

Pledger: Automated Benchmarking for Cloud

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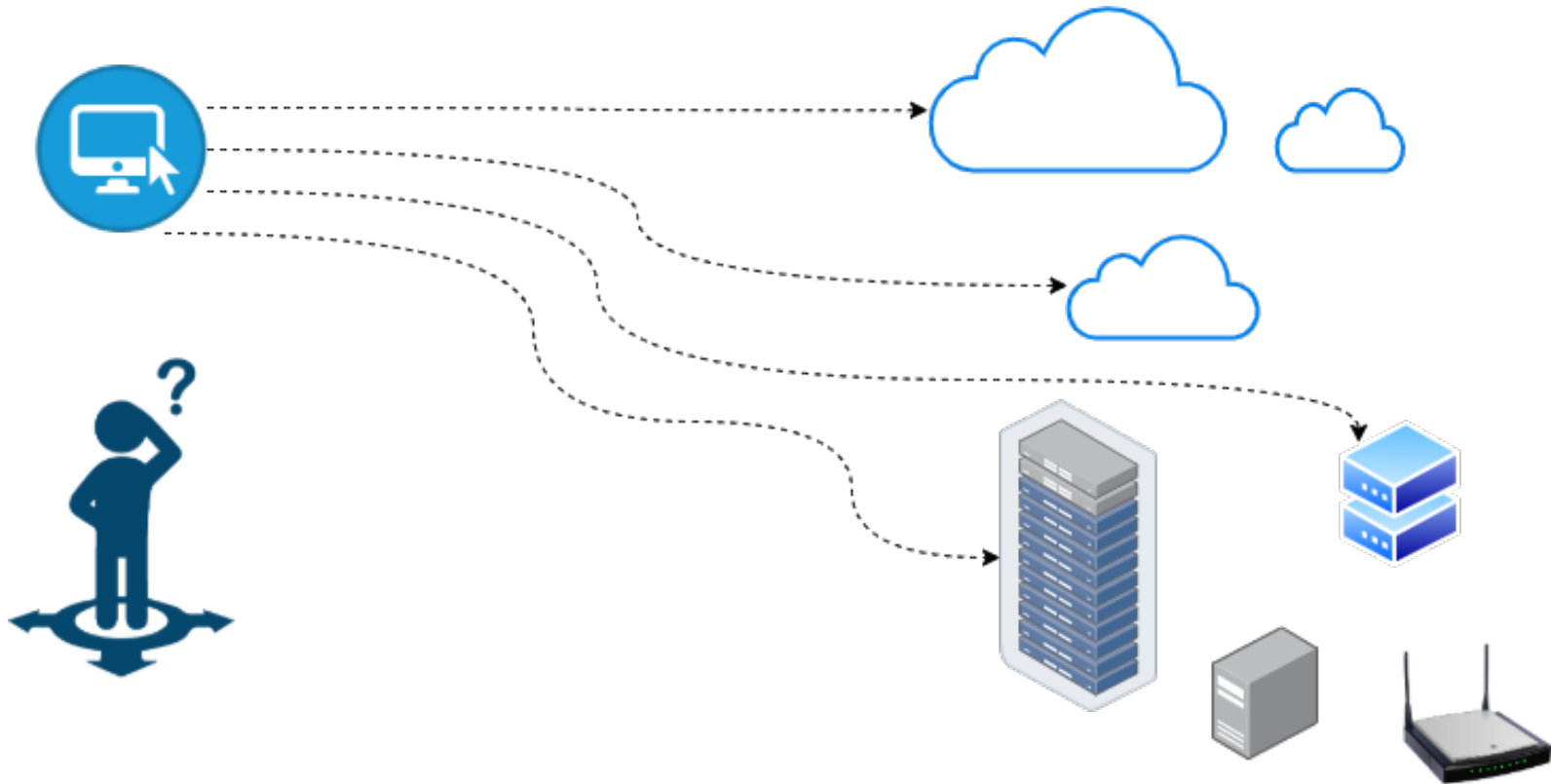
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Pledger Project

Facilitate the adoption of Cloud and Edge providing methodologies and tools for adopter and providers to manage and improve **deployment, security and QoS/QoE** in the **Cloud-Edge continuum**



Cloud/Edge provider selection



Which is the **BEST** provider for my application?

