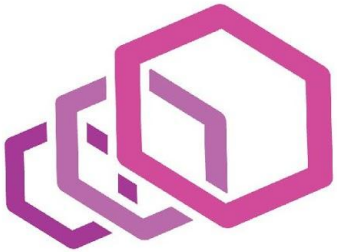
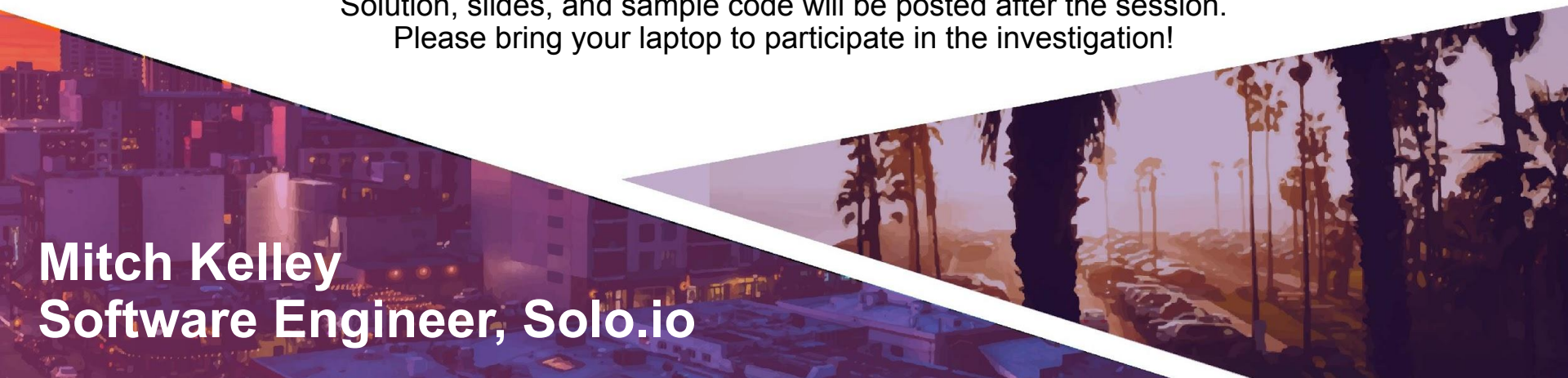


envoycon

Solving Microservice Mysteries with Envoy's Tap Filter

Solution, slides, and sample code will be posted after the session.
Please bring your laptop to participate in the investigation!



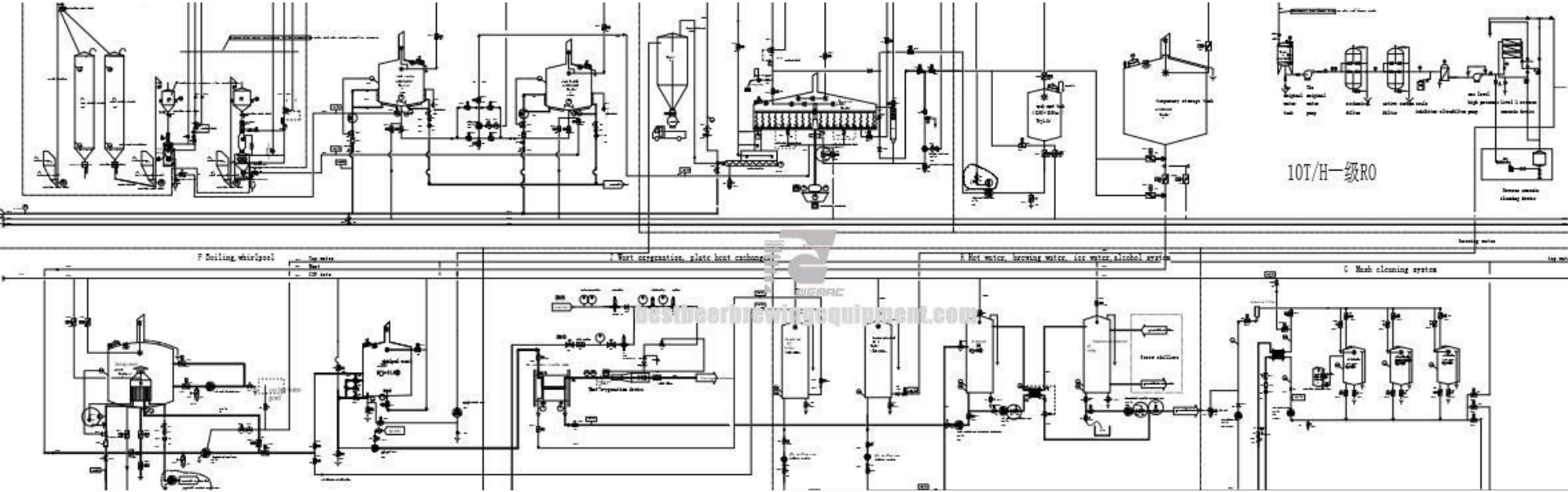
Mitch Kelley
Software Engineer, Solo.io

The **Tap Filter** captures the **headers and bodies** of the **full request and response** when a given **match criteria** is met.

