Update on CERN infrastructure services

Nils Høimyr, on behalf of CERN IT/PES/IS

- Update on existing services
  - TWiki service status
  - Update on Version Control Services (SVN, CVS)
  - Engineering Service infrastructure (on linux)
- 2 new services:
  - Issue Tracking Service (JIRA)
  - BOINC volunteer computing project support

TWiki service update

- TWiki offered as a collaborative Wiki solution since 2004 and widely used by LHC experiments and CERN users.
    - 124k topics (web pages)
    - 2 M monthly topic views
    - 55 k monthly topic updates
- TWiki 4.3.2 in production, with many plugins and extensions for CERN E-groups authorization.
- Upgrade to TWiki 5.1.1 planned for May.
    - Many usability enhancements and application platform changes.
    - Undergoing final tests and validation now.
- Service evolution plans:
    - Further integration with CERN SSO and web infrastructure.
    - Keeping an eye on alternatives, such as Foswiki.

Version Control Services

- **Central SVN service**
  - 1014 hosted projects

- **Legacy CVS service**
  - 14 projects remaining, the most active is CMS Offline.
  - Plan to stop the CVS service during LS1 in 2013.

- **Focus on consolidation of SVN**
  - Reliability & performance
    - Running SVN 1.6, upgrade to 1.7.x planned
    - Back-end storage optimization (AFS parameters, NFS alternative)
      - Trac db moving from Sqlite to MySQL
  - Integration with Issue Tracking Service
  - Pilot Git setup for the autumn
    - Focus on security and scalability

http://cern.ch/svn

Engineering service infrastructure

- Linux licence servers (Flexlm cluster, Mathlm, Nag..) all migrated to virtual infrastructure.

  - Some issues with Flexlm triads and the proprietary licence server extension for Ansys.

  - Flexnet monitoring application suite from vendor Flexera not very robust, yet helpful as a tool to manage licences.

- Engineering batch resource (part of LXBATCH)

  - 40 nodes with 10Gb Ethernet interconnects.

    - 20 first nodes with "Net Effect" low latency cards supporting the OFED stack (Infiniband protocol). 20 nodes added later.

    - Used for MPI applications; CFD (Ansys/Fluent, OpenFoam), Beam Dynamics (ORBIT), Field Calculations (GdfidL) etc.

    - AFS used for input & results, local disk for task i/o where possible.

Issue Tracking Service

- Issue tracking service based on JIRA from Atlassian
  - Requests from users in LHC experiments for a JIRA service
  - LCG Savannah portal old and needs a replacement
  - Trac too close to SVN and insufficient to meet all requirements
  - Many groups with private JIRA installations at CERN

- Central hosted JIRA Service, integration with :
  - SSO, eGroups, CERN Services
  - Version Control Systems (SVN, Git(?))
- Service starting up
  - Pilot projects running successfully
  - Offer an integrated service for new projects
  - Migrate existing JIRA installations to the central service
    - http://cern.ch/its

JIRA from Atlassian

- JIRA is a commercial software from Atlassian, used by : Apache, facebook, eBay, NASA, twitter, …

Serving more than **18,000** companies worldwide

- Issue tracking tool, highly customizable (plugins, workflows, …), friendly UI

- Other Atlassian tools of interest :
  - GreenHopper, Bamboo, Confluence, Crucible, Fisheye, …

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- Supported by Atlassian :
  - https load balancing + Tomcat6 + Oracle

- Virtual Machines on SLC6

- Architecture :
  - 1 VM = 1 instance
  - Central instance for common needs (most projects)
  - Separate instances for special needs (no administration by ITS)

- Quatorrized
- Out-of-the-box SVN and Git plugin

- **CERN SSO :**
  - Shibboleth (mod_shib for Apache) protecting login page (anonymous access)
  - Custom Authenticator in Jira (java class that "filter" login requests)

- **CERN eGroups**
  - Jira Gadget : mapping eGroups to Jira Groups

- **Service-now : basic link**
  - Custom plugin

What is BOINC?

