readxl (1)

INTRODUCTION TO IMPORTING DATA IN R

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Microsoft Excel

- Common data analysis tool
- Many R packages to interact with Excel
- readxl - Hadley Wickham

Typical Structure Excel Data

- Different sheets with tabular data

Capital	Population
New York	16044000
Berlin	3433695
Madrid	3010492
Stockholm	1683713

year_1990

	Population
	17800000
Berlin	3382169
Madrid	2938723
Stockholm	1942362

year_2000

readxl

- excel_sheets()
  - list different sheets
- read_excel()
  - actually import data into R

```
install.packages("readxl")
library(readxl)
```

excel_sheets()

```
dir()
```

```
"cities.xlsx"  "the_rest_is_secret.txt"
```

```
excel_sheets("cities.xlsx")
```

```
"year_1990" "year_2000"
```

read_excel()

```
read_excel("cities.xlsx")
```

```
# A tibble: 4 × 2
    Capital Population
      <chr>      <dbl>
1  New York   16044000
2    Berlin    3433695
3    Madrid    3010492
4 Stockholm    1683713
```

```
read_excel("cities.xlsx", sheet = 2)
read_excel("cities.xlsx", sheet = "year_2000")
```

```
# A tibble: 4 × 2
    Capital Population
      <chr>      <dbl>
1  New York   17800000
2    Berlin    3382169
3    Madrid    2938723
4 Stockholm    1942362
```

readxl (2)

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read_excel()

```
read_excel(path, sheet = 1,
           col_names = TRUE,
           col_types = NULL,
           skip = 0)
```

Capital	Population
New York	16044000
Berlin	3433695
Madrid	3010492
Stockholm	1683713

year_1990

	Population
	17800000
Berlin	3382169
Madrid	2938723
Stockholm	1942362

year_2000

read_excel() - col_names

```
read_excel(path, sheet = 1,
           col_names = TRUE,
           col_types = NULL,
           skip = 0)
```

- col_names = FALSE: R assigns names itself
- col_names = character vector: manually specify

read_excel() - col_types

```
read_excel(path, sheet = 1,
           col_names = TRUE,
           col_types = NULL,
           skip = 0)
```

```
read_excel("cities.xlsx", col_types = c("text", "text"))
```

```
# A tibble: 4 × 2
    Capital Population
      <chr>      <chr>
1  New York   16044000
2    Berlin    3433695
3    Madrid    3010492
4 Stockholm    1683713
```

read_excel() - col_types

```
read_excel(path, sheet = 1,
           col_names = TRUE,
           col_types = NULL,
           skip = 0)`
```

```
read_excel("cities.xlsx",
             col_types = c("text", "blank"))
```

```
# A tibble: 4 × 1
    Capital
      <chr>
1  New York
2    Berlin
3    Madrid
4 Stockholm
```

read_excel() - skip

```
read_excel(path, sheet = 1,
           col_names = TRUE,
           col_types = NULL,
           skip = 0)
```

```
read_excel("cities.xlsx",
             col_names = c("Capital", "Population"),
             skip = 2)
```

```
# A tibble: 3 × 2
    Capital Population
      <chr>      <dbl>
1    Berlin    3433695
2    Madrid    3010492
3 Stockholm    1683713
```

- n_max not (yet) available

Wrap-up

- excel_sheets()
- read_excel()
- Everything you need!
- Fast
- Same arguments as in readr package
- Consistency

gdata

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gdata

- Gregory Warnes
- Entire suite of tools for data manipulation
- Supercharges basic R
- read.xls()
- Support for XLS
- Support for XLSX with additional driver
- No readxl::excel_sheets() equivalent

gdata

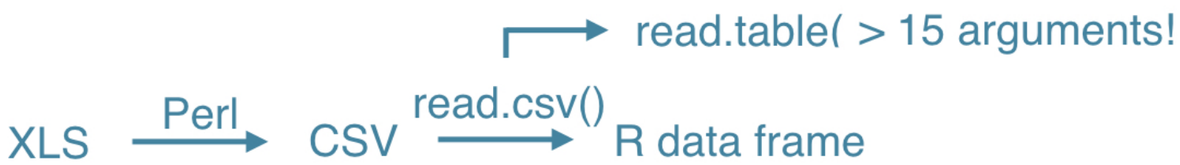
XLS $\xrightarrow{\text{Perl}}$ CSV

gdata

XLS $\xrightarrow{\text{Perl}}$ CSV $\xrightarrow{\text{read.csv()}}$ R data frame

gdata

gdata



- Elegant extension of utils package
- Easy if familiar with utils
- Extremely inefficient
- readxl < v1.x

cities.xls

Capital	Population
New York	16044000
Berlin	3433695
Madrid	3010492
Stockholm	1683713

year_1990

	Population
	17800000
Berlin	3382169
Madrid	2938723
Stockholm	1942362

year_2000

read.xls()

```
install.packages("gdata")
library(gdata)
```

```
read.xls("cities.xls")
```

```
    Capital Population
1  New York   16044000
2    Berlin    3433695
3    Madrid    3010492
4 Stockholm    1683713
```

```
read.xls("cities.xls", sheet = "year_2000")
```

```
    Capital Population
1  New York   17800000
2    Berlin    3382169
3    Madrid    2938723
4 Stockholm    1942362
```

