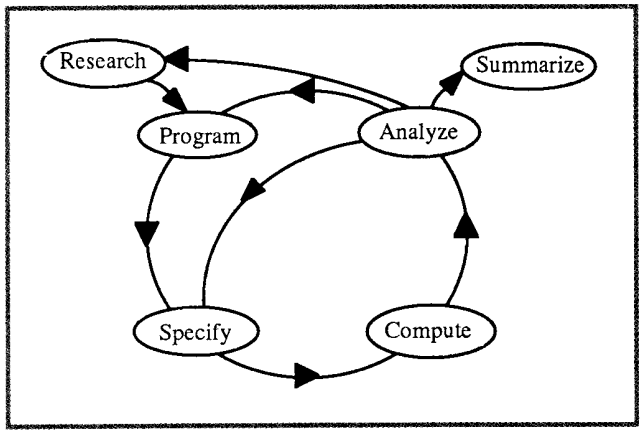


Figure 1. Computational cycle.

The Visualization Pipeline

CS 5630 / 6630
Fall 2009

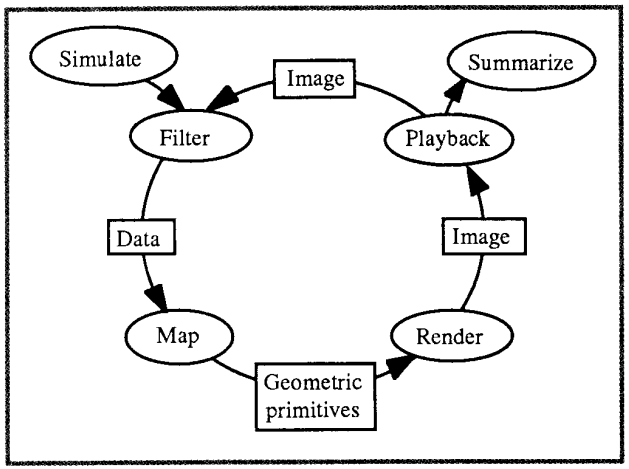


Figure 2. Analysis cycle.

The Application Visualization System: A Computational Environment for Scientific Visualization

Craig Upson, Thomas Faulhaber, Jr., David Kamins, David Laidlaw, David Schlegel, Jeffrey Vroom, Robert Gurwitz, Andries van Dam

Stellar Computer

IEEE Computer Graphics & Applications

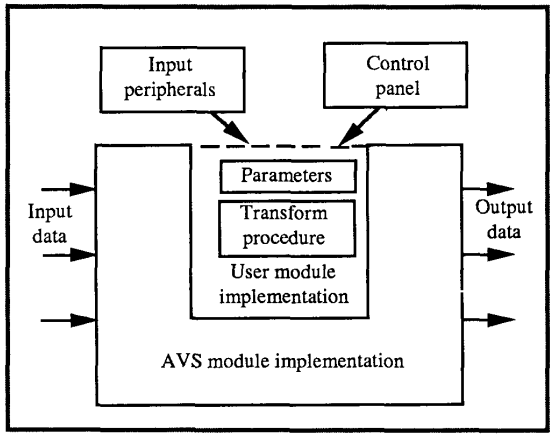


Figure 4. Conceptual model of a module.

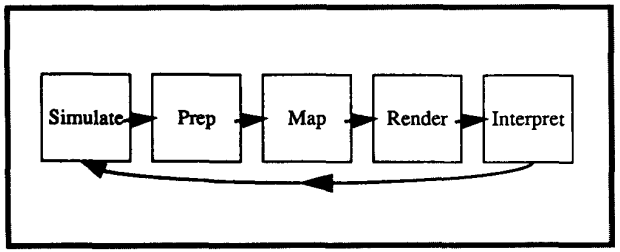


Figure 1. The visualization pipeline.