- "**B**erkeley **O**pen **I**nfrastructure for **N**etwork **C**omputing"

- **Software platform for distributed computing using volunteered computer resources**

- http://boinc.berkeley.edu

- **Uses a volunteer PC's unused CPU cycles to analyse scientific data**

- **Client-server architecture**

- **Free and Open-source**

- **Example projects**
  - **SETI@Home**
 - **Climateprediction.net**
  - **Einstein@Home**

How BOINC works
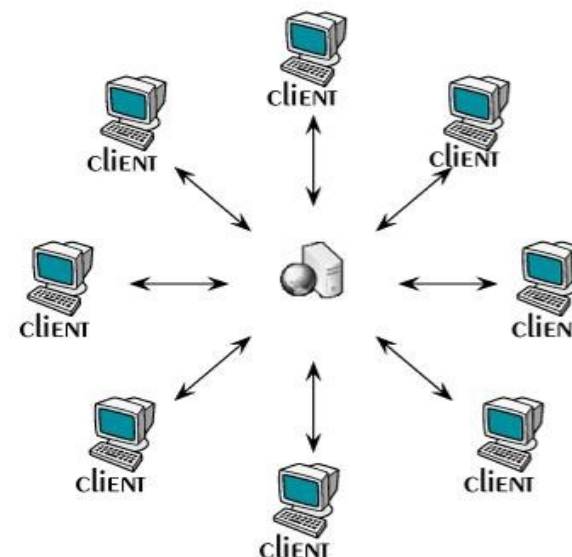
- Download and run BOINC software

- Choose a project

- Enter an email address and password in the BOINC Manager.

- That's it, your done!

LHC@home - SixTrack
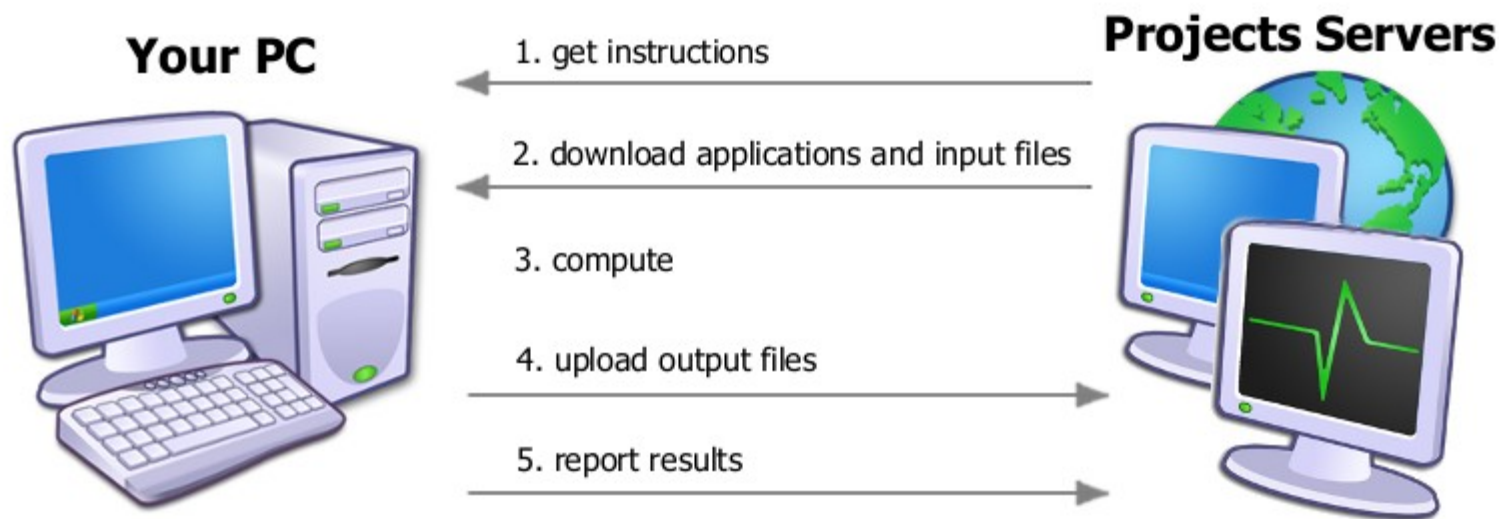
- Calculates stability of proton orbits in the LHC accelerator.
  - SixTrack Fortran program, simulating particle trajectories.
- About 60 000 users, 100 000 PC's…   over 3000 CPU years of processing.
- Client runs on Linux and Windows platforms
  - Classic BOINC archicture
- Started as an outreach project for CERN 50th Anniversary 2004; used for Year of Physics (Einstein Year) 2005.
- Objectives: extra CPU power and raising public awareness of CERN and the LHC - both successfully achieved.
- Ran (intermittently) since, with server in QMUL since 2007.
- Server migrated back to CERN in September 2011

LHC@home 2.0 - Volunteer Cloud

- Project done by Ben Segal, a number of short term students and the CernVM team of PH/SFT

- Application case from the Theory group
  - Theoretical fitting of LHC data using Monte Carlo simulation based on Standard model

