Openpyxl tutorial

In this tutorial we show how to work with Excel files in Python using openpyxl library.

Openpyxl

The *openpyxl* is a Python library to read and write Excel 2010 xlsx/xlsm/xltx/xltm files.

Excel xlsx

In this tutorial, we will work with xlsx files. The xlsx is a file extension for an open XML spreadsheet file format used by Microsoft Excel. The xlsm files support macros. The xls format is a proprietary binary format while xlsx is based on Office Open XML format.

```
$ sudo pip3 install openpyxl
```

We install `openpyxl` with the `pip3` tool.

Creating a new file

In the first example, we will create a new xlsx file with `openpyxl`.

write_xlsx.py

```
#!/usr/bin/python3

from openpyxl import Workbook
import time

book = Workbook()
sheet = book.active

sheet['A1'] = 56
sheet['A2'] = 43

now = time.strftime("%x")
sheet['A3'] = now

book.save("sample.xlsx")
```

In the example, we create a new xlsx file. We write data into three cells.

```
from openpyxl import Workbook
```

From the `openpyxl` module, we import the `Workbook` class. A workbook is the container for all other parts the document.

```
book = Workbook()
```

We create a new workbook. A workbook is always created with at least one worksheet.

```
sheet = book.active
```

We get the reference to the active sheet.

```
sheet['A1'] = 56
sheet['A2'] = 43
```

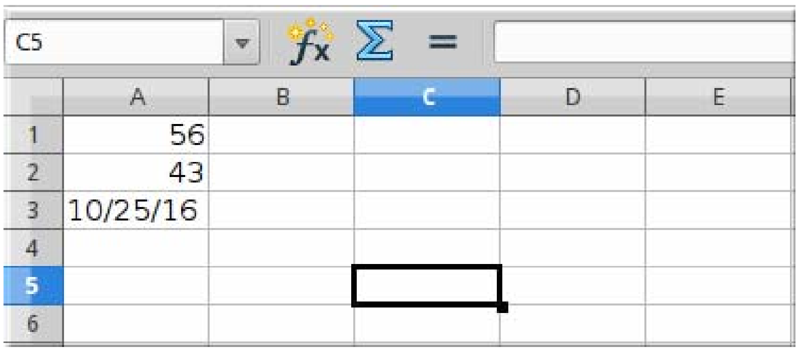
We write numerical data to cells A1 and A2.

```
now = time.strftime("%x")
sheet['A3'] = now
```

We write current date to the cell A3.

```
book.save("sample.xlsx")
```

We write the contents to the `sample.xlsx` file with the `save()` method.



	A	B	C	D	E
1	56				
2	43				
3	10/25/16				
4					
5					
6					

Figure: New file

Writing to a cell

There are two basic ways to write to a cell: using a key of a worksheet such as A1 or D3, or using a row and column notation with the `cell()` method.

write2cell.py

```
#!/usr/bin/python3

from openpyxl import Workbook

book = Workbook()
```

```
sheet = book.active

sheet['A1'] = 1
sheet.cell(row=2, column=2).value = 2

book.save('write2cell.xlsx')
```

In the example, we write two values to two cells.

```
sheet['A1'] = 1
```

Here, we assing a numerical value to the A1 cell.

```
sheet.cell(row=2, column=2).value = 2
```

In this line, we write to cell B2 with the row and column notation.

Appending values

With the `append()` method, we can append a group of values at the bottom of the current sheet.

appending_values.py

```
#!/usr/bin/python3

from openpyxl import Workbook

book = Workbook()
sheet = book.active

rows = (
    (88, 46, 57),
    (89, 38, 12),
    (23, 59, 78),
    (56, 21, 98),
    (24, 18, 43),
    (34, 15, 67)
)

for row in rows:
    sheet.append(row)

book.save('appending.xlsx')
```

In the example, we append three columns of data into the current sheet.

```
rows = (
    (88, 46, 57),
    (89, 38, 12),
    (23, 59, 78),
    (56, 21, 98),
    (24, 18, 43),
    (34, 15, 67)
)
```

The data is stored in a tuple of tuples.

```
for row in rows:
    sheet.append(row)
```

We go through the container row by row and insert the data row with the `append()` method.