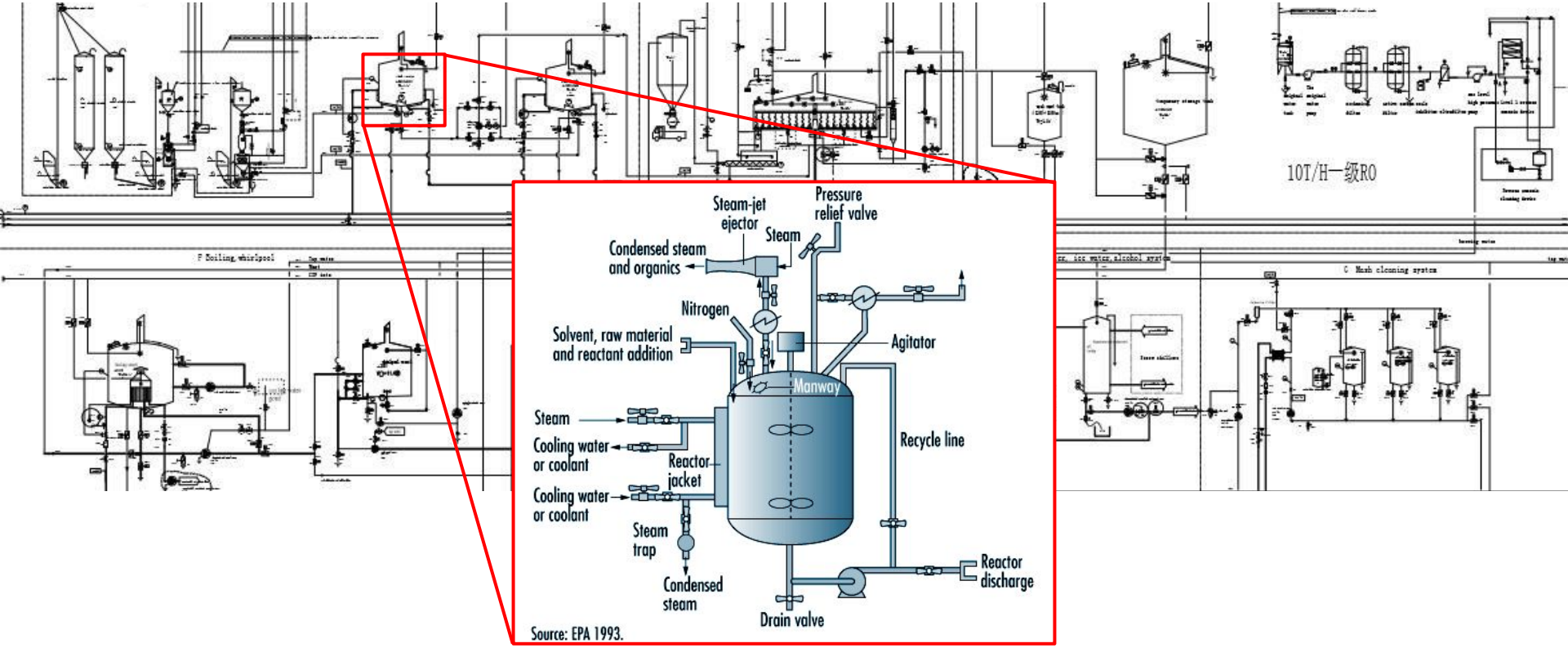
The **Tap Filter** captures the **headers and bodies** of the **full request and response** when a given **match criteria** is met.

```
# Simplest config: match everything, save to filesystem
http_filters:
  - name: envoy.filters.http.tap
    config:
      common_config:
        static_config:
          match_config:
            any_match: true
          output_config:
            sinks:
              - file_per_tap:
                  path_prefix: taps/any
```

