



Rancher

Kubernetes as a service for the masses



Overview

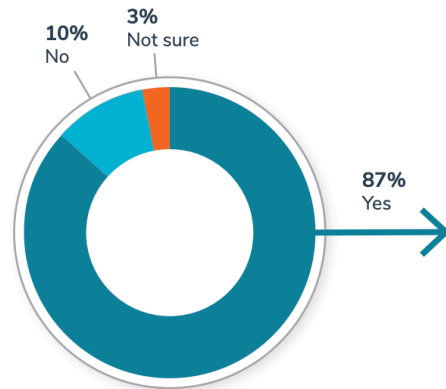
- Container adoption: state of the art
- Users perspective and expectations
- Rancher 101
- IaaS integration
- Conclusions

Containers adoption

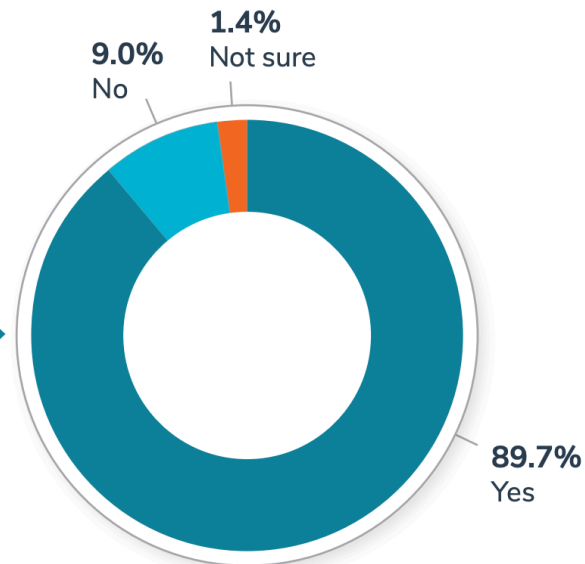


Containers adoption

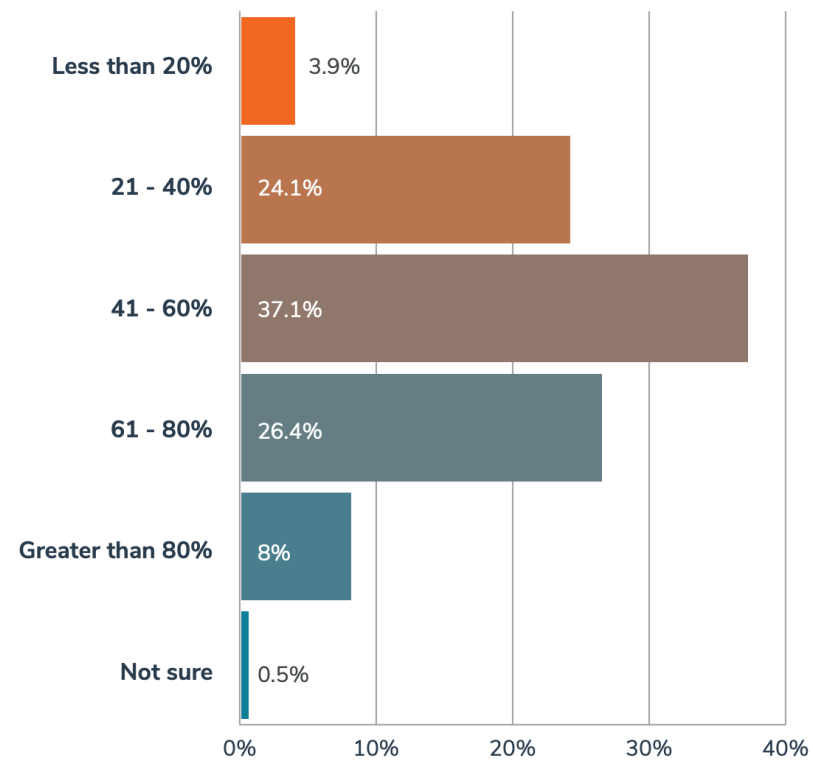
Does your organization run container technologies?



Does your organization run container technologies **in production**?

