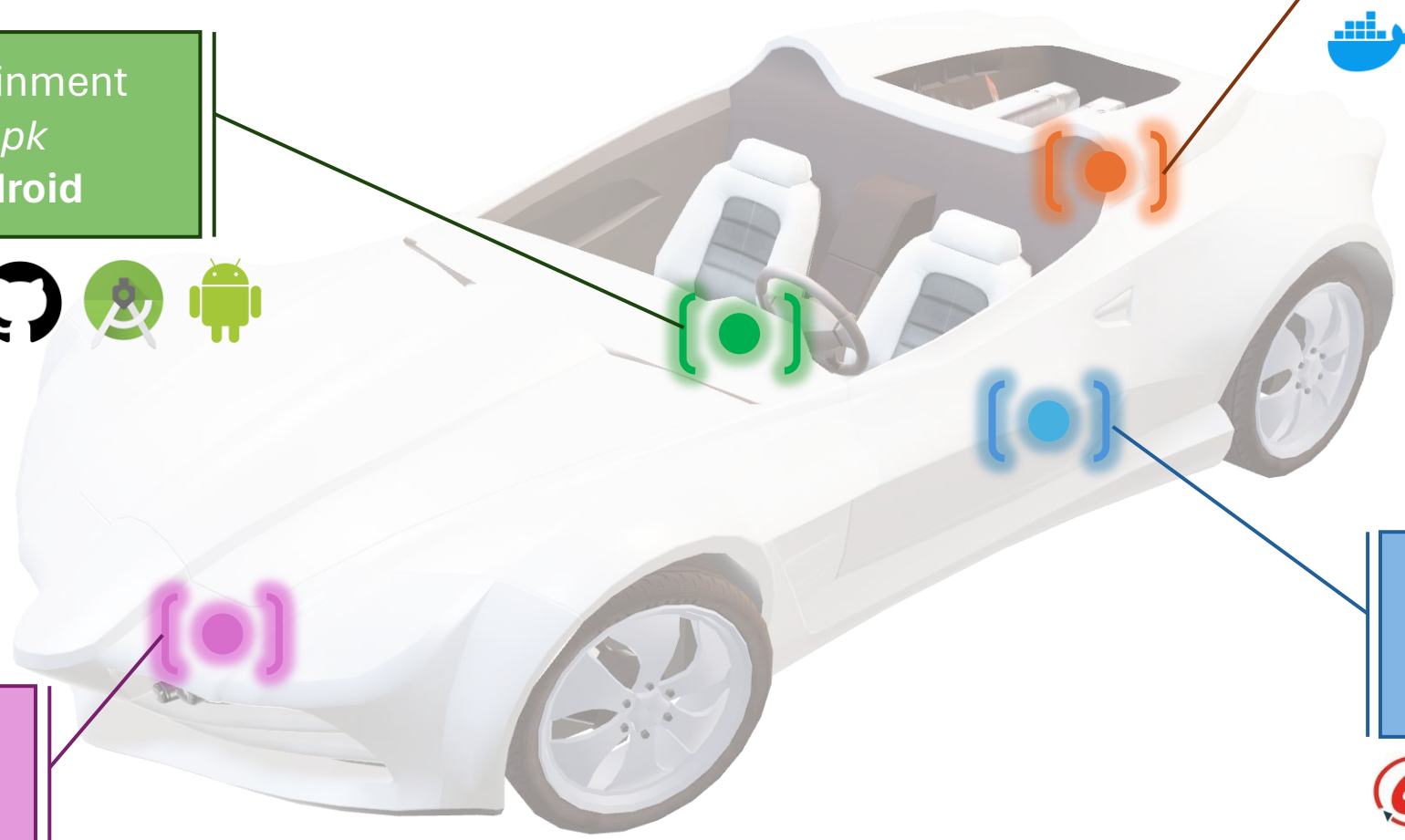
Symphony

2024

Problem

- Orchestrate multiple toolchains
  - Different vendors at different times
  - Diverse workforce knowledge base and capabilities
  - Mixture of different deployments and versions

