Oracle database security checklist pdf

This is the only authoritative book on Oracle Security, Oracle Privacy and Oracle Auditing written by two of the world's leading Oracle Security experts. This indispensable book is only $39.95 and has an instant download of working security scripts: This chapter gives you a broad overview of the many types of tasks you have to confront in order to build a good security. Understanding the different categories of such data improves the likelihood of preventing security vulnerabilities. Such gaps, whether exploited by mistake or intentionally, can undermine or overwhelm the otherwise tight security that you have created in other areas. Chapter 1 introduced the requirements of good security, threats to it and concepts that have proved useful in creating practical methods for developing and maintaining it. The overview presented here, in this chapter, identifies categories of data useful for meeting these requirements and threats. This chapter presents brief descriptions of these categories and tasks, with cross-references to Parts 2 and 3, which describe the important details necessary for their implementation. Good security requires physical access control, reliable personnel, reliable installation and configuration procedures, secure communication, and control of database operations such as selection, display, update, or deletion of database records. Since some of these requirements involve applications or stored procedures as well as human action, safety procedures must also account for the development and treatment of these programmes. Practical concerns must also be addressed: minimising the cost of equipment, staff, and training, minimising delays and failures, and maximising prompt and thorough accountability. Scalability is also an important and independent practical criterion that should be assessed for each proposed solution. These are therefore the categories to which this overview is concerned. They are discussed in the following sections: Physical access control checklist slated for access without a key or badge, or without being required to show identity or authorization. Controlling physical access is your first line of defense, protecting your data (and your staff) against the simplest of accidental or malicious intrusions and interference. Lack of such control can make it easier to observe, copy or steal your other security checks, including internal keys, key codes, brand numbers or badges, and so on. Of course, the security of these actions also depends on how alert and security-aware each of your staff is, but physical access control stops a variety of potential problems before they even get started. Each organisation must evaluate its own risks and budget. Develop measures can be not be needed, depending on many factors: company size, risk risk internal access controls, quantity and frequency of third-party visitors, and so on. Preparations for responsibility and recovery are further considerations, possibly prompting alarms or video surveillance of inputs. The visibility of these preparations may also act as a deterrent. Improving your facility's physical access control can add to your security. Makes it difficult to enter, difficult to stay or leave unobserved or unidentified, difficult to get into sensitive or safe areas inside, and difficult not to leave a trace. Staff checklist Your staff makes your organization work, good or bad, depending on who they are and how they are managed. Your safety is critically dependent on them: firstly, on how honest and reliable they are, and secondly, on how aware and attentive they are to security issues and considerations. The first question is a question of selection, interviews, observation, and reference control. Done well, these skills can prevent your hiring people who are (or are likely to be) unsuitable for tasks or environments that depend on establishing and maintaining security. To a very large extent, safety depends on individuals: when they become careless, resentful or larcenous, tight safety comes off or disappears. Your other actions do not matter if they are carelessly or deliberately undermined or sabotaged. The second question is how aware and alert your staff are to security issues and considerations. Such consciousness is only partly a matter of background: the environment and education you provide are the most significant influences, given the basic honesty and intention to cooperate. When an organization both shows and says that safety is important, by establishing and enforcing security procedures and by providing training and bulletins about it, learning and adapting people. The result is better security and security for them, as well as for the organization's data and products. Secure checklist for installation and configuration Information security, privacy, and protection of company assets and data are critical to every business. For databases, establishing a secure configuration is a very strong first line of defense, using industry standard best security practices for operational database deployments. The following list of such practices is deliberately general to remain short. Additional details for each recommendation as it apply to Oracle Database are shown in Chapter 7, Security Policies. Additional specific descriptions of database-related data and actions can be found throughout oracle's documentation set. Implementing the following ten recommendations