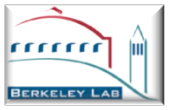
The Ultra-scale Visualization Climate Data Analysis Tools:

Climate Model Analysis and Visualization Efforts for Next Generation Needs

UV-CDAT Team Presentation
http://uv-cdat.org

Wednesday, February 20, 2013



U.S. DEPARTMENT OF ENERGY | Office of Science

DOE BER/NASA Sponsor Presentation
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Overview

Introduction… (5 min) (Dean)

Live UV-CDAT Demonstrations… (20 min)

- Accessing the Earth System Grid Federation (ESGF) from UV-CDAT (Charles)
  - Client access, exploration, and analysis of ESGF's multi-petabyte archive.
- Using UV-CDAT's 2D and 3D capabilities to explore time series data (Jerry)
  - Easy extraction and analysis of time series data from multiple sources.

UV-CDAT Presentations… (5 min)

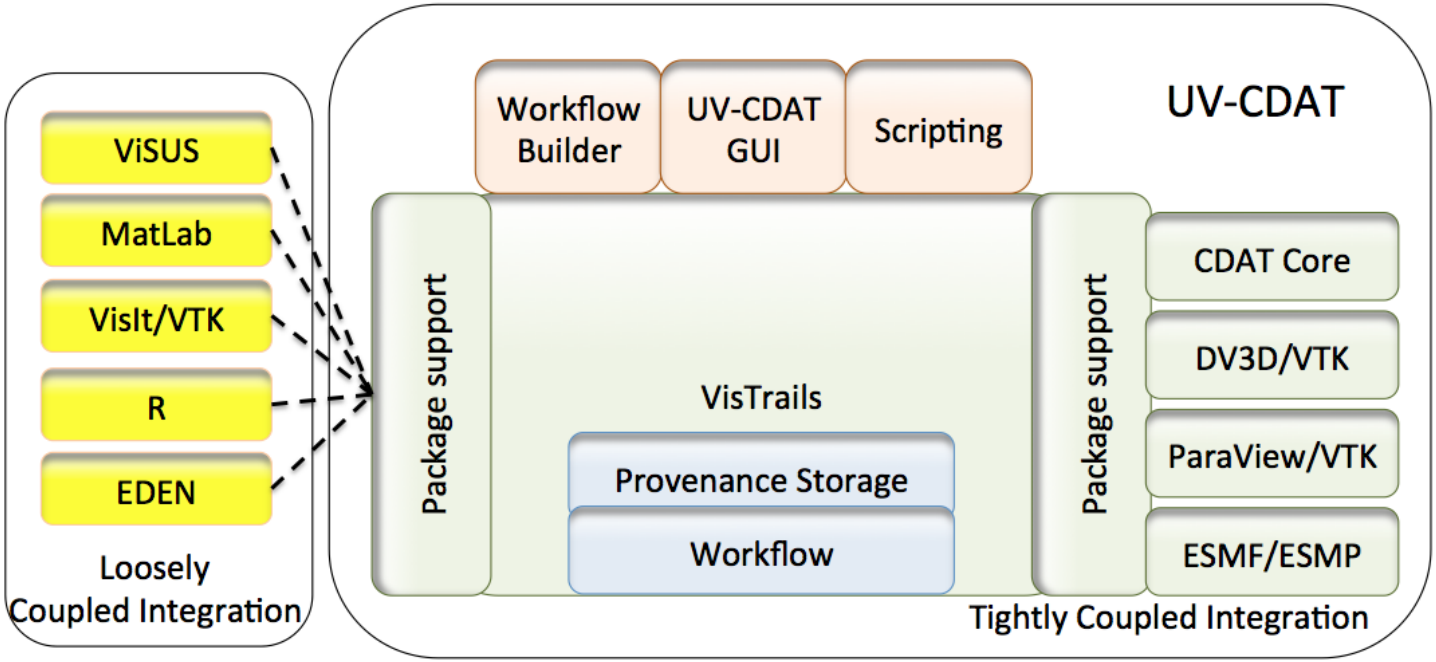
- Software process for UV-CDAT (Aashish)
  - Description of software repository, version control, build system, testing framework, and dashboard.

