



Cornell University
Center for Advanced Computing

Visualization Labs

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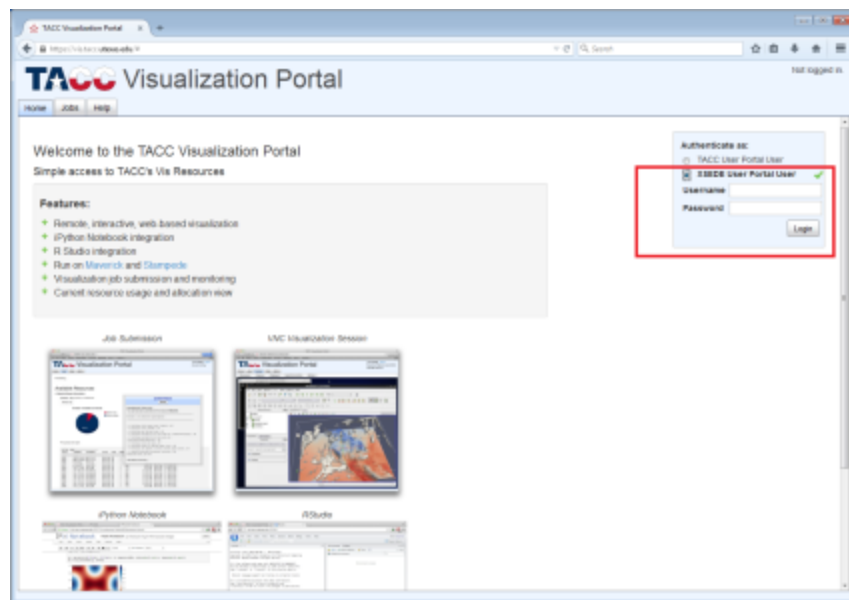
High Performance Computing on Stampede

January 15, 2015



Visualization Portal: Getting Started: Login

- <https://vis.tacc.utexas.edu>
- Use XSEDE username/password, or local TACC credentials (if you have it)





Visualization Portal: Getting Started: Jobs

- Click the 'jobs' tab, if you aren't there already
- Click the 'Stampede' button in the 'Resource' section.
- Scroll down to the 'Stampede load and queue state' pie chart. Are there enough vis nodes to run your job?

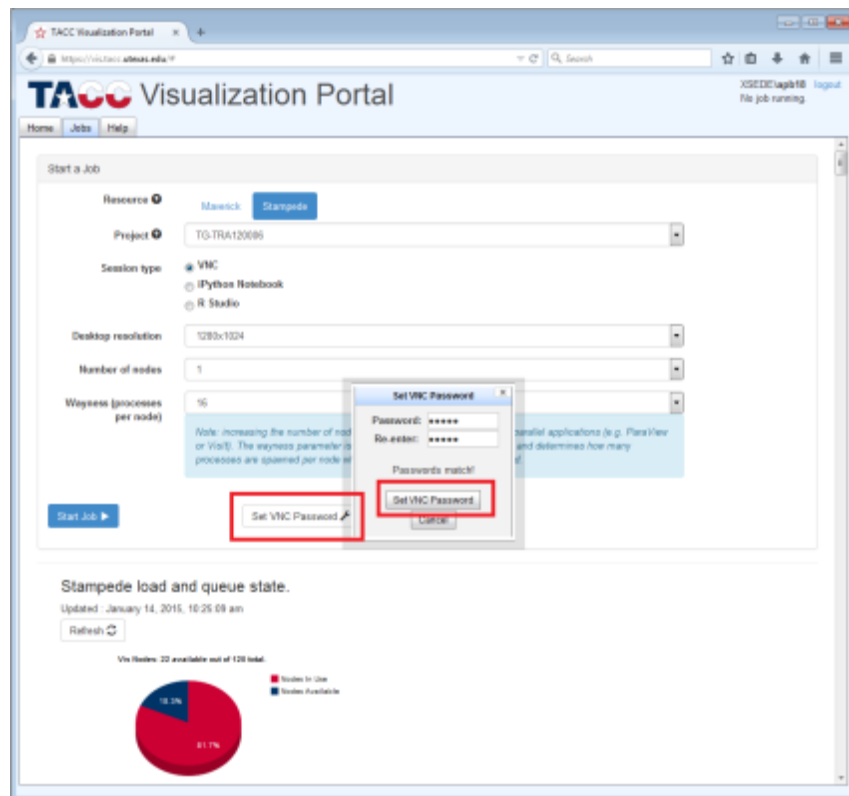
The screenshot shows the TACC Visualization Portal interface. The 'Jobs' tab is selected in the top navigation bar. In the 'Start a Job' section, the 'Resource' dropdown menu is open, and the 'Stampede' option is highlighted with a red box. Below the form, there is a section titled 'Stampede load and queue state' with a pie chart. The pie chart shows 22 nodes in use (18.7%) and 101 nodes available (81.3%).

State	Count	Percentage
Nodes In Use	22	18.7%
Nodes Available	101	81.3%



Visualization Portal: Getting Started: VNC passwd

- This needs to be done only once, ever
- DO NOT use your login password! This password protects the VNC graphical session only.
- Sometimes, you want to intentionally share VNC password with collaborators





Visualization Portal: Getting Started: Jobs

- Pick job parameters. For this example, we're just opening a desktop on one node
 - Make sure 'Stampede' is selected, as well as the right account.
 - Session type is VNC, One node. Wayness irrelevant for this example
- Start Job!

The screenshot shows the TACC Visualization Portal interface. The 'Start a Job' form has the following values: Resource: Stampede, Project: TOSTRAT0000, Session type: VNC, Desktop resolution: 1280x1024, Number of nodes: 1, and Wayness (processes per node): 16. A 'Start Job' button is highlighted with a red box. Below the form is a 'Stampede load and queue state' section with a pie chart showing 22 available nodes out of 128 total.

