PeteFinnigan.com Limited

Oracle Security Expertise

UKOUG Windows SIG, September 25th 2007

Oracle Security on Windows

By

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Introduction - commercial slide.☹

- PeteFinnigan.com Limited
- Founded February 2003
- CEO Pete Finnigan
- Clients UK, States, Europe
- Specialists in researching and securing Oracle databases
- http://www.petefinnigan.com
- Consultancy and training available
- Author of Oracle security step-by-step
- Published many papers, regular speaker (UK, USA)

Agenda

- What is Oracle Security?
- Common security issues
- Windows / Unix differences issues
- Windows security
  - Information, bugs
- Windows security differences
- Auditing a database
- Hardening a database

What is Oracle Security

- Performing a security audit of an Oracle database?
- Securely configuring an Oracle database?
- Designing a secure Oracle system before implementation?
- Using some of the key security features
  - Audit, encryption, RBAC, FGA, VPD…
- Oracle security is all of these
  - It is about creating a secure database
  - Storing critical / valuable data securely

What's involved in securing data?

- Perform an Oracle Security health audit
- Design a secure installation
- Perform database hardening
  - New database or existing
- Choose and use Security features where relevant e.g.
  - encryption in the database for credit cards
  - TDE for secure data on disk
  - VPD to enable secure access to critical data

Common Security Issues

- Installation issues
- Feature overload

Some examples from real life!!

- Functionality not needed in the database
- Configuration issues
- Operating system - Some real horrors often found
- Network issues – usually not much security
- Bugs / vulnerabilities - no easy fix

Unix and Windows

- Is there a difference for securing Oracle on Windows or Unix? – anyone?
- In the database – very small differences in configuration
- Oracle networking – small differences
- Operating system – yes, biggest area but the issues are not dissimilar to Unix
- We will highlight some of the differences shortly

Windows Oracle Security Info

- There is a lack of Windows specific information on Oracle security - example:
- SANS SCORE – 5 Windows from hundreds (http://www.sans.org/score/oraclechecklist.php?portal=06e42a60647bfcf9d1afc5b9bdf932b3)
- CIS Benchmark (v1.2 and 2.0.1) – 21 Windows from hundreds in 10g version - (http://www.cisecurity.org/)
- SANS Step-By-Step guide v2 – 4 from hundreds
- Oracle hackers Handbook – 2 pages from @120
- Oracle Privacy Security Auditing – no specific Windows issues

General Oracle Security Info

- All is not lost; most Oracle security guidelines, information and tools are useful also for Windows
- Tools – http://www.petefinnigan.com/tools.htm
  - Who_has scripts, CIS benchmark, Scuba, Metacortex, cqure, many more
- Papers, blogs, forums
- Checklists
  - CIS, SCORE, DoD Stig, Oracles hardening document
- Websites – petefinnigan, cqure, RDS, Argeniss, databasesecurity.com

Windows Oracle Bugs

- As with Oracle security information specific Oracle security bugs on Windows are a small percentage of the whole
- Unlike the lack of information where the positive effect is that 95% of other information is still relevant with bugs most are still exploitable against Windows hosted Oracle ..☹
- ORA_DBA / AcceptSecurityContex / share bug – see OHH
- Windows privilege escalation – NULL DACL bug http://securityvulns.com/news/Oracle/Windows/PE.html
- Windows directory traversal – extension of previous generic bugs
- 35 bugs on Securiteam – only 1 (possibly 2) are Windows specific
- Milw0rm.com – 4 Windows specific (?) from 27
- BugTraq – Hundreds of issues, difficult to check, possibly 1 in 20/30
- RDS – approx 40 exploits – only one confirmed for just Windows

Windows Oracle bugs

- As with any exploit / bug; patching is generally the only solution – very few have workarounds
- The action for the DBA is therefore to
  - Be on a supported version of the database
  - Be on a supported platform – i.e. no Windows home edition
  - Be on the latest patch release
  - Ensure CPU's are applied as promptly as possible

Windows Differences

- Don't install on domain controller (install on domain member/stand alone)
  - If domain services required use RSA and should it be a domain user account not domain admin
  - Create global group, remove from domain group
  - Remove domain users from Users group
- Windows has default Administrator account – rename it
- Oracle must be installed as Local Admin or SYSTEM (No) – Unix doesn't require admin – deny Logon

Windows Differences (2)

- Limit AT jobs
- Oracle provides Windows Native Authentication
- Audit goes to the event viewer – use SQL to archive and purge and to filter and monitor
- File permissions
  - Remove Everyone group from ORACLE_HOME ORACLE_BASE
  - Allow Local Administrator full control
  - Remove Users permissions on Program Files\Oracle
  - Do not allow Oracle owner access to system tools

