Week 6: Libraries

Unit 1: What Are Libraries?

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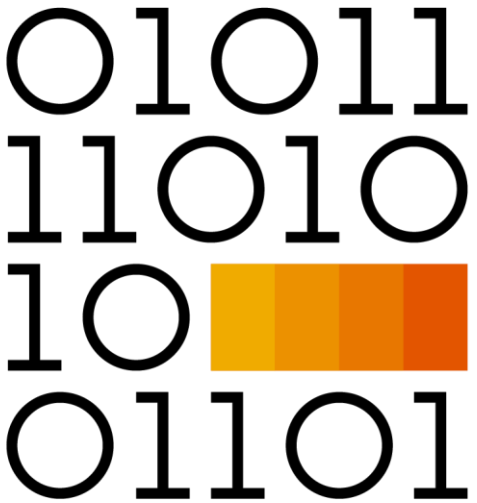
What are libraries?

Libraries enable structuring and reusability of code on a large scale

- Large programs become confusing and hard to read
- Copying and pasting code to a new project leads to duplication of code snippets
  - Maintaining code (different versions) becomes very difficult
- Modularization makes software cleaner and more reusable
- Many Python libraries and many functions are part of the Python standard library



What are libraries?
Showtime

Now it’s time to get hands on and start programming!

If you like, you can open the Jupyter Notebook instructions in parallel to the demo.

If you haven’t done so yet:

- Download the Notebook
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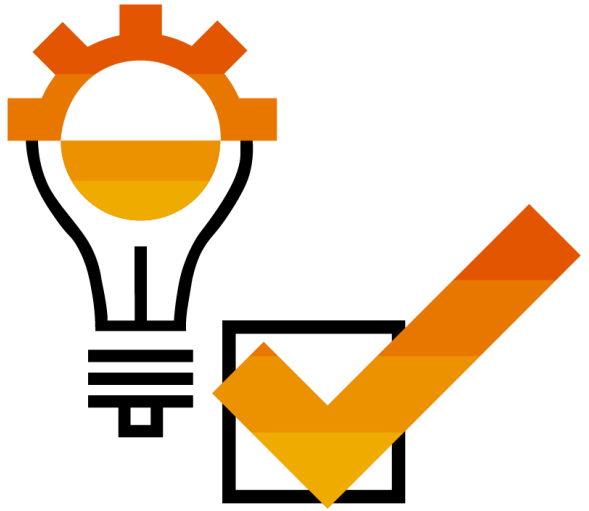
Summary / key takeaways

In this unit you learned ...

- … why libraries are essential to develop software on a large scale



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Unit 2: Importing Libraries

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Importing libraries

Libraries must be imported before they can be used

- You need to *import* libraries before using the functions they contain.
  - It is possible to import complete libraries
  - It is possible to import only required functions
- You can define aliases for *namespaces*
  - Shorten the function calls
  - Avoid naming conflicts

```
import requests

import matplotlib.pyplot as plt
import numpy as np

from bs4 import BeautifulSoup
from tkinter import *
```

Importing libraries
Showtime

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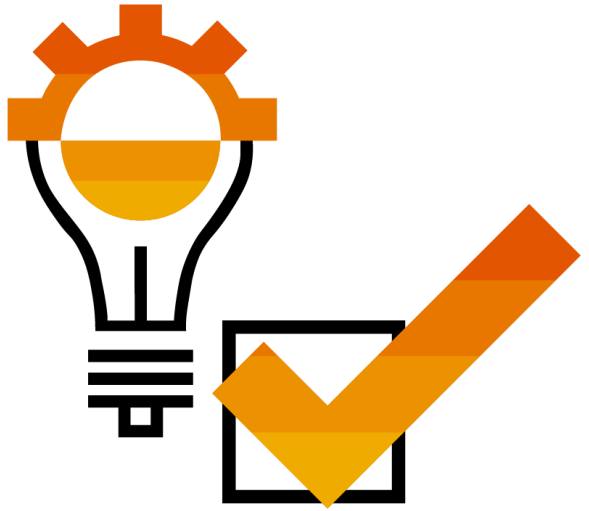
Summary / key takeaways

In this unit you learned ...

