The Python Scripting Language

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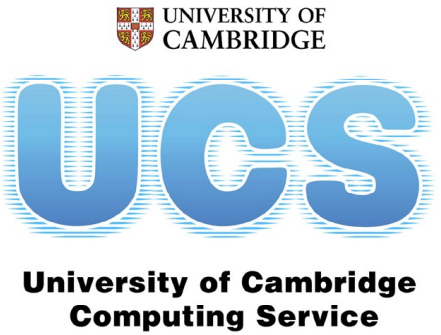
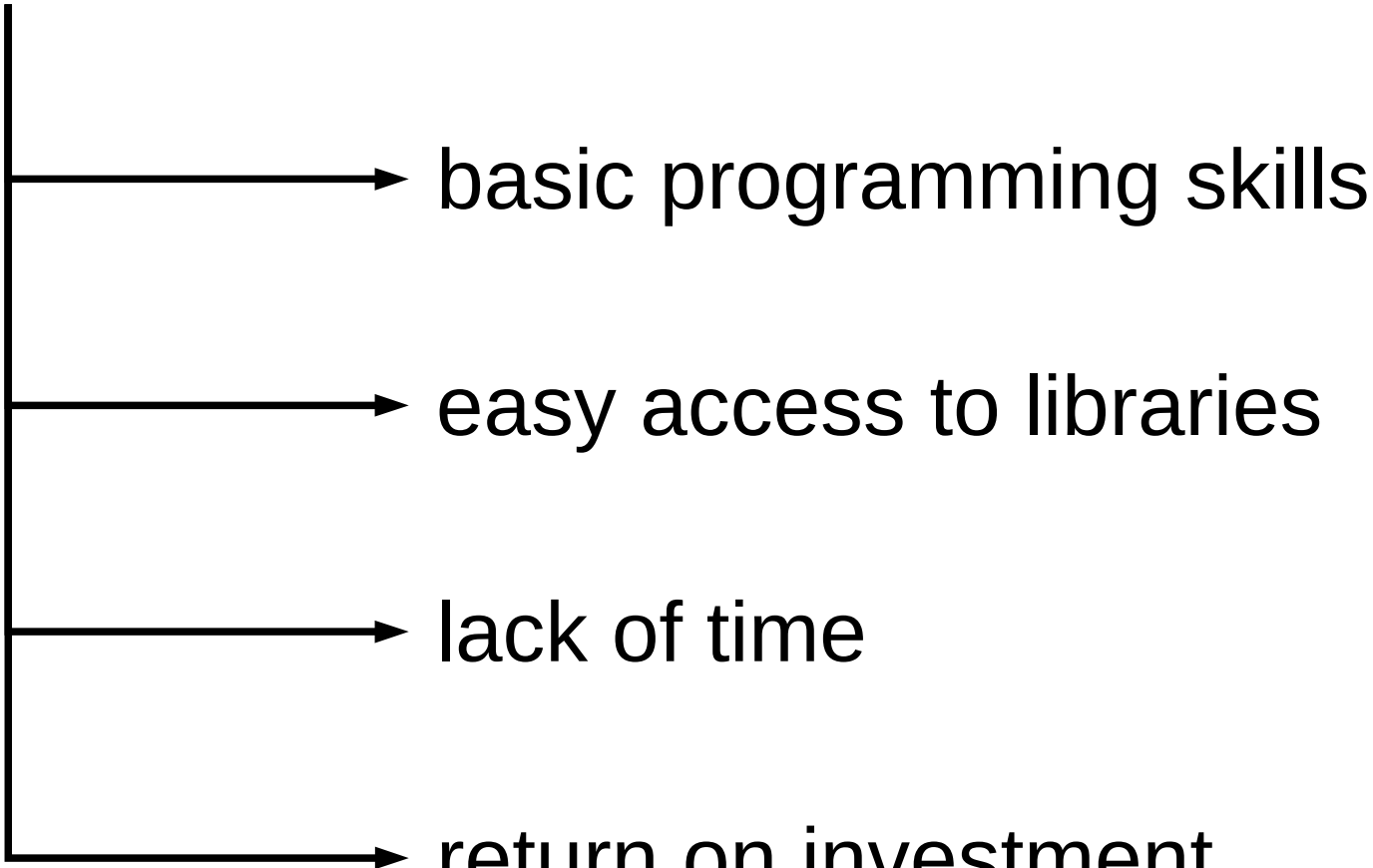
University of Cambridge Computing Service



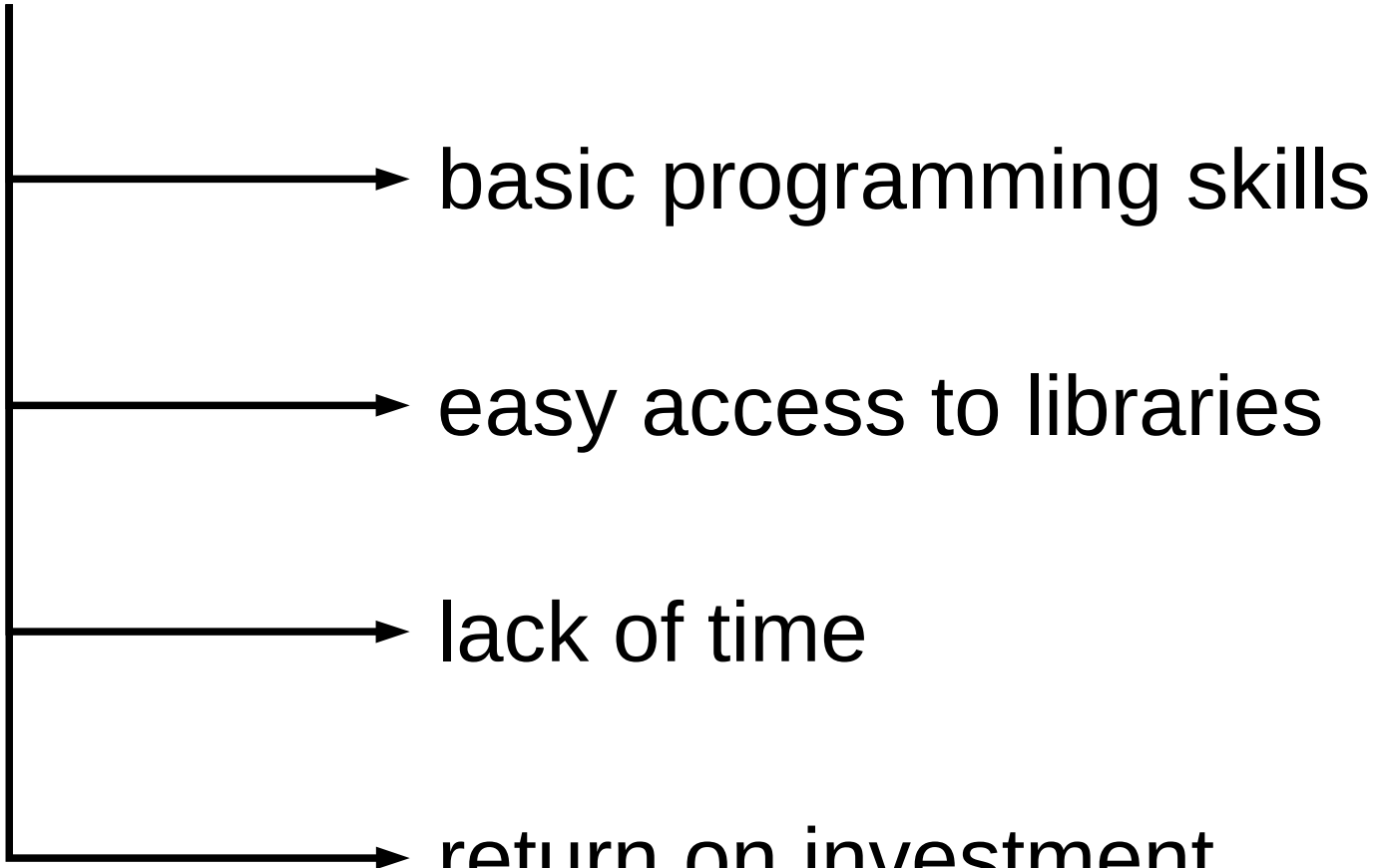
Why Python?

