Causality based Profiling

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Causality/Based Profiling

Motivation

Profiling - Motivation

- Time from start to end of operation
- Resource usage
- Resource utilization
- Items processed per time unit
- QoS
- Snappy-ness
- ..

Profiling yields

Measures time spent in scopes


choices

Profling - Choices

- https://lib.rs/crates/flamegraph

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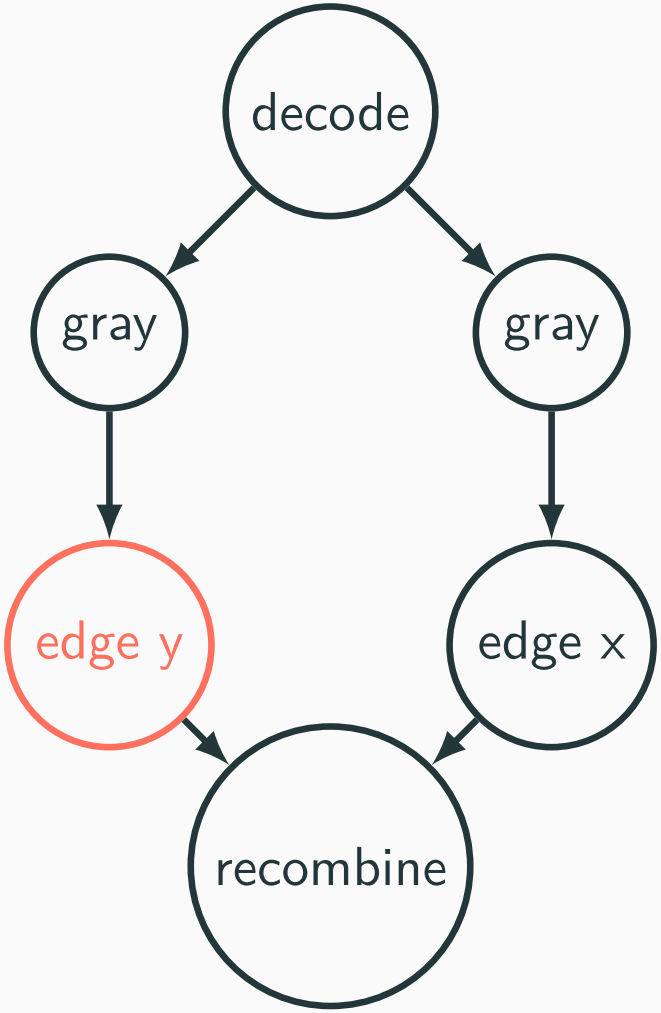
- https://lib.rs/crates/mick-jaeger

Profling - Demo App Architecture



flamegraph

Profling - Flamegraph

Profling - Flamegraph

List of spent time per scope.

Profling - Flamegraph

List of spent time per scope.

Hint: Try to keep an eye on the threads

Demo: flamegraph

How does that help us?

What's our goal?

Optimize

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- Throughput
- Latency

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of the end to end execution

Optimize

- Throughput
- Latency

of the end to end execution in heavily threaded applications.

Influence of Locking

Component/Scope vs System/Service

Causality Based Profiling

Causality Based Profiling

coz

coz - throughput

```
// Throughput
coz::scope!("foo");

// equiv to:

coz::begin!("foo");
// ..
coz::end!("foo");
```

coz - latency

```
// Latency
coz::progress!("foo");
```


Scarlet BANDIT
CHECKER SCHUCK'S KRAGEN
AUTO PARTS
HUGHES
FRAM
Autolite

Demo: coz

How it works - semantics

- Performance measurements
- Delay injection for all threads other than the one running the $f(x)$
- Randomized delays

How it works - mechanics outline

- LD_PRELOAD
- Intercept posix API
- Counter and delay tracking per thread

coz

- https://www.youtube.com/watch?v=jE0V-p1odPg
- https://github.com/plasma-umass/coz/
- https://arxiv.org/pdf/1608.03676v1.pdf

Best use cases

- Component ∞ System/Service
- Easily repeatable
- Representative input data distribution
- Determine best investment for the given system

Caveats

- Sampling data points take up to a few hours
- OOM Conditions skew the experiments
- Bezier interpolation of plot representation sometimes misleading

Questions?

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Credits

Presentation by Bernhard Schuster - ahoi.io
Theme by Matze Vogelsang and contributors -
`https://bloerg.netbloerg.net`