SDV Ecosystem



HPC
container
Linux

Infotainment
.apk
Android

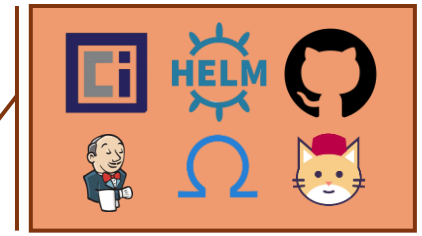
AUTOSR
xml
RTOS

ECU
binary
Custom OS

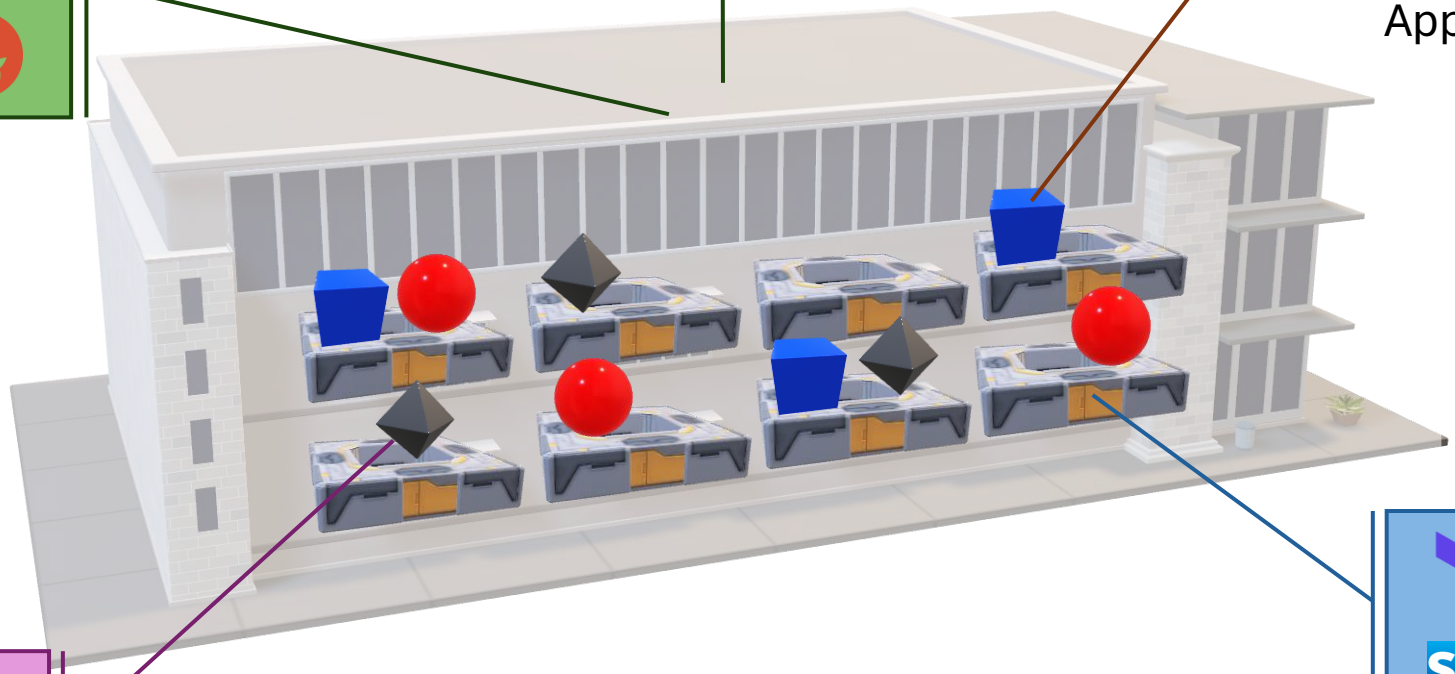
Manufacture

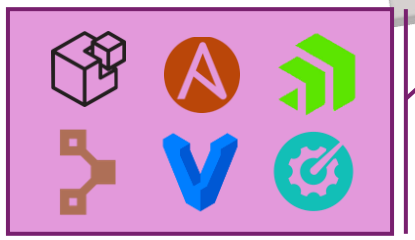
Big Data
Analysis
AI
...

Policy
Security
Observability
...



