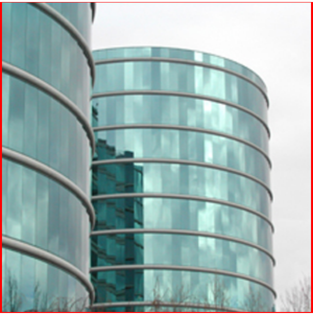

Moving to the NoSQL side: MySQL JSON functions

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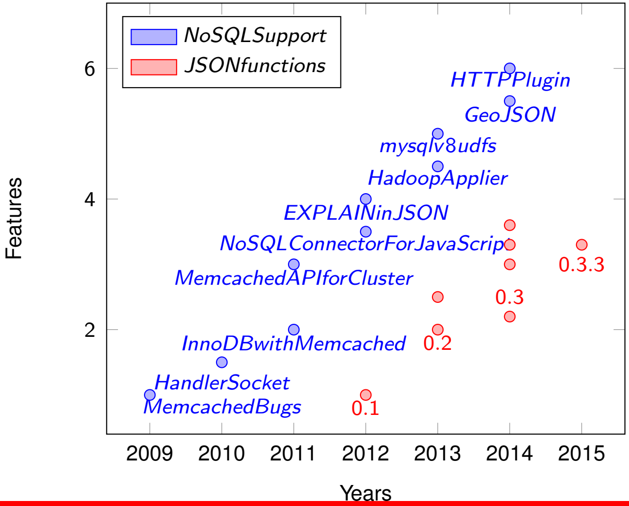
NoSQL and JSON functions support in MySQL



Improvements in JSON functions since first release From 0.2.0 to 0.3.3

- 30 bugs fixed
- 13 features implemented
- 1 Community contribution
- Simplified build
- Automatic package builder
- Error messages in the error log file

JSON functions overview
What do they do?

- Functions
  - Manipulate JSON documents
    - Validate
    - Search
    - Modify
- UDF functions
  - Easy to install
  - Independent from MySQL Server version
- Work on all MySQL supported platforms
- Binaries for Linux, Mac OS X 10.9 and Windows

Function descriptions

JSON_VALID

- Checks if doc is valid JSON document
- Returns 1 if document is valid, 0 if document is invalid
- Strict format as described at
  - `http://json.org`
  - `http://www.ietf.org/rfc/rfc4627.txt?number=4627`

JSON_VALID
Usage example

```
mysql> select json_valid(
-> '{"Fosdem": ["conference", 2015]}'),
-> json_valid('["conference", 2015]'),
-> json_valid('"conference"'),
-> json_valid('{"Fosdem"}')\G
********************** 1. row **********************
json_valid('{"Fosdem": ["conference", 2015]}'): 1
json_valid('["conference", 2015]'): 1
json_valid('"conference"'): 1
json_valid('{"Fosdem"}'): 0
1 row in set (0.00 sec)
```

Functions, accessing elements by a key

• json_contains_key	Checks if the document contains key specified
• json_extract	Extracts the element by key
• json_append	Appends the element
• json_replace	Replaces the element
• json_set	Perform a kind of INSERT ON DUPLICATE KEY UPDATE operation
• json_remove	Removes the element

json_contains_key(doc, keypart1, keypart2, ...)
Usage example

```
SET optimizer_trace=1;
mysql> select user from mysql.user;
...
mysql> select json_contains_key(trace, 'steps', '1',
-> 'join_optimization', 'steps', '0',
-> 'condition_processing') as contains
-> from information_schema.optimizer_trace;
+----------+
| contains |
+----------+
|        0 |
+----------+
1 row in set (0.01 sec)
```

json_contains_key(doc, keypart1, keypart2, ...)
Usage example

```
mysql> select user from mysql.user where user='Sveta';
mysql> select json_contains_key(trace, 'steps', '1',
-> 'join_optimization', 'steps', '0',
-> 'condition_processing') as contains
-> from information_schema.optimizer_trace;
+----------+
| contains |
+----------+
|        1 |
+----------+
1 row in set (0.01 sec)
```

json_extract(doc, keypart1, keypart2, ...)
Usage example

```
SET optimizer_trace=1;
mysql> select user from mysql.user;
...
mysql> select json_extract(trace, 'steps', '1',
-> 'join_optimization', 'steps', '0',
-> 'condition_processing') as contains
-> from information_schema.optimizer_trace;
+----------+
| contains |
+----------+
| NULL     |
+----------+
1 row in set (0.03 sec)
```

