

PERFORMANCE COMPARISON OF DYNAMIC LOAD BALANCING ALGORITHM FOR INDONESIA E-HEALTH CLOUD

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Abstract

The popularity of cloud computing has been growing - including the use of cloud computing in healthcare, as commonly called e-health cloud. The increasing number of cloud computing users has driven the selection of an effective load balancing algorithm. This study has examined the performance of load balancing algorithms for a cloud. The cloud is Indonesian e-health cloud using Particle Swarm Optimization (PSO) and Ant Colony Optimization (ACO) algorithms for load balancing. We used CloudAnalyst simulator, a cloud computing simulator that applies a GUI. Before running the scenario, PSO and ACO algorithms are added on CloudAnalyst. The simulation is done for a cloud model with the number of users and data centers that adopt the need of part of e-health cloud in Indonesia. 42 users were taken based on the number of cities, while for 6 data centers were taken from 6 provinces on the Java Island. The data center selection use optimized response time policy. The average response time and the average data center processing time are investigated for different requests per user and data sizes. The results show that the ACO algorithm provides a lower response time and data center processing time compared to using the PSO algorithm for load balancing on the cloud.

Keywords: Ant Colony Optimization, CloudAnalyst, load balancing, Particle Swarm Optimization,

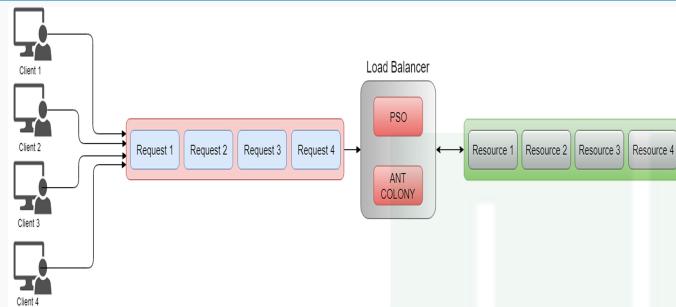


Figure 1. Load Balancing Topology

Topology

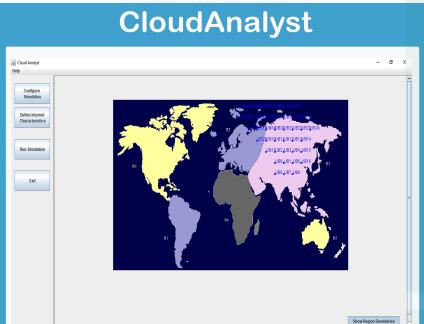


Figure 2. CloudAnalyst view

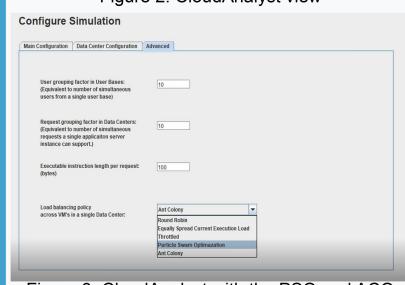


Figure 3. CloudAnalyst with the PSO and ACO algorithms

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1. Results and Comparison of Response Time Between Algorithms for Data Size per Request 100 Bytes



Figure 4. Response time comparison of PSO and ACO algorithms vs request per users for data size per request 100 bytes

Result

2. Results and Comparison of Response Time Between Algorithms for Data Size per Request 1000 Bytes

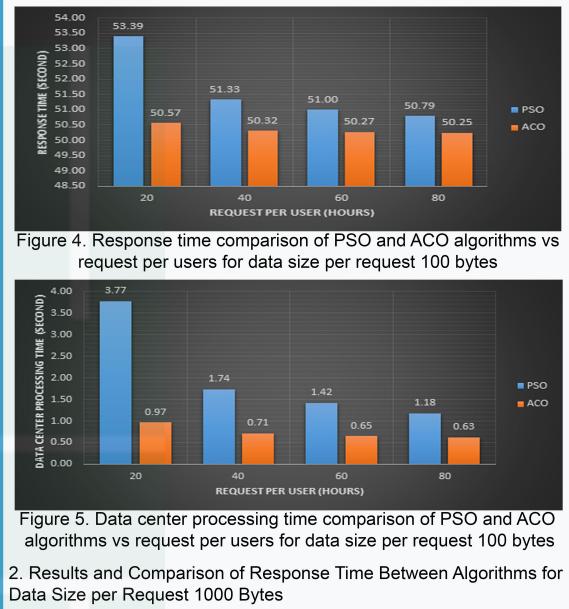


Figure 5. Data center processing time comparison of PSO and ACO algorithms vs request per users for data size per request 100 bytes

2. Results and Comparison of Response Time Between Algorithms for Data Size per Request 1000 Bytes

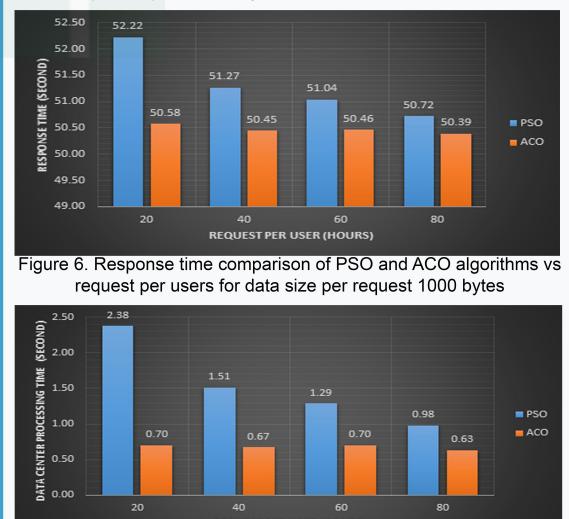


Figure 6. Response time comparison of PSO and ACO algorithms vs request per users for data size per request 1000 bytes

Figure 7. Data center processing time comparison of PSO and ACO algorithms vs request per users for data size per request 1000 bytes

Experiments

The simulation is done for a part of Indonesian e-health cloud model. We examined the average response time and the average data center processing time for 6 data centers and 42 users - those are based on the number of provinces and major cities in Java Island. The data center selection use optimized response time policy with parameters use in the simulation follow Table 1. The average response time and the average data center processing time are investigated for different requests per user and data sizes.

Future Work

For further research, the CloudAnalyst might be modified in such a way that the position of user and data center could be exactly as in a real map.

Conclusion

For Java part of Indonesian e-Health Cloud model, we better use the ACO algorithm. The results of simulation show that the ACO algorithm provides a lower response time and data center processing time compared to using the PSO algorithm for load balancing on the cloud.