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Kubernetes Networking Fundamentals

Take your Kubernetes Knowledge to the Next Level!

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Agenda

1. Introductions and Housekeeping
2. Polling Questions
3. Addressing the Community Kubernetes Skills Gap
4. Kubernetes Networking Defined
5. Networking Theory and Hands on Lab
6. New Learning Content Update
7. Q and A
8. Gift Card Drawing

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Polling Questions

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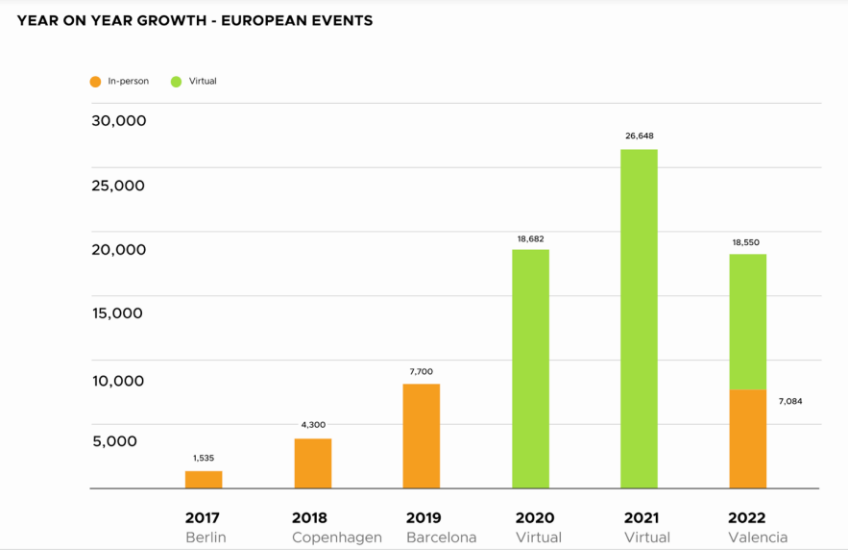
Community Growth

KubeCon NA 2021 69% first time visitors

TYPE	2016 - Seattle	2017 - Austin	2018 - Seattle	2019 - San Diego	2020 - Virtual	2021 - L.A. Hybrid
Total	1,139	4,212	8,000	11,981	22,816+	23,164+

KubeCon EU 2022 65% first time visitors



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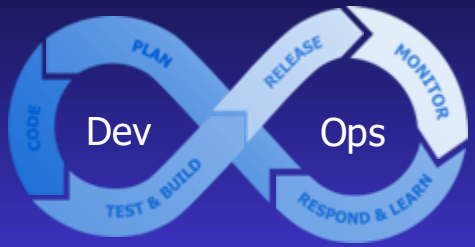
Challenges



Complexity

Cultural Change – Traditional IT to Devops

Lack of Training

* CNCF Cloud Native Survey

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Introducing KubeCampus

Community First – Open to all

Transformation

- Neutral, Community Driven
- Still free – always!

New Site: User Experience, Structure, Labs

- New Look and feel
- Optimized Learning Flow and navigation
- New Structure - courses composed of lessons – Blog, ppt, VOD, hands on lab
- More high-quality labs and content on diverse topics

Let's partner!

- Join us – Technology, instructional and content partners are welcome
- Let's explore co-produced labs, joint training sessions (live and virtual), new content, competitive sessions

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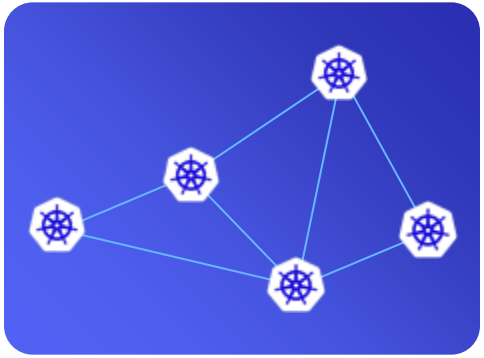
Kubernetes Networking Defined



- Kubernetes networking allows Kubernetes components to communicate with each other and with other applications.
- Different from other networking platforms
  - Based on a flat network structure, eliminating need to map host ports to container ports.
- Provides a way to run distributed systems, sharing machines between applications without dynamically allocating ports.

