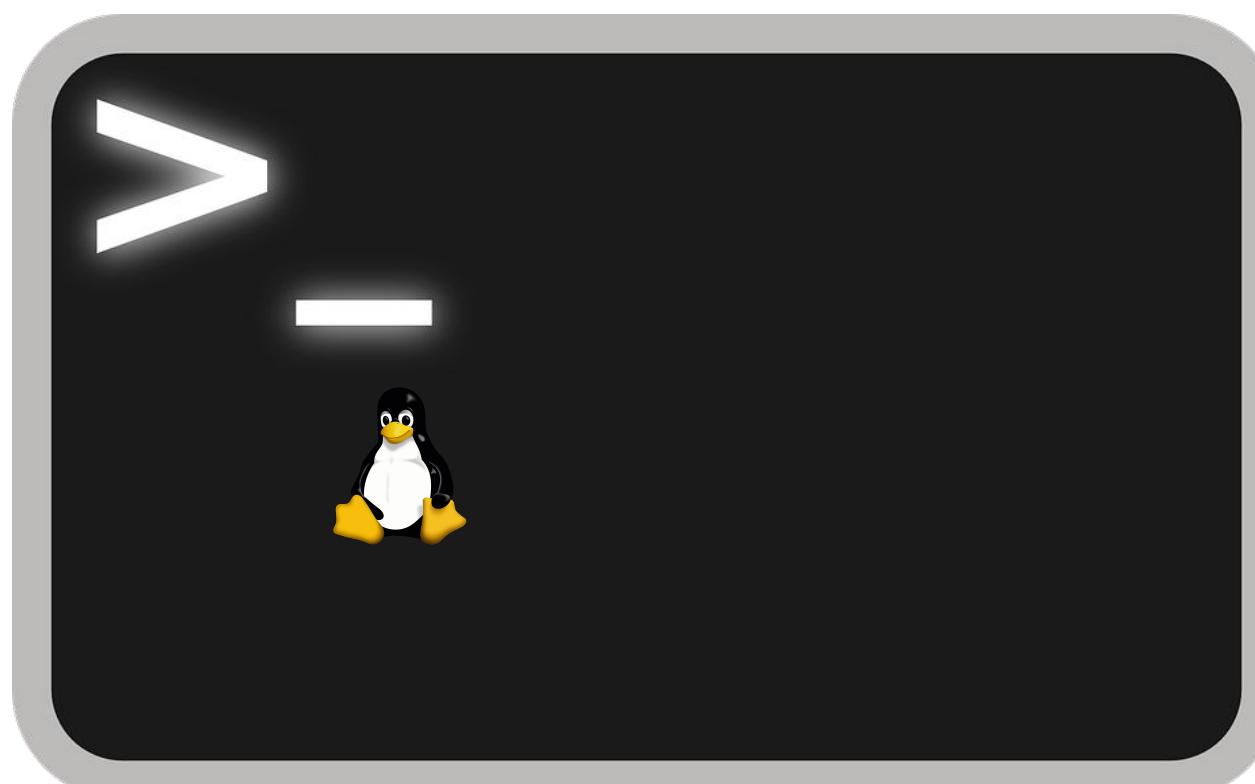
Understanding DevOps?



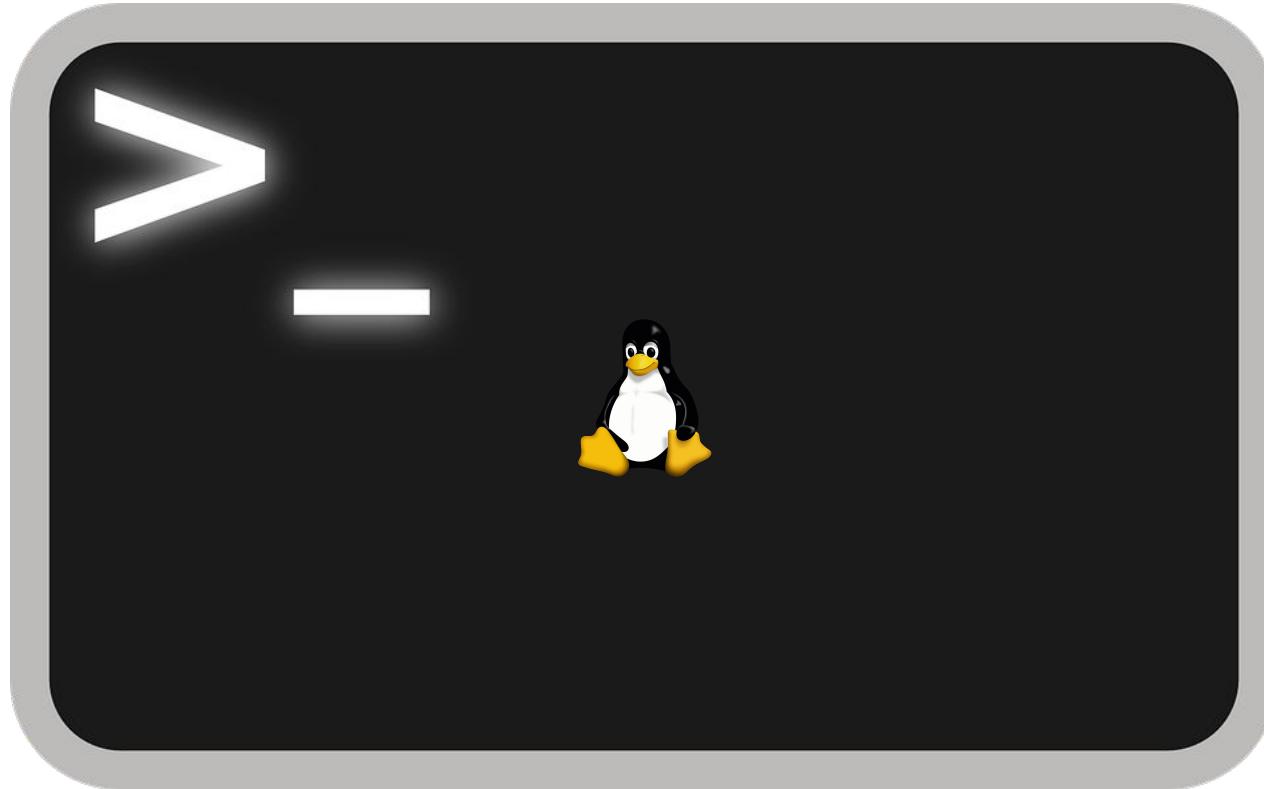
Coding - Hands On

We will do hands on with:

1. Linux Terminal
2. Git
3. Python



Coding - Hands On



Linux

1. Sign Up with CloudxLab.com
2. Go to "My Courses", Locate the [Course on "Linux"](#)
3. Or Go to "My Lab" and Open Jupyter
4. In Jupyter, open New -> Terminal
5. Here you can try all your commands. If you are new, go thru tutorial
6. Create a directory: ***mkdir devops***
7. Change the directory: ***cd devops***

Git - Hands On



What is Git?

Git is a distributed version-control system for **tracking changes in source code** during software development. It is designed for **coordinating work among programmers**, but it can be used to track changes in any set of files. Its goals include speed, data integrity, and support for distributed, non-linear workflows.

Coding - Hands On



Try Git - Create a simple python program

1. Open Jupyter, go to the folder devops.
2. Create a text file with name "helloworld.py"
3. Add the following code to it:

```
print("Hello, World!")
```

4. Save the file

Coding - Hands On



Try Git

1. Go to the terminal and go to devops folder using "cd" command
2. Initialize repository: git init .
3. Add the python file create earlier: git add *
4. Commit: git commit -m "This is hello world"
5. See status: git log
6. Try changing the file and then reverting it with: git checkout .

Coding - Hands On



Try Git - Work with GitHub

1. Signup with GitHub - create login/pass and upload public key
2. Create a repository on github
3. Add origin
4. git push ...

Understanding DevOps?



3. Build

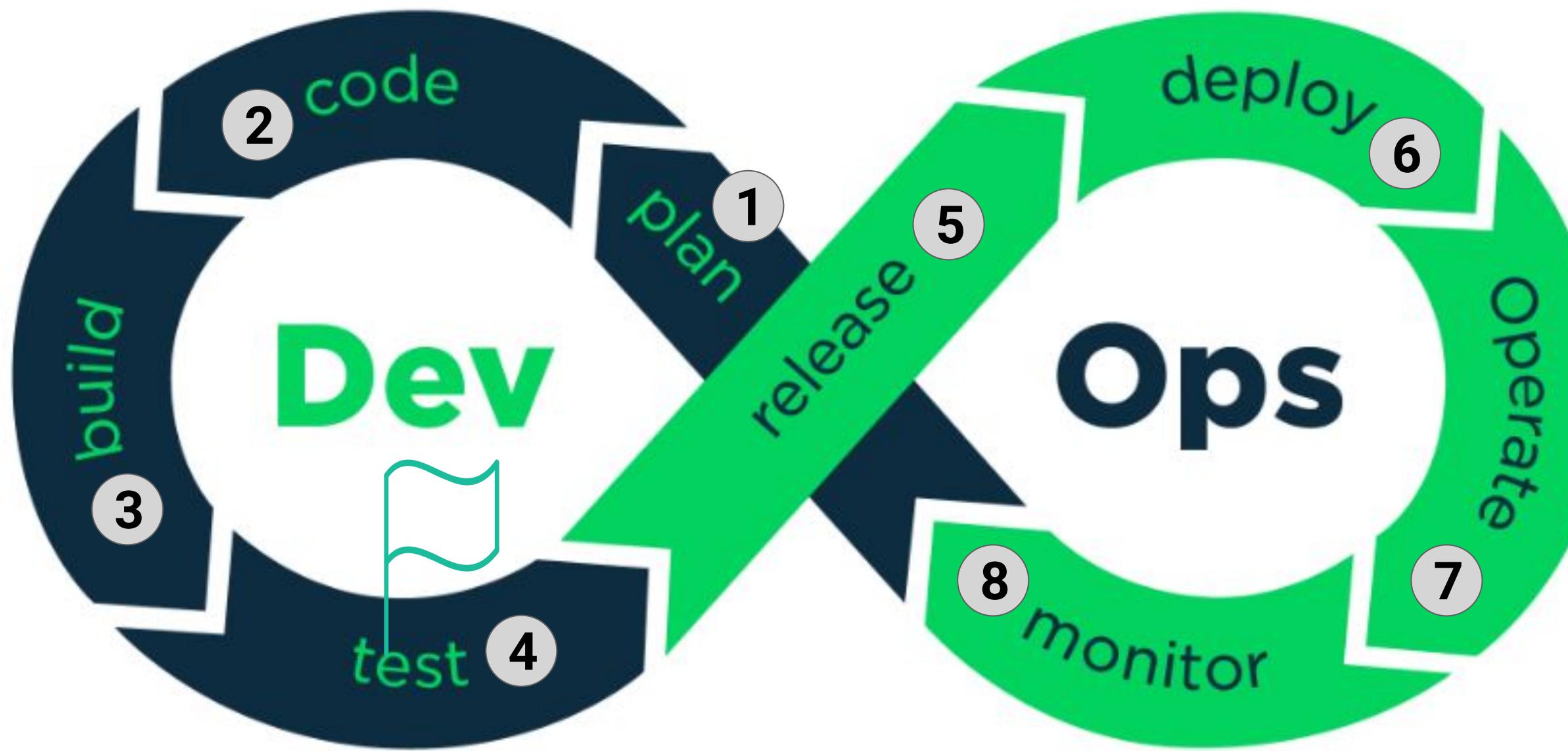
Build process involves compiling code, copying the assets, generating config and documentation. It should also work on developer machine as well as on unattended machine.

