NPRG065: Programming in Python
Lecture 11

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Special methods

- **`__setattr__(self, name, value)`**
  - called when an attribute assignment is attempted
- **`__getattr__(self, name)`**
  - called when the default attribute access fails with an AttributeError
    - if an attribute already has a value, __getattr__() is not used
- **`__delattr__(self, name)`**
  - like __setattr__() but for attribute deletion instead of assignment
- **`__dir__(self)`**
  - called when dir() is called on the object
    - a sequence must be returned

See attrs.py

Special methods

- `dir(object)`
  - if the object has a method named __dir__(), this method will be called
  - if the object does not provide __dir__(), the function tries to gather information from the object's __dict__ attribute, if defined, and from its type object
- `__dict__`
  - a dictionary used to store an object's attributes
  - created automatically

Special methods

- Why use __xxxattr__()
  - creating immutable objects (with __slots__)
  - lazy creation of attribute values
  - own property-like behavior but in a single method
  - creating attributes when setting values to other attributes
  - …

Special methods

- `__slots__`
  - a class variable that can be assigned a string, iterable, or sequence of strings with variable names used by instances
  - reserves space for the declared variables
  - prevents the automatic creation of __dict__
  - i.e., no other than declared variables can be created
  - plus – objects with slots are smaller and faster
    - there is no dynamic dict

See
slots.py

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Special methods

- **`__getattribute__(self, name)`**
  - called unconditionally to attribute accesses
    - default implementation locates value in __dict__ or __slots__
  - if the class also defines __getattr__(), the latter will not be called unless __getattribute__() either calls it explicitly or raises an AttributeError
  - to access other attributes from __getattribute__, call the base class method (to avoid recursion)
    - object.__getattribute__(self, name)
  - usages
    - preventing access to attributes
    - inventing new attributes (like with __getattr__ but without look for existing attributes)
  - rarely used

See attribute.py

Function decorators

```
@decorate
def function():
    pass
```

- decorator ~ a function modifying a function to create new function
  - code above is equivalent to

```
def function():
    pass
function = decorate( function )
```

See
fdecorators.py

Function decorators

- many predefined decorators
  - @property, @staticmethod
    - we already know them
  - functools module
    - many useful decorators (not only for defining other decorators)

Class decorators

- Similar to function decorators
- A function receiving a class object as an argument and returning a class object as a result

- Less commonly used than function decorators

See cdecorators.py