Taking Batch Scripting to the Next Level with SQLcl

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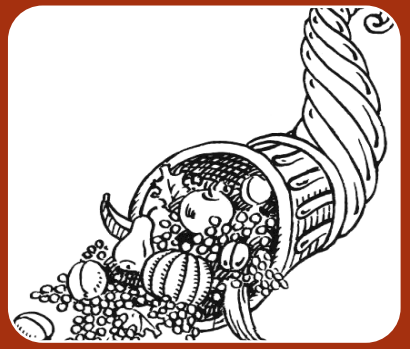
What´s in Store for you?

Scripts and Slides available for Download



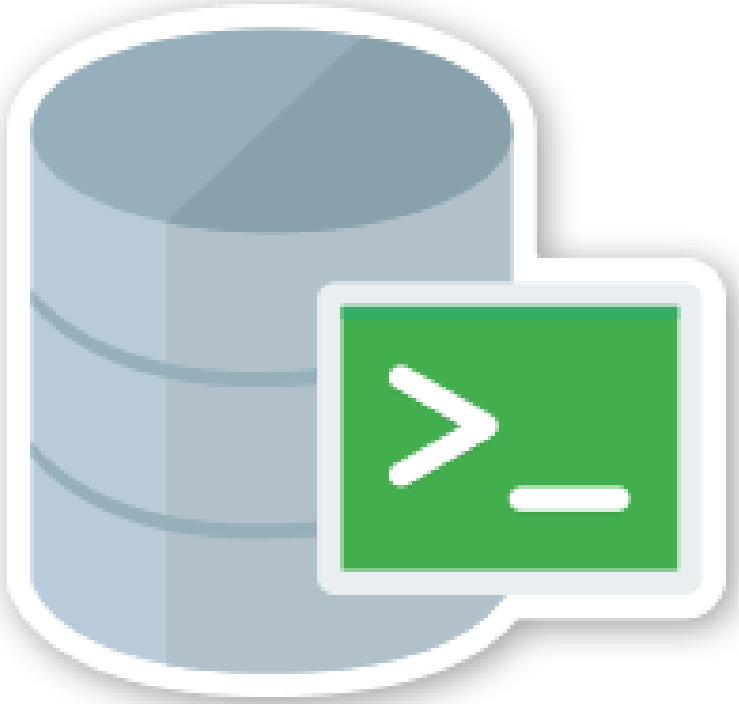
What to expect:

- Discover new Possibilities
- Examples

Not included:

- Introduction to JavaScript
- Complete Feature Overview

What is SQLcl?



Oracle SQL Developer Command Line

- The new SQL*Plus
- Modern Command Line
- Production Release since OOW
- Included in 12cR2 $ORACLE_HOME/bin

Scripting Vintage Style

SQL*Plus

Stable for decades

Sequential
SQL & PL/SQL

Not too dynamic
„DEFINE“

Error Handling
„whenever sqlerror“

Scripting in SQLcl

Languages (JSR-223)

New Possibilities

SQL*Plus „plus“

Scripting in SQLcl – Basics

GitHub Readme

https://github.com/oracle/oracle-db-tools/blob/master/sqlcl/README.md

ctx

ctx.write(<string>)
print();

sqlcl

sqlcl.setStmt(<string>)
sqlcl.run()

util

execute(<string>,binds)
executeReturnOneCol(<string>,binds)
executeReturnListofLists(<string>,binds)
executeReturnList(<string>,binds)

Globals

There are a few globals pushed into the scripting engine for use.

args -This is a simple array of the arguments passed along

Example:

```
for(var arg in args) {
   ctx.write(arg + ":" + args[arg]);
   ctx.write("\n");
}
```

sqlcl - This is SQLCL itself

```
setStmt(<String of stuff to run>)
           This can be a single statement, an entire script of stuff, or any sqlcl command such as "@numbers.sql"
```

```
run()
       Runs whatever is set via the setStmt function
```

