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Complete Oracle database schema auditing

Mike Ault

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Documenting Oracle Databases
Complete Oracle database schema
auditing

Mike Ault

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Documenting Oracle Databases

Complete Oracle database schema auditing

By Mike Ault

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Introduction

Many times the Oracle DBA is hired once the database becomes too much to handle without one, inherits the position or is appointed to it “since they are so good with computers”. In any case, they usually get an undocumented system that follows no conventions and holds many traps for the unwary DBA.

In other situations the DBA may find they have the task of recreating the database for which they are responsible. If export and import can be used, this task is fairly easy to accomplish, however, sometimes the DBA will be required to provide DDL (Data Definition Language) for this purpose. The DBA may also wish to document existing procedures, views, constraints and such other structures as they see fit, with human readable output and a minimum of re-editing.

In all of the above cases, the Oracle provided methods fall woefully short of the mark in providing the DBA with documentation. It falls on the DBA’s shoulders to develop SQL, PL/SQL and SQLPLUS code to delve into the inner workings of the Oracle Data Dictionary tables and regenerate the required DDL.

This presentation will demonstrate techniques to use the Oracle instance to document itself.

The Oracle Data Dictionary, an Overview

The heart of the whole matter is a collection of C constructs, Oracle tables and Oracle views that are collectively called the Oracle Data Dictionary. At the lowest level are the “hidden” C structures known as the X\$ tables. These X\$ tables are usually best left alone. Indeed, to even see the contents a DBA has to jump through a few hoops and once they do get to

them, they are not well documented and have such logical attributes as “mglwmp” or “tabsrpr”. Needless to say, unless the DBA has several long nights available and a penchant for solving riddles it is suggest that they leave these to Oracle.

The next layer of the Oracle Data Dictionary is the \$ tables. These are more human readable cuts of the X\$ tables and have such names as COL\$ or TAB\$. While being a step above the X\$ structures, it is still suggested that the DBA only use them when it is really needed. Some of the reports discussed in this paper will use these tables.

The third layer of the dictionary is the V\$ views and their cousins the V_\$ tables (actually, Siamese twins since for nearly all of the V\$ views there is a corresponding V_\$ view). These are the workhorses of the Data Dictionary and what most of the scripts in this paper deal with.

The final layer of the dictionary (for our purposes) is the DBA_ series of views. These views are made from the V\$ and \$ sets of views and tables and provide a very friendly interface for viewing the insides of your Oracle Data Dictionary. The USER_ and ALL_ views are based on the DBA_ views. Some of the user specific scripts, such as for constraints, uses the USER_ subset of views, however, the script can be made more general by adding reference to the “OWNER” attribute and changing USER_ to DBA_ if the DBA desires.

Documenting or Rebuilding?

This paper will use the terms documenting and rebuilding interchangeably. A good set of build scripts will provide excellent documentation for an instance. Essentially there are two types of documentation, “hard” documentation such as DDL that an experienced database developer can understand, and “soft” documentation such as generalized reports showing structures and relations that anyone with a smattering of database experience can use. The paper will deal more with the “hard” type of documentation, that is, the scripts to rebuild the database, where

applicable, reports that provide “soft” documentation will be mentioned, and included with the paper.

The Database

Databases contain the following items:

Hard Objects:

- Tablespaces and their associated Datafiles
- Control Files
- Redo Logs
- Rollback Segments
- Tables
- Indexes
- Database Initialization file
- Clusters

Stored Objects:

- View definitions
- Constraints
- Procedures
- Functions
- Packages
- Package Bodies
- Triggers
- User definitions
- Roles

- Grants
- Database Links
- Snapshots and Snapshot Logs

In the following pages this paper will cover how to generate the required DDL to recreate or document each of the above database objects using SQL, PLSQL and SQLPLUS. This paper will also discuss creation of scripts to allow dropping a set of objects (such as constraints) and recreating them.

The Control File

To begin at the beginning, we should first document the Control file since this is the only location where the information for MAXDATAFILES, MAXLOGFILES MAXMEMBERS and other instance specific data can be found. This information will be added by hand to the Database rebuild script covered later in the paper.

Having a script around that rebuilds the control file is a very good idea. In the case where the Oracle instance was built by people with very little understanding of how Oracle builds default instances (poorly) you will usually get a very dysfunctional database from a vanilla build. The DBA will find their MAXDATAFILES will be set to 20 or maybe 32 and that other hard database limits are probably set too low as well. Once the DBA generates a script to rebuild their control files, they can change these hard database limits without rebuilding the database by simply rebuilding the control files. In other situations, a disk crash can wipe out the control file (hopefully there is more than one, but maybe a DBA didn't create the database?) and leave the database unable to even startup (actually there is a way, but it is beyond the scope of this paper.) With a rebuild script on hand, it makes these situations easier to handle.

A DBA can always backup the control file with the command:

```
ALTER DATABASE BACKUP CONTROLFILE to 'filename' REUSE;
```

However, the above command only makes a machine readable copy, a good idea for when changes are made to structures, A DBA should usually backup the control file with each set of backups. Of course, this doesn't provide documentation of the control file.

Since there are no tables which document the control files (other than v\$parameter which only documents their location) the DBA must depend on a system command to provide them with the require script:

```
ALTER DATABASE
    BACKUP CONTROLFILE TO TRACE NOREESTLOGS;
```

The output of this script looks like so:

```
Dump file H:\ORAWIN\RDBMS71\trace\ORA14071.TRC
Sat Mar 30 10:05:53 1996
ORACLE V7.1.4.1.0 - Production.
vsnsta=0
vsnsql=a vsnxtr=3
MS-WINDOWS Version 3.10
Sat Mar 30 10:05:52 1996
Sat Mar 30 10:05:53 1996

*** SESSION ID:(5.3)
# The following commands will create a new control file and use it
# to open the database.
# No data other than log history will be lost. Additional logs may
# be required for media recovery of offline data files. Use this
# only if the current version of all online logs are available.
STARTUP NOMOUNT
CREATE CONTROLFILE REUSE DATABASE "ORACLE" NORESETLOGS NOARCHIVELOG
    MAXLOGFILES 32
    MAXLOGMEMBERS 2
    MAXDATAFILES 32
    MAXINSTANCES 16
    MAXLOGHISTORY 1600
LOGFILE
    GROUP 1 'H:\ORAWIN\DBS\wdblog1.ora' SIZE 500K,
    GROUP 2 'H:\ORAWIN\DBS\wdblog2.ora' SIZE 500K
DATAFILE
    'H:\ORAWIN\DBS\wdbsys.ora' SIZE 10M,
    'H:\ORAWIN\DBS\wdbuser.ora' SIZE 3M,
    'H:\ORAWIN\DBS\wdbbrs.ora' SIZE 3M,
    'H:\ORAWIN\DBS\wdbtemp.ora' SIZE 2M
;

# Recovery is required if any of the datafiles are restored backups,
# or if the last shutdown was not normal or immediate.
RECOVER DATABASE
```

```
# Database can now be opened normally.
ALTER DATABASE OPEN;
```

As can be seen from a glance at the above script, all the required “hard” database setpoints are now documented. The output from the command is located wherever the system places its system level trace files (check v\$parameter on a wildcard name search for ‘%dump%’).

Documenting the Database Initialization file

The initialization file, commonly called INIT.ORA or initSID.ora where the SID is the database instance name, is another key file for the database documentation set. Sadly, the initialization file is often overlooked, in fact many “DBAs” don’t even know how to find it. All of the values used in the initialization process are stored in the V\$PARAMETER table. The following script will provide a complete INIT.ORA file for a system:

```
REM
REM NAME                : init_ora_rct.sql
REM FUNCTION            : Recreate the instance init.ora file
REM USE                 : GENERAL
REM Limitations        : None
REM
SET NEWPAGE 0 VERIFY OFF
SET ECHO OFF feedback off termout off PAGES 300 lines 80 heading off
column name format a41
column value format a37
column dbname new_value db noprint
select value dbname from v$parameter where name = 'db_name';
DEFINE OUTPUT = 'rep_out\&db\init.ora'
SPOOL &OUTPUT
SELECT '# Init.ora file from v$parameter' name, null value from dual
union
select '# generated on:'||sysdate name, null value from dual
union
select '# script by MRA 11/7/95 TRECOM' name, null value from dual
union
select '#' name, null value from dual
UNION
SELECT name||' =\' name,value FROM V$PARAMETER
WHERE value is not null;
SPOOL OFF
CLEAR COLUMNS
```

```
set termout on
pause Press enter to continue
exit
```

An example output from this report follows:

```
#
# Init.ora file from v$parameter
# generated on:06-MAR-96
# script by MRA 11/7/95 TRECOM
audit_file_dest          =                ?/rdbs/audit
audit_trail              =                NONE
background_core_dump     =                full
background_dump_dest     =                /bto/sys/oracle/product/7.2.2/rdbs/log
blank_trimming           =                FALSE
cache_size_threshold     =                20
ccf_io_size              =                65536
checkpoint_process       =                FALSE
cleanup_rollback_entries =                20
close_cached_open_cursors =              FALSE
commit_point_strength    =                1
compatible                =              7.1.0.0
control_files            =
                          /vol2/oracle1/ORCSPCD1/ctrl1ORCSPCD101.ct1,/vol2/oracle2/ORCSPCD1/c
                          trl2ORCSPCD102.ct1,/vol3/oracle3/ORCSPCD1/ctrl3ORCSPCD103.ct1
core_dump_dest           =                /bto/sys/oracle/product/7.2.2/dbs
cpu_count                 =                1
cursor_space_for_time    =                FALSE
.
. (the actual output is 3 pages long, so this is the short version)
.
thread                   =                0
timed_statistics         =                FALSE
transactions             =                66
transactions_per_rollback_segment =        16
use_readv                =                FALSE
user_dump_dest           =                /bto/sys/oracle/product/7.2.2/rdbs/log
```

The DBA will have to edit the output to add quotes and parenthesis, but this is still better than rebuilding the file by hand.

Most DBAs will see a number of parameters they weren't aware existed in their listing from this script. In fact, many of the parameters may not be documented. This script lists all of the parameters available on your platform and uses their default value if the DBA hasn't supplied a value via the initialization file.

The Database Itself

Now that the control file settings and the initialization file settings have been documented, it is time to document the database creation script itself. The following script will generate a “bare bones” CREATE DATABASE command. The values from the CREATE CONTROLFILE script for the setting of MAX parameters generated prior to this should be edited into the command script.

```
REM FUNCTION: SCRIPT FOR CREATING DB
REM
REM          This script must be run by a user with the DBA role.
REM
REM          This script is intended to run with Oracle7.
REM
REM          Running this script will in turn create a script to
REM          rebuild the database. This created
REM          script, crt_db.sql, is run by SQLDBA
REM
REM          Only preliminary testing of this script was performed.
REM          Be sure to test it completely before relying on it.
REM
REM M. Ault 3/29/96 TRECOM
REM

set verify off;
set termout off;
set feedback off;
set echo off;
set pagesize 0;

set termout on
prompt Creating db build script...
set termout off;
create table db_temp
    (lineno NUMBER, text VARCHAR2(255))
/

DECLARE
    CURSOR dbf_cursor IS
        select file_name,bytes
        from dba_data_files
        where tablespace_name='SYSTEM';
    CURSOR mem_cursor (grp_num number) IS
        select member
        from v$logfile
        where group#=grp_num
        order by member;
    CURSOR thread_cursor IS
```

```

select thread#, group#
from v$log
order by thread#;

grp_member          v$logfile.member%TYPE;
db_name             varchar2(8);
db_string           VARCHAR2(255);
db_lineno          number := 0;
thrd               number;
grp               number;
filename           dba_data_files.file_name%TYPE;
sz                number;
begin_count       number;

procedure write_out(p_line INTEGER,
                   p_string VARCHAR2) is
begin
    insert into db_temp (lineno,text)
        values (db_lineno,db_string);
end;

BEGIN
    db_lineno:=db_lineno+1;
    SELECT 'CREATE DATABASE '||value into db_string
        FROM v$parameter where name='db_name';
    write_out(db_lineno,db_string);
    db_lineno:=db_lineno+1;
    SELECT 'CONTROLFILE REUSE' into db_string
        FROM dual;
    write_out(db_lineno,db_string);
    db_lineno:=db_lineno+1;
    SELECT 'LOGFILE (' into db_string
        FROM dual;
    write_out(db_lineno,db_string);
commit;
if thread_cursor%ISOPEN then
    close thread_cursor;
    open thread_cursor;
else
    open thread_cursor;
end if;
loop
    fetch thread_cursor into thrd,grp;
    exit when thread_cursor%NOTFOUND;
    db_lineno:=db_lineno+1;
    db_string:= 'THREAD '||thrd||' GROUP '||grp||' (';
    write_out(db_lineno,db_string);
    if mem_cursor%ISOPEN then
        close mem_cursor;
        open mem_cursor(grp);
    else
        OPEN mem_cursor(grp);
    end if;
    db_lineno:=db_lineno+1;
    begin_count:=db_lineno;
    loop
        fetch mem_cursor into grp_member;
        exit when mem_cursor%NOTFOUND;

```

```

        if begin_count=db_lineno then
            db_string:=''||grp_member||''';
            write_out(db_lineno,db_string);
            db_lineno:=db_lineno+1;
        else
            db_string:=''||grp_member||''';
            write_out(db_lineno,db_string);
            db_lineno:=db_lineno+1;
        end if;
    end loop;
    db_lineno:=db_lineno+1;
    db_string:=')';
    write_out(db_lineno,db_string);
end loop;
db_lineno:=db_lineno+1;
SELECT ')' into db_string from dual;
write_out(db_lineno,db_string);
commit;
if dbf_cursor%ISOPEN then
    close dbf_cursor;
    open dbf_cursor;
else
    open dbf_cursor;
end if;
begin_count:=db_lineno;
loop
    fetch dbf_cursor into filename, sz;
    exit when dbf_cursor%NOTFOUND;
    if begin_count=db_lineno then
        db_string:='DATAFILE '||filename||' SIZE
'||sz||' REUSE';
    else
        db_string:=''||filename||' SIZE '||sz||
REUSE';
    end if;
    db_lineno:=db_lineno+1;
    write_out(db_lineno,db_string);
end loop;
commit;
SELECT decode(value,'TRUE','ARCHIVELOG','FALSE','NOARCHIVELOG')
    into db_string from v$parameter where name='log_archive_start';
    db_lineno:=db_lineno+1;
    write_out(db_lineno,db_string);
SELECT ';' into db_string from dual;
    db_lineno:=db_lineno+1;
    write_out(db_lineno,db_string);
CLOSE dbf_cursor;
CLOSE mem_cursor;
CLOSE thread_cursor;
commit;
END;
/
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
set heading off pages 0 verify off
set recsep off
spool rep_out\&db\crt_db.sql
col text format a80 word_wrap

```

```
select  text
from    db_temp
order by lino;
spool off
set feedback on verify on termout on
drop table db_temp;
prompt Press enter to exit
exit
```

The reason this script is so long is that there may be multiple datafiles for the SYSTEM tablespace and there most certainly will be multiple redo logs, redo log groups and possibly redo log threads. This multiplicity of files results in the need for a cursor for each of the possible recursions and a loop-end loop construct to support the selection of the data from the database.

It is ironic that all of the above code is used to produce the following output:

```
CREATE DATABASE ORCSPCD1
CONTROLFILE REUSE
LOGFILE (
THREAD 1 GROUP 1 (
'/vol2/oracle1/ORCSPCD1/log1ORCSPCD1.dbf'
)
THREAD 1 GROUP 2 (
'/vol2/oracle2/ORCSPCD1/log2ORCSPCD1.dbf'
)
THREAD 1 GROUP 3 (
'/vol3/oracle3/ORCSPCD1/log3ORCSPCD1.dbf'
)
)
DATAFILE '/vol2/oracle1/ORCSPCD1/systORCSPCD1.dbf' SIZE 41943040 REUSE
NOARCHIVELOG
;
```

The generated script would be longer if there were multiple datafiles in the SYSTEM tablespace and if mirrored redo logs were in use. As was said above, the script should have the MAX set of parameters from the CREATE CONTROLFILE command edited into it between the DATAFILE and NOARCHIVELOG (or ARCHIVELOG) clauses.

Soft documentation for database related items would consist of reports on the redo logs, system parameters, and, datafiles for the SYSTEM tablespace. The scripts redo_log.sql, db_thr.sql, db_parm.sql and

datafile.sql provide soft documentation reports of these items. The soft documentation scripts are in appendix A.

