

MariaDB Server on macOS

On my lame attempts to build and use it on 10.13.6

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What is this session about?

- Why bother to run MariaDB Server on macOS?
 - Because I can, I have a spare MacBook Air at hand, and I want to study and use **DTrace**, **Instruments** and other macOS specific tools, and test more (also on M1 eventually)
- Status of MariaDB Server on macOS
- Building recent MariaDB Server 10.1 ... 10.6 from GitHub sources on macOS 10.13.6 (High Sierra), related issues and bugs reported
- My first lame attempts to use **DTrace** with MariaDB Server
- My first lame attempts to use **Instruments** with MariaDB Server

MariaDB Server on macOS - NOT SUPPORTED

- At least it is not supported by MariaDB Corporation or Foundation
- We do not provide binaries for macOS
- There is no macOS host in the buildbot
- Somebody cares, so there are different versions in MacPorts (that may work or not):

```
Yuliyas-Air:~ Valerii$ sudo port list | grep -i maria | grep server
mariadb-server @5.5.68 databases/mariadb
mariadb-10.0-server @10.0.38 databases/mariadb-10.0
mariadb-10.1-server @10.1.48 databases/mariadb-10.1
mariadb-10.2-server @10.2.41 databases/mariadb-10.2
mariadb-10.3-server @10.3.32 databases/mariadb-10.3
mariadb-10.4-server @10.4.22 databases/mariadb-10.4
mariadb-10.5-server @10.5.13 databases/mariadb-10.5
mariadb-10.6-server @10.6.5 databases/mariadb-10.6
mariadb-10.7-server @10.7.1 databases/mariadb-10.7
```

MariaDB 10.6 Server on macOS from MacPorts...

- At least on my Air with macOS 10.13.6 there is a problem:

```
Yuliyas-Air:~ Valerii$ sudo port install mariadb-10.6
mariadb-10.6-server
...
---> Attempting to fetch mariadb-10.6-10.6.5_1.darwin_17.x86_64.tbz2
from http://nue.de.packages.macports.org/mariadb-10.6
---> Building mariadb-10.6
Error: Failed to build mariadb-10.6: command execution failed
Error: See
/opt/local/var/macports/logs/_opt_local_var_macports_sources_rsync.macp
orts.org_macports_release_tarballs_ports_databases_mariadb-10.6/mariadb
-10.6/main.log for details.
Error: Follow https://guide.macports.org/#project.tickets if you
believe there is a bug.
Error: Processing of port mariadb-10.6 failed
...
```

- But I still want to build and MariaDB server there...

MariaDB Server on macOS - Known Bugs

- I know I am not the only upstream user on macOS, as there are bug reports - 82 MDEVs matching now
- Who cares about them? 60 of the above are closed.
- I've reported the following while preparing for this talk:
 - **MDEV-27402** - easy to workaround with a simple patch
 - **MDEV-27403** - closed, surely affected 10.4+ badly when built with (unsupported) openssl 3. The fix may be even released already
 - **MDEV-27579** - assigned, client, readline-related, may be workarounded with a patch
 - ...

Building on macOS - prerequisites

- This KB page is a good start, but it's far from being complete...
- Install proper version of XCode for your macOS version, from here

```
Yuliyas-Air:server Valerii$ clang -v
Apple LLVM version 10.0.0 (clang-1000.10.44.4)
```

- Install **MacPorts** (or Homebrew)
- Install **git** and get the source code:

```
git clone https://github.com/MariaDB/server.git
git checkout 10.3
git submodule update --init --recursive
```

- Openssl version 3 is installed by default (not supported until **10.8.1**), you'll need 1.1 for MariaDB 10.4+:

```
Yuliyas-Air:server Valerii$ sudo port list | grep openssl | head -4
fbopenssl                @0.0.4          devel/fbopenssl
openssl                 @3              devel/openssl
openssl10                 @1.0.2u        devel/openssl10
openssl11              @1.1.11        devel/openssl11
```

