



KubeCon



CloudNativeCon

Europe 2023

# It is More Than Just Correlation - A Debug Journey

*Simon Pasquier & Vanessa Martini*

Red Hat





## Simon Pasquier

Observability Software Engineer  
at Red Hat

*Focus on* Monitoring

[LinkedIn](#)



## Vanessa Martini

Observability Product Manager  
at Red Hat

*Focus on* OpenShift Analytics & UI

[LinkedIn](#)

# It is More Than Just Correlation - A Debug Journey

## *Agenda*

- Problem Statement —————• *What problem do we want to solve?*
- Solution —————• *What is **korrel8r**?* —• **DEMO**
- Functionalities —————• *How does it work?*
- Roadmap —————• *What are our future plans?*

## ► *Problem Statement*

*What problem do we want to solve?*

Our *target persona*



## Site Reliability Engineer

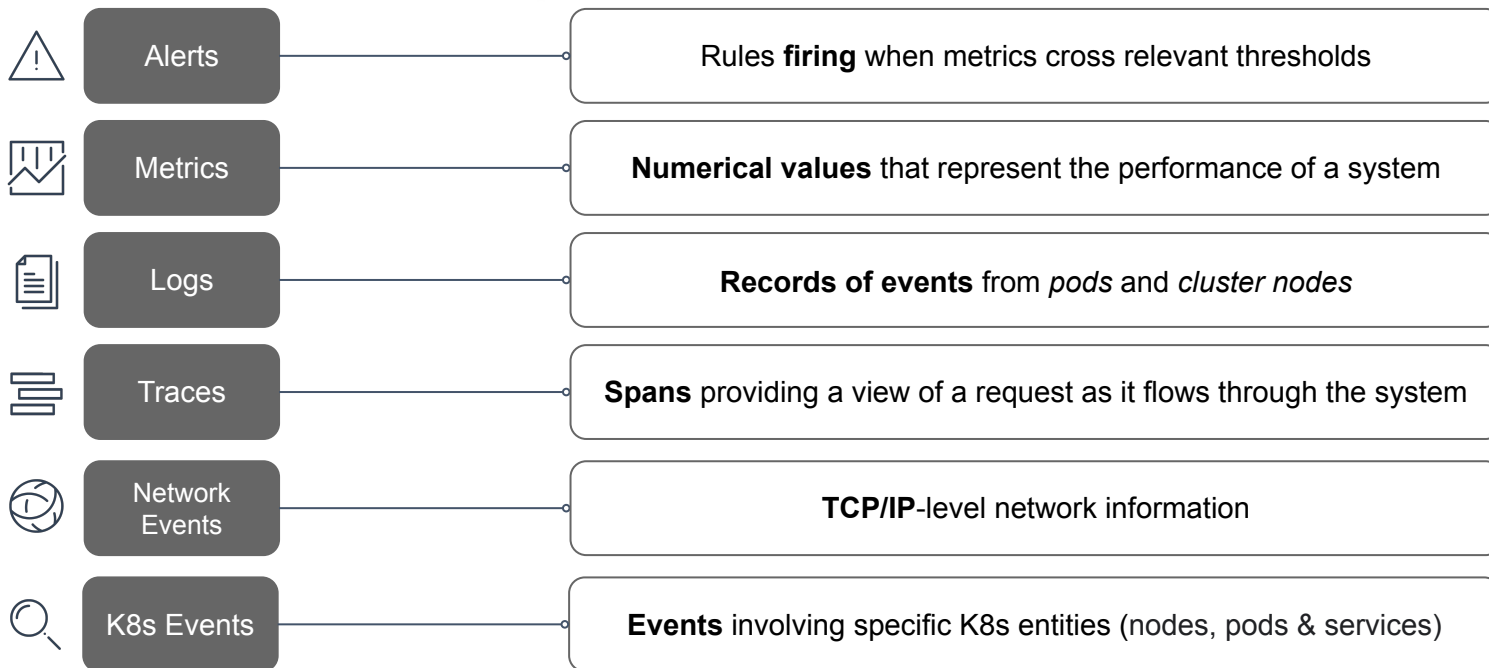
**Focus:** Keep systems/applications secure and stable, avoiding disruptions for customers

**Needs:** Access to relevant information in order to determine **WHERE** is the problem and **WHAT** is its root cause on K8s production environments

