Getting started with Iogram

In this tutorial we will build a simple Iogram project that renders meshes in a scene, and then export that project to a standalone application. If you're looking for Iogram's "hello, world" you've come to the right place!

Launch Iogram Editor

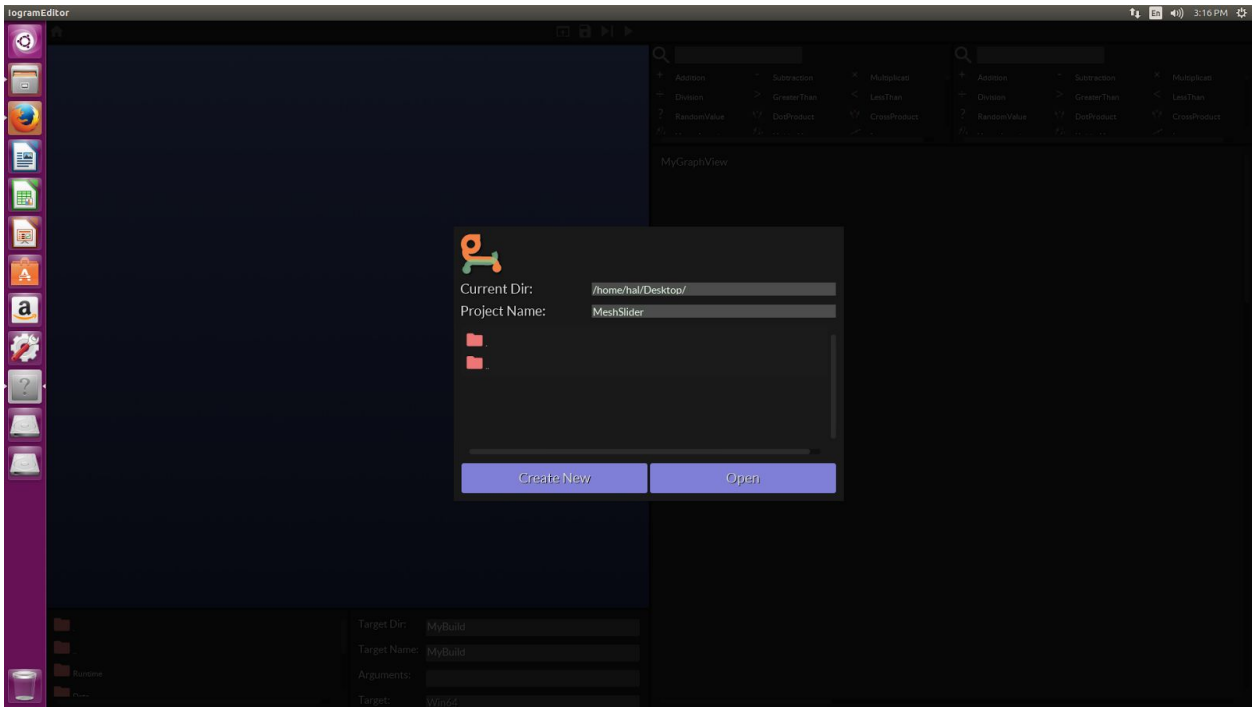
The Iogram editor is a tool that lets you create and edit Iogram projects. Iogram projects can be exported as standalone applications.

To use Iogram, launch the executable named IogramEditor (IogramEditor.exe on Windows) on your platform of choice. For example, on Windows, use Windows search to find and launch Iogram, or double click the Desktop icon. On Ubuntu, double click the IogramEditor executable in your Iogram_Linux folder, or alternatively run it from the command line.

Create a new project

When the editor launches, you will be greeted by a project dialogue that lets you create a new project or open an existing one. To create a new project, choose the directory in which you wish the project to reside, and type a name for your project.

In our example, we have chosen to name our project "MeshSlider" and to save it on the user's Desktop. When you click "Create New", a folder with the name MeshSlider will be created in the project directory.

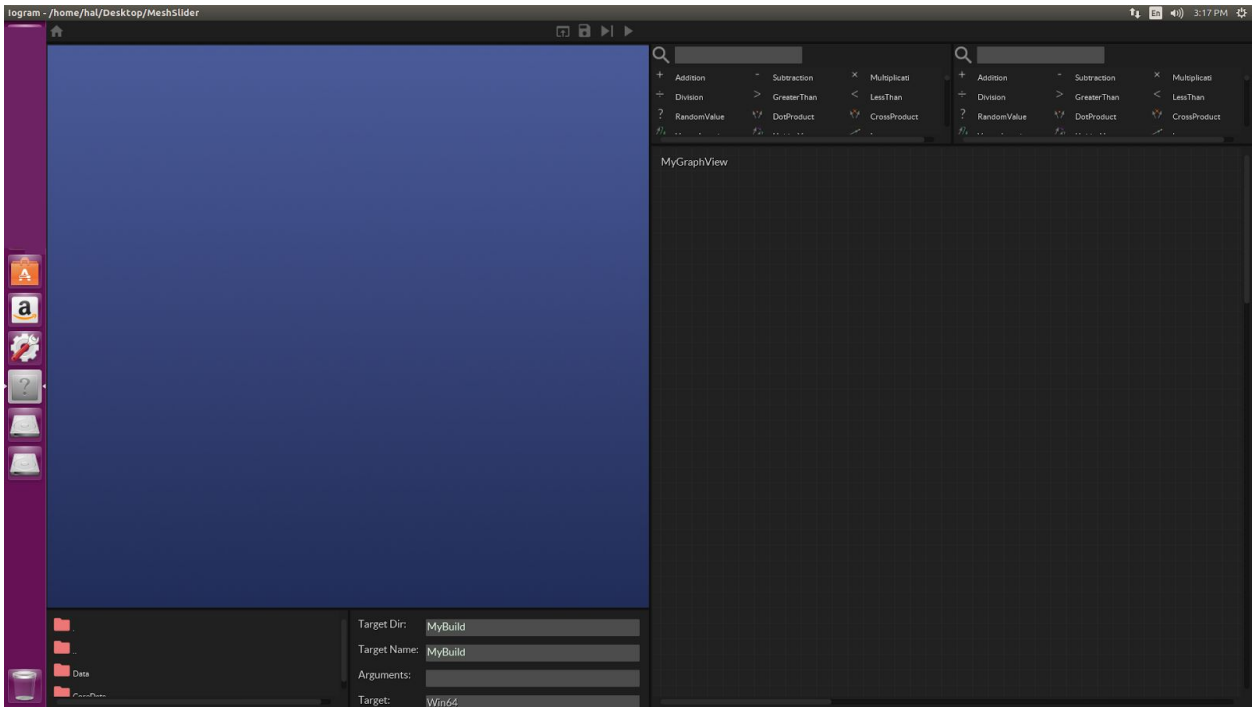


Get to know the Iogram Editor workspace

When you create a new project, you will see a blank Iogram workspace. The workspace is highly customizable, but by default you will see

- a 3D scene view (top left)
- a file explorer (extreme bottom left)
- a build menu (bottom left)
- a graph view (bottom right)
- and two component libraries (top right and extreme top right).

