Introduction to Reinforcement Learning and RLlib

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RAY SUMMIT 22

Anyscale

Who we are: Original creators of Ray, a unified framework for scalable, distributed computing. Part of that framework are our libraries for ML and data processing.

What we do: Scalable compute for AI and Python

Why we do it: Scaling is a necessity, scaling is hard; make distributed computing easy and simple for all developers.

RL Team @ Anyscale

Sven

Jun

Avnish

Artur

Kourosh

Christy

Steven

Rohan

Charles

https://github.com/anyscale/ray-summit-2022-training

Some of RLlib's Industry Users

(thanks for presenting at our conferences!)

Overview of the Tutorial

	Lesson	Description
	Module 1	**Introduction to Gym Environments & RLlib APIs**
01	OpenAI Gym and RLlib	Introduction to OpenAI Gym and Ray RLlib
	BREAK	🥤🥤
	Module 2	**Create a Custom RLlib Multi-Agent Environment and Train a RLlib Multi-Agent Model**
02	Multiagent RLlib Environment	Create a Custom Multi-Agent Environment in RLlib
03	Train a RLlib Muti-Agent model using Ray Tune	Introduction to Ray Tune and hyperparameter optimization HPO
	BREAK	🥤🥤
	Module 3	**Offline RL, Remote Class distributed stateful pattern and Ray Serve**
04	Introduction to Offline RL	Introduction to Offline RL with RLlib
05	Ray Serve and RL	Using RLlib with Ray Serve to deploy a policy into production
	4:30pm HAPPY HOUR + Meetup	
	Module 4 (take home)	**Extra Notebooks, Depending on Class Timing**
06	End-to-end Demo	End-to-End Demo of what you built in this tutorial
07	Introduction to RLlib in RecSys	Introduction to RL applied to Recommender Systems

Happy Hour @ 4:30pm & Ray Meetup @ 6pm - Seacliff foyer

Meetup

Ray Summit Meetup Community Talks

Monday, August 22
6:00 PM - 8:00 PM

We are delighted to host an exclusive Ray Summit Meetup, hosted by Anyscale with Ray community talks, on the eve of the summit. Invited Ray community speakers will share how they use Ray to scale and solve challenging ML problems.

You don't have to be registered for the Ray Summit to attend. The meetup is free for the community. Join us for the Ray Summit Happy Hour from 5:00 - 6:00 p.m., followed immediately by the meetup.

Agenda (The times are not strict; they may vary slightly.)

- 5:00 - 6:00 p.m. Ray Summit Community Happy Hour (in Seacliff Foyer)
- 6:00 p.m. Welcome remarks, announcements, and agenda - Jules Damji, Anyscale
- 6:05 p.m. Talk 1: Ray + Arize: Close the ML infrastructure loop - Aparna Dhinakaran, Arize AI
- 6:35 p.m. Q & A
- 6:40 p.m. Talk 2: Maintaining long-running distributed Ray clusters - Jaehyun Sim, Ikigai Labs
- 7:20 p.m. Q & A
- 7:25 p.m. Talk 3: Large-scale distributed approximate nearest neighbor search with Ray - Daniel Acuna, Syracuse University
- 7:50 p.m. Q & A

Talk 1: Ray + Arize: Close the ML infrastructure loop Detecting, diagnosing, and resolving ML model performance can be difficult for even the most sophisticated ML engineers. As more machine learning models are deployed into production, it is imperative we have tools to monitor, troubleshoot, and explain model decisions. Join Aparna Dhinakaran, chief product officer at Arize AI, in a discussion on the state of commonly seen ML production monitoring challenges. Learn how to use ML Observability from training through production environments to find upstream model issues faster, monitor your models in real time at scale, and improve model interpretability and explainability.

