

QScintilla documentation

(A learn-by-example guide)

This documentation assumes a basic knowledge of the Python programming language. But even if you are a complete beginner in the language do not get discouraged, the examples should be quite understandable regardless.

All examples will use the Python 3 programming language and the PyQt5 application framework. To change the examples to Python 2 or the PyQt4 is quite simple and in most cases, trivial.

For in-depth information about Qt, PyQt, Scintilla and QScintilla go to the official documentation websites.

Table of Contents

1. Introduction.....	4
1.1. What is QScintilla?.....	4
1.2. Some QScintilla features.....	4
1.3. QScintilla object overview.....	5
1.3.1. PyQt5.Qsci.QsciScintillaBase.....	5
1.3.2. PyQt5.Qsci.QsciScintilla.....	5
1.3.3. PyQt5.Qsci.QsciLexer.....	5
1.3.4. PyQt5.Qsci.QsciAPIs.....	6
1.4. PyQt objects used by QScintilla.....	6
1.4.1. PyQt5.QtWidgets.QApplication.....	6
1.4.2. PyQt5.QtWidgets.QMainWindow.....	6
1.4.3. PyQt5.QtWidgets.QWidget.....	6
1.4.4. PyQt5.QtGui.QFont.....	6
1.5. QScintilla visual description.....	8
1.5.1. Editing area.....	8
1.5.2. Margin area.....	8
1.5.3. Scroll bar area.....	9
1.5.4. Autocompletion windows.....	9
1.5.5. Context menu.....	10
1.6. QScintilla's default settings.....	10
1.6.1. Default lexer.....	10
1.6.2. Default font.....	10
1.6.3. Default paper.....	11
1.6.4. Default keyboard shortcuts.....	11
1.6.5. Default scroll bar behaviour.....	12
1.6.6. Default margin.....	12
1.6.7. Default autocompletion behaviour.....	12
1.6.8. Default mouse behaviour.....	12
1.6.9. Default encoding.....	13
2. Installation guide.....	14
2.1. Windows.....	14
2.2. GNU/Linux.....	14
2.3. Mac OS.....	14
3. QScintilla options.....	16
3.1. Text wrapping.....	16
3.1.1. Text wrapping mode.....	16
3.1.2. Text wrapping visual flags.....	17
3.1.3. Text wrapping indent mode.....	18
3.2. End-Of-Line (EOL) options.....	19
3.2.1. End-Of-Line mode.....	19
3.2.2. End-Of-Line character/s visibility.....	19
3.3. Indentation options.....	20
3.3.1. Indentation character (tabs or spaces).....	20
3.3.2. Indentation size.....	20
3.3.3. Indentation guides.....	20
3.3.4. Indentation at spaces options.....	21
3.3.5. Automatic indentation.....	21

3.4. Caret options (cursor representation).....	22
3.4.1. Caret foreground color.....	22
3.4.2. Caret line visibility.....	22
3.4.3. Caret line background color.....	23
3.4.3. Caret width.....	23
4. Basic examples.....	24
4.1. Qscintilla's "Hello World" example.....	24
4.1.1. Code breakdown.....	24
4.2. Customization example.....	25
4.2.1. Code breakdown.....	25
FUTURE CHAPTERS:.....	29
Creating a Nim programming language lexer.....	29
X. Appendix: code examples.....	30
X.1. Hello World.....	30
X.2. Customization.....	30

1. Introduction

This chapter assumes you know nothing about QScintilla or PyQt and will guide you step by step to understanding the basics of the PyQt framework and the QScintilla editing component.

1.1. What is QScintilla?

QScintilla is a text editing component for the Qt application framework written in the C++ programming language. It is a wrapper for the Scintilla text editing component created by Neil Hodgson also written in the C++ programming language. The Qt application framework is a set of objects, also referred to as widgets, that help making GUI (Graphical-User-Interface) and other types of applications easier and is cross-platform.

PyQt is a set of Python bindings to the Qt application framework, which also includes bindings to the QScintilla component. So hurray, we can use QScintilla in Python. This introduction chapter will focus solely on the PyQt's QScintilla component, other PyQt components will only be mentioned when they are needed with regards to the QScintilla component.

As PyQt is a wrapper for Qt framework, it cannot be avoided that some parts of Qt will have to be described in order to understand the documentation. Sometimes I will even mention some C++ code, but only when it is absolutely necessary.

The referencing of QScintilla / Scintilla will seem confusing at first but do not get discouraged, just keep in mind that QScintilla component is just the Scintilla text editing component wrapped in a Qt QWidget object so it can be used in the Qt framework, and PyQt's QScintilla component is just the QScintilla component wrapped in Python!

Also later in the document I will use the terms QScintilla, Qscintilla document, editor, object or widget interchangeably. All terms mean the QScintilla editing component.

1.2. Some QScintilla features

- Built-in syntax highlighting for more than 30 programming languages
- Create syntax highlighting for custom purposes
- Text styling: underlining, highlighting, ...
- Clickable text (called **Hotspots** in QScintilla)
- Word wrapping
- Autocompletion functionality and call tips
- Error indicating, bookmarks, ... using the margins of the document
- Code folding
- Selecting various font styles and colors

- Mixing font styles in the same document
- Customizing keyboard commands
- Block selection of text
- Zooming text in / out
- UTF-8 support
- Command macros (call sequences of commands with one command)
- Customizing the **Caret** (the blinking marker that shows where the cursor is located)
- Built-in search and replace functionality
- ...

Plus with Python and the entire PyQt framework at your disposal, you will be able to do much, much more.

1.3. QScintilla object overview

All QScintilla objects are part of the PyQt framework under the **PyQt5.Qsci** module. The below listed objects will be covered in depth (some more than others) in this documentation.

1.3.1. PyQt5.Qsci.QsciScintillaBase

The base object for text editing. This is a more direct low level wrapper to access all of the underlying Scintilla functionality. It is used when you cannot implement something in the higher level **PyQt5.Qsci.QsciScintilla** object.

1.3.2. PyQt5.Qsci.QsciScintilla

The high level object for text editing. It is a subclass of the low level **PyQt5.Qsci.QsciScintillaBase** object, which just means it has access to all of the **PyQt5.Qsci.QsciScintillaBase** methods and attributes. This object will be used most of the time for all text editing purposes you will need and has a very Qt-like API. **When using the name QScintilla, I will always be referring to this object.**

1.3.3. PyQt5.Qsci.QsciLexer

The abstract object used for styling text (syntax highlighting) usually in the context of a programming language. This is an abstract object and has to be sub-classed to make a custom lexer. There are many built-in lexers already available such as: **QsciLexerPython**, **QsciLexerRuby**, ... The lexer needs to be applied to an instance of a **PyQt5.Qsci.QsciScintilla** object for it to start styling the text.

1.3.4. PyQt5.Qsci.QsciAPIs

The object used for storing the custom autocompletion and call tip information. In a nutshell, you assign it to an instance of the sub-classed **PyQt5.Qsci.QsciLexer** with autocompletions / call tips enabled, add keywords to it and you get custom autocompletions in the editor.

1.4. PyQt objects used by QScintilla

There are various PyQt objects needed to customize the QScintilla component, while some are needed to initialize the PyQt application.

1.4.1. PyQt5.QtWidgets.QApplication

The [QApplication](#) object manages the GUI application's control flow and main settings. It's the object that needs to be initialized and executed to get QScintilla shown on the screen.

1.4.2. PyQt5.QtWidgets.QMainWindow

This object provides the main application window. It should always be used as the main window widget. If you are creating a simple QScintilla editor without any bells and whistles, just create

1.4.3. PyQt5.QtWidgets.QWidget

The [QWidget](#) object is the base object of all user interface objects. The QScintilla object and all other GUI object inherit from this object, that is why it is relevant.

