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Distributed Big Data Network Analytics

Goal: Democratize big data AI analytics framework by creating easily deployable & customizable stack

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Agenda

- Analytics introduction & Use cases
- Data analytics framework stack – Needs/requirements
- Data analytics stack - Components chosen, new enhancements
- Summary & next steps

Big Picture – Analytics

Reactive

Acted on escalation, productivity impact in hours

Pro-active

Continuous monitoring, act on alerts, little impact on end users, but may miss alerts due to volumes

Predictive

Identifies and then attempts to prevent SLA-impacting events

Need AI (ML/DL) analytics
Need Big data framework

Use cases

Traffic Prediction
(for dynamic resource allocation and power management)

Traffic Classification
(for service differentiation, security etc…)

Traffic Routing
(for selecting best path to optimize cost, maximize link utilization etc…)

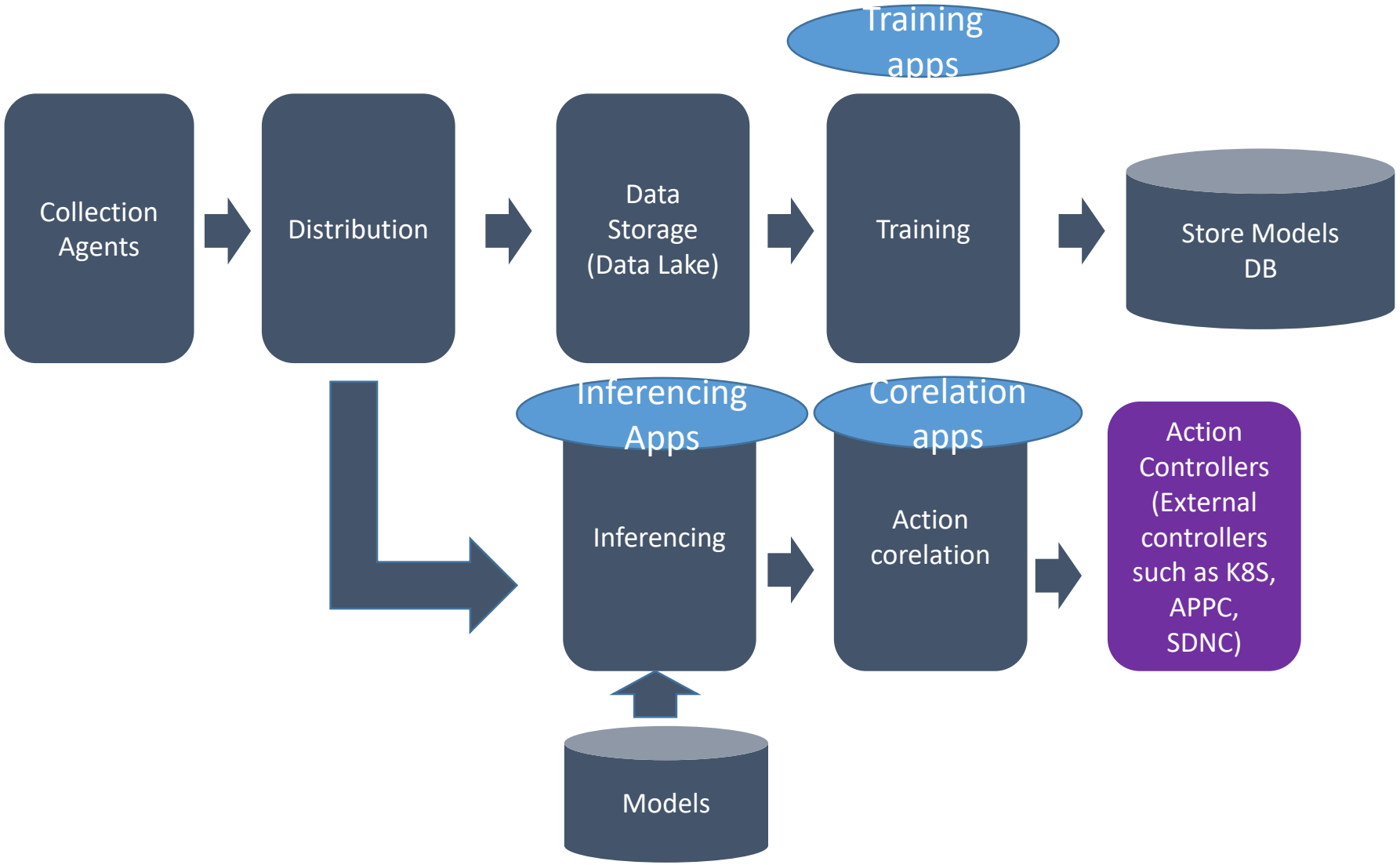
AND
Media and other Analytics

Admission Control
(Allowing new requests based on available resource prediction)

