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North America 2023





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Kubernetes SIG Node Intro and Deep Dive

Sergey Kanzhelev, Google
Mrunal Patel, Red Hat

Previous updates from SIG Node



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- Covered up to 1.27 roadmap at KubeCon EU 2023
 - **Recording** (<https://youtu.be/fsuwU94kuns>)
 - **Sched** (<https://sched.co/1HyU4>)

Also:

Kubernetes SIG节点介绍和深入探讨 | Kubernetes
SIG Node Intro and Deep Dive - Paco Xu, DaoCloud &
Xiongxiang Yuan, Gitlab China

- Recording: <https://youtu.be/6BTBViTUjwY>
- Sched: <https://sched.co/1PTJk>



Agenda



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- SIG Node overview and a current state
- Feature updates in 1.29
 - Sidecar
 - User Namespaces update
 - conf.d
 - Images
 - Spit disk
 - parallel image pull
 - Image GC
- Deep dive: feature requests around container images
- Get Involved



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SIG Node overview and a current state

SIG Node Overview



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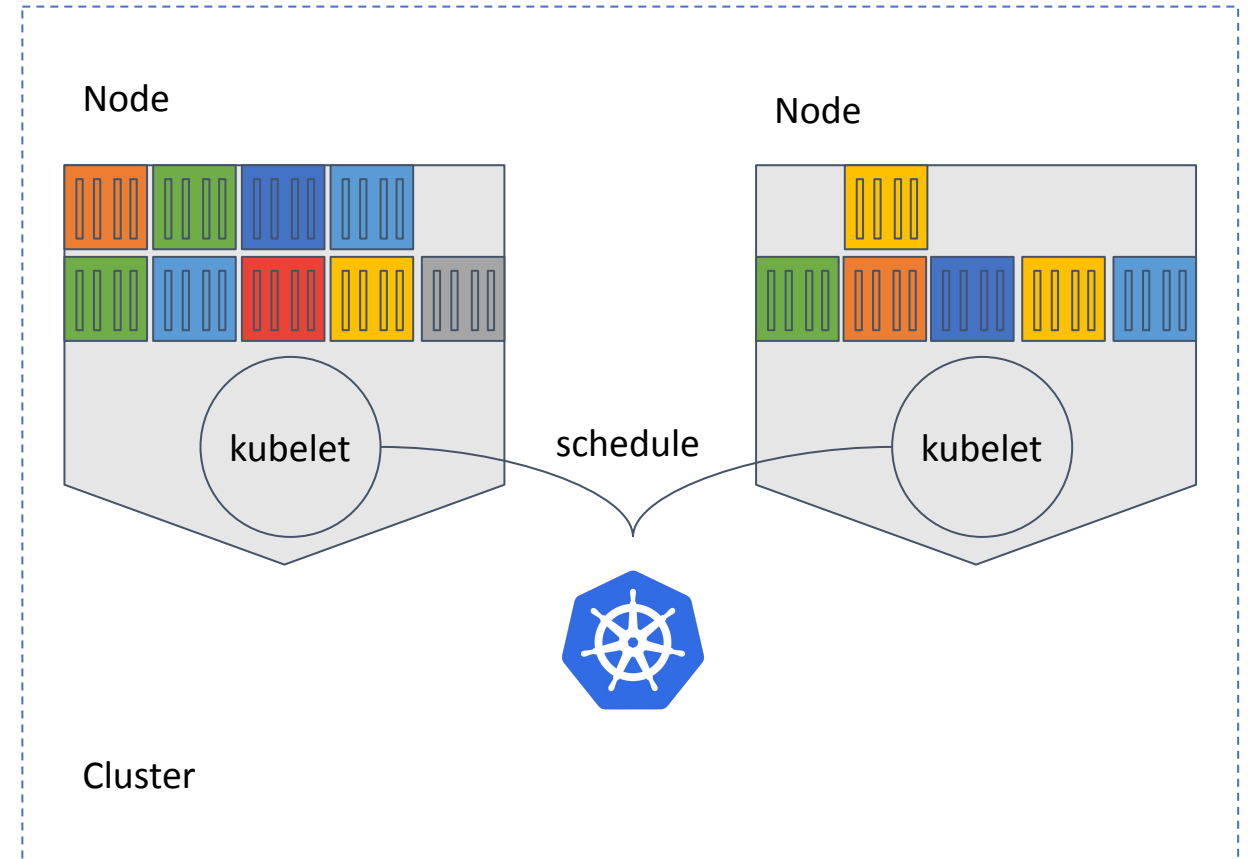


