Agenda

- Updates

- Upcoming Work

- Additional Resources

- Q&A

Enhancements Updates

- OS field in pod-spec
  - Stable in 1.25

- HostProcess Containers
  - Stable in 1.26

- HostNetwork support for Windows containers
  - Targeting Alpha in v1.26 (Will require containerd vNext)

- NodeService log viewer
  - Targeting Alpha in v1.26

- CRI-based stats support for Windows

Pod OS Field

- Promoted to Stable in v1.25
- Currently NOT used for scheduling
- Allows for enhanced pod validation and error reporting
- No default values!

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: ping
spec:
  os:
    name: windows
  containers:
  - name: ping-test
    image: mcr.microsoft.com/windows/nanoserver:1809
    command:
      - "ping"
      - "-t"
      - "127.0.0.1"
  nodeSelector:
    "kubernetes.io/os": windows
```

Use when scheduling Windows where **restricted** pod security profiles are used!

Windows container accidently scheduled to linux nodes

Old behavior

```
                                      $ kubectl get pod
NAME    READY    STATUS          RESTARTS    AGE
ping    0/1      ErrImagePull    0           111s
```

```
Events:
  Type      Reason      Age             From               Message
  ----      ------      ----            ----               -------
  Normal    Scheduled   7s              default-scheduler  Successfully assigned default/ping to marosset-capz-2022-ep-md-0-94drk
  Normal    Pulling     6s              kubelet            Pulling image "mcr.microsoft.com/windows/nanoserver:1809"
  Warning   Failed      6s              kubelet            Failed to pull image "mcr.microsoft.com/windows/nanoserver:1809": rpc error: code =
  NotFound desc = failed to pull and unpack image "mcr.microsoft.com/windows/nanoserver:1809": failed to unpack image on snapshotter overlayfs
  : no match for platform in manifest sha256:62a8d022600141cd93d7e74cb190de58c9ad273ca238424028af88ad46495ca7: not found
  Warning   Failed      6s              kubelet            Error: ErrImagePull
  Normal    BackOff     4s (x2 over 5s) kubelet            Back-off pulling image "mcr.microsoft.com/windows/nanoserver:1809"
  Warning   Failed      4s (x2 over 5s) kubelet            Error: ImagePullBackOff
```

New behavior

```
                                      $ kubectl get pods
NAME    READY    STATUS              RESTARTS    AGE
ping    0/1      PodOSNotSupported   0           3s
```

