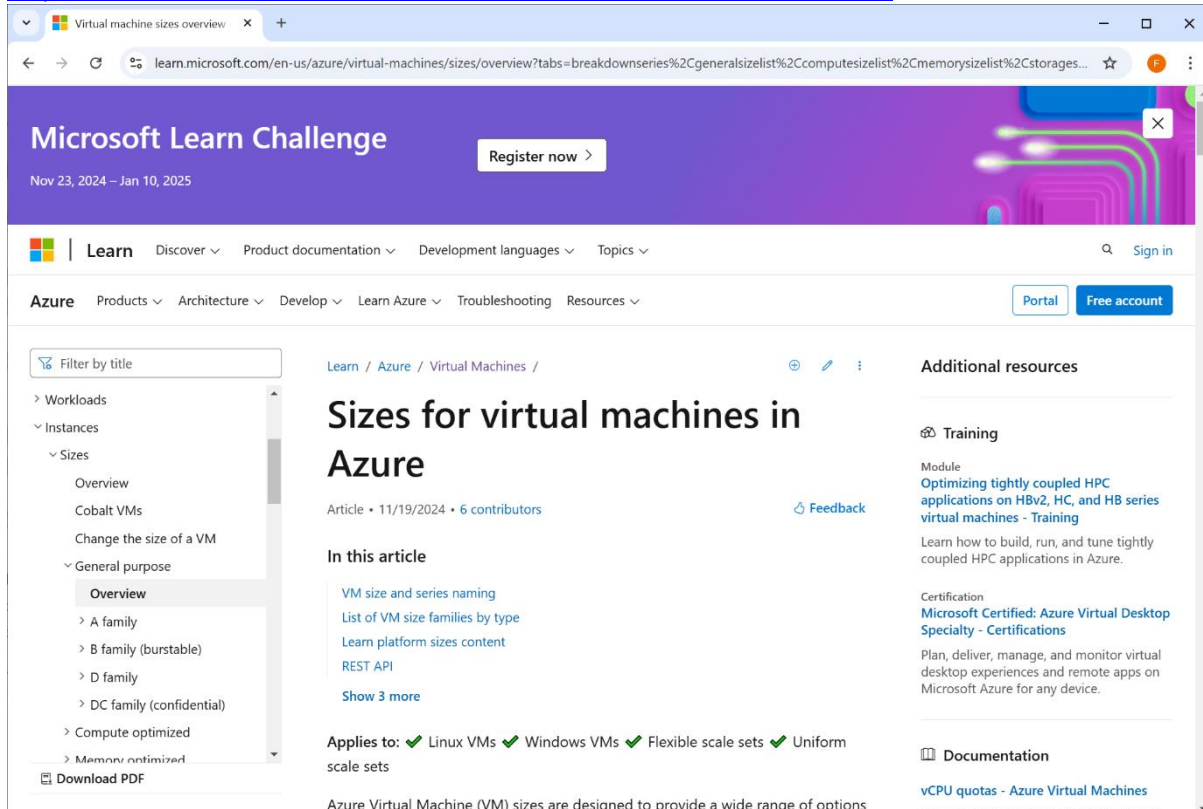


Azure VM pricing vs Hetzner/TIMi pricing

Version v1.01 – 2024-12-2

From the Azure documentation available here:

<https://learn.microsoft.com/en-us/azure/virtual-machines/sizes/overview>



... the virtual machines available inside Azure are classified in 9 different “Series”:

VM Series	vCPU Range	Memory (GB)	Purpose
A-series	1 - 8	2 - 64	Entry-level, dev/test, small apps
B-series	2 - 32	1 - 128	Burstable, cost-efficient workloads
D-series	2 - 96	8 - 384	General-purpose, business apps
E-series	2 - 128	16 - 672	Memory-intensive apps
F-series	2 - 64	4 - 256	Compute-intensive workloads
L-series	4 - 80	32 - 512	Storage-intensive workloads
M-series	8 - 416	192 - 11,400	Extremely high-memory workloads
N-series	6 - 96	56 - 672	GPU-based tasks (AI, ML, graphics)
H-series	2 - 120	8 - 1200	High-performance computing (HPC)

Here are the processors available in each of these series:

VM Series	Processor	vCPU Range	Memory Range (GB)	Key Features
A-series	Intel Xeon E5 family (E5-2673 v3 and v4), Intel Xeon Platinum 8370C and 8272CL, Intel Xeon 8171M (Ice Lake)	1-8	2 - 64	Budget-friendly, entry-level, consistent CPU performance
B-series	AMD EPYC 7763v (Genoa) and 7452, Intel Xeon Platinum 8473C (Sapphire Rapids) or 8370C (Ice Lake)	2 - 32	1 - 128	Burstable, credit-based CPU performance model
D-series	Intel Xeon Platinum 8573C (Emerald Rapids) and 8272CL (Cascade Lake), AMD EPYC 7763 (Milan), AMD's 4th Generation EPYC™ 9004	2 - 96	8 - 384	High CPU-to-memory ratio for general-purpose workloads
E-series	Intel Xeon Platinum 8370C (Ice Lake), AMD EPYC 7763 (Milan), AMD's fourth Generation EPYC™ 9004	2 - 128	16 - 672	Memory-optimized, great for relational databases and in-memory analytics
F-series	Intel Xeon Platinum 8272CL (Cascade Lake)	2 - 64	4 - 256	Compute-intensive workloads with a high CPU-to-memory ratio
L-series	Intel Xeon Platinum 8370C (Ice Lake), AMD EPYC 7763v (Milan).	4 - 80	32 - 512	Optimized for storage-intensive workloads with high IOPS
H-series	Intel Xeon Platinum 8168, 4th Gen AMD EPYC 7551 (Naples), AMD EPYC 7V12 (Genoa) , AMD EPYC 9V33X (Genoa-X), AMD EPYC™ 7V73X (Milan-X), AMD EPYC 7V12	2 - 120	8 - 1200	High-performance computing (HPC), with enhanced interconnects for fast data

If we search the performances for each of these processors on [cpubenchmark.net](https://www.cpubenchmark.net), we get (the higher the “Single thread rating”, the better the CPU):

Processor	Single Thread Rating	Clock Speed [GHz]	URL
Intel Xeon E5-2673 v3	1,738	2.4	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+E5-2673+v3+%40+2.40GHz&id=2606
Intel Xeon E5-2673 v4	2,107	2.3	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+E5-2673+v4+%40+2.30GHz&id=2888
Intel Xeon Platinum 8575C	2,593	4.0	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+Platinum+8575C&id=6173
Intel Xeon Platinum 8370C (Ice Lake)	2,474	3.5	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+Platinum+8375C+%40+2.90GHz&id=4486

