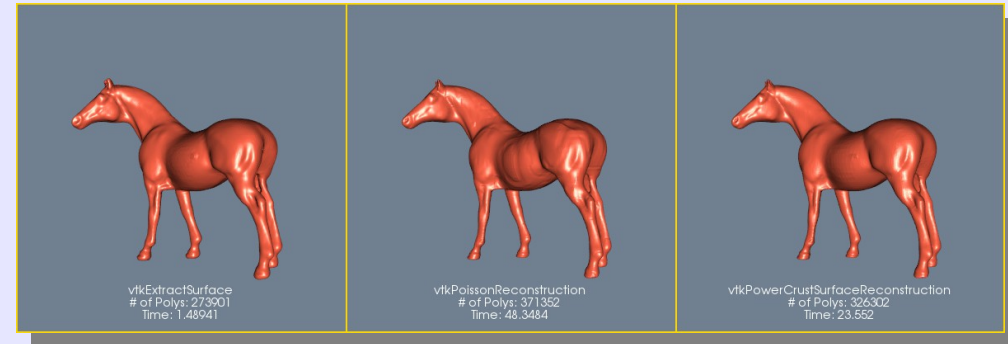
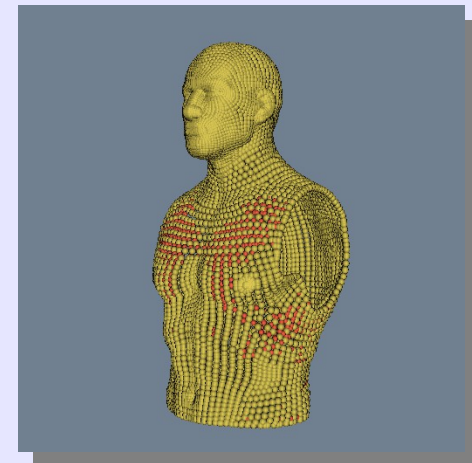
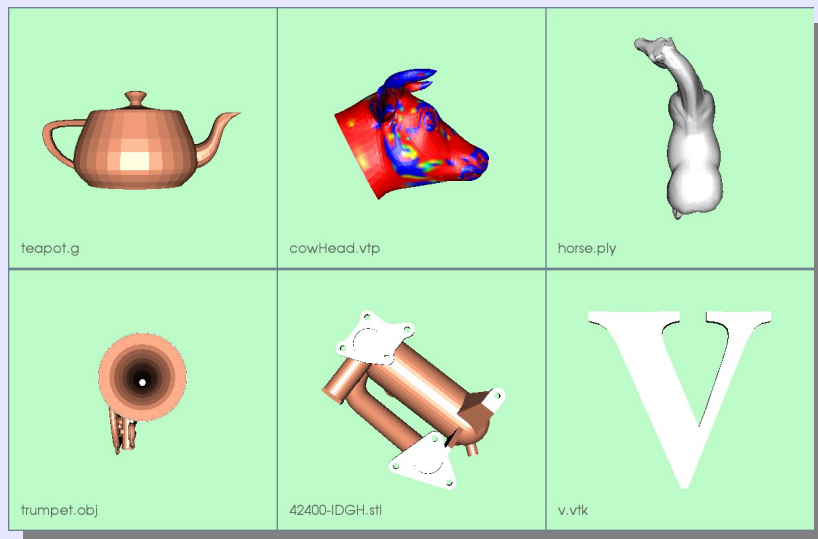


# VTK Examples Moving Forward

Bill Lorensen  
Noware



"It is a bad plan that admits  
of no modification."  
— Publilius Syrus



# April 27 Hack-a-thon

- The current WikiExamples have served us well for 8 years
- But...
  - Adding examples requires creating a wiki page in an archaic language
  - No mechanism to push changes to the wiki
  - Dated look and feel
  - Not mobile friendly
- But

# The Old Guy Hates Change

"Change is the law of life and those who look only to the past or present are certain to miss the future."

— John F. Kennedy

"In times of rapid change, experience could be your worst enemy."

— J. Paul Getty

# A Lot of Change

- 1966 - Machine language
- 1967 - IBM Assembler
- 1968 - Fortran
- Fortran II
- 1978 - Fortran 4
- 1980 - C
- 1994 - C++
- 1996 - Java
- 1966 – IBM
- 1967 - IBM
- 1968 – Univac SS80
- 1970 – IBM MFT
- 1974 - PDP 11 DOS
- 1980 - GECOS
- 1994 – Vax VMS
- 1996 - Unix

There's an old saying about those who  
forget history. I don't remember it, but  
it's good.”