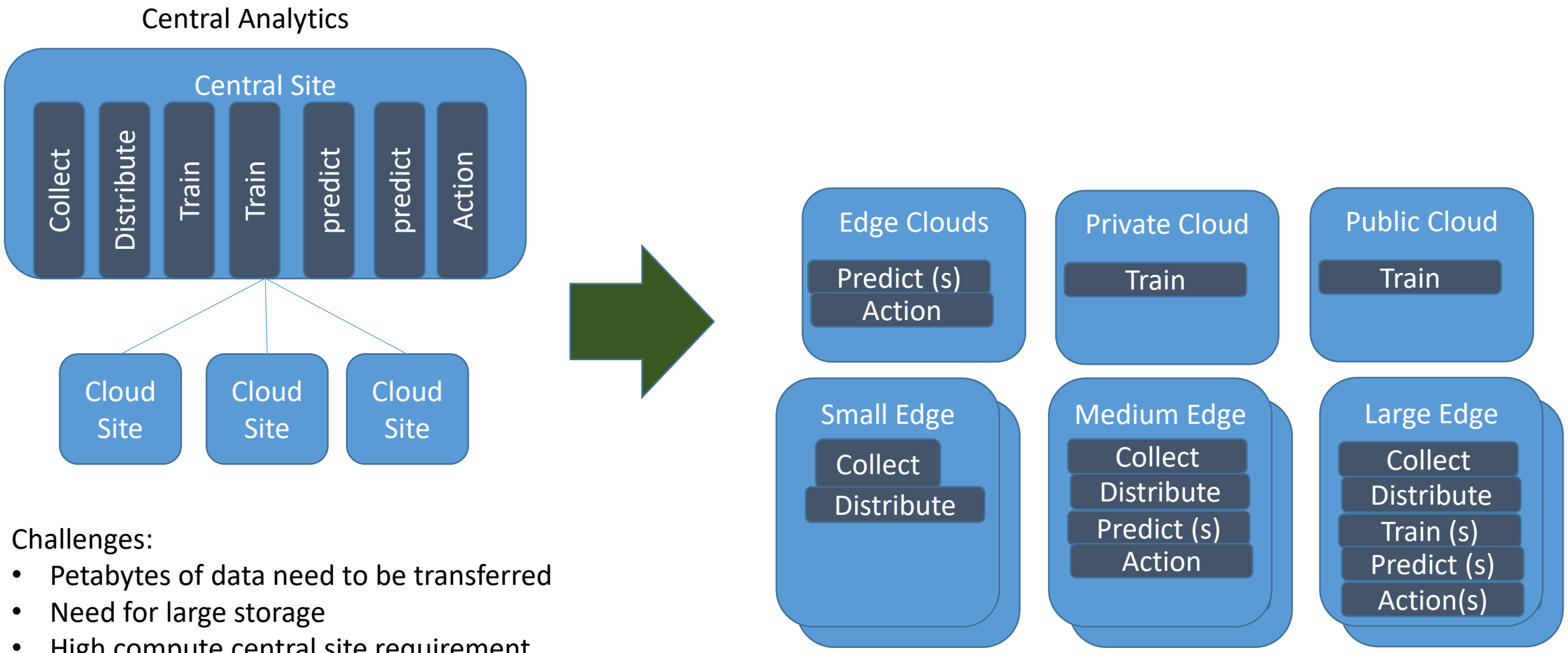
Fault Prediction & Localization
(for simplifying the fault management and root cause analysis)

Network Security
(for intrusion detection)

