

OpenOffice.org



Draw Guide

Copyright

This document is Copyright © 2006 by its contributors as listed in the section titled **Authors**. You can distribute it and/or modify it under the terms of the Creative Commons Attribution License, version 2.5 or later (<http://creativecommons.org/licenses/by/2.5/>).

All trademarks within this guide belong to their legitimate owners.

Authors

Agnes Belzunce

Daniel Carrera

Lin M. Hall

Peter Kupfer

Ian Laurensen

Alexandre Martins

Paul Miller

Daniel Rentz

Carol Roberts

Iain Roberts

Wolfgang Uhlig

Jean Hollis Weber

Linda Worthington

Feedback

Please direct any comments or suggestions about this document to:

authors@user-faq.openoffice.org

Acknowledgments

This book is based on an original French document written for OpenOffice.org 1.x by Michel Pinquier (translated to English by Alex Thurgood), and previous content revised by Jim Taylor. It has been heavily rewritten.

This book was created entirely using OpenOffice.org, including writing, page layout, and PDF creation. Most graphics were produced using OOo Draw.

Publication date and software version

Published 26 June 2006. Based on OpenOffice.org 2.0.2.



You can purchase a printed copy of this book from <http://www.lulu.com/opendocument>

You can download an editable version of the chapters in this book from <http://oooauthors.org/en/authors/userguide2/published/>

Contents

Chapter 1

Introduction to Draw.....	1
General Introduction.....	2
The Workplace.....	3
The Toolbars.....	4
The Standard Bar.....	6
The Line and Filling Bar.....	6
The Drawing Toolbar.....	6
The Color Bar.....	6
The Options Bar.....	8
The Rulers.....	8
The Status Bar.....	9

Chapter 2

Drawing Basic Shapes.....	11
Drawing Basic Shapes.....	12
Drawing a line.....	12
Drawing a rectangle.....	13
Drawing a circle or ellipse.....	13
The Basic Drawing Shapes.....	14
Text.....	14
Rectangles and Squares.....	15
Circles, Ellipses and Arcs.....	15
3D Objects.....	15
Curves.....	16
Lines and Arrows.....	16
Connectors.....	17
Connector drawing basics.....	17
The Connectors toolbar.....	18
Editing Glue points.....	19

Chapter 3

Editing Objects Part 1:.....	23
Introduction.....	24
Selection modes.....	24
Changing the selection mode.....	25
Selecting objects.....	25

Direct selection.....	25
Selection by framing.....	25
Selecting hidden objects.....	26
Arranging objects.....	26
Selecting several objects.....	26
Moving and dynamically adjusting an object's size.....	27
Dynamic movement of objects.....	27
Dynamic size modification of objects.....	27
Rotating an object.....	28
Inclination.....	28
Editing object points.....	29
Direct operation.....	29
How curves work.....	30
The Bezier Curve Toolbar.....	30
The three kinds of tangent.....	30
Examples.....	31
Chapter 4	
Editing Objects Part 2:.....	35
Toolbars and menus.....	36
Line and Filling toolbar.....	36
The context menu.....	36
Editing lines and borders.....	37
Common line properties.....	37
Drawing arrows.....	38
Customizing line and arrow styles.....	39
Customizing line styles.....	39
Customizing arrow styles.....	40
Editing the inside (fill) of an object.....	41
Common fill properties.....	41
Fill with a uniform color.....	42
Fill with a gradient.....	42
Fill with a line pattern.....	42
Fill with an image.....	43
Adding a shadow.....	43
Advanced area fill options.....	43
Creating your own fill color.....	43
Creating your own gradient.....	44
Creating your own line pattern.....	45

Creating your own bitmap fill.....	46
Customizing shadows.....	47
Adding transparency.....	47
Editing size and position precisely.....	48
Position and size.....	48
Rotate objects.....	49
Rounded corners and shear (slant).....	49
Using styles.....	50
Creating a new style.....	50
Applying a style.....	50
How to modify a style.....	50
Special effects.....	51
Rotating an object.....	51
Flip an object.....	51
3D rotations.....	52
Distorting an image.....	54
Dynamic gradients.....	54
Chapter 5	
Managing 3D Objects and Bitmaps.....	57
Managing 3D Objects.....	58
Rotating 3D objects.....	58
3D effects.....	58
Geometry Management page.....	60
Shading Management page.....	63
Illumination Management page.....	64
Textures Management page.....	65
Material Management page.....	67
Managing Bitmaps.....	68
The Picture Toolbar.....	68
Bitmap Image Management Palette.....	70
Chapter 6	
Combining Multiple Objects.....	75
Grouping and combining objects.....	76
Grouping objects.....	76
Group by common selection.....	76
Maintaining groups and undoing groups.....	76
Editing individual objects in a group.....	76
Nesting groups.....	77

Contents

Combining objects.....	77
Merge, subtract or intersect shapes.....	78
Merge.....	78
Subtract.....	78
Intersect.....	79
Practical example.....	79
Aids for positioning objects.....	80
Moving an object to the front or to the back.....	80
Aligning objects.....	82
Chapter 7	
Tips and Tricks.....	85
Place objects with precision.....	86
Use zoom to place objects with precision.....	86
Zoom using the status bar.....	86
Zoom toolbar.....	87
Use snap to grid to place objects with precision.....	87
I can't see the grid dots!.....	87
Snap to grid.....	88
Configuring the grid.....	88
Use snap lines to place objects with precision.....	89
Inserting a snap line.....	89
Position a snap line with precision.....	90
Use guiding lines to place objects with precision.....	90
Make complex diagrams with layers.....	91
Cool effects.....	92
Duplication.....	92
Cross-fading.....	93
Which object goes in front?.....	94
Index.....	95



Chapter 1

Introduction to Draw

OpenOffice.org's Vector Drawing Component

General Introduction

Draw is a vector graphics drawing tool. It offers a series of powerful tools that enable you to quickly create all sorts of graphics.

It is perfectly integrated into the OpenOffice.org suite, and this makes exchanging graphics with all components of the suite very easy. For example, if you create an image in Draw, reusing it in a Writer document is as simple as copy and paste. You can also work with drawings directly from within Writer and Impress, using a subset of the functions and tools from Draw.

Draw's functionality is very extensive and complete. Even though it was not designed to rival high-end graphics applications, Draw still possesses more functions than the majority of drawing tools that are integrated into office productivity suites.

A few examples of drawing functions might whet your appetite: layer management, magnetic grid point system, dimensions and measurement display, connectors for making organization charts, 3D functions enabling small three-dimensional drawings to be created (with texture and lighting effects), drawing and page style integration, and Bezier curves, just to name a few.

This document describes only the functions associated with Draw. Some notions such as file management or the way the OpenOffice.org environment works are mentioned only briefly as they are covered in the *Getting Started* guide.

The Workplace

The main components of the **Draw** interface have the appearance shown in Figure 1.

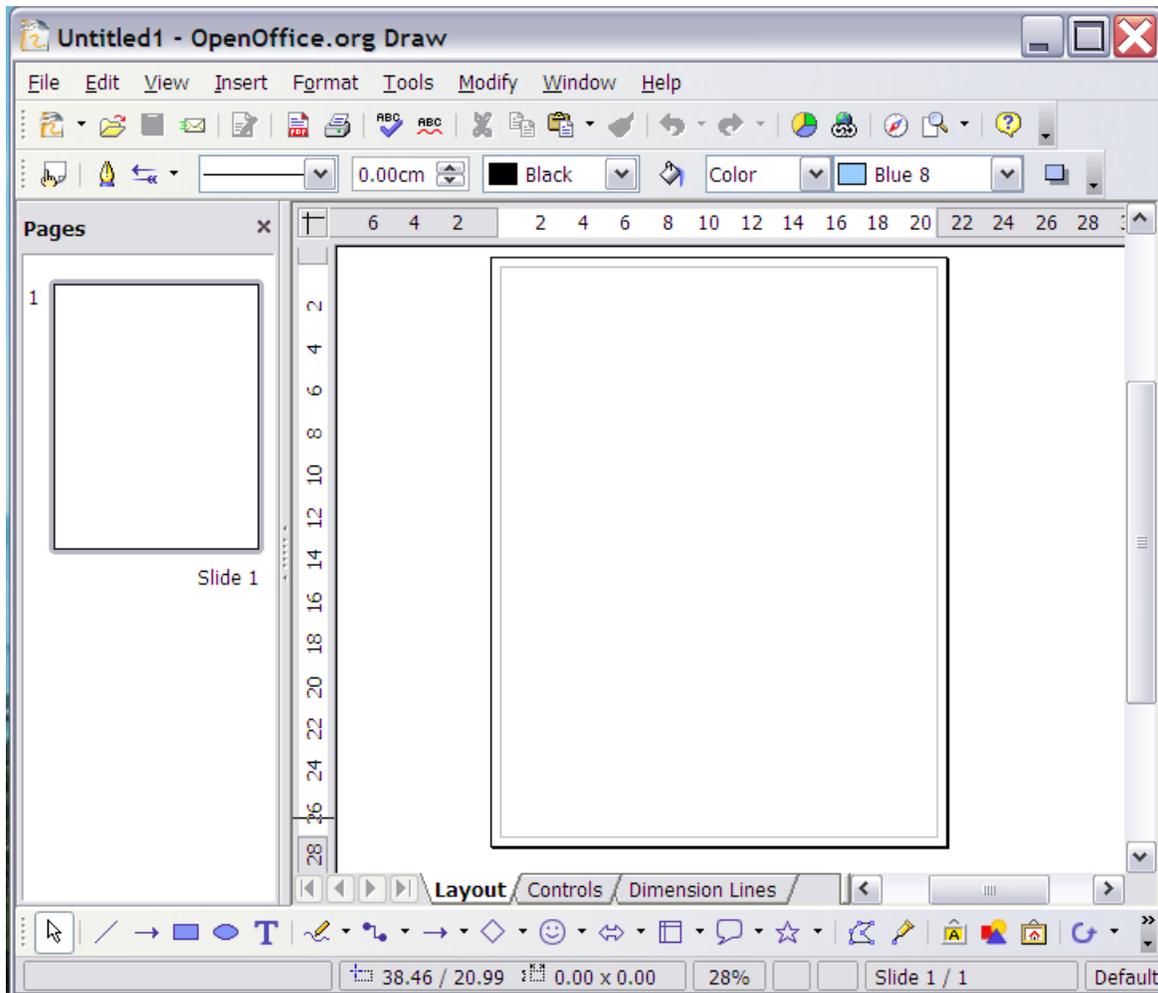


Figure 1. Initial Draw window

The large area in the center of the window is where the drawings are made. It is surrounded by toolbars and information areas. You can vary the number and position of the visible tools, so your setup may look a bit different. For example, many people put the main Drawing toolbar on the left-hand side of the workspace, not at the bottom as shown here.

The Toolbars

The various Draw toolbars can be displayed or hidden according to your needs.

New in 2.0

Many of the floating toolbars in OOo 1.x have become main toolbars in OOo 2.0.

Note To access any toolbar, choose **View > Toolbars**.

To display or hide the toolbars, simply click **View > Toolbars**. On the menu that appears, choose which toolbars to display.

You can also select the buttons that you wish to appear on the corresponding toolbar. On the **View > Toolbars** menu, select **Customize**, click on the **Toolbars** tab (see Figure 2), and then select the desired buttons for that toolbar. Each toolbar has a different list of buttons.

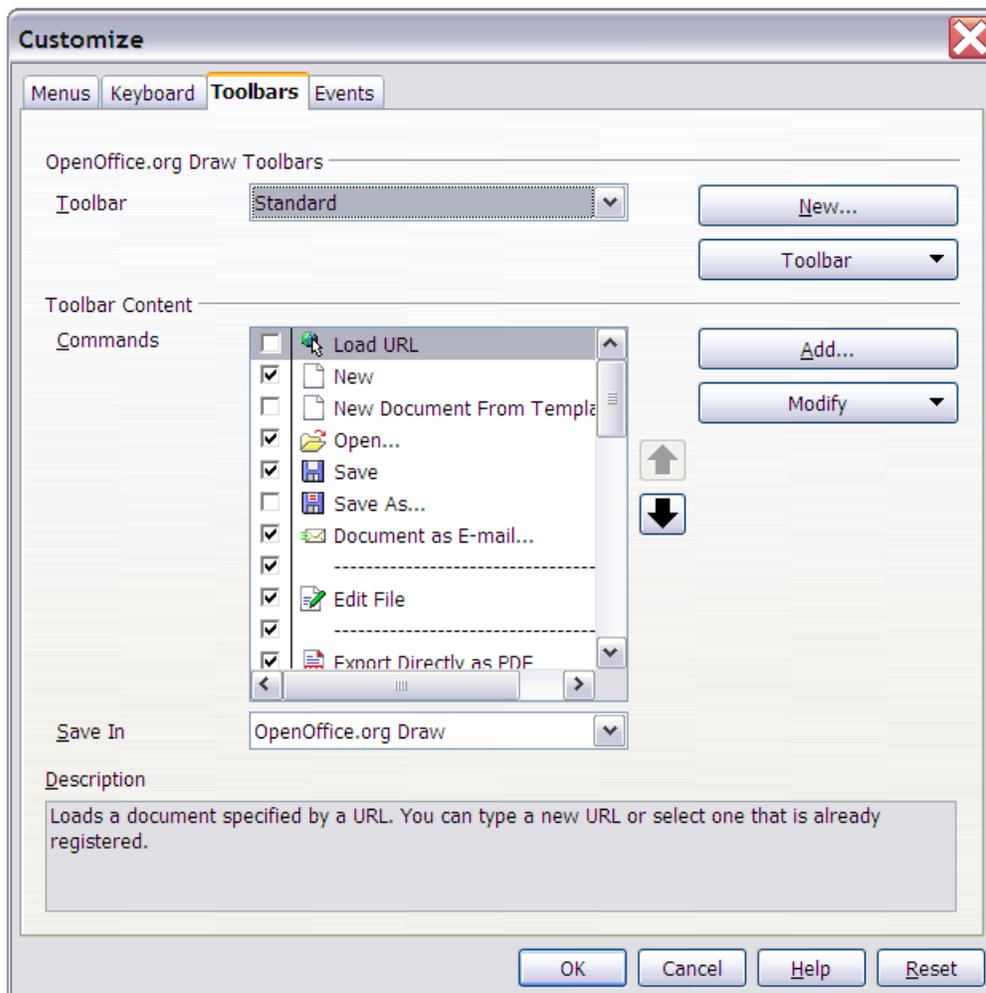


Figure 2. Customizing a toolbar

Many toolbar buttons are marked with a small arrow beside the button. The arrow indicates that this button has additional functions. Click the arrow and a submenu or floating toolbar appears, showing its additional functions (see Figure 3).

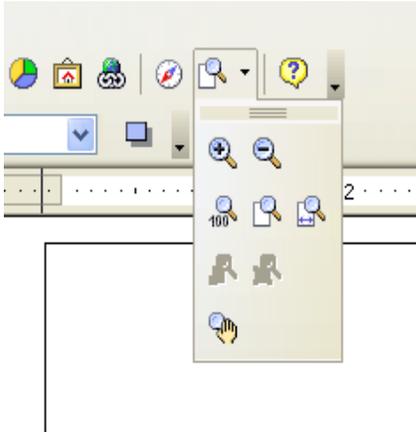


Figure 3 An arrow next to a button indicates additional functions

Similarly, click on the arrow on the title bar of a floating toolbar to display additional functions (see Figure 4).

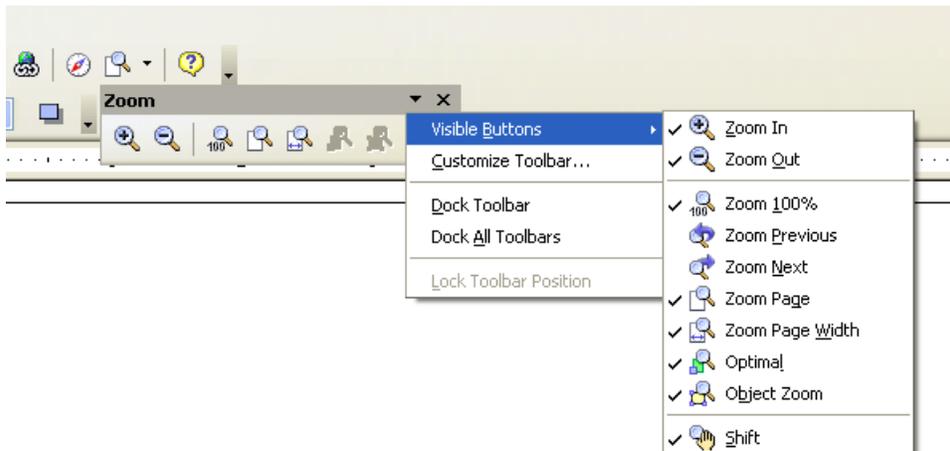


Figure 4. An arrow on a floating toolbar indicates additional functions

You may wish to keep this submenu displayed on your screen, but in a different position than the default location. You can make this submenu into a *floating toolbar*. To do so, click the submenu title bar, drag it across the screen, and then release the mouse button.

Note Most buttons marked with the small arrow can become floating toolbars. The floating toolbar capability is common to all components of the OpenOffice.org suite.

The tools available in the various toolbars are explained in the following sections.

The Standard Bar

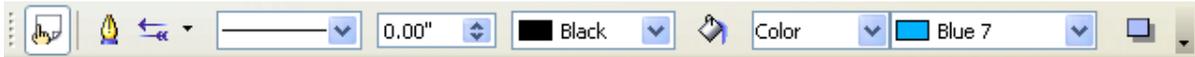
The Standard Bar looks like this:



It is the same for all parts of OpenOffice.org.

The Line and Filling Bar

The Line and Filling Bar (called the *Object Bar* in OOo 1.x) lets you modify the main properties of a drawing object.



In the example above, the available functions enable you to change the color of the line drawn, the fill color, and so on, of a selected object. If the selected object is text, the toolbar changes to the one below, which is very similar to the Formatting toolbar in Writer.



The Drawing Toolbar

The Drawing toolbar is the most important toolbar in Draw. It contains all the necessary functions for drawing various geometric and freehand shapes and organizing them on the page.



The Color Bar

To display the Color Bar, use **View > Toolbars > Color Bar**. The toolbar then appears at the bottom of the workspace.



This toolbar lets you rapidly choose the color of the objects in your drawing. The first box in the panel corresponds to transparency (no color).

The color palette that is shown by default can be changed using **Format > Area** as shown in Figure 5. Choose the tab marked **Colors**.

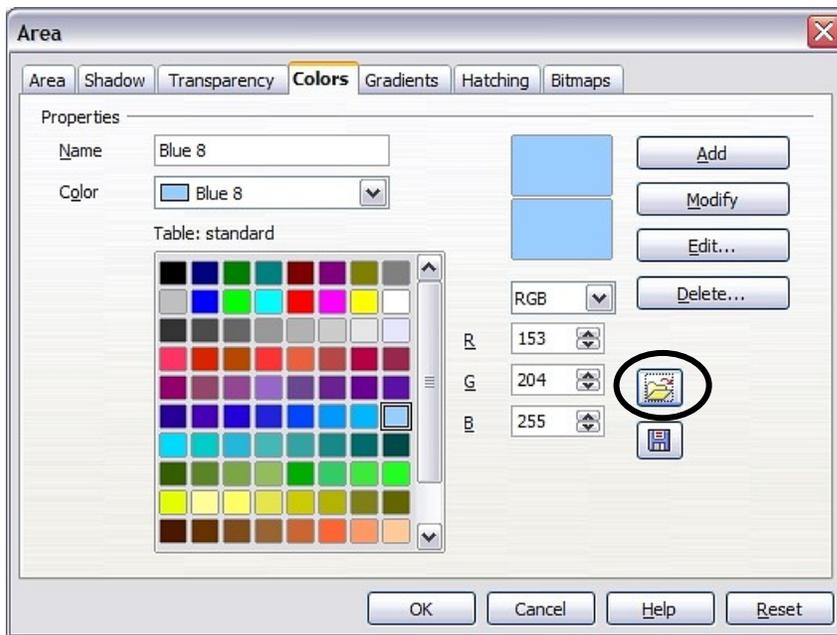


Figure 5. Changing the color palette

If you click on the **Load Color List** button (circled), the file selector asks you to choose a palette file (bearing the file extension **.soc**). Several palettes are supplied as standard with OpenOffice.org. For example, **web.soc** is a color palette that is particularly adapted to creating drawings that are going to appear in Web pages, because the colors will be correctly displayed on workstations with screens displaying at least 256 colors.

The color selection box also lets you individually change any color by modifying the numerical values in the fields provided to the right of the color palette. You also can click on **Edit** to display a dialog box (shown in Figure 6), making the choice of colors easier.

