Cloud computing - Service mesh and microservices networking!

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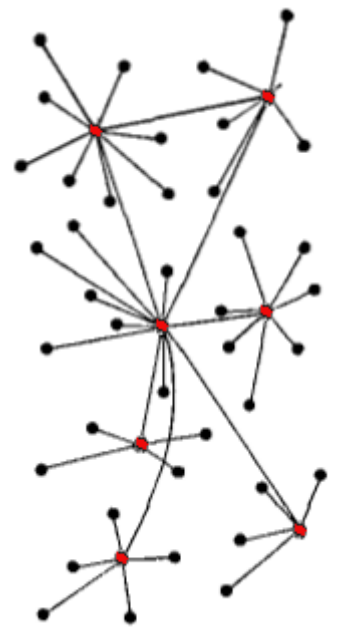
Service mesh and microservices networking

We will be trying to create a swarm implementation that will allow communication between all of the members/nodes.

Imaging a swarm

To undertand this better lets look at the picture bellow and imagine that red dots are iot devices that can send and receive and black ones are clients that gather data.

Architecture of swarm communication



- Red Node: Server/Client and Gateway Role
- Black and Red Node: Client Role

To make our life easier at this task we will be using the following tools...

- Docker [link icon 16]
- Ansible [link icon 16]

- NodeJS [link icon 16]
- VueJS [link icon 16]
- Redis [link icon 16]
- MongoDB [link icon 16]

1. General info:

1.1. Timeframe:

This is a project that will be deleveloped thoughout the semester 2021.

1.2. What will i learn?

You will learn to code, coordinate and orchestrate a swarm of self-acting nodes.

1.3. What tools will I need

Internet and a pc

For tool info please reffer to the tools section below.

Installation will be explained live.

1.4. What students can take this course

Any student with basic knowledge of networking and computer programming should be able to cope with the needs.

1.5. How is the course going to take place

The course will be divided into following parts

- A list of videos, asciinemas and instructions explaining the project
- lectures BASED ON THE VIDEOS for deeper analysis and questions
- and a Gitter for further conversations and answers to any of your questions

1.6. Will there be some kind of exam/certificate? What will i gain?

- The will NOT be an exam or certificate.
- You will gain contributions in form of commits and merge requests into larger projects, which you can then add to your C.V. and upgrade it.

Just to give some context, **contribution of code is regarded as the most important factor when choosing a software engineer**, thus making the course very helpful for future employment

2. Course Description

2.1. Cloud & microservice

2.1.1. docker app

The section guides you through the following activities:

- Create a Dockerized Sample application
- Start an app container

2.1.2. docker swarm

The section guides you through the following activities:

- initializing a cluster of Docker Engines in swarm mode
- adding nodes to the swarm
- deploying application services to the swarm
- managing the swarm once you have everything running

2.1.3. Orchestration

The section guides you through the following activities:

- scale our containerized applications across clouds and datacenters

2.2. Administer and maintain a swarm of Docker Engines

2.2.1. manager nodes

2.2.2. Monitor swarm health

2.2.3. Scheduling Services on a Docker Swarm Mode Cluster

- Scheduling Preferences
- Rescheduling on Failure

2.2.4. ansible

- Using ansible to perform operations on managed nodes aka Configurations, deployment, and orchestration/automation
- Deploying Docker Containers with Ansible

2.3. Create service on nodes

This section includes Docker images and an application for Node development using containers.

Create Real-time Application with

- Node.js
- Express.js
- Socket.io
- Redis

2.4. Monitoring - service applications communication

2.4.1. Real-Time data/Log Collection

2.5. create noSQL DB (mongo cluster)

A replica set is a group of mongod processes that maintain the same data set

2.5.1. create replicas

- Replication in MongoDB
- Change Streams
  - work with the change stream cursor.
  - Watch Collection/Database/Deployment etc

2.6. central web admin interface

Create a CRUD App

2.6.1. vuejs

Create single-page application