DevOps

Software Architecture

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Question

Who has heard of *DevOps*?
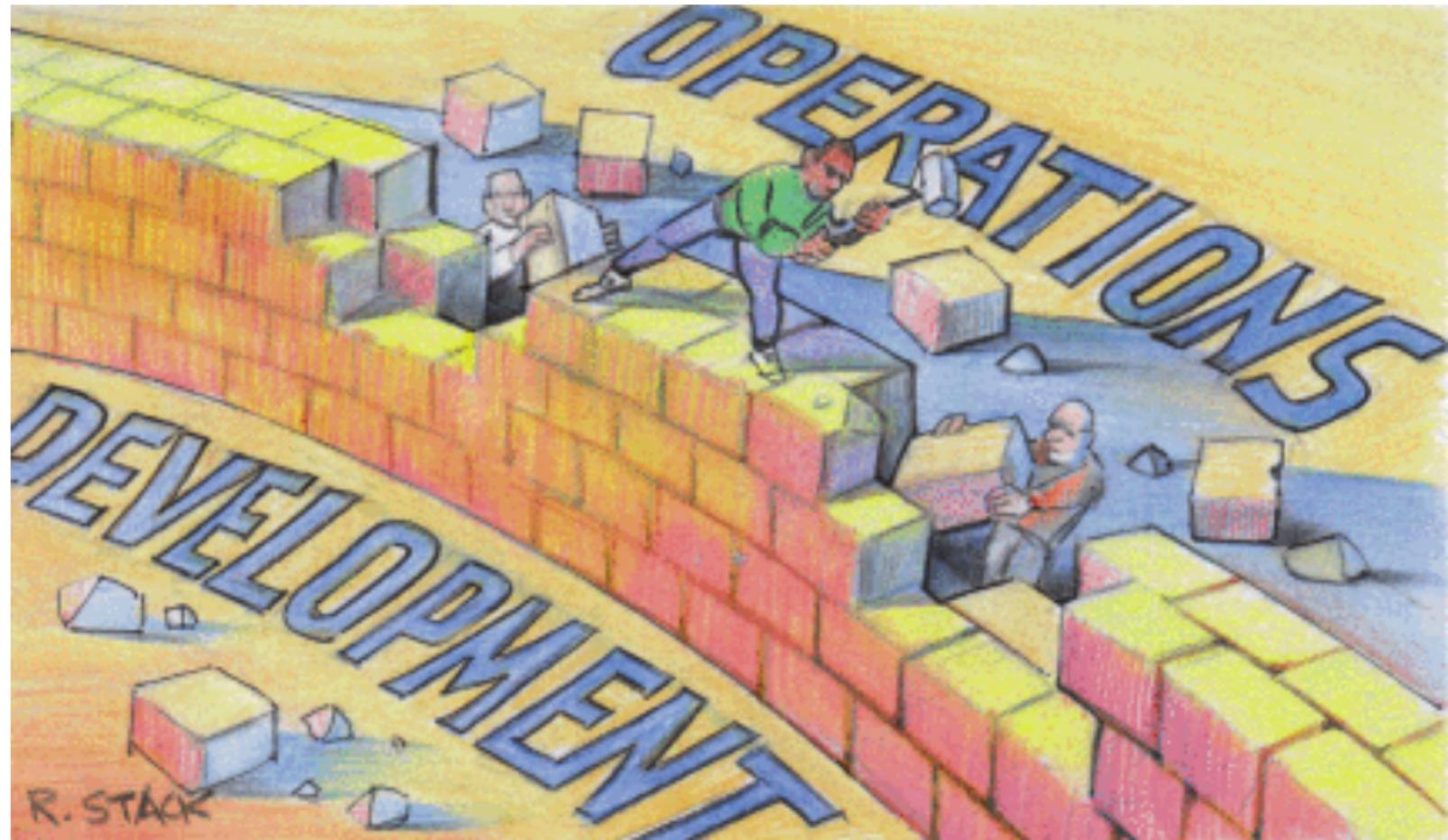
Who has used *DevOps*?

