

Accelerated hybrid computing, anywhere you want to run

Atos HPC, AI and Quantum
01/06/2022



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The Atos logo, consisting of the word "Atos" in a bold, blue, sans-serif font. The letter 'o' is stylized with a circular graphic element inside it.

Atos: A leader in HPC, Quantum and AI

Supercomputing market segment

#1 in Europe

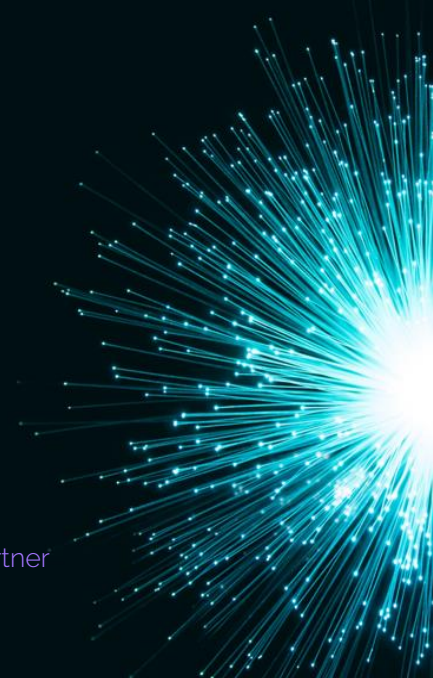
5 out of 7 wins announced



EuroHPC
Joint Undertaking

Sustained growth in strategic areas

- 🌀 BullSequana XH3000 : any scale up to Exascale
- 🌀 Nimble Supercomputing Suite: as-a-service model
- 🌀 ThinkAI : Address large-scale AI deployments
- 🌀 Quantum Learning Machine : penetrate to NA; IQM partner



GENCI



JÜLICH
FORSCHUNGSZENTRUM

Science & Technology
Facilities Council

CINECA



KNMI



Rolls-Royce

AIRBUS



SAFRAN



EuroHPC

CDAC
CENTER FOR DEVELOPMENT OF
ADVANCED COMPUTING

OAK RIDGE
National Laboratory

Argonne
NATIONAL LABORATORY



BR
PETROBRAS



ECMWF



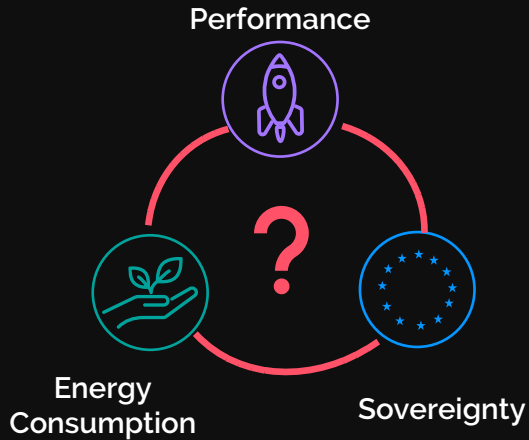
PSA
GROUPE



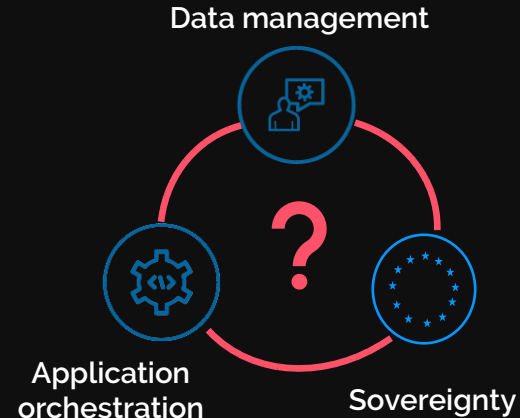
Exascale is imminent, cloud is a reality

The market is moving fast

Exascale is imminent



Cloud is a reality




How to get there...?


