

DATA MANAGEMENT FOR COMPLEX AND NOVEL APPLICATIONS

PI : **Dr XU Jianliang**, Associate Professor, Department of Computer Science
Dr CHOI Byron K K, Assistant Professor, Department of Computer Science

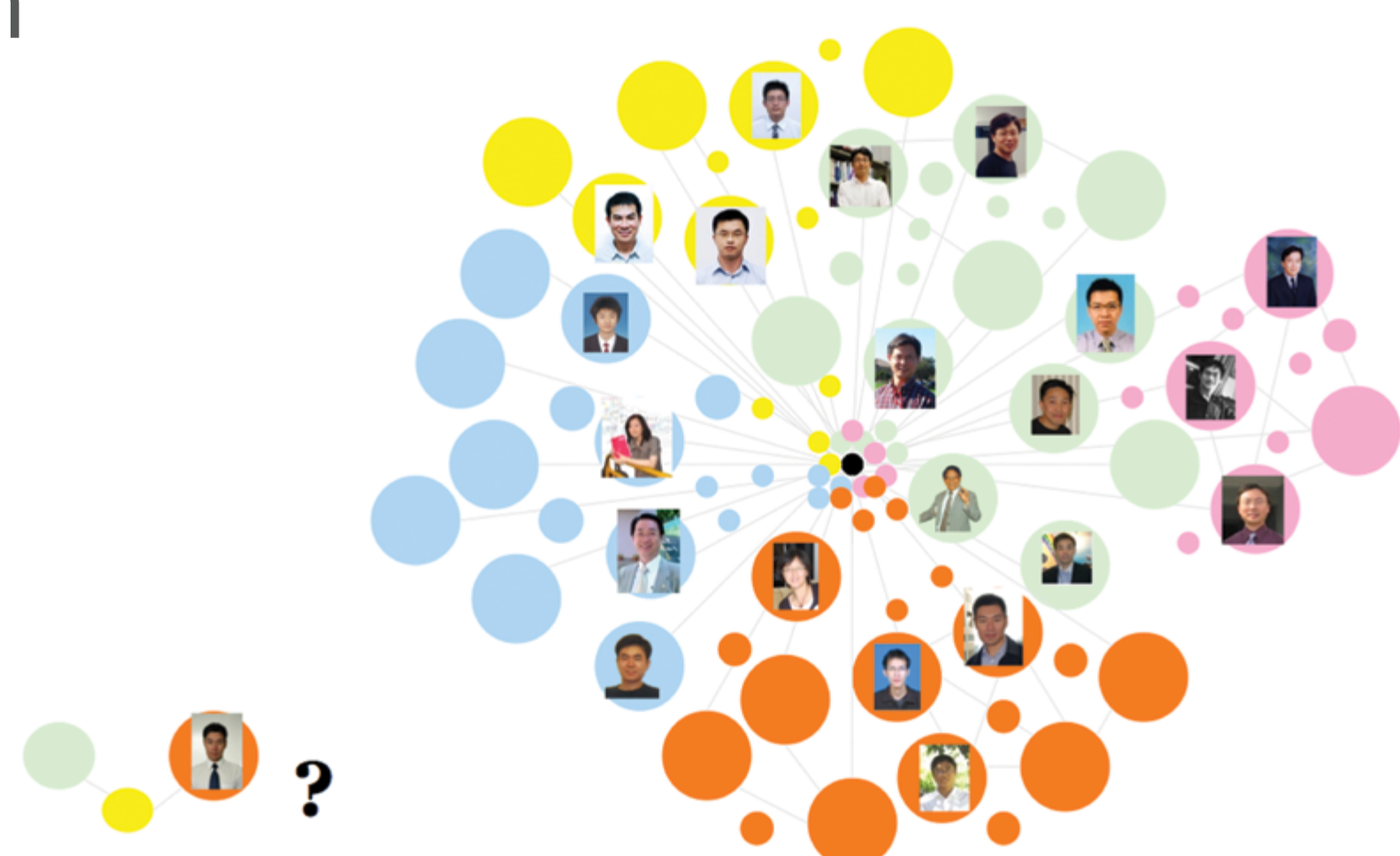
OBJECTIVE

To facilitate the secure, effective, and efficient use and management of voluminous information under a wide variety of hardware, software, and organizational settings.

