

Introduction to Cython - Week 3

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Outline

1 Cython as a Module

2 Using C Libraries

Exercise

`sum_nums.pyx`

Exercise

sum_nums.pyx

```
1 cdef unsigned long long sum_nums(unsigned long n):  
2     cdef unsigned long long s = 0  
3     cdef unsigned long i  
4     for i in range(1, n+1):  
5         s += i  
6     return s
```

run_sum_nums.py

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```
1 import sum_nums as sn
2
3 print(sn.sum_nums(10))
```

run_sum_nums.py

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1 import sum_nums as sn
2
3 print(sn.sum_nums(10))
```

```
python setup.py build_ext -inplace
python run_sum_nums.py
```

run_sum_nums.py

```
1 import sum_nums as sn
2
3 print(sn.sum_nums(10))
```

python setup.py build_ext -inplace

python run_sum_nums.py

>> AttributeError: 'module' object has no attribute 'sum_nums'

The Fix

sum_nums.pyx

```
1 def sum_nums_wrapper(n):  
2     return sum_nums(int(n))
```

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```
1 def sum_nums_wrapper(n):  
2     return sum_nums(int(n))
```

run_sum_nums.py

```
1 import sum_nums as sn  
2  
3 print(sn.sum_nums_wrapper(10))
```

Testing The Fix

```
python setup.py build_ext -inplace  
python run_sum_nums.py
```

Testing The Fix

```
python setup.py build_ext -inplace  
python run_sum_nums.py  
>> 55
```

The Sugar

sum_nums.pyx

```
1  cpdef unsigned long long sum_nums(unsigned long n):
2      cdef unsigned long long s = 0
3      cdef unsigned long i
4      for i in range(1, n+1):
5          s += i
6      return s
```

Using The Sugar

run_sum_nums.py

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python setup.py build_ext -inplace
python run_sum_nums.py
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Using The Sugar

run_sum_nums.py

```
1 import sum_nums as sn
2
3 print(sn.sum_nums(10))
```

```
python setup.py build_ext -inplace
python run_sum_nums.py
>> 55
```


Exercise

sum_logs.pyx

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sum_logs.pyx

```
1 import math
2
3 cpdef double log_loop(double n, unsigned long iters):
4     cdef unsigned long i
5     cdef double s = 0
6     for i in range(iters):
7         s += math.log(n)
8
9     return s
```

Running sum_logs.pyx

setup.py

```
1 from distutils.core import setup
2 from Cython.Build import cythonize
3
4 setup(
5     ext_modules=cythonize('*.pyx'),
6 )
```

Running sum_logs.pyx

setup.py

```
1 from distutils.core import setup
2 from Cython.Build import cythonize
3
4 setup(
5     ext_modules=cythonize('*.pyx'),
6 )
```

```
python setup.py build_ext -inplace
python run_sum_logs.py
```

Log Loops

clog.pyx

```
1  cdef extern from "math.h":  
2      float log(float n)  
3  
4  cpdef double log_loop(double n, unsigned long iters):  
5      cdef unsigned long i  
6      cdef double s = 0  
7      for i in range(iters):  
8          s += log(n)  
9  
10     return s
```

Speed Test

run_log_loops.py (Summarized)

```
1 import clog
2 print(clog.log_loop(100,000,000, 10,000,000))
3
4 import pylog
5 print(pylog.log_loop(100,000,000, 10,000,000))
```

Speed Test

run_log_loops.py (Summarized)

```
1 import clog
2 print(clog.log_loop(100,000,000, 10,000,000))
3
4 import pylog
5 print(pylog.log_loop(100,000,000, 10,000,000))
```

clog: 184,206,807.418

clog took: 0.77s

pylog: 184,206,807.418

pylog took: 8.05s