

CS 399: Research seminar in CS

9/11/23

This class

- Read, write, and discuss technical material
- Specific focus on high-performance computing (HPC)
 - Basically stuff I'm interested in (some opportunity to branch out...)
- Particularly good preparation if you're interested in research, but useful skills no matter what

Expectations

- Come to class (I'm actually taking attendance)
- Read and present research papers (~2 each)
- Participate in discussions and do assignments
- Do/start a small project in the latter part of the term

Parallel computing in the large

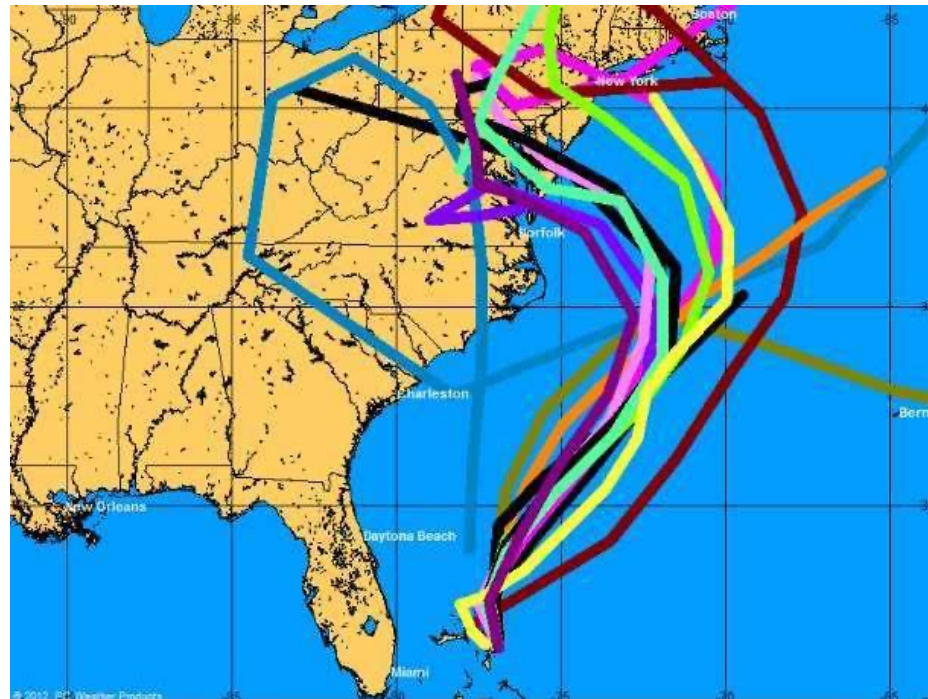


Photo: <http://www.lanl.gov/orgs/hpc/cielo/>

User's view of one of these systems

- Access through a terminal or web interface
- Submit program with its input (a “job”)
- Wait
- Read file(s) of results

