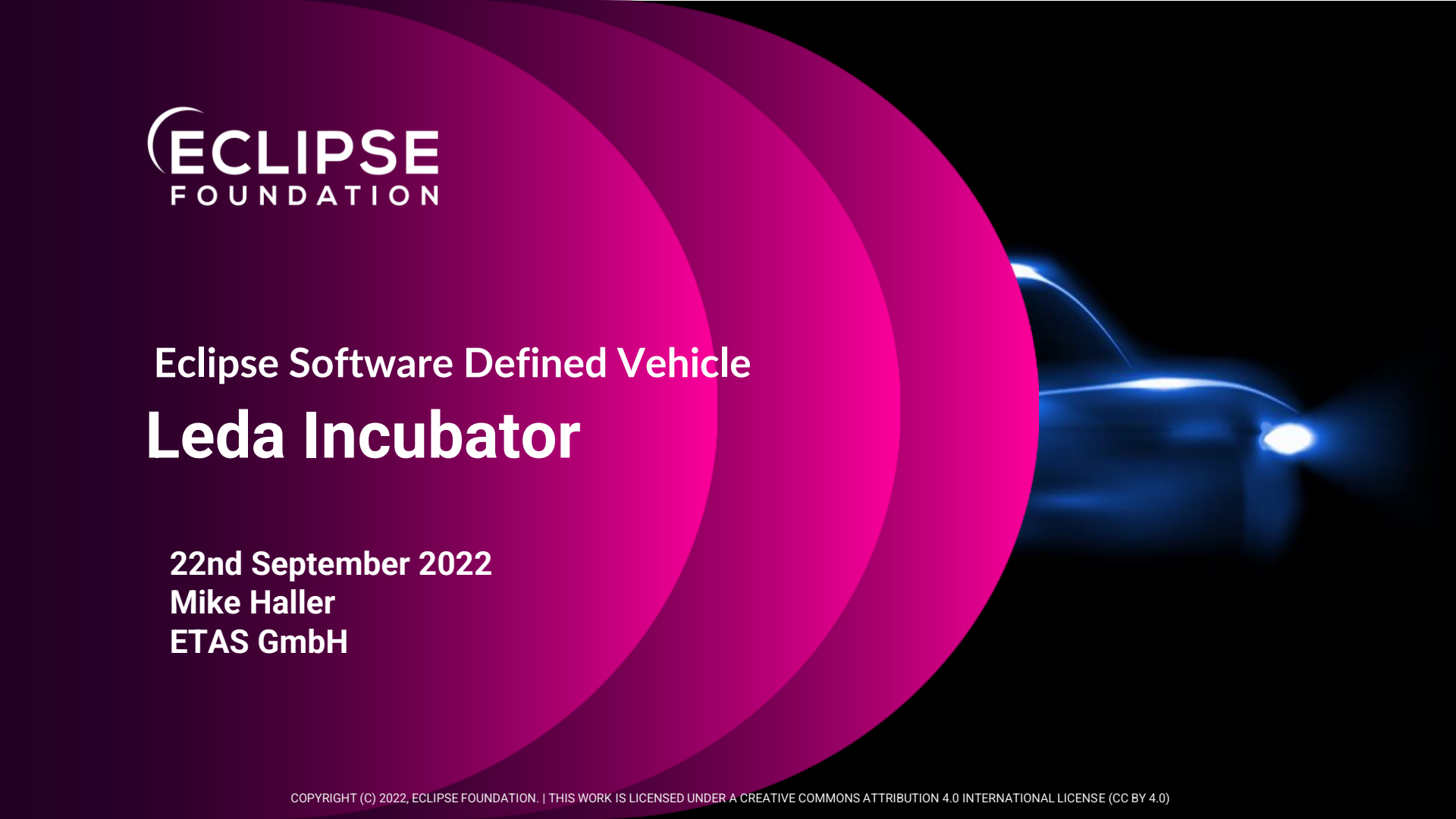


ECLIPSE FOUNDATION

Eclipse Software Defined Vehicle

Leda Incubator

22nd September 2022
Mike Haller
ETAS GmbH

Agenda

- ➔ Eclipse Leda
- ➔ Incubator Goals
- ➔ Cloud Connector
- ➔ Vehicle Update Manager
- ➔ Self Update Agent
- ➔ OpenTelemetry Collector
- ➔ Roadmap

ECLIPSE FOUNDATION

SDV?

