What is ModelBuilder?

ModelBuilder is an application you use to create, edit, and manage models. Models are workflows that string together sequences of geoprocessing tools, feeding the output of one tool into another tool as input. ModelBuilder can also be thought of as a visual programming language for building workflows.

While ModelBuilder is very useful for constructing and executing simple workflows, it also provides advanced methods for extending ArcGIS functionality by allowing you to create and share your models as tool.

ModelBuilder can even be used to integrate ArcGIS with other applications. An example is provided below:
The above model is used by a municipality to send e-mail notifications to all addresses within 1 mile of an address for which a building permit application is filed. The model starts with a feature class of multiple permit application point locations. This feature class is fed into an iterator that loops over each individual point and feeds the point into the Select Layer By Location tool, where all addresses (parcels) within 1 mile of the point are selected. These addresses are then passed to a custom script tool (one that you or your colleague created), Generate Mailing List, that executes Python code to output a mailing list in HTML format. Finally, the mailing list is fed to another custom script tool, Send Email Notifications, which runs a custom executable that sends e-mail notifications and produces a success code.

The benefits of ModelBuilder can be summarized as follows:

- ModelBuilder is an easy-to-use application for creating and running workflows containing a sequence of tools.
- You can create your own tools with ModelBuilder. Tools you create with ModelBuilder can be used in Python scripting and other models.
- ModelBuilder, along with scripting, is a way for you to integrate ArcGIS with other applications.

If you have never used ModelBuilder, start with the Executing tools in ModelBuilder tutorial. If interested in creating custom tools with ModelBuilder, see A quick tour of creating tools with ModelBuilder and the Creating tools with ModelBuilder tutorial.

**Related Topics**

A quick tour of ModelBuilder
A quick tour of ModelBuilder

ModelBuilder is how you create models and model tools. A model is nothing more than a sequence of tools and data chained together; the output of one tool is fed to the input of another. When you save a model, it becomes a model tool.

You open ModelBuilder by clicking Geoprocessing > ModelBuilder. You add data and tools to the ModelBuilder canvas by dragging them from the Catalog or Search window or by using the Add button tool. There are a variety of ways you can connect data to tools; a common method is to use the Add Connection tool.

Once you have connected data to tools, you can execute the model from within ModelBuilder by clicking the Run button.

There are two primary uses of ModelBuilder:

- To immediately execute a tool sequence you've created
- To create tools that you can use like any other tool—from the tool dialog box, from Python scripts, or in another model

There are two tutorials for ModelBuilder:

<table>
<thead>
<tr>
<th>Executing tools in ModelBuilder tutorial</th>
<th>If you've never used ModelBuilder, this is the place to start.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating tools with ModelBuilder tutorial</td>
<td>Once you've become familiar with building simple models, you're only a few steps away from creating tools. This topic will show you how.</td>
</tr>
</tbody>
</table>

The ModelBuilder interface

ModelBuilder has a simple interface with drop-down menus, tools on a toolbar, and shortcut menu options as illustrated below. Shortcut menus are available for the whole model or any individual model element (variable, connector, or tool) with a right-click. The white empty space in a model onto which the tools are dragged and connected to the variables is called the canvas, whereas the appearance and layout of the tools and variables connected together is called the model diagram.
There are five pull-down menus on the main menu:

<table>
<thead>
<tr>
<th>Menu</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Options for running, validating, viewing messages, saving, printing, importing, exporting, and closing the model. You can also use this menu to delete intermediate data and set properties for the model.</td>
</tr>
<tr>
<td>Edit</td>
<td>Cut, copy, paste, delete, and select model elements.</td>
</tr>
<tr>
<td>Insert</td>
<td>Add data or a tool, create a variable, create a label, and add Model Only tools and iterators.</td>
</tr>
<tr>
<td>View</td>
<td>Contains an Auto Layout option that applies the settings specified on the Diagram Properties dialog box to your model. It also contains options for zooming in or out. The Custom Zoom option lets you zoom by a custom percentage. The preset zoom levels on the View menu (25%, 50%, 75%, 100%, 200%, and 400%) zoom to fixed percentages of the actual size.</td>
</tr>
</tbody>
</table>
Window
Contains an overview window you can use to display the entire model while you zoom in on a certain part of the model in the display window. Your current location in the model window is marked by a rectangle in the Overview window. When you navigate in the ModelBuilder window, this rectangle moves correspondingly.

Help
Access the ArcGIS Desktop Help Online system and the About ModelBuilder box.

Related Topics
What is ModelBuilder?

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Model canvas

The model canvas is the white empty space in a model.

Model diagram

The model diagram is the appearance and layout of the tools and variables connected together in a model.

Model elements

There are three main types of model elements: tools, variables, and connectors.

- **Tools:** Geoprocessing tools are the basic building blocks of workflows in a model. Tools perform various operations on geographic or tabular data. When tools are added to a model, they become model elements.
- **Variables:** Variables are elements in a model that hold a value or a reference to data stored on disk. There are two types of variables:
  - **Data:** Data variables are model elements that contain descriptive information about data stored on disk. Properties of data that are described in a data variable include field information, spatial reference, and path.
  - **Values:** Value variables are values such as strings, numbers, Booleans (true/false values), spatial references, linear units, or extents. Value variables contain anything but references to data stored on disk.
- **Connectors:** Connectors connect data and values to tools. The connector arrows show the direction of processing. There are four types of connectors:
  - **Data:** Data connectors connect data and value variables to tools.
  - **Environment:** Environment connectors connect a variable containing an environment setting (data or value) to a tool. When the tool is executed, it will use the environment setting.
  - **Precondition:** Precondition connectors connect a variable to a tool. The tool will execute only after the contents of the precondition variable are created.
  - **Feedback:** Feedback connectors connect the output of a tool back into the same tool as input.

Learn more about model elements

Model process

A model process consists of a tool and all variables connected to it. Connector lines indicate the sequence of processing. Many processes can be chained together to create a larger process.
Intermediate data

When a model is run, output data is created for each process in the model. Some of this output data is only created as a middle step to connect to other processes that will create the final output. The data generated from these middle steps, called intermediate data, is often (but not always) of no use once the model has finished running. You can think of intermediate data as temporary scratch data that should be deleted after the model has run. However, when you run a model from the ModelBuilder window, intermediate data is not deleted—it is up to you to delete it.

Learn more about intermediate data

Model validation

Model validation refers to the process of making sure all model variables (data or values) are valid.

Learn more about validating a model

Model parameter

Model parameters are the parameters that appear on the model tool dialog box. Any variable in the model can be made a model parameter.
Running a model within ModelBuilder

Selected processes in a model or the entire model can be run from within ModelBuilder. Learn how to run a model within ModelBuilder

Running a model tool

A model can be run from its tool dialog box. Learn how to run a model tool

Workspace environments

There are three workspaces that can be used in ModelBuilder to simplify model data management:

- **Current:**
  Tools that honor the Current Workspace environment setting use the workspace specified as the default location for geoprocessing tool inputs and outputs.

- **Scratch:**
  Tools that honor the Scratch Workspace environment setting use the specified location as the default workspace for output datasets. The Scratch Workspace is intended for output data you do not wish to maintain.

- **In-memory:** The in-memory workspace is a temporary workspace where geoprocessing outputs can be written to the system memory.
Learn more about working with the current and scratch workspace environments in ModelBuilder
Learn more about working with the in-memory workspace in ModelBuilder

**Related Topics**
A quick tour of ModelBuilder
What is ModelBuilder?