



# Scale Java Microservice with Envoy on K8s

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# Apache Dubbo



- Java RPC Framework Open sourced by Alibaba
- Very Popular in China



# Apache Dubbo



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History

htuch	cleanup: string_view and cast cleanups for Google import. (#5139)	Latest commit bff0167 2 days ago
..		
<a href="#">BUILD</a>	dubbo_proxy: implement dubbo filter (#4896)	27 days ago
<a href="#">buffer_helper.cc</a>	dubbo_proxy: Add hessian utils for dubbo proxy filter (#4569)	2 months ago
<a href="#">buffer_helper.h</a>	cleanup: string_view and cast cleanups for Google import. (#5139)	2 days ago
<a href="#">config.cc</a>	dubbo_proxy: implement dubbo filter (#4896)	27 days ago
<a href="#">config.h</a>	dubbo_proxy: implement dubbo filter (#4896)	27 days ago
<a href="#">decoder.cc</a>	dubbo_proxy: implement dubbo filter (#4896)	27 days ago
<a href="#">decoder.h</a>	dubbo_proxy: implement dubbo filter (#4896)	27 days ago
<a href="#">deserializer.h</a>	dubbo_proxy: Add hessian rpc deserialize (#4785)	a month ago
<a href="#">deserializer_impl.cc</a>	dubbo_proxy: Add hessian rpc deserialize (#4785)	a month ago
<a href="#">deserializer_impl.h</a>	dubbo_proxy: Add hessian rpc deserialize (#4785)	a month ago

# Apache Dubbo + RSocket



# RSocket

Application protocol providing Reactive Streams semantics

SPEC JAVA JAVASCRIPT C++ KOTLIN

RSocket is a binary protocol for use on byte stream transports such as TCP, WebSockets, and Aeron.

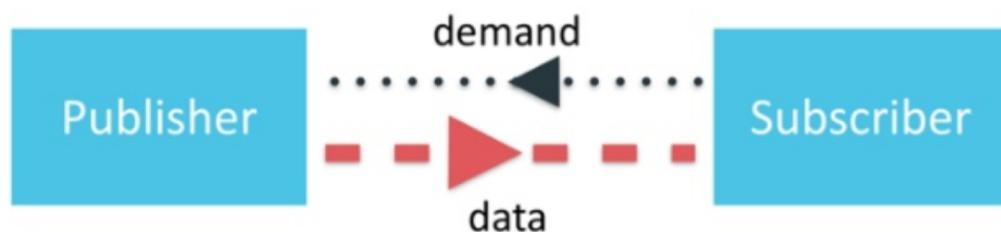
It enables the following symmetric interaction models via async message passing over a single connection:

- request/response (stream of 1)
- request/stream (finite stream of many)
- fire-and-forget (no response)
- channel (bi-directional streams)

# The rise of Reactive programming



- Reactive programming is gaining momentum  
Responsive, Resilient, Elastic and Message Driven.



- Protects the workers from getting over loaded .

# Reactive Stream



# Kubernetes HPA



- K8s Horizontal Pod Autoscaler performs scaling on different metrics
- Default is CPU and Memory utilization
- Custom metrics provided through adapters (i.e. Prometheus)

