AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

CON321-S

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Kubernetes observability use cases

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aws

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Observability today



Software is now decoupled for velocity, agility, and scale, but . . .



we still **waste time** wrangling the data we need to debug, secure, and manage our applications

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WHERE DO WE WASTE TIME?

Waste months setting up rigid, predetermined data collection

Boilerplate language-specific instrumentation, added manually

```go
import (
    "net/http"
    "net/http/httptrace"

    "github.com/opentracing/opentracing-go"
    "github.com/opentracing/opentracing-go/log"
    "golang.org/x/net/context"
)

// We will talk about this later
var tracer opentracing.Tracer

func AskGoogle(ctx context.Context) error {
    // retrieve current Span from Context
    var parentCtx opentracing.SpanContext
    parentSpan := opentracing.SpanFromContext(ctx);
    if parentSpan != nil {
        parentCtx = parentSpan.Context()
    }

    // start a new Span to wrap HTTP request
    span := tracer.StartSpan(
        "ask google",
        opentracing.ChildOf(parentCtx),
    )

    // make sure the Span is finished once we're done
    defer span.Finish()

    // make the Span current in the context
    ctx = opentracing.ContextWithSpan(ctx, span)

    // now prepare the request
    req, err := http.NewRequest("GET", "http://google.com", nil)
    if err != nil {
        return err
    }

    // attach ClientTrace to the Context, and Context to request
    trace := NewClientTrace(span)
    ctx = httptrace.WithClientTrace(ctx, trace)
    req = req.WithContext(ctx)

    // execute the request
    res, err := http.DefaultClient.Do(req)
    if err != nil {
        return err
    }

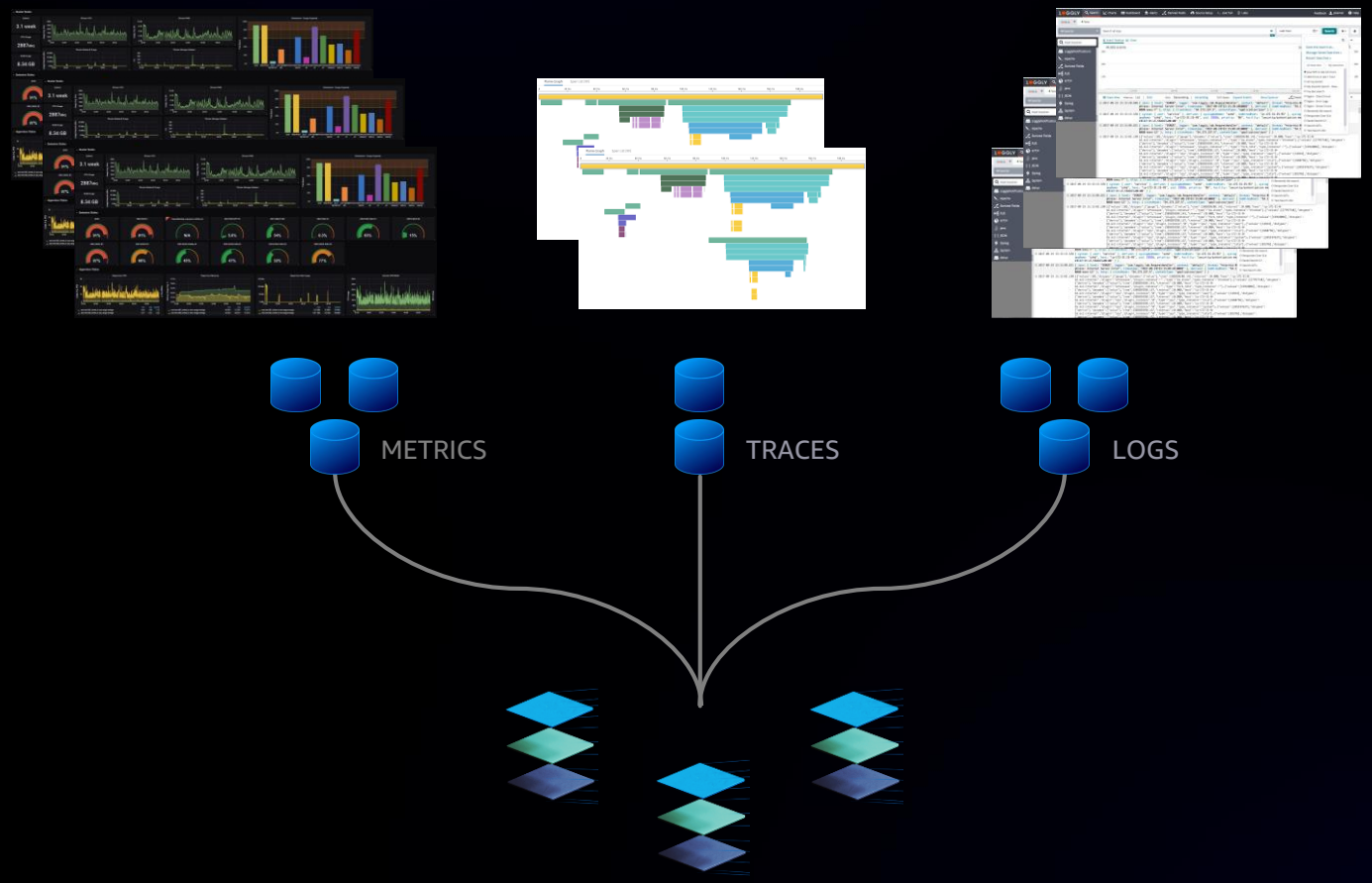
    // Google home page is not too exciting, so ignore the result
    res.Body.Close()
    return nil
}
```

Actual business logic

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WHERE DO WE WASTE TIME (AND $$$)?

Centralized cloud-only storage and AI/ML



98%+ of telemetry data is useless, but moved to centralized backend . . .

