

# Handle Graphics (v. 1.0)

---

C. S. Tritt, Ph.D.  
December 11, 2011

---

---

---

---

---

---

---

---

## Handle Graphics

- Have similarities with structures and function handles.
- Also related to OO programming and the current program design paradigm (objects have properties, are responsible for maintaining their own state and exhibiting (displaying) this state on command).
- Provides powerful and detailed interactive and programmatic control of plot appearance.

2

---

---

---

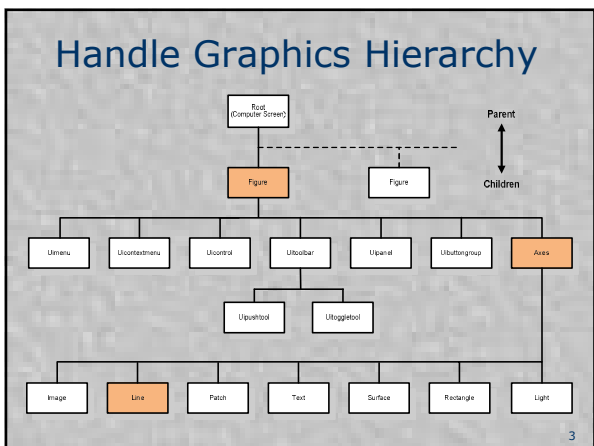
---

---

---

---

---



---

---

---

---

---

---

---

---

### Handles are like Structures

- Each graphic object has a variety of named properties associated with it.
- How the object looks depends on the values of the properties.
- Handles are displayed in the command windows as arbitrary numerical values.
- An example follows:

4

---

---

---

---

---

---

---

---

### Simple Plot Example

- Given the previously defined function, the following commands produces the following output:

```
>> x = [0:.5:20];  
>> y = sample_func(x)/100;  
>> hPlot = plot(x,y) % store handle.
```

```
hPlot =  
  
305.0021
```

5

---

---

---

---

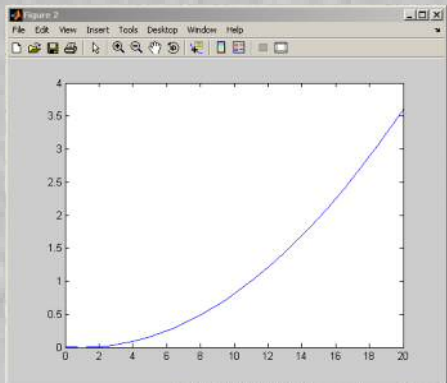
---

---

---

---

Plot Produced



6

---

---

---

---

---

---

---

---

### Interactive Manipulation

- I have never liked the way Matlab formatted tick labels. It suppresses trailing zeros.
- Handle graphics allows me to "correct" this problem.
- I'll demonstrate using the interactive "Property Editor."
- See next slide...

7

---

---

---

---

---

---

---

---

### Property Editing

Manually edit YTickLabel using the property editor.

Also added axis labels, main title, grids and initials (text box).

8

---

---

---

---

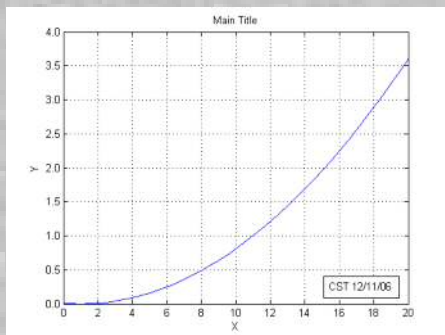
---

---

---

---

### Manually Modified Figure



9

---

---

---

---

---

---

---

---

### Class Activity

- Create a plot of the function:

$$y = 0.01x^2 - 0.02x + 0.01$$

from -15 to 15 at 0.5 x increments.  
Assume x is in volts and y in amps.

- Modify this plot using the Property Editor and Inspector to include proper tick labels, axis labels, grids, your initials and a main title.

10

---

---

---

---

---

---

---

---

### Programmatic Modifications

- You may occasionally want to create a program that produces plots. Being able to programmatically modify plot properties will sometimes be useful in these cases.
- Use the `get` function to return the values of an individual or all the properties of an object.
- Use the `set` function to set the values of one or more object properties.

