CSE341: Programming Languages
Installing and Using Ruby and irb

Contents

1 Overview

The last two units will be using the Ruby language. We recommend editing your files in Emacs and using irb, which is Ruby's REPL. (If you prefer a different editor that has support for Ruby, that is fine.) This document describes basic installation and usage steps sufficient for doing your homework. Unlike when we used SML, we recommend running the REPL from a terminal (shell) window, *not* from within Emacs. This is described below.

For installation purposes related to Homework 6, there are some key facts:

- **You need to have some version of Ruby 2, but based on recent installation troubles, we recommend you not use Ruby 2.3.0 and perhaps not 2.3.x for any x. And we haven't tried 2.4.x yet.** We will grade with Ruby 2.2 but believe any version of Ruby 2.x.y (or even 1.9) should work fine except for the Ruby 2.3 troubles. Please do not use Ruby 1.8 since there are substantial language differences (though not relevant to any of our high-level concepts).

- You need to have a version of the Tk graphical toolkit.

- If you have Emacs version 23 or higher, you should not need to configure it in any special way for using Ruby: opening a file with extension `.rb` should use Ruby mode.

- If you have a version of Ruby that is not working, we recommend you uninstall it before installing a different version, though there are ways to avoid doing this if needed.

Because this document describes installation for various operating systems, you do not need to read it all. Just find the section that is most convenient for you. But also notice the last two sections of this document, which have information relevant to all operating systems.

2 Windows

2.1 Using Windows in the Department's Undergraduate Labs

- You do not need to install any software.

- Create a Ruby file (e.g., by downloading the provided code and renaming it) wherever is convenient (e.g., where you have been storing your other homework assignments). **Do not store it on the desktop or under C:\ because all changes to these directories get erased when you log out. Store your files under Z:\ (your directory on the department file system) or somewhere else (e.g., on a personal usb drive).**

- Open Emacs however is convenient. You should be able to find it by, e.g., typing `emacs` in the "Search Programs and Files" from the Start Menu.

- Open your Ruby file in Emacs, by dragging it from an Explorer window onto Emacs, or by C-x C-f and then entering the full path to the file, or by using the File menu. Edit and save the file as usual.

- In Windows, open a command shell, either by running `cmd` (a Windows shell) or a cygwin bash shell. Use the `cd` command to switch to the directory where your Ruby file is (using the Windows shell you separate directories with backward slashes (\) and with cygwin you use forward slashes (/)). *After* you are in the right directory, type `irb` to start the Ruby REPL. Alternately, you can use File Explorer to navigate to the folder holding your Ruby file, then hold down shift while right-clicking to bring up an option to "Open a command shell here" — this will open the shell already switched to that directory.

2.2 Using Your Own Windows Machine

- If you did not install Emacs earlier in the course, do so using the instructions for the SML portion of the course. Note you do not need SML mode — all you need to do is install Emacs.

- Go to `http://rubyinstaller.org/`, click on the giant red 'Download' button, and click on the latest Ruby 2.2.6 RubyInstaller (not the x64 variant and not the Ruby 2.3.3 or 2.4.x variants).

- Run the installer.
  - Accept the License.
  - **On the next screen, click all three boxes: Install Tcl/Tk support, Add Ruby executables to your PATH, and Associate .rb and .rbw files with this Ruby installation:**
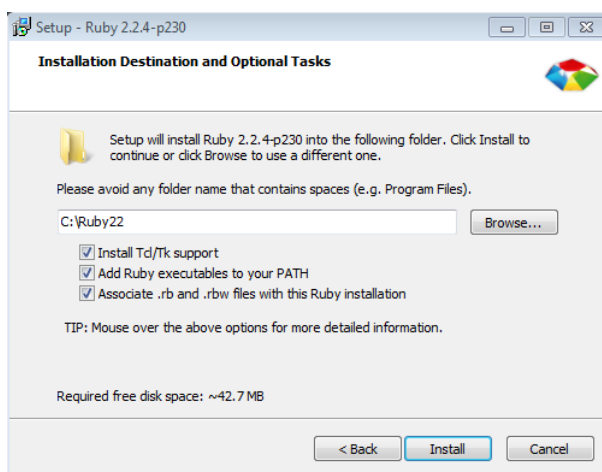
– Then click Install.