Applications

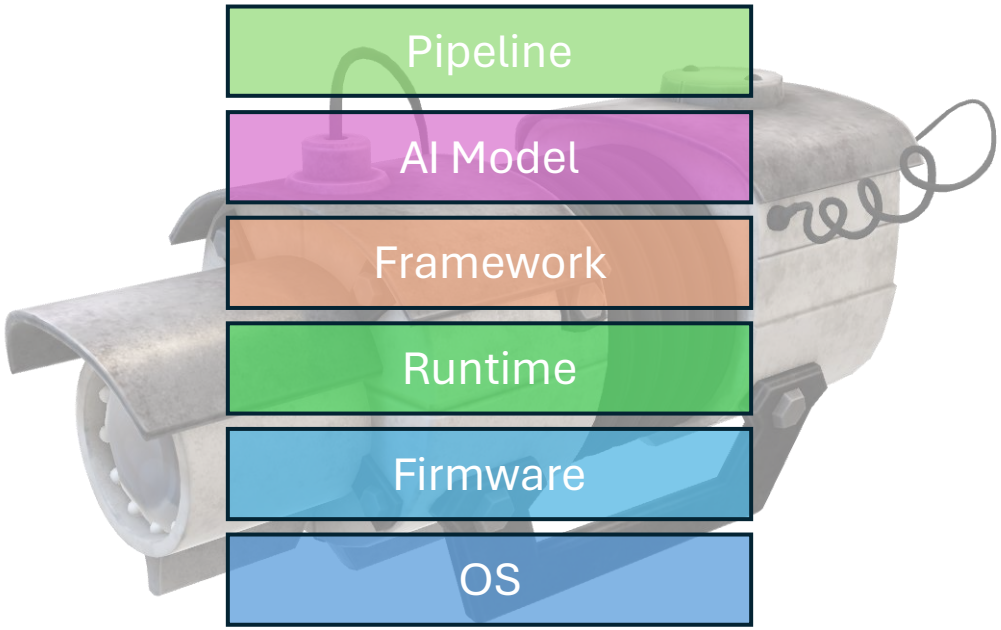




Configurations

IaC

Edge AI


Pipeline
AI Model
Framework
Runtime
Firmware
OS

OpenVINO
yocto
PROJECT
WA
Onvif
TensorRT

How do we build an **end-to-end, consistent edge experience** out of this heterogenous, dynamic landscape?

(without losing our minds)

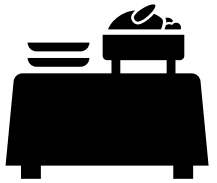
Roads to unification

Laws & regulations

Specifications
Standards

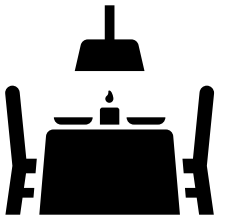
Fast-food chain

Full-stack



Food court

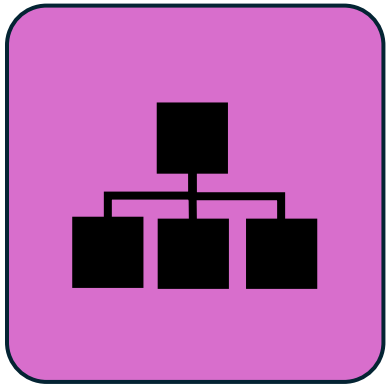
- Unified experience
- Embraces diversity
- Embraces dynamism



Fine dining

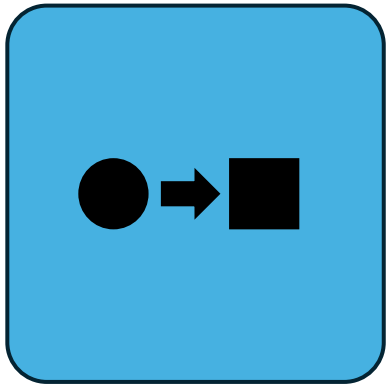
Deep engagement

Symphony abstractions



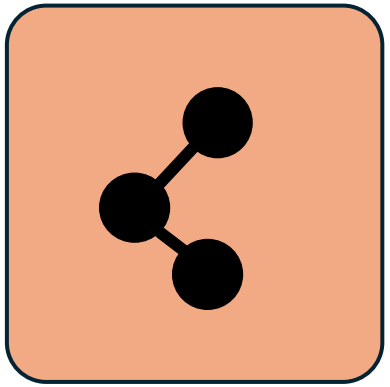
orchestration model

- model orchestration problems
- * as code
- application topologies
- device capabilities
- AI pipelines



