

# KUBERNETES IN ML

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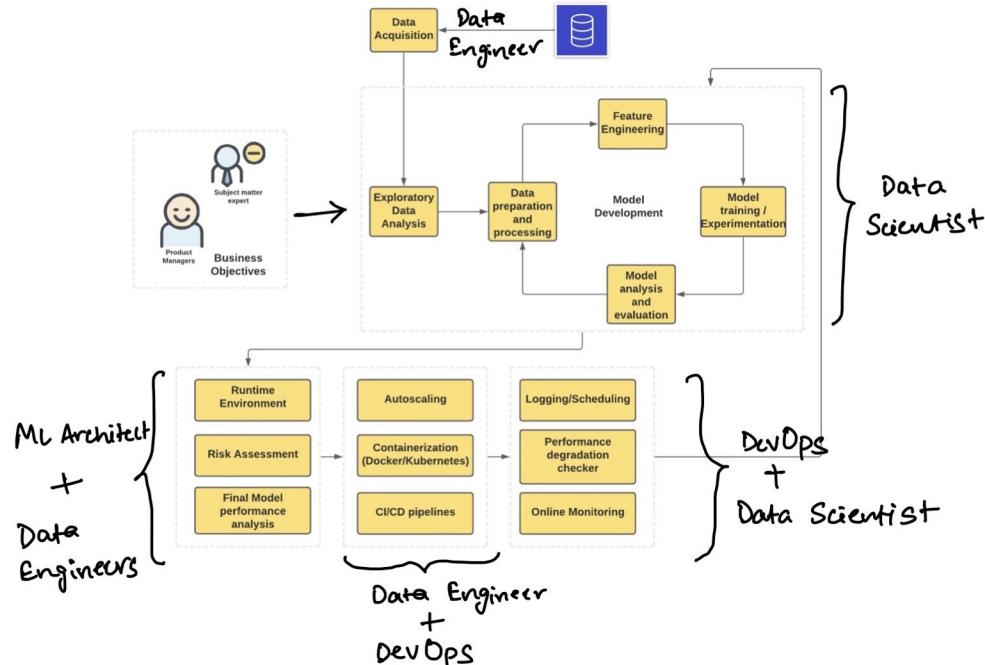


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# WHAT IS MLOPS?

It is an engineering discipline that aims to unify ML systems development(dev) and ML systems deployment(ops) to standardize and streamline the continuous delivery of high-performing models in production.

## ML Engineering & Operations



# CHALLENGES IN MLOPS

- Scaling ML Workloads
- Containerization and Dependency Management
- Complexity of Managing ML Infrastructure
- Model Versioning and Reproducibility
- Data Management and Sharing
- Model Deployment and Serving
- Monitoring and Observability
- CI/CD for ML
- Security and Compliance

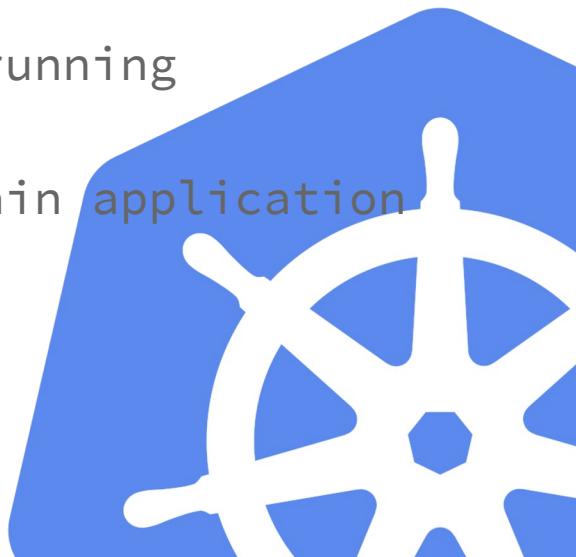


# CHATGPT SAYS,

Using Kubernetes for MLOps can be a powerful way to manage and scale machine learning applications, but it requires careful planning, tooling, and best practices to address the unique challenges presented by ML workloads