Documenting Tablespaces

Tablespaces and their underlying datafiles should be created immediately after the database itself. Therefore, we will cover the generation of the tablespace DDL next. The following script will create the DDL required to make an exact duplicate of a systems existing tablespace/datafile profile. The DBA may wish to edit the resulting script to combine multiple datafiles into a single large datafile per tablespace or, the inverse, spread a large datafile across several physical platters for improved performance. The script follows:

```
REM
REM FUNCTION: SCRIPT FOR CREATING TABLESPACES
REM
REM FUNCTION: This script must be run by a user with the DBA role.
REM
REM This script is intended to run with Oracle7.
REM
REM FUNCTION: Running this script will in turn create a script to build
REM FUNCTION: all the tablespaces in the database. This created script,
REM FUNCTION: crt_tbls.sql, can be run by any user with the DBA role
REM FUNCTION: or with the 'CREATE TABLESPACE' system privilege.
REM
REM Only preliminary testing of this script was performed. Be sure to
test
REM it completely before relying on it.
REM

set verify off;
set termout off;
set feedback off;
set echo off;
set pagesize 0;

set termout on;
select 'Creating tablespace build script...' from dual;
set termout off;

create table ts_temp (lineno number, ts_name varchar2(30),
                    text varchar2(800))
/
DECLARE
    CURSOR ts_cursor IS select tablespace_name,
                             initial_extent,
                             next_extent,
```

```

                min_extents,
                max_extents,
                pct_increase,
                status
            from    sys.dba_tablespaces
            where   tablespace_name != 'SYSTEM'
            and    status != 'INVALID'
            order  by tablespace_name;

CURSOR df_cursor (c_ts VARCHAR2) IS
    select  file_name,
           bytes
    from    sys.dba_data_files
    where   tablespace_name = c_ts
           and tablespace_name != 'SYSTEM'
    order  by file_name;
lv_tablespace_name  sys.dba_tablespaces.tablespace_name%TYPE;
lv_initial_extent   sys.dba_tablespaces.initial_extent%TYPE;
lv_next_extent      sys.dba_tablespaces.next_extent%TYPE;
lv_min_extents      sys.dba_tablespaces.min_extents%TYPE;
lv_max_extents      sys.dba_tablespaces.max_extents%TYPE;
lv_pct_increase     sys.dba_tablespaces.pct_increase%TYPE;
lv_status           sys.dba_tablespaces.status%TYPE;
lv_file_name        sys.dba_data_files.file_name%TYPE;
lv_bytes            sys.dba_data_files.bytes%TYPE;
lv_first_rec        BOOLEAN;
lv_string            VARCHAR2(800);
lv_lineno           number := 0;

procedure write_out(p_line INTEGER, p_name VARCHAR2,
                  p_string VARCHAR2) is
begin
    insert into ts_temp (lineno, ts_name, text) values
        (p_line, p_name, p_string);
end;

BEGIN
    OPEN ts_cursor;
    LOOP
        FETCH ts_cursor INTO lv_tablespace_name,
                             lv_initial_extent,
                             lv_next_extent,
                             lv_min_extents,
                             lv_max_extents,
                             lv_pct_increase,
                             lv_status;

        EXIT WHEN ts_cursor%NOTFOUND;
        lv_lineno := 1;
        lv_string := ('CREATE TABLESPACE '||lower(lv_tablespace_name));
        lv_first_rec := TRUE;
        write_out(lv_lineno, lv_tablespace_name, lv_string);
        OPEN df_cursor(lv_tablespace_name);
        LOOP
            FETCH df_cursor INTO lv_file_name,
                                 lv_bytes;

            EXIT WHEN df_cursor%NOTFOUND;
            if (lv_first_rec) then
                lv_first_rec := FALSE;
                lv_string := 'DATAFILE ' ;

```

```

else
    lv_string := lv_string || ',';
end if;
lv_string:=lv_string||''''||lv_file_name||''''||
    ' SIZE '||to_char(lv_bytes) || ' REUSE';
END LOOP;
CLOSE df_cursor;
lv_lineno := lv_lineno + 1;
write_out(lv_lineno, lv_tablespace_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := (' DEFAULT STORAGE (INITIAL ' ||
    to_char(lv_initial_extent) ||
    ' NEXT ' || lv_next_extent);
write_out(lv_lineno, lv_tablespace_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := (' MINEXTENTS ' ||
    lv_min_extents ||
    ' MAXEXTENTS ' || lv_max_extents);
write_out(lv_lineno, lv_tablespace_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := (' PCTINCREASE ' ||
    lv_pct_increase || ')');
write_out(lv_lineno, lv_tablespace_name, lv_string);
lv_string := (' ' ||lv_status);
write_out(lv_lineno, lv_tablespace_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='/';
write_out(lv_lineno, lv_tablespace_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='
';
write_out(lv_lineno, lv_tablespace_name, lv_string);
END LOOP;
CLOSE ts_cursor;
END;
/

spool rep_out\cre_tbsp.sql
set heading off
set recsep off
col text format a80 word_wrap
select  text
from    ts_temp
order by ts_name, lineno;
spool off;
drop table ts_temp;
exit

```

Example output from this script follows:

```

CREATE TABLESPACE users
DATAFILE '/oracle1/ORCSPCD1/data/users01.dbf' SIZE 157286400 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121
PCTINCREASE 50)
ONLINE
/

```

```
CREATE TABLESPACE temp
DATAFILE '/oracle1/ORCSPCD1/data/temp01.dbf' SIZE 157286400 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121
PCTINCREASE 50)
ONLINE
/
```

```
CREATE TABLESPACE rbs
DATAFILE '/oracle1/ORCSPCD1/data/rbs01.dbf' SIZE 157286400 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 102400
MINEXTENTS 2 MAXEXTENTS 121
PCTINCREASE 0)
ONLINE
/
```

```
CREATE TABLESPACE cspc_data_dyn
DATAFILE '/oracle1/ORCSPCD1/data/cspc_data_dyn01.dbf' SIZE 157286400 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121
PCTINCREASE 50)
ONLINE
/
```

```
CREATE TABLESPACE cspc_data_stat
DATAFILE '/oracle2/ORCSPCD1/data/cspc_data_stat01.dbf' SIZE 52428800 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121
PCTINCREASE 50)
ONLINE
/
```

```
CREATE TABLESPACE cspc_indx
DATAFILE '/oracle3/ORCSPCD1/data/cspc_indx01.dbf' SIZE 157286400 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121
PCTINCREASE 50)
ONLINE
/
```

```
CREATE TABLESPACE cspc_rbs
DATAFILE '/oracle4/ORCSPCD1/data/cspc_rbs01.dbf' SIZE 157286400 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121
PCTINCREASE 50)
ONLINE
/
```

```
CREATE TABLESPACE cspc_temp
DATAFILE '/oracle4/ORCSPCD1/data/cspc_temp01.dbf' SIZE 31457280 REUSE
DEFAULT STORAGE (INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121
PCTINCREASE 50)
ONLINE
/
```


One thing to note about this output is that the SYSTEM tablespace will not be included, if you have multiple datafiles for your existing SYSTEM tablespace and want to rebuild it exactly as it exists, add a ALTER TABLESPACE system ADD DATAFILE section to the script for these files. The sizes and locations can be obtained from the DBA_DATA_FILES view with the following select:

```
SELECT file_name,bytes
from DBA_DATA_FILES
where tablespace_name='SYSTEM';
```

Soft documentation of the tablespaces in a database can be obtained from the scripts datafile.sql, free_spc.sql, db_tbsp.sql located in Appendix A.

Documentation of Rollback Segments

Before anything else in the database can be created, the rollback segments have to be built. If the scripts so far have been run a functioning database will result, a copy of our tablespaces, but only the default SYSTEM rollback segment. The next script will create DDL to make an exact copy of the existing rollback segment profile.

```
REM rbk_rct.sql
REM FUNCTION: SCRIPT FOR CREATING ROLLBACK SEGMENTS
REM
REM This script must be run by a user with the DBA role.
REM
REM This script is intended to run with Oracle7.
REM
REM Running this script will in turn create a script to re-build
REM the database rollback segments. The created script is called
REM crt_rbks.sql and can be run by any user with the DBA
REM role or with the 'CREATE ROLLBACK SEGMENT' system privilege.
REM
REM NOTE: This script will NOT capture the optimal storage for
REM a rollback segment that is offline.
REM
REM The rollback segments must be manually brought online
REM after running the crt_rbks.sql script.
REM
REM Only preliminary testing of this script was performed. Be
REM sure to test it completely before relying on it.
```

```

REM

set verify off
set feedback off
rem set termout off
rem set echo off
set pagesize 0

set termout on
prompt Creating rollback segment build script...
set termout off

create table rb_temp (lineno NUMBER, rb_name varchar2(30),
                    text varchar2(800))
                    tablespace temp;

DECLARE
  CURSOR rb_cursor IS select segment_name,
                            tablespace_name,
                            decode(owner, 'PUBLIC', 'PUBLIC ', NULL),
                            segment_id,
                            initial_extent,
                            next_extent,
                            min_extents,
                            max_extents,
                            status
                    from sys.dba_rollback_segs
                    where segment_name <> 'SYSTEM';
  CURSOR rb_optimal (r_no number) IS select usn,
                    decode(optsize, null, 'NULL',
to_char(optsize))
                    from sys.v_$rollstat
                    where usn=r_no;
  lv_segment_name      sys.dba_rollback_segs.segment_name%TYPE;
  lv_tablespace_name   sys.dba_rollback_segs.tablespace_name%TYPE;
  lv_owner             VARCHAR2(10);
  lv_segment_id        sys.dba_rollback_segs.segment_id%TYPE;
  lv_initial_extent    sys.dba_rollback_segs.initial_extent%TYPE;
  lv_next_extent       sys.dba_rollback_segs.next_extent%TYPE;
  lv_min_extents       sys.dba_rollback_segs.min_extents%TYPE;
  lv_max_extents       sys.dba_rollback_segs.max_extents%TYPE;
  lv_status            sys.dba_rollback_segs.status%TYPE;
  lv_usn               sys.v_$rollstat.usn%TYPE;
  lv_optsize           VARCHAR2(40);
  lv_string             VARCHAR2(800);
  lv_lineno            number := 0;

  procedure write_out(p_line INTEGER, p_name VARCHAR2, p_string VARCHAR2)
is
begin
  insert into rb_temp (lineno, rb_name, text) values
    (p_line, p_name, p_string);
end;

BEGIN
  OPEN rb_cursor;
  LOOP
    FETCH rb_cursor INTO lv_segment_name,

```

```

        lv_tablespace_name,
        lv_owner,
        lv_segment_id,
        lv_initial_extent,
        lv_next_extent,
        lv_min_extents,
        lv_max_extents,
        lv_status;
    EXIT WHEN rb_cursor%NOTFOUND;
    lv_lineno := 1;
    OPEN rb_optimal(lv_segment_id);
    LOOP
        FETCH rb_optimal INTO lv_usn,
            lv_optsize;
        EXIT WHEN rb_optimal%NOTFOUND;
    END LOOP;
    CLOSE rb_optimal;
    if lv_status = 'ONLINE' then
lv_string:='CREATE ' || lv_owner || 'ROLLBACK SEGMENT ' ||
        lower(lv_segment_name);
write_out(lv_lineno, lv_segment_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='TABLESPACE ' || lower(lv_tablespace_name);
write_out(lv_lineno, lv_segment_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='STORAGE ' || '(INITIAL ' || lv_initial_extent || ' NEXT ' ||
        lv_next_extent || ' MINEXTENTS ' || lv_min_extents ||
        ' MAXEXTENTS ' || lv_max_extents ||
        ' OPTIMAL ' || lv_optsize || ')';
write_out(lv_lineno, lv_segment_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='/';
write_out(lv_lineno, lv_segment_name, lv_string);
    else
lv_string:='CREATE ' || lv_owner || 'ROLLBACK SEGMENT ' ||
        lower(lv_segment_name);
write_out(lv_lineno, lv_segment_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='TABLESPACE ' || lower(lv_tablespace_name);
write_out(lv_lineno, lv_segment_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='STORAGE ' || '(INITIAL ' || lv_initial_extent || ' NEXT ' ||
        lv_next_extent || ' MINEXTENTS ' || lv_min_extents ||
        ' MAXEXTENTS ' || lv_max_extents || ')';
write_out(lv_lineno, lv_segment_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:='/';
write_out(lv_lineno, lv_segment_name, lv_string);
    end if;
lv_lineno := lv_lineno + 1;
lv_string:= '
';
write_out(lv_lineno, lv_segment_name, lv_string);
END LOOP;
    CLOSE rb_cursor;
END;
/
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';

```

```
spool rep_out\&db\crt_rbks.sql
set heading off
col text format a80 word_wrap
select  text
from    rb_temp
order by rb_name, lineno;
spool off;
Drop table rb_temp;
exit
```

Example output from this script follows:

```
CREATE ROLLBACK SEGMENT r01
TABLESPACE cspc_rbs
STORAGE (INITIAL 1048576 NEXT 1048576 MINEXTENTS 2 MAXEXTENTS 121 OPTIMAL
4216832)
/

CREATE ROLLBACK SEGMENT r02
TABLESPACE cspc_rbs
STORAGE (INITIAL 1048576 NEXT 1048576 MINEXTENTS 2 MAXEXTENTS 121 OPTIMAL
4216832)
/

CREATE ROLLBACK SEGMENT r03
TABLESPACE cspc_rbs
STORAGE (INITIAL 1048576 NEXT 1048576 MINEXTENTS 2 MAXEXTENTS 121 OPTIMAL
4216832)
/

CREATE ROLLBACK SEGMENT r04
TABLESPACE cspc_rbs
STORAGE (INITIAL 1048576 NEXT 1048576 MINEXTENTS 2 MAXEXTENTS 121 OPTIMAL
4216832)
/
```

The script documents the rollbacks segments as they currently exist, the DBA should edit the scripts to make any improvements that are required or desired before executing it on the new database.

Soft documentation of rollback segments can be obtained with the `rbk1.sql`, `rbk2.sql` and `db_rbk.sql` scripts located in Appendix A.

Documenting Roles, Grants and Users

Before database objects such as tables, indexes, constraints and the like can be created, there must be users (or schemas) with the appropriate roles and grants to create and own them. The next set of scripts is used to generate DDL to create users, roles and grants. Since a user must have roles and grants, the scripts to document these objects will be discussed first.

Roles

A script to recreate the roles in the database follows:

```
REM role_rct.sql
REM
REM FUNCTION: SCRIPT FOR CREATING ROLES
REM
REM This script must be run by a user with the DBA role.
REM
REM This script is intended to run with Oracle7.
REM
REM Running this script will in turn create a script to build all the
REM roles in the database. This created file, crt_role.sql, can
REM be run by any user with the DBA role or with 'CREATE ROLE' system
REM privilege.
REM
REM Since it is not possible to create a role under a specific schema,
REM it is essential that the original creator be granted 'ADMIN' option
REM to the role. Therefore, such grants will be made at the end of the
REM crt_role.sql script. Since it is not possible to distinguish the
REM creator from someone who was simply granted 'WITH ADMIN OPTION', all
REM grants will be spooled. In addition, the user who creates the role
REM is automatically granted 'ADMIN' option on the role, therefore, if
REM this script is run a second time, this user will also be granted
REM 'ADMIN' on all the roles. You must explicitly revoke 'ADMIN OPTION'
REM from this user to prevent this from happening.
REM
REM NOTE: This script will not capture the create or grant on the
REM Oracle predefined roles, CONNECT, RESOURCE, DBA, EXP_FULL_DATABASE,
REM or IMP_FULL_DATABASE.
REM
REM Only preliminary testing of this script was performed. Be sure to
REM test it completely before relying on it.
REM
set verify off feedback off termout off echo off pagesize 0 embedded on
```

```

set termout on
Prompt 'Creating role build script...'
set termout off

column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\crt_role.sql

select 'CREATE ROLE ' || lower(role) || ' NOT IDENTIFIED;'
  from sys.dba_roles
  where role not in ('CONNECT','RESOURCE','DBA', 'EXP_FULL_DATABASE',
                    'IMP_FULL_DATABASE')
  and password_required='NO'
/
select 'CREATE ROLE ' || lower(role) || ' IDENTIFIED BY VALUES ' ||
      ''' || password || ''' || ';'
  from sys.dba_roles, sys.user$
  where role not in ('CONNECT','RESOURCE','DBA', 'EXP_FULL_DATABASE',
                    'IMP_FULL_DATABASE')
  and password_required='YES' and
      dba_roles.role=user$.name
  and user$.type=0
/

select 'GRANT ' || lower(granted_role) || ' TO ' || lower(grantee) ||
      ' WITH ADMIN OPTION;'
  from sys.dba_role_privs
  where admin_option='YES'
  and granted_role not in ('CONNECT','RESOURCE','DBA',
                          'EXP_FULL_DATABASE',
                          'IMP_FULL_DATABASE')
  order by grantee
/
spool off
exit

```

Example output from the above script follows:

```

CREATE ROLE cspc_dev NOT IDENTIFIED;
CREATE ROLE application_developer NOT IDENTIFIED;
CREATE ROLE cspc_user NOT IDENTIFIED;
GRANT cspc_dev TO sys WITH ADMIN OPTION;
GRANT application_developer TO system WITH ADMIN OPTION;
GRANT cspc_user TO system WITH ADMIN OPTION;

```

The next step for roles is recreating the grants which have been given to the roles created. The next script creates the DDL to grant the privileges to the roles created above:

```

REM FUNCTION:   SCRIPT FOR CAPTURING ROLE GRANTS
REM
REM This script must be run by a user with the DBA role.
REM
REM This script is intended to run with Oracle7.

