An Oracle White Paper
January 2013

Oracle Hyperion Planning on the Oracle Database Appliance using Oracle Transparent Data Encryption

Executive Overview

Oracle Hyperion Planning is a centralized, Excel and Web-based planning, budgeting and forecasting solution that integrates financial and operational planning processes and improves business predictability. Planning where your application is to be installed, run, and implementing security can be time consuming and confusing. Protecting sensitive information is a top priority for all organizations. The amount of sensitive information collected and transmitted will continue to increase dramatically as organizations strive to achieve increased efficiencies and consumers continue to embrace Internet based commerce.

The Oracle Database Appliance is a pre-configured, highly available Oracle database system. It is a complete system that includes hardware, software, networking, and storage, all packaged in a single 4-U rack installable box. The hardware configuration provides complete redundancy and protects against all single points of failures in the system.

This paper summarizes performance testing carried out for Oracle's Hyperion Planning, a component of Oracle's Enterprise Performance Management (EPM) System, using the Oracle RDBMS with Oracle Transparent Data Encryption. These tests, which used EPM version 11.1.2.1 running on the Oracle Database Appliance, demonstrates that there is negligible impact in performance for Planning users when encryption is enabled for the Oracle database.

Introduction

Hyperion Planning

Planning is a Web-based budgeting and planning solution, driving collaborative, event-based operational planning processes throughout the organization for a wide range of financial and operational needs, enabling Web users to enter, analyze, and report on data, manage the planning process, and personalize data-entry forms.

Planning is a comprehensive approach for the complete and closed-loop planning process that drives continuous business improvement. With Planning, decision-makers and front-line managers can communicate which course of action to take and get budget-holders to collaborate so that the planning process is optimized and efficient. When an event causes a

change in direction, planners have the flexibility to adapt rapidly, ensuring that plans are relevant and useful.

Planning benefits:

- Facilitates collaboration, communication, and control across multidivisional global enterprises
- Provides a framework for perpetual planning, with attention to managing volatility and frequent planning cycles
- Provides ease of use and deployment through the Web or Oracle® Hyperion Smart View for Office, Fusion Edition
- Reduces the total cost of ownership through a shorter rollout and implementation phase and easier applications maintenance
- Enhances decision-making with reporting, analysis, and planning
- Promotes modeling by including complex business rules and allocations
- Integrates with Oracle Hyperion Smart View for Office, Fusion Edition, so you can design worksheets in Microsoft Excel to enter, format, analyze, and report on data in a Planning application. Using Smart Slices—subsets of data forms—in Smart View, you also can perform ad hoc analysis. See the *Oracle Hyperion Smart View for Office, Fusion Edition, User's Guide* for information about all Smart View functionality.
- Integrates with other systems to load data
- Enables you to enter and analyze data using Offline Planning when you are disconnected from the Internet—for example, on planes or at hotels—and later save the data back to the Planning server. (The administrator must enable this feature for the application.)

Oracle Advanced Security - Transparent Data Encryption

Oracle Advanced Security TDE provides both encryption of application *tablespaces* as well as individual application table *columns* such as credit card and social security numbers. TDE tablespace encryption eliminates the complexities of identifying and encrypting individual columns and achieves increased efficiencies resulting in higher performance. Customers upgrading to Oracle Database 11g can choose to skip the process of identifying which columns to encrypt and simply use TDE tablespace encryption to protect entire application tablespaces. All data stored in encrypted tablespaces will be automatically encrypted. Data that is stored in temporary and 'undo' tablespaces as well as redo logs is encrypted as well. When the database is backed up, the encrypted files remain encrypted on the destination media, protecting the information even when the backup media is lost or stolen. TDE tablespace encryption works seamlessly with Oracle Streams, Oracle Data Guard, Oracle Advanced Compression, Oracle Exadata Smart Scans, Exadata Hybrid Columnar Compression (EHCC) and databases running on Oracle Database Appliance. Storage savings achieved as a result of compression remain the same because data is encrypted after the compression process completes

Transparent Data Encryption (TDE) supports Intel AES-NI. Oracle Database 11g Release 2 (11.2) running on Intel Xeon 5600 series processor-based servers with Intel AES-NI shows a multifold increase in TDE encryption and decryption speed.

Oracle Database Appliance

Oracle Database Appliance is a two node RAC cluster database system running Oracle Linux operating system, Oracle Database, Oracle Clusterware and Automatic Storage Management. These components provide the foundation for the highly available databases operating on Oracle Database Appliance.

Oracle Database Appliance comprises of two independent, but interconnected compute nodes and direct attached SAS and SSD storage. The storage provides about 4 TB of usable space in a highly available, fully redundant configuration. Oracle Database Appliance requires minimal configuration and almost no performance tuning. Oracle Database Appliance includes Oracle Appliance Manager software to manage and maintain the database system, including patching of the entire stack, upgrades of all stack components, as well as end to end troubleshooting.

