High Performance Computing (HPC) on Cloud with workload schedulers and parallel file system storage

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https://www.ibm.com/cloud/hpc

Agenda

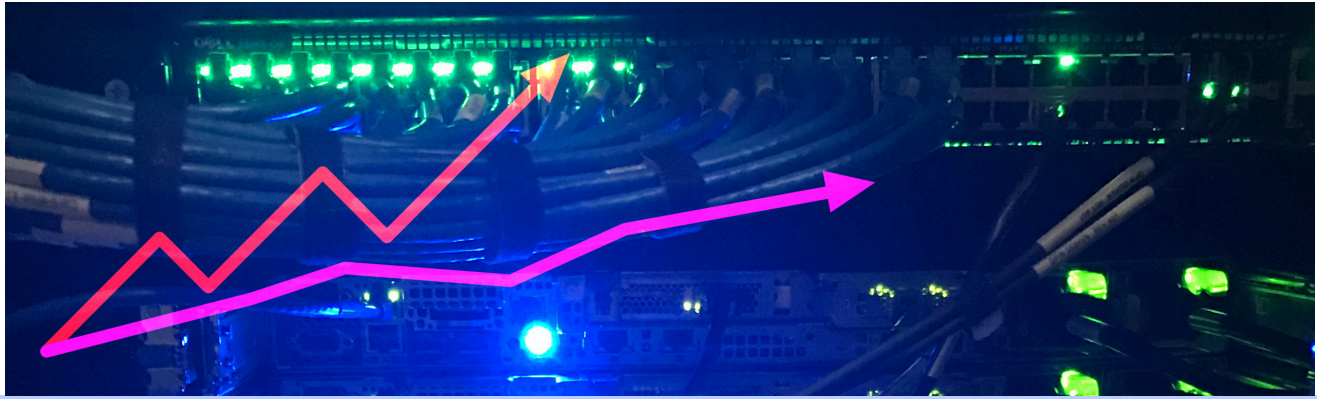
HPC Introduction

HPC on IBM Cloud - Offering Details

Customer Engagement

Support and Useful Information

HPC industry use cases / workloads



Financial Services*	Monte Carlo simulation, Risk modeling, Actuarial sciences
Life Sciences*	Genomic sequencing, Drug discovery, Molecular modeling, Protein docking
Automotive	Vehicle drag coefficient analysis, Crash simulation, Engine combustion analysis, Air flow modeling
Aerospace	Structural, fluid dynamics, thermal and electromagnetic analysis, Turbine flow
Electronic Design (EDA)*	Optical Proximity Correction (OCP), Design Rule Checking (DRC), Simulation (like timing analysis)
Oil and Gas	Subsurface terrain modeling, Reservoir simulation, Seismic analysis
Transportation	Routing logistics, Supply Chain optimization
Weather*	Severe storm prediction, climate, weather and ocean modelling
Education/Research	High energy physics, Computational chemistry

*Best suited

IBM HPC on cloud value proposition

Integrated User Experience

Entire HPC Cluster (Scheduler, Compute, Storage etc.) under one IBM Cloud environment

Time to Value

Deploy HPC cluster in hours, not days, enabling clients to quickly bring their HPC workloads to cloud

Pricing/Licensing for HPC resources

Cloud-like licensing model helps customers save cost and avoid the hassle when they move HPC workloads to IBM Cloud.

Hybrid cloud for peak workloads

Connect on-premise environments to IBM Cloud and configure job schedulers for bursting

Static and dynamic workloads

Ability to run steady state workloads on premise and on-demand workloads with Virtual Servers on VPC by leveraging auto-scaling.

