Sachin More

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Skills

Innovation
Propose and evaluate new ideas. Use simulation and/or advanced development for evaluation.

Technology Evaluation
Evaluate new products/technologies. Propose innovative ways to incorporate the technology in products.

Rapid prototyping and development
Assist projects/groups with deploying innovative solutions. Provide finished product by active participation in design, development and test processes.

Key Accomplishments

Storage system firmware 2000-2007
Evaluated and proposed changes to the control software of EMC Symmetrix storage array. Some ideas made fundamental changes to how the product works:

- U.S. patent 7,177,853 changed the data caching mechanism used by the storage array. Was introduced into the product in 2005.
- U.S. patent 6,954,833 changed the way data is read from RAID-1 protected disks. Was introduced into the product in 2001.
- U.S. patent 6,865,648 and 7,437,515 changed the way the storage array handles dirty data to improve performance of the array.

Other ideas led to were incremental improvements and were incorporated into the product (U.S. patents 6,715,039 and 6,721,870 and 7,406,574 and 7,552,280).

Solid State Disk Technology 2007-current
Was part of the team that introduced the first NAND flash-based SSD to the enterprise storage industry. Successfully integrated the SSD in the EMC Symmetrix storage array. SSDs led to unprecedented perfomance boost and lower power consumption for the product. Introduced new methodology for assessing SSDs as the technology continues to evolve. Innovations around SSD usage in the product (U.S. patent 8,010,738 and others pending).

Secure Erase Appliance for SSDs 2008
The appliance was developed to support SSDs in the EMC storage products lineup. The appliance is used by the *EMC Certified Secure Erase Service* to decommission/re-purpose SSDs in the field.

Disk Replacement Appliance 2011-current
Currently working on an appliance that will allow rapid replacement of disk drives in the field.

Awards

President's Award at EMC Corp. 2008
For innovations related to solid state drive technology.

Work Experience

Principal Performance Engineer 2000 - current
Innovation and Systems Engineering, Symmetrix Business Unit
EMC Corporation, Hopkinton, MA

Intern Summer 1998
Bell Laboratories, Murray Hill, NJ

Software Engineer 2/1994 - 7/1994
Datamatics Ltd., Mumbai, India

System Executive 2/1993 - 1/1994
Spectrum Business Support Pvt. Ltd., Mumbai, India

Freelance Work 7/1991 - 1/1993
Shree Software Consultants, Pune, India

Education

Ph.D. 2000
Computer Engineering
Northwestern University, Evanston, IL

Master of Science 1996
Computer Engineering
Syracuse University, Syracuse, NY

Bachelor of Engineering 1991
Computer Engineering
University of Poona, India

Patents

U.S. Patent 6,591,287 7/2003
Method to increase the efficiency of job sequencing from sequential storage
This patent describes a technique to efficiently accessing large scientific data sets stored in a magnetic tape library.

U.S. Patent 6,715,039 3/2004
Cache slot promotion in a replacement queue cache using determinations of probabilities and costs
This patent describes a technique to manage data stored in an Integrated Cache Disk Array (ICDA). It is used to determine how soon a piece of data will be accessed again.

U.S. Patent 6,721,870 4/2004
Prefetch algorithm for short sequences
This patent describes a technique to predict future data accesses for a logical volume when the accesses are small, few and concentrated in a small area. It is used by the microcode in the EMC Symmetrix product line.

U.S. Patent 6,769,054 7/2004
U.S. Patent 7,213,113 5/2007
System and method for preparation of workload data for replaying in a data storage environment
These patents describe a technique to help replicate a customer problem in a lab environment. The method takes a trace of the I/O activity in the customer environment and transforms it into an I/O activity trace appropriate for the lab environment.

U.S. Patent 6,865,648 3/2005
U.S. Patent 7,437,515 10/2008
Data structure for write pending
These patents describe an efficient way to manage dirty data in an Integrated Cache Disk Array (ICDA).

U.S. Patent 6,954,833 10/2005
Expedited dynamic mirror service policy
This patent describes a complete overhaul of the *Dynamic Mirror Service Policy* (DMSP) in the EMC Symmetrix product line. DMSP is used for orchestrating reading data from RAID-1 devices.

U.S. Patent 7,177,853 2/2007
Cache management via statistically adjusted time stamp queue
This patent forms the basis for the cache management scheme used in EMC Symmetrix product line.

U.S. Patent 7,281,086 10/2007
U.S. Patent 7,293,136 11/2007
Management of two-queue request structure for quality of service in disk storage systems
This patent describes a method to implement *Quality of Service* (QOS) for the disks used by EMC Symmetrix product line.

U.S. Patent 7,406,574 7/2008
Management of invalid tracks

This patent describes a method to find inconsistent pieces of data in a RAID protected system like EMC Symmetrix.

U.S. Patent 7,552,280 6/2009
Asymmetrically interleaving access to redundant storage devices
This patent describes an enhancement of the *Dynamic Mirror Service Policy* scheme used by EMC Symmetrix to read data from RAID-1 protected device.

U.S. Patent 7,640,342 12/2009
System and method for determining configuration of one or more data storage systems
The patent describes a method to configure a data storage system based on observed performance metrics. It is employed in a software used by field personnel for configuring EMC Symmetrix data storage system.

U.S. Patent 7,882,373 2/2011
System and method of reducing power consumption in a storage system through shortening of seek distances
This patent describes a way to reduce power consumption of a hard disk drive.

U.S. Patent 8,010,738 8/2011
Techniques for obtaining a specified lifetime for a data storage device
This patent describes a method to ensure that a NAND-flash based solid state disk will be usable for a specified period of time.

Publications

Passion: Optimized I/O for Parallel Applications
IEEE Computer, June 1996
Sachin More, Rajeev Thakur, Alok Choudhary, Rajesh Bordawekar, Sivaramakrishna Kuditipudi

MTIO - A Multi-Threaded Parallel I/O System
11th International Parallel Processing Symposium, April 1997
Sachin More, Alok Choudhary, Ian Foster, Ming Xu

Efficient Sequencing Tape-Resident Jobs
Proceedings of the Eighteenth ACM SIGACT-SIGMOD-SIGART Symposium on Principles of Database Systems, June 1999
Sachin More, S. Muthukrishnan, Elizabeth Shriver

Data Management for Large-Scale Scientific Computations in High Performance Distributed Systems
The Eighth IEEE International Symposium on High Performance Distributed Computing, August 1999
Sachin More, Alok Choudhary, Mahmut T. Kandemir, Harsha S. Nagesh, Jaechun No, Xiaohui Shen, Valerie E. Taylor, Rajeev Thakur

Tertiary Storage Organization for Large Multidimensional Datasets
Seventeenth IEEE Symposium on Mass Storage Systems, March 2000
Sachin More, Alok Choudhary

A novel application development environment for large-scale scientific computations
Proceedings of the 2000 International Conference on Supercomputing, May 2000
Sachin More, Xiaohui Shen, Wei-keng Liao, Alok Choudhary, Gokhan Memik, Mahmut T. Kandemir, George K. Thiruvathukal, Arti Singh

Scheduling Queries for Tape-Resident Data
6th International Euro-Par Conference, August 2000
Sachin More, Alok Choudhary

Data Management for Large-Scale Scientific Computations in High Performance Distributed Systems
Cluster Computing, Volume 3, November 2000
Sachin More, Alok Choudhary, Mahmut T. Kandemir, Jaechun No, Gokhan Memik, Xiaohui Shen, Wei-keng Liao, Harsha S. Nagesh, Valerie E. Taylor, Rajeev Thakur, Rick L. Stevens