

ABSTRAK

Perubahan kondisi cuaca yang tidak menentu memerlukan sistem monitoring yang mampu menyajikan informasi secara *real-time*. Penelitian ini bertujuan mengembangkan sistem monitoring cuaca *multinode* berbasis *Internet of Things (IoT)* menggunakan Wemos D1 Mini dengan sensor DHT11, BMP280, LDR, dan sensor hujan. Variabel yang diamati meliputi suhu, kelembapan udara, tekanan udara, intensitas cahaya, dan kondisi hujan. Data hasil pembacaan sensor dikirimkan ke *Firestore Realtime Database* melalui jaringan *Wi-Fi*, ditampilkan pada *dashboard* berbasis *web*, serta disimpan pada *MicroSD Card* sebagai media penyimpanan cadangan. Metode penelitian meliputi perancangan perangkat keras dan perangkat lunak, implementasi sistem, pengujian akurasi sensor dengan membandingkan data BMKG, serta pengujian *Quality of Service (QoS)* yang meliputi *success rate*, *packet loss*, dan *latency*. Hasil penelitian menunjukkan bahwa sistem memiliki tingkat akurasi sensor yang tinggi dengan rata-rata akurasi suhu sebesar 99,285%, kelembapan 98,737%, dan tekanan udara 99,984%. Selain itu, pengujian komunikasi data menghasilkan *success rate* sebesar 71,92%, *packet loss* sebesar 28,08%, dan *latency* rata-rata sebesar 83,43 detik. Berdasarkan hasil tersebut, sistem mampu melakukan monitoring cuaca secara *real-time* serta menyediakan penyimpanan data cadangan ketika koneksi internet mengalami gangguan.

Kata kunci: *Internet of Things (IoT)*, monitoring cuaca, Wemos D1 Mini, *Quality of Service (QoS)*, *Firestore Realtime Database*.

ABSTRACT

Unpredictable weather changes require a monitoring system capable of providing real-time information. This study aimed to develop a multinode weather monitoring system based on the Internet of Things (IoT) using a Wemos D1 Mini equipped with DHT11, BMP280, LDR, and rain sensors. The observed variables included temperature, humidity, air pressure, light intensity, and rainfall conditions. Sensor data were transmitted to Firebase Realtime Database through a Wi-Fi network, displayed on a web-based dashboard, and stored on a MicroSD Card as backup storage. The research method consisted of hardware and software design, system implementation, sensor accuracy testing by comparing measurement results with BMKG reference data, and communication quality testing using Quality of Service (QoS) parameters, including success rate, packet loss, and latency. The results showed that the system achieved average accuracy values of 99.285% for temperature, 98.737% for humidity, and 99.984% for air pressure. Furthermore, the communication test produced a success rate of 71.92%, packet loss of 28.08%, and an average latency of 83.43 seconds. These results indicate that the proposed system is capable of performing real-time weather monitoring while providing backup data storage during internet connection interruptions.

Keywords: Internet of Things (IoT), weather monitoring, Wemos D1 Mini, Quality of Service (QoS), Firebase Realtime Database.