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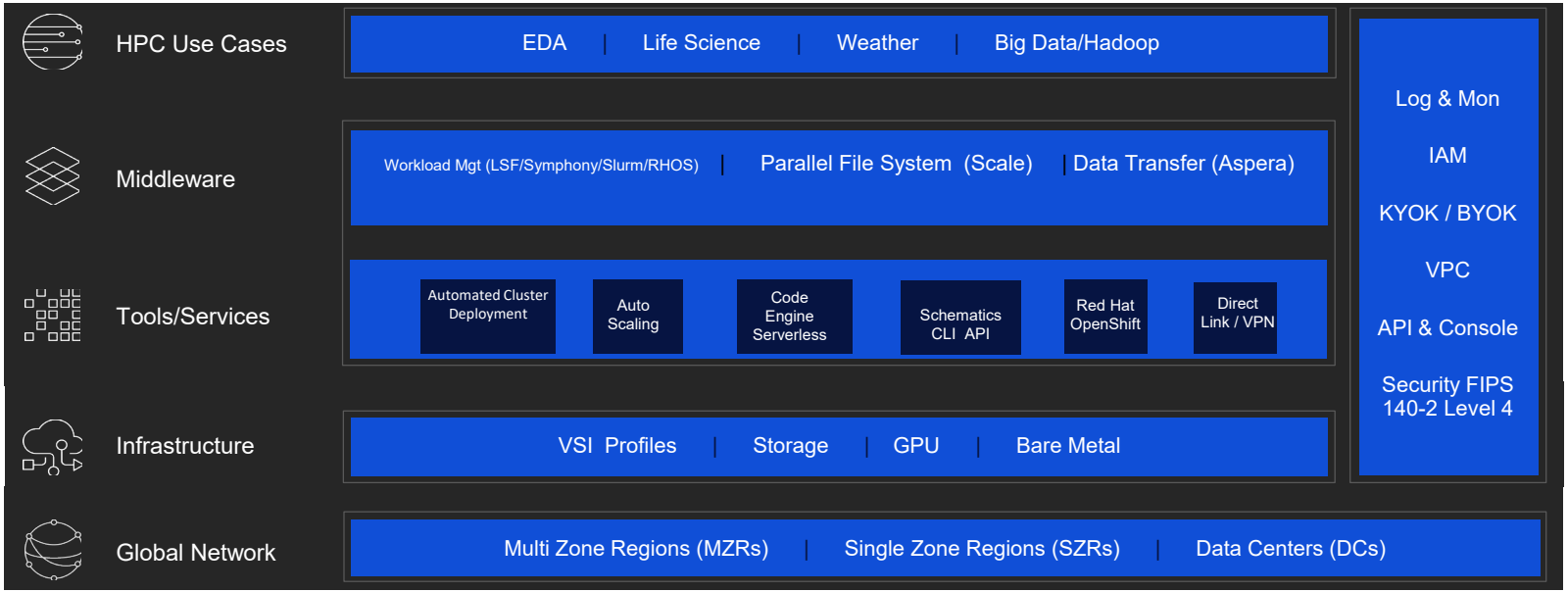
IBM Cloud for HPC Workloads

Open Cloud Innovation

Security Leadership

Enterprise Grade Cloud



Cloud Native
as-a-service w/pervasive security & driven via APIs

Choice
enabling flexible deployments

Innovate
patent leader 25 years

VPC Profiles for HPC

Get the isolation and control you need for increased security and compliance with a single-tenant IBM Cloud Host with rapid provisioning.

- Supports advanced compliance needs previously only available on-prem
- Use full performance Compute, Balanced, and Memory profiles
- No additional cost for vCPU or RAM used by Instance on a Dedicated Host

Best uses: HPC workloads, analytics, secure data storage

Hosts details for HPC

Optimized profile
Specific for memory virtual server profile families

Top security
Single-tenancy, firewall options, security groups, SSL, and SSH

Extensive memory
RAM options from 4 to 384 GBs

Available in All Major Geos
us-east, eu-de, jp-tok

Storage
SAN with up to 10 IOPS per GB

Pay only what you need
Hourly rates, per second billing metering

Suspended Billing

Only pay for what you use – billing stops when you power off the virtual server.

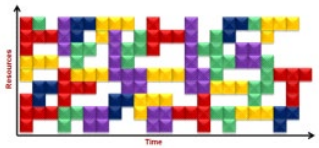
Sustained Usage Discounts

Sustained usage discounts will lower the hourly rate the longer an instance runs during the billing month.

