



Technical description of HLA/NETN including interoperation with C2SIM and MSaaS

MSG-211 Lecture Series on M&S Standards in NATO
Federated Mission Networking

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Outline

- Allied Framework for MSaaS and key capabilities
- Kubernetes technology platform
- MSaaS key capabilities
- A small exercise (demo)
- Summary

Allied Framework for MSaaS

- Allied Framework for MSaaS comprises the following documents:
 - MSaaS Operational Concept Description
 - MSaaS Concept of Employment
 - MSaaS Business Model
 - MSaaS Technical Reference Architecture

Key MSaaS capabilities

- The key capabilities supported by the Allied Framework for MSaaS:
 - **Discover Services:** The Allied Framework for MSaaS provides a mechanism for users to search and discover M&S services and assets (e.g., Data, Services, Models, Federations, and Scenarios).
 - **Compose Services:** The Allied Framework for MSaaS provides the ability to compose discovered services to perform a given simulation use case.
 - **Execute Services:** The Allied Framework for MSaaS provides the ability to deploy the composed services automatically on a cloud-based or local computing infrastructure.

CNCI Cloud Native Landscape 1.0

Overwhelmed? Please see the CNCI Trail Map. This and the interactive landscape are at t.cnkf.io

Open Source

App learn toward development

Operator & Management

Runtime

Provisioning

Special

Database

Streaming & Messaging

Application Definition & Image Build

Continuous Integration & Delivery

Platform

Serverless

Virtualization

CD Found on Landscape

Scheduling & Orchestration

Coordination & Service Discovery

Remote Procedure Call

Service Proxy

API Gateway

Service Mesh

Cloud Native Storage

Container Runtime

Cloud Native Network

Automation & Configuration

Container Registry

Security & Compliance

Key Management

Kubernetes Certified Service Provider

Kubernetes Training Partner

Certified CNCF

Logging


Tracing

Chaos Engineering

Continuous Optimization







Technology choices

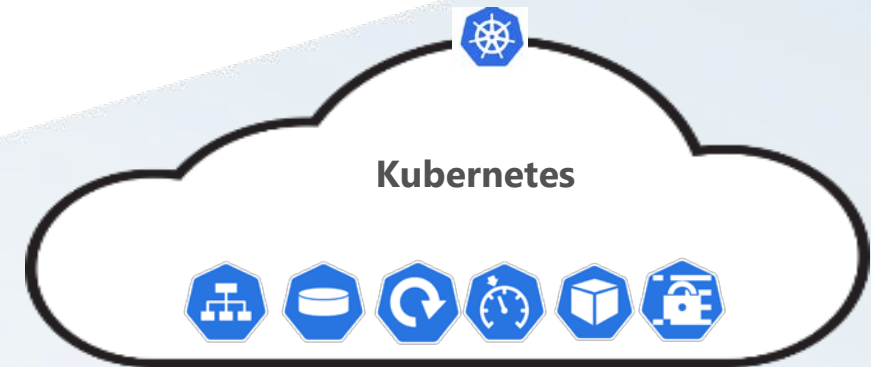
CLOUD NATIVE LANDSCAPE
CLOUD NATIVE COMPUTING REPOSITORY

 This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCI suggesting representative or particularly noteworthy paths.

