

replacing `import`
with `accio`

a dive into python internals

muggle python

```
>>> import random
```

```
>>> random.random( )
```

```
0.18660693012691754
```

```
>>> accio random
```

```
File "<stdin>", line 1
```

```
    accio random
```

```
        ^
```

```
SyntaxError: invalid syntax
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nagini


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>>> accio random      # no error
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File "<stdin>", line 1
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import random
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```
^
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```
SyntaxError: invalid syntax
```

__builtins__
import
Grammar
bootstrapping

__builtins__

import

Grammar

bootstrapping

```
>>> __builtins__
```

```
<module '__builtin__' (built-in)>
```

```
>>> dir(__builtins__)
```

```
['ArithmeticError', ..., '__import__',  
..., 'float', ..., 'zip']
```



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>>> __builtins__
```

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<module '__builtin__' (built-in)>
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```
<module '___builtin___' (built-in)>
```

```
>>> dir(__builtins__)
```

```
['ArithmeticError', ..., '__import__',  
..., 'float', ..., 'zip']
```

we can shadow
builtins!

```
>>> float(3)
```

```
3.0
```

```
>>> wingardium_leviosa =  
__builtins__.float
```

```
>>> wingardium_leviosa(3)
```

```
3.0
```

```
>>> float(3)
```

```
3.0
```

```
>>> wingardium_leviosa =  
__builtins__.float
```

```
>>> wingardium_leviosa(3)
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>>> float(3)
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>>> wingardium_leviosa =  
__builtins__.float
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```
>>> wingardium_leviosa(3)
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```
3.0
```



```
>>> float(3)
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```
3.0
```

```
>>> wingardium_leviosa =  
__builtins__.float
```

```
>>> wingardium_leviosa(3)
```

```
3.0
```

we can delete
builtins!

```
>>> del __builtins__.float
```

```
>>> float(3)
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'float' is not  
defined
```

```
>>> wingardium_leviosa(3)
```

```
3.0
```

```
>>> del __builtins__.float
```

```
>>> float(3)
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'float' is not  
defined
```

```
>>> wingardium_leviosa(3)
```

```
3.0
```

```
>>> del __builtins__.float
```

```
>>> float(3)
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'float' is not  
defined
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```
>>> wingardium_leviosa(3)
```

```
3.0
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```
>>> del __builtins__.float
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```
>>> float(3)
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```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'float' is not  
defined
```

```
>>> wingardium_leviosa(3)
```

```
3.0
```

```
>>> del __builtins__.float
```

```
>>> float(3)
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'float' is not  
defined
```

```
>>> wingardium_leviosa(3)
```

```
3.0
```

`__builtins__`

`import`

Grammar

bootstrapping

can we shadow
import?

```
>>> accio = import
```

```
File "<stdin>", line 1
```

```
    accio = import
```

```
        ^
```

```
SyntaxError: invalid syntax
```

```
>>> accio = import
```

```
File "<stdin>", line 1
```

```
    accio = import
```

```
        ^
```

```
SyntaxError: invalid syntax
```

: (

can we delete
import?

```
>>> del import
```

```
File "<stdin>", line 1
```

```
del = import
```

```
^
```

```
SyntaxError: invalid syntax
```

```
>>> del import
```

```
File "<stdin>", line 1
```

```
del = import
```

```
^
```

```
SyntaxError: invalid syntax
```

: (

`__import__`

```
>>> dir(__builtins__)
```

```
['ArithmeticError', ..., '__import__',  
..., 'float', ..., 'zip']
```

```
>>> __builtins__.__import__
```

```
<built-in function __import__>
```

```
>>> dir(__builtins__)  
[ 'ArithmeticError', ..., '__import__',  
..., 'float', ..., 'zip' ]
```

```
>>> __builtins__.__import__  
<built-in function __import__>
```

```
>>> dir(__builtins__)  
[ 'ArithmeticError', ..., '__import__',  
..., 'float', ..., 'zip' ]
```

```
>>> __builtins__.__import__  
<built-in function __import__>
```

```
>>> dir(__builtins__)  
[ 'ArithmeticError', ..., '__import__',  
..., 'float', ..., 'zip' ]
```

```
>>> __builtins__.__import__  
<built-in function __import__>
```

```
>>> __builtins__.__import__(random)
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'random' is not  
defined
```

```
>>> __builtins__.__import__('random')
```

```
<module 'random' from '/usr/local/.../  
random.pyc'>
```

```
>>> __builtins__.__import__(random)
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'random' is not  
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```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
NameError: name 'random' is not  
defined
```

```
>>> __builtins__.__import__('random')
```

```
<module 'random' from '/usr/local/.../  
random.pyc'>
```

```
>>> random =  
__builtins__.__import__( 'random' )
```

```
>>> random.random( )  
0.05857571707711129
```

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>>> random =  
__builtins__.__import__( 'random' )
```

```
>>> random.random( )
```

```
0.05857571707711129
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__builtins__.__import__( 'random' )
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```
>>> random.random( )  
0.05857571707711129
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can we shadow
__import__?

```
>>> accio = __builtins__.__import__
```

```
>>> random = accio( 'random' )
```

```
>>> random.random( )
```

```
0.8735934644377295
```