There are various build tools:

1. Maven, Ant, SBT etc..
2. Ref: "[Writing Spark Applications](#)"



Understanding DevOps?



4. Test

Testing involves verifying if the code is performance as per requirement. Unit Testing starts at coding time.

Write test cases before you code.

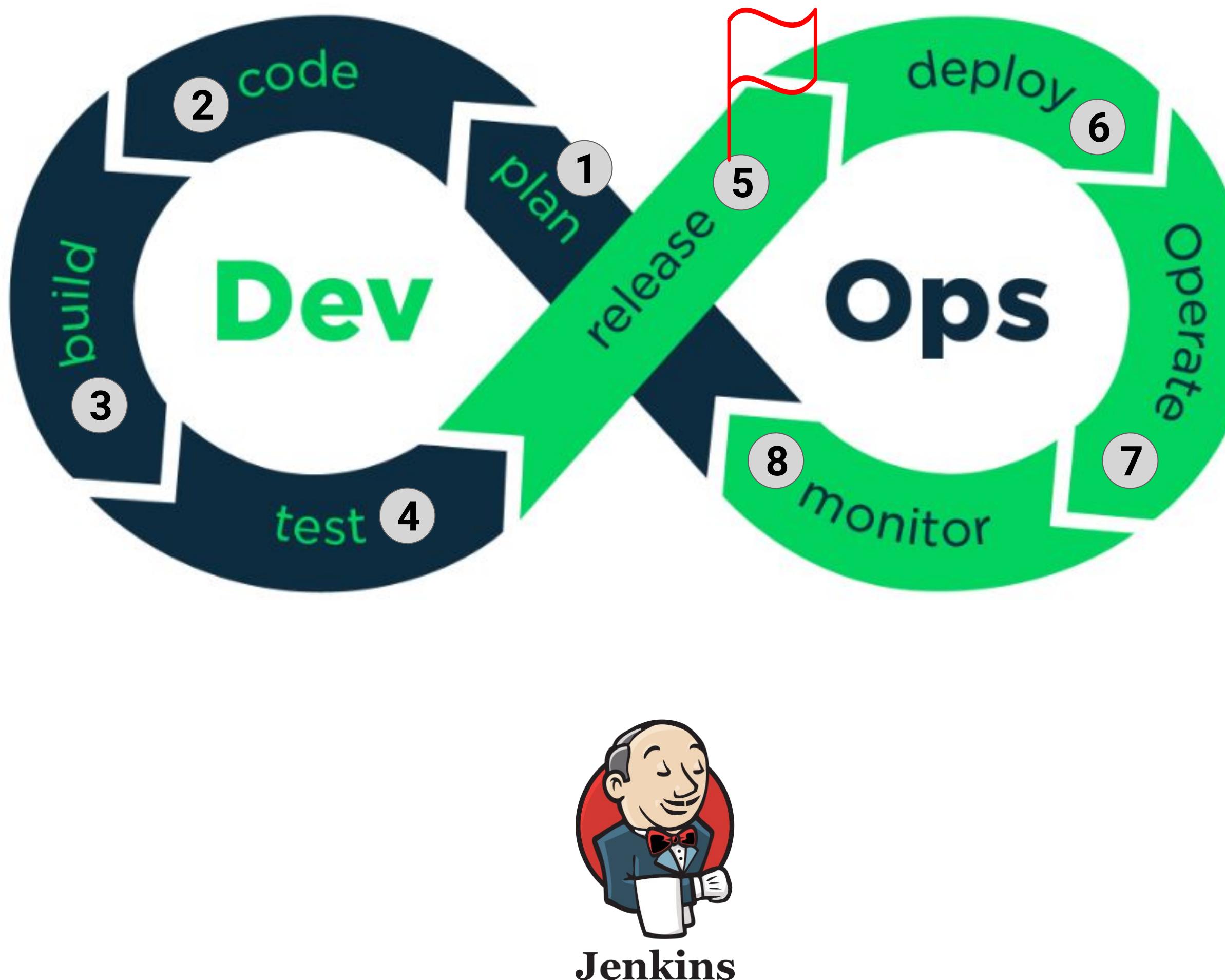
Various Types: Manual, Unit testing, Integration, Stress testing.

Tools: xUnit, Selenium, Scripts, [Stress_testing](#)

See [List_of_unit_testing_frameworks](#)

To ensure completeness, we use [code coverage tools](#) like cobertura.

Understanding DevOps?

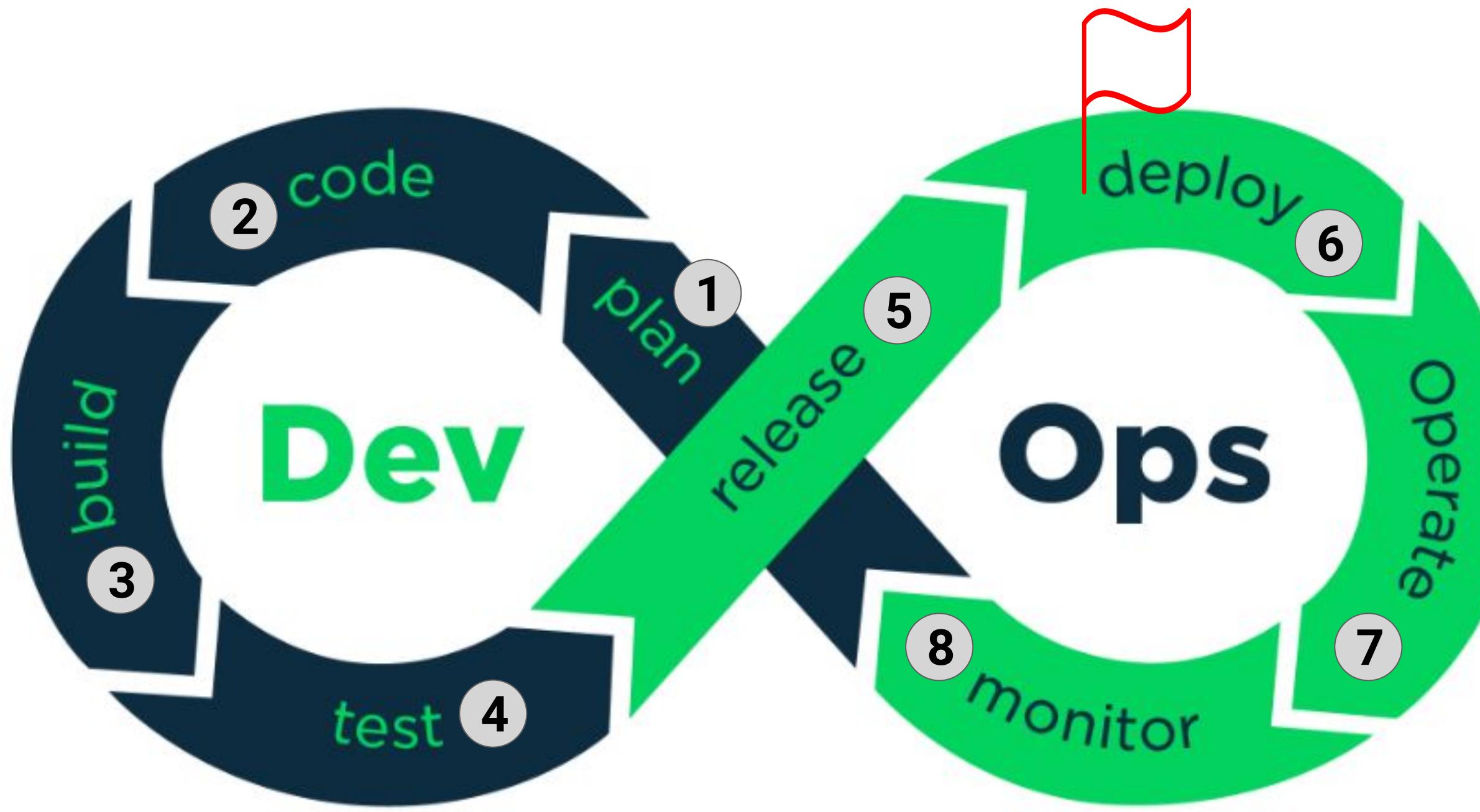


5. Release

Once the testing has been successfully done, the build is released as RC (release candidate) which is ready for being deployed in production.

Tools like Jenkins are used for releasing. Also, Apache Maven repositories are also used for releasing the binaries.

Understanding DevOps?



6. Deploy

Once the release is finalized, we can deploy it using different automation tools:

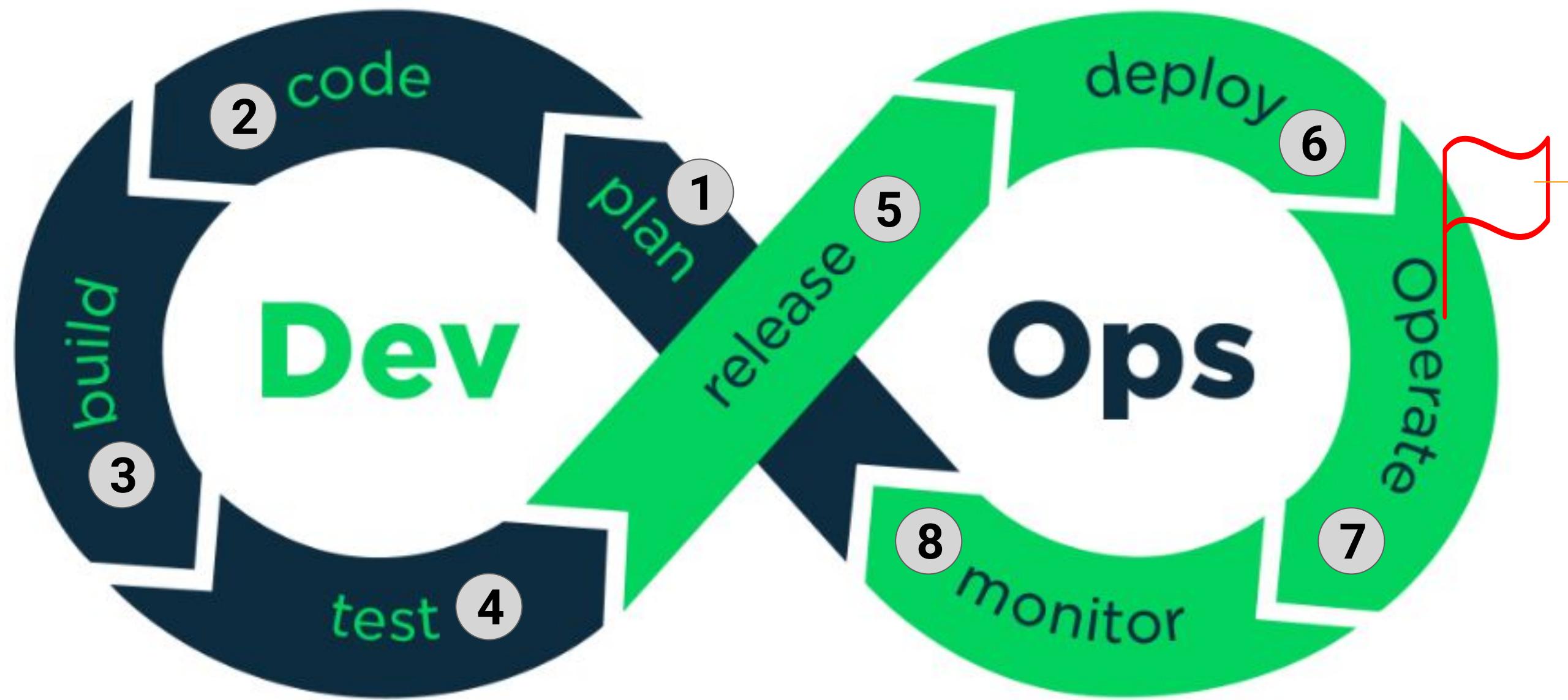
Puppet, Chef, Ansible, SaltStack

Newer tools such as Docker and Kubernetes help scale infinitely and instantaneously.



