

No APIs, No Problem

Automating content delivery with R and Excel

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 @GoldbergData

slides at goldbergdata.github.io/no-api-no-problem



Your boss wants 49 Excel sheets, but why?



Data dump

sales_data

```
## # A tibble: 9,994 x 21
##   Person `Order ID` `Order Date`      `Ship Date`      `Ship Mode`
##   <chr>  <chr>      <dtm>          <dtm>          <chr>
## 1 Cassa... CA-2016-1... 2016-11-08 00:00:00 2016-11-11 00:00:00 Second Cla...
## 2 Cassa... CA-2016-1... 2016-11-08 00:00:00 2016-11-11 00:00:00 Second Cla...
## 3 Anna ... CA-2016-1... 2016-06-12 00:00:00 2016-06-16 00:00:00 Second Cla...
## 4 Cassa... US-2015-1... 2015-10-11 00:00:00 2015-10-18 00:00:00 Standard C...
## 5 Cassa... US-2015-1... 2015-10-11 00:00:00 2015-10-18 00:00:00 Standard C...
## 6 Anna ... CA-2014-1... 2014-06-09 00:00:00 2014-06-14 00:00:00 Standard C...
## 7 Anna ... CA-2014-1... 2014-06-09 00:00:00 2014-06-14 00:00:00 Standard C...
## 8 Anna ... CA-2014-1... 2014-06-09 00:00:00 2014-06-14 00:00:00 Standard C...
## 9 Anna ... CA-2014-1... 2014-06-09 00:00:00 2014-06-14 00:00:00 Standard C...
## 10 Anna ... CA-2014-1... 2014-06-09 00:00:00 2014-06-14 00:00:00 Standard C...
## # ... with 9,984 more rows, and 16 more variables: `Customer ID` <chr>,
## #   `Customer Name` <chr>, Segment <chr>, Country <chr>, City <chr>,
## #   State <chr>, `Postal Code` <dbl>, Region <chr>, `Product ID` <chr>,
## #   Category <chr>, `Sub-Category` <chr>, `Product Name` <chr>,
## #   Sales <dbl>, Quantity <dbl>, Discount <dbl>, Profit <dbl>
```



XLConnect created by Mirai Solutions GmbH

Excel interface

What can XLConnect do?

Excel interface

What can XLConnect do?

- Create/load Excel workbooks

Excel interface

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- Add/read data from Excel

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- Include images

Excel interface

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- Create/load Excel workbooks
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- Format worksheets (some limitations)
- Include images
- And much more... see [here](#)

Excel interface

What can XLConnect do?

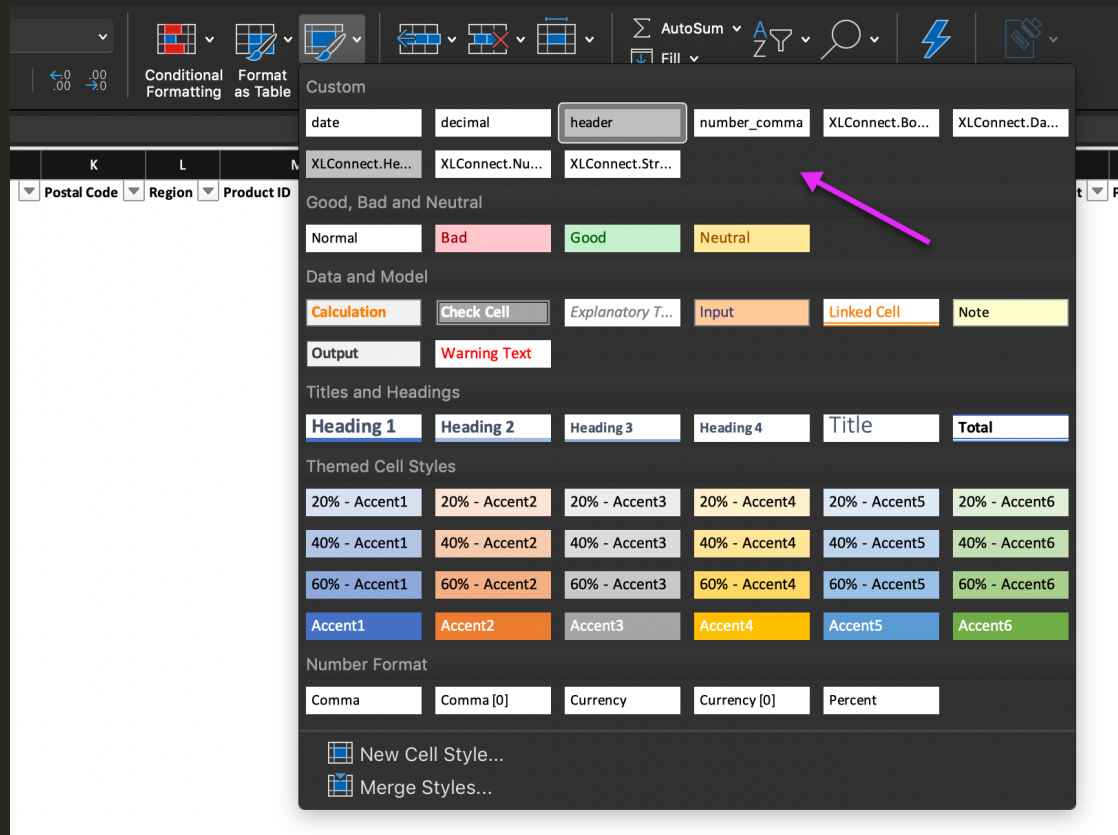
- Create/load Excel workbooks
- Add/read data from Excel
- Format worksheets (some limitations)
- Include images
- And much more... see [here](#)

