MONT-BLANC

http://www.montblanc-project.eu

High-Performance Computing from Commodity Embedded Technology

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Enabling Exascale in Europe for Industry

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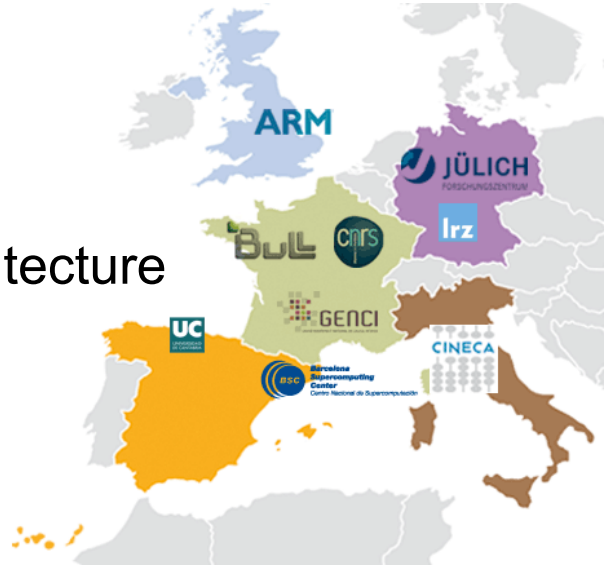
Mont-Blanc in a glance

Mont-Blanc 2011-2015

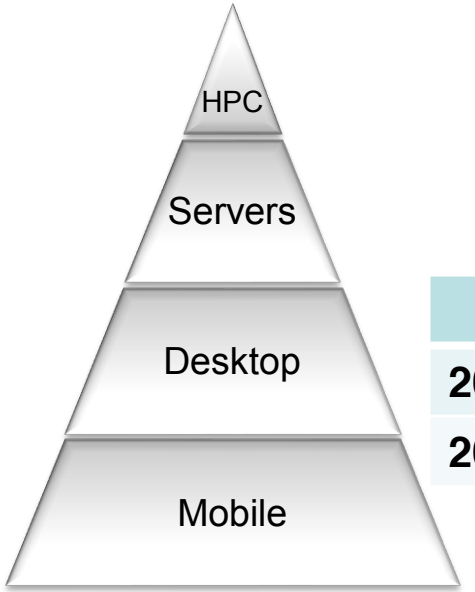
- HPC prototype based on current mobile embedded technology
- Learn from the experience, plan for future architecture
- Port real scientific applications



Mont-Blanc 2013-2016

- Extend
  - Set of scientific applications
  - OmpSs programming model
  - Productivity tools
  - Next generation Mont-Blanc architecture
- Explore
  - ARM 64-bit
  - Fault tolerance and resiliency
  - Market of ARM-based platforms for mini-clusters
- Disseminate
  - End-User Group