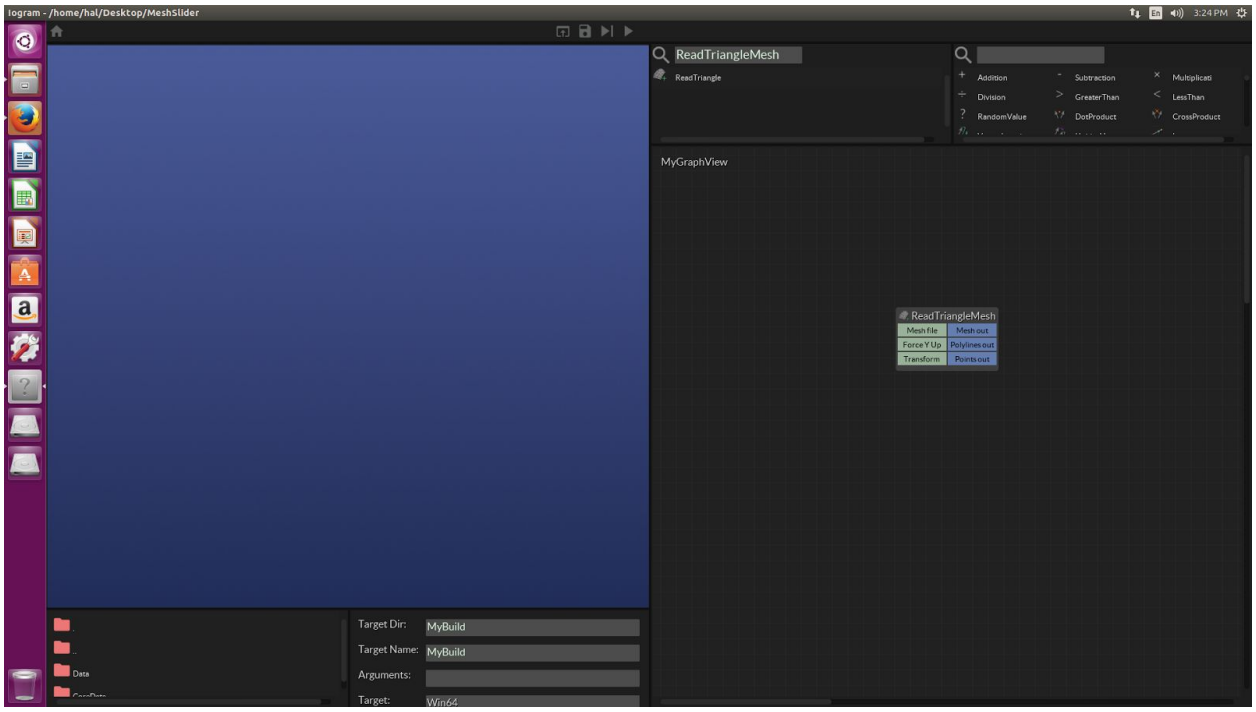
A border divides each workspace view according to a recursive splitting pattern -- but to get started try dragging a border or two to resize the views. You will get a feel for how the views are arranged.



Drop a component onto a graph view

The core of an Iogram project is its component graph. To start building the graph, we will add the first component to our component graph. Our graph has the default name "MyGraphView". We will keep that name in this tutorial, but keep in mind that you can change the name, and you can create multiple views to organize your work on a graph.

In the search bar of one of the component library views, type "ReadTriangleMesh". The complete list of components disappears and only components relevant to your search are in the library now. In our case, there is only one. Left click and drag the *ReadTriangleMesh* component onto the graph view, and the component will appear in the graph view.



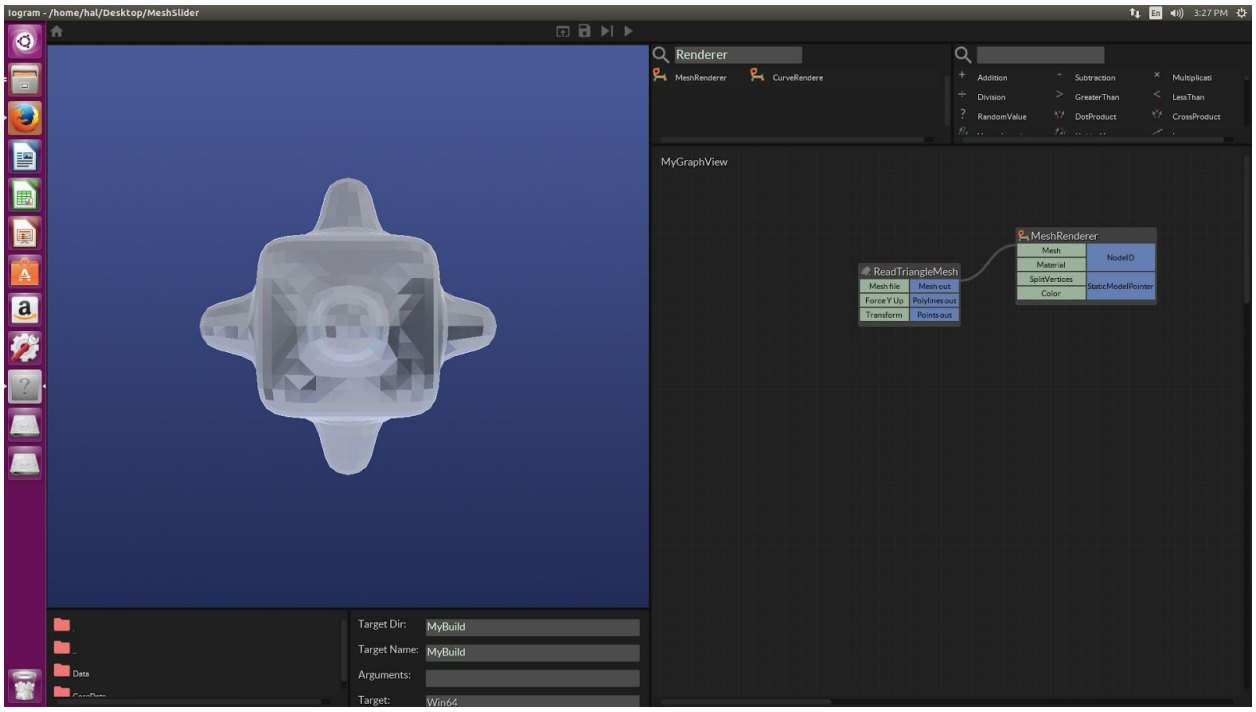
Save your work by clicking the save command in the middle of the command bar across the top of the editor. The icon for the save command is a floppy disk. Save your work often!