Docker and Kubernetes are used in testing too these days in CI.

Understanding DevOps?



7. Operate

Once the software is in production, users can use it and the product managers can customize it. During the "operating" phase, we can measure the effectiveness using A/B Testing.

Understanding DevOps?



8. Monitor

We also need to monitor the various system resource consumptions such as [Nagios](#).

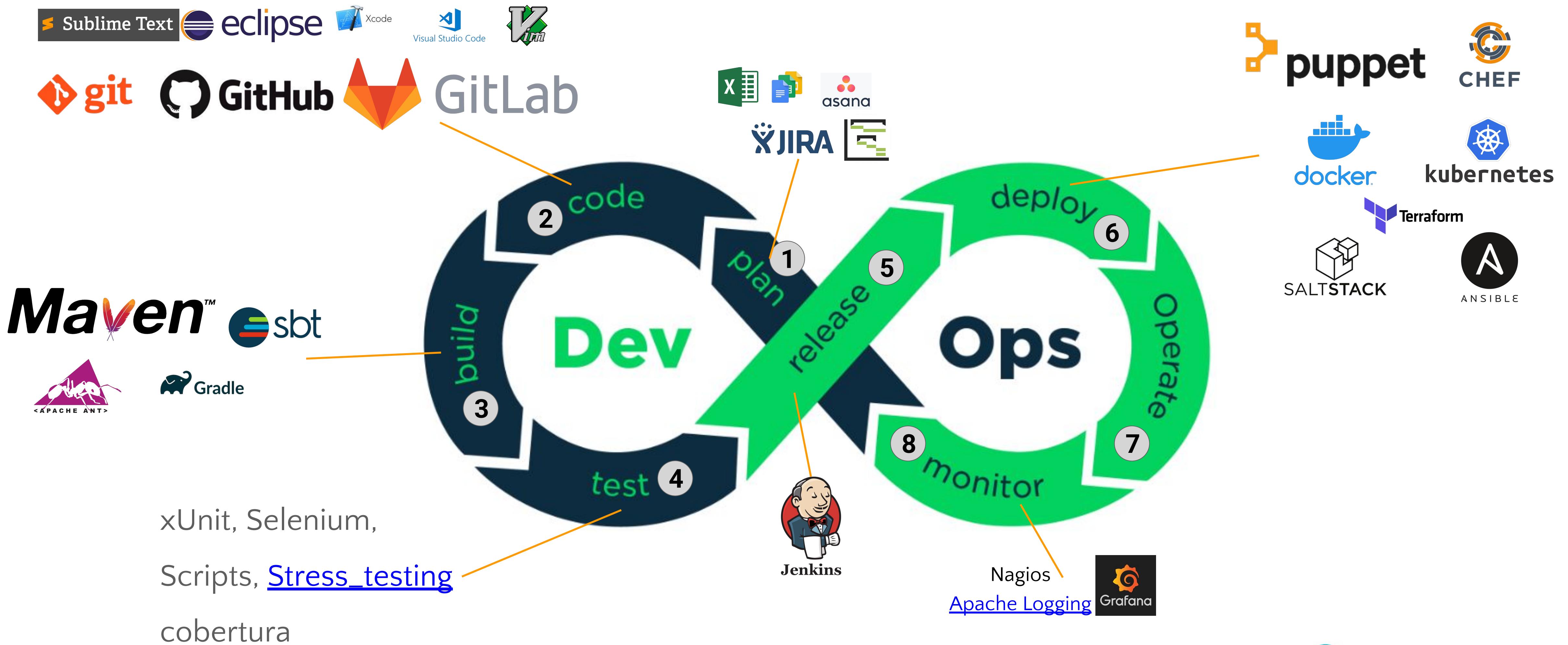
We must also monitor the various logs and errors being thrown by the system.

See: [Apache Logging System](#)



Visualization tools such as Grafana are used to represent metrics.

Understanding DevOps?



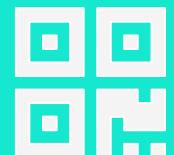
DevOps Practices



Continuous Integration



Continuous Delivery



Microservices



Infrastructure as Code



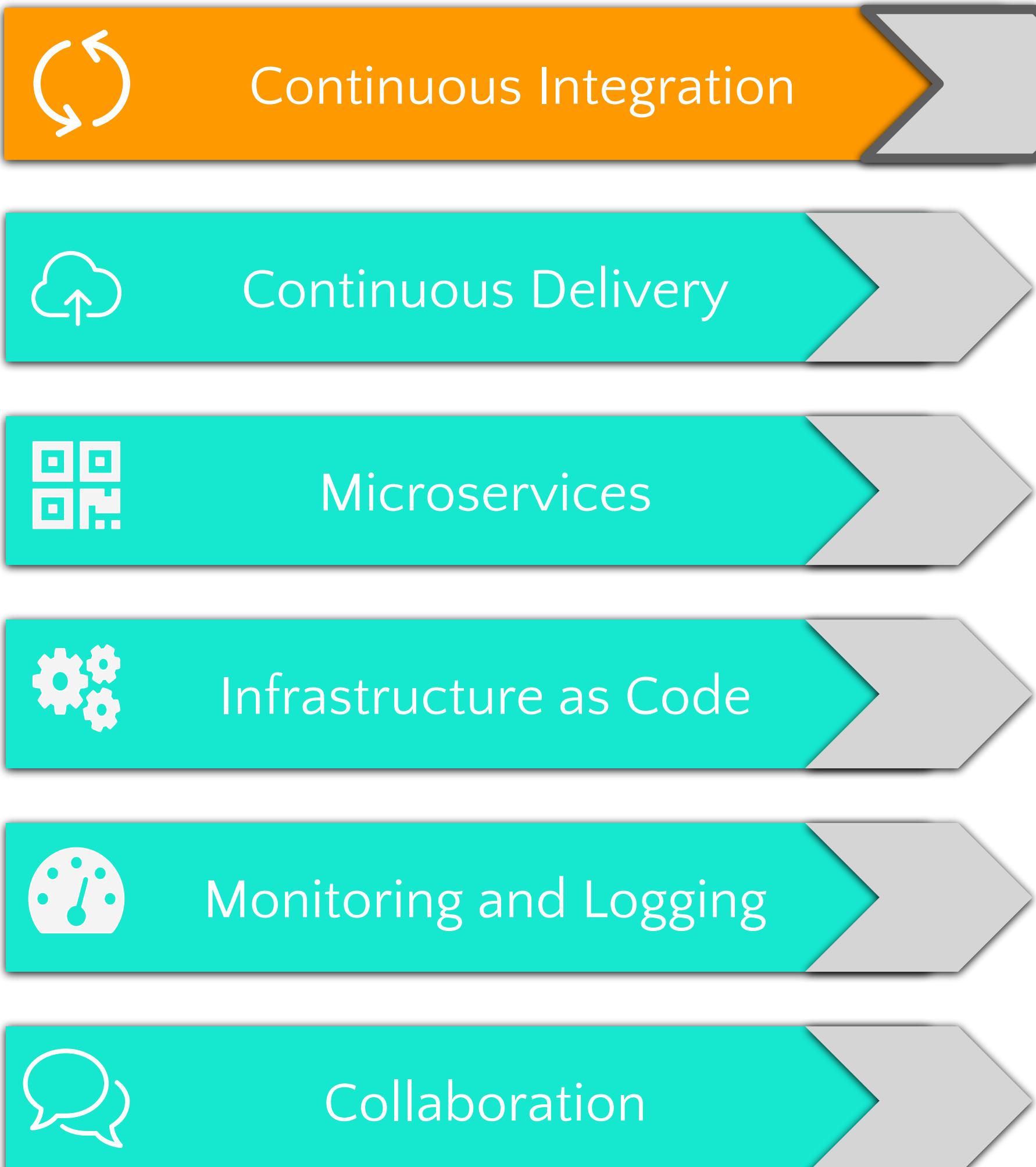
Monitoring and Logging



Collaboration

Let's discuss the DevOps Best Practices

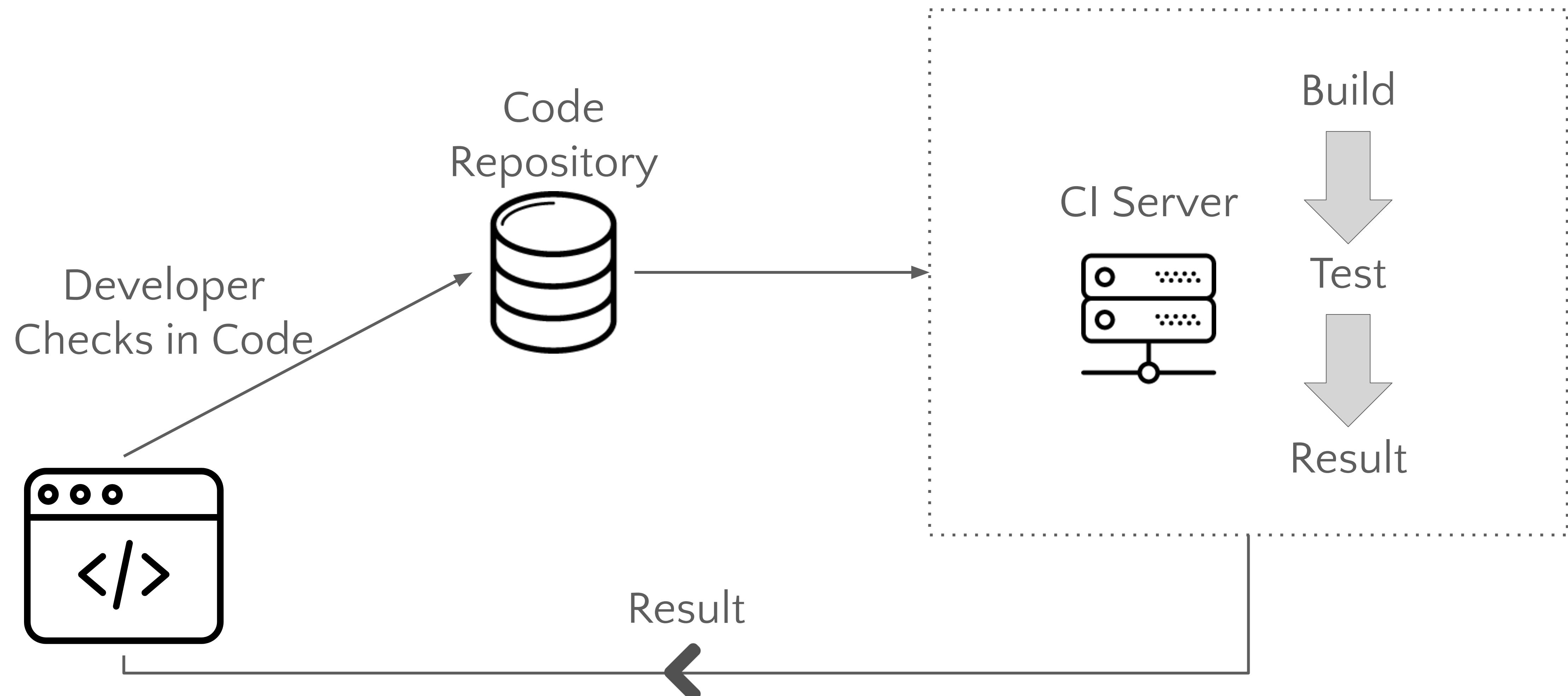
DevOps Practices



Continuous Integration

- Refers to the build and unit testing stages of the software release process
- Every code commit triggers an automatic workflow that
 - Builds the code and
 - Tests the code

