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The RMOUG event calendar is a compilation of FREE educations webinars and webcasts gathered from any and all sources across the internet, as well as information about technology meetups in the Denver/Boulder metro area.

It is updated almost daily and covers topics on Oracle technology and related to Oracle technology.

Find FREE educational sessions to learn something new, or get a start on a new topic!

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The mission of RMOUG is two-fold...

1. Provide continuing education for practicing Oracle technology professionals
2. Encourage new entrants into the information technology

Fulfilling the first part of our mission is what the annual Training Days conferences, the quarterly educational workshops (QEWs), and this newsletter are all about.

Fulfilling the second part of our mission is all about ensuring that our successors are prepared and available to continue our work. A healthy and growing information technology (IT) industry is possible only where an educated and experienced workforce lives. Colorado has shown that IT has a home here, but upkeep is required.

To help encourage new qualified entrants to the IT industry, here in Colorado and elsewhere in the United States, RMOUG offers two scholarships...

1. Stan Yellott Scholarship
   • Offered quarterly, submission deadlines on 15-March, 15-June, 15-September, and 15-December each year, a total of $4000/year is budgeted

2. Women In Technology (WIT) Scholarship
   • Offered annually, submission deadline is 15-December, a total of $1000/year is budgeted

These scholarships are funded by RMOUG activities and by your donations. RMOUG is a certified charitable non-profit organization under section 501(c)3 of the IRS code (http://bit.ly/2hB7iIP), so any donations are fully tax-deductible.

Please go to http://www.rmoug.org/scholarship/scholarship-contribution/ for more information
On the Cover:

Our Winter cover photo award went to Sal Jr. Sal was born and raised on Long Island, New York, and worked as a computer programmer for an International freight forwarding company. He moved to Colorado in November of 2012. His hobbies are bowling, chess, and card playing. RMOUG appreciates Sal’s contributions to SQL>Update and for his gorgeous photos also used in the article headers.
It’s taken a little longer to get this issue of SQL>Update_RMOUG published, because this is my first experience as newsletter editor. It is not a trivial job, but it is rewarding, and I’d like to thank Pat Van Buskirk for so many years of publishing four newsletters each and every year. A remarkable achievement by a remarkable person!

At this time of year, the Training Days conference is upon us, and we’re looking forward to the 28th consecutive installment of the 4th-largest Oracle technology event in North America (after Oracle OpenWorld, Collaborate, and KScope), at the Colorado Convention Center in downtown Denver on Tuesday through Thursday, 07-09 February 2017. Come join us for two and a half days of the best professional education in the world.

Among the 120+ different sessions at TD2017 will be sessions on “cloud” technology. If the topic doesn’t excite your interest, then it likely has you rolling your eyes instead. Depending on one’s perspective, it is either an annoying buzzword or the next incremental groundswell to hit the information technology (IT) industry. Arguably, cloud services started 10 years ago with Amazon Web Services, and although joining somewhat late, at this point Oracle Corporation is deep into the second year of the second big pivot of its 40 year history, going “all in” on the cloud.

In 1977, Software Development Laboratories was founded and produced its flagship product, Oracle, as the first RDBMS. The company changed its name to Relational Software Inc, then to Oracle in 1982 and remained focused on technology for database and tools until the mid-1990s. Realizing that the future meant focusing on business applications and not on the underlying technology, Oracle performed its first company-wide pivot to focus on applications in 1995-1996. Since that time, every major move by Oracle has been to enhance this direction, to become the biggest provider of applications to almost every industry. This focus is ingrained so deeply that many felt that Oracle almost missed the cloud bandwagon, although it is more likely that Oracle was allowing the technology to mature to the point where it could exploit the upswell with its application suites.

At any rate, 20 years after its first major course correction, Oracle is making its second major course correction toward the cloud, and internally the impact is all-pervasive. Acquisitions, hiring, and firings are proceeding all at once. The traditional annual “June reorganizations” which followed the company’s fiscal year end on 31-May appear to be increasing to a quarterly or even monthly tempo. At some point, when the company settles into its new internal structure, the pace of change is likely to slow, but for now it is exciting or disconcerting to watch.

In the previous SQL>Update_RMOUG issue, in the summer of 2016, I commented on this phenomena in this column...

Most of the entire 130,000+ person corporation is being re-organized to align with a dozen different cloud products. Oracle is literally de-emphasizing on-premise products in favor of cloud-based products, across the board, affecting every nook and cranny of one of the largest technology companies in the world.

This “pivot to the cloud” is the biggest strategic move by Oracle since the company re-aligned away from database technology and toward applications in 1995. Back then, there were fewer than 20,000 employees and the company had not yet begun the buying spree of companies that continues to this day. At that time, the analogy that employees were using to visualize the shift was of Larry Ellison’s enormous yacht making a 90-degree turn in a small pond.

Today, with 20 years of rapid growth and corporate acquisitions, pivoting Oracle brings to mind the image of 10,000 boats, ranging in size from yachts to cabin-cruisers to canoes, all chained to another, each trying to perform another 90-degree turn in a small pond.

It is an image that boggles the mind. It takes an enormous amount of will, of effort, of resolve, and of courage, and we are all excited to see how Oracle Corporation looks and performs when this shift is completed.

Of course, such a huge pivot internally is going to have an effect externally, and I’ve recently been involved with some conversations on online forums that underscore this point. First, there is still some vagueness about exactly what the “cloud” comprises, and what the impact will be closer to home.

I see first-hand viewpoints such as “we’re doing a migration to cloud, and it’s no big deal” to breathless sales promotions that “cloud changes everything”, from breezy assurances from old hands that “migrating to cloud just is just new servers not in our data center” to doom-laden wails from the panicked that “cloud is the end of the IT industry”.

From The President
None of this is totally correct. None of this is totally incorrect. There is truth in all these statements, and each of these statements come from perspective, rather like the old adage about blind people describing an elephant, where one touches a leg and states, “it’s like a tree”, another touches the flank and states, “it’s like a wall”, another grabs the trunk and states, “it’s like a snake”.

By way of explanation, the differences in perspective could be due to the fact that “cloud services” have three major layers: IaaS, PaaS, and SaaS.

SaaS (software as a service) involves complete IT solutions (i.e. Salesforce, Google Calendar, Gmail, NetSuite, Confluence, JIRA, etc), so it could mean the elimination of most IT roles.

PaaS (platform as a service) involves tools like databases or development environments, with Oracle APEX or Amazon RDS as good examples. With PaaS migration, the cloud company is supporting a limited set of database choices, and companies are developing solutions using those tools.

IaaS (infrastructure as a service) basically means “servers” and “storage”, with AWS EC2 and S3 being classic examples, respectively. With IaaS, the SysAdmin role along with the data-center has largely been eliminated, and as a result, DBAs, developers, and application leads are allocating virtual machines in IaaS. Migrating to IaaS is largely no different than migrating to different servers. The major gotcha is the OS platform, as most IaaS vendors only support x86 servers running Linux and Windows. With IaaS migration, databases and applications are not “supported” by the cloud company unless such a service is purchased additionally, so it is largely up to the customer to manage and deploy on IaaS.

So while “most companies” are indeed migrating to the “cloud”, sometimes they are migrating to IaaS (a.k.a. someone else’s servers), sometimes they are migrating to PaaS (a.k.a. someone else’s tools), and sometimes they are migrating to SaaS (i.e. someone else’s IT department).

The driving factor isn’t necessarily lower cost, because the “pay as you go” pricing model can get very expensive at the high end. The real attraction is agility, the ability to provision instantly, and the ability to add more resources when needed, and the ability to remove resources when no longer needed. As such, production systems are certain to migrate last, but non-production environments are certain to migrate first into what is called “hybrid data center”. Environments for development, QA/testing, break/fix maintenance, and training are the ones where agility is needed most, so there is a natural fit for such systems with IaaS.

The most important point is to understand which choice your company is making, when, and plan accordingly.

You might work in the IT department for a financial services company, or a consumer packaged-goods, or a retail company. In that situation, IT supports the real business of the company, and senior leadership might decide that it is important to focus on the core business goals, and outsource supporting functions as much as possible.

You might work for a telecommunications company, or a manufacturing company. In that situation, IT is an integral part of the main business of the company, and senior leadership understands that this tight integration is both crucial to success, and difficult to unravel.