All programmatically!

Make a template

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	State	Postal Code	Region	Product ID	Category	Sub-Category	Product Name	Sales	Quantity	Discount	Profit
2																				
3																				
4																				
5																				
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Create cell styles



Load/create workbook and styles

```
wb <- loadWorkbook("template.xlsx")
```

```
date_cellstyle <- getCellStyle(wb, "date")  
num_comma_cellstyle <- getCellStyle(wb, "number_comma")  
dec_cellstyle <- getCellStyle(wb, "decimal")  
  
setStyleAction(wb, XLC$STYLE_ACTION.NONE)
```

Write data/format data

```
writeWorksheet(wb, data = data,
               sheet_name,
               startRow = 2,
               header = FALSE)

walk(
  2:(row_count + 1),
  ~ setCellStyle(
    wb,
    sheet = sheet_name,
    row = .x,
    col = 2:3,
    cellstyle = date_cellstyle
  )
)

walk(
  2:(row_count + 1),
  ~ setCellStyle(
    wb,
    sheet = sheet_name,
    row = .x,
    col = c(sales, discount, profit),
    cellstyle = num_comma_cellstyle
  )
)
```


Add a plot to Excel

```
createName(wb, "plot", formula = glue("Summary!{idx2cref(c(1, 6))}") %>% as.character)

p <- data %>%
  group_by(Segment, Category) %>%
  summarise_if(is.numeric, ~ sum(.x, na.rm = TRUE)) %>%
  gather(key = key, value = value, -c("Segment", "Category", "Postal Code")) %>%
  filter(!key %in% c("Quantity", "Discount")) %>%
  ggplot(aes(Category, value, fill = key)) +
  geom_col(position = "dodge") +
  scale_fill_brewer(name = "Metric", type = "qual", palette = 2) +
  scale_y_continuous(label = scales::comma) +
  facet_wrap(~ Segment) +
  ggthemes::theme_tufte() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1)) +
  labs(title = "Profit/Sales by Segment/Category",
       y = NULL)

ggsave(p, filename = "segment-category.png", width = 4, height = 3)

addImage(wb, filename = "segment-category.png", name = "plot", originalSize = TRUE)

saveWorkbook(wb, file = file_name)
```

Functional

```
make_plot()
```

```
style()
```

```
build_excel()
```

Functional

```
make_plot()
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```

```
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```


















```
walk(sales_split, function(split) {  
  build_excel(split, "reports")  
})
```

Functional

```
make_plot()  
style()  
build_excel()
```

```
walk(sales_split, function(split) {  
  build_excel(split, "reports")  
})
```

```
plan(multiprocess)  
furrr::future_map(sales_split, ~ build_excel(.x, "reports"))
```

