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Handelsbankens Microsoftdag 2021

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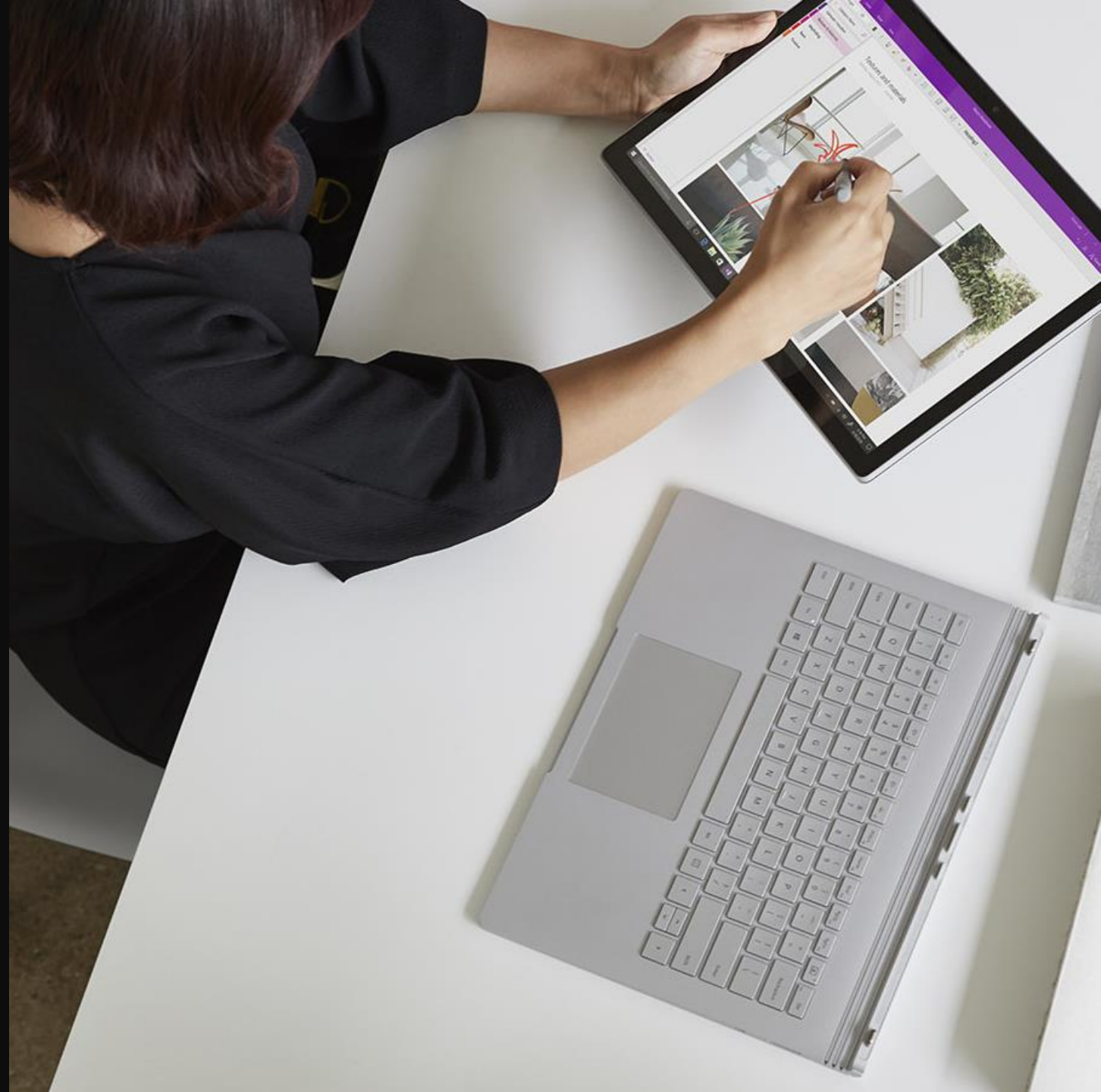
Microsoft