HPC requires more than just Cloud infrastructure

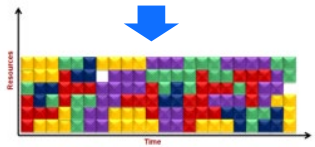
Without scheduling, workloads are dispatched in a haphazard fashion leading to sub-optimal resource use and longer execution times

Without Scheduling

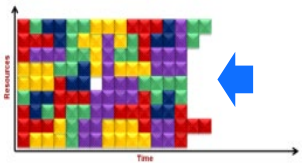


With sophisticated scheduling, we use resources more efficiently and can optimize for high-utilization, better performance, or both

Fewer Resources



Faster Results



Spectrum LSF simplifies hybrid HPC cloud

- Simple, automated deployment on IBM Cloud
- Seamless, policy-based cloud bursting to your choice of public clouds for peak workloads
- Dynamic provisioning using resource connector
- Intelligent movement of data for cloud workloads
- Help drive productivity by intelligent use of extra computing capacity
- Support for containerized workloads

Watch the VIDEO

IBM Spectrum Symphony

12 of the top 20 global banks run enterprise grids powered by IBM Spectrum Symphony

Counterparty Credit Risk Modelling

Compliance Trade Surveillance

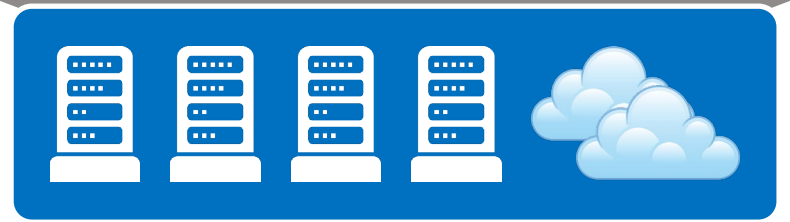
Distributed ETL & Batch Credit Scoring

Sentiment Analysis, HBase Datamart

Spark Aggregation & Reporting

Insurance Actuarial

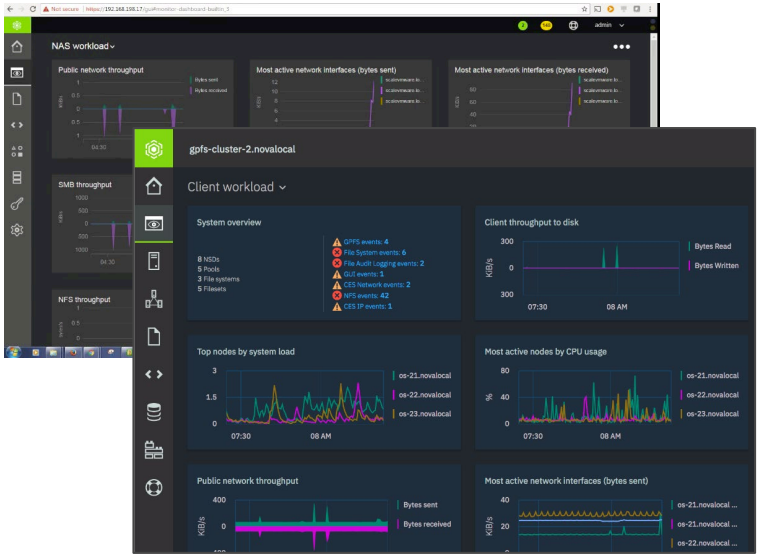
IBM **Spectrum Symphony**



DETAILS

IBM Spectrum Scale for HPC Workloads

Drive innovation and create flexibility with global data services and high-performance global data access



Watch the VIDEO

- Parallel high-performance access for faster results with more data
- Access HPC data anywhere for application agility
- Simplicity at scale for growing data requirements
- Global data services to protect and secure your most valuable resources – your data
- Data efficiency to lower cost

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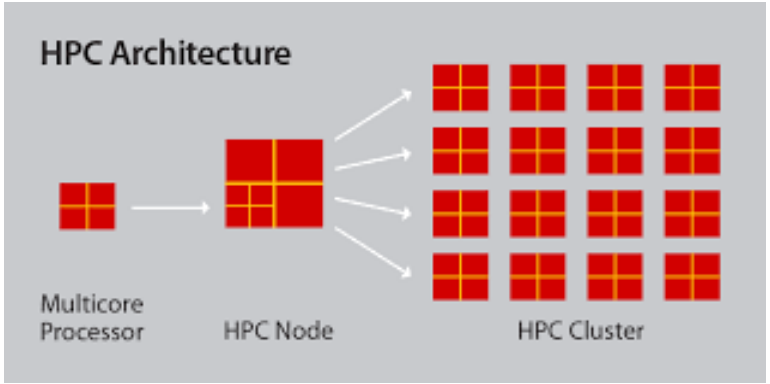
HPC on IBM cloud offering overview