Atos Strategy

Accelerated hybrid computing, anywhere you want to run

Accelerated
hybrid computing



 BullSequana XH3000

 Quantum Learning Machine

 ThinkAI

8:45 - 9:15

E. Eppe & C. Bourrasset

Any way you
want to run



 Nimbix Supercomputing Suite

9:15 - 9:30

S. Hebert

Customer
Stories



Inspiring customer stories
empowering scientific breakthroughs

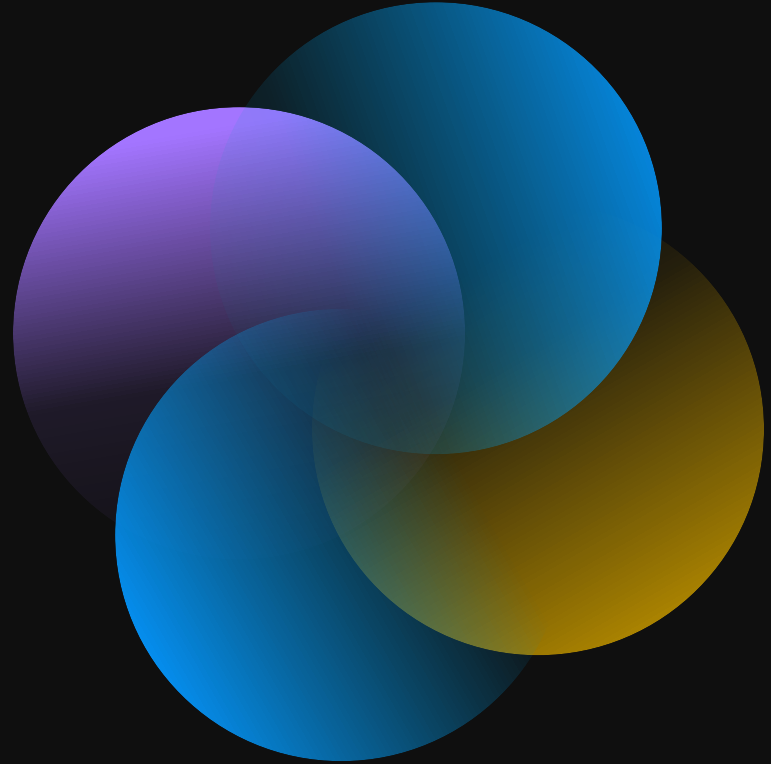
9:30 - 9:45

A. Grant

...and work with the best-in-class partners!

02. Accelerated Hybrid Computing

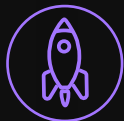
E. Eppe



Our Exascale strategy

The future of supercomputing is hybrid

Higher Performance



Lower Carbon
footprint



Sovereignty



TOP 500

&

Global
efficiency
at scale



Accelerated
Hybrid
Computing

AI Optimized
System
efficiency &
availability

Atos

What options do we have for an Exascale SuperComputer?

1000X more flops or a more efficient time to solution?

2023-2025: with next generation GPUs



More flops option

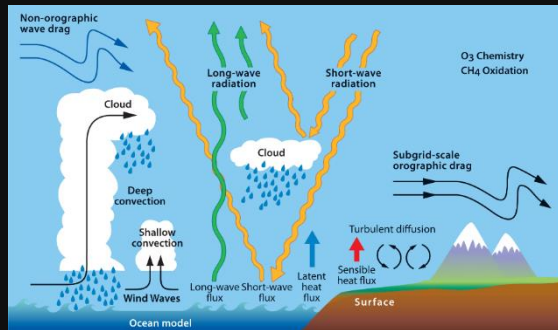


Better efficiency option



AI speed up Weather Numerical Prediction models

1. ECMWF IFS parameterization of non orographic gravity waves (NOGWD)



Physical processes represent ~30 % of the total computational cost of IFS (Weather Numerical Prediction model)

Before : 1000 Seconds
With AI4Sim : 704 Seconds

~30%
Gain

Simulation size

1,6 million IFS columns	Traditional Simulation	With AI4Sim Neural Network	Gain
CPUs based simulation	300s	300s	Same time with higher precision
GPUs based simulation	n/a	4s	x75 time reduction with same precision as CPU based

AI will drive our SuperComputers

Too complex to be human handled

+20K
endpoints

All Atos Smart Software Suites will generalize Machine Learning mechanisms to allow SuperComputers to be self healing at scale

+5K
nodes

How hard will it be to optimize compute resources at the scale of a 10K nodes system?

AI optimized Scheduling or Orchestration will rule the system

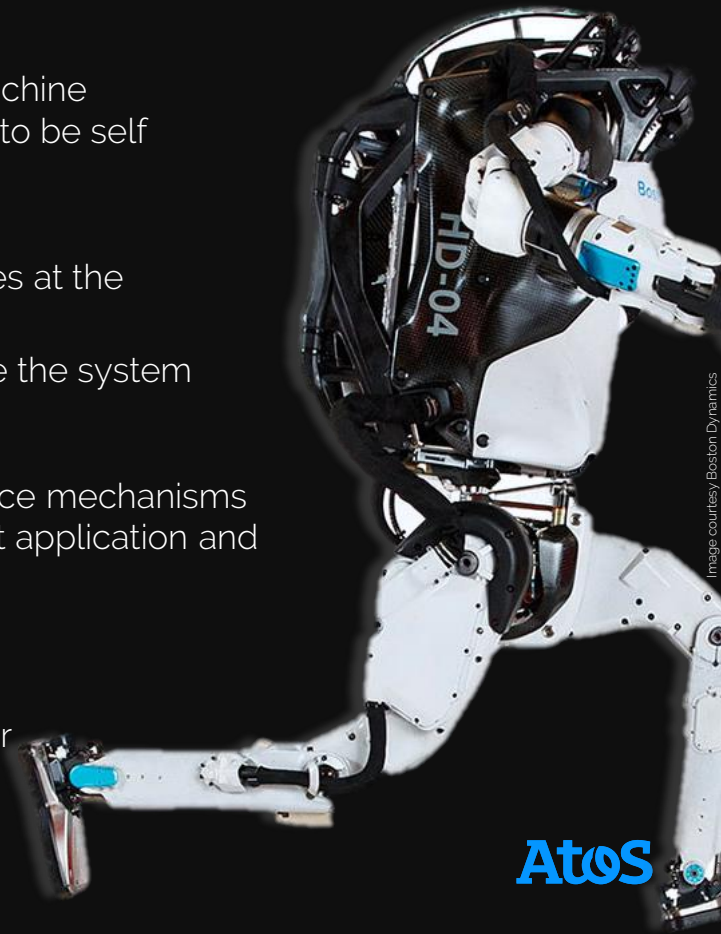
+5M
component

5 Million reasons for your job to fail

Atos CDC will incorporate predictable maintenance mechanisms into all Atos HW & SW components, offering best application and system availability