Stephen Colbert, The Colbert Report  
March 10, 2008

# Reuse Some Old Technology

- Nightly testing
- Three ways to build
  - Individual example
  - Git clone the repository
  - VTK Remote Module
- Auto tarball per example

# VTK Examples New Technologies

- Github pages replaces Media Wiki
- Markdown replaces wiki *language*
- MkDocs
  - Google's Material Design look and feel
  - Code hilite extension
  - Admonition extension
  - TOC extension
- Class coverage
  - Contributed by Andrew Maclean
- Google custom search engine
- Google Analytics

# Old versus New

- Old Way
  - The wiki contains the example code and description
  - The wiki holds the master copy of each example
  - As examples are added to the wiki, they are automatically placed in the git repo each night, compiled and tested (no review)
- New Way
  - The git repo contains the example code and description
  - The repo holds the master copy
  - Examples are added using git merge



# Make it easier to write examples

- Developer
  - Write code for example and description and push to github
  - Generate a merge request
- ScrapeRepo
  - Auto insert example images into descriptions
  - Auto insert thumbnails into language summary pages
  - Auto link any vtk class references to doxygen
  - Auto highlight code lines with vtk classes
- Reusable snippets

[page](#)
[discussion](#)
[view source](#)
[history](#)

[log in](#)

## VTK/Examples/Cxx/GeometricObjects/OrientedCylinder

< VTK | Examples | Cxx

This example illustrates how to create and display a cylinder that passes through two points.

It demonstrates two different ways to apply the transform:

1. Use [vtkTransformPolyDataFilter](#) to create a new transformed polydata. This method is useful if the transformed polydata is needed later in the pipeline, e.g. [vtkGlyph3DFilter](#).
2. Apply the transform directly to the actor using [vtkProp3D's SetUserMatrix](#). No new data is produced.

Switch between the two methods by #defining USER\_MATRIX or leaving out the #define.

**NOTE:** Compare this example with [Oriented Arrow](#). The transform is different because the cylinder height direction is along the y-axis and the arrow height is along the x axis.

Contents [\[hide\]](#)

[1 OrientedCylinder.cxx](#)  
[2 Please try the new VTKExamples website.](#)  
[2.1 CMakeLists.txt](#)  
[2.2 Download and Build OrientedCylinder](#)

### OrientedCylinder.cxx

```

#define USER_MATRIX
#include <vtkCylinderSource.h>
#include <vtkPolyData.h>
#include <vtkSmartPointer.h>
#include <vtkPolyDataMapper.h>
#include <vtkActor.h>
#include <vtkRenderWindow.h>
#include <vtkRenderer.h>
#include <vtkRenderWindowInteractor.h>
#include <vtkMath.h>
#include <vtkSphereSource.h>
#include <vtkProperty.h>
#include <vtkTransform.h>
#include <vtkTransformPolyDataFilter.h>
#include <time.h>

int main(int, char *[])
{
    //Create an cylinder

```

navigation

[Main page](#)  
[Recent changes](#)  
[Random page](#)  
[Help](#)

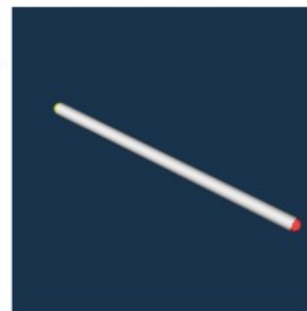
search

tools

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# Wiki Examples

# VTK Examples

[Cxx / GeometricObjects / OrientedCylinder](#)

[lorensen/VTKExamples](#)

VTKExamples

[Home](#)  
[CSharp](#)  
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[CellTypeSource](#)  
[Circle](#)  
[ColoredLines](#)  
[Cone](#)

OrientedCylinder

[VTKExamples/Cxx/GeometricObjects/OrientedCylinder](#)

Description

This example illustrates how to create and display a cylinder that passes through two points.

It demonstrates two different ways to apply the transform:

1. Use [vtkTransformPolyDataFilter](#) to create a new transformed polydata. This method is useful if the transformed polydata is needed later in the pipeline, e.g. [vtkGlyph3DFilter](#).
2. Apply the transform directly to the actor using [vtkProp3D's SetUserMatrix](#). No new data is produced.

Table of contents

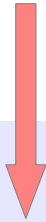
[Description](#)  
[Code](#)  
[CMakeLists.txt](#)  
[Download and Build](#)  
[OrientedCylinder](#)

# Lots of Hyperlinks

DensifyPoints

vtkDensifyPointCloudFilter

Add points to a point cloud.