You might work for a cloud services company, or a technology vendor. In that situation, technology is the main business of the company, and senior leadership understands that only continual reinvestment in technology and IT people will lead to company success.

Developments in the cloud are only the latest big changes that continue to roll through the IT industry. The tempo for such innovations seems to be increasing.

- The first wave of mainframe-based commercial deployments covered about 25-30 years, from the 1960s to the 1980s.
- After the advent of desktops and departmental computing in the 1980s, client-server computing gained momentum in the 1990s, over a period of period of perhaps 8-10 years.
- Web-based 3-tier architectures came to dominate on-premise in the 2000s, and then co-location and/or hosting of these architectures arose in the 2010 timeframe. The problem with co-location/hosting services is that it continues just-in-time, budgeted provisioning of compute and storage (i.e. slow).
- In the late 2000s, AWS was experimental, but in the past 5 years, IaaS services have begun to dominate. The main difference between co-location/hosting and IaaS is instant provisioning and pay-as-you-go pricing (i.e. agility).

Re-training oneself to master new skills is the way to survive in our industry. RMOUG itself is evolving, providing more information on skillsets such as cloud, Big Data, virtualization, and new applications.

At TD2017, RMOUG is joining for the first time with the local Colorado Oracle Applications Users Group (COAUG - "http://colorado.communities.oaug.org/"), which is associated with the international OAUG for E-Business Suites, and the local Rocky Mountain Users Group (RMUG - “https://www.linkedin.com/groups/3804489”), which is associated with the international Quest users group for Peoplesoft and JD Edwards applications.

Together, RMOUG, COAUG, and RMUG are presenting a comprehensive, collaborative conference on all aspects of Oracle technology at Training Days 2017.

Please register at “http://www.rmoug.org/training/training-days-2017-registration/” and join us to keep up with the changes in our industry and in your daily work life.
Oracle DBaaS
A Real Cloud - Not Just Vapor
John King

Introduction
Oracle has been king of the database hill for many years. Now, they’re extending that dominance to the cloud. Oracle DataBase as a Service (DBaaS) uses the Platform as a Service (PaaS) model to enable deployment and management of Oracle database instances in the cloud.

Using Oracle’s DataBase as a Service (DBaaS) is quick and easy. In the example below I create and deploy an Oracle SE instance in about thirty minutes; about twenty of that was waiting for the system to complete provisioning. Have you ever been able to create a database and the server space it required so simply or so quickly? Once you have Oracle’s DBaaS, instance creation and deployment can be as easy as following a wizard-based process; no forms to fill out from you operations people and no hardware to purchase/allocate.

Creating a New Service
First you must have an Oracle Cloud account with DBaaS (you can go through your Oracle Sales team, but, Oracle offers free trials at https://cloud.oracle.com/home). Log in and go to “My Services” as shown below. Click on “Create Service” to begin the wizard-based process.

Subscription Type and Billing Frequency
The first screen in the process asks that you choose to create the database entirely with wizards (as I do in this paper), manually, or using DBCA (Database Configuration Assistant). You also need to choose the billing frequency desired; you can pay by the hour or pay by the month (unlimited hours).

Software Release
The next stage in the process is to specify the database version to be used. (At Oracle Open World 2016 Larry Ellison confirmed that Oracle 12c 12.2 will be available first to Oracle DBaaS cloud customers and only later to on-premise shops. As of November 2016 Oracle 12c 12.2 is available to Oracle Exadata Express Edition and Oracle DBaaS cloud customers. Availability outside the cloud will probably occur sometime in early 2017.)

Software Edition
Part of Oracle DBaaS’s flexibility is allowing you to choose a Standard Edition (SE) database as shown below; or one of three “flavors” of Oracle Enterprise Edition.

Service Details (Configuration)
The Service Details panel allows detailed specification of the Database Service including Service Configuration, Backup and Recovery Configuration, and Database Configuration. For the sake
of this example I did not set up Backup and Recovery and went with the simplest setup possible. However, as you can see it is possible to create your instance based upon an existing backup; or to manually choose from many options allowing specification of a complex, fully protected database including “shape” and disk requirements (shape is a resource profile including number of OCPUs and amount of memory).

**SSH Public Key**

Security is a significant concern in today’s world; Oracle’s DBaaS requires that you provide a valid SSH (Secure Shell) key to protect your cloud resource. On UNIX/Linux/Mac this means running the “ssh-keygen” line command, on Windows this is usually accomplished using PuTTYgen’s SSH-2 RSA feature. You will specify a “passphrase” and create a public key and a private key. You will use the public key when creating the DBaaS service instance and the private key when accessing it later.

Choose the “Edit” button provided to direct the wizard to your SSH Public Key file selection. The public key is used to define the DBaaS instance; the private key will be used when accessing the instance (see below).

[Image: ssh_key.png]

Here is the screen with the public key file in place. Next select the “shape” of the instance. In this example I selected a simple single CPU with minimal RAM; most of the instances I create are for training developers so this is more than adequate. Your applications might require significantly greater resources, so choose them!

**Backup and Recovery**

In this example; I opted to skip having backup and recovery. For most of my training courses this is the appropriate decision. Your production systems will probably require that you more-fully protect your data.

**Database Configuration**

In the final part of the screen you may choose to create the instance from an existing backup; or you may specify several options to complete the database configuration: file storage; admin password, SID, PDB name, character sets, and whether or not to enable Oracle GoldenGate.

**Confirmation Page**

Finally, the “Create Service Instance” wizard provides a confirmation page allowing you to review and if necessary go back and change settings.
Create Service Completed!

Once the service is created; a message appears with the start and stop time (about 20 min below, times vary). Note that the service has now been assigned an IP address and a connect string.

Service Created

Once the service is created; you are returned to the Cloud Services Dashboard where the new service is listed. However, it may take a while for provisioning and deployment to complete. Clicking on the instance name “sedemo1” in the example below takes you to a page that shows many specifics for the instance.

Instance Specifics - Abbreviated

The screen below shows that the instance is not yet completely provisioned as illustrated by the lack of IP address and the “In Progress” message at the bottom of the page. To see more details, click the “show more” link.

Instance Specifics – Detailed

After clicking “show more” greater detail is displayed about the DBaaS service instance. Note, still “in progress” – this can sometimes take 15-20 minutes.

Congratulations!

Congratulations, you have now created and provisioned an Oracle Database as a Service (DBaaS) service instance.

Oracle’s Database as a Service provides a quick and simple mechanism to use the world’s premier ORDBMS (Oracle) from the cloud. Spread the word.

About the Author:

John Jay King is a partner in King Training Resources, a firm providing customized training for IT professionals since 1988. John has worked with Oracle database and its tools since Oracle Version 4; he is an Oracle ACE Director, member of the Oak Table Network, member of the Arizona Oracle User Group board, and long-time member of RMOUG. He presents frequently at Oracle Open World and user group events in the USA and around the world.

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As companies and agencies continue to evaluate how this new Apache technology can reap value from operational data, they begin to realize that the technical and cultural origins of Hadoop are different from the way they have been doing things. This is why the transition is much harder than anyone is willing to admit. My experience at Hortonworks exposed me to customers struggling and succeeding with adopting this new technology. For me, it brought into relief the difference in approach between the enterprise and web-scale worlds.

**Legacy Practices, Legacy Doctrine**

Oracle grew out of the IBM mainframe business, so it had to be just as reliable, and cheaper. Hadoop grew out of Yahoo!’s need to solve their problem of keeping up with Google. Hadoop was designed to cost-effectively analyze hundreds of TBs (Terabytes) of data quickly and with little operational burden. Hadoop was neither developed by a software vendor, nor designed to displace an existing commercial ecosystem.

Frequently, the initial attraction is to save OPEX (Operational Expenses) or the realization that the legacy OLAP (Online Analytic Processing)/data warehouse has hit the wall. The price/performance and scalability of Hadoop running workloads for which it was best suited has been proven and remains unrivaled at scales of thousands of nodes. Early adopters with large datasets had to figure out how to program these clusters and adopted a new culture that was better suited to high performance computing.