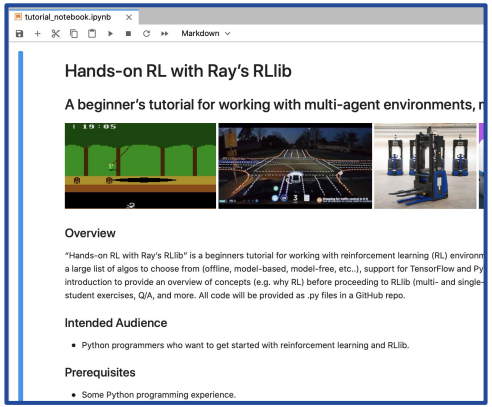
Daniel Acuna
Associate Professor, Computer Science Department, University of Colorado

Jaehyun Sim
Director of Engineering, Ikigai Labs, Inc.

Aparna Dhinakaran
Chief Product Officer, Arize AI

Jules Damji
Lead Developer Advocate, Anyscale

And now … Moving to our Jupyter Notebook



https://github.com/anyscale/ray-summit-2022-training

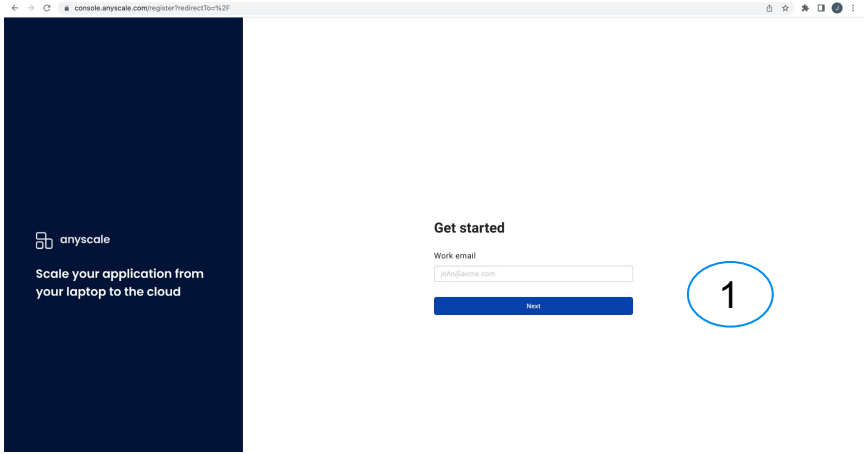
Anyscale User/Password

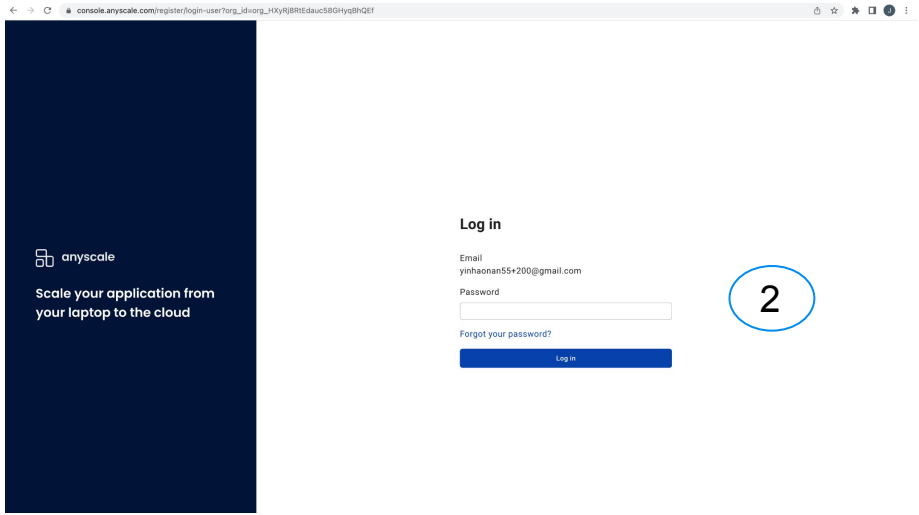
https://bit.ly/rsummit2022-class-logins

- Choose any line from spreadsheet under your class name: “Introduction to Ray RLlib”
- In column “Account” switch “Not Available”
- For example, Username/password: `yinhaonan55+520@gmail.com/tutorialpassword520`

