Opal Alapat
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Jorge Rimblas
APEX Power Option

Board Focus - Komal Goyal
Cloud ERP & Legacy Systems - Divya Shampur
Make an unexpected impact by delivering 30x faster performance and more storage with a Meta7 Exadata refresh.
FEATURED ARTICLES

6 Template Options
by Jorge Rimblas
APEX Power Option

8 Precision Guesswork
by Jason D. Aughenbaugh
Subjective Statistics

12 Recognizing & Overcoming Limitations
by Roger Cornejo
AWR/ASH Reports

16 War of the Nerds
by Opal Alapat
Conflict Resolution Strategies

20 EBS Single Sign On
by Mark Mestetskiy
Overview & Lessons Learned

24 Cloud ERP & Legacy Systems
by Divya Shampur
SOA Suite 12 Integration

Monthly Features
2 Summer 2016 QEW
4 Letter From Our President
5 Stan Yellott Scholarship Fund
11 2016 Scholarship Awards
26 Board Focus - Komal Goyal
28 RMOUG Board of Directors
We have a new board of directors at RMOUG this month, with many familiar faces returning from last year, along with a new face: Apurva Panidhar. Apurva works for 6eTech and has been working with board for the past 2 years, and this year she campaigned to become a director and will serve as our social media director. The social media director works to increase the visibility of RMOUG on the Facebook (http://www.facebook.com/RMOUG), LinkedIn (http://xxx), and Twitter (http://www.twitter.com/RMOUG_ORG), and also analyzes social media activity to report back to the board for response and reaction. Welcome aboard, Apurva!

Overall, we have a very experienced and strong board of directors this year, ready to move forward on the many activities and events we have planned. We also have room for more “at-large” members of the board. At-Large members do not have explicit responsibilities, but they are observing and stand ready to help if the need arises. Being an At-Large member of the board of directors is a great way to learn all that is going on with the most active regional Oracle users group in the world.

For more information about the newly-elected board of directors, please visit “http://rmoug.org/about/board-of-directors”. For more information about the role of each of the directors, please visit “http://rmoug.org/about/roles-of-the-board-of-directors”.

Having a strong experienced board is going to come in handy, as we have a lot planned...

- **Meetups**
  - Thursday 23-June from 6:00pm to 8:30pm: Boulder/Denver Big Data Meetup, http://www.meetup.com/Boulder-Denver-Big-Data/
  - Saturday 09-July from 10:00am to 2:00pm: “APEX Hands-On Labs”, http://www.meetup.com/RMOUGLabs/
  - Thursday 14-July from 6:00pm to 8:00pm: RMOUG Big Data Meetup, http://www.meetup.com/RMOUG-Big-Data-SIG-Meetup/
- **RMOUG Quarterly Educational Workshops (QEWs)**
  - Friday 29-July from 8:30am - 1:00pm: Denver Aquarium, bring friends and family, http://rmoug.org
- **RMOUG Training Days 2017 conference**
  - Tuesday, 07-Feb to Thursday 09-Feb 2017, Colorado Convention Center, Denver CO, http://rmoug.org
- **Other Oracle users groups**
  - Friday 17-June from 11:00am - 4:00pm: Colorado Oracle Applications Users Group, http://colorado.comunities.oaug.org/
- **Free webinars on all topics**
  - The RMOUG events calendar at “http://rmoug.org/about/calendar” is constantly updated with new free educational opportunities

There is a lot going at Oracle Corporation these days as well. Unless you’ve been living in a cave, you’re aware that Oracle is pivoting toward the cloud. This is much more than just a direction, or a new marketing slant. 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...
The Scholarship Fund started in 2001 to encourage future IT professionals in their efforts to broaden their knowledge. In 2007, RMOUG voted to rename the scholarship fund to honor the memory of Stan Yellott. Stan was a long time member of RMOUG where he supported the user community by serving on the RMOUG board. Stan focused on expanding Oracle educational opportunities. Stan’s vision was to include high school and college students as the next generation of IT professionals.

Application Deadlines
- March 15th for an April scholarship distribution
- June 15th for a July scholarship distribution
- September 15th for an October scholarship distribution
- December 15th for a January scholarship distribution for the following year in January

Scholarship Recipients receive a complimentary pass to RMOUG’s Annual Training Days.

Please see a detailed outline of RMOUG’s scholarship policies on www.rmoug.org/scholarship.

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From a personal perspective, people have asked why I’ve been actively involved with RMOUG for the past 25 years, and on the board for the past 21 years. The question becomes: what is the advantage of giving so many hours as an unpaid volunteer?

In the end, the motives are self-interest. For myself, I want to stay aware of the latest developments in my industry, and users groups and meetups keep me aware of trends as they are building, long before the wave has crested, so that I can try to be at least an hour ahead of everyone else with the right set of information. This career won’t last forever, and I want to maximize the benefits each year for my family and myself. I feel I’ve been amply repaid with friendships and experience, and I’m grateful for the opportunity of another year working with all of you.
Since inception, Oracle Application Express, or APEX for short, has always used the concept of Themes and Templates to implement an application user interface. In APEX, a collection of templates comprises a theme. Templates are mostly a combination of HTML, CSS, and JavaScript. Templates are the building blocks that make up the web pages we see in an APEX application.

When APEX 5.0 was released, it brought with it many enhancements. One of the most notable, outward facing improvements was the Universal Theme. The Universal Theme is a modern, responsive, and, why not, even beautiful theme. Thanks to the introduction of the Theme Roller you can even change the color scheme and other CSS attributes of the Universal Theme. The Universal Theme and the Theme Roller have gotten a lot of well-deserved attention. However, today I want to bring some attention to a small but powerful feature: Template Options.

The number of templates in the Universal Theme (Theme 42) is drastically reduced from previous themes. However, flexibility and options to style your elements on the screen did not go down. On the contrary, I would argue it has increased. How is this possible when instead of 36 region templates (on Theme 25) we now have 13 (on the new Theme 42)? Or in the case of buttons that have gone from 10 templates to now 3 in the Universal Theme? The answer is Template Options.

Here are some of the counts from different themes.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Builder Blue</td>
<td>77</td>
</tr>
<tr>
<td>Bluejay</td>
<td>94</td>
</tr>
<tr>
<td>Cloudy</td>
<td>99</td>
</tr>
<tr>
<td>Productivity</td>
<td>107</td>
</tr>
<tr>
<td>Blue Responsive</td>
<td>77</td>
</tr>
</tbody>
</table>

In contrast, the Universal Theme only has 52 templates.

Template Options add an extra degree of configuration (or styling) to just about any template. It’s an elegant, simple and yet powerful approach to styling templates with developer defined options. Take for example the figure below.

These are four screenshots from a form created on a client table. All variations from the default view were achieved by simply selecting the options “Accent”, Item Size “Large” and “Remove Borders”. These are all the exact same page and by changing the Template Options on the region we’re able to achieve different results.

Those variations are only a small portion of all the default Template Options available to the “Standard” template used by our region. At their core, think of a Template Option as a value pair, meaning a name and assigned value. The name is what you will see when you select the option, the value is a CSS class (or a list of CSS classes). In the previous example, the following CSS classes were added by APEX to the region as the options were selected: `t-Region, t-Region-accent5, t-Region-noBorder, t-Region-scrollBody, t-Form-large`. But, we don’t have to know the name of those classes. You only have to choose from friendly names and descriptions on the Template Options selection page.

*I believe that Template Options are to UI what Dynamic Actions are for JavaScript. As such, this enhancement would unlock great power.*

The actual “magic”, of course, is performed by the CSS behind those classes (and the effort of the APEX Development Team that thought about them). The definitions of the classes are part of the Core.css file that comes with the Universal Theme.

The definition of Template Options also allows specifying whether a “feature” can be used in conjunction with others or if it contains mutually exclusive options. For example, let us take the “Accent” option. Since only one Accent color makes sense at a time, they are grouped under the “Accent” heading, and they are select
We are almost ready to test our handy work, except for one important step. We need to add the CSS Class definition to our application. Normally, best practice would be to place it in a file and register the file as part of the User Interface under “Cascading Style Sheets”. APEX will then add it as part of the #APPLICATION_CSS# we mentioned earlier in the chapter. Another good approach, when using small amounts of CSS code, is to place it in the “Custom CSS” field available at the bottom of the “Theme Roller”. However, for this example, placing the CSS on the Page Attributes Inline CSS will do just fine.

Here is the before and after effect of adding our new template option to a “Blank with Attributes” sub-region.

When you create your own Template Options, make sure you select an appropriate Group. Some options will not need one. These are elements that can optionally be used in conjunction with other visual elements. However, the correct group will go a long way in explaining, to future developers, what the option does. An exciting new feature making its way into a future version of APEX is “Live Template Options.” Live Template Options will allow a developer, in pretty much the same way the Theme Roller does, to make Template Option changes while viewing a running application page and see the desired effects immediately. The new Template Option changes can also be saved without the need to edit the page from the Builder. The reduction in friction and gain in productivity from this new feature are positively exciting.

If like me, you feel that we developers should be able to enhance the Universal Theme via our own Template Options check out enhancement request AMV6. Go to apex.oracle.com/vote and check it out.
“There are three kinds of lies: lies, damned lies, and statistics.”

The origin of this topic comes from two sources. First, I actually enjoy working on metrics of many varieties. I enjoyed my statistics classes in college too. Secondly, I had always assumed that we as IT professionals would have all had to take at least one of these courses during our college years. When I came into the business I found this assumption was false. In fact, fewer IT professionals understand this science of Math than I could possibly imagine. I am no professional statistician by any stretch of the word but I have found where this topic has intersected with my work.

It may be an odd topic to discuss for an audience of programmers, analysts, DBAs, and the variety of other professionals that may pick up this issue. However, our whole profession is based on the existence, creation, propagation, and interpretation of data. Statistics means different things to different people. On the one hand we might think of database statistics, or political, pharmaceutical, or societal figures. In the midst of the digital age we are bombarded by statistics from just about every angle. The question is; do we really understand them?

We are also a contradiction of behaviors when it comes to statistics. Some we refuse to trust; others we accept without question. When I read the above quote I tend to place politics in that list as well. It’s fitting because during a particularly active political season we are subjected to any number of statistics that people use to prove to us that we should vote for one candidate over another. This usually led my Father to his favorite statistic; “49.2% of all Statistics are made up.” Is this statement true? Or, are statistical values less telling than some might have you believe.

My opinion is that statistics are, like Daisy (my 1 year-old, well-behaved, pit-bull terrier), horribly misunderstood to the point where we act irrationally to them depending on our moods, experiences, beliefs, and our mentors. Now, if you are thinking this article is going to be a painful discussion on Mathematics, fear not. Today I want to drive just a single point home.

“Objectivity is in the Eye of the Beholder”

It’s a simple, yet powerful, quote; that I really wish I knew who to properly attribute it to.

The best way I know to discuss this point is by picking on the one statistic that stands out in front. It’s the one we all know, most times we trust it implicitly and most often we don’t understand it enough to question it properly. The Mean.

