"Large Scale Storage in the Web"

Eighteenth IEEE Symposium on Mass Storage Systems

held in cooperation with the Ninth NASA Goddard Conference on
Mass Storage Systems and Technologies

April 17-20, 2001
Hyatt Regency Islandia, San Diego, USA

Tutorial Session:

Emerging Standards
Impacting Storage System
Architectures

Jack Cole, Session Chair

Jack Cole

- Computer Technologist for ARL IAC
  - Army Research Laboratory Information Assurance Center

- Represent IEEE MSSTC
  - Mass Storage Systems Technical Committee

- Sponsor IEEE Storage System Standards
  - Committee Chair, Standards Board Member
  - Past SSSWG Chair (1244.1-.5)
  - MSSRM Contributor
    - Mass Storage Systems Reference Model

Links

- Mass Storage Systems Technical Committee
  - http://www.ieee-msstc.org

- Storage Systems Standards Committee
  - http://www.ieee-sssc.org

- Storage Systems Standards Working Group
  - http://www.ssswg.org

- IEEE – NASA Conferences, Workshops, Events
  - http://storageconference.org

Session Overview

- (My) Perspective
- Infiniband
- DMTF CIM and WBEM
- IEEE Storage System Standards
- SNIA Storage Networking Architecture
- AIIM Information Technology Standards
- IETF IP Storage
- XML

Perspective - Regret

- **Skipped Major Sources of Standards**
  - So Many Sources, So Little Time

- **Example: NCITS, T10**
  - National Committee for Information Technology Standards, http://www.ncits.org
  - T10 Technical Committee (SCSI, etc) http://www.t10.org

- **Thorough Taxonomy Needed**

Perspective – Nature of Standards

- Guidance That a Lot of People Follow, Regardless of Source, Authority, Process
  - Legal Implications of Formal Standards
  - But Practical Aspect: Must Have Following
  - So: All Sources of Standards Must Be Considered

- Evolving Statement of Understanding, Not Fixed in Stone
  - Periodic Review, Re-Affirmation, Withdrawal!
  - Subject to Modification At Any Time, Just Like Public Laws

Perspective – Why Standards?

- Why This Question? (Defense of Standards)

- Avoid Chaos

- Achieve Best Interoperability, Security

- Need Hand Hold Somewhere to Climb Mountain, Select Best Within Reach, Must Climb Mountain

- Market Gain, Not Loss for Value Added Products

Attitude Toward Storage

- Boring As …
  - 'Sunbathing Pet Rock'
  - Viscosity of Motor Oil
- JBOD
  - Storage Problem? Take A Couple of Disk Drives, and Call Me in the Morning.
- Now Less "Should We Buy" Than "What Should We Buy"
- Recognition that We Are Facing Tsunami (Watery Mountain) of Information

Nature of Storage

- **Information Access**
  - Accessibility is a sine qua non for information
  - Secure, Distributed Access In Heterogeneous Environs Is Main Focus of Storage
  - Storage Is Silly Otherwise (Use "rm")

- **Dilbert Cartoon – Record Retention Clerk**
  - "This Job Got So Much Easier When I Realized That Nobody Ever Asks for Anything Back"

How Much Information Is There?

- Lots!

- Less Important Than How Much There Will Be

- All Past Information Valuable,
  But In Volume, Inconsequential

- Current Effort To Estimate
  - www.sims.berkeley.edu/how-much-info/

- How Much Exists in Our Awareness?
  - http://research.microsoft.com/~gray/papers/MSR_TR_00_101_Digital_Immortality.doc

More – How Much Information?

- **"As We May Think" by Vannevar Bush (1945)**
  - http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm

- **1995 Roy Williams of CalTech**
  - http://www.cacr.caltech.edu/~roy/dataquan/
  - Recognized As Dated: 500 MB per PC

- **1997 Estimation**
  - http://www.lesk.com/mlesk/ksg97/ksg.html

Information Tsunami

- 550 Billion Web Pages Today
- Billion-Transistor Processors by 2012 ?
- "10^3 Bytes / FLOP"
- TF Machine Requires PB Storage?
- Intrusion-Detection (IDS)
  - Hacker/Cracker Brief Intrusion Causes 34 Hours of Detection/Analysis
- Puny Humans Read 100 KB/hour
  - Back to Awareness, Accessibility

Must Collaborate

- Standards Developers Number Like Guitar Pickers in Nashville … More!

- Overlapping Purposes, Sometimes Conflicting

- Burden of Going-It-Alone No Longer Tolerable
  - Fosters NIH Syndrome
  - Travel Time and Money Less Available
  - Diffusion of Human Inventiveness
  - Need Results Now for Tsunami Defense

Quote from HDS VP

One result of a lack of cooperation among vendors is that security is almost nonexistent in storage installations.

Hubert Yoshida,
a vice president at Hitachi Data Systems Corp

http://www.computerworld.com/cwi/story/0,1199,NAV47_NLTpm_STO56997,00.html
Jan 29, 2001

Major Directions

- Evolution Not Complete from "SAD" to "NAS"

- Further Abstraction of "Files" to "Storage Objects" (But Still Called "Files")

- Solutions for Transactions/Time Bottleneck

- Higher Throughput Devices and Systems

- Collaboration, Interoperability

"SAD" is Garth Gibson's "Server Attached Disk"

Presenters

- ## Infiniband
  - Tom Ruwart, CTO for Ciprico, speaks about an evolving interconnection technology and the Infiniband Trade Association of 220 members

- ## DMTF CIM and WBEM
  - Dr. Bruce Haddon, Senior Java Architect with Sun Microsystems Professional Services, speaks about the Distributed Management Task Force and its Common Information Model, Web-based Enterprise Management Schema

Note About CIM and WBEM

- CIM and WBEM are important to products of SUN, Microsoft, and Intel, and other companies.

- The connection between JIRO and WBEM has been mentioned. Microsoft's flavor of WBEM is called Windows Management Instrumentation (WMI), and one can find files on Windows systems.

- Intel's WMI Provider Implementation exposes instrumentation data and alerting events to the CIM Object Manager (CIMOM). This is hardware health monitoring, etc.
  - http://developer.intel.com/design/motherbd/cimfaq.htm

- DMTF Offers Great Online Tutorial, Glossary, Etc
  - http://www.dmtf.org/educ/tutorials/cim/

Presenters (Continued)

- IEEE Storage System Standards
  - Curtis Anderson, Storage Architect with Integratus and Chair of the IEEE Storage Systems Standards Working Group Presents Information on Recently-Approved Media Management System Standards and Current Projects of the IEEE

- SNIA Storage Networking Architecture IETF IP Storage
  - Dr. David Black, Senior Technologist at EMC, a member of the SNIA Technical Council and a co-chair of the IETF IP Storage Working Group, Makes Separate Presentations On These Areas

Presenters (cont'd)

- **AIIM Information Technology Standards**
  - Betsy Fanning, Director of Standards for AIIM International, will speak about AIIM's storage related standards as well as document management standards

- **XML**
  - Drs Moore and Marciano will present.
  - Reagan Moore is Associate Director for Data Intensive Computing at the San Diego Supercomputer Center and an Adjunct Professor in the UCSD CSE department.
  - Richard Marciano is Staff Scientist, Data Intensive Computing Environments Group, SDSC, UC San Diego

Note About
Presenters and Presentations

- Each Presenter's Credentials Were Too Extensive to List Here

- Each Presenter Represents Organizations With Memberships In the Hundreds

- Greater Detail Will Be Given at the Tutorial and Placed Online Afterward at http://storageconference.org/2001