



CERN Projects

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With thanks to Tim Bell, Domenico Giordano, Helge Meinhard & Alberto Pace



Outline

- CPU
- Storage
- Cloud

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Now

Application	HPC	High Throughput Computing			
Scheduling	LSF or Interactive	LSF	HTCondor	BOINC	Experiment Pilot Factories
Resources	Dedicated Farms	VMs on CERN Private Cloud		BOINC Desktops	External VMs on Public Clouds

2018

Application	HPC	High Throughput Computing			
Scheduling	HTCondor				
Resources	Containers, Bare-Metal and VMs on CERN Private Cloud			BOINC Desktops	External VMs on Public Clouds

Resource Management

- Currently 90% compute virtualised
- Target a single accounting and resource management framework for all compute resources
 - Containers
 - Docker
 - Kubernetes
 - Mesos
 - ? Indigo Dataclouds, OpenShift, Rocket, CoreOS, Atomic, ...
 - Bare-Metal
 - Hardware allocation for services
 - Support micro-kernel containers
 - HPC

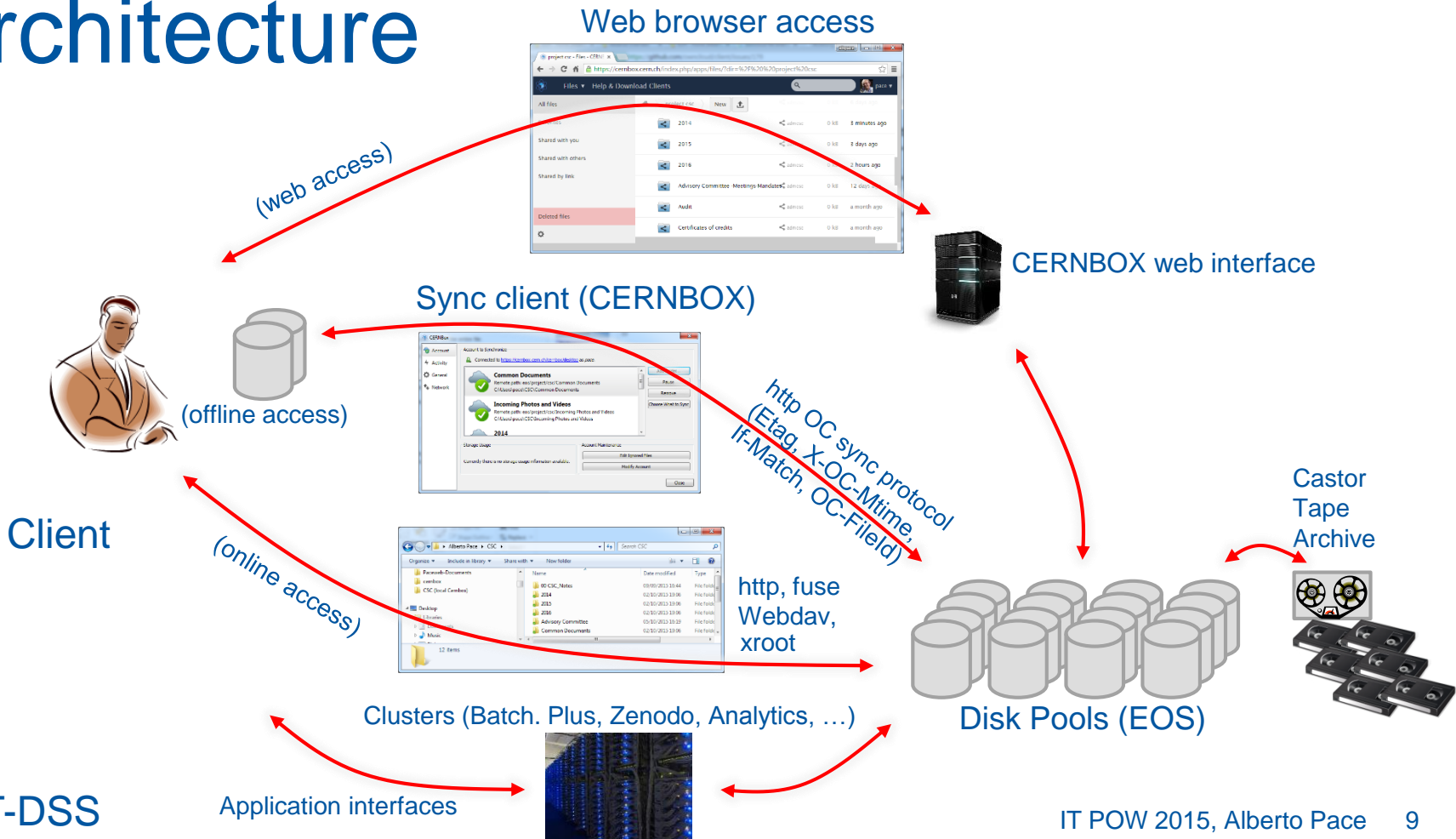
Target Steps and Schedules

What	Target
LSF to HTCondor	Production HTCondor Q4 2016 Stop LSF by Q4 2019
HPC Implementation	Theory Q3 2016 Beams Q2 2017
HTCondor to BOINC	Pilot Q4 2016
Container Service	Pilot Q2 2016 Production Q4 2016
Bare-metal Service	Pilot Q1 2017 Production Q3 2017
Public Cloud Resources	HNSciCloud Preparation Q1 2016 HNSciCloud Completion Q2 2018

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Architecture



A global storage service...