Using Azure Machine Learning SDK to run heavy scripts on the cloud

Daniel Labbe



linkedin.com/in/daniellabbe

Daniel Labbe

Sr. Customer Engineer, Data & AI domain @ Microsoft

Master Student @ The University of Edinburgh

Teacher Assistant @ Udemy

Data Scientist

- 23+ years of experience in data related roles
- Azure Data Scientist Associate, Azure AI Engineer Associate
- 8+ years dealing with Data Science
- 15,000+ questions answered in courses (400,000+ students)
- Presented workshops in Data Science, Python, ML & AI
- Engaged in StackOverflow and Kaggle

Session Objectives

- Discuss the elasticity of cloud solutions
- Discuss the flexibility of Azure Machine Learning
- Discuss the convenience of local SDKs

Motivations

Heavy workloads might not be suited for your local Infrastructure

- Time consuming
- Tech dependent – new tech demands new hardware
- Demands upfront investments
- Limits the capacity of experimentation

Azure Machine Learning workspace is virtually free*

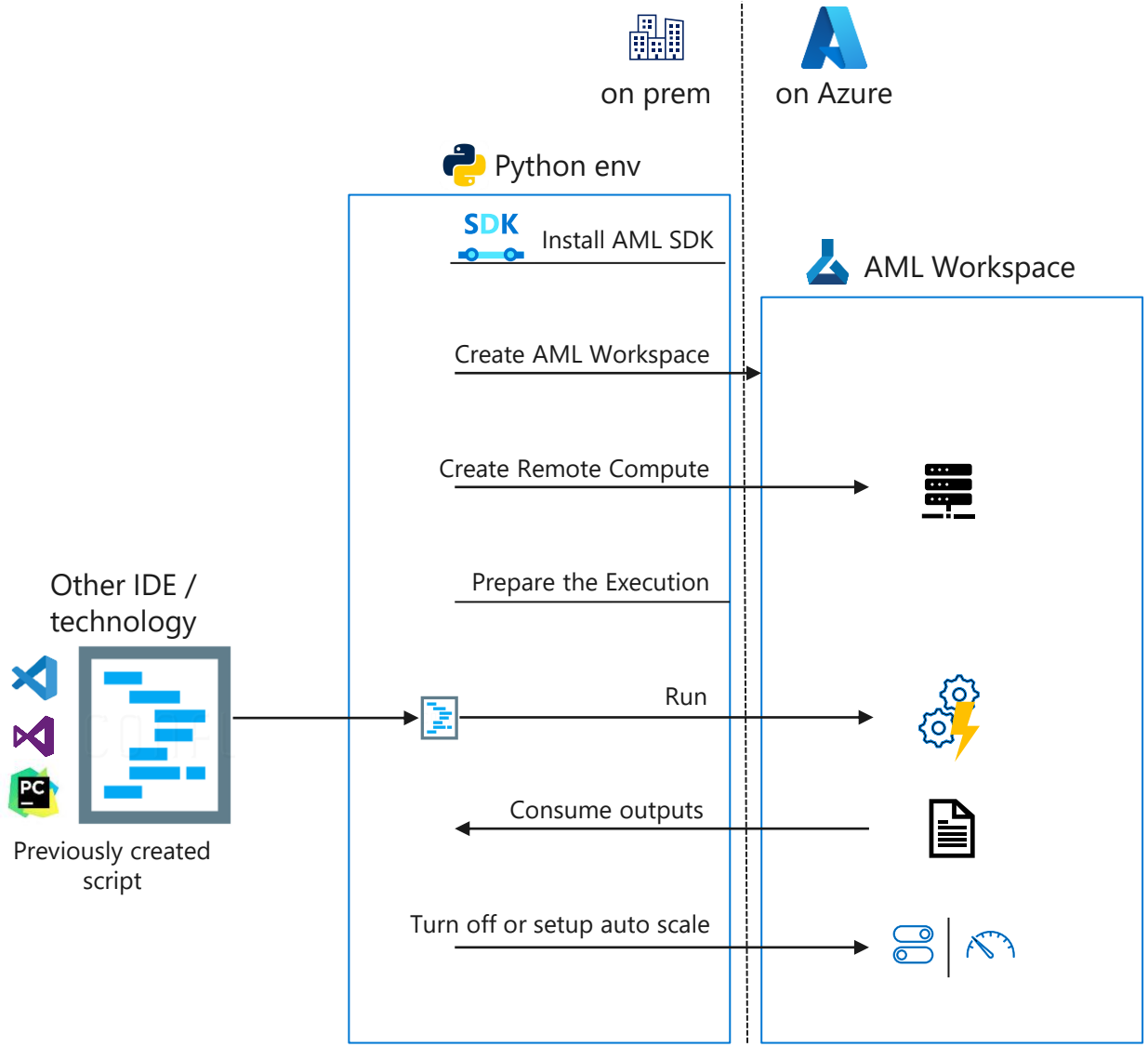
- Adjacent resources have costs
- Storage Account, Key Vault, Apps Insights have marginal costs
- Computes can be expensive, but pay as you go