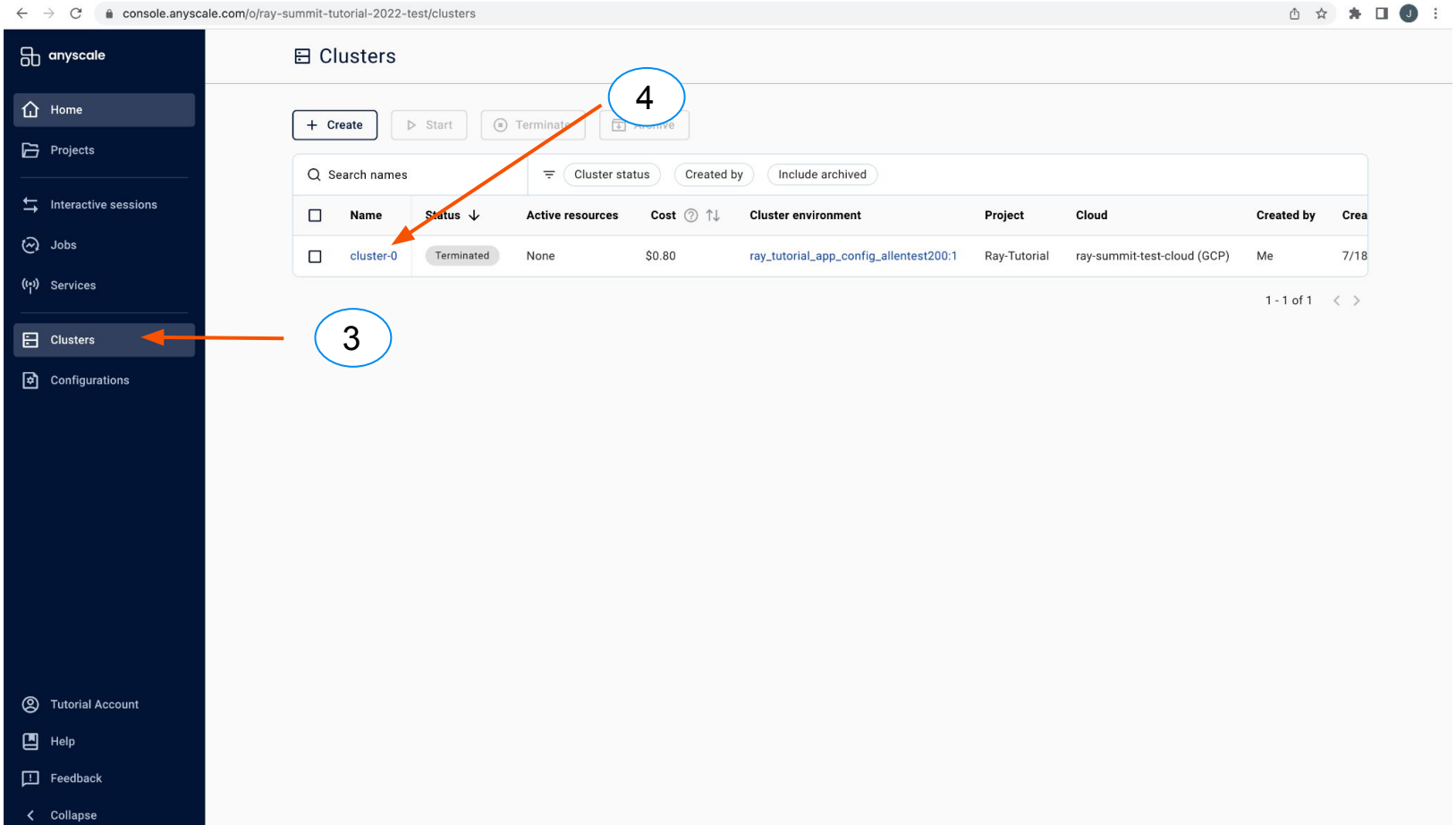
Your Anyscale Cluster

- → Console: http://console.anyscale.com/
- → User name: <username@gmail.com>
- → Password : password

