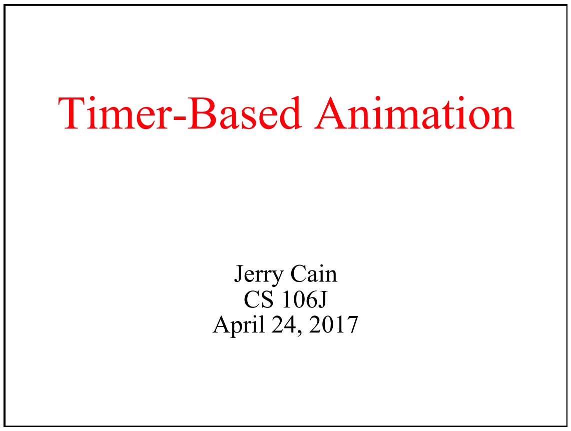
Jerry Cain and Eric Roberts
CS 106J

Handout #17
April 24, 2017

Timer-Based Animation



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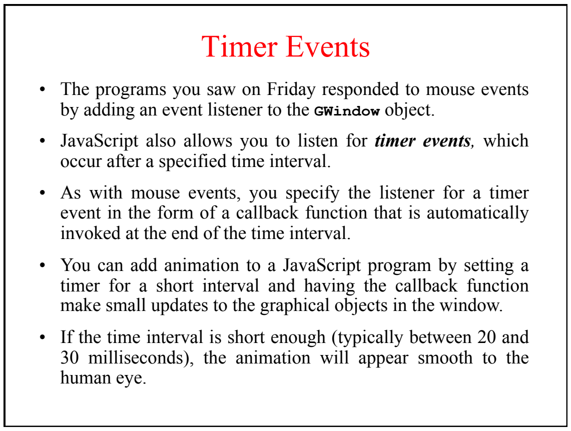
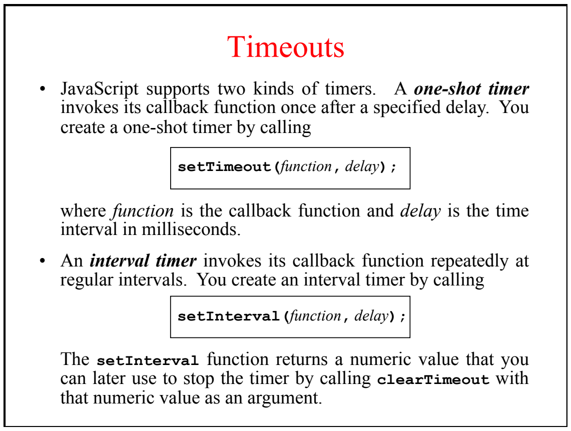


Timer Events

- The programs you saw on Friday responded to mouse events by adding an event listener to the `GWindow` object.
- JavaScript also allows you to listen for ***timer events***, which occur after a specified time interval.
- As with mouse events, you specify the listener for a timer event in the form of a callback function that is automatically invoked at the end of the time interval.
- You can add animation to a JavaScript program by setting a timer for a short interval and having the callback function make small updates to the graphical objects in the window.
- If the time interval is short enough (typically between 20 and 30 milliseconds), the animation will appear smooth to the human eye.



Timeouts

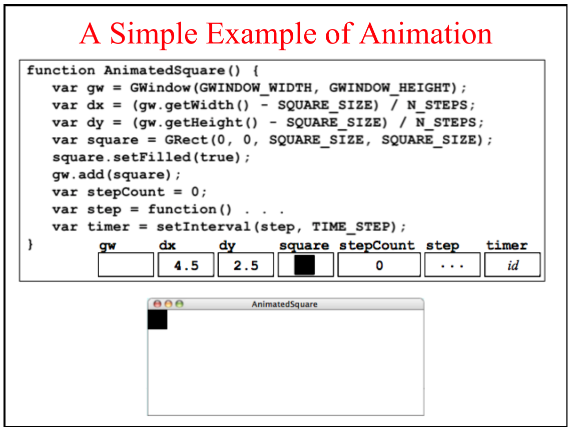
- JavaScript supports two kinds of timers. A ***one-shot timer*** invokes its callback function once after a specified delay. You create a one-shot timer by calling

  `setTimeout(`*function*`, `*delay*`);`

  where *function* is the callback function and *delay* is the time interval in milliseconds.
- An ***interval timer*** invokes its callback function repeatedly at regular intervals. You create an interval timer by calling

  `setInterval(`*function*`, `*delay*`);`

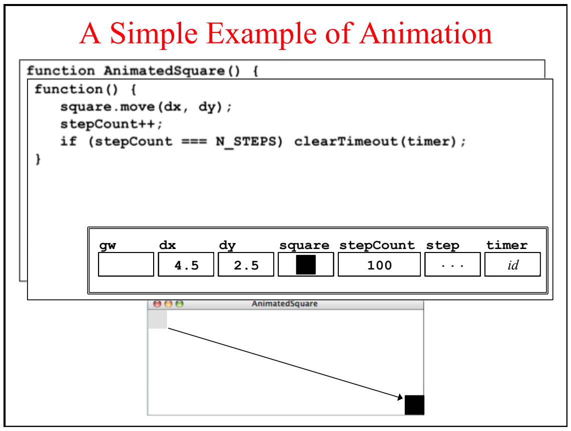
  The `setInterval` function returns a numeric value that you can later use to stop the timer by calling `clearTimeout` with that numeric value as an argument.



A Simple Example of Animation

```
function AnimatedSquare() {
   var gw = GWindow(GWINDOW_WIDTH, GWINDOW_HEIGHT);
   var dx = (gw.getWidth() - SQUARE_SIZE) / N_STEPS;
   var dy = (gw.getHeight() - SQUARE_SIZE) / N_STEPS;
   var square = GRect(0, 0, SQUARE_SIZE, SQUARE_SIZE);
   square.setFilled(true);
   gw.add(square);
   var stepCount = 0;
   var step = function() . . .
   var timer = setInterval(step, TIME_STEP);
}
```

gw	dx	dy	square	stepCount	step	timer
	4.5	2.5	■	0	. . .	*id*



A Simple Example of Animation

```
function AnimatedSquare() {
function() {
   square.move(dx, dy);
   stepCount++;
   if (stepCount === N_STEPS) clearTimeout(timer);
}
```

gw	dx	dy	square	stepCount	step	timer
	4.5	2.5	■	100	. . .	*id*