

art Visualization Using ParaView

Keshav Kapoor
(Naperville Central High School)

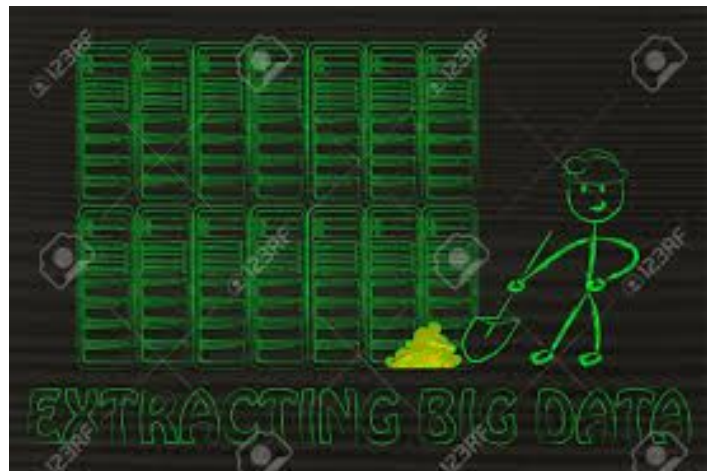
Project

- Restructure the current framework for passing *art* data to ParaView to make it more like the current *art* framework.

Background

art:

- Created by Fermilab's Scientific Computing Division
- High Energy Physics event processing framework
- Written in C++
- Uses GÉANT
- Lets scientists dig through large amounts of data

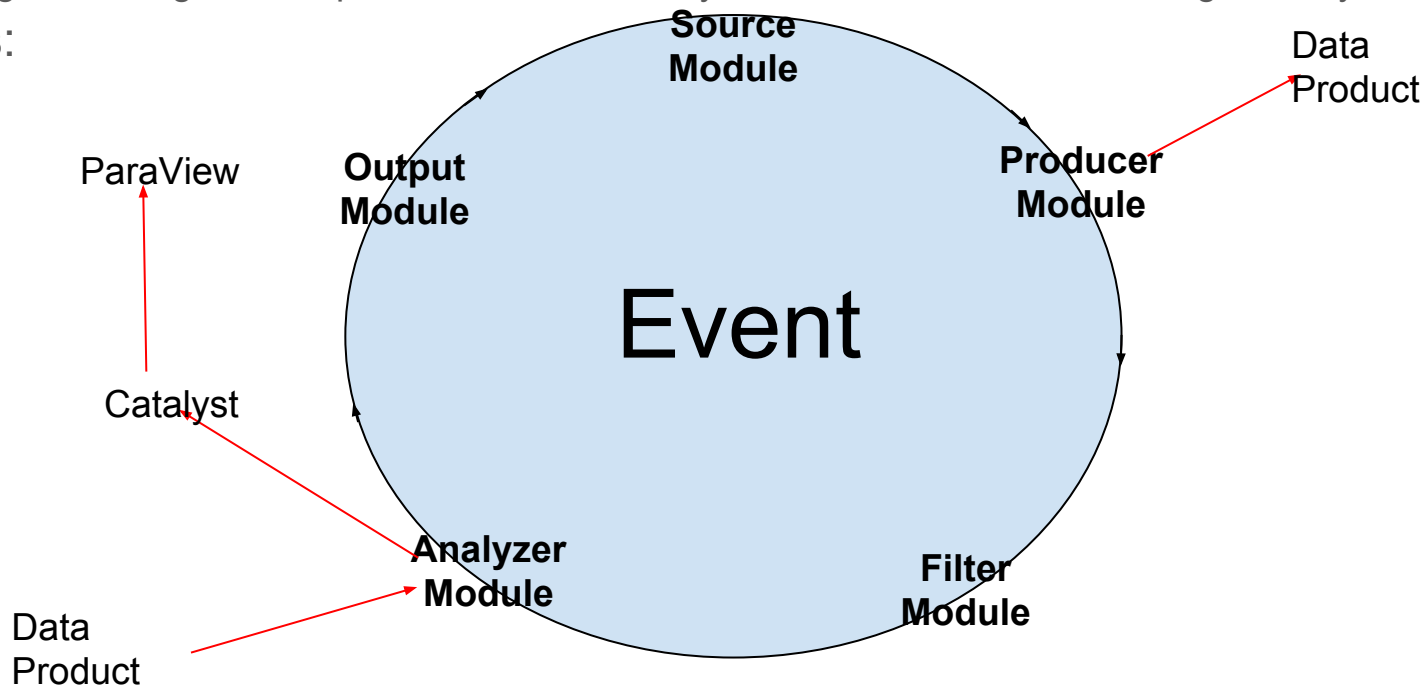


Background

- Event loop
 - One event goes through the loop and is modified/analyzed at different modules along the way