It is already recognized that ETL (Extract Transform Load) is becoming (Extract, Load Multiple-Parallel) ELmpT. Traditional tools transformed data on platforms separate from the database to minimize impact. For Hadoop, it is broken into an EL phase that concentrates on getting data moved quickly and simply. Once the data is landed, the economics and headroom of Hadoop allows multiple transformation pipelines to experiment and determine whether SQL, K/V (Key/Value) or Graph processing is best. In another twist of doctrine, a development cluster might be much larger than a production cluster. Non-production clusters can still get real work done.

If some enterprises are now questioning whether Hadoop even works, it is not a failure of the technology. It’s a difference in expectations derived from doctrine—an impedance mismatch between how things have been done and how things at Facebook are done. The question is whether the Apache ecosystem makes sense for customers in their current stage of evolution. I believe that is a matter of when, not if.

Anyone who remembers trying to use Oracle during the first 10 years of its life will acknowledge this takes time. The transition will take extra time since Hadoop did not evolve from the IBM/Oracle commercial processing world.

**DIY Supercomputing**

I started off programming supercomputers that would have filled a 5-car garage, so performance has always been a part of my DNA. At Oracle, I worked on SMP (Symmetric Multi-Processor) performance and cluster scaling for the DB kernel as well as the underlying OS kernels and hardware. Most customers don’t obsess about efficiency and scale until they have to. Oracle depends on many components in the platform responding to the needs of the workload. The application architecture and resulting query plans also play a serious role in creating those needs, but changing how an application is designed and deployed is a delicate conversation involving doctrine. Hadoop had to challenge these application, platform and computing doctrines. Every assumption about how to build massively scalable databases had to be deconstructed and re-validated in order to cost-effectively solve Petabyte (PB)-scale problems.

At Yahoo!, cost, scale and availability were prioritized over absolute durability. These altered priorities forced many changes in practices and technology. Hadoop was developed because there were no alternatives that were affordable to operate at scale. Hadoop was designed to meet all these criteria, but was never designed to be a product in the traditional enterprise sense.

The enterprise analytics market wasn’t ever all that Do-it-yourself (DIY), so the DIY nature of Hadoop throws a wrench into things. It is powerful, but some assembly is required.
Accounting vs. Analytics

As Cloudera and Hortonworks commercialized Hadoop, it was being sold into enterprises whose only experience with analytic data processing was with their relational/transactional systems that accumulated enough historic data to amass analytic interest. A relational/transactional system is designed to worry about the contents of a column. There are a lot of code-path, memory, bus contention and write latency demands put on a platform to make sure transactions complete quickly and safely. One of the hardest things to make a platform do is randomly write things into memory or onto disk. Insult adds to injury by expecting it to do this very fast and concurrently. A simple mantra captures it: The more you write and share, the less you scale. Building massively scalable Online Transaction Processing (OLTP) systems has been forever hard and expensive.

Oracle RAC is a great example of how much engineering effort Oracle had to expend to get it to fly on 8 nodes for users who think it is cool to change any column on any node as often as possible. They extended the GCS coherency protocol, seriously hacked recovery to cash that check, and put the coherency “bus” on remote Direct Memory Access (rdDMA) protocols over government lab technology. Oracle reduced the distance between nodes by reducing the time between them. All the IO pathways were sufficiently greased with (Asynchronous IO) (AIO) and Direct IO (DIO) and write-back caches to isolate the ponderous spin of rust. All this hardware and software engineering ensures 300,000,000 columns can be updated safely and simultaneously.

Customers often use transactionally consistent replication tools such as Golden Gate to populate a Hadoop cluster, where a 20-week old flakey set of tapes or a dump off a standby instance would do nicely. Of course, it always depends on what the data scientist is looking for, but Logical Change Records (LCR)-based tools are transactional transport services and must be slowed down by accounting. Practices need to match the requirements of the work and moving 20 TB/hour over Golden Gate is slow because not dropping rows is important in a transactional world.

Customers who use Exadata and Teradata systems to perform analytics are using platforms where the contents of a column still matter. This is a grueling accounting problem and yields costly infrastructure. This is not how you would design a system to sift through 890 billion call detail records to see how many RMoug members forgot to call their mother on her birthday. Analytics is about sifting through data for patterns. This work requires a different set of tools, workflows, platforms, economics ... and practices.

Practices also are shifting for analytic development because tools like HBASE (an ISAM-like key/value access method that allows the value to be dynamically sliced by the application) do not contain a SQL interface. Writing an application in HBASE is like programming right onto the Oracle Kernel Data Index (KDI) layer. There is no language and optimizer interface, so there is ... no language and optimizer interface. SQL is a declarative language that makes it very hard to discover persons of interest or needles in a haystack. 5000 cheap servers can create some decent hay, and with non-SQL graph algorithms, find needles very quickly.

General Purpose Products

Hadoop is a technology that was designed to run purpose-built supercomputing applications – as much as any Cray - and resists the urge to become a general-purpose computing platform. High performance applications do not perform well with general-purpose software solutions as general-purpose compromises performance; and performance can’t ever be compromised, especially at scale.

A software or hardware product that is designed to be all things to all people means that high-performance end cases are compromised for the sake of general applicability. General purpose is a property of a product that needs to be sold to as many customers as possible. Hadoop was not designed to be a product.

The Hadoop Distributed Filesystem (HDFS) is also not a general-purpose clustered filesystem and gets dinged for only supporting write-append operations. All versioned filesystems, like NetApp’s Write Anywhere File Layout (WAFL), operate in write-append mode to support versioning. This ability to do to random in-situ updates is an OLTP property. Customers often think HDFS is a generic data lake and can replace clustered 8K (Network Attached Storage) NAS systems, but HDFS was not optimized for that either. HDFS is a large-block, self-healing computational filesystem that fully exploits commodity hardware to achieve affordable scale.

HDFS assumes you pay $30/TB for storage, so it doesn’t use parity to preserve capacity. Both in steady-state writes and degraded reconstruct mode, parity-based storage trades off performance for capacity. This used to be a big deal. HDFS implements cluster-wide software mirroring, so a volume manager or durable storage is not required. HDFS is optimized for cost, availability and scale, but OLTP and legacy OLAP systems are optimized differently because they have different requirements.

64, 1500, 4096 and 8192 Bytes

Processors, networks and storage have embedded OLTP assumptions, as systems of record need to concurrently fiddle with columns. In order to make this easier, there are 1500 byte network frames, 4096 byte pages and 8192 data buffers and blocks. Support for 4K and 8K granular operations favor concurrency and accounting. It is a balance of concurrency and small payloads against throughput. Accounting needs granular response time. Analytics needs web-scale throughput.

HDFS takes heat for not being Atomicity, Consistency, Isolation, Durability (ACID) compliant, but ACID is rarely a property of a filesystem but is a property of transactional systems. Oracle implements ACID in the Oracle buffer cache using the transaction layer to orchestrate latches, undo, enqueues, and redo with a little help from the storage layer. Customers can get some ACID going in HBASE using write-ahead logs and compaction or with Apache Kafka. ACID impacts performance and scale but is mandatory for keeping track of employee paychecks, but quite performance invasive when trying to analyze patterns amongst 890 billion Cell Phone Call Detail Records (CDRs). As with all the blanket statements here, there are use-case dependent exceptions for workloads, but generally, most datasets that derive from OLTP systems that need analysis don’t need ACID.

Engineering Operations

Hadoop is a low-cost, commodity form of Scientific or High Performance Computing (HPC) cluster topology so capacity in the form of bi-sectional bandwidth is added every time a node is added. Large clusters support a broader diversity of workload types because there is just that much more headroom. This flexibility gives a customer more options to adapt their cluster to their evolving environment without ever having to take the cluster down to add capacity. This has an impact on operational doctrines.

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Since there are no new ideas, the original Tandem non-stop platform was reliable like Hadoop becomes more reliable when you add more nodes. I use a term called Service Level Agreement (SLA) or service-time jitter to indicate the throughput noise or variance that can occur when a section of the cluster fails. If you have 20 nodes and lose 2, then you might notice 10%. But large node-count clusters push the SLA jitter into the noise floor, so losing 10 nodes out of 1000 is difficult to detect. Although HDFS and the Apache Hadoop scheduler YARN (Yet Another Resource Negotiator) ride through failures, moving jobs around can create back-hauling network bottlenecks that can impact some, not all, workloads.

