Introduction to Computing for Engineers 050IU

MATLAB GUI

Dr. Nguyen Ngoc Truong Minh

Image and Sound

- Read and show Image:

```
addpath('PNG');
h= imread('red_back.png');
imshow(h);
```

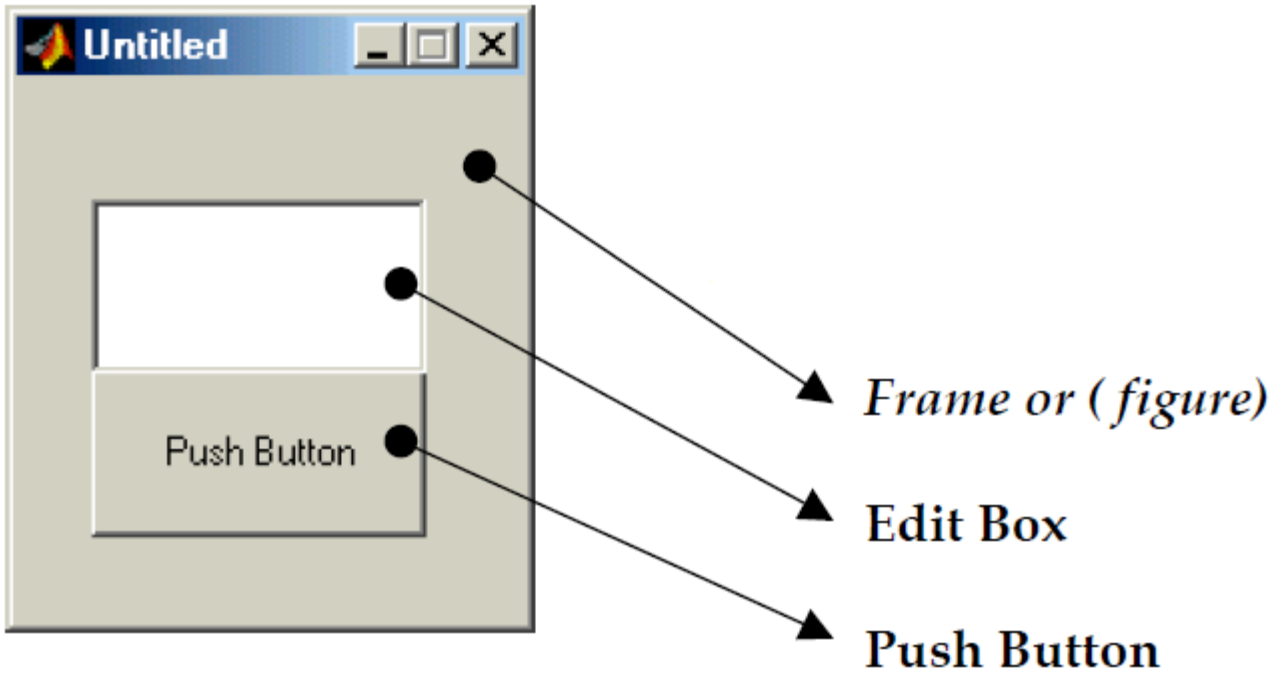
- Read and play sound:

```
[y, Fs] = audioread('card.mp3');
player = audioplayer(y,Fs);
play(player);
```

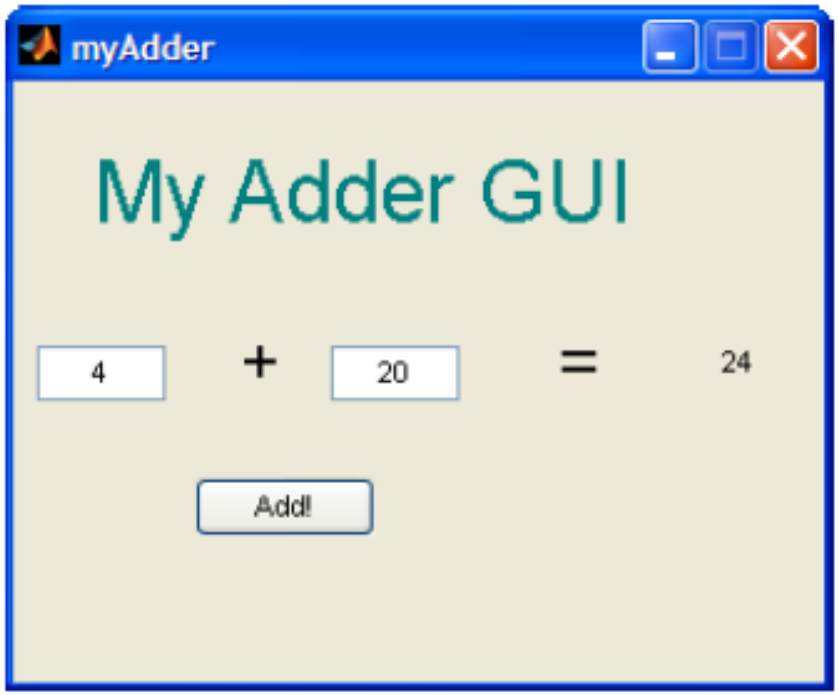
GUI

- User-friendly
- Visualization
- Convenient analysis tool

GUI-Graphical User Interface

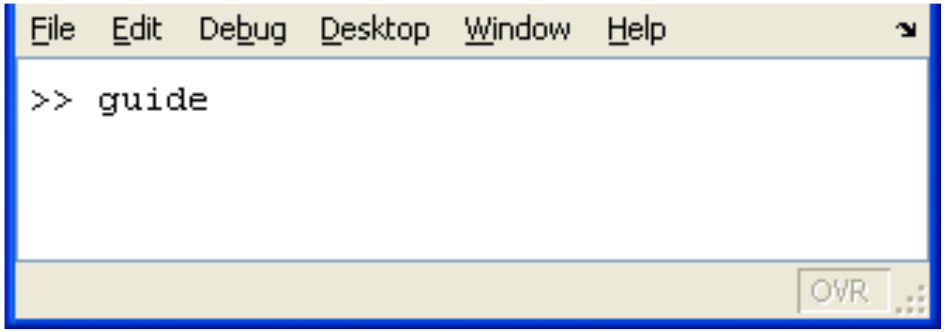


Create GUI

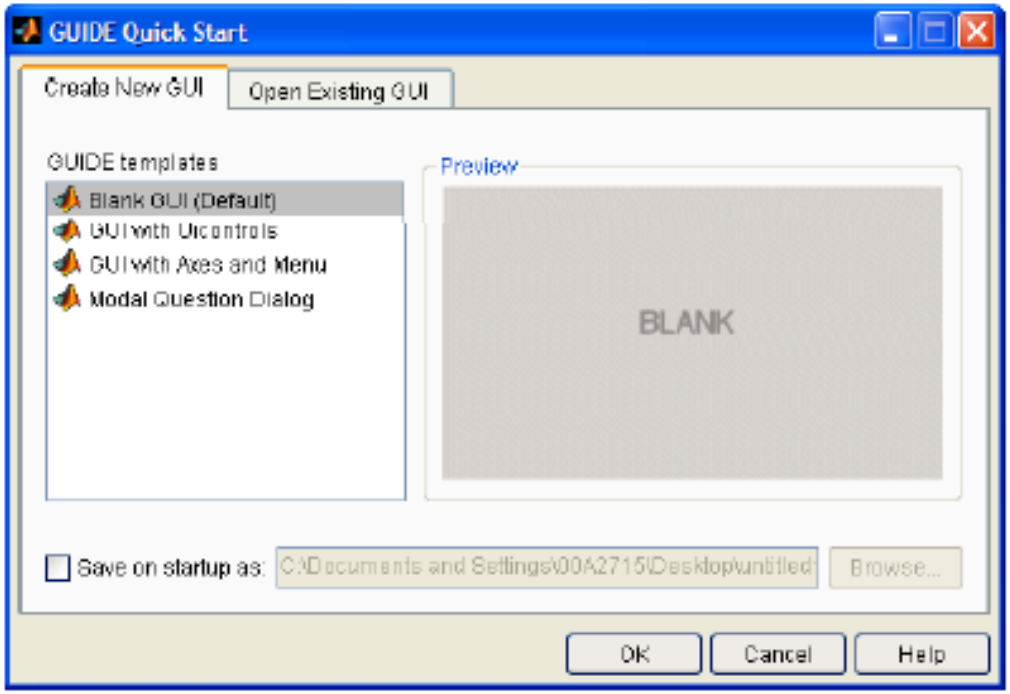


Create GUI

- Open up MATLAB. Go to the command window and type in ***guide***

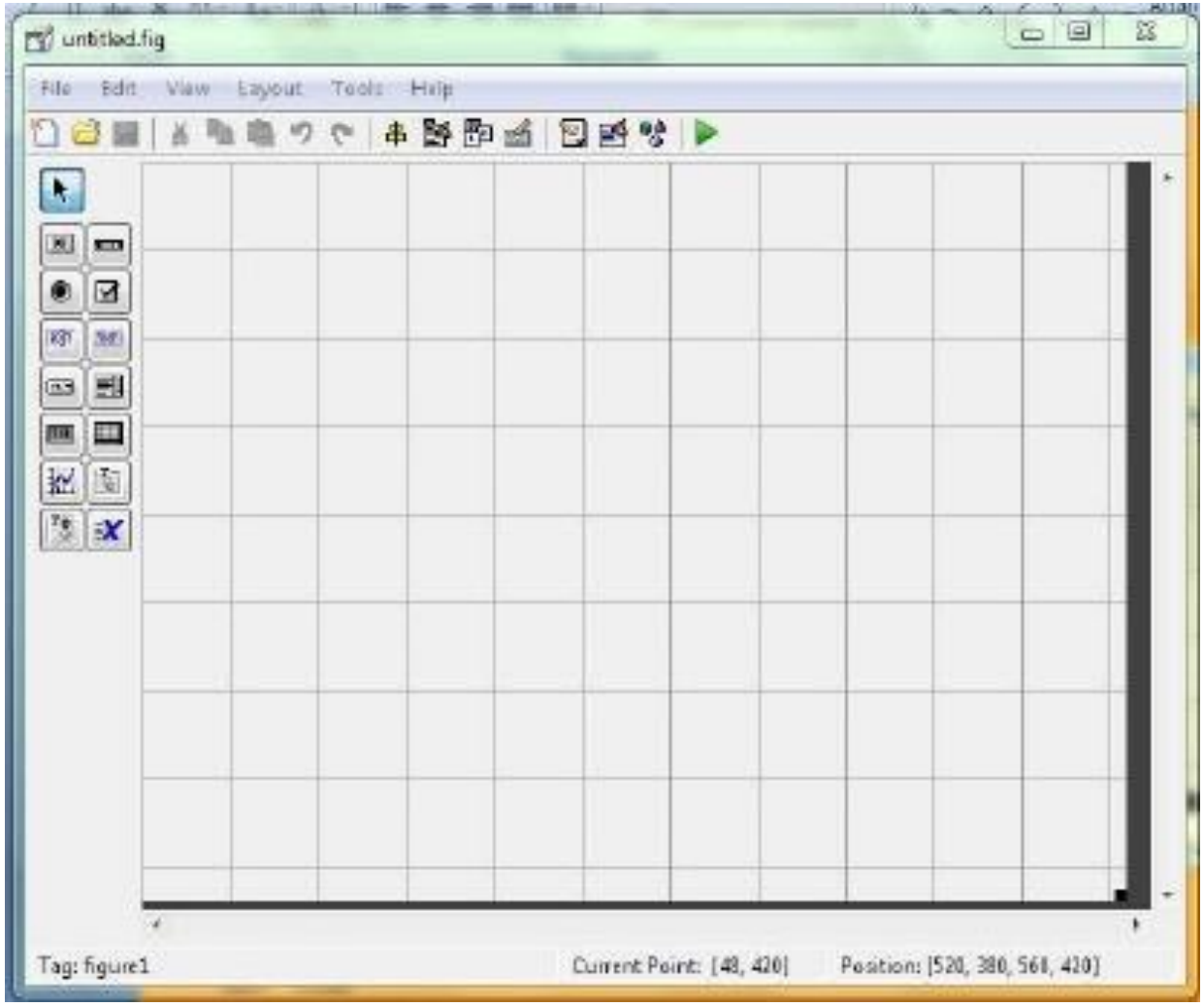


- Choose the first option Blank GUI (Default)



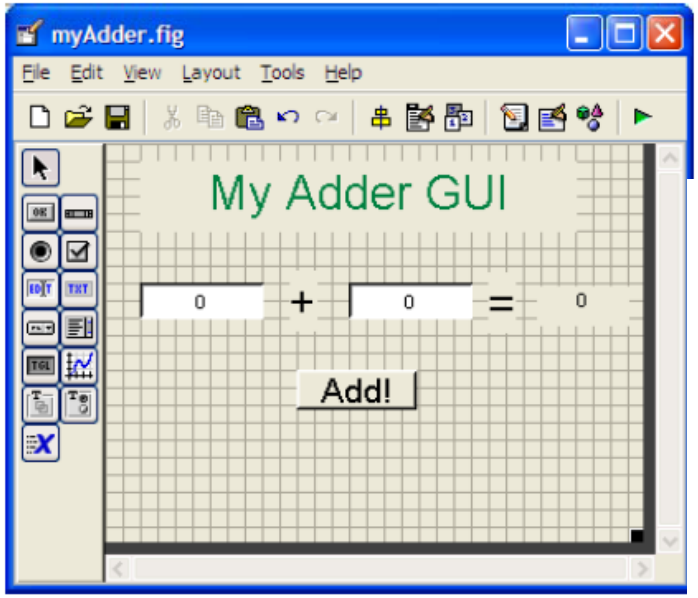
Create GUI

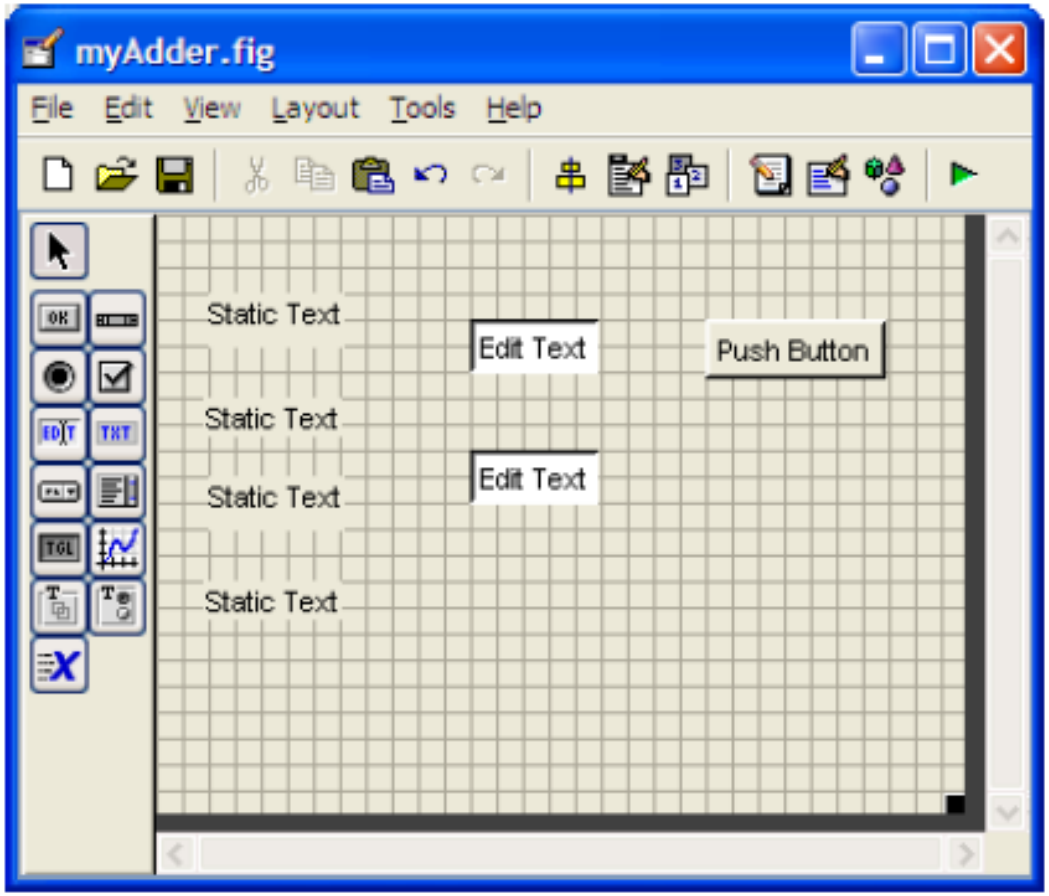
- You should now see the following screen.



Create GUI

- Add components



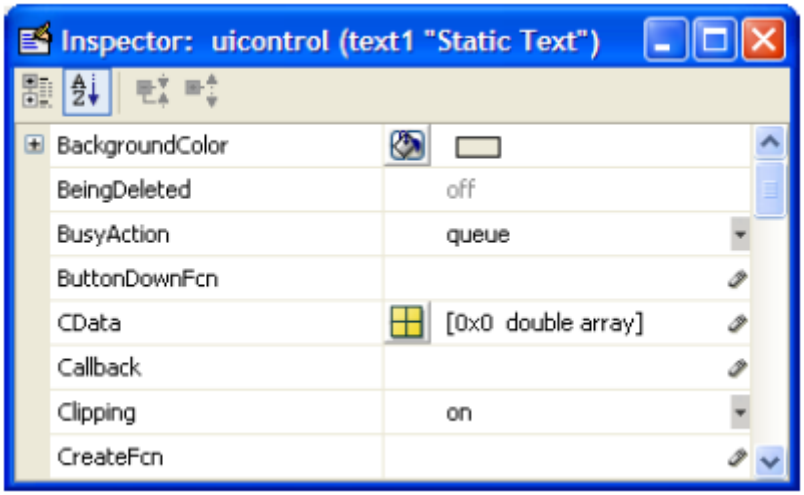


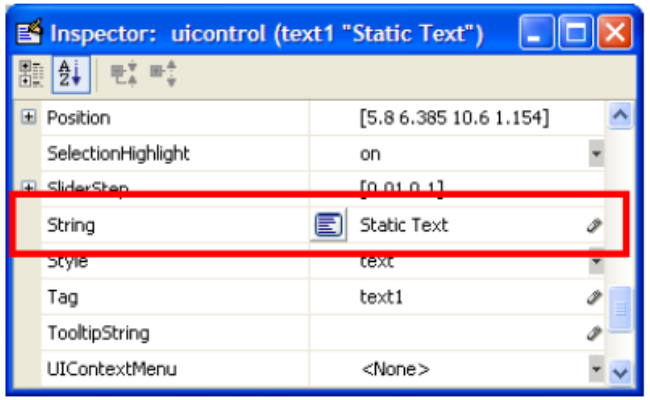
Create GUI

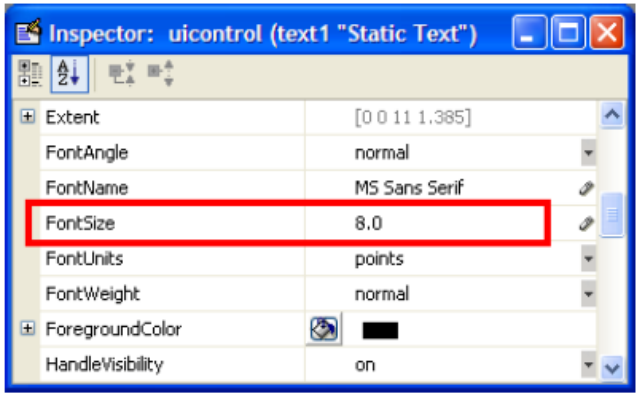
Edit the properties of these components.

