MULTITHREADING IN PYTHON

Thread

Process: It is an instance of a computer program that is being executed.

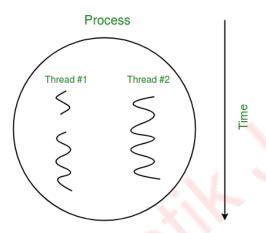
Thread is the smallest unit of Process that can be processed in an OS.

Multithreading is a technique which allows a CPU to execute many tasks of one process at the same time.

Why Multithreading?

Multithreading allows developer to break down an application into multiple sub-tasks and run these tasks simultaneously. If multithreading is used properly, the application speed, performance, and rendering can all be improved

Multithreading in Python



In Python Multithreading can be achieved by using below modules:

- thread
- threading

threading is newer module. It is included with Python 2.4 provides much more powerful, high-level support for threads than the **thread** module

Multithreading Program

t2.join()

```
import threading
                            #Importing threading Module
def task1(num):
    print("Name of task1 thread:", threading.current_thread().name)
    print("Square of number", num**2)
def task2(num):
    print("Name of task2 thread:", threading.current_thread().name)
    print("Square of number", num**3)
print("Name of main thread:",threading.current_thread().name)
                                                                    #Print name of main thread
t1=threading.Thread(target=task1, args=(5,),name='sgr thread')
                                                                    #Creating Thread 1
t2=threading.Thread(target=task2, args=(5,),name='cube thread')
                                                                    #Creating Thread 2
                #Starting of thread1
t1.start()
t2.start()
                #Starting of thread1
#Wait Until all threads finish
t1.join()
```

Let's try to understand the code,

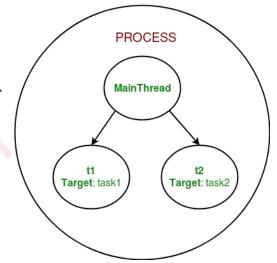
To create a new thread, we create an object of Thread class.

target: the function to be executed by thread

args: the arguments to be passed to the target function

name: the name of thread

To start the thread, start() is used



Once the threads start, the current program i.e main thread also keeps on executing. In order to stop execution of current program until a thread is complete, we used join method.

As a result, the current program will first wait for the completion of 11 and then 12. Once, they are finished, the remaining statements of current program are executed.

PYTHON GUI

GUIs

GUI or Graphical User Interface provides an attractive and presentable way of showcasing the application to user.

Python provides various options for developing graphical user interfaces (GUIs). Some of them are:

Tkinter - Tkinter is the Python interface to the Tk GUI toolkit shipped with Python. It is easy to use, faster and standard way to implement GUI in python.

wxPython - This is an open-source Python interface. Details: http://wxpython.org

JPython – JPython is a Python port for Java which gives Python scripts seamless access to Java class libraries on the local machine. Details: http://www.ivtho.org

Tkinter

Python with tkinter is the fastest and easiest way to create the GUI applications. Creating a GUI using tkinter is an easy task.

To create a tkinter app:

- Importing the module tkinter
- Create the main window (container)
- Add any number of widgets to the main window
- Apply the event Trigger on the widgets.

E.g:

Geometry Manager Classes

There are mainly three geometry manager classes in Tkinter.

pack(): It organizes the widgets in blocks before placing in the parent widget.

grid(): It organizes the widgets in grid (table-like structure) before placing in the parent widget.

place(): It organizes the widgets by placing them on specific positions directed by the programmer.

Widgets

Widgets govern any GUI application. The major widgets are:

- Button
- Canvas
- Check Button
- Radio Button
- Entry
- Label
- Menu
- Menu Button
- Listbox

Implementation Of Widgets

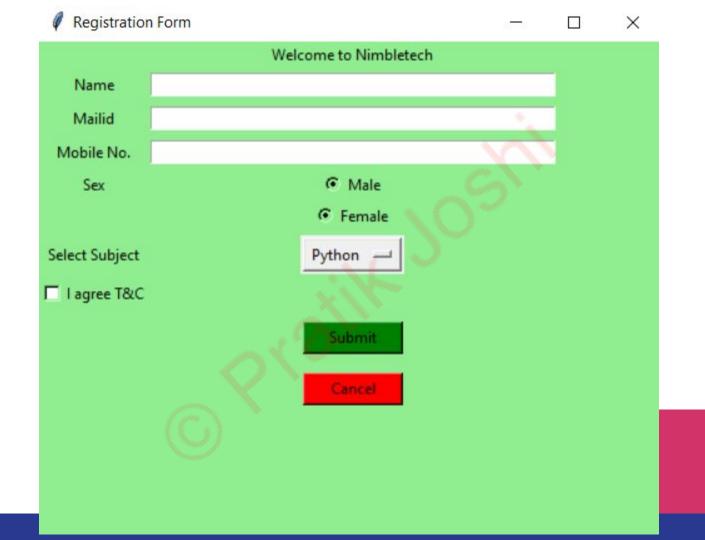
```
import tkinter as tk
r = tk.Tk()
r.title('Counting Seconds')
button = tk.Button(r, text='Stop', height=2, width=25, command=r.destroy)
button.pack()
# button.grid(padx=100,pady=80)
# button.place(relx = 0.5, rely = 0.5, anchor=tk.CENTER)
r.mainloop()
               Counting Sec...
0p:
                          Stop
```