- … how to import libraries into your program
- … how to avoid naming conflicts using namespaces



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Unit 3: Math and Statistics Libraries

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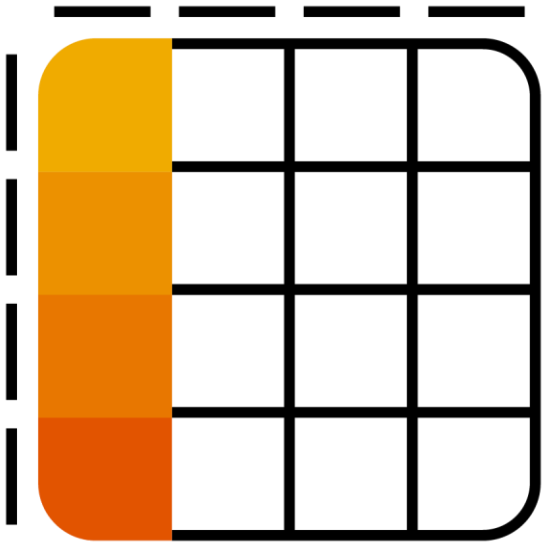
The math and statistics libraries offer lots of mathematical functions

- Historically, computing focused on mathematical calculations
  - Actually, the word *compute* is just a synonym for *calculate*
- It is therefore no surprise that there are lots of libraries supporting mathematical operations
- Three basic libraries in this context are *math*, *random*, and *statistics*
- Read the documentation of the *math*, *random*, and *statistics* libraries
- Try to solve the exercises on your own



Math and statistics libraries
Showtime

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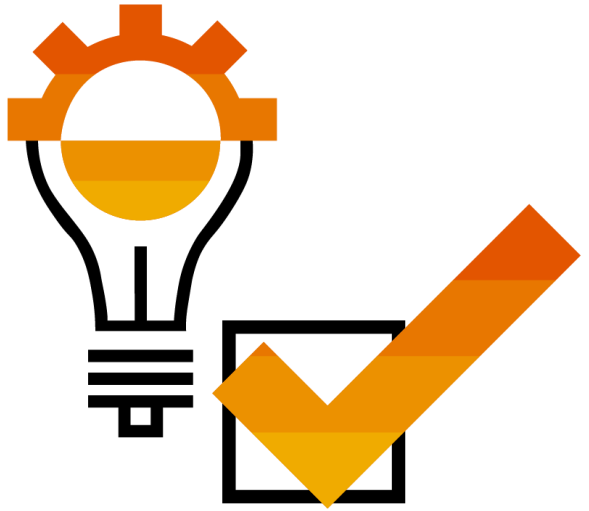
Summary / key takeaways

In this unit you learned ...

- … about the documentation for some basic libraries
- … how to import these libraries into your program
- … how to use functions from these libraries in your own code



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Unit 4: Other Standard Libraries

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Other standard libraries

There is more than pure math

To get a glimpse of the variety of other libraries…

- The **calendar** library offers functions to work with dates
  - Check weekday of specific date
  - Print out text calendars in the terminal
  - Check for leap year
- The **csv** library simplifies the handling of csv files
  - Read *.csv* file content
  - Split lines
  - Create lists or dictionaries of imported csv
  - Export csv files

```
import calendar

print(calendar.weekday(2022, 3, 1))
```

```
import csv

with open("students_excel.csv", "r") as f:
    reader = csv.reader(f)
    for row in reader:
        print(row)
```

Other standard libraries
Showtime

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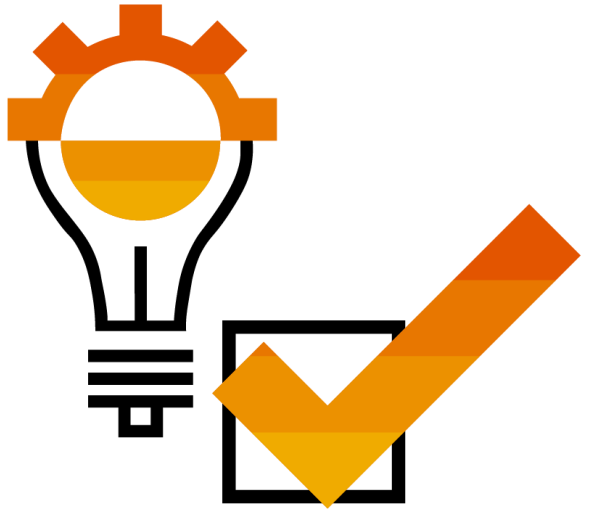
Summary / key takeaways

In this unit you learned ...

