SqueakCMI Notebook:
Projects, Tools, and Techniques

Introduction

Welcome to eToys/Squeak: an object-oriented programming language. This notebook was written to introduce Squeak to curious beginners with step-by-step descriptions of projects and how they were done.

Advice is freely given in the hope that the path you take to learning eToys/Squeak is quick and smooth. The Squeak community will be generous with their time, their knowledge, and their willingness to help newcomers. The Office for Mathematics, Science, and Technology Education at the University of Illinois Urbana-Champaign invites you to use these materials to the benefit of students everywhere.

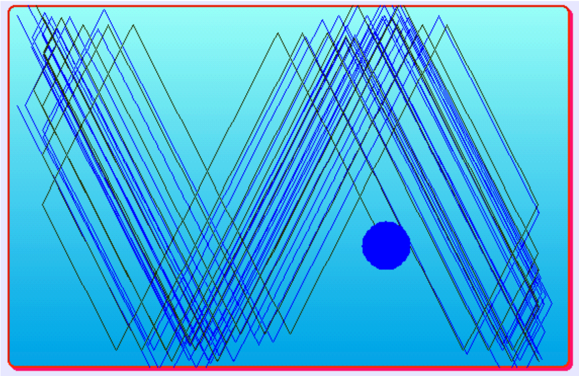
These projects can be explored on the computer by opening them from www.Squeakcmi.org. This dynamic experience of projects on the computer in conjunction with the written materials should give you a range of ideas and possibilities to combine in many ways and for many purposes.

Section I

This section contains two easy projects designed to help you get started with Squeak. They are followed by an extensive description of the rich resources, tools, icons, supplies, and conventions that make Squeak what it is.

Section II

This section explains more complicated projects. They are in alphabetical order by the name of a Squeak tool used predominantly in that project. The projects are not in sequential order by level of difficulty. The project's name can be used to locate that project atwww.Squeakcmi.org. So, if you wonder, "What is a scale factor and how could it be used in a Squeak project?" you can find out.



www.SqueakCMI.org
Resources, projects, tutorials, and standards-based lessons applying Squeak in math, science, language arts, social science, and art. Additional projects and essays can be found on the website. Tutorials developed by math specialists show the myriad ways Squeak enriches the study of geometry and trigonometry. The SqueakCMI community can answer questions, share ideas, and schedule workshops.

www.squeakland.org
The origin of Squeak: software, tutorials, and example projects. Get the most current versions of the software at Squeakland. The site includes interesting essays about the nature of learning, about programming and thinking.

www.squeak.org
Technical information for experienced programmers and developers

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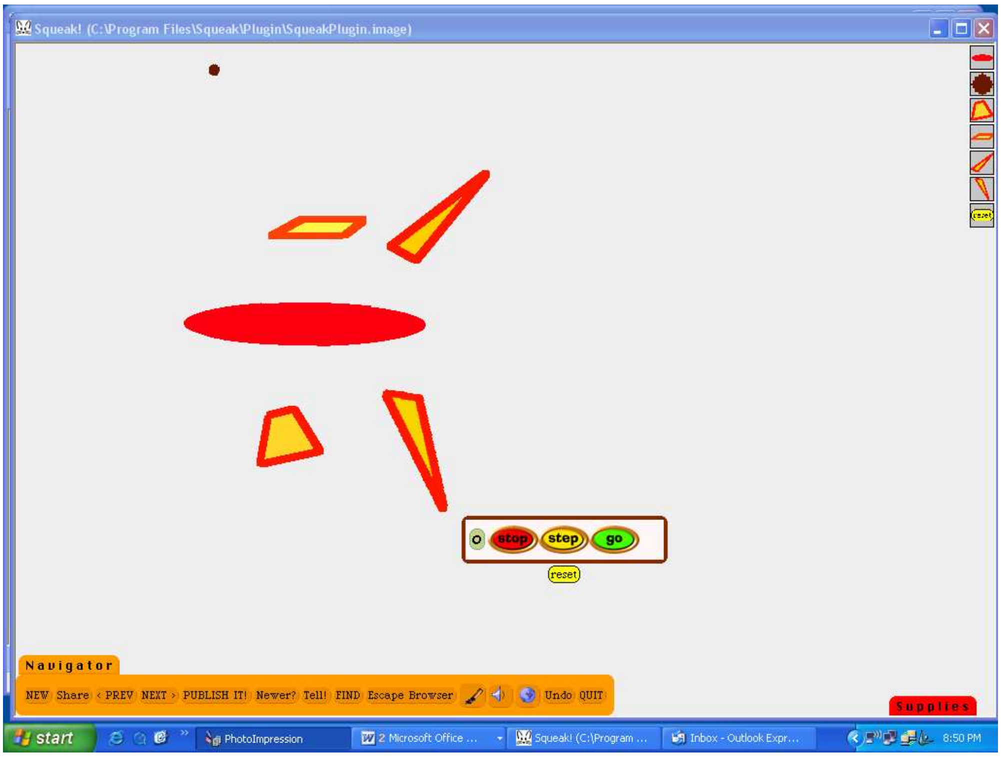
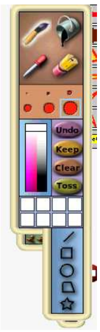
Forward: shapesfishnb