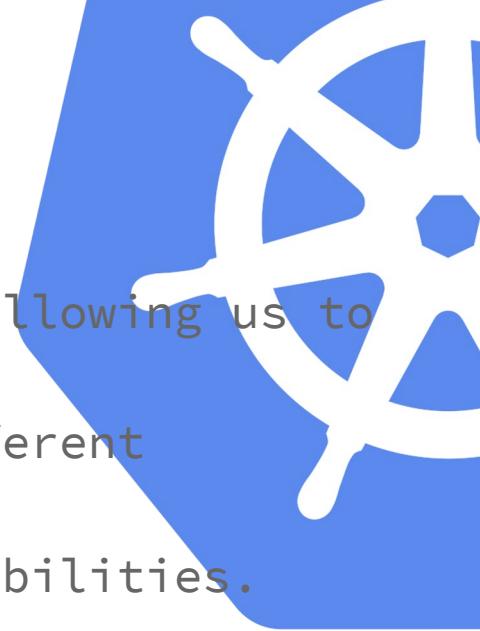
# WHAT IS KUBERNETES?

- A powerful container orchestration platform
- Automates the deployment, scaling, and management of containerized applications.
- It provides a robust infrastructure for running distributed systems.
- Declarative approach to define and maintain application states.



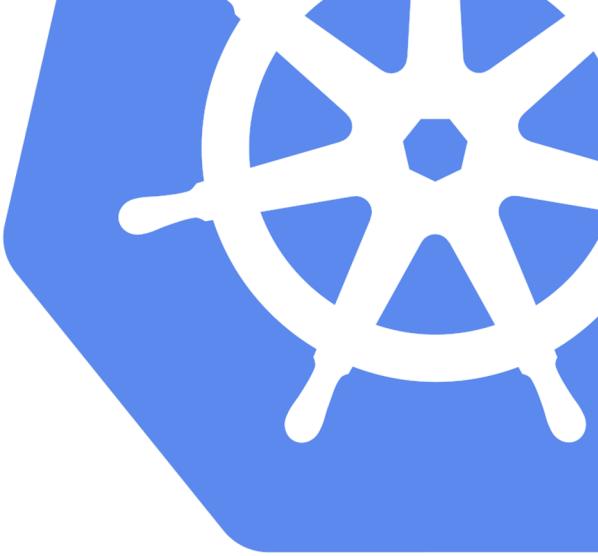
# WHY KUBERNETES?

- Enables efficient container orchestration, allowing us to package and deploy ML models as containers.
- It ensures consistent deployment across different environments.
- Offers powerful scaling and autoscaling capabilities.
- It is Cloud agnostic
- Cost efficient
- Managed Kubernetes Services
- Ensures high availability and fault tolerance, minimizing downtime for critical ML applications.



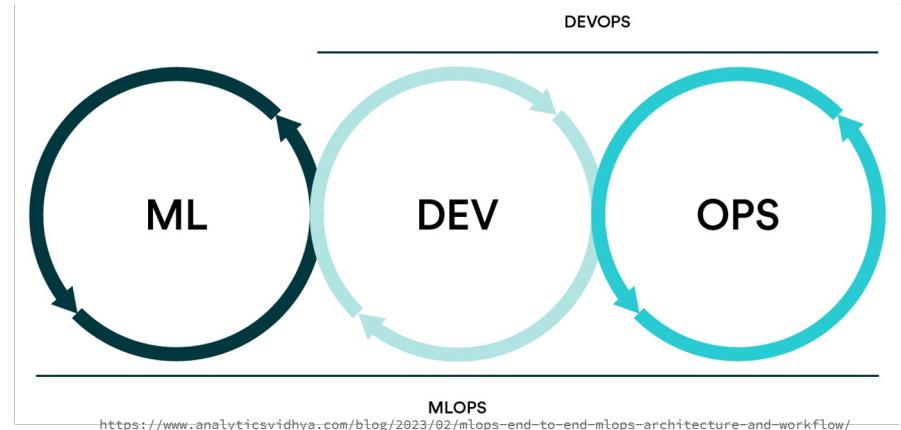
# BENEFITS OF KUBERNETES IN ML PRODUCTION

- Scalability
- Resiliency
- Portability
- Containerization for ML models
- Resources allocation
- Horizontal scaling and Autoscaling ML workloads

