

#### Simulation Modeling Sciences

## CUBIT Fast-Start Tutorial 25. Usability Tools (Advanced)



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# **Custom Toolbars**



**CUBIT Basic Tutorial** 



### **Custom Toolbars**

- Convenient access to frequent tasks as toolbar buttons
  - Run favorite Cubit commands
  - Play specific scripts
  - Shortcuts to specific command panels
- Share with colleagues
  - Import and export toolbars and supporting files.





### **Custom Toolbars**







### **New Toolbar**

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| ۰ 🕼   | New Toolbar ? 😒 🔿 😣 |
|-------|---------------------|
| Name: |                     |
| File: |                     |
|       | OK Cancel           |
|       |                     |

3 Give the toolbar a name and a filename. Click *OK*.



Click the '+' button in the Buttons column.

|                    | Custom Toolbar Editor                 | $\otimes \odot \odot$ |
|--------------------|---------------------------------------|-----------------------|
| Toolbars           | Buttons                               |                       |
|                    | sible  All Visible                    |                       |
| Edit Tool<br>Name: | bar<br>MyTools                        |                       |
| File:              | /home/michael/CurrentTask/MyTools.ttb | €3                    |
| Descrip            | btion                                 |                       |
| (Optio             | Reset OK Apply                        | Cancel                |
|                    |                                       | Sandia<br>Nationa     |



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### **New Tool Button**

|   | Tool Button   |
|---|---------------|
| ) | Copy Existing |
| 3 | Actions (5)   |
|   |               |

Accept the default Tool Button type 5 and click OK.

Give the tool button a name.

6

Enter Cubit commands here (e.g., 'brick x 10', 'mesh volume 1', etc.)

Click OK to save the toolbar. A new 8 toolbar should appear in the GUI.



| ۵ 🔍                  | Custom Toolbar Editor | $\otimes \odot \odot$ |
|----------------------|-----------------------|-----------------------|
| Toolbars             | Buttons               |                       |
| ✔ All Visible        | + - 🖌 All Visible     | + -                   |
| MyTools              | New Custon            | m Tool                |
| dit Tool Button      |                       |                       |
| Name New Custom      |                       |                       |
| lcon                 |                       |                       |
| Working Dir (Optiona | 6                     |                       |
| Commands             |                       |                       |
| Enter commands he    | re.                   |                       |
| Show Description     |                       |                       |
| Help Res             | et OK Appl            | y Cancel              |
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### **Custom Toolbar Button Types**

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| 1 | Tool Button   |
|---|---------------|
|   | Journal File  |
| ٠ | Python Script |
|   | Command Panel |
|   |               |

- **Tool Button** execute a series of Cubit or Python commands.
- Journal File run a specified journal file
- Python Script run a specified Python script
- Command Panel open a specific command panel (acts as a shortcut)

| ()<br>()<br>()<br>() | Operation     Image: Construction       Image: Construction       Image: Construction  |
|----------------------|--|
|                      | Actions<br>• MyTools<br>• PythonExample<br>• MyPythonScript<br>• GeometryVolumeCreateBrick<br>• MeshVolumeSchemeSweep<br>• MyJournalFile |
|                      | OK Cancel  |

Copy Existing allows you to create a new tool by copying an existing one.



|                        |                     | Sim                   | ulation Modeling      |
|------------------------|---------------------|-----------------------|-----------------------|
|                        | <b>@</b> 🖸          | Custom Toolbar Editor | $\otimes \odot \odot$ |
|                        | Toolbars            | Buttons               |                       |
|                        | ✔ All Visible       | 🕂 🗕 🗹 All Visible     | + -                   |
|                        | My Iools            | V 65 YyCustomT        | ool                   |
|                        |                     |                       |                       |
| y name.                |                     |                       |                       |
|                        |                     |                       |                       |
| file If unspecified    |                     |                       |                       |
| lefault icon 🚳 🥿       | Edit Tool Button    |                       |                       |
|                        | Name MyCustomTo     | bl                    |                       |
|                        | lcon                |                       |                       |
| )ir – changes the      | Working Dir Optiona | al)                   |                       |
| rectory during tool    | Commands            |                       |                       |
| . Upon completion, the | mesh vol 1          |                       |                       |
| orking directory is    | vol 1 copy move x 1 | 1 repeat 9            |                       |
|                        |                     |                       |                       |
|                        |                     |                       |                       |
| mands to run. To run 🧹 |                     |                       |                       |
| mmands the first line  | Show Description    |                       |                       |
| innanus, uic mounic    |                     |                       |                       |

