

# Tuning Your PeopleSoft Applications

For Maximum Performance

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# About The Presenter

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- **Founder of PSoftPros (PeopleSoftPros)**



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# Agenda

- Introduction
- PIA Overview
  - Tuning the Database, Application Server, Web Server layers
- Tuning the Application Layers
  - Indexing
  - SQL Tuning
  - Temporary Tables

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# Agenda

- Tuning the Application Cont..
  - The Component Buffer
  - PeopleCode Performance
  - Summary

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# Introduction

- Inadequate performance can have a significant cost impact on your business.
- PeopleSoft is an extremely powerful and highly configurable product
- Developed for many different hardware and database platforms.

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# Introduction

- A poor performing system and application can result in customer dissatisfaction, reduced productivity, and high costs.
- It is absolutely critical that the system's performance is operating at its peak levels.

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# Introduction

- There is a significant amount of analyzing and tuning that needs to occur to obtain the optimal level of performance.
- Specific code and SQL statements delivered out-of-the-box, which may perform well on one database platform but perform poorly on another

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# Introduction

- There are Indexes that provide a baseline level of performance but do not provide the most optimal level of performance for the specific table they are built against
- This presentation will assist you in identifying areas where improvements can be obtained.

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# PIA Overview

- PeopleSoft was originally Introduced as a client server architecture
- Version 6 incorporated an application server for a three tier architecture
- Recent versions of PeopleSoft starting with version 8 introduced the PeopleSoft Internet architecture (PIA) where a web server was added - N-Tier

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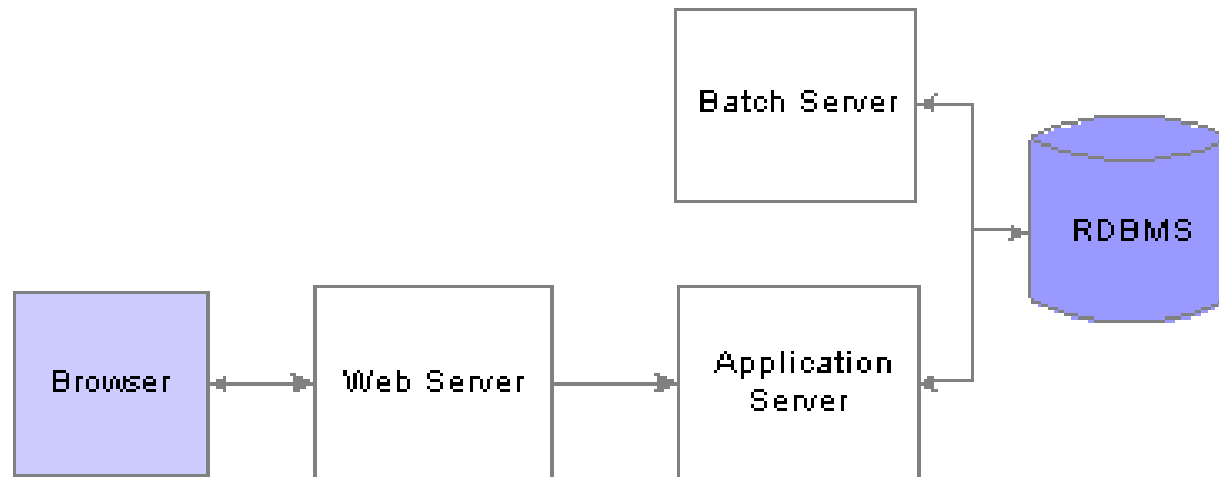
# PIA Overview