Quality of Experience (QoE)

Overall **quality perceived** by the user while using a service/application

It's a holistic metric

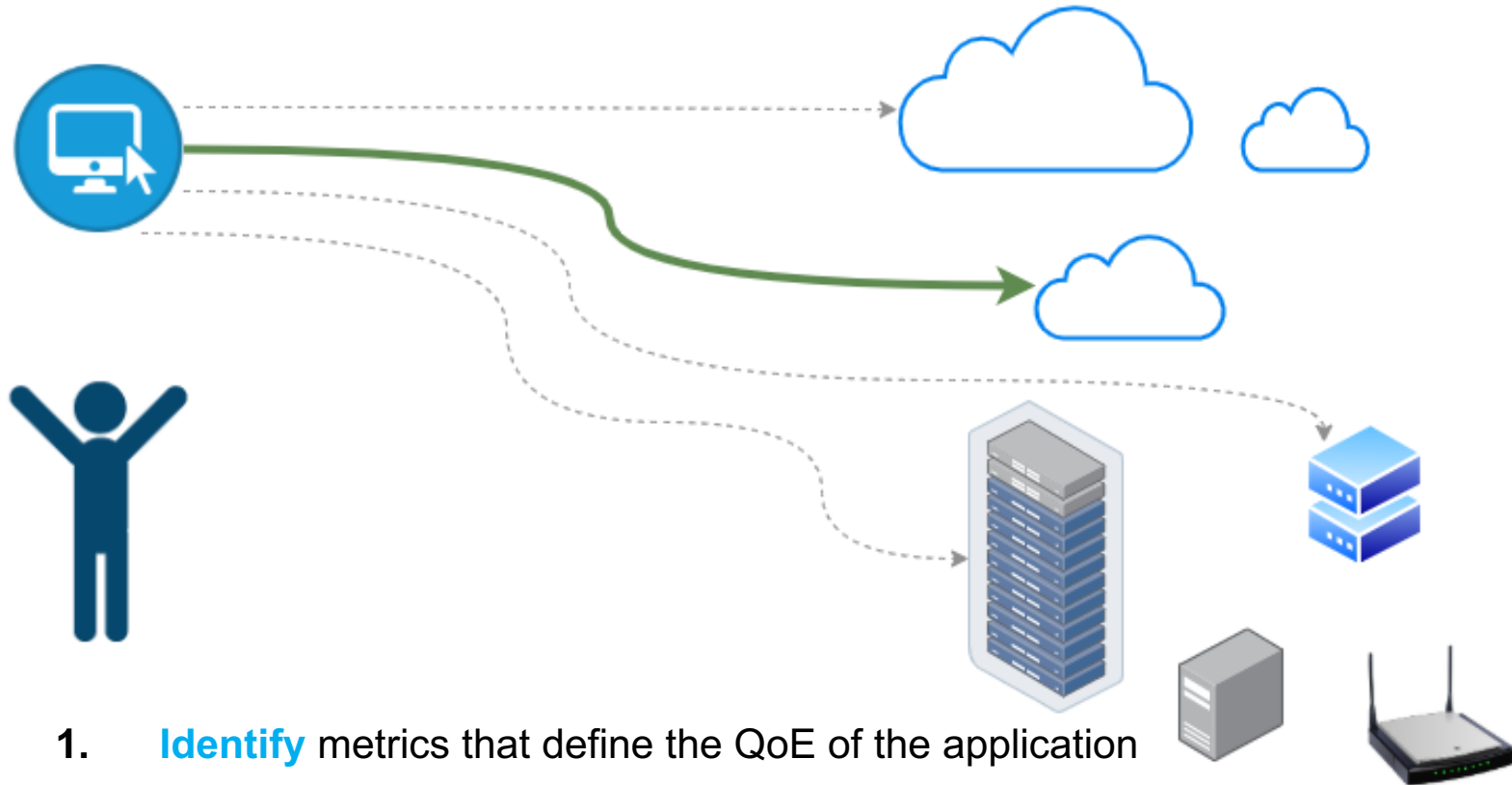
We are interest into technical aspects that can be mapped to infrastructure characteristics



E.g.