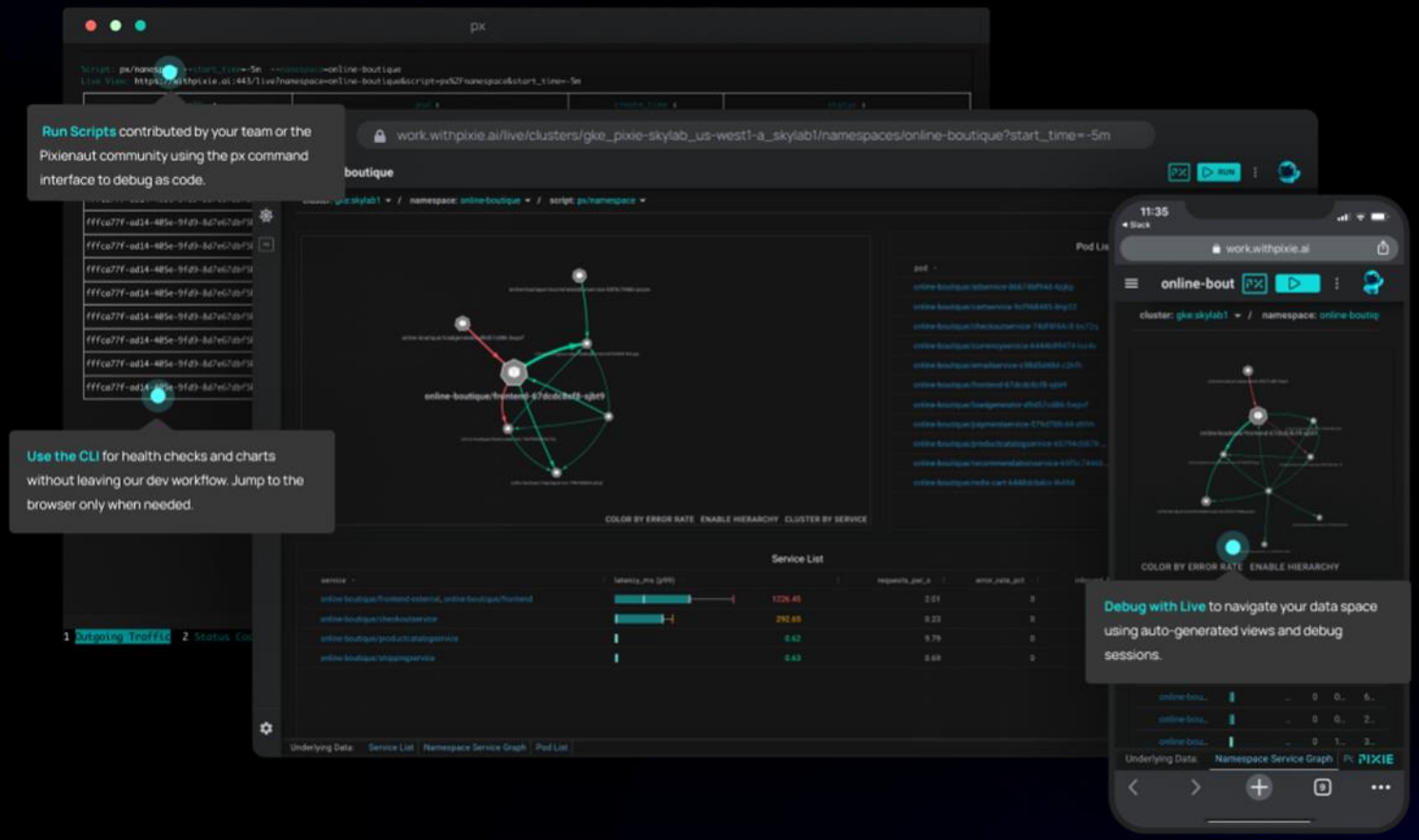
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What is Pixie?

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WHAT IS PIXIE?

Instant code-driven debugging: APM + infra-metrics + NPM + profiling



USE PIXIE FOR

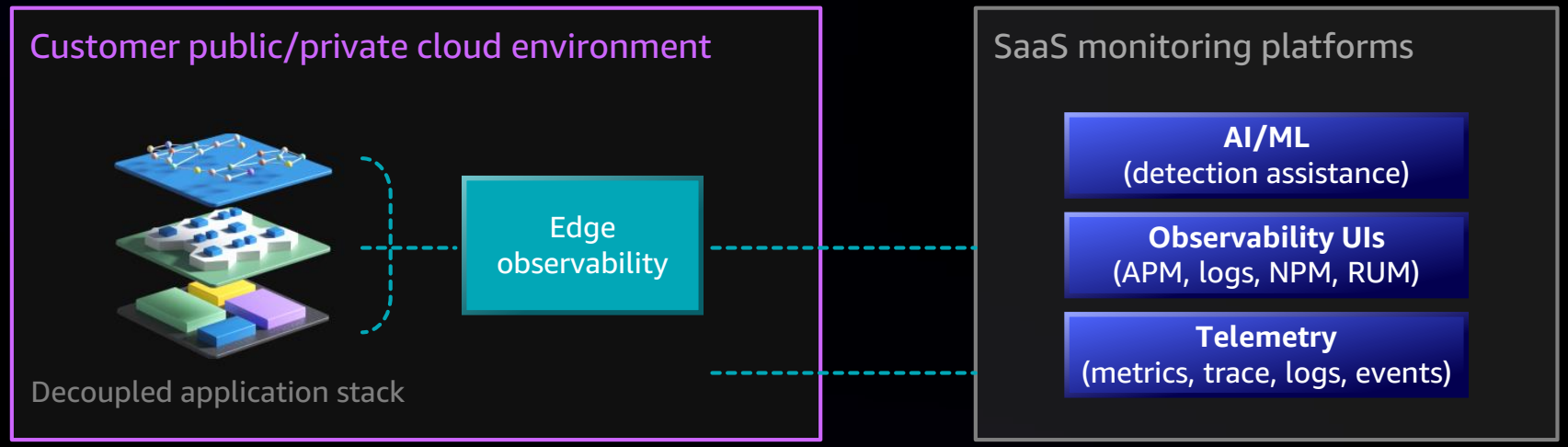
- Service Health
- Golang Logging
- Request Tracing
- DB Request Profiles
- K8s Infra Health
- Canary Analysis
- see more.....

