

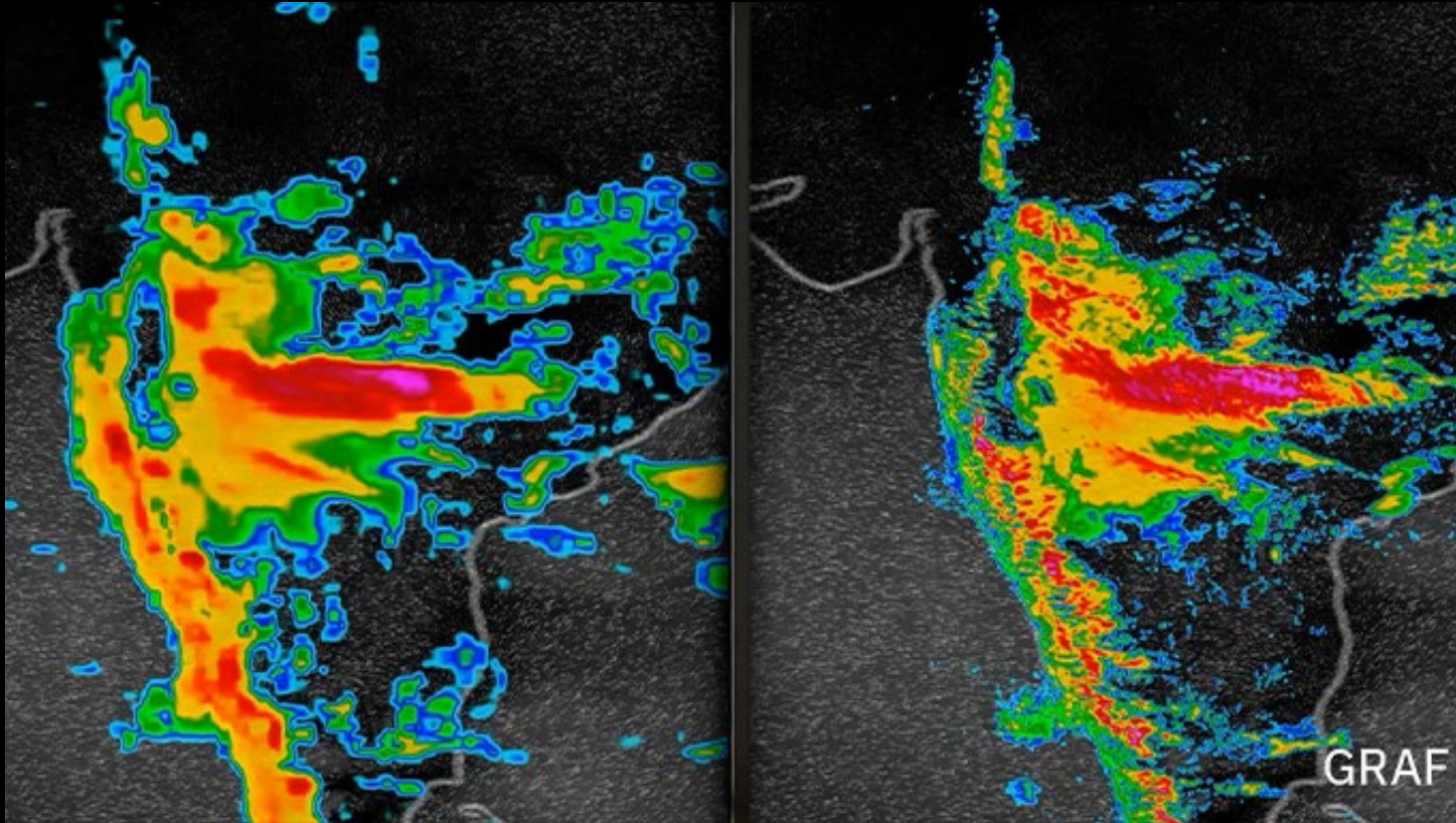
Porting and Benchmarking GRAF on AWS

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Principal Solutions Architect, AWS