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SIG Node Areas

- Kubelet
- Node and Pods Lifecycle
- Resource management
- Container runtimes



SIG Charter & Subprojects



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- **Charter**: We are responsible for the components that support the controlled interactions between pods and host resources.
- SIG Node is a *vertical SIG*
- **Subprojects**:
 - Kubelet
 - Container Runtime Interface (CRI)
 - Node Problem Detector
 - Kernel modules
 - ... and more!

SIG Node current state



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- Continue the drive to prevent perma-betas and features reliability
- A lot of experimentation!
 - 40 feature gates
 - 5 GA
 - 16 beta (3 in supported versions)
 - 19 alpha, many draft keps

SIG Node development directions



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Two main development directions:

- New workload types
- Better understand the hardware
- Quality of life and other improvements

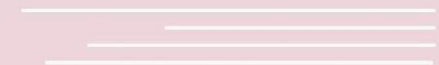


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Feature Updates in 1.29

- **Sidecar beta - termination ordering**

Learn more at the talk

```
kind: Pod
spec:
  initContainers:
    - name: vault-agent
      image: hashicorp/vault:1.12.1
      restartPolicy: OnFailure
    - name: istio-proxy
      image: istio/proxyv2:1.16.0
      args: ["proxy", "sidecar"]
      restartPolicy: Always
  containers:
    ...
```

November 9 • 11:55am - 12:30pm: Sidecar Containers Are Built-in to Kubernetes: What, How, and Why Now? - Todd Neal, Amazon & Sergey Kanzhelev, Google

User namespaces



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- **User namespaces** alpha - PSA changes to allow user to be root inside a container when using user namespaces

`hostUsers: false`

Drop-in configuration



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- **conf.d** alpha - Allow drop-in files to customize kubelet configuration

- **Split disk** alpha - Better support for evictions and image GC when container images are on a separate disk from the root disk.
- **Parallel image pulls** beta - ***MaxParallelImagePulls*** to control how many pulls are allowed in parallel.
- **Image GC** alpha - ***ImageMaximumGCAge*** unused images older than configured age get GC'ed.



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Deep dive: feature requests around images