Category	Count	Percentage
Nodes Available	22	17.19%
Nodes In Use	106	82.81%



Visualization Portal: Getting Started: Jobs

- Various status screens will pop up until the job starts running
- You cancel the job submission via 'cancel' if you need to (i.e. you notice queue is full, don't want to wait)

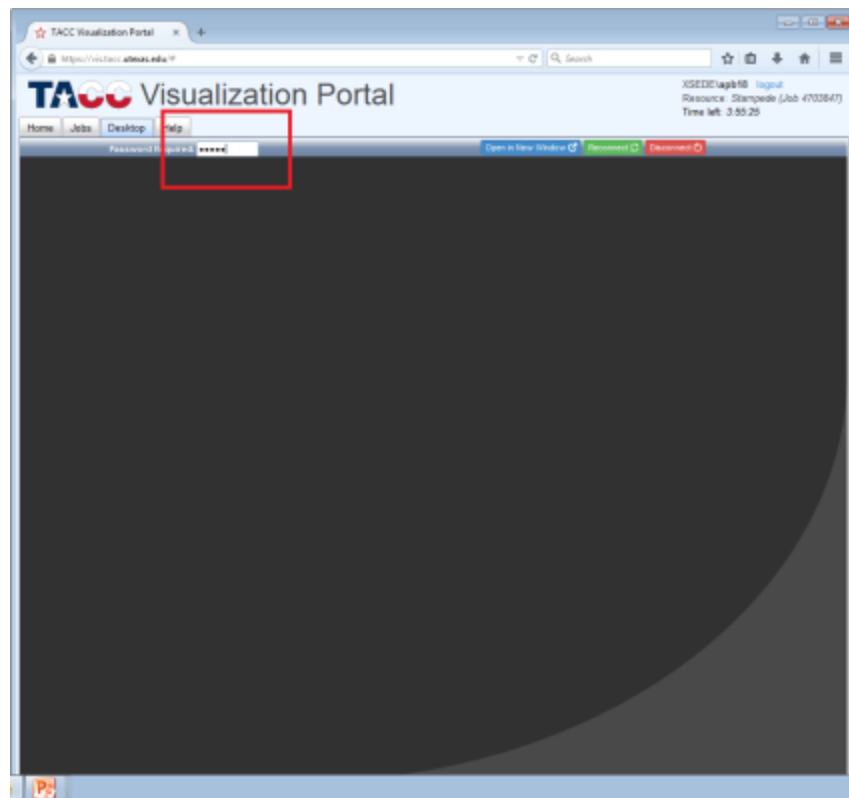
The screenshot shows the TACC Visualization Portal interface. At the top, it says 'TACC Visualization Portal' and 'ESEC/ap18 No job running'. Below this, there's a 'Processing...' section with a 'Stampede load and queue state.' update from January 14, 2015. A pie chart shows '100%' in red, indicating the queue is full. A 'Cancel' dialog box is overlaid on the screen, displaying the message: 'Submitting job: Please wait. Your job has been submitted to the resource Stampede. Below is the Stampede log output.' The log output shows various status messages and a table of job details.

JobID	JOBNAME	USERNAME	Running	Nodes	Normal	Start Time	End Time
408230	hmc	ml2dml2	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408179	h24	lg450211	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408184	OR_78	ORAC111	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408181	NCL_04	ky047	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408180	NCL_50	ky047	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408188	Pa20PT24	AW027	Running	160	16	normal	11:18:00 Tue Jan 13 20:27:16
408186	Pa232	AW027	Running	160	16	normal	11:18:00 Tue Jan 13 20:27:16
408185	q0P17	lurong	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408188	q0P27	lurong	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408187	vps4_g0-10	slidiam	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408178	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408180	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408182	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408181	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408180	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408182	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408181	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408180	ANDBA_wat	aur367	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408209	tar_120	tk0904	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408208	or_14	ORAC111	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16
408217	6_3_of_g0T	Thiang	Running	16	1	normal	11:18:00 Tue Jan 13 20:27:16



Visualization Portal: Getting Started: Jobs

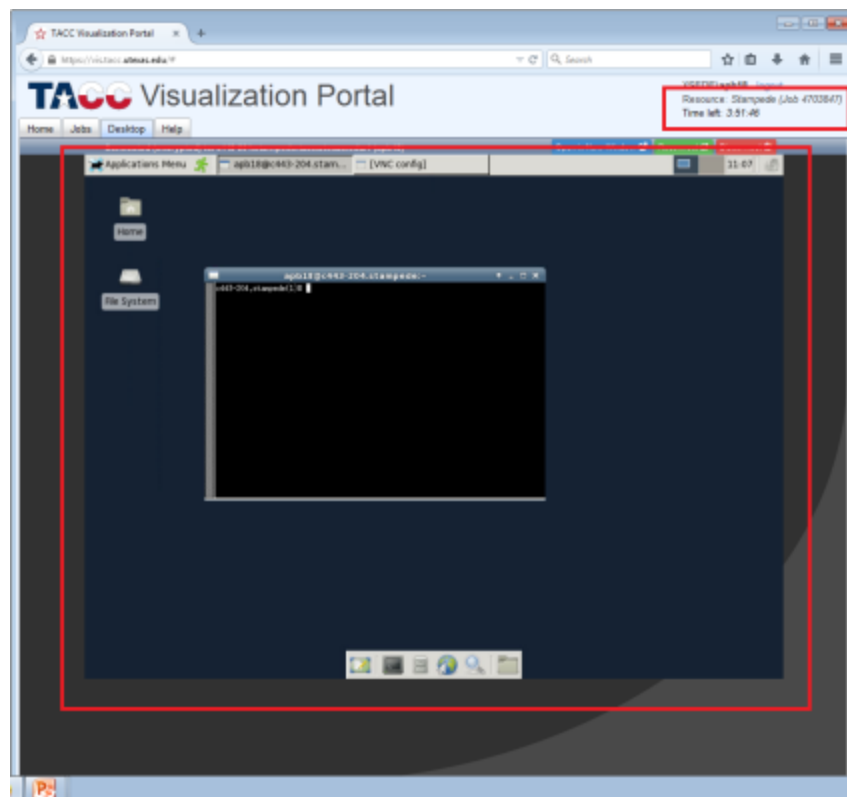
- Once job is running, you will be directed to a new 'desktop' tab
- Type your VNC password in the box, then HIT ENTER KEY. Do not click on any of the tempting colored boxes.





