2022

PERISKOP

Exception Monitoring at Scale

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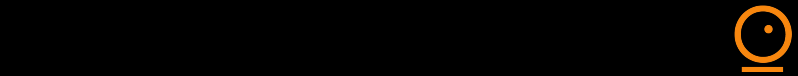
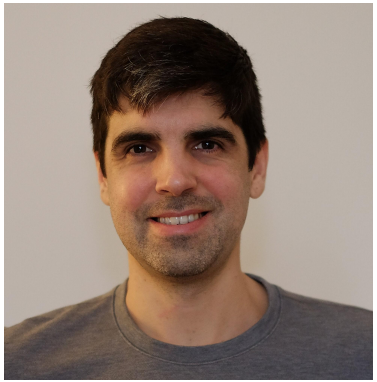


About Us



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Senior Engineer at SoundCloud
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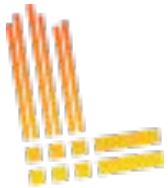
- Opinions are our own -

Why Monitor Errors?

Why Monitor Errors?

Metrics and Alerting

Quantitative, allow to determine whether a system operates within acceptable thresholds.

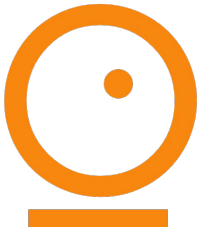


Logging

General purpose audit trail of events of interest.

Error Monitoring

Qualitative, specialized indexing and aggregation of errors for gaining insights into the source of a problem (**request context, backtraces**, etc). Useful during investigations and incident response.