Static Text

- Double click one of the Static Text components.





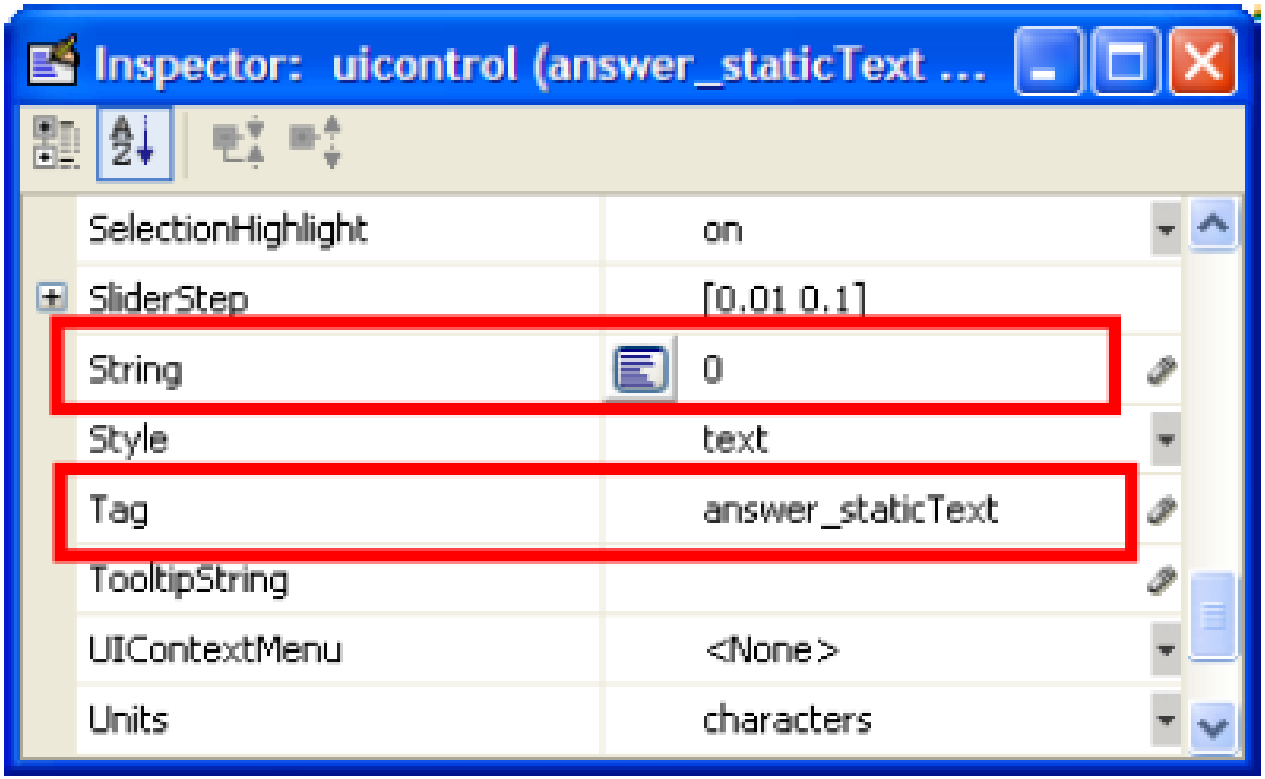


Create GUI

Edit the properties of these components.

Static Text

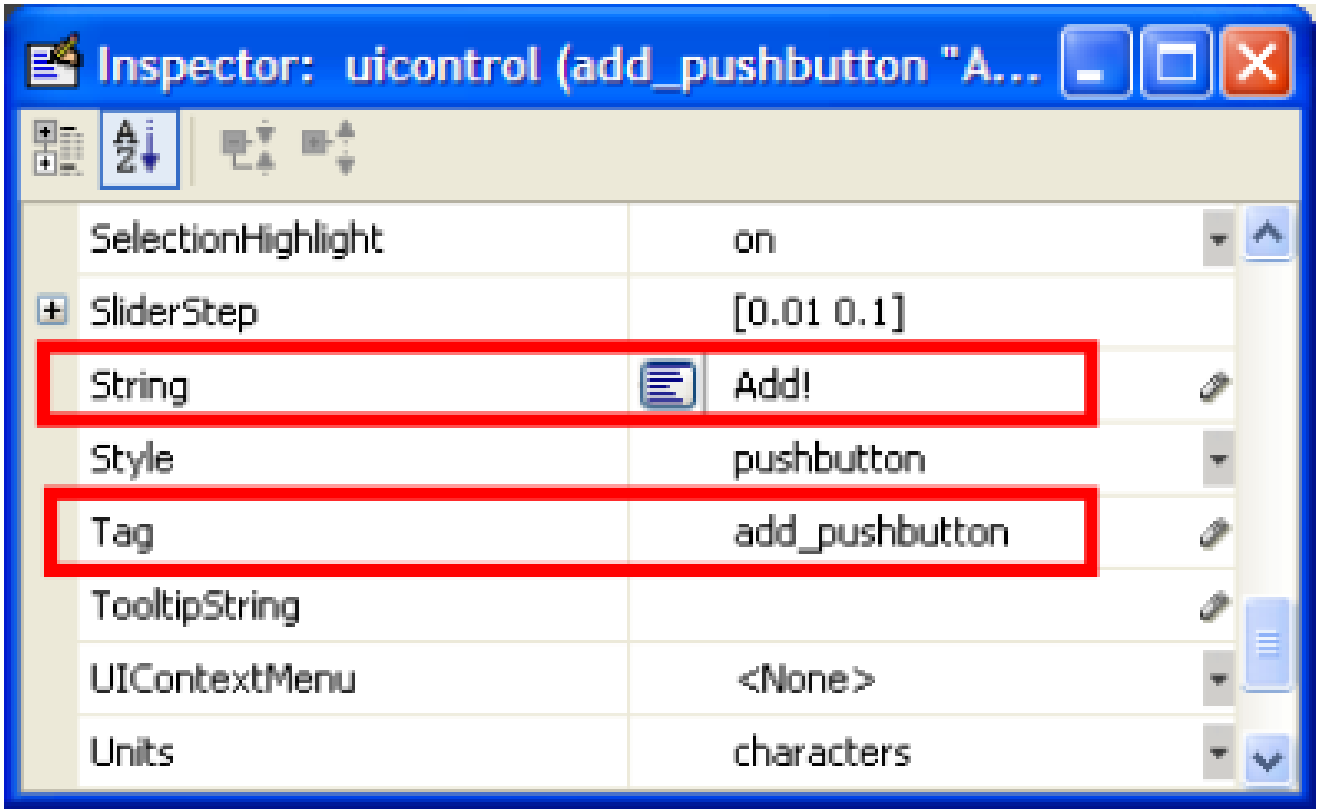
- Double click one of the Static Text components.



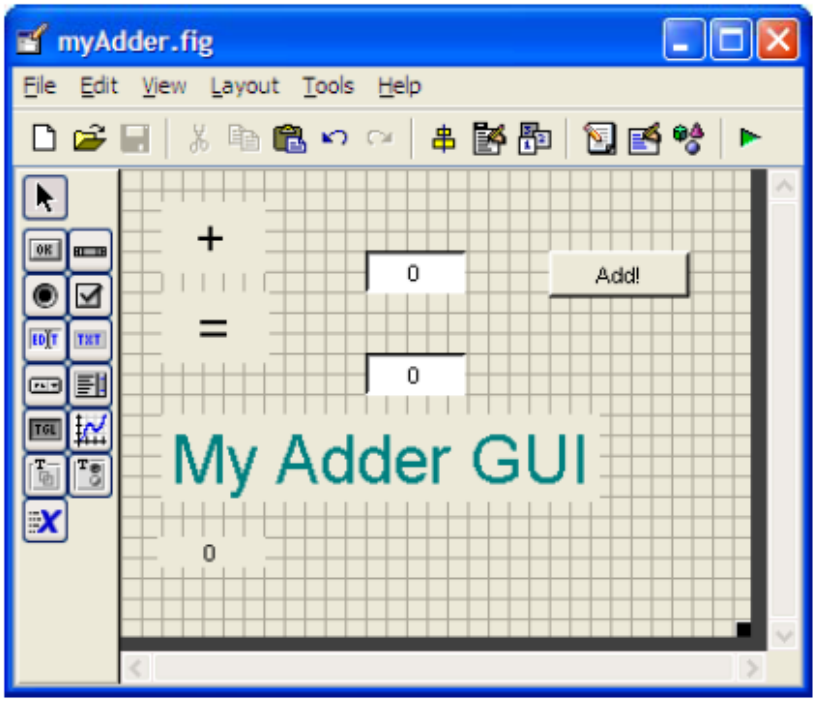
Create GUI

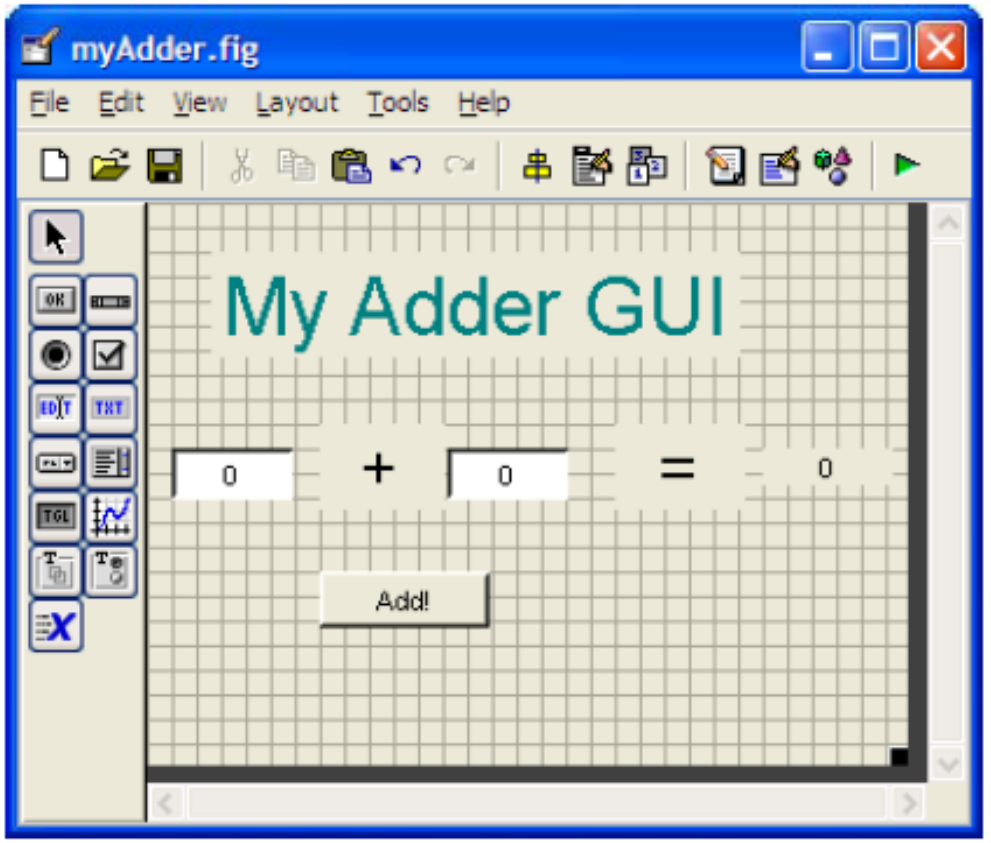
Edit the properties of these components.

Push Button



Create GUI


myAdder.fig
File Edit View Layout Tools Help
+
=
0
0
Add!
My Adder GUI
0

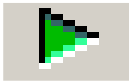

myAdder.fig
File Edit View Layout Tools Help
My Adder GUI
0
+
0
=
0
Add!

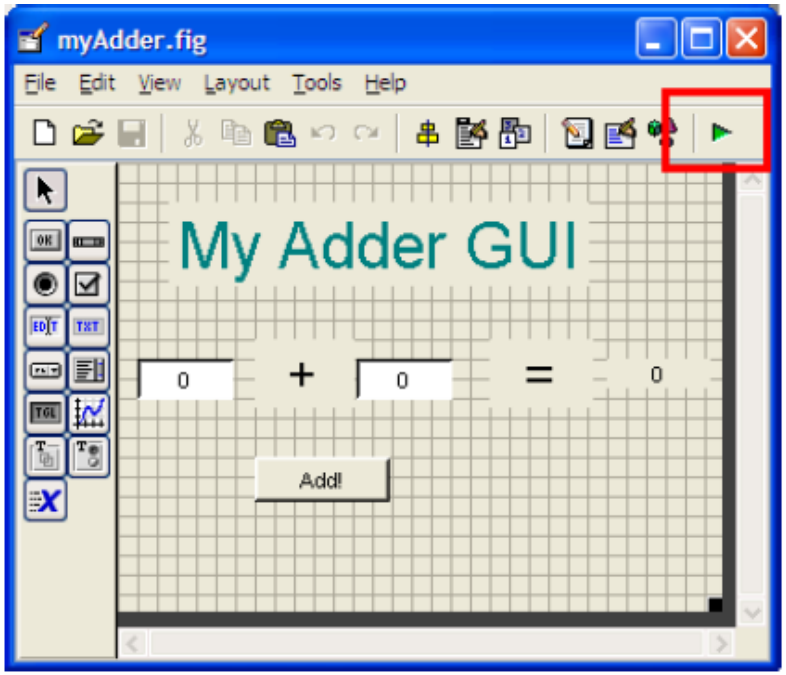
GUI Callbacks

add_pushbutton_Callback

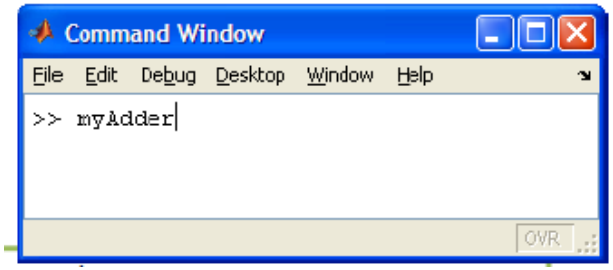
```
a = get(handles.input1_editText,'String');
b = get(handles.input2_editText,'String');
% a and b are variables of Strings type, and need to be converted
% to variables of Number type before they can be added together


total = str2num(a) + str2num(b);
c = num2str(total);
% need to convert the answer back into String type to display it
set(handles.answer_staticText,'String',c);
```

Run GUI

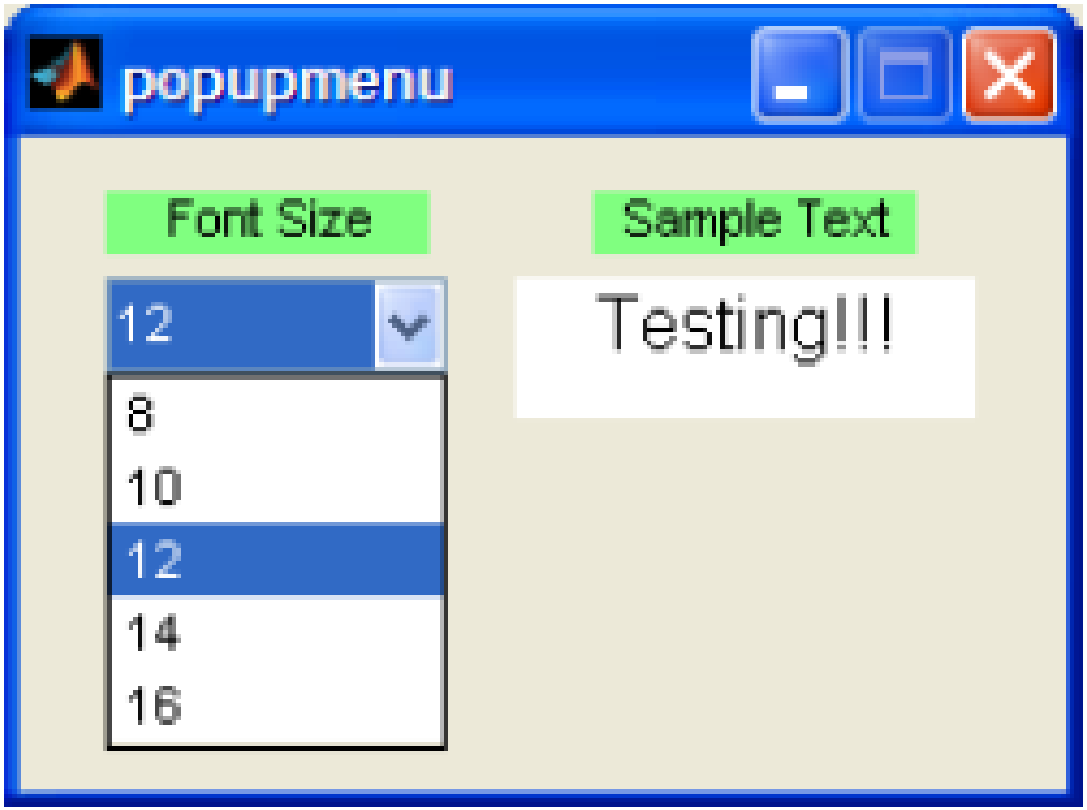
- The first way: Press the icon  on the GUIDE editor



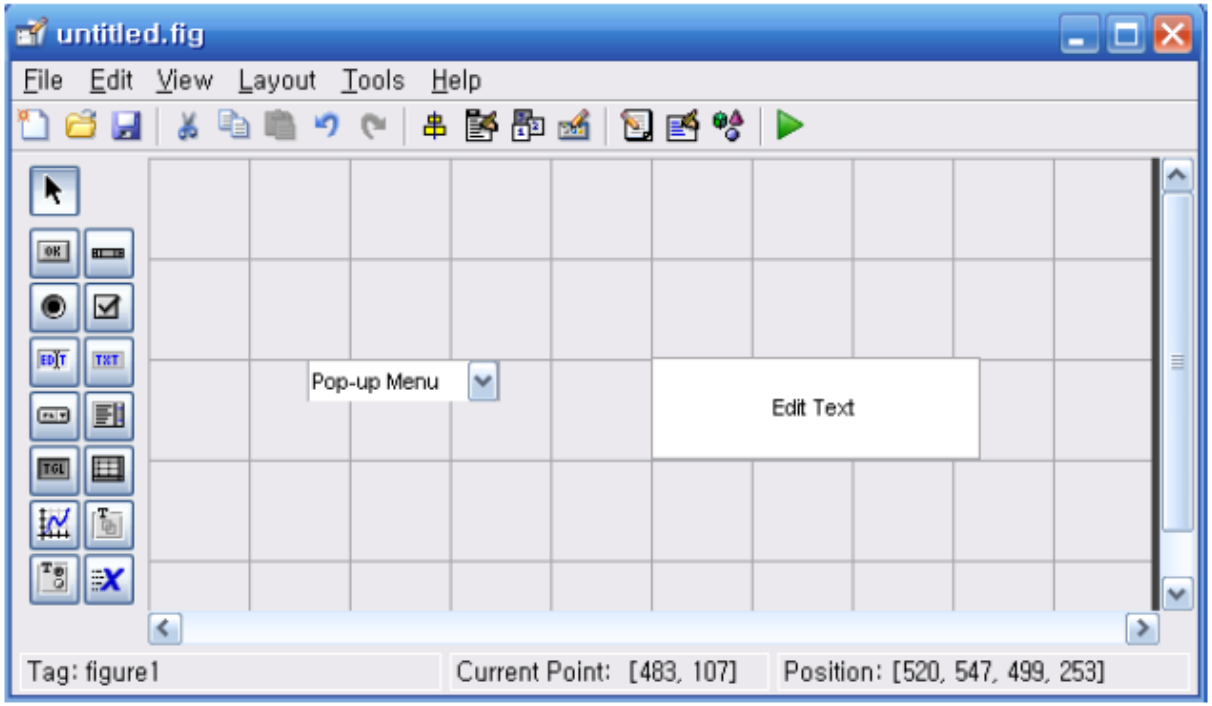
- Launch the GUI from the MATLAB command prompt.