Visualization Portal: Getting Started: Jobs

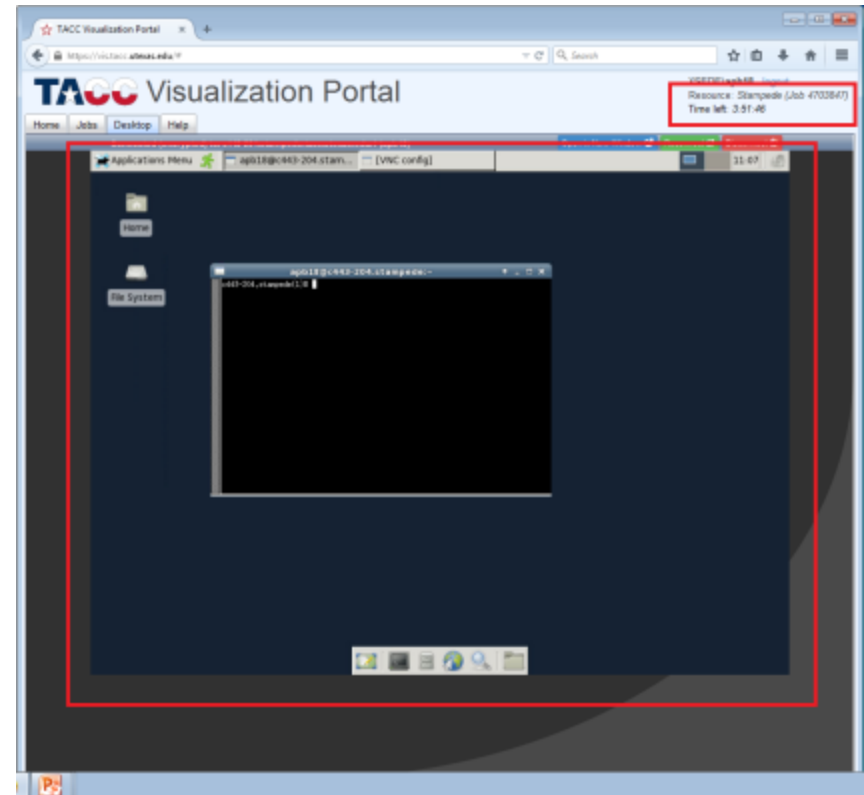
- Your job is now running, and you have a desktop on one of the compute nodes!
- Move windows around and click on things. You can even use the 'Applications' menu in the upper left, or the 'dock' buttons at the bottom.
- Job status/timer in corner





Visualization Portal: Getting Started: Jobs

- Do not type 'exit' in the default xterm, that will end your session!
- Use the 'dock' or application menu to launch a new terminal, or just type in 'xterm' to launch one manually.





Visualization Portal: Getting Started: Jobs

- Click on 'jobs' tab to see job details, and perform various actions
- Look at vnc connection URL. This is used for connecting with a standalone VNC client
- When finish, terminate your session by clicking on the red button.

The screenshot shows the TACC Visualization Portal interface. The 'Jobs' tab is selected and highlighted with a red box. Below the navigation tabs, there is a message: "Your VNC session is running on Stampede". Underneath this message are several buttons: "Open in Desktop", "Open Native Client", "Set VNC password", and "Terminate Session". The "Terminate Session" button is highlighted with a red box. Below the buttons, there is a text box containing the URL: "Session available at: vnc.tacc.cornell.edu:14324", which is also highlighted with a red box. Further down, there is a section titled "Stampede load and queue state" with a pie chart showing "Nodes In Use" (red) and "Nodes Available" (blue). The pie chart indicates that 1 node is available out of 100 total. Below the pie chart, there is a table of active jobs.

JOBID	JOBNAME	USER@NODE	STATE	CORE	NODE	QUEUE	REMAINING	STARTTIME
4081338	fnrc	we@don13	Running	48	3	normal	33:38:00	Tue Jan 13 20:27:36
4081798	cds	tg@al021	Running	64	4	gdr	9:28:58	Tue Jan 13 20:27:36
4081284	wh_78	dm@cel13	Running	250	35	normal	33:00:00	Tue Jan 13 20:27:35
4081481	HCS_O1	kv@47	Running	16	1	normal	33:38:00	Tue Jan 13 20:27:36
4081482	HCS_O2	kv@47	Running	16	1	normal	33:38:00	Tue Jan 13 20:27:36



Visualization Portal: Sharing VNC

- VNC session can be shared by many people (fight for the mouse) by sharing the VNC connection URL and password
- Portal is only useful for connecting to your own sessions. Everybody else needs their own standalone client

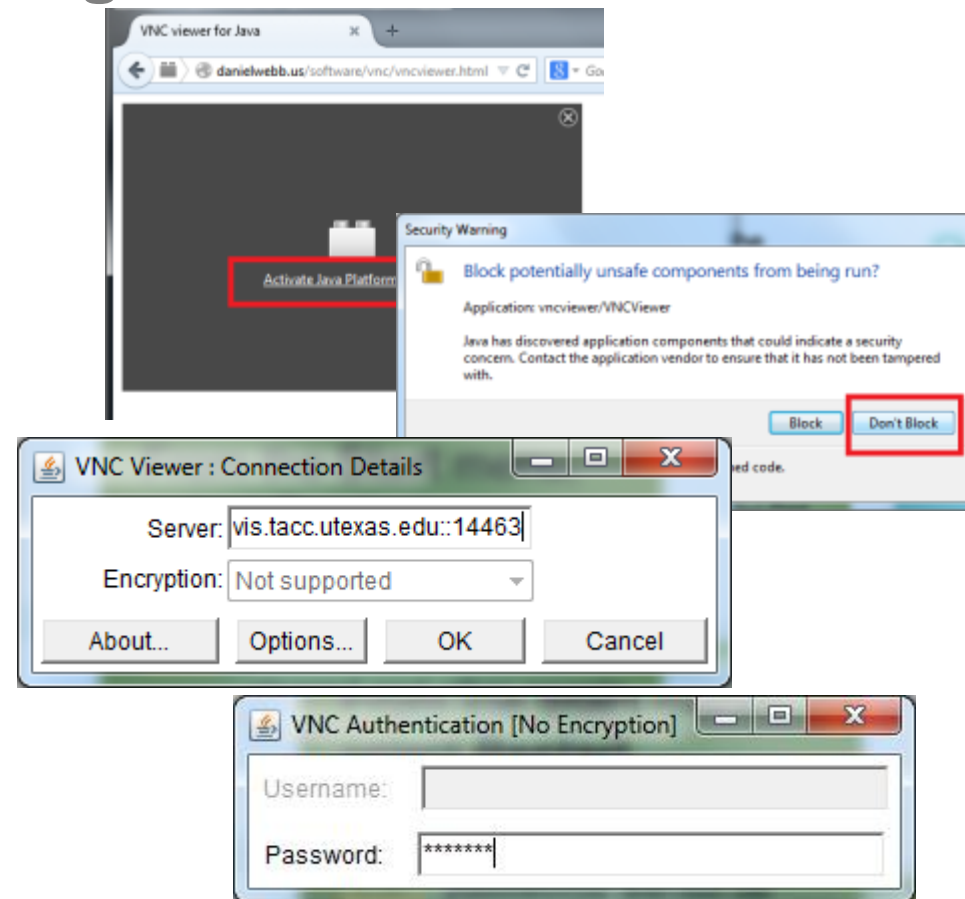
The screenshot shows the TACC Visualization Portal interface. The main content area displays a message: "Your VNC session is running on Stampede". Below this message are several buttons: "Open In Desktop", "Open Native Client", "Set VNC password", and "Terminate Session". The "Terminate Session" button is highlighted with a red box. Below the buttons is a text box containing the URL "Session available at: via tacc.stamps.edu:14324", also highlighted with a red box. The interface also shows a "Stampede load and queue state" section with a pie chart indicating "10.2%" of nodes are in use. At the bottom, there is a table of active jobs.

