2011 PSTA WINNER CITATIONS

PRESIDENT'S SCIENCE AWARD 2011

Professor Ooi Beng Chin
Professor Tan Kian Lee
School of Computing
National University of Singapore

"For their outstanding contributions to database systems research for managing "big data" inlarge-scale parallel and distributed systems"

Professor Ooi Beng Chin and Professor Tan Kian Lee have, in the past 20 years, helped to shape the development of various forms of non-centralised database systems, namely distributed database systems, parallel database systems, heterogeneous database systems, peer-to-peer data management systems and cloud-based data management systems. The two-man team has pioneered the use of peer-to-peer data management for managing "big data" in large-scale parallel and distributed systems. Their work broke new grounds in the science and implementation of database management systems, becoming the first to demonstrate the practicality and usability of peer-to-peer data management systems.

It has been traditionally accepted that finding practical and highly decentralised solutions to manage distributed data requires solving several hard and challenging problems. It is costly to maintain and manage data distributed across autonomous nodes, and even more arduous to keep up with an acceptable performance as the system scales.

The team designed and developed a series of highly efficient mechanisms that tackle these notorious challenges. The solutions include: (a) a novel self-configurable distributed system, comprising autonomous database-enabled nodes, which facilitates data sharing without the need for explicit knowledge of the structure of the data content; (b) a distributed data structure and overlay for routing and discovering data that not only has a theoretical guaranteed worst-case bound but also performs several times faster than any known schemes in practice; (c) a query processing mechanism that significantly reduces the overhead of maintaining routing information and thus rendering large-scale distributed systems practical and feasible. Many other techniques and systems have also been developed by the team to support a wide variety of applications.

The work of Professor Ooi and Professor Tan has also provided the basis of data integration and analytics solution for enterprises. A good example is the integration of healthcare data belonging to individual autonomous clinics to a national network. The system allows clinics to share data from their existing systems, while retaining ownership of their data, through a peer-to-peer arrangement.

A company, BestPeer has been spun off from their project, targeting businesses that are naturally geographically distributed.

For their outstanding contributions to database systems research for managing "big data" in large-scale parallel and distributed systems, the two-man team, Professor Ooi Beng Chin and Professor Tan Kian Lee, from the National University of Singapore is awarded the 2011 President's Science Award.