# Docker containers deployed using IBM Bluemix

**Name:** Thomas Flynn

**ID:** 16117743

**Course:** M.Eng in Information & Network Security

**Supervisor:** Dr Sean McGrath

## Containerization platform

- Lightweight
- Open
- Secure by default

## Platform as a service

- Integrates Docker
- Accelerates application delivery
- Container Lifecycle management

➢ Build a bridge between WSN data and data miners.

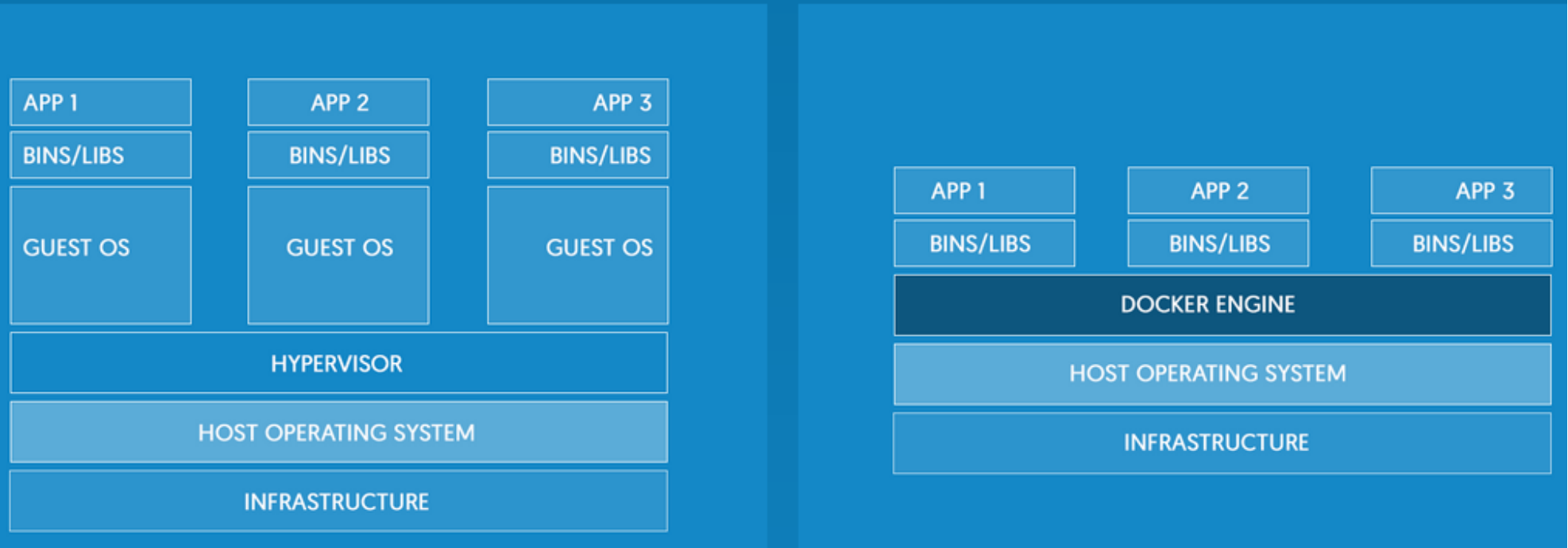➢ Build using microservices and a highly scalable database.

## **Primary Goals**

➢ IoT simulation sends pseudo data

➢ Service reads pseudo data

➢ Service stores pseudo data

➢ CI/CD pipeline

➢ Frontend web application queries database

➢ Scale up number of sensor instances

## **Secondary Goals**

➢ Load balance testing

➢ Add graph features to backend

➢ Add functionality to web application

➢ Test security of frontend – backend

➢ Test security of backend – IoT WSN

COMPARING CONTAINERS AND VIRTUAL MACHINES

Containers and virtual machines have similar resource isolation and allocation benefits -- but a different architectural approach allows containers to be more portable and efficient.

| APP 1 | APP 2 | APP 3 |
|-------|-------|-------|
| BINS/LIBS | BINS/LIBS | BINS/LIBS |
| GUEST OS | GUEST OS | GUEST OS |

