Workshop in numbers

Subheading, optional

• 41 Attendees
  • 31 from this side of the Atlantic
  • Travel is still hard, many institutes only sending one person
  • Mix of new faces and old friends

• 20 Organizations from 9 Countries

• 28 "Scheduled" Contributions by 16 Presenters

• Interesting wide range of talks, high quality presentations.

The organizing committee

Chris Brew, Christoph Beyer, Helge Meinhard, Todd Tannenbaum, Mary Hester, Catalin Condurache, Antonio Puertas-Gallardo, Gabriele Fronzé, Greg Thain, Josep Flix, Michel Jouvin, Matthew West

Local Organizer: Michel Jouvin
The Location

IJCLAB Orsay/France
The Group Picture :)  
We picked the only rainy day for the pic
Interactive parts of the Program

“show us your toolbox” & “Lightning talks”

- Show us your toolbox by now a fixed program point & highlight
  - Filled 1,5h easily without a single ‘prepared teaser’ by one of the usual suspects
  - Had even to turn down 2 more candidates
  - Good mix of entries reflecting tools and ideas of a lively community
  - Monitoring and energy saving amongst the contribution
  - Could be splitted into several more specific sessions e.g. “show us your monitoring”, “show us your accounting” and a “general” one

- Lightning talks
  - Meant as a chance for a short introduction of what people are using HTC for
  - Like a micro-site report with one slide
  - Worked out well but was more like an additional toolbox session
  - Still a good idea for the first day in order to fuel coffee break talks (not that those would need any fuel actually ;)
  - Need to make purpose more clear

- Both interactive parts very lively with plenty of ideas and tools shown, well received by the audience!
Tuesday morning

Data & Security

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Welcome</td>
<td>Christoph Beyer</td>
</tr>
<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>09:00 - 09:05</td>
</tr>
<tr>
<td>09:15</td>
<td>Welcome and housekeeping</td>
<td>Michel Jouvin</td>
</tr>
<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>09:15 - 09:30</td>
</tr>
<tr>
<td>09:45</td>
<td>I3CLab in a nutshell</td>
<td>Valérie CHAMBERT et al.</td>
</tr>
<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>09:15 - 09:30</td>
</tr>
<tr>
<td>10:15</td>
<td>HTCSS Vocabulary, Architecture, and User View</td>
<td>Todd Tannenbaum</td>
</tr>
<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>09:30 - 10:20</td>
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<tr>
<td>10:30</td>
<td>Coffee</td>
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<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>10:30 - 11:00</td>
</tr>
<tr>
<td>11:00</td>
<td>Data and Security intro</td>
<td>Mirjam LIVNY</td>
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<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>11:00 - 11:10</td>
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<tr>
<td>11:10</td>
<td>Pelican: Data Federations and HTCSS</td>
<td>Brian Paul Blockelman</td>
</tr>
<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>11:10 - 11:30</td>
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<tr>
<td>11:30</td>
<td>IGWN Data Story</td>
<td>Peter Couvares et al</td>
</tr>
<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td></td>
</tr>
<tr>
<td>12:00</td>
<td>Token Taxonomy</td>
<td>Brian Paul Blockelman</td>
</tr>
<tr>
<td></td>
<td>Auditorium Joliot Curie, UC Lab</td>
<td>12:10 - 12:30</td>
</tr>
</tbody>
</table>
Tuesday morning

HTCSS Vocabulary, Architecture, and User View

- Audience very admin focused for quite a while now
- Vocabulary talk replaces ‘end-user-talk’
- Provides overview and introduction of architecture

**HTC** = **High Throughput Computing**

**HTCSS** = **HTCondor Software Suite**

https://indico.cern.ch/event/1274213/contributions/5571128/attachments/2716862/4719087/intro_and_architecture.pdf
Tuesday morning

HTCSS Vocabulary, Architecture, and User View

- **SCHEDULER** -> AccessPoint -> AP
- **Condor-CE** -> Compute Entrypoint -> CE
- **STARTD** -> Execute Point -> EP
- **Condor Master** -> Central Manager -> CM

What is the HTCSS, what does it do?