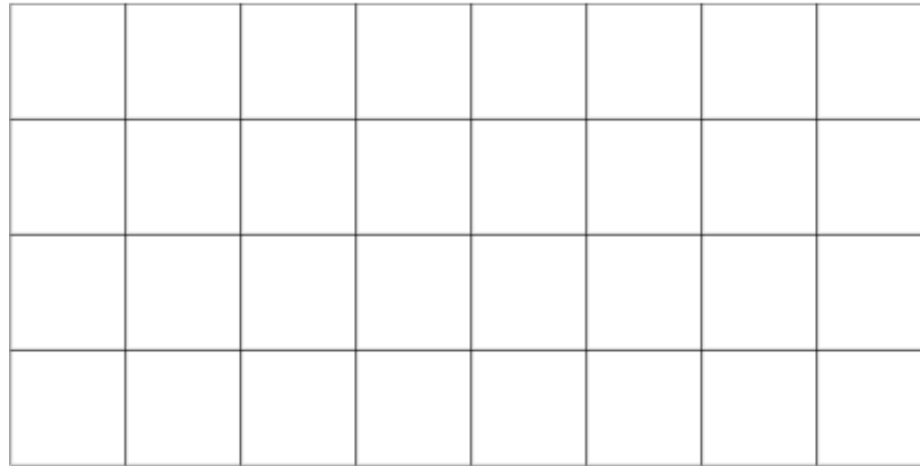
Application: Storm path prediction



Predictions of Hurricane Sandy's path

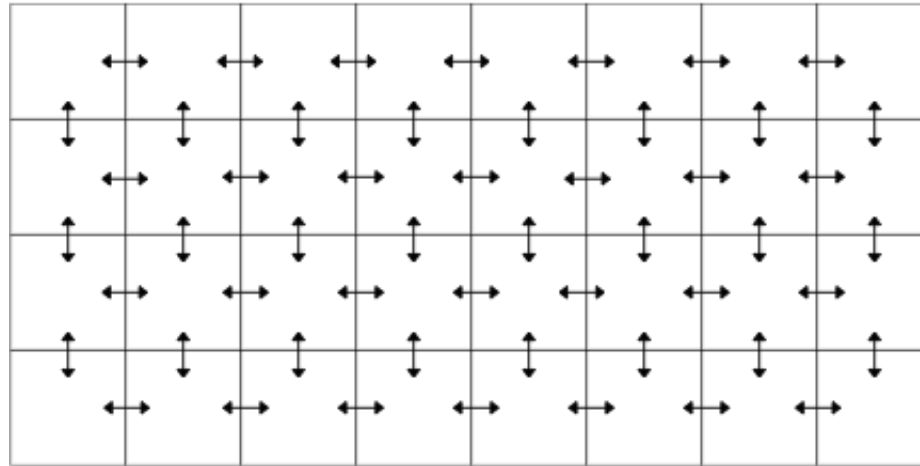
Photo: PCWeather Products, Inc.

How does it work?



- Keep track of temperature, pressure, humidity, etc for each cell
- Each time step, adjacent cells share information

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A more complicated mesh

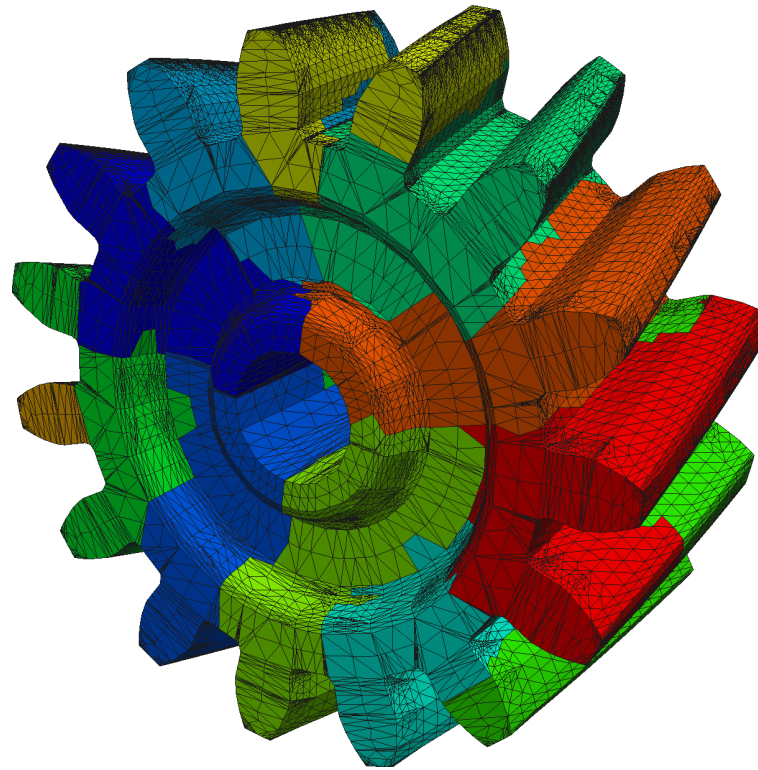


Photo: <http://www.eng.cam.ac.uk/~gnw20/research/research.html>

Back of the pretty cabinets



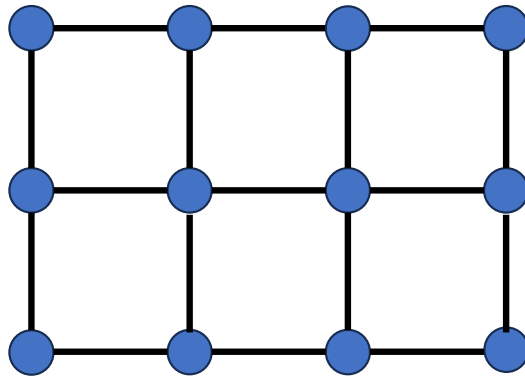
Photo: http://degiorgi.math.hr/~vsego/phun/beautiful_supercomputer/

Under the floor



Photo: http://degiorgi.math.hr/~vsego/phun/beautiful_supercomputer/

Logical view of the connections



- Captures interaction between processors without irrelevant details

Problems I've thought about

- Scheduling: When to run
- Processor allocation: Where to run
- Task mapping: What part runs where
- Routing: Which links a message takes
- Network topology: How nodes are connected

First assignment: Watch video on HPC simulations for commercial products

- Write a reaction (NOT a summary)
 - What stood out to you?
 - What did it remind you about?
 - What questions did it leave you with?