Big Data Analytics Steps



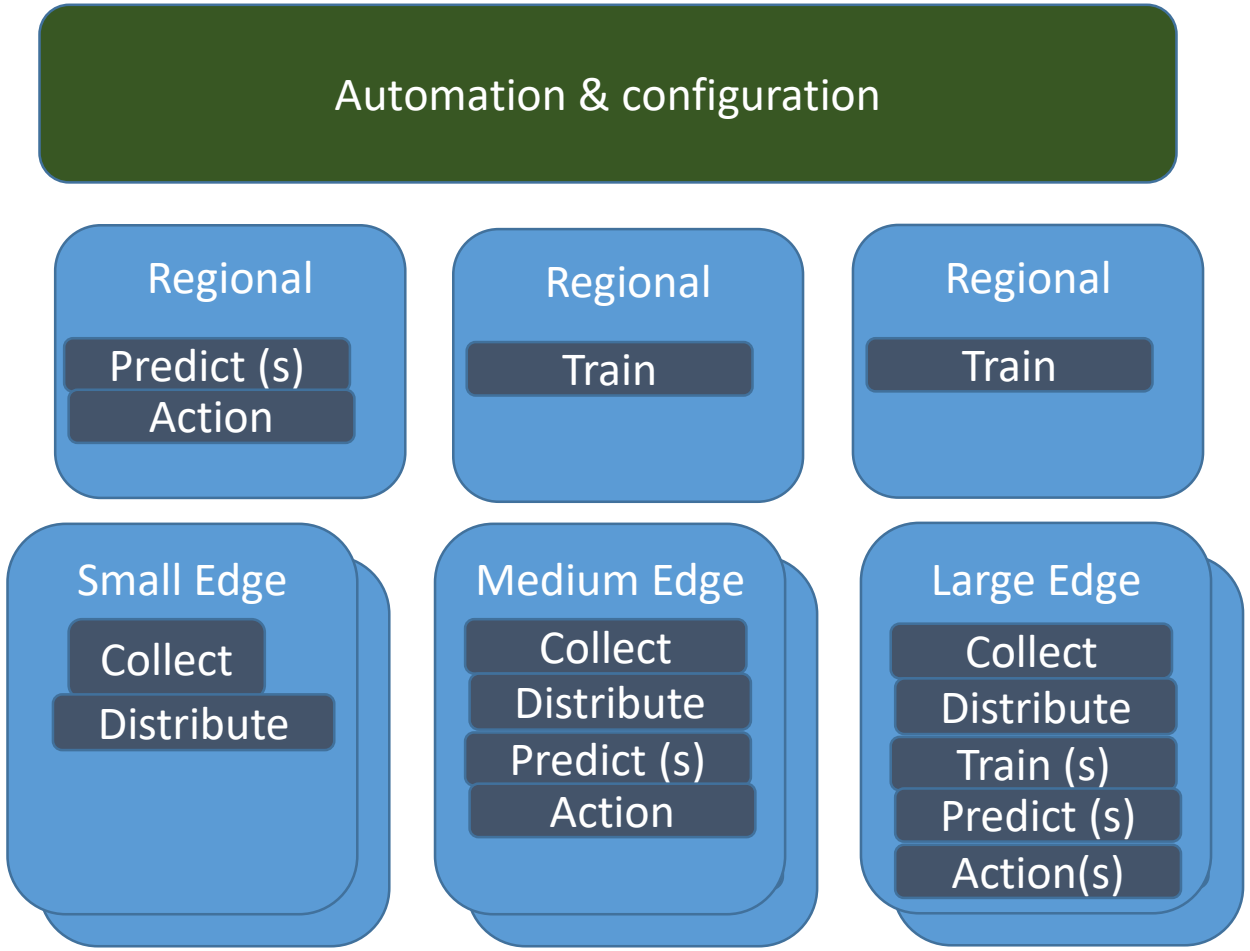
Stack Goals - Decentralization



Challenges:

- Petabytes of data need to be transferred
- Need for large storage
- High compute central site requirement.
- Not edge friendly

Stack Goals – Bulk Deployment & configuration



- Edges could be in thousands
- Each edge would have its own site orchestrator (e.g K8S)

- Need for centralized automation
  - To deploy various parts of analytics stack in multiple locations.
  - Configure them to make them work together
  - Support for dynamic edges

Goal: Deploy and Configure big data analytics framework in hours instead of months

Stack Goals – Use known big data frameworks

- Goal is to leverage known and open source packages
- Choose right versions
- AI (ML/DL) training and inferencing
- Make them work together
- Gaps and fixes.