Reading sheets

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XLConnect

- Martin Studer
- Work with Excel through R
- Bridge between Excel and R
- XLS and XLSX
- Easy-to-use functionality

Installation

```
install.packages("XLConnect")
```

```
also installing the dependencies 'XLConnectJars', 'rJava'
...
```

- Problems?
  - Install Oracle's Java Development Kit (JDK)
  - Google your error!

loadWorkbook()

```r
library("XLConnect")
book <- loadWorkbook("cities.xlsx")
str(book)
```

```
Formal class 'workbook' [package "XLConnect"] with 2 slots
  ..@ filename: chr "cities.xlsx"
  ..@ jobj    : ...
```

getSheets()

```
getSheets(book)
```

```
"year_1990" "year_2000"
```

```
library(readxl)
excel_sheets("cities.xlsx")
```

```
"year_1990" "year_2000"
```

readWorksheet()

```
readWorksheet(book, sheet = "year_2000")
```

```
    Capital Population
1  New York   17800000
2    Berlin    3382169
3    Madrid    2938723
4 Stockholm    1942362
```

readWorksheet()

Capital	Population
New York	17800000
Berlin	3382169
Madrid	2938723
Stockholm	1942362

row 3

row 4

year_2000

col 2

```
readWorksheet(book, sheet = "year_2000",
              startRow = 3,
              endRow = 4,
              startCol = 2,
              header = FALSE)
```

```
     Col1
1 3382169
2 2938723
```

Adapting sheets

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New data!

```
pop_2010 <- data.frame(Capital = c("New York", "Berlin", "Madrid", "Stockholm"),
    Population = c(8191900, 3460725, 3273000, 1372565))

pop_2010
```

```
    Capital Population
1  New York    8191900
2    Berlin    3460725
3    Madrid    3273000
4 Stockholm    1372565
```

createSheet()

```
pop_2010 <- ... # truncated
library(XLConnect)
book <- loadWorkbook("cities.xlsx")
```

Capital	Population
New York	16044000
Berlin	3
Madrid	3
Stockholm	1

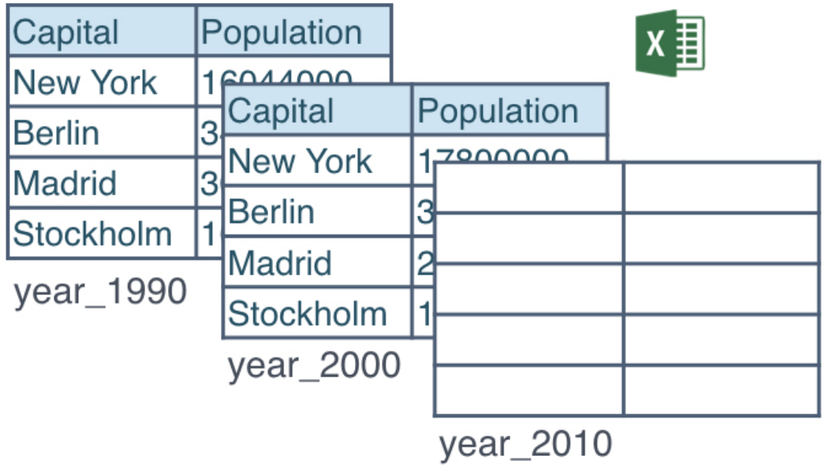
year_1990

Capital	Population
New York	17800000
Berlin	3382169
Madrid	2938723
Stockholm	1942362

