Introduction to the Special Issue on USENIX FAST 2015

This special issue of the ACM Transactions on Storage presents some of the highlights of the 13th USENIX Conference on File and Storage Technologies (FAST'15). In the 13 years since its inception, FAST has grown into a very active community, attracting more than 520 attendees and 130 submissions in 2015. FAST'15 continues the tradition of bringing together storage-system researchers and practitioners to explore new directions in the design, implementation, evaluation, and deployment of storage systems. This encompasses everything from low-level storage devices to information management systems. The FAST Program Committee selected three high-quality papers that had more to say than could be published in the proceedings—making them suitable for an expanded journal publication in this special issue of ACM Transactions on Storage.

The first article, which was also selected as the best paper at the conference, is "Skylight—A Window on Shingled Disk Operation," by Abutalib Aghayev and Peter Desnoyers. Finding how disk drives operate internally had always been challenging. Skylight uses software and hardware techniques (e.g., drilling holes to observe the drive's head) to analyze how drive-managed Shingled Magnetic Recording (SMR) drives operate. Their findings shed light onto the internal operations of these emerging storage devices that could help software designers optimize storage stacks for SMR drives.

The second article is "RAIDShield: Characterizing, Monitoring, and Proactively Protecting Against Disk Failures" by Ao Ma, Rachel Traylor, Fred Douglis, Mark Chamness, Guanlin Lu, Darren Sawyer, Surendar Chandra, and Windsor Hsu. RAID arrays can lose data when multiple drives fail. The authors analyzed data of over a million drives spanning five years to find strong hints of impending disk failures. RAIDShield proactively monitors drives' health and replaces them before they fail, reducing the rate of multiple disk failures that would have resulted in data loss.

The third article is "BetrFS: A Right-Optimized Write-Optimized File System" by William Jannen, Jun Yuan, Yang Zhan, Amogh Akshintala, John Esmet, Yizheng Jiao, Ankur Mittal, Prashant Pandey, Phaneendra Reddy, Leif Walsh, Michael Bender, Martin Farach-Colton Johnson, Bradley C. Kuszmaul, and Donald E. Porter. More and more workloads these days are write heavy or write many small pieces of metadata. BetrFS is a file system designed to use write-optimized indexes. For such workloads BetrFS is more than four times faster than modern Linux file systems—helping write-heavy user applications improve their performance significantly.

Jiri Schindler and Erez Zadok
Program Committee Co-Chairs
USENIX FAST 2015

DOI: http://dx.doi.org/10.1145/2825000