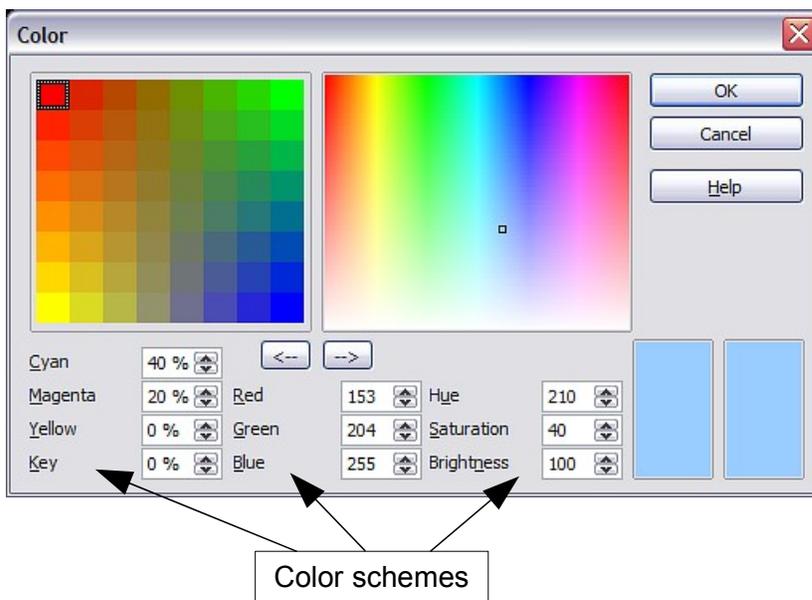


Figure 6. Defining color schemes

You can use the color schemes known as CMYK (Cyan, Magenta, Yellow, Black), RGB (Red, Green, Blue) or HSB (Hue, Saturation, Brightness).

The Options Bar

This toolbar lets you activate or deactivate various drawing aids. The Options Bar is not displayed by default. To display it, select **View > Toolbars > Options**.



The Rulers

You should see rulers on the upper and left-hand side of the workspace (see Figure 7). These show the size of the objects on the page. The rulers show the location of the mouse to help you position objects more precisely. The rulers also are used to manage handle points and capture lines that make positioning objects easier.

The page margins in the drawing area are also represented on the rulers. You can change the margins directly on the rulers by dragging them with the mouse. To modify the units of measurement of the rulers, right-click on one of the two rulers. The two rulers can have different units.

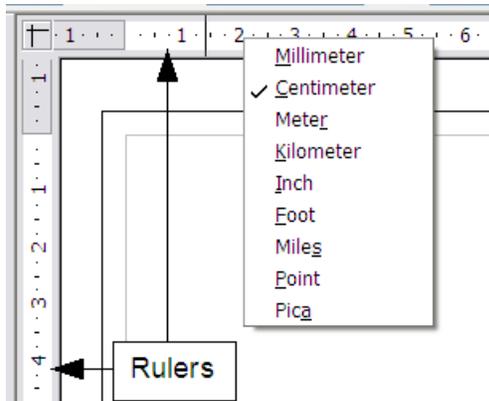
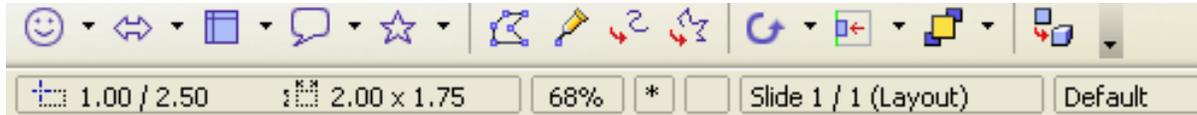


Figure 7. Rulers in a drawing

The Status Bar

The Status Bar is located at the bottom of the screen. The middle part of this area is particularly relevant to the Draw module.



The sizes are given in the current unit (not to be confused with the ruler units). This unit is defined in **Tools > Options > OpenOffice.org Draw > General**, where you can also change the scale of the page. Another way to change the scale is to double-click on the number shown in the status bar.



Chapter 2
Drawing Basic Shapes

Drawing Basic Shapes

This chapter describes how to draw simple shapes. All shapes, whether they are simple lines, rectangles, or more complicated shapes, are *objects*. This is common notation in vector drawing software.

The following sections illustrate how to draw three basic shapes: a line, a rectangle and an ellipse. Figure 8 shows the buttons on the Drawing toolbar that correspond to the next three sections.

New in 2.0

In previous versions of OOo, several toolbar buttons expanded by a long-click on a button with an arrow . In OOo 2.0 the expanded toolbars are separate. To see other button options, select **View > Toolbars** and choose the toolbar you need.

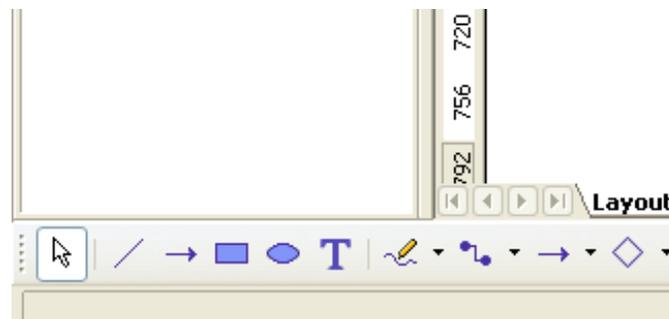


Figure 8: The Drawing toolbar

Note The Drawing toolbar can be positioned anywhere on or around the screen.

Drawing a line

Click on the Line button  on the Drawing toolbar and place the mouse cursor at the point where you wish to start drawing.

Click to start the line, then drag to where you want the line to end. A handle will appear at each end of the line, showing that this is the currently selected object.

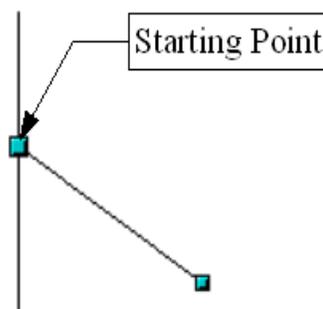


Figure 9: Drawing a line

Hold down the *Shift* key while drawing the segment to force the line to be drawn at a multiple of 45° from the horizontal.

Hold down the *Alt* key to draw the line symmetrically from the start point (the line extends out to both sides of the start point equally). This lets you draw lines by starting from the middle of the line.

The line you draw will have the default attributes (such as color and line type). To change the line attributes, click on the line to select it, right-click and change the attribute from the **Line** dialog.

Drawing a rectangle

Drawing rectangles is similar to drawing lines, except that you use the Rectangle tool  from the Drawing toolbar. The (imaginary) line drawn with the mouse corresponds to the diagonal of the rectangle.

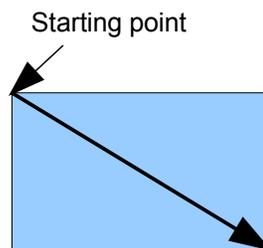


Figure 10: Drawing a rectangle

Hold down the *Shift* key to draw a square. Hold down the *Alt* key to draw a rectangle starting from its center.

Drawing a circle or ellipse

To draw an ellipse, use the Ellipse Button  from the Drawing toolbar. The ellipse drawn is the largest ellipse that would fit inside the (imaginary) rectangle drawn with the mouse.

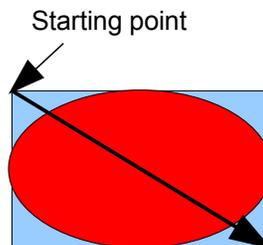


Figure 11: Drawing a circle

New in 2.0

Other shapes are available on the **Drawing** toolbar. In previous versions of OOo, these shapes were extended functions shown by long-clicking the **Ellipse** button.

There are three other ways to draw an ellipse or circle:

- Hold down the *Shift* key while drawing to force the ellipse to be a circle.
- Hold down the *Alt* key to draw a symmetrical ellipse or circle from the center instead of dragging corner to corner.
- Hold down the *Ctrl* key while drawing to snap the ellipse or circle to grid lines.

Note If you first press (and hold) the *Control* key before clicking on any of these buttons (Line, Rectangle, Ellipse, and Text), the chosen object appears directly on the page with a default size, shape and color. All of these attributes can then be changed.

The Basic Drawing Shapes

This section provides a complete overview of the basic objects in the Draw module. These objects can be edited, combined, and manipulated to create more complex shapes. We have already seen how to use some of these.

All of the tool palettes described here can be displayed from the Drawing toolbar (**View > Toolbars > Drawing**).

Text

Use the Text tool **T** to write text and select the font, color, size, and other attributes. Click on an empty space in the workspace to write the text at that spot. Press *Enter* to drop to the next line.

When you have finished typing text, click outside the text frame. Double-click on the text at any time to edit it.

To add text to an object, double-click on the object, or click on the object to select it and then click the text tool.

When you type text, the upper toolbar includes the usual paragraph attributes: indents, first line and tab stops.

You can change the style of all or part of the text. The Styles and Formatting window also works here (select **Format > Styles and Formatting** or press *F11*), so you can create styles that you can reuse in other text frames exactly as you would with Writer.

Text frames can also have fill colors, shadows and other attributes, just like any other Draw object. You can rotate the frame and write the text at any angle. These options are available by right-clicking on the object.

Use the Callout tool, located on the Drawing toolbar, to create captions (also known as callouts or figure labels).

Rectangles and Squares

New in 2.0

The toolbar palette previously had 8 tools. In OOo 2.0 the rectangle is located on the Drawing toolbar. The other rectangle and square tools are located under the Basic Shapes button on the Drawing toolbar.

Circles, Ellipses and Arcs

New in 2.0

The toolbar palette previously had 14 tools. In OOo 2.0 the Ellipse is located on the Drawing toolbar. The other circles, ellipses and arcs are located under the Basic Shapes button on the Drawing toolbar.

3D Objects

The 3D Objects palette (Figure 12) has 8 primitives that can be used to create more complex three-dimensional objects through merging or combination.

In OOo 2.0 the 3D Objects palette is located on the Drawing toolbar. The palette is not loaded by default. To load it:

New in 2.0

- 1) Click on the shaded area at the far end of the Drawing toolbar .
- 2) Select **Visible Buttons > 3D Objects**.
- 3) The 3D Objects button appears in the Drawing toolbar.

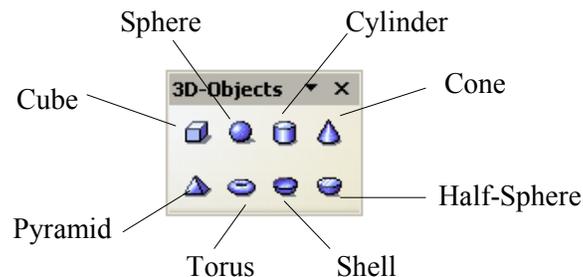


Figure 12: 3D objects palette

All 3D objects work in the same way: click on the button and draw a rectangle on the work area. You will see a boundary box (Figure 13). The final object will be drawn inside this box.

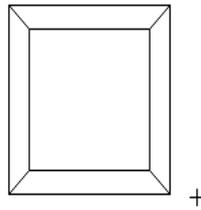


Figure 13: 3D boundary box

Draw includes a wide variety of 3D effects (right-click on the object and select **3D Effects** from the pop-up menu). These include the geometry, shading, texture, color, material and lighting of the object. For more information, see Chapter 6, “Managing 3D Objects and Bitmaps” in this guide.

Curves

The Curves palette (Figure 14) offers 8 tools for drawing non-linear profiles.



In OOo 2.0 the Curve palette is located on the Drawing toolbar. If you tear off this palette, the title bar on the palette shows *Lines*, as shown in Figure 14.

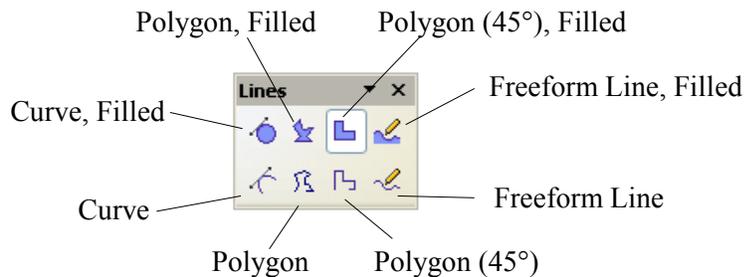
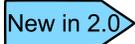


Figure 14: The curves palette (incorrectly titled “Lines” in OOo 2.0)

Lines and Arrows

The Arrows palette (Figure 15) offers 10 tools for drawing lines (with or without arrows).



In OOo 2.0 the Arrows palette is located on the Drawing toolbar. If you tear off this palette, the title bar on the palette shows *Arrows*, as shown in Figure 15.

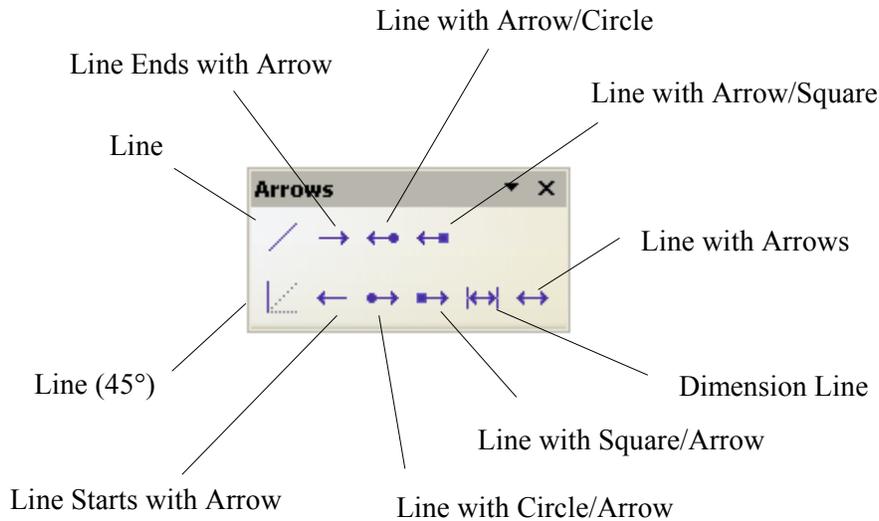


Figure 15: The Arrows palette

Connectors

Connectors are a type of line or arrow whose ends stick to *glue points* on other objects. When you move the other object, the connector moves with it.

Connectors are particularly useful for making organizational charts. You can reorganize the blocks of your chart and all the connectors stay connected.

Draw has a range of advanced connector functions.

Connector drawing basics

All objects have invisible glue points associated with them. Connectors attach themselves automatically to the glue points of an object. Draw sets the default number of glue points for an object to 4. We will see later how you can add new glue points.

The default glue points are located at the midpoints of the sides of the square bounding the object, as shown in Figure 16.

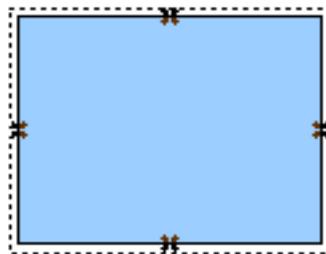


Figure 16: 4 glue points

When you move one of the ends of a connector over an object, its glue points become visible. You can drop the end of the connector onto one of the glue points. Afterwards, whenever either the connector or the object is moved, the end of the connector will remain attached to the object glue point.

Note Glue points are different from handles (the small blue or green squares around an object). Use the handles to move or resize an object; use the glue points to attach connectors to an object.

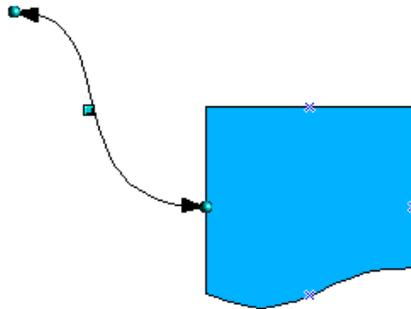


Figure 17: Selecting a connector

You can also drop the end of the connector onto the object. In this case, when you move the object or the connector, Draw will automatically choose the best glue point to minimize the length of the connector:

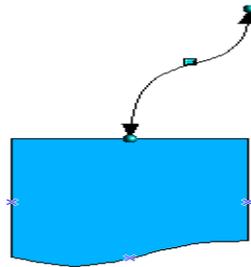


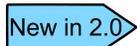
Figure 18: Selecting a gluepoint

Draw will try to avoid drawing the connector on top of the object.

You can always break the link between a connector and an object by moving the end of the connector away from the glue point to which it was attached.

As with all objects, connectors have control points to make drawing easier. The main control point is located in the middle of the connector and lets you set the length of the segments on either side of the control point.

The Connectors toolbar



In OOo 2.0 the Connectors palette is located on the Drawing toolbar. If you cannot see it, you can launch it by clicking on the shadowed arrow at the end of the toolbar and choosing **Visible Buttons > Connectors**.

The connector toolbar (Figure 19) contains a large number of buttons.

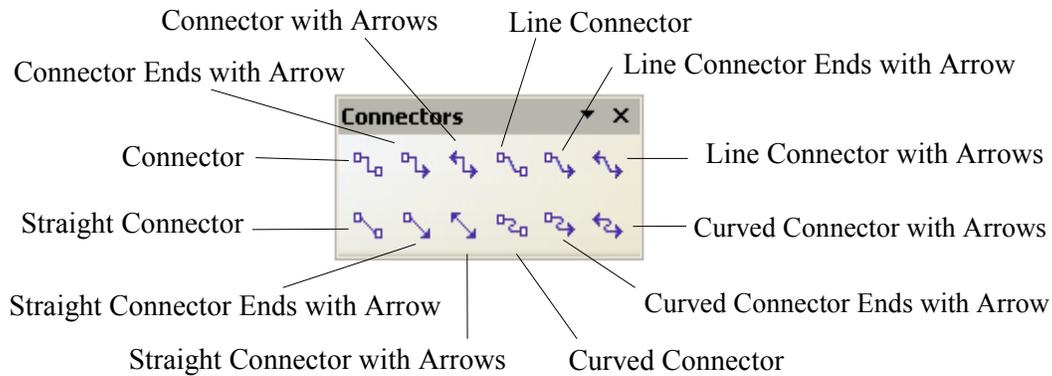


Figure 19: The Connectors palette

Connectors can be grouped into four categories:

- *Traditional Connectors* are like the ones you have seen so far.
- *Line Connectors* are made up of a line segment and two smaller segments at the horizontal or vertical ends.
- *Straight Connectors* are made up of a simple straight line.
- *Curved Connectors* are based on Bezier curves (Bezier curves are discussed in another chapter).

Editing Glue points

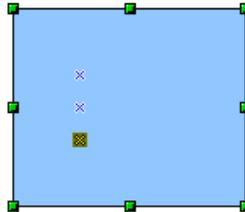
Glue point management is handled by a special toolbar. This toolbar is not visible by default. Select **View > Toolbars > Gluepoints** to display it.



Here is a brief description of the way these buttons work.



This button lets you insert a new glue point. Draw a new object. If the object is filled, the point can be inserted anywhere within the object, not only on its contour. Choose the Glue Points button  on the Drawing Toolbar. After you have chosen this button, click on the object to add the glue points.

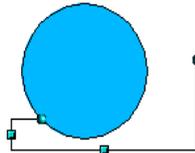


The glue points remain visible for as long as the button appears as “pressed down”. They are displayed as little blue crosses and the selected glue point is highlighted. You can move the glue points with the mouse and delete them with the *Del* key.



These four buttons let you choose the directions of movement that are allowed around the junction of a connector glue point. You can select several of these buttons for any given glue point. They specify from which directions a connector can arrive at the glue point.

If you click on the  button, any connector placed on the glue point is forced to come in from the left as shown in the following drawing.



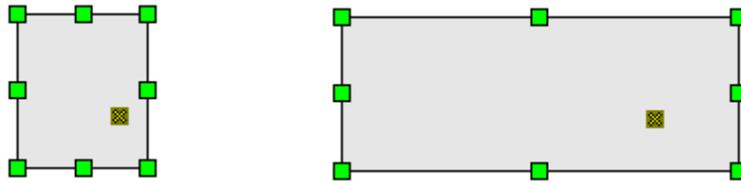
When in glue point edit mode, if you click on the  button, you can add a new possible direction to a glue point. If we keep the preceding example, this would give:



The addition of this extra direction enabled OOO to draw a shorter connector.



When this button (“Glue Point Relative”) is active (which it is by default), resizing an object causes glue points to move too. The glue point moves relatively, as shown in the following example.



If this button is deactivated, the glue point will not move.

When the button is deactivated, the last six buttons on the toolbar that were grayed out become usable. These buttons let you choose how the glue points will be rearranged when the object is resized.



These three buttons let you choose the horizontal position of the glue point. You can choose to maintain the same position with respect to the left edge (first button), the center (second button) or the right edge (third button).



As an example, in the following figures you see a glue point *Horizontal left*. The distance from the glue point to the left edge will always remain the same, unless the distance is larger than the object itself.



These three buttons let you choose the vertical positioning of the glue point. You can choose to maintain the same position with respect to the upper edge (first button), the center (second button) or the lower edge (third button).





Chapter 3
Editing Objects Part 1:
Working with Objects and Object Points

Introduction

In this chapter, we shall look at the tools and functions that let you modify existing drawings. All of the functions apply to the selected object or group of objects. The selected object differentiates itself from any others by small colored squares or circles located around the object (this is also true when several objects are selected simultaneously). In the rest of this document, we call these points *handles*.

These handles form a rectangular frame that is just big enough to contain the object. Where several objects are selected, the frame around them corresponds to the smallest rectangle that can contain all of the objects. This frame is called the *selection rectangle*.