e-Science interviews



Why Python?

Social Science interviews



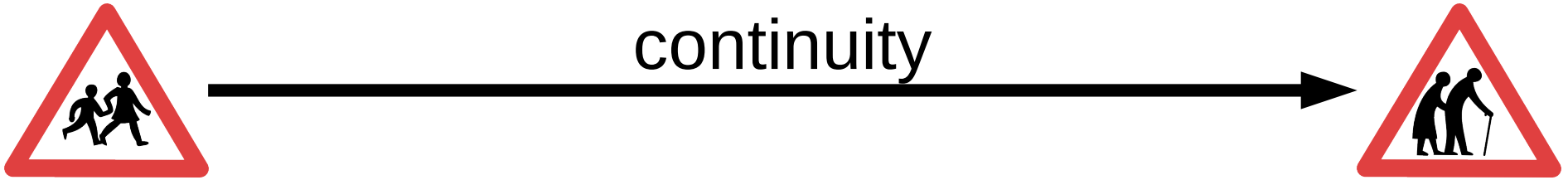
Why ***Python***?

Python		**Requirements**
good *first* language	←	basic programming skills
“batteries included”	←	easy access to libraries
easy to learn	←	lack of time
ubiquity	←	return on investment

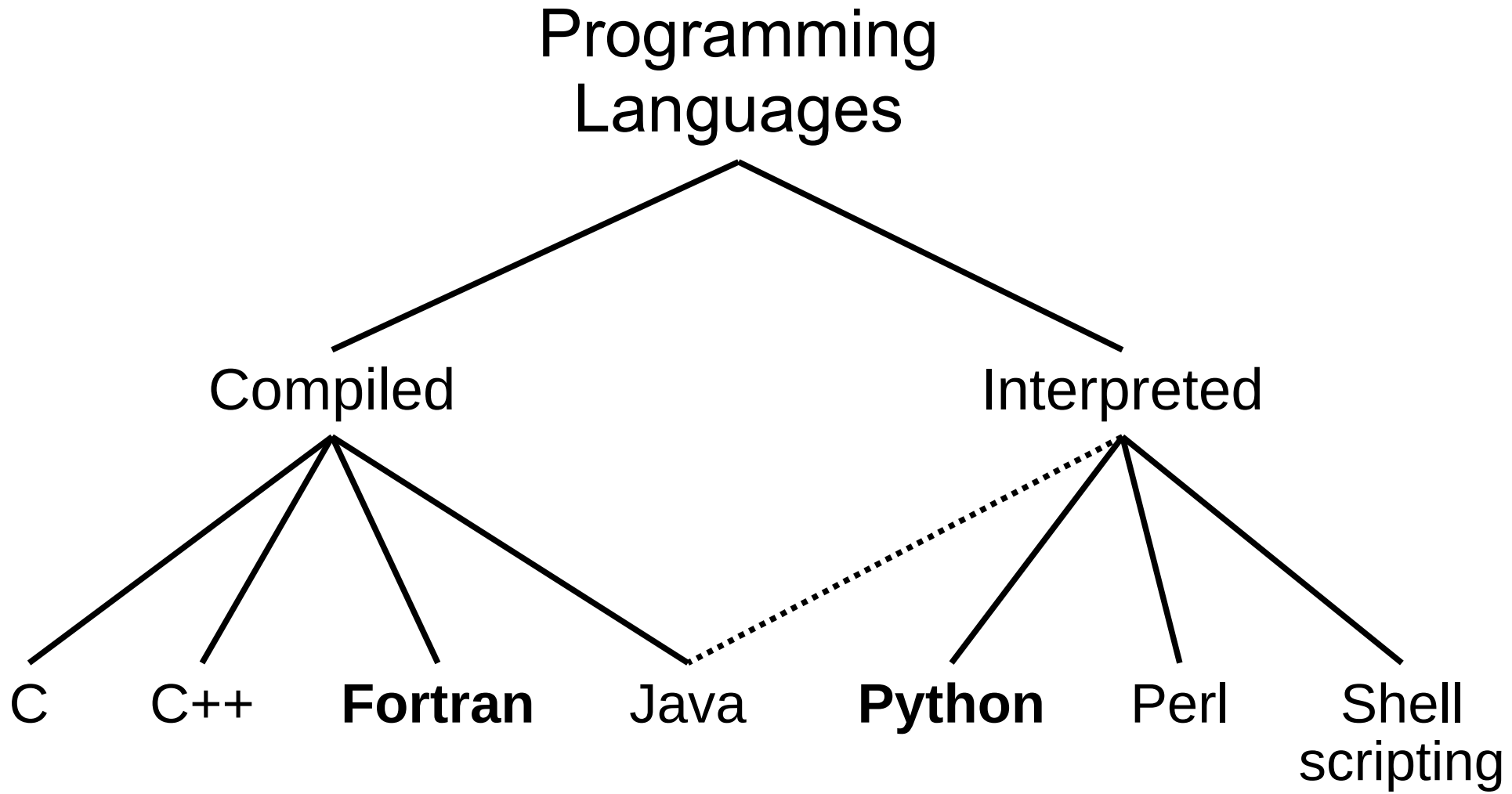
Good first language

Already widely used as a first language

`http://wiki.python.org/moin/SchoolsUsingPython`



Immediate gratification → Good habits → Fully featured

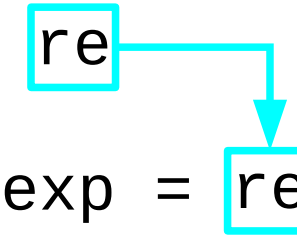

Programming Languages
Compiled
Interpreted
C
C++
Fortran
Java
Python
Perl
Shell scripting