Azure Machine Learning can handle more than ML Workloads

- AML is flexible to different maturity level
- AML can handle well hybrid architectures for on-prem/on-cloud environments
- AML can run scripts, not only training scripts

Solution Overview

- Provision cloud resources using code (infra-as-code)
- Run previously created scripts on remote computes
- Turn off or auto scale the compute resources



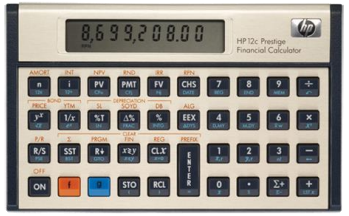
Monte Carlo Simulations

Monte Carlo simulations are used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. It is a technique used to understand the impact of risk and uncertainty in prediction and forecasting models.

Monte Carlo Simulations

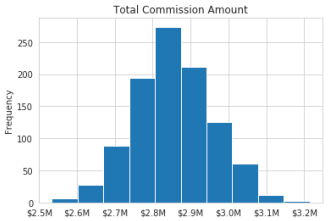
Pythonic implementation

Meaning that inside the “previously created script” to run, there will be no parallelization in the demo



Sales Rep Commission

The demo considered a simplistic use case of the Monte Carlo simulations focusing on the execution, not on the implementation



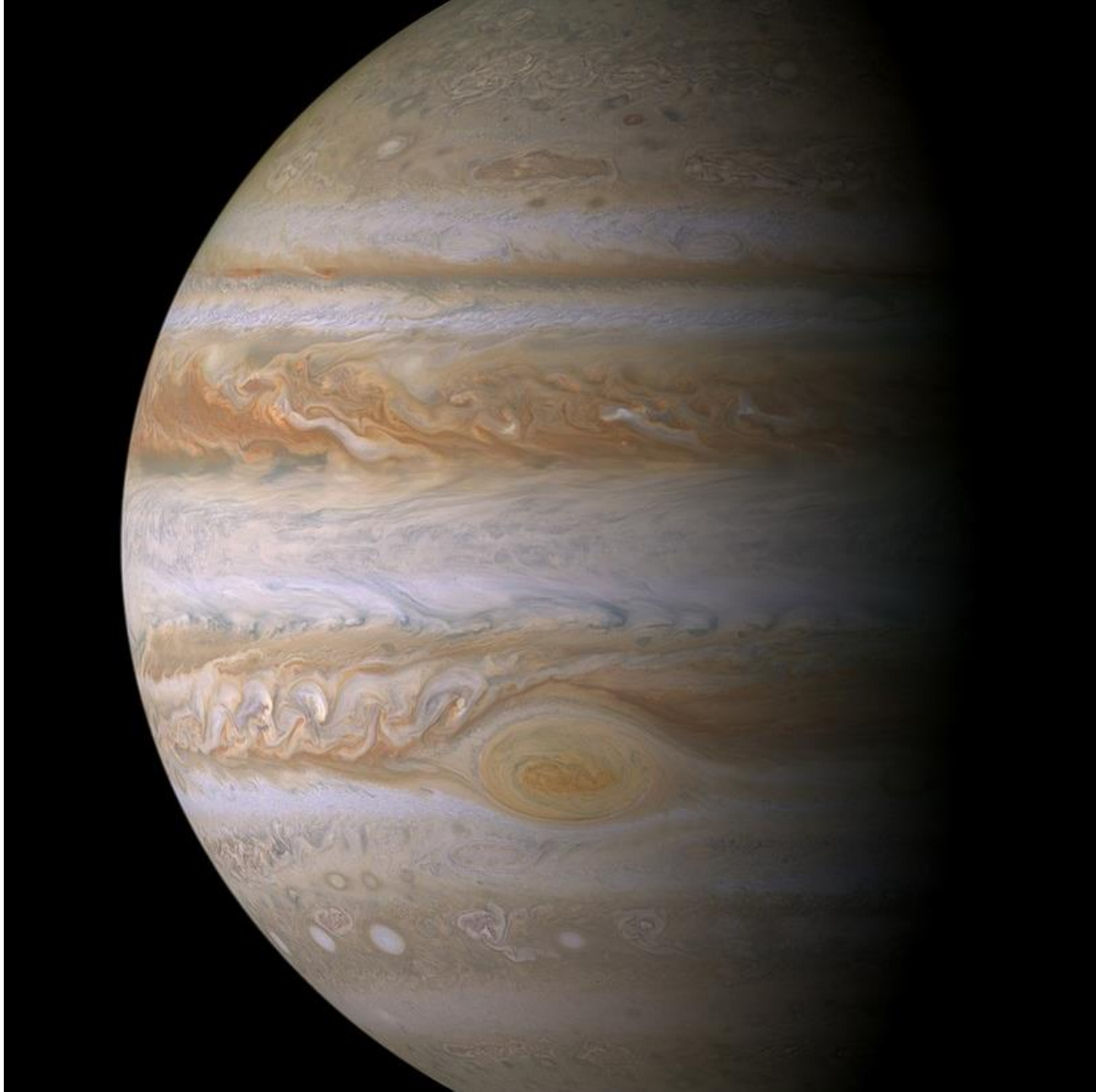
Statistical Output Interpretation

In this example, the uncertainty experimented is the number of sales to compute commissions, expecting a normally distributed outcome with the range of +/- 2 std covering 95% of the possibilities

[Monte Carlo Simulation with Python - Practical Business Python (pbpython.com)]

Demo

Using a local Jupyter instance to start a set of Monte Carlo simulations on Azure via AML SDK