year_2000

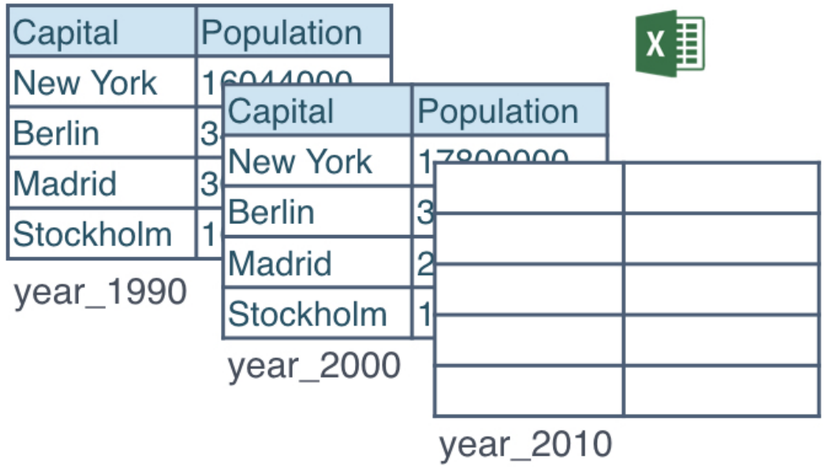
createSheet()

```
pop_2010 <- ... # truncated
library(XLConnect)
book <- loadWorkbook("cities.xlsx")
createSheet(book, name = "year_2010")
```



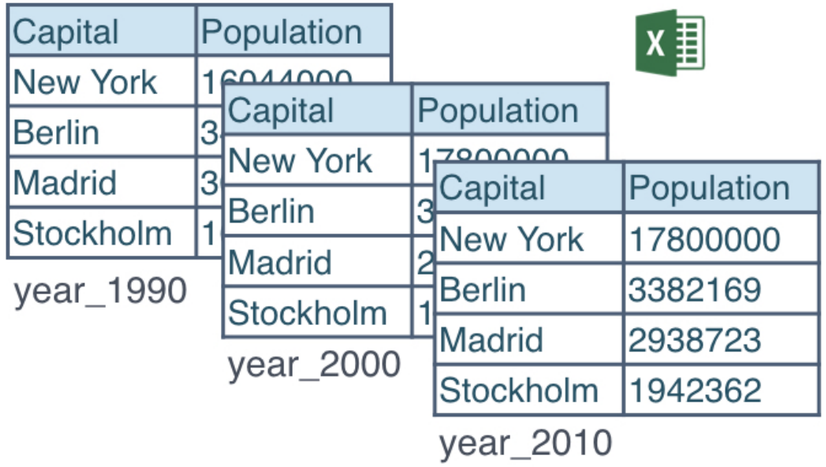
writeWorksheet()

```
pop_2010 <- ... # truncated
library(XLConnect)
book <- loadWorkbook("cities.xlsx")
createSheet(book, name = "year_2010")
writeWorksheet(book, pop_2010, sheet = "year_2010")
```



saveWorkbook()

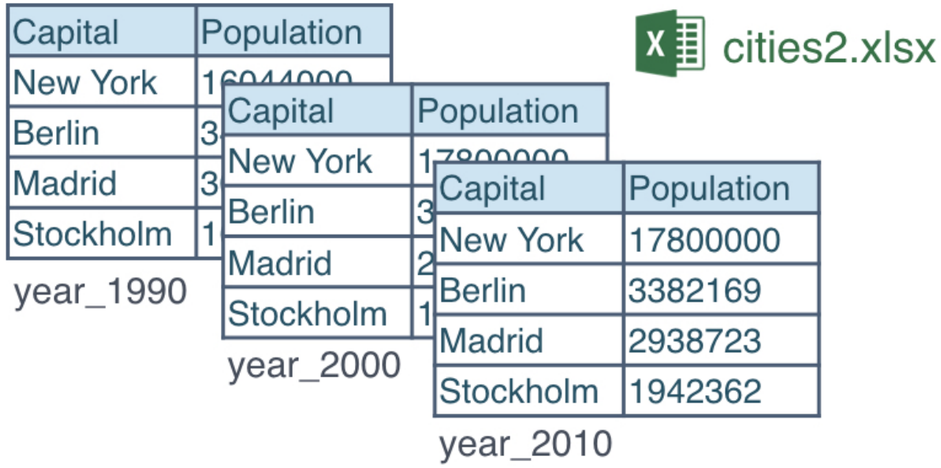
```
pop_2010 <- ... # truncated
library(XLConnect)
book <- loadWorkbook("cities.xlsx")
createSheet(book, name = "year_2010")
writeWorksheet(book, pop_2010, sheet = "year_2010")
```



saveWorkbook()