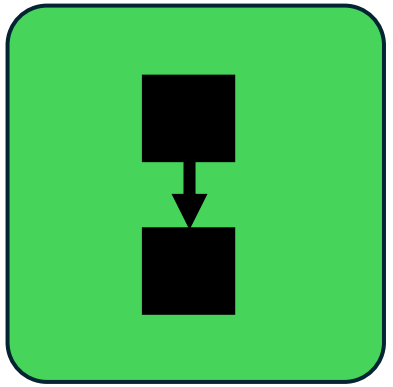
state seeking

- deployment
- update
- configuration
- policy
- sidecar injection



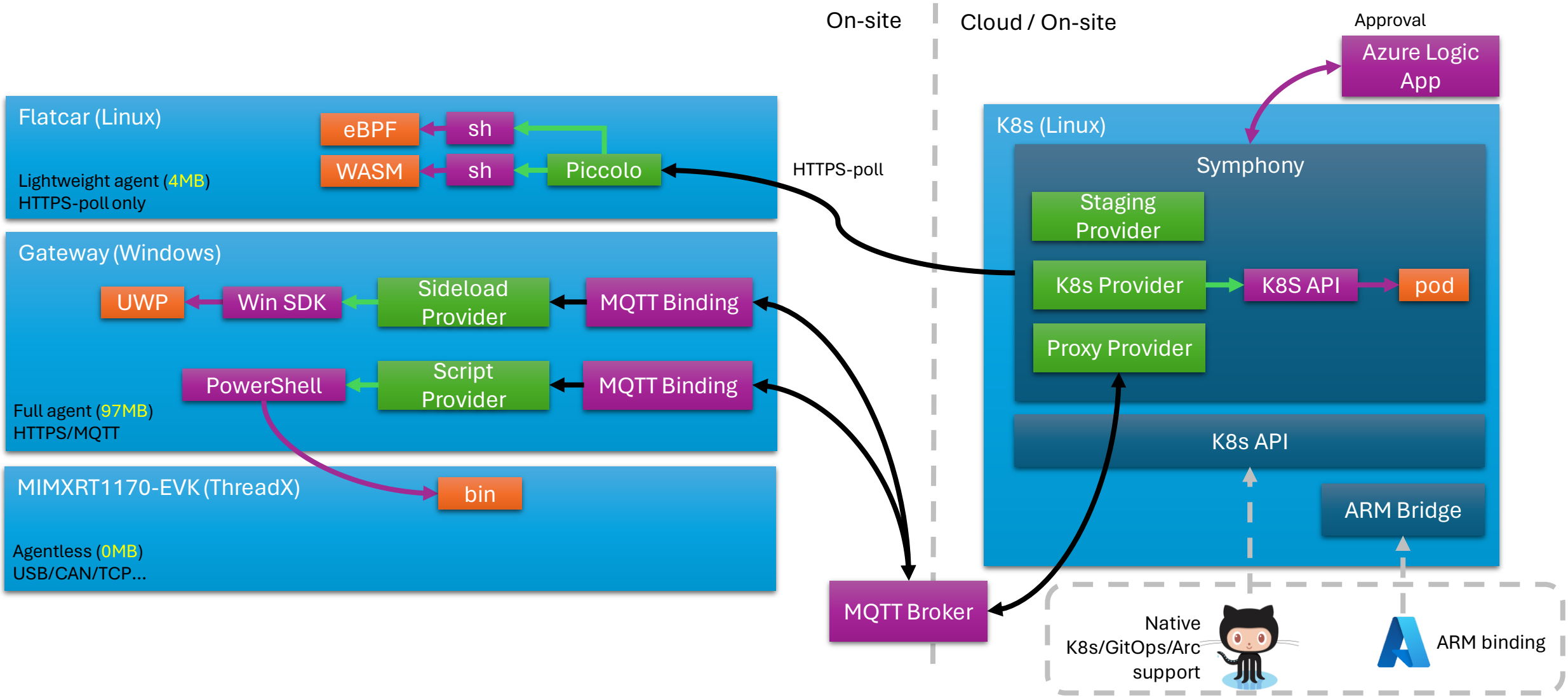
information graph

- asset management
- configuration management
- templating
- status report
- analysis



