



Metrics 和监控

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01

什么是 Metrics



Metric Types



Counter
计数器



Gauge
最简单的 Metric, 反映一个值



Meter
统计吞吐量, 单位时间内发生“事件”的次数



Histogram
统计数据分布, Quantile, Mean, StdDev, Max, Min



Metric Group

- Metric 在 Flink 内部有多层结构，以 Group 的方式组织
- Metric Group + Metric Name 是 Metrics 的唯一标识
- TaskManagerMetricGroup
 - TaskManagerJobMetricGroup
 - TaskMetricGroup
 - TaskIOMetricGroup
 - OperatorMetricGroup
 - *$\${User-defined\ Group} / \${User-defined\ Metrics}$*
 - OperatorIOMetricGroup
 - JobManagerMetricGroup
 - JobManagerJobMetricGroup

02

怎么用 Metrics



System Metrics

- CPU
- Memory
- Threads
- Garbage Collection
- Network
- Classloader
- Cluster
- Availability
- Checkpointing
- StateBackend
- IO
- 详见: <https://ci.apache.org/projects/flink/flink-docs-release-1.8/monitoring/metrics.html#system-metrics>



User-defined Metrics

- 除了系统的 Metrics 之外，Flink 支持自定义 Metrics
- 继承 RichFunction
 - Register user-defined Metric Group:

```
getRuntimeContext().getMetricGroup().addGroup(...)
```

- Register user-defined Metric:

```
getRuntimeContext().getMetricGroup().counter/gauge/meter/histogram(...)
```



User-defined Metrics Example

- Counter processedCount = getRuntimeContext().getMetricGroup().counter("processed_count");
processedCount.inc();
- Meter processRate = getRuntimeContext().getMetricGroup().meter("rate", new MeterView(60));
processRate.markEvent();
- getRuntimeContext().getMetricGroup().gauge("current_timestamp", System::currentTimeMillis);
- Histogram histogram = getRuntimeContext().getMetricGroup().histogram("histogram", new DescriptiveStatisticsHistogram(1000));
histogram.update(1024);
- <https://ci.apache.org/projects/flink/flink-docs-release-1.8/monitoring/metrics.html#metric-types>



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获取 Metrics



Web UI



RESTful API

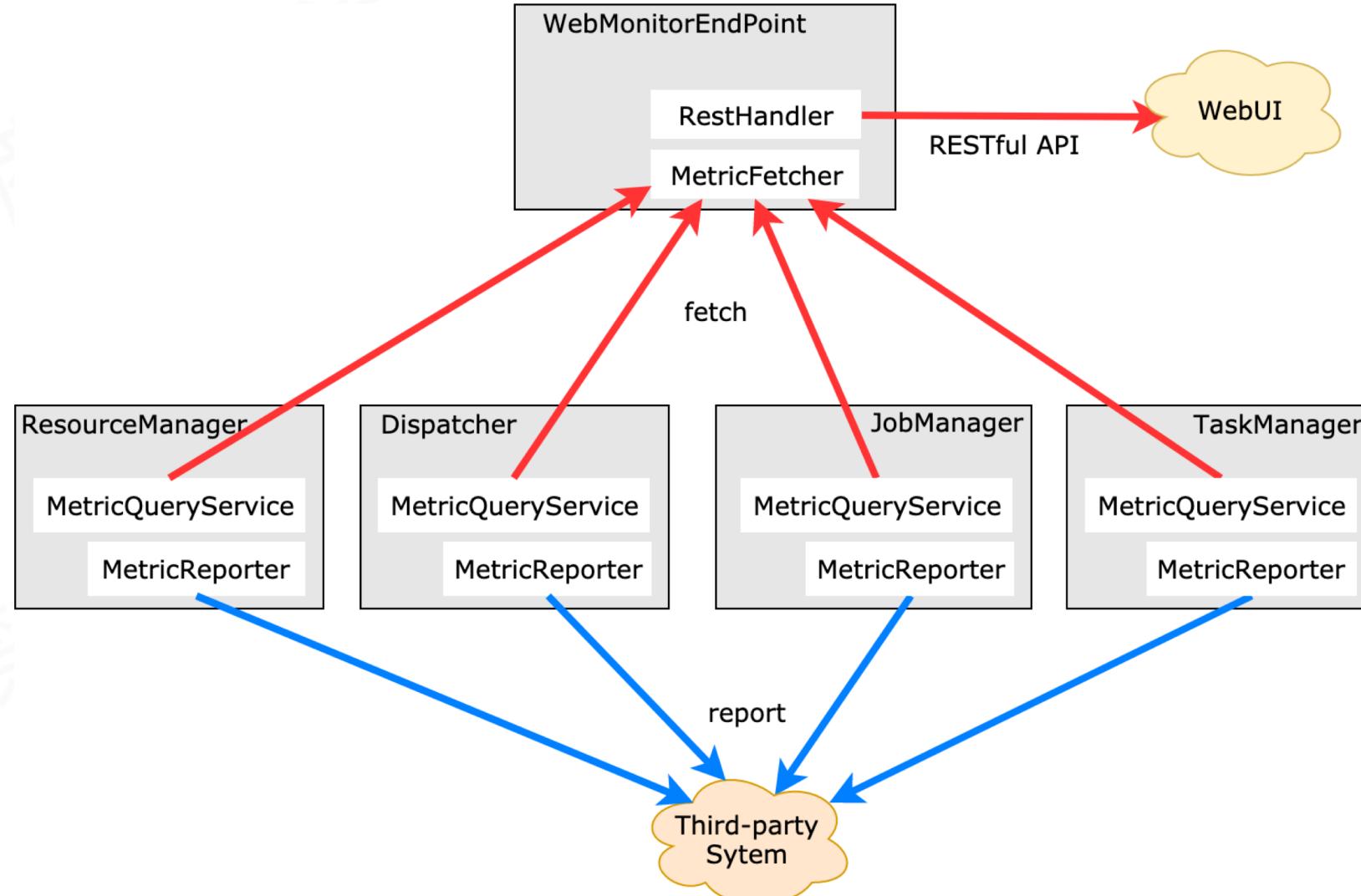
详见: https://ci.apache.org/projects/flink/flink-docs-release-1.8/monitoring/rest_api.html



