GIAC BEIJING Dec.12.16-17

架構 ARCHNOTES 高可用架构

小米深度学习平台架构与实践

技术架构未来

thegiac.com

About me

- 陈迪豪，就职小米，深度学习领域
- 分布式存储 - HBase - Ceph
- 基础架构 - Docker - OpenStack
- 人工智能 - TensorFlow - K8S
- Seagull作者，1400+ stars

Agenda

- 机器学习与深度学习应用
- 深度学习平台架构与设计
- 深度学习平台应用与实践

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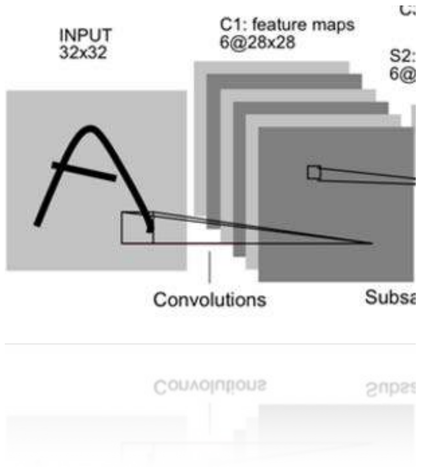
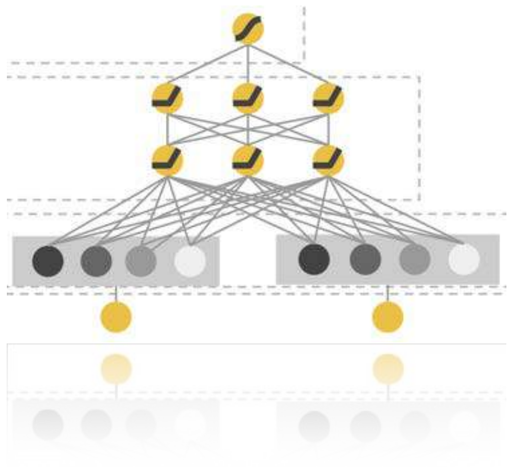
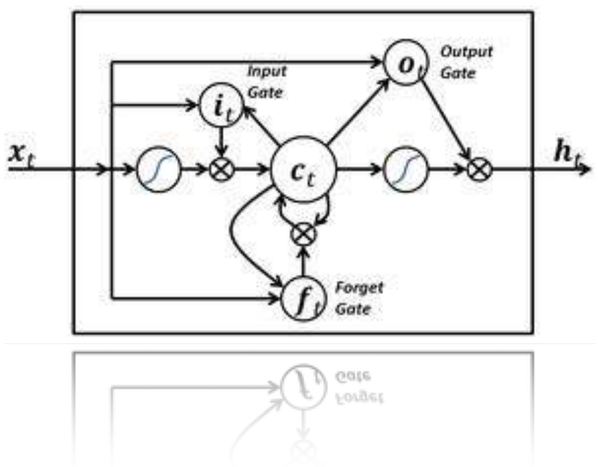
Introduce ML/DL



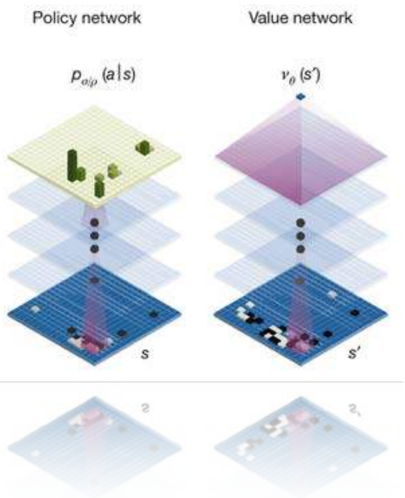
CNN



MLP



RNN/LSTM



RL

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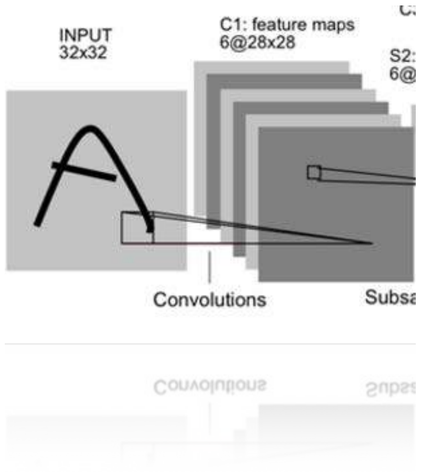

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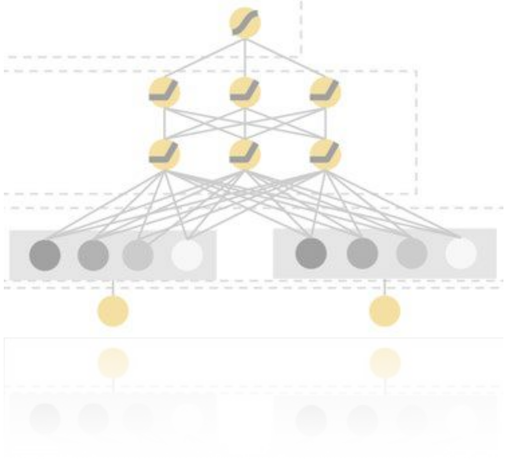

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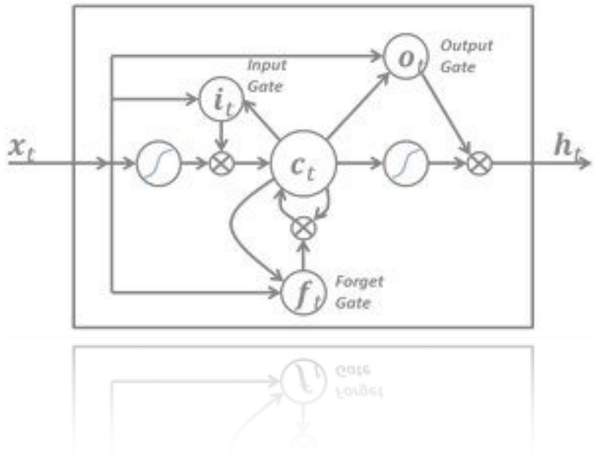

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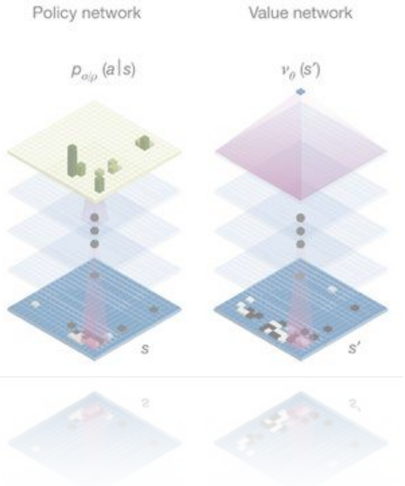

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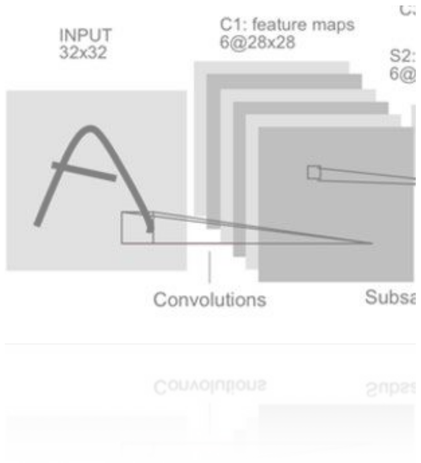

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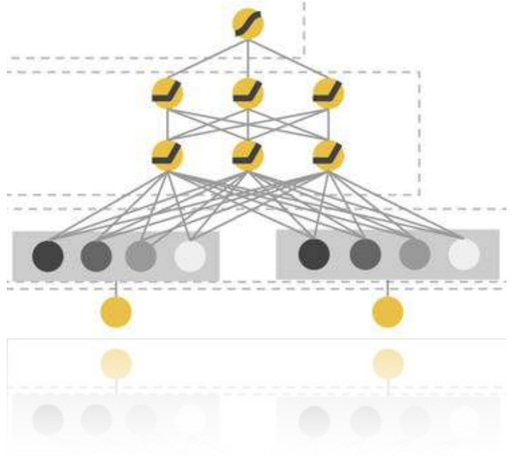

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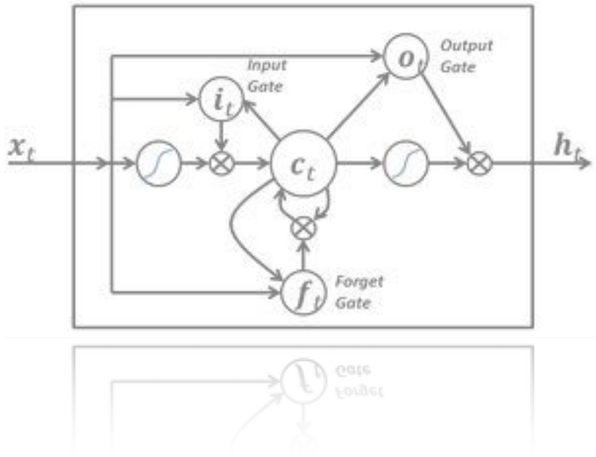

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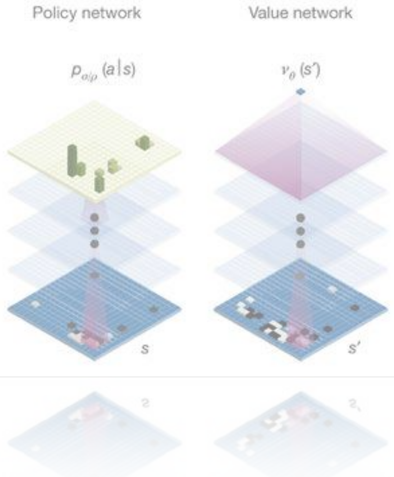

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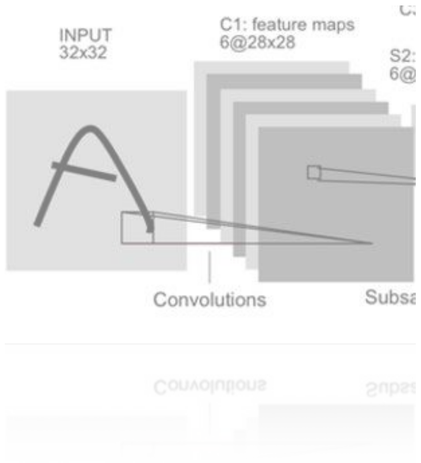

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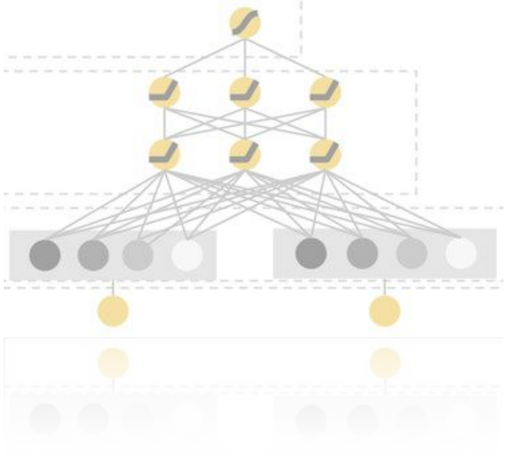

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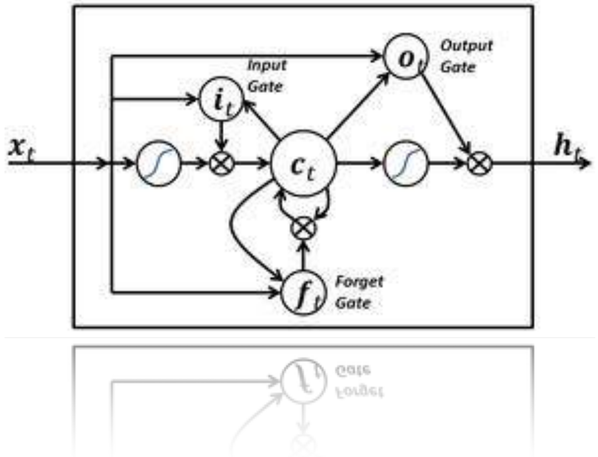

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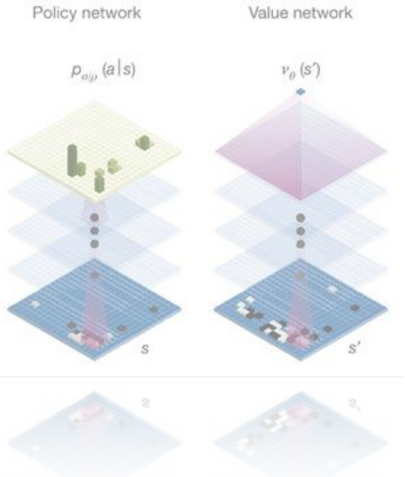

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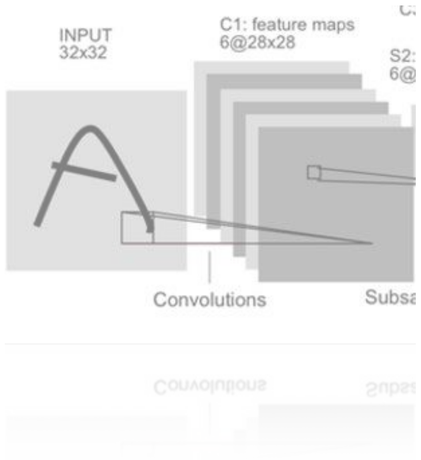

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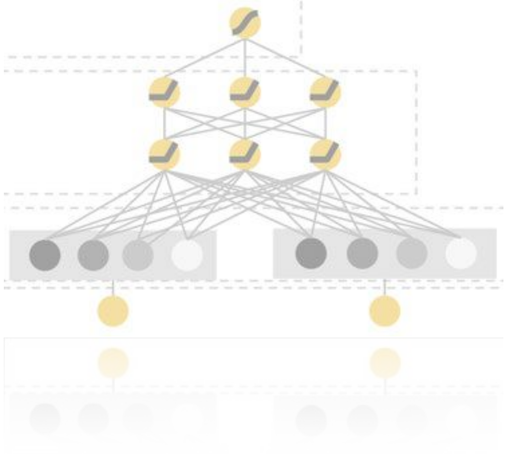