## Detailed Description

add points to a point cloud to make it denser

**vtkDensifyPointCloudFilter** adds new points to an input point cloud. The new points are created in such a way that all points in any local neighborhood are within a target distance of one another. Optionally, attribute data can be interpolated from the input point cloud as well.

A high-level overview of the algorithm is as follows. For each input point, the distance to all points in its neighborhood is computed. If any of its neighbors is further than the target distance, the edge connecting the point and its neighbor is bisected and a new point is inserted at the bisection point (optionally the attribute data is interpolated as well). A single pass is completed once all the input points are visited. Then the process repeats to the limit of the maximum number of iterations.

### Warning

This class can generate a lot of points very quickly. The maximum number of iterations is by default set to  $\approx 1.0$  for this reason. Increase the number of iterations very carefully. Also the `MaximumNumberOfPoints` data member can be set to limit the explosion of points. It is also recommended that a `N` closest neighborhood is used.

This class has been threaded with **vtkSMPTools**. Using TBB or other non-sequential type (set in the CMake variable `VTK_SMP_IMPLEMENTATION_TYPE`) may improve performance significantly.

### See also

[vtkVoxelGridFilter](#) [vtkEuclideanClusterExtraction](#) [vtkBoundedPointSource](#)

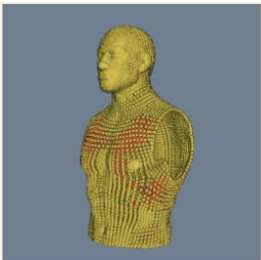
### Tests:

[vtkDensifyPointCloudFilter \(Tests\)](#)

Definition at line 57 of file [vtkDensifyPointCloudFilter.h](#).

## DensifyPoints

[VTKExamples/Cxx/Points/DensifyPoints](#)



## Description

In this example, the original points are yellow and the added points are red.

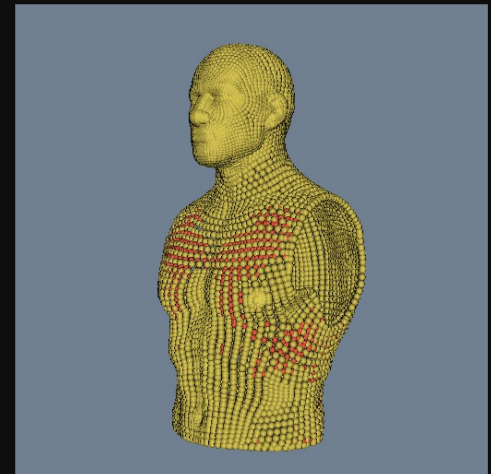
The image was produced using [this torso dataset](#)

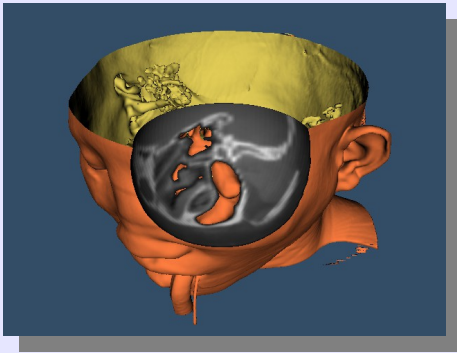


### Warning

This example requires [vtk 7.1](#) or greater.

Code





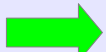
.png



.md



.CXX



.txt



S  
c  
r  
a  
p  
e  
R  
e  
p  
o



MkDocs



TissueLens

Google Custom Search

loreisen/VTKExamples

site/

Table of contents

- Description
- Code
- CMakeLists.txt
- Download and Build TissueLens

TissueLens

VTKExamples/Cxx/Medical/TissueLens

Description

This example uses two `vtkClipDataSet` filters to achieve a "tissue lens" affect. First, a sphere implicit function is used to clip a spherical hole in the extracted isosurface. Then a geometric sphere samples the original volume data using a `vtkProbeFilter`. The resulting scalar point data is used to clip the sphere surface with the isosurface value.