Reading a cell

In the following example, we read the previously written data from the `sample.xlsx` file.

read_cells.py

```
#!/usr/bin/python3

import openpyxl

book = openpyxl.load_workbook('sample.xlsx')

sheet = book.active

a1 = sheet['A1']
a2 = sheet['A2']
a3 = sheet.cell(row=3, column=1)

print(a1.value)
print(a2.value)
print(a3.value)
```

The example loads an existing xlsx file and reads three cells.

```
book = openpyxl.load_workbook('sample.xlsx')
```

The file is opened with the `load_workbook()` method.

```
a1 = sheet['A1']
a2 = sheet['A2']
a3 = sheet.cell(row=3, column=1)
```

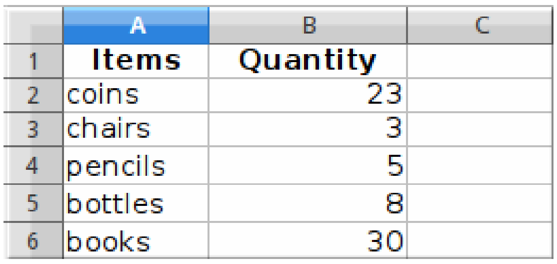
We read the contents of the A1, A2, and A3 cells. In the third line, we use the `cell()` method to get the value of A3 cell.

```
$ ./read_cells.py
56
43
10/26/16
```

This is the output of the example.

Reading multiple cells

We have the following data sheet:



	A	B	C
1	Items	Quantity	
2	coins	23	
3	chairs	3	
4	pencils	5	
5	bottles	8	
6	books	30	

Figure: Items

We read the data using a range operator.

read_cells2.py

```
#!/usr/bin/python3

import openpyxl

book = openpyxl.load_workbook('items.xlsx')

sheet = book.active

cells = sheet['A1': 'B6']

for c1, c2 in cells:
    print("{0:8} {1:8}".format(c1.value, c2.value))
```

In the example, we read data from two columns using a range operation.

```
cells = sheet['A1': 'B6']
```

In this line, we read data from cells A1 - B6.

```
for c1, c2 in cells:
    print("{0:8} {1:8}".format(c1.value, c2.value))
```

The `format()` function is used for neat output of data on the console.

```
$ ./read_cells2.py
Items    Quantity
coins          23
chairs          3
pencils         5
bottles         8
books          30
```

This is the output of the program.

Iterating by rows

The `iter_rows()` method return cells from the worksheet as rows.

iterating_by_rows.py

```
#!/usr/bin/python3

from openpyxl import Workbook

book = Workbook()
sheet = book.active

rows = (
    (88, 46, 57),
    (89, 38, 12),
    (23, 59, 78),
    (56, 21, 98),
    (24, 18, 43),
    (34, 15, 67)
)

for row in rows:
    sheet.append(row)

for row in sheet.iter_rows(min_row=1, min_col=1, max_row=6, max_col=3):
    for cell in row:
        print(cell.value, end=" ")
    print()

book.save('iterbyrows.xlsx')
```

The example iterates over data row by row.

```
for row in sheet.iter_rows(min_row=1, min_col=1, max_row=6, max_col=3):
```

We provide the boundaries for the iteration.

```
$ ./iterating_by_rows.py
88 46 57
89 38 12
23 59 78
56 21 98
24 18 43
34 15 67
```

This is the output of the example.

Iterating by columns

The `iter_cols()` method return cells from the worksheet as columns.

iterating_by_columns.py

```
#!/usr/bin/python3

from openpyxl import Workbook

book = Workbook()
sheet = book.active
```

```
rows = (
    (88, 46, 57),
    (89, 38, 12),
    (23, 59, 78),
    (56, 21, 98),
    (24, 18, 43),
    (34, 15, 67)
)

for row in rows:
    sheet.append(row)

for row in sheet.iter_cols(min_row=1, min_col=1, max_row=6, max_col=3):
    for cell in row:
        print(cell.value, end=" ")
    print()

book.save('iterbycols.xlsx')
```

The example iterates over data column by column.

```
$ ./iterating_by_columns.py
88 89 23 56 24 34
46 38 59 21 18 15
57 12 78 98 43 67
```

This is the output of the example.