If the **Options Bar** is displayed, you can change the size of the handles using two buttons: **Simple Handles** shows the handles as flat squares, and **Large Handles** shows the handles in a larger size. You can combine the effects obtained by pressing on both buttons. You can thus have large handles having a 3D shape or small handles having no 3D shape. This illustration shows the location of the handles and other buttons.

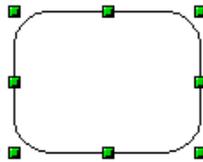


Selection modes

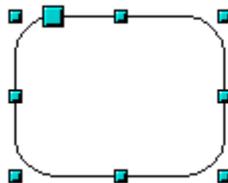
There are three selection modes: moving and changing size, rotating, and editing points.

To set the default mode for selecting objects, click on the **Points** button  on the **Drawing** Toolbar.

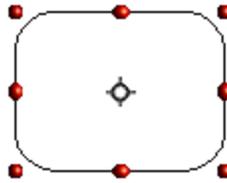
When the **Points** button is not active, the default mode is for selections to be moved or changed in size; these selections are indicated by small green squares.



When the **Points** button is active, the default mode is for selections to be edited; these selections are indicated by blue squares. Some objects will have one or more extra handles, which are larger or colored differently. This is explained in more detail in “Editing object points” on page 29.



Selections for rotating objects are indicated by small red circles and a symbol representing the center of rotation. To choose these selections click on the **Effects** drop-down button  from the **Drawing** Toolbar.



Changing the selection mode

To go from one mode to another, you can do one of the following:

Choose the **Points** button  from the **Drawing** Toolbar to switch from simple selection mode to Points mode. You can also use the keyboard shortcut $F8^1$ (Points).

Choose the **Effects** drop-down button from the **Drawing** Toolbar  to activate the Rotation mode for a selected object.

By choosing the **Rotation Mode after Clicking Object** button  from the **Options** bar, you can cycle through normal and rotation modes just by clicking on the object. This can be more convenient than clicking the object, then clicking the **Rotate** button from the **Drawing** Toolbar.

Selecting objects

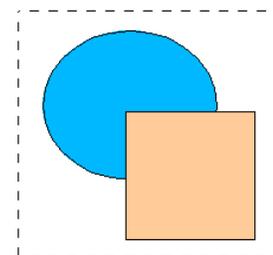
Direct selection

To select an object, the easiest way is to click directly on it. For objects that are not filled, you have to click directly on the object's outline to select it.

Selection by framing

You can select several objects by dragging a large rectangle around the objects with the select button, as shown.

For an object to be selected, it must be entirely within the rectangle.



¹ Keyboard shortcuts can be configured by the user (**Tools > Configure > Keyboard**). See Chapter 1 for more information.

Selecting hidden objects

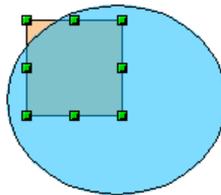
When objects are located behind others, they can still be selected. To select an object that is covered by another object, hold down the *Alt* key and click the object. To select an object that is covered by several objects, hold down the *Alt* key and click through the objects until you reach the required underlying object. To cycle through the objects in reverse order, hold down the *Alt+Shift* keys when you click. To help in making accurate selections, you can check the number and type of the selected objects, shown at the left of the status bar.

Note There may be some variation in the use of the *Alt* key on different operating systems.

To select an object that is covered by another object using the keyboard, press *Tab* to cycle through the objects. To cycle through the objects in reverse order, press *Shift+Tab*.

The easiest method is to use the *Tab* key to cycle through the objects, stopping at the object you wish to select. (This may not be practical if you have a large number of objects in your drawing). When you click on your selected object, its outline will appear briefly through the objects on top of the selected object.

In the illustration below, the square located beneath the circle was selected in this way (the circle was made transparent in order to see the square).



Arranging objects

In a complex drawing, you may have objects stacked up, one on top of the other. You can rearrange stacked objects by clicking **Modify > Arrange** and selecting the appropriate **Bring Forward** or **Send Backward** options, or by right-clicking the object and selecting **Arrange** from the context menu, then selecting the appropriate **Bring Forward** or **Send Backward** options. A keyboard shortcut is *Shift+Ctrl++* to bring an object to the top, and *Shift+Ctrl+-* to send an object to the bottom.

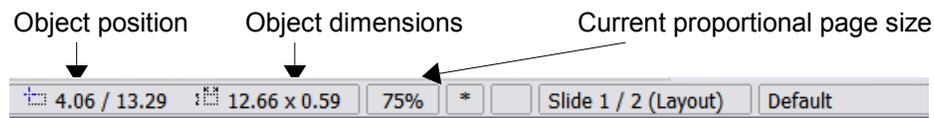
Selecting several objects

To select or deselect several objects one by one, press the *Shift* key and click on the various objects to be selected or deselected.

Moving and dynamically adjusting an object's size

There are several ways of moving or changing the size of an object. The method described here will be called *dynamic* in the sense that it is carried out using the mouse.

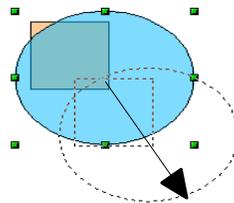
When you dynamically change an object, remember to check the right hand area of the status bar at the bottom of your screen. This shows detailed information about the ongoing manipulation. For example, during a resizing manipulation, you will see the following information displayed.



The information displayed changes when the mouse is moved.

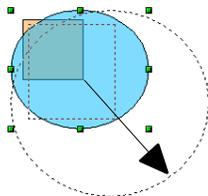
Dynamic movement of objects

To move an object, select it and then click within the object's border and hold down the left mouse button while moving the mouse. To drop the object at its new location, let go of the mouse button. During movement, the shape of the object appears as dotted lines to help with repositioning.



Dynamic size modification of objects

To change the size of an object (or group of selected objects) with the mouse, you need to move one of the handles located around the selection. As shown in the following illustration, the outline of the resulting new object appears as a dotted line.



The results will differ depending on which handle you use. If you choose a corner handle, you will resize the object along two axes at the same time. If you use a side handle, the objects will only be resized along one axis.

Note If you press the *Shift* key at the same time as you carry out the resizing operation, the size change will be carried out symmetrically with respect to the two axes, which enables you to keep the height/length ratio of the object.

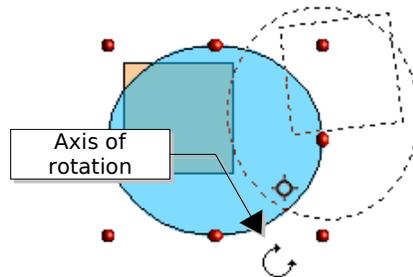
Rotating an object

Rotating an object lets you slant the object along an axis. To do this dynamically, use the red handles, as you do when changing the size of the object.

Note Rotation works in a slightly different way for 3D objects, since the rotation occurs in 3D space and not in one plane. See also page 34 regarding rotation when Edit Points mode is active.

To rotate an object (or a group of objects), drag the red corner handle points of the selection with the mouse. The mouse cursor takes the shape of an arc of a circle with two arrows at each end. A dotted outline of the object being rotated appears and the current angle of rotation is dynamically shown in the status bar.

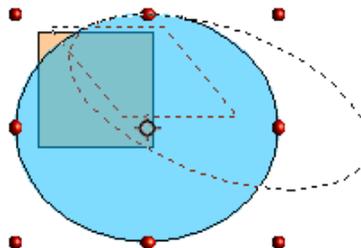
Rotations are made about an axis which is displayed as a small symbol. You can move the axis of rotation with the mouse, as shown below.



If you hold down the *Shift* key during the rotation, the operation will be carried out in increments of 15°.

Inclination

To incline or slant an object, use the red handles located on one of the edges of the selected object. The inclination axis is shown as the nearest handle to the opposite edge.



As with rotation, you can set the inclination to occur as steps of 15° by pressing the *Shift* key while moving the handle.

Editing object points

Draw offers a complete set of tools that let you accurately edit the contour of an object. As we shall see, the functions related to editing points work substantially in the same way as on curves. To make the most of these tools, you need to convert your objects into curves. To do this, select the object, then right-click and choose **Convert > To Curve** or choose **Modify > Convert > To Curve** from the menu bar.

Direct operation

Some objects can be manipulated in Points mode without converting them into curves. When you do this, you act directly on the properties of the object. The objects involved are defined by the presence of one or more extra handle points. When you manipulate this handle (which is generally larger than the other selection handles), you will obtain various effects. The mouse cursor takes the shape of a pointing hand when it passes over one of these points. Here is the complete list of the objects concerned.

Rectangle or square.

You can make the corners more or less rounded.

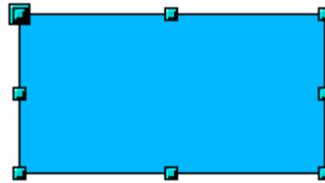


Figure 20 - Simple rectangle

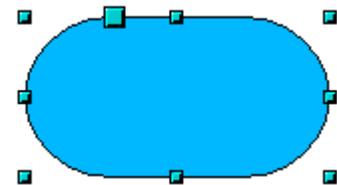


Figure 21 - Rounded rectangle

Arc or ellipse.

You can change the associated angles. Arcs have two control handles.

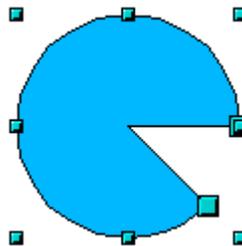


Figure 22 - Pie

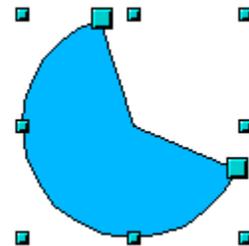


Figure 23 - Moving control points in the pie

Circular or elliptical segments.

You can change the position of the edge of the segment.

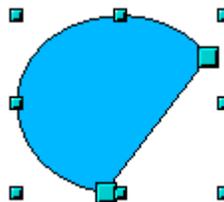


Figure 24 - Circular segment

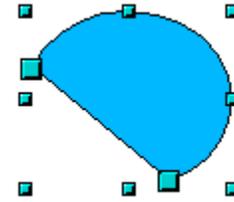


Figure 25 - Moving control points of the segment

How curves work

Editing curves works on the basis of a method called Bezier curves². The complete study of such curves goes beyond this particular work. We shall cover only the basics of this powerful method of editing the contour of an object.



Figure 26 - Definition of a tangent

Editing a point in a Bezier curve uses several mechanisms as represented in the drawing on the left: The main point is called the junction point. Two tangents project from this point, enabling manipulation of the curve that passes through the junction point. The basic idea is that, around the junction point, the two sides of the curve flatten out more or less along the tangent depending upon the size and position of the tangent.

You can create many different shapes by moving either the junction point itself, or one or both of the round handle points at either end of the tangent.

The Bezier Curve Toolbar

When you work in Edit Points mode, use the **Edit Points** Toolbar as shown in Figure 27.

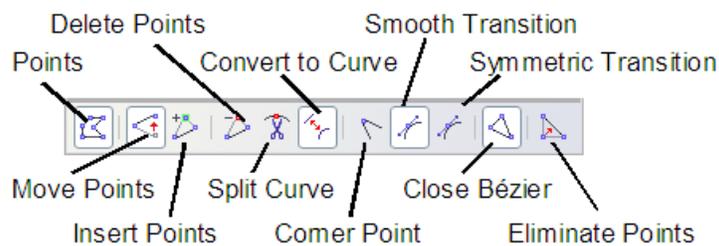


Figure 27 - Edit Points Toolbar

On this toolbar, depending upon the selected object some buttons can be selected or not. When selected, their behavior is different. The role of the three buttons enabling you to choose the type of tangent will be described in the following chapter. The functioning of the other buttons will be described in relation to working examples.

The three kinds of tangent

Three buttons in the **Edit Points** Toolbar let you select the type of tangent and convert from one type to another. Only one of these buttons can be active at any given time.

2 Bezier curves were invented by Pierre Bézier, an engineer working with the Renault car manufacturer, who developed the technique in the 1960s. The technology was intended to make modeling the surface of vehicles easier.



Figure 28 - Symmetrical transition



Figure 29 - Asymmetrical tangent

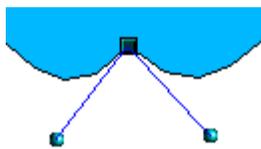


Figure 30 - Inflexion point

The **Symmetric Transition** button  lets you work with a symmetrical tangent. Any movement of one or the other of the handles will be carried over symmetrically to the other one.

The **Smooth Transition** button  lets you separate the lengths of the two parts of a tangent. In the drawing opposite, you can clearly see that the curve is flatter on the longest side of the tangent. This kind of tangent is known as a smooth junction. This button should not be confused with the preceding one, since their representations are fairly similar.

It is also possible to completely detach both sides of the tangent. In this case, the central point is known as the *inflexion point*. Using this technique, you can draw spikes and troughs in objects. Use the **Corner Point** button  to create an inflexion point around the selected point.

Examples

The following examples start from a filled circle. As mentioned earlier, in order to use Edit Points mode, you first need to convert the object to a curve.

You will notice that after conversion, the handles located in the corners of the rectangle have disappeared. This behavior is normal in that the handles which are used in Edit Points mode are located along the trace of the drawn object.

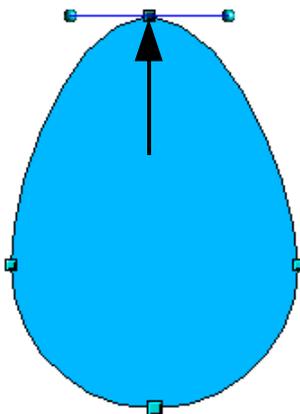


Figure 31 - Moving a junction point

The **Move Points** button  is the default mode when editing points. If it has not been activated, click on the button. When this mode is active, the mouse cursor has the following shape when it is hovered over an edit point:



Movement of a point is one of the easiest manipulations to do. Figure 35 illustrates how an egg can be drawn very easily by starting from a circle and dragging the the top point upwards.

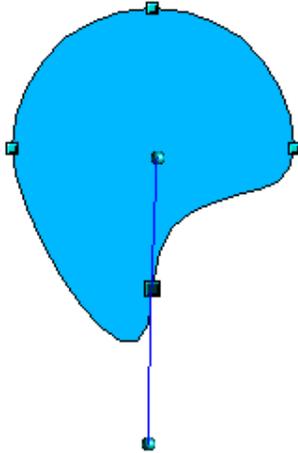


Figure 32 - Rotating a tangent

To change the location of the tangents, just move the circular handles at each end. The mouse cursor then looks like this:

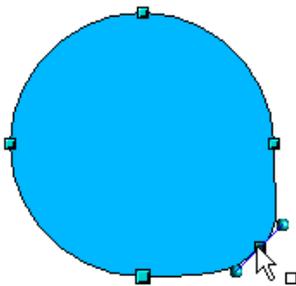
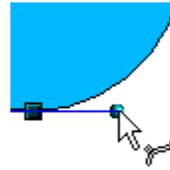


Figure 33 - Adding an edit point to a curve

Use the **Add Points** button  to add an extra edit point to an existing curve. Click on the curve at the spot where you want to insert a point and then move the mouse slightly, in any direction, while holding down the button. If you just click, the new point will not be added.

The tangent attributes associated with the new point depend on the buttons that are selected on the toolbar.

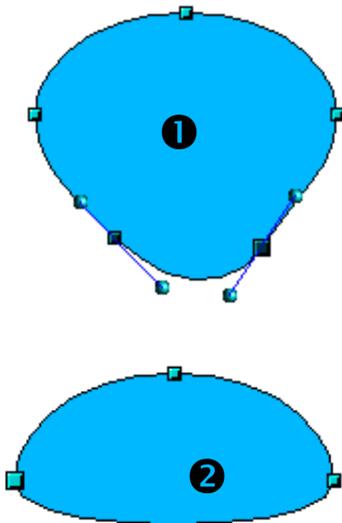


Figure 34 - Deleting points from a curve

The **Delete Points** button  has the opposite effect: it subtracts one or more points from the curve. The resulting curve stretches itself automatically around the remaining points after subtraction.

Select one or more points to delete. You can select several points by holding down the *Shift* key (❶).

Then click the **Delete Points**  button. The selected points disappear from the curve, which then reforms around the remaining points (❷).

You can also delete the selected points by pressing the *Del* key on the keyboard.

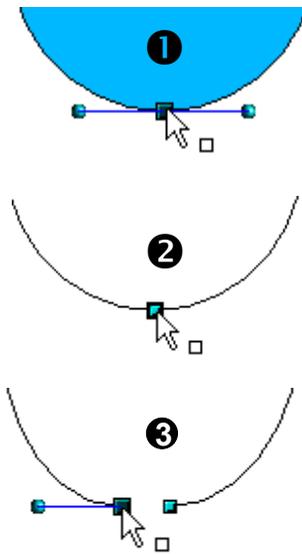


Figure 35 - Cutting a curve

Use the **Split Curve** button  to split or cut a curve at the location of the selected handle. If the object is filled, it will be emptied, because the curve that represented the edge is no longer closed.

Check that you have selected the correct handle (❶), click the **Split Curve** button  (❷) and notice that the object is no longer filled. You can then check, by moving the point, that the curve has indeed been separated (❸).

If you have an open curve, the start point of the curve is larger than the others.

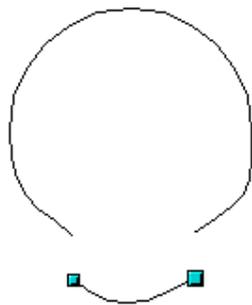


Figure 36 - Moving a segment

You can also separate a curve at several points simultaneously. Just keep the *Shift* key pressed down and select all of the points at which the cut should occur.

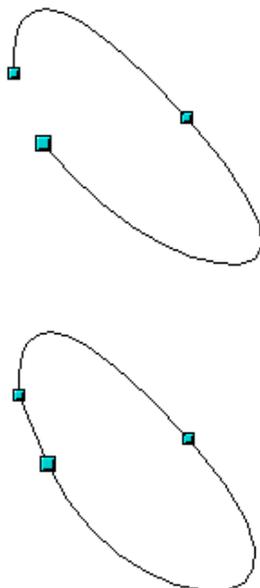


Figure 37 - Closing an open curve

To close an existing curve, select an open curve and click on the **Close Bézier** button  .

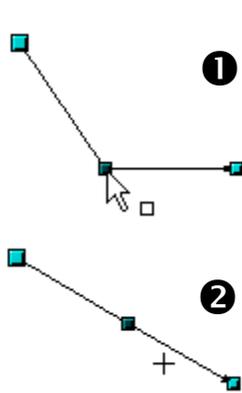


Figure 38 - Using the "select points" switch

The **Select** button  on the **Drawing** Toolbar functions as a switch. It works as follows.

If you have two points linked together by a straight line (you do not need to have a curve between the points) and you insert a new point between them that is set at an angle to the initial straight line (and hence the two endpoints), then:

- If the **Select** button is active, you will have a drawing similar to that illustrated in ❶.
- If the **Select** button is not active, and you move the point you have just inserted to bring it back close to its initial position in the straight line, you will have a drawing similar to that illustrated in ❷.

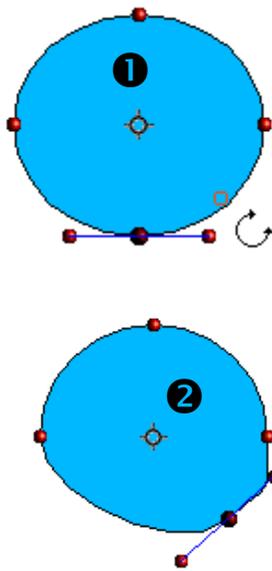


Figure 39 - Moving a point on a curve

The **Effects** drop-down button  on the Drawing Toolbar and the **Rotation Mode after Clicking Object** button  on the **Options** Toolbar can be used in Edit Point mode. In this case, it can be used to move a point around the contour of an object.

Switch into Rotation mode by clicking on either of the rotation buttons. Notice that in rotation mode, all of the tangent points become red dots.

Select the point to be moved and then drag it around the contour while keeping the left mouse button pressed down (❶). When you let go of the mouse button, the point will be moved to the new position (❷).

If you move one of the handles located at the end of the tangents during rotation, you will make the object rotate in exactly the same way as with the usual rotation operations.



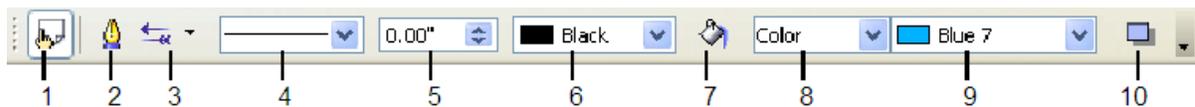
Chapter 4
Editing Objects Part 2:
Changing Object Attributes

Toolbars and menus

To change an object's attributes (such as color, border width, etc) you can use the Line and Filling toolbar or the context menu.

Line and Filling toolbar

If the Line and Filling toolbar is not visible, you can display it using **View > Toolbars > Line and Filling**. From here you can edit the most common object attributes. You can also open the Line dialog by clicking on the  icon and the Area dialog by clicking on the  icon to see more options.