Code

TissueLens.cxx

```
#include <vtkSmartPointer.h>
#include <vtkMarchingCubes.h>
#include <vtkMetaImageReader.h>

#include <vtkSphereSource.h>
#include <vtkProbeFilter.h>
#include <vtkSphere.h>
#include <vtkClipDataSet.h>
#include <vtkImplicitVolume.h>
#include <vtkStructuredGrid.h>
```

# Performance Improvements

- Lazy image loading via javascript
  - Initial implementation loaded all summary images and hit github limits
- Use tiny url's for summary pages
- Htmlmin reduces page sizes by ~30%

# Adding a Summary Line

- Old

|-

```
| [[VTK/Examples/Cxx/Medical/TissueLens|TissueLens]] ||  
{{VTKDoxygenURL|vtkMarchingCubes}} {{VTKDoxygenURL|  
vtkClipDataSet}} {{VTKDoxygenURL|vtkProbeFilter}} ||Cut a  
volume with a sphere
```

- New

```
[TissueLens](/Cxx/Medical/TissueLens) | vtkMarchingCubes  
vtkClipDataSet vtkProbeFilter | Cut a volume with a sphere
```

And... If the example has an image, you get a thumbnail for free






Medical

Example Name ↕	VTK Classes Demonstrated ↕	Description
MedicalDemo1	vtkMarchingCubes	Create a skin surface from volume data
MedicalDemo2	vtkMarchingCubes	Create a skin and bone surface from volume data
MedicalDemo3	vtkMarchingCubes	Create skin, bone and slices from volume data
MedicalDemo4	vtkFixedPointVolumeRayCastMapper	Create a volume rendering
TissueLens	vtkMarchingCubes vtkClipDataSet vtkProbeFilter	Cut a volume with a sphere

Old

New

Medical

Example Name	Classes Demonstrated	Description	Image
MedicalDemo1	vtkMarchingCubes	Create a skin surface from volume data	
MedicalDemo2	vtkMarchingCubes	Create a skin and bone surface from volume data	
MedicalDemo3	vtkMarchingCubes	Create skin, bone and slices from volume data	
MedicalDemo4	vtkFixedPointVolumeRayCastMapper	Create a volume rendering	
TissueLens	vtkMarchingCubes vtkClipDataSet vtkProbeFilter	Cut a volume with a sphere	

# VTK Examples By the Numbers

## ScrapeRepo Summary

- C++ examples: 835
- CSharp examples: 121
- Python examples: 139
- Java examples: 18
- Total examples: 1113
- Doxygen links added: 1229
- Thumbnails added: 1075
- Nightly Tests: 750



