

FHASL INFRASTRUCTURE REQUIREMENTS



April 2005
Version 2
(Attachment 27)

Office of Housing
Federal Housing Administration
Department of Housing and Urban
Development

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	10/2004	A statement of capacity requirements developed to acquire adequate hardware and software to host the FHA Subsidiary Ledger.
Rev. 1	4/18/2005	Updated transaction content for future systems, removed unnecessary content, and updated projections for database sizing.
Rev. 2	4/19/2005	Added content for future systems, and reformatted.

FHASL Infrastructure Requirements

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Abbreviations:

CRM	Customer Relationship Management
DB	Database
DBA	Database Administrator
E&G	Education & Government
FHA	Federal Housing Administration
FIN	PeopleSoft Financials
GC	Financials Golden Instance
GL	General Ledger
HUD	Department of Housing and Urban Development
PS	PeopleSoft
QA	Quality Assurance
RM	Revenue Management
XLAT	Translate

Instance Naming Conventions:

Prefixes:

F88	- PeopleSoft Financials version 8.8x
F90	- PeopleSoft Financials version 9.0x
CRM	- PeopleSoft Customer Relationship Management 8.9x
RM	- PeopleSoft Revenue Management 8.9x

Suffixes:

ADM	Security Administration Database
ARC	Archive Database
CFG	Configuration Database
DBA	DBA Testing Database
DCV	Data Conversion Database
DEV	Development Database
DMO	Demo Database
GLD	Gold Master Database
HTC	HUD Test Center Database
PAT	Patch Testing Database
PAR	Parallel Production Database
PDM	Patch Demo Database
PRF	Performance Testing Database
PRO	Production Database

PTT	Prototype Database
RPT	Report Database
SBX	Sandbox Database
ST1	String Testing Database
STS	Stress Testing Database
SUP	Production Support Database
TRN	Training Database
UAT	User Acceptance Testing Database
VVT	Verification and Validation Testing Database

NOTE: An underscore “_” preceding any suffix indicates any version prefix can be attached to the instance name.

1 FHASL INTRODUCTION

The Department of Housing and Urban Development (HUD) Federal Housing Administration (FHA) Comptroller developed the *FHA Vision of Financial Management* in February 2000 to describe FHA's goals and objectives for financial management systems and operations. FHA's vision incorporates the use of a new Joint Financial Management Improvement Program (JFMIP)-compliant commercial-off-the-shelf (COTS) software package to function as a subsidiary ledger that will capture and report on FHA's financial transactions in a manner consistent with federal rules and regulations. The new system will provide the ability to perform daily and real-time funds control, automate the reconciliation of fund and cash balances, and conduct queries of detailed case-level financial data.

The FHA Subsidiary Ledger project will:

- Provide FHA with a core accounting system that satisfies Federal Generally Accepted Accounting Principals (FedGAAP).
- Address a current material weakness under *Office of Management and Budget (OMB) Circular A-127, Policies and Standards for Financial Management Systems*.
- Address material weaknesses as identified in financial statement audits since 1998.
- Attend to several reportable conditions in order to maintain FHA's clean audit opinions in future years.

The project has several phases, and this document focuses on the third phase. Phase 2 was the implementation of the Joint Financial Management Improvement Program (JFMIP)-compliant PeopleSoft accounting software to record and maintain FHA's general ledger (GL). Phase 3 is the additional implementation of Credit Subsidy, Cash and Funds Control, and integration of the remaining FHA financial management functions into the PeopleSoft application while maintaining current PeopleSoft upgrade, service pack, bundle, and patch releases within the application as need is determined by management.

1.1 Purpose

This document describes the technical environment currently in place and the upgraded environment necessary to complete the Department of Housing and Urban Development (HUD) Federal Housing Administration (FHA) Subsidiary Ledger project.

FHASL is currently in production with PeopleSoft Financials version 8.8 with PeopleTools version 8.45.06.

There have been concerns raised about performance on all servers. Because of performance problems experienced in production, a Tiger Team was formed. The goal of the Tiger Team is to analyze the performance on all servers, make recommendations to improve performance, and then implement these recommendations as necessary. Thus far, the Tiger Team has accomplished the following:

- EDS conducted a load test of development and test boxes and discovered that they were not sufficient. Two Sun Fire v480 Servers were acquired to serve development and testing