HYPERVISOR

HOST OPERATING SYSTEM

INFRASTRUCTURE

| APP 1 | APP 2 | APP 3 |
|-------|-------|-------|
| BINS/LIBS | BINS/LIBS | BINS/LIBS |

DOCKER ENGINE

HOST OPERATING SYSTEM

INFRASTRUCTURE

## Virtual Machines

➤ Separate set of resources

➤ Heavyweight

➤ Slow boot up time

## Docker Containers

➤ Shared set of resources
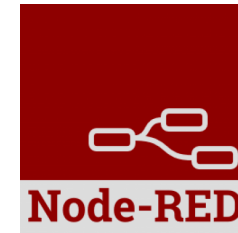
➤ Lightweight

➤ Highly scalable

# Chosen technologies
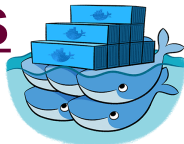
**Documentation**

**IoT Simulation**

**Frontend - Backend**

**Database**

**DevOps & Security**

# High level design
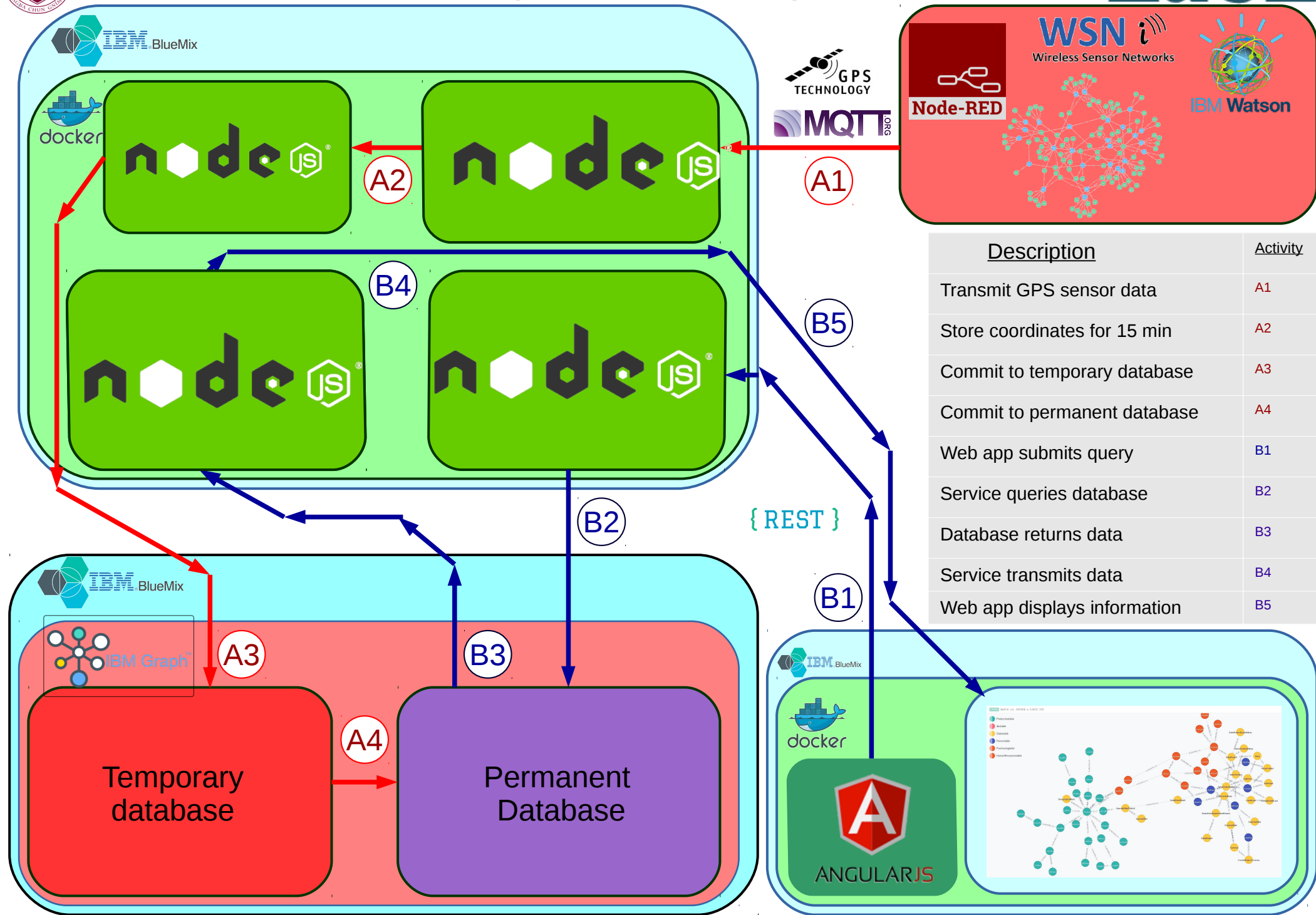


| Description | Activity |
|---|---|
| Transmit GPS sensor data | A1 |
| Store coordinates for 15 min | A2 |
| Commit to temporary database | A3 |
| Commit to permanent database | A4 |
| Web app submits query | B1 |
| Service queries database | B2 |
| Database returns data | B3 |
| Service transmits data | B4 |
| Web app displays information | B5 |