The Mean Truth

As I stated before the Mean (commonly called an Average) is the most common statistic used in the world. Each of you reading today likely learned this statistic in your early Primary education. For me, it was 3rd or 4th Grade. In fact, this is a reason I think we trust it so implicitly we know what it means. Or, rather, we think we do. The mean is simply; the sum of a set of numbers, divided by the number of numbers in the set.

\[
\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n}
\]

This formula produces a calculated value for the middle of the set. It is used to distill a large set of values into a single value that we in business use for decision-making. It is also one of the most used calculations in business and operations metrics the world over. In actual practice the higher you are on the corporate ladder, the more likely you are to be looking at averages or metrics that are using them than any other. So why pick on the Mean? I pick on it mainly due to its high usage in business, and the fact that technology makes it easy to get this value; too easy. In SQL and PL/SQL it is as easy as `select avg(column) from table` and nearly instantly you get an average for anywhere between 1 and 1 million values.

We have here a set of ten averages that all seem to be telling us the same thing. Can you tell what the difference is between them? Without anything to tell us what they represent it really isn’t meaningful. So we’ll make a change.
Here now we have some meaning. I have changed this around a bit to represent a common IT support metric **Mean Time to Respond (MTTR)**. We'll say that the metric is a percent, based on the number of tickets received that were responded to within the Service Level Agreement (SLA). Can you spot any meaningful differences now?

At the moment all ten of the averages look identical. If this was a number that was acceptable to management, they might very well pass by the opportunity to verify if these are valid metrics. My advice is to never pass, always look deeper into the data.

As discussed before the Mean/Average is made of the sum of the values divided by the number of the values. This seems like a good place to start, until you see this.

```
<table>
<thead>
<tr>
<th>TEST_MONTH</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN</td>
<td>50</td>
</tr>
<tr>
<td>FEB</td>
<td>50</td>
</tr>
<tr>
<td>MAR</td>
<td>50</td>
</tr>
<tr>
<td>AFR</td>
<td>50</td>
</tr>
<tr>
<td>MAY</td>
<td>50</td>
</tr>
<tr>
<td>JUN</td>
<td>50</td>
</tr>
<tr>
<td>JUL</td>
<td>50</td>
</tr>
<tr>
<td>AUG</td>
<td>50</td>
</tr>
<tr>
<td>SEP</td>
<td>50</td>
</tr>
<tr>
<td>OCT</td>
<td>50</td>
</tr>
</tbody>
</table>
```

So, we have more details, but few differences, and not much more understanding. What we can see is that August to October give a little different picture. Certainly fewer opportunities for measurement.

**The Mean Friends**

The Mean isn’t alone in statistics, it has friends. The Median is one of these friends, very often we see statistics that involve only the Median (like ‘Median Household Income’). The median is the value at the exact middle of the set when it is ordered from least to greatest. By itself it is much like the mean in that only tells you specifically one thing and fails to explain what lies above and below that line. Aside from this the Median does tend to tell us if the mean is closer to the truth if they are close to the same value.

```
1,2,3,4,5,6,7,8,9
(5)

1,2,3,4,5,6,7,8,9,10
(5.5)
```

The next Friend of the Mean is the Mode, and this is really just the value in the set with the highest occurrence. Taken in this context there is little business value to the mode without also having the Mean and Median. This is mostly due to the occurrence of multiple modes within a set.

```
1,2,3,3,4,5,6,7,8,9
```

```
1,2,3,3,4,5,6,6
```

In both cases Oracle does make it easy to get these numbers. However, on the topic of the mode Oracle only ever returns the mode of the lowest value in the set.

```
SELECT
  TEST_MONTH,
  AVG(test_value) mean,
  MEDIAN(test_value) "MEDIAN",
  STATS_MODE(test_value) "MODE"
FROM rmoung_td
GROUP BY test_month
```

Now if we add these items to our dataset we should get some more understanding of the true nature of the numbers. I have added the range values as well to demonstrate some common numbers that tend to be used in conjunction with the Mean. Yet, as we can see it really didn’t shine a huge light in this case.

```
<table>
<thead>
<tr>
<th>TEST_MONTH</th>
<th>MEAN</th>
<th>SUM_OF_VALUES</th>
<th>NUMBER_OF_VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN</td>
<td>50</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>FEB</td>
<td>50</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>MAR</td>
<td>50</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>AFR</td>
<td>50</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>MAY</td>
<td>50</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>JUN</td>
<td>50</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>JUL</td>
<td>50</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>AUG</td>
<td>50</td>
<td>250</td>
<td>5</td>
</tr>
<tr>
<td>SEP</td>
<td>50</td>
<td>550</td>
<td>11</td>
</tr>
<tr>
<td>OCT</td>
<td>50</td>
<td>550</td>
<td>11</td>
</tr>
</tbody>
</table>
```

More likely now we have a lot more data with not much more understanding and a key point. That most managers and decision-makers rarely have enough time or attention span to interpret this much data into a decision.

**“Believe none of what you hear and only half of what you see.”** -- soldier’s proverb

So we need a solution. Something simple, easy to read, and understandable. Can we hope for that much? Enter the Standard Deviation. If you have taken statistics then this is a core value that we all had to learn, if not then this could sound a lot like a someone saying ‘minor brain-surgery’.

```
S_N = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (x_i - \bar{x})^2},
```
Now don't run. This may seem like it is more math than anyone in their right mind would want to do or write code to perform, but Oracle makes it easier than all that.

```
SELECT
    TEST_MONTH, avg(test_value) mean, median(test_value) "MEDIAN",
    stats_mode(test_value) "MODE",
    stddev(test_value) "STANDARD DEVIATION"
FROM rmoug_td
GROUP BY test_month
```

This calculation (and simpler SQL function) takes a lot of information into account and produces a single number that represents the spread of the numbers in the set from the mean. Think Consistency. So, when we go back to our dataset.

What we see here now is the average value and the first standard deviation. If we take an example we find that January has an average of 50% and a Standard Deviation of 51.3(%), meaning that 68% the values contained in the set vary from 0 to 101.5%. And of course the Standard deviation means more than this but in the context of our data this is the simplest description.

Using this example, we can also apply it to the other metrics in the set and we can find either a wide or narrow variation. The smaller the standard deviation, the more consistent the data is to the mean. The more consistent the numbers are the more truthful the mean is. Hence, better value to making a decision.

But the numbers are just part of the solution. It helps to get them right but how we operate around them is key to improving them as well. The first major item to change is how we visualize the numbers. Typically, this is done using a line or bar graph, but these are only visually useful with a single value. Hopefully I have convinced you that this is not enough to make it work.

Now statisticians tend to like seeing this data in a distribution, or curve object as in Figure 12. But this does not really lend itself to business analysis. What this does give us a good look at is a concept known as the Empirical Rule, which roughly translates that if the data follows a 'normal' distribution, it will have certain percentages of the data that fall within a number of standard deviations from the mean.

What I have come to prefer is a visual that we often see with stocks. It's called a box and whisker chart or more commonly a stock chart.

This fun visual is available to us through a variety of BI platforms including Oracle's Application Express tool kit. It takes the more complex concepts involved with the mean and the standard deviation and combines them with a unique type of bar chart that shows how the data is concentrated. When we look at the Figure 13 example we can very clearly see which months in our metric set had more or less consistency and now have a visual reference to good and bad within the numbers. This is by far the easiest way to tell if the mean is hiding issues from you.

"If we do not change our direction we are likely to end up where we are headed.” -sj

The problem with business metrics is two-fold. First the numbers are generally too simplified to see enough of the problems and opportunities. Second, the manner in which we set expectations is often very one-sided and in desperate need of a change. Since we have covered some of the numbers now might be a good time to discuss the rest.

All too often when I see business metrics I see a goal line. It is set at an arbitrary point of expectation. Come in just fast enough and you pass, fall just a hair slower and you fail. This is the kind of expectation that can cause a whole spectrum of morale and staffing issues that can affect the numbers to an even greater degree.
So, in a previous life I offered the roadmap you see here. It suggests that we use the numbers gleaned from the exercise above to set a new definition of normal within the new high and low lines and left it alone for the time being. Above normal were incidents we investigated to discover any new techniques or data to bring to the whole process, the opportunities. Below normal were investigated to discover any issues that could be mitigated. During the initial exercise the pattern of data showed that by handling the outliers we improved the whole to the point where we could re-define Normal once again. By running this exercise over several phases we came to a point where there really were no more improvements to be made and so we entered a maintenance phase where the normal zone did not change but the practice was still used to manage the outliers. What was found here is a natural level of expectations. As well as a better culture of work around these processes.

If you consider taking this route as a next step there are some important things to know. You must commit to taking a path that stages the expectations appropriately. Talk to the people involved, there is a good chance they know how to improve the process without making a huge deal out of it. Be patient, number don’t change overnight and I’d truly be worried if they do. Relax, nothing is worth your health and welfare. If one approach doesn’t work, try something new.

“Smile, it makes them wonder what you’re up to”

So in this brief session I hope to have shown that statistics can be very subjective, they can be used to tell great truths or to conceal horrible lies. The point I hope to have made for all levels here is to look beyond the numbers on your page. Know how to dig in and see behind the curtain we tend to pull over our data and to enable us to make better decisions in the future.

So why bring this article here? The answer is fairly simple. When business units need metrics they come to the people with the data. In this field we are not just responsible for the storage of data but how it is read. We even have more than our share of these metrics to report for our own operations. We should be informed as to the pitfalls that could be within the request we receive. By making everyone aware of the challenges and opportunities, we can hopefully make the right change at the right times to improve performance for everyone.

Jason Aughenbaugh, Sr. Programmer Analyst, Insum
Jason Aughenbaugh is a Programmer Analyst/Tinkerer specializing in precision guesswork. He is a 15+-year veteran of business and IT solutions development and support. As veteran of the US Naval Construction Force (Seabees), Jason has been building, fighting, maintaining, improving, and leading since age 17. Jason is currently a member of the Insum (www.insum.ca) team as a Sr. Programmer Analyst and APEX Developer. Prior to Insum, he worked in the solar energy, pharmaceutical, cultural, and government sectors. You can read his ill-maintained weblog at www.precision-guesswork.net.

Quarterly Stan Yellott Scholarship Awards 2016 First Quarter

Rasheed Graham
• Resides in Centennial, CO
• Attending University of Denver for a masters in computer science
• Works in telecom industry, focusing on computer networks

Heather Gray
• Resides in Ft Collins, CO
• Attending Front Range Community College in Ft Collins
• Working toward an associates in computer science with a 3.80 GPA

Donald Schreiber
• Resides in Westminster, CO
• Attending Front Range Community College in Westminster
• Working towards an associates in cybersecurity and as a computer technician with a 3.68 GPA

Ramianahalli Chokkalingam Giri
• Resides in Colorado Springs, CO
• Attending Regis University for a masters in database technologies with a 4.00 GPA

Sushmita Shilpakar
• Resides in Boulder, CO
• Attending Front Range Community College in Boulder
• Working towards an associates in programming with a 3.63 GPA

Annual Women In Technology Scholarship for 2016

Jennifer Wheaton
• Resides in Dartmouth, MA
• Graduating high school 1st in her class of 260 in May 2016
• Attending StoneHill College starting September 2016

Maria Moore
• Resides in Northglenn, CO
• Attending Regis University for a masters in computer science
• Focusing on database development and architecture
Recognizing and Overcoming Limitations of Standard Performance Tuning Tools

Part 1 - AWR/ASH & ADDM Reports

Roger Cornejo

Performance Tools

When I was a little kid and asked my mother a question she was too busy to answer, her standard reply was, “Look it up in your Funk & Wagnall’s.” All I really wanted to know was the quick answer - Did fish like worms or grasshoppers better? I didn’t want to wade through an encyclopedic entry about fish behavior. Today, massive amounts of data/big data has become an obsession; the usefulness of large amounts of data for database performance cannot be understated.

