Set-up for R-based workshops

Configure your laptop
Install R and RStudio
Install Quartz / MobaXterm
Know your computer OS

Training materials for Next Gen Sequencing Analysis @ BRC

Jean-Yves Sgro
Image credits:

Tux: the Linux mascot: https://en.wikipedia.org/wiki/Tux

146 base pairs DNA portion of a nucleosome structure (PDB 1aoi) rendered with PyMOL

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Class location:

Genetics-Biotechnology Center Building - 425 Henry Mall

Campus Map short link:
http://bit.ly/1m9n50Z

Google map short link:
https://goo.gl/maps/BDNQ0
This Book Belongs to:

Name:________________________

Cluster User Name:___________
Note: for safety reasons student user names will be disabled after class.

Cluster Password:____________
Note: for safety reasons password will be reset after class.

Assigned Cluster For the Exercises:____________________
(e.g. agar1, agar2, agar3, sumo)
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Foreword & Summary

This booklet contains information to prepare for attending an R-based workshop at the Biotechnology Center.

**SUMMARY**

1) **Bring a computer notebook**, Mac or PC
2) Install R
   
   https://cran.r-project.org
3) Install RStudio
   
   https://rstudio.com
4) PC: install MobaXterm
   
   http://mobaxterm.mobatek.net/download.html
5) Mac: install X11
   
   http://xquartz.macosforge.org/
Bring a Laptop

Summary:
Bring a wireless capable laptop & power supply

Workshops are geared to using BRC Linux computers for Next Gen Sequencing analysis. As such, any local computer can be used as a connecting terminal to link to the BRC nodes. New class format is now assuming that you bring your own laptop to class. Follow these instructions to be ready for class.

1. Laptop required

Classes are no longer taught in dedicated computer classrooms and you are required to bring a computer with you.
1.1. Bring your own

Your own computer can be a Mac, a PC or a Linux-based computer. The computer will only be used as a terminal to access the remote BRC Linux system and run simple visualization software.

1.2. Free Library Loan

UW Libraries have computers to loan, up to 20 times per semester without cost as far as we can tell.

Locations and numbers of available computers are visible on a map at this link:

[https://ecs.library.wisc.edu/]

The Steenbock Library is one possible loan location that might be closer to most life scientists:

[http://www.library.wisc.edu/steenbock/services-at-steenbock/computers/laptops/]

or short URL: http://bit.ly/1jdLcw2

Laptops are available for checkout from the Circulation Desk near the entrance on 2nd floor.

Call 608-262-1371 for more information.

Laptops
50 Macbook Air and 5 Macbook Pro laptops

- Check availability
- Runs both Windows and Apple OS.
- Includes carrying case and power adapter. Loaded with standard software including Microsoft office. Note: Adobe Creative suite is only available on Infolab Desktop computers.
Laptop checkout policies

- Steenbock Infolab laptops may not be reserved in advance.
- Laptops are checked out at the Circulation/Reserves desk.
- Two Forms of ID required:
  - UW-Madison ID
  - Driver’s license, Wisconsin ID, or passport
- Loan period is 3 days

1.3. Rental

It is possible to rent a computer for $10 for the day at DoIT.
See https://it.wisc.edu/services/rentals/

The information from that page is reproduced here:
(First verified 6/2019.)

**Notebook computers for rent**

- **Apple MacBookPro** (dual boot): 2.26GHz, 2-4GB RAM, Mac OS X 10.9 with Microsoft Office 2010, Windows 7 with Microsoft Office 2013, Google Chrome, Mozilla Firefox, Skype and more.

- **Dell Latitude E6400**: 2.66GHz, 4GB RAM, Windows 7 with Microsoft Office 2013, Google Chrome, Mozilla Firefox and more.

- **Software & data policy**: Customers are free to install any other software that they require. Please note that we do not support customer-installed software, and all software and data will be erased from the computer at the end of the rental period.

<table>
<thead>
<tr>
<th>Model</th>
<th>Daily</th>
<th>Weekly (7 Days)</th>
<th>Monthly (4 weeks)</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notebook computer</td>
<td>$10</td>
<td>$25</td>
<td>$75</td>
<td>$150</td>
</tr>
</tbody>
</table>
Rental inquiries:

For availability information, stop by our location or email us at rentals@doit.wisc.edu. Email inquires and rental reservations will receive an email response within four business hours.

1.4. Wireless

Although it is standard now, the computer must have standard wireless capabilities.

1.5. Bring your power supply!

Power-strips may be available or plug directly in the wall.

2. Admin password

You should have Administrative privileges to install software on the computer you will bring in class.
Software required for all computers

Summary:
Install or update R and RStudio

✔ TASK: install R and RStudio:
Download and install from the following links.
Choose a mirror if necessary:

R: https://cran.r-project.org

RStudio: https://www.rstudio.com
Software required if you have Mac

Summary:
Install or update X11/XQuartz

Modern Macintosh computers running Mac OS X are already “Unix-based” computers and most software is already present.