Building on macOS - MariaDB Server 10.1

- Basically build works without any issues, good old version, even though no longer supported
- Build out of source (**mkdir buildtmp; cd buildtmp; ...; rm -rf *;**)
- Use as simple **cmake** command lines as possible. This usually works for my purposes:

```
Yuliyas-Air:buildtmp Valerii$ cmake ..  
-DCMAKE_INSTALL_PREFIX=/Users/Valerii/dbs/maria10.1  
-DCMAKE_BUILD_TYPE=RelWithDebInfo -DENABLE_DTRACE=1
```

- Run MTR tests if you care about the usability of the results:

```
Yuliyas-Air:mysql-test Valerii$ ./mtr --force  
  
...  
MariaDB Version 10.1.49-MariaDB  
  
...  
connect.json [ pass ] 204  
connect.part_file [ pass ] 292  
  
...
```

Building on macOS - MariaDB Server 10.2

- With this version I've hit my first problem during compilation, in the **mysql.cc** client code:

```
...
[ 99%] Building CXX object client/CMakeFiles/mysql.dir/mysql.cc.o
/Users/Valerii/git/server/client/mysql.cc:1055:16: error: redefinition
of
    '_hist_entry'
typedef struct _hist_entry {
                ^
/opt/local/include/editline/readline.h:57:16: note: previous definition
is here
typedef struct _hist_entry {
                ^
1 error generated.
```

- It was easy to resolve with a lame patch, but I still reported it as **MDEV-27587**

Building on macOS - MariaDB Server 10.3

- With this version I've got my second problem, with MTR tests:

```
Yuliyas-Air:mysql-test Valerii$ ./mtr main.connect
```

```
Logging: ./mtr main.connect
```

```
...
```

```
MariaDB Version 10.3.33-MariaDB
```

```
...
```

```
main.connect [ fail ]
```

```
Test ended at 2022-01-23 17:31:31
```

```
CURRENT_TEST: main.connect
```

```
Could not execute 'check-testcase' before testcase 'main.connect' (res:  
1):
```

```
...
```

```
mysqltest: Start processing test commands from
```

```
'./include/check-testcase.test' ...
```

```
mysqltest: At line 19: query 'let $tmp= `SELECT '$tmp' = 'No such  
row``' failed: 2013: Lost connection to MySQL server during query
```

Building on macOS - MariaDB Server 10.4+

- With these versions I was initially not able to get **mysql_install_db** to work without crashes (so MTR fails too)
- The solution was eventually to install openssl 1.1 from ports and make sure it is used:

```
Yuliyas-Air:buildtmp Valerii$ cmake ..  
-DCMAKE_INSTALL_PREFIX=/Users/Valerii/dbs/maria10.6  
-DCMAKE_BUILD_TYPE=RelWithDebInfo -DBUILD_CONFIG=mysql_release  
-DFEATURE_SET=community -DWITH_EMBEDDED_SERVER=OFF  
-DPLUGIN_TOKUDB=NO -DWITH_SSL=/opt/local/libexec/openssl11  
-DENABLE_DTRACE=1
```

- 10.4 and 10.5 built cleanly (MTR tests problem aside), while for 10.6 I had to add [lame fixes](#) to workaround some problematic parts of the code when **__APPLE_CC__** is defined

DTrace on macOS - Basics

- Read about **DTrace** here, or there, or anywhere...
- It is there in macOS, ready to use:

```
Yuliyas-Air:maria10.6 Valerii$ dtrace
```

```
Usage: dtrace [-aACeFHLqSvVwZ] [-arch i386|x86_64] [-b bufosz] [-c cmd]
[-D name[=def]]
```

```
[-I path] [-L path] [-o output] [-p pid] [-s script] [-U name]
[-x opt[=val]]
```

```
[-P provider [[ predicate ] action ]]
```

```
[-m [ provider: ] module [[ predicate ] action ]]
```

```
[-f [[ provider: ] module: ] func [[ predicate ] action ]]
```

```
[-n [[[ provider: ] module: ] func: ] name [[ predicate ] action ]]
```

```
[-i probe-id [[ predicate ] action ] [ args ... ]
```

```
predicate -> '/' D-expression '/'
```

```
action -> '{' D-statements '}'
```

...

