CDF offsite computing

What's new since October 30, 2003

Outline

- This talk is about
  - What has been done
  - What hardware is in use now
  - What remote institutions are coming online in immediate future
  - Not a description of international commitments/plans, that is up to this committee

- 2 type of offsite resources:
  - Those funded for usage by one institutions
  - Those funded for CDF-GRID
  - So far we are tying together the former ones
  - Hope this committee will give us the latter ones

Goal reminder
Cfr. Frank Wuerthwein's talk at last IFC meeting

- For 2005, 2006 … move offsite 50% of analysis load
  - Significant contribution also desired in 2004
- Offsite = addition to FNAL's 1.5M$/fy budget
  - US + non-US

- Do it via CAF's, SAM, JIM
  - We have a plan on how to do it
  - We have most software tools already developed and under use/test
  - We are working on the other tools
  - We = CDF + FNAL CD + PPDG, tens of people working on this

  - It is a large project

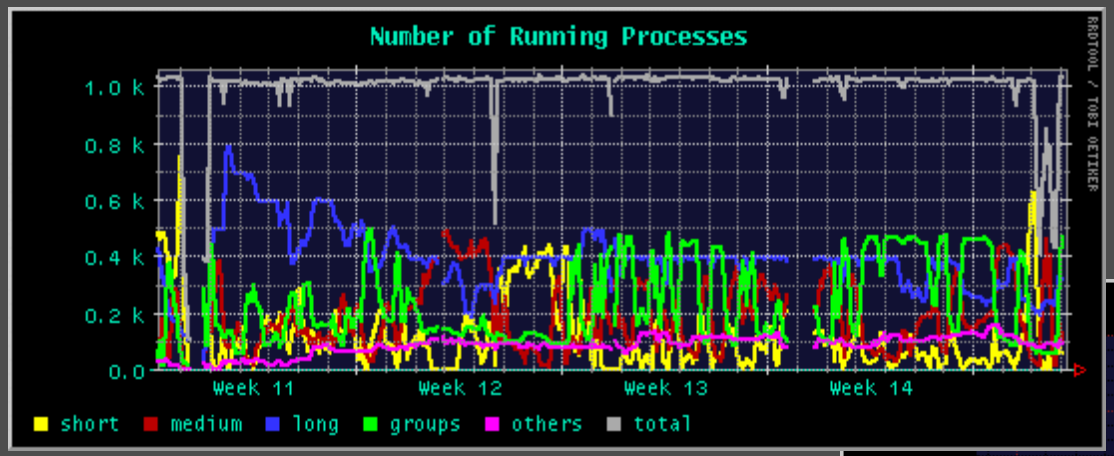
What's happened

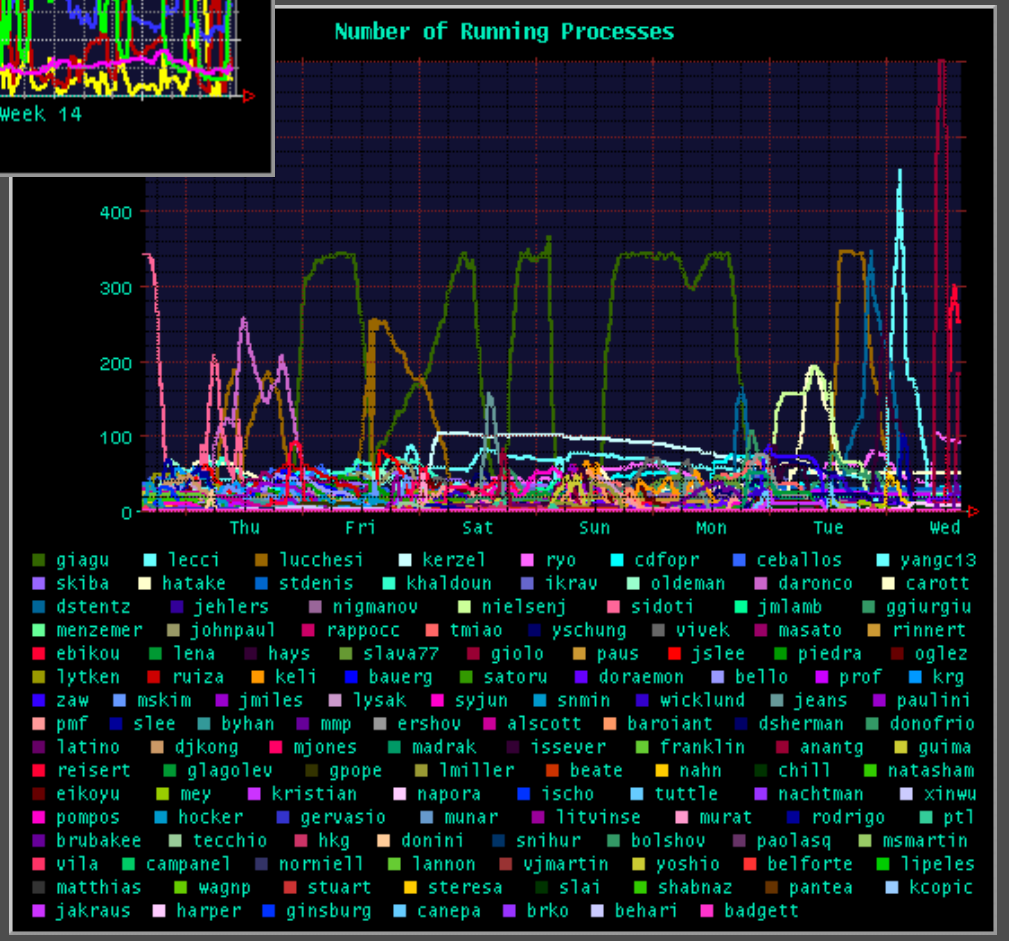
- 2 CDF-GRID workshops (Jan 20-22, Apr 1-2, 2004)
  - Focused on installation of a handful of sites
  - Move from expert-only to assisted install/operation
  - Feed back into documentation and streamlining of procedures for more sites
    - e.g. SAM from 2 days to 10 min
- Start to tackle operational issues with first production sites coming online, now have weekly CDF-Grid operation meetings
  - Italy, Korea and Taiwan already up
- More production sites rolling in by summer
  - UCSD, MIT
  - Japan, Spain ?
- More institutions contributing with MC production, even if not opening farms to all users (yet)
  - Canada, Rutgers, UK

