

Where we are today with Deep Learning and Kubernetes

江骏 ohmystack @ 饿了么

- 继承 Apache 系列，在此之上做调度、研发
- 专注于 TensorFlow、MXNet、pyTorch 这些新的框架，
与 Cloud 结合，提供配套的平台服务

在 Kubernetes 的帮助下，
“运行一个任务”这件事，已经变得非常简单。
这绝不是一个 Deep Learning Platform
所关注的重点。

大数据平台 \neq 深度学习平台

主办：



elearn

Preprocess

Hive, Spark, Storm, ...

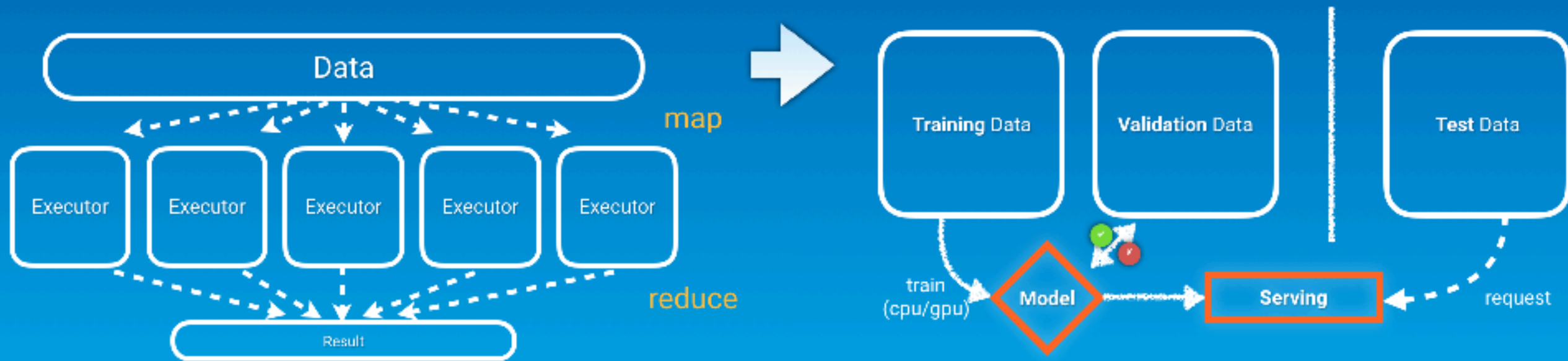
Distributed Storage

NFS, HDFS, S3, ...

Training

TensorFlow

(Distributed Training)



	通常的代码	Deep Learning
开发环境	虚拟机	Where? 数据的展示、分析， 大量的开发数据 & 生产数据
版本管理	git	How to control the model versions?
发布	各种灰度发布的策略	How to serve the model?