DevOps Practices - Continuous Integration



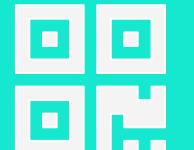
DevOps Practices



Continuous Integration



Continuous Delivery



Microservices



Infrastructure as Code



Monitoring and Logging

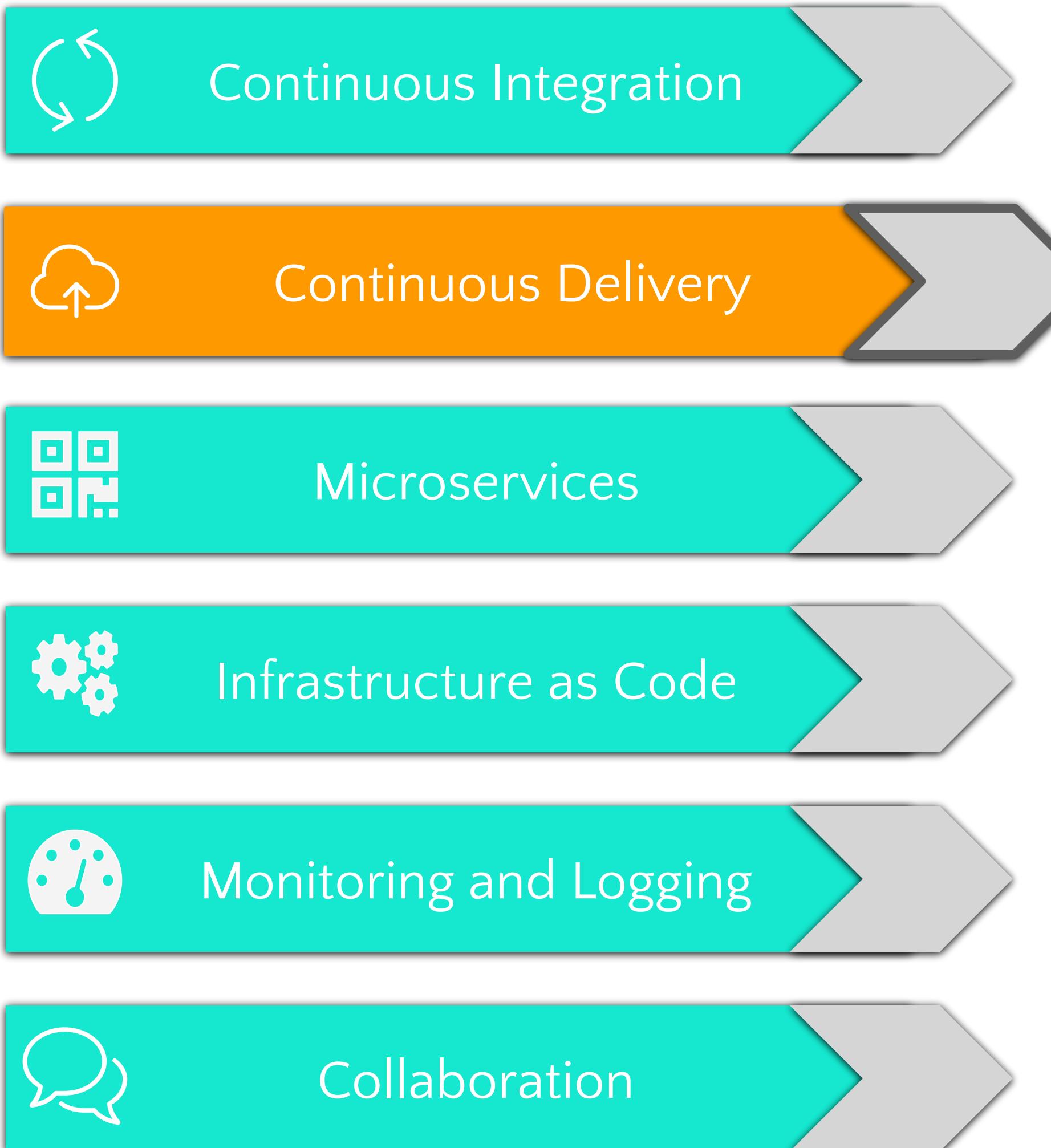


Collaboration

Continuous Integration

- Helps in finding and addressing bugs quicker

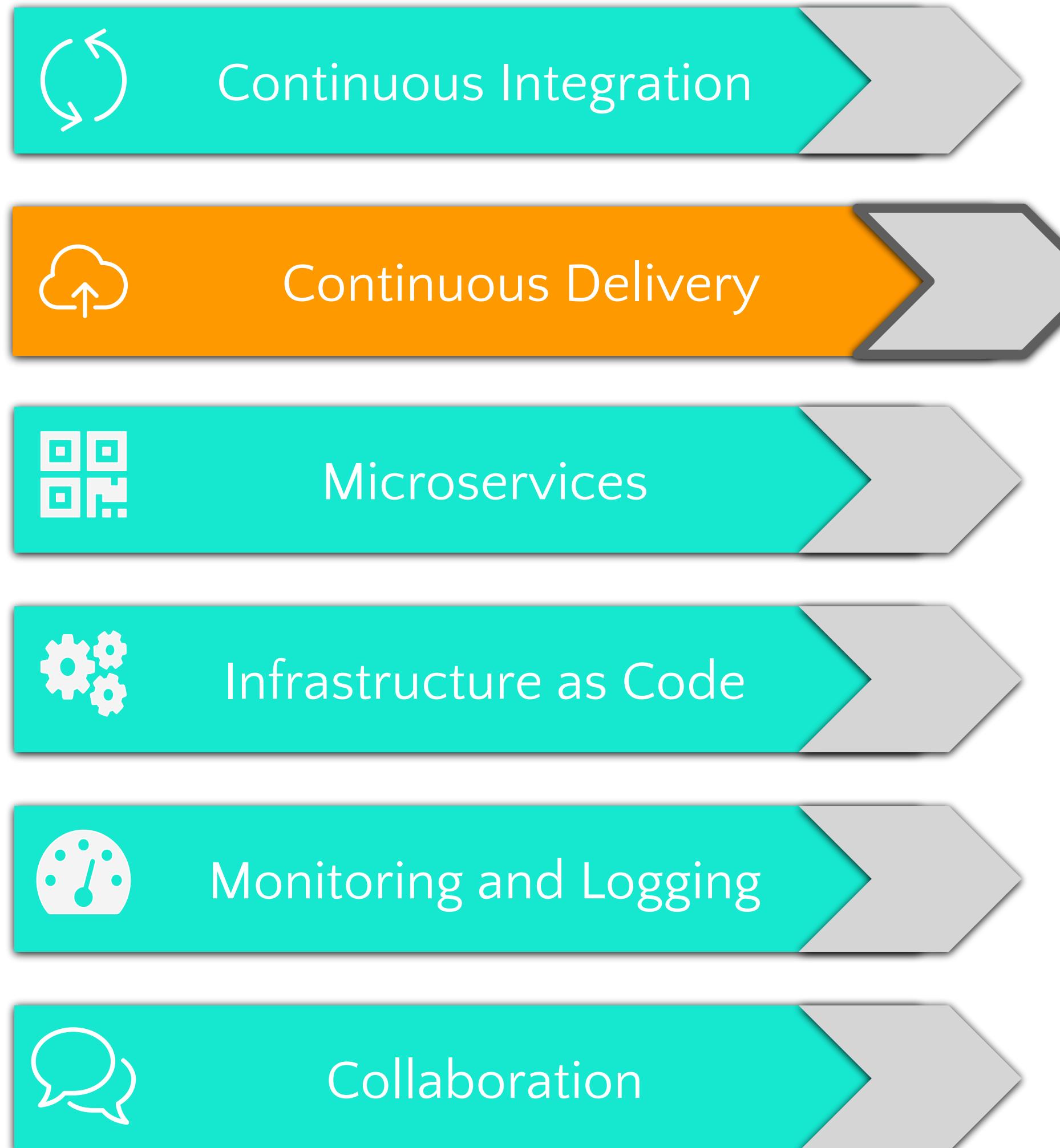
DevOps Practices



Continuous Delivery

- Continuous Delivery automates the entire software release process.
- Continuous Delivery extends the Continuous Integration

