TIDC 2023 Annual Meeting on Nov/25th, 2023

COMPUTING REPORT

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OVERVIEW

➤ **Computing is an essential service for HEP** — no matter what kind of experiments or detectors, we always need sufficient computing power to process, to store, and to analyze data!

– Resources and knowledge required for modern system operations are non-trivial — need to consider space/power/cooling/knowhow/*people*.

– Optimal is to have a centralized system instead of clusters running individually, not to add lots of management loads to each group.

➤ Thanks to the supports from ASGC, now **a new Tier-3 cluster under the name of TIDC** has been initiated, mainly for user analyses.

– Seeding cost allocated under TIDC project.

– Computing equipments injected from individual grants (George's summit, grants from Ming & myself, etc).

Many thanks for all the supports!

➤ ATLAS grid running by ASGC & CMS Tier-2 running at NCHC are considered as separated projects so far.

COMPUTING SUPPORTS @ ASGC

➤ Currently ASGC is operating the **NSTCCore** services to support general HPC users & applications:

- CPU: 2976 cores (*to be increased in the next years*),
  GPU: V100×32+A100×8.

- Working space: Ceph filesystem (3 Tb / group).

- Batch jobs: Slurm management system, with the entry UI:
  slurm-ui.twgrid.org.

- Interactive jobs with web-based UI via dicos.grid.sinica.edu.tw

It is possible to start a Jupyter notebook with GPU supports.

COMPUTING SUPPORTS @ ASGC (II)

➤ ASGC is welcoming new users — in order to use the resources, **group PI has to create a group account first** and then ask the users to register;

– PI has the privilege to monitor the user activities (*and will receive the cost bill monthly.*)

➤ Group/user accounts creation:
https://canew.twgrid.org/ApplyAccount/groupcreate.php
https://canew.twgrid.org/ApplyAccount/ApplyAccount.php

➤ TIDC cluster is managed under the same dicos system — if you would like to use TIDC CPU/storage, you have to apply the same accounts too.

– At this moment people affiliated to NTU and NCU should fill Kai-Feng Chen and Chia-Ming Kuo as PI.

TIDC CLUSTER OVERVIEW

➤ TIDC machines are configured as separated **Condor clusters** for grid/local usage:

– CPU: 768 cores (*AMD EPYC 7713*) + 768 cores (*Intel CPU E5- 2650 v4*)

– EOS storage: 650 Tb (60% reserved for grid) + 400 Tb

– Shared user/group working space (the same as NSTCCore services mentioned earlier).

– UI: tidc-ui01.grid.sinica.edu.tw, accessible via SSH.

– CE: tidc-arc6-1.grid.sinica.edu.tw, accessible with grid certificate.

Local condor jobs (up to 50%) → tidc-ui01 sched

Grid jobs (up to 50%) → tidc-arc6-1 sched

tidc-arc6-1 Collector Negotiator

Worker node

TIDC CLUSTER OVERVIEW (II)

➤ Software access:

  – CVMFS is available — so basically all the CERN related libraries/tools should be accessible directly.

  – We have only tested CMS software (CMSSW) and analysis frameworks (RDataFrame/Coffea) so far, but the general analysis flow should be similar for other HEP projects too.
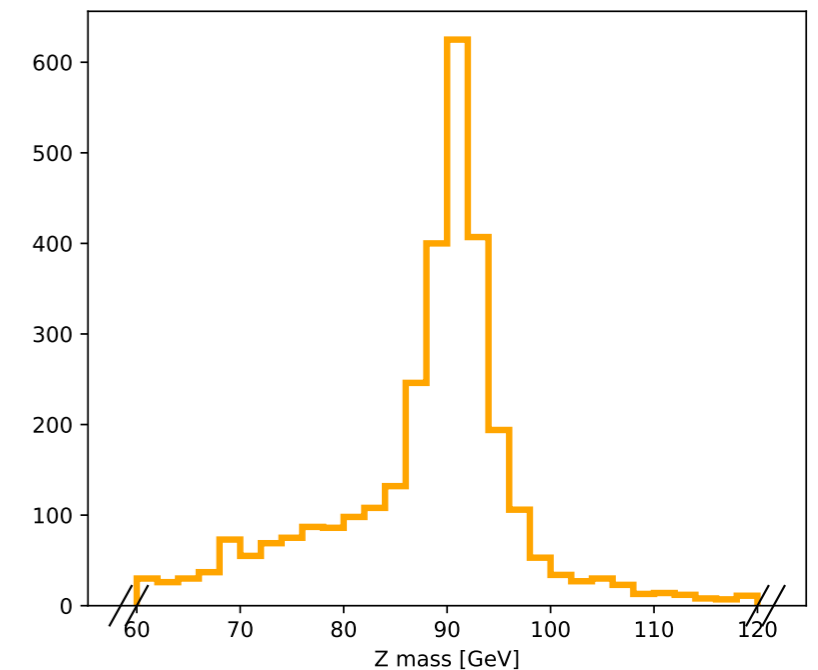
➤ Storage access:

  – Grid EOS storage is accessible by xrootd: `root://tidc-smstor1.grid.sinica.edu.tw/eos/`

    ➡ Or via fuse mount under UI: `/eos`

  – Private EOS area: `/eos/tidc/⟨group_name⟩` (50 Tb / group)

  – Working space: `/ceph/work/⟨group_name⟩` (3 Tb / group).

  ps. This is basically too small for modern analyses, PI can ask for more when needed.

