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Systems Software Technology to Maneuver Gigantic Data

The world is becoming able to digitally record each and every event happening every second to form large-scale data, which (recently called big data) has the potential to be exploited to make our life more convenient and create new business. Yet, the increasing amount of data has continued to be generated in the world. It is challenging to explore how humanity manages and utilizes the data without being misled or deluded. Our laboratory has been studying and exploring **systems software technology for managing and processing large-scale data** to enable higher speed, efficiency, and manageability than ever before. Major ongoing research projects mainly work on database systems and storage systems, but prospective students' projects are not necessarily limited to them. **We welcome students who want to explore and invent new systems software technology that nobody sees ever in the world.**

Super-fast database system

We are developing a new database system based on the unique software execution method (Fig. 1). This brand-new technology has the significant potential to speed up query execution; for example, a business decision-support query taking one hour is enabled to finish in less than ten seconds. Our laboratory is studying and exploring software design and implementation to prove the potential power for a variety of data, hardware, and application software. Besides, we are working to apply the technology into cloud infrastructure and open source software and explore new social applications enabled by the technology.

Super-energy-efficient database system

Energy consumption has continued to increase at data centers and clouds. Securing the necessary energy might be a critical issue for the IT industry shortly. In anticipation of such an energy competition era, we are

exploring fundamental technologies to significantly improve the energy efficiency of database systems (Fig. 2).

Super-intelligent storage system

Magnetic disks were the mainstream device for data storage systems for more than half a century. Today, semiconductor technology (flash memory and storage-class memory) is being incorporated into the system. The storage system is a complex made of heterogeneous devices plus a powerful controller. Our laboratory is studying fundamental technology for realizing the automatic management of storage systems by fully utilizing the technical characteristics of cutting-edge storage devices.

- We provide online/offline laboratory tours and consultations for prospective students upon request. Please feel free to contact Dr. Kazuo Goda.
- Email: kgoda@tkl.iis.u-tokyo.ac.jp
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Fig 1. Super-fast database system.



Fig 2. Super-energy-efficient database system.