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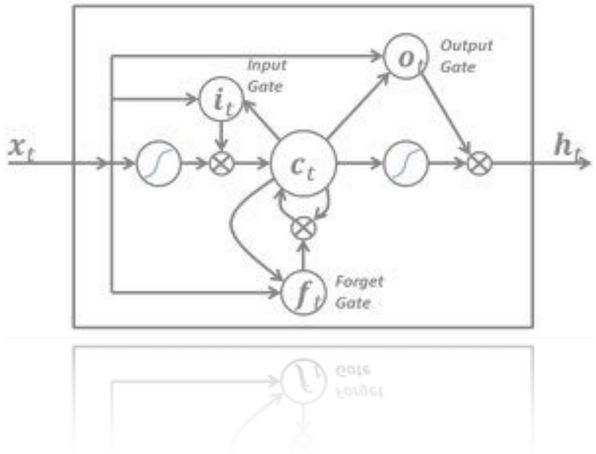

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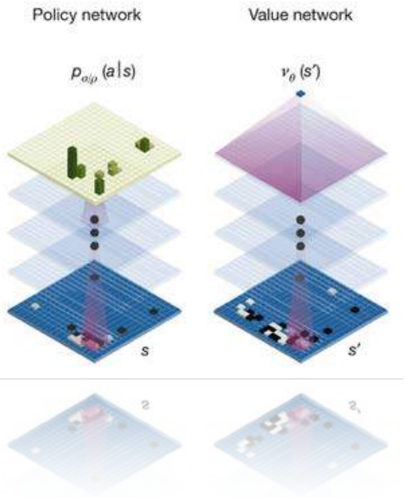

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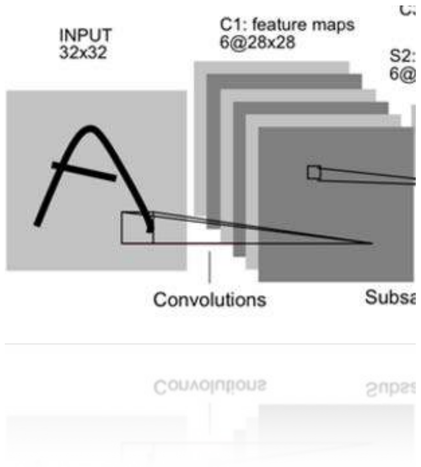

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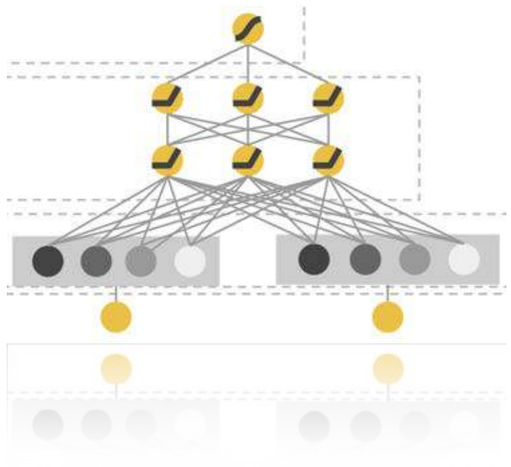

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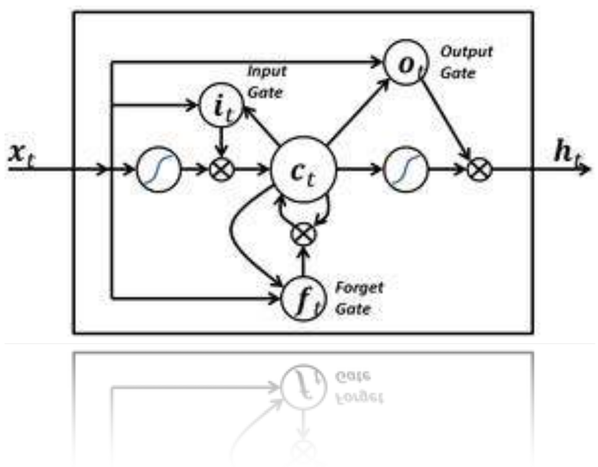

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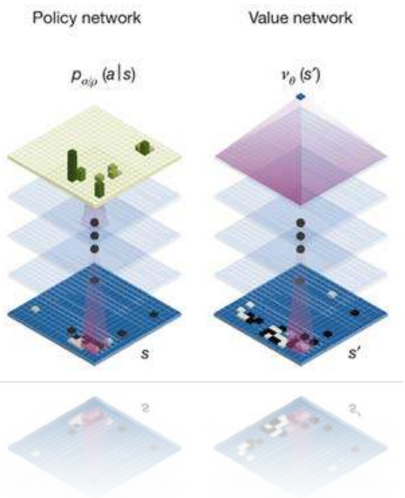
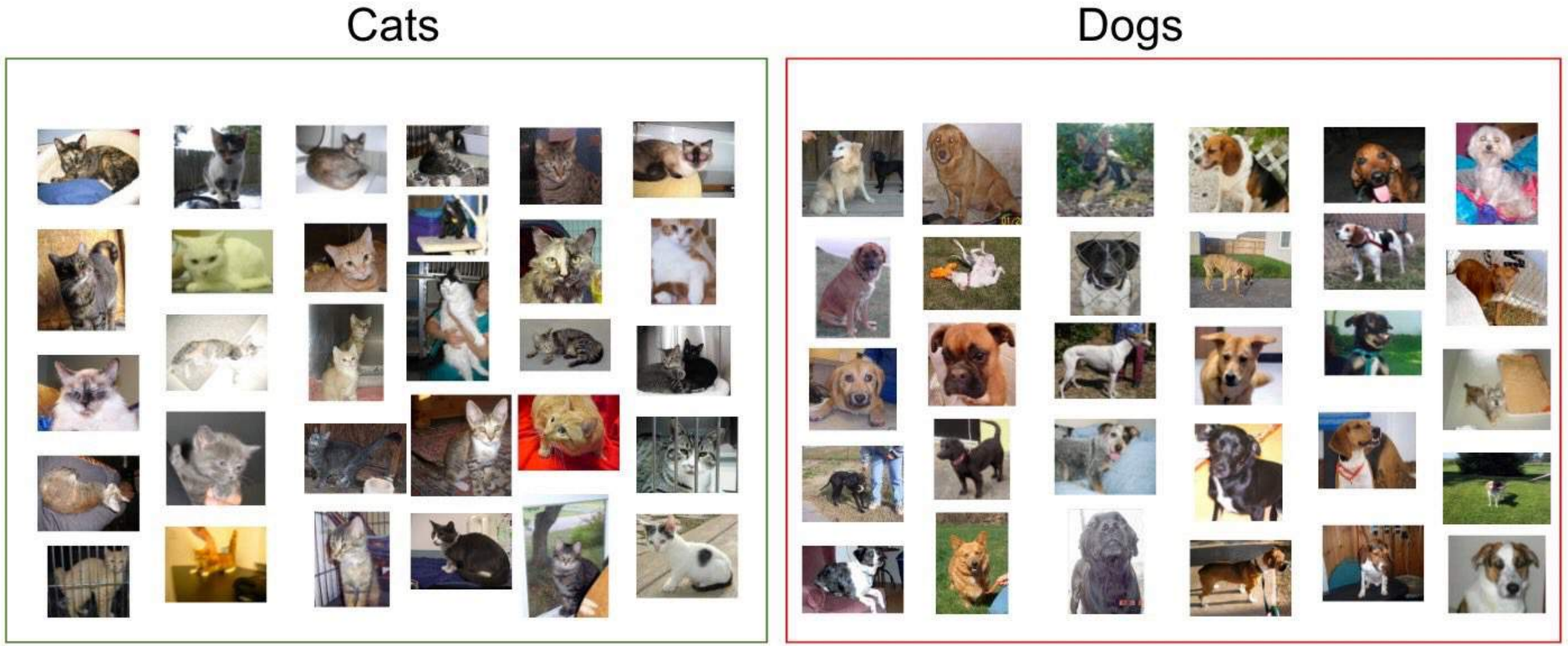


RL

Case Study: Image Classification



Sample of cats & dogs images from Kaggle Dataset

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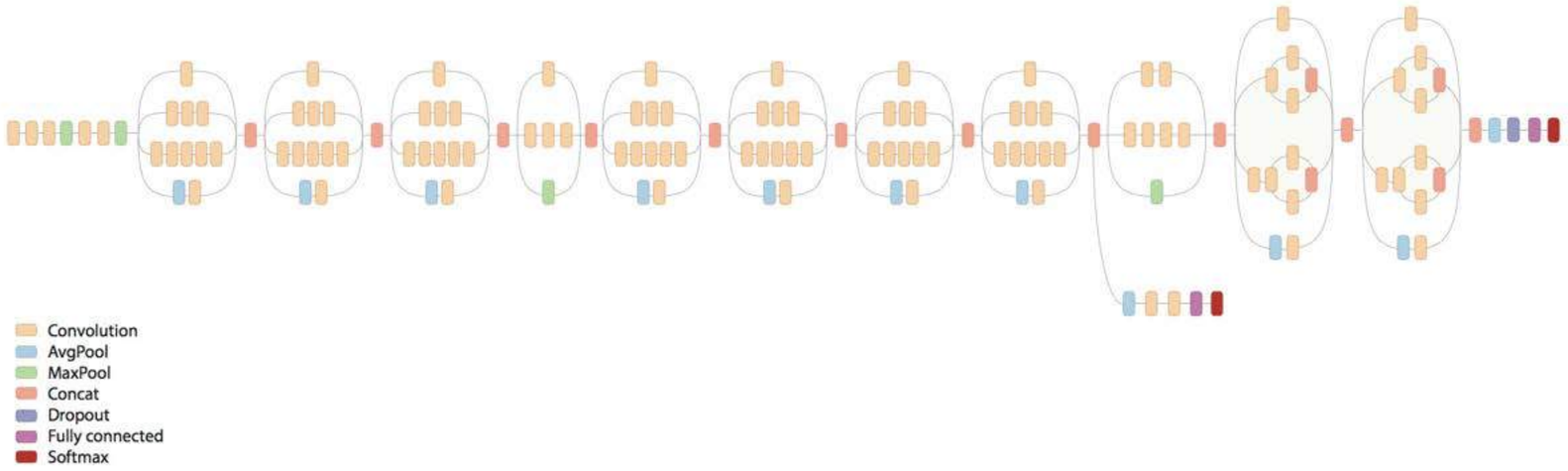
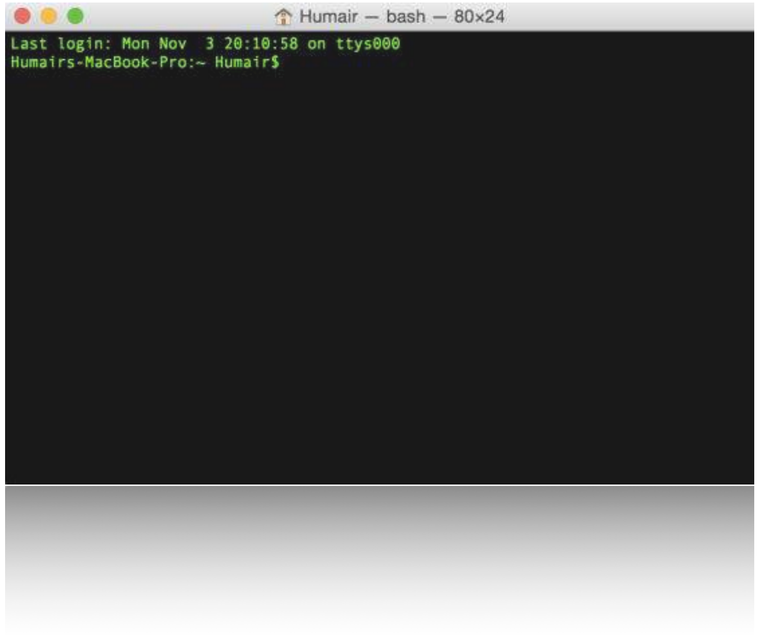


https://github.com/tensorflow/models/tree/master/inception



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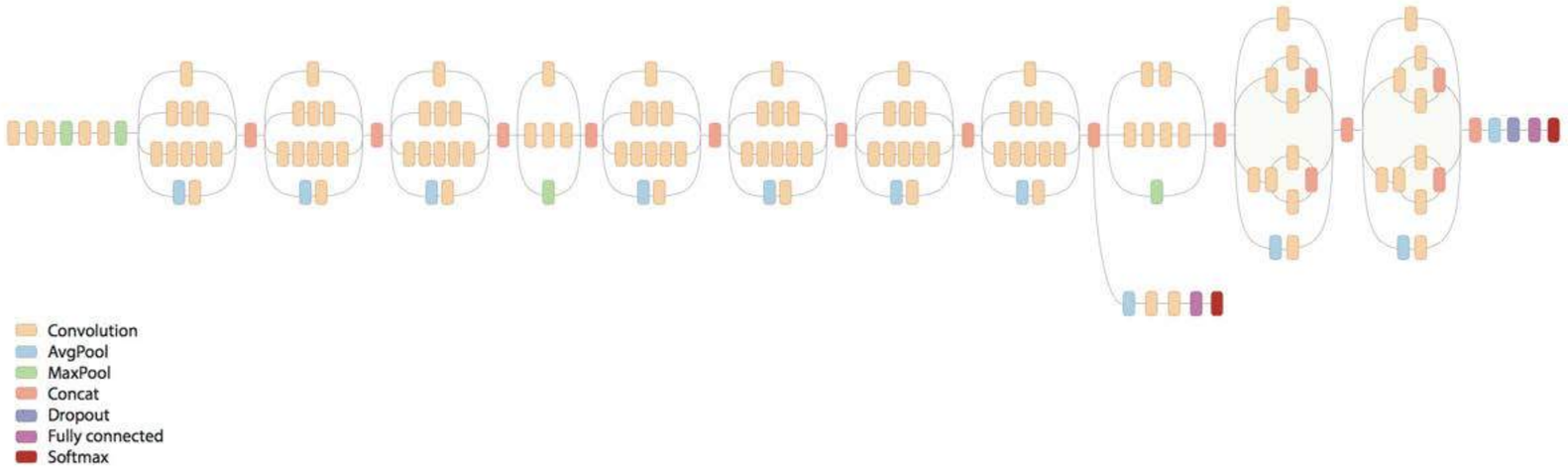