Load a mesh asset and render it in the 3D scene view

Right click on the input labelled "Mesh file" and you will see that it has a default value of "Models/bumpy.off". We will change this shortly, but for now go back to your search in the component library and search for "Renderer". Drag a *MeshRenderer* component onto your graph view. (Tip: you can use the shortcut Alt + m in the graph view to instantly drop a *MeshRenderer* component!)

Join the "Mesh out" output of the *ReadTriangleMesh* component to the "Mesh" input of the *MeshRenderer* component. You can do this by left clicking in the blue "Mesh out" output slot of the *ReadTriangleMesh* component and dragging the mouse to the green "Mesh" input slot of the *MeshRenderer* component.

Now you should see some action in your 3D view. The *MeshRenderer* takes a triangle mesh as input and renders it in the scene.



You don't have to use "bumpy.off". You can use any OFF file (Object File Format) you happen to have lying around, and many other formats too. A great source of OFF files is our favorite open source C++ geometry processing library libigl, which you can find here.

In the extracted folder libigl-master/tutorial/shared you will find a collection of great meshes stored as OFF files, and more. You can of course use any OFF file you have. We will use "cheburashka.off".

Now, if you just enter the full path on disk to "cheburashka.off", your Iogram project will find it and render it in the scene with no problem. However, you will want your exported applications to have access to the "cheburashka.off" asset as well. The simplest way to ensure this is to copy the "cheburashka.off" file into your project's Data folder. Specifically, copy "cheburashka.off" into the Models folder at MeshSlider/Data/Models. (You won't find "bumpy.off" here, by the way, because it's part of the CoreData shared by all Iogram projects.)

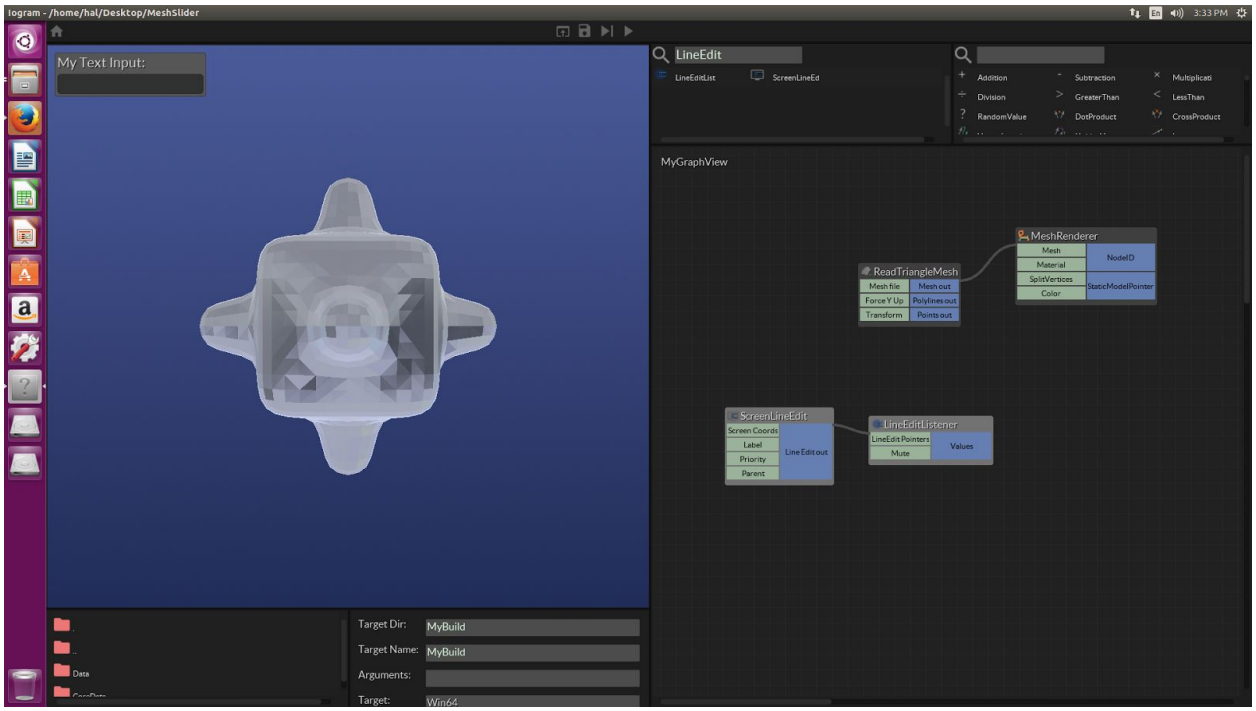
As you will see, there are folders for many custom resources and assets you might want to include with your exported applications, including Scripts, Textures, Fonts, and more. When you store your files in a project's Data folder, you ensure that not only this particular Iogram project but also the exported applications created from it will have access to those files.

Allow the application end-user to choose the mesh

Search for "LineEdit" in the component library. Your search will turn up two components, *LineEditListener* and *ScreenLineEdit*. This component pair illustrates a key Iogram idiom used

to gather input from the end-user: a "Screen" component that creates a user interface element in the 3D scene view and a "Listener" component that listens for input from the user interface element.

Drag one *ScreenLineEdit* component and one *LineEditListener* component onto your graph view. Check the 3D scene view to see that a user interface text entry element has appeared in the scene, with the default label "My Text Input".