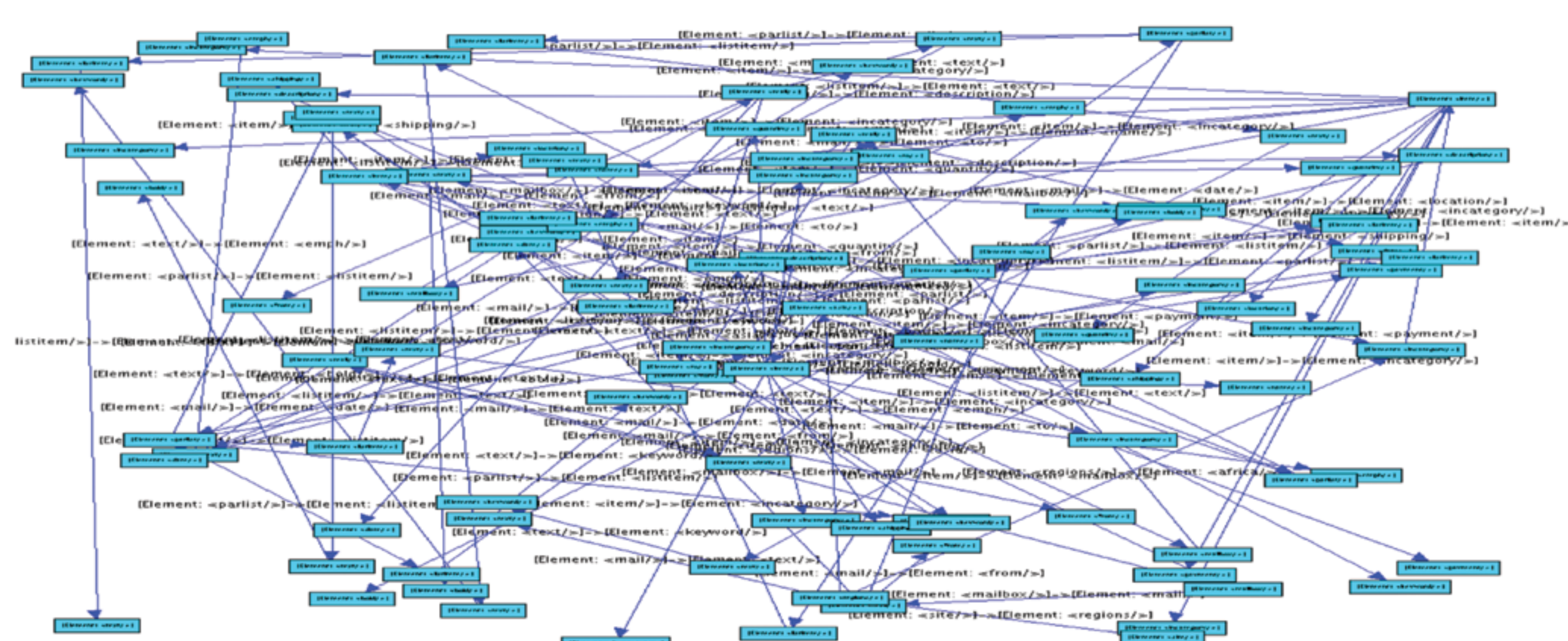
HIGHLIGHTS

1. QUERYING STRUCTURALLY COMPLEX DATA

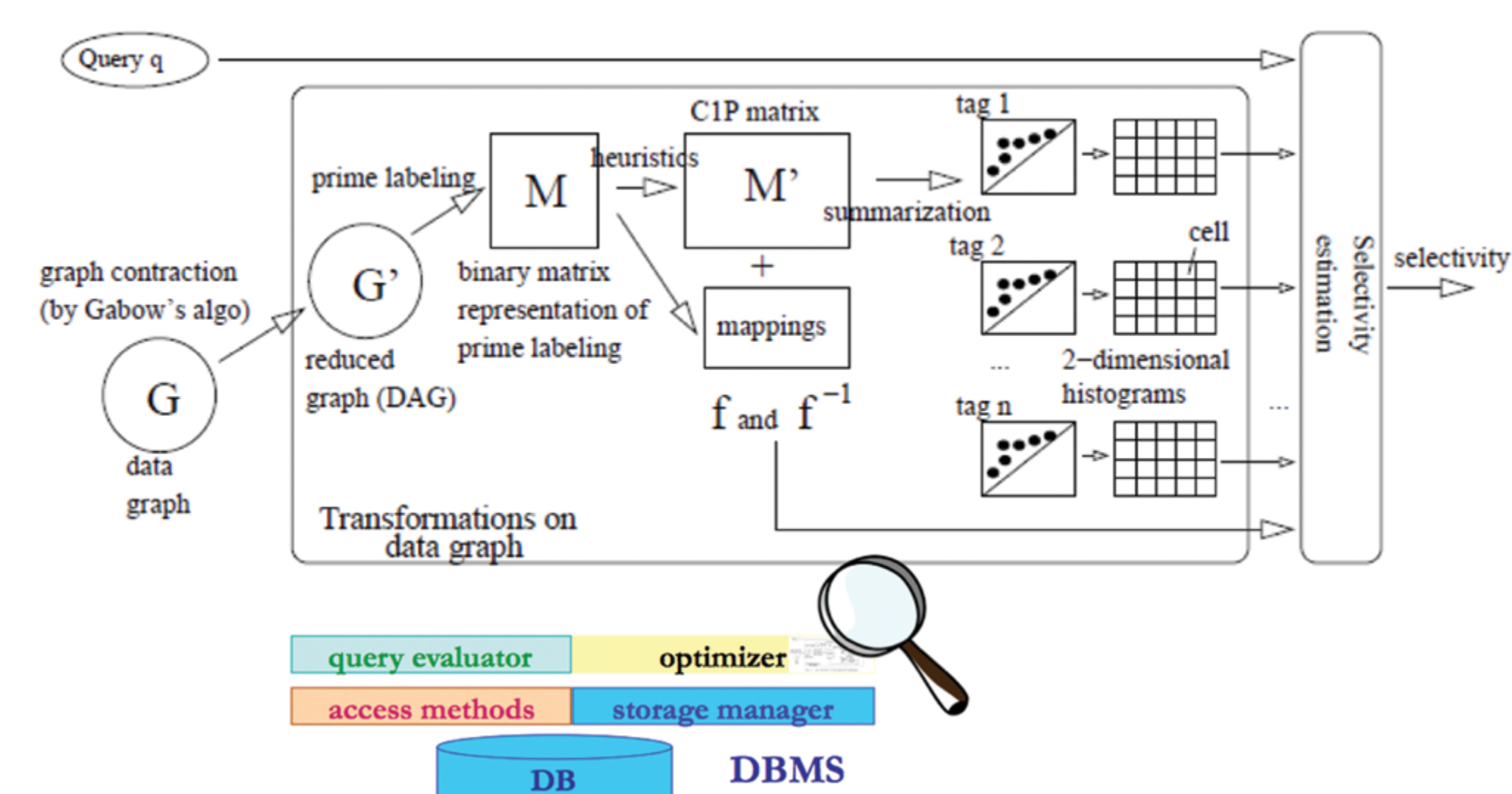
- ✦ GRFs 210510 & 210409 (PI: Dr CHOI Byron)
- ✦ To extend the capabilities of database technologies to handle structurally complex data
- ✦ To address major components of DBMS with efficient sub-optimal solutions, where the optima are often beyond reach



