



Catalyst in the Wild

on Catalyst as it matures into production

Ken's Slide of Doom

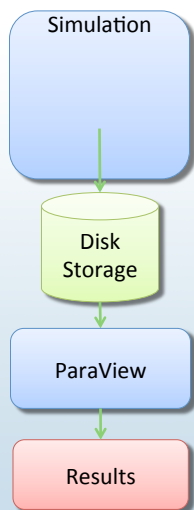
1018
 Scientific Discovery
 at the Exascale:
 Report from the DOE ASCR 2011 Workshop on
 Exascale Data Management, Analysis, and Visualization
 February 2011
 Houston, TX

System Parameter	2011	"2018"		Factor Change
System Peak	2 PetaFLOPS	1 ExaFLOP		500
Power	6 MW	≤ 20 MW		3
System Memory	0.3 PB	32 – 64 PB		100 – 200
Total Concurrency	225K	1B × 10	1B × 100	40,000 – 400,000
Node Performance	125 GF	1 TF	10 TF	8 – 80
Node Concurrency	12	1,000	10,000	83 – 830
Network BW	1.5 KB/s	100 GB/s	1000 GB/s	66 – 660
System Size (nodes)	18,700	1,000,000	100,000	50 – 500
I/O Capacity	15 PB	300 – 1000 PB		20 – 67
I/O BW	0.2 TB/s	20 – 60 TB/s		10 – 30



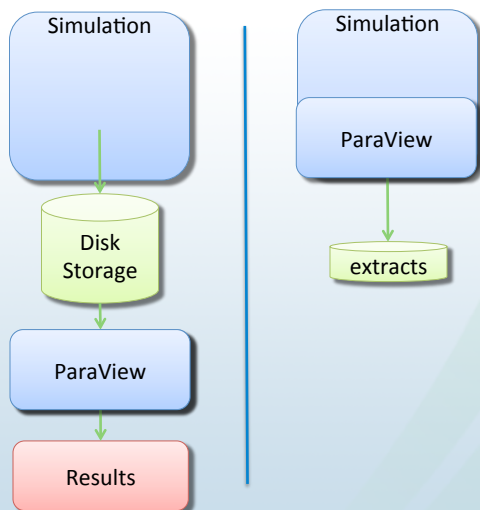
From Tera- to Exa-scale
<http://catalyst.paraview.org>

Traditional Vis



From Tera- to Exa-scale
<http://catalyst.paraview.org>

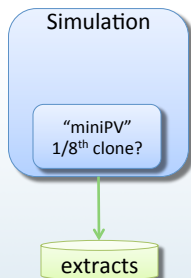
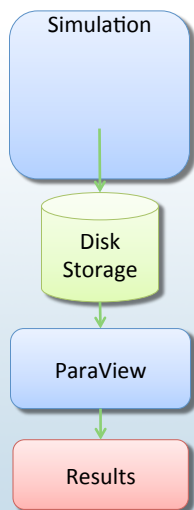
Traditional Vis





From Tera- to Exa-scale
<http://catalyst.paraview.org>

Traditional Vis



Scripts to generate your own subsets

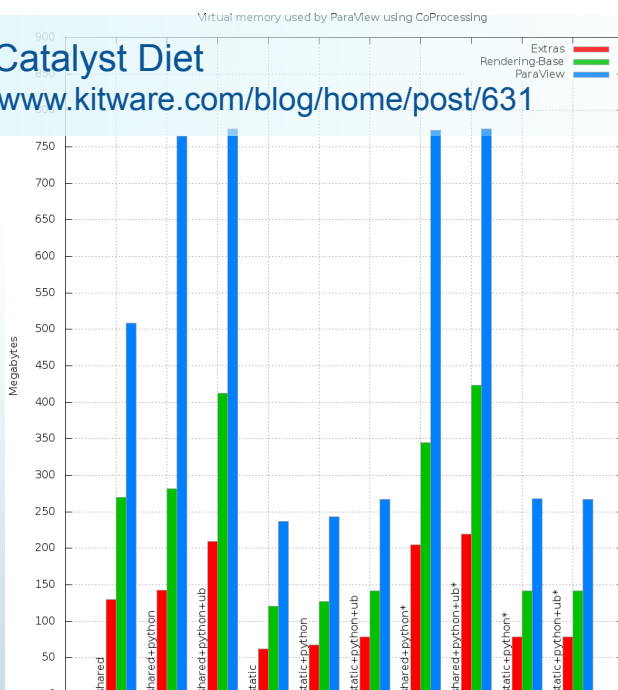
“Editions” - selected subsets of paraview

- Base - bare minimum
- + essentials - writers
- + python - scripting
- + rendering