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Our Journey

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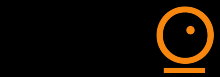
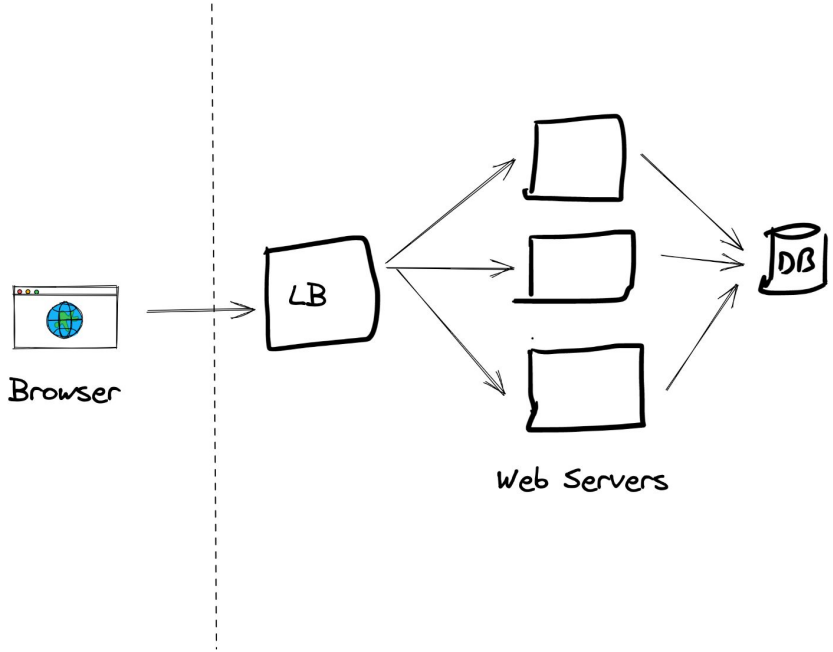
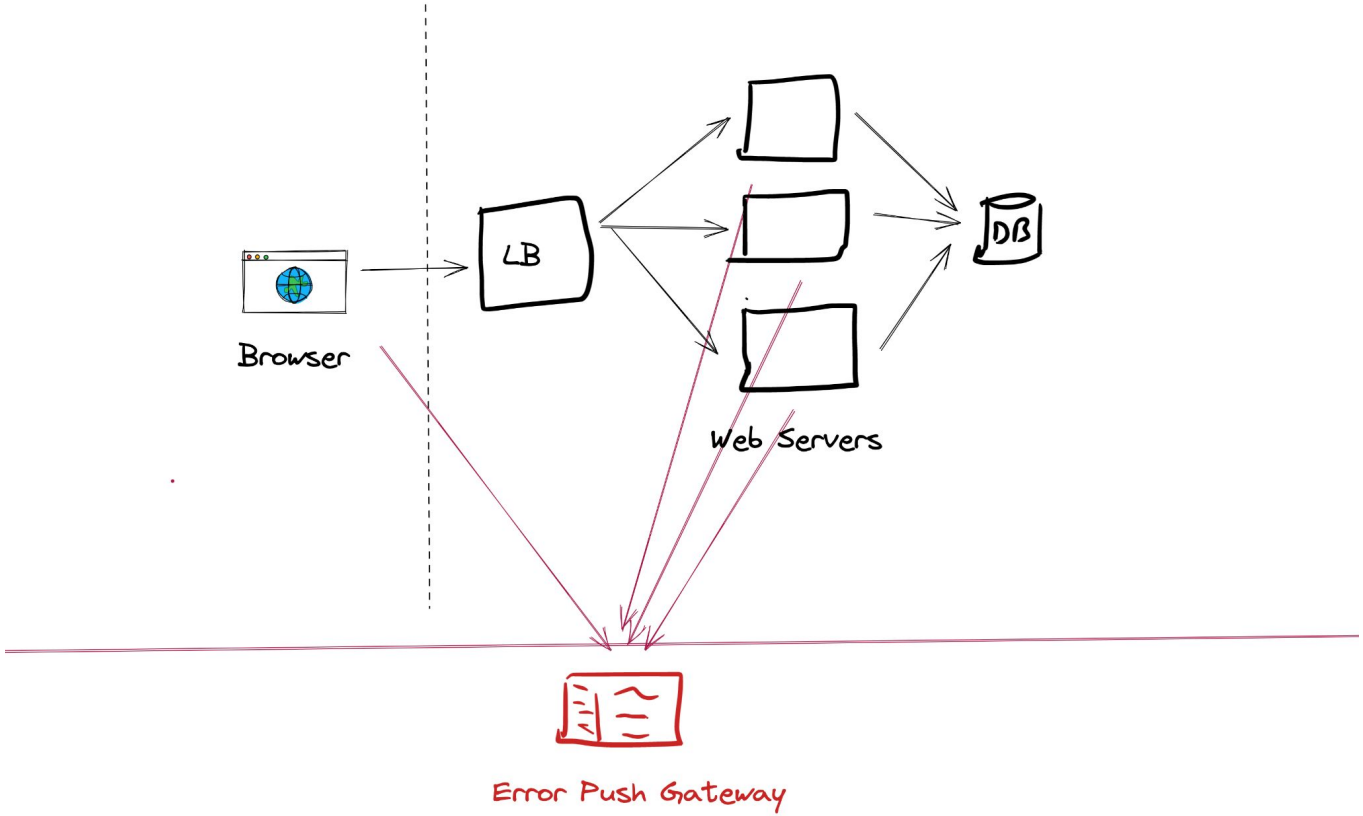


