Jin Li

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Career Highlights

Partner Research Manager, Cloud Computing and Storage, Microsoft Research, Redmond, WA.

IEEE Fellow

Microsoft Gold Star Service Award x4
(1999: for contribution in founding Microsoft Research Asia.
2001: for contribution to scalable audio compression.
2006: for contribution to P2P VoD and P2P folder sharing
2010: for contribution to Deduplication in Windows Server.)

Microsoft Technical Community Network (TCN) Storage Technical Achievement Award 2013

Established a highly productive research team with standout productivity

Broad and in-depth technical contribution to a wide array of strategic Microsoft Products, with financial impact in the order of hundreds of millions dollars per annum: WMA9 Lossless (Reversible Transform), Live Messenger (NAT traversal, sharing folder), Live Mesh (NAT traversal), Windows 7 (Teredo), Lync (Bandwidth Estimation & Management, FEC, Media Gateway, DiffServ, QoS monitoring), Windows 8 (RemoteFX for WAN, BranchCache, Miracast), Windows 8 server (Primary Data Deduplication, Erasure Coding in Storage Spaces), Azure (Local Reconstruction Coding), Bing (Global Traffic Management, Bing object store), Xbox Live (Low Delay Message Protocol), DL Workspace (AI Infrastructure).

Extensive contribution to multimedia compression standards: JPEG 2000 (sub-bitplane scanning and rate-distortion optimization, visual weighting and progressive visual coding, JPEG Interactive Protocol), MPEG 4 (arbitrary shape wavelet transform), H.264 SVC (motion compensated temporal filtering).

72 issued US patents.

IEEE ComSoc Distinguished Lecturer, 2011-2012.

Extensive Community Service and Organization Committee Involvement
e.g., Packet Video Workshop 2009 General Chair.
ICME 2011 Lead TPC Chair.
CCNC 2013 TPC Chair
ICME Steering Committee Chair
ACM Multimedia 2016 TPC Chair

Associate Editors/Guest Editors served: IEEE Trans. On Multimedia, Journal of Selected Area of Communication, Journal of Visual Communication and Image Representation, P2P networking and applications, Journal of Communications

Ph.D. with honor in Electrical Engineering, Tsinghua University, 1994.

Affiliated Professor, Tsinghua University, from 2000

Demoed to Xiaoping Deng in 1984. The event brought forth the quote "Computer literacy should start with children" (计算机普及要从娃娃抓起), an iconic event in China. The event photo and the computer used are in display at Shanghai Science Museum.

Selected Recent Projects and Personal Contribution

Deep Learning workspace: A turnkey infrastructure for AI scientists (2016-current)

- Turnkey cloud computing infrastructure for AI scientists.
- AI scientists can manage AI training, interactive exploration, inference, and analytics on the cluster without any installation
- Seamless setup/collaboration among AI scientists
- Modularly built with heavy use of open source components (CoreOS and Ubuntu as basic OS with PXE deployment, Kubernetes + docker for orchestration, network file share via NFS, glusterFS, HDFS or Azure file share, ASP.Net/flask WebUI, OpenID for authentication)

Prajna: Cloud Computing Platform, http://msrccs.github.io/Prajna/ (2013-2016) [Fortune press]

- (Spark on .Net) A Distributed Functional Programming Platform for Interactive Big Data Analytics and Cloud Service Building
- Open sourced at https://github.com/MSRCCS/Prajna

Erasure coded storage (2006-2017) [press]

- In 2006, the pervasive wisdom was that 3-way replication was the golden standard for durability in Cloud storage. Jin foresaw that erasure coding (when performed lazily) could be adopted to significantly save storage to achieve similar durability goal. The challenges included redesigning the storage system, and the need to work out new codes that optimizes performance for common failure scenario in storage systems at the cost of rare failure event.
- Engaging with Azure, the combined team developed a Local Reconstruction Code (LRC). Compared with Reed-Solomon code (used in Google and Facebook), LRC reduced storage overhead from 1.5x to 1.29x. The work went into production around 2012.
- LRC receives a number of awards, include:
  - The best paper at USENIX ATC 2012
  - 2013 Microsoft TCN Storage Technical Achievement Award
- It alone saves Microsoft hundreds of million dollars per annum.
- A slight variation of the code is also deployed in Windows Storage for Windows 8 and Windows Server 2012.
- Jin and his group group also owned the implementation of a number of erasure coding implementation in Microsoft, include the code used in Windows Media Server, Skype/Skype for Business, RemoteFX for WAN.

Deduplication (2007-2012) [press]

- In 2007, believing that there were big opportunities for reducing redundancies within primary data, an area that hadn't been examined because of the impact on server managing live data, Jin's team prototyped a tool that can analyze the data for deduplication savings.
- Collaborating with Windows File Server group, the team architected and implemented the Primary Data Deduplication feature in Widows Server 2012 [paper] and End-to-End Deduplication for Storage Virtualization in

Windows Server 2012 R2. Key contributions include a new data chunking algorithm, a low RAM footprint indexing data structure to detect duplicate data (based on ChunkStash), and a data partitioning and reconciliation technique, the latter two for scaling index resource usage with data size. It led to major saving to customers (20-82%), and is among top 3 features for Windows File Server introduced at Windows Server 2012. The feature has received rave reviews (The Register, IT Pro, Arts Technica, IT World, Tech Republic), and there are evidence that some customers upgrading to Windows Server 2012 for the primary data deduplication feature only.

SSD (Flash) based storage (2007-current)

- Noticing that the storage engineers care dearly for disk I/O performance, while Solid State Drive (SSD) disrupts Hard Disk Drive (HDD) in term of I/O performance, Jin's team conducted a series of research to exploit the benefit of SSD for storage applications. "FlashStore" has implemented a SSD optimized, low RAM footprint key-value store that organizes storage on flash in a log-structured manner.
- It was tech transferred to Bing Object Store in Microsoft backend. SkimpyStash has implemented an ultra-low RAM footprint key-value store. The storage layer design of SkimpyStash has been incorporated into BW-Tree, a joint project among CCS, MSR Database group, and Azure DocumentDB team, and is shipping in SQL Server 2014 (Hekaton) and Azure DocumentDB.

Honors and Awards

Gold Star service award x4 (1999, 2001, 2006, 2010), Microsoft
(1999: for contribution in founding Microsoft Research Asia.
2001: for contribution to scalable audio compression.
2006: for contribution to P2P VoD and P2P folder sharing
2010: for contribution to Deduplication in Windows Server.)
Microsoft Technical Community Network (TCN) Storage Technical Achievement Award 2013.
Microsoft Member Bench Program, 2007.
Best paper award, USENIX ATC 2012.
Best paper award, ICME 2009.
The Young Investigator Award from SPIE/IS&T, 1998
The Best Ph.D. Thesis Award, Tsinghua University, 1994
Various prestigious scholarships of Tsinghua Univ. during year 1987-1994, such as "Tsinghua Ten Stars", the Supreme Guanghua Scholarship(1993), the Supreme Scholarship of Tsinghua (1991), the Best M.S. Thesis Award (1991), etc..
Championship (ranked 1st) of National Youth Computer Programming Competition, China, 1987.