Accounting of HPC resources with AUDITOR

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IDIUM

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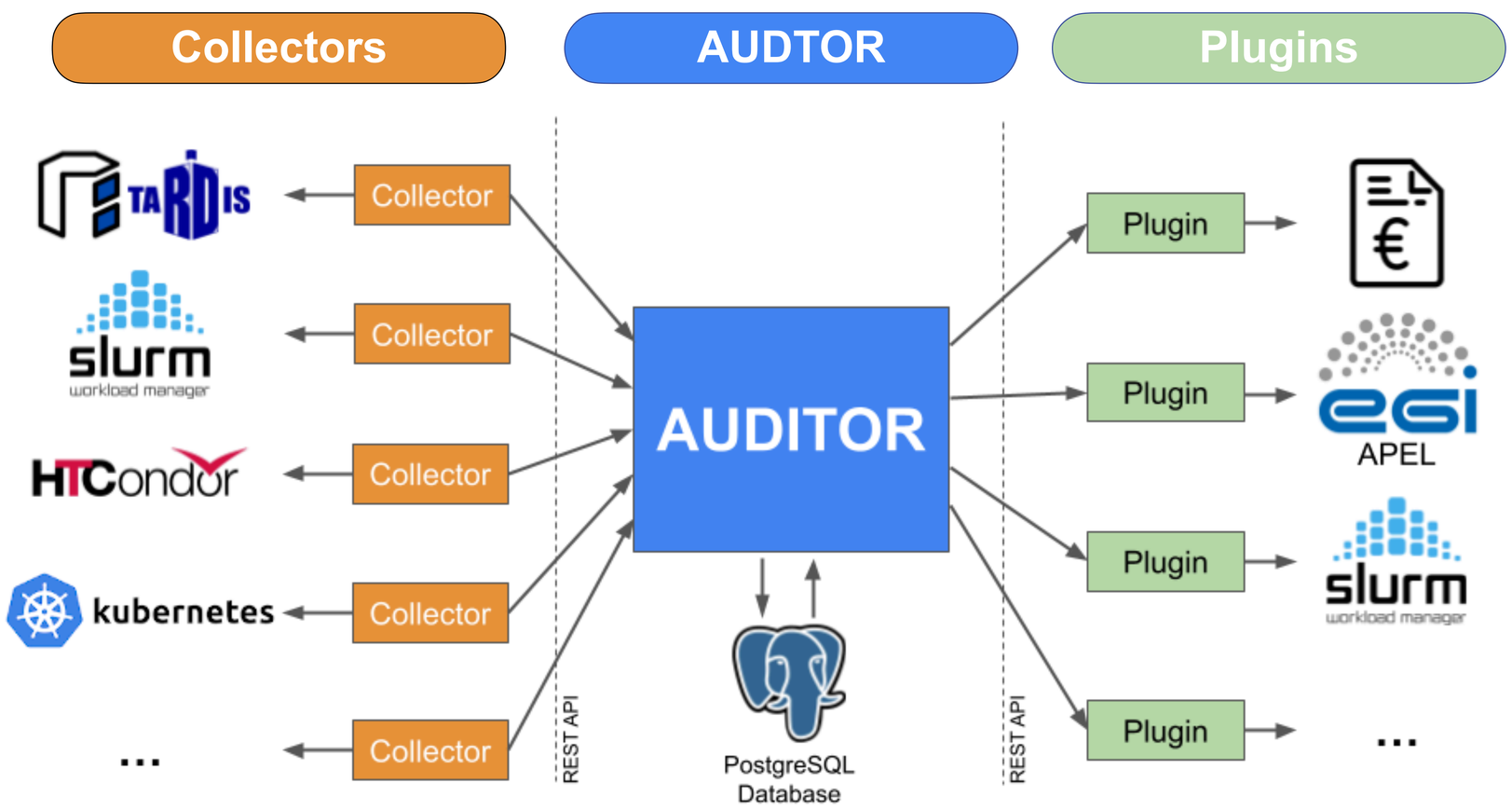
Introduction

- AUDITOR is an multi purpose accounting ecosystem
- Suitable for accounting resources combined e.g. via CobalD/TARDIS

Overview



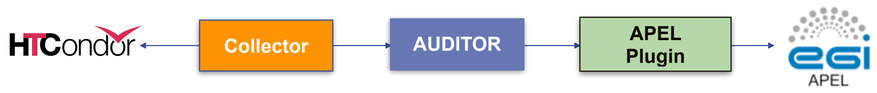
Collectors
- Obtain accounting data from sources
- Send data as records to AUDITOR