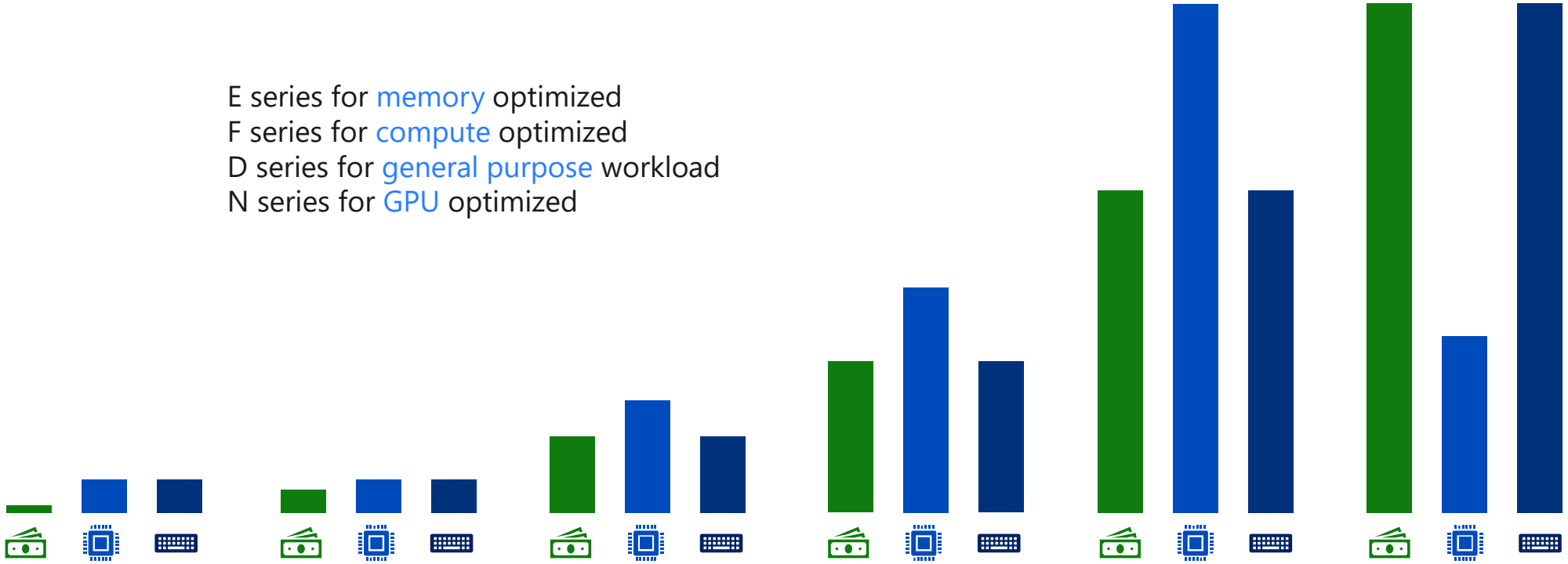


Benchmark

Scalling from 10^1 to 10^6 simulations in different compute sizes and prices for a parallelized implementation in R

Compute Sizes and Prices

E series for memory optimized
F series for compute optimized
D series for general purpose workload
N series for GPU optimized



Local PC
4 cores,16 GB RAM
Price: €0.00/hour *

DS3 V2
