

Spring 2010

Mapping System Management of Two Erps (Oracle Ebusiness Suit and Peoplesoft)

Eric Hernandez
Regis University

Follow this and additional works at: <http://epublications.regis.edu/theses>



Part of the [Computer Sciences Commons](#)

Recommended Citation

Hernandez, Eric, "Mapping System Management of Two Erps (Oracle Ebusiness Suit and Peoplesoft)" (2010). *All Regis University Theses*. Paper 438.

Regis University
College for Professional Studies Graduate Programs
Final Project/Thesis

Disclaimer

Use of the materials available in the Regis University Thesis Collection ("Collection") is limited and restricted to those users who agree to comply with the following terms of use. Regis University reserves the right to deny access to the Collection to any person who violates these terms of use or who seeks to or does alter, avoid or supersede the functional conditions, restrictions and limitations of the Collection.

The site may be used only for lawful purposes. The user is solely responsible for knowing and adhering to any and all applicable laws, rules, and regulations relating or pertaining to use of the Collection.

All content in this Collection is owned by and subject to the exclusive control of Regis University and the authors of the materials. It is available only for research purposes and may not be used in violation of copyright laws or for unlawful purposes. The materials may not be downloaded in whole or in part without permission of the copyright holder or as otherwise authorized in the "fair use" standards of the U.S. copyright laws and regulations.

A THESIS

SUBMITTED ON 16 OF MARCH, 2010

TO THE DEPARTMENT OF INFORMATION SYSTEMS, INFORMATION TECHNOLOGY,

COMPUTER SCIENCE

OF THE SCHOOL OF COMPUTER & INFORMATION SCIENCES

OF REGIS UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF MASTER OF SCIENCE IN

COMPUTER INFORMATION TECHNOLOGY

BY



Eric Hernandez

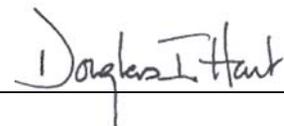
APPROVALS



Ed Lindoo, Thesis Advisor



Shari Plantz-Masters



Douglas I. Hart

Mapping System Management of Two ERPs (Oracle E-Business Suite and PeopleSoft)

Eric Hernandez

Regis University

Abstract

Due to the fact that Enterprise Resource Planning (ERP) vendors provide business solutions to address similar business challenges, most ERP products have a lot of similar components and functionalities. Using these similar components and functionalities, ERP system management of one ERP product can be mapped to a different ERP product. In this particular case, E-Business Suite's (EBS) system management is mapped against PeopleSoft (PS). By having an EBS Administrator indirectly collaborate with a PS administrator, a system management mapping table linking the two ERP systems was established. By allowing an EBS Administrator handle PS systems using the mapping solution, the mapping table's accuracy was validated. As time went by, newly discovered system management challenges were investigated from these two different ERP perspectives and added into the map. The mapping table was presented to a team of administrators to help them expedite knowledge acquisition of a new ERP system.

Introduction

Today, multitasking has become the norm as employees are expected to wear many different hats. In the ERP administration world, administrators are expected to manage all ERP related components such as database server, web server, batch processing server, reports server, etc. Additionally, administrators are under pressure to handle not just one ERP system but two or more. Learning one ERP system is difficult enough, thus it is a huge undertaking to become proficient with two ERP systems. As a manager of 20+ ERP Administrators for Zanett Managed Services (ZMS), it was critical to find a way to help facilitate knowledge acquisition of another ERP system. ZMS was hoping Oracle would be able to “fuse” EBS and PS (plus other recently acquired software) into a product called Fusion. Unfortunately, it appears that the release of the highly marketed Oracle Fusion Applications is going to be delayed significantly. Regardless of what Oracle does with Fusion, everyone on my team is expected to be well versed in both EBS and PS. Unfortunately, it will not be an easy task because ERP Administrators generally specialize in only one ERP system. With the current working conditions of “doing more work with less people”, it is difficult to find sufficient time to do an independent study. It is even more difficult when there is limited training budget for in-class training. Relying on administrators to use personal time to study a new ERP system prolongs the knowledge acquisition.

The necessity for a mapping solution came up when my employer decided to add PS in our managed services offering about two years ago. Prior to that, our services revolved around one ERP system, EBS. Hence, all of our administrators specialize in EBS and have no knowledge of PS. Our employer provided PS books and websites to assist in our independent study. Most of the administrators were already worried that they would have to start learning PS from the ground up and go through numerous PS documentations just like what they did for EBS.

In order to facilitate knowledge acquisition of a new ERP system for someone familiar with an ERP system, a mapping of components and functionalities had to be established between two ERP systems. A mapping solution is probably the most effective and timely way to learn a new ERP system. Mapping provides the necessary vantage point for administrators to quickly survey how the application is laid out. They can then use prior ERP knowledge to easily understand the purpose of each new component. The name and/or functionalities of a component may not be exactly the same but similar enough to allow for ease of understanding. Obviously, a mapping solution provides sufficient foundation that will complement and enhance other learning techniques. The mapping solution does not have the answer for every administrator's questions but it does provide enough information to give an administrator a better chance in finding what is needed.

To simplify the explanation of a mapping solution, equate it to a Boeing 747 pilot learning to fly an Airbus 380. Both Boeing and Airbus have similar controls and components for takeoff, cruise, landing, etc. For a Boeing pilot to learn to fly an Airbus, it would be expedited if the familiar Boeing controls and components were mapped to Airbus. The goal is to take advantage of one's knowledge of a system to quickly learn a new system using similar terminology and concepts. This basic approach also applies to ERP administrators; an EBS Administrator learning PS or PS Administrator learning EBS.

Literature Review

David Paul Ausubel was a psychologist who made significant contributions to the field of science education (Taricani, 2000). His focus on how individuals can learn large amounts of meaningful material led to a technique called concept mapping. It is a learning process whereby diagrams are used to represent relationships between concepts. Concept mapping are very useful in generating and communicating complex ideas. Research has shown that concept mapping can improve learning efficiency up to 15% over conventional study techniques (Farrand, Fearzana & Hennesy, 2002).

Thorough and accurate concept mapping is not an easy undertaking. First, it requires an explicit understanding of both concepts which can be time consuming. Second, paper-based concept mapping is riddled with scratch-outs, erasures, and substantial recopying. Nowadays, this second challenge has been simplified with the use computer programs (Anderson-Inman & Horney, 1996). Computer programs minimize frustration by making it easy to adjust and correct errors. Companies like Inspiration, MindMap, and SemNet have produced software for computer-based concept mapping. Software makes it easy to diagram concepts and connect or link them to each other. Constant modifications and corrections are inherent in concept mapping; but greatly simplified with computers.

