SOFTWARE MAINTENANCE
CSE426

Evolving the Editor

Moataz Khaled Zakaria 16P8244

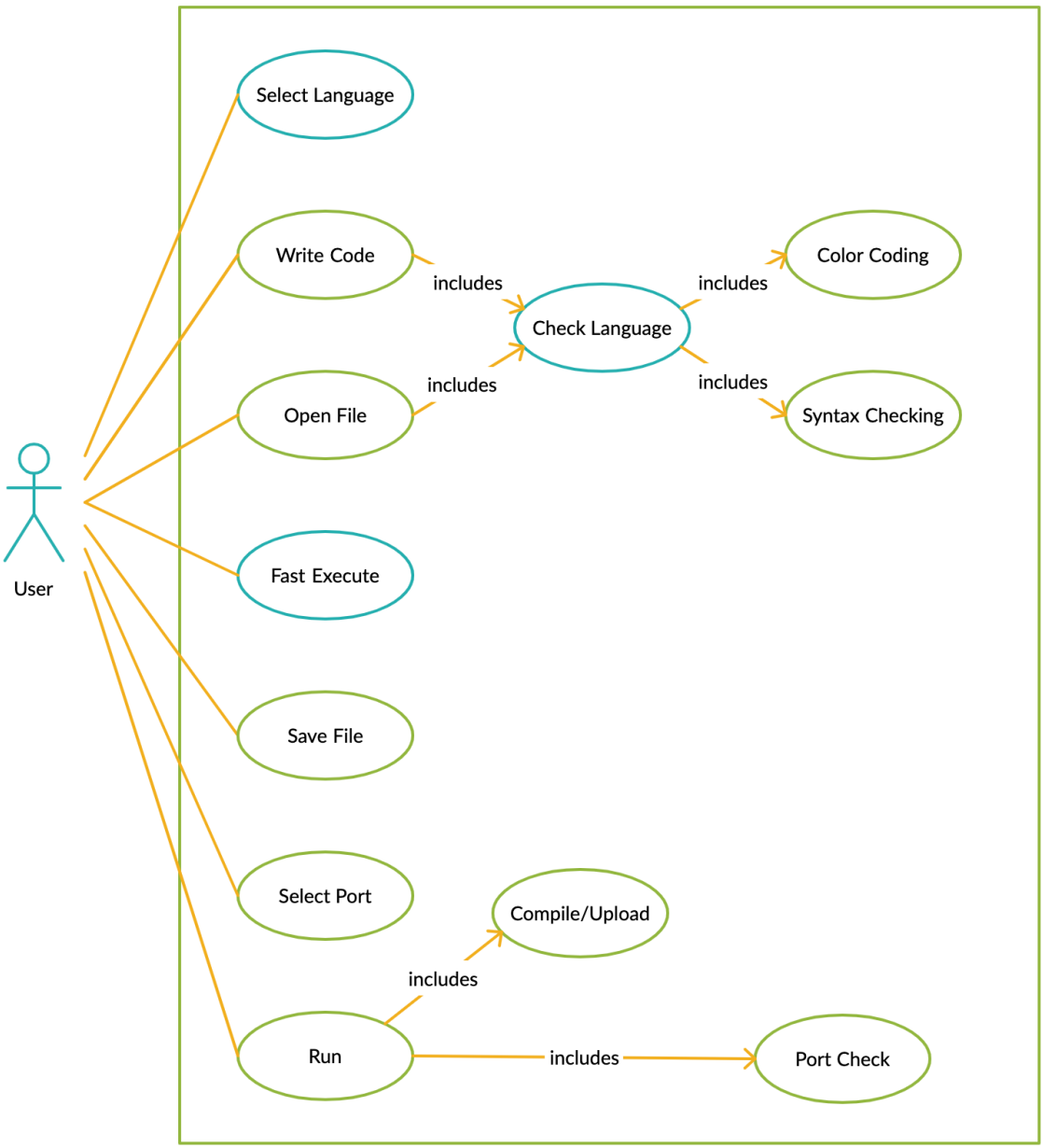
Table of Contents

GitHub repo

https://github.com/moataz98/Anubis-IDE.git

Design

Use Case Diagram



Use Case Description

Name	**Select language**
Main actor	**User.**
Description	**User chooses a programming language between python andC#.**
Goal	**The user selects his preferred programming language.**
Trigger	**The user clicks on the language menu.**
Include	**None.**
Pre-condition	**The IDE is installed correctly and running, the language menuappears at the top.**
Input	**Programming language from the menu.**
Post-condition	**The selected language is set as the current language.**
Output	**The selected language is displayed in the top menu.**
Normal path	**1. The user opens the languages menu.** **2. The user selects a programming language.** **3. The language is set and displayed in the top menu.**
Alternative path	**3.1 a. The language is not set.** **b. The user can report the error.**

Name	**Write code**
Main actor	**User**
Description	**User is writing new code or editing existing code using theIDE.**
Goal	**User writes code that gets color coding and highlights forsyntax errors.**
Trigger	**User starts writing in the opened tab.**
Include	**Check Language**
Pre-condition	**The IDE is installed correctly and running, a new tab isopened automatically to write code in a new file.**
Input	**Code**
Post-condition	**The written code is colored according to color codes andsyntax errors are underlined.**
Output	**Color coded and underlined for syntax errors code.**
Normal path	**1. Start writing code in a new tab or open a file.** **2. The code is colored, and syntax errors are underlined.**

Alternative path	**1.1 a. The code is not colored correctly.** **b. The user can report the error.** **2.2 a. The code has syntax errors but not underlined.** **b. The user can report the error.**

Name	**Check language**
Main actor	**None.**
Description	**The IDE checks the current language or the selected fileextension and perform color coding and syntax analysisaccordingly.**
Goal	**The system assigns the correct color codes and syntax analyzer.**
Trigger	**User writes new code (check based on selected language) oropens an existing file (check based on file extension)**
Include	**Color Coding, Syntax Checking**
Pre-condition	**Code exists in the opened tab.**
Input	**Plain code**
Post-condition	**The written code is colored according to color codes andsyntax errors are underlined.**
Output	**Code is color coded and highlighted for syntax error code.**
Normal path	**1. Start writing code in a new tab or open a file.** **2. The code is colored, and syntax errors are underlinedaccording to the chosen language.**
Alternative path	**2.1 a. Code is not colored, or syntax error are not underlined.** **b. The user can report the error.** **2.2 a. The language is not set correctly.** **b. The user can report the error.**

Name	Color coding
Main actor	None.
Description	Color code the keywords in the code.
Goal	The code is color coded for enhance readability.
Trigger	User writes some code or opens an existing file.
Include	None.
Pre-condition	Code exists in the opened tab.
Input	Plain code.
Post-condition	Code is color coded.
Output	Colored code.
Normal path	1. User writes some code or opens a file. 2. The code is color coded.
Alternative path	2.1 a. The code is not color coded. b. The user can report the error.