+20MW
Energy

ML enabled Smart Power Management Suite optimizes the power envelope to sustain the maximum performance while reducing the power budget



BullSequanaXH3000 – The next-gen. hybrid HPC platform

Harness the power of Exascale



 BullSequana XH3000

AMD  **EPYC
INSTINCT**

intel

 **NVIDIA**

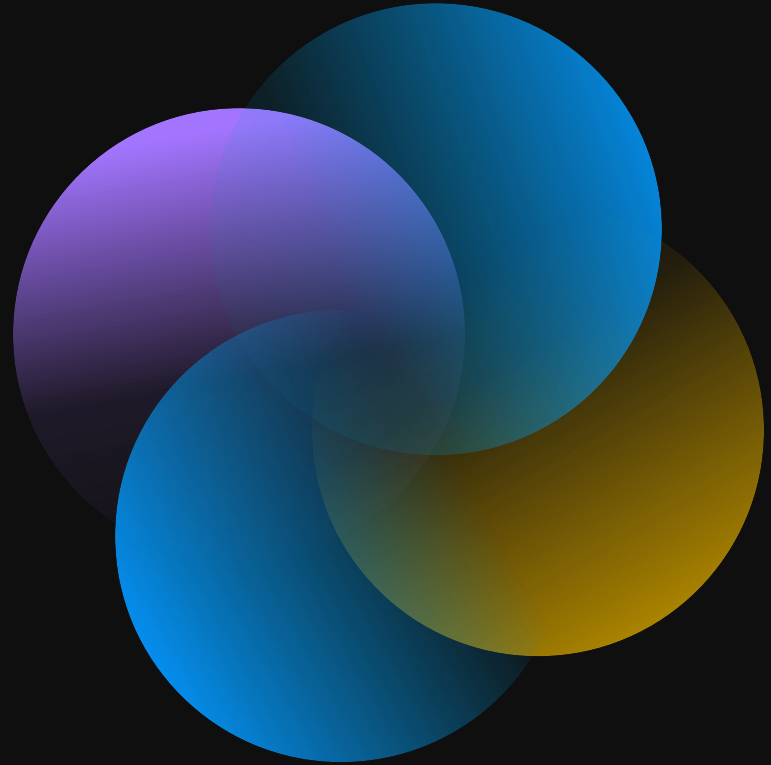
 **SIPeARL**
The Silicon Pearl

 **ISC**
High Performance

AtoS

03. Strategize your AI journey with ThinkAI

C. Bourrasset



Atos High Performance AI Computing



Develop HPC & AI convergence

Accelerate AI workloads

Coupled AI into simulations applications

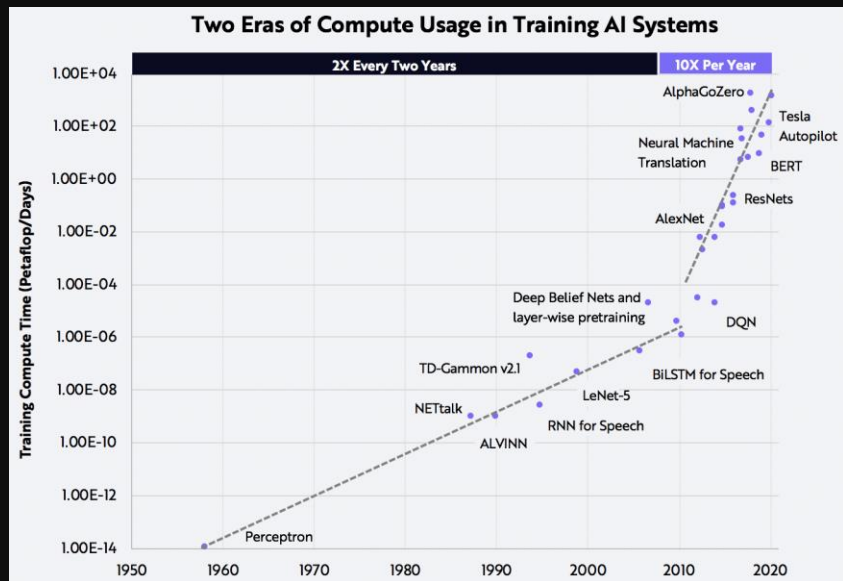
Develop AI
Supercomputer

Enable AI into numerical
Simulation workloads



Deep learning models needs AI Supercomputing

In the last three years, **the deep learning models have grown over 1000x** to reach hundreds of billions of parameters.