- HTCSS provides a distributed high-throughput batch computing environment
- Manages workflows / sets of jobs for researchers
- Federates and supervises computing capacity
- Matches the capacity to workflows
- Distributed, highly available

HTCondor Suite Components:
- Access Point (AP)
- Directed Acyclic Graph Manager (DAGMan)
- Execution Point (EP)
- Central Manager (CM)
- Compute Entrypoint (CE)

9/19/2023
Tuesday morning

Pelican: Advancing the Open Science Data Federation Platform

Dataset Sharing Powers Open Science

- Datasets are the lifeblood of science. Without them, the cleverest software or algorithms are essentially useless.
- To *utilize* these datasets, they need to be effectively connected to a broad set of computing types and capacity.
- Engineering this access is an immensely difficult problem:
  - Challenges in both software & infrastructure scale.
  - Inherently distributed problem: the archive and the computing may be separate resources.

The **Open Science Data Federation (OSDF)** federates dataset repositories with a reach of all of open science.

Tuesday morning
Pelican: Advancing the Open Science Data Federation Platform

OSDF by the numbers

Over the last 12 months, the OSDF transferred

64\text{PB} \&
62 \text{files/s}

Data used by

15 \text{science collaborations} \&
\sim 120 \text{OSPool users}
Tuesday morning

Pelican: Advancing the Open Science Data Federation Platform

Introducing: the Pelican Platform

The Pelican Platform is a project recently funded by the NSF to help advance the OSDF. Scale: $7M over 4 years starting 1 September.

Three main goals:

1. Strengthen and Advance the OSDF
2. Expand the types of computing where OSDF is impactful.
3. Expand the science user communities.
   - Particularly, Pelican is funded as part of the “National Discovery Cloud for Climate” (NDC-C) so there will be an early focus on climate datasets.
Tuesday afternoon

Subheading, optional

<table>
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<tr>
<td>14:00</td>
<td>(Sci)Tokens authentication in HTCondor-CE (incl new features)</td>
<td>James Fray</td>
<td>Auditorium Joliot Curie, ILCLab</td>
</tr>
<tr>
<td>15:00</td>
<td>Getting Your Data with HTCondor</td>
<td>Brian Paul Bockelman</td>
<td>Auditorium Joliot Curie, ILCLab</td>
</tr>
<tr>
<td>15:00</td>
<td>Data and Security Wrap Up</td>
<td>Miron Livny</td>
<td>Auditorium Joliot Curie, ILCLab</td>
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<td>15:30</td>
<td>Coffee</td>
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<td>Auditorium Joliot Curie, ILCLab</td>
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<tr>
<td>16:00</td>
<td>Lightning Talks</td>
<td></td>
<td>Auditorium Joliot Curie, ILCLab</td>
</tr>
</tbody>
</table>

DESY. | HTCondor european workshop 2023 | Beyer C., Hartmann T., Meinhardt H. | 11-10-2023 |
Tuesday afternoon

(Sci)Tokens authentication in HTCondor-CE (incl new features)

Why Move to Tokens?

› HTC has used X.509 credentials for user authentication
  • Proposed by grid community with extensions
› Tokens are more widely supported
  • Proxies never embraced by industry
› Tokens allow a better security model
  • Authorization via capability instead of identity

https://indico.cern.ch/event/1274213/contributions/5571156/attachments/2716926/4719205/SciTokensOnTheCE.pdf
Tuesday afternoon

(Sci)Tokens authentication in HTCondor-CE (incl new features)

• SciTokens & WLCG tokens accepted for job control

• Token discovery First location with a valid token is used

• Token can be in file or env ( $BEARER_TOKEN_FILE & use_scitokens = true)

• Token claims in the job ad unalterable by the user

• Authorizing through mapfile & plugin if needed

• EGI CheckIn tokens supported out-of-the-box (plugin available)

• Simple testing scenario for SciTokens in the talk

• Quitting GSI & X.509 proxy support
  • X.509 proxy for user jobs supported in all versions
### Wednesday morning

