ABSTRAK

Awibi Muhamad Yusuf. K2514012. ANALISIS PERFORMA PENDINGINAN CELUP (*IMMERSION COOLING*) TERHADAP DATA CENTER DENGAN VARIASI CAIRAN PENDINGIN. Skripsi, Surakarta: Fakultas Keguruan dan Ilmu Pendidikan, Universitas Sebelas Maret, November 2018.

Pemakaian komputer yang terlalu lama membuat *Central Processing Unit* (CPU) menghasilkan temperatur berlebih. Akan tetapi, metode pendinginan konvensional sudah tidak mampu mengimbangi panas yang dihasilkan. Penelitian ini membahas tentang analisis performa pendinginan celup (*immersion cooling*) terhadap data center dengan variasi cairan pendingin. Tujuan dari penelitian ini adalah mengetahui cairan pendingin yang terbaik dalam metode *immersion cooling* untuk mendinginkan CPU.

Metode penelitian yang digunakan adalah penelitian eksperimen. Komputer dengan pendinginan konvensional didesain menjadi pendinginan celup. *Motherboard* dan *power supply* direndam kedalam bejana yang berisi cairan dielektrik. Cairan dielektrik yang digunakan yaitu *mineral oil* dan *Virgin Coconut Oil* (VCO). Pompa *submersible* digunakan untuk mensirkulasi cairan dielektrik dari bejana melewati radiator, kemudian masuk kembali kedalam bejana. Pengambilan data temperatur *inlet* dan *outlet* menggunakan alat ukur *thermocouple*. Sedangkan, untuk pengambilan data temperatur CPU menggunakan *software SpeedFan*. Untuk mengkondisikan komputer bekerja secara maksimal peneliti menggunkan *software LinX*. Pengambilan data dilakukan selama 24 jam. Setiap menit alat ukur mencatat temperatur inlet, outlet dan temperature CPU.

Hasil pengujian diperoleh pendinginan *immersion cooling* lebih baik daripada pendinginan konvensional. Temperatur CPU menggunakan pendinginan konvensional sebesar 60°C sedangkan menggunakan *immersion cooling* 48°C. Dalam penelitian yang lebih lanjut, performa *immersion cooling* dengan cairan pendingin *mineral oil* lebih baik dibandingkan *immersion cooling* yang memakai cairan pendingin VCO. Hal ini dibuktikan temperatur maksimal CPU yang dihasilkan ketika menggunakan cairan pendingin *mineral oil* hanya 48°C. Temperatur ini lebih rendah dibandingkan dengan VCO yang sebesar 51°C. Temperatur maksimal saluran inlet dan outlet cairan pendingin mineral oil sebesar 35,5°C dan 33,8°C sedangkan *virgin coconut oil* sebesar 37,4°C dan 35°C.

Kata Kunci: *Immersion cooling,* cairan dielektrik, *mineral oil, virgin coconut oil,* efektivitas *immersion cooling.*

ABSTRACT

Awibi Muhamad Yusuf. K2514012. THE ANALYSIS OF IMMERSION COOLING TO DATA CENTER WITH COOLING LIQUID VARIATIONS. Thesis, Surakarta: Teacher Training and Education Faculty, Sebelas Maret University, November 2018.

Heavy use of computer makes Central Processing Unit (CPU) produce an excess temperature or overheating. In this case, conventional cooling methods are no longer able to compensate the heat produced in CPU. This study discusses the analysis of immersion cooling performance on the data center with cooling liquid variations. The purpose of this study is to find out the best coolant in the immersion cooling method to reduce the heat of the CPU.

The research method used is experimental research. Computers with conventional cooling are designed to be an immersion cooling. Motherboard and power supply are then dipped into a container filled with dielectric fluid. The dielectric liquid types are mineral oil and Virgin Coconut Oil (VCO). Submersible pumps are used to circulate the dielectric fluid from the container through the radiator, then re-enter the container. Retrieving temperature data of inlet, outlet, and wet bulb is using thermocouple device. Meanwhile, for taking CPU temperature data, the researcher uses SpeedFan software. To make the computer works optimally, the researcher uses LinX software. Data collection is carried out for 24 hours. In every minute, the gauge records the inlet, outlet temperature as well as the CPU temperature.

The test results obtain that the immersion cooling is better than the conventional cooling. CPU temperature which is using conventional cooling is at 60℃ while the one using immersion cooling is at 48℃. In further research, the performance of immersion cooling with mineral oil coolant is significantly better than immersion cooling using VCO coolant. This proves that the maximum CPU temperature produced when using mineral oil coolant is only 48℃. This temperature is lower than the VCO which is at 51℃. The maximum temperatures of the mineral oil coolant inlet and outlet channels are 35.5℃ and 33.8℃ while the ones with virgin coconut oil are 37.4℃ and 35℃.

Keywords: Immersion cooling, dielectric fluid, mineral oil, virgin coconut oil, the effectiveness of immersion cooling.