CMS computing

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Thanks input from Xuantong Zhang, LI Yuan, Zhen Hu. Leyun, zhengyu, Kai Yi, Shuai Yang, Meng Xiao, Zhenyun, Chengpin, Nan Lu…

Available computing resources

- Chinese CMS computing
  - IHEP Tier3(share) + University local computing resources
  - IHEP Tier2, managed by CMS grid
  - Shared computing provided by CERN
    - lxplus
    - grid

站点	总存储占用	平均 CPU 占用	作业提交频率分布
高能所	0	0	从不：100%
THU	90TB	80	偶尔：80%，从不：20%
NNU	200TB	500	经常：60%，偶尔：40%
FermiLAB LPC	100TB	400	经常：60%，偶尔：40%
lxplus	10TB	400	经常：60%，偶尔：20%，从不：20%

	IHEP T2	IHEP T3	PKU	THU	BAAU	ZJU	NNU	SCNU	USTC/SYSU/FDU/SDU
CPU	1728核	640核	355核	1500核	～160核	1000核	500核	1500	-
GPU	-	1 A100 +shared	4x RTX3090 2xK80	-	-	-		300	-
Storage	1.7Pb	849 TB	302TB	400 TB	-	60 TB	200 TB	6PB	-

Usage of CMS computing

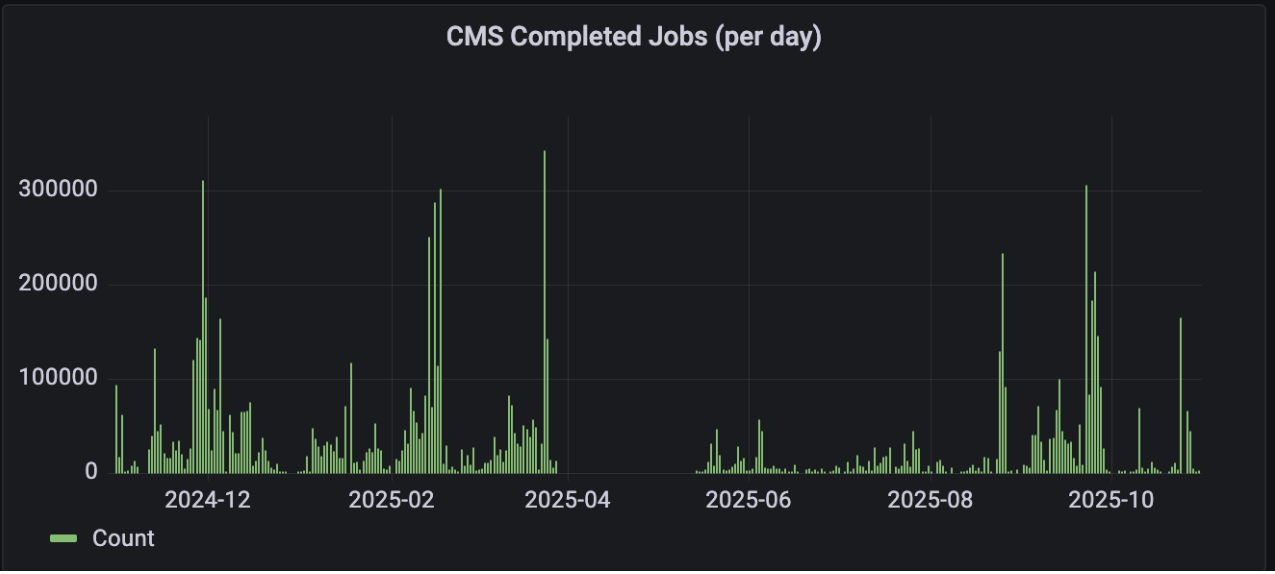
- IHEP tier 3: 9,636,000 jobs， 1,490,000 hours CPU wall time

