

# unPython

Compiling Python numerical programs to C

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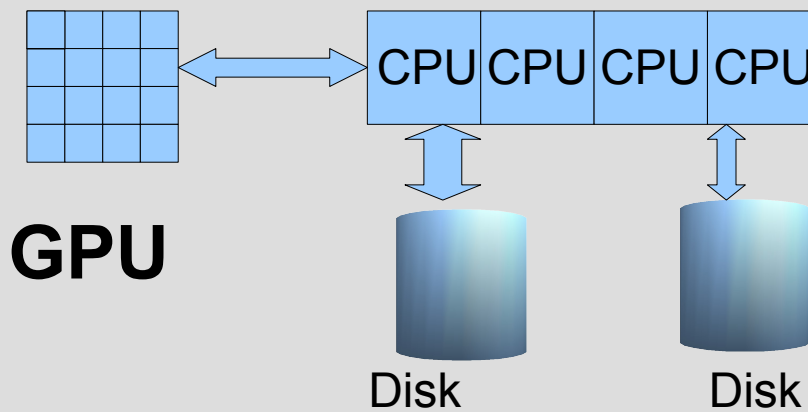
NumPy

Python

# Holy Grail Problem

?

## Multicores



# Parallel Annotations

NumPy

Python

unPython

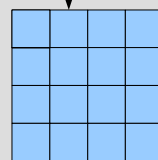
## My Dream Project

OpenMP + C

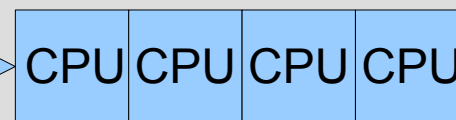
GPU Code

C compiler

Multicore CPU

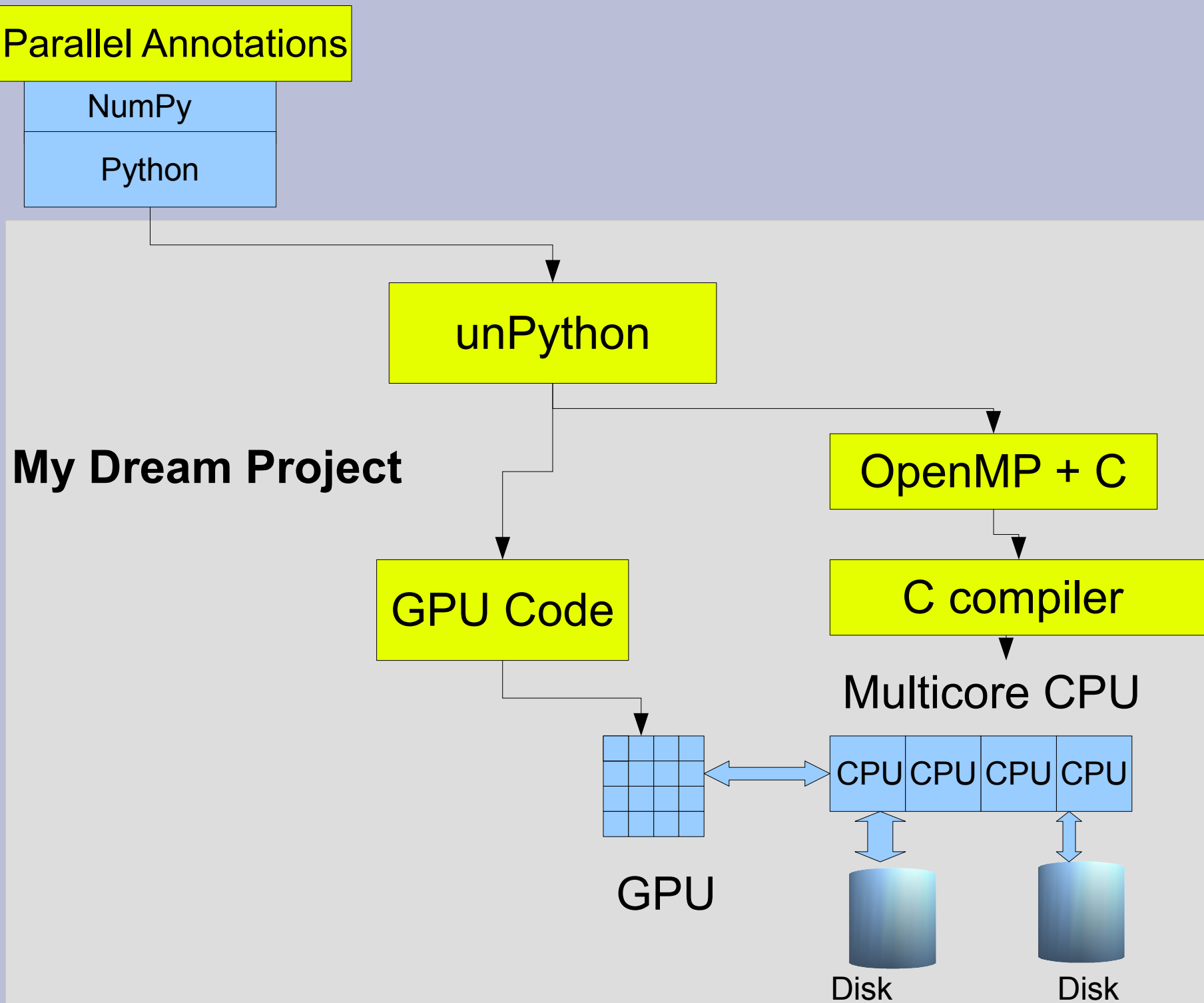


GPU



Disk

Disk



# Parallel Annotations

NumPy

Python

unPython

OpenMP + C

C compiler

Multicore CPU

CPU CPU CPU CPU

Disk

Disk

**Currently working**

# Features

- Type signatures added as decorators
- Local variable types are inferred
- NumPy arrays are supported
- Parallel loops are supported
- Basic support for classes, tuples, lists, dicts
- Disclaimer : Talking about non-public version