provides the basis for a secure configuration: Install only what is required. Make a custom installation. Avoid installing options and products that you Need. Choose to install only the additional products and options, in addition to the database server, that you do Need. Or, if you decide to do a typical installation instead, improve your security after the installation processes, by deinstalling the options and products you don't need. Lock and expire default user accounts. The Oracle database installs user accounts with many standard (preset) database server user accounts. In the successful creation of a database server instance, the database configuration assistant automatically locks and expires most default database user accounts. Note: If you use Oracle Universal Installer or Database Configuration Assistant, they will ask for new SYS and SYSTEM passwords, and will not accept default change_on_install or manager, respectively. Once the database is installed, lock SYS and SYSTEM as well, and use AS SYSDBA for administrator access. Enter administrative passwords individually. This account (AS SYSDBA) tracks the operating system's user name, maintaining responsibility. If you only need access to start and shut down the database, use AS SYSOPER instead. SYSOPER has fewer administrator privileges than SYS, but enough to perform basic tasks such as startup/shutdown, assembly, backup, archive, and restore. The database configuration assistant is not used during a manual installation, so all standard database users remain unlocked and can gain unauthorized access to data or to interfere with database operations. Therefore, after a manual installation, use SQL to lock and expire all standard database user accounts except SYS, SYSTEM, SCOTT, and DBSNMP. (Make it to SCOTT too, if it is not actively used. Also lock SYS and SYSTEM as described earlier.) If a locked account is later needed, a database administrator can simply unlock and activate that account with a new, meaningful password. Change the Default User Password. Security is most easily compromised when a default database server user account still has a default password even after installation. Three steps fix this: Change the default passwords for administrative users immediately after installing the database server. In any Oracle environment (production or test), assign strong, meaningful passwords to SYS and SYSTEM user accounts immediately upon successful installation of the database server. Under no circumstances may sys and system passwords remain in their default states. Similarly, for production environments, do not use default passwords for any administrative accounts, including SYSMAN and DBSNMP. Change the default passwords for all users immediately after installation. Locks and expires all default accounts after installation. If such an account is later activated, change its default password to a new meaningful password. Force password management. Apply basic password management rules, such as history and complexity, on all user passwords. Require all users to change their passwords regularly, such as every eight-eighth If possible, use Oracle Advanced Security (an alternative to enterprise edition of Oracle Database) with network authentication services (such as Kerberos), token cards, smart cards, or X.509 certificates. These services provide strong user authentication and enable better protection against unauthorized access. Enable data protection words. Implement data protection word protection to prevent users who have any system privilege from using it on the data dictionary. Oracle Database sets O7_DICTIONARY_ACCESSIBILITY to FALSE. This setting prevents the use of any system privilege on the data dictionary, with the exception of authorized users who make DBA-privileged connections (such as CONNECT/AS SYSDBA). practice the principle of minimum privilege. Three practices implement this principle: Grant necessary privileges only. Do not give database users more privileges than necessary. Enable only the privileges that are actually required to perform the required jobs efficiently: 1) Limit the number of system and object permissions granted to database users, and 2) Limit the number of SYS-privileged connections to the database as much as possible. For example, there is generally no need to grant CREATE ANY TABLE to any non-DBA privileged user. Revoke unnecessary privileges and roles from the public user group of the database server. This default role, granted to each user in an Oracle database, allows unlimited use of its privileges, such as EXECUTE on different PL/SQL packages. If unnecessary privileges and roles are not revoked from public, a minimally privileged user could access and execute packets otherwise unavailable to him. The more powerful packages that may be misused are listed in Chapter 7, Security Policies. Restrict permissions on runtime facilities. Do not assign all permissions to a database server runtime facility, such as Oracle Java Virtual Machine (OJVM). Instead, grant special permissions to the explicit document root file paths for such sites that can execute files and packets outside the database server. Examples are listed in Chapter 7, Security Policies. Force access controls effectively. Authenticate clients properly. Although remote authentication can be enabled (TRUE), your installation is more secure with the off (FALSE, which is the default). With remote authentication turned on, the