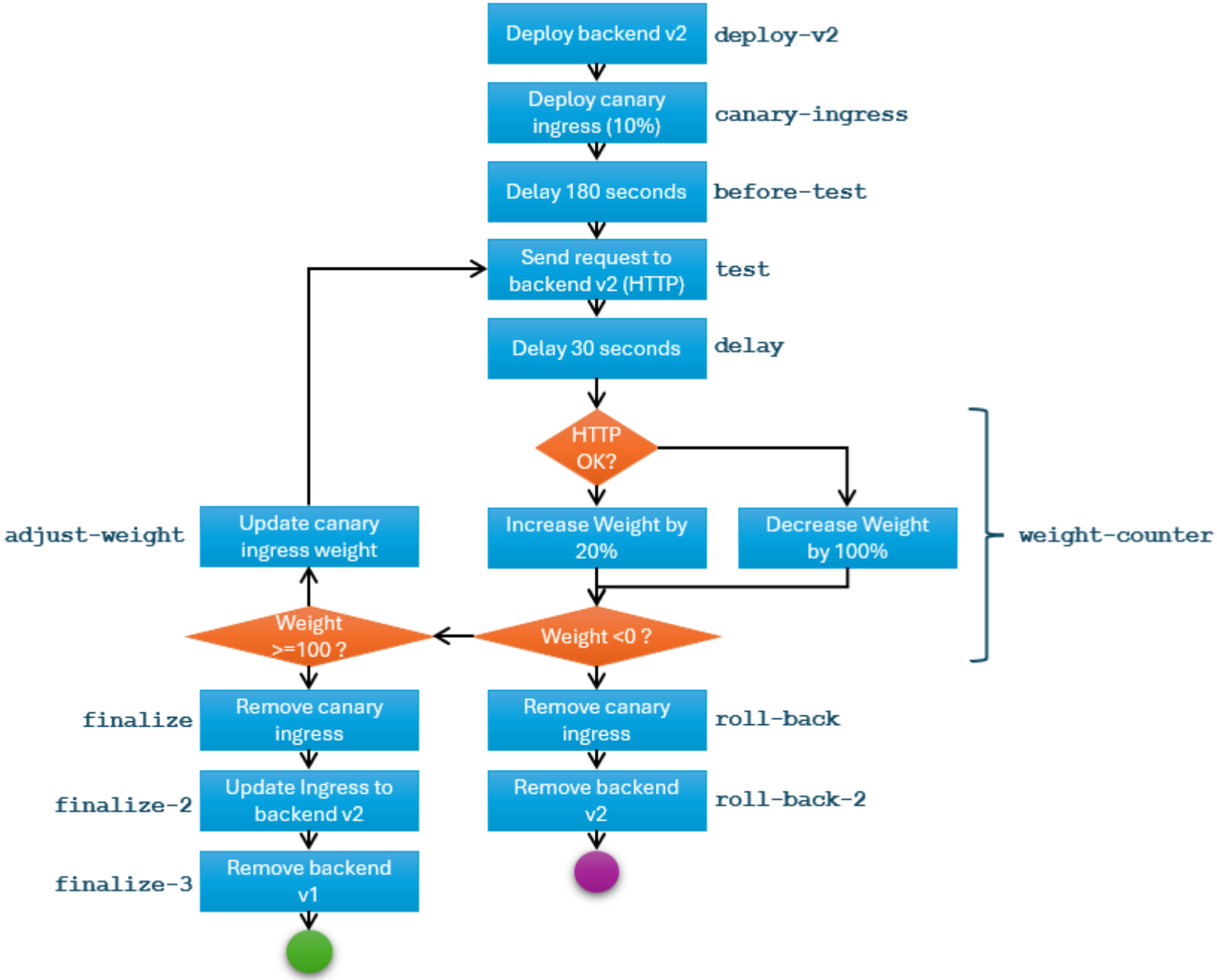
workflow

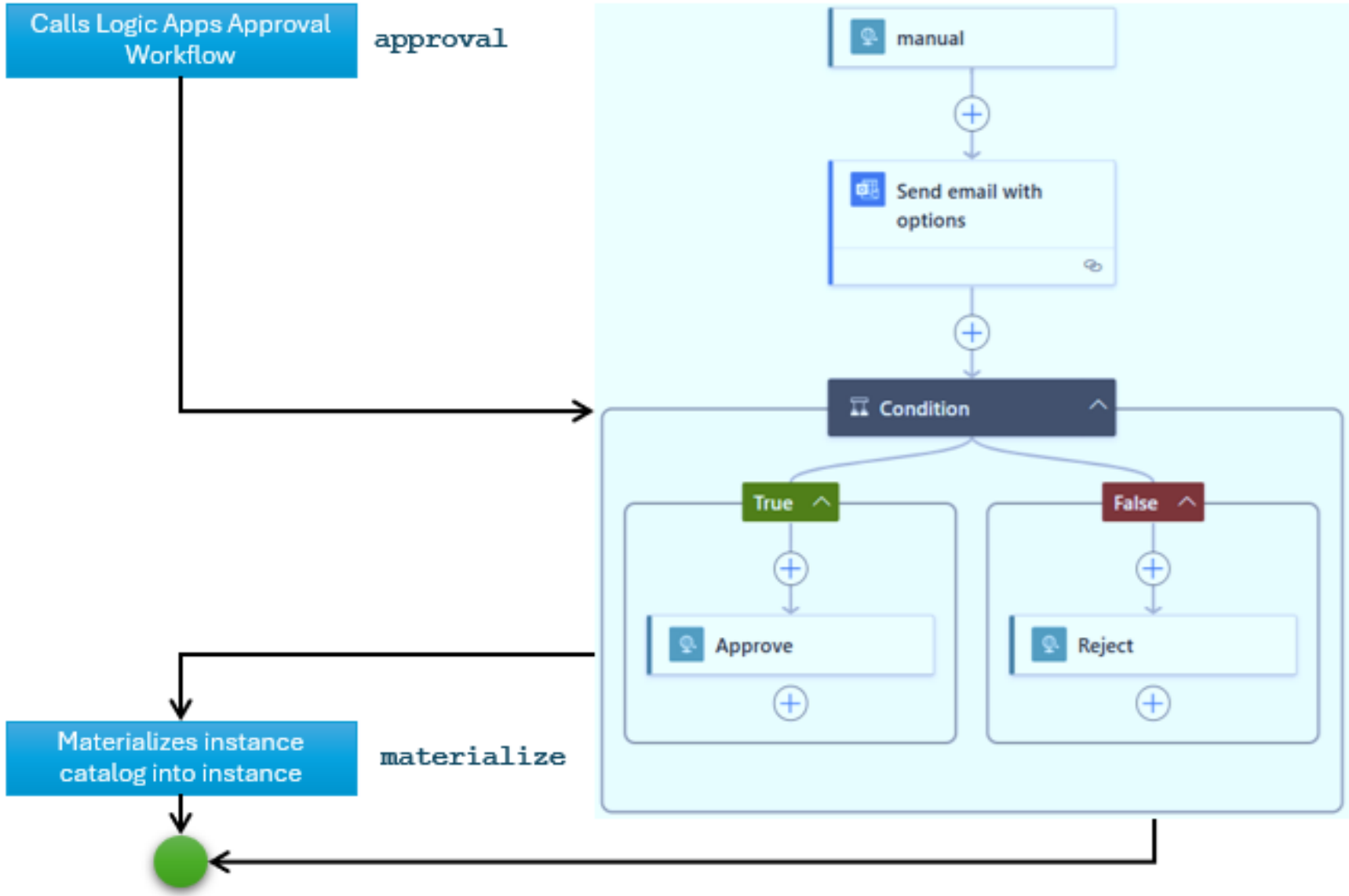
- approval
- scheduled deployment
- canary
- CI/CD integration
- multi-site coordination