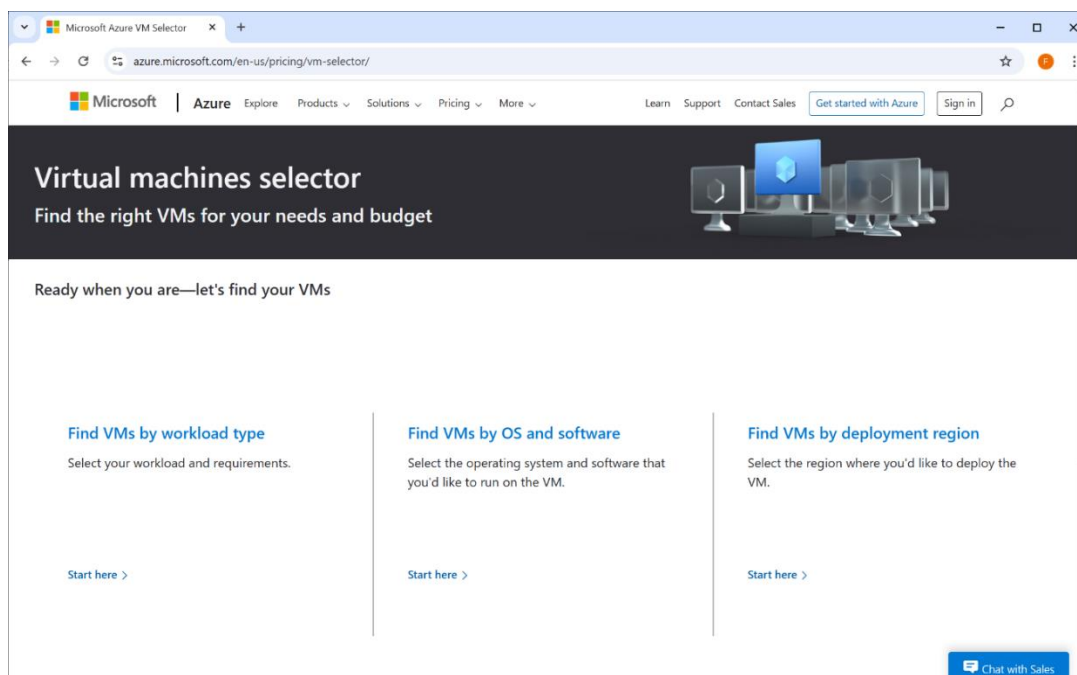
Intel Xeon Platinum 8272CL (Cascade Lake)	2,386	3.0	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+Platinum+8275CL+%40+3.00GHz&id=3624
Intel Xeon 8171M (Ice Lake)	2,222	2.6	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+Platinum+8171M+%40+2.60GHz&id=3220
AMD EPYC 7763v (Genoa)	2,517	2.45	https://www.cpubenchmark.net/cpu.php?cpu=AMD+EPYC+7763&id=4207
AMD EPYC 7452	1,995	2.35	https://www.cpubenchmark.net/cpu.php?cpu=AMD+EPYC+7452&id=3600
Intel Xeon Platinum 8280L	2,029	2.7	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+Platinum+8280+%40+2.70GHz&id=3662
AMD EPYC 7551	1,766	2.0	https://www.cpubenchmark.net/cpu.php?cpu=AMD+EPYC+7551&id=3089
AMD EPYC 7V12 (7443)	2,907	2.9	https://www.cpubenchmark.net/cpu.php?cpu=AMD+EPYC+7443&id=4708
Intel Xeon Platinum 8168	2,092	2.7	https://www.cpubenchmark.net/cpu.php?cpu=Intel+Xeon+Platinum+8168+%40+2.70GHz&id=3111
4th Gen AMD EPYC 7Hx (HBv4)	2022	2.6	https://www.cpubenchmark.net/cpu.php?cpu=AMD+EPYC+7H12&id=3618&cpuCount=2
AMD EPYC 9V33X (Genoa-X) (9334)	2,367	2.7	https://www.cpubenchmark.net/cpu.php?cpu=AMD+EPYC+9334&id=5519

Inside Azure, the processor with the highest speed is thus **AMD EPYC 7V12 (7443)** with a score of 2907: These processors are only available inside the **HBv2-series**.

We'll now make a pricing simulation for a virtual machines based on a the **H series**.

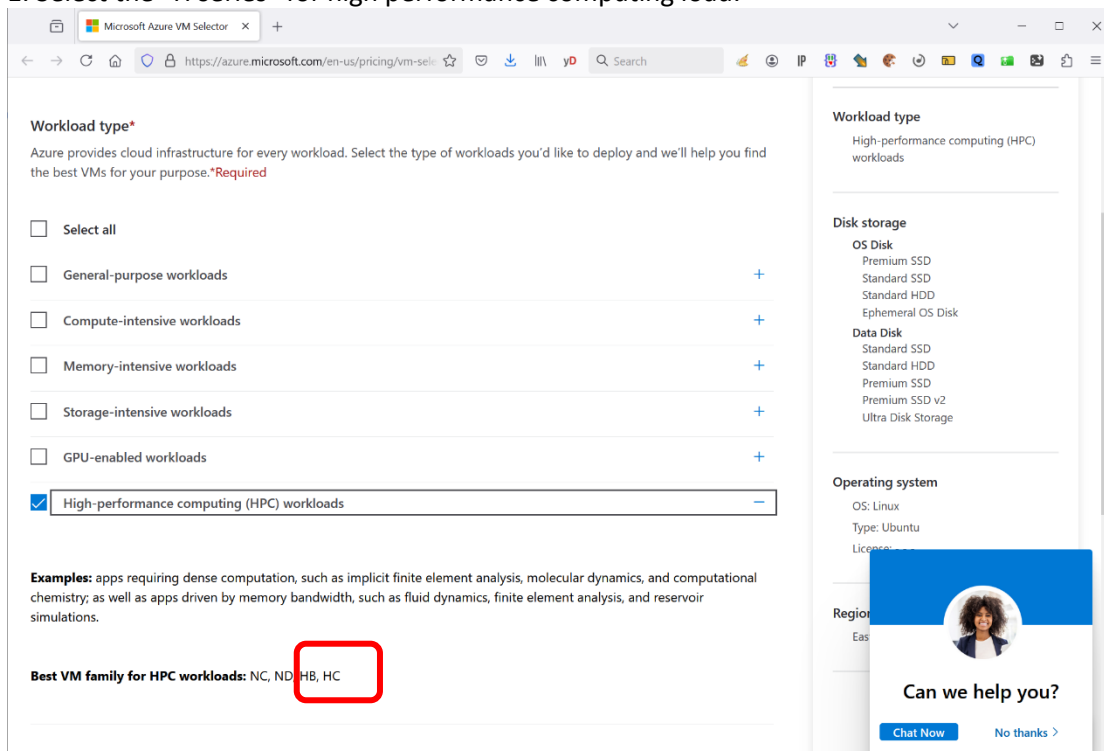
We start here:

<https://azure.microsoft.com/en-us/pricing/vm-selector/>



Here are the configuration steps for the Wizard on Azure:

1. Select the “H series” for high performance computing load:



Workload type*

Azure provides cloud infrastructure for every workload. Select the type of workloads you'd like to deploy and we'll help you find the best VMs for your purpose.*Required

☐ Select all

☐ General-purpose workloads

☐ Compute-intensive workloads

☐ Memory-intensive workloads

☐ Storage-intensive workloads

☐ GPU-enabled workloads

☒ High-performance computing (HPC) workloads

Examples: apps requiring dense computation, such as implicit finite element analysis, molecular dynamics, and computational chemistry; as well as apps driven by memory bandwidth, such as fluid dynamics, finite element analysis, and reservoir simulations.