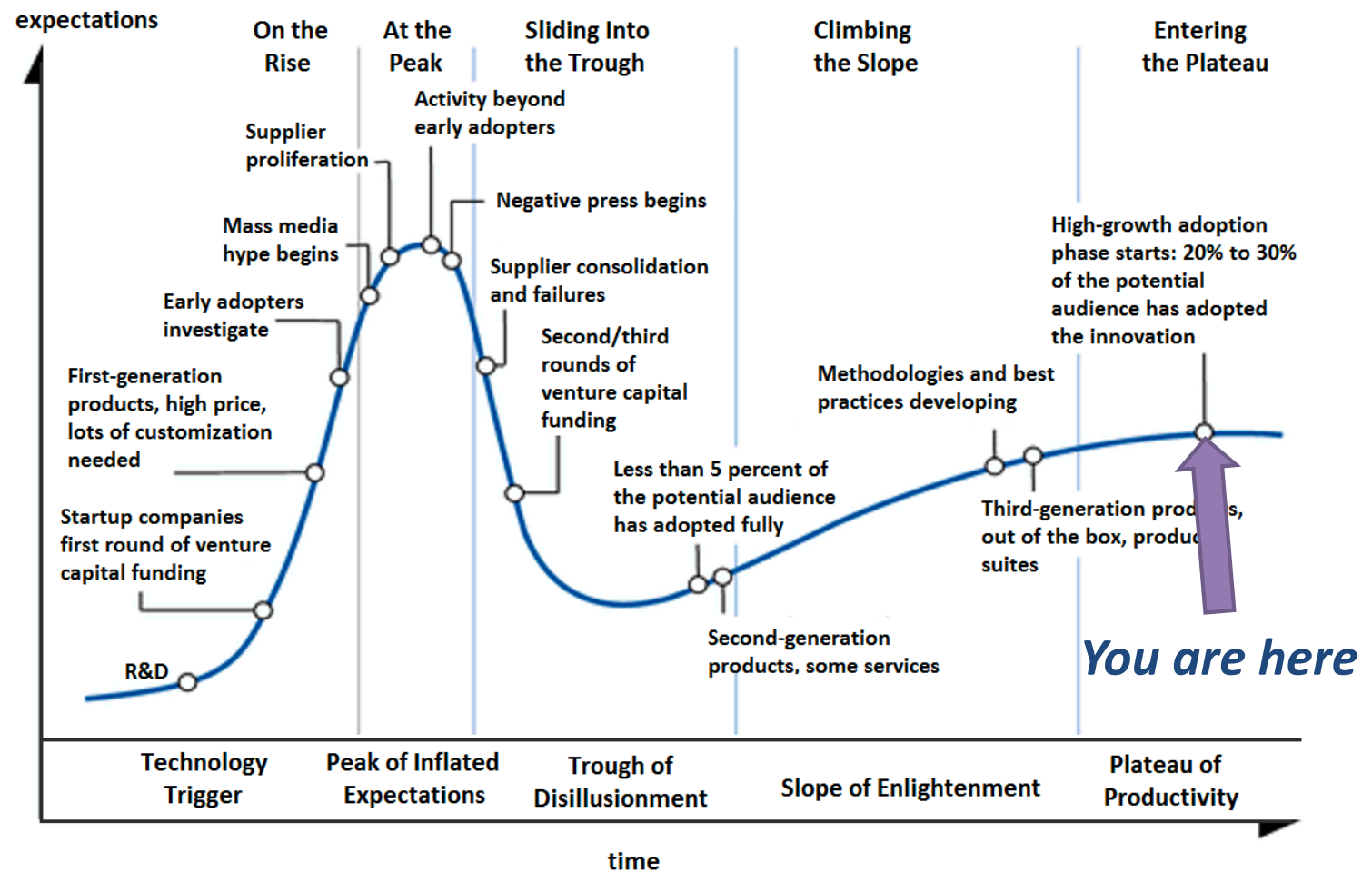


What percentage of your apps are running in containers?