Source : Open AI

Natural language processing needs supercomputing

2021: OpenAI GPT3 175B param

2021: NVIDIA Megatron (GPT3 / 1T)

2022: Meta OPT 175B param

Atos ThinkAI

Accelerate AI Computing for Industry and Research



Advise Center of Excellence in Advanced Computing



Industry-contextualized &
sustainable high-performance AI



Architect

Best-of-breed
hardware & software

AI-driven
optimization toolbox

Digital security

Operate

Managed Services

CAPEX & OPEX
Business Model

As a Service

The future of Large-Scale AI Computing is **Water Cooled!**

Improve your Power Usage Effectiveness (PUE) & BullSequanaX technology

Standard Air Cooled: ~1.4/1.5
Atos Water Cooled Doors: ~1.2

BullSequanaX Water Cooled < 1.02



BullSequana X



3744 GPUS A100

#8



Atos ThinkAI - Graphcore

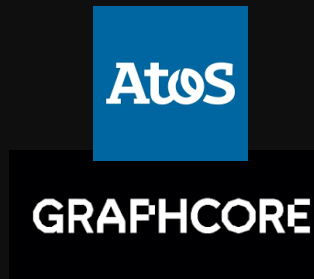
Improve your TCO with AI dedicated chips



Bring the best (alternative) Technologies to answer customers needs and implement first AI solutions



Educate and jointly leverage the AI technology into current workflows



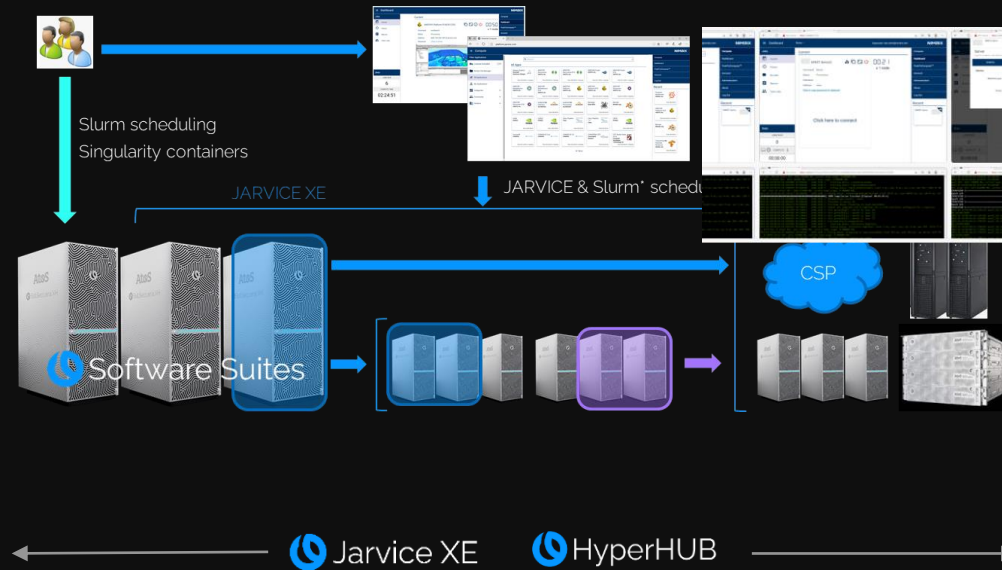
Start Combining AI & HPC to boost simulations & production through applications optimizations and HW/SW specific designs



Be ready for exascale with optimized solutions combining Graphcore assets with Atos ones