Global High-Resolution Atmospheric Forecasting System

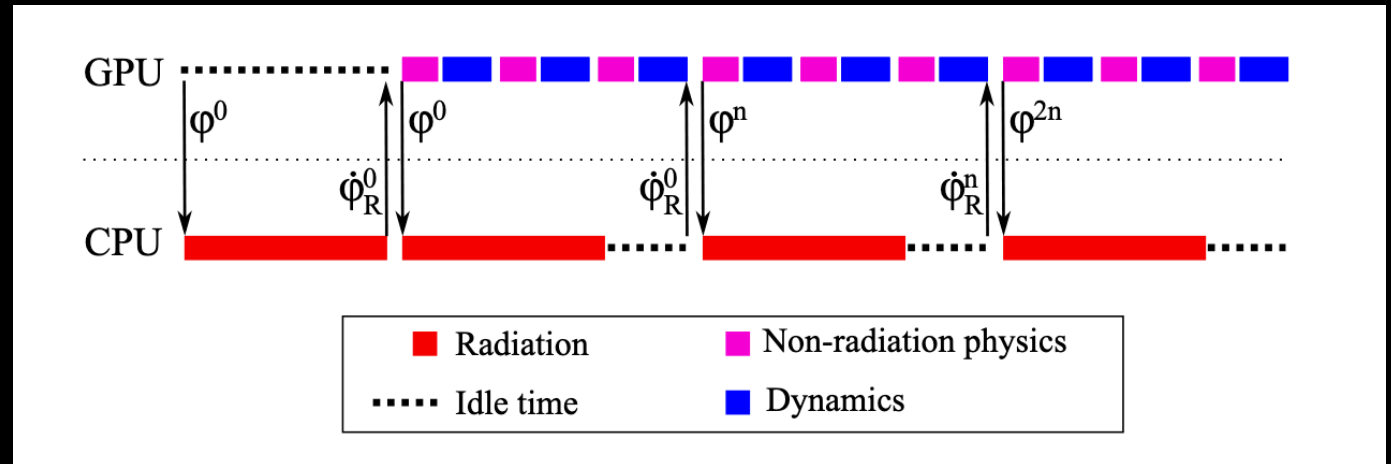


The 
Weather
Company

- Hourly forecasts
- 5 min output for US and EU
- 3.5 km over US and EU
- GPU optimized
- Modelling system

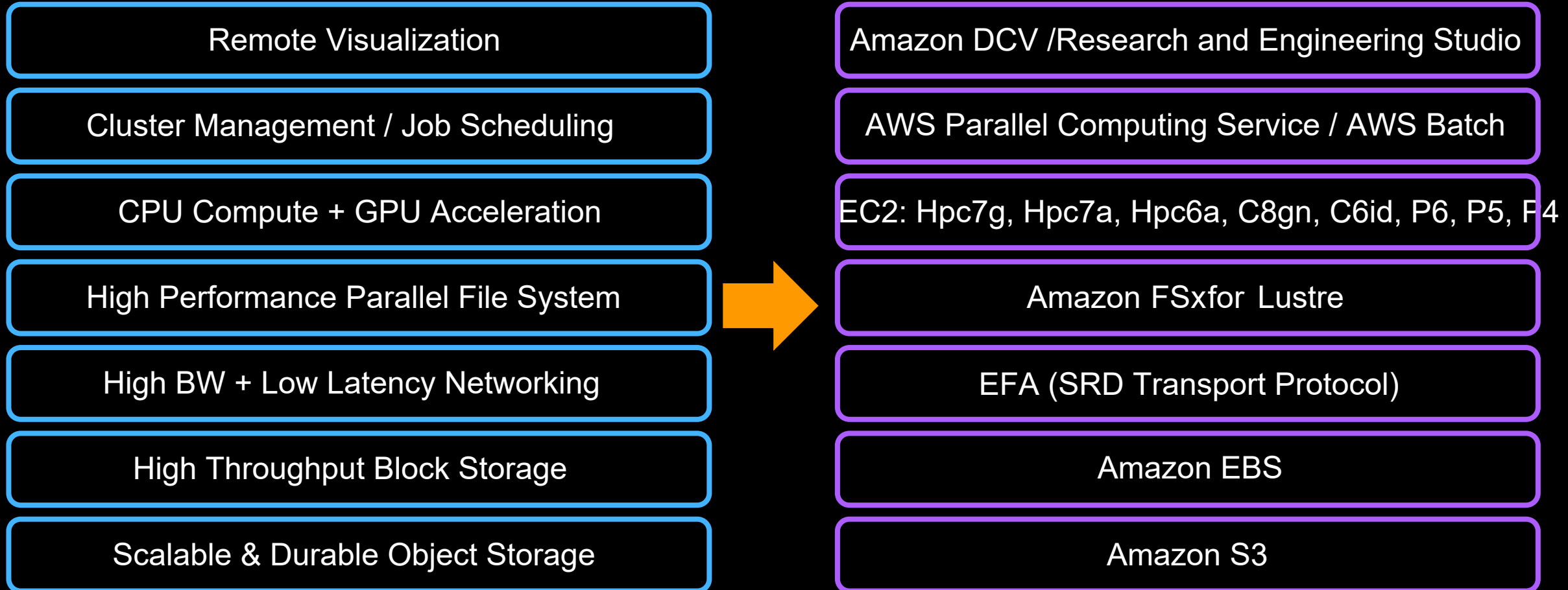
Global High-Resolution Atmospheric Forecasting System

