UKOUG UNIX SIG

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Oracle Security

The Right Approach (IMHO) – Part 2

By

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Why Am I Qualified To Speak

- PeteFinnigan.com Ltd, Est 2003.
- http://www.petefinnigan.com
- First "Oracle security" blog.
- Specialists in researching and securing Oracle databases providing consultancy and training

Database scanner software authors and vendors.

- Author of Oracle security step-by-step book; co-author of Expert Oracle practices, author of HSM/TDE Book to be published soon.
- Published many papers, regular speaker (UK, USA, Slovenia, Norway, Iceland, Finland and more).
- Member of the Oak Table Network.

Agenda - Reminder

- Two Parts to this presentation
- Background “glue”
- The correct approach (IMHO) – The message
- Exploit + reaction (a number of levels)
  - downloadable, easy
  - Realistic theft
  - Sophisticated attack
  - Data analysis
  - User Analysis
- Conclusions

Reaction From Part 1 Demo

- Access is available to the database
- Credentials are guessable
- Default accounts have access to critical data – Actually all accounts do!!
- Critical data is easy to find
- Poor, weak encryption and protection used
- This is reality, this is what Oracle database security REALLY looks like!!

Some Issues?

- OK, easy and realistic
- There are still issues, for someone to steal they still need Oracle knowledge and business knowledge
- The issue is that because “WE” (the Oracle customers) do not fix databases we make it easy to steal – the target audience for these “ADVANTAGES” is likely employees – DBA, Power users, Dev....

Data Theft

- Data theft is more likely possible due to:
  - Application abuse
  - Data not in the database
  - Data given to users
  - More....
- Oracle will not fix these issues for you, they are your responsibility!

The Defenders View

- Did our realistic attack leave evidence
- Does the DBA review these evidences?
- Audit trail
- Listener log
- redo
- More...

Live Demo 3

What if the Hacker Was Clever

- If he was clever he may take a number of different approaches
  - Stealth
    - in finding an account
    - Escalate first
    - Check identity
    - Steal the data from somewhere else

A Stealth Attack

Live Demo 4

Some Thoughts

- A data security solution must be comprehensive
- All copies of the data must be located and protected to the same level
- Theft will always occur taking the easiest approach!

The True Access To The Data

Live Demo 5

Analysing Data

- We should now be ready for "***layers***" and "***hierarchy***" being evident in this investigation
- Data is never where you think it is.
- Unless you really know where it is you cannot secure it
- Understand the access models and who can access the data

The Access Issue

- This is the number 1 Oracle security issue for me
- A database can only be accessed if you have three pieces of information
  - The IP Address or hostname
  - The Service name / SID of the database
  - A valid username / password
- A database can only be accessed at the TNS level if there is a direct route from the user (authorised or not) and the database

11gR1 has broken this with the default sid/service name feature

Access Issue 2

- At lots of sites we audit we see:
  - Tnsnames.ora deployed to all servers and desktops
  - Tnsnames.ora with details of every database
  - access to servers is open (no IP blocking)
  - Guessable SID/Service name
  - Weak passwords
- Do not do any of these at your sites!

The Core Problems

- Incorrect versions and products installed
- Unnecessary functions and features installed
- Excessive users / schemas installed
- Elevated privileges for most database accounts
- Default and insecure configurations
- Lack of audit trails in the database
- Data often held outside the database
- Evidence of ad-hoc maintenance

Configuration And Defaults

- Default database installations cause some weak configurations
- Review all
  - configuration parameters – checklists?
  - File permissions
- Some examples
  - No audit configuration by default (fixed in 10gR2 for new installs)
  - No password management (fixed in 10gR2 new installs)
- In your own applications and support accounts
  - Do not use default accounts
  - Do not use default roles including DBA
  - Do not use default passwords

Background Information

- Basic information must be to hand for familiarisation rather than actual use
- Vulnerabilities and exploits:
  - SecurityFocus – www.securityfocus.com
  - Milw0rm – www.milw0rm.com
  - PacketStorm – www.packetstorm.org
  - FrSirt – www.frsirt.com
  - NIST – http://nvd.nist.gov
  - CERT – www.kb.cert.org/vulns

