# Ministerul Educaţiei şi Tineretului al Republicii Moldova

Universitatea Tehnică a Moldovei

Facultatea Calculatoare Informatică şi Microelectronică

Catedra Automatica şi Tehnologii Informaţionale

Raport

MIDPS

Lucrarea de laborator Nr. 3

Tema: GUI Development

A efectuat: studentul grupei TI-141: **Negrusa Petru**

A verificat: lector asistent: **Irina Cojanu**

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## GUI Development

### Conditii Necesare:

* IDEs: Visual Studio, QTCreator, Xcode, Code::Blocks
* Limbaje de programare: C/C++, C#, Objective C, Python, etc
* Technologii si Frameworks: Forms, wxWidgets, Win32 API, WinRT API, PyQt or others (depinde de IDE si limbajul de programare ales)
* Timp de lucru: 4-8 hours

### Obiective:

* Realizeaza un simplu GUI Calculator
* Operatiile simple: +,-,\*,/,putere,radical,InversareSemn(+/-),operatii cu numere zecimale.
* Divizare proiectului in doua module - Interfata grafica(Modul GUI) si Modulul de baza(Core Module).

### Technical Prerequisites:

* Aplicatia trebuie sa fie divizata in doua module:
  + Core module - contine functionalitatile de baza
  + GUI module - include codul responsabil de crearea Interfetei Grafice si interactiunea ei cu elementele interfetei grafice si modulul de baza
* \* Incearca sa realizezi programul tau sa fie cross platform (Compatibil cu diferite platforme: Windows,Linux,Mac).

### Laboratory Requirements:

* Basic Level (nota 5 || 6):
  + Realizeaza un simplu GUI calculator care suporta functiile de baza: +, -, /, \*.
* Normal Level (nota 7 || 8):
  + Realizeaza un simplu GUI calculator care suporta urmatoare functii: +, -, /, \*, putere, radical, InversareSemn(+/-).
* Advanced Level (nota 9 || 10):
  + Realizeaza un simplu GUI calculator care suporta urmatoare functii: +, -, /, \*, putere, radical, InversareSemn(+/-), operatii cu numere zecimale.
  + Divizare proiectului in doua module - Interfata grafica(Modul GUI) si Modulul de baza(Core Module).

**IDE:** PyCharm

**OS:** Ubuntu 14.04

**Limbaj de programare:** Python 2.7.6

**Biblioteca folosită:** PyQt4

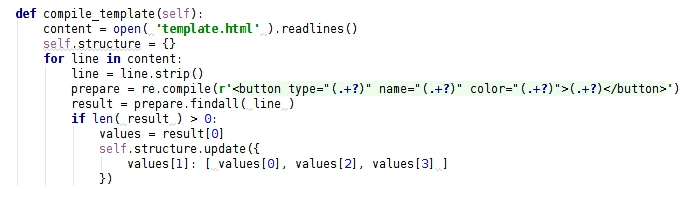
PyQt este o extendie pentru limbajul de programare Python. Care ne permite lucru cu framework-ul grafic Qt, care este disponibil pe majoritatea sistememlor de operare populare (Linux, Windows, Mac).

Partea logică

Logica programului se îndeplinește în fișierul main.py care primește de la utilizator evenimentele de click pe butoane și afișarea rezultatlor.

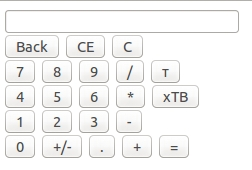
Partea View

Fișierul template.html răspunde de structura butoanelor în programm, valoarea butonului și culoarea font-ului butonului. Pentu acest fișier a fost elaborată o metodă aparte de parsing care va permite colectarea și convertarea datelor în date înțelese pentru PyQt.



Template.html ( View )

Fișierul template.html ( sceletul programului ).