Back in the old days when we had only the v$ performance statistics, one had to be present and watching when a performance problem was happening; StatsPack improved upon that, but the real windfall came with the Automated Workload Repository (AWR). The advent of the Diagnostics and Tuning Pack tools (AWR and the advisors), along with OEM and third party tools, has been a “game changer” for the DBA needing to tune an application or database. In my “elevator speech” describing the Diagnostics and Tuning Pack tools, I use the metaphor that they are like two sides of the same coin: 1) the Diagnostics Pack (i.e. AWR) provides the information necessary to establish Root Cause, and 2) the Tuning Pack gives instructions for immediately-actionable solutions. When AWR is not available on an instance, the tuning process is much more laborious, because the historic performance statistics and advisors are lacking.

In spite of all the seeming and real benefits, however, AWR can still seem very much like the Funk & Wagnall’s, causing many people to be scared off by the vast sea of information. To the casual or novice tuner, the sheer volume of information is intimidating; he lacks a strategy for dealing with all that data and may be tempted to just stay away. To these individuals, I say, “Hop aboard or you are going to miss the boat. Oracle database tuning is a field that requires adaptability, and a familiarity with AWR is vital to your success.” You must also realize that simply learning to use the out-of-the-box tools so AWR can “do its thing” is not going to get you as far as you want to solve complex performance issues. While the standard AWR tools have much to commend them, they are not a panacea for database performance ills.

Of course, DB performance problems are as varied as there are databases and applications. In my experience, there are situations where the standard tools work well, but there are numerous cases where they fail to provide just the right view into the historic performance statistics (i.e. that precise, narrow slice through the performance stats) that will enable the Oracle DB tuner to quickly discern root cause and enable him/her to provide solutions for the specific database performance problems being addressed. For example, a typical OEM performance page will show you an aggregate view of all the wait classes for the instance over time; this may be interesting in and of itself, but it does little to get you quickly to the portion of the application that is experiencing performance difficulties. Also, while the ARW report does contain a lot of information, it is usually not at all level of granularity necessary to solve a specific performance problem quickly.

ORACLE Corporation designed AWR and the suite of tools that accompany it as part of their effort to provide a manageability framework to undergird a self-managing database. Their goal was/is to make out-of-the-box database tuning as effortless as possible. While these tools are extremely useful and I commend them highly, the DBA/performance tuner must still be skilled in their use. Just as a physician must know how and when to use the scalpel and when to prescribe pain pills instead, so the database tuner must provide insight and skill in the right application of the AWR tool set. AWR is a great help to tuning and can be an effective tool in the hands of a trained database/application tuner, but, in my experience, the set of tools with which it comes “pre-loaded” is just not sufficient for every problem. While very detailed historic session level and SQL level performance statistics are in the AWR data, the standard tools don’t always [or, rather, don’t usually] expose the correct level of information to the Oracle DB tuner in a way that allows him/her to quickly understand the specific issue and take action. Most of the information that is needed to diagnose and correct performance issues is in the AWR repository, however, and it is available to the person who knows how to be creative, craft his/her own tools, and accurately leverage the wealth of information that is there.

This article details some of the tuning wisdom I’ve gathered in my 30+ years of working with Oracle and more than 7 years working specifically with AWR, by outlining exceptional case studies where it is necessary to go beyond the standard toolset to get the job done. I will review several AWR tools and scenarios where the standard tools are insufficient to solve the application performance problem and show how the practical DBA can dig deep in the AWR repository using her own tools to come up with a solution.
**AWR Report / ASH Report**

The AWR is a massive repository of historic performance metrics and statistics obtained from the database as the applications are running. One of the main applications of the AWR / Active Session History (ASH) Reports is to help identify the top resource-consuming SQL statements running on a database. These reports can be very helpful tools in some situations. An example of where it would be helpful to run an AWR report as a performance analysis starting point is when the problem is non-specific DB lethargy or when the user is having difficulty pinpointing the specific application function that is experiencing slowness. One particular case study comes to mind - a vendor-supplied expense reporting application - was performing so poorly that the support team was not able to identify specific performance issues. Using the AWR and ASH reports, I was able to literally cycle through several problem ID/fix/test cycles until the application was performing reasonably well for most operations. That gave the client enough breathing room that we were able to focus in on the remaining slow points on specific application functions.

While there are cases where it may be advisable to begin the tuning process with an AWR report, in my experience, it is generally true that the AWR or ASH reports are not an effective or efficient starting point for tuning because of their high potential for lack of alignment with the reported performance problem. One reason for this is that there are often several/many SQL statements running in the same problem interval reported by a client. An AWR report run in this case, could misdirect an inexperienced tuner into thinking he has identified the problem SQL, and cause him to chase down “problems” that have nothing at all to do with the performance problem the client is facing. Following this misdirected tuning path might be fun, and it could provide a valuable learning experience for a novice, it might even result in some performance improvement, but it is not a focused way to go about tuning. The saying that “you won’t get there if you don’t know where you are going,” can be modified here to assert, “You can’t tune a problem if you can’t identify it.” It is absolutely true that the most efficient and productive tuning is targeted tuning.

Targeted tuning of a performance problem begins by seeking to identify exactly which SQL was running during the period identified by the client as being problematic/slow. I have observed that less battle-hardened/seasoned tuners often grab the top SQL and declare it/them to be the problem, and then go about trying to fix it/them – but just because a SQL ran often doesn’t mean it was a performance issue. What we want to identify, rather, is the SQL that is causing the actual performance issues for the client. Spending time on a top SQL statement that is not the real problem is a time waster; several fix/test cycles may pass before you get to the real problem (if you ever get there).

In the case of a multi-step process or a PL/SQL procedure, there may be many SQL involved, so finding the slowest ones for the specific user reported slow process and deep diving into those is where I start. It is my usual practice to directly query the ASH data to find the slowest SQL involved in a slow process. One could argue that OEM and AWR provide sufficient capability out of the box to do this, but I find that subsetting ability obtained from a custom built SQL statement gives me more flexibility and gets me focused on the correct problem more quickly. I usually start by querying the historic session information in DBA_HIST_ACTIVE_SESS_HISTORY, but you could also use gv$active_session_history if the data is still in this circular buffer. My favorite “go-to” query (which I run through TOAD) for identifying the sessions and SQL is what I call my “Identify Sessions” query. This query allows me to subset on pretty much anything in the active session history (e.g.: session id, session serial number, sql id, sql plan hash value, top level sql id, date time range, module, machine, program, how long the session spent on a query, …), and by extension (because the code pulls in additional attributes found elsewhere in the AWR repository) I can subset on related attributes such as SQL text and username. Additionally, I have built in some flexible ordering so I can see the sessions / sql in the order in which they appeared in the active session history, or by how long they were there. In practice, I cut a new version of this code almost daily as I learn more about how to zero in on the exact problem SQL/sessions the fastest. Since I don’t always have all the subset conditions at the onset, I have coded this query to accept null as default for all the subset conditions [the only problem is you get back all the active session history information aggregated by session/sql; which is usually too much information to take meaningful action on a specific performance issue].

As you can imagine, getting to the right session or SQL level information in the AWR data is predicated on having accurate run information from your clients. I usually ask the client to provide the following information when the help ticket is initiated: date/time(+tz)/duration/expected duration [expected duration helps determine performance requirements] of the performance problem. Additionally, it is helpful to know what account the application is using to connect to the DB, along with the SQL statement they are running and any other session identifying information you are able to glean from interacting with the client (such as machine, module, program).

Once you are confident you have identified the session information related to the problematic SQL statement, you can run the SQL Tuning Advisor right away (since you have the sql id, and the begin/end snap id’s). Since I’m examining the AWR data straight from a custom query, I generate the SQL*Plus commands to run the SQL Tuning Advisor for a particular SQL statement, so I just cut the SQL*Plus commands from the relevant row returned by TOAD and paste them into a SQL*Plus window. What is being run at this point is a custom SQL*Plus script that pulls the SQL Details along with the SQL Monitor Report (when available) [in Part II of this article I intend to cover issues I’ve encountered with the SQL Monitor Report], then it runs the SQL Tuning Advisor for the specific SQL_ID and snapshot interval. The combination of these two outputs generally gives me all I need to know about the SQL statement (statement, execution statistics, plan, table cardinality, indexes, wait events) plus what the tuning advisor thinks regarding actionable tuning advice (see section below on the SQL Tuning Advisor).

As I’ve tried to stress, tuning should be a targeted operation. Sometimes, however, as in the example at the beginning of this section, the target is hard to identify. In these situations, AWR can be useful for identifying “low-hanging fruit” that can be cleaned up and this will allow you to begin to home in on areas that will benefit from closer scrutiny. As mentioned earlier, learning to “speed read” an AWR report is important; I will typically focus in on the following report content:

- Average Active Sessions (AAS) [not available on AWR reports until 12c in the ADDM Report Summary section] and Load [Operating System Statistics section]
- To understand AAS and OS load you should compare these metrics to the CPU count. AAS or Load values...
approaching the CPU count are very high which would indicate a stress situation for the DB. With high AAS/Load, one might look for root causes related to application load on the instance/machine. With low AAS/Load and performance issues still present, one would look for application specific SQL that are performing outside of the requirements (involving application people to understand what is running that is relevant to the slow processing).

- In 11g AAS is provided directly in the stats collected by Oracle: `dba_hist_sysmetric_summary.metric_name = 'Average Active Sessions'`, however, in 10g, AAS is calculated: AAS = DB TIME / Elapsed Time

- Unusual Wait Events
  - Recently someone asked me to take a peek at an AWR report for them. Knowing nothing about the application other than the report period was for an overnight data load for the DB hosted on the cloud, I could see high log file related wait events. Checking next in v$log_history I could see that there has been high log file switching. The solution to this was to increase the size of the redo logs. Additionally, (also by the wait events) I could see that RMAN hot backups were occurring during the load period (our usual practice is to have the hot backups during periods of low update activity).
  - Most DB's will have high I/O related wait events and I will generally want to understand this in the context of the SQL experiencing these events. At a high level though, I/O latency can be examined via Single-Block Read Latency (11g+) and User IO Wait Time. Sadly, neither of these metrics are available in the AWR Report so I simply query `dba_hist_sysmetric_summary.metric_name = 'Average Synchronous Single-Block Read Latency'` and `dba_hist_systat.stat_name='user I/O wait time'`. Similarly, throughput can be examined via `dba_hist_sysmetric_summary.metric_name = 'Physical Read Total Bytes Per Sec'` and `Physical Write Total Bytes Per Sec'.

- Top SQL by Elapsed Time
  - Since the majority of performance issues are at the application/SQL level, and since users experience performance issues as long elapsed times, this section of the AWR report is a good “go-to” section.