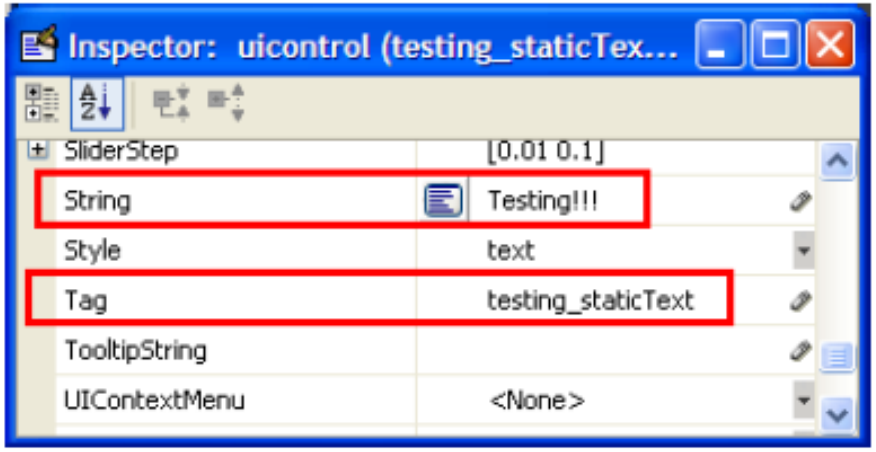


Pop-up Menu

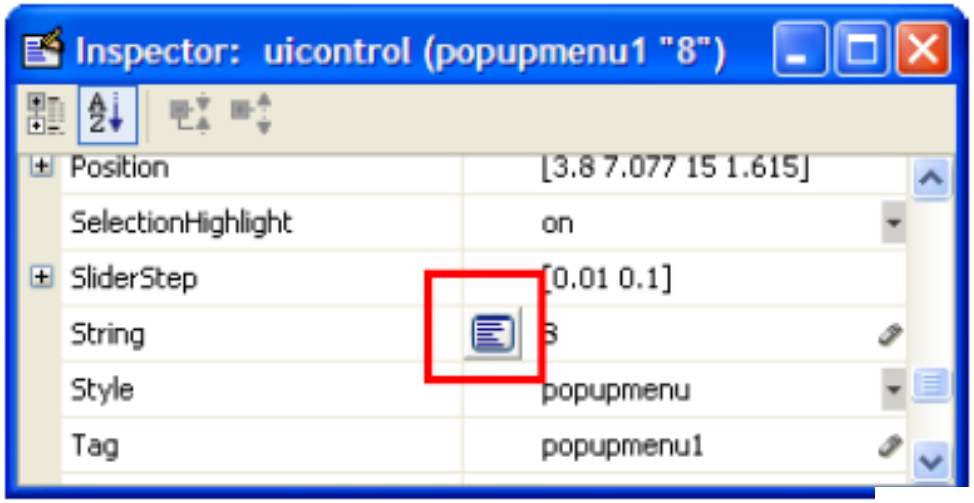


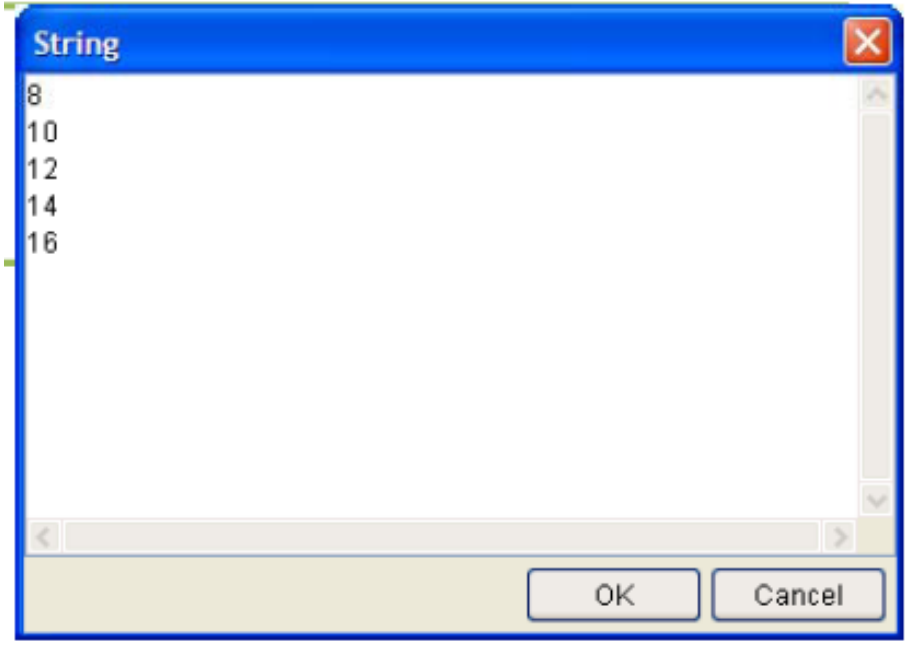
Pop-up Menu


untitled.fig
File Edit View Layout Tools Help
Pop-up Menu
Edit Text
Tag: figure1
Current Point: [483, 107]
Position: [520, 547, 499, 253]


Inspector: uicontrol (testing_staticTex...
SliderStep
[0.01 0.1]
String
Testing!!!
Style
text
Tag
testing_staticText
TooltipString
UIContextMenu
<None>

Pop-up Menu

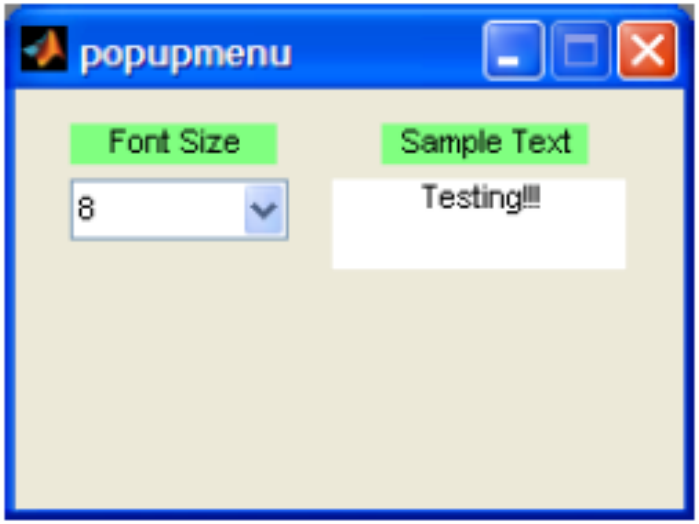

Inspector: uicontrol (popupmenu1 "8")
Position
[3.8 7.077 15 1.615]
SelectionHighlight
on
SliderStep
[0.01 0.1]
String
8
Style
popupmenu
Tag
popupmenu1

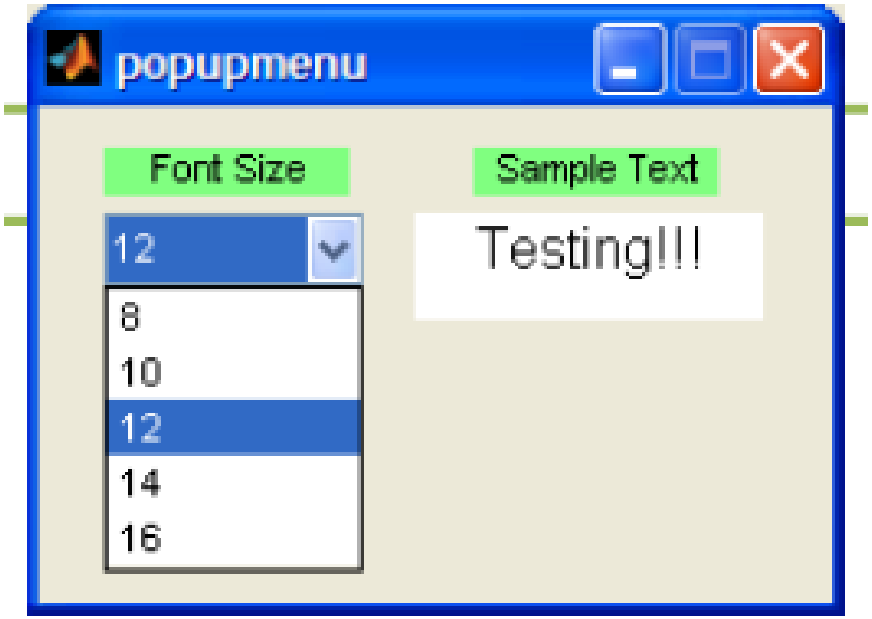

String
8
10
12
14
16
OK
Cancel

Pop-up Menu Callback

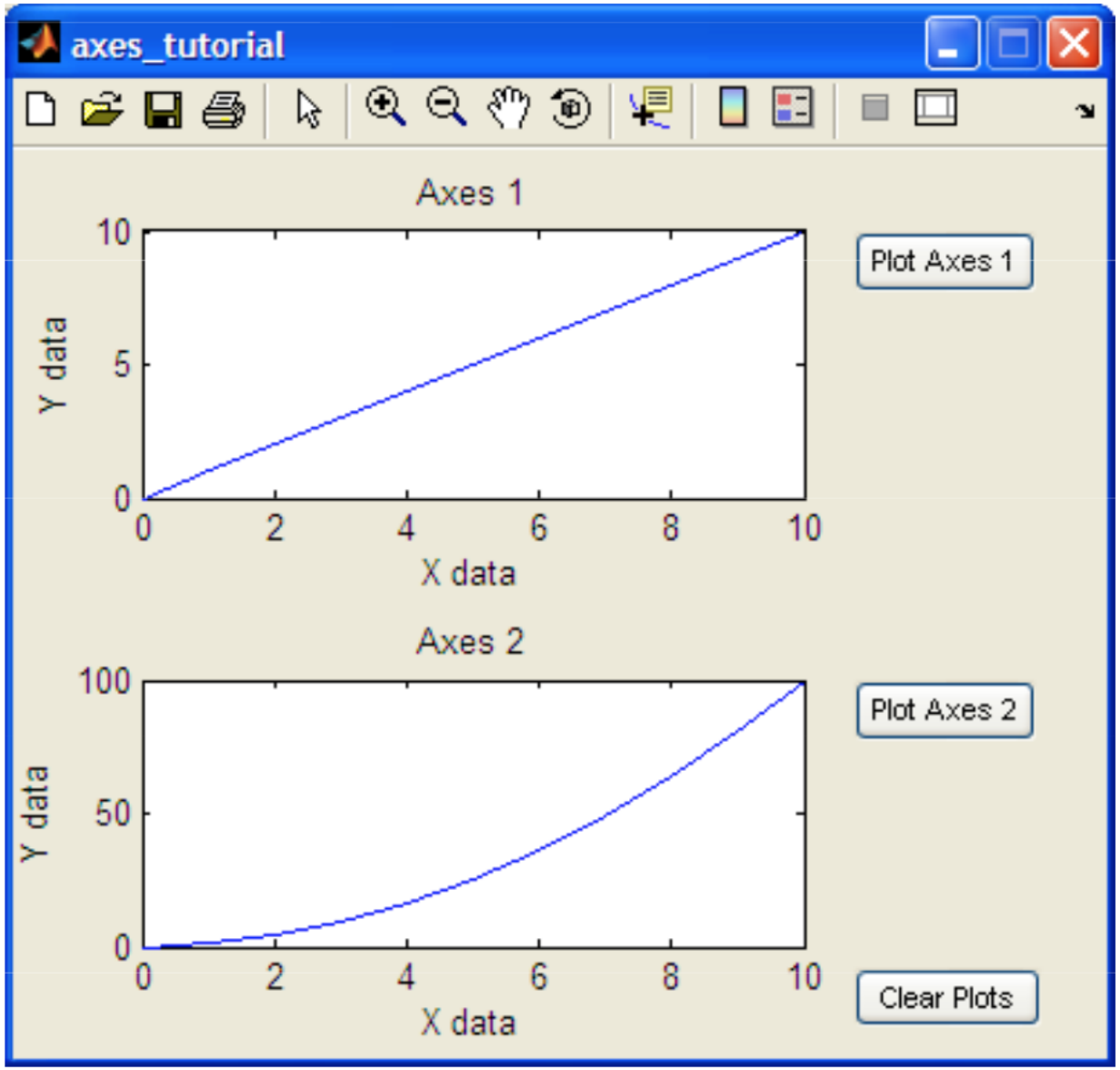
```
%gets the selected option
switch get(handles.popupmenu1,'Value')
    case 1
        set(handles.testing_staticText,'FontSize',8);
    case 2
        set(handles.testing_staticText,'FontSize',10);
    case 3
        set(handles.testing_staticText,'FontSize',12);
    case 4
        set(handles.testing_staticText,'FontSize',14);
    case 5
        set(handles.testing_staticText,'FontSize',16);
    otherwise
end
```

