



bullx

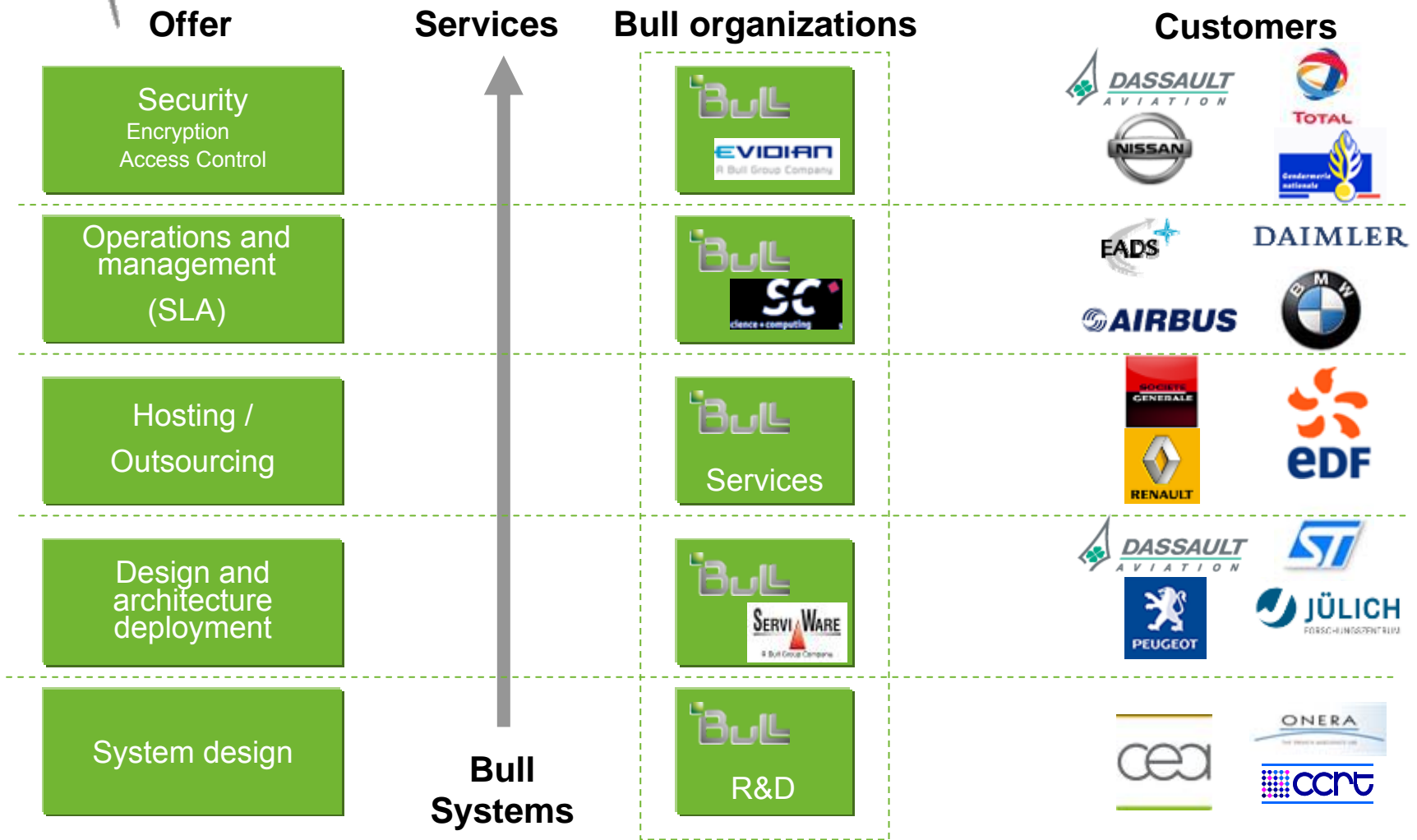
instruments for innovation



Extreme Computing – Update on Bull offer

Jean-marc.denis@bull.net
Director of HPC Operations

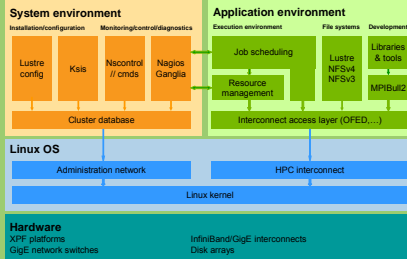
The most complete HPC value chain in Europe