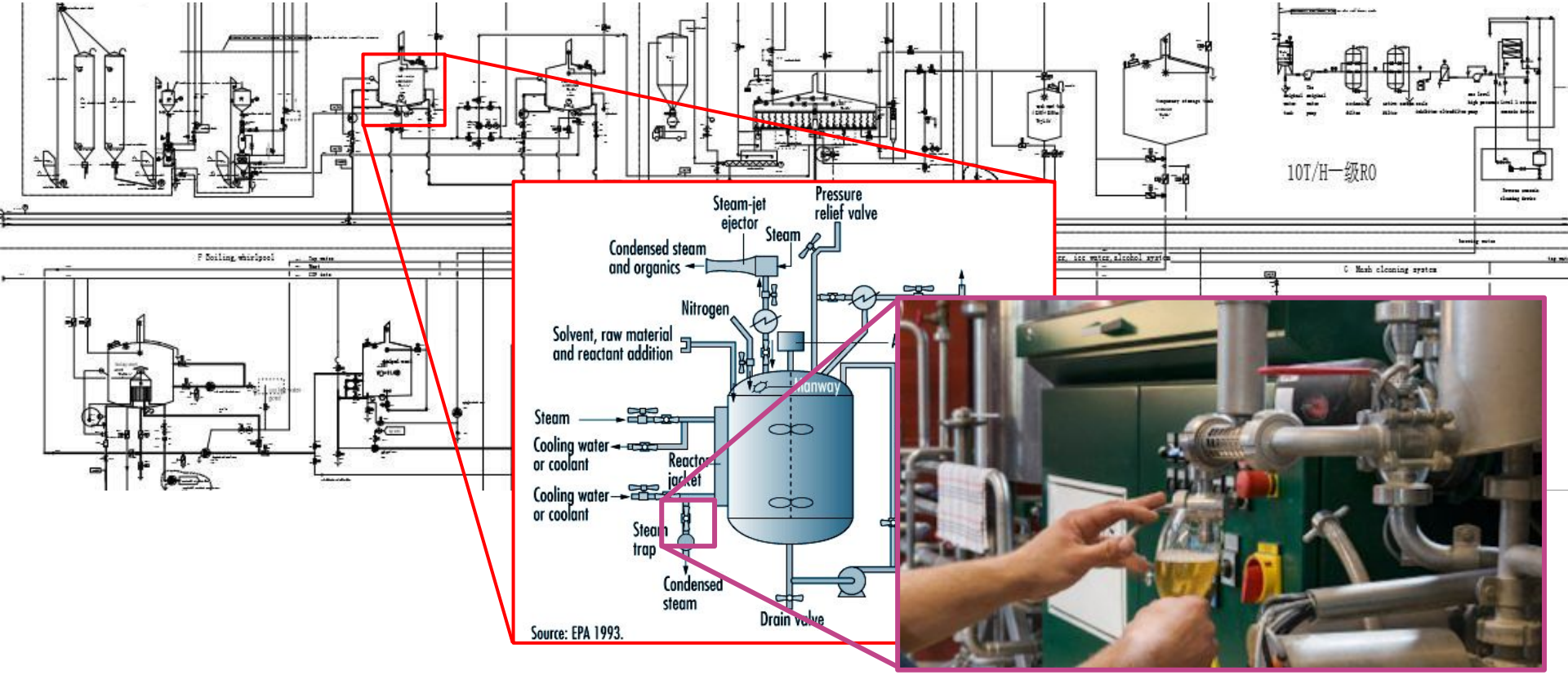
Tap: sample live data flows



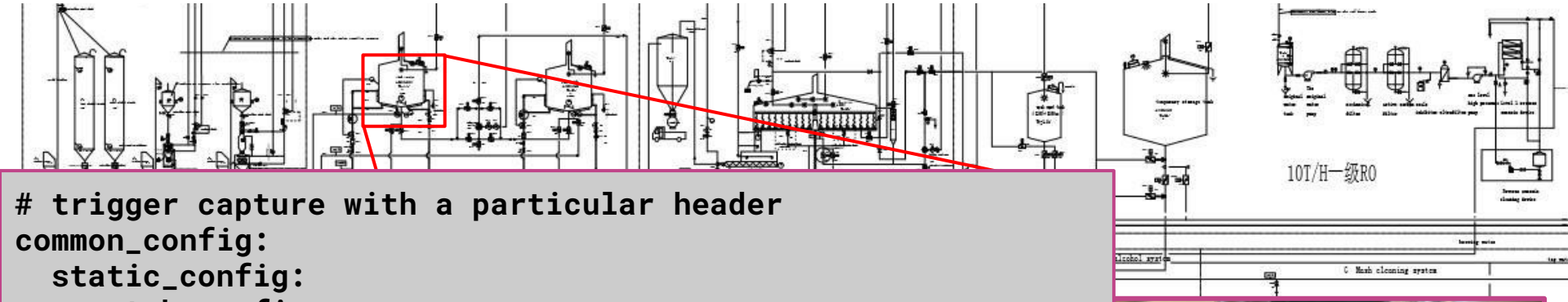
Tap: sample live data flows



Tap: sample live data flows

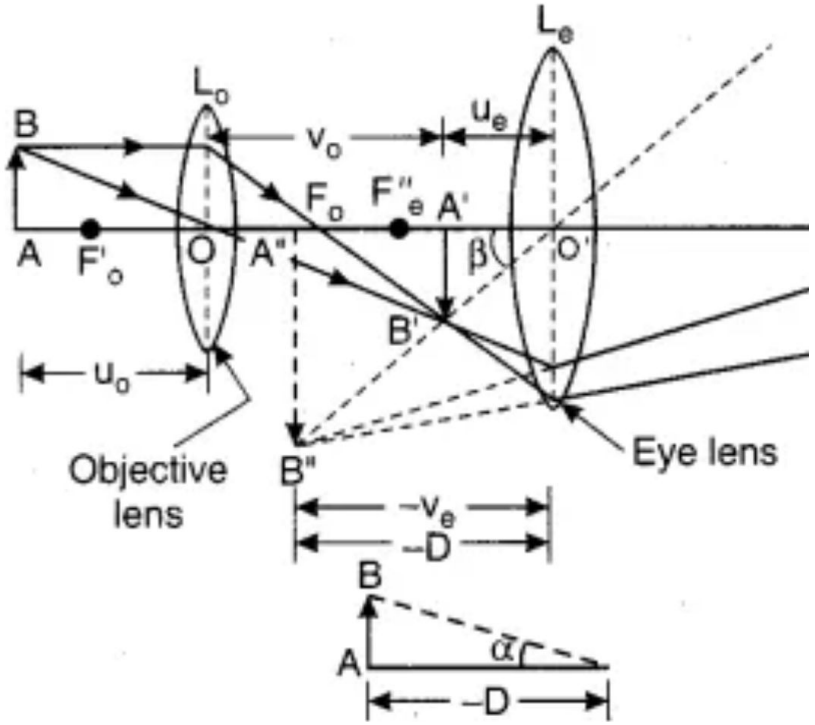


Tap: sample live data flows

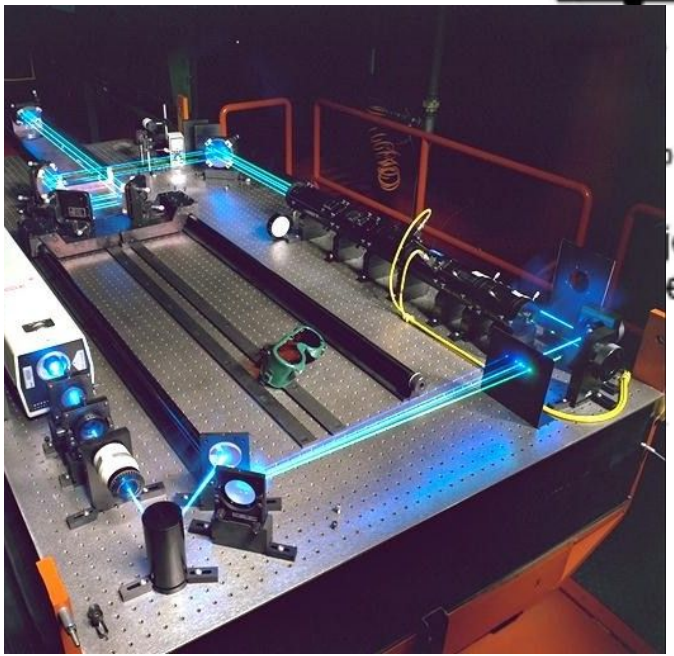


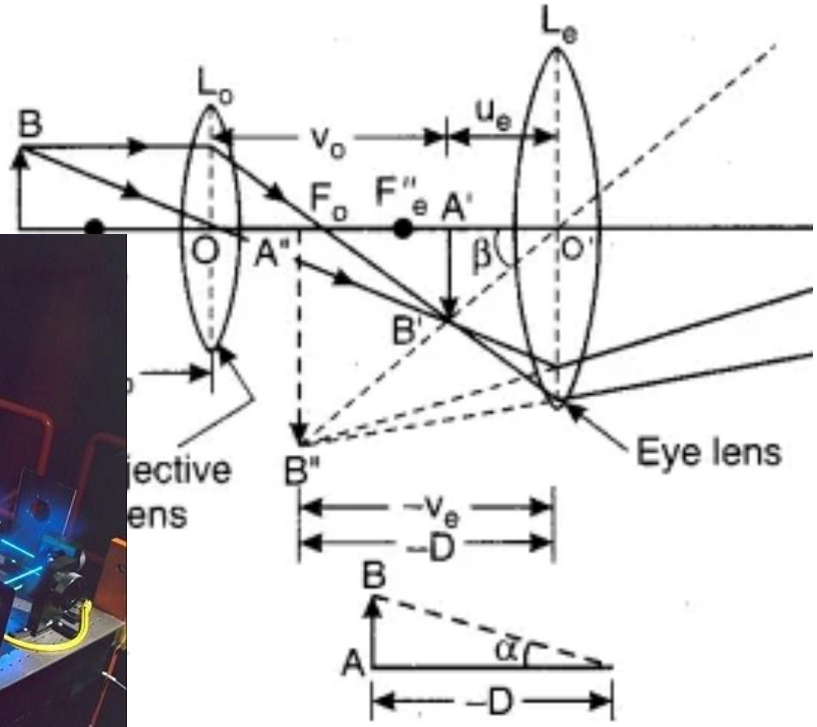

```
# trigger capture with a particular header
common_config:
  static_config:
    match_config:
      http_request_headers_match:
        headers:
          - name: "trigger-sample-capture"
            exact_match: "feature-xyz"
    output_config:
      sinks:
        - file_per_tap:
            path_prefix: tap_root/feature-xyz
  # tap_enabled: [RuntimeFractionalPercent] (coming soon!)
```

