

# *Streaming Data Applications & Middleware*



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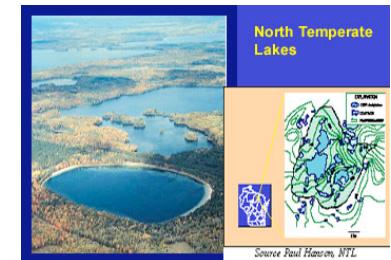


Cyberinfrastructure Lab for  
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San Diego Supercomputer Center, UCSD

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Peter Shin, Sameer Tilak



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# ***Observing Systems CI Requirements***

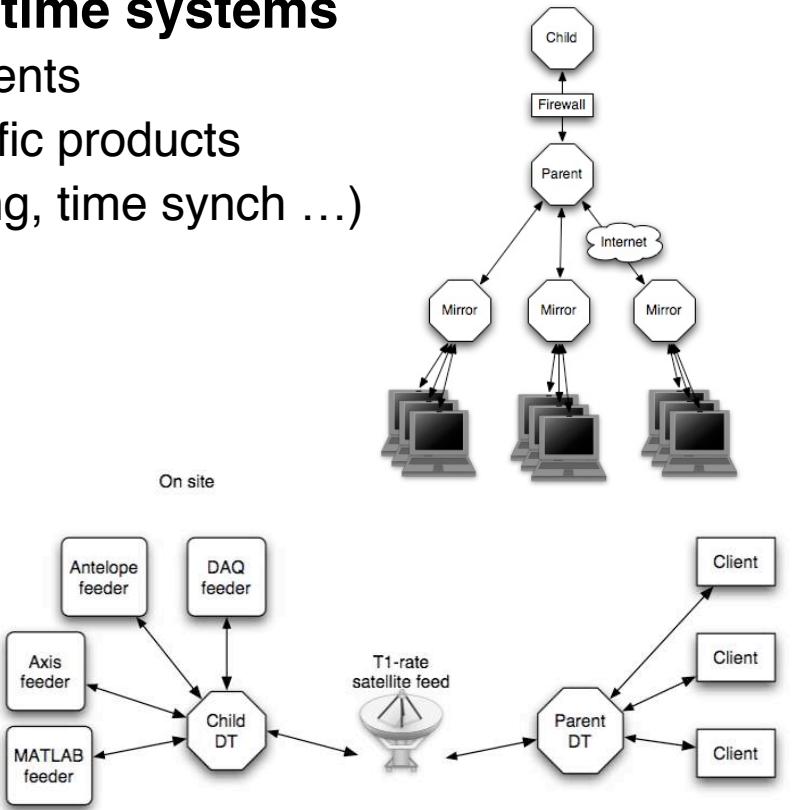
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- Numerous observing systems being planned or built – from local to global
  - Ecology, Oceanography, Seismology, Engineering, Hydrology
- All have similar CI requirements wrt data acquisition, instrument management, and state-of-health monitoring
  - Reliable data capture and transport
  - Persistent monitoring of numerous data channels
  - Automated processing, event detection, analysis
  - Integration across heterogeneous resources and systems
  - Real-time tasking and remote operations
  - Secure access to system resources
- Streaming data middleware provides the framework for application development and integration



# *Streaming Data Middleware*

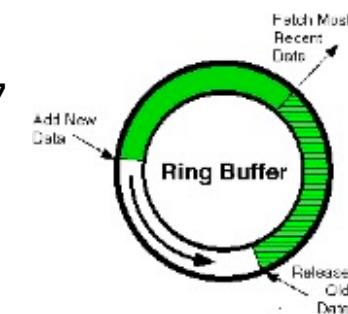
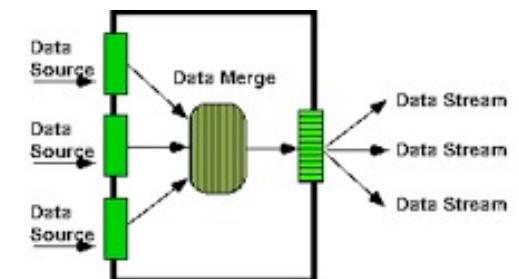
- **Common programming layer for real-time systems**
  - Enables integration of real-time components
  - Provides abstractions over vendor-specific products
  - Supports in-network processing (buffering, time synch ...)
- **Make data streams first class objects**
  - Addressable
  - Efficient operations
    - Monitoring, QA/QC, event detection
    - Replication and subscription
    - Reliable transport



