

Software Carpentry I: The Shell & Version Control

Luís Pedro Coelho

Programming for Scientists

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University of Pittsburgh

Carnegie Mellon

Software engineering helps you build the equivalent of a bridge.

Software carpentry is what you need to build the equivalent of a garden shed.

Basic Tool: Shell

```
File Edit View Scrollback Bookmarks Settings Help
luispedro@lolitop - ~/work/pfs $ls
advertisement documents lectures notes projects scratchpad spring-2009 syllabus website
luispedro@lolitop - ~/work/pfs $git pull
Already up-to-date.
luispedro@lolitop - ~/work/pfs $cd lectures/slides
luispedro@lolitop - ~/work/pfs/lectures/slides $ls
01-intro.pdf          03L-python-review.tex    E1-introprogramming.tex  Makefile
01-intro.tex         03-odds-ii-errors.tex    E2-introprogramming2.pdf  media
01L-python-intro.pdf 04-softwarecarpentry.pdf E2-introprogramming2.tex  media~
01L-python-intro.tex 04-softwarecarpentry.tex figures                    template.pdf
02L-python-odds-ends.pdf assert.tex                headers                    template.tex
02L-python-odds-ends.tex countframes.py           hello.py
02-oop.pdf           do-slides.sh             hello.py~
02-oop.tex           E1-introprogramming.pdf  images
luispedro@lolitop - ~/work/pfs/lectures/slides $cat
luispedro@lolitop - ~/work/pfs/lectures/slides $ksnapshot
█
```

slides : vim slides : ksnapshot slides : zsh

- Current directory.

```
cd newdir
```

Directories

Your program also has a current directory.

```
import os
os.chdir('..')
```

- **Absolute paths:**

`/home/luispedro/work/pfs/lectures/slides/04-software`

- **Relative paths:** `04-softwarecarpentry.pdf,`

`images/04-konsole.png, ../homeworks/02-oop.pdf`

Opening Files Inside Python

```
input = file('/home/luispedro/absolute.txt')  
output = file('output.txt', 'w')
```

Executing Programs

```
luispedro@lolitop - ~/work/pfs/lectures $
```

Input/Output

```
hello.py
```

```
print 'Hello World'
```

```
Shell
```

```
python hello.py
```

Standard input/stdout.

```
lp@lolitop ~/pfs/lects/slides $grep Exception *tex
01-intro.tex:\item Exception: implementing code from a paper
03-odds-ii-errors.tex:\frametitle{Exceptions}
03-odds-ii-errors.tex:\begin{block}{Exceptions}
03-odds-ii-errors.tex:\frametitle{Exceptions}
03-odds-ii-errors.tex:\frametitle{Exceptions}
03-odds-ii-errors.tex:\begin{block}{Exceptions}
03-odds-ii-errors.tex:\item Exceptions are \alert{objects}.
03-odds-ii-errors.tex:\item Exceptions have \alert{type} an
03-odds-ii-errors.tex:\frametitle{Exception Hierarchy}
03-odds-ii-errors.tex:                Exception
03-odds-ii-errors.tex:\frametitle{Exception Handling}
03-odds-ii-errors.tex:\begin{block}{Exception Handling: Err
03-odds-ii-errors.tex:    print 'Exception'
03-odds-ii-errors.tex:False\\Exception
03-odds-ii-errors.tex:True\\Exception
04-softwarecarpentry.tex:grep Exception *tex
```

WC: Word Count

```
wc -l: count lines
```

```
lp@lolitop ~/pfs/lects/slides $grep Exception *tex | wc -l
19
```

Command-line Arguments

```
grep Exception *.tex
```

Levels

- 1 konsole/xterm/gnome-terminal/iTerm.app/Terminal.app/...
- 2 sh/bash/zsh/...
- 3 your program

Command-line Arguments

```
luispedro@lolitop - ~ $echo Hello World  
Hello World
```

Command-line Arguments

```
import sys
print len(sys.argv)
print sys.argv
```

Command-line Arguments

```
$python printargs.py Hello World  
3  
['printargs.py', 'Hello', 'World']
```

Command-line Arguments

```
$python printargs.py "Hello World"  
2  
['printargs.py', 'Hello World']
```

Command-line Argument Parsing

```
from optparse import OptionParser
parser = OptionParser()
parser.add_option("-d", "--database", dest="database")
parser.add_option("-i", "--ideal-scale", dest="ideal")
parser.add_option("-m", "--min-scale", dest="min")
parser.add_option("-M", "--max-scale", dest="max")
(options, args) = parser.parse_args()
```

```
Elsevier_DB=options.database
Ideal_Scale=float(options.ideal)
Min_Scale=float(options.min)
Max_Scale=float(options.max)
```

Commands

- `cd`
- `ls`
- `cat`
- `grep`
- ...

Secure Shell

```
$ssh coupland.cbi.cmu.edu
```

Password-less Login

Public key authentication.