AUDTOR
- Stores records in PostreSQL DB
  - `record_id` (String, unique)
  - `[meta]` (HashMap[String → [String]])
  - `[components]` (Array)
    - `name` (String)
    - `amount` (Integer)
    - `[scores]` (Array)
      - `name` (String)
      - `value` (Float)
  - `start_time` (Datetime, UTC)
  - `stop_time` (Datetime, UTC)
  - `runtime` (Integer,seconds, output-only)
- Allow access via REST

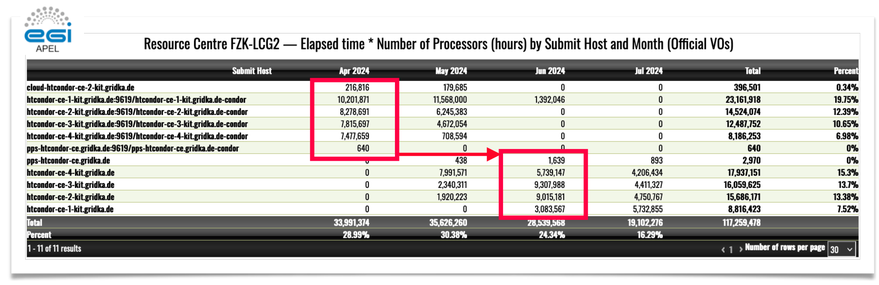
Plugins
- Request data from AUDITOR
- Take action based on stored info

3 Use Cases

1. Replace EGI Accounting by AUDITOR Pipeline



use case: DE Tier-1 @ KIT replaced APEL client by AUDITOR



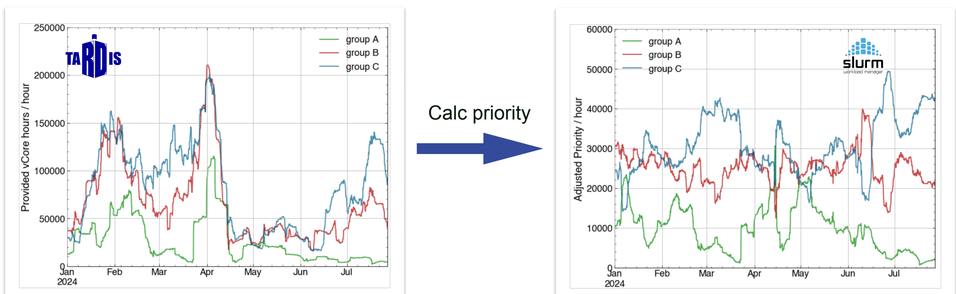
Resource Centre FZK-LCG2 — Elapsed time * Number of Processors (hours) by Submit Host and Month (Official VOs)

Submit Host	Apr 2024	May 2024	Jun 2024	Jul 2024	Total	Percent
cloud-htcondor-ce-2-kit.gridka.de	216,816	179,685	0	0	396,501	0.34%
htcondor-ce-1-kit.gridka.de:9619/htcondor-ce-1-kit.gridka.de-condor	10,201,871	11,568,000	1,392,046	0	23,161,918	19.75%
htcondor-ce-2-kit.gridka.de:9619/htcondor-ce-2-kit.gridka.de-condor	8,278,691	6,245,383	0	0	14,524,074	12.39%
htcondor-ce-3-kit.gridka.de:9619/htcondor-ce-3-kit.gridka.de-condor	7,815,697	4,672,054	0	0	12,487,752	10.65%
htcondor-ce-4-kit.gridka.de:9619/htcondor-ce-4-kit.gridka.de-condor	7,477,659	708,594	0	0	8,186,253	6.98%
pps-htcondor-ce.gridka.de:9619/pps-htcondor-ce.gridka.de-condor	640	0	0	0	640	0%
pps-htcondor-ce.gridka.de	0	438	1,639	893	2,970	0%
htcondor-ce-4-kit.gridka.de	0	7,991,571	5,739,147	4,206,434	17,937,151	15.3%
htcondor-ce-3-kit.gridka.de	0	2,340,311	9,301,988	4,411,327	16,053,625	13.7%
htcondor-ce-2-kit.gridka.de	0	1,920,223	9,015,181	4,750,767	15,686,171	13.38%
htcondor-ce-1-kit.gridka.de	0	0	3,083,567	5,732,855	8,816,423	7.52%
Total	33,991,374	35,626,260	28,539,568	19,102,276	117,259,478	
Percent	28.99%	30.38%	24.34%	16.29%		

