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Building a Content Delivery Pipeline for a Website in R

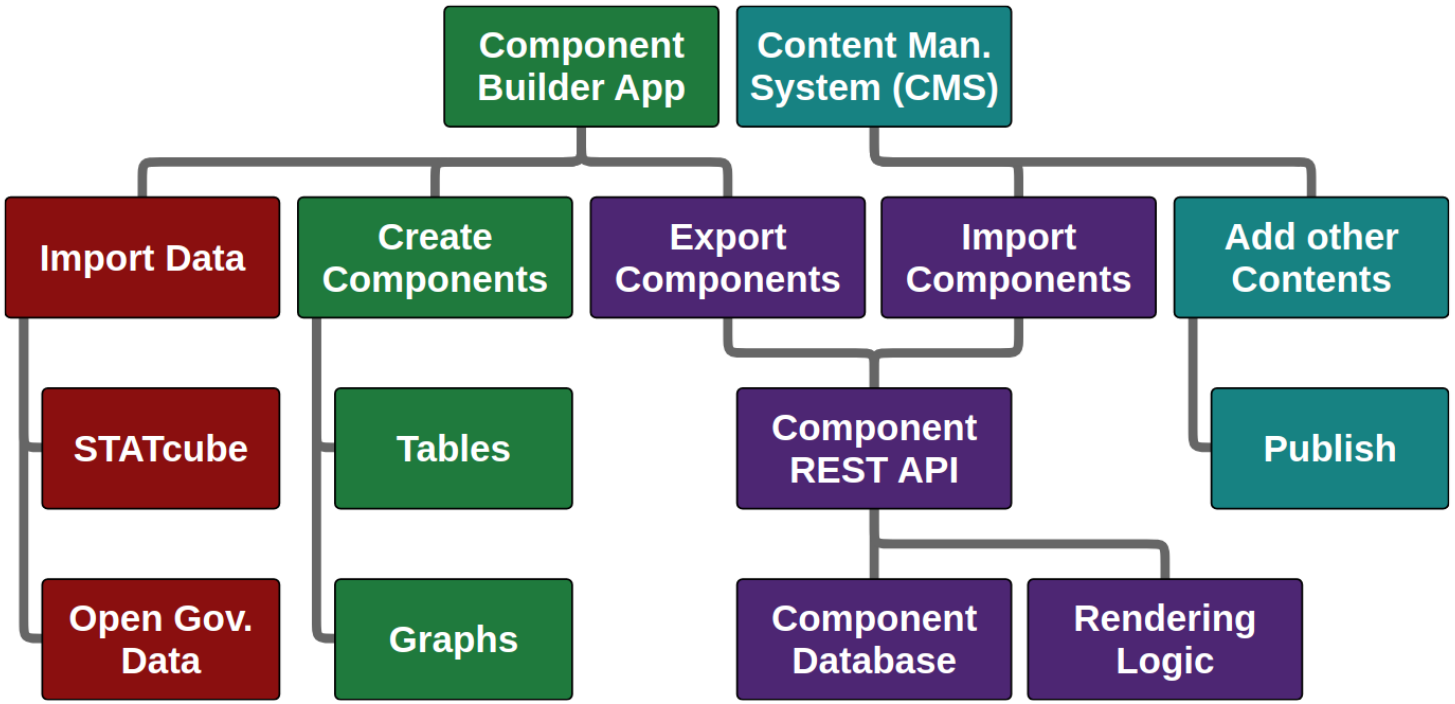
Embedding web components from R into a content management system

Abstract

Statistics Austria is currently working towards the release of a new website. An important part of it, namely **graphs** and **tables**, will be created using R

Content creators will create **graphs** and **tables** via a shiny app and transfer them to the content management system (**CMS**). The transfer uses a plumber REST API under the hood

Outline



Parts of the presentation

1. Showcase the **app** and **components**
2. Remarks about the **data import**
3. Mechanism to **transfer** components from the **app** to the **CMS**

The components that can be delivered by the pipeline are **graphs** and **tables**

Both the graphs and tables are **interactive** in the sense that they provide hover and/or click events

- Graphs are generated with highcharts.js and the corresponding R package highcharter
- Tables are created using datatables.js which provides features like **sorting**, **searching** and more

Interactive demos can be found in the html version of these slides

Component Builder App

The component builder **app** is a shiny application which is hosted on RStudio Connect. It guides the content creator through the component generation process

- Data can be **imported** from different sources
- Components can be **created** and **previewed**. Sensible defaults make it possible do this with a few clicks
- An **export menu** makes the component accessible for the **CMS**

A demo video of the app can be found in the html version of these slides

Currently, there are two datasources which are compatible the component builder **app**: STATcube and Open Government Data

Both data sources are imported using the open source package STATcubeR which defines a common **interface** for the data sources

```
# online docs: statistikat.github.io/STATcubeR
remotes::install_github("statistikat/STATcubeR")
```

Open Government Data

The Open Data Portal of Statistics Austria provides a series of datasets following the **open data** principles

About **300 datasets** are compatible with the component builder **app** which provides a coverage of about **95%**

OGD data can be imported from the **app** by choosing one of the datasets from a selection menu