This project shows uses of the forward script tiles. It shows one use for a stop-step-go button from Supplies and how to build a handy reset script and a button to control when it works.

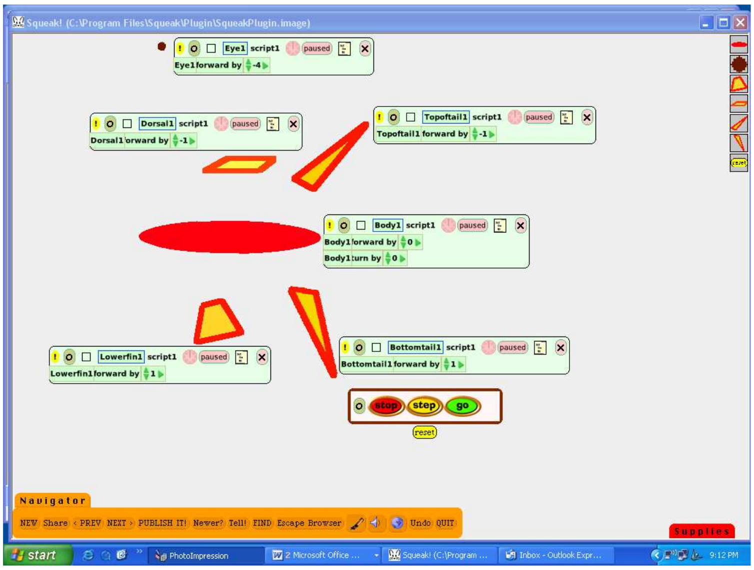


The six shapes that make this fish were drawn each as a separate object using the paint tools. Use a paint brush from the Navigator Flap and when the paint palette is open, pull down the tab on the lower right corner.



The straight line tool, the ellipse tool, and the paint bucket were used. Each separate part of the fish will have a script that makes that part move so draw each part and click to keep it before drawing another part. Draw an outline of a shape and fill it by clicking on the paint bucket, choosing a color and clicking to pour the paint into any closed shape.

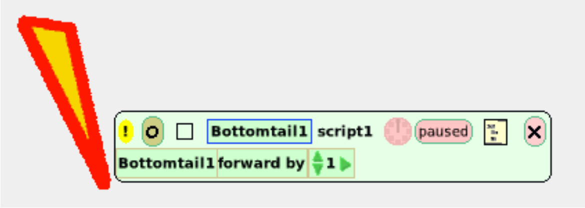
Get a halo for each object, click on the cyan handle, and open a viewer pane for each. Give each sketch part a meaningful name.