Database and application are two very complex components of an ERP system. Bridging applications and databases is a fundamental data management problem. ERP developers have a constant need to encapsulate business logic into objects stored in database systems. In order to handle this challenge effectively, one of the mapping strategies used is linking the relationship between application data and the persistent storage (Melnik, Adya, & Bernstein, 2008). These

mapped relationships are compiled into bidirectional views that drive the transformation engine.

The solution is to express the application model as a view on the database and express the database schema as a view on the application model.

In the last several years, Oracle has been aggressive in acquiring other software companies. It has bought out competitors such as PeopleSoft, JDE, Siebel (Saran, 2005). Oracle's ultimate objective is to gain more application market share by providing a software solution comprised of fused acquired software with its own line of products (Ricadela, 2007). Oracle's marketing name for the fused software is known as Oracle Fusion Applications. The Oracle user community has been patiently waiting for the release of Oracle Fusion Applications. It was initially announced in a 2006 conference that it would arrive around 2008 (Boucher, 2006). Even before the 2008 release date was announced, some had already speculated the significant difficulty in "fusing" together the best modules from the acquired software vendors (Cowley, 2005). Others are speculating that Oracle is not rushing the release of Fusion because Oracle wants to make sure that it is a higher quality product (Teter, 2008).

There are still no official words yet on when Oracle Fusion Applications is expected to be released. From Oracle's Fusion Application website, it is stated that the product is still under development (Oracle, 2010). IT News Reporters have stopped speculating the delivery date. Unfortunately, today's administrators who are expected to manage the best of breed Oracle software will have to live without Oracle Fusion Applications. Fusion would have eliminated the need to learn another ERP system. Unfortunately, today's administrators have to learn different ways of managing Oracle ERP systems (EBS, PS, JDE, Siebel, etc) using different management utilities and concepts. However, it should not come as a surprise to anyone working in the IT field because lifelong learning is inherent in an IT career (Gallivan, Truex, & Kvasny, 2004).

Methodology

About a year ago, my employer landed our first PS managed services customer deal. Finding a way to expedite the knowledge acquisition process of PS for EBS Administrators became very urgent. Unfortunately, at the time, no one could fully assist in the on-boarding of this new customer because we were not able to find the time to learn PS on our own. Luckily, ZMS hired a PS contractor to help us with the on-boarding. The budget was not available to have the PS contractor provide a formal training to our EBS Administrators. However, while performing the on-boarding which includes installation and set up, the PS contractor was able to share enough information with me. It was then when it dawned on me then that it would be easier to comprehend PS concepts if it were presented to an EBS Administrator from an EBS perspective.

While working side by side with the PS contractor, my role changed into an interviewer as a way to obtain as much PS information as possible. Every day for the next three months, any new PS information shared with me was entered in the mapping table. The most challenging times are when a new PS concept or component is introduced. It takes a significant amount of time to fully understand the new topic. Since the contractor's objective is not to train me, searches on Google or on-line vendor support websites were done frequently to get a proficient understanding of the subject matter. Once full understanding takes place, another thinking process kicks in to figure out how EBS addresses the same PS task. After the connection is made between EBS and PS, a new category is added in the mapping table for the new topic. Corresponding information for EBS and PS completes the mapping between two ERP systems as shown in the table as the second and third column, respectively. Since syntax, usage, and concepts are too big to fit in a table, hyperlinks are provided to allow for detailed reading on a selected category. A reverse

link is provided to get back to the high level topic within the table. Both table and hyperlink features came with Microsoft Word.

After about a year of information gathering, the mapping solution went through some modifications. As the mapping table was being created, it was also being used to solve PS issues at the time. This became the perfect opportunity for another DBA to validate the accuracy of the mapping table. If it turns out that some information were inaccurate, it was escalated back to me for adjustment. After the PS contractor left, our DBA team were given the task of managing the new PS customer. Thankfully, my employer provided us access to the same PS contractor that can help us with PS issues that my team is not able to solve. The contractor is paid a fee for the assistance. Obviously, that puts the pressure on my team to document every detail to prevent from calling the contractor for the same issue. When issues do arise that have not been documented in the mapping table, the mapping table was updated with the PS information and its corresponding EBS information. As months went by, the mapping table increased significantly in size. As a whole, the mapping table had to be modified because it became disorganized. It was becoming difficult to search through the table; hence, it was organized and divided into 8 categories. Each item in a category is related to each other from an ERP administration/management perspective.

About two months ago, the mapping solution was formally presented to the rest of the DBA team. Before a new item is discussed from the mapping table, it was introduced first from an EBS perspective. An initial review of the EBS category is followed by a corresponding PS introduction. For example, there is a category called "Batch Server Name". Before discussing how PS refers to its batch server, we reviewed EBS batch server first.

For the sake of simplifying some of the concepts and techniques, there were certain assumptions made during the creation of the mapping solution. These assumptions are listed below:

- Linux based environment using Red Hat 5
- One Application Server
- One Database Server
- One Domain
- Used 10gAS as Web Server
- Used Oracle RDBMS as Database

Results

Indirect collaboration between an EBS and PS Administrators has produced the EBS/PS mapping shown in Appendix A. The 8 main categories of EBS have been mapped against PS. Right after the mapping table is the detailed explanation of each item in the category. Links were provided to allow for drilling down to details. Once in the detail section of the category, links were made available to get back to the original place in the table. The accuracy of the data in the table has been validated initially by applying the information on some real life PS troubleshooting. It was further validated by a recently hired PS administrator.

Discussion

ERP systems' main purpose is to facilitate the flow of information between business functions. EBS and PS have similar components and functionalities to achieve these same business objectives. By taking advantage of these similar components and functionalities, system management of EBS system can be mapped to PS. The mapped components and functionalities may not be exactly the same but the end results are. For example, before the business community can log into an ERP system, the system needs to be up and running. Both EBS and PS have a control for starting the application. In EBS, the start control is `$COMMON_TOP/admin/scripts/adstrtal.sh`; in PeopleSoft, the start control for the application server is `$PS_HOME/appserv/psadmin`. Although the syntax and usage of these two scripts are different, the end result is the same --- the application server starts. By documenting in a mapping table how an application can be started in PS, an EBS Administrator using this documentation should be able to start the application without having to memorize or do a lot of research. Another similarity example is that both EBS and PS have parent application directory that contains critical ERP system configuration files. These parent directories are given an environment variable name for ease of management. EBS Administrators know that the EBS parent application directory's environment variable name is `$APPL_TOP`. By taking a quick glance at the mapping table, EBS Administrators would see that the parent directory environment variable name of PS is `$PS_HOME`. Even if the mapping table does not list every single PS configuration file there is, an EBS Administrator would have an idea where to start looking for configuration files. Moreover, by knowing a key PS environment variable name, an EBS Administrator should be able to discuss PS issues intelligently with a PS vendor support engineer. Since major ERP vendors allow their users to access their application over a web