+500 specialists in Europe

Bull Extreme Computing building blocks

bullx Cluster Suite



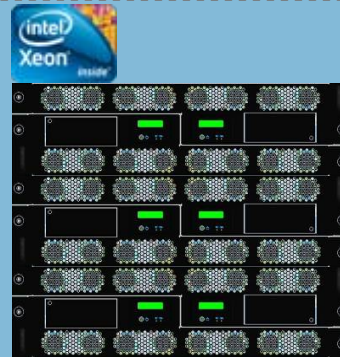
bullx blade system



1P flops
10,000 blades

3900 GPU blades
ACCELERATORS

bullx Large SMP system



1P flops
800 SMP

160 GPU SMP

bullx

Water cooling

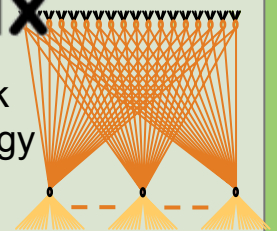


Storage

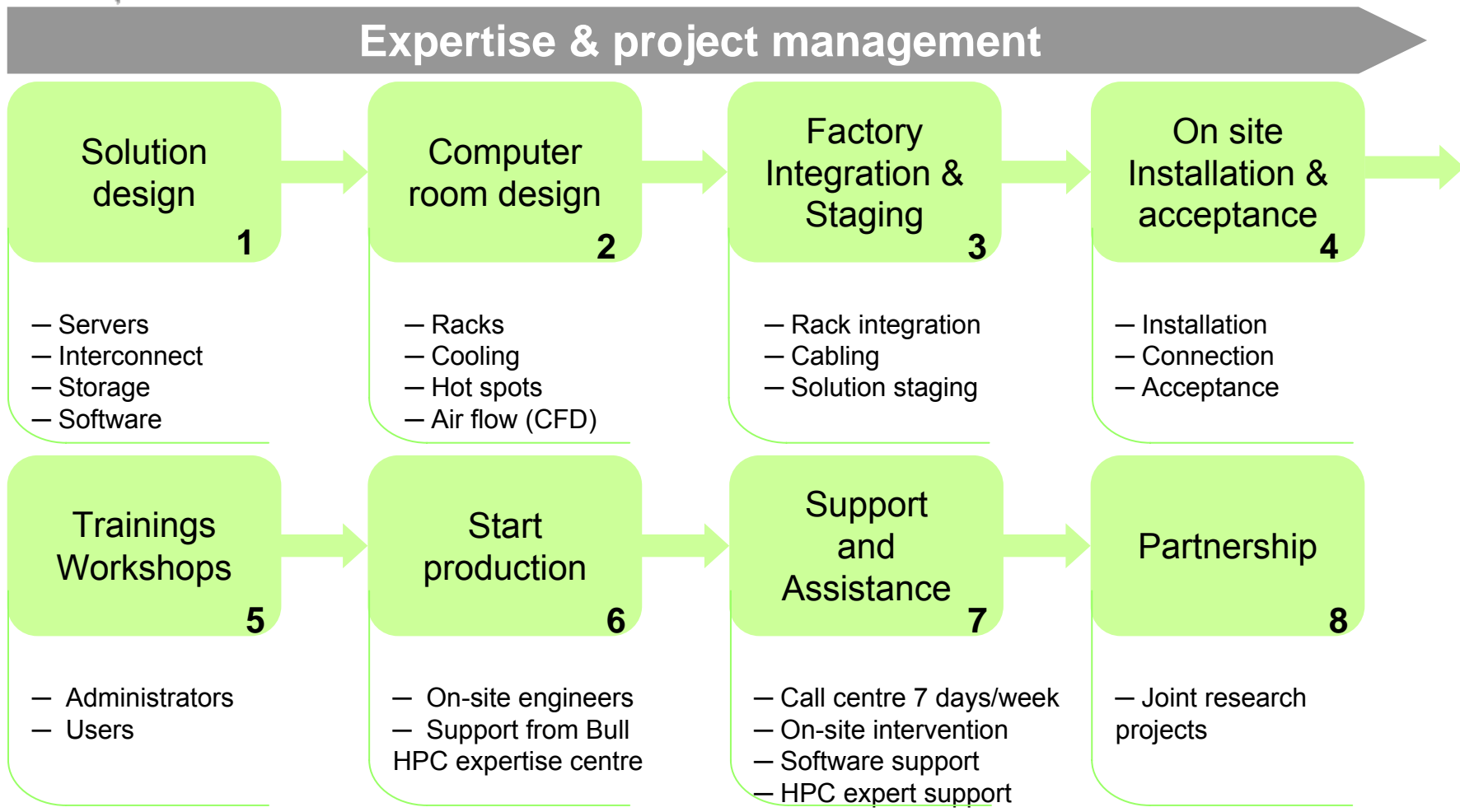


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Network & Topology



Industrialized project management



Collaborative research & development model

■ HW

- **With CEA:** computer room optimisation (Goal: PUE close to 1.05)
- **With « industrial partner »:** B505 Accelerator Blade

■ SW

- Very important contributor to the opensource community
- Key contributor to the Lustre community
- **With CEA:** management of clusters with 100,000 to 1,000,000 cores (including hybrid HW)
- **With FZJ/PARTEC/INTEL/SUN/MELLANOX:** JUROPA Step2 project
- **With CAPS and CEA:** GPU compilers
- **With Uni. Düsseldorf:** MyJAM (application fingerprint and batch scheduling)
- **With Uni. Cardiff:** Linux / Microsoft hybrid clusters
- **With Science + Computing (Bull subsidiary):** SC Venus

Bullx Products – Bull flagships for 2009



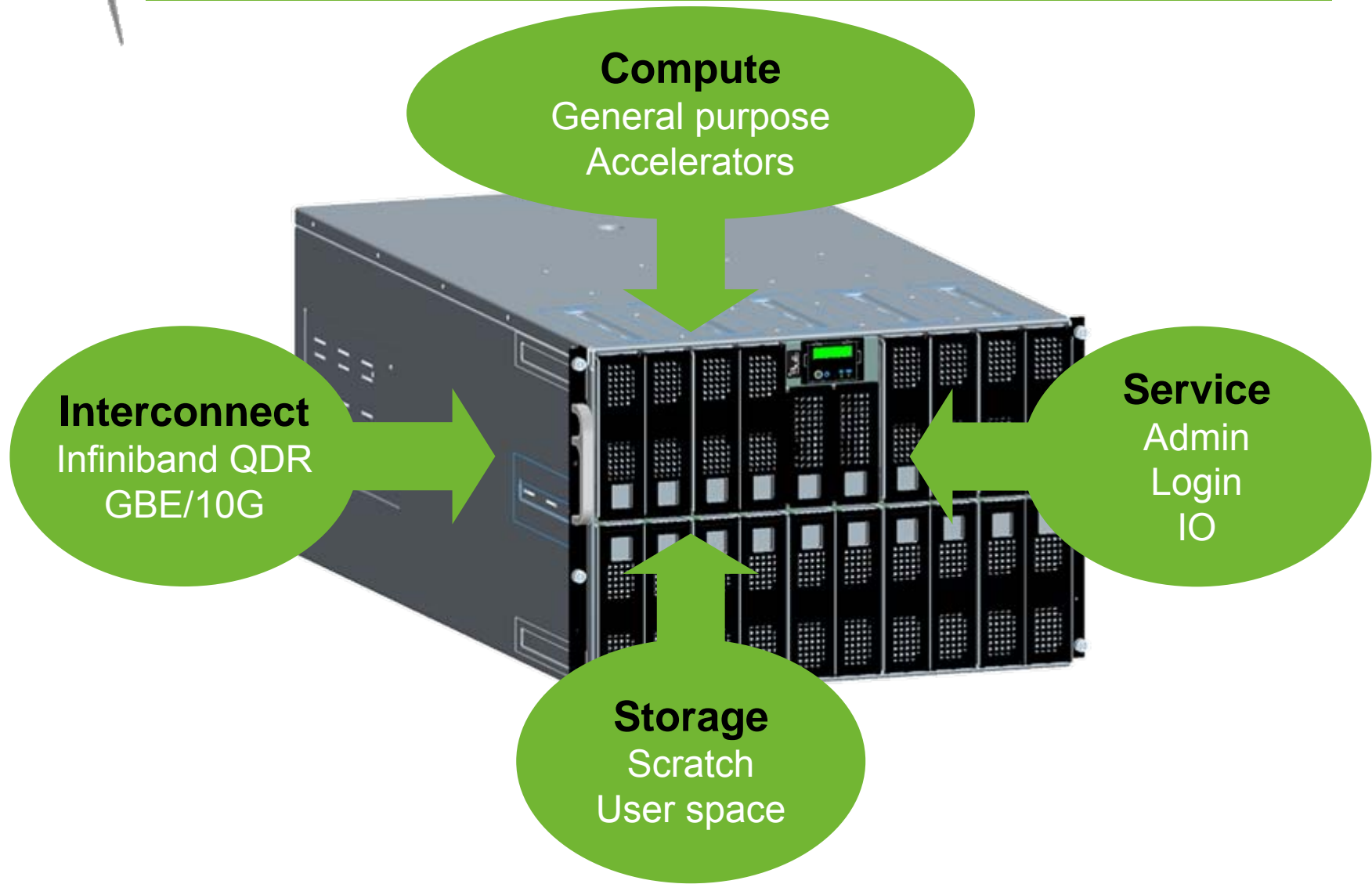
BULLX Flagships (as of today)

