

**Lecture**

# **Public vs. Private**





Public vs. Private

# Restrict Access

Information-hiding





## Public vs. Private

### Public

- Can be accessed anywhere
- No access restriction

### Private (non-public)

- Can't (or shouldn't) be accessed outside the class
- Two levels of access restriction



## Public vs. Private

```
class Car:  
  
    def __init__(self, model, year):  
        self.model = model  
        self.year = year
```

Public instance attributes



## Public vs. Private

```
class Car:  
    def __init__(self, model, year):  
        self.model = model  
        self.year = year
```

Public instance attributes

```
>>> my_car = Car("Escape", 2006)  
>>> my_car.model  
'Escape'  
>>> my_car.year  
2006
```



## Public vs. Private

```
class Car:  
    def __init__(self, model, year):  
        self.model = model  
        self.year = year
```

Public instance attributes

```
>>> my_car = Car("Escape", 2006)  
>>> my_car.model ←  
'Escape'  
>>> my_car.year ←  
2006
```



## Public vs. Private

```
class Car:  
    def __init__(self, model, year):  
        self.model = model  
        self.year = year
```

Public instance attributes

```
>>> my_car = Car("Escape", 2006)  
>>> my_car.model  
'Escape'  
>>> my_car.year  
2006
```





## Public vs. Private

```
class Car:  
    def __init__(self, model, year):  
        self.model = model  
        self.year = year
```

Public instance attributes

```
>>> my_car.year = 5600  
>>> my_car.year  
5600
```





## Public vs. Private

```
class Car:  
    def __init__(self, model, year):  
        self.model = model  
        self.year = year
```

Public instance attributes

```
>>> my_car.year = 5600  
>>> my_car.year  
5600
```





## Public vs. Private

```
class Car:  
    def __init__(self, model, year):  
        self.model = model  
        self.year = year
```

Public instance attributes

```
>>> my_car.year = 5600  
>>> my_car.year  
5600
```



### Risk of Public Attributes



## Public vs. Private

**Non-Public**

**By Convention**  
(Protected)



**<attribute>**

**Functionally**  
(Private)



**<attribute>**

**Name Mangling**





## Public vs. Private

**Non-Public**

**By Convention**  
(Protected)



**<attribute>**

**Functionally**  
(Private)



**<attribute>**

Name Mangling

Only for special cases





## Public vs. Private

### Method Names and Instance Variables

Use the function naming rules: lowercase with words separated by underscores as necessary to improve readability.

Use one leading underscore only for non-public methods and instance variables.

To avoid name clashes with subclasses, use two leading underscores to invoke Python's name mangling rules.

Python mangles these names with the class name: if class `Foo` has an attribute named `__a`, it cannot be accessed by `Foo.__a`. (An insistent user could still gain access by calling `Foo._Foo__a`.) Generally, double leading underscores should be used only to avoid name conflicts with attributes in classes designed to be subclassed.

Note: there is some controversy about the use of `__names` (see below).



PEP 8



## Public vs. Private

```
class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
        self.model = model
        self.year = year
        self._id_num = id_num
        self.__engine_serial_num = engine_serial_num
```

**Non-Public Attributes**



## Public vs. Private

```
class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
        self.model = model
        self.year = year
        self._id_num = id_num
        self.__engine_serial_num = engine_serial_num
```

**Non-Public Attributes**



## Public vs. Private

```
class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
        self.model = model
        self.year = year
        self.id_num = id_num
        self.__engine_serial_num = engine_serial_num
```

**Non-Public Attributes**





## Public vs. Private

```
>>> class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
        self.model = model
        self.year = year
        self._id_num = id_num
        self.__engine_serial_num = engine_serial_num

>>> my_car = Car("Escape", 2006, "44542", "201109048934242")
>>> my_car.__engine_serial_num
Traceback (most recent call last):
  File "<pyshell#3>", line 1, in <module>
    my_car.__engine_serial_num
AttributeError: 'Car' object has no attribute '__engine_serial_num'
```





## Public vs. Private

```
>>> class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
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## Public vs. Private

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>>> class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
        self.model = model
        self.year = year
        self._id_num = id_num
        self.__engine_serial_num = engine_serial_num
```

```
>>> my_car = Car("Escape", 2006, "44542", "201109048934242")
>>> my_car._engine_serial_num
```

```
Traceback (most recent call last):
  File "<pyshell#3>", line 1, in <module>
    my_car._engine_serial_num
AttributeError: 'Car' object has no attribute '__engine_serial_num'
```





Public vs. Private

# Non-Public?



## Public vs. Private

We don't use the term "private" here, since no attribute is really private in Python



## Public vs. Private

```
>>> class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
        self.model = model
        self.year = year
        self._id_num = id_num
        self.__engine_serial_num = engine_serial_num

>>> my_car = Car("Escape", 2006, "44542", "201109048934242")
>>> my_car._id_num
'44542'
>>> my_car._Car__engine_serial_num
'201109048934242'
```



