

# Channel Archiver Stats & Problems

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# SNS Stats

- Averaging ~2000 samples/sec, from ~80000 channels
  - 1997 design goal: 10000 samples/sec
  - Raw 'write' test: >50000 samples/sec
- Split into ~70 active sub archives
  - CSS DataBrowser makes that usable
- Disk space: ~170 GB/month
  - Maybe 6 month left

| Archive                | Key  | Description             |
|------------------------|------|-------------------------|
| Target                 | 4800 | /arch/TGT/master_ind    |
| Target Loops (last r   | 4801 | /arch/TGT/loops/curre   |
| ModeratorColdbox       | 4802 | /arch/TGT/mcb/curre     |
| Target shut (last res  | 4803 | /arch/TGT/shut/curre    |
| RF                     | 4900 | /arch/RF/master_inde    |
| RF llrf (last restart) | 4901 | /arch/RF/llrf/current_i |
| RF hprf (last restart  | 4902 | /arch/RF/hprf/current   |
| RF refline (last resta | 4903 | /arch/RF/refline/curre  |
| RF xstart              | 4950 | /arch/RF_xstart/maste   |
| RFQ xmtr1 start (la    | 4951 | /arch/RF_xstart/rfq1_   |

Pattern: SCL\_LLRF\*01a\* Search

Add ...  Replace search results  RegEx

| Name                            | Archive    | Start    |
|---------------------------------|------------|----------|
| SCL_LLRF:FCM01a:AutoSetRotOffse | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:CtIDDS          | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:CtIRFPW         | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:FdFwd_mag       | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:FdFwd_phase     | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:FdFwd_type      | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:Gain            | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:Gain_Rot        | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:Int_scale       | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:RFRef_AmpMea    | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:T_FB            | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:T_FdFwd         | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:cavAmpAvg       | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:cavAmpSet       | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:cavPhaseAvg     | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:cavPhaseSet     | RF llrf (l | 2007/09/ |
| SCL_LLRF:FCM01a:cavV            | RF llrf (l | 2007/09/ |
| SCL_LLRF:Gate01a_LOCAL:EventSe  | RF llrf (l | 2007/09/ |
| SCL_LLRF:Gate01a_LOCAL:Phase    | RF llrf (l | 2007/09/ |
| SCL_LLRF:HPM01a:ADC0_Loss       | RF llrf (l | 2007/09/ |
| SCL_LLRF:HPM01a:ADC1_Loss       | RF llrf (l | 2007/09/ |
| SCL_LLRF:HPM01a:ADC2_Loss       | RF llrf (l | 2007/09/ |
| SCL_LLRF:HPM01a:ADC3_Loss       | RF llrf (l | 2007/09/ |
| SCL_LLRF:HPM01a:ADC4_Loss       | RF llrf (l | 2007/09/ |
| SCL_LLRF:HPM01a:ADC5_Loss       | RF llrf (l | 2007/09/ |
| SCL_LLRF:HPM01a:ADC6_Loss       | RF llrf (l | 2007/09/ |



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# Data Management Limitations

- **Difficult and time consuming**
  - Moving data around requires manual index updates
- **Few Informational Tools**
  - Nothing prevents duplication
  - Which *channels* contribute the most to data growth?
- **Storage only supports "Append new samples"**
  - Removal of selected channels impossible
  - Removal of older data limited to complete 'sub archives'
  - No practical way to use Java or Matlab code to replace original samples with reduced sample count,
  - .. or to insert computed data like daily statistics into "archive"

# JLab: MySQL Transition

- **Very promising performance tests!**
- **Limitations by design**
  - Stores every update from IOC. No 'sampling'.
  - 'Double' stored as 'float'.
  - Only small arrays.
  - Metadata: Units. No limits, precision. No status/severity.
- **MySQL Issues**
  - Table size limited
    - Need one table per channel
  - Table count limited
    - Custom code implements 'clustering'
  - SQL "DELETE" doesn't free disk space or is very slow



# SNS: Recent Oracle Tests

- **Basic JDBC test code:**  
up to 8000 inserts/second via network
- **Tricks**
  - "Batching" ~500 inserts
  - "Partitioning" spreads one big "sample" table over disk partitions
    - Currently one partition each day, automatically added
- **Expensive, but looks like the way to go**
  - Avoid MySQL workarounds
  - SNS committed to Oracle anyway, but will need partitioning license