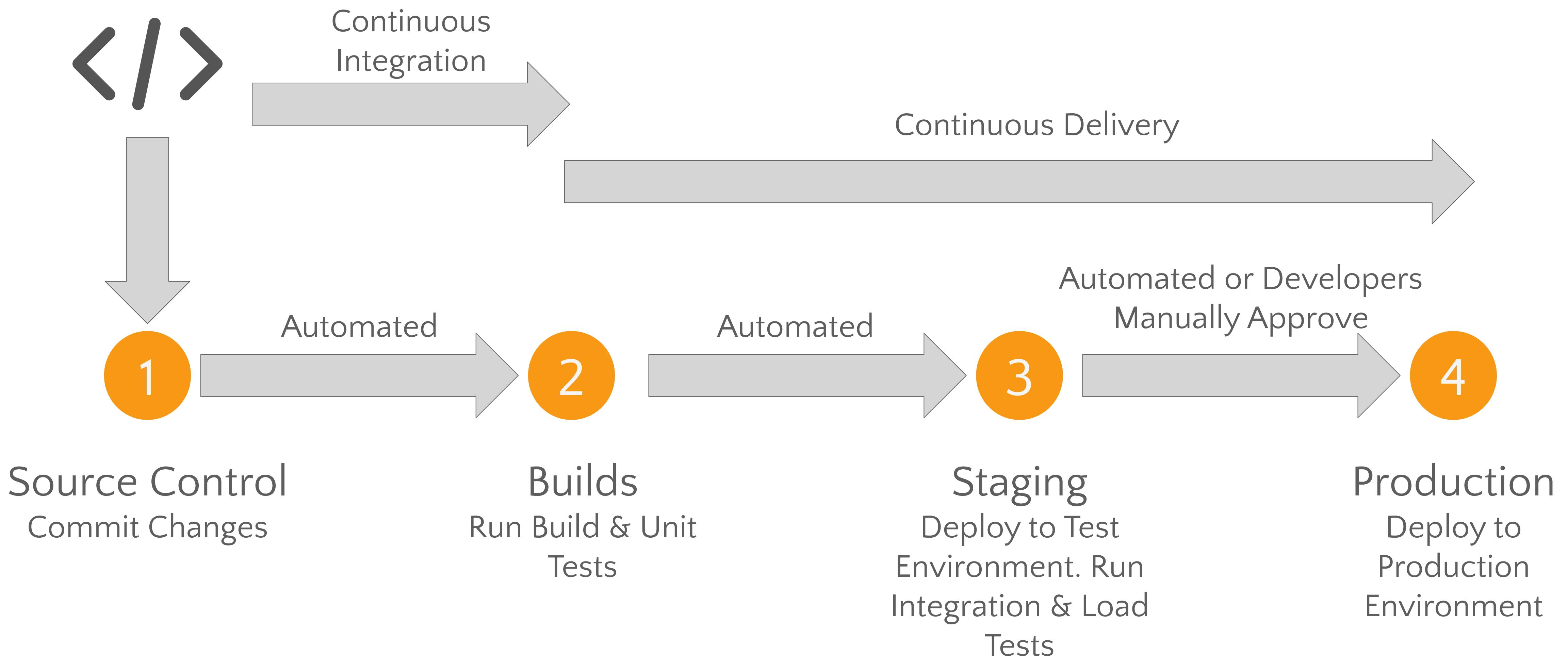
DevOps Practices



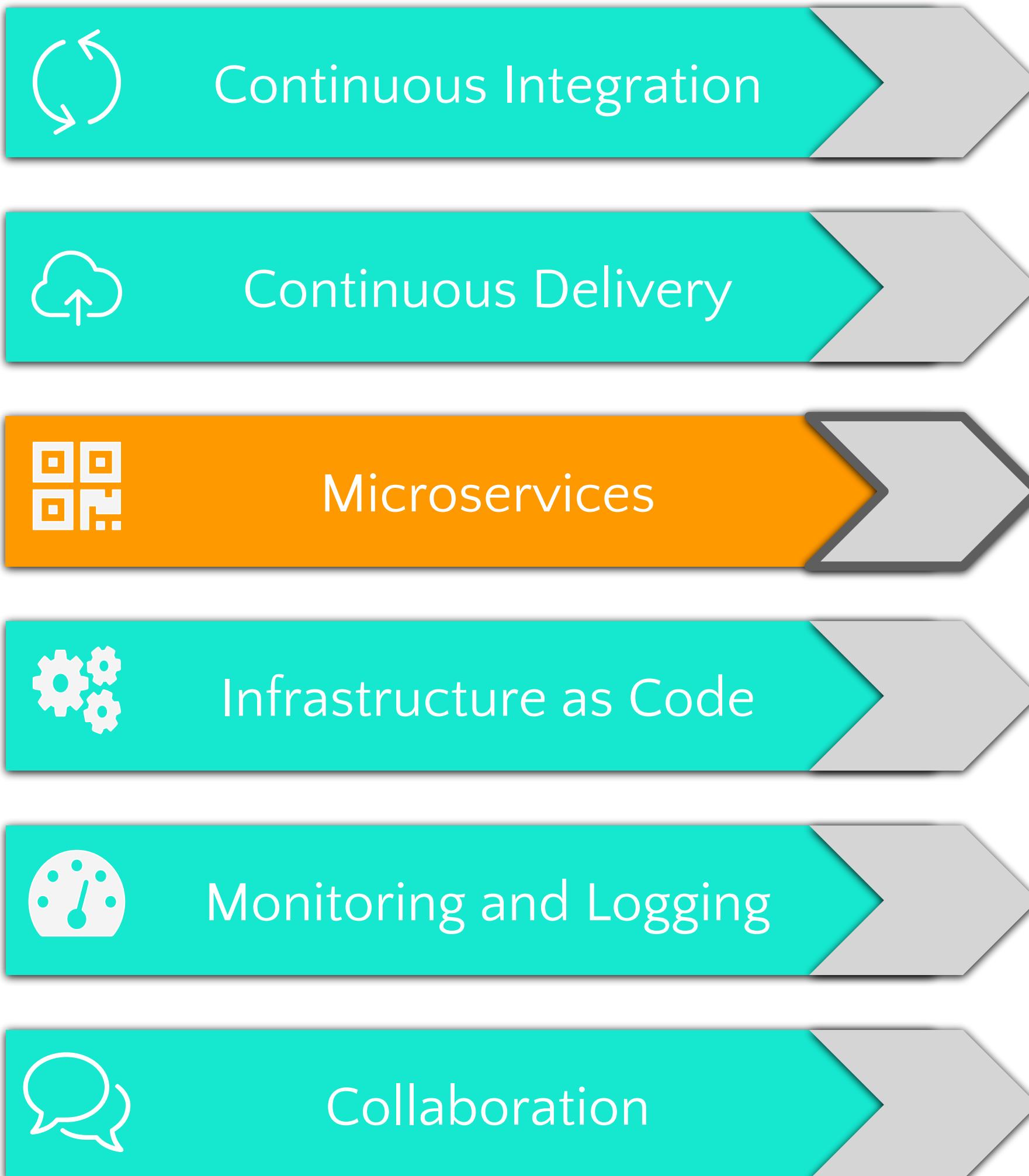
Continuous Delivery

- Every code-commit triggers an automatic workflow that
 - Builds the code (Continuous Integration)
 - Tests the code and (Continuous Integration)
 - Then deploys the code to staging and then to production

DevOps Practices – Continuous Deployment



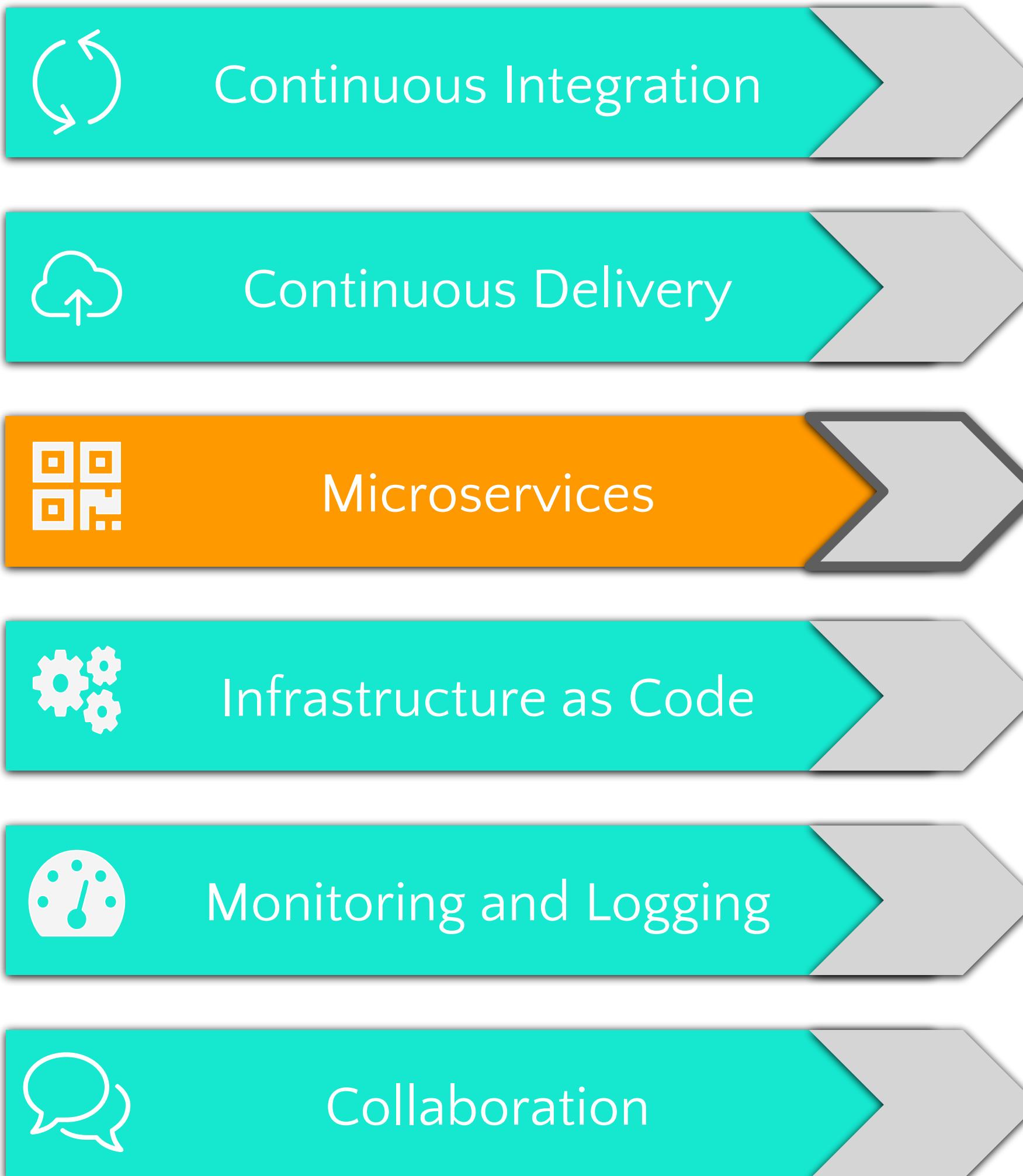
DevOps Practices



Microservices

- Design single application as a set of small services
- Each service runs its own process