Python

- Interpreted language
- Strict about its syntax (unlike Perl)
- Object oriented:
  - Completely. ***Everything's*** an object.
- Does its own garbage collection
- Dynamically typed
  Strongly typed

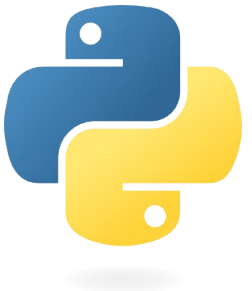
“Batteries included”

“Clean” language ⟶ Modular extensions



```
import re
…
fx_regexp = re.compile('^f.*x$')
…
fx_hits = fx_regexp.search(line)
…
if fx_hits:
   …
```

“Batteries included”



numbers unicodedata optparse mimetypes
calendar keyword locale crypt
json quopri math re atexit socket
zlib

> 200 standard modules

webbrowser
imaplib sys ssl datetime
random email formatter
xml base64 pydoc
logging getopt httplib
os pickle
sched urlparse
tempfile

More batteries

NumPy Numerical Python

SciPy Scientific Python

Astronomy
A.I.
Biology
Dynamical systems
Economics
Electromagnetics
Geology
Molecular modelling
Signal processing
Symbolic maths

Yet more batteries

Python Package Index

> 15,000 extra modules

artistic	education	office	sociology
communications	games	printing	system
database	home	religion	terminals
desktop	internet	science	text
documentation	multimedia	security	utilities

`http://pypi.python.org/pypi?:action=browse`

`http://pypi.python.org/pypi`

UCS

Ubiquity

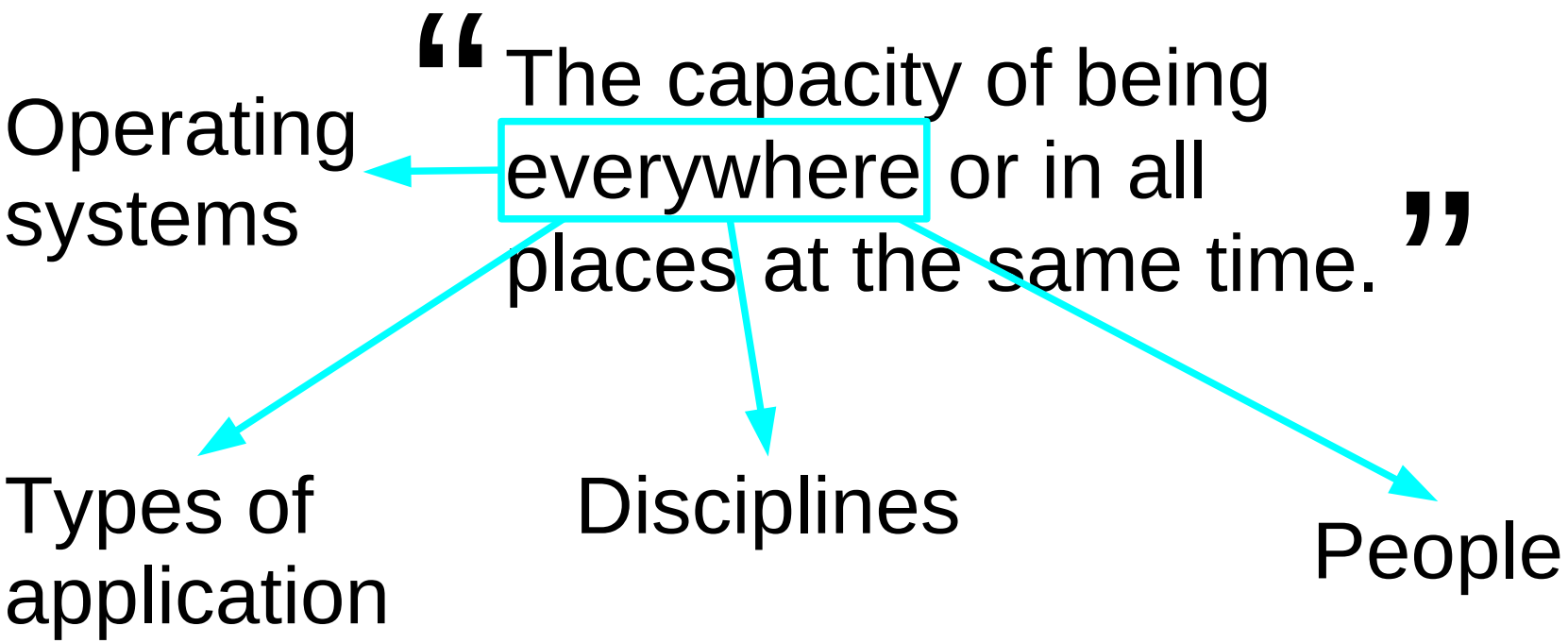
> “The capacity of being everywhere or in all places at the same time.”
>
> O.E.D.

Ubiquity

“The capacity of being everywhere or in all places at the same time.”

Now!

Ubiquity


“The capacity of being everywhere or in all places at the same time.”
Operating systems
Types of application
Disciplines
People

Operating Systems

Unix

Linux, MacOS X, BSD,
AIX, Solaris, Irix, …

MS Windows

DOS, CE, 2K, ME,
NT, XP, Vista, 7.