Example: Pattern matching in large complex graphs



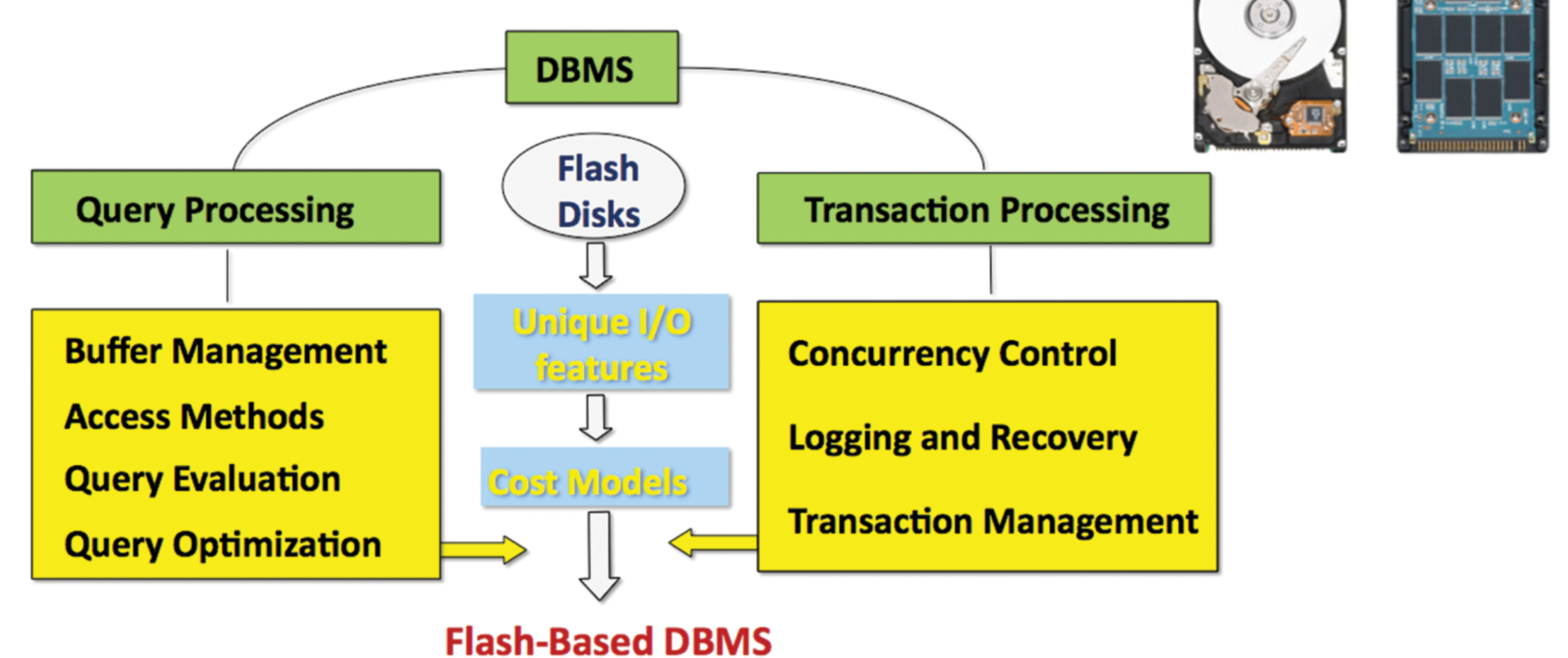
An impression of complex data: XMark graph (Partial) – a benchmark for XML