- bullx blade system
- Bull rack systems

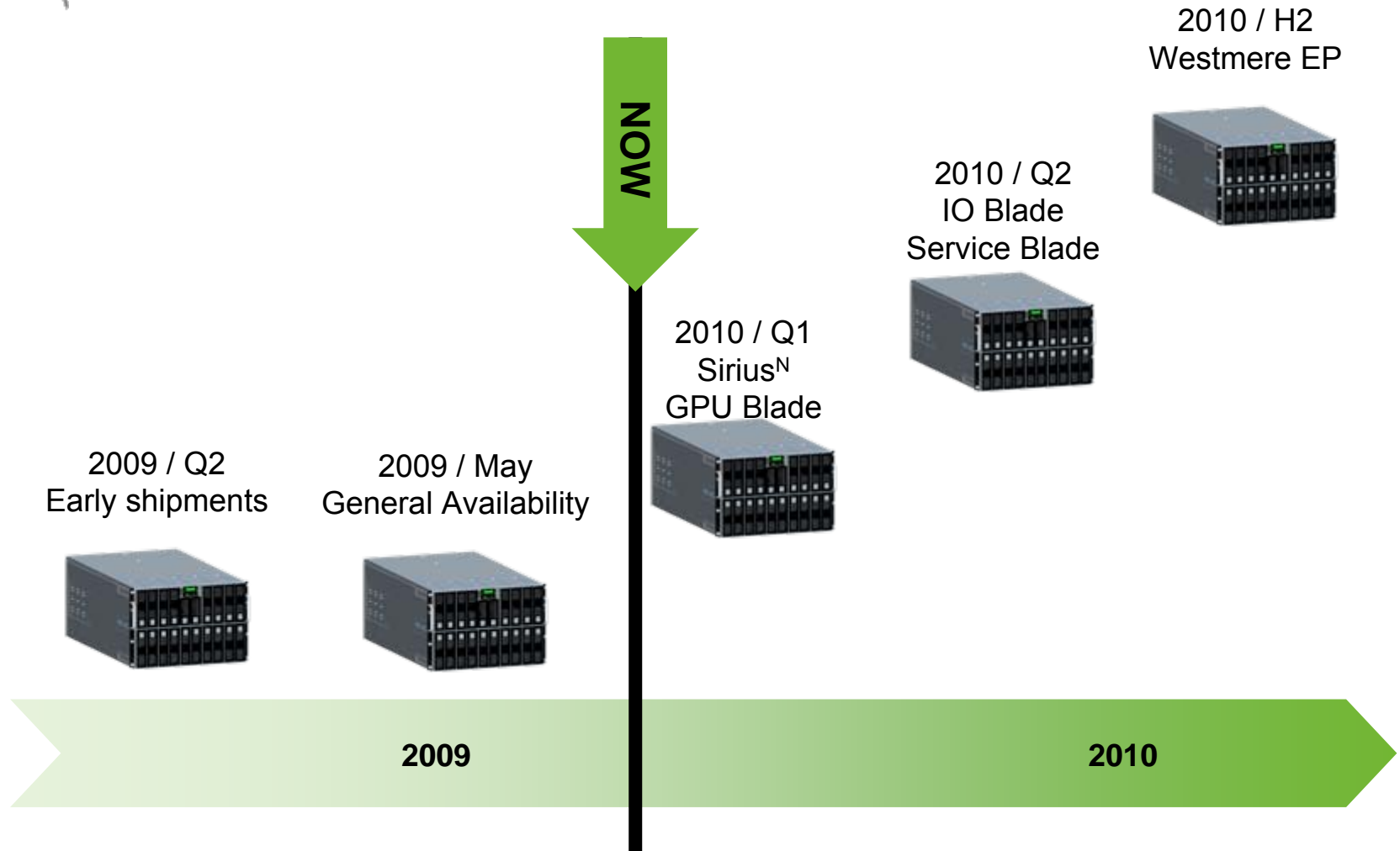
bullx blade system



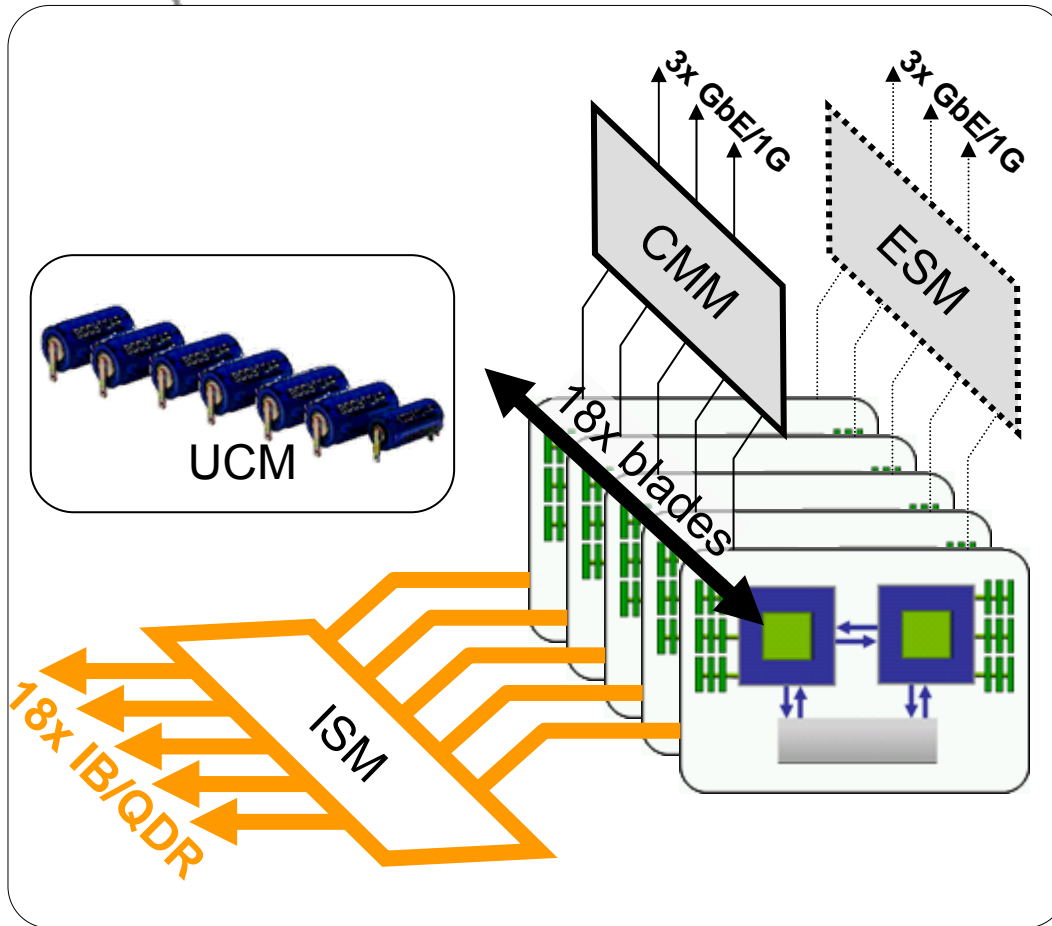
bullx blade system : approach



bullx blade system - Roadmap



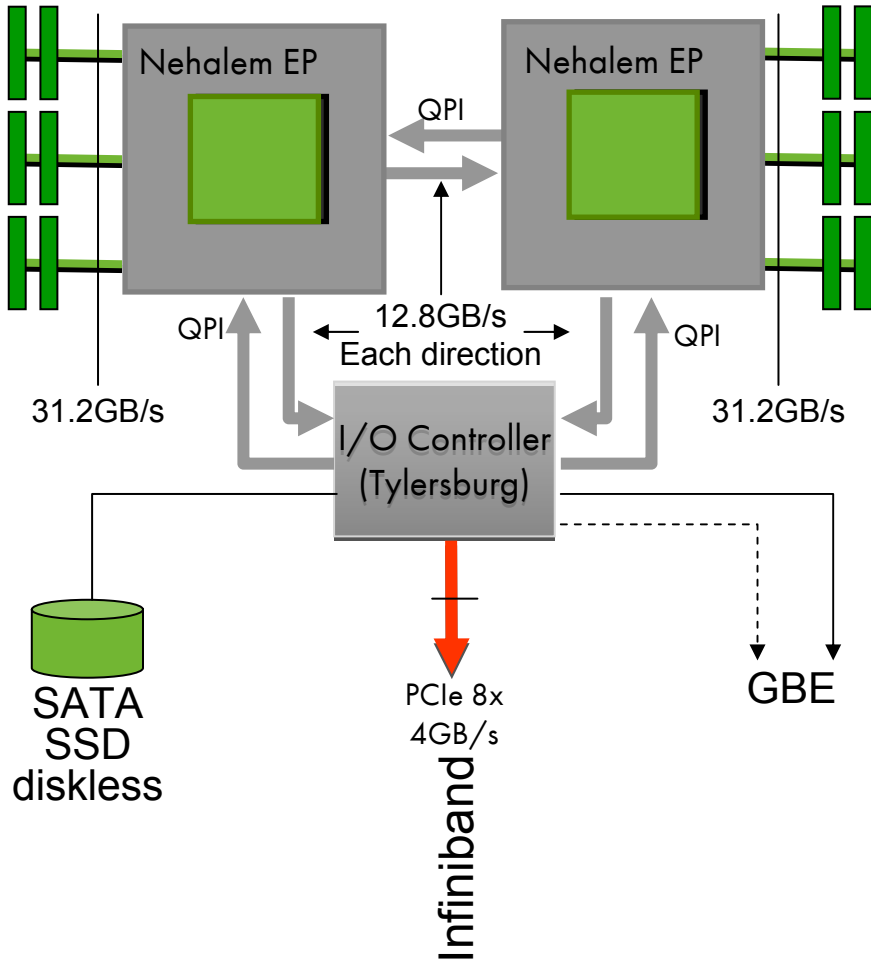
bullx blade – Chassis Block Diagram



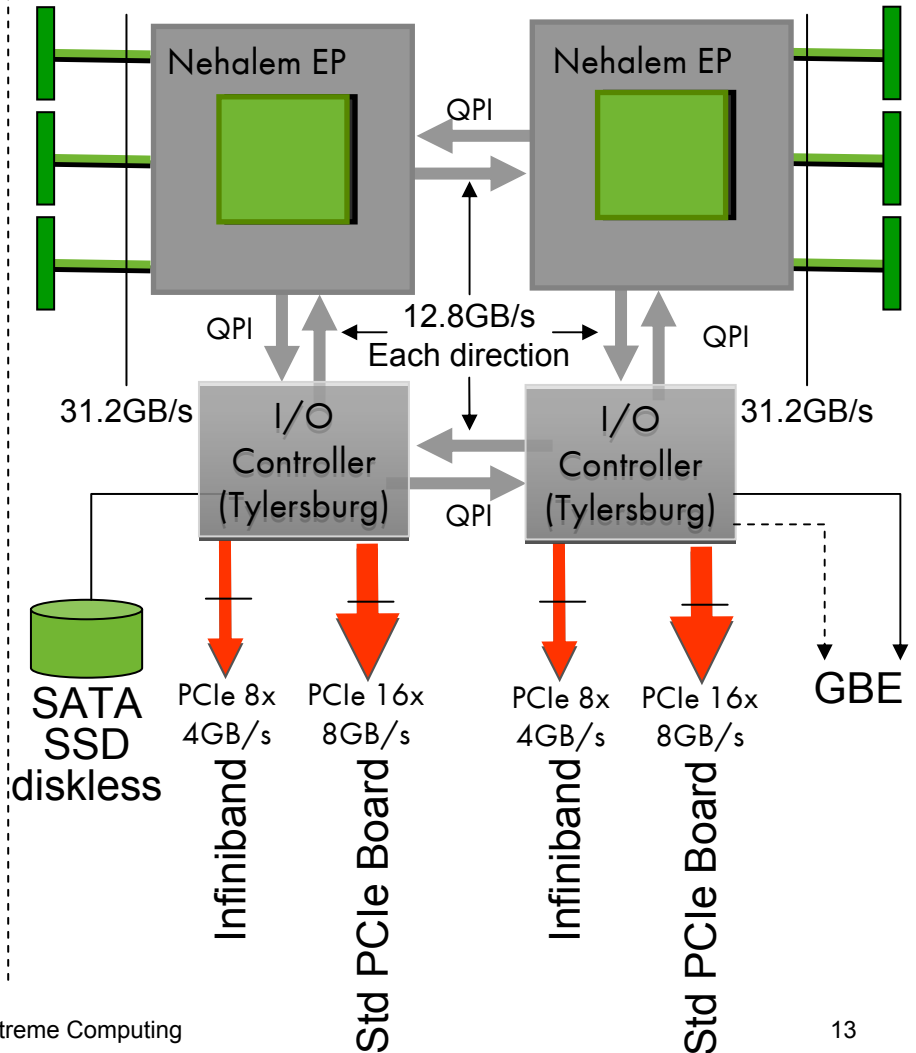
- 18x compute blades
 - 2x Nehalem-EP sockets
 - 12x memory DDR3 DIMMs (12x8GB=96GB)
 - 1x SATA HDD/SSD slot (optional – diskless an option)
 - 1x IB ConnectX/QDR chip
- 1x InfiniBand Switch Module (**ISM**) for cluster interconnect
 - 36 ports QDR IB switch
 - 18x internal connections
 - 18x external connections
- 1x Chassis Management Module (**CMM**)
 - OPMA board
 - 24 ports GbE switch
 - 18x internal ports to Blades
 - 3x external ports
- 1x optional Ethernet Switch Module (**ESM**)
 - 24ports GbE switch
 - 18x internal ports to Blades
 - 3x external ports
- 1x optional Ultra Capacitor Module (**UCM**)