4 cores, 16 GB RAM
Price: **€0.23/hour**
(€167/month)

F16s V2
16 cores, 32 GB RAM
Price: **€0.65/hour**
(€477/month)

F32s V2
32 cores, 64 GB RAM
Price: **€1.30/hour**
(€955/month)

F72s V2
72 cores, 144 GB RAM
Price: **€2.94/hour**
(€1,273/month)

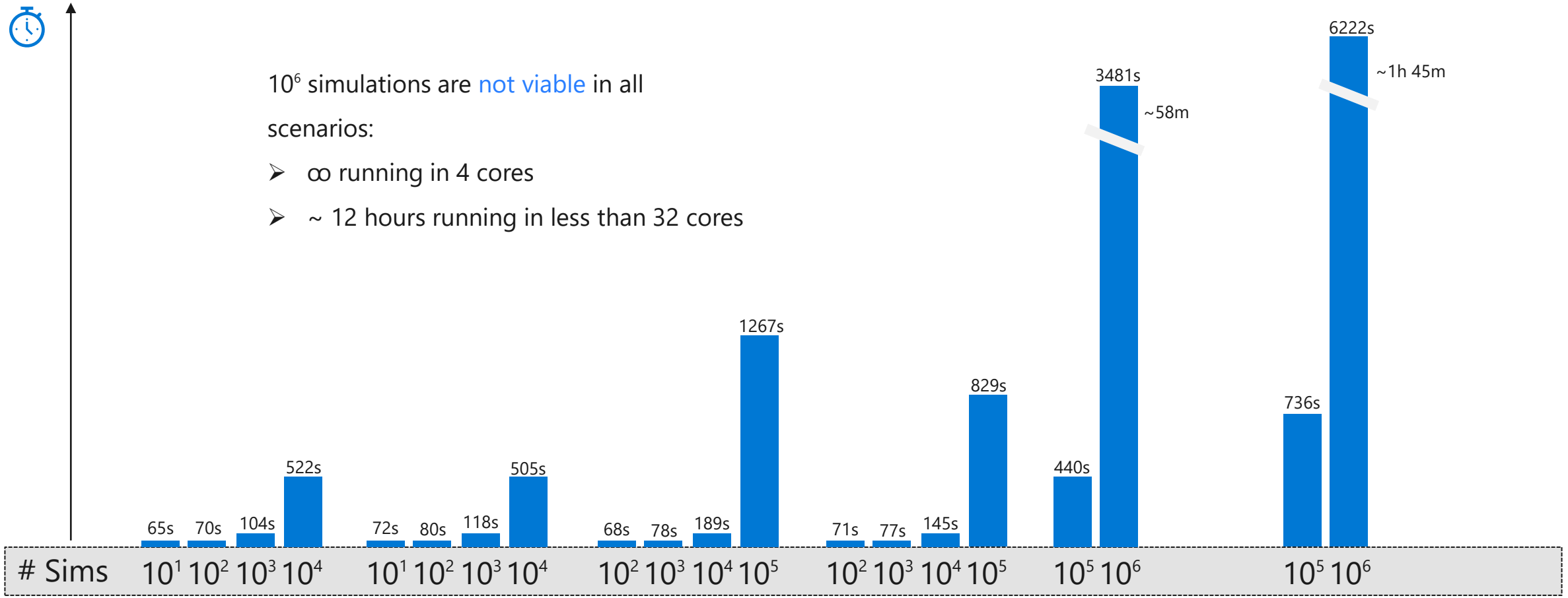
NV24
24 cores, 224 GB RAM
(4x NVIDIA Tesla M60 GPU)
Price: **€4.60/hour**
(€3,361/month)