```
Events:
  Type      Reason              Age     From               Message
  ------    -------             ----    ----               -------
  Warning   PodOSNotSupported   48s     kubelet            Failed to admit pod as the OS field doesn't
match node OS
  Normal    Scheduled           48s     default-scheduler  Successfully assigned default/ping to maross
et-capz-2022-ep-md-0-4b8tw
```

HostProcess Containers Updates

- Going stable in v1.26

- Requires containerd v1.7

- New volume-mount behavior
  - Volume mounts will show in expected locations
    (not under %CONTAINTER_SANDBOX_MOUNT_POINT%)
  - InClusterConfig works!!

- New base image
  - http://bit.ly/hpc-base-image

- https://bit.ly/k8s-hpc-kep

- More information in https://sched.co/182Fe

Windows Node Exporter

- Runs as a DaemonSet

- Can use with Prometheus Operator
  - ServiceMonitor or PodMonitor

- Integrates with Graphana to create dashboards

WCNpect
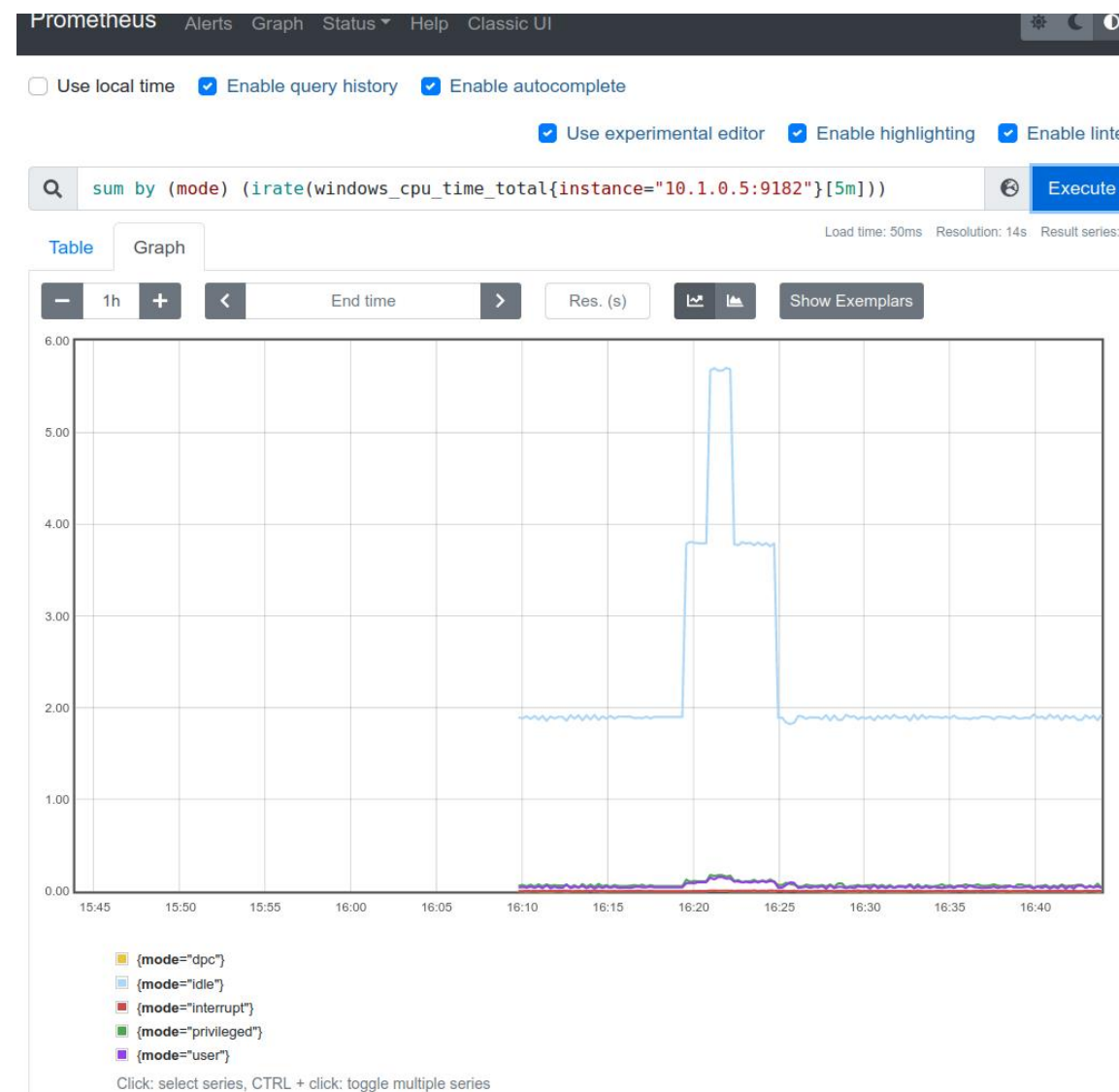
Windows **c**ontainer **n**etworking **s**tack in**spect**or

- Captures Network Traffic across
  - Nodes
  - Pods

- Traces
  - Packets
  - Packets Received/Transmitted/Dropped
  - VFP Counters
  - HNS Counters
  - HNS state

- Uses PacketMon to capture packets
  - Convert to Wireshark format

