QUEEN'S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 1
Date of Meeting: 8 October 2024

Progress since last meeting, and decisions arrived at during meeting:

- Discuss the project setup.
- Discuss the Initial Project Description and Work Plan Draft.

Action Points:

1. Install Apache Kafka on macOS and test its functionality.
2. Begin exploring and integrating a time series database (e.g., InfluxDB, TimescaleDB, Prometheus).
3. Use macOS for development for now; Linux server access will be arranged later if necessary.
4. Come back with demonstrable progress (e.g., Kafka running, initial DB interaction).

Date of next meeting: 22 October 2024

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 8/10/2024

Supervisor's Comments:

Good Progress

QUEEN'S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 2
Date of Meeting: 22 October 2024

Progress since last meeting, and decisions arrived at during meeting:

- Revised the Initial Project Description and Work Plan Draft.
- Had the simple producer – kafka – consumer system ready

Action Points:

1. Create a UML diagram to visually represent the system architecture.
2. Test system behavior when the master consumer shuts down—verify that standby correctly takes over and data is still uploaded.
3. Improve ability to explain and communicate technical decisions more clearly.
4. Generate more sensor data, aiming for at least 10 data points minimum.
5. Evaluate at least one additional time series database (e.g., TimescaleDB or Prometheus).
6. Fix the Gantt chart to ensure no phase overlaps—structure it to reflect one task at a time.

Date of next meeting: 19 November 2024

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 22/10/2024

Supervisor's Comments:

Good Progress

QUEEN'S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 3
Date of Meeting: 19 November 2024

Progress since last meeting, and decisions arrived at during meeting:

- Updated the systems to have failover mechanism.
- Implement TimescaleDB to the system.
- Managed to display the data from InfluxDB UI.
- Created some diagrams to help explain the system.

Action Points:

1. **Develop Master-Standby Consumers:**

   - Implement 1 master and 1+ standby consumers (preferably 2–4 standbys).
   - Integrate heartbeat communication to monitor "I am alive" signals and handle failover.

2. **Create Display Program for Kafka Bus:**

   - Build a display program that queries the database via Kafka.
   - Program should default to master, but fallback to standby if master is unresponsive.

3. **Build Manager Program:**

   - Monitor all system components via heartbeat signals.
   - Function as a task manager for the Kafka bus environment.

4. **Benchmark Time Series Databases:**

   - Integrate multiple TSDBs (e.g., InfluxDB, TimescaleDB) into the Kafka bus.
   - Compare their performance under load.

5. **Ensure Scalable Architecture:**

   - Support multiple standalone programs that can query the Kafka bus from anywhere.
   - Design the system for concurrent access and modular growth.

6. **Develop Data Generator for hr.csv:**

   - Stream 10–20 heart rate records per minute to Kafka.
   - Make data rate adjustable for future testing.

7. **Design Time Series DB Table Structure:**

   - Experiment with different schemas:
     - Per bed group (e.g., beds 501–508, etc.)
     - Per floor (e.g., floor 500, floor 600)
     - Single large table.

8. **Preprocess hr.csv:**

   - Extract and use only Bed numbers and HR (heart rate) values.
   - Ignore HP… and date fields.

9. **Conduct System Load Testing:**

- Simulate both master and standby active.
- Test and observe system performance at 10, 20 records/min using CPU monitoring tools (e.g., Task Manager).

10. **Develop Bed-Specific Display Program:**

- Allow user input for bed number (e.g., Bed 603).
- Request and display updated heart rate data every minute as a real-time graph:
    - X-axis = Time
    - Y-axis = Heart Rate

Date of next meeting: 13 January 2025

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 19/11/2024

Supervisor's Comments:

Good Progress

QUEEN'S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 4 (Demo)
Date of Meeting: 13 January 2025

Progress since last meeting, and decisions arrived at during meeting:

- Had the system working and dockerised the TSDBs.
- The heart rate data from the csv file is parsed successfully.
- Developed display program.
- Had the revised sequence diagram.

Action Points:

1. **Continue Code Development:**

   - Progress the system components with functional implementation.

2. **System Load Testing:**

   - Send 10, 15, 20... up to 100 messages per minute.
   - Measure latency from data input to display output.

3. **Implement Comprehensive Testing:**

   - Perform unit tests at function/procedure level.
   - Extend to integration and user-level testing.

4. **Validate Input Data Robustness:**

   - Simulate bad data (e.g., invalid timestamps, unknown bed numbers).
   - Ensure such data is detected and rejected before entering the system.

Date of next meeting: 27 January 2025

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 13/1/2025

Supervisor's Comments:

Good Progress

QUEEN'S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 5
Date of Meeting: 27 January 2025

Progress since last meeting, and decisions arrived at during meeting:

- Developed the code further
- Fixed the Display Program
- Fixed the docker set up

Action Points:

1. Fix graph plotting issue causing a 1-hour time shift.
2. Continue performance testing: ramp up to 100 messages per minute to test throughput limits.
3. Set up a standard SQL database to serve as a baseline for comparison with TSDBs.

Date of next meeting: 24 February 2025

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 27/1/2025

Supervisor's Comments:

Good Progress

QUEEN'S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 6
Date of Meeting: 24 February 2025

Progress since last meeting, and decisions arrived at during meeting:

- Added a PostgreSQL as the baseline.
- Fixed the graph in the display program
- Updated the system to be ready for the testing

Action Points:

1. Record the DBs performances.
2. Record the CPU % and Memory usage every 10, 20, 40, 60, 80, 100 messages per minute.
3. Make the logs to show the timestamp in milliseconds.
4. Put the code repo in GITLAB.

Date of next meeting: 1 April 2025

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 24/2/2025

Supervisor's Comments:

Good Progress

QUEEN’S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 7
Date of Meeting: 1 April 2025

Progress since last meeting, and decisions arrived at during meeting:

- Added VictoriaMetrics as the third TSDB.
- Dockerised the system.
- Have the test for performance automated.
- Got the data and logs for 3 metrics (Global resource, per-message resource, and write time)
- Generated the graphs.
- Get the code repo into GITLAB.

Action Points:

1. Test data up to 1000 messages per minute.
2. Get the writeups for the dissertation ready.
3. Fix the graph.
4. Fix the test for the global resource metrics.

Date of next meeting: 25 April 2025

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 1/4/2025

Supervisor's Comments:

Good Progress

QUEEN'S UNIVERSITY OF BELFAST COMPUTER SCIENCE

Minute of Project Supervision Meeting

Student Name: Dominicus Adjie Wicaksono
Project Module Code: CSC3002
Project Supervisor: Charles Gillan
Meeting Number: 8
Date of Meeting: 25 April 2025

Progress since last meeting, and decisions arrived at during meeting:

- Dissertation Draft
- Fully working system.
- Benchmarking tests done.

Action Points:

- Finalise Dissertation

Date of next meeting: -

Agreed minute should be initialled by the supervisor.

Supervisor's Initials: C.G. Date: 25/4/2025

Supervisor's Comments:

Good Progress