database implicitly trusts each client, because it assumes each client was authenticated by remotely authenticating the system. However, clients in general (such as remote computers) cannot be trusted to perform proper operating system authentication, so turning on this feature is a very poor security practice. To enforce proper server-based authentication of clients connecting to an Oracle database, leave or turn off this feature default). Restrict access to the operating system. four four implement appropriate operating system access restrictions: Limit the number of operating system users. Limit the privileges of operating system accounts (administrative, root-privileged, or DBA) on the Oracle Database (physical machine) host to the least and least powerful privileges required for each user. Fail to change the default permissions for the Oracle Database home directory (installation) or its contents, even by privileged operating system users or the Oracle owner. Limit symbolic links. Make sure that when any path or file to the database is provided, neither that file nor any part of that path is modifiable by an untrusted user. The file and all components of the path should be owned by DBA or any trusted account, such as root. This recommendation applies to all types of files: data files, log files, trace files, external tables, bfiles, and so on. Restrict Network Access. (See Network Security Checklists later in this chapter for appropriate methods.) Apply all security patches and solutions. Plug any safety hole or breach as soon as corrective action is identified. Always apply all relevant and up-to-date security patches to both the host operating system and Oracle Database itself, and to all installed Oracle Database options and components. Check the Oracle Technology Network security site regularly for details of security alerts released by Oracle Corporation: also check the Oracle Worldwide Support Service website, Metalink, for information about available and upcoming security patches: Contact Oracle Security Products. If you believe that you have found a security flaw in Oracle Database, submit an iTAR to Oracle Worldwide Support Services using Metalink or email a full description of the issue, including product version and platform, along with any exploit scripts and examples, to the following address: secalert_us@oracle.com Networking Security Checklists Security for Network Communication is improved by using client, listener, and network checklists to create thorough protection. Using Secure Sockets Layer (SSL) is an important part of these lists, enabling the highest security for authentication and communication. SSL (Secure Sockets Layer) Checklist SSL is the Internet standard protocol for secure communication, which provides mechanisms for data integrity and data encryption. These mechanisms can protect the messages sent and received by you or by applications and servers, with support for secure authentication, authorization, and messaging using certificates, and encryption if necessary. Good safety practices maximise all of these protections and minimize gaps or disclosures Them. While the primary documentation for Oracle's SSL configuration and practices is Oracle Advanced Security Security Guide, the following basic list illustrates careful attention to detail necessary for the successful, secure use of SSL: Make sure that configuration files (as for clients and listeners) use the correct port for SSL, which is the port configured during installation. You can run HTTPS on any port, but the standards set port 443, where any HTTPS-compatible browser looks default. Or the port can be specified in the url,for example (for port 4445): If a firewall is used, it must also use the same port(s) for secure (SSL) communication. Ensure that TCPS is specified as the protocol in the ADDRESS parameter in the tnsnames.ora file (usually on the client or in the LDAP directory). The identical specification must appear in the listener.ora file (usually in $ORACLE_HOME/network/admin directory). Make sure that SSL mode is consistent for both ends of each communication. For example, between the database on one side and the user or application on the other. This mode can indicate that there is only client or server authentication (one-way), both client and server authentication (bidirectional), or no authentication. Make sure that the server supports the client cipher suites and the certificate key algorithm that will be used. Do not remove the encryption from your RSA private key inside your server.key file, which requires you to enter your pass phrase to read and interpret this file. (A server that is not SSL-aware does not require such a phrase.) However, if you were to determine that your server is secure enough, you would be able to remove the encryption from the RSA private key while preserving the original file. This would allow system boot scripts to start the server, because no pass phrase would be needed. However, be very sure that permissions on the .key file only allow root or web server user to read it. Ideally, limit permissions to root alone, and have the web server boot as root but run as another server. Otherwise, anyone who receives this key can impersonate you online. Client checklist Because authenticating client computers over the Internet is problematic, user authentication is usually done instead. This approach avoids client system problems that include counterfeit IP