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PeopleTools: Mid-Tier Deployment Best Practices

Introduction	3
Disclaimer	3
Structure of This White Paper	3
Related Materials	3
Overview	5
Who Should Read This Paper?	5
Before You Begin	5
Common Terms	6
The PeopleSoft Homes	6
PS_HOME – PeopleTools Home	7
PS_CFG_HOME – Config Home	7
PS_APP_HOME – PeopleSoft Application Home	8
PS_CUST_HOME – Customizations Home	9
PS_PIA_HOME	9
Decoupled Environments - Motivation and Benefits	10
Secure Deployment	10
Minimize disk-space	10
Patch Application	11
Reuse	11
Problem Diagnosis and Regression Detection	12
Isolation of Customizations	12
Administration Overhead	12
Implementing PeopleSoft Homes	13
How it Works	16
Sharing PeopleSoft Homes	18
Maintenance and Upgrade Considerations	19
Sample Deployments	22
Example: Decoupled Configuration and Installation	22
Example: Typical Decoupled Deployment	23
Example: Hosted Environment PS_HOME Sharing with Customizations	24
Conclusion	25
Revision History	25

Introduction

Secure by Default has become an accepted software industry standard for software deployment. This implies that operational security best practices are not inhibited by the way in which a software product is deployed. Secure by default permits a natural separation of concerns and segregation of roles according to the Principle of Least Privilege. This means that the level of access afforded to system users goes no further than the minimum required to fulfill the roles and responsibilities associated with that user.

With a view to being secure by default, PeopleTools has introduced greater installation deployment flexibility in recent releases. This paper explains these features and introduces the ways in which a more secure and efficient PeopleSoft deployment is maintained.

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Structure of This White Paper

This white paper addresses each of the following topics in turn:

- Explanation of the PeopleSoft Homes introduced since PeopleTools 8.50
- Benefits of implementing the steps described in this paper
- Guidelines for implementing the recommended deployment
- Addressing concerns with upgrading to a newer version of PeopleTools or PeopleSoft Application

Related Materials

This paper draws upon existing documentation made available elsewhere. The table below provides links to relevant material referred to later in this document.

TABLE 1. RELATED MATERIALS

DOCUMENT	SOURCE
PeopleSoft Enterprise Hosted PeopleBooks	docs.oracle.com/cd/E17566_01/epm91pbr0/eng/psbooks/psft_homepage.htm
COBOL Compilation Guide	Available from the within the PeopleTools Installation Guide docs.oracle.com/cd/E28611_01/InstallUpgrade_Resources_site.htm
Installation and Upgrade Guides – PeopleTools and Applications	docs.oracle.com/cd/E28611_01/InstallUpgrade_Resources_site.htm

Overview

More complex software installations lead to higher ownership costs. Adhering to industry accepted best practices and recommended deployments reduce software ownership costs. There are numerous reasons for this, including the following:

- Vendor recommendations ensures that the deployment is consistent with internal processes used by the software manufacturer
- Support and consulting services are more familiar with common deployment standards
- Documentation and installation instructions from vendors are positioned for the standard deployment
- The product is optimized for standard, out-of-the box deployments
- Intuitive and consistent deployments save time in the transition between hosted vendors

This document describes an approach for managing mid-tier PeopleSoft environments – Application Server, Process Scheduler and PIA. Following these recommendations will lead to a more manageable and consistent deployment of PeopleSoft. The approaches advocated below are considered to be best practices for the mid-tier deployment of PeopleSoft.

Who Should Read This Paper?

This document is a practical guide to understanding large scale deployments of PeopleSoft systems. In particular those interested in creating efficient and secure mid-tier deployments should consider the material described here. This material will be of interest to Solution Architects and System Administrators

This guide is intended for System Administrators seeking a better understanding of the way in which PeopleSoft software is installed and configured.

Before You Begin

The information provided in this guide will require some understanding of how a PeopleSoft system is installed and configured. Ensure that you are familiar with the following features:

- PeopleTools 8.50: Secure and Decoupled PS_HOME
- PeopleTools 8.52 with 9.1 Applications: Decoupled Application Home
- PeopleTools 8.53 with 9.1 Feature Pack (FP) 3 Applications: Customized PeopleSoft Homes
- PeopleTools 8.54 Portable PS_HOME

Depending upon the release with which you are working you should ensure that you're aware which features are applicable to that release. This document will not refer extensively to which release these features were introduced. Rather, it assumes that you are working with the most

recent version of PeopleTools. If you are working with an earlier version of PeopleTools you must be aware which aspects of this guide are not applicable to your release.

Common Terms

The following table provides definitions for some of the common terms that are used in this guide. If you are unfamiliar with some of the more technical material, you may want to review external information sources, such as wikipedia.org.

TABLE 2. COMMON TERMS

TERM	DEFINITION
AppBatch	Application Server and Process Scheduler
EM Agent	Process within the PeopleSoft Lifecycle Management (LCM) framework that allows installed PeopleSoft applications to be discovered. In addition, it plays a role in distributing change packages to the PeopleSoft Application installation homes.
OTN	Oracle Technical Network is a resource available at www.oracle.com/technetwork/index.html that provides information about how to use Oracle Applications. The information spans high level marketing information to technical details about how to implement an Oracle Application.
PeopleSoft Home	Refers to a location into which PeopleSoft file system artifacts may be deployed. This is a general term for the additional Homes described in detail below. The Installation or Binary Homes are those that contain content that does not require write access at runtime. These include PS_HOME, PS_APP_HOME and PS_CUST_HOME.

The PeopleSoft Homes

This section explains the concept known as PeopleSoft Home. It describes the purpose of each home and its contents. Familiarization with the terminology in this section is essential to understanding the remainder of the material in this document.

