

# Konveyor - Forklift Roadmap

June, 2021



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A community of people passionate about helping others modernize and migrate their applications to the hybrid cloud by **building tools and best practices on how to break down monoliths, adopt containers, and embrace Kubernetes.**



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**Rehost** virtual  
machines to  
KubeVirt



**Rehost** apps  
between  
Kubernetes  
clusters



**Replatform**  
applications to  
Kubernetes



**Refactor**  
applications for  
Kubernetes



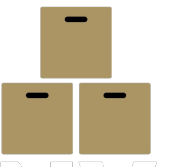
**Measure** software  
delivery  
performance

# Forklift: Roadmap Overview



# Forklift Roadmap

## Mission

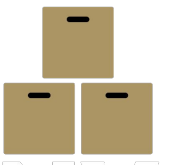


# Forklift Roadmap

## VM migration

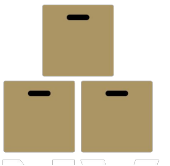
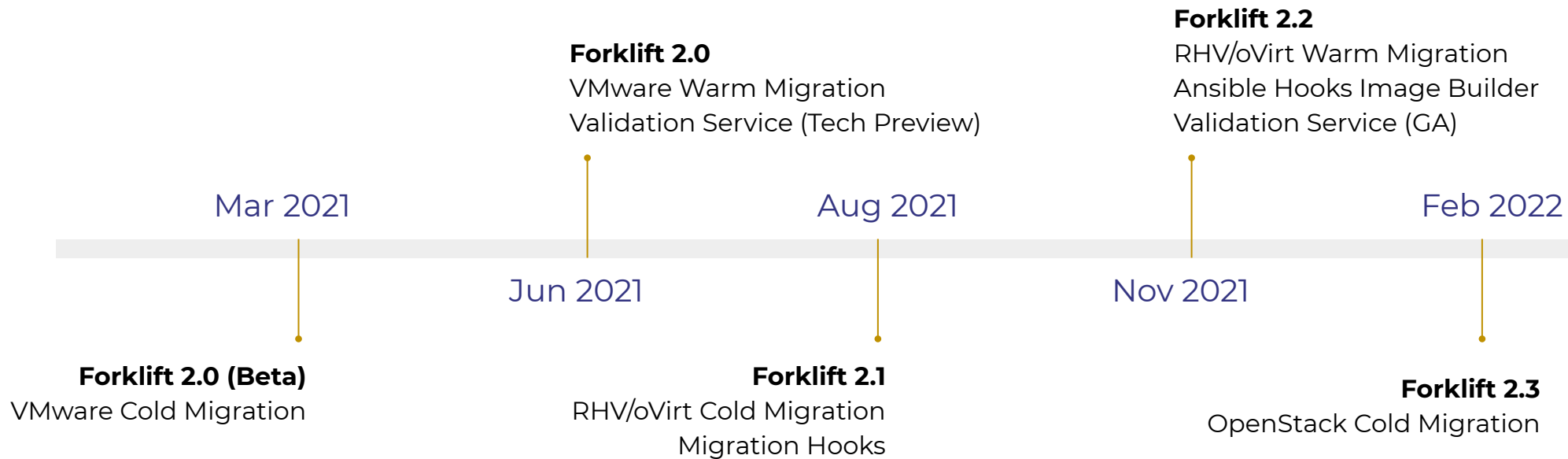


- **Forklift 2.0** [Jun 2021]
  - VMware Warm migration
  - Validation Service (Tech Preview)
- **Forklift 2.1** [Aug 2021]
  - RHV/oVirt Cold Migration
  - Migration Hooks
- **Forklift 2.2** [Nov 2021]
  - RHV/oVirt Warm Migration
  - Ansible Hooks Image Builder
  - Validation Service (GA)
- **Forklift 2.3** [Feb 2022]
  - OpenStack Cold Migration



# Forklift Roadmap

## VM migration to KubeVirt + Kubernetes



# Forklift Roadmap

## Engineering Pillars



### #1 - RELIABILITY + PERFORMANCE

The tool has to be predictable in order to perform the main task: moving VMs to K8S. Scaling migrations important, therefore performance is key. Covering most migration cases will require be close to real world experience.

### #2 - CLEAR ERROR MESSAGES

Having clear and actionable error messages will help users resolve issues faster avoiding internal escalations. This will increase the chances for larger migrations and improve feedback loop.

### #3 - REDUCE DOWNTIME

The time allocated for intervention windows will be the limiting factor on VM migrations. Being able to make the most of that time is important to increment migrated workloads.