browser, ERP systems share another similar component in the form of an application server. Generally speaking, an application service is needed to provide the user what it needs from a database. The application server used for EBS and PS is 9iAS and BEA Tuxedo, respectively. Through the use of EBS/PS mapping, EBS Administrators would be able to quickly determine that the application server used for PS is BEA Tuxedo without having to search through several books. By knowing the corresponding PS component, they would be able to quickly search through online help or ask for vendor support (if needed) using the proper component name. Without the accurate component name, issue resolution may be prolonged. Lastly, another key similarity between these two ERP systems that is mapped is the use of installer utilities. The mapping solution compares how EBS and PS are installed. EBS uses only one installer whereas PS uses several installers. EBS uses only one installer because everything is built by one vendor, Oracle. However, EBS is not as flexible as PS when it comes to working with other software. PS can use a variety of databases and application servers which makes it flexible; but it makes installation more difficult because it requires different installers to be executed. The start control, environment variable name, application server name, and how the application is installed are just some examples on how the similar components and functionalities can be mapped between EBS and PS. These mapped items simplify and expedite the knowledge acquisition of PS system management for EBS Administrators. Fortunately, just like any mapping solution that provides directions from Point A to Point B, it can also do the reverse. A PS Administrator can use the same mapping table to learn EBS. For ZMS' business to be scalable, it is critical that recently hired PS Administrators can be easily assimilated into an EBS Administrator.

My superior and direct reports assessed that the mapping solution provided them a solid foundation to grow into PS administration. This was the anticipated response because the

mapping solution was never meant to be an all-inclusive source on how to manage PS. It was meant to provide visual guidance (like any ordinary map). Just like any journey that requires a map, the journey itself is where all the work takes place. Our EBS Administrators are expected to review/research online and offline documentations for PS just as they do now for EBS. However, the mapping table decreases the intimidation factor of PS by providing that visual guidance. Furthermore, the mapping solution makes an awesome source for reference; obviously, it would be difficult to memorize every single item in the mapping table. One of the objectives for this paper is to be able to present this in a conference where there will be a bigger audience and non-biased evaluations. My colleague's evaluations are not necessarily biased but my 20+ direct reports and superior does not have a full administrator understanding of both EBS and PS. Since more and more managed services companies are doing more with less and using the same administrator to manage other ERP systems, there is an expectation that there might be a big audience for a conference presentation like this one. There is hope that a sponsor would put the mapping table in a big poster that would be distributed during a conference and be used as a wall reference. It may become very useful for dual ERP Administrators especially if Oracle does not deliver Fusion Applications in the very near future.

As my team grow in to the PS administration role, our next step is to keep adding into the mapping table and review these additions on a regular basis. Two of my near future mapping solution objectives is to add a fourth column for another ERP system, JD Edwards (JDE); the second objective is to create a new table specifically for mapping databases between Oracle RDBMS and Microsoft SQL Server. My employer recently brought in a customer that does not use EBS or PS. This customer uses JDE as their ERP system. No one from my team is able to support JDE because it is new to us. ZMS currently use outside contractors to help us support

JDE. It is my employer's goal to start having the same resources supporting EBS and PS to learn JDE. It remains to be seen whether a team of administrators will be able to handle 3 ERP systems simultaneously even with a mapping solution. There is a good chance that a mapping solution will help because PS has more similarities with JDE than EBS; hence, mapping should enhance acquisition knowledge of JDE.

On another note, since both PS and JDE can use a variety of databases, there is an urgent need to map Oracle RDBMS with MS SQL Server. Our DBAs specialize in managing Oracle databases because EBS runs only on Oracle RDBMS. SQL Server seems to be the database choice for JDE customers. It is not cost effective for my employer to use a contractor to manage SQL Servers for us. ZMS will have to learn SQL Server also. It is a lot to ask of administrators to manage EBS, PS, JDE, Oracle RDBMS, and SQL Server simultaneously but it appears to be a viable goal with the help of a mapping solution.

Acknowledgements

Efrem Suarez was the PS Contractor that was brought in to help on-board our employer's first PS customer. Efrem indirectly collaborated with the creation of the mapping table.

Appendix A – Mapping Table

Mapping Category	e-Business Suite (EBS)	PeopleSoft (PS)
Application Architecture		
Name of Architecture	Application Framework (OAF)	Pure Internet Architecture (PIA)
Application Installation	Comes automatically in the installation (rapidwiz)	Installed separately and not tied to any web and database vendors
Application Server Used	9iAS	BEA Tuxedo
Compatible Web Server Used	9iAS	10gAS, WebSphere, Apache Tomcat, and WebLogic
Batch and Report Processing provided by	Concurrent Manager, Reports, Discoverer, XML Publisher	Application Engine, SQR, Query, Crystal Reports, nVision
Procedural Language Name	PL/SQL	PeopleCode
Application Instance Name	CONTEXT_NAME	DOMAIN_NAME
Key Application Location	\$APPL_TOP	\$PS_HOME
Compatible Database Server Used	Oracle	MS SQL Server, IBM DB2, Oracle, Sybase, and Informix
Database Server		
Database Installation	Comes automatically in the installation (rapidwiz)	Installed separately and not tied to one database vendor
Database Definition	Oracle Database is the actual Physical Database instance	PeopleSoft Database is a set of SQL objects that resides in a database as a schema and is

		referred to as a logical database
Database Limitation	One database can support only one Oracle Apps	One database can support multiple PeopleSoft Schemas/Applications
Use Database Server-Based Codes	Yes	No
How are database objects created	RapidWiz	During installation, a DataMover script is generated to be executed manually later on Or PS database can be created using a PeopleSoft provided template for Oracle Database Configuration Assistant Or PeopleSoft Database Configuration Wizard on Windows
Authenticating Application Schema	applsypub	people
Main application schema	apps	sysadm

Application Schema	Each application module is in its own schema	There are only 3 Schemas sysadm, people, and ps. PS hold only one table called PSDBOWNER; it maps the schema to the logical database
Roles	no default roles	two roles (PSUSER and PSADMIN)
Data Dictionary	Uses RDBMS' Data Dictionary	Has its own data dictionary
Data Dictionary for Table Information	DBA_TABLES	PSRECDEFN/PSRECTBLSPC
Data Dictionary for Table Columns	DBA_TAB_COLUMNS	PSRECFIELDDB/PSRECFIELD
Data Dictionary for Views	DBA_VIEWS	PSSQLDEFN/PSSQLTEXTDEFN
Data Dictionary for Indexes	DBA_INDEXES	PSINDEXDEFN
Data Dictionary for Indexed Columns	DBA_IND_COLUMNS	PSKEYDEFN
Data Dictionary for Application Users	FND_USER	PSOPRDEFN
Table Used for Patch Record Keeping	AD_APPLIED_PATCHES	PS_MAINTENANCE_LOG
Allowed to Update Records Directly in the Objects	No	No
Create or Use Database	Yes	No