Understanding that running massive ingest which creates 3 writes might mean a cluster dedicated to this type of work might be different from one that caches everything in region servers or Spark heaps and does little reading or writing. The technology is flexible and cheap.

In a traditional project, the functionality and the durability of the application take precedence and if there was any time—and money—left over, some performance testing could happen. Since Hadoop is a platform that is built primarily for large, high performance workloads, the application must have this pedigree. Many assume this just happens through the miracle of Map/Reduce. Customers porting SQL applications to Hadoop quickly learn that both of these products have SQL Cost-Based Optimizers (CBOs) and writing high performance SQL queries—assuming SQL is the best choice—is not just about having an OR tool take care of it. Simple queries move first and simply. Moving the data is the next trick since continuous back-hauling doesn’t scale. Queries that evolved within a complex OLTP/OLAP schema require untangling and re-calibrating.

All of these differences in practices provide an opportunity to re-visit practices. IT was centralized long ago for economies of scale, but this isolated the technology from the business. Companies that are the most successful with Hadoop have adapted a culture that mirrors web-scale pioneers. This org can be called a lot of things, but it comes down to having the data scientists, data engineers and infrastructure experts all working together in a single group. This is the hidden cultural cost of the new technology as it evolved from this type of culture. Understanding that cultural shifts come bundled with technology shifts makes it easier for companies to balance the past and present.

About the author

Jeffrey is the founder of Fabrix Analytix, which specializes in unique Apache appliances for threat intelligence, governance and IoT. Previously, Jeffrey had various roles in Hortonworks, Red Hat, and Oracle product development.
SQL*Net Troubleshooting  
Where Do You Go After tnsping?

Jared Still - Pythian

Introduction

When diagnosing Oracle connectivity issues the problems are often straightforward. However the flexibility that Oracle provides in Oracle name resolution can lead to problems that are difficult to diagnose unless the DBA has a clear understanding of how Oracle goes about resolving an Oracle TNS name to a particular server and service name.

Troubleshooting TNS-03505

Let’s consider an example of a user that is seeing ORA-03505 when attempting to logon to a particular database. The first thing you may do is see just what Oracle says about this error. Logging onto the database server as the oracle owner you issue the oerr ora command and see the following output:

```
> oerr tns 3505
03505, 00000, "Failed to resolve name"
// *Cause: The service name you provided could not be found in TNSNAMES.ORA,
// an Oracle Names server, or a native naming service.
// *Action: Verify that you entered the service name correctly. You may need
// to ensure that the name was entered correctly into the network
// configuration
```

That worked as it should, so the problem must be elsewhere, right?

But where? Relying too heavily on tnsping can be detrimental to a DBA’s mental well-being when troubleshooting connectivity issues. Knowing the limitations of tnsping will help in understanding the problem.

Let’s consider the circumstances in this test case. We have a Linux server with an oracle client on it. The client software is owned by the Oracle account. The client account has permissions allowing the use of the client software.

In this case someone has changed the permissions of the OH/network/admin/tnsnames.ora file. The client account no longer has permissions to read the file. Unfortunately the tnsping program will not inform you of this, it simply fails.

The strace utility may not be the first choice go to tool for many DBA’s but it should not be discounted. Strace can be quite useful when troubleshooting some issues. In this case we can use it to determine just why the TNS-03505 is occurring.

The following example will show why the error is occurring. Strace is run against tnsping as a non-oracle user account:

```
strace -e trace=stat,open tnsping js03 2>&1 >/dev/null
```

```
| grep -IP "^stat.*=\s+0" |
```

```
open("/u01/app/oracle/product/11.2.0/db/network/admin/sqlnet.ora", O_RDCALL) = 3
stat("/home/jkstill/.tnsnames.ora", {st_mode=S_IFREG|0664, st_size=589, ...}) = 0
open("/home/jkstill/.tnsnames.ora", O_RDONLY) = 3
stat("/u01/app/oracle/product/11.2.0/db/network/admin/tnsnames.ora", {st_mode=S_IFREG|0600, st_size=627, ...}) = 0
```

```
open("/u01/app/oracle/product/11.2.0/db/network/admin/tnsnames.ora", O_RDONLY) = -1 EACCES (Permission denied)
```

The output from strace clearly shows that the user does not have permission to open the file. Output from strace can be quite verbose, so in this case the ‘-e trace’ argument was used to limit the output to stat and open calls. The stat call checks for the existence of a file, and the open call attempts to open the file. The strace output is then piped to grep.
The ‘-l’ argument to grep causes the line before and after the searched for line to appear in the output. The ‘-P’ argument allows Perl regular expressions. The expression in this case searches for lines that include a successful ‘stat’ call. The lines of interest are successful stat calls followed by an unsuccessful open call. The open for tnsnames.ora can be seen to have failed due to permissions issues.

The fix in this case was simple:

```bash
chmod +r tnsnames.ora
```

While the fix for this issue was simple, locating the issue may not be so simple if you don’t explore how Oracle resolves service names. In this case the issue became obvious. What can be learned from this trace of tnsping is not limited to solving this particular issue, there is much more that can be learned.

For example, we can learn all of the files that tnsping attempts to use to resolve a service name. You can force tnsping to use every possible TNS configuration file available to resolve a name by using a name that is known to be unresolvable. In this case the name ‘no-such-sid’ is used:

```bash
strace -e trace=access,open,stat tnsping no-such-sid 2>&1 >/dev/null | grep '\.ora' | cut -f2 -d" | sort | uniq -c
```

The following LDAP entry was created, which correctly points to the ora11203fs server:

```sql
A remote database is js01 located on server ora112034fs.
```

The sqlnet.ora file is sometimes taken for granted. Before creating or modifying this file though it is a good idea to understand the implications of any changes that are to be made involving this file.

If you have installed and/or administered a RAC system you probably have notice that by default there is no file sqlnet.ora created by default. In the absence of the sqlnet.ora file, the default name resolution methods for Oracle are TNSNAMES, EZCONNECT and LDAP, in that order.

How can we know the search order? By creating a database name in tnsnames.ora and LDAP that is the same as one used for EZCONNECT entry, and using tnsping.

```sql
The following tnsnames.ora entry was created on server ora11net01. This entry points to a database local to ora11net01.
```

The sqlnet.ora file is read before OH/network/admin/tnsnames.ora. What this means is that if the file /etc/tnsnames.ora exists, the file OH/network/admin/tnsnames.ora will not even be considered.

This is something not detailed in the documentation, and was only learned by experimenting with strace and tnsping.

**sqlnet.ora**

The sqlnet.ora file is sometimes taken for granted. Before creating or modifying this file though it is a good idea to understand the implications of any changes that are to be made involving this file.

If you have installed and/or administered a RAC system you probably have notice that by default there is no file sqlnet.ora created by default. In the absence of the sqlnet.ora file, the default name resolution methods for Oracle are TNSNAMES, EZCONNECT and LDAP, in that order.

How can we know the search order? By creating a database name in tnsnames.ora and LDAP that is the same as one used for an EZCONNECT entry, and using tnsping.

A remote database is js01 located on server ora112034fs.

The following tnsnames.ora entry was created on server ora11net01. This entry points to a database local to ora11net01.

```sql
The following LDAP entry was created, which correctly points to the ora11203fs server:
```

```sql
The following LDAP entry was created, which correctly points to the ora11203fs server:
```

```
```
There is no setting in sqlnet.ora for NAMES.DIRECTORY_PATH:

```
[jkstill@oral1net01]$ grep ^NAMES.DIR /u01/app/oracle/product/11.2.0/db/network/admin/sqlnet.ora
[jkstill@oral1net01]$
```

Will EZCONNECT (also known as HOSTNAME) be used in this case?

```
[jkstill@oral1net01 sqlnet]$ tnsping //ora11203fs/js01
TNS Ping Utility for Linux: Version 11.2.0.4.0 - Production on 27-FEB-2015 11:59:56
Copyright (c) 1997, 2013, Oracle. All rights reserved.
```

No, EZCONNECT was not used. The tnsnames.ora entry took precedence.