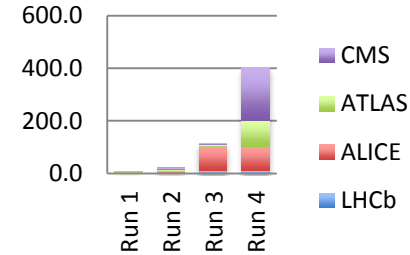
- Access to the **whole storage** repository
 - All Physics (and user) data at CERN
 - Access to WLCG / HTTP federated storage worldwide
- Mounted **online** file access
 - On Linux, Mac : Use FUSE or WebDAV
 - On Windows : Webdav (...)
- Synced **offline** file access
 - Supported on all platforms (Linux, Mac, Windows, IOS, Android)
- **Web browser** file access
 - Available anywhere there is internet connectivity: Easy sharing to unregistered identities, Read/Write sharing, Bulk download
- Programmatic, **high performance, custom** access
 - Xroot (and http) libraries for all relevant programming languages

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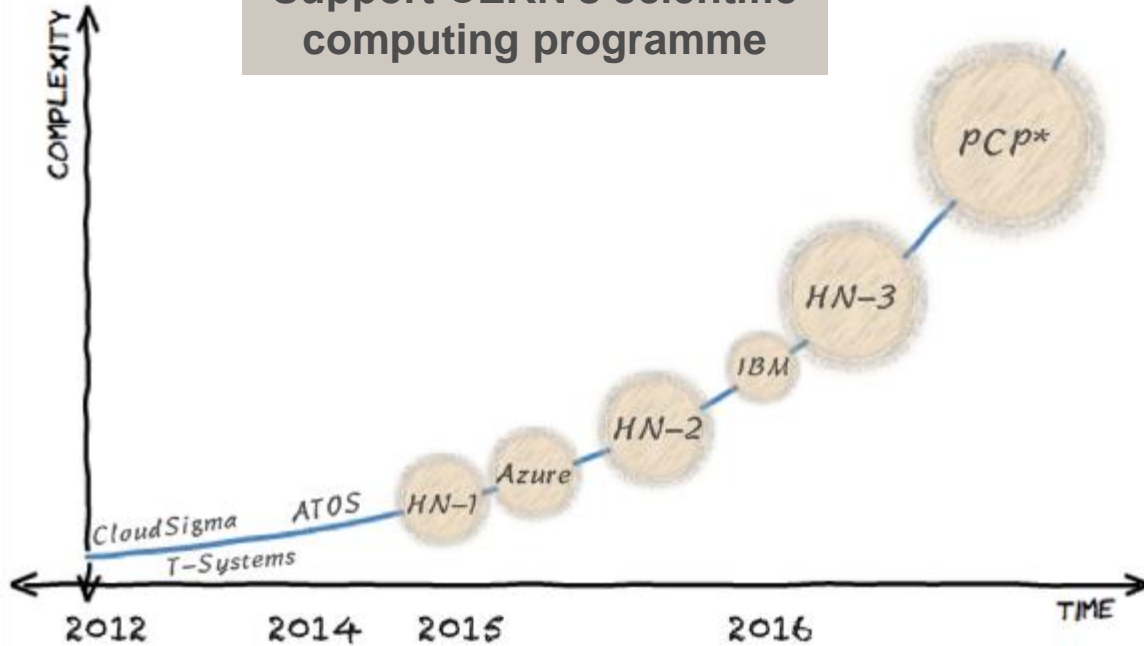
Evolution of CERN's Resources

- Wigner contract will expire in 2019
- Computing for LHC will require sharply increasing resources
- Options:
 - Extend / new CERN centre
 - New (multiple?) hosting contracts
 - Temporary structures
 - Commercial services
 - Far larger scale than CERN – economy of scale?
 - Little experience in the past



Past, ongoing & future commercial activities @ CERN

Support CERN's scientific computing programme



HN - Helix Nebula

- Partnership between research organization and European commercial cloud providers

* EC co-funded joint Pre-Commercial Procurement (PCP) project: <https://indico.cern.ch/event/319753>

** Other work has been conducted outside CERN, such as the [Amazon Pilot project at BNL for ATLAS](#)