YOU'LL NEED

- v1.12+
- v4.14+

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Extend the observability stack to the edge to reduce complexity + cost



Rigid predetermined manual collection

↓

Code-driven, on-the-fly, no instrumentation collection

Cloud-only storage and AI/ML

↓

Edge + cloud storage and AI/ML

Manual and siloed user interfaces

↓

API-driven scriptable interfaces

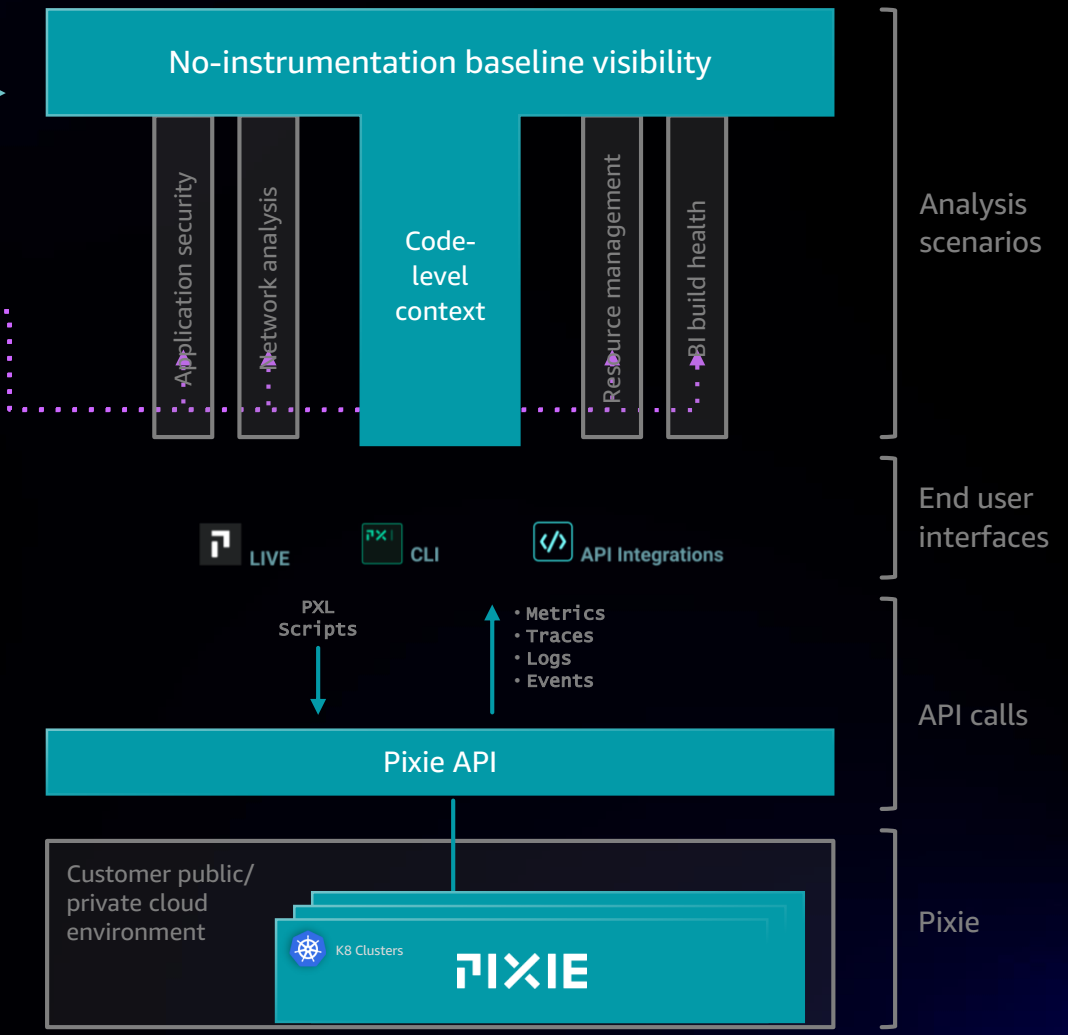
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WHAT IS PIXIE'S FOCUS USE CASE?

Help developers debug application performance issues in production (APM)

Primary focus is APM for performance debugging

Other use cases like NPM, build health, and AppSec are enabled by Pixie but are not currently a product focus



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New Relic + open source = 

New Relic is betting big on open-source software
by contributing Pixie to CNCF!

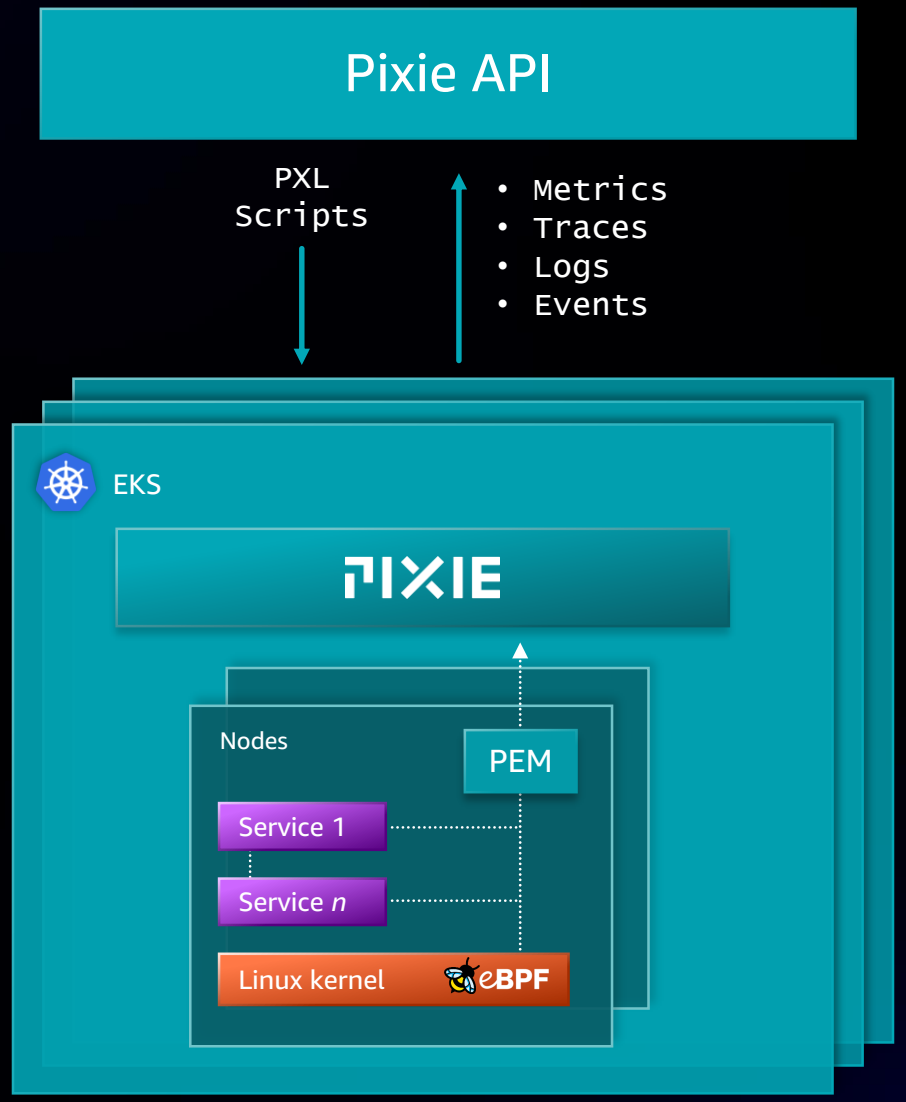
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Kubernetes observability at the network edge