```

```

REM
REM Running this script will create a script of all the grants
REM of roles to users and other roles. This created script,
REM grt_role.sql, must be run by a user with the DBA role.
REM
REM Since role grants are not dependant on the schema that issued the
REM grant, the grt_role.sql script will not issue the grant of a role by
REM the original grantor. All grants will be issued by the user
REM specified when running this script.
REM
REM NOTE: Grants made to 'SYS','CONNECT','RESOURCE','DBA',
REM        'EXP_FULL_DATABASE','IMP_FULL_DATABASE' are not captured.
REM
REM        Only preliminary testing of this script was performed. Be
REM        sure to test it completely before relying on it.
REM
set verify off feedback off termout off echo off pagesize 0 embedded on

set termout on
select 'Creating role grant script...' from dual;
set termout off

column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\grt_role.sql

select 'GRANT ' || lower(granted_role) || ' TO ' || lower(grantee) ||
       decode(admin_option,'YES',' WITH ADMIN OPTION',';')
       from sys.dba_role_privs
       where grantee not in ('SYS','CONNECT','RESOURCE','DBA',
                            'EXP_FULL_DATABASE','IMP_FULL_DATABASE')
order by grantee
/
spool off
exit

```

Example Output from above script:

```

GRANT connect TO cspcdba WITH ADMIN OPTION;
GRANT cspc_dev TO cspcdba;
GRANT dba TO cspcdba WITH ADMIN OPTION;
GRANT exp_full_database TO cspcdba WITH ADMIN OPTION;
GRANT imp_full_database TO cspcdba WITH ADMIN OPTION;
GRANT resource TO cspcdba WITH ADMIN OPTION;
GRANT connect TO cspcdev_1;
GRANT cspc_user TO cspcdev_1;
GRANT connect TO ops$oracle;
GRANT dba TO ops$oracle;
GRANT resource TO ops$oracle;

```

The above script will capture all privileges granted to roles. Any system level privileges and be captured by a similar script that uses the DBA_SYS_GRANTS view.

```

REM FUNCTION:   SCRIPT FOR CAPTURING ROLE SYSTEM GRANTS
REM
REM This script must be run by a user with the DBA role.
REM
REM This script is intended to run with Oracle7.
REM
REM Running this script will create a script of all the grants
REM of roles to users and other roles.  This created script,
REM grt_sys.sql, must be run by a user with the DBA role.
REM
REM Since role grants are not dependant on the schema that issued the
REM grant, the grt_role.sql script will not issue the grant of a role by
REM the original grantor.  All grants will be issued by the user
REM specified when running this script.
REM
REM NOTE:  Grants made to 'SYS','CONNECT','RESOURCE','DBA',
REM        'EXP_FULL_DATABASE','IMP_FULL_DATABASE' are not captured.
REM
REM        Only preliminary testing of this script was performed.  Be
REM        sure to test it completely before relying on it.
REM
set verify off feedback off termout off echo off pagesize 0 embedded on
set heading off

set termout on
prompt Creating role sys grant script...
set termout off

column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\grt_sys.sql

select 'GRANT ' || lower(privilege) || ' TO ' || lower(grantee) ||
       decode(admin_option,'YES',' WITH ADMIN OPTION;',';')
       from sys.dba_sys_privs
       where grantee not in ('SYS','CONNECT','RESOURCE','DBA',
                             'EXP_FULL_DATABASE','IMP_FULL_DATABASE')
order by grantee
/
spool off
exit

```

Example output from the above script:

```

GRANT alter session TO application_developer;
GRANT create sequence TO application_developer;
GRANT create session TO application_developer;
GRANT create table TO application_developer;
GRANT create view TO application_developer;
GRANT unlimited tablespace TO cspcdba WITH ADMIN OPTION;
GRANT create session TO cspcdev_1;
GRANT create procedure TO cspc_dev;
GRANT create sequence TO cspc_dev;
GRANT create synonym TO cspc_dev;
GRANT create table TO cspc_dev;
GRANT create trigger TO cspc_dev;

```



```
GRANT create view TO cspc_dev;
GRANT create session TO cspc_user;
GRANT analyze any TO ops$oracle;
GRANT unlimited tablespace TO ops$oracle;
GRANT unlimited tablespace TO system WITH ADMIN OPTION;
```

The next layer of grants which must be allowed for are table grants. The following script will regenerate table grants for roles and users:

```
REM FUNCTION:   SCRIPT FOR CAPTURING TABLE GRANTS
REM
REM This script must be run by a user with the DBA role.
REM
REM This script is intended to run with Oracle7.
REM
REM Running this script will create a script of all the grants
REM of roles to users and other roles. This created script,
REM grt_sys.sql, must be run by a user with the DBA role.
REM
REM Since role grants are not dependant on the schema that issued the
REM grant, the grt_role.sql script will not issue the grant of a role by
REM the original grantor. All grants will be issued by the user
REM specified when running this script.
REM
REM NOTE:   Grants made to 'SYS','CONNECT','RESOURCE','DBA',
REM         'EXP_FULL_DATABASE','IMP_FULL_DATABASE' are not captured.
REM
REM         Only preliminary testing of this script was performed. Be
REM         sure to test it completely before relying on it.
REM
set verify off feedback off termout off echo off pagesize 0 embedded on

set termout on
prompt Creating table grant script...
set termout off

break on line1
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\grt_tabs.sql

select 'CONNECT '||grantor||'/'||grantor line1,
'GRANT
'||lower(privilege)||' on '||owner||'.'||table_name||' to '||
lower(grantee) ||
decode(grantable,'YES',' WITH ADMIN OPTION;',';')
from sys.dba_tab_privs
where grantee not in ('SYS','CONNECT','RESOURCE','DBA',
'EXP_FULL_DATABASE','IMP_FULL_DATABASE')
order by line1,grantee
/
spool off
exit
```

This script will produce a list of grantors and the commands to grant whatever access they have granted to other users and roles on their tables. The script will have to be edited to insert the appropriate passwords for the granting users.

Example of the output of this script:

```
CONNECT CSPCDBA/CSPCDBA
GRANT
alter on CSPCDBA.ACTSEQ to cspcdev_1;
GRANT
select on CSPCDBA.ACTSEQ to cspcdev_1;
GRANT
delete on CSPCDBA.ACCCAR to cspcdev_1;
GRANT
select on CSPCDBA.CSPCSEQ to cspcdev_1;
GRANT
update on CSPCDBA.ACCCAR to cspcdev_1;
GRANT
delete on CSPCDBA.ACT to cspcdev_1;
GRANT
select on CSPCDBA.ACT to cspcdev_1;
```

The final layer of grants are the column level grants. The next script will allow documentation and recreation of these grants.

```
REM FUNCTION:   SCRIPT FOR CAPTURING TABLE COLUMN GRANTS
REM
REM This script must be run by a user with the DBA role.
REM
REM This script is intended to run with Oracle7.
REM
REM Running this script will create a script of all the grants
REM of roles to users and other roles.  This created script,
REM grt_sys.sql, must be run by a user with the DBA role.
REM
REM Since role grants are not dependant on the schema that issued the
REM grant, the grt_role.sql script will not issue the grant of a role by
REM the original grantor.  All grants will be issued by the user
REM specified when running this script.
REM
REM NOTE:  Grants made to 'SYS','CONNECT','RESOURCE','DBA',
REM        'EXP_FULL_DATABASE','IMP_FULL_DATABASE' are not captured.
REM
REM        Only preliminary testing of this script was performed.  Be
REM        sure to test it completely before relying on it.
REM
set verify off feedback off termout off echo off pagesize 0 embedded on
set heading off

set termout on
prompt Creating table grant script...
```

```

set termout off

break on grantor
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\db\grt_tabc.sql

select 'connect '||grantor||'/'||grantor line1,
'grant
'||lower(privilege)||' on '||owner||'.'||table_name||'.'||column_name||'
'||' to '||lower(grantee)||
decode(grantable,'YES',' WITH ADMIN OPTION;',';')
  from sys.dba_col_privs
where grantee not in ('SYS','CONNECT','RESOURCE','DBA',
'EXP_FULL_DATABASE','IMP_FULL_DATABASE')
order by grantor,grantee
/
spool off
exit

```

Example of the output from the above script follows:

```

connect SYSTEM/SYSTEM
grant
update on SYSTEM.TOOL_DEPENDENT.DEPCHANGED
  to public;

```

The scripts to create the roles and role grants can be run at any time. The scripts for user grants and table grants must be run after the users and tables are created. The next script will recreate the database users as they currently exist (except for passwords which the DBA will have to edit in afterwards.)

```

REM rct_usrs.sql
REM
REM FUNCTION: Create a script to recreate users
REM
REM This script is designed to run on an ORACLE7.x database
REM
REM This script creates a script called crt_usrs.sql that
REM recreates the CREATE USER commands required to rebuild the database
REM user community. The script includes the tablespace quota grants for
REM each user as a set of ALTER USER commands. The user's passwords are
REM initially set to the username so editing is suggested if other
REM values are desired.
REM
REM Only preliminary testing has been accomplished on this script,
REM please fully qualify it for your environment before use
REM
REM M. Ault TRECOM 3.30.96
REM
set verify off feedback off termout off echo off pagesize 0 embedded on

```

```
set termout on
prompt Creating user create script...
set termout off

column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\crt_usr$.sql

SELECT 'create user '||username||' identified by '||username||'
      '||' default tablespace '||default_tablespace||'
      '||' temporary tablespace '||temporary_tablespace||'
      '||' profile '||profile||'
      '||' quota unlimited on '||default_tablespace||';'
FROM dba_users
WHERE username not in ('SYS','SYSTEM')
UNION
SELECT 'alter user '||username||'
      '||'quota '||bytes||' on '||tablespace_name||';'
FROM dba_ts_quotas
WHERE username not in ('SYS','SYSTEM')
/
spool off
exit
```

Example output from the above script:

```
create user CSPCDEV_1 identified by CSPCDEV_1
  default tablespace CSPC_DATA_DYN
  temporary tablespace CSPC_TEMP
  profile DEFAULT
  quota unlimited on CSPC_DATA_DYN;

create user OPS$ORACLE identified by OPS$ORACLE
  default tablespace USERS
  temporary tablespace CSPC_TEMP
  profile DEFAULT
  quota unlimited on USERS;
```

Now we have fully documented all users, roles and grants. The next sets of scripts provide documentation for the tables and their associated indexes, constraints, procedures, triggers and views.

Soft documentation of roles, grants and users can be obtained by using the `db_roles.sql`, `db_grnts.sql` and `db_usr$.sql` scripts located in Appendix A.

Documenting Tables

So far the database control file, redo logs, initialization parameters, tablespaces, rollback segments, roles, grants and users have been documented. All non-data related structures. It is now time to document the application tables. If the database has been properly set up (always a questionable proposition) the tables and other related data structures should be owned by one application owner or schema. If the application is owned by more than one schema, or, there is more than one application in the database, the following script will need to be run multiple times.

The script to document existing tables follows:

```
REM tab_rct.sql
REM
REM FUNCTION: SCRIPT FOR CREATING TABLES
REM
REM          This script can be run by any user .
REM
REM          This script is intended to run with Oracle7.
REM
REM          Running this script will in turn create a script to
REM          build all the tables owned by the user in the database.
REM          This script, crt_tab.sql, can be run by any user with the
REM          'CREATE TABLE' system privilege.
REM
REM NOTE:     The script will NOT include constraints on tables. This
REM          script will also NOT capture tables created by user 'SYS'.
REM
REM Only preliminary testing of this script was performed. Be sure to
REM test it completely before relying on it.
REM
set verify off
rem set feedback off
rem set termout off
set echo off;
set pagesize 0
set termout on
Prompt Creating table build script...
set termout off

create table t_temp
  (lineno NUMBER, tb_owner VARCHAR2(30), tb_name VARCHAR2(30),
  text VARCHAR2(255))
/

DECLARE
  CURSOR tab_cursor IS
```

```

select      table_name,
           pct_free,
           pct_used,
           ini_trans,
           max_trans,
           tablespace_name,
           initial_extent,
           next_extent,
           min_extents,
           max_extents,
           pct_increase
from        user_tables
order by   table_name;

```

```

CURSOR col_cursor (c_tab VARCHAR2) IS
select
  column_name,
  data_type,
  data_length,
  data_precision,
  data_scale,
  nullable
from    user_tab_columns
where   table_name = c_tab
order by column_name;

```

```

lv_table_name      user_tables.table_name%TYPE;
lv_pct_free        user_tables.pct_free%TYPE;
lv_pct_used        user_tables.pct_used%TYPE;
lv_ini_trans       user_tables.ini_trans%TYPE;
lv_max_trans       user_tables.max_trans%TYPE;
lv_tablespace_name user_tables.tablespace_name%TYPE;
lv_initial_extent  user_tables.initial_extent%TYPE;
lv_next_extent     user_tables.next_extent%TYPE;
lv_min_extents     user_tables.min_extents%TYPE;
lv_max_extents     user_tables.max_extents%TYPE;
lv_pct_increase    user_tables.pct_increase%TYPE;
lv_column_name     user_tab_columns.column_name%TYPE;
lv_data_type       user_tab_columns.data_type%TYPE;
lv_data_length     user_tab_columns.data_length%TYPE;
lv_data_precision  user_tab_columns.data_precision%TYPE;
lv_data_scale      user_tab_columns.data_scale%TYPE;
lv_nullable        user_tab_columns.nullable%TYPE;
lv_first_rec       BOOLEAN;
lv_lineno          NUMBER := 0;
lv_string          VARCHAR2(80);

```

```

procedure write_out(p_line INTEGER, p_name VARCHAR2,
                  p_string VARCHAR2) is
begin
  insert into t_temp (lineno, tb_name, text)
  values (p_line,p_name,p_string);
end;
BEGIN
OPEN tab_cursor;
LOOP
  FETCH tab_cursor INTO      lv_table_name,
                             lv_pct_free,

```

```

        lv_pct_used,
        lv_ini_trans,
        lv_max_trans,
        lv_tablespace_name,
        lv_initial_extent,
        lv_next_extent,
        lv_min_extents,
        lv_max_extents,
        lv_pct_increase;
EXIT WHEN tab_cursor%NOTFOUND;
    lv_lineno := 1;
    lv_string := 'DROP TABLE ' || lower(lv_table_name) || ';';
    write_out(lv_lineno, lv_table_name, lv_string);
    lv_lineno := lv_lineno + 1;
    lv_first_rec := TRUE;
    lv_string := 'CREATE TABLE ' || lower(lv_table_name) || ' (';
    write_out(lv_lineno, lv_table_name, lv_string);
    lv_lineno := lv_lineno + 1;
lv_string := null;
OPEN col_cursor(lv_table_name);
LOOP
    FETCH col_cursor INTO lv_column_name,
                        lv_data_type,
                        lv_data_length,
                        lv_data_precision,
                        lv_data_scale,
                        lv_nullable;

    EXIT WHEN col_cursor%NOTFOUND;
    if (lv_first_rec) then
        lv_first_rec := FALSE;
    else
        lv_string := ',';
    end if;
    lv_string := lv_string || lower(lv_column_name) ||
                ' ' || lv_data_type;
    if ((lv_data_type = 'CHAR') or (lv_data_type = 'VARCHAR2')) then
        lv_string := lv_string || '(' || lv_data_length || ')';
    end if;
    if (lv_nullable = 'N') then
        lv_string := lv_string || ' NOT NULL';
    end if;
    write_out(lv_lineno, lv_table_name, lv_string);
    lv_lineno := lv_lineno + 1;
END LOOP;
CLOSE col_cursor;
lv_string := ')';
write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := null;
lv_string := 'PCTFREE ' || to_char(lv_pct_free) ||
            ' PCTUSED ' || to_char(lv_pct_used);
write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'INITRANS ' || to_char(lv_ini_trans) ||
            ' MAXTRANS ' || to_char(lv_max_trans);
write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'TABLESPACE ' || lv_tablespace_name;

```

```

write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'STORAGE (';
write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'INITIAL ' || to_char(lv_initial_extent) ||
            ' NEXT ' || to_char(lv_next_extent);
write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'MINEXTENTS ' || to_char(lv_min_extents) ||
            ' MAXEXTENTS ' || to_char(lv_max_extents) ||
            ' PCTINCREASE ' || to_char(lv_pct_increase) || ')';
write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := '/';
write_out(lv_lineno, lv_table_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string:= '
';
write_out(lv_lineno, lv_table_name, lv_string);
END LOOP;
CLOSE tab_cursor;
END;
/

set heading off
spool rep_out\crt_tabs.sql
select text
from T_temp
order by tb_name, lineno;
spool off
drop table t_temp
exit

```

Again, the recursion required by the multiple entries in the USER_TAB_COLUMNS view cause multiple cursors to be used and multiple loop-end loop constructs to be required. This script can be made generic by adding reference to the OWNER column of the DBA_TABLES and DBA_TAB_COLUMNS views throughout the logic. An example of this scripts output follows:

```

DROP TABLE acccar;
CREATE TABLE acccar (
  acccaridcd NUMBER
  ,accarrdrccd VARCHAR2(3)
  ,acccartypcd VARCHAR2(10)
  ,acccustnmabbr VARCHAR2(3) NOT NULL
  ,custcarnmabbr VARCHAR2(3)
  ,fk_cococcd VARCHAR2(15) NOT NULL
  ,fk_cofk_leleid NUMBER NOT NULL
)
PCTFREE 60 PCTUSED 40
INITRANS 1 MAXTRANS 255
TABLESPACE CSFC_DATA_DYN
STORAGE (

```



```

INITIAL 118784 NEXT 55296
MINEXTENTS 1 MAXEXTENTS 121 PCTINCREASE 50)
/
  DROP TABLE act;
CREATE TABLE act (
actseqnbr NUMBER NOT NULL
,actstpdt DATE
,actstrtdt DATE NOT NULL
,actvyhilgtind VARCHAR2(1)
,fk_acttypacttypnm VARCHAR2(16)
,fk_acttypacttypvrs CHAR(7)
,fk_eventevntid NUMBER NOT NULL
)
PCTFREE 60 PCTUSED 40
INITRANS 1 MAXTRANS 255
TABLESPACE CSPEC_DATA_DYN
STORAGE (
INITIAL 4096 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121 PCTINCREASE 50)
/
.
. (Since this database has nearly 300 tables, the output has been
. truncated)
.
DROP TABLE wrkgrp_table;
CREATE TABLE wrkgrp_table (
wrkgrpnm VARCHAR2(8) NOT NULL
)
PCTFREE 10 PCTUSED 40
INITRANS 1 MAXTRANS 255
TABLESPACE CSPEC_DATA_DYN
STORAGE (
INITIAL 10240 NEXT 10240
MINEXTENTS 1 MAXEXTENTS 121 PCTINCREASE 50)
/

```

As the remarks section of the code relates, this code does not capture table constraints. The reasoning for this is to allow data loading to occur before the constraints are enabled. In the following sections a script the re-creates all primary key, unique, foreign key, non-”not null” check type and default value constraints will be examined.

Soft documentation of tables can be generated using the `db_tbl.sql`, and `tab_stat.sql` scripts in Appendix A.

A subset of tables, called clusters, are documented using the cluster scripts in Appendix A. Since very few applications use clusters, this paper won’t cover rebuilding them.

Documenting Database Constraints

The next database objects which will be documented are the table constraints. In many cases the constraints will have been specified during the CREATE TABLE command and probably will not have been named. This lack of naming for a constraint will result in Oracle selecting a name consisting of SYS_C with a sequence number appended to it, such as SYS_C00123. Using a derivation of the next script these constraints can be renamed to a more informative naming convention, however that is the topic for another paper and beyond the scope of this one.