Name	Syntax checking
Main actor	None
Description	Syntax errors are underlined.
Goal	Underlined syntax errors to help the user correcting them.
Trigger	User writes some code or opens a file.
Include	None.
Pre-condition	Code exists in the opened tab.
Input	Plain code.
Post-condition	The code is underlined where syntax errors exist.
Output	Underlined code.
Normal path	1. User writes some code or opens a file. 2. Syntax errors are underlined.
Alternative path	2.1 a. The code has syntax errors but not underlined. b. The user can report the error.

Name	**Open file**
Main actor	**User**
Description	**The user opens a file into the IDE.**
Goal	**The user opens a file into the IDE to get color coding andsyntax errors check.**
Trigger	**The clicks on a file from the left panel or click on the open filemenu.**
Include	**Check language**
Pre-condition	**The user has a file to open.**
Input	**File.**
Post-condition	**The selected file is opened in the IDE, code is colored, andsyntax errors are underlined.**
Output	**Color coded and underlined for syntax errors code.**
Normal path	**1. The user clicks on the open menu.** **2. The user chooses the desired file.** **3. The file is opened in the IDE.** **4. Code is colored and syntax errors are underlined.**
Alternative path	**3 a. The user chooses an unsupported file.** **b. The program displays a message “wrong file type”.**

Name	**Fast execute**
Main actor	**User**
Description	**The user wants to test a new function in python, the IDE helps by writing the main and calls the new function inside.**
Goal	**The IDE helps the user by writing the main and calls the newfunction inside.**
Trigger	**The clicks on the fast execute menu.**
Include	**None.**
Pre-condition	**Python is selected as programming language**
Input	**Code.**
Post-condition	**The main function is written, and the new function is calledinside the main.**
Output	**Code is appended with the main function.**
Normal path	**1. The user selected python as programming language.** **2. The user clicks on the fast execute menu.** **3. The main function is appended to the code and the newfunction is called inside it.**
Alternative path	**3.1 a. The user did not choose python** **b. The program displays a message "fast execute is onlyavailable for python".** **3.2 a. The user did write a function to test** **b. The program appends an empty main function.**

Name	**Select port**
Main actor	**User**
Description	**User selects the port of the pyboard to upload the code.**
Goal	**The port is selected to upload the code to the pyboard.**
Trigger	**The user clicks on the select port menu.**
Include	**None.**
Pre-condition	**A pyboard is connected to the computer.**
Input	**A port from the available ports list.**
Post-condition	**A port is selected.**
Output	**The selected port is marked as selected.**
Normal path	**1. The user connects a pyboard to the computer.** **2. The user opens the ports menu.** **3. The user selects a port.**
Alternative path	**3.1 a. The user cannot find his port in the list.** **b. Display a message try reconnecting the board.**

Name	Save file
Main actor	User
Description	The user saves a file from the IDE on his disk space.
Goal	The file is saved on the disk for future use.
Trigger	The user clicks on the save menu.
Include	None.
Pre-condition	A file is opened in the IDE.
Input	A file.
Post-condition	The opened file is saved on the disk space.
Output	A confirmation message that the file has been saved.
Normal path	1. The user clicks on the save menu. 2. If it's not an existing file, the user chooses file name andlocation. 3. The file is saved on the disk space.
Alternative path	3.1 a. The IDE could not save the file due to ungrantedpermissions. b. Display a message to grant write permission to the IDE. 3.2 a. The IDE could not save the file due to insufficientspace. b. Display a message "insufficient space".

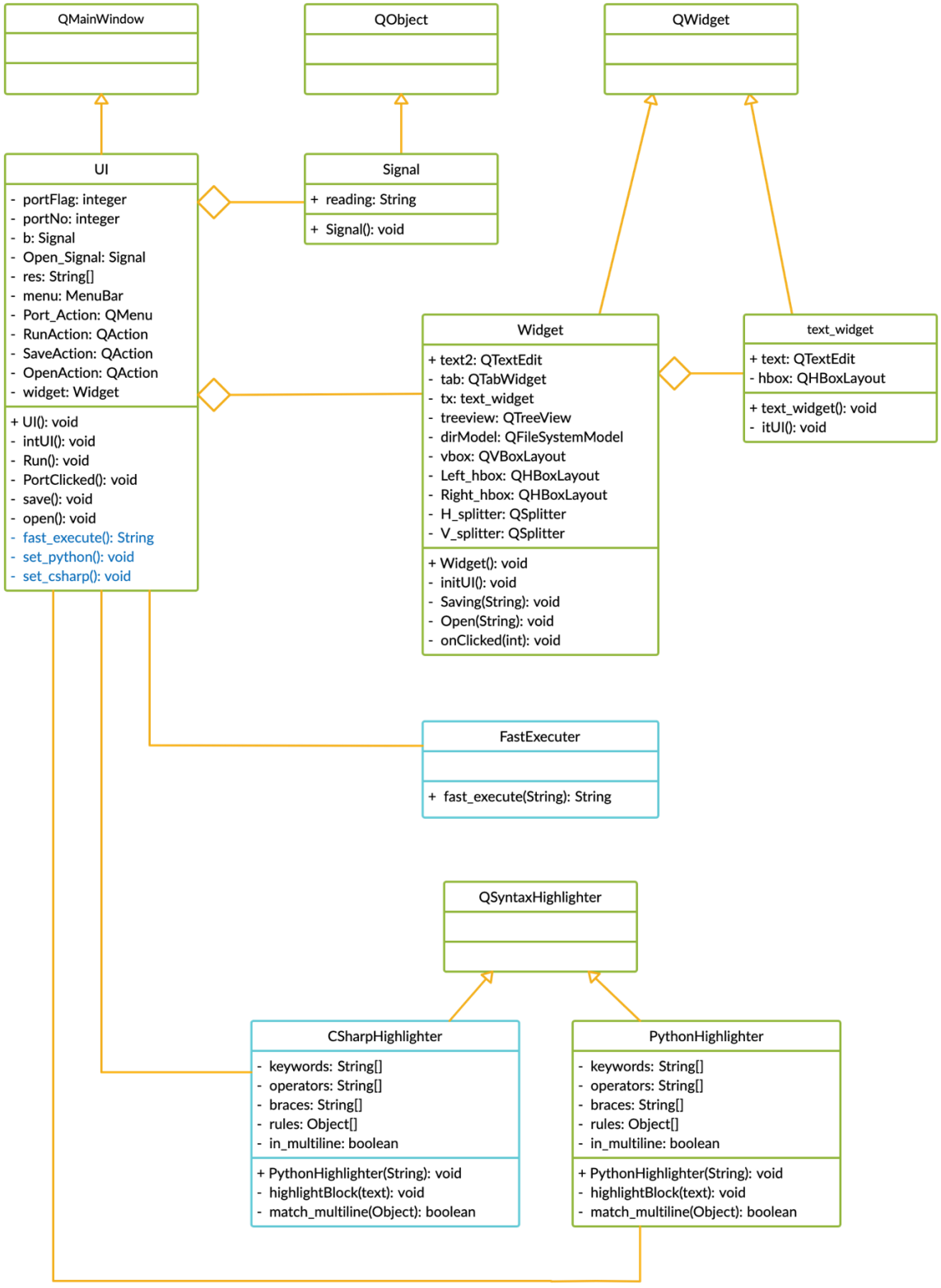
Name	Run
Main actor	User
Description	The IDE checks the port, complies and uploads the code
Goal	The code is compiled and uploaded to the board to run
Trigger	The user clicks on the run menu.
Include	Compile/Upload, Port Check.
Pre-condition	A file is opened in the IDE.
Input	Code.
Post-condition	The code is uploaded to the board
Output	A successful message that the code is uploaded.
Normal path	1. The user clicks on the run menu. 2. The program checks the port 3. The program checks for compilation errors. 4. The program uploads the code to the board