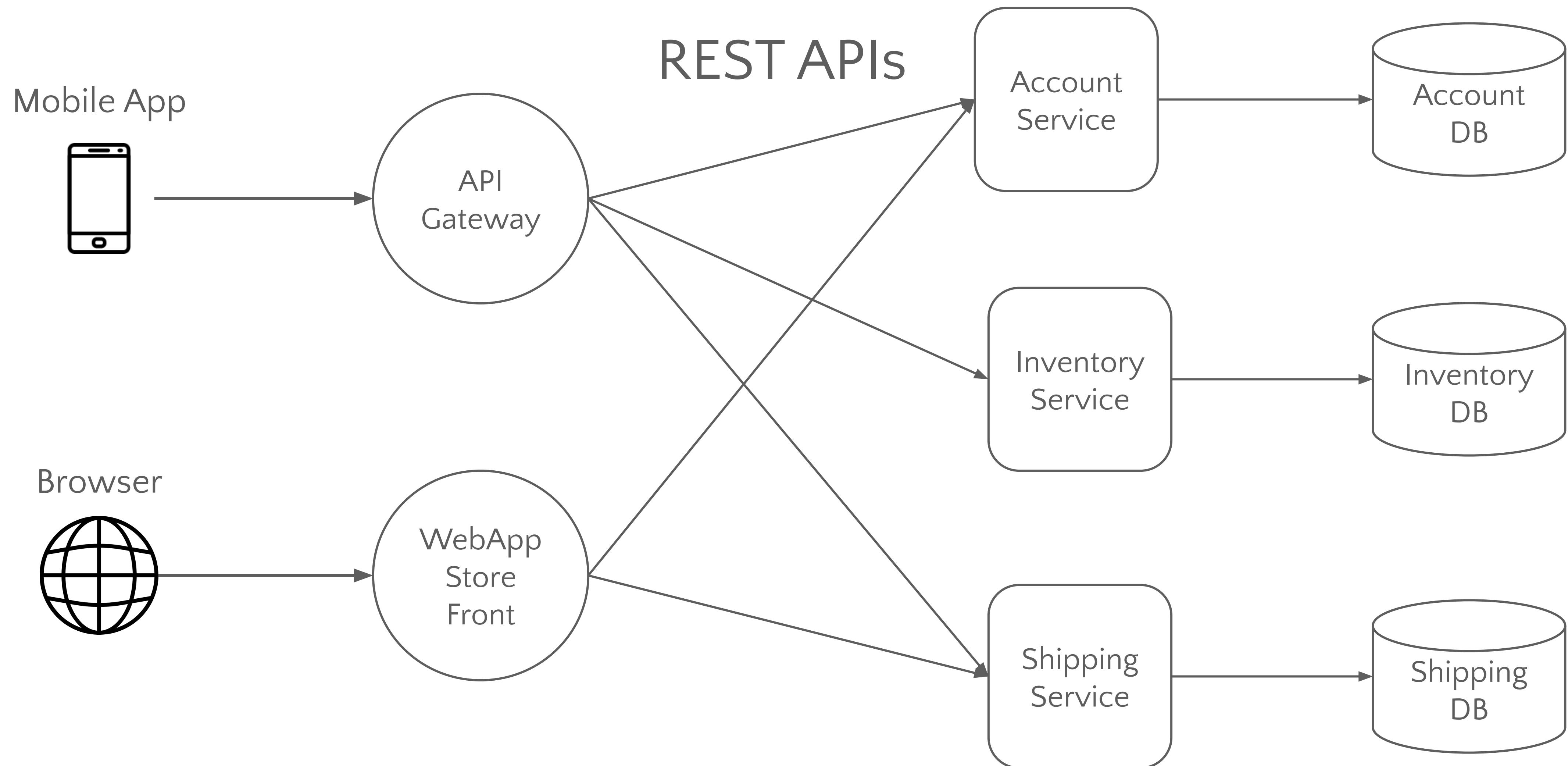
DevOps Practices



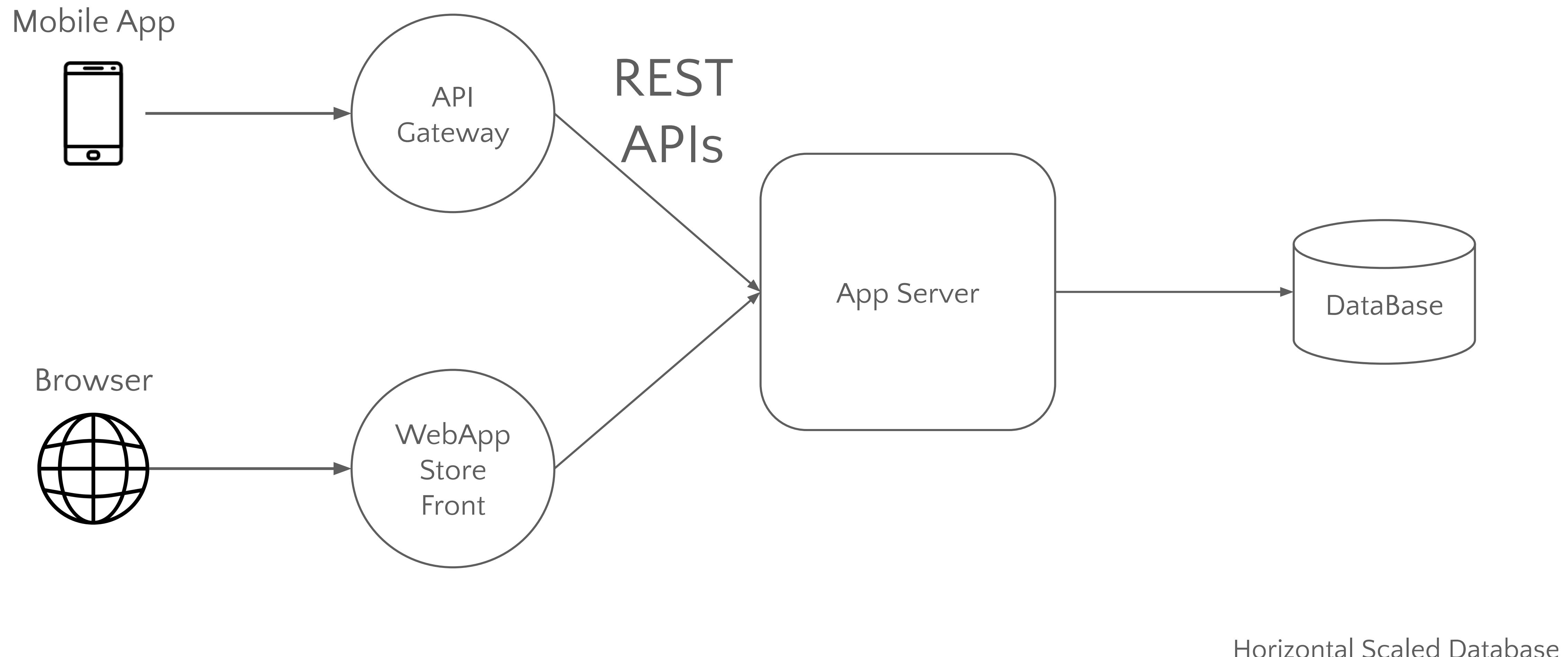
Microservices

- Each service communicates with other services through a lightweight mechanism like REST APIs
- Microservices are built around business capabilities
- Each service caters to a single business purpose