UV-CDAT Research and Development… (15 min)

- UV-CDAT/ParaView Spatio-temporal work to solve important use cases (Boonth)
  - Parallel UV-CDAT integration and spatio-temporal R&D performance work in UV-CDAT using ParaView.
- Decreasing time to analysis using ParCAT (Parallel Climate Analysis Toolkit) (Brian)
  - Preprocessing large data sets in parallel environments to provide summary statistical data.
- Remote visualization of large scale ensembles using ViSUS plugin (Timo)
  - On-the-fly processing of large scale ensembles at remote locations (e.g., regridding, averaging, etc..)

Background and Introduction

- What is UV-CDAT:
  - ❑ A seamless environment for open-source data analysis and visualization packages



- What is UV-CDAT purpose:
  - ❑ Bring together robust tools for climate data processing
  - ❑ Integration heterogeneous data sources (e.g., simulations, observation, re-analysis)
  - ❑ Local and remote data access and visualization
  - ❑ Reproducibility

VisIt/R Collaboration

VisIt-R work will be discussed in detail during the VDX call

Highlights

- Software Infrastructure updates.
- Progress on TECA & R integration.
- Python/R parallel computation capability.

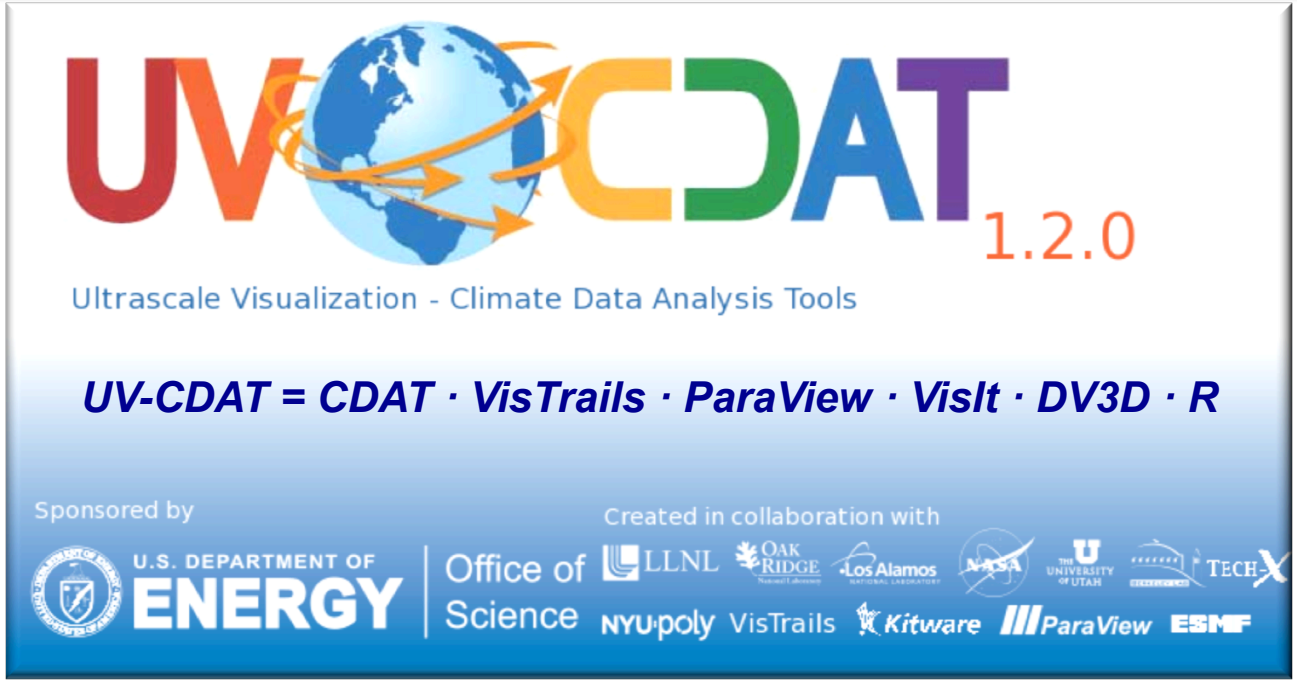
Scalable Parallel Computation in VisIt/R

- Feature support – GEV, Extreme Value Analysis, and Model-Based Clustering.
- Support for programmable kernels executed in parallel or over MPI within VisIt.
- VisIt optimized templates to execute operations over spatial, temporal, or files.