Alternative path	**2 a. The program found no port or port error.** **b. The program displays a message “Please select a port”.** **c. The program does not upload the code.** **3 a. The program found compilation errors.** **b. The program underlines the code causing the errors.** **c. The program does not upload the code.**

Name	**Port check**
Main actor	**None.**
Description	**The IDE checks that a port is selected and that a board isconnected to that port.**
Goal	**Check if a valid port exists to upload the code.**
Trigger	**The user clicks on the run menu.**
Include	**None.**
Pre-condition	**None.**
Input	**Selected port.**
Post-condition	**Port is validated.**
Output	**Boolean, if the port is valid or not.**
Normal path	**1. The IDE checks if a port is valid.**
Alternative path	**1.1 a. The program found no port or port error.** **b. The program displays a message “Please select a port”.** **c. The program does not upload the code.**

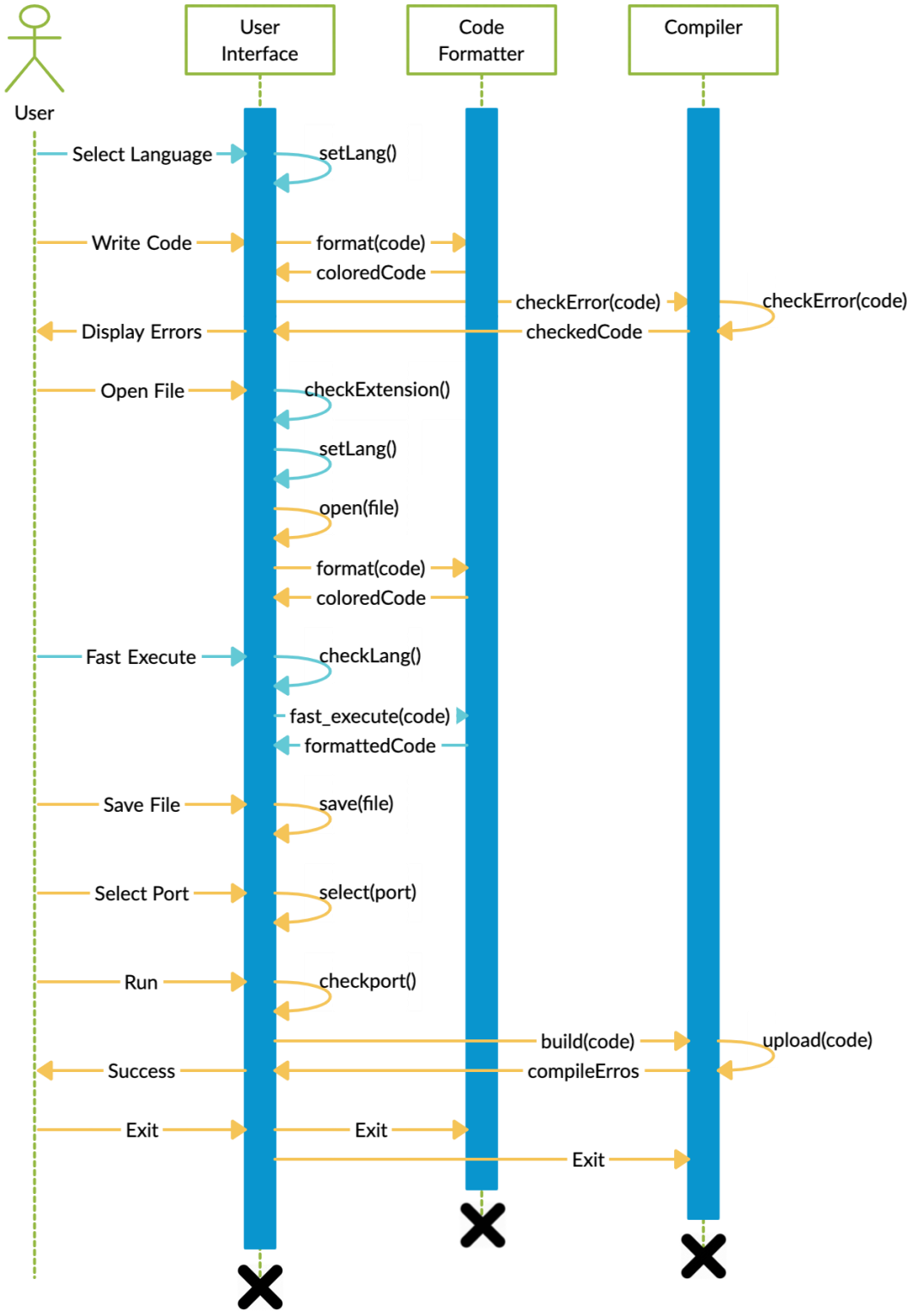
Name	**Compile/Upload**
Main actor	**None**
Description	**The IDE complies the code and upload it to the board to run.**
Goal	**The code is compiled and uploaded to the board to run**
Trigger	**The user clicks on the run menu.**
Include	**None.**
Pre-condition	**The IDE found a valid port.**
Input	**Code.**
Post-condition	**The code is uploaded to the board**
Output	**Compiled code.**
Normal path	**1. The program checks for compilation errors.** **2. The program uploads the code to the board** **3. Displays a success message**
Alternative path	**3 a. The program found compilation errors.** **b. The program underlines the code causing the errors.** **c. The program does not upload the code.** **d. The program displays unsuccessful message.**

