WIDGETS

CSSE 120—Rose Hulman Institute of Technology

Viewing Feedback and Tasks

- Turn on Task view in Eclipse
  - Window → Show View → Tasks
- Add CONSIDER tag
  - Window → Preferences → Pydev → Task Tags
  - Add CONSIDER: to end of list

Widgets

- "Widget" is a generic name for a component of a Graphical User interface (such as a button, menu, or textbox).
- Our simple Python graphics module only provides one kind of widget.
- We can create our own: a **RoseButton**.

Button Widget Class

- Button object:
  - Displayed as text inside a rectangle.
  - What information does a Button object need to know about itself (instance variables)?
  - What are its operations (methods)?
  - Before answering these questions, let's run a demo.

Constructor for Button class

```
class Button:
    """ A Button widget similar to the one in Zelle 10.6…"""

    FONT_NAME = 'courier'
    FONT_SIZE = 20

    def __init__(self, win, label, center, height=0, width=0):
        """Initialize a Button with the given   """
        self.center = center
        self.label = label

        self.__setRectDimensions(height, width)
        self.__setRect()
        self.__setText()
        self.enable()
```

class variables (used as constants here)

put complex tasks into separate methods, to keep constructor simple

methods (like __setRect) whose names begin with two underscores (and do not also end with two underscores) are intended to be used as "private" helper methods, only called from other methods from the same class.

Private methods used by __init__()

```
def __setRect(self):
        """Internal method.  Called by the constructor.
           Create the rectangular border of the button. """
        self.rect = Rectangle(Point(self.minX, self.minY),
                              Point(self.maxX, self.maxY))

    def __setText(self):
        """Internal method.  Called by the constructor.
           Create the Text object for the button's label"""
        self.text = Text(self.center, self.label)
        self.text.setFace(Button.FONT_NAME)
        self.text.setSize(Button.FONT_SIZE)
```

`self.minX` , etc have been computed in `__setRectDimensions()` (not shown) from the center, height, and width

Note the use of the class variables

Build a Better Button, a **Rose**Button?

- The problem
  - If width and/or height passed to the constructor are too small, the button's label may extend outside the rectangle that is supposed to bound it.
  - User has to rely on trial and error to get a reasonable button width.
- Solution
  - A better Button constructor that will create a "barely large enough" rectangle if the given width and height are too small.

Constraints and research

- Fixed-width font (Courier). Why?
- Fixed font size (I chose 20 point).
- Experiments indicated that each character is about 16 pixels wide and about 34 pixels tall.
- Thus these class variables:

```
MIN_HEIGHT = 38  # A button should be at least this tall,
                 # in order to comfortably surround the text.
FONT_NAME = 'courier'
FONT_SIZE = 20
CHAR_WIDTH = 16     # The width of a character (in pixels) of
                    #   the chosen font face/size.
EXTRA_HORZ_SPACE = 6  # Put in this much extra horizontal
                        # space so that the label doesn't run
                        # into the end of the rectangle.
```

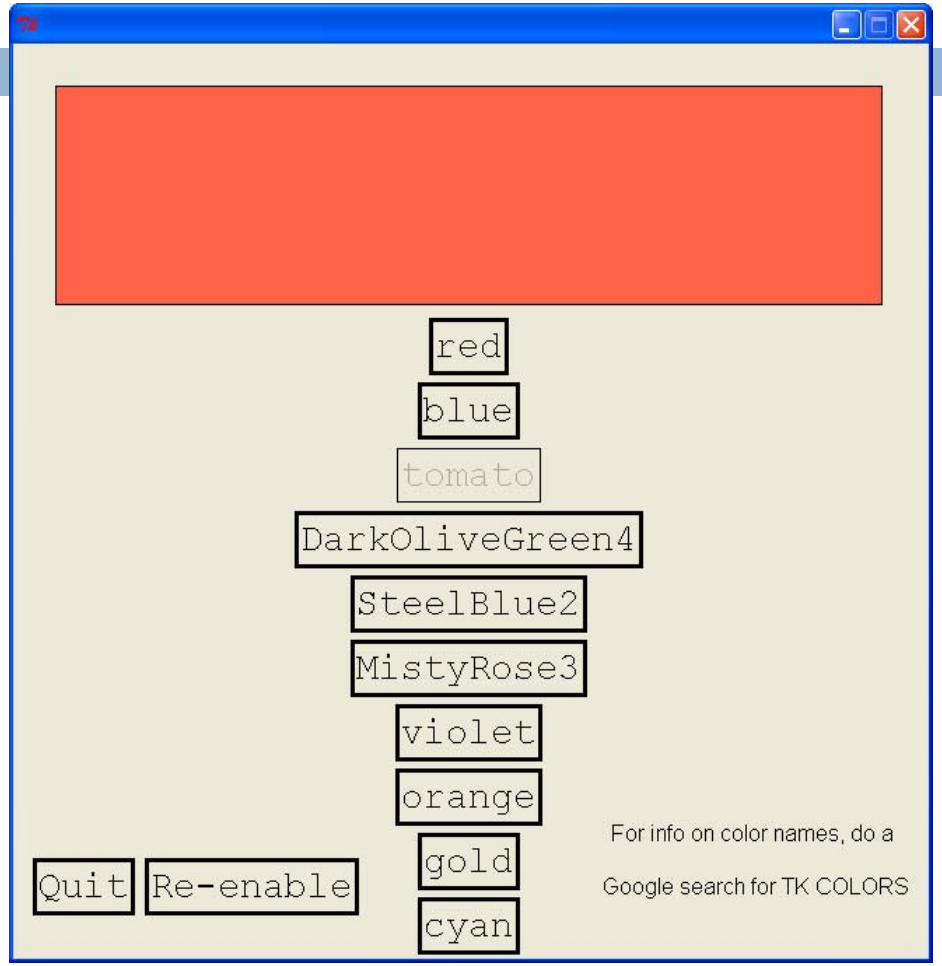
Enhance the RoseButton Class

- Checkout the ButtonWidget project.
- In RoseButton.py, add code to guarantee that a button's rectangle will be large enough to enclose its text.
- Hints:
  - Need to convert label text to a minimum button width
  - Use `max(i,j)` function to get the maximum of two numbers (to avoid shrinking the big button)
- Look for the TODO tags in the Task view in Eclipse!

If you finish this, go on to the next step (see handout)

Ooh, pretty colors!

- Go to ColorButtons.py.
  - Study the code that is there (especially the event loop) Add code to create the buttonList.
  - Add the **re-enable all** button and make it work.
- Commit the new version to your repository.



Look for the TODO tags in the Task view in Eclipse!