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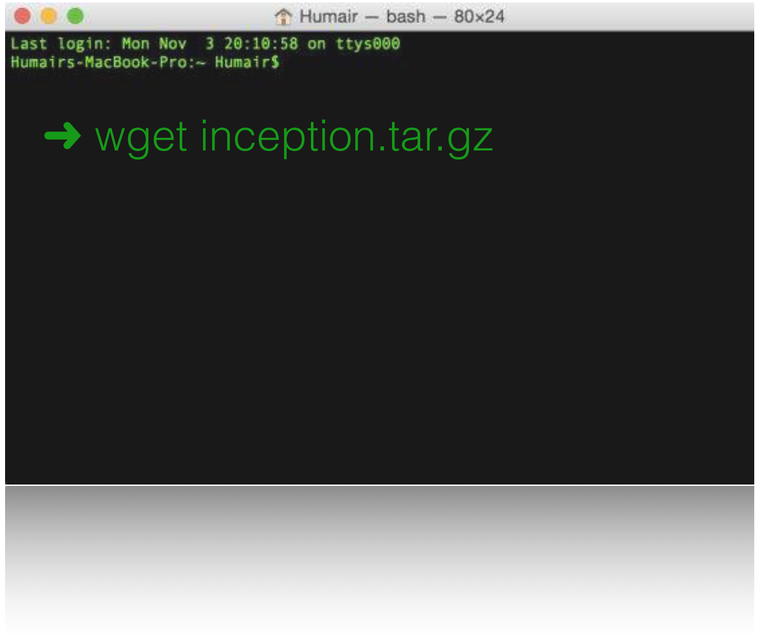

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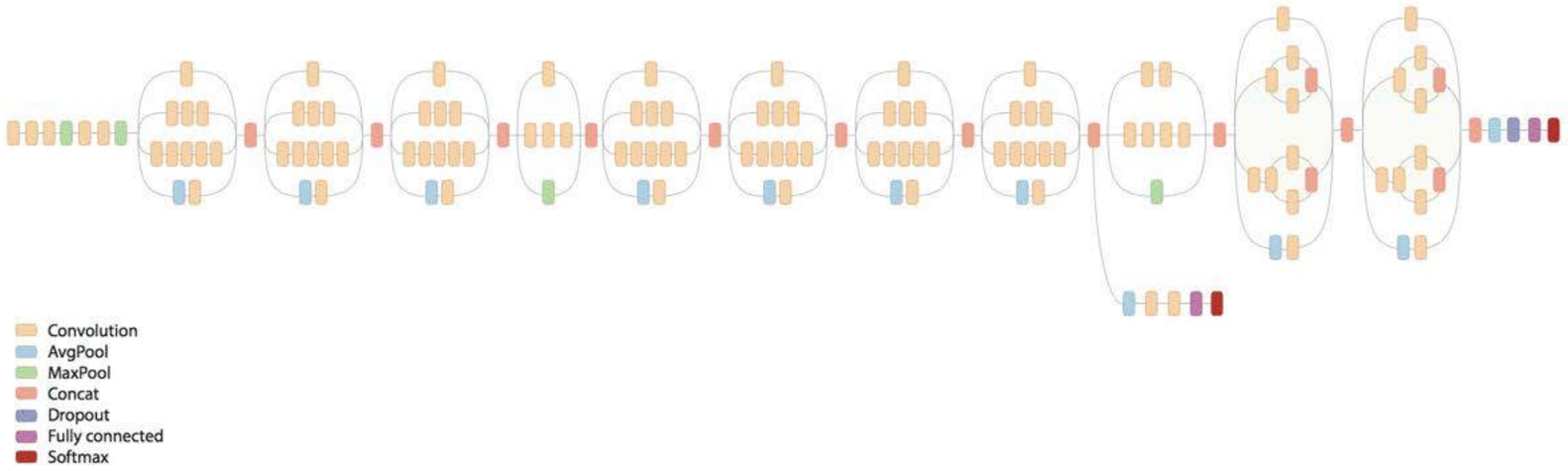

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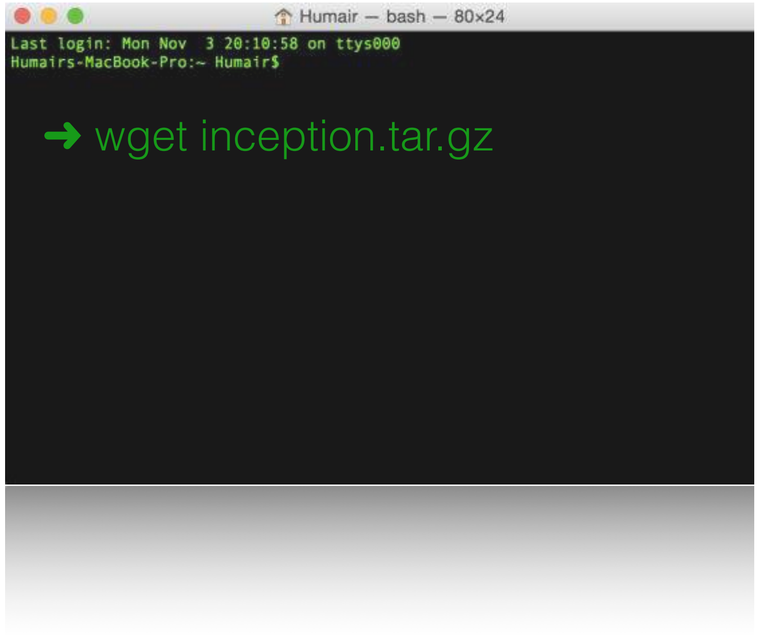

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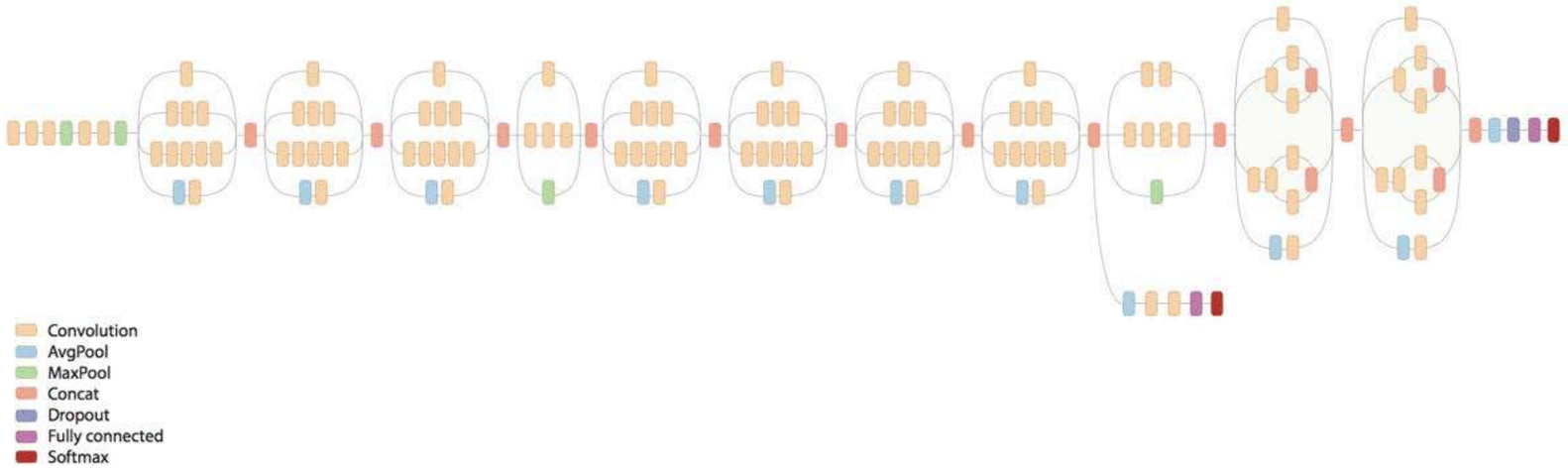

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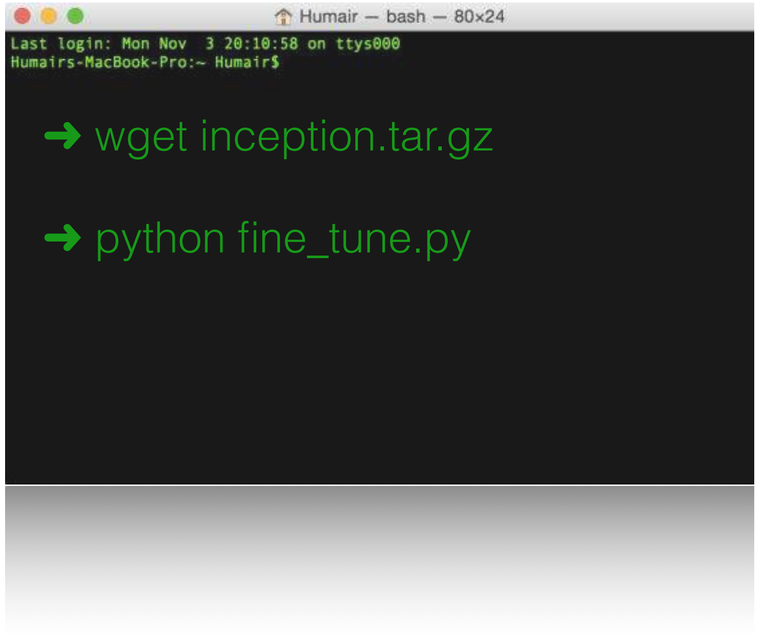

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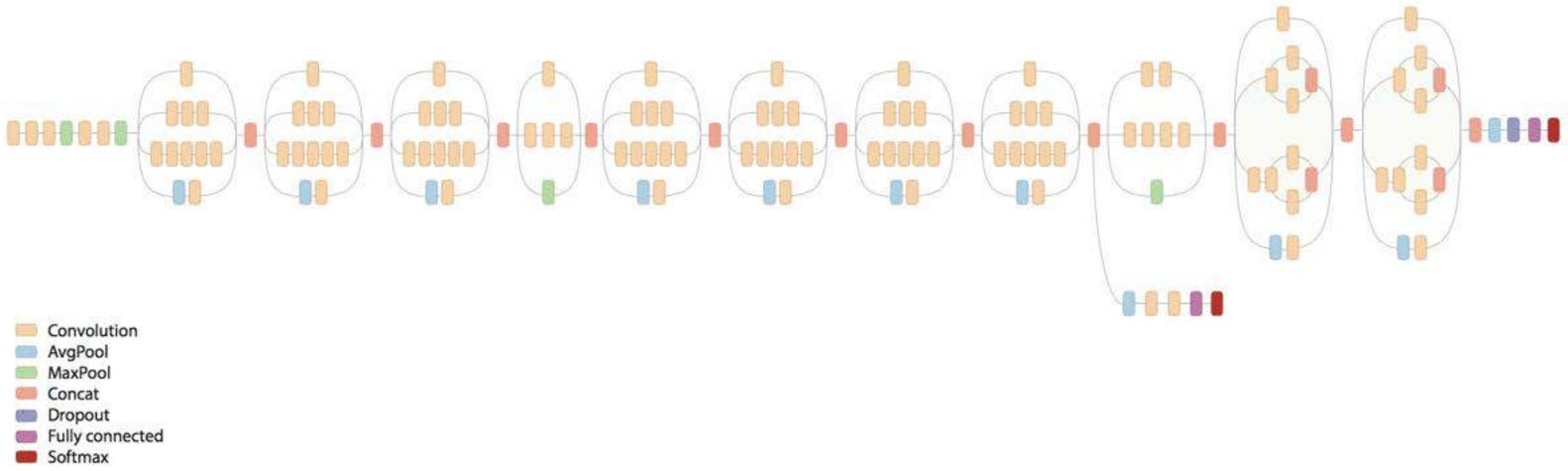

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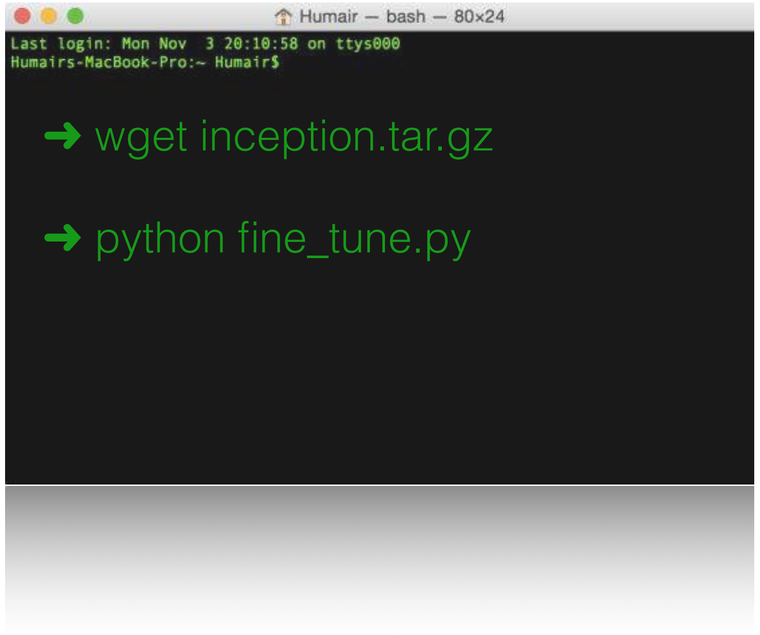