Others

VMS, zOS, OS/2, OS/400,
BeOS, iPod, Palm, QNX, …

Python

- Interpreted language
- Cross-platform (Unix/Linux, Windows, Mac OS X, etc)
- Strict about its syntax (unlike Perl)
- Object oriented:
  - Completely. ***Everything's*** an object.
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- Dynamically typed
  Strongly typed

Implementations

CPython	Unix
IronPython	.NET
Jython	Java
Stackless	Multi-threaded

Applications

Network services

Web applications

Graphical applications

Command line applications

Instrumentation control

Embedded systems

Network services

EVE Online

MMORPG

300,000+ players

Stackless Python

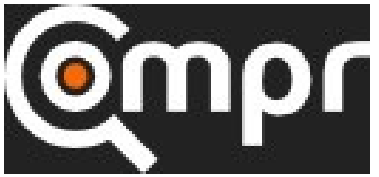
Web applications

Django

Turbogears

Zope
(Plone)

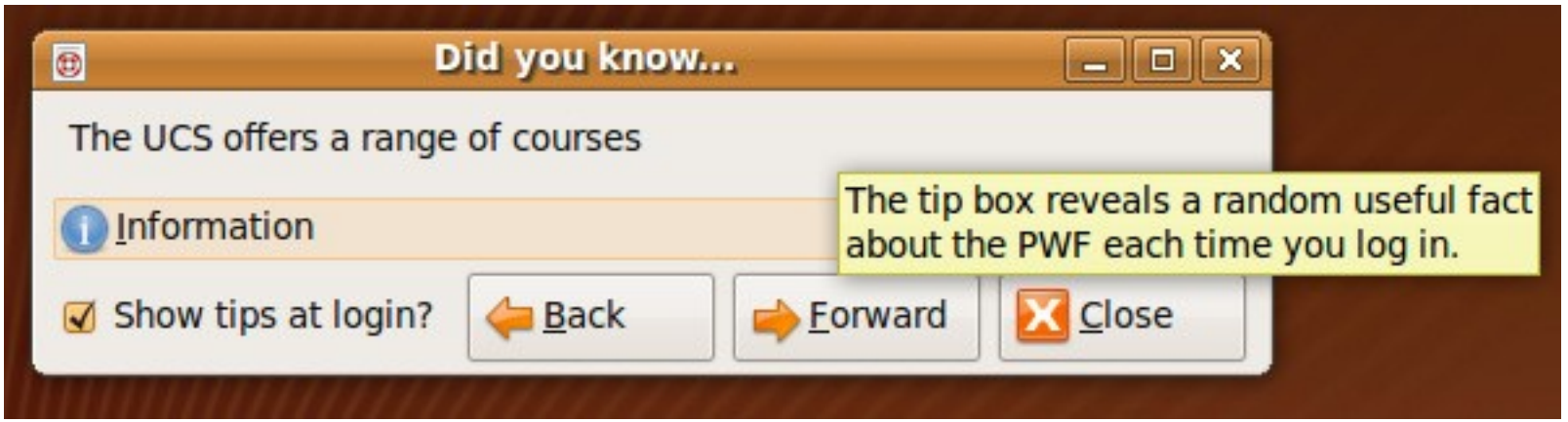
Web applications



Web applications

UCS

Graphical applications



GUI builders

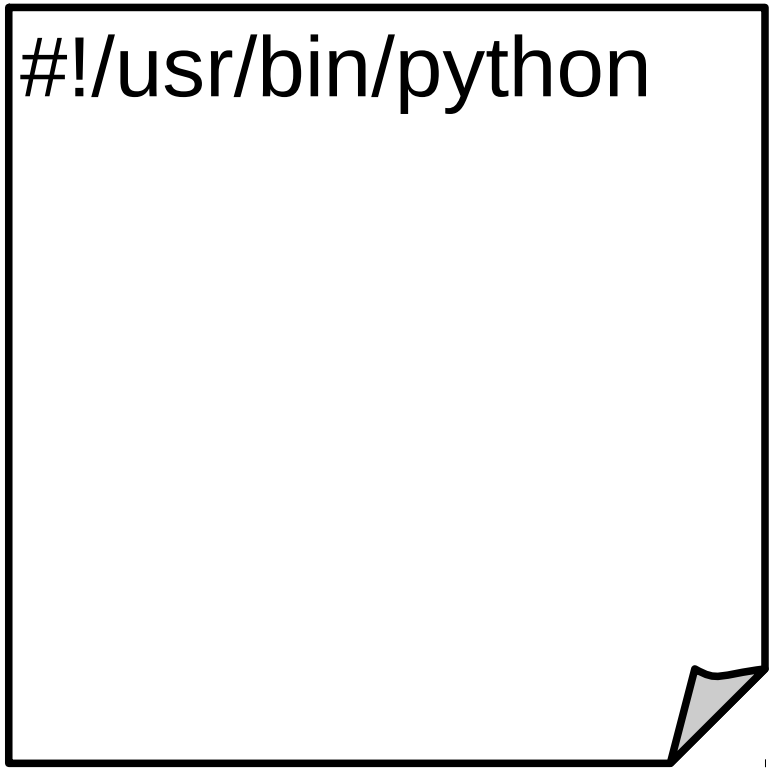
Java

Python

C++

Tk

Command line



Scripts in `/usr/bin`

7% Ubuntu
1% OpenSUSE

`/usr/bin/command-not-found`

Instrument control

Serial port

PyVISA

Virtual Instrument
Software Architecture

Institute for Personal
Robots in Education

Embedded systems

"…IEEE802.15.4 based, auto-forming, multi-hop, instant-on, mesh network stack combined with an embedded Python interpreter for running application code."

