Where it started

Kitware

• Medical / Weather Imaging
• Visualization Toolkit Engine
• Open source
• Cluster capable
• OOD
Sources
Provide initial data input from files or generated

Filters (Optional)
Modify the data in some way, conversion, reduction, interpolation, merging, ...

Mappers
Convert data into tangible "objects"

Actors
Adjusts the visible properties (transparency, color, level of detail, etc.)

Renderers & Windows
The viewport on the screen Interaction done here also
Programming with E2VO Students

Robert Maynard
Lead Programmer
Where it was

• Paraview -> ParaviewGeo
• OPEN
  – Major challenge for mining
  – Switch from GoCad / DataMine
• 2.5 month Experiment
  – Mentorship
  – Tool development
My Job

• Teacher
  – Programming (Python / VTK)
  – 3 week course

• Mentor
  – Resource for daily programming problems

• Developer
Finite-Discrete Element Method

- ParaViewGeo Reader
- Reads files generated by Y program
Why?

• Geomechanics Group @ U of T
Why ParaViewGeo?

- Time Support
- Data Analysis
- Animation
- Pan
- Zoom
- Rotate
Customizing ParaViewGeo
Customizing ParaViewGeo

“Floating” Detached View Manager
Fullscreen ParaViewGeo

Server

Client
Cross Section Loading
Cross Section Loading
Surface Reconstruction
Information Visualization

- Mining Mind Map
- Mine Planning and SOT
- ParaViewGeo Implementation
Mining Mind Map

Scheduling
SOT Data

Schedule Parameters:
- Guidance Formula
- Capacity
- Net Present Value
- Mine Life
- Village
- Similarity
ParaViewGeo Implementation
Paper Space vs. Model Space

- AutoCAD has 2 separate work spaces
  - Paper space
  - Model space
- Two different scales
  - Automatic scaling
- ParaViewGeo does not scale automatically
Model Space
2D and 3D

- ParaViewGeo now has support for both 2D and 3D DXF files
3D Files

AutoCAD

ParaViewGeo
Layers and Blocks

- Data grouped by layer/block
- Coloured by layer
Extensive Object Support

- Supported objects
  - Points
  - Lines
  - Polylines
  - Circles
  - Arcs
  - Text
  - 3DFaces (polygons)
  - 3D Polyface meshing
DrillHole Compositing

- User-defined analysis region
- Intersection detection
DrillHole Visualization - Hierarchical Datasets
MINE24D to MAP3D
MINE24D to MAP3D

Statistics
Type: Polyhedral Mesh
Number of Cells: 7742
Number of Points: 47583
Memory: 6.66e-01 MB

Statistics
Type: Polyhedral Mesh
Number of Cells: 040
Number of Points: 705
Memory: 7.10e-02 MB
Volume Tetrahedralization

Slicing the objects

Tetrahedralized objects
SGeMS Reader/Writer

Cartesian Grid in SGeMs

Cartesian Grid in Paraview
Discover Abitibi Cross Sections

- ID, position, value, unit
- Value + Unit = Thickness of Surficial Sediments

Database → Text File → ParaViewGeo
2D vs. 3D Cross Sections

We started with 2D

We made it 3D
Discover Abitibi

Gravity and Magnetic Shells

Binary $\rightarrow$ ParaViewGeo $\rightarrow$ VRML $\rightarrow$ with Python
Gravity and Magnetic Shells
GoCad Reader / Writer

```
GOCAD Tsurf 1
HEADER {
name: example
}
GOCAD_ORIGINAL_COORDINATE_SYSTEM
NAME Default
AXIS_NAME "X" "Y" "Z"
AXIS_UNIT "m" "m" "m"
ZPOSITIVE Elevation
END_ORIGINAL_COORDINATE_SYSTEM
PROPERTIES RTData
NO_DATA VALUES -99999
PROPERTY_CLASSES rtdata
RSIZES 1
TFACE
FVRTX 0 -3 -6 -10 137.0824690136719
FVRTX 1 -2 -6 -10 133.2936401367188
FVRTX 2 -2 -6 -9 147.1745952806539
FVRTX 3 -3 -6 -9 150.651808963828
FVRTX 4 -3 -5 -10 152.5312605175701
FVRTX 5 -2 -5 -10 149.91932067719141
FVRTX 6 -3 -5 -9 167.7955678592625
FVRTX 7 -1 -6 -10 139.4127502441409
FVRTX 8 -1 -6 -9 153.484378
FVRTX 9 -1 -5 -10 156.1485140925791
FVRTX 10 -3 -4 -10 137.523779236875
FVRTX 11 -2 -4 -10 134.163742D654297
FVRTX 12 -3 -4 -9 152.4675640569141
FVRTX 13 -1 -4 -10 140.484130859275
FVRTX 14 -3 -6 -10 154.6106179970703
FVRTX 15 -4 -6 -8 140.0381392798034
FVRTX 16 -4 -6 -9 136.4937438968441
FVRTX 17 -4 -5 -9 153.3743266132613
FVRTX 18 -2 -5 -8 151.4384155273438
FVRTX 19 -1 -5 -10 157.93495517022266
FVRTX 20 -4 -4 -9 137.838211059703
FVRTX 21 0 -6 -10 136.6458740334375
FVRTX 22 0 -6 -9 152.7817077636719
```
MIRARCO Drillhole Manager
MIRARCO Seismic Database

Complete Seismic Data Set

Ellipsoid Clusters

Cluster Intersections
ParaViewGeo Filters

- Convert Polygons to Grid
- Distance to Grid
- Drillhole Compositing
- Drillhole to Hierarchical Dataset
- Map Attributes Between Datasets
- Peak Particle Velocity
- Proximity Threshold
- Sequence Arrows
- Surface Reconstruction
- Time Threshold
- Volume Tetrahedralization
- Wireframe Intersection
ParaViewGeo Readers

- Autocad DXF
- BlockModel (ASCII – CSV)
- Datamine
- FEM/DEM
- GoCad
- Geo Referenced Cross Section Images
- Geo Referenced Plane Images
- GeoSoft
- Gemcom (ASCII – CSV)
- Map3D
- Maptek Vulcan
- MIRARCO Drillhole Database
- MIRARCO Seismic Database
- MIRARCO SOT-EPS
- Minesight
- SGeMs
- VTK
ParaViewGeo Wiki

http://paraviewgeo.mirarco.org

- Download
- About
- Features
- Functionality
- Tutorials
Thank You