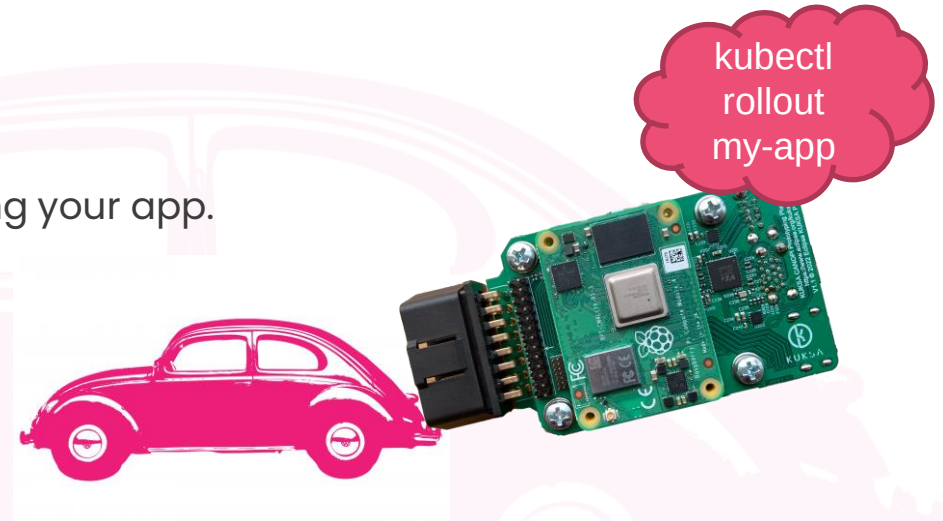
- New **challenges** to be solved
- Global, collaborative ecosystem is needed
- There is **no "One size fits all"**
- Separating hardware and software lifecycle
- Automotive SW is a highly specialized domain
- A lot of new code will be written
- It will have to be maintained for a long time
- A lot of computers-on-wheels need to be administrated

Looking into the crystal ball

- Automotive SW development must become more open, more attractive, it needs to spark enthusiasm
- Methodology and technology from IoT and Cloud will find its way into the vehicles
- DevOps will become normal for millions of vehicles
- The build-deploy-monitor DevOps cycle will continuously become faster and more effective thanks to containerized applications
- Vehicle Abstraction Layers are laying the ground for innovation
- Technology needs evaluation, ideas need to be tested
- A lot of variations and alternatives will be possible

Leda?

It takes time to ...
... find the right components
... design a working stack
... build the full stack
... deploy on a device
... configure the base services
... and NOW you can start developing your app.



How about...
... download Leda
... run on qemu/docker or some affordable HW device
... and directly start deploying your Vehicle Applications?

* Shamelessly stealing the Kuksa ideas >:-D

The `diff` to commercial

	Eclipse Leda & Incubator	Commercial projects
Sources	Open Source only	OSS + proprietary
Releases	Multiple variations of the SDV stacks (full vs minimal vs rescue-mode)	Single target device only (as optimized as possible)
Hardware	Common, affordable, available	Specialized, expensive
Customization	Sane defaults for quickstart image High flexibility when building from scratch	Full customization No invest into "quickstart"
Documentation	Community	Commercial, Trainings
Validation	Briefly - low hanging fruits Focus: demo the process	Strict, Lots of regulations, certification requirements, "100% Coverage"
Support	Community, best-effort	Commercial, long-term contracts
Entry barrier	Low, Accept contributions	High

Deliverables

Leda

Build recipes for SDV-related packages
Meta-Layer (Yocto, OpenEmbedded)

Quickstart Images (Distro)
Sane default configurations
Pre-Integrated
Documentation, How-Tos

Runs on Raspi, QEMU, ... Docker

Incubator

Source Code

Build recipes
Documentation

No releases!