Example:

```
/* Run any amount of command in the sqlcl prompt */
sqlcl.setStmt("select something from somewhere; @myscript \n begin null;end;");

sqlcl.run();
```

ctx (this has tons of methods but this is the single most important)

```
write(<String>)
```

Example:

```
ctx.write('Hello World');
```

util (again tons of methods)

```
execute(<string>,binds)
      executes whatever is passed in with a boolean return for success/failure
```

```
executeReturnOneCol(<string>,binds)
      executes and returns the first row , first column
```

```
executeReturnListofList(<string>,binds)
      executes and returns an array(rows) of arrays(row).
```

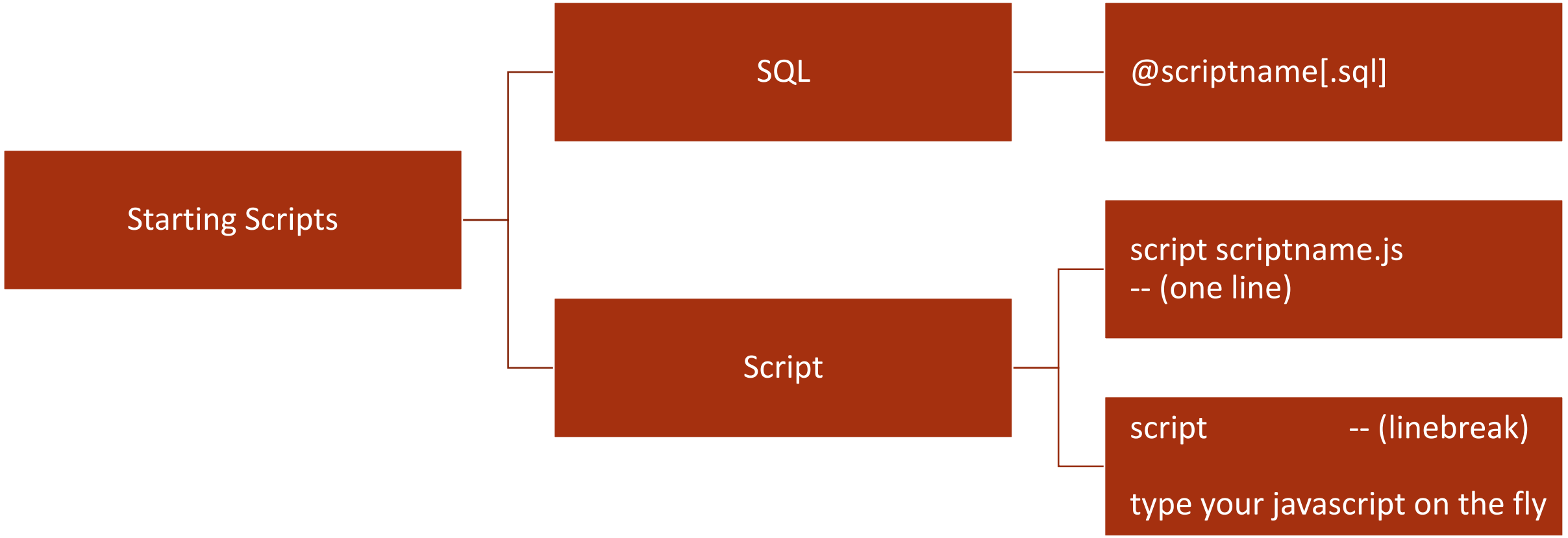
```
executeReturnList(<string>,binds)
      execute and returns and array ( rows ) of objects ( row )
```

SQLcl – Warm-Up

Invoking

sql usr[/pwd[@connect]] [as sysdba]