- | | | |
|-----------------------|--------------|------------------------|
| 1 Styles & Formatting | 4 Line Style | 7 Area dialog |
| 2 Line dialog | 5 Line Width | 8-9 Area Style/Filling |
| 3 Arrow Style | 6 Line Color | 10 Shadow |

When you select text, this toolbar changes to show text formatting options.



The context menu

When an object is selected, you can right-click on the object to bring up a context menu. The context menu provides another way to change an object's attributes. The entries with an arrow contain a submenu.

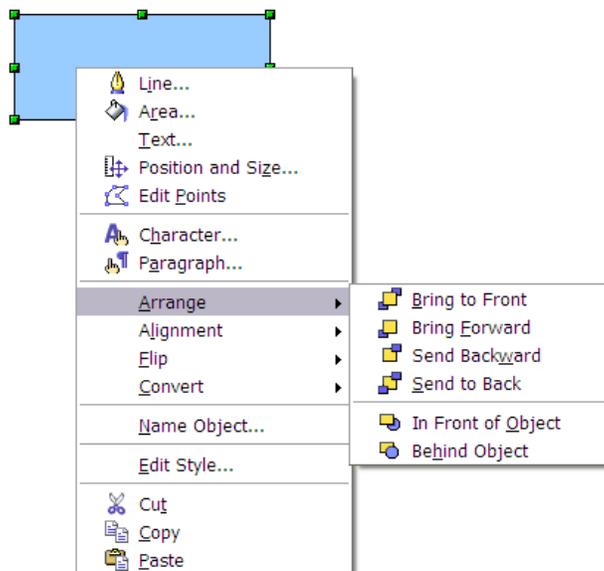


Figure 40: Right-click on an object to see the context menu.

Editing lines and borders

Lines (like arrows) and the borders of an object are managed through the same dialog. An object's border is just one type of line.

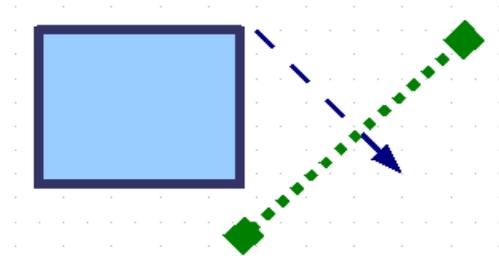


Figure 41: Lines and borders

You can change some properties from the Line and Filling toolbar. To see more options, select the object and click on the  icon or right-click and choose **Line**. This opens the Line dialog.

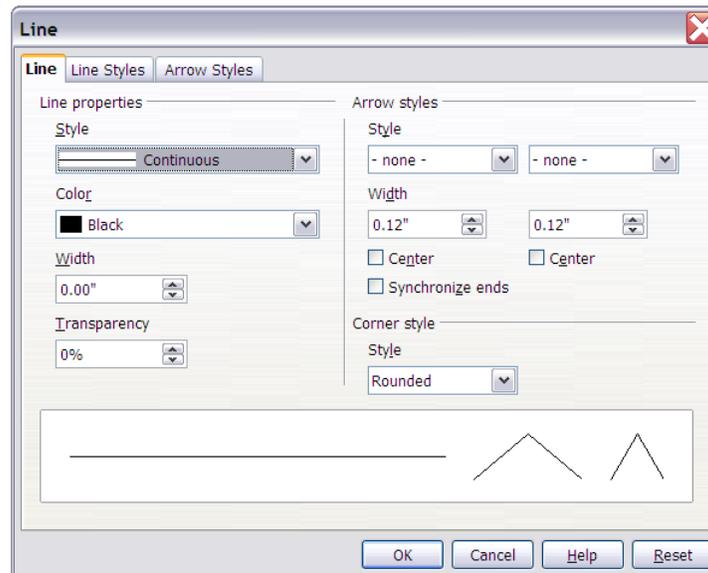


Figure 42: Line dialog (right-click on an object and choose Line).

Common line properties

Most often the property you want to change is the line's style (solid, dashed, invisible, etc), its color or width. These options are all available from the Line and Filling toolbar.



Figure 43: Common line options (style, width, color).

You can also edit these properties from the Line dialog. They are on the first tab, left column. In addition, from the Line dialog you can also change the line's transparency.

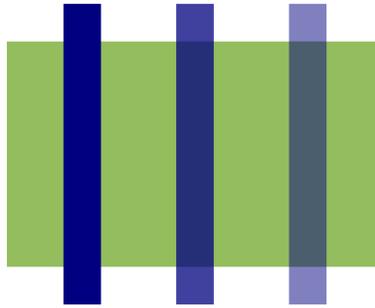


Figure 44: The blue lines have different levels of transparency (0%, 25% and 50%).

Drawing arrows

Arrowheads are a line property. Select a line and click on the  button. This opens the Arrowheads dialog. There are several types of arrowheads available. Each end of the line can have a different arrowhead (or no arrowhead).



Note Arrowheads are only applicable to lines. They have no effect on an object's border.

With the Line dialog you can fine tune the arrow properties.

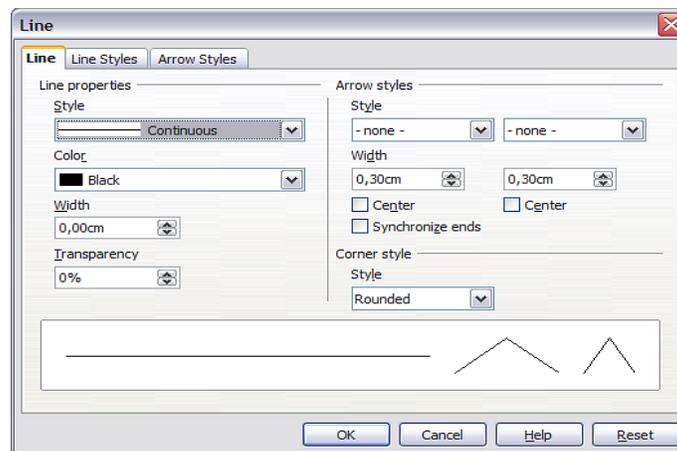


Figure 45: Line dialog.

Synchronize ends forces the two arrow ends to be the same. The **Center** option is easier to see than to explain. It makes the arrow head move outwards to be centered around the end point (see below).

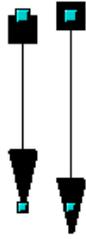


Figure 46: Default arrowheads (left) vs Centered arrowheads (right).

Customizing line and arrow styles

You are not constrained to only using the line and arrow styles provided by default. You can modify the styles, and create your own.

Customizing line styles

On the Line dialog, click on the Line Styles tab. From here you can customize the line styles or create your own (click on the **Add** button to create your own). You can change the length of the dashes, the space between them, and other attributes.

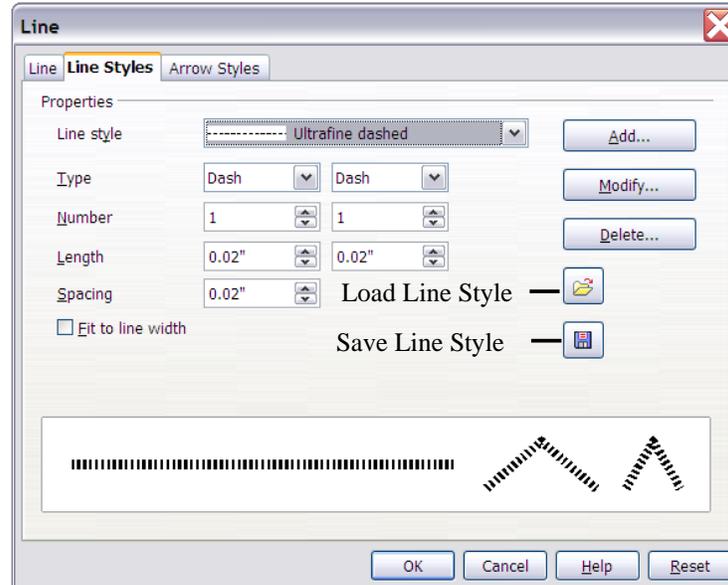
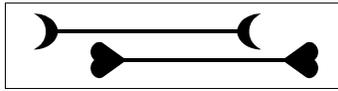


Figure 47: Editing line styles.

Use the Load Line Style and Save Line Style buttons to save a new definition or read one from disk (file extension .sod).

Customizing arrow styles

You can also create your own arrowheads to create some interesting effects, such as:



The first step is to draw a curve with the shape you want for the arrowhead.

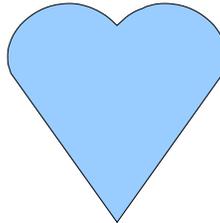


Figure 48: To create your own arrowhead you must first draw a curve.

Note The arrowhead must be a “curve”. A curve is something you could draw without lifting a pencil. For example,  is a curve but  is not a curve.

Select the curve, open the Line dialog, and go to the Arrow Styles tab. Click on **Add**, enter a name for the arrow style and click **OK**.

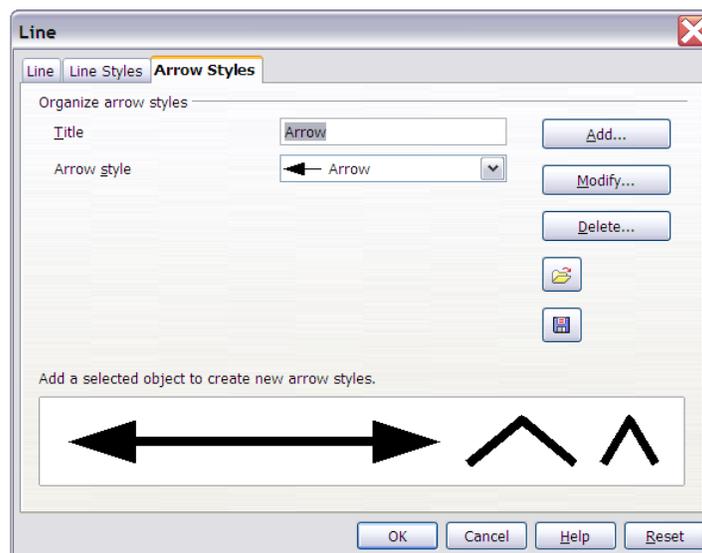


Figure 49: Adding an arrow style.

Now you can access the new style from the Arrow style list (Figure 40).

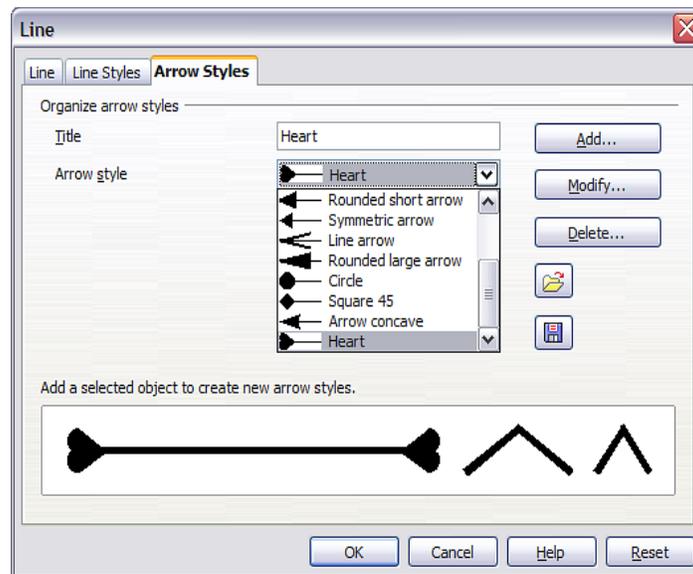


Figure 50: Arrow Styles list.

Editing the inside (fill) of an object

The OpenOffice.org term for the inside of an object is **Area fill**. The area fill of an object can be a uniform color, a gradient, or an image.

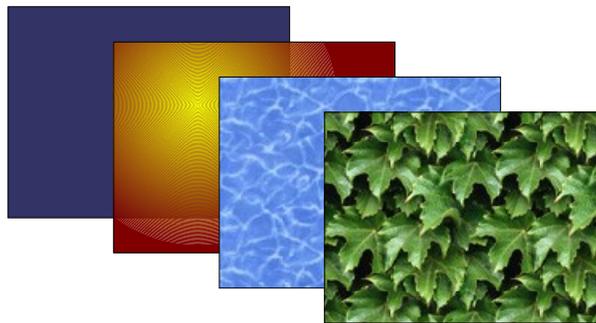


Figure 51: Different types of area fill.

Common fill properties

Most often you will want to use one of the standard fill options, whether it is a color, a gradient or an image. These options are all available from the Line and Filling toolbar.

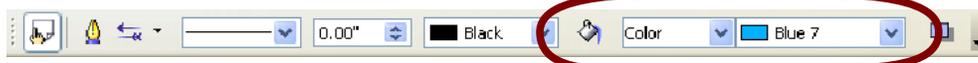
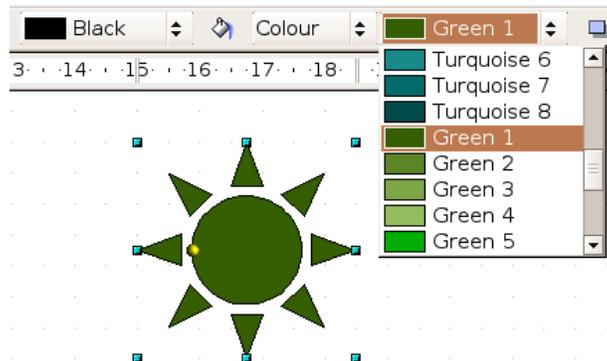


Figure 52: Common fill options.

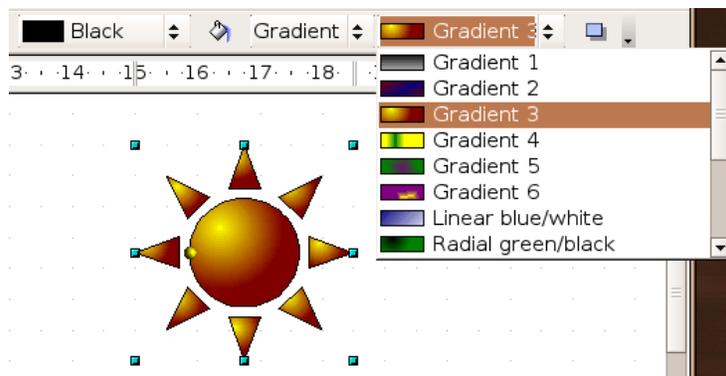
Fill with a uniform color

Select the object you wish to edit. On the Line and Filling toolbar, select **Color** and then choose a color from the right-hand menu.



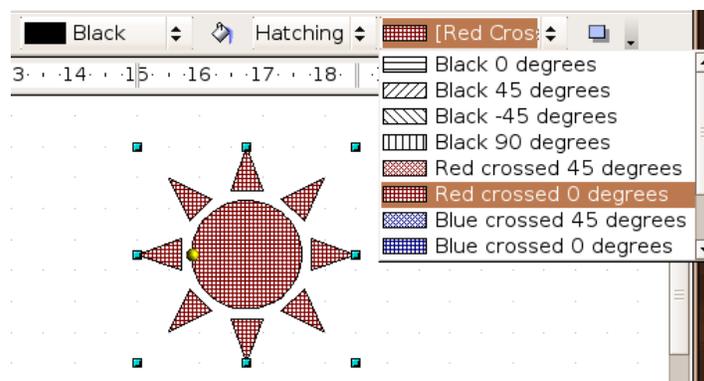
Fill with a gradient

Select the object you wish to edit. On the Line and Filling toolbar, select **Gradient** and then choose a gradient from the right-hand menu.



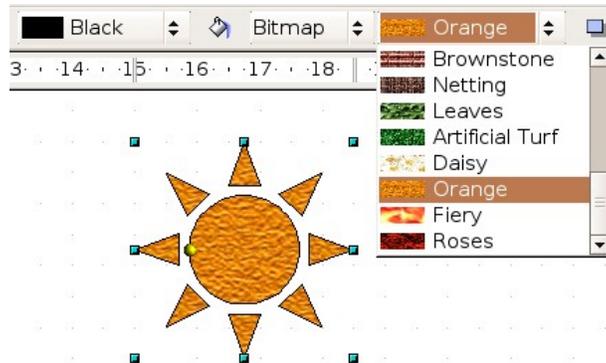
Fill with a line pattern

The OpenOffice.org term for line patterns is Hatching. Select the object you wish to edit. On the Line and Filling toolbar, select **Hatching** and then choose an option from the menu.



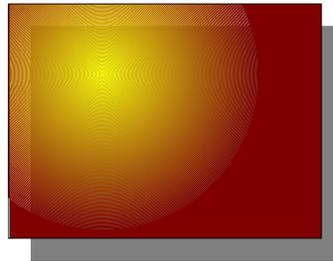
Fill with an image

You can fill an object with a bitmap image (as opposed to a vector graphic image). Select the object you wish to edit. On the Line and Filling toolbar, select **Bitmap** and then choose an option from the menu.



Adding a shadow

In OpenOffice.org shadows are considered an area property. Click on the  icon on the Line and Filling toolbar (next to the area fill functions).



Advanced area fill options

Click on the Area button  to bring up the Area dialog. From this dialog you can fine tune the area fill of an object in greater detail.

Creating your own fill color

Click on the **Colors** tab. From here you can modify existing colors or create your own.

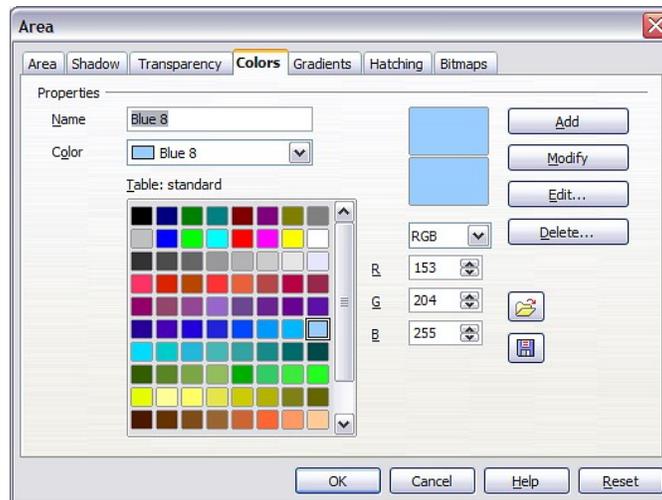


Figure 53: Customizing the color palette.

Every color is specified by a combination of the three primary colors (Red, Green and Blue), hence the notation RGB. Change these values and click on **Add**.

Creating your own gradient

On the Area dialog, click on the **Gradients** tab. From here you can modify existing gradients or create your own.

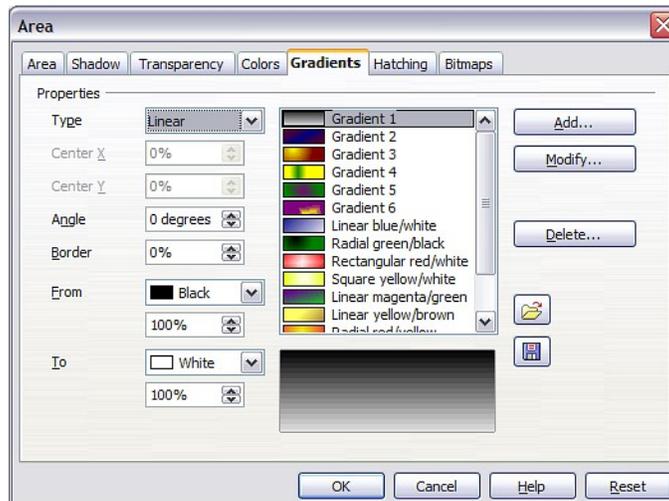
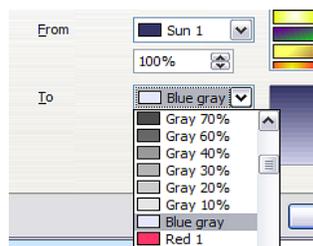


Figure 54: Customizing gradients.

First you need to choose two colors. A gradient works by creating a smooth transition from one color to another.



Then choose a type of gradient. There are several available (Linear, Axial, Radial, etc) and each has different options. For example, a radial gradient has a center you can specify.

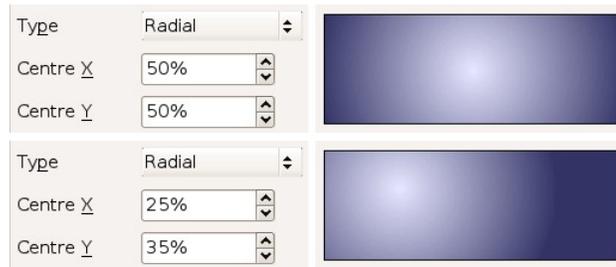


Figure 55: Center option in a radial gradient.

Creating your own line pattern

On the Area dialog, click on the **Hatching** tab. From here you can modify existing hatchings (line patterns) or create your own.