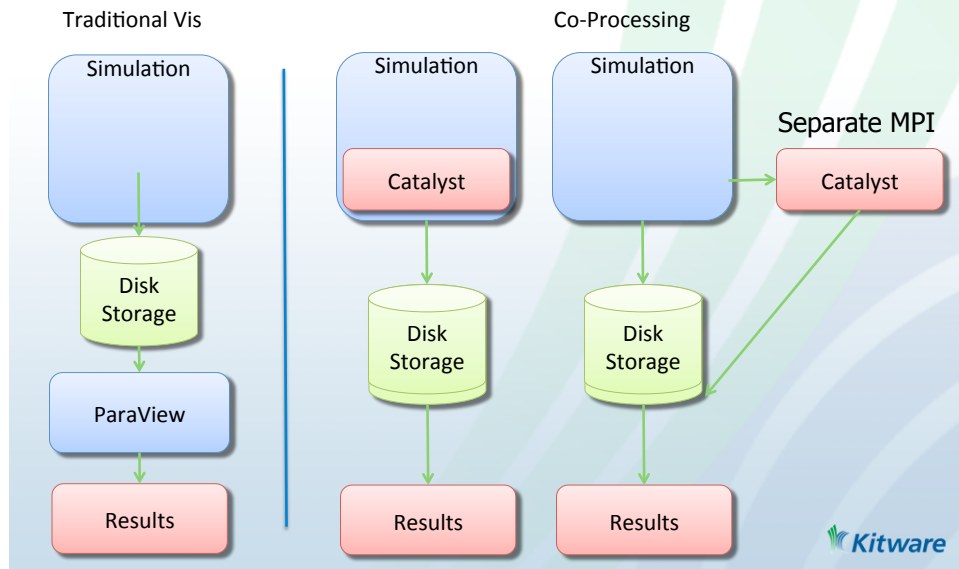
The Catalyst Diet

<http://www.kitware.com/blog/home/post/631>





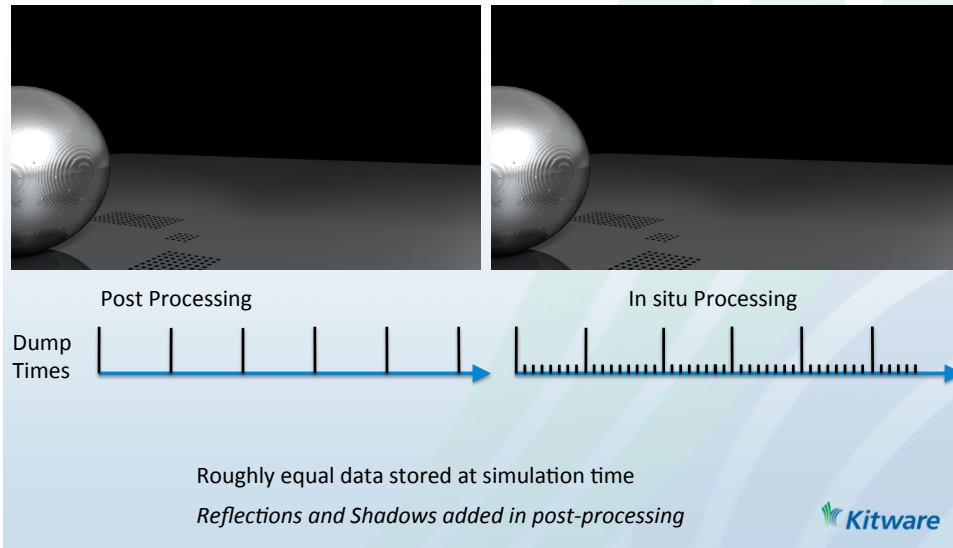
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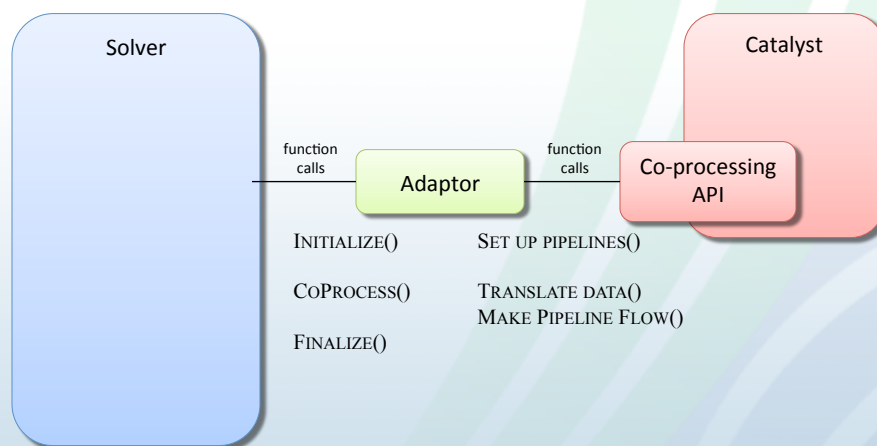
Reduced File Size

- Helicopter simulation output size for a single time step
 - Full data set – 448 MB
 - Surface of blades – 2.8 MB
 - Image – 71 KB