Leda Incubator

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Leda Incubator Goals

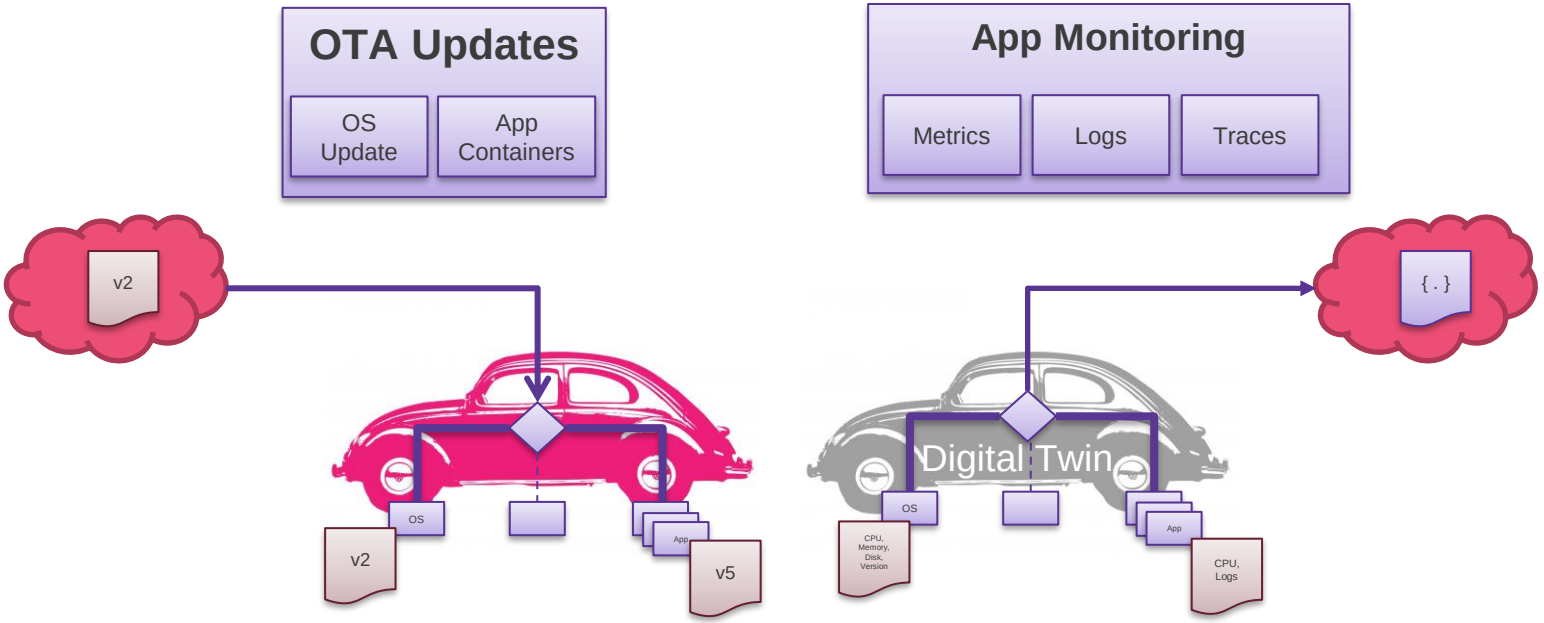
A place for new SDV components for integration into the Leda quickstart images.

Includes **new components, experimental, pre-mature**, temporary implementations etc. to fill the current gaps.