Tap: robust configurable observability

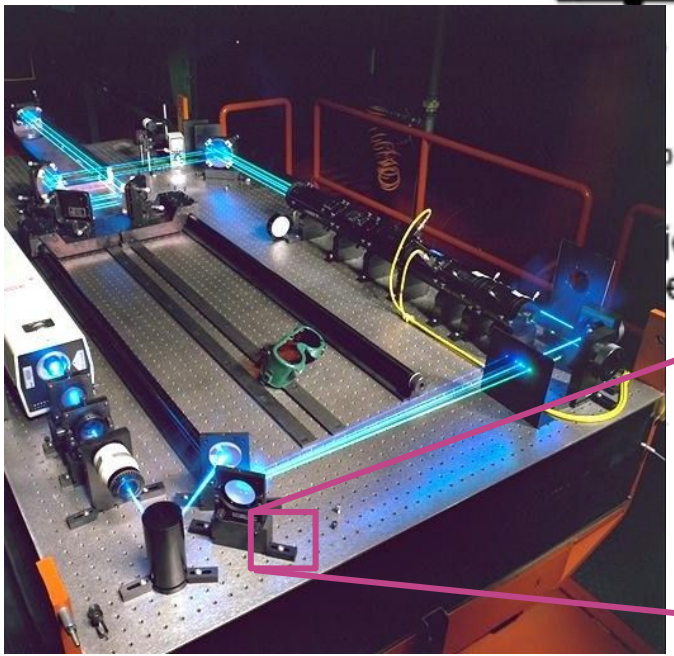


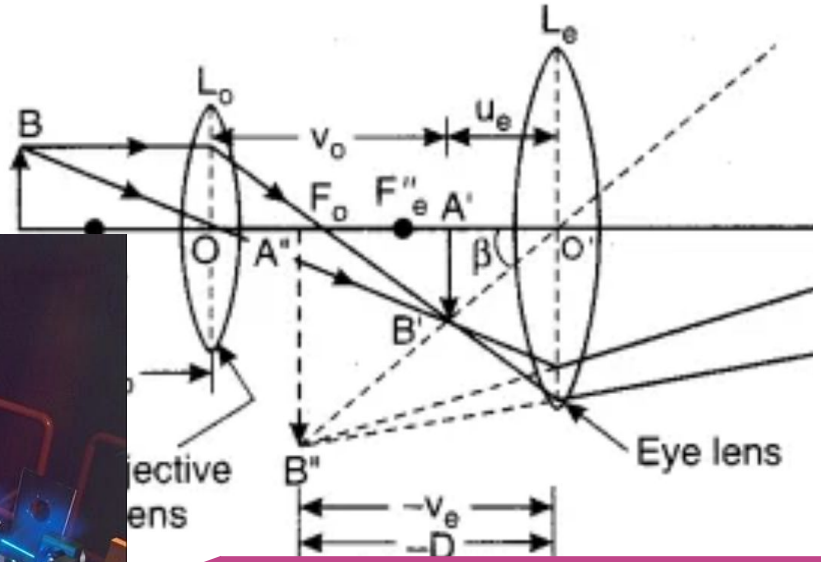
Tap: robust configurable observability

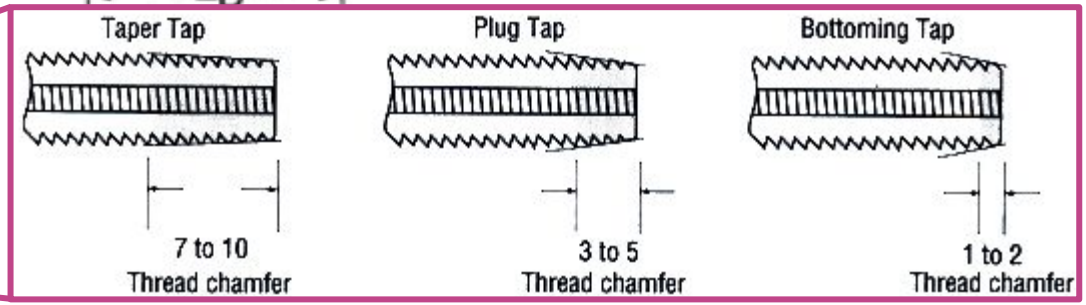




Tap: robust configurable observability

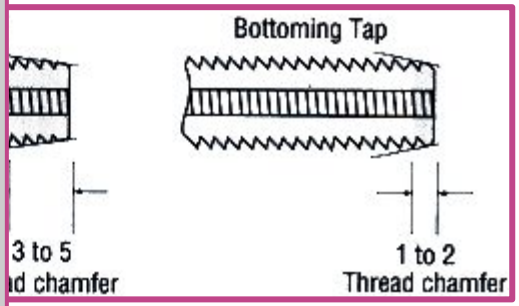




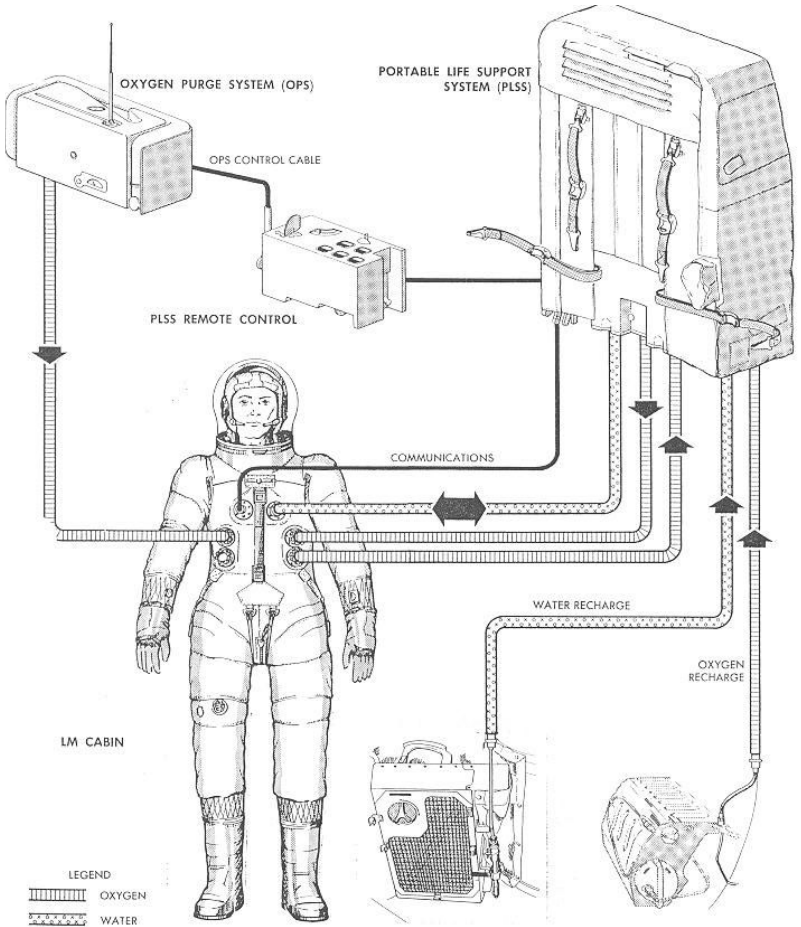


Tap: robust configurable observability

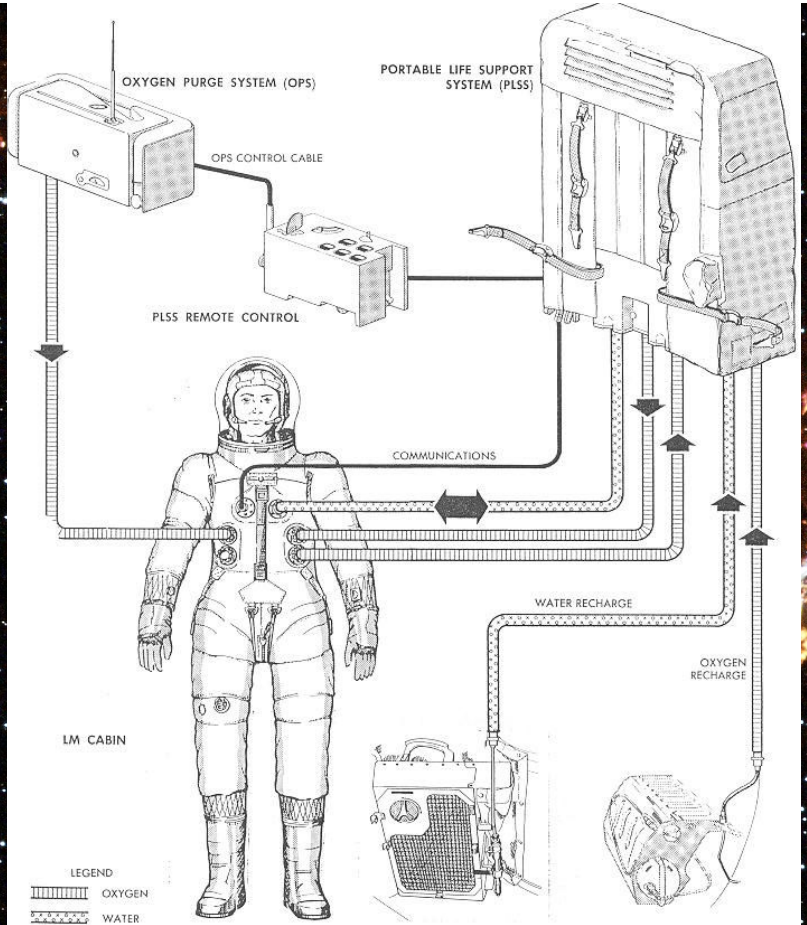
```
http_filters:
  # team-specific Tap config
  - name: envoy.filters.http.tap
    config:
      common_config:
        static_config:
          match_config:
            http_request_headers_match:
              headers:
                - name: "trigger-sample-capture"
                  exact_match: "team-abcd-feature-xyz"
          output_config:
            sinks:
              - file_per_tap:
                  path_prefix: taps/team-abcd/feature-xyz
  # organization-wide Tap configs
  - name: envoy.filters.http.tap
    config:
      common_config: {...} # org-wide/standard tap spec
```



