

MCplots Computing Platform

Laurence Field

CERN IT

Volunteer Computing

- A type of distributed computing
- Origins in mid 1990s
- Computer owners donate computing capacity
 - To a cause or project
- Not necessarily only spare cycles on Desktops
 - Idle machines in data centers
 - Home clusters
- SETI@home and Folding@home
 - Launched 1999

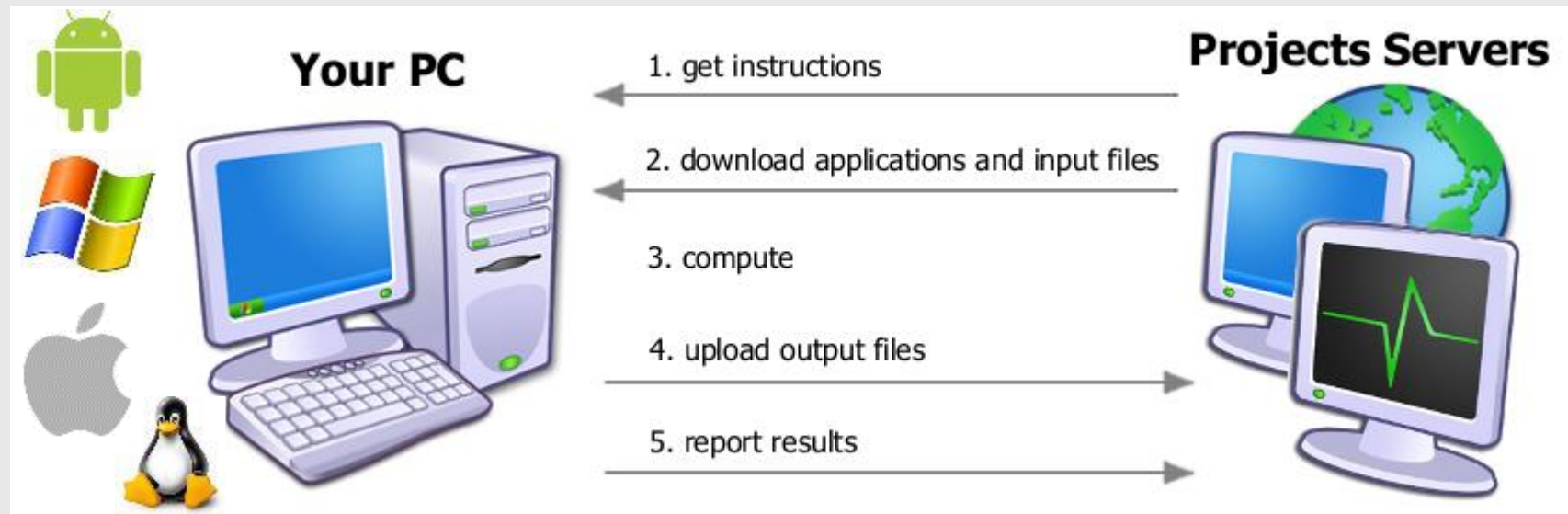
BOINC

- Berkeley Open Infrastructure for Network Computing
 - Started in 2002
 - Funded by the National Science Foundation (NSF)
 - Developed by a team based at the Space Sciences Laboratory
 - University of California, Berkeley
 - Led by David Anderson
- Provides the middleware for volunteer computing
 - Client (Mac, Windows, Linux, Android) with CLI
 - GUI
 - Application runtime system
 - Server software
 - Project Web site



Volunteer Perspective

- Download and run the BOINC client
- Choose a project
- Enter an email address and password
 - Or silent connection with a key
- Run the application and earn credit