Even in the few cases where I might start a performance analysis reviewing an AWR report for a high level analysis, you can see that there are yet deficiencies. For a high level analysis, I prefer to use a couple of health checks that I’ve developed that primarily examine `dba_hist_sysmetric_summary` for a variety of metrics that I’ve found can be used to characterize workload.

In summary, with few exceptions, I do not start the tuning process with an AWR report because of their lack of specificity. They are helpful, however, for confirming the findings and root cause analysis, so I tend to use them more as a double check to see if some important aspect of the performance behavior was overlooked in the SQL analysis. They can also be helpful in cases that are very complex, where an iterative process can help identify areas for targeted effort.

### ADDM Report

Unlike, the AWR Report, which has no interpretive component, the Automated Database Diagnostics and Monitoring (ADDM) is designed to be an analytic tool. Oracle Corp. describes ADDM as “a revolutionary, first-of-its-kind performance self-diagnostic solution”. ADDM interprets the stats collected/reported by the AWR framework and analyzes them in regards to the top SQL statements and wait events [in 12c the AWR report includes the high level findings from the ADDM report]. The goal behind the ADDM analysis is to optimize database time, thus long-running/high resource-consuming processes are identified as “problems.” ADDM will often direct you to run further investigations (usually SQL Tuning Advisor or Segment Tuning Advisor) on these “problems.” And it will also frequently generate “solutions” (ADDM solutions most frequently involve parameter changes, specifically increasing SGA or PGA or log buffer).

I will chime in with many other voices to extol the virtues of the ADDM because it has huge significance to the Oracle DB tuner. But here again, the DBA/tuner must apply some wisdom to know and overcome the limitations of this capability. For example, I regularly encounter scenarios where the problem SQL is not one of the top SQL statements identified in the ADDM analysis. In these cases, the ADDM totally misses the problem SQL and will therefore not address the SQL statements that are key to solving the specific performance problem that has been reported. An inexperienced tuner may take the SQL statements highlighted by the ADDM and spend time fixing problems that have nothing to do with the real issue. Recall the Mantra- “If you don’t identify the problem, you won’t be able to fix it.”

The reason for this “deficiency” in the ADDM tool, is its inability to know of a specific problem at a level detailed enough to give really useful information for that problem. That is, ADDM looks at the entire database, not a specific issue, and quite frequently, application performance issues are with SQL far below the top 5. I generally view the ADDM as best for identifying “low hanging fruit” because it’s generally the case that if you tune SQL identified by the ADDM, you will get some performance improvement, but this improvement may or may not be significant. More importantly, as I’ve already mentioned, it may not even address the problem SQL relevant to the reported performance problem.

Another shortcoming in the ADDM, is that if not used judiciously, it can supply lots of busy work for the tuning professional and add cost unnecessarily. Some ADDM-derived advice, if actioned unquestioningly, may not produce a meaningful performance impact for the user. For example: much effort can be spent upgrading memory, with negligible impact to the overall performance. This is a waste of resources and the waste can be compounded by the fact that adding memory has a cost as well. When I first started using ADDM, I was tempted to action the SGA/PGA memory increase advice right away without any additional analysis, but considering that in our organization memory usage on a machine generally has to be balanced across several instances running on that machine, plus the future planned use for the machine, I need to temper my enthusiasm for adding more memory to the instance with the reality that memory is a limited resource that needs to be managed.

When I do decide to action SGA or PGA increase recommendations from the ADDM, I will check the expected impact of a PGA of SGA increase that the ADDM calculates. If the impact is not likely to be more than 10%, I usually will not action (unless that %age is sufficient to meet the performance requirements). Moreover, before
actioning a memory increase, I usually want to see what recommenda-
tions there were for other periods. For this I use the information
persisted in the hourly ADDM Auto Task runs (see sidebar note
below). Using the DBA_ADVISOR% views with a custom query I
can see how often a particular SGA or PGA parameter change was
recommended, and I’ll use this information to help me decide what
values to recommend for the parameter changes.

While a mindless use of the ADDM is unwise and likely to lead
to a lot of wasted effort, there are many instances where this tool
can and should be used profitably.

As with the AWR Report, sometimes a client will be unable to
identify a specific/narrow time interval or problem area. The com-
plaint goes something like this, “Everything is bad. Between 8 am
and 5 pm, the database is dog slow; it just lays down and dies.” In
this situation, the ADDM can be run to identify the “low hanging
fruit.” Top SQL statements can be tuned and then ADDM can beun again. In this way, through various iterations, a more specific
tuning can be performed at each subsequent pass. This process will
take time because it will take several iterations of the “problem id/
fix/test” cycle, but ultimately you will get to the point where only
specific portions of the application are slow and then you can deep
dive into those areas for more focused and productive tuning.

The ADDM report will often leave some further investigative
action for the tuner, such as examining code for inefficiencies related
to a specific table, running the SQL Tuning Advisor on specific SQL,
or running the Segment Advisor on specific tables or indexes.

Sidebar note on ADDM parameter advice:

Here’s a short version of the DBA_ADVISOR query:

```sql
select attr1 parameter, message, count(*)
from dba_advisor_actions
where command = 'ALTER PARAMETER'
and attr1 in ('sga_target', 'pga_aggregate_target')
group by attr1, message
order by attr1;
```

With a little bit of reverse engineering of the attributes (i.e. this
is largely undocumented), and some grouping, the clever DBA could
easily come up with a useful query.

Also in the ADDM Auto Task runs, I tend to see some common
advice such as “Consider increasing the session cur-
sor cache size by increasing the value of param-
eter “session_cached Cursors”.” Our operations DBA’s
tend to have low default settings for this one and most applications
could benefit from having higher values for session Cached cur-
sors. Additionally, one ADDM recommendation that I will rarely
action is “Alternatively, you may set the parameter
“cursor_sharing” to “force”.” My reason is because this
modification changes the optimization of many SQL statements and
some, for the worse. In these cases, I will usually check to see if
the application has an issue with bind variables not being used and
notify the application owners of the perils of this “feature” of their
application.

Conclusion

This short article, if successful, has reinforced two important
ideas. First, that AWR and its suite of tools is a fantastic advance
for database tuners and is not optional for anyone who wants to
be successful in this field. Secondly, familiarity with, and artful

Roger Cornejo has been working with large/
complex Oracle applications (versions 4.1.4 – 12c)
for over 30 years. He has developed expertise in
the area of DB performance analysis and tuning
and has been working intensively with AWR for
the past seven years. His tuning efforts are vital to
the efficient operation of over 300 Oracle produc-
tion instances (well over 1,000 in total) across
12c/11g/10g (and occasionally 9i) at GSK where
he is a Principal Oracle Performance Consultant.
As a thought leader, Roger has been sought out
for his expertise in tuning, presenting at the
past 5 East Coast Oracle conferences, as well
as IOUG14, Rocky Mountain Oracle Users Group
Training Days 2016, and Oracle Conference on the
James 2016. He also regularly consults and blogs
at OracleDBTuning.com. His tweets can be found
@OracleDBTuning. Roger will field questions as
well at Roger.D.Cornejo@gmail.com.
War of the Nerds
Conflict Resolution Strategies

Opal Alapat, MBA

Earlier this year, I had the good fortune of presenting on conflict resolution strategies at the RMOUG Training Days 2016 event. It was my first time attending this conference and it was a wonderful experience being part of a track that I think is critical for survival in the tech world: professional empowerment. To me, professional empowerment in our industry is the promotion of career transformation and advancement through non-technical education and the improvement of soft skills. This is an area about which I’m super passionate. As part of a prior role, I used to run company workshops focused on these types of topics. RMOUG Training Days is one of the few Oracle conferences that invests in this type of education.

So why conflict resolution? If you’re in the tech world, the chances are high that you’ve encountered difficult situations and/or challenging people. We are an ecosystem of geeks, stereotyped by an armament of technical verbiage, an innate gift of software and hardware problem solving, and ever expanding egos. Let’s face it – there is some truth in this assessment and these character traits do not always yield an optimal environment for human interaction.

A couple of years ago, I earned a graduate degree from a local executive MBA program. Out of all of the classes that I took, one of the most memorable ones was entitled “Conflict Resolution”. This class focused on two main concepts:
1. Definition and stages of conflict
2. Tips for dealing with difficult people

This was an elective class and one that I took for both professional and personal growth. I, like the many students who also signed up for the class, took it to enrich my knowledge and prowess in difficult situations. It also became somewhat of a case study on our own human natures. We shared war stories, pointed out the shortcomings in each other’s personalities, and learned how to be better human beings. If you ever come across an opportunity to learn more about conflict resolution in a classroom setting, I’d highly recommend taking advantage of it. In my opinion, there’s no better way to engage in these types of lessons than with an even playing field with complete strangers.

In an effort to condense one MBA class into a single article, I’m going to attempt to distill these concepts into a handful of terms, techniques, and paragraphs.

The Obligatory Caveat

Yeah, so...just in case it wasn’t clear, I’m not an expert in human psychology. I’m a geek, just like all of you are. Even if I were, I can guarantee that I would never be an expert on people - I am forever a student of life. I’m still learning about conflict resolution Every. Single. Day. This summarized information came from a class based on two main books, in addition to supplemental Internet research, as well as the wisdom and expertise of my husband (who actually holds an undergrad degree in Psychology and a Masters degree in Counseling). If you’d like more information, you might want to consider picking up these books and taking a deeper read: How to Manage Conflict by Peg Pickering and Dealing with People You Can’t Stand by Dr. Rick Brinkman and Dr. Rick Kirschner.
Definition and Stages of Conflict

What is conflict? Conflict has many definitions depending on the context, but the one that I think applies most to the workplace and people comes from www.dictionary.com:
- a fight, battle, or struggle
- discord of action, feeling, or effect
- incompatibility or interference, as of one idea, desire, event, or activity with another

Everyone experiences conflict. It’s natural since we are all feeling beings and not machines. Sometimes we encounter conflict due to the situation. Sometimes we encounter conflict due to the people. Sometimes it’s both. And sometimes we are the source of the conflict.

There are three main stages of conflict. They move along a spectrum that include everyday irritations (stage one) to full on violence (stage three). In my life, I’ve been fortunate never to personally witness stage three in a professional environment.

1. **Stage One**: everyday irritations
2. **Stage Two**: deeply personal effects
3. **Stage Three**: an intent to harm

Why is it important to understand the stages of conflict? We are now living in a world of technological obsession. We’re so wrapped up in our gadgets and information consumption that we often ignore those around us. A few nights ago I was taking the airport shuttle back to my parked car. There were five strangers on the shuttle bus with me. After a grunt to the bus driver about where we were each parked, all six of us immediately pulled out our smart phones and ignored each other. This is a typical scenario. Now think for a moment about how much more attention we have for the human beings in our work space. Even after the teachings from my MBA class, I’m still guilty of recognizing too late that something is wrong between me and my colleagues and loved ones. Perhaps understanding the symptoms will help you see the warning signs before the situation spirals out of control.

**Stage One Conflict**

Stage one conflict is often characterized by day-to-day irritations. Situations and people get on your nerves. Characteristics of this stage include low intensity, less threatening issues. Symptoms of this stage can include eye rolling, complaining, and a shrugging of the shoulders. People often deal with this type of conflict unconsciously by coping, avoidance, and tolerance. Deliberate, logical action is recommended in these types of situations: examining both sides of the story, understanding the true source of the conflict, and working from points of agreement instead of points of disagreement. If you’re lucky, this is the most challenging type of conflict you’ll ever have to deal with. Strong managers who make it a point to get to know their reports can help prevent escalations to the next stage by paying attention to behaviors and taking action when required.