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# PIA Overview



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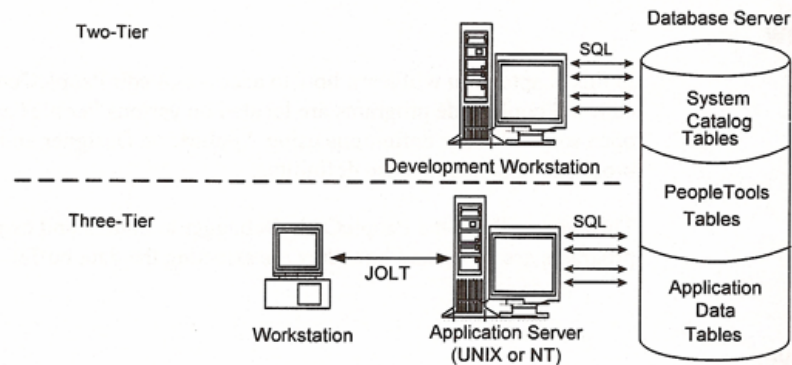
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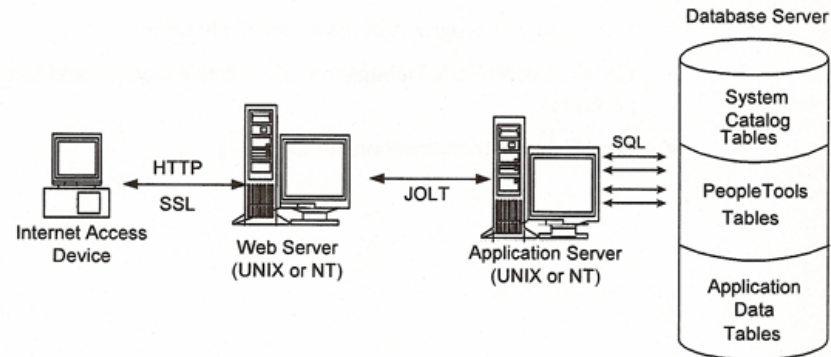


# PIA Overview

## Development Environment



## PeopleSoft Internet Architecture (PIA)



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# PIA Overview

- PeopleSoft architecture Is always been driven by meta data
- There are three categories of tables
  - **1. System catalog**
    - Analogous to a table of contents for a book
    - Structure and names vary depending on which RDBMS is used
    - Contains metadata that tracks objects that reside in the database

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# PIA Overview

- **2. PeopleTools tables**
  - Holds data about PeopleSoft application installed on the database
  - Contains definitions that make up an application
  - The structure of tables is the same for all applications

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# PIA Overview

- **3. Application data tables**
  - Contains data entered for use by your organization
  - Specific tables and the structure depend on the applications installed or by the definitions you create in customizations
    - Example – supply chain management applications use tables to store inventory information , human resources applications have tables to hold employee data
  - Table names in column names are always in all capital letters

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# PIA Overview

- PeopleSoft 8 is a server centric Component architecture
  - The browser is the client , No executables on your computer
  - Can also be an Internet device
    - HTTP, HTML, XML
- Benefits of browsers
  - The easy access, Platform independence
  - Look and feel , Low bandwidth access , Maintenance and deployment
- Clients to this architecture can be nearly any kind of Internet access device:

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# PIA Overview

- Web services in tools 8.4 are from
  - BEA WebLogic
  - IBM websphere
  - 8.48 Offers Oracle App Server 10.1 as a web server
- Web services displays HTML
  - HTML must exist first
  - Database server has definitions stored in tables but not HTML pages
  - We need the missing piece of the puzzle ... the application server

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# PIA Overview

- The application server is the work horse at the center of the PeopleSoft Internet architecture
- There is a very tight association with the web server
- App Server talks to Web Server via JOLT