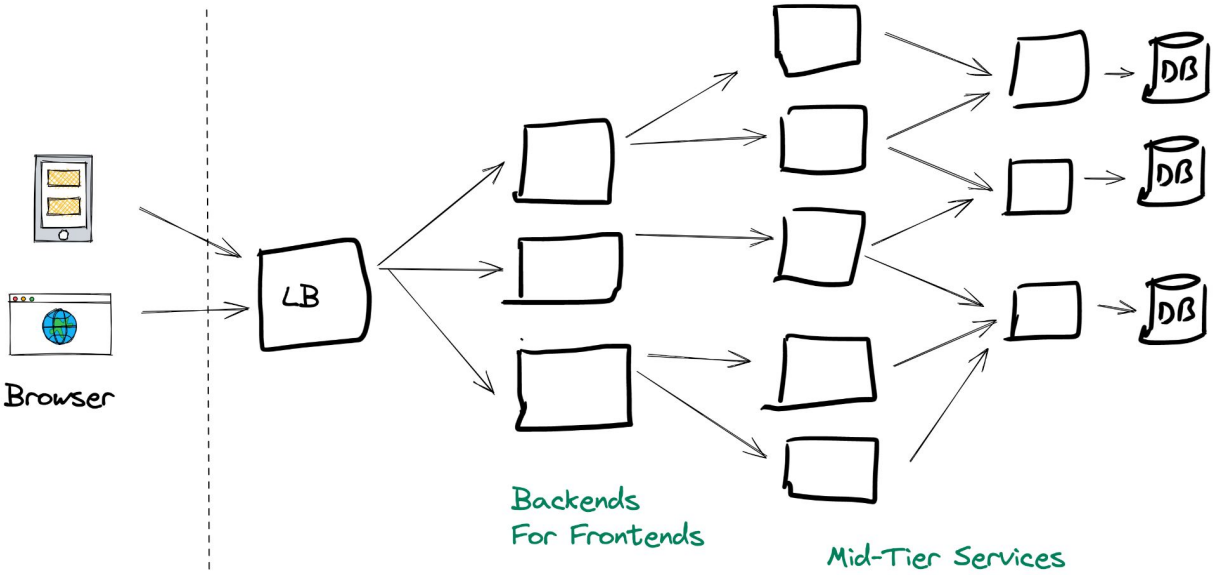
Early Days: Monolithic Architecture



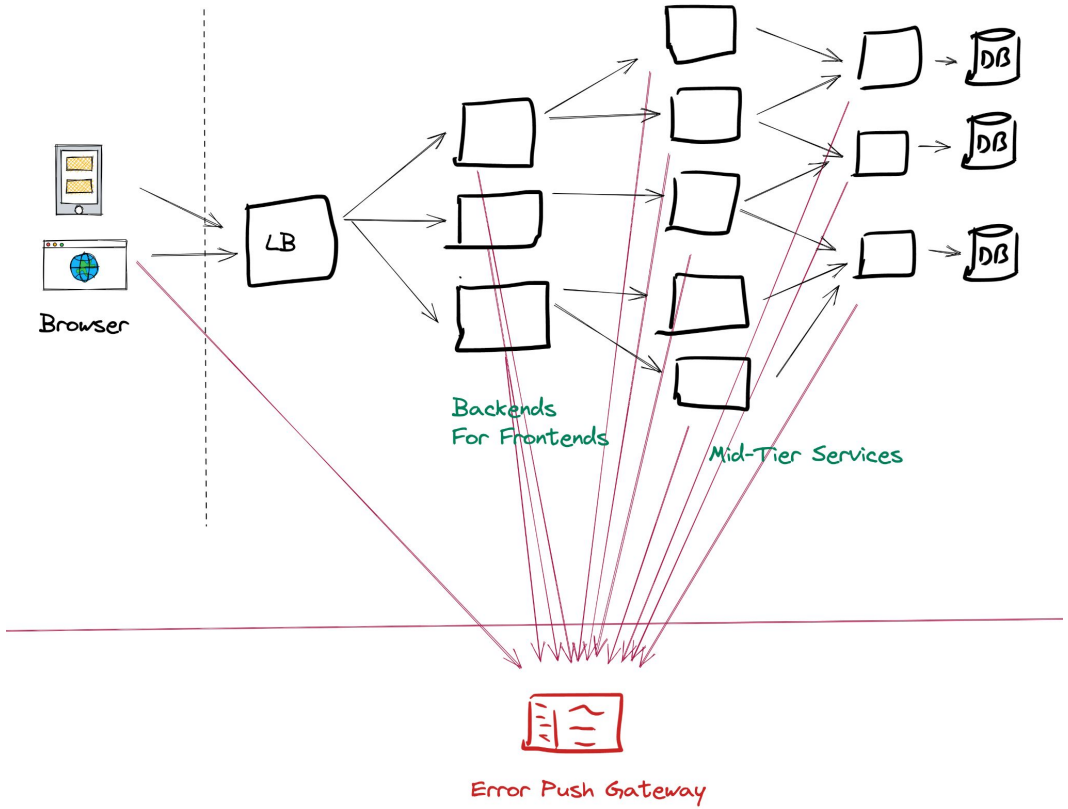
Early Days: Monolithic Architecture



Micro-Service Architecture



Micro-Service Architecture



Limitations

Thundering herd issues

A single bad deploy for a microservice would create a **spike** of errors, exhausting the entire quota for the month.

