

BOINC service for volunteer cloud computing

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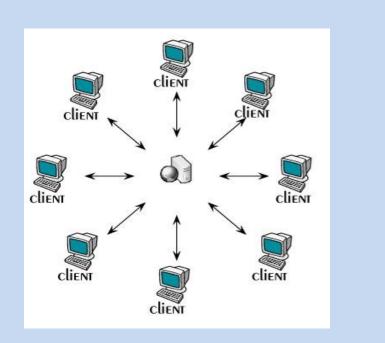
At CERN, the European Laboratory for High Energy Physics, Volunteer computing has been used for LHC beam dynamics studies with Sixtrack since 2004. Some 60 000 volunteers with more than 100 000 PCs have actively contributed computing power for LHC simulations since 2004.

Thanks to developments with CernVM and virtualisation, now also physics simulations are running under BOINC. Monte Carlo event generation of collisions at the LHC are running on Volunteer PCs connected to the Test4Theory project, with results for users available on the site: http://mcplots.cern.ch/

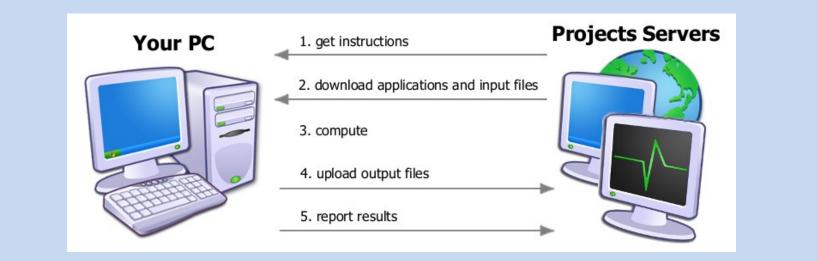
BOINC, how does it work?

Virtualisation with BOINC

The Berkeley Open Infrastructure for Network Compting (BOINC) allows scientists to harness computing power from thousands of volunteer PCs for their scientific computing projects.



The clients connect to a central BOINC server via the web and download jobs from there.



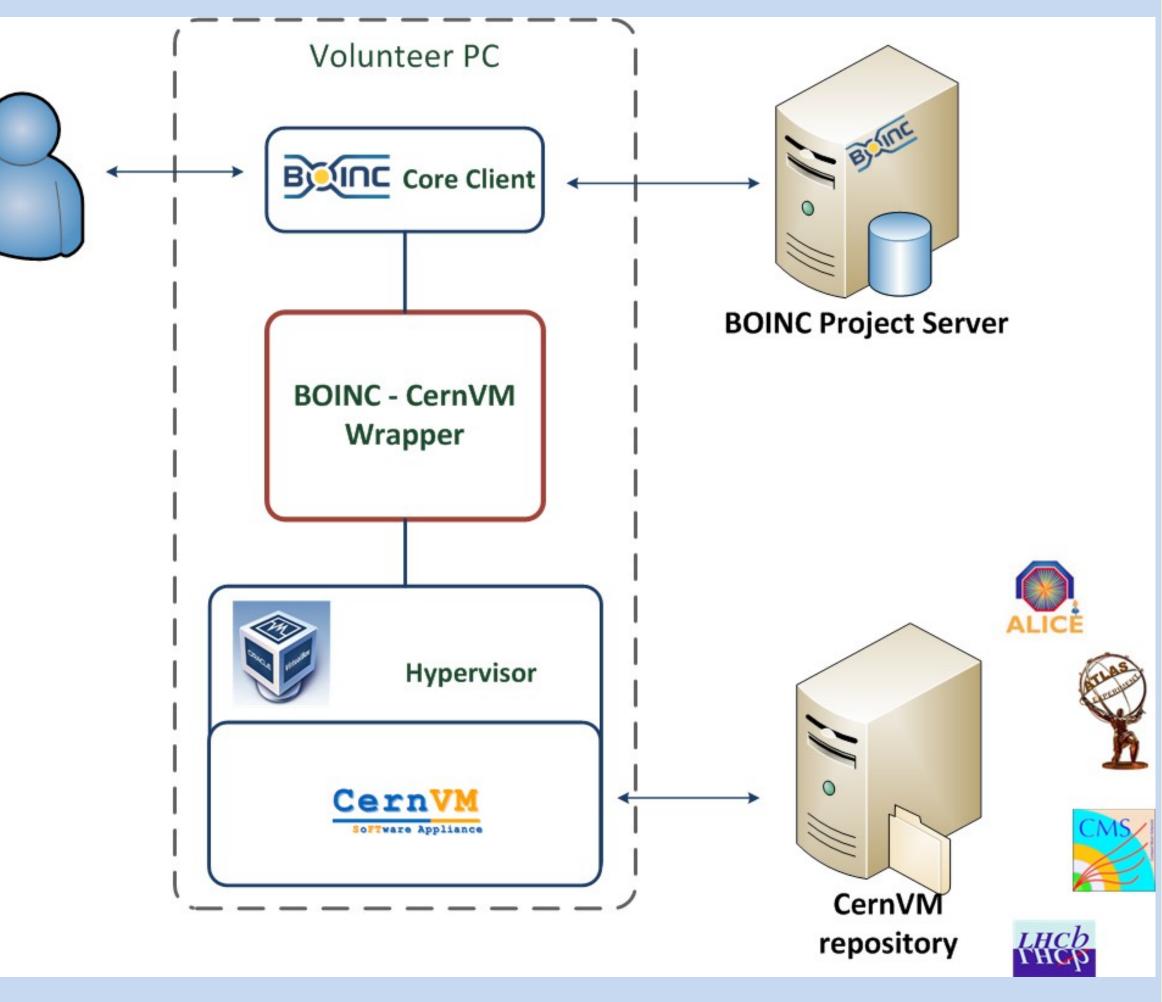
When the computations on the volunteer PC are finished, the resulting output files are uploaded to the BOINC server and the results reported.

