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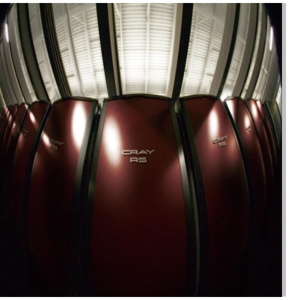

Metadata Management to Aid Data Discovery

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Exceptional service in the national interest

NSDF All Hands

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Problem Space

- Long term data archiving
  - Which data set(s) contain what I want to study?
- Short/medium term data set identification
  - What does each set contain and which ones to save?
- Provenance largely focuses on environment
  - Critical, but insufficient/inefficient

Three current generations of tools with a fourth being developed

First Generation Tools

- File-level metadata tagging
- POSIX extended attributes
- HPSS
- Starfish (https://starfishstorage.com/)
- JAMO – Joint Genome Institute Archive and Metadata Organizer

Second Generation Tools

- Raw data indexing
  - Exact value or binning
- FastBit
  - Does a value in the bin range exist in this file/dataset?
- SciDB
  - Multi-dimensional array data model with rich query facilities
- IO libraries
  - HDF5, ADIOS, NetCDF attribute capabilities

Third Generation Tools

- Feature tagging
  - Region/var/run
  - Bounding box, simple tag

- Key-value based
  - SoMeta - encode tag information into key and use value for data location (focused on object stores)
  - TagIt – distributed, shared nothing storage integrated for faster data searching

Third Generation Tools

- RDMBS-based
  - EMPRESS – independent database(s) of tags related to run, timestep, or var; flexible query interface into data directly via logical locations
  - BIMM – image database with tags

Fourth Generation Tool

- Derived quantity information-based tagging
  - For a climate model, where is the pressure gradient greater than a particular value

- Problems!
  - Derived quantities take time to compute
  - Derived quantities can be as large as the original data

Thank you

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