A Dataflow Toolkit for Visualization

D. Scott Dyer
Ohio Supercomputer Center

IEEE Computer Graphics & Applications

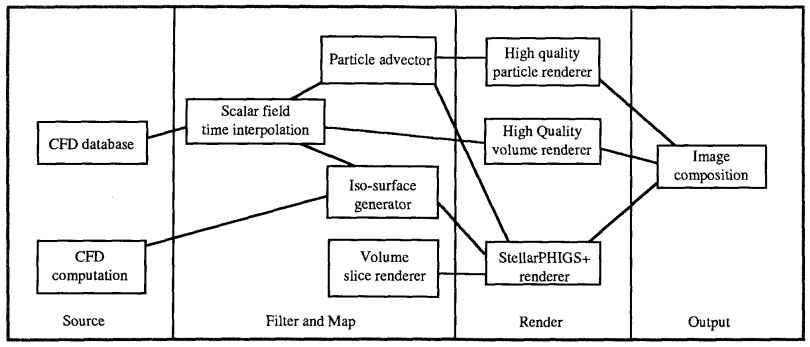


Figure 9. Example of a computational flow network.

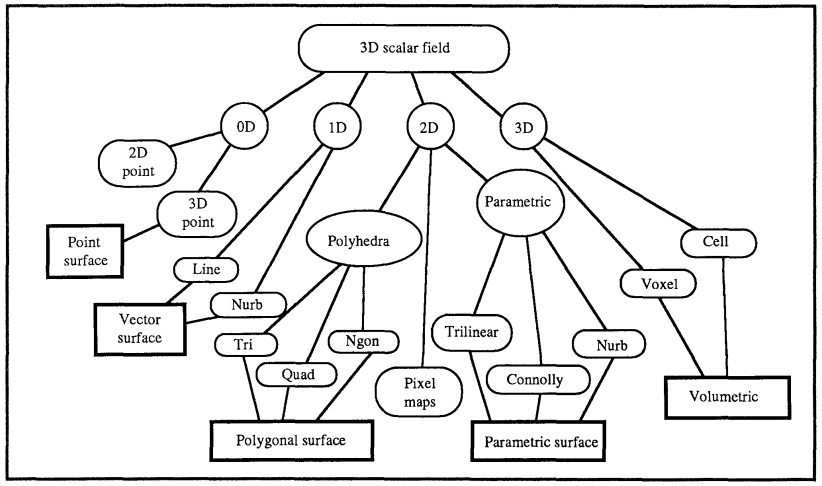
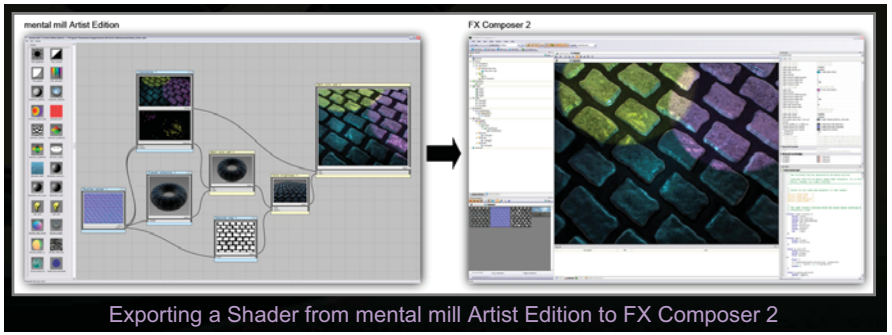


Figure 3. Mapping approaches for 3D scalar fields.



Exporting a Shader from mental mill Artist Edition to FX Composer 2

ConMan: A Visual Programming Language for Interactive Graphics

Paul E. Haeberli

Silicon Graphics, Inc.
Mountain View, CA 94043

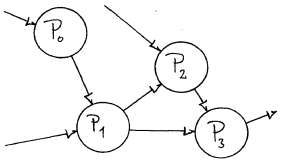


Figure 1. A directed graph representation.