Best VM family for HPC workloads: NC, ND, HB, HC

Workload type

High-performance computing (HPC) workloads

Disk storage

OS Disk

Premium SSD

Standard SSD

Standard HDD

Ephemeral OS Disk

Data Disk

Standard SSD

Standard HDD

Premium SSD

Premium SSD v2

Ultra Disk Storage

Operating system

OS: Linux

Type: Ubuntu

License: Pay as you go

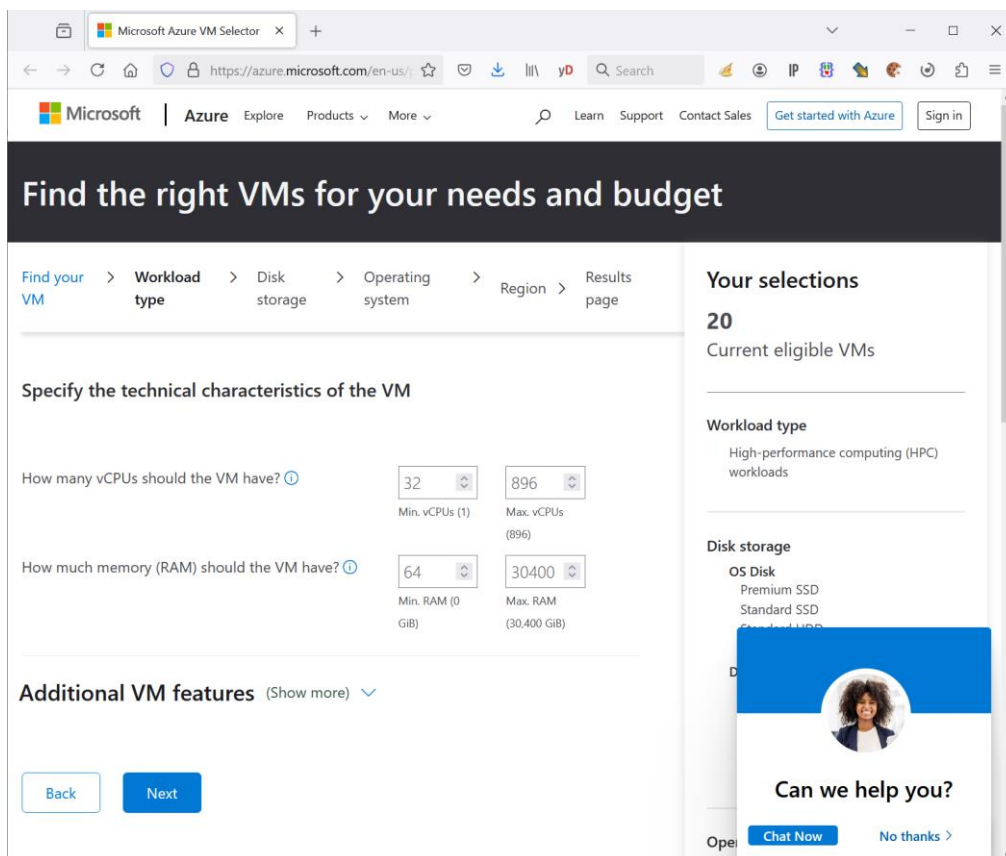
Region

East US

Can we help you?

Chat Now No thanks >

2. We want a machine with at least 32 cores and 64 GB of RAM:



Microsoft Azure VM Selector

Find the right VMs for your needs and budget

Find your VM > Workload type > Disk storage > Operating system > Region > Results page

Specify the technical characteristics of the VM

How many vCPUs should the VM have? 32 896

Min. vCPUs (1) Max. vCPUs (896)

How much memory (RAM) should the VM have? 64 30400

Min. RAM (0) Max. RAM (30,400 GiB)

Additional VM features (Show more) v

Back Next

Your selections

20

Current eligible VMs

Workload type

High-performance computing (HPC) workloads

Disk storage

OS Disk

Premium SSD

Standard SSD

Standard HDD

Ephemeral OS Disk

Data Disk

Standard SSD

Standard HDD

Premium SSD

Premium SSD v2

Ultra Disk Storage

Operating system

OS: Linux

Type: Ubuntu

License: Pay as you go

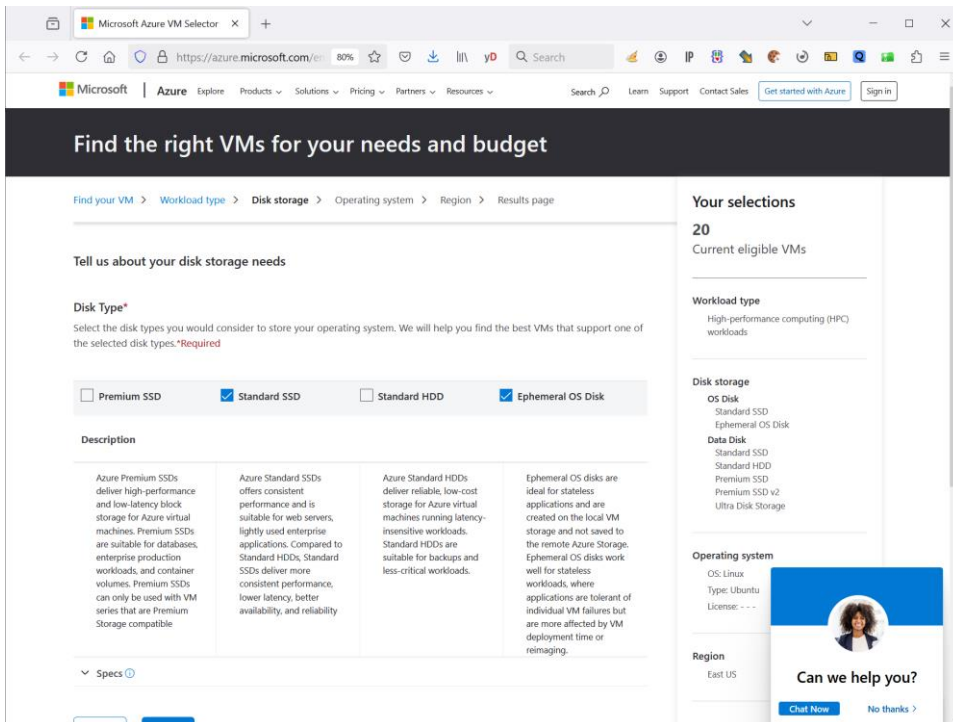
Region

East US

Can we help you?

Chat Now No thanks >

3. We want a machine with a fast SSD for the OS:



Microsoft Azure VM Selector

Find the right VMs for your needs and budget

Find your VM > Workload type > Disk storage > Operating system > Region > Results page

Tell us about your disk storage needs

Disk Type*
Select the disk types you would consider to store your operating system. We will help you find the best VMs that support one of the selected disk types.*Required

☐ Premium SSD ☒ Standard SSD ☐ Standard HDD ☒ Ephemeral OS Disk

Description

Azure Premium SSDs deliver high-performance and low-latency block storage for Azure virtual machines. Premium SSDs are suitable for databases, enterprise production workloads, and container volumes. Premium SSDs can only be used with VM series that are Premium Storage compatible.	Azure Standard SSDs offers consistent performance and is suitable for web servers, lightly used enterprise applications. Compared to Standard HDDs, Standard SSDs deliver more consistent performance, lower latency, better availability, and reliability.	Azure Standard HDDs deliver reliable, low-cost storage for Azure virtual machines running latency-insensitive workloads. Standard HDDs are suitable for backups and less-critical workloads.	Ephemeral OS disks are ideal for stateless applications and are created on the local VM storage and not saved to the remote Azure Storage. Ephemeral OS disks work well for stateless workloads, where applications are tolerant of individual VM failures but are more affected by VM deployment time or reimagining.
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▼ Specs

