DevOps

CSSE6400

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Who has heard of *DevOps*?

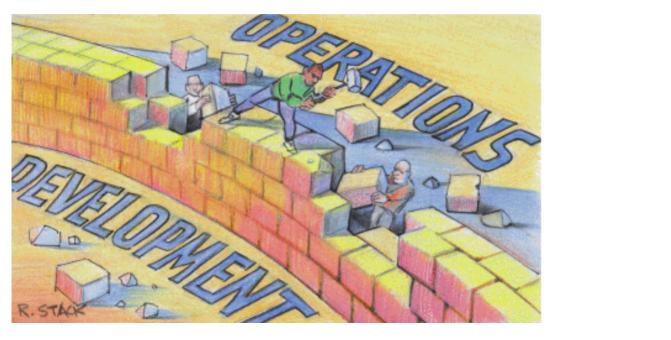# Who has used *DevOps*?

The larger story

Server Config	Config Management
Application Config	Config Files
Provisioning	Infrastructure Code
Building	Continuous Integration
Deployment	Continuous Deployment
Testing	Automated Tests
Database Administration	Schema Migration
Specifications	Behaviour Driven Development

What is *DevOps*?

What is *DevOps*? [1]

- A combination of *software development* and *IT operations* skills

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- A *cultural movement* that enables rapid development with four defining characteristics: open communication, incentive and responsibility alignment, respect, and trust

Important

Continuous *

Also Important

If it hurts, do it more often

Tooling

1. Continuous *development*
2. Continuous *integration*
3. Continuous *testing*
4. Continuous *deployment*
5. Continuous *operations*
6. Continuous *monitoring*
7. Continuous *feedback*

Discussion

Do the seven necessary *DevOps practices* map perfectly to the *enablers* in the article by Senapathi *et al* [1]?

Technological Enablers

- *Build* automation
- *Test* automation
- *Deployment* automation
- *Monitoring* automation
- *Recovery* automation
- *Infrastructure* automation
- *Configuration* management for code and infrastructure
- *Metrics* automation

Design a DevOps pipeline for *Sahara*

Order Personnel
[Person]

Manages inventory and ordering products.

Payment Provider
[Software System]

External service providing payment facilities.

Customer
[Person]

Someone who shops at the Sahara on-line store.

Search, browse and purchase products.

Monitor inventory and order new stock.

Process payment.
[REST API JSON/HTTPS]

On-line Store
[Software System]

Allows customers to browse and search for items and to order them.

Get Product Suggestions

Data Mining Service
[Software System]

Collects customer visit data and provides product recommendations.

Customer Browsing History
[REST API JSON/HTTPS]

Sahara eCommerce
[Enterprise]

[System Context] On-line Store
Friday, 18 March 2022, 23:38 Australian Eastern Standard Time

Web Application
[Container: J2EE Server]

Delivers the web front-end for the on-line store.

Suggest Products
[Component: Java]

Suggest products user may be interested in.

Search for Product
[Component: Java]

Finds products based on search criteria.

Data Mining Service
[Software System]

Collects customer visit data and provides product recommendations.

Product Browsing Façade
[Component: JSP]

Provides interface to retrieve product information based on search criteria

Browse for Product
[Component: Java]

Finds products based on user navigation.

Application Database
[Container: MySQL]

Stores customer credentials, products and orders.

Shopping Cart Management
[Component: Java]

Add and remove items from user's shopping cart.

Find & Retrieve
Product Details
[RMI]

Uses

Uses

Uses

Uses

Get Product
Suggestions
[REST API JSON/HTTPS]

Customer
Browsing History
[REST API JSON/HTTPS]

Finds Product
[JPA]

Finds Product
[JPA]

Updates Cart
[JPA]

Customer
Browsing History
[REST API JSON/HTTPS]

Record Cart
Updates
[REST API JSON/HTTPS]

Product Browsing
[Container]

[Component] On-line Store - Product Browsing
Sunday, 20 March 2022, 21:51 Australian Eastern Standard Time

Mobile Application
[Container: React Native]
[Container: Rich Client]
Mobile app on iPhone and Android providing shopping experience

Customer's Mobile Device
[Deployment Node: Apple iOS or Android]

