Evolution of Observability
Tools at Pinterest

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Engineering Manager, Observability
Naoman Abbas

Engineering Manager
Observability

- Operational Metrics
- Alerting
- Log Search
- Distributed Tracing
Pinterest

Helping people discover and do what they love

+300M monthly active users
+200B pins saved
+2000 employees
Agenda

1. Why Observability?
2. Observability Tools
3. Evolution
4. Lessons Learned
Why Observability?
Microservice Architecture
Change Cycle

- Change
- Mitigate
- Deploy
- Root cause
- Monitor
- Issue found
Observability Tools
Statsboard

Operational metrics

- Service dashboards
- Alerts
- Debugging
- Performance tuning
- **2,000** dashboards
- **16,000** alerts
Logsearch

**Debug logs**
- Root cause analysis
- Alerting
Pintrace

### Distributed tracing
- Performance tuning
- Root cause analysis
Evolution
Observability Needs

- Reliable
- Easy to use
- Automated
Tools
Reliability
Usage Growth

Metrics per Minute

- January 2017
- January 2018
- January 2019
- January 2020

Unique Metrics
Tool Architecture

- **Metrics Storage**
  - Graphite -> OpenTSDB -> Sharding -> Goku (in-memory storage)

- **Metrics Processing**
  - Storm -> Spark Streaming -> Job Stream (custom streaming)
Data Reduction

Metrics Aggregation by Service

Host1

Host2

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Data Reduction

Chargeback
Before

```tscript
divideSeries(abs(diffSeries(timeShift(tc.kafka.stats.kafka.server.brokertopicmetrics.mbytesinpersec.perTopic.OneMinuteRate.metrics07{topic=pinlogger},'7d'),tc.kafka.stats.kafka.server.brokertopicmetrics.mbytesinpersec.perTopic.OneMinuteRate.metrics07{topic=pinlogger})), 100)
```

After

```tscript
today = metric
one_week = today.timeShift(Week)
return today.pctDiff(one_week).abs()
```
Integrated Alerts

Health Score (combination of Correctness, Query SR, and Write Delay)

MP: 99.846
TC: 100
OSTRICH: 99.974

Fetched 2 series in 0.223s.
Fetched 3 series in 0.209s.
Fetched 2 series in 0.209s.
Roughly 70% of outages are due to changes in a live system

Google SRE Book
Automated Canary Analysis
Automated Canary Analysis
Automated Root Cause Analysis
Automated Root Cause Analysis
Automated Root Cause Analysis

Trace Analyzer
### Automated Root Cause Analysis

#### Trace Analyzer

**Downstream Services Latency**

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<thead>
<tr>
<th>Service</th>
<th>First traces</th>
<th>Second traces</th>
<th>Difference</th>
</tr>
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<td>99.3975</td>
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<td>pinacle_p2p</td>
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<td>metatron</td>
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<td>8.72428</td>
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</table>

**Downstream Services Calls**

<table>
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<th>Difference</th>
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<tr>
<td>asterix</td>
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</tr>
</tbody>
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Automation Roadmap

- Anomaly detection
- Auto remediation
- Error budgets (SLO/SLI)
Lessons Learned
Lessons Learned

- Avoid tool fragmentation
- Observability is challenging
- Observability is expensive
- Great ROI
Observability Team

Brian Overstreet
Colin Probasco
Dai Nguyen

Humsheen Geo
Peter Kim
Wei Zhu
Acknowledgements

- Storage and Caching team (HBase, Goku)
- Logging team (Kafka)
- BDP team (Compute platform for Spark)
We’re hiring! Come work with us!
Questions