Diagram



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Data collector

Omid Azizi

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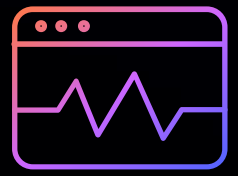
PIXIE DATA COLLECTOR

Pixie includes various automatic observability features

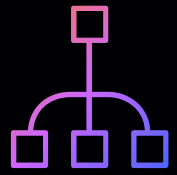


Process stats

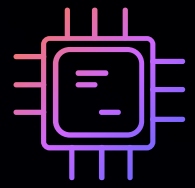
(CPU, memory, I/O)



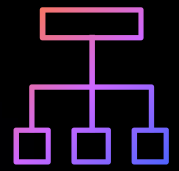
Network stats



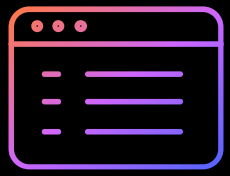
Protocol tracing



Application CPU profiler



Bpftrace



Dynamic logging

(alpha)

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PIXIE DATA COLLECTOR

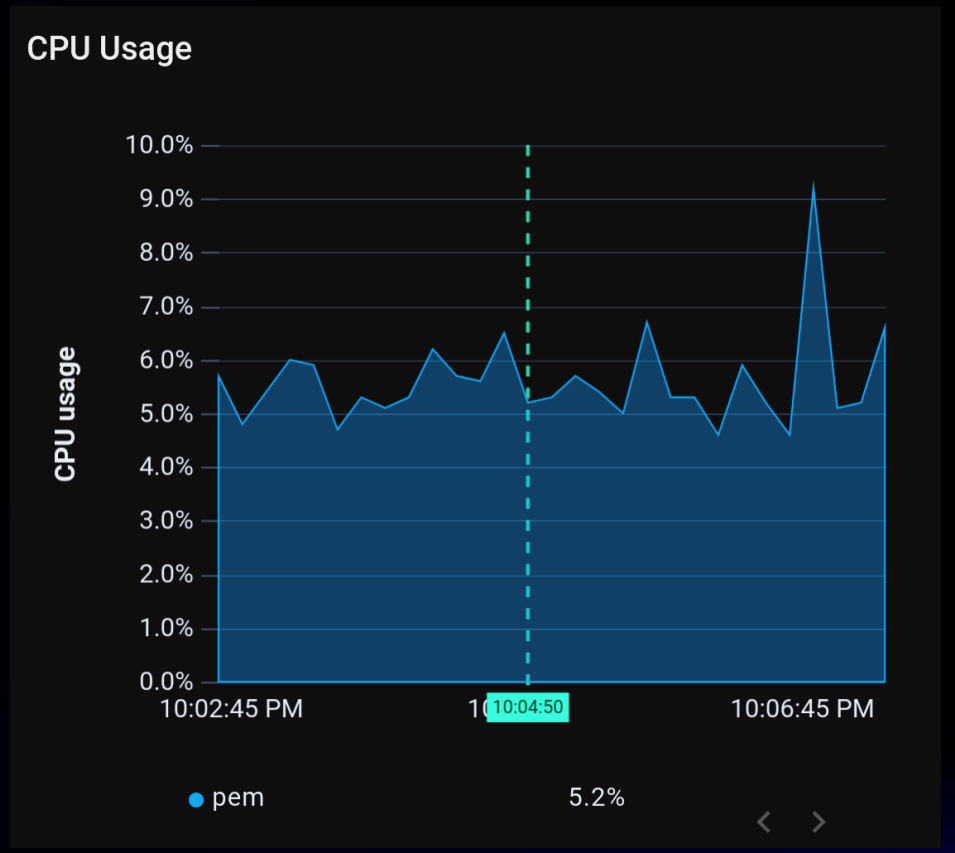
Pixie includes various automatic observability features



Process stats

(CPU, memory, I/O)

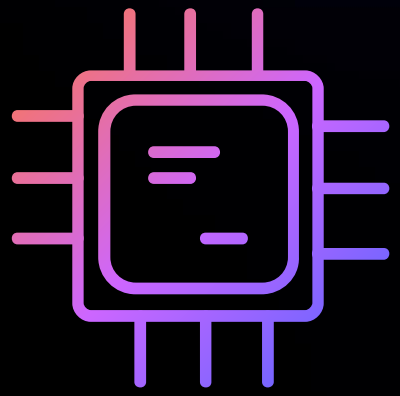




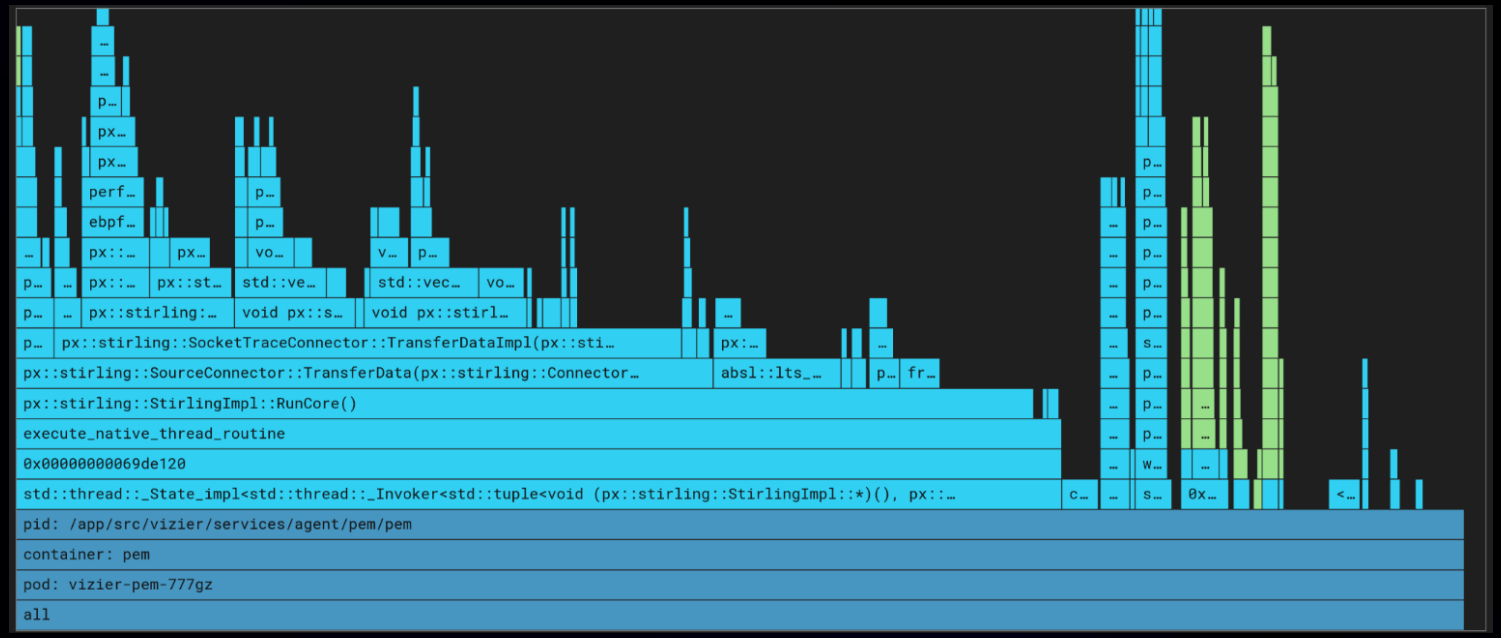
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PIXIE DATA COLLECTOR