Hook the blue "LineEditout" output slot on the *ScreenLineEdit* component to the green "LineEditPointers" input slot on the *LineEditListener* component. You can left mouse click and drag your components around to give them an orderly arrangement as the number of components in your graph grows. For most large component graphs, you will want to organize your components using Iogram's more advanced multiple graph views feature.

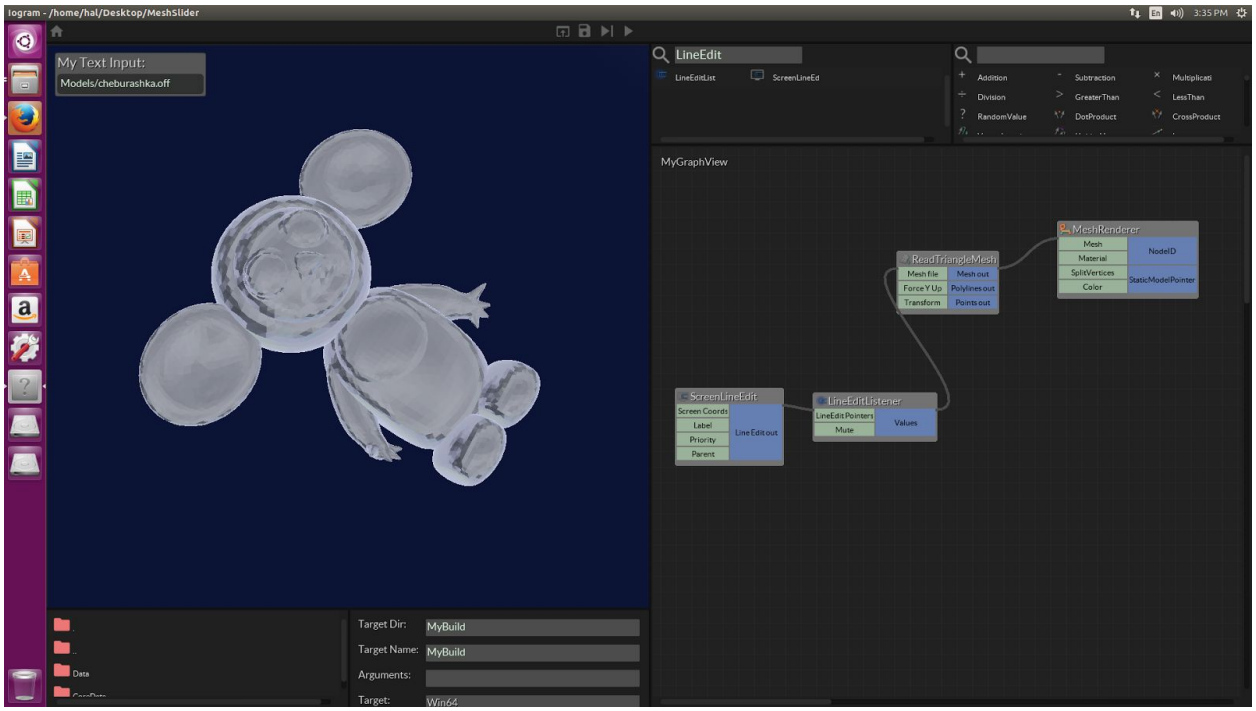
In the 3D scene view, type "Models/cheburashka.off" into the user interface text entry labelled "My Text Input".

Now right click the "Values" output slot to inspect the values stored there. If you entered "Models/cheburashka.off" into the "My Text Input" text entry in the 3D scene view, you should also see "Models/cheburashka.off" when you inspect the "Values" output slot of the *LineEditListener* component. To inspect the content stored in the "Values" output slot of *LineEditListener*, right click in the corresponding blue field. (Another way to inspect the contents at an output is to hook it up to a *Panel* component, which you can drop with the shortcut Alt + p. The *Panel* component displays its inputs in the body of the component. It also does double duty as a data entry field.)

Next, hook the blue "Values" output slot of the *LineEditListener* component to the green "Mesh file" input slot of the *ReadTriangleMesh* component. If all goes well, you will see the bumpy model replaced with the dreaded cheburashka.

It will appear quite small at first. The 3D scene view has the following controls:

- Zoom: move the mouse while holding Ctrl + right mouse button
- Rotate: move the mouse while holding the right mouse button
- Pan: move the mouse while holding Shift + right mouse button