Squeak! (C:\Program Files\Squeak\Plugin\SqueakPlugin.image)

```
Eye1 script1
Eye1 forward by -4

Dorsal1 script1
Dorsal1 forward by -1

Topoftail1 script1
Topoftail1 forward by -1

Body1 script1
Body1 forward by 0
Body1 turn by 0

Lowerfin1 script1
Lowerfin1 forward by 1

Bottomtail1 script1
Bottomtail1 forward by 1
```

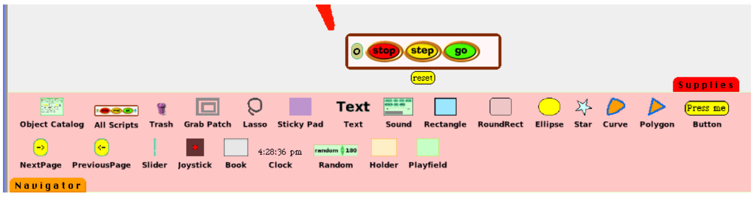
Here is one of the scripts and the object shape it moves.



```
Bottomtail1 script1
Bottomtail1 forward by 1
```

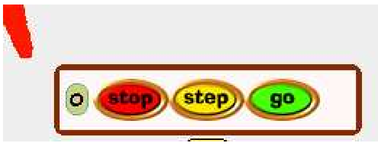
The movement of each object is forward. Some go up to the body and some go down. The direction arrows in the center of each object were used to set the direction of movement so that the final correct position of each part would look right. The script shows uses of positive and negative numbers. The fish's eye has a script forward by - 4 because it is further than the other objects and yet will arrive at a correct position around the same time.

Open Supplies and drag out a copy of the stop-step-go button.



Before this go button will work all of the scripts must have been started and stopped once using the clock button in script boxes for each object.

The help balloon for the green go button says, “Resume running all paused scripts”. The important word is resume. A brand new script shows the word normal and this does not change until the clock/start button has been clicked on and then clicked again to stop the script. The first click changes normal to ticking and the script is running and your object is following the script you wrote. The second click on the clock button will pause a script. After you start and stop/pause each object’s script, then you can use the stop-step-go button to control them all at once.



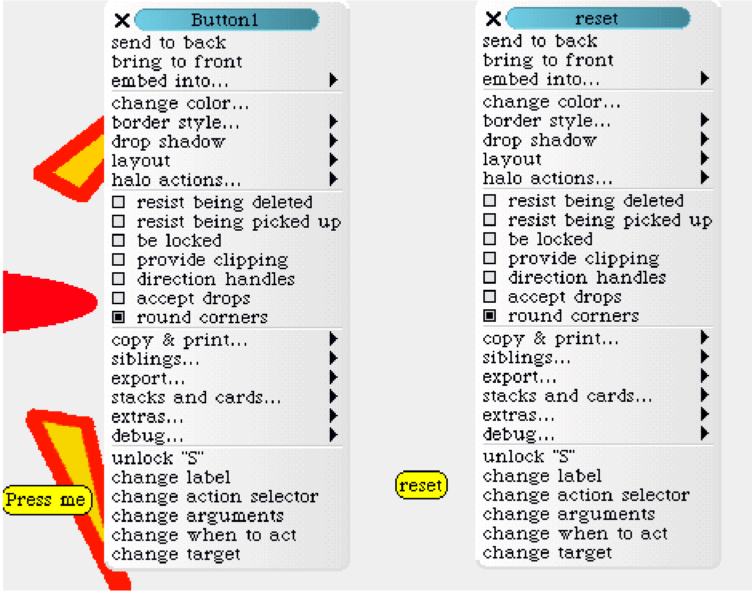
One mouse click on the green go button will start all the objects’ scripts at the same time. The red stop button will stop them all at the same time. The center button called step will cause each script to cycle one time.

A reset button is useful. It is one way to have a project that can be started over and over again and always look the same as it did at the beginning.

Once an object is placed where you want it to be when the project opens, you can put that information into a script that is controlled by a ‘reset’ button. Then with one click of the reset button all the objects will return to their starting positions. The fish in this project has six parts and each part has a script and each part has some information about it in the ‘reset’ button’s script.