[Pricing - Azure Machine Learning | Microsoft Azure]

Tim ings

10^6 simulations are not viable in all scenarios:

- ∞ running in 4 cores
- ~ 12 hours running in less than 32 cores



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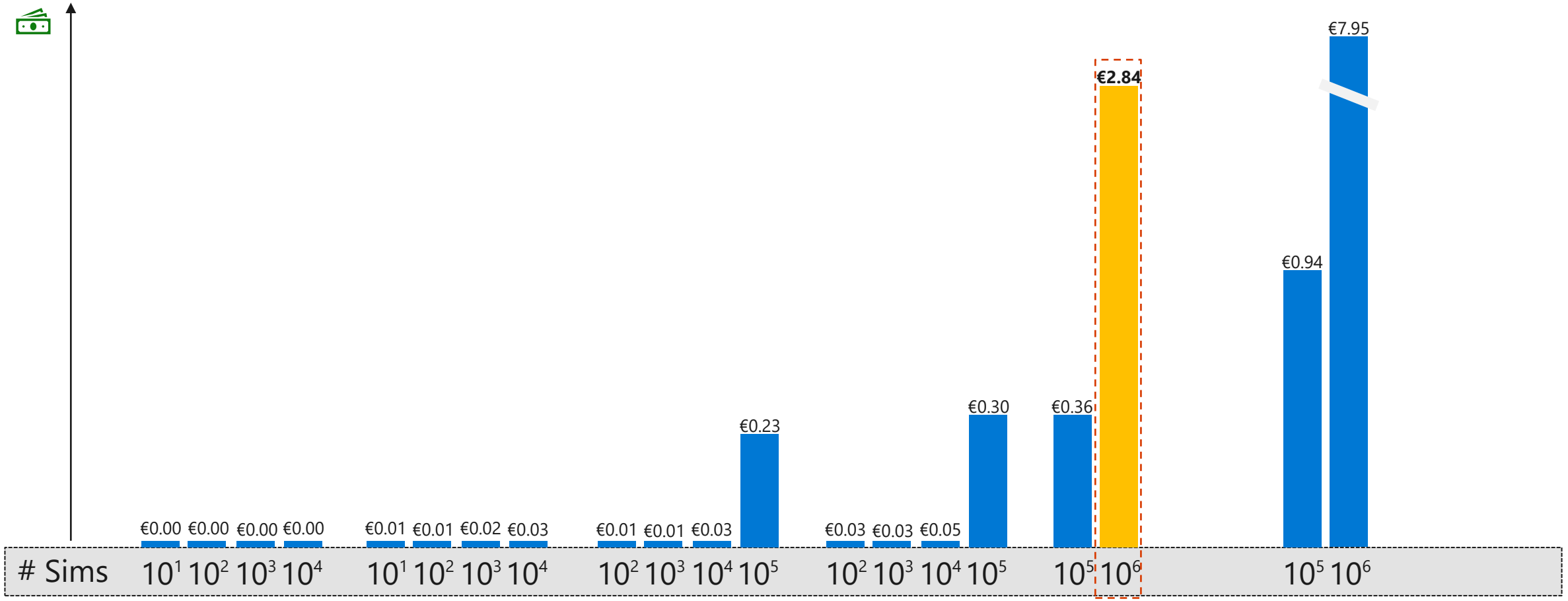
Cost per Execution



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Questions?