Class Diagram

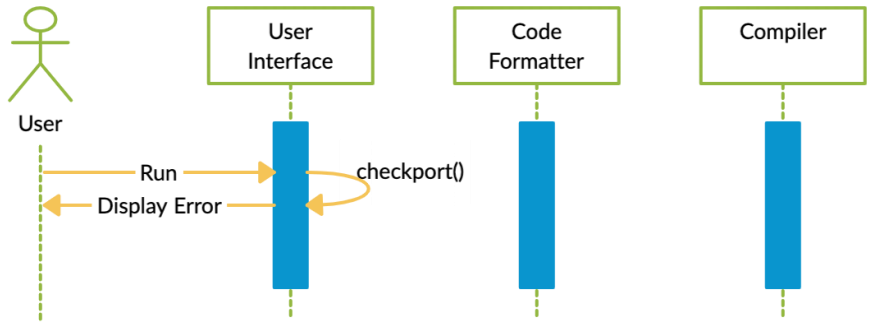


Sequence Diagrams

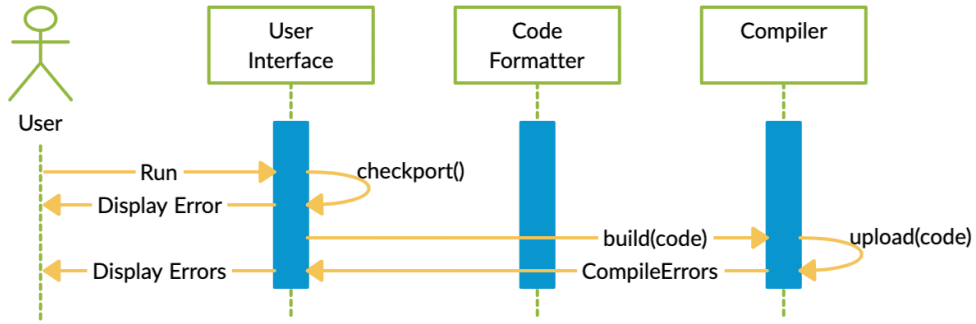
Normal Scenario



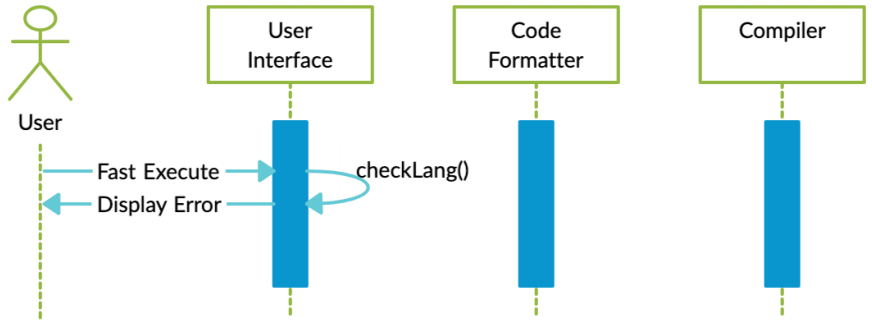
Port Check Error



Compilation Error



Fast Execute Error



Source Code

Anubis.py

```
#############      author => Anubis Graduation Team        ###########
#
#############      this project is part of my graduation project and i
t intends to make a fully functioned IDE from scratch    ########
#############      I've borrowed a function (serial_ports()) from a gu
y in stack overflow whome I can't remember his name, so I gave hime th
e copyrights of this function, thank you  ########


import sys
import glob
import serial

import Python_Coloring
from PyQt5 import QtCore
from PyQt5 import QtGui
from PyQt5.QtWidgets import *
from PyQt5.QtCore import *
from pathlib import Path

import CSharp_Coloring
import FastExecuter


def serial_ports():
    """ Lists serial port names
        :raises EnvironmentError:
            On unsupported or unknown platforms
        :returns:
            A list of the serial ports available on the system
    """
    if sys.platform.startswith('win'):
        ports = ['COM%s' % (i + 1) for i in range(256)]
    elif sys.platform.startswith('linux') or sys.platform.startswith('
cygwin'):
        # this excludes your current terminal "/dev/tty"
        ports = glob.glob('/dev/tty[A-Za-z]*')
```

```
    elif sys.platform.startswith('darwin'):
        ports = glob.glob('/dev/tty.*')
    else:
        raise EnvironmentError('Unsupported platform')

    result = []
    for port in ports:
        try:
            s = serial.Serial(port)
            s.close()
            result.append(port)
        except (OSError, serial.SerialException):
            pass
    return result


#
#
#
#
############ Signal Class ############
#
#
#
#
class Signal(QObject):

    # initializing a Signal which will take (string) as an input
    reading = pyqtSignal(str)

    # init Function for the Signal class
    def __init__(self):
        QObject.__init__(self)

#
#
############ end of Class ############
#
#
```

```
# Making text editor as A global variable (to solve the issue of being
 local to (self) in widget class)
text = QTextEdit
text2 = QTextEdit

language = "Python"

#
#
#
#
############ Text Widget Class ############
#
#
#
#

# this class is made to connect the QTab with the necessary layouts


class text_widget(QWidget):
    def __init__(self):
        super().__init__()
        self.itUI()

    def itUI(self):
        global text
        text = QTextEdit()
        Python_Coloring.PythonHighlighter(text)
        hbox = QHBoxLayout()
        hbox.addWidget(text)
        self.setLayout(hbox)


#
#
############ end of Class ############
```

```
#
#


#
#
#
#
############ Widget Class ############
#
#
#
#
class Widget(QWidget):

    def __init__(self, ui):
        super().__init__()
        self.initUI()
        self.ui = ui

    def initUI(self):

        # This widget is responsible of making Tab in IDE which makes
the Text editor looks nice
        tab = QTabWidget()
        tx = text_widget()
        tab.addTab(tx, "Tab"+"1")

        # second editor in which the error messeges and succeeded conn
ections will be shown
        global text2
        text2 = QTextEdit()
        text2.setReadOnly(True)
        # defining a Treeview variable to use it in showing the direct
ory included files
        self.treeview = QTreeView()

        # making a variable (path) and setting it to the root path (su
rely I can set it to whatever the root I want, not the default)
```

```
        # path = QDir.rootPath()

        path = QDir.currentPath()

        # making a Filesystem variable, setting its root path and appl
ying somefilters (which I need) on it
        self.dirModel = QFileSystemModel()
        self.dirModel.setRootPath(QDir.rootPath())

        # NoDotAndDotDot => Do not list the special entries "." and ".
.".
        # AllDirs =>List all directories; i.e. don't apply the filters
 to directory names.
        # Files => List files.
        self.dirModel.setFilter(QDir.NoDotAndDotDot |
                                QDir.AllDirs | QDir.Files)
        self.treeview.setModel(self.dirModel)
        self.treeview.setRootIndex(self.dirModel.index(path))
        self.treeview.clicked.connect(self.on_clicked)

        vbox = QVBoxLayout()
        Left_hbox = QHBoxLayout()
        Right_hbox = QHBoxLayout()

        # after defining variables of type QVBox and QHBox
        # I will Assign treevies variable to the left one and the firs
t text editor in which the code will be written to the right one
        Left_hbox.addWidget(self.treeview)
        Right_hbox.addWidget(tab)

        # defining another variable of type Qwidget to set its layout
as an QHBoxLayout
        # I will do the same with the right one
        Left_hbox_Layout = QWidget()
        Left_hbox_Layout.setLayout(Left_hbox)

        Right_hbox_Layout = QWidget()
        Right_hbox_Layout.setLayout(Right_hbox)
```

```
        # I defined a splitter to seperate the two variables (left, ri
ght) and make it more easily to change the space between them
        H_splitter = QSplitter(Qt.Horizontal)
        H_splitter.addWidget(Left_hbox_Layout)
        H_splitter.addWidget(Right_hbox_Layout)
        H_splitter.setStretchFactor(1, 1)

        # I defined a new splitter to seperate between the upper and l
ower sides of the window
        V_splitter = QSplitter(Qt.Vertical)
        V_splitter.addWidget(H_splitter)
        V_splitter.addWidget(text2)

        Final_Layout = QHBoxLayout(self)
        Final_Layout.addWidget(V_splitter)

        self.setLayout(Final_Layout)

    # defining a new Slot (takes string) to save the text inside the f
irst text editor
    @pyqtSlot(str)
    def Saving(s):
        if language == "Python":
            with open('main.py', 'w') as f:
                TEXT = text.toPlainText()
                f.write(TEXT)
        else:
            with open('main.cs', 'w') as f:
                TEXT = text.toPlainText()
                f.write(TEXT)

    # defining a new Slot (takes string) to set the string to the text
 editor