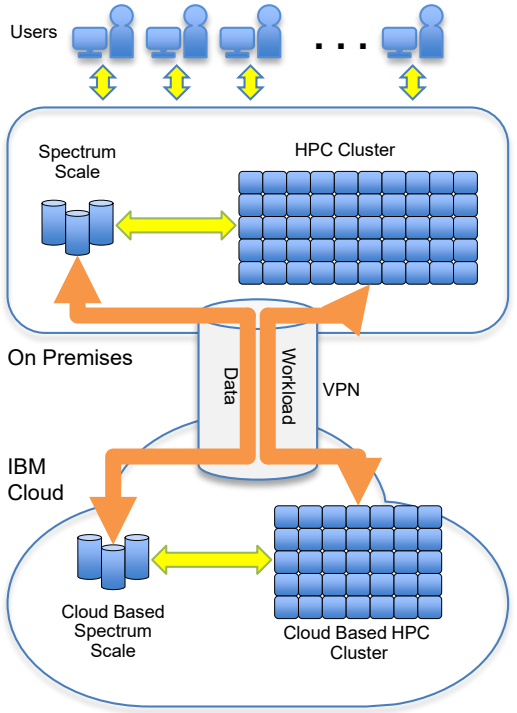
Solution Components

1. Virtual Private Cloud (VPC) HPC clusters
2. Spectrum LSF/Symphony/Slurm/RHOS
3. Spectrum Scale

LSF, Symphony and Scale are Cloud Catalog BYOL tiles

Automated deployment of HPC clusters, storage & schedulers is a unique differentiator of the IBM Cloud.





IBM Consulting Managed Service Offering for Grid Computing Workloads

- **As a service model** for Compute & Storage clusters; Spectrum Symphony & Scale software; networking connectivity; access management; IBM cloud object storage (COS); and data encryption
- **Specific end points** for client to interact with the platform – Compute (job submissions), Storage (loading data and logs), Applications (simulation results)
- **Day 2 operations** with lifecycle governance; monitoring; performance tuning; ticketing system for incident/problem management; software patching; key vaults; event/change management
- **Continuity of Business (COB)** with SLA's for incident/resolution management and HPC platform availability

Target Clients for HPC on IBM Cloud

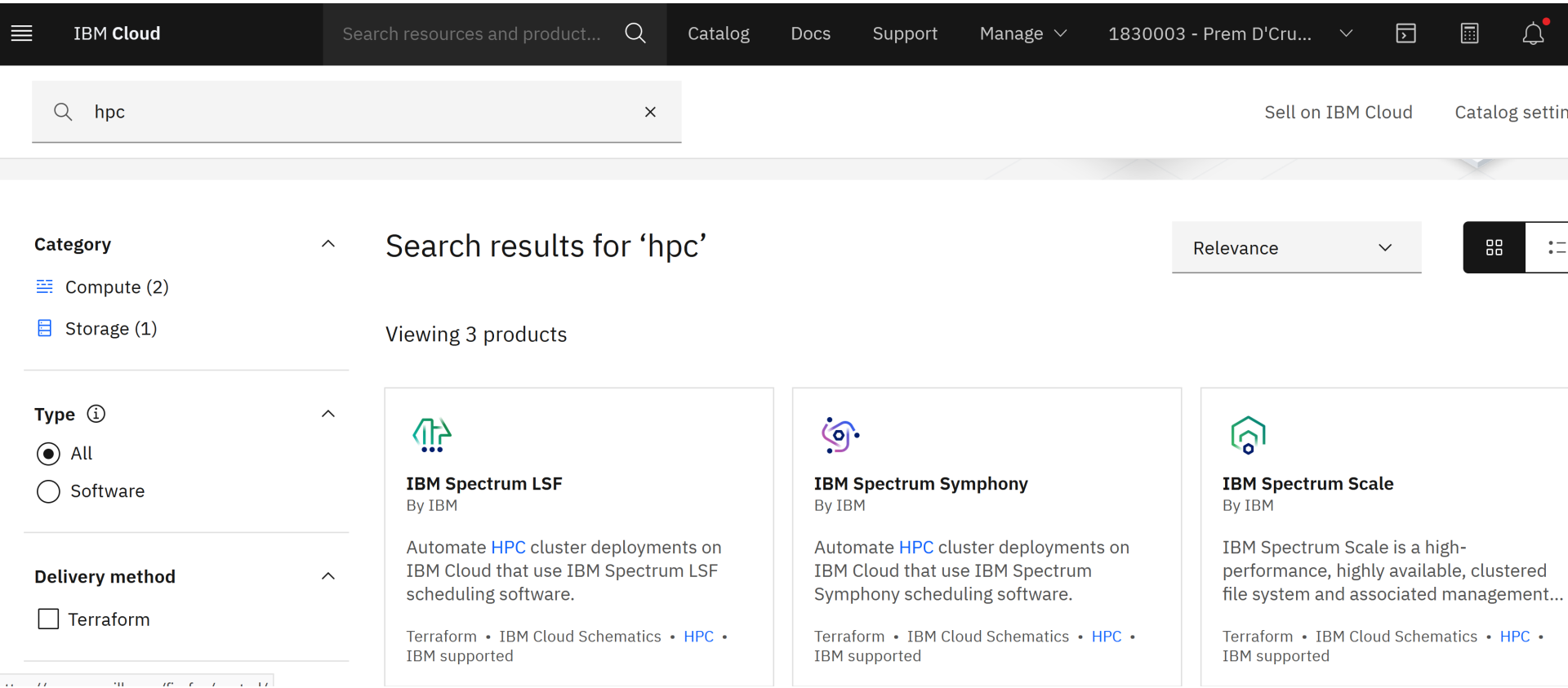
On-premises current customers running at capacity

