Computational Resources and Processing

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ERDC’s Coastal Storm-Modeling System (ERDC CSTORM-MS)

Application of high-resolution, highly skilled numerical models in a tightly integrated modeling system with user-friendly interfaces.

Not just hurricanes and not just in the Gulf of Mexico.

Provides for a robust, standardized approach to establishing the risk of coastal communities to future occurrences of storm events.
The DoD has 5 Supercomputing Resource Centers which are sponsored by the DoD High Performance Computing Modernization Program (HPCMP).

- Army (Aberdeen Proving Ground, MD)
- Air Force (Wright-Patterson Air Force Base, OH)
- Army (Vicksburg, MS)
- Air Force (Maui, HI)
- Navy (Stennis Space Center, MS)

Innovative solutions for a safer, better world
HPC Resources

For this project two separate DSRC systems will be used, ERDC’s Garnet and AFRL’s Spirit

After Garnet’s Upgrade is complete in July 2013

4716 compute nodes with 32 cores/node = 150,912 processors

Spirit is an SGI Ice X

4590 compute nodes with 16 cores/node = 73,440 processors
Estimates

• For planning purposes, we are estimating using 2048 processors for each CSTORM simulation with model execution taking no more than 8 hours for a 5-6 day simulation.
• We plan to run 8-10 simulations simultaneously
• And do 3 sets of such runs a day
Scripting

An advanced set of scripts developed for the IPET work following Hurricane Katrina will be updated.

Key Features:
- Setup all directories and link files
- Flag all directories with user/runtime information
- Adjust all run time parameters for particular run
- Create a set of initial run diagnostics including solution graphics and assemble into a single PDF report for each storm
- Compress needed files and store on long term archive
Unified File & Metadata Standards

The eXtensible Data Model and Format (XDMF) is a library providing a standard way to access data.

- Distinguishes between the metadata (Light) and the data itself (Heavy)
- **Light Data** – Is stored in a human/machine readable format known as XML (Extensible Markup Language)
- **Heavy Data** – Typically stored in HDF5 format which is platform independent and compact
- Has been used to loosely couple models
XDMF and CSTORM-DB

- **Light data in the XML can contain:**
  - Metadata – units, times, descriptions
  - Ancillary data – max, min, average

- **Heavy data can be read by using the “instructions” in the Light data**
  - This allows for one reader for all the models

- **Division of Light and Heavy data will help tools like CSTORM-DB and IMEDS and facility access from “cloud” servers**
Metadata

• ISO 191** is a set of standards for geographical information
  • ISO 19115 (-2) Metadata Standards
  • Supersedes the FGDC (Federal Geographic Data Committee) Standards

Essential

• Model Version Number
• Vertical Datum
• Horizontal Coordinate Sys.
• Time Datum
• Units for Data

Important

• Description of the Data
• Who/When Created
• Quality Control Rating