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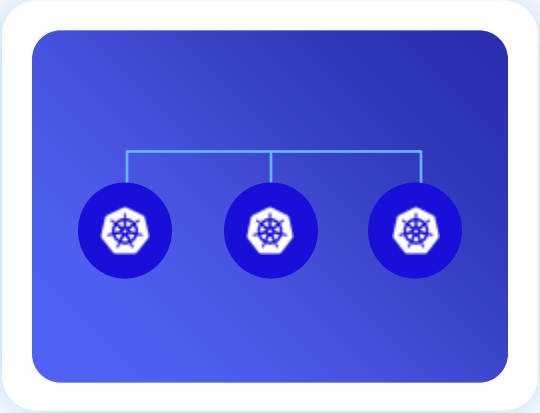
The CNI – the Basis of K8s networking



- Key aspect of Kubernetes networking is the Container Networking Interface, or CNI.
- The CNI connects Pods across nodes, acting as an interface between a network namespace and a network plug-in or a network provider and a Kubernetes network.
- CNI plug-ins can dynamically configure a network and resources as Pods are provisioned and destroyed.
- They provision and manage IP addresses as containers are created and deleted.

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The CNI – the Basis of K8s networking

- It is common for a CNI plug-in such as Flannel, Calico, Canal, or Weave Net to be installed and each offers different capabilities and features.

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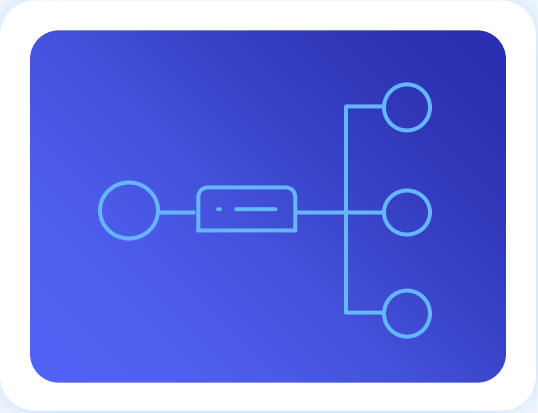
Key Networking Terminology



- Kubernetes Services
- Cluster IP
- Node Port
- Load Balancer
- External Name

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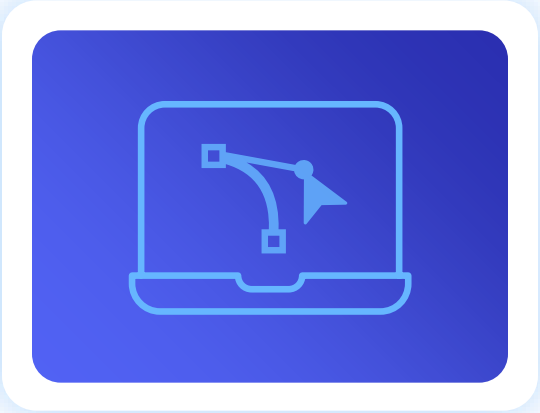
Kubernetes Services



- Allow clients to discover and talk to Pods
- Similar to internal load balancers designed to distribute traffic to a subset of pods that satisfy a set of rules on their labels
- Allows creation of a single constant point of entry to a group of pods
- Each service has an IP address and port that never changes while the service exists

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Cluster IP

- Exposes groups of pods to other pods in the cluster
- Choosing Cluster IP value make the service reachable only from within the cluster.

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Node Port

- Allows you to expose services such as frontend webservers to outside resources, so that external clients an access them
- Opens ports on the nodes or virtual machines, and traffic is forwarded from the ports to the service
- Often used for services that don’t always have to be available, such as demo applications

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Load Balancer

- Kubernetes clusters running on public clouds usually support the automatic provisioning of a load balancer from the cloud infrastructure.
- Set the service's type to LoadBalancer instead of NodePort.
- The load balancer will have its own unique, publicly accessible IP address and will redirect all connections to your service.

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ExternalName

- Instead of exposing an external service by manually configuring the service's endpoints, a simpler method allows you to refer to an external service by its fully qualified domain name (FQDN).
- ExternalName maps the service to the contents of the externalName field, by returning a CNAME record with its value.