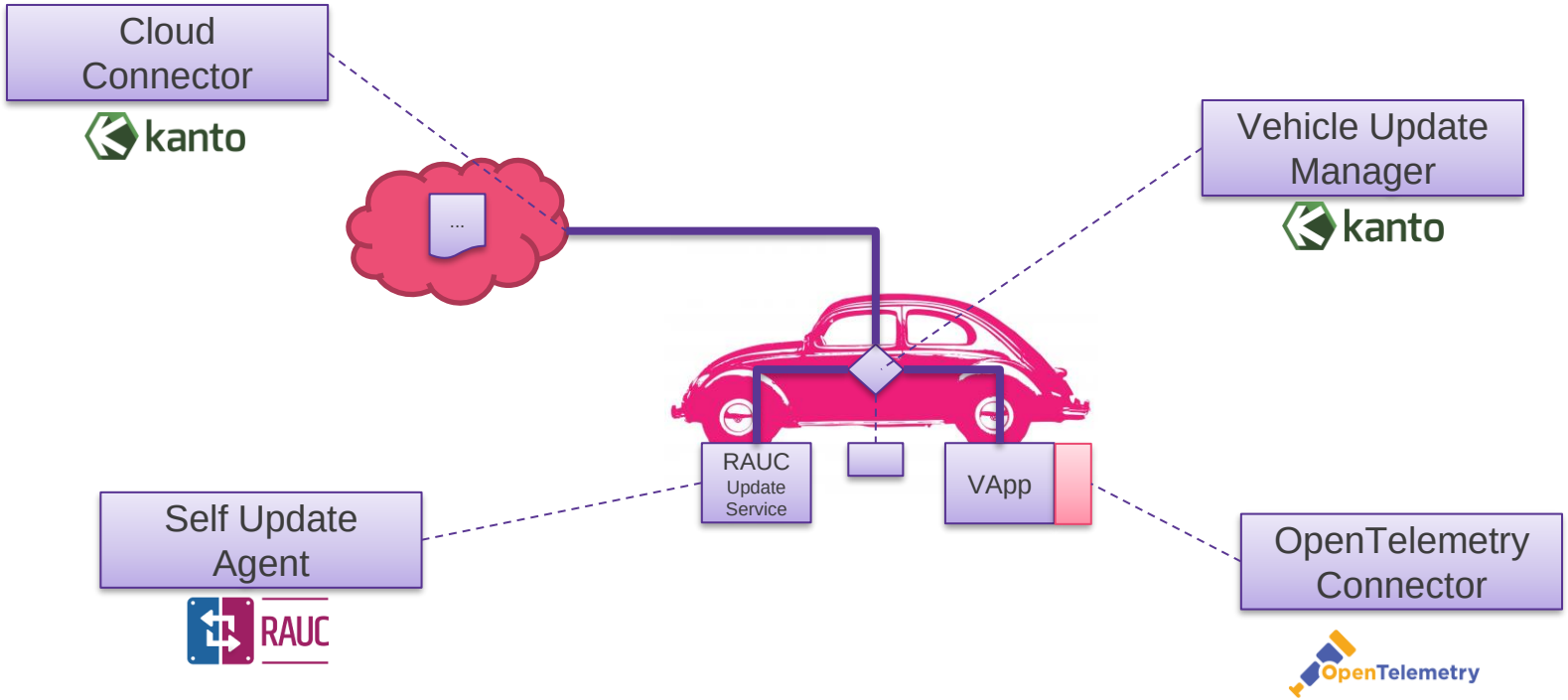
Leda Incubator can be a home until the "right" upstream projects are identified, contributions are worthy or the component may even become a standalone project.

Low entry barrier regarding overhead (don't need project proposals, project websites, build environment etc. > Leda can be reused)

Use Cases


OTA Updates
OS Update
App Containers
App Monitoring
Metrics
Logs
Traces
v2
{ . }
OS
App
v2
v5
Digital Twin
OS
App
CPU, Memory, Disk, Version
CPU, Logs