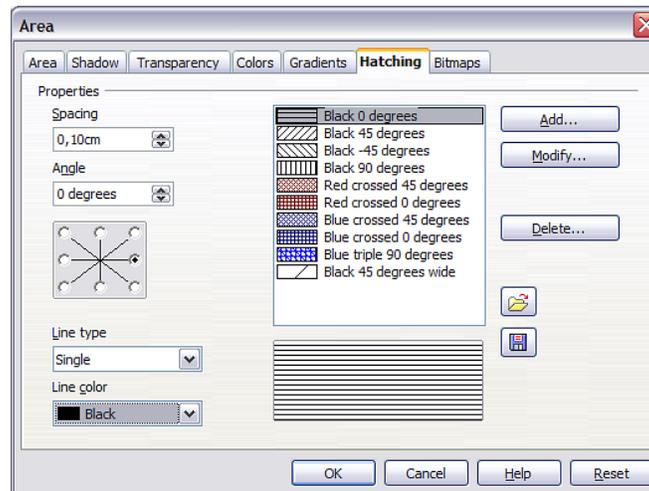
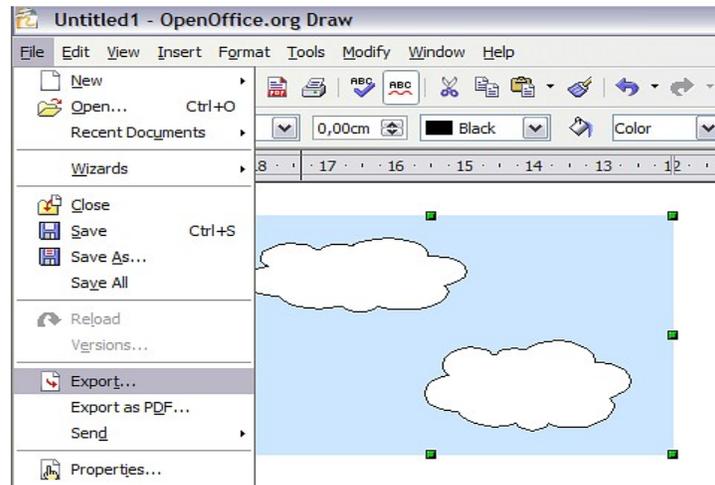


Figure 56: Modifying line patterns (hatchings).

You can customize options like the spacing between lines, the angle and the color of the lines. There is no way to edit the line thickness.

Creating your own bitmap fill

You can add your own bitmap images to the area fill. First you need to create the bitmap image. For example, draw something with Draw and **export** it to PNG.



Now open the Area dialog and click on the **Bitmaps** tab. From here you can add new bitmap images to serve as area fill.

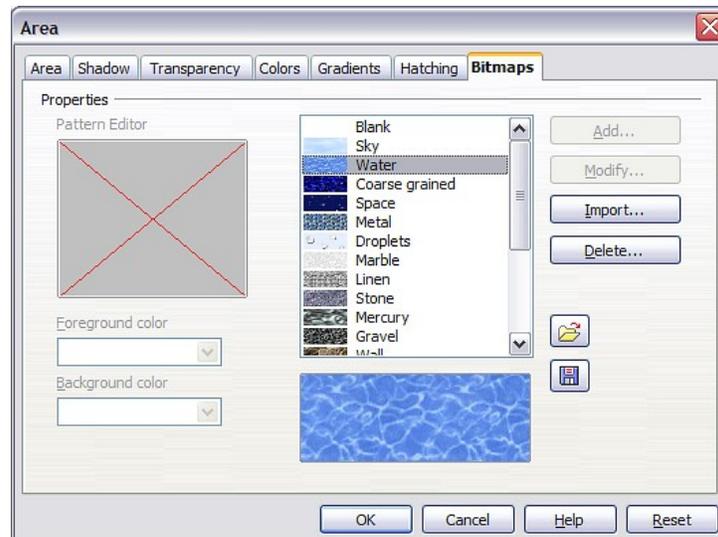
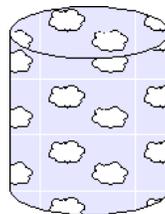


Figure 57: You can add your own bitmap images.

Click on **Import** and choose the file you saved. Now you can use that image as an area fill.



Customizing shadows

First select the object you want to apply a custom shadow to. Open the Area dialog and go to the **Shadow** tab. Here you can customize the shadow's position, distance and color.

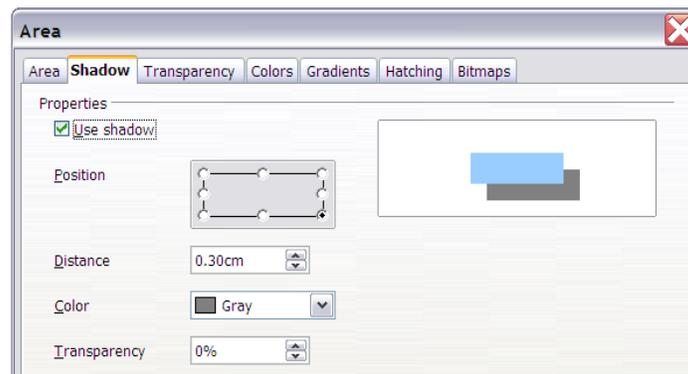


Figure 58: Customizing shadows.

Shadows can also have transparency, so that the shadow will not hide objects behind it.

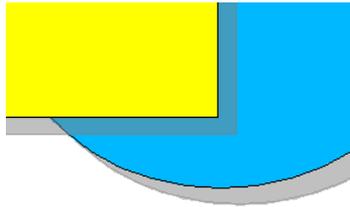
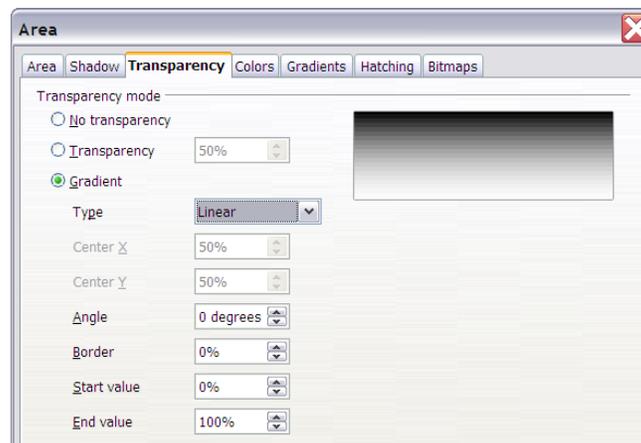


Figure 59: Shadow with 50% transparency.

Adding transparency

You can make objects semi-transparent. On the **Transparency** tab, choose Transparency (for a uniform transparency) or Gradient for a gradient transparency.



Editing size and position precisely

You can move and resize objects using a mouse, but this method is not very precise. There is a tool for setting an object's size and position precisely. Right-click on an object and choose **Position and Size** (or press the *F4* key).

Position and size

Open the Position and Size dialog. On the first tab you can specify the size and position of an object. The position is specified as the (x,y) coordinate of the **base point**. By default, the base point is the top-left corner of the object, but you can change that too on this tab.

TIP The **Keep ratio** checkbox is your friend. Use it to keep the right object proportion.

To “Protect” the position means that the object is fixed in place and cannot be changed. This is useful to avoid moving the object accidentally. Un-protect it to move it again.

TIP Cannot move an object? Check that the position is not “protected”.

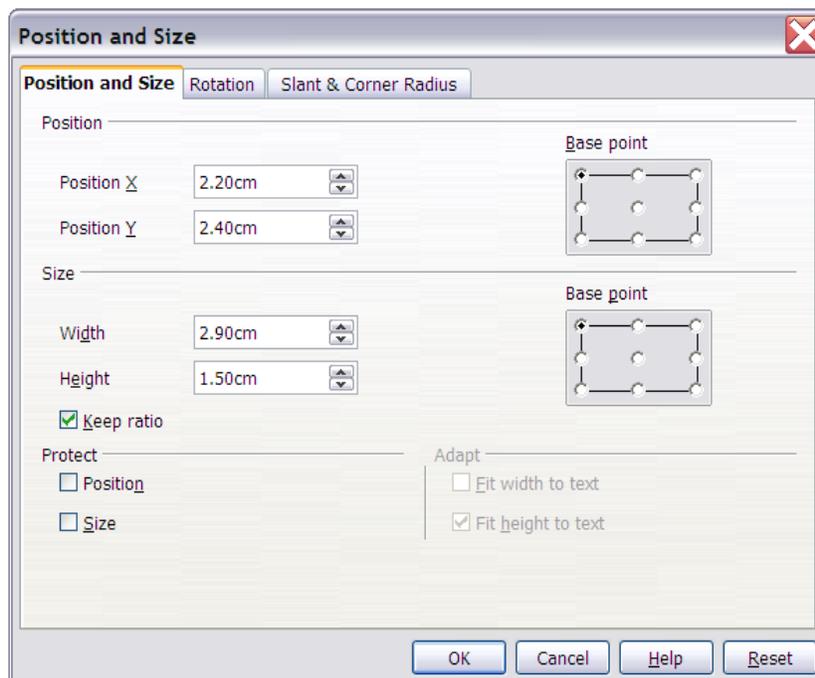


Figure 60: Object size and position.

Rotate objects

Under the **Rotation** tab you can rotate the object. Set the angle and center of rotation (pivot).

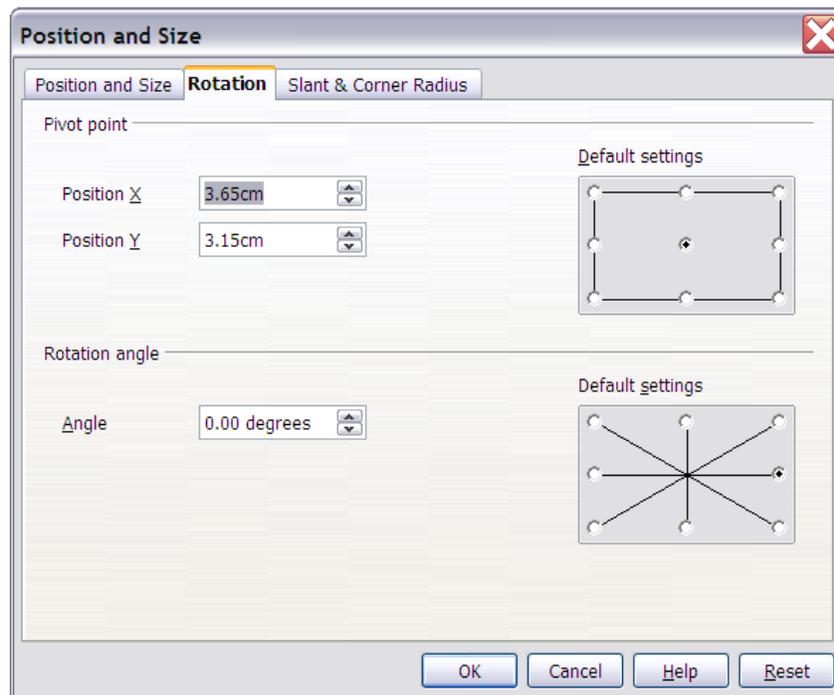
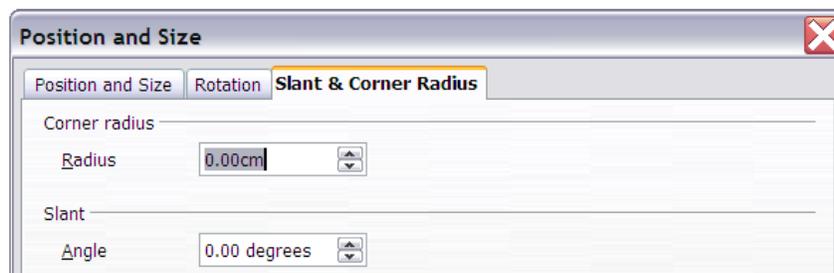


Figure 61: Rotating an object.

Rounded corners and shear (slant)

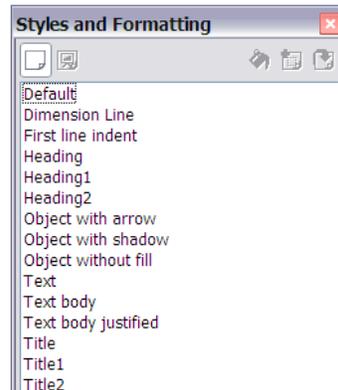
OpenOffice.org considers rounded corners and shear a “position and size” property. Both are configured on the Position and Size dialog, under the **Slant & Corner Radius** tab.



The corner radius gives rounded corners (the greater radius the more rounded). The Slant angle gives a shear. 0 degrees means “no change”, and higher degrees give more shear.

Using styles

Suppose that you want to apply the same area fill and border to a set of objects. You can define a style with this combination and apply that style to multiple objects. For an introduction to styles, see the chapter titled “Introduction to Styles” in the *Writer Guide*. Click on the  icon on the Function Bar or press the *F11* key to open the Styles and Formatting window.



Creating a new style

Select an object and customize the area fill and border. When you are satisfied, click on the  icon on the Styles and Formatting window. This defines a new style based on the selected object. Type a name for the new style and click **OK**.

Applying a style

Once the new style is defined, select another object and double-click on the style name you defined. The new object will acquire the area fill and line properties of that style.

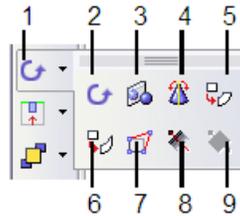
TIP What happens if I modify a style after it has been applied?
 Then every object with that style is updated automatically.

How to modify a style

Modifying a style is similar to creating a new style. Select an object **with that style** and change the area and line properties. When satisfied, click on the Update Style icon  .

Special effects

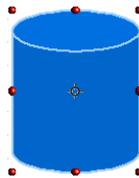
First make sure that the **Drawing toolbar** is selected (**View > Toolbars > Drawing**). On the Drawing toolbar, locate the **Effects** icon . Click on the **arrow** next to that icon. This opens a submenu with all the special effect tools (see below).



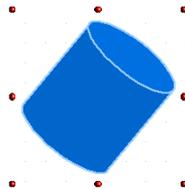
- | | | |
|-----------|-------------------------------|----------------|
| 1 Effects | 4 3D Rotation Object | 7 Distort |
| 2 Rotate | 5 Set in Circle (Perspective) | 8 Transparency |
| 3 Flip | 6 Set to Circle (Slant) | 9 Gradient |

Rotating an object

Click on the  icon to select the rotate tool. Then select an object. The selected object will have red handles instead of the usual green handles.

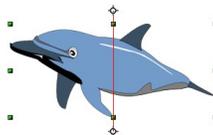


Grab one of the handles and move it to rotate the object. The black circle in the middle of the object is the pivot (center of rotation). You can move the pivot with the mouse.



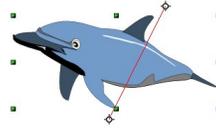
Flip an object

Select an object and click on the flip icon . You will see a red line through the middle.

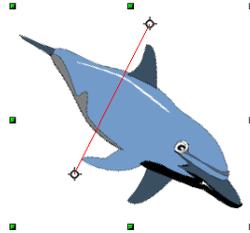


Special effects

This red line is the **axis of symmetry**. The object will be reflected about this line. You can move the ends of the line with your mouse.

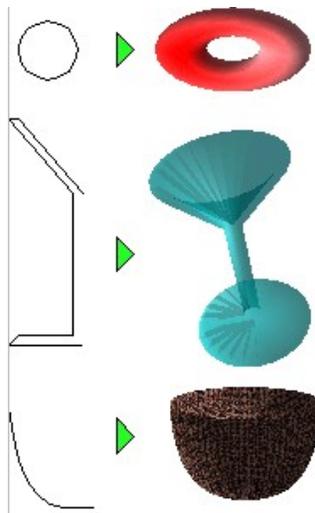


Then grab one of the green handles and move it across to the other side of the red line.

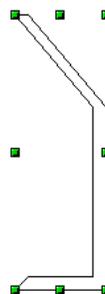


3D rotations

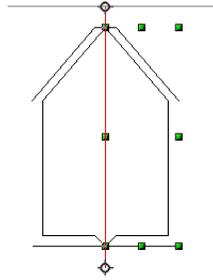
Imagine that you take a 2D object and rotate it around an axis to create a 3D object. Like this:



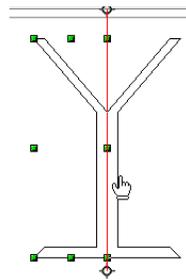
Start by drawing the 2D “profile” of the object.



Click on the 3D rotation icon . You will see a red axis with a handle at each end. This will be the axis of rotation for the 3D figure.



Move the ends of the axis line (the handles).



Click outside the image to complete the rotation.

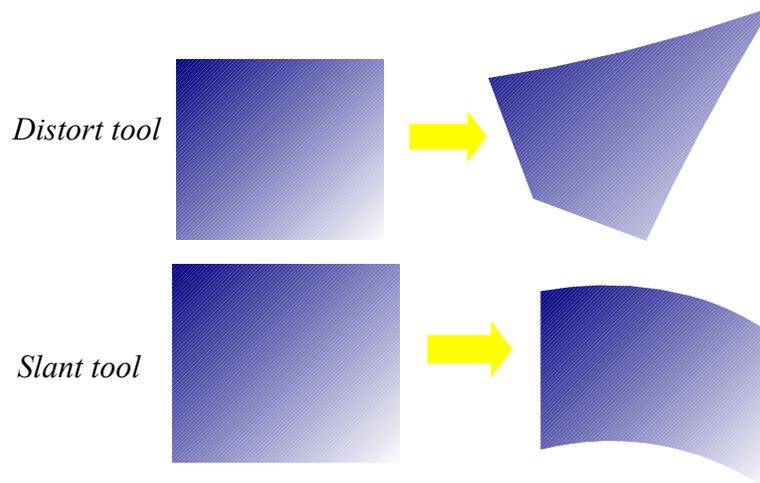


To complete the effect, change the area fill to some color and add some transparency. The transparency makes the object look like it is made of glass.



Distorting an image

There are two tools that let you drag the corners and edges of an object to distort the image.



Select an object and click on the distort icon  or the Set to circle (slant) icon . If these icons are not visible, you can display them using **View > Toolbars > Mode**. OpenOffice.org will ask you if you want to transform the object to a curve. This is a necessary step before distortion, click **Yes**. Then you can move the object handles to stretch it.

Note Transforming an object into a curve is a safe operation, but it cannot be reversed other than by clicking the **Undo** button.

Dynamic gradients

A “transparency gradient” is something like this. The direction and degree of an object’s fill color changes from opaque to transparent. In a regular gradient, the fill changes from one color to another, but the degree of transparency remains the same.

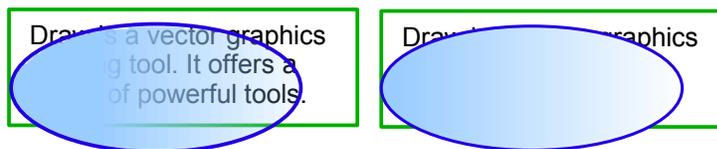


Figure 62: Transparency gradient (left) vs regular gradient (right).

To define a transparency gradient, select an object with a color fill, and then click on the transparency icon . A dashed line connecting two small squares appears on top of the object, as shown in Figure 63. Click outside the object to set the gradient.

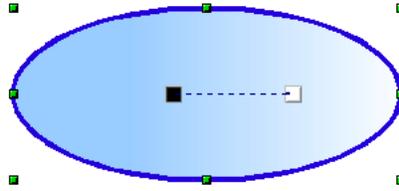


Figure 63: To modify a transparency gradient, move the squares.

To define a regular gradient, select an object, choose a gradient fill from the Line and Filling toolbar. The gradient icon  is now active. When you click on the gradient icon, a dashed line connecting two squares appears on the object, just as it does for a transparency gradient.

Move the two squares to modify the gradient. You can define the direction of the gradient (vertical, horizontal, or at any angle) and the spot at which the transparency begins.

Note If the transparency and gradient icons are not visible, you can display them using **View > Toolbars > Mode**.

Moving the squares will have different effects depending on the type of gradient. For example, for a linear gradient, the start and end squares of the gradient will always be situated to either side of the center point of the object.



Chapter 5
Managing 3D Objects
and Bitmaps

Managing 3D Objects

Even though OpenOffice.org does not claim to rival leading 3D image software packages, it contains a number of tools that let you create powerful 3D drawings.

Rotating 3D objects

The rotation function also works with 3D objects, but differently from flat objects. Rotation acts in a three-dimensional space as shown in Figure 64.

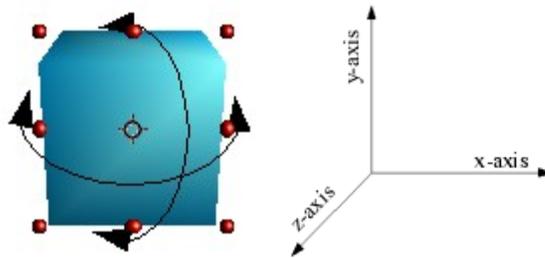


Figure 64: Rotation of a 3D object

For 3D objects, the axis of rotation is indicated by the symbol \odot .

To do this

- Rotate the object about the x-axis.
- Rotate the object about the y-axis.
- Rotate the object about the z-axis (the axis coming out of the page).
- Re-locate the axis of rotation.

Do this

- Move the left and right (edge) handles.
- Move the top and bottom (edge) handles.
- Move the corner handles.
- Move the \odot symbol.

3D effects

3D objects have their own configuration dialog, called the **3D Effects** dialog. The dialog contains several pages that can be selected through the buttons at the top. This chapter discusses each of these pages in turn.