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? [Senapathi et al., 2018]

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

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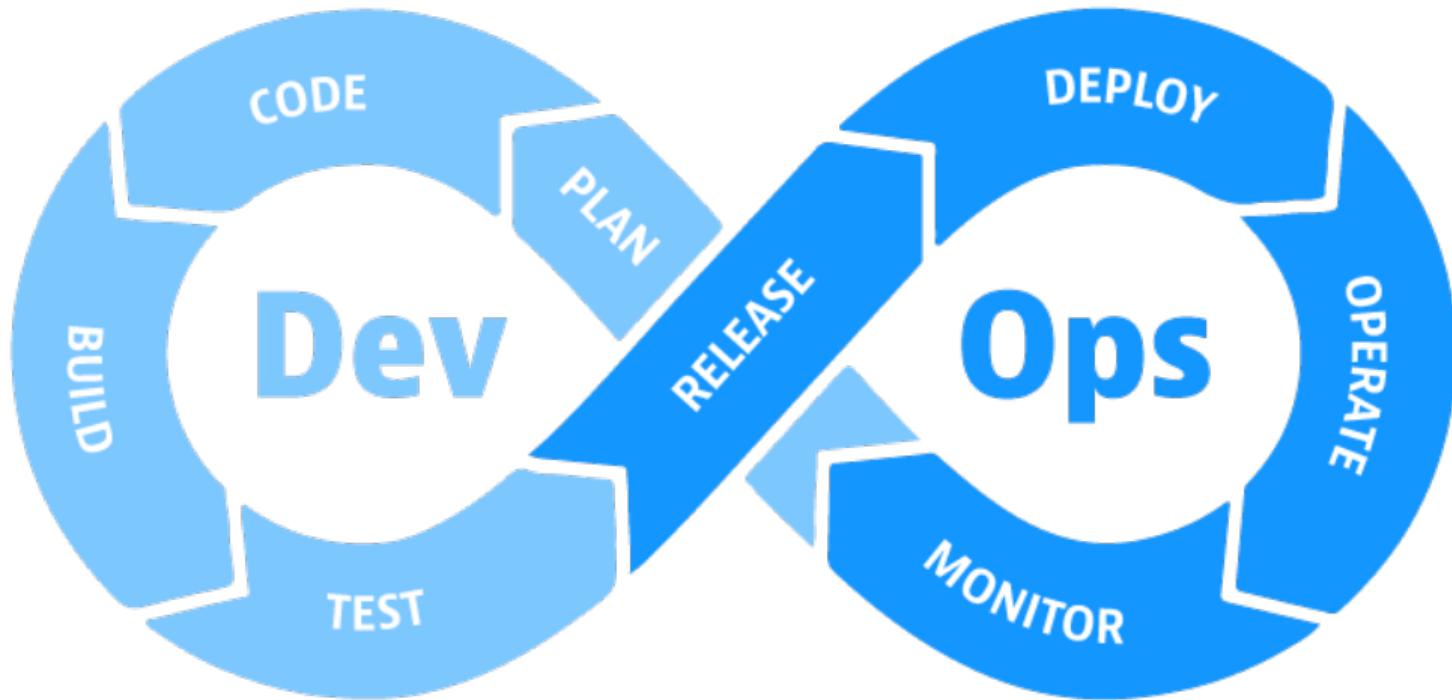
- A combination of *software development* and *IT operations* skills