Your selections
20 Current eligible VMs

Workload type
High-performance computing (HPC) workloads

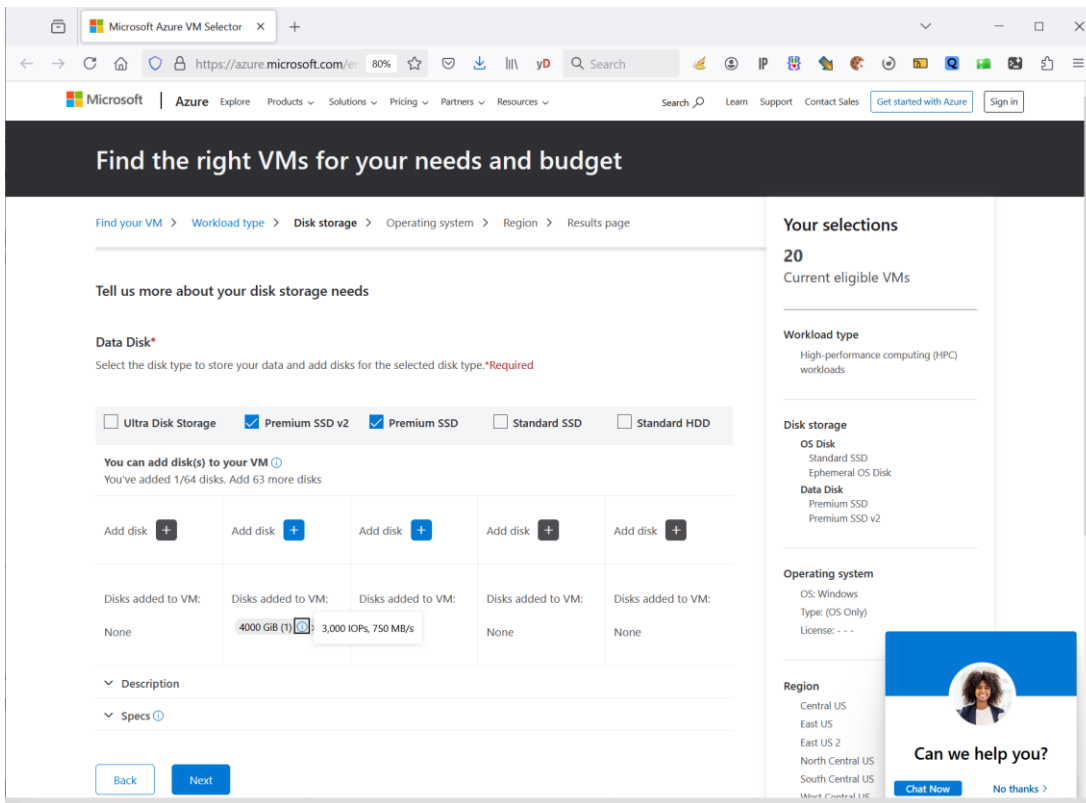
Disk storage
OS Disk: Standard SSD, Ephemeral OS Disk
Data Disk: Standard HDD, Standard SSD, Premium SSD, Premium SSD v2, Ultra Disk Storage

Operating system
OS: Linux
Type: Ubuntu
License: ---

Region
East US

Can we help you?
Chat Now No thanks >

4. We want to store around 4 TB of data (same capacity as the machines on Hetzner): When we select this size, we can only get a SSD with an access-speed of 750 Mbyte/sec (i.e. quite slow). No way to get better speed without exploding the budget.



Microsoft Azure VM Selector

Find the right VMs for your needs and budget

Find your VM > Workload type > Disk storage > Operating system > Region > Results page

Tell us more about your disk storage needs

Data Disk*
Select the disk type to store your data and add disks for the selected disk type.*Required

☐ Ultra Disk Storage ☒ Premium SSD v2 ☒ Premium SSD ☐ Standard SSD ☐ Standard HDD

You can add disk(s) to your VM
You've added 1/64 disks. Add 63 more disks

Add disk +	Add disk +	Add disk +	Add disk +	Add disk +
Disks added to VM:	Disks added to VM:	Disks added to VM:	Disks added to VM:	Disks added to VM:
None	4000 GiB (1) 3,000 IOPS, 750 MB/s	None	None	None

▼ Description
▼ Specs

Back Next

Your selections
20 Current eligible VMs

Workload type
High-performance computing (HPC) workloads

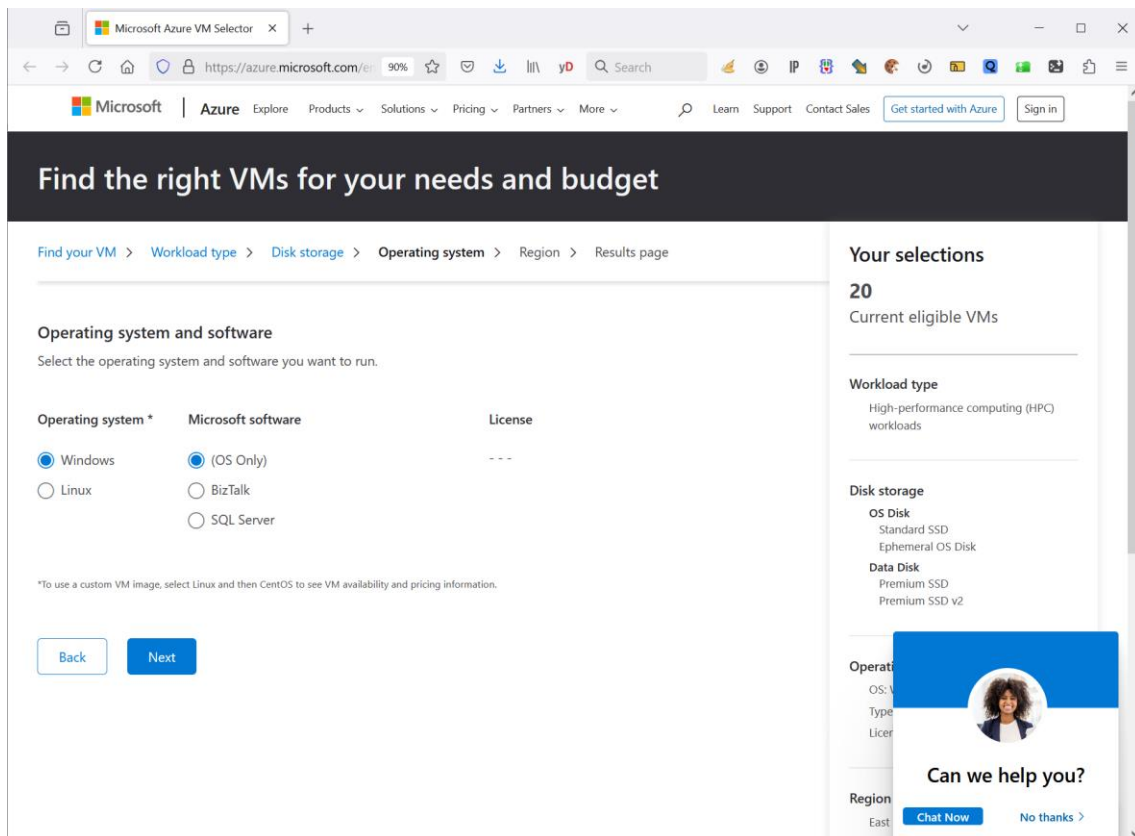
Disk storage
OS Disk: Standard SSD, Ephemeral OS Disk
Data Disk: Premium SSD, Premium SSD v2

Operating system
OS: Windows
Type: (OS Only)
License: ---

Region
Central US, East US, East US 2, North Central US, South Central US, West Central US

Can we help you?
Chat Now No thanks >

5. The OS on the machine should be Windows:



Microsoft Azure VM Selector

Find the right VMs for your needs and budget

Find your VM > Workload type > Disk storage > Operating system > Region > Results page

Operating system and software

Select the operating system and software you want to run.

Operating system *	Microsoft software	License
<input checked="" type="radio"/> Windows	<input checked="" type="radio"/> (OS Only)	---
<input type="radio"/> Linux	<input type="radio"/> BizTalk	
	<input type="radio"/> SQL Server	

*To use a custom VM image, select Linux and then CentOS to see VM availability and pricing information.

