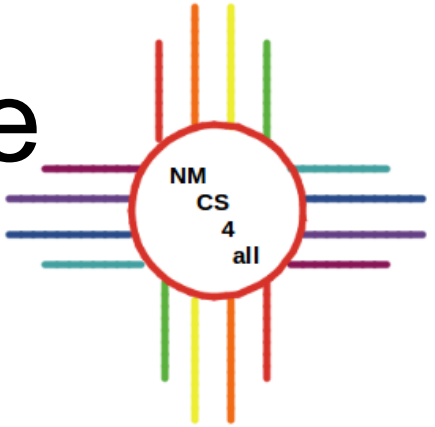
Module 5

Overview

- Variables and Scope
- Interface Input
- Interface Output
- Creating Turtles
- Creating Breeds

Variables and Scope



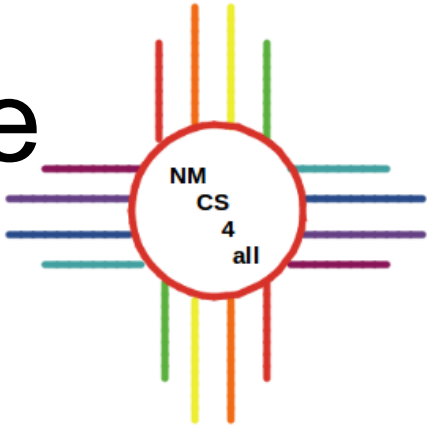
- Variable: container that holds a value
- Three steps:
    - Declare
        - Allocate space and set the name
    - Initialize
        - Set the initial value
    - Get and Set
        - Use in the program or change the value

Variables Example

- Declare, initialize, use and change a variable

```
to drawLines
  clear-all
  create-turtles 1
  ask turtles
  [
    pen-down
    let stepsTaken 5
    forward stepsTaken
    set stepsTaken 10
    left 90
    forward stepsTaken
  ]
end
```

Variables and Scope



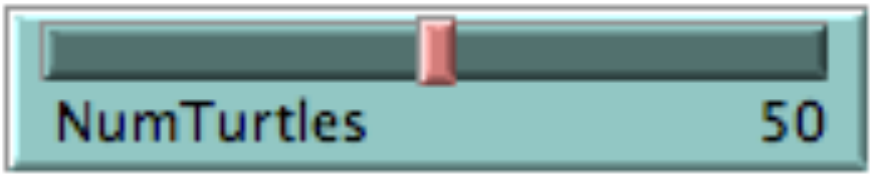
- Scope: where variables can be used
- Three types of variables
    - Local – used in the block where declared
    - Agent – used by specific type of agent
    - Global – used anywhere in the program

Interface Input

- Four ways to input global variables from the interface:
    - Sliders
    - Switches
    - Choosers
    - Input boxes

Interface Input

- Sliders:
  - Set a global variable to a number
  - Moving the slider sets the value



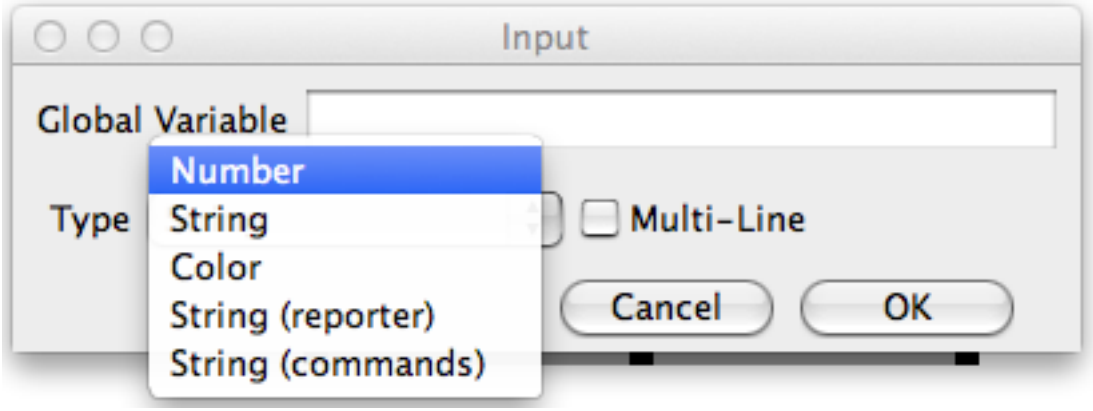
- Switches:
  - Set a global variable to a boolean value

