

Fancy Email with R

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26 March 2022 / Botswana R Users



email is old

1971 ~ email invented

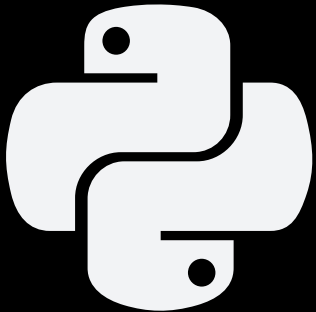
but...

Is it still relevant?

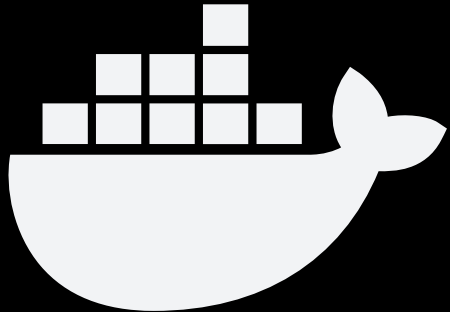
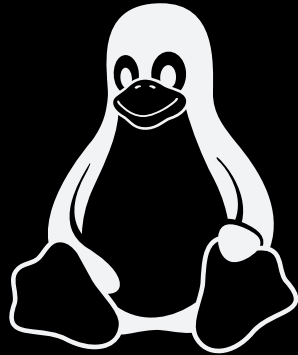
email is still sexy

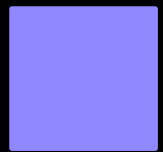
- ~100 billion emails per day
- accessible
- versatile

Andrew Collier



git





athom

We do a lot of

automated reporting



{emayili}

Zulu word for email, *imeyili*.

Design goals:

- works on all SMTP servers and
- no complicated dependencies.

CRAN

CRAN 0.7.5

downloads 63K

Development

pkgdown passing

coverage 100%

lifecycle stable

If you want to be part of a demo, please add your details here:

<https://tinyurl.com/emayili-demo-botswana>

† I solemnly promise not to misuse this information.





Yet another email package?

Do we really need another email package?

What does `{emayil}` bring to the table?

- Works on all (most?) SMTP servers.
- No complicated dependencies.
- Actively developed.
- Works well with `%>%`.
- **Encryption!**
- **Markdown!**
- **Templates!**

Sending Email

What are the components of a (email|letter)?



envelope



letter



delivery

Create a couple of `address` objects:

```
# Using constructor.  
bob <- address(email = "bob@yahoo.com")  
bob <- address(email = "bob@yahoo.com", display = "Bob")  
# Coercing from character vector.  
alice <- as.address("Alice <alice@google.com>")
```

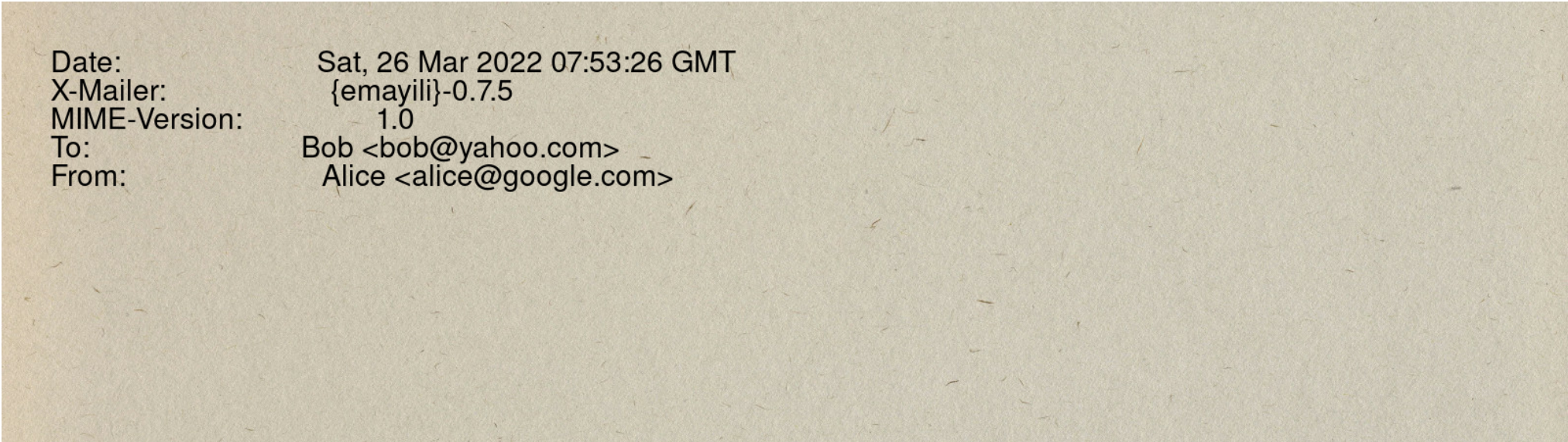
```
bob
```

```
[1] "Bob <bob@yahoo.com>"
```

