

HPC development on Mahti for LUMI

Tomas Lindén¹, Gianfranco Sciacca², Ievgen Sliusar³

HIP¹, UniBE², UiO³



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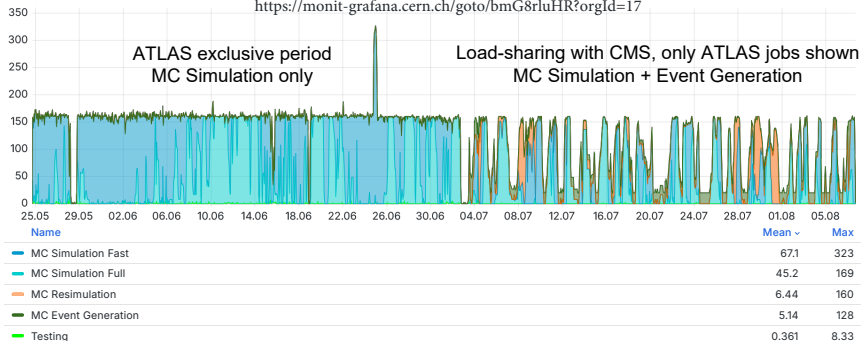


Mahti HPC ATLAS & CMS integration status



- We have moved from LUMI to Puhti to Mahti
- Puhti and Mahti have nodes with local disk, which is lacking on LUMI
- Mahti has more nodes with local disks than Puhti
- We have a 1 MBU development CSC allocation that we use
- The ARC CE **snowarc.hip.fi** used for Puhti is now used for Mahti
- Single queue ATLAS/CMS load-sharing is done with per subject ARC-CE limits
- ATLAS and CMS accounting data is reported to NDGF from snowarc
- ATLAS jobs
 - ATLAS HammerCloud and Monte Carlo jobs run on Mahti
- CMS Jobs
 - A CMS HammerCloud workflow run fine on Mahti
 - CMS Site Availability Monitoring (SAM) jobs are green
 - A CMS ITB pilot test workflow run fine
 - CMS MC production pilots start on the worker nodes, but fail to run
- A poster on this work will be presented at ACAT 2025 in Hamburg

Slots of Running jobs by ATLAS activity
<https://monit-grafana.cern.ch/goto/bmG8rluHR?orgId=17>





Mahti HPC ATLAS & CMS integration status



snowarc.hip.fi		https://etf-04.cern.ch/etf/			
State	Service	Icons	Summary	Age	Checked
WARN	org.cms.WN-01basic-/cms-ce-token	≡	c1108.mahti.csc.fi: WARNING: No IPv6 access	2025-08-14 11:01:05	13 m
OK	org.cms.WN-02cvmsf-/cms-ce-token	≡	c1108.mahti.csc.fi: OK: CVMFS check ok	2025-08-14 11:01:05	13 m
OK	org.cms.WN-03siteconf-/cms-ce-token	≡	c1108.mahti.csc.fi: OK: SITECONF check ok	2025-08-14 11:01:05	13 m
OK	org.cms.WN-05apptainer-/cms-ce-token	≡	c1108.mahti.csc.fi: OK: Apptainer check ok	2025-08-14 11:01:05	13 m
OK	org.cms.WN-21squid-/cms-ce-token	≡	c1108.mahti.csc.fi: all OS runs successful	2025-08-14 11:01:05	13 m
OK	org.cms.WN-22frontier-/cms-ce-token	≡	c1108.mahti.csc.fi: all OS runs successful	2025-08-14 11:01:05	13 m
OK	org.cms.WN-25dataaccess-/cms-ce-token	≡	c1108.mahti.csc.fi: all OS runs successful	13 m	13 m
WARN	org.cms.WN-99summary-/cms-ce-token	≡	c1108.mahti.csc.fi: WARNING: wn_basic probe with warning	73 m	13 m
OK	org.cms.WN-analysis-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	193 s	193 s
OK	org.cms.WN-basic-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	2025-08-18 12:50:46	193 s
OK	org.cms.WN-cvmfs-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK, cvmfs vers 2.12.4 (probe 1.3-pre2)	2025-08-23 05:56:57	193 s
OK	org.cms.WN-env-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	2025-08-14 11:12:35	193 s
OK	org.cms.WN-frontier-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	2025-08-14 11:12:35	193 s
OK	org.cms.WN-isolation-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	2025-08-14 11:12:35	193 s
OK	org.cms.WN-mc-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	2025-08-14 11:12:35	193 s
OK	org.cms.WN-psst-test-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK: alien cache	2025-08-14 11:12:35	193 s
OK	org.cms.WN-squid-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	2025-08-14 11:12:35	193 s
OK	org.cms.WN-xrootd-access-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	2025-08-14 11:12:35	193 s
OK	org.cms.WN-xrootd-fallback-/cms/Role=lcgadmin	≡	c1108.mahti.csc.fi: OK	93 m	193 s
OK	org.sam.ARC-JobState-/cms/Role=lcgadmin	≡	OK - Job successfully completed (status:Finished, id:https://snowarc.hip.fi:443/arcx/rest/1.0/jobs/ac52366c0417)	2025-08-14 10:57:29	199 s
OK	org.sam.CONDOR-JobState-/cms-ce-token	≡	OK - Job successfully completed (status:COMPLETED, id:533148)	2025-08-14 10:45:36	13 m
OK	org.sam.CONDOR-JobSubmit-/cms-ce-token	≡	OK - Job successfully completed	2025-08-23 03:16:51	13 m
OK	org.sam.CONDOR-JobSubmit-/cms/Role=lcgadmin	≡	OK - Job successfully completed	2025-08-14 11:12:35	193 s

Figure: CMS ETF/SAM snowarc tests run 26.08.2025 on Mahti.



Possible next steps

- We could test more with other workflows
- We could go back to use LUMI
- Jobs run with fapptainer use more memory, but we have not measured how much more
- It would be interesting to know to how many jobs the current system can scale to by running with a larger allocation

Running with an external ARC CE using SSH for two VOs is only for development



CSC HPC CPU summary table

		CPU	nodes	disk	disk	disk nodes
		cores		cores	nodes	RAM/core (GB)
LUMI	→2027	262 244	2 048	-	-	2–8
Puhti	→2026	27 280	682	3760	94	4.8–37.5
Mahti	→2026	179 712	1404	7168	56	1.875
Roihu	2026→	186 624	486	186 624	486	2

According to Sebastian CVMFS will not be installed on LUMI for EESSI.



LUMI AI Factory

- Will replace LUMI in 2027
- combined HPC + AI + QC platform
 - AI-optimised supercomputer LUMI-AI
 - AI Factory service center
 - Experimental QC-AI platform LUMI-IQ
- CSC (Finland) with Czechia, Denmark, Estonia, Norway and Poland
- Total budget over **600 MEUR**

Hopefully the LUMI AI Factory HPC partition will support HEP workloads?
Hopefully the LUMI AI Factory HPC partition will have node local storage?



Summary



- ATLAS MC-jobs can run on Mahti
- CMS SAM jobs are green on Mahti
- CMS MC-jobs needs some more debugging
- Other workflows could be tested more
- We could go back to use LUMI
- A poster on this work will be presented at ACAT 2025 in Hamburg