|  |  |                              | Simula          | tion Modeling S      |
|--|--|------------------------------|-----------------|----------------------|
|  | <b>@</b> 🖸   | Custom Toolb                 | ar Editor       | $\odot \odot \odot $ |
|  | Toolbars   | Bu                           | ittons          |                      |
|  | ✔ All Visible  | + - •                        | All Visible     | + -                  |
|  | ✓ MyTools  |                              | 🖌 🐔 MyCustomToo |                      |
| con file. If unspecified,<br>the default icon m<br>nal file to run.  | Edit Journal File<br>Name MyJournalFile<br>Icon<br>Journal File /home/<br>Working Dir (Option<br>Description<br>(Optional) | michael/CurrentTask/m<br>al) | iakebrick.jou   |                      |
| ory before executing the journal<br>seful if the journal file has<br>re file paths for imports or<br>ts. Restores the original working<br>ory upon completion. | Help Re  | set                          | OK Apply        | Cancel               |

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## **Python Script Tool**

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 $\odot \odot \odot \otimes$ Custom Toolbar Editor Toolbars Buttons All Visible ✔ All Visible + -+ -✓ MyTools 🖌 🚳 MyCustomTool 🔽 🍈 MyJournalFile 🔽 🍦 MyPythonScript Tool icon file. If unspecified, Edit Python Script uses the default icon 🟓 Name MyPythonScript Icon ... Browse •3 /home/michael/CurrentTask/SomeCoolScript.py Script Python script to run. Files Working Dir (Optional) Description (Optional) Working Dir – changes the working directory before executing the Python script. Useful if the script uses relative paths or imports other Python scripts. Restores the original working directory upon completion. Help Reset ΟK Apply Cancel Sandia

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### **Command Panel Shortcut**

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| A    | ction -         | Mesh      |     |            |          |                    | _ |
|------|-----------------|-----------|-----|------------|----------|--------------------|---|
|      | Π               |           | 8   | Ø          | ß        | *                  |   |
|      |                 | 1+<br>100 |     | Ø          | 9        | <b>-</b> 10<br>-00 |   |
|      | Sweep           |           |     |            |          |                    | • |
| Sele | ct Volu         | mes       |     |            |          |                    |   |
|      |                 |           |     |            |          |                    | ) |
|      | <u>R</u> eset [ | Data      |     |            |          |                    |   |
|      | <u>C</u> lose F | Panel     |     | rget       |          |                    |   |
|      | Add to          | Toolbai   | -   | <u>ا</u> ا | MyTools  | 5                  |   |
| Sou  | rce Sur         | face ID   | (e) | E          | Edit Too | olbars             |   |
| 300  | rce Sui         |           |     |            |          |                    |   |
| Targ | get Sur         | face ID   |     |            |          |                    |   |
|      |                 |           |     |            |          |                    |   |

Can create by right clicking on a blank area of the desired command panel. The panel's icon is used as the tool's default icon.

| <b>@</b> 💿              | Custom Toolbar Ed | litor ? 📀 🗞 🕺      |
|-------------------------|-------------------|--------------------|
| Toolbars                | Buttons           |                    |
| ✔ All Visible ✔ MyTools |                   | <pre>/isible</pre> |
| Edit Command Panel      |                   |                    |
| Name MeshVolumeSchem    | neSweep           |                    |
| lcon                    |                   |                    |
| Panel ID MeshVolumeSch  | emeSweep          |                    |
| Description             |                   |                    |
| (Optional)              |                   |                    |
| Command p               | anel ID           | Browse command     |
|                         |                   | panels             |
|                         |                   |                    |
| Help Reset              | ОК                | Apply Cancel       |