Metric Reporter



获取 Metrics





Metric Reporter

- Flink 内置了很多 Reporter，对外部系统的技术选型可以参考，详见：
<https://ci.apache.org/projects/flink/flink-docs-release-1.8/monitoring/metrics.html#reporter>
- Metric Reporter Configuration Example

```
metrics.reporters: your_monitor,jmx
```

```
metrics.reporter.jmx.class: org.apache.flink.metrics.jmx.JMXReporter  
metrics.reporter.jmx.port: 1025-10000
```

```
metrics.reporter.your_monitor.class: com.your_company.YourMonitorClass  
metrics.reporter.your_monitor.interval: 10 SECONDS  
metrics.reporter.your_monitor.config.a: your_a_value  
metrics.reporter.your_monitor.config.b: your_b_value
```

03

实战

利用 Metrics 监控



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利用 Metrics 监控



自动化运维



性能分析



自动化运维

定制监控规则
关注关键指标, Failover,
Checkpoint, 业务 Delay

大盘、报表
通过大盘时刻了解作业总体信息
通过报表分析优化



收集 Metrics 作为决策依据

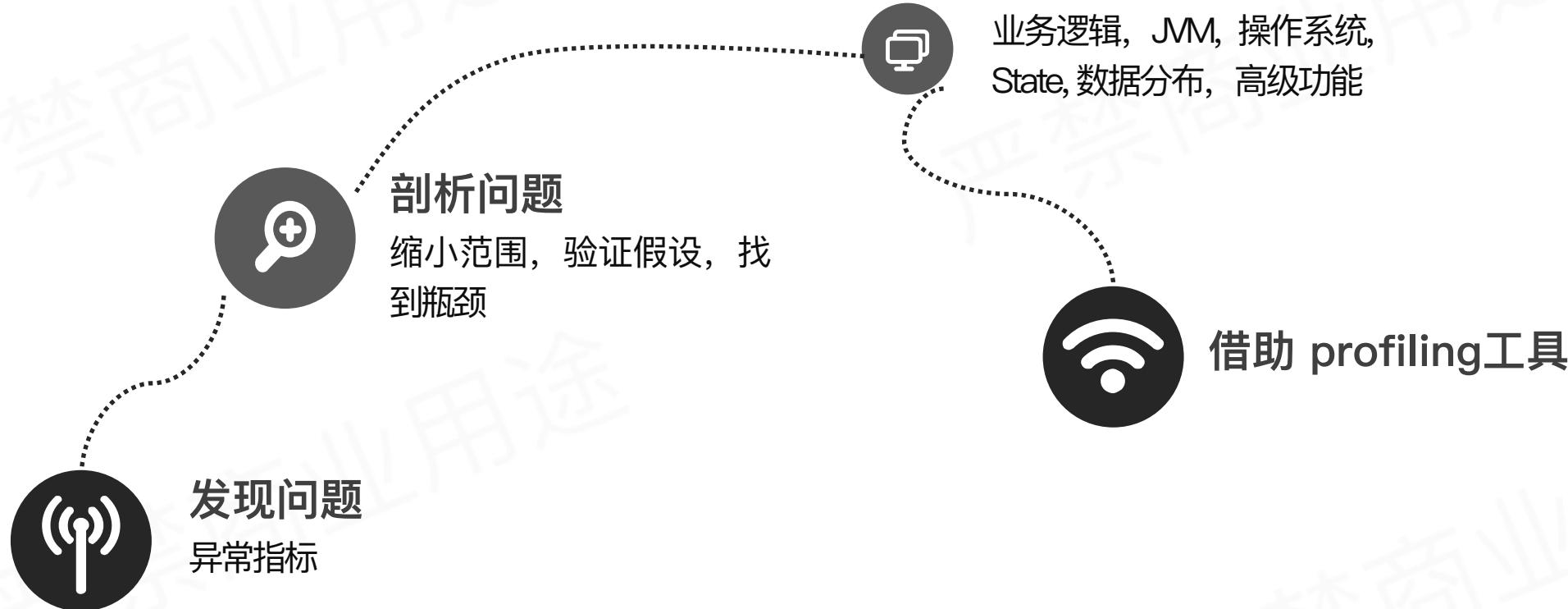
利用 Metric Reporter 收集 Metrics 到
存储/分析系统 (例如 TSDB)
或者直接通过 RESTful API

通知工具

钉钉报警, 邮件报警, 短信报警,
电话报警



性能分析



实战——“我的任务慢，怎么办”