<u>Privileges</u>		
<u>Create or Use Synonyms</u>	Yes	No
<u>Create or Use Referential Constraints</u>	Yes	No
<u>Tracking Custom DDL Commands</u>	Manual Tracking; Oracle prefers no customization	Automatic Tracking is done through the use of Application Designer
<u>Total Number of Application Tablespace</u>	12	Each module has its own tablespace
<u>Temporary Tablespace Name</u>	TEMP	PSTEMP
<u>Default Tablespace Name</u>	APPS_TS_TX_DATA	PSDEFAULT
<u>Index Tablespace</u>	APPS_TS_TX_IDX	PSINDEX
<u>Sequence Generation</u>	Uses database sequence	Does not use database sequence; uses PS_INSTALLATION which is a table to support all sequence generation needs
Configuration		
<u>Configuration File Name</u>	SID_server.xml	psappsrv.cfg for the Application Server; psprcs.cfg for the Batch Server

Configuration Utility	autoconfig	psadmin
Controls		
Start Application	Non-Interactive one command line to start all components using one script that came with the install	Multiple command and prompts involved in starting the application
Stop Application	Non-Interactive one command line to stop all components using one script that came with the install	Multiple command and prompts involved in stopping the application
Batch Server		
Batch Server Name	Concurrent Manager	Process Scheduler
Batch Server Created By	RapidWiz Automatically	Manually created/configured
Batch Job Name	Concurrent Job	Process
Batch Job Number	Concurrent Request ID	Instance
Batch Job Program Created Using	Oracle (no 3 rd Party)	PeopleTools, Cobol, SQR, nVision, and Crystal
Distribute Server	Not Used	Uses a Distribute Server to transfer output/log/trace files to the report repository
How to run a batch test job	Submit an “Active Users” Concurrent Program	Submit a “Simple AE test program”, “COBOL Multi-process Job”, “SQR Multi-process Job”, and “Crystal Multi-process Job” (if

		needed) Process
Table to Query for Batch Jobs Information	APPS.FND_CONCURRENT_REQUESTS	SYSADM. PSPRCSQUE
Script to Synchronize Batch Job Tables	cmclean.sql	PRCSCLR.DMS
Monitor		
How to monitor the application/database sessions?	Use the “ACTION” column of v\$session to find out who the forms users are but not the html-web users	Use the “CLIENT_INFO” column of v\$session to find out any users that logged into the application
How to trace a web session	Use the Diagnostic feature available on the web page	Add “&trace=y” in the login URL
How to monitor/search for batch jobs	Navigational Path from the Oracle Applications Manager main page -> Site Map -> Monitoring -> Concurrent Requests	Navigational Path from main page -> PeopleTools -> Process Scheduler -> Process Monitor
How to trace a batch job	Enable SQL Trace and FND Diagnostics for a specific concurrent program	Enable Application Engine Program traces
Tools		
Installation Tool	Rapidwiz	Separate Installer is needed for PeopleSoft, Web Server, Database, Tuxedo, and other 3 rd Party Software

Does the installation tool have to be run on each machine?	No	Yes
What tool to use to add an index?	Any SQL tool	Application Designer
What tool to use to change schema passwords?	FNDCPASS	Alter user/datamover
How to navigate to performance utilities	Navigational Path from the Oracle Applications Manager main page -> Dashboard -> Performance	Navigational Path from main page -> PeopleTools -> Performance Monitor
Clone Application using Cloning Utility	Rapid Clone	No cloning utility provided
Patch Application Utility	adpatch	Change Assistant
Patch Impact Analysis Utility	Patch Wizard Impact Analysis	Change Impact Analyzer
Key Command Line Administration Tool	AD_TOP/bin/adadmin	PS_HOME/appserv/psadmin
Miscellaneous		
Inbound Mail Processing	Is able to process incoming email	No mechanism to process incoming emails
How to compile COBOL	COBOL is not used	COBOL programs are compiled using pscbl.mak and psrun.mak

Location of COBOL	COBOL is not used	COBOL needs to be in the same location as the Application Server
-----------------------------------	-------------------	--

Application Installation

Since EBS is Oracle-centric, administrators can easily install a complete application by using one installation tool called RapidWiz. PeopleSoft's flexibility with regards to being able to run on varying suppliers of web servers poses a more complex installation process. In PS, each web server is installed separately using that component's installation tool. Outside of the web server, all PS instance must have BEA Tuxedo executables which also comes as a separate install.

[Go Back to top](#)

Application Server

Generally speaking, the purpose of an application server is to interpret data from the database tables, executes the business logic of the application, and generates pages that are served up to the browser. The application server used by EBS and PeopleSoft uses is 9iAS (Oracle 9i Application Server) and BEA Tuxedo, respectively.

[Go Back to top](#)

Web Server

The web server mediates the communication between the client's browser and application server. EBS will only run using Oracle 9iAS as its web server whereas PS can run on different web servers (Oracle 10gAS, WebSphere, Apache Tomcat, and WebLogic).

[Go Back to top](#)

Database Server

EBS will only work with an Oracle database whereas PS will run on MS SQL Server, IBM DB2, Oracle, Sybase, and Informix

[Go Back to top](#)

Procedural Language Name

The main procedural language used by EBS and PS is PL/SQL and PeopleCode, respectively.

[Go Back to top](#)

Batch and Report Processing

EBS uses only Oracle proprietary products (Concurrent Manager, Reports, Discoverer, XML Publisher) for batch and report processing. PS uses a best of breed solutions including its own proprietary products (Application Engine, SQR, Query, Crystal Reports, and nVision).