Create an `envelope` object.

```
# Using constructor arguments.
msg <- envelope(
  to = "bob@yahoo.com",
  from = "alice@google.com"
)
```

```
# Using methods.
msg <- envelope() %>%
  to(bob) %>%
  from(alice)
```



Date: Sat, 26 Mar 2022 07:53:26 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
To: Bob <bob@yahoo.com>
From: Alice <alice@google.com>

Probably want to include a subject.

```
msg <- msg %>%  
  subject("Hiya!")
```

Date: Sat, 26 Mar 2022 07:53:26 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
To: Bob <bob@yahoo.com>
From: Alice <alice@google.com>
Subject: Hiya!

Use the `text()` method to insert plain text content.

```
msg_text <- msg %>%  
  # Add a text body.  
  text("Go and boil your bottoms, sons of a silly person!")
```

```
Date: Sat, 26 Mar 2022 07:53:28 GMT  
X-Mailer: {emayili}-0.7.5  
MIME-Version: 1.0  
To: Bob <bob@yahoo.com>  
From: Alice <alice@google.com>  
Content-Type: text/plain;  
              charset=utf-8;  
              format=flowed  
Content-Disposition: inline  
Content-Transfer-Encoding: 7bit  
Content-MD5: yLznZFG/pZBSdumgNmHLhA==
```

Go and boil your bottoms, sons of a silly person!

Use the `html()` method to insert HTML content.

```
msg_html <- msg %>%  
  # Add an HTML body (either from string or file).  
  html("<p>Leave before I'm forced to taunt you a 2nd time!</p>")
```

```
Date: Sat, 26 Mar 2022 07:53:28 GMT  
X-Mailer: {emayili}-0.7.5  
MIME-Version: 1.0  
To: Bob <bob@yahoo.com>  
From: Alice <alice@google.com>  
Content-Type: text/html;  
              charset=utf-8  
Content-Disposition: inline
```

```
<html><body><p>Leave before I'm forced to taunt you a 2nd time!</p></body></html>
```

The `server()` function sets up the SMTP server configuration.

```
smtp <- server(  
  host = "smtp.gmail.com",  
  port = 587,  
  username = Sys.getenv("SMTP_USERNAME"),  
  password = Sys.getenv("SMTP_PASSWORD")  
)
```

It returns a closure which captures the credentials.

To send a message you just call the closure.

```
# Minimal output.  
smtp(msg)  
# Detailed output.  
smtp(msg, verbose = TRUE)
```

- Detailed logs available.
- Can reuse the connection (faster).
- Exponential backoff on error.

Demo: Send

1.
Encrypted Email



Andrew B. Collier

@datawookie



Most people use email every day without giving much thought to security.

Email data in motion is often secured by SSL/TLS. But you can encrypt the content of an email before you send it, ensuring that only the intended recipient can read it.

Do you encrypt your email?

8% All the time

20% Sometimes

72% Never

25 votes • Final results

2 2:13 PM - Nov 28, 2021



[See Andrew B. Collier's other Tweets](#)



Why not?

Getting it all set up can be a problem.