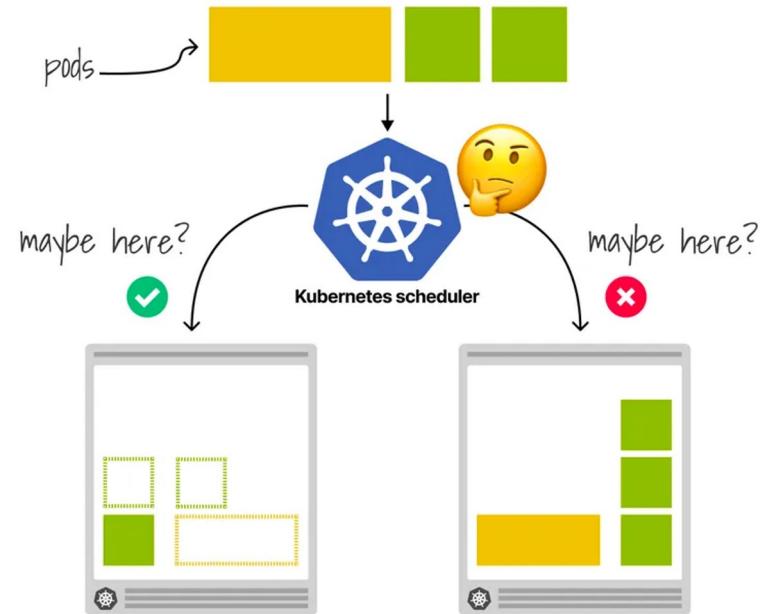
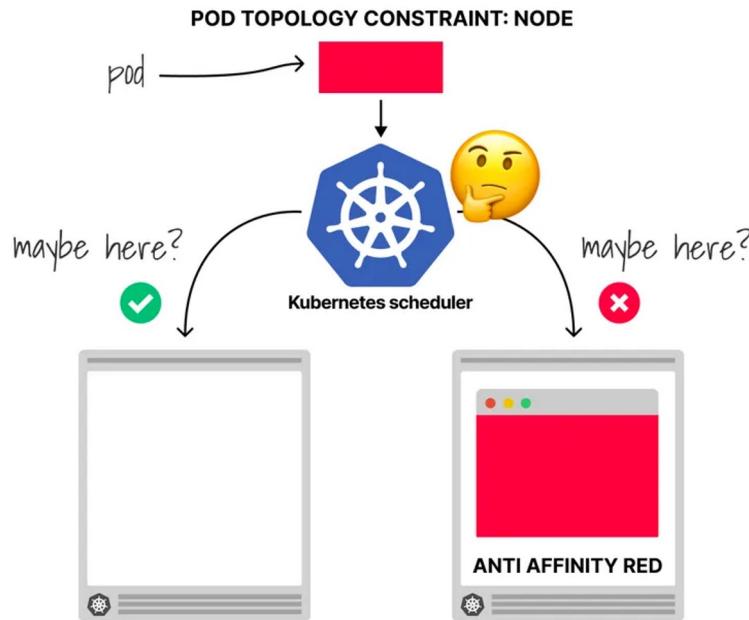


# BENEFITS OF KUBERNETES IN ML PRODUCTION

- Monitoring & Observability
- CI/CD for MLOps
- Security
- Secrets management



# AFFINITY AND ANTI-AFFINITY



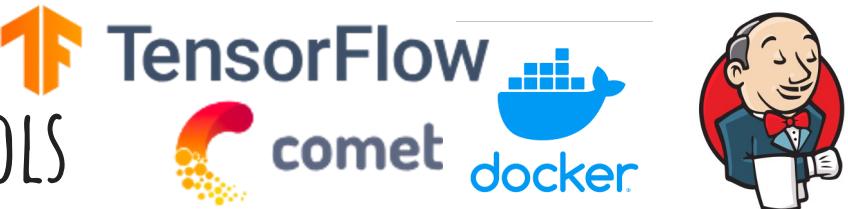
# NODE AFFINITY

- Constrain the Nodes that can receive a Pod by matching labels of those Nodes
- `spec.affinity.nodeAffinity`

# INTER-POD AFFINITY & ANTI-AFFINITY

- Constrain the Nodes that can receive a Pod by matching labels of the existing Pods already running on each of those Nodes.
- `spec.affinity.podAffinity` & `spec.affinity.podAntiAffinity`

# CLOUD-NATIVE & OPEN-SOURCE TOOLS



Rohit Ghumare | That #DevOps Guy 🎉  
@ghumare64

DevOps tools:

- Programming → Python, Groovy, Go Lang
- Provision → @github
- Containers → @Docker
- Orchestration → @kubernetesio
- Cloud → @awscloud @CivoCloud  
@Azure
- CI/CD & GitOps → Jenkins, Github Actions, Gitlab, ArgoCD, Flux
- IaC & IP → Terraform, Ansible, Pulumi, Crossplane

1:01 PM · Aug 20, 2022 · Twitter for Android

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199 Retweets 7 Quote Tweets 714 Likes

Reply Share Like Retweet

**VALIDKUBE**           

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@ghumare64

Scripting → Linux  
Observability → Prometheus, Grafana, Nagios, ELK Stack  
Chaos Engg → Chaos Mesh  
Service Mesh → @IstioMesh @soloio\_inc

Its deep ocean, Cloud native tools are fascinating too.

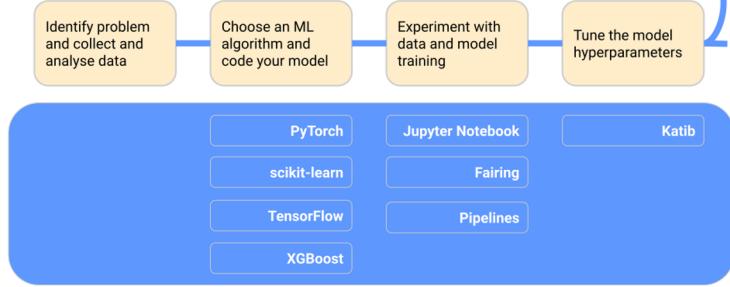
Go slow and learn step by step.

1:06 PM · Aug 20, 2022 · Twitter for Android

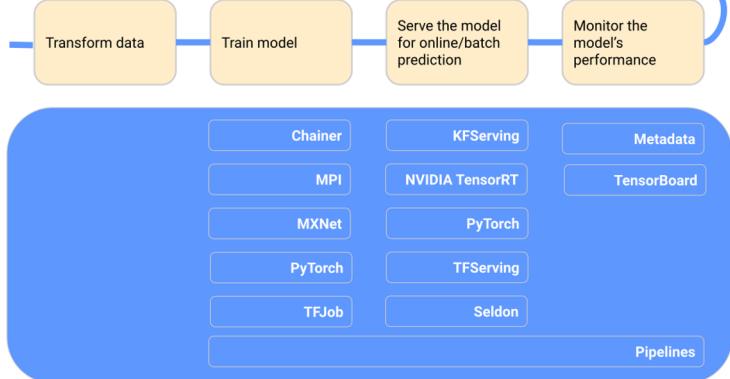
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# KUBEFLOW