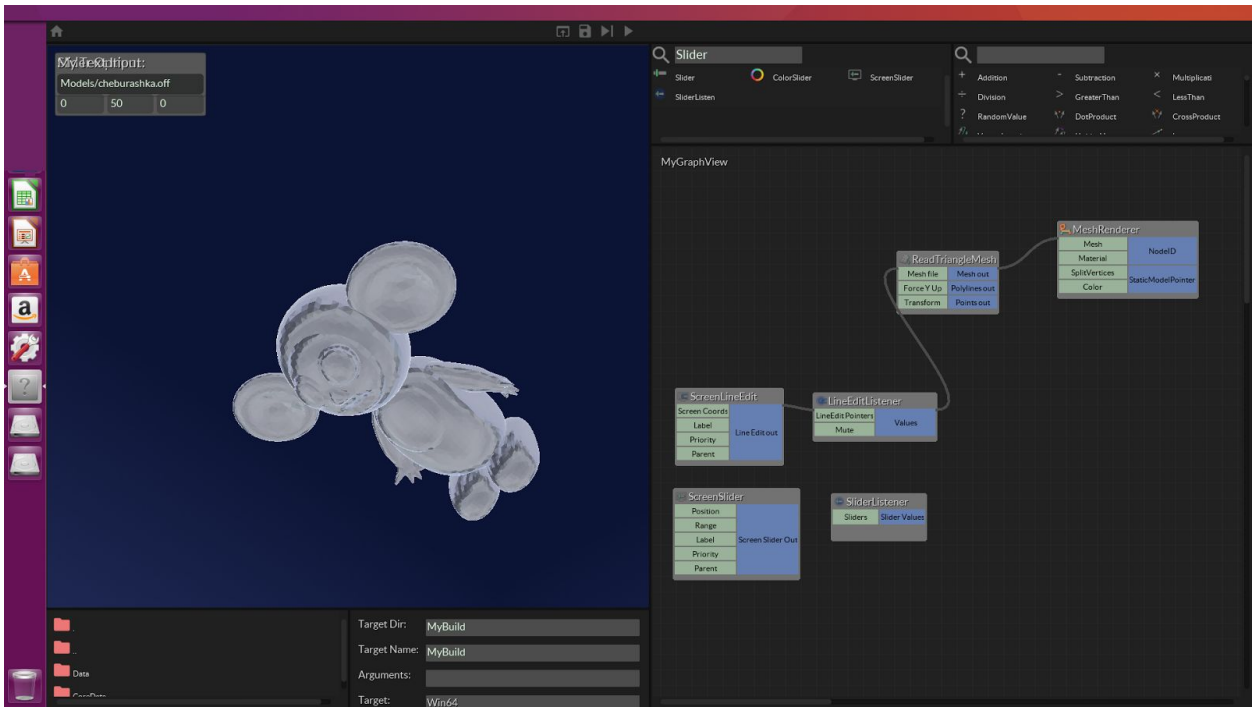


Add a slider for more end-user interaction

We will add a little more end-user interaction by introducing an input slider in the 3D scene that a user can use to adjust the scale of the rendered mesh.

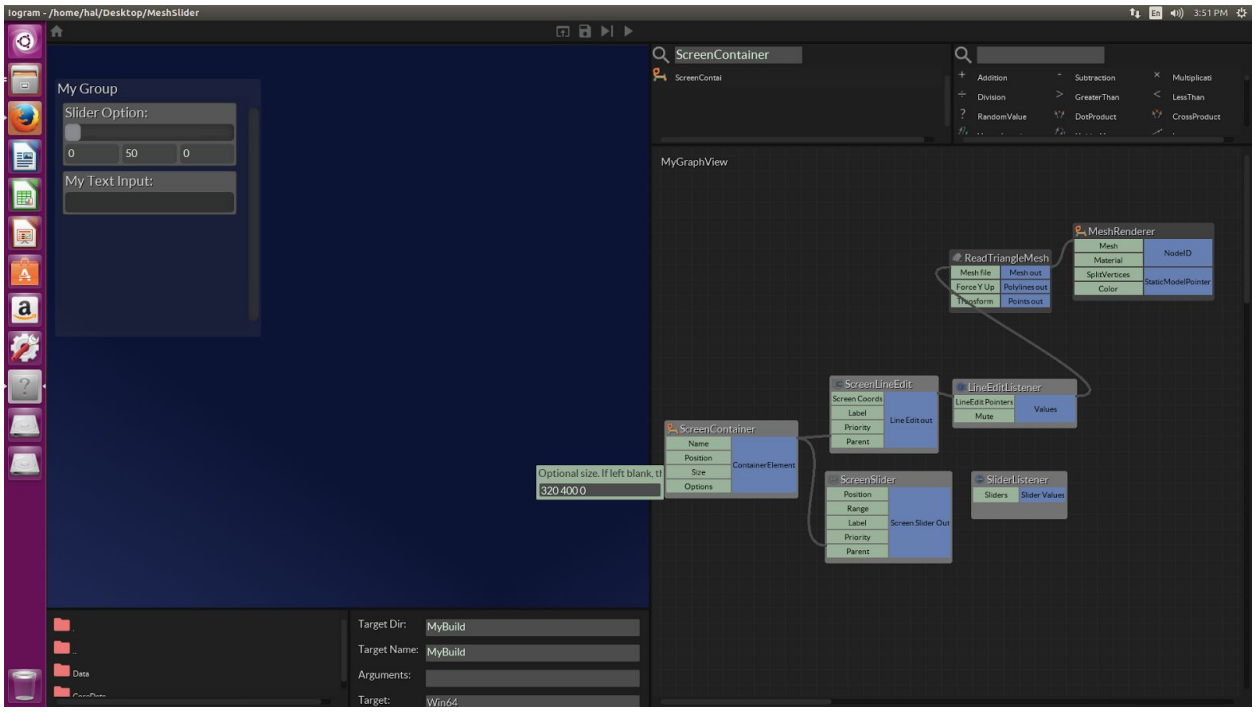
Search the component library for "Slider" and drag one *ScreenSlider* component and one *SliderListener* component onto your graph view. This is another example of the "Screen"/"Listener" component pattern for end user input. (Tip: there is also a *Slider* component for use directly in the graph view, and it's handy enough that we've configured the shortcut Alt + s to instantly drop one on the graph view.)

However, if you look closely you will see there is a problem. Look at the "My Text Input" text entry element you created earlier. The *ScreenSlider*'s user interface element has landed in the scene right on top of it!



You can address such issues manually by adjusting inputs to the *ScreenLineEdit* and *ScreenSlider* components, but you can also use a *ScreenContainer* component as a convenient way to organize your user interface elements in the scene.

Search the component library for "ScreenContainer" and drag that component onto the graph view. Now connect the *ScreenContainer*'s blue "ContainerElement" output slot to the green "Parent" input slot of both the *ScreenLineEdit* component and the *ScreenSlider* component. (Don't forget that you can drag your components around to make space, and don't forget to keep saving your work!)



If parenting the *ScreenLineEdit* to the *ScreenContainer* reset its text value, enter "Models/cheburashka.off" again in the user interface text entry element.

The user interface elements are organized for you in the screen container labelled "My Group". Try adjusting the size of the *ScreenContainer* at the "Size" input slot. Right click and enter "320 240 0". When you enter this, you are specifying a horizontal width of 320 and a vertical height of 240 for your screen container, but you are doing this by entering a vector with three coordinates. Three-coordinate vectors are used so much in Iogram that it is sometimes convenient to enter two input values as the first two coordinates in a three-coordinate vector.

Play around with the "Size" input to get used to the pattern and to find some dimensions you like.

Then use this trick again at the "Range" input slot of the *ScreenSlider* to change the slider's range from 0-50 to 0-4 (hint: enter "0 4 0").

Hook the *ScreenSlider* component's "Screen Slider Out" output slot to the *SliderListener* component's "Sliders" input slot. Drag the slider in the scene and right click the *SliderListener* component's "Slider Values" output slot to see how the *SliderListener* transmits the *ScreenSlider*'s value to the component graph.