### #4 - MORE SOURCES

VMware is initial source for footprint. Including oVirt/RHV to provide a path to K8S. OpenStack customers can migrate, specially the developer related workloads.





# Forklift Roadmap

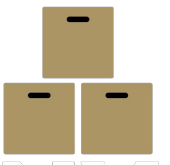
## Early Access Program



Red Hat Early Access Program for Downstream:  
Migration Toolkit for Virtualization (MTV)

- Starting June 2021

## MTV - Early Access Program



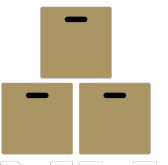
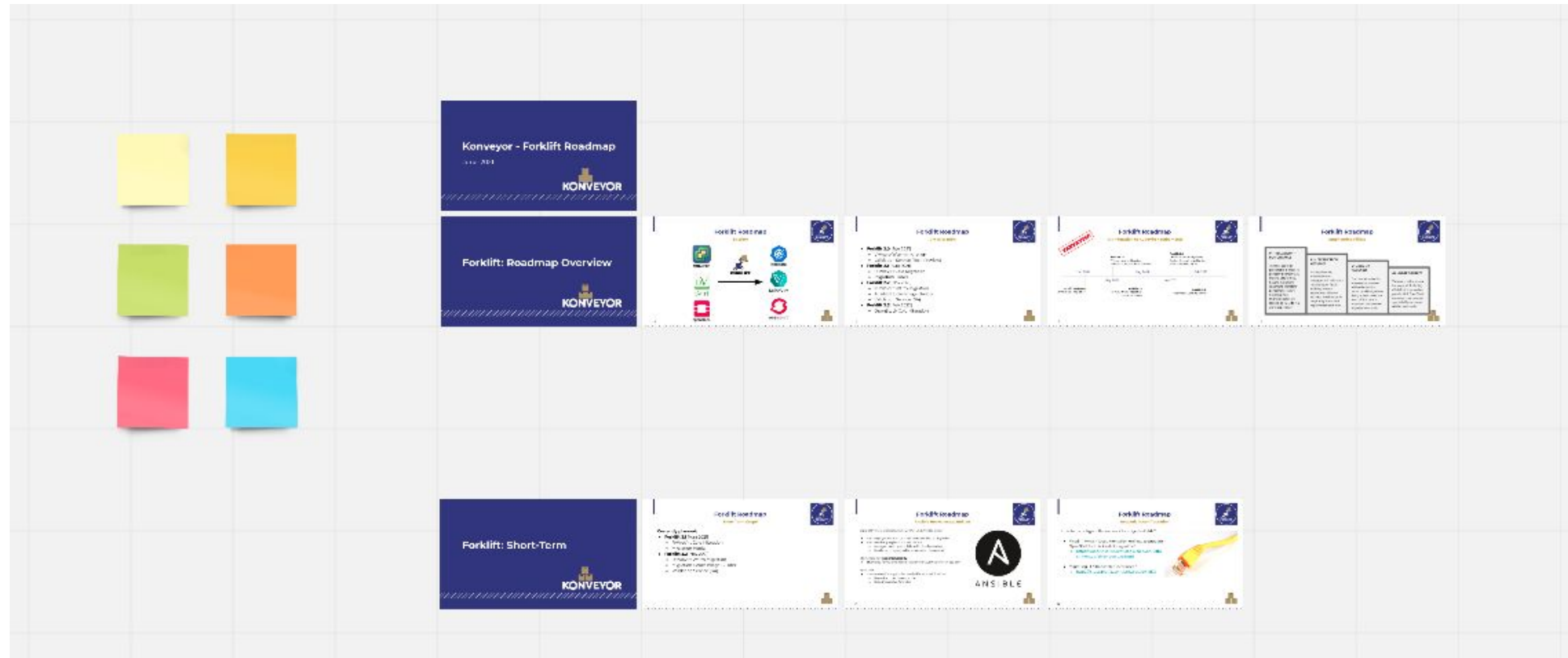
# Forklift Roadmap

## Early Access Program



Please add comments in Miro:

[https://miro.com/app/board/o9J\\_IBFAqHM=](https://miro.com/app/board/o9J_IBFAqHM=/)



# Forklift: Short-Term



# Forklift Roadmap

## Short-Term Scope



### Currently planned:

- **Forklift 2.1** [Aug 2021]
  - RHV/oVirt Cold Migration
  - Migration Hooks
- **Forklift 2.2** [Nov 2021]
  - RHV/oVirt Warm Migration
  - Migration Hooks Image Builder
  - Validation Service (GA)