Constraints come in several forms, primary key (P), foreign key (R), unique (U), check (C) and default value (V). Check constraints can be the standard NOT-NULL type constraint or can be a full blown verification algorithm. Default value constraints provide a default value for those fields effected by them.

The following script generates three SQL scripts, one for primary key and unique constraints, one for foreign key constraints and one for non-NOT-NULL check constraints and default value constraints:

```
REM
REM FUNCTION: SCRIPT FOR RE-CREATING DATABASE CONSTRAINTS
REM
REM FUNCTION: This script must be run by the constraint owner.
REM
REM FUNCTION: This script is intended to run with Oracle7.
REM
REM FUNCTION: Running this script will in turn create scripts to build
REM FUNCTION: constraints owned in the database. The scripts are called
REM FUNCTION: 'pk_rct.sql', 'fk_rct.sql', and 'ck_rct.sql'.
REM FUNCTION: The primary key and unique
REM FUNCTION: constraints will include the USING INDEX clause, you may
REM FUNCTION: point this to an INDEX tablespace if the constraints
REM FUNCTION: don't already. The foreign key constraints build an index
REM FUNCTION: if one exists with the same name as the constraint.
REM FUNCTION: Otherwise, the foreign key isn't built.
REM FUNCTION: You may wish to edit this part of the script if this isn't
REM FUNCTION: the case in your database
REM
REM Only preliminary testing of this script was performed. Be sure to
```

```
REM test it completely before relying on it.
REM
REM M. Ault 2/25/96 TRECOM
REM

set verify off
rem set feedback off
rem set termout off
rem set echo off
set pagesize 0
set long 4000
set termout on
select 'Creating constraint build script...' from dual;
rem set termout off

create table cons_temp (owner varchar2(30),
                        constraint_name varchar2(30),
                        constraint_type varchar2(11),
                        search_condition varchar2(2000),
                        table_name varchar2(30),
                        referenced_owner varchar2(30),
                        referenced_constraint varchar2(30),
                        delete_rule varchar2(9),
                        constraint_columns varchar2(2000),
                        con_number number);

DECLARE

CURSOR cons_cursor IS select      owner,
                                constraint_name,
decode(constraint_type,'P','Primary Key',
        'R','Foreign Key',
        'U','Unique',
        'C','Check',
        'D','Default'),
        table_name,
        search_condition,
        r_owner,
        r_constraint_name,
        delete_rule

from user_constraints
where owner not in ('SYS','SYSTEM')
order by owner;

cursor cons_col is select
        owner,
        constraint_name,
        column_name
from user_cons_columns
where owner not in ('SYS','SYSTEM')
order by owner, constraint_name,
        position;

cursor get_cons (tab_nam in varchar2) is
select distinct
        OWNER, TABLE_NAME, CONSTRAINT_NAME, CONSTRAINT_TYPE
from cons_temp
where table_name=tab_nam
```

```

and constraint_type='Foreign Key'
order by owner,table_name,constraint_name;

cursor get_tab_nam is
select distinct table_name
from cons_temp
where constraint_type='Foreign Key'
order by table_name;

tab_nam          user_constraints.table_name%TYPE;
cons_owner       user_constraints.owner%TYPE;
cons_name        user_constraints.constraint_name%TYPE;
cons_type        varchar2(11);
cons_sc          user_constraints.search_condition%TYPE;
cons_tname       user_constraints.table_name%TYPE;
cons_rowner      user_constraints.r_owner%TYPE;
cons_rcons       user_constraints.r_constraint_name%TYPE;
cons_dr          user_constraints.delete_rule%TYPE;
cons_col_own     user_cons_columns.owner%TYPE;
cons_col_nam     user_cons_columns.constraint_name%TYPE;
cons_column      user_cons_columns.column_name%TYPE;
cons_tcol_name   user_cons_columns.table_name%TYPE;
all_columns      varchar2(2000);
counter          integer:=0;
cons_nbr         integer;

```

```

BEGIN
OPEN cons_cursor;
LOOP
  FETCH cons_cursor INTO  cons_owner,
                           cons_name,
                           cons_type,
                           cons_sc,
                           cons_tname,
                           cons_rowner,
                           cons_rcons,
                           cons_dr;
EXIT WHEN cons_cursor%NOTFOUND;
all_columns := '';
counter := 0;
open cons_col;
loop
  fetch cons_col into
                           cons_col_own,
                           cons_col_nam,
                           cons_column;
exit when cons_col%NOTFOUND;
  if cons_owner = cons_col_own and cons_name=cons_col_nam
  then
    counter := counter+1;
    if counter = 1 then
      all_columns := all_columns||cons_column;
    else
      all_columns := all_columns||', '||cons_column;
    end if;
  end if;
end loop;
close cons_col;

```

```

        insert into cons_temp values (cons_owner,
                                     cons_name,
                                     cons_type,
                                     cons_tname,
                                     cons_sc,
                                     cons_rowner,
                                     cons_rcons,
                                     cons_dr,
                                     all_columns,
                                     0);

    commit;
END LOOP;
CLOSE cons_cursor;
commit;
begin
    open get_tab_nam;
loop
    fetch get_tab_nam into tab_nam;
    exit when get_tab_nam%NOTFOUND;
/*sys.dbms_output.put_line(tab_nam);*/
    open get_cons (tab_nam);
    cons_nbr:=0;
    loop
        fetch get_cons into cons_owner,
                        cons_tname,
                        cons_name,
                        cons_type;
        exit when get_cons%NOTFOUND;
        cons_nbr:=cons_nbr+1;
/*    sys.dbms_output.put_line('cons_nbr='||cons_nbr);*/
/*sys.dbms_output.put_line(cons_owner||'.'||cons_name||' '||cons_type);*/
        update cons_temp set con_number=cons_nbr where
            constraint_name=cons_name and
            constraint_type=cons_type and
            owner=cons_owner;
    end loop;
    close get_cons;
    commit;
end loop;
close get_tab_nam;
commit;
end;
END;
/
REM The following indexes make the create part of this script run
REM much faster
REM
create index pk_cons_temp on cons_temp(constraint_name);
create index lk_cons_temp on cons_temp(constraint_type);
create index lk_cons_temp2 on cons_temp(referenced_constraint);

set heading off feedback off pages 0 termout off echo off
set recsep off verify off
set embedded on
REM
REM Do the check and default values first since they are usually the
smallest
REM

```

```

spool ck_rct.sql
select 'alter table '||a.table_name||'
drop constraint '||a.constraint_name||';
alter table '||a.table_name||' add constraint '||a.constraint_name||'
'||constraint_type||'(' ||a.search_condition||' )
;
from cons_temp a where constraint_type in ( 'Check','Default' ) and
search_condition not like '%NULL%'
/
spool off
REM
REM Next, do the primary constraints
REM
spool pk_rct.sql
select 'alter table '||a.table_name||'
drop constraint '||a.constraint_name||';'
drop index '||a.constraint_name||';'
alter table '||a.table_name||' add constraint '||a.constraint_name||'
'||constraint_type||'(' ||a.constraint_columns||' )'
'||using index tablespace '||b.tablespace_name||'
'||pctfree '||b.pct_free||'
'||initrans '||b.ini_trans||'
'||maxtrans '||b.max_trans||'
'||storage (
'||initial '||b.initial_extent||'
'||next '||b.next_extent||'
'||minextents '||b.min_extents||'
'||maxextents '||b.max_extents||'
'||pctincrease '||b.pct_increase||'
)|| freelist groups '||b.freelist_groups||')
;
from cons_temp a, user_indexes b where
a.constraint_type in ('Primary Key','Unique') and
a.constraint_name=b.index_name
/
spool off
REM
REM Finally do the foreign key constraints
REM
spool fk_rct.sql
select 'alter table '||a.table_name||'
drop constraint '||a.constraint_name||';
drop index '||c.index_name||';
alter table '||a.table_name||' add constraint '||a.constraint_name||'
'||a.constraint_type||'('
  '||a.constraint_columns||' )
'||references '||a.referenced_owner||'.'||b.table_name||' (
  '||b.constraint_columns||' )
'||decode (a.delete_rule,'CASCADE','on delete cascade','')||'
;
'||
'||create index '||c.index_name||' on '||a.table_name||' (
  '||a.constraint_columns||')
'||tablespace '||c.tablespace_name||'
'||pctfree '||c.pct_free||' '||initrans '||c.ini_trans||' maxtrans
  '||c.max_trans||'
'||storage ( '||initial '||c.initial_extent||' next '||c.next_extent||'
  '||minextents '||c.min_extents||' maxextents '||c.max_extents||'
  '||pctincrease '||c.pct_increase||'

```

```
'||' freelist groups '||c.freelist_groups||')
;'
from cons_temp a, cons_temp b, user_indexes c
where a.constraint_type = 'Foreign Key' and
a.referenced_constraint=b.constraint_name
and a.constraint_name=c.index_name
/
drop table cons_temp;
exit
```

As the remarks at the top of the script indicate, this script expects the foreign key indexes to exist and be named the same as the foreign key. If this isn't the case, modify the last bit of code to either not build the index at all or hard code the location of the index and its name and storage parameters.

An excerpt from the `pk_rct.sql` script follows:

```
alter table ACCCAR
drop constraint PK_ACCCAR;
drop index PK_ACCCAR;
alter table ACCCAR add constraint PK_ACCCAR
Primary Key( FK_COCOCD, FK_COFK_LELEID )
using index tablespace CSPC_INDX
pctfree 10
intrans 2
maxtrans 255
storage (
initial 10240
next 10240
minextents 1
maxextents 121
pctincrease 50
freelist groups 1)
;
alter table ACT
drop constraint PK_ACT;
drop index PK_ACT;
alter table ACT add constraint PK_ACT
Primary Key( FK_EVENTEVNTID, ACTSEQNBR )
using index tablespace CSPC_INDX
pctfree 10
intrans 2
maxtrans 255
storage (
initial 10240
next 24576
minextents 1
maxextents 121
pctincrease 50
freelist groups 1)
;
alter table ACTASGT
```

```

drop constraint PK_ACTASGT;
drop index PK_ACTASGT;
alter table ACTASGT add constraint PK_ACTASGT
Primary Key( FK_ACTACTSEQNBR, FK_ACTFK_EVENTEVNT, ACTASGTROLECD )
using index tablespace CSPC_INDX
pctfree 10
initrans 2
maxtrans 255
storage (
initial 10240
next 10240
minextents 1
maxextents 121
pctincrease 50
freelist groups 1)
;

```

An excerpt from the `fk_rct.sql` script follows:

```

alter table ACCCAR
drop constraint FK_ACCCAR_1;
drop index FK_ACCCAR_1;
alter table ACCCAR add constraint FK_ACCCAR_1 Foreign Key(
FK_COFK_LELEID, FK_COCOD )
references CSPCDBA.CO (
FK_LELEID, COCD )
on delete cascade
;
create index FK_ACCCAR_1 on ACCCAR(
FK_COFK_LELEID, FK_COCOD)
tablespace CSPC_INDX
pctfree 10 initrans 2 maxtrans 255
storage ( initial 10240 next 10240
minextents 1 maxextents 121
pctincrease 50
freelist groups 1)
;
alter table ACT
drop constraint FK_ACT_1;
drop index FK_ACT_1;
alter table ACT add constraint FK_ACT_1 Foreign Key(
FK_EVENTEVNTID )
references CSPCDBA.EVENT (
EVNTID )
on delete cascade
;

```

The scripts for constraint recreation should be run after the tables have been built and loaded with data. They should be run in the following order:

1. `pk_rct.sql`

2. `fk_rct.sql`
3. `ck_rct.sql`

There may be additional lookup indexes in the database, in this case, these must also be recreated or performance may suffer. The next script allows you to recreate the other indexes in the database.

The soft documentation for constraints can be generated through use of the `pk_fk.sql` script in Appendix A.

Documenting Indexes in the Database

Indexes are usually create for one of four purposes, enforcing a primary key, enforcing a unique value, lookup support on a foreign key or performance enhancement. The constraints rebuilding script handles primary key, unique and foreign key type indexes. The next script will allow the DBA to rebuild all indexes in a database, since Oracle will not allow multiple indexes on the same set of columns, running the resulting DDL after rebuilding your constraints will allow creation of any look up indexes without the possibility of damaging already existing indexes used in support of primary, unique or foreign key constraints.

```
REM in_rct.sql
REM
REM FUNCTION: SCRIPT FOR CREATING INDEXES
REM
REM          This script must be run by a user with the DBA role.
REM
REM          This script is intended to run with Oracle7.
REM
REM          Running this script will in turn create a script to
REM          build all the indexes in the database. This created
REM          script, create_index.sql, can be run by any user with
REM          the DBA role or with the 'CREATE ANY INDEX' system
REM          privilege.
REM
REM          The script will NOT capture the indexes created by
REM          the user 'SYS'.
REM
REM NOTE:      Indexes automatically created by table CONSTRAINTS will
```

```

REM          also be INCLUDED in the create_index.sql script.  It may
REM          cause a problem to create an index with a system assigned
REM          name such as SYS_C00333.
REM

```

```

REM          Only preliminary testing of this script was performed.
REM          Be sure to test it completely before relying on it.
REM

```

```

set verify off;
set termout off;
set feedback off;
set echo off;
set pagesize 0;

```

```

set termout on
Prompt Creating index build script...
set termout off;

```

```

create table i_temp
  (lineno NUMBER, id_owner VARCHAR2(30), id_name VARCHAR2(30),
  text VARCHAR2(255))
/

```

```

DECLARE
  CURSOR ind_cursor IS select   owner,
                                index_name,
                                table_owner,
                                table_name,
                                uniqueness,
                                tablespace_name,
                                ini_trans,
                                max_trans,
                                initial_extent,
                                next_extent,
                                min_extents,
                                max_extents,
                                pct_increase,
                                pct_free
  from       dba_indexes
  where owner != 'SYS'
  order by index_name;
  CURSOR col_cursor (i_own VARCHAR2, c_ind VARCHAR2, c_tab VARCHAR2) IS
  select   column_name
                                from       dba_ind_columns
                                where      index_owner = i_own
                                and        index_name = c_ind
                                and        table_name = c_tab
                                order by  column_position;

  lv_index_owner      dba_indexes.owner%TYPE;
  lv_index_name       dba_indexes.index_name%TYPE;
  lv_table_owner      dba_indexes.table_owner%TYPE;
  lv_table_name       dba_indexes.table_name%TYPE;
  lv_uniqueness       dba_indexes.uniqueness%TYPE;
  lv_tablespace_name  dba_indexes.tablespace_name%TYPE;
  lv_ini_trans        dba_indexes.ini_trans%TYPE;
  lv_max_trans        dba_indexes.max_trans%TYPE;
  lv_initial_extent   dba_indexes.initial_extent%TYPE;

```

```

lv_next_extent          dba_indexes.next_extent%TYPE;
lv_min_extents          dba_indexes.min_extents%TYPE;
lv_max_extents          dba_indexes.max_extents%TYPE;
lv_pct_increase         dba_indexes.pct_increase%TYPE;
lv_pct_free             dba_indexes.pct_free%TYPE;
lv_column_name          dba_ind_columns.column_name%TYPE;
lv_first_rec            BOOLEAN;
lv_string                VARCHAR2(80);
lv_lineno                NUMBER := 0;

```

```

procedure write_out(p_line INTEGER, p_owner varchar2, p_name VARCHAR2,
                   p_string VARCHAR2) is

```

```

begin

```

```

    insert into i_temp (lineno,id_owner, id_name,text)
    values (p_line,p_owner,p_name,p_string);

```

```

end;

```

```

BEGIN

```

```

    OPEN ind_cursor;

```

```

    LOOP

```

```

        FETCH ind_cursor INTO          lv_index_owner,
                                       lv_index_name,
                                       lv_table_owner,
                                       lv_table_name,
                                       lv_uniqueness,
                                       lv_tablespace_name,
                                       lv_ini_trans,
                                       lv_max_trans,
                                       lv_initial_extent,
                                       lv_next_extent,
                                       lv_min_extents,
                                       lv_max_extents,
                                       lv_pct_increase,
                                       lv_pct_free;

```

```

    EXIT WHEN ind_cursor%NOTFOUND;

```

```

        lv_lineno := 1;

```

```

        lv_first_rec := TRUE;

```

```

        lv_string:= 'DROP INDEX ' || lower(lv_index_owner) || '.' ||
                   lower(lv_index_name)||';';

```

```

        write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);

```

```

        lv_lineno := lv_lineno+1;

```

```

        if (lv_uniqueness = 'UNIQUE') then

```

```

            lv_string:= 'CREATE UNIQUE INDEX ' || lower(lv_index_owner) || '.'