Reference: <https://portworx.com/wp-content/uploads/2019/05/2019-container-adoption-survey.pdf>

Hype cycle



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State of the art: users perspective

- To run containers in production **an orchestrator is mandatory**
- **K8s** is the **de facto standard**
- Cloud users **expect their "clouds" to provide them** with K8s "as-a-service"
- Building an highly available k8s cluster is **not a piece of cake**

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Users expectations

- As-a-service model
- Kubernetes managed engine
- Simple and effective web interface
- Reliable
- Replicable (*infrastructure as code*)

Users expectations



IBM Cloud
Kubernetes Service



Amazon
EKS



AZURE KUBERNETES
SERVICE





Some context...

"INFN Corporate Cloud (INFN-CC) is INFN's geographically distributed private Cloud infrastructure.

*It provides services starting from the IaaS level and it is **based on OpenStack.***

What we were looking for...



Done!

(magic)



***Big
Red
Button***




User

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Use cases

- User exploits IaaS cloud api and will be **autonomous in creating/destroying its own clusters** using a web interface
- User will be provided with a **running k8s cluster managed by INFN Cloud staff**
- User will be provided with a simple web interface for **provisioning preconfigured applications packaged in helm charts** (*PaaS paradigm*)



Rancher, anyone ?

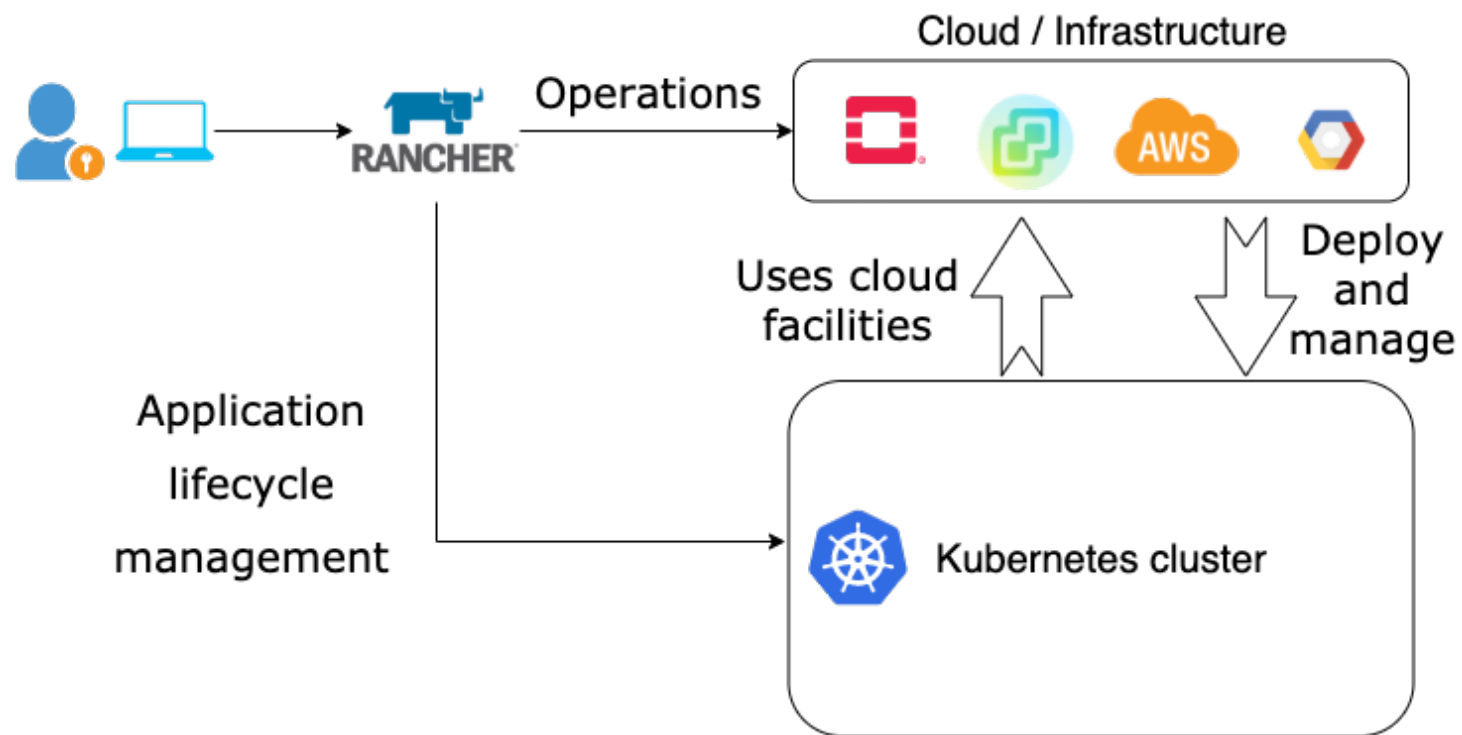
Rancher is a **complete software stack for teams adopting containers.**

