

Session 3: Cloud Computing

Albert Reuther/ MIT Lincoln Laboratory

**HPEC Conference
16 September 2010**



MIT Lincoln Laboratory



Cloud Computing Concepts

Data Intensive Computing

- **Compute architecture for large scale data analysis**
 - Billions of records/day, trillions of stored records, petabytes of storage
 - Google File System 2003
 - Google MapReduce 2004
 - Google BigTable 2006
- **Design Parameters**
 - Performance and scale
 - Optimized for ingest, query and analysis
 - Co-mingled data
 - Relaxed data model
 - Simplified programming
- **Community: YAHOO!**



Utility Computing

- **Compute services for outsourcing IT**
 - Concurrent, independent users operating across millions of records and terabytes of data
 - IT as a Service
 - Infrastructure as a Service (IaaS)
 - Platform as a Service (PaaS)
 - Software as a Service (SaaS)
- **Design Parameters**
 - Isolation of user data and computation
 - Portability of data with applications
 - Hosting traditional applications
 - Lower cost of ownership
 - Capacity on demand
- **Community: Google**





Cloud Computing Concepts

Data Intensive Computing

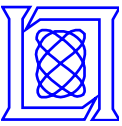
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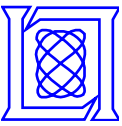
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- **Invited: Accelerating Data Intensive Applications with Flash**
 - *Allan Snavely* / San Diego Supercomputing Center
- **Invited: Cloud Computing for Processing Large Volumes of Data**
 - *Patrick Dreher* / Renaissance Computing Institute
- **Break**
- **Persistent Surveillance Supercomputing in a Can**
 - *Jeremy Kepner, William Arcand, Chansup Byun, Bill Bergeron, Matthew Hubbell, Andrew McCabe, Peter Michaleas, Julie Mullen and Albert Reuther* / MIT Lincoln Laboratory
- **Building a Scalable Knowledge Space on the Cloud: Initial Integration and Evaluation**
 - *Delsey Sherrill, Jonathan Kurz and Craig McNally* / MIT Lincoln Laboratory



Poster / Demo B: Cloud Technologies and Applications

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Cloud Technologies and Applications

- 1 **Performance Characterization of the Tile Processor Architecture: Lessons Learned**
 - Eric Grobelny, Jim Passwater and Andrew White / Honeywell
- 2 **The MIST, a local, secure cloud context and 802.11s testbed**
 - Gregory Dempsey, Ronald Feher and Lindsay Gordon / USMA Kurt Keville / MIT
- 3 **Development of a Real-Time Parallel UHF SAR Image Processor**
 - Matthew Alexander, Michael Vai, Thomas Emberley, Stephen Mooney and Joseph Rizzari / MIT Lincoln Laboratory
- 4 **Automated Software Cache Management**
 - William Lundgren, Kerry Barnes and James Steed / Gedae, Inc.
- 5 **Dependable Multiprocessor (DM) Implementation for Nano-satellite and CubeSat Applications**
 - Matthew Clark, John Samson, Jr., / Honeywell
- 6 **Combining Scripting Environments and Sourcery VSIPL++ for Rapid Prototyping**
 - Stefan Seefeld, Brooks Moses, Don McCoy and Justin Voo / CodeSourcery, Inc.
- 7 **Multicore, Multithreaded, and/or Multi-GPU-Kernel VSIPL Standardization, Implementation, and Programming Impacts: Syntax, Semantics, Models**
 - Anthony Skjellum / RunTime Computing Solutions, LLC
- 8 **Mnemosyne: A Tool for Temporal Memory Access Analysis in HPC Applications**
 - Shahrukh Tarapore and Matthew Burkholder / Lockheed Martin
- 9 **Development of a Component-Based Framework using VSIPL++**
 - Alan Ward, Roger Winstanley and Mark Hayman / Northrop Grumman
- 10 **Deploying an ISR Cloud Platform**
 - Geert Wenes and Dan Poznanovic / Cray, Inc.
- 11 **Improving FFTW Benchmark to Measure Multi-core Processor Performance**
 - William Pilaud / Curtiss Wright Controls Embedded Computing