bullx blade – blade block diagrams

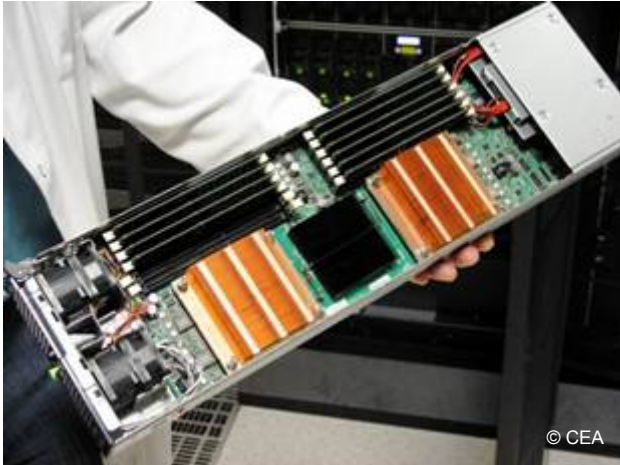
BULLX-B B500



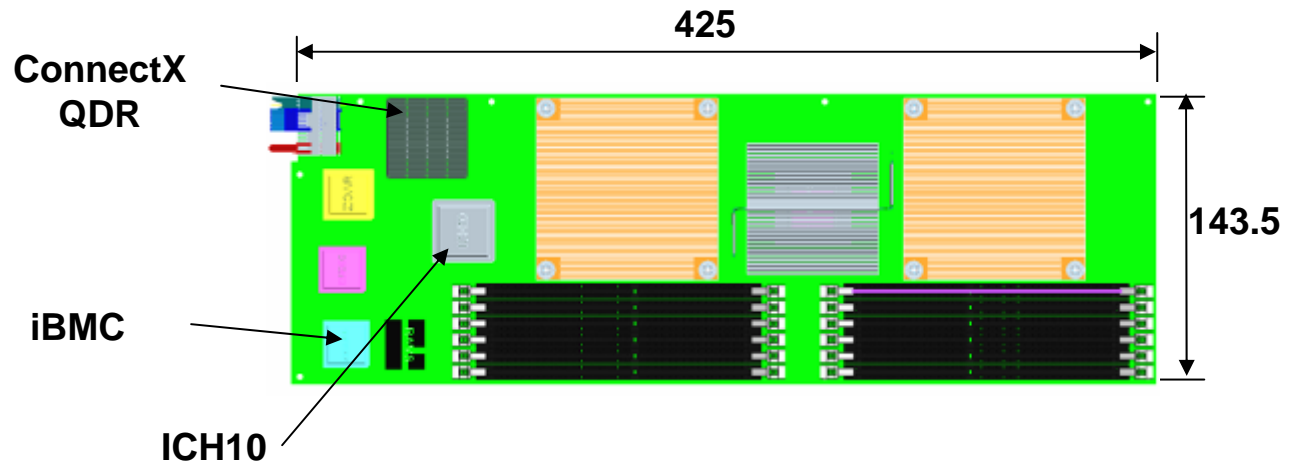
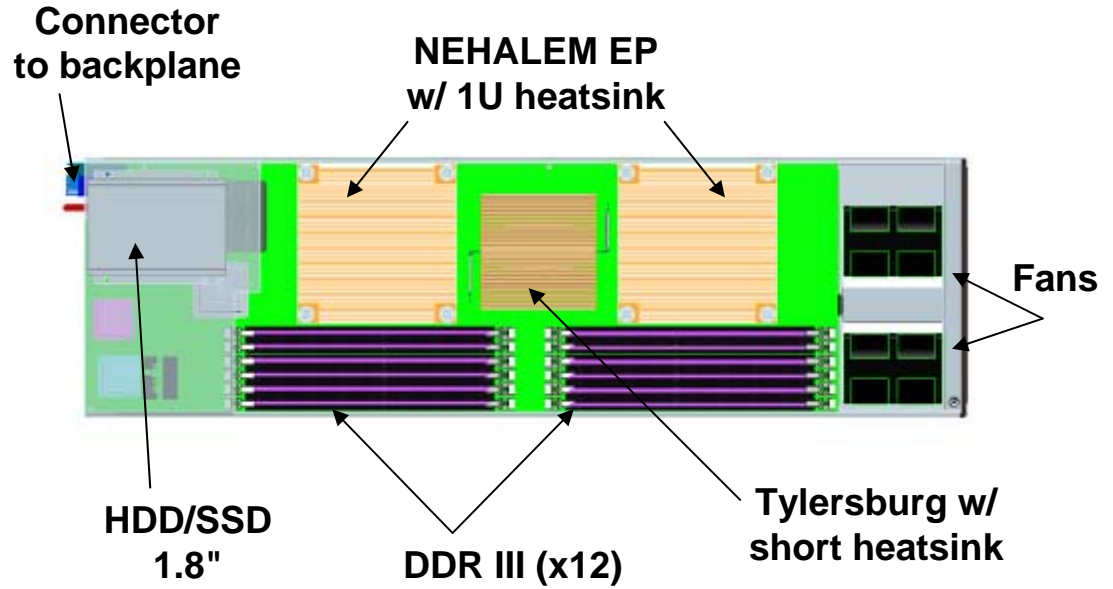
BULLX-B B505