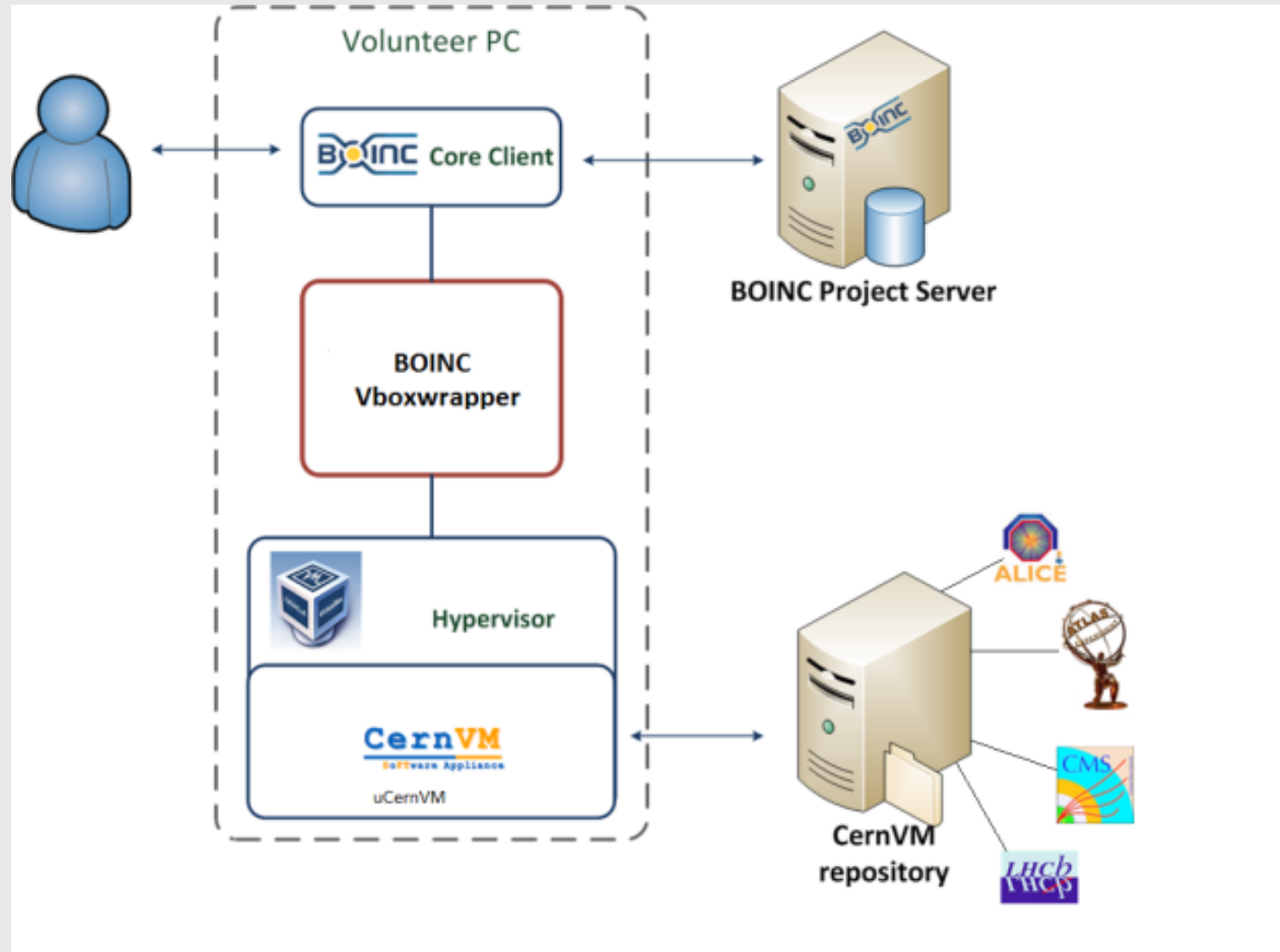
Motivation

- Free* resources
 - 100K hosts achievable for large projects
 - Actual job slot count (number of cores) is higher
 - Community engagement
 - Outreach channel
 - Explaining the purpose and value of the science
 - Participation
 - Offering people a chance to contribute
 - Engagement forms a strong bond
 - Community support
- * There are costs associated with their use