# *RBNB Middleware Technology*

## *“Ring Buffered Network Bus”*

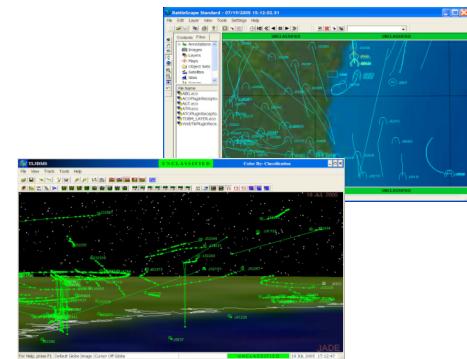
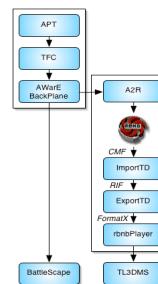
- In-network buffered data management and archiving for streaming data
- Scalable support for in-network intelligent routing, data processing, filtering, and topology management
- Robust bridge environment between diverse data sources and distributed data destinations
- Optimized for high-speed streaming data
- All-software solution (Java)
- Used in NSF, NASA, NOAA, DOE projects
- Developed by Creare Inc., <http://www.creare.com/>
- OPEN SOURCE SOFTWARE under Apache 2.0 License, Jan 07
- NSF support from SDCI program, start Sept 07



# *Open Source DataTurbine Initiative*

## [www.dataturbine.org](http://www.dataturbine.org)

The Open Source DataTurbine Initiative combines commercial-quality software support with an active and engaged user and developer community. We invite you to share our vision and join the Open Source DataTurbine Initiative.



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# *Integration of Heterogeneous Devices*

- National Instruments CompactRIO Datalogger
- Campbell Scientific DataLoggers
- Apprise Templine
- Vaisala Weather Transmitter WXT510
- Vaisala Digital Barometric Pressure Sensor PTB210
- Axis video camera and Axis cameras on pan-tilt-zoom (PTZ) platforms
- Nikon 5700 Digital camera
- Greenspan Dissolved Oxygen Sensor
- Labview-based DAQs
- Strain gages and string potentiometers
- Linear variable displacement transducers (LVDTs).



# *RBNB on a broad-range of platforms*



\*cables not included



Nokia N80: Integrated Wireless LAN (802.11g), Java MIDP 2.0, CLDC 1.1, Symbian OS

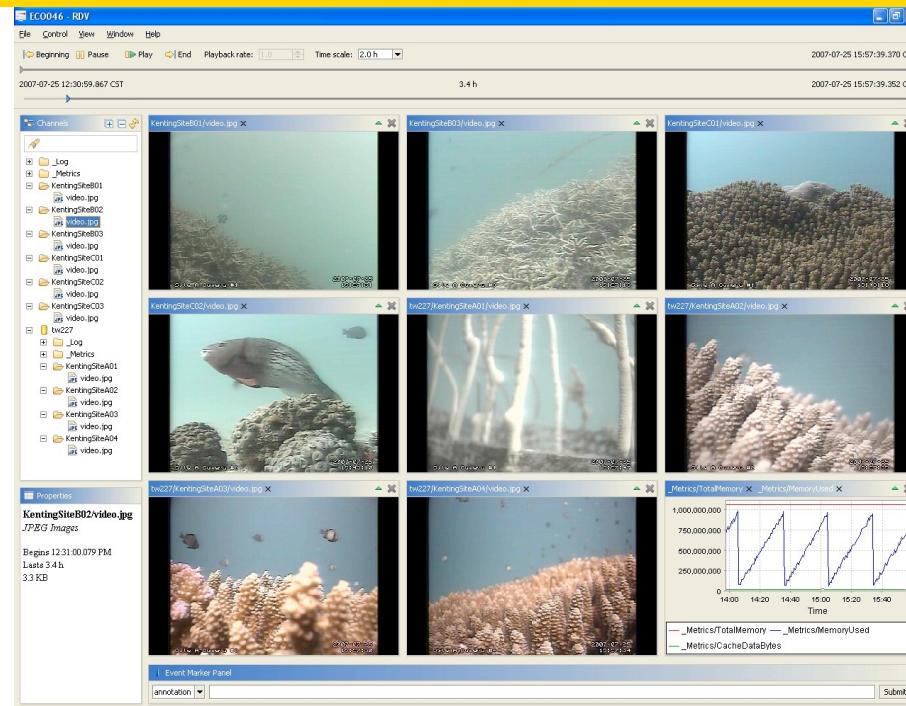
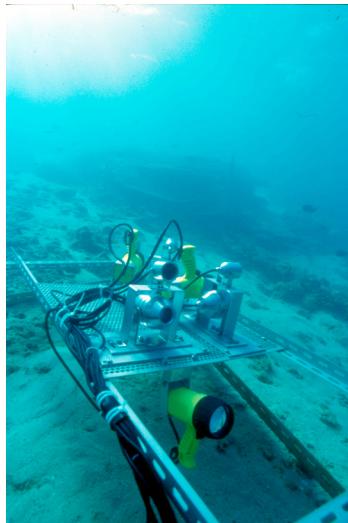
Gumstix: Intel Xscale - 400 MHz processor 64MB RAM and 16MB Flash, Linux 2.6 OS