JOBID	JOBNAME	USER/GRP	STATE	CORE	NODE	QUEUE	REMAINING	STARTTIME
4082338	hrrc	we20mls	Running	48	3	normal	33:38:00	Tue Jan 13 20:27:36
4081798	cds	tg64021	Running	64	4	gdr	9:28:58	Tue Jan 13 20:27:36
4081284	wh_78	dmarec11	Running	250	35	normal	33:00:00	Tue Jan 13 20:27:35
4081481	HCS_O1	kv347	Running	16	1	normal	33:38:00	Tue Jan 13 20:27:36
4081482	HCS_O2	kv347	Running	16	1	normal	33:38:00	Tue Jan 13 20:27:36



Visualization Portal: Sharing VNC

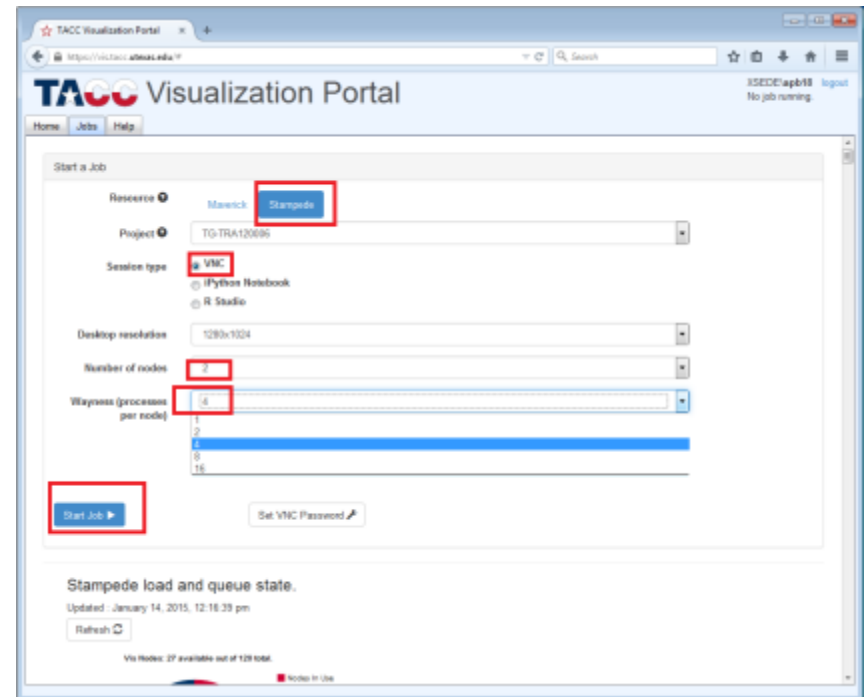
- Somebody has put up the java VNC client for people to use:
- <http://danielwebb.us/software/vnc/vncviewer.html>
- Click through all the scary messages about running java applets in order to run. Type in VNC URL exactly as it appears in the portal





Visualization: ParaView in parallel

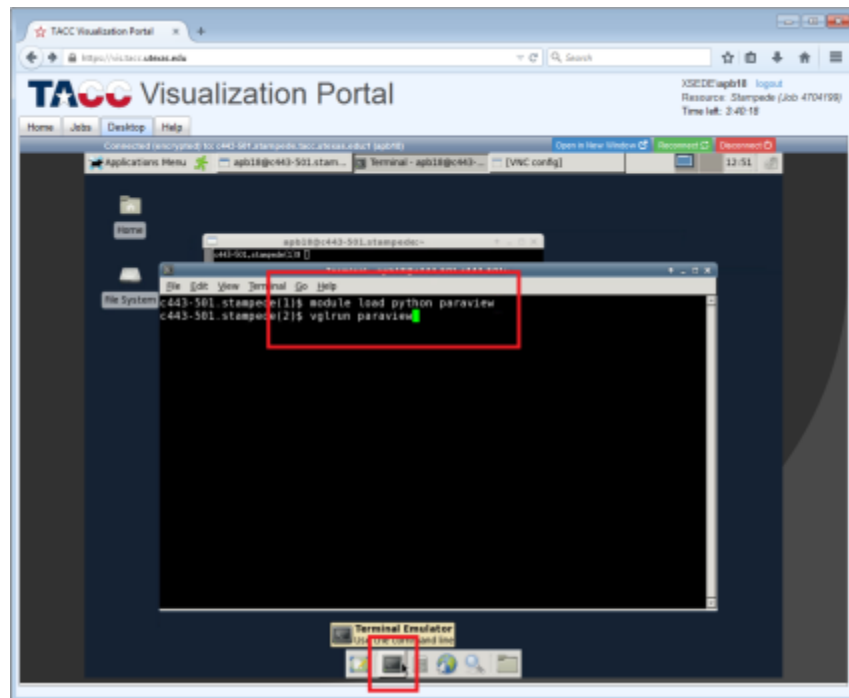
- Use the portal to launch a 2-node job, with 4 processes on each node.
 - Go back to the ‘Getting Started’ slides for step by step instructions if anything is unclear
- Once the job is running, connect to the VNC desktop.





Visualization: ParaView in parallel

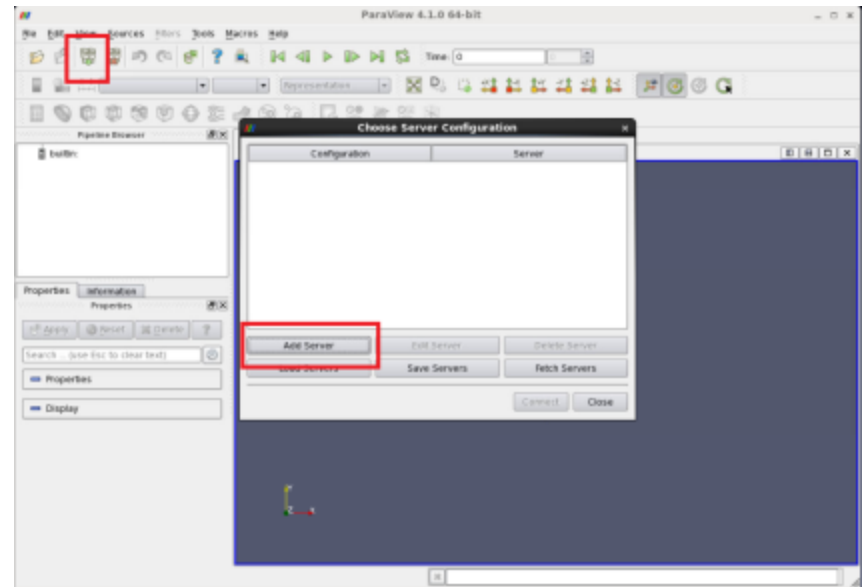
- Open up a new terminal, load the paraview module, and run
 - `module load python paraview`
 - `vglrun paraview`
- Notice that you still need to load any modules you need, and need to wrap 3D applications in `vglrun` in order for them to run on the VNC desktop