    @pyqtSlot(str)
    def Open(s):
        global text
        text.setText(s)

    def on_clicked(self, index):
```

```
        nn = self.sender().model().filePath(index)
        nn = tuple([nn])

        file_ext = nn[0].split(".")[1]
        if file_ext == "py":
            UI.set_python(self.ui)
        else:
            UI.set_csharp(self.ui)

        if nn[0]:
            f = open(nn[0], 'r')
            with f:
                data = f.read()
                text.setText(data)

#
#
############ end of Class ############
#
#

# defining a new Slot (takes string)
# Actually I could connect the (mainwindow) class directly to the (wid
get class) but I've made this function in between for futuer use
# All what it do is to take the (input string) and establish a connect
ion with the widget class, send the string to it


@pyqtSlot(str)
def reading(s):
    b = Signal()
    b.reading.connect(Widget.Saving)
    b.reading.emit(s)

# same as reading Function


@pyqtSlot(str)
```

```
def Openning(s):
    b = Signal()
    b.reading.connect(Widget.Open)
    b.reading.emit(s)
#
#
#
#
############ MainWindow Class ############
#
#
#
#


class UI(QMainWindow):
    def __init__(self):
        super().__init__()
        self.intUI()

    def intUI(self):
        self.port_flag = 1
        self.b = Signal()

        self.Open_Signal = Signal()

        # connecting (self.Open_Signal) with Openning function
        self.Open_Signal.reading.connect(Openning)

        # connecting (self.b) with reading function
        self.b.reading.connect(reading)

        # creating menu items
        menu = self.menuBar()

        # I have three menu items
        filemenu = menu.addMenu('File')
        Port = menu.addMenu('Port')
        Run = menu.addMenu('Run')
```

```
        fast_menu = menu.addMenu('Fast Executer')
        self.language_menu = menu.addMenu('Python')

        # As any PC or laptop have many ports, so I need to list them
to the User
        # so I made (Port_Action) to add the Ports got from (serial_po
rts()) function
        # copyrights of serial_ports() function goes back to a guy fro
m stackoverflow(whome I can't remember his name), so thank you (unknow
n)
        Port_Action = QMenu('port', self)

        res = serial_ports()

        for i in range(len(res)):
            s = res[i]
            Port_Action.addAction(s, self.PortClicked)

        # adding the menu which I made to the original (Port menu)
        Port.addMenu(Port_Action)

#         Port_Action.triggered.connect(self.Port)
#         Port.addAction(Port_Action)

        # Making and adding Run Actions
        RunAction = QAction("Run", self)
        RunAction.triggered.connect(self.Run)
        Run.addAction(RunAction)

        # Making and adding File Features
        Save_Action = QAction("Save", self)
        Save_Action.triggered.connect(self.save)
        Save_Action.setShortcut("Ctrl+S")
        Close_Action = QAction("Close", self)
        Close_Action.setShortcut("Alt+c")
        Close_Action.triggered.connect(self.close)
        Open_Action = QAction("Open", self)
        Open_Action.setShortcut("Ctrl+O")
```

```
        Open_Action.triggered.connect(self.open)

        filemenu.addAction(Save_Action)
        filemenu.addAction(Close_Action)
        filemenu.addAction(Open_Action)

        fast_action = QAction("Fast Executer", self)
        fast_action.triggered.connect(self.fast_execute)
        fast_action.setShortcut("Ctrl+e")
        fast_menu.addAction(fast_action)

        python_action = QAction('Python', self)
        python_action.triggered.connect(self.set_python)

        csharp_action = QAction('C#', self)
        csharp_action.triggered.connect(self.set_csharp)

        self.language_menu.addAction(python_action)
        self.language_menu.addAction(csharp_action)

        # Seting the window Geometry
        self.setGeometry(200, 150, 600, 500)
        self.setWindowTitle('Anubis IDE')
        self.setWindowIcon(QtGui.QIcon('Anubis.png'))

        widget = Widget(self)

        self.setCentralWidget(widget)
        self.show()

    ############################        Start OF the Functions
 ###################
    def Run(self):
        if self.port_flag == 0:
            mytext = text.toPlainText()
        #
        # Compiler Part
        #
#           ide.create_file(mytext)
```

```
#            ide.upload_file(self.portNo)
            text2.append("Sorry, there is no attached compiler.")

        else:
            text2.append("Please Select Your Port Number First")

    # this function is made to get which port was selected by the user

    @QtCore.pyqtSlot()
    def PortClicked(self):
        action = self.sender()
        self.portNo = action.text()
        self.port_flag = 0

    # I made this function to save the code into a file

    def save(self):
        self.b.reading.emit("name")

    # I made this function to open a file and exhibits it to the user
in a text editor

    def open(self):
        file_name = QFileDialog.getOpenFileName(self, 'Open File', '/h
ome')
        file_ext = file_name[0].split(".")[1]
        if file_ext == "py":
            self.set_python()
        else:
            self.set_csharp()

        if file_name[0]:
            f = open(file_name[0], 'r')
            with f:
                data = f.read()
            self.Open_Signal.reading.emit(data)

    def fast_execute(self):
        if language == "Python":
```

```
            main_func = FastExecuter.FastExecuter.fast_execute(
                text.toPlainText())
            text.setText(main_func)
        else:
            text2.append("Fast Executor option is only available with
Python")

    def set_python(self):
        self.language_menu.setTitle("Python")
        global language
        language = "Python"
        Python_Coloring.PythonHighlighter(text)

    def set_csharp(self):
        self.language_menu.setTitle("C#")
        global language
        language = "C#"
        CSharp_Coloring.CSharpHighlighter(text)


#
#
############ end of Class ############
#
#
if __name__ == '__main__':
    app = QApplication(sys.argv)
    ex = UI()
    # ex = Widget()
    sys.exit(app.exec_())
```