	..	
<input type="checkbox"/>	 Alabama.xlsx	99 KB
<input type="checkbox"/>	 Arizona.xlsx	119.6 KB
<input type="checkbox"/>	 Arkansas.xlsx	98.6 KB
<input type="checkbox"/>	 California.xlsx	345 KB
<input type="checkbox"/>	 Colorado.xlsx	117.5 KB
<input type="checkbox"/>	 Connecticut.xlsx	102.8 KB
<input type="checkbox"/>	 Delaware.xlsx	104.1 KB
<input type="checkbox"/>	 District of Columbia.xlsx	89.3 KB
<input type="checkbox"/>	 Florida.xlsx	140.9 KB
<input type="checkbox"/>	 Georgia.xlsx	123.4 KB
<input type="checkbox"/>	 Idaho.xlsx	95.1 KB
<input type="checkbox"/>	 Illinois.xlsx	160.9 KB
<input type="checkbox"/>	 Indiana.xlsx	110.2 KB
<input type="checkbox"/>	 Iowa.xlsx	91.2 KB
<input type="checkbox"/>	 Kansas.xlsx	93 KB
<input type="checkbox"/>	 Kentucky.xlsx	109.9 KB

Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	State	Postal Code	Region	Product ID	Category	Sub-Category	Product Name	Sales	Quantity	Discount	Profit
CA-2016-138688	6/11/16	6/15/16	Second Class	DV-13045	Darrin Van Hoff	Corporate	United States	Los Angeles	California	90036	West	OFF-LA-10000240	Office Supplies	Labels	Self-Adhesive Address Labels for Typewrite	14.62	2	0.00	6.87
CA-2014-115812	6/8/14	6/13/14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	FUR-FU-10001487	Furniture	Furnishings	Eldon Expressions Wood and Plastic Desk	48.86	7	0.00	14.17
CA-2014-115812	6/8/14	6/13/14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	OFF-AR-10002833	Office Supplies	Art	Newell 322	7.28	4	0.00	1.97
CA-2014-115812	6/8/14	6/13/14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	TEC-PH-10002175	Technology	Phones	Mitel S320 IP Phone VoIP phone	907.15	6	0.20	90.72
CA-2014-115812	6/8/14	6/13/14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	OFF-BI-10003910	Office Supplies	Binders	DXL Angle-View Binders with Locking Ring	18.50	3	0.20	5.78
CA-2014-115812	6/8/14	6/13/14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	OFF-AP-10002892	Office Supplies	Appliances	Belkin F5C206VTEL 6 Outlet Surge	114.90	5	0.00	34.47
CA-2014-115812	6/8/14	6/13/14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	FUR-TA-10001539	Furniture	Tables	Chromcraft Rectangular Conference Table	1706.18	9	0.20	85.31
CA-2014-115812	6/8/14	6/13/14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	TEC-PH-10002033	Technology	Phones	Konftel 250 Conference phone - Charcoal	1911.42	4	0.20	68.36
CA-2014-143336	8/26/14	8/31/14	Second Class	ZD-21925	Zuschuss Donatelli	Consumer	United States	San Francisco	California	94109	West	OFF-AR-10003056	Office Supplies	Art	Newell 341	8.56	2	0.00	2.48
CA-2014-143336	8/26/14	8/31/14	Second Class	ZD-21925	Zuschuss Donatelli	Consumer	United States	San Francisco	California	94109	West	TEC-PH-10001949	Technology	Phones	Cisco SPA501G IP Phone	213.48	3	0.20	16.01
CA-2014-143336	8/26/14	8/31/14	Second Class	ZD-21925	Zuschuss Donatelli	Consumer	United States	San Francisco	California	94109	West	OFF-BI-10002215	Office Supplies	Binders	Wilson Jones Hanging View Binder, White	22.72	4	0.20	7.38
CA-2016-121755	1/15/16	1/19/16	Second Class	EH-13945	Eric Hoffmann	Consumer	United States	Los Angeles	California	90049	West	OFF-BI-10001634	Office Supplies	Binders	Wilson Jones Active Use Binders	11.65	2	0.20	4.22
CA-2016-121755	1/15/16	1/19/16	Second Class	EH-13945	Eric Hoffmann	Consumer	United States	Los Angeles	California	90049	West	TEC-AC-10003027	Technology	Accessories	Imation BGR Mini Travel Drive USB 2.0 Flas	90.57	3	0.00	11.77
CA-2016-101343	7/16/16	7/21/16	Standard Class	RA-19885	Ruben Asuman	Corporate	United States	Los Angeles	California	90049	West	OFF-ST-10003479	Office Supplies	Storage	Eldon Base for stackable storage shelf, plat	77.88	2	0.00	3.89
CA-2015-135545	11/23/15	11/29/15	Standard Class	KM-16720	Kunst Miller	Consumer	United States	Los Angeles	California	90004	West	TEC-AC-10004633	Technology	Accessories	Verbatim 25 GB 6x Blu-ray Single Layer Re	13.98	2	0.00	6.15