From the official Qt 5 documentation:

The widget is the atom of the user interface: it receives mouse, keyboard and other events from the window system, and paints a representation of itself on the screen. Every widget is rectangular, and they are sorted in a Z-order. A widget is clipped by its parent and by the widgets in front of it.

A widget that is not embedded in a parent widget is called a window. Usually, windows have a frame and a title bar, although it is also possible to create windows without such decoration using suitable [window flags](#)). In Qt, [QMainWindow](#) and the various subclasses of [QDialog](#) are the most common window types.

1.4.4 PyQt5.QtGui.QFont

QScintilla uses PyQt's QFont object for describing fonts. The QFont object resides in the **PyQt5.QtGui** module. The relevant attributes of the QFont object with regards to QScintilla are:

- family: style of the font. Some examples are: Courier, Times, Helvetica, ...
- pointSize: size of the font in points. If it is set to lower than 1, it will default to the system default size

- **weight**: font thickness from 0 (ultralight) to 99 (extremely black). The predefined values are QFont.Light, QFont.Normal, QFont.DemiBold, QFont.Bold and QFont.Black.
- **italic**: tilted text, True or False.

For more detailed information on this object, see the PyQt's web documentation.

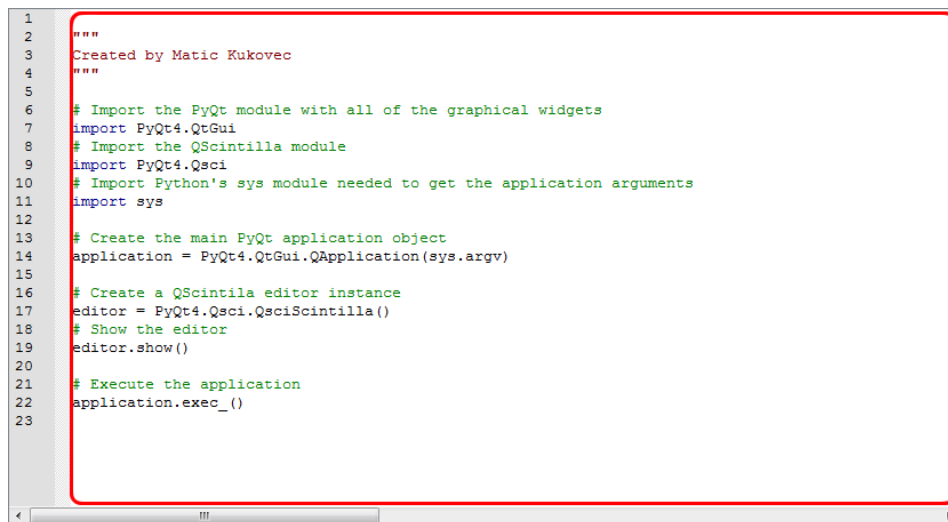
You may be wondering how do you change the **color** of the font, right? This is what styling does, which will be described in a later chapter.

1.5. QScintilla visual description

Here I will describe the parts of the QScintilla component that will be discussed throughout this document, so you will have a clear idea of what goes where. **A more detailed look into these parts will follow in a later chapter.**

1.5.1. Editing area

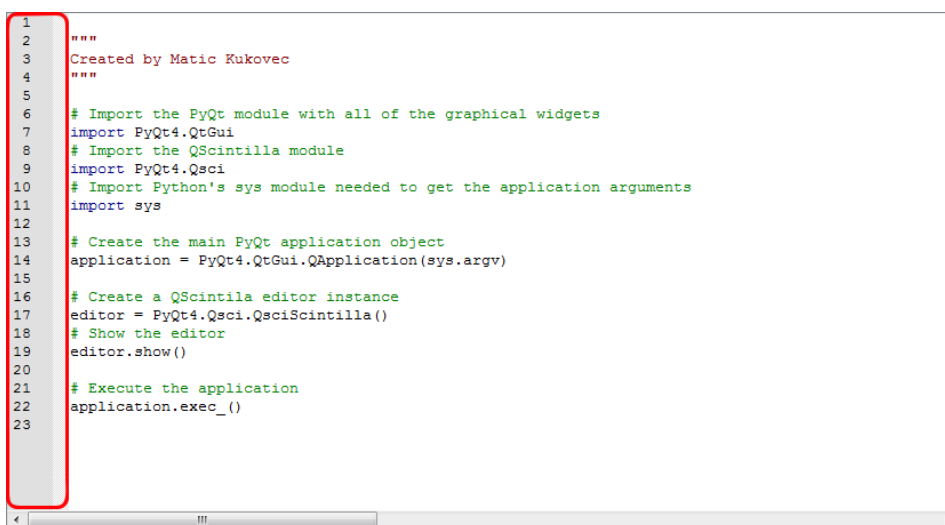
This is where all of the editing and styling (coloring, ...) of text happens. Text is edited using the mouse and keyboard, but it may also be manipulated in Python code. The editing area is shown in the red rectangle in the image below.



```
1 2
2  """
3  Created by Matic Kukovec
4  """
5
6  # Import the PyQt module with all of the graphical widgets
7  import PyQt4.QtGui
8  # Import the QScintilla module
9  import PyQt4.Qsci
10 # Import Python's sys module needed to get the application arguments
11 import sys
12
13 # Create the main PyQt application object
14 application = PyQt4.QtGui.QApplication(sys.argv)
15
16 # Create a QScintilla editor instance
17 editor = PyQt4.Qsci.QsciScintilla()
18 # Show the editor
19 editor.show()
20
21 # Execute the application
22 application.exec_()
23
```

1.5.2. Margin area

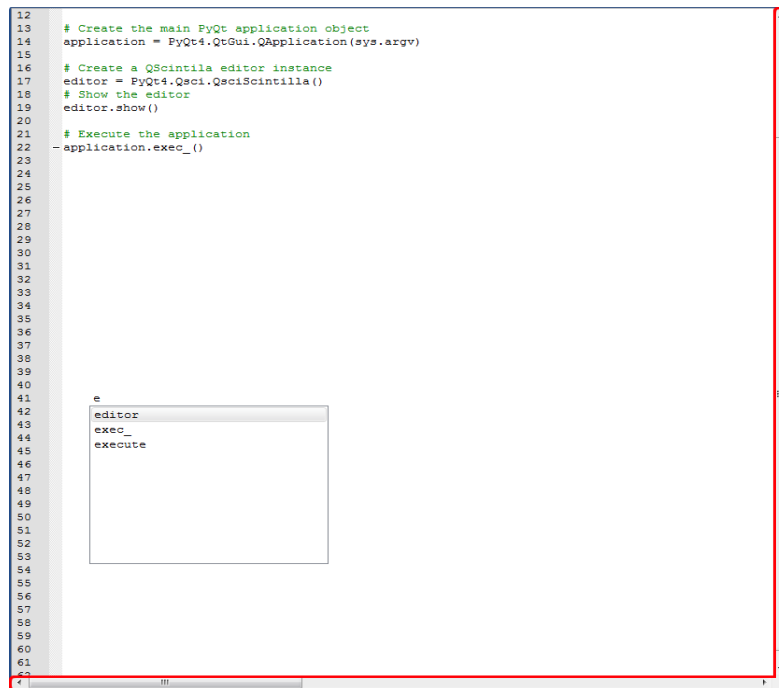
This is where the margins of the QScintilla document are located. Margins are the sidebars that can show line numbers, where there is the option for code folding, showing error indicators, showing bookmarks and anything else you can think of. The QScintilla can have up to 7 margins (**I think?**). The margin area is shown in the image below.



```
1 2
2  """
3  Created by Matic Kukovec
4  """
5
6  # Import the PyQt module with all of the graphical widgets
7  import PyQt4.QtGui
8  # Import the QScintilla module
9  import PyQt4.Qsci
10 # Import Python's sys module needed to get the application arguments
11 import sys
12
13 # Create the main PyQt application object
14 application = PyQt4.QtGui.QApplication(sys.argv)
15
16 # Create a QScintilla editor instance
17 editor = PyQt4.Qsci.QsciScintilla()
18 # Show the editor
19 editor.show()
20
21 # Execute the application
22 application.exec_()
23
```