Windows Differences (3)

- Possibility to stop port redirection in Windows – use_shared_socket=TRUE
- Set OSAUTH_PREFIX_DOMAIN= TRUE in registry to prevent OS account spoofing
- Don't allow Everyone group access to registry and limit access to Oracle keys/ hives to owner
- Windows tends to include additional protocol stacks
- Limited Possibility to rename ORA_DBA
  - Don't allow any OS user membership of ORA_DBA except Oracle DBA

Windows Differences (Subtle)

- Excessive services enabled by default
  - Net meeting, messenger, auto update,
  - Web servers, fax, DHCP etc
  - Ensure OS is hardened first
- Shares – authentication bug
- virus software needed on Windows (Unix usually not a major issue)
- Maintenance access is usually harder
  - Local access or terminal services
  - SSH shell access (Unix) not available

Auditing Oracle Databases

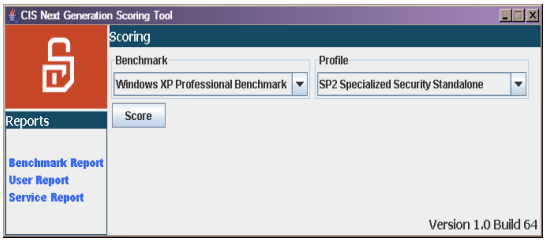
- We cannot cover a complete security audit here
- Default passwords, weak passwords, password management
- Audit settings
- Configuration settings
- File system – passwords exposed, ad hoc maintenance
- Shares – check for existence
- Confirm accounts used for software, Admin, Application / privileges
- Tendency for remote ops$ to be used on Windows – check into this

Auditing an Oracle Database

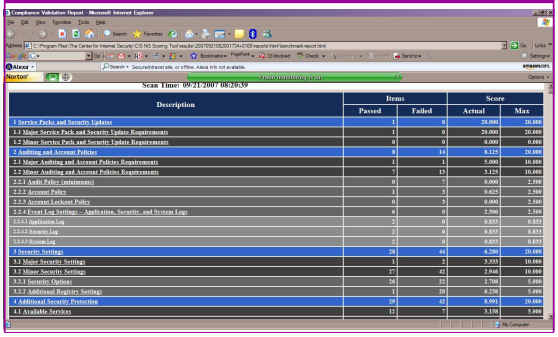
- Windows security Checklists
  - CIS benchmarks for XP-SP1/2, Server 2003, Win 2000 (Std, Prof, server), NT
  - Windows tools – The CIS benchmarks are useful – others are available
- Oracle security checks
  - Most tools are windows centric – don't install them on the prod
  - Audit by hand
  - Audit using a free or commercial tool
  - Get professional help
- Oracle security checklists
  - use and work through
  - these are great resources to start with

Windows OS Security Audit (1)

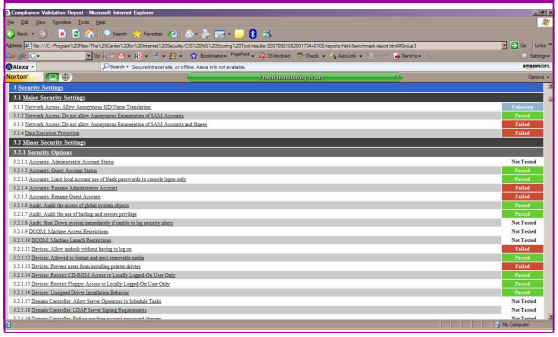
http://www.cisecurity.org/



Windows OS Security Audit (2)



Windows OS Security Audit (3)

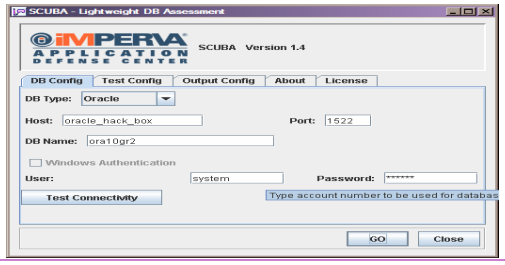


What to audit (First?)