Schematics of our estimator

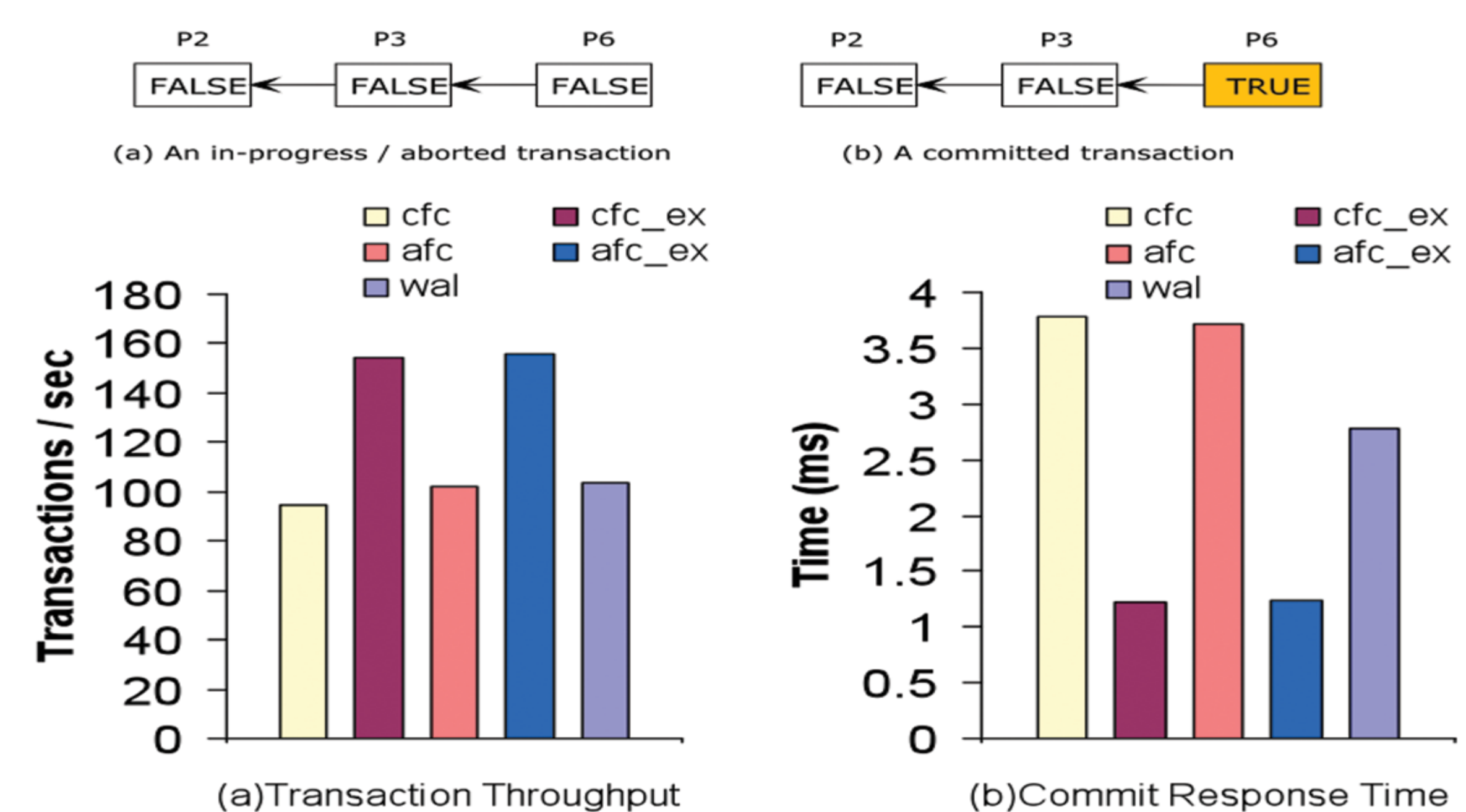
2. DATA MANAGEMENT ON NOVEL STORAGE MEDIA

- ✦ GRFs 211510 & 210808 (PI: Dr XU Jianliang)
- ✦ Novel non-volatile storage media (e.g., flash memory, phase change memory) is emerging as a competitive alternative to magnetic hard disks
- ✦ Unique I/O features of flash disks:
 - No mechanical part => fast random access
 - Erase-before-write constraint => out-of-place update
 - Asymmetric read/write performance



Re-examination of database components for flash I/O features

- ✦ Shadow Paging with new flag-based commit protocols outperforms Write-Ahead Logging



RESEARCH GRANTS & OUTPUT IN RECENT 5 YEARS

- ✦ 6 GRF grants funded in the capacity of PI, with a total amount over HK\$3M.
- ✦ More than 20 papers published in top journals and conferences in information systems and databases, including ACM SIGMOD, ACM TODS, VLDBJ, IEEE TKDE, IEEE TPDS and IEEE ICDE.

SELECTED RECENT PUBLICATIONS

- S. T. On, J. Xu, B. Choi, H. Hu, and B. He. "Flag Commit: Supporting Efficient Transaction Recovery in Flash-based DBMSs." *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, in press, 2011.
- X. Pan, J. Xu, and X. Meng. "Protecting Location Privacy against Location-Dependent Attacks in Mobile Services." *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, in press, 2011.
- Y. Peng, B. Choi and J. Xu. "Selectivity Estimation of Twig Queries on Cyclic Graphs." *Proc. of the 27th IEEE International Conference on Data Engineering (ICDE '11)*, Hannover, Germany, 2011.
- R. Bramandia, B. Choi, and W-K. Ng. "Incremental Maintenance of 2-hop Labeling of Large Graphs." *IEEE Transactions on Knowledge and Data Engineering (TKDE)* 22(5): 682-698, May 2010.
- J. Xu, X. Tang, H. Hu, and J. Du. "Privacy-Conscious Location-Based Queries in Mobile Environments." *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, 21(3): 313-326, March 2010.