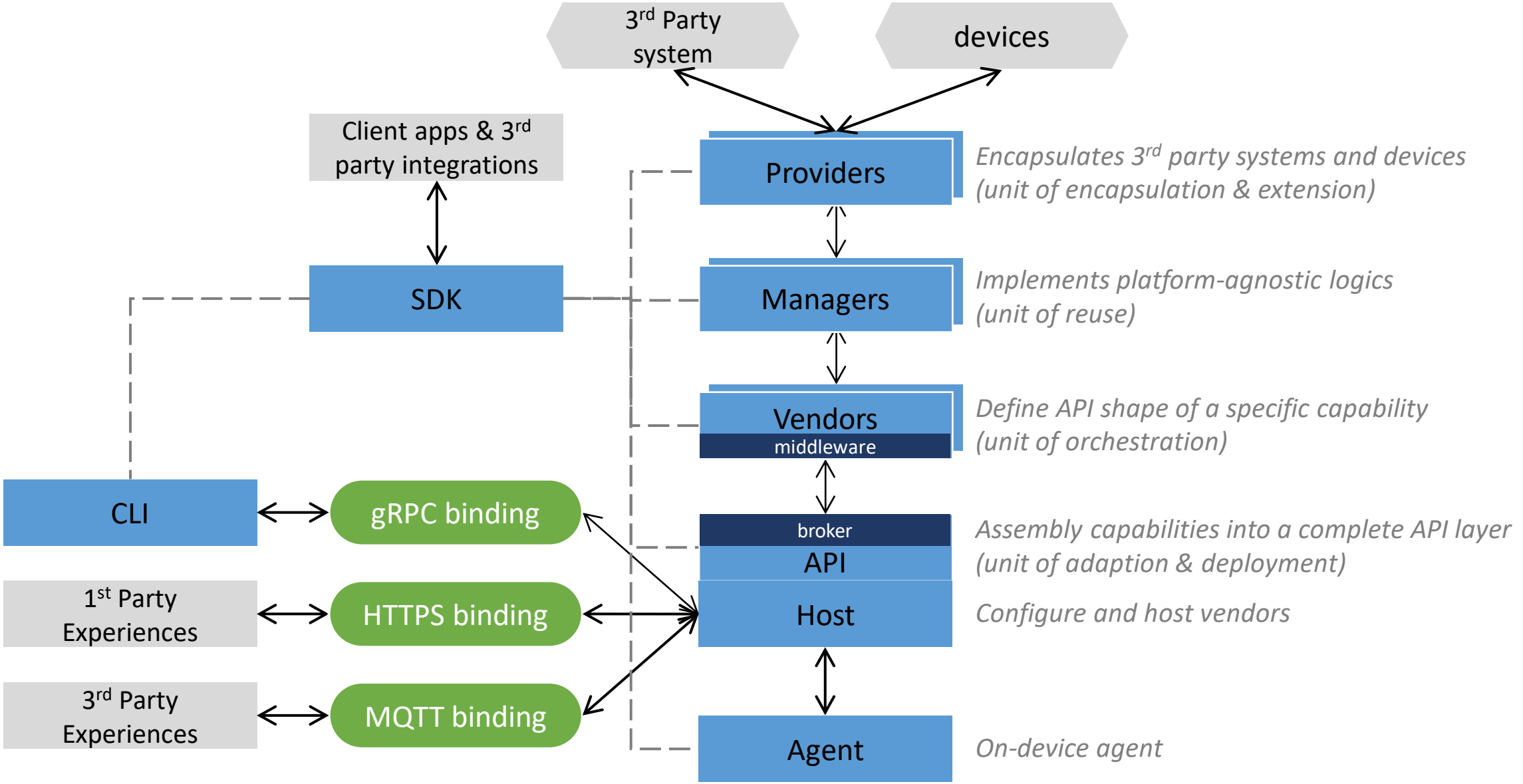

On-site
Cloud / On-site
Approval
Azure Logic App
Flatcar (Linux)
eBPF
sh
WASM
sh
Piccolo
Lightweight agent (4MB)
HTTPS-poll only
HTTPS-poll
K8s (Linux)
Symphony
Staging Provider
K8s Provider
K8S API
pod
Proxy Provider
K8s API
ARM Bridge
Gateway (Windows)
UWP
Win SDK
Sideload Provider
MQTT Binding
PowerShell
Script Provider
MQTT Binding
Full agent (97MB)
HTTPS/MQTT
MIMXRT1170-EVK (ThreadX)
bin
Agentless (0MB)
USB/CAN/TCP...
MQTT Broker
Native K8s/GitOps/Arc support
ARM binding

Facts

- Eclipse open-source project under MIT license (0.48.2)
- Platform agnostic and extensible
- Standalone or Kubernetes
- Agentless (0MB), light agent (4MB) or full agent (97MB)


Deploy backend v2
deploy-v2
Deploy canary ingress (10%)
canary-ingress
Delay 180 seconds
before-test
Send request to backend v2 (HTTP)
test
Delay 30 seconds
delay
HTTP OK?
Increase Weight by 20%
Decrease Weight by 100%
weight-counter
Weight <0 ?
Weight >=100 ?
adjust-weight
Update canary ingress weight
Remove canary ingress
roll-back
Remove backend v2
roll-back-2
finalize
Remove canary ingress
Update Ingress to backend v2
finalize-2
Remove backend v1
finalize-3