#### Jobs & Access Points

<table>
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<tr>
<td>09:00</td>
<td>Jobs and Access Points Introduction</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>MIRON LIVNY</td>
</tr>
<tr>
<td>09:30</td>
<td>Talk of all the Tools</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>Gregory Thain</td>
</tr>
<tr>
<td>10:00</td>
<td>Visit of ThomX and SUPRATECH facilities</td>
<td>Auditorium Joliot Curie, IJCLab</td>
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<tr>
<td>10:30</td>
<td>Coffee</td>
<td>Auditorium Joliot Curie, IJCLab</td>
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</tr>
<tr>
<td>11:00</td>
<td>Linux tuning for large scale APs</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>Gregory Thain</td>
</tr>
<tr>
<td>11:30</td>
<td>What Are My Jobs Doing?</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>James Frey</td>
</tr>
<tr>
<td>12:00</td>
<td>Whirlwind Tour: Job Placement Options</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>Gregory Thain</td>
</tr>
</tbody>
</table>
Wednesday morning
Whirlwind tour of HTCondor tools

- Excellent entry point for administrators and power-users alike

Every* HTCondor tool in 40 minutes

Greg Thain
Center for High Throughput Computing
University of Wisconsin - Madison

https://indico.cern.ch/event/1274213/contributions/5573363/attachments/2715115/4721039/whirlwind-tour.pdf
Wednesday morning

What Are My Jobs Doing?

- Any user would benefit of Christina’s talk about how to gather informations about what the job actually does or did!
- Including a live demo analyzing running and finished jobs

What Are My Jobs Doing?

HTCondor Week 2022
Christina Koch

### Wednesday afternoon

#### User talks

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>14:00</td>
<td>HTCondor Services for Non-Humans</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>James Frey</td>
<td>14:00 - 14:20</td>
</tr>
<tr>
<td>14:25</td>
<td>Jobs and Access Points Wrap Up</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>Miron Livny</td>
<td>14:25 - 14:45</td>
</tr>
<tr>
<td>14:50</td>
<td>News from the DESY Clusters</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>Thomas Hartmann</td>
<td>14:50 - 15:10</td>
</tr>
<tr>
<td>15:15</td>
<td>Deployment of HTCondor at GRIF</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>Dr. Emmanuel Voltarekopoulos</td>
<td>15:15 - 15:40</td>
</tr>
<tr>
<td>15:40</td>
<td>Coffee</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td></td>
<td>15:40 - 16:10</td>
</tr>
<tr>
<td>16:10</td>
<td>CERN Update</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>Ben Jones</td>
<td>16:10 - 16:35</td>
</tr>
<tr>
<td>16:40</td>
<td>Office Hours</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td></td>
<td>16:40 - 17:30</td>
</tr>
</tbody>
</table>
Wednesday afternoon

User talks / Site reports

• 3 interesting site report style talks (DESY, GRIF, CERN)
• Changes in the LINUX ecosystem are an issue for everyone
• DESY
  • analysing job-events in KAFKA
  • scale-out of Jupyter notebooks with DASK
  • Adapting to energy challenges by load shedding
• GRIF
  • early adaptor of HTC (2014)
  • currently upgrading to HTC 10.X with pure token auth
  • ARC CE still in use at IRFU/CEA
  • HTC-CE in the distributed common pool

https://indico.cern.ch/event/1274213/contributions/5570407/attachments/2717928/4721764/DESYHH.pdf
https://indico.cern.ch/event/1274213/contributions/5573382/attachments/2718282/4722008/htcondor@GRIF_2023-3.pdf
https://indico.cern.ch/event/1274213/contributions/5570468/attachments/2718124/4722076/condoreu23lxbatch.pdf
Wednesday afternoon

CERN

- CERN
  - Energy savings over christmas
  - Collector and Negotiator got ‘happier’ over time despite growth of cores and jobs
  - Scaling easy due to HTC devs, CMS pool leading the way and “IRONIC” bare metal instead of VMs
  - Linux: skipping .*8 using .*9
  - long tail of ”local” user submitted jobs is 80% of the effort
  - possible transition scenario between interactive to batch use case:
    - Login to SWAN, use notebook on small dataset, when happy and ready to submit to batch…?
Wednesday afternoon
User talks CERN