FastExecuter.py

```
import re


class FastExecuter:
    def fast_execute(code):
        func_prototype = re.search("def.*:", code)
        if func_prototype:
            if re.search("main", func_prototype.group()):
                return code
            func_call = func_prototype.group().replace("def", "result
=")
            func_call = func_call.replace(":", "")
        else:
            func_call = "# no functions found"

        main_exists = re.search("def.main\(\):", code)
        print(main_exists)
        if main_exists:
            main = code[0: main_exists.start()] + "def main():\n    "
+ func_call + "\n    "
        else:
            main = code +  "\n\ndef main():\n    " + func_call + "\n
  "


        return main
```

CSharp_Coloring.py

```
from PyQt5.QtCore import QRegExp
from PyQt5.QtGui import QColor, QTextCharFormat, QFont, QSyntaxHighlig
hter


def format(color, style=''):
    """
    Return a QTextCharFormat with the given attributes.
    """
    _color = QColor()
    if type(color) is not str:
        _color.setRgb(color[0], color[1], color[2])
    else:
        _color.setNamedColor(color)

    _format = QTextCharFormat()
    _format.setForeground(_color)
    if 'bold' in style:
        _format.setFontWeight(QFont.Bold)
    if 'italic' in style:
        _format.setFontItalic(True)

    return _format


# Syntax styles that can be shared by all languages
STYLES = {
    'keyword': format([3, 169, 252]), #blue
    'operator': format([176, 124, 207]), #purple
    'brace': format('black'),
    'string': format([85, 171, 79]), #green
    'string2': format([104, 214, 96]), #light green
    'comment': format([163, 168, 173], 'italic'), #grey
    'numbers': format([171, 114, 65]), #brown
}

class CSharpHighlighter(QSyntaxHighlighter):
    """Syntax highlighter for the Python language.
```

```
    """
    # C# keywords
    keywords = [
        'abstract', 'bool',     'continue', 'decimal',  'default',
        'event',    'explicit', 'extern',   'char',     'checked',
        'class',    'const',    'break',    'as',       'base',
        'delegate', 'is,'       'lock',     'long',     'num',
        'byte',     'case',     'catch',    'false',    'finally',
        'fixed',    'float',    'for',      'foreach',  'static',
        'goto',     'if',       'implicit', 'in',       'int',
        'interface','internal', 'do',       'double',   'else',
        'namespace','new',      'null',     'object',   'operator',
        'out',      'override', 'params',   'private',  'protected',
        'public',   'readonly', 'sealed',   'short',    'sizeof',
        'ref',      'return',   'sbyte',    'stackalloc','static',
        'string',   'struct',   'void',     'volatile', 'while',
        'true',     'try',      'switch',   'this',     'throw',
        'unchecked' 'unsafe',   'ushort',   'using',    'using',
        'virtual',  'typeof',   'uint',     'ulong',    'out',
        'add',      'alias',    'async',    'await',    'dynamic',
        'from',     'get',      'orderby',  'ascending','decending',
        'group',    'into',     'join',     'let',      'nameof',
        'global',   'partial',  'set',      'remove',   'select',
        'value',    'var',      'when',     'Where',    'yield'
    ]

    # C# operators
    operators = [
        '=',
        # logical
        '!', '?', ':',
        # Comparison
        '==', '!=', '<', '<=', '>', '>=',
        # Arithmetic
        '\+', '-', '\*', '/', '\%', '\+\+', '--',
        # self assignment
        '\+=', '-
=', '\*=', '/=', '\%=', '<<=', '>>=', '\&=', '\^=', '\|=',
        # Bitwise
```

```
        '\^', '\|', '\&', '\~', '>>', '<<',
    ]

    # braces
    braces = [
        '\{', '\}', '\(', '\)', '\[', '\]',
    ]

    def __init__(self, document):
        QSyntaxHighlighter.__init__(self, document)

        # Multi-line strings (expression, flag, style)
        # FIXME: The triple-quotes in these two lines will mess up the
        # syntax highlighting from this point onward
        self.tri_single = (QRegExp("'''"), 1, STYLES['string2'])
        self.tri_double = (QRegExp('"""'), 2, STYLES['string2'])

        rules = []

        # Keyword, operator, and brace rules
        rules += [(r'\b%s\b' % w, 0, STYLES['keyword'])
                  for w in CSharpHighlighter.keywords]
        rules += [(r'%s' % o, 0, STYLES['operator'])
                  for o in CSharpHighlighter.operators]
        rules += [(r'%s' % b, 0, STYLES['brace'])
                  for b in CSharpHighlighter.braces]

        # All other rules
        rules += [
            # Double-
quoted string, possibly containing escape sequences
            (r'"[^"\\]*(\\.[^"\\]*)*"', 0, STYLES['string']),
            # Single-
quoted string, possibly containing escape sequences
            (r"'[^'\\]*(\\.[^'\\]*)*'", 0, STYLES['string']),

            # comments // & /**/
            (r'//[^\n]*', 0, STYLES['comment']),
            (r'/\*[\s\S]*\*/$', 0, STYLES['comment']),
```

