

Instructor Name	Kazuo GODA, Professor	Laboratory Location	Institute of Industrial Science (IIS)	Research Area	Data Platform Engineering
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Systems Software Technologies for Big Data and AI

Every event in the world is now being digitally recorded at unprecedented scale, driving the rise of AI and enabling advances that make our lives more convenient and create new industries. Yet the volume of data generated worldwide continues to grow, and how humanity manages and harnesses this data without being overwhelmed remains a critical challenge. Our laboratory studies and explores systems software technology for managing and processing large-scale data to enable higher speed, efficiency, and manageability than ever before. Our primary research targets are database systems and storage systems, though we are by no means limited to these areas. We welcome students who aspire to invent new systems software technologies that will astonish the world.

Super-fast database system

We are developing new database systems based on the unique software execution method (Fig. 1), which can dramatically accelerate query execution — for example, reducing a one-hour analytical query to under ten seconds. We study software engine design to realize this potential across diverse data types, hardware platforms, and application workloads. We also investigate AI-driven approaches to software development and quality assurance, pursue practical deployment to AI platforms and cloud infrastructure, and pioneer advanced societal applications.

Super-energy-efficient database system

Due to the strong demand for AI, energy consumption has increased dramatically at data centers and clouds. Securing the necessary energy is expected to become a critical challenge for the IT industry in the near future. Anticipating this energy-constrained era, we are exploring fundamental technologies to dramatically improve the energy efficiency of data and AI infrastructure (Fig. 2).

Super-intelligent storage system

Magnetic disks were the mainstream device for data storage for more than half a century. Today, flash memory has become widespread, and emerging technologies such as storage-class memory and CXL are creating increasingly complex storage hierarchies. The storage system is being transformed to an intelligent complex. We are develop fundamental software technologies that automate and optimize storage management by leveraging the characteristics of these cutting-edge devices. We are also exploring life cycle management for AI systems backed by large-scale data.

- Online and in-person laboratory tours and consultations are always welcome. Please feel free to contact Prof. Kazuo Goda. Our laboratory is well-equipped with cutting-edge machines and a strong team of research staff — all ready to support motivated students.
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Fig 1. Super-fast database system.



Fig 2. Super-energy-efficient database system.