ALEPH analysis preservation

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Aims

• This is a preliminary work on software and data preservation of the ALEPH experiment.

• Fully functional stand-alone ALEPH installation.

• Use cases we wanted to cover:
  • initial integration with a Cloud technology;
  • definition of data distribution policy (Apache/WebDav, StoRM);
  • instantiate interactive machines on demand.
ALEPH environment

Current situation using VirtualBox:

• SLC4 distribution.
• ALEPH environment:
  • SLC4;
  • CERNLIB;
  • ALEPH software;
  • ALEPH data access.

Last native environment of the experiment:

• Linux RedHat 6.2;
• direct acces to CERN tape;
• software installed on AFS - heavy dependences on CERNLIB
SLC4 and CERNLIB

Why SLC4? It has been used few years ago for published analysis (last known official Aleph analysis use SLC4).

Also SLC5 is suitable for this purpose, but for preservation goals it is important to have a certified platform for analysis.

CERNLIB rpm is available in the SLC4 repository and no problem observed in the coexistence with SLC4 and ALEPH software.

The integration of CERNLIB with SLC5 and ALEPH software is more elaborated but not impossible.
AFS

- A local copy of the needed files stored under the `/afs/cern.ch/aleph/ area has been made;
- The system at the moment is totally independent from AFS;
- Moreover, it is independent from any network issue (keeping out cloud applications).
- A different choice is represented by CernVM-FS (building a `/cvmfs/ aleph.cern.ch/ area):
  - At the moment this is not of primary importance - the software occupy ~hundreds MegaBytes of space.
How the VM was prepared

- SLC4 32 bit;
- CERNLIB available on yum repository;
- software locally copied from /afs/cern.ch/aleph;
- no dependences from AFS and network, a part from DB access.
Data

- CERN currently hosts archival ALEPH data on the Castor storage system:
  - slow and complex access to them.
- We have searched for a solution that guarantees readiness and ease of use:
  - total data + MC for analysis is less than 20 TB: it can be served by a single WebDav instance.
    - plan is to use StoRM resource manager;
  - data have been moved to a current generation disk system at T2_IT_Pisa and served via the WebDav protocol (SL4 supports davfs2).
Cloud computing

* A set of virtual machines like this is available on a cloud supplied by the INFN-Bari datacenter for jobs submission, thanks to two Italian projects:

  * PRISMA - IaaS and PaaS Cloud Computing infrastructure with completely OpenSource solutions, available for scientific community, business companies and public administrations;

  * ReCaS - development of the Computing infrastructure in the south of Italy, Bari is involved in the construction of a new datacenter with 15k CPUs and 5 PB of storage.

* Such a system is implemented in an OpenStack instance.
Tested software components

- The whole analysis chain has been reproduced:
  - kingal: event generator library;
  - galeph: MC simulation program for the detector;
  - julia: reconstruction program;
  - alpha: physics analysis package.

- Compilation of new analyses and software works - not limited to replaying ancient analyses.
Tested software components

- Interactive use - the system is suitable for interactive analysis.
- All the previous functionalities, plus the event display and PAW works.
Applications

- The solution can be used to reproduce published analysis and completely new studies.

- The solution includes a complete development environment, where software components at any step can be modified, recompiled, debugged.

- The whole software stack is available, for data and MC sets, for interactive and batch processing.
Conclusions

- Installed a SLC4 with fully ALEPH environment available:
  - no dependency from AFS and network issues.
- Cloud computing for job submission is possible via an OpenStack instance hosted by the Bari datacenter.
- Data and MC are available in a current generation disk system.
  - They can be served by a single WebDav instance.
Conclusions

- The whole ALEPH analysis chain has been reproduced:
  - the machine is ready and available for interactive usage, ancient analysis can be reproduced and new ones are possible;
  - software components at any steps can be modified;
  - interactive and batch processing are possible.

- Knowledge and bit preservation services developed by european projects will be investigated (SCIDIP-ES, EUDAT).
Backup
IaaS Open Source: current situation (INFN testbed)

- 11 server
- 264 CPU/Core
- 880 GB RAM
- 66TB HDD (DAS) 7.2K rpm

- 1 Manager Node (24 Core, 80GB Ram, 6dischi, 10Gbit/s)
- 1 Network Node (24 Core, 80GB Ram, 6dischi, 10Gbit/s)
- 10 Gbit/s on Wide-Area-Network
- 250 Public IP addresses AVAILABLE