Self hosted solutions would need to be overprovisioned, be ready to auto-scale very fast or subject to rate limits, risking losing important signals.

Third-Party Vendor

Crossing internet boundaries, **security** and sensitive **data locality** concerns.

Early Alternatives

Log Tailing

Extremely verbose logs, **slow**. Like finding a needle in a needle in haystack.

Issues with log truncation/splitting and out of order processing.

Log Ingestion and Indexing

Initially discarded due to massive **storage** requirements.

TAKING A STEP BACK

What Do We Really Need?

Requirements

- Complete Index of Errors
- Highly Scalable (traffic, instances, clusters)
- Low resource consumption
- Cluster-Local (cloud native)
- Occurrence Sampling and Request Context (reproducible errors)

Non-Requirements:

- Data durability
- Detailed metrics (already provided by Prometheus)
- Client-Based Errors

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Periskop

PERISKOP

Design

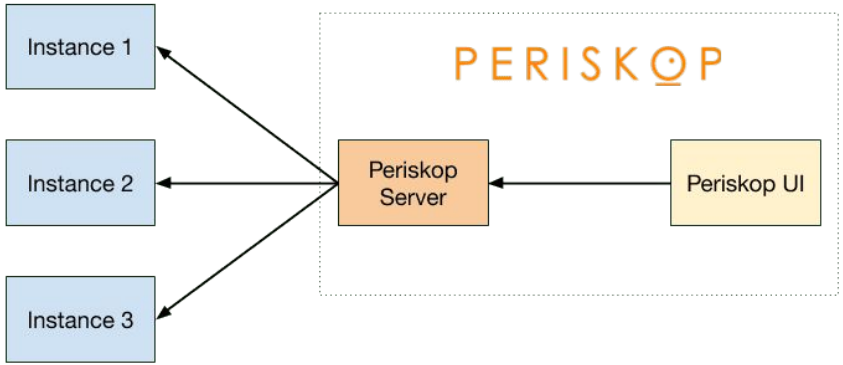
Pull Based Model

Client Library Aggregates and Samples Errors in Memory

The collector builds a unique key with the exception's message and a hash of the stack trace.

Periskop Server Scrapes and Further Aggregates Errors Across Instances

Multiple levels of aggregation possible (federation)



Trade-Offs

Pull Based Model

+ Very Efficient Use of Resources

Sampling and aggregation provide a very low memory footprint. I/O reduced to the minimum.

+ Scales to Very Large Number of Errors and Instantes

+ Decentralized

Hierarchical collection across multiple data centers possible (federation).

- Not Suitable for Short Lived Processes

Fork-based application servers, batch jobs.

