AUDITOR: Accounting for opportunistic resources

DB Performance Optimization

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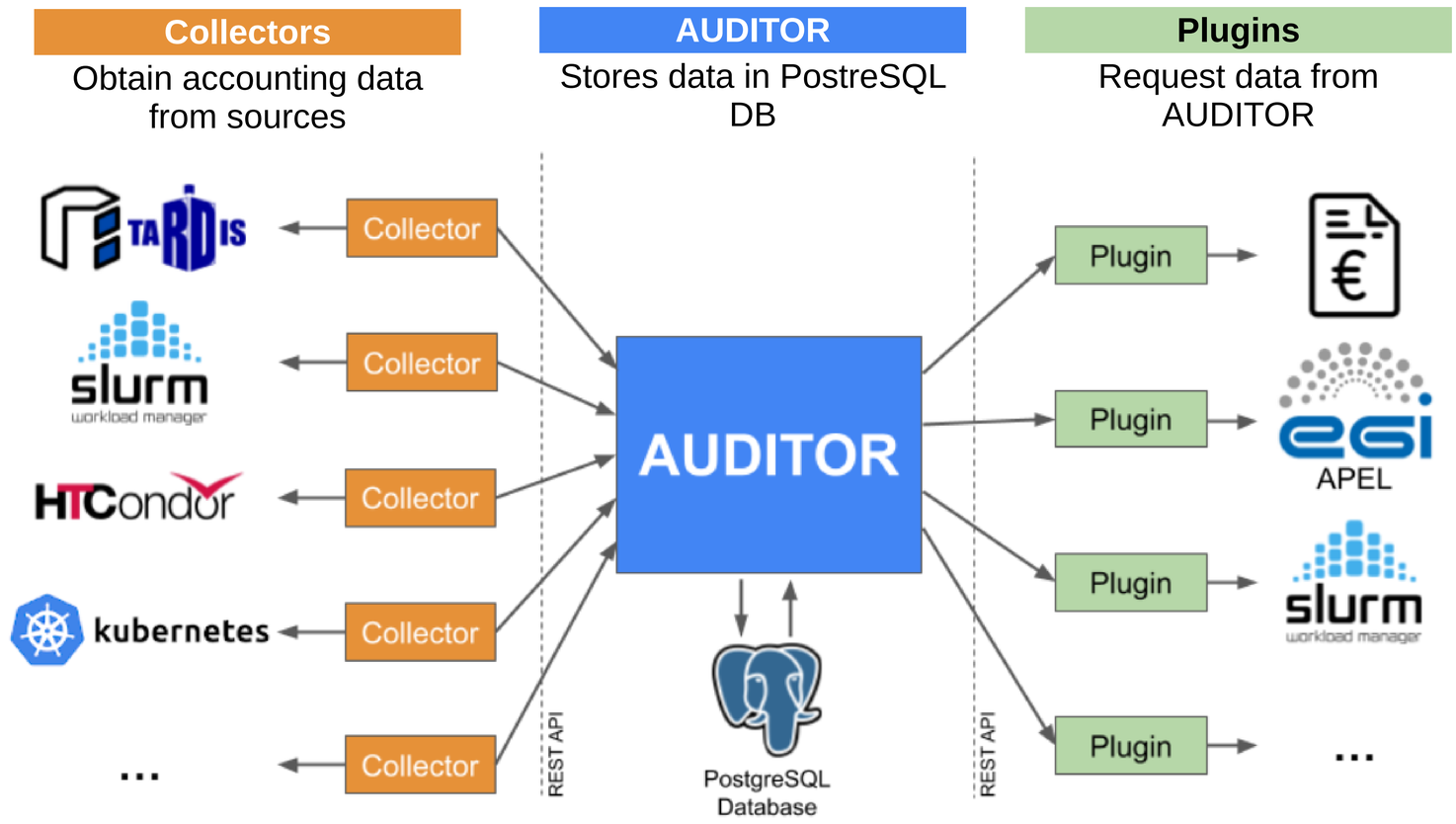
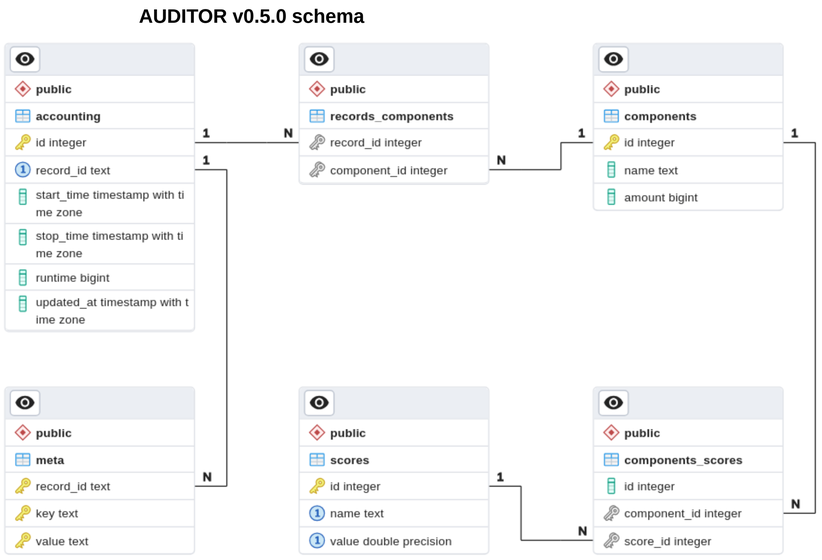
Introduction