```

```

||

```

```

                lower(lv_index_name);

```

```

            write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);

```

```

            lv_lineno := lv_lineno + 1;

```

```

        else

```

```

            lv_string:= 'CREATE INDEX ' || lower(lv_index_owner) || '.' ||
                       lower(lv_index_name);

```

```

            write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);

```

```

            lv_lineno := lv_lineno + 1;

```

```

        end if;

```

```

    OPEN col_cursor(lv_index_owner,lv_index_name,lv_table_name);

```

```

    LOOP

```

```

        FETCH col_cursor INTO lv_column_name;

```

```

        EXIT WHEN col_cursor%NOTFOUND;

```

```

        if (lv_first_rec) then

```

```

        lv_string := ' ON ' || lower(lv_table_owner) || '.' ||
                    lower(lv_table_name) || ' (';
lv_first_rec := FALSE;
else
    lv_string := lv_string || ',';
end if;
lv_string := lv_string || lower(lv_column_name);
END LOOP;
CLOSE col_cursor;
lv_string := lv_string || ')';
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := null;
lv_string := 'PCTFREE ' || to_char(lv_pct_free);
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'INITRANS ' || to_char(lv_ini_trans) ||
            ' MAXTRANS ' || to_char(lv_max_trans);
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'TABLESPACE ' || lv_tablespace_name || ' STORAGE (';
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'INITIAL ' || to_char(lv_initial_extent) ||
            ' NEXT ' || to_char(lv_next_extent);
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := 'MINEXTENTS ' || to_char(lv_min_extents) ||
            ' MAXEXTENTS ' || to_char(lv_max_extents) ||
            ' PCTINCREASE ' || to_char(lv_pct_increase) || ')';
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_string := '/';
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
lv_lineno := lv_lineno + 1;
lv_lineno := lv_lineno + 1;
lv_string:=';
write_out(lv_lineno, lv_index_owner, lv_index_name, lv_string);
END LOOP;
CLOSE ind_cursor;
END;
/
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\crt_indx.sql
set heading off
set recsep off
col text format a80 word_wrap
select text
from I_temp
order by id_owner, id_name, lineno;
spool off
drop table i_temp;
exit

```

An excerpt from the resulting DDL script follows:

```

DROP INDEX cspcdba.lu_ofctypview_1;
CREATE INDEX cspcdba.lu_ofctypview_1
ON cspcdba.ofctypview (fk_viewnmviewnm, fk_viewnmviewtyp)
PCTFREE 60
INITRANS 2 MAXTRANS 255
TABLESPACE DSPT_INDX STORAGE (
INITIAL 4096 NEXT 2048
MINEXTENTS 1 MAXEXTENTS 121 PCTINCREASE 50)
/
DROP INDEX cspcdba.lu_ofctypview_2;
CREATE INDEX cspcdba.lu_ofctypview_2
ON cspcdba.ofctypview (fk_ofctypofctypcd)
PCTFREE 60
INITRANS 2 MAXTRANS 255
TABLESPACE DSPT_INDX STORAGE (
INITIAL 4096 NEXT 2048
MINEXTENTS 1 MAXEXTENTS 121 PCTINCREASE 50)
/
.
.
.
DROP INDEX cspcdba.lu_eventcloitem_2;
CREATE INDEX cspcdba.lu_eventcloitem_2
ON cspcdba.eventcloitem
(fk_cloitemcloitemn, fk_cloitemfk_clofk,
fk_cloitemfk_cloc0, fk_cloitemfk_cloc1)
PCTFREE 60
INITRANS 2 MAXTRANS 255
TABLESPACE DSPT_INDX STORAGE (
INITIAL 4096 NEXT 2048
MINEXTENTS 1 MAXEXTENTS 121 PCTINCREASE 50)
/

```

So far the “hard” database objects and a few “soft” ones have been documented. What is left are the remainder of the “soft” database objects, these being packages, package bodies, procedures, functions, triggers and views. The next script handles packages, package bodies, procedures and functions.

Soft documentation for indexes can be generated using the `pk_fk.sql`, `db_inx.sql` and `inx_stat.sql` scripts located in Appendix A.

Documenting Sequences

Since sequences aren't a part of standard SQL many people tend to overlook them, until they break. Sequences can break if you exceed their maximum (for an ascending sequence) or minimum (for a descending sequence) values or place too much stress on a single sequence. By documenting your sequences you can see how they were created and have the script to recreate them if it becomes needed. In some situations, such as import or use of SQL*loader, sequences used for key values can come out of sync with the tables they relate to and will require resetting. Use of a documentation script can speed this process. The following script will generate the DDL to rebuild your indexes:

```
REM
REM      FUNCTION: SCRIPT FOR RE-CREATING DATABASE SEQUENCES
REM
REM          This script must be run by 'SYS'.
REM
REM          This script is intended to run with Oracle7.
REM
REM          Running this script will in turn create a script to
REM          build all the sequences in the database. This created
REM          script is called 'crt_seq.sql'.
REM
REM          This script will start the sequence (start with value)
REM          at the last value of the sequence at the time the
REM          script is run (LAST_NUMBER).
REM
REM Only preliminary testing of this script was performed. Be sure to
REM test it completely before relying on it.
REM

set verify off feedback off termout off echo off pages 0

set termout on
select 'Creating sequence build script...' from dual;
set termout off

create table seq_temp (grantor_owner varchar2(30),
text VARCHAR2(255))
/
DECLARE
    CURSOR seq_cursor IS select    sequence_owner,
                                sequence_name,
                                min_value,
                                max_value,
                                increment_by,
```

```

        decode(cycle_flag,'Y','CYCLE','NOCYCLE'),
        decode(order_flag,'Y','ORDER','NOORDER'),
        decode(to_char(cache_size),'0','NOCACHE','CACHE')
'||to_char(cache_size)),
        last_number
        from dba_sequences
where sequence_owner not in ('SYS','SYSTEM')
order by sequence_owner;
seq_owner      dba_sequences.sequence_owner%TYPE;
seq_name       dba_sequences.sequence_name%TYPE;
seq_min        dba_sequences.min_value%TYPE;
seq_max        dba_sequences.max_value%TYPE;
seq_inc        dba_sequences.increment_by%TYPE;
seq_order      VARCHAR2(7);
seq_cycle      VARCHAR2(7);
seq_cache      VARCHAR2(15);
seq_lnum       dba_sequences.last_number%TYPE;
seq_string     VARCHAR2(255);
procedure write_out(p_string VARCHAR2) is
begin
    insert into seq_temp (grantor_owner,text)
        values (seq_owner,p_string);
end;

BEGIN
OPEN seq_cursor;
LOOP
    FETCH seq_cursor INTO      seq_owner,
                               seq_name,
                               seq_min,
                               seq_max,
                               seq_inc,
                               seq_order,
                               seq_cycle,
                               seq_cache,
                               seq_lnum;
EXIT WHEN seq_cursor%NOTFOUND;
    seq_string:=('CREATE SEQUENCE '||seq_owner||'.'||seq_name||'
                INCREMENT BY '||seq_inc||'
                START WITH '||seq_lnum||'
                MAXVALUE '||seq_max||'
                MINVALUE '||seq_min||'
                '||seq_cycle||'
                '||seq_cache||'
                '||seq_order||';');

write_out(seq_string);
END LOOP;
CLOSE seq_cursor;
END;
/
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\crt_seqs.sql
break on downer skip 1
col text format a60 word_wrap
col downer noprint
select grantor_owner downer,text
from seq_temp

```

```

order by downer
/
spool off
drop table seq_temp;
  set termout on verify on feedback on
prompt Finished build
exit

```

Example output from the above script followos:

```

CREATE SEQUENCE DSPTDBA.ACTSEQ
INCREMENT BY 1
START WITH 27
MAXVALUE 99999999999999999999999999999999
MINVALUE 1
NOORDER
CACHE 20
NOCYCLE;

```

```

CREATE SEQUENCE DSPTDBA.CSPCSEQ
INCREMENT BY 1
START WITH 217094
MAXVALUE 99999999999999999999999999999999
MINVALUE 0
NOORDER
CACHE 20
NOCYCLE;

```

The 9's can be removed by eliminating the MAXVALUE specification, allowing it to default to the maximum value allowed.

Soft documentation for sequences can be generated using db_seqs.sql from Appendix A.

Documenting Packages, Package Bodies, Procedures and Functions

Under Oracle 7 PLSQL constructs can be stored in the database as stored objects. The lowest level of objects are procedures and functions. The procedures and functions in an Oracle 7 database can be grouped by application or related function into packages (and associated package bodies). All of the DDL to define PLSQL stored objects such as packages, package bodies, procedures and functions is stored in the DAB_SOURCE

view and additional information on them stored in the DBA_OBJECTS view. By creating a script which joins these two tables we can re-create any of the objects mentioned above. The scripts shown below could more readily be done in PLSQL, but was deliberately done in SQL and SQLPLUS to show that it can be done. The first script is the script which does the actual work of selecting the text from the database and reconstructing the text into a command, it is called fprc_rct.sql:

```
REM
REM NAME:          FPRC_RPT.SQL
REM
REM FUNCTION: Build a script to re-create functions, procedures,
REM            packages or package bodies.
REM
REM
set termout off verify off feedback off lines 132 pages 0 heading off
set recsep off space 0
column text format a79
column line noprint
select 'create or replace '||text,line
from
    dba_source
where
    owner = upper('&&1') and
    type = upper('&&2') and
    name = upper('&&3') and
    line = 1;
select text,line
from
    dba_OBJECTS s1,
    dba_source s2
where
    s1.OBJECT_type = upper('&&2') and
    s1.owner = upper('&&1') and
    s1.object_name = upper('&&3') and
    s1.OBJECT_type = s2.type and
    s1.owner = s2.owner and
    s1.OBJECT_NAME = s2.name and
    line > 1
order by
    2;
```

This script can be run standalone by calling it with the values for owner, object type and object name. However, it was designed to be called by a reiterative program called do_fprc.sql which is created by a script run_fprc.sql, shown below:

```

REM
REM NAME                : RUN_FPRC.SQL
REM FUNCTION            : Generate and execute the crt_fprc.sql procedure
REM USE                 : Document the procedures and packages and functions
REM                    for a user or users
REM Limitations        : Must have access to dba_source and dba_objects.
rem                    The FPRC_RCT.SQL procedure must be in same directory
REM
column dbname new_value db noprint
pause Use % for a wildcard - Press enter to continue
accept owner prompt 'Enter object owner:'
accept type  prompt 'Enter object type:'
accept name  prompt 'Enter object name:'
prompt Working...
set echo off heading off verify off feedback off
select value dbname from v$parameter where name='db_name';
spool rep_out\db\do_fprc.sql
select unique('start fprc_rct ||owner|| '||' '||type||' '||name)
from
      dba_source
where
      owner like upper('&owner') and
      type  like upper('&type') and
      name  like upper('&name');
spool off
set termout off
spool rep_out\db\crt_fprc.sql
start rep_out\db\do_fprc.sql
spool off
exit

```

This script generates a sequence of calls to `fprc_rct.sql`:

```

start fprc_rct C$PCDBA "PROCEDURE" ADDRMANOTE
start fprc_rct C$PCDBA "PROCEDURE" ENTERRULES
start fprc_rct C$PCDBA "PROCEDURE" ESCALATE
start fprc_rct C$PCDBA "PROCEDURE" GETDETAILDATA
start fprc_rct C$PCDBA "PROCEDURE" GETLEAST
start fprc_rct C$PCDBA "PROCEDURE" GETMAXACTSEQNBR
start fprc_rct C$PCDBA "PROCEDURE" GETSUMMARYHEADERS
start fprc_rct C$PCDBA "PROCEDURE" GET_PAWS0001
start fprc_rct C$PCDBA "PROCEDURE" INSADMINAREA
start fprc_rct C$PCDBA "PROCEDURE" INSAFFLNROL
start fprc_rct C$PCDBA "PROCEDURE" INSAUTSYSAREA
start fprc_rct C$PCDBA "PROCEDURE" INSCO
start fprc_rct C$PCDBA "PROCEDURE" INSCOORG
start fprc_rct C$PCDBA "PROCEDURE" INSCOORGAREA
start fprc_rct C$PCDBA "PROCEDURE" INSCOORGAUTH
start fprc_rct C$PCDBA "PROCEDURE" INSEMP
start fprc_rct C$PCDBA "PROCEDURE" INSERTTMPTABLE
start fprc_rct C$PCDBA "PROCEDURE" INSINDIV
start fprc_rct C$PCDBA "PROCEDURE" INSINDIVAUTH
start fprc_rct C$PCDBA "PROCEDURE" INSORGEMP
start fprc_rct C$PCDBA "PROCEDURE" INSSUM
start fprc_rct C$PCDBA "PROCEDURE" PAWS1
start fprc_rct C$PCDBA "PROCEDURE" POSTERROR

```

The script run_fprc.sql then executes the do_fprc.sql script spooling output to the crt_fprc.sql script. The crt_fprc.sql script contains the commands to rebuild the specified object or objects:

```

create or replace PROCEDURE AddRmaNote (
    hv_eventid      IN event.evntid%TYPE,
    hv_actseqnbr    IN act.actseqnbr%TYPE,
    hv_user         IN INDIV.CUIDNBR%TYPE,
    hv_notes        IN VARCHAR2,
    hv_status       IN OUT NUMBER
)
AS
    leid    NUMBER(10);
    datel   DATE;
BEGIN
    hv_status := 0;
    leid := 0;
    BEGIN
        SELECT FK_LELEID INTO leid FROM INDIV WHERE ( CUIDNBR = hv_user );
        EXCEPTION WHEN OTHERS THEN
            hv_status := 1;
    END;
    SELECT SYSDATE INTO datel FROM dual;
    IF ( leid > 0 ) THEN
        INSERT INTO actvy_rmk ( ACTVYRMKDT, ACTVYRMKTXT,
            FK_ACTFK_EVENTEVNT,
                FK_ACTACTSEQNBR, FK_INDIVFK_LELEID )
            VALUES ( datel, hv_notes, hv_eventid, hv_actseqnbr, leid );
    END IF;
    COMMIT;
END AddRmaNote;
/
.
.
.
create or replace PROCEDURE wkgrp_usr (
    hv_wrkgrp      IN COORG.COORGCD%TYPE,
    hv_grptyp     IN COORG.COORGTYP%TYPE,
    hv_status      IN OUT NUMBER
)
AS
    CURSOR wkgrpusr_cur is
        SELECT indiv.CUIDNBR, indiv.INDIVLASTNM, indiv.INDIVFRSTNM
        FROM orgemp, emp, afflnrol, le, indiv
        WHERE (
            indiv.FK_LELEID = le.leid AND
            le.letypcd = 'EMP' AND
            afflnrol.FK_LELEID = le.leid AND
            emp.FK_AFFLNROLAFFLNRO = afflnrol.AFFLNROLCD AND
            emp.FK_AFFLNROLFK_AFFL = afflnrol.FK_AFFLNROAFFLNID AND
            emp.FK_AFFLNROLFK_LELE = afflnrol.FK_LELEID AND
            orgemp.FK_EMPEMPSSN = emp.EMPSSN AND
            orgemp.FK_COORGCCOORGTYP = hv_grptyp AND
            orgemp.FK_COORGCCOORGCD = hv_wrkgrp
        );
    id    indiv.CUIDNBR%TYPE;

```

```
    fnm indiv.INDIVFRSTNM%TYPE;
    lnm indiv.INDIVLASTNM%TYPE;
BEGIN
    hv_status := 0;
    BEGIN
    OPEN wkgrpusr_cur;
    FETCH wkgrpusr_cur INTO id, lnm, fnm;
    WHILE NOT wkgrpusr_cur%NOTFOUND LOOP
    INSERT INTO user_table (cuid,lastnm,frstnm) VALUES (id,lnm,fnm );
    FETCH wkgrpusr_cur INTO id, lnm, fnm;
    END LOOP;
    CLOSE wkgrpusr_cur;
    END;
    COMMIT;
END wkgrp_usr;
```

The `crt_fprc.sql` script, with minor editing if the developers tended to string commands over several lines, can then be executed to rebuild whichever object or objects it was invoked to recreate. If the DBA doesn't mind editing the `crt_fprc.sql` the code for the packages, package bodies, procedures or functions can be modified to be more readable and to adhere to any coding standards. In shops where many developers may be working on a single project, the diversity of coding techniques can be astounding, this allows the DBA to enforce some semblance of order on the code in the database.

Soft documentation on object status can be generated using the `db_obj.sql` script in Appendix A.