```
t 2022-10-14 04:31:14.1079323 +0000 UTC:
        00-0D-3A-14-F2-30 > 00-15-5D-65-50-05, ethertype IPv4 (0x0800), length 60: 152
 [.], ack 2793264986, win 501, length 0
Response from aksnpwin000000 StartCapture (10.224.0.33) sent at 2022-10-14 04:31:14.10
04:31:11.985876900 PktGroupId 562949954527102, PktNumber 1, Appearance 1, Direction Tx
 Filter 0, OriginalSize 64, LoggedSize 64
Response from aksnpwin000000 StartCapture (10.224.0.33) sent at 2022-10-14 04:31:14.10
        00-15-5D-65-50-05 > 12-34-56-78-9A-BC, ethertype IPv4 (0x0800), length 64: 10
 wpad. (22)
Response from aksnpwin000000 StartCapture (10.224.0.33) sent at 2022-10-14 04:31:14.10
04:31:11.993994900 PktGroupId 1303417, PktNumber 1, Appearance 1, Direction Rx , Type
0, OriginalSize 139, LoggedSize 128
Response from aksnpwin000000 StartCapture (10.224.0.33) sent at 2022-10-14 04:31:14.10
        12-34-56-78-9A-BC > 00-15-5D-65-50-05, ethertype IPv4 (0x0800), length 139: 10
Domain 0/1/0 (97)
Response from aksnpwin000000 StartCapture (10.224.0.33) sent at 2022-10-14 04:31:14.10
04:31:11.994318700 PktGroupId 562949954527103, PktNumber 1, Appearance 1, Direction Tx
 Filter 0, OriginalSize 90, LoggedSize 90
Response from aksnpwin000000 StartCapture (10.224.0.33) sent at 2022-10-14 04:31:14.10
        00-15-5D-65-50-05 > 12-34-56-78-9A-BC, ethertype IPv4 (0x0800), length 90: 10
 wpad.default.svc.cluster.local. (48)
StopCapture successfully ran on node: aksnpwin000000 (IP: 10.224.0.33) at time: 2022-1
Packet capture ended on node: aksnpwin000000 (IP: 10.224.0.33).
PS C:\hpc> .\wcnspect.exe counters
```

Kube-Proxy perf improvements

- 2000 Cluster IPS and 5000 endpoints
- Found issue Syncing proxy rules made a lot of calls to HNS Subsystem
- Caching locally and improvements in HNS
- Available in K8s v1.22+

- Thanks to David Schott and Sravanth Bangari!

Winkernel proxier	Windows Server 2019	Windows Server 2022
Without improvements	114 minutes	192 minutes
With improvements	110 minutes	10 minutes
With improvements + OS updates (shipping separately)	22 minutes	1 minute

Perf stuff

Performance Dashboard

soak-tests-capz-win... ▼ E2E ▼ MemoryUsage ▼ kubelet ▼

1564677034490204160: 75.98

Runs over time
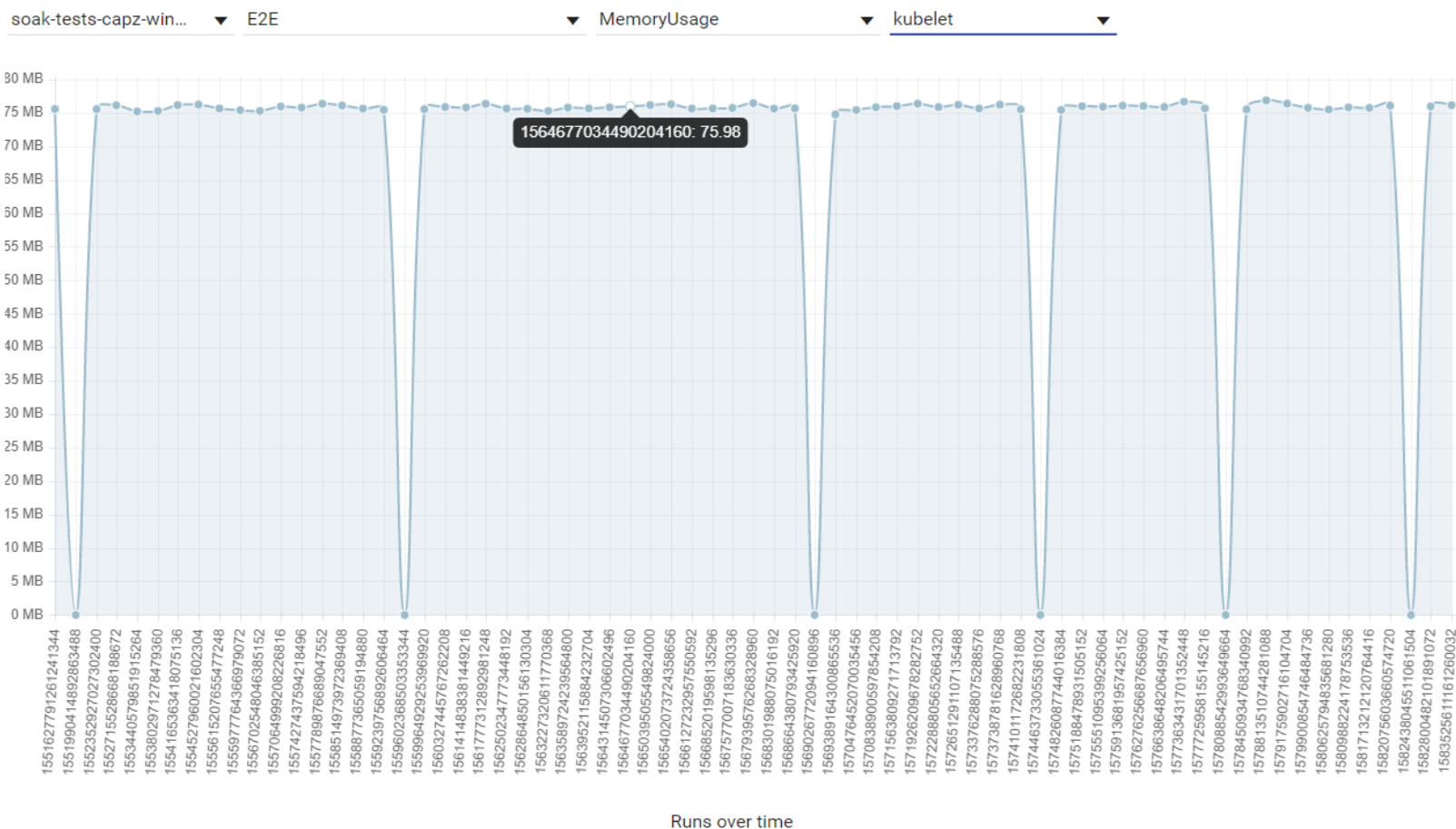
- Uses the Windows Exporter
- Runs Daily and measures
- Memory usage
- CPU
- OpenFile handles
- Network
- Integration With Perf-test Framework

- Next up:
- Larger scale tests
- Turning into soak

http://perf-dash.k8s.io/#/?jobname=soak-tests-capz-windows-2019

Windows Operational Readiness Spec

Make it easy for an enterprise to compare Windows K8S distributions via:

- Learning what **features** are supported on your Cluster.
- Discover the **healthiness** of your Windows cluster.
- Simplify the ginkgo E2E tests to run, without having to **select/grep** from 1000s of K8s e2e strings.