Many years ago, I was the project manager on a small engagement. One of my team members was a junior consultant and this was his first project at the firm. During the first couple of weeks, I witnessed him not taking advantage of downtime. He would surf the internet and leave early when he ran out of tasks to work on. Other team members would roll their eyes and make small jokes at his expense. I took him aside and calmly confronted him about his behavior and explained how his actions were affecting project revenue and the morale of the other team members. He was truly unaware of how his actions were being perceived, so he asked me for advice. Eventually, he turned it around. He became proactive about his tasks, enhanced some areas of our solution design, and made it a point to ask everyone on the team if they needed assistance when he had free time. As a result, he taught some of the other more senior consultants a few tricks along the way about being a better project member.

**Stage Two Conflict**

Stage two conflict occurs when the irritations start to affect you personally. Characteristics of this stage include higher emotional involvement, a resistance to address the issues directly, and longer-term consequences. Symptoms of this stage include behaviors such as not being able to sleep at night, indulging in “escape” activities for longer than normal periods of time (watching TV, reading, playing video games), the use of sarcasm and put downs, “win lose” attitudes, talking in generalizations (“they”, “everyone”, and “always”), and characteristics of extreme frustration. Recommended tactics for resolving this stage of conflict include more advanced training: focusing on the facts and not the people, creating a neutral ground to address the issues, approaching the resolution as a team and sharing in the responsibility, and looking for middle ground without compromise.

On a different project, also many years ago, I co-headed up one of the largest teams that I’ve ever had to manage. Due to the size of the project, there were over a dozen people, including multiple architects. At one point on the project, two of the architects got into
it. Unbeknownst to me, this was an escalation that had simmered over time and finally reached its breaking point. The straw that broke the camel’s back came one day when the two architects got into a screaming match at the client site. Luckily, it was an internal disagreement that the client wasn't witness to. As I was not a seasoned manager at the time, I pulled in senior members at our consulting firm to help me with the situation. We did resolve the issue, and looking back, the keys to this were creating a neutral territory to address the issues, as well as asking each person to focus on the facts. The truth of the matter is that this conflict stemmed from a lack of respect for each other that skyrocketed out of control. One of the tactics we took was to encourage respect by demonstrating the strengths that each person brought to the table. Luckily, that project ended successfully with all folks working together in the right direction.

Stage Three Conflict

Stage three conflict is as bad as it gets. People who have escalated here are at the “point of no return”. People who are at this stage might have an intent to harm each other physically and/or psychologically. Characteristics include volatile emotions, a true hostile working environment, and a resistance to logic and reasoning. Symptoms of this stage include violent behavior, sabotage in the workplace, “nice” people turning “evil”, and extreme manipulation with the intent of getting someone fired. Resolution tactics require professional help: arbitration, intervention, negotiation, and mediation services. In this situation, it’s best to minimize the losses and redirect the team.

I've been fortunate not to have personally witnessed this level of conflict myself. However, a colleague of mine recently found themselves in this type of situation. Unfortunately, it never got resolved - the conflict actively ended when the project ended. This person and the other person engaged in the conflict started off as friends and ended as enemies. They do not speak to this day. Looking back, it’s clear that this situation, much like the stage two conflict example, also stemmed from a lack of respect that spiraled out of control. The management team in place ignored the situation, which led to a disastrous and irreparable outcome.

Part II: Dealing with Difficult People

So now that you know some of the symptoms and resolution strategies of challenging situations, how can you prevent them in the future? This comes back to human nature and dealing with people individually before the situation gets out of control. Conflict is often situation-based - there can be many contributing factors and variables. Therefore, not one solution fits all.

How many of you have encountered difficult people? How many of you have been the difficult person? There are thousands of books written on the different kinds of difficult people (OK, maybe not thousands - I didn’t bother to count them all...but there are a bunch). Some characteristics that are used to describe people that other people can’t stand include:

- Passive
- Indecisive
- Indifferent
- Aggressive
- Negative
- Whiny
- Angry
- Sarcastic or rude
- Explosive
- Confrontational

In addition, there are different ways of classifying difficult people. However, instead of describing all of the different categories (I only have a few thousand words), I’m going to focus on some general techniques. Here are three simple strategies that you can use to improve your dealings with challenging people:

1. Blending
2. Listening to understand
3. Speaking to be understood

Blending

Blending is any behavior where you reduce the differences between you and another person by moving to common ground. This can be either verbal or physical. Examples include: finding out that you and someone are from the same home town, mimicking the same gestures, facial expressions, and/or body posture, and blending your speaking volume, speed, and intonation during conversation. If you ever pause and take a moment to examine yourself when you’re surrounded by people you genuinely like and respect, you’ll find yourself doing this automatically. People who get along blend naturally. One important thing to note here is that blending is different from mocking. In addition, blending should never be done with a hostile gesture - meeting aggression with aggression is never a good idea.

Listening to Understand

Listening to understand is about a concept called “active listening skills”. This is where you, as the listener, listen effectively and with a respect and focus on the other person (instead of nodding your head and thinking ahead to the next question you want to ask, which many of us are guilty of). Some tips for actively listening include:

- Backtracking - repeating the literal words that the other person has used to come to a common vernacular...just be careful to avoid sounding like a parrot (e.g. if the other person uses the terms “situation”, “positive”, and “opportunity”, then you also using those
same terms during discussion)

Clarifying - asking open-ended follow-up questions to show that you're focused and interested in learning more (e.g. asking "how was your day?" vs. "did you have a good day?")

Summarizing - demonstrating that you've heard and understood what someone said by summarizing it in your own words (e.g. stating "so if I could summarize what you said..." and "here are the takeaways from this meeting...")

Confirming - directly asking if you've fully grasped what the other person is saying (e.g. "am I understanding you correctly?")

Speaking to Be Understood

Speaking to be understood is about both verbal and non-verbal communication. Together, verbal and non-verbal communication make up the sum total of what people understand and take away from a conversation.

People can underestimate how much non-verbal behavior influences communication. For instance, if you're giving someone a compliment and don't look directly at them while speaking, your compliment might be perceived as disingenuous. Take a look at this graphic, courtesy of Susan Young at Get in Front Communications:

![Graphic showing percentages of meaning conveyed by words, tone, and facial expressions](image)

The verbal part of communication, although not equal in measure, is also important. You as the speaker, have equal ownership in your part of the conversation.

Some tips for speaking to be understood:

Monitor the tone (the "attitude") of your voice. Emotion often leaks out through tone unconsciously, which people take personally. Just remember that when the tone and the words don't match, tone will be believed over words nearly every time. A perfect example of this is sarcasm. If you don't know someone well and they use sarcasm when speaking to you, you might take their tone the wrong way.

State your positive intent up front. In difficult situations, it's often better to tell people why you're having the discussion so that you can direct the conversation where you want it to go. For instance, when giving constructive criticism, you might want to try starting with something like "I wanted to share some feedback with you so that we can be a stronger team."

Tactfully interrupt interruptions. It can be difficult to get your point across when someone is constantly interrupting you. People sometimes interrupt others for negative reasons – for instance, when they are trying to take control of the conversation. One of the best strategies I've learned for combatting this situation is to say the interrupter's name over and over again in a neutral manner until they hear you and stop the interruption. This technique is one popular takeaway from this conflict resolution presentation that others have come back to me afterwards and exclaimed about its effectiveness.

Tell your truth. This means to use "I" language instead of "you" language and to be specific about the issue. Speak from your experience. When you use "you" language it can come across as accusatory. For instance, instead of saying "quit cursing at me", try "I feel disrespected when foul language is directed at me." Can you see the difference in how one response affects you over the other?

Finally, stay flexible. Even when you're speaking, you have to remember to listen. Be willing to drop what you're saying to focus on someone's reaction to it, instead of continuing your agenda. For example, if you're talking to someone and they become visibly emotional and start crying in response to you, stop and address their reaction. This is an important skill when fostering a new relationship with someone, and an even more important skill when you're managing someone.

Conclusion

Now that you understand the stages of conflict and have a few techniques in your tool belt for dealing with difficult people, it's time to put these lessons into action. This is a conscious effort and one that gets better with experience. And it doesn't stop at the career world – these strategies can be used with your loved ones in addition to your colleagues. Just like my professor challenged us, my challenge to you is to think about where your own shortcomings are when it comes to difficult situations and to make an effort to incorporate at least one of these techniques in the future. With any luck, you can alter the dynamic between you and others when confronted, and come to a swifter, more palatable resolution.

In the 2 years since I've taken that class, I've encountered several extremely difficult situations in my professional world. It can be hard being in a visible role, especially one in charge of a popular user group tech conference. I've been yelled at, threatened, and down-right hated. Every time this happens, my handling of the situation is a testament of what I've learned and how far I've come. I'm getting better at handling conflict, and although it's mentally exhausting at times, I'm a stronger person as a result and I feel more equipped for whatever challenges might come my way.

My main takeaway from that class is this: dealing with challenging situations and people is a learning process and it requires both patience and practice. Even when armed with these techniques, you will fail sometimes and succeed at other times. Make an effort to learn from each situation you encounter and build upon it.

Good luck!

Opal Alapat is an EPM Cloud specialist at interRel Consulting. She's also an Oracle Ace Associate, published author, obsessive tweeter and blogger, on the ODTUG Board of Directors & Kscope16 conference committee, and a co-founder of the NtxHUG (a Dallas-based Hyperion user group). She's been a consultant in the EPM space for over 15 years and enjoys evangelizing Oracle technologies. She's held a variety of roles including Consultant, Architect, and Project Manager. In addition, she's spoken at multiple Oracle tech conferences and events, webinars, and user group meetings. In her free time, Opal enjoys spending time with family and friends, fooding, and indulging in way more hobbies than she actually has time for.

Contact information:
About.me: https://about.me/opalalapat
Blog: http://womaninepm.com
Twitter: @opal_epm
LinkedIn: https://www.linkedin.com/in/opalalapat
Although term SSO is usually used to present a way to access a set of enterprise resources via single set of credentials – subject of this article is to share some aspects of implementation experience for Oracle EBS only.

**EBS Users repository without SSO**

Oracle EBS comes with the FND_USER package as a core component of the application user’s information, including user names, passwords, and expiration rules. Credentials loss is a common situation when password is forgotten, expired and needs to be reset. The FND_USER repository has to be maintained, audited and stay compliant with enterprise security policies. Every time the EBS instance is refreshed (DEV, QA from PROD as source) – passwords have to be reset. All of the above present certain challenges to EBS support and security management. Access Management rules have to be applied to Corporate Network and Oracle EBS separately. These rules are different and it leads to necessity of additional resources, time and efforts to assure uninterrupted EBS functionality.