t.cnkf.io

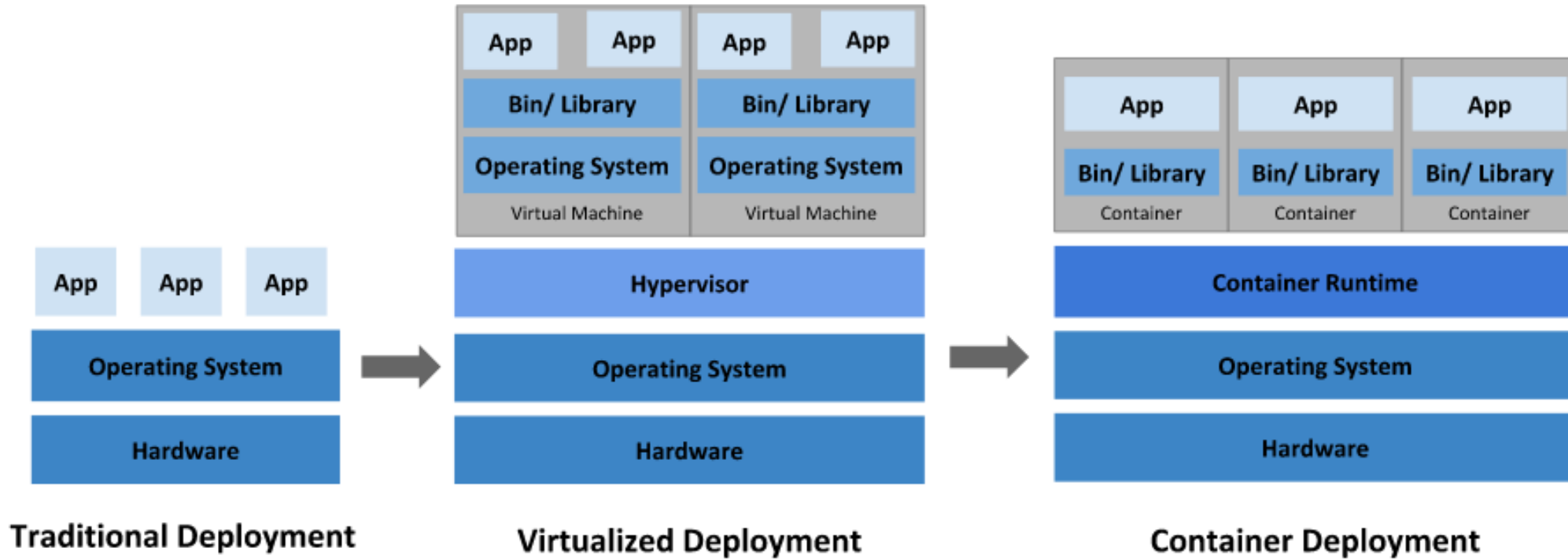
Kubernetes as technology platform

-  Service discovery and load balancing
-  Storage orchestration
-  Automated rollouts and rollbacks
-  Automatic bin packing
-  Self-healing
-  Secret and configuration management