SQLcl – Warm-Up



SQLcl – Warm-Up – Demo 01.1

SQLcl Persistence

Objects outlast the End of the Script

Demo Object Persistance

Assign Variables

Access from next Script

SQLcl – Warm-Up – Demo 01.1 cont.

```
-- First Script
script
    // Use Java Class to access Properties of SQLcl
    var myHistory = Java.type("oracle.dbtools.raptor.console.MultiLineHistory");
    var dontForget = 'Buy herbs';
    var historyMaxSize = myHistory.getInstance().getMaxSize();
    function printCurrentHistorySize(SQLclHistory){
        print("Current History Size: " +
            SQLclHistory.getInstance().size());
    }
/
```

SQLcl – Warm-Up – Demo 01.1 cont.

```
-- Do some SQL stuff; Next Script
script
    printCurrentHistorySize(myHistory);
    print("Cutting History");
    myHistory.getInstance().setMaxSize(20);
    printCurrentHistorySize(myHistory);
/
```

```
-- Next Script
script
    print(dontForget);
/
```

SQLcl – Warm-Up – Demo 01.2

Alias

Suitable for small, reoccuring tasks

May contain SQL, PL/SQL or Script

Definition is persistent

Demo
- Restore Data + RememberMe

SQLcl – Warm-Up – Demo 01.2 cont.

```
alias restore_emp=begin
  delete from employees;
  insert into employees
    select * from employees_backup;
  commit;
end;
/
            alias remindMe=script
              if(typeof dontForget != 'undefined') {
                print("Don't forget: "+ dontForget)
              }
            ;
```

SQLcl – Warm-Up – Demo 01.3

login.sql	Customise your command line using JavaScript	
	SQLPATH	set
		show
	Demo	Switching between prompt layouts

SQLcl – Warm-Up – Demo 01.3 cont.

```
script

var dbUser = util.executeReturnOneCol('select user from dual');
if ( dbUser == 'GEOFF' ) {
 sqlcl.setStmt('set sqlprompt "@|white,bg_green,INTENSITY_BOLD Go _user! |@ "');
} else {
 sqlcl.setStmt('set sqlprompt "@|white,bg_red,INTENSITY_BOLD Go _user! |@ "');
}

sqlcl.run();

/
```

SQLcl – Warm-Up – Demo 01.3 cont.

```
script

var dbUser = util.executeReturn
if ( dbUser == 'GEOFF' ) {
 sqlcl.setStmt('set sqlprompt "
} else {
 sqlcl.setStmt('set sqlprompt "
}

sqlcl.run();

/
```

```
01 Basics> sql geoff/geoff

SQLcl: Release 4.2.0 Production auf Di

Copyright (c) 1982, 2017, Oracle. All

Last Successful login time: Di Feb 07

Verbunden mit:
Oracle Database 12c Enterprise Edition
With the Partitioning, OLAP, Advanced

Go GEOFF!  connect chris/chris
Angemeldet.
Go CHRIS!
```

SQLcl – Warm-Up – Demo 01.4

Output Streams	ctx.write()	Needs trailing **"\n"** to produce output
	print()	Works like expected
		Uses Different output Stream
	Demo	Mixed ctx.write() & print() statements

SQLcl – Warm-Up – Demo 01.4 cont.

```
ctx.write('1 - ctx\n');
print(    '2 - print');
ctx.write('3 - ctx\n');
print(    '4 - print');
ctx.write('5 - ctx\n');
print(    '6 - print');
```

SQLcl – Warm-Up – Demo 01.4 cont.

```
ctx.write('1 - ctx\n');
print(    '2 - print');
ctx.write('3 - ctx\n');
print(    '4 - print');
ctx.write('5 - ctx\n');
print(    '6 - print');
```

```
2 - print
4 - print
6 - print
1 - ctx
3 - ctx
5 - ctx
SQL>
```

SQLcl – Flow Control – Demo 02

SQL*Plus	Sequential SQL Blocks	
	DEFINE, VARIABLE	
	Workarounds	Spool „new Script.sql“
		PL/SQL execute immediate
SQLcl	Modern Scripting Languages	
	JDBC Connection	Bind Variables
		Result Evaluation
	Access to SQLcl Interpreter	
	Dynamic Loading of Scripts	

SQLcl – Flow Control – Demo 02 (cont.)