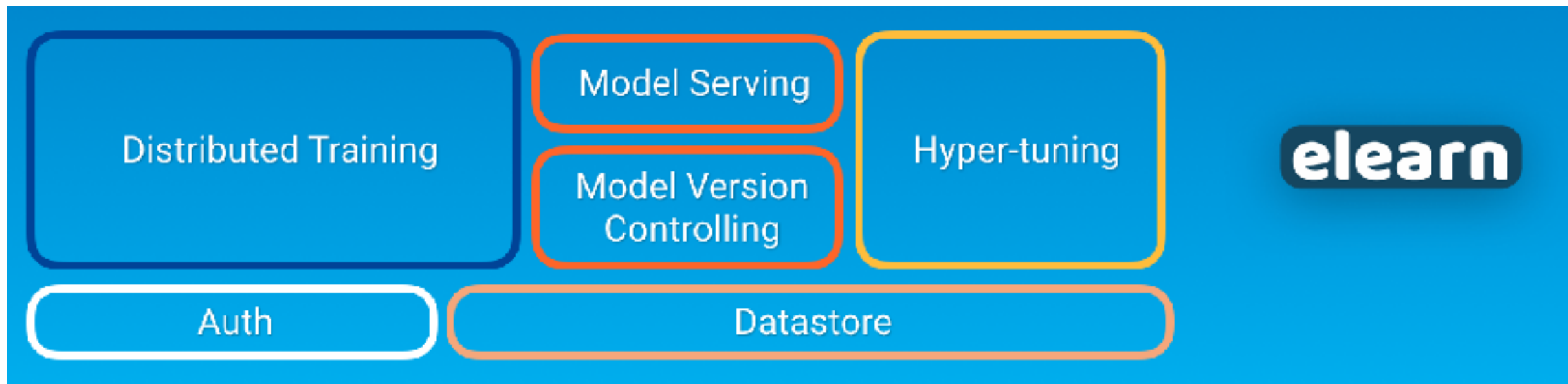
十分成熟

刚刚起步

主办：



Deep Learning Platform 的基本功能



Kubernetes 中，Deep Learning 任务与普通任务的不同

- 更加需要分布式存储
- 任务的 Restart Policy 往往无法直接满足需求
- Kubernetes Quota 机制无法直接满足需求
- 任务本身的资源需求 (CPU, memory, GPU) 偏大
-

Papers by Google

Hidden Technical Debt in Machine Learning Systems

<https://papers.nips.cc/paper/5656-hidden-technical-debt-in-machine-learning-systems.pdf>

TFX: A TensorFlow-Based Production-Scale Machine Learning Platform

<http://www.kdd.org/kdd2017/papers/view/tfx-a-tensorflow-based-production-scale-machine-learning-platform>

KDD 2017 Applied Data Science Paper

KDD'17, August 13–17, 2017, Halifax, NS, Canada

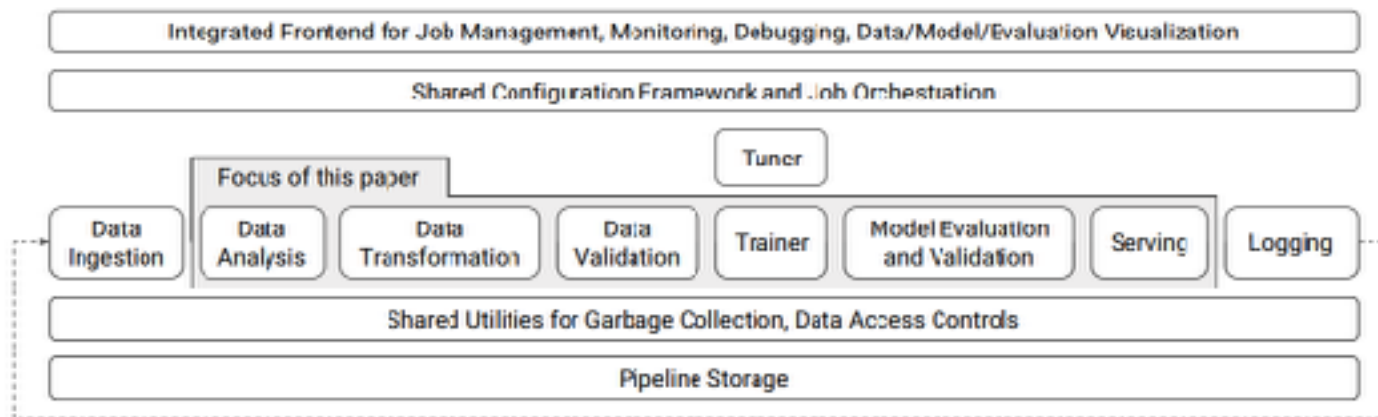


Figure 1: High-level component overview of a machine learning platform.

主办:



Why we need this

- GPU 卡使用效率低
 - 一个人占用一整台
 - 机器GPU 型任务变成了串行，需要排队等资源
- 任务缺乏管理
- 工程师搭建自己的开发环境麻烦

算法开发环境乱象

```
[root@wg-bdi-vision-1 ~]$ pstree 4048 -a
python
└─8*[{python}]
```

cpu 100%,
但根本看不出进程是在跑什么内容

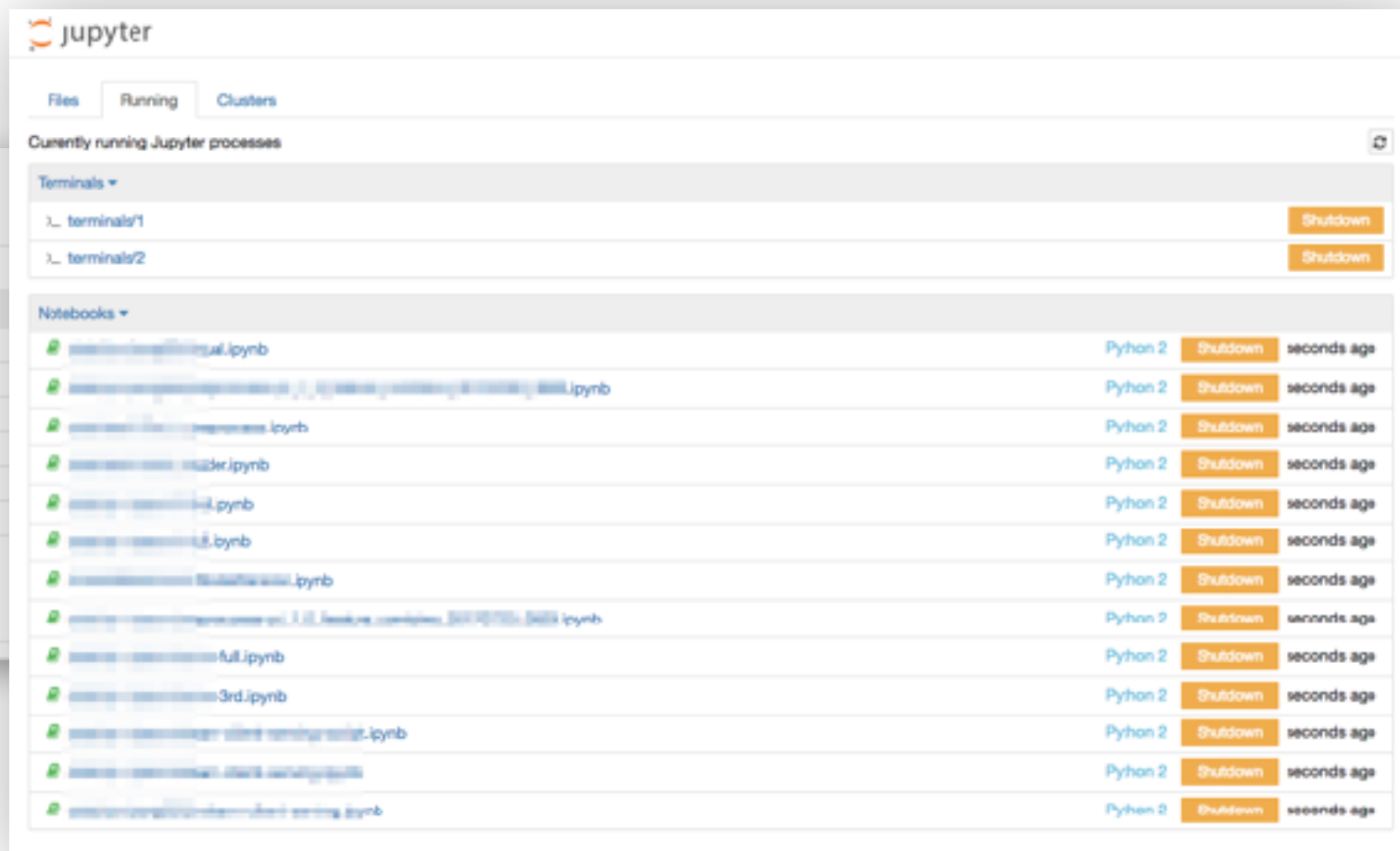
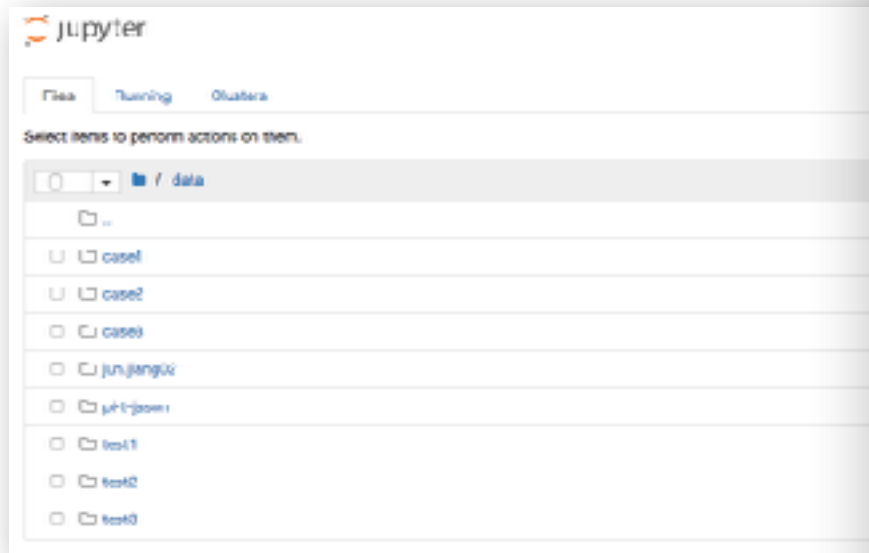
```
[I 04:43:29.240 NotebookApp] Adapting to protocol v5.1 for kernel 16e359d4-a838-4
[I 05:16:44.494 NotebookApp] Adapting to protocol v5.1 for kernel 16e359d4-a838-4
[I 05:29:37.176 NotebookApp] Adapting to protocol v5.1 for kernel 16e359d4-a838-4
/bin/bash: line 1: 11 Killed                  /run_jupyter.sh --allow-root --N
NotebookApp.base_url='/elearn/notebook-gpu-hwq' --NotebookApp.notebook_dir='/data
```