That is when **observability signals**  
come into play



## Observability Signals



*What are today's core observability **signals** for debugging?*

☆ used **all** the time

Alerts

Logs /  
Cloud Logs

K8s Events

K8s  
Objects

K8s Links

👁 used **some** of the time

Metrics

⊗ **not** used

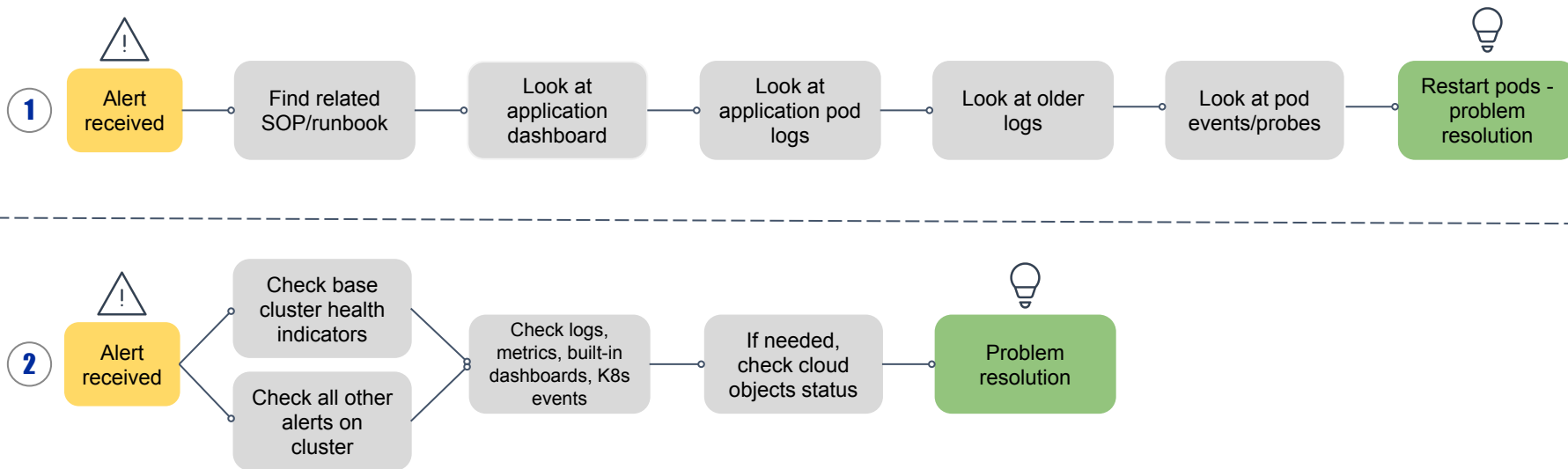
Traces

Network  
Events

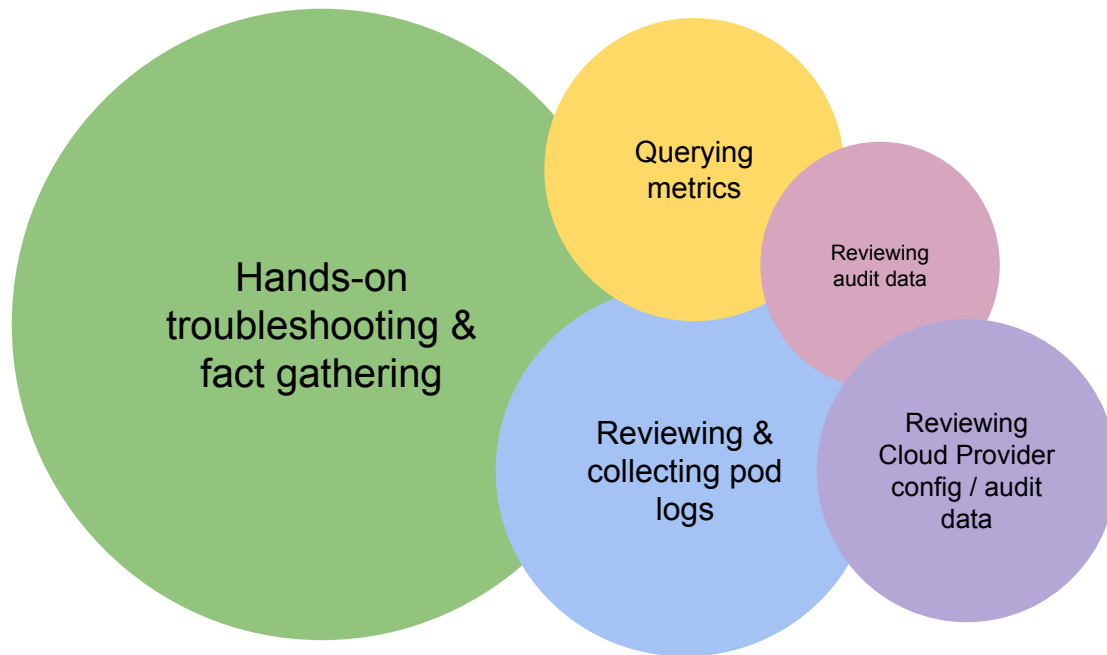
microservices



*How does a typical **SRE** workflow look like?*



## *Time Spent on **Clusters***





**High Cognitive Load**

## *Day-to-day challenges*



Time needed to gain  
**familiarity** with complex  
K8s systems



Efforts needed to learn  
**how to query** relevant  
information - fact  
gathering



Metadata and API  
heterogeneity hinder the  
possibility to quickly  
**identify root causes**

How can we provide *Site Reliability Engineers* with the observability signals they need, **when** they need them?