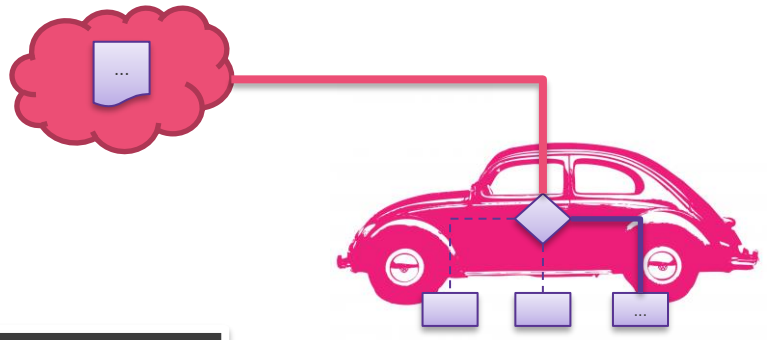
Incubator Components



Cloud Connector

Connect the vehicle to a cloud backend and route messages

- Connectivity (Azure IoT Hub)
- Authentication & Security
- Device Identity
- Connectivity Recovery
- Device Telemetry (D2C)
- Command & Control (C2D)
- Extensible Message Routing (Apps)



Potential future upstream project:

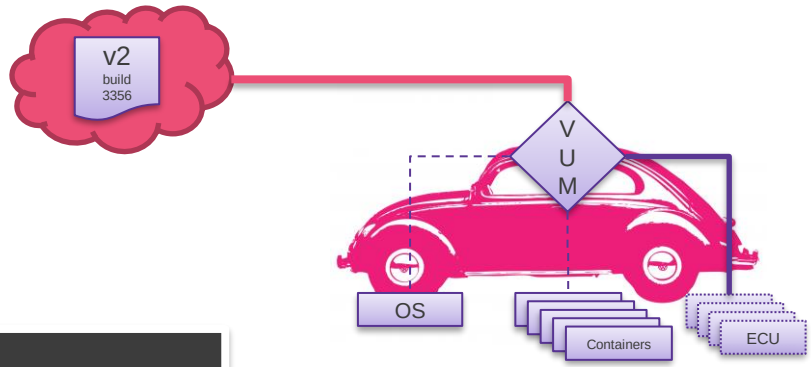
kanto

Status:
Implemented > CQ

Vehicle Update Manager

Dispatch remote requests for different types of updates

- Routing Decision:
  Self Update vs Container vs other domains
- Delegate to corresponding target service
- Define message protocol and behavior (UpdateAgent API)
- Update requests follow "desired state" paradigm



Potential future upstream project:

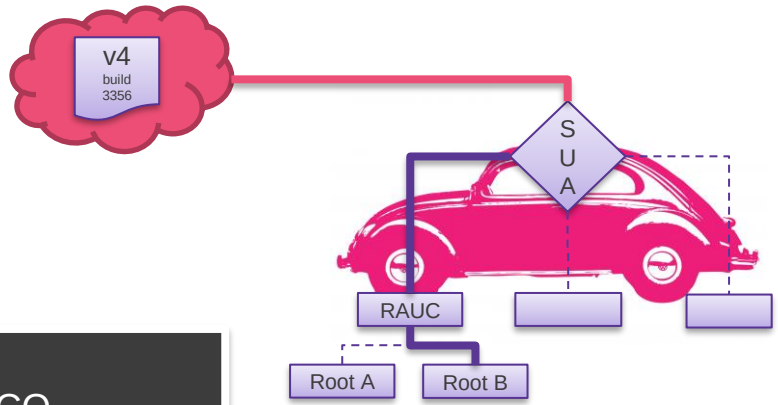
kanto

Status:
Implemented > CQ

Self Update Agent

Enable Over-the-Air (OTA) updates of the operating system and base packages

- Triggered by remote API via PubSub from the cloud backend
- Determine need for update (current vs desired)
- Dispatch to local update mechanism, such as RAUC
- Send progress information to cloud