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

Continuous *

If it hurts, do it more often

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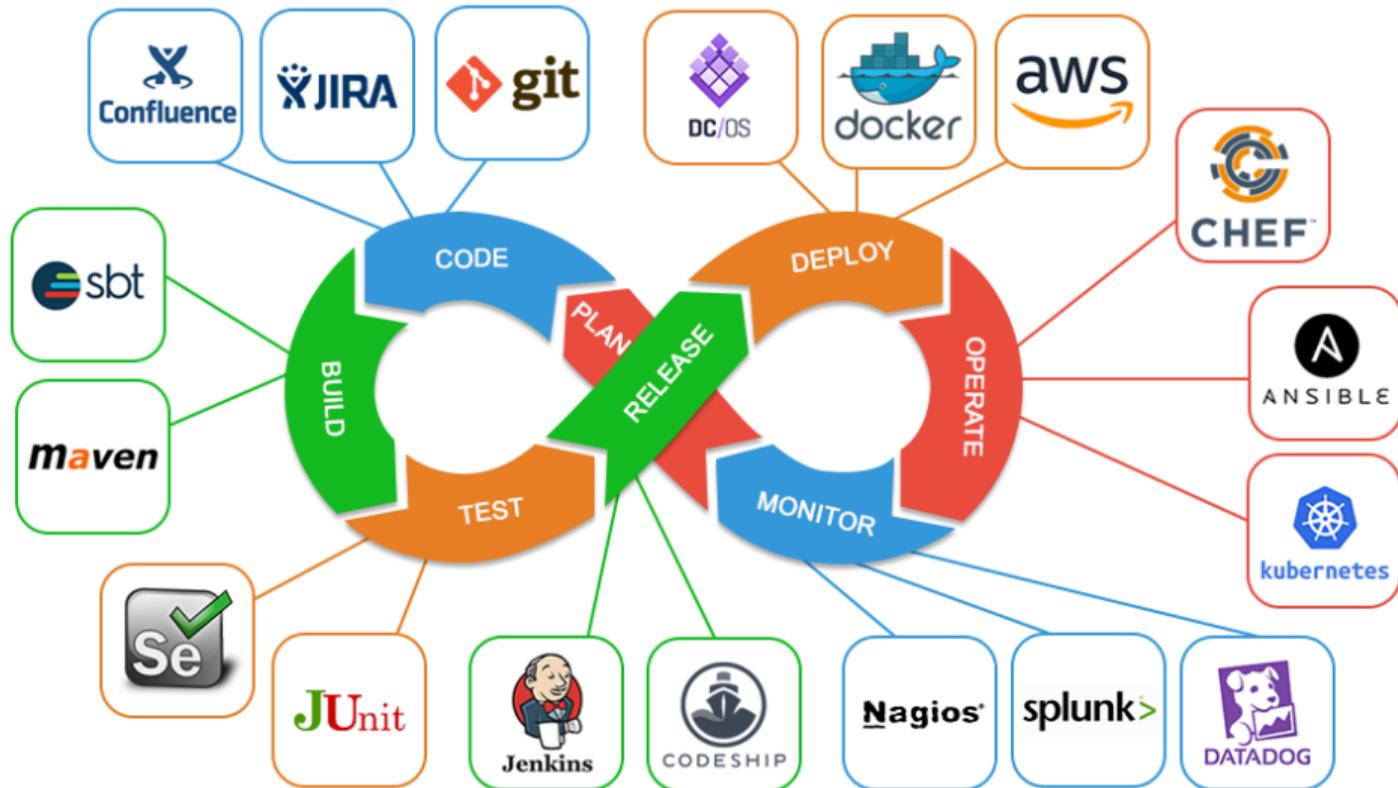
1. Continuous *development*
2. Continuous *integration*
3. Continuous *testing*
4. Continuous *deployment*
5. Continuous *operations*
6. Continuous *monitoring*
7. Continuous *feedback*