- Problematic for Crash-Looping Processes

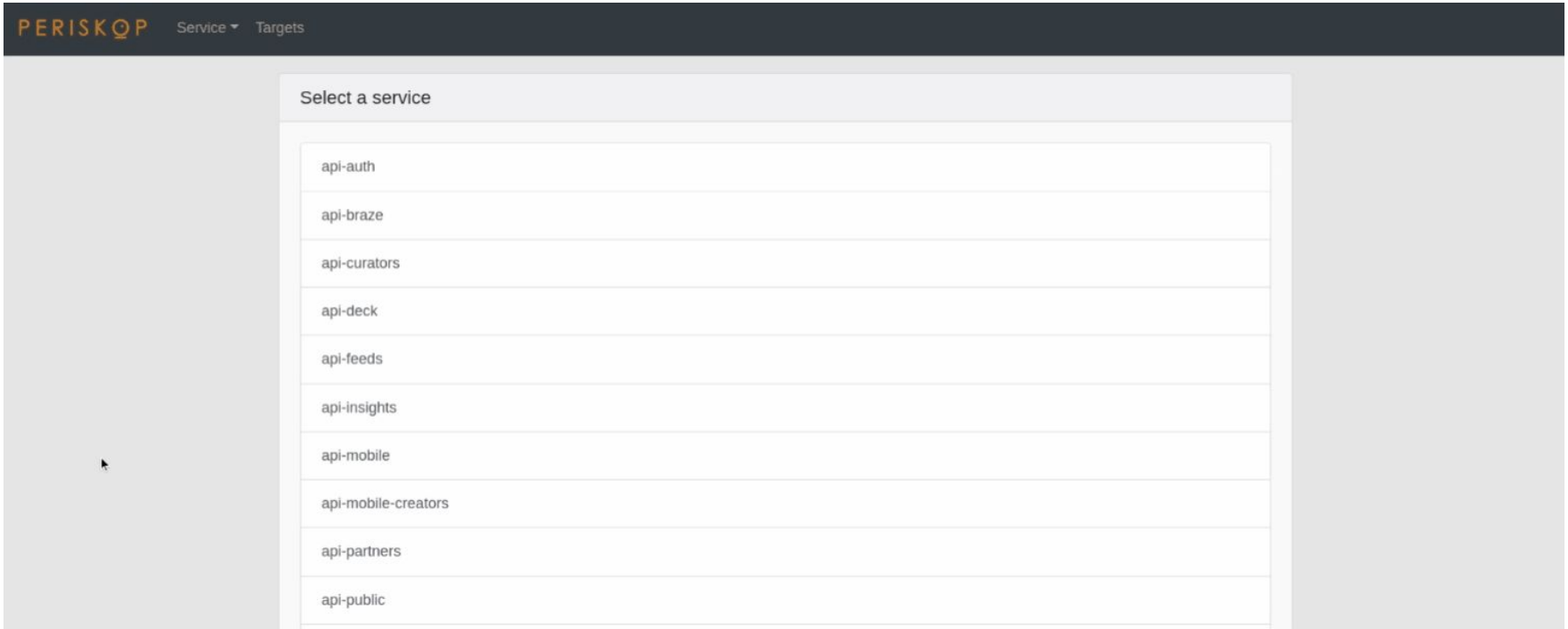
Panics, OOMs

- Less flexibility for Aggregation Strategies

Main Features

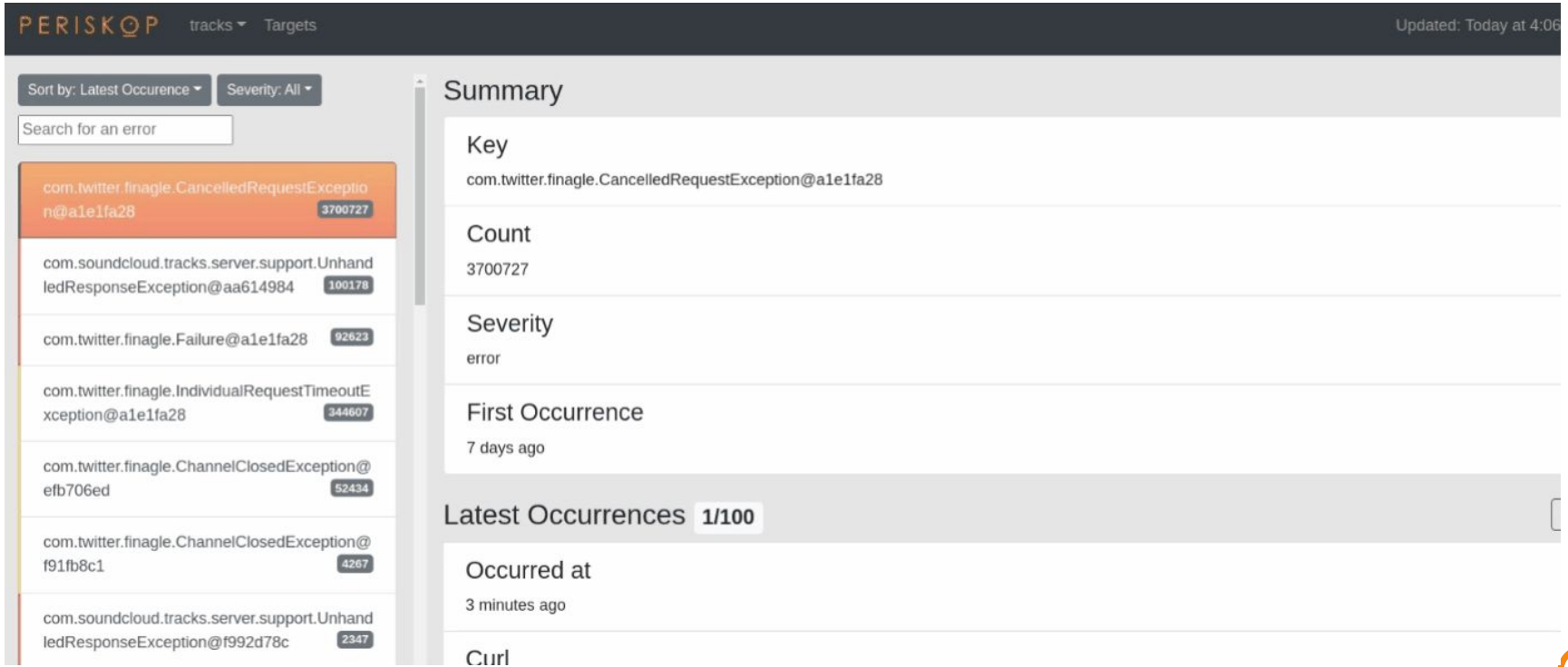
Periskop UI

Services and errors navigation



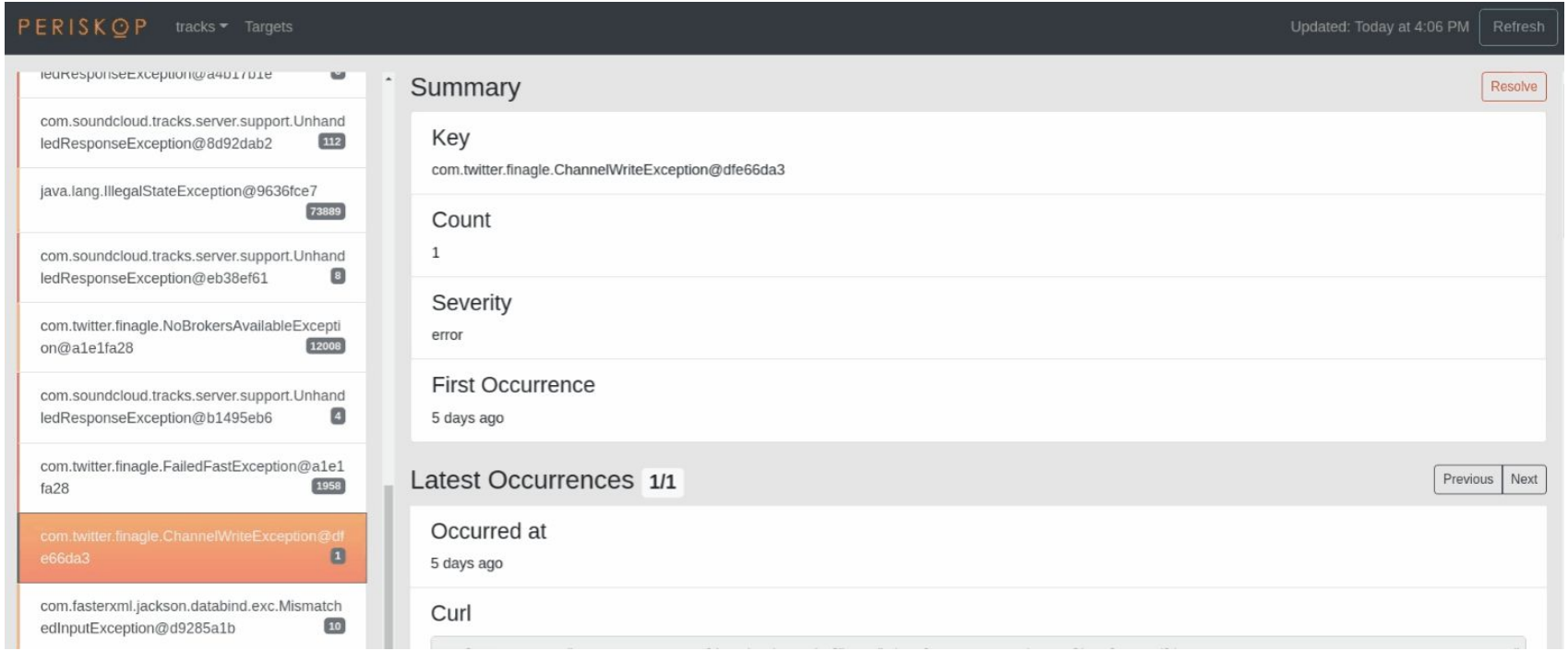
Periskop UI

Error search and filtering



Periskop UI

Mark errors as resolved



Client libraries

Current client implementation of Periskop in the following languages

- Go
- Scala
- Python
- Ruby

periskop-go

```go
func main() {
    c := periskop.NewErrorCollector()

    // Without context
    c.Report(faultyFunc())