Make the slider scale the mesh

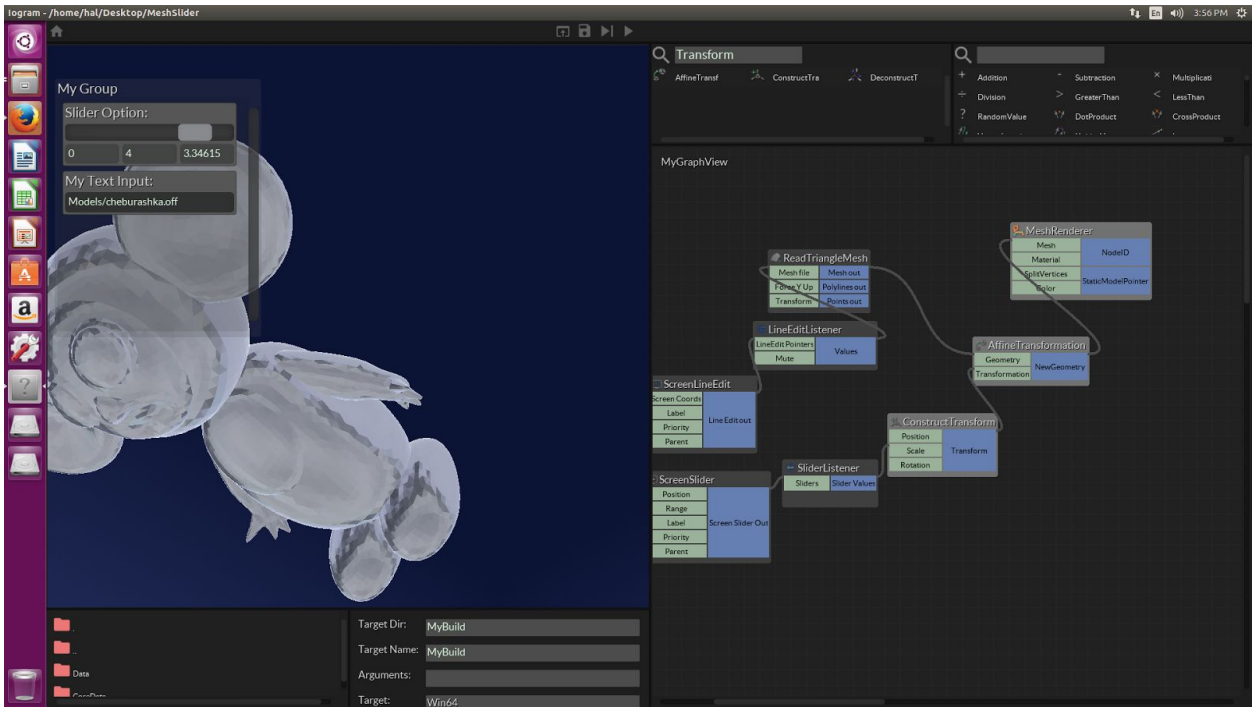
To make the slider have a real-time effect on the mesh geometry, search for "Transform" in a component library. Drag one *ConstructTransform* component and one *AffineTransformation*

component onto your graph view. The *ConstructTransform* component lets you construct a transformation as a mathematical object (a matrix!) by specifying "Position", "Scale", and "Rotation" inputs, while the *AffineTransformation* component lets you actually perform that transformation on a geometric object.

We only want to modify the scale of our meshes, so hook the *SliderListener* component's "Slider Values" output to the *ConstructTransform* component's "Scale" input.

Next hook the *ConstructTransform* component's "Transform" output to the *AffineTransformation* component's "Transformation" input.

Then hook the *ReadTriangleMesh* component's "Mesh out" output to the *AffineTransformation* component's "Geometry" input. The "NewGeometry" output contains the result of applying the transformation to the input geometry. Hook "NewGeometry" to the *MeshRenderer* component's "Mesh" input. (And, if you did not unhook *ReadTriangleMesh*'s "Mesh out" input from *MeshRenderer*'s "Mesh" input, watch how hooking a new connection there unhooks the connection previously in place.)

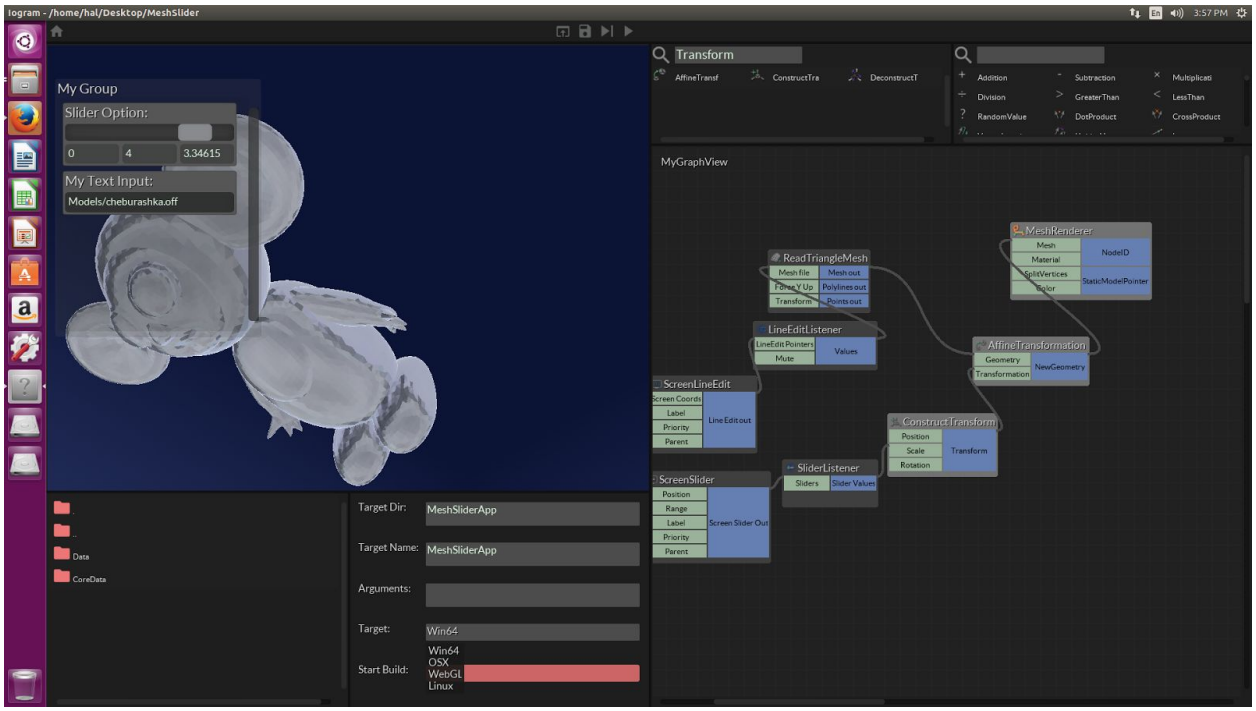


Now slide your slider around (that's what it's for!). If all goes well, you will see your mesh shrink and expand in sync with the slider's values.