Compare Plans

Hushmail for Healthcare	Perfect for therapists, psychologists, chiropractors, optometrists, dentists, physical therapists, and other healthcare professionals. Our encrypted email and web forms with e-signatures come with a BAA and email archive to support your HIPAA compliance.	From \$9.99/month	View plans
Hushmail for Small Business	Perfect for small businesses, startups, and nonprofits, as well as teams within large organizations. Our encrypted email and web forms with e-signatures keep your conversations confidential and secure.	From \$5.99/month	View plans
Hushmail for Law	Perfect for attorneys and legal professionals who need a reliable way to communicate securely. Our encrypted email and web forms with e-signatures protect the attorney-client privilege, keeping conversations confidential between you and your clients.	From \$9.99/month	View plans
Hushmail for Personal Use	Everyone is entitled to their email privacy. Take back control of your data and experience a clean inbox with no advertising. Choose which emails you want to send using our powerful encryption and keep your most personal conversations private and confidential.	From \$49.98/year	View plans
Custom Solutions	For large organizations, our encrypted email, web forms, and e-signatures can be configured in a variety of ways to support your organization. Let us know what you need, and we'll work with you to build the perfect solution.		Contact us

Why would you need encrypted email?

BIG BROTHER



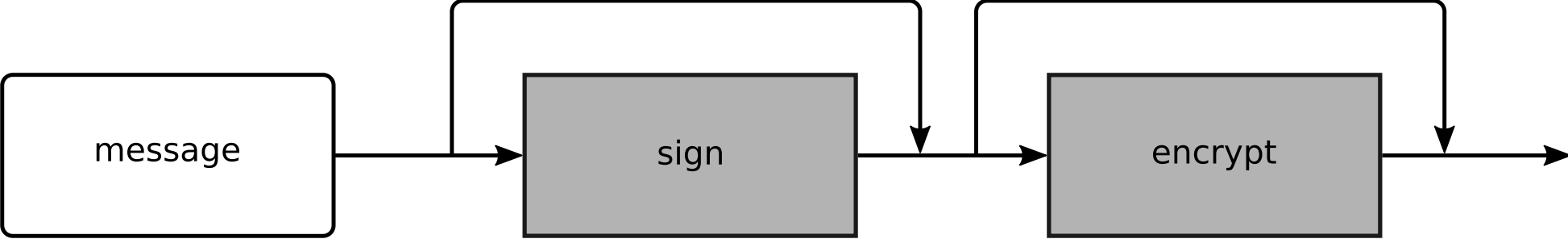
IS WATCHING YOU

To **sign** a message

Validates that you are the actual sender

To **secure** a message

Ensure that only valid recipients can read the message



Signing & Encrypting

```
# Sign & encrypt the message (default).  
msg_text %>% encrypt()  
# Just sign the message.  
msg_text %>% encrypt(sign = TRUE, encrypt = FALSE)  
# Just encrypt the message.  
msg_text %>% encrypt(sign = FALSE, encrypt = TRUE)
```

Sign

MIME structure:

multipart/signed
 multipart/mixed
 text/plain
 application/pgp-signature

Original message:

```
Date: Mon, 07 Mar 2022 06:09:53 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
To: Bob <bob@yahoo.com>
From: Alice <alice@google.com>
Content-Type: text/plain;
              charset=utf-8;
              format=flowed

Content-Disposition: inline
Content-Transfer-Encoding: 7bit
Content-MD5: yLznZFG/pZBSdumgNmHLhA==
```

Go and boil your bottoms, sons of a silly person!

```
Date: Mon, 07 Mar 2022 06:09:53 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
To: Bob <bob@yahoo.com>
From: Alice <alice@google.com>
Content-Type: multipart/signed;
              micalg="pgp-sha256";
              protocol="application/pgp-signature";
              boundary="e0373503"
```

This is an OpenPGP/MIME signed message (RFC 4880 and 3156).

```
--e0373503
Content-Type: multipart/mixed;
              boundary="33bb0866"

--33bb0866
Content-Type: text/plain;
              charset=utf-8;
              format=flowed

Content-Disposition: inline
Content-Transfer-Encoding: 7bit
Content-MD5: yLznZFG/pZBSdumgNmHLhA==

Go and boil your bottoms, sons of a silly person!
--33bb0866--
--e0373503
Content-Type: application/pgp-signature;
              name="signature.asc"

Content-Description: OpenPGP digital signature
Content-Disposition: attachment; filename="signature.asc"
```