别人的进程被强行 OOM kill

主办：



Cloud Jupyter Notebook



主办:



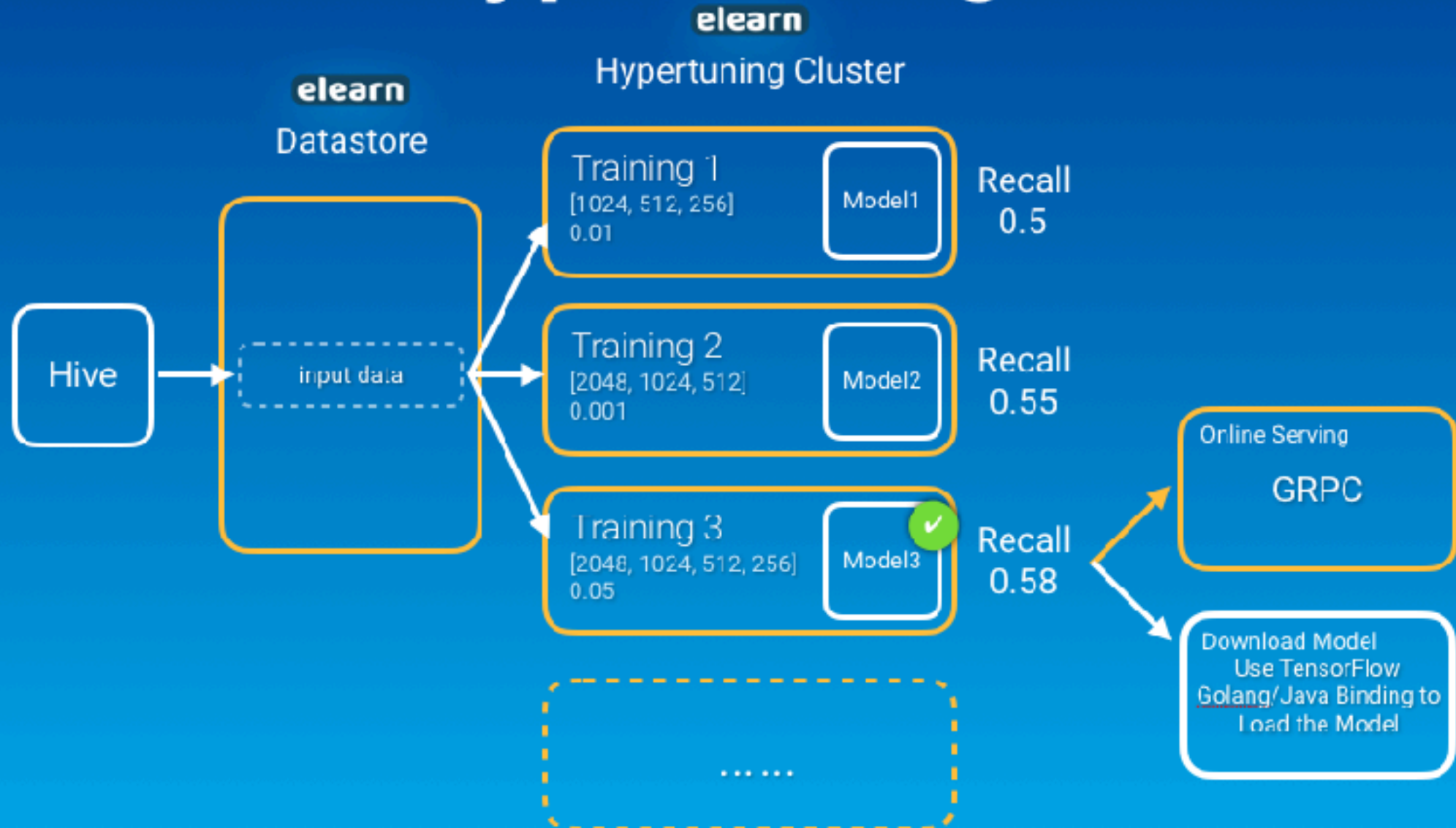
一个平台，我们真正看的是它的附加值。
而不是封装，或者是界面的改变。

Hyper Parameter Tuning

主办：



Hypertuning



Hyper Parameter Tuning

Google Vizier

<https://research.google.com/pubs/pub46180.html>

Google Vizier: A Service for Black-Box Optimization

Venue

ACM (2017)

Publication Year

2017

Authors

Daniel Golovin, Benjamin Sotnik, Subhodeep Moitra, Greg Kochanski, John Elliot Karr, D. Sculley