Visualization: ParaView in parallel

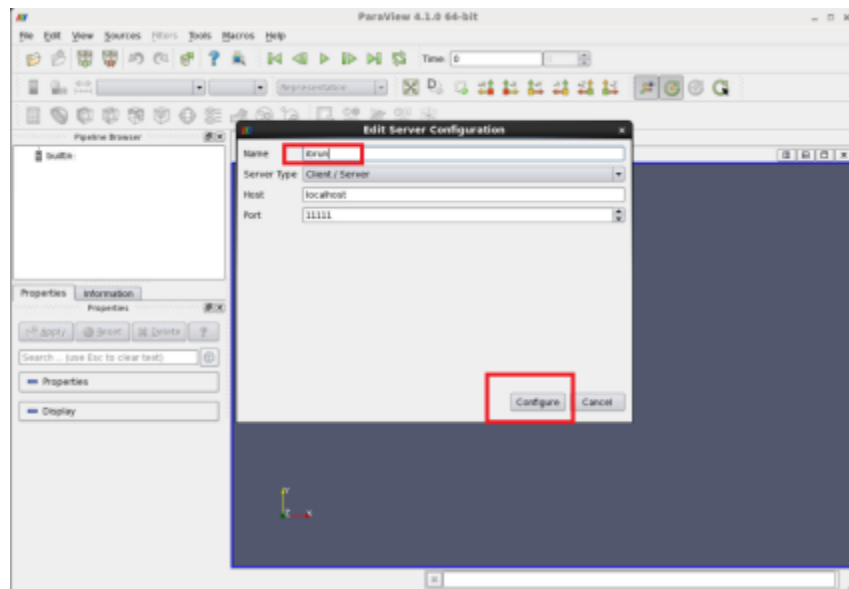
- Click the “connect” button (or choose file->connect)
- This will bring up a “choose a server” dialog.
- Select “add server”
- Paraview can launch backend parallel processes for us and connect to them, but we need to configure it to do so.





Visualization: ParaView in parallel

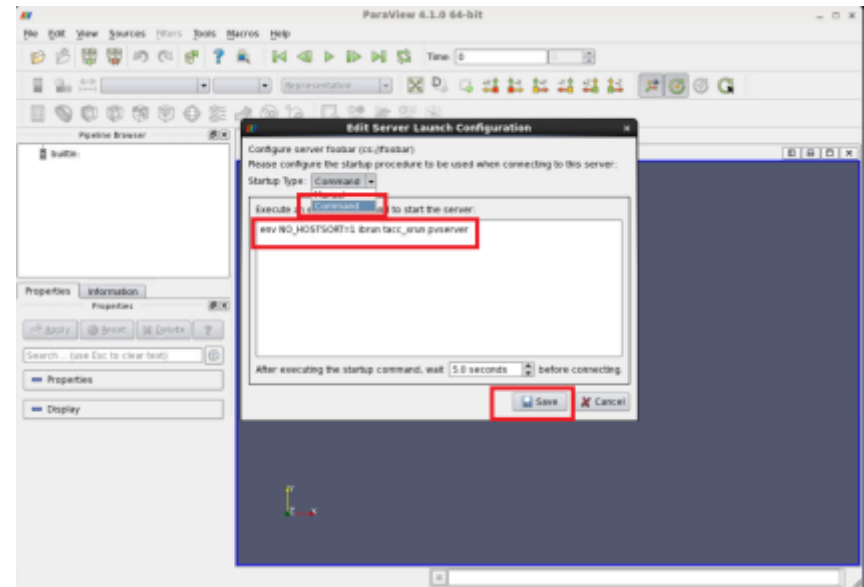
- Once you click “add”, an “edit server configuration” dialog will pop up.
- Give it this configuration a name (e.g. “ibrun”) in the “name” field
- Leave the other fields alone
 - Server Type: Client/Server
 - Host: Localhost
 - Port: 11111
- Click “configure”





Visualization: ParaView in parallel

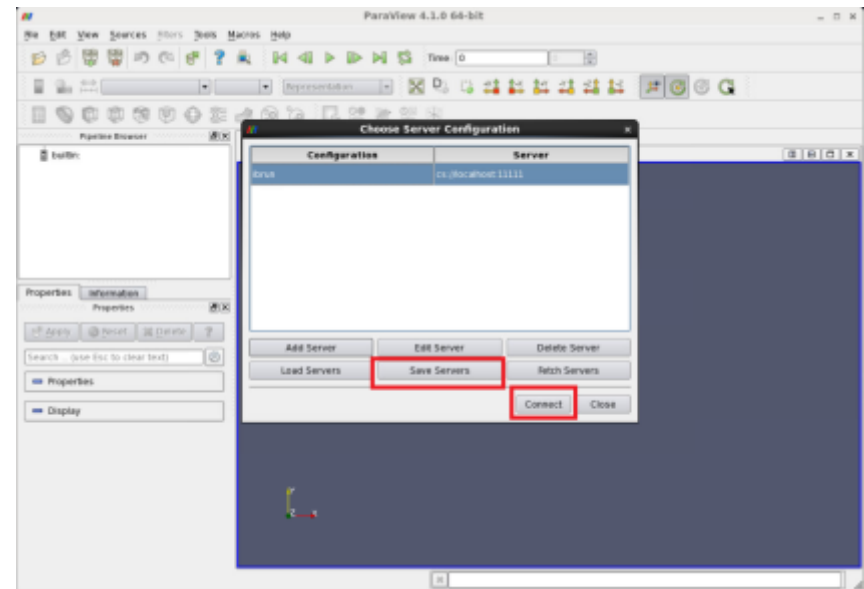
- Select Startup Type: “Command” from the dropdown menu
- In the large text box, type in “env NO_HOSTSORT=1
ibrun tacc_xrun
pvserver”
 - This is the command that paraview will use to launch parallel backends
- Click “save”