    // With HTTP context
    c.ReportWithHTTPContext(faultyFunc(), &periskop.HTTPContext{
        RequestMethod:  "GET",
        RequestURL:     "http://example.com",
        RequestHeaders: map[string]string{"Cache-Control": "no-cache"},
        RequestBody:    nil,
    })

    // Call the exporter and HTTP handler to expose the
    // errors in /-/exceptions endpoints
    e := periskop.NewErrorExporter(&c)
    h := periskop.NewHandler(e)
    http.Handle("/-/exceptions", h)
    http.ListenAndServe(":8080", nil)
}
```


periskop-python

```
if __name__ == "__main__":
    collector = ExceptionCollector()
    try:
        faulty_func()
    except Exception as exception:
        collector.report(exception)
```


Plugable Service Discovery

Prometheus Based

Same SD mechanism as Prometheus

Many types supported

Same Configuration Format

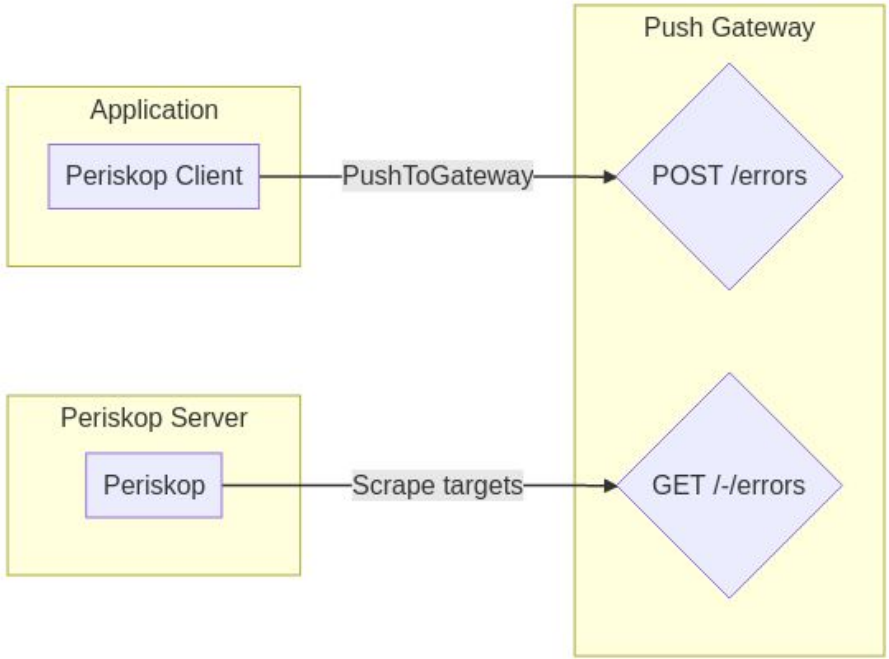
```
services:
- name: mock-target
  dns_sd_configs:
  - names:
    - localhost
    refresh_interval: 10s
    type: A
    port: 7778
  scraper:
    endpoint: "/errors"
    refresh_interval: 10s
```


Push capabilities

Using pushgateway service

For the the cases of fork-based application servers or batch jobs.

