Lab1: Introduction and Linux Setup

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Course Learning Objectives

- Practice basic programming from Dr. Fridman's lectures
- Basic Perl Programming
- Using Perl to solve general biological problem
- Basic R Programming and Omics Analysis

Syllabus

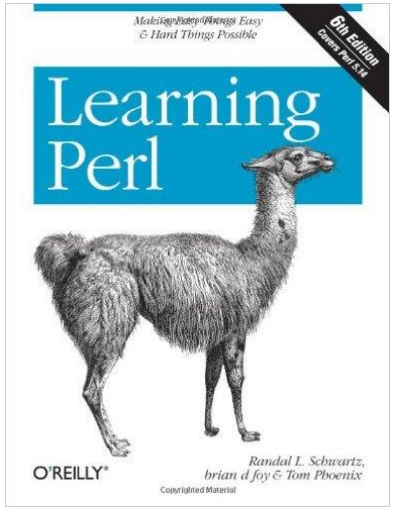
- 14 lab sessions
- *4 modules comprised of*:
  - Module 1 : Primer Design
  - Module 2 : Finding Open Reading Frames
  - Module 3 : Statistical Assessment of Proteins
  - Module 4: Introduction to R and Omics and Analysis
- 11 labs of Perl
- 2-3 labs of R
- 1 lab of Python
- Subjected to change

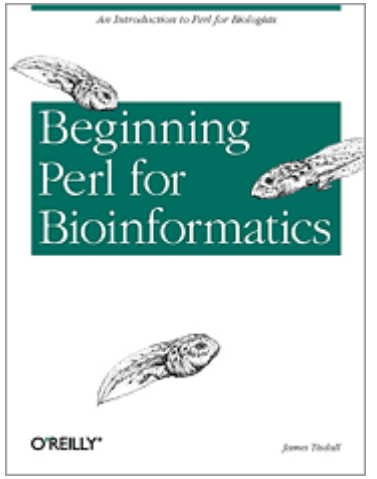
Homework and Grading

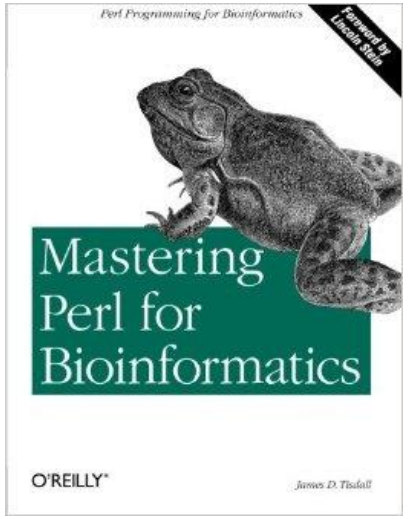
- *11 homeworks*
  - Module 1: 3 homeworks
  - Module 2: 3 homeworks
  - Module 3: 3 homeworks
  - Module 4: 2 homeworks
- Top 10 scores will be graded for final grade.
- Subjected to change
- Due the midnight of next lab class (Midnight (11:59 pm) next Monday)
- *Grading Rubric:*
  - 1pt: Header with name, assignment number, and description of what code is doing
  - 3pt: Comments documenting each section of code with HOW and WHY the chosen implementation was used
  - 3pt: Code shows logical progression
  - 3pt: Code functions correctly