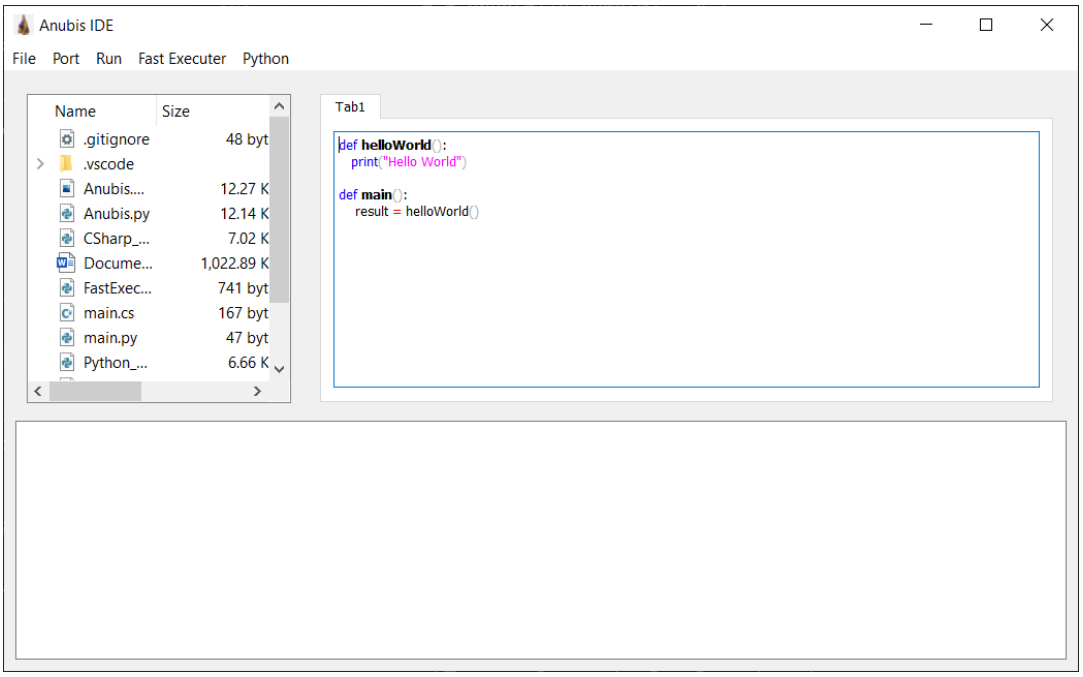
```
            # Numeric literals
            (r'\b[+-]?[0-9]+[lL]?\b', 0, STYLES['numbers']),
            (r'\b[+-]?0[xX][0-9A-Fa-
f]+[lL]?\b', 0, STYLES['numbers']),
            (r'\b[+-]?[0-9]+(?:\.[0-9]+)?(?:[eE][+-]?[0-
9]+)?\b', 0, STYLES['numbers']),
        ]

        # Build a QRegExp for each pattern
        self.rules = [(QRegExp(pat), index, fmt)
                      for (pat, index, fmt) in rules]

    def highlightBlock(self, text):
        """Apply syntax highlighting to the given block of text.
        """
        # Do other syntax formatting
        for expression, nth, format in self.rules:
            index = expression.indexIn(text, 0)

            while index >= 0:
                # We actually want the index of the nth match
                index = expression.pos(nth)
                length = len(expression.cap(nth))
                self.setFormat(index, length, format)
                index = expression.indexIn(text, index + length)

        self.setCurrentBlockState(0)

        # Do multi-line strings
        in_multiline = self.match_multiline(text, *self.tri_single)
        if not in_multiline:
            in_multiline = self.match_multiline(text, *self.tri_double
)

    def match_multiline(self, text, delimiter, in_state, style):
        """Do highlighting of multi-
line strings. ``delimiter`` should be a
```

```
        ``QRegExp`` for triple-single-quotes or triple-double-
quotes, and
        ``in_state`` should be a unique integer to represent the corre
sponding
        state changes when inside those strings. Returns True if we're
 still
        inside a multi-line string when this function is finished.
        """
        # If inside triple-single quotes, start at 0
        if self.previousBlockState() == in_state:
            start = 0
            add = 0
        # Otherwise, look for the delimiter on this line
        else:
            start = delimiter.indexIn(text)
            # Move past this match
            add = delimiter.matchedLength()

        # As long as there's a delimiter match on this line...
        while start >= 0:
            # Look for the ending delimiter
            end = delimiter.indexIn(text, start + add)
            # Ending delimiter on this line?
            if end >= add:
                length = end - start + add + delimiter.matchedLength()
                self.setCurrentBlockState(0)
            # No; multi-line string
            else:
                self.setCurrentBlockState(in_state)
                length = len(text) - start + add
            # Apply formatting
            self.setFormat(start, length, style)
            # Look for the next match
            start = delimiter.indexIn(text, start + length)

        # Return True if still inside a multi-
line string, False otherwise
        if self.currentBlockState() == in_state:
            return True
```