The BOINC client downloads a BOINC – CernVM wrapper from the BOINC project server.

CernVM runs under the Hypervisor of the Volunteer PC, and downloads tasks from the project via the Co-Pilot job management framework.

This scheme is suitable for all kinds of simulation or analysis with small data sets pr. job.

Any physics software that can run under CernVM can benefit from volunteer computing power under BOINC.



See also Artem Harutyunyan's presentation on CernVM Co-Pilot and the talk on CernVmFS by Jakob Blumer.

The user gets BOINC Credit for his work.

Outlook for a BOINC service

Theory
 LHC Acc
 Atlas
 CMS

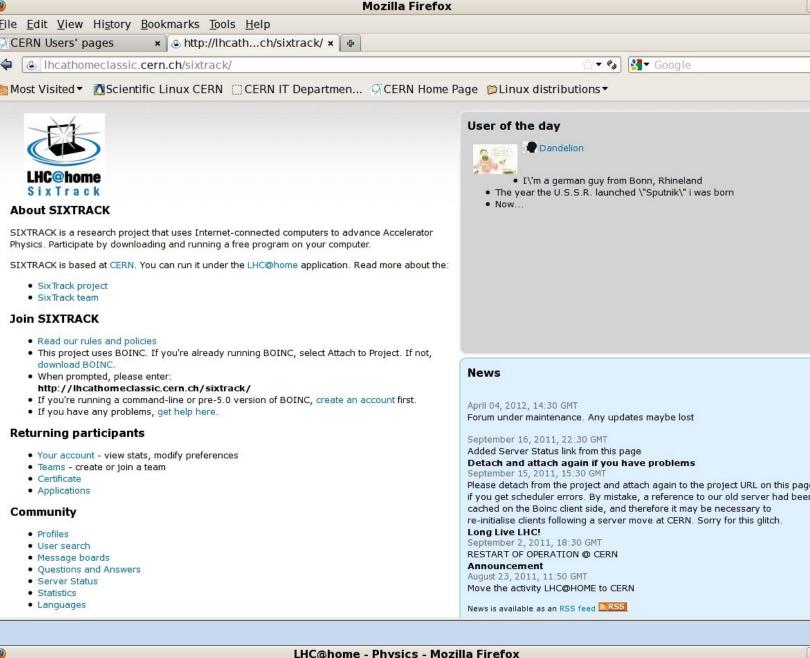
BOINC projects

At CERN, there are currently 2 BOINC projects, both within the LHC@home platform:

LHC@home 2.0

Sixtrack, is a classic BOINC project with executables for Linux and Windows.