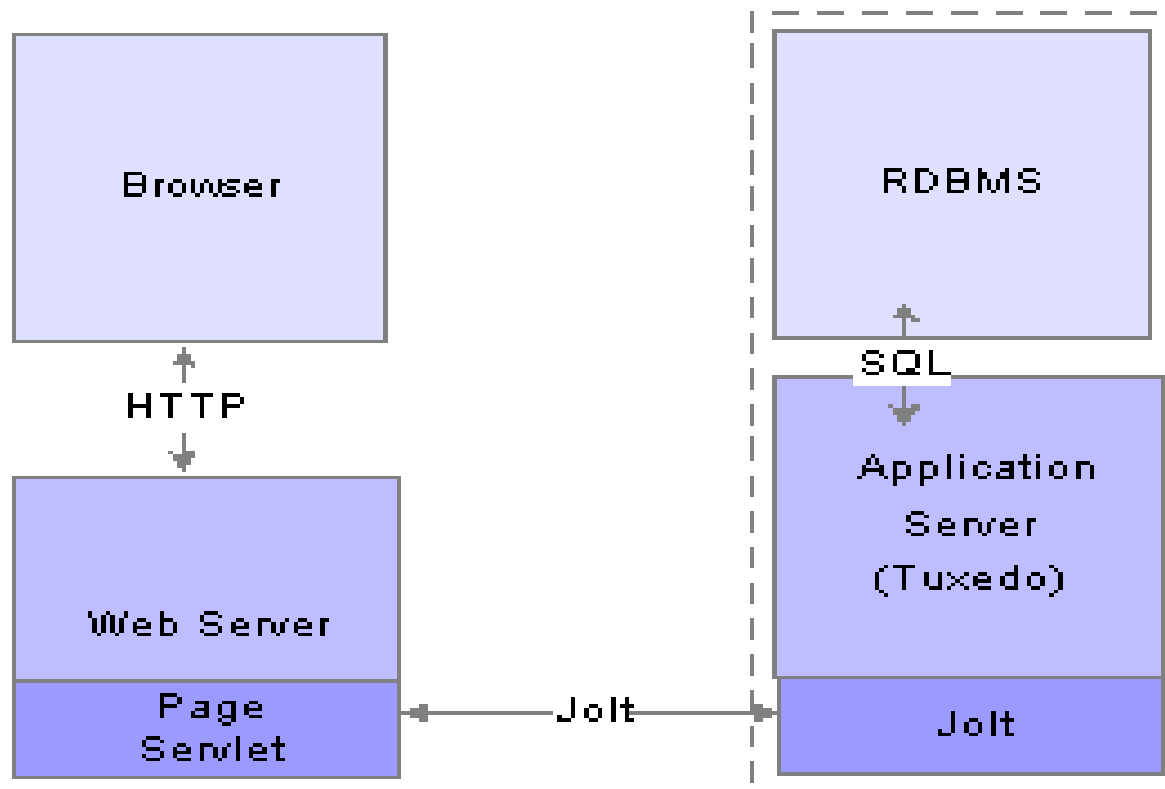
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# PIA Overview



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# PIA Overview

- When a user navigates using a browser a number of things happen behind the scenes
  - **PeopleTools tables**

All the raw data required to assemble the page is contained in the PeopleTools tables . This includes definitions of the Component, page, fields, navigation, and other elements

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# PIA Overview

- **Application data tables**  
the specific information or data based on the high level key is retrieved and sent to the application server
- **PeopleSoft services**  
there are dozens of processes running here. PSAPPSRV is just one of these that takes the PeopleTools data and application data and assembles it into a HTML for display

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# PIA Overview

- **BEA Tuxedo & Jolt**  
Tuxedo manages the multiple connections to the database . JOLT is a java based communication protocol . The HTML is sent to the web server
- **Java Servlets**  
Individual programs manage the state of each user session including a buffer that allows the use of the browser back button . Servlets pass HTML to web services for display