- Five Modules:

- Analyzer
- Producer
- Filter
- Source
- Output



Background



ParaView:

- Supercomputing/High Performance Computing visualization software
- Uses the Visualization Toolkit(VTK)
- We use a feature called Catalyst:
 - Provides In Situ analysis of data.
 - We use it as a pipeline between *art* and ParaView

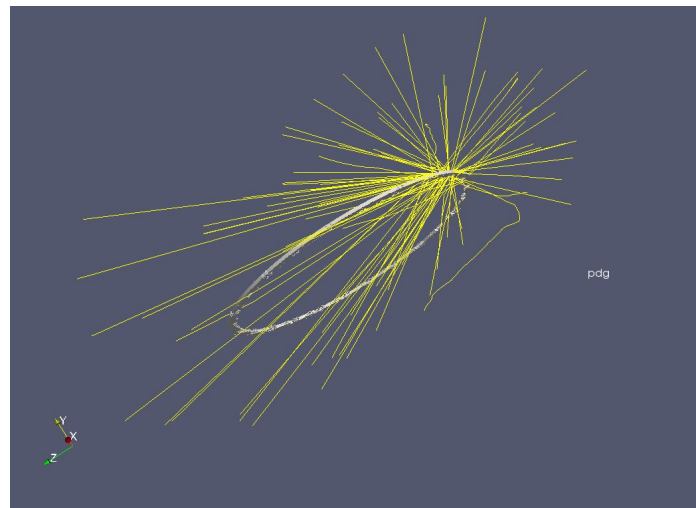
$$\rho \frac{D\vec{v}}{Dt} = -\nabla p + \mu \nabla^2 \vec{v}$$

Simulation Code



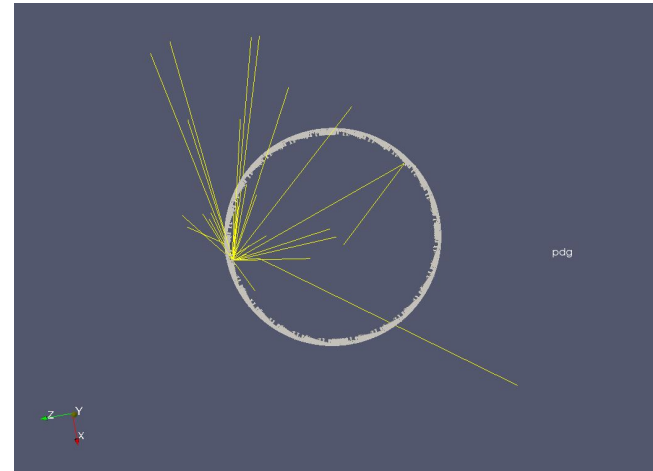
Context

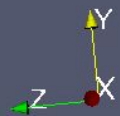
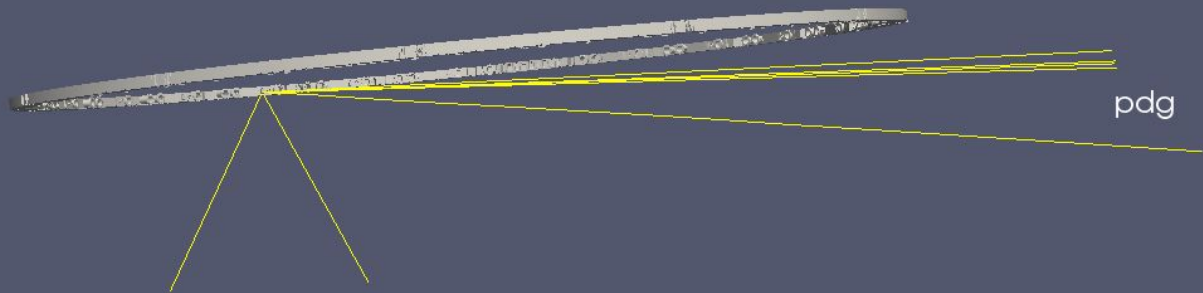
- Visualizations are done by individual scientists/groups
 - Fermilab hopes to provide some support in this scenario
- Useful for checking geometry/ developing and verifying reconstruction algorithms
- Provides insight into supercomputing/hpc which is a path being looked into
- Monitoring equipment status