Stack Goals – Follow Cloud Native and Micro-services design patterns

Security

- ISTIO CA, Envoy proxy for Mutual TLS among PODs.
- ISTIO ingress for communication outside of clusters.
- ISTIO RBAC

→ Security away from applications

Load balancing & CI/CD

- ISTIO Envoy with Cilium acceleration
- Visualization and monitoring
- A/B testing & Canary

Operators

- To bring up PODs.
- To configure using CRDs

Functions

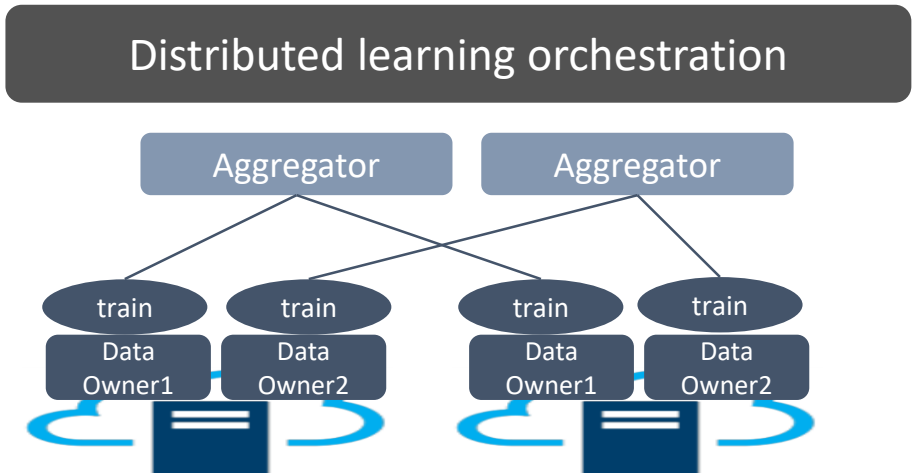
- To enable developer functions to get executed in the pipeline
- Knative

Stack Goals – Reduce training time

Distributed Learning with data parallelism

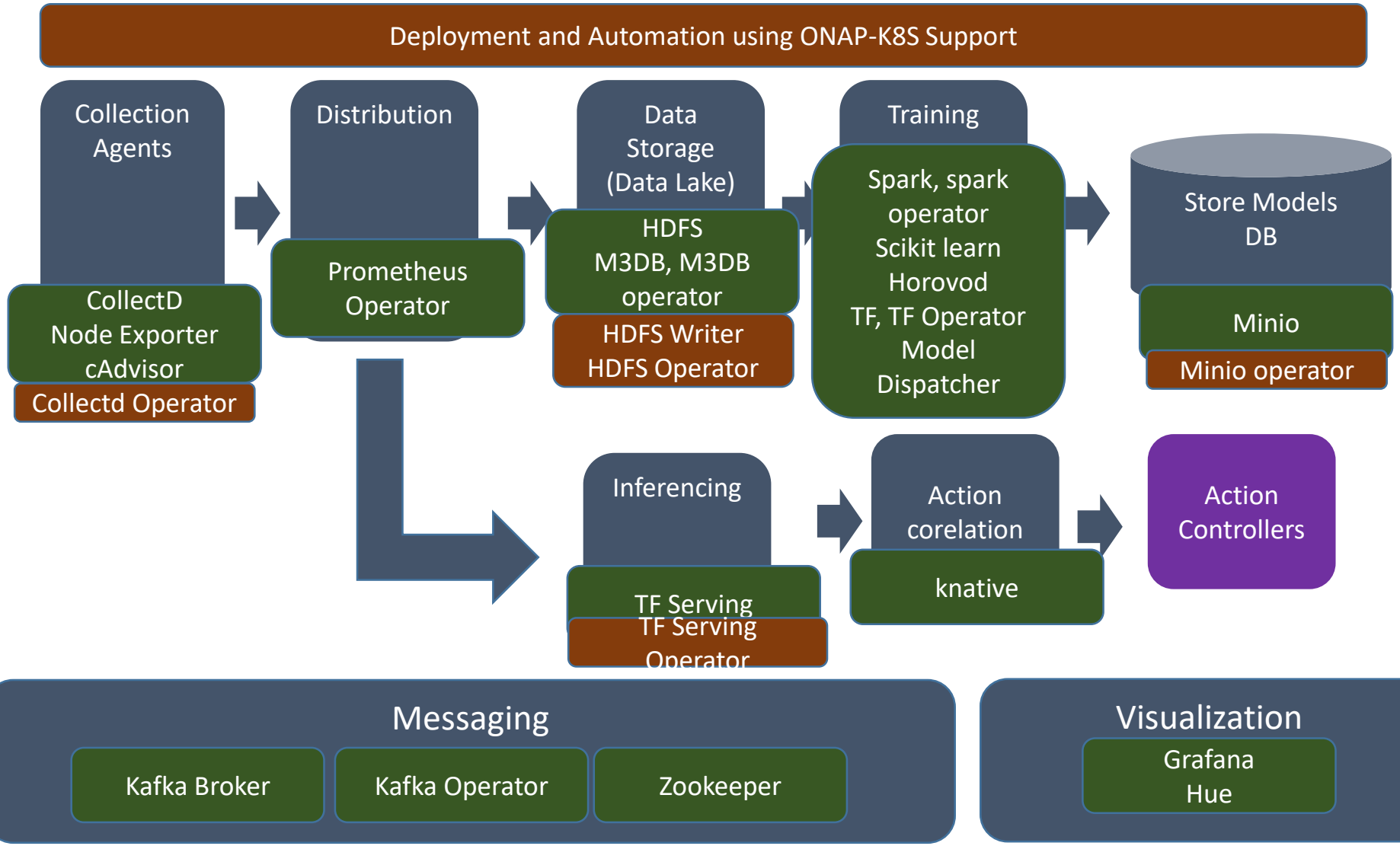
Leverage hardware accelerators for performance