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blue light yellow snow4 azure4 LightBlue1 PaleGreen3 goldenrod3 brown2 pink1 DarkOrchid3 gray24 gray62	medium blue	pale goldenrod	snow2	azure2	LightSteelBlue3	PaleGreen1	goldenrod1	firebrick4	HotPink3	DarkOrchid1	gray22	gray60	gray98
	royal blue	light goldenrod yellow	snow3	azure3	LightSteelBlue4	PaleGreen2	goldenrod2	brown1	HotPink4	DarkOrchid2	gray23	gray61	gray99
dodger blue yellow seashell2 SlateBlue1 LightBlue2 PaleGreen4 goldenrod4 brown3 pink2 DarkOrchid4 gray25 gray63		light yellow	snow4	azure4	LightBlue 1	PaleGreen3	goldenrod3	brown2	pink1	DarkOrchid3	gray24	gray62	
	dodger blue	yellow	seashell2	SlateBlue1	LightBlue2	PaleGreen4	goldenrod4	brown3	pink2	DarkOrchid4	gray25	gray63	1

A Simple Form using Python GUI

```
import tkinter as tk
                                 # Main Window
root = tk.Tk()
root.title('Registration Form')  # Title of Window
root.geometry("500x400")
                         # Size of Window
root.configure(background='light green') # Set background color
w = tk.Label(root, text='Welcome to Nimbletech', bg='light green') # Heading
w.grid(row=0,column=1)
tk.Label(root, text='Name', background='light green').grid(row=1)
tk.Label(root, text='Mailid',background='light green').grid(row=2)
tk.Label(root, text='Mobile No.',background='light green').grid(row=3)
#Entry for Name, Mail and Mobile field
name_filed=tk.Entry(root)
name_filed.grid(row=1,column=1,ipadx="100",pady=4)
mail_filed=tk.Entry(root)
mail_filed.grid(row=2,column=1,ipadx="100",pady=4)
mob_filed=tk.Entry(root)
mob_filed.grid(row=3,column=1,ipadx="100",pady=4)
```

```
#Radio Button for Gender
v = tk.StringVar()
tk.Label(root, text='Sex',background='light green').grid(row=4)
radio_male=tk.Radiobutton(root, text='Male', variable=v, value='Male',bg='light
green').grid(row=4,column=1)
radio_female=tk.Radiobutton(root, text='Female', variable=v, value='Female',bg='light
green').grid(row=5,column=1)
#Drop Down for Subject
tk.Label(root, text='Select Subject', background='light green').grid(row=6)
opt=tk.StringVar(root)
opt.set('Python')
sub_optn=tk.OptionMenu(root, opt, "Python", "Java", "Oracle").grid(row=6,column=1,pady=3)
#Checkboc for Terms and Condition
chk = tk.IntVar()
chk_btn=tk.Checkbutton(root, text='I agree T&C', variable=chk,bg='light green').grid()
#Button to Submit and Cancel
button = tk.Button(root, text='Submit', height=1, width=10, bg='green', command=clicked)
button.grid(column=1,pady=10)
button = tk.Button(root, text='Cancel', height=1, width=10, bg='red', command=root.destroy)
button.grid(column=1,pady=5)
root.mainloop()
```



Functionality From GUI

```
The value from the field in GUI widgets can be fetched using get().
When button will be clicked, submit() will be invoked. And functionality can bed added in
that method.
button = tk.Button(root, text='Submit', height=1, width=10, command=submit)
def submit():
    name=name_filed.get()
    mail=mail_filed.get()
    mob=mob_filed.get()
    tnc=chk.get()
    gend=v.get()
    sub=opt.get()
```

Projects

Project 1:

Develop a notepad application using GUI. Enable Save, Open, Save As, Exit feature.

Project 2:

Develop your own IDE to compile python program. Enable all standard feature of an IDE (New, Save, Run, Exit).