Search path

```
{"steps":
  [
        ...
           {"join_optimization":
               {"steps":
                   [
                    {"condition_processing": .....

json_extract(trace, 'steps', '1', 'join_optimization',
'steps', '0', 'condition_processing')
```

json_extract(doc, keypart1, keypart2, ...)
Usage example

```
mysql> select user from mysql.user where user='Sveta';
...
mysql> select json_extract(trace, 'steps', '1',
-> 'join_optimization', 'steps', '0',
-> 'condition_processing') as contains
-> from information_schema.optimizer_trace\G
********************* 1. row *********************
contains: {
"condition": "WHERE",
"original_condition": "(`mysql`.`user`.`User` = 'Sveta
"steps":
...
```

json_append(doc, keypart1, keypart2, ..., new_element) Usage example

```
mysql> select json_append(
-> '{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 2, '"Brussels"') as el2,
-> json_append('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', -1, '"Brussels"') as `el-1`,
-> json_append('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 1, '"Brussels"') as el1\G
********************** 1. row **********************
el2:  {"Fosdem": ["conference", 2015, "Brussels"]}
el-1: {"Fosdem": ["conference", 2015, "Brussels"]}
el1:  {"Fosdem": ["conference", 2015]}
1 row in set (0.00 sec)
```

json_replace(doc, keypart1, keypart2, ..., new_value) Usage example

```
mysql> select json_replace(
-> '{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 0, '"User conference"') as el0,
-> json_replace('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 2, '"User conference"') as el2,
-> json_replace('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', -1, '"User conference"') as `el-1`\G
********************* 1. row *********************
el0: {"Fosdem": ["User conference", 2015]}
el2: {"Fosdem": ["conference", 2015]}
el-1: {"Fosdem": ["conference", 2015]}
1 row in set (0.01 sec)
```

ORACLE

json_set(doc, keypart1, keypart2, ..., new_value) Usage example

```
mysql> select json_set(
-> '{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 0, '"User conference"') as el0,
-> json_set('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 2, '"Brussels"') as el2,
-> json_set('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', -1, '"Brussels"') as `el-1`\G
********************* 1. row *********************
el0: {"Fosdem": ["User conference", 2015]}
el2: {"Fosdem": ["conference", 2015, "Brussels"]}
el-1: {"Fosdem": ["conference", 2015, "Brussels"]}
1 row in set (0.00 sec)
```

json_remove(doc, keypart1, keypart2, ...)
Usage example

```
mysql> select json_remove(
-> '{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 1) as el1,
-> json_remove('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', 2) as el2,
-> json_remove('{"Fosdem": ["conference", 2015]}',
-> 'Fosdem', -1) as `el-1`\G
********************** 1. row **********************
el1: {"Fosdem": ["conference"]}
el2: {"Fosdem": ["conference", 2015]}
el-1: {"Fosdem": ["conference", 2015]}
1 row in set (0.00 sec)
```

json_search(doc, value)

- Searches for specified value in the document
- Wildcards supported since version 0.3.2
- Returns key path of the element which contains the value in reverse order or NULL if not found or parsing failed

json_search(doc, value)
Usage example

```
mysql> select json_search(trace,
-> '"trivial_condition_removal"') as `full`,
-> json_search(trace,
-> '"trivial_condition"') as `partial`,
-> json_search(trace,
-> '"trivial_condition%"') as `wildcard` from informati
********************** 1. row **********************
full:
transformation:0:steps:condit...essing:0:steps:
join_optimization:0:steps::
partial: NULL
wildcard: transformation:0:steps:condit...essing:0:step
join_optimization:0:steps::
1 row in set (0.01 sec)
```