RiikTeX

Abstract

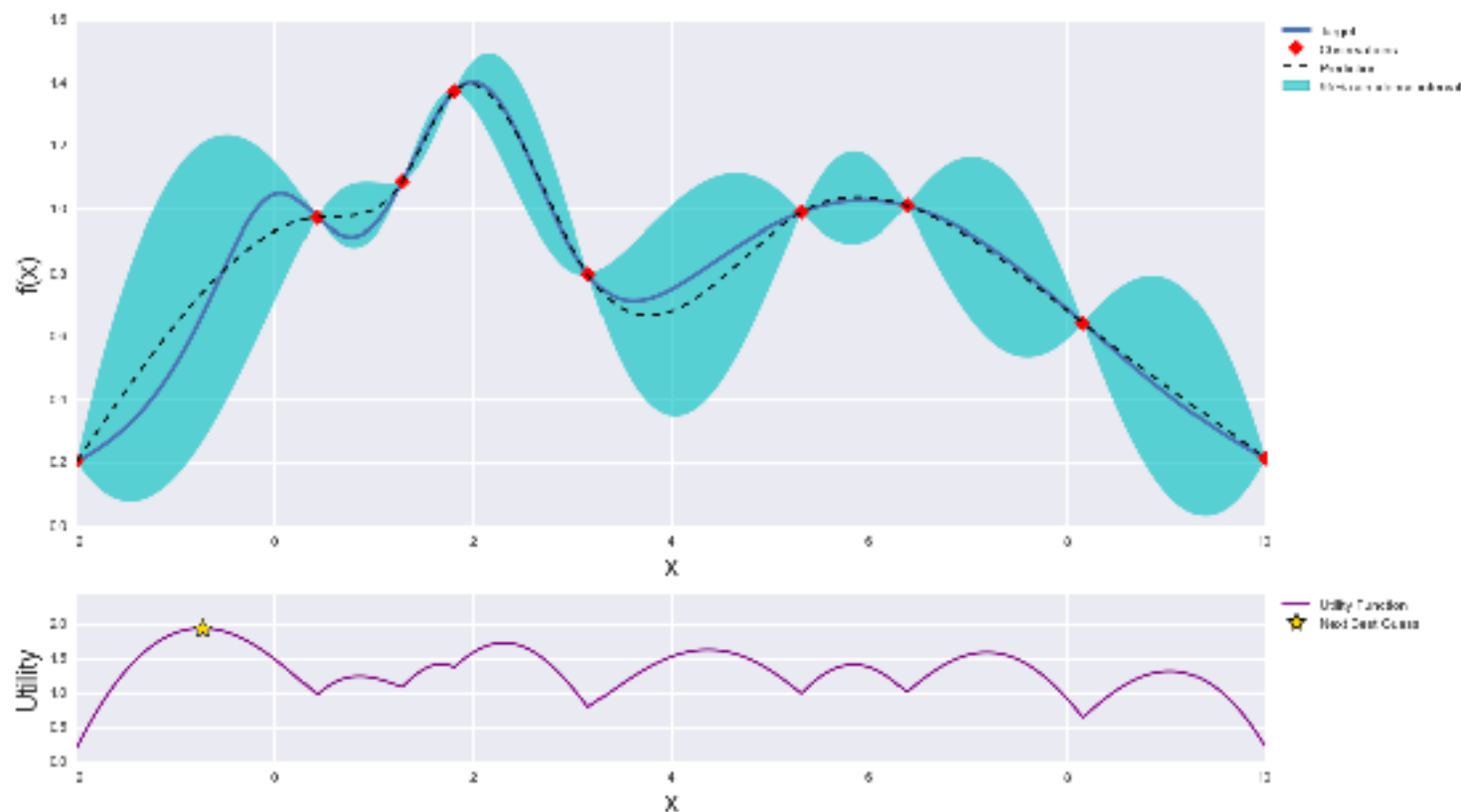


Any sufficiently complex system acts as a black box when it becomes easier to experiment with than to understand. Hence, black-box optimization has become increasingly important as systems have become more complex. In this paper we describe **Google Vizier**, a Google-internal service for performing black-box optimization that has become the de facto parameter tuning engine at Google. Google Vizier is used to optimize