Describe the tools you have identified for the Continuous * practices.
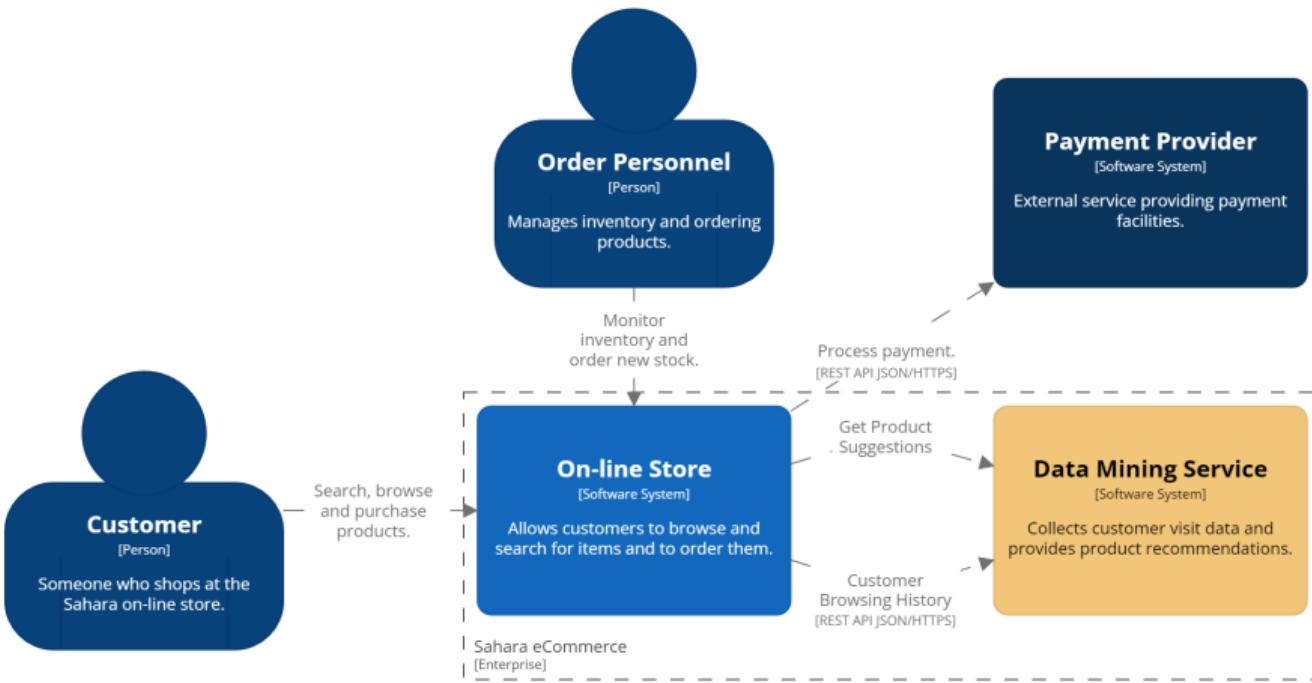
Summarise the tools identified by each group