If the tnsnames.ora entry is removed, you will see that the HOSTNAME (EZCONNECT) adapter is then used:

```
[jkstill@oral1net01 sqlnet]$ tnsping //ora11203fs/js01
TNS Ping Utility for Linux: Version 11.2.0.4.0 - Production on 27-FEB-2015 12:01:51
Copyright (c) 1997, 2013, Oracle. All rights reserved.
```

Now verify that the LDAP entry is indeed working. This is done by restricting the naming resolution to LDAP only and executing tnsping.

```
[jkstill@oral1net01 sqlnet]$ grep ^NAMES.DIR /u01/app/oracle/product/11.2.0/db/network/admin/sqlnet.ora
NAMES.DIRECTORY_PATH= (LDAP)
```

From these tests the naming resolution order is verified as TNSNAMES, EZCONNECT, LDAP.

You may be curious how oracle changes the name resolution order when NAMES.DIRECTORY_PATH is set. Are the tns configuration files read, stuffed into an array and the values shuffled accordingly, or are the files just read in different order?

The strace utility can be used to determine that. The tnsping command is used to look for database name that is known not to exist, thereby forcing oracle to use all available methods to look for the name.

```
strace -e trace=open,stat,access tnsping no-such-sid 2>&1  >/dev/null | grep '^\.ora' | cut -f2 -d" | cut -f1 -d" | uniq
```

```
/u01/app/oracle/product/11.2.0/db/network/admin/sqlnet.ora
/u01/app/oracle/product/11.2.0/db/ldap/admin/fips.ora
/u01/app/oracle/product/11.2.0/db/ldap/admin/ldap.ora
/u01/app/oracle/product/11.2.0/db/network/admin/ldap.ora
/u01/app/oracle/product/11.2.0/db/network/admin/ldap.ora
/home/jkstill/tnsnames.ora
/etc/tnsnames.ora
```

From this output you can see that the simpler option was used, that is the order of files was changed.

It is important to remember that the NAMES.DIRECTORY_PATH parameter changes the search order. For instance, there may be multiple clients on a single server that are using the oracle software. One of those clients may be using the personal ~/.tnsnames.ora file to override the global tnsname for a database. The client may be referring to a copy of the database used for development or testing.

If a change is made to NAMES.DIRECTORY_PATH value this may break that client's connectivity to the database.

Let's say there are two entries for database js03 on a server.

```
OH/network/admin/tnsnames.ora
JS03 =
  (DESCRIPTION =
   (ADDRESS = (PROTOCOL = TCP) (HOST = localhost) (PORT = 1521))
   (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = js03)))
OK (0 msec)
```

```
/home/jkstill/tnsnames.ora
/etc/tnsnames.ora
```

In the clients .tnsnames.ora file:

```
JS03 =
  (DESCRIPTION =
   (ADDRESS = (PROTOCOL = TCP) (HOST = someother-)
Used TNSNAMES adapter to resolve the alias
Attempting to contact
TNS-12533: TNS:illegal ADDRESS parameters

The DBA examining OH/network/admin/tnsnames.ora will be hard pressed to explain this, as that file is correct. Knowing the different methods available for resolving a tnsname will be required to successfully troubleshoot this issue.

Windows Search Order

Some of what was learned experimenting on a Linux system will transfer to other platforms. There may however be differences that you should be aware of.

On the windows platform Oracle will first search the current directory for tnsnames.ora. The current directory in this case does not necessarily refer to a session’s current working directory as you might expect. On the windows platform current directory in this case will refer to the directory from where an executable program resides.

Consider an application of which there are two copies on a server, a current version of the app, and an old version of the app. Each program is in a different directory, and each has a tnsnames.ora file.

C:\old_app\runme.exe
C:\old_app\tnsnames.ora
C:\new_app\runme.exe
C:\new_app\tnsnames.ora

Assuming that NAMES.DIRECTORY_PATH Each application will use the tnsnames.ora file found in its own directory. If there is not a tnsnames.ora file in the current directory, then the search for a name proceeds as already shown on Linux.

Another difference found in the Windows environment as compared to Linux is the use of the ORACLE_HOME environment variable. Though this variable is required to be set in Linux, it is not generally used in Windows, and in fact should not be set.

On a Windows server Oracle determines the ORACLE_HOME at runtime from the location of the binary being used. Setting ORACLE_HOME can cause a number of issues, including the use of the ‘wrong’ .ora files for SQLNet.

Please see the following Oracle Support note for details.
How to Set or Switch Oracle Homes on Windows (Doc ID 969581.1)

LDAP.ORA

You may have noticed earlier there are two default locations for the ldap.ora file.

[jkstill@ora11net01 ~]$ strace -e trace=open,stat,access tsnping no-such-sid 2>/dev/null | grep ‘ldap.ora’ | cut -f2 -d’’ | cut -f1 -d’\’ | sort -u
/u01/app/oracle/product/11.2.0/db/ldap/admin/ldap.ora
/u01/app/oracle/product/11.2.0/db/ldap/admin/ldap.ora

This is something to keep in mind when troubleshooting SQLNet issues, particularly if LDAP is involved.; make sure there are not competing ldap.ora files.
The `/etc/tnsnames.ora` file is somewhat special. This file can be used as a standard location for `tnsnames.ora` files rather than `OH/network/admin`. What is important to know about `/etc/tnsnames.ora` is that if the file exists and is readable, then `OH/network/admin/tnsnames.ora` will not be considered.

Here `tnsping` works as expected:

```
[jkstill@ora11net01 ~]$ tnsping js03
TNS Ping Utility for Linux: Version 11.2.0.4.0 - Production on 27-FEB-2015 13:01:38
Copyright (c) 1997, 2013, Oracle. All rights reserved.
Used parameter files:
/u01/app/oracle/product/11.2.0/db/network/admin/sqlnet.ora

Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = localhost)(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = js03)))
OK (0 msec)
```

Now as root, create a file `/etc/tnsnames.ora`

```
[root@ora11net01 etc]# touch tnsnames.ora
[root@ora11net01 etc]# ls -l tnsnames.ora
-rw-r--r-- 1 root root 0 Feb 27 13:01 tnsnames.ora
```

Try now to `tnsping` the same database:

```
[jkstill@ora11net01 ~]$ tnsping js03
TNS Ping Utility for Linux: Version 11.2.0.4.0 - Production on 27-FEB-2015 13:01:51
Copyright (c) 1997, 2013, Oracle. All rights reserved.
Used parameter files:
/u01/app/oracle/product/11.2.0/db/network/admin/sqlnet.ora

Used LDAP adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = ora12102a.jks.com)(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = js03.jks.com)))
TNS-12543: TNS:destination host unreachable
```

Notice that while `.tnsnames.ora` is considered, the `OH/network/tnsnames.ora` file is not read.

The use of the `TNS_ADMIN` environment variable will change this behavior, causing the correct tnsname to be found:

```
[jkstill@ora11net01 sqlnet]$ export TNS_ADMIN=$ORACLE_HOME/network/admin
```

```
[jkstill@ora11net01 sqlnet]$ tnsping js03
TNS Ping Utility for Linux: Version 11.2.0.4.0 - Production on 27-FEB-2015 13:07:50
Copyright (c) 1997, 2013, Oracle. All rights reserved.
Used parameter files:
/u01/app/oracle/product/11.2.0/db/network/admin/sqlnet.ora

Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = localhost)(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = js03)))
OK (0 msec)
```

While the `tnsping` utility can be useful, make sure you understand just what it does, as it cannot be relied on to tell you if a database or service is available or can be connected to. As far as connectivity is concerned, `tnsping` can tell you only if the listener is running.

From Oracle documentation:

* “The TNSPING utility determines whether the listener for a service on an Oracle Net network can be reached successfully.”*
• “If the net service name specified is a database name, then TNSPING attempts to contact the corresponding listener. It does not actually determine whether the database is running. Use SQL*Plus to attempt a connection to the database.”

This can be seen by using tnsping with a non-existent Oracle SID:

$ tnsping //192.168.1.42/no-such-sid

Attempting to contact (DESCRIPTION=(CONNECT_DATA=(SERVICE_NAME= no-such-sid)) (ADDRESS=(PROTOCOL=TCP) (HOST=192.168.1.42) (PORT=1521)))

OK (10 msec)

The tnsping command has succeeded, but there is no such service.

Database Link Connections

When you want to know about sessions connecting to the database, typically the v$session and v$process views are used.

What these views do not tell you is if the connection is via database link. This information can be found by querying x$ tables.

Here a database link is created on server js02. The link connects to database js03 on another server.

- Two databases:
  - js02 is remote
  - js03 is local
- On remote db:
  create database link js03_from_js02
  connect to scott identified by tiger using '
  (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP) (HOST=192.168.1.49) (PORT=1521)) (CONNECT_DATA=(SERVER=DEDICATED) (SERVICE_NAME=js03)))'

From the js02 database the following SQL is used to create a connection to js03 via the database link:

select sysdate from dual@js03_from_js02

From js03 the following query will show this connection via database link:

SELECT /*+ ORDERED */
  substr(s.ksusemnm,1,10)||'-'||substr(s.ksuseser,1,5)
  "ORIGIN",
  substr(g.K2GTITID_ORA,1,35) "GTXID",
  substr(s.indx,1,4)||'.'||substr(s.ksuseser,1,5) "LSESSION",
  s2.username,
  substr(
    decode(bitand(ksuseidl,11),
      1,'ACTIVE',
      0, decode(bitand(ksuseflg,4096),
        0,'INACTIVE','CACHED'),
      2,'SNIPED',
      3,'SNIPED',
      'KILLED'
    ),1,1)
  )"S",
  substr(w.event,1,10) "WAITING"
FROM x$k2k2ge g, x$ktxxb t, x$kuses s, v$session_
wait w, v$session s2
WHERE g.K2GTDXCB = t.ktxcbxba

and g.K2GTDSES=t.ktxcbxes
and s.addr=g.K2GTDSES
and w.sid=s indx
and s2.sid = w sid

ORIGIN          GTXID          LSESSION
------------------ ------------------------ ----
ora12304a-21632 JS02.7a14ac8.10.4.6541 27.19613

SCOTT
Remote Server-PID Global TX ID? Local SID.Serial
ora112304a-21632 JS02.7a14ac8.10.4.6541 27.19613

The same query can be run at the originating end to show outgoing connections via database link:

SELECT /*+ ORDERED */
  substr(s.ksusemnm,1,10)||'-'||substr(s.ksuseser,1,5)
  "ORIGIN",
  substr(g.K2GTITID_ORA,1,35) "GTXID",
  substr(s.indx,1,4)||'.'||substr(s.ksuseser,1,5) "LSESSION",
  s2.username,
  substr(
    decode(bitand(ksuseidl,11),
      1,'ACTIVE',
      0, decode(bitand(ksuseflg,4096),
        0,'INACTIVE','CACHED'),
      2,'SNIPED',
      3,'SNIPED',
      'KILLED'
    ),1,1)
  )"S",
  substr(w.event,1,10) "WAITING"
FROM x$k2k2ge g, x$ktxxb t, x$kuses s, v$session_
wait w, v$session s2
WHERE g.K2GTDXCB = t.ktxcbxba

and g.K2GTDSES=t.ktxcbxes
and s.addr=g.K2GTDSES
and w.sid=s indx
and s2.sid = w sid

ORIGIN          GTXID          LSESSION
------------------ ------------------------ ----
ora112304a-21632 JS02.7a14ac8.10.4.6541 27.19613

SCOTT
Remote Server-PID Global TX ID? Local SID.Serial
ora112304a-21632 JS02.7a14ac8.10.4.6541 27.19613

What is not shown is the name of the database link used. This information can be found at the destination end via database session auditing if it is enabled. Consider the following example:

11:13:17 SYS@js03 AS SYSDBA> l
  1 select ntimestamp#, comment$text
  2 from sys.aud$
  3 where userid = 'SCOTT'
  4* and trunc(ntimestamp#) = trunc(systimestamp)
11:13:18 SYS@js03 AS SYSDBA> /

NTIMESTAMP#
------------------
16-FEB-15 07.12.42.465377 PM

Authenticated by: DATABASE; Client address:
  (ADDRESS=(PROTOCOL=tcp) (HOST=192.168.1.132) (PORT=20834)); DBLINK_INFO: (SOURCE_GLOBAL_NAME=oravm.jks.com, DBLINK_NAME=JS03_FROM_ORAVM.JKS.COM, SOURCE_AUDIT_SESSIONID=4294967295)

3 rows selected.

Unfortunately at this time I do not know of any method to find the same information from the originating end of the connection.

Finding Other Remote Connections

At times it may be necessary to determine the network connections made by a client program. In this case a client program is connecting to a local database server. The client program is consuming nearly all of a CPU. Suspecting that the problem may be database related, you check v$session only to find out that the session is idle:

```sql
SELECT /*+ ORDERED */
  substr(s.ksusemnm,1,10)||'-'||substr(s.ksuseflg,4096),
  0,'INACTIVE','CACHED'),
  2,'SNIPED',
  3,'SNIPED',
  'KILLED'
  )"S",
  substr(w.event,1,10) "WAITING"
FROM x$k2k2ge g, x$ktxxb t, x$kuses s, v$session_
wait w, v$session s2
WHERE g.K2GTDXCB = t.ktxcbxba
```

Unfortunately at this time I do not know of any method to find the same information from the originating end of the connection.
The next step is strace on the client program to get some idea of what is happening.

What is discovered is that the process is reading and writing file descriptor 9 in a very tight loop:

```
[jkstill@ora11net01 sqlnet]$ strace -p 4287 2>&1 | head
Process 4287 attached - interrupt to quit
read(9, "\0\347\0\0\6\0\0\0\0\0\6\1262\1\0\0\0\0\0\267\2\0\0\0\0\0\0", 8208) = 231
write(9, "\0\35\0\0\6\0\0\0\0\0\3N\236\3\0\0\0\267\2\0\0\0\0\0\0", 29) = 29
```

The /proc file system is utilized to determine which file this is for.

```
[jkstill@ora11net01 sqlnet]$ ls -l /proc/4287/fd/9
lrwx------ 1 jkstill jkstill 64 Nov 14 21:00 /proc/4287/fd/9 -> socket:[13414748]
```

As it is a network socket, the next step is to find the remote connection address and port.

```
head -1 /proc/net/tcp; grep 13414748 /proc/net/tcp
sl  local_address   rem_address   st tx_queue
rx_queue tr ...
13: 2F01A8C0:5DA1 1F01A8C0:05F1 01:00000014 01:00000014 ...
```

As you are interested in the remote address the next step is to decode the into the IP address and port number:

- Remote Address: 1F01A8C0
  - 1F = 31
  - 01 = 1
  - A8 = 168
  - C0 = 192
- Remote Port: 05F1
  - 05F1 = 1521
- 192.168.1.31:1521

Does that port look familiar? As 1521 is the default port for an Oracle listener, it is quite likely the client program has a connection to the remote database, and troubleshooting may proceed there.