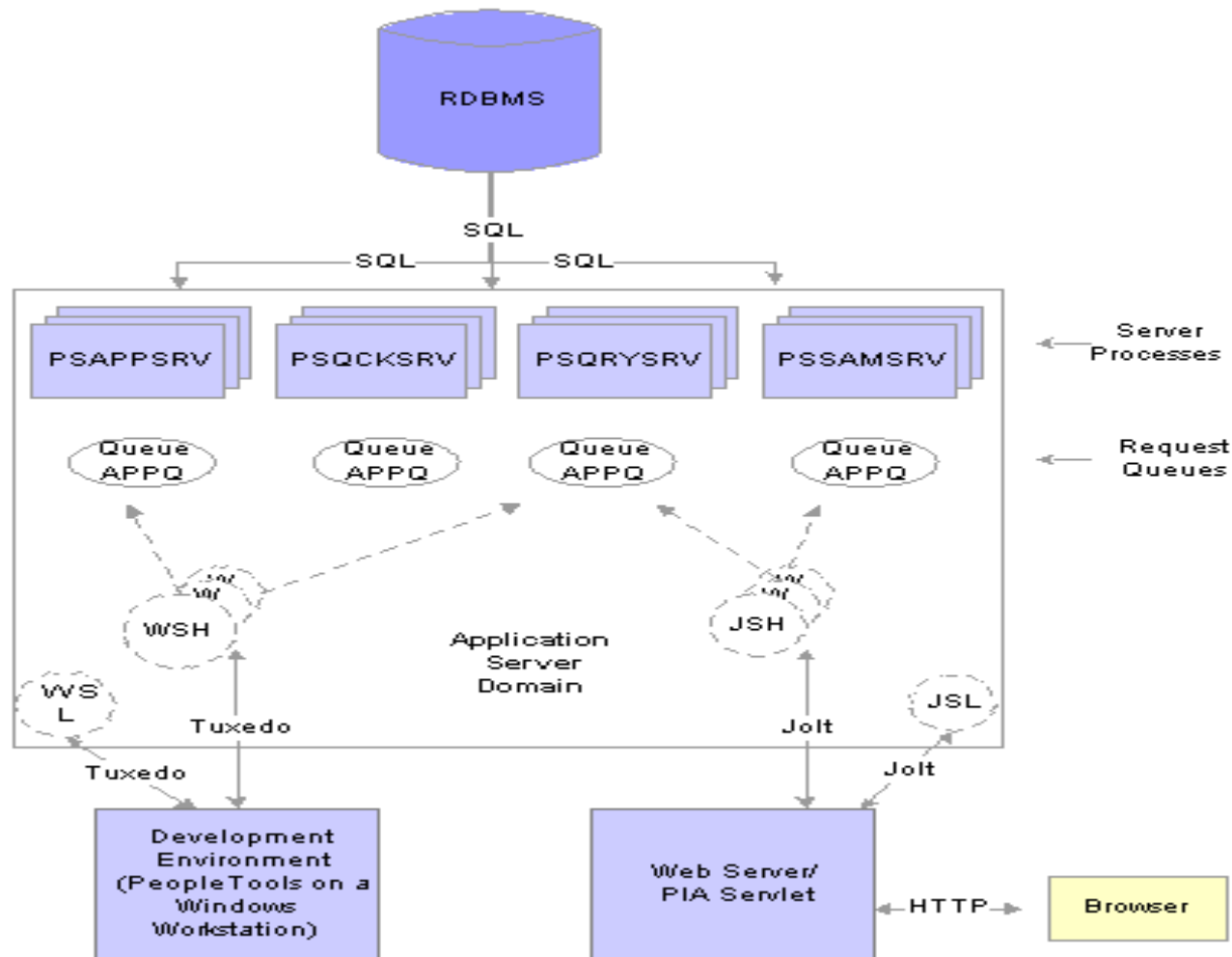
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# PIA Overview



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# PIA Overview

- There are Advantages to developing applications for a browser without local code and there are Disadvantages also
  - Data processing is done on a central server
  - A new screen has to be generated on the application server and then passed to the web server for every request
  
- Two Strategies for limiting trips to the server
  - **Deferred processing**
    - All actions by users are stored and processed in batches when a page is saved
  - **Multi row processing**
    - Users can select the number of rows they wish to enter and then enter all of them without interim trips to the database server