- MPAS Atmosphere
 - Version 7
 - OpenACC
 - RRTMG scheme is on CPUs



<https://www.mmm.ucar.edu/models/mpas>

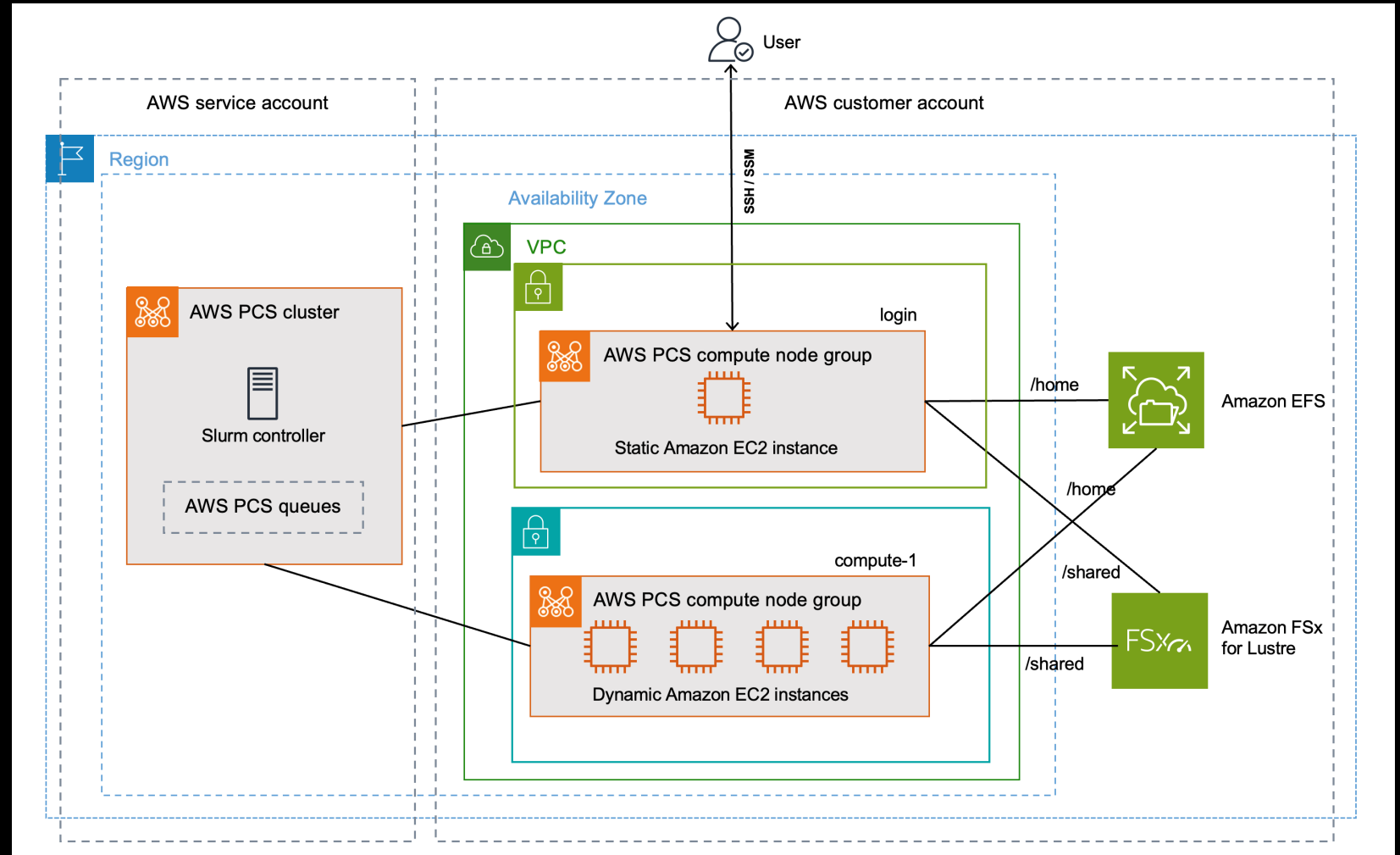
Reference AWS HPC Stack



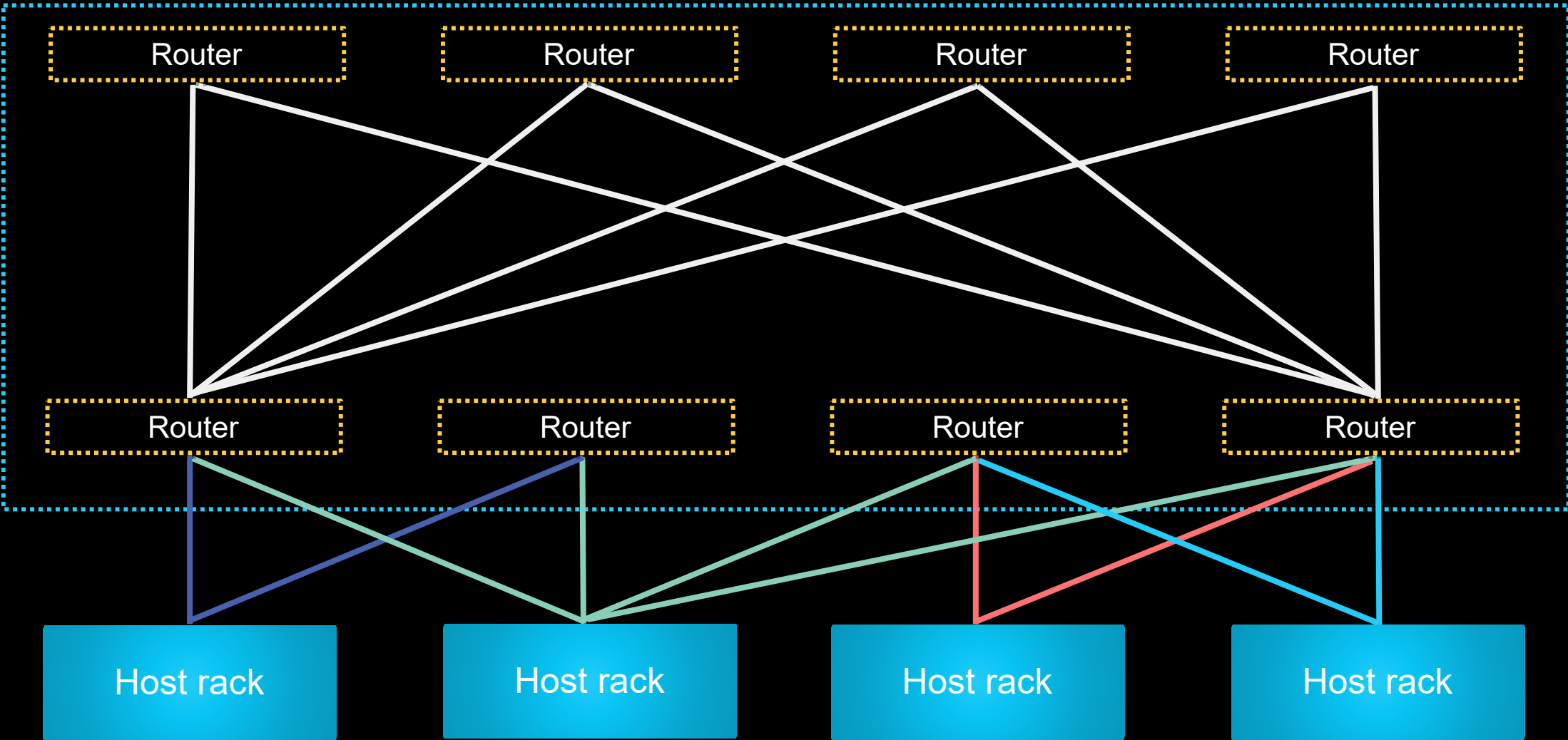
Reference Architecture – AWS Parallel Computing Service