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Networking Types in a Kubernetes Cluster

- Container-to-container
- Pod-to-pod
- Pod-to-service
- Internet-to-service

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Courses

Introduction

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Hardware, software and knowledge requirements

- Knowledge of Basic Linux commands and navigation
- Laptop with 4 GB of memory and 20 GB of hard drive available
- Windows 10 , Mac OS, Linux
- Chrome, Microsoft Edge, Chromium Browser, Safari

Courses Structure

- Review of concepts from pre-work including blog, ppt, VOD and Kasten K10 docs for advanced users
- Hands on lab, following specific Kubernetes commands to achieve mastery and success
- Badging and added resources awarded for each course completed

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Pre-Assessment Quiz
Level set

Level of Expertise

- Beginner – Student
- Intermediate
- Pro

Responsibility for Kubernetes

- Learn about Kubernetes
- Architect Kubernetes Solutions
- Manage infrastructure
- Build and deploy Applications in Kubernetes
- Kubernetes Backup and DR

What are you looking for in Learning

- General knowledge
- Deep Expertise
- Advanced courses and certification

What Kubernetes Topics Interest you?

- Kubernetes Fundamentals
- Kubernetes Architectecture
- Kubernetes Use Cases
- Deploying and Backing up Applications in Kubernetes
- Kubernetes Integrations
- Advanced Courses in Kubernetes

What other Lab topics would you like to see?

- Disaster Recovery
- Helm Basics
- Applications Mobility
- Management tools
- Something else

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Networking Fundamentals Lab

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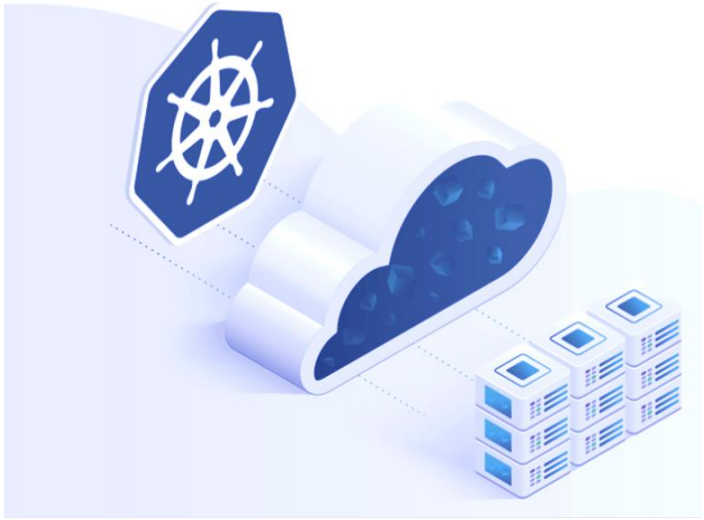
Rookie Lab – Learning Day Featuring Kubernetes hosted by KubeCampus

Kubernetes Networking Fundamentals



Objectives

- Review K8s networking terminology
- Answer a series of initial challenge questions in the lab to ensure the user has mastered the Kubernetes terminology
- Use real keyboard networking commands

Pre-work requirements

For all users

- Blog
- Intro to Kubernetes
- Lab Series Overview slides

For more advanced users

- Kasten K10 documentation
- Free Kasten K10 download

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Rookie Lab – Learning Day Featuring Kubernetes hosted by KubeCampus

Kubernetes Networking Fundamentals – Part 1

Kubernetes Introduction

The network model is implemented by the container runtime on each node. The most common container runtimes use Container Network Interface (CNI) plugins to manage their network and security capabilities

Terminology

- Kubernetes Services
- Microservices
- Load Balancer
- ClusterIP
- NodePort

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Rookie Lab

Kubernetes Networking Fundamentals – Part 2

Commands for the Rookie Lab

- Kubernetes Services Review
- Deploy pod inside cluster
- Expose Pod via a ClusterIP service
- Test to confirm we can reach the pod through the service internally

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Lab Demo

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Networking Fundamentals

Welcome to the Networking Fundamentals Lab, released during the KubeCon + CloudNativeCon North America Tradeshow 2022. This lab is targeted to persons beginning their journey in Kubernetes and who want to grow their cloud native skills.

Kubernetes is an open-source system for deploying, scaling, and managing containerized applications and continues to grow in popularity in the enterprise. One consistent request from the KubeCon community is more Kubernetes training for all skill levels. KubeCampus has recognized this need and is delivering exactly that.