Documenting Triggers

Triggers are used to enforce referential integrity constraints, enforce snapshot logic, provide updates on calculated table values and a number of other database functions. The triggers required for constraint enforcement and snapshot upkeep are automatically generated by the Oracle kernel. The following script will recreate the triggers in the database. It is suggested that all triggers created by other than Oracle processes be preceded by some unique set of characters so that the script can be made more selective to ignore the Oracle created triggers.

```

REM  trig_rct.sql
REM
REM  FUNCTION: SCRIPT FOR RE-CREATING DATABASE TRIGGERS
REM
REM          This script can be run by anyone with access to dba_views
REM
REM          This script is intended to run with Oracle7.
REM
REM          Running this script will in turn create a script to
REM          build all the triggers in the database.  This created
REM          script is called 'crt_trig.sql'.
REM
REM          Only preliminary testing of this script was performed.
REM          Be sure to test it completely before relying on it.
REM
REM  M. Ault 3/29/96 TRECOM
REM
set verify off feedback off termout off echo off pages 0 long 4000

set termout on
select 'Creating trigger build script...' from dual;
set termout off

create table trig_temp (owner varchar2(30),
                        trigger_name varchar2(30),
                        trigger_type varchar2(16),
                        triggering_event varchar2(26),
                        table_owner varchar2(30),
                        table_name varchar2(30),
                        referencing_names varchar2(87),
                        when_clause varchar2(2000),
                        trigger_body long,
                        trigger_columns varchar2(400)) ;

DECLARE
  CURSOR trig_cursor IS select owner,
                               trigger_name,
                               trigger_type ,
                               triggering_event,
                               'on '||table_owner,
                               table_name,
                               referencing_names,
                               'when '||when_clause,
                               trigger_body
  from dba_triggers
  where owner not in ('SYS','SYSTEM')
  order by owner;
  cursor trig_col is select trigger_owner,
                           trigger_name,
                           column_name
  from dba_trigger_cols
  where trigger_owner not in ('SYS','SYSTEM')
  order by trigger_owner, trigger_name;

  trig_owner      dba_triggers.owner%TYPE;
  trig_name       dba_triggers.trigger_name%TYPE;
  trig_type       dba_triggers.trigger_type%TYPE;
  trig_event      dba_triggers.triggering_event%TYPE;
  trig_towner     dba_triggers.table_owner%TYPE;

```

```

trig_tname          dba_triggers.table_name%TYPE;
trig_rnames         dba_triggers.referencing_names%TYPE;
trig_wclause        dba_triggers.when_clause%TYPE;
trig_body           dba_triggers.trigger_body%TYPE;
trig_col_own        dba_trigger_cols.trigger_owner%TYPE;
trig_col_nam        dba_trigger_cols.trigger_name%TYPE;
trig_column         dba_trigger_cols.column_name%TYPE;
all_columns         varchar2(400);
counter             integer:=0;

```

```
BEGIN
```

```
  OPEN trig_cursor;
```

```
  LOOP
```

```
    FETCH trig_cursor INTO      trig_owner,
                                trig_name,
                                trig_type,
                                trig_event,
                                trig_towner,
                                trig_tname,
                                trig_rnames,
                                trig_wclause,
                                trig_body;
```

```
  EXIT WHEN trig_cursor%NOTFOUND;
```

```
    all_columns :='';
```

```
    counter := 0;
```

```
    open trig_col;
```

```
    loop
```

```
      fetch trig_col into      trig_col_own,
                                trig_col_nam,
                                trig_column;
```

```
    exit when trig_col%NOTFOUND;
```

```
      if trig_owner = trig_col_own and trig_name=trig_col_nam
      then
```

```
        counter := counter+1;
```

```
        if counter = 1 then
```

```
          all_columns := ' of '||all_columns||trig_column;
```

```
        else
```

```
          all_columns := all_columns||', '||trig_column;
```

```
        end if;
```

```
      end if;
```

```
    end loop;
```

```
    close trig_col;
```

```
    if trig_rnames = 'REFERENCING NEW AS NEW OLD AS OLD' then
```

```
      trig_rnames := '';
```

```
    end if;
```

```
    if trig_wclause = 'when ' then
```

```
      trig_wclause := '';
```

```
    end if;
```

```
    insert into trig_temp values (trig_owner,
```

```
                                trig_name,
```

```
                                trig_type,
```

```
                                trig_event,
```

```
                                trig_towner,
```

```
                                trig_tname,
```

```
                                trig_rnames,
```

```
                                trig_wclause,
```

```
                                trig_body,
```

```
                                all_columns);
```

```

END LOOP;
CLOSE trig_cursor;
commit;
END;
/

spool rep_out\crt_trgs.sql
set heading off
set recsep off

select 'create trigger '||owner||'.'||trigger_name||'
'||decode(trigger_type,'BEFORE EACH ROW','BEFORE ',
          'AFTER EACH ROW','AFTER
',trigger_type)||triggering_event||'
'||trigger_columns||'
'||table_owner||'.'||table_name||'
'||referencing_names||'
'||decode(trigger_type,'BEFORE EACH ROW','ON EACH ROW',
          'AFTER EACH ROW','ON EACH ROW','')||'
'||when_clause,
trigger_body,' '||'
/||'
'
from trig_temp
order by owner;
spool off
drop table trig_temp;
exit

```

The output from this script may require more editing than the other scripts shown thus far. An example of its output follows:

```

create trigger CSPCDBA.ACTPER_BEFORE_INSERT
BEFORE INSERT OR UPDATE
of FK_AUTOSYSAUTOSYSC, FK_AUTOSYSAUTOSYSV
on CSPCDBA.ACTPER
ON EACH ROW
when NEW.FK_AUTOSYSAUTOSYSV IS NOT NULL
AND NEW.FK_AUTOSYSAUTOSYSC IS NOT NULL
DECLARE
DUMMY INTEGER;
/
BEGIN
DUMMY := 0;
SELECT COUNT(*) INTO DUMMY
FROM AUTOSYS
WHERE AUTOSYS.AUTOSYSVRSNNBR = :NEW.FK_AUTOSYSAUTOSYSV
AND AUTOSYS.AUTOSYSCD = :NEW.FK_AUTOSYSAUTOSYSC;
IF DUMMY = 0 THEN
RAISE_APPLICATION_ERROR(-20000, 'INVALID FOREIGN KEY');
END IF;
END;

create trigger CSPCDBA.ACTRSLTRSPTYP_BEFORE_INSERT
BEFORE INSERT OR UPDATE
of FK_AUTSYSRSLTTYFK, FK_AUTSYSRSLTTYFK0,

```

```

        FK_AUTSYSRSLTTYFK1, FK_AUTSYSRSLTTYFK2
on CSPCDBA.ACTRSLTRSPTYP
ON EACH ROW
when    NEW.FK_AUTSYSRSLTTYFK IS NOT NULL
        AND NEW.FK_AUTSYSRSLTTYFK0 IS NOT NULL
        AND NEW.FK_AUTSYSRSLTTYFK1 IS NOT NULL
        AND NEW.FK_AUTSYSRSLTTYFK2 IS NOT NULL
DECLARE
    DUMMY INTEGER;
/
BEGIN
    DUMMY := 0;
    SELECT COUNT(*) INTO DUMMY
        FROM AUTSYSRSLTTYP
        WHERE
            AUTSYSRSLTTYP.FK_RSLTTYPRSLT_CD = :NEW.FK_AUTSYSRSLTTYFK
            AND AUTSYSRSLTTYP.FK_RSLTTYPRSLTTYPC = :NEW.FK_AUTSYSRSLTTYFK0
            AND AUTSYSRSLTTYP.FK_AUTOSYSAUTOSYSC = :NEW.FK_AUTSYSRSLTTYFK1
            AND AUTSYSRSLTTYP.FK_AUTOSYSAUTOSYSV = :NEW.FK_AUTSYSRSLTTYFK2;
    IF DUMMY = 0 THEN
        RAISE_APPLICATION_ERROR(-20000, 'INVALID FOREIGN KEY');
    END IF;
END;
```

The script should be run after all other trigger building events in the database have completed. use of the CREATE rather than the CREATE OR REPLACE command should provide some measure of safety that existing triggers will not be harmed by running the script.

Soft documentation of database objects can be generated with db_obj.sql in Appendix A.

Documenting Database Views

The final set of stored objects that will be documented are database views. Views are used to pre-join tables, provide security or make it easier for non-sql literate users to get at complex data. Often times, a developer may create a view and then forget to document it. This script should provide some measure of documentation and allow recreation of database views:

```

REM
REM NAME                :rct_vw.sql
REM FUNCTION            :recreate database views by owner
REM USE                 :Generate ddl for database views
REM Limitations        :If your views are greater than 5000 characters
```



```

REM          then increase the set long. This can be determined
by
REM          querying the DBA_VIEWS table's text_length column
REM          for the max value: select max(text_length) from
REM          dba_views;
REM
set pages 59 lines 79 feedback off echo off
column text          format a80
column view_name     format a20
set long 5000 heading off
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\crt_view
select
    'REM Code for view: '||v.view_name||'
CREATE OR REPLACE VIEW '||v.owner||'.'||v.view_name||' as
',
    v.text
from dba_views v
where v.owner like upper('%&&owner_name')
order by
    v.view_name;
spool off
Pause Press enter to continue
exit

```

Example output for two of the ALL_ views:

```

REM Code for view: ALL_CATALOG

CREATE OR REPLACE VIEW SYS.ALL_CATALOG as
select u.name, o.name,
decode(o.type, 0, 'NEXT OBJECT', 1, 'INDEX', 2, 'TABLE', 3, 'CLUSTER',
4, 'VIEW', 5, 'SYNONYM', 6, 'SEQUENCE', 'UNDEFINED')
from sys.user$ u, sys.obj$ o
where o.owner# = u.user#
and o.type in (2, 4, 5, 6)
and o.linkname is null
and (o.owner# in (userenv('SCHEMAID'), 1) /* public objects */
or
obj# in ( select obj# /* directly granted privileges */
from sys.objauth$
where grantee# in ( select kzsrorol
from x$kzsro
)
)
or
(
o.type in (7, 8, 9) /* prc, fcn, pkg */
and
exists (select null from v$enabledprivs
where priv_number = -144 /* EXECUTE ANY PROCEDURE */)
)
or
(
o.type in (2, 4, 5) /* table, view, synonym */

```

```

and
exists (select null from v$enabledprivs
where priv_number in (-45 /* LOCK ANY TABLE */,
-47 /* SELECT ANY TABLE */,
-48 /* INSERT ANY TABLE */,
-49 /* UPDATE ANY TABLE */,
-50 /* DELETE ANY TABLE */))
)
or
( o.type = 6 /* sequence */
and
exists (select null from v$enabledprivs
where priv_number = -109 /* SELECT ANY SEQUENCE */))

REM Code for view: ALL_COL_COMMENTS

CREATE OR REPLACE VIEW SYS.ALL_COL_COMMENTS as
select u.name, o.name, c.name, co.comment$
from sys.obj$ o, sys.col$ c, sys.user$ u, sys.com$ co
where o.owner# = u.user#
and o.type in (2, 4, 5)
and o.obj# = c.obj#
and c.obj# = co.obj#(+)
and c.col# = co.col#(+)
and (o.owner# = userenv('SCHEMAID')
or o.obj# in
(select obj#
from sys.objauth$
where grantee# in ( select kzsrorol
from x$kzsro
)
)
)
or
exists (select null from v$enabledprivs
where priv_number in (-45 /* LOCK ANY TABLE */,
-47 /* SELECT ANY TABLE */,
-48 /* INSERT ANY TABLE */,
-49 /* UPDATE ANY TABLE */,
-50 /* DELETE ANY TABLE */))
)

```

Try running the above documentation script against the DBA_ series of views, a DBA can learn a lot from looking at the way those views are constructed.

Soft documentation on view status can be obtained by use of the db_obj.sql and db_view.sql scripts in Appendix A.

Snap Shot and Snap Shot Log Documentation

At the current time there are no scripts to re-generate existing snapshots, there are however report scripts that will document snapshots and snapshot logs in the instance.

Script to Document Snapshot logs:

```
rem
rem Name:          snap_log_rep.sql
rem FUNCTION:      Report on database Snapshot Logs
rem Use:           From an account that accesses DBA_ views
rem M. Ault TRECOM
rem
set pages 56 lines 130 feedback off
start title132 "Snapshot Log Report"
spool rep_out\&db\db_snplg
rem
column log_owner      format a10      heading "Owner"
column master         format a20      heading "Master"
column log_table      format a20      heading "Snapshot"
column log_trigger    format a20      heading "Trigger Name"
column current_snapshots heading "Last Refresh"
rem
select
    log_owner,
    master,
    log_table,
    log_trigger,
    current_snapshots
from
dba_snapshot_logs
order by 1;
rem
spool off
pause Press enter to continue
exit
```

Script to Document Snapshots:

```
rem
rem Name:          snap_rep.sql
rem FUNCTION:      Report on database Snapshots
rem Use:           From an account that accesses DBA_ views
rem
set pages 56 lines 130 feedback on
```

```
rem
column owner      format a10      heading "Owner"
column snapshot   format a20      heading "Snapshot"
column source     format a20      heading "Source Table"
column link       format a20      heading "Link"
column log        heading "Use Log?"
column refreshed  heading "Refreshed?"
column error      format a20      heading "Error?"
column type       format a10      heading "Refresh Type"
column started    format a13      heading "Start Refresh"
column next       format a13      heading "Next Refresh"
rem
start title132 "Snapshot Report"
spool rep_out\db\db_snp
rem
select owner, name||'.'||table_name Snapshot, master_view,
       master_owner||'.'||master Source, master_link Link,
       can_use_log Log, last_refresh Refreshed, start_with started,
       error, type , next,
       query
from dba_snapshots
order by 1,3,5;
rem
spool off
pause Press enter to continue
exit
```

Documenting Database Links

Many databases will be distributed in nature. This distributed attribute requires that the database have pre-defined linkages to other databases. These linkages are known as database links. The following script allows re-creation of database links for a specific database:

```
REM
REM link_rct.sql
REM
REM     FUNCTION: SCRIPT FOR RE-CREATING DATABASE LINKS
REM
REM           This script must be run by 'SYS'.
REM
REM           This script is intended to run with Oracle7.
REM
REM Running this script will in turn create a script to build all the
REM database links in the database. This created script is called
REM 'crt_dbpls.sql'.
REM
REM Since a DBA cannot create a private database link for a user,
REM this script will contain various connect clauses before each create
REM statement. In order for the database links to be created under
REM the correct schema, it must connect as that individual. Therefore,
```

```
REM before using the script, you must add each user's password to the
REM connect clause. Duplicate connect clauses can be eliminated being
REM sure that the database link is created under the correct schema.
REM
REM The PUBLIC database links will cause connect as 'SYS'. However, this
REM username can be changed to any user with the DBA role or with the
REM 'CREATE PUBLIC DATABASE LINK' system privilege.
REM
REM The spooled output is ordered by the link owner, a PUBLIC database
REM link has 'PUBLIC' as it's owner.
REM
REM Only preliminary testing of this script was performed. Be sure to
REM test it completely before relying on it.
REM
```

```
set verify off
set feedback off
set termout off
set echo off
set pagesize 0
```

```
set termout on
select 'Creating database link build script...' from dual;
set termout off
```

```
create table dl_temp (lineno NUMBER, grantor_owner varchar2(20),
text VARCHAR(255))
TABLESPACE TEMP01;
```

```
DECLARE
```

```
    CURSOR link_cursor IS select      u.name,
                                     l.name,
                                     l.userid,
                                     l.password,
                                     l.host
                                from    sys.link$ l, sys.user$ u
                                where   l.owner# = u.user#
                                order by l.name;
```

```
lv_owner      sys.user$.name%TYPE;
lv_db_link    sys.link$.name%TYPE;
lv_username   sys.link$.userid%TYPE;
lv_password   sys.link$.password%TYPE;
lv_host       sys.link$.host%TYPE;
lv_string     VARCHAR2(255);
lv_user       VARCHAR2(255);
lv_connect    VARCHAR2(255);
lv_text       VARCHAR2(500);
```

```
procedure write_out(p_string VARCHAR2) is
begin
    insert into dl_temp (grantor_owner,text)
        values (lv_owner,p_string);
end;
```

```
BEGIN
```

```
    OPEN link_cursor;
    LOOP
        FETCH link_cursor INTO lv_owner,
```

```

        lv_db_link,
        lv_username,
        lv_password,
        lv_host;
    EXIT WHEN link_cursor%NOTFOUND;
if (lv_owner = 'PUBLIC') then
    lv_string := ('CREATE PUBLIC DATABASE LINK '||
        lower(replace(lv_db_link, '.WORLD', '')));
else
    lv_string := ('CREATE DATABASE LINK '||
        lower(replace(lv_db_link, '.WORLD', '')));
end if;
    if (lv_username is not null) then
        lv_user := ('CONNECT TO '||lower(lv_username)||
            ' IDENTIFIED BY '||lower(lv_password));
    end if;
    if (lv_host is not null) then
        lv_connect := ('USING '''||lv_host||''''');
    end if;
lv_text := lv_string || ' ' || lv_user || ' ' || lv_connect;
write_out(lv_text);
lv_user := ' ';
lv_connect := ' ';
END LOOP;
CLOSE link_cursor;
END;
/
column dbname new_value db noprint
select value dbname from v$parameter where name='db_name';
spool rep_out\&db\crt_dbpls.sql
break on downer skip 1
col text format a60 word_wrap

select 'connect ' || decode (grantor_owner, 'PUBLIC', 'SYS',
grantor_owner)
|| '/'|| decode (grantor_owner, 'PUBLIC', 'SYS', grantor_owner) downer,
'||rtrim(text)
from dl_temp
order by downer
/
spool off

drop table dl_temp;

exit

```

An edited example of the output from this script is shown below.

```

connect SYSTEM/SYSTEM

CREATE DATABASE LINK orcspcd2 CONNECT TO cspcdba2 IDENTIFIED BY notit
USING 't:90.37.190.32:ORCSPCD2';
CREATE DATABASE LINK orcspcd3 CONNECT TO dsptdba IDENTIFIED BY notit USING
't:90.32.44.48:ORCSPCD3';
CREATE DATABASE LINK ordsppt1 CONNECT TO system IDENTIFIED BY notit USING
't:90.93.232.17:ORDSPTT1';

```

In Conclusion

In this presentation techniques for documenting existing Oracle 7 Instances have been presented. Virtually every aspect of the Oracle database has been covered with the exception of items relating to recreation of snapshots and snapshot logs. By using these techniques a DBA can create a series of scripts that allow documentation and if required, recreation of their Instance or Instances.