Configuration required resources

- AMI
- GPU instance
- Storage
- Software Stack



Building a network building block

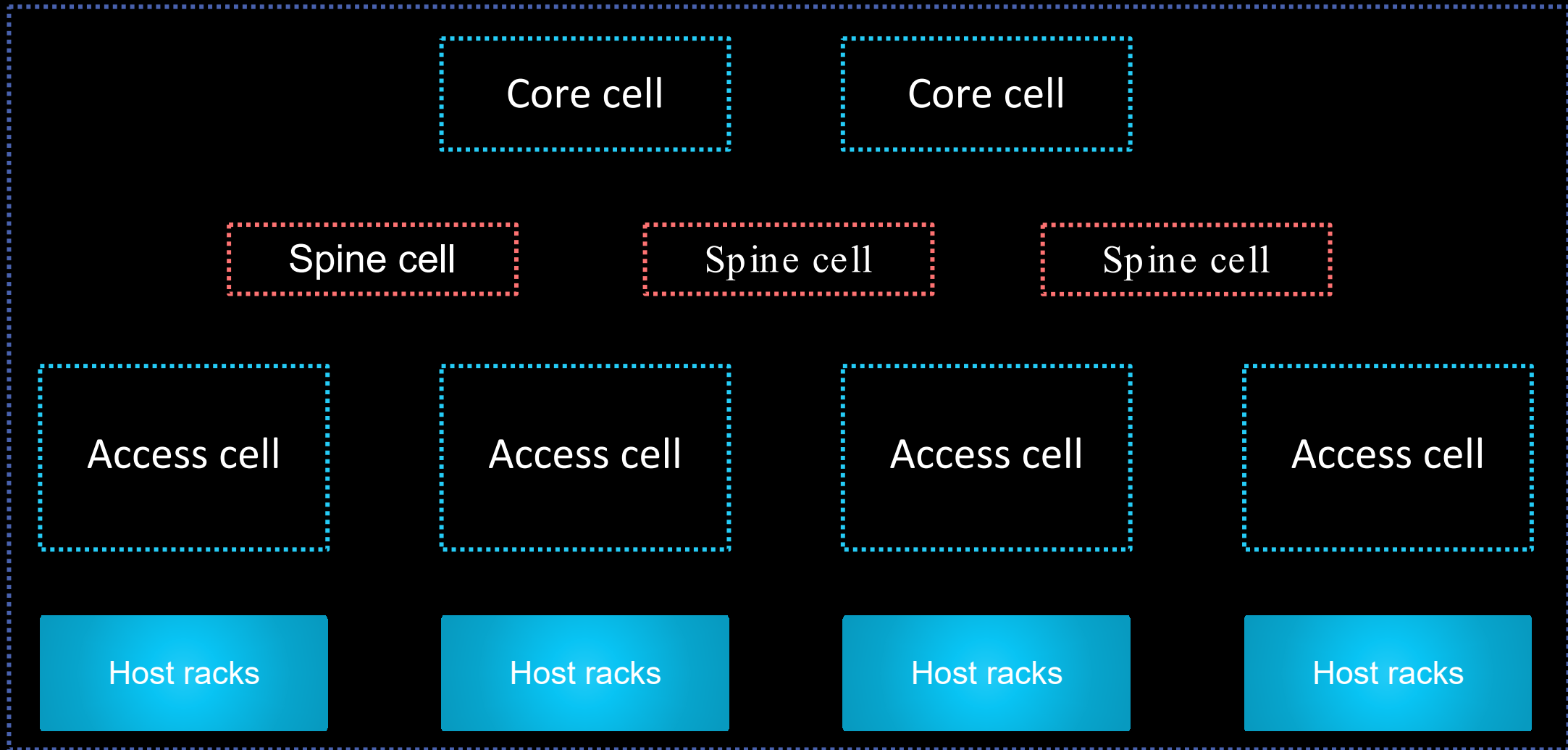


Source: AWS re:Invent 2019: Innovation and operation of the AWS global network infrastructure (NET339)



Cellular network pattern

Scale out by adding cells



Source: AWS re:Invent 2019: Innovation and operation of the AWS global network infrastructure (NET339)



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Amazon EC2 Capacity Blocks

- Reserve a start time up to 8 weeks in advance
- Set a reservation duration of one to 14 days or a multiple of 7 days, up to 182 days
- Configure up to 64 instances per Capacity Block
- Configure up to 256 instances across multiple Capacity Blocks
- Capacity Blocks are in a single Placement Group

Find Capacity Block [Info](#)

Capacity Blocks requirements

Capacity attributes

Instance type
p6-b200.48xlarge
8 B200 accelerators
192 vCPU 2 TiB Memory 1440 GB HBM3e GPU Memory