CA-2015-135545	11/23/15	11/29/15	Standard Class	KM-16720	Kunst Miller	Consumer	United States	Los Angeles	California	90004	West	OFF-BI-10001078	Office Supplies	Binders	Acco PRESTEX Data Binder with Storage	25.82	6	0.20	9.36
CA-2015-135545	11/23/15	11/29/15	Standard Class	KM-16720	Kunst Miller	Consumer	United States	Los Angeles	California	90004	West	OFF-PA-10003892	Office Supplies	Paper	Xerox 1943	146.73	3	0.00	68.96
CA-2015-135545	11/23/15	11/29/15	Standard Class	KM-16720	Kunst Miller	Consumer	United States	Los Angeles	California	90004	West	FUR-FU-10000397	Furniture	Furnishings	Luxo Economy Swing Arm Lamp	79.76	4	0.00	22.33
CA-2014-139451	10/11/14	10/15/14	Standard Class	DN-13690	Duane Noonan	Consumer	United States	San Francisco	California	94122	West	OFF-AR-10002053	Office Supplies	Art	Premium Writing Pencils, Soft, #2 by Cent	14.90	5	0.00	4.17
CA-2014-139451	10/11/14	10/15/14	Standard Class	DN-13690	Duane Noonan	Consumer	United States	San Francisco	California	94122	West	OFF-ST-10002370	Office Supplies	Storage	Scitellix Multipurpose Personal File Organ	21.39	1	0.00	6.20
CA-2016-109806	9/16/16	9/21/16	Standard Class	JS-15685	Jim Sink	Corporate	United States	Los Angeles	California	90036	West	OFF-AR-10004930	Office Supplies	Art	Turquoise Lead Holder with Pocket Clip	20.10	3	0.00	6.63
CA-2016-109806	9/16/16	9/21/16	Standard Class	JS-15685	Jim Sink	Corporate	United States	Los Angeles	California	90036	West	TEC-PH-10004093	Technology	Phones	Panasonic Kx-TS550	73.58	2	0.20	8.28
CA-2016-109806	9/16/16	9/21/16	Standard Class	JS-15685	Jim Sink	Corporate	United States	Los Angeles	California	90036	West	OFF-PA-10000304	Office Supplies	Paper	Xerox 1995	6.48	1	0.00	3.11
CA-2017-157833	6/16/17	6/19/17	First Class	KD-16345	Katherine Ducich	Consumer	United States	San Francisco	California	94122	West	OFF-BI-10001721	Office Supplies	Binders	Trimflex Flexible Post Binders	51.31	3	0.20	17.96
US-2016-125969	11/5/16	11/9/16	Second Class	LS-16975	Lindsay Shagari	Home Office	United States	Los Angeles	California	90004	West	FUR-CH-10001146	Furniture	Chairs	Global Task Chair, Black	81.42	2	0.20	-9.16
US-2016-125969	11/5/16	11/9/16	Second Class	LS-16975	Lindsay Shagari	Home Office	United States	Los Angeles	California	90004	West	FUR-FU-10003773	Furniture	Furnishings	Eldon Cleatmat Plus Chair Mats for High P	238.56	3	0.00	26.24
CA-2016-145583	10/12/16	10/18/16	Standard Class	LC-16885	Lena Creighton	Consumer	United States	Roseville	California	95661	West	OFF-PA-10001804	Office Supplies	Paper	Xerox 195	20.04	3	0.00	9.62
CA-2016-145583	10/12/16	10/18/16	Standard Class	LC-16885	Lena Creighton	Consumer	United States	Roseville	California	95661	West	OFF-PA-10001736	Office Supplies	Paper	Xerox 1880	35.44	1	0.00	16.66
CA-2016-145583	10/12/16	10/18/16	Standard Class	LC-16885	Lena Creighton	Consumer	United States	Roseville	California	95661	West	OFF-AR-10001149	Office Supplies	Art	Sanford Colorific Colored Pencils, 12/Box	11.52	4	0.00	3.46
CA-2016-145583	10/12/16	10/18/16	Standard Class	LC-16885	Lena Creighton	Consumer	United States	Roseville	California	95661	West	OFF-FA-10002988	Office Supplies	Fasteners	Ideal Clamps	4.02	2	0.00	1.97
CA-2016-145583	10/12/16	10/18/16	Standard Class	LC-16885	Lena Creighton	Consumer	United States	Roseville	California	95661	West	OFF-BI-10004781	Office Supplies	Binders	GBC Wire Binding Strips	7.18	3	0.20	26.66
CA-2016-145583	10/12/16	10/18/16	Standard Class	LC-16885	Lena Creighton	Consumer	United States	Roseville	California	95661	West	OFF-SU-10001218	Office Supplies	Supplies	Fiskars Softgrip Scissors	65.88	6	0.00	18.45
CA-2016-145583	10/12/16	10/18/16	Standard Class	LC-16885	Lena Creighton	Consumer	United States	Roseville	California	95661	West	FUR-FU-10001206	Furniture	Furnishings	Longer-Life Soft White Bulbs	43.12	14	0.00	20.70