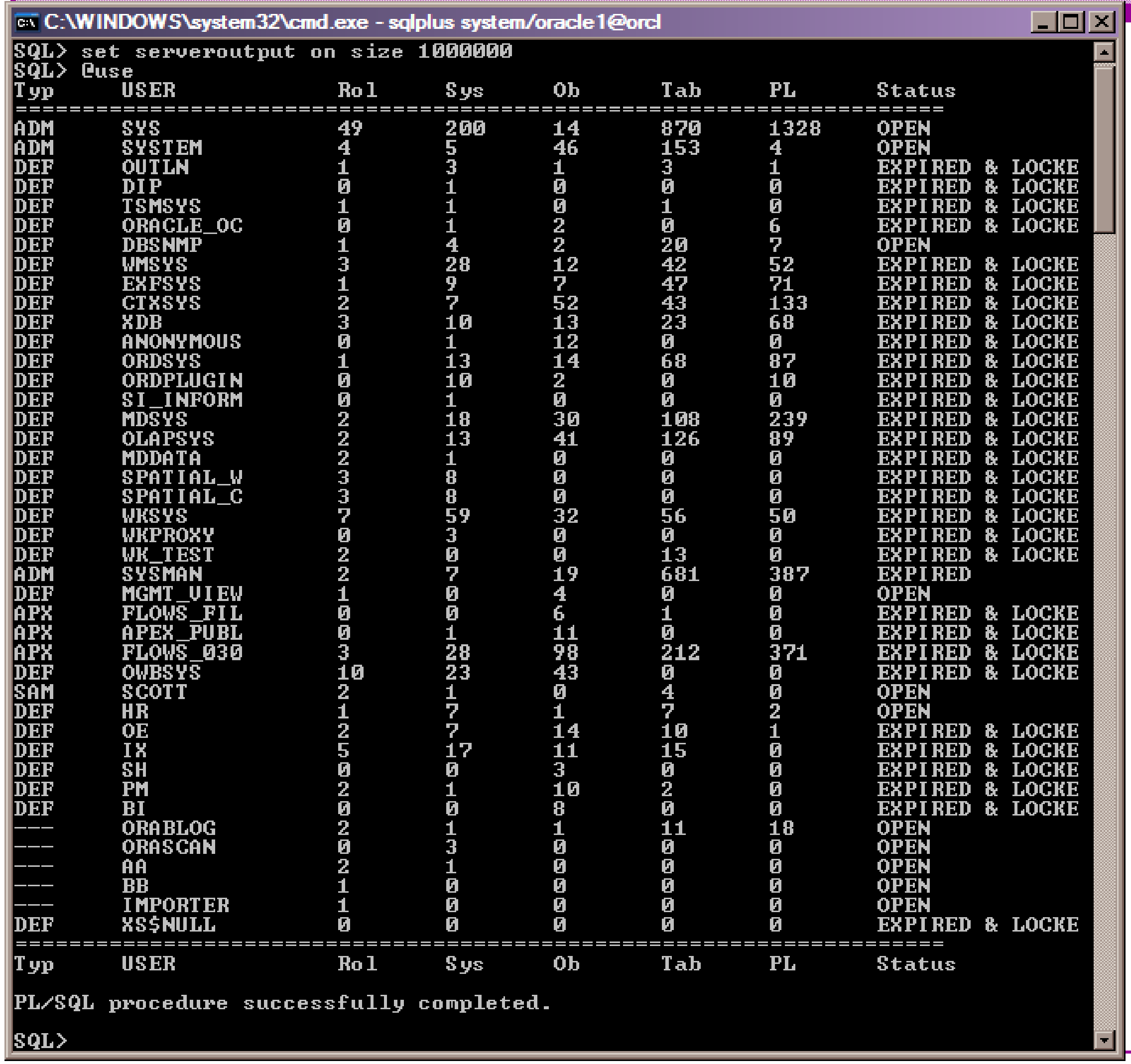
Background Information 2

- Some background information we do use!
- There are a few standalone tools available
- I would start with manual queries and toolkit of simple scripts such as:
  - www.petefinnigan.com/find_all_privs.sql
  - www.petefinnigan.com/who_has_priv.sql
  - www.petefinnigan.com/who_can_access.sql
  - www.petefinnigan.com/who_has_role.sql
  - www.petefinnigan.com/check_parameter.sql
- Hand code simple queries as well

Background Information 3

- There are a number of good checklists to define what to check:
- CIS Benchmark - http://www.cisecurity.org/bench_oracle.html
- SANS S.C.O.R.E - http://www.sans.org/score/oraclechecklist.php
- Oracle's own checklist - http://www.oracle.com/technology/deploy/security/pdf/twp_security_checklist_db_database_20071108.pdf
- DoD STIG - http://iase.disa.mil/stigs/stig/database-stig-v8r1.zip
- Oracle Database security, audit and control features – ISBN 1-893209-58-X