Visualization: ParaView in parallel

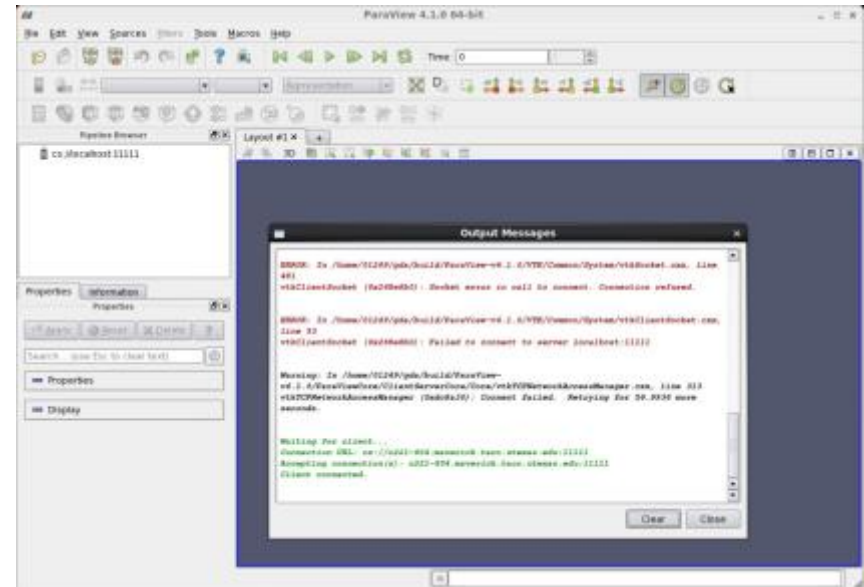
- Select “Save Servers” to have paraview remember these settings
 - Otherwise, you’ll need to type this information every time you restart paraview!
- It will prompt you for a filename. Just type in something like “servers” and click OK
- Click “connect” to have paraview launch the parallel backends.





Visualization: ParaView in parallel

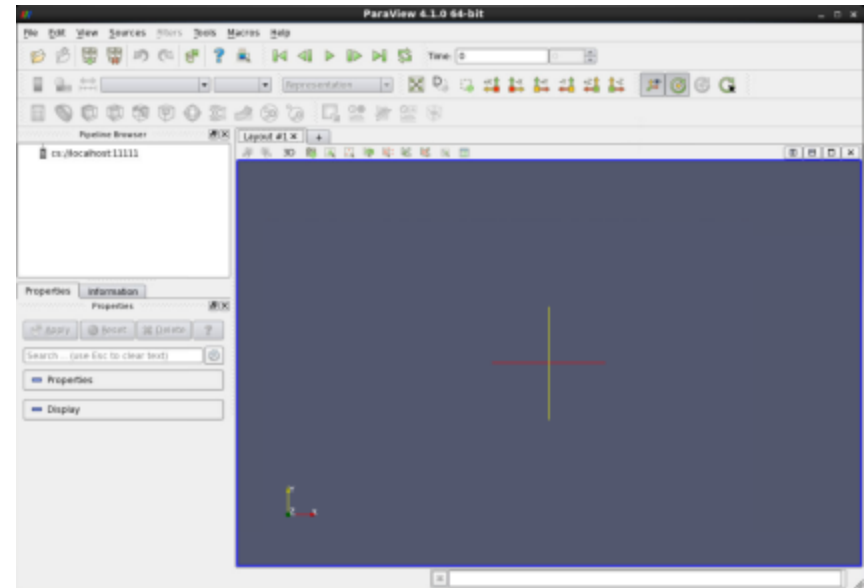
- You will see several windows pop up that report status.
- Wait for the green “Client Connected” message, ignore connection failure messages unless they are persistent. Close the window when it finishes connecting.
- The number and location of backends is automatically determined by your initial settings from submitting the VNC job.





Visualization: ParaView in parallel

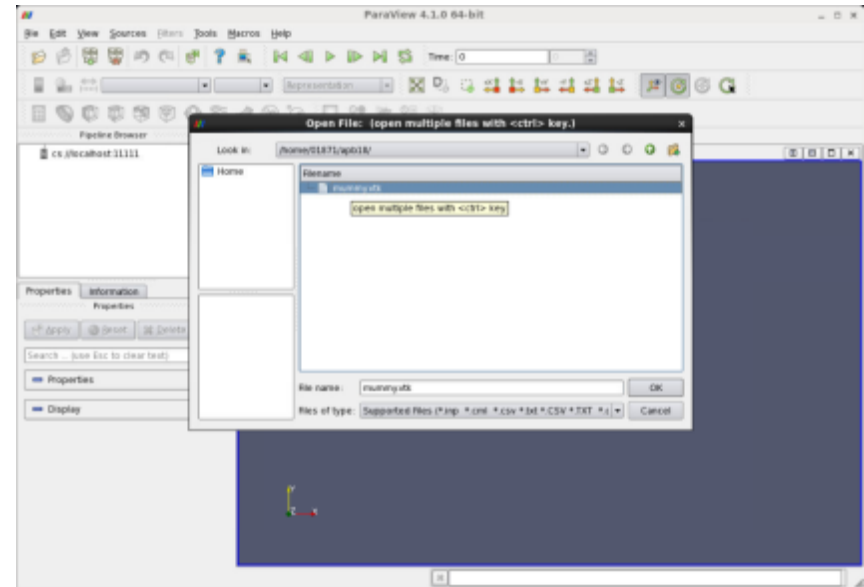
- ParaView is now ready to use. It looks no different from “normal”
- The only visible difference: the pipeline browser now starts with “cs://localhost:11111”
- You can proceed as usual, ParaView will automatically use all available resources in parallel.





Visualization: ParaView in parallel

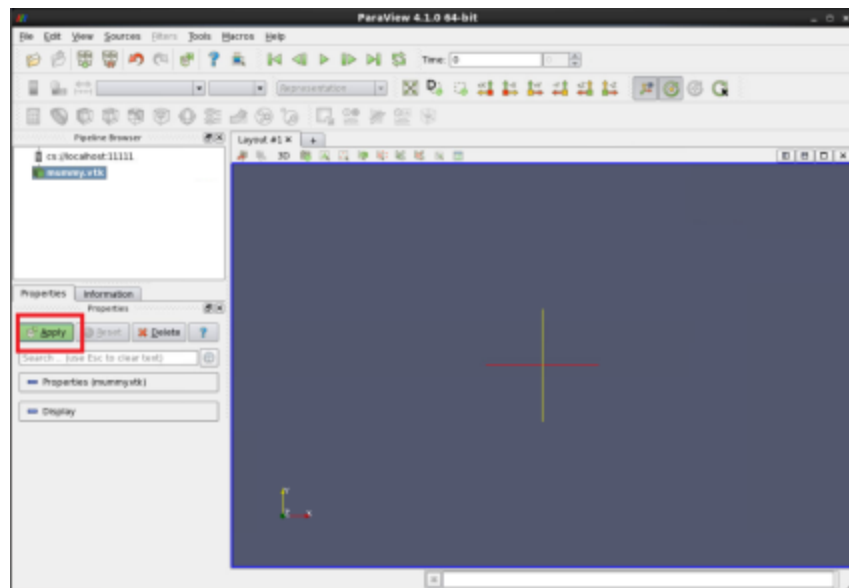
- Select File->Open to load the example dataset
- Navigate to
~tg459572/LABS/
- Load the mummy dataset:
mummy.vtk, click OK.





