# Principles of Software Programming: Structured and OOP paradigms

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# This Episode

- 13:00-15:45

- Structured programming in Python

  - Branching (if-else)

  - Iteration (for, while)

- Object Oriented Programming (OOP):

  - Classes

  - Objects

  - Methods

  - Inheritance

  - UML

# Programming paradigms

- **Structured** programming: all programs are seen as composed of control structures

- **Object-oriented** programming (OOP):
  - Java, C++, C#, **Python**

- **Functional** programming:
  - Clojure, Haskell

- **Logic** programming based on formal logic:
  - Prolog, Answer set programming (ASP), Datalog

# Control flow

- Algorithm - sequence of commands (computation steps)
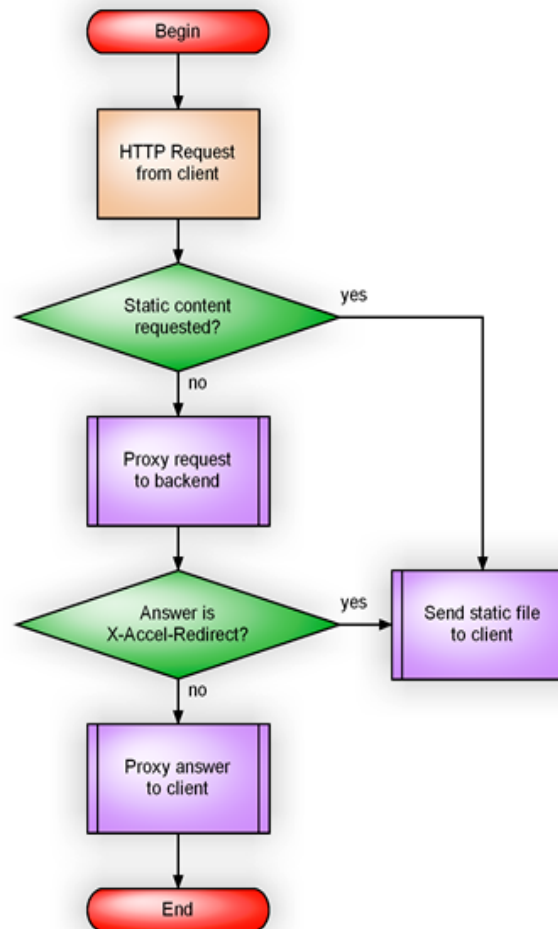
# Conditions

```python
x = input("What is the time?")
if x < 10:
 print "Good morning"
elif x<12:
 print "Soon time for lunch"
elif x<18:
  print "Good day"
elif x<22:
 print "Good evening"
else:
  print "Good night"
```

# Data Types

- **Boolean:** `True` and `False`

- Numeric Types — int, float, long

- String

# Operators

- **Comparison**: >, <, ==, !=, <>, >=, <=

- Arithmetic: +, -, *, /, %, **, //

- Assignment: =, +=, -=,*=,/=, %=, **=, //=

- **Logical**: and, or, not

# Warm up: Hello, World!

# Ex.1: ATM PIN



https://pixabay.com/en/atm-pin-number-field-withdraw-cash-1524869/

# Data Structure: List

# Data Structure: List



```
shopping_list = ['Milk', 'Apples',
'Eggs', 'Toilet rolls', 'Bananas',
'Bread']
```

http://www.bbc.co.uk/scotland/education/wwww/buildings/standard/shopping/?item=list

# List Slicing



```python
shopping_list = ['Milk', 'Apples',
'Eggs', 'Toilet rolls', 'Bananas',
'Bread']

shopping_list[1]
shopping_list[-1]
shopping_list[0:-1]
```

# List Functions



Shopping list
- Milk
- Apples
- Eggs
- Toilet rolls
- Bananas
- Bread

```python
shopping_list = ['Milk', 'Apples',
'Eggs', 'Toilet rolls', 'Bananas',
'Bread']

len(shopping_list)

'Milk' in shopping_list
```

# Warm up: Hello, World!

# Loops

```
>>> authors = ['William Shakespeare', 'Jane Austen', 'J.K. Rowling']
```

```
>>> i = 0
>>> while i < len(authors):
...     print authors[i]
...     i += 1
William Shakespeare
Jane Austen
J.K. Rowling
```

```
for x in shopping_list:
    print ("I need " + x)
```

# Create int list

```
>>> range(10)
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]


>>> range(5, 10)
[5, 6, 7, 8, 9]


>>> range(0, 10, 3)
[0, 3, 6, 9]
```

# Counting Loop

- **for** loop

for x in range(9):

    print 'The count is:', x

print "Good bye!"

- **while** loop

```
x = 0
while (x < 9):
    print 'The count is:', x
    x = x + 1
print "Good bye!"
```

http://www.tutorialspoint.com/python/python_while_loop.htm

https://wiki.python.org/moin/WhileLoop

https://wiki.python.org/moin/ForLoop

# Ex.1: ATM PIN



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# Ex.2: Hey-You

"Write a program that prints the numbers from 1 to 100. But for multiples of three print "Hey" instead of the number and for the multiples of five print "You". For numbers which are multiples of both three and five print "HeyYou"."

http://c2.com/cgi/wiki?FizzBuzzTest