PeopleSoft Home refers to a file system location in which artifacts associated with a PeopleTools runtime environment are located. The various PeopleSoft Homes are intended to serve specific purposes. Until PeopleTools 8.50, all file system content related to a PeopleSoft environment was consolidated within the same directory tree. This means that all the following all resided in the original PeopleSoft Home – PS_HOME:

- Content written by the product installation - virtual cd installers
- Configuration files that describe how the system will run
- Log content written by running programs
- Customizations added by the user

PS_HOME – PeopleTools Home

Prior to PeopleTools 8.50, PS_HOME contained everything associated with a PeopleSoft runtime environment.

- PeopleTools installation plus patch.
- PeopleSoft Application installation plus maintenance¹.
- PeopleTools runtime components – AppServer, Process Scheduler and PIA domains. Included configuration and log files.
- Some third party products – Verity, for example.

From PeopleTools 8.50 onwards, PS_HOME contains only file system artifacts deployed by PeopleTools installation programs. Configuration and logs have been relocated to PS_CFG_HOME.

From PeopleTools 8.54 onwards, PS_HOME is *portable*. This means that a PS_HOME can be copied to other file system locations. This also means that PS_HOME can be reused in different runtime environments. This is because unlike earlier PeopleTools releases, files within PS_HOME do not contain any explicit references to the location to which they were installed. This reuse can take the form of copying, cloning or remote mapping from different file system mount points².

PS_CFG_HOME – Config Home

From PeopleTools 8.50 onwards, a new PeopleSoft Home has been introduced. Known also as *Config Home* (PS_CFG_HOME), this new file system location contains only the PeopleSoft configuration content associated with runtime components. In particular this refers to the domain directories and their content such as cache and log files.

¹ Maintenance refers to the concept of applying additional file system content on top of a major PeopleSoft Application. This can take the form of maintenance packs or bundles depending upon the PeopleSoft Application.

² Although mount point is a term traditionally encountered on UNIX systems, in the context of this paper can be thought of as a mapped drive or UNC Path on Microsoft Windows.

The PS_CFG_HOME is placed at a default location relative to the current user's home directory³. This location is outside PS_HOME by default. You can override this default location by setting the PS_CFG_HOME environment variable to the file system location of your choosing. This environment variable can be set to the location of PS_HOME. This results in the domains being placed within PS_HOME, and is known as a *classic* PS_HOME deployment.

PS_CFG_HOME has the following restrictions:

- PeopleTools domains contain files that are fixed to the location on which they were created and therefore cannot be moved or copied. Other strategies are available for replicating the contents of PS_CFG_HOME.

For PeopleSoft 9.1 Applications the following restrictions apply:

- Contains only domains for a single Application Database.
- Can be associated with only one Application Home - PS_APP_HOME. See the next section of this document for more details about PS_APP_HOME.

PS_APP_HOME – PeopleSoft Application Home

PeopleTools 8.52 introduced PS_APP_HOME or *Application Home*. PS_APP_HOME refers to the installation location of the PeopleSoft Application. This location is anywhere in the file system that can be accessed by the PeopleTools runtime. This means that the PeopleSoft Application no longer must be installed into the same file system location as PeopleTools. The introduction of a decoupled Application Home allows the PeopleSoft Application to be installed and maintained independent of PeopleTools. Similar to the PS_CFG_HOME described above, a classic deployment is possible by installing the PeopleSoft Application on top of PS_HOME.

PS_APP_HOME can only be used for new Application installations with PeopleTools 8.52 and later. PeopleTools-only upgrades to pre-9.1 Applications are not supported. Furthermore a fresh installation of PeopleTools and Application is required to use this deployment. This is because earlier pre-8.52 PS_HOMEs will typically contain Application content that may remain after an in-place installation. It is however possible to install subsequent PeopleTools versions in-place on the condition that the Application installation resides in PS_APP_HOME and that PS_HOME contains only the PeopleTools installation.

³ The user's home directory refers to a specific directory into which the user has greater access than the remainder of the file system. This is /home/<username> by default on UNIX. On Microsoft Windows this is defaulted to c:\users\<username>.

PS_CUST_HOME – Customizations Home

PeopleTools 8.53 introduced the ability to designate a specific file system location for customizations. This file system location is known as *Cust Home* or PS_CUST_HOME. Typical file system objects that are customized include COBOL, SQR, nVision and Crystal Reports. PS_CUST_HOME mandates the same file system layout as an installed PeopleSoft Home – PS_APP_HOME and PS_HOME. This means that the runtime environment will recognize the file system structure and draw the required file system artifacts from PS_CUST_HOME instead of the conventional installation home. For example, if the same nVision layout file resides in the Application Home and the Customized Homes, the PeopleTools runtime will draw the appropriate file from PS_CUST_HOME.

Following the theme of optional usage of these features, customizations may continue to be made in-place within a PS_HOME or PS_APP_HOME. By default it is assumed that no customizations have been made and the PeopleSoft system operates as before if no action is taken by the administrator.

PS_PIA_HOME

PIA domains are installed into PS_CFG_HOME by default in PeopleTools 8.52. In addition PeopleSoft PIA domains can be managed from inside PSAdmin. AppServer and PIA domains that are running out of the same PS_CFG_HOME can therefore be managed from inside the same PSAdmin. This is in addition to the historical ability to manage Application Server, Process Scheduler and Search domains.

TABLE 3. TIMELINE AND SUMMARY

PS_HOME	<ul style="list-style-type: none"> • Historical unified file system location for PeopleTools, PeopleSoft application, configuration and log files • Successively refined from PeopleTools 8.50 onwards to contain only PeopleTools only content • Portable from PeopleTools 8.54+
PS_CFG_HOME	<ul style="list-style-type: none"> • PeopleTools 8.50+ • Configuration placed outside PS_HOME by default • Administered by the runtime or domain user
PS_APP_HOME	<ul style="list-style-type: none"> • Available only with PeopleTools 8.52+ and PeopleSoft 9.1 Feature Pack 2⁴ Applications • Application installable outside PS_HOME • Owned by the Application installation user

⁴ Feature Pack (FP) refers to a post-GA release of a PeopleSoft Application that contains significant new functionality. The schedule by which FPs are made available vary by PeopleSoft Application.