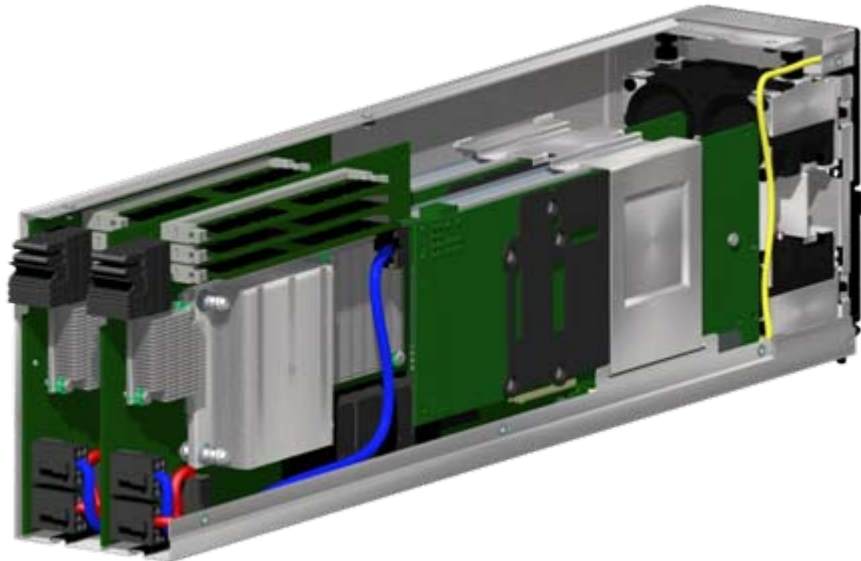
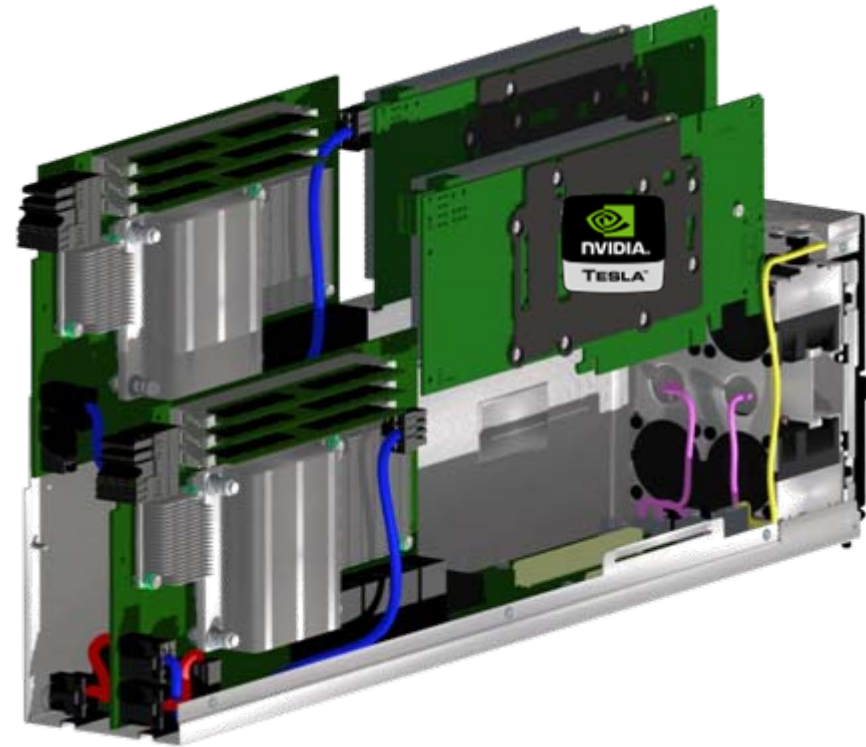
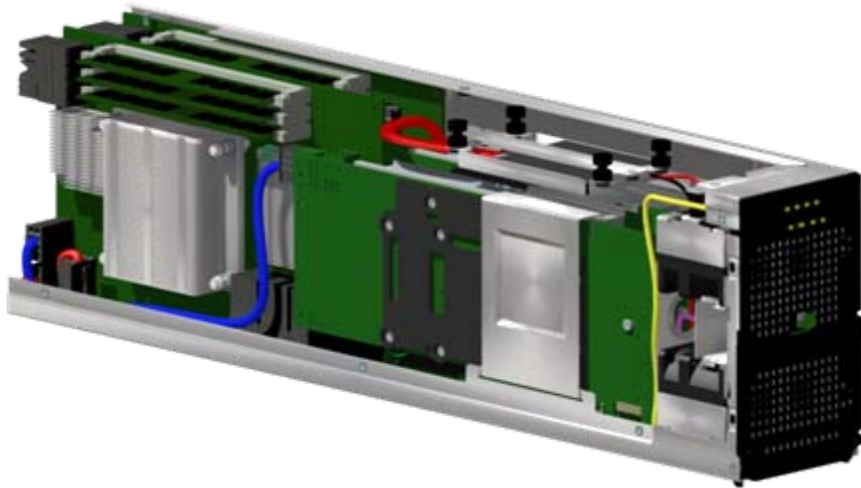
bullx B500 compute blade



