bookdown + exams + webex

First and foremost, the main part of the hack is to realize that any exercises in a .Rmd file can be broken into a list using `exams::xexams`. Let's use an example from the book, with the first three exercises of chapter 01:

```
# example from book
afedR::copy_book_files(path_to_copy = tempdir())
## Copying data files files to /tmp/RtmpIs4EpM/afedR files/data
##  37 files copied
## Copying end-of-chapter (eoc) exercises with solutions to
/tmp/RtmpIs4EpM/afedR files/eoc-exercises/
##  99 files copied
## Copying R code to /tmp/RtmpIs4EpM/afedR files/R-code
##  15 files copied
# temp folder with exercises
eoc_dir <- file.path(tempdir(), 'afedR files/eoc-exercises/')

# select exercises
my_exercises <- list.files(eoc_dir, pattern = '*.Rmd', full.names =
TRUE)
my_exercises <- my_exercises[1:3]

# break it down
my_l <- exams::xexams(my_exercises)

# check it
dplyr::glimpse(my_l)
## List of 1
##  $ exam1:List of 3
##   ..$ exercise1:List of 6
##   .. ..$ question    : chr [1:3] "" "The R language was developed
based on what other programming language?" ""
##   .. ..$ questionlist: chr [1:5] "C++" "Python" "Julia" "Javascript"
...
##   .. ..$ solution    : chr [1:2] "" "Straight from the book, section
**What is R**: \"R is a modern version of S, a programming language
originally "| __truncated__
##   .. ..$ solutionlist: NULL
##   .. ..$ metainfo    :List of 18
##   .. ..$ supplements : Named chr(0)
##   .. .. ..- attr(*, "names")= chr(0)
##   .. .. ..- attr(*, "dir")= chr "/tmp/RtmpIs4EpM/
file4e094f974499/exam1/exercise1"
##   ..$ exercise2:List of 6
##   .. ..$ question    : chr [1:3] "" "What are the names of the two
authors of R?" ""
##   .. ..$ questionlist: chr [1:5] "Linus Torvalds and Richard
Stallman" "John Chambers and Robert Engle" "Roger Federer and Rafael
Nadal" "Guido van Rossum and Bjarne Stroustrup" ...
```

```
##   .. ..$ solution    : chr [1:3] "" "Straight from the book: \"...
The base code of R was developed by two academics, **Ross Ihaka** and
**Robert Ge"| __truncated__ ""
##   .. ..$ solutionlist: NULL
##   .. ..$ metainfo    :List of 18
##   .. ..$ supplements : Named chr(0)
##   .. .. ..- attr(*, "names")= chr(0)
##   .. .. ..- attr(*, "dir")= chr "/tmp/RtmpIs4EpM/
file4e094f974499/exam1/exercise2"
##   ..$ exercise3:List of 6
##   .. ..$ question    : chr [1:4] "" "Why is R special when comparing
to other programming languages, such as Python, C++, javascript and
others?" "" ""
##   .. ..$ questionlist: chr [1:5] "It was designed for analyzing data
and producing statistical output" "Easy to use" "Works on any plataform
such as Windows, Unix, MacOS" "Makes it easy to write mobile apps" ...
##   .. ..$ solution    : chr [1:2] "" "Undoubtedly, the main
differential of the R language is the ease with which data can be
analyzed on the platfor"| __truncated__
##   .. ..$ solutionlist: NULL
##   .. ..$ metainfo    :List of 18
##   .. ..$ supplements : Named chr(0)
##   .. .. ..- attr(*, "names")= chr(0)
##   .. .. ..- attr(*, "dir")= chr "/tmp/RtmpIs4EpM/
file4e094f974499/exam1/exercise3"
```

As an example, in this list you can see the main text of the question 01 in slot `l_out$exam1$exercise1$question`:

```
my_l$exam1$exercise1$question
## [1] ""
## [2] "The R language was developed based on what other programming
language?"
## [3] ""
```

And the solution at `my_l$exam1$exercise1$solution`

```
my_l$exam1$exercise1$solution
## [1] ""
## [2] "Straight from the book, section **What is R**: \"R is a modern
version of S, a programming language originally created in Bell
Laboratories (formerly AT&T, now Lucent Technologies).\""
```

