
GLOC
Great Lakes Oracle Conference
Automate SQL with Method5 Open Source Remote Execution
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CLEVELAND PUBLIC AUDITORIUM, CLEVELAND, OHIO
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Summary

1. Parallel remote execution SQL extension
2. Easily run SQL, PL/SQL, and shell scripts
3. Advanced features in a simple syntax:

```
select *
from table(m5('select * from dual'));
```

4. Complements existing automation tools
5. Open-source, secure, agentless, robust implementation
6. More resources - https://method5.github.io
7. Find, fix, and prevent problems everywhere

About Jon Heller

1. Oracle developer or DBA for 17 years
2. DBA at Ventech Solutions in Urbandale, Iowa
3. Stack Overflow top user in Oracle and PL/SQL
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Oracle Automation Gap

1. Groundhog Day DBA
2. Many simple tasks do not scale
3. Only obvious, pre-defined tasks are automated
4. Every environment has unique challenges
5. SQL and PL/SQL are great but per-database
6. We avoid row-by-row processing, we should also avoid database-by-database administration

Current Tools - Not Good Enough

1. Won't transform your processes
2. Slow, complex, or insecure
3. IDE, plugin, website, files, agents
4. Often expensive, closed source
5. Pre-defined tasks only
6. None of them are ***relational***

Fabric

Ideal Solution

1. Treat everything as one database
2. New dynamic SQL - control what and *where*
3. New SQL syntax would be perfect:

```
SELECT *
  FROM DBA_USERS
 WHERE PROFILE = 'DEFAULT'
TARGETS ('DEV', 'QA')
```

4. We can get surprisingly close to that

A Robust Solution – Method5

1. Not your typical home-made script
2. In production since 2014, public since 2016
3. First user: 400 databases, 1 petabyte of data, 15 million runs
4. 1800 unit tests, open source, focus on security

Interface - Function or Procedure

```
select *
from table(m5('select * from dual', 'dev,qa'));
```

WHAT WHERE

```
begin
  m5_proc(
    p_code                => 'begin null; end;',
    p_targets             => 'dev,qa',
    p_table_name          => 'test_data',
    p_table_exists_action => 'drop',
    p_asynchronous        => true,
    p_run_as_sys          => false
);
end;
/
```

WHAT
WHERE
HOW

Advantages

1. Performance - fast, parallel, asynchronous
2. Interface - plain SQL and PL/SQL
3. Relational - save, share, and join
4. Administration - for most users - none
5. Security - hardened, configurable
6. Exceptions and Metadata - handled, saved

Parameters

1. P_CODE - what to run
2. P_TARGETS - where to run it
3. P_TABLE_NAME - where to save it
4. P_TABLE_EXISTS_ACTION - if it already exists
5. P_ASYCHRONOUS - return or wait for all rows
6. P_RUN_AS_SYS - run with SYSDBA privilege

Other Features

1. Tables - data, _META, _ERR
2. Views - M5_RESULTS, M5_METADATA, M5_ERRORS
3. M5_ links - M5_* created in your schema
4. Global Data Dictionary - Common tables refreshed nightly (M5_DBA_USERS, M5_V$PARAMETER, etc.)
5. Admin Email - Summary of daily issues
6. Version Star - Use "**" for version differences
7. Examples - Many pre-built, complex examples

Simple Example

```
> begin
  2     m5_proc('select * from dual');
  3  end;
  4  /

PL/SQL procedure successfully completed.

> select * from m5_metadata;

DATE_STARTED DATE_UPDATED USERNAME    IS_COMPLETE TARGETS_EXPECTED TARGETS_COMPLETED
------------ ------------ ---------- ----------- ---------------- ----------------
10/29/2017   10/29/2017   [redacted] No                       421               79

> select * from m5_results where rownum <= 3;

DATABASE_NAME DUMMY
------------- -----
[redacted]    X
              X
              X

> select * from m5_errors;

DATABASE_NAME DB_LINK_NAME DATE_ERROR ERROR_STACK_AND_BACKTRACE
------------- ------------ ---------- ----------------------------------------
[redacted]    M5_[redacted] 10/29/2017 ORA-12505: TNS:listener does not currently know
```