[Go Back to top](#)

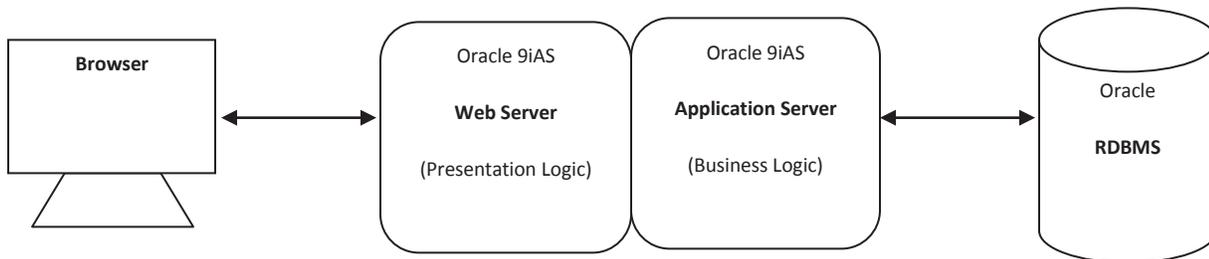
Use Database Server-Based Codes

Since EBS is tightly integrated with its database, EBS takes advantage of database server-based codes. Generally speaking, PS takes pride in being platform-independent because of the flexibility it brings; hence, PS does not use database server-based codes.

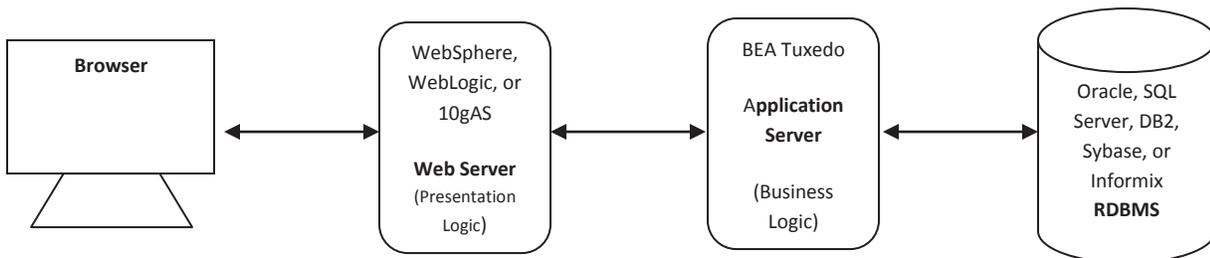
[Go Back to top](#)

Architecture

Oracle Applications Framework shown below is the development platform for EBS' HTML-based applications. Web and application server are both served from 9iAS.



PS's "no code on the client" architecture is known as Pure Internet Architecture (PIA) which is shown below. The web server is served by a number of vendors which are different from the application server.



[Go Back to top](#)

Installation Tool

Since EBS is Oracle-centric, administrators can easily install a complete database by using one installation tool called RapidWiz. PeopleSoft's flexibility with regards to being able to run on

varying suppliers of databases presents a more complex installation process. In PS, each database server is installed separately using that vendor's installation tool.

In an ERP installation, multiple machines are normally involved. In an EBS installation, RapidWiz does not have to be executed multiple times on separate machines as long as shared file system and the same OS are used. In a PS installation, multiple installers would have to be run on multiple machines.

[Go Back to top](#)

Tool to Use to Add an Index

If adding an index to the database is required, using any sql utility will suffice for EBS. That's not the case with PS; even though a PS database is accessible from any sql utility, Application Designer must be used to add an index or it may get lost during maintenance (see Tracking Custom DDL Commands for further explanation)

[Go Back to top](#)

Tool to Use to Change Schema Passwords

In order to maintain password synchronicity between the application and database, EBS uses the FNDCPASS utility to change schema passwords whereas PS uses sql tool or datamover to do the same.

[Go Back to top](#)

Database Installation

RapidWiz is an EBS utility that installs both application and database at the same time since Oracle EBS runs only on Oracle databases. With PS's database platform independence, the database must be installed separately using the vendor's installer utility.

[Go Back to top](#)

Database Definition/Limitation

When one refers to a database in EBS, one is referring to a physical database. Since there are several database schemas (APPS, GL, AR, FA, and so on) that come in by default in one EBS installation, one database can support only one application.

In PS, a database is a logical database. One can have multiple PS database in one physical database. A PS database is a set of SQL objects owned by one schema (except for one object). By creating another schema for another PS application, one physical database can support multiple PS applications.

[Go Back to top](#)

How are Database Objects Created?

When RapidWiz installs a new physical database, it automatically creates the objects needed by the EBS application.

In PS, database objects are created as a separate step from the database installation. Objects are created using a Data Mover script or PeopleSoft Database Configuration Wizard. If using an Oracle database, PS objects can also be created using an Oracle Database Configuration Assistant with a PS template.

[Go Back to top](#)

Authenticating Application Account

Both EBS and PS use an authenticating account to validate the credentials of a user who is trying to login into the application. In EBS, applsyspub is the initial pre-authentication account. This account has bare minimum privileges needed only to query the users tables in order to validate an application user's credential. Just like applsyspub, PS uses the "people" authenticating account to validate the credential of application users.

[Go Back to top](#)

Main Application Schema

apps is the super account in EBS that owns all of the database codes necessary to run the application. In PS, sysadm owns all of the applications objects necessary to run the application.

[Go Back to top](#)

Application Schema

In EBS, there are several schemas because each application module is designated a database schema. There are only 3 schemas sysadm, people, and ps in PS. PS hold only one table called PSDBOWNER which maps the schema to the logical database.

[Go Back to top](#)

Roles

When the application is installed, roles are not created in EBS whereas two roles are created in PS (PSUSER and PSADMIN)

[Go Back to top](#)

Data Dictionary

The database's data dictionary is not used by PS. Since PS is a database platform-independent, it must have its own data dictionary. The database dictionary provides information on what objects actually exists in the database; however, PS data dictionary provides information on what objects should exist. If the database and PS data dictionary gets out of synch, DDDAUDIT or SYSAUDIT can be used to help with synchronization.

EBS won't be able to function without the database's data dictionary. Below are some key data dictionary objects critical in managing the application.

[Go Back to top](#)

Data Dictionary for Tables

If table structure information is needed, one looks into DBA_TABLES in EBS and PSRECDEFN/PSRECTBLSPC in PS.

[Go Back to top](#)

Data Dictionary for Table Columns

If table column information is needed, one queries DBA_TAB_COLUMNS in EBS and PSRECFIELDDB/PSRECFIELD in PS.

[Go Back to top](#)

Data Dictionary for Views

If view definition is needed, one queries DBA_VIEWS in EBS and PSSQLDEFN/PSSQLTEXTDEFN in PS.

[Go Back to top](#)

Data Dictionary for Indexes

If index structure information is needed, one queries DBA_INDEXES in EBS and PSINDEXDEFN in PS.

[Go Back to top](#)

Data Dictionary for Index Columns

If index column information is needed, one queries DBA_IND_COLUMNS in EBS and PSKEYDEFN in PS.

[Go Back to top](#)

Data Dictionary for Application Users

If application information is needed, one queries FND_USER in EBS and PSOPRDEFN in PS.