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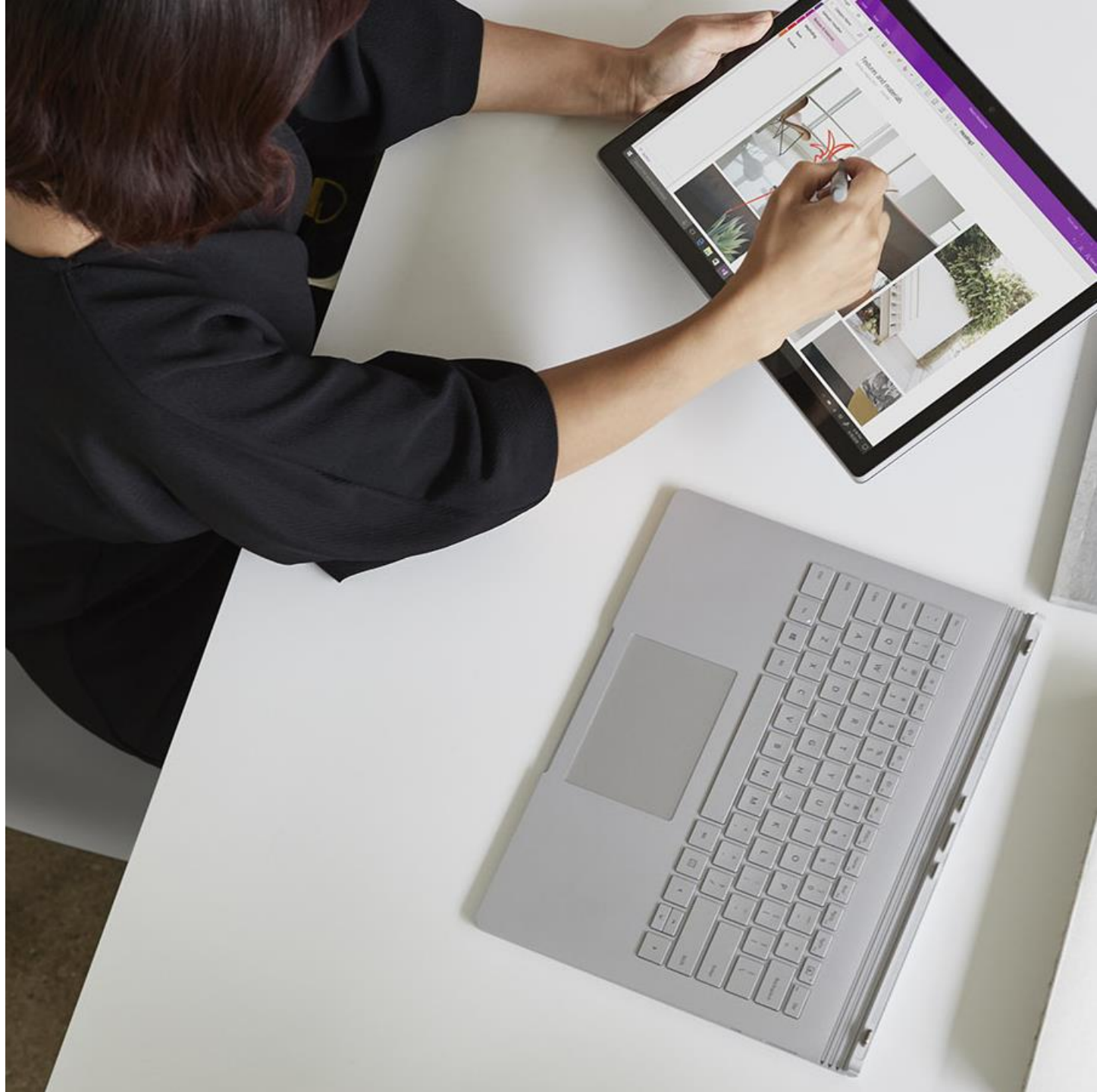
Takeaways & Resources

Monte Carlo Simulation with Python - Practical Business Python (pbpython.com)

Azure Machine Learning SDK for Python - Azure Machine Learning Python | Microsoft Docs

Pricing - Azure Machine Learning | Microsoft Azure

github.com/dlabbe1005/MCSimulationsOnAML



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Thank you!