Statistics

For the next example, we need to create a xlsx file containing numbers. For instance, we have created 2
rows of numbers in 10 columns with the `RANDBETWEEN()` function.

mystats.py

```
#!/usr/bin/python3

import openpyxl
import statistics as stats

book = openpyxl.load_workbook('numbers.xlsx', data_only=True)

sheet = book.active

rows = sheet.rows

values = []

for row in rows:
    for cell in row:
        values.append(cell.value)

print("Number of values: {0}".format(len(values)))
print("Sum of values: {0}".format(sum(values)))
print("Minimum value: {0}".format(min(values)))
print("Maximum value: {0}".format(max(values)))
print("Mean: {0}".format(stats.mean(values)))
print("Median: {0}".format(stats.median(values)))
print("Standard deviation: {0}".format(stats.stdev(values)))
print("Variance: {0}".format(stats.variance(values)))
```

In the example, we read all values from the sheet and compute some basic statistics.

```
import statistics as stats
```

The `statistics` module is imported to provide some statistical functions, such as median and variance.

```
book = openpyxl.load_workbook('numbers.xlsx', data_only=True)
```

Using the `data_only` option, we get the values from the cells, not the formula.

```
rows = sheet.rows
```

We get all the rows of cells that are not empty.

```
for row in rows:
    for cell in row:
        values.append(cell.value)
```

In two for loops, we form a list of integer values from the cells.

```
print("Number of values: {0}".format(len(values)))
print("Sum of values: {0}".format(sum(values)))
print("Minimum value: {0}".format(min(values)))
print("Maximum value: {0}".format(max(values)))
print("Mean: {0}".format(stats.mean(values)))
print("Median: {0}".format(stats.median(values)))
print("Standard deviation: {0}".format(stats.stdev(values)))
print("Variance: {0}".format(stats.variance(values)))
```

We compute and print mathematical statistics about the values. Some of the functions are built-in, othe
are imported with the `statistics` module.

```
$ ./mystats.py
Number of values: 312
Sum of values: 15877
Minimum value: 0
Maximum value: 100
Mean: 50.88782051282051
Median: 54.0
Standard deviation: 28.459203819700967
Variance: 809.9262820512821
```

This is a sample output.

Dimensions

To get those cells that actually contain data, we can use dimensions.

dimensions.py

```
#!/usr/bin/python3

from openpyxl import Workbook

book = Workbook()
sheet = book.active

sheet['A3'] = 39
sheet['B3'] = 19

rows = [
    (88, 46),
    (89, 38),
    (23, 59),
    (56, 21),
    (24, 18),
    (34, 15)
]

for row in rows:
    sheet.append(row)

print(sheet.dimensions)
print("Minimum row: {0}".format(sheet.min_row))
print("Maximum row: {0}".format(sheet.max_row))
print("Minimum column: {0}".format(sheet.min_column))
print("Maximum column: {0}".format(sheet.max_column))

for c1, c2 in sheet[sheet.dimensions]:
    print(c1.value, c2.value)

book.save('dimensions.xlsx')
```

The example calculates the dimensions of two columns of data.

```
sheet['A3'] = 39
sheet['B3'] = 19

rows = [
    (88, 46),
    (89, 38),
    (23, 59),
    (56, 21),
    (24, 18),
    (34, 15)
]

for row in rows:
    sheet.append(row)
```

We add data to the worksheet. Note that we start adding from the third row.

```
print(sheet.dimensions)
```

The `dimensions` property returns the top-left and bottom-right cell of the area of non-empty cells.

```
print("Minimum row: {0}".format(sheet.min_row))
print("Maximum row: {0}".format(sheet.max_row))
```

Witht the `min_row` and `max_row` properties, we get the minimum and maximum row containing data.

```
print("Minimum column: {0}".format(sheet.min_column))
print("Maximum column: {0}".format(sheet.max_column))
```

With the `min_column` and `max_column` properties, we get the minimum and maximum column containing data.

```
for c1, c2 in sheet[sheet.dimensions]:
    print(c1.value, c2.value)
```

We iterate through the data and print it to the console.

```
$ ./dimensions.py
A3:B9
Minimum row: 3
Maximum row: 9
Minimum column: 1
Maximum column: 2
39 19
88 46
89 38
23 59
56 21
24 18
34 15
```

This is the ouput of the example.

Sheets

Each workbook can have multiple sheets.