Platform
Linux/UNIX
Platforms other than Linux/UNIX incur a usage-based charge while your instances are running. [Learn more](#)

Total capacity
1 instance(s)
The instance purchase quantity must be an integer value between 1 and 64 instances.

Duration
The number of days or weeks for which you want to purchase a Capacity Block.
1 day(s)
The duration must be 1-14 days, 21 days, 28 days, or multiples of 7 up to 182 days.

Capacity Block start date
Choose your earliest start date. You can enter a start date for up to 8 weeks in advance.

Capacity Blocks available in 30 Minutes
You can now reserve Capacity Blocks that start in as little as 30 minutes.

Earliest start date
2025/09/15
Use YYYY/MM/DD format

[Find Capacity Block](#)

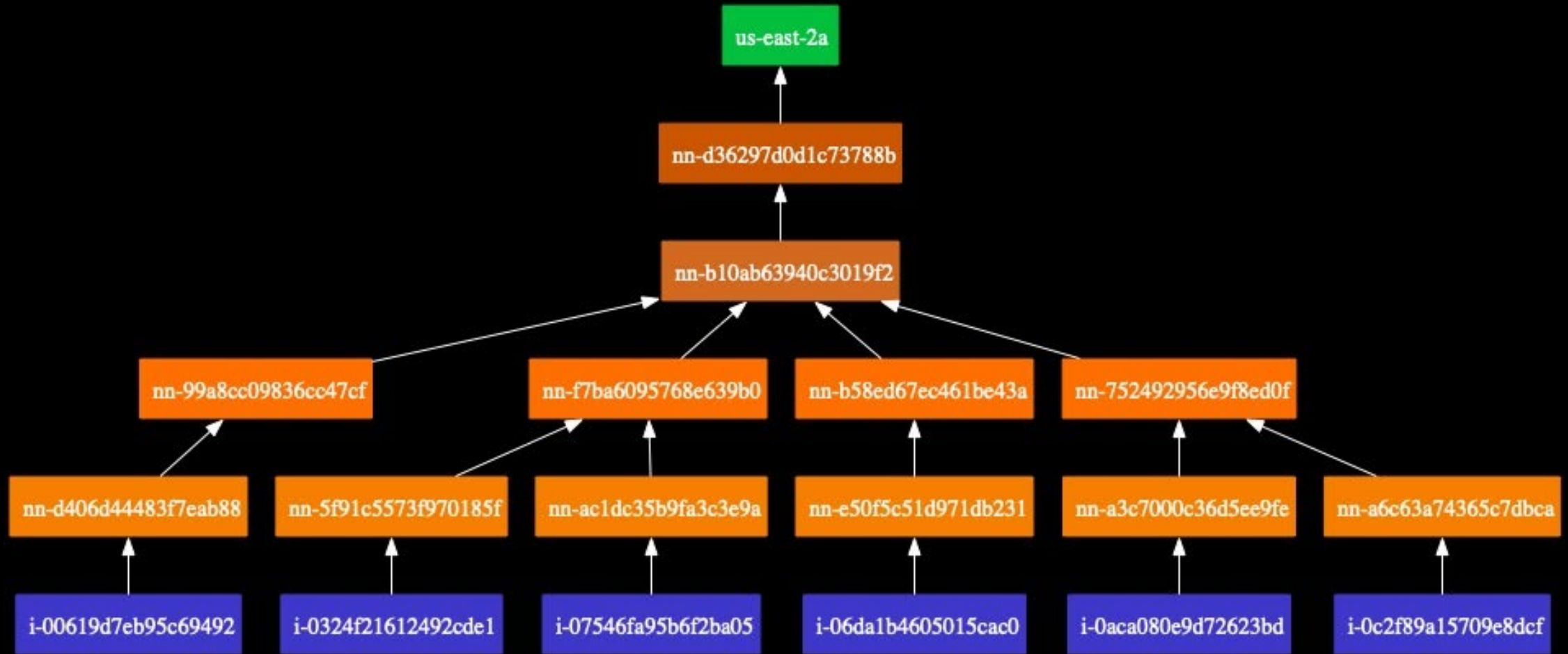
Capacity Block availability
This is the earliest available Capacity Block based on your requested start date. To find a different Capacity Block, change the start date.