It addresses the **operational and security challenges** of managing multiple Kubernetes clusters.

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In a nutshell

- Runs in a docker container
- Keeps cluster info and status...
- ...but clusters run even with rancher offline
- Exploit cloud / infrastructure api to deploy needed components
- Use K8s api to manage user's applications deployment and lifecycle



Supported cloud / infrastructures



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Bonus features

- Simple and effective web UI
- Ease the kubernetes learning curve
- Multi cluster/multi cloud management
- Manages all ops related tasks :
 - Kubernetes version upgrade
 - Cluster state backup/restore
 - Cluster scaling out/in
 - Managed cluster metrics/logs/alerts
 - [...]

Cluster monitoring



Fine grained access control

▼ Grant Resources

Grant access to specific operations on Kubernetes resources

Create	Delete	Get	List	Patch	Update	Watch	Resource
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Catalogs



Apps



Projects



ProjectAlerts



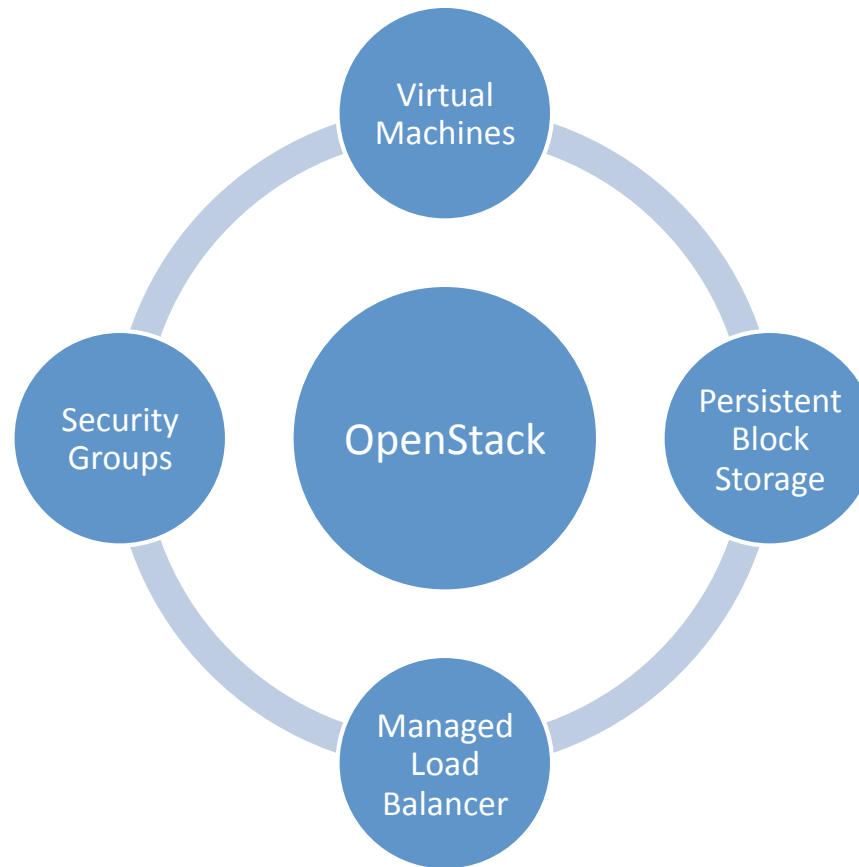
Add Resource

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Fine grained access control

- ✓ Per cluster
 - ✓ Per project
 - ✓ Per resource
 - ✓ Per verb

Exploited IaaS components





Workflow: cluster creation

User asks for new cluster using web interface

Rancher uses openstack api to deploy Virtual Machines

Rancher assigns floating ips/security groups to vms

Rancher ssh in the vms and installs Kubernetes



Workflow: App deployment

User picks an app from marketplace or deploy k8s yaml

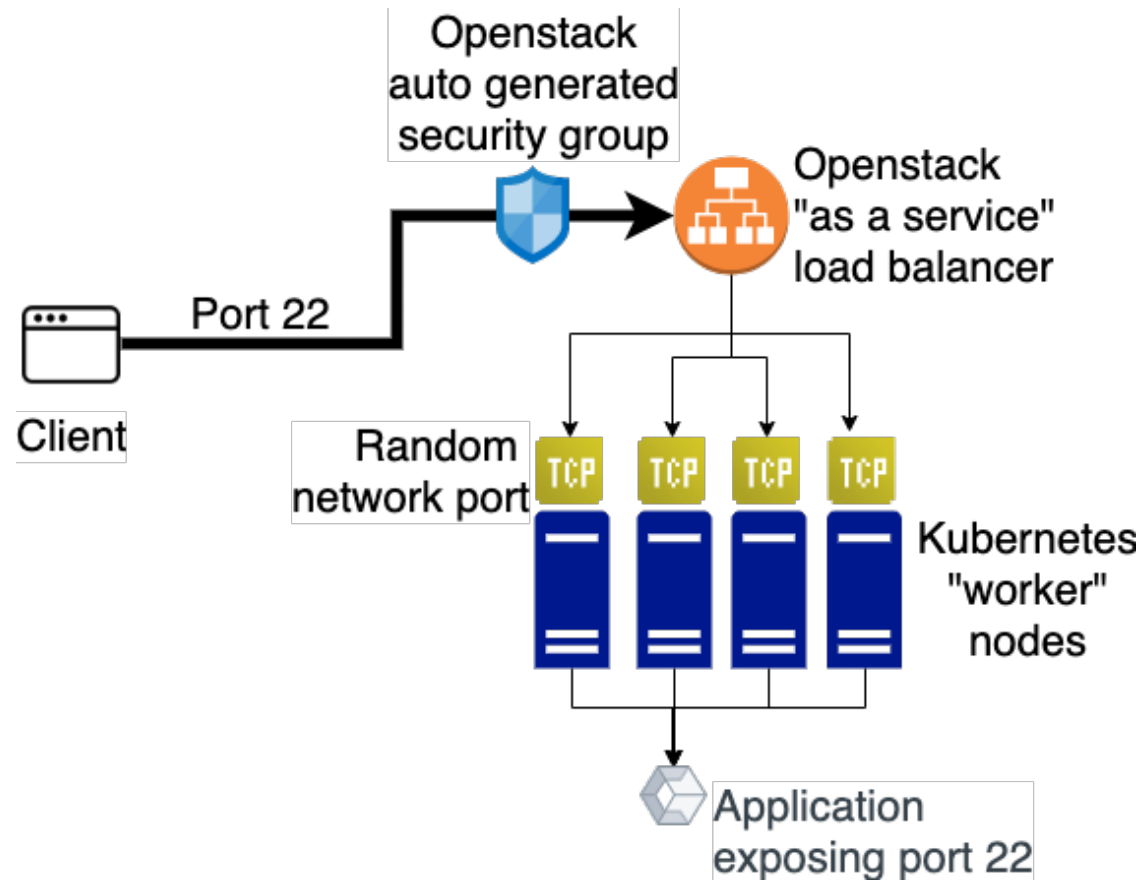
Rancher uses openstack api to request cinder block storage volumes