Deployment

- Provenance support.
- Several use cases.
- Visualizations with unified UV-CDAT VisIt interface.

Official Release 1.2.0



1.2.0 Official Release – *January 7th, 2013*

Downloads – *160+ Downloads since official version release*

Usage – *600+ different users from 400+ machines logged using UV-CDAT since official release*

Release, presentations, tutorials, and articles can be found at the following URLs: *http://uvcdat.org/*

User support mailing list: *uvcdat-support@llnl.gov*

Team Work

UV-CDAT Team

- Talents joined to work towards a common goal:
  - **Climate Data Analysis Tools**
    - ❑ Charles Doutriaux – LLNL
    - ❑ Jerry Potter – NASA/GFSC
    - ❑ Elo Leung – LLNL
    - ❑ Alexander Pletzer
    - ❑ Dean N. Williams – LLNL
  - **VisTrails**
    - ❑ Ben Burnett – NYU Poly
    - ❑ Jorge Poco – NYU Ploy
    - ❑ David Koop – NYU Poly
    - ❑ Claudio Silva – NYU Poly
    - ❑ Emanuele Santos – NYU Poly
    - ❑ Huy T. Vo
    - ❑ Tommy Ellqvist
    - ❑ Rémi Rampin
  - **Software Process**
    - ❑ Aashish Chaudhary – Kitware
    - ❑ Charles Doutriaux – LLNL
    - ❑ Thomas Maxwell – NASA/GFSC
    - ❑ Harinarayan Krishnan – LBNL
    - ❑ Andy Bauer - Kitware
    - ❑ Dave DeMarle – Kitware
    - ❑ Chris Harris – Kitware
    - ❑ Berk Geveci – Kitware
    - ❑ Rick Knight – LANL
    - ❑ John Patchett – LANL
  - **User Interface**
    - ❑ Emanuele Santos – NYU Poly
    - ❑ Ben Burnett – NYU Poly
    - ❑ Charles Doutriaux – LLNL
    - ❑ Dean N. Williams – LLNL
  - **Web application & Earth System Grid Federation (ESGF) Integration**
    - ❑ Elo Leung – LLNL
    - ❑ Charles Doutriaux – LLNL
    - ❑ Luca Cinquini – NASA/JPL
    - ❑ Dean N. Williams – LLNL
    - ❑ Daniel Thurman – LLNL
  - **Distributed Arrays and ESMF/ESMP**
    - ❑ Alexander Pletzer – Tech-X
    - ❑ Charles Doutriaux – LLNL
  - **DV3D**
    - ❑ Thomas Maxwell – NASA/GFSC
    - ❑ Jerry Potter – NASA
  - **ParCAT and integration into UV-CDAT**
    - ❑ Brian Smith – ORNL
    - ❑ Chad Steed – ORNL
    - ❑ Galen Shipman– ORNL
    - ❑ Charles Doutriaux – LLNL
    - ❑ Aashish Chaudhary – Kitware
  - **ViSUS (visualization streaming) integration**
    - ❑ Timo Bremer – LLNL
    - ❑ Charles Doutriaux - LLNL
  - **ParaView**
    - ❑ Aashish Chaudhary – Kitware
    - ❑ John Patchett – LANL
    - ❑ Andy Bauer - Kitware
    - ❑ Dave DeMarle – Kitware
    - ❑ Boonthanome Nouanesengsy - LANL
  - **VisIt Integration**
    - ❑ Harinarayan Krishnan – LBNL
    - ❑ Charles Doutriaux – LLNL
    - ❑ Aashish Chaudhary - Kitware
    - ❑ Hank Childs – LBNL
    - ❑ Dave Pugmire – LBNL
    - ❑ Chris Paciorek – LBNL
    - ❑ E. Wes Bethel – LBNL
  - **Principal and Site Investigators**
    - ❑ Dean N. Williams (PI) – LLNL
    - ❑ Claudio Silva – NYU Ploy
    - ❑ Tom Maxwell/Jerry Potter – NASA/GFSC
    - ❑ Galen Shipman – ORNL
    - ❑ John Patchett – LANL
    - ❑ Berk Geveci – Kitware
    - ❑ E. Wes Bethel – LBNL
    - ❑ Alexander Pletzer – Tech-X