Visualization: ParaView in parallel

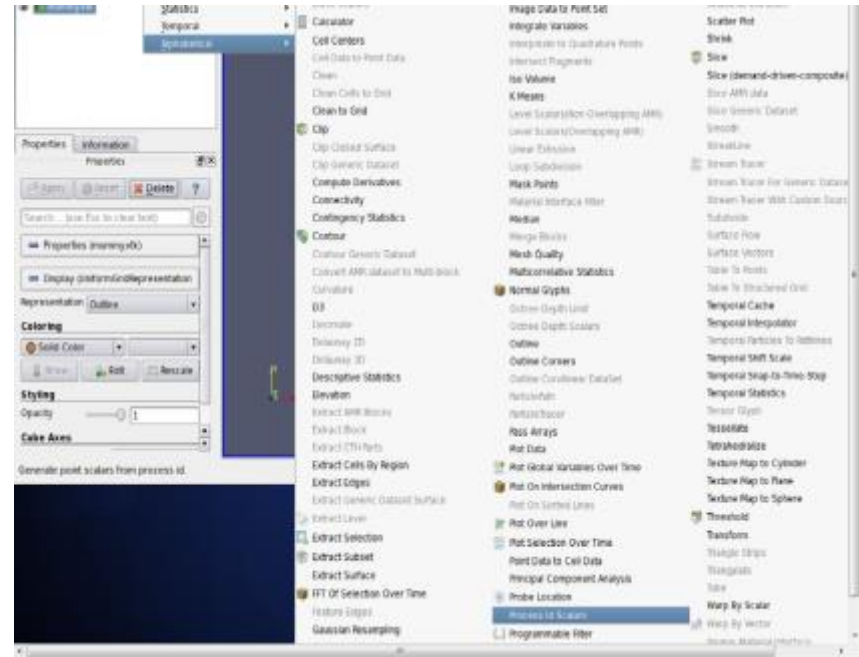
- Once loaded, click “apply” in the “properties” tab of the object inspector
- We will now add a filter which augments this data by adding another variable representing backend process ID for each point. This will indicate which backend is processing which portion of the data.





Visualization: ParaView in parallel

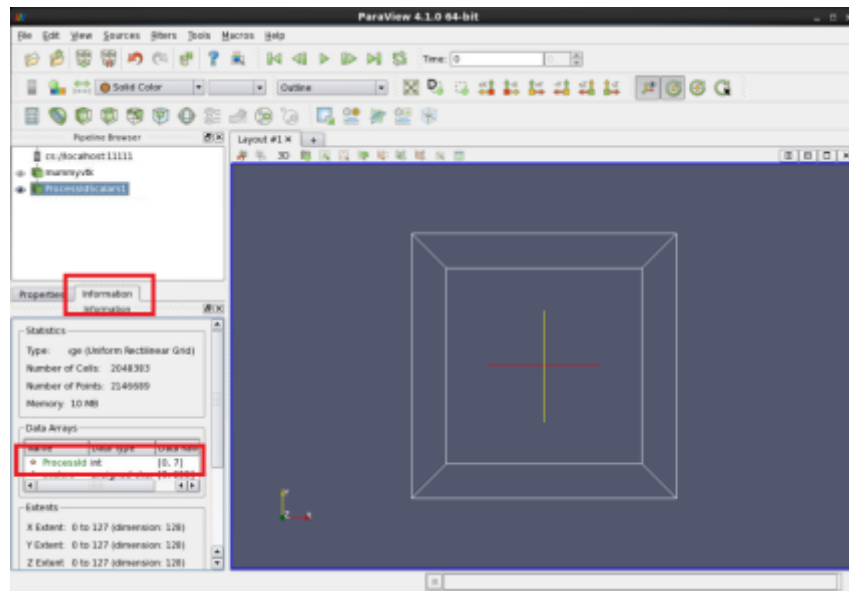
- In the “Filters” menu, go down to “Alphabetical”
- This will open a large menu showing all available filters. Navigate to the “Process Id Scalars” filter and choose it.
- Click “apply” in the “properties” tab of the object inspector for the ProcessID Scalars filter (as you did in the previous slide)





Visualization: ParaView in parallel

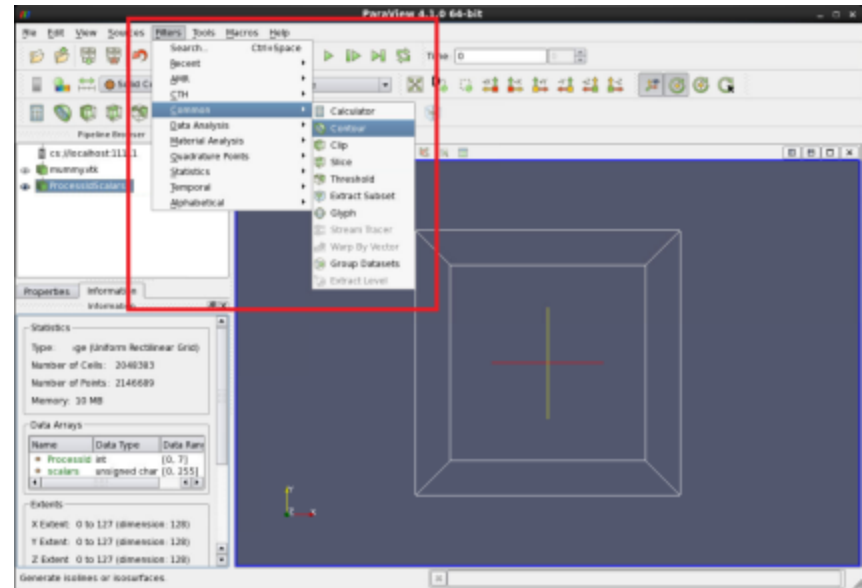
- Go to the “information” tab of the object inspector for the ProcessID Scalars filter. Scroll down until you can see the “Data Arrays” section.
- Observe that there is a new array named “ProcessId” containing integers ranging from 0-7.
 - These values map to our eight backend servers