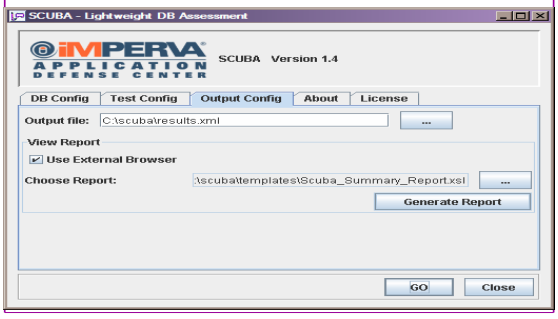
- Perform a password audit – use a tool such as orabf – http://www.toolcrypt.org/index.html?orabf
- File system
  - look for passwords
  - permissions
- Audit basic configuration
  - Parameters
  - User accounts that exist
  - Privileges on objects
  - Privileges assigned to users
- Use one of the free tools – CIS, OScanner, Scuba

Sample Audit Checks using SCUBA

http://www.imperva.com/application_defense_center/scuba/



Sample Audit Checks using SCUBA



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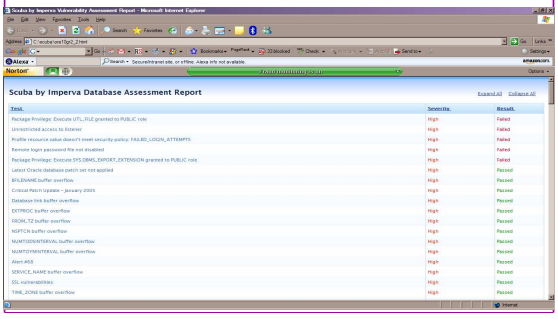
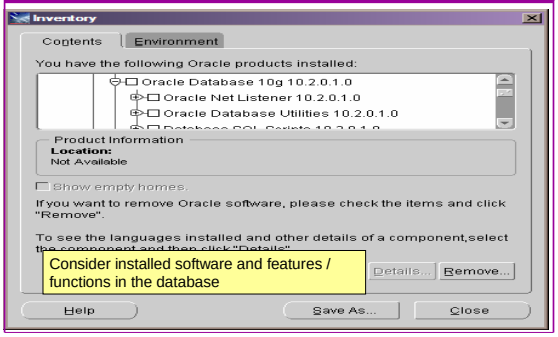


Hardening

- Reduce the features and functions installed – OS and DB
- Harden the OS – covered above
- Review RBAC for all users
- Remove defaults – settings, users, passwords
- Decide on secure configuration settings
- Clean up
- Create processes and policies to ensure secure data going forward

Features



RBAC

- Review the complete RBAC model
- Understand default schemas installed and why
- Understand the application schemas
  - Privileges, objects, resources
- Understand which accounts are Admin / user / Application Admin etc
  - Consider privileges, objects, resources
- lock accounts if possible
  - reduce attack surface

Defaults

- Defaults are one of the biggest issues in Oracle
- Most default accounts in existence
- Tens of thousands of public privileges granted
- Many default roles and privileges
  - Many application developers use default Roles unfortunately
- Reduce the Public privileges as much as possible
- Do not use default accounts
- Do not use default roles including DBA
- Do not use default passwords

Database Configuration

- Default database installations cause some weak configurations
- Review all
  - configuration parameters
  - File permissions
- Some examples
  - No audit configuration by default (fixed in 10gR2 for new installs)
  - No password management (fixed in 10gR2 new installs)

Clean Up

- This is the security killer in most systems I see
- Often file systems include
  - Scripts with passwords
  - Use tools such as
    - Oracle Password Repository
    - Mkstore from Oracle
    - DBMS_JOBS, DBMS_SCHEDULER
    - OS authenticated users under certain circumstances
- Clean up
  - ad-hoc scripts
  - Maintenance evidence
  - Trace files
  - Audit logs….

Create a Policy

- Perform an Oracle database audit
- Define what the key/critical issues are
- Determine / decide what to fix
- Work on a top 20 basis and cycle (This is effective for new hardening)
- Create a baseline standard
  - A document
  - Scripts – maybe for BMC
  - Commercial tool such as AppDetective

Decide what to fix

- My extensive experience of auditing Oracle databases is that there are
  - Usually a lot of security issues
  - Usually a lot are serious – i.e. server access could be gained if the issue is not plugged
  - There are constraints on the applications, working practice, practicality of fixing
- The best approach is to classify issues
  - Must fix now (really serious), fix as soon as possible, fix when convenient, maybe more
- Create a top ten / twenty approach

Enable Database Auditing

- Every database I have ever audited has no database audit enabled – ok a small number do, but usually the purpose if for management / work / ??? but not for audit purposes.
- Core audit doesn't kill performance
  - Oracle have recommended 24 core system audit settings since 10gR2 – these can be enabled and added to in earlier databases
  - Avoid object audit unless you analyse access trends then its Ok
- On Windows audit directed to the OS goes to the event Log
- By default all SYSDBA connections are audited – also to the event log on Windows
- VBScript / SQL can be used to access the event log

Conclusions

- Securing Oracle on Windows is not drastically different to Unix
- Most documentation / checklists / tools are valid for Windows
- Most Oracle security tools are available on Windows – don't install them on prod!
- The key techniques are the same
- Database security is about the data and Oracle isolates the OS quite well
- Don't forget to harden the OS though!

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Any Questions?

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