DevOps Practices – Microservices

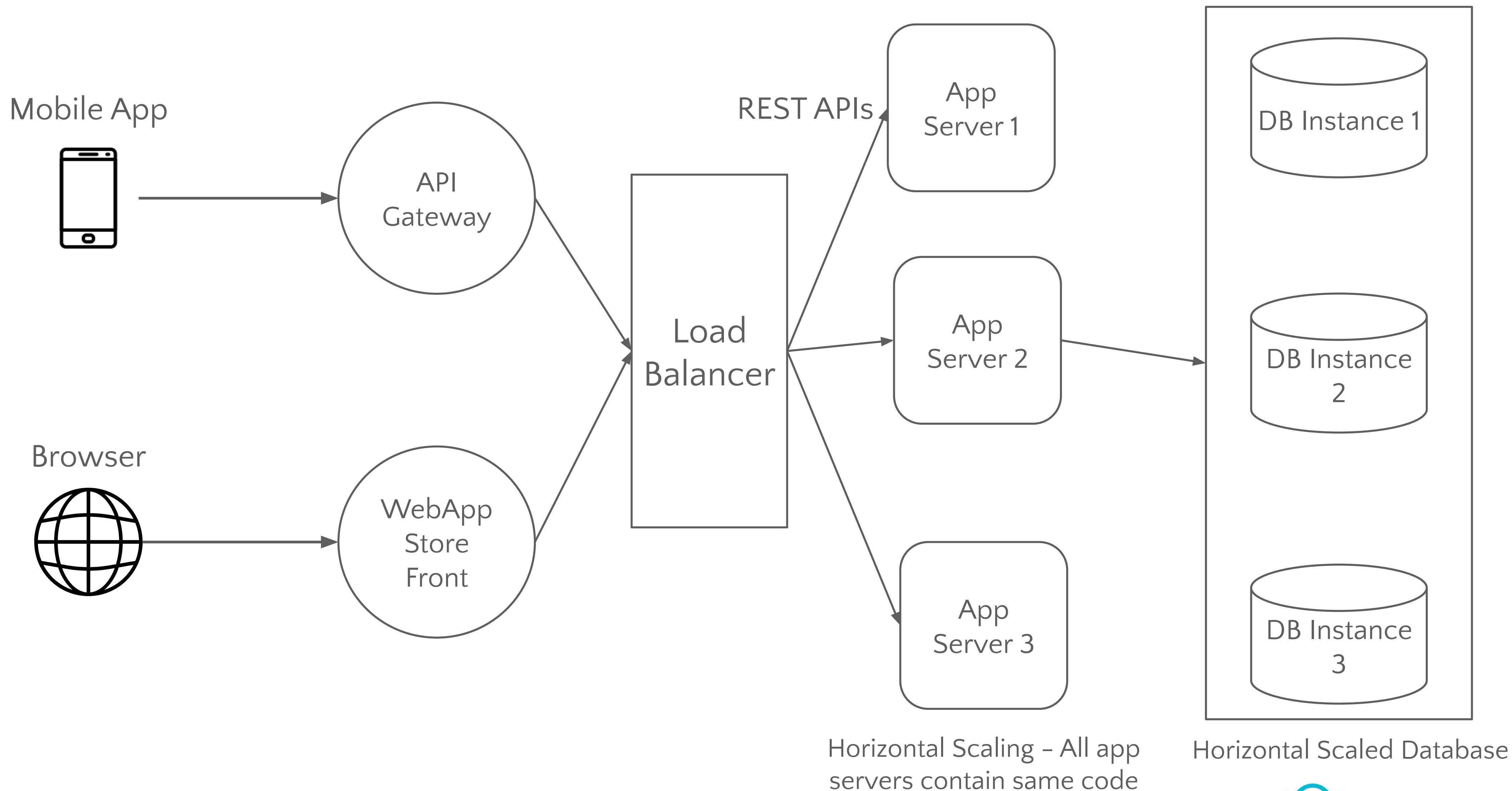


DevOps Practices – Monolith

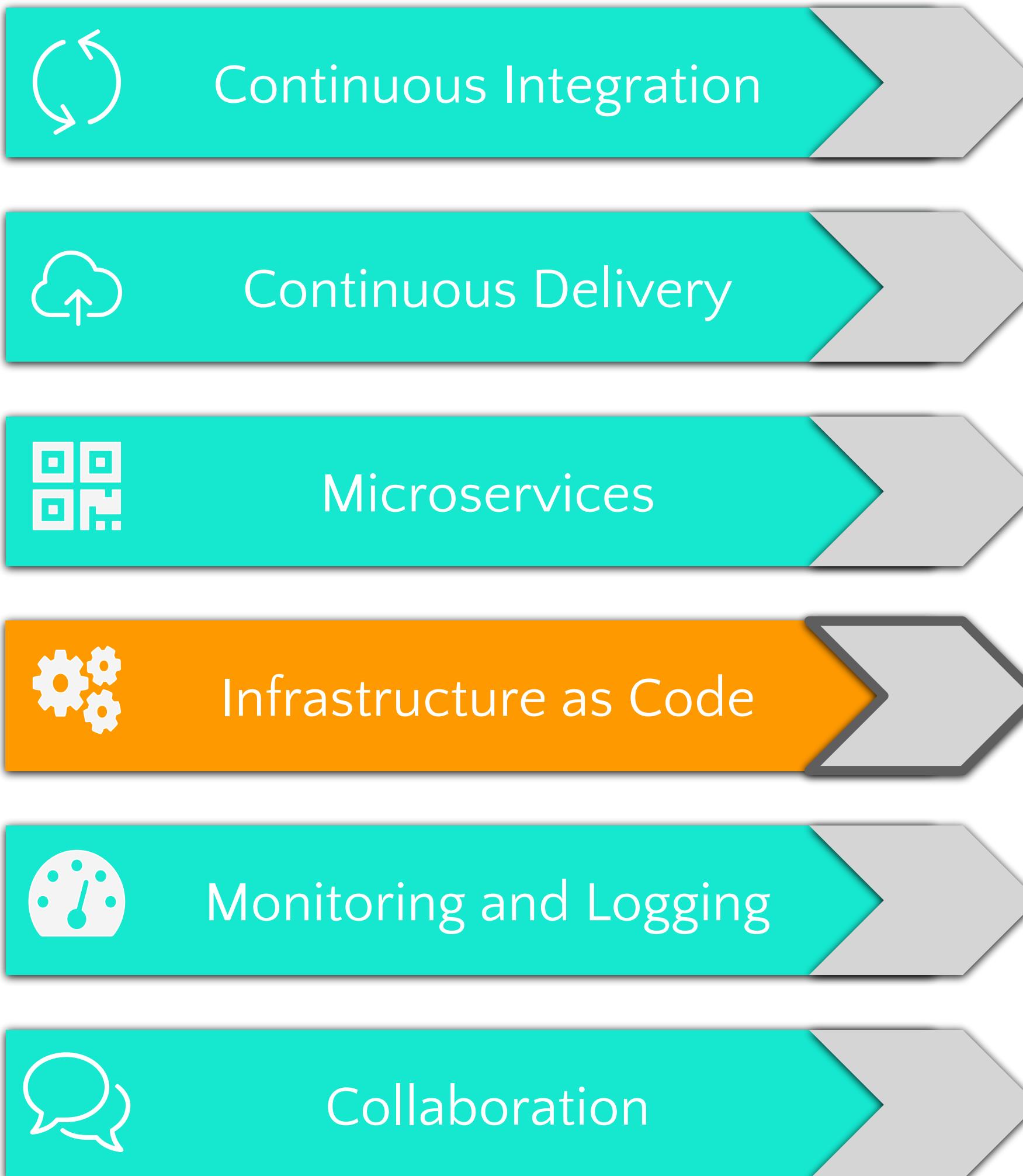


Horizontal Scaled Database

DevOps Practices – Monolith – Horizontal Scaling



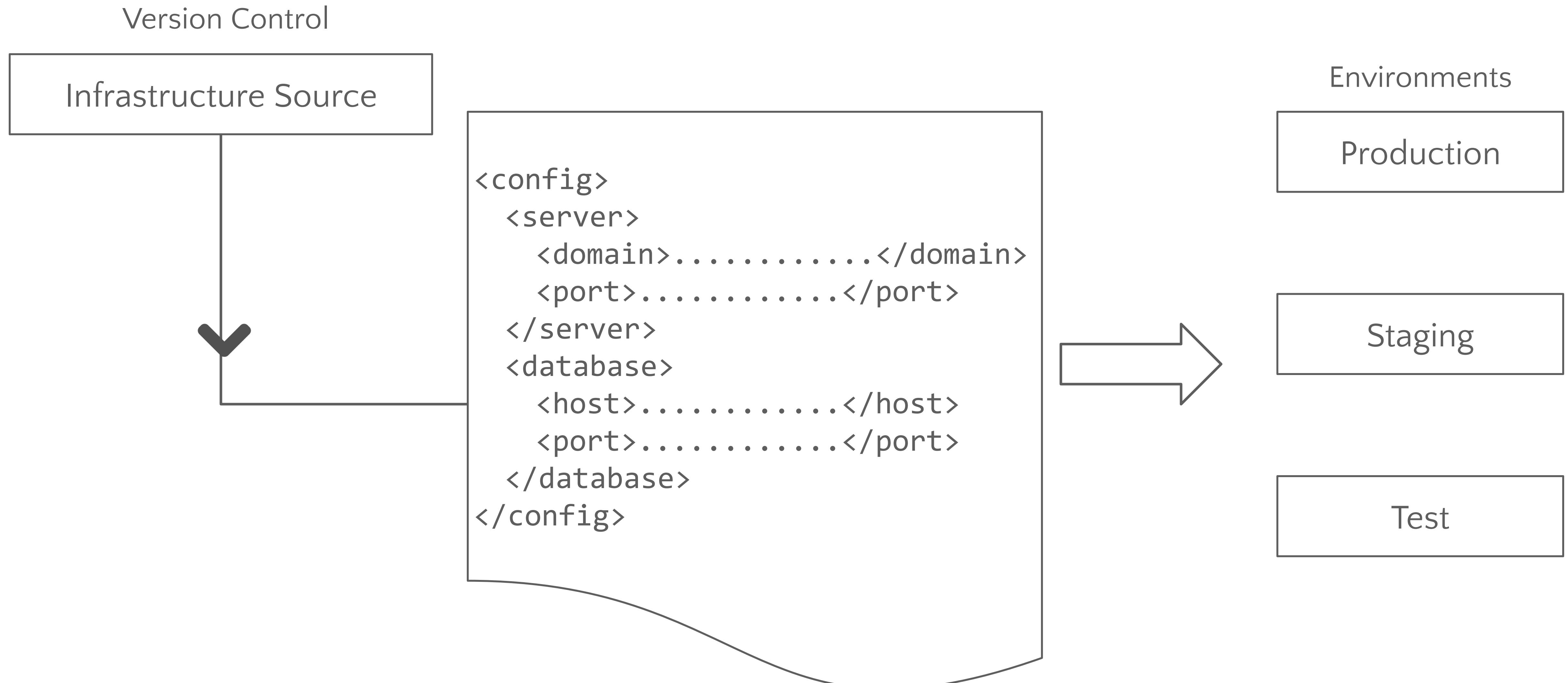
DevOps Practices



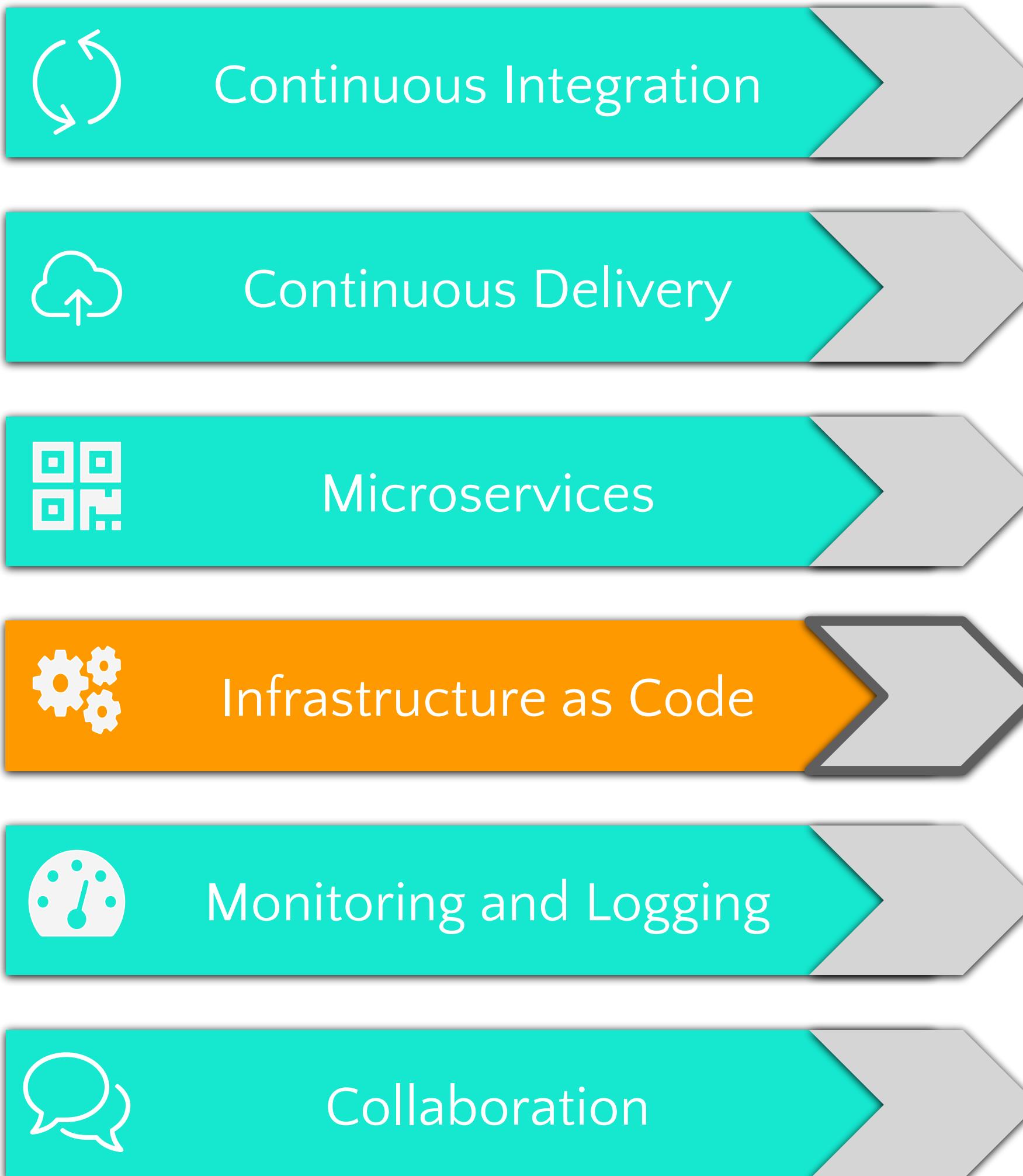
Infrastructure as Code

- Infrastructure is provisioned and managed using
 - Code and
 - Software development techniques such as
 - Version control and
 - Continuous integration

