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:

- Ruben Cerrato
- Brady Berner
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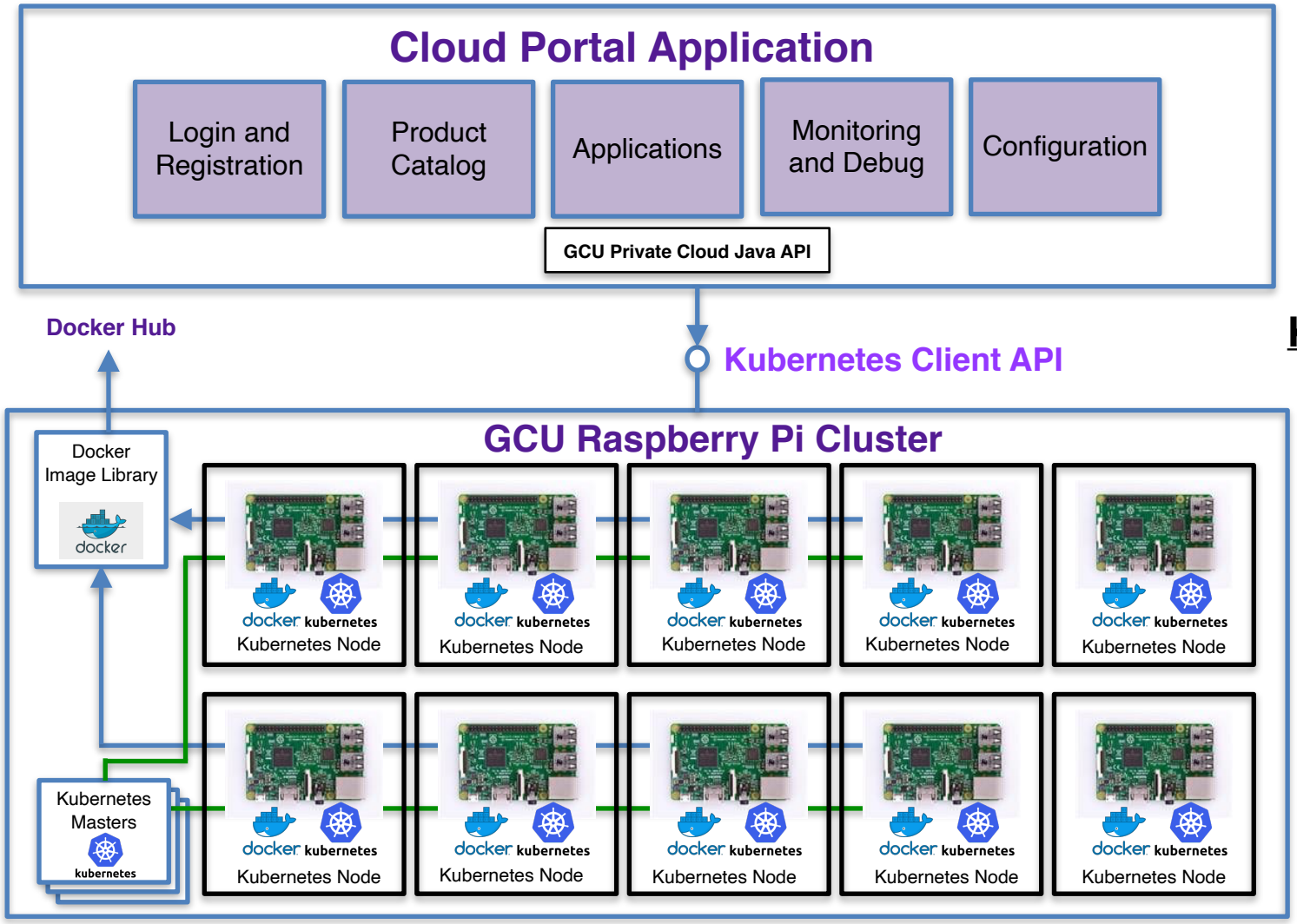
GCU Private Cloud Platform



Management

Responsive Web Application written using the Spring 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 expanded 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

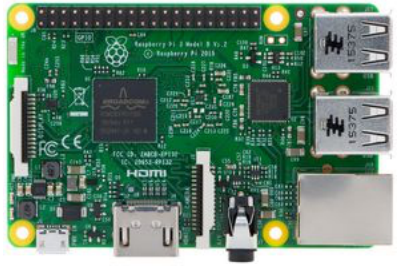
Cloud Portal Application

- Implemented using the Java Spring Framework
- Implemented using Bootstrap for responsive design
- User registration to access Cloud Platform
- Browse a Cloud PaaS 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 (Pi's and GCU API)
  - Network and DNS design
  - Attach NAS for a storage solution
  - Performance Analysis and Optimization
  - Cloud Portal Application v3
  - Author and publish a Research Paper



docker

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RDP Student Learning Opportunities

- Raspberry Pi
- Cloud Computing:
  - Docker Images and Containers
  - Kubernetes Orchestration
  - Java Client API 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