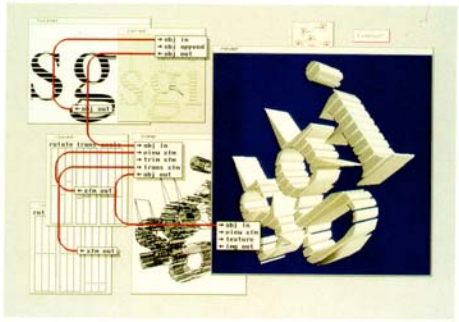
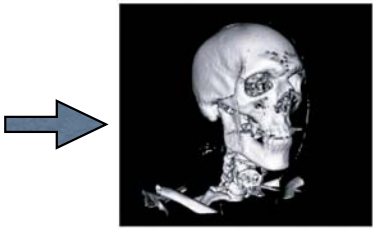


Figure 8. Extracting geometry from an image to make an extruded logo.

Visualizing with VTK: A Tutorial

William J. Schroeder, Lisa S. Avila, and William Hoffman
Kitware



Building Block Shaders

Gregory D. Abram and Turner Whitted
Numerical Design Ltd.
Chapel Hill, NC

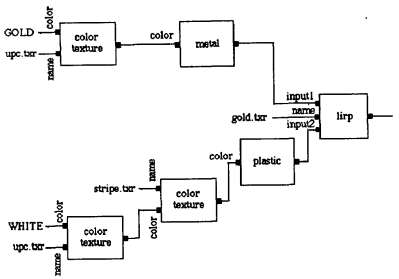


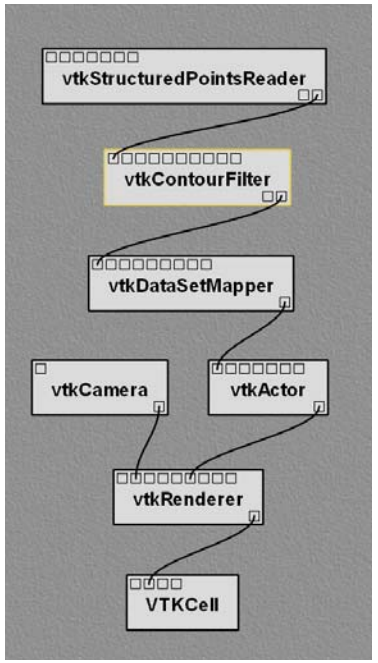
Figure 9. The Cola-Cola can shader.

Figure 8. Two Cola-Cola cans.

VTK Object Types

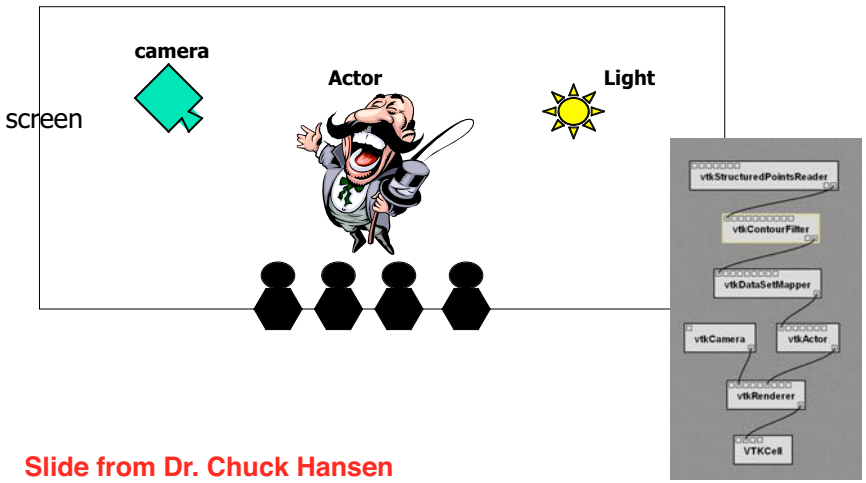
- Process Objects: The sources, filters, and mapper algorithms that manipulate the data.
- Data Objects: The datasets that define the dataflow through the network.

```
import vtk

data = vtk.vtkStructuredPointsReader()
data.SetFileName(../examples/data/head.120.vtk)

contour = vtk.vtkContourFilter()
contour.SetInput(data.GetOutput())
contour.SetValue(0, 67)

mapper = vtk.vtkPolyDataMapper()
mapper.SetInput(contour.GetOutput())
mapper.ScalarVisibilityOff()

actor = vtk.vtkActor()
actor.SetMapper(mapper)

cam = vtk.vtkCamera()
cam.SetViewUp(0,0,-1)
cam.SetPosition(745,-453,369)
cam.SetFocalPoint(135,135,150)
cam.ComputeViewPlaneNormal()

ren = vtk.vtkRenderer()
ren.AddActor(actor)
ren.SetActiveCamera(cam)
ren.ResetCamera()

renwin = vtk.vtkRenderWindow()
renwin.AddRenderer(ren)

style = vtk.vtkInteractorStyleTrackballCamera()
iren = vtk.vtkRenderWindowInteractor()
iren.SetRenderWindow(renwin)
iren.SetInteractorStyle(style)
iren.Initialize()
iren.Start()
```