- … that there are libraries other than mathematical ones. Actually, there is much more!
- … some general facts about the libraries *calendar* and *csv*



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Week 6: Libraries

Unit 5: Installing Additional Libraries

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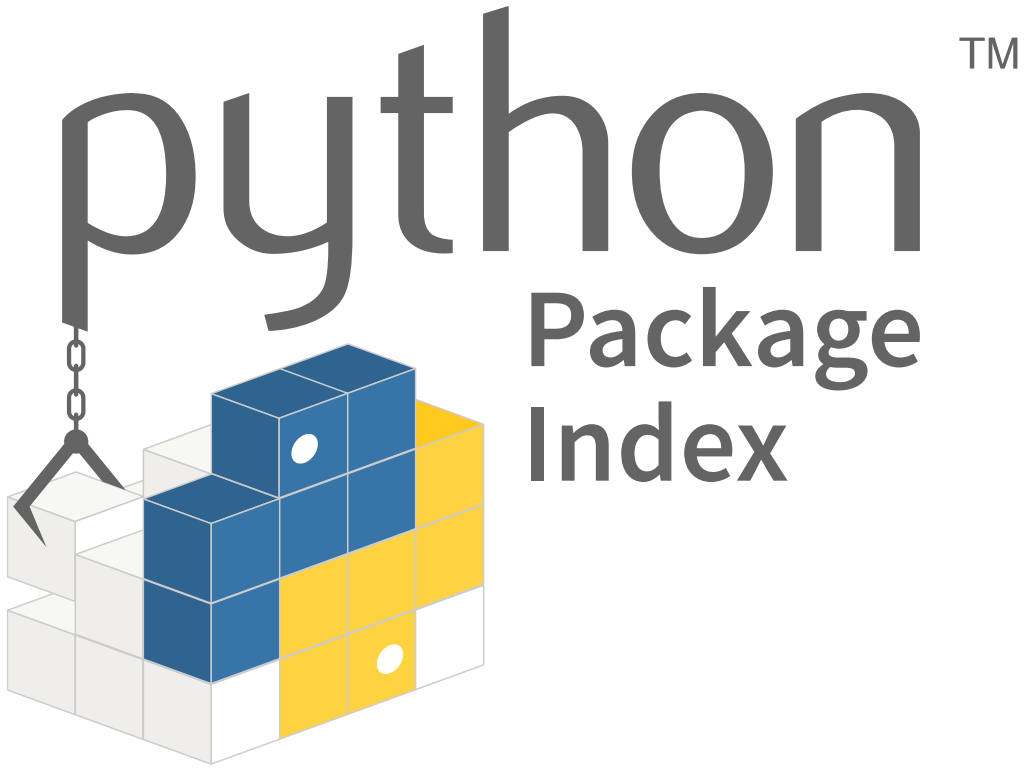
Installing additional libraries

There are many more libraries in addition to the standard ones

- There are a large number of additional libraries available in the Python world.
  - Probably more than 100,000 libraries available
- When installing Python on your computer, only the standard libraries are installed.
- How to find and install the other libraries?
  - Google
  - pypi.org, the *Python Package Index (PyPI),* is the main repository for other libraries.
- Before importing a non-standard library, it must first be installed on your computer.
  - This is done using the program *pip*



Installing additional libraries
Showtime

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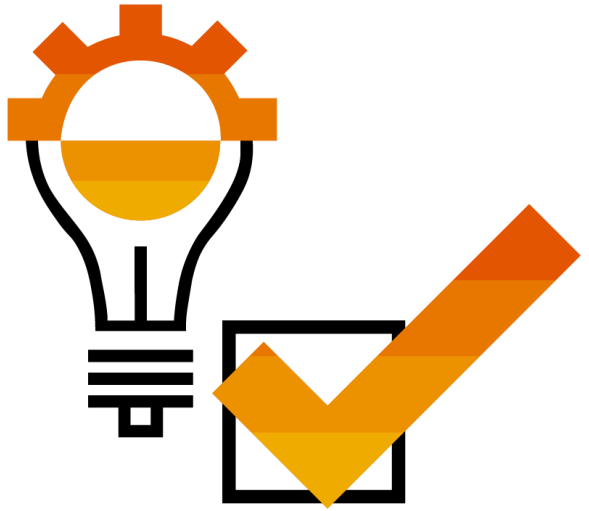
Summary / key takeaways

In this unit you learned ...

