



# **DEEP and DEEP-ER**

### Estela Suarez Joint Workshop of European Exascale Projects, Edinburgh 2014

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## **DEEP Hardware Architecture**



#### Cluster: 128 CNs - Sandy Bridge

## Booster (a cluster of accelerators): 512 BNs – Intel<sup>®</sup> Xeon Phi<sup>™</sup>



Multi-core processors To run low scalable code parts of appl. Many-core processors To run highly scalable code parts of appl.



#### OmpSs on top of MPI provides pragmas to ease the offload process

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### Software Architecture

III DEEP







## Application-driven approach



#### • DEEP+DEEP-ER applications:

- Brain simulation (EPFL)
- Space weather simulation (KULeuven)
- Climate simulation (CYI)
- Computational fluid engineering (CERFACS)
- High temperature superconductivity (CINECA)
- Seismic imaging (CGGVS)
- Human exposure to electromagnetic fields (INRIA)
- Geoscience (BADW-LRZ)
- Radio astronomy (Astron)
- Oil exploration (BSC)
- Lattice QCD (UREG)
- Goals:
  - Co-design and evaluation of DEEP architecture and its programmability
  - Analysis of the I/O and resiliency requirements of HPC codes











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### Take aways



- Exascale poses challenges
  - Energy, Resiliency, Scalability, Programmability
  - Have to face more and huger levels of parallelism
  - Computing will become (even more) heterogeneous
- Some new ideas are around → DEEP
  - allows to map application's levels of scalability onto hardware
  - follows new approaches for the programming paradigm
  - tries to handle heterogeneity in an innovate way
- Next step → DEEP-ER
  - Also handle I/O and resiliency
- More info: <u>http://www.deep-project.eu</u>
  <u>http://www.deep-er.eu</u>



### The DEEP and DEEP-ER Consortia





#### www.deep-project.eu

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