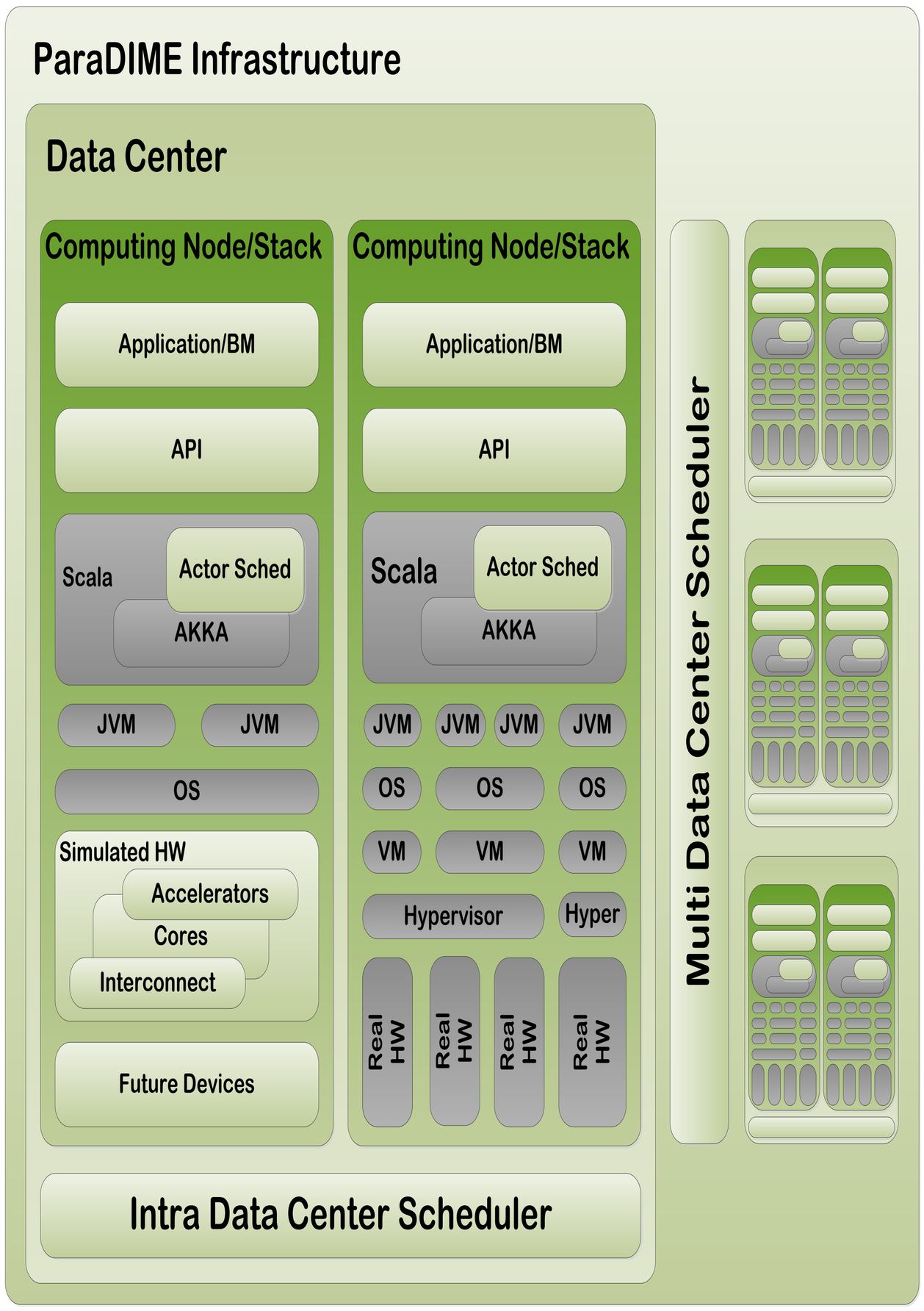
Parallel Distributed Infrastructure for Minimization of Energy

Barcelona Supercomputing Center

PROJECT OVERVIEW



IMEC Contribution

- Demonstration of technology scaling on energy efficiency (emerging and far-future devices)
- Inputs for architectural simulators
- Device-based simulation results for future processors

AoTerra Contribution

- Energy-efficient computing and environmental friendly data centers
- Proof-of-concept by running several applications from different domains on real data centers

BSC Contribution

- **Hardware support**
  - Efficient message passing
  - Approximate computing
- **Operation below safe Vdd**
- **Heterogeneous computing**
  - Combination of low/high performance processors
  - Hardware accelerators
  - Multi-device processors
- **Efficient scalable interconnects for message passing workloads**

UniNe Contribution

- **Programming model**
  - Messaging passing (actors)
  - Allow programmers to define computing tasks
  - Software-level support for energy minimization (approximate computing)
  - Fine tuning energy consumption of individual tasks
  - Run time support to dynamically determine the trade-offs
  - Error detection and recovery
  - Accelerator API
- **Applications and benchmarks**

TUD Contribution

- Fine grain scheduling (energy reduction per operation)
- Energy-proportional computing (computational load)
- Source-aware scheduling (carbon/renewable)
- Intra / multi data center schedulers

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