The forums and outreach are handled by the Sixtrack team in BE Department and at EPFL.



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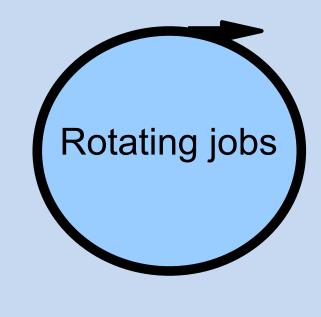
Shared front-end LHC@home portal

Distribution of different types of jobs to the volunteer cloud would all go via CernVM, no need for dedicated BOINC executables.

Jobs from different projects can be dispactched to volunteers via a rotating job scheme.

Depending of processing needs from the service customers, there would be

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Test4Theory, a VM based BOINC project running Monte Carlo event generators like ALPGEN, HERVIG++ and PYTHIA. All the programs are running under CernVM on hypervisors on the volunteer PCs.

The site contains an active outreach part and notably links to scientific work of the scientists involved in the project. (http://mcplots.cern.ch)

neory project gh Energy Physics nulations	Test4theory is fully opening up for new volunteers! Thu, 09/08/2011 - 09:11 — Daniel Lombraña	Search this site:
iy so important?	We have finally reached a point where the system seems to be very stable (thanks to all the volunteers that have collaborated!), so we are opening up Test4Theory again: the invitation code is no longer necessary for joining the project.	News
stalling VirtualBox stalling BOINC GNU/Linux Mac OS X	Please, remember that we may close the registration if we detect a problem due to a large influx of new volunteers. Thanks for your understanding!	 New bug fix release for the virtual machine P2P University challenge CernVM Wrapper 7.07 is out!!
Windows aching your computer	Welcome!	 The 2nd Citizen Cyberscience Summit: Feb 16 - 18, 2012
nd Support Q	Fri, 06/24/2011 - 11:09 — Daniel Lombraña LHC@home 2.0 is a volunteer computing platform for physicists working at the Large Hadron Collider - the world's largest particle accelerator - at CERN, the European Particle Physics Laboratory. This platform will host several sub-projects for different LHC physics groups.	 New wrapper bug fix released more
of Conduct	LHC@home 2.0 is an extension of the LHC@home platform, launched in 2004 to help physicists simulate protons beam	Planet BOINC
	dynamics in the LHC. At that time, doing full-fledged simulations of particle collisions was beyond the scope of volunteer computing. But the evolution of computer software and hardware, and in particular the use of virtual machine technology, has enabled a breakthrough LHC@home 2.0!	 World Community Grid: Computing for Sustainable Water project launch
	As a result you can now be part of a global effort to simulate data that physicists will use in their analysis of LHC data, by running simulations of particle collisions on your home computer. The first project to run on the LHC@home 2.0 platform - currently in test phase - is called Test4Theory .	 PrimeGrid: End-of-life for current iteration of Sophie Germain Prime Search PrimeGrid: Generalized
	Join us, and help scientists in their cutting edge research: it's important!	Fermat Mega Prime

jobs from the Theory group, LHC accelerator studies, or from Alice, Atlas, CMS, LHCb etc.

Summary



Use of Virtualisation Technology with Volunteer Computing overcomes the principal obstacle for using volunteer PCs as a computing resource in High Energy Physics. The current project-based approach to Volunteer Computing at CERN will gradually evolve towards a general service, where the Volunteer Cloud can be considered as a computing resource. The outreach aspect of Volunteer Computing has a lot of potential, and we should not neglect this communication channel.

Acknowledgements to our colleagues providing the underlying IT services and applications. And last, but not least, to the thousands of volunteers who are donating computing power.