[Go Back to top](#)

Table Used for Patch Record Keeping

The table used for patch record keeping is AD_APPLIED_PATCHES and PS_MAINTENANCE_LOG for EBS and PS, respectively.

[Go Back to top](#)

Is Direct Record Update in the Objects Allowed?

Updating records directly in the database objects are not allowed for both EBS and PS. Customers may lose software support if application is corrupted due to a direct update.

[Go Back to top](#)

Creates or Use Database Privileges

EBS creates and uses database privileges. PS has no need for database system owned privileges because everything is installed under one schema (except for only one object).

[Go Back to top](#)

Create or Use Synonyms

EBS creates and uses synonyms to minimize the impact of having several schemas for one application. PS has no need for synonyms because everything is installed under one schema (except for only one object).

[Go Back to top](#)

Create or Use Referential Constraints

EBS is able to take advantage of the database's referential constraints because EBS runs only in one vendor database. PS do not use referential constraints.

[Go Back to top](#)

Tracking Custom DDL Commands

DDL stands for Data Definition Language. DDL are mainly use to create or alter database objects.

In EBS, Oracle strongly recommends to stay away from customizations. It is preferred that business processes are modified to accommodate ERP requirements. There is no mechanism to automatically track customizations. In order to prevent patch or upgrade from breaking customizations, DDL commands must be tracked manually. Every time a patch or upgrade is needed, it has to be evaluated for possible customization issues.

In PeopleSoft, DDL commands are automatically tracked by the application designer. It is a must that ERP administrators use application designer for any customization. If changes are introduced without using the application designer, customizations may break that patch or upgrade or rerunning of scripts. During an upgrade process, it is critical that the ddlora.dms script is not executed for it will put back in the vanilla DDL configuration.

[Go Back to top](#)

Total Number of Application Tablespace

Each module in PS requires its own tablespace. EBS used to have the same tablespace model as PS but now, there are only 12 tablespaces created by a newly installed EBS.

[Go Back to top](#)

Temporary Tablespace

Temporary tablespace holds temporary tables for session specific private data. The temporary tablespace used by EBS is TEMP whereas PeopleSoft uses PSTEMP.

[Go Back to top](#)

Default Tablespace

Database users are assigned a default tablespace. In EBS, the default tablespace is APPS_TS_TX_DATA whereas in PeopleSoft, the default tablespace is PSDEFAULT.

[Go Back to top](#)

Index Tablespace

In EBS, the index tablespace is APPS_TS_TX_IDX whereas in PeopleSoft, it is PSINDEX.

[Go Back to top](#)

Sequence Generation

EBS uses a database object called sequence. It can be used by multiple users to generate unique integers. The sequential numbers generated are used as unique primary keys in tables. Generally speaking, each table that has a unique primary key column in EBS has its own corresponding database sequence. For example, FND_USER is a table that contains information on application users. It has a column called USER_ID that holds unique identification number for a specific user. The USER_ID column obtains unique integers for newly created application users by using a sequence called FND_USER_S (the "S" stands for sequence)

Since PS can run on different types of database, it is not able to take advantage of specific database features like an Oracle Sequence. PS stores sequence numbers in various tables. For example, if a unique employee ID needs to be generated for a new employee, PS will execute a function to increment the integer stored in PS_INSTALLATION. The incremented value is then used as the new employee ID.

[Go Back to top](#)

Key Application Location

In both ERP systems, there's an environment variable that will point any administrators to the parent folder of the application. In EBS, \$APPL_TOP contains the information for the physical parent location of the installed application whereas \$PS_HOME serves the same purpose for PS.

[Go Back to top](#)

Configuration File Name

Both EBS and PS allows for ease of application modification by providing a single configuration file. In EBS, there's only one master configuration file called <SID>_<server>.xml. In PS, there are two configuration files. psappsrv.cfg and psprcs.cfg are the configuration files for the application and batch server, respectively.

[Go Back to top](#)

Configuration Utility

After the configuration file is modified, a configuration utility needs to be executed. In EBS, autoconfig needs to be executed via a provided shell script before the modified configuration file

can take effect. In PS, a configuration utility is executed with the use of psadmin. After any configuration utility execution has taken place, the application needs to be restarted for both EBS and PS.

[Go Back to top](#)

Application Instance Name

In EBS, the application instance name is known as CONTEXT_NAME whereas DOMAIN_NAME for PS.

[Go Back to top](#)

Start Application

In a PS environment, there are different database vendors used. Hence, the steps to start and stop the database are not included in the documentation. All in all, EBS has a significant advantage when it comes to starting the application. As you can see below, the steps are simplified and not as involved for starting EBS compared to PS.

In order to start the application in EBS, follow the steps below:

1. Log into the machine where the application is stored as the application owner
2. `cd $COMMON_TOP/admin/scripts/<SID_hostname>`
3. `adstrtal.sh apps/<apps password>`

In order to start the application in PS, follow steps below:

1. Log into the machine where the application is stored as the application owner
2. Start the application server

- a. `cd $PS_HOME/appsserv`
 - b. `psadmin`
 - c. Select “1) Application Server” from the “PeopleSoft Server Administration” main page
 - d. Select “1) Administer a domain”
 - e. Select <select the desired domain to be started>
 - f. Select “1) Boot this domain”
 - g. Select “1) Boot (Serial Boot)”
 - h. Type “q” for Quit until the page is back to the “PeopleSoft Server Administration” main page
3. Start the process scheduler
 - a. Select “2) Process Scheduler”
 - b. Select “1) Start a Process Scheduler Server”
 - c. Select <select the desired domain to be started>
 - d. Completely exit out of psadmin
 4. Start the web server
 - a. At the OS prompt as the application owner, type “opmnctl startall”

[Go Back to top](#)

Stop Application

In order to stop EBS, follow the steps below:

1. Log into the machine where the application is stored as the application owner
2. `cd $COMMON_TOP/admin/scripts/<SID_hostname>`

3. `adstpall.sh apps/<apps password>`

In order to stop PS, follow the steps below:

1. Stop the application server
 - a. `cd $PS_HOME/appsserv`
 - b. `psadmin`
 - c. Select “1) Application Server” from the “PeopleSoft Server Administration” main page
 - d. Select “1) Administer a domain”
 - e. Select <select the desired domain to be stopped>
 - f. Select “2) Domain shutdown menu”
 - g. Select “1) Normal shutdown”
 - h. Type “q” for Quit until the page is back to the “PeopleSoft Server Administration” main page
2. Stop the process scheduler
 - a. Select “2) Process Scheduler”
 - b. Select “1) Stop a Process Scheduler Server”
 - c. Select <select the desired domain to be stopped>
 - d. Completely exit out of psadmin
3. Stop the web server
 - a. At the OS prompt as the application owner, type “opmnctl stopall”

[Go Back to top](#)

Application/Database Session Monitoring

In troubleshooting an application user's issue, it is sometimes necessary to determine corresponding database session that belongs to the application user.