```
This concludes the first part of two. Please watch for the second and concluding part of this article in the Spring 2017 issue of SQL>Update, the newsletter of the Rocky Mountain Oracle Users Group (RMOUG.org).
```

References

- Dynamic Oracle Net Server Tracing (Doc ID 1550897.1)
- Everything a DBA Should Know About TPC/IP Networks
  - Gwen Shapira
Compliance Management provides the ability to evaluate the compliance of targets and systems as they relate to business best practices for configuration, security, and storage. This is accomplished by defining, customizing, and managing compliance frameworks, standards, and rules. In addition, Compliance Management provides advice of how to change configuration to bring your targets and systems into conformity with these guidelines.

Enterprise Manager provides the functionality to associate out of the box compliance standards with different targets, but one area that’s still being developed is the ability to associate Oracle Database 12c STIG compliance standards with (obviously) Oracle Database 12c targets. For those that are unaware of the STIGs, “STIG” stands for Security Technical Implementation Guide. STIGs are published by DISA (the US Defence Information Systems Agency). According to the DISA website, “The STIGs contain technical guidance to ‘lock down’ information systems/software that might otherwise be vulnerable to a malicious computer attack.” They are available for Operating Systems, Applications (Application Servers, Databases, etc.) and much more. Many US Government agencies are required to follow them, and many US and non-US commercial companies voluntarily follow or base their internal standards on these benchmarks.

As I mentioned in the last paragraph, we’re still “productizing” the Oracle Database 12c: STIG released by DISA. However, we do have some sample code you can play around with against your Oracle Database 12c targets. You can find the details of what’s in the sample code on my website (http://petewhodidnttweet.com). There’s a post announcing the availability of the sample code (http://wp.me/p5dtV7-mO) and another that walks you through installing the sample code (http://wp.me/p5dtV7-mW). In this article, I’m going to walk you through the process of associating these sample standards with Oracle Database 12c targets.

There are two separate standards in the sample code, one for multitenant databases and the other for conventional architecture databases. The process of associating the databases is the same in each case. You simply have to choose the compliance standard that matches your architecture. In this walkthrough, I will show you how to associate a multitenant database with the “Oracle 12c PDB STIG” compliance standard.

The first step is to go to the “Compliance Standards” tab on the “Compliance Framework” page. To access this, follow the menu path “Enterprise” -> “Compliance” -> “Library”:

Click on the “Compliance Standards” tab, then select the “Oracle 12c PDB STIG” compliance standard and click on “Associate Targets”:

On the “Compliance Standard Target Association” page, click the “Add” button:
On the “Select Targets” pop-up, select the databases you want and click the “Select” button (this is my test environment so a lot of the remaining databases are down at the moment):

Back on the “Compliance Standard Target Association” page, click “OK”:

Next, we want to look at the results of the target association, so from the “Enterprise” menu, select “Compliance” and then “Dashboard”:

We can see immediately that we have a lot of issues to address, as the Oracle 12c Database STIG shows an average compliance score in the “Compliance Summary” region of only 22% (please note, the number in your environment may vary from this). You can also see this graphically by selecting the framework from the dropdown list in the “Compliance Framework Summary” region:

TIP: If you see an average compliance score of 0%, this means the evaluation did not complete successfully. One of the main reasons for this is if the DBSNMP account is not available to login as. For example, if the account is locked, expired, or even giving a message that it is about to expire, the evaluation won’t complete. Note that the DBSNMP account can be open in a CDB, but expired in a PDB. To address that it can be easiest to simply login to the CDB, and enter the command:

On the “Select Targets” pop-up, select the databases you want and click the “Select” button (this is my test environment so a lot of the remaining databases are down at the moment):

Back on the “Compliance Standard Target Association” page, click “OK”:

Click “Yes” on the “Save Association” pop-up:

You will see an informational message that the compliance standard has been submitted to the target for processing, and the association count value for the standard is now 1. Click “OK” to close the informational window:
Clearly, you can do it container by container if you want to have different passwords for the DBSNMP user in different PDB's.

If you click on the compliance score in the “Compliance Framework Summary” region, you get a little more information along with the ability to drill in for more details. Click on “Click here for more information …”: 

This will take you to the “Compliance Results” page, where you can see the breakdown on a per target or per compliance standard basis (note that the per compliance standard results are just a combination of the per target results since we have only evaluated one compliance standard thus far). To see more details, click on the number of critical violations (e.g. the number “44” for the “HRdb0000_HRDBPDB1” row):

On the “Violations” pop-up, click on the violation count:

This will show you a list of all the compliance standard rules that have been violated, along with a violation count for each rule.

While it is not immediately obvious, the numbers of each violation count are actually links to more details:

For example, if you click on the number 35 (for the SV-76031r1_pdbrule), you can see the following accounts have non-standard passwords:

Click “Close” to close the “Violations” window. Resolving the violations is not part of this article, but in this case you can see that if you change the passwords for these users to something other than the default and re-execute the compliance check, these violations would clear.

I hope this short walkthrough has shown you how you can harden the security of your Oracle Database environments. Obviously, there are a lot more compliance standards built into Enterprise Manager, so make sure to have a look at those to see how you can harden other parts of your Oracle infrastructure. And of course, if you have any questions on any of this, feel free to reach out to me at peter.r.sharman@gmail.com at any time.

About the author
Pete has been working in a variety of roles at Oracle for the past 22 years, most recently as a database architect in the Database Lifecycle Management (DBLM) and Database as a Service (DBaaS) team in the Enterprise Manager product management group. His responsibilities included compliance management, change management, configuration management, jobs, and BI Publisher use in EM as well as Snap Clone and other parts of DBaaS. He is now looking for a new role that would suit his many talents in the database architecture arena.
I started my career with Oracle in part because I failed an organic chemistry exam.

I entered MIT as an undergraduate intending to study biomedical engineering. At MIT, biomedical engineering students were expected to major in either mechanical engineering or electrical engineering and then take a few extra bio courses as electives. I chose to major in electrical engineering. In the spring semester of my freshman year, I had a heavy course load that included the first course in the electrical engineering sequence and also organic chemistry, which was a requirement for biomedical engineering students. On my first exam in organic chemistry, I scored 24 out of 100. Ouch! After consulting with my advisor, I decided to drop the course and try it again later. Over the next few years, though, I found the electrical engineering program to be sufficiently overwhelming on its own and I never got around to taking organic chemistry or any of those extra bio courses. I graduated in 1988 with an electrical engineering degree.

At the time, Oracle had about 5000 employees worldwide and was growing rapidly. Oracle representatives came to the MIT campus to interview graduating seniors, particularly those in electrical engineering and computer science. I signed up for an interview on campus. After a second interview in Washington D.C., I was offered the opportunity to join the Oracle Consulting. Woohoo! The job sounded far more interesting to me than any of the electrical engineering positions for which I had interviewed.

Oracle sent me to six weeks of “boot camp” training to help me and other recent graduates get up to speed on Oracle tools and consulting practices. Then we were sent out into the world to help Oracle clients. It was an exciting time to be in my first real job, flying all over the country to help clients implement Oracle in their environments. I especially enjoyed being a consultant because it gave me the opportunity to move on to new projects frequently and this helped me learn and grow rapidly.

Over time, I developed a solid skill set in Oracle’s CASE tools, data modeling, SQL and PL/SQL coding, and Oracle’s software development methodology, eventually moving through the ranks from an Associate Consultant to a Technical Manager. I especially enjoyed the opportunity to teach Oracle tools and techniques to clients and colleagues. When new versions of Oracle Designer were released, Oracle would send me to be trained on the new versions and I would then travel around to client sites to deliver workshops on the new features. I even had the opportunity to participate in the “boot camp” program again, this time as the lead instructor.

As much as I loved working for Oracle, after nearly 20 years I wanted a break from the near-constant travel. When I was offered an opportunity to apply my Oracle skills at Denver Public Schools, I took it. I had a great time there working on their data warehousing team, pulling data from source systems into a central repository for the district. We made extensive use of Oracle Designer to document our data models and Oracle Warehouse Builder to create our ETL. One of my projects involved building some very complex logic needed to create the special education reports required by the state of Colorado. That pushed me to learn more about analytic functions and query tuning.

After six wonderful years at DPS, though, I needed some new challenges. As it turned out, my next challenge was outside of IT. Years ago, a friend and I were talking about the benefits of belonging to a community such as one that people often find at churches. Church members have opportunities to find friends, get help when they go through difficult times, join together with others to volunteer for the larger community, and experience educational opportunities. As non-religious people, we thought it would be great if we could find the community...
similar to one might be found in a church but also one that did not have the expectation that we adhere to any particular religious beliefs. Someone suggested that we try Unitarian Universalism. So we did that for a while. We met a lot of wonderful people and I joined the choir, of which I am still a member. There were many wonderful things about the community, but the overall experience still felt a bit too “churchy” to us.

