MURALI VILAYANNUR

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EMPLOYMENT

Technical Lead/Software Engineer,
Facebook Inc.,
Apr 2016 – Present,

- Member of the TAO/TACO engineering team that is responsible for the distributed social graph cache and ephemeral storage system for graph data with limited lifetimes.
- Designed and rolled out a new flash engine format that allows for better retention of short-term data on TACO without premature eviction without compromising on flash burn-rate. The same engine has been used in other projects outside of TAO and TACO.
- Had a significant role in rearchitecting several subsystems of TACO that netted in significant read and write SLA improvements in 2017 (over 5 9s of reliability!).
- Technical lead and architect for next generation system called Zinc that provides an eventually consistent, distributed key-value cache for a proprietary key-value based replicated database system (ZippyDB).
- Helped improve operational and engineering practices for the team to be able to move faster (Modularization of sub-systems, scripts for on-calls, Use modern C++ features, Fix flaky and broken unit/integration tests).

Senior Technical Director,
PernixData Inc.
Mar 2012 – Apr 2016,

- Founding engineer and lead architect at this start-up that delivers a distributed scale out software storage tier to complement a capacity tier of storage.
- Designed, architected and implemented large portions of the FVP software stack to accelerate virtual machine I/O performance uisng RAM and direct-attached flash resources on ESXi hypervisor.
- Immense contribution to the company's IP portfolio and filed several patents and a paper at a reputed storage conference.

Senior Staff Engineer
VMware Inc.,
Oct 2006 – Feb 2012,

- Senior Technical Lead of the hypervisor storage team with a consistent track record of delivering key technical solutions and features like VMFS5 file system & space efficient desktop virtual disk format across multiple ESX releases.
- Designed, proposed and implemented several innovations that led to patents and publications at prestigious academic conferences.
- Mentored several interns on advanced development projects that also contributed to the company's IP portfolio.

Postdoctoral Staff

Argonne National Laboratory
Jun 2005 – Sep 2006

- Co-designed, implemented and developed two generations of a popularly used open-source parallel file-system for Linux clusters (PVFS versions 1 and 2).

EDUCATION

The Pennsylvania State University — **State College, PA** — **Aug 1999 – May 2005**

- Ph.D. in Computer Science & Engg.

IIT-Varanasi — **Varanasi** — **Jul 1995 - May 1999**

- B.Tech in Computer Science & Engg.

SELECTED PATENTS

- Computer Storage Deduplication with Jinyuan Li, Irfan Ahmad and Austin Clements
- Consistent unmapping of application data in presence of concurrent unquiesced writers and readers with Fraz Shaikh, Satyam Vaghani and Kiran Joshi
- Hybrid Locking Using Network and On-Disk Based Schemes with Jinyuan Li, Mayank Rawat, and Dan Scales
- File system introspection and Defragmentable Virtual Disk format for space efficiency with Satyam Vaghani, Krishna Yadappanavar, Manjunath Rajasekar, and Faraz Shaikh
- In-place snapshots of a virtual disk configured with sparse extents with Krishna Yadappanavar and Faraz Shaikh
- Avoiding physical fragmentation in a virtualized storage environment with Faraz Shaikh
- Configuration-Less Network Locking Infrastructure for Shared File Systems with Jinyuan Li and Mayank Rawat
- Improvements to a System Automatically Optimizing capacity between clusters of hosts with Irfan Ahmad, Jinyuan Li, Austin Clements and Carl Waldspurger
- Optimistic Input/Output operations for clustered file-systems with Satyam Vaghani
- Performing online, in-place upgrade of cluster file system with Jinyuan Li, Mayank Rawat and Satyam Vaghani
- Method and System for ensuring cache coherence of meta-data in clustered file system with Satyam Vaghani and Jinyuan Li
- Distributed Data Movement with Mayank Rawat, Jinyuan Li, and Chris Frost
- Enforced Correct Ordering of Unmap and write commands at disk level for safe reclamation with Faraz Shaikh, Satyam Vaghani and Kiran Joshi
- AWO: Modular Analysis Layer for Storage Workloads with Ali Mashtizadeh and Ricardo Koller

Selected Publications

- Deepavali Bhagwat, Mahesh Patil, Michal Ostrowski, Murali Vilayannur, Woon Jung, Chethan Kumar. A practical implementation of clustered fault tolerant write acceleration in a virtualized environment, 13th USENIX Conference on File and Storage Technologies (**FAST 15**).
- Philip Carns, Sam Lang, Robert Ross, Murali Vilayannur, Julian Kunkel, Thomas Ludwig. Small File Access in Parallel File Systems, IEEE International Parallel and Distributed Processing Symposium, **(IPDPS'09)**.

- Austin Clements, Irfan Ahmad, Murali Vilayannur, Jinyuan Li. Decentralized Deduplication in SAN Cluster File Systems, Proceedings of the 2009 Annual USENIX Technical Conference, (**USENIX ATC'09)**.
- Murali Vilayannur, Partho Nath, Anand Sivasubramaniam. Providing Tunable Consistency for a Parallel File Store, Proceedings of the Fourth USENIX Conference on File and Storage Technologies, (**FAST'05**).

Languages and Technologies

- C/C++: Expert/proficient
- Python/Java: Basic familiarity
- Other tools: MPI, Matlab, bash, sed, VMware suite of tools