Oracle Database Appliance used as the platform for Oracle Hyperion Planning and implementing TDE will demonstrate the relative performance of Hyperion Planning when configured with an Oracle database using no encryption vs. Oracle Advanced Security Transparent Data Encryption for Planning metadata. This paper is not intended to be used as a benchmark, but instead to show that users will not notice much, if any impact from implementing encryption for the database.

Test Configuration

Hardware Setup

A simple configuration was used consisting of Oracle Database Appliance running Oracle Enterprise Linux 5.8 running Hyperion Planning, the EPM Foundation Software, Essbase the Oracle 11gR2.

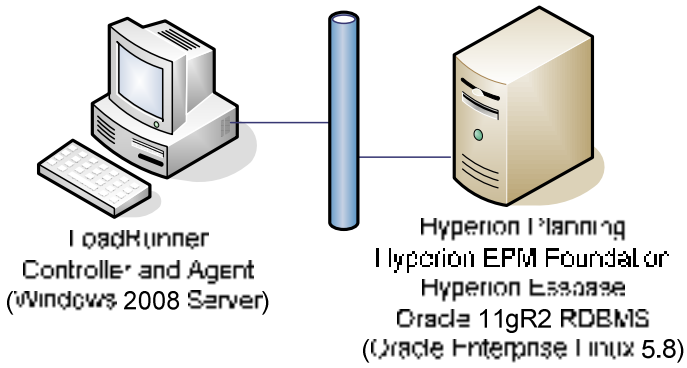

Figure 1 Hardware Configuration

Host	Operating System	Processor	Memory	Function
Client	Windows 2008 Server R2	2 x 3.2 GHz	3.5 GB	LoadRunner Controller and Load Generator
Server	Oracle Enterprise Linux 5.8	2 x 6-core 3.06 GHz CPU for each server node (system controller)	96GB for each server	Hyperion Planning Hyperion EPM Foundation Hyperion Essbase Oracle 11gR2 RDBMS

Installing Hyperion Planning on Database Appliance

To install the Hyperion Planning software on the Oracle Database Appliance, it follows the standard install process as documented in the Oracle® Enterprise Performance Management System Installation

and Configuration Guide, which can be found at the following location, http://docs.oracle.com/cd/E17236_01/epm.1112/epm_install_11121.pdf.

When you use the Oracle Database Appliance to host the database and application, the following steps were followed:

- *Deploy the Oracle Database Appliance using a Medium database template.*
  For more information on deploying the Oracle Database Appliance, please review the Getting Started documentation that can be found here: http://download.oracle.com/docs/cd/E22693_01/index.htm.
- *Download and install the Hyperion Planning software to the Oracle Database Appliance.*
  For the supported location to install applications on the Oracle Database Appliance, please take a look at My Oracle Support (MOS) note 1457717.1.
- *Convert the Hyperion Planning database tablespaces to use Oracle Advanced Security Transparent Data Encryption.*
  Oracle Advanced Security Transparent Data Encryption (TDE) makes encryption of sensitive data simple with no changes to the existing application code. For more information on TDE, please take a look here: http://www.oracle.com/technetwork/database/options/advanced-security/index-099011.html.
- *Load Data.*
  You are now ready to migrate data into the Oracle Database Appliance databases. Oracle Database Appliance: Migration Strategies may help you to choose the most efficient method to populate your new Hyperion Planning database. http://www.oracle.com/technetwork/server-storage/engineered-systems/database-appliance/documentation/oda-migration-strategies-1676870.pdf

Test Scenario

Hyperion Planning was loaded with an application originally provided by an actual customer. Two new forms were created for testing purposes, T1M (medium, 100 rows by 17 columns) and T1B (big, 100 rows by 34 columns).

Three different tests where run with the same client loads writing data in clear text or no encryption (baseline), Advanced Security – Transparent Data Encryption tablespace encryption, and Advanced Security – Transparent Data Encryption with Intel AES-NI activated tablespace encryption.

Client loads for Planning testing were simulated using LoadRunner 11. LoadRunner enables users to record browser actions in a file that can then be edited to add think time, transaction definitions, and parameters for substitution with random values. Using LoadRunner, Oracle developed a test script that included opening forms of two sizes, modifying data and writing back to Essbase, and executing two business rules (BR) assigned to the opened forms. The test script was then run repeatedly for each simulated client until the defined test schedule terminated them.

Random think times were included between all actions in the script. Two types of think time intervals were used in the tests. Shorter think times, between 2 and 15 seconds, were used primarily for navigation transactions, and medium think times, of 15 to 30 seconds, were used when working with opened forms and Business Rules.

Each simulated client chose a unique user name from 10,000 total registered users, thereby logging in many different users during the course of testing. Each user was limited to work with his unique point of view (POV) of the data, corresponding to actual use of a Planning application. The number of virtual users started at 20 and increased by 20 users every 10 minutes. Each test ran for approximately 3.5 hours, gradually ramping up to 400 users during that time. Additional details of the test scenario are provided below in Table 1.