Interface Input

- Choosers:
  - Any data type in a list of choices with a drop down menu

Interface Input

- Input boxes:
  - Globals with strings, numbers or colors
  - More variety than sliders
  - Variable type must be chosen

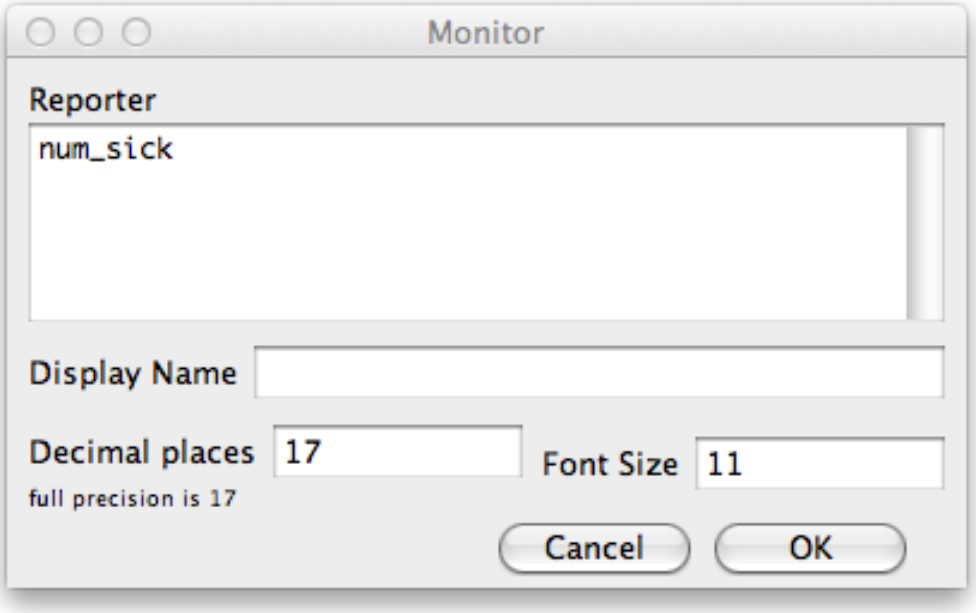


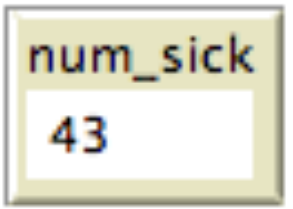
Interface Output

- Ways to gather data:
    - Monitors
    - Plots
    - Command Center

Interface Output

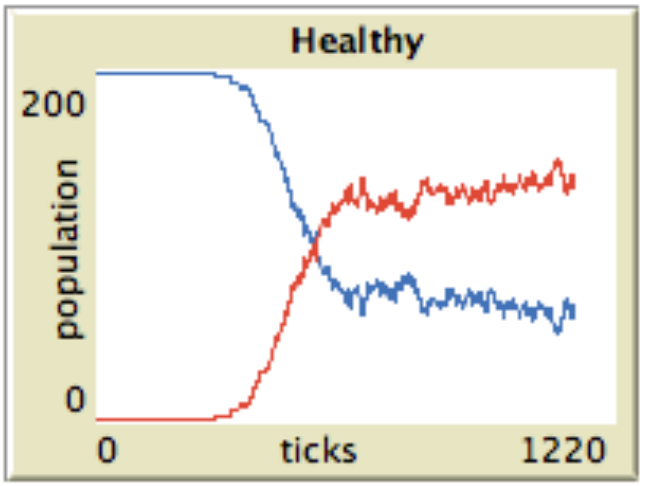
- Monitors:
  - Output the current value of the variable they are associated with
  - Updated each time their variable changes