Potential future upstream project:

rauc/**meta-rauc-community**

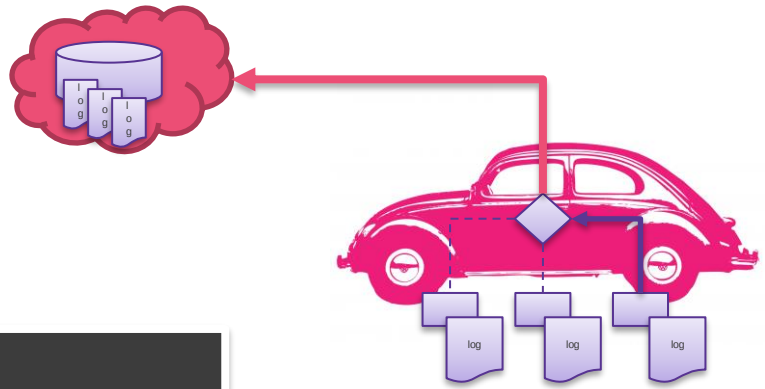
Yocto/OpenEmbedded meta layer with examples for integration of RAUC, the embedded Linux A/B update framework

Status:
Implemented > CQ

OpenTelemetry Collector

Collect and publish general device telemetry and applications logs, metrics and traces

- Use OTel / OTLP implementations
- Example configurations
- Adapter for mqtt integration



Potential future upstream project:

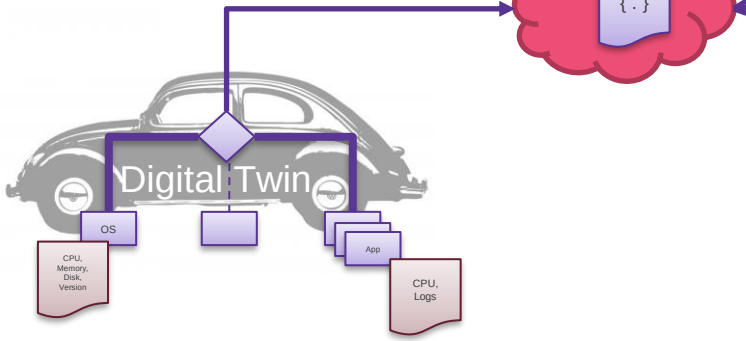
Leda

Status:
Implemented > CQ

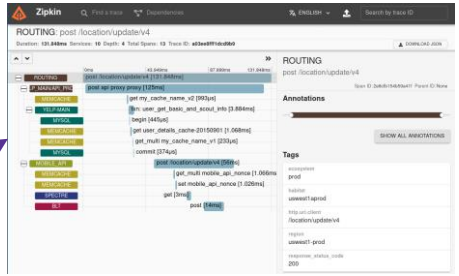
OpenTelemetry Collector

- Minimized, custom container image
- Open OTEL/OTLP protocols
- Logs from native services (eg journald)
- Logs from containers
- Velocitas V-Apps: Logs + DAPR traces
- Host Metrics (eg CPU load, memory)
- Metrics per container
  cpu & memory per node/pod/container

Example monitoring backends:

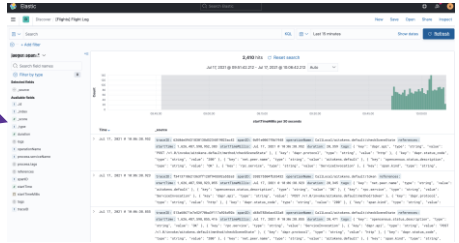


Zipkin



jaeger

elasticsearch



Prometheus
Grafana
loki
...

Current Work

- Support for Yocto **Kirkstone** LTS until Apr'24
- Migrate to better build and layer tool: siemens/**kas**
- Recipes for ESRLabs **Northstar**: embedded container runtime
- Build recipes for first **incubators**
- ETAS sponsoring an Eclipse Leda introduction video
- Setup build environment on Eclipse infrastructure

Roadmap

- Support for Yocto Dunfell
- Support for Yocto Langdale
- **Prepare binary OSS build ("nightly")**
- Setup Eclipse ORT license scanning
- Setup of dependency track + CVE checks
- Dockerized qemu images

Join us!

You can help us by using Leda!
We're grateful for feedback

Mailing List:
`leda-dev@eclipse.org`

We're looking for ...

- additional hardware to support
- ideas for use cases
- contributions (ideas, code, docs)

22nd September 2022
Mike Haller
ETAS GmbH

THANK YOU