Back Next

Your selections

20
Current eligible VMs

Workload type
High-performance computing (HPC) workloads

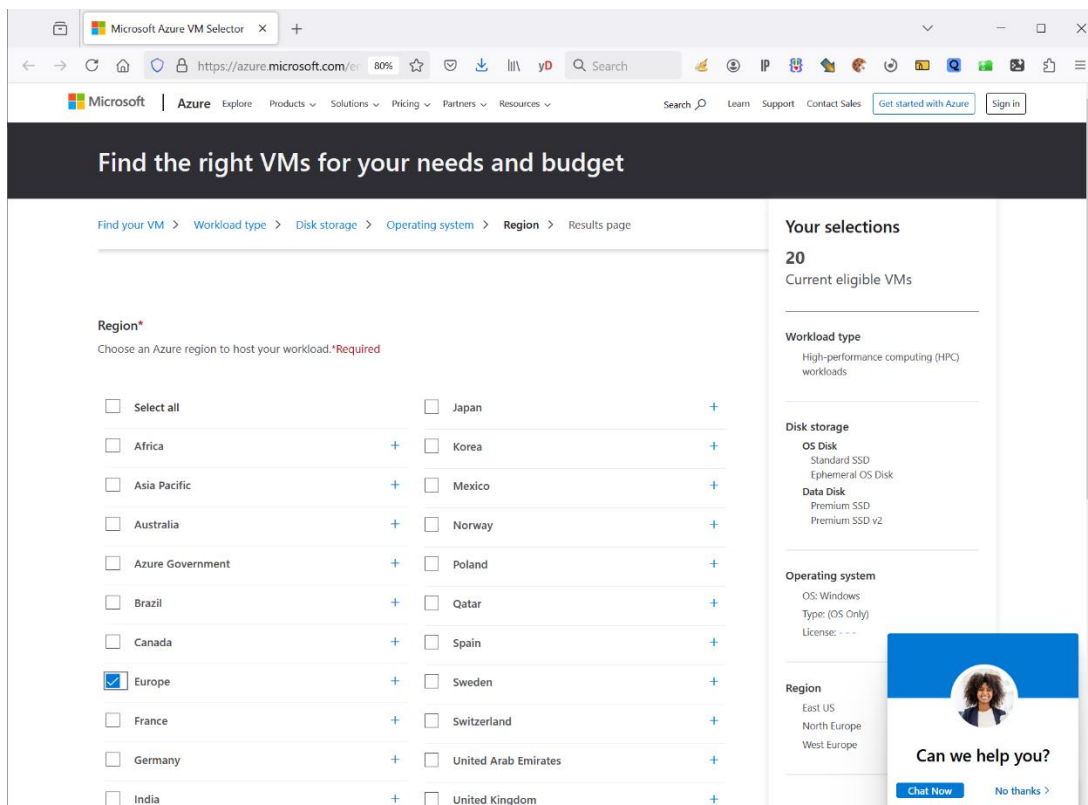
Disk storage
OS Disk: Standard SSD, Ephemeral OS Disk
Data Disk: Premium SSD, Premium SSD v2

Operating system
OS: Windows
Type: (OS Only)
License: ---

Region
East US

Can we help you?
Chat Now No thanks >

6. We want our machine in Europe:



Microsoft Azure VM Selector

Find the right VMs for your needs and budget

Find your VM > Workload type > Disk storage > Operating system > Region > Results page

Region*

Choose an Azure region to host your workload.*Required

Region	Region
<input type="checkbox"/> Select all	<input type="checkbox"/> Japan
<input type="checkbox"/> Africa	<input type="checkbox"/> Korea
<input type="checkbox"/> Asia Pacific	<input type="checkbox"/> Mexico
<input type="checkbox"/> Australia	<input type="checkbox"/> Norway
<input type="checkbox"/> Azure Government	<input type="checkbox"/> Poland
<input type="checkbox"/> Brazil	<input type="checkbox"/> Qatar
<input type="checkbox"/> Canada	<input type="checkbox"/> Spain
<input checked="" type="checkbox"/> Europe	<input type="checkbox"/> Sweden
<input type="checkbox"/> France	<input type="checkbox"/> Switzerland
<input type="checkbox"/> Germany	<input type="checkbox"/> United Arab Emirates
<input type="checkbox"/> India	<input type="checkbox"/> United Kingdom

Your selections

20
Current eligible VMs

Workload type
High-performance computing (HPC) workloads

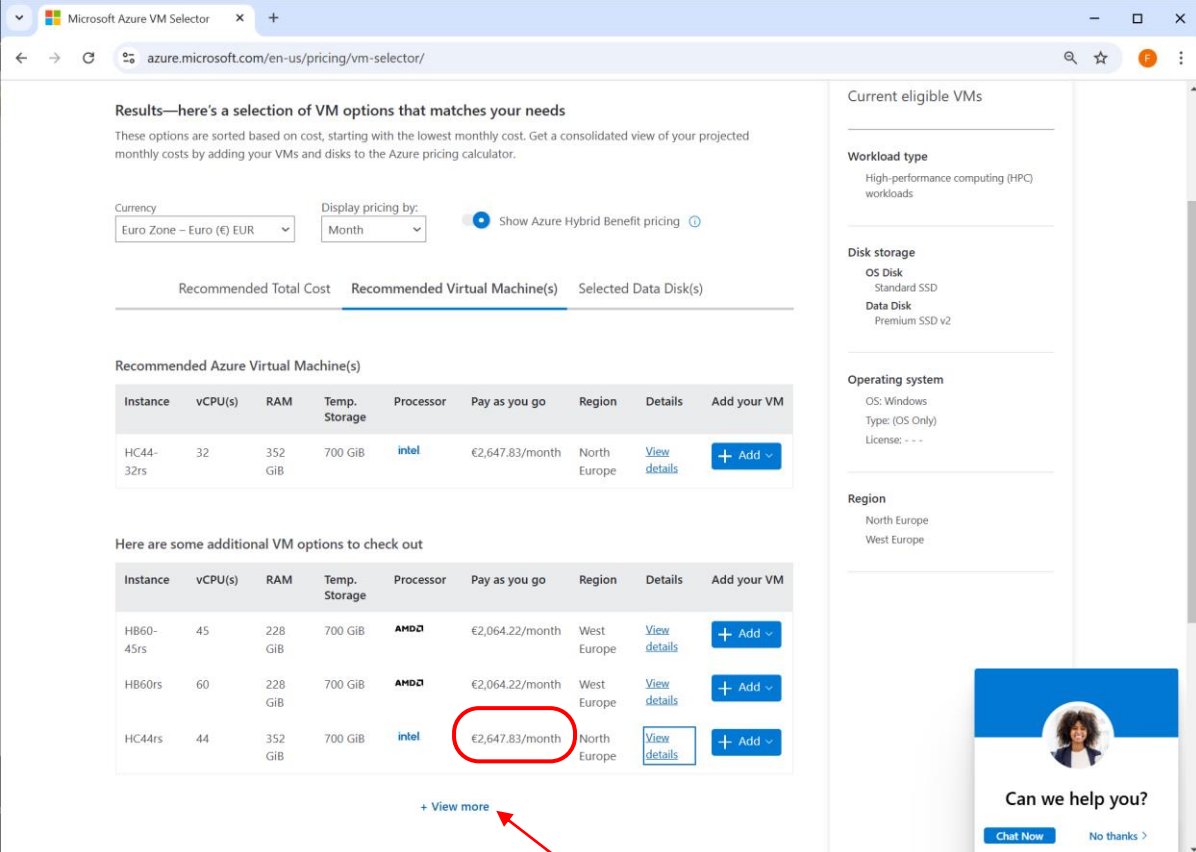
Disk storage
OS Disk: Standard SSD, Ephemeral OS Disk
Data Disk: Premium SSD, Premium SSD v2

Operating system
OS: Windows
Type: (OS Only)
License: ---

Region
East US, North Europe, West Europe

Can we help you?
Chat Now No thanks >

We finally arrive at a proposition from the Azure-Wizard for some machine based on HB60rs series. The monthly price for the machine (without the SSD storage) is 2647 €: See screenshot:



Results—here's a selection of VM options that matches your needs

These options are sorted based on cost, starting with the lowest monthly cost. Get a consolidated view of your projected monthly costs by adding your VMs and disks to the Azure pricing calculator.

