A Lesson Learned of Cloud Computing in Fleet Management System in Taiwan

Over the past few years when GPS and digital maps are much available and affordable to the public, GPS-based fleet management systems (FMS) have become a powerful tool for both commercial fleet companies and government sectors with public service vehicles to better manage their transportation resources in a more efficient and economic manner. More and more fleet companies have been adopting a web-based FMS in recent years, rather than premise-based solutions as before, to dispense the investment on internal IT staff and disregard annoyance induced by frequent updates and upgrades of the software. Most fleet management systems collect real-time position data from their vehicles equipped with GPS-enabled car kits every 30 seconds or so, which results in the rapid accumulation of records in databases and enormous demand on computing resources to process those spatial data while the number of vehicles grows. Hence, how to fulfill the massive computing demand and meanwhile remain scalable has turned into an important issue for SaaS fleet management. SkyEyes, one of leading FMS companies in Taiwan, has currently established an online commercial fleet with up to 1,300 vehicles. For a typical work day with 12 service hours, the database has to accommodate around 2 million records each day in order to render the daily vehicle trail on the map upon the request by fleet managers, or 0.18 billion records every 3 months for fleet company executive officers to produce managerial reports for business analysis. For near real-time monitoring, it requires a great amount of CPU time for spatial and analytical computation; for example, mapping geographic coordinates into map features, such as roads, factories, or administrative zones, with surrounding buffers for Georeferencing or Geofencing. To fulfill the potential market expansion in the future, SkyEyes begins a pilot study of introducing cloud computing to enhance the performance and scalability of the current architecture, with an ultimate goal of shifting the entire system onto the 'Cloud'. In its early stage of testing, we imported the 8-month historic vehicle trails and driving status into HBase, a non-relational, distributed database modeled in Java for Hadoop, a software framework that supports data-intensive distributed applications. Under Hadoop architecture, we implemented a socket server to take in real-time vehicle position data as well as a web service for clients to request for their historic vehicle records. This research reexamines the track of study and addresses the evaluation on performance, providing a lesson learned in fleet management industry for future research work.

Primary authors : Dr. LIN, Will Wei-yen (GIS Research Center, Feng Chia University) ; Mr. CHEN, Chien-fu (GIS Research Center, Feng Chia University)

Co-authors : Mr. KU, Wen-yuan (GIS Research Center, Feng Chia University) ; Mr. MU, Jackie C. Y. (GIS Research Center, Feng Chia University)