When one uses EBS, one is either using a java applet enabled "forms" or the html-web browser page. When a forms session is started, the database makes an entry in v\$session under the "ACTION" column. The entry appears as "FRM:<username>..."; this is one way to determine the database session for an applications' forms users. With regards to trying to determine the database session of an EBS html-web application session, it is very difficult to do so.

In PS, they have done a much better job in tracking application users to their corresponding database session. All application users are easily traceable at the database level by using the "CLIENT_INFO" column of v\$session. The entry in the CLIENT_INFO appears as "<username,...>".

[Go Back to top](#)

Tracing a Web Session

In order to trace a self service web session in EBS, one has to perform the following steps:

1. Ensure the application profile FND: Diagnostics = Yes
 - a. If setting for the first time, re-login after changing the value to "Yes"
2. On the top right of the page, click on "Diagnostics" button
3. On the Diagnostic dropdown, select "Set Trace Level ", then click "Go"
4. Click on the radio button that corresponds to your desired setting and click on "Save"
 - a. Make a note of the trace id number provided

- i. This will NOT contain any important information as this is the trace of the previous activities
5. Perform the steps that needs to be traced
6. On the top right of the page, click on “Diagnostics” button
7. On the Diagnostic dropdown, select “Set Trace Level “, then click “Go”
8. A few more trace id numbers would’ve shown up
 - a. Please make a note of the other numbers
 - i. These new trace id numbers should contain the information you’re looking for
9. Select the radio button for “Disable Trace” and then click on “Save”
10. Retrieve the trace files with the obtain trace id numbers from the user_dump_dest directories of the database
 - a. The trace files will normally have the process id number of the traced session and the username
11. Perform a tkprof on the trace file such as
 - a. `tkprof <filename.trc> <filename.txt> sys=no explan=apps/pwd
sort='(prsela,exeela,fchela)'`

As a personal opinion, PS’s web tracing session capabilities has more features and easier to use than EBS. In order to trace a self service web session in EBS, one has to perform the following steps:

1. Ensure that TracePCMask is set to 4095 in the psappsrv.cfg

2. Ensure that TraceSqlMask is set to 12319 in the psappsrv.cfg
3. Ensure that TraceSQL is set to 3 in the psappsrv.cfg
4. Ensure that TracePC is set to 2048 in the psappsrv.cfg
5. If any of the values above were changed, please restart the application server
6. On the login page of the browser window, add “&trace=y” in the URL address bar
 - a. The login page changes to a tracing option page
7. For the SQL trace settings
 - a. Check “SQL statements”
 - b. Check “SQL statements variables”
 - c. Check “SQL connect, disconnect, commit, rollback”
 - d. Check “SQL fetch”
 - e. Check “All other SQL API calls except SSBs”
8. For PeopleCode trace settings
 - a. Check “Program starts”
 - b. Check “Each statement”
9. Login
10. Proceed to the page right before starting the trace
11. Before performing the steps to be traced, delete the traces created so far
 - a. Trace files should be found under \$PS_HOME/appserv/domain/LOGS
 - b. The trace file will normally contain the username

[Go Back to top](#)

Monitor Batch Jobs

In order to monitor batch jobs in EBS, one has to navigate using Oracle Applications Manager main page -> Site Map -> Monitoring -> Concurrent Requests

In PS, the navigational path for monitoring batch jobs from the main home page is PeopleTools -> Process Scheduler -> Process Monitor

[Go Back to top](#)

Tracing a Batch Job

In order to trace a batch job (concurrent program) in EBS, one has to do the following:

1. Set the “Concurrent: Allow Debugging” profile option to “Yes” for the username submitting the batch job
2. Login with the username mentioned in the previous step
3. Proceed to the Concurrent Request Submission form to submit the batch job that one wants to trace
4. Before clicking on the “Submit” button of the Submit Request form, click on the “Debug Options” button
5. In the new window that opens, select the option you desire to enable trace and FND logging and then click “OK”
6. As apps, perform the following query to determine the max log_sequence in the FND_LOG_MESSAGES table
 - a. Provide the query with the username that would be used to run the batch job
 - i. Make a note of the value returned

```
select max(log_sequence)
```

```
from
```

```
fnd_log_messages fnd, fnd_user fu
where fnd.user_id = fu.user_id
and fu.user_name = '<username>'
order by log_sequence desc;
```

7. Click on “Submit” and wait for the job to complete
8. As apps, perform the following query to determine the new max log_sequence in the FND_LOG_MESSAGES table
 - a. Provide the query with the username that would be used to run the batch job

- i. Make a note of the value returned

```
select max(log_sequence)
from
fnd_log_messages fnd, fnd_user fu
where fnd.user_id = fu.user_id
and fu.user_name = '<username>'
order by log_sequence desc;
```

9. Retrieve the trace information from FND_LOG_MESSAGES table by performing the following query:

- a. Provide the query with the username and the two max sequence retrieved from the previous queries

```
select fnd.*
from
fnd_log_messages fnd, fnd_user fu
```

```
where  
  
fu.user_id = fnd.user_id and  
  
fu.user_name = '<username>' and  
  
fnd.log_sequence > <first_max_sequence_retrieved> and  
  
fnd.log_sequence < <second_max_sequence_retrieved>  
  
order by fnd.log_sequence asc;
```

In order to trace a batch job in PS, one has to perform the following:

1. From the PS home page, follow the navigation path below
 - a. PeopleTools > Process Scheduler > Processes
2. Locate the batch job (process name) and click it
3. Click on the “Override Options” tab
4. In the parameter list, select “Append”
5. In the “Parameters” field, type -TRACE 135 -TOOLSTRACEPC 2048 -
TOOLSTRACESQL 7
6. Run the batch job
7. Trace files are located in \$PS_HOME/appserv/prcs/<DOMAIN>/log_output
 - a. The trace files will have the file name format of AE_<process_name>_<pid>

[Go Back to top](#)

Batch Server Name

In EBS, the batch server is known as Concurrent Manager whereas in PS, it is known as Process Scheduler.

[Go Back to top](#)

Batch Server Created By

The batch server in EBS is automatically created and configured by default when the application is installed. In PS, the batch server is installed separately.

[Go Back to top](#)

Batch Job Name

The batch job name in EBS and PS is known as concurrent job and process, respectively.