**Why SSO?**

After SSO is implemented – Oracle EBS user’s repository stopped serving a major role in EBS authentication process. FND_USER passwords are not being used, password expiration is not relevant anymore and the entire user’s repository is used as a mapping mechanism between SSO user’s repositories and EBS users to perform authorization. This effectively excludes FND_USER from security maintenance procedures and allows Access Management to remain focused on other areas of concern. It practically terminates EBS credentials loss situation. If the user is connected to Corporate Network – SSO automatically guarantees uninterrupted access to Oracle EBS. Oracle SSO components are based on a set of open standards, highly configurable and after implementation it can satisfy the variety of authentication needs with relatively low effort.

**Why Zero Sign On?**

Zero Sign On option assumes that user’s identity doesn’t need to be prompted once again after user is authenticated on Windows network. Kerberos Version 5 protocol is used to perform this action. It provides secure user authentication using industry standard that permits interoperability. The Kerberos protocol name is based on the three-headed dog figure from Greek mythology known as Kerberos. The three heads of Kerberos comprise the Key Distribution Center (KDC), the client user and the server with the desired service to access. The KDC is installed as part of the domain controller and performs two service functions: the Authentication Service (AS) and the Ticket-Granting Service (TGS). Three exchanges are involved when the client initially accesses a server resource:

1. AS Exchange
2. TGS Exchange
3. Client/Server (CS) Exchange

Kerberos authentication schema is one of many authentication mechanisms offered by Oracle Access Manager and allows authentication without an additional credentials request. This creates a very pleasant user experience, which is one of the main goals of implementing SSO.

**Where to start?**

- Metalink Notes:
  - Integrating Oracle E-Business Suite Release 12 with Oracle Access Manager 11gR2 (11.1.2) using Oracle E-Business Suite AccessGate (Doc ID 1484024.1)
  - Integrating Oracle E-Business Suite Release 12.2 with Oracle Access Manager 11gR2 (11.1.2) using Oracle E-Business Suite AccessGate (Doc ID 1576425.1)
- Blogs:
  - High level configuration OAM/SSO blog maintained by Steven Chan and Elke Felps from Oracle Development group
  - https://blogs.oracle.com/stevenChan/entry/oracle_access_manager_11_15

**Assemble Your Resources.**

This looks like a long list of resources and it only partially reflects the complexity of the implementation.

- Technology Stack.
  - Weblogic server
  - OID – Oracle Internet Directory
  - OAM – Oracle Access Manager
  - Webgate – Apache based web server
  - Access gate – Java based application provided by Oracle
  - EBS System administration
  - Microsoft AD, Kerberos
High Availability.

SSO with Zero Sign option is becoming a critical single entry into Oracle EBS. If SSO is in place, password expiration policy on EBS side is still being enforced, but passwords are not renewed and any SSO failure immediately causes inability to access EBS resources if the user’s password has expired. It brings the situation to Severity One level immediately. To avoid such a catastrophic scenario, high availability for SSO components (Oracle Access Manager, WebGate, AccessGate, OID) must be designed and implemented. Another option is a load balancing via F5 to assure uninterrupted application delivery. Clustered configuration for OAM managed services is a preferable solution considering that Oracle Coherence server takes care of user sessions distributions and maintaining continuous functionality in case one of the cluster nodes is down.

Oracle SSO components:

- Oracle SSO solution is based on Fusion Middleware architecture and its components. Core component is WebLogic server and it is the first component to be installed.
- Oracle Internet directory is a mandatory LDAP repository component supporting integration of E-Business Suite with Oracle Access Manager. While OAM relies on OID (Oracle Internet Directory), E-Business Suite has its own user namespace — FND_USER. Both OID and FND_USER are required to be linked to assure that user identified by OAM in OID is the same user represented by a specific record in FND_USER. This link is provided by matching ORCLGUID attribute in OID and USER_GUID column value in FND_USER. ORCLGUID value is automatically generated when new user record is created in OID. This value has to be provisioned into FND_USER for the matching user record. When new user record is created in OID, the Active Directory “samAccountName” attribute value must match Windows NT Login name. Multiple Oracle EBS instances could point to the same OID instance. In this case the ORCLGUID value has to be provisioned into each individual EBS instance. OID is also required due to the fact that the authorization application fnauth.war or AccessGate developed by Oracle ERP development group has a hardcoded reference to OID. This approach makes it impossible to replace Oracle Internet Directory with third party LDAP repositories and still maintain the ability to authorize E-Business Suite user via SSO using delivered fnauth.war application.
- Oracle Access Manager is an essential part of SSO and represents Oracle Identity Management’s solution for web access management and user identity administration. The backend repository for the Access Manager is an LDAP-based directory service. OAM out of the box contains set of integrated services such as Identity Federation with SAML, Kerberos, LDAP, X509, etc. It provides centralized, policy-based authentication and single sign-on for Web applications, Web services, data and cloud services. OAM delivers seamless single sign-on to enterprise resources from any device including desktops, laptops, and mobile devices. Part of SSO implementation is a creation of OAM authentication agents. Each set of protected/public resources requires its own OAM agent. Multiple agents can be created to protect resources across multiple application using different authentication schemas.

- WebGate (OAM agent) is an out-of-the-box (Oracle HTTP server) plugin that intercepts Web resource (HTTP) requests and forwards them to the Oracle Access Manager Server for authentication and authorization. Oracle E-Business Suites is delivered with SSO built-in functionality.
- Standard EBS profile option: “Application Authenticate Agent” – contains URL pointing to WebGate. Every time request is made to access EBS – this URL is being used to redirect to WebGate.
- AccessGate is an out-of-the-box Java based application, fnauth.war, developed by the Oracle ERP development team to perform authorization for E-Business Suite SSO

Single Sign On transaction flow

1. The user requests an E-Business Suite resource. (for Example: http://YOUR_EBS_DOMAIN:8000/)
2. The request is intercepted and directed to WebGate based on “Application Authenticate Agent” profile option value.
3. WebGate forwards the request to Oracle Access Manager for policy evaluation.
4. Access Manager:
5. Checks for the existence of an SSO cookie.
6. Checks policies to determine if the resource protected and if so, how?
7. Oracle Access Manager Server logs and returns decisions.
8. WebGate responds as follows:
   a. Unprotected Resource: Resource is served to the user.
   b. Protected Resource: Request is redirected to the embedded credential collector.
   1. Request is redirected to the embedded credential collector.
   2. OAM invokes Kerberos (Zero Sign on) authentication scheme without prompting for credentials.
   3. Kerberos accesses AD to get credentials.
   4. Oracle Access Manager verifies credentials.
   5. Oracle Access Manager starts the session and creates the following host-based cookies:
   f. One per Authentication Agent: OAMAuthnCookie set by 11g WebGates (ObSSOCookie set by 10g WebGate) using the authentication token received from the OAM Server after successful authentication.
   g. Note: A valid cookie is required for a session.
   h. One for OAM Server: OAM_ID
9. Access Manager logs Success or Failure.
10. Credential collector redirects to WebGate and authorization processing begins.
11. WebGate prompts Oracle Access Manager to look up policies, compare the user’s identity, and determine the user’s level of authorization.
12. Access Manager logs policy decision and checks the session cookie.
13. OAM Server evaluates authorization policies and cache the result.
14. OAM Server logs and returns decisions.
15. WebGate responds as follows:
   a. If the authorization policy allows access, the desired content or applications are served to the user.
   b. If the authorization policy denies access, the user is redirected to another URL determined by the Administrator.

Oracle Access Manager Agents (WebGate)

An agent (also known as a single sign-on agent or policy-enforcement agent) is any front-ending entity that acts as an access client to enable single sign-on across enterprise applications. Individual agents must be registered with Access Manager 11g to set up the required trust mechanism between the agent and OAM Server. Registered agents delegate authentication tasks to the OAM Server.

During agent registration, the application can be automatically registered, and basic policies can be generated automatically. Alternatively, you can turn off automatic policy generation during Agent registration and manually create policies.

After registration, the Agent collaborates communication between the OAM Server and its services and acts as a filter for HTTP/HTTPS requests. The Agent intercepts requests for resources protected by Access Manager and works with Access Manager to fulfill access requirements. Each OAM agent (R11) uses a single authentication scheme. If for example you would like your resources to be authenticated by Kerberos scheme for internal users and Identity Federation scheme to support mobile devices for external communications, separate OAM agents will be required. Setting up an authentication scheme for the set of resources can be done via the OAM dashboard.

OAM agent or 11g Web Gates provide the following features:
- Host-based cookie
- Individual Webgate OAMAuthnCookie_<host:port>
- Resource to Authorization Policy
- Authorization Result
- Webgate Authorization Caching
- Diagnostic page to tune parameters
- Capability to act as a detached credential collector

Mandatory EBS account to manage AccessGate database connection.

One of the prerequisite steps before installing EBS AccessGate is to create an EBS user service account which is necessary to support communication between AccessGate and EBS database instance. The user account can be named based on your company naming conventions. We will refer to it as “SSO Admin account”.

This account will be given role UMX|APPS Schema Connect. Refer to Section 2.1.3 “Set Up Necessary Oracle E-Business Suite Users in My Oracle Support Knowledge Document 974949.1”.

This is the only responsibility “SSO Admin Account” must have.

After this account is created and AccessGate patch is downloaded – next step is to deploy EBS AccessGate J2EE application. Currently Oracle provides Patch 21522495 to install AccessGate.

Oracle E-Business Suite AccessGate

The E-Business suite AccessGate application is deployed to the WebGate host managed server and is responsible to create EBS user session based on successful Oracle Access Manager Session.

Oracle provides a generic patch to deploy AccessGate to non-default WebGate WebLogic managed server.

There are a few things to keep in mind when installing AccessGate for EBS.

Oracle E-Business Suite AccessGate and its front end OHS/WebGate must be installed and configured in the same domain.
(e.g. "yourcompanydomain.com") as your Oracle E-Business Suite middle tier servers, because several of the Oracle E-Business Suite cookies, such as the ICX session cookie, are domain cookies.

Part of the AccessGate patch is an ANT script, which must be altered based on your configuration requirements and domain names.

Example of the AccessGate build-deploy script is below:

```
ant -f txkEBSAuth.xml \
-DuseDefaults=true \
-Dwlshosturl=YOURWEBGATEHOST:YOURWEBGATEADMINPORT \
-Dwlspassword=weblogic \
-DforceDataSource=true \
-DforceDeployment=true \
-D(dataSourceName=[EBS_DB_INSTANCE]) \ 
-D(asadminUser=[SSO_ADMIN_USER_w_UMX|CONNECT]) \ 
-DasadminPassword=[PASSWD]\ 
-DDBCFile=[Full path to EBS DBC file] \ 
-DplanPath=[Full path to plan/Plan.xml] \
-DSSOServerRelease=11 \ 
-DSSOServerURL=[URL TO OAM server:14100]/ \
-DWGateLogoutURL=[URL_TO_CLEANUP.html] \
-logfile [MYFILE.log]
```

“DserverName” – indicates which managed server where AccessGate application is deployed.

In case of EBS DB instance refresh, anew DBC file has to be supplied after the autoconfig run. Then the AccessGate application has to be redeployed.

There is one more point worth mentioning, each OAM Agent is configured with its own authentication scheme and permits communication from a single WebGate instance.

In case you have to use different authentication methods, a separate OAM Agent will be required and a separate managed server on WebGate is required as well.