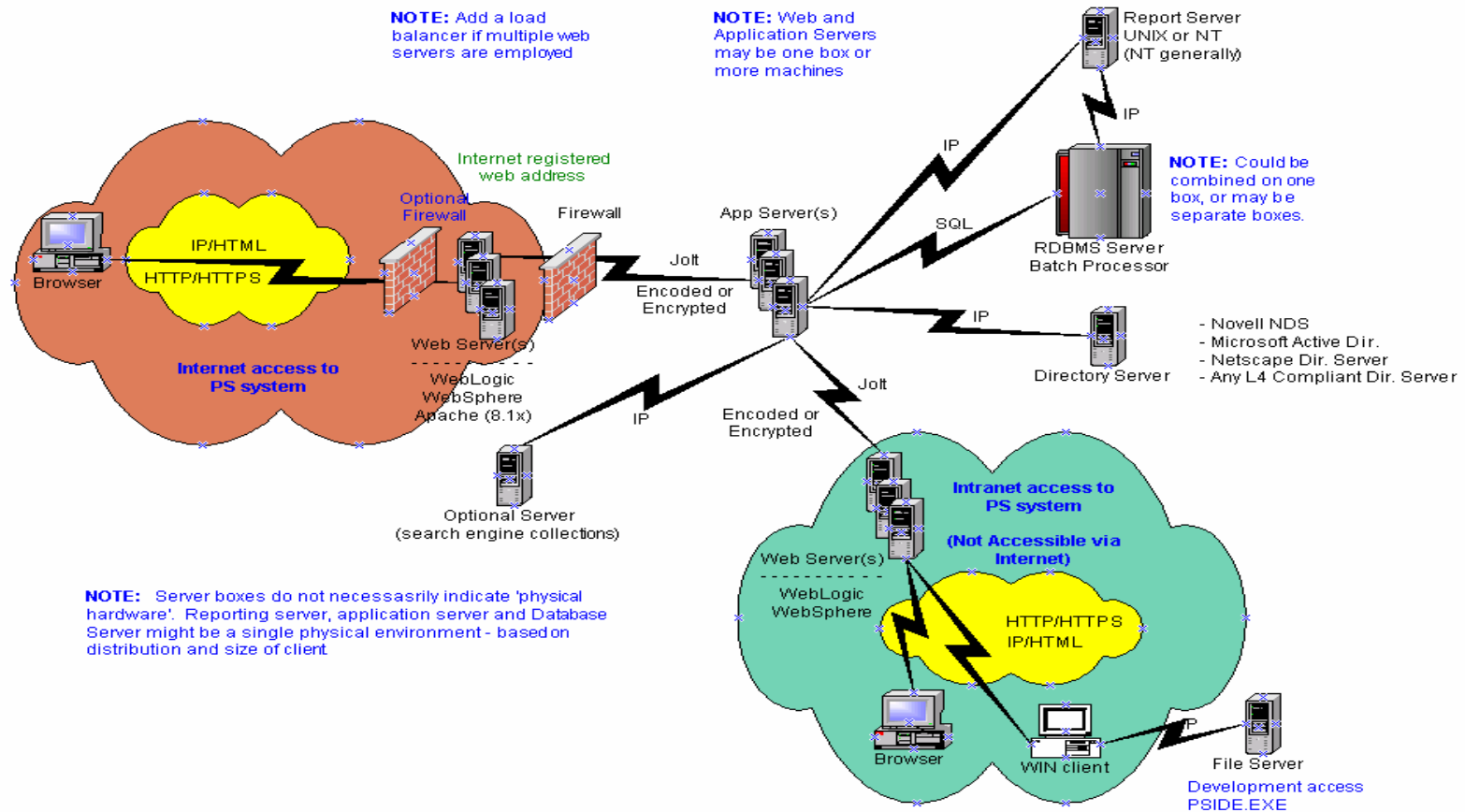
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# PIA Overview



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# Database

- Some PeopleSoft DBA's say that tuning a PeopleSoft database after going live is like trying to work on a Ferrari while it's flying down the highway at 140 MPH!



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# Database

- This is a true statement and become a nightmare, therefore it is vitally important to ensure that you configure and tune your database server correctly from the beginning.

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# Database

- Your database server houses your PeopleSoft database and the sizes vary depending on the application's use. The best advice is to initially oversize your storage media and maximize your RAM, rather than undersize it.

