



RBMS Template Engine

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1. RBMS Template Engine

The RBMS Template Engine is an execution engine for templates. A folder in the filesystem serves as template storage for the engine. The content of the folder follows a convention.

1.1. Template Folder structure

Template folder structure

```
templates
|-- includes
|   |-- <include-template>.gojson
|-- <template name>
|   |-- config.yaml
|   |-- <include-template>.gojson
|   |-- <main-template>.gojson
```

The template engine uses one templates folder where all the templates are stored. Each template resides in his own folder, the folder name is the template name. The `config.yaml` file inside a template folder indicates that this folder is a template. In this file also other configurations for the template engine can be made.

The template folder contains one `main-template` and can contain multiple `include-templates`. The include-templates can be included into the main template.

Folders that don't contain a `config.yaml` are not treated as templates. This folders can be used as containers for other include-template files.

1.2. Template config

This section describes the `config.yaml` file. Image this folder structure for the next examples.

Simple example folder structure

```
templates
|-- includes
|   |-- global_include.gojson
|-- sample
|   |-- config.yaml
|   |-- local_include.gojson
|   |-- main.gojson
```

Here there is a main-template which includes the local_include-template and the global_include-template. The `config.yaml` is used by the template engine to parse the right files, so that the include-directives work.

templates/sample/config.yaml

```
engine: golang
main_template: "main.gojson"
main_pattern: "*.gojson"
include_pattern: "includes/*.gojson"
post_processors:
  - removeTrailingCommas
  - prettyJSON
```

Table 1. config.yaml attributes

| Attribute | Default | Description |
|-----------------|---------|--|
| engine | golang | selects the template engine, at the moment only golang is supported |
| main_template | none | points to the entrypoint of the rendering process, this template is used as the top most, it has to be included in the main pattern. |
| main_pattern | none | describes which files the engine should parse from the template folder. |
| include_pattern | none | describes which files the engine should additionally parse relative to the templates folder. |
| post_processors | none | allows to specify post processors that are used in that order on top of the generated output. |

Table 2. Post processors

| Attribute | Description |
|----------------------|---|
| removeTrailingCommas | removes in json files the commas which are not valid, this makes the template much easier |
| removeEmptyLines | removes empty lines |
| prettyJSON | Pretty converts the input json into a more human readable format where each element is on its own line with clear indentation |
| uglyJSON | Ugly removes insignificant space characters from the input json byte slice and returns the compacted result. |

1.3. GO Lang Template Engine

The default engine is the golang template engine. This gives some links to more detailed information.

The GO Lange template engine is based on:

- **GoLang test template**
The golang text template engine. This allows evaluating arguments, execute actions and include other templates.
- **sprig functions**
Beside of the default functions golang already provides, the sprig function library is added to the engine.

1.4. Example

This section shows a simple example, that covers a lot of functionality of the templates.

The example uses the following folder structure. Each file will be described in more detail.

Full example folder structure

```
templates
|-- includes
|   |-- global_include.gojson
|-- sample
|   |-- config.yaml
|   |-- example_variables.json
|   |-- local_include.gojson
|   |-- main.gojson
```

The template is called sample, because there is a config.yaml in the folder sample.

templates/sample/config.yaml

```
engine: golang
main_template: "main.gojson"
main_pattern: "*.gojson"
include_pattern: "includes/*.gojson"
post_processors:
  - removeTrailingCommas
  - prettyJSON
```

The **config.yaml** file states that the **main_template** is called **main.gojson**, so thats the entrypoint for the generation.

The **main_pattern** defines this files **templates/sample/*.gojson** should be parsed into the template engine, so also the **main_pattern** is included.

The **include_patterns** defines this files **templates/includes/*.gojson** should be parsed into the template engine.

The **post_processors** are used to remove the trailing commas and make the JSON output more readable.

Let's expect the following example variables structure.

templates/sample/example_variables.json

```
{
  "description": "sample",
  "interfaces": [
    {
      "name": "ifp_0/0/1",
      "ipv4": "127.0.0.1",
      "x": 5,
      "y": 3
    },
    {
      "name": "ifp_0/0/2",
      "ipv4": "127.0.0.2",
      "x": 4,
      "y": 4
    }
  ]
}
```

The this variables can be used to fill a template.

templates/sample/main.gojson

```
{{define "t1"}}
  "hostname": "static",
{{end}}
{
  {{template "t1"}}
  "description": "{{.description}}",
  "interfaces": {
    {{template "local_include.gojson" .interfaces}}
  },
  "list": {{template "global_include.gojson" .}}
}
```

This templates starts with a definition of a new template **t1** that will be used in this template.

This template **t1** is included immediately after **{**.

Then the description is added, the selection from the variable is done via the **.description**.

For the interfaces we use the local template **local_include.gojson**, the variables that are forwarded to the template are the **.interfaces** so only the array of the original variable set.

To render the list we include the **global_include.gojson** template and forward the original variable set.

templates/sample/local_include.gojson

```

{{range .}}
"{{.name}}": {
  "ip": "{{.ipv4}}",
  "1000/x*y": {{div 10000 (mul .x .y) }},
},
{{end}}

```

The *local_include.gojson* iterates over the interfaces list and prints the name and ip-address of the interface.

Also a simple computation is done by using the *sprig* functions *div* and *mul*.

templates/includes/global_include.gojson

```

[
  {{range .interfaces}}"{{.name}}",{{end}}
]

```

The *global_include.gojson* iterates over the interfaces list and prints in an array.



This json template does not create a valid json. The commas are not set correct. The document is not well formatted. Therefore it is easier to create the templates. To create a syntactically correct and well formatted document we use post processors. The syntax is corrected by `removeTrailingCommas`` post processor. The format is corrected by the `prettyJSON` post processor.

The next source block shows the expected outcome when applying the variables from above to the template.

templates/sample/example_result.json

```
{
  "description": "sample",
  "hostname": "static",
  "interfaces": {
    "ifp_0/0/1": {
      "1000/x*y": 666,
      "ip": "127.0.0.1"
    },
    "ifp_0/0/2": {
      "1000/x*y": 625,
      "ip": "127.0.0.2"
    }
  },
  "list": [
    "ifp_0/0/1",
    "ifp_0/0/2"
  ]
}
```

1.5. TestKit

In order to do a fast template prototyping we developed a test kit. The test kit allows to execute a template with a given variable set and validate the outcome against an expected result.

To execute we have to specify:

- `templatePath`: Template main folder (default ".")
- `template`: Template name
- `format`: File format [txt, json, json5] (default "txt")

So for example if we execute `template-engine-test -template sample -test example -format json` inside the templates folder, this command will execute the `sample` template with the content of the `example_variables.json` file as input variables. After execution the outcome is stored in the `example_got.json` file, and validated against the `example_result.json` file. The format not only specifies the file endings, it also specifies how the validation is done. So for example the json format does not care about ordering of whitespace differences.