# Progress to date

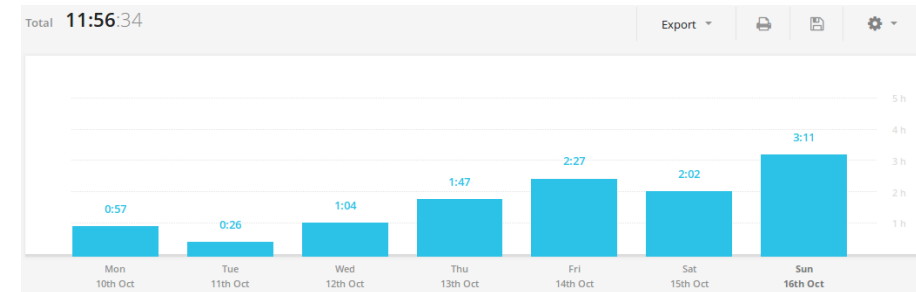## Week 5

- Meet with supervisor
- Create log template
- Research Docker
- Research Bluemix
- Backup files
- Install Ubuntu
- Week 5 log

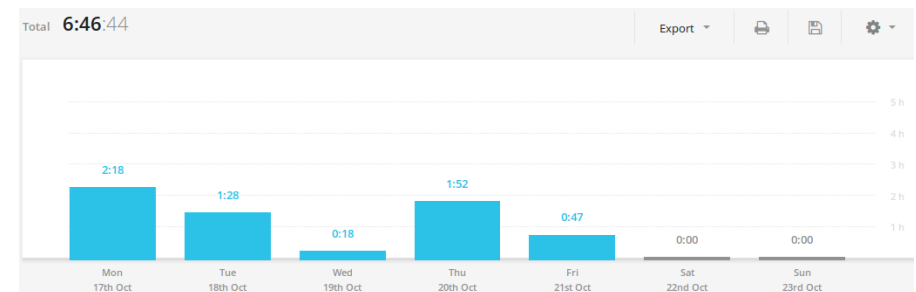**Total 8:16:21**

| Mon 3rd Oct | Tue 4th Oct | Wed 5th Oct | Thu 6th Oct | Fri 7th Oct | Sat 8th Oct | Sun 9th Oct |
|---|---|---|---|---|---|---|
| 0:25 | 0:00 | 0:38 | 3:22 | 1:36 | 1:06 | 1:06 |
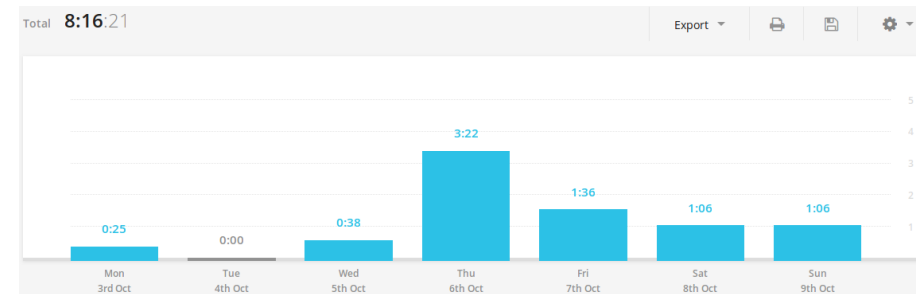
## Week 6

- Research Competitors
- GitHub repositories
- Install Docker
- Start report
- Research NoSQL
- Research graph DB
- Week 6 log

**Total 11:56:34**

| Mon 10th Oct | Tue 11th Oct | Wed 12th Oct | Thu 13th Oct | Fri 14th Oct | Sat 15th Oct | Sun 16th Oct |
|---|---|---|---|---|---|---|
| 0:57 | 0:26 | 1:04 | 1:47 | 2:27 | 2:02 | 3:11 |

## Week 7

- Draw project plan
- Spring Gantt chart
- Summer Gantt chart
- Two page summary
- Draft report on Github
- Week 7 log

**Total 6:46:44**

| Mon 17th Oct | Tue 18th Oct | Wed 19th Oct | Thu 20th Oct | Fri 21st Oct | Sat 22nd Oct | Sun 23rd Oct |
|---|---|---|---|---|---|---|
| 2:18 | 1:28 | 0:18 | 1:52 | 0:47 | 0:00 | 0:00 |

## Week 8

- Bluemix account
- IoT simulation
- Install Bluemix CLI
- Login to Bluemix (CLI)
- Docker/Bluemix demo
- Week 8 log

**Total 11:34:38**

| Mon 24th Oct | Tue 25th Oct | Wed 26th Oct | Thu 27th Oct | Fri 28th Oct | Sat 29th Oct | Sun 30th Oct |
|---|---|---|---|---|---|---|
| 1:01 | 1:55 | 1:39 | 6:58 | 0:00 | 0:00 | 0:00 |