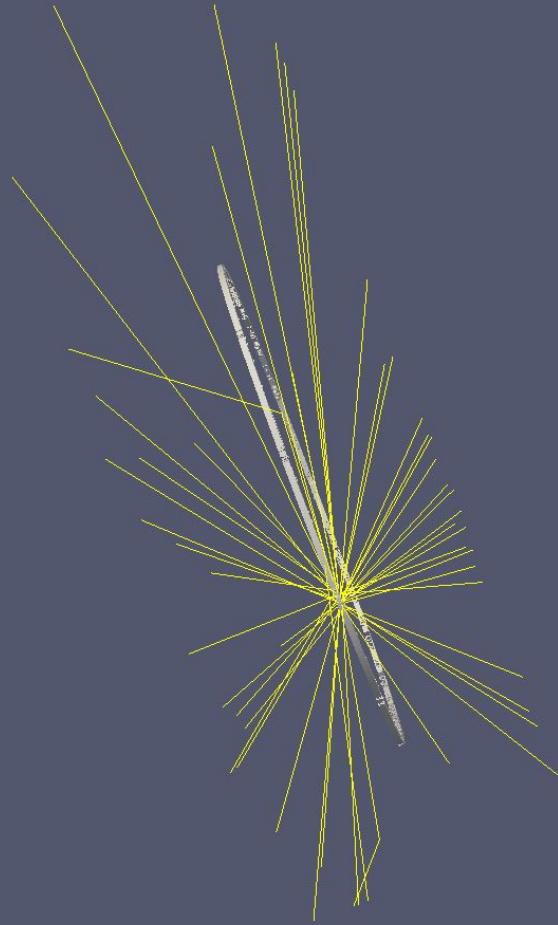
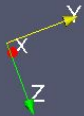


What I Did

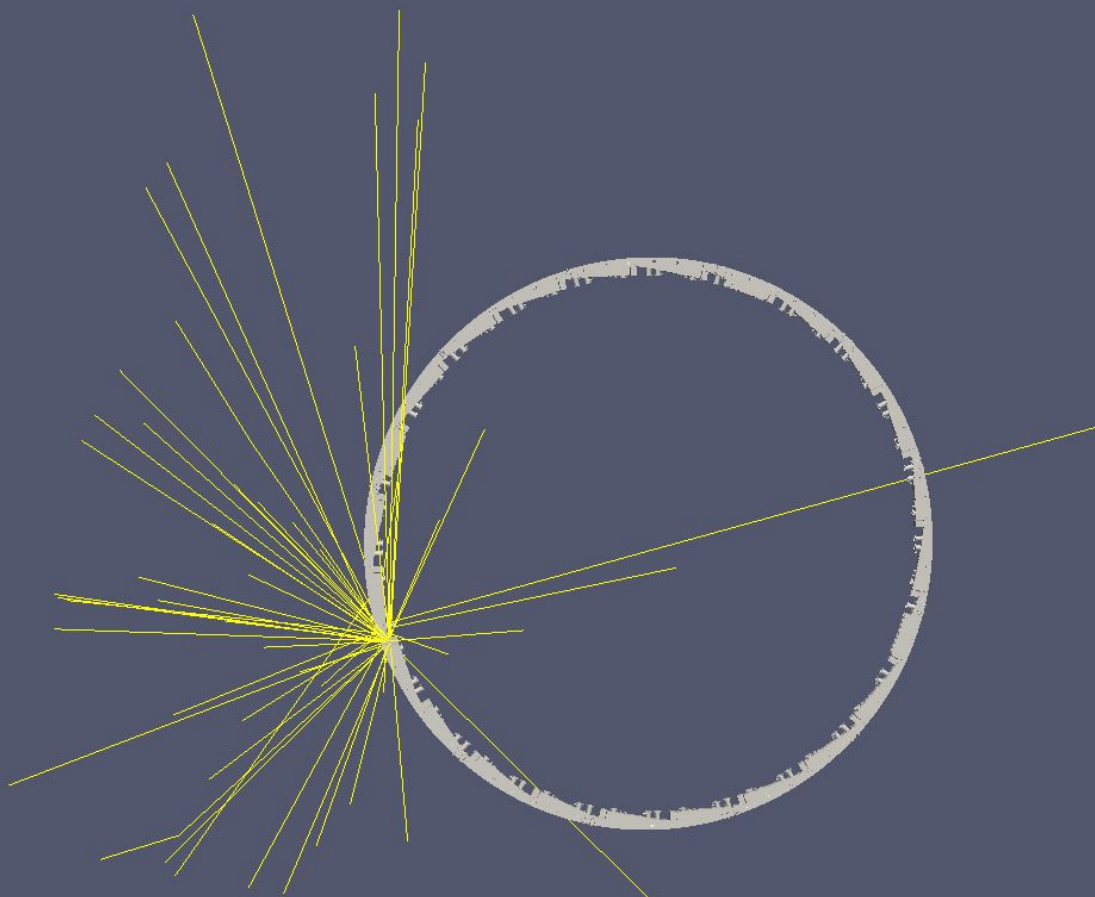
- Made a Data Product:
 - Holds simple data elements like integers, doubles, and floats
- Made a producer:
 - Puts data into a data product
- Made an Analyzer
 - Gets data from the data product, converts it into VTK data types
 - Loops over the points
 - Joins points to create the tracks
 - Assigns tracks pdg(Monte Carlo Number assignment)
 - Passes the VTK data onto ParaView through Catalyst