More information can be found at `https://statistikat.github.io/STATcubeR/articles/od_table.html`

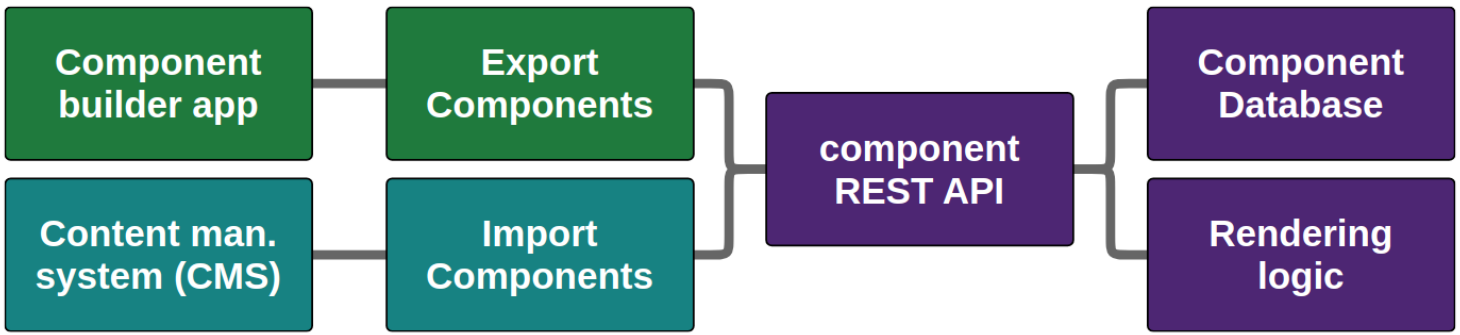
STATcube allows you to **generate** custom tables from databases and **export** them in different formats

One export option, the "json API request", is compatible with the **component builder app**. The exported json file can be provided to the app via a shiny fileInput

The app then fetches data from the **STATcube REST API**

More information can be found at `https://statistikat.github.io/STATcubeR/articles/sc_table.html`

Transfer: App to CMS



In order to make the **graphs** and **tables** available for the **CMS**, a **REST API** is used. The **app exports** the components to a **database** and the **CMS imports** the components

The API is built with plumber and hosted on RSConnect

Export: App to Database

When a user **exports** a graph or table, the app performs a **/POST** request against the component API

The component is submitted as a binary object in the request body and added to a **BLOB** field in the **component database**

The database also captures **metadata** about the component such as the author and a timestamp

The `/GET` method of the **component API** lists all components in a json format. A tabular representation is provided below

```
httr::GET("rsconnect.local/component-api")
```

Key	Created.at	Creator	Custom.Label	Data.Source	Graph	Table
001	2021-09-19/11:43	decill	Cancer Types by Year	OGD_krebs_ext_KREBS_1	NULL	175x3
002	2021-09-19/14:17	meindl	Household Forecast	OGD_f1741_HH_Proj_1	Timeseries	NULL
003	2021-09-20/06:34	decill	Structure of Earnings	OGD_veste301_Veste301_1	Barplot	122 x 7
004	2021-09-21/13:29	kowa	Tourism: Correlations	detouextregsai	Scatterplot	02 x 9

Each row represents a **graph**, a **table** or both. Notice the `NULL` values in the last two rows

The columns **Creator** and **Data Source** reference the user and dataset behind a component

Import: Database to CMS

Single items can be requested with `/GET table` and `/GET graph`. They return a **rendered** version of a component for the **CMS**

The json payload of the response contains a `<div>` or `<table>` tag and a `<script>` tag which define the component

```
# get the component from the api
response <- httr::GET(
  "rsconnect.local/component-api/graph?Key=001")
payload  <- httr::content(response)

# fill a html template
fill_table_template(
  # pass a javascript string
  script    = payload['script'],
  # pass container (<div>) as html string
  container = payload['container']
)
```

Template example

The **template** defines where the component (graph) is inserted and loads all necessary **js/css dependencies**

```
<head>
  <script src="highcharts.js"/>
  <script src="rsconnect.local/component-api/utils.js"/>
</head>

<body>
  <h1>Graph template</h1>
  <!-- define placeholder container for the graph -->
  ${container}

  <!-- fill container using a script tag -->
  ${script}
</body>
```

utils.js is a helper package that defines functions for **layouting** of components, **formatting tooltips**, etc.

Most Valuable Packages

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Frameworks

- shiny defines the component builder **app**
- The component **API** is generated with plumber

Front End

- highcharter builds the **graphs**
- All **tables** are generated using datatables.js

Back End

- httr communicates with the **plumber API** and the **STATcube API**
- Data **import** is performed with the STATcubeR package

Open Source Roadmap

Currently, the package STATcubeR is available on github. It will be released to CRAN when the STATcube REST API becomes available for external users

The internal packages **STATgraph** and **STATtable**, which create graphs and tables based on the **STATcubeR** data interface, might become open-source once the pipeline is fully integrated in the **CMS** workflow

Thank you for your attention

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More information as well as the source code for these slides can be found at https://github.com/GregorDeCillia/pipedream

A video with this presentation is available at
https://youtu.be/kjUtApjK6XE?t=215