Atos Nimbix for Hybrid AI Cloud as a service

Overall proposition



CUSTOMERS on-premises clusters

ACROSS customers partners ecosystem

Nimbix Supercomputing Suite

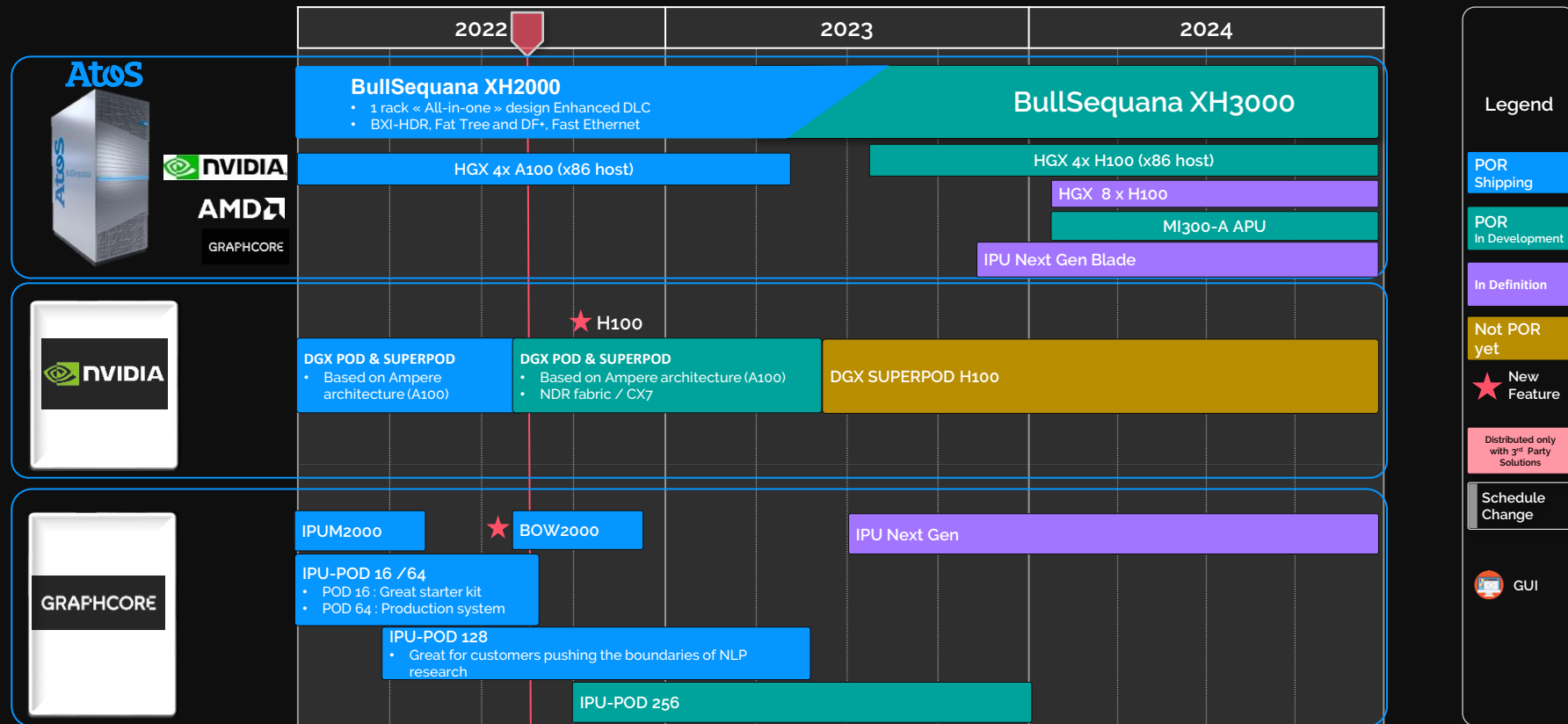
ATOS global/regional cloud zones

- HPC servers
- Quantum machines
- ThinkAI HW (GraphCore/NVIDIA DGX)
- Cloud Service Provider (AWS/GCP/Azure)