```
 1   kubernetesVersions:
 2   - 1.25
 3   - 1.24
 4   - 1.23
 5
 6   testCases:
 7     # Network category
 8     - category: Core.Network
 9       description: Ability to access Windows container IP by pod IP
10       focus:
11       - 'should have stable networking for Linux and Windows pods'
12       linux_image: .nan
13       skip:
14       - ''
15       windows_image: .nan
16     - category: Core.Network
17       description: Ability to expose windows pods by creating the service ClusterIP
18       focus:
19       - 'should be able to up and down services'
20       linux_image: .nan
21       skip:
22       - ''
23       windows_image: .nan
24     - category: Core.Network
```
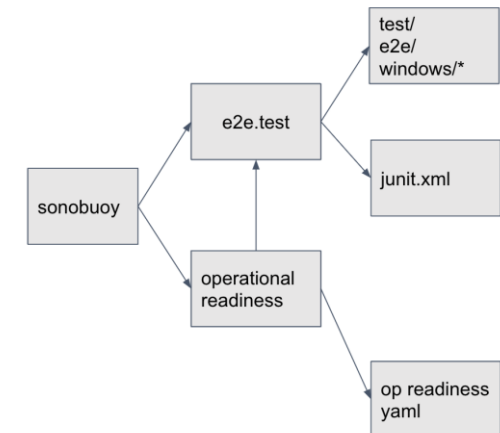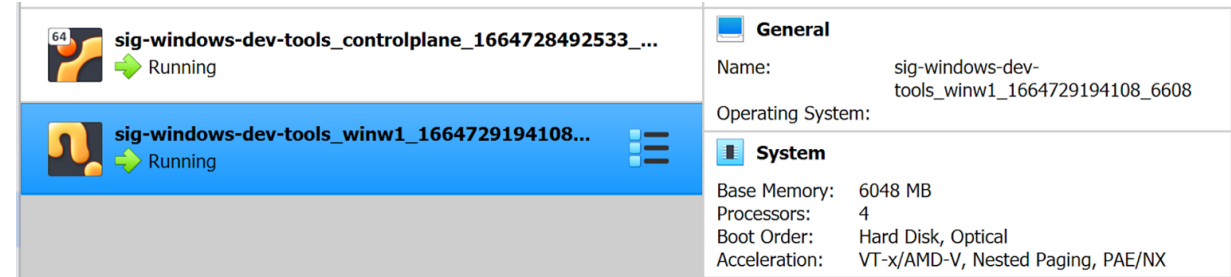
KPNG now supports Windows!

- The Next generation Kube Proxy

- Allows running Windows proxier as a separate process from the APIServer watch

- Windows Kernelspace and Userspace backends on KPNG

- Easy to develop new backends

- Collaborative effort
  - Mark Rossetti
  - Dmitri Mititelu
  - Jay Vyas
  - Douglas Landgraf

- Windows (and Linux) Userspace ARE removed from Kubernetes v1.26 in-tree.
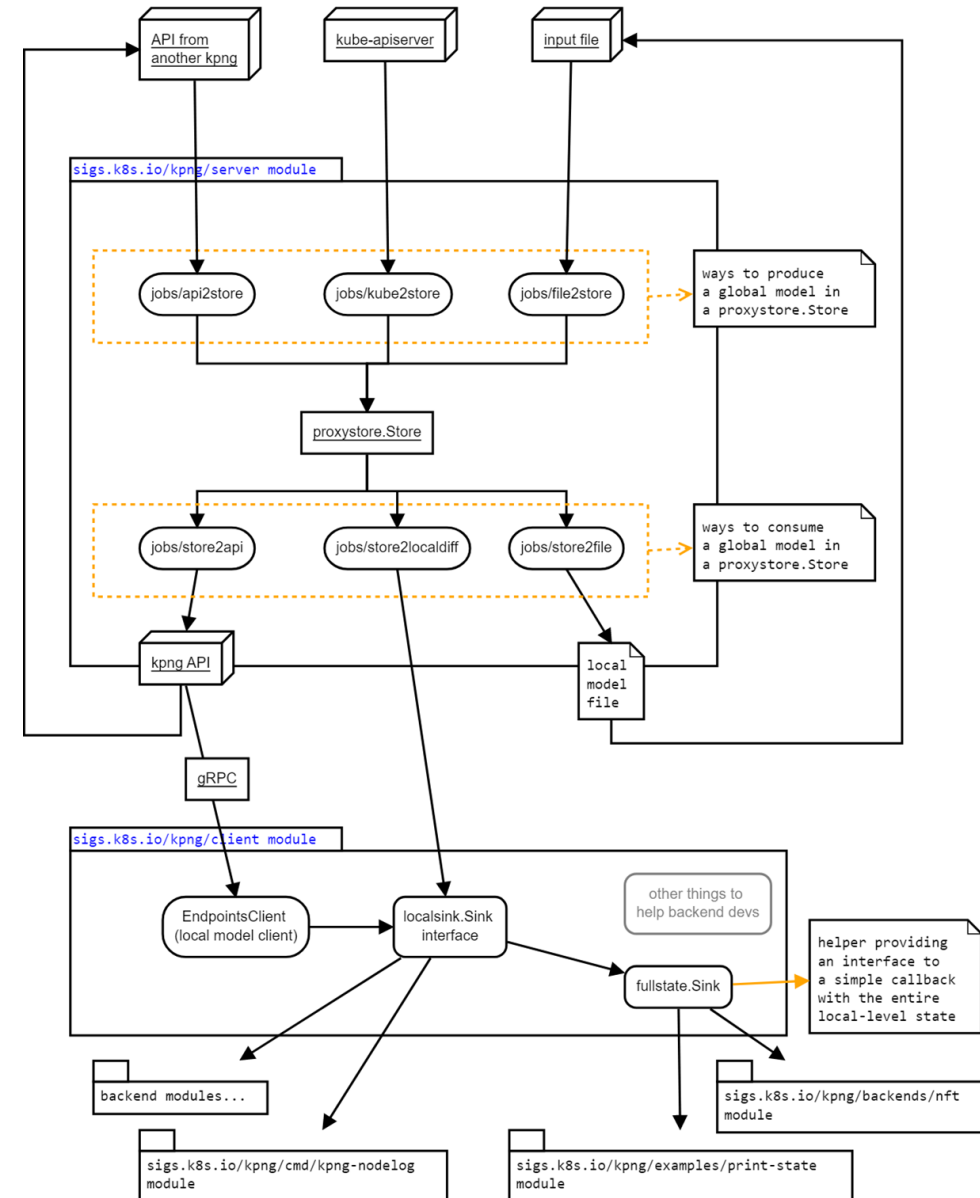
SIG Windows Development Tools

- Easy onboarding for developers working with Windows clusters.

- What's new?:
  - Run on a Windows machine with **WSL2**.
  - Use latest **binaries** OR build Kubernetes from **source** using a hash.
  - Latest CNI plugins:
    - **Antrea** v1.8.0
    - **Calico** v3.23.2

Hyper-V Isolated Containers

- Support for starting Hyper-V Isolated Containers added for containerd v1.7

- Tracked with https://github.com/containerd/containerd/issues/6862

- Uses runtime classes to tell containerd which mode to run containers in

- Uses Pod annotations to specify UVM memory/CPU sizes

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: wcow-test
  labels:
        app: wcow
  annotations:
        io.microsoft.virtualmachine.computetopology.memory.sizeinmb: "4096"
        io.microsoft.virtualmachine.computetopology.processor.count: "4"
spec:
  replicas: 2
  selector:
    matchLabels:
      app: wcow
    spec:
      runtimeClassName: runhcs-wcow-hypervisor  <---------------
      containers:
      - name: servercore
        image: mcr.microsoft.com/windows/servercore:1809
        ports:
        - containerPort: 80
          protocol: TCP
```