Pixie includes various automatic observability features



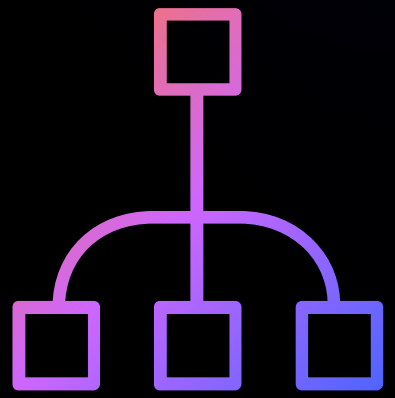
Application CPU profiler



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PIXIE DATA COLLECTOR

Pixie includes various automatic observability features



Protocol tracing

eBPF

9/27/2021, 10:13:54 PM	{ Accept: application/json	GET	/carts/57a98d98e4b00679b4…	
9/27/2021, 10:13:54 PM	{ Accept: application/json	POST	/paymentAuth	{ address: { id: null, …
9/27/2021, 10:13:54 PM	{ Accept: application/json	POST	/paymentAuth	{ address: { id: null, …
9/27/2021, 10:13:54 PM	{ Accept: application/json	POST	/shipping	{ id: 793ab593-0a13-464…
9/27/2021, 10:13:54 PM	{ accept: application/json	POST	/orders	{ customer: http://user…
9/27/2021, 10:13:54 PM	{ Accept: application/json	POST	/shipping	{ id: 3547d8e3-8ffb-4b5…

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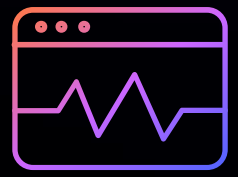
PIXIE DATA COLLECTOR

Pixie includes various automatic observability features

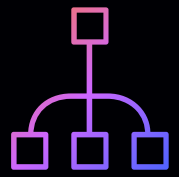


Process stats

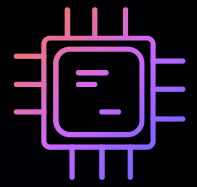
(CPU, memory, I/O)



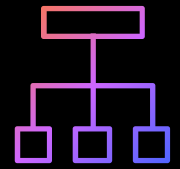
Network stats



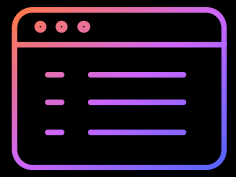
Protocol tracing



Application CPU profiler



Bpftrace



Dynamic logging

(alpha)

All without user instrumentation or redeployments

Powered by eBPF

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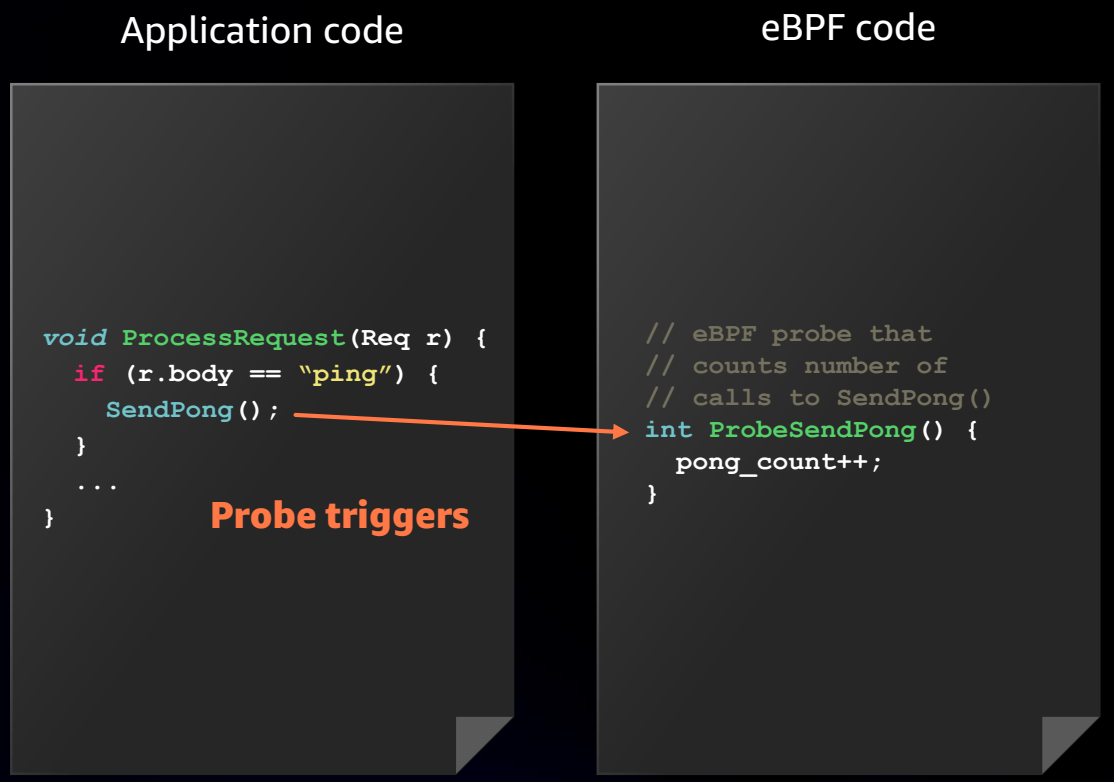
eBPF analogy: An automated debugger