- Requires fresh installation for uptake

PS_PIA_HOME	<ul style="list-style-type: none"> • PeopleTools 8.52+ • PIA domains written to PS_CFG_HOME by default • Owned by the PIA installation user – must also be responsible for starting, stopping and configuring PIA domains
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PS_CUST_HOME	<ul style="list-style-type: none"> • PeopleTools 8.53+ • All customizations placed in PS_CUST_HOME • Owned by the user responsible for managing customizations • Only supported with 9.1 FP3 Applications
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Decoupled Environments - Motivation and Benefits

The benefits of decoupling constituent parts of a conventional PeopleSoft installation and configuration are discussed in this section. This helps you understand why implementing a PeopleSoft deployment in this fashion is a more sustainable proposition.

Secure Deployment

The deployment of PeopleTools and PeopleSoft Applications to different file system locations allows the installation of each to be performed independently. Therefore the user who installs to PS_HOME does not require write access to PS_APP_HOME and vice versa. Ownership of PS_APP_HOME and PS_HOME by different users helps isolate file system entities. This isolation guarantees that there is no cross-writing of the PS_HOME and PS_APP_HOME by restricted users.

Relocating the PeopleSoft configuration outside PS_HOME allows a more secure deployment by preventing the Runtime User from having write access outside its own sphere of privilege. Restriction of privilege for the domain administrator is a valuable tool for the system planner. The user that starts the PeopleSoft domains therefore requires only read-execute privileges on PeopleSoft Homes that contain binary content. This prevents a compromised process in the PeopleSoft runtime from taking advantage of installed PeopleSoft Homes. Until the introduction of the decoupled PS_HOME in PeopleTools 8.50 this was challenging to achieve and required manual intervention to limit access to subdirectories within a PeopleTools installation.

The above concepts follow the security principle of *least privilege* and are intended to compartmentalize independent software components.

Minimize disk-space

A valuable implication of a secure deployment of PeopleSoft installations is that the same installation can be shared by multiple independent runtime users. The relocation of the configuration and other runtime-specific content means that installed content is no longer user-specific. Therefore multiple users can share the same installation. This can be achieved by creating a shared network file system to host the installation. Multiple runtime machines can concurrently rely on the same centralized read-only installation. The sharing of a centralized file system resource therefore implies a lower disk-space footprint. The portability of PS_HOME from 8.54 onwards means that the same PeopleTools installation can be shared in a secure read-only mode by multiple runtime environments using different mount points.

Patch Application

In this section, the term *patch* refers to the general concept of making changes to a previously installed software product. Making changes to a pre-existing PeopleTools or PeopleSoft Application is more efficient for the following reasons:

- A shared installation point means that there are fewer distinct copies of the installation that must be patched or have updates applied.
- In a decoupled deployment, applying post GA changes to PS_HOME and PS_APP_HOME can be performed independently. It is not necessary therefore to use the same user account to manage both installations. Applying a PeopleTools patch ensures that no PeopleSoft Application content is overwritten.

Reuse

Until the introduction of the Decoupled Application Home feature it was necessary to dedicate a PS_HOME to a specific application. Even if PeopleSoft HCM and FSCM were running on the same PeopleTools release it would be necessary to dedicate a separate PeopleTools installation to each. This feature allows a single PS_HOME to be shared between multiple Applications. Conversely, the same Application installation can be used in tandem with multiple PS_HOMES.

Occasionally within the same organization, different customizations are required for different environments. For example, the development, test and production environments all contain customized objects but are not guaranteed to contain the same customizations. By placing customizations in a specific location the same installation homes - PS_HOME and PS_APP_HOME, can be shared between multiple environments. This is particularly useful for Software as a Service (SaaS) vendors who can therefore support hundreds of customer environments out of the same PS_HOME.

In PeopleTools 8.53 and earlier all runtime environments using PS_HOME must access the PS_HOME using the same relative file system path. For example, if PeopleTools is installed to /opt/oracle/psft/pt/8.53.11, any remote host that wishes to use this installation must mount it locally to exactly the same file system path. Furthermore, if you wish to clone this patched PS_HOME it must be placed in exactly the same file system path on the target system. This requirement is in place for PeopleTools 8.50 through 8.53 because files within PS_HOME

contain explicit paths to where they were installed. This is not a requirement in PeopleTools 8.54 and later.

Problem Diagnosis and Regression Detection

In a combined installation of PeopleTools and Application to the same PS_HOME, it is difficult to determine from which product a particular source or binary file has come. For example, it is uncertain whether the file was laid down by the Application or PeopleTools vcd. By decoupling the installation of PeopleTools and the Application results in the deployment of file system artifacts to different locations. This makes it unambiguous whether file system content was installed by PeopleTools or the PeopleSoft Application.

If problems are observed, it becomes easier to narrow the cause of the problem to being Application or PeopleTools specific. This is possible by attempting to reproduce the problem using a domain that only takes content from the PeopleTools installation - PS_HOME.

Isolation of Customizations

Given that most PeopleSoft installations will contain a customization of some nature it makes sense to provide a mechanism for managing this process in a consistent fashion. This has historically been managed in an ad-hoc fashion without any formal guidelines from PeopleSoft. PeopleTools 8.53 brings a consistent process to the way in which this should be managed. This is particularly appealing for COBOL customizations.