HOW TO USE?

➤ ASGC is running hands-on tutorials every 3 months. Latest one was held at NTU (*many thanks to ASGC & TIDC again!*): https://indico4.twgrid.org/event/35/ with a special session for TIDC cluster.

➤ Topics of interests:

  – Access to TIDC & Condor schedular (by Felix Lee): https://indico4.twgrid.org/event/35/#b-595-hands-on-computing-servi

  – General CMS software setup & condor jobs (by You-Ying Li): https://indico4.twgrid.org/event/35/#b-597-hands-on-analysis-framew

  – Running analysis with RDataFrame (by Cheng-Han Wu) & Coffea (by Yu-Hsuan Chou): https://indico4.twgrid.org/event/35/#b-587-computing-service-for-he

$Z \rightarrow e^+ e^-$ peak generated by Coffea running on TIDC system, using CMS open data.

ANALYSIS WORKFLOW

➤ Typical workflow:

Inputs

Outputs

Jobs

EOS

Outputs

Grid
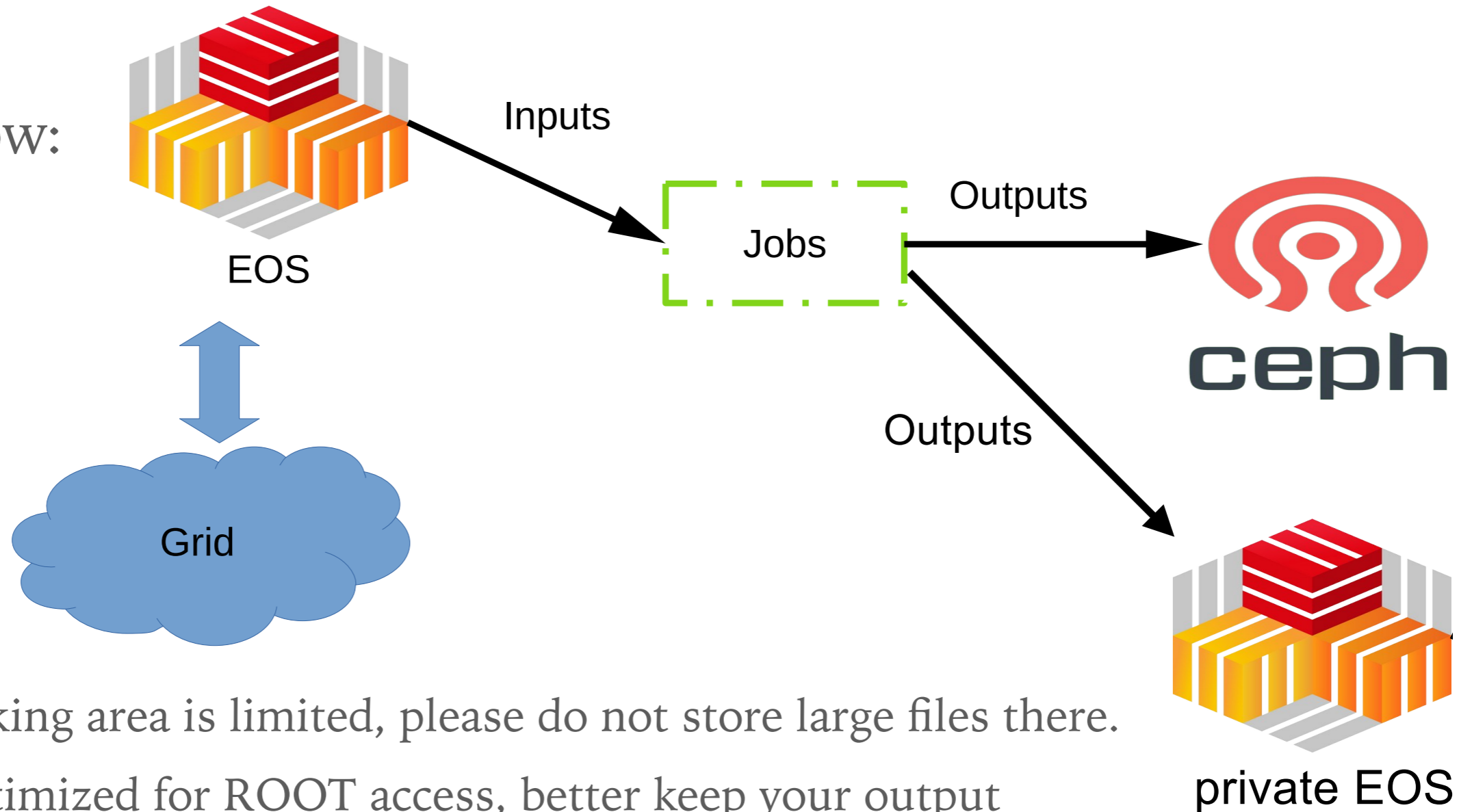
ceph

private EOS

– Ceph working area is limited, please do not store large files there.