An eBPF probe is like a breakpoint in a debugger

- Interrupts execution when breakpoint is reached

But unlike a breakpoint, a small program is run

- Inspects and collects any relevant state
- Then immediately resumes the execution



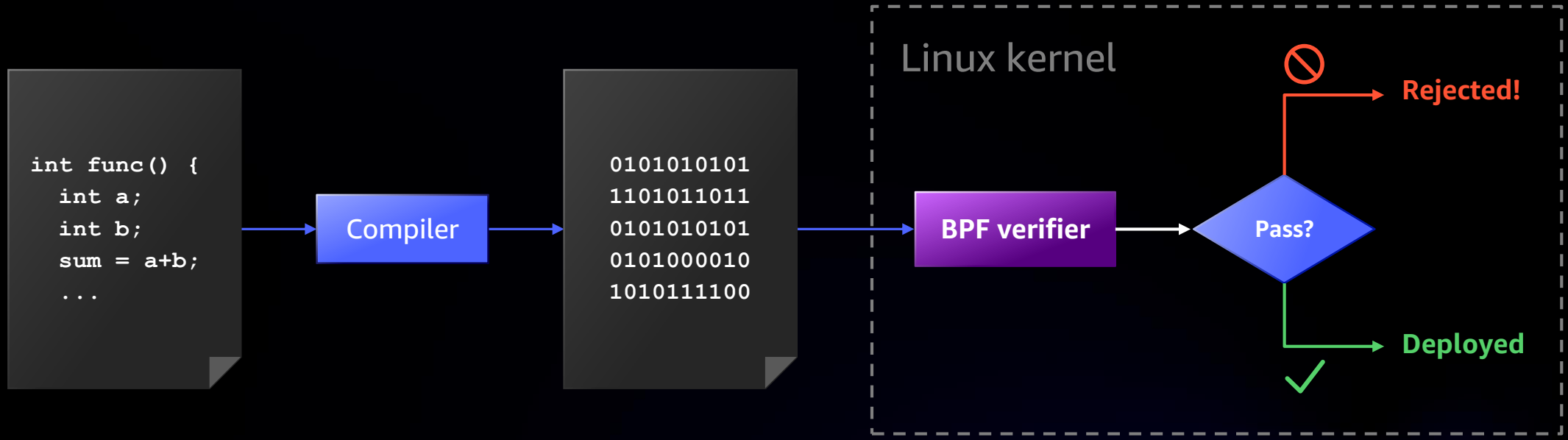
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The eBPF verifier: The kernel's guardian

So can you do anything? Not quite

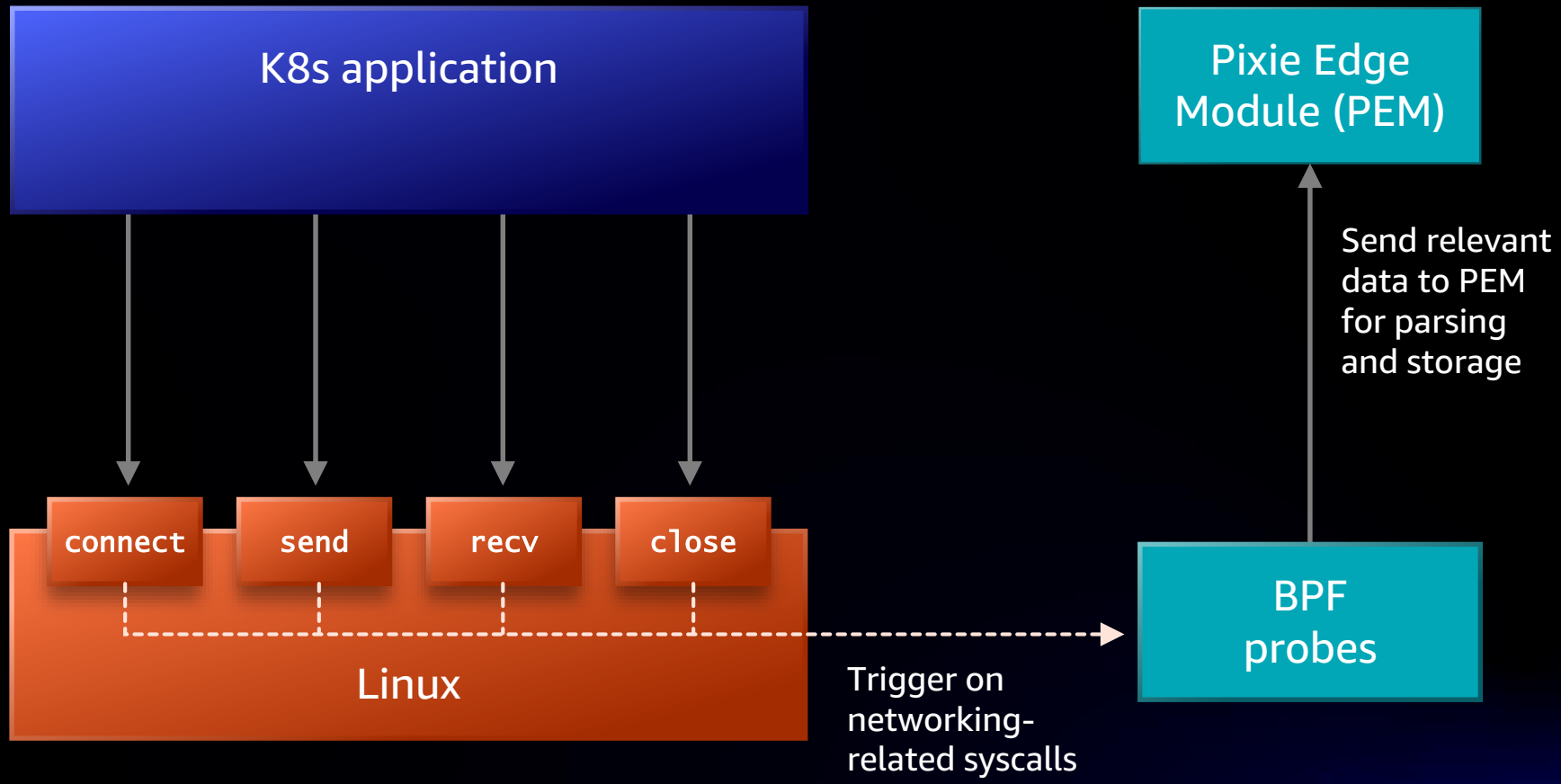
- The eBPF verifier is there to ensure the stability of the system



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HOW DOES PIXIE USE EBPF?