Additional Resources

Special Thanks and New Contributors

- Fabian Fulga – For adding adding test coverage to multiple components and documentation updates in sig-windows-tools docs

- David Schott – For perf improvements and various fixes in the winkernel proxy and building tools like WCNspect to help trouble shoot networking issues on Windows

- Andrew Collins – For sharing findings from his perf investigations with the community.

- Aravindh Puthiyaparambil - For helping with bug triage, backlog grooming, docs, and the node service log viewer.

- And all our community members!

How To Contribute

- Visit our [SIG-Windows community page](#)

- Follow our [contributing guide](#)

- Join our [community meetings](#) (12:30pm EST every tuesday)

- Join our SIG-Windows pairing sessions: [https://github.com/kubernetes-sigs/sig-windows-samples/blob/master/PAIRING.md](#) (right after the main meeting)

- Help us write additional documentation and user stories

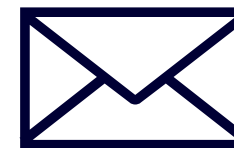- File bugs or review open PRs from our project boards - [Issues](#) - [PRs](#)

Community Resources

Mark Rossetti
Co-Chair
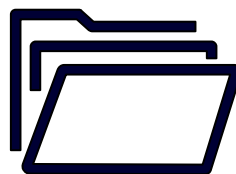Microsoft
@Mark Rossetti [Slack]
@marosset [GitHub]

Jay Vyas
Technical Lead
VMWare
@jayunit100 [Slack / GitHub]

James Sturtevant
Technical Lead
Microsoft
@jsturtevant [Slack / GitHub]

Claudiu Belu
Technical Lead
Cloudbase Solutions
@Claudiu Belu [Slack]
@claudiubelu [Github]

Slack.k8s.io

#sig-windows

https://groups.google.com/forum/#!forum/kubernetes-sig-windows

https://kubernetes.io/docs/setup/production-environment/windows/

https://github.com/kubernetes/community/tree/master/sig-windows

YouTube Playlist

https://zoom.us/j/94389601840
Every Tuesday @ 12.30pm EST

Please scan the QR Code above to
leave feedback on this session