

Future of Global Arrays

Discussion/Debate/Free for all



Global Arrays Technical Meeting

May 7, 2010

FYI. Special Session at SC10 in Honor of Jarek Nieplocha

- **Session Chair**

- Moe Khaleel, PNNL

- **Speakers**

- Robert Harrison , ORNL,

- “Using Global Arrays”

- Daniel Chavarria, PNNL,

- “Global Arrays today and tomorrow”

- Fred Johnson, Consultant,

- “Jarek Nieplocha’s impact on the Computer Science portfolio of ASCR”

What is the best way to learn?

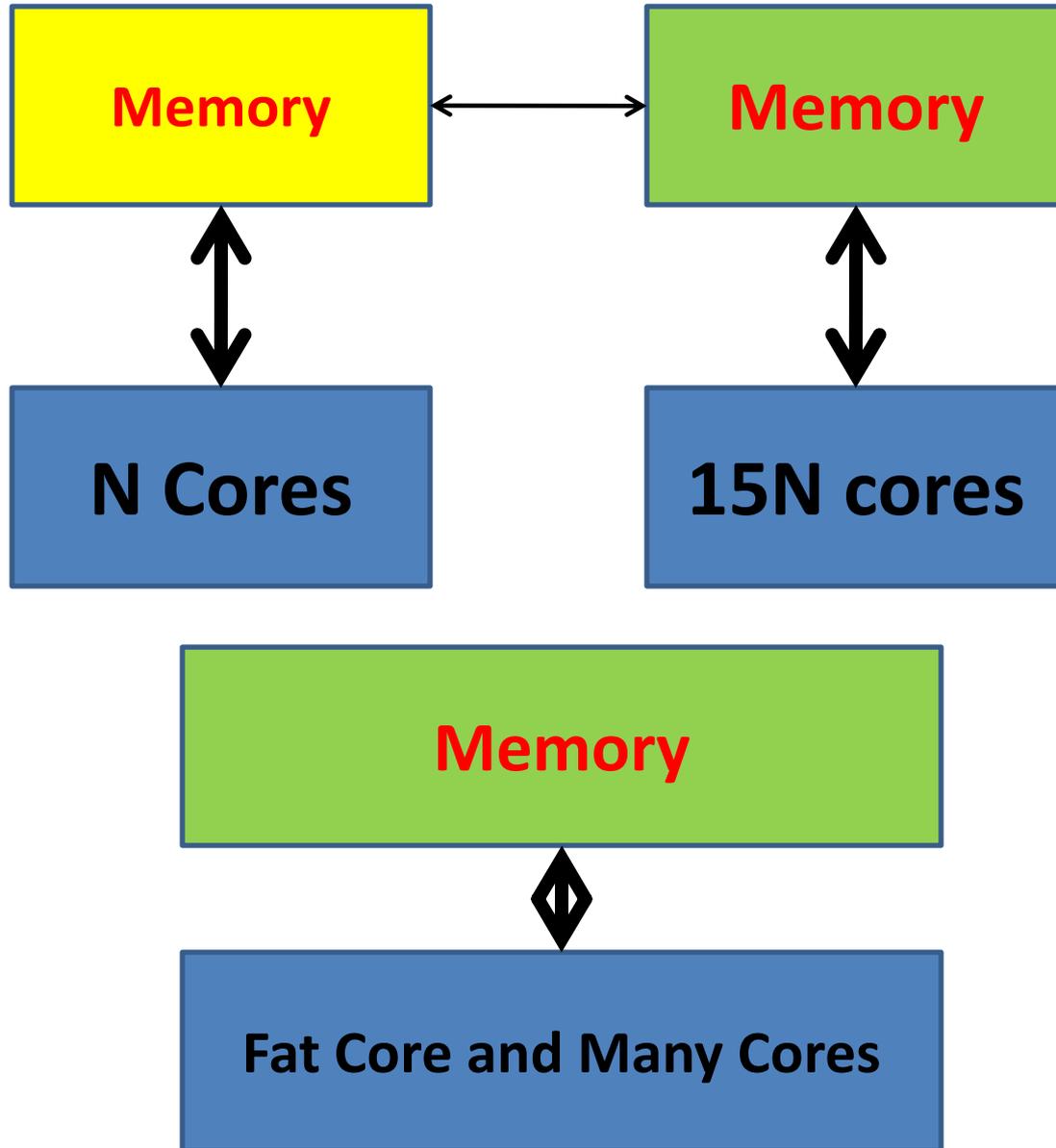
- **Prototype and fail**

- Need access to resources
- Need tools (like GA) that support the application space efforts
- Have to have an idea of where your application will evolve to.

- **Evolution Issues**

- Exascale architecture is unknown
- Fred's two swim lanes
 - Only the accelerator based one looks viable to me
 - Accelerators today
 - FPGA, GPGPU, CellBE, Altivec, Convey etc.
- Applications have to evolve as architectures change

GPGPUS now and in the future



Global Arrays today

- **Mainly a Memory Model**

- Handles data movement through the API

- **Global View of data**

- My array is a 15483 by 17839 array
- distributed across the machine and
- I can get any part of it I need for the task at hand.

- **Only “two” kinds of memory exposed Global and Local**

- Lots of optimizations under the covers e.g., SMP awareness

- **Execution Model**

- SPMD, Get, compute, Accumulate or Put

- **Data structures are limited**

- **Moving forward we need to preserve this functionality**

Global Arrays future???

- **Exposing multiple levels of memory to match algorithmic concurrency needs.**
 - Match data “locality” to system resources within a numa like node.
- **More expansive data types (should they be added?)**
 - Sparse, irregular, trees, graphs, lists, user defined etc.
- **Should or could we fold in the notion of moving operations on data as opposed to just data?**
 - Should this be an orthogonal thing?
- **Tasking model?**
 - Should this be an orthogonal thing?
- **Homework from domain folks???**

Discussion