addresses, hacked operating systems or applications, and forged or stolen client system identities. Nevertheless, the following steps improve the security of client connections: Configure the connection to use SSL. Using SSL (Secure Sockets Layer) communication makes eavesdropping unfruitful and enables the use of certificates for user and server authentication. Configure certificate authentication for clients and servers. Listener checklist Because the listener acts as the database gateway to the network, it is important to limit the consequences of malicious Limit the privileges of the listener so that it cannot read or or files in the database or the Oracle server address space. This restriction prevents external procedure agents played by the listener (or procedures performed by such an agent) from inheriting the ability to make such reads or writes. The owner of this sepasrate listening process should not be the owner who installed Oracle or executes the Oracle instance (for example, ORACLE, the default owner). Secure administration through the following four steps: Password protect the listener. Prevent on-line administration. Use SSL when administering the listener. If you do not intend to use such procedures, remove the external procedure configuration from the listener.ora file. Monitor listener activity. Network Checklist Protecting your network and its traffic from inappropriate access or modification is at the heart of network security. The following methods improve network security: Restrict physical access to the network. Make it difficult to pin devices to listen to, interfere with, or create communication. Protect network access points from unauthorized access. This goal includes protecting the network-related software on the computers, bridges, and routers used in communication. Because you can't protect physical addresses when you transfer data over the Internet, use encryption when that data needs to be secure. Use firewalls. Appropriately located and configured firewalls can prevent third-party people from accessing your organization's intranet when you allow internal users to access the Internet. Keep the database server behind a firewall. Oracle Databases network infrastructure supports a variety of firewalls from different vendors; example is set out in Chapter 7, Security Principles. Make sure that the firewall is located outside the network to be protected. Configure the firewall to accept only those protocols, applications, or client/server sources that you know are secure. Use a product such as Oracle Connection Manager to multiple client network sessions over a single network connection to the database. It can filter by source, destination, and host name. This feature allows you to ensure that connections are accepted only from physically secure terminals or from application Web servers with known IP addresses. (Filtering on IP address alone is not sufficient for authentication, as it may be fake.) Never poke a hole through a firewall. For example, do not leave open the Oracle Listeners 1521 port, which allows the database to connect to the Internet or the Internet to connect with the database. Such a hole introduces significant security problems that hackers are likely to exploit. They can enable even more port openings through the firewall, create server problems with multiple threads, and access important information about databases behind the firewall. If the Listener is running without an established password, they can probe critical details of the databases it listens to. These details include tracking and logging information, banner information, and database descriptors and service names, enabling malicious and malicious attacks on target databases. Prevent unauthorized administration of Oracle Listener. Always establish a meaningful, well-formed password for Oracle Listener, to prevent remote configuration of the Oracle Listener. Further, prevent unauthorized administration of the Oracle listener, as described in Chapter 7, security policies. Check network IP addresses. Use the Oracle Net Valid Node Control security feature to allow or deny access to Oracle server processes from network clients with specified IP addresses. Set parameters in the protocol.ora (Oracle Net configuration file) file to specify client IP addresses, respectively, denied or allowed connections to the Oracle listener. This action prevents potential Denial of Service attacks. Encrypt network traffic. If possible, use Oracle Advanced Security to encrypt network traffic between clients, databases, and application servers. (Note that Oracle Advanced Security is only available with the Enterprise Edition of the Oracle database). Harden the host operating system (the system on which Oracle Database is located). Disable all unnecessary operating system services. Many UNIX and Windows services are not necessary for most deployments. Such services include FTP, TFTP, TELNET and so on. For each disabled service, be sure to close both the UDP and TCP ports. Leaving either type of port enabled leaves the operating system vulnerable. In summary, consider all routes data travel and assess the threats that impinge on each path and node. Then take steps to reduce or eliminate these threats and the consequences of a successful breach of security. Also monitor and review to detect either increased threat levels or successful penetration. Penetration.

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