Stack Goals – Federated/Distributed Learning



- To honor Data sovereignty
- Data does not leave the site.
- Aggregation server based model
- Tensorflow based DL

Stack - Packages & enhancements to realize analytics stack

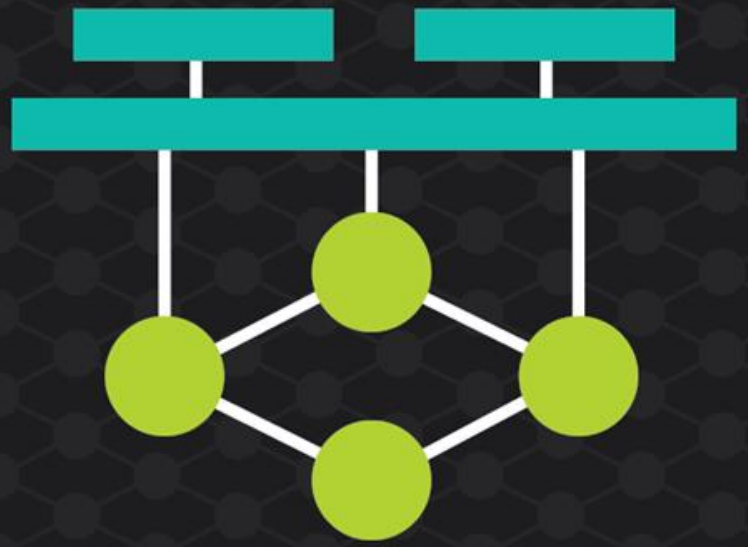


- An opinioned stack
- Helm Charts
- Container images
- Customized Day0 profiles
- Day2 templates for dynamic configuration
- Deployed using K8S in each site
- Monitoring
- Security via ISTIO
- Deploy with ONAP-K8S.
- Sample applications
- Code: https://github.com/onap/demo/tree/master/vnfs/DAaaS

Summary & Next steps

- Big data based AI analytics is a need for network and media analytics.
- We are leveraging K8S, Big data eco-system to create the stack.
- Leveraging ONAP service orchestrator to deploy various parts of stack at multiple sites
- More automation opportunities still exist – Deployment in matter of hours require enhancements at ONAP.
- Federated learning orchestration is yet to be done
- Model LCM and Model Security work is yet to be done.
- Proving with real AI application might expose few more gaps.
- Help us to improve the stack.

Q&A



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