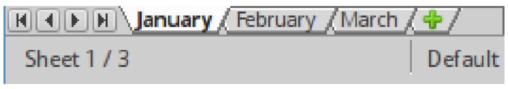


Figure: Sheets

Let's have a workbook with these three sheets.

sheets.py

```
#!/usr/bin/python3

import openpyxl
```

```
book = openpyxl.load_workbook('sheets.xlsx')

print(book.get_sheet_names())

active_sheet = book.active
print(type(active_sheet))

sheet = book.get_sheet_by_name("March")
print(sheet.title)
```

The program works with Excel sheets.

```
print(book.get_sheet_names())
```

The `get_sheet_names()` method returns the names of available sheets in a workbook.

```
active_sheet = book.active
print(type(active_sheet))
```

We get the active sheet and print its type to the terminal.

```
sheet = book.get_sheet_by_name("March")
```

We get a reference to a sheet with the `get_sheet_by_name()` method.

```
print(sheet.title)
```

The title of the retrieved sheet is printed to the terminal.

```
$ ./sheets.py
['January', 'February', 'March']
<class 'openpyxl.worksheet.worksheet.Worksheet'>
March
```

This is the output of the program.

sheets2.py

```
#!/usr/bin/python3

import openpyxl

book = openpyxl.load_workbook('sheets.xlsx')

book.create_sheet("April")

print(book.sheetnames)

sheet1 = book.get_sheet_by_name("January")
book.remove_sheet(sheet1)

print(book.sheetnames)

book.create_sheet("January", 0)
print(book.sheetnames)
```

```
book.save('sheets2.xlsx')
```

In this example, we create a new sheet.

```
book.create_sheet("April")
```

A new sheet is created with the `create_sheet()` method.

```
print(book.sheetnames)
```

The sheet names can be shown with the `sheetnames` attribute as well.

```
book.remove_sheet(sheet1)
```

A sheet can be removed with the `remove_sheet()` method.

```
book.create_sheet("January", 0)
```

A new sheet can be created at the specified position; in our case, we create a new sheet at position with index 0.

```
$ ./sheets2.py
['January', 'February', 'March', 'April']
['February', 'March', 'April']
['January', 'February', 'March', 'April']
```

This is the output of the program.

It is possible to change the background colour of a worksheet.

sheets3.py

```
#!/usr/bin/python3

import openpyxl

book = openpyxl.load_workbook('sheets.xlsx')

sheet = book.get_sheet_by_name("March")
sheet.sheet_properties.tabColor = "0072BA"

book.save('sheets3.xlsx')
```

The example modifies the background colour of the sheet titled "March".

```
sheet.sheet_properties.tabColor = "0072BA"
```

We change the `tabColor` property to a new colour.

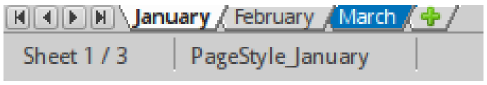


Figure: Background colour of a worksheet

The background colour of the third worksheet has been changed to some blue colour.

Merging cells

Cells can be merged with the `merge_cells()` method and unmerged with the `unmerge_cells()` method. When we merge cells, all cells but the top-left one are removed from the worksheet.

merging_cells.py

```
#!/usr/bin/python3

from openpyxl import Workbook
from openpyxl.styles import Alignment

book = Workbook()
sheet = book.active

sheet.merge_cells('A1:B2')

cell = sheet.cell(row=1, column=1)
cell.value = 'Sunny day'
cell.alignment = Alignment(horizontal='center', vertical='center')

book.save('merging.xlsx')
```

In the example, we merge four cells: A1, B1, A2, and B2. The text in the final cell is centered.

```
from openpyxl.styles import Alignment
```

In order to center a text in the final cell, we use the `Alignment` class from the `openpyxl.styles` module.

```
sheet.merge_cells('A1:B2')
```

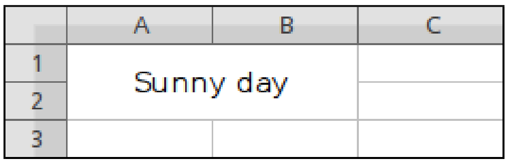
We merge four cells with the `merge_cells()` method.

```
cell = sheet.cell(row=1, column=1)
```

We get the final cell.

```
cell.value = 'Sunny day'
cell.alignment = Alignment(horizontal='center', vertical='center')
```

We set text to the merged cell and update its alignment.



	A	B	C
1	Sunny day		
2			
3			

Figure: Merged cells

Freezing panes

When we freeze panes, we keep an area of a worksheet visible while scrolling to another area of the worksheet.

freezing.py

```
#!/usr/bin/python3

from openpyxl import Workbook
from openpyxl.styles import Alignment

book = Workbook()
sheet = book.active

sheet.freeze_panes = 'B2'

book.save('freezing.xlsx')
```

The example freezes panes by the cell B2.

```
sheet.freeze_panes = 'B2'
```

To freeze panes, we use the `freeze_panes` property.