More Simple Examples

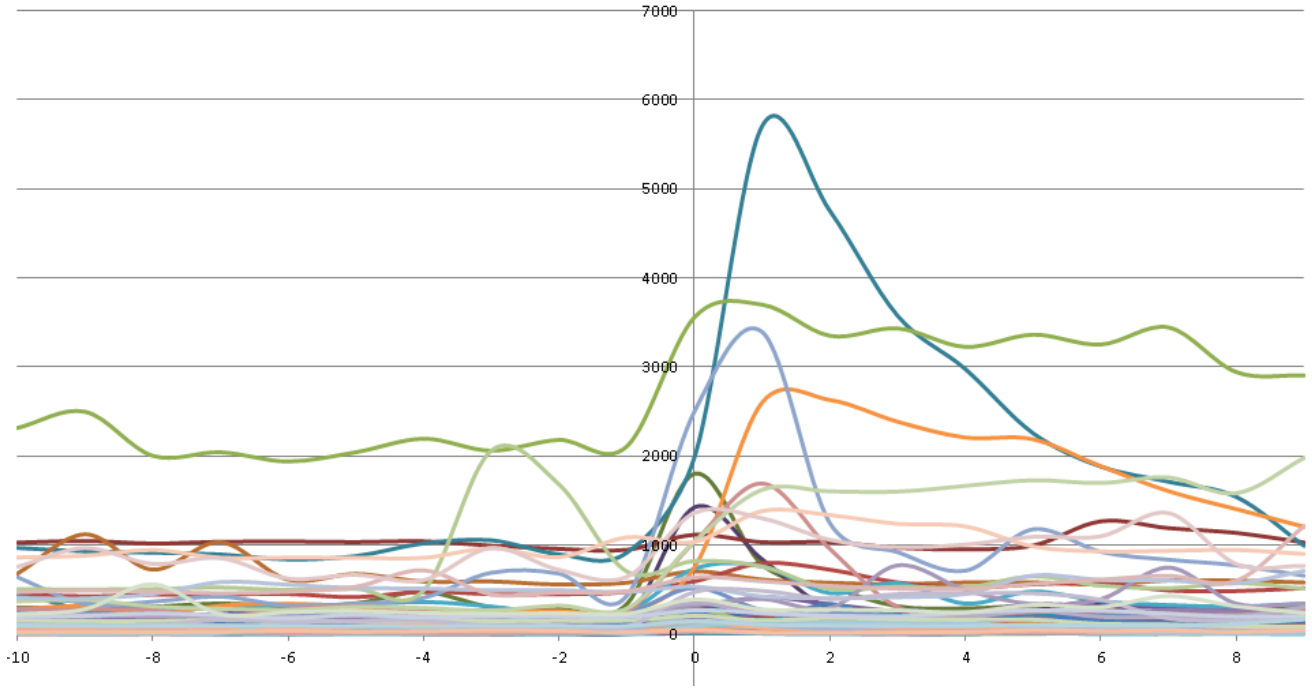
```
1. select * from table(m5('select ** from dba_data_files'));
2. select * from table(m5('#!/bin/ksh
    df -h|grep Mounted;df -h|grep /tmp;'));
3. select * from m5_dba_users where username = 'SOME_USER';
4. select * from m5_v$parameter where name='ddl_lock_timeout';
5. begin
     m5_proc('alter system set ddl_lock_timeout = 0', 'dev');
   end;
   /
   select * from m5_results;
   select * from m5_metadata;
   select * from m5_errors;
```