- Run peak workloads using automated cloud bursting
- Move some base workloads to cloud for better compute performance
- Run workload where it minimizes cost
- Ensure latest infrastructure at all times

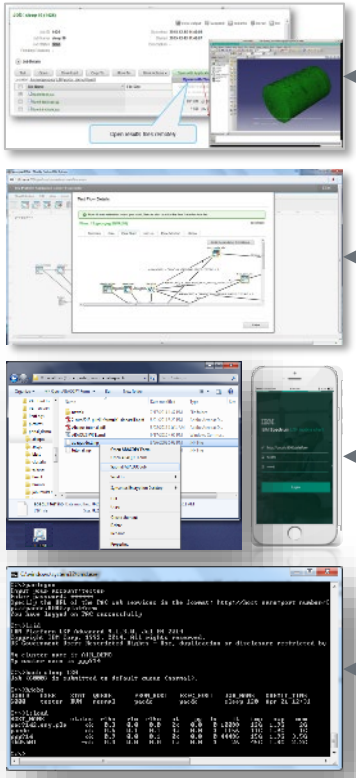
Customers currently unable to afford entry price for on-premises HPC

- Looking for an end-to-end HPC solution on Cloud
- Proven products and ease of use to manage
- Pay for usage only model
- Ability to provide single tenant and dedicated hosts
- Single vendor HPC support for IaaS, Workload, Storage and Networking

IBM Cloud Catalog Tiles for HPC



Hybrid Cloud for HPC



Job Submission

LSF **MultiCluster** forwards specific workloads to the cloud based on site defined policies.