Pop-up Menu Callback

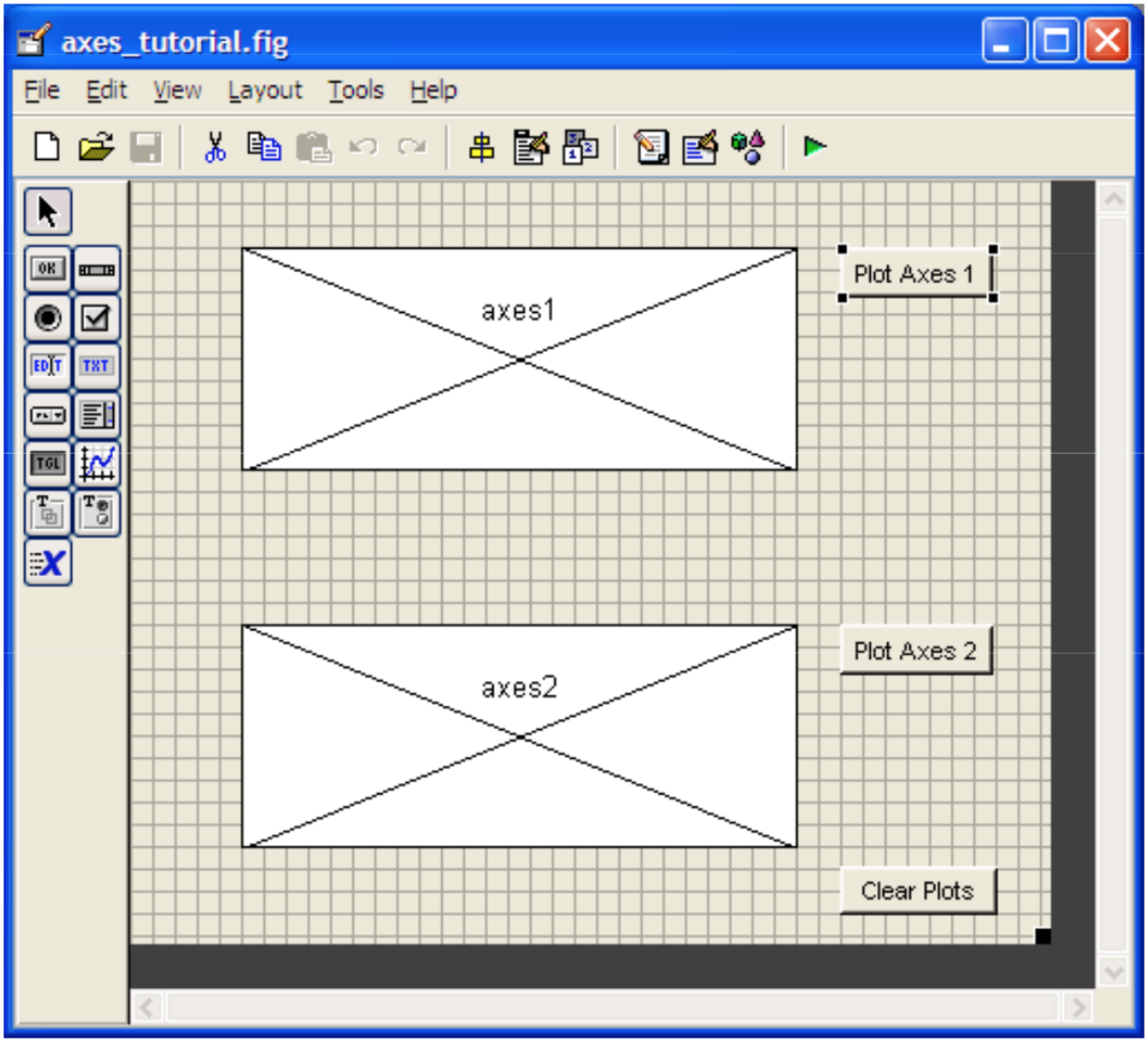




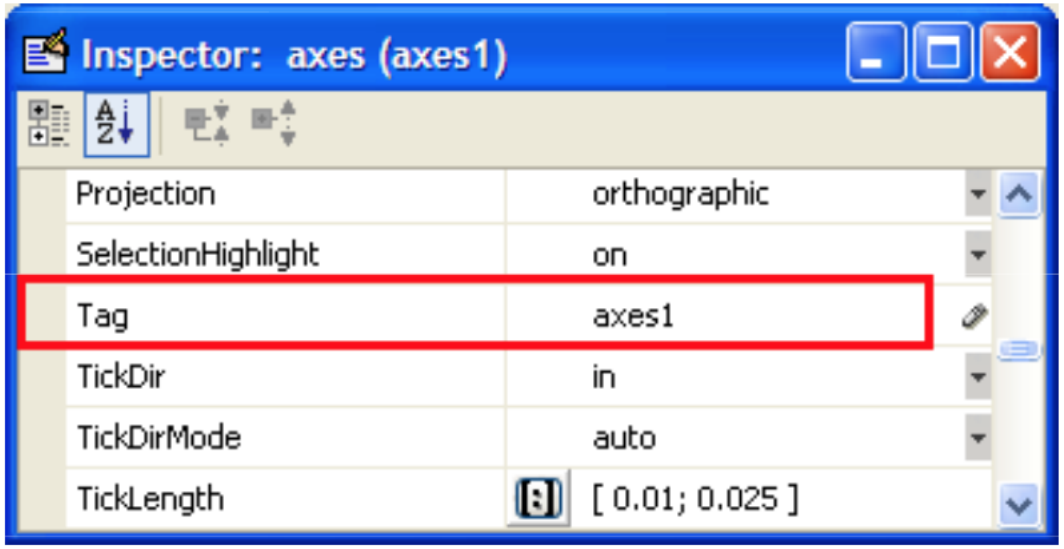
Plotting Data to Axes



Plotting Data to Axes

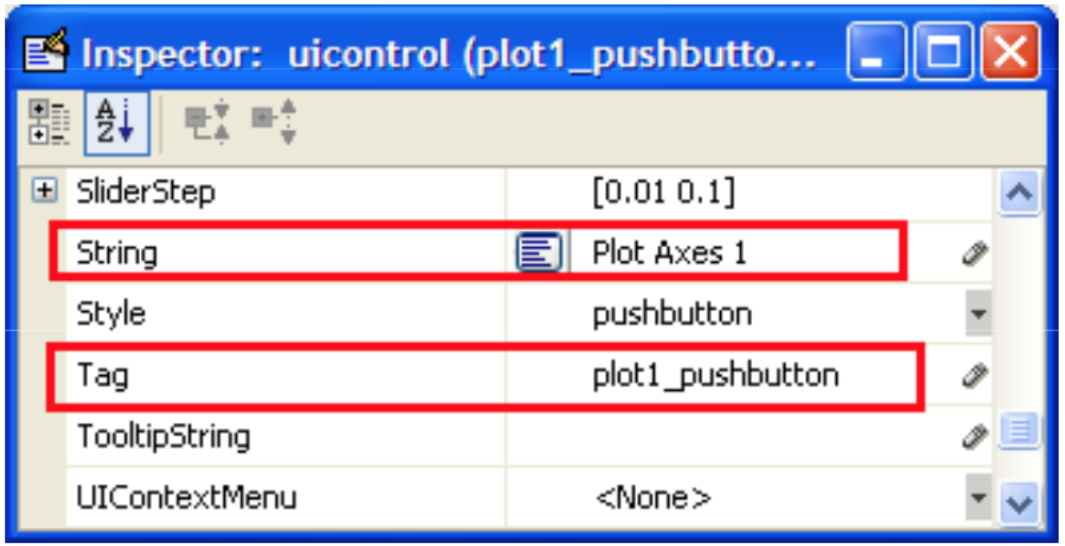


Plotting Data to Axes



- Axes Figure

- Push button



Plotting Data to Axes Callback

- Figure 1

```
%selects axes1 as the current axes, so that
%Matlab knows where to plot the data
axes(handles.axes1)

%creates a vector from 0 to 10, [0 1 2 3 . . . 10]
x = 0:10;
%creates a vector from 0 to 10, [0 1 2 3 . . . 10]
y = 0:10;

%plots the x and y data
plot(x,y);
%adds a title, x-axis description, and y-axis description
title('Axes 1');
xlabel('X data');
ylabel('Y data');
```

Plotting Data to Axes Callback

- Figure 2

```
%selects axes2 as the current axes, so that
%Matlab knows where to plot the data
axes(handles.axes2)

%creates a vector from 0 to 10, [0 1 2 3 . . . 10]
x = 0:10;
%creates a vector  [0 1 4 9 . . . 100]
y = x.^2

%plots the x and y data
plot(x,y);
%adds a title, x-axis description, and y-axis description
title('Axes 2');
xlabel('X data');
ylabel('Y data');
```

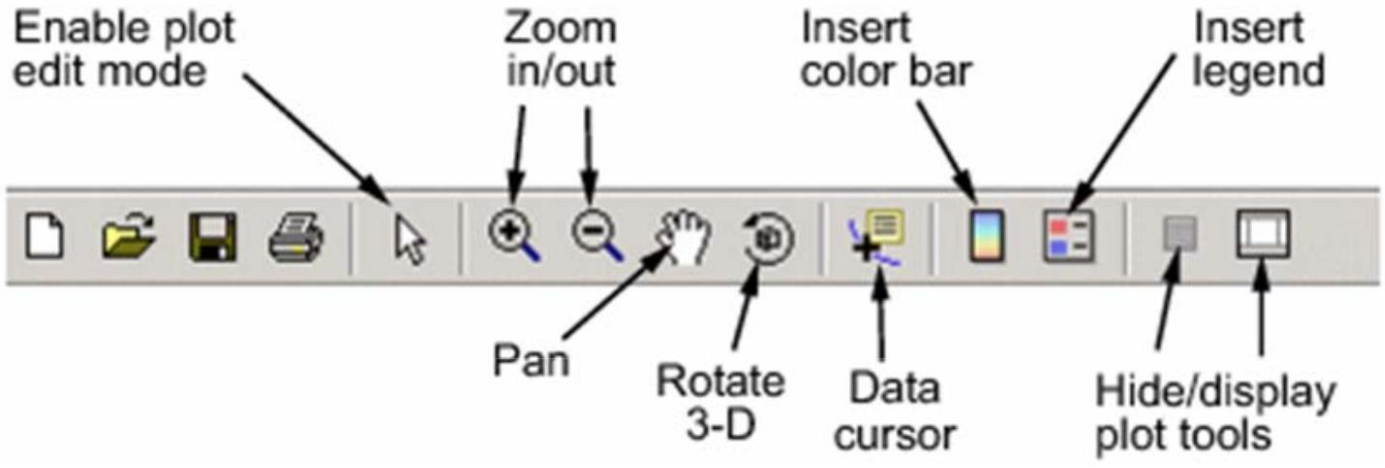
Plotting Data to Axes Callback

- clearPlots_pushbutton_Callback:

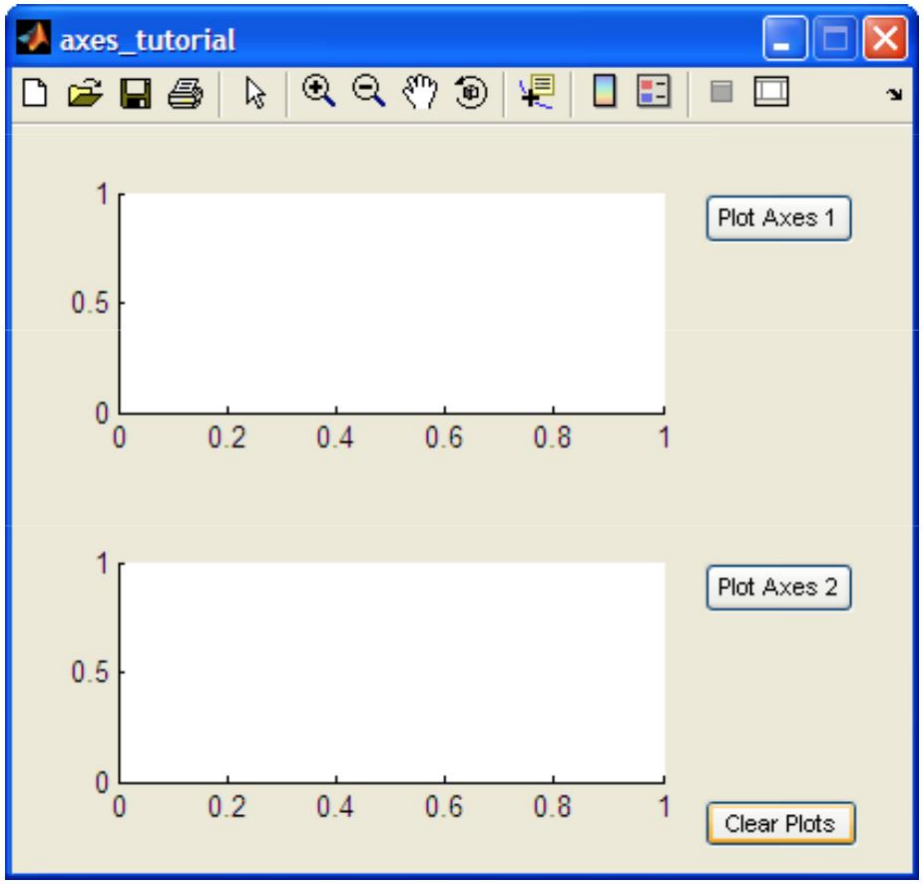
```
%these two lines of code clears both axes
cla(handles.axes1,'reset')
cla(handles.axes2,'reset')
```

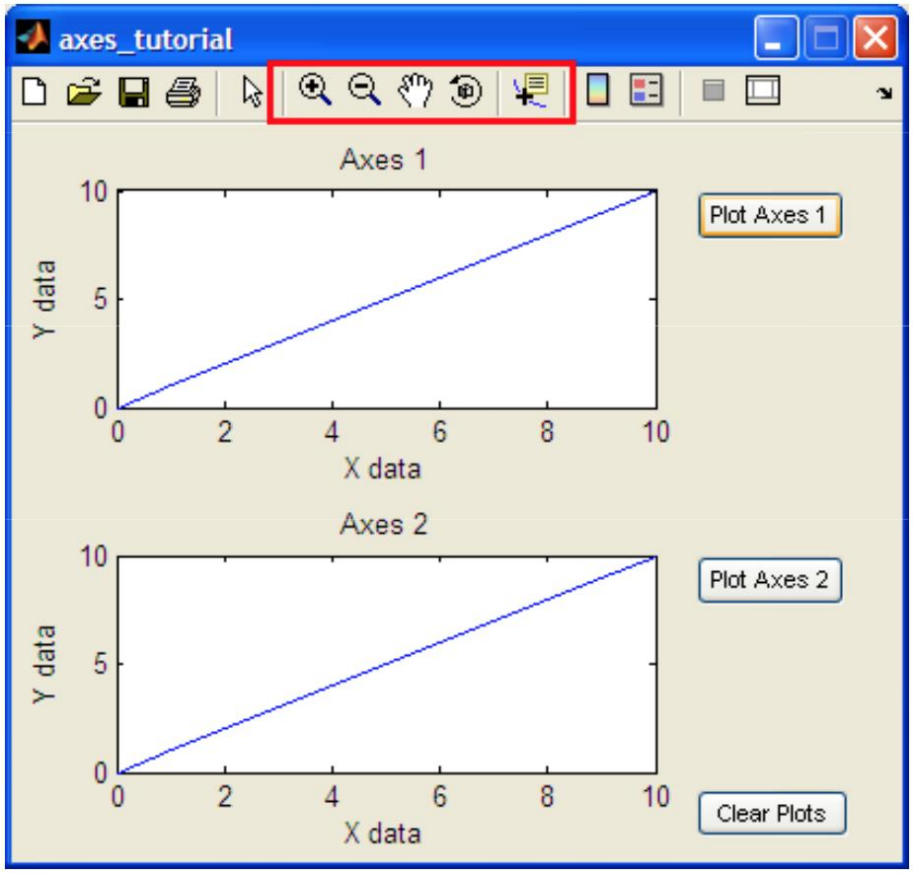
- axes_tutorial_OpeningFcn:

```
set(hObject,'toolbar','figure');
```