Workstation: 3.8 GHz Processor, 2 GB memory, 160 GB storage, Linux/Windows OS

64-bit RBNB DataTurbine on Sun Fire T200 server: 32 cores (UltraSPARC T1 processor) , 16 GB memory, 6 TB storage (RAID), Solaris OS

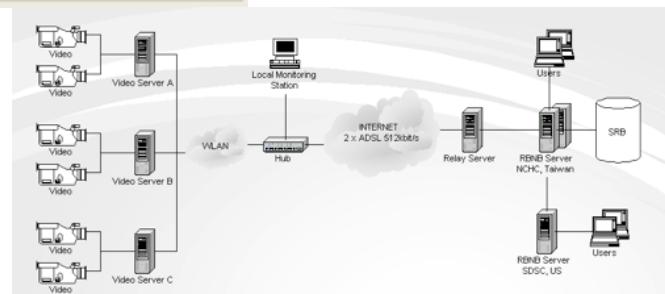


# *PRAGMA telepresence experiment: Collaboration between NCHC and SDSC- Open-source RBNB deployment: Underwater video camera Network at Kenting*



Ebbe Strandell, Hsiu-Mei Chou, Yao-Tsung Wang, Fang-Pang Lin @ NCHC,  
Hsinchu, Taiwan

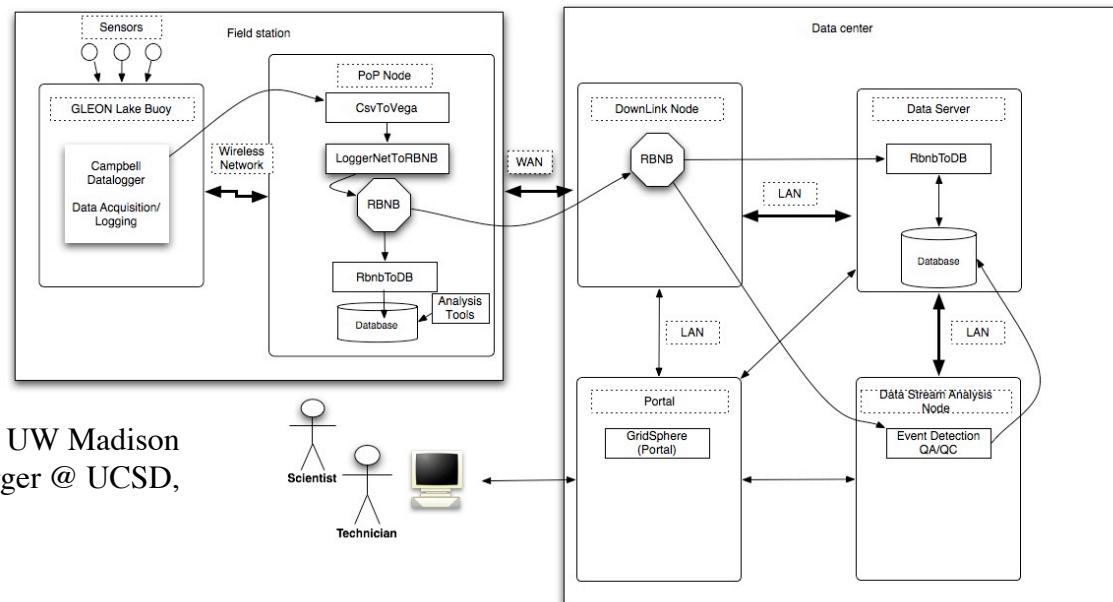
Sameer Tilak, Tony Fountain, Peter Arzberger, Arcot Rajasekar @ UCSD,  
California, USA



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# *Open-source DataTurbine deployment at Lake Erken, Sweden (GLEON)*



Luke Winslow, Paul Hanson, Tim Kratz @ UW Madison  
Sameer Tilak, Tony Fountain, Peter Arzberger @ UCSD,  
California, USA



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