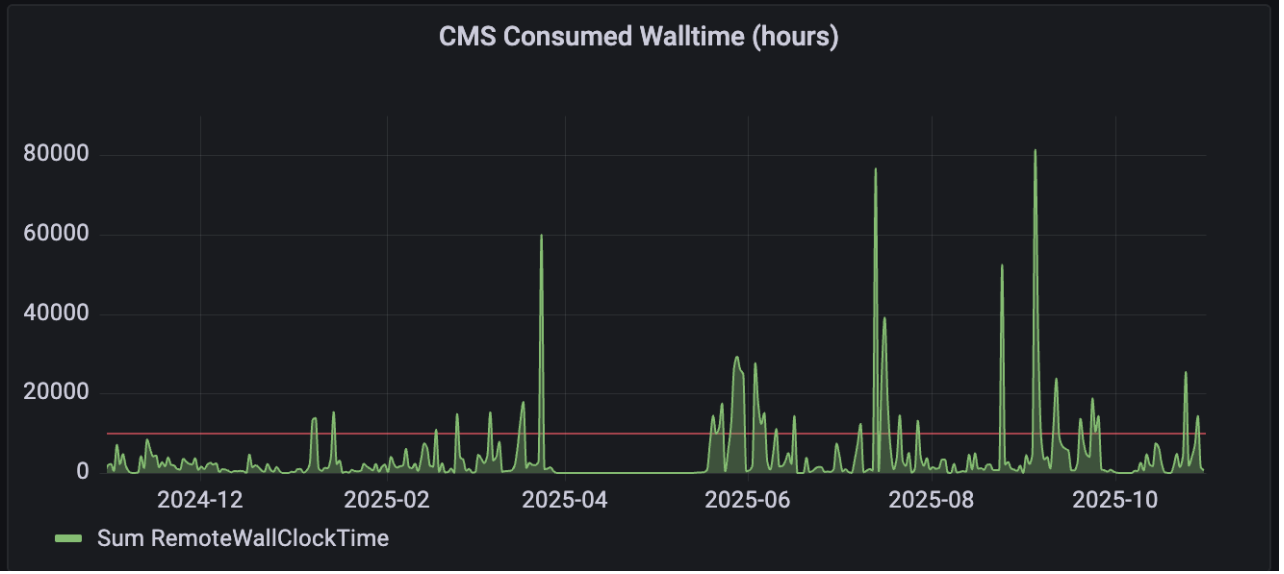
Completed Job

HepJob_RealGroup	Count
cms	9636309

Consumed Walltime (hours)

HepJob_RealGroup	Sum
cms	1490160





A very nice Grafana based monitoring webpage by Xuantong: Many more stats there

Feedbacks from PKU computing

- Issues with PKU Computing Cluster
  - Slow and unstable Internet connection to CERN
    - Current solution: Use IHEP servers as proxies.
  - External CPU access blocked on certain dates
    - Current solution: Connect via PKU VPN or IHEP reverse proxies.
- We thank IHEP computing service for the great helps in resolving these issues.

Feedback from IHEP computing

- IHEP Tier3 usage are generally good
  - Low performance for massive `/afs` and `/publicfs` operations
    - e.g., ~300 file creations per second)
    - Also leads to a delay (> 10 s) when logging in with Conda environment initialization.
  - High latency when accessing `/afs/cern.ch`
    - Understandable due to long physical distance, but performance improvements would still be highly beneficial.
- IHEP tier 2/tier 3 storage:
  - storage ~full, cleaned and back again
- Thanks to the virtual server mechanism

INK: excellent

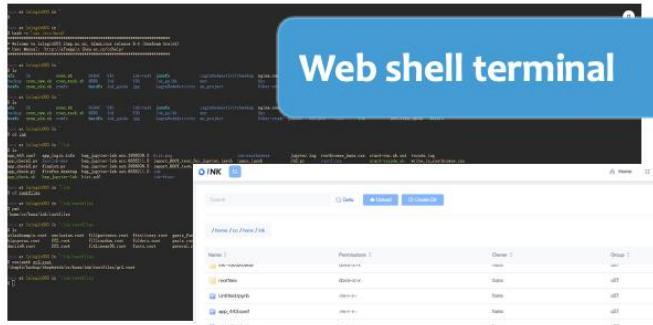
INK: Interactive aNalysis worKbench

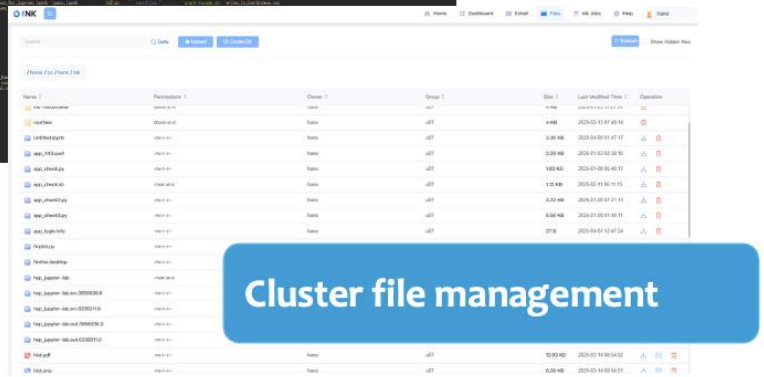
INK is a web-based interactive analysis platform provided by IHEP.

- Serves as **a counterpart to CERN SWAN platform**.

Supply interactive analysis tools.

- **Web-based VSCode** server with AI code plugins.
- **Terminal Shell** Integration.
- **Customized Jupyter-lab** Configuration.
  - LCG environment is added for all LHC experiments.
- Visualizing Cluster via **VNC Service.**





Plan to be open-sourced, easy to be deployed on any local Condor/Slurm farm.