Isolation of customizations to a specific file system location allows the PS_HOME and PS_APP_HOME locations to retain only content delivered with the installation program. Furthermore, isolation of these customizations provides an easier upgrade process because the customizations can be easily compared with versions of the same file artifact from an earlier release.

This is a common situation for very large deployments or solution providers that host many different PeopleSoft installations, each of which contains different customizations.

Given that a Customized PeopleSoft Home is the recommended approach, utilities such as the COBOL compilation program and runtime recognize the presence of the customized homes and include the file system content in the correct order. This applies to both the COBOL compilation and runtime.

Because the Customized Home requires only read-execute access at runtime, different users can own the Customized and Installation PeopleSoft Homes.

Administration Overhead

Consequent to the benefits noted above, the cost of administration is reduced. Fewer distinct installations imply less effort spent managing file system allocations. The features above allow separation of administrative users that would be responsible for different aspects of the system.

Furthermore, many of the steps described in this document can be taken using automation scripts.

The features described above offer varying benefits. These will be particular system within which it is deployed. You are encouraged to consider the features above with recognition of how they would serve your deployment best. The features described above are of varying benefit depending upon the goals and objectives of the target environment. The following sections describe ways in which they may be deployed.

Implementing PeopleSoft Homes

This section explains how to take advantage of the features offered by decoupling the PeopleSoft configuration from the PeopleTools and Application installations. Variations on this model are possible and encouraged. The steps below describe a deployment strategy that you can customize and expand upon.

Step 1: Plan and Create Users and Groups

As noted above, the various PeopleSoft Homes are normally owned by different users. This allows a more secure environment to be deployed. The user with whom the installation is performed will typically be the owner of the file system. For this reason it is intuitive to perform the installation of the different PeopleSoft Homes with different users. Additionally, the use of OS groups within which these users reside is also essential to the sharing model. The table below assumes a familiarity with UNIX Operating System file system security. In particular the concept of “user, group, world” must be understood. The example bellow illustrates only one possible deployment. It makes assumptions about the level of security required. This may be unsuitable for some deployments. For example, the installation homes may need to be invisible to ‘other’ users because of concerns that COBOL source code can be seen or copied by such non-group users.

TABLE 4. USERS AND GROUPS – EXAMPLE

FILE SYSTEM LOCATION	USER	GROUP MEMBERSHIP	PERMISSIONS
PS_CFG_HOME	cfgadm	cfggrp	<ul style="list-style-type: none"> • cfgadm user creates and starts AppBatch domains • Users starting domains are required to have read-execute (rx) access to the installation homes • cfggrp group can read PS_CFG_HOME • Other (non-group) has no access
PS_HOME	psadm1	psgrp1	<ul style="list-style-type: none"> • psadm1 installs PeopleTools and patch to PS_HOME • Owner and group can read-write-execute (rwx) • Other has read-execute access. This allows cfgadm to

start domains using this home			
PS_APP_HOME	psadm2	psgrp2	<ul style="list-style-type: none"> psadm2 installs PeopleSoft Application to PS_APP_HOME Owner and group can read-write-execute (rwx) Other has read-execute access. This allows cfgadm to start domains using this home
PS_CUST_HOME	psadm3	psgrp3	<ul style="list-style-type: none"> psadm3 copies customized file system objects to appropriate subdirectories within PS_CUST_HOME Only customized file system objects are added to PS_CUST_HOME
N/A	psemf1	psemgrp, psgrp1, psgrp2, cfggrp	<ul style="list-style-type: none"> Has write access to PS_APP_HOME to write update and change packages Has write access to PS_HOME to write log and cache content
PS_PIA_HOME	psadm4	cfggrp (primary), psgrp1	<ul style="list-style-type: none"> psadm4 installs PIA to a specific file system location outside PS_HOME. Only requires read access to PS_HOME for installation but not runtime⁵

Step 2: Install PeopleTools plus Patch

PeopleTools is installed to the file system location of choice. Any required patches are also installed on top of the installed PS_HOME. The installation is performed with a user account that has write access to PS_HOME. This user account should be considered the only user that can write to PS_HOME. Other than the permission to write to PS_HOME, this user requires no special privileges beyond those afforded to a typical non-root user.

Step 3: Install PeopleSoft Application

The PeopleSoft Application is installed to a file system location outside PS_HOME. The installation is performed with a user that has write access to PS_APP_HOME but cannot write to PS_HOME. Updates will also be applied via change packages to the PS_APP_HOME at this time.

⁵ Applications using WebAppDeploy, such as OLM in CRM, will also require read access to PS_APP_HOME when installing PIA.

Step 4: Migrate Customizations

Customizations that have been made to file system objects will need to be migrated from the old PS_HOME to the new PS_APP_HOME or PS_HOME. If creating a PS_CUST_HOME, these customizations should be migrated to this file system location. **Note:** The original or base versions of files that have been customized do not need to be removed from PS_HOME or PS_APP_HOME. This is because the PeopleSoft runtime will disregard any files with identical names that are located in a lower order PeopleSoft Home. This is described in further detail later in this document.

Customizations will typically have been made in earlier release of PeopleTools or the PeopleSoft application. Historically these customizations may have been added directly to PS_HOME or PS_APP_HOME. This is especially true in the case of COBOL. These customizations should now be relocated to the Customized Home. This involves identifying which installation program wrote the file and propagating the customized file to the correct location. The steps taken here are analogous to the steps taken to migrate file system customizations during a conventional upgrade. Relocation of customizations to PS_CUST_HOME is not mandatory. It simply offers a more standardized way of managing customizations in a PeopleSoft environment and aligns with best practices advocated by Oracle.

See the Maintenance and Upgrade Considerations section later in this document for considerations you must make when upgrading from an earlier PeopleSoft release.