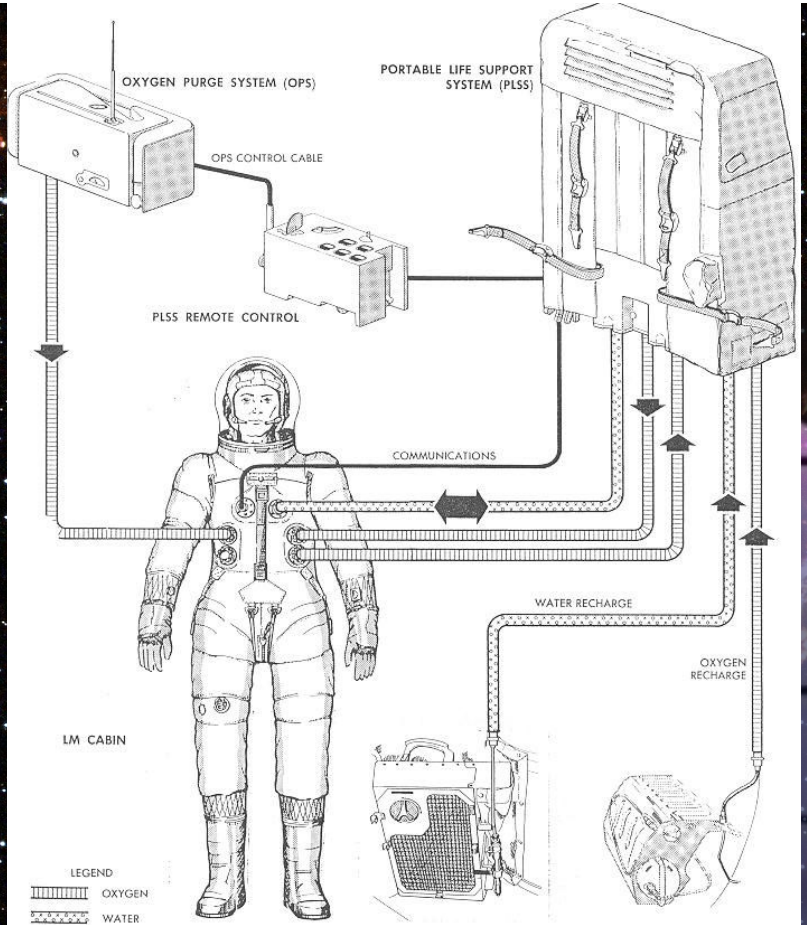
Tap: assistance in error recovery



Tap: assistance in error recovery

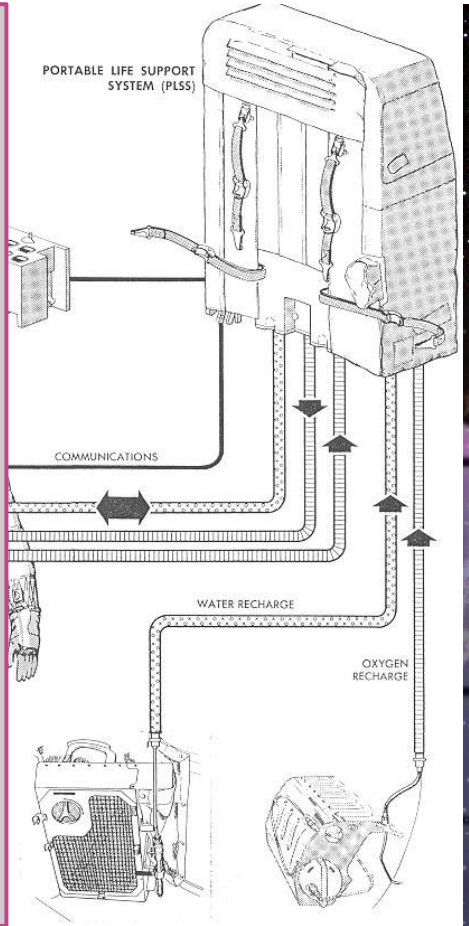


Tap: assistance in error recovery



Tap: assistance in error recovery

```
# all errors
match_config:
  http_response_headers_match:
    headers:
      - name: ":status"
        exact_match: "500"
---
# just errors from the new service
match_config:
  and_match:
    rules:
      - http_request_headers_match:
          headers:
            - name: service-version
              exact_match:  "1.0.0"
      - http_response_headers_match:
          headers:
            - name: ":status"
              exact_match: "500"
      - and_match: {...}
```

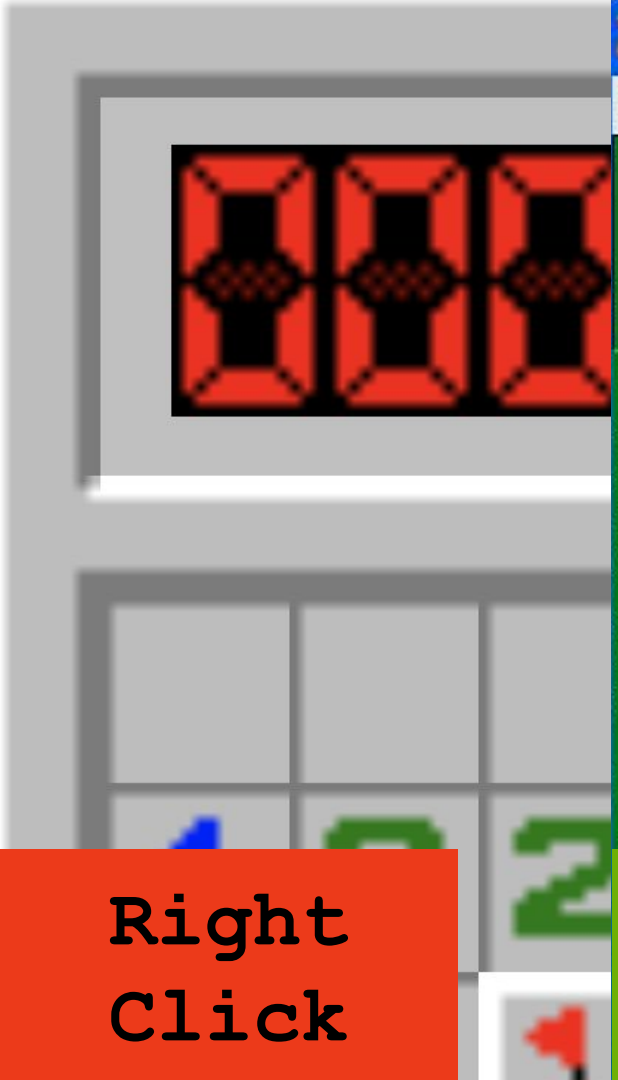


Software Engineering Mythologies Volume I:

On User Education

Right
Click

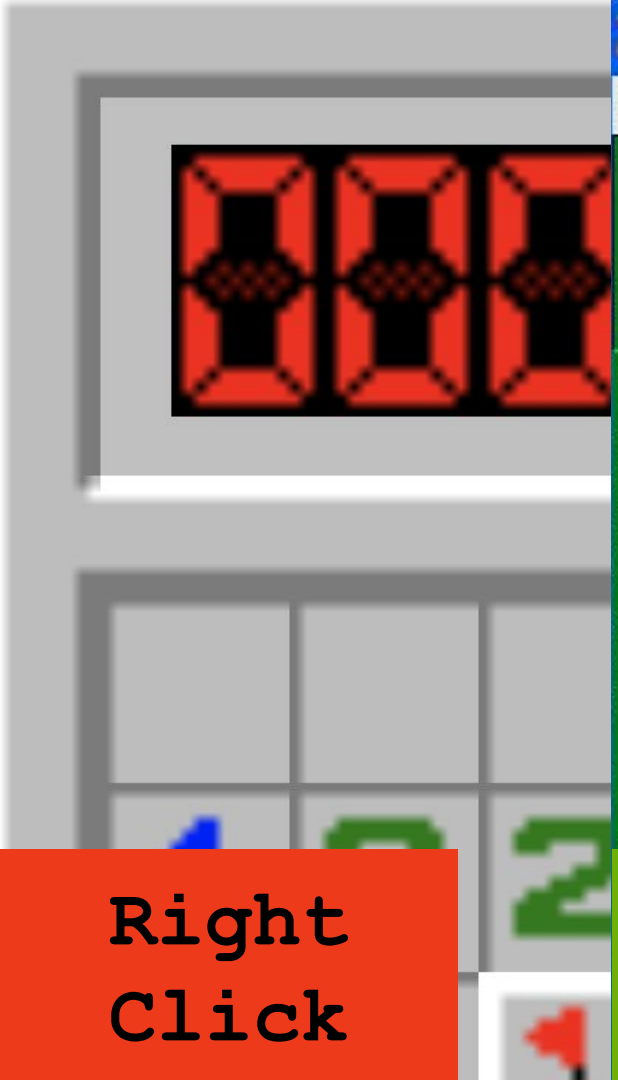
FreeCell Game #26855
Game
Help
Cards
Right Click
Drag & Drop