Image pull in kubelet

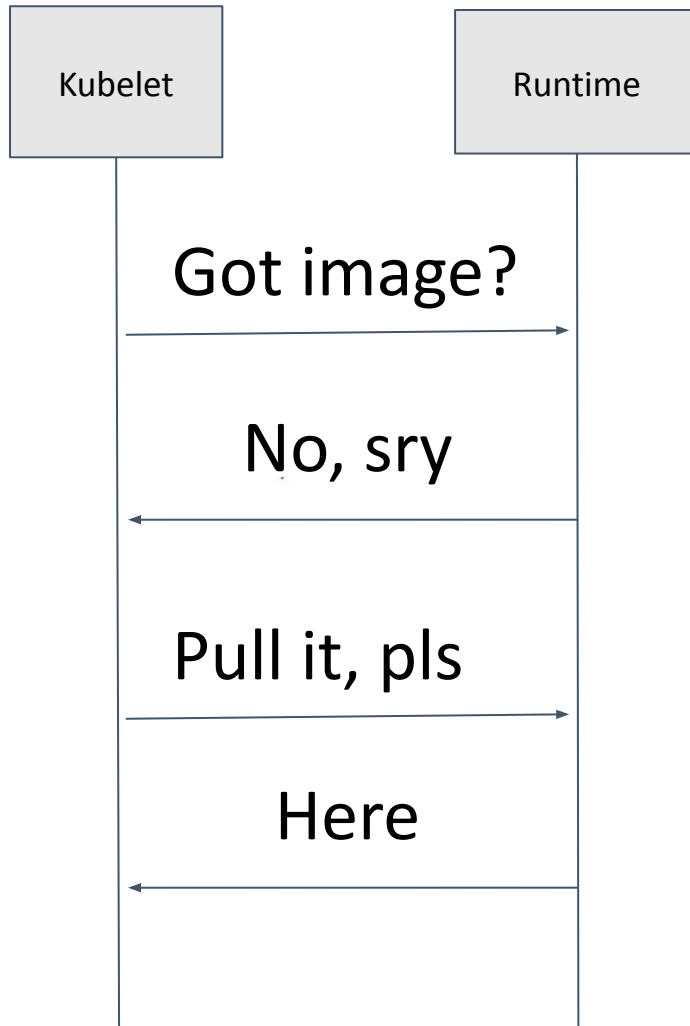


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```
// ImageService defines the public APIs for managing images.
service ImageService {
    // ListImages lists existing images.
    rpc ListImages(ListImagesRequest) returns (ListImagesResponse) {}
    // ImageStatus returns the status of the image. If the image is not
    // present, returns a response with ImageStatusResponse.Image set to
    // nil.
    rpc ImageStatus(ImageStatusRequest) returns (ImageStatusResponse) {}
    // PullImage pulls an image with authentication config.
    rpc PullImage(PullImageRequest) returns (PullImageResponse) {}
    // RemoveImage removes the image.
    // This call is idempotent, and must not return an error if the image has
    // already been removed.
    rpc RemoveImage(RemoveImageRequest) returns (RemoveImageResponse) {}
    // ImageFSInfo returns information of the filesystem that is used to store images.
    rpc ImageFsInfo(ImageFsInfoRequest) returns (ImageFsInfoResponse) {}
}
```


Image pull in kubelet... contd

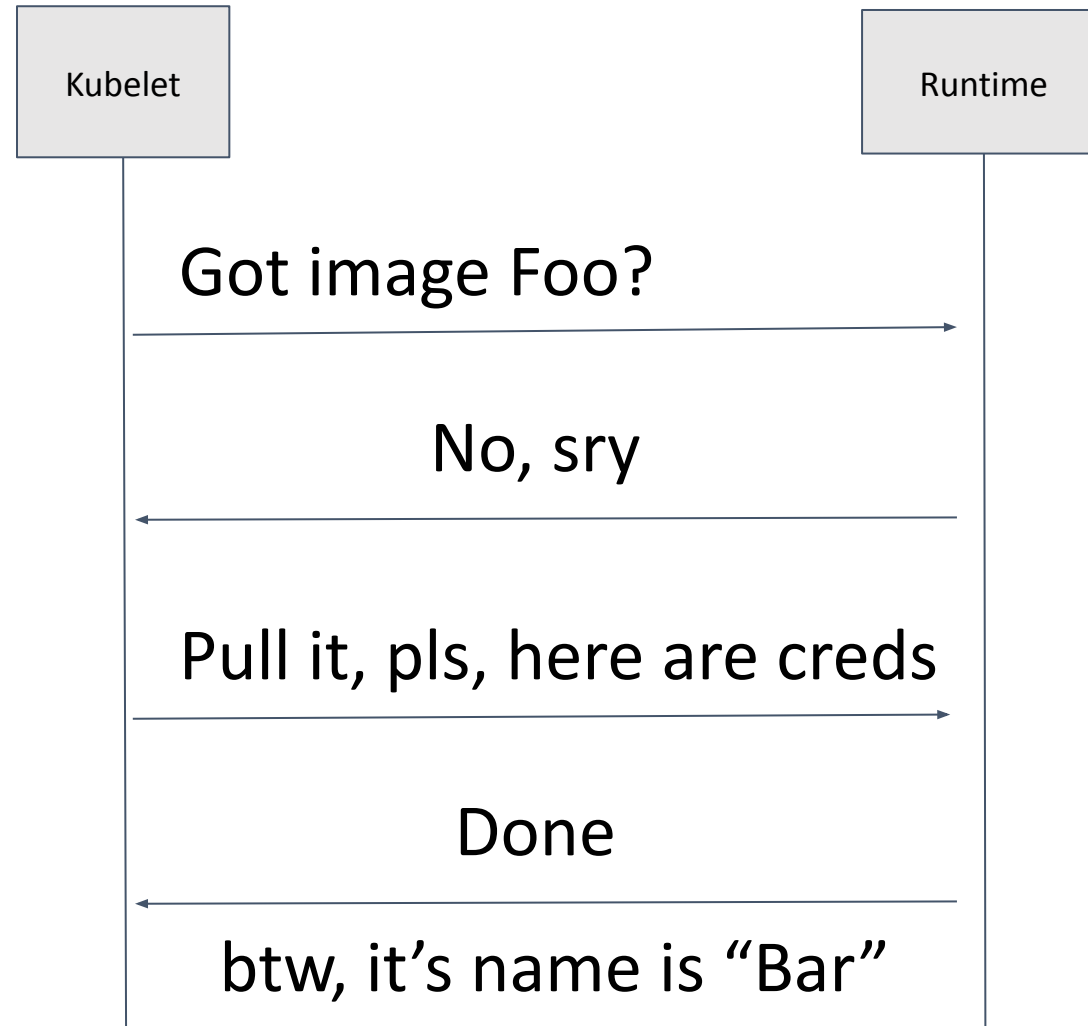


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Images cleanup in kubelet... contd