Use as sidecar container



Roadmap and Future

Roadmap

Built-in federation (Hierarchical Collection)

Time Series Visualization

More Integrations (Backstage, Grafana?)

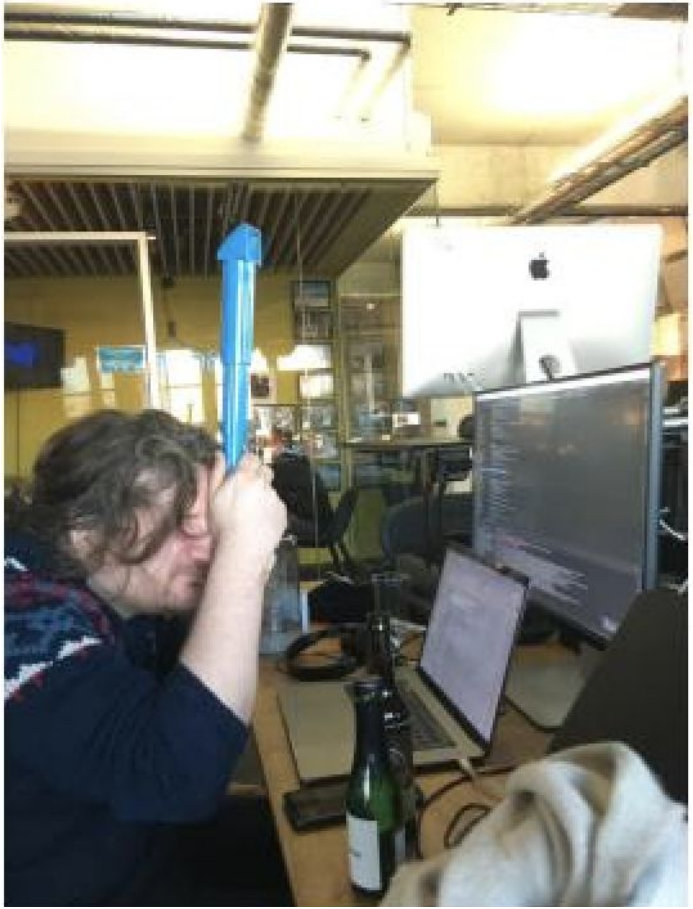
More Languages and Frameworks Supported

Labelling of Errors

Fun Facts

Periskop: The Name

Inspired by a Very Interesting Office Device



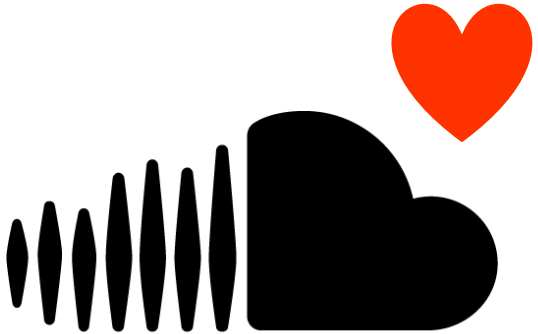
Early Contributors Exchanged Roles

Initial Goal: Solve an existing problem while learning something new

Go Backend Initially built by Android and iOS Engineers

Front-End in Typescript/React by Backend Engineers

Usage of Self Allocated Time (SAT) (thanks SoundCloud!)



Conclusion

Key Takeaways

Periskop is a FOSS exception monitoring system for the cloud

Pull based systems offer good scalability characteristics with some trade-offs

Focus on your needs, optimize your resources

Never stop building new things, learning and contributing

Contribute

https://periskop.io

2022

THANK YOU

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