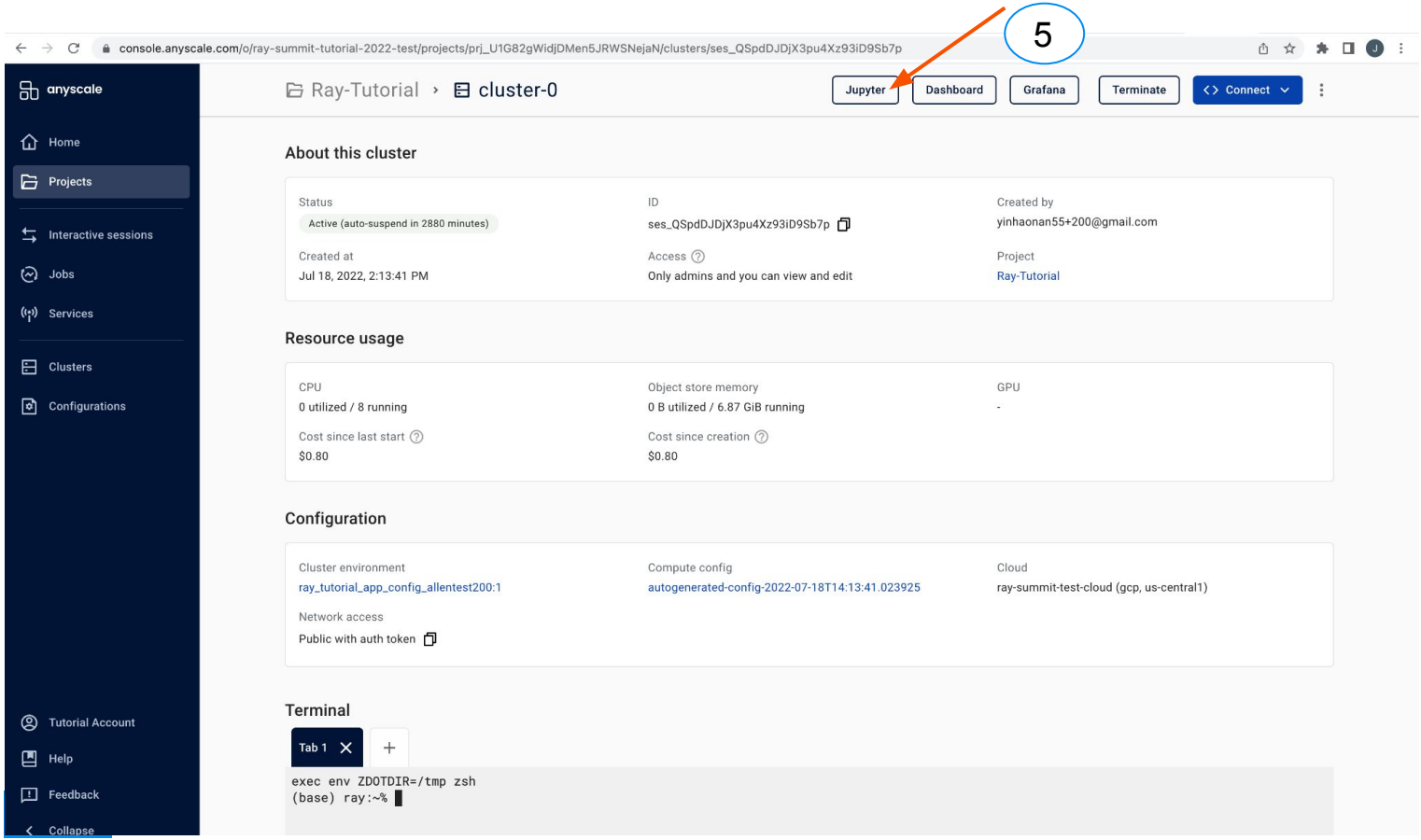




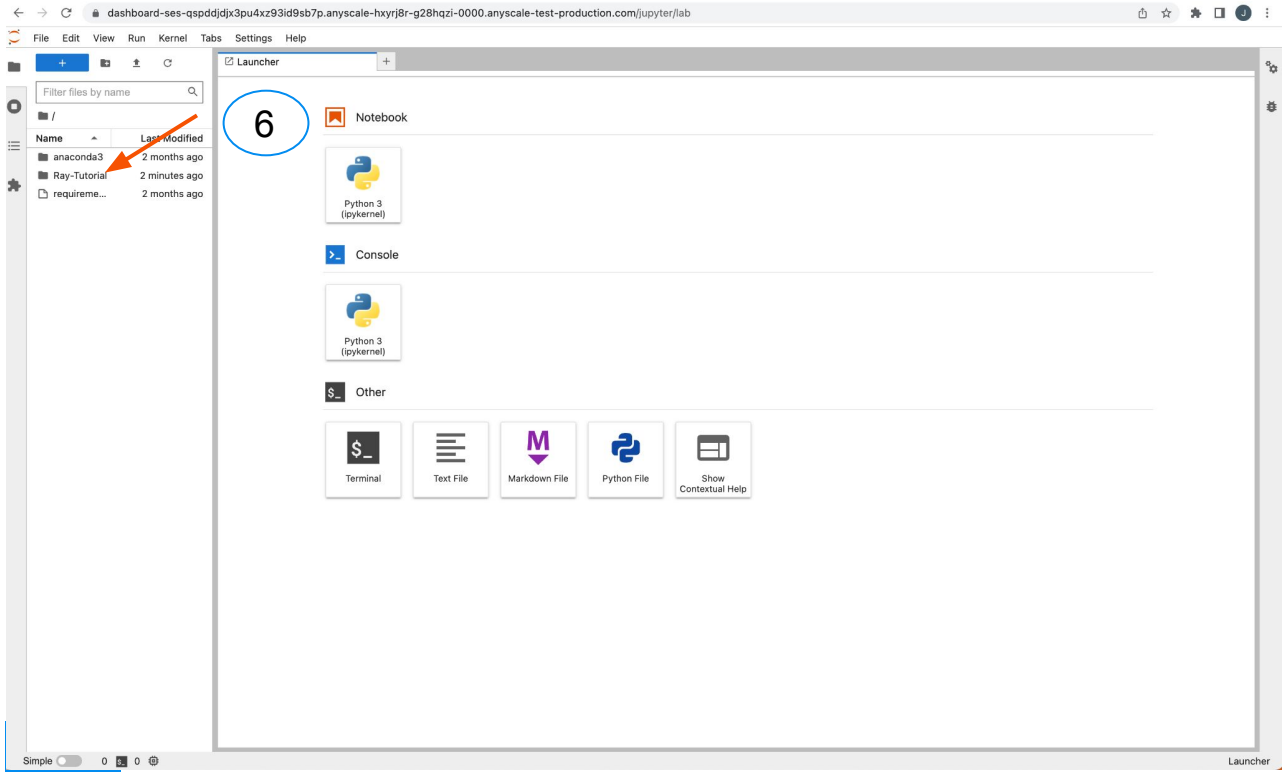
Your Anyscale Cluster



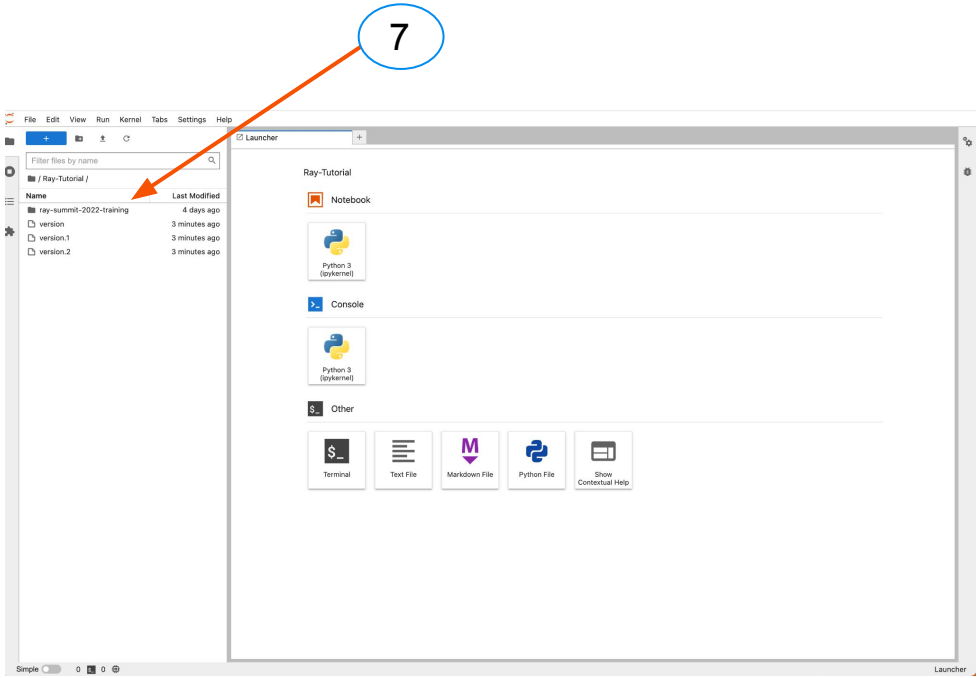
Your Anyscale Cluster

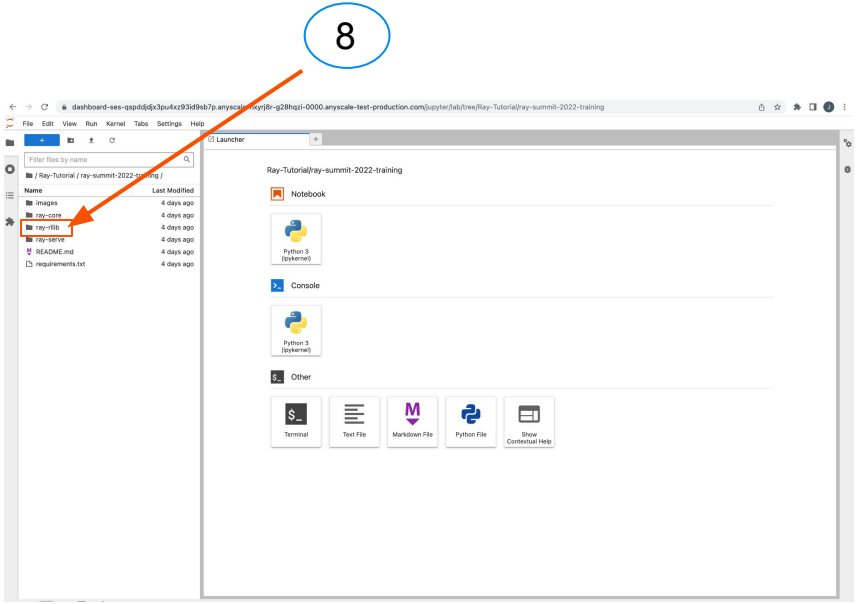


Your Anyscale Cluster