### **Toolbar Button Appearance**

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| Buttons             |            |
|---------------------|------------|
| ✔ All Visible       | + -        |
| 🗹 🚳 MyCustomTool    |            |
| V 🔮 V MeshVolum     | eSchemeSwe |
| 🔽 🏬 MeshVolumeSchem | neSweep    |
|                     |            |
|                     |            |
|                     |            |
|                     |            |
|                     |            |

Drag buttons in the editor to re-order appearance on the toolbar.







### **Custom Toolbars**

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Features descriptive tooltips to help identify tools.

Right click for quick access to edit tools (opens editor)







### **Custom Toolbars Exercise**

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- 1. Create a new Tool button
- 2. Enter the commands:

*mesh volume all draw volume with not is\_meshed* 

- 3. Save the toolbar button.
- 4. Import the model "schemes.sat"
- 5. Click the new tool button to run the commands





### **Export Toolbar**

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Right-click in the toolbars column of the editor. Select *Export*.



1

Choose where to save the exported toolbar.

Click Next.

| 🍈 🖸                          | Export Toolbars   | $\odot \odot \odot \otimes$ |
|------------------------------|---|-----------------------------|
| <b>Create ex</b><br>Choose t | <b>port file</b><br>the name of the exported file and the location where it wil | l be saved.                 |
| Save As:                     | /home/michael/CurrentTask/MyToolbar.tar.gz                                      | €3                          |
|                              |   |                             |
| <u>H</u> elp                 | < <u>B</u> ack <u>N</u> ext >   | Cancel                      |





Select the toolbars to

4

5

export.

Click Next.

### **Export Toolbar**

| ✓ Select All ✓ MyTools |  |    |
|------------------------|--|----|
|                        |  |    |
| <u>(4)</u>             |  |    |
|                        |  | ÷. |
|                        |  |    |
|                        |  |    |
|                        |  |    |
|                        |  |    |
|                        |  |    |



6

### **Export Toolbar**







### **Import Toolbar**

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Right-click in the toolbars column of the editor. Select *Import*.



Choose a toolbar package and a directory to unpack it.

### Click Import.



### **Import Toolbar**



Review the Import Summary and click *Finish*.

|                                |                              |  | Simulation Mode                            | ling Sciences    |
|--------------------------------|------------------------------|--|--|------------------|
|                                | Impor                        | t Toolbars                               | S 🛇 S                                      |                  |
| Import Summ                    | nary                         |  |  |                  |
| Reminder: Update fi            | le and directory pa          | ths in scripts and con                   | nmands.                                    |                  |
| Imported Toolbars              | 5                            |  |  |                  |
| Name 🔺 File                    |                              |  |  |                  |
| MyTools /home                  | e/michael/CurrentT           | ask/tutorials/Toolbard                   | lir/toolbars/MyTool                        |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
| Extracted Files                |                              |  |  |                  |
| Filename                       | ▲ Size                       | Location                                 |  |                  |
| 🛃 SomeCoolScr<br>🐵 MvTools.ttb | ript.py 0.002 KB<br>2.137 KB | /home/michael/Curr<br>/home/michael/Curr | entTask/tutorials/T<br>entTask/tutorials/T |                  |
| 📄 makebrick.jou                | u 0.002 KB                   | /home/michael/Curr                       | entTask/tutorials/T                        |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
|                                |                              |  |  |                  |
| Hala                           |                              |  | Finish                                     |                  |
|                                |                              |  | <u></u>                                    | $\mathbf{\zeta}$ |
|                                |                              |  |  |                  |
|                                |                              |  | 4  |                  |
|                                |                              |  |  |                  |





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# **Extended Selection**



**CUBIT Basic Tutorial** 



- Gives users the ability to use more complex selection tools.
- Can create new selection filters using Python
  - Start with a larger selection and narrow it down based on some user-defined criteria