QoE of a video streaming platform has a relationship with the hosting infrastructure network bandwidth and latency

The Pledger workflow



1. **Identify** metrics that define the QoE of the application
2. **Measure** the metrics on different providers
3. **Rank** the providers by results
4. **Suggest** the best provider for a given application

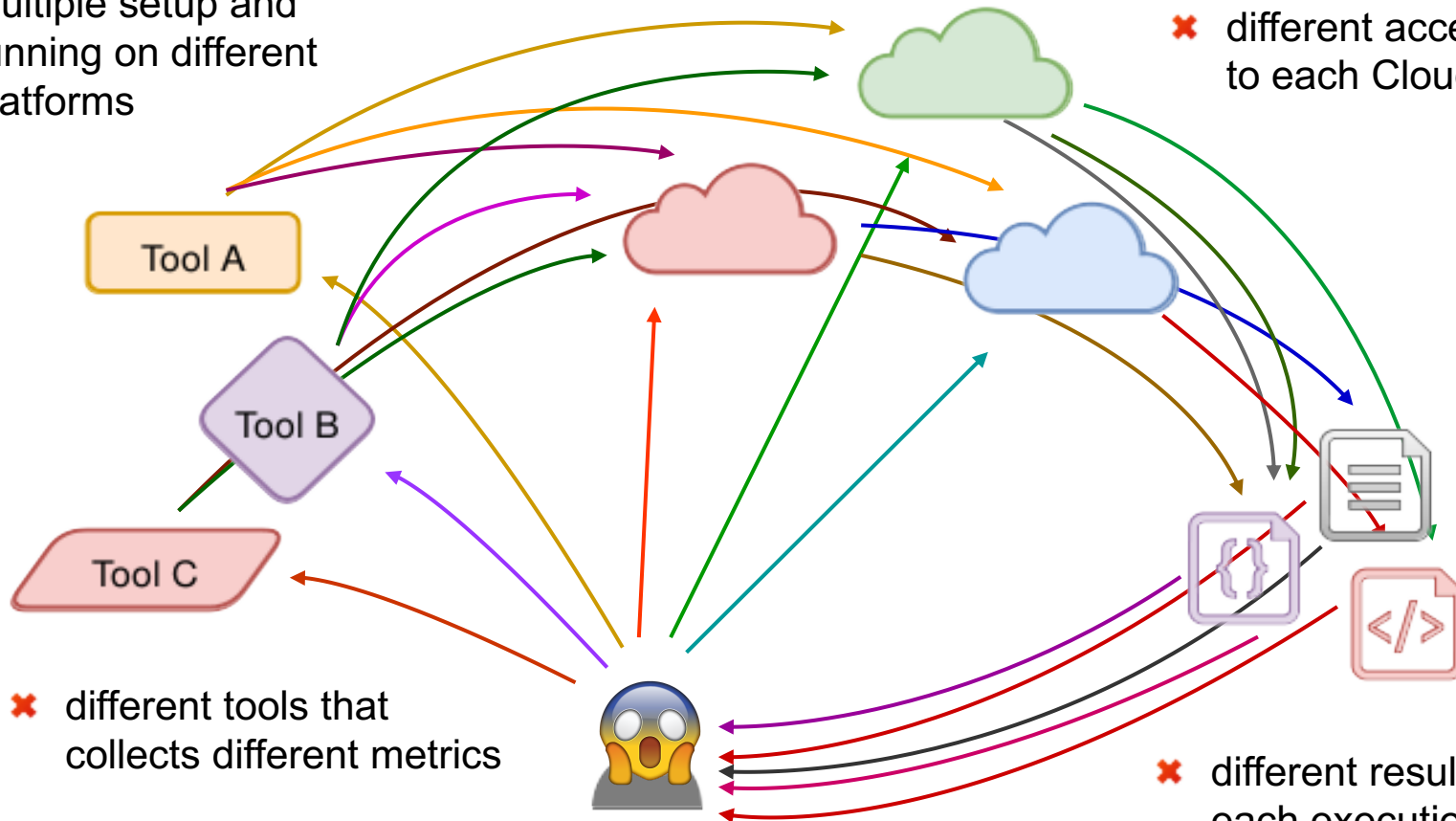
Benchmarking approach

- We adopt benchmarking to measure infrastructures' performance
 - Execute specific programs to stress hardware resources or simulate usage patterns
 - Possible prior the application is deployed
 - Takes into consideration also "hidden" aspects of the infrastructure's configuration
- We exploit existing benchmark tests
 - System level benchmarks
 - e.g., Sysbench, Iperf, ..
 - Application level benchmarks
 - e.g., YCSB, FileBench, WebFramework benchmarks, EdgeBench, AIBench, ...

