Parallel ELCIRC

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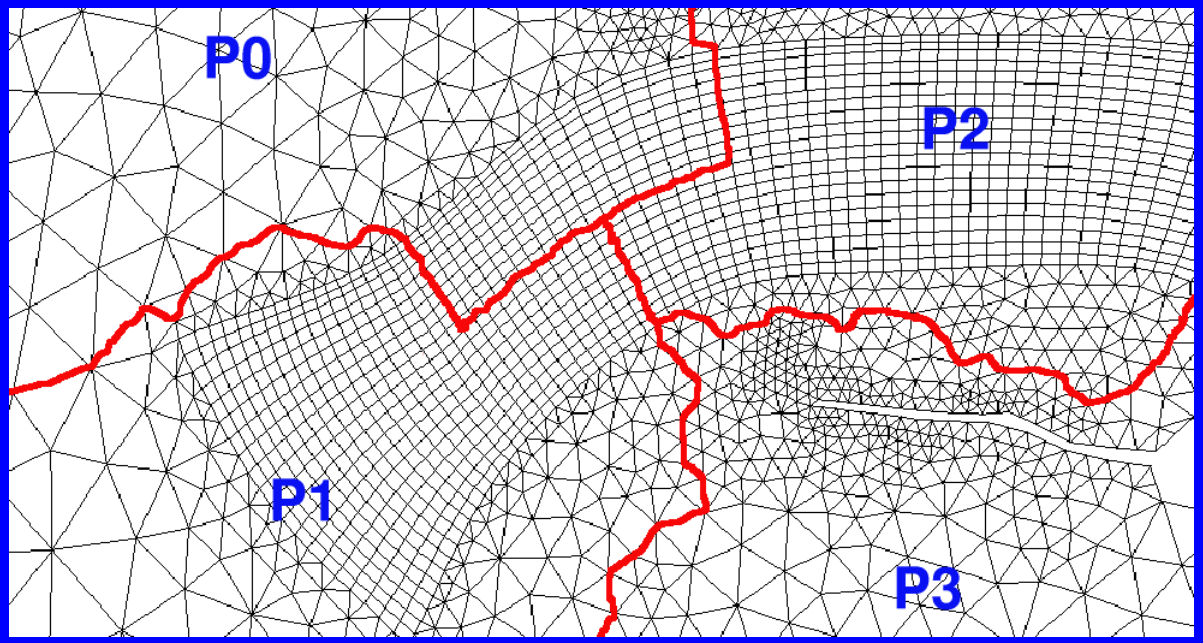
- Support from DoD High Performance Computing Modernization Program – Programming, Environment & Training (DoD HPCMP PET)
- Estimated completion – December 2004

Overview

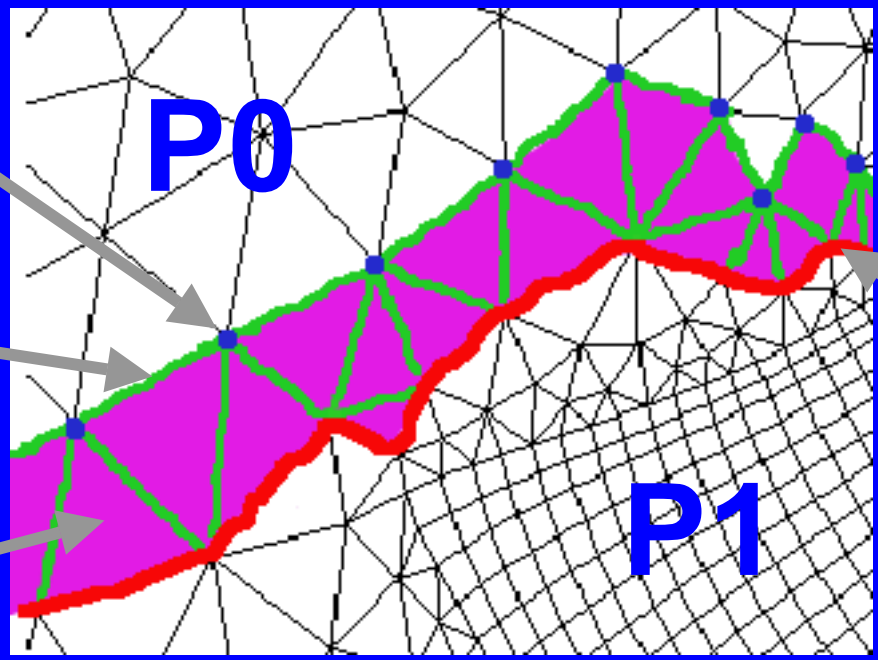
- Domain decomposition approach using *de facto* standard Message Passing Interface (MPI)
- Will run on all parallel platforms
- Communication modules will be developed for data exchange and coordination of backtracking
- Reuse parallel Jacobi CG solver from parallel ADCIRC
- Work closely with ELCIRC developers to ensure changes are accepted into release version