LSF Scheduler

LSF Scheduler

Compute Nodes

IBM Spectrum Scale

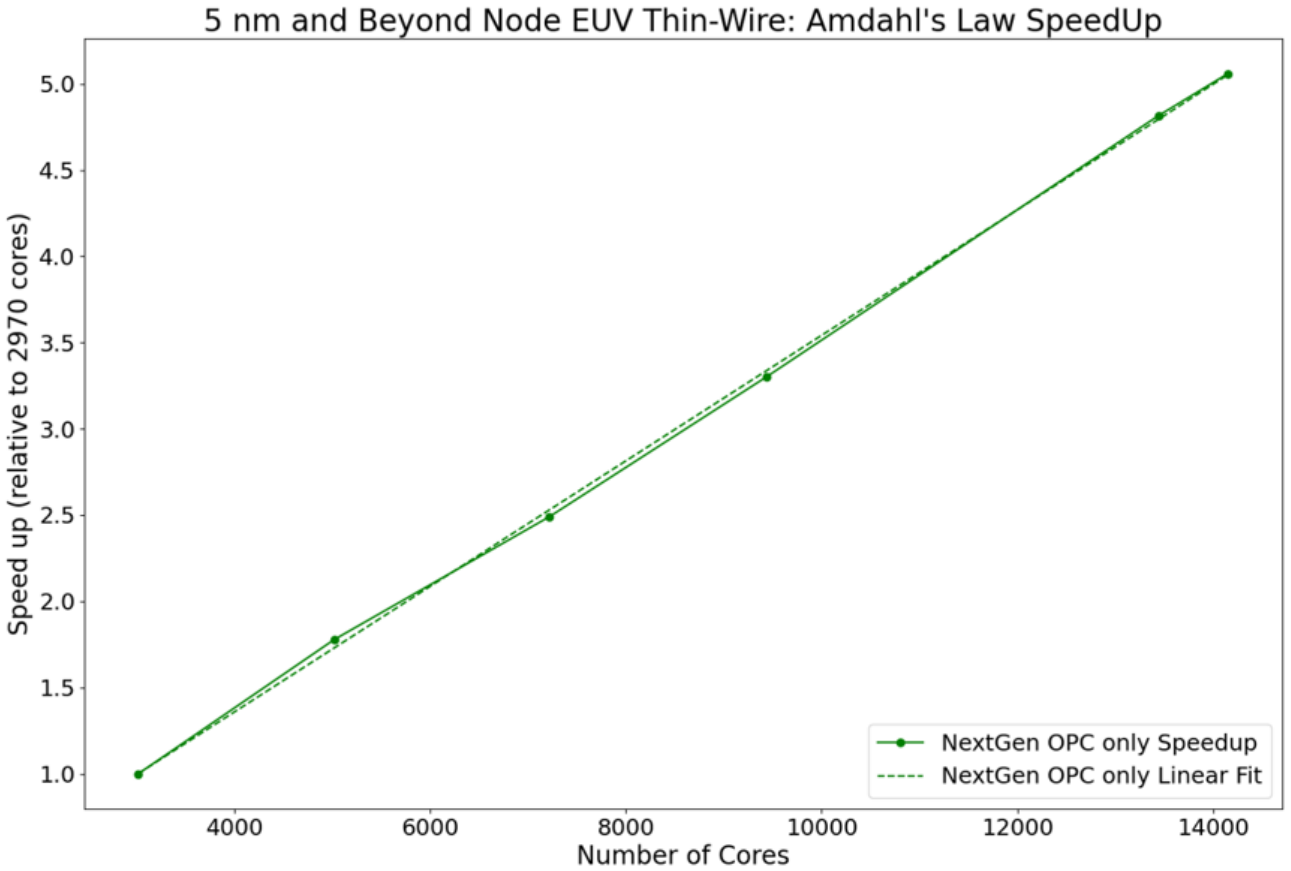
LSF's **Resource Connector** dynamically resizes the pool of hosts in the cloud based upon workload demands and policies.

File or Object Storage

IBM Spectrum Scale

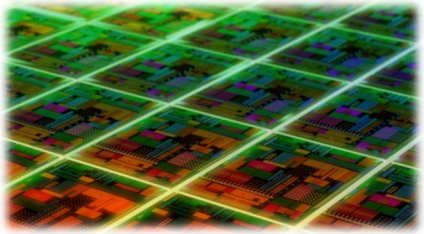
Scale AFM or LSF **Data Manager** pre-stages the necessary data from on-prem to cloud before hosts are provisioned. It also caches files to avoid repeatedly moving the same files, and it returns results to on-prem out of band.

IBM Aspera can be used as the underlying transport mechanism.



Electronic Design Automation (EDA) application scaled up by IBM and an independent software vendor from 2,970 to 14,500 physical cores resulting in a 5X performance improvement.