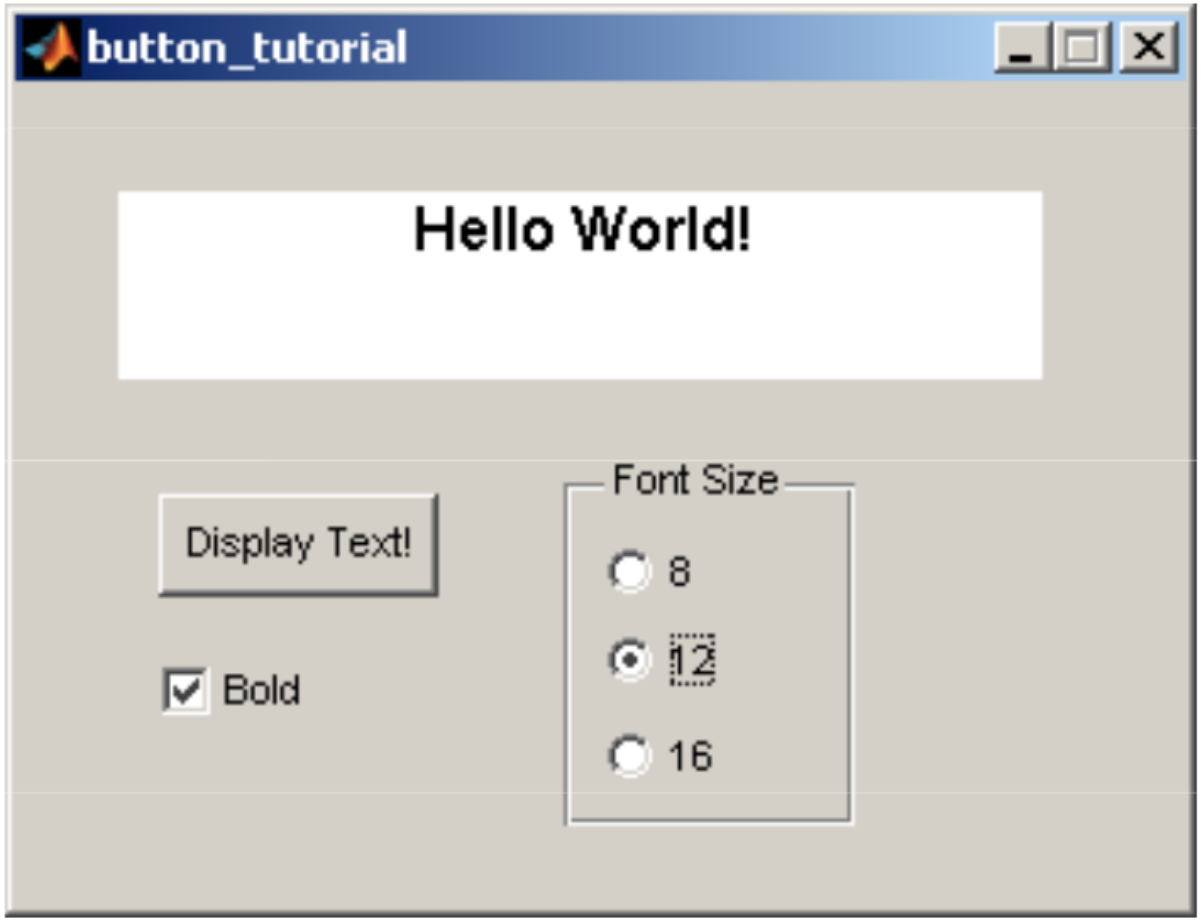


Plotting Data to Axes

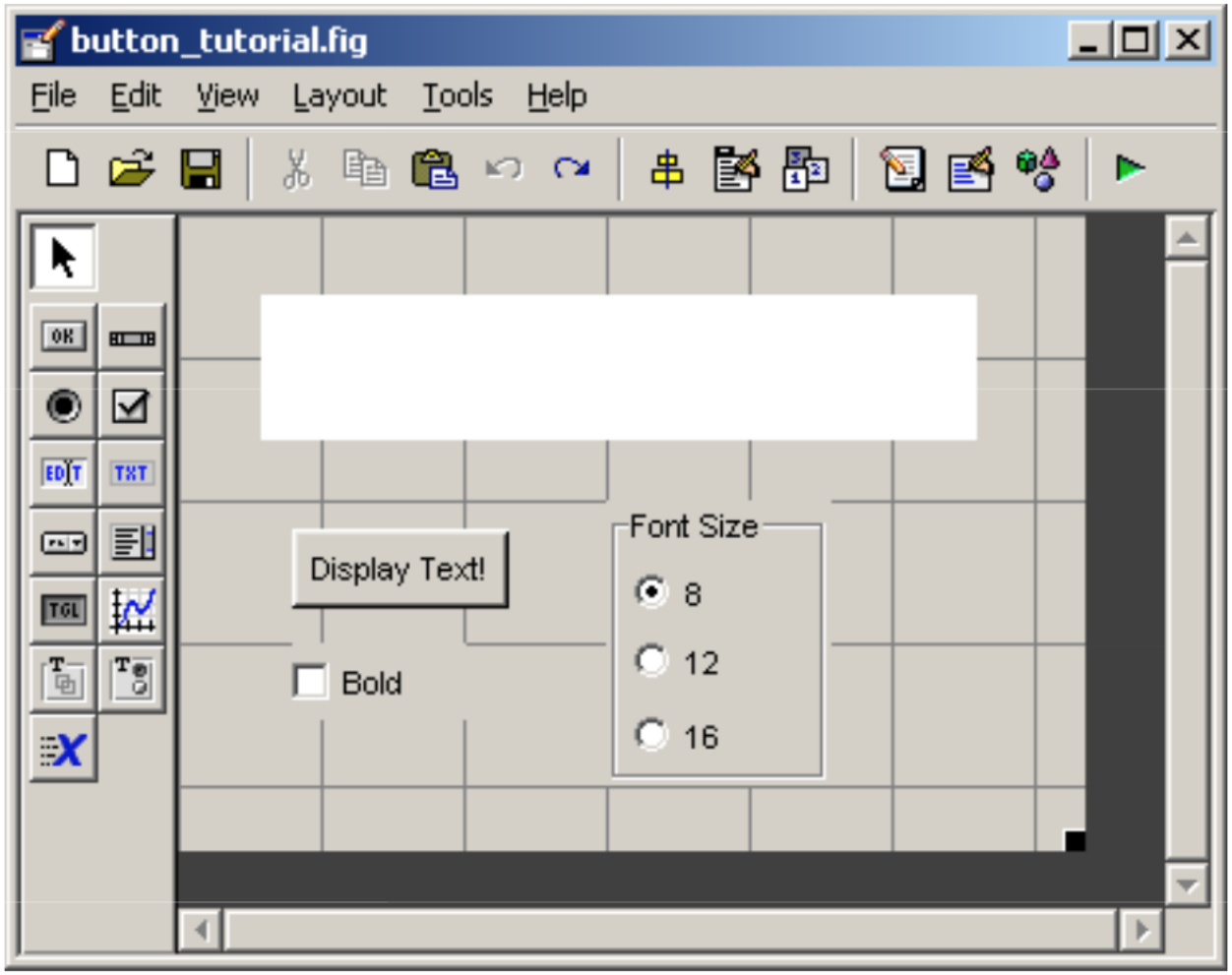




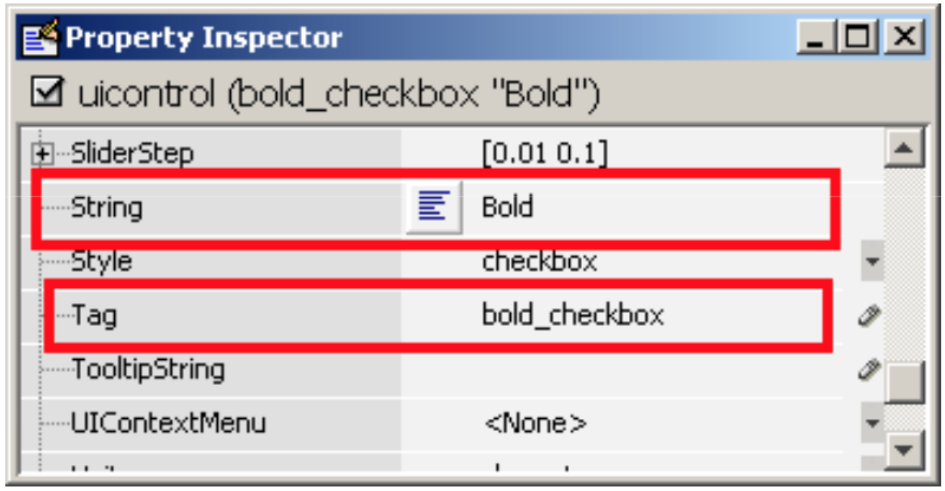
Button Types & Button Group



Button Types & Button Group



Button Types & Button Group

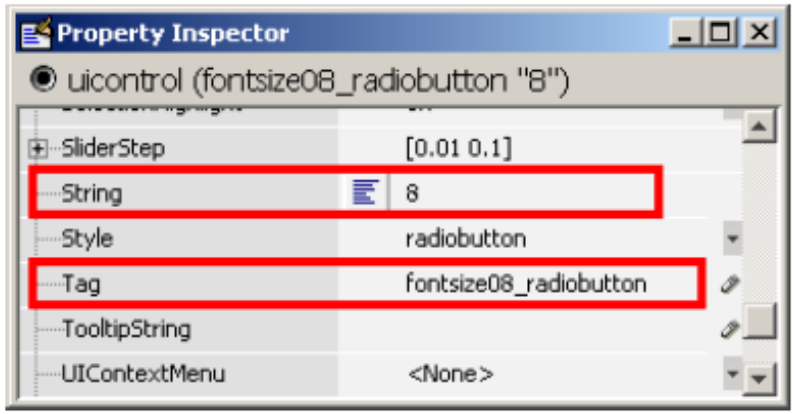


- Check box

- bold_checkbox_Callback

```
%checkboxStatus = 0, if the box is unchecked,
%checkboxStatus = 1, if the box is checked
checkboxStatus = get(handles.bold_checkbox,'Value');
if(checkboxStatus)
    %if box is checked, text is set to bold
    set(handles.display_staticText,'FontWeight' , 'bold');
else
    %if box is unchecked, text is set to normal
    set(handles.display_staticText,'FontWeight', 'normal');
end
```

Button Types & Button Group

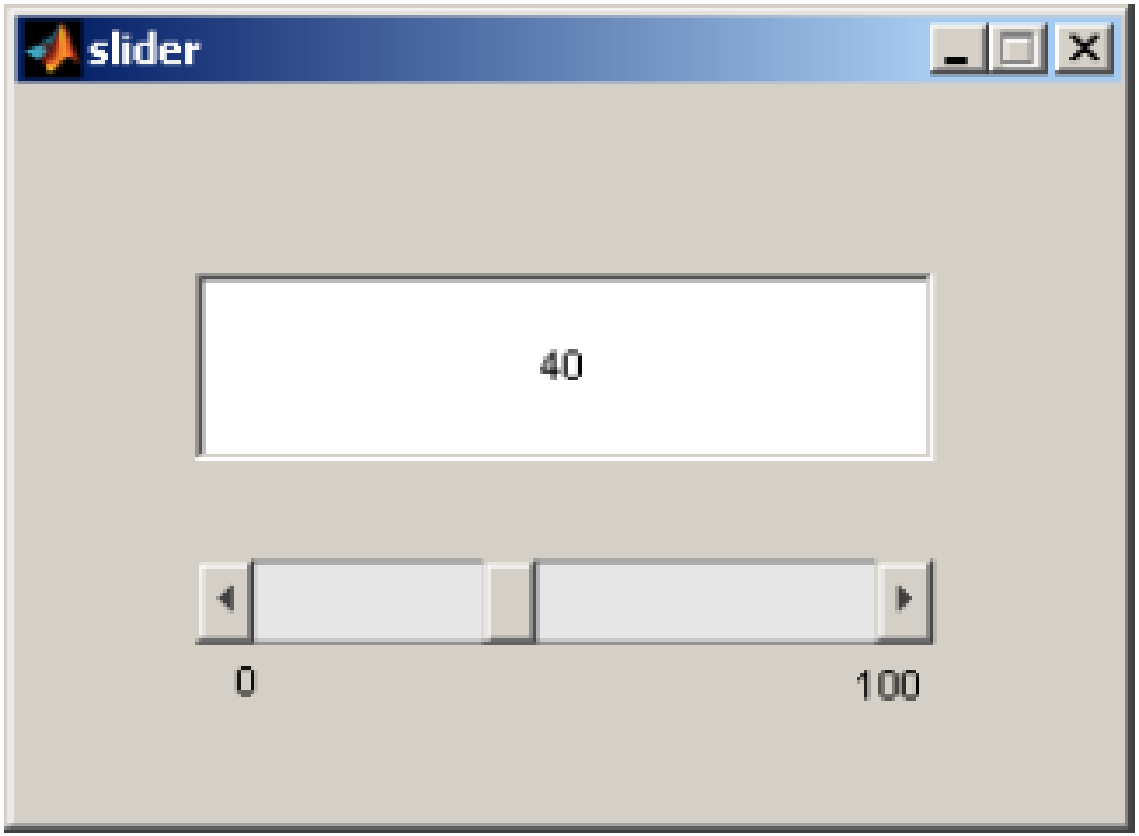


- Radio Button

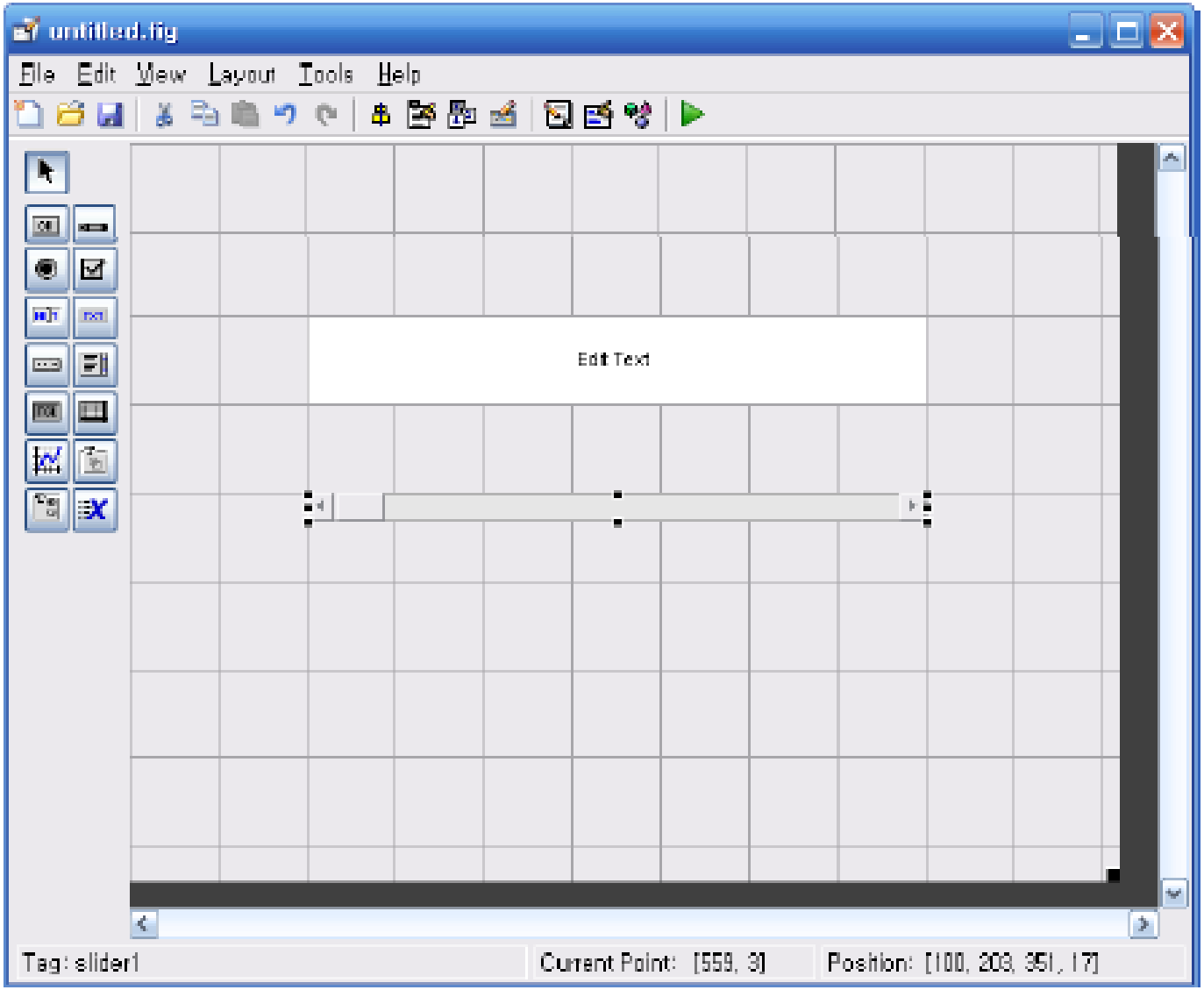
SelectionChangedFcn

```
function fontSelect_buttongroup_SelectionChangeFcn(hObject, eventdata)

%retrieve GUI data, i.e. the handles structure
handles = guidata(hObject);

switch get(eventdata.NewValue,'Tag')   % Get Tag of selected object
    case 'fontsize08_radiobutton'
      %execute this code when fontsize08_radiobutton is selected
      set(handles.display_staticText,'FontSize',8);

    case 'fontsize12_radiobutton'
      %execute this code when fontsize12_radiobutton is selected
      set(handles.display_staticText,'FontSize',12);

    case 'fontsize16_radiobutton'
      %execute this code when fontsize16_radiobutton is selected
      set(handles.display_staticText,'FontSize',16);
    otherwise
       % Code for when there is no match.

end
```

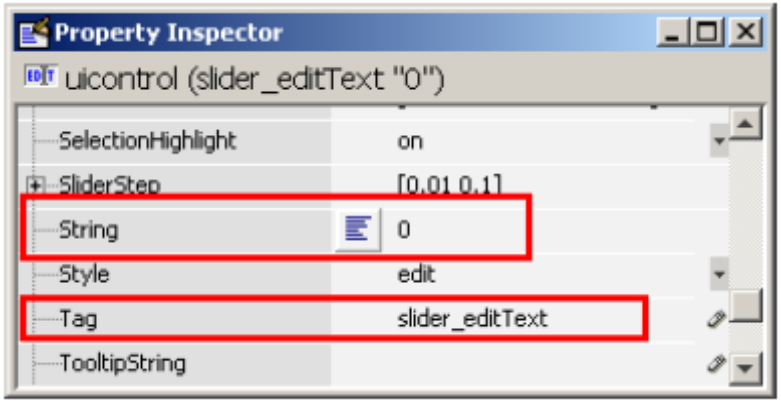
Slider



Slider

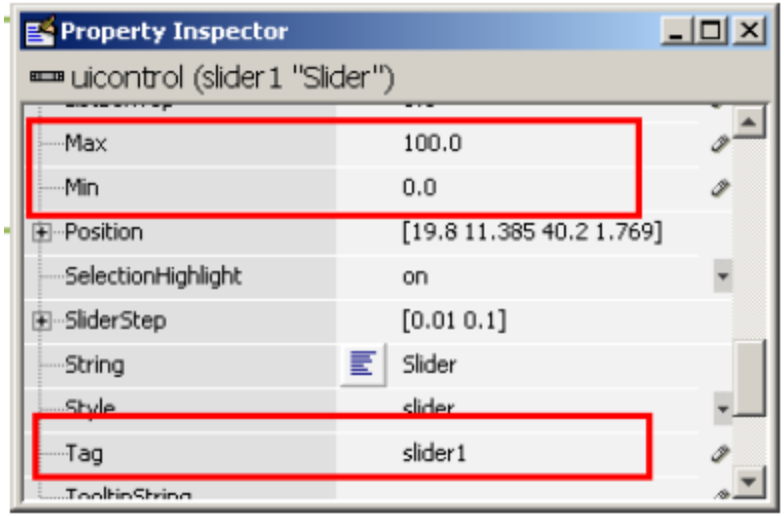

untitled.fig
File Edit View Layout Tools Help
Edit Text
Tag: slider1
Current Point: [559, 3]
Position: [100, 209, 351, 17]

Slider

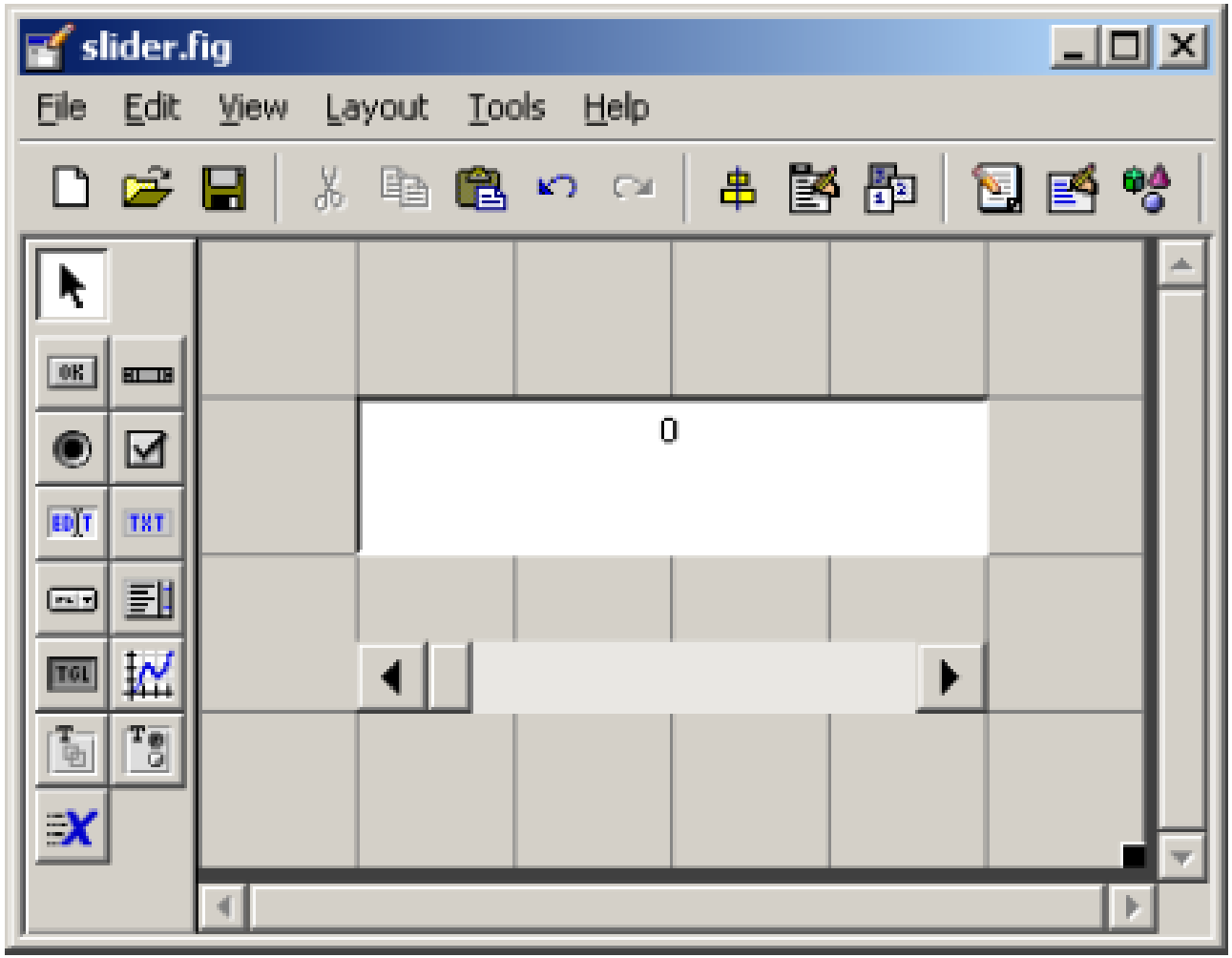


- Edit Text

- Slider



Slider



Slider

- slider_Callback.