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# Database

- There are many aspects of tuning your PeopleSoft database server. For more details, there is a Performance Tuning eBook I will give you at the end of the presentation.
- This presentation will focus on the Application Layer

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# Application Server

- The PeopleSoft architecture is a very server-centric architecture. At the very heart of the architecture is the most important component: The Application Server. The Application server's main purpose is to allow communication between the web server and the database.

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# Application Server

- In the PeopleSoft 8 Internet Architecture, the bulk of all processing and activity will occur on the application server. Therefore, as with the database server it is extremely important that you choose the appropriate hardware and configure it properly.

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# Application Server

- This server should be the most powerful machine and should contain a very large amount of memory. Additionally, the disk storage should be large enough to contain PeopleSoft application server files, COBOL files, SQR's, BEA Tuxedo, and database connectivity software.

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# Application Server

- There are many areas that you can tune with the application server including
  - Parameters
  - Load Balancing
  - Caching
  - Tuxedo Parameters
- More details on Tuning the App Server are available in our Performance Tuning eBook.

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# Web Server

- Besides the application server, the web server is an important component of PeopleSoft's server-centric Internet Architecture. However, the web server itself performs little or almost no logic. The Web server is responsible for passing data and requests to and from the application server and presenting it to the client browser using the JOLT and HTTP protocols.

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# Web Server

- The majority of activity on this server is network activity.
- For more details on Tuning the Web server, you can read our Performance Tuning Guide.
- Now to the Application Layer!!

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# Tuning The Application

- 80% of performance problems are a direct result of the application code.
- Other factors that contribute to poor performance
  - server configuration, resource contention, and other issues that we have described in previous chapters.

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# Tuning the Application

- Assuming you have tuned your servers and followed the guidelines for your database server, application server, and web server, most of your performance problems can be addressed by tuning the PeopleSoft Application code.

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# Tuning the Application

- Methods and tips for tuning the application.
- Tuning the application can consist of tuning, PeopleCode, SQR code, SQL-intensive code, queries, nVision, and indexes.
- We will focus on the most common application performance problems and how to resolve them.

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# Indexing

- One of the most common performance problems in the PeopleSoft Application is ineffective indexing against key application tables.
- indexes that exist are not specific to any one environment.

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# Indexing

- You Must fine-tune your application by selectively finding poor performing applications and determining whether or not the cause is due to ineffective indexing.
- trace the SQL of poor performing pages, application engine programs, COBOL, or sqr programs and finding the long running queries.

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# Indexing

- Once you find the problematic queries that take a significant amount of time to complete, you will need to analyze the indexes that are being used.
- Example: The Journal Generator application,, is a COBOL application (FSPGJGEN) that performs very many selects based on the run control id parameters. It is determined that it is taking approximately 2 hours to process only 50 Journals.

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# Indexing

- Turn on tracing for that specific process and re-run in your test environment.
- Be sure that you always do your tuning in your test environment. You do not want to blindly start adding indexes to your production environment without performing full regression testing. The results can be catastrophic

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# Indexing

- Examine the trace file and look for long running queries.
- Find the SQL Statement and run it through your RDBMS Query tool to determine the indexes being used.
- Explain Plan for Oracle
- `SET SHOWPLAN_ALL { ON | OFF }`  
for SQL Server

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# Indexing

- Look at the Indexes used and examine the columns
- Look at the Where clause of the SQL and make sure the indexes used have the same columns
- Tuning and adding indexes is one of the most overlooked and very simple ways to improve performance.

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# Indexing

- Trace
- Examine the SQL
- Analyze the SQL in your RDBMS tool
- Determine Indexes being used
- Create Indexes with Columns in Where clause
- Re-Analyze the SQL and repeat until you get improved results

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# Indexing

- Another tip for tuning indexes
- try re-ordering columns within the index.
- sometimes gain huge performance improvements, by simply changing the order of the columns
- Trial and error method
- There is no hard and fast rule for which column should be placed in what order.