Pixie uses eBPF technology to automatically collect APM data

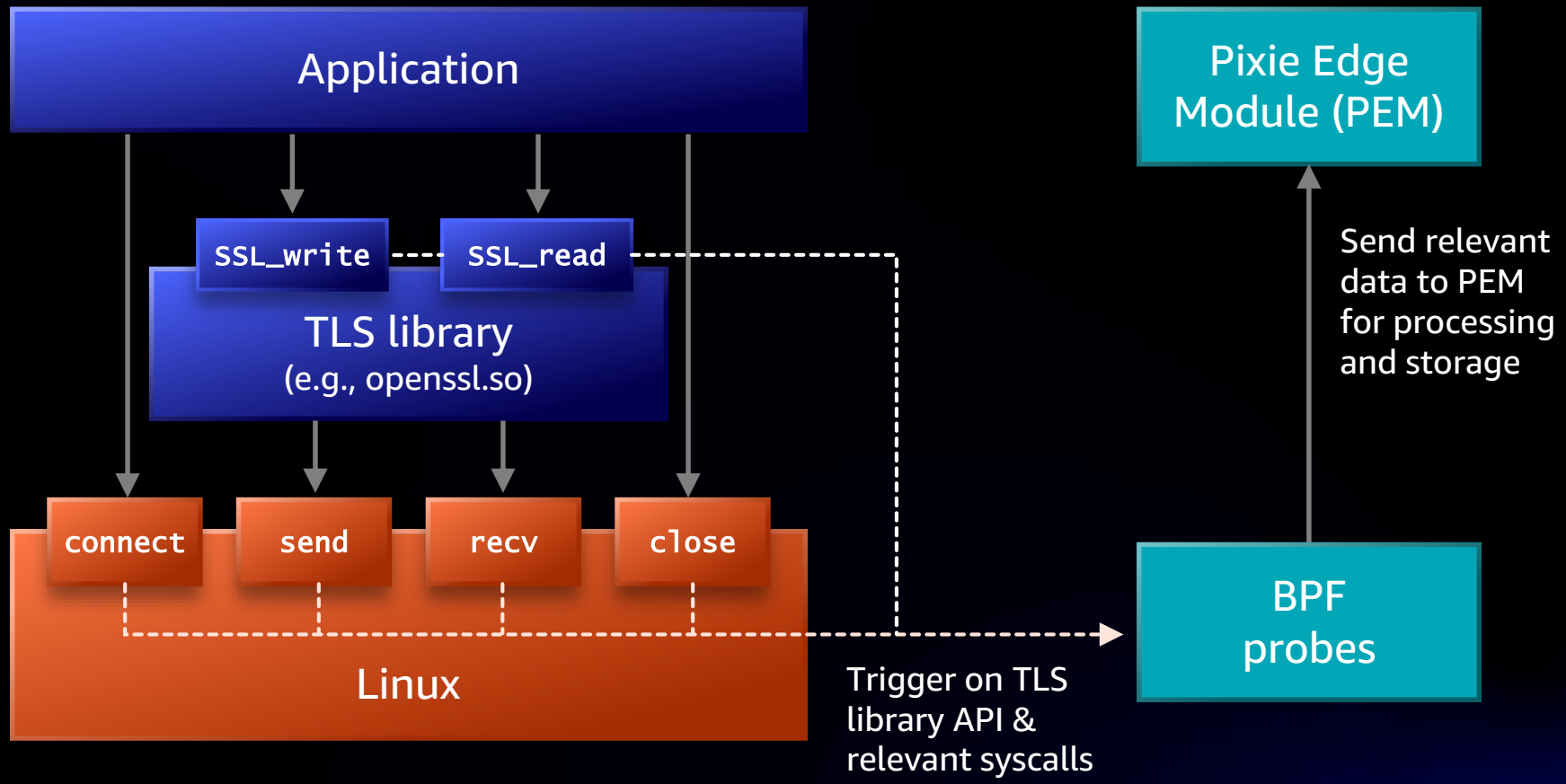


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HOW DOES PIXIE USE EBPF?

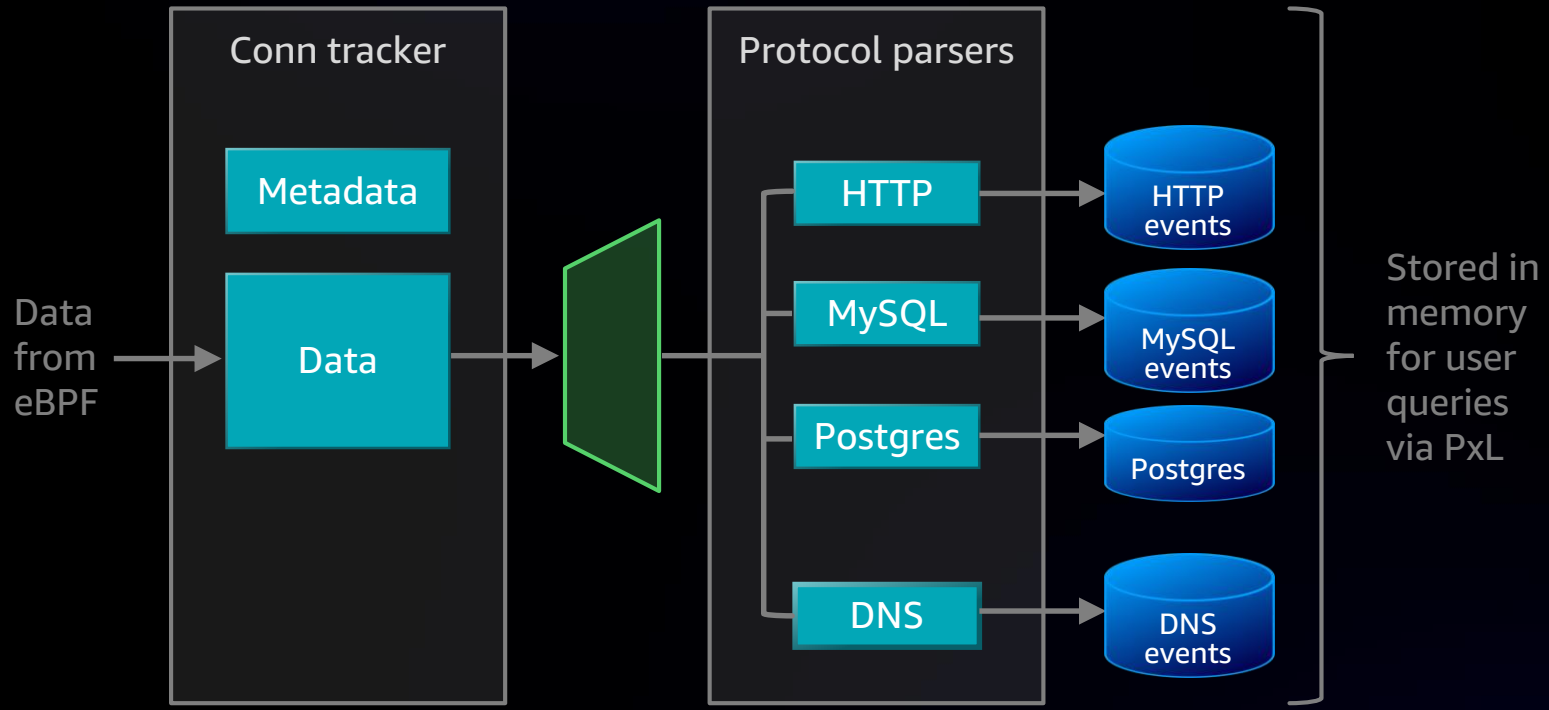
Pixie even traces your TLS/SSL traffic using eBPF