CA-2017-106180	9/17/17	9/22/17	Standard Class	SH-19975	Sally Hughsby	Corporate	United States	San Francisco	California	94122	West	OFF-AR-10000940	Office Supplies	Art	Newell 433	8.82	3	0.00	2.38
CA-2017-106180	9/17/17	9/22/17	Standard Class	SH-19975	Sally Hughsby	Corporate	United States	San Francisco	California	94122	West	OFF-EN-10004030	Office Supplies	Envelopes	Convenience Packs of Business Envelopes	10.86	3	0.00	5.10
CA-2017-106180	9/17/17	9/22/17	Standard Class	SH-19975	Sally Hughsby	Corporate	United States	San Francisco	California	94122	West	OFF-PA-10004327	Office Supplies	Paper	Xerox 1911	143.70	3	0.00	68.98
CA-2015-110744	9/8/15	9/11/15	Standard Class	HA-14920	Helen Andreada	Consumer	United States	Padadena	California	91104	West	OFF-ST-10003656	Office Supplies	Storage	Salco Industrial Wire Shelving	671.93	7	0.00	20.16
CA-2015-124919	5/30/15	6/1/15	First Class	SP-20650	Stephanie Phelps	Corporate	United States	San Jose	California	95123	West	OFF-PA-10001950	Office Supplies	Paper	Southworth 25K Cotton Antique Laid Pap	58.38	7	0.00	26.27
CA-2015-124919	5/30/15	6/1/15	First Class	SP-20650	Stephanie Phelps	Corporate	United States	San Jose	California	95123	West	OFF-PA-10002254	Office Supplies	Paper	Xerox 1883	105.52	4	0.00	48.54
CA-2015-124919	5/30/15	6/1/15	First Class	SP-20650	Stephanie Phelps	Corporate	United States	San Jose	California	95123	West	OFF-ST-10001590	Office Supplies	Storage	Tenex Personal Project File with Scoop Frc	80.88	6	0.00	21.03
CA-2016-162733	5/10/16	5/11/16	First Class	TT-21070	Ted Trevino	Consumer	United States	Los Angeles	California	90004	West	OFF-PA-10002751	Office Supplies	Paper	Xerox 1920	5.98	1	0.00	2.69
CA-2014-118962	8/4/14	8/8/14	Standard Class	CS-12130	Chad Sievert	Consumer	United States	Los Angeles	California	90004	West	OFF-PA-10000659	Office Supplies	Paper	Adams Phone Message Book, Professional,	20.94	3	0.00	9.84
CA-2014-118962	8/4/14	8/8/14	Standard Class	CS-12130	Chad Sievert	Consumer	United States	Los Angeles	California	90004	West	OFF-PA-10001144	Office Supplies	Paper	Xerox 1913	110.96	2	0.00	53.26
CA-2014-118962	8/4/14	8/8/14	Standard Class	CS-12130	Chad Sievert	Consumer	United States	Los Angeles	California	90004	West	FUR-CH-10003817	Furniture	Chairs	Global Value Stereo Chair, Gray	340.14	7	0.20	21.26
CA-2014-123260	8/25/14	8/29/14	Standard Class	PM-14290	Frank Merwin	Home Office	United States	Los Angeles	California	90032	West	TEC-AC-10002323	Technology	Accessories	SanDisk Ultra 32 GB MicroSDHC Class 10 A	176.80	8	0.00	22.98
CA-2015-131457	10/30/15	11/5/15	Standard Class	MZ-17515	Mary Zewe	Corporate	United States	Redlands	California	92374	West	OFF-EN-10001509	Office Supplies	Envelopes	Poly String Tie Envelopes	14.28	7	0.00	6.71
CA-2017-108329	12/8/17	12/31/17	Standard Class	LE-16810	Laurel Elliston	Consumer	United States	Whittier	California	90604	West	TEC-PH-10001918	Technology	Phones	Netol Business Series Terminal T7208 Dig	444.77	4	0.20	44.48
CA-2016-130162	10/27/16	10/31/16	Standard Class	JH-15910	Jonathan Howell	Consumer	United States	Los Angeles	California	90032	West	OFF-ST-10001328	Office Supplies	Storage	Personal Filing Tote with Lid, Black/Gray	93.06	6	0.00	26.06
CA-2016-130162	10/27/16	10/31/16	Standard Class	JH-15910	Jonathan Howell	Consumer	United States	Los Angeles	California	90032	West	TEC-PH-10002563	Technology	Phones	Adtran 1202752G1	302.38	3	0.20	22.68
CA-2017-160514	11/11/17	11/15/17	Standard Class	DB-13120	David Bremner	Corporate	United States	Santa Clara	California	95051	West	OFF-PA-10002479	Office Supplies	Paper	Xerox 4200 Series MultiUse Premium Cop	10.56	2	0.00	4.75
CA-2016-154739	12/9/16	12/14/16	Second Class	LH-17155	Logan Haushalter	Consumer	United States	San Francisco	California	94109	West	FUR-CH-10002965	Furniture	Chairs	Global Leather Highback Executive Chair v	321.57	2	0.20	28.14

