Integrating PostgreSQL Documentation in 3rd Party Applications

An example with MediaWiki

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Swiss PostgreSQL Users Group

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Outline

1. Introduction
2. Documenting Resources
3. The Old Way
4. Moving On
5. The Magic of Integration
6. The Magic Explained
7. Conclusion

Charles Clavadetscher

- Senior DB Engineer at KOF ETH Zurich
  - KOF is the Center of Economic Research of the
  - ETHZ the Swiss Institute of Technology in Zurich, Switzerland
  - Independent economic research on business cycle tendencies for almost all sectors
  - Maintenance of all databases at KOF: PostgreSQL, Oracle, MySQL and MSSQL Server. Focus on migrating to PostgreSQL
  - Support in business process re-engineering
- Co-founder and treasurer of the SwissPUG, the Swiss PostgreSQL Users Group
- Member of the OK of the Swiss PGDay

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Why bother ?

Documenting resources such as software or database objects is one of those activities that suffer most:

- Companies are often unwilling to pay for a decent documentation.
- Developers find it cumbersome and boring to document their objects.

But without a good documentation:

- New developers spend a huge amount of time figuring out from the code how they need to proceed in order to make changes.
- Code is for the authors themselves something new after a few weeks without working on it, i.e. the developer has no big advantage compared to somebody new.

The bottom line is that a good documentation increases the efficiency of IT human resources leading to a reduction of development and maintenance costs. It is in the best interest of a company and its developers not only to support it financially, but also require a commitment to it from all people involved.

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From...

```
db=> CREATE SCHEMA test;

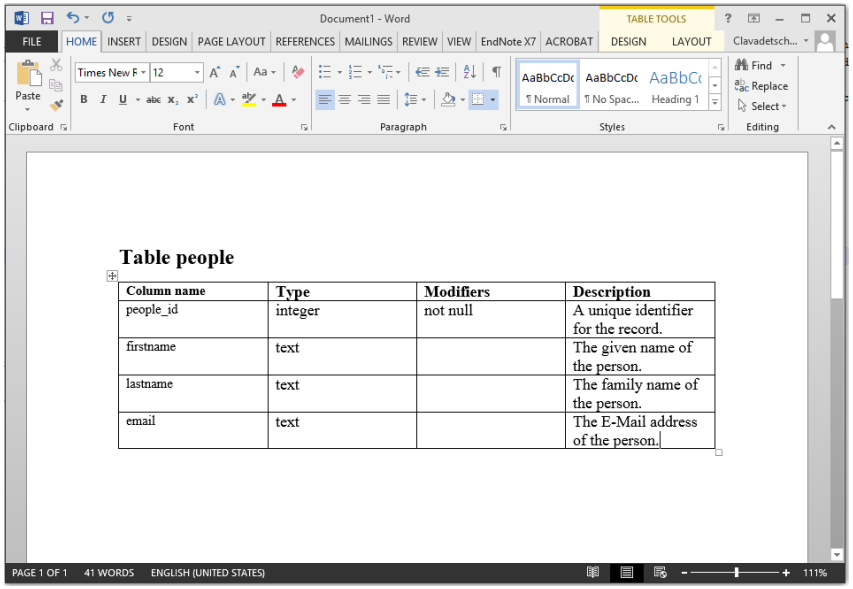
db=> CREATE TABLE test.people
     (
       people_id INTEGER,
       firstname TEXT,
       lastname TEXT,
       email TEXT
     );

db=> CREATE UNIQUE INDEX people_id_idx ON test.people(people_id);

db=> ALTER TABLE test.people ADD PRIMARY KEY USING INDEX people_id_idx;

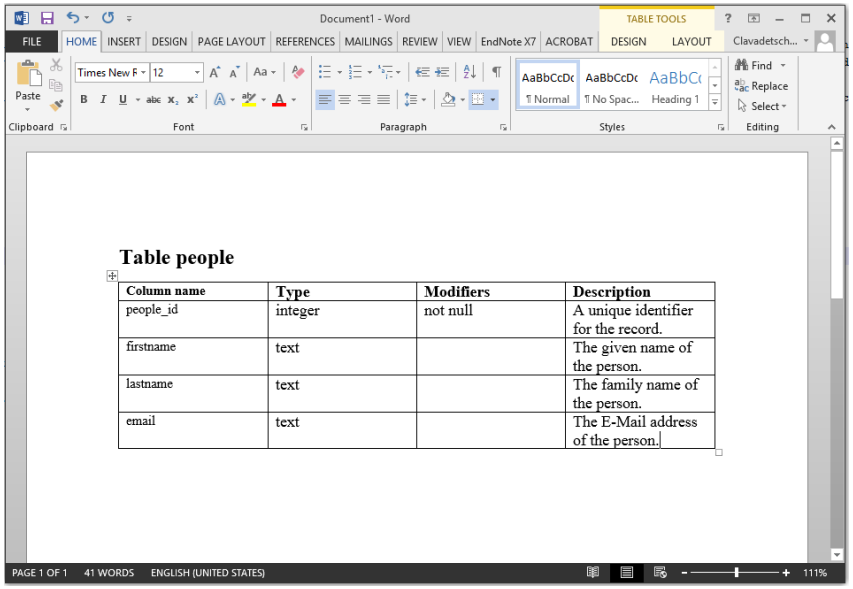
db=> \d test.people
       Table "test.people"
  Column   |  Type   | Modifiers
-----------+---------+-----------
 people_id | integer | not null
 firstname | text    |
 lastname  | text    |
 email     | text    |
Indexes:
    "people_id_idx" PRIMARY KEY, btree (people_id)
```