Export your application

Now it's time to export your prototype as a standalone application! First, save your work by clicking the save button (floppy disk icon) in the bar across the top of the editor.

Find the build menu view, which is positioned in the mid bottom left of the screen in the default logram editor workspace. Drag the border up (in the default workspace, this is the border between the build menu view and the 3D scene view) until you can see the entire build menu including the "Start Build" button in light red.



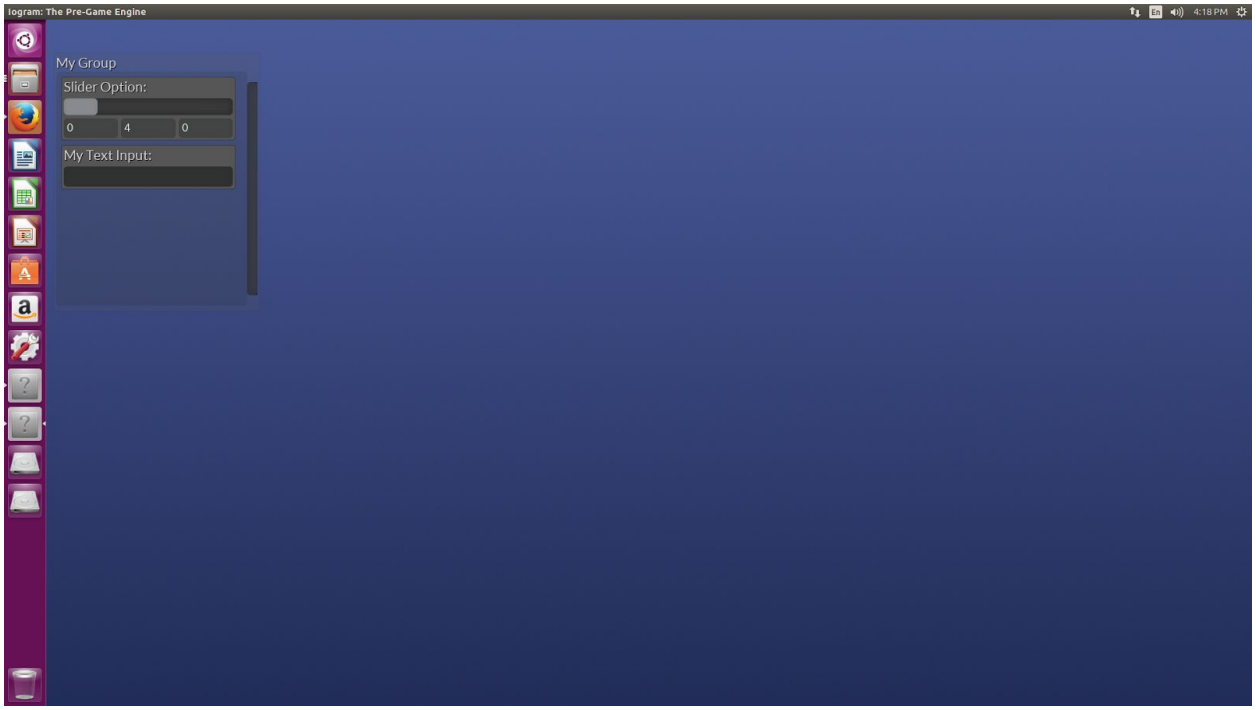
For both "Target Dir" and "Target Name" we will choose to override the default "MyBuild" and enter "MeshSliderApp" in both fields, but you can use whatever you like. What this means is that in the *project* directory (for us, MeshSlider) a new directory called MeshSliderApp will be created which will contain an executable file called MeshSliderApp (MeshSliderApp.exe on Windows) as well as the necessary project resources in two .pak files called CoreData.pak and Data.pak.

From the "Target" drop down menu choose the platform you are using to work through this tutorial. (You are by no means limited to exporting applications only to the platform on which you are running the editor, but for this tutorial we will want to test the exported application right away.)

When you are ready, click the light red button labelled "Start Build". Look in your project folder, and you should see a new folder called MeshSliderApp. This folder and the files it contains together make up the standalone application that the MeshSlider project has exported. You can share it and run it on another computer matching its target platform. (On Ubuntu, by default the exported binary file will not have permission to execute, so your users will have to allow this permission to run the application.)