Conditional containerisation of user jobs

JobImages:
* e17 /cvmfs/unpacked.cern.ch/gitlab-registry.cern.ch/batch-team/containers/plusbatch/e17-full:latest
* e18 /cvmfs/unpacked.cern.ch/gitlab-registry.cern.ch/batch-team/containers/plusbatch/e18-full:latest
* e19 /cvmfs/unpacked.cern.ch/gitlab-registry.cern.ch/batch-team/containers/plusbatch/e19-full:latest

JobOS:
* e17 CentOS7
* e18 CentOS8
* e19 AlmaLinux9
### Thursday morning

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<td>09:00</td>
<td>What's New, What's Coming Up</td>
<td>Todd Tannenbaum</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>09:00 - 09:40</td>
</tr>
<tr>
<td>10:00</td>
<td>Energy Savings: Roosters and Condors, oh my!</td>
<td>Todd Tannenbaum</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>09:45 - 10:00</td>
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<td>Visit of ThomX and SUPRATECH facilities</td>
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<td></td>
<td><strong>Coffee</strong></td>
<td></td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>10:35 - 11:00</td>
</tr>
<tr>
<td>11:00</td>
<td>Reaching new scales in the CMS Global pool</td>
<td>Marco Masseroni</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>11:25 - 11:45</td>
</tr>
<tr>
<td>12:00</td>
<td>The Virgo Data Quality Reports: an HTCondor automated framework to vet gravitational-wave candidates</td>
<td>Dr. Nicolas Arnaud</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>12:10 - 12:30</td>
</tr>
<tr>
<td></td>
<td>Energy savings by power modulation of a HTC pool</td>
<td>Christoph Beyer</td>
<td>Auditorium Joliot Curie, IJCLab</td>
<td>12:10 - 12:30</td>
</tr>
</tbody>
</table>
Thursday morning
What’s new - what’s coming up?

- "stable series" -> LTS release
  - bug fixes, 10.0.0, 10.0.1, ...

- "developer series" -> Feature Releases
  - bug fixes & new features, 10.1.0, 10.2.0, ...

- new command line user interface
  - "htcondor <noun> <verb>" e.g. "htcondor job submit"
  - Legacy tools (condor_q etc.) not going anywhere

Thursday morning
What’s new - what’s coming up?

New Job Status

$ htcondor job status 123.45

Job 123.45 is currently running on host exec221.chtc.wisc.edu.
It started running again 2.1 hours ago.
It was submitted 3.6 hours ago.
Its current memory usage is 2.5 GB out of 4.0 GB requested.
Its current disk usage is 3.8 GB out of 5.5 GB requested.
It has restarted 2 times.
Goodput is 80% (0.5 hours badput, 2.1 hours goodput).
Thursday morning
What’s new - what’s coming up?

• Event Log holds more infos e.g. about glidein site
  • “htcondor eventlog read my_log_file”

• Can make "+CustomAttributes" first class with knobs
  • +SiteJobType = "analysis" -> SiteJobType = "analysis"

• Enterprise Linux 9 😊😊😊
  • Required work to support cgroups v2 and OpenSSL 3 Processors:
    • Intel/AMD ("x86_64")
    • ARM (“aarch64”)
Thursday morning

Two talks about power-management

- Condor-rooster daemon meant for hibernating EPs can be used to shut off EPs
  - When/how to shut off easy to implement in Hibernate policies

- DESY is preparing to modulate the power consumption following a given profile off cheap/sustainable energy

- Split pool in high efficient EPS that fulfill pledges and opportunistic low efficiency part

- Currently load shedding empty EPs using condor-rooster

https://indico.cern.ch/event/1274213/contributions/5570403/attachments/2718752/4722916/power_modulation_condor_pool.pdf
Thursday afternoon

14:00
Multi-tenancy HTCondor for the European Weather Cloud
Francesco Muradian
Auditorium Joliot Curie, ICLab
13:45 - 14:05

14:10
Just-in-time matching of workflows for the DUNE experiment
Andrew McWhab
Auditorium Joliot Curie, ICLab
14:10 - 14:30

14:35
The journey to modern storage.
David Handelman
Auditorium Joliot Curie, ICLab
14:35 - 14:55

15:00
Thoughts on EDIA in dHTC Cyber-Infrastructure
Matthew West
Auditorium Joliot Curie, ICLab
15:00 - 15:10