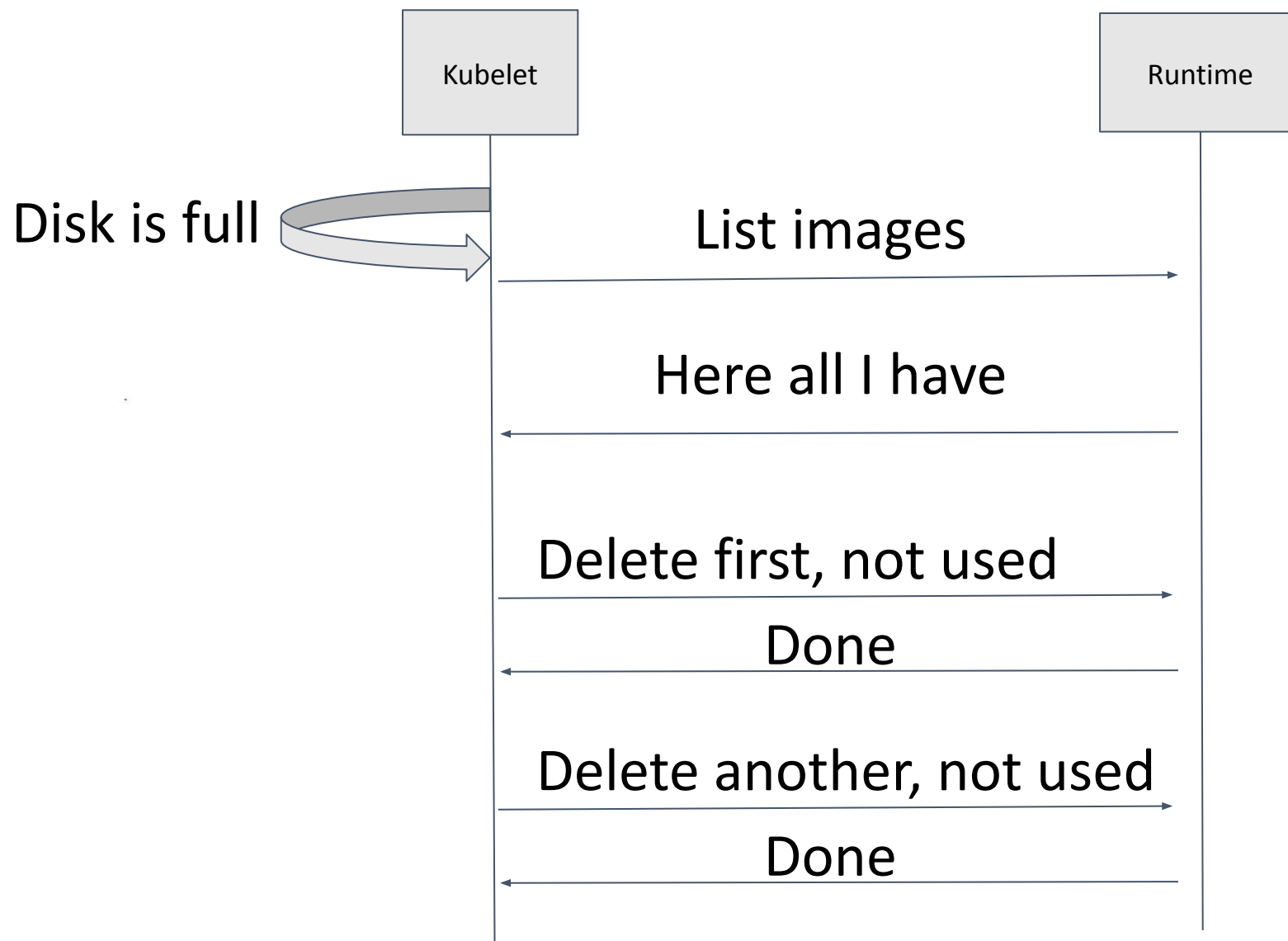


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Images Working Group



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- Problem: Kubelet and Container Runtime areas of responsibility is not clearly defined:
 - Image Service API is separate from CRI Runtime API
 - Kubelet is responsible for getting creds, but the Runtime is responsible for mirrors
 - Kubelet knows about Pods metadata and images service doesn't
 - Kubelet tracks disk usage while Runtime is pluggable and has different patterns for the usage
- Image Garbage Collection WG: [notes](#)

Missing features



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- Download progress
- Better security
 - Sigstore validation
 - Image pull secrets
 - No-cache images
- Faster images download
 - Pre-fetch Pod images
 - Lazy download
 - Priority-based downloads

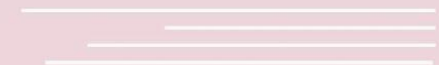


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Get Involved!

Contribution Priorities



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- Stability first!
 - Tests > bug fixes/open issues > features
 - Test infrastructure monitoring and health
- Optimizations
- Features
- Improve the user and developer experience
 - Documentation
 - Enhance logging and metrics
 - Keeping on top of PRs/issues

How to Contribute






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- **Attend our SIG meetings!** 
 - *SIG meetings* cover features, KEPs, and more
 - *CI/Triage meetings* are a smaller, hands-on group
 - Good setting for learning how to triage, improve CI
- **Participate in reviews, issues, and docs!** 
 - [Triage Guide](#)
 - [Main Node PRs](#) / [CI and Test Enhancements Board](#) / [Bugs](#)
- **Adopt new features and give feedback!** 
 - Testing in real environments is critical for graduating features

Where to find us



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- **SIG Meetings:**
 - [Regular meeting](#), **weekly** on
Tuesdays at 10am Pacific Time
 - [CI/Triage meeting](#), **weekly** on
Wednesdays at 10am Pacific Time
- **Slack channel:** [#sig-node](#)
- **Mailing list:** [kubernetes-sig-node](#)
- **Chairs:** Sergey Kanzhelev, Mrunal Patel
- **TLs:** Dawn Chen, Derek Carr, Mrunal Patel



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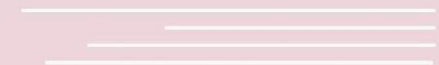


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Thank you!