Conditions	If – then – else	
	Case	
	Demo	Create table if not exists
Loops	For / While	
	Demo	Looping through Results
		Assembling Script-Calls

SQLcl – Flow Control – Demo 02a If-Then-Else

```
// Test existance of DB Objects
/* is the table already there? */
var tabName = "SQLCL_DEMO";
var tabCnt = util.executeReturnOneCol(
             'select count(*) ' +                    // JS won't care what kind
             '  from tabs '     +                    // of quote-chars
             " where table_name = '"+tabName+"'"     // are used
             );

print ("tabCnt: " + tabCnt);
```

SQLcl – Flow Control – Demo 02a If-Then-Else

```
if (tabCnt == 0){
  print("Table " + tabName + " not found. Creating it...");

  sqlcl.setStmt( "set echo on\n"                    // This code will be used
               + "set feedback on \n"               // as if it's typed  into SQLcl
               + "create table "+tabName+"( indx       number not null \n"
               + "                        , fibonacci  number          \n"
               + "                        );                           \n"
               + "set serveroutput on size unl \n"   // Everything that works in SQLcl can be used.
               + "alter table "+tabName+" add constraint pk_"+tabName+" primary key (indx);");
  // You will find all statements in the SQLcl History afterwards...
  sqlcl.run();
} else {
  ctx.write("Table "+tabName+" already exists.\n");
}
```

SQLcl – Flow Control – Demo 02b Loops

```
// Loops
var binds = {};
var a = 0, b = 1, f = 1, n=10, ret;
for(var i = 2; i <= n; i++) {
  f = a + b;
  a = b; b = f;
  binds.i = i;
  binds.f = f;
  util.execute( "insert into sqlcl_demo(indx,fibonacci) values(:i, :f)",
                binds);
}
```

SQLcl – Flow Control – Demo 02b Loops

```
// Constructing Scripts
var stmt ="commit; \n";
binds={};
var ret = util.executeReturnList("select indx, fibonacci from sqlcl_demo where rownum <=3", binds);

for (i = 0; i < ret.length; i++) {
    stmt = stmt + "@02_demo.sql "+ ret[i].INDX + " " + ret[i].FIBONACCI + "\n";
}

ctx.write ("Script: \n"+stmt);
sqlcl.setStmt( stmt );
sqlcl.run();
```

SQLcl – Flow Control – Demo 02b Loops

```
-- 02_demo.sql
-- Print out the first two parameters
set verify off
set heading off

select &1 as para1, &2 as para2
  from dual;
```

SQLcl – Loading Blobs – Demo 03

Blob	Transfer Blob from File into Database	
	Use Java Classes	Access Files via java.nio.files.Files
	Demo	Copy Image to Table

SQLcl – Loading Blobs – Demo 03

```
//script "03-LoadingBlobs.js" "<complete image path>"
//script "03-LoadingBlobs.js" /home/oracle/image.jpg

var HashMap = Java.type("java.util.HashMap");
var bindmap = new HashMap();

print("\nreading file: "+ args[1]);
var filePath=args[1];

var blob=conn.createBlob();
var bstream=blob.setBinaryStream(1);

java.nio.file.Files.copy( java.nio.file.FileSystems.getDefault().getPath(filePath)
                        , bstream );
bstream.flush();

bindmap.put("inhalt",  blob);
bindmap.put("pfad", filePath);
```

SQLcl – Loading Blobs – Demo 03

```
if(!util.execute( "insert into dokument (datei_inhalt,datei_pfad, datum) values(:inhalt, :pfad,
  sysdate)"
                , bindmap)
  ){ print("insert failed, exiting");
     exit;
}
sqlcl.setStmt( "commit; \n"
             + "set sqlformat ansiconsole \n"
             + ' select datei_pfad "Dateipfad",dbms_lob.getlength(datei_inhalt) "Größe", to_char(
               datum,\'DD.MM.YYYY HH24:MI:SS\') "Zeit" '
             + "from dokument;");
sqlcl.run();
```