**Template.html – Source**

<**div**>

<**input name="line"**>

</**div**>

<**div**>

<**button type="ops" name="back" color="red"**>Back</**button**>

<**button type="ops" name="ce" color="red"**>CE</**button**>

<**button type="ops" name="c" color="red"**>C</**button**>

</**div**>

<**div**>

<**button type="num" name="seven" color="blue"**>7</**button**>

<**button type="num" name="eight" color="blue"**>8</**button**>

<**button type="num" name="nine" color="blue"**>9</**button**>

<**button type="ops" name="div" color="red"**>/</**button**>

<**button type="ops" name="sqrt" color="green"**>√</**button**>

</**div**>

<**div**>

<**button type="num" name="four" color="blue"**>4</**button**>

<**button type="num" name="five" color="blue"**>5</**button**>

<**button type="num" name="six" color="blue"**>6</**button**>

<**button type="ops" name="mult" color="red"**>\*</**button**>

<**button type="ops" name="squared" color="green"**>x²</**button**>

</**div**>

<**div**>

<**button type="num" name="one" color="blue"**>1</**button**>

<**button type="num" name="two" color="blue"**>2</**button**>

<**button type="num" name="three" color="blue"**>3</**button**>

<**button type="ops" name="minus" color="red"**>-</**button**>

</**div**>

<**div**>

<**button type="num" name="zero" color="blue"**>0</**button**>

<**button type="ops" name="switch" color="green"**>+/-</**button**>

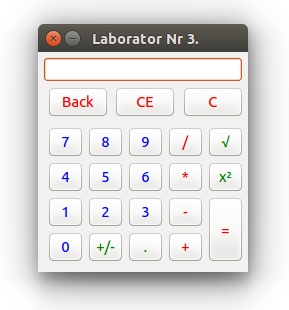
<**button type="ops" name="point" color="green"**>.</**button**>

<**button type="ops" name="plus" color="red"**>+</**button**>

<**button type="ops" name="equal" color="red"**>=</**button**>

</**div**>

**Front-end final**

****

**Source code: main.py**

*# -\*- coding: utf-8 -\*-*

**import** sys

reload(sys)

sys.setdefaultencoding(**'utf8'**)

**from** PyQt4 **import** QtGui

**from** PyQt4.QtCore **import** Qt

**from** math **import** sqrt

**import** re

num = 0.0

newNum = 0.0

sumAll = 0.0

operator = **""**

opVar = False

sumIt = 0

**class** Main(QtGui.QMainWindow):

**def** \_\_init\_\_(self):

QtGui.QMainWindow.\_\_init\_\_(self)

self.initUI()

**def** initUI(self):

*# Get buttons settings from HTML Template.*

self.compile\_template()

self.line = QtGui.QLineEdit(self)

self.line.move(5,5)

self.line.setReadOnly(True)

self.line.setAlignment(Qt.AlignRight)

self.line.resize(200,25)

zero = QtGui.QPushButton( self.structure[**'zero'**][2] ,self)

zero.setStyleSheet(**"color: %s ;"** % self.structure[**'zero'**][1])

zero.move(10,180)

zero.resize(35,30)

one = QtGui.QPushButton( self.structure[**'one'**][2] ,self)

one.setStyleSheet(**"color: %s ;"** % self.structure[**'one'**][1])

one.move(10,145)

one.resize(35,30)

two = QtGui.QPushButton( self.structure[**'two'**][2] ,self)

two.setStyleSheet(**"color: %s ;"** % self.structure[**'two'**][1])

two.move(50,145)

two.resize(35,30)

three = QtGui.QPushButton( self.structure[**'three'**][2] ,self)

three.setStyleSheet(**"color: %s ;"** % self.structure[**'three'**][1])

three.move(90,145)

three.resize(35,30)

four = QtGui.QPushButton( self.structure[**'four'**][2] ,self)

four.setStyleSheet(**"color: %s ;"** % self.structure[**'four'**][1])

four.move(10,110)

four.resize(35,30)

five = QtGui.QPushButton( self.structure[**'five'**][2] ,self)

