

GPU accelerated adaptive wave propagation algorithm

Brian Kyanjo (PhD in Computing, Boise State Univ.)

Donna Calhoun (Dept. Math, BSU)

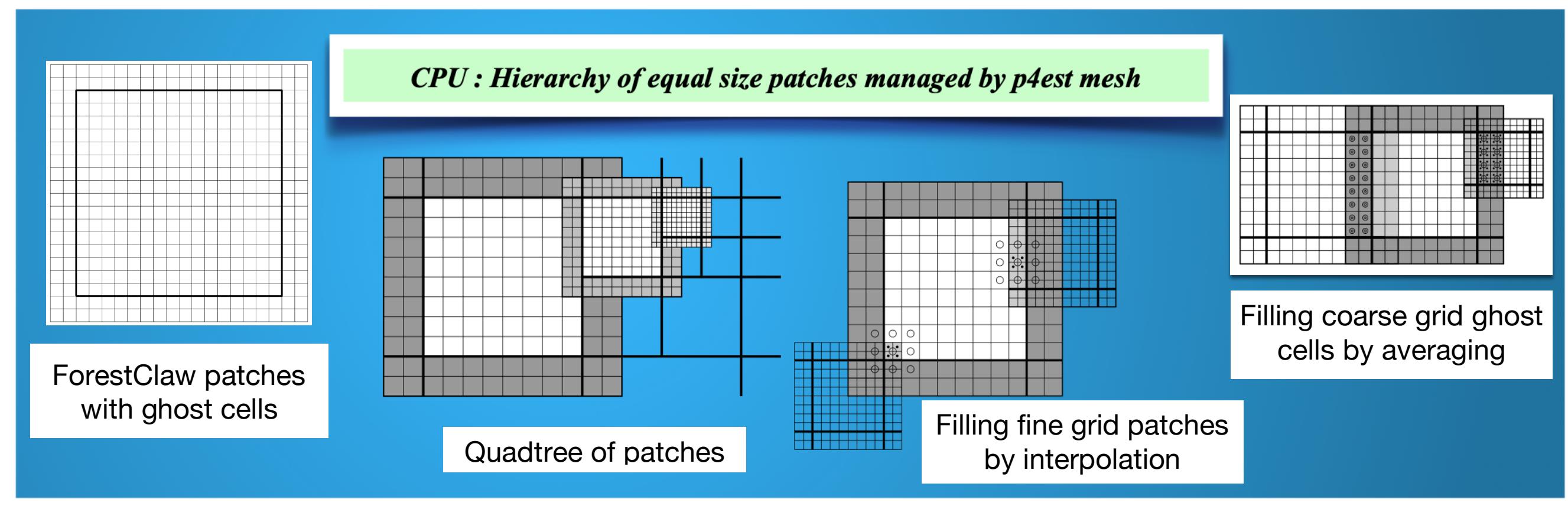
Collaborators : C. Burstedde (Univ. of Bonn); S. Aiton (BSU); J. Snively (ERAU); M. Shih (NYU)

Key features of ForestClaw

ForestClaw is a parallel, multi-block library for solving PDEs on adaptively refined logically Cartesian meshes.

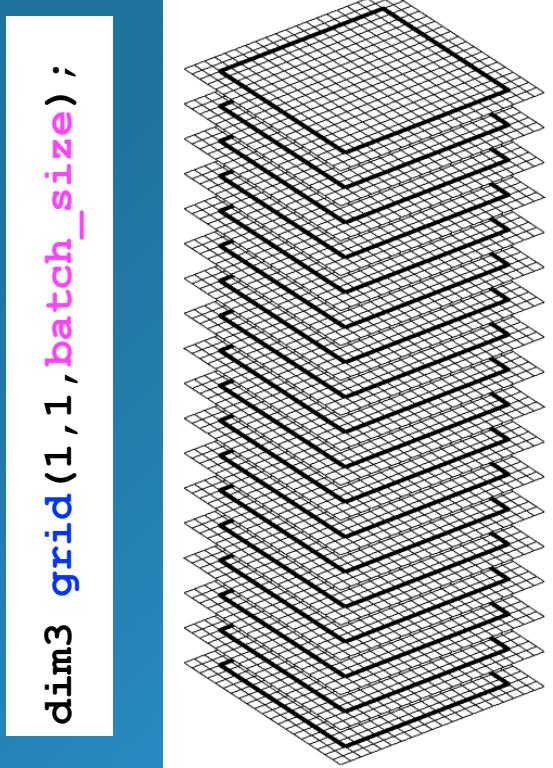
Some of the features of ForestClaw are :

1. Based on the **highly scalable** grid management library p4est (www.p4est.org)
2. **Multi-block** capabilities extends the usefulness of Cartesian mesh methods to many important domains, including the cubed sphere, and non-square rectangular regions.
3. **Quad-tree** adaptive meshing means that less meta-data is stored on each processor, and nearest-neighbors are easy to find.
4. Cartesian grid layout of each patch and regular neighbor patterns **greatly simplifies the development of novel numerical methods**.
5. ForestClaw has been extended by several popular libraries, such as **Clawpack** and **GeoClaw** (www.clawpack.org).