Managing sessions

When a user requests a resource, which is generally a Web site, it creates a session. With Oracle Access Manager, the user must be authenticated through Access Manager authentication services and must be accessing Access Manager-protected resources. An Access Manager session is created and bound to both a user and the client with which they have authenticated.

The Access Manager session lifecycle consists of state transitions for session creation, updates, idleness, and expiration. Access Manager sessions are maintained within OAM Servers to provide tracking and policy enforcement for a given session’s lifecycle (performed either manually by an Administrator and using automated flows).

Access Manager session management refers to the process of managing the lifecycle requirements of a session, and notification of session events to enable global logout. Administrators can configure Access Manager session lifecycle settings using the Oracle Access Management Console.

Access Manager uses Oracle Coherence to provide a distributed cache with low-data access latencies and to transparently move data between distributed caches (and into the session store). Session data is redundant across these tiers. For example, when a session is created, it then exists within the local cache on the server that created it, the distributed cache, and (if enabled) within the session store database as well.

Administrators can configure the session lifecycle to define the maximum duration of a session, the period of inactivity before the user must re-authenticate, and the maximum number of active sessions each user have. The session expiration configuration enables inter-operability with OSSO Agents (mod_osso), which are only visible to the server during user login and logout.

Access Manager uses Oracle Coherence to replicate session states within a distributed installation. Coherence is used to communicate state changes between the Oracle Access Management Console and OAM Servers. Coherence relies on User Datagram Protocol (UDP) for cluster discovery and heartbeat. If a firewall exists between certain components, then the corresponding UDP ports used by Coherence must be open. Otherwise, Access Manager might not work correctly.

High Availability

It is important to maintain stable and uninterrupted Single Sign On functionality to access EBS. SSO for EBS is a mission critical application and it must provide access 24x7x365. This can be achieved by applying high availability architecture which guarantees failover and load balancing in case of unwanted downtime and can minimize planned downtime.

Placing F5 BIG-IP in front of Oracle OAM and WebGates allows for addressing these points:

- Process death detection
- Traffic redirect in case of node failure
- Protecting access to OAM resources using VIP

Let’s consider a configuration where WebGates are load balanced and OAM is clustered within a single data center. Same architecture is implemented in two data centers and access to WebGates is balanced by F5 BIG-IP.
In this configuration a simultaneous failure of any 2 components doesn’t bring SSO down.
This is how it looks on OAM console dashboard:

![OAM Console Dashboard](image)

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**EBS profile option values for SSO**

There are a few profile option values which have to be configured to support SSO for EBS:

- Application Authenticate Agent (APPS_AUTH_AGENT) - URL pointing to WebGate. It is set up on the site level.
- Applications SSO Type (APPS_SSO) - controls login prompt.
- Applications Single Sign On Hint Cookie Name (APPS_SSO_HINT_COOKIE_NAME) - this value is blank for SSO.

**Users Provisioning**

After SSO is implemented, user records must be setup in Oracle Internet Directory and synchronized with FND_USER namespace to allow seamless authentication. Oracle provides OID registration utility which automatically creates new OID entry every time new FND_USER record is created.

Another option is to create a custom provisioning solution using one of a few available APIs to access LDAP.

This can be achieved by using database triggers or as a periodic EBS concurrent program.

DBMS_LDAP is a standard PLSQL package delivered by Oracle which can be used to develop custom solution for on-boarding or off-boarding process.

It allows one to create, search, delete and modify LDAP entries.

Below are code snippets showing some features of the DBMS_LDAP package

```sql
my_session := DBMS_LDAP.init(ldap_host, ldap_port);
-- bind to the directory
retval := DBMS_LDAP.simple_bind_s(my_session, ldap_user, ldap_passwd);
... to search for a specific entry
retval := DBMS_LDAP.search_s(my_session, ldap_base, DBMS_LDAP.SCOPE_SUBTREE, user_name, my_attrs, 0, my_message);
....... Count entries ......
```

---

**Conclusion**

Integrating Oracle Single Sign On with E-Business Suite allows an organization to achieve these important goals:

- Enabling better security and protection of EBS resources
- Better management of the processes acting on these resources
- Improving user experience while accessing E-Business Suite
- Increased effectiveness in developing and applying compliance policies to protect these resources
- In many cases, better automation of on-boarding processes
- Setting up a universal authentication platform, which can be extended into other applications with a relatively small effort

Implementing SSO for EBS, while presenting a certain technological challenge, is definitely worth the effort. Improving both user experience and protection of the resources while decreasing maintenance and simplifying enterprise processes is a good reason to take this step.

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Mark Mestetskiy graduated from Moscow Aviation University in Russia. Worked on mechanical control systems of the aircraft, airplane geometry modeling and various aspects of airplane designs and engineering. After moving to US, has been extensively working with Oracle E-Business Suite. IAM has become the latest favorite.
Organizations with multiple diverse applications and services require comprehensive integration. The migration from home-grown, native applications to Cloud can be a challenging task that requires considerable investment in terms of effort and resources. The ideal approach to enable smooth migration from existing systems to the Cloud solution is the implementation of a hybrid integration platform.

Integrating on premise systems with cloud provides organizations with the ability to easily move interfaces, services and assets. This integration can best be achieved using the Oracle SOA platform.

Oracle SOA technologies have been used to integrate host of different platforms, services and applications like mainframe systems, Customer Relationship Management (CRM) systems, Oracle Hyperion Systems and Databases, to name a few. Oracle SOA Suite 12c has a host of new features added to unify Cloud, Mobility and Internet of Things into one single platform.

**Oracle ERP/HCM/Sales Cloud**

For any inbound integration, wherein the data comes from an on-premise system to the Cloud, there are three ways in which integration can be performed:

1. **ADF Services** – Web Services are a standardized way of integrating different web-based applications. Various functions are exposed as Web Services and these operations are described in a Web Service Description Language (WSDL). A consumer need not be made aware about the implementation details of a function. With the Cloud WSDL, a consumer can gain access to a lot of the Cloud functions. These functions include, but are not limited to, Customer creation, Invoice creation, supplier creation, supplier site creation, to name a few. The Oracle Fusion Financials Cloud services alone comprise of over 180 web services that are documented in the Oracle Enterprise Repository. These services are built using Oracle Application Development Framework (ADF) Business Components. These services are used to integrate systems by the exchange of XML data between different applications and different platforms.

2. **ADF Desktop Integration (ADFDi)** – This is used for large volumes of data. For initial data conversions and migration to the Cloud, this is the most ideal method. MS Excel spreadsheets are used to input the data, validate the data and submit the data immediately to the Cloud from MS Excel. The ADFDi templates also offer data validation so users are able to upload only data that has been validated. ADFDi is secure as it requires an application user login to ensure data is accessed securely. It also provides users with a list of values, where applicable and also data validation upon file upload. Loading General Ledger into budgets is one excellent example of using ADFDi as it performs budget period validation and validation for budget accounts.

3. **File Based Data Import** – Pre-defined templates (available from Oracle Enterprise Repository) are utilized in this integration approach. OER has a host of Excel based templates, available for various modules. The data is entered into the templates from the external system and a CSV file is generated. This CSV file is uploaded to the server and processes are invoked to import the data from the interface tables into the various applications. The data is validated during import to ensure integrity.

For outbound integration, where the data is extracted from the Cloud and then integrated with an on-premise system, there is one option:

1. **Reporting tools** – This is used to extract data from the Cloud either though XML, Excel, PDF or other file types. The specific tools used are
   a. **BI Publisher** – Provides out-of-the-box reports that can be used to obtain transactional data in Comma Separated Values (CSV) file format and then imported to any legacy system.
   b. **Oracle Transactional Business Intelligence for Financials (OTBI)** – Provides the ability to build custom reports on transactional data and the output can be downloaded as Excel.
   c. **Financial Reporting Center** – Provides the ability to view live reports that are based on real-time data that can be obtained in various file formats.
   d. **Excel plugin called Smart View** – Mainly used for financial users to view and analyze general ledger balances in real-time.

Continued on page 30
Komal Goyal, Managing Partner and CEO of 6e Technologies is an accomplished technology leader and consultant with more than twenty years progressive experience in establishing and executing value driven global IT service strategy and delivery. She is truly a serial entrepreneur as this is not her first business. She also founded a foreign liquor distribution business in a tough market like India in 2008; that business has survived Indian market and has grown significantly. In December of 2012 she took over 6e Technologies and since then she has helped this company grow 100%. She is very passionate about solving client problems and, being a technologist herself, she understands the client pains and is considered a leading solution architect for her client base. In her leadership, the company has become an extremely focused service provider and has been able to create a brand. To achieve this she has built a wonderful team to help her take the company to the next level. In her own words, “Company is what its people are, and all my colleagues help me get where we want to go”. To know her vision in detail please visit http://www.6etech.com/PressRoom

She started her career as a programmer and over time has acquired extensive consulting experience with Enterprise Systems and technologies in commercial and federal industries. She has led many successful client IT process transformations through her deep knowledge around orchestrating complex processes across business applications and infrastructure layers. For her clients, she can be ready with a solution whether that solution means taking a tool out of her back pocket, finding the right company to partner with or even building a custom solution to meet a specific need. A thought leader and an evangelist of Cloud Computing, she believes that using cloud for IT requirements is actually an environmentally responsible thing to do. She says, as she started off her career as a programmer, the programmer inside her will never die. In spite of her busy schedule being an owner of the company, she loves getting involved in the solution design for her clients. She says that she thrives when innovative ideas and the latest technology is being used in the solution.

She has worked at giants like General Electric and KPMG. She now considers herself as a cloud computing evangelist, and jokingly calls herself a Cloud XaaS expert; i.e., Everything IT(X) As A Service. She has helped her clients save money by creating executable cloud strategy. Her management style is relatively new age and unique. She believes in creating a star structure in her company as opposed to creating a hierarchy. She also believes that everyone in her company is a stakeholder including herself. She does not support the idea of managing people, as she expects that everyone who is a part of this company is accountable for their work and answerable to themselves before being answerable to their so-called managers. Encouraging this culture in her company, she feels that she has experienced measurable results in retention and productivity.

A mom and a volunteer at multiple non-profits, she is a big proponent of Women in Technology (WIT) and wants to help bring more girls/women into the technology world. To help this cause, she has opened her company’s doors for internship and helps the Business Major students to get exposure to the IT world. She worries about IT losing 60% women in the workforce and wants to help change that by helping WIT programs across the state and volunteering for organizations like Rocky Mountain Oracle User Group and Colorado Technology Association. Being on the board of such non-profit organizations empowers her to take her message across. After completing an internship at 6e Technologies, some of the Business Major students declared their emphasis in Information Systems. She calls this as a big win, one girl at a time. She has a long association with
Women Impacting Public Policy (WIPP), another non-profit bi-partisan organization that helps women business owners navigate the government contracting world. She is a recipient of the ‘Member to Watch 2013’ award by WIPP. Now a WIPP Leadership Advisory Council member, she has a voice for other women leaders in her space.

She also trained to be an Indian classical singer at a very young age and still loves to sing for her close family and friends circle. She is an avid yoga practitioner and makes sure that she attends at least one yoga retreat a year for downtime. She deliberately chooses places in the mountains to go to such retreats where she is disconnected from the world. She believes that such downtime helps her rejuvenate, energize and get centered. She also practices meditation regularly and says that her day does not start without a meditation practice. For her, this is second nature and gets her off to a calm start of the day. She believes that meditation helps her focus and stay on track for the day. This is one thing she says she cannot survive without and also teaches meditation to young adults in her community.