© CEA



Bullx B505 – Accelerator blade



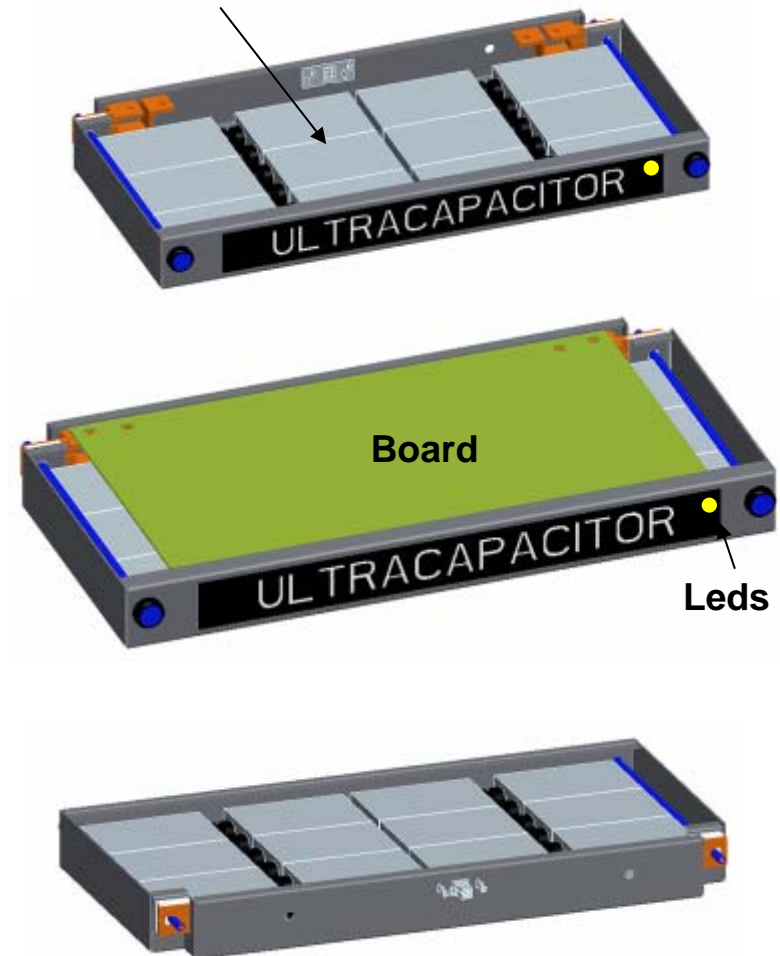
Ultracapacitor Module (UCM)

- Embedded protection against brown outs
- Protect one chassis with all its equipment under load
- Up to 250ms

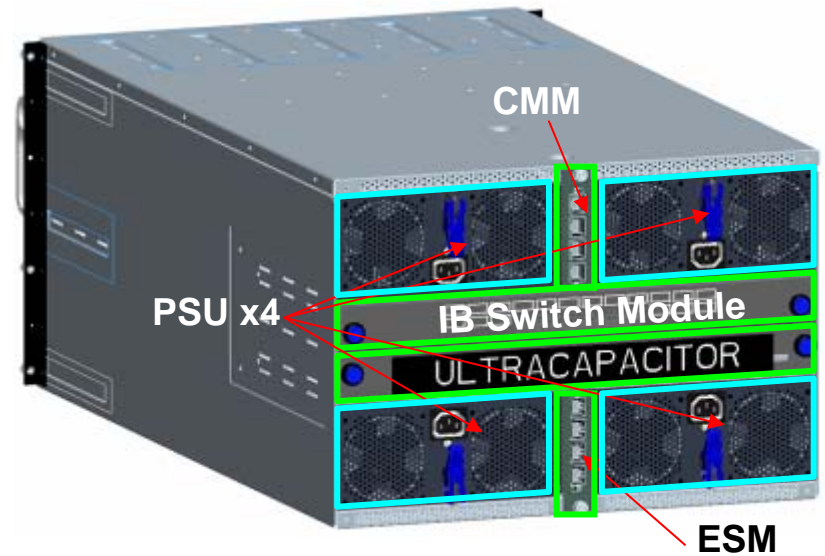
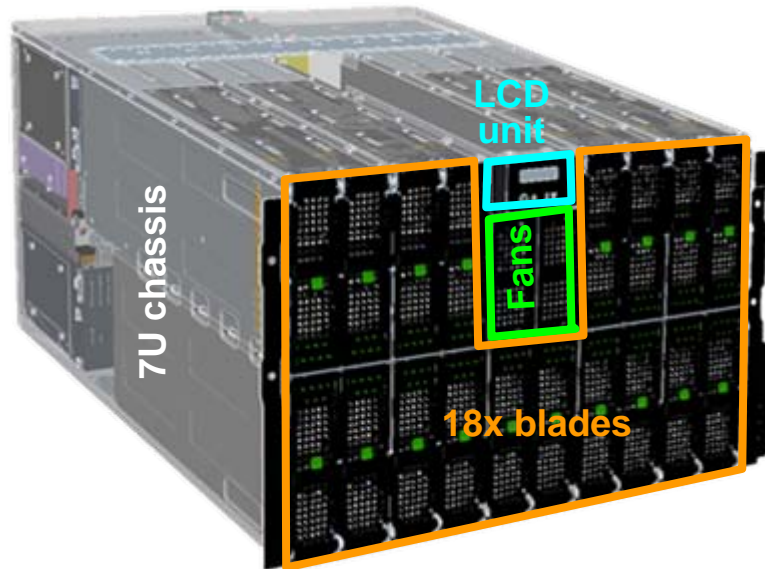
- Avoid on site UPS
 - save on infrastructure costs
 - save up to 15% on electrical costs

- Improve overall availability
 - Run longer jobs

NESSCAP Capacitors (2x6)



bullx chassis packaging

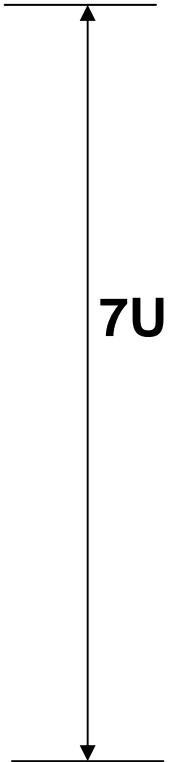
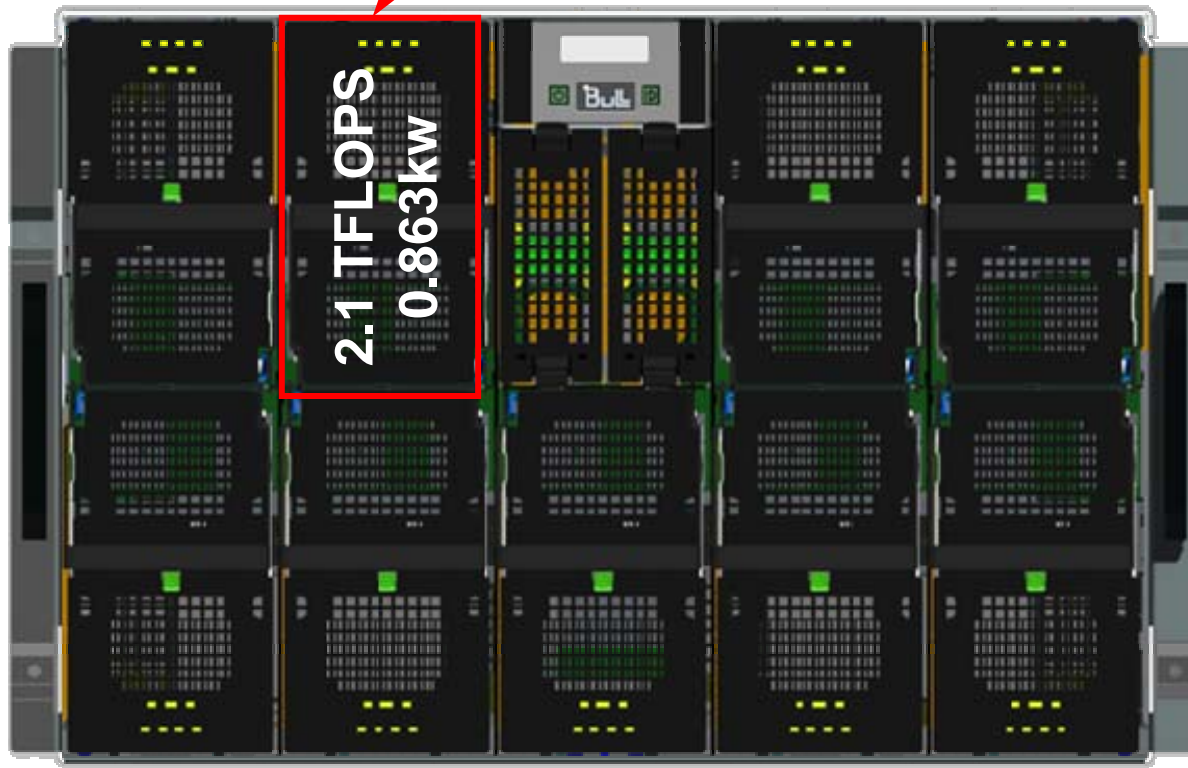