Calls Logic Apps Approval Workflow
approval
manual
Send email with options
Condition
True
False
Approve
Reject
Materializes instance catalog into instance
materialize



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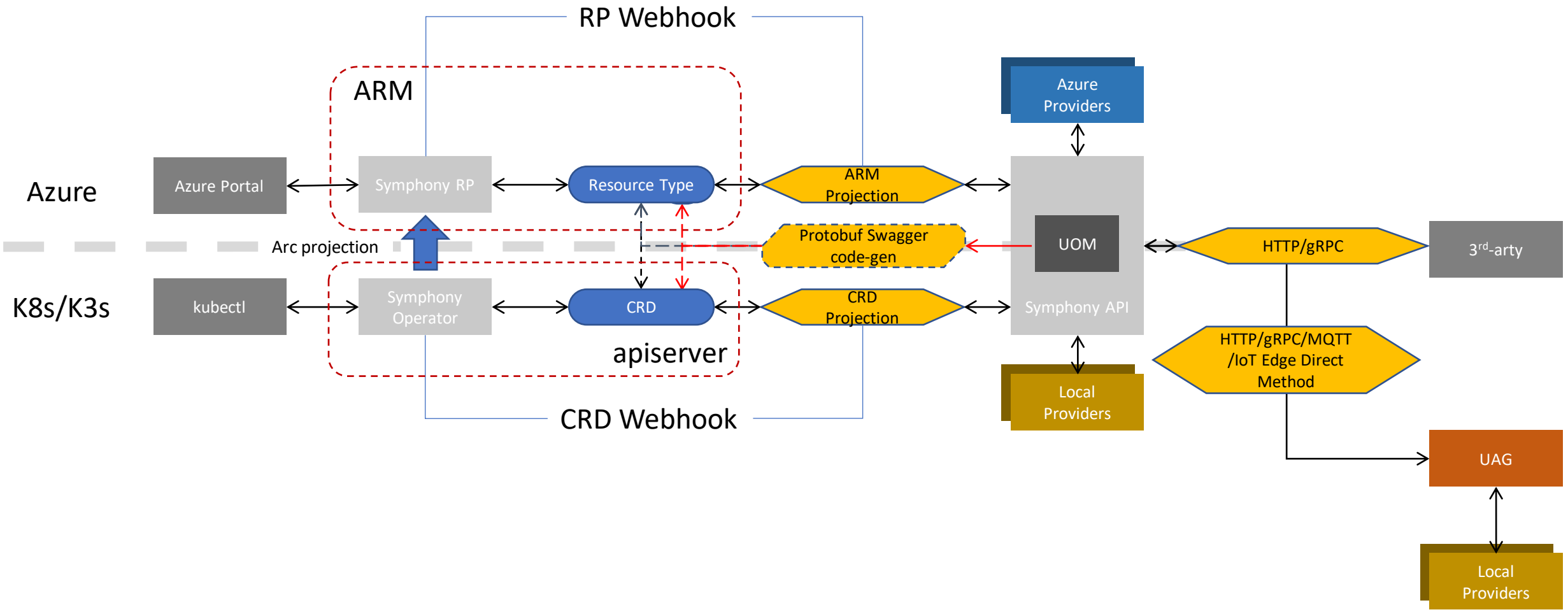
Architecture



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CLI	Portal	Script	CI/CD	K8s Binding

Symphony API

Protocol binding – HTTPS, MQTT, others

Middleware – observability, authn, billing

Solutions	Targets	Instances	Catalogs	Campaigns	Devices	Models	Skills	Trails	Jobs	Federation	Settings	Solution	Hydra
application management	infrastructure management	deployment management	configuration templates ontologies indexes	workflows approvals gated updates canary CI/CD scheduled fan-out policies	sensors cameras actuators ECUs SoCs accessories	AI models	AI pipelines data pipelines	immutable log	remote tasks clean up ingestion async ops	sync multi-site graph queries	sys config contexts	agent state-seeking	ingestion projection import export

Managers – platform-agnostic business logic

Providers – integration/extension points to connect to external tool chains