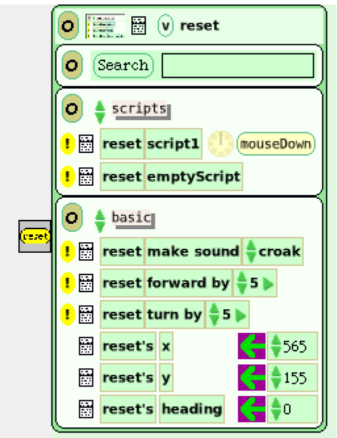
Open the Supplies Flap, drag out a copy of a Press me button.

Get the halo for the Press me object and click on the red handle to open a menu of choices for it. Select change label and a box will open with the words press me highlighted and ready to accept the new name you choose for it.
Type reset or another name that is meaningful to the project you want to do, click on accept and the name of the button is changed.

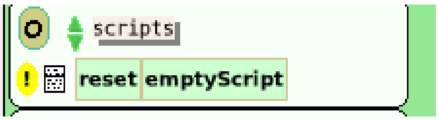


To add a script to the newly named reset button, click on the cyan eye handle and open a viewer panel of script panes.

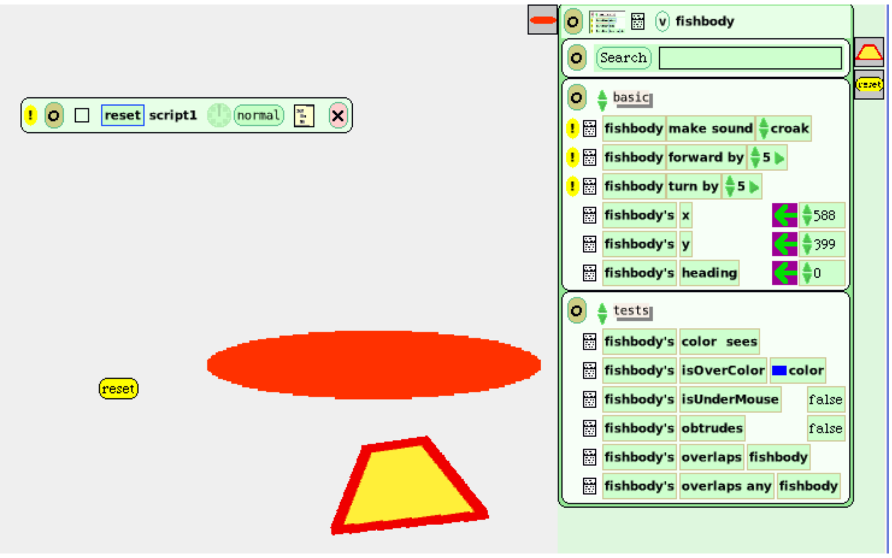
Click on the word sketch and name the script what you want the button to do after you finish scripting it. Click and hold down on basic to open the list of viewer panes. Choose change label; this example has called it reset.



Drag out the phrase reset emptyScript and drop it onto the screen.



This object's (the reset button is the object) script will be built out of phrase tiles from each of the objects' scripts.


reset script1
normal
reset
fishbody
Search
basic
fishbody make sound croak
fishbody forward by 5
fishbody turn by 5
fishbody's x 588
fishbody's y 399
fishbody's heading 0
tests
fishbody's color sees
fishbody's isOverColor color
fishbody's isUnderMouse false
fishbody's obtrudes false
fishbody's overlaps fishbody
fishbody's overlaps any fishbody

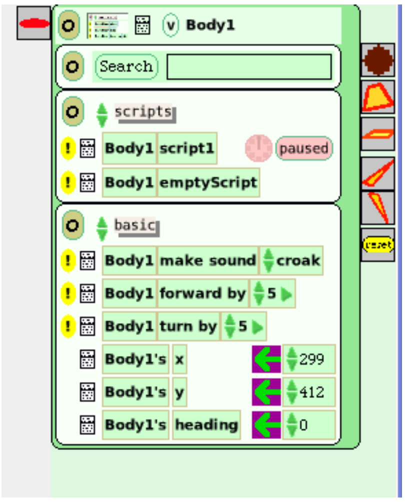
The fish body's first position is set using x and y coordinates. These x and y coordinates are just a way of placing something on the screen at a position.