Step 5: Compile COBOL

COBOL source code is located in both PS_HOME and PS_APP_HOME. There may also be COBOL located in the PS_CUST_HOME if changes have been made to the delivered PeopleSoft COBOL. This means that COBOL source code from all of these locations must be compiled. The COBOL build system⁶ that is delivered with PeopleTools understands how to correctly handle each of the PeopleSoft Homes when it recognizes that their corresponding environment variables have been set. Upon initiating a build of the COBOL source, the build system recognizes the presence of each of the PeopleSoft Home environment variables and compiles COBOL programs in each of the locations in the correct order. The binary files created by the compilation will be placed in the respective COBOL bin directory of the PeopleSoft Home from which the source entity originated.

⁶ What is referred to as the 'build system' is a series of scripts that are responsible for creating the runnable COBOL copybooks from the COBOL source content that is shipped with the PeopleSoft installation.

Step 6: Create Application Server and Process Scheduler Domains

A specific user account is created for managing Application Server and Process Scheduler domains. This is known as the runtime user account. This user should not have write access to the PeopleSoft installation homes. Before creating any Application Server or Process Scheduler domains it is necessary to set the environment variable `PS_APP_HOME`. If implementing a Customized PeopleSoft Home, the `PS_CUST_HOME` environment variable must also be defined. These environment variables point to the file system installation location of the PeopleSoft Application. The presence of this environment variable is observed by the PeopleSoft runtime environment. This is how the PeopleSoft runtime processes can find the Application installation. Because these environment variables must be set each time the domains are administered it is recommended to add this environment variable to the user account's profile. For example, on Linux, the following lines could be added such that PSAdmin can be started immediately after logging in as the runtime user.

```
export PS_APP_HOME=/opt/oracle/peoplesoft/hr/9.1fp2
export PS_CUST_HOME=/opt/oracle/peoplesoft/hr/9.1fp2-cust
. ./psconfig.sh
```

Step 7: Create PIA Domains

PIA is typically deployed onto a different host to the Application Server domains. If deployed onto the same host, a different user account can be used from the account that is used to administer AppBatch domains. The PIA installation should be installed outside `PS_HOME` using a different user to that used to install PeopleTools and the PeopleSoft Application. The PIA installation by default goes to the same directory that PSAdmin places Application Server and Process Scheduler domains. This means that if AppBatch domains are to be placed in the same `PS_CFG_HOME` as PIA installations the same user is recommended for administering both. All domains types can be managed from inside PSAdmin with PeopleTools 8.52 and later.

How it Works

This section explains how the runtime environment recognizes that a decoupled environment as been implemented. This is what allows the runtime environment to search in the correct locations for installed file system content.

Environment Variables

Setting environment variables prior to creating AppBatch domains is the starting point for defining the runtime environment. The following are the environment variables that are used.

- **PS_CFG_HOME** – by default as assigned to being located within the user's home. The default location can be overridden by explicitly setting the value of `PS_CFG_HOME`. This is described earlier in this document. For portability between multiple releases the administrator can also use the `%V` and `%K` *meta-variables*. By placing `%V` inside the environment variable value the PeopleTools version will be

substituted. For example, in a PeopleTools 8.53.02 environment, a value of `/etc/cfg/pt%V` would expand to `/etc/cfg/pt8.53` and `/etc/cfg/pt%K` would expand to `/etc/cfg/pt8.53.02`

- **PS_APP_HOME** – Set to the location where the PeopleSoft Application has been installed. Many different PeopleSoft applications can be associated with a PS_HOME by setting this environment variable before creating domains in PSAdmin. If this environment variable has not been set the value is assumed to be the same as PS_HOME.
- **PS_CUST_HOME** – Set to the location where customized PeopleTools software has been placed. If not set this environment variable will be present in the domain runtime but will contain the same value as PS_APP_HOME. This equates to earlier releases where customizations are made in-place within the PS_APP_HOME.

Config Home Creation

The first time PSAdmin is started for a particular PS_CFG_HOME it automatically creates the required directory structure to contain domains. As part of this step it copies the `peopletools.properties` file from the source PS_HOME to the new PS_CFG_HOME. This allows PSAdmin to associate a PS_CFG_HOME with a particular PeopleTools release for which it was originally created. The presence of the `peopletools.properties` file also helps the EM Agent to discover a PS_CFG_HOME when crawling the file system.

At the time of PS_CFG_HOME creation PSAdmin also copies any Verity style file and collections from the PeopleSoft installation homes to PS_CFG_HOME. This means that customized search style files can be placed in the PS_CUST_HOME. These customized search style files will then be copied to PS_CFG_HOME when it is being created by PSAdmin. Like other customizable entries in PS_CUST_HOME these must be placed in a subdirectory structure that matches the layout of PS_HOME. Verity is not used for PeopleSoft 9.2 Applications. If you are using a PeopleSoft 9.2 Application you can safely disregard the presence of these files in your PS_CFG_HOME.

It is essential to note that a PS_CFG_HOME is bound to the PeopleSoft Homes for which it was created. Furthermore, it is recommended that all domains within a PS_HOME are associated with the same database. This is because environments that use Verity will typically share Search indexes that are generated into the PS_CFG_HOME. Environments using SES do not have this restriction.

Domain Creation and Configuration

When a domain is created its configuration template is drawn from `PS_HOME/appserv`. This means that all default settings that were delivered with the PeopleTools installation will be incorporated into the domain configuration file.

In addition, at the time of domain creation PSAdmin examines the content of any variables that have been defined that are related to the installed PeopleSoft Homes. Having examined the

contents of these variables it will manipulate configuration settings within the domain configuration. This is with respect to customizable content such as the following:

- SQR
- Compiled COBOL
- nVision
- Crystal Reports

This means that it is not necessary to update configuration settings in the domain for the above sub-products because this will be done at the time of domain creation. It is sufficient to set the environment variables and take no further steps at domain configuration time. PSAdmin will ensure the correct file system artifacts are located by the runtime environment. The administrator may subsequently modify or override these settings.