# It is More Than Just Correlation - A Debug Journey

## ► *Solution*

*What is korrel8r?*

**Correlating observability signals** *means* following  
**relationships** to find related data in *multiple heterogeneous*  
*stores*



What does **correlation** mean in our case?

-----○ ✓ **Broader Connotation**

*Correlation* indicating **an association** between two and more variables

⊗ **Statistical Connotation**

*Correlation* indicating the degree to which two variables are **linearly related**



## *Why is **correlating** observability signals beneficial?*



Bringing together  
**observability signals** -  
focusing *ONLY* on  
diagnostic data that  
matters



**Eliminating the**  
**manual efforts** of  
navigating from a signal  
to another, hence the  
**time** spent  
troubleshooting

## What is *korrel8r*?



**Open-Source** project  
founded in 2022  
at Red Hat

<https://github.com/korrel8r>

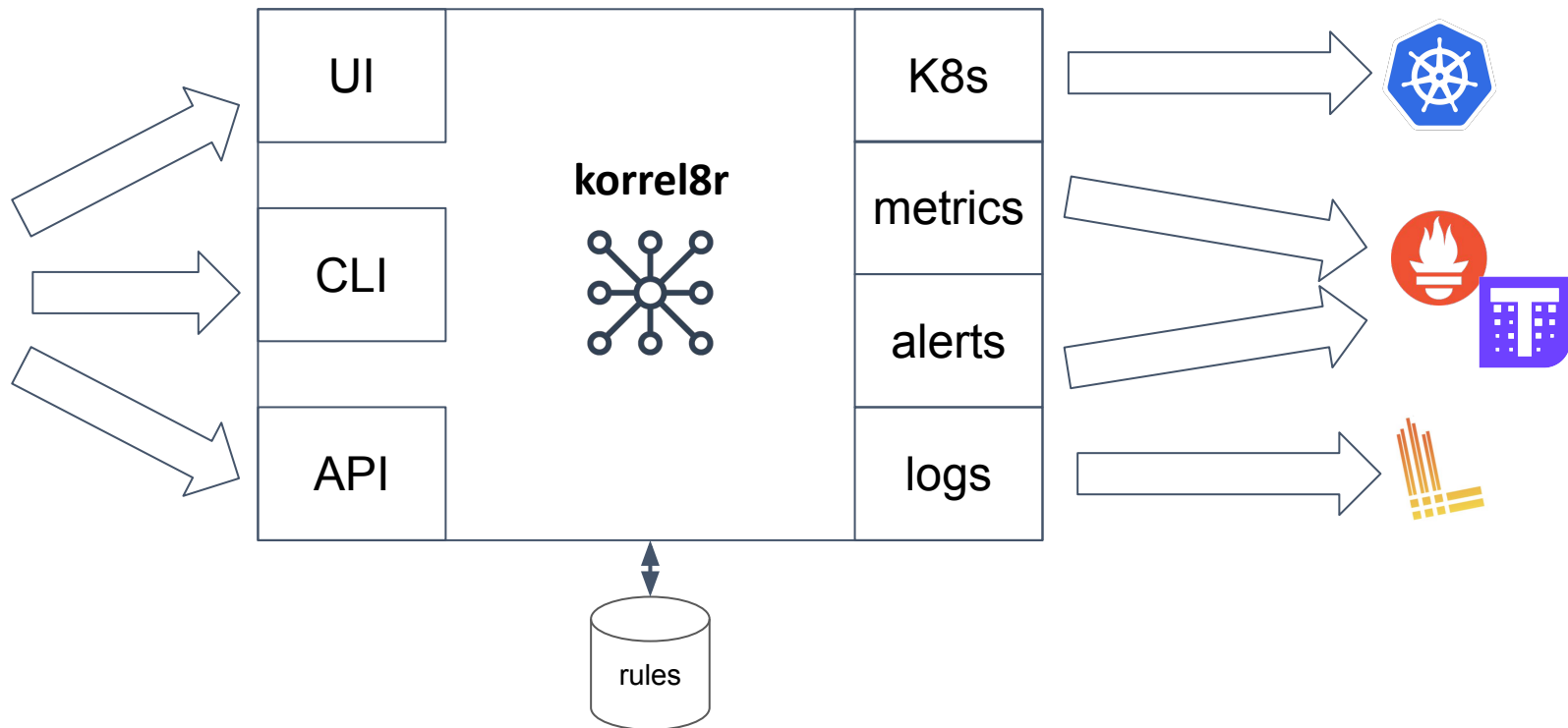


A **correlation engine**  
using a **set of rules**,  
describing relationships  
between observability  
signals