# Forklift Roadmap

## Ansible Hooks Image Builder



Expand the Ansible hooks user with Git and Ansible Galaxy

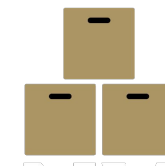
- Ansible playbooks can be more complex than a single file
- Ansible roles, plugins and modules are:
  - Managed in Git and published in Ansible Galaxy
  - Used as a company-wide automation framework

Main challenge is **reproducibility**

- The same hooks are applied to all the virtual machines in the plan

Approach:

- Create sealed images to be used without modifications.
  - Reuse for more than one plan
  - Keep images for forensics
- Builder will add a layer to the existing Ansible Hooks to
  - Be available for Crane or any other project
  - Reduce the maintenance effort



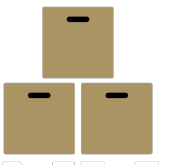
# Forklift Roadmap

## Network Reconfiguration



How to reconfigure the network for migrated VMs?

- Fixed IP VMs? → Documentation on how to prepare OpenShift for this kind of migration?
  - <https://kubevirt.io/2020/Multiple-Network-Attachments-with-bridge-CNI.html>
- Migrating DPDK enabled interfaces?
  - <https://issues.redhat.com/browse/CNV-11337>



# Forklift: Mid-Term



# Forklift Roadmap

## Mid-Term Scope



### Currently planned:

- **Forklift 2.3** [Feb 2022]
  - OpenStack Cold Migration





# Forklift Roadmap

## Provider Verifications

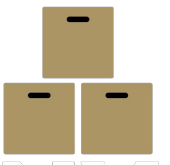


Improve user experience when adding providers:

- Can we simplify verification of provider fingerprints?
- Can we enable check before save?

Possible approaches:

- Validating Webhook
  - Meant for that kind of requirement. The provider is rejected if validation fails.
  - Implementation can be tricky: API latency, dead lock, etc...
- CR with a draft flag
  - This creates a real resource and validation is done by the controller
  - The resource can be reloaded and modified by the UI
  - There can be leftovers when the UI is closed



# Forklift Roadmap

## Analytics

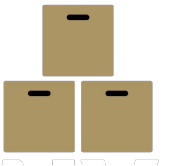


Prototype in CY2021 - On Premise Analytics Layer (OPAL).

- Data graph exploration with traversal
- Search feature - Find VMs with similar concerns and *fix* the cause
- Search feature - Build migration plans from the search result
- Reporting - Generate CSV/JSON for injection in other tools

### Next steps

- Production grade integration with the inventory data
- User experience design, either integrated in Forklift UI or standalone
- Extend the inventory data model to cover more use cases



# Forklift Roadmap

## Analytics



VSphere Explorer - Filter Virtual Machines (by Host and Cluster)

VSphere OpenShift

Hosts and Clusters VM and Templates Storage Networking Filter VMs

Filter by Id...

Id	Name	Provider / Datacenter/ Cluster / Host	Concerns	Power State	Memory
vm-2847	Brett - BOSH CentoOS7	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOn	4096
vm-1158	Brett - Windows_MSSQL	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	4096
vm-66	brett-dev-windows-server-2012	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOn	4096
vm-74	DSL-i28M-Template	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	4096
vm-2931	fdupont-guestos	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	4096
vm-2932	fdupont-guestos7	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	4096
vm-2841	fdupont-test-win2019	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	4096
vm-2858	jortel-testing2	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	4096
vm-2860	jortel-testing3s	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	4096
vm-2861	jortel-testing4s	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	3 x Warning	poweredOff	4096
vm-2781	marnold-mtv	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	1 x Warning - 1 x Information	poweredOff	4096
vm-2867	marnold-mtv-win	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	1 x Warning - 1 x Information	poweredOff	4096
vm-2963	marnold-nosnap	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	4096
vm-3145	miguel-rhel8	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOn	4096
vm-2849	pemcg-test87	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	2048
vm-2851	pemcg-test88	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	2048
vm-2930	pemcg-test89	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning	poweredOff	2048
vm-2782	skucidi-import-test	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	2 x Warning - 1 x Information	poweredOff	2048
vm-2834	Vince	boston/V2V-DC/V2V_Cluster/esx12.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	16384
vm-156	Brett - dev-windows-server-2008	boston/V2V-DC/V2V_Cluster/esx13.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	4096
vm-1155	Brett - mssql	boston/V2V-DC/V2V_Cluster/esx13.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	4096
vm-1172	Brett - oracle_db	boston/V2V-DC/V2V_Cluster/esx13.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	4096
vm-1005	Brett - oracle_weblogic	boston/V2V-DC/V2V_Cluster/esx13.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	4096
vm-1154	Brett - sap_hana	boston/V2V-DC/V2V_Cluster/esx13.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	16384
vm-1153	Brett - tomcat	boston/V2V-DC/V2V_Cluster/esx13.v2v.bos.redhat.com	1 x Critical - 2 x Warning	poweredOff	2048
vm-1177	Brett - Windows-2016-HA-Nrde1	boston/V2V-DC/V2V_Cluster/esx13.v2v.bos.redhat.com	1 x Critical - 3 x Warning	poweredOff	4096