- Create a Ruby file (e.g., by downloading the provided code and renaming it) wherever is convenient (e.g., where you have been storing your other homework assignments).

- Open Emacs however is convenient, e.g., from the Start Menu.

- Open your Ruby file in Emacs, by dragging it from an Explorer window onto Emacs, or by C-x C-f and then entering the full path to the file, or by using the File menu. You can now edit and save the file as usual.

- In Windows, open a command shell by running `cmd` (a Windows shell). Use the `cd` command to switch to the directory where your Ruby file is (using the Windows shell you separate directories with backward slashes (\)). *After* you are in the right directory, type `irb` to start the Ruby REPL. Alternately, you can use File Explorer to navigate to the folder holding your Ruby file, then hold down shift while right-clicking to bring up an option to "Open a command shell here" — this will open the shell already switched to that directory.

2.3 Using the Department's Windows Machines Remotely

- Follow the instructions for your operating system at `http://vdi.cs.washington.edu/vdi/` to connect.

- Once connected, follow the directions above for *Using Windows in the Department Undergraduate Labs*.

- Save your work often in case you lose your connection.

3 Linux

3.1 Using Linux in the Department's Undergraduate Labs

- You do not need to install any software.

- Create a Ruby file (e.g., by downloading the provided code and renaming it) wherever is convenient (e.g., where you have been storing your other homework assignments).

- Open Emacs however is convenient (one way is to *activities*, then *applications*, then the icon for *emacs*).

- Open your Ruby file in Emacs by C-x C-f and then entering the full path to the file, or by using the File menu. You can now edit and save the file as usual.

- Open a command shell however is convenient (one way is to find the terminal program under the large list of applications).

- Use the `cd` command to switch to the directory where your Ruby file is (separating directories with forward slashes). *After* you are in the right directory, type `irb` to start the Ruby REPL.

3.2 Using Your Own Linux machine

Most Linux distributions should make it easy to install a recent version of Ruby and connect it to the Tk graphics library.

- When you install Ruby, explicitly get some 2.x.y version (e.g., 2.2.4). If you install the default "ruby" package, check the version.

- You can use your favorite package manager GUI, or on the command line. For example, on Debian (Ubuntu, Mint) systems, type: `sudo apt-get install ruby2.2.4`

- If irb is a separate package, install that too, again looking for an explicit use of the same Ruby version.

- After installation, you can check the version by running `ruby --version`.

- Create a Ruby file (e.g., by downloading the provided code and renaming it) wherever is convenient (e.g., where you have been storing your other homework assignments).

- Open Emacs or whatever text editor you are using.

- Open your Ruby file in Emacs by C-x C-f and then entering the full path to the file, or by using the File menu. You can now edit and save the file as usual.

- Open a command shell however is convenient.

- Use the `cd` command to switch to the directory where your Ruby file is (separating directories with forward slashes). *After* you are in the right directory, type `irb` to start the Ruby REPL.

3.3   Using the Department's Remote Linux Server `attu`

- On Linux or Mac

  - Open a terminal window
  - Run `ssh -X uname@attu.cs.washington.edu`, replacing `uname` with your CSE id, and log in with your CSE Linux password.

- On Windows

  - Use a program like PuTTY (`http://www.putty.org`) to gain access to SSH.
  - Connect to `uname@attu.cs.washington.edu`, replacing `uname` with your CSE NetId, and log in with your CSE Linux password.

- On `attu`, open Emacs and your Ruby code.

- On `attu`, run `irb` or `Ruby` from the command line as described below.

3.4   Using the Department's Linux Virtual Machine on Your Machine

The department provides a Linux virtual machine that runs on your own computer no matter what operating system you have.

Installation

- The instructions for the current release are available here:
  `https://www.cs.washington.edu/lab/software/linuxhomevm`.

- Run these three commands at a shell prompt:

```
sudo yum -y install sqlite-devel
curl -sSL https://get.rvm.io | bash
rvm reinstall ruby-2.2.3 --with-tcl --with-tk
```

Running Ruby

- You should now be able to simply follow the instructions above for *Using Linux in the Department Undergraduate Labs.*

4 Mac

How to install what, if anything, you need, depends on your version of Mac OS X. After you're done installing, see the last section for how to edit files and run Ruby.

If installing Ruby, use Ruby Version 2.2.3 or similar, not Ruby Version 2.3.X, which appears to have a bug that prevents using our graphics code.