Right Click

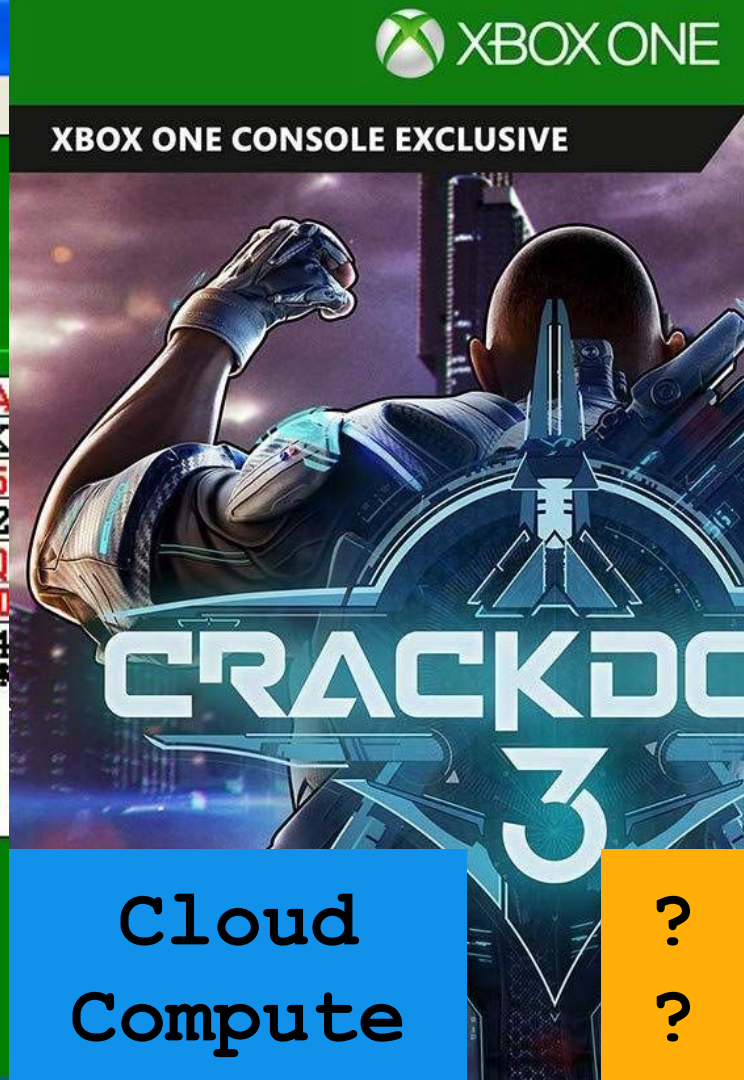
Drag & Drop

Cloud Compute



Right Click

Drag & Drop



Cloud Compute

? ?

Network filters

- Echo
- SNI Cluster
- envoy/config/filter/network/mysql_proxy/v1alpha1/mysql_proxy.proto
  - config.filter.network.mysql_proxy.v1alpha1.MySQLProxy
- envoy/config/filter/network/zookeeper_proxy/v1alpha1/zookeeper_proxy.proto
  - config.filter.network.zookeeper_proxy.v1alpha1.ZooKeeperProxy
- Client TLS authentication
  - config.filter.network.client_ssl_auth.v2.ClientSSLAuth
- Network External Authorization
  - config.filter.network.ext_authz.v2.ExtAuthz
- HTTP connection manager
  - config.filter.network.http_connection_manager.v2.HttpConnectionManager
  - config.filter.network.http_connection_manager.v2.HttpConnectionManager.Tracing
  - Enum config.filter.network.http_connection_manager.v2.HttpConnectionManager.Tracing.OperationName
  - config.filter.network.http_connection_manager.v2.HttpConnectionManager.InternalAddressConfig
  - config.filter.network.http_connection_manager.v2.HttpConnectionManager.SetCurrentClientCertDetails
  - config.filter.network.http_connection_manager.v2.HttpConnectionManager.UpgradeConfig
  - Enum config.filter.network.http_connection_manager.v2.HttpConnectionManager.CodecType
  - Enum config.filter.network.http_connection_manager.v2.HttpConnectionManager.ServerHeaderTransformation
  - Enum config.filter.network.http_connection_manager.v2.HttpConnectionManager.ForwardClientCertDetails
  - config.filter.network.http_connection_manager.v2.Rds
  - config.filter.network.http_connection_manager.v2.ScopedRouteConfigurationsList
  - config.filter.network.http_connection_manager.v2.ScopedRoutes
  - config.filter.network.http_connection_manager.v2.ScopedRoutes.ScopeKeyBuilder
  - config.filter.network.http_connection_manager.v2.ScopedRoutes.ScopeKeyBuilder.FragmentBuilder
  - config.filter.network.http_connection_manager.v2.ScopedRoutes.ScopeKeyBuilder.FragmentBuilder.HeaderValueExtra
  - config.filter.network.http_connection_manager.v2.ScopedRoutes.ScopeKeyBuilder.FragmentBuilder.HeaderValueExtra
  - config.filter.network.http_connection_manager.v2.ScopedRds

HTTP filters

- CORS processing
- AWS DynamoDB
- gRPC HTTP/1 bridge
- gRPC Web
- Buffer
  - config.filter.http.buffer.v2.Buffer
  - config.filter.http.buffer.v2.BufferPerRoute
- CSRF
  - config.filter.http.csrf.v2.CsrfPolicy
- External Authorization
  - config.filter.http.ext_authz.v2.ExtAuthz
  - config.filter.http.ext_authz.v2.BufferSettings
  - config.filter.http.ext_authz.v2.HttpService
  - config.filter.http.ext_authz.v2.AuthorizationRequest
  - config.filter.http.ext_authz.v2.AuthorizationResponse
  - config.filter.http.ext_authz.v2.ExtAuthzPerRoute
  - config.filter.http.ext_authz.v2.CheckSettings
- Fault Injection
  - config.filter.http.fault.v2.FaultAbort
  - config.filter.http.fault.v2.HTTPFault
- Gzip
  - config.filter.http.gzip.v2.Gzip
  - config.filter.http.gzip.v2.Gzip.CompressionLevel
  - Enum config.filter.http.gzip.v2.Gzip.CompressionLevel.Enum
  - Enum config.filter.http.gzip.v2.Gzip.CompressionStrategy
- Header-To-Metadata Filter
  - config.filter.http.header_to_metadata.v2.Config

Click Drop Compute ?

Software Engineering Mythologies Volume II:

On User Experience

Honest Status Page
@honest_update

We replaced our monolith with micro services so that every outage could be more like a murder mystery.