and the practices they support.
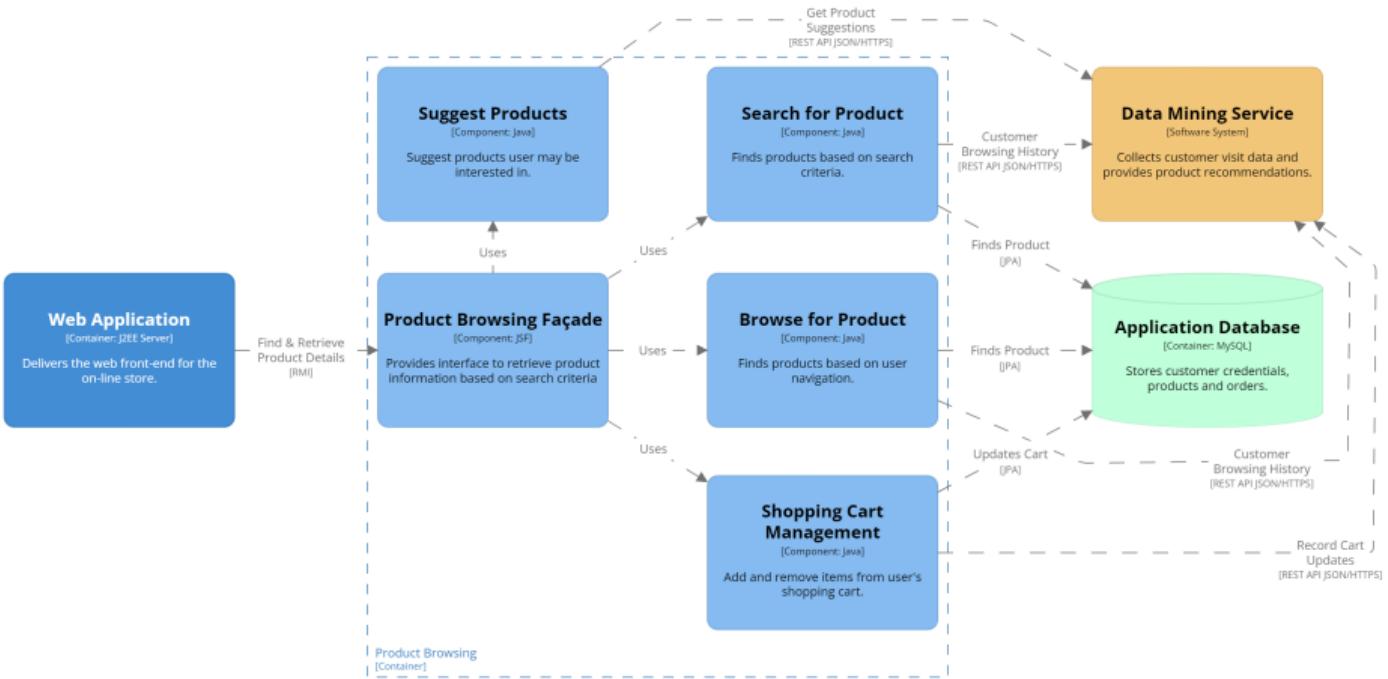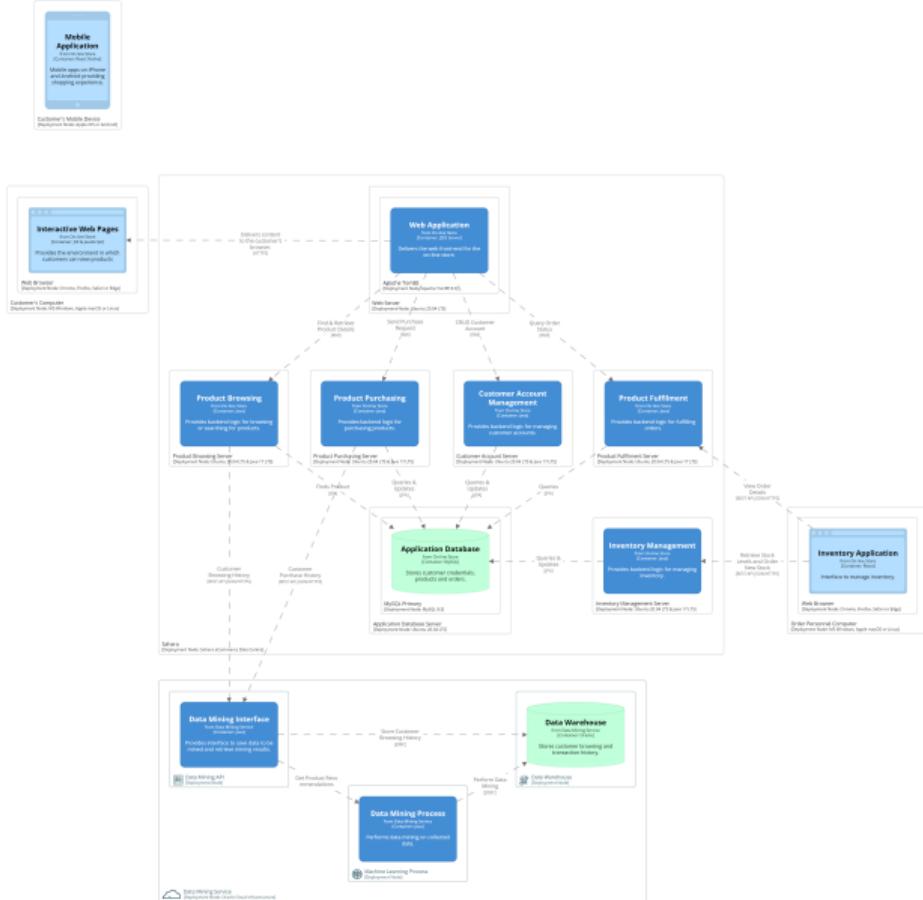
Design a DevOps pipeline for *Sahara*