Note: The step of modifying the entries within the configuration file will only be followed when the domain is created. This step will not be repeated on subsequent configuration events.

Runtime Search Order

When PSAdmin is started it sets a number of variables within the environment. These mostly concern the binary search path. On MS Windows systems this is the PATH environment variable. On UNIX and Linux variants this involves setting the LD_LIBRARY_PATH or LIBPATH variables. This is also performed for Java classes that may be located in PS_APP_HOME or PS_CUST_HOME. This means that no specific steps are required to set these variables once the domain has been created. As noted above, domain configuration settings do not need to be altered once the PeopleSoft Home environment variables have been defined prior to starting PSAdmin and creating domains.

The PeopleSoft runtime always searches for file system artifacts in the following order of precedence.

1. PS_CUST_HOME
2. PS_APP_HOME
3. PS_HOME

Following the same philosophy as operating system search paths, once a match has been identified no subsequent PeopleSoft Home locations are checked.

Sharing PeopleSoft Homes

The benefits of making an installation home shareable are described earlier in this document. However, there are a number of considerations to be kept in mind when sharing PeopleSoft Homes.

When sharing a PeopleSoft Home between environments, the PeopleSoft Home will typically need to be placed on a network disk appliance⁷ in order to make it widely available. This means that the disk appliance must provide fast access for all clients that will access it. This disk appliance must also be reliable in terms of availability, fault tolerance and quality of service. This is an important consideration because sharing PeopleSoft Homes brings additional risk. This risk is that each of the runtime environments sharing the PeopleSoft Home will become unavailable if the shared PeopleSoft Home becomes inaccessible.

For PeopleTools 8.53 and earlier: it is important that the PS_HOME is mounted by all remote machines at the same mount point. This is because the PS_HOME installation path is explicitly defined in a number of files within PS_HOME, most ostensibly the PS_HOME/pconfig.sh file. These files are created at the time of PeopleTools installation. To make the pconfig.sh script execute correctly it is essential that consistency is maintained across all users of the shared PS_HOME. **Note:** this restriction applies only to PS_HOME, the other PeopleSoft installation homes do not have this limitation.

It is important to remember that domains associated with a PeopleSoft Home will need to be stopped if the PeopleSoft Home becomes unavailable for any reason. This includes planned outages for maintenance operations such as patching, replacing hardware, or other administrative activities. This clearly implies system downtime. A PeopleSoft environment with its domains split between two mirrored sets of PeopleSoft Homes can achieve adequate reliability and guarantee uninterrupted availability in times of planned or unplanned outages.

PeopleTools offers other mechanisms for migrating workload between servers that allows the system to continue functioning seamlessly without downtime when a specific PS_HOME becomes available. This is not the subject of this document. See the related materials section at the beginning of this document for more information.

Maintenance and Upgrade Considerations

Support for Decoupled Application Homes began with PeopleTools 8.52 and PeopleSoft 9.1 Feature Pack 2 Applications. In order to take advantage of the Decoupled Application Home it is necessary to perform a clean installation of PeopleTools plus any required patches. When implementing a Decoupled Application Home it is not possible to overlay earlier versions of combined PeopleTools-PeopleSoft Application Homes with the newer version. A new installation of PeopleTools and the PeopleSoft Application is necessary. Therefore, if you are deploying a decoupled Application home, it is **not** possible to do the following:

- Overlay PeopleTools 8.52+ on top of an earlier PS_HOME.

⁷ For example, a Windows Share or NFS mounted volume on UNIX like operating systems.

- Overlay a PeopleSoft Application Release with a new installation.
- Perform a PeopleTools-only upgrade to PeopleTools 8.52+ on a pre-9.1 Application. In such circumstances customers must retain their 'classic' deployment until ready to upgrade the Application.

Depending upon the source and target PeopleSoft Application version, it may be necessary to go to an intermediate release in order to conduct the upgrade. Once a Decoupled Application has been implemented, subsequent releases can follow familiar patterns for applying maintenance to an existing Application Home.

PeopleTools-Only Upgrade

As of PeopleTools 8.54, the PeopleTools-Only upgrade process requires you to install a separate PS_HOME for the purpose of the PeopleTools-Only upgrade. If you were already decoupled prior to starting the upgrade, then simply switch over to the newly installed PS_HOME after completing the upgrade. If you choose to implement a decoupled configuration after completing the upgrade, you may only do so if your application supports it. Otherwise you must continue to use the 'classic' deployment until you are ready to upgrade your Application to a release that supports decoupled homes. If you need to continue using the 'classic' deployment, then you must install the new PeopleTools release into your existing coupled PS_HOME after completing the upgrade.

Customizations

Customizations that reside in a PS_APP_HOME are always exposed to the possibility that an update to the base version will occur when maintenance is applied. This means that retaining the customizations outside the Installation Homes provides a cleaner, more cost-effective approach for maintaining PeopleSoft environments. In such a scheme it is not necessary to manually migrate file system customizations from the previous PS_HOME to the destination PS_APP_HOME.

The initial switch to using a Decoupled and Customized PeopleSoft Home may require additional investment of time. The cost incurred is to convert existing operational processes and migrate customized content to the new file system locations. Subsequent upgrades will be less burdensome.

There is more information on this process from an upgrade perspective available on Oracle Technical Network (OTN). See the related materials section at the beginning of this document for more information.

PeopleTools Patches

PeopleTools patches are installed on top of an existing PS_HOME. When applying a patch there are a number of steps required:

1. **Stop runtime components:** Application Server and Process Scheduler domains associated with the PS_HOME must be stopped.

