TECHARENA

Server Fleet Management At Scale

HUAWEI IRELAND RESEARCH CENTRE

HUAWEI Ireland Tech Arena, 2024
Phase 1 Webinar | 19 August 2024

Welcome: Thank you for joining us!
The Webinar @11:30 (UTC+01:00) London time will start shortly!

POWERED BY:
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TECHARENA

Server Fleet Management At Scale

HUAWEI | IRELAND RESEARCH CENTRE

Your Host

Rayanne Beayno
Master of Ceremony

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Server Fleet Management At Scale

HUAWEI IRELAND RESEARCH CENTRE

Technical Guide

Stefano Mauceri
Machine Learning Engineer
HUAWEI

Webinar Agenda

HUAWEI IRELAND TECH ARENA 2024 Overview | Key Figures

Phase 1 | How it works

Rules | What is expected from you?

Prizes | What's at Stake?

Phase 1 challenge | Huawei team

Q&A

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Huawei Ireland Tech Arena – Overview:

Shape the future of Cloud Computing at the Huawei 2024 Ireland Tech Arena!

Join us in the "Server Fleet Management At Scale" competition, where your innovative solutions can drive the next wave of technology.

Participate now!

Data centers in cloud computing are the backbone of our digital world, powering businesses, and services globally. As a participant, you'll tackle the critical task of optimizing data center server inventory.

This is your moment to showcase your **analytical modelling, optimization, and simulation skills**, learn from industry experts, and compete for exciting prizes and internship opportunities. Whether you're studying in Ireland or the UK, this is your moment to shine and make a difference. Don't miss out on this incredible opportunity to contribute to a high-stakes, high-impact field.

Sign up now and take your first step toward transforming the cloud computing landscape!

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Huawei Ireland Tech Arena – Key figures*:

10+

WEEKS OF APPLICATION PHASE

>508

HACKATHON REGISTRANTS

>185

TEAMS

**10 days left*

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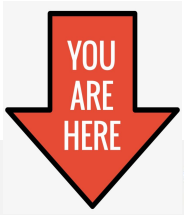
Huawei Ireland Tech Arena - Today:



Timeline

Registration Phase
Until Aug. 30, 2024

Register on the platform to participate in Phase 1 for a chance to be selected to attend the final Hackathon during Phase 2!

Phase 1
Aug. 19 - Sept. 6, 2024

Submit your solution on the platform and climb higher on the leaderboard!

Preparation Phase
Sept. 7 - 20, 2024

Top performing teams, up to 70 people, will be invited to the final Hackathon in Dublin!

Phase 2: The Hackathon
Sept. 21 - 22, 2024

Live a 2-day unique Hacking experience with your teammates, Huawei mentors, and pitch your solution for a chance to win!

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Phase 1 Rules

RULES

- During both Phase 1 and Phase 2 participants will be **asked to upload a zip file containing their solutions as detailed in the challenge instructions** that they will receive at the beginning of Phase 1. The solution format and detailed submission instructions will be provided in Challenge Question. The submission limit for the zip file is set to 3 submissions per day during phase 1, and 5 submissions per day during phase 2.
- At the end of each challenge participants will be **asked to upload their codebase including all the files required to replicate their solution** to the Agorize website.

If a Deliverable cannot be downloaded, is not in the right format or is incompatible, illegible, or unintelligible, the Deliverable will be disqualified.

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Phase 1 Prizes

GRAND PRIZE: 1 TEAM

A cash reward of **EUR 6,000** to the **top-placing** team

SECOND PLACE: 1 TEAM

A cash reward of **EUR 4,000** to the **second-placing** team

THIRD PLACE: 2 TEAMS

A cash reward of **EUR 1,500** to each of the **two third-placing** teams

AWARDS

1. **A total of 4 teams** will be defined as Huawei competition students and **offered internal internship opportunities**
2. The top students will have the **opportunity to attend a visit trip to Huawei in China**
3. **All participants** who make it to the final Hackathon will receive **great and unique Huawei souvenirs**

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HUAWEI

Phase 1 Challenge

Server Fleet Management at Scale

The goal is to build a model that at each time-step recommends **the number of servers of each type to deploy at each data-center** in order to maximize the given objective function.

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Phase 1 Challenge

Data-Centers		1	2	3	4	Demand
Server Type	CPU	150	250	340	150	891
	GPU	50	80	120	190	540
	Capacity					

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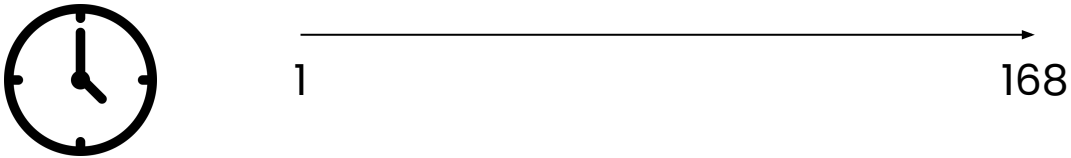
Phase 1 Challenge

Time



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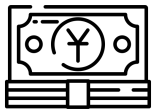
Phase 1 Challenge

Objectives

1. Maximize Servers' Utilization

2. Maximize Servers' Lifespan



3. Maximize Profit

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Phase 1 Challenge

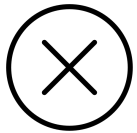
At each time step you can take 1 action per server with no limit on the total number of actions