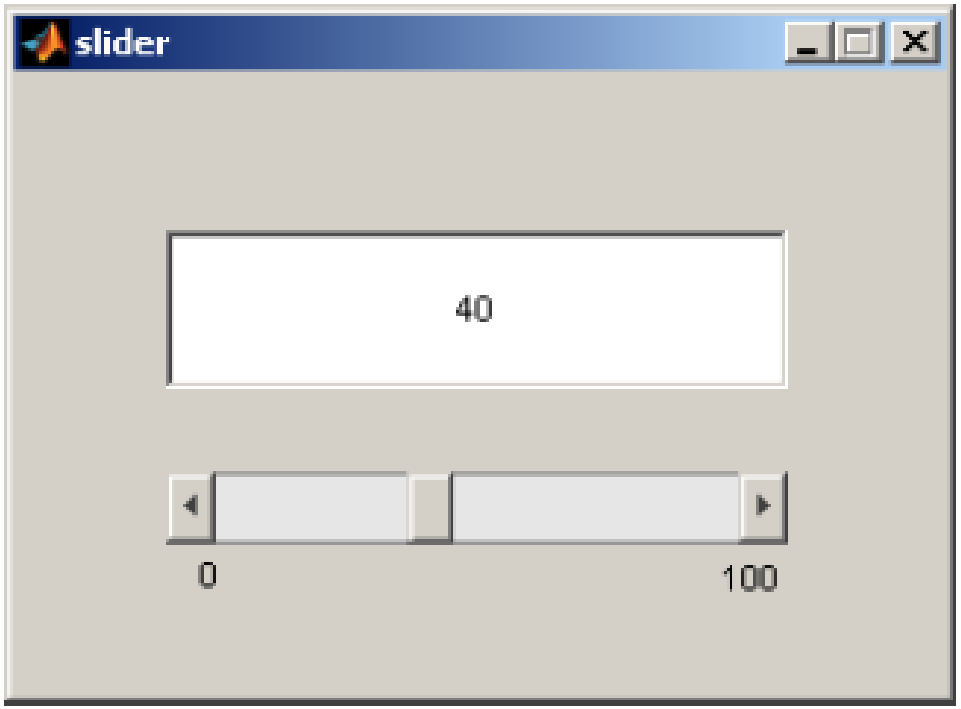
```
%obtains the slider value from the slider component
sliderValue = get(handles.slider1,'Value');

%puts the slider value into the edit text component
set(handles.slider_editText,'String', num2str(sliderValue));
```

Slider

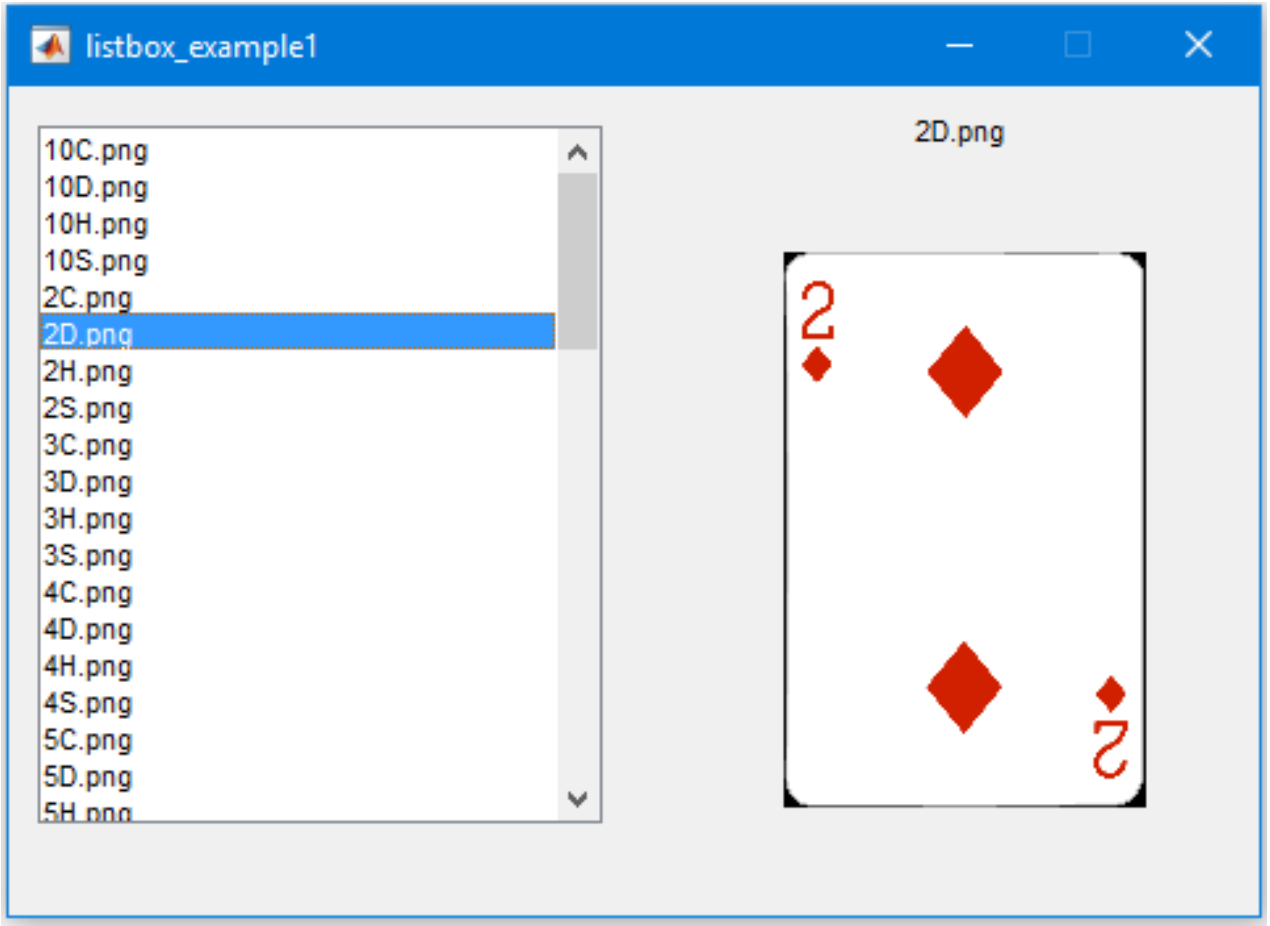
- slider_editText_Callback

```
%get the string for the editText component
sliderValue = get(handles.slider_editText,'String');

%convert from string to number if possible, otherwise returns empty
sliderValue = str2num(sliderValue);

%if user inputs something is not a number,
%or if the input is less than 0
%or greater than 100, then the slider value defaults to 0
if (isempty(sliderValue) || sliderValue < 0 || sliderValue > 100)
    set(handles.slider1,'Value',0);
    set(handles.slider_editText,'String','0');
else
    set(handles.slider1,'Value',sliderValue);
end
```

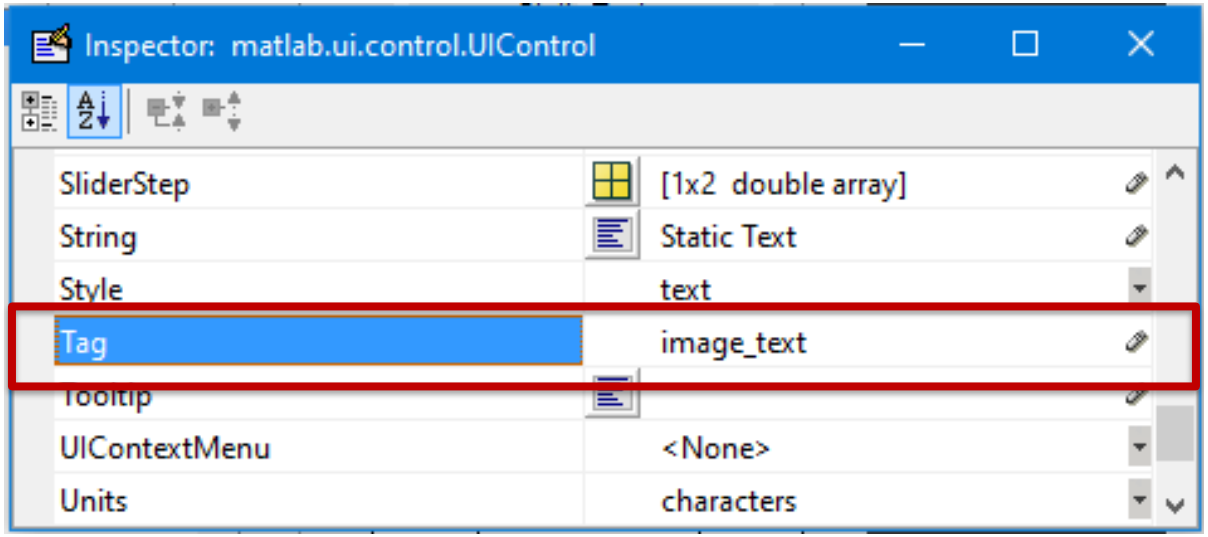
Slider



Listbox

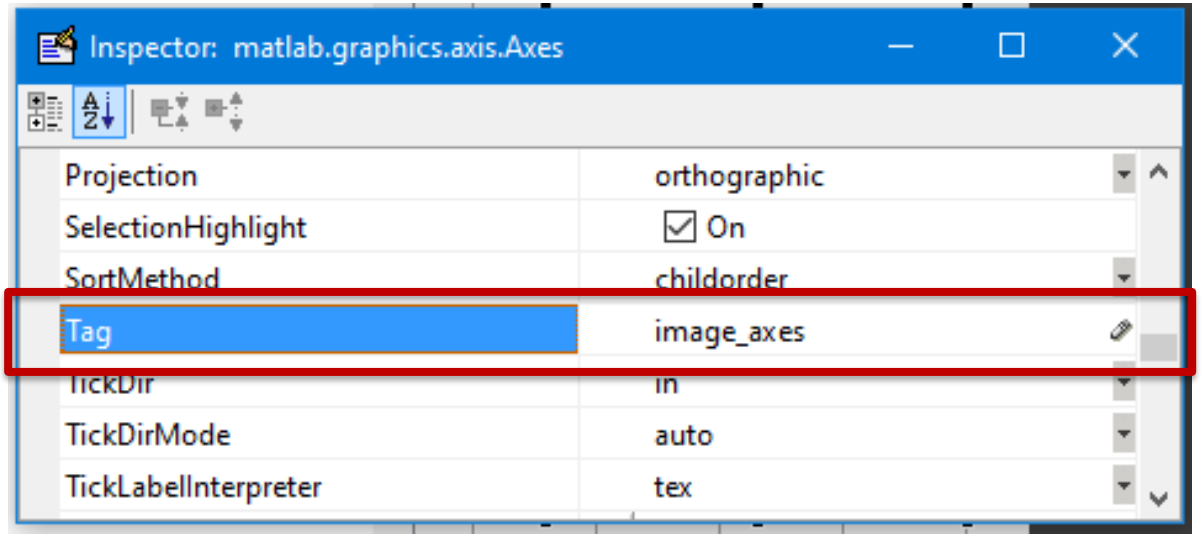

listbox_example1
10C.png
10D.png
10H.png
10S.png
2C.png
2D.png
2H.png
2S.png
3C.png
3D.png
3H.png
3S.png
4C.png
4D.png
4H.png
4S.png
5C.png
5D.png
5H.png
2D.png

Listbox

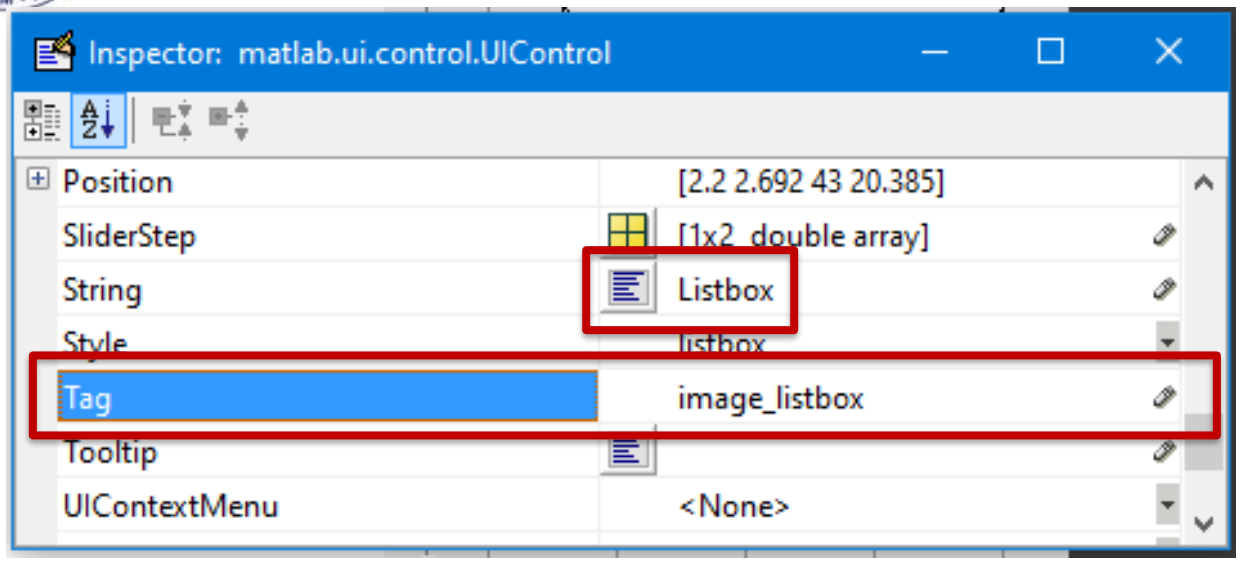


- Static Text

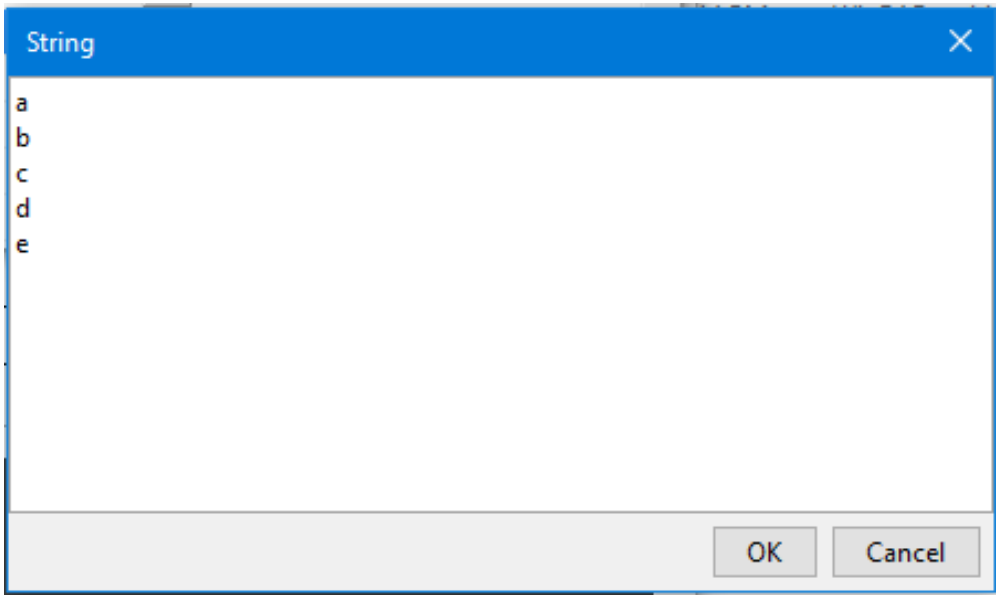
- Axes



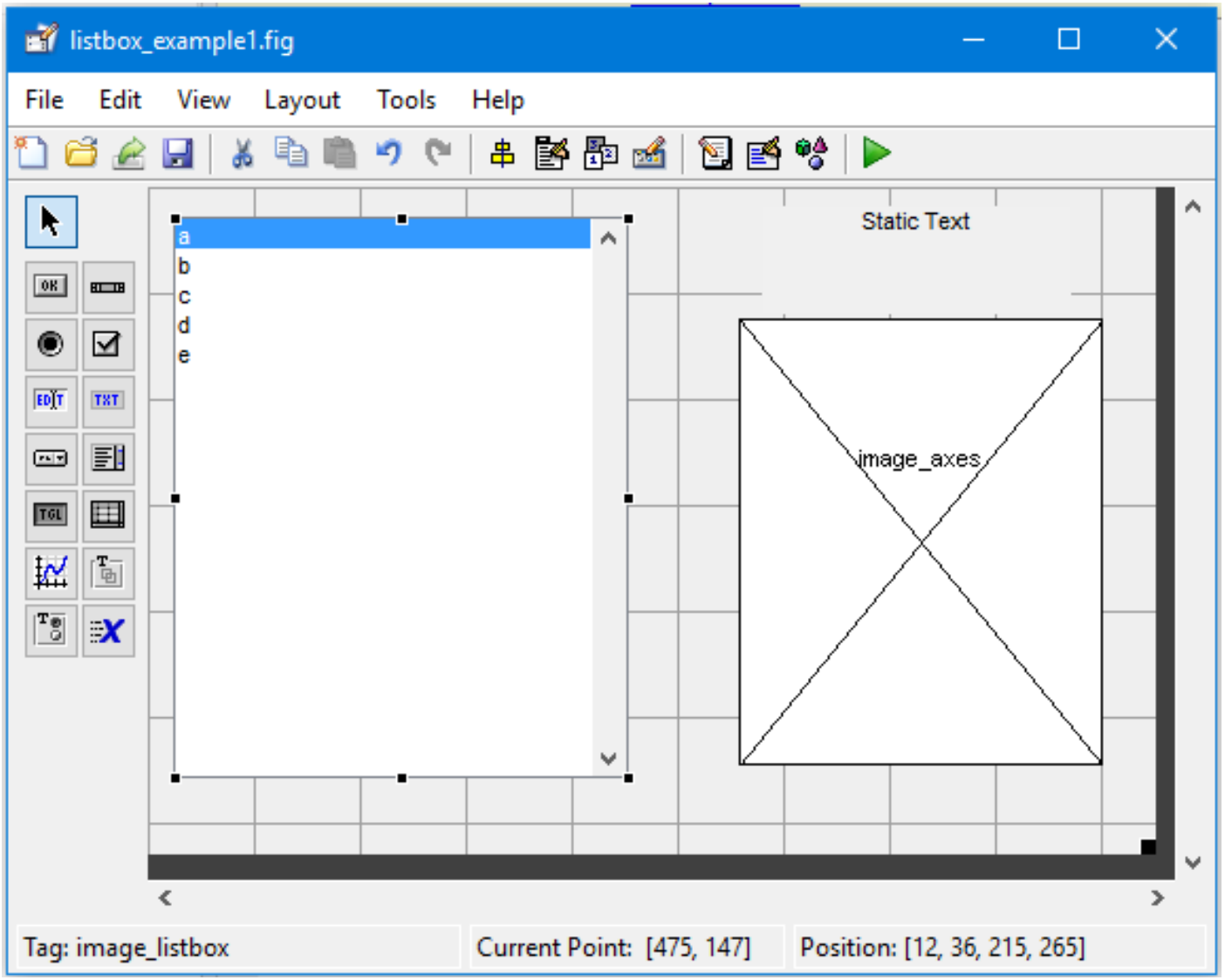
Listbox



- Listbox



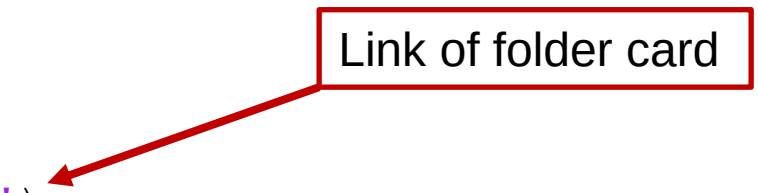
Listbox


listbox_example1.fig
File
Edit
View
Layout
Tools
Help
a
b
c
d
e
Static Text
image_axes
Tag: image_listbox
Current Point: [475, 147]
Position: [12, 36, 215, 265]