-----BEGIN PGP SIGNATURE-----

```
iQGzBAABcGAdFiEEvi1H7Idpf84D0SexPvSfNPpf4eEFAmIlog4ACgkQPvSfNPpf
4eGrTQwAtA55hv13TYwgd1HVThg9Q85aMpd224XfLGyK3x/zWqjE/2AKGxeu1I
G8fSQssms6fdasYVB8pf2/7gGdxfrQxDtTBTJx5e2jfqL8zE1PZfQ+uPvpiFDUM/
Lv0o+TcQY6jh7tbLqYo+bmjThrT2M7vPKxZ2Fvn0opGadNL0XAij0yYWIkyPUpiL
ZmTRFZLM
=JE35
```

-----END PGP SIGNATURE-----

--e0373503--

Encrypt

MIME structure:

multipart/encrypted
application/pgp-encrypted
application/octet-stream

```
Date: Mon, 07 Mar 2022 06:09:53 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
To: Bob <bob@yahoo.com>
From: Alice <alice@google.com>
Content-Type: multipart/encrypted;
              protocol="application/pgp-encrypted";
              boundary="5020abfd"
```

This is an OpenPGP/MIME encrypted message (RFC 4880 and 3156).

```
--5020abfd
Content-Type: application/pgp-encrypted
Content-Description: PGP/MIME version identification

Version: 1
--5020abfd
Content-Type: application/octet-stream;
              name="encrypted.asc"
Content-Description: OpenPGP encrypted message
Content-Disposition: inline; filename="encrypted.asc"
```

-----BEGIN PGP MESSAGE-----

```
hQGMA2up9Aq2yU+oAQwAyZUxmWjSbcD6ykiBJF7ivPNXWgnlkyXGwBKAT1si25YQ
QVLWMyiDcA2fE5sZbGSYTiLKqg/OsHSX7D4LJLH3sGfTRwErdhmRqPsFj5VAYdvi
wTl+1H+OmS0AabzT9b8Br120LHVN/TOxF/oK3oDYaXmp5mhySeY49/rye+EVAQV/
1KUmMV2NFmajfNwCXU/NHqeNhbUxn5PrwDB00LVRe0K1+tMDpm87abgFGIaiSN+5
BGopkGxsH/lihnVbzdsK3LrWDIVp2R1H2uA1BsmR72nmXMoGGAIIPRYQUUonj50B
exqKhQDUwr3Dytt1gDiLHqnUn2DY5inC6KC0GPOZrytXco2RBrf++qRxRSMTD8Mn
Sv5bcxL7APr1VzURRB74BcXSXgXmldvPraQDoqUJPCthjUPIgqEHLlJoRpVrH6Kx
EuJfRJKUVhXw9VEBZi22cKL/rnq98uxxawMedwxbTWbeSEPUH9h+V9+9Bn0adTn
IQdJnJCFpJf9tZXdsY4cuamK/2tlDgq2g6w6VA==
=vqdc
```

-----END PGP MESSAGE-----

--5020abfd--

Sign & Encrypt

MIME structure:

multipart/encrypted
application/pgp-encrypted
application/octet-stream

```
Date: Mon, 07 Mar 2022 06:09:53 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
To: Bob <bob@yahoo.com>
From: Alice <alice@google.com>
Content-Type: multipart/encrypted;
              protocol="application/pgp-encrypted";
              boundary="b5b9cc81"
```

This is an OpenPGP/MIME encrypted message (RFC 4880 and 3156).

--b5b9cc81

```
Content-Type: application/pgp-encrypted
Content-Description: PGP/MIME version identification
```

Version: 1

--b5b9cc81

```
Content-Type: application/octet-stream;
              name="encrypted.asc"
Content-Description: OpenPGP encrypted message
Content-Disposition: inline; filename="encrypted.asc"
```

