NAVIGATING THE IN SITU VISUALIZATION LANDSCAPE

Tom Fogal, 4/6/2016
VISUALIZATION & ANALYSIS

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POST HOC VISUALIZATION AND ANALYSIS

Compute timestep → Compute timestep → Compute timestep → Vis & analysis

Write to disk → Write to disk → …
IN SITU VISUALIZATION & ANALYSIS

Compute timestep → Vis & analysis → Write to disk → Compute timestep → Vis & analysis → Write to disk → Compute timestep → Vis & analysis → Write to disk → ...
“When running PyFR at scale, it generates very large data sets that need analyzing for acoustics. The traditional post hoc method is simply not fit for purpose - in situ visualization and processing are critical. We see a potential for 50x speedups with in situ, which significantly accelerates our scientific discovery.”

- Dr. Peter Vincent
Imperial College
HOW?
IN SITU AXES

In situ terminology project: Childs et al.

Integration type
Proximity
Access
Division of execution
Operation controls
VISIT’S LIBSIM

Local Computer

Remote Supercomputer

Simulation

- VisIt runtime library
- Libsim

Data Adaptor

- Images

Commands

Geometry & images
LIBSIM AUTOMATIC IN SITU ADDITIONS

- Simulate
  - VisIt Is Connected()?
    - N
    - Y
      - Timestep Changed()
      - Update Plots()
      - Save Window()
LIBSIM CONTROL

1. AttemptToCompleteConnection()
2. ProcessEngineCommand()
3. set callbacks
4. Simulate

VisIt Detect Input()
PARAVIEW’S CATALYST
CATALYST AUTOMATIC IN SITU ADDITIONS

Processor:: New()

(meta)Data Description setup

Simulate

Data Description ?

N

Y

Convert to VTK data

Data Description SetGrid(vtk)

Processor:: CoProcess
NVIDIA INDEX
IN SITU VIA CUDA IPC
Zero-copy sharing between processes

Simulation process → Simulation data → Visualization process
DAMARIS/VIZ, ADIOS
VTK-M

GUI / Parallel Management

Base Vis Library

In Situ Vis Library

ParaView Catalyst

Simulations

libsim

VTK
FURTHER RESOURCES

http://visitusers.org/index.php?title=VisIt-tutorial-in-situ

http://www.paraview.org/in-situ/


http://damaris.gforge.inria.fr/

OTHER TALKS OF INTEREST

10:00 Wednesday: HPC visualization hangout, Pod B

15:00 Wednesday: VTK-m, LL21D

16:00 Wednesday: Raytracing (Sparse) Scientific data in OptiX™, LL21D

10:30 Thursday: Marriot Salon 1

15:00 Thursday: Marriot Salon 1
THANK YOU

JOIN THE CONVERSATION
#GTC16  

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