The value of IBM HPC and Spectrum LSF



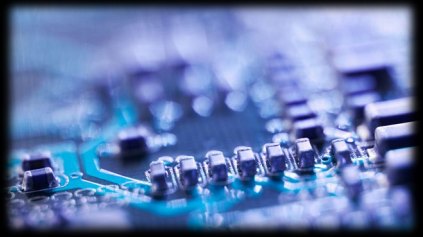
MaxLinear
Speeding product development

IBM Spectrum LSF solutions help to speed product development and verification cycles, for faster time to market

Increase license utilization from 70 to almost 100%, delivering significant cost savings

Greater control on HPC capacity and EDA licenses helps drive up utilization, and ensure high-priority tasks completed rapidly

Link to case study



Cypress Semiconductor
Accelerating time to market & reducing costs

IBM Spectrum Scale provides high availability for business-critical electronic design automation (EDA) processes, which run on clusters managed by IBM Spectrum LSF

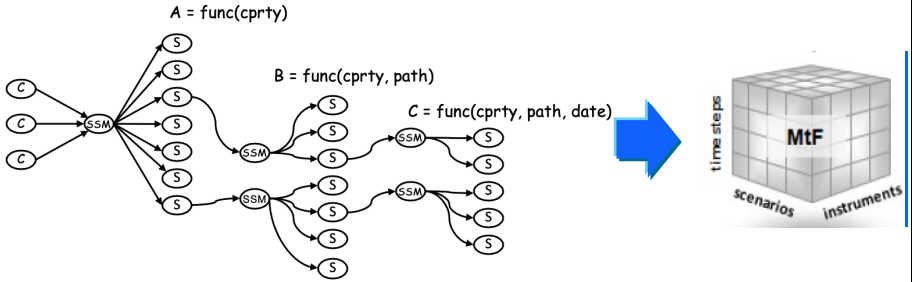
High reliability helps eliminate unplanned downtime and lowers TCO

10x better performance on the same hardware reduces total cycle time which equals faster time to market and major design cost savings

Link to case study

Cloud bursting at a top bank

Unique Parallel Recursion API framework provides both performance and productivity

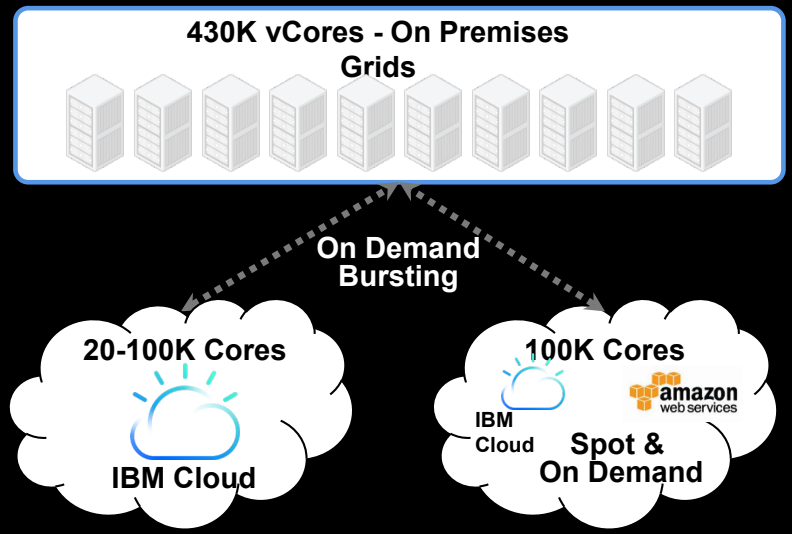


"IBM then proved its approach, taking an existing job that required two hours on 20,000 cores and running it in one hour on 10,000 cores. Achieving twice the performance on half the infrastructure was absolutely compelling for us."
CIO Major Wall Street Investment Bank

Leverage multi-cloud to optimize costs

Spectrum Symphony hybrid multi-cloud

LOB leveraging on-premises and cloud to execute interactive trader tasks and EOD batch



Call to Action

- Identify the HPC decision makers and influencers at the client
- Set up client meeting to understand the as-is environment (cores, memory, storage, scheduler, network and HPC applications)
- Propose workshop to discuss the to-be state and client value
- Develop business case and ROI working with the customer
- Propose a demo to show the client the ease of use with the automation built in
- Generate customer proposal with approved pricing

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Get started

Learn more about IBM Cloud for HPC Solutions on our website

5-minute video – Why HPC on IBM Cloud?

More about Spectrum Scale link

IBM Cloud docs – automated set up HPC clusters and Spectrum Scale

Virtual Servers for IBM Cloud VPC

HPC Podcast

IBM Cloud for HPC solution brief

Need Help?

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