... to



Where do the descriptions come from ?

... to



Where do the descriptions come from ? They were entered manually - the good old way.

Fair enough ?

Fair enough ?

Well...

```
db=> ALTER TABLE test.people ADD COLUMN phone TEXT;

db=> \d test.people
      Table "test.people"
  Column   |  Type   | Modifiers
-----------+---------+-----------
 people_id | integer | not null
 firstname | text    |
 lastname  | text    |
 email     | text    |
 phone     | text    |
Indexes:
    "people_id_idx" PRIMARY KEY, btree (people_id)
```

Fair enough ?

Well...

```
db=> ALTER TABLE test.people ADD COLUMN phone TEXT;

db=> \d test.people
      Table "test.people"
  Column   |  Type   | Modifiers
-----------+---------+-----------
 people_id | integer | not null
 firstname | text    |
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Indexes:
    "people_id_idx" PRIMARY KEY, btree (people_id
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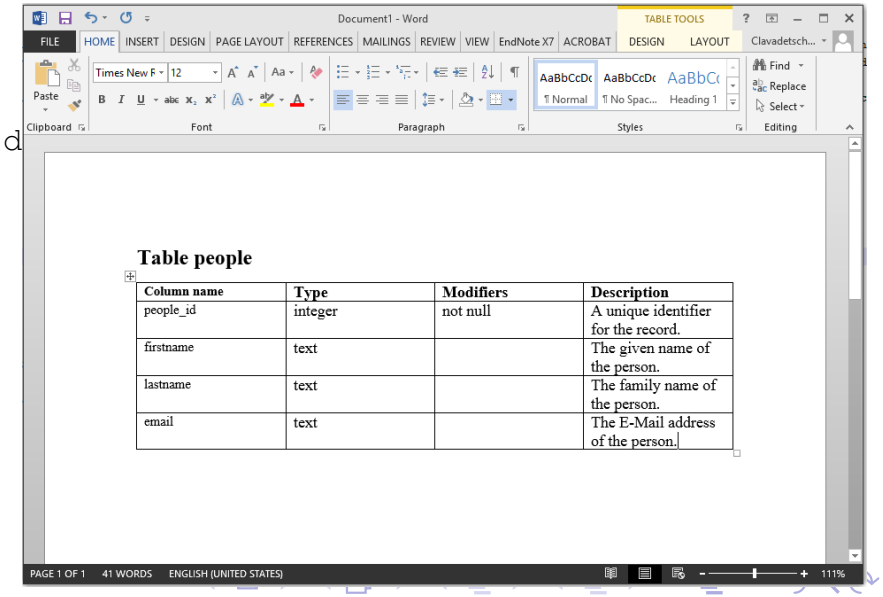

Table people

Column name	Type	Modifiers	Description
people_id	integer	not null	A unique identifier for the record.
firstname	text		The given name of the person.
lastname	text		The family name of the person.
email	text		The E-Mail address of the person.

Didn’t you forget something ?

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Document In the Database