### **Pick Extended**

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|   | <u>F</u> ile    | <u>E</u> dit     | ⊻iew  | <u>D</u> isplay | <u>T</u> ools | <u>H</u> elp |        |     |
|---|-----------------|------------------|-------|-----------------|---------------|--------------|--------|-----|
|   |                 | New              |       |                 |               |              | Ctrl+N |     |
| 2 | $\square$       | <u>O</u> pen     |       |                 |               |              | Ctrl+C | , ľ |
|   | 2               | <u>S</u> ave     |       |                 |               |              | Ctrl+S |     |
|   |                 | Save <u>A</u> s  | s     |                 |               |              |        |     |
|   |                 | <u>R</u> ecent   | Impor | ts              |               |              |        | •   |
|   | ${}^{\swarrow}$ | Import.          | . –   | 7               |               |              |        |     |
|   | ľ               | <u>E</u> xport   |       | S               |               |              |        |     |
|   |                 | Set <u>D</u> ire |       | $\sim$          |               |              |        |     |
|   |                 | <u>1</u> //fas   |       | MeshSc          | alingAss      | embly.cub    |        |     |
|   |                 | E <u>×</u> it    |       |                 |               |              |        |     |
| 1 |                 |                  |       |                 |               |              |        |     |

### Import 'knuckle.sat'

|          | $\frown$ |   |
|----------|----------|---|
| ſ        | 0        |   |
|          | Ζ        |   |
| <u> </u> | -        | / |

Select the volume, right-click and choose *Pick Extended...* from the context menu. The Extended Selection Dialog will appear.

| Select Other             |
|--------------------------|
| Pick Extended            |
|                          |
| Rotate About             |
| Draw Z                   |
| Draw Elements F          |
| Isolate                  |
| Add to Group/BC          |
| Add to Bicked Croup      |
| Remove from Bicked Group |
| Visibility Off           |
| Mesh                     |
| Delete Mesh              |
| Show Quality             |
| Beset Entity             |
| List Information         |
| Graphics View Hotkeys    |
| Save Selection As        |
| Delete                   |



### **Extended Selection Dialog**





### **Load Filter Dialog**

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|   | 🍈 🕙 🛛 Locate and Load Filters 🕜 📀 ⊗ ⊗   |
|---|---|
| Directory containing filter scripts.<br>Note: default scripts are provided in<br><install_dir>/scripts/SelectionFilters</install_dir> | <ul> <li>ndia/Cubit-release-qt5/claro/scripts/SelectionFilters</li> <li>Browse</li> <li>Select/Unselect all</li> <li>AdjacentVolumeFilter.py</li> </ul>   |
| List of enabled filters.  | <ul> <li>CoordinateFilter.py</li> <li>CurveFilter.py</li> <li>RadiusFilter.py</li> <li>SurfaceAreaFilter.py</li> <li>SurfaceFilter.py</li> <li>VertexFilter.py</li> </ul>   |
| Script viewer – provides<br>a read-only view of the<br>script's contents.   | <ul> <li>VolumeFilter.py</li> <li>VolumeFilter.py</li> <li>For example,<br/># if vertex 1 is attached to surfaces 1, 2, and 3, selecting<br/>vertex 1 will<br/># populate the target selection list with surface 1, 2, and 3.</li> <li>import cubitgui<br/>import cubitgui</li> </ul> |
| 4 Select all filters.   | class SurfaceFilter(cubitgui.SelectionFilter):  |
| 5 Click <i>OK</i> to save and close the dialog.   | Clear List  |
|   | CUBIT Basic Tutorial  |