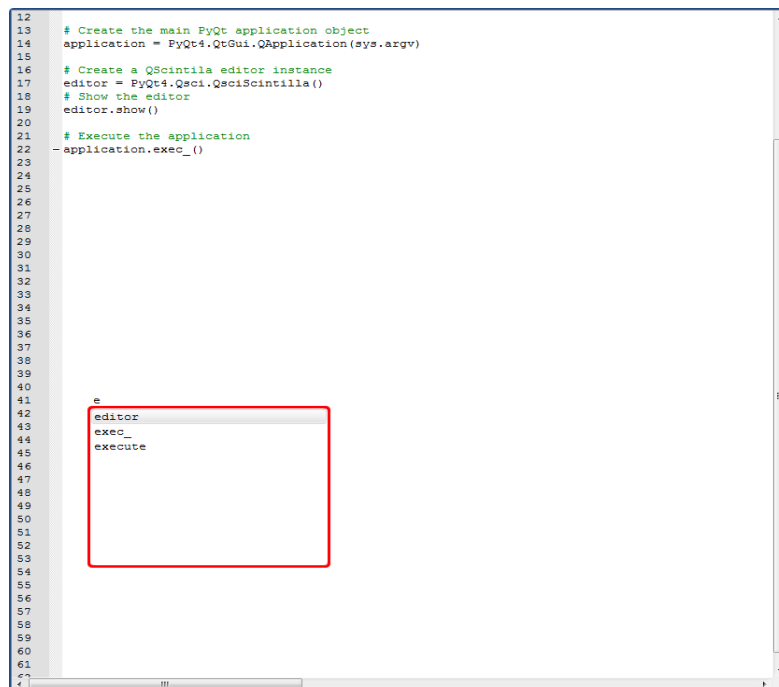

1.5.3. Scroll bar area

This is the area where the scroll bars are shown. The horizontal vertical bar is always present, while the vertical scroll bars is shown depending on the number of lines in the document and the documents window size. The scroll bar area is shown in the image below.



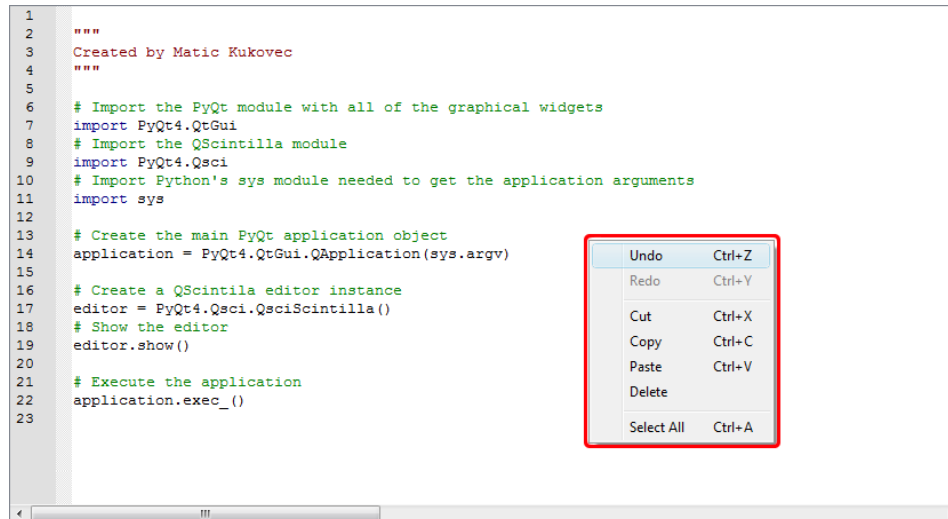
1.5.4. Autocompletion windows

When autocompletions are active in the document, the documentation window show sthe current autocompletion suggestions. By default, autocompletion is not enabled. An example autocompletion window is shown in the image below.



1.5.5. Context menu

By default there is only the right-click context menu that shows some standard editing options in the QScintilla component. Custom context menus can be added in Python code, but they use other parts of the PyQt framework that will not be covered in this documentation. QScintilla's default context menu is shown in the image below.



1.6. QScintilla's default settings

Below are QScintilla's default settings. These are the settings when you create an instance of the QScintilla component without setting any of its options.

1.6.1. Default lexer

By default, there is **NO** lexer set for the QScintilla editing component when it is first created. Sometimes I will also say that the lexer is disabled, but it means the same thing, that no lexer is set for the editor.

1.6.2. Default font

The default font used by QScintilla when **NO** lexer is set depends on the operating system you are using. On Windows it is **MS Shell Dlg 2**, while on GNU/Linux Debian Jesse it is **Roboto**.

The default font color is black. The size of the font depends on your system's settings. I have not had the opportunity to test on other systems.

When there is a lexer set for the document, it overrides any settings that you have manually set previously. If you are trying to set some font style or color directly and nothing is happening, it means that a lexer is set on the document and is always overriding the changes you are trying to make.

1.6.3. Default paper

In QScintilla the background of the document is called the **paper**. The paper is the background color of the document. By default the paper is white.

Here it's the same as with the font. If you are trying to set the paper color directly and nothing is happening, it means that a lexer is set on the document and is always overriding the changes you are trying to make.

1.6.4. Default keyboard shortcuts

Below is the list of the default shortcuts used by QScintilla.

(NOTE: FIX ALL OF THE DESCRIPTIONS BELOW)

- 'Down': Move one line down
- 'Down+Shift': Extend selected text one line down
- 'Down+Ctrl': Scroll the view one line down
- 'Down+Alt+Shift': Block extend selection one line down
- 'Up': Move one line up
- 'Up+Shift': Extend selected text one line up
- 'Up+Ctrl': Scroll the view one line up
- 'Up+Alt+Shift': Block extend selection one line up
- '[+Ctrl': Move paragraph up
- '[+Ctrl+Shift': Extend selection one paragraph up
- '] +Ctrl': Move paragraph down
- '] +Ctrl+Shift': Extend selection one paragraph down
- 'Left': SCI_CHARLEFT
- 'Left+Shift': SCI_CHARLEFTTEXTEND
- 'Left+Ctrl': SCI_WORDLEFT
- 'Left+Shift+Ctrl': SCI_WORDLEFTTEXTEND
- 'Left+Alt+Shift': SCI_CHARLEFTRECTEXTEND
- 'Right': SCI_CHARRIGHT
- 'Right+Shift': SCI_CHARRIGHTTEXTEND
- 'Right+Ctrl': SCI_WORDRIGHT
- 'Right+Shift+Ctrl': SCI_WORDRIGHTTEXTEND
- 'Right+Alt+Shift': SCI_CHARRIGHTRECTEXTEND
- '/+Ctrl': SCI_WORDPARTLEFT
- '/+Ctrl+Shift': SCI_WORDPARTLEFTTEXTEND
- '\\+Ctrl': SCI_WORDPARTRIGHT
- '\\+Ctrl+Shift': SCI_WORDPARTRIGHTTEXTEND
- 'Home': SCI_VCHOME
- 'Home+Shift': SCI_VCHOMEEXTEND
- 'Ctrl+Home': SCI_DOCUMENTSTART
- 'Ctrl+End': SCI_DOCUMENTSTARTEXTEND
- 'Home+Alt': SCI_HOMEDISPLAY
- 'Home+Alt+Shift': SCI_VCHOMERECTEXTEND
- 'End': SCI_LINEEND
- 'End+Shift': SCI_LINEENDEXTEND
- 'Ctrl+End': SCI_DOCUMENTEND
- 'Ctrl+Shift+End': SCI_DOCUMENTENDEXTEND
- 'End+Alt': SCI_LINEENDDISPLAY
- 'End+Alt+Shift': SCI_LINEENDRECTEXTEND
- 'PageUp': SCI_PAGEUP
- 'Shift+PageUp': SCI_PAGEUPEXTEND
- 'PageUp+Alt+Shift': SCI_PAGEUPRECTEXTEND
- 'PageDown': SCI_PAGEDOWN
- 'Shift+PageDown': SCI_PAGEDOWNEXTEND
- 'PageDown+Alt+Shift': SCI_PAGEDOWNRECTEXTEND
- 'Delete': SCI_CLEAR
- 'Delete+Shift': SCI_CUT
- 'Ctrl+Delete': SCI_DELWORDRIGHT