```
db=> COMMENT ON TABLE test.people IS E'A table with people';
db=> COMMENT ON COLUMN test.people_id IS E'The unique ID of a person.';
db=> COMMENT ON COLUMN test.firstname IS E'The given name of a person.';
db=> COMMENT ON COLUMN test.lastname IS E'The family name of a person.';
db=> COMMENT ON COLUMN test.email IS E'The E-Mail address of a person.';
db=> COMMENT ON COLUMN test.phone IS E'The phone number of a person.';
db=> COMMENT ON INDEX people_id_idx IS E'The primary key identifier of the table.';

db=> \d+ people
                    Table "test.people"
  Column   |  Type   | Modifiers |           Description
-----------+---------+-----------+---------------------------------
 people_id | integer | not null  | The unique ID of a person.
 firstname | text    |           | The given name of a person.
 lastname  | text    |           | The family name of a person.
 email     | text    |           | The E-Mail address of a person.
 phone     | text    |           | The phone number of a person.
Indexes:
    "people_id_idx" PRIMARY KEY, btree (people_id)

db=> \di+ people_id_idx
     Name      | Type  |  Owner   | Table  |                Description
---------------+-------+----------+--------+-----------------------------------------
 people_id_idx | index | charles | people | The primary key identifier of the table.
```

Why In the Database ?

Why In the Database ?

Because your documentation in the database is as safe as your data itself.

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Because your documentation in the database is as safe as your data itself.

- Texts written with anything a bit more complex than plain text (e.g. Word and similar strange programs) are not likely to be readable with new versions of the software after some time.
- If you have copies on paper they will likely to be out-of-date soon.
- If you published electronic copies on a server your documents can get lost in a crash or suffer from the same problems as printed items.

So the question is: How can you synchronize your documentation with a different medium as quick as possible and spending as little effort as possible ?

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A small demo...

At the beginning: An empty page.

Create a Table

```
db=> CREATE TABLE test.people
     (
       people_id INTEGER,
       firstname TEXT,
       lastname TEXT,
       email TEXT
     );
db=> CREATE UNIQUE INDEX people_id_idx ON test.people(people_id);
db=> ALTER TABLE test.people ADD PRIMARY KEY USING INDEX people_id_idx;

db=> COMMENT ON TABLE test.people IS E'A table with people';
db=> COMMENT ON COLUMN test.people.people_id IS E'The unique ID of a person.';
db=> COMMENT ON COLUMN test.people.firstname IS E'The given name of a person.';
db=> COMMENT ON COLUMN test.people.lastname IS E'The family name of a person.';
db=> COMMENT ON COLUMN test.people.email IS E'The E-Mail address of a person.';
db=> COMMENT ON INDEX test.people_id_idx IS E'The primary key identifier of the table.';
```

Create a Table

```
db=> CREATE TABLE test.people
     (
       people_id INTEGER,
       firstname TEXT,
       lastname TEXT,
       email TEXT
     );
db=> CREATE UNIQUE INDEX peop
db=> ALTER TABLE test.people