Example: Compare Everything Everywhere

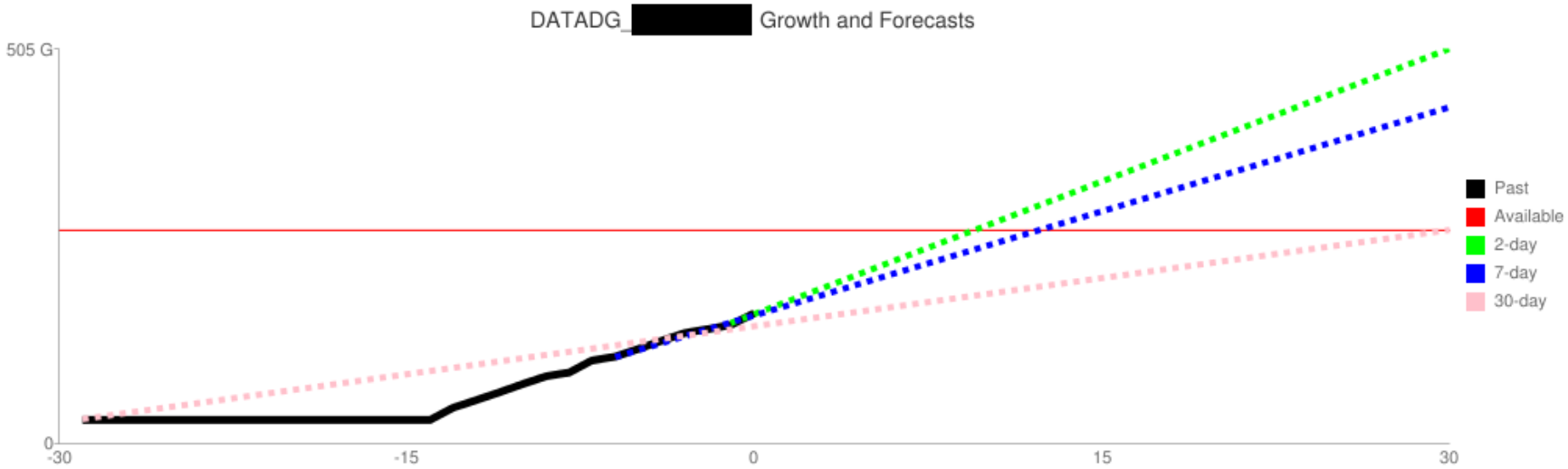
	A	B	C	D	E	F	G	H	I	J	K
1	**OWNER**	**OBJECT_TYPE**	**OBJECT_NAME**	**VERSIONS**	**DEV1**	**DEV2**	**QA**	**PROD**	**A**	**B**	**C**
2	SOME_SCHEMA	COMMENT	TABLE1	1	A	A	A	A	COMMENT		
3	SOME_SCHEMA	CONSTRAINT	TABLE1_PK	2	A	B	B	A	ALTER TABLE	ALTER TABLE	
4	SOME_SCHEMA	INDEX	TABLE1_PK	2	A				CREATE		
5	SOME_SCHEMA	OBJECT_GRANT	TABLE1	4	A	B		C	GRANT	GRANT	GRANT
6	SOME_SCHEMA	PACKAGE_BODY	PACKAGE1	2	A	B	B	B	CREATE OR	CREATE OR	
7	SOME_SCHEMA	REF_CONSTRAINT	TABLE2_FK	1	A	A	A	A	ALTER TABLE		
8	SOME_SCHEMA	SEQUENCE	TABLE1_SEQ	1	A	A	A	A	CREATE		
9	SOME_SCHEMA	TABLE	TABLE1	2	A	A	A	B	CREATE	CREATE	
10	SOME_SCHEMA	USER	SOME_SCHEMA	1	A	A	A	A	CREATE USER		

Example: Global ASH

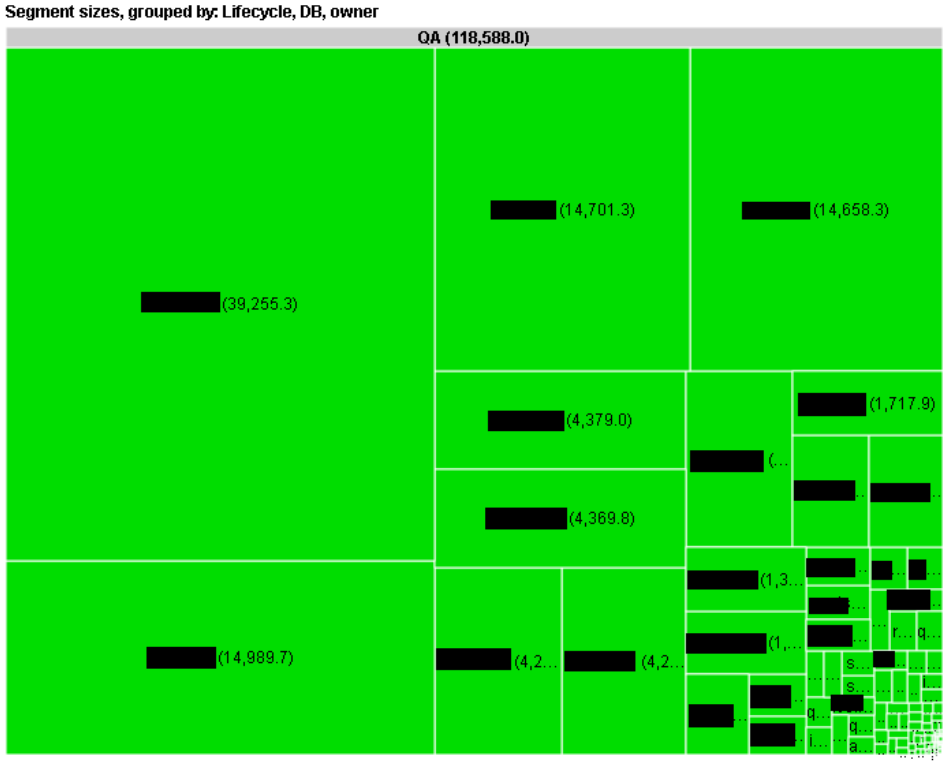
Active Sessions per minute, per host, around the hour mark.



