Media Computing Project
Python and Fusion 360 API

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Python

BASICS

Example:

```python
def walkthroughtram(l, dir):
    if type(l) is str:
        padding_length = len(l) - value + 1
        pad = " "
    else:
        padding_length = 0
        pad = "\n"
    return strvalue + pad

for child in dir:
    if child in active_design:
        print(child)
```

```
active_design = 
```

```python

# Get all components in the root component of the active design
root = active_design.rootComponent
```

```python
When developing a software application, it's important to keep your code organized and readable. This can be achieved by following the principles of good software design and adhering to best practices.

For example, in Python, you can use functions to break down complex tasks into smaller, more manageable pieces. This not only makes your code easier to understand and maintain, but it also helps to ensure that your application is scalable and maintainable.

In this example, we have a function called `walkthroughtram` that takes a parameter `l` and a direction `dir`. Depending on the type of `l`, we calculate the padding length and pad the `strvalue` accordingly.

We then iterate over the `dir` and print each component if it is part of the active design.

```
```
Basics

- Introduced in 1991
- Made for beginners
  - Easy to read (resembles English)
  - Simple syntax
- Interpreted language
- Large community
  - Many libraries / modules
Basics

• Indent-based coding
  • Code blocks are created by evenly indenting

• Case sensitive
  • True \neq true
  • \texttt{do} \_\texttt{something}() \neq \texttt{Do} \_\texttt{something}()

• Python 2.X and 3.X are incompatible
Variables

- Type is not defined in the code and can change during runtime

```python
x = 3
x = 3.7
x = "3"
x = True (not true as python is case sensitive)
```
If Statements

```python
if condition1 and condition2:
    do_something()

if condition1 or condition2:
    do_something()

if not condition1:
    do_something()

if condition1:
    do_something()

elif condition2:
    do_something_different()

else:
    do_something_else()
```
nothing = []  # empty list

names = ["Adrian", "Oliver", "Marcel", "Anke"]

names[1]  # -> "Oliver"

names[0:2]  # -> ["Adrian", "Oliver"]

names[1:]  # -> ["Oliver", "Marcel", "Anke"]

names[-1]  # -> "Anke"
names = ["Adrian", "Oliver", "Marcel", "Anke"]

for name in names:
    print(name)

for index in range(len(names)):
    print(names[index])

index = 0
while index < len(names):
    print(names[index])
    index += 1
Try-Except

• Keeps your code alive if something unexpected happens

```python
try:
    some_dangerous_code()
except ValueError:
    some_error_handling()
else:
    no_errors_occurred()
finally:
    do_some_cleanup()
```

• Optional: ValueError, else & finally
def longest_name(names):
    if len(names) < 1:
        return ""

    result = ""
    for name in names:
        if len(name) > len(result):
            result = name

    return result

def my_function(*args, **kwargs):
    for arg in args:
        print(arg)
        print("kwargs: ", kwargs)

my_function("MCP", "Python", arg1="Fusion", arg2="Duck")
# MCP
# Python
# kwargs: {'arg1': 'Fusion', 'arg2': 'Duck'}
Standard Library

• Usually distributed with python

• Contains many modules
  
    • Can be included using `import`

• Documentation:
  
    • [https://docs.python.org/3.7/library/index.html](https://docs.python.org/3.7/library/index.html)
Built-in Functions

- Functions which are always available
- Casting
  - int(), float(), str(), …
- Checking types
  - type(), isinstance(), …
- …
Imports

- Include other modules and packages
- Can be renamed locally
- Examples:

```python
import math
import numpy as np
from Modules import MyFile
```
Guidelines

- Documentation:
  - https://www.python.org/dev/peps/pep-0008/
Guidelines

“Always code as if the guy who ends up maintaining your code will be a violent psychopath who knows where you live”

- John Woods
SOFTWARE

Fusion 360 API
Python within Fusion 360

• Fusion has python included

• Currently version 3.7.6
  • NOT 3.9.0
API - Good to Know

• Lengths are usually in cm

• Angles are usually in radians

• Use try-except blocks to see possible error messages

• Try to avoid modules which are not pure python

• Always pay attention on case sensitive problems
  • The API contains some in their documentation as well
VS Code

- Used to code and debug
- Print commands are displayed here
IN-CLASS EXERCISE

Fusion 360 API User’s Manual
In-Class Exercise

Exercise

Follow the Fusion 360 API User’s Manual

Create this circle
ASSIGNMENT

Tasks for next week
Tasks for next week

• Modify the script to create a random number of circles
  • 5 - 10 circles
  • The circle for the first revolve has $1/n \times 360$ degrees
    • The second circle has $2/n \times 360$ degrees
    • The last circle is complete with 360 degrees
• Optional:
  • Assign colours to the circles within your script
• Hint:
  • Profiles inside a sketch may not be sorted by creation order
Tasks for next week