SQLcl – Array Magic – Demo 04

Arrays	Powerful structures	Simple Types
		Objects
		Nested Arrays
	Demo Deploy Framework	List of Credentials
		Connection Check
		Execute Scripts with Credentials

SQLcl – Array Magic – Demo 04a – SQL-Define

```
-- define passwords
DEFINE DATA_PWD
DEFINE DBGDI_PWD
DEFINE DBIS_EXPORT_OWD_PWD
DEFINE DOOTZ_PWD
DEFINE EBA_LAERM_EXPORT_OWNER_PWD
DEFINE EBA_PLATZ_PWD
DEFINE ELBEKA_PWD
DEFINE EXPORT_PWD
DEFINE GDOSYS_PWD
DEFINE GEOBEANS_PWD
DEFINE GEOSAP_DATA_OWNER_PWD
DEFINE GEOSAP_META_OWNER_PWD
DEFINE GINA_OWNER_PWD
DEFINE ISK_2010_PWD
DEFINE ISK_DATA_OWNER_PWD
DEFINE ISK_DBGDI_TEST_PWD
DEFINE ISK_EXPORT_PWD
DEFINE ISK_GEO_OWNER_PWD
DEFINE ISK_VISU_EXT_PWD
DEFINE ISK_VISU_STAGE_TMP_PWD
DEFINE ISR_GEO_OWNER_PWD
DEFINE ISR_PWD
```

```
-- Test passwords
@&INSTALLER_CORE_PATH/process_check_connect.sql "&DATA."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&DBGDI."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&DBIS_EXPORT_OWD."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&DOOTZ."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&EBA_LAERM_EXPORT_OWNER."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&EBA_PLATZ."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ELBEKA."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&EXPORT."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&GDOSYS."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&GEOBEANS."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&GEOSAP_DATA_OWNER."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&GEOSAP_META_OWNER."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&GINA_OWNER."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISK_2010."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISK_DATA_OWNER."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISK_DBGDI_TEST."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISK_EXPORT."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISK_GEO_OWNER."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISK_VISU_EXT."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISK_VISU_STAGE_TMP."
@&INSTALLER_CORE_PATH/process_check_connect.sql "&ISR."
```

SQLcl – Array Magic – Demo 04b – JS Arrays

```
// Users could be filled from a JSON-File as well...
users=[
  {"user" : "DATA"                  , "password" : "E_DXxXxXe2r" }
, {"user" : "DBGDI"                 , "password" : "E_bXxXxXdfeym" }
, {"user" : "DBIS_EXPORT_OWD"       , "password" : "E_WXxXxXt_u5b" }
, {"user" : "DOOTZ"                 , "password" : "E_OXxXxX_uas" }
, {"user" : "BARRY"                 , "password" : "Barry's Secret" }
, {"user" : "EBA_LAERM_EXPORT_OWNER" , "password" : "E_aXxXxXO34dnE" }
, {"user" : "EBA_PLATZ"             , "password" : "E_cXxXxXushU" }
, {"user" : "ELBEKA"                , "password" : "E_fXxXxXewl" }
, {"user" : "EXPORT"                , "password" : "E_nXxXxXbSu_n" }
, {"user" : "GDOSYS"                , "password" : "E_wXxXxXyri" }
, {"user" : "GEOBEANS"              , "password" : "E_jXxXxXepKo" }
, {"user" : "GEOSAP_DATA_OWNER"     , "password" : "E_kXxXxXhia" }
, {"user" : "GEOSAP_META_OWNER"     , "password" : "E_TXxXxXW7i" }
, {"user" : "GINA_OWNER"            , "password" : "E_qXxXxXva8" }
, {"user" : "ISK_2010"              , "password" : "E_IXxXxX_yb" }
, {"user" : "ISK_DATA_OWNER"        , "password" : "lunXxXxXti" }
, {"user" : "ISK_DBGDI_TEST"        , "password" : "E_yXxXxXO_shy" }
, {"user" : "ISK_EXPORT"            , "password" : "E_GXxXxX_Az4a" }
, {"user" : "ISK_GEO_OWNER"         , "password" : "aykXxXxXrn" }
, {"user" : "ISK_VISU_EXT"          , "password" : "E_IXxXxXt_i" }
, {"user" : "ISK_VISU_STAGE_TMP"    , "password" : "E_aXxXxXDuo" }
, {"user" : "ISR_GEO_OWNER"         , "password" : "E_aXxXxX8#eq" }
, {"user" : "ISR"                   , "password" : "E_sXxXxX7o_w" }
];
```