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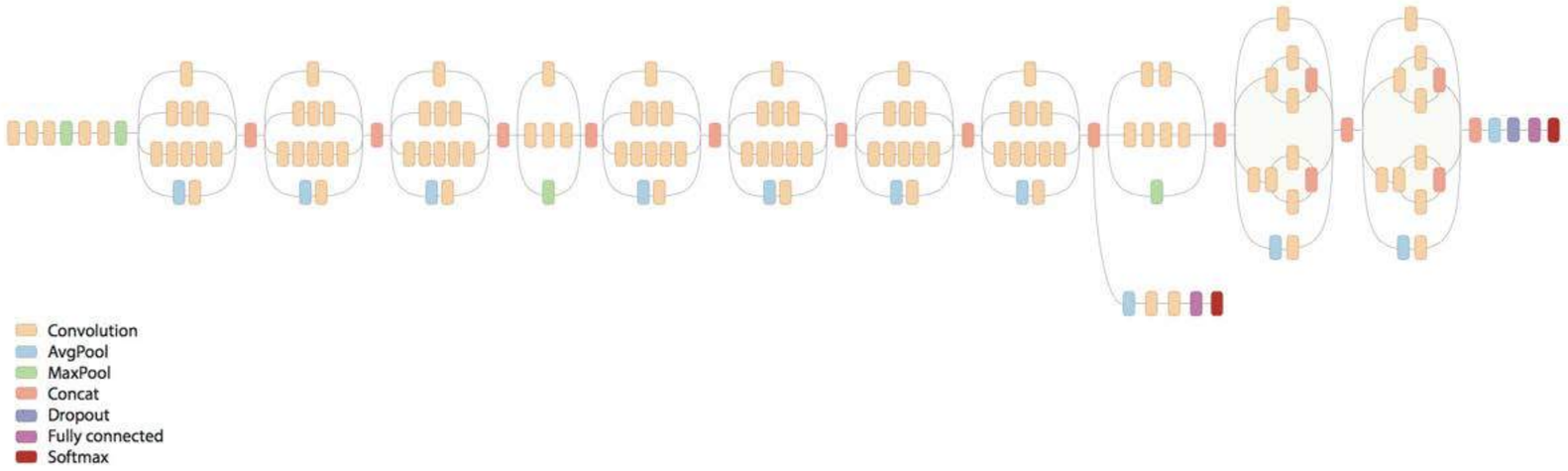

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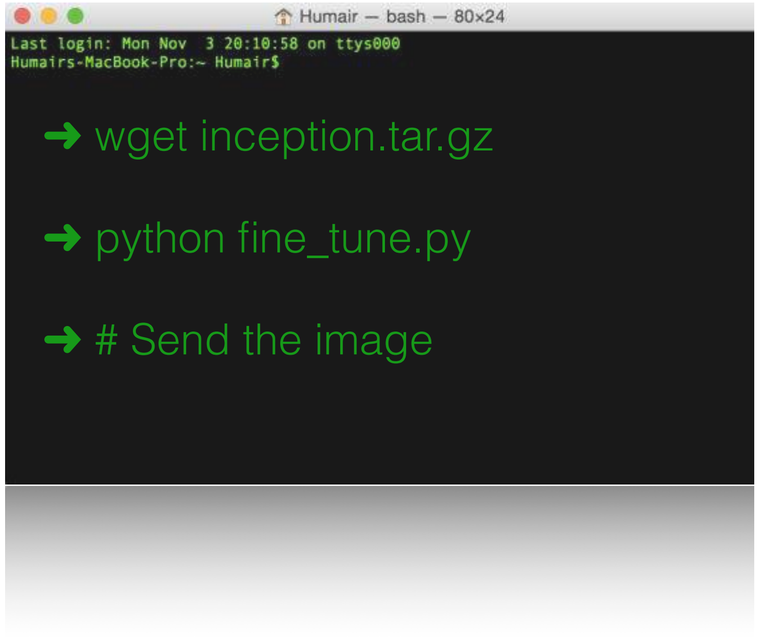

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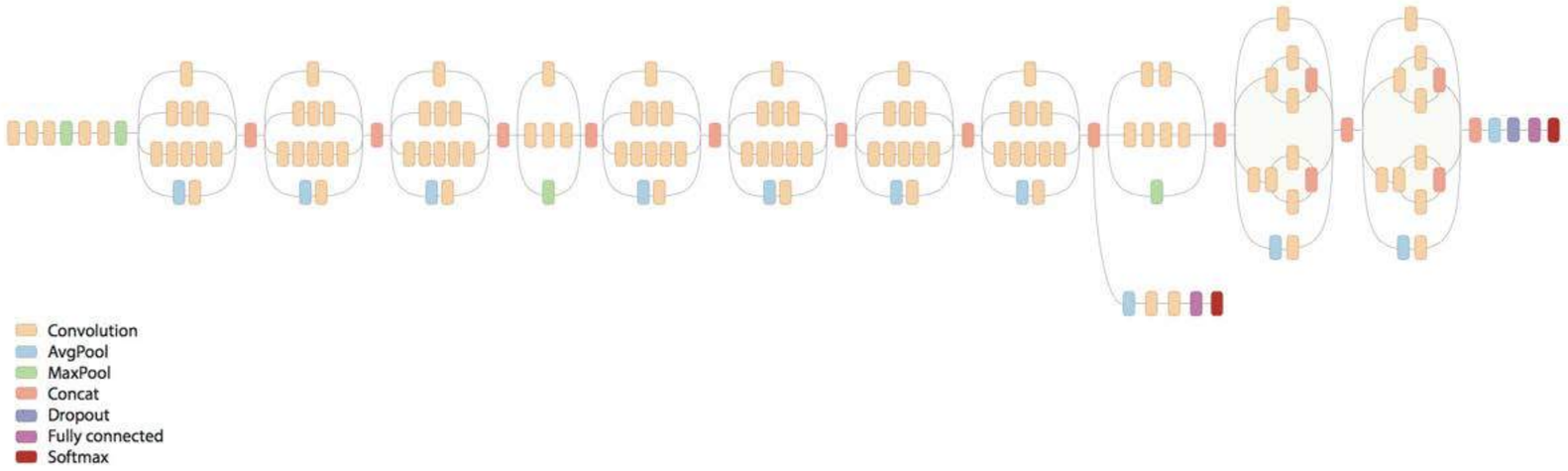

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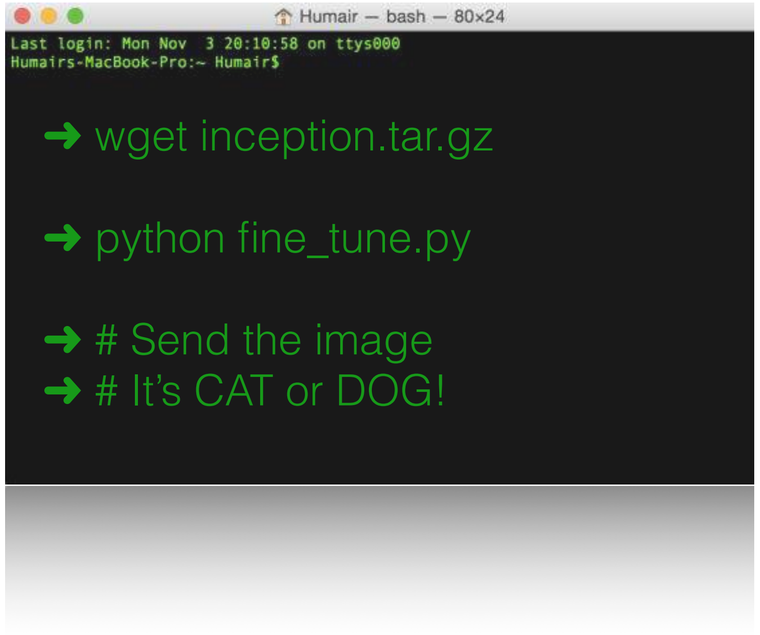
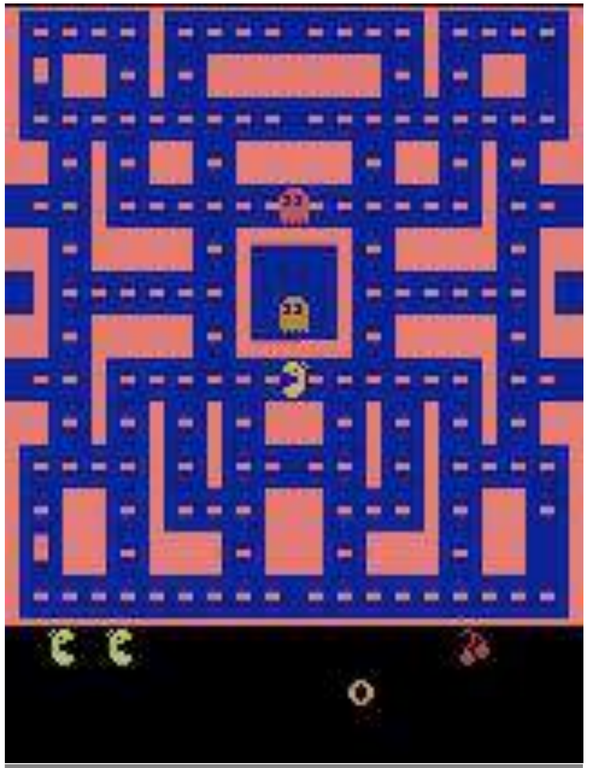
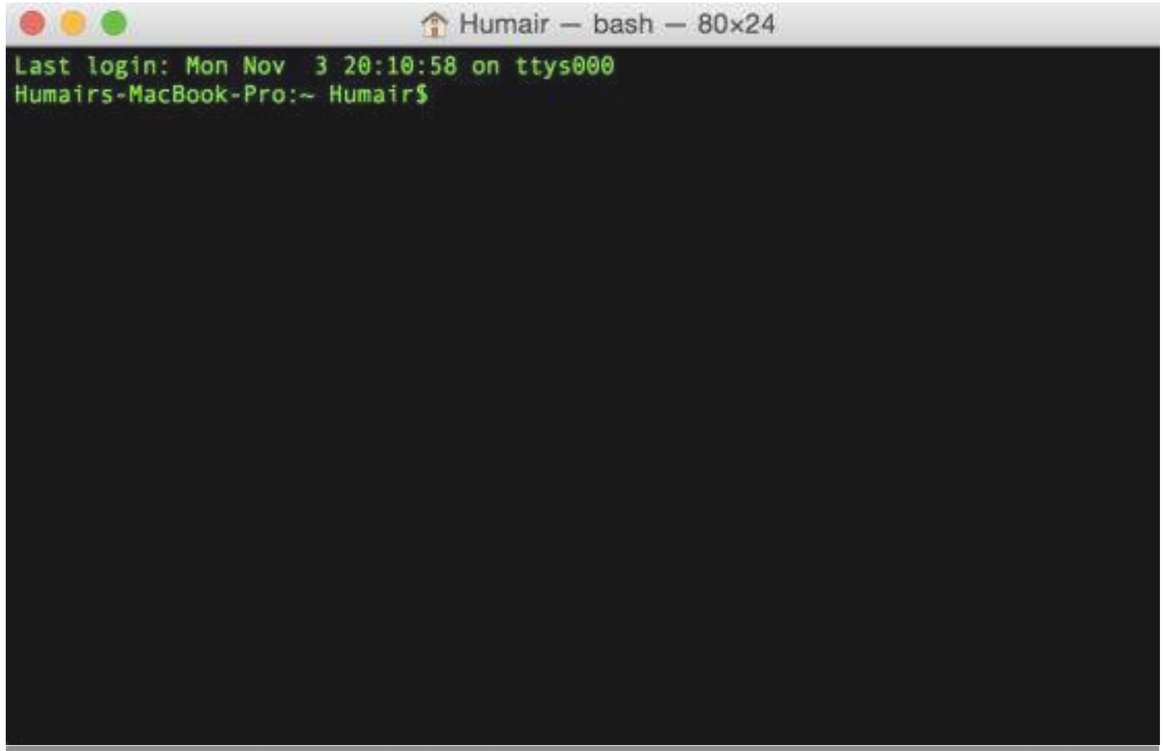


Case Study: Games AI





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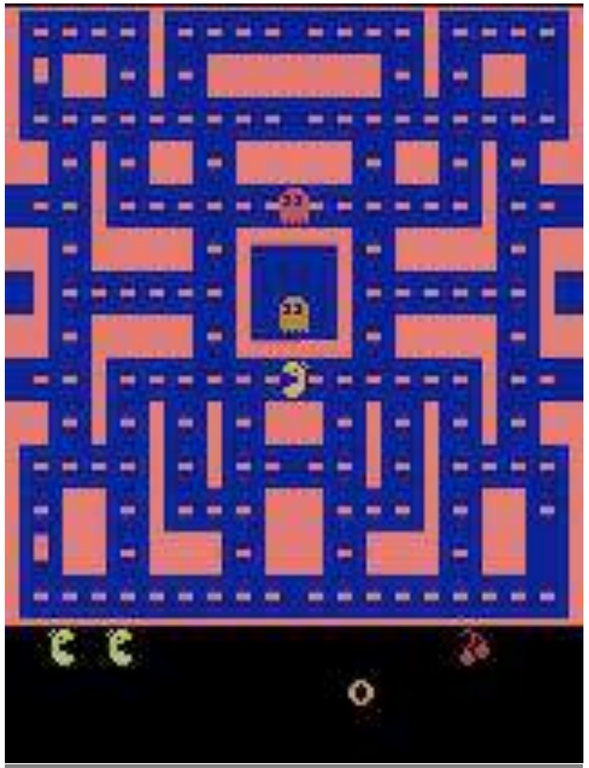