five.setStyleSheet(**"color: %s ;"** % self.structure[**'five'**][1])

five.move(50,110)

five.resize(35,30)

six = QtGui.QPushButton( self.structure[**'six'**][2] ,self)

six.setStyleSheet(**"color: %s ;"** % self.structure[**'six'**][1])

six.move(90,110)

six.resize(35,30)

seven = QtGui.QPushButton( self.structure[**'seven'**][2] ,self)

seven.setStyleSheet(**"color: %s ;"** % self.structure[**'seven'**][1])

seven.move(10,75)

seven.resize(35,30)

eight = QtGui.QPushButton( self.structure[**'eight'**][2] ,self)

eight.setStyleSheet(**"color: %s ;"** % self.structure[**'eight'**][1])

eight.move(50,75)

eight.resize(35,30)

nine = QtGui.QPushButton( self.structure[**'nine'**][2] ,self)

nine.setStyleSheet(**"color: %s ;"** % self.structure[**'nine'**][1])

nine.move(90,75)

nine.resize(35,30)

switch = QtGui.QPushButton( self.structure[**'switch'**][2] ,self)

switch.setStyleSheet(**"color: %s ;"** % self.structure[**'switch'**][1])

switch.move(50,180)

switch.resize(35,30)

switch.clicked.connect(self.Switch)

point = QtGui.QPushButton( self.structure[**'point'**][2] ,self)

point.setStyleSheet(**"color: %s ;"** % self.structure[**'point'**][1])

point.move(90,180)

point.resize(35,30)

point.clicked.connect(self.pointClicked)

div = QtGui.QPushButton( self.structure[**'div'**][2] ,self)

div.setStyleSheet(**"color: %s ;"** % self.structure[**'div'**][1])

div.move(130,75)

div.resize(35,30)

mult = QtGui.QPushButton( self.structure[**'mult'**][2] ,self)

mult.setStyleSheet(**"color: %s ;"** % self.structure[**'mult'**][1])

mult.move(130,110)

mult.resize(35,30)

minus = QtGui.QPushButton( self.structure[**'minus'**][2] ,self)

minus.setStyleSheet(**"color: %s ;"** % self.structure[**'minus'**][1])

minus.move(130,145)

minus.resize(35,30)

plus = QtGui.QPushButton( self.structure[**'plus'**][2] ,self)

plus.setStyleSheet(**"color: %s ;"** % self.structure[**'plus'**][1])

plus.move(130,180)

plus.resize(35,30)

sqrt = QtGui.QPushButton( unicode( self.structure[**'sqrt'**][2] ) ,self)

sqrt.setStyleSheet(**"color: %s ;"** % self.structure[**'sqrt'**][1])

sqrt.move(170,75)

sqrt.resize(35,30)

sqrt.clicked.connect(self.Sqrt)

squared = QtGui.QPushButton( unicode( self.structure[**'squared'**][2] ) ,self)

squared.setStyleSheet(**"color: %s ;"** % self.structure[**'squared'**][1])

squared.move(170,110)

squared.resize(35,30)

squared.clicked.connect(self.Squared)

equal = QtGui.QPushButton( self.structure[**'equal'**][2] ,self)

equal.setStyleSheet(**"color: %s ;"** % self.structure[**'equal'**][1])

equal.move(170,145)

equal.resize(35,65)

equal.clicked.connect(self.Equal)

c = QtGui.QPushButton( self.structure[**'c'**][2] ,self)

c.setStyleSheet(**"color: %s ;"** % self.structure[**'c'**][1])

c.move(145,35)

c.resize(60,30)

c.clicked.connect(self.C)

ce = QtGui.QPushButton( self.structure[**'ce'**][2] ,self)

ce.setStyleSheet(**"color: %s ;"** % self.structure[**'ce'**][1])

ce.move(77,35)

ce.resize(60,30)

ce.clicked.connect(self.CE)

back = QtGui.QPushButton( self.structure[**'back'**][2] ,self)

back.setStyleSheet(**"color: %s ;"** % self.structure[**'back'**][1])

back.move(10,35)

back.resize(60,30)

back.clicked.connect(self.Back)

nums = [zero,one,two,three,four,five,six,seven,eight,nine]

ops = [back,c,ce,div,mult,minus,plus,equal]

rest = [switch,squared,sqrt,point]