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>>> accio = __builtins__.__import__
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can we delete
__import__?

```
>>> del __builtins__.__import__
```

```
>>> random = accio('random')
```

```
Traceback (most recent call last):
```

```
File "<stdin>", line 1, in <module>
```

```
File "/usr/local/.../random.py", line  
42, in <module>
```

```
    from __future__ import division
```

```
ImportError: __import__ not found
```

```
>>> del __builtins__.__import__
```

```
>>> random = accio('random')
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
  File "/usr/local/.../random.py", line  
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    from __future__ import division
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```
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```
>>> random = accio('random')
```

```
Traceback (most recent call last):
```

```
  File "<stdin>", line 1, in <module>
```

```
  File "/usr/local/.../random.py", line  
42, in <module>
```

```
    from __future__ import division
```

```
ImportError: __import__ not found
```

`import x` is a
statement

`__builtins__`

`import`

Grammar

`bootstrapping`

clone cpython!


```
$ ls -d cpython/*/
```

```
Doc/           Objects/
```

```
Grammar/       PC/
```

```
Include/       PCbuild/
```

```
Lib/           Parser/
```

```
Mac/           Python/
```

```
Misc/          Tools/
```

```
Modules/
```

```
$ ls -d cpython/*/
```

Doc/	Objects/
------	----------

Grammar/	PC/
----------	-----

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----------	----------

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------	---------

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------	---------

Misc/	Tools/
-------	--------

Modules/	
----------	--

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```
Doc/           Objects/
```

```
Grammar/      PC/
```

```
Include/       PCbuild/
```

```
Lib/           Parser/
```

```
Mac/           Python/
```

```
Misc/          Tools/
```

```
Modules/
```

`import_stmt: import_name |`

`import_from`

`import_name: 'import' dotted_as_names`

`import_from: ('from' ('.' *`

`dotted_name | '.' +) 'import' ('*'`

`| '(' import_as_names ') ' |`

`import_as_names))`

import_stmt: import_name |

import_from

import_name: 'import' dotted_as_names

import_from: ('from' ('.' *

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| '(' import_as_names ')' |

import_as_names))

```
import_stmt: import_name |  
            import_from  
import_name: 'import' dotted_as_names  
import_from: ('from' ('.'*  
                    dotted_name | '.'+)'import' ('*' |  
                    '(' import_as_names ')') |  
                    import_as_names))
```

`import_name:`

```
import matplotlib.pyplot as plt
```

`import_from:`

```
from matplotlib import pyplot as plt
```

`import_name:`

```
import matplotlib.pyplot as plt
```

`import_from:`

```
from matplotlib import pyplot as plt
```



```
import_stmt: import_name |  
            import_from  
import_name: 'import' dotted_as_names  
import_from: ('from' ( '.' *  
                    dotted_name | '.' + ) 'import' ( '*'  
                    | '(' import_as_names ')' |  
                    import_as_names ) )
```

```
import_stmt: import_name |  
            import_from  
import_name: 'accio' dotted_as_names  
import_from: ('from' ( '.' *  
                    dotted_name | '.' + ) 'accio' ( '*'  
                    | '(' import_as_names ')' ) |  
                    import_as_names ) )
```

```
$ make
```

```
Traceback (most recent call last):
```

```
...
```

```
File ".../cpython/Lib/sysconfig.py",  
line 4
```

```
    import sys
```

```
        ^
```

```
SyntaxError: invalid syntax
```

```
$ make
```

```
Traceback (most recent call last):
```

```
...
```

```
File ".../cpython/Lib/sysconfig.py",  
line 4
```

```
    import sys
```

```
        ^
```

```
SyntaxError: invalid syntax
```

half of cpython is
written in python!

```
$ (script that replaces `import` with  
`accio` in all .py files)
```

```
$ make
```

```
Traceback (most recent call last):
```

```
...
```

```
    accio sys
```

```
        ^
```

```
SyntaxError: invalid syntax
```

```
$ (script that replaces `import` with  
`accio` in all .py cpython files)
```

```
$ make
```

```
Traceback (most recent call last):
```

```
...
```

```
    accio sys
```

```
        ^
```

```
SyntaxError: invalid syntax
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```
$ (script that replaces `import` with  
`accio` in all .py cpython files)
```

```
$ make
```

```
Traceback (most recent call last):
```

```
...
```

```
    accio sys
```

```
        ^
```

```
SyntaxError: invalid syntax
```


wat!

__builtins__

import

Grammar

bootstrapping

```
import_stmt: import_name |  
            import_from  
import_name: 'import' dotted_as_names  
import_from: ('from' ('.'*  
                    dotted_name | '.'+)'import' ('*' |  
                    '(' import_as_names ')') |  
                    import_as_names))
```

import_stmt: import_name |

import_from

import_name: **'import'** dotted_as_names

import_from: ('from' ('.' *

dotted_name | '.' +) 'import' ('*'

| '(' import_as_names ') ' |

import_as_names))

```
import_name: 'import' dotted_as_names  
            | 'accio' dotted_as_names
```

```
import_name: 'import' dotted_as_names  
            | 'accio' dotted_as_names
```

```
$ make
```

```
$ ./python
```

```
>>> accio random      # no errors!
```

```
>>> import sys        # no errors :(
```

```
$ make
```

```
$ ./python
```

```
>>> accio random      # no errors!
```

```
>>> import sys        # no errors :(
```



```
$ make
```

```
$ ./python
```

```
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```

```
>>> import sys        # no errors :(
```

```
$ make
```

```
$ ./python
```

```
>>> accio random      # no errors!
```

```
>>> import sys        # no errors :(
```

yo dawg I heard
you like pythons

fin