db=> COMMENT ON TABLE test.pe
db=> COMMENT ON COLUMN test.p
db=> COMMENT ON COLUMN test.p
db=> COMMENT ON COLUMN test.p
db=> COMMENT ON COLUMN test.p
db=> COMMENT ON INDEX test.pe
```

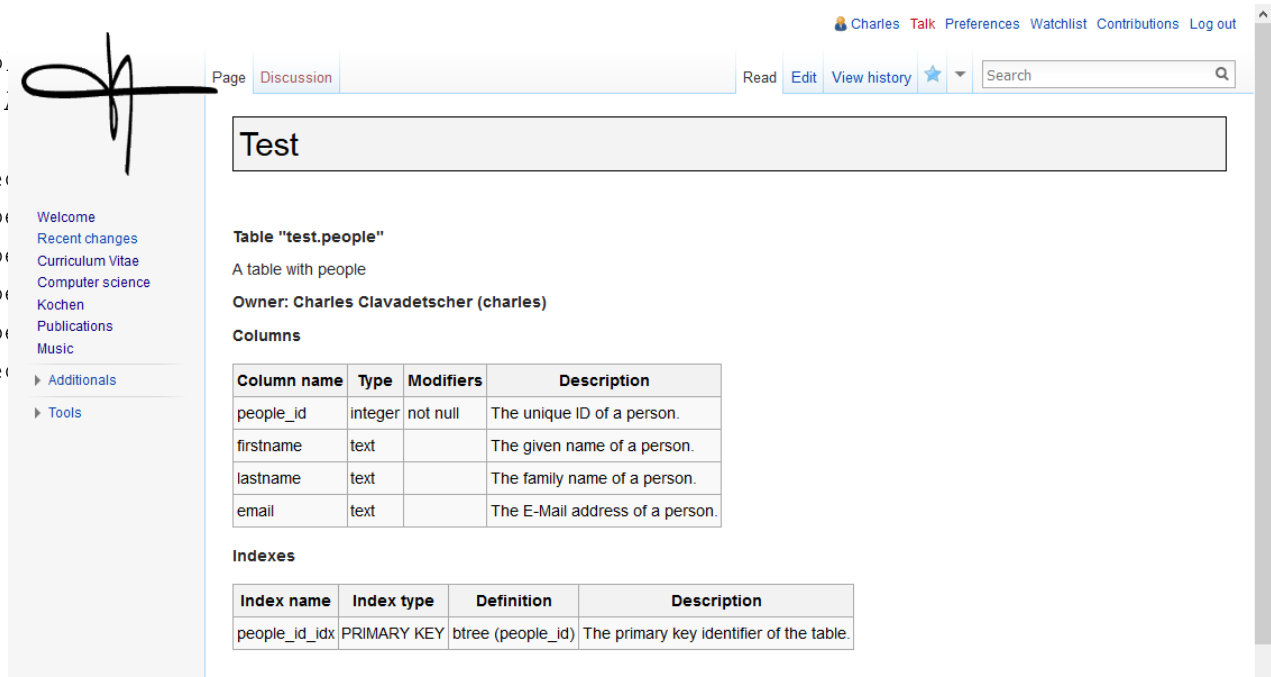

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Table "test.people"

A table with people

Owner: Charles Clavadetscher (charles)

Columns

Column name	Type	Modifiers	Description