为什么提问没人回答

- 闻者伤心
- 听者流泪
- 提问黑洞
- 话题终结者

为什么

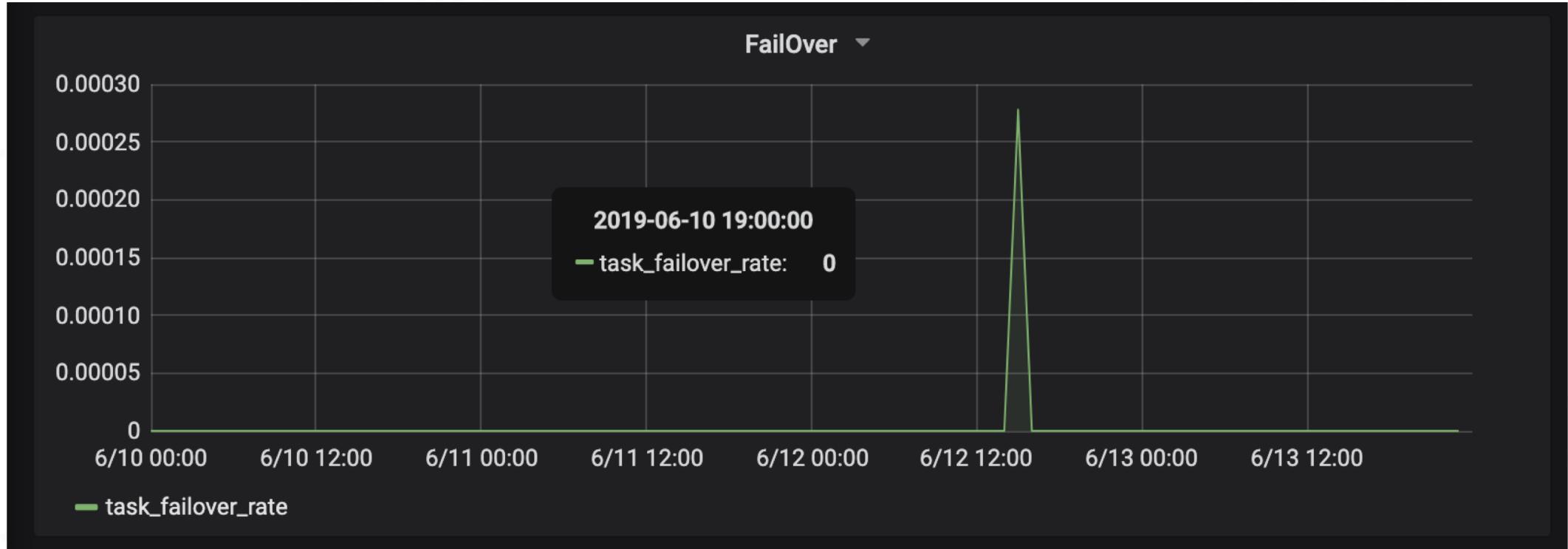
- 黑盒，缺少信息，无法了解系统状态

怎么办

