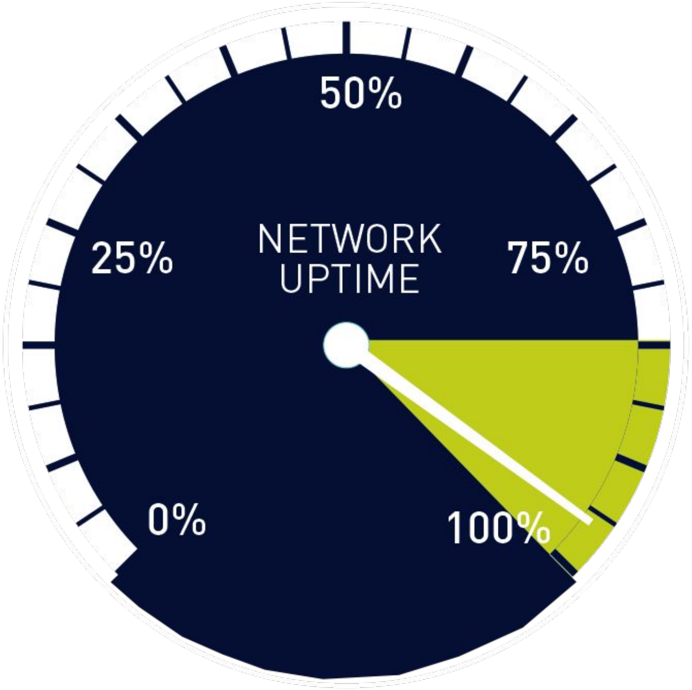
SESSION EIGHT

Resiliency with Spring
Spring Cloud Circuit Breakers

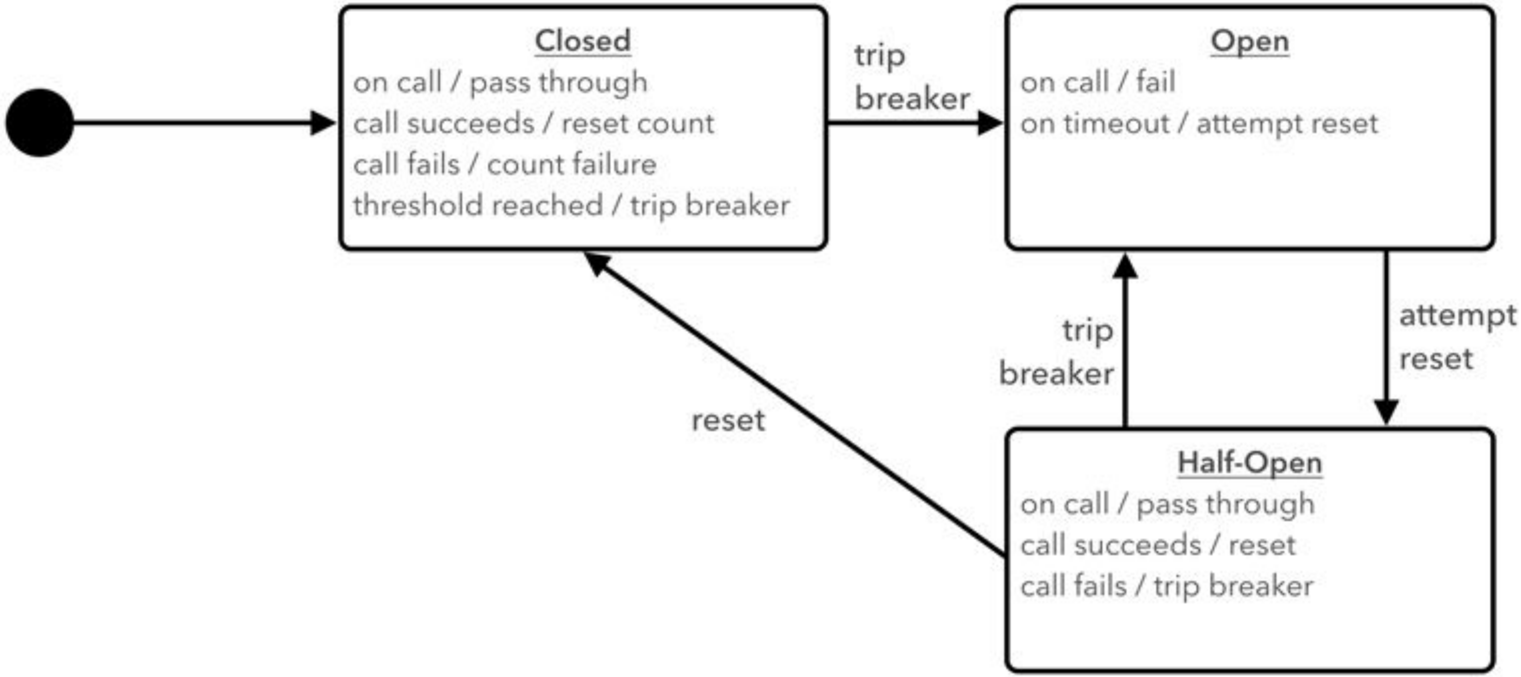
Fault Tolerance

Service Level Agreements

- No Cascading Failures
- 99.9%
  - **8h45m Yearly**
- 99.99%
  - **52m Yearly**
- Reality is Often Worse



Circuit Breaker Pattern



Closed
on call / pass through
call succeeds / reset count
call fails / count failure
threshold reached / trip breaker

trip breaker

Open
on call / fail
on timeout / attempt reset

attempt reset

trip breaker

reset