Users

1.8K

↑71.2%

vs last 28 days

Sessions

4K

↑85%

Bounce Rate

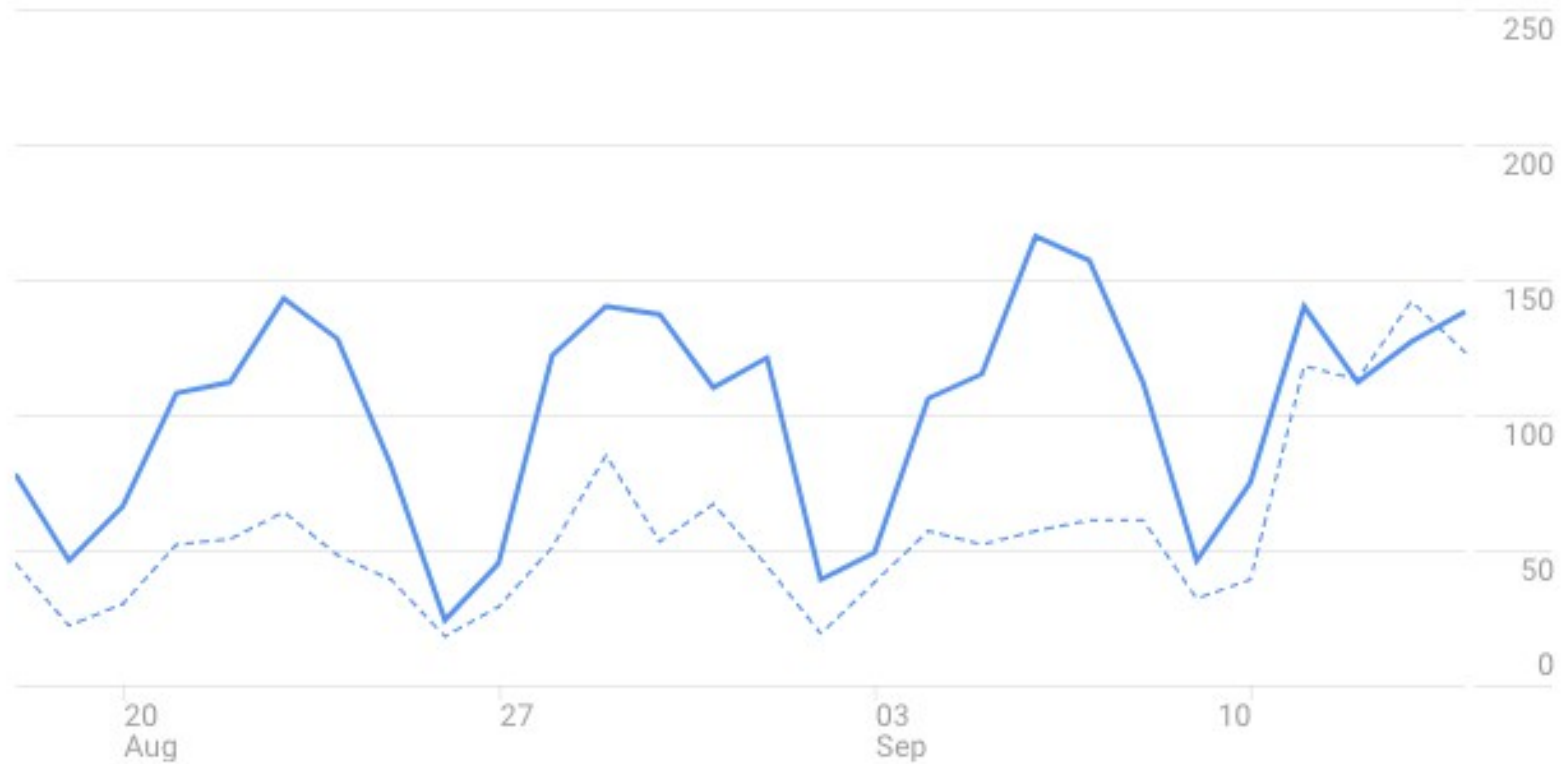
29.81%

↑0.8%

Session Duration

5m 48s

↓4.5%

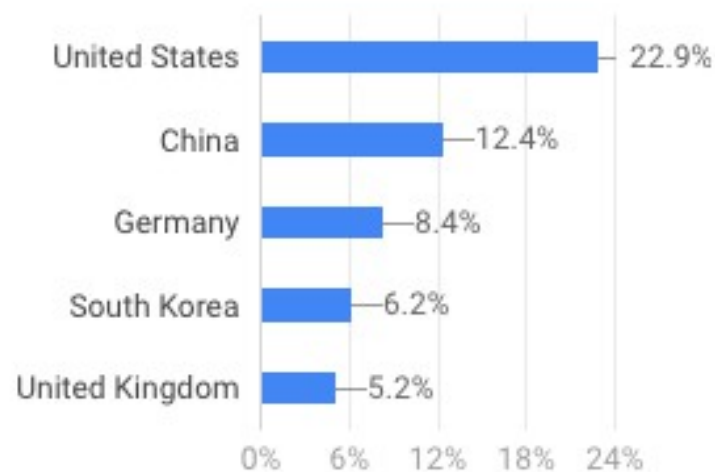


Last 28 days ▼

[AUDIENCE OVERVIEW >](#)

## Where are your users?

Sessions by country

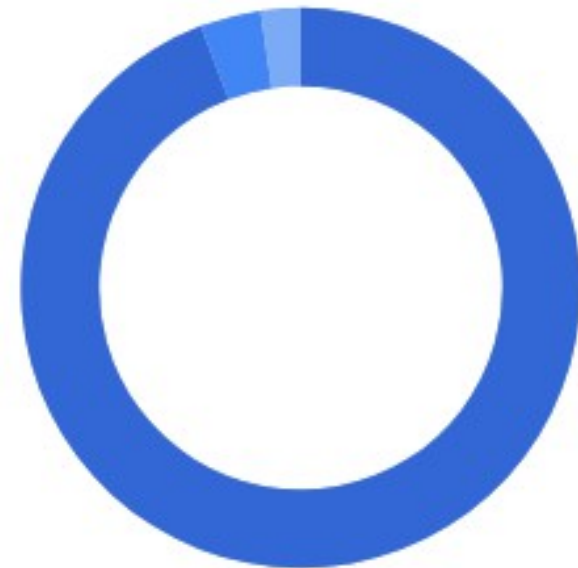


Last 28 days ▼

[LOCATION OVERVIEW](#) >

## What are your top devices?

Sessions by device



Desktop

94.2%

↑1.4%



Mobile

3.5%

↓1.1%



Tablet

2.3%

↓0.2%

Last 7 days ▼

[MOBILE OVERVIEW](#) >

How are your active users trending over time?

### Active Users



Last 30 days ▼

[ACTIVE USERS REPORT >](#)

# Issues

- Google needs to discover the VTK Examples
  - There are some links from the old Wiki Examples to the VTK Examples
- Deprecate VTK Wiki Examples
  - Redirect to VTK Examples
- Convert or retire remaining VTK/Examples
- Cannot get Google Search to generate image results
- Need more Administrators
  - Instructions are being prepared

# Quick Demo