Building Multi-arch Pipelines

With Cloud Native tools

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Section Header Layout Arial 40pt

Section Header Subtitle Arial 28pt

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What I want to discuss today

- Motivation
- State of NFD
- Intro to ArchSpec
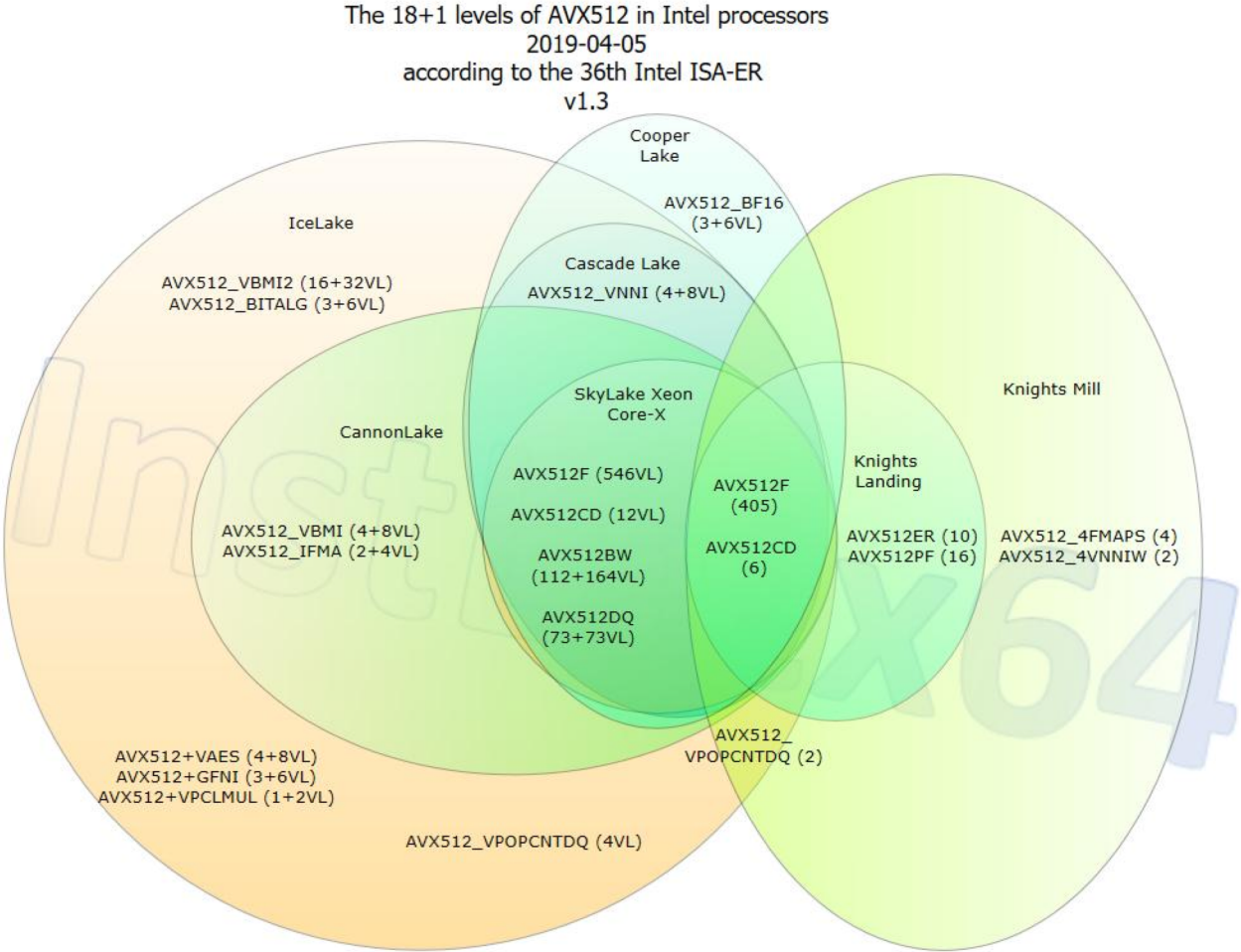- ArchSpec SideCar
- Future work

Multi-Arch but...

