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GNSS-HBASE: A DISTRIBUTED STORAGE AND REAL-TIME RETRIEVAL INFRASTRUCTURE  
FOR MASSIVE GLOBAL NAVIGATION SATELLITE SYSTEMS DATA AND PRODUCT BASED ON  
HBASE**Abstract**

With the widespread deployment of GNSS (Global Navigation Satellite Systems) and the continued growth of CORS (Continuously Operating Reference Stations), conventional methods of data management, such as IBM, Oracle and EMC architectures, are overwhelmed by high throughput access and huge volumes of GNSS data and products generated by receivers or processing software. On the other hand, NoSQL databases such as HBase allow the system to support high I/O performance and large-scale data, while guaranteeing fault-tolerance, and high concurrency. In this paper, we present the design and implementation of GNSS-HBase, a distributed storage and real-time retrieval schema for massive global navigation satellite systems data and products based on HBase, which bridges the contradiction between scale and real-time. The data based on the Receiver INdependent EXchange format (RINEX) will be separated according to the type of observation and stored in HBase. The rowkey of HBase table, designed based on the characteristics of RINEX file, can efficiently meet the high write rates, real-time querying requirements. Moreover, in order to further improve the overall performance of this system, the system storage layer and index layer has been optimized respectively. We experimentally evaluated the key performance indicators of the prototype system.