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).

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.

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 is in display at Shanghai Science Museum and included in the text book of Elementary School in China.

Selected Recent Projects and Personal Contribution

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

- Prajna is a response to fill the vacuum of big data computing on .Net platform, it is open sourced at https://github.com/msrccs/Prajna/.

- Prajna is designed to be a generic distributed computing platform, with core functionality being the execution of an arbitrary closure (C#, F#, native code, etc.) on any remote node, in public cloud or in private cluster.

- Prajna supports interactive big data computing across a cluster with in-memory computation. The programming API is similar to Spark.

- Prajna has a managed web service (Prajna Hub), which can help developer to quickly prototype and host cloud service and run services

on mobile Apps.

- Prajna supports distributed machine learning (e.g., distributed neural network trainer using Caffe on each node).

- Jin is the architect and the lead developer, and drives all aspects of the project (feature design, development direction, pitch, marketing/ deployment plan). He has written about 70% of the code on the entire project.

Erasure coded storage (2006-2012) [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 prototyped the first distributed storage system that used lazy erasure coding. He also led the research team that engaged with Azure and Windows.

- 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 and Sudipta Sengupta, they prototyped a tool that can analyze the data for deduplication savings.

- Collaborating with Windows File Server group, he 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 (Jin implemented and shipped the production code), 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 leads 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 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.

Professional experience	

2001.1 – Current   Microsoft Research   Redmond, WA
Partner Research Manager, Cloud Computing and Storage (CCS) Group

1999.4 – 2000.12   Microsoft   Beijing, China
Researcher/Project Leader, Internet Media Group, Microsoft Research Asia

1996.11 – 1999.4   Sharp Laboratories of America   Camas, WA
Member of Technical Staff, Digital Video Department

1994.8 – 1996.11   University of Southern California   Los Angeles, CA
Research Associate, Integrated Media Systems Center

References   **Available Upon Request**