Software Carpentry I: The Shell & Version Control

Luís Pedro Coelho

Programming for Scientists

February 3, 2009

University of Pittsburgh

Carnegie Mellon

Software Carpentry

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-intropro gramming.tex   Makefile
01-intro.tex              03-odds-ii-errors.tex     E2-intropro gramming2.pdf  media
01L-python-intro.pdf      04-softwarecarpentry.pdf  E2-intropro gramming2.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-intropro gramming.pdf  images
luispedro@lolitop - ~/work/pfs/lectures/slides §cat
luispedro@lolitop - ~/work/pfs/lectures/slides §ksnapshot                             !!!!!
```

slides : vim | slides : ksnapshot | slides : zsh

Basic Concepts

- Current directory.

```
cd newdir
```

Directories

Your program also has a current directory.

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

Paths

- Absolute paths: `/home/luispedro/work/pfs/lectures/slides/04-softwar`
- 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
```

Input/Output

Standard input/stdout.

grep

```
lp@lolitop ~/pfs/lects/slides $grep Exception *tex
01-intro.tex:\item Exception: implementing code from a pape
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
- ...

SSH

Secure Shell

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

Password-less Login

Public key authentication.

Version Control

If your laptop exploded, how many hours of work would you lose?

Advantages

- Maintain project history.
- Sync between computers.
- Sync between project members.
- . . .

Subversion

Subversion: model

1. Repository
2. Checkout
3. Commit

Example

1. Create a repository
2. Create a checkout
3. Edit
4. Commit

Version Control Etiquette

- Don’t commit over my commit.
- Use the log.