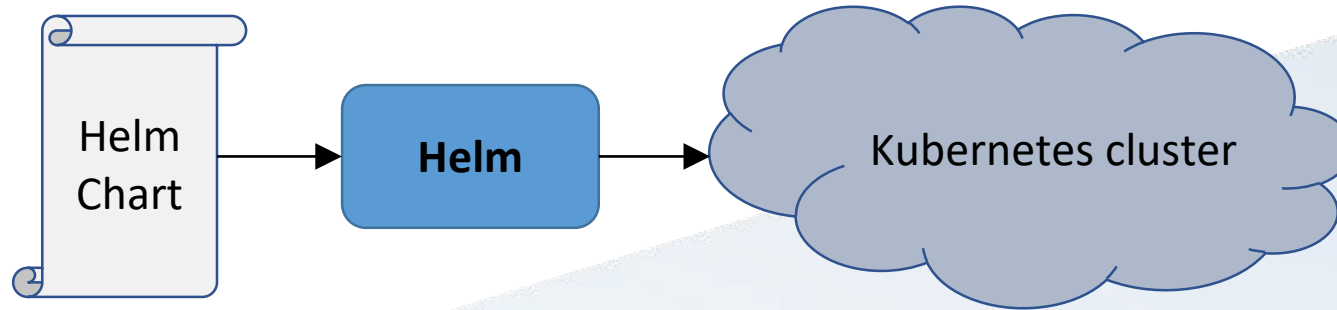


Orchestration platform for containerized workloads
<https://kubernetes.io>

Virtualization



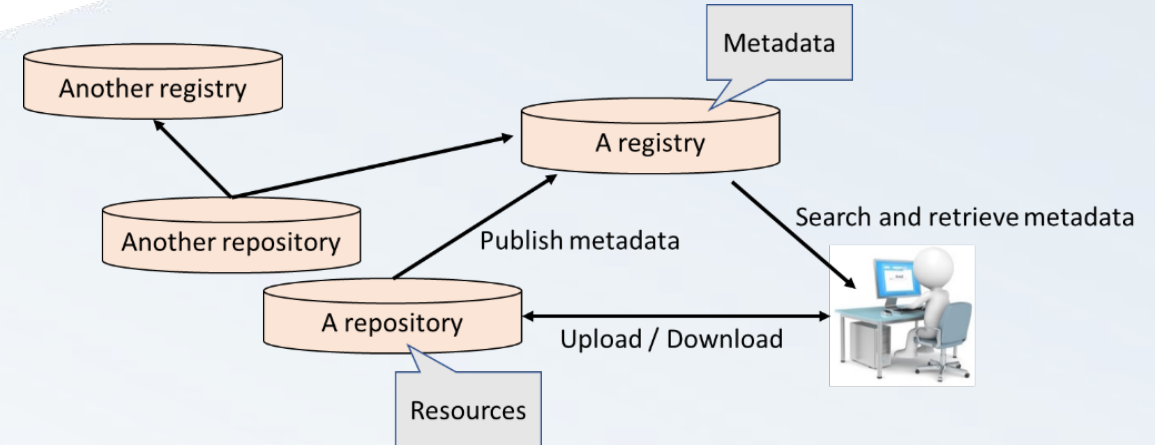
Helm: Kubernetes package manager



```
pith-crc/  
Chart.yaml           # A YAML file containing information about the chart  
LICENSE              # OPTIONAL: A plain text file containing the license for the chart  
README.md            # OPTIONAL: A human-readable README file  
values.yaml          # The default configuration values for this chart  
values.schema.json   # OPTIONAL: A JSON Schema for imposing a structure on the values.yaml file  
charts/              # A directory containing any charts upon which this chart depends.  
crds/                # Custom Resource Definitions  
templates/           # A directory of templates that, when combined with values,  
                     # will generate valid Kubernetes manifest files.  
templates/NOTES.txt  # OPTIONAL: A plain text file containing short usage notes
```

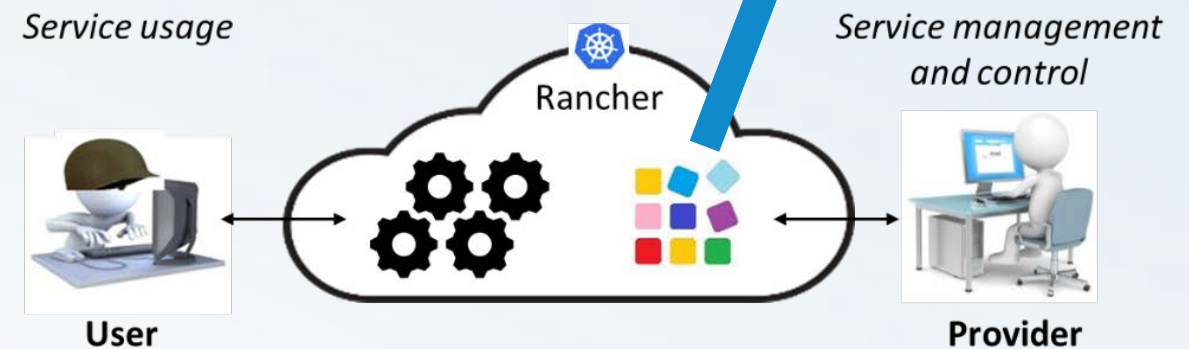
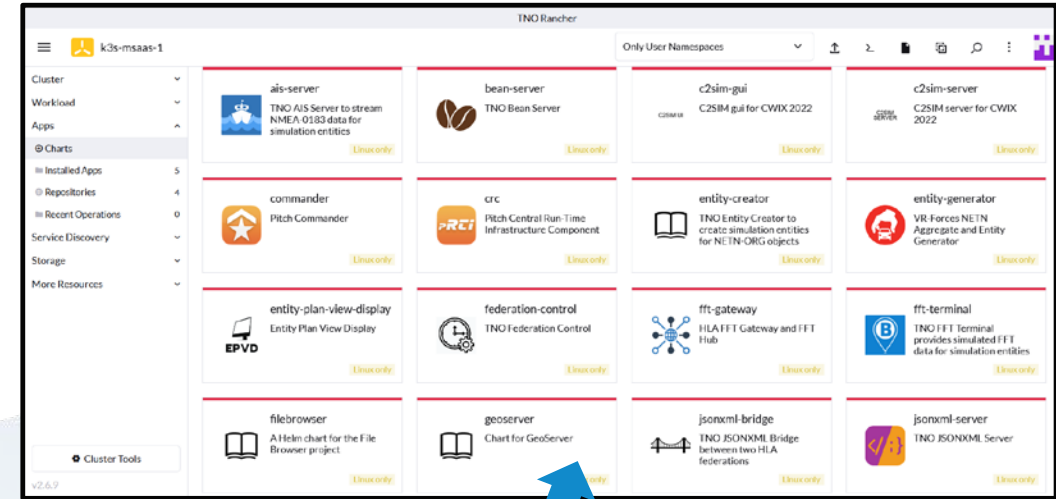