Standalone **Go** binary

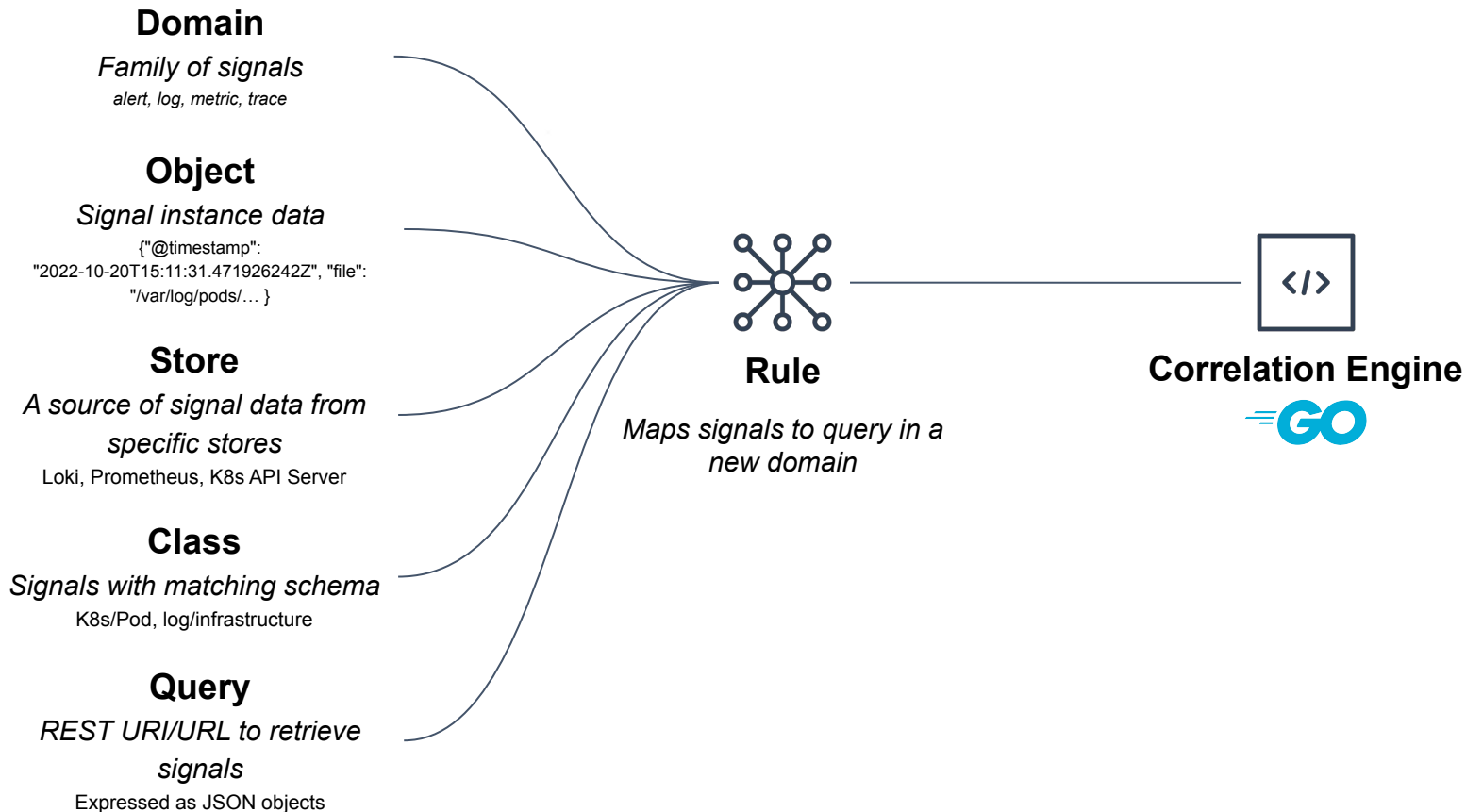
## Architecture



*Demo*

## ► *Functionalities*

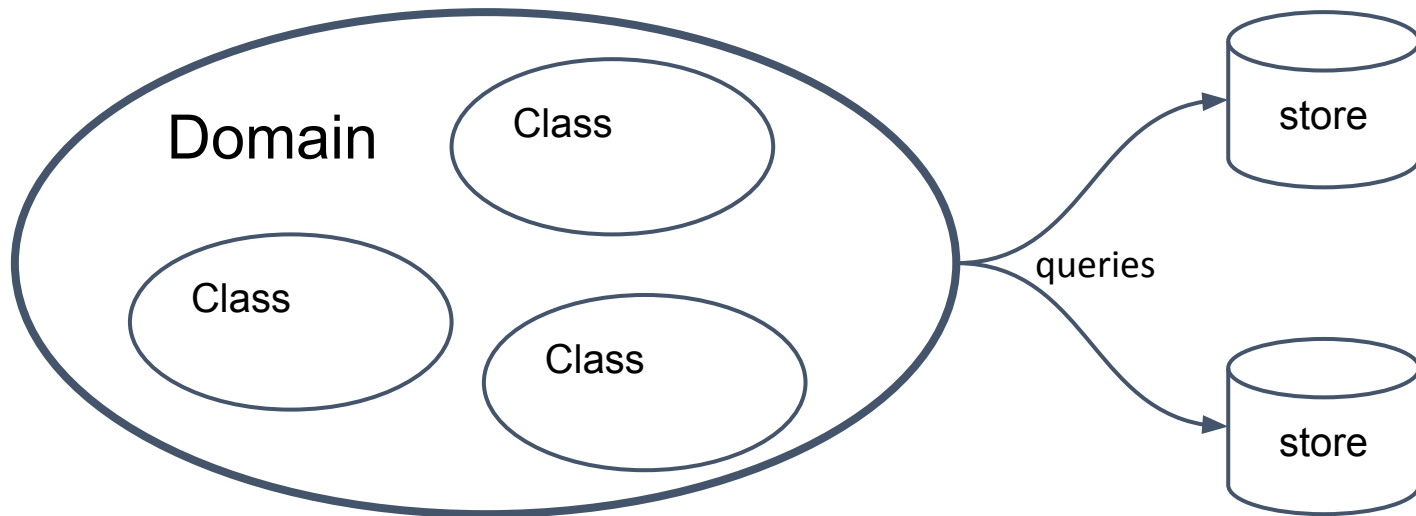
*How does korrel8r work?*



## *Anatomy of a rule*

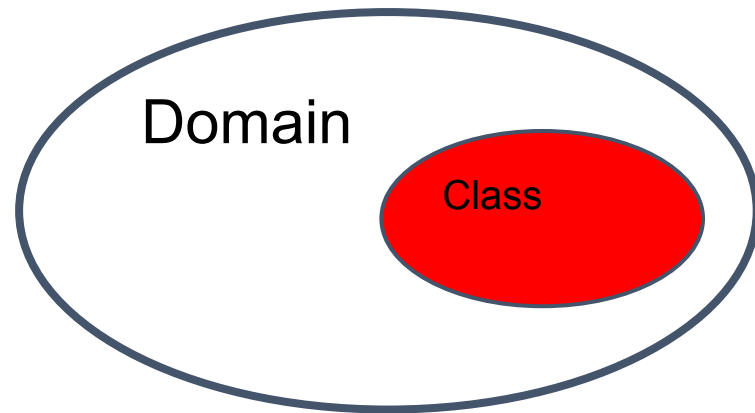
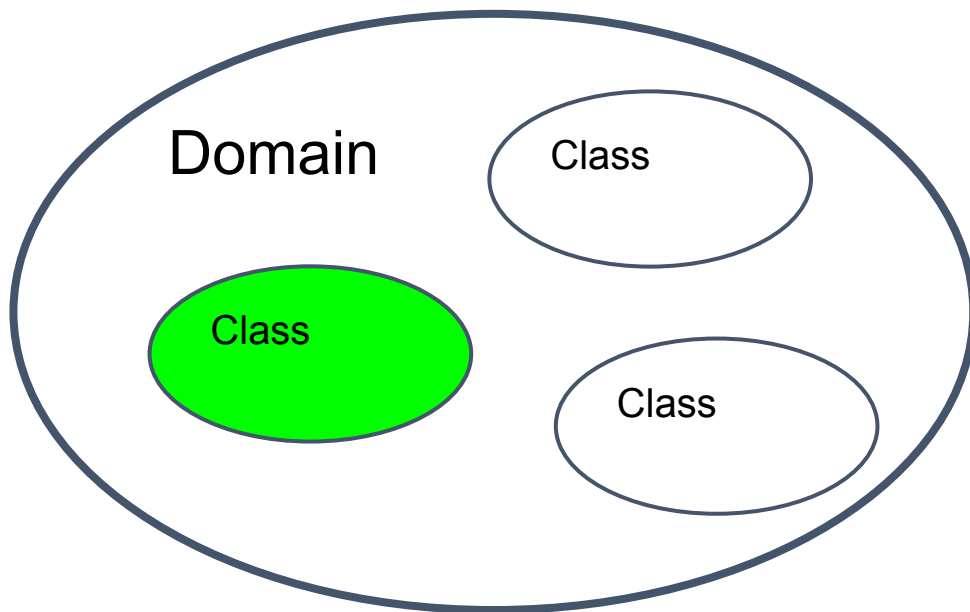
```
rules:
- name: AlertToDeployment
  start:
    domain: alert
  goal:
    domain: k8s
    classes: [Deployment.apps]
  result:
    query: |-
      {
        {{k8sQueryClass "Deployment.apps"}} ,
        "Namespace": "{{.Labels.namespace}}",
        "Name": "{{.Labels.deployment}}"
      }
```