## Experimental phase with Kubeflow

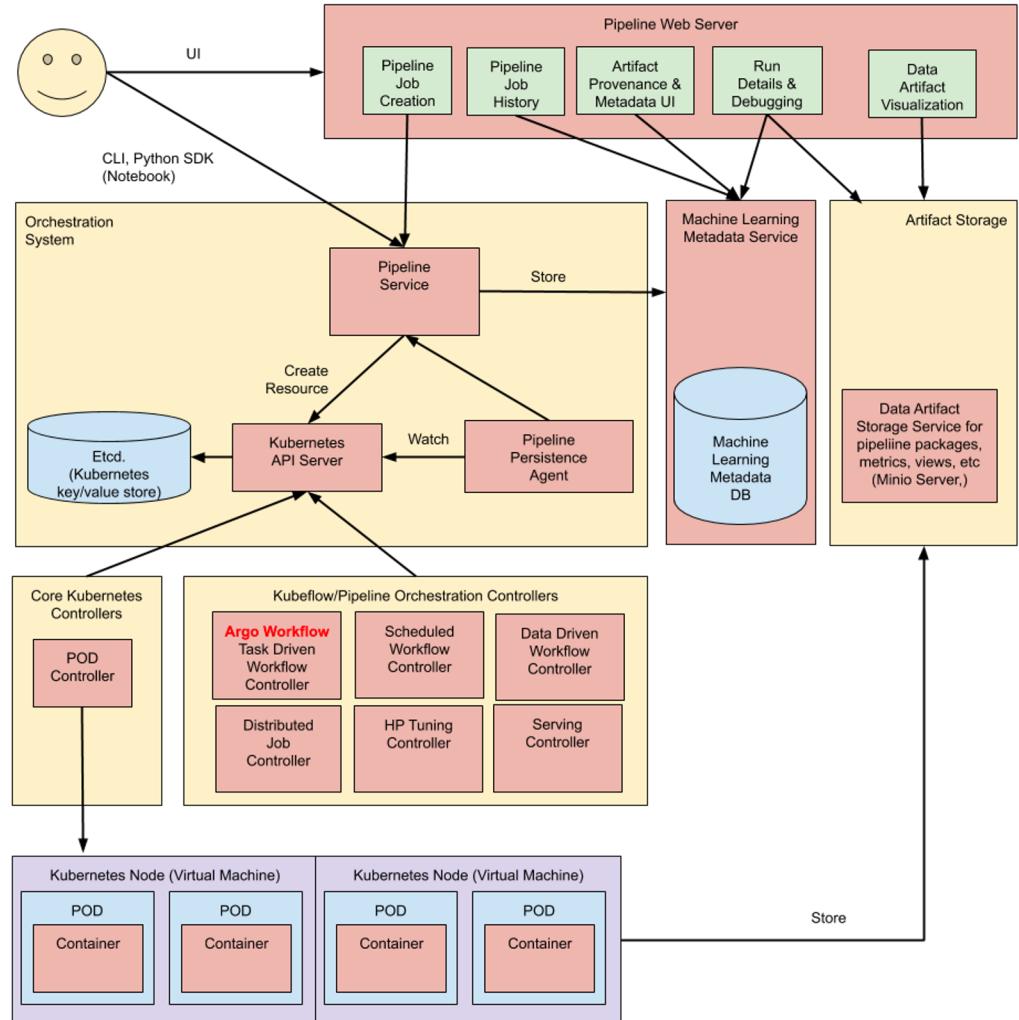


## Production phase with Kubeflow



Iterate tuning and training

Iterate tuning and training



# CAREER PROSPECTS

- ML Engineer
- MLOps Engineer
- ML Engineer
- Data Scientist
- Applied Scientist
- AIOps Engineer
- DevOps Engineer
- Kubernetes Engineer
- Cloud DevOps Engineer
- AI Consultant
- Developer Advocate
- Freelancer
- Support Work



# RECOMMENDED RESOURCES TO LEARN MLOPS

MLOps roadmap

<https://huyenchip.com/mlops/>

<https://madewithml.com/>

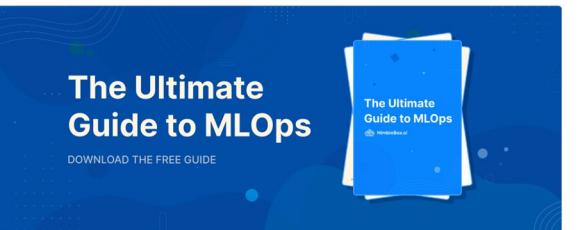
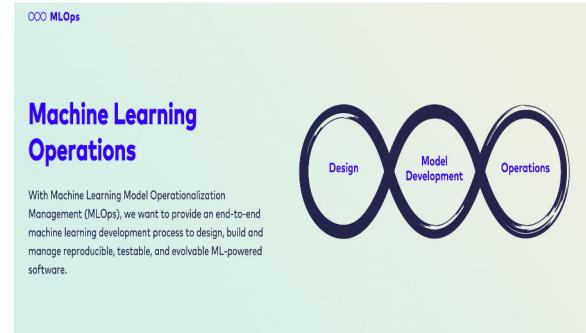
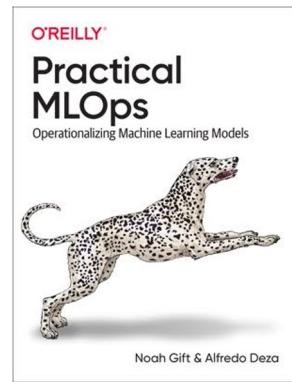
<https://blog.nimblebox.ai/mlops-the-ultimate-guide>

<http://bit.ly/RG-mlops>

DevOps Roadmap by Saiyam

DevOpsCommunity.in

<https://github.com/MichaelCade/90DaysOfDevOps>



# CONNECT WITH US



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# THANK YOU!