Rancher uses openstack LBaaS api to request a new load balancer

Rancher deploy app components in k8s



Exposing traffic: Layer 4





Exposing http(s) traffic

Two approaches, both based on virtual host

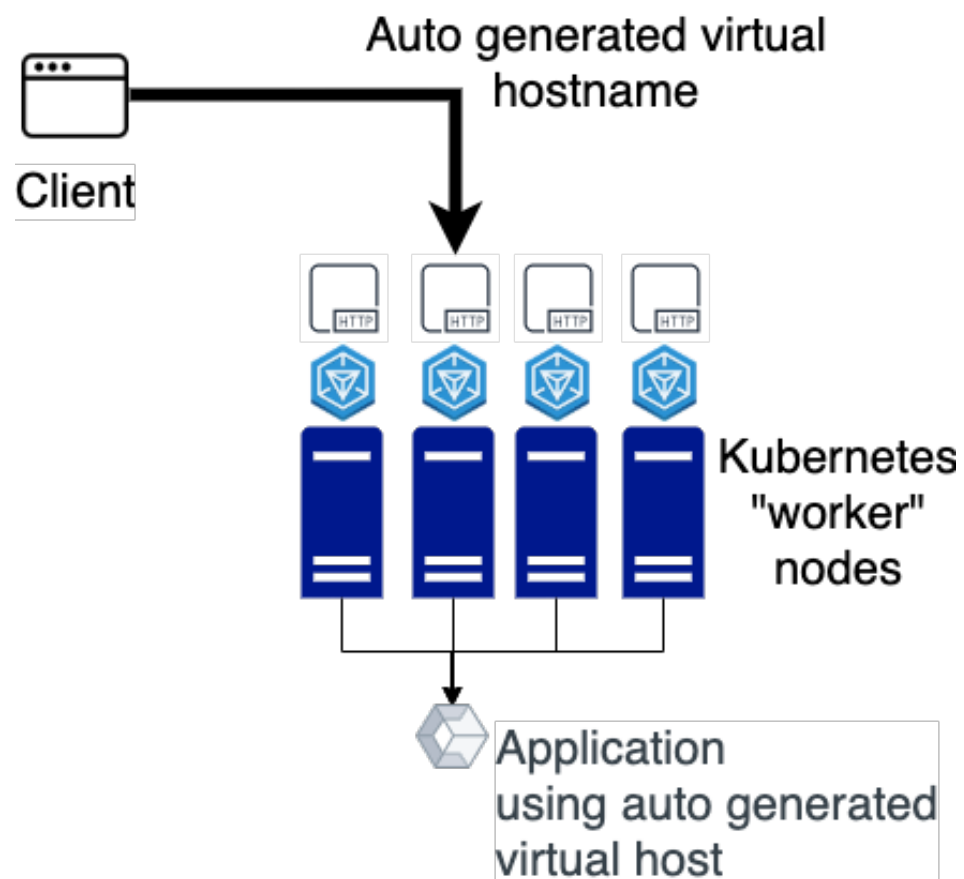
Auto generated virtual hostname

- No external DNS configuration needed
 - Perfect for quick app deployment
 - 'Free' TLS termination
- Ingress traffic is bound to a single worker node
- Long (LONG!) url to remember