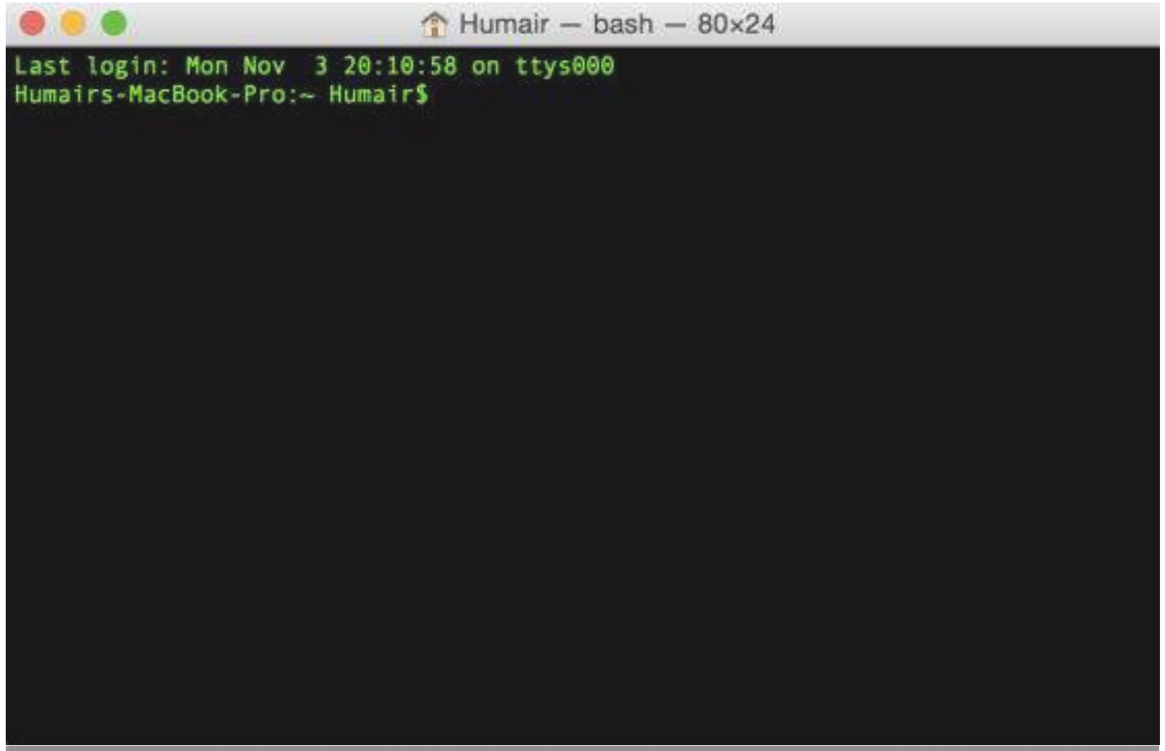

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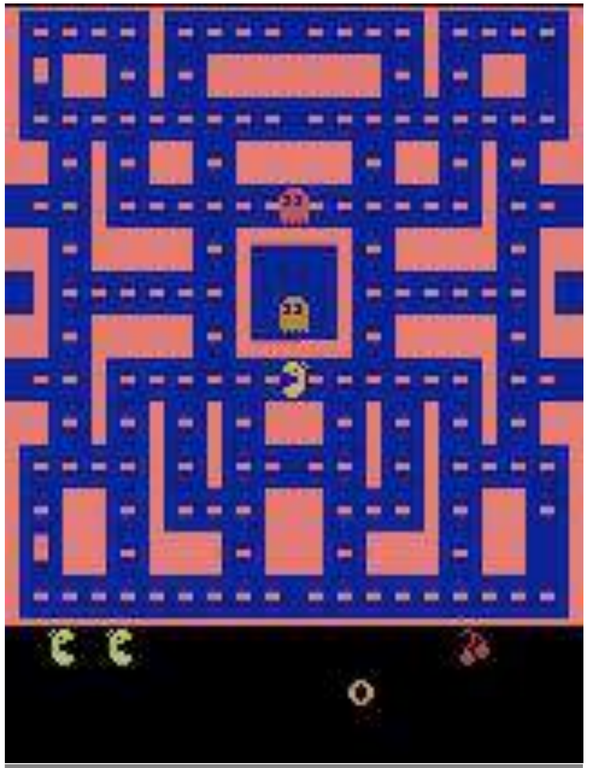


Humair — bash — 80×24

```
Last login: Mon Nov  3 20:10:58 on ttys000
Humairs-MacBook-Pro:~ Humair$
```

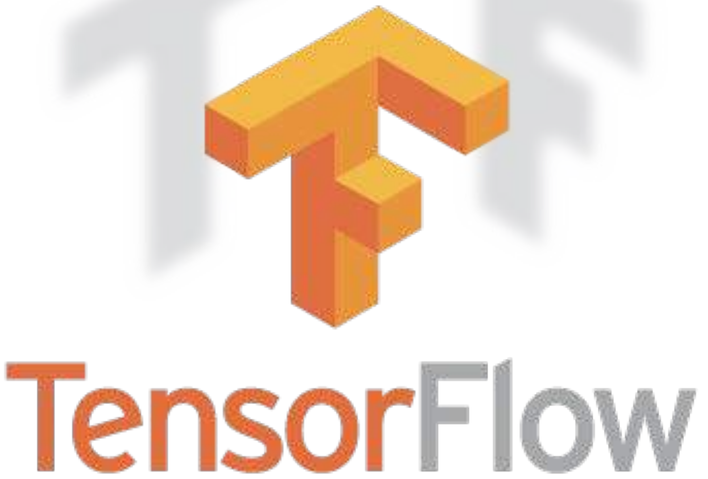
```
import gym

env = gym.make("MsPacman-v0")

observation = env.reset()

for _ in range(1000):
    env.render()
    action = env.action_space.sample()
    env.step(action)
```

Introduce TensorFlow



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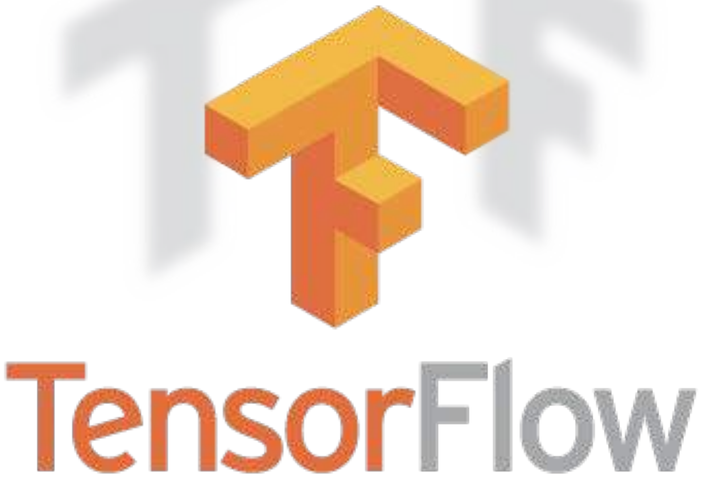
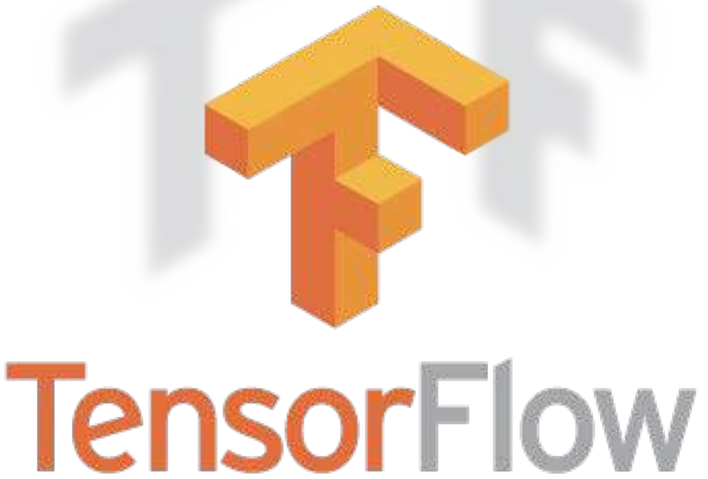


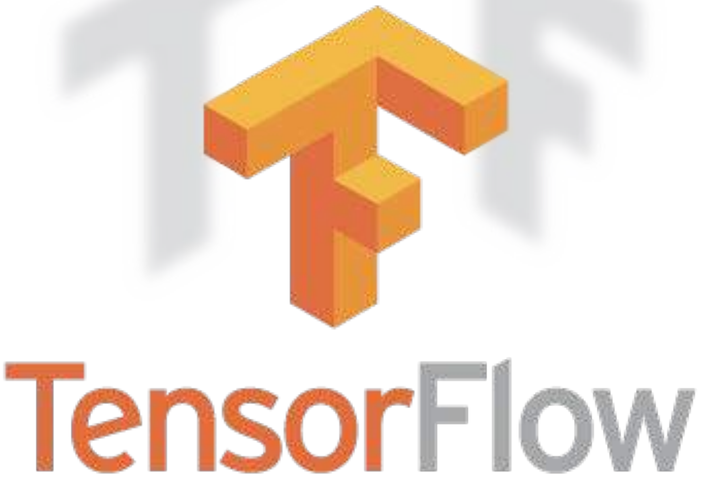
- Deep learning library

Introduce TensorFlow



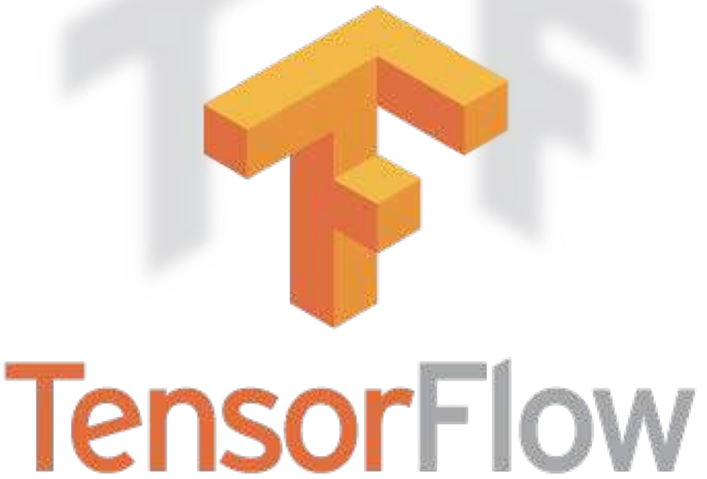
- Deep learning library
- C++/Python interfaces

Introduce TensorFlow



- Deep learning library
- C++/Python interfaces
- Training with CPU/GPU

Introduce TensorFlow



- Deep learning library
- C++/Python interfaces
- Training with CPU/GPU
- Distributed for large scale

Introduce TensorFlow

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# Import the library
import tensorflow as tf

# Define the graph
hello_op = tf.constant('Hello, TensorFlow!')
a = tf.constant(10)
b = tf.constant(32)
compute_op = tf.add(a, b)

# Define the session to run graph
with tf.Session() as sess:
    print(sess.run(hello_op))
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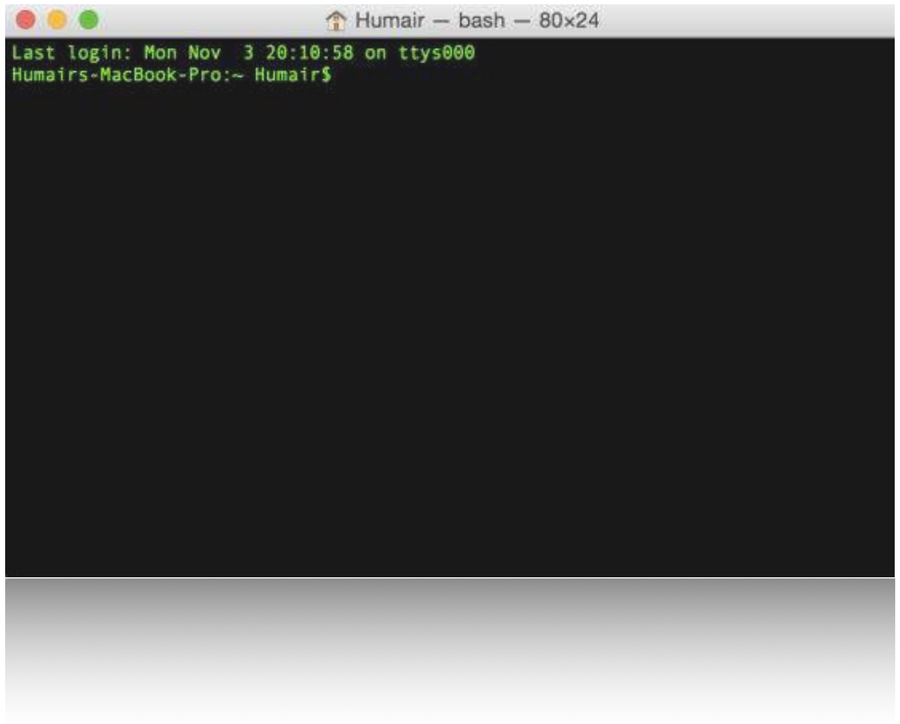

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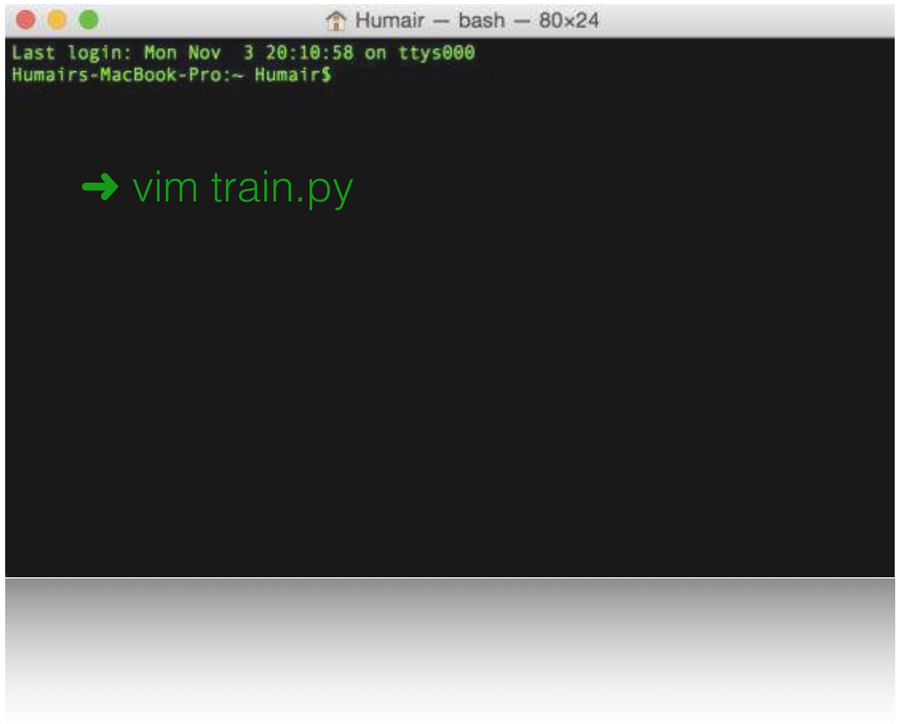