many of our machine learning models and other systems, and also provides core capabilities to Google's Cloud Machine Learning **HyperTune** subsystem. We discuss our requirements, infrastructure design, underlying algorithms, and advanced features such as transfer learning and automated early stopping that the service provides.

Hyper Parameter Tuning

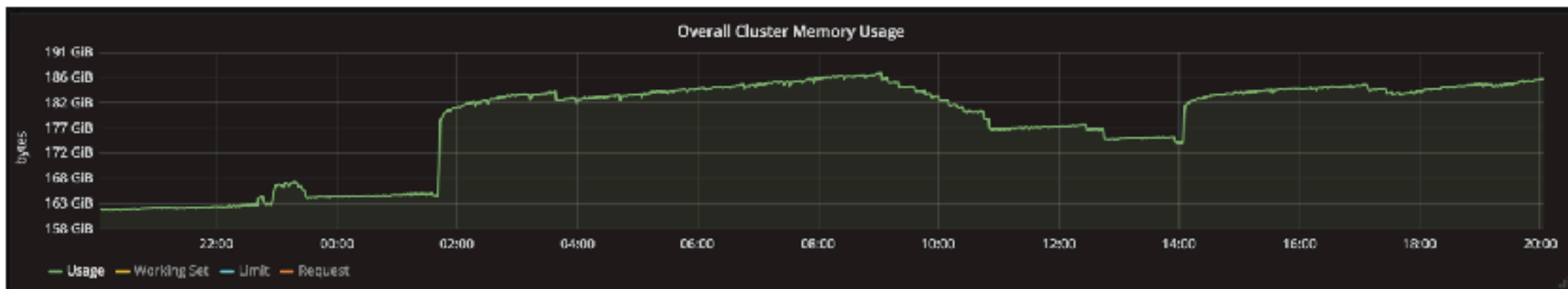
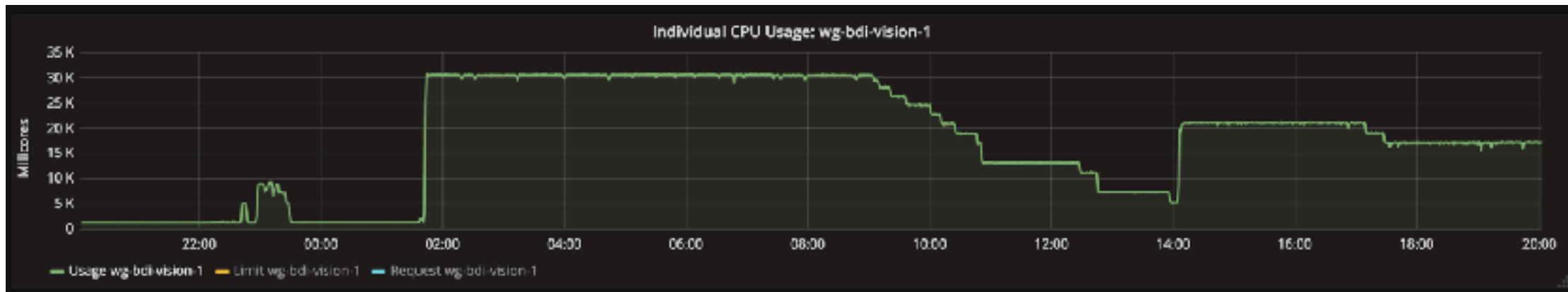
<https://github.com/fmfn/BayesianOptimization>