DTrace on macOS - using DTrace probes

- DTrace (USDT) probes in the code, or *static tracepoints*:

```
Yuliyas-Air:maria10.6 Valerii$ sudo dtrace -l ./bin/mariadb | grep
query-start
```

...

```
2464 mysql73374          mariadb
_ZL17wsrep_mysql_parseP3THDPcjP12Parser_state [wsrep_mysql_parse(THD*,
char*, unsigned int, Parser_state*)] query-start
```

```
2465 mysql73374          mariadb
_Z16dispatch_command19enum_server_commandP3THDPcjb
[dispatch_command(enum_server_command, THD*, char*, unsigned int, bool)]
query-start
```

- How to use them:

```
Yuliyas-Air:server Valerii$ grep -rni 'query-start' *
support-files/dtrace/query-time.d:28:mysql*:::query-start
```

...

```
support-files/dtrace/query-rowops.d:30:mysql*:::query-start
```

```
Yuliyas-Air:server Valerii$ cat support-files/dtrace/query-time.d
```

DTrace on macOS - query execution time

- Slightly shortened **query-time.d** from the above:

```
Yuliyas-Air:maria10.6 Valerii$ cat /tmp/query-time.d
#!/usr/sbin/dtrace -s
#pragma D option quiet
dtrace:::BEGIN {
    printf("%-20s %-20s %-40s %-9s\n", "Who", "Database", "Query",
"Time(ms)");
}

mysql*:::query-start {
    self->query = copyinstr(arg0);
    self->connid = arg1;
    self->db = copyinstr(arg2);
    self->who = strjoin(copyinstr(arg3), strjoin("@", copyinstr(arg4)));
    self->querystart = timestamp;
}

mysql*:::query-done {
    printf("%-20s %-20s %-40s %-9d\n", self->who, self->db, self->query,
        (timestamp - self->querystart) / 1000000);
}
```