bullx B505 accelerator blade

Embedded Accelerator for high performance with high energy efficiency



2 x Intel Xeon 5500 / 2 x NVIDIA T10(*) / 2 x IB QDR
(* T12 in 2010)



18.9 TFLOPS in 7 U

Bull Cool Cabinet Door

Bull's contribution to reducing energy consumption

- **Enables world densest HPC solution !**
 - 28kW/m² (40kW on 1.44m²)
 - 29 'U'/m² (42U + 6PDUs on 1.44m²)
- **77% energy saving compared to air conditioning !**
 - Water thermal density much more efficient than air
 - 600W instead of 2.6kW to extract 40kW(*)
- **Innovative Bull design**
 - 'Intelligent' door (self regulates fan speed depending on temperature)
 - survives handily fan or water incidents (fans increase speed and extract hot air)
 - optimized serviceability
 - A/C redundancy



(*) max kw is subject to environmental conditions. It could be >50kw.

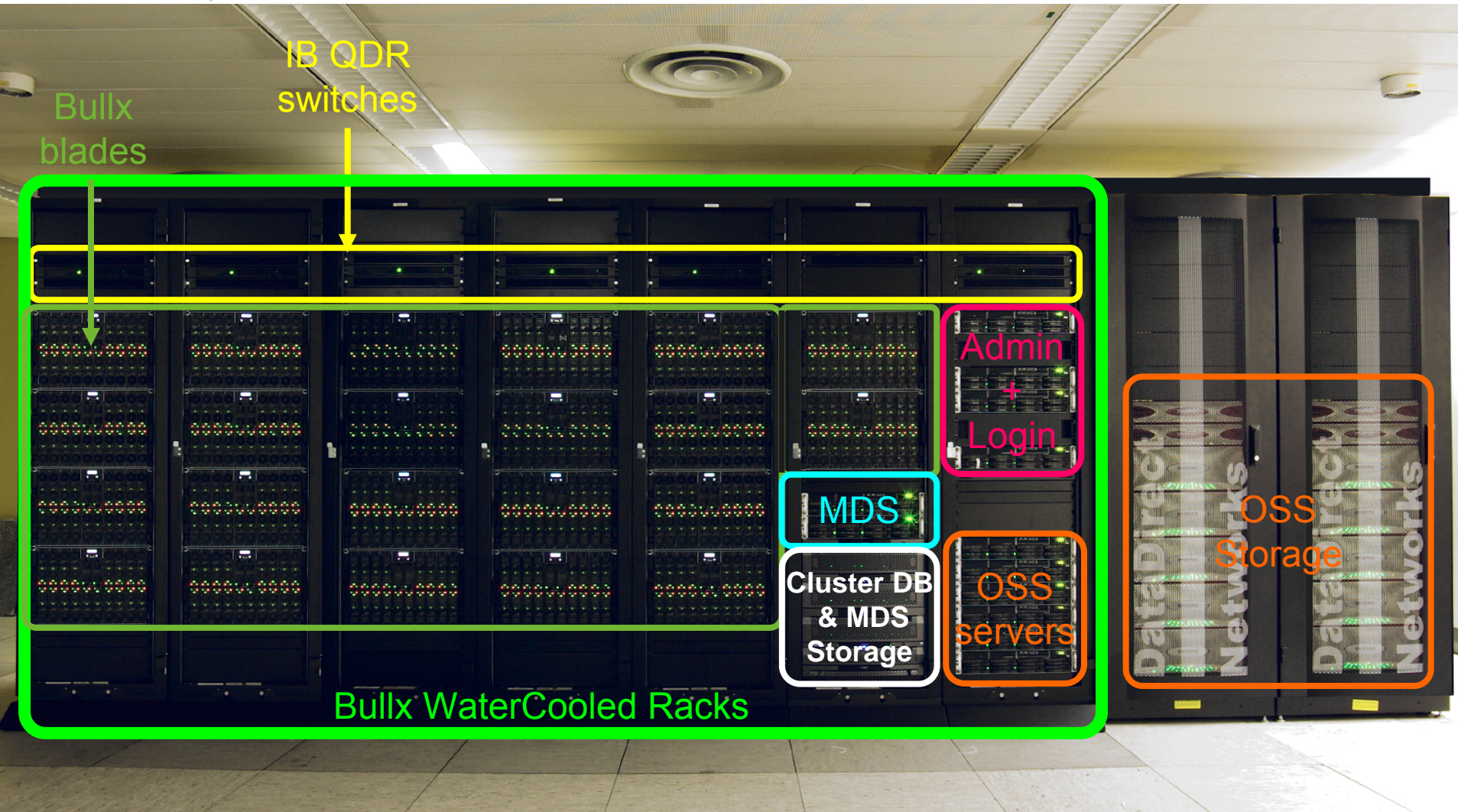
FZJ – JUROPA (HPC-FF)



Regionales Rechenzentrum Köln



RRZK





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instruments for innovation