This Squeak project uses the whole screen. The x axis starts on the left at a position called 0. A bigger screen will show a bigger number of positions on the x axis. The computer screen that I am using shows the far right on the screen to be at 1038. The y axis is like a ladder to climb up from bottom to top with 0 at the bottom of the screen. The top y axis number which my screen shows is 782.

These x and y position numbers can be found in the basic script for each object. Before you build the reset script, place all the objects where you want them on the screen and then use the tiles with those positions to build the reset button's script.

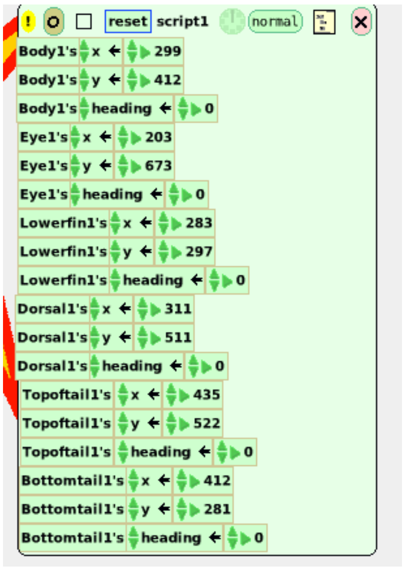
Those phrase tiles are dragged into the script box for the reset button. The body of the fish is at x 299 and y 412 and the heading is at 0.

Those three tiles are dragged into the reset button's script. Use the purple/green arrow to do this.



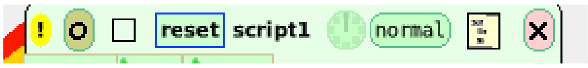
Body1
Search
scripts
Body1 script1 paused
Body1 emptyScript
basic
Body1 make sound croak
Body1 forward by 5
Body1 turn by 5
Body1's x 299
Body1's y 412
Body1's heading 0

The full list of script phrases is shown below. It looks like a lot of information but is just a long list of places defined by the x and y co-ordinates and headings for each fish part.

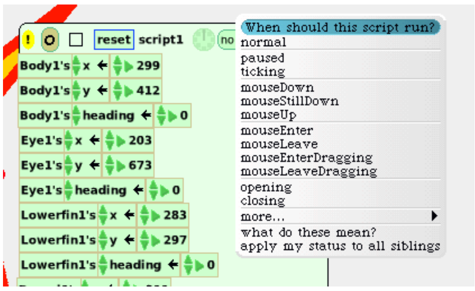


```
Body1's x ← 299
Body1's y ← 412
Body1's heading ← 0
Eye1's x ← 203
Eye1's y ← 673
Eye1's heading ← 0
Lowerfin1's x ← 283
Lowerfin1's y ← 297
Lowerfin1's heading ← 0
Dorsal1's x ← 311
Dorsal1's y ← 511
Dorsal1's heading ← 0
Topoftail1's x ← 435
Topoftail1's y ← 522
Topoftail1's heading ← 0
Bottomtail1's x ← 412
Bottomtail1's y ← 281
Bottomtail1's heading ← 0
```

Decide when the reset button should work and how the person using the project will control it. Look at the top line of the script box and click on the word normal to open a menu of options.



The menu list that opens looks like this and asks the question: When should this script run? The decision in this project was to have all the objects return to their starting positions whenever the reset button was clicked on.



```
Body1's x ← 299
Body1's y ← 412
Body1's heading ← 0
Eye1's x ← 203
Eye1's y ← 673
Eye1's heading ← 0
Lowerfin1's x ← 283
Lowerfin1's y ← 297
Lowerfin1's heading ← 0
```

Click on the phrase mouseDown and the reset script will run only when a mouse is clicked down on it.