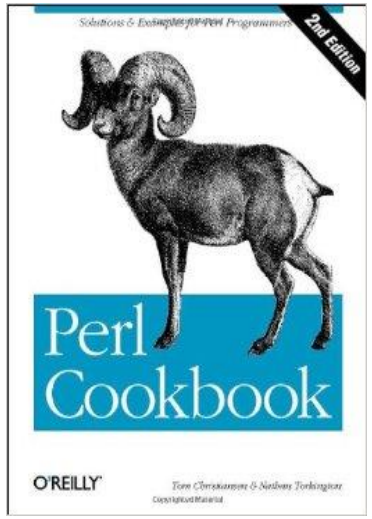
Reference Books

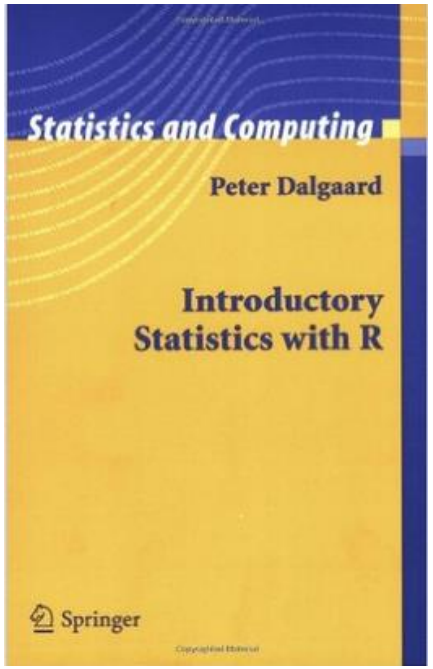
- Learning Perl
- Beginning Perl for Bioinformatics
- Mastering Perl for Bioinformatics
- Perl Cookbook
- Online documentation
  http://learn.perl.org/tutorials/
  http://qntm.org/perl
- Introductory Statistics with R (Statistics and Computing) by Peter Dalgaard
- Online help:
  http://r-statistics.net/r-tutorial.html





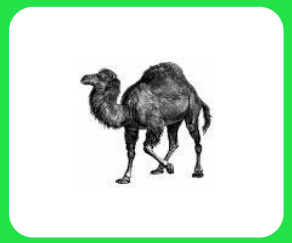






System and Software

Unix/ Linux/ OS X



Perl: practical extraction and report language

R software: a statistical tool

System and Software

Unix/ Linux/ OS X

Linux distributions

- Free
- Free upgrades
- Secure and stable
- Software-center
- Install dependencies automatically
- Awesome community

https://renewablepcs.wordpress.com/about-linux/advantages-of-using-linux/

https://nixwindows.files.wordpress.com/2015/02/linux-distro-stickers.png?w=705&h=273&crop=1

System and Software

Perl: practical extraction and report language

- ✓ Encapsulates the best features of the shell, sed, grep, awk, tr, and C
- ✓ Write powerful codes quickly and easily
- ✓ More efficient for ‘string’ or ‘sequence’

System and Software

R software: a statistical tool

Why use R?

- Free
- Open-Source
- Thousands of cutting-edge, user-contributed packages available on CRAN
- Integrate with other languages (C/C++, Java, Python)
- R has a large, active, and growing community of users

http://www.r-bloggers.com/why-use-r/

RStudio

Free & Open-Source IDE for R

Shiny

by RStudio

Review: Basic Linux Commands in Lec.1

- Viewing and changing directory:
  - pwd # print working directory
  - cd <directory_name>
  - cd # goes to your home directory
  - cd - # goes back to previous directory
  - cd .. # Moves one directory up
  - cd ../../ # Moves two directories up
  - ls
  - ls -a
  - ls -l

Review: Basic Linux Commands in Lec.1

- Files and directories
  - mkdir <directory_name>
  - rm <file_name>
  - cp <name> <path>
  - mv <name> <path>
- Text Viewing
  - more
  - less
  - cat # concatenates files
- Others
  - chmod a+x
  - ./ # execute, ./your_script

Review: Basic Linux Commands in Lec.1

- Text Editors
  - Terminal-based: Vi, Vim, Emacs, Nano
  - Graphical GUI: Notepad++ (windows),

    TextWrangler(mac),Geany(Ubuntu),

    SublimeText(all)

First Perl Script

- Task: Print ‘Hello World!’：
  1）Type the program below in your favorite text editor
  2）Save it as helloworld.pl
  3）Change its permissions and execute it. What do you see?

```
#!/usr/bin/perl
use strict;
use warnings;

print “Hello World!\n”;
```

Install Ubuntu 14 on VirtualBox

- http://www.wikihow.com/Install-Ubuntu-on-VirtualBox
- Different VirtualBox window:
- http://www.psychocats.net/ubuntu/virtualbox

Choose “INSTALL UBUNTU”, not the ‘try’ one

- VirtualBox Download link:
- https://www.virtualbox.org/wiki/Downloads

- Ubuntu Download link:
- http://www.ubuntu.com/download/desktop

Alternatively….Install Ubuntu as Dual Boots

- **First, BACKUP your files!**
- Then, follow the instruction here:
- http://www.everydaylinuxuser.com/2014/05/install-ubuntu-1404-alongside-windows.html