

# A New Method for Performing On-line Sequential Data Analysis

Patent Title: Sequence Online Analytical processing System  
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This invention relates to a new method for implementing the concept of Sequence OLAP (S-OLAP) for supporting on-line sequential data analysis. It allows users to interactively explore different levels of summarization of the sequence data through a user-friendly interface. The on-line approach of sequential analysis greatly facilitates the managerial decision process.

## Market Opportunity

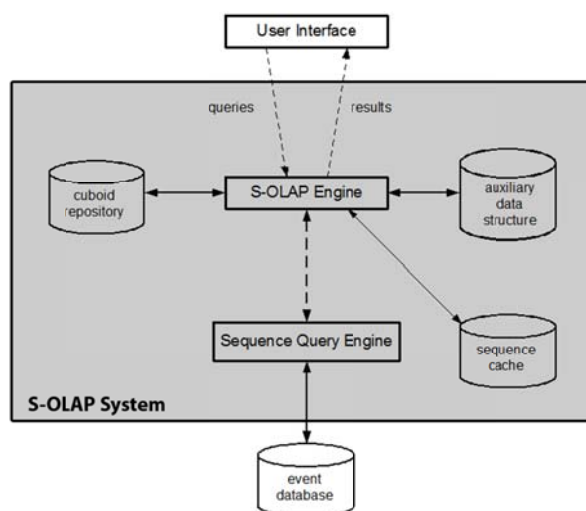
Many kinds of real-life data exhibit logical ordering among their data items and are thus sequential in nature. Examples of sequence data include stock data, web server access logs and various kinds of RFID logs such as those generated by a commodity tracking system in a supply chain. However, traditional on-line analytical processing (OLAP) systems and techniques were not designed for sequence data and they are incapable of supporting sequence data analysis. This has implications for managerial decisions. Currently, whenever a manager has business sequence queries, he/she has to request the IT department to write customized programs. Given the huge volume of data and the administrative overhead, it may take weeks for the manager to get the query results. Furthermore, if the manager is interested in certain query results and wishes to perform deeper analysis, he/she has to request the IT department to write new programs to answer his/her new business queries. This inefficient method of sequence data analysis severely hampers the managerial decision process.

To address this, we have proposed the concept of Sequence OLAP, or S-OLAP for short,, in which a sequence can be characterized not only by the attribute values of its constituent items, but also by the subsequence/substring patterns it possesses. Our invention includes a suggested model to implement the S-OLAP concept as well as algorithms to implement the proposed model.

According to Frost & Sullivan, the North American Enterprise Analytics Software Market was US\$2.2 billion in 2005 and is expected to grow at a Compound Annual Growth Rate (CAGR) of 10.8% from 2006 to 2012. The market consists of Business-Intelligence (BI) Reporting, Enterprise-Report-Planning (ERP) Analytics, Supply-Chain-Management (SCM) Analytics and Customer-Relationship-Management (CRM) Analytics. All these applications can benefit from the new S-OLAP method in making efficient and effective sequential data analysis. Major players in the market include Business Objects, Oracle, IBM, SAS, Cognos, Hyperion and SAP.

## The HKU Invention

We have developed a new method for implementing the concept of Sequence OLAP (S-OLAP) to support on-line sequential data analysis. As shown by the figure, it allows users to interactively explore different levels of summarization of the sequence data through a user-friendly interface. The on-line approach of sequential analysis greatly facilitates the managerial decision process.



In addition to the basic S-OLAP concept, the invention also includes the notions of Sequence Cuboid and Sequence Data Cube; these two components together form a novel model to implement the concept of S-OLAP. In contrast, traditional OLAP models such as Relational OLAP (ROLAP) and Multidimensional OLAP (MOLAP) are incapable of supporting the main features of S-OLAP.

## About the Lead Inventors

Professor Ben Kao is a professor in the Department of Computer Science at The University of Hong Kong (HKU). His research interests include database management systems, data mining, real-time systems, and information retrieval systems.

Dr Eric Lo is an assistant professor at the Hong Kong Polytechnic University (HKPU), which he joined in 2007. His research interests include data engineering, software engineering, and the fusion of both.

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Versitech Limited is the technology transfer and commercial arm of the University of Hong Kong (HKU). Being the first and foremost university in Hong Kong, HKU is an institution with a long and distinguished academic heritage, in addition to an international reputation for forward-looking pioneering research. HKU is consistently ranked among the very best in Asia by QS and Times Higher Education.

## Contact Us

Address: Room 405A, Cyberport 4, 100 Cyberport Road, Hong Kong

Tel: (852) 2299 0111

Fax: (852) 2299 0122

Email: [info@versitech.hku.hk](mailto:info@versitech.hku.hk)

Web: <http://versitech.hku.hk>