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# SQL Tuning

- When tuning any application code, there are several system performance layers that need to be considered, prior to application SQL tuning. These components are Hardware, Network, Operating System, Database, and Application.

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# SQL Tuning

- You should be certain that these underlying layers are performing at acceptable levels, before you take on a SQL tuning project. For the purpose of this section, we will focus on tuning using the Oracle database.

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# SQL Tuning

- **No PeopleSoft application is tuned right out-of-the-box.**
- SQL is at the heart of all PeopleSoft online and batch applications. Therefore, understanding how to properly tune the SQL of your PeopleSoft applications is the key to better performance!

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# SQL Tuning

- Assuming the other layers are at acceptable and optimal performance levels, you will analyze and tune your applications on a case by case basis, as they are brought to your attention.
- There are several reasons for tuning the

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# SQL Tuning

1. Application SQL of the PeopleSoft Apps.  
Here a few of the biggest reasons.
2. Improve overall throughput
3. Ensure application scalability
4. Reduce the system load
5. Reduce processing time
6. Your Users are Breathing down your Neck

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# SQL Tuning

- PeopleSoft has several "Tune-able" components containing SQL that you can analyze and modify to increase performance.
  - Application Engine
  - SQL, COBOL
  - Query/nVision
  - PeopleCode.

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# SQL Tuning

- SQL Tuning takes time and is a trial and error type of task
- Before beginning SQL tuning you should first make sure that your database engine and database architecture is optimized and that you fully understand it.
- Before getting into SQL tuning, you should gain an understanding of your Database architecture and how to optimize it.

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# SQL Tuning

- SQL tuning is platform specific.
- You need to be familiar with your database, table structures, table relationships, Data, and the associated applications.
- You will need to analyze the process in order to identify performance bottlenecks.

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# SQL Tuning

- You will need to pinpoint the specific application SQL needing to be tuned and there are a variety of tools available to help you measure SQL performance.
- Start by using PeopleSoft's Tracing facilities to help you troubleshoot your performance issues and obtain timings. This is the best way to pinpoint where the problem is.

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# SQL Tuning

- SQL Tips
- Avoid using the following:
  - Boolean operators >, <, >=, <=, is null, is not null
  - Not in, !=
  - Like '%pattern', not exists
  - Calculations on unindexed columns or (use union instead)
  - Having (use a WHERE clause instead)

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# SQL Tuning

- Do use the following:
  - Enable aliases to prefix all columns
  - Place indexed columns higher in the WHERE clause
  - Use SQL Joins instead of using sub-queries
  - Make the table with the least number of rows the driving table by making it first in the FROM clause

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# SQL Tuning

- **Other important points for SQL Tuning**
  - Establish a tuning environment that reflects your production database
  - Establish performance expectations before you begin
  - Always Design and develop with performance in mind
  - Create Indexes to support selective WHERE clauses and join conditions
  - Use concatenated indexes where appropriate
  - Consider indexing more than you think you should, to avoid table lookups
  - Pick the best join method

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# SQL Tuning

- Nested loops joins are best for indexed joins of subsets
- Hash joins are usually the best choice for "big" joins
- Pick the best join order
- Pick the best "driving" table
- Eliminate rows as early as possible in the join order
- Use bind variables. Bind variables are key to application scalability

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# SQL Tuning

- Use Oracle hints where appropriate
- Compare performance between alternative syntax for your SQL statement
- Consider utilizing PL/SQL to overcome difficult SQL tuning issues
- Consider using third party tools to make the job of SQL tuning easier

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# Temporary Tables

- PeopleSoft utilizes temporary tables in many of its application programs
- Constantly populated with data and deleted, over and over. Each time a temporary table is populated and deleted, it causes certain databases like Oracle to leave the High Water Mark and produces full table scans.

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# Temporary Tables

- For example, an application engine program inserts 200000 rows and then delete them. The next time that application runs, it only inserts 2000 rows, yet a read against that table performs poorly.
- Additionally, the indexes that exist on these temporary tables are heavily fragmented from all of the deletes.