## *Domains and stores*

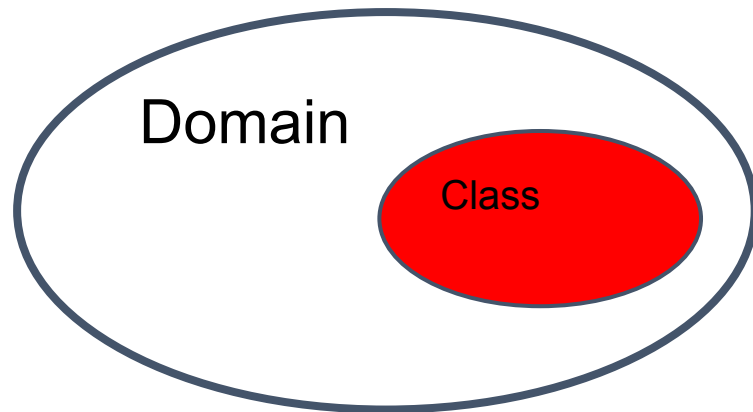
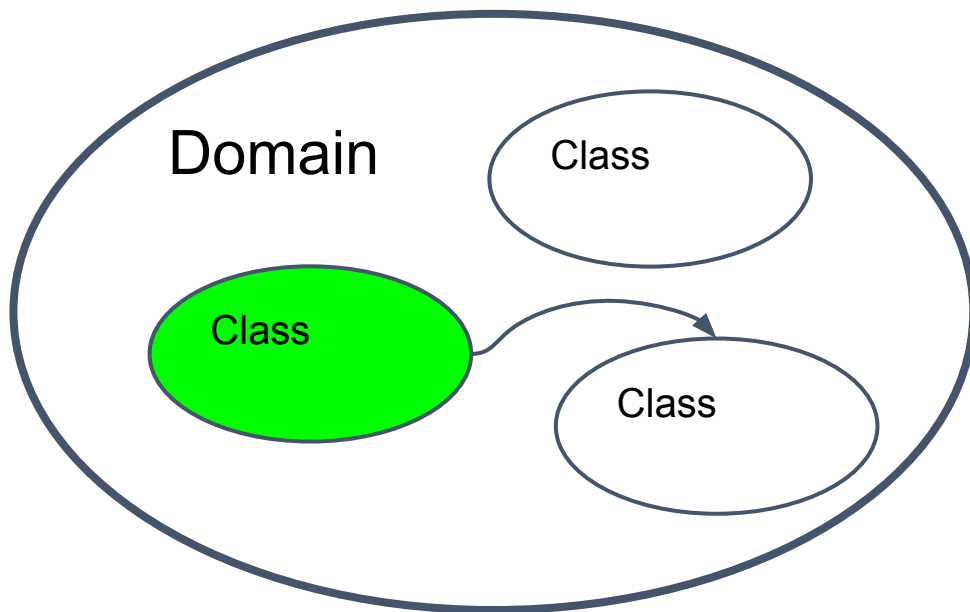