SYNAPSE

Disciplines

Artistic

Pharmaceuticals

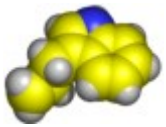
Ship building

Space travel

Academic disciplines

Astronomy

Bioinformatics



Chemistry

…

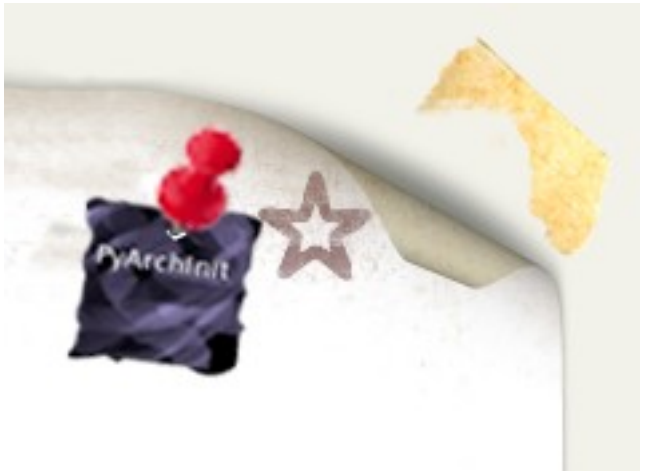
Zoological
Data Processing

Zoology

Academic disciplines *not* in the sciences

Gutenkarte

Book Catalog



Pleiades

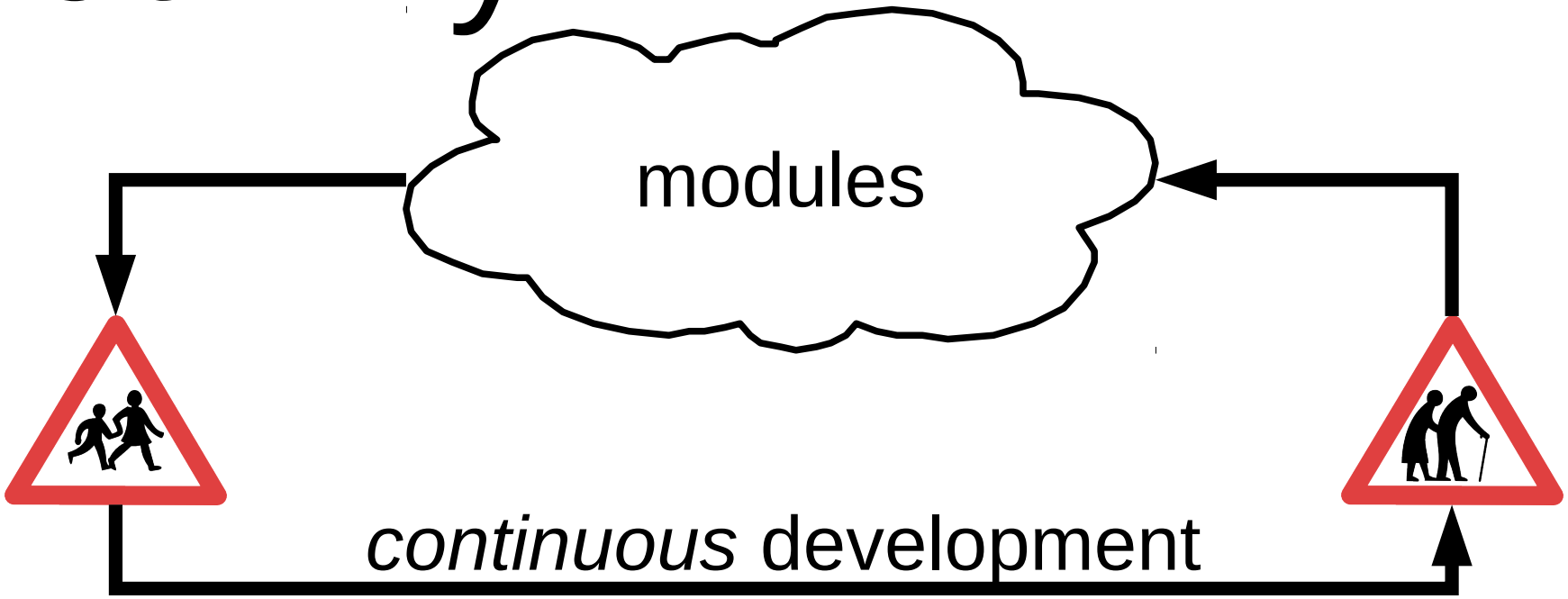
… in Cambridge

Smooth Particle Hydrodynamics	Astronomy
“Basics of programming in Python” **“Python Bioinformatics”**	Biochemistry
Crystallography	CIMR
Compression algorithms **Dimensional quantities**	Physics

Ubiquity

> “The capacity of being everywhere or in all places at the same time.”
>
> O.E.D.

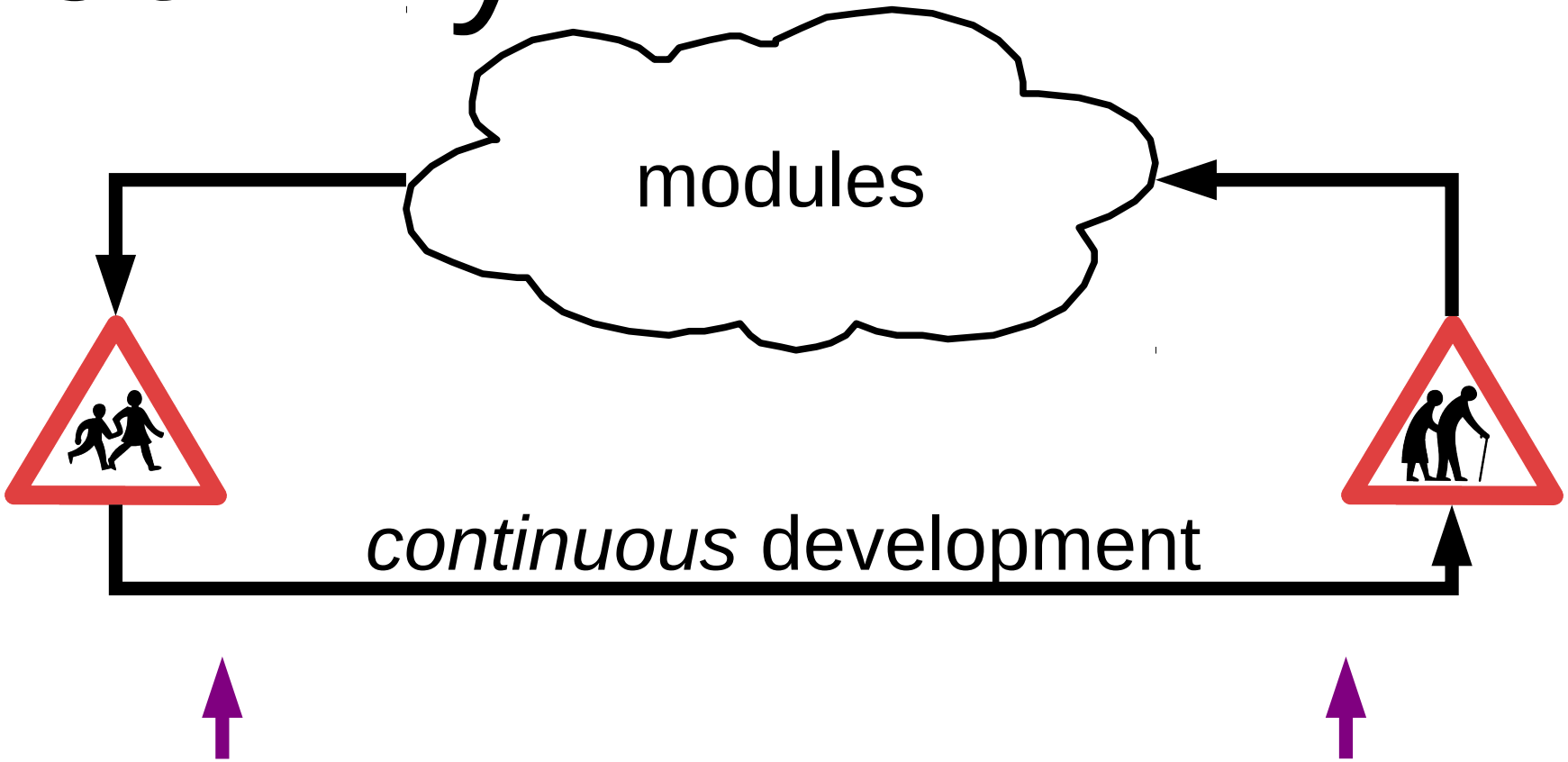
But why?