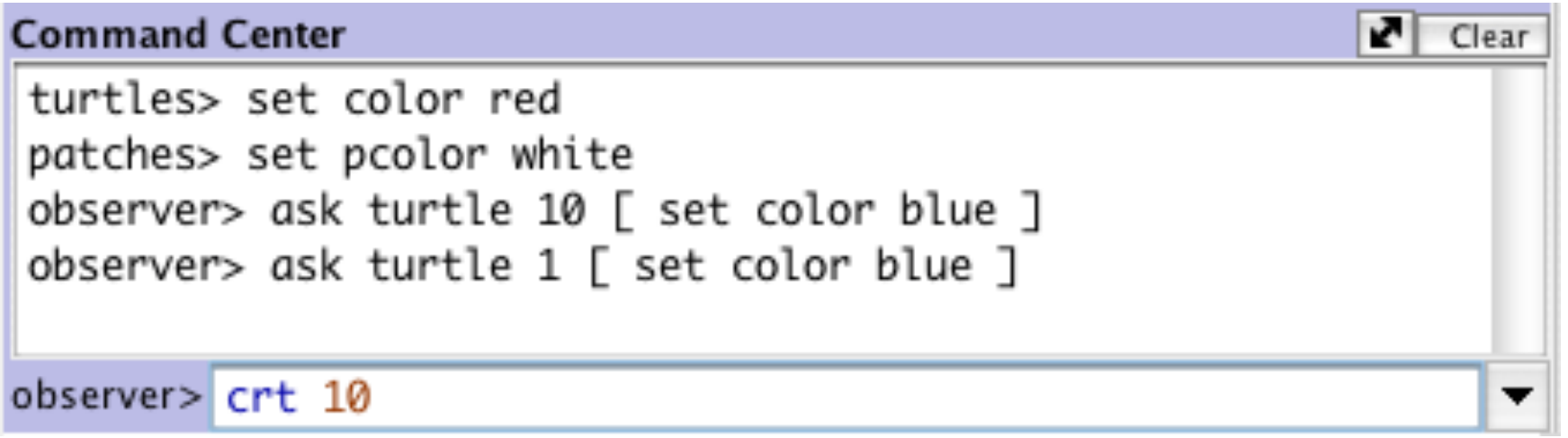
Interface Output

- Plots:
  - More than one variable at a time
  - Updated every tick



Interface Output

- Command Center:
    - Useful for debugging



Creating Turtles

- Three ways to create turtles:
    - By observer – **create-turtles #**
    - By patches – **sprout #**
    - By turtles – **hatch #**

Creating Breeds

- Subset of turtles
- Why should you use a breed?
    - Want agents with attributes
    - Want different behavior for different kinds of agents
    - Want to refer to each breed separately
    - Want different variables for each breed

Defining Breeds

- At the top, before any procedures

breed [plural singular]

- Examples

```
breed [sharks shark]
breed [fish a-fish]
```

Using Breeds

- **create-<breeds> number**

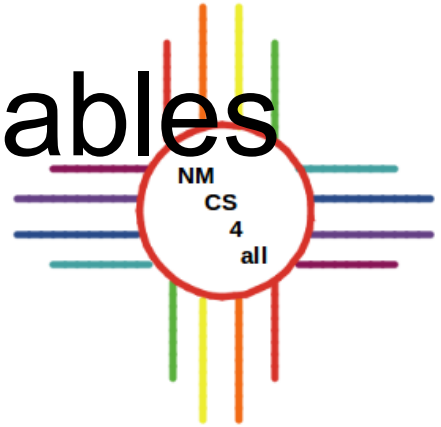
```
create-sharks 5
create-fish 10
```

- Can set breed attributes

ask <breed> [set attribute value]

```
ask shark 0 [set size 3]
ask sharks [set size 4]
```

Breed Specific Agent Variables

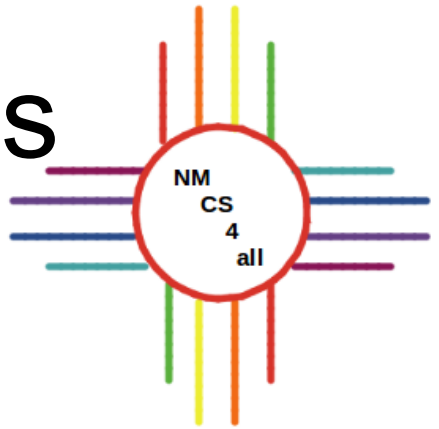


- Each agent within breed has own value
- Specified at the top of the program

<breeds>-own [variables]

```
sharks-own [energy]
```

Breed Specific Actions



- Only performed by members of breed
- Examples
  -

```
ask sharks
[
  left random 90
  right random 90
  forward 1
]

ask shark 0
  [
    set size 3
    set energy energy - 1
  ]
```

Thank you for watching!

Video created by Bianca Bologa

https://moseslab.cs.unm.edu/lab-page/bianca-bologa.html