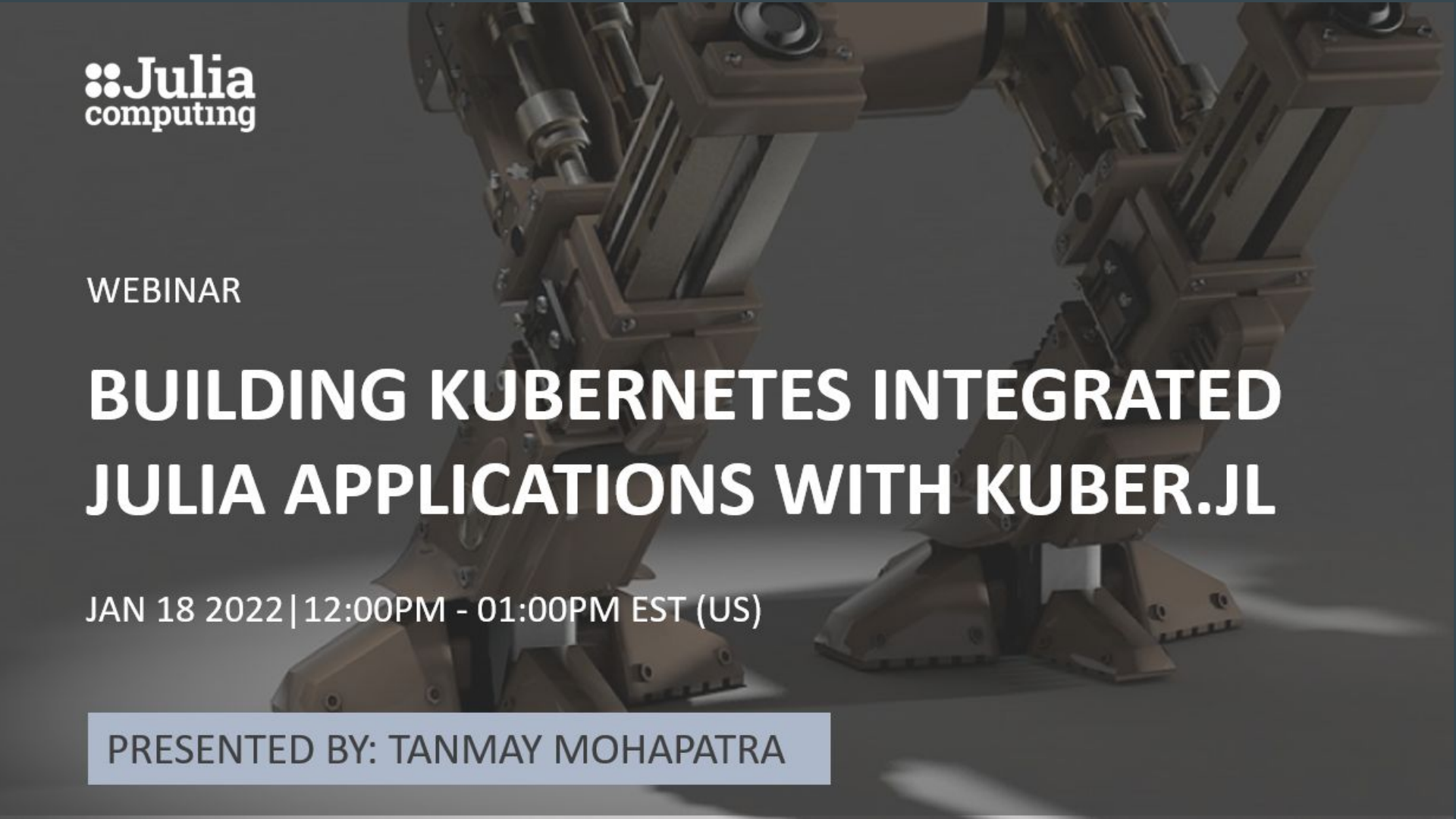

Julia
computing
WEBINAR
BUILDING KUBERNETES INTEGRATED JULIA APPLICATIONS WITH KUBER.JL
JAN 18 2022|12:00PM - 01:00PM EST (US)
PRESENTED BY: TANMAY MOHAPATRA