**for** i **in** nums:

i.clicked.connect(self.Nums)

**for** i **in** ops[3:7]:

i.clicked.connect(self.Operator)

self.setGeometry(300,300,210,220)

self.setFixedSize(210,220)

self.setWindowTitle(**"Laborator Nr 3."**)

self.setWindowIcon(QtGui.QIcon(**""**))

self.show()

**def** Nums(self):

**global** num

**global** newNum

**global** opVar

sender = self.sender()

newNum = int(sender.text())

setNum = str(newNum)

**if** opVar == False:

self.line.setText(self.line.text() + setNum)

**else**:

self.line.setText(setNum)

opVar = False

**def** pointClicked(self):

**global** opVar

**if "." not in** self.line.text():

self.line.setText(self.line.text() + **"."**)

**def** Switch(self):

**global** num

**try**:

num = int(self.line.text())

**except**:

num = float(self.line.text())

num = num - num \* 2

numStr = str(num)

self.line.setText(numStr)

**def** Operator(self):

**global** num

**global** opVar

**global** operator

**global** sumIt

sumIt += 1

**if** sumIt > 1:

self.Equal()

num = self.line.text()

sender = self.sender()

operator = sender.text()

opVar = True

**def** Equal(self):

**global** num

**global** newNum

**global** sumAll

**global** operator

**global** opVar

**global** sumIt

sumIt = 0

newNum = self.line.text()

**print**(num)

**print**(newNum)

**print**(operator)

**if** operator == **"+"**:

sumAll = float(num) + float(newNum)

**elif** operator == **"-"**:

sumAll = float(num) - float(newNum)

**elif** operator == **"/"**:

sumAll = float(num) / float(newNum)

**elif** operator == **"\*"**:

sumAll = float(num) \* float(newNum)

**print**(sumAll)

self.line.setText(str(sumAll))

opVar = True

**def** Back(self):

self.line.backspace()

**def** C(self):

**global** newNum

**global** sumAll

**global** operator

**global** num

self.line.clear()

num = 0.0

newNum = 0.0

sumAll = 0.0

operator = **""**

**def** CE(self):

self.line.clear()

**def** Sqrt(self):

**global** num

num = float(self.line.text())

n = sqrt(num)

num = n

self.line.setText(str(num))

**def** Squared(self):

**global** num

num = float(self.line.text())

n = num \*\* 2

num = n

self.line.setText(str(n))

**def** compile\_template(self):

content = open( **'template.html'** ).readlines()

self.structure = {}

**for** line **in** content:

line = line.strip()

prepare = re.compile(**r'<button type="(.+?)" name="(.+?)" color="(.+?)">(.+?)</button>'**)

result = prepare.findall( line )

**if** len( result ) > 0:

values = result[0]

self.structure.update({

values[1]: [ values[0], values[2], values[3] ]

})

**def** main():

app = QtGui.QApplication(sys.argv)

main = Main()

main.show()

sys.exit( app.exec\_() )

**if** \_\_name\_\_ == **"\_\_main\_\_"**:

main()

**Concluzie**

În urma elaborării acestei lucrări de laborator am studiat documentația bibliotecii PyQt4. Am structurat programul într-o formă obiect-orientată pentru a permite manipularea mai rapidă a datelor. Am studiat cum are loc procesarea evenimentelor în PyQt. Am făcut o tangentă cu informația primită la cursurile WinAPI și studierea bibliotecii PyQt.

**Bibliografie**

<http://zetcode.com/gui/pyqt4/>

<http://zetcode.com/ebooks/advancedpyqt4/>