- Uses a virtual machine on the volunteer computers
  - User installs Virtual Box
  - User installs the BOINC client
    - Attach to project and ready to go with application on CernVM
    - The BOINC client downloads a VM-wrapper, that gets the image and the job to run on the VM
    - Potentially wide range of physics applications

BOINC – CernVM Architecture
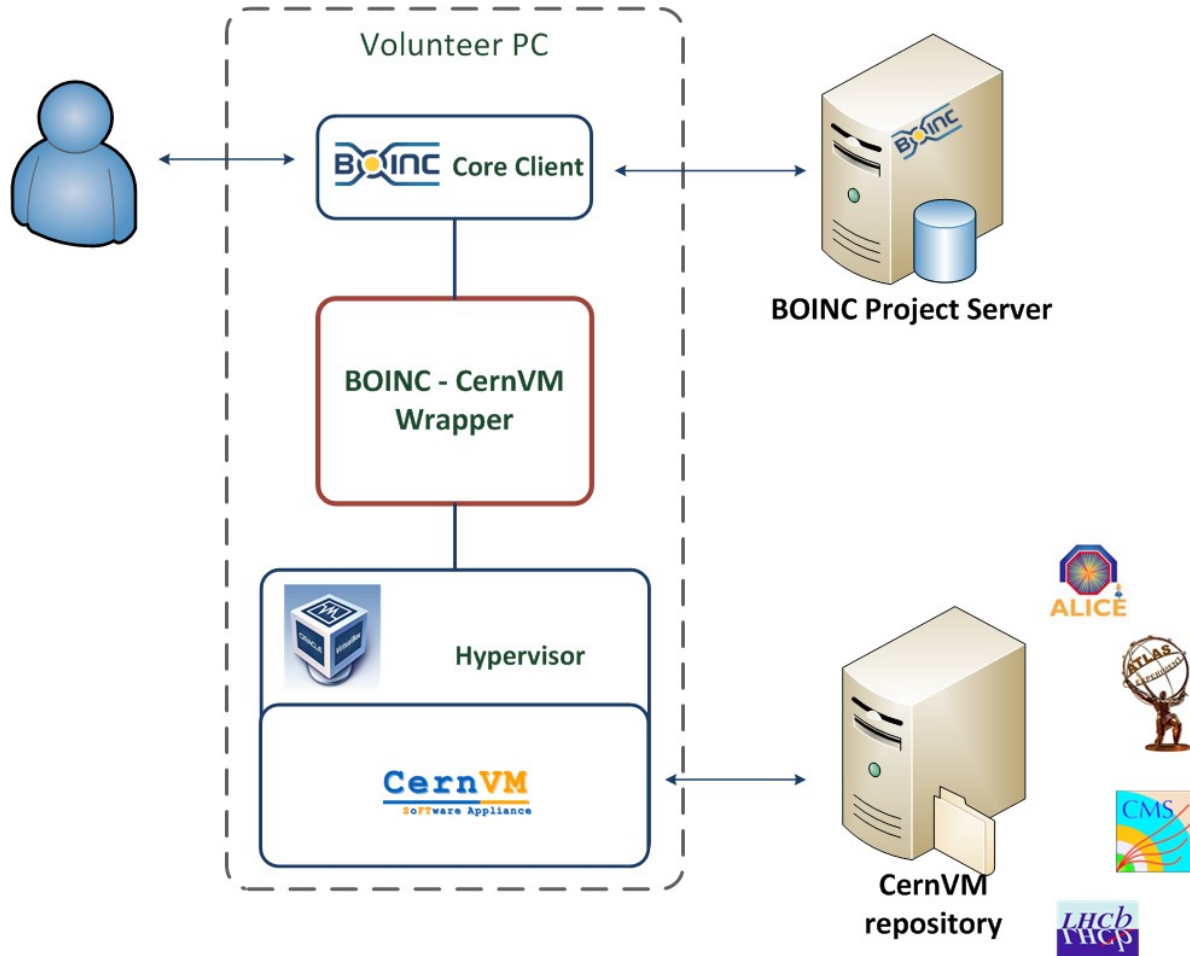
- ## BOINC server cluster
  - VM infrastructure for each server

- ## BOINC server application
  - Configuration, monitoring
  - MySQL database server back-end
  - Portal with user forums etc
  - In progress:
    - Hosting of Co-Pilot, CernVmFS etc

- ## *Out of scope: BOINC user applications*
  - *Porting of applications to BOINC*
  - *Communication with users about scientific projects*

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- Many thanks to my colleagues:
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  - Gautam Botrel (JIRA)
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  - Georgios Koloventzos (VCS)
    - The rest of the PES group
    - PH & BE colleagues for LHC@home

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Questions?

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