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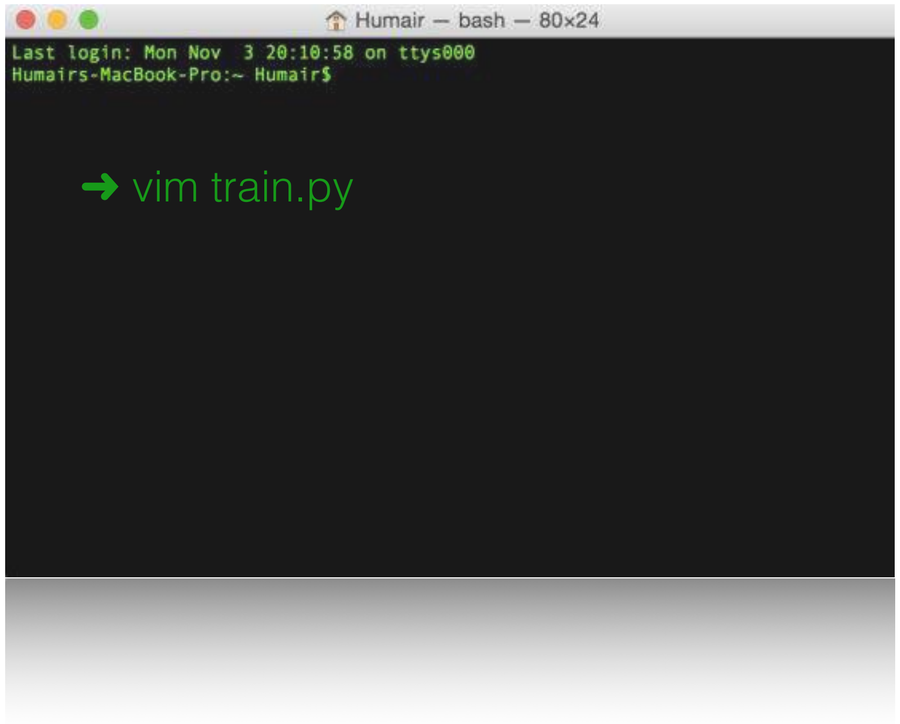

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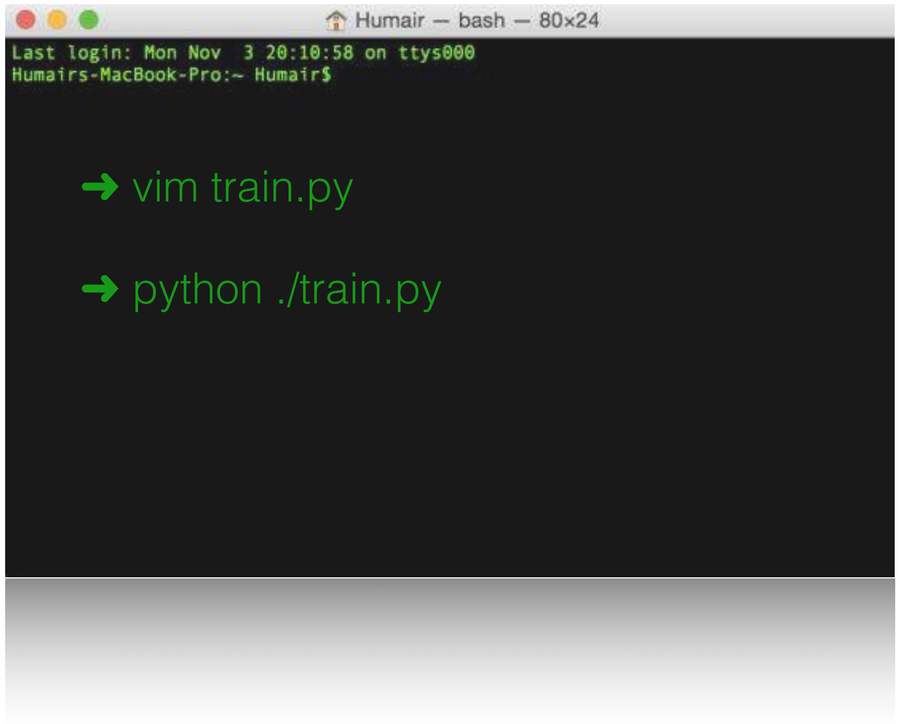

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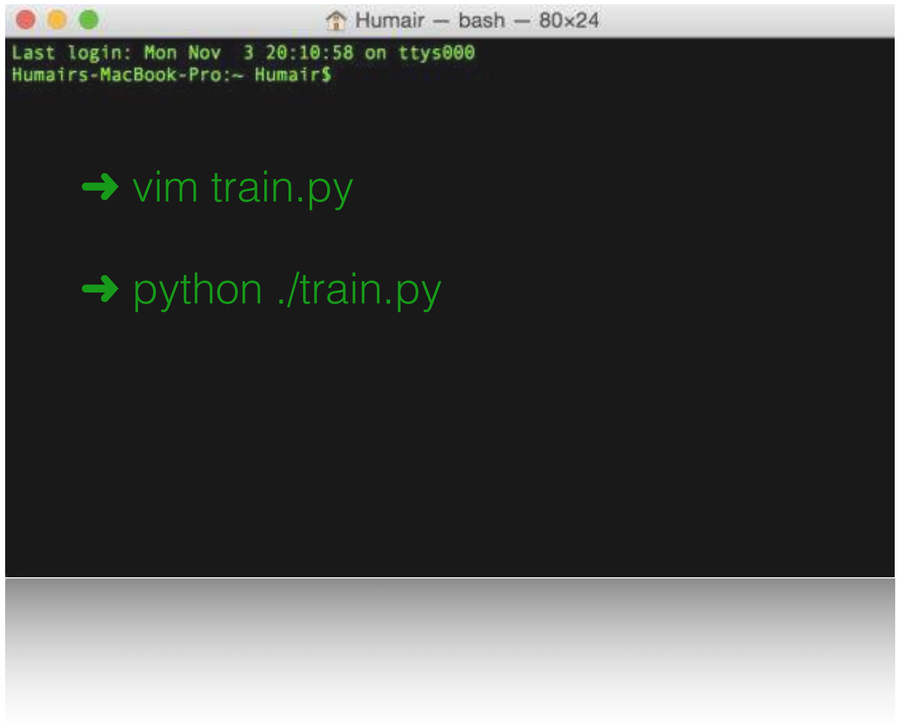

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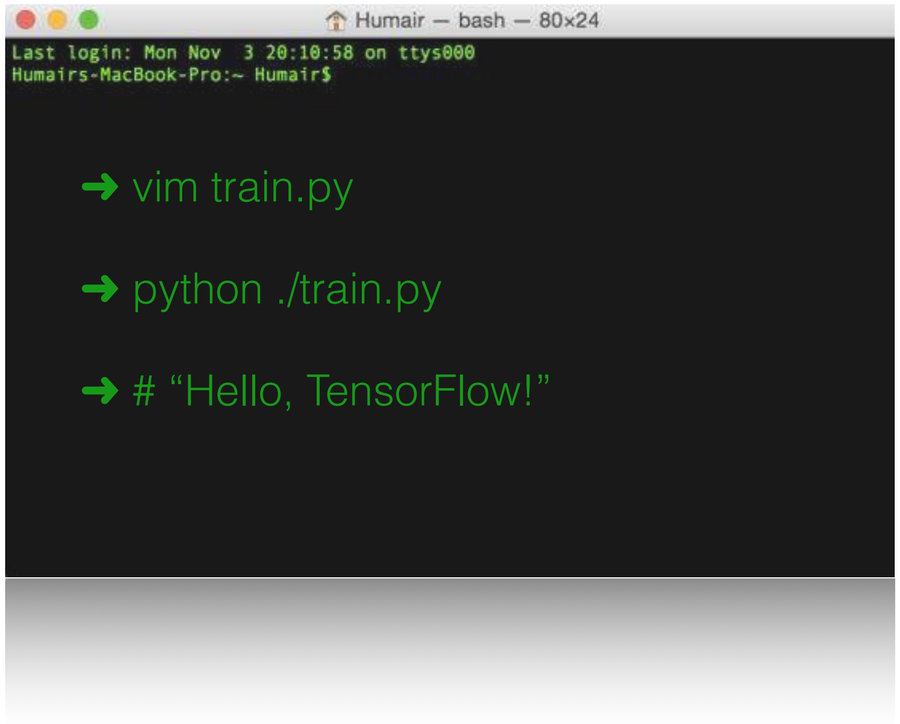

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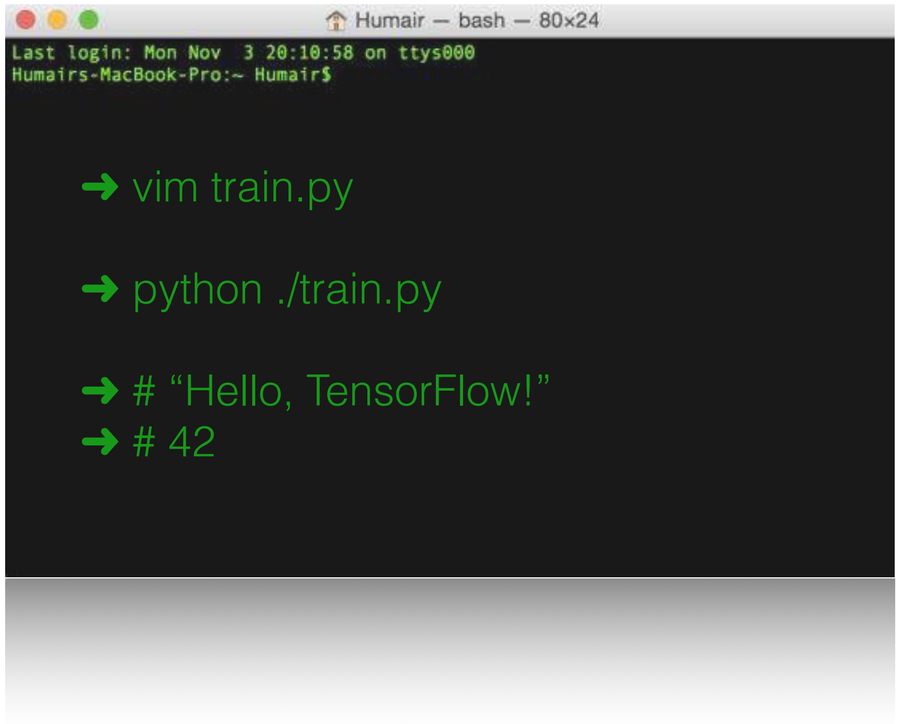

Summary of TensorFlow

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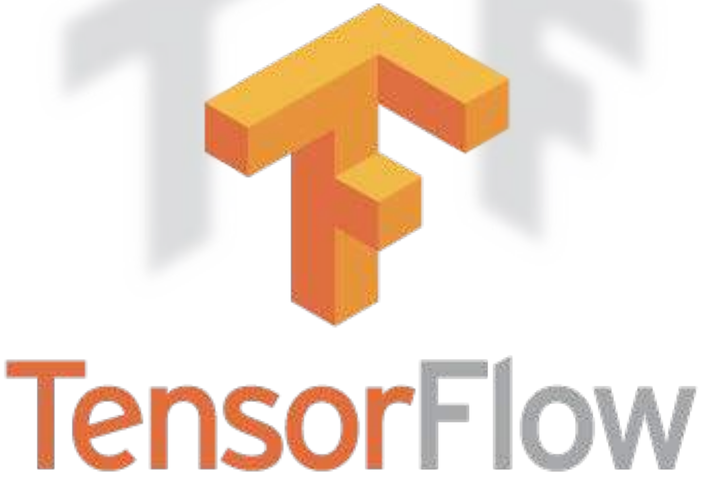

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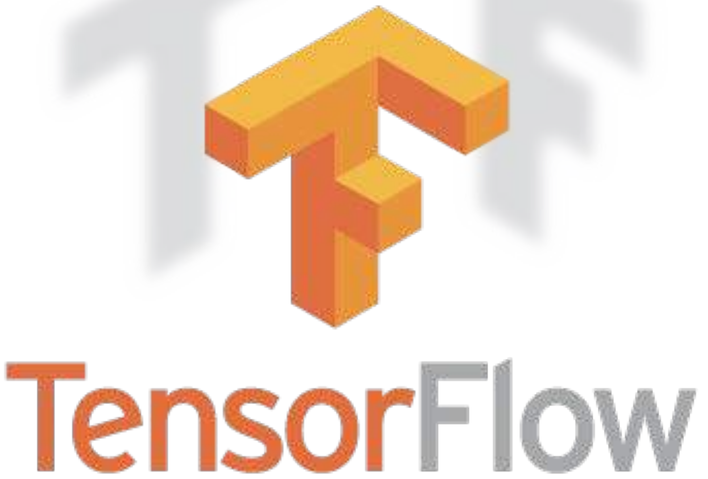