Why?

the future is multi-arch

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One chip to rule them all

The 18+1 levels of AVX512 in Intel processors
2019-04-05
according to the 36th Intel ISA-ER
v1.3

Cooper Lake
AVX512_BF16 (3+6VL)

IceLake
AVX512_VBMI2 (16+32VL)
AVX512_BITALG (3+6VL)

Cascade Lake
AVX512_VNNI (4+8VL)

SkyLake Xeon Core-X
AVX512F (546VL)
AVX512CD (12VL)
AVX512BW (112+164VL)
AVX512DQ (73+73VL)

AVX512F (405)
AVX512CD (6)

CannonLake
AVX512_VBMI (4+8VL)
AVX512_IFMA (2+4VL)

Knights Landing
AVX512ER (10)
AVX512PF (16)

Knights Mill
AVX512_4FMAPS (4)
AVX512_4VNNIW (2)

AVX512+VAES (4+8VL)
AVX512+GFNI (3+6VL)
AVX512+VPCLMUL (1+2VL)

AVX512_VPOPCNTDQ (4VL)

AVX512_VPOPCNTDQ (2)

There's a need for Node-local resource representation

Resource discovery

Recently we have been seeing an increase on customer requests for enabling Performance & Latency Sensitive Applications on top of OpenShift. As specialized Hardware get's enabled for Kubernetes, a need for node resource discovery and application discovery becomes more important

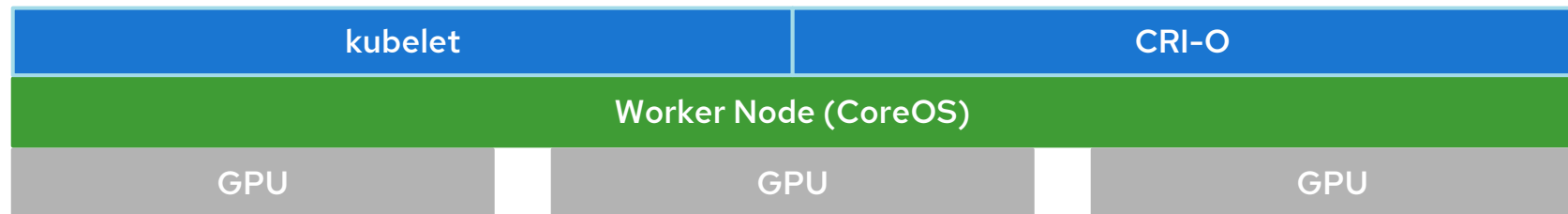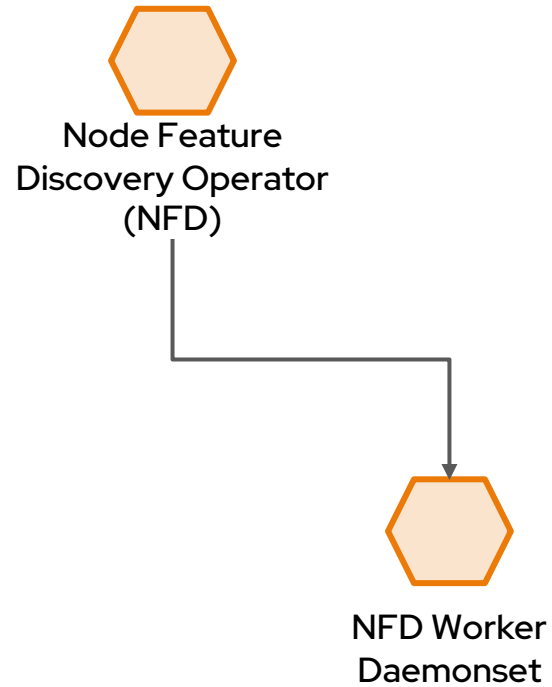**Services scheduling vs performance scheduling (HPC like)**

A small update
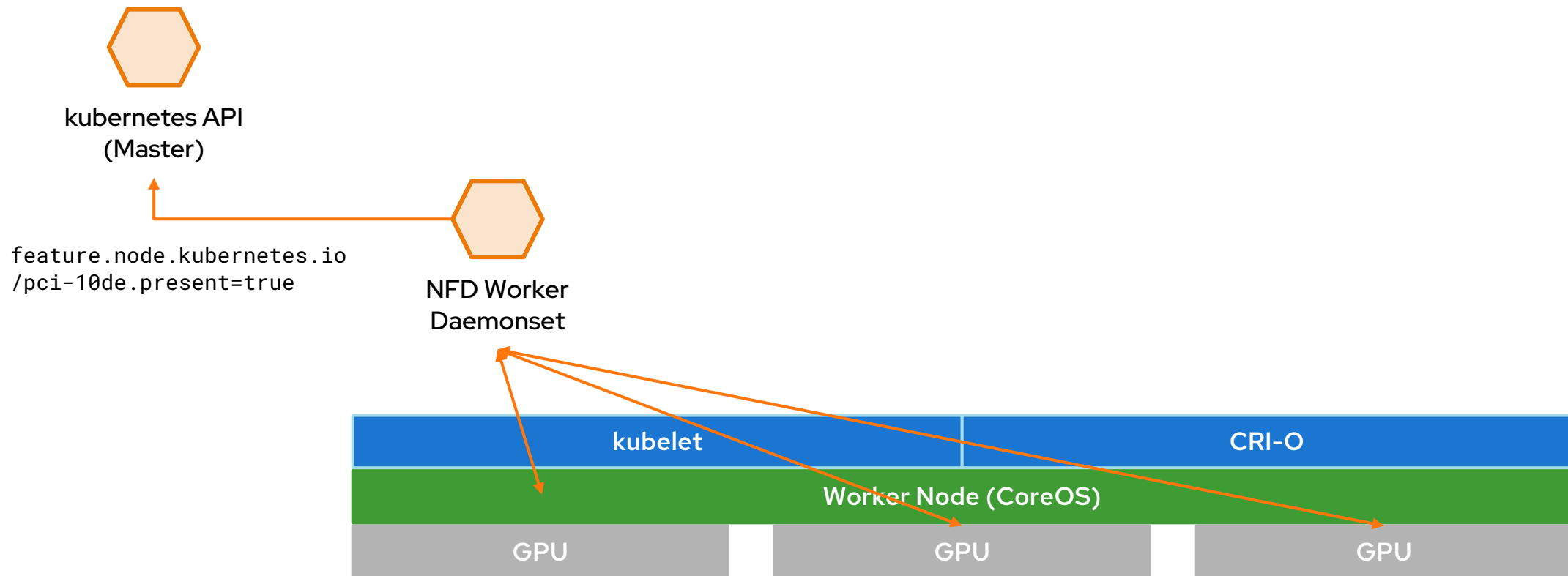
State of Node-Feature-Discovery