Currency: Euro Zone – Euro (€) EUR | Display pricing by: Month | Show Azure Hybrid Benefit pricing

Recommended Total Cost | Recommended Virtual Machine(s) | Selected Data Disk(s)

Instance	vCPU(s)	RAM	Temp. Storage	Processor	Pay as you go	Region	Details	Add your VM
HC44-32rs	32	352 GiB	700 GiB	intel	€2,647.83/month	North Europe	View details	+ Add

Here are some additional VM options to check out

Instance	vCPU(s)	RAM	Temp. Storage	Processor	Pay as you go	Region	Details	Add your VM
HB60-45rs	45	228 GiB	700 GiB	AMD	€2,064.22/month	West Europe	View details	+ Add
HB60rs	60	228 GiB	700 GiB	AMD	€2,064.22/month	West Europe	View details	+ Add
HC44rs	44	352 GiB	700 GiB	intel	€2,647.83/month	North Europe	View details	+ Add

[+ View more](#)

Current eligible VMs

Workload type: High-performance computing (HPC) workloads

Disk storage: OS Disk: Standard SSD, Data Disk: Premium SSD v2

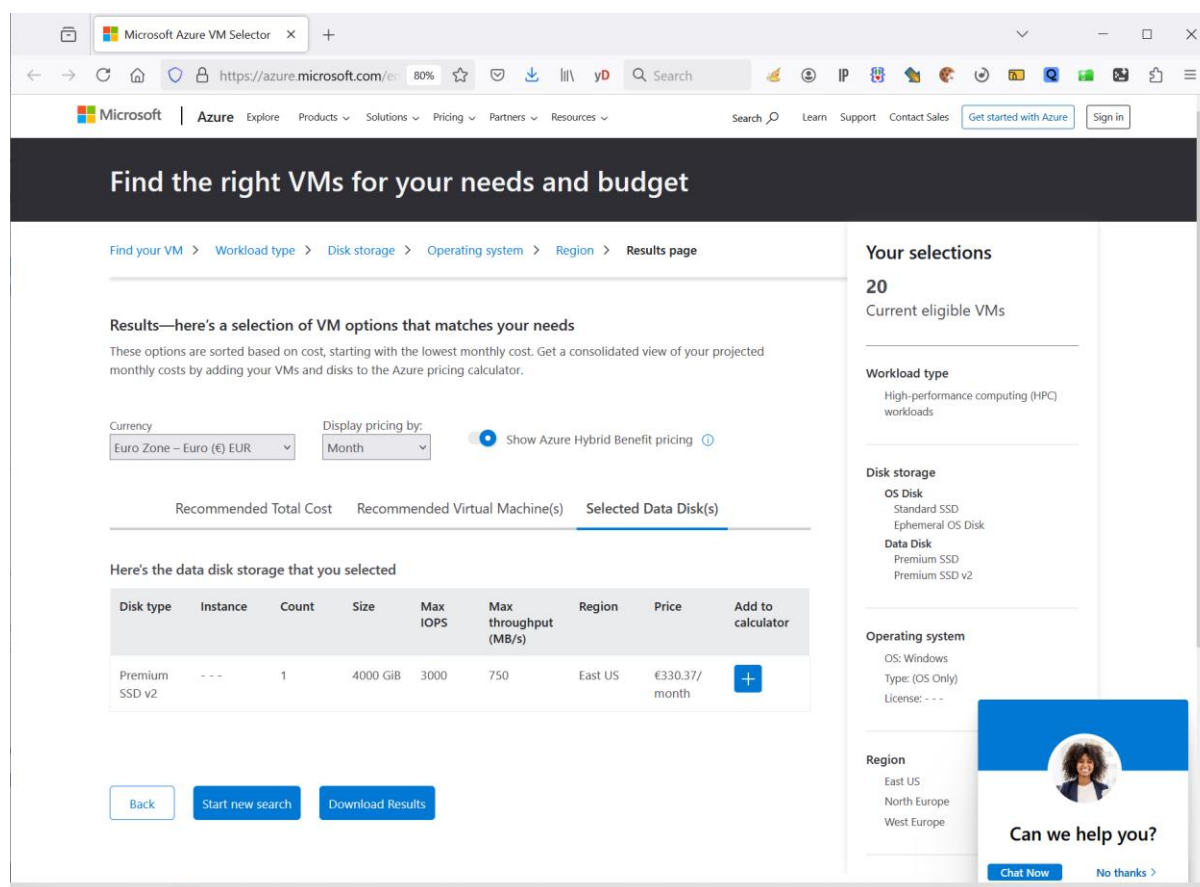
Operating system: OS: Windows, Type: (OS Only), License: - - -

Region: North Europe, West Europe

Can we help you? [Chat Now](#) [No thanks](#)

We tried to make many different other simulations that would allow us to get another type of instance with some CPUs. Actually, when you click here: [+ View more](#), you can see more machines with really bad CPU's (AMD EPYC 7002 and 7003). The only instance that is slightly better than the others is from the series HC44rs that has an Intel Xeon 8168 processor (you can see the exact processors when clicking on the "View details") with a performance score of 2092.

In addition to the machine cost, the monthly storage cost is around 330 €:



The screenshot shows the Microsoft Azure VM Selector interface. The main heading is "Find the right VMs for your needs and budget". The breadcrumb trail is: Find your VM > Workload type > Disk storage > Operating system > Region > Results page. The results are sorted by cost, starting with the lowest monthly cost. The selected configuration is: Workload type: High-performance computing (HPC) workloads; Disk storage: OS Disk (Standard SSD, Ephemeral OS Disk), Data Disk (Premium SSD, Premium SSD v2); Operating system: OS: Windows, Type: (OS Only), License: ---; Region: East US. The recommended total cost is 2647 €, and the recommended virtual machine is 20. The selected data disk(s) are: Premium SSD v2, 4000 GiB, 3000 Max IOPS, 750 Max throughput (MB/s), East US, Price: €330.37/month. The interface includes buttons for "Back", "Start new search", and "Download Results".