- 'Ctrl+Shift+BackSpace': SCI_DELLINERIGHT
- 'Insert': SCI_EDITTOGGLEOVERTYPE
- 'Insert+Shift': SCI_PASTE
- 'Insert+Ctrl': SCI_COPY
- 'Escape': SCI_CANCEL
- 'Backspace': SCI_DELETEBACK
- 'Backspace+Shift': SCI_DELETEBACK
- 'Ctrl+BackSpace': SCI_DELWORDLEFT
- 'Backspace+Alt': SCI_UNDO
- 'Ctrl+Shift+BackSpace': SCI_DELLINELEFT
- 'Ctrl+Z': SCI_UNDO
- 'Ctrl+Y': SCI_REDO
- 'Ctrl+X': SCI_CUT
- 'Ctrl+C': SCI_COPY
- 'Ctrl+V': SCI_PASTE
- 'Ctrl+A': SCI_SELECTALL
- 'Tab': SCI_TAB
- 'Shift+Tab': SCI_BACKTAB
- 'Return': SCI_NEWLINE
- 'Return+Shift': SCI_NEWLINE
- 'Add+Ctrl': SCI_ZOOMIN
- 'Subtract+Ctrl': SCI_ZOOMOUT
- 'Divide+Ctrl': SCI_SETZOOM
- 'Ctrl+L': SCI_LINECUT
- 'Ctrl+Shift+L': SCI_LINEDeLETE
- 'Ctrl+Shift+T': SCI_LINECOPY
- 'Ctrl+T': SCI_LINETRANSPOSE
- 'Ctrl+D': SCI_SELECTIONDUPLICATE
- 'U+Ctrl': SCI_LOWERCASE
- 'U+Ctrl+Shift': SCI_UPPERCASE

1.6.5. Default scroll bar behaviour

By default, only the horizontal scroll bar is shown and it has a default starting length. The horizontal scroll bar automatically grows as you enter more text and adjusts itself to the longest line in the document. The vertical scroll bar also shrinks automatically when you delete text from the lines, but it shrinks back to its default size.

The vertical scroll bar appears only when there are more lines than can be shown in the current QScintilla document. When you add lines the vertical scroll bar grows automatically, while when you delete lines it shrinks automatically.

1.6.6. Default margin

The QScintilla shows one margin by default. Its behaviour is, that it selects the text of the line next to the position where the user has left-clicked on the margin using the mouse.

1.6.7. Default autocompletion behaviour

By default, autocompletion is disabled.

1.6.8. Default mouse behaviour

The default mouse behaviour is text selection with holding the left mouse button and dragging the mouse. Right clicking anywhere in the document shows the context menu. By default the context menu has the following options: Undo, Redo, Cut, Copy, Paste, Delete and Select All.

When there is text selected in the editor

1.6.9. Default encoding

The default encoding is ASCII. Unknown characters will appear as the questionmark (?) symbol.

2. Installation guide

Note that in this installation guide I mention **QScintilla2**. QScintilla is at version 2.9.3 at the moment, this is where the **2** comes from.

Installing PyQt5 using **pip** as described below can be done **ONLY** with Python3.5 at the moment.

2.1. Windows

Install the latest [PyQt5](#) library for your version of Python 3, this can be done easily using the [pip package manager](#) (if you have it installed) with the following command in the windows console:

```
pip install PyQt5
```

The other option is to install the Visual Studio version that your Python 3 version was compiled with and compile the from source from their official [website](#). You will also need to download the [SIP library source code](#). Download the source code and follow the instructions in the readme/install files. You'll also need the [Qt5 C++ source code](#).

2.2. GNU/Linux

If you are on Ubuntu, Raspbian or probably most Debian derivatives, install the following libraries using **apt-get**:

- python3.x (Probably already installed on the system)
- python3-pyqt5
- python3-pyqt5.qsci

Another option is as on Windows using [pip](#) with the following command in your favourite terminal:

```
pip3 install PyQt5
```

Notice it's **pip3** on GNU/Linux as it usually has both Python2 and Python3 installed.

Otherwise you can install PyQt5 and QScintilla2 (you will also need the [SIP library](#)) from source from their official [website](#). Download the source code and follow the instructions in the readme/install files. You'll also need the [Qt5 C++ source code](#).

2.3. Mac OS

Install the latest Python3 version and the pip package manager and use the following command in the terminal:

```
pip install PyQt5
```

Another thing you can try is using Anaconda Python 3 and it's package manager to install all dependencies. Here is the more [information](#).

I don't know much about Mac's, but you can try using the default Mac package manager to find the PyQt5 and QScintilla2 libraries or install the libraries from source, same as on GNU/Linux.

3. QScintilla options

This chapter will be an in depth description of all QScintilla options.

3.1. Text wrapping

Text wrapping disables or enables multiple types of text wrapping, which means breaking lines that are longer than what the QScintilla editor can show in the editor screen into multiple lines.

3.1.1. Text wrapping mode

Set with method: `setWrapMode(wrap_mode)`

Queried with method: `wrapMode()`

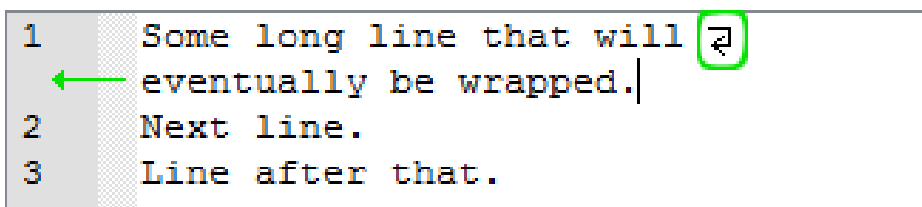
wrap_mode parameter options:

- **PyQt5.Qsci.QsciScintilla.WrapNone**

No wrapping. Lines that exceed the editor's screen width cannot be seen unless you scroll horizontally using the mouse or with the cursor.

- **PyQt5.Qsci.QsciScintilla.WrapWord**

Lines are wrapped at words. Example:

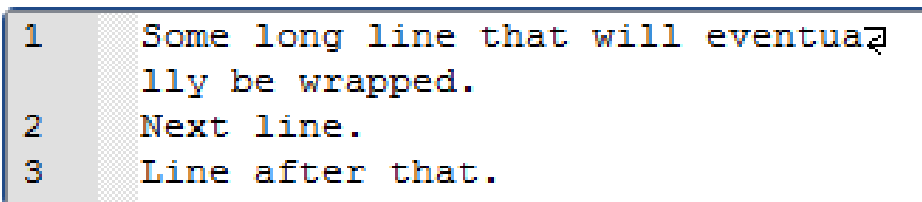


```
1 Some long line that will eventually be wrapped.
2 Next line.
3 Line after that.
```

Note the line wrap character and that the wrapped line has no line number (if there is a line margin present in the QScintilla editor). The other wrap visualisation options will be shown later.