2. **Install patch:** Can be performed interactively or by using the patch installation program with a response file for unattended installation.

```
setup.sh -i silent -DRES_FILE_PATH=<response file> -tempdir <temp>
```

3. **Recreate Application Server and Process Scheduler domains:** Domains must be recreated after applying a patch. This is because changes to the configuration templates may be delivered with the PeopleTools patch. Existing domains will typically contain settings that you will wish to propagate to the new runtime environment. These settings can be imported into the new domain using the PSAdmin import feature which pulls the environment-specific settings from the old domains into your new domains. For Application Server and Process Scheduler domains this can be conducted using the PSAdmin command line option. The `-keepfeatures` switch in the following command was introduced in PeopleTools 8.54. For example:

```
psadmin -c import <Source Config Home> -d <old domain name>  
-n <new domain name> -keepfeatures
```

4. **Recreate Search indexes:** Search indexes must always be rebuilt after applying a PeopleTools patch or Application Maintenance. This is because updated object definitions may have been added to the database as part of the maintenance being applied. Building search indexes can be scheduled as an Application Engine job.
5. **Reinstall PIA:** When a PeopleTools patch is applied, a new installation of PIA will be required. Similar to installing the PeopleTools patch a silent installation can also be conducted using a response file unattended execution.
6. **Replicate Config Home:** PSAdmin provides a feature to permit a PS_CFG_HOME to be replicated to other locations. This allows a single Config Home to be created with any number of domains and then propagated to other locations. This can be thought of as an intelligent clone because it is not possible to simply copy a Config Home between locations. Tuxedo domains are bound to a specific hostname and file system location. Copying them between locations requires configuration files to be regenerated, log files removed etc. Like other PSAdmin functionality, this feature can be conducted via a command line switch:

```
psadmin -r replicate <source config home>
```

7. **Start all domains:** PeopleTools 8.54 and later provides a PSAdmin feature to start all domains in a PS_CFG_HOME. This option will start Application Server and Process Scheduler domains prior to starting PIA domains. If a domain cannot start for any reason an error message will be echoed to the shell (stdout, stderr output streams) and the command will proceed to the next domain in sequence.

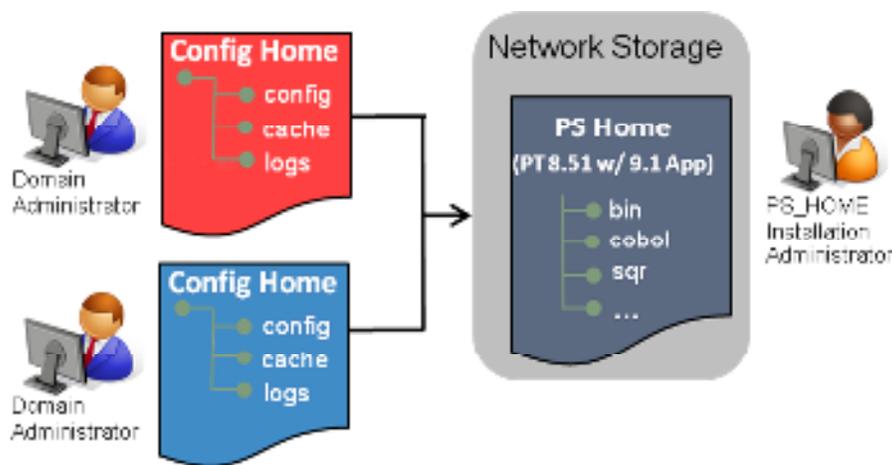
```
psadmin start -d *all
```

All of the above steps can be achieved using well crafted shell scripts. This helps reduce the manual effort required when applying a PeopleTools patch to an existing environment.

Sample Deployments

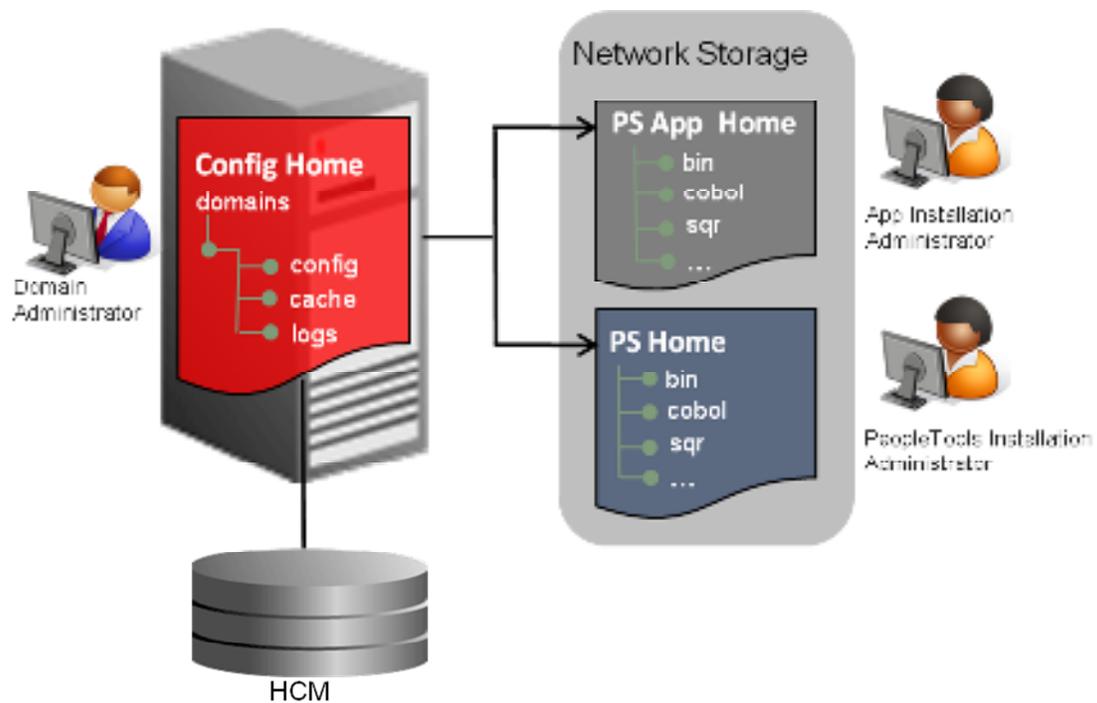
This section contains examples of possible deployments. These examples will appear trivial. This is in the interest of brevity to the reader. Details concerning the types of customizations, choice of network storage, file system security, etc are not described below.