Functions, merging documents

	Merge two or more documents into one Return first document with followings appended
• json_merge	Does not handle duplicate keys, does not check for validity, open and closing brackets must match
• json_safe_merge	+ Checks for validity
• json_deep_merge	+ Duplicates keys are updated

json_[safe_ |deep_]merge(doc1, doc2, ...)
Usage example

```
mysql> select json_merge('{"Fosdem": ["BE", 2014]}',
-> '{"Fosdem": ["BE" 2015]}') as 'jm',
-> json_safe_merge('{"Fosdem": ["BE", 2014]}',
-> '{"Fosdem": ["BE" 2015]}') as 'jsm',
-> json_safe_merge('{"Fosdem": ["BE", 2014]}',
-> '{"Fosdem": ["BE", 2015]}') as 'jsm',
-> json_deep_merge('{"Fosdem": ["BE", 2014]}',
-> '{"Fosdem": ["BE", 2015]}') as 'jdm'\G
********************** 1. row **********************
jm: {"Fosdem": ["BE", 2014], "Fosdem": ["BE" 2015]}
jsm: {"Fosdem": ["BE", 2014]}
jsm: {"Fosdem": ["BE", 2014], "Fosdem": ["BE", 2015]}
jdm: {"Fosdem": ["BE", 2014, "BE", 2015]}
1 row in set (0.00 sec)
```

json_depth(doc)

- Returns depth of the document
-
```
mysql> select json_depth(
-> '{"Fosdem": ["conference", 2015]}')
-> as 'json_depth';
+------------+
| json_depth |
+------------+
|          3 |
+------------+
1 row in set (0.00 sec)
```

json_count(doc[, keypart1[, keypart2[, ...]]])

- Returns number of childs of the key specified

-
  ```
  mysql> select json_count(
  -> '{"Fosdem": ["conference", 2015]}')
  -> as 'root count',
  -> json_count('{"Fosdem": ["conference", 2015]}',
  -> 'Fosdem') as 'first element count'\G
  ********************* 1. row ********************
  root count: 1
  first element count: 2
  1 row in set (0.00 sec)
  ```

json_version()

- Returns version number of the functions
-
```
mysql> select json_version();
+-----------------------------+
| json_version()              |
+-----------------------------+
| MySQL JSON UDFs 0.3.3-labs |
+-----------------------------+
1 row in set (0.00 sec)
```

json_test_parser(doc)

- Returns text representation of parse tree of the JSON document, partial parse tree or empty string if document is invalid.
- **This function is supposed to use for tests only and should not be used in production.**

Where to get the functions?

- MySQL Labs at `http://labs.mysql.com`
- Source code
  - Compile for any version you like
  - Known to work with 5.5, 5.6 and 5.7 series
- Binaries
  - x86 and x86_64
  - Generic Linux
  - Mac OSX 10.9
  - Windows 7

How to install?

- Manually
  - UNIX:

    ```
    create function json_valid returns integer
    soname 'libmy_json_udf.so';
    ```
  - Windows:

    ```
    create function json_remove returns string
    soname 'my_json_udf.dll';
    ```
- Ready-to-use scripts

  -
    ```
    mysql < install_jsonudf.sql
    mysql < uninstall_jsonudf.sql
    ```
  - Thank you, Daniel van Eeden!

How to compile?

- You need
  - MySQL Server
  - CMake
  - Compiler
    - UNIX: any, tested with gcc
    - Windows: Visual Studio
- How to compile
  - UNIX

    ```
    cmake . -DMYSQL_DIR=/home/sveta/build/mysql-5.6
    make
    ```
  - Windows

    ```
    "C:\...\cmake.exe" -G "Visual Studio 11 Win64" . \
    -DMYSQL_DIR="C:/MySQL/mysql-5.6.21"
    devenv my_json_udf.sln /build Release
    ```

References

- More information
  - README, ChangeLog files
  - `https://blogs.oracle.com/svetasmirnova/`
  - `https://twitter.com/#!/svetsmirnova`
  - `http://json.org/`
  - `http://www.pcre.org/`
  - `http://dev.mysql.com/doc/refman/5.6/en/adding-functions.html`
- Feature Requests and Bug Reports
  - `https://bugs.mysql.com`
  - Oracle's Bugs Database for engineers and paying customers

Thank you

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