

Org-mode coding assignment

This file contains the first Org-mode assignment, a glossary of terms, and a sample solution in the programming language R instead of C. The main challenge is not the programming language but managing the complexity of writing a "literate" program, which includes layout, documentation, source code and result elements. Note that the sample solution also lists relevant references at the end¹.

Assignment

Create an Org-mode file with the following characteristics:

- A **headline**: * My first Org-mode file.
- A paragraph of **text** that explains what the following code block does. You can break it down with bullets or numbers.
- A C source **code block**, which looks like this:

```
#+name: [name]
#+begin_src [header]
  [statements]
#+end_src
```

- Replace [name] by hello_world_program.
- For the source code block [header], use the following **arguments**:

```
:main yes
:includes stdio.h
:tangle first.c
:exports both
:comments both
:results raw
```

- In the body of the code block, replace the [statements] by a single command preceded by a comment:

```
// print a string
puts("hello world");
```

- Save the file as YourName.org (e.g. MarcusBirkenkrahe.org)
- Upload the file to [this GitHub repo](#): /birkenkrahe/cc100/assignments/org-mode

Example solution in R (not C)

When you look at this solution as a PDF or on GitHub, you will not see the **Org-mode** commands delimited by #+. Org-mode files need to be edited/viewed in GNU Emacs.

My first Org-mode file

- The function str() prints all variables (column vectors) of a data structure.
- In the code block, str() is applied to the built-in data frame mtcars.
- The result shows that mtcars contains 32 rows (observations) of 11 variables.

- The syntax is not highlighted (language keywords like `str` and data like `mtcars` are not visually distinguished).
- The code block header has the following arguments:

HEADER ARGUMENT	MEANING
<code>:session *R*</code>	Run R in a session in the Emacs buffer <code>*R*</code>
<code>:var DATA="mtcars"</code>	Assign <code>mtcars</code> to the variable <code>DATA</code>
<code>:results output</code>	insert output directly in the org file
<code>:tangle first.R</code>	export source code as R file <code>first.R</code> ("tangle")
<code>:exports both</code>	both result and source code will be exported
<code>:comments both</code>	link source code and org files, add comments to source

```
## print structure of mtcars data frame
str(mtcars)
```

```
'data.frame':  32 obs. of  11 variables:
 $ mpg : num  21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
 $ cyl : num   6  6  4  6  8  6  8  4  4  6 ...
 $ disp: num  160 160 108 258 360 ...
 $ hp  : num  110 110  93 110 175 105 245  62  95 123 ...
 $ drat: num   3.9  3.9  3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
 $ wt  : num   2.62 2.88 2.32 3.21 3.44 ...
 $ qsec: num  16.5 17 18.6 19.4 17 ...
 $ vs  : num   0  0  1  1  0  1  0  1  1  1 ...
 $ am  : num   1  1  1  0  0  0  0  0  0  0 ...
 $ gear: num   4  4  4  3  3  3  3  4  4  4 ...
 $ carb: num   4  4  1  1  2  1  4  2  2  4 ...
```

Executing the program on the command line

In Emacs - provided the R software is installed and in the PATH:

```
M-x eshell
Rscript mtcars.R
```

References

- GCC, the GNU Compiler Collection. [URL: gcc.gnu.org](http://gcc.gnu.org).
- GitHub: software hosting platform. [URL: github.com](https://github.com).
- Kernighan, Brian W.; Ritchie, Dennis M. (February 1978). The C Programming Language (1st ed.). Englewood Cliffs, NJ: Prentice Hall. ISBN 0-13-110163-3. [URL: archive.org](http://archive.org).
- Knuth (1992). Literate Programming. Stanford: CSLI. [URL: stanford.edu](http://stanford.edu).
- mtcars: Motor Trend Car Road Tests. [URL: rdocumentation.org](http://rdocumentation.org).
- R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. [URL: r-project.org](http://r-project.org).
- str: Compactly Display the Structure of an Arbitrary R Object. [URL: rdocumentation.org](http://rdocumentation.org).

- tecosaur (n.d.). The Org Manual: 16 Working with Source Code [website]. [URL: orgmode.org](https://orgmode.org).

Glossary

Your org files and notebooks do not always have to have glossaries, but if you have non-trivial information ready to be summarized or visualized, you should use tables and graphs to do so.

TERM	EXPLANATION
Org-mode headline	Starts with one ore more * characters
Org-mode code block	An executable (in some language) block of text
Org-mode code block header	Language and optional arguments
Argument	Some data passed on for further processing
Function	Algorithm $f(x)$ expecting an argument x
String	Data type representing text
Begin/End statement	Symbol to signal the start/end of a command
File	Storage unit in a computer
GitHub repo	Cloud storage platform
Uploading	Sending so that file exists locally and remotely

Footnotes:

¹ The references have URLs, and these URLs have inline links. To add a link in GNU Emacs Org-mode, use the key sequence `C-x C-1 [link] RET (~org-insert-link)`. In published Org files, references should be used in the text as inline citations like in the example below, which links the first mention of R to a reference.

Create an R source block in R (R Core Team, 2021).

This is also why there are so many references - one reference for every non-trivial concept or software tool used!

Created: 2021-12-30 Thu 13:44

[Validate](#)