Challenges

- The cost of using the free resources
 - Initial integration requires investment
- Operations and Maintenance
 - Public facing support on all levels
 - Lowered by community supports
- Attracting and retention of volunteers
 - Advertisement and engagement
 - Communications cost for capacity building
- Low Level of Assurance
 - Anyone can register as a volunteer
 - Not the same level of trust as with Grid
- Running HEP software on Windows
 - 85% of the resources

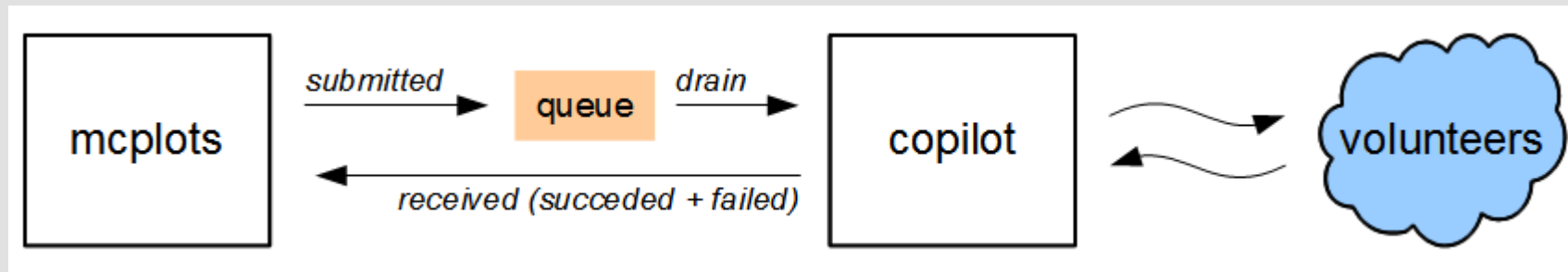
BOINC with Virtualization



MCplots

- Theoretical fitting of all past experimental data
 - Including from the LHC
 - Using Monte Carlo simulation based on Standard Model
 - Test4Theory provides the computing for MCPlots
- Test4Theory launched in 2011
 - In partnership with the Citizen Cyberscience Centre (CCC)
- Pioneered use of virtualization with BOINC
- Built using technology from CERN's PH-SFT Group
 - CernVM
 - CernVMFS
 - CoPilot
- Recently been revised along with the general strategy
 - Added 64bit images