people_id	integer	not null	The unique ID of a person.
firstname	text		The given name of a person.
lastname	text		The family name of a person.
email	text		The E-Mail address of a person.

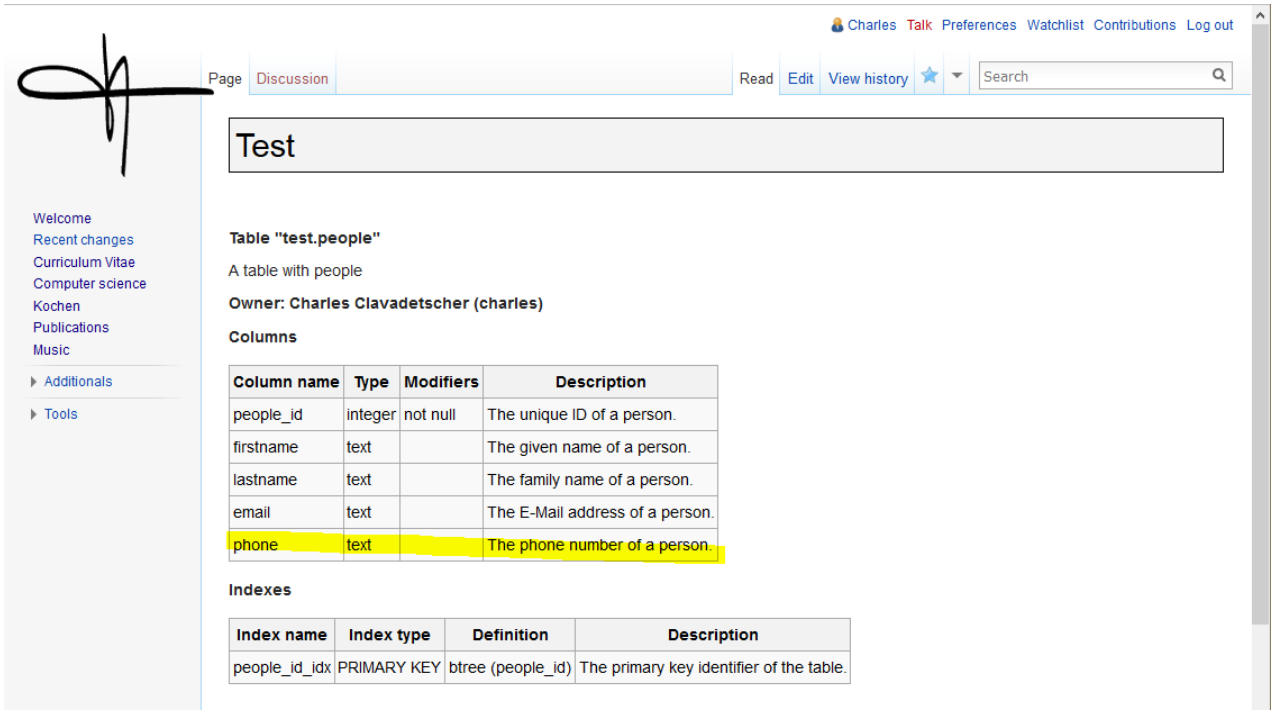
Indexes

Index name	Index type	Definition	Description
people_id_idx	PRIMARY KEY	btree (people_id)	The primary key identifier of the table.

The table appears in the Wiki page.

Modify the table