DTrace on macOS - adding user probes

- Consider this lame example:

```
Yuliyas-Air:maria10.6 Valerii$ cat /tmp/userfunc.d
#!/usr/sbin/dtrace -s
#pragma D option flowindent
pid$1:::$2:entry {
    printf("Enter %s\n", probefunc);
}

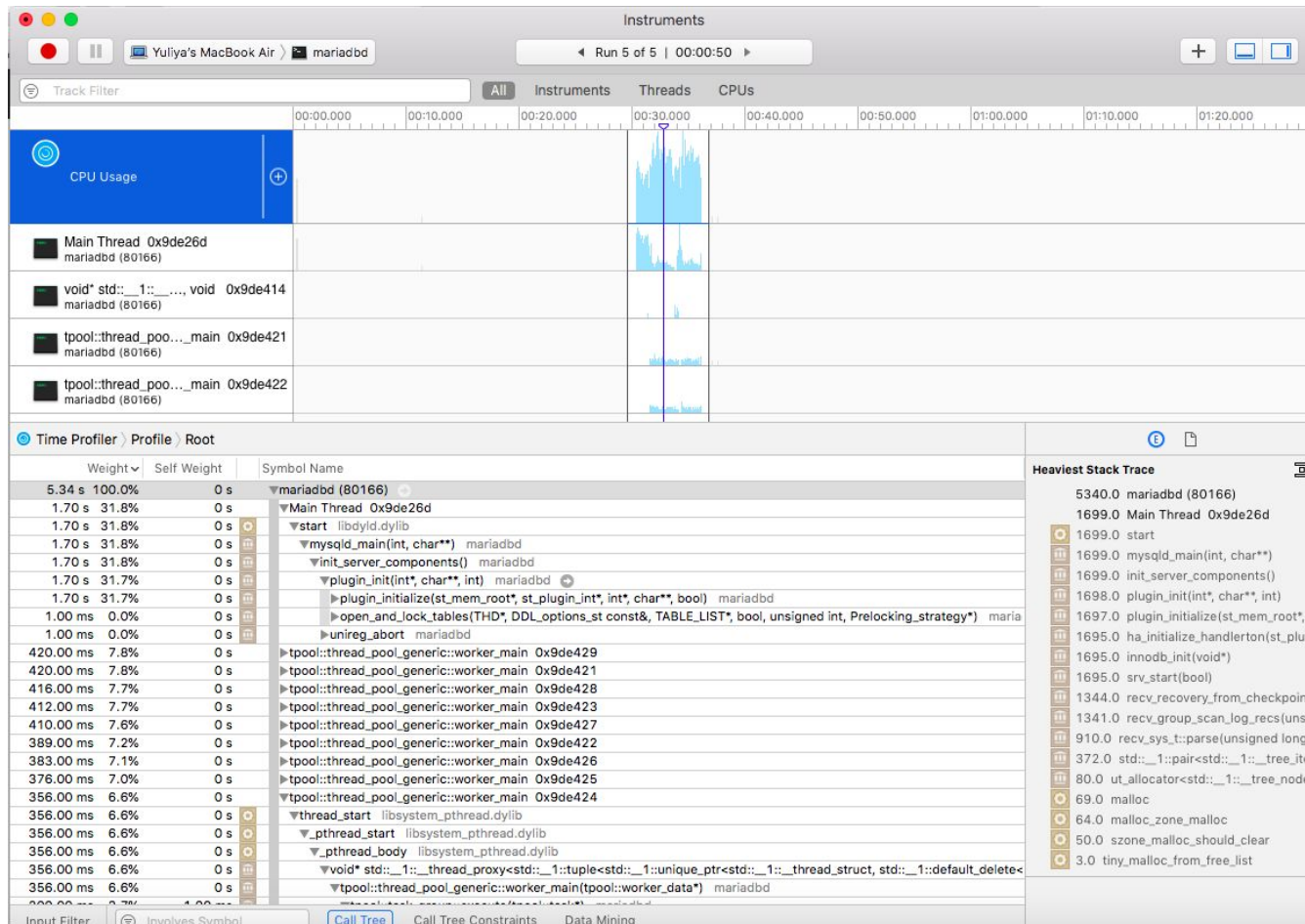
pid$1:::$2:return {
    printf("Return from %s\n", probefunc);
}
```

- Now let's apply it to all functions in the PID of mariadb:

```
Yuliyas-Air:maria10.6 Valerii$ sudo /tmp/userfunc.d 61198 '*' >
/tmp/trace.txt
...
Failed to start process notifications for pid 61198 (19)
dtrace: script '/tmp/userfunc.d' matched 453035 probes
^CYuliyas-Air:maria10.6 Valerii$ ls -l /tmp/trace.txt
-rw-r--r--  1 Valerii  wheel  4162041 Jan 23 22:06 /tmp/trace.txt
```

Instruments on macOS - what you can do?

- **Instruments** looks impressive, DTrace-based GUI



MariaDB Server on macOS - Next Steps

- Studying **DTrace** and re-implementing/re-checking all Linux **bpftrace** scripts, at scale!
- Building Percona Toolkit and **sysbench** from sources

```
Yuliyas-Air:sysbench Valerii$ src/sysbench --version  
sysbench 1.1.0-df89d34
```
- Studying of some MariaDB Server performance problems on macOS with better (?) instrumentation than ever
- Maybe working on proper fixes for MDEVs reported and new ones
- macOS upgrades and related experience. Maybe newer versions resolve problems I hit...
- Builds and tests on M1-based hardware, maybe one day...
- Blog posts pending. Stay tuned!

Thank you!

Questions and Answers?

Please, search and report bugs at:

- <https://jira.mariadb.org>