Domain Decomposition (1)



- 2D partition using METIS (a portable, popular graph partitioning library)
- Based on elements weighted with initial number of active vertical levels
- Minimize computational load imbalance and inter-processor communication

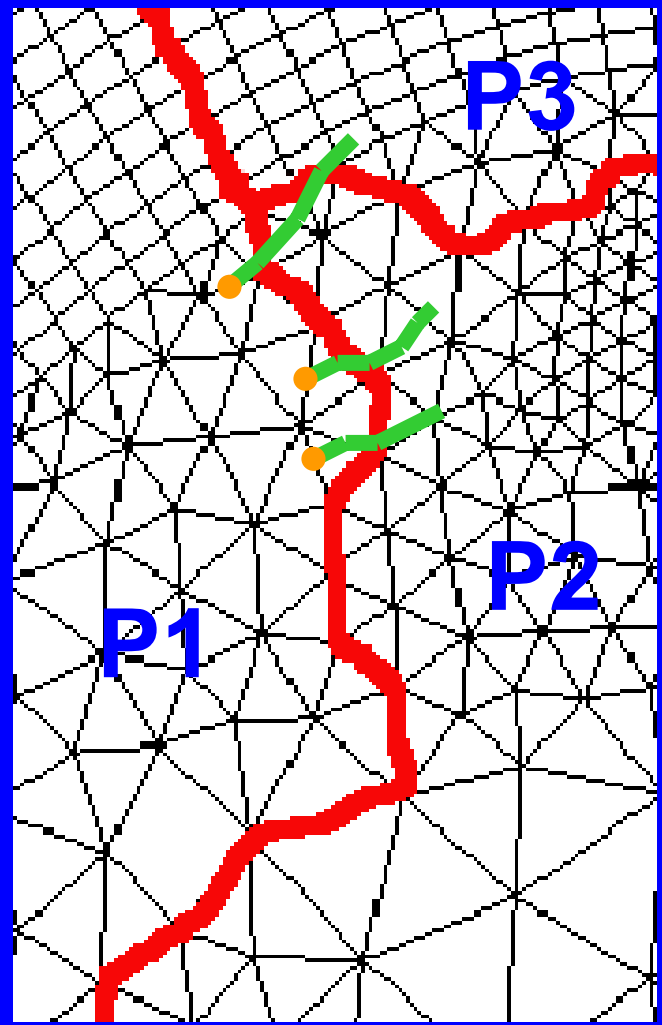
Domain Decomposition (2)



- Each processor will compute on its “resident” elements, sides & nodes
- Redundant computations for boundary sides & nodes (red)
- Ghost entities are updated during inter-processor communication phases

Backtracking

- Each backtracking phase consists of two parts:
  - Part 1: Attempt to backtrack for every resident side/node; build “interface queue” of characteristics that originate from neighboring subdomains
  - Part 2: Each process completes characteristics in “interface queue” and returns interpolated variables to originating processor



Overview of Time Stepping