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WHAT DOES PIXIE TRACE?

Data collected by eBPF is parsed and stored for querying



Supported protocols list

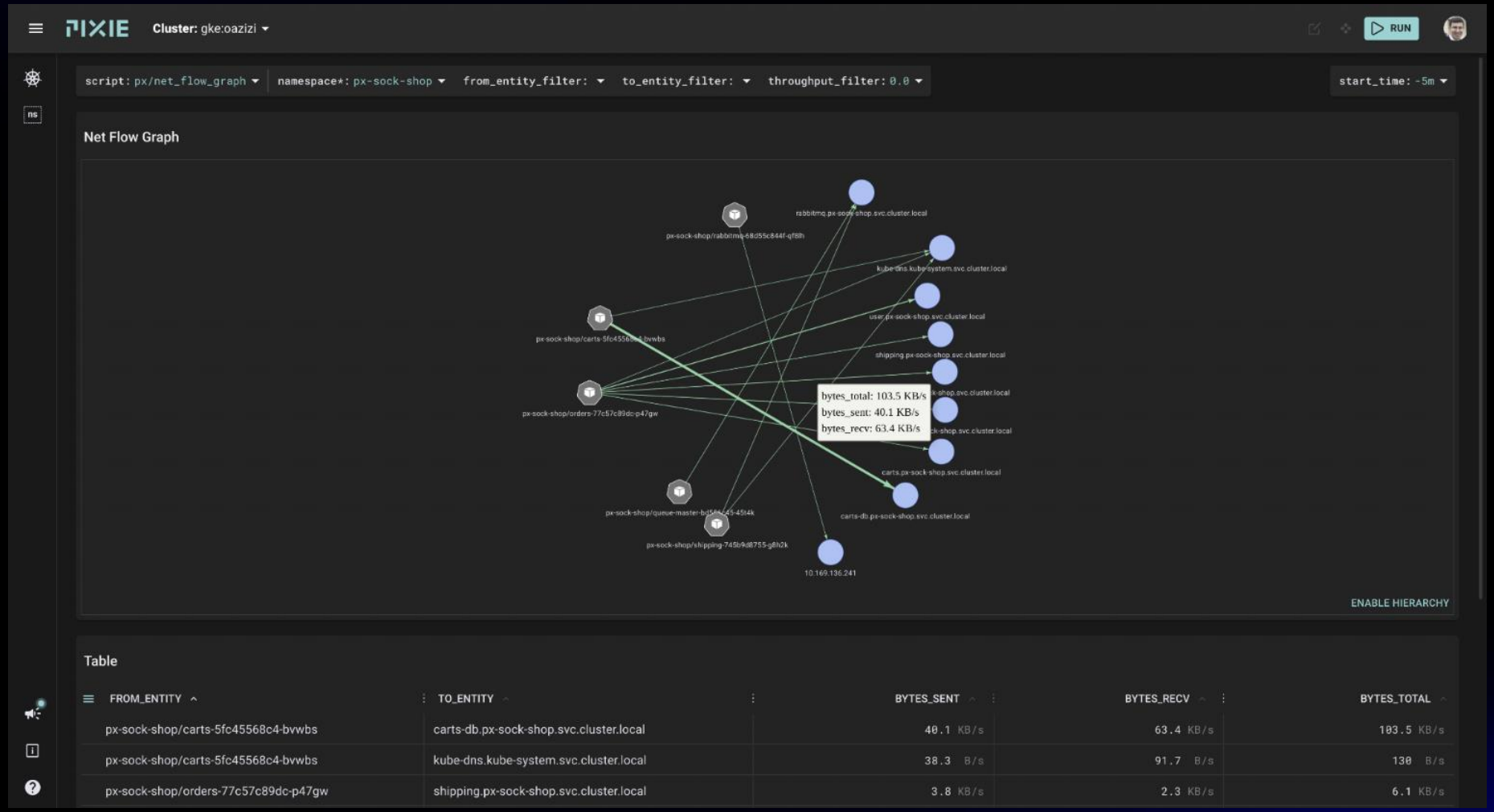
HTTP
MySQL
Postgres
Redis
Cassandra
Kafka
NATS
DNS
gRPC*

*gRPC is traced with dedicated uprobes

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WHAT DOES PIXIE TRACE?

The result: Full body tracing, automatic service maps, and more



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Pixie + OpenTelemetry = ♡

YOU CAN INTEGRATE PIXIE WITH ALL THE OTHER TOOLS YOU LOVE!











Example OTel input data sources

Example OTel destinations

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New Relic®

Developer Appreciation Party

Come celebrate with us! Everyone welcome!

Omnia Nightclub | Wednesday, Dec 1, 8pm–11pm



RSVP here

Thank you!

Check out Pixie's GitHub

github.com/pixie-io/pixie

Check out New Relic One, 100 GB/mo for free!

newrelic.com

Join Pixie's Community Slack

slackin.px.dev

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