Infinite scalability & capabilities

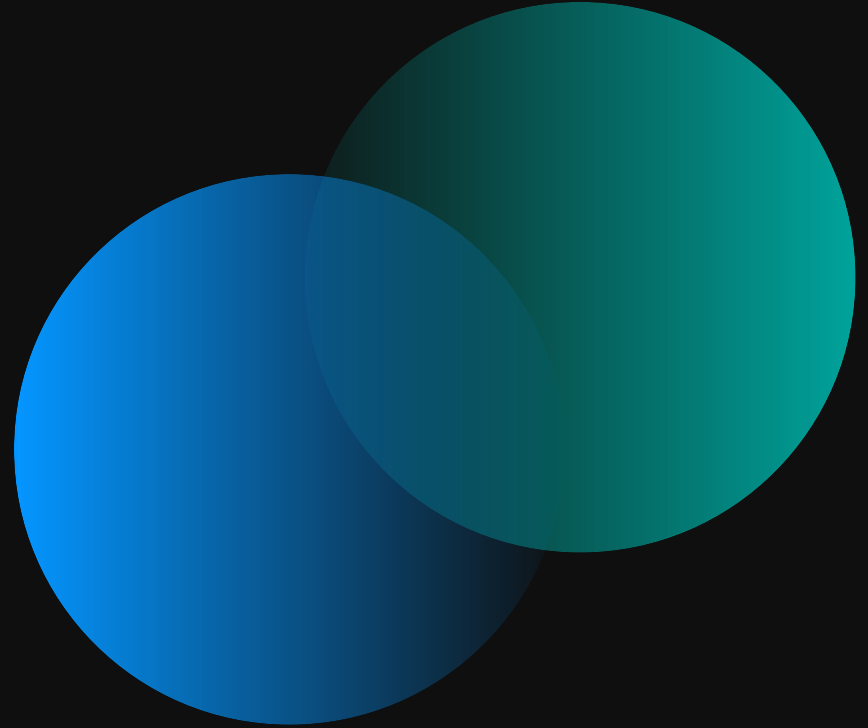
Atos ThinkAI Hardware Roadmap

Roadmap is indicative only and subject to change without notice
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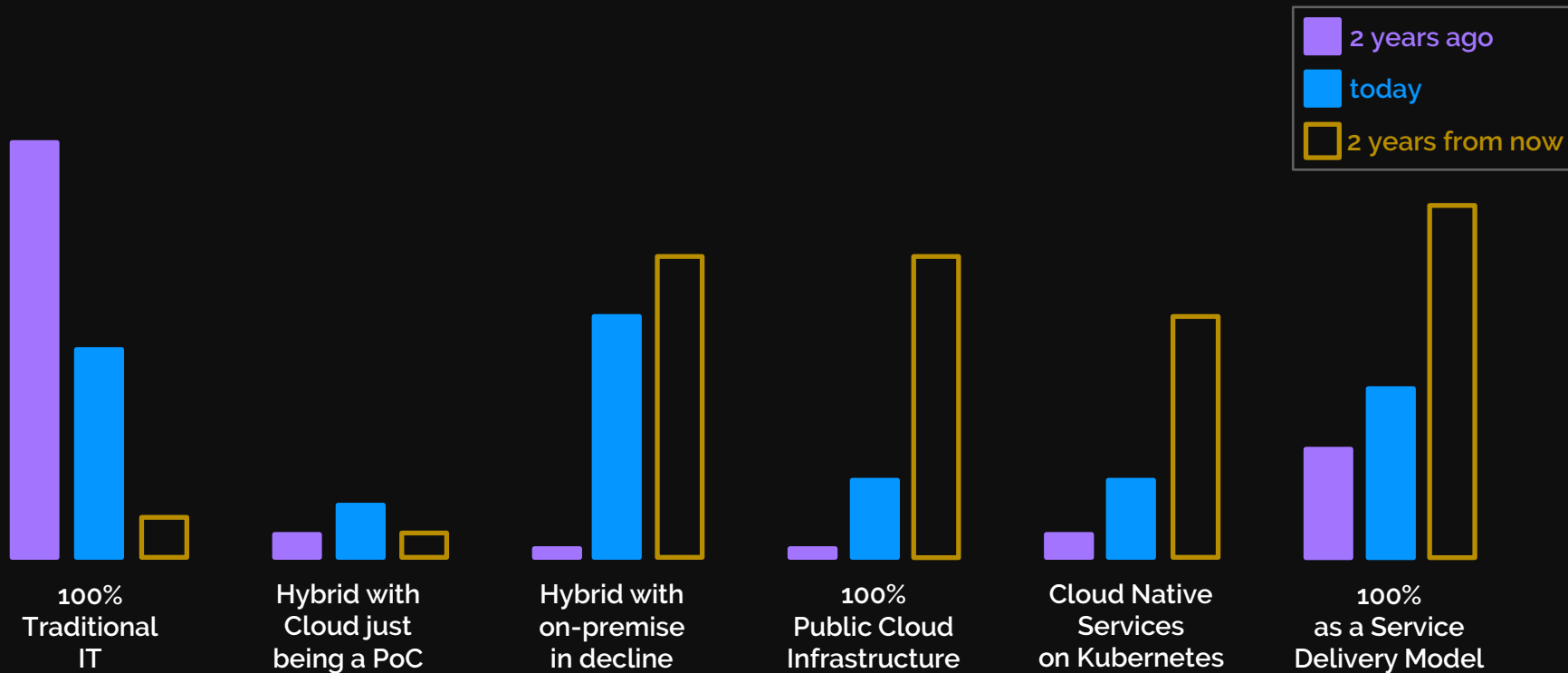
04. HPC Software and as-a-Service

S. Hebert



Trend towards Cloud, Cloud Native & aaS

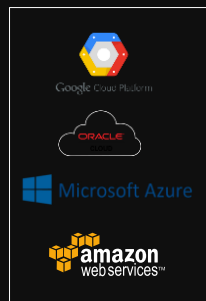
Why Flexibility for HPC, AI, & Quantum Matters



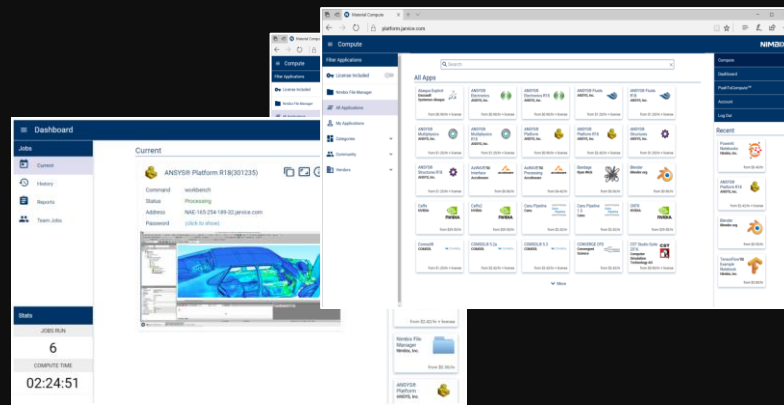
Atos HPC Solutions Deliver HPC Any Way You Want to Run

On Premises, Hybrid Cloud HPC Software, & Cloud Service

 Nimbix Supercomputing Suite



 **JARVICE™ XE**
Hybrid Cloud Software



Nimbix Supercomputing Suite

Global Elastic HPC & Supercomputing as-a-Service

3 Supercomputing “as-a-Service” Consumption Models

Elastic



Pay-as-you-go, on-demand, secure and scalable supercomputing through a **single** user interface.

Dedicated



Leverage powerful **dedicated Bullsequana HPC servers** as “Bare Metal as-a-Service” for the best of infrastructure and **on-demand scalability**, convenience, and agility.

Federated



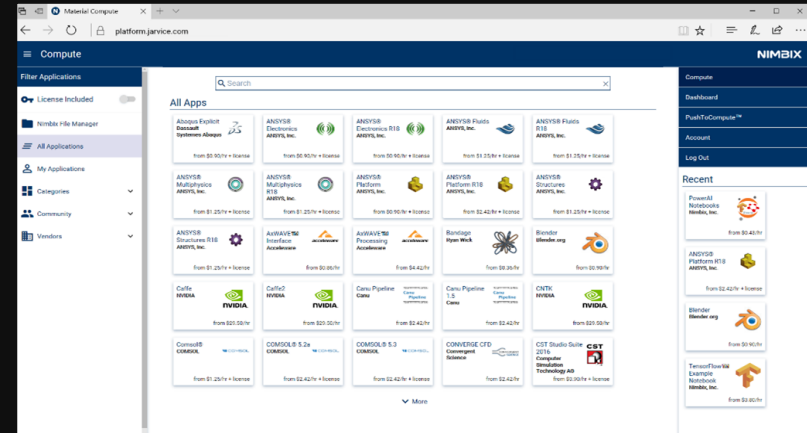
Federated Supercomputing-as-a-Service offers a unified service console to manage **all compute zones and regions** in a public or private HPC, AI, and supercomputing federation.