Table 1 Planning User Transactions

Transaction Timer	Comment
1000_Home	Bringing Workspace Welcome page
1010_Login	Submit Login information
1200_OpenPlanning_Nasdaq	Open Applications-Planning-Nasdaq
1210_Open_T1M	Open 'Test1_medium'
1220_SelectPage_T1M	Select User's page
1230_FillSave_T1M	Enter some data and Save
1240_CollapseTrain_T1M	Collapse on 'Training and Educations'
1330_BR_Open_T1M	Open 'GI-Test1_Clean' BR
1340_BR_SelectMember_T1M	Select Members
1350_BR_ExpandAll_T1M	Expand All
1360_BR_Search_T1M	Search for user's page from step 1220
1370_BR_Launch_T1M	Launch BR
1380_Refresh_T1M	Refresh form
1215_Open_T1B	Open 'Test1_big'
1225_SelectPage_T1B	Select User's page
1235_FillSave_T1B	Enter some data and Save
1245_CollapseTrain_T1B	Collapse on 'Training and Educations'
1335_BR_Open_T1B	Open 'GI-Test1_Clean' BR
1345_BR_SelectMember_T1B	Select Members
1355_BR_ExpandAll_T1B	Expand All
1365_BR_Search_T1B	Search for user's page from step 1225
1375_BR_Launch_T1B	Launch BR
1385_Refresh_T1B	Refresh form
1090_CloseAll	File-Close-All
1100_Logout	Logout

Test Results

The first test executed was run to obtain baseline response time numbers using the Oracle database without any encryption at all. The same test was repeated with software encryption enabled for the

database, and again with hardware encryption. Figure 2 and Table 2 below show the full scenario response times for each simulated user session versus the user load for these three tests.

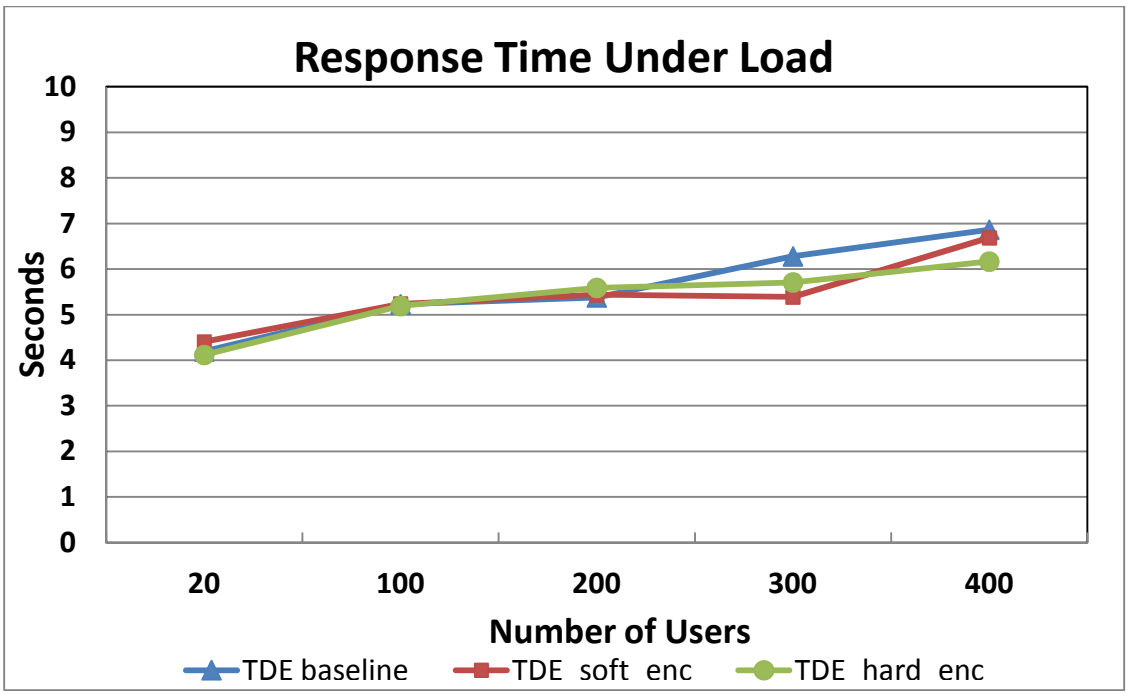

Figure 2 Total Scenario Response Times vs. Load

Table 2 Total Scenario Response Times

Test	Number of Users				
	20	100	200	300	400
Baseline	4.20	5.23	5.38	6.28	6.87
Software Encryption	4.40	5.24	5.46	5.39	6.69
Hardware Encryption	4.12	5.19	5.59	5.71	6.17

Conclusion

The use of Oracle 11.2.0.3 TDE for Hyperion Planning metadata will be completely transparent to end users. There is no discernible difference in scenario response times through 200 users, and the total difference for all transactions in the scenario was less than 1.5 seconds for 300 and 400 users.

White Paper Title
Jan 2013
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