# Example

```
import unpython

@unpython.type('int','int','int')
def f(x,y):
    temp = x + y
    return temp
```

## ***Compilation:***

```
python frontend.py mymodule.py
```

# Example

```
import unpython
```

```
@unpython.type('int','int','int')  
def f(x,y):  
    temp = x + y  
    return temp
```

Dummy



**Compilation:**  
python frontend.py mymodule.py

unPython frontend



# Type examples

- 'ndarray[int 2]'
- 'list[float]'
- 'tuple[double]'
- 'dict[int float]'
- 'SomeClass'



# Parallel Loops

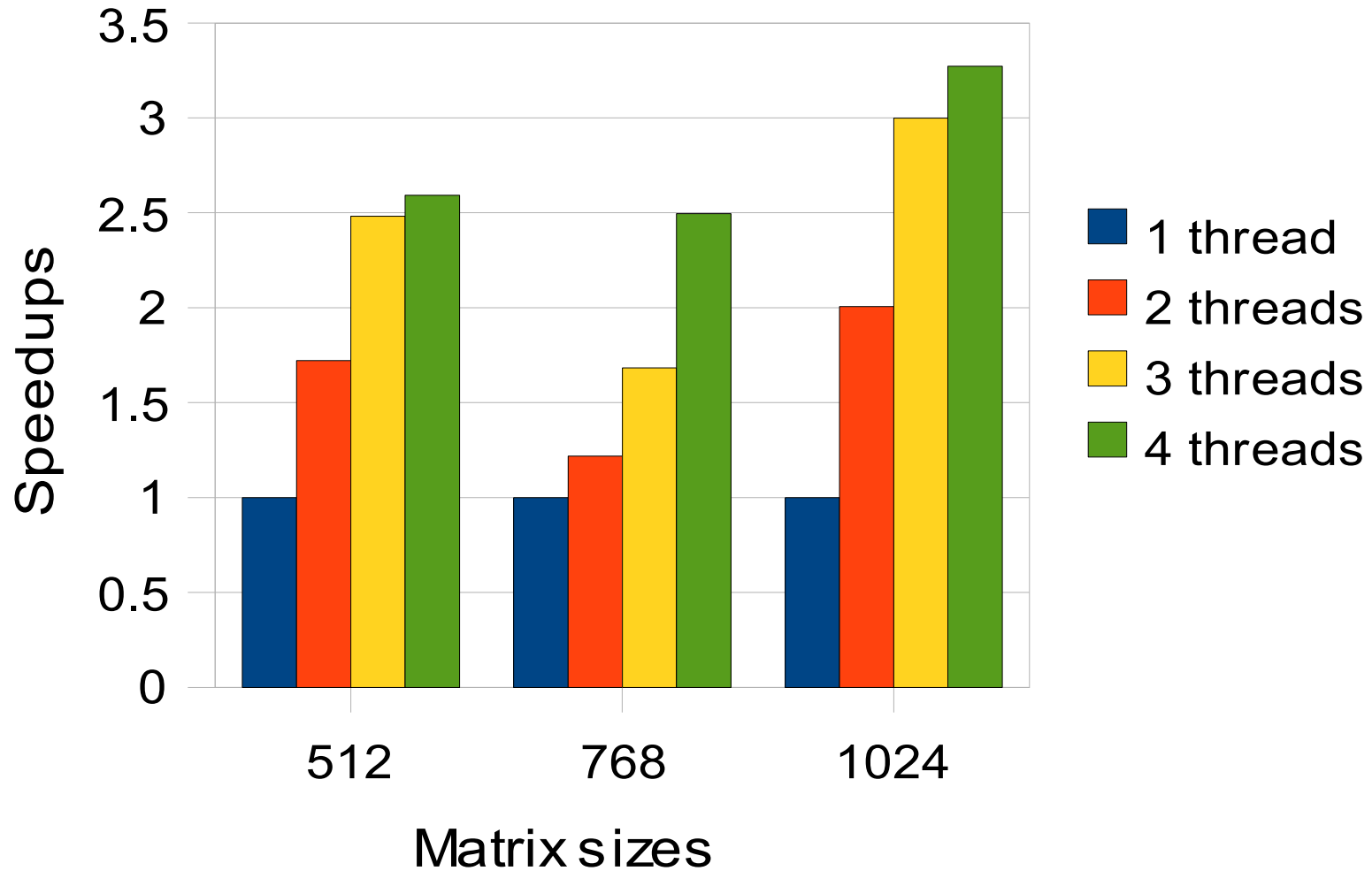
```
for i in xrange(n): x[i] = x[i]*2.0
```

```
for i in unpython.range(n): x[i] = x[i]*2.0
```

```
#pragma omp parallel for  
for(i=0;i<n;i++) x[i] = x[i]*2.0
```

# Speedups on Quad-core

Code compiled using unPython



# Future Work

- Broader NumPy support
- Exceptions
- Ctypes
- Research : Better compiler internals
  - Alias analysis and Dependence analysis
- Research : More parallel programming
  - Broader parallel loop support
  - GPU Programming
  - Multicore optimizations

# Help !!

- <http://code.google.com/p/unpython>
- License : GPLv3
- I need community support :
  - Submit bug reports
  - Test cases
  - Feature requests
  - Flames, comments, compiler crashes, questions ..
- Next release : August 30 2008
  - Will have everything we talked about and more
  - Requirements : Python 2.5, Numpy 1.0.4+, Java 5 or Java 6