Benchmarking without automation

✗ multiple setup and running on different platforms

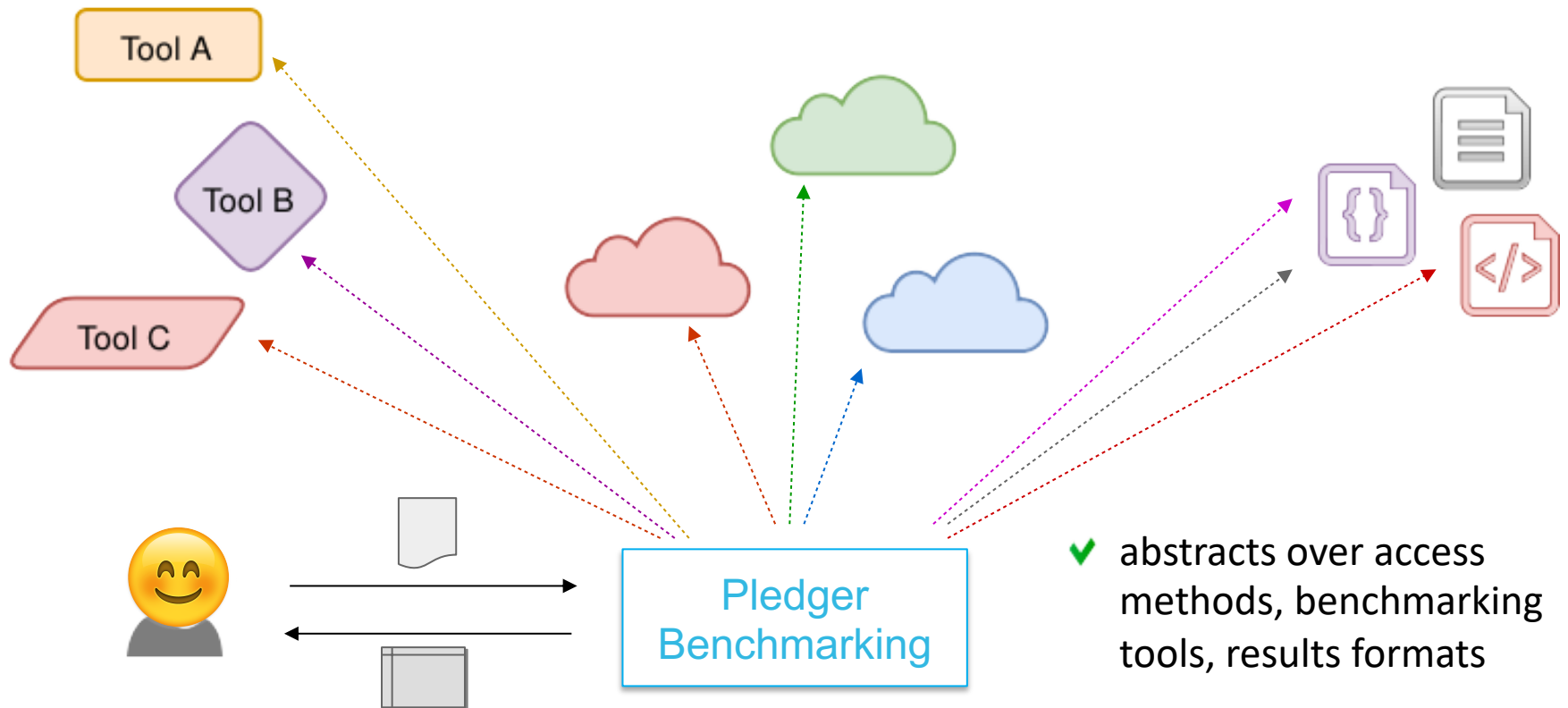
✗ different access methods to each Cloud



