Deduplication Storage System

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Abstract:
As we move into the digital world where most information is digitized, data protection for massive datasets has become an increasingly important issue due to its large scale, cost and power consumption. This talk describes a disruptive technology in called "deduplication" storage system, as the new-generation storage system for enterprise data protection to replace tape libraries. Deduplication removes redundant data segments in a large storage system to compress data into a highly compact form and makes it economical to store backups on disk and to transfer them across the wide area network for disaster recovery. The key technical challenge is to achieve high-throughputs on hardware platforms whose cost are lower than tape libraries.

This talk first presents the design and implementation of a deduplication storage system for both data protection and nearline storage use cases, and then describes several techniques to address the deduplication throughput challenge on a low-cost system. We will show that the resulting system can achieve over 500MB/sec deduplication throughput on a commodity server. We will also show that such a system can reduce the storage footprint and network bandwidth requirement for real backup datasets by a factor of 10 to 50 and reduce the power consumption of storage for data protection by an order of magnitude. We will then discuss the impact of deduplication technology in future storage systems.

Biography:
Kai Li is a professor at the Computer Science Department of Princeton University. His research interests include operating systems, computer architecture, distributed systems, scalable display systems. He has led several research projects at Princeton including the Shared Virtual Memory project which studies how to build shared memory on a cluster without physically shared memory, the Scalable I/O project which attacks I/O bottleneck problems for supercomputers, the Scalable High-performance Really Inexpensive MultiProcessor (SHRIMP) project which investigates how to build high-performance servers on a cluster, and the Scalable Display Wall project which explores how to build and use a high-resolution, wall-size display system to visualize massive datasets. During his sabbatical from Princeton, he co-founded Data Domain, Inc which built the first commercial deduplication storage system in 2002.

He joined Princeton after receiving his Ph.D. degree from Yale University In 1986. Prior to that, he received his B.S. degree from Jilin University in China and M.S. degree from University of Science and Technology of China, Academy of Sciences of China, respectively. He became an ACM fellow in 1998.