4:10 PM · Oct 7, 2015 · Buffer

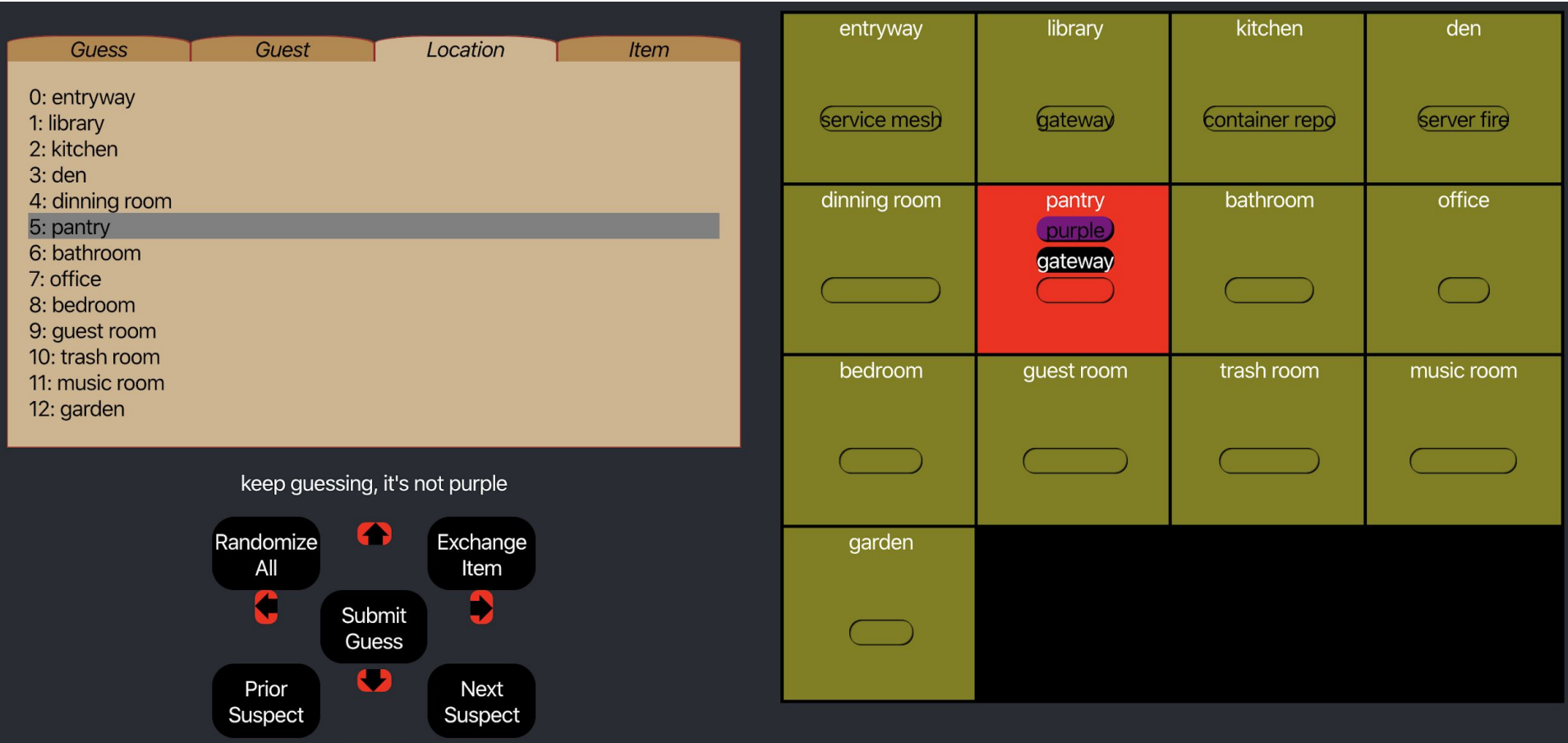
Mystery Service Game

Imagine you have **nine** services, deployed in **six** different cloud environments, coordinating over **six** API versions. And something goes wrong.

324 possible failure categories.

Spooky, but not compared to your real environment.

Mystery Service Game



Tap File Content: Request


```
{"http_buffered_trace": {
  "request": {
   "headers": [
    {"key": ":authority", "value": "localhost:9911"},
    {"key": ":path", "value": "/guess"},
    {"key": ":method", "value": "POST"},
    {"key": ":scheme", "value": "http"},
    {"key": "user-agent", "value": "curl/7.64.1"},
    {"key": "accept", "value": "*/*"},
    {"key": "content-type", "value": "application/json"},
    {"key": "content-length", "value": "49"},
    {"key": "x-forwarded-proto", "value": "http"},
    {"key": "x-request-id", "value": "500415a9-290c-482e-9b6a-11e9091b0464"},
    {"key": "x-envoy-expected-rq-timeout-ms", "value": "15000"}
   ],
   "body": {
    "truncated": false,
    "as_bytes": "eyJndWVzcyI6IHsiZ3Vlc3QiOiAiYSIsInJvb20iOiJiIiwib2JqZWN0IjoiYyJ9fQ=="
   },
   "trailers": []
  }
```


```
{
  "guess": {
    "guest": "a",
    "room": "b",
    "object": "c"
  }
}
```

```
cat taps/err_3319132769332768402.json | jq -r \
 '.http_buffered_trace.request.body.as_bytes' | \
  base64 -d | jq '.'
```

Tap File Content: Response


```
"response": {
  "headers": [
   {"key": ":status", "value": "500"},
   {"key": "date", "value": "Sun, 27 Oct 2019 22:46:26 GMT"},
   {"key": "content-length", "value": "18"},
   {"key": "content-type", "value": "text/plain; charset=utf-8"},
   {"key": "x-envoy-upstream-service-time", "value": "0"},
   {"key": "server", "value": "envoy"}
  ],
  "body": {
   "truncated": false,
   "as_bytes": "YWFhYWFhYWhoaGhoaGghISEh"
  },
  "trailers": []
 }
}
```


```
aaaaaaahhhhhhh!!!!
```

```
cat taps/err_3319132769332768402.json | jq -r \
 '.http_buffered_trace.response.body.as_bytes' | \
  base64 -d
```

Thank you

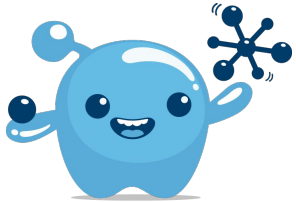
envoycon

If you would like to learn more about the Tap Filter or any of our Envoy-related projects including **Gloo**, **Loop**, and **Service Mesh Hub** please find me or my teammates at our booth during KubeCon or at **solo-io.slack.com**

solo.io

we are hiring!

www.solo.io/company/careers/



game source and slides: http://github.com/mitchdraft/mysteryservice

SOLVING
MICROSERVISES
MYSTERIES