Immediate gratification → Fully featured

Small scripts → Major projects

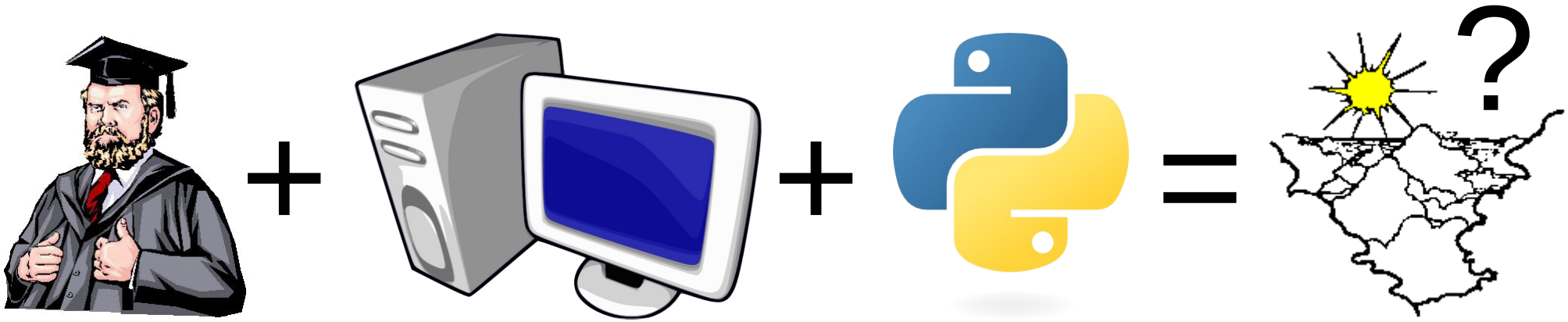
But why?



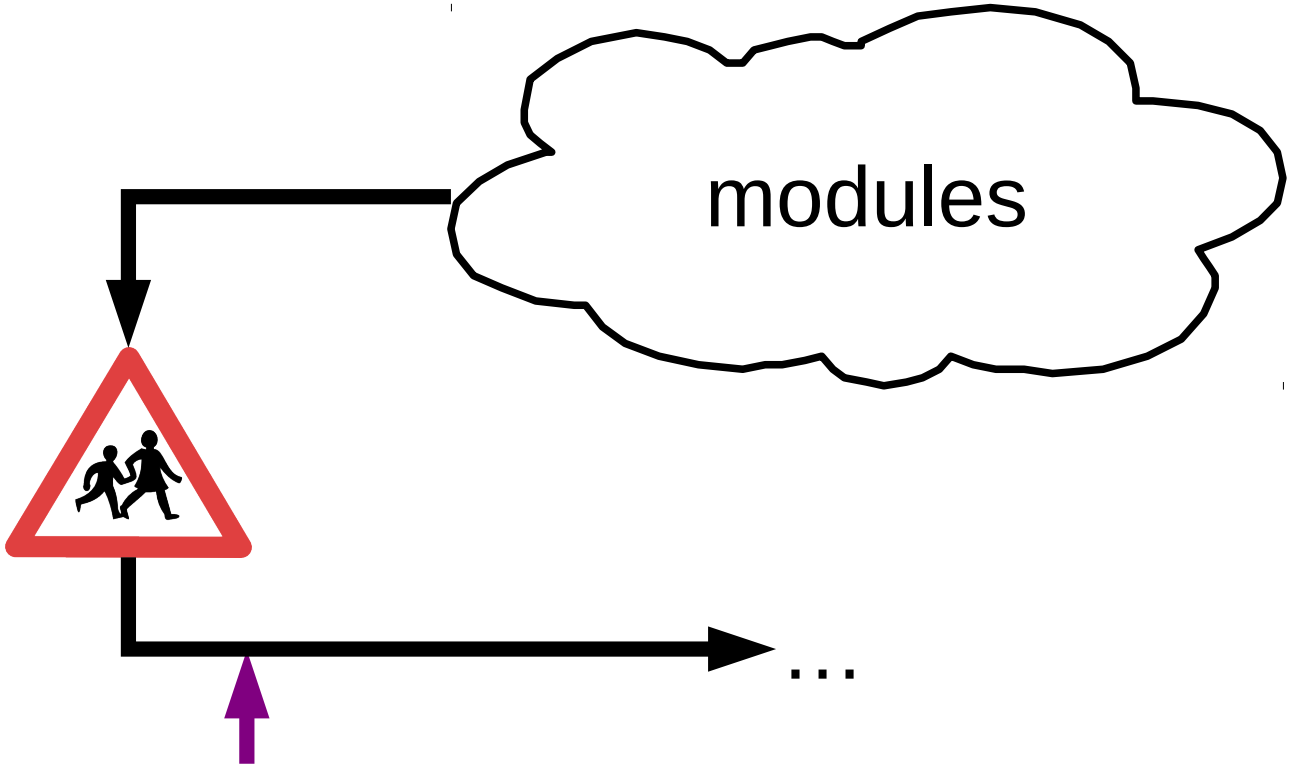
Immediate return
on investment

Good return
on investment

So what?



So what?