Listbox

- **OpeningFcn**

```
function listbox_example1_OpeningFcn(hObject, eventdata, handles,
varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to listbox_example1 (see
VARARGIN)

% Choose default command line output for listbox_example1
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);
file=dir('F:\**********\card\*.png');
for i=1:length(file)
    card_image{i}=file(i).name;
end
set(handles.image_listbox,'string',card_image);
% UIWAIT makes listbox_example1 wait for user response (see UIRESUME)
% uiwait(handles.figure1);
```

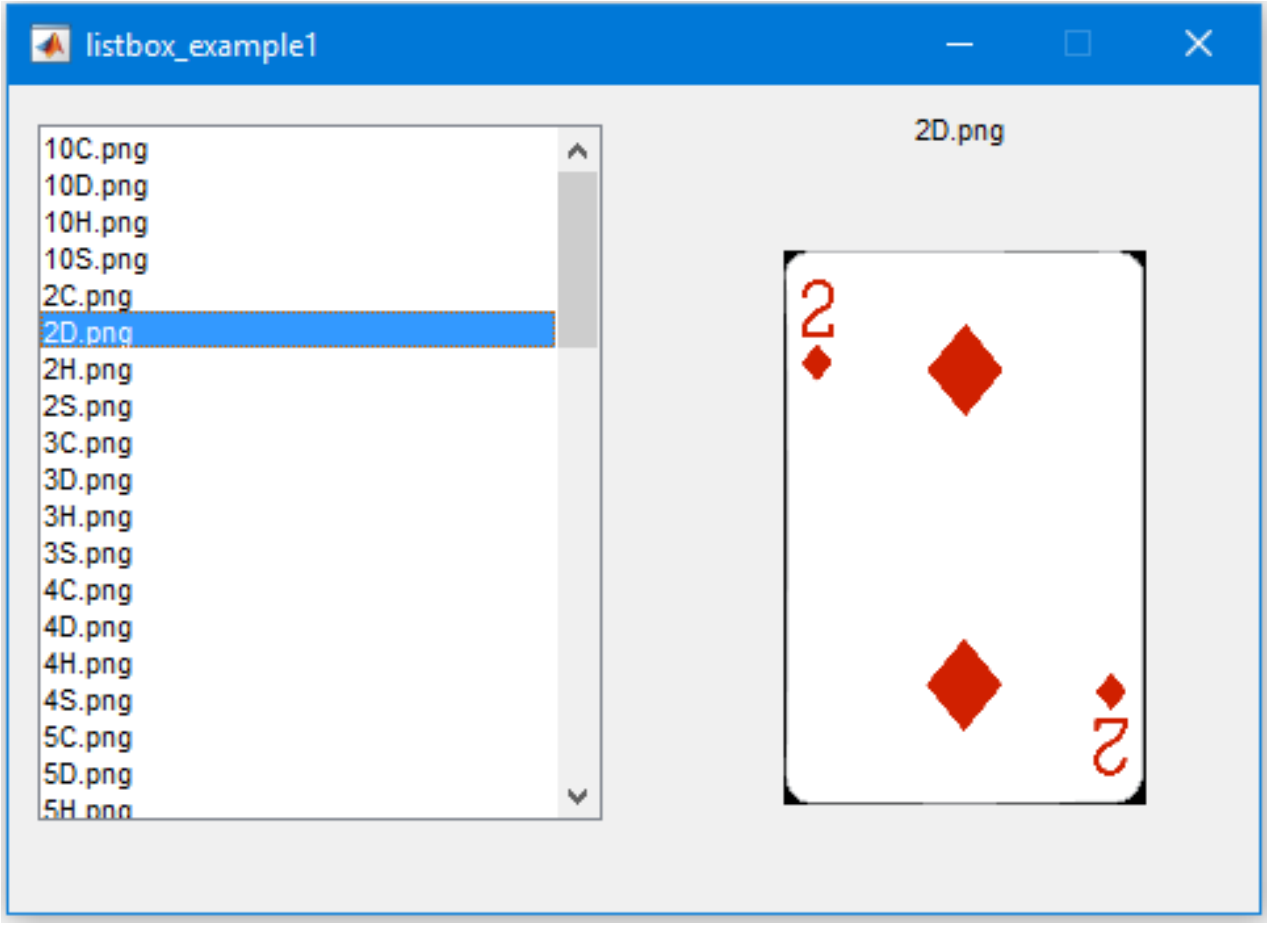


Listbox

Listbox Callback

```
function listbox1_Callback(hObject, eventdata, handles)
% hObject    handle to listbox1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = cellstr(get(hObject,'String')) returns
listbox1 contents as cell array
%        contents{get(hObject,'Value')} returns selected item
from listbox1

index=get(handles.image_listbox,'value');
data_listbox=get(handles.image_listbox,'string');
set(handles.image_text,'string',data_listbox{index});
h=imread(data_listbox{index});
axes(handles.image_axes);
image_show=imshow(h);
```

Listbox


listbox_example1
10C.png
10D.png
10H.png
10S.png
2C.png
2D.png
2H.png
2S.png
3C.png
3D.png
3H.png
3S.png
4C.png
4D.png
4H.png
4S.png
5C.png
5D.png
5H.png
2D.png

Table

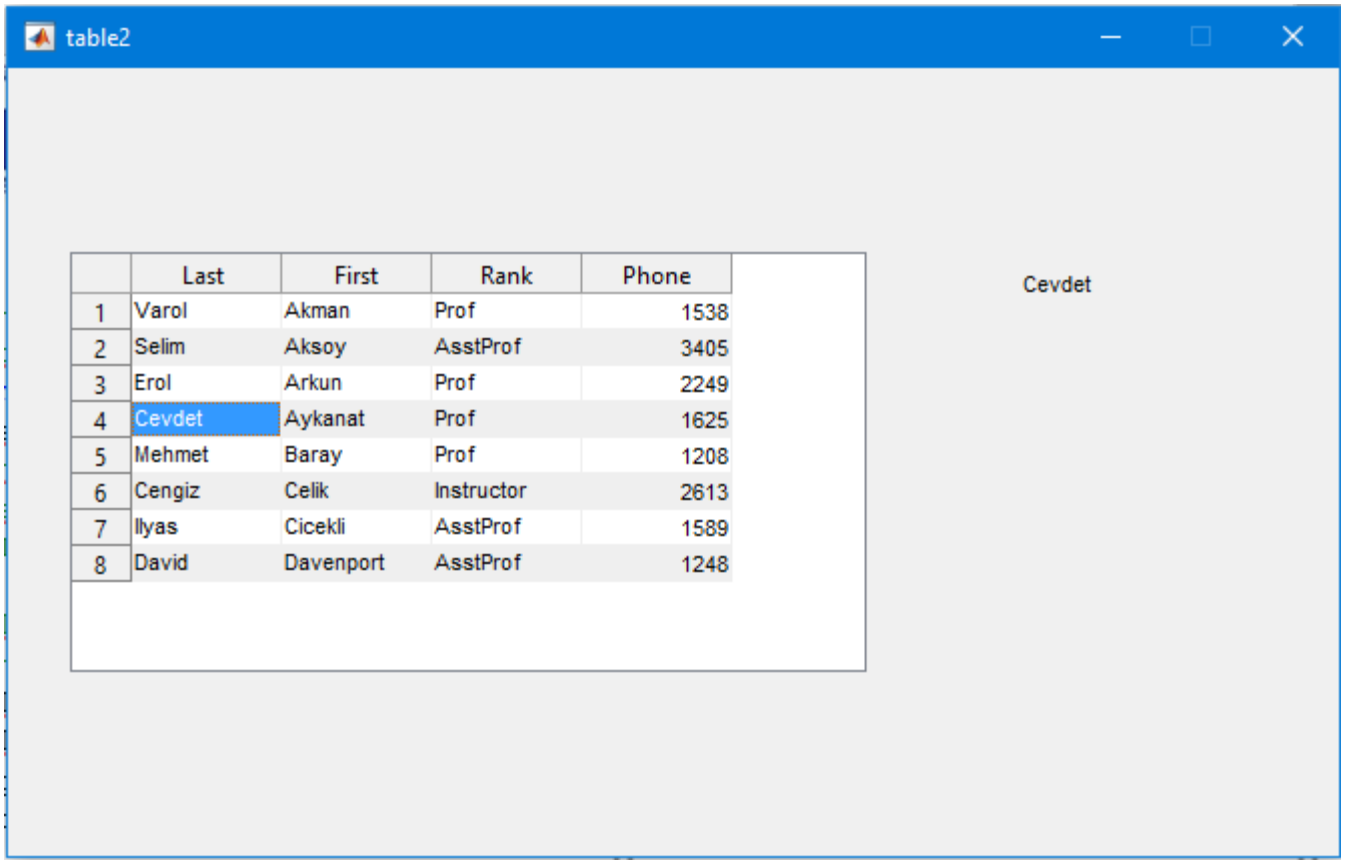
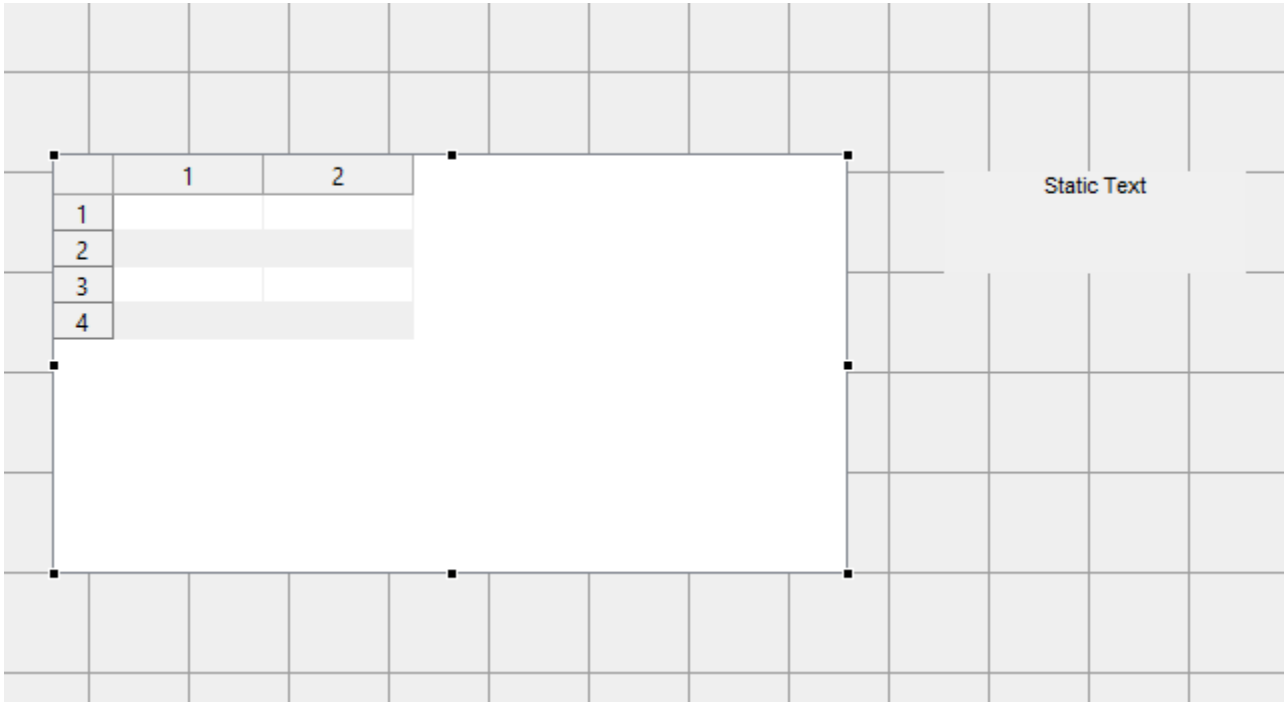
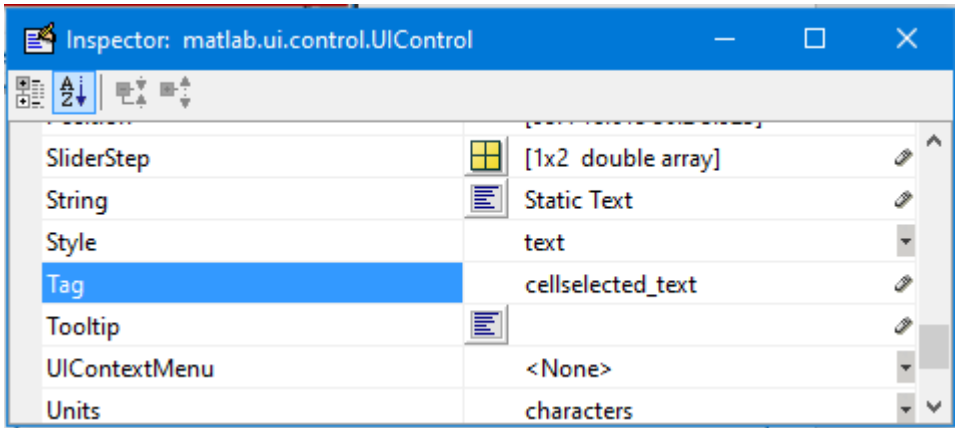


table2
Last
First
Rank
Phone
1 Varol Akman Prof 1538
2 Selim Aksoy AsstProf 3405
3 Erol Arkun Prof 2249
4 Cevdet Aykanat Prof 1625
5 Mehmet Baray Prof 1208
6 Cengiz Celik Instructor 2613
7 Ilyas Cicekli AsstProf 1589
8 David Davenport AsstProf 1248
Cevdet

Table



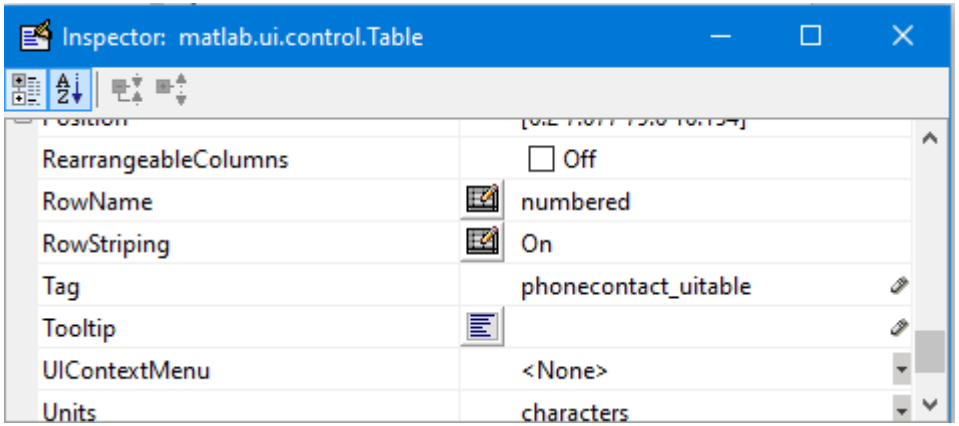
Table

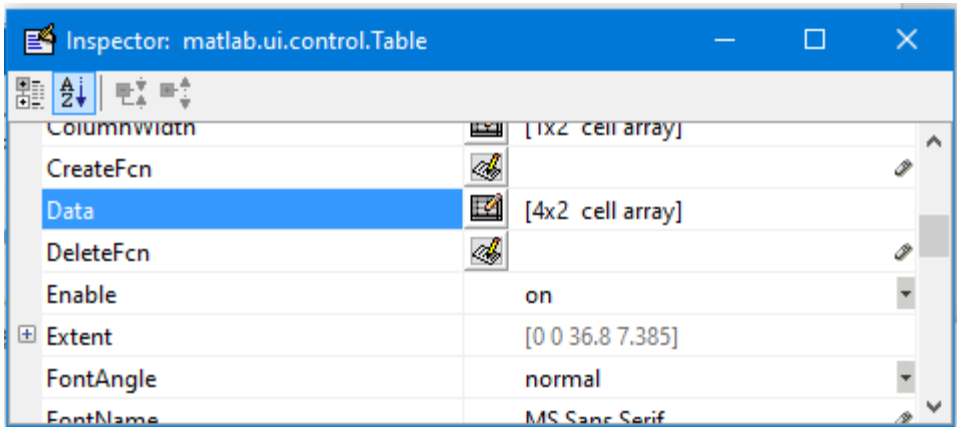


- **Static text**

Table

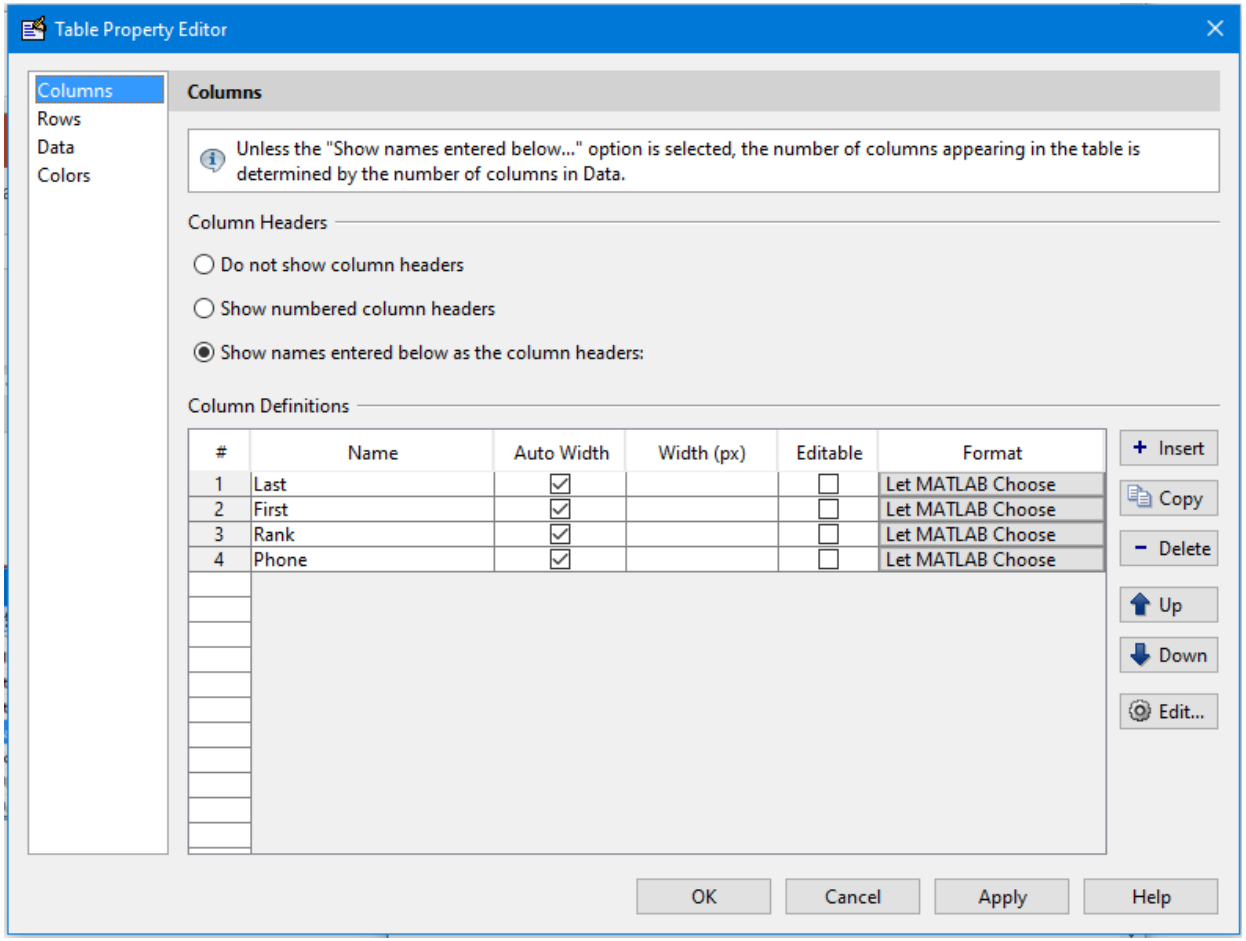
- **Table**


Inspector: matlab.ui.control.Table
RearrangeableColumns
Off
RowName
numbered
RowStriping
On
Tag
phonecontact_uitable
Tooltip
UIContextMenu
<None>
Units
characters