✗ different tools that collect different metrics

✗ different results formats for each execution

Automated Benchmarking

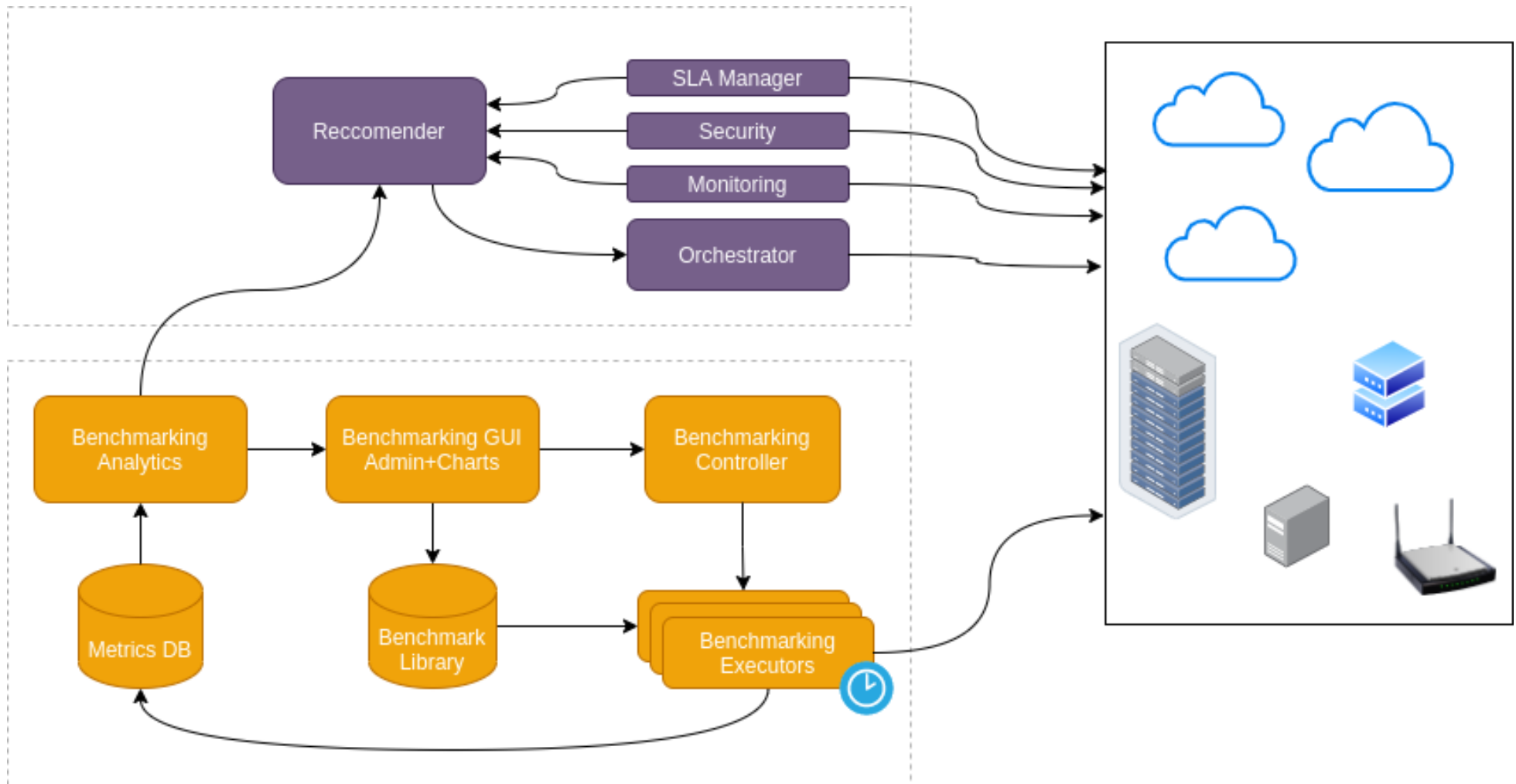


✓ **Simple, declarative configuration**

✓ **normalized, structured benchmarking scores database**

✓ **abstracts over access methods, benchmarking tools, results formats**


Pledger Benchmarking Architecture





Benchmarking Subsystem


- **Benchmarking Library:** The set of pre-defined tests we can execute
- **Metrics DB:** Contains all measurements done during benchmarking
- **Analytics:** Compute high level metrics and statistics (e.g., stability of metric values)
- **Controller:** Manage the execution of benchmarks
- **Executor:** Interfaces with the providers for the execution of tests
- **GUI:** Admin tasks (e.g., configure new provider, new test) + Charts


Benchmarking Configuration


 Welcome

 Providers

 Workloads

 Executions

 Schedules

 Results

Benchmarking suite / Schedules


All Schedules


NEW SCHEDULE


Your own scheduled benchmarks are listed here.