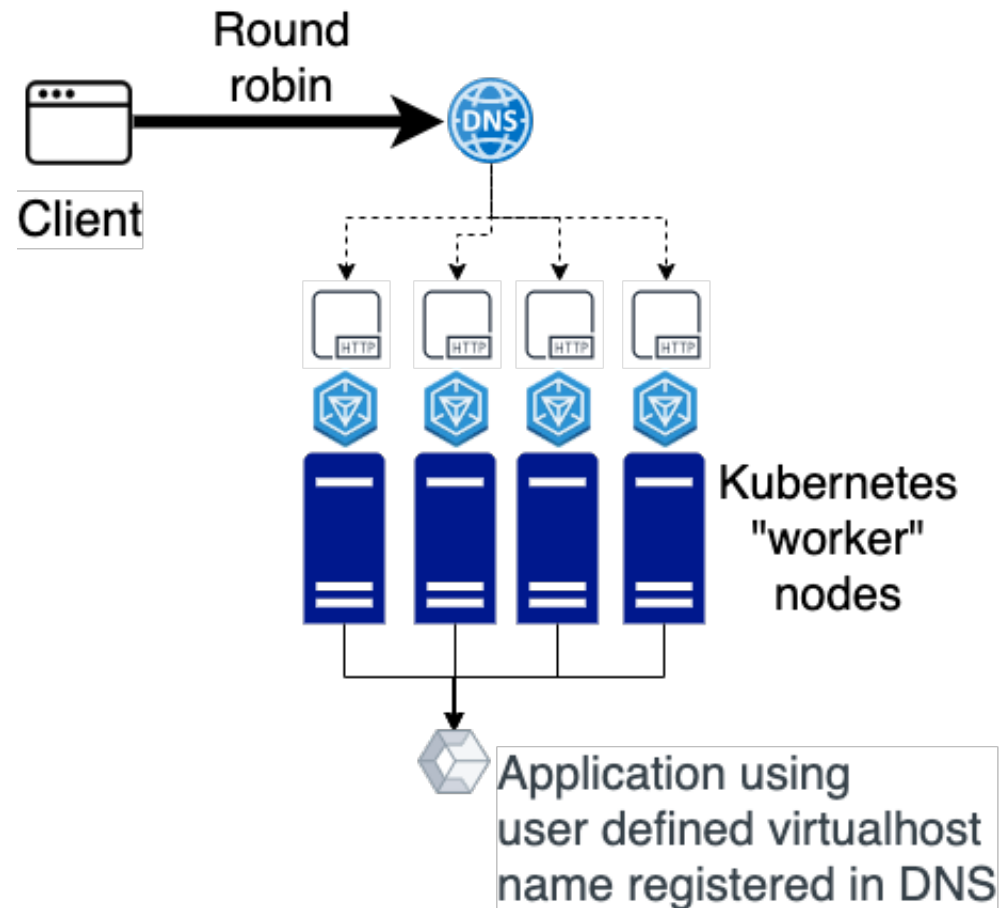
User defined virtual hostname

- Incoming traffic might be distributed
- Expose app with user friendly url
- External DNS configuration required

Ingress traffic with auto generated virtualhost



Ingress traffic with user defined virtualhost



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xip.io magic domain name

What is xip.io?

xip.io is a magic domain name that provides wildcard DNS for any IP address.

Say your LAN IP address is **10.0.0.1**.

Using xip.io,

10.0.0.1.xip.io resolves to **10.0.0.1 www.**

10.0.0.1.xip.io resolves to **10.0.0.1 mysite.**

10.0.0.1.xip.io resolves to **10.0.0.1 foo.bar.**

10.0.0.1.xip.io resolves to **10.0.0.1**



Exposing traffic: self hosted xip.io

Registered web.cloud.infn.it zone in our dns



Deployed modified xip.io code in our powerdns



Configured rancher to use web.cloud.infn.it for autogenerated virtual hostname



Apps are reachable at
`https://<app>.<project>.<worker ip>.web.cloud.infn.it`



Geant4 environment

Remote web virtual desktop

Expand All

Configuration Options

Name *

Add a Description

Hostname *

☒ Automatically generate a `.web.cloud.infn.it` hostname

☐ Specify a hostname to use

Virtual hostname to reach your application

App: MyGeant4App

Active



Version 1.0.0

Namespace mca-rr65s-p-pptxb

Created Last Monday at 12:02 PM

Expand All

Status

Status of current application

Workloads

Workloads created for this application.