Example: Decoupled Configuration and Installation



In the example above, the same installation of PeopleTools and Application can be shared between different runtime environments. These different runtime environments can be owned by different administrators with read-only access to the installation PS_HOME. This example depicts an environment where the Application and PeopleTools and installed into a combined PS_HOME. This is applicable to PeopleTools 8.50+ and PeopleSoft 9.1 Applications.

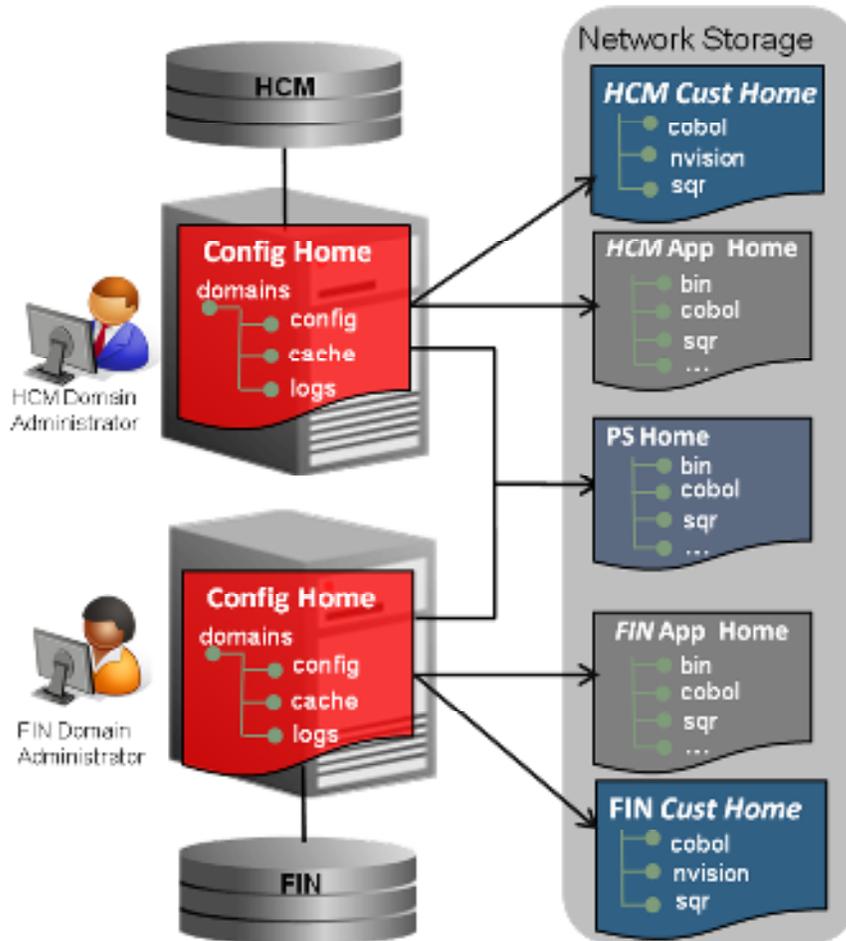
Example: Typical Decoupled Deployment



In the example above a conventional default deployment of PeopleTools and PeopleSoft Application is shown. The PeopleTools and Application installations reside in different directories and the PS_CFG_HOME resides in its default location outside the PS_HOME. This example does not show any customizations. If customizations were made in the above environment they would be made directly in the installation directories. This is the type of deployment that is recommended for Applications running with PeopleTools 8.52.

Similar to the previous example, the same PS_APP_HOME and PS_HOME can be shared by multiple runtime environments by creating different PS_CFG_HOMEs owned by potentially different administrators.

Example: Hosted Environment PS_HOME Sharing with Customizations



This example illustrates a scenario where multiple Applications use the same PS_HOME. This also demonstrates how customizations are placed outside the Application homes. Network storage is used so that PeopleSoft Homes can be shared among multiple runtime environments.

The deployment above shows the Config Home residing on local storage and the various PeopleSoft binary homes on network storage. Although only one Config Home is depicted per Application, any number of Config Homes could use these shared PeopleSoft Homes residing on the network storage. This is possible because PeopleTools domains do not write to any of the PeopleSoft binary homes. The Config Home contains PeopleTools domains and their log and cache files. The Config Home is frequently placed on a low-latency local file system. Config Homes require fast access due to the frequency of write operations being performed to log and cache files.

Note: in the above example the logs and cache files created by the EMF Agent during maintenance are directed to a location outside PS_HOME. This ensures that there is no conflict between the file system content during updates to the Financials and HCM systems.

Conclusion

This document has outlined the motivation and value proposition of installation and deployment enhancements offered since PeopleTools 8.50. A detailed explanation of each of the PeopleSoft Homes has been outlined. Coupled with example deployments and considerations to be borne in mind you will be better positioned to start planning a PeopleSoft deployment that incorporates best practices endorsed by Oracle PeopleSoft.

Revision History

TABLE 8. REVISION HISTORY

DATE	CHANGE
March 2012	This version describes applies to environments built with PeopleTools 8.52 and later.
February 2013	This version includes additional information for PeopleTools 8.53.
November 2014	This version includes updates for PeopleTools 8.54.



PeopleTools: Mid-Tier Deployment Best Practices

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