Through that experience, however, we became acquainted with the Humanists of Colorado, a group that held their monthly meetings in the church building. They typically brought in speakers on topics in the areas of science, philosophy, human rights, education, books, renewable energy, and much more. This was a group that was closer to what we were seeking. Ever so, it was difficult to build community when meeting only once a month in a room rented from the church. We often said, “Wouldn’t it be great if we had our own space?” One evening, after the monthly meeting, we went to a bar to continue discussing the talk we had just heard and we talked again about the dream of having our own space. Someone who was relatively new to the group said, “What’s keeping us from doing that?” From this conversation emerged the idea for the Secular Hub. We shared thoughts about the sort of community we would like to create and brainstormed on how we could generate the funding necessary to make it viable.

We assembled a group of founding members from various secular groups around Denver who were willing to provide the initial funding that allowed us to find a space of our own. In late 2012, we took over an old Obama campaign office. We painted the space and furnished it, creating an events room, a kitchen, an office, and a conference room. On Darwin Day in 2013, we held our first talk at the Hub. Since then, our community has grown to the point that we have several events occurring at the Hub every week. We bring in local and national speakers, host social events, and provide meeting space for local secular groups. On Sunday mornings, we hold an event called Coffee & Community where people can get together and socialize over coffee and whatever goodies people bring. Once a month these Sunday gatherings turn into a pancake breakfast. There are weekly movie nights and a book group. We have support groups for those who are in recovery from substance abuse and who are not comfortable attending a religion-based recovery program. The Secular Volunteer Corps performs community service projects for the broader community and their efforts were recognized last year with a Keep Denver Beautiful Community Service Award from Denver Public Works.

As we had hoped, the Secular Hub has become a place for non-religious people to come together to make friends, get support, become educated on many topics, and give back to the community. As a non-profit organization, we have all the usual non-profit struggles. We are constantly working to raise funds. We are completely staffed by volunteers who often have unpredictable schedules, limited time, and varying levels of commitment. We have challenges capturing and maintaining the data needed to run the organization and to do the necessary tax reporting required of a 501(c)(3) organization. Despite the challenges, the community seems to be thriving and I am grateful to have been part of creating and nurturing this community.

So what’s next for me in technology? I am interested in moving into some aspect of data science, but I am still figuring out the right path to get there. I love writing logic to sort through data. Data science would give me an opportunity to continue working in a detailed way with data while also pushing me to learn new tools and techniques. I have been studying Python, R, and machine learning to help me figure out where I might best fit. I am particularly interested in the application of data science in biological subjects, such as the human genome.

Maybe I will finally need to learn organic chemistry after all.
I recently began a new personal quest. It started when I was introduced to the book A Complaint Free World - by Will Bowen. Step one of this journey is the challenge to go 21 days without a single complaint. Yes: 21 days in-a-row. Again yes: Zero complaints.

In all honesty, I took this challenge up without giving it much thought. I believed myself to be a happy person. I laugh a LOT. I have a fabulous family life, a job that makes me feel challenged and appreciated, plenty of food, lots of shoes (I am a girl...this is important) and a lovely home. I’m healthy, still capable of learning new things and have amazing friends. I thought I was going to skate through this challenge. I did not even see it as much of a quest. I have mostly everything to be happy about and not much reason to grumble. In my mind, grouchiness was reserved for the Grinch and this was going to be E-A-S-Y. My whole life usually seems both amazing and wonderful. What do I have to complain about?

Quite a bit, it seems.

While I do enjoy my work and currently have both the best boss on the planet and many marvelous co-workers, at work I do get caught up in problems. After all, I’m paid to be a problem-solver. I find problems, fix them, try to anticipate some and figure out how to work around others. Software can earn its own set of complaints and then there are our software users. I recently experienced a time where another employee chewed me out for using our software to set up an account HIS way. I was so very confused and I tried to explain that I have documented in writing my solution to the problem and his insistence that we handle these setups in a completely different manner. He told me he was sick of my attitude. I had great fodder for a logical complaint.

I hear from others how they have much less enjoyable working conditions then I do... and then they find that they are being pressed to find ways to accomplish even more with dwindling resources. Many are figuring out how to cope when their employer eliminates basic cost-of-living raises while they watch grocery prices skyrocket, housing prices go through the roof and college tuition fees becoming nearly unmentionable. There are many reasons people have for making valid, honest complaints.

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Indeed, problems are universal. It’s how we deal with them that make all the difference not just for ourselves but also for those sharing space with us on our trek around the Sun. Through this journey, I have found that there is a vast difference between saying, “I had a particularly slow commute.” and “Oh my God, traffic was so bad this morning that it made me want to hurt someone!” One thing is a statement of fact. The other is a complaint.

Why does it matter? Well, when I first started this challenge, I found myself complaining about 15 times on an average day. At this point, I’m down to about 1 complaint a week. While my goal is not yet in hand, I’m exceedingly happy at the amount of negativity I’m no longer adding to our universe. Simple math shows that the complaints I’m no longer making equal over 400 times a month when someone does not have to listen to me complain.

Complaining forces both the complainer (usually me) and the listener (normally you) to focus entirely on negativity... and it grows. How often have I complained about my commute only to have someone else or even a few other listeners share horror stories from their own commutes? At that point we had an entire group of people who have spent precious moments of this limited life dwelling on what was wrong with our morning, rather than celebrating another day and preparing ourselves to get to work as a team.

When I was experiencing the problem with my coworker which I discussed earlier, I was surprised by the number of “bad coworker” stories people brought my way. For weeks, I seemed to accumulate these stories. More and more negativity seemed to be attached to them. It’s almost as if my focus on the negative made things even more negative.
Or as great philosophers and teachers have told us:

“We become what we think about.” – Earl Nightingale

“We are shaped by our thoughts; we become what we think.” – Buddha

“The highest possible stage in moral culture is when we recognize that we ought to control our thoughts.” – Charles Darwin

This is about the time that I began to notice my words and their consistent propensity to become negative and when I also discovered that I had the power to change things for the better.

There are actual scientific studies that have been done on the subject of pretending to be happy and what outcome study participants encounter. Some of these studies have mixed results, but one truth becomes apparent. If people get stuck in a rut of unhappiness, pretending happiness can help discover new truths...new things, people and ideas about which they truly ARE happy. It can become a self-fulfilling prophesy, helping them to discover or enhance their capacity for more positive feelings.

While I previously thought of myself as a joyful, positive person, it quickly became obvious that’s not the life I was leading. This truth is evidenced by the nearly constant stream of complaints coming out of my mouth. I decided to use the 21 Day Complaint-Free Challenge as my version of “pretending to be happy” and have found that my contentment has been greatly multiplied. Instead of spending time feeling frustrated (except the one time when someone pointed out to me that I was complaining about not being able to complain), I have found greater peace and a new ease with which I am able to respond to crisis. Friends, co-workers and even my family have stated that they are surprised by the equanimity with which I’m handing obstacles in my path.

I’ve discovered that positivity grows in the same way that I used to be growing negativity. While I don’t presume to force this challenge upon anyone, I have had those around me say things like “Oh yes, I can’t complain around you anymore.” Personally, I find this amusing since my personal quest has nothing to do with their journey. However, it has made me realize even more that I am surrounded by amazing people who want to see me do well. I’ve become aware that there’s a positive force growing slowly but surely and that even I have the power to be calm and patient in the eye of the storm.

I may not change the whole world, but I can make mine better – one problem at a time.

Kristina Boone,
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Rocky Mountain User Group President
Resident Happy Person

Editor’s Note
The “Rocky Mountain User Group” or “RMUG” is the local Colorado users group affiliated with Quest, the international users group for Peoplesoft and JD Edwards, found online at https://www.linkedin.com/groups/3804489/profile.

The “Rocky Mountain Oracle Users Group” or “RMOUG” is the local Colorado users group affiliated with IOUG, the national Oracle users group for technology, and is the publisher of this newsletter, found online at http://rmoug.org, on Facebook at https://www.facebook.com/RMOUG, on LinkedIn at https://www.linkedin.com/groups/91789, and on Twitter at https://twitter.com/RMOUG_ORG.

The “Colorado Oracle Applications Users Group” or “COAUG” is the local Colorado users group affiliated with OAUG, the national Oracle users group for applications, found online at http://colorado.comunities.oaug.org/.

Come see all three Colorado users groups at the RMOUG “Training Days” conference on Tuesday-Thursday 07-09 February 2017 at the Colorado Convention Center in downtown Denver. For more information
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Connor McDonald is a former Oracle ACE Director who has joined the Oracle Developer Advocates Team. Over the past 18 years, he has worked with systems in Australia, the United Kingdom, Southeast Asia, Western Europe, and the United States. He has co-authored three books and has been a popular speaker at Oracle conferences around the world, specializing in topics regarding the database engine and PL/SQL. He has twice won the Inspirational Speaker award from the UK Oracle User Group in 2009 and 2011.

It has been just over a year since the reins of Ask Tom were handed over to Connor McDonald and the Oracle Developer Advocates Team. This session is a “fireside chat” of his experiences of stepping into Tom’s large shoes and what it has revealed to him regarding the art of problem solving, the importance of the global Oracle development community, and the scope of features available within Oracle technology.