RDP 2020 - 2021

GCU Cloud Platform

v0.1

Research Question

Can we design and build a fully functioning Private Cloud Platform using a cluster of Raspberry PI's using current Cloud Technologies?

docker

kubernetes

Mentor and Lead:

- Professor Mark Reha
- Professor Jevon Jackson

Students:

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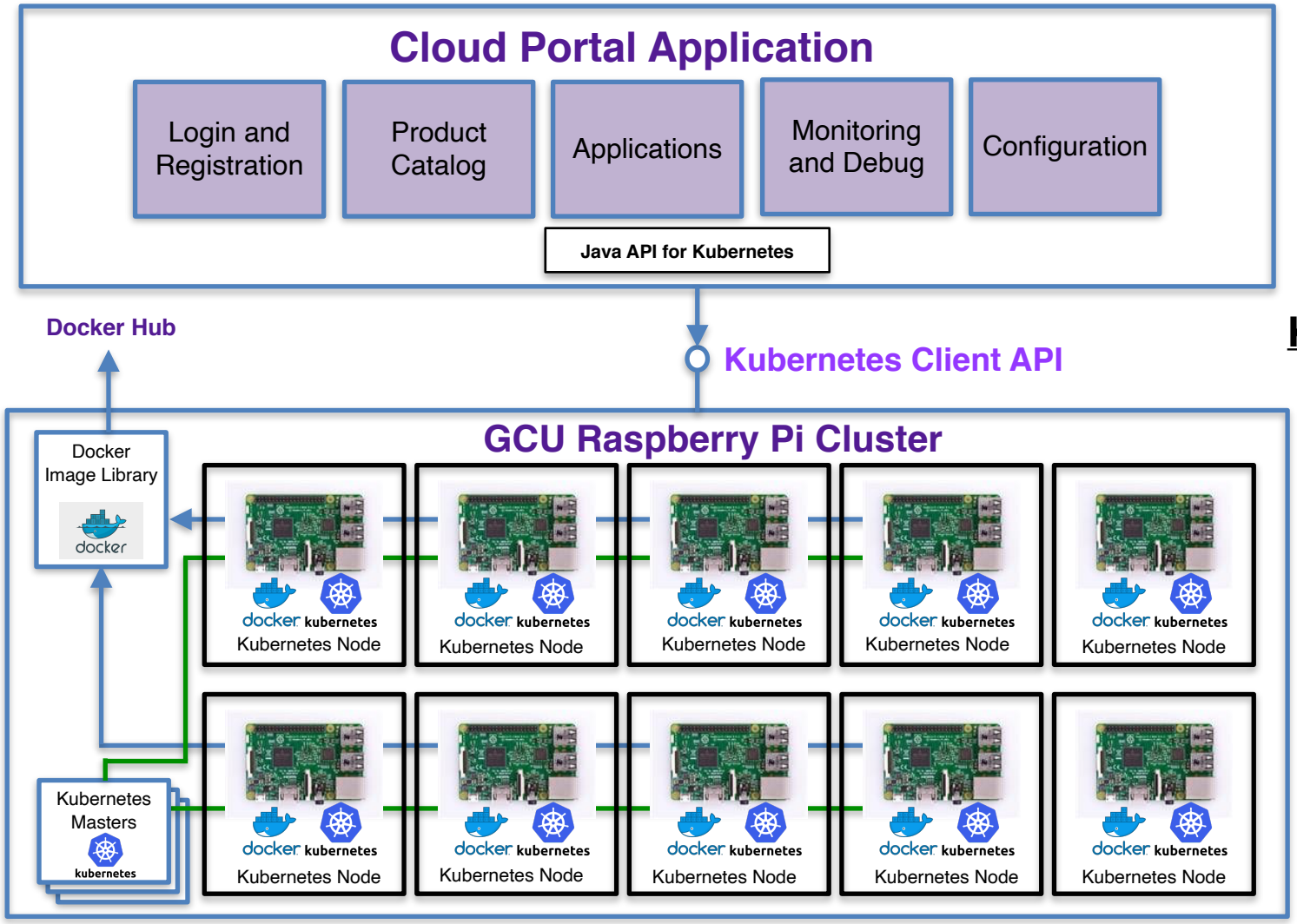
- Brady Berner
- Kevin George

GCU Private Cloud Platform



Management

Responsive Web Application written using the Spring Boot Framework

Kubernetes API's

Use Java Client

Cloud Compute

Expandable cluster of Raspberry Pi's all running Docker in a Kubernetes Cluster

Raspberry Pi Cluster

- Cluster of Raspberry Pi's for Compute Services
  - Built to use 20 Pi's but could be expandable to 40
- Easily expandable to add more Compute Services
- Docker Library to include the following Images:
  - Application Stacks:
    - JBoss, TomEE, Tomcat, Apache PHP, Python, Python AI, NodeJS, .NET Core
  - Databases:
    - MySQL, PostgreSQL, CloudBase (future)
- Leverage Docker for Containers
- Leverage Kubernetes for Orchestration

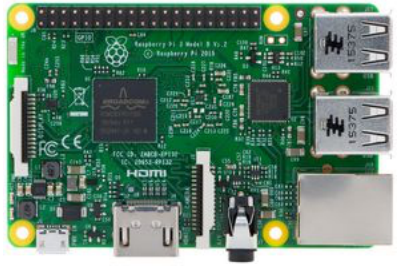
Cloud Portal Application

- Implemented using the Java Spring Framework
- Implemented using Bootstrap for responsive design
- User registration to access Cloud Platform
- Browse a Cloud Product Catalog
- Setup and configure a Cloud Application:
  - Provision an Application Stack
  - Provision a Database (with a Stack)
  - Configure an Application (CPU / RAM)
  - Deploy Application Code
  - Start/Stop/Restart Application
  - Monitor and Debug Application

SPRING Framework

RDP Team Activities

- Focus in 2019-2020:
  - Storage Design
  - Network and DNS Design (Docker Swarm Issue)
  - Cloud Portal Application v2
  - Setup a Cluster of 20-40 Pi's
- Focus in 2020-2021:
  - Port design to use Kubernetes
  - Network and DNS design
  - Attach NAS to storage solution
  - Performance Analysis and Optimization
  - Cloud Portal Application v3
  - Author and publish a Research Paper



RDP Student Learning Opportunities

- Raspberry Pi
- Cloud Computing:
  - Docker Images and Containers
  - Kubernetes Orchestration
  - Java API Client for Kubernetes
  - General Cloud Computing Concepts
  - General Linux and Networking Concepts
- Knowledge recall from prior BSCP classes:
  - CST-221: Linux, bash shell scripting, networking
  - CST-323: Cloud PaaS, Docker, DevOps
  - CST-341: Open Source Technologies using the Spring Framework
  - CST-341: Open Source Technologies using Bootstrap
  - CST-361: Java Design Patterns