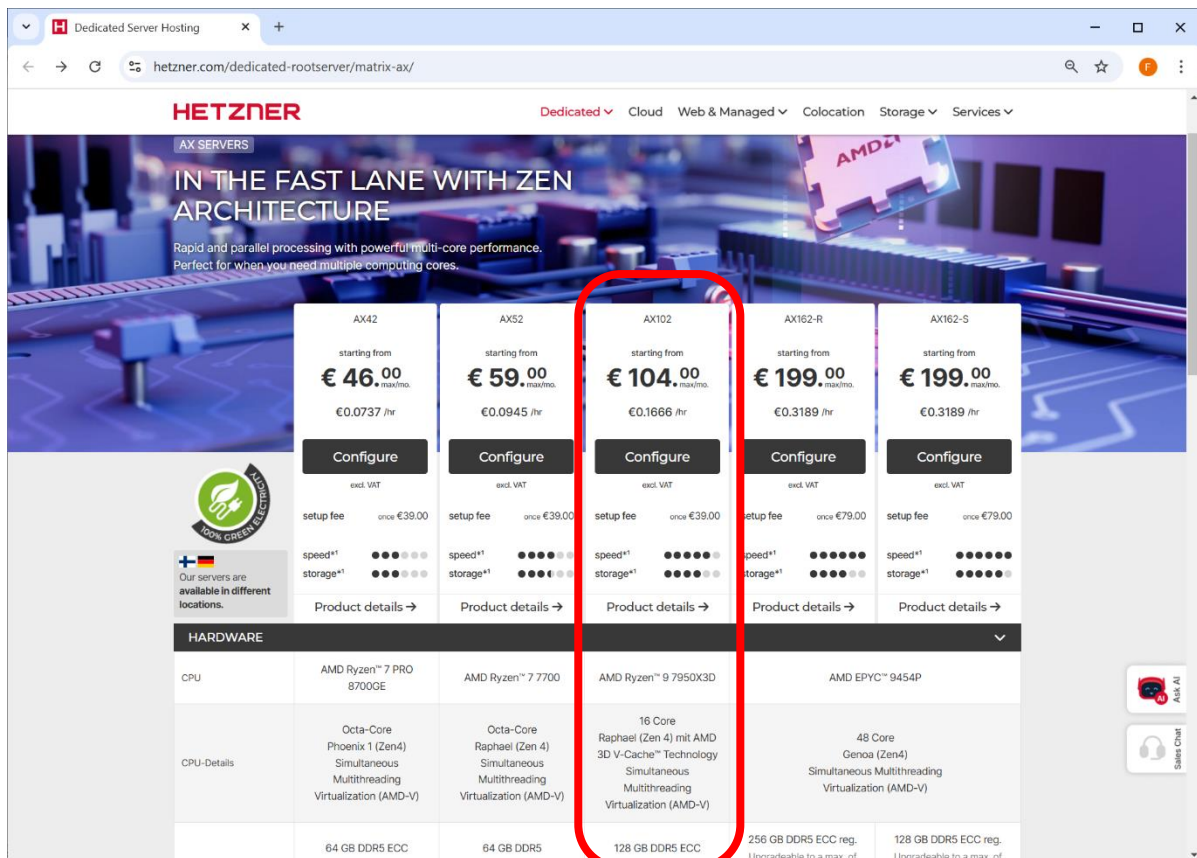
Thus, the total monthly cost for the best Azure machine is $2647 + 330 = 2977$ €/month

Let's now compare the best&most efficient machine from Azure to 2 machines readily available on Hetzner: AX102 and EX101. Since the machine from Fiberklaar is the AX101 (an older version from AX102), we'll also add it to the comparison.

Here is a table with the 3 processors from Hetzner:

Processor	Single Thread Rating	Clock Speed	URL
AX101 AMD Ryzen 9 5950X	3469	3.4	https://www.cpubenchmark.net/cpu.php?cpu=AMD+Ryzen+9+5950X&id=3862
AX102 AMD Ryzen 9 7950X3D	4150	4.2	https://www.cpubenchmark.net/cpu.php?id=5234&cpu=AMD+Ryzen+9+7950X3D
EX101 Intel Core i9-13900	4330	5	https://www.cpubenchmark.net/cpu.php?id=5176&cpu=Intel+Core+i9-13900

Here are the specs for the AX102: <https://www.hetzner.com/dedicated-rootserver/matrix-ax/>



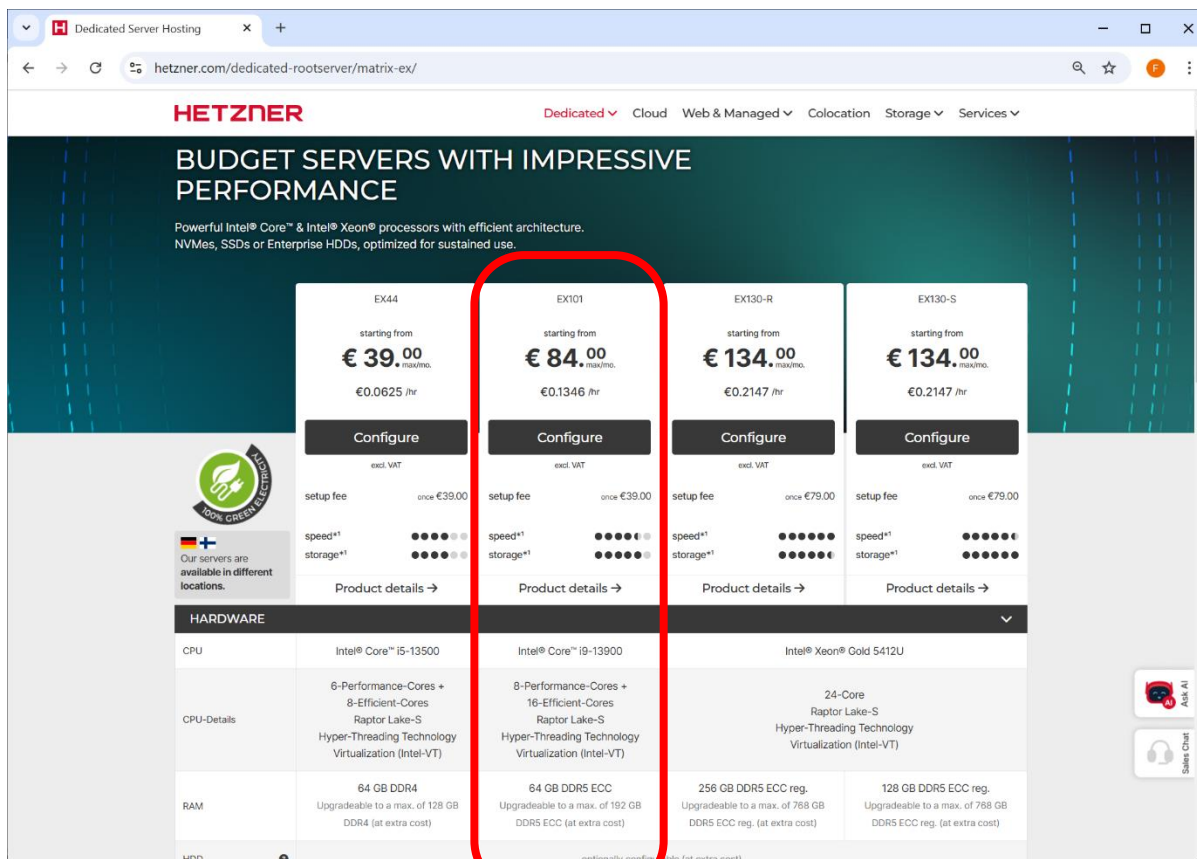
HETZNER Dedicated Cloud Web & Managed Colocation Storage Services

AX SERVERS

IN THE FAST LANE WITH ZEN ARCHITECTURE
Rapid and parallel processing with powerful multi-core performance. Perfect for when you need multiple computing cores.