Redeploy

Pause Orchestration

Download YAML

Delete

Search

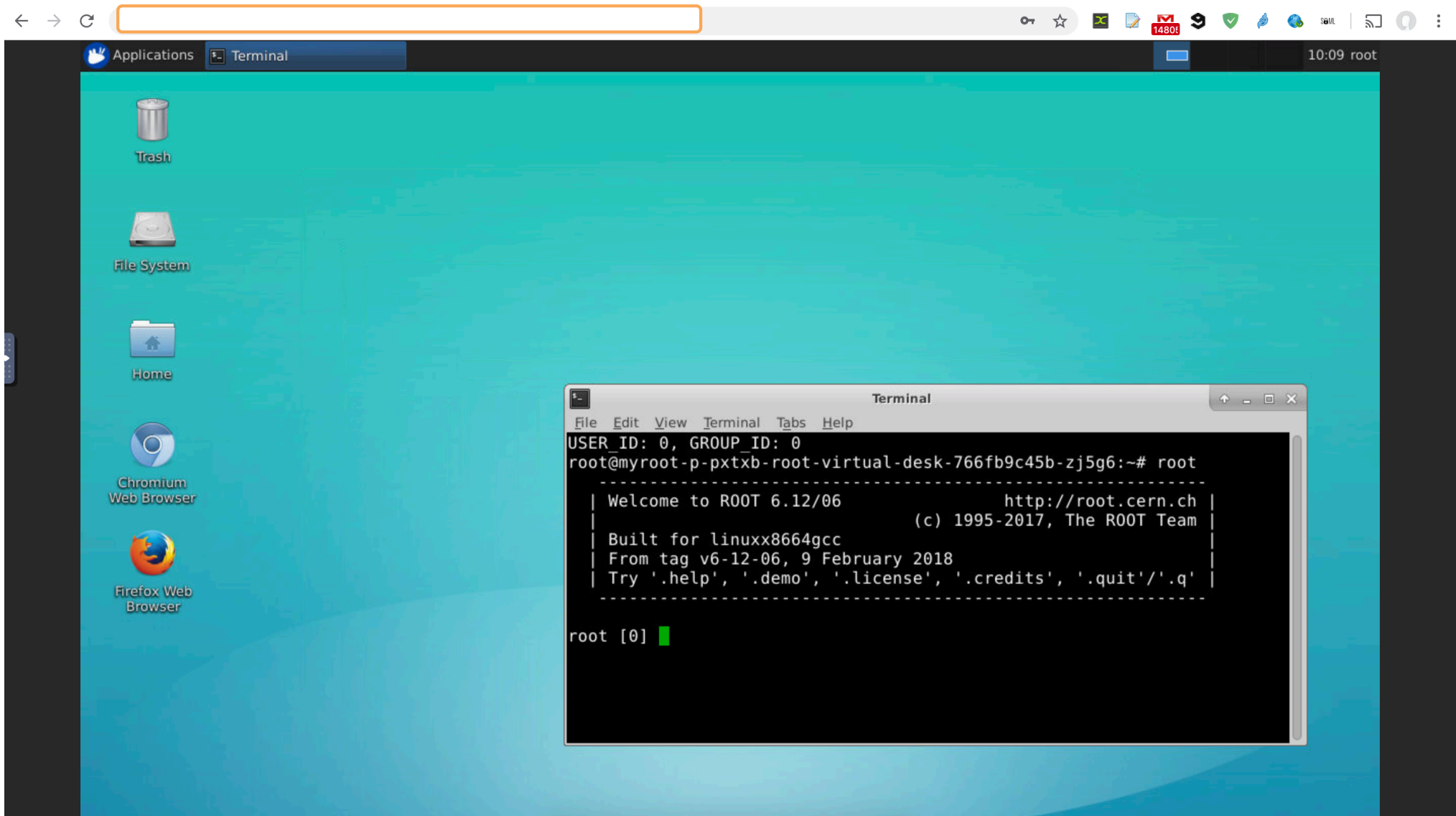
	State	Name	Image	Scale
<input type="checkbox"/>	Active	mca-rr65s-p-pptxb-python-shell 80/http, 80/tcp	virtuallabs/psiabox:latest 1 Pod / Created 2 days ago / Pod Restarts: 1	1

Endpoint

Protocol

https://mygeant4app.mca-rr65s-p-pptxb.<worker ip>.web.cloud.infn.it

HTTP





Conclusions

- ✓ Paradigm shifted from '**Why should I use container for my app**' to '**why shouldn't I**'
- ✓ Users are used to public cloud, we should try to get close to that level of **user experience**
- ✓ Keep **innovating**...
- ✓ ...and **DRIVE** innovation!



Thanks!

- GARR
- Simone Ferretti – ex borsista GARR
 - INFN Corporate Cloud team