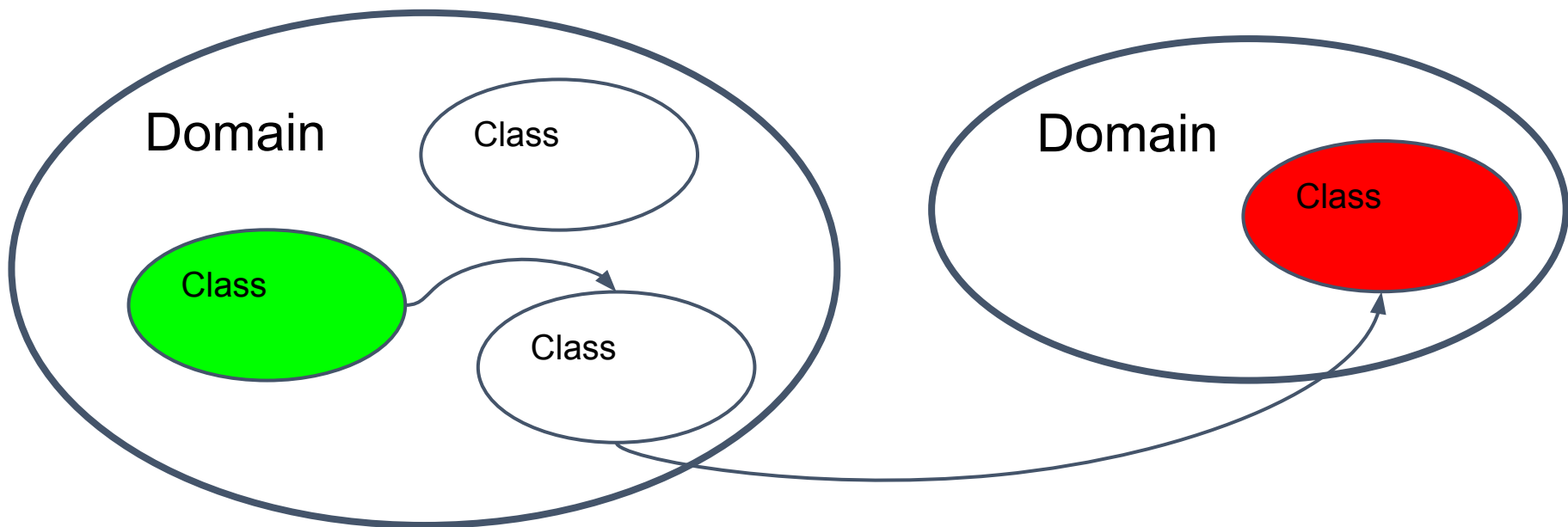
## *Class traversal*



## *Class traversal*



## *Class traversal*



*Why should you test **korrel8r** out?*

**1**

## **K8s-specific**

Correlation possible at  
different K8s layers:  
*Deployment, ReplicaSet,  
Pod, Node Cluster, Node  
Processes & Container*

**2**

## **Expert knowledge**

Correlation possible  
across signals from  
multiple heterogeneous  
data stores

**3**

## **Flexible**

Build your **own** rules,  
based on your use  
cases!