To display the 3D Effects dialog, right-click on the object and select **3D Effects**.

You can use the **Material** page of the 3D Effect dialog to apply 3D attributes to any 3D object (Figure 65).

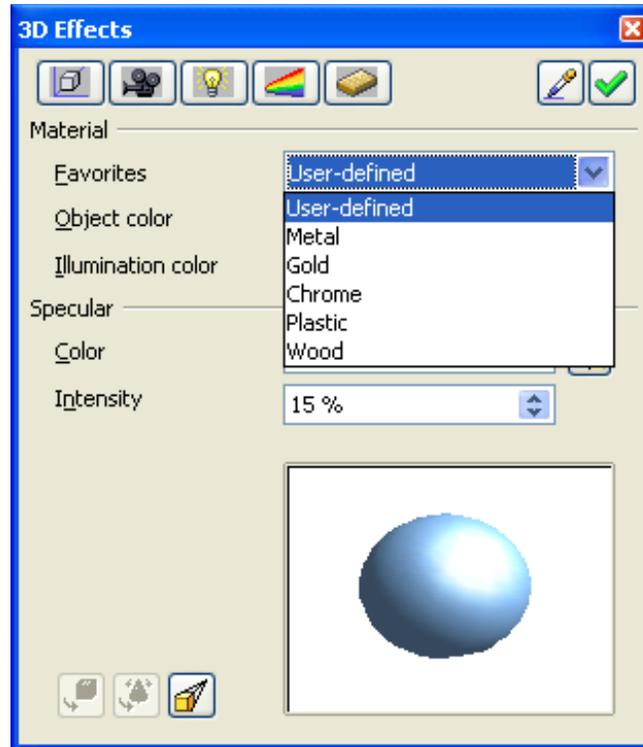


Figure 65: The 3D Effects dialog

To apply a 3D attribute to a selected object, choose one of the attributes from the **Favorites** zone and click the **Assign** icon

Note Only the attributes are applied; no objects are transformed. For example, a circle will not turn into a torus if you click on the first defined effect in the Favorites drop-down menu.

If the selected object is not a 3D object, it will be converted into one. The operation that converts a 2D object into a 3D object is called an *extrusion*. This mechanism lets you create a variety of objects.

To apply a 3D attribute to a 2D object:

- 1) Choose one of the attributes from the **Favorites** zone and click on the **Assign** icon .
- 2) If you do not have the 3D Effects dialog open, right-click on your 2D object, and choose **Convert > To 3D**, or go to **Modify > Convert > To 3D**.

An example is shown on the right.

- 1) Draw a circle.
- 2) Go to **Modify > Convert > To 3D** to change the circle to 3D.



Geometry Management page

Use the **Geometry** page (Figure 66) to define the geometric settings that are linked to a 3D object. To access this page, right-click on the object, and select **3D Effects**. The 3D Effects dialog opens, then click on the **Geometry** icon  .

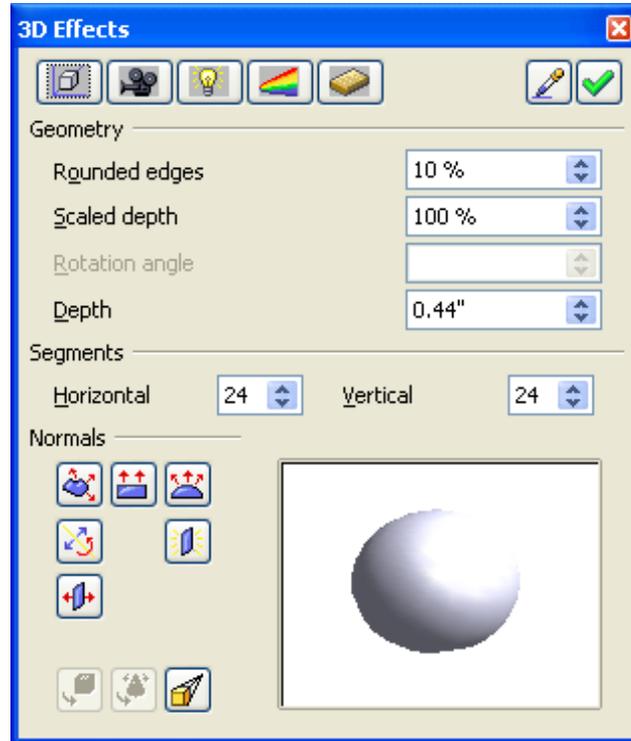


Figure 66: The Geometry Page

The **Rounded edges** parameter applies when you turn a 2D shape into a 3D shape. It defines the degree of rounding of edges during conversion, as shown in Figure 67.

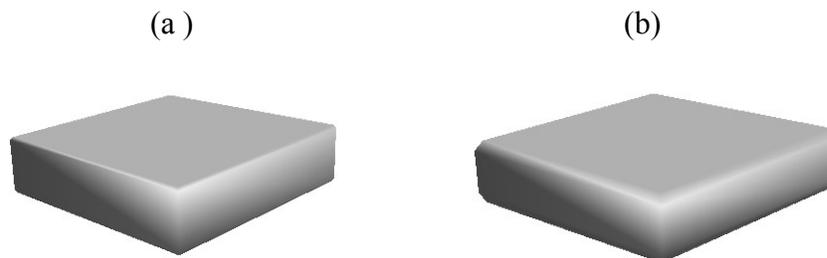


Figure 67: Rounded edges with (a) 0% rounding and (b) 30% rounding

This parameter is particularly useful for texts that have been extruded into 3D shapes.

The **Scaled depth** parameter defines the dimension ratio between the front face and the back face of the object. By default, the scale is set to 100%, which means that both faces will have the same dimensions. If you set the scaled depth to 50%, for example, with the cube above, you get the object shown in Figure 68.

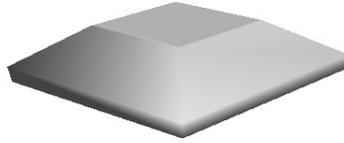


Figure 68: Scaled depth of 50%

Here you can see that the front face has a length and breadth that is 50% smaller than the back face. It is even possible to set the scaled depth to more than 100% and thus have a front face that is larger than the back face.

The **Rotation angle** parameter is useful for some shapes that are made by revolving a profile about an axis. Use this parameter to decide whether or not the rotation will be complete (360°). Figure 69 shows what you can obtain with a half-sphere and a value of 270°.

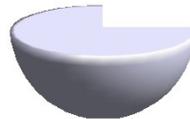


Figure 69: Rotation angle of 270°

Use the **Depth** parameter to define the depth of a 2D object that has been transformed into a 3D object. This value can be changed at any time. The parameter does not apply to 3D primitives.

Use the **Horizontal** and **Vertical Segments** parameters to define the number of segments for the rounded shapes. The higher the number is, the smoother the surface of the shape will be, but the longer it will take to display. In Figure 70 the left-hand sphere is made up of 10 horizontal and vertical segments, whereas the right-hand sphere is made up of 25 segments.

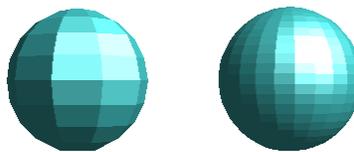


Figure 70: 10 line segments (left) and 25 line segments (right).

The icons in the **Normals** zone let you modify the normals of 3D objects. A *normal* is a straight line that is directed perpendicularly across the surface of an object.

Figure 71 shows a few normals drawn on a sphere with 10 segments.

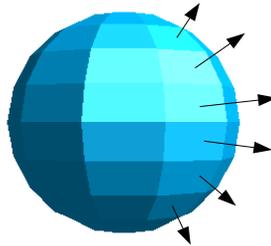


Figure 71: Object Normals

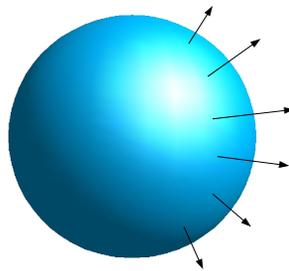
Normals let you define the exterior aspect of an object and its interactions with textures and lighting. When you change the normal mode (also known as the *projection mode*), you act on the geometry of an object. Here is a description of the functions that act on normals.



Object-Specific: Lets you choose the object-specific rendering that is best suited to the object.



Flat: Lets you create smooth surfaces. Where a sphere is concerned, we obtain a perfect sphere:



Sphere with smooth faces

Here in the drawing above the normals have been kept drawn on the shape so that you will remember that the faces are still present even if they cannot be seen.



Invert Normals: Lets you invert the normals.



Spherical: Corresponds to the projection mode illustrated above, wherein each of the faces is visible.



Double-Sided Illumination: Lets you light an object from the inside and outside.



Double-Sided: Lets you create double or single-sided 3D objects. When the extrusion function is used, the resulting objects are closed (for example, a square will give a cube). If you use this function, Draw will produce open objects.

Shading Management page

The **Shading** page (Figure 72) covers the parameters linked to the shading of objects (such as shading type and shadow).

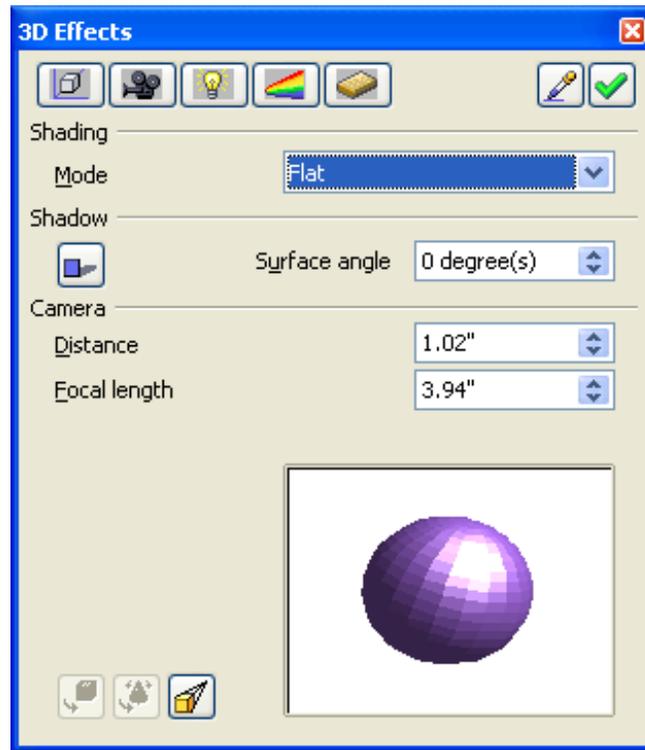


Figure 72: The Shading Page

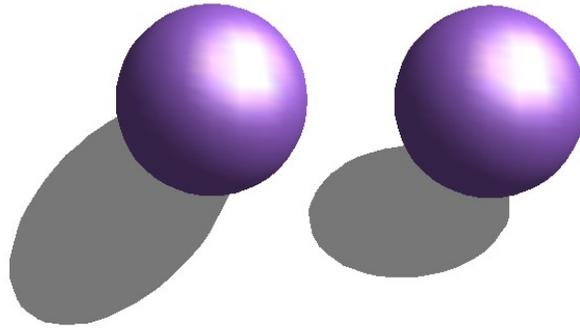
The **Shading mode** refers to the method that Draw uses to render objects and their interaction with light. Draw offers three choices: Flat, Phong and Gouraud.

- *Flat* is the quickest technique, but it also gives the worst results (all of the faces are visible).
- *Phong* is an intermediate technique.
- *Gouraud* renders objects with the highest quality.



In the above drawing, flat shading (left) is clearly less attractive, whereas it is more difficult to distinguish between Phong (middle) and Gouraud shading (right). One might simply note that the shading appears to be more realistic with Gouraud shading than with Phong shading.

The **Shadow** area of the dialog lets you display shadows under 3D objects. By changing the surface angle, you can obtain shadows that look more elongated or less elongated:



The first 3D sphere has a shadow with a surface angle of 0° (the paper is vertical) and the second has a surface angle of 45° (paper inclined at 45°).

You can also see that the shadow is displayed in such a way that it corresponds to the angle of illumination of the sphere.

Use the other parameters on this page to define the focal length and distance of the virtual camera that displays the 3D object. The closer the camera (focal length, distance) is, the greater the effect of perspective will be.

Illumination Management page

Use the **Illumination** page (Figure 73) to define the way in which 3D objects are illuminated. Contrary to most 3D drawing software, the parameters can be set for each object independently of the others. However, in order for the drawing to be coherent, set these parameters the same way for all 3D objects.

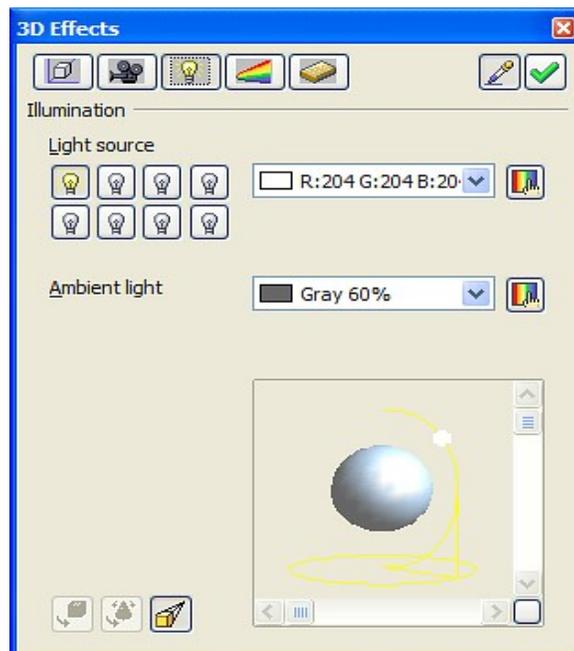


Figure 73: The Illumination Page

On this page you can select eight different light sources to illuminate the currently selected object. For each light source, you can specify its color and position with respect to the object.

To choose the current light source, use the buttons representing a small light bulb. The bulbs that are lit correspond to an active light source and those that are not correspond to an inactive light source. Double-click on a button to active or deactivate the corresponding light source. A button that appears pressed down indicates the currently selected light source.

You can choose the color from the drop-down list or by using the small button on the right of the list. Define the position of the light source by moving the blank dot with the mouse or the slider bars on the small inset drawing located in the lower area of the **Illumination** page. Then click the **Assign** icon  to implement the light source setting.

Textures Management page

Before using this page, we will look at the two ways you can apply bitmapped images to an object.

- Right-click on the object and select **Area**, then on the **Bitmaps** tab select a bitmap motif.
- Use the **Gallery** (Figure 74). To apply a texture, first display the Gallery (**Tools** > **Gallery**). Then drag and drop the motif with the mouse while pressing the *Shift+Control* keys.

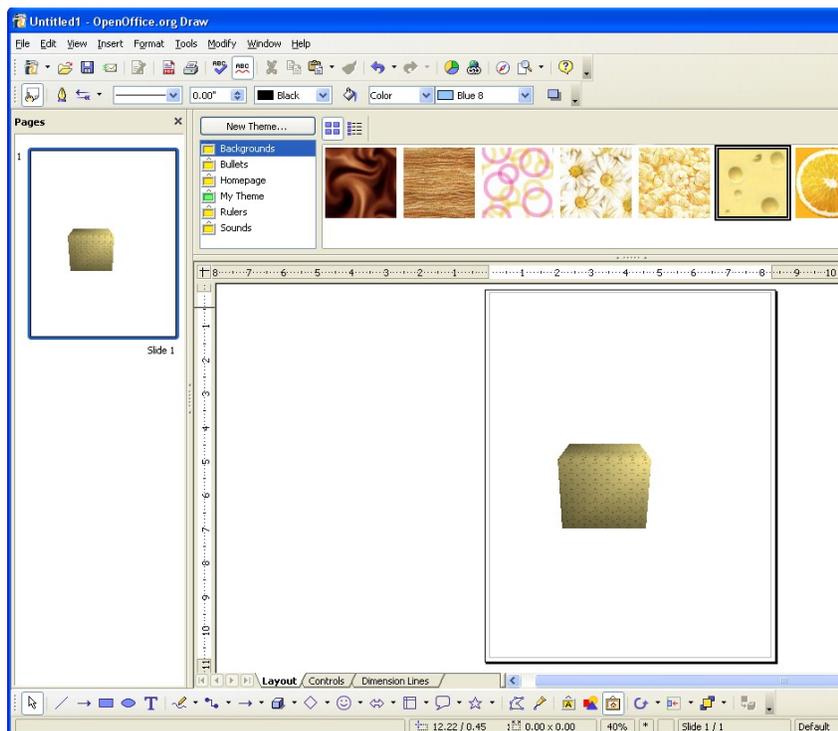


Figure 74: Applying a texture

The first method is better in that you can easily choose the number of tiles of the bitmap motif to be applied. To open the Bitmap Application settings dialog (Figure 75), select **Format** > **Area** and make your background edits there.

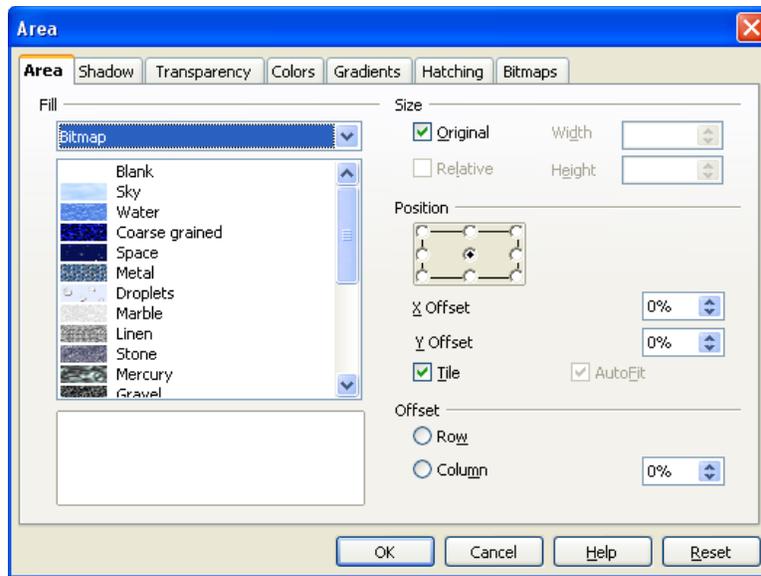


Figure 75: Bitmap application settings

Note The checkbox **Tile** in the dialog lets you specify whether you want the motif to be repeated (as in the cube top left) or not (as in the bottom right cube).

We have just seen how to change the number of tilings of the bitmap pattern. Now we will look at the method that Draw uses to project the image onto the object. This is done on the **Textures** page (Figure 76). The **Textures** page lets you manage the properties of a bitmap texture applied to an object.



Figure 76: The Textures Page

Type lets you choose to project the image in Black & White or in Color.

Mode tells Draw whether you want to manage lighting and shadow on the selected object. In Figure 77 the first sphere corresponds to the setting **Only Texture** and the second (more realistic) to the setting **Texture and Shading**.

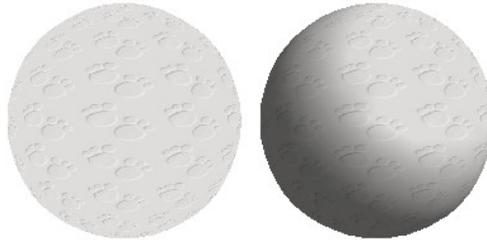


Figure 77: Example of texture settings

The six **Projection X / Y** icons specify the type of projection used to draw the motif on the object. The settings on the X and Y axes are **Object-Specific**, **Parallel** and **Circular**. Generally, the default setting of Object-Specific can be left as it is because it gives the best results.

Material Management page

The **Material** page (Figure 78) concerns the use of materials on the surface of 3D objects. Use this page to give object the appearance of commonly used materials such as plastic or metal.

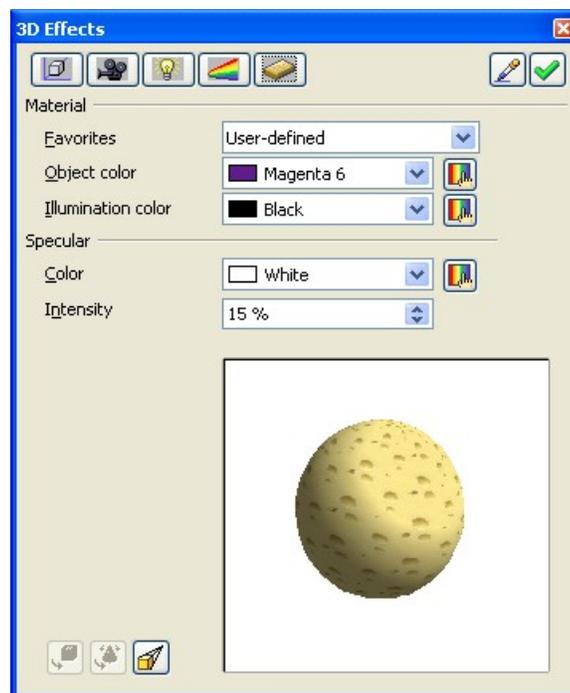


Figure 78: The Material Page

Use the drop-down list **Favorites** to choose a predefined texture. The default choices are Metal, Gold, Chrome, Plastic and Wood (see Figure 79).