6 schedules available

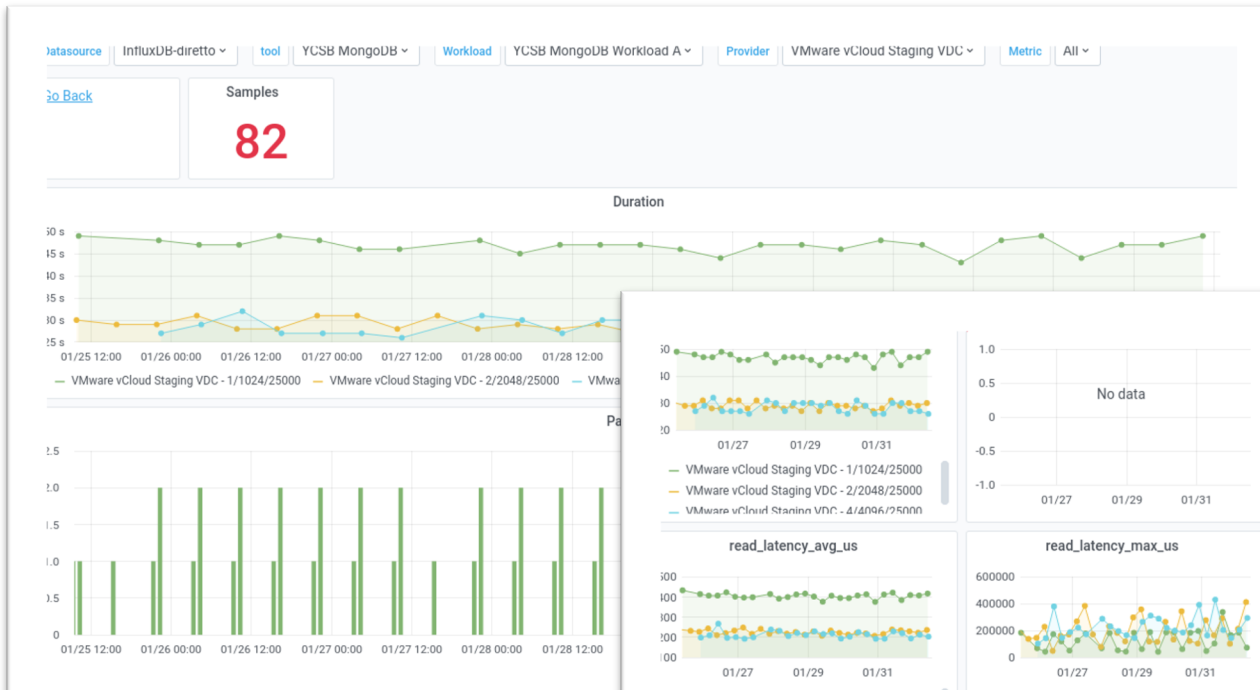
Filter

 **Medium**
Provider is: **EasyCloud VDC M**
Benchmarked resources are: **debian_10_3 (MCP.G-LARGE)**
Workloads are: **cpu_10000 (SysBench)**, **fileserver (FileBench)**, **varmail (FileBench)**, **videosever (FileBench)**, **webproxy (FileBench)**, **webserver (FileBench)**, **WFB Django Query (Web Framework Benchmarking)**, **YCSB Workload A (YCSB MySQL)**
This schedule is **PAUSED**. It would run every **90 minutes**.
Id: cb88fbb9-f2fa-48c5-8ef7-c1254320c3e5