NFD

NFD finds certain resources

Node Feature Discovery Operator (NFD)

NFD Worker Daemonset

kubelet	CRI-O

Worker Node (CoreOS)

| GPU | GPU | GPU |

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NFD labels nodes

kubernetes API
(Master)

feature.node.kubernetes.io
/pci-10de.present=true

NFD Worker
Daemonset

kubelet

CRI-O

Worker Node (CoreOS)

GPU

GPU

GPU

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Update on NFD

Operator is now Upstream!

https://github.com/kubernetes-sigs/node-feature-discovery-operator

NFD now available for OKD

https://github.com/operator-framework/community-operators/pull/1760

NFD now runs on Vanilla kubernetes

Upstream NFD operator successfully tested on Vanilla 1.18

Custom resources

NFD V0.6.0 add the possibility for custom labels
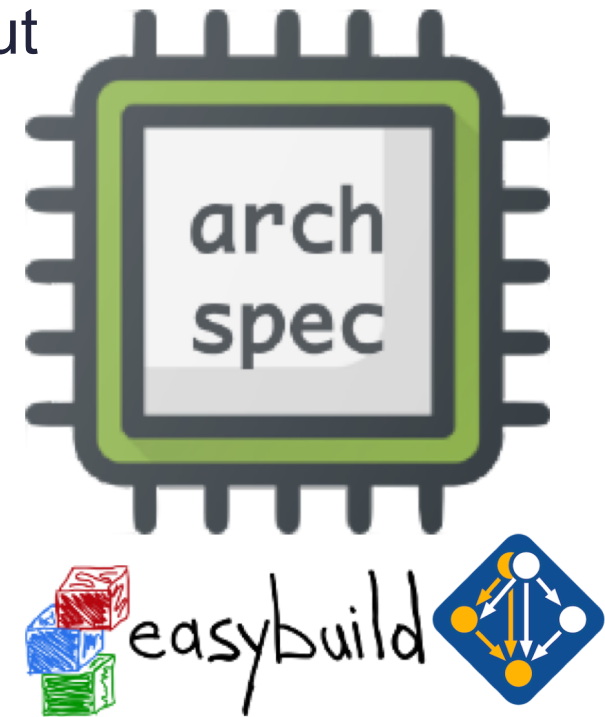
ArchSpec

A library for detecting, labeling, and reasoning about microarchitectures

- Spinoff project from Spack and EasyBuild

- Community adoption

- Detect, query and compare

- Currently as Python and Go library

- https://github.com/archspec/archspec

ArchSpec-feature-discovery

ArchSpec sidecar to the node feature discovery for Kubernetes

- https://github.com/ArangoGutierrez/archspec-feature-discovery

  – archspec.io/xxx= labels

  – Extendable API
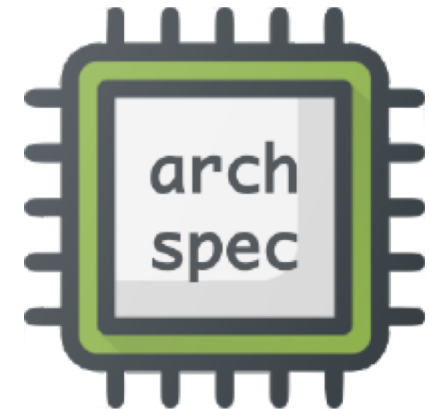
Roadmap for NFD

NFD future work

What's coming for NFD

- Node-local resources

    - CRD for Resource Topology Exporter in NFD

- A GO pkg for querying NFD

- Prune old / deprecated labels

- NFD as hook for Kube-Flux project

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Thanks!

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