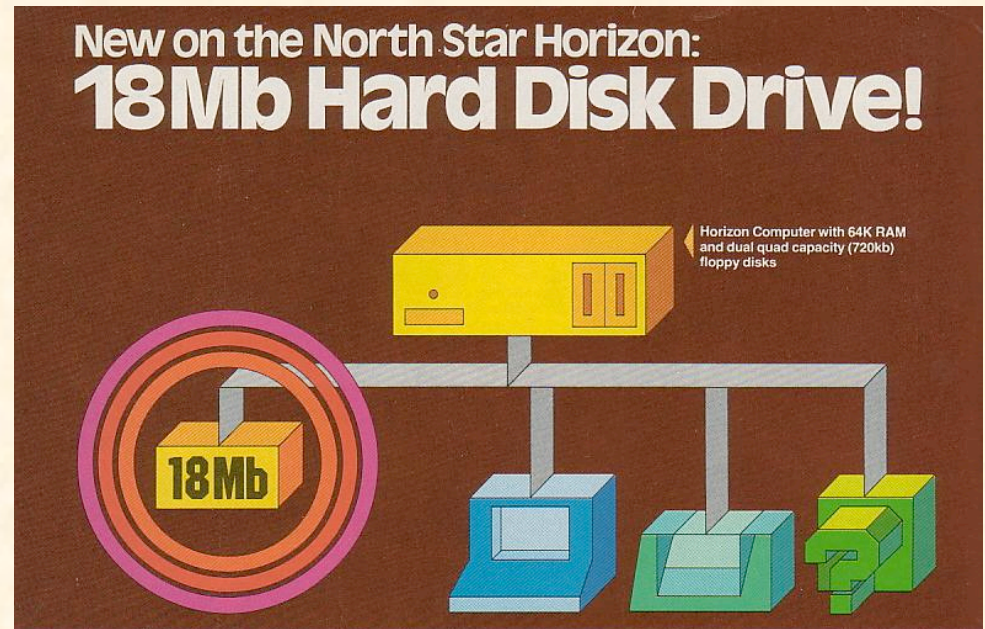


# Great! But what about SLAC?

- Reported promising performance results for Oracle-based data storage
  - Lee Ann Yasukawa, Robert Hall:  
*"Archiving Into Oracle"*, ICALEPCS2001
- End of 2004: No more.
  - What do we need to learn from that?

# SNS Plan

- **Buy HP EVA storage array and 30TB disks**
  - Shared:  
Computing Integration group, Controls group
- **Can be used for anything**
  - Add to current archive server??
  - Add to current Oracle server?
  - Use with designated Oracle server!



# Archive Engine Prototype

- **Developed in Java**
  - Eclipse/CSS command-line app
- **Reads existing engine config files**
  - OK with LLRF, RCCS, new "permanent" BLM setups
- **Writes into Oracle**
  - From office and controls network
  - ... and MySQL for sites that don't have much data
- **Write performance OK for scalar tests**
- **Current issue: Channel Access connections**



# Engine's Web Server

The image shows two browser windows side-by-side. The left window is titled 'Archive Engine' and displays a 'Summary' table. The right window is titled 'Archive Engine Channel' and displays a 'Channel Info' table and a 'Group Membership' section.

## Archive Engine

| Summary        |                                  |
|----------------|----------------------------------|
| Description    | Archive Engine                   |
| State          | RUNNING                          |
| Start Time     | 2007/10/09 13:09:19              |
| Uptime         | 1.34 min                         |
| Workspace      | /private/tmp/                    |
| Groups         | 97                               |
| Channels       | 9204                             |
| Batch Size     | 500 samples                      |
| Write Period   | 30.0 sec                         |
| Write Count    | 10312 samples                    |
| Write Duration | 0.3 sec                          |
| Idle Time      | 99.7 %                           |
| Memory         | 21.3 MB of 63.3 MB used (33.7 %) |
| Version        | 0.1                              |

[-Main-](#) [-Groups-](#)  
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## Archive Engine Channel

| Channel Info        |                                     |
|---------------------|-------------------------------------|
| Channel             | CCL_LLRF:FCM3:FdFwd_mag             |
| Connected           | Connected                           |
| Internal State      | GotMonitor                          |
| Mechanism           | 1.00 min scan                       |
| Last Archived Value | 2007/10/09 13:12:29.120000000 0.000 |
| Enablement          | Passive                             |
| State               | Enabled                             |
| Queue Len.          | 1                                   |
| Queue Avg.          | 1.3                                 |
| Queue Max.          | 2                                   |
| Capacity            | 3                                   |
| Overruns            | 0                                   |

### Group Membership

**Group Enabled**  
[CCL3](#) Enabled

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# Basic Sample Table Design

- **What data types to support?**
  - Time stamp detail, enumerated values, arrays, meta data?
- **One table per channel (JLab)?**
- **One table per data type (SLAC)?**
- **One table for all samples (SNS)?**
  - Possibly wasting space, but best to use SQL across various channels of different types



# Summary

- Investigating Oracle as archive data storage
- Currently working with Oracle to obtain a quote to add partitioning to license
- Testing Oracle setups, prototyping sampling engine
- Performance expected to be almost comparable to current SNS ChannelArchiver setup
- ... but sustainable in the long run.