Gaussian Process and Utility Function After 9 Steps



Hyper Parameter Tuning

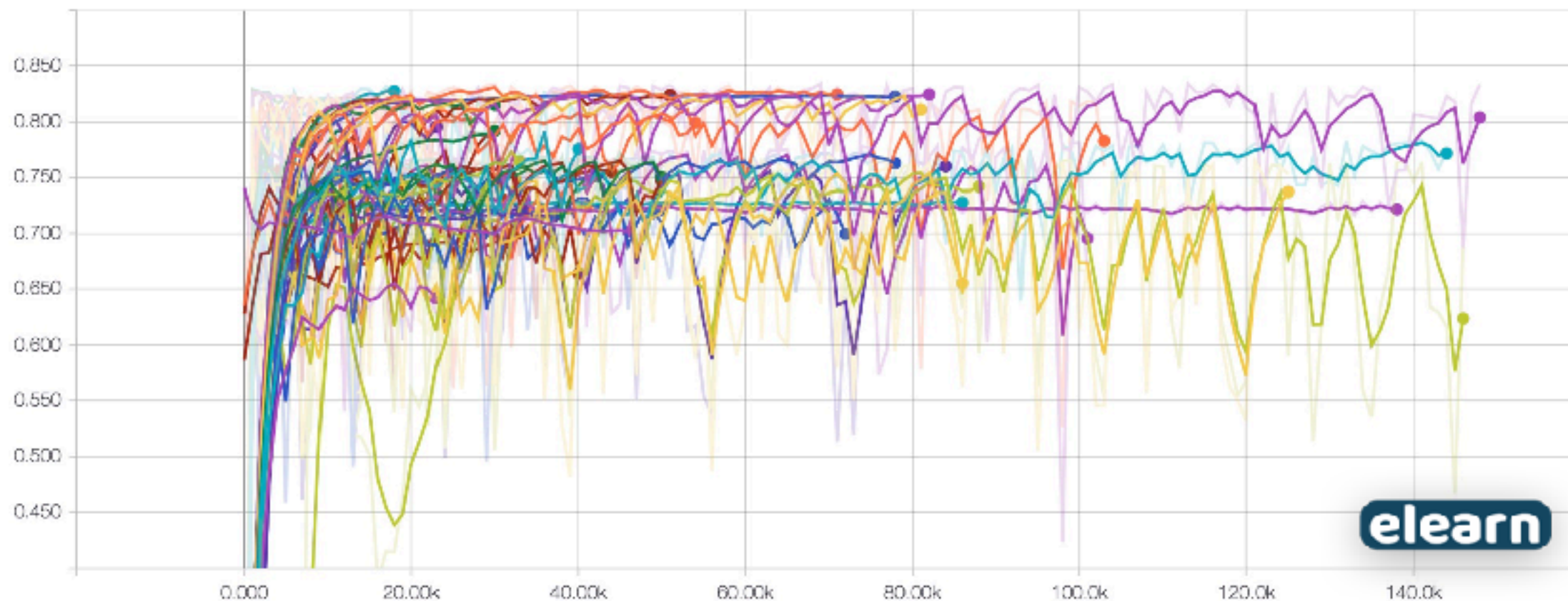
Hypertuning 时，集群中某单台物理机 metrics。充分发挥 Cloud 的计算能力。



主办：



2017
China Kubernetes
End User Conference
kubernetes.中国用户大会 —2017—
2017.10.15 | 中国·杭州



Hyper Parameter Tuning



Gentle Introduction to Making Predictions with Sequences
Photo by abstrkt.ch, some rights reserved.