Your Anyscale Cluster





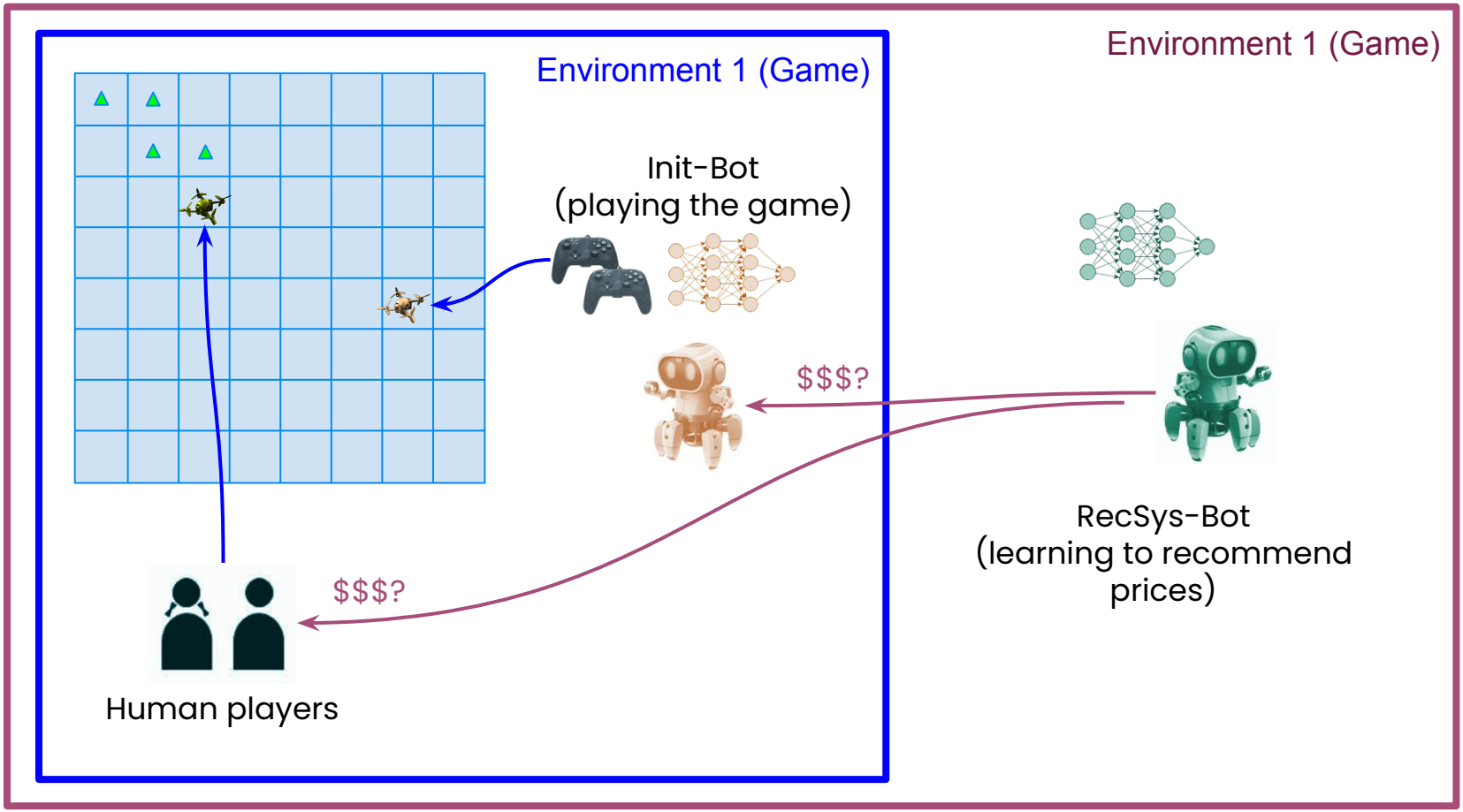
Tell us what you think + Ask questions

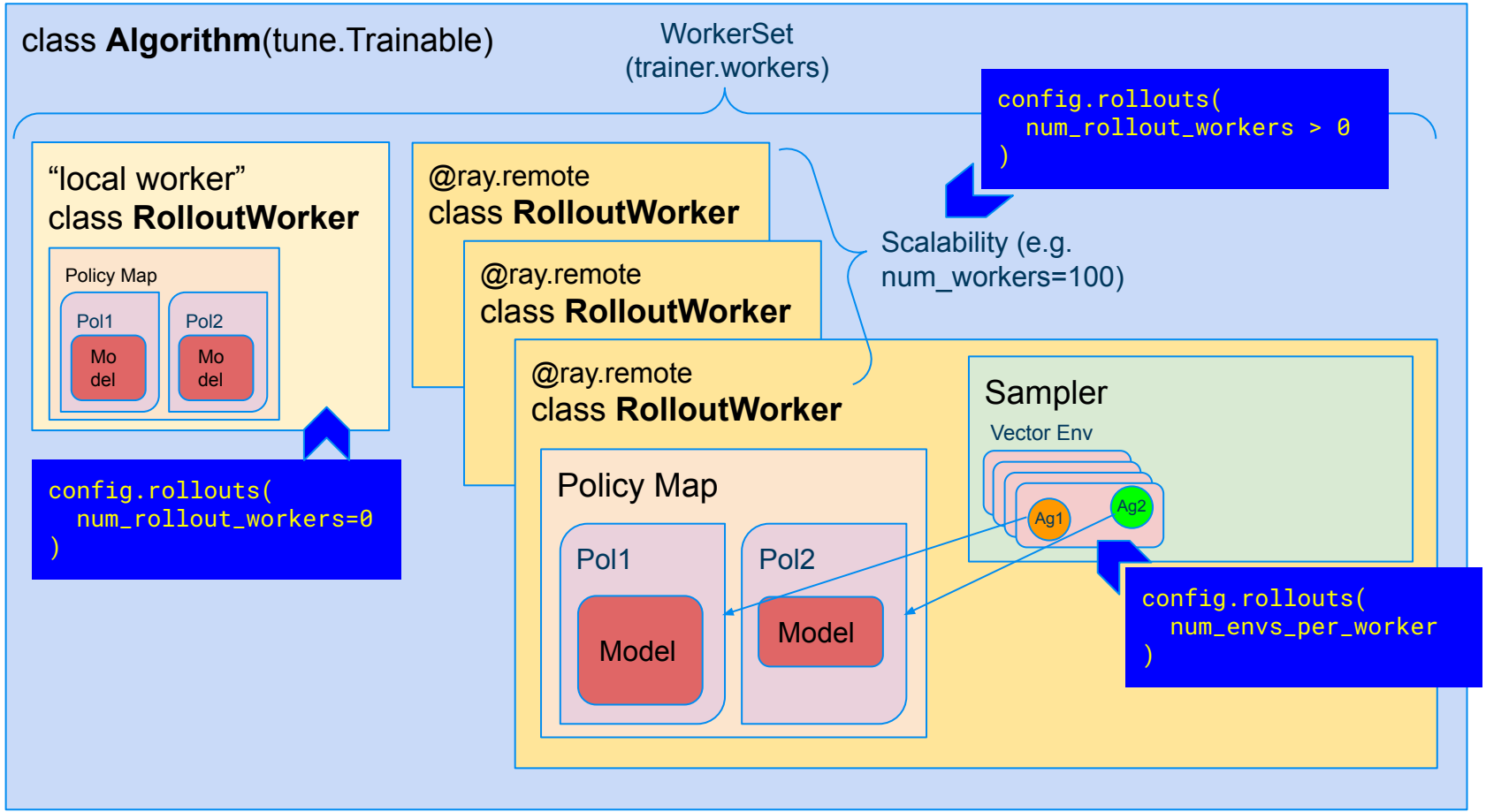
Survey	Q&A Doc
https://bit.ly/ray_summit2022_rllib	https://bit.ly/ray_summit2022_rllib_qa
	

Thank you.

Tell us what you think...

https://bit.ly/ray_summit2022_rllib


Environment 1 (Game)
Environment 1 (Game)
Init-Bot
(playing the game)
$$$?
$$$?
RecSys-Bot
(learning to recommend
prices)
Human players


class **Algorithm**(tune.Trainable)
WorkerSet
(trainer.workers)
config.rollouts(
num_rollout_workers > 0
)
"local worker"
class **RolloutWorker**
Policy Map
Pol1
Mo
del
Pol2
Mo
del
@ray.remote
class **RolloutWorker**
@ray.remote
class **RolloutWorker**
@ray.remote
class **RolloutWorker**
Scalability (e.g.
num_workers=100)
Sampler
Vector Env
Ag1
Ag2
Policy Map
Pol1
Model
Pol2
Model
config.rollouts(
num_rollout_workers=0
)
config.rollouts(
num_envs_per_worker
)