whoami

Google Cloud
Agenda

1. Problems
2. Goals
3. What's inside
4. Demo
5. Future Direction
ML decision tree

Is this a clearly defined problem?

No → Move along

Yes → Can it be solved in a deterministic way?

Yes → Do that

No → Dive in

Credit: David Andrzejewski
Counting things is still really hard.
Production code
Moving from local to production
Complexity
Perception

ML Code

Figure 1: Only a small fraction of real-world ML systems is composed of the ML code, as shown by the small black box in the middle. The required surrounding infrastructure is vast and complex.

Maintainability

- Error resolution, recovery, & prevention
- Speed of iteration
- Versioning
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Make it easy for everyone to develop, deploy, and manage portable, scalable ML everywhere
Kubeflow

Composability
Single, unified tool for common processes

Portability
Entire stack

Scalability
Native to k8s
Reduce variability between services & environments

Full product lifecycle

Support
specialized hardware, like GPUs
Reduce costs
Improve model performance
# Kubeflow

<table>
<thead>
<tr>
<th>Who</th>
<th>What</th>
<th>Why</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data scientists</td>
<td>Portable ML products on k8s</td>
<td>Because building a platform is too big of a problem to tackle alone</td>
</tr>
<tr>
<td>ML researchers</td>
<td>v0.2.5 release</td>
<td></td>
</tr>
<tr>
<td>Software engineers</td>
<td></td>
<td></td>
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<tr>
<td>Product managers</td>
<td></td>
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</tbody>
</table>

https://github.com/kubeflow/kubeflow
Kubeflow

**Kubernetes-native platform for ML**
- Run wherever k8s runs
- Use k8s to manage ML tasks
- CRDs for distributed training

**Adopt k8s patterns**
- Microservices
- Manage infra declaratively

**Package infrastructure components together**
- Ksonnet
- Move between local -> dev -> test -> prod -> onprem

**Support multiple ML frameworks**
- Tensorflow
- Pytorch
- Scikit
- Xgboost
- Et al.
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But what is it?
A curated set of compatible tools and artifacts that lays a foundation for running production ML apps

Enables consistency across deployments by providing Kubernetes object templates that bring together disparate components

Google Cloud
What's inside

- Ambassador reverse HTTP proxy
- Central Dashboard
- JupyterHub
- Tf-job dashboard
- Tf-job operator

<table>
<thead>
<tr>
<th>NAME</th>
<th>READY</th>
<th>STATUS</th>
<th>RESTARTS</th>
<th>AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ambassador-849fb9c8c5-dppk4</td>
<td>2/2</td>
<td>Running</td>
<td>0</td>
<td>2h</td>
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<tr>
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<td>Running</td>
<td>0</td>
<td>2h</td>
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<td>Running</td>
<td>0</td>
<td>2h</td>
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<td>Running</td>
<td>0</td>
<td>2h</td>
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<tr>
<td>tf-hub-0</td>
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<td>Running</td>
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<tr>
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<td>1/1</td>
<td>Running</td>
<td>0</td>
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Yelp Restaurant Reviews

1. Install Kubeflow locally
2. Run training locally
3. Install Kubeflow on GKE
4. Run training on CPUs
5. Run training on TPUs
6. Create serving and UI components
7. Run a notebook on GPUs

https://github.com/kubeflow/examples/demos
Try it yourself

- codelabs.developers.google.com
  - Intro to Kubeflow on Google Kubernetes Engine: https://goo.gl/192bs7
  - Kubeflow End-to-End: GitHub Issue Summarization: https://goo.gl/qLXUTG
- Qwiklabs: https://qwiklabs.com
- Katacoda: https://www.katacoda.com/kubeflow
- GitHub: https://github.com/kubeflow/examples/tree/master/github_issue_summarization
- http://gh-demo.kubeflow.org
Just the beginning

- Easier setup
- Utilize more k8s features
- Add support for packages, frameworks, libraries, and example models
- You tell us! Get involved
  - github.com/kubeflow
  - cubeflow.slack.com 📣
  - @kubeflow 🐦
  - kubeflow-discuss@googlegroups.com
  - Community call Tuesdays alternating
    - 8:30am and 5:30pm Pacific
  - Kubeflow Contributor Summit
    - Sept. 25 in Sunnyvale, CA
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Future Direction

- Release 0.3.0 end of September
- Getting started: single command
- Monitoring with Prometheus
- Codeless hyperparameter tuning with Katib
- API consistency between TFJob and PyTorch
- TFServing follows k8s style patterns
- Jupyterhub
  - More configurable
  - Run distributed TFJobs from a notebook
- Batch prediction
- Benchmarking
- Chainer support
Questions?