Visualization: ParaView in parallel

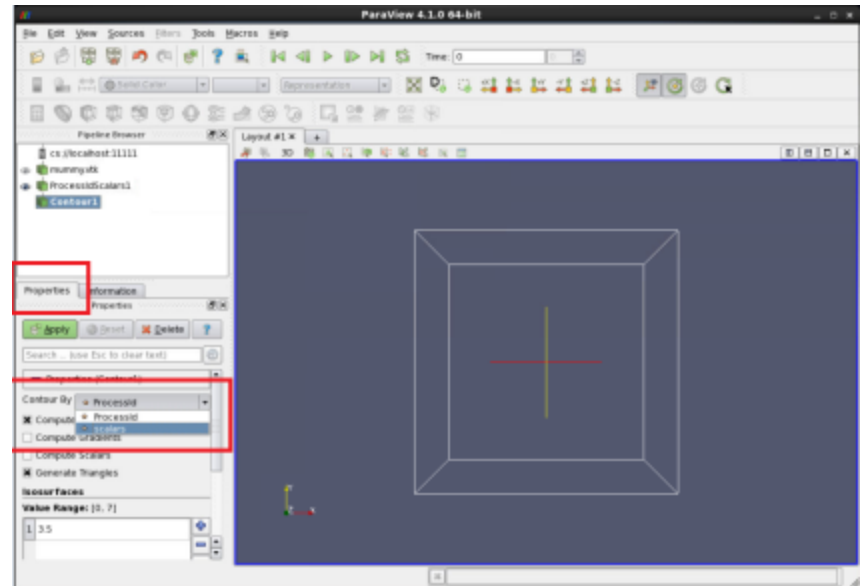
- Add and apply a contour filter via Filters -> Common -> Contour
- We will use this to produce an isosurface of the mummy skull wherever the value is 128.
- We will color this surface by ProcessId
- Be sure to click “Apply” after selecting the Contour filter, as you have done before





Visualization: ParaView in parallel

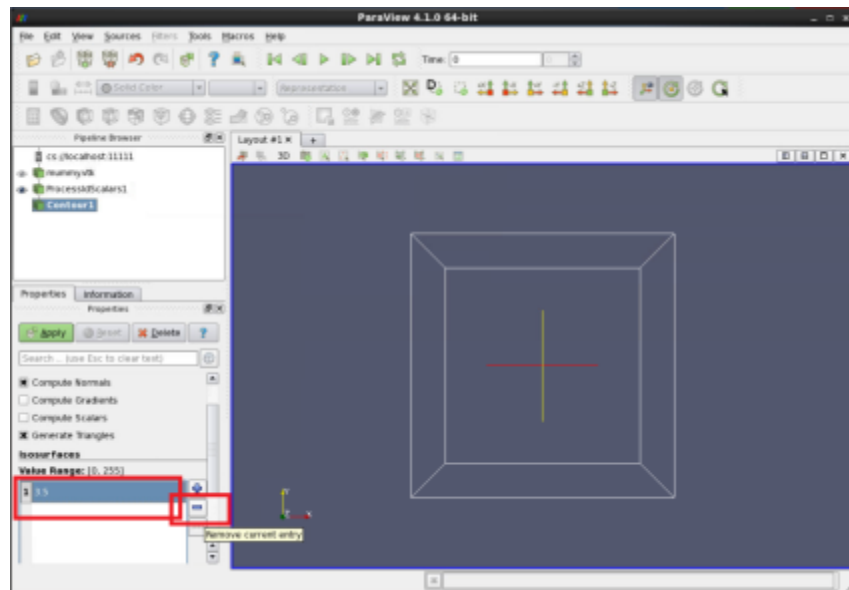
- In the “properties” tab of the object inspector for the contour filter, find the “contour section”
- The value will likely be “ProcessId” change it to “scalars”
 - We want to use the “scalars” data to produce the surface.





Visualization: ParaView in parallel

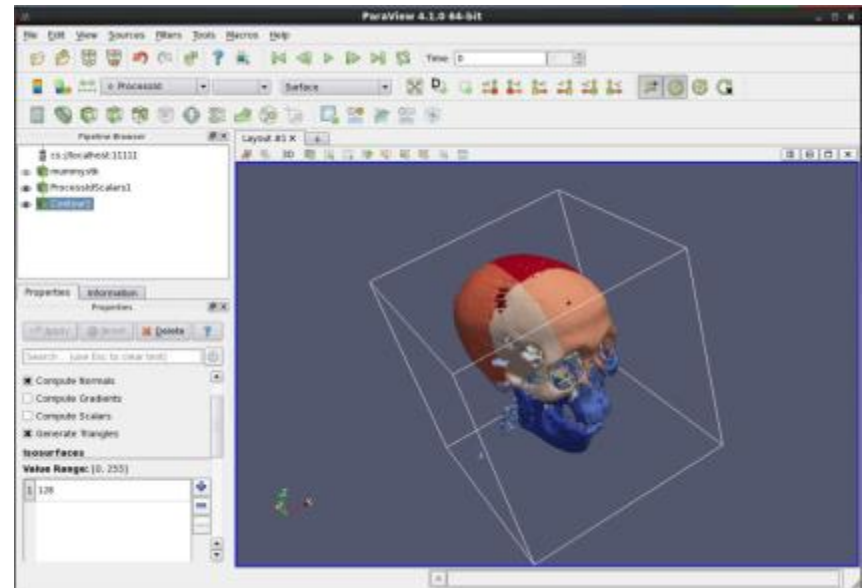
- Still in the “properties” tab, scroll down to the “isosurfaces” section.
- Delete the existing value (probably) 3.5 by selecting it and clicking on the minus (-) button
- Click on the plus (+) button to add a new value of 128.
- Click ‘apply’ when finished, as usual





Visualization: ParaView in parallel

- You should now see a rendering where the contour surface is determined by the original data, but colored by process ID.
- Since we have 2 nodes at 4 processes per node, we should see 8 distinct colors. This is showing data parallelism.
- Click on the image and drag the mouse to rotate, zoom, etc.





Visualization: ParaView in parallel

- ParaView will automatically determine if backends perform data processing only (sending triangles for client to render), or perform rendering as well (send the pixels to directly display).
- This can be tweaked via going into “settings” from the “Edit” menu.
 - Select “Server” under “Render View” in the tree on the left of the dialog box