- **PyQt5.Qsci.QsciScintilla.WrapCharacter**

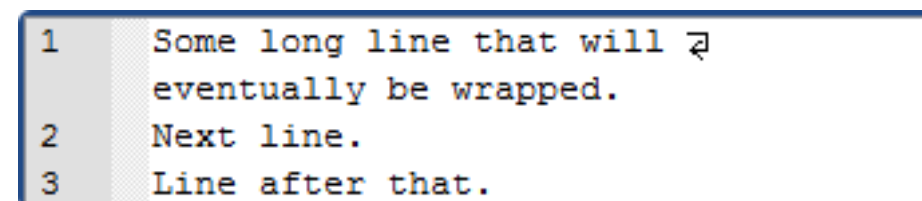
Lines are wrapped at the character boundaries. Example:



```
1 Some long line that will eventually be wrapped.
2 Next line.
3 Line after that.
```

- **PyQt5.Qsci.QsciScintilla.WrapWhitespace**

Lines are wrapped at the whitespace boundaries. Example:



```
1 Some long line that will eventually be wrapped.
2 Next line.
3 Line after that.
```


3.1.2 Text wrapping visual flags

These method selects how the text wrapping will be indicated in the QScintilla editor.

Set with method: **setWrapVisualFlags(endFlag, startflag, indent)**

endFlag parameter options:

- **PyQt5.Qsci.QsciScintilla.WrapFlagNone**

```
1  Some long line that will
   eventually be wrapped
2  Next line.
3  Line after that. |
```

- **PyQt5.Qsci.QsciScintilla.WrapFlagByText**

```
1  Some long line that will ↗
   eventually be wrapped
2  Next line.
3  Line after that.
```

- **PyQt5.Qsci.QsciScintilla.WrapFlagByBorder**

```
1  Some long line that will ↗
   eventually be wrapped
2  Next line.
3  Line after that.
```

- **PyQt5.Qsci.QsciScintilla.WrapFlagInMargin**

```
1  Some long line that will
↳ eventually be wrapped
2  Next line.
3  Line after that.
```

startflag parameter options:

- **PyQt5.Qsci.QsciScintilla.WrapFlagNone**

```
1  Some long line that will
   eventually be wrapped
2  Next line.
3  Line after that. |
```

- **PyQt5.Qsci.QsciScintilla.WrapFlagByText** or **PyQt5.Qsci.QsciScintilla.WrapFlagByBorder**

```

1  Some long line that will
   eventually be wrapped
2  Next line.
3  Line after that.

```

- **PyQt5.Qsci.QsciScintilla.WrapFlagInMargin** (same effect as the endflag parameter)

```

1  Some long line that will
   eventually be wrapped
2  Next line.
3  Line after that.

```

indent parameter options:

- This parameter sets the number of spaces each wrapped line is indented by. It has to be an **int**. Its effects can be seen **ONLY** if **setWrapIndentMode** is set to **PyQt5.Qsci.QsciScintilla.WrapIndentFixed!**

3.1.3 Text wrapping indent mode

Selects how wrapped lines are indented.

Set with method: **setWrapIndentMode (indent_mode)**

indent_mode parameter options:

- **PyQt5.Qsci.QsciScintilla.WrapIndentFixed** (with **setWrapVisualFlags indent** parameter set to 4!)

```

1  Some long line that will
   eventually be wrapped
2  Next line.
3  Line after that.

```

- **PyQt5.Qsci.QsciScintilla.WrapIndentSame**

Indents the same as the first wrapped line. In the below example, the first line is indented by two whitespaces.

```

1  |Some long line that
   |will eventually be
   |wrapped
2  Next line.
3  Line after that.

```

- **PyQt5.Qsci.QsciScintilla.WrapIndentIndented**

Indents the same as the first wrapped line **PLUS** one more indentation level. Indentation level is by the **setTabWidth** method.

```
1      Some long line that ↵
      will eventually ↵
      be wrapped
2      Next line.
3      Line after that.
```

3.2. End-Of-Line (EOL) options

These options effect the End-Of-Line settings like the End-Of-Line character and mode for the QScintilla editor. By default the line endings are invisible but can be made visible with the **setEolVisibility** method, described below.

3.2.1. End-Of-Line mode

Set with method: **setEolMode(eol_mode)**

Queried with method: **eolMode()**

indent_mode parameter options:

- **PyQt5.Qsci.QsciScintilla.EolWindows**: Carrige-Return + Line-Feed (\r\n)
- **PyQt5.Qsci.QsciScintilla.EolUnix**: Line-Feed (\n)
- **PyQt5.Qsci.QsciScintilla.EolMac**: Carrige-Return (\r)

3.2.2. End-Of-Line character/s visibility

This selects the visibility of the EOL character/s in the editor window. By default it is not visible.

Set with method: **setEolVisibility(visibility)**

Queried with method: **eolVisibility()**

visibility parameter options:

- **False**: The EOL character/s is/are **NOT** visible

```
1      No EOL character at the end.
2      New line.|
```

- **True**: The EOL character/s is/are visible (marked in green in the image below)

```
1      This line shows the EOL character LF
2      New line.|
```

3.3. Indentation options

These options select the indentation character, indentation size, ...

3.3.1. Indentation character (tabs or spaces)

This selects whether the **indent/unindent** functions use either the **TAB** (`'\t'`) character or the **WHITESPACE** (`' '`) character.

Set with method: **setIndentationsUseTabs(use_tabs)**

Queried with method: **indentationsUseTabs()**

use_tabs parameter options:

- **False:** Indentation uses the whitespace characters
- **True:** Indentation uses the tab character

3.3.2. Indentation size

Selects the number of space characters to indent by.

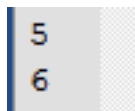
This means the number of space characters when indenting with WHITESPACES or the width of the TAB character in spaces when using TABS for indentation.

Set with method: **setTabWidth(indentation_size)**

Queried with method: **tabWidth()**

indentation_size parameter options:

- **A number greater than zero:** Number of space characters to indent by



```
5 Indented by 4 characters.  
6 Indented by 6 characters.
```

3.3.3. Indentation guides

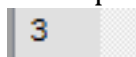
QScintilla can show vertical guiding lines at indentation columns as dotted lines. These guides are only visual guides, they do not effect the editor's text.

Set with method: **setTabIndents(indents)**

Queried with method: **tabIndents()**

- **False:** indentation guides not visible

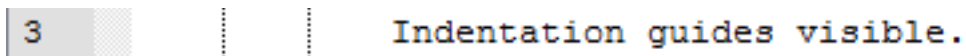
Example:



```
3 Indentation guides not visible.
```

- **True:** indentation guides visible

Example:



3.3.4. Indentation *at spaces* options

This one is a little confusing to explain without pictures. When indenting at a place in a line where there are ONLY whitespaces/tabs, if this option is set to **True**, then QScintilla indents and aligns the next NON-whitespace/tab character and the rest of the line to the indentation level and moves the cursor to the NON-whitespace/tab character.

But if set to **False**, then QScintilla just inserts an indentation, whether whitespaces or tabs. This sounds confusing, but take a look at the examples shown in the images below.

Set with method: **setTabIndents(indents)**

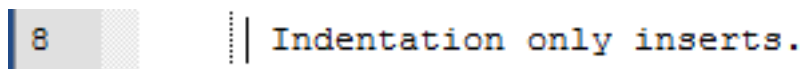
Queried with method: **tabIndents()**

indents parameter options:

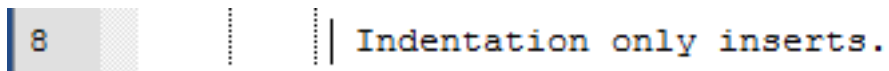
- **False:** Indentation simply inserts an indentation (whitespaces/tab) if indenting in a place in a line where there are only whitespaces to each side of the cursor.