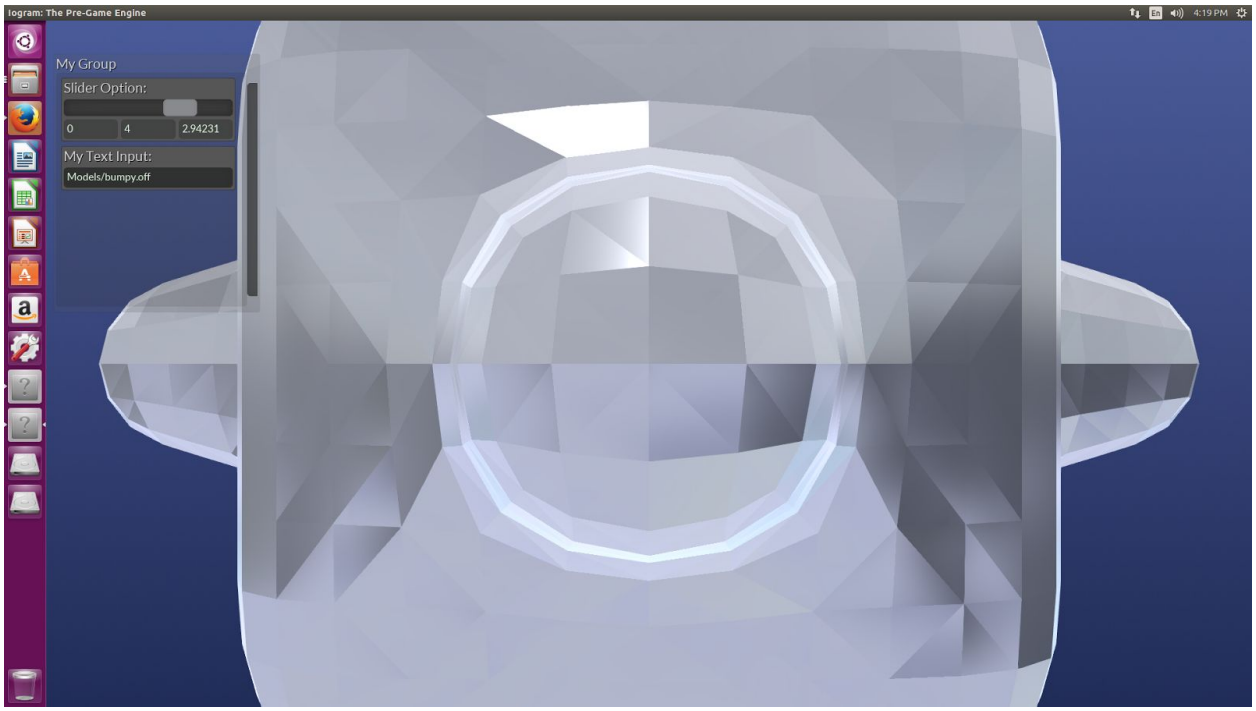
Try out your application

You are ready to try out your exported application. Double click or otherwise launch the MeshSliderApp executable (MeshSliderApp.exe on Windows) that your project built inside the MeshSliderApp folder. When it launches, the application shows only the 3D view, including the user interface elements, but none of the editor workspace views.

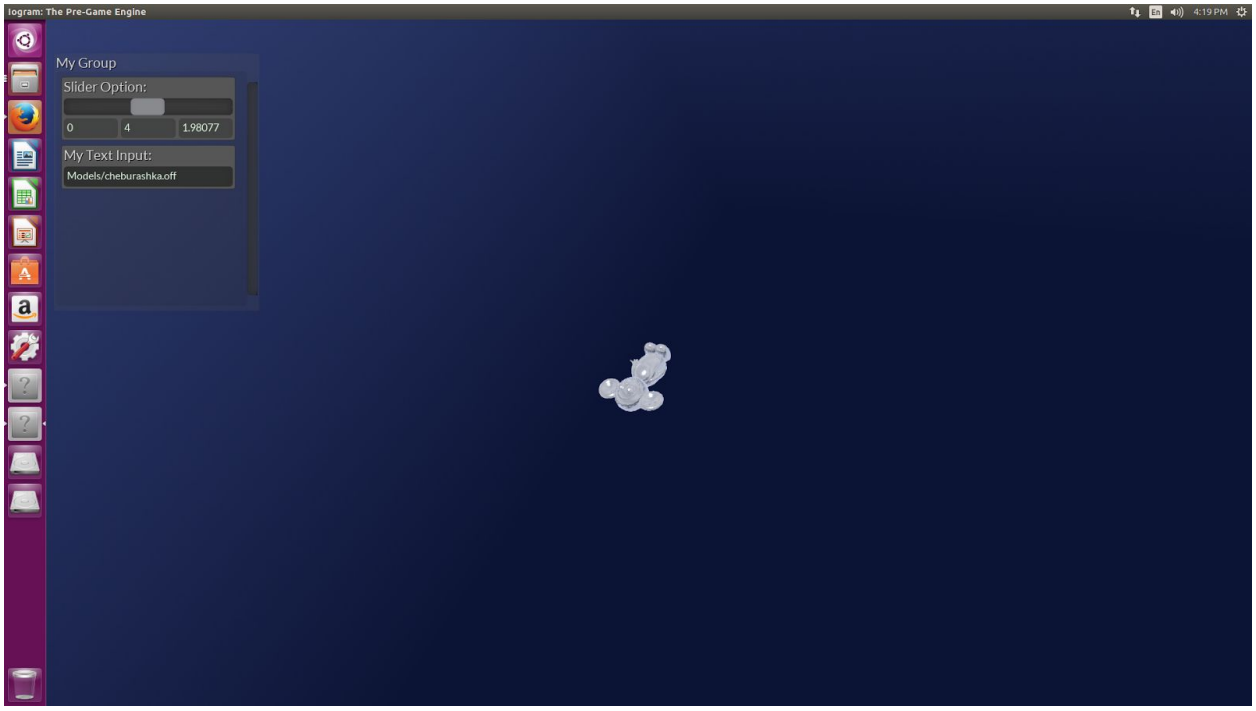


The view is blank because we haven't loaded a mesh yet *and* because the slider is at zero, which would shrink any loaded mesh to nothing.

Go ahead and enter "Models/bumpy.off" in the text input and play around with the slider. We have made the bumpy model pretty large.



Now try loading "Models/cheburashka.off". If the cheburashka is small or hard to find, you can control the 3D scene view in the exported application the same way you can in the 3D scene view in the Iogram editor, with right mouse button to rotate, and with right mouse button plus Ctrl or Shift to zoom or pan respectively.



Advanced features

Your basic introduction to Iogram is complete, but as you use Iogram it will be helpful to keep in mind a few more advanced features of Iogram. We merely mention them here, so you will be aware of them as you experiment with Iogram.

Configuring editor view

You can resize existing views by dragging the border between them. Moreover, you can add a new view by splitting an existing one.

To do so, click anywhere along the top right border of an existing view, just below where you would click to drag the border. A view command toolbar will appear along the vertical border of the view. Look for the icons in the left of the bar. Choose either the horizontal or vertical split icon to split your view.

Play around with splitting views and resizing them. You will find the recursive splitting pattern becomes pretty intuitive after a while.

Data trees

Iogram components organize inputs and outputs according to a "data tree" pattern, which is a kind of bookkeeping that lets each Iogram component perform its operation on many sets of inputs at once. It's pretty complicated, and you can ignore it when you're just starting out, but for power users data trees are an essential efficiency tool.

Scripting

One way to write custom Iogram components is with the *ScriptInstance* component, which lets you write a custom AngelScript program to define that component's operation.

Next steps....

Iogram (and its documentation!) is a work in progress, so we will fill out these next steps in the coming weeks, but watch for

- component documentation giving you a list of all available Iogram components
- a tutorial video if you'd prefer to see Iogram in real-time.

Watch for links to these and other resources as they appear.