Appendix A

Soft Documentation Scripts

```

rem
rem datafile.sql
rem FUNCTION: Report on Database datafiles
rem USE: From SQLPLUS
rem
rem M. Ault 11/23/95 TRECOM
rem
column file_name          format a65          heading 'File|Name'
column file_id            format 999999       heading 'File|Number'
column tablespace_name    format a10          heading 'Tablespace'
column bytes              format 9,999.99     heading 'Megs'
column status             heading 'File|Status'
column value      new_value block_size      noprint
rem
select
    value
from
    sys.v_$parameter
where
    name='db_block_size';
rem
column blocks format 99,999 heading '&block_size byte|Blocks'
set feedback off echo off lines 132 pages 59
start title132 'File Storage Statistics Report'
spool rep_out\&db\db_files
select
    file_name,
    file_id,
    status,
    tablespace_name,
    bytes/(1024*1024) bytes,
    blocks
from
    sys.dba_data_files
order by
    file_id
/
spool off
pause press enter/return to continue
clear columns

rem db_logs.sql
rem FUNCTION: Report on Redo Logs Physical files
rem MRA TRECOM 13-Oct-1995
rem
column group# format 999999
column member format a50
set lines 80 pages 60 feedback off verify off

```



```
start title80 'Redo Log Physical Files'  
break on group#  
spool rep_out\&db\db_redo  
select * from sys.v_$logfile  
order by group#  
/  
spool off  
pause Press enter to continue  
exit
```

```
rem Name: log_stat.sql
rem FUNCTION: Provide a current status for redo logs
rem MRA TRECOM 13-Oct-95
rem
column first_change#   format 9999999 heading Change#
column group#         format 9,999 heading Grp#
column thread#       format 999 heading Th#
column sequence#     format 9,999 heading Seq#
column members       format 999 heading Mem
column archived      format a4 heading Arc?
break on thread#
set pages 60 lines 80 feedback off
start title80 'Current Redo Log Status'
spool rep_out\&db\db_logst
select
    thread#,
    group#,
    sequence#,
    bytes,
    members,
    archived,
    status,
    first_change#,
    first_time
from
    sys.v_$log
order by
    thread#,
    group#;
pause Press Enter to continue
exit
```

```
rem FUNCTION: Provide data on Redo Log Threads
rem
rem name: db_thrd.sql
rem MRA 10-20-95 TRECOTM
rem
column current_group#          heading Current|Group#
column Checkpoint_change#      heading Checkpoint|Change#
column checkpoint_time         heading Checkpoint|Time
column open_time               heading Open|Time
column thread#                 heading Thread#
column status                   heading Status
column enabled                  heading Enabled
column groups                   heading Groups
column Instance                 heading Instance
column sequence#               heading Sequence#
set lines 132 pages 59
start title132 'Redo Thread Report'
spool rep_out\&db\db_thds
select *
from      sys.v_$thread
order by
         thread#;
spool off
pause Press enter to continue
exit
```

```
REM
REM NAME                : DB_PARM.SQL
REM FUNCTION            : GENERATE LIST OF DB PARAMETERS
REM USE                 : GENERAL
REM Limitations         : None
REM Revisions:
REM      Date            Modified By          Reason For change
REM      11/24/93       M. Ault              Initial Creation
SET NEWPAGE 0 VERIFY OFF
SET ECHO OFF termout off PAGES 58 lines 131
column num              format 999
column type             format 9999
column name             format a37
column value            format a30
COLUMN ISDEFAULT       FORMAT A8 HEADING "Default"
start title132 "INIT.ORA PARAMETER LISTING"
DEFINE OUTPUT = rep_out\&db\db_parm
SPOOL &OUTPUT
SELECT * FROM V$PARAMETER;
SPOOL OFF
CLEAR COLUMNS
pause Press enter to continue
exit
```

```
rem Name: free_spc.sql
rem FUNCTION: Provide data on tablespace extent status
rem REQUIREMENTS: The free_space view must exist
SET FEED OFF
SET FLUSH OFF
SET VERIFY OFF
set pages 58 LINES 130
column tablespace      heading Name      format a30
column file_id         heading File#    format 99999
column pieces          heading Frag     format 9999
column free_bytes      heading 'Free Byte'
column free_blocks     heading 'Free Blk'
column largest_bytes   heading 'Biggest Bytes'
column largest_blks    heading 'Biggest Blks'
column ratio           heading 'Percent' format 999.999
start title132 "FREE SPACE REPORT"
define l = rep_outp\&db\db_fspc
spool &l
select
    tablespace,
    count(*) files,
    sum(pieces) pieces,
    sum(free_bytes) free_bytes,
    sum(free_blocks) free_blocks,
    sum(largest_bytes) largest_bytes,
    sum(largest_blks) largest_blks,
    sum(largest_bytes)/sum(free_bytes)*100 ratio
from
    free_space
group by
    tablespace;
spool off
clear columns
pause Press Enter to Continue
exit
```

```
rem Name          : fs_view.sql
rem FUNCTION: Create free_space view for use by freespc reports
create view free_space
      (tablespace,
        file_id,
        pieces,
        free_bytes,
        free_blocks,
        largest_bytes,
        largest_blks) as
select
      tablespace_name,
      file_id, count(*),
      sum(bytes),
      sum(blocks),
      max(bytes),
      max(blocks)
from
      sys.dba_free_space
group by
      tablespace_name,
      file_id;
```

```
REM
REM db_tbsp.sql
REM
REM FUNCTION: Generate a report of Tablespace Defaults
REM USE: From SQLPLUS
REM
REM M. Ault TRECOM 4/1/96
REM
column tablespace name format a15 heading 'Tablespace|Name'
column initial format 9,999,999,999 heading 'Initial|Extent (Bytes)'
column next format 9,999,999,999 heading 'Next|Extent (Bytes)'
column minextents format 999 heading 'Minimum|Extents'
column maxextents format 999 heading 'Maximum|Extents'
column pctincrease format 999 heading 'Percent|Increase'
column status format a15 heading 'Status'
set pages 60 lines 80 feedback off verify off
start title80 "Tablespace Defaults Report"
spool rep_out/&db/db_tbsp
select
    tablespace_neme,
    initial,next ,
    minextents,
    maxextents,
    pctincrease,
    status
from
    dba_tablespaces
order by
    tablespace_name;
spool off
set feedback on verify on
pause Press enter to continue
Exit
```

```
REM NAME :RBK1.SQL
REM FUNCTION :REPORT ON ROLLBACK SEGMENT STORAGE
REM USE :FROM SQLPLUS
REM Limitations : None
REM
COLUMN NAME          FORMAT A10          HEADING 'ROLLBACK'
COLUMN EXTENTS       FORMAT 99999999    HEADING 'CUR EXTENTS'
COLUMN OPTSIZE       FORMAT 99999999    HEADING 'OPTL SIZE'
COLUMN SHRINKS       FORMAT 99999999    HEADING 'SHRINKS'
COLUMN AVESHRINK     FORMAT 9999999999    HEADING 'AVE SHRINK'
COLUMN AVEACTIVE     FORMAT 9999999999    HEADING 'AVE TRANS'
rem
SET FEEDBACK OFF VERIFY OFF lines 80 pages 58
@title80 "ROLLBACK SEGMENT STORAGE"
SPOOL rep_out\&db\db_rbks1
rem
SELECT *
FROM ROLLBACK1
ORDER BY NAME;
SPOOL OFF
pause Press enter to continue
exit
```



```
REM NAME :RBK2.SQL
REM FUNCTION :REPORT ON ROLLBACK SEGMENT STATISTICS
REM USE :FROM SQLPLUS
REM Limitations : None
REM
COLUMN NAME FORMAT A10 HEADING 'ROLLBACK'
COLUMN EXTENTS FORMAT 9999999 HEADING 'EXTENTS'
COLUMN XACTS FORMAT 9999999 HEADING 'TRANS'
COLUMN HWMSIZE FORMAT 99999999 HEADING 'LARGEST TRANS'
COLUMN RSSIZE FORMAT 99999999 HEADING 'CUR SIZE'
COLUMN WAITS FORMAT 99999 HEADING 'WAITS'
COLUMN WRAPS FORMAT 99999 HEADING 'WRAPS'
COLUMN EXTENDS FORMAT 99999999 HEADING 'EXTENDS'
rem
SET FEEDBACK OFF VERIFY OFF lines 80 pages 58
rem
@title80 "ROLLBACK SEGMENT STATISTICS"
SPOOL rep_out\&db\db_rbks2
rem
SELECT *
FROM
    ROLLBACK2
ORDER BY
    NAME;
SPOOL OFF
pause Press enter to continue
exit
```

```

REM FUNCTION: create views required for rbk1 and rbk2 reports.
REM
CREATE OR REPLACE VIEW ROLLBACK1 AS
SELECT
    NAME,
    EXTENTS,
    OPTSIZE,
    SHRINKS,
    AVESHINK,
    AVEACTIVE
FROM
    V$ROLLNAME N,
    V$ROLLSTAT S
WHERE
    N.USN=S.USN;

CREATE OR REPLACE VIEW ROLLBACK2 AS
SELECT
    NAME,
    EXTENTS,
    XACTS,
    HWMSIZE,
    RSSIZE,
    WAITS,
    WRAPS,
    EXTENDS
FROM
    V$ROLLNAME N,
    V$ROLLSTAT S
WHERE
    N.USN=S.USN;

rem
rem db_rbks.sql
rem FUNCTION: Generate a report on database rollback segments
rem USE: From SQLPLUS
rem M. Ault 11/28/95 TRECOM
rem
column rollback_seg      format a10           heading 'Rollback|Segment'
column tablespace        format a10           heading 'Rbks|Tablespace'
column pct                format 9990         heading 'Pct|Inc'
column init               format 99,999       heading 'Init|Ext'
column next               format 99,999       heading 'Next|Ext'
column min                format 999          heading 'Min|Ext'
column max                format 9,999        heading 'Max|Ext'
column instance           format a3           heading 'Int|Num'
column type               heading 'Rbks|Type'
column status             heading 'Rbks|Status'
set pages 59 lines 132 feedback off echo off
start title132 'Rollback Storage Parameter Report'
spool rep_out\&db\db_rbks
select
    segment_name rollback_seg,
    tablespace_name tablespace,
    initial_extent init,
    next_extent next,
    min_extents min,
    max_extents max,

```

```
        pct_increase pct,
        status,
        instance_num Instance,
        decode(owner, 'SYS', 'PRIVATE') type
from
        dba_rollback_segs;
spool off
pause press enter/return to continue
clear columns
exit
```

```
REM NAME          : DB_PROF.SQL
REM FUNCTION      : GENERATE USER PROFILES REPORT
REM USE          : From SQLPLUS
REM
set flush off term off pagesize 58 linesize 78
column profile          format A20      heading Profile
column resource_name    heading 'Resource:'
column limit            format A15      heading Limit
break on profile
start title80 'ORACLE PROFILES REPORT'
define output = rep_out\&db\db_profs
spool &output
select
    profile,
    resource_name,
    limit
from
    sys.dba_profiles
order by
    profile;
spool off
pause Press enter to continue
exit
```

```
REM
REM NAME                : DB_ROLE.SQL
REM FUNCTION             : GENERATE ROLES REPORT
REM USE                  : FROM SQLPLUS
REM Limitations         : None
REM M. Ault TRECOM
REM
rem set flush off term off pagesize 58 linesize 78
column grantee          heading 'User or Role'
column admin_option     heading 'Admin?'
break on grantee
start title80 'ORACLE ROLES REPORT'
define output = rep_out\&db\db_roles
spool &output
select
    grantee,
    privilege,
    admin_option
from
    sys.dba_sys_privs
order by
    grantee;
spool off
pause Press enter to continue
exit
```

```

rem*****
rem NAME: db_tgnts.sql
rem
rem HISTORY:
rem Date Who What
rem -----
-
rem 05/24/91 Gary Dodge Creation
rem 12/12/92 Michael Brouillette Allow specification of
a
rem owner.
rem 05/27/93 Mike Ault Updated to ORACLE7
rem
rem FUNCTION: Produce report of table grants showing GRANTOR, GRANTEE
rem and specific GRANTS.
rem
rem INPUTS: Owner name
rem *****
rem
COLUMN GRANTEE FORMAT A18 heading "Grantee"
COLUMN OWNER FORMAT A18 heading "Owner"
COLUMN TABLE_NAME FORMAT A30 heading "Table"
COLUMN GRANTOR FORMAT A18 heading "Grantor"
COLUMN PRIVILEGE FORMAT A10 heading "Privilege"
COLUMN GRANTABLE FORMAT A19 HEADING "With Grant Option?"
rem
BREAK ON OWNER SKIP 4 ON TABLE_NAME SKIP 1 on grantee on grantor ON REPORT
REM
SET LINESIZE 130 PAGES 56 VERIFY OFF FEEDBACK OFF
start title132 "TABLE GRANTS BY OWNER AND TABLE"
DEFINE OUTPUT = rep_out\&db\db_tgnts
SPOOL &output
REM
SELECT
OWNER,
TABLE_NAME,
GRANTEE,
GRANTOR,
PRIVILEGE,
GRANTABLE
FROM
DBA_TAB_PRIVS
WHERE
OWNER NOT IN ('SYS','SYSTEM')
ORDER BY
OWNER,
TABLE_NAME,
GRANTOR,
GRANTEE;
REM
SPOOL OFF
pause Press enter to continue
exit

```

```
REM
REM NAME                : DB_USRS.SQL
REM FUNCTION            : GENERATE_USER_REPORT
REM USE                 : From SQLPLUS
REM Limitations         : None
REM Revisions
REM Date                Modified By      Reason For change
REM 08-Apr-1993         MIKE AULT        INITIAL CREATE
REM
set flush off term off pagesize 58 linesize 131
rem
column username                format a10      heading User
column default_tablespace      format a20      heading "Default Tablespace"
column temporary_tablespace    format a20      heading "Temporary
Tablespace"
column granted_role            format a20      heading Roles
column default_role            format a9       heading Default?
column admin_option            format a7       heading Admin?
column profile                 format a15      heading 'Users
Profile'
rem
start :title132 'ORACLE USER REPORT'
define output = rep_out\&db\db_usrs
break on username skip 1 on default_tablespace on temporary_tablespace on
profile
spool &output
rem
select
    username,
    default_tablespace,
    temporary_tablespace,
    profile,
    granted_role,
    admin_option,
    default_role
from
    sys.dba_users a,
    sys.dba_role_privs b
where
    a.username = b.grantee
order by
    username,
    default_tablespace,
    temporary_tablespace,
    profile,
    granted_role;
rem
spool off
pause Press enter to continue
exit
```

```
REM NAME           : DB_TABS.SQL
REM FUNCTION      : GENERATE TABLE REPORT
REM USE          : FROM SQLPLUS
REM Limitations   : None
clear columns
column table_name          heading Table
column tablespace_name    format A15 heading Tablespace
column minextents         heading "Min|Extents"
column maxextents         heading "Max|Extents"
column pctfree            heading "Percent|Free"
column pctused            heading "Percent|Used"
column pctincrease        heading "Percent|Increase"
set lines 132 pages 60 feedback off verify off
START TITLE132 "ORACLE TABLE REPORT"
spool rep_out\&db\db_tabs
select
    owner,
    table_name,
    tablespace_name,
    initial, next,
    minextents,maxextents,
    pctfree, pctused,
    pctincrease
from
    sys.dba_tables
where
    OWNER NOT IN ('SYSTEM', 'SYS')
order by
    tablespace_name, owner;
spool off
clear columns
pause Press enter to continue
EXIT
```



```

rem
rem NAME: tab_stat.sql
rem HISTORY:
rem Date Who What
rem -----
rem 5/27/93 Mike Ault Initial creation
rem
rem FUNCTION: Will show table statistics for a user's tables or all rem
rem tables.
rem Statistics must have been run on tables
rem
set pages 56 lines 130 newpage 0 verify off echo off feedback off
rem
column owner format a12 heading "Table Owner"
column table_name format a20 heading "Table"
column tablespace_name format a20 heading "Tablespace"
column num_rows format 999,999,999 heading "Rows"
column blocks format 999,999 heading "Blocks"
column empty_blocks format 999,999 heading "Empties"
column space_full format 999.99 HEADING "% Full"
column chain_cnt format 999,999 HEADING "Chains"
column avg_row_len format 99,999,999,999 HEADING "Avg Length (Bytes)"
rem
start title132 "Table Statistics Report"
DEFINE OUTPUT = rep_out\&db\tab_stat
spool &output
rem
BREAK ON OWNER SKIP 2 ON TABLESPACE_NAME SKIP 1;
select
    owner,
    table_name,
    tablespace_name,
    num_rows,
    blocks,
    empty_blocks,
    100 * ((NUM_ROWS*AVG_ROW_LEN) / ((GREATEST(blocks,1)+empty_blocks) *2048))
space_full,
    chain_cnt,
    avg_row_len
from
    dba_tables
WHERE
    OWNER NOT IN ('SYS','SYSTEM')
order by
    owner,
    tablespace_name;
spool off
pause Press enter to continue
exit

rem Name: db_clus.sql
rem FUNCTION: Generate a report on database clusters
rem FUNCTION: showing cluster, tablespace, tables, and column data
rem MRA TRECOM 10/23/95
rem
column owner format a10
column cluster_name format a15 heading "Cluster"
column tablespace_name format a20 heading "Tablespace"

```

```

column table_name      format a20 heading "Table"
column tab_column_name format a20 heading "Table Column"
column clu_column_name format a20 heading "Cluster Column"
set pages 56 lines 130 feedback off
start title132 "Cluster Report"
break on owner on tablespace_name on cluster_name on table_name
spool rep_out\db\db_clus
select
    a.owner,
    tablespace_name,
    a.cluster_name,
    table_name,
    tab_column_name,
    clu_column_name
from
    dba_clusters a,
    dba_clu_columns b
where
    a.cluster_name=b.cluster_name
order by 1,2,3,4
/
spool off
pause Press enter to continue
exit
rem Name          :      clu_typ.sql
rem Purpose       :      Report on new DBA_CLUSTER columns
rem Use          :      From an account that accesses DBA_views
rem
column owner      format a10   heading "Owner"
column cluster_name format a15  heading "Cluster"
column tablespace_name format a10 heading "Tablespace"
column avg_blocks_per_key format 999999 heading "Blocks per Key"
column cluster_type format a8   heading "Type"
column function   format 999999 heading "Function"
column hashkeys   format 99999  heading "# of Keys"
set pages 56 lines 79 feedback off
start title80 "Cluster Type Report"
spool rep_out\db\clu_type
select
    owner,
    cluster_name,
    tablespace_name,
    avg_blocks_per_key,
    cluster_type,
    function,
    hashkeys
from
    dba_clusters
order by 2
/
spool off
exit

rem Name: clus_siz.sql
rem
rem FUNCTION: Generate a cluster sizing report
rem
column owner      format a10

```

```

column cluster_name          format a15          heading
"Cluster"
column tablespace_name      format a15          heading
"Tablespace"
column pct_free              format 999999      heading "%
Free"
column pct_used              format 999999      heading "%
Used"
column key_size              format 999999      heading "Key
Size"
column ini_trans             format 999          heading
"IT"
column max_trans             format 999999      heading "Max
Tran"
column initial_extent        format 9999999999   heading
"Initial Ext"
column next_extent           format 9999999999   heading "Next
Ext"
column max_extents           format 9999          heading
"Max Ext"
column pct_increase          format 9999          heading
"% Inc"
set pages 56 lines 130 feedback off
start title32 "Cluster Sizing Report"
break on owner on tablespace_name
spool rep_out\&db\cls_sze
select
    owner,
    tablespace_name,
    cluster_name,
    pct_free,
    pct_used,
    key_size,
    ini_trans,
    max_trans,
    initial_extent,
    next_extent,
    min_extents,
    max_extents,
    pct_increase
from
    dba_clusters
order by
    1,2,3
/
spool off
pause Press enter to continue
exit

