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Who is Tecplot?

We help Engineers SEE

Empowering engineers and scientists to discover, analyze and understand information in complex data, and helping them effectively communicate their results.
Tecplot at a Glance

• Founded in 1981 by Boeing engineers – Seattle, WA
• Largest independent CFD post-processor – 47,000 users worldwide
• Known for being the most complete and flexible post-processing option
• Focused on large data and emerging needs in the CFD community
Tecplot for Barracuda

• Celebrating 3 years of Tecplot for Barracuda!
  • Unlimited use of Tecplot 360 with Barracuda data
  • Unlimited use of PyTecplot (connected mode)
  • Unlimited CPU count

• Distributed & Licensed by CPFD
• Tier 1 technical support provided by CPFD
Tecplot for Barracuda

With a full license of Tecplot 360 you get

- More presentation options with multiple pages and frames
- Ability to load data from other sources & solvers
- Faster automation with batch mode
  - Use headless HPC resources or even Python multiprocessing on a single workstation
- Tecplot Chorus
  - Helps organize optimization and design of experiments work
PyTecplot

• The Python API for Tecplot 360
• Record PyTecplot scripts from the Tecplot 360 GUI
• PyTecplot supports 64-bit Python, 3.8 and newer
• Use any Python IDE: Spyder, Jupyter, Idle, PyCharm, etc.
• Gain direct access to the data
• Connect with other Python packages
• Truly headless batch mode
• Create custom GUIs to streamline workflows
```python
import glob
import sys
import tecplot as tp

if '-c' in sys.argv:
    tp.session.connect()

files = ['bvr.grid.plt']
files.extend(glob.glob('bvr.cells*.plt'))
files.extend(glob.glob('bvr.particles*.plt'))
files.append('bvr.setup.plt')

tp.data.loadtecplot(files)
.tp.active_frame().load_stylesheet("plot_style.sty")

for t in tp.active_frame().plot().solution_times:
    tp.active_frame().plot().solution_time = t
    tp.export.save_png(f"image_{t}.png", width=2048)
```
Can I quantify the bubble characteristics in a fluidized bed simulation?

Can I compute the size of the bubbles?
Can I compute the rise velocity of the bubbles?

Yes!
Advanced Analysis with Tecplot 360 & PyTecplot

Bubble Characteristics

Steps

- Define the bubbles using value blanking
- Extract each separate bubble to a new zone
- Compute the volume and average z-velocity of each bubble
- Add the resulting values as new scalars in the dataset
- Plot the results
Advanced Analysis with Tecplot 360 & PyTecplot

Bubble Characteristics

Automate with PyTecplot

- Only 60 lines of code
- Repeatable with similar datasets
- Executes fast in batch-mode!

Connected Mode
1392 seconds (23 minutes)

Batch Mode
Serial: 35.7 seconds (39x faster)
4 cores: 17.7
8 cores: 11.4
16 cores: 7.8
32 cores: 7.3 (4.8x faster than serial, 190x faster than connected)
Advanced Analysis with Tecplot 360 & PyTecplot
Batch vs Connected

Connected Mode (included with Tecplot for Barracuda)
• PyTecplot drives the Tecplot 360 GUI
• Communication with the GUI is done through socket connections
• Great for developing and debugging PyTecplot scripts
• Not great for data analysis, as large data arrays need to be passed over sockets

Batch Mode (requires Tecplot 360)
• Runs truly headless
• Uses the Tecplot 360 “engine” – has all the capabilities of the 360 GUI
• Great for data analysis as large data arrays are passed by pointer (fast)
• Can be run embarrassingly parallel on HPC or on a single node using Python’s multiprocessing module
Can I identify the location of minimum pressure with respect to height?

Yes!
Advanced Analysis with Tecplot 360 & PyTecplot

Locate Minimum Pressure

Steps

• Extract slices at regular Z intervals
• Use PyTecplot to locate the cell which has the minimum pressure value
• Get the XYZ location at that cell number
• Create a new linear zone which contains the results
Automate with PyTecplot

- Only 60 lines of code (again!)
- 361 timesteps, 6.7Gb
- [https://github.com/Tecplot/handyscripts/blob/master/jupyter_notebooks/MinimumPressure/MinimumPressureLocation.ipynb](https://github.com/Tecplot/handyscripts/blob/master/jupyter_notebooks/MinimumPressure/MinimumPressureLocation.ipynb)

**Connected Mode**

30,600 seconds (510 minutes)

**Batch Mode**

Serial: 776 seconds (39x faster than connected)
- 2 cores: 338 seconds
- 4 cores: 145 seconds
- 8 cores: 70 seconds
- 16 cores: 43 seconds
- 32 cores: 37 seconds (21x faster than serial, 827x faster than connected)
Summary

**Tecplot 360**
- Load data from multiple sources
- Unlimited CPU threads
- Organize your layouts using multiple pages

**Tecplot Chorus**
- Perform comparative analysis
- Explore design spaces, operating envelopes, geometry configurations

**PyTecplot**
- Speed up automation with PyTecplot
- Build custom GUIs
- Headless plot generation
• Tecplot 360 is about more than just making pretty pictures and movies. It’s about knowledge extraction.
• Get more information out of your Barracuda simulation results with PyTecplot.
• And get that information faster in batch mode!

• Use support@tecplot.com as a resource!
Thank you, CPFD!