CDF-GRID status

- User's MC at remote sites = reality
  - Run on dCAF
  - Have output sent to FNAL's desktop
    - already used for real work
- Organized MC production
  - Offsite resources can be exploited "now"
  - Mostly a matter of operational issues anyhow
    - bookkeeping
    - error handling
    - output archiving/cataloguing
- Analysis on remote-copied data samples
  - Tools in place, working in Germany since ~1 year
  - Other sites slowed by lack of large local disk
- Accounting still to be developed but will come as extension of available tools

Monitor 1: what, who





Each remote CAF runs software that makes this kind of plots on the web

Monitor 2: to do what

- Analysis code logs data set access

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Data access summary

Datasets: aexp08,hbot0h


INPUT data summary:

           RecRead EvtRead RO(sec) OC(sec) Size(MB) KbPerRec KbPerEvt FailOpen
Aggregate  7.8e+04 7.8e+04      26   18405  8.3e+03       --       --        0
Average    1.6e+04 1.6e+04     5.2  3681.0  1.7e+03    108.7    108.7        0


OUTPUT data summary:

           RecWrote EvtWrote OC(sec) Size(MB) KbPerRec KbPerEvt
Aggregate   2.3e+05  2.3e+05   55308  2.5e+04       --       --
Average     4.7e+04  4.7e+04 11061.6  5.1e+03    111.4    111.5
```

- CAF software collects name of data set accessed by users, amount of data read, data written, cpu time, real time

- Existing tools allow to tell
  - What resources are there
  - Who is using them
  - To look at what data

Ship is sailing

- Cdf grid is de-facto our working environment and hypothesis
- Analysis farm is built/developed to be clonable
- DataHandling has dissolved into SAM
- Larger and larger effort being spent in tools that are
  - Usable both on- and off-site
    - SAM
    - remote / multi-level db servers
  - Export of former "fnal only" facilities
    - dCache
    - storage on FNAL's tape robot from remote farms
- GridKa in Karlsruhe/Germany already an autonomous data analysis center based on SAM
- INFN will follow in ~1 month

An example: CNAFCAF farm in Italy (pick this because I know it better)

- Built at new INFN "Tier1" center at CNAF
  - 250GHz, 5TB now
  - Mainly used for MC production
  - Computing room ready in January 2004
  - Running as a clone of FNAL's CAF
  - Running SAM with 3TB local cache and 1 Gbit WAN
  - Provides working environment identical to FNAL
  - Data import ~1TB/day demonstrated on day-long transfers
    - Equivalent to CDF data logging rate
  - Open for access already to all CDF menbers in transparent way, but batch priority higher for INFN physicists
- Important human contribution
  - One FTE since ~January for sw install/maintenance/operation
  - ~0.5 FTE for hw install/maint/debug
  - Much time spent on optimizing disk → cpu data flow

CNAFCAF future

- Hardware expansion already in procurement phase
- Italy = large group with many physics interests, need much more disk to be able to move significant analysis effort (cfr. GridKa)
- CNAF will have large common CPU pool on PBS farm
  - CDF will be able to access it, but need new software tools
  - One position for CDF being filled at CNAF

- Full GRID-dification
  - So far founded by INFN for INFN physicists
  - Already proving to be useful for others
    - heavy MC production ran by physicists at Winsconsin and SanDiego
  - Addition of resources dedicated to CDF-GRID (i.e. in fair share across all collaboration) no problem technically
  - Taking over 15% of cdf analysis load (vs. 50% that cdf would like to move offsite) is ~40% increase to farm size over what is plausible for INFN-only. Well within what we can manage

Hardware resources in CDF-GRID

site	GHz now	TB now	GHz Summer	TB Summer	Notes
INFN	250	3	950	30	Priority to INFN users
Taiwan	100	2.5	150	2.5	
Japan	-	-	150	6	
Korea	120	-	120	-	
Germany GridKa	~200	16	~240	18	Min. guaranteed CPU from x8 larger pool. Open to all by ~Dec (JIM)
Cantabria	30	1	60	2	~1 months away
UCSD	280	5	280	5	Days away. Pools resources from several US groups. Min guaranteed from x2 larger farm (CDF+CMS)
Rutgers	100	-	400	-	In-kind, will do MC production
MIT	-	-	200	-	~1 month away
Canada	240+	-	240+	-	In-kind, doing MC production, access to larger common pool

Conclusion

- CDF is building a MC and Analysis grid
- It is a lot of work for fnal/cdf caf/sam/dh/db/jim teams
- People are working hard for this:
  - Implement and use an analysis grid 4 years before LHC
  - Working in close relation but not as part of LCG (so far)
  - LHC will benefit from feedback and user's case
  - Not obvious that code developed for CDF will be part of LHC grid nor viceversa

- Clear commitment and timelines for deployment of significant offsite resources makes this effort more appealing and add deadlines to developer's motivation