## Public vs. Private

```
>>> class Car:

    def __init__(self, model, year, id_num, engine_serial_num):
        self.model = model
        self.year = year
        self._id_num = id_num
        self.__engine_serial_num = engine_serial_num

>>> my_car = Car("Escape", 2006, "44542", "201109048934242")
>>> my_car._id_num
'44542'
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## Public vs. Private

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>>> class Car:

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>>> my_car = Car("Escape", 2006, "44542", "201109048934242")
>>> my_car._id_num
'44542'
>>> my_car._Car__engine_serial_num
'201109048934242'
```





## Public vs. Private

**You can still  
access them (technically),  
but you shouldn't**



## Public vs. Private



# Access Modifiers

```
public String model;  
public int year;  
protected String idNum;  
private String EngineSerialNum;
```



## Public vs. Private



# Access Modifiers

```
public String model;  
public int year;  
protected String idNum;  
private String EngineSerialNum;
```



## Public vs. Private



# Access Modifiers

```
public String model;  
public int year;  
protected String idNum;  
private String EngineSerialNum;
```





## Public vs. Private

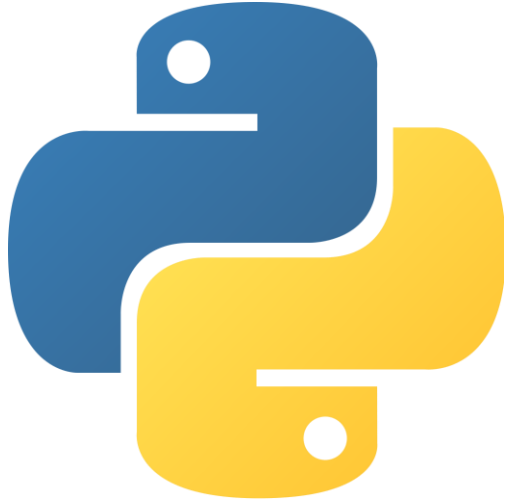


# Access Modifiers

```
public String model;  
public int year;  
protected String idNum;  
private String EngineSerialNum;
```



Public vs. Private



# No Access Modifiers



Public vs. Private



# No Access Modifiers

Conventions



## Public vs. Private

**<elem>**



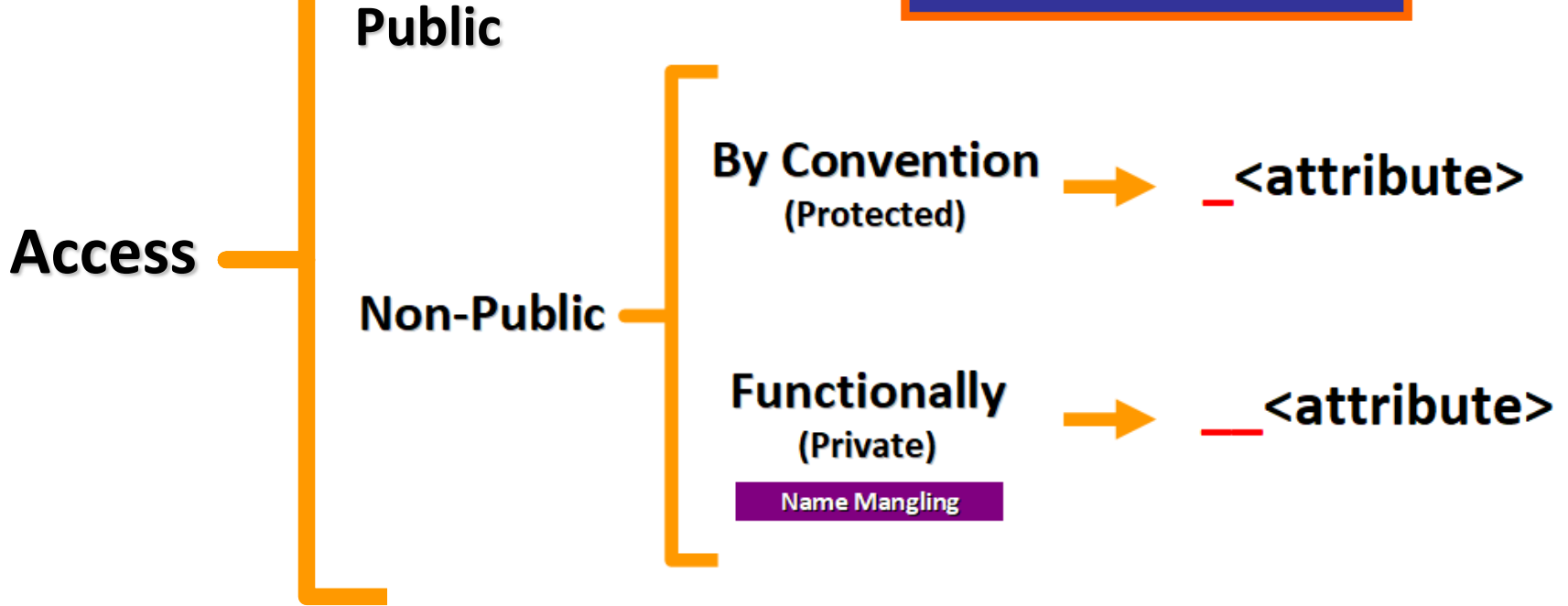
**Not imported**

**from <module> import \***





## Public vs. Private



## Encapsulation





## Now... An Example