```
db=> ALTER TABLE test.people ADD COLUMN phone TEXT;
db=> COMMENT ON COLUMN test.people.phone IS E'The phone number of a person.';
```



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lastname	text		The family name of a person.
email	text		The E-Mail address of a person.
phone	text		The phone number of a person.

Indexes

Index name	Index type	Definition	Description
people_id_idx	PRIMARY KEY	btree (people_id)	The primary key identifier of the table.

Add a row security policy

```
db=> CREATE POLICY working_days ON test.people
db=> FOR ALL TO PUBLIC
db=> USING (CURRENT_TIME BETWEEN '08:00:00' AND '17:00:00'
db=> AND date_part('dow',CURRENT_TIMESTAMP) NOT IN (0,6));

db=> ALTER TABLE test.people ENABLE ROW LEVEL SECURITY;

db=> COMMENT ON POLICY working_days ON test.people IS
db=>   'Only allow access to the table during working days (Mo-Fr 08:00-17:00).';
```

Add a row security policy

```
db=> CREATE POLICY working_da
db=> FOR ALL TO PUBLIC
db=> USING (CURRENT_TIME BETW
db=> AND date_part('dow',CURR

db=> ALTER TABLE test.people

db=> COMMENT ON POLICY workin
db=>   'Only allow access to
```

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Test

Table "test.people"

A table with people

Owner: Charles Clavadetscher (charles)

Columns

Column name	Type	Modifiers	Description
people_id	integer	not null	The unique ID of a person.
firstname	text		The given name of a person.
lastname	text		The family name of a person.
email	text		The E-Mail address of a person.
phone	text		The phone number of a person.

Indexes

Index name	Index type	Definition	Description
people_id_idx	PRIMARY KEY	btree (people_id)	The primary key identifier of the table.

Policies

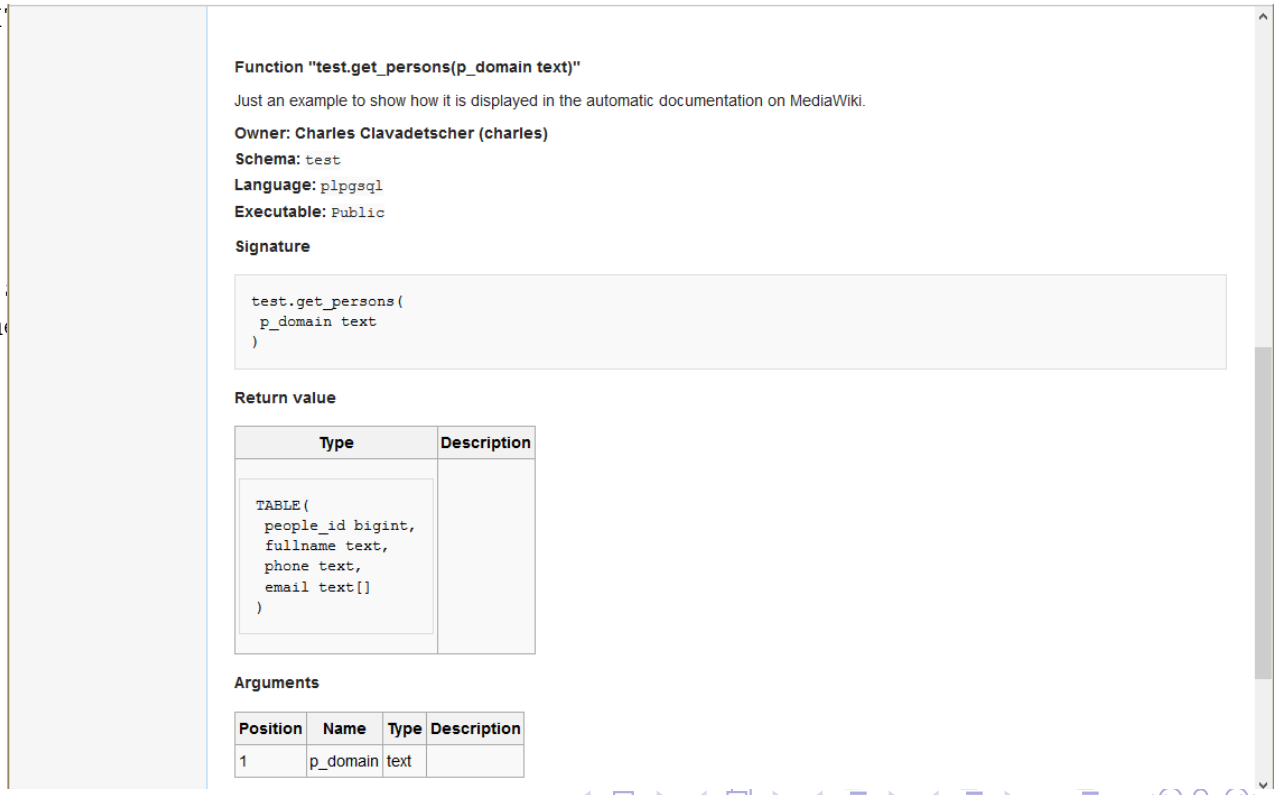
Policy name	For	To	Using	With check	Description
working_days	ALL	PUBLIC	((('now'::text)::time with time zone >= '08:00:00+02'::time with time zone) AND (('now'::text)::time with time zone <= '17:00:00+02'::time with time zone)) AND (date_part('dow'::text, now()) <> ALL (ARRAY[(0)::double precision, (6)::double precision]))		Only allow access to the table during working days (Mo-Fr 08:00-17:00).

Create a Function

```
db=> CREATE OR REPLACE FUNCTION test.get_persons(p_domain TEXT)
     RETURNS TABLE (people_id BIGINT,
                    fullname TEXT,
                    phone TEXT,
                    email TEXT[])
     AS $body$
     BEGIN
     END;
     $body$ LANGUAGE plpgsql;
\p
db=> COMMENT ON FUNCTION test.get_persons(p_domain TEXT)
     IS E'Just an example to show how it is displayed in '||
        E'the automatic documentation on MediaWiki.';
```

Create a Function