### **Run Filter**

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| Pick Curves                        |                        |  |              |
|------------------------------------|------------------------|--|--------------|
|                                    | d Filters Pick Cu      | rves 💌   | Load Filters |
| Surface Are 6 ect<br>Pick Surfaces | ntities Sour<br>Volume | ce Selection Targe Curve 1 Curve 10 Curve 11 Cur | t Entities   |
| Pick Vertices<br>Pick Volumes      | :                      | Curve 12<br>Curve 13<br>Curve 14<br>Curve 15   |              |
|                                    |                        | Curve 16<br>Curve 17<br>Curve 18<br>Curve 19   | 8            |
|                                    |                        | Curve 2<br>Curve 20<br>Curve 21<br>Curve 22  |              |
| Refresh Close                      | e                      | Refresh C  | lose         |



Change the filter to Pick Curves

Select the volume in the Source Selection column

8 Select several curves in the Target Entities column



### **Drag Target Selections**

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| $rac{1}{40}$ $\odot$ Extended Selection $\bigcirc$ $\oslash$ $\bigotimes$                               | 🍈 🕑 Extended Selection 🧷 😒 🛆 😣                                       |
|--|--|
| Pick Curves    Load Filters  | Pick Surfaces   Load Filters   |
| Source Selection Target Entities   | Source Sele Target Entities  |
| Volume 1<br>Curve 10<br>Curve 11<br>Curve 12<br>Curve 15<br>Curve 16<br>Curve 14<br>Curve 16<br>Curve 14 | Volume 1<br>curve 14<br>curve 15<br>curve 16<br>curve 17<br>curve 18 |
| Curve 17<br>Curve 18<br>9<br>Curve 16<br>Curve 17<br>Curve 18<br>Curve 19                                |  |
| Curve 2<br>Curve 20<br>Curve 21<br>Curve 22<br>Curve 23  |  |
| Refresh Close  | Refresh Close  |

9 Drag the curves into the Source Selection column

10 Change the filter to *Pick Surfaces* 





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1) Select a curve (or two) to update the Target Entities column with surfaces.



Select a surface in Target Entities column and note the updated selection in the graphics view.



### **Context Menu Options**





**Filter Script** 

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Source selection type and IDs retrieved using get\_source\_types() and get\_source\_ids().

Target selections added using
add\_target\_selection(type, id)



### **Filter Script Exercise**



Copy the file **SurfaceFilter.py** and rename it to **UnmergedSurfaceFilter.py**.







Add a check for the merge status of a surface and save the filter. *Remember indentation is important in Python.* 





### **Filter Script Exercise**

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In Cubit, run the commands: reset brick x 10 volume 1 copy move x 10 merge all

G 6 an

Select a volume, right-click and open the Pick Extended dialog. Click *Load Filters*.





### **Filter Script Exercise**

| 🍿 😳 🛛 Locate and Load Filters 🕐 😒 🔿 🗵              |   |
|--|---|
| -release-qt5/claro/scripts/SelectionFilters Browse | • |
| Select/Unselect all                                | A |
| ✓ AdjacentVolumeFilter.py                          | s |
| CurveFilter.py                                     | Р |
| ✓ SurfaceAreaFilter.py                             | R |
| UnmergedSurfaceFilter.py                           | s |
| neFilter.py  | Р |
| (7)  | U |
|  | Р |
|  | P |
|  |   |
|  |   |
| Clear List   |   |
| OK Cancel  |   |
|  |   |

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Select the new UnmergedSurfaceFilter. Click *OK*.

Select the new filter and run it on

8 Volume 1. The resulting target list

should have 5 surfaces.





## **Filter UI**

- Filters can add very basic UI.
- Uses a Qt .ui file. These can be generated using Qt Designer. See <u>http://doc.qt.io/qt-5/qtdesigner-</u> manual.html
- In the Python filter script, the desired .ui file is specified by implementing the function get\_ui\_file().
- UI elements are referenced by their objectName, as specified in the .ui file.
- For an example of how this is done, please refer to the included filter RadiusFilter.py.

| Extended Se                | lection 🕐 🖂 🖄                    |
|----------------------------|----------------------------------|
| Radial Select              | <ul> <li>Load Filters</li> </ul> |
| Radius:<br>Select: Volumes |                                  |
| Source Selection           | Target Entities                  |
| Volume 1                   |                                  |
| Refresh                    | Close                            |