The idea is to exploit commodity technology

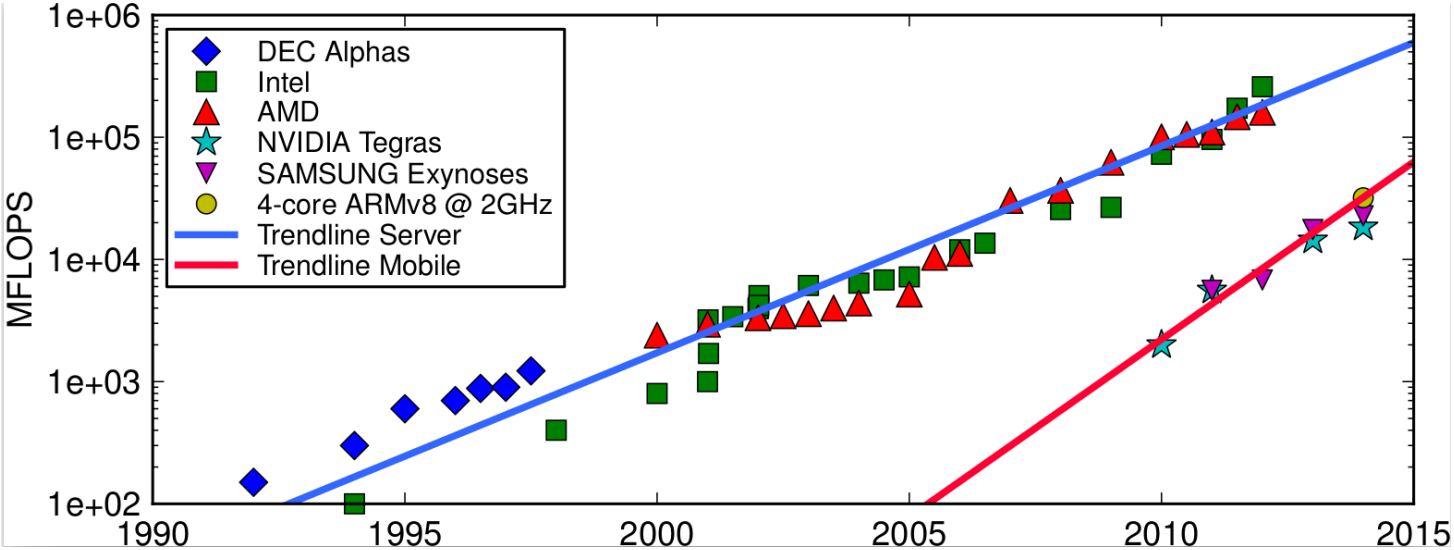


TOP 500 The List.

~23M cores (Nov 2014)

	Servers		PC		Smartphones	
2013	9.0M		316M		1000M	
2014	9.3M	+3%	314M	-1%	1300M	+30%

...and we are still ignoring tablets: >200M



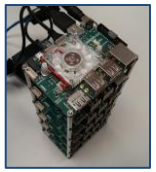
The Mont-Blanc prototype ecosystem

Tibidabo:
ARM multicore

Carma:
ARM +
external
mobile GPU

Pedraforca:
ARM +
HPC GPU

Arndale:
ARM + embedded GPU



Odroid:
ARM bigLITTLE
In-kernel switcher

Odroid Octa:
ARM bigLITTLE
Heterogeneous
multi-processing

NVIDIA Jetson
ARM 4+1 + K1 GPU

Mont-Blanc prototype:

2011 2012 2013 2014

Prototypes are critical to accelerate software development
System software stack + applications

The Mont-Blanc prototype

Exynos 5 compute card
2 x Cortex-A15 @ 1.7GHz
1 x Mali T604 GPU
6.8 + 25.5 GFLOPS
15 Watts
2.1 GFLOPS/W

Carrier blade
15 x Compute cards
485 GFLOPS
1 GbE to 10 GbE
300 Watts
1.6 GFLOPS/W

Blade chassis 7U
9 x Carrier blade
135 x Compute cards
4.3 TFLOPS
2.7 kWatts
1.6 GFLOPS/W

Rack
8 BullX chassis
72 Compute blades
1080 Compute cards
2160 CPUs
1080 GPUs
4.3 TB of DRAM
17.2 TB of Flash

35 TFLOPS
24 kWatt

	Mont-Blanc [GFLOPS/W]	Green500 [GFLOPS/W]
Nov 2011	0.15	2.0
Nov 2014	1.5	5.2

Mont-Blanc project status

DONE!

- Prototype: design, development, deployment, monitor
- Deployment of HPC software stack on ARM
- Porting of HPC kernel and applications
- Test of non-HPC workload (Hadoop, OpenStack)

ON GOING…

- Next-generation architecture modelling
- ARM 64-bit exploration (mobile and server market)
- Porting of new applications
- Programming model enhancement
- Monitoring prototype for fault tolerance techniques

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MontBlancEU

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End-User Group

- Develops a synergy among industry, research centers and partners of the project
- Validates the novel HPC technologies produced by the project
- Provides feedback to the project

Mont-Blanc provides EUG members with:

- Remote access to Mont-Blanc prototype platforms
- Support in platform evaluation and performance analysis
- Invitation to the Mont-Blanc training program