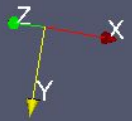
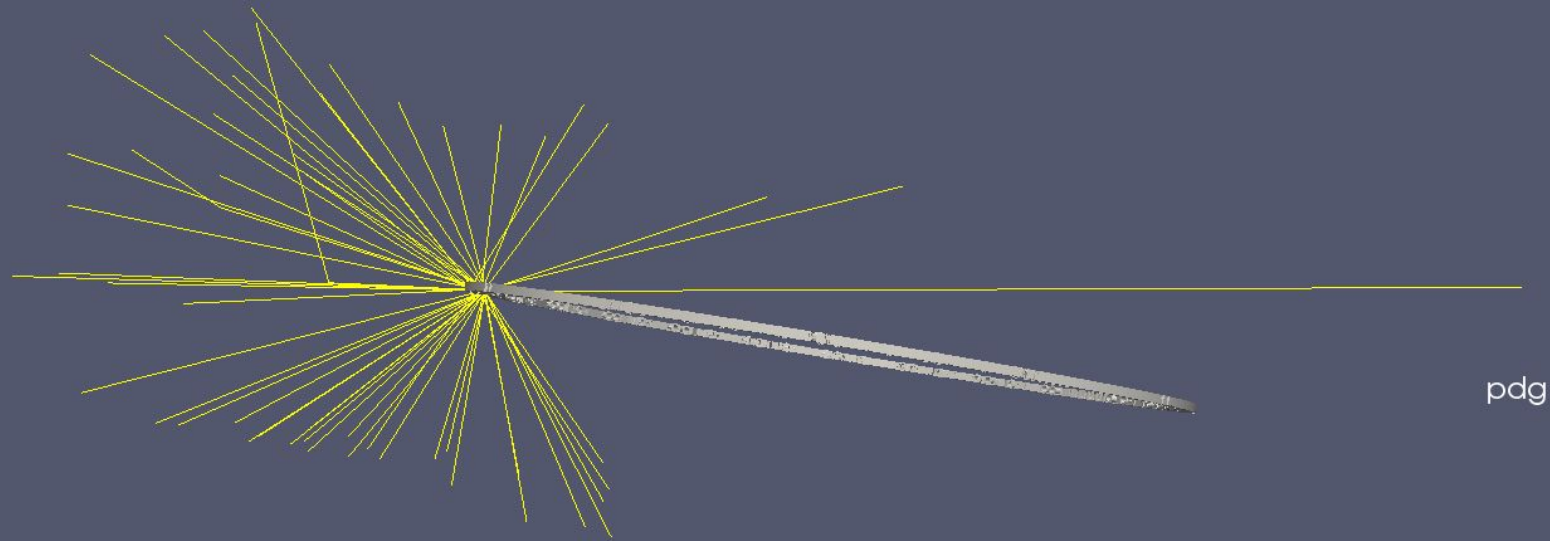


pdg



pdg





Future

- Incorporate the pipeline into the analyzer
- An attempt to incorporate microBoone experiment data will be done on Friday
- DUNE near detector is also looking into using the data.



Acknowledgements

- Dr. Adam Lyon (FNAL)
- Paul Russo (FNAL)