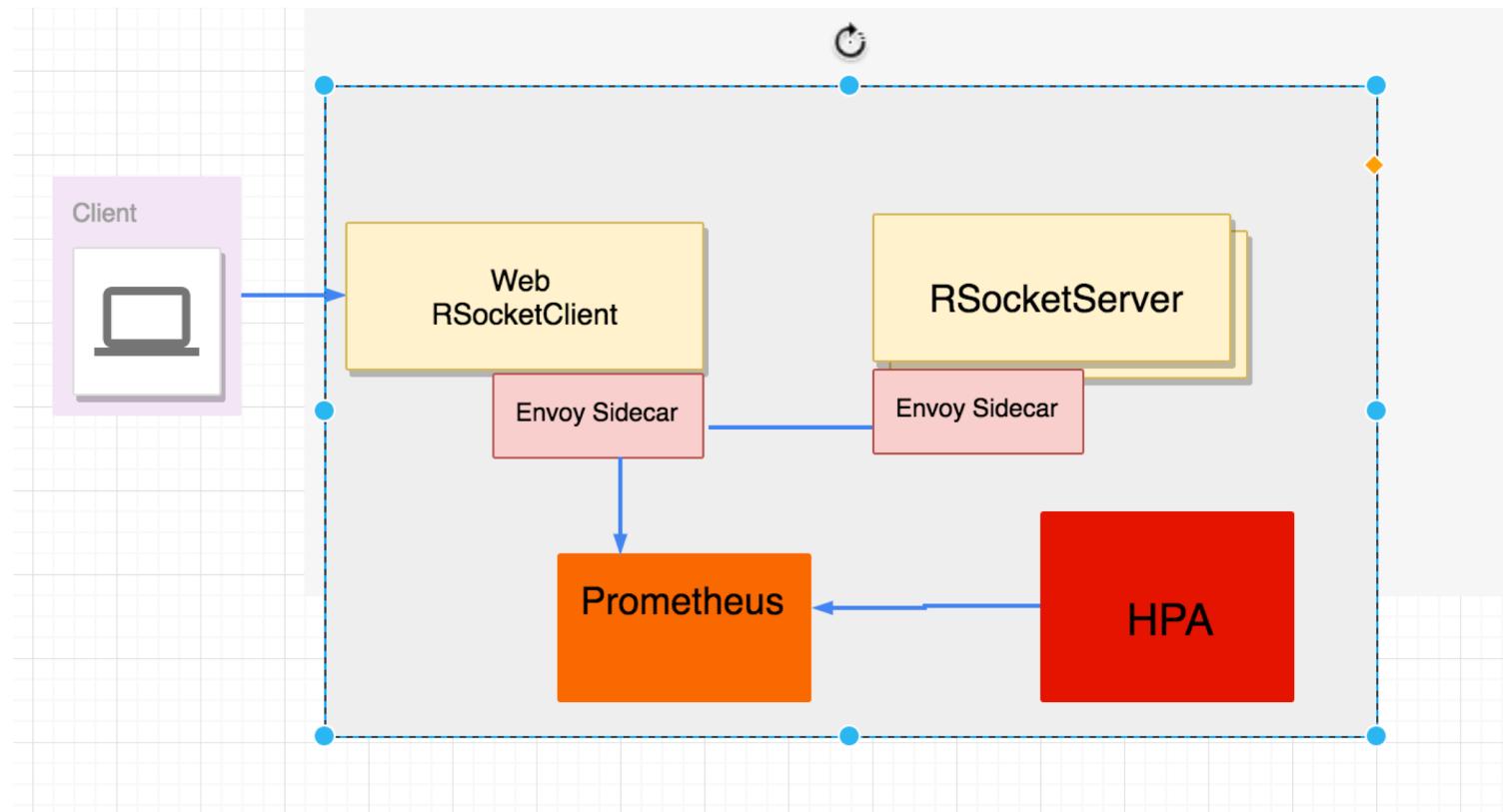
# Challengers for K8s Autoscaler



1. The worker/consumer will not burn out, just slow
2. Scale out using metrics from the provider side



# Overall Architecture



# Envoy coming to help



```
#define ALL_RSOCKET_STATS(COUNTER, GAUGE, HISTOGRAM) \
    COUNTER    (request_counter) \
    COUNTER    (frame_0x0B_counter) \
    GAUGE     (upstream_connection_count) \
    COUNTER    (frame_0x04_request_count) \
    COUNTER    (frame_0x04_response_count) \
    COUNTER    (frame_0x05_request_count) \
    COUNTER    (frame_0x06_request_count) \
    COUNTER    (frame_0x06_response_count) \
    COUNTER    (frame_0x0A_response_count)

// clang-format on

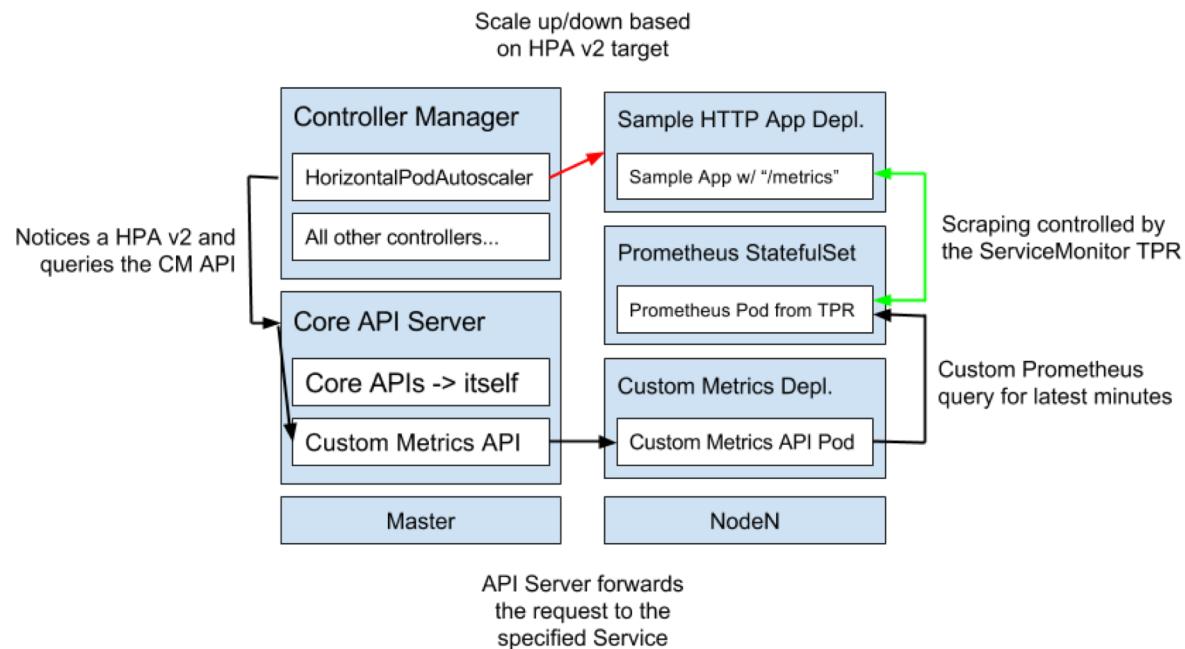
/**
 * Struct definition for all rsocket stats. @see stats_macros.h
 */
struct RSocketStats {
    ALL_RSOCKET_STATS(GENERATE_COUNTER_STRUCT, GENERATE_GAUGE_STRUCT, GENERATE_HISTOGRAM_STRUCT)
};
```

# Envoy coming to help



```
namespace RSocket {
    //on data received
    Network::FilterStatus RSocketFilter::onData(Buffer::Instance &data, bool) {
        ENVOY_CONN_LOG(trace, "tap: got {} bytes", read_callbacks_->connection(), data.length());
        if (isRSocketData(data)) {
            Frame frame{data, this->metadata_type_};
            std::cout << "=====request start=====" << std::endl;
            std::string metric_name = fmt::format("rsocket_type_{}_counter",
                                                   static_cast<int>(frame.getFrameType()));
            this->scope_.counter(metric_name).inc();
            std::cout << frame.toString() << std::endl;
            this->stats_.request_counter_.inc();
            std::cout << "=====request end=====" << std::endl;
        }
        // inject cluster name for next filter
        return Network::FilterStatus::Continue;
    }
}
```

# Kubernetes HPA Custom metrics



## Demo



## Credits



*Libing Chen* Envoy RSocket filter

HPA custom adapter samples:

<https://github.com/DirectXMan12/k8s-prometheus-adapter>

<https://github.com/luxas/kubeadm-workshop>

<https://github.com/stefanprodan/k8s-prom-hpa>



# Thank You!