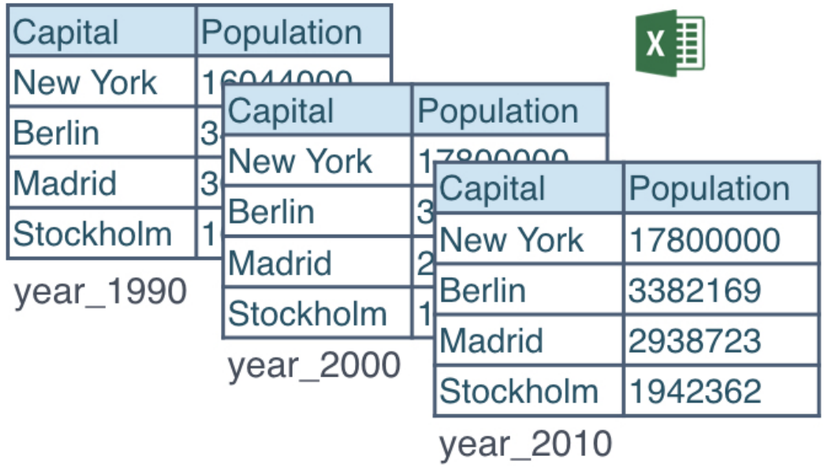
```
pop_2010 <- ... # truncated
library(XLConnect)
book <- loadWorkbook("cities.xlsx")
createSheet(book, name = "year_2010")
writeWorksheet(book, pop_2010, sheet = "year_2010")

saveWorkbook(book, file = "cities2.xlsx")
```



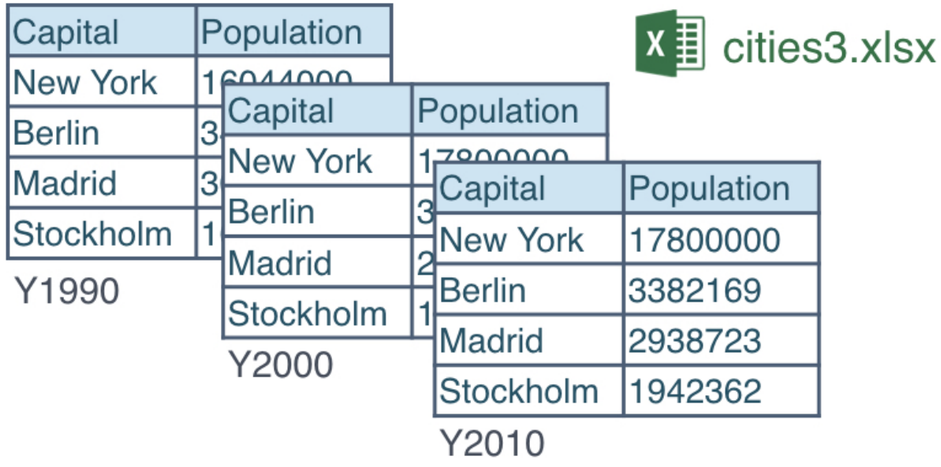
renameSheet()

```
renameSheet(book, "year_1990", "Y1990")
renameSheet(book, "year_2000", "Y2000")
renameSheet(book, "year_2010", "Y2010")
```



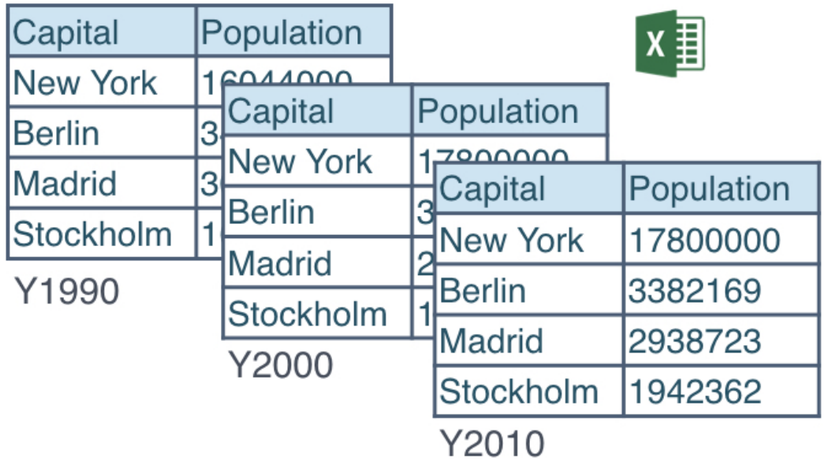
renameSheet()

```
renameSheet(book, "year_1990", "Y1990")
renameSheet(book, "year_2000", "Y2000")
renameSheet(book, "year_2010", "Y2010")
saveWorkbook(book, file = "cities3.xlsx")
```



removeSheet()

```
removeSheet(book, sheet = "Y2010")
```



removeSheet()

```
removeSheet(book, sheet = "Y2010")
saveWorkbook(book, file = "cities4.xlsx")
```

Capital	Population
New York	16044000
Berlin	3
Madrid	3
Stockholm	1

Y1990

Capital	Population
New York	17800000
Berlin	3382169
Madrid	2938723
Stockholm	1942362

Y2000

cities4.xlsx

Wrap-up

- Basic operations
- Reproducibility is the key!
- More functionality
  - Styling cells
  - Working with formulas
  - Arranging cells
  - ...