Sales by Segment and Category

Row Labels	Total Sales \$	Total Profit \$	Count
Consumer	11,683	1,629	42
Furniture	3,584	246	8
Office Supplies	1,578	359	24
Technology	6,521	1,024	10
(blank)			
Corporate	1,366	429	16
Furniture			
Office Supplies	1,293	420	15
Technology	74	8	1
(blank)			
Home Office	497	40	3
Furniture	320	17	2
Office Supplies			
Technology	177	23	1
(blank)			
Grand Total	13,546	2,098	61

Profit/Sales by Segment/Category California



Compose a message

```
subject = "Sales State Coverage Report"

msg <- paste0(
  '<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0
  Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
  <html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0"/>
    <title>Sales Coverage</title>
    <style type="text/css">
    </style>
  </head>
  <body>
    Hello,
  </p>
  <p>Attached is sales data for your state coverage.</p>
  <p>A visualization and summary are available on the second tab.</p>
  <p>Let us know if you have questions.</p>
  <p>Kind regards,</p>
  <p>Analysis Group,</p>
  </body>
  </html>'
)
```


mailR/sendmailR

```
send.mail(  
  from = "user@domain.com",  
  to = "user@domain.com",  
  subject = subject,  
  body = msg,  
  html = TRUE,  
  smtp = list(  
    host.name = "smtp.gmail.com",  
    port = 465,  
    user.name = rstudioapi::askForPassword(),  
    passwd = rstudioapi::askForPassword(),  
    ssl = TRUE  
  ),  
  attach.files = "file_path",  
  authenticate = TRUE,  
  send = TRUE  
)
```

Nice to know

- Java/rJava are required to use XLConnect and mailR/sendmailR.
- Latest version of java: <https://java.com/en/download/>.
- If you have trouble installing Java on Mac, see <https://www.chrisjmendez.com/2018/11/16/installing-xlconnect-and-rjava-on-macos/>.
- It's typically required you set your JAVA_HOME, such as
`Sys.setenv(JAVA_HOME = "C:\\\\Program Files\\\\Java\\\\jdk1.8.0_102")`.
The path is relative to your machine, so you must locate your directory and version of Java.
- Useful: `vignette("XLConnect")`.
- XLConnect runs on memory until `saveWorkbook()` is called. If you experience out-of-memory errors, try allocating more memory with
`options(java.parameters = "-Xmx1024m")`. See vignette above.