Depending on the version of Mac OS the following software may be useful, but probably dispensable: X11

From the Apple web site:

X11 is no longer included with OS X, but X11 server and client libraries for OS X are available from the XQuartz project: http://xquartz.macosforge.org. You should use the latest available version of XQuartz.

On the Quartz web (reproduced below) download the .dmg file and install.
A version of the X.Org X Window System that runs on OS X

The XQuartz project is an open-source effort to develop a version of the X.Org X Window System that runs on OS X. Together with supporting libraries and applications, it forms the X11.app that Apple shipped with OS X versions 10.5 through 10.7.

### Quick Download

<table>
<thead>
<tr>
<th>Download</th>
<th>Version</th>
<th>Released</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>XQuartz-2.7.8.dmg</td>
<td>2.7.8</td>
<td>2015-10-17</td>
<td>For OS X 10.6.3 or later (including El Capitan)</td>
</tr>
</tbody>
</table>

A list of all available XQuartz releases can be found here [http://xquartz.macosforge.org/trac/wiki/Releases](http://xquartz.macosforge.org/trac/wiki/Releases)

**Note:** XQuartz will be installed in `/Applications/Utilities` on your computer. You may need Admin privileges to accomplish the installation.

**Note:** When launching XQuartz a terminal of type “xterm” might appear. In general this is not the preferred terminal as it is difficult to copy/paste text commands. The terminal used in class is: `/Applications/Utilities/Terminal` and can easily copy/paste plain text within.
Software required if you have a PC

Summary:
Install MobaXterm

If you have a Windows-PC it should be running Windows 10 or later as Windows XP, 7, 8.1 are no longer allowed on UW networks.

The following, free software contains all that is need to connect and display data from a remote Linux computer and should be installed before class: MobaXterm

✓ TASK Go to mobaxterm.mobatek.net

Click on Download and Download and install the “Free download” Home Edition.
The features labeled “unlimited” in the paid edition do not play a role in how we use the software and therefore the free edition is perfectly fine.

Click Download now:

There are 2 installer versions:

Portable edition ← choose the portable edition preferably
Installer edition

The final software is the same. The difference is a “Windows thing” and resides only on the installation method. The portable version, once no longer needed can be simply placed into the recycle bin. The installed version would have to be removed via the Windows-specific method to “Add/Remove” software via the control panel.

The portable edition seems to be more reliable to install.

✔ TASK Install the software and explore the menu options.
Software required for a Linux system

A Linux laptop should already have everything necessary and nothing further should be required.

Make sure that you know where to find the “Terminal” or “Console” for text commands.

Verify that your Java is up to date (see above) and that you know the administrative password.
In this section you will learn how to display the **real name** of a file in the computer that you are familiar with, Mac & PC. This may be important to transfer files to the BRC computers.

### 1. Operating System of your computer

Most likely you will access your BRC account from either a Windows-PC or a Macintosh computer. If you are using Linux as your main computer you might skip the Linux tutorial section.

Below are a few hints that may help in the process of accessing your account and transferring files with your own computer.

### 2. File name extension: the “real name” of files

✔ **READ:** By default, most modern computer will show file names without the traditional file name extension.
For example a document created with Microsoft Word may appear as “My Letter” in the directory where it is stored whether you are looking at it as an icon or a list. Most likely the real name of the file is either “My Letter.doc” or “My Letter.docx” depending on the version of Word that created it. In the same way, PDF documents will not show the “.pdf” and text files will not show the “.txt” filename extension etc. This was invented to “help” users but in some cases it is important or even imperative to know the exact name of the file to use.

File name before and after changes are made to show file extension

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Letter</td>
<td>My Letter.doc</td>
</tr>
<tr>
<td>My Letter</td>
<td>My Letter.docx</td>
</tr>
<tr>
<td>My Letter</td>
<td>My Letter.pdf</td>
</tr>
<tr>
<td>My Letter</td>
<td>My Letter.txt</td>
</tr>
</tbody>
</table>

Before the extension is made visible, the only visual cue might be the icon shown for each file.

**Here is how to show the real, complete name of your files on your computer:**

3. Macintosh

- General method:
- Click anywhere on the Desktop to see the finder menu at the top of the screen
- On the upper left, next to the apple, click on “Finder” and choose “Preferences…”
- Click on the “Advanced” tab (top right of window)
- Check the box next to “Show all filename extensions”
- From now on all the file extensions will be
shown.

- **Single file method:**

It is also possible to change this on a per file basis with the Finder menu Get Info (⌘ I) and clicking the square button Hide extension as shown in this example.

![Image](image.png)

## 4. Windows

Microsoft web sites don’t seem to have this info easily found. Paragraph below could be useful.

### 4.1. Control Panel (Windows 10)

Some versions might best be served by using the Control Panel\(^1\).

To show or hide file name extensions:

1. Open Folder Options by clicking the **Start** button 📱, clicking **Control Panel**, clicking **Appearance and Personalization**, and then clicking **Folder Options**.

2. Click the **View** tab, and then, under **Advanced settings**, do one of the following:

   - To show file name extensions, clear the **Hide extensions for known file types** check box, and then click **OK**.
   - To hide file name extensions, select the **Hide extensions for known file types** check box, and then click **OK**.

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