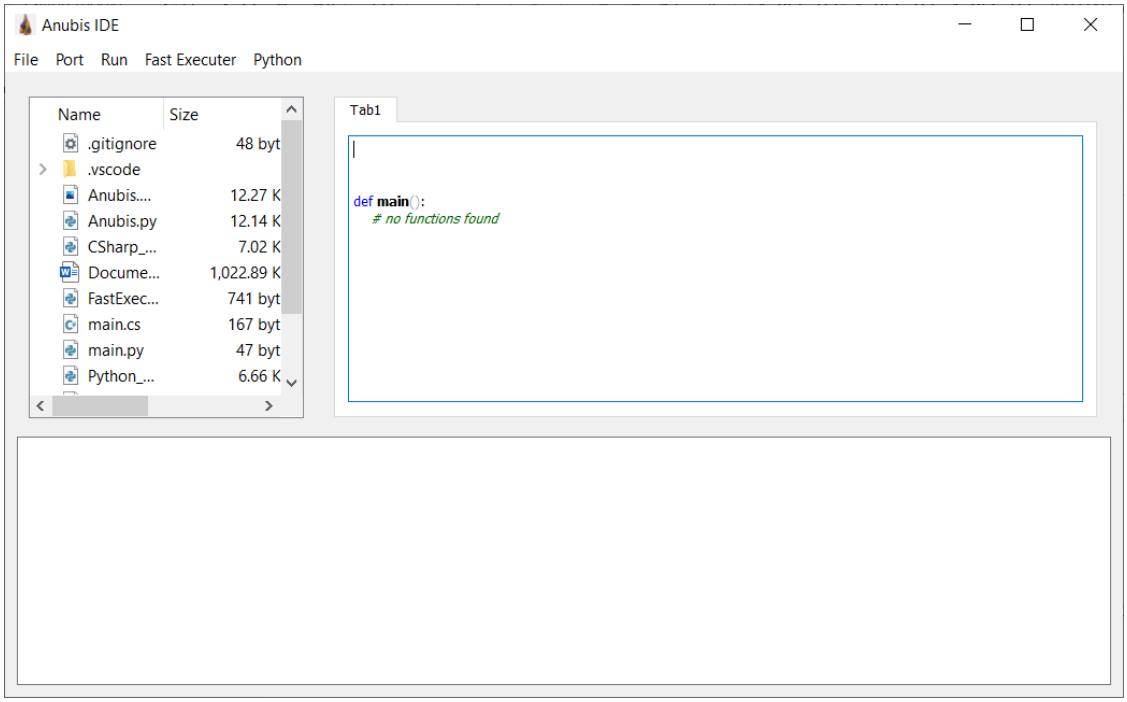
```
        else:
            return False
```

Screenshots

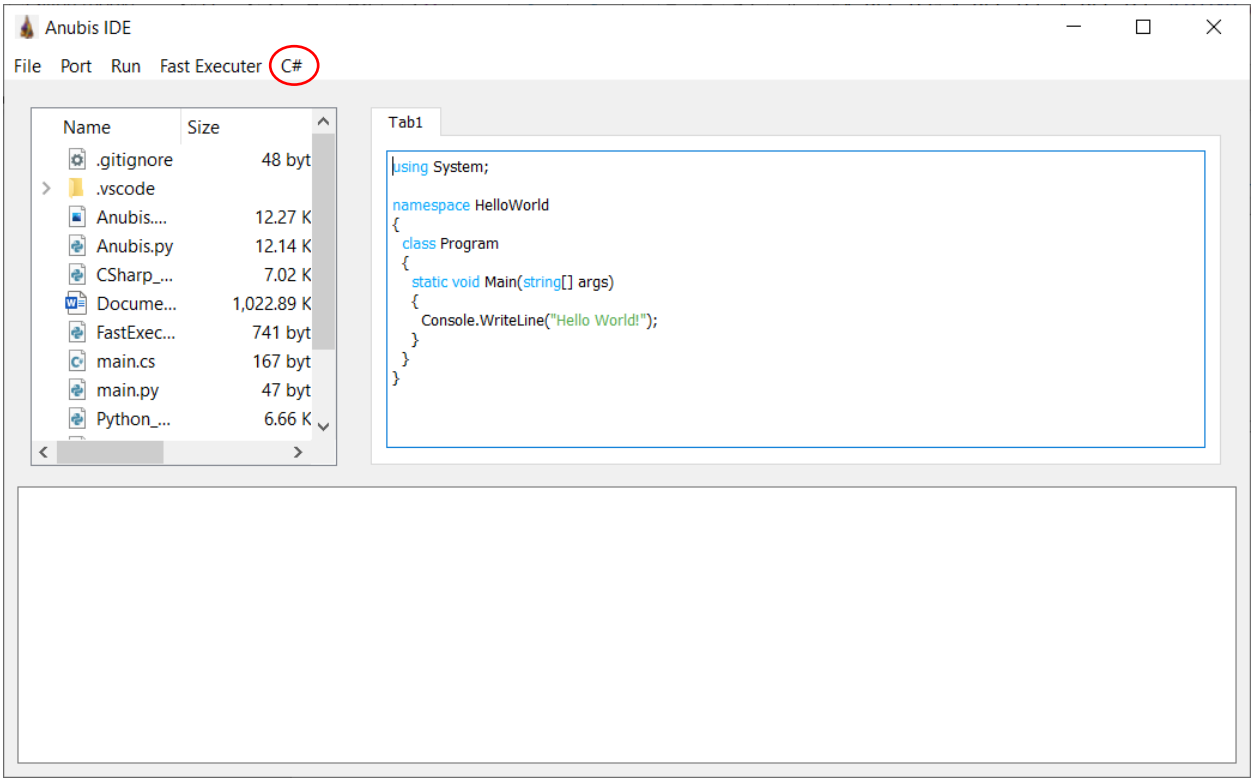
Fast Executer normal scenario



Fast Executer with no function written



Detection of c# format and using c# color encoding when .cs file is opened



Saving .cs file in main.cs