

The Turtle System

Guide for Online Users

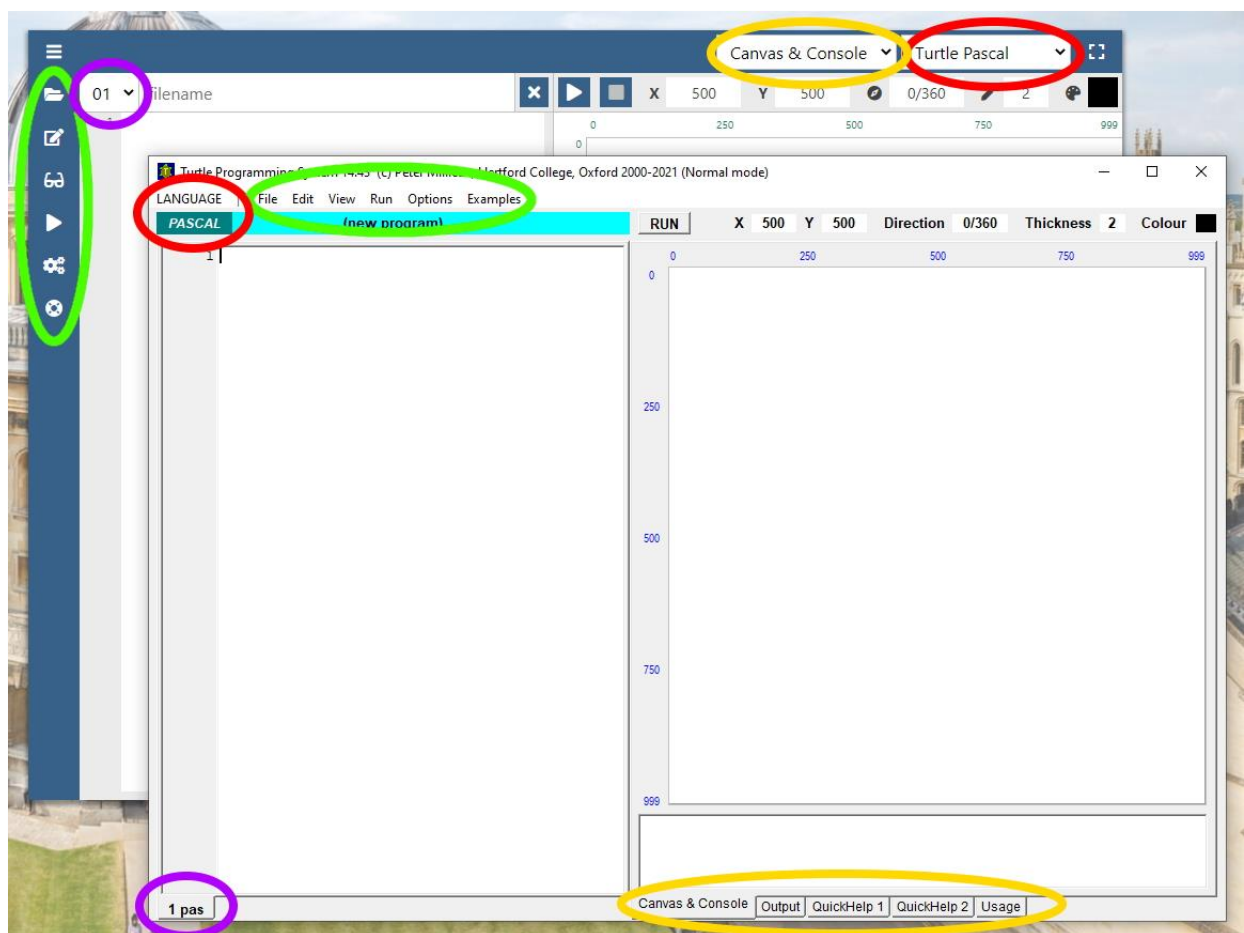
1. The Two Turtle Systems

The *Turtle System* is available as a traditional desktop app for Windows, and also as a web app that runs directly inside a browser. These two versions are developed and maintained in tandem, and in general you should have little difficulty switching between the two. However, there are a few points to bear in mind:

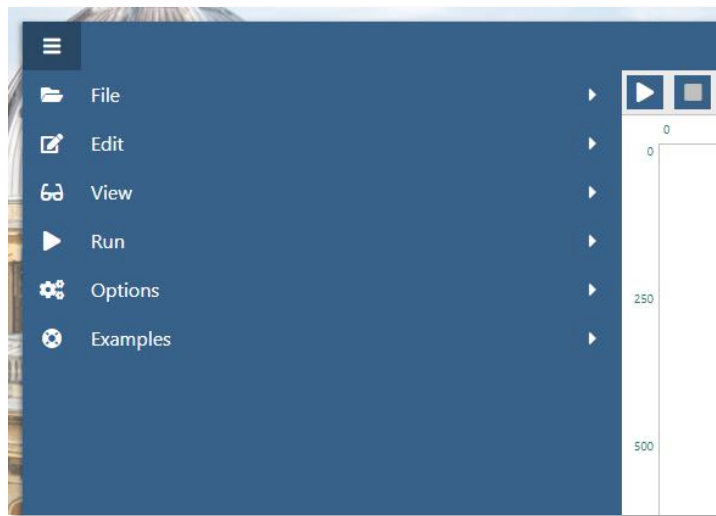
1. Because of the inherent differences between browsers and desktop apps, and to make best use of the available screen space in the browser, the online version looks a little bit different at the edges. Details and screenshots in section 2 below.
2. The canvas drawing tools are slightly different in the two environments, which has led us to modify some of the onboard examples a little, and to provide some different runtime options. Details in section 3 below.
3. Sometimes features or languages are implemented or updated in one system before they make their way into the other. Details at any given time are available on our homepage at www.turtle.ox.ac.uk.

This document does not describe how to use the online system in full. Instead, it explains the ways in which it differs from the downloadable system. For further documentation, consult the other guides on our web site, which are geared towards the downloadable system but apply equally to the online one.

2. Interface Differences



As this screenshot illustrates, the main menus at the top of the downloadable system are vertically aligned and on the left of the online system (highlighted above in green). Icons are shown in place of text, but if you click on the ‘hamburger’ menu item in the top left corner, the menu is expanded to include the text as well:



The “LANGUAGE” menu in the top left of the downloadable system, however, is shown as a dropdown in the top right of the online system (highlighted in red in the screenshot). The tabs at the bottom of the downloadable system are also shown as dropdown menus in the online system, and are moved to the top (highlighted in purple and yellow).

3. Canvas Drawing Differences

The downloadable system draws “pixelated” graphics (if you zoom in close, you can see that all the images are made up of lots of tiny squares or “pixels”). Ultimately this is true of all computer images. The online system, however, uses a trick called “anti-aliasing” to give an illusion of smoother edges, by adding some pixels at the boundaries of the shapes you draw that are somewhere in between the colour of the shape and the colour of the background that shape was drawn on. (This is built into the way web browsers work, and is not something that we have any control over.) Most of the time, this won’t make much difference to any programs run in the two systems, but there are two special cases to consider:

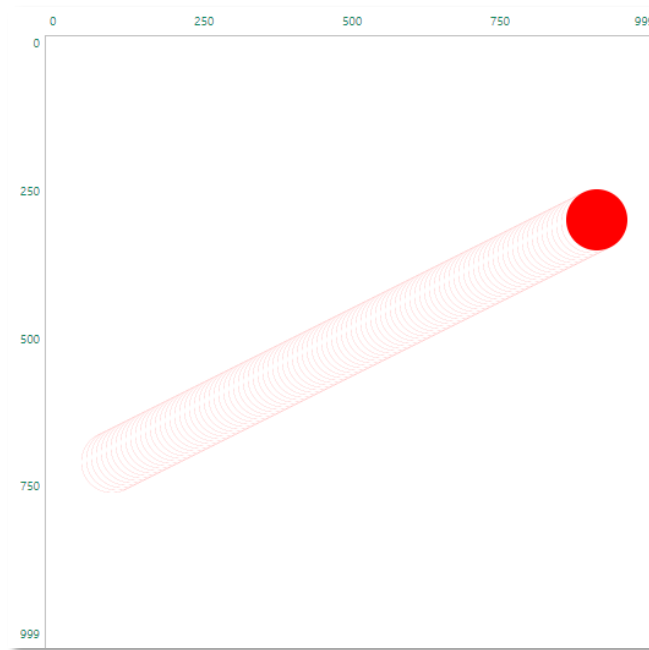
3.1. Animation

A standard trick for creating animations in the *Turtle System* (which is used in several of our example programs), is to do something like this:

1. draw a red circle of radius 50
2. pause for a fraction of a second
3. draw a white circle of radius 50 directly on top of the red circle (to rub it out), and then immediately draw a new red circle in a slightly different place on the canvas
4. repeat

This trick gives the illusion that the red circle is moving. (See the various moving ball examples under “Examples 4 – smooth movement and bouncing” in the “Examples” menu).