Actions

Buy

Move

Hold



Dismiss

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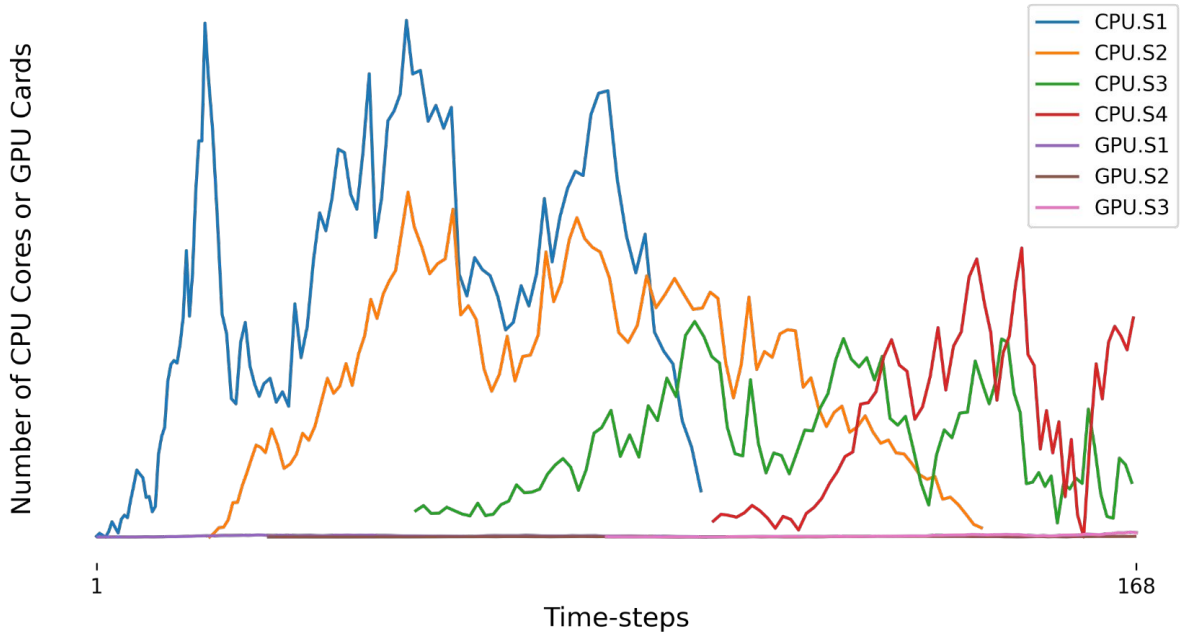
Phase 1 Challenge

Demand

Build & Update your Fleet over time. Take a look at servers.csv



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Phase 1 Challenge

Share your questions on the Platform

More Details...

- Each data-center has different characteristics...
- Each server has different characteristics...
- There are different generations of servers...available at different time-steps...
- There are different segments of demand...
- etc.

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Phase 1 Challenge

Code-Base and Data

```
tech_arena_24_phase_1
|   evaluation.py
|   evaluation_example.py
|   mysolution.py
|   seeds.py
|   utils.py
|   tech_arena_24_phase_1.pdf
|
+---data
|       datacenters.csv
|       demand.csv
|       selling_prices.csv
|       servers.csv
|       solution_example.json
```

You will get access to this zipped folder

Example of a pipeline that can be used to solve the problem.

Complete and detailed challenge instructions.

Example of a challenge solution.

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Phase 1 Challenge

How to get started?

mysolution.py

```python
seeds = known_seeds('training')

demand = pd.read_csv('./data/demand.csv')
for seed in seeds:
    # SET THE RANDOM SEED
    np.random.seed(seed)

    # GET THE DEMAND
    actual_demand = get_actual_demand(demand)

    # CALL YOUR APPROACH HERE
    solution = get_my_solution(actual_demand)

    # SAVE YOUR SOLUTION
    save_solution(solution, f'./output/{seed}.json')
```

You need to submit 10 solutions, 1 for each random seed

We suggest that a solution should account for actual demand...but you may suggest something else..

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Phase 1 Challenge

Solution Format

A solution looks like "a list of dictionaries"...

Each dictionary represents an action taken on a certain server...

```
[
    {"time_step": 1,
     "datacenter_id": "DC1",
     "server_generation": "CPU.S1",
     "server_id": "abc1",
     "action": "buy"},
    {"time_step": 1,
     "datacenter_id": "DC2",
     "server_generation": "CPU.S1",
     "server_id": "abc2",
     "action": "buy"},
    ...
    {"time_step": 1,
     "datacenter_id": "DC3",
     "server_generation": "GPU.S1",
     "server_id": "abc3",
     "action": "buy"},
    {"time_step": 1,
     "datacenter_id": "DC4",
     "server_generation": "GPU.S1",
     "server_id": "abc4",
     "action": "buy"},
    ...
    {"time_step": 70,
     "datacenter_id": "DC1",
     "server_generation": "CPU.S2",
     "server_id": "abc5",
     "action": "buy"},
    ...
]
```

Must be an unique identifier for each server of the fleet.

Run your approach over 10 training seeds

Naming convention: seed.json

Compress all the json files in a zipped folder

2 days before the end you will have 10 test seeds

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Phase 1 Challenge

Build and Update the Best Fleet of Servers for 168 time-steps!

Final Remarks

Do not hesitate to ask in case you have any questions.

Take a close look at the challenge instructions + data + code.

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END OF PHASE 1 WEBINAR

Thank you for joining us, and good luck hacking!

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