```
db=> CREATE OR REPLACE FUNCTION test.get_persons(p_domain TEXT)
     RETURNS TABLE (people_id BIGINT,
                    fullname TEXT,
                    phone TEXT,
                    email TEX
     AS $body$
     BEGIN
     END;
     $body$ LANGUAGE plpgsql;
\p
db=> COMMENT ON FUNCTION test
     IS E'Just an example to
        E'the automatic docum
```



Function "test.get_persons(p_domain text)"

Just an example to show how it is displayed in the automatic documentation on MediaWiki.

Owner: Charles Clavadetscher (charles)
Schema: test
Language: plpgsql
Executable: Public

Signature

```
test.get_persons(
 p_domain text
)
```

Return value

Type	Description
TABLE(people_id bigint, fullname text, phone text, email text[])	

Arguments

Position	Name	Type	Description
1	p_domain	text	

Add Comments to Function Arguments

```
db=> SELECT public.comment_on_function_argument('test.get_persons(TEXT)',
     -1,
     E'A set of entries matching the query domain:\n'||
     E'people_id: The unique identifier of the entry.\n'||
     E'fullname: Given and familiy name of the person.\n...');
db=> SELECT public.comment_on_function_argument('test.get_persons(TEXT)',
     1,
     E'A mail domain in the format <code>@domain</code>.');
```

Add Comments to Function Arguments

```
db=> SELECT public.comment_on_function_argument('test.get_persons(TEXT)',
     -1,
     E'A set of entries matching the query domain:\n'||
     E'people_id: The unique identifier of the entry.\n'||
     E'fullname: Given and familiy name of the person.\n...');
db=> SELECT public.comment_on_function_argument('test.get_persons(TEXT)',
     1,
     E'A mail domain in the f
```

Function "test.get_persons(p_domain text)"

Just an example to show how it is displayed in the automatic documentation on MediaWiki.

Owner: Charles Clavadetscher (charles)
Schema: test
Language: plpgsql
Executable: Public

Signature

```
test.get_persons(
 p_domain text
)
```

Return value

Type	Description
TABLE(people_id bigint, fullname text, phone text, email text[])	A set of entries matching the query domain: people_id: The unique identifier of the entry. fullname: Given and familiy name of the person. ...

Arguments

Position	Name	Type	Description
1	p_domain	text	A mail domain in the format @domain.

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Custom Function Delivering Wiki Markup

Function "public.create_wiki_doc(p_title integer, p_type text, p_schema_names text[], p_object_names text[])"

Create a set of wiki markup texts from a set of PostgreSQL objects. Notice that you must qualify or cast at least one of the p_schema_names or p_object_names to TEXT[] in order to enable PostgreSQL to pick this function instead of the base one.
Example: use array['schema_name1','schema_name2',...] or '{schema_name1,schema_name2}'::TEXT[] instead of a pure string representation of the array like '{schema_name1,schema_name2}'.

Owner: Charles Clavadetscher (charles)
Schema: `public`
Language: `plpgsql`
Executable: `Public`

Signature

```
public.create_wiki_doc(
 p_title integer,
 p_type text,
 p_schema_names text[],
 p_object_names text[]
)
```

Return value

Type	Description
`SETOF text`	The wiki markup formatted TEXT with the description of the object in p_object_name.

Arguments

Position	Name	Type	Description
1	p_title	integer	The heading number for the title: NULL or 0=Simple bold text. 1-4=The corresponding HTML header (in wiki markup this is the number of "=" the line is put between).
2	p_type	text	The type of object. Currently supported: table view function
3	p_schema_names	text[]	The name of the schemas where the objects are to be found. Use NULL for all schemas.
4	p_object_names	text[]	The name of the objects to be documented. Use NULL for all objects of this type.

Custom Functions for Arguments - 1

Function "public.comment_on_function_argument(p_proname text, p_position integer, p_comment text)"

A function to create comments on function arguments and return value.

Owner: Charles Clavadetscher (charles)
Schema: `public`
Language: `plpgsql`
Executable: `Public`

Signature