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



Schema change

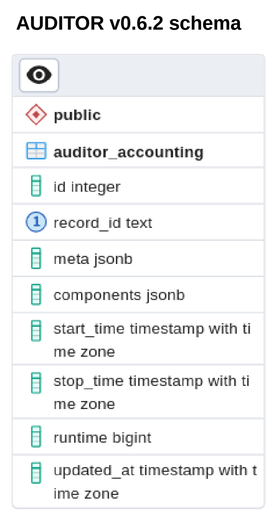


Why schema was changed

- Multiple joins for a record query is slower
- Benchmark showed performance dip if the database scales

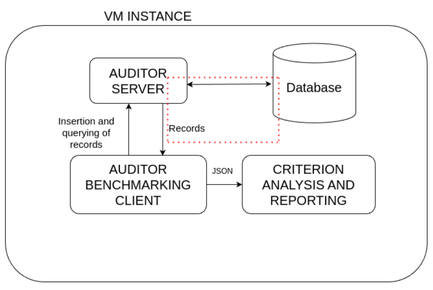
Changes made to improve performance

- Migrated to a new schema with jsonb type.
- Meta and component tables are migrated to columns with jsonb type.



Benchmarks

1. Database query time



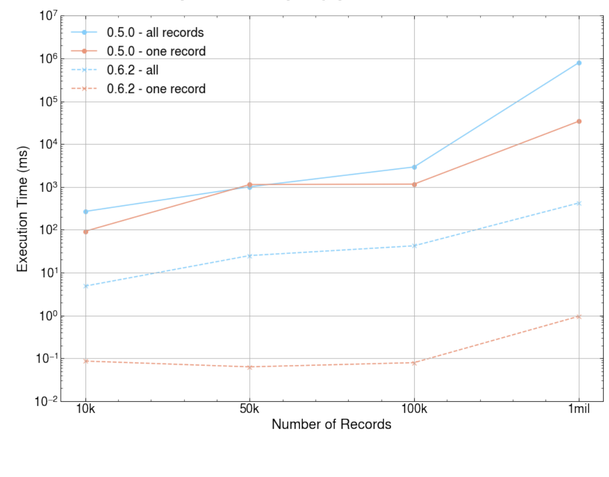
Specifications:
Processor: Intel(R) Xeon(R) CPU E5-2630 v4 @ 2.20GHz
Memory: 4 GB