Example: ASM Forecast



Example: Space Treemap

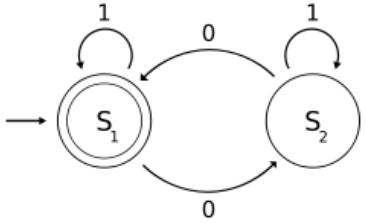


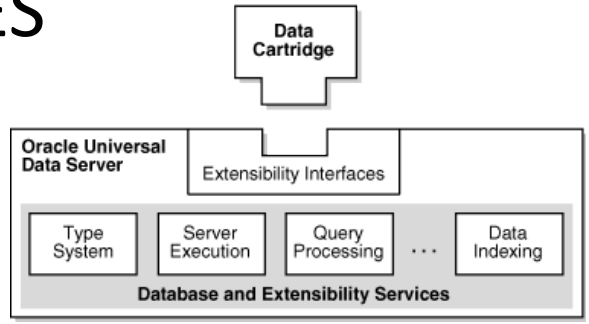
Technologies

1. Dynamic, templated SQL and PL/SQL

```
replace(q'[create procedure m5_temp_proc_##SEQUENCE## is ...
```

2. Database Links
3. PL/SQL Lexer
4. DBMS_SCHEDULER, DBMS_PIPES
5. Table-driven configuration
6. Oracle Data Cartridge





Install and Administer

1. Requirements
2. One DBA needed for setup and administration
3. Download open source code, follow install_method5.md and administer_method5.md
4. Everything lives inside the database
5. How much time will it take?
6. Create GitHub issue or send email if problems

Any DBA can try it out in a few hours

Why Method5 is Safe

~~1. Public database links~~, ~~password sharing~~, ~~direct logons~~

2. Auditing - M5_AUDIT and database audit trail
3. Multi-Step Authentication - Oracle and OS username
4. Intrusion Detection - Invalid access or config changes email admin
5. Shell Script and SYS - Commands from master are encrypted, remote DBA cannot break into it
6. Open Source - Not just security through obscurity

Minimum Privileges

	Method5	User
Master	High	Low
Remote	Medium - High	None

User Configuration

1. M5_USER - username (oracle and OS), email, is admin, default targets
2. M5_ROLE - name, targets, sys, shell, links, sandbox
3. M5_USER_PRIV - role, privilege
4. M5_USER_ROLE - username, role

Security Query Examples

1. `m5_proc('#!/bin/ksh'||chr(10)||'crontab -l', '%');`
2.
```
m5_proc('#!/bin/ksh
. /export/home/oracle/set_localASM.sh
cat $ORACLE_HOME/network/admin/sqlnet.ora', '%');
```
3. `m5_proc('select ** from dba_profiles', %');`
4. `m5_proc('select ** from dba_audit_trail where returncode in (1017,2800)', %');`
5. `select database_name, value from m5_v$parameter where name = 'sec_case_sensitive_logon';`
6. `select * from m5_dba_role_privs where granted_role = 'DBA';`

More Information

1. https://method5.github.io
2. Download code, user guide, examples, roadmap, presentation, and more
3. Email the creator: jon@jonheller.org or jon.heller@ventechsolutions.com
4. Create an issue on the GitHub repository: https://github.com/method5/method5

Your New Mission: Automate Everything

1. Remote execution is not just faster
2. Find, fix, and prevent all problems on all databases
3. Be proactive (preventive maintenance)
4. Work on only ONE database