Inspector: matlab.ui.control.Table
CreateFcn
Data
[4x2 cell array]
DeleteFcn
Enable
on
Extent
[0 0 36.8 7.385]
FontAngle
normal

Table

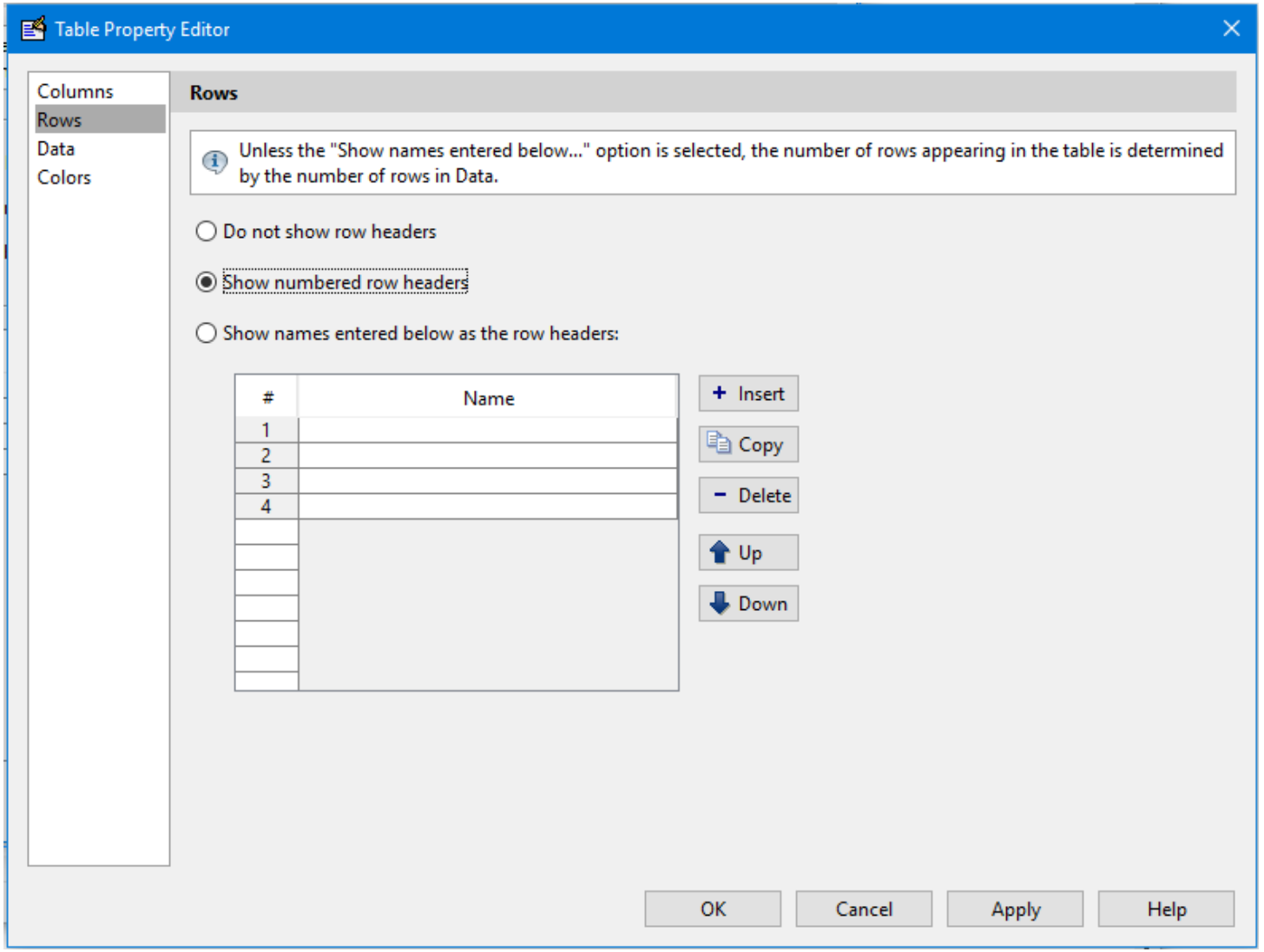
- **Data Property:**
  Columns



Table

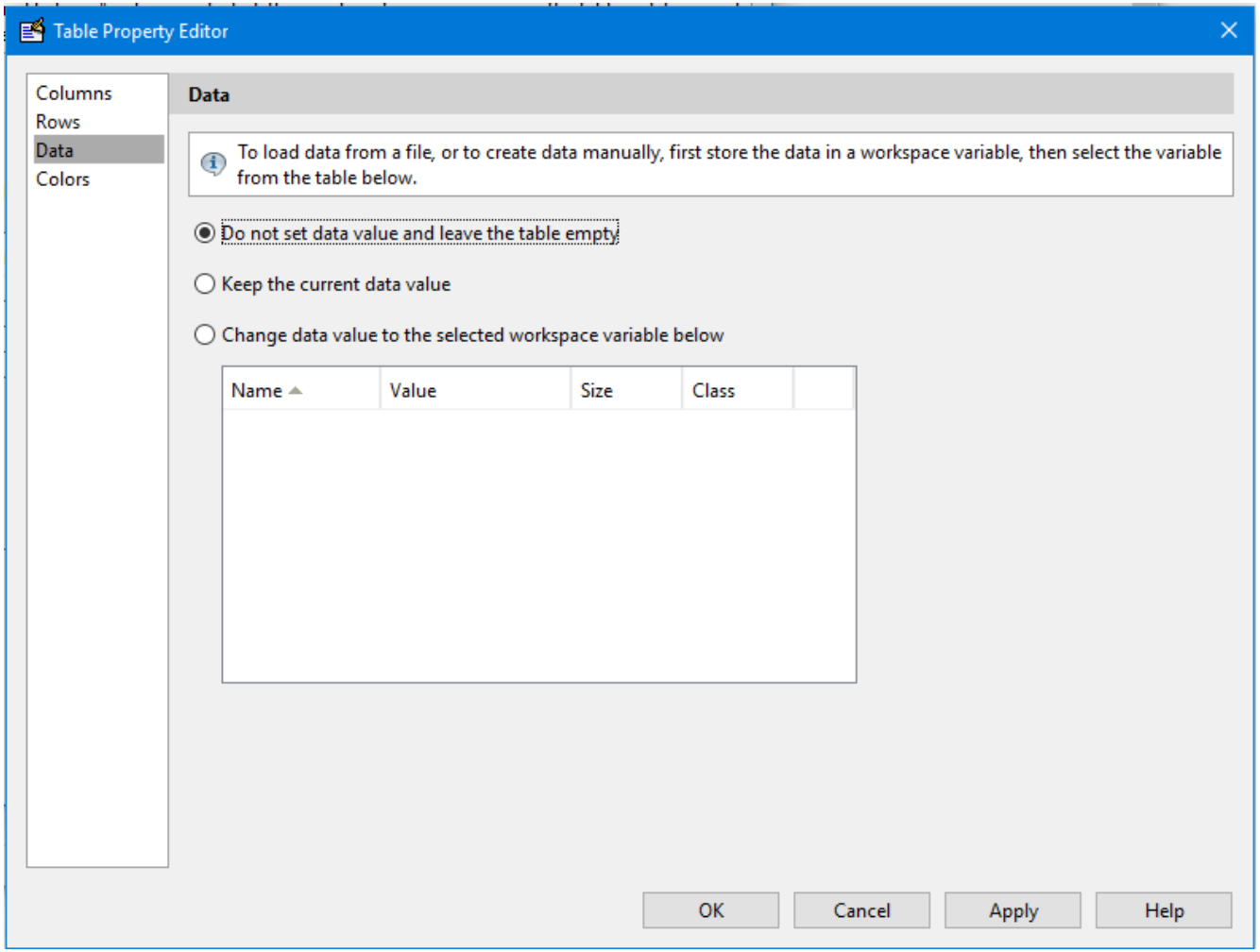
- **Data Property:**

  Rows

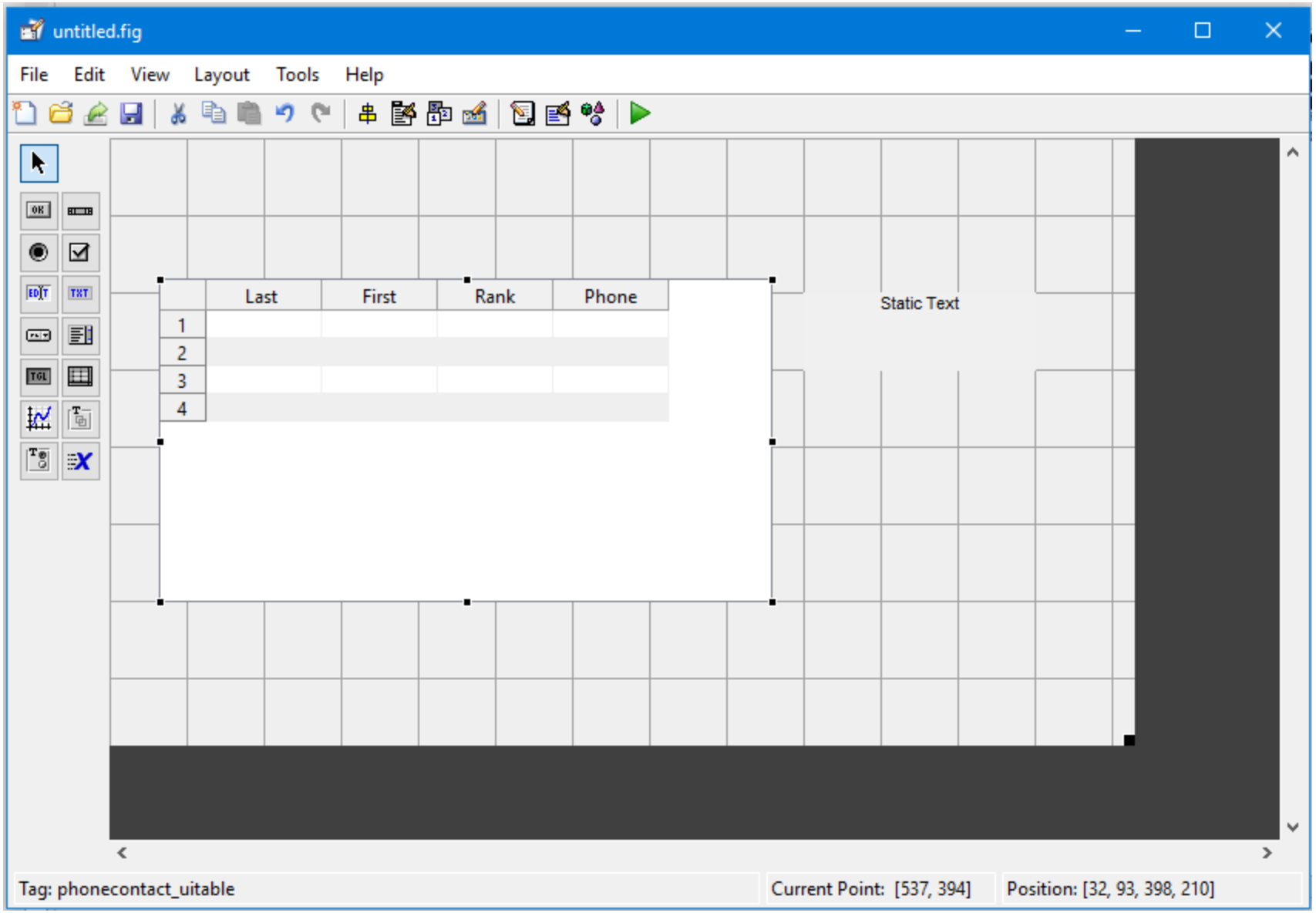


Table

- **Data Property:**
  Data



Table


untitled.fig
File
Edit
View
Layout
Tools
Help
Last
First
Rank
Phone
1
2
3
4
Static Text
Tag: phonecontact_uitable
Current Point: [537, 394]
Position: [32, 93, 398, 210]

Table

Table OpeningFcn

```
function table2_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to table2 (see VARARGIN)
% Choose default command line output for table2
handles.output = hObject;
% Update handles structure
guidata(hObject, handles);
fid = fopen('phone.txt');
n=1;
data=[];
while ~feof(fid)
data{n,1} = fscanf(fid','%s',1);
data{n,2} = fscanf(fid','%s',1);
data{n,3} = fscanf(fid','%s',1);
data{n,4} = fscanf(fid','%d',1);
n=n+1
end
set(handles.phonecontact_uitable,'data',data)
```

Table

phonecontact_uitable CellSelectionCallback

```
% --- Executes when selected cell(s) is changed in
phonecontact_uitable.
function phonecontact_uitable_CellSelectionCallback(hObject,
eventdata, handles)
% hObject    handle to phonecontact_uitable (see GCBO)
% eventdata  structure with the following fields (see
MATLAB.UI.CONTROL.TABLE)
%   Indices: row and column indices of the cell(s) currently
selecteds
% handles    structure with handles and user data (see GUIDATA)
selectedRow = eventdata.Indices(1);
selectedCol = eventdata.Indices(2);
c=get(handles.phonecontact_uitable,'data')
set(handles.cellselected_text,'string',c(selectedRow,selectedCol))
```

Table

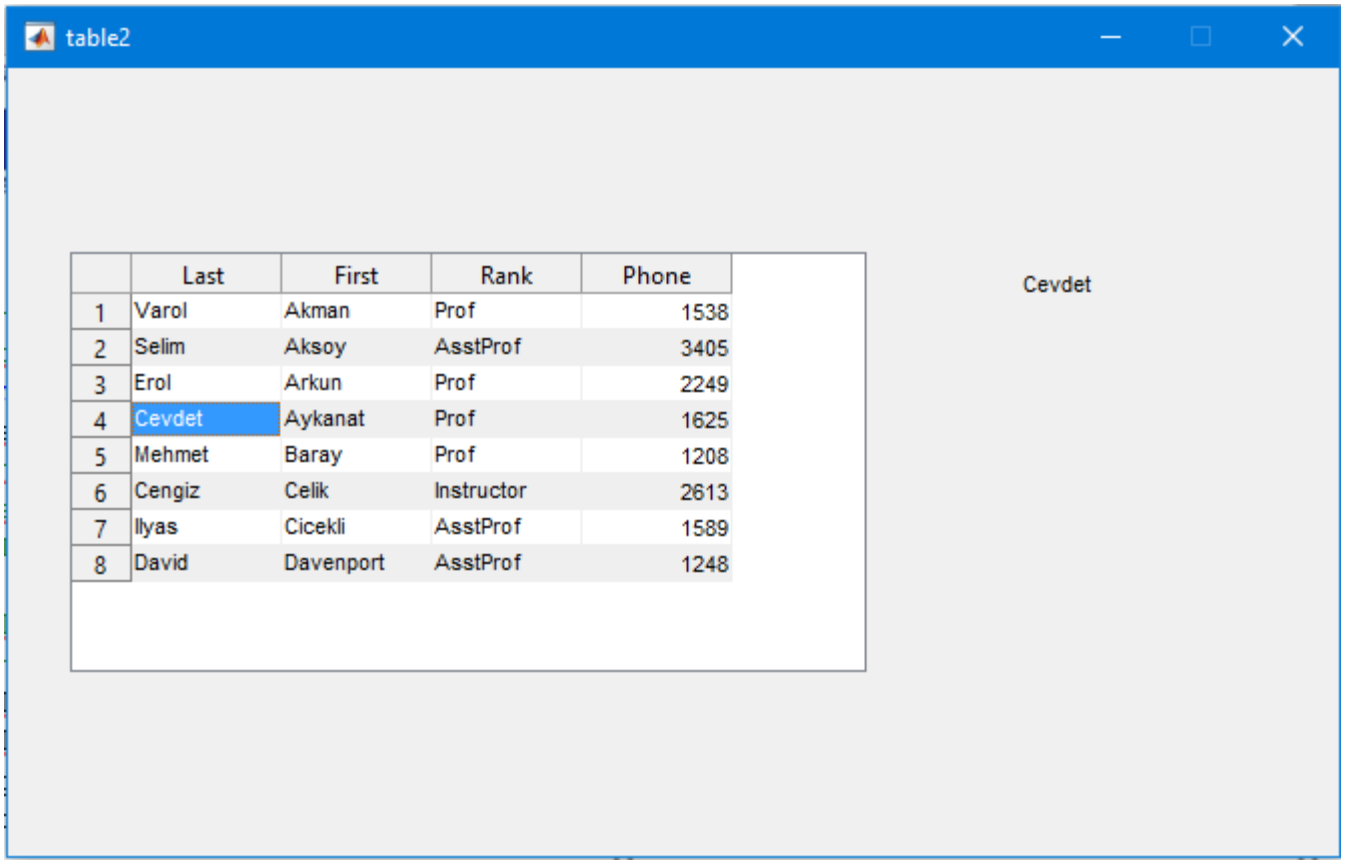


table2
Last
First
Rank
Phone
1 Varol Akman Prof 1538
2 Selim Aksoy AsstProf 3405
3 Erol Arkun Prof 2249
4 Cevdet Aykanat Prof 1625
5 Mehmet Baray Prof 1208
6 Cengiz Celik Instructor 2613
7 Ilyas Cicekli AsstProf 1589
8 David Davenport AsstProf 1248
Cevdet