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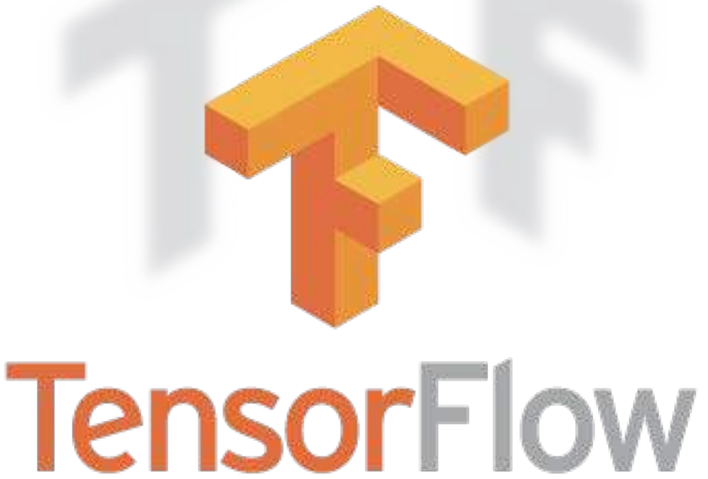

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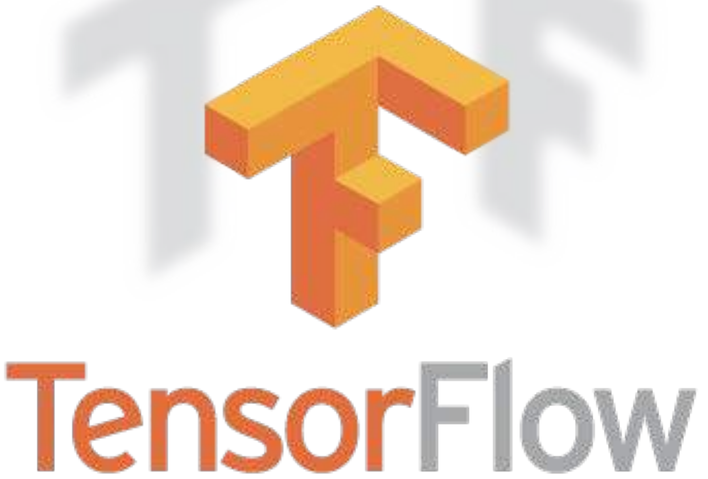

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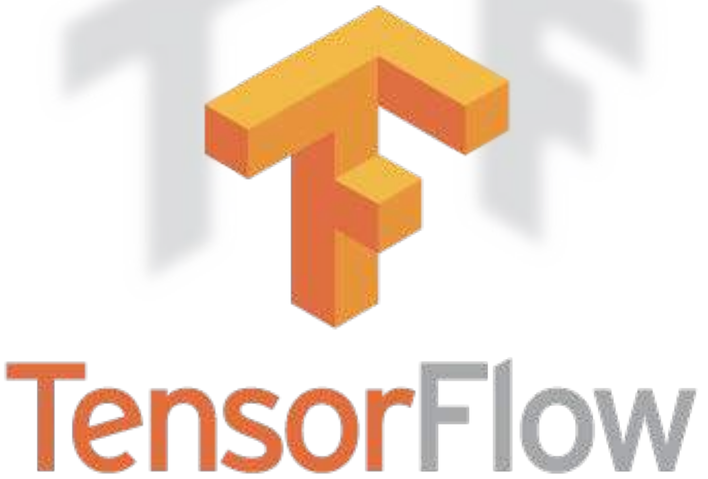

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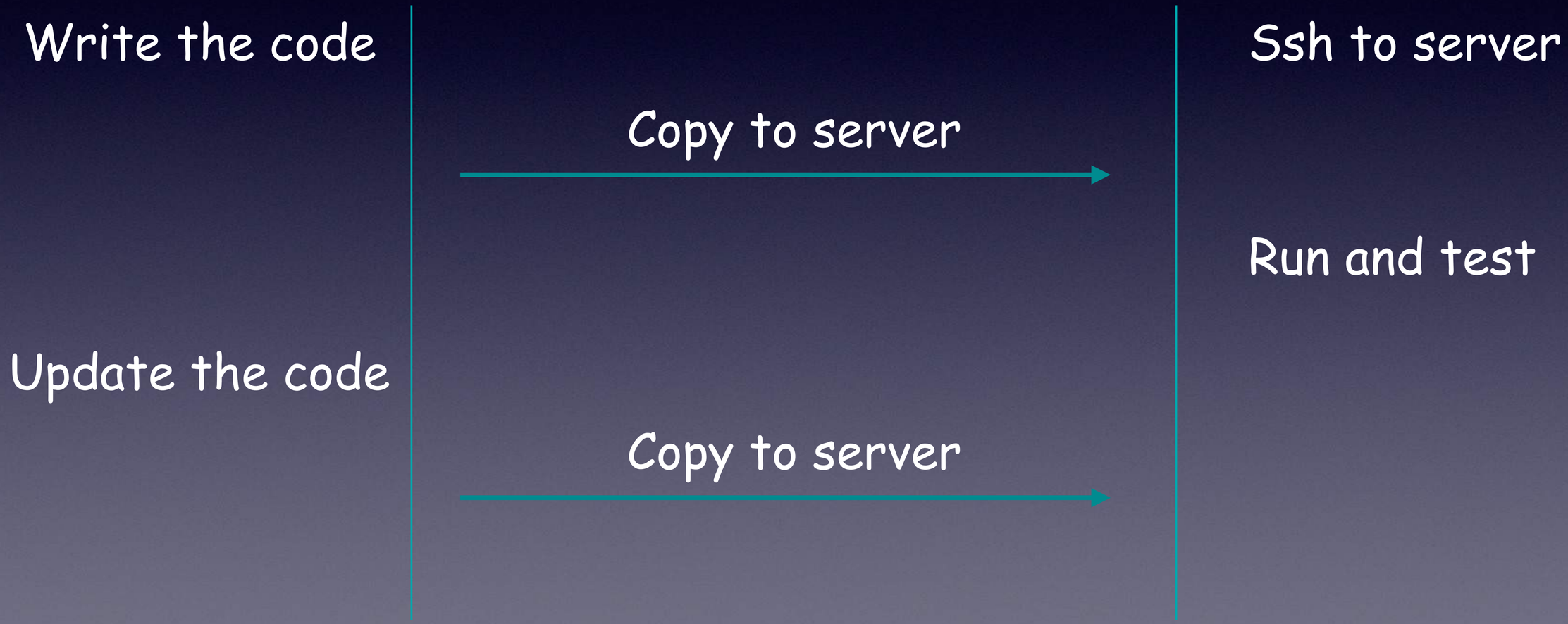
- Configure manually
- Distributed manually
- Run and tune manually

Standalone TensorFlow Workflow



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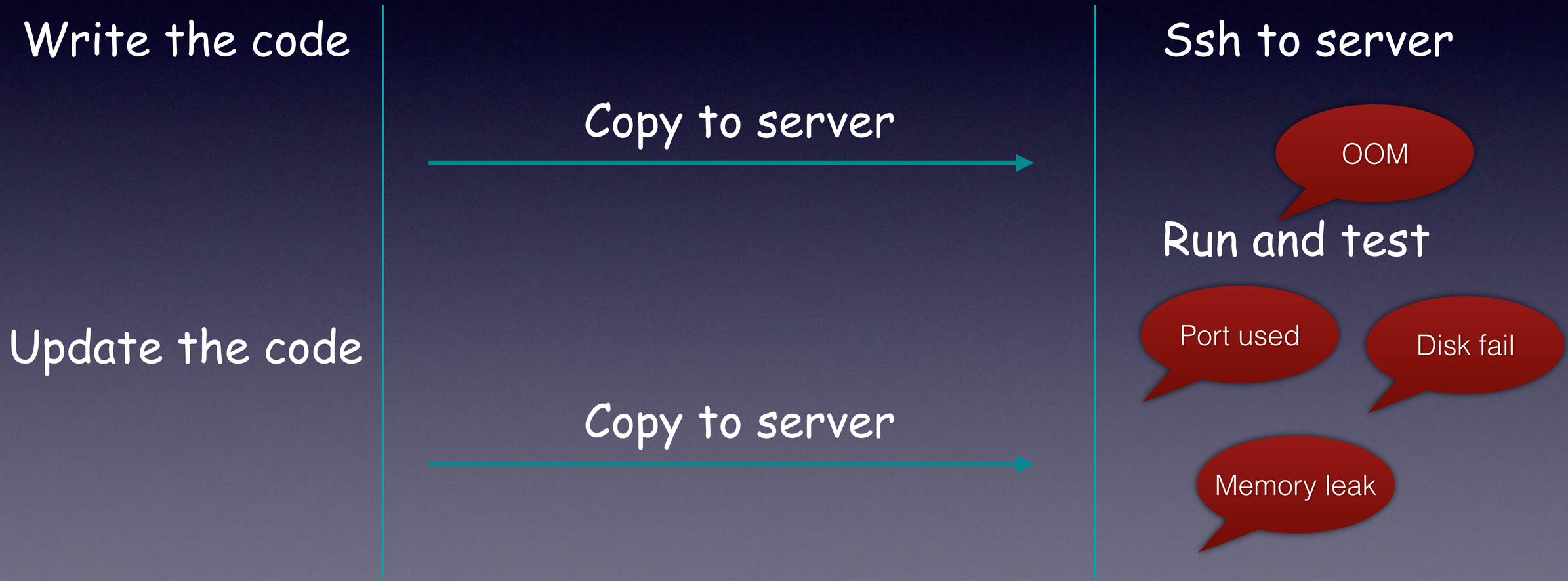
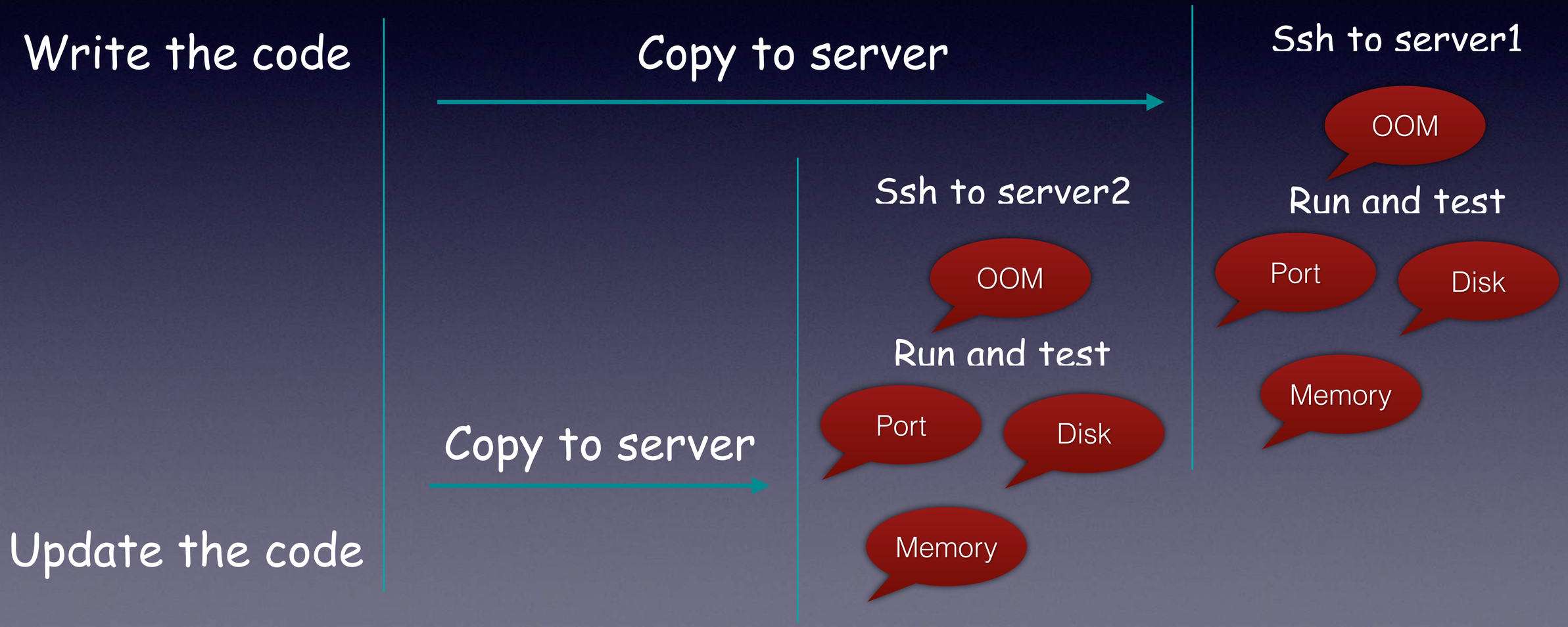
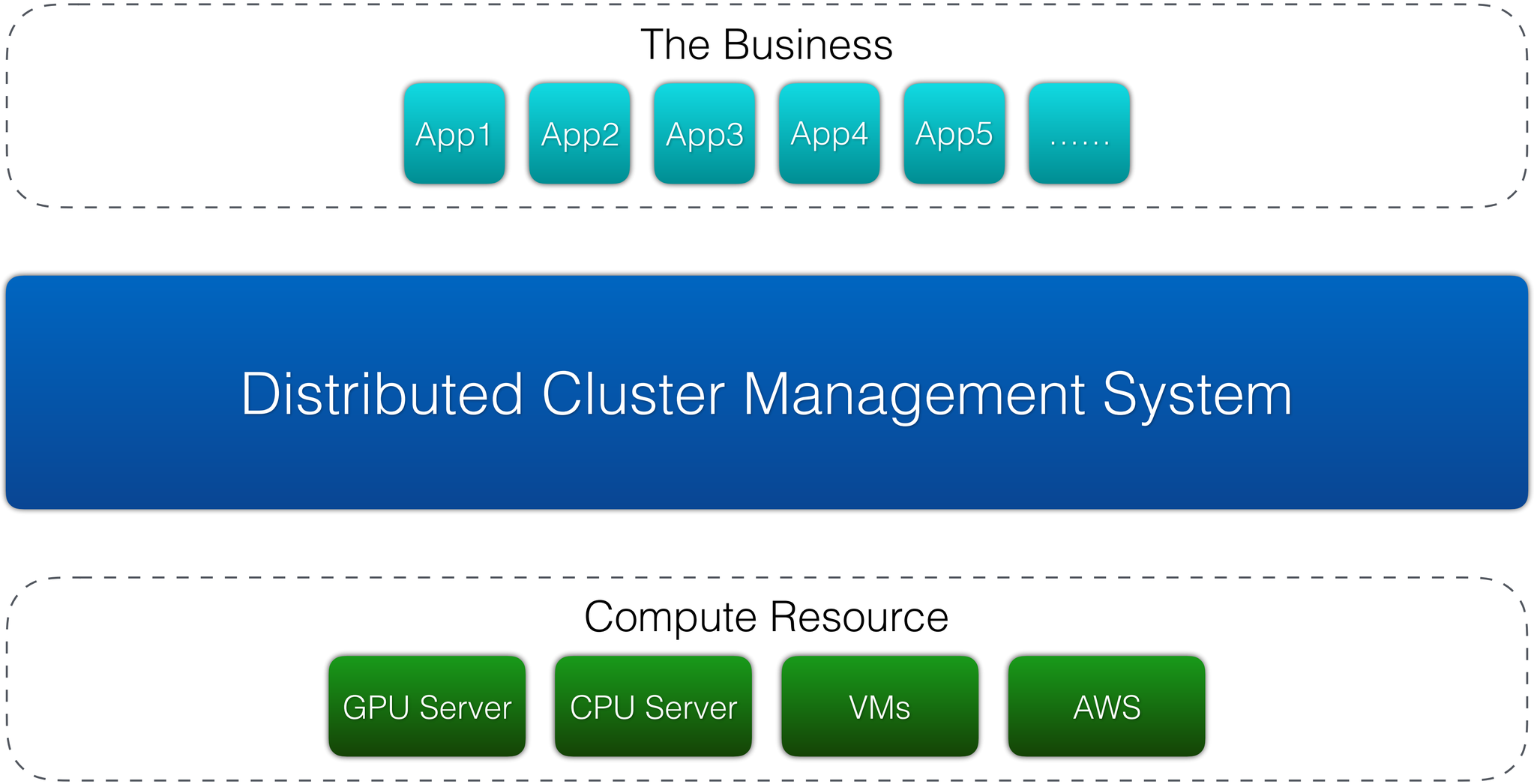