If you find the instructions do not work, please let us know so we can update them.

4.1 Installation: Mac OS X High Sierra, Sierra, and El Capitan

Ruby 2.0 is already installed, but for Homework 6 we will also need the Tk graphics library, so we will install Tk and a newer version of Ruby (2.2.3 but not 2.3) as follows:

- Make sure you have the Homebrew package manager installed (check using `which brew` in Terminal). Also check that the directory `/usr/local/Cellar` exists and is owned by you (not root).

- Install ActiveTcl 8.5 instead of the latest version from `http://www.activestate.com/activetcl/downloads` or this more convenient direct link: `http://downloads.activestate.com/ActiveTcl/releases/8.5.18.0/ActiveTcl8.5.18.0.298892-macosx10.5-i386-x86_64-threaded.dmg`.

- Install the Ruby version manager with the instructions to "Install RVM stable with Ruby" at `https://rvm.io/rvm/install` (basically run a couple commands on that web page in Terminal).

- Now in Terminal, run the command `rvm reinstall ruby-2.2.3 --with-tcl --with-tk` (see `http://stackoverflow.com/questions/20874900/ruby-require-tk-yields-loaderror-no-such-file-to-load-tk`).

- Now in Terminal, tell rvm to make the installation from the previous step the default version via `rvm use 2.2.3 --default`.

Running `gem install tk` may also work.

4.2 Installation: Mac OS X Yosemite and Mavericks

Ruby 2.0 is already included, which should work fine, and should already be connected to Tk graphics. So, there's nothing to do.

4.3 Installation: Mac OS X Mountain Lion and Older

By default, you have Ruby 1.8.7 installed if you have Ruby installed at all, so you will need a more recent version of Ruby. Try to follow the same instructions as for El Capitan above, but if you run into problems, email the course staff and we will try to help and, working with you, provide more detailed instructions by updating this document. (Or you can use a different approach, such as using the department labs, the department virtual machine, or the department's remote access.)

4.4   Editing and Running Code

- You should be able to use Emacs to edit files and your *Terminal* program to navigate directories and run `irb` and `ruby`. In other words, your Mac *Terminal* behaves like a Linux terminal. Use the `cd` command to switch to the directory where your Ruby file is (separating directories with forward slashes). *After* you are in the right directory, type `irb` to start the Ruby REPL.

- For a better terminal application, consider *iTerm2*, available free at `http://www.iterm2.com/`.

- For a native Emacs experience on Mac, consider *Aquamacs*, available free at `http://aquamacs.org/`.

5   General Information on Using (or Not Using) the REPL

- As described previously, run `irb` from the command line to start the REPL.

- To run the code in file `foo.rb`, do `load "foo.rb"` assuming the file is in the same directory where you started irb.

- As usual, it is least error-prone to restart the REPL after editing and resaving any files you are using. Reloading a file without restarting may work depending on what has changed.

- To quit, type `quit` or `exit` or *Control-d* (i.e., `d` while holding down the Control key). As usual in Ruby, there is more than one way to do things.

- You can cycle through previous input lines by using the up and down arrows.

- Unlike in SML, do *not* end a line of REPL input with a semicolon. This will *not* work because this indicates to the REPL exactly that you want to enter another expression before evaluating anything.

You can also run a Ruby program that is in file `foo.rb` by running `ruby "foo.rb"` from the shell command-line (the place where you ran `irb`, *not* from within `irb`). For this to be useful, your Ruby file should have some top-level expression like a call to a method outside of any class or method definition. Otherwise, "nothing will happen" since just defining methods has no effect until you use one of them.

On Windows and perhaps other operating systems, you can also just double-click on your `foo.rb` file to have the same effect as running `ruby foo.rb`. This approach may bring up another blank window, which you can ignore.

6   Main Links for Ruby Documentation, etc.

- The main Ruby home page is `http://www.ruby-lang.org/`.

- For documentation, you may find `http://ruby-doc.org/` at least as useful. See in particular the standard-library documentation. (The library differences among recent versions are probably very minor.)

- There are many excellent books on Ruby available, which you may find useful but not required for the material in this course. We particularly recommend Programming Ruby 1.9 & 2.0: The Pragmatic Programmers' Guide by Dave Thomas et al; see `https://pragprog.com/book/ruby4/programming-ruby-1-9-2-0`.