Global Risk, Resilience and Impacts Toolbox (GRRIT) Demo

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“Floods are acts of God, but flood losses are largely acts of man.”
Dr. Gilbert White - Environmental Geographer
Global Risk, Resilience, and Impacts Toolbox (GRRIT®)

Science-Based Tools for Improved Management, Planning, and Adaptation to Weather and Climate Extremes.
Global Risk, Resilience, and Impacts Toolbox (GRRIT®)

Server
User request processed in parallel computing environment.


Tableau Online Dashboard

Intermediate File
Data ready for analysis and display in Tableau

Interactive Interface to Data

User Selections

C3WE/NCAR * June 2017

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GRRIT SERVER PROTOTYPE

• **Goal**: provide interactive sub-setting and statistics for user-defined space time window
  - Window = counties x days

• **Interactive response times**
  - Target < 1 second for most operations

• **Parallel design**
  - Server listens for short input request (~100 bytes)
  - Processes each request in parallel
  - Returns window stats to Tableaux in CSV format
Data Flow

Forecast dataset

Subset of Interest
e.g. forecasts for fall in TX

Output Statistics
e.g. min/max Tmax
No parallel I/O!
GRRIT SERVERS: SCALING OF KEY OPERATIONS WITH NUMBER OF FORECASTS (TX CASE)
GRRIT SERVER: VISION

- Data analysis pattern similar to MapReduce
- Extension to increase flexibility and address complex workflows, requires a framework. Candidates:
  - Apache Spark
  - DASK
- GRRIT Vision:
  - Cloud-based
  - Parallel analytics backend
  - Tableau UI frontend
Example: Impact of Hurricanes

Ivan (left) and Dennis (right)
where both Category 3 cyclones and both made landfall in the same location
Engineering Design

- Building lifetime = 50 years
- Cost = $\beta
Engineering Design
Supply Chain