Model	AX42	AX52	AX102	AX162-R	AX162-S
starting from	€ 46.00	€ 59.00	€ 104.00	€ 199.00	€ 199.00
per month	€0.0737 /hr	€0.0945 /hr	€0.1666 /hr	€0.3189 /hr	€0.3189 /hr
Setup fee	once €39.00	once €39.00	once €39.00	once €79.00	once €79.00
Speed	4/5	5/5	5/5	5/5	5/5
Storage	4/5	5/5	5/5	5/5	5/5
CPU	AMD Ryzen™ 7 PRO 8700GE	AMD Ryzen™ 7 7700	AMD Ryzen™ 9 7950X3D	AMD EPYC™ 9454P	AMD EPYC™ 9454P
CPU-Details	Octa-Core Phoenix 1 (Zen4) Simultaneous Multithreading Virtualization (AMD-V)	Octa-Core Raphael (Zen 4) Simultaneous Multithreading Virtualization (AMD-V)	16 Core Raphael (Zen 4) mit AMD 3D V-Cache™ Technology Simultaneous Multithreading Virtualization (AMD-V)	48 Core Genoa (Zen4) Simultaneous Multithreading Virtualization (AMD-V)	48 Core Genoa (Zen4) Simultaneous Multithreading Virtualization (AMD-V)
RAM	64 GB DDR5 ECC	64 GB DDR5	128 GB DDR5 ECC	256 GB DDR5 ECC reg. Upgradable to a max. of	128 GB DDR5 ECC reg. Upgradable to a max. of

Here are the specs for the EX101: <https://www.hetzner.com/dedicated-rootserver/matrix-ex/>



HETZNER Dedicated Cloud Web & Managed Colocation Storage Services

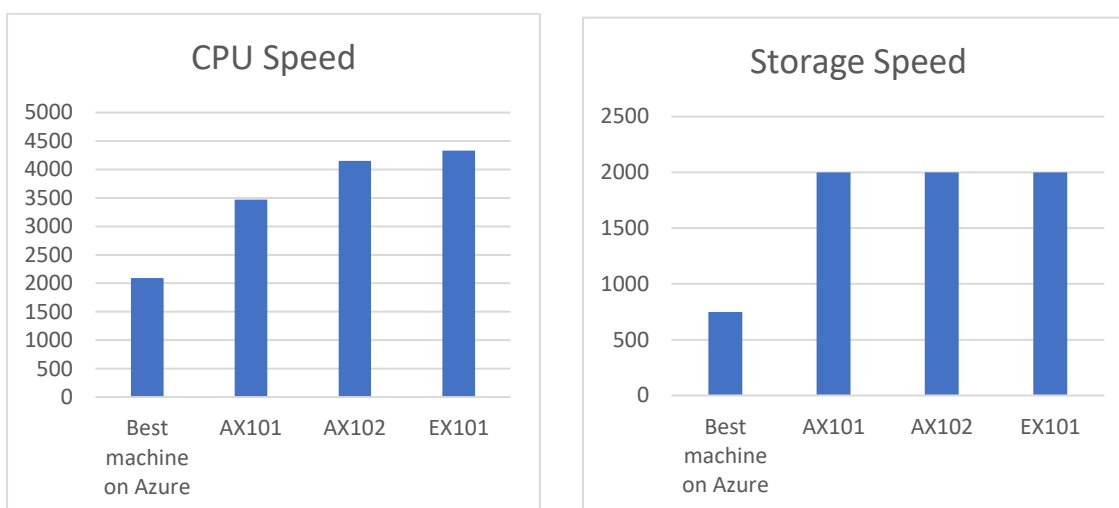
BUDGET SERVERS WITH IMPRESSIVE PERFORMANCE
Powerful Intel® Core™ & Intel® Xeon® processors with efficient architecture. NVMe, SSDs or Enterprise HDDs, optimized for sustained use.

Model	EX44	EX101	EX130-R	EX130-S
starting from	€ 39.00	€ 84.00	€ 134.00	€ 134.00
per month	€0.0625 /hr	€0.1346 /hr	€0.2147 /hr	€0.2147 /hr
Setup fee	once €39.00	once €39.00	once €79.00	once €79.00
Speed	4/5	5/5	5/5	5/5
Storage	4/5	5/5	5/5	5/5
CPU	Intel® Core™ i5-13500	Intel® Core™ i9-13900	Intel® Xeon® Gold 5412U	Intel® Xeon® Gold 5412U
CPU-Details	6-Performance-Cores + 8-Efficient-Cores Raptor Lake-S Hyper-Threading Technology Virtualization (Intel-VT)	8-Performance-Cores + 16-Efficient-Cores Raptor Lake-S Hyper-Threading Technology Virtualization (Intel-VT)	24-Core Raptor Lake-S Hyper-Threading Technology Virtualization (Intel-VT)	24-Core Raptor Lake-S Hyper-Threading Technology Virtualization (Intel-VT)
RAM	64 GB DDR4 Upgradable to a max. of 128 GB DDR4 (at extra cost)	64 GB DDR5 ECC Upgradable to a max. of 192 GB DDR5 ECC (at extra cost)	256 GB DDR5 ECC reg. Upgradable to a max. of 768 GB DDR5 ECC reg. (at extra cost)	128 GB DDR5 ECC reg. Upgradable to a max. of 768 GB DDR5 ECC reg. (at extra cost)
HDD		optionally configurable (at extra cost)		

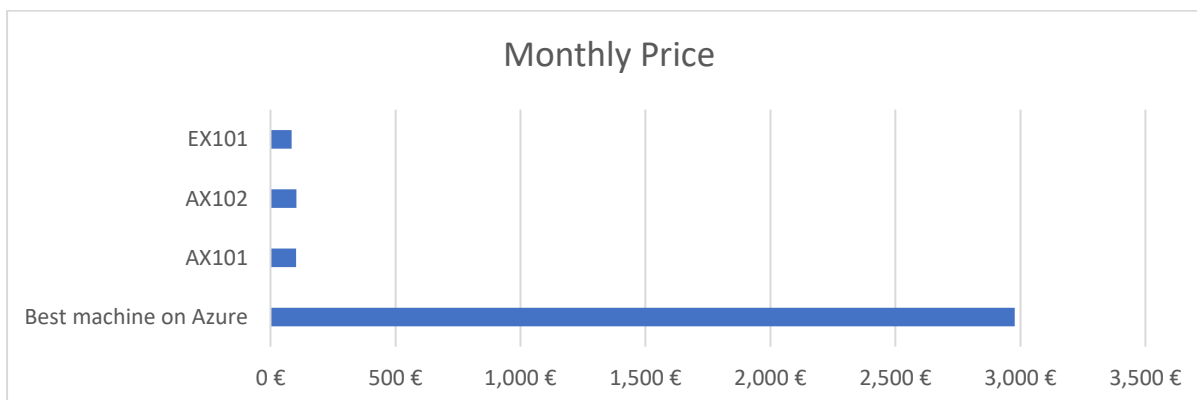
Here is the final comparison table between Hetzner and Azure:

	Best machine on Azure	AX101	AX102	EX101
CPU name	AMD EPYC 7551	AMD Ryzen 9 5950X	AMD Ryzen 9 7950X3D	Intel Core i9-13900
CPU Speed	2092	3469	4150	4330
RAM	200 GB	128 GB	128 GB	64 GB
Storage capacity	4 TB	4 TB	4 TB	4 TB
Storage Speed	750 MB/sec	2000 MB/sec	2000 MB/sec	2000 MB/sec
Monthly Price	2977 €	102 €	104 €	84 €

Graphically:



Monthly Price:



We recommend to use the EX101 server on Hetzner because it is:

- 35.4 times cheaper than the best available Azure server
- 2.07 times faster in terms of CPU than the best available Azure server
- 2.66 times faster in terms of Storage-Access-Speed (to read & write data on SSD) than the best available Azure server
- The Hetzner server has enough RAM (64GB) to do everything and anything with TIMi.