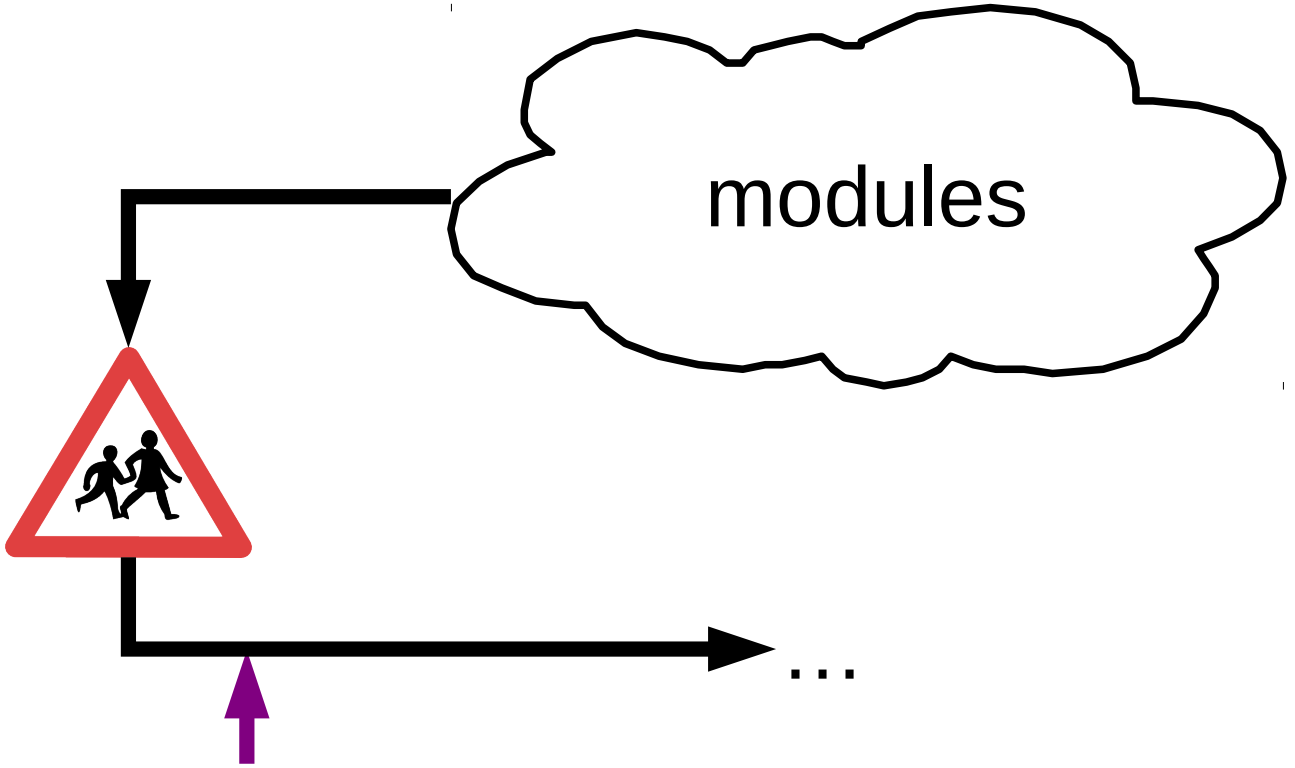


Immediate return on investment

Novel academic research possible

Powerful admin-y scripts are easy

So what?