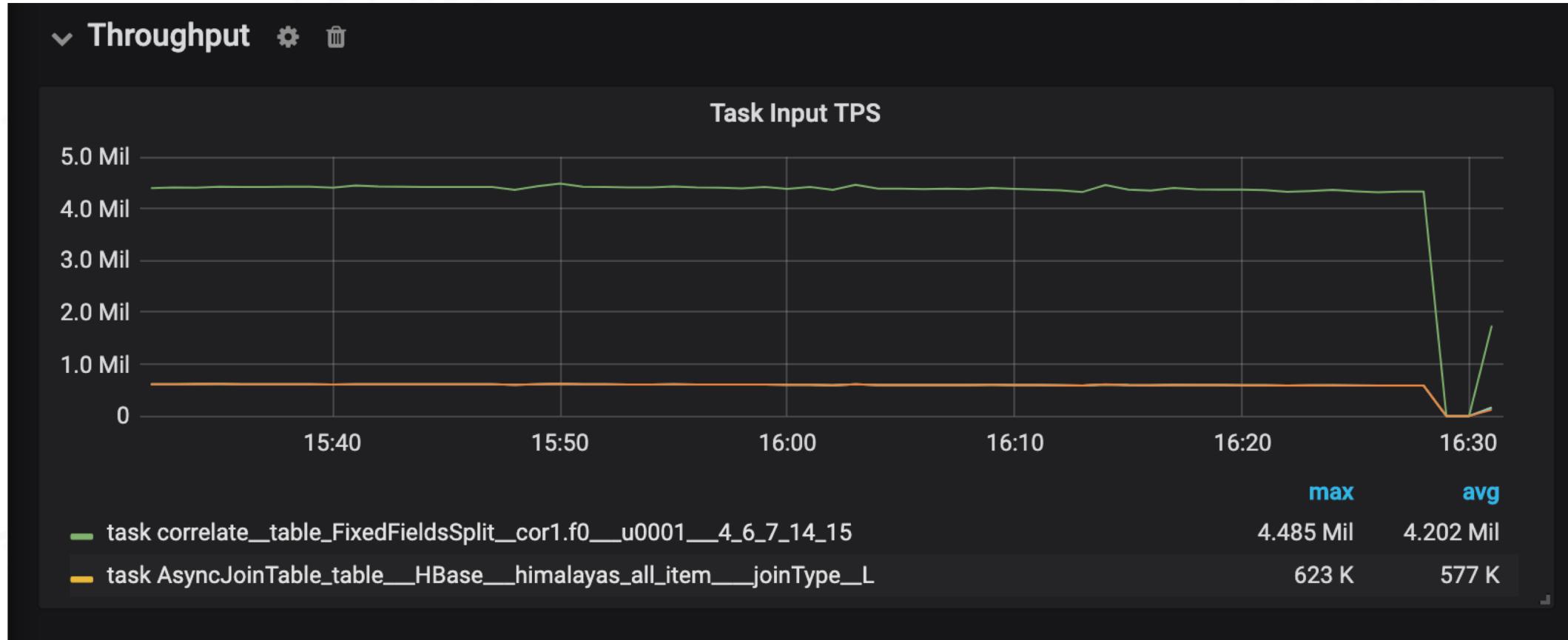
- 求助 Metrics



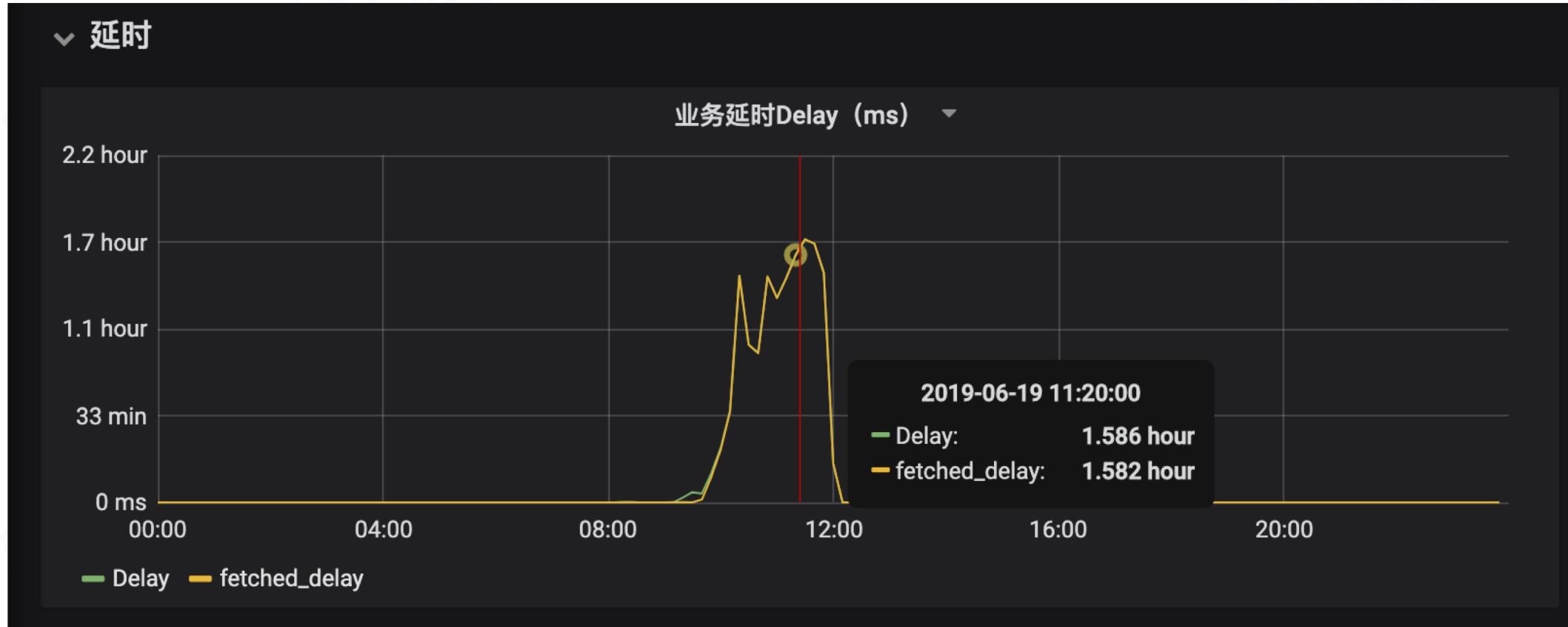
发现问题



发现问题

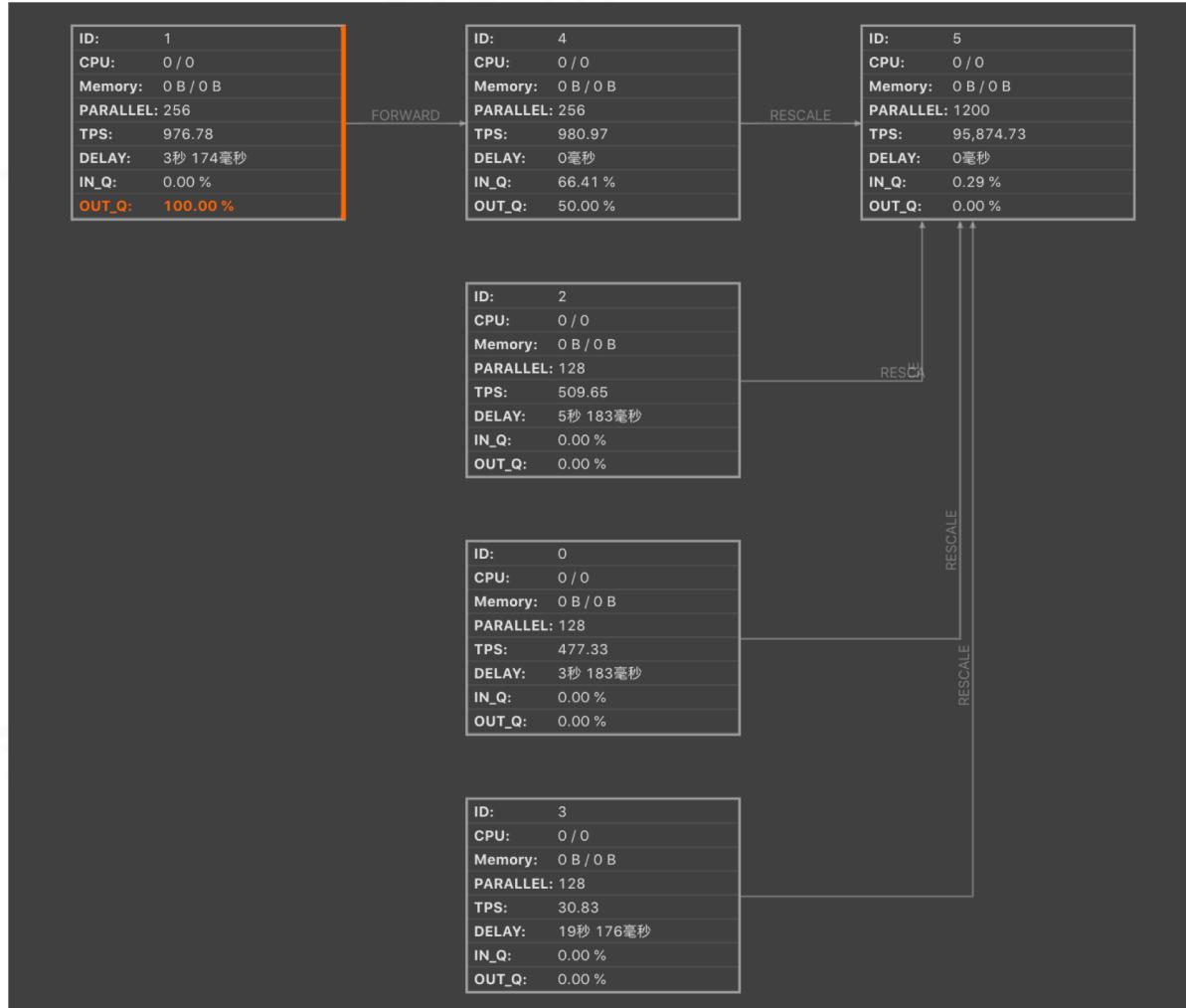