| Availability Zone | Start date | End date | Duration | Total upfront price (USD) |
|-------------------|--|--|--------------------------|---------------------------|
| us-east-2b | September 15, 2025, 13:30:00 (UTC+02:00) | September 16, 2025, 13:30:00 (UTC+02:00) | 1 day | \$1,563.00 |
| us-east-2b | September 15, 2025, 09:07:00 (UTC+02:00) | September 16, 2025, 13:30:00 (UTC+02:00) | 1 day 4 hours 23 minutes | \$1,848.00 |

[Cancel](#) [Next](#)



EC2 Topology



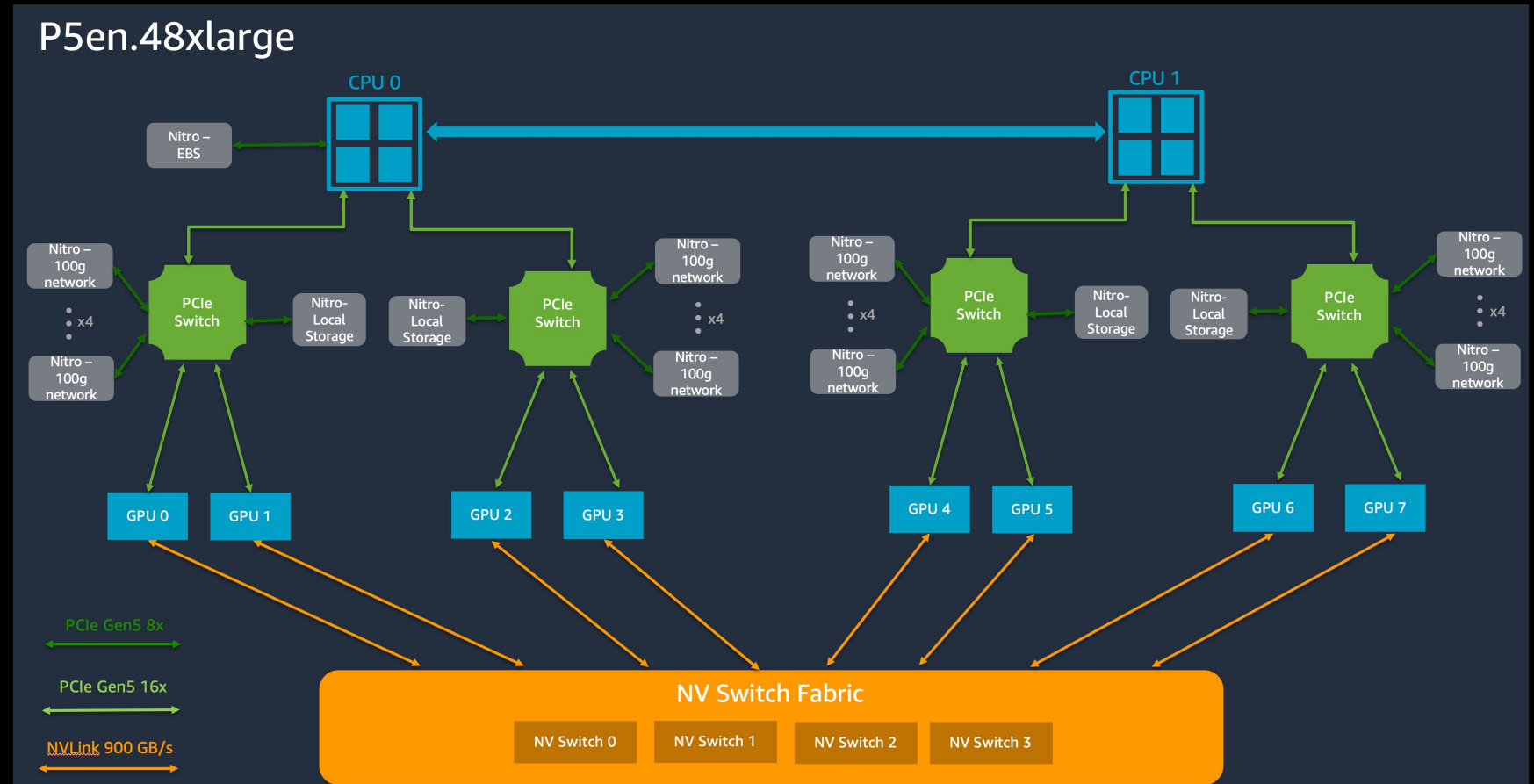
AWS P5 Instance

P4.48xlarge

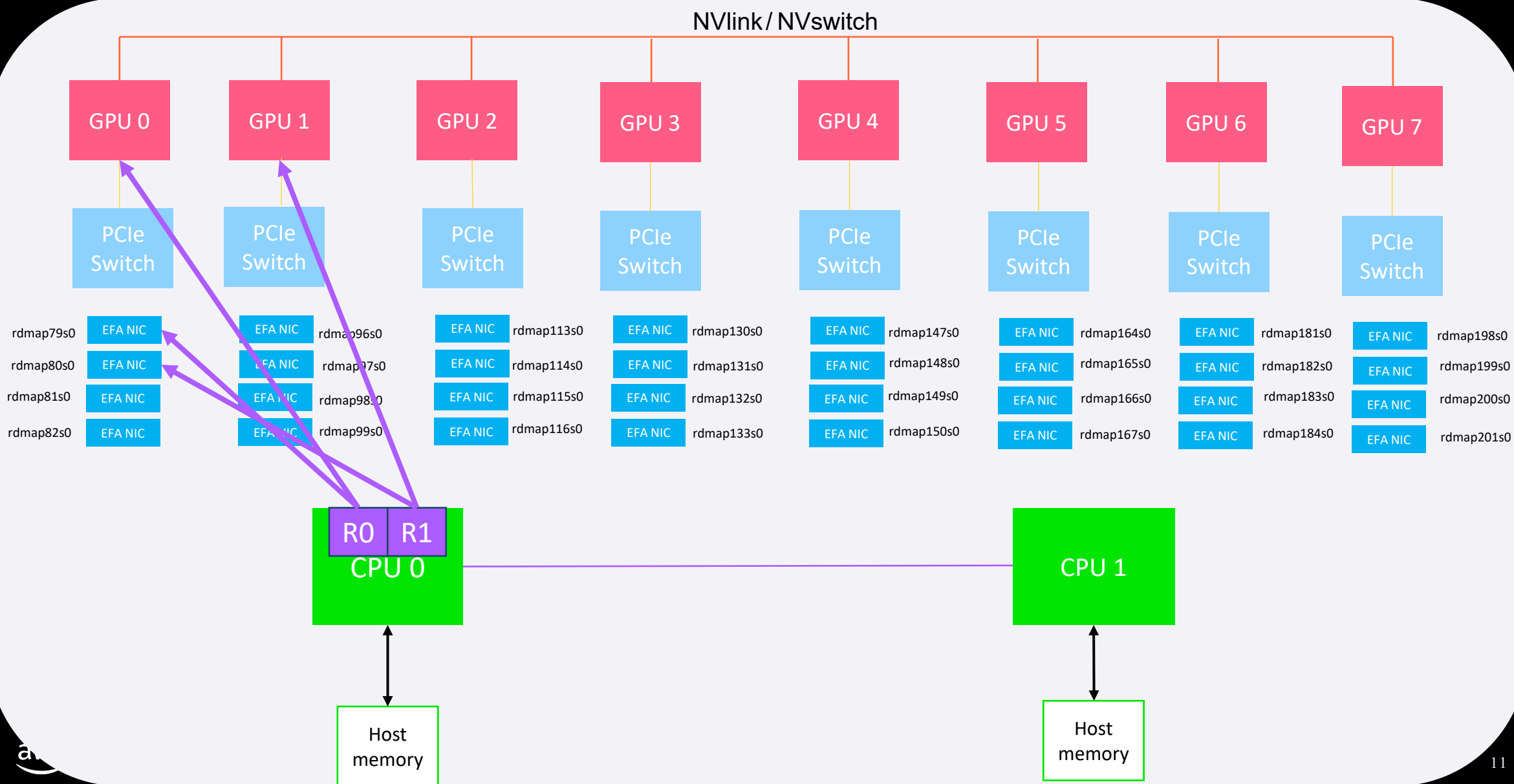
- Intel
- 8 NVIDIA A100
- 400 Gbps EFA
- 8 TB NVMe