Catalyst: Access More Data

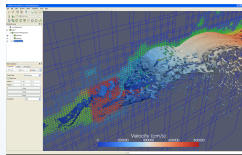


Developer Perspective



<http://www.paraview.org/Wiki/ParaView/Catalyst/Overview>

User Perspective



Script Export

```
# Create the reader and set the filename.
reader = servermanager.libaries.Reader(filename=path)
view = servermanager.CreateRenderView()
repr = servermanager.CreateRepresentation(reader, view)
reader.UpdatePath(path)

dataInfo = reader.GetDataInformation()
jcbInfo = dataInfo.GetFieldDataInformation()
arrayInfo = jcbInfo.GetArrayInformation("displacement")

if arrayInfo:
    # get the range for the magnitude of displacement
    range = arrayInfo.GetComponentRange(-1)
    lut = servermanager.rendering.PColorMapTable()
    lut.RGBColors = range[0], 0.0, 0.0, 1.0,
    range[1], 1.0, 0.0, 0.0
    lut.VectorsColors = "Magnitude"
    repr.LookupTable = lut
    repr.ColorAttribute = "displacement"
    repr.ColorAttributeType = "POINT_DATA"
```



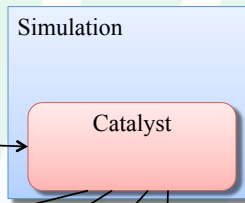
User Perspective

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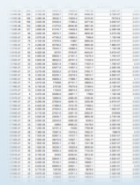
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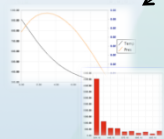
script into input deck.



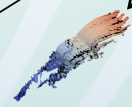
Output Processed Data



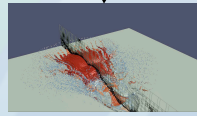
Statistics



Series Data



Polygonal Output with Field Data



Rendered Images



Adaptors thus far

- Sandia:
 - CTH
 - S3D
 - Sierra
 - Albany
 - Alegra*
 - miniFE in Mantevo*
- Army:
 - Helios
- LANL:
 - NPIC
 - VPIC
 - xRAGE
 - MPAS
 - Pagosa
- Others:
 - PHASTA : UC Boulder
 - Bose-Einstein Condensates :
 - George Vahala (PI)
 - Code_Saturne osCFD

* not merged yet



mira@anl - build against it

/soft/visualization/paraview/v4.1.0

.../catalyst/<edition>

Where <edition> is:

base[+essentials][+extras][+python]

In each:

- */source
- */install
- */build_host - host side compilation tools
- */build_cross - compute side library to link to



mira@anl - try it



/soft/visualization/paraview/v4.1.0

.../catalyst/examples

<https://github.com/acbauer/CatalystExampleCode.git>

Toy simulation code and 12 adaptors that span
 <data type> [structured/unstructured/MB]

<language> [c/c++/python/fortran]

One built example with pbs script to run it

README and make scripts throughout



titan@ornl



- /sw/xk6/paraview/4.1.0 😊
 .../catalyst ☹️
- Not finished in time for DOE CGF 14 ...
- Intend to build mirror image or mira



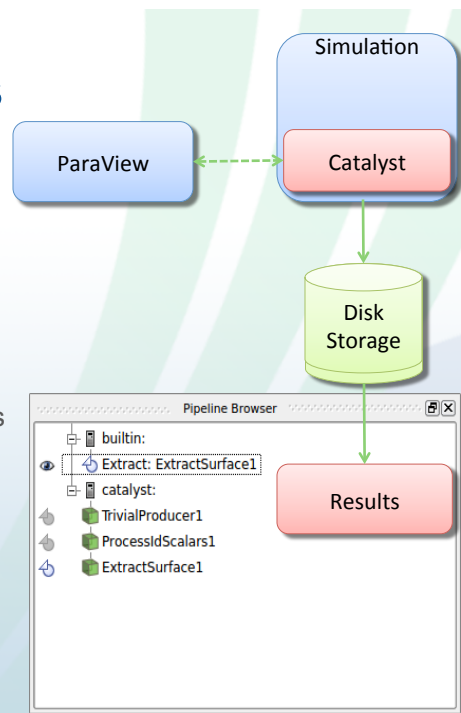
Works in progress

- Continuing installations
 - Let simulation developers focus on simulations
- Simplify adaptor compilation
 - #include “catalyst.h” -lcatalyst is the goal
- Simplify process to make editions
 - Fairly easy now to make make your own editions
 - Should be even easier
- More Adaptors
 - Hydra : LANL
 - GEMS : (Purdue) at Edwards AFB
 - ADH : Army's ERDC
 - SM/MURF : Edwards AFB



Works in progress

- Live connections
 - Dusty corner but has been in master since 4.0.1
 - **Blocking** : stop and control simulation - useful for debugging
 - **NonBlocking** : asynchronous updates to visualize evolving results as they are generated
- DOE PET project (due August) to revamp



Gratuitous Catalyst Images