Customer
[Person]

Someone who shops at the Sahara on-line store.

Order Personnel
[Person]

Manages inventory and ordering products.

Payment Provider
[Software System]

External service providing payment facilities.

On-line Store
[Software System]

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

Data Mining Service
[Software System]

Collects customer visit data and provides product recommendations.

Search, browse and purchase products.

Monitor inventory and order new stock.

Process payment.
[REST API JSON/HTTPS]

Get Product Suggestions

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

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.

Web Application
[Container: J2EE Server]
Delivers the web front-end for the on-line store.

Product Browsing Façade
[Component: JSF]
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.

Get Product Suggestions
[REST API JSON/HTTPS]

Customer Browsing History
[REST API /HTTPS]

Find & Retrieve Product Details
[RMI]

Uses

Uses

Uses

Uses

Uses

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
Port Ad Sec Class
[Container] Web Device
Mobile app on iPhone and Android providing shopping experience

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

Interactive Web Pages
Port Ad Sec Class
[Container] Web Jacket
Provides the environment in which customers can view products

Web Browser
[Deployment Node: MS Windows, Apple macOS or Linux]

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

Web Application
Port Ad Sec Class
[Container] Server
Delivers the web front end for the online store

Apache Tomcat
[Deployment Node: Apache Tomcat 8.0]

Sale Server
[Deployment Node: Ubuntu LTS 14 LTS]

Product Browsing
Port Ad Sec Class
[Container] Java
Provides backend logic for browsing or searching for products

Product Browsing Server
[Deployment Node: Ubuntu LTS Linux 17 LTS]

Product Purchasing
Port Ad Sec Class
[Container] Java
Provides backend logic for purchasing products

Product Purchasing Server
[Deployment Node: Ubuntu LTS Linux 17 LTS]

Customer Account Management
Port Ad Sec Class
[Container] Java
Provides backend logic for managing customer accounts

Customer Account Server
[Deployment Node: Ubuntu LTS Linux 17 LTS]

Product Fulfillment
Port Ad Sec Class
[Container] Java
Provides backend logic for fulfilling orders

Product Fulfillment Server
[Deployment Node: Ubuntu LTS Linux 17 LTS]

Application Database
Port Ad Sec Class
[Container] Data Online Store
Stores customer credentials, products and orders

MySQL Primary
[Deployment Node: MySQL 8.0]

Application Database Server
[Deployment Node: Ubuntu LTS LTS]

Tatura
[Deployment Node: Data center of service Amsterdam]

Inventory Management
Port Ad Sec Class
[Container] Java
Provides backend logic for managing inventory

Inventory Management Server
[Deployment Node: Ubuntu LTS Linux 17 LTS]

Inventory Application
Port Ad Sec Class
[Container] Web Jacket
Interface to manage inventory

Web Browser
[Deployment Node: MS Windows, Apple macOS or Linux]

Order Personnel Computer
[Deployment Node: MS Windows, Apple macOS or Linux]

Data Mining Interface
Port Ad Sec Class
[Container] Server
Provides interface to user data to to collect and retrieve mining results

Data Mining API
[Deployment Node:]

Data Mining Process
Port Ad Sec Class
[Container] Java
Performs data mining on collected data

Machine Learning Process
[Deployment Node:]

Data Warehouse
Port Ad Sec Class
[Container] Data Online Store
Stores customer browsing and transaction history.

Data Warehouse
[Deployment Node:]

Data Mining Service
[Deployment Node: Data center Cloud Infrastructure]

[Deployment] - Live
Friday, 18 March 2022, 15:00 (Australian Eastern Standard Time)

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

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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?
4. What parts of the deployment and operations processes could be *automated*?

Present the DevOps pipelines that you have developed to the rest of the class.

Do the seven necessary *DevOps practices* map perfectly to the *enablers* in the article by Senapathi *et al* [Senapathi et al., 2018]?

- *Build* automation

- *Test* automation

- *Deployment* automation

- *Monitoring* automation

- *Recovery* automation

- *Infrastructure* automation

- *Configuration* management for code and infrastructure

- *Metrics* automation

References

[Senapathi et al., 2018] Senapathi, M., Buchan, J., and Osman, H. (2018). 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.