Atos Nimbix for HPCaaS and Cloud Supercomputing

Run Workloads in Minutes

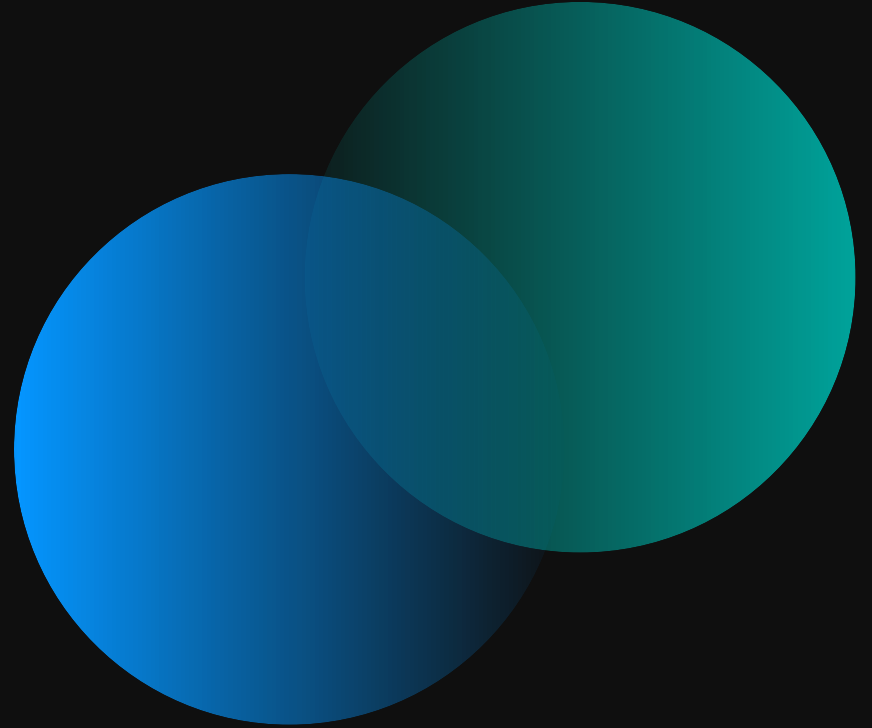


- Login and run workloads from any device
- Exceptionally clear and easy to use interface
- Multiple users can easily collaborate through advanced team features
- Scale applications as needed
- Seamless global updates of both platform and applications
- Access to hundreds of applications and workflows through the HyperHub Application Marketplace



05. Customer Stories

A. Grant



European leadership – Promoting European Technology

5 EuroHPC systems out of 7 so far awarded to Atos (1/3 pre-exa, 4/5 peta)



CINECA – **Leonardo** (Italy) 320 PFlops



BSC – **MareNostrum5** (Spain) 200 PFlops?



LuxProvide – **Meluxina** (Lux) 18.7 PFlops



IZUM – **Vega** (Slovenia) 10.11 PFlops



NCSA – **Discoverer** (Bulgaria) 6 PFlops



MACC – **Deucalion** (Portugal) 5 PFlops



India leadership

With the National Supercomputing Mission (NSM)

NSM
NATIONAL
SUPERCOMPUTING
MISSION



PARAM Shivay



PARAM Shakti



PARAM Brahma



PARAM Yukti



PARAM Sangam



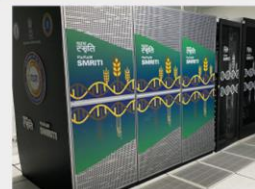
PARAM Pravega



PARAM Seva



PARAM Smriti



PARAM Utkarsh



PARAM Ganga



South America leadership

All systems on
Top500 for
South America
are from Atos

Petrobras, LLNC
and CIMATEC the
main customers



Aero engine manufacturer

HPC as a Service



Nimbix Supercomputing Suite

Dedicated

Business challenge

- Minimum capex to deploy
- A flexible model with minimum lock-in
- Consume HPC based on their order book
- Run at Official Sensitive security classification
- in service in 9 months from contract signature

Solution

- Innovation in the HPC platform
 - Processor Choice
- Offered a Capacity-On-Demand commercial model
 - Pay as you go for electricity and additional CPU capacity
- CFD nodes w 4GB/core and FEA nodes w 10GB/node

Benefit

- Technical innovation:
 - Better use of memory, better price/performance
 - same or better performance per core
- Commercial innovation
 - Both fixed and variable components and a fully Managed Service from Atos

CEA/DAM – CEA-HF Exa-1

France



“Developing such a high-level supercomputer is essential for some of the defence programs that we implement at the CEA/DAM.