The Graphics Model

The purpose is to render the geometry (volume) on the screen

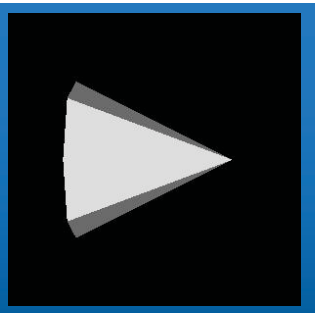


Slide from Dr. Chuck Hansen

VTK Graphical Model

- Render Windows: The object which manages a window on the display device.
- Renderers: The object which coordinates the lights, cameras, and actors of the scene and draws them into the render window.
- Props: The objects added to the renderers to create a scene. The props are the things that you see in the scene.
- Mappers: The object that refer to an input data object and knows how to transform and render it.
- Properties: The object that contains rendering parameters such as color and material properties.

Cone.tcl



```
catch {load vtktcl}
# user interface command widget
source ../../examplesTcl/vtkInt.tcl

# create a rendering window and renderer
vtkRenderer ren1
vtkRenderWindow renWin
    renWin AddRenderer ren1
vtkRenderWindowInteractor iren
    iren SetRenderWindow renWin

# create an actor and give it cone geometry
vtkConeSource cone
  cone SetResolution 8
vtkPolyDataMapper coneMapper
  coneMapper SetInput [cone GetOutput]
vtkActor coneActor
  coneActor SetMapper coneMapper

# assign our actor to the renderer
ren1 AddActor coneActor

# enable user interface interactor
iren SetUserMethod {wm deiconify .vtkInteract}
iren Initialize

# prevent the tk window from showing up then start the event loop
wm withdraw .
```

Slide by Dr. Penny Rheingans

User interaction

- vtkRenderWindowInteractor – allow the user to interact with the graphics objects
- Try the following keypresses:

w: wireframe mode
s: surface mode
r: reset the transformation
3: toggle stereo
button 3: zoom; botton 2: pan; button1: rotate;
c/o: camera mode or object mode
j/t: joy stick or tracer ball mode
e: exit

Slide from Dr. Chuck Hansen

Dataflow Programming with VisTrails

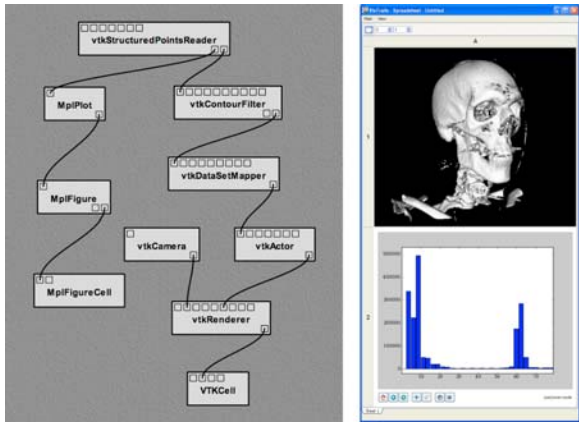


Figure 3.3: Multiple libraries are combined to create two seperate visualizations of the same data. The histogram uses Matplotlib.