CAM Parallelism

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CAM Parallelism

- MPI for communication between nodes
- OpenMP directives on processes within a node

N (Tasks) = N (Nodes) * N (PEs per Node)

N (Tasks) = N (CRCPs running simultaneously)

Obviously, the more tasks can run simultaneously, the faster the model will be

CAM Parallelism

CAM1 : N (tasks) = N (Lats)

Example: T42 (EUL or SLD): maximum N (tasks) = 64

On NCAR's IBM SP, only 16 nodes can be used for CAM1 T42, as it has 4 PEs per node.

CAM Parallelism

CAM2 : max N (nodes) = N (Lats)

Then max N (tasks) = N (Lats) * N (PEs per Node)

Thus, for T42 CAM2:
On NCAR's IBM SP, max N (tasks) = 256
On LL's IBM SP, max N (tasks) = 1024

CAM Parallelism

In a nutshell: For T42 resolution, CAM1+CRCP could use maximum 64 PEs, while CAM2+CRCP could use as many as 2048 PEs if a 32 PEs-per-Node IBM SP is used.

That's important since the CAM + CRCP model is 99.5% parallel.

CAM Parallelism

CAM2+CRCP is 4 times as fast as CAM1+CRCP
on NCAR's "blackforest" IBM SP (in "wall-clock" sense):

T42 SLD on 64 nodes: 1 year per 5 wall-clock days

Phase II NCAR's "bluesky" 38-node IBM SP estimate:
T42 SLD on 32 nodes: 1 year per 9 wall-clock hours

CAM Parallelism

Future CAM will have “chunk” parallelism of the physics independent from the dynamics, and, thus, the “number-of-latitudes = number-of-nodes” limitation will be no more.