Figure 79: Texture examples. From left to right: Metal, Gold, Chrome, Plastic and Wood.

The parameters you need to define are the default color and the lighting of the object, and the color and intensity of the spot. The spot shows how the light reacts on the object.

Note that materials are compatible with textures. The use of materials generally lets you accentuate the effect of any applied textures.

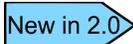
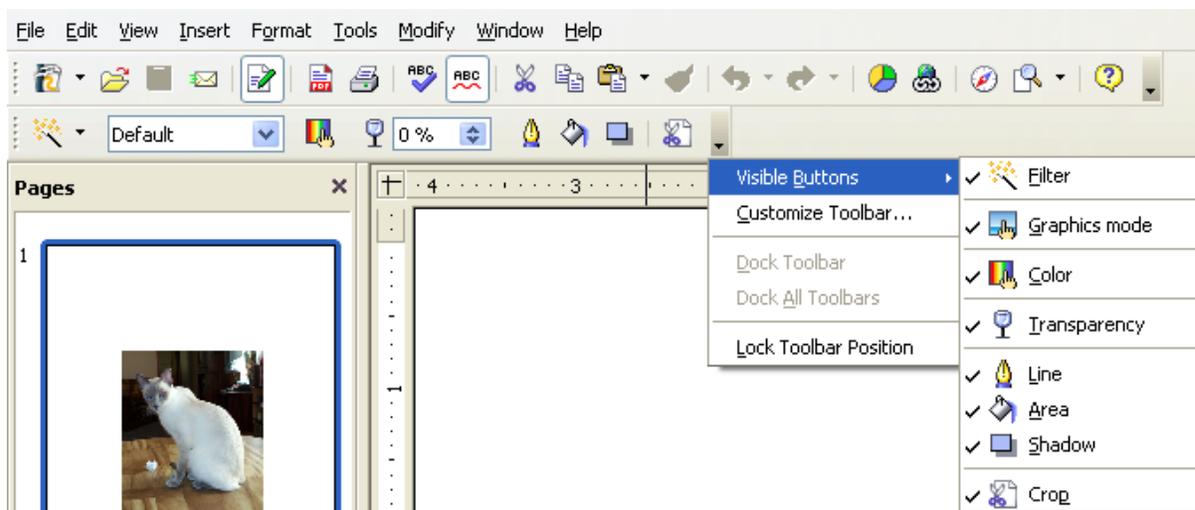
Managing Bitmaps

Up to now, we have only dealt with vector drawings. Draw also includes functions for managing bitmaps, such as photographs.

We will not deal very much with the bitmap editing tools since other programs (such as The Gimp) have more advanced functionality.

The Picture Toolbar

When a bitmap image is selected in the workspace, the **Picture** toolbar is displayed.



The **Bitmap Image** toolbar has been replaced with the **Picture** toolbar in OoO 2.0. The filters are also located on this toolbar.

Note Any changes you make to a bitmap will change only a copy of the image file in your document. The original image will not be modified.

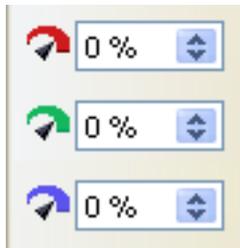


Graphics Mode: The type of display for the image. The four options are:

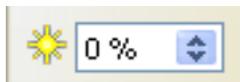
- Default.
- Grayscale: displays the bitmap with 256 levels of gray.
- Black/White: transforms the image into a black and white representation.
- Watermark: fades the colors of the bitmap image to make it extremely pale.



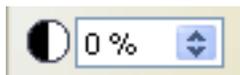
Color: The control menu is visible when you click on the Color button. Use the color controls to modify the level for each of the primary colors in the image.



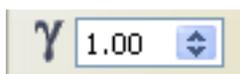
You can set each color level from –100% (no color) to +100% (full intensity).



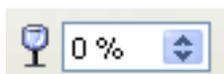
Adjust the brightness of the image from –100% (totally black) to +100% (totally white).



Adjust the contrast of the image from –100% (least contrast) to +100% (most contrast).



Adjust the gamma level from 0.10 to 10. This control lets you effectively set the monitor balance for an image created on one computer when the image is loaded on another computer.



Adjust the transparency of the image from 0% (opaque) to 100% (totally transparent).



Use this tool to crop an image. When you click this button, the Crop dialog (Figure 80) appears.

In the Crop dialog (Figure 80) you can do the following:

- Cut out a part of the contour of the image. To do this, change the values in the **Crop** section (such as **Left** and **Right**). The preview display area shows the new image frame.
- Change the scale of the image up to 100%.
- Change the size of the bitmap in the current measurement unit.

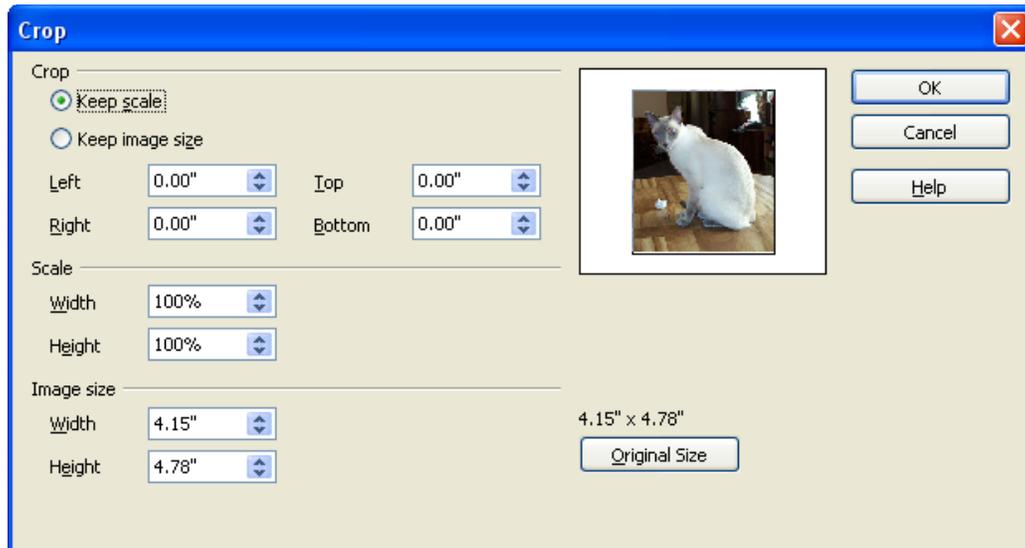


Figure 80: Cropping an image

Bitmap Image Management Palette

Use the leftmost button on the **Picture** toolbar to display and pick the bitmap filters. OpenOffice.org offers 11 filters.



Inverts the colors in an image. The result looks like a color negative. This filter is useful for resetting the colors in a scanned negative.





Smooths an image.



Sharpens an image.



Removes noise pixels from an image.

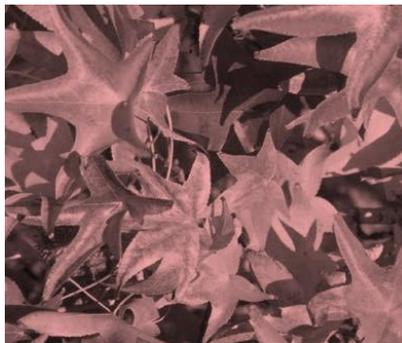




Applies a solarization effect to an image. You can choose the degree of solarization for the image using a dialog box.



Applies an aging effect to the image. You can set the degree of aging using a dialog box.



The Posterize filter lets you reduce the number of colors in an image. You can choose the number of colors in the dialog box. The result is an image that looks a bit like a drawing.





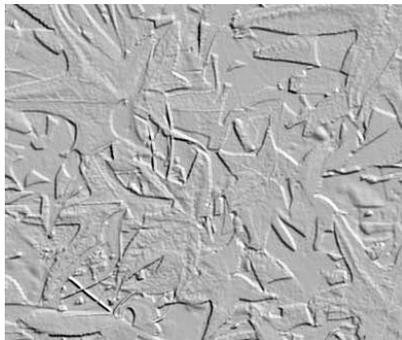
The pop art filter applies an effect that transforms the image into something resembling a pop art drawing:



Simulates a charcoal drawing effect



Applies a relief aspect to your image.





The mosaic filter transforms the image into a pixellated mosaic.





Chapter 6
Combining Multiple Objects

Grouping and combining objects

Using Draw, you can combine drawing objects together in two distinct ways: grouping and combining. These two methods allow you to treat multiple objects as one unit, or to merge objects to form a new shape.

Grouping is like putting objects in a container. You can move them in group and apply global changes to them. A group can always be undone and the objects that make up the group can always be manipulated separately.

A *combination* is a permanent fusion of objects leading to a new object. The original objects are no longer available as individual entities and the operation is irreversible.

TIP To select multiple objects, click on each object while holding down the *Shift* key or click the **Select** icon (on the Drawing toolbar) and draw a rectangle around the objects.

Grouping objects

Group by common selection

When several objects are selected, any operations you carry out are applied to all of the objects. For example, you can rotate a group of objects in its entirety. Groups obtained through common selection of several objects are undone as soon as you click outside the group. However, you can group objects and keep those selected objects grouped together.

Maintaining groups and undoing groups

To group selected objects, right-click and choose **Group** from the context menu. You can also use the keyboard shortcut *Control+Shift+G* or choose **Modify > Group** from the menu bar.

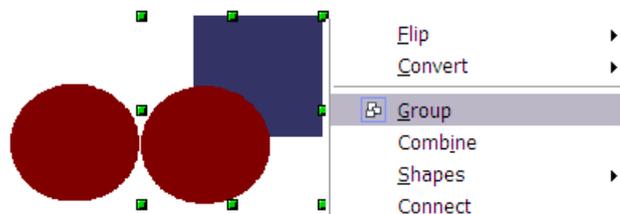


Figure 81: Grouping objects from the context menu.

When objects are grouped, any editing operations carried out on that group are applied to all members of the group. If you click on one member of the group, the whole group is selected.

The objects of a group maintain their individuality. To undo a group, right-click and choose **Ungroup** from the context menu or choose **Modify > Ungroup** from the menu bar.

Editing individual objects in a group

You can always edit a member of a group individually without breaking the group. To do this, right-click and choose **Enter group** or double-click on the group.

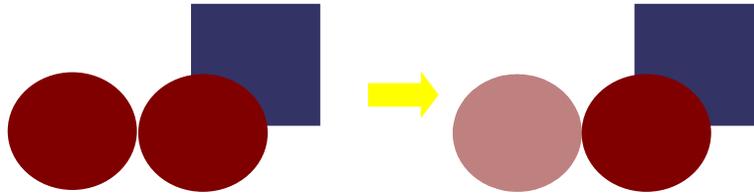


Figure 82: When you enter a group, objects outside the group can not be selected and are grayed out.

Once inside the group, click on any object to edit it.

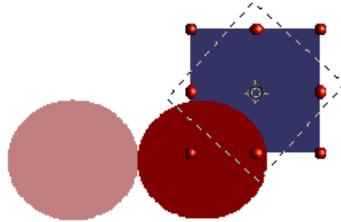


Figure 83: Editing an object inside a group.

To leave this mode, right-click and choose **Exit group** or double-click outside the group.

Nesting groups

You can create “nested” groups, or groups of groups. In this case, OpenOffice.org keeps the initial group hierarchy. If you ungroup a group made of other groups, you are left with individual groups that you can then ungroup further.

Combining objects

In contrast to grouping functions, combinations create a new object. Select a collection of objects, then right-click and choose **Combine** from the context menu. The result of this operation is shown below.

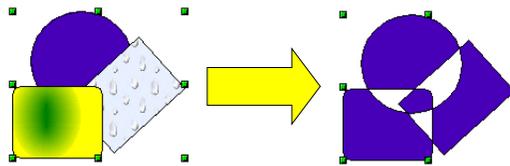


Figure 84: Combining objects

At first glance, this can seem rather surprising. Once you have understood the rules governing combination in OpenOffice.org, it will become clear.

- The attributes (for example, area fill) of the resulting object are those of the object furthest back. In this example, it is the circle.
- Where the objects overlap, the overlapping zone is either filled or empty depending on the number of overlaps. When the number of overlaps is even, you get an empty space; when the number is odd, you get a filled area.

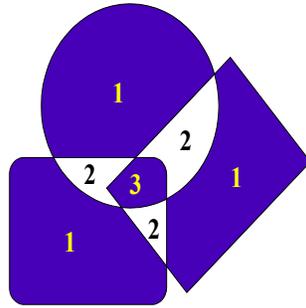


Figure 85: Odd overlaps are filled, even overlaps are empty.

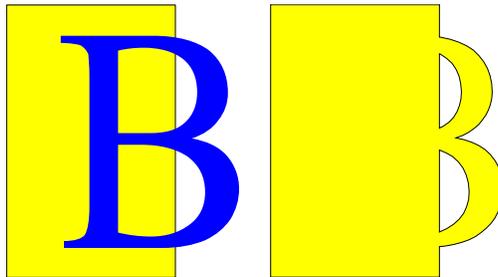
TIP How do I move an object so it is further back or closer to the front? See page 80.

Merge, subtract or intersect shapes

The functions Merge, Subtract, and Intersect can be reached through the group's context menu, under the heading **Shapes**.

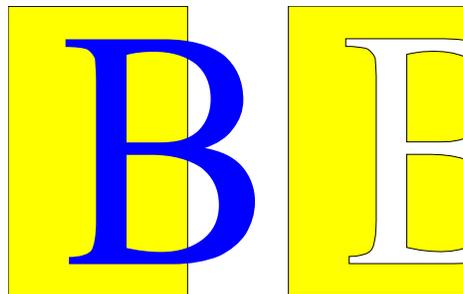
Merge

When you merge objects, the new object covers the entire surface of the original objects (it is the *union* of the objects).



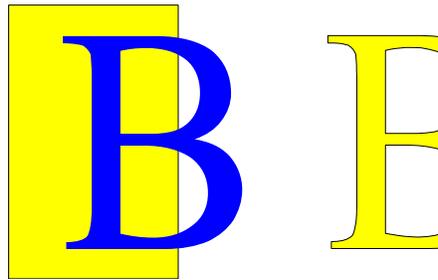
Subtract

When you subtract, the upper object is subtracted from the lower object.



Intersect

When you intersect two objects, you get the area covered by both objects.

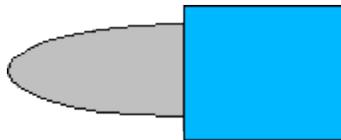


TIP How do I move an object so it is further back or closer to the front?
See page 80.

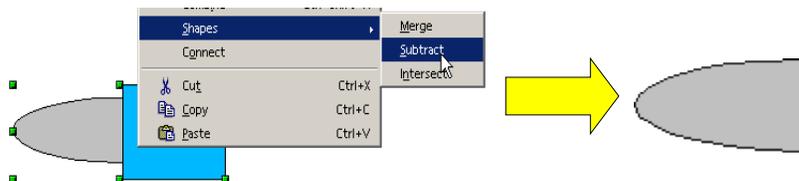
Practical example

The following example shows how one can use the shape merge functions to create a complex shape.

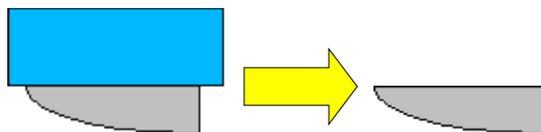
- 1) Draw an ellipse and then a rectangle overlapping half of its width.



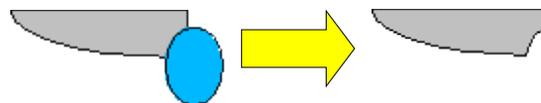
- 2) Select both shapes, right-click, and choose **Shapes > Subtract** from the context menu.



- 3) Draw another rectangle and put it over the top half of the ellipse. Then subtract again.



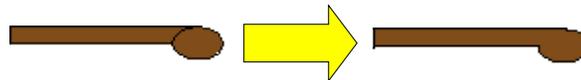
- 4) Draw a small ellipse covering just the lower corner and subtract again.



- 5) To make the handle, draw a rectangle and an ellipse as shown.



6) *Merge* the shapes together.



7) *Group* this image with the previous one.



Aids for positioning objects

Draw has various tools to help you arrange the objects with respect to each other. Here we explore some of the more important ones.

Moving an object to the front or to the back

When you combine or merge objects, the end result varies drastically depending on which object is “in front” and which one is “in the back”.

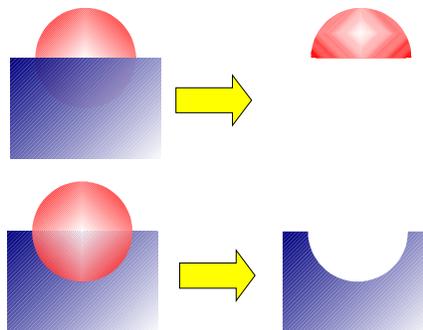
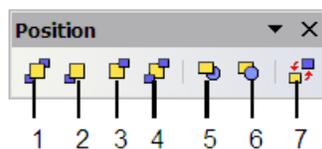


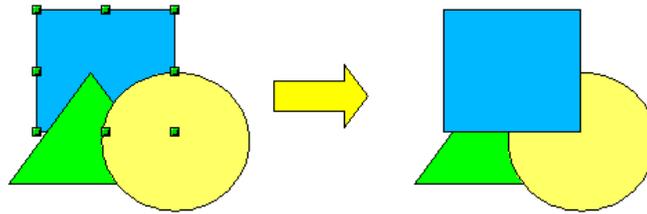
Figure 86: Subtracting objects: the result varies depending on which object is in front

First select an object, then click on  to open the **Position** toolbar.

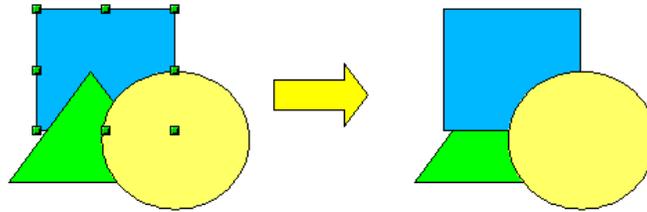


- | | |
|------------------|----------------------|
| 1 Bring to Front | 5 In Front of Object |
| 2 Bring Forward | 6 Behind Object |
| 3 Send Backward | 7 Reverse |
| 4 Send to Back | |

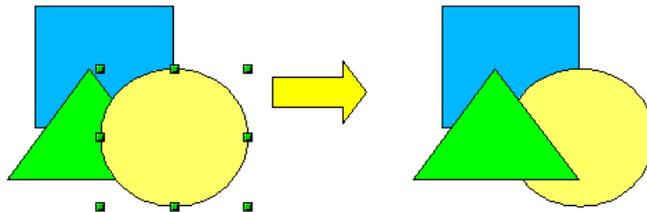
 brings the selected object to the front of the group.



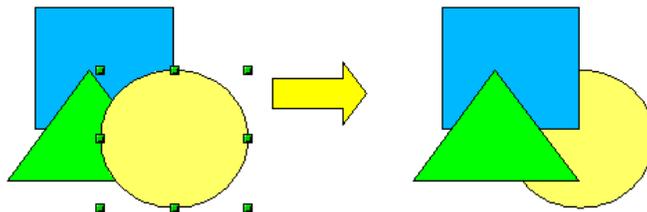
 brings the selected object one step upwards.



 brings the selected object one step backwards.

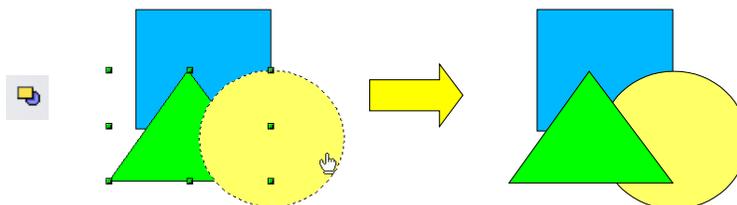


 brings the selected object to the back of the group.

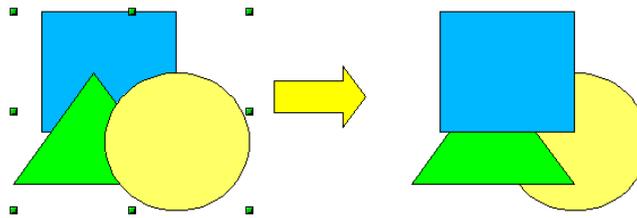


 moves the selected object in front of another chosen object.

 moves the selected object behind another chosen object.

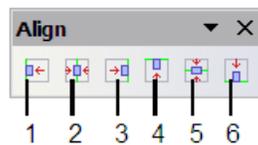


 reverses the order of the selected objects.



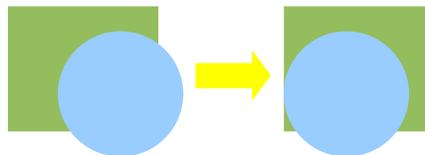
Aligning objects

Click on  to open the **Align** toolbar. This toolbar helps you position an object with respect to another.