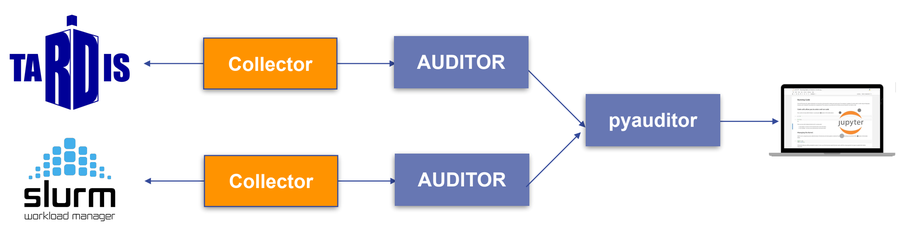
1 - 11 of 11 results

2. Steer the priority of Batch System based to provided resources

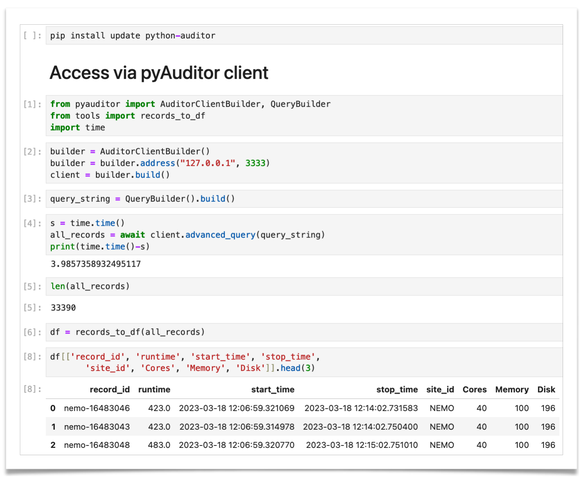
use case: ATLAS Tier-3 @ UniFR integrates HPC resources and steers priority by provided resources of contributing groups



3. Collect Accounting data (from several source) → create combined report



use case: ATLAS Tier-3 @ UniFR integrates HPC resources, accounting of HPC done by TARDIS Collector, of ATLAS Tier-3 s by Slurm Collector, combined plots created via pyauditor client in jupyter notebook (few lines of code)



```
pip install update python-auditor
```

Access via pyAuditor client

```
from pyauditor import AuditorClientBuilder, QueryBuilder
from tools import records_to_df
import time

builder = AuditorClientBuilder()
builder = builder.address("127.0.0.1", 3333)
client = builder.build()

query_string = QueryBuilder().build()

s = time.time()
all_records = await client.advanced_query(query_string)
print(time.time()-s)
```

```
3.9857358932495117
```

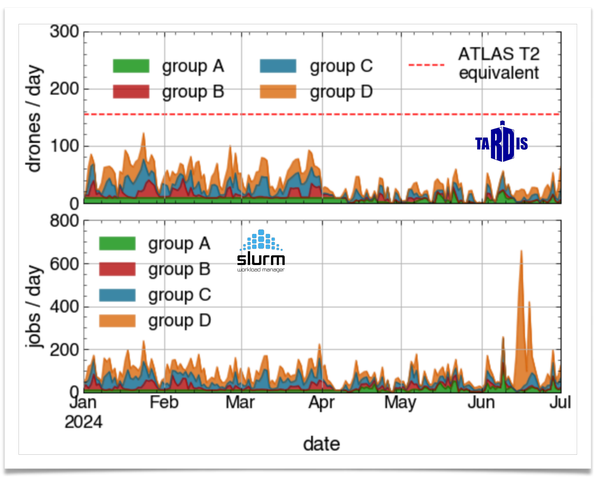
```
len(all_records)
```

```
33390
```

```
df = records_to_df(all_records)
```

```
df[['record_id', 'runtime', 'start_time', 'stop_time',
    'site_id', 'Cores', 'Memory', 'Disk']].head(3)
```

	record_id	runtime	start_time	stop_time	site_id	Cores	Memory	Disk
0	nemo-16483046	423.0	2023-03-18 12:06:59.321069	2023-03-18 12:14:02.731583	NEMO	40	100	196
1	nemo-16483043	423.0	2023-03-18 12:06:59.314978	2023-03-18 12:14:02.750400	NEMO	40	100	196
2	nemo-16483048	483.0	2023-03-18 12:06:59.320770	2023-03-18 12:15:02.751010	NEMO	40	100	196



References:

Boehler, M., von Cube, F., Fischer, M., Giffels, et al. (2024). The accounting ecosystem AUDITOR (v0.6.2). Zenodo. https://doi.org/10.5281/zenodo.13239266
Boehler, M. Gamel, A. J., Kroboth S., et al. (2024). AUDITOR: Accounting for opportunistic resources. 10.1051/epjconf/202429504008
github.com/ALU-Schumacher/AUDITOR/