Distributed TensorFlow Workflow




The Business
App1
App2
App3
App4
App5
.....
Distributed Cluster Management System
Compute Resource
GPU Server
CPU Server
VMs
AWS

Agenda

- 机器学习与深度学习应用
- **深度学习平台架构与设计**
- 深度学习平台应用与实践

Cloud-ml: The Principles

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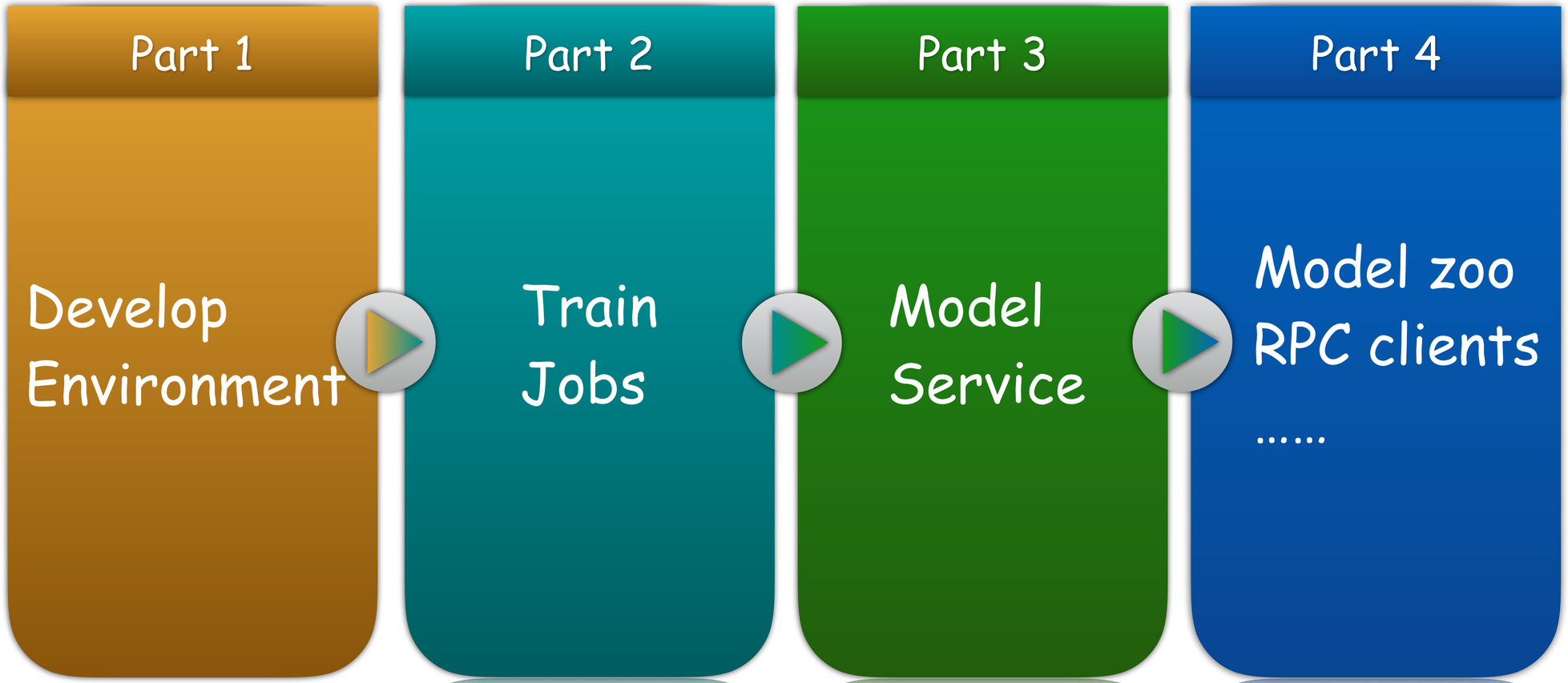
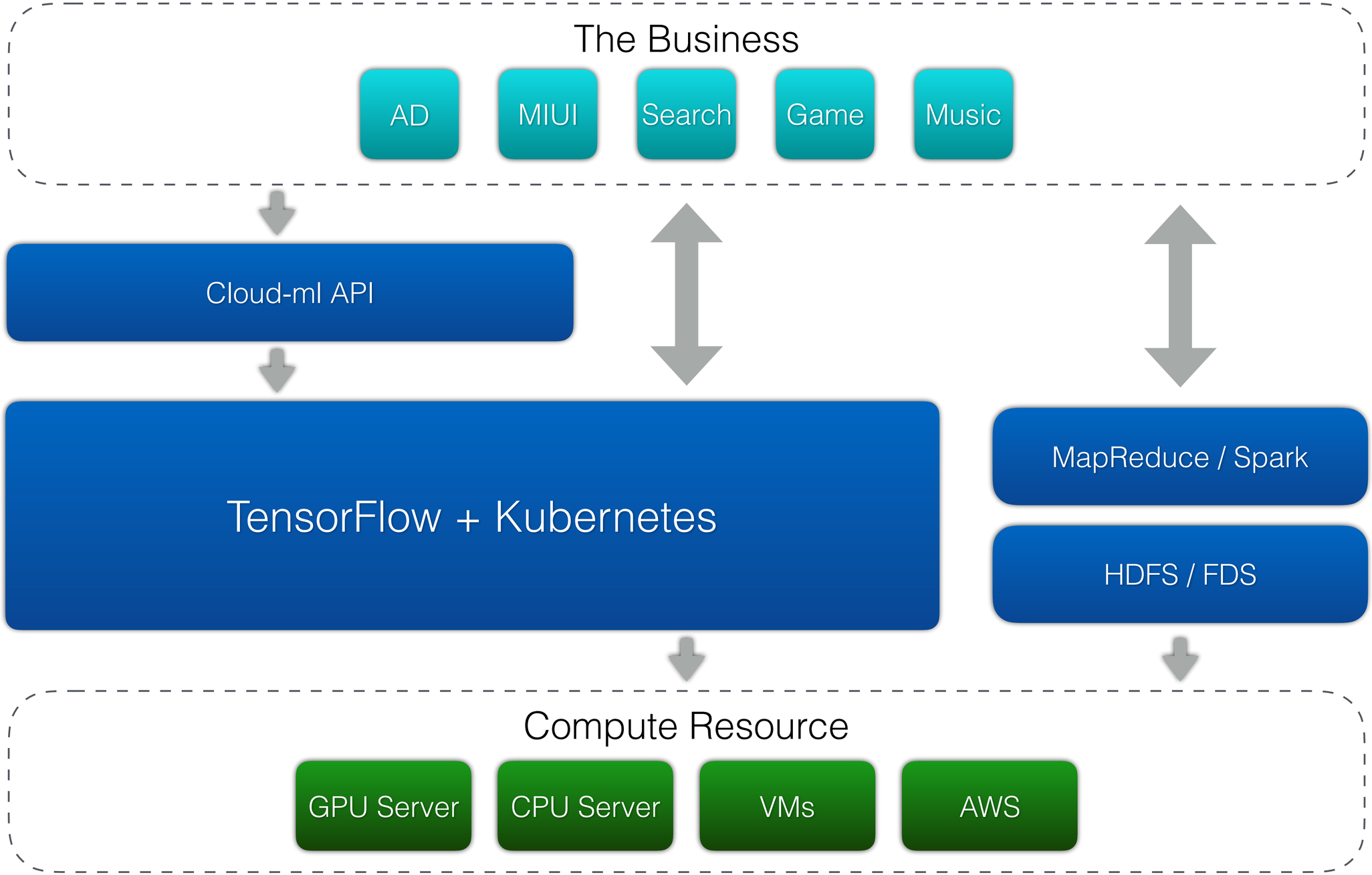
- Resource isolation and dynamic scheduling
- Parallel training and automatically tuning

Cloud-ml: All-in-one Platform




The Business
AD
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Search
Game
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TensorFlow + Kubernetes
MapReduce / Spark
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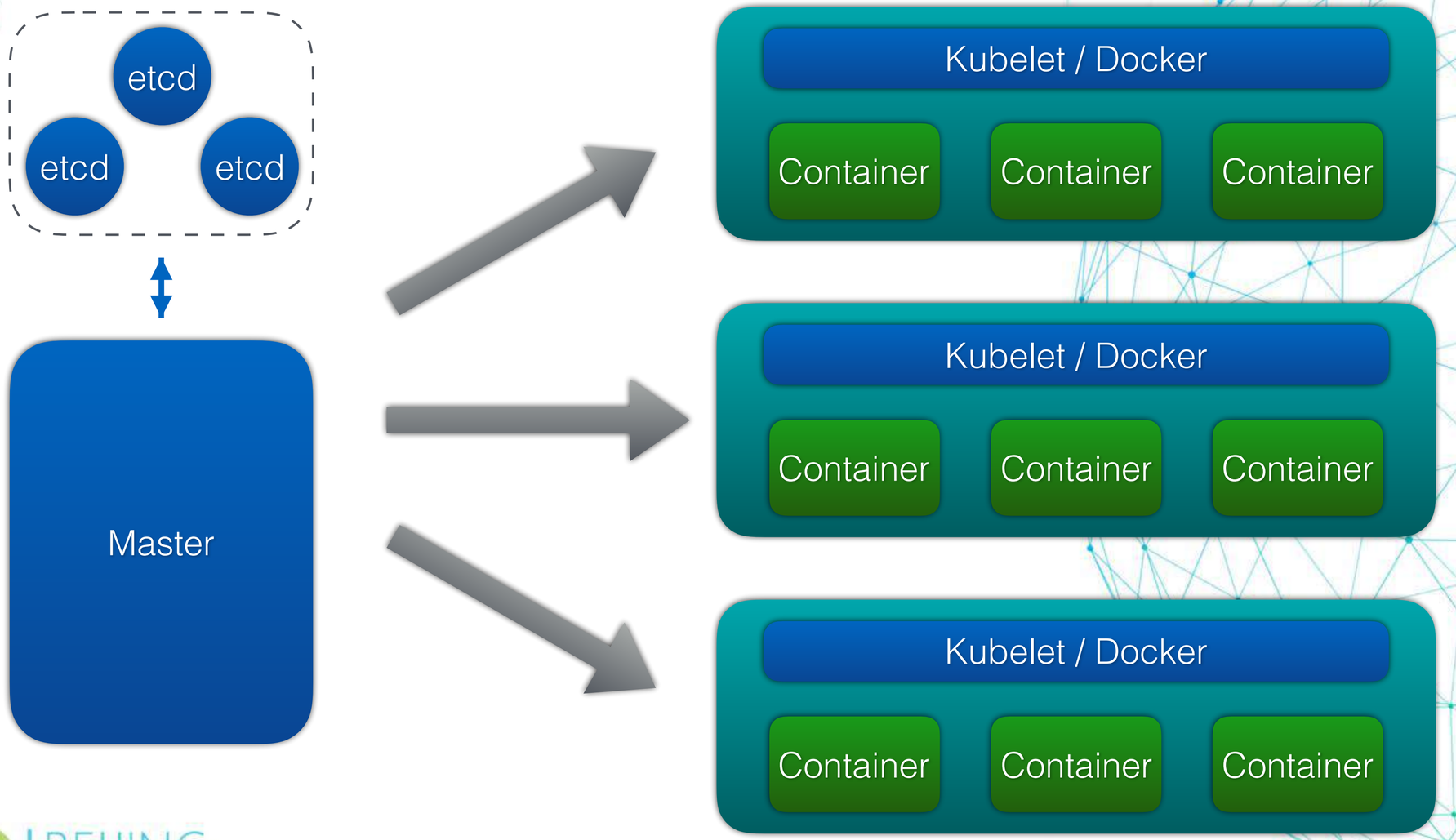
Cloud-ml: Kubernetes Inside



Cloud-ml: The Architecture