15:10
Discussion on EDIA
Auditorium Joliot Curie, ICLab
15:10 - 15:30

15:30
Coffee
Auditorium Joliot Curie, ICLab
15:30 - 16:00

16:00
Show your Toolbox

16:00 - 17:30
 Thursday afternoon

user talks

• European Weather Cloud: Batch Processing (EWC)

• Aims to be the cloud-based collaboration platform for meteorological application development and operations in Europe and enables the digital transformation of the European Meteorological Infrastructure (EMI)

• Challenging use cases, large datasets, millions of relatively small jobs

• HTCondor already used internally at EUMETSAT for full mission dataset reprocessing activities (Climate Team)

• Physically separated tenancies will be joined through an overall HTC pool (currently beta)

Thursday afternoon

user talks

---

Batch Processing on EWC: multitenancy

**Advantages:**
- Use Idle machines
- Small tenancies can benefit from external large amount of resources
- User can submit job from their tenancy with their submit node
- Easy to deploy/maintainSCALE in each tenancy
- Retain individual privacy
Thursday afternoon

user talks

• Just-in-time workflow matching for DUNE

What will DUNE be?

• Build huge tanks of liquid argon in a gold mine in South Dakota.
• Send neutrinos from Fermilab to South Dakota.
• Detect what neutrino flavours arrive in the liquid argon.
• Look out for supernova neutrinos and proton decays at the same time.

Thursday afternoon

user talks

• Due to DUNE’s scale and specific requirements, in 2022 Fermilab set up a dedicated HTCondor Global Pool for DUNE to allow DUNE-specific configurations.
  • This uses HTCondor schedds at Fermilab and offsite: BNL and RAL-PPD so far; CC-IN2P3 and CERN are planned.

• To satisfy these Rucio/MetaCat/LArSoft/GlideInWMS constraints they designed a just-in-time workflow management system: justIN

• Central idea: once we get a job slot at a site, they choose and run a workflow that needs “nearby” unprocessed files, and we feed it the details (URLs, Rucio DIDs, …) of nearby unprocessed files to work on.
## Friday

**Subheading, optional**

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<td>09:00 - 09:05</td>
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<td><strong>Collector Overviews</strong></td>
<td>James Frey</td>
<td>09:05 - 09:35</td>
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<tr>
<td>10:00</td>
<td><strong>Microarchitecture</strong></td>
<td>Gregory Train</td>
<td>09:40 - 10:10</td>
</tr>
<tr>
<td>10:15</td>
<td><strong>What are gfdelms using my cluster for? Monitoring via the CE</strong></td>
<td>Todd Tannenbaum</td>
<td>10:15 - 10:30</td>
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<td><strong>Coffee</strong></td>
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<td>11:00</td>
<td><strong>Advanced debugging with eBPF and Linux perf tools</strong></td>
<td>Gregory Train</td>
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</table>
Debugging Condor (and much more)

Introduction to perf, eBPF, ... by Greg

- **perf**: powerful debugging tool
  - attach to kernel performance counters
  - get debugging info directly from the kernel

- **eBPF**: trace the kernel yourself
  - build your own
    - monitoring, diagnostics, telemetry,...
    - performance, security,... analyses
  - replace your own kernel modules

- **intro to bpftrace**
  - awk like syntax

- Check out Greg’s user stories for inspiration

https://indico.cern.ch/event/1274213/contributions/5571148/
Getting ready for all Tokens

Debug and Test Token Access

- talks by Jamie and Brian on tokens in Condor

- debug (and impersonate) tokens
  - `condor_test_token`
  - `clone` (as admin) a token to trace the job flow

- enable X509 DN for direct submissions (no Globus)
  - how to submit w/o tokens for dedicated users/certs

https://indico.cern.ch/event/1274213/contributions/5571156/

https://indico.cern.ch/event/1274213/contributions/5571155/
After the Workshop is before the Workshop

Tentative planning for 2024

• Feedback by attendees very good, workshop is considered useful

• Strong commitment by the HTC developers

• About 50% regular participants and 50% new faces

• Very lively community profiting from the rather small scale workshop by interacting a lot

• NIKHEF Amsterdam volunteered to host the next meeting

• Tentative next date: calendar week 39 (23-09-2024 to 27-09-2024)
Thank you