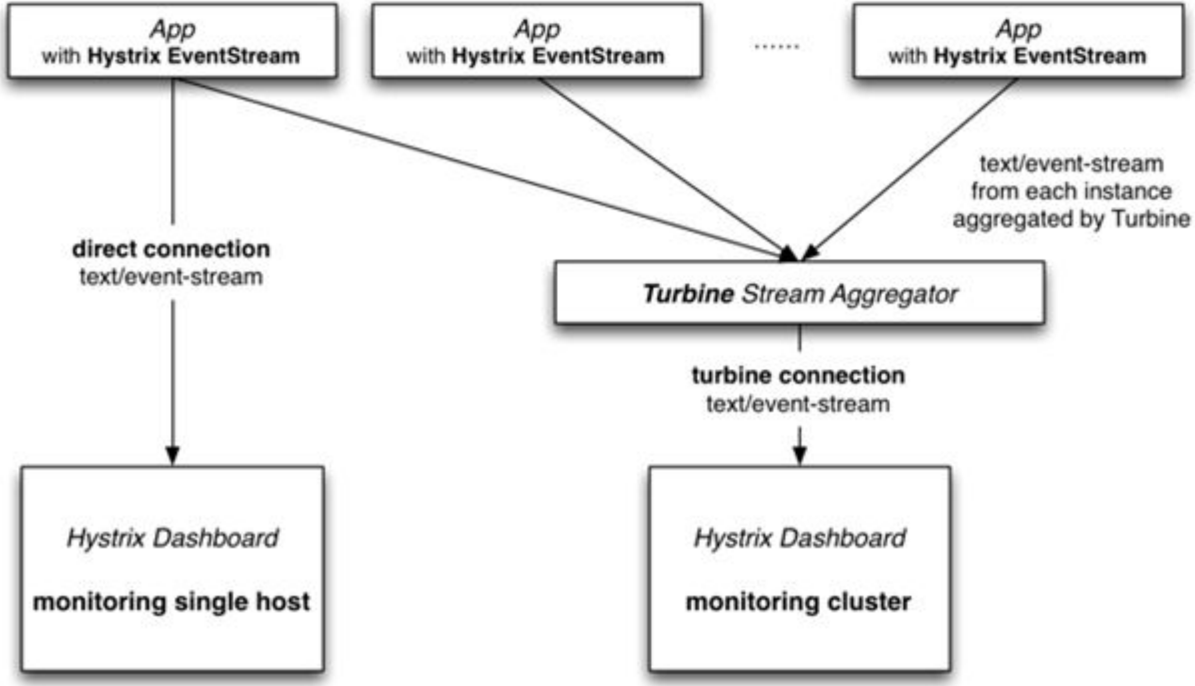
Half-Open
on call / pass through
call succeeds / reset
call fails / trip breaker

Spring Cloud with Hystrix

Instrumentation through Dependency Injection

- Hystrix Publishes Per-Implementation Metrics
  - Informational and Status
  - Gauges and Counters
  - Latency Percentiles
  - Latency Percentiles for End-To-End Execution
  - Property Values
- Integration with Spring Actuators
- *Optional* Publishing via Turbine and RabbitMQ

Hystrix with Turbine



App
with **Hystrix EventStream**

App
with **Hystrix EventStream**

......