```
public.comment_on_function_argument(
 p_proname text,
 p_position integer,
 p_comment text
)
```

Return value

Type	Description
`boolean`	A boolean value to indicate if the description entry could be done.

Arguments

Position	Name	Type	Description
1	p_proname	text	The function signature: function_name(comma separated list of data types).
2	p_position	integer	The 1-based position of the paramenter for the comment. Use -1 for the return value.
3	p_comment	text	The comment itself.

Custom Functions for Arguments - 2

Function "public.param_description(objoid oid, posnum integer)"

A function to retrieve the comment on a function argument or the return value.

Owner: Charles Clavadetscher (charles)

Schema: `public`

Language: `sql`

Executable: `Public`

Signature

```
public.param_description(
 objoid oid,
 posnum integer
)
```

Return value

Type	Description
`text`	The description of the argument or the return value.

Arguments

Position	Name	Type	Description
1	objoid	oid	The oid of the function: (function_name(comma separated list of data types).oid
2	posnum	integer	The position of the paramenter or -1 for the return value.

Custom Functions Target Table

```
                    Table "pg_catalog.pg_description"
   Column    |  Type   | Modifiers | Storage  | Stats target | Description
-------------+---------+-----------+----------+--------------+-------------
 objoid      | oid     | not null  | plain    |              |
 classoid    | oid     | not null  | plain    |              |
 objsubid    | integer | not null  | plain    |              |
 description | text    |           | extended |              |
Indexes:
    "pg_description_o_c_o_index" UNIQUE, btree (objoid, classoid, objsubid)

db=> SELECT * FROKM pg_catalog.pg_description
     WHERE objoid = 'get_persons(TEXT)'::regprocedure;

 objoid | classoid | objsubid |                    description
--------+----------+----------+-----------------------------------------------------
  89277 |     1255 |       -1 | A set of entries matching the query domain:          +
        |          |          | people_id: The unique identifier of the entry.       +
        |          |          | fullname: Given and familiy name of the person.      +
        |          |          | ...
  89277 |     1255 |        0 | Just an example to show how it is displayed in the   +
        |          |          | automatic documentation on MediaWiki.
  89277 |     1255 |        1 | A mail domain in the format <code>@domain</code>.
(3 rows)
```

ExternalData And MagicNoCache MediaWiki Extensions

```
__NOCACHE__
{{#get_db_data:
db=wikireader
|from=public.create_wiki_doc(0,ARRAY['test'],NULL)
|data=documentation=create_wiki_doc
}}
{{#for_external_table:<nowiki />
{{{documentation}}}
}}
{{#clear_external_data:}}

{{#get_db_data:
db=wikireader
|from=public.create_wiki_doc(0,'function',ARRAY['test'],ARRAY['get_persons(text)'])
|data=documentation=create_wiki_doc
}}
{{#for_external_table:<nowiki />
{{{documentation}}}
}}
{{#clear_external_data:}}
```

What you need

Detailed instructions:
http://www.schmiedewerkstatt.ch/wiki/index.php/Database_self-documenting_Wiki

- An installation of MediaWiki (version 1.19+) on a web server.
- The ExternalData MediaWiki extension.
  - A dedicated database user for this component with only execute privileges on the Wiki markup creating functions.
  - The configuration for the database connection with this user.
- The MagicNoCache MediaWiki extension.
  - This component is not a strict requirements. If you don't use it, you will need to force a cache bypass in MediaWiki using ?action=purge after the page link.
- Install custom functions.
  - Download both scripts and execute them in a psql shell.

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Resources

- These slides: http://www.schmiedewerkstatt.ch/documents/04-publications/integrating_doc_with_mediawiki_handout_pdfa.pdf
- Working examples: http://www.schmiedewerkstatt.ch/wiki/index.php/Database_self-documenting_Wiki
- MediaWiki: https://www.mediawiki.org
- ExternalData: https://www.mediawiki.org/wiki/Extension:External_Data
- MagicNoCache: https://www.mediawiki.org/wiki/Extension:MagicNoCache
- PostgreSQL COMMENT Command: https://www.postgresql.org/docs/9.5/static/sql-comment.html

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  http://www.swisspug.org
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  http://www.schmiedewerkstatt.ch

Thank you

Thank you very much for your attention !

Feedback

Q&A