CoPilot

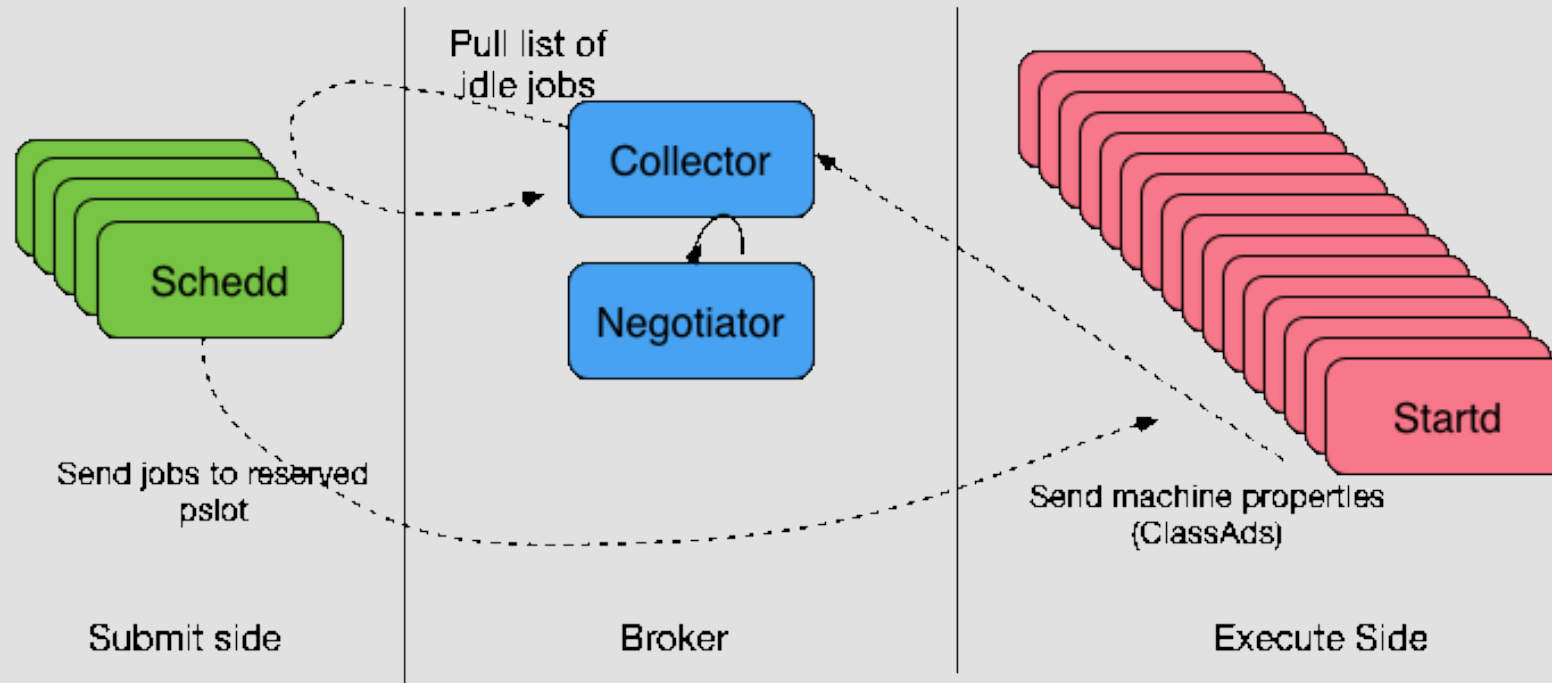


- Worked well
- Question of long-term support
 - Custom in-house solution
 - Unmaintained servers
 - Reduction in manpower

HTCondor

- Open Source batch system developed at the CHTC at the University of Wisconsin
- “High Throughput Computing”
- Long history in HEP and elsewhere (including previously at CERN)
- Used extensively in OSG, and things like the CMS global pool (160K++ cores)
- System of symmetric matching of job requests to resources using ClassAds of job requirements and machine resources
- CERN currently migrating from LSF to HTCondor


The HTCondor Model



Fifemon



CERN Accelerating science Sign in Directory




LHC@home

Volunteer computing for the LHC

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Antimatter
Exotic particles
Proton beam physics

Help CERN explore our Universe.

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Applications

 <p>ATLAS @HOME</p>	<p>ATLAS@home</p> <p>"Known" physics and "new" phenomena - want to create alternative models of the universe?</p>
	<p>Beauty</p> <p>"b" is for "Beauty" - the gorgeous little particle in antimatter physics.</p>
 <p>CMS</p>	<p>CMS@Home</p> <p>CMS is on the lookout for completely new, unpredicted phenomena.</p>
	<p>SixTrack</p> <p>Help CERN accelerator engineers to run intensive simulations to check the stability of the twin proton beams circulating in the LHC machine.</p>
	<p>Test4Theory</p> <p>Simulate high-energy particle collisions and help tune the theory to the experimental results.</p>

Project Server Unification

- Consolidating existing servers into one production service
- Single user id and password for all LHC@home applications
- Single forum for communication
- Single entity to advertise
- Combine existing resources in to a single pool

Summary

- Test4Theory going strong since 2011
 - Providing computing for MCplots
- Platform recently revised to provide long-term sustainability
 - 64bit image
 - Migrated from CoPilot to HTCondor
 - Web portal as a single entry point
 - Unified BOINC projects
- Questions:
 - Is MCplots still need?
 - What are the computing requirements?
 - Are there any other potential uses for this resource?