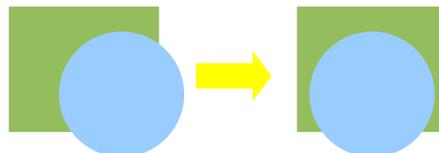


- | | |
|-----------------------|---------------------|
| 1 Align left | 4 Align top |
| 2 Centre horizontally | 5 Centre vertically |
| 3 Align right | 6 Align bottom |

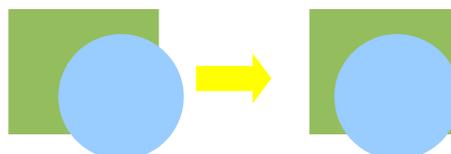
 Align left.



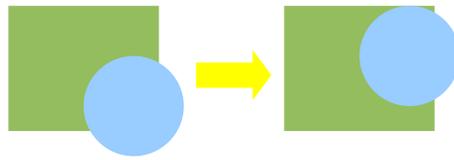
 Center horizontally.



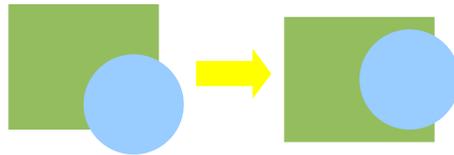
 Align right.



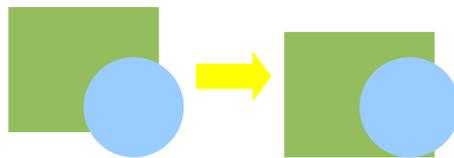
 Align top.



 Center vertically.



 Align bottom.





Chapter 7
Tips and Tricks

Place objects with precision

Draw has several tools to help you place objects with precision.

Use zoom to place objects with precision

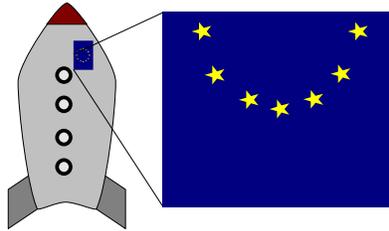


Figure 87: With zoom you can place objects with higher precision.

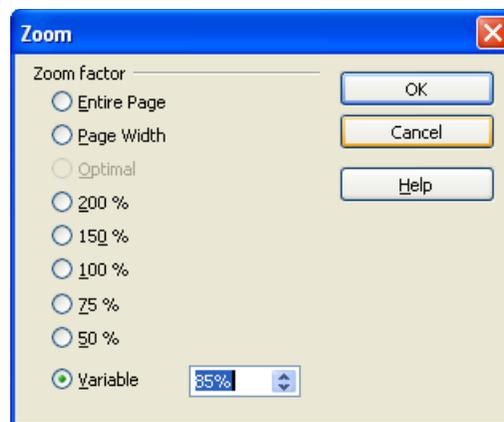
Zoom using the status bar

The current zoom value is displayed in the status bar:



Figure 88: Zoom level on the status bar.

Double-click on the zoom value to display the Zoom window. From the Zoom window you can change the zoom factor.



You can enter a zoom value in the Variable box, or you can choose from one of the pre-set zoom values (see Figure 89):

- *Entire Page* displays the whole page on the screen.
- *Page Width* sets the right and left edges of the page to the window.
- *Optimal* sets the zoom so that your drawing just fits in the window.

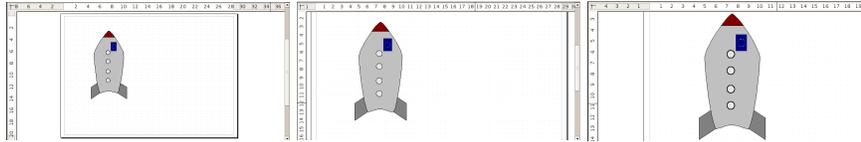


Figure 89: Zoom values: Entire Page, Page Width, Optimal

Zoom toolbar

The Zoom toolbar provides additional zoom options. On the Standard toolbar (**View > Toolbars > Standard**), click on the downwards arrow of the **Zoom** button .



Click on the **Zoom In** button  and then on an object to zoom into that object. Click on the **Zoom Out** button  to zoom out.

You can also zoom in using the + key on the numeric keypad and zoom out using the – key.

Use snap to grid to place objects with precision

The grid utility is one of Draw's most useful tools for moving objects precisely. First, make the grid visible with **View > Grid > Display Grid**.

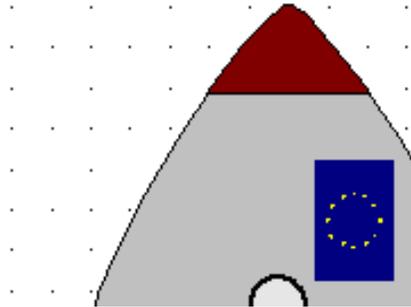


Figure 90: Black dots on the background show the grid.

I can't see the grid dots!

By default the grid dots are light gray, which can be very hard to see. To improve visibility, go to **Tools > Options**, then **OpenOffice.org > Appearance**.

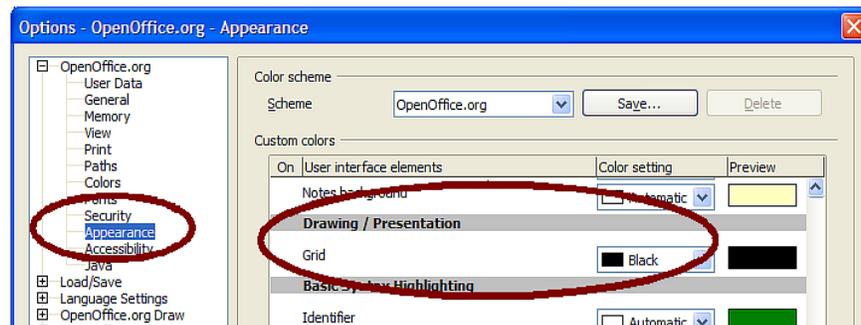


Figure 91: Changing the grid color.

Under **Custom colors**, scroll down until you see **Drawing / Presentation**. Then set the Grid color to a darker color like black.

Snap to grid

What makes the grid really useful is that you can have objects *snap* to the grid. That is, the object handles are always positioned exactly on the dots of the grid. Choose **View > Grid > Snap to Grid**.

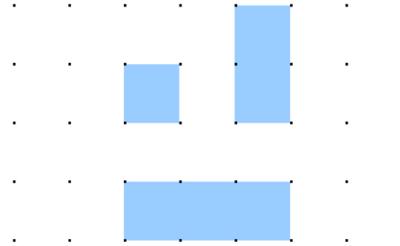


Figure 92: With snap to grid, objects align to the grid precisely.

Configuring the grid

You can configure several aspects of the grid like the spacing between dots. Go to **Tools > OpenOffice.org Draw > Grid**.

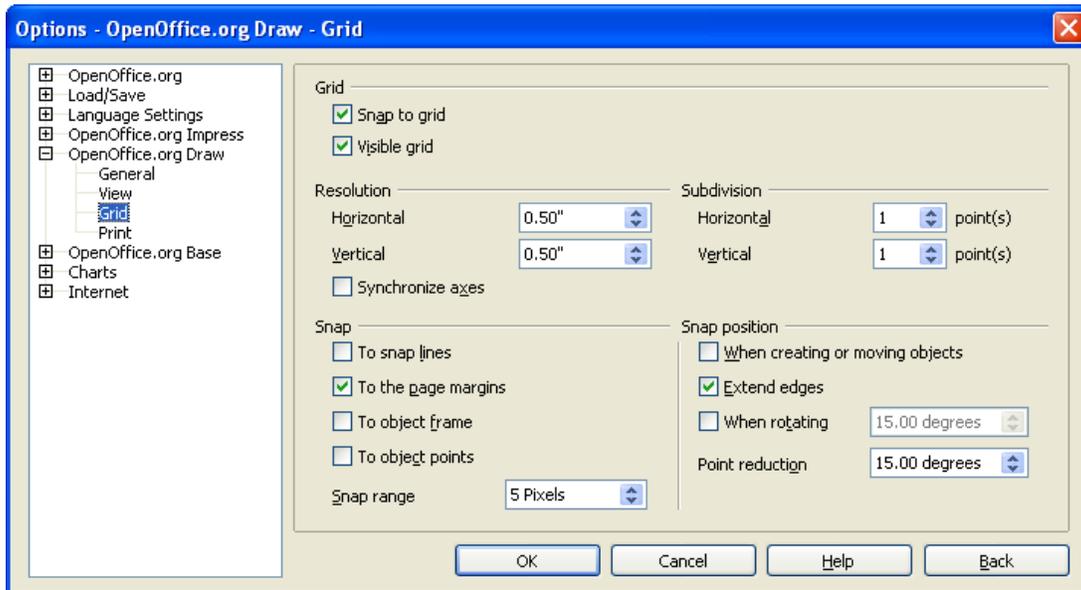


Figure 93: Configuring the grid.

On this dialog you can configure several grid properties.

- Resolution: The width (horizontal) and height (vertical) of the grid rectangles.

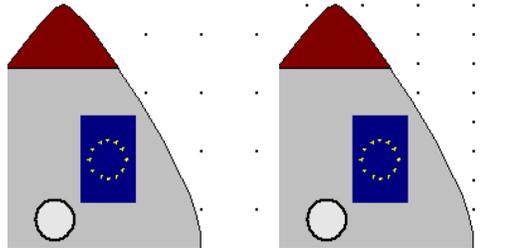


Figure 94: Grid resolution.

- Subdivisions: Additional points that appear along the sides of each rectangle or square in the grid. Objects snap to subdivisions as well as to the corners of the grid.

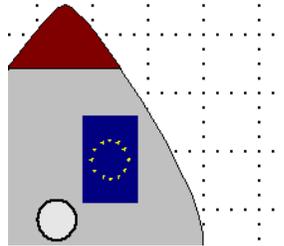


Figure 95: Grid subdivisions.

Use snap lines to place objects with precision

Guides or snap lines are dashed horizontal or vertical lines to which you can snap objects.



Figure 96: Object snaps to the snap line.

Inserting a snap line

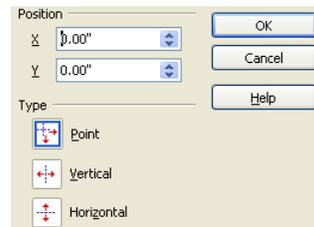
To insert a snap line:

- 1) Hover the mouse cursor over either ruler.
- 2) Click and hold the left mouse button down.
- 3) Move the mouse cursor into the drawing area to drag the snap line.

You can always move a snap line with the mouse. However, moving snap lines will not move any objects that have been snapped to that line.

Position a snap line with precision

Go to **Insert > Insert Snap Point/Line**. In the following dialog, define the X or Y position of the snap line. You can use this same dialog to create a snap point.



You can also edit an existing snap point or snap line. Right-click on the snap line and choose **Edit Snap Line**.

Use guiding lines to place objects with precision

You can have OpenOffice.org Draw display guiding lines while an object is being moved. They show more clearly the edges of the object being moved.

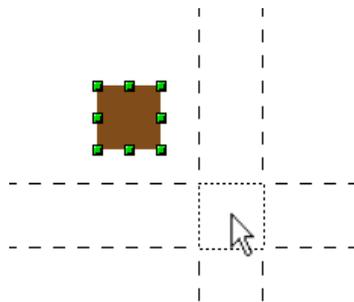


Figure 97: Guiding lines when an object is moved.

Go to **Tools > Options > OpenOffice.org Draw > View**. Under **Display**, check **Guides when moving**. Now all objects will show guiding lines when you move them.

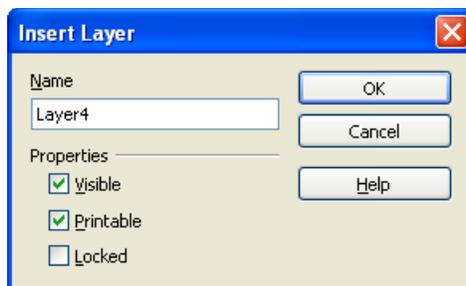
Make complex diagrams with layers

Layers are like transparencies on an overhead projector. You can create complex drawings by stacking layers together. For example, in architecture you could have the basic plan of a building in one layer and the piping on another layer, and the electrical circuits on another.

In Draw, three layers are always present by default: Layout, Controls, and Dimension Lines.

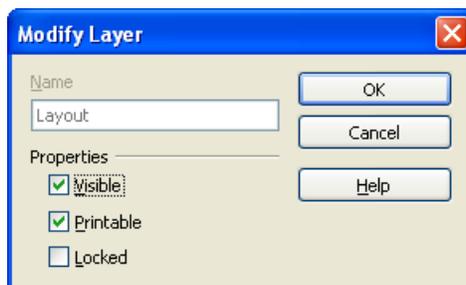


To activate a layer, click on its tab. When you draw something, the drawing is placed on the currently selected layer (usually “Layout”). To create a new layer, select **Insert > Layer**.



Right-click on a layer tab to bring up a menu where you can insert or delete a layer, rename an existing layer or modify it. You can change the names of user-defined layers; the default layer names cannot be changed.

If you choose **Modify**, you will see the following dialog box:

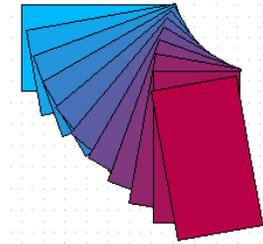


On the **Modify Layer** dialog, you can specify layer properties:

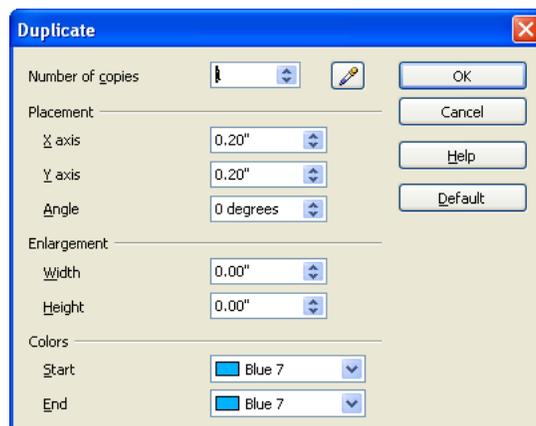
- **Visible:** Whether the layer is visible.
- **Printable:** Whether or not the layer is printed. This is useful for guides or annotations that help you make the drawing but should not appear in the final output.
- **Protected:** Objects on a protected layer cannot be moved. For example, if one layer has the basic plan of a building, you could protect it while you draw the pipes.

Cool effects

Duplication



Duplication makes copies of an object while applying a set of changes (such as color or rotation) to the duplicates. To start duplication, click on an object or group and choose **Edit > Duplicate**. The **Duplicate** dialog appears:



Choose the number of copies, their separation (placement), rotation, and so on. Here is an example of the result.

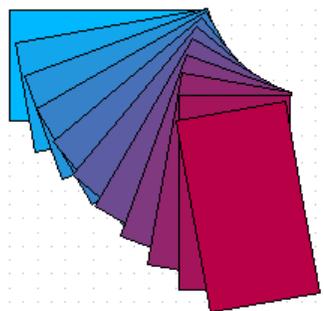
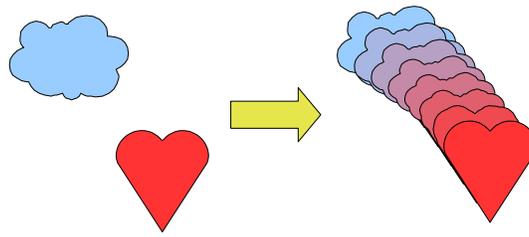
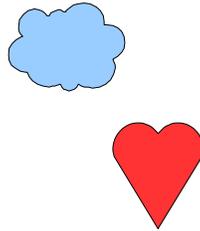


Figure 98: The duplicate tool in action.

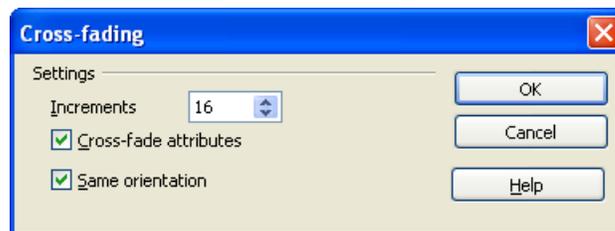
Cross-fading



Cross-fading transforms one shape into another. The result is a new group of objects including the two end points and the intermediate steps. To do a cross-fade, select two objects.



Then choose **Edit > Cross-fading**.



On the dialog choose the number of increments (transition steps). You probably want to have *Cross-fade attributes* and *Same orientation* both checked. The end result is shown below.

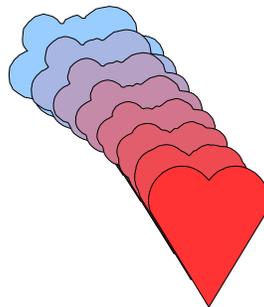


Figure 99: Cross-fading.

Which object goes in front?

How do I tell OpenOffice.org I want  and not  ?

If you want  then select  (the object we want in front), right-click and choose

Arrange > Bring to Front. Or select  (the object we want behind), right-click and choose **Arrange > Send to Back.**

Index

3

- 3D effects 58
 - depth 61
 - geometry 60
 - horizontal segments 61
 - Illumination 64
 - Material 67
 - rounded edges 60
 - scaled depth 61
 - shading 63
 - Textures 65
 - vertical segments 61
- 3D objects
 - rotating 58
- 3D objects, drawing 15
- 3D rotations 52

A

- add points 32
- aging effect 72
- aligning objects 82
- apply 3D attribute 59
- arc, drawing 15
- Area dialog 43
- area fill, editing 41
- arranging objects 26
- arrow styles, customizing 39, 40
- arrows 16, 38

B

- Bezier Curve Toolbar 30
- bitmap 65
- bitmap editing tools 68
- bitmap fill 46
- bitmap filters 70
- bitmap image 43
- borders, editing 37
- brightness 69
- bring forward 26
- bring to front 80

C

- Callout tool 14
- charcoal drawing effect 73
- circle, drawing 13, 15
- close Bézier 33
- CMYK palette 8
- Color Bar 6
- color fill 42
- color palette 6
- color schemes 7
- combining objects 77

- Connectors 17, 18
- context menu 36
- contrast 69
- convert to 3D 59
- corners 49
- crop 69
- cross-fading 93
- curve 40
- curve, drawing 16
- customizing toolbars 4

D

- delete points 32
- distorting an image 54
- Drawing toolbar 6, 12
- duplication 92
- dynamic gradients 54

E

- Edit Points Toolbar 30
- editing object points 29
- editing objects in a group 76
- effects 34, 51
- ellipse, drawing 13, 15

F

- fill color, creating 43
- fill properties 41
- fill, editing 41
- flip an object 51
- floating toolbar 5

G

- Gallery 65
- gamma level 69
- Gimp 68
- Glue Point Relative button 21
- glue points 17, 19
- Gouraud shading 63
- gradient 44
- gradient fill 42
- gradients 54
- grayscale 69
- grid 87
- grid properties 88
- grouping objects 76
- guides 89
- guiding lines 90

H

- handles 24
- hatching 42

hidden objects 26
horizontal segments 61
HSB palette 8

I

illumination 62, 64
image 43
inclination 28
intensity 69
intersecting objects 79
inverts colors 70

L

layers 91
light sources 65
Line and Filling Bar 6
Line and Filling toolbar 36
Line dialog 38
line options 37
line pattern 45
line pattern, fill 42
line properties 37
line styles, customizing 39
line, customizing 39
line, drawing 12, 16
lines, editing 37

M

material 67
merging objects 78
mosaic filter 74
move points 31
move to front 80
move to front or back 80

N

negative 70
nesting groups 77
noise pixels 71
normals 62

O

Object Bar 6
objects
 adjusting size 27
 arranging 26
 curves 30
 dynamic movement 27
 dynamic size modification 27
 editing points 29
 framing 25
 hidden 26
 moving 27
 rotating 28
 selecting several 26

Options Bar 8, 24

P

page margins 8
Phong shading 63
Picture toolbar 68
pop art filter 73
position, editing 48
positioning objects 80
posterize 72
projection mode 62

R

rectangle, drawing 13, 15
relief aspect 73
RGB palette 8
rotating 3D objects 58
rotating an object 28, 51
rotating objects 49
rotation angle 61
Rotation mode 34
rounded corners 49
rounded edges 60
rulers 8

S

scaled depth 61
segments 61
selecting objects 25
selection modes 24
send backward 26
shading 63
shadow 43, 64
shadows 47
shapes, basic 14
sharpen 71
shear 49
size, editing 48
slant 49
slanting an object 28
smooth transition 31
smooths 71
snap lines 89
snap to grid 88
solarization 72
Special effects 51
split curve 33
square, drawing 15
Standard Bar 6
Status Bar 9
styles 50
submenu display 5
subtracting objects 78
symmetric transition 31
synchronize ends 39

T

- tangents 30
- Text tool 14
- textures 65
- toolbar
 - 3D objects 15
 - Arrows 16
 - Connectors 18
 - Curves 16
 - Drawing 12
 - Edit Points 30
 - Glue points 19
- toolbars 4
- transparency 47, 69

U

- undoing groups 76
- ungrouping 76

V

- vector graphics 2
- vertical segments 61

W

- watermark 69
- workplace 3

Z

- zoom 86