11

---

---

---

---

---

---

---

---

### Partial Get Results

```

result = get(hPlot)
result =
    Color: [0 0 1]
    EraseMode: 'normal'
    LineStyle: '-'
    LineWidth: 0.5000
    Marker: 'none'
    MarkerSize: 6
    MarkerEdgeColor: 'auto'
    MarkerFaceColor: 'none'
    XData: [1x41 double]
    YData: [1x41 double]
    ZData: [1x0 double]
...snip...
    Visible: 'on'
    Parent: 304.0016
    DisplayName: ''
...snip...
    ZDataSource: ''

```

12

---

---

---

---

---

---

---

---

### Set Example

- The following command changes the plot line color to red and width to 1.5 pixels.

```
>> set(hPlot, 'Color', [1 0 0], 'LineWidth', 1.5)
```

- In later slides, I'll modify the font and title text.

13

---

---

---

---

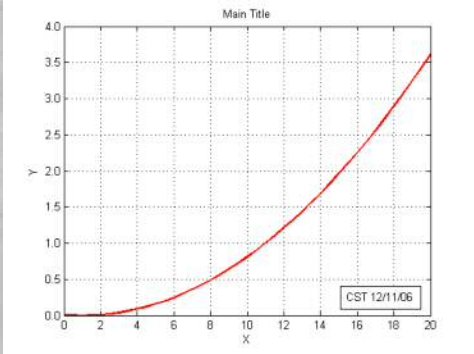
---

---

---

---

### Modified Figure



14

---

---

---

---

---

---

---

---

### More Changes

- Now examine the properties of some other aspects of the figure (including the title).
- Change the Font and Title Text

15

---

---

---

---

---

---

---

---

## Accessing the Parent

```
>> hFig = get(hPlot, 'Parent') % Get Figure.
hFig =
    304.0016
>> figProps = get(hFig)
figProps =
    ActivePositionProperty: 'outerposition'
                    ALim: [0 1]
...snip...
    FontAngle: 'normal'
    FontName: 'Helvetica'
    FontSize: 10
    FontUnits: 'points'
    FontWeight: 'normal'
    GridLineStyle: ':'
```

16

---



---



---



---



---



---



---

## More Parent Properties

```
...snip...
    Parent: 2
...snip...
    TickDir: 'in'
    TickDirMode: 'auto'
    TickLength: [0.0100 0.0250]
    Title: 21.0017
    Type: 'axes'
...snip...
    XColor: [0 0 0]
    XDir: 'normal'
    XGrid: 'on'
    XLabel: 18.0017
...snip...
```

17

---



---



---



---



---



---



---

## Title Properties

```
>> hTitle = get(hFig, 'Title') % get Title.
hTitle =
    21.0017
>> get(hTitle)
    BackgroundColor = none
    Color = [0 0 0]
    EdgeColor = none
...snip...
    FontAngle = normal
    FontName = Helvetica
    FontSize = [10]
    FontUnits = points
    FontWeight = normal
    HorizontalAlignment = center
...snip...
    String = Main Title
    Units = data
    Interpreter = tex
    VerticalAlignment = bottom
...snip...
```

18

---



---



---



---



---



---



---

## Now Do the Modifications

- Commands are:

```
set(hFig, 'FontName', 'Times', 'FontSize', 12)  
set(hTitle, 'String', 'Modified Figure', ...  
    'FontName', 'Times', 'FontSize', 14)
```

- Results on the next slide.

(FontNames include *Helvetica*, *Times* and *Courier*)

19

---

---

---

---

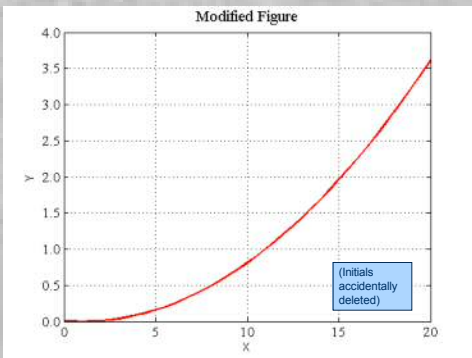
---

---

---

---

## Resulting Plot



20

---

---

---

---

---

---

---

---