```

```
rem
rem NAME:      pk_fk.sql
rem
rem FUNCTION: Report on all primary key - foreign key relationships
rem           in the database
rem
rem
column for_owner   format a10 heading "Foreign|Owner"
column for_table   format a25 heading "Foreign|Table"
column pri_owner   format a10 heading "Primary|Owner"
column pri_table   format a25 heading "Primary|Table"
column for_col     format a25 heading "Foreign|Column"
column pri_col     format a25 heading "Primary|Column"
accept owner prompt 'Enter Table Owner:'
break on for_owner on for_table on pri_owner
start title132 "Primary-Foreign Key Report"
set lines 131 pages 59 verify off feedback off
spool rep_out\&db\pk_fk
select
    a.owner for_owner,
    a.table_name for_table,
    c.column_name for_col,
    b.owner pri_owner,
    b.table_name pri_table,
    d.column_name pri_col
from
    dba_constraints a,
    dba_constraints b,
    dba_cons_columns c,
    dba_cons_columns d
where
    a.r_constraint_name=b.constraint_name
    and a.constraint_type = 'R'
    and b.constraint_type = 'P'
    and a.owner=upper('&owner')
    and a.r_owner = b.owner
    and a.constraint_name = c.constraint_name
    and b.constraint_name = d.constraint_name
    and a.owner = d.owner
    and a.table_name = c.table_name
    and b.owner = d.owner
    and b.table_name = d.table_name
order by
    1,2,4;
spool off
pause press enter to continue
exit
```

```

rem *****
rem NAME:      db_inx.sql
rem FUNCTION:  Generate report on Indexes.
rem INPUTS:
rem          1 = Oracle Account
rem          2 = Table name
rem *****
SET HEADING OFF VERIFY OFF PAUSE OFF
PROMPT ** Index Column Report **
PROMPT
PROMPT Percent signs are wild
ACCEPT OWNER CHAR PROMPT 'Enter Oracle account to report on (or wild): ';
ACCEPT TABLE_NAME CHAR PROMPT 'Enter table name to report on (or wild): ';
PROMPT
PROMPT Report file name is DB_INX.LIS
SET HEADING ON
SET LINESIZE 130 PAGESIZE 56 NEWPAGE 0 SPACE 1 TAB OFF
SET TERMOUT OFF
BREAK ON TABLE_OWNER SKIP PAGE ON TABLE_TYPE ON TABLE_NAME
ON UNIQUENESS ON INDEX_NAME SKIP 1
COLUMN TABLE_OWNER          FORMAT A30      HEADING 'Object Owner'
COLUMN TABLE_TYPE           FORMAT A6       HEADING 'Type'
COLUMN TABLE_NAME           FORMAT A30      HEADING 'Object Name'
COLUMN INDEX_NAME             FORMAT A30      HEADING 'Index Name'
COLUMN UNIQUENESS             FORMAT A1       HEADING 'U|N|I|Q|U|E'
COLUMN COLUMN_NAME           FORMAT A30      HEADING 'Column Name'
START TITLE132 "Index Columns by Owner and Table Name"
SPOOL rep_out\&db\db_inx
SELECT
    I.TABLE_OWNER
    , DECODE(TABLE_TYPE,'CLUSTER','CLUSTR','TABLE') TABLE_TYPE
    , I.TABLE_NAME
    , I.INDEX_NAME
    , SUBSTR(UNIQUENESS,1,1) UNIQUENESS
    , IC.COLUMN_NAME
FROM
    DBA_INDEXES I,
    DBA_IND_COLUMNS IC
WHERE
    I.INDEX_NAME = IC.INDEX_NAME
    AND OWNER = INDEX_OWNER
    AND I.OWNER      LIKE upper('&OWNER')
    AND I.TABLE_NAME LIKE upper('&TABLE_NAME')
ORDER BY
    1,2,3,5 DESC,4,COLUMN_POSITION;
SPOOL OFF
EXIT

```

```
rem NAME: INX_STAT.sql
rem HISTORY:
rem Date Who What
rem 05/27/93 Mike Ault Initial creation
rem
rem FUNCTION: Report on index statistics
rem INPUTS: 1 = Index owner 2 = Index name
rem
def iowner= '&OWNER'
def iname = '&INDEX'
set pages 56 lines 130 verify off feedback off
column owner format a20 heading "Owner"
column index_name format a20 heading "Index"
column status format all heading "Status"
column blevel format 9,999,999,999 heading "Tree Level"
column leaf_blocks format 999,999,999 heading "Leaf Blk"
column distinct_keys format 999,999 heading "# Keys"
column avg_leaf_blocks_per_key format 999,999,999 heading "Avg. LB/Key"
column avg_data_blocks_per_key format 999,999,999 heading "Avg. DB/Key"
column clustering_factor format 999,999,999 heading "Clstr Factor"
rem
start title132 "Index Statistics Report"
spool report_outpur/ind_stat&db
rem
select
    owner,
    index_name,
    status,
    blevel,
    leaf_blocks,
    distinct_keys,
    avg_leaf_blocks_per_key,
    avg_data_blocks_per_key,
    clustering_factor
from
    dba_indexes
where
    owner like upper('&iowner')
    and index_name like upper('&iname')
order by 1,2;
rem
spool off
exit
```

```

rem *****
rem NAME: PKEY.sql
rem
rem FUNCTION: This routine prints a report of all primary keys defined
rem           in the data dictionary (for owners other than SYS and rem
rem           SYSTEM).
rem           As written, it must be run by a DBA. By changing the query to
rem           run against ALL_CONSTRAINTS, etc. it could be used by any user
rem           to see the primary keys which are "available" to them.
rem
rem INPUTS: Owner for tables
rem *****
ACCEPT OWNER PROMPT 'ENTER OWNER NAME OR "ALL" '
rem
COLUMN OWNER          FORMAT A15  NOPRINT NEW_VALUE OWNER_VAR
COLUMN TABLE_NAME    FORMAT A25   HEADING 'Table Name'
COLUMN CONSTRAINT_NAME FORMAT A20   HEADING 'Constraint Name'
COLUMN COLUMN_NAME    FORMAT A25   HEADING 'Column Name'
rem
BREAK ON OWNER SKIP PAGE ON TABLE_NAME SKIP 1 ON
      CONSTRAINT_NAME
rem
start title80 "Primary Keys For Database Tables"
SPOOL rep_out\&db\pkey
rem
SELECT
      C.OWNER,
      C.TABLE_NAME,
      C.CONSTRAINT_NAME,
      CC.COLUMN_NAME
FROM
      DBA_CONSTRAINTS C,
      DBA_CONS_COLUMNS CC
WHERE
      C.CONSTRAINT_NAME = CC.CONSTRAINT_NAME
      AND C.OWNER = CC.OWNER
      AND C.CONSTRAINT_TYPE = 'P'
      AND C.OWNER <> 'SYS'
      AND C.OWNER <> 'SYSTEM'
      AND C.OWNER = UPPER('&&OWNER')
      OR UPPER('&&OWNER') = 'ALL'
ORDER BY
      C.OWNER,
      C.TABLE_NAME,
      CC.POSITION;
SPOOL OFF
UNDEF OWNER
exit

```

```

rem *****
rem NAME: FKEY.sql
rem
rem FUNCTION: This routine prints a report of all foreign keys defined
rem             in data dictionary(for owners other than SYS and SYSTEM).
rem             AS written, it must be run by a DBA.By changing the query
rem             against ALL_CONSTRAINTS, etc. it could be used by any
rem             user to see the foreign keys which are "available".
rem *****
SET LINES 130 PAGES 56
rem
COLUMN OWNER                FORMAT A10  NOPRINT NEW_VALUE OWNER_VAR
COLUMN TABLE_NAME          FORMAT A24  HEADING 'TABLE NAME'
COLUMN REF_TABLE            FORMAT A24  HEADING 'REF TABLE'
COLUMN R_OWNER              FORMAT A10  NOPRINT
COLUMN CONSTRAINT_NAME      FORMAT A30  HEADING 'CONST NAME'
COLUMN R_CONSTRAINT_NAME    FORMAT A30  NOPRINT
COLUMN COLUMN_NAME          FORMAT A20  HEADING 'COLUMN'
COLUMN REF_COLUMN           FORMAT A20  HEADING 'REF
COLUMN'
rem
start title132 "FOREIGN KEY REPORT"
rem
BREAK ON OWNER SKIP PAGE ON TABLE_NAME SKIP 1 -
        ON CONSTRAINT_NAME ON REF_TABLE
SPOOL rep_out\&db\fkey
rem
SELECT
    C.OWNER,
    C.TABLE_NAME,
    C.CONSTRAINT_NAME,
    CC.COLUMN_NAME,
    R.TABLE_NAME REF_TABLE,
    RC.COLUMN_NAME REF_COLUMN
FROM
    DBA_CONSTRAINTS C,
    DBA_CONSTRAINTS R,
    DBA_CONS_COLUMNS CC,
    DBA_CONS_COLUMNS RC
WHERE
    C.CONSTRAINT_TYPE = 'R'
    AND C.OWNER NOT IN ('SYS','SYSTEM')
    AND C.R_OWNER = R.OWNER
    AND C.R_CONSTRAINT_NAME = R.CONSTRAINT_NAME
    AND C.CONSTRAINT_NAME = CC.CONSTRAINT_NAME
    AND C.OWNER = CC.OWNER AND
    AND R.CONSTRAINT_NAME = RC.CONSTRAINT_NAME
    AND R.OWNER = RC.OWNER
    AND CC.POSITION = RC.POSITION
ORDER BY
    C.OWNER,
    C.TABLE_NAME,
    C.CONSTRAINT_NAME,
    CC.POSITION;
SPOOL OFF
EXIT

```



```

rem NAME: db_seqs.sql
rem
rem FUNCTION: Generate a report on sequences for an account
rem
rem INPUTS:
rem          1 - Sequence Owner or Wild Card
rem          2 - Sequence Name or Wild Card
rem *****
SET HEADING OFF VERIFY OFF PAUSE OFF
rem
PROMPT ** Sequence Report **
PROMPT
PROMPT Percent signs are wild
ACCEPT sequence_owner prompt 'Enter Oracle account for report: ';
ACCEPT sequence_name prompt 'Enter object name for report: ';
PROMPT
PROMPT Report file name is db_seqs.lis
rem
SET HEADING ON
SET LINESIZE 130 PAGESIZE 56 NEWPAGE 0 TAB OFF SPACE 1
SET TERMOUT OFF
BREAK ON SEQUENCE_OWNER SKIP 2
rem
COLUMN SEQUENCE_OWNER   FORMAT A10           HEADING 'Sequence Owner'
COLUMN SEQUENCE_NAME    FORMAT A30           HEADING 'Sequence Name'
COLUMN MIN_VALUE        HEADING 'Minimum'
COLUMN MAX_VALUE        HEADING 'Maximum'
COLUMN INCREMENT_BY     FORMAT 9999          HEADING 'Incr.'
COLUMN CYCLE_FLAG       HEADING 'Cycle'
COLUMN ORDER_FLAG       HEADING 'Order'
COLUMN CACHE_SIZE       FORMAT 99999         HEADING 'Cache'
COLUMN LAST_NUMBER      HEADING 'Last Value'
rem
START title132 "SEQUENCE REPORT"
SPOOL rep_out\&db\db_seqs
rem
SELECT
  SEQUENCE_OWNER,
  SEQUENCE_NAME,
  MIN_VALUE,
  MAX_VALUE,
  INCREMENT_BY,
  DECODE(CYCLE_FLAG, 'Y', 'YES', 'N', 'NO') CYCLE_FLAG,
  DECODE(ORDER_FLAG, 'Y', 'YES', 'N', 'NO') ORDER_FLAG,
  CACHE_SIZE,
  LAST_NUMBER
FROM
  DBA_SEQUENCES
WHERE
  SEQUENCE_OWNER LIKE UPPER('&SEQUENCE_OWNER') AND
  SEQUENCE_NAME LIKE UPPER('&SEQUENCE_NAME')
ORDER BY
  1,2;
SPOOL OFF
pause Press Enter to continue
EXIT

```

```
rem *****
rem NAME : db_obj.sql
rem FUNCTION : Report on all objects and their status
rem HISTORY:
rem Date Who What
rem _____
rem 02/08/94 Michael Ault Created
rem *****
column owner format a17 heading "Owner"
column object_name format a23 heading "Object"
column object_type format a20 heading "Type of Object"
column status format a10 heading "Status"
rem
set verify off feedback off lines 80 pages 58 heading off
rem
break on owner on object_type
start title80 "Database Object Status"
spool rep_out\&db\db_obj
rem
prompt Enter % for all objects
rem
select
    owner,
    object_type,
    object_name,
    status
from
    dba_objects
where
    object_type like upper('&type')
order by
    1,2;
spool off
pause Press enter to continue
exit
```

```

rem *****
rem NAME           : db_trig.sql
rem FUNCTION      : Report on all triggers and their status
rem HISTORY:
rem Date           Who           What
rem -----
rem 02/08/94 Michael Ault Created
rem *****
column owner      format a10
column trigger_name format a20 heading "Trigger"
column trigger_type format a20 heading "Type"
column triggering_event format a10 heading "Event"
column table      format a40 heading "Trigger Table"
rem
break on owner
set verify off feedback off lines 130 pages 58
start title132 "Trigger Status Report"
spool trigger_status&db
rem
Select
    owner,
    trigger_name,
    trigger_type,
    triggering_event,
    table_owner||'.'||table_name "Table",
    status
from dba_triggers
order by 1,5,2;
spool off
exit

```

```
REM
REM NAME                :db_view.sql
REM FUNCTION:           :report on database views by owner
REM USE                 :Generate a report on database views
REM Limitations         :If your view definitions are greater than 5000
REM                    :characters then increase the set long. This can be
REM                    :determined by querying the DBA_VIEWS table's
REM                    :text_length column for the max value:
REM                    :select max(text_length) from dba_views;
REM
set pages 59 lines 131 feedback off echo off
column text             format a75
column owner            format a20
column view_name        format a20
column status           format a7
set long 5000
start title132 "Database Views Report"
spool rep_out\&db\db_views
select
    v.owner,
    v.view_name,
    v.text,
    o.status
from
    dba_views v,
    dba_objects o
where
    v.owner like upper('%&owner_name') and
    o.owner = v.owner and
    o.object_type = 'VIEW' and
    o.object_name = v.view_name
order by
    o.status,
    v.view_name;
spool off
Pause Press enter to continue
exit
```

```
REM NAME          : DB_LINKS.SQL
REM FUNCTION:     GENERATE REPORT OF DATABASE LINKS
REM USE          : FROM SQLPLUS
REM Limitations   : None
set pages 58 lines 130 verify off term off
start title132 "Db Links Report"
spool rep_out\&db\db_links
column host       format a60      heading "Connect String Used"
column owner      format a15      heading "Creator of DB Link"
column db_link    format a10      heading " DB Link Name"
column username   format a15      heading "Connecting User"
column password   format a15      heading "Password"
column create     heading "Date Created"
select
    host,
    owner,
    db_link,
    username,
    created
from
    dba_db_links
order by
    owner,
    host;
spool off
pause Press enter to continue
exit
```

```

rem TITLE132.SQL - FUNCTION:      This SQL*Plus script builds a standard
rem                               heading for 132 col database reports
rem
column  TODAY                NEW_VALUE      CURRENT_DATE  NOPRINT
column  TIME                 NEW_VALUE      CURRENT_TIME  NOPRINT
column  DATABASE            NEW_VALUE      DATA_BASE    NOPRINT
column  PASSOUT             NEW_VALUE      DBNAME        NOPRINT
define COMPANY = "Insert Company Name"
define HEADING = "&1"
rem
TTITLE LEFT "Date: " current_date CENTER company col 118 "Page:" format
999 -
      SQL.PNO SKIP 1 LEFT "Time: " current_time CENTER heading RIGHT -
      format a15 SQL.USER SKIP 1 CENTER format a20 data_base SKIP 2
set heading off
set pagesize 0
SELECT
      TO_CHAR(SYSDATE,'MM/DD/YY') TODAY,
      TO_CHAR(SYSDATE,'HH:MI AM') TIME,
      value||' database' DATABASE,
      rtrim(value) passout
FROM
      sys.v_$parameter
WHERE
      name = 'db_name';
set heading on
set pagesize 58
set newpage 0
DEFINE DB = ' _&DBNAME '

rem TITLE80.SQL - FUNCTION:      This SQL*Plus script builds a standard rem
rem                               report heading for database reports that
rem                               are 80 columns
column  TODAY                NEW_VALUE      CURRENT_DATE  NOPRINT
column  TIME                 NEW_VALUE      CURRENT_TIME  NOPRINT
column  DATABASE            NEW_VALUE      DATA_BASE    NOPRINT
column  PASSOUT             NEW_VALUE      DBNAME        NOPRINT
define COMPANY = "Insert Company Name"
define HEADING = "&1"
rem
TTITLE LEFT "Date: " current_date CENTER company col 66 "Page:" format 999
-
      SQL.PNO SKIP 1 LEFT "Time: " current_time CENTER heading RIGHT -
      format a15 SQL.USER SKIP 1 CENTER format a20 data_base SKIP 2
rem
set heading off
set pagesize 0
SELECT
      TO_CHAR(SYSDATE,'MM/DD/YY') TODAY,
      TO_CHAR(SYSDATE,'HH:MI AM') TIME,
      value||' database' DATABASE,
      rtrim(value) passout
FROM
      v$parameter
where name = 'db_name';
set heading on
set pagesize 58
set newpage 0
DEFINE DB = ' _&DBNAME '

```