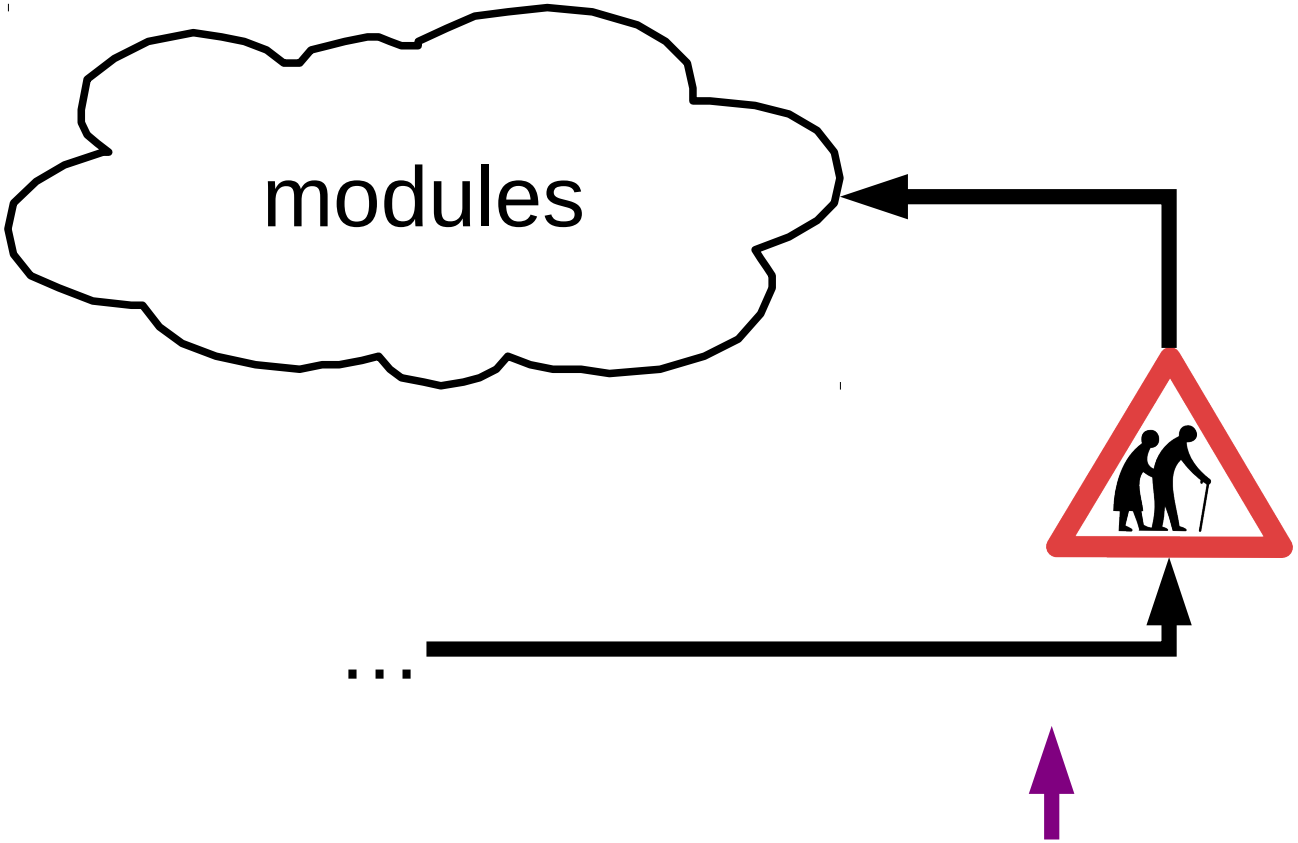


Easy to
get started

Happy academics possible

Happy I.T. staff possible

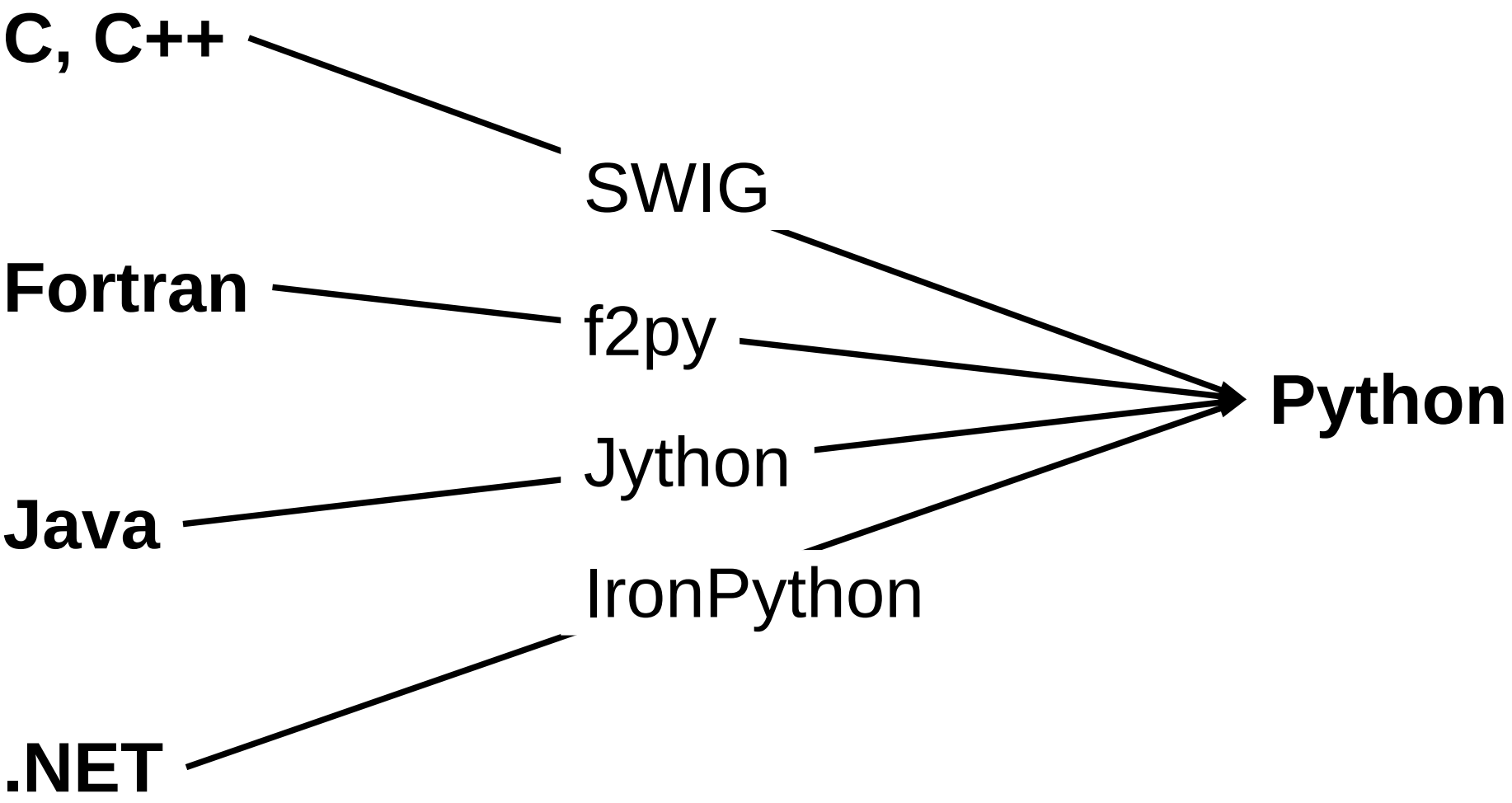
So what?



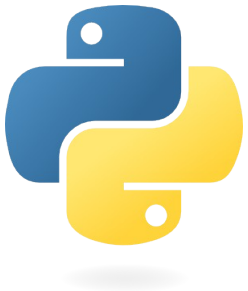
A few *remarkable* results possible

Good return on investment

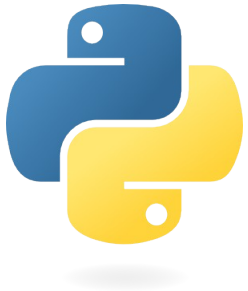
Integration with existing code



So what should we do?



Learn Python



Encourage Python

Encourage programming

UCS

```c
#include <stdio.h>

int main()
{
  int rc;
  rc = printf("Hello, world!\n");
  if (rc != 14)
  {
    perror("Failed to print");
    return(1);
  }
  return(0);
}
```

```
print ('Hello, world!')
```

```c
#include <stdio.h>

int main()
{
  printf("Hello, world!\n");
  return(0);
}
```

```
try:
  print ('Hello, world!')
except:
  pass
```

Python:

Ubiquitous

Good place to start

Good “return on investment”

Python

Two major versions in use:
2.x (2.7.2) and ***3.x*** (3.2.1)

- Interpreted language
- Cross-platform (Unix/Linux, Windows, Mac OS X, etc)
- Strict about its syntax (unlike Perl)
- Object oriented:
  - Completely. ***Everything's*** an object.
- Does its own garbage collection
- Dynamically typed
  Strongly typed

Books on Python 2

Dive Into Python
Mark Pilgrim
Apress
ISBN: 1-59059-356-1
http://diveintopython.org/

Best book on Python your presenter has found.
(It was written for Python 2.3, though. Luckily, Python 2.4, 2.5 and 2.6 are very similar to Python 2.3.)

Python Programming: An Introduction to Computer Science
First Edition
John M. Zelle
Franklin, Beedle & Associates,Inc.
ISBN: 1-887902-99-6
http://mcsp.wartburg.edu/zelle/python/

Superb introduction to computer programming, using Python as a first language (which also makes it a good introduction to Python).

Official Python documentation: http://docs.python.org/

Books on Python 3

Dive Into Python 3
Mark Pilgrim
Apress
ISBN: 1-430-22415-0
http://diveintopython3.org/

Python Programming: An Introduction to Computer Science
Second Edition
John M. Zelle
Franklin, Beedle & Associates,Inc.
ISBN: 1-590282-41-8
http://mcsp.wartburg.edu/zelle/python/

Superb introduction to computer programming, using Python as a first language (which also makes it a good introduction to Python).

Official Python 3 documentation: http://docs.python.org/3.2/

University of Cambridge Computing Service Python course notes are usually to be found at:

http://www-uxsup.csx.cam.ac.uk/courses/

Questions?