DevOps Practices – Infrastructure as Code



DevOps Practices



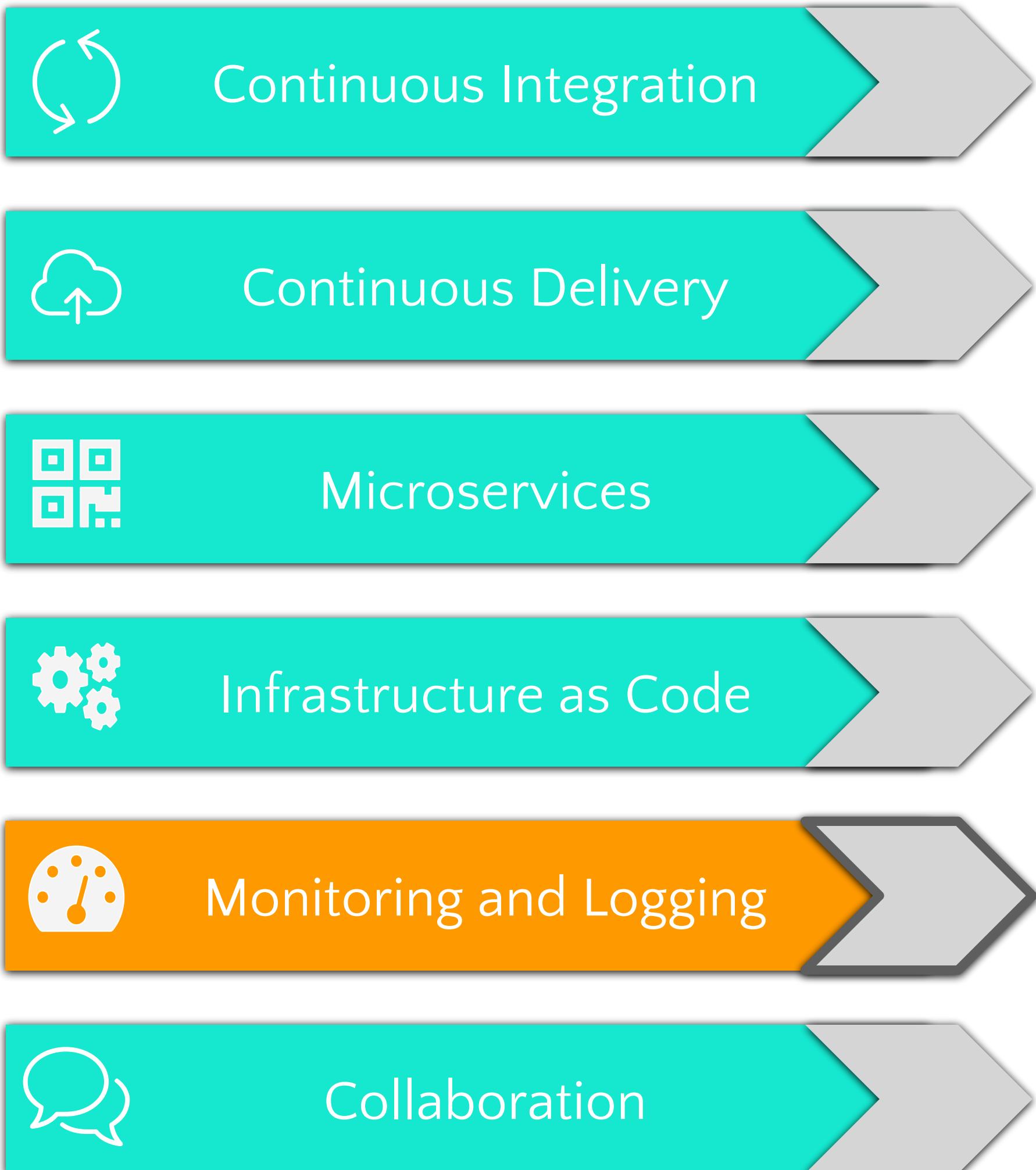
Infrastructure as Code

- This helps developers and system admins to manage infrastructure at scale
- Without worrying about manually setting up and configuring the servers and resources.

DevOps Practices – Infrastructure as Code



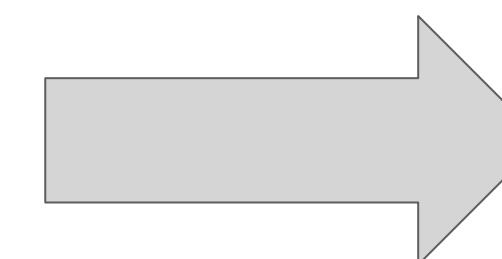
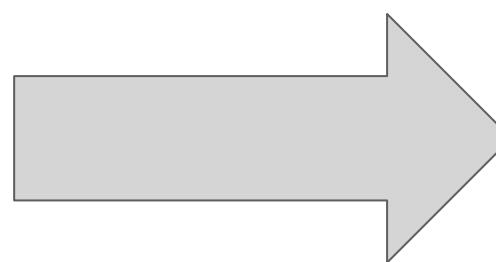
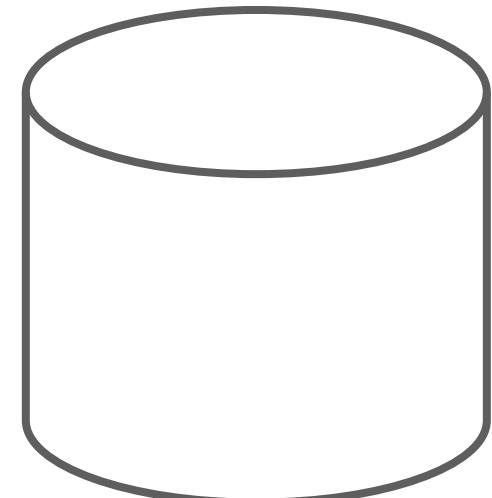
DevOps Practices



Monitoring and Logging

- Monitor metrics and logs to see how application and infrastructure is performing
- Taking necessary actions to fix the bottlenecks

DevOps Practices – Monitoring and Logging

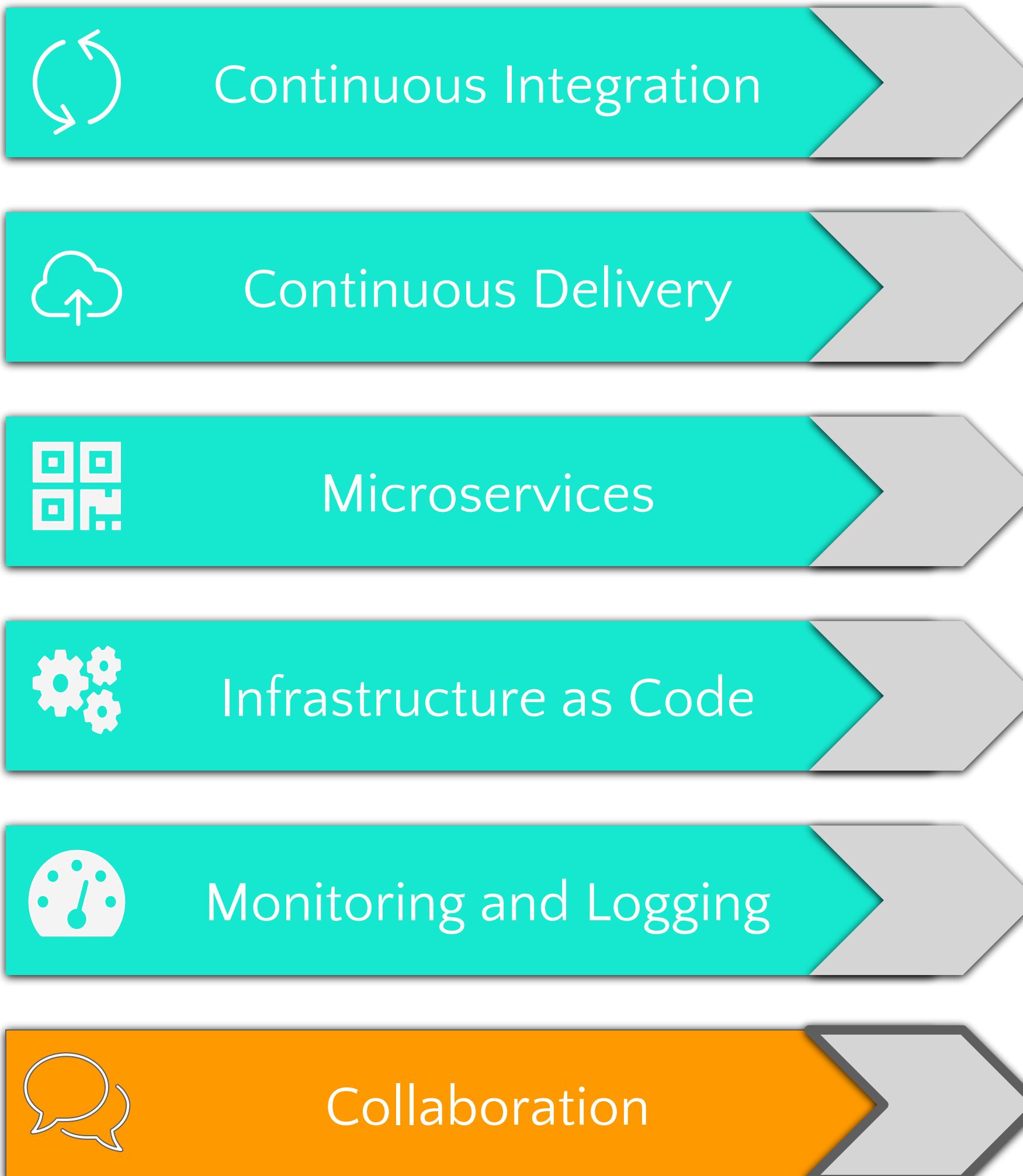


Collect Metrics and
Logs from
Application and
Servers

Monitor Application
and Infrastructure
Health

Analyze the Problem
and Fix it

DevOps Practices



Collaboration

- DevOps process setup strong cultural norms and best practices
- Well defined processes increase the quality communication and collaboration among various teams

Hands-on

How the hands-on will be done?

- 90 days access to lab – Few tools can be practiced on lab
- Create your own account on AWS and GCP
 - Root access to deploy services and modify configurations
 - Instructor will show how to deploy services on AWS/GCP

Frequently Asked Questions

**Q: I am a software engineer, will this course be useful to
me?**

Q: I am a software engineer, will this course be useful to me?

Yes.

1. It would help you learn the better practices and tools for building better software for large number of users
2. It would help you learn how to deploy the software.

**Q: I am system administrator, will DevOps course help
me?**

Q: I am system administrator, will DevOps course help me?

Yes.

1. Most of the tasks of system administrator are around managing the deployment and development environment.
2. This could will teach you both.

Q: I am Machine Learning Engineer, should I attend this course?

Q: I am Machine Learning Engineer, should I attend this course?

Yes.

ML Engineers need to deploy their models as services. This course will help you understand how to deploy your models as services. We will have a project involving deploying the ML model as services.

You will also learn how to manage your training project code using SCM and other mechanisms.

**Q: I am a frontend Engineer, is this course relevant to
me?**

Q: I am a frontend Engineer, is this course relevant to me?

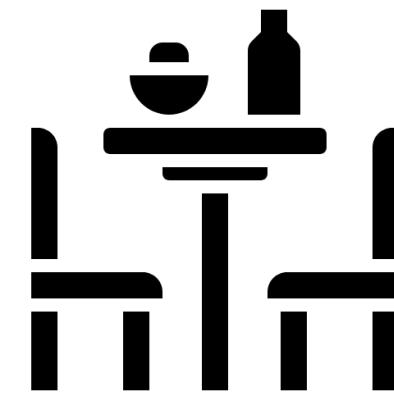
Yes.

First, you will learn how to use Source Code Management tools.

Second, while testing the frontend, you usually need to deploy.

Therefore, it is needed to be involved in the continuous deployment. For testing frontend too you should build a practice as mentioned earlier.

DevOps Specialization Course Enrollment

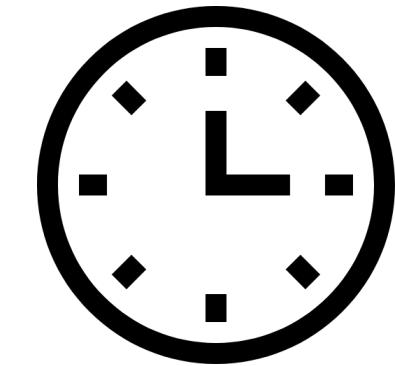


Only Few Seats Left



March 28 -
Second and
Onwards
Sessions

7:30 am to 9:30 am PST
8 pm - 10 pm IST
40 Hours



\$369
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Questions?

<https://discuss.cloudxlab.com/c/course-discussions/devops>