***korrel8r***

as part of your

## Debug Journey



Alert



Problem  
Resolution

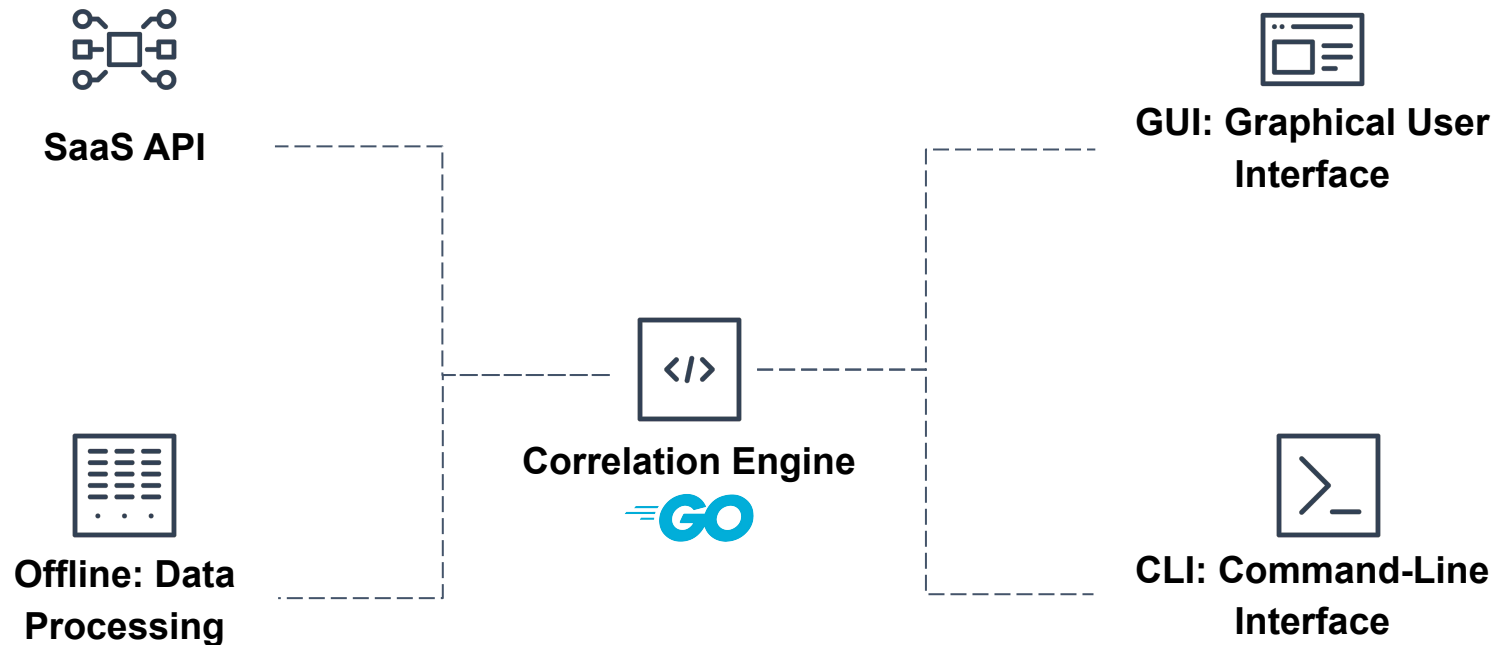


# It is More Than Just Correlation - A Debug Journey

## ► *Roadmap*

*What are our future plans?*

*What is our **goal**?*



## Who do we want to *support*?



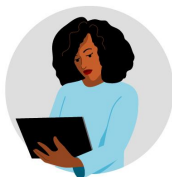
### Site Reliability Engineer

**Focus:** Understand system & react to events



### IT Operations

**Focus:** Provide/monitor deployment environments & optimize IT infrastructure



### Developer

**Focus:** Continuous & fast delivery



## Near-Term

(3-6 months)

Near-Term

- ▶ Enhancing the set of rules
- ▶ Beyond OpenShift - supporting all K8s environments
- ▶ Improving the *Graphical User Interface* Experience

## Mid-Term

(6-9 months)

Mid-Term

- ▶ *Offline* Services
- ▶ Improving the *Command-Line Interface* Experience

## Long-Term

(9+ months)

Long-Term

- ▶ Simplifying capturing domain knowledge through rules

# Roadmap

Interested in learning more about **korrel8r**? Engage in the community!

korrel8r / korrel8r Public

Edit Pins Watch 2 Fork 1 Star 11












Code Issues 9 Pull requests Discussions Actions Projects 1 Wiki Security Insights Settings

main 2 branches 0 tags

Go to file

Add file

Code

 alanconway	UI hover docs, clearer labels, more self-describing.	✓ 6999c80 2 weeks ago 81 commits
 .github/workflows	Add golanci-lint check to repo.	4 months ago
 cmd/korrel8r	UI hover docs, clearer labels, more self-describing.	2 weeks ago
 internal/pkg	Improved graph traversal logic, avoid repeat store operations.	2 weeks ago
 pkg	Improved graph traversal logic, avoid repeat store operations.	2 weeks ago
 rules	Improved graph traversal logic, avoid repeat store operations.	2 weeks ago
 LICENSE	Correlation, first sketch: Types and backwards chaining logic.	6 months ago
 Makefile	Web UI takes Query as starting point as well as console URL	3 weeks ago
 README.md	UI hover docs, clearer labels, more self-describing.	2 weeks ago
 go.mod	Move query unmarshaling to the Domain.	3 weeks ago
 go.sum	Add metric domain, misc bug fixes	last month

## About

Correlation of observability signals.

Readme

Apache-2.0 license

11 stars

2 watching

1 fork

## Releases

No releases published

[Create a new release](#)

## Packages


No packages published

[Publish your first package](#)

<https://github.com/korrel8r>

## Issue: Feature request











Suggest an idea for this project. If this doesn't look right, [choose a different type](#).



[RFE]

Write

Preview

H B I          

**\*\*1. When I am in this situation: \_\_\_\_\_\*\***

Situations where:

- you have some information, and want to use it to jump to related information
- you know how get there, but it's not trivial: you have to click many console screens, type many commands, write scripts or other automated tools.

The context could be

- interacting with a cluster via graphical console or command line.
- building services that will run in a cluster to collect or analyze data.
- out-of-cluster analysis of cluster data.

**\*\*2. And I am looking at: \_\_\_\_\_\*\***

Any type of signal or cluster data: metrics, traces, logs alerts, k8s events, k8s resources, network events, add your own...

The data could be viewed on a console, printed by command line tools, available from files or stores (Loki, Prometheus ...)

**\*\*3. I would like to see: \_\_\_\_\_\*\***


Again types of information include: metrics, traces, logs alerts, k8s events, k8s resources, network events, add your own...

Describe the desired data, and the steps needed to get from the starting point in step 2.


Examples:

- I'm looking at this alert, and I want to see ...
- I'm looking at this k8s Event, and I want to see ...
- There are reports of slow responses from this Service, I want to see...
- CPU/Memory is getting scarce on this node, I want to see...
- These PVs are filling up. I want to see...

Attach files by dragging & dropping, selecting or pasting them.

 Styling with Markdown is supported

Submit new issue



Do you work with **K8s** clusters?

Are you interested in providing feedback that could help us build a **rule-base** for our correlation engine?

Submit your feature request:

<https://github.com/korrel8r>

Remember, contributions to this repository should follow our [GitHub Community Guidelines](#).



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# Thank you! Questions?



Please scan the QR Code above  
to leave feedback on this session