In my case, I wanted the html version of the book to have all the solutions hidden by a clickable button – just like in `webex` – while the pdf and ebook would only have the text of the questions. Here are the functions I used:

```
compile_eoc_exercises <- function(files_in, type_doc) {
  my_counter <<- 1

  if (is.null(type_doc)) {
    type_doc = 'html'
    #type_doc = 'latex'
```

```
  }

  for (i_ex in files_in) {
    exercise_to_html(i_ex, my_counter = my_counter,
                     type_doc)

    my_counter <<- my_counter +1
  }

  return(invisible(TRUE))
}

exercise_to_html <- function(f_in, my_counter, type_doc) {

  require(exams)
  require(webex)
  require(tidyverse)

  text_pre_solution <- paste0('To reach the same result, you must
execute the code below. ',
                              'For that, open a new R script in RStudio
(Control+shift+N), ',
                              'copy and paste the code, and execute it
whole by pressing ',
                              'Control+Shift+Enter or line by line with
shortcut ',
                              'Control+Enter.')

  my_dir <- file.path(tempdir(), basename(tempfile()))
  dir.create(my_dir)

  suppressMessages({
  l_out <- exams::xexams(f_in, driver = list(sweave = list(png =
TRUE)),
                         dir = my_dir)

  })

  exercise_text <- paste0(l_out$exam1$exercise1$question, collapse =
'\n')
  alternatives <- l_out$exam1$exercise1$questionlist
  correct <- l_out$exam1$exercise1$metainfo$solution
  solution <- paste0(l_out$exam1$exercise1$solution,
                     collapse = '\n')
  ex_type <- l_out$exam1$exercise1$metainfo$type

  if (type_doc %in% c('latex', 'epub3')) {

    my_str <- str_glue('\n\n {sprintf("%02d", my_counter)} -
{exercise_text} \n\n ')

    if (ex_type == 'schoice') {
```

```
      n_alternatives <- length(alternatives)

      for (i_alt in seq(1, n_alternatives)) {
        my_str <- paste0(my_str,
                         letters[i_alt],') ', alternatives[i_alt],
                         '\n')
      }

    }

    cat(my_str)

    return(invisible(TRUE))

  } else if (type_doc == 'html') {

    if (ex_type == 'schoice') {
      vec_mcq <- sample(
        c(alternatives[!correct],
          answer = alternatives[correct])
      )

      my_answers_text <- str_glue('
 Solution: {mcq(vec_mcq)}')
      numeric_sol <- alternatives[correct]
      text_sol <- str_glue('The solution is {numeric_sol}.
{text_pre_solution}')

    } else if (ex_type == 'num') {

      numeric_sol <- correct
      my_answers_text <- str_glue('

 Your Answer: {fitb(correct)}')
      text_sol <- str_glue('The solution is {numeric_sol}.
{text_pre_solution}')

    } else if (ex_type == 'string') {
      my_answers_text <- ''
      numeric_sol <- ''

      if (stringr::str_detect(solution,
                              '```text')) {
        text_sol <- paste0('In order to execute the code, open a new R
script in RStudio (Control+shift+N), ',
                           'copy and paste the code, and execute it
whole by pressing ',
                           'Control+Shift+Enter or line by line with
shortcut ',
                           'Control+Enter.')

      } else {
```

```
        text_sol <- ''
      }

    }

    my_str <- paste0('\n\n
```

```
 \n',
                     webex::total_correct(), '\n',
                     '### Q.', my_counter, '{-} \n',
                     exercise_text, '\n',
                       my_answers_text)

    temp_id <- basename(tempfile(pattern = 'collapse_'))
    sol_str <- str_glue(
      '
```

{text_sol}

{solution}

```
')

    cat(paste0(my_str, '\n' ,
               sol_str))

  }

  return(invisible(TRUE))

}
```

Html Exercises

The html output for the selected three exercises is given next. Do notice that the correct solution is **not highlighted** in this blog post due to the lack of css and javascript. In the final result you'll see that it works correctly. Also, you'll need to set `results='asis'` in the knitr options of the chunk (the code output pure html).

```
compile_eoc_exercises(my_exercises, type_doc = 'html')
```

Q.1

The R language was developed based on what other programming language?

Solution:

The solution is S. To reach the same result, you must execute the code below. For that, open a new R script in RStudio (Control+shift+N), copy and paste the code, and execute it whole by pressing Control+Shift+Enter or line by line with shortcut Control+Enter.
Straight from the book, section **What is R**: “R is a modern version of S, a programming language originally created in Bell Laboratories (formerly AT&T, now Lucent Technologies).”

Q.2

What are the names of the two authors of R?

Solution:

The solution is Ross Ihaka and Robert Gentleman. To reach the same result, you must execute the code below. For that, open a new R script in RStudio (Control+shift+N), copy and paste the code, and execute it whole by pressing Control+Shift+Enter or line by line with shortcut Control+Enter.

Straight from the book: “… The base code of R was developed by two academics, **Ross Ihaka** and **Robert Gentleman**, resulting in the programming platform we have today.”.

Q.3

Why is R special when comparing to other programming languages, such as Python, C++, javascript and others?

Solution:

The solution is It was designed for analyzing data and producing statistical output. To reach the same result, you must execute the code below. For that, open a new R script in RStudio (Control+shift+N), copy and paste the code, and execute it whole by pressing Control+Shift+Enter or line by line with shortcut Control+Enter.
Undoubtedly, the main differential of the R language is the ease with which data can be analyzed on the platform. Although other languages also allow data analysis, it is in R where this process is supported by a wide range of specialized packages.

Pdf/Ebook Exercises

And for latex (pdf) and epub3 (ebook), the result is:

```
compile_eoc_exercises(my_exercises, type_doc = 'latex')
```

01 - The R language was developed based on what other programming language?

a. C++
b. S
c. Javascript
d. Julia
e. Python

02 - What are the names of the two authors of R?

a. Guido van Rossum and Bjarne Stroustrup
b. John Chambers and Robert Engle
c. Roger Federer and Rafael Nadal
d. Ross Ihaka and Robert Gentleman
e. Linus Torvalds and Richard Stallman

03 - Why is R special when comparing to other programming languages, such as Python, C++, javascript and others?

a. Works on any plataform such as Windows, Unix, MacOS
b. Easy to use
c. Quick code execution
d. Makes it easy to write mobile apps
e. It was designed for analyzing data and producing statistical output