Comparison of database query time of AUDITOR v0.5.0 and v0.6.2

	10k		50k		100k		1 mil	
Query Type	0.5.0	0.6.2	0.5.0	0.6.2	0.5.0	0.6.2	0.5.0	0.6.2
All records	267.7	4.8	1007.3	25.0	2929.9	42.2	791457.6	421.1
Time range	100.5	0.6	686.6	2.5	1814.3	24.4	41948.1	188.7
Time range and site_id	88.8	1.0	814.6	4.1	2500.0	25.2	76142.9	232.6
Component	99.7	7.8	564.5	42.6	2366.5	31.1	41905.9	1648.8
Time range + meta + comp	77.0	0.5	499.6	3.2	1159.0	25.0	29114.5	496.0
Time range + 2 meta + comp	80.5	0.6	567.6	2.5	2285.6	25.7	23803.7	187.3
One record	92.3	0.1	1136.4	0.1	1164.6	0.1	34045.7	1.0

All measurements are in milli seconds

Comparison of query performance



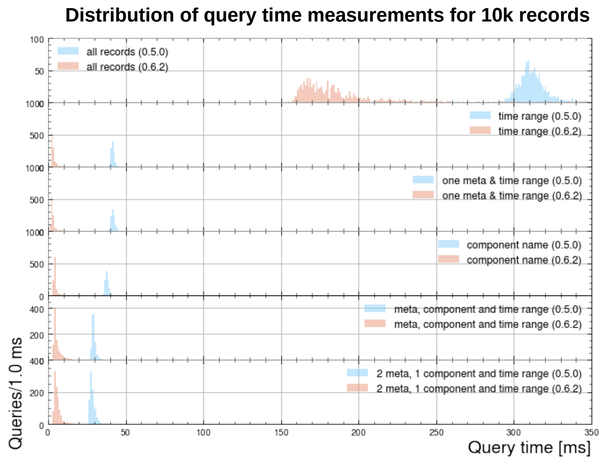
2. Client Benchmark results

Comparison of response time for different queries from AUDITOR benchmarking client

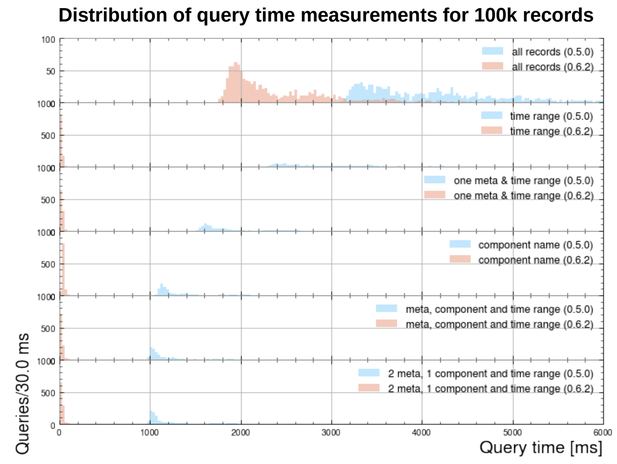
	10k		50k		100k	
Query Type	0.5.0	0.6.2	0.5.0	0.6.2	0.5.0	0.6.2
All records	313.2	220.9	1540.8	1083.5	4113.8	2368.9
Time range	41.8	4.7	1011.7	8.5	3037.4	32.5
One meta and time range	42.0	3.4	391.1	4.7	1982.9	40.0
Component name	38.0	5.9	209.4	24.1	1428.9	49.1
Meta, component and time range	29.5	6.5	194.4	6.3	1265.6	39.8
2 meta, 1 component and time range	28.9	7.9	194.9	4.7	1255.5	47.0

All measurements are in milli seconds

Distribution of query time measurements for 10k records



Distribution of query time measurements for 100k records



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

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