SQLcl – Array Magic – Demo 04b – JS Arrays

```
// Users could be filled
users=[
  {"user" : "DATA"
, {"user" : "DBGDI"
, {"user" : "DBIS_EXPORT_
, {"user" : "DOOTZ"
, {"user" : "BARRY"
, {"user" : "EBA_LAERM_EX
, {"user" : "EBA_PLATZ"
, {"user" : "ELBEKA"
, {"user" : "EXPORT"
, {"user" : "GDOSYS"
, {"user" : "GEOBEANS"
, {"user" : "GEOSAP_DATA_
, {"user" : "GEOSAP_META_
, {"user" : "GINA_OWNER"
, {"user" : "ISK_2010"
, {"user" : "ISK_DATA_OWNER
, {"user" : "ISK_DBGDI_TEST"
, {"user" : "ISK_EXPORT"
, {"user" : "ISK_GEO_OWNER"
, {"user" : "ISK_VISU_EXT"
, {"user" : "ISK_VISU_STAGE_TMP"
, {"user" : "ISR_GEO_OWNER"
, {"user" : "ISR"
];
```

```
// Testing all Users
for (var i=0; i < users.length; i++ ){
  ctx.write ("Testing Schema "+ users[i].user+"\n");
  // Some fancy connect tests and statistical Informations
  // Result could be something like this:
  //   125 Users tested
  // , 112 open
  // ,  10 locked
  // ,   1 wrong username
  // ,   2 wrong password
}
```

```
, "password" : "E_yXxXxXO_shy" }
, "password" : "E_GXxXxX_Az4a" }
, "password" : "aykXxXxXrn" }
, "password" : "E_IXxXxXt_i" }
, "password" : "E_aXxXxXDuo" }
, "password" : "E_aXxXxX8#eq" }
, "password" : "E_sXxXxX7o_w" }
```

SQLcl – Array Magic – Demo 04b – JS Arrays

```
// Users could be filled
users=[
  {"user" : "DATA
, {"user" : "DBGD
, {"user" : "DBIS
, {"user" : "DOOT
, {"user" : "BARR
, {"user" : "EBA_
, {"user" : "EBA_
, {"user" : "ELBE
, {"user" : "EXPO
, {"user" : "GDOS
, {"user" : "GEOB
, {"user" : "GEOS
, {"user" : "GEOSAP_META
, {"user" : "GINA_OWNER"
, {"user" : "ISK_2010"
, {"user" : "ISK_DATA_OWNER"
, {"user" : "ISK_DBGDI_TEST"
, {"user" : "ISK_EXPORT"
, {"user" : "ISK_GEO_OWNER"
, {"user" : "ISK_VISU_EXT"
, {"user" : "ISK_VISU_STAGE_TMP"
, {"user" : "ISR_GEO_OWNER"
, {"user" : "ISR"
];
```

```
// Testing all Users
```

```
// Searching Password for user
function getPasswd(username){
  return users.filter(function ( obj ) {
                                    return obj.user === username;
                    }
                   )[0].password;
}
```

```
// ,   2 wrong password
}
```

```
// Using in Scripts:
var uname = "BARRY";
ctx.write( "The password of Schema "+uname+" is "
  + getPasswd(uname)+ "\n");
```