To reach this capacity, technological breakthroughs are needed – such as maintaining low levels of energy consumption, while ensuring that the huge volumes of data produced by increasingly precise simulations can be effectively processed. I am proud that the long-term R&D partnership between Atos and the CEA/DAM allows us to achieve this new major milestone for our program, and leverage CEA/DAM's innovation capabilities”.

Vincenzo SALVETTI,
Director of the CEA's Military Applications Division,



23,2 Pflops – **14th**



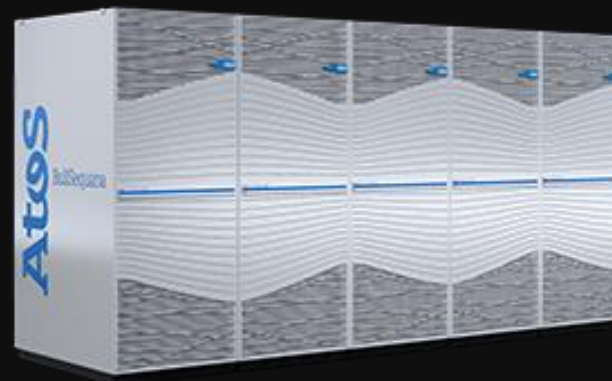
CEA-HF Exa-1

- BullSequana XH2000
- 4,96 MWatt
- 12,960 AMD Milan processors
- BXI-v2 interconnect

- **Technische Universität Dresden** (TU) in Germany.
- The supercomputer will be used for data intensive HPC tasks at the Center for Information Services and High-Performance Computing (ZIH).
- Researchers will use the new supercomputer for computational tasks in **environmental research, life sciences, materials sciences and engineering**, as well as basic research in physics, chemistry and mathematics

"In addition to the **innovative hot water cooling**, which will lead to an encouraging increase in the energy efficiency of the system, the balanced architecture and the exceptionally powerful infrastructure for the fast input/output of data are to be highlighted, which sustainably advance important research fields of ours such as modeling, simulation, and data analytics"

Prof. Dr. Wolfgang E. Nagel, TU Dresden/ZIH.



Atos BullSequana XH2000

- More than 600 nodes
- INTEL Sapphire Rapids processors – >60.000 cores
- 1 PiB storage for home – 21 PiB for scratch
- Replaces previous Taurus system (2013-5) also supplied by Atos

Centre National d'Études Spatiales - CNES

France



Founded in 1961, the Centre National d'Études Spatiales (CNES) is the government agency responsible for shaping and implementing France's space policy in Europe.

Located in Toulouse (TOULOUSE SPACE CENTRE-CST), the CNES computing center is one of the largest computing centers in France. All of its application platforms and services are available to engineers and researchers working on a wide variety of space projects, such as CFOSat or PEPS. The Center also offers support and expertise to its many users.

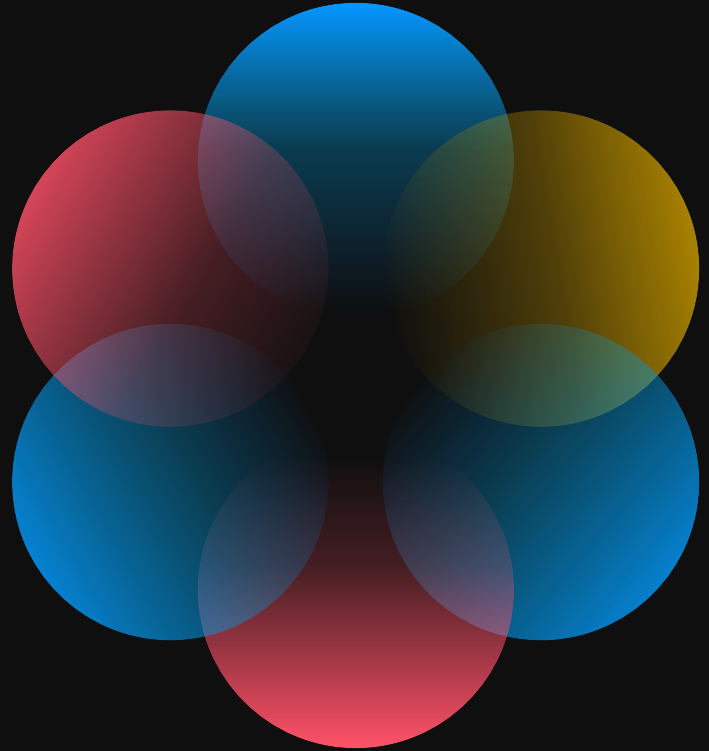


BullSequana X400

- CPU nodes
 - AMD Milan 7713 (64c @ 2GHz)
 - 1 GB DDR4-3200 memory
- GPU nodes w Nvidia A100-80
- Viz nodes w Nvidia A40
- InfiniBand 100 Gbps
- Atos sw suite (SMC, SPM)

o6. Conclusion

E. Le Roux



Atos

Empowers the digital and economical sovereignty with hybrid supercomputing

Collaboration in tackling the scientific challenges



Decarbonization

Direct Liquid Cooling (DLC), +72 patents,



BullSequana XH3000



Quantum Learning Machine



Nimbix Supercomputing Suite



ThinkAI



Mobull

◀..... Accelerated hybrid computing, anywhere you want to run▶

Q&A



Thank you!

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