Example:

Before indentation



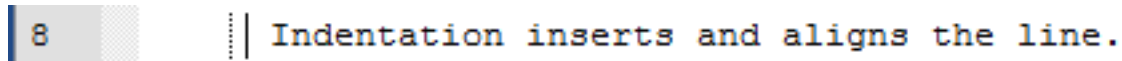
After indentation (after pressing the **TAB** key). An indentation (whitespaces/tab) is inserted and the cursor moved the width of the indentation forward.



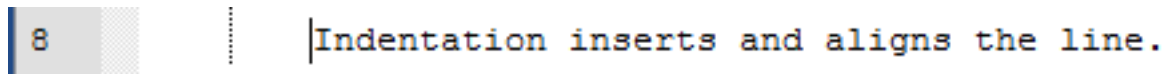
- **True:** Indentation indents and aligns the next non-whitespace/tab character to that indentation level and also moves the cursor to that indentation level.

Example:

Before indentation



After indentation (after pressing the **TAB** key). The next non-whitespace/tab character is aligned to the indentation and the cursor has aligned to the same indentation level.



3.3.5. Automatic indentation

When set to **True**, automatic indentation moves the cursor to the same indentation as the previous line when adding a new line by either pressing **Enter** or **Return**. But when set to **False**, the cursor will always move to the start of the new line.

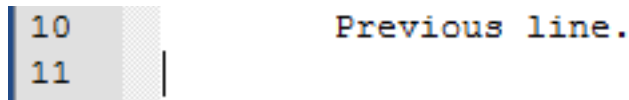
NOTE: A lexer can modify this behaviour with it's **setAutoIndentStyle** method!

Set with method: **setAutoIndent(autoindent_on)**

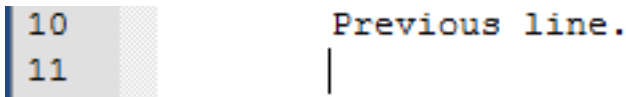
Queried with method: **autoIndent()**

autoindent_on parameter options:

- **False:** The cursor moves to the start of the line when creating a new line.

A screenshot of a code editor with a light gray background. On the left, there is a vertical scrollbar. The editor shows two lines of code: line 10 with the text "Previous line." and line 11 which is currently empty. A blue vertical cursor (caret) is positioned at the very beginning of line 11, indicating that pressing Enter will start a new line at the start of the line.

- **True:** The cursor moves to the same indentation as the previous line.

A screenshot of a code editor similar to the previous one. Line 10 contains "Previous line." and line 11 is empty. The blue vertical cursor is positioned at the start of line 11, but it is aligned with the indentation of line 10, demonstrating the 'True' behavior of the autoindent option.

3.4. Caret options (cursor representation)

These option set the way the cursor symbol looks and behaves.

3.4.1. Caret foreground color

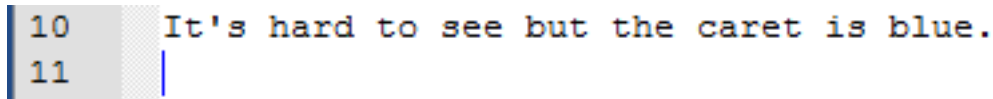
This option sets the color of the cursor.

Set with method: **setCaretForegroundColor(fg_color)**

Queried with method: **Not available directly**

fg_color parameter options:

- **PyQt5.QtGui.QColor:** To set the caret color to for example blue, use `PyQt5.QtGui.QColor("#ff0000ff")`.

A screenshot of a code editor showing two lines of code. Line 10 contains "It's hard to see but the caret is blue." and line 11 is empty. A blue vertical cursor is positioned at the start of line 11. The text in the editor is a mix of blue and black, making the blue caret stand out.

3.4.2. Caret line visibility

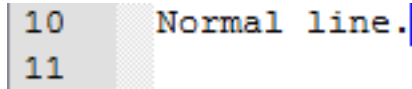
This option enables or disables the coloring of the line that the cursor is on.

Set with method: **setCaretLineVisible(visibility)**

Queried with method: **Not available directly**

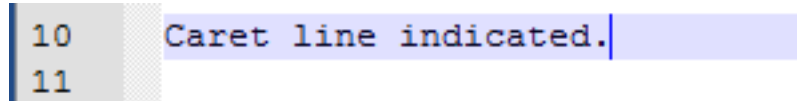
visibility parameter options:

- **False:** The line the cursor is on is not colored.



```
10 Normal line.
11
```

- **True:** The line the cursor is on is indicated with the caret background color.



```
10 Caret line indicated.
11
```

3.4.3. Caret line background color

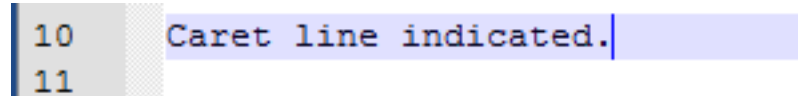
This option sets the background color of the line that the cursor is on. The caret line visibility option has to be set to **True** for this option to be visible!

Set with method: **setCaretLineBackgroundColor(bg_color)**

Queried with method: **Not available directly**

bg_color parameter options:

- **PyQt5.QtGui.QColor:** To set the caret color to for example light blue, use `PyQt5.QtGui.Qcolor("#1f0000ff")`.



```
10 Caret line indicated.
11
```

3.4.3. Caret width

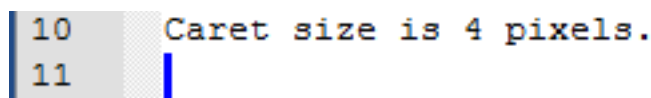
This option sets the caret width in pixels. **0 makes the caret invisible!**

Set with method: **setCaretWidth(size)**

Queried with method: **Not available directly**

size parameter options:

- **Integer:** Size of the caret in pixels.



```
10 Caret size is 4 pixels.
11
```

3.5. Autocompletion – Basic

Autocompletion is the functionality of the QScintilla editor to show suggestions for words from an autocompletion source while you are typing characters into the editor. The autocompletion source is selectable. The suggestions are shown in Autocompletion windows, which are described in 1.5.4. Autocompletion windows.

These are the basic options that do not need a lexer to be set for the editor and no **API**'s loaded (lexer/API autocomplete options will be explained in the **Advanced** chapter).