[Go Back to top](#)

Batch Job Number

The batch job number is referred to as concurrent request id and instance in EBS and PS, respectively.

[Go Back to top](#)

Batch Job Program Created Using

Generally speaking, EBS does not use 3rd Party in building its batch programs. PS uses a variety of 3rd party in building its batch programs such as Cobol, SQR, nVision, and Crystal.

[Go Back to top](#)

Distribute Server

If there are multiple batch servers, EBS uses a central location for the output/log/trace files via a shared file system. Hence, there isn't any need to relocate these files after they are created. In PS, a Distribute Server (PSDSTSRV) is needed to transfer output/log/trace files to a designated central location called report repository.

[Go Back to top](#)

Validate Batch Server

If an administrator wants to validate whether a batch server is functioning properly, an administrator normally submits a batch test job. The specific jobs mentioned here are the ones generally submitted.

In EBS, an administrator would submit an "Active Users" to validate the functionality of a batch server by:

1. Log into the application as sysadmin
2. Click on "System Administrator" responsibility
3. Concurrent -> Request -> Submit a New Request -> Single Request -> OK
4. In the Name Field, enter "Active Users"
5. Click on Submit
6. Click OK
7. When the "Active Users" job completes successfully, click on "View Log"
 - a. If the log is viewable with a successfully complete job, then the batch server is confirmed to be functional

In PS, an administrator can follow the steps below to validate the functionality of a batch server.

There are more jobs to submit because some PS jobs are created by 3rd party.

1. From the main page, PeopleTools ->Process Scheduler -> System Process Requests
2. Find and select a control id
3. Click on Run
4. Put a check box for “Simple AE test program”, “COBOL Multi-process Job”, “SQR Multi-process Job”, and “Crystal Multi-process Job” (if needed)
5. Select the batch server in the drop down for “Server”
6. Click OK
7. Click on Process Monitor
8. Wait for the job to have a run status of “Success”
9. Click on “Details”
10. Click in “View Log/Trace”
11. Click on “Message Log”

[Go Back to top](#)

Which Table Contains Batch Job Information?

The main table for querying batch job information for EBS and PS is

APPS.FND_CONCURRENT_REQUESTS and SYSADM.PSPRCSQUE, respectively.

[Go Back to top](#)

Synchronize Batch Job Tables

From time to time batch servers will run into unexplainable issues due to batch job tables going out of synch. The standard solution for synchronizing the batch job tables is by cleaning up them up. In EBS, the clean up script is known as cmclean.sql where as in PS, the clean up script is known as PRCSCCLR.DMS.

[Go Back to top](#)

Navigate to Performance Utilities

The navigation path to performance utilities have been provided in the mapping table. However, it is important to note that extra configuration is needed to be done if all of the performance features are to be enabled. With EBS, other types of monitoring are enabled but forms monitoring is not enabled by default. A profile option called “Sign On: Audit Level” needs to be set to “Forms” in order to monitor forms activities.

With PS, none of the performance utilities are enabled by default. Relative to EBS, it will take more time to set up the Performance Utilities.

[Go Back to top](#)

Application Cloning

The high level step for cloning EBS application is as follow:

1. Duplicate the database from source to target
2. Run RapidClone PreClone step at the source
3. Copy the files from source to target
4. Run RapidClone PostClone steps at the target

In PS, there isn't a utility to allow for easy cloning of the application from source to target. It's not a standard practice to clone the application. The cleanest way to clone is to install the application binaries according to Metalink Note 655598.1. However, a PS database clone is performed as follows without copying any application binary files from the source to target.

1. Export PS system tables from target
2. Duplicate the database from source to target
3. Clear application and web server cache of the target
4. Reset IB Domains

[Go Back to top](#)

Patch Application Utility

In EBS, administrators use adpatch to apply a patch whereas PS administrators use Change Assistant to apply a patch.

[Go Back to top](#)

Patch Impact Analysis Utility

In order to determine the impact of a patch, EBS administrators use the Impact Analysis option of the Patch Wizard. PS administrators can use the Change Impact Analyzer.

[Go Back to top](#)

Key Command Line Administration Tool

The most important command line tool for EBS and PS are adadmin and psadmin, respectively. These two command lines are not exactly the same in function but they are the most highly used utilities by administrators.

[Go Back to top](#)

Inbound Mail Processing

Both EBS and PS are able to send out emails but only EBS is able to receive and process incoming emails.

[Go Back to top](#)

COBOL

EBS does not use COBOL programs. In PS, COBOL is located wherever the Application Server exists. COBOL programs are compiled using the following steps.

1. Go to `$PS_HOME/setup`
2. run `./pscbl.mak` to recompile all COBOL programs
3. run `./psrun.mak` to link all COBOL programs to the RDBMS API

[Go Back to top](#)

References

- Anderson-Inman, L., & Horney, M. (1996). Computer-based concept mapping: Enhancing literacy with tools for visual thinking. *Journal of Adolescent & Adult Literacy*, 40(4), 302. Retrieved from Academic Search Elite database (10813004).
- Boucher, R. (2006, Jan 23). Oracle: Fusion at a halfway point. *News & Analysis*. Retrieved April 25, 2009 from <http://www.eweek.com/c/a/Database/Oracle-Fusion-at-Halfway-Point/>
- Cowley, S. (2005, Sep 26). Oracle's Fusion Challenge. *InfoWorld*, 13.
- Farrand, P., Fearzana H., & Hennessy, E. (2002). The efficacy of the 'mind map' study technique. *Medical Education*, 36, 5, 426-431.
- Gallivan, M., Truex, D., & Kvasny, L. (2004). Changing patterns in IT skill sets 1988-2003: a content analysis of classified advertising. Retrieved from ACM Digital Library (0095-0033).
- Melnik, S., Adya, A., & Bernstein, P. (2008). Compiling mappings to bridge applications and databases. Retrieved from ACM Digital Library (0362-5915).
- Ricadela, A. (2007). Oracle Fusion Gets a New Boss. *BusinessWeek Online*, 20. Retrieved from Academic Search Premier Database.

Saran, C. (2005, Sep 27). Oracle sets out Project Fusion strategy to bring enterprise applications together. *Computer Weekly*, 12.

Taricani, E. (2000). Influences of Concept Mapping and Learning Styles on Learning. Retrieved from ERIC database (RIEJAN2002).

Teter, F. (2008, Dec 29). Fusion Applications – Mea Maxima Culpa. *ORCLVILLE*. Retrieved April 27, 2009 from <http://orclville.blogspot.com/2008/12/fusion-applications-mea-maxima-culpa.html>

Oracle Fusion Applications. Retrieved Nov 11, 2009 from <http://www.oracle.com/us/products/applications/fusion/index.htm>