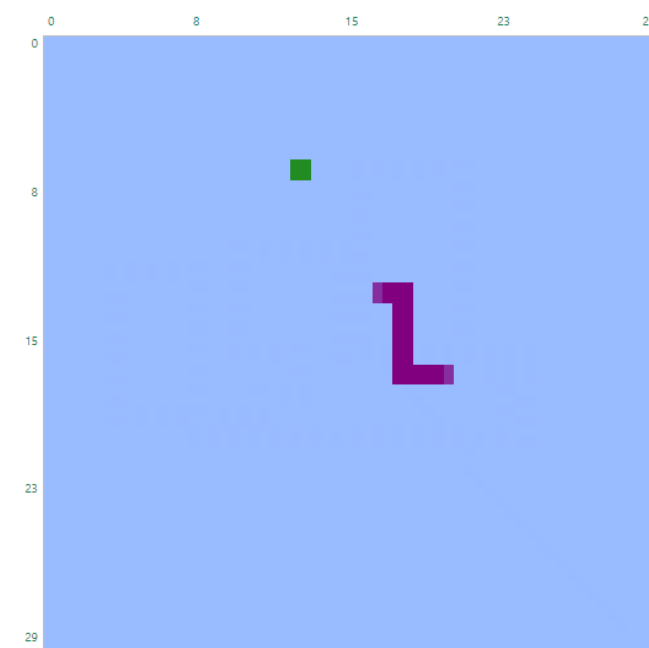
When drawing a red circle of radius 50 in the online system, the resulting circle will in fact have a slightly larger radius, because of the extra faded pixels around the edge. Because of this, a white circle of radius 50 will not rub it out completely, and you will be left with a “vapour trail” as the ball moves across the canvas:



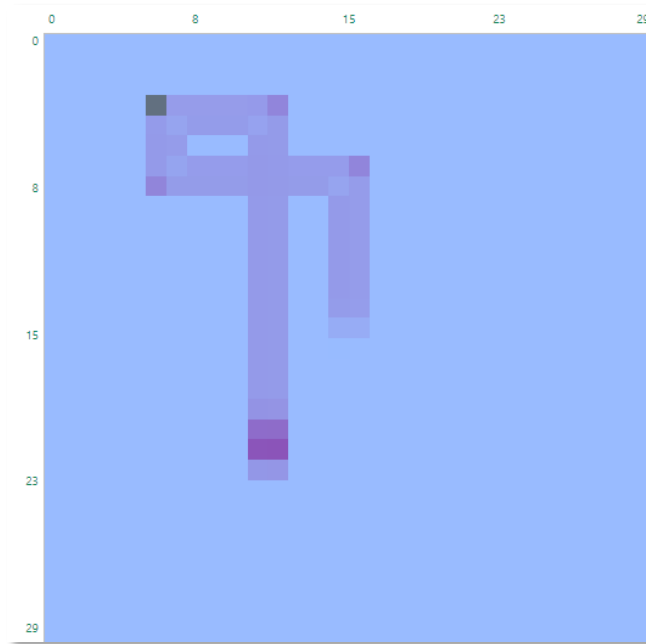
To compensate for this, the corresponding example in the online system rubs out the red circle or radius 50 with a white one of radius 51.

3.2. Low resolution images

By default, the canvas has a resolution of 1000x1000 – 1,000 pixels in each dimension. However, it is possible to change this resolution to anything you want, using the `resolution` command. Now, if you set a very low resolution, the image will be scaled up so that it still occupies the same amount of space on your screen, and you will be able to see each of the individual pixels very clearly. This is used in the Snake game example under “Examples 5 – user input, interaction and games” in the “Examples” menu:



If we try to run this program in the ordinary way in the online system, here’s what happens:



Because the body of the purple snake is only 1 pixel wide, it ends up being all blurry edges and no actual body!

To work around this, there is an additional feature in the online system, whereby the resolution of very low resolution images is implicitly doubled, and the size of everything you draw is doubled as well. These two changes combined cancel each other out, giving you an image that looks the same – but since everything will always be at least 2 pixels wide, the problem created by anti-aliasing (illustrated in the screenshot above) goes away.

By default, the online system applies this trick whenever you set the resolution of your image to 60 pixels or less (in either dimension). This should probably work fine for most programs. If you find strange blurry images in some of your low resolution images, however, you may want to play around with this default setting. You can do this by editing the “Resolution at which to scale up the canvas” property, available from the “Run Options” under the “Run” menu. (For these options to be visible, you first need to set the system to “Machine Mode” through the “View” menu.)