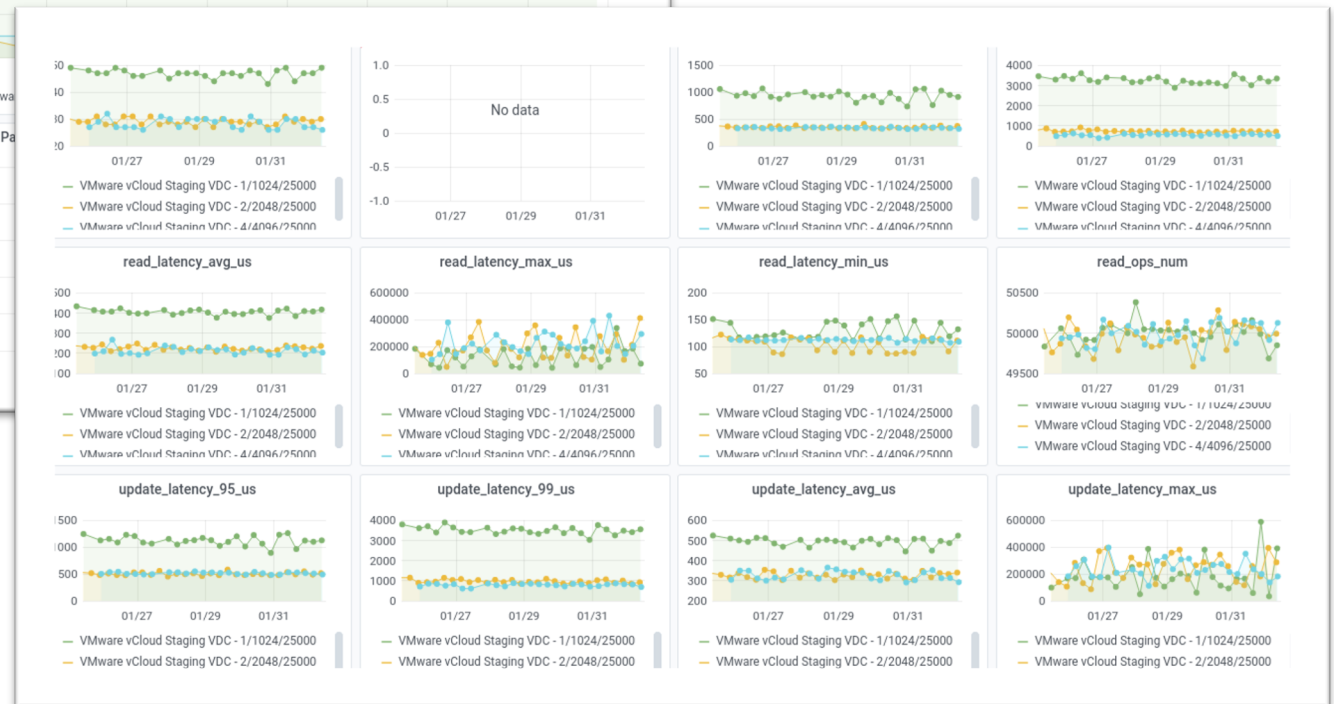
 **Schedule1**
Provider is: **EasyCloud VDC M**
Benchmarked resources are: **ubuntu_20_04 (MCP.G-SMALL)**
Workloads are: **WFB Django Query (Web Framework Benchmarking)**
This schedule is **PAUSED**. It would run every **1 hours**.
Id: f17e2b64-f322-4d4d-911a-02c63062d47c

 **Schedule2**
Provider is: **EasyCloud VDC M**
Benchmarked resources are: **ubuntu_20_04 (MCP.G-SMALL)**
Workloads are: **WFB Django Query (Web Framework Benchmarking)**
This schedule is **PAUSED**. It would run every **1 hours**.
Id: 84452325-7cb0-401d-8ece-2f63ea6056ab

Ranking and results visualization



Grafana based GUI
being developed



Benchmark-Application results matching

Given an application, which are the most appropriate benchmarks and metrics to consider?

- Category-based matching
 - the user selects the metrics based on her knowledge of the application
- User-provided benchmarks
 - The user can provide a benchmark that we execute
- Automated application profiling
 - Pledger automatically matches the application with the most appropriate benchmark/metric

Roadmap

- This work started in previous research projects: ARTIST (EU), CloudPerfect (EU) and EasyCloud (EIT)
- In Pledger we will advance it to:
 - **Automate configuration** of infrastructures, tests and schedules
 - Support for **Kubernetes** cluster benchmarking
 - Feed the **Pledger DSS** with benchmarking data
 - **Add benchmarks** for the use cases domain (smart mobility, augmented reality, industrial IoT)
 - **Docker**-based executions
 - Improve result analysis and **presentation**

Thank You!

<http://www.pledger-project.eu/>

Image Sources

- <https://app.diagrams.net/>
- https://www.pinclipart.com/pindetail/owJomh_person-icon-question-mark-clipart/
- <https://dlpng.com/png/6999757>
- https://www.flaticon.com/free-icon/man-standing-with-arms-up_10581