- … where to find non-standard libraries
- … about pypi.org
- … that you can install additional libraries on your computer using pip



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Week 6: Libraries

Unit 6: Examples of Non-Standard Libraries

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Examples of non-standard libraries

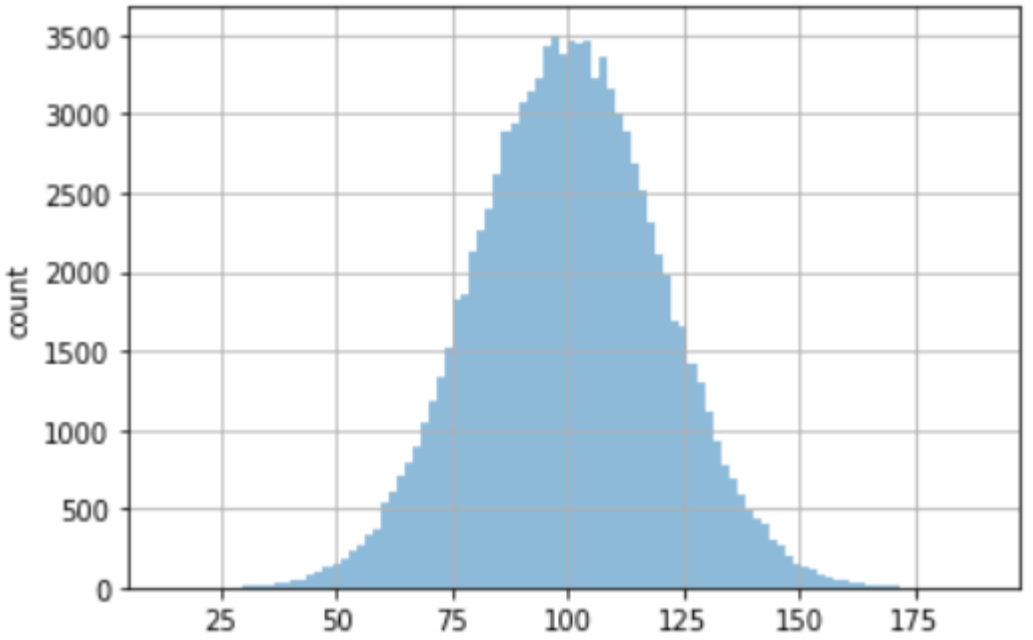
To give you a small taste of the world of Python

In this unit we will show some popular libraries.

- Of course, we cannot go into these libraries in detail.
- Some of the libraries would justify a whole course of their own.

Some popular Python libraries:

- requests – communicate with web servers
- BeautifulSoup – parse and analyze web pages
- tkinter – create GUIs
- Pandas – analyze data
- Matplotlib – plot charts, graphs



Examples of non-standard libraries
Showtime

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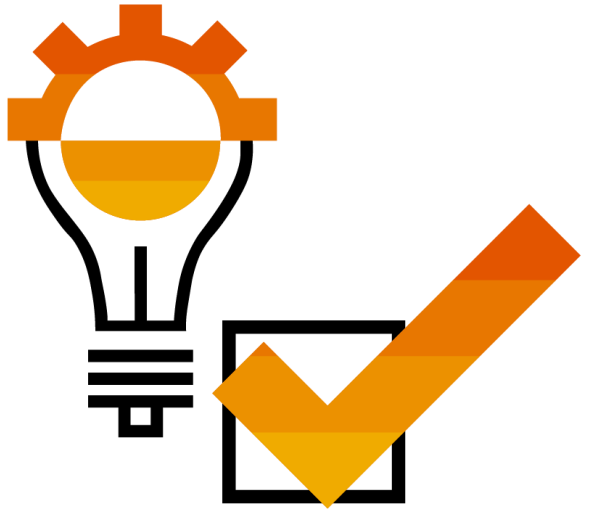
Summary / key takeaways

In this unit you learned ...

- … some basics about really powerful libraries
- … that there are thousands of possibilities to explore
- … about the (nearly) infinite world of Python



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