Interactive Web Pages
[Container: JavaScript and Angular]
[Container: Web Browser]
Provides the environment in which customers can view products

Web Browser
[Deployment Node: Chrome, Firefox, Safari or Edge]

Customer's Computer
[Deployment Node: PC/Windows, Apple macOS or Linux]

Web Application
[Container: JEE Server]
[Container: Web Server]
Delivers the web front-end for the purchase store

Web Server
[Deployment Node: Apache Tomcat]

Apache Tomcat
[Deployment Node/Apache Tomcat/JVM]

Delivers content to the customer's browser
[HTTPS]

Visit & retrieve product details
[JSON]

Send Purchase Request
[JSON]

CRUD Customer account
[JSON]

Query Order Status
[JSON]

Product Browsing
[Container: Java]
[Container: Server-Side]
Provides backend logic for browsing or searching for products

Product Browsing Server
[Deployment Node: Ubuntu 18.04 Basic 11.13]

Product Purchasing
[Container: Java]
[Container: Server-Side]
Provides backend logic for purchasing products

Product Purchasing Server
[Deployment Node: Ubuntu 18.04 Basic 11.13]

Customer Account Management
[Container: Java]
[Container: Server-Side]
Provides backend logic for managing customer accounts

Customer Account Server
[Deployment Node: Ubuntu 18.04 Basic 11.13]

Product Fulfillment
[Container: Java]
[Container: Server-Side]
Provides backend logic for fulfilling orders

Product Fulfillment Server
[Deployment Node: Ubuntu 18.04 Basic 11.13]

Application Database
[Container: MySQL]
[Container: Database]
Stores customer credentials, products and orders

MySQL Primary
[Deployment Node: MySQL]

Application Database Server
[Deployment Node: Ubuntu 18.04]

Inventory Management
[Container: Java]
[Container: Server-Side]
Provides backend logic for managing inventory

Inventory Management Server
[Deployment Node: Ubuntu 18.04 Basic 11.13]

Inventory Application
[Container: Java]
[Container: Web]
Interface to manage inventory

Web Browser
[Deployment Node: Chrome, Firefox, Safari or Edge]

Order Personal Computer
[Deployment Node: PC/Windows, Apple macOS or Linux]

Find & retrieve Product Details
[JDBC]

Queries & Updates
[JDBC]

Queries & Updates
[JDBC]

Queries
[JDBC]

Queries & Updates
[JDBC]

Store Purchase History
[JDBC]

Customer Browsing History
[and consumer info]

Customer Purchase History
[and info payments]

View Order Details
[and component list]

Retrieve stock levels and Update item stock
[and component list]

Sahara
[Deployment Node: Sahara eCommerce Data hosting]

Data Mining Interface
[Container: Python and Django]
[Container: Server-Side]
Provides interface to operations to record and retrieve mining results

Data Mining API
[Deployment Node]

Data Warehouse
[Container: Binary Service]
[Container: Binary]
Stores customer browsing and transaction history

Data Warehouse
[Deployment Node]

Data Mining Process
[Container: Python and Django]
[Container: Bot]
Performs data mining on collected data

Machine Learning Process
[Deployment Node]

Store Customer Browsing History
[JSON]

Get Product Mine recommendations

Perform Data Mining
[JDBC]

Data Mining Service
[Deployment Node/Public Cloud (Kubernetes)]

[Deployment] - Live
Friday, 13 March 2021 ... C4 Architecture Model Generated from ...

1. What *types of tools* would be required?

Sahara Pipeline

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2. Which *specific tools* would you choose?

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2. Which *specific tools* would you choose?
3. On which type of *computing infrastructure* would you deliver the system?

1. What *types of tools* would be required?
2. Which *specific tools* would you choose?
3. On which type of *computing infrastructure* would you deliver the system?
4. What parts of the deployment and operations processes could be *automated*?

References

[1] Mali Senapathi, Jim Buchan, and Hady Osman.
DevOps capabilities, practices, and challenges: Insights from a case study.
In *Proceedings of the 22nd International Conference on evaluation and assessment in software engineering 2018*, volume 137700 of *EASE'18*, pages 57–67. ACM, 2018.