Formulas

The next example shows how to use formulas. The `openpyxl` does not do calculations; it writes formulas into cells.

formulas.py

```
#!/usr/bin/python3

from openpyxl import Workbook

book = Workbook()
sheet = book.active

rows = (
    (34, 26),
    (88, 36),
    (24, 29),
    (15, 22),
    (56, 13),
    (76, 18)
)

for row in rows:
    sheet.append(row)

cell = sheet.cell(row=7, column=2)
cell.value = "=SUM(A1:B6)"
cell.font = cell.font.copy(bold=True)

book.save('formulas.xlsx')
```

In the example, we calculate the sum of all values with the `SUM()` function and style the output in bold font.

```
rows = (
    (34, 26),
    (88, 36),
    (24, 29),
    (15, 22),
    (56, 13),
    (76, 18)
)

for row in rows:
    sheet.append(row)
```

We create two columns of data.

```
cell = sheet.cell(row=7, column=2)
```

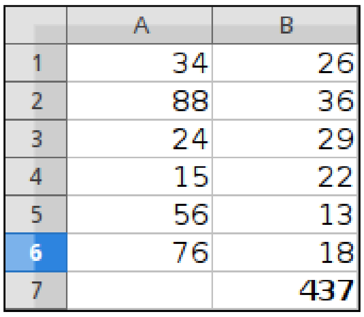
We get the cell where we show the result of the calculation.

```
cell.value = "=SUM(A1:B6)"
```

We write a formula into the cell.

```
cell.font = cell.font.copy(bold=True)
```

We change the font style.



	A	B
1	34	26
2	88	36
3	24	29
4	15	22
5	56	13
6	76	18
7		**437**

Figure: Calculating the sum of values

Images

In the following example, we show how to insert an image into a sheet.

write_image.py

```
#!/usr/bin/python3

from openpyxl import Workbook
from openpyxl.drawing.image import Image

book = Workbook()
sheet = book.active
```

```
img = Image("icesid.png")
sheet['A1'] = 'This is Sid'

sheet.add_image(img, 'B2')

book.save("sheet_image.xlsx")
```

In the example, we write an image into a sheet.

```
from openpyxl.drawing.image import Image
```

We work with the `Image` class from the `openpyxl.drawing.image` module.

```
img = Image("icesid.png")
```

A new `Image` class is created. The `icesid.png` image is located in the current working directory.

```
sheet.add_image(img, 'B2')
```

We add a new image with the `add_image()` method.

Charts

The `openpyxl` library supports creation of various charts, including bar charts, line charts, area charts, bubble charts, scatter charts, and pie charts.

According to the documentation, `openpyxl` supports chart creation within a worksheet only. Charts in existing workbooks will be lost.

create_bar_chart.py

```
#!/usr/bin/python3

from openpyxl import Workbook
from openpyxl.chart import (
    Reference,
    Series,
    BarChart
)

book = Workbook()
sheet = book.active

rows = [
    ("USA", 46),
    ("China", 38),
    ("UK", 29),
    ("Russia", 22),
    ("South Korea", 13),
    ("Germany", 11)
]

for row in rows:
    sheet.append(row)
```

```
data = Reference(sheet, min_col=2, min_row=1, max_col=2, max_row=6)
categs = Reference(sheet, min_col=1, min_row=1, max_row=6)

chart = BarChart()
chart.add_data(data=data)
chart.set_categories(categs)

chart.legend = None
chart.y_axis.majorGridlines = None
chart.varyColors = True
chart.title = "Olympic Gold medals in London"

sheet.add_chart(chart, "A8")

book.save("bar_chart.xlsx")
```

In the example, we create a bar chart to show the number of Olympic gold medals per country in Londo 2012.

```
from openpyxl.chart import (
    Reference,
    Series,
    BarChart
)
```

The `openpyxl.chart` module has tools to work with charts.

```
book = Workbook()
sheet = book.active
```

A new workbook is created.

```
rows = [
    ("USA", 46),
    ("China", 38),
    ("UK", 29),
    ("Russia", 22),
    ("South Korea", 13),
    ("Germany", 11)
]

for row in rows:
    sheet.append(row)
```

We create some data and add it to the cells of the active sheet.

```
data = Reference(sheet, min_col=2, min_row=1, max_col=2, max_row=6)
```

With the `Reference` class, we refer to the rows in the sheet that represent data. In our case, these are the numbers of olympic gold medals.

```
categs = Reference(sheet, min_col=1, min_row=1, max_row=6)
```