-----BEGIN PGP MESSAGE-----

```
hQGMA2up9Aq2yU+oAQwAnVGf9cMctVbGL24NTVmFLFiShxuGElq5AXpYKveIXbCU
V0e1o9ogoTMUPfCrioTpqL/upT1QRJQRpW0GW840KvnJ4/5VP/WEXHEj+DfXQ0nc
EBtngPdxRnRXYTW2LS5PajfTXX5Jb4z5EYPGQ+P+Y3VSNbDEVx8Vieq0LI/0/du5
SuK5dSyDI8oz7hIybKwRidTMvtzs00fpf5/wqYU0bTv3zMBYXAAuup5V9dyB8w8U
IQMrP+QRZxy4XX6bcouISY+/mby2JF3gzKFM2GNnQ4UA3/jJtg/xf0/4JSOZ60a
39JtIVL0LuIcOtqBoziHJWC2GtNo8XbR3DnAyuXKhpMprVlB8jPbW0qT9K2XLz4I
ORyMUt9mnP/c/BForrJk43DQ5wheCxDmtYtQQBekBeSecuidFguZlXerdZFWdQ95
CvASQh8E1FDX2tqvHdU8/dj4dt5mYGIqTLizU0448wf6bwutRtYnc/XPASz/omz1
m/Zr3H0as/KRKzA+fxCB0ukBdgjbOmzY0AZmLuAt3Kx82vBpZ2GWIXP33x73b43x
C3beNweI5ACrECjh5yEGg0L5FNyMsR+fhsWb7zZJ4ZxJlNE2VIyanECXcvjpuDuL
2jJ5CDcu+p0/v3U3QEaCZzyy/g9yJJjk/msAkWP8e3qFXjw91Hs2TEscQnAGXdn
rBs2kMD96vSirMPVaQ8wGovJnHlfpQi+2iTEp+wseXUiQ+hbsQk8yuuenuXU9HBNL
S6C90uuELCv8Fkphu70xdlHtAfo9UJYETcYbtt2rI6Fp97SuE0IOJ0lF1sBTX1tI
DWMv7GoAkoA+DwXmEUbCkxCf9ftMjLFOT4xC6qR4lmgR6AfExZB+4uGrB+QfLMZV
qEhW2w+WPhBrHLTQ9Fy4022E/wxxnNGQeXjwfIDhed9SUGunagmXJEK9FMEuidoz
tGi5j079L337sRUSOKspTyzKWgDY0klhtB/0s5uY6N776H7SIjSXZhpLPrMLDgZ9
HFCyKugR+qMGN8Tim0xq0blyQlMnk3SaHWadrzyzPisObkdtBIPVgA/Edxr/adv
ncZ/N4KIpfVsVL4BKH6EvoSTTgscKPAB1Hl/VdGtP7QwRp2B0FfxKQILfxUaR1W/PO
In8D3jJ3MWD1nxfch0PRun8KczuHBOs3AFDLGt/CdRucXd9f7ft0QpzScuCdMBX2
I6tLDRaWxdAJc8ZxQx/7iTcWnpOewFNvOW1pm83wOQtWzMP7GziK
=bwa1
```

-----END PGP MESSAGE-----

--b5b9cc81--

Demo: Encryption

2.
Markdown

HTML emails look nicer than text.

But HTML is more difficult to write than text.

Markdown to the rescue!

Can we render **Plain Markdown** straight into an email?

```
msg_md <- envelope() %>%  
  render("Markdown is awesome!")
```

```
Date: Sat, 26 Mar 2022 07:53:29 GMT  
X-Mailer: {emayili}-0.7.5  
MIME-Version: 1.0  
Content-Type: text/html;  
              charset=utf-8  
Content-Disposition: inline
```

```
<html><body><p>Markdown is <strong>awesome</strong>!</p></body></html>
```

So, that's fairly cool.

Can we render **R Markdown** straight into an email?

A simple R Markdown document, pi.Rmd:

```
---  
title: "Approximating Pi"  
output: html_document  
---
```

```
```{r}  
22 / 7
```
```

```
msg_rmd <- envelope() %>% render("pi.Rmd", include_css = FALSE)
```

```
Date: Sat, 26 Mar 2022 07:53:30 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
Content-Type: text/html;
              charset=utf-8
Content-Disposition: inline
```

```
<html>
<head>
<title>Approximating Pi</title>
</head>
<body>
<div class="container-fluid main-container">
<div id="header">
<h1 class="title toc-ignore">Approximating Pi</h1>
</div>
<pre class="r"><code>22 / 7</code></pre>
<pre><code>[1] 3.142857</code></pre>
</div>
</body>
</html>
```

Demo: Markdown

3.