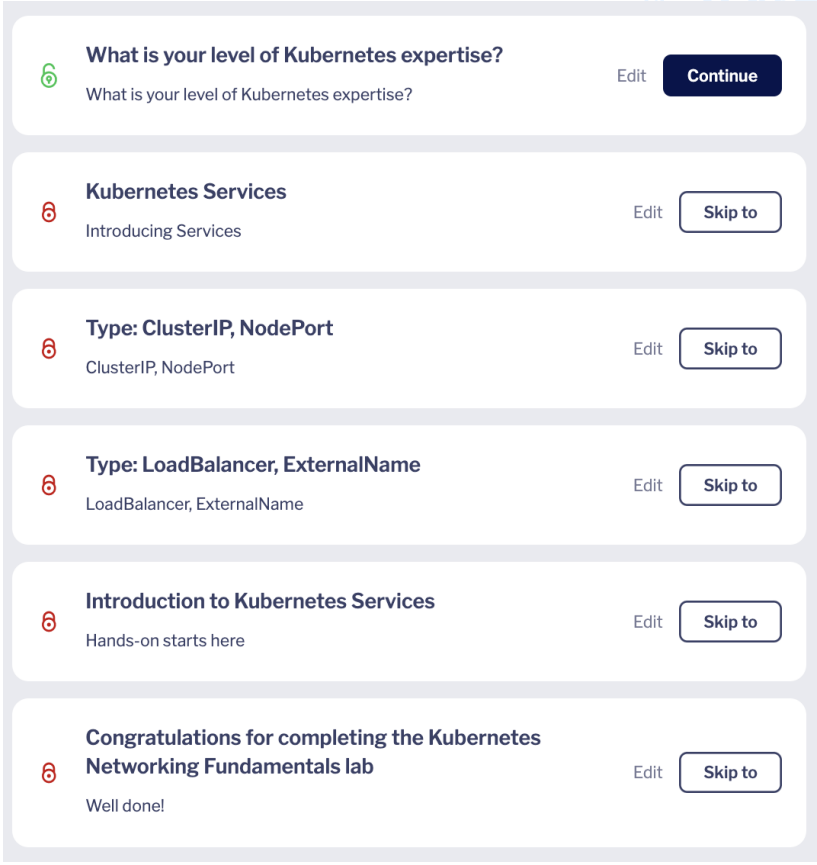
This initial 30 minute lab:

- Allows you to self-qualify your skill level for later, more in-depth labs in the series
- Covers key Kubernetes Networking Concepts
- Rewards your time invested!

Complete this lab in person or virtually!

Important

- On multiple choice questions, note that more than one answer maybe correct.
- Please note this lab is timed and should be completed in one sitting.



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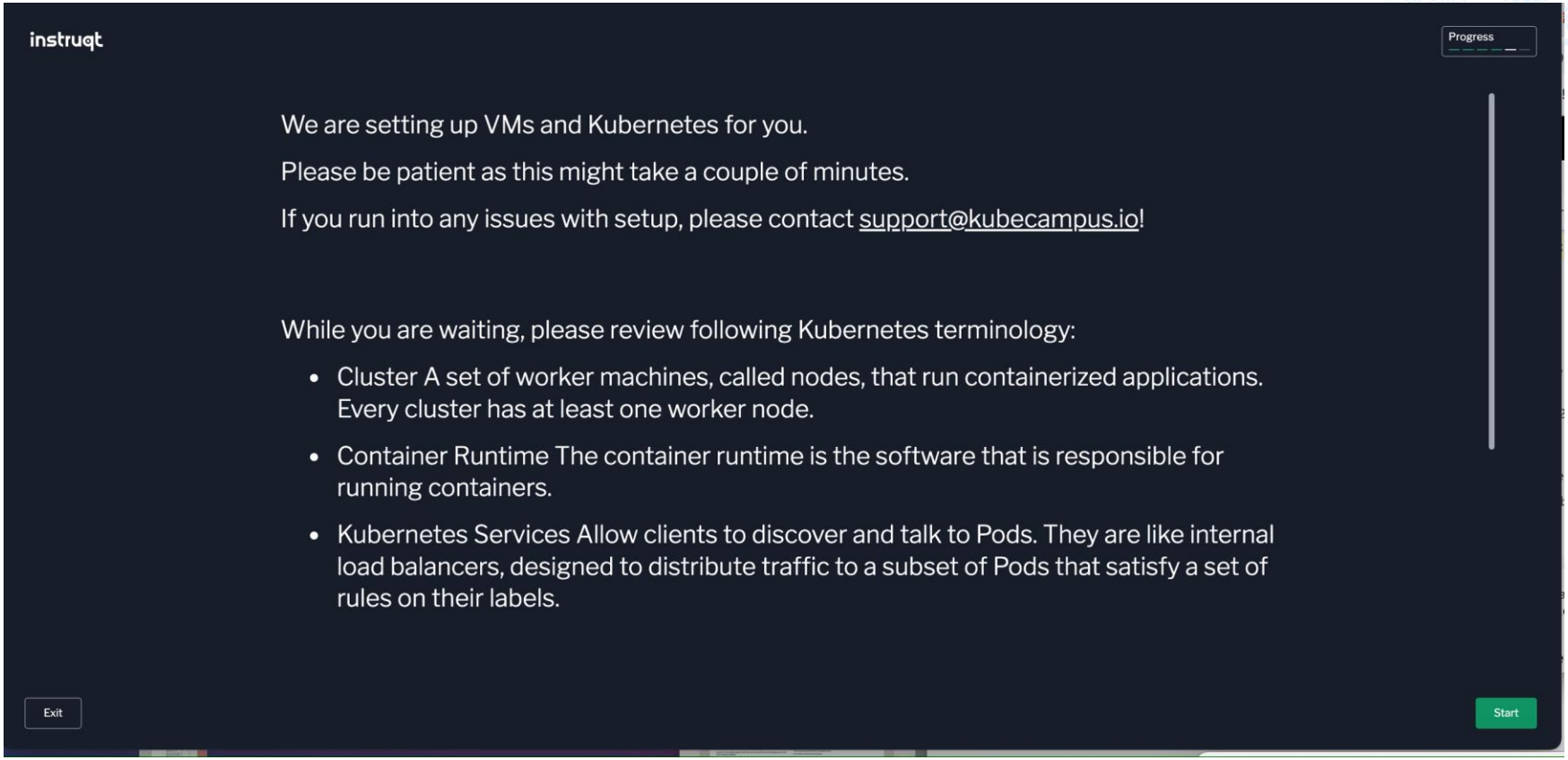
Networking Fundamentals Hands on