powerState Any

Id vm-28 x Conc On x Off

Id vm-28 x Clear all filters

Id Name

vm-2847 Brett - BOSH CentoOS7

vm-2841 fdupont-test-win2019

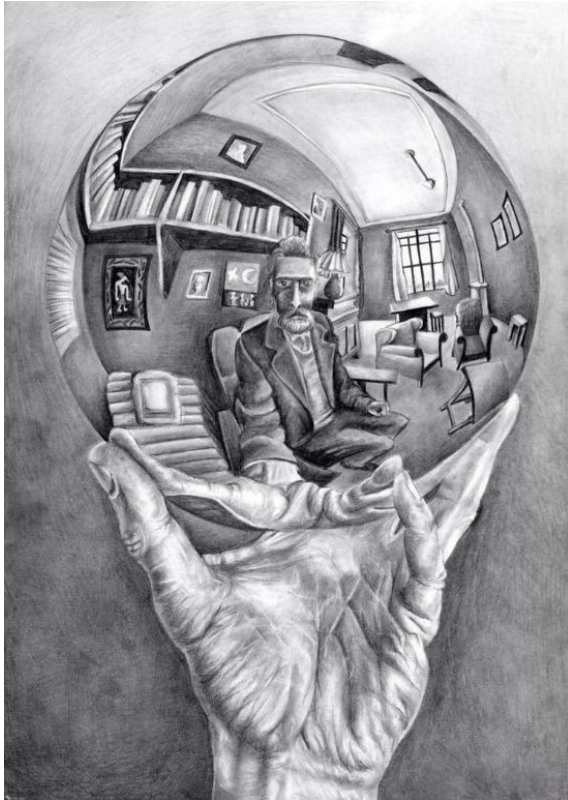
vm-2858 jortel-testing2

vm-2858 intel-testing2



# Forklift Roadmap

## VM Introspection



- Forklift inventory is limited to infrastructure
- VM Introspection gathers information about the workload
  - Enables better compatibility rules
  - Provides workload classification
- Knowing the workload helps to decide whether to rehost or refactor

Current state - Proof of concept -

<https://github.com/pemcg/vm-analyzer>



# Forklift Roadmap

## Migrating GPU enabled VMs



Automatically migrate and configure GPU enabled VMs?

- GPU support in KubeVirt [CNV-4776](#)



# Forklift: Long-Term

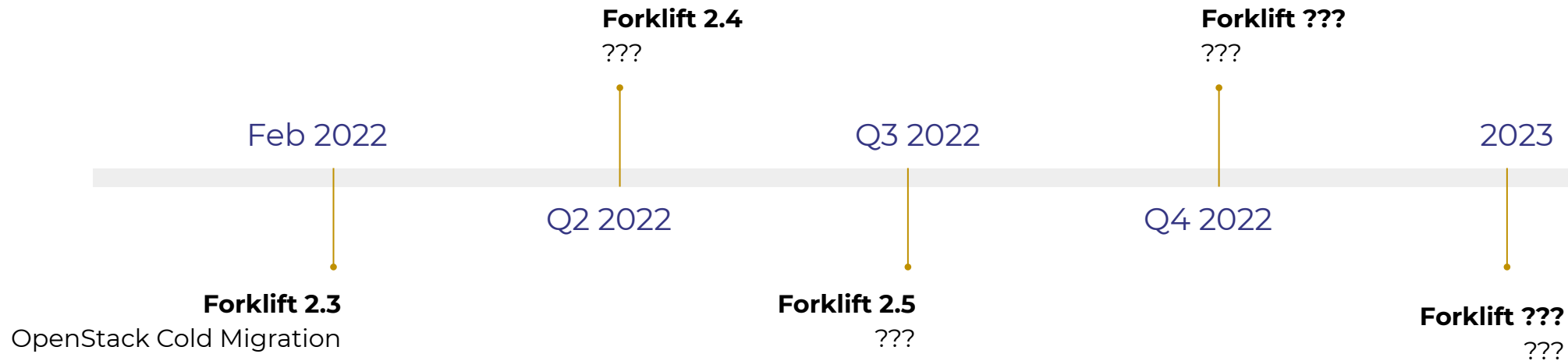


# Forklift Roadmap

## Long-Term Scope



- Q2 2022 and beyond → Forklift 2.4



# Forklift Roadmap

## OpenStack Advanced Migration Features

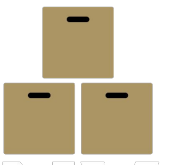


Possible objects to be migrated from OpenStack:

