PERFORMANCE ANALYSIS OF IN MEMORY DATABASE REDIS AND APACHE IGNITE IN DISPLAYING STRUCTURED DATA

Nama Mahasiswa   : Adi Rizky Ramadhan
NIM   : 6304201278
Dosen Pembimbing I : Depandi Enda, M.Kom
Dosen Pembimbing II : Elvi Rahmi,S.T.,M.Kom

Abstract

This research aims to analyse and compare the performance of Redis as a memory-based in-memory database and Apache Ignite as an in-memory distributed database platform in displaying structured data. This research utilises the Maritime Automatic Identification System (AIS) dataset stored in the MongoDB document database. AIS data samples were processed by Redis and Apache Ignite to measure key performance metrics including throughput, latency, resource utilisation, and error rate under various load testing scenarios. The local environment uses Docker Desktop, while the server uses a Virtual Private Server (VPS) from IdCloudHost. Load testing using JMeter simulates concurrent data access as in real-world applications. Results show that Redis excels in terms of latency and throughput at low to medium workloads, while Apache Ignite shows better performance in resource utilisation and scalability under high workloads. In terms of data consistency, Apache Ignite experienced some issues under heavy load conditions but could be improved with configuration adjustments. Overall, this study concludes that Redis is more suitable for applications with low latency and high throughput requirements, while Apache Ignite is more ideal for applications that require high scalability and efficient resource utilisation. The evaluation from both sides, local and server, provides a comprehensive insight into the strengths and weaknesses of each technology in real usage contexts.

Keywords*: In-Memory Database, Redis, Apache Ignite, load testing, structured data*