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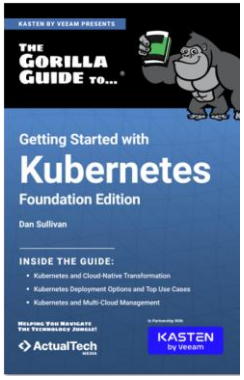
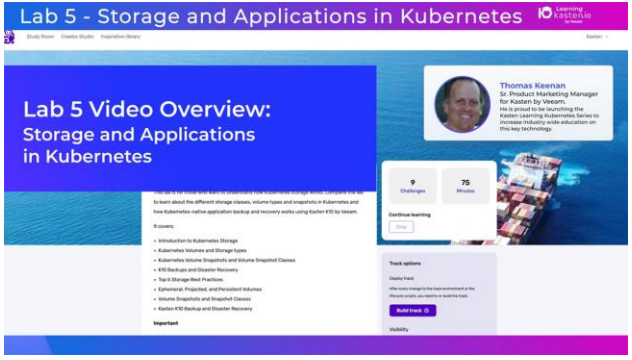
Insightful Content

Ebooks, Blog Posts, Webinars



Worth the Fight: An Engineer's Path to Kubernetes Proficiency – Part 1 of a 2 part series



Ebooks

- Gorilla Guides – Getting Started, Storage, Security
- Dummies Guide

Blog Posts

- Diverse topics of interest to Kubernetes Community
  - Application Consistency, OIDC, Networking, Security, Minikube
- Beginner and Pro Journeys
- Submit yours today! Contact@KubeCampus.io

Video Recordings and Webinars

- VODs accompany each Lab
- Live Webinars on Security, Storage, Application Monitoring and other topics
  - Also available on demand

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Learning Blog – Recent Additions

link

Practical Kubernetes monitoring with Prometheus and Grafana

- Monitoring Defined
- Prometheus Background
- Grafana Summary
- Practical hands-on monitoring example

link

Key Takeaways from the Gorilla Guide to Storage and Applications in Kubernetes

- Understanding the Container Storage Interface (CSI)
- Different Types of Storage Volumes
- VolumeSnapshots and Backups

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Holiday Promotions

- **New Year, New Gear!** Complete any lab during the month of December for a chance to win an Apple watch:

  https://kubecampus.io/kubernetes/special-promotion-courses/

- **Join KubeCampus on Instagram** and you could be the lucky winner of a $200 Gift Card.

  https://www.instagram.com/kubecampus/

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Questions ?

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The $200 gift card winner is...

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Thank You