- Virtual machine
- Virtual machine image
- Volume
- External network
- Load balancer
- Orchestration Stack
- Project

We can consider optimization such as storage swing

- Both OpenStack and OpenShift support Ceph





# Forklift Roadmap

## Ansible Migration Playbooks Catalog



Ansible collection published in Ansible Galaxy?

- Create and maintain sample playbooks?
- Playbooks for most common use cases?
  - F5 reconfig
  - Infoblox DNS changes
  - Removing commons agents



# Forklift Roadmap

## VM Introspection + OPAL

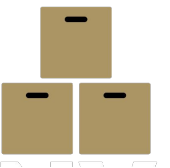
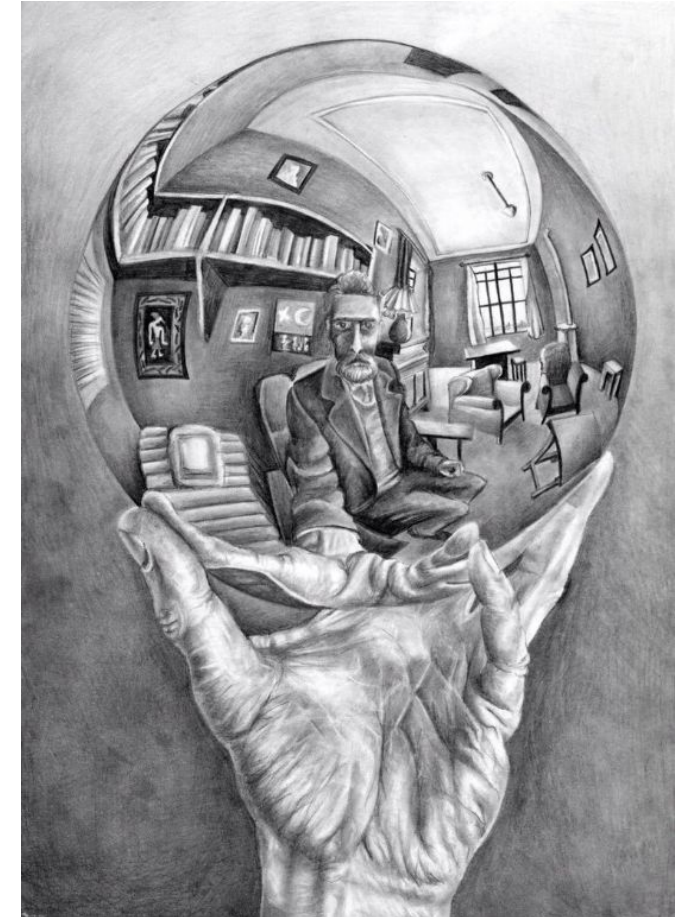


### Introspection++

- Bridge OPAL + VM introspection?
- Possibility to engage with Tackle

### Next steps:

- Design the workload data model
- Extend the inventory and OPAL graph
- Identify how to bridge Forklift with Tackle



# Forklift Roadmap

## Network Reconfiguration



Migrate the source provider network configuration

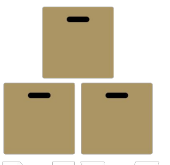
### Minimal Viable Product

- Extend the inventory with network deep dive
- Write a translator to configure the layers in k8s:
  - NodeNetworkConfigurationPolicy (nmstate)
  - NetworkAttachmentDefinition (multus)

### Additional features:

- Discovery of VLANs trunked to a node
- Support for VMware NSX
- Support for OpenStack Neutron

Joint effort with Kubevirt team.



# Forklift Roadmap

## Disk Optimization



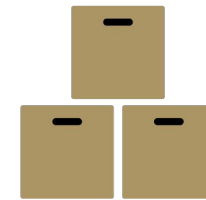
Disk management optimization:

- Over-utilization in disk reported as an issue by IBM GBS. Being able to right size them provides an incentive to migration
- Golden Image import to be used for both VMs and containers.



# Are we missing anything?

Please make your proposals!

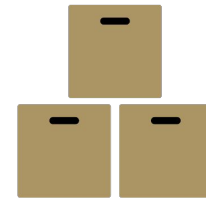


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