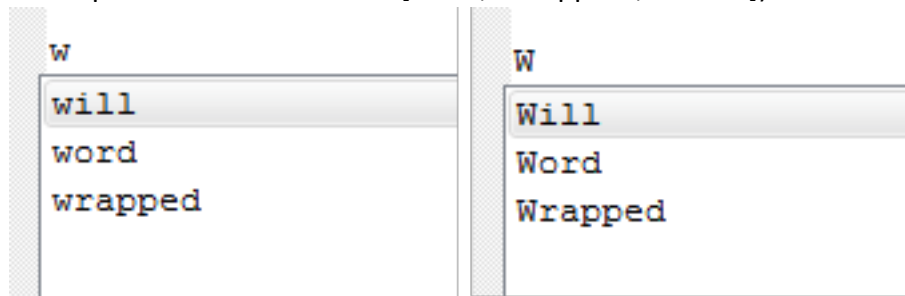
3.5.1. Autocompletion case sensitivity

Set with method: **setAutoCompletionCaseSensitivity(case_sensitivity)**

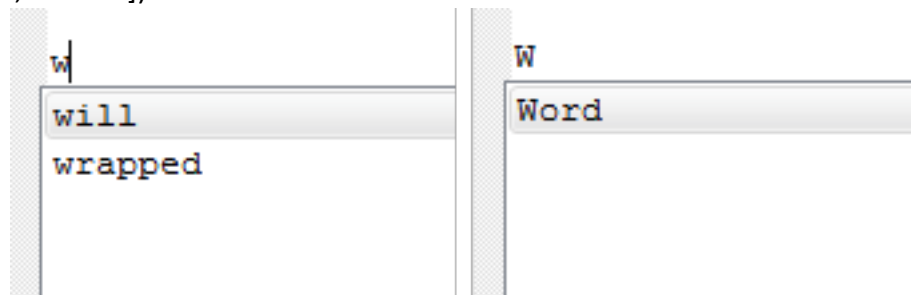
Queried with method: **autoCompletionCaseSensitivity()**

case_sensitivity parameter options:

- **False:** Autocompletion is case **IN**-sensitive. This means that the letters in the word you are typing do not have to match the case of the words in the autocompletion source. Example (the autocompletion source contains ["will", "wrapped", "Word"]):



- **True:** Autocompletion is case sensitive. If you type a word that is in the autocompletion sources but does not match the case of the autocompletion source word, the word will not appear in the suggestion window. Example (the autocompletion source contains ["will", "wrapped", "Word"]):



4. Basic examples

Below will be the basic learning examples to get you familiarized with how to setup and put the QScintilla editor component on the screen and start editing some text. Most of the parts of the QScintilla visual description chapter will be explained here briefly.

As this is learn-by-example guide, in this chapter the core functionalities will be described in much detail.

For all examples below on GNU/Linux operating systems substitute the executing command “**python script_name.py**” with “**python3 script_name.py**” if you have both Python2 and Python3 installed.

ALL THE EXAMPLES SHOULD BE PROVIDED WITH THIS DOCUMENTATION. Otherwise the code examples can be copied into your favourite editor, saved and executed with Python 3.

4.1. Qscintilla's “Hello World” example

So lets start with the mandatory “Hello World” example. The code is in chapter X, link here: X.1. Hello World.

Execute the example file **hello_qscintilla.py** with Python 3, provided along with this documentation. If you do not have the example files, save the above code to a text file called **hello_qscintilla.py** and run it using:

```
python hello_qscintilla.py
```

A new window should appear with a QScintilla text editing component inside it with the text “Hello World” already entered into the editor's editing area. Click inside the window and type something. You will see that you're already editing text.

4.1.1. Code breakdown

Pretty straightforward code, here are the key points:

- We import all of the needed modules (*lines 1 to 6*)
- Create a PyQt5.QtWidgets.QApplication object instance (*line 10*). This is the main object which needs to be initialized and handles things like widget initialization and finalization.
- Create a PyQt5.Qsci.QsciScintilla object instance (*line 13*). This is our main editing object.
- Show the QScintilla editor widget using the QWidget's [show](#) method (*line 16*). As QScintilla inherits from the QWidget object, it has all of QWidget's methods. The **show** method shows the widget and its child widgets on the screen in a new window.

This way of displaying the QScintilla editor on the screen is not recommended! Always use a PyQt5.QtWidgets.QMainWindow as the main

widget and set it's central widget to be the editor! That way all events in the editor will be handled properly. BUT FOR THIS SIMPLE EXAMPLE IT WILL BE OK.

- Next is an example of directly setting the QScintilla editor's text using the [setText](#) method (*line 18*). This method sets the text to the string you enter as the argument **AND** also resets the undo/redo buffer of the editor. QScintilla has an internal buffer that you that stores all of the text changes until it runs out of memory and cannot store any more. I personally have never reached this limit.
- And lastly we execute the application (*line 21*). This is called in all PyQt applications, but sometimes with a different style like `sys.exit(app.exec_())`, so that the application does not run any code after the PyQt application is closed.

4.2. Customization example

Let's show some customizing of various QScintilla settings by modifying the previous example. This example will disable the editor's lexer. Some customization features are only accessible with a lexer, but that will be shown in a later example. The entire code example is in chapter X, link here: X.2. Customization

Run the example **customization.py** or save the code to a file and execute it with Python 3. There is a lot going on in this example, so each of the sections will be explained in detail in the next paragraph.

4.2.1. Code breakdown

This example will be broken down into separate sections. The sections are divided with docstrings, the triple double-quoted strings at the top of each section.

- **Initialization:**
Nothing special here, same basic initialization process. The only thing added was the **append** method, which just adds the parameter string to the editors text.

- **General customizations:**

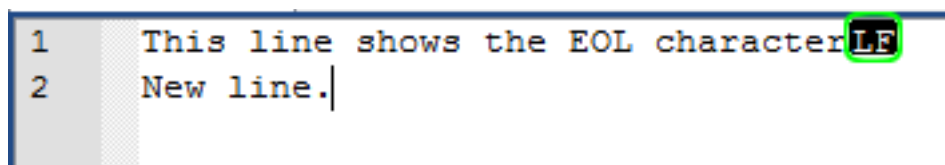
```
"""
Customization - GENERAL
"""

1. # Disable the lexer
2. editor.setLexer(None)
3. # Set the encoding to UTF-8
4. editor.setUtf8(True)
5. # Set the End-Of-Line character to Unix style ('\n')
6. editor.setEolMode(PyQt5.Qsci.QsciScintilla.EolUnix)
7. # Make End-Of-Line characters visible
8. editor.setEolVisibility(True)
```

9. `# Set the zoom factor, the factor is in points.`

10. `editor.zoomTo(4)`

- Disabling the lexer is done in line 2. We simply set the lexer to **None** with the **setLexer** method. As described in chapter 1.6.1. Default lexer, by default the lexer is disabled, so this step can be skipped.
- In line 4 we set the editor's encoding to UTF-8 with the **setUtf8** method. If the **setUtf8** method's parameter is **False**, the QScintilla editor's encoding will be set to ASCII and will show non-ASCII characters as **questionmarks (?)**. Be careful when changing the encoding from UTF-8 to ASCII at runtime, you will get some interesting squiggles and symbols if you used UTF-8 characters.
- Line 6 set the End-Of-Line mode for the editor's document with the **setEolMode** method. This selects how line endings will be interpreted when using the **text** method. This comes into play when you will be saving or manipulating the editor's text in code. In the above example the line endings are set to **Unix** mode, which means the **Line-Feed (\n)** character. All End-Of-Line options are described in 3.2. End-Of-Line (EOL) options .
- Line 8 we set the End-Of-Line (EOL) character to be visible with the **setEolVisibility** method. In the below example the EOL character is circled in green:



```
1 This line shows the EOL character LF
2 New line. |
```

- In line 10 we set the zoom factor for the editor with the **zoomTo** method. This sets the current base font size to the size you set the parameter of the method to. Experiment with different parameters to see the effects. This recalculates all the font sizes in the editor.

- **Line wrapping customizations:**

1. `"""`

2. `Customization - LINE WRAPPING`

3. `"""`

4. `# Set the text wrapping mode to word wrap`

5. `editor.setWrapMode(PyQt5.Qsci.QsciScintilla.WrapWord)`

6. `# Set the text wrapping mode visual indication`

7. `editor.setWrapVisualFlags(PyQt5.Qsci.QsciScintilla.WrapFlagByText)`

8. `# Set the text wrapping to indent the wrapped lines`

9. `editor.setWrapIndentMode(PyQt5.Qsci.QsciScintilla.WrapIndentSame)`

- Wrapping mode is selected in line 5 with the **setWrapMode** method. There are 4 wrap modes to choose from, described in 3.1.1. Text wrapping mode. Here we selected to wrap text at word boundaries.