发现问题

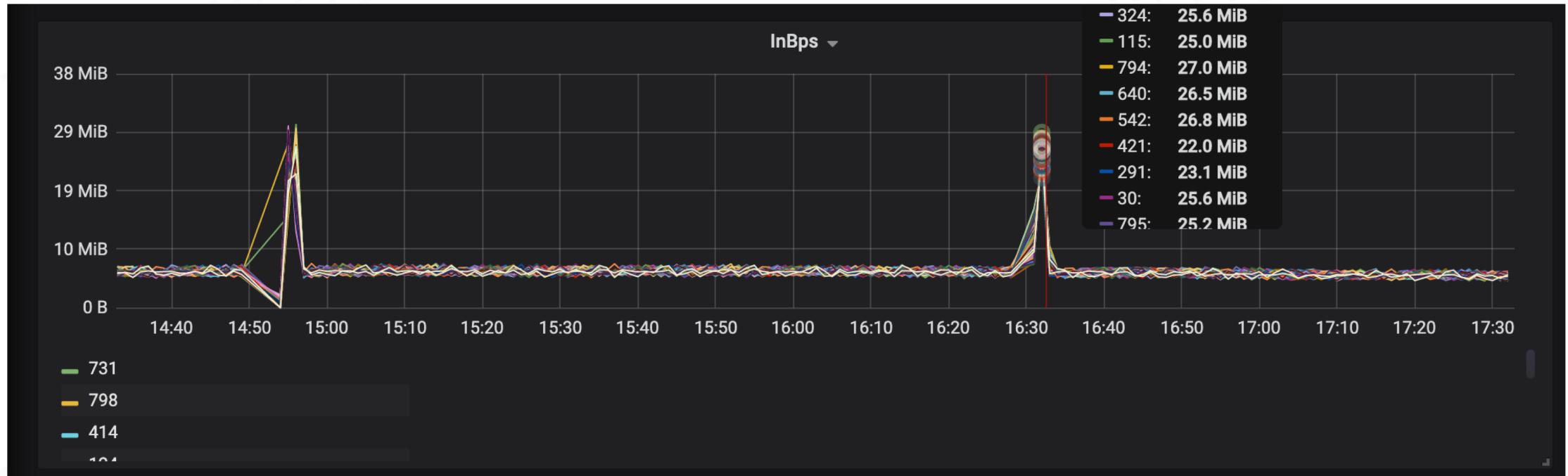




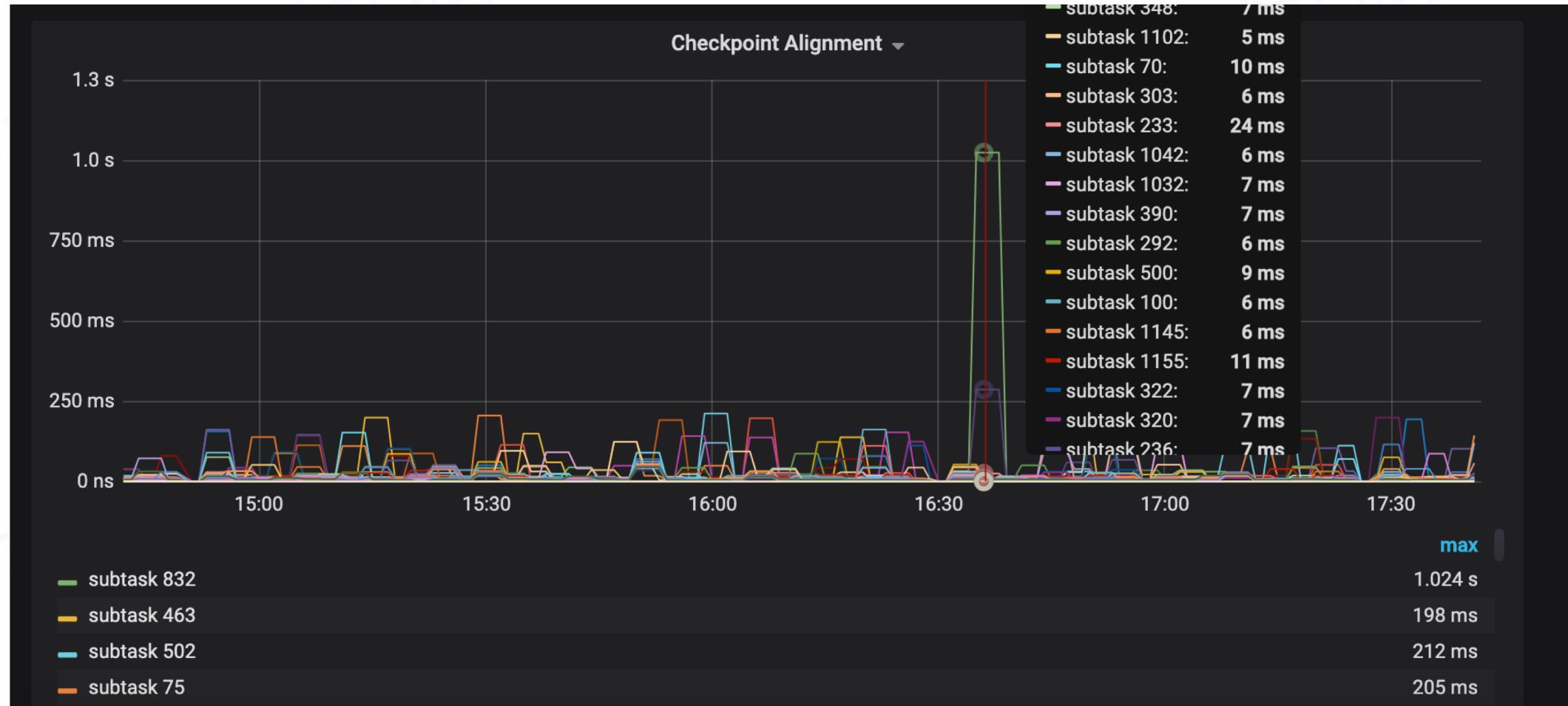
缩小范围，定位瓶颈



缩小范围，定位瓶颈



缩小范围，定位瓶颈





多维度分析

- 业务维度
 - 并发度是否合理
 - 数据波峰波谷
 - 数据倾斜
- Garbage Collection
 - GC log
- Checkpoint Alignment
- State Backend 性能
 - Rockdb
- 系统性能
 - CPU
 - 内存, Swap
 - Disk IO, 吞吐量, 容量
 - Network IO, 带宽



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THANKS