Message Templates

Message templates
make it possible
to create

sophisticated

and

stylish

messages.

Hard Coded Content

```
msg %>%  
  html("<p>Hi Bob!</p>")
```

- Use `html()` to insert HTML.

```
Date: Sat, 26 Mar 2022 07:53:32 GMT  
X-Mailer: {emayili}-0.7.5  
MIME-Version: 1.0  
To: bob@yahoo.com  
From: alice@google.com  
Content-Type: text/html;  
charset=utf-8  
Content-Disposition: inline  
  
<html><body><p>Hi Bob!</p></body></html>
```

Content Interpolation

```
name <- "Bob"  
  
msg %>%  
  html("<p>Hi {{ name }}!</p>")
```

- Use `html()` to insert HTML.
- Use `{glue}` to interpolate variables.

```
Date: Sat, 26 Mar 2022 07:53:32 GMT  
X-Mailer: {emayili}-0.7.5  
MIME-Version: 1.0  
To: bob@yahoo.com  
From: alice@google.com  
Content-Type: text/html;  
charset=utf-8  
Content-Disposition: inline  
  
<html><body><p>Hi Bob!</p></body></html>
```


Markdown with Interpolation

```
name <- "Bob"  
  
msg %>%  
  render("Hi {{ name }}!")
```

- Use `render()` for Markdown → HTML.
- Use `{glue}` to interpolate variables.

```
Date: Sat, 26 Mar 2022 07:53:32 GMT  
X-Mailer: {emayili}-0.7.5  
MIME-Version: 1.0  
To: bob@yahoo.com  
From: alice@google.com  
Content-Type: text/html;  
charset=utf-8  
Content-Disposition: inline  
  
<html><body><p>Hi Bob!</p></body></html>
```

Markdown with Parameters

```
params <- list(name = "Bob")

msg %>%
  render(
    "message.Rmd",
    params = params,
    include_css = FALSE
  )
```

Content of message.Rmd:

```
---
title: Message
---
```

```
Hi `r params$name`!
```

```
Date: Sat, 26 Mar 2022 07:53:32 GMT
X-Mailer: {emayili}-0.7.5
MIME-Version: 1.0
To: bob@yahoo.com
From: alice@google.com
Content-Type: text/html; charset=utf-8
Content-Disposition: inline

<html>
<head>
<title>Message</title>
</head>
<body>
<div class="container-fluid main-container">
<div id="header">
<h1 class="title toc-ignore">Message</h1>
</div>
<p>Hi Bob!</p>
</div>
</body>
</html>
```

Templates use the **Jinja template engine** syntax.

Template with Parameters

```
msg %>%  
  template(  
    "greeting",  
    name = "Bob"  
  )
```

Content of greeting/template.html:

```
<html>  
  <head>  
  </head>  
  <body>  
    <p>Hi {{ name }}!</p>  
  </body>  
</html>
```

```
Date: Sat, 26 Mar 2022 07:53:32 GMT  
X-Mailer: {emayili}-0.7.5  
MIME-Version: 1.0  
To: bob@yahoo.com  
From: alice@google.com  
Content-Type: text/html;  
charset=utf-8  
Content-Disposition: inline  
  
<html>  
<head></head>  
<body>  
  <p>Hi Bob!</p>  
</body>  
</html>
```

Advantages of Templates

Templates allow you to use

- variables
- comments
- looping & conditionals (control structures)
- inheritance
- inclusion

When to use a Template rather than Markdown?

Sometimes Markdown is enough.

But templates win when

- not using code
- want to use control structures (HTML rather than R Markdown) and
- need flexible HTML/CSS structure.

What can you do with templates?

I'm **so** glad that you asked.



mailchimp

Demo: Templates

Where does `{emayili}` play well?

- standalone R scripts
- in RStudio
- in Shiny
- in Docker
- in GitHub Actions
- in GitLab CI

email is still sexy

... especially if you're using `{email}`.

Slides at <https://bit.ly/20220326-botswana-r-users>.



Andrew Collier

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- <https://github.com/datawookie/emayili>
- <https://datawookie.github.io/emayili/>