TOC

- Kubernetes & Kuber.jl
  - Kuber.jl - Julia Package for interacting with Kubernetes
- Kuber.jl APIs
  - Basic APIs - get, put, delete
  - Monitoring cluster events - the watch API
- Example: Code Search Server on Kubernetes
  - Pipeline to crawl sources, download and index them
  - Serve HTTP APIs to search the index
  - Update index periodically
- Q & A

Slides: https://github.com/tanmaykm/KubernetesIntegratedJulia

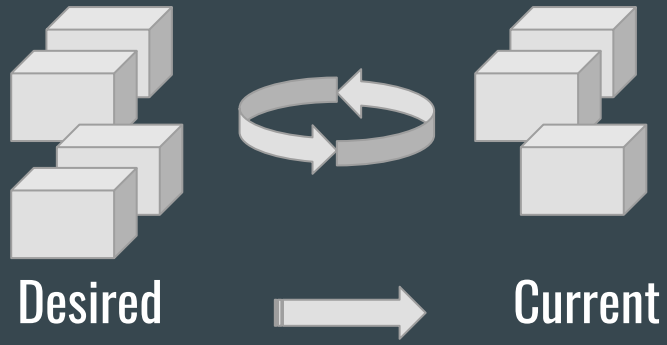
Kubernetes & Kuber.jl

Kubernetes (k8s)

- Container orchestration tool (https://kubernetes.io/)
  - Automate container deployment, scaling and management
- API: Open, Unified and Extensible
- Popular Distributions
  - AWS - EKS, Google - GKE, Azure - AKS, Red Hat Openshift
  - K3S, minikube, microk8s
- Example with Azure AKS
  - https://github.com/JuliaComputing/Kuber.jl/blob/master/WalkThrough.md
- Kubeadm used for this demo
  - https://kubernetes.io/docs/setup/production-environment/tools/kubeadm/install-kubeadm/

Kubernetes (k8s) - Under the Hood

- State store stores desired state of entities
- Machinery to match current state to desired state
- APIs to store, update and query state of entities
- Controllers
  - Create entities on the cluster
  - Monitor current state and desired state
  - Act to bring current state to the one desired



Kuber.jl

- REST API paradigm - entities and verbs
  - get/list
  - put
  - update!
  - delete!
- Watch for changes
  - watch

Using Kuber.jl

Screencast - Using Kuber.jl to deploy and watch a nginx server

https://asciinema.org/a/462454

Search Server on Kubernetes

Search Server Core

- A simple search server for demo.
  - Fetches source code for Julia packages from github releases
  - Extracts them
  - Indexes them using GoogleCodeSearch.jl
  - Serves a REST API that provides results using the index
- To simplify things and highlight the important parts, we use
  - only certain pre-downloaded sources, from the file system
  - a single index, no incremental re-indexing
  - the search server provided by GoogleCodeSearch.jl
- References:
  - https://github.com/tanmaykm/KubernetesIntegratedJulia/blob/main/src/utils.jl
  - https://github.com/tanmaykm/GoogleCodeSearch.jl

Search Server K8S Integration

- Building the Docker Image
- Indexing pipeline on k8s
- Search server on k8s
- Re-indexing
- References:
  - https://github.com/tanmaykm/KubernetesIntegratedJulia/blob/main/Dockerfile
  - https://github.com/tanmaykm/KubernetesIntegratedJulia/blob/main/src/main.jl
  - https://github.com/tanmaykm/KubernetesIntegratedJulia/blob/main/src/k8sutils.jl
- Screencast:
  - https://asciinema.org/a/462469

Extend Search Server

- Run the whole thing inside the cluster as a Controller
- Vastly enhance the implementation!
  - Monitor GitHub repos for changes
  - Incremental parallel downloads, better store
  - Better indexing - maybe split, incremental and parallel
  - Multiple search servers to scale

Summary

- Kubernetes under the hood
  - APIs & Controllers
- Deploy simple applications using Kuber.jl APIs
- Deploy Julia applications that run entirely on K8s
  - Can monitor and manipulate self entirely on k8s

Q & A