

## Real-time 3D Visualization of Weather Radar Data in Full Resolution via Concurrent Processing and High-speed Transfer in Science Cloud

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With the tremendous development of remote sensing technologies, a large amount of observation data are generated from sensors. Since each sensor generates data periodically, e.g., every minute, a concurrent data processing using a cloud system plays an important role in the modern design process. This paper focuses on concurrent data processing techniques for an X-band phased array weather radar (PAWR) using high-speed network, parallel data processing system, and large-scale storage system. The PAWR at National Institute of Information and Communications Technology (NICT), Japan rotates in 30 sec to capture a 3D structure of rainfalls within 60 km in radius and 15 km in altitude. In this paper, we develop a real-time 3D visualization system of the observation data of the PAWR. Our visualization is carried out from 54 sec to 69 sec (depending on the weather conditions) after every observation period, which is in the same time scale with other conventional 2D visualization of X-band weather radars. In addition, we discuss a combination of cloud ecosystems for the concurrent processing at low cost. The methodology is considered as a pioneering case study to develop of a variety of real-time data processing systems of big data via remote sensing [1].

[1] K. T. Murata, K. Muranaga, K. Yamamoto, Y. Nagaya, P. Pavarangkoon, S. Satoh, T. Mizuhara, E. Kimura, O. Tatebe, M. Tanaka, and S. Kawahara, "Real-time 3D visualization of phased array weather radar data via concurrent processing in science cloud," in Proc. 7th IEEE Annu. Information Technology, Electronics and Mobile Communication Conf. (IEMCON), 2016. doi: 10.1109/IEMCON.2016.7746347