P5.48xlarge

- Intel
- 8 NVIDIA H100
- 3,200 Gbps EFA
- 30 TB NVMe



AWS P5 Instance



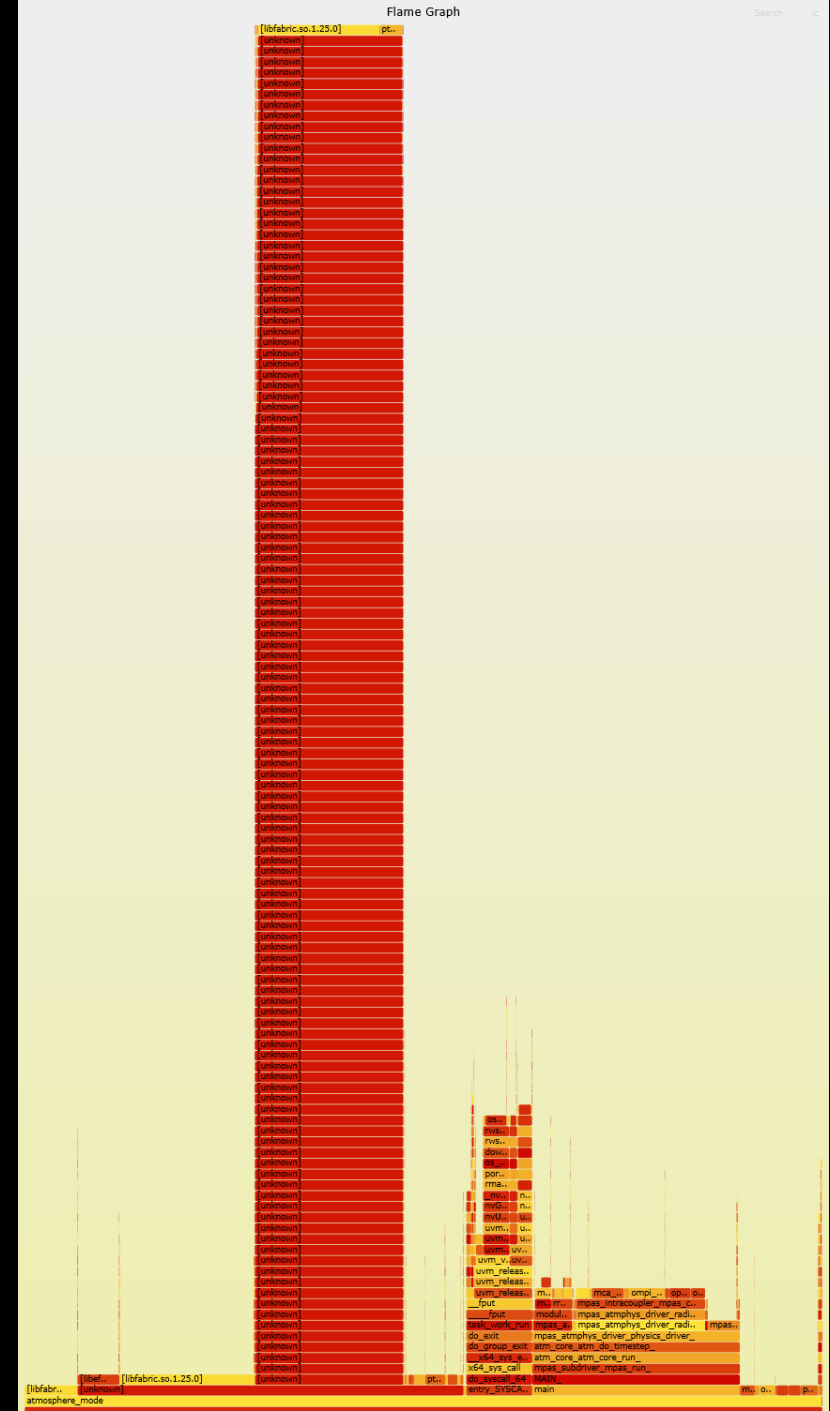
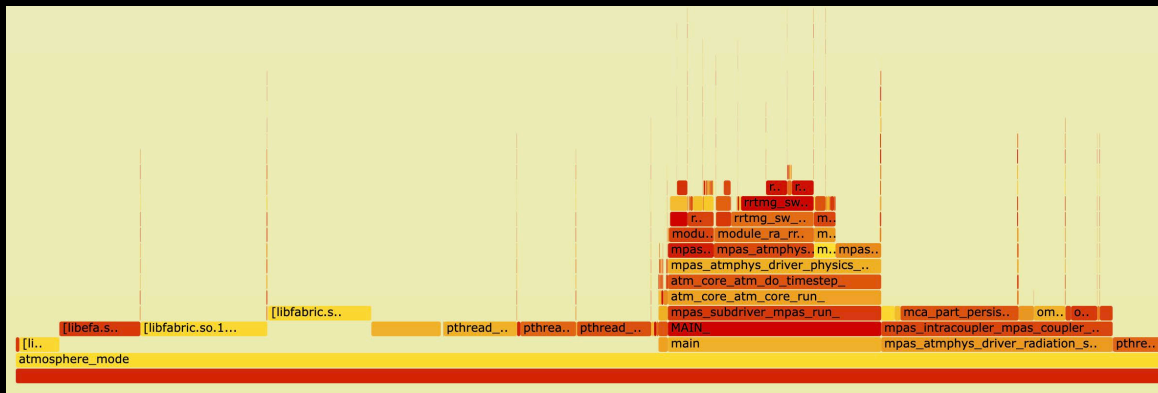
Flamegrph

- With bad NIC bindings
- Exorbitant time is spent in libfabric

NEW!!

12/9/25 Extended EFA metrics in /sys

<https://aws.amazon.com/about-aws/whats-new/2025/09/aws-efa-metrics-improved-observability-networking/>



Performance Requirements & Results

- Hourly global forecast
- MPAS-A maximum runtime **51 minutes**
- Pre and post can have overlapping running time – to an extent









Conclusion & Future Work

- Able to meet production run -time requirements of 51 minutes
- With 14 p5 instances, 112 H100. Vs 840 V100.

- Benchmark on p5en instances.
- Investigate optimizations for p6 -b200 instances (Blackwell GPUs)
- Investigate IO performance and the possibility of async IO

Thank you

tpbrown@amazon.com