App
with **Hystrix EventStream**

text/event-stream
from each instance
aggregated by Turbine

direct connection
text/event-stream

Turbine *Stream Aggregator*

turbine connection
text/event-stream

Hystrix Dashboard

monitoring single host

Hystrix Dashboard

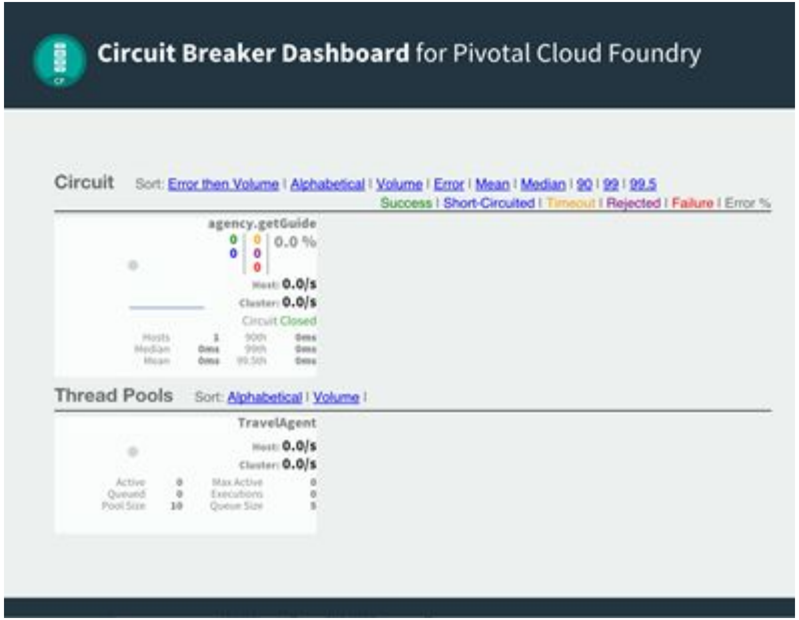
monitoring cluster

Pivotal

Spring Cloud Services for Pivotal Cloud Foundry

Better Together

- Automated Deployment
  - Dashboard
  - Turbine
  - RabbitMQ
- Service Bindings
- *Optional* Spring Starter Dependency



Circuit Breaker Dashboard for Pivotal Cloud Foundry
Circuit
Sort: Error then Volume | Alphabetical | Volume | Error | Mean | Median | 90 | 99 | 99.5
Success | Short-Circuited | Timeout | Rejected | Failure | Error %
Thread Pools
Sort: Alphabetical | Volume |

```
agency.getGuide
0 | 0 | 0.0 %
0 | 0 |
  | 0 |
          Host: 0.0/s
       Cluster: 0.0/s
    Circuit Closed
Hosts    1    90th    0ms
Median 0ms    99th    0ms
Mean   0ms  99.5th    0ms

TravelAgent
          Host: 0.0/s
       Cluster: 0.0/s
Active     0  Max Active   0
Queued     0  Executions   0
Pool Size 10  Queue Size   5
```

Spring Cloud with Hystrix

```
@Service
public class BookService {
  private final RestTemplate restTemplate;

  public BookService(RestTemplate rest) {
    this.restTemplate = rest;
  }

  @HystrixCommand(fallbackMethod = "reliable")
  public String readingList() {
    URI uri = URI.create("http://localhost:8090/recommended");
    return this.restTemplate.getForObject(uri, String.class);
  }

  public String reliable() {
    return "Cloud Native Java (O'Reilly)";
  }
}
```

Spring Cloud with Circuit Breaker

```java
@EnableDiscoveryClient
@EnableCircuitBreaker // <- for Hystrix Integration
@SpringBootApplication
public class QuotesService {

    public static void main(String[] args) {
        SpringApplication.run(QuotesService.class, args);
    }
}
```

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Questions?

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Lab: Spring Cloud Circuit Breaker