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# Temporary Tables

- In order to prevent fragmentation and improve performance on most used temporary tables, you should truncate temporary tables on a regular basis.

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# Where Exists

- **Replace Where Exists Statements**
- PeopleSoft utilizes a practice in SQL of using the WHERE EXISTS clause. This where clause causes major performance degradation and can be easily changed to improve performance. Usually, this is used in update and deletes.

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# The Component Buffer

- Many different PeopleCode programs work together
- It is very important to understand the exact order in which they will be performed.
- It is necessary to identify within the component which PeopleCode will be performed and which PeopleCode will not be performed.
- It is also necessary to identify in which order all the programs in an event will be performed.

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# Component Buffer

- Determined by the occurs level in a component and the buffer allocation process.
- The Component Processor will apply People Code on fields using the same order as creating buffers.
- looping statements used to loop manually through rows of data at a lower level.
- built-in functions that need to be used with looping statements.

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# Component Buffer

- Scroll occurs levels in the page definition allow PeopleSoft to maintain common key information for child record definitions.
- If the value of the common key is updated on the parent table, PeopleSoft automatically updates it on the child table.
- Every component has at least one level 0 record definition.
- There can only be one row of data for each level 0 record definition because scrolls begin at occurs level 1.

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# Component Buffer

## Occurs Level 1

- The keys of the occurs level 1 record definition must include the same search keys as level 0, with at least one additional key.
- PeopleSoft allows only one primary record definition per scroll. The purpose of a scroll is to control input into a single SQL table.
- There can be more than one scroll on level 1.
- Each scroll has its own primary record definition.
- The rows of data within one scroll are completely independent from the rows of data within another scroll at level 1.

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# Component Buffer

## Occurs Levels 2 and 3

- Additional occurs levels can be added to a component.
- The maximum possible value of an occurs level for a component is 3.
- Each Occurs Level is subordinate to the one above it.
- The Occurs Levels are managed by common keys between the tables using a parent/child relationship

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# Component Buffer

- The Component Processor allocates temporary buffers on the application server to hold the application data for a component and retrieves all the data needed for the entire component up front.
  - Its important to understand the fields that the component processor retrieves and how they are arranged in the buffer.
- For PeopleCode to refer successfully to a page field online, the Component Processor must retrieve that field from the database.
  - As a developer you must ensure that the Component Processor retrieves all the data required.

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# Component Buffer

## Buffer Contents

- If one field from a primary record definition is placed on a page, all fields from that record definition are retrieved into the component buffer.
- Other fields may also be retrieved:
  - Search Dialog Field
  - Related Display Field
  - Derived/Work Field
  - Translate Table Field

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# Component Buffer

- If an entire row of data was brought into the buffers, any PeopleCode on that record definition may be performed.
- If derived/work fields are brought into the buffers, any PeopleCode on that specific field maybe performed.
- PeopleCode on the related/display record definition is not performed.

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# Component Buffer

- The order of PeopleCode execution is determined as follows:
  1. PeopleCode **event**
  2. Within an event, by **level** order – as determined by the buffer allocation order.
  3. For a given field, **first record** PeopleCode, **then component** PeopleCode.

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# PeopleCode Performance

- Writing extensive PeopleCode can sometimes cause performance issues if not correctly written and placed in the proper location. For the best performance of your PeopleCode, you should try to place the code at the lowest level possible.

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# PeopleCode Performance

- Sometimes you are forced to place the code up a level due to operator actions. However, the lower the level, the easier and more straightforward the code can be written.

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# Summary

- This presentation provides you with the basic guidelines, methods, and tips for tuning your overall PeopleSoft environment and application. There are many components to a PeopleSoft installation and sometimes, performance problems can be overwhelming.

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# Summary


- It is suggested to begin performance tuning early on, before you go live, to avoid major problems. However, whether you are installing, implementing, or have been live for 8 years, these methods and guidelines will help you to improve your application performance.

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# Questions & Answers

## Questions & Answers

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[www.PSoftPros.net](http://www.PSoftPros.net)

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