GPU : Explicit single time step done in parallel via GPU threads

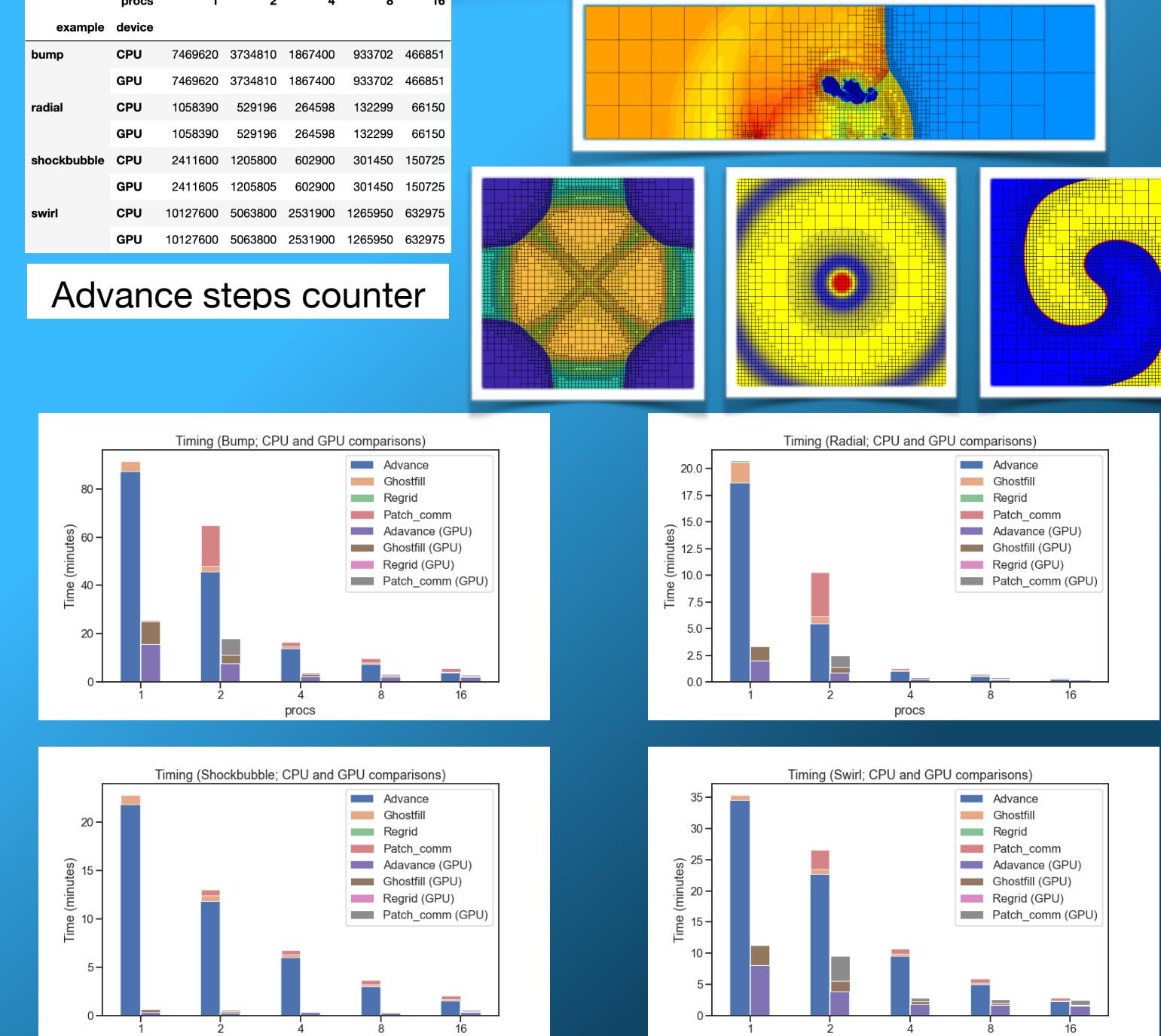
```
block_size = 128; batch_size = 4000;  
mwork = 9*meqn + 9*maux + mwaves + meqn*mwaves;  
bytes_per_thread = sizeof(double)*mwork;  
bytes = bytes_per_thread*block_size;  
  
dim3 block(block_size,1,1);  
dim3 grid(1,1,batch_size);  
claw_flux2<<<grid,block,bytes>>>(mx,my,meqn,...)
```



Single thread block reused per patch.
Warp of 32 threads run simultaneously

Results : Four examples

Scalar advection, SWE, Euler, Acoustics



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www.forestclaw.org