Komal helps clear her thoughts. Chautauqua in Flatirons, and Devil’s Thumb are some of her favorite trails. Reading inspirational books keeps her motivated. Some of her favorite books are ‘The Power of Now’ by Eckhart Tolle and the ‘Tipping Point’ by Malcolm Gladwell.

Growing up in a very small town in India did not set her up to be in the field she currently is in. When asked this question, she says, ‘If it was not for my father, I would have married at the age of 19 and turned into a homemaker still living in India. My father was a visionary who gently nudged me in the right direction. This helped me become a software engineer at a time when women would drop out of school to get married. The times in India when I was growing up were very different; getting a girl married at the age of 18 was very common. He steered me from choosing that path and encouraged me to continue my education, that too in a very little known field in India during early 90’s. His encouragement and support helped me chase my dreams on another new level. I wanted to do something different and unique than all of the other girls in my society. I wanted to become something and go after my dreams that I was passionate about.’

Komal was recently awarded ‘Enterprising Woman of the Year’ in her tier by Enterprising Women magazine. The Enterprising Women of the Year award is one of the most prestigious recognitions that a women business owner can receive. In order to win this spectacular award, the nominees of this award must show they have a fast growing business. They must mentor and support other women who are involved in entrepreneurship. These nominees must clearly stand out as great leaders in their communities. The nominees tend to serve as leaders of the different key organizations that support any sort of growth amongst entrepreneurship in women. In 2013, she was awarded as ‘Member to Watch’ by Women Impacting Public Policy (WIPP), the country’s largest nonpartisan women’s business group. WIPP was very proud and honored to award such business leaders like Komal who dedicated so much of their time and energy to support WIPP’s mission; i.e., supporting women entrepreneurs who navigate the very complex world of federal contracting.

She earned a master’s degree in Computer Applications (M.C.A) in Computer Science from the Regional Engineering College Kurukshetra University in India. She is a certified DAMAIC green belt in Six Sigma quality assurance and takes IT quality very seriously.
Tim Gorman  
President  
Newsletter Director  
E-mail: President@rmoug.org  
NewsletterDir@rmoug.org

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E-mail: MembershipDir@rmoug.org

Komal Goyal  
Marketing Director  
E-mail: MarketingDir@rmoug.org

Kellyn Gorman  
Programs Director  
SIGS Director  
Training Days Director  
E-mail: ProgramsDir@rmoug.org

Art Marshall  
Web Director  
E-mail: WebDir@rmoug.org

Sruthi Kumar Annamnidu  
Assistant Training Days Director  
E-mail: TrainingDaysAsst@rmoug.org

Mark James  
Scholarship Director  
E-mail: ScholarshipDir@rmoug.org
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For initial loading of data, ADFDi is an excellent starting point. This enables large chunks of data to be uploaded at once. For a real-time integration, Service Oriented Architecture (SOA) can be utilized to ensure that data is flowing between systems constantly using the File Based Data Import process. This article focuses on the integration approach using File Based Data Imports for Cloud Inbound data.

**Oracle SOA Suite 12c**

Oracle SOA Suite 12c provides a complete set of service components for designing, developing, building and deploying composite applications. Oracle SOA Suite Composites enable easy assembly of multiple components into one single composite application. It enables easy integration of heterogeneous architecture and service reuse across an enterprise’s diverse application platform. Some of the most common uses of SOA Suite can be found when obtaining data from or writing data to databases, files, web services or queues. For integrating with the Cloud, all of these features can be leveraged to ensure the data flow between the systems in an organization and the Cloud. BPEL processes are an excellent starting point in orchestrating the complete flow for the integration process.

Oracle SOA Suite 12c simplifies integration with both Cloud as well as on-premise systems by providing a standards-based platform that allows users with the ability to audit, ensure compliance, security and easy governance.

The design-time tool that is bundled with Oracle SOA Suite 12c is jDeveloper. jDeveloper can be used to create Service Component Architecture (SCA) assembly models, create SCA deployment modules, BPEL Processes, mediators, dashboards, web applications as well as Java applications. This tool also has the ability to design ESS (Enterprise Scheduler Service) jobs and deploy from the tool directly to the server.

**Integration**

The different players involved in the hybrid integration are described in the following sections.

1. **On-premise Systems**

This includes all the applications and services that have been in use within an organization that is used to maintain the financial data. The first step in the integration approach is to identify the systems that can provide the right data and determine the format in which the data can be obtained. The data from the legacy systems can be extracted periodically as a CSV file and places on an FTP server, or the data can be extracted using Database Adapters or the data can be placed in a queue. For each of these approaches, SOA Suite 12c provides an adapter configuration that can be utilized to get the data. Some of the common adapters that can be used to get the data are:

   - **Database adapters:** Connect directly to a database to get the data.
   - **FTP adapters:** Read the data from a CSV file or an Excel file using the FTP adapter.
   - **JMS or MQ adapters:** If an external system can place the data in an internal JMS queue or an external MQ, then the SOA Suite is capable of reading the data from there.
   - **SOAP/Web Service adapter:** If the external systems can expose the data as web service operation, then SOA Suite 12c can invoke the web service at run time to get the data.

2. **FBDI Templates**

Users can obtain FBDI templates from one of the following locations:

   - Oracle Help Center
   - My Oracle support
   - Setup and Maintenance area within the Cloud application
   - Oracle Enterprise Repository for Oracle Applications

Users can search across multiple product areas, or by a specific product or based on the guide. The FBDI templates contain a comprehensive list of all required fields. When manually done, users will have to enter the data, save as CSV, upload the file to the server and import the data to the various applications. With the introduction of SOA layer, all of these tasks can be managed at the SOA layer, eliminating the need for any kind of manual intervention. Since the FBDI templates translate to a CSV file, the appropriate XML Schema Definitions can be created to match the template. Having this Schema as a target schema, the source data can be converted into this target Schema using XML Stylesheet Language (XSL) Transformation. This target XML can then be converted to CSV files using SOA Suite and all relevant files zipped together and the zipped file loaded to the Cloud.

3. **Pre-validation**

For some of the interfaces that have to get data from on-premise systems and load it into the Cloud, there may be a requirement for some pre-validations to be performed. For example, for a GL Journal ledger entry, the source system has to be designated as an acceptable source within the Cloud. For every record that has to be loaded to the Cloud, this check has to be performed to ensure security and for data governance. These kind of validations can be performed with the help of the Reporting tools available within Oracle Cloud. Simple BI reports can be written to validate the incoming data. Within Oracle SOA Suite 12c process, these BI reports can be invoked and based on the result of these reports, the flow can either be allowed to continue or terminated.

4. **Data Loading to the Cloud**

Data loading to the Cloud can be achieved with the use of either Data Loaders or Web Service Loaders.

**Data Loaders:** There are three types of data loaders available to load data to the Fusion Applications. For all three approaches, SOA layer can be leveraged with the appropriate design and implementation. The three approaches are categorized based on the product family of either ERP applications, Oracle Sales Cloud or HCM Applications.

   - **Cloud Fusion ERP** – This includes Financials, Procurement, projects and other related categories. Data loading in this approach, is done through External Data Integration Services. The CSV and ZIP files, created from the FBDI templates, are uploaded to the Cloud ERP by a “File Import Export” process available within the Cloud. During import, the file is validated to ensure all required fields are present. After the file is imported successfully, the data is
processed using task-specific process, described in the next section.

- Oracle Sales Cloud (Fusion CRM) – The data is loaded into the repository using the “Define File-Based Import” task available within Functional Setup Manager in the Sales Cloud instance. Users create an import activity and an import mapping while defining the overall import process. The import mapping specifies a mapping of the fields from the file to the attributes of the import object.
- Oracle HCM – HCM applications have two loaders. The first one is the “File Based Import Export” that is also available for Oracle Cloud ERP applications. In this case, the subsequent data processing is done via Workforce Management – Data Exchange pages. The other loader available is the HCM Spreadsheet Loader, available via ADFDi add-in for MS Excel.

**Web Service Loaders:** Along with the above mentioned Data Loaders, each of the Cloud instances offer the services to programmatically upload the data with the use of Web Service Loaders.

- Cloud Fusion ERP – Offers Financial Utilities services (/finFunShared/FinancialUtilService). This service gives users the ability to upload data in Base64 encoding directly in the payload. The service has features to store the file in UCM, upload data to the interface tables and continue processing to import data into the base tables. It also provides services to inquire about the status of a submitted job.
- Fusion CRM – Includes File Import Activity Service (/mktImport/ImportPublicService). This can be used to import data either from a text file or from an XML.
- Fusion HCM – Provides Loader Integration Service (/hcm-CommonBatchLoader/LoaderIntegrationService). This allows users to submit ESS jobs for loading the data. It assumes that the file is already present in the WebCenter Content Repository.

5. **Oracle Enterprise Scheduler Service Jobs (ESS)**

Oracle ESS jobs can be used to schedule concurrent programs to run periodically at a pre-determined schedule or as required, to run import jobs, to extract data or for generating BI Publisher Reports. These are useful for submitting and monitoring long running processes that could take a long time to finish. ESS Web service contains operations such as submitESSJob and getESSJobStatus. These services originate from the Middleware technology and have certain additional security features. To invoke the ESS web services, the WS Security header and WS addressing header are required. When these services are invoked programmatically from BPEL processes, the WebLogic Server on which the BPEL processes are deployed should have the HTTPS certificate imported. The credentials to access the web service are stored in the credential store in Enterprise Manager Console.

To submit an ESS jobs, there are certain values that have to be passed. The job package name and the job definition name have to be passed. These jobs can have any number of input Parameter Lists. These lists contain information about the name of the parameter, the value of the parameter and also the data type of the parameter.

6. **Email notifications**

At the end of the ESS process, the data has either been successfully inserted/uploaded to the Cloud or the file has been rejected due to data issues. In either of the scenarios, a summary report can be generated using BI publishers. These reports can be sent out to the concerned users by the Oracle SOA Suite 12c processes.

In summary, Oracle SOA Suite 12c can automate the entire process of integrating on-premise systems with Oracle Fusion Cloud with minimal human intervention. All of the steps mentioned above can be designed using either Oracle BPEL processes or Oracle Service Bus. Until all the systems are completely migrated to the Cloud, Oracle SOA Suite 12c will ensure a smooth flow of data between existing systems and the new Cloud applications.

**References:**

- Oracle Sales Cloud File Based Data Import-Export: [http://docs.oracle.com/cloud/latest/salescs_gs/OAFDI/OAFDI1504153.htm#OAFDI910493](http://docs.oracle.com/cloud/latest/salescs_gs/OAFDI/OAFDI1504153.htm#OAFDI910493)

Divyashree Shampur is an Oracle Middleware technology professional with extensive experience in implementing Oracle SOA Suite. She has experience in implementing JAVA, J2EE, and SOA-based applications across various clients. She has expertise in desktop, mobile, and front-end UI applications, and extensive skills in IT project leadership, web development, software development methodologies, data center management, and cloud computing. Divyashree is devoted to client satisfaction.
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