We create a category axis. A category axis is an axis with the data treated as a sequence of non-numeric text labels. In our case, we have text labels representing names of countries.

```
chart = BarChart()
chart.add_data(data=data)
chart.set_categories(categs)
```

We create a bar chart and set it data and categories.

```
chart.legend = None
chart.y_axis.majorGridlines = None
```

Using `legend` and `majorGridlines` attributes, we turn off the legends and major grid lines.

```
chart.varyColors = True
```

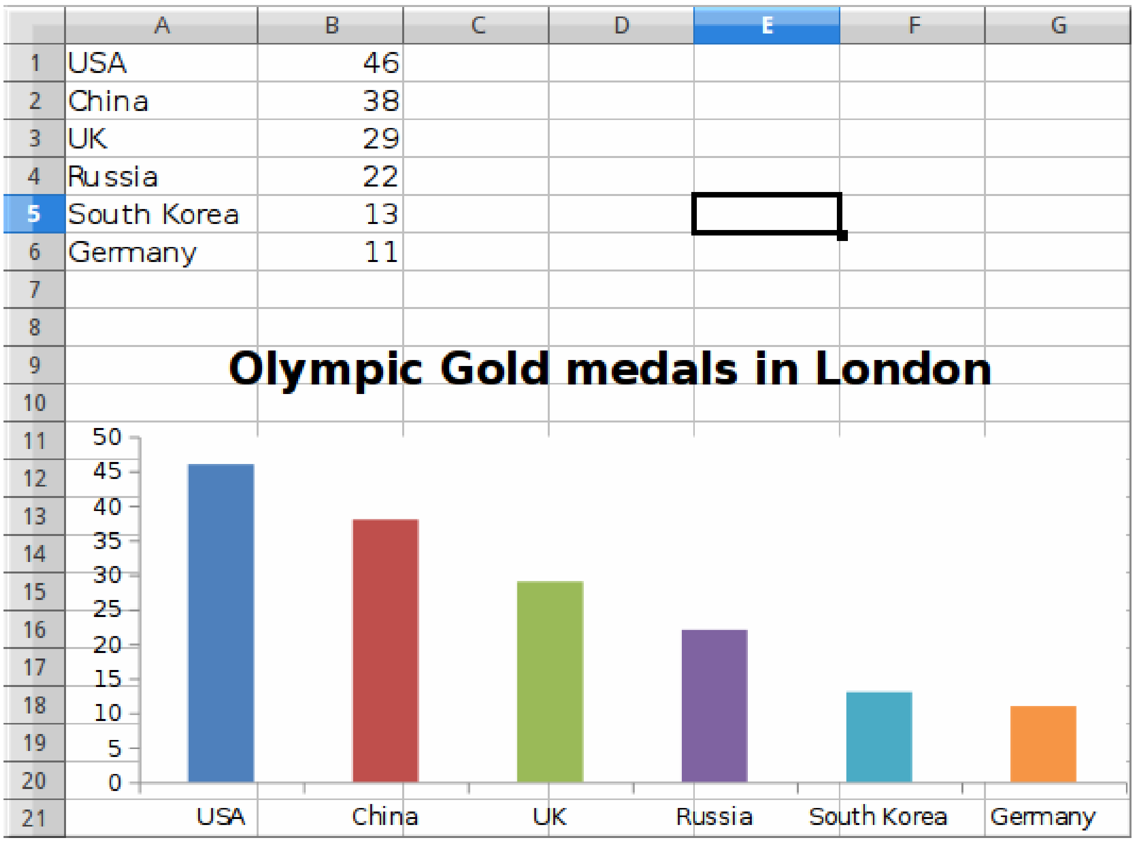
Setting `varyColors` to `True`, each bar has a different colour.

```
chart.title = "Olympic Gold medals in London"
```

A title is set for the chart.

```
sheet.add_chart(chart, "A8")
```

The created chart is added to the sheet with the `add_chart()` method.



	A	B	C	D	E	F	G
1	USA	46					
2	China	38					
3	UK	29					
4	Russia	22					
5	South Korea	13					
6	Germany	11					

Figure: Bar chart

In this tutorial, we have worked with the openpyxl library. We have read data from an Excel file, writter data to an Excel file.

You might also be interested in the following related tutorials: Python tutorial, Python CSV tutorial, Python simplejson tutorial, PyMongo tutorial, Python requests tutorial, and Python list comprehension

Home Top of Page