- Choosing how wrapping is indicated is set in line 7 with **setWrapVisualFlags** methods.

- **Indentation customizations:**

These customizations effect the indentation functionality when pressing the **Tab / Shift + Tab** buttons or using the **indent / unindent** methods.

```
1. """
2. Customization - INDENTATION
3. """
4. # Set indentation with spaces instead of tabs
5. editor.setIndentationsUseTabs(False)
6. # Set the tab width to 4 spaces
7. editor.setTabWidth(4)
8. # Set tab indent mode, True indents the with the next
9. # non-whitespace character while False inserts
10.# a tab character
11.editor.setTabIndents(True)
12.# Set autoindentation mode to maintain the indentation
13.# level of the previous line (the editor's lexer HAS
14.# to be disabled)
15.editor.setAutoIndent(True)
16.# Make the backspace jump back to the tab width guides
17.# instead of deleting one character, but only when
18.# there are ONLY whitespaces / tab characters on the
19.# left side of the cursor
20.editor.setBackspaceUnindents(True)
21.# Set indentation guides to be visible
22.editor.setIndentationGuides(True)
```

- In line 5 we choose the indentation functionality to use whitespace characters instead of the tab character (`\t`) with the **setIndentationsUseTabs** method.
- Line 7 sets the number of characters the indentation functionality indents / unindents by with the **setTabWidth** method. In the above example the indentation is increased or decreased by 4 characters when indenting / unindenting (pressing **Tab** or **Shift+Tab**). More details in chapter 3.3.2. Indentation size.
- Line 11 sets the special indentation functionality. When set to **False** and when the cursor is in set to a whitespace character in a line and then indent is executed (e.g.: by pressing **Tab**), a Tab character is inserted. For more detailed explanation see chapter 3.3.4. Indentation at spaces options.
- Line 15 sets smart indentation on with the **setAutoIndent** method, which means that when inserting a new line character/s by pressing **Enter/Return**, the new line will be indented to the same indentation level as the previous NON empty line.

- Line 20 sets the **Backspace** key functionality with the **setBackspaceUnindents** method. When set to **True**, this makes pressing the backspace key unindent to columns aligned to the tab width property. Basically when pressing backspace and there are only whitespaces before the cursor position, the cursor will move exactly like as if it was unindenting.
- Line 22 makes the indentation guides (vertical dots where indentations align) visible if set to **True** with the **setIndentationGuides** method.

FUTURE CHAPTERS:

- Creating a **Nim programming language** lexer

X. Appendix: code examples

X.1. Hello World

```
# Import the PyQt module with all of the graphical widgets
import PyQt5.QtGui
# Import the QScintilla module
import PyQt5.Qsci
# Import Python's sys module needed to get the application arguments
import sys

# Create the main PyQt application object and give it the
# command line arguments passed to the Python application
application = PyQt5.QtWidgets.QApplication(sys.argv)

# Create a QScintilla editor instance
editor = PyQt5.Qsci.QsciScintilla()
# Put the "Hello World" text into the editing area of the editor
editor.setText("Hello World")
# As the QScintilla object inherits from the QWidget object it has
# the show method which displays the widget on the screen. THIS WAY
# OF DISPLAYING THE EDITOR SHOULD NOT BE USE FOR ANYTHING OTHER THAN
# TESTING PURPOSES! USE THE QMainWindow WIDGET AND SET IT'S CENTRAL
# WIDGET TO BE THE EDITOR, SO THAT THE EVENTS ARE PROPERLY HANDLED!
editor.show()

# Execute the application
application.exec_()
```

X.2. Customization

```
"""
Initialization
"""

# Import the PyQt5 module with some of the GUI widgets
import PyQt5.QtWidgets
# Import the QScintilla module
import PyQt5.Qsci
# Import Python's sys module needed to get the
# application arguments
import sys

# Create the main PyQt application object
application = PyQt5.QtWidgets.QApplication(sys.argv)

# Create a QScintila editor instance
```

```

editor=PyQt5.Qsci.QsciScintilla()
# Set the initial text
editor.setText("Inicialization example.")
# Append some text
editor.append("\nAdded text.")

"""
Customization - GENERAL
"""
# Disable the lexer
editor.setLexer(None)
# Set the encoding to UTF-8
editor.setUtf8(True)
# Set the End-Of-Line character to Unix style ('\n')
editor.setEolMode(PyQt5.Qsci.QsciScintilla.EolUnix)
# Make End-Of-Line characters visible
editor.setEolVisibility(True)
# Set the zoom factor, the factor is in points.
editor.zoomTo(4)

"""
Customization - LINE WRAPPING
"""
# Set the text wrapping mode to word wrap
editor.setWrapMode(PyQt5.Qsci.QsciScintilla.WrapWord)
# Set the text wrapping mode visual indication
editor.setWrapVisualFlags(PyQt5.Qsci.QsciScintilla.WrapFlagByText)
# Set the text wrapping to indent the wrapped lines
editor.setWrapIndentMode(PyQt5.Qsci.QsciScintilla.WrapIndentSame)

"""
Customization - EDGE MARKER
"""
# Set the edge marker's position and set it to color the
background
# when a line goes over the limit of 50 characters
editor.setEdgeMode(PyQt5.Qsci.QsciScintilla.EdgeBackground)
editor.setEdgeColumn(50)
edge_color=caret_fg_color=PyQt5.QtGui.QColor("#ff00ff00")
editor.setEdgeColor(edge_color)
# Add a long line that will display the edge marker coloring
editor.append("\nSome long line that will display the edge
marker's functionality.")

```



```

"""
Customization - INDENTATION
"""

# Set indentation with spaces instead of tabs
editor.setIndentationsUseTabs(False)
# Set the tab width to 4 spaces
editor.setTabWidth(4)
# Set tab indent mode, see the 3.3.3 chapter in QSciDocs
# for a detailed explanation
editor.setTabIndents(True)
# Set autoindentation mode to maintain the indentation
# level of the previous line (the editor's lexer HAS
# to be disabled)
editor.setAutoIndent(True)
# Make the backspace jump back to the tab width guides
# instead of deleting one character, but only when
# there are ONLY whitespaces on the left side of the
# cursor
editor.setBackspaceUnindents(True)
# Set indentation guides to be visible
editor.setIndentationGuides(True)

"""
Customization - CARET (the blinking cursor indicator)
"""

# Set the caret color to red
caret_fg_color = PyQt5.QtGui.QColor("#ffff0000")
editor.setCaretForegroundColor(caret_fg_color)
# Enable and set the caret line background color to slightly
transparent blue
editor.setCaretLineVisible(True)
caret_bg_color = PyQt5.QtGui.QColor("#7f0000ff")
editor.setCaretLineBackgroundColor(caret_bg_color)
# Set the caret width of 4 pixels
editor.setCaretWidth(4)

"""
Customization - AUTOCOMPLETION (Partially usable without a lexer)
"""

# Set the autocompletions to case INsensitive
editor.setAutoCompletionCaseSensitivity(False)
# Set the autocompletion to not replace the word to the right
of the cursor
editor.setAutoCompletionReplaceWord(False)

```

```
# Set the autocompletion source to be the words in the
# document
editor.setAutoCompletionSource(PyQt5.Qsci.QsciScintilla.AcsDocument)
# Set the autocompletion dialog to appear as soon as 1
character is typed
editor.setAutoCompletionThreshold(1)

# For the QScintilla editor to properly process events we
# need to add it to a QMainWindow object.
main_window = PyQt5.QtWidgets.QMainWindow()
# Set the central widget of the main window to
# be the editor
main_window.setCentralWidget(editor)
# Resize the main window and show it on the screen
main_window.resize(800, 600)
main_window.show()

# Execute the application
application.exec_()
```