– EOS is optimized for ROOT access, better keep your output ROOT files there if needed.

➡ It is a bad idea to write your private files back to grid EOS (might be killed by global grid management), please use the private EOS area instead.

ANALYSIS WORKFLOW

➤ Integration with NSTCCore services:

    – It is possible to use the CPU/GPU allocated under NSTCCore too (as the Dicos user area & Ceph workspace are shared).

    – No direct access to experimental software but possible to run general analysis tasks (e.g. statistical studies, ML training, etc).

tidc-ui01.grid.sinica.edu.tw

TIDC cpu pool

slurm-ui.twgrid.org

NSTC cpu pool
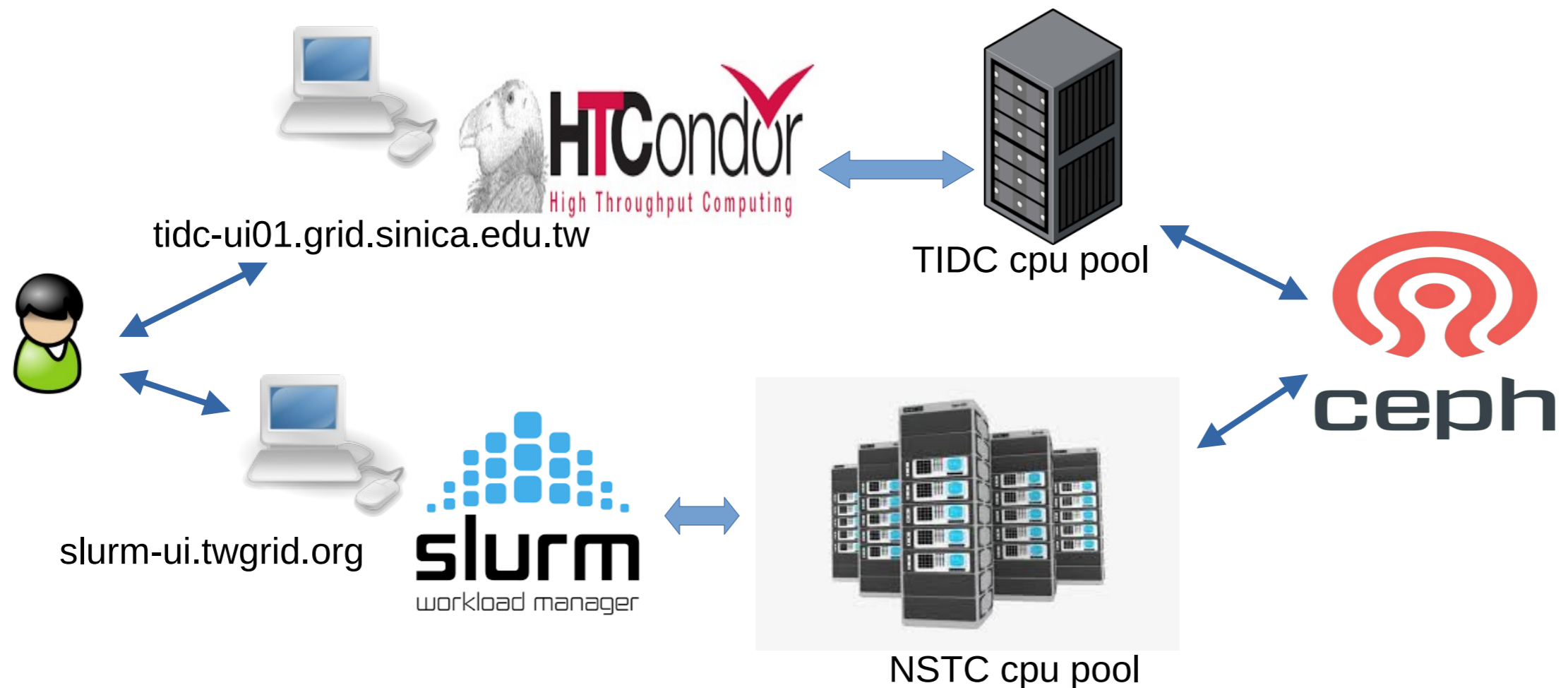
SUMMARY & PROSPECTS

➤ Many thanks to ASGC's support, now we have a **new TIDC cluster up and running**.

 – Please apply group/user accounts to access the resources.

 – Now it is CMS compatible, but it should be able to run the analysis jobs for other experiments as well (*CERN projects should be straightforward*) –– further integrations can be discussed!

➤ **Only one UI at this moment –– please be gentle / not to overload it!** (*more UIs to be built in the near future*)

➤ Expected to double the specs based on the summit grant; NCU resources to be integrated into the same pool.

HAPPY RUNNING ANALYSIS JOBS!