Much more things to do ...

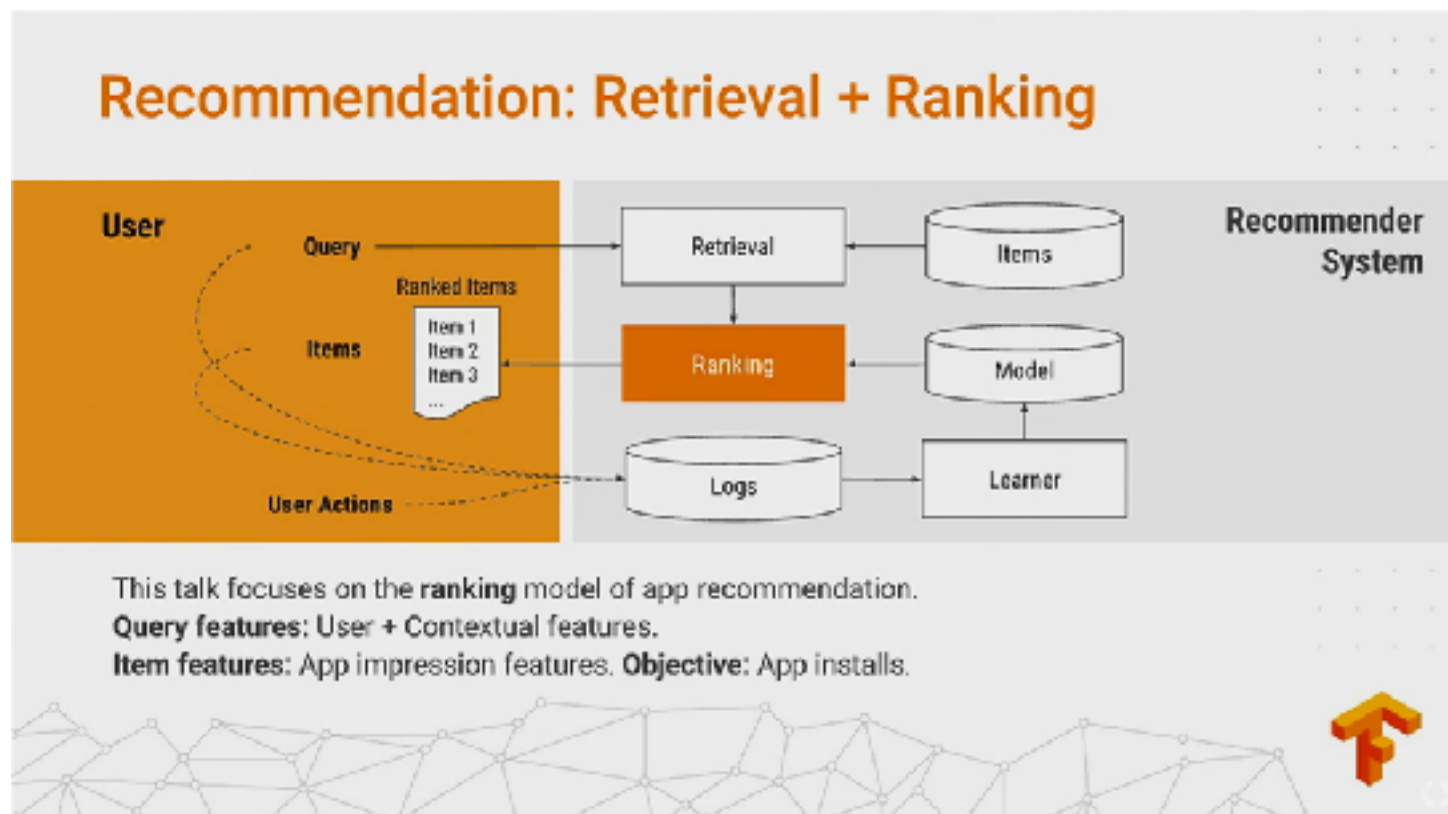
主办：



Much more things to do ...

Streaming

Live Model Fine-tuning



Q&A

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<https://github.com/ohmystack>

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主办：

