

## Animation Example

What changes (or has the potential to change) from one frame to the next?  
→ one variable for each thing identified

For each variable –

- what kind of value is it?
  - whole number
  - number with a decimal point
  - true or false
- what's the starting point?
- how does the value change from one frame to the next?

for a rectangle moving to the right...

x position of the rectangle

number – either whole number or number with decimal point



on the left side – x is 0 (CORNER mode)

x gets bigger → add 1

## (Non-System) Variables

Four steps –

1. **declare** – “hey computer, this name is going to mean something!”
  - variables must be declared before initialization
2. **initialize** – give it a starting value
  - variables must be initialized before use or update
3. **use** – to draw (or whatever)
4. **update** – change its value

variable declaration

`type name; // description`

- **type** specifies what kind of value the variable stores
  - `int` – whole numbers
  - `float` – numbers with decimal points
  - `boolean` – true or false
- **name** should be brief but descriptive
  - convention is to start with lowercase letter and separate words with capital or `_`
  - case-sensitive
- **description** provides info not apparent from the declaration itself

`name = value;`

assignment statement

- **value** can be a literal or an expression
  - as an expression, it can reference the variable *name*
- the value of *value* is computed and then stored in *name*, replacing any value already there

## Structural Pattern – Animation

Where does stuff go?

Animation variables are usually –

- declared at the very beginning of the sketch, before `setup()` and `draw()`
- initialized in `setup()`
- used and updated in `draw()`

## Animation Example

What changes (or has the potential to change) from one frame to the next?  
→ one variable for each thing identified

For each variable –

- what kind of value is it? → type, for the declaration
  - whole numbers → `int`
  - numbers with decimal points → `float`
  - true or false → `boolean`
- what's the starting point? → initialization
- how does the value change from one frame to the next? → update

for a rectangle moving to the right...

x position of the rectangle

number – either whole number or number with decimal point

on the left side – x is 0 (CORNER mode)

x gets bigger – add 1

```
// rectangle moves to the
// right

int x; // x coordinate of
// the left side

void setup () {
  // open window
  size(800, 400);

  // initialize variables
  x = 0;

  void draw () {
    // draw one frame
    background(255);
    rectMode(CORNER);
    stroke(0);
    fill(255, 0, 0);
    rect(x, 200, 60, 20);

    // update variables
    x = x+1;
  }
}
```

## Pattern Summary

- nothing changes (static picture)

→ static mode sketch

- something changes based on the mouse position

→ active mode sketch (setup(), draw()) using mouseX, mouseY

- something changes over time

→ active mode sketch (setup(), draw()) with animation variables

- do something when the mouse is clicked (or pressed or released) or a key is pressed

→ active mode sketch (setup(), draw()) with event handlers

```
size(200, 200);
background(255);
rectMode(CENTER);
fill(255, 0, 0);
rect(100, 100, 100, 100);

void setup () {
  size(400, 400);
}
void draw () {
  background(255);
  rectMode(CORNER);
  fill(255, 0, 0);
  rect(mouseX, mouseY, 50, 50);
}

int x;
void setup () {
  size(400, 400);
  x = 0;
}
void draw () {
  background(255);
  rectMode(CORNER);
  fill(255, 0, 0);
  rect(x, 100, 50, 50);
  x = x+1;
}
```