SQLcl – Remote Control – Demo 05

Pipes

Copy Data

No Export File or DB Link

```
SQL> select /*insert*/
  2         employee_id, first_name, last_name, salary
  3    from geoff.employees
  4   where rownum <4;
REM INSERTING into GEOFF.EMPLOYEES
SET DEFINE OFF;
Insert into GEOFF.EMPLOYEES (EMPLOYEE_ID,FIRST_NAME,LAST_NAME,SALARY) values ('220','Curtis','Newton','6300');
Insert into GEOFF.EMPLOYEES (EMPLOYEE_ID,FIRST_NAME,LAST_NAME,SALARY) values ('219','Andreas','von der Meden','13000');
Insert into GEOFF.EMPLOYEES (EMPLOYEE_ID,FIRST_NAME,LAST_NAME,SALARY) values ('218','Marcus','Brody','2700');

SQL>
```

Demo

Copy Data between two Databases

SQLcl – Background Sessions – „noDemo“ 06

Parallelise Tasks	Java Threads	GitHub oracle-db-tools	bg.js longops.js
		its-people Blog	yet to be written
Additional JDBC connections		Connection	metadata available except credentials SQLcl connection can be cloned
		„n“ threads	

SQLcl – As you like it – Demo 07

JSR-223	e.g. JavaScript, Lua or Python	Java Implementations „nashorn“, „LuaJ“, „Jython“
	Embedding SQLcl	Use SQLcl JARs in your Apps
	Demo	Running lua & python from SQlcl
		Using SQLcl from python
		ECMA Script 5 & 6

SQLcl – As you like it – Demo 07a

```
print "Fibonacci till 10 in Python (Jython)"
a, b = 0, 1
while b <10:
  print "Python Fibonacci: " + str(b)
  a, b = b, a+b;
```

SQLcl – As you like it – Demo 07a

```
print ("Fibonacci first 10 in Lua (LuaJ)")

local function Fibonacci_iterative(n)
  a, b = 0, 1

  for i = 1, n do
    print(string.format("Lua Fibonacci: %s",b))
    a, b = b, a + b
  end
  return a
end

Fibonacci_iterative(10)
```

SQLcl – As you like it – Demo 07a

```
echo "Pointing the CLASSPATH to the interpreters"
export CLASSPATH="jython-standalone-2.7.0.jar:luaj-jse-3.0.1.jar"

echo CLASSPATH: $CLASSPATH

sql -s geoff/geoff << EOF

script ./fibonacci.py
script ./fibonacci.lua

EOF
```

SQLcl – As you like it – Demo 07c

```
/* ES6 Demo */
const user = util.executeReturnOneCol('select user from dual');

const a="Hello ECMA Script 6";
let b="const and let are new to ES6";

print(`ES 6 allows multiline strings
  enclosed in backticks and variables includes with "$"
  and curly braces ${a} ${b} User: ${user}`);
```

SQLcl – As you like it – Demo 07c

```
export PATH=~/jre-9/bin:$PATH
export JAVA_HOME=/home/oracle/jre-9
export APP_VM_OPTS="-Dnashorn.args=--language=es6"
java -version

sql -s geoff/geoff << EOF
script demo07c.js
EOF
```

The JavaScript

The JavaScript
Edvard Munch
1910

Reading List

Getting Started

- SQLcl Scripting: Docs
- SQLcl Community

Basics

- List of JVM languages
- JavaScript Cheat Sheet
- Nashorn Tutorial

Reading List

- Git Hub
  - SQLcl Examples (oracle-db-tools/sqlcl)
  - its-people (sqlclscripts)
- Blogs
  - Barry McGillin
  - Kris Rice
  - Jeff Smith

Conclusion