Key MSaaS capabilities using Kubernetes

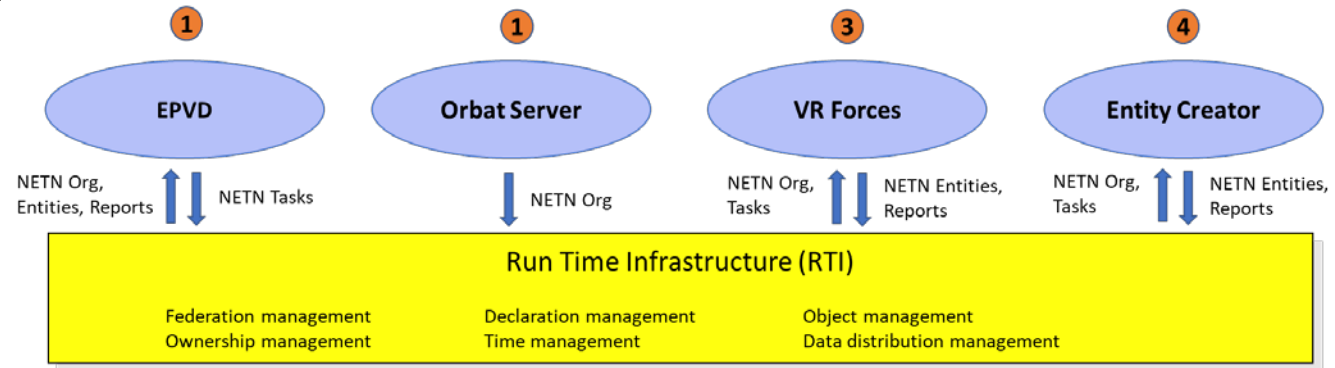
- **Discovery:** Search and retrieve information about candidate applications described by Helm Charts
- **Composition:** Combining Helm Charts
- **Execution:** Browse and start Helm Chart applications from catalog



Small exercise (demo)

- **Execution:** demonstrate the on-demand deployment and cloud-based execution of simulation applications





Demo steps

Step	Actor	Description
1.	Provider	Start a Simulation Control Application (TNO Entity Plan View Display)
2.	User	Initialize the simulation with C2SIM LOX Initialization data
3.	Provider	Start a Computer Generated Forces (CGF) application (VTMaK VR-Forces)
4.	Provider	Start another simple CGF application (TNO Entity Creator)
5.	User	Issue a NETN MoveToLocation task to an entity in the simulation
6.	User	Issue a NETN MagicMove task to an entity in the simulation
7.	Provider	Terminate the applications

Demo

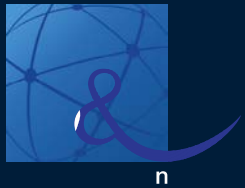
- With slides as backup

Summary

- Demonstrated Kubernetes as technology platform as realization of an MSaaS Capability supporting the key capabilities discovery, composition, and execution
- Demonstrated the cloud based deployment and execution of a few simulation applications
- Demonstrated the successful application of a number of simulation standards: SISO C2SIM LOX, SISO MSDL, HLA, NETN, and WebLVC



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The screenshot shows the NATO STO website homepage. At the top left is the NATO OTAN logo. To its right is the text "NORTH ATLANTIC TREATY ORGANIZATION" and "SCIENCE AND TECHNOLOGY ORGANIZATION". On the far right is a "Sign In" link and social media icons for YouTube, Facebook, LinkedIn, and Twitter. Below this is the "S&T organization" logo. A navigation menu contains the following items: ORGANIZATION, NEWS, PROGRAMME, ACTIVITIES, PUBLICATIONS, and CONTACT. The main content area is titled "NEWSROOM" and features a large banner for "2022 HIGHLIGHTS" with the text "SCIENCE AND TECHNOLOGY ORGANIZATION". Below the banner is the headline "NATO STO releases 2022 Highlights publication". To the right of the banner are two smaller news items. The first shows a satellite in space with the headline "NATO STO hosts wargame on Space Deterrence ...". The second shows a futuristic interface with the headline "2023 COLLABORATIVE Programme of Work Report ...".