Analysis Of Users



```
SQL> set serveroutput on size 1000000
SQL> @use
Typ     USER            Rol     Sys     Ob      Tab     PL      Status
=====================================================================
ADM     SYS             49      200     14      870     1328    OPEN
ADM     SYSTEM          4       5       46      153     4       OPEN
DEF     OUTLN           1       3       1       3       1       EXPIRED & LOCKE
DEF     DIP             0       1       0       0       0       EXPIRED & LOCKE
DEF     TSMSYS          1       1       0       1       0       EXPIRED & LOCKE
DEF     ORACLE_OC       0       1       2       0       6       EXPIRED & LOCKE
DEF     DBSNMP          1       4       2       20      7       OPEN
DEF     WMSYS           3       28      12      42      52      EXPIRED & LOCKE
DEF     EXFSYS          1       9       7       47      71      EXPIRED & LOCKE
DEF     CTXSYS          2       7       52      43      133     EXPIRED & LOCKE
DEF     XDB             3       10      13      23      68      EXPIRED & LOCKE
DEF     ANONYMOUS       0       1       12      0       0       EXPIRED & LOCKE
DEF     ORDSYS          1       13      14      68      87      EXPIRED & LOCKE
DEF     ORDPLUGIN       0       10      2       0       10      EXPIRED & LOCKE
DEF     SI_INFORM       0       1       0       0       0       EXPIRED & LOCKE
DEF     MDSYS           2       18      30      108     239     EXPIRED & LOCKE
DEF     OLAPSYS         2       13      41      126     89      EXPIRED & LOCKE
DEF     MDDATA          2       1       0       0       0       EXPIRED & LOCKE
DEF     SPATIAL_W       3       8       0       0       0       EXPIRED & LOCKE
DEF     SPATIAL_C       3       8       0       0       0       EXPIRED & LOCKE
DEF     WKSYS           7       59      32      56      50      EXPIRED & LOCKE
DEF     WKPROXY         0       3       0       0       0       EXPIRED & LOCKE
DEF     WK_TEST         2       0       0       13      0       EXPIRED & LOCKE
ADM     SYSMAN          2       7       19      681     387     EXPIRED
DEF     MGMT_VIEW       1       0       4       0       0       OPEN
APX     FLOWS_FIL       0       0       6       1       0       EXPIRED & LOCKE
APX     APEX_PUBL       0       1       11      0       0       EXPIRED & LOCKE
APX     FLOWS_030       3       28      98      212     371     EXPIRED & LOCKE
DEF     OWBSYS          10      23      43      0       0       EXPIRED & LOCKE
SAM     SCOTT           2       1       0       4       0       OPEN
DEF     HR              1       7       1       7       2       OPEN
DEF     OE              2       7       14      10      1       EXPIRED & LOCKE
DEF     IX              5       17      11      15      0       EXPIRED & LOCKE
DEF     SH              0       0       3       0       0       EXPIRED & LOCKE
DEF     PM              2       1       10      2       0       EXPIRED & LOCKE
DEF     BI              0       0       8       0       0       EXPIRED & LOCKE
---     ORABLOG         2       1       1       11      18      OPEN
---     ORASCAN         0       3       0       0       0       OPEN
---     AA              2       1       0       0       0       OPEN
---     BB              1       0       0       0       0       OPEN
---     IMPORTER        1       0       0       0       0       OPEN
DEF     XS$NULL         0       0       0       0       0       EXPIRED & LOCKE
=====================================================================
Typ     USER            Rol     Sys     Ob      Tab     PL      Status

PL/SQL procedure successfully completed.

SQL>
```

Analyse users into 2 groups

Seek to reduce the accounts (features) installed as default schemas – i.e. OEM, Intelligent agent, DIP, Samples

Analyse accounts created by “you”. Assess these in terms of what should exist

Analysing Users

Live Demo 6

Analysing Users

- Users (or rather accounts that exist in the database) provide fixed access paths to the data.
- You must understand how these accounts can access data, percentages of data, how, when
- Finally which “real people” use these accounts, share accounts....

Layers, Hierarchy, Complexity

- Each of the three examples has
  - Layers of complexity
  - Multiple requirements for one area - Users
  - Multiple paths to data
  - Multiple copies of data
  - Multiple pieces of the puzzle involved with operating system objects
  - Multiple paths to the operating system
- See the pattern now?

Conclusions

- There are a few important lessons we must learn to secure data held in an Oracle database
  - We must secure the “**data**” not the software (quite obviously we MUST secure the software to achieve “**data**” security)
  - We must start with the “**data**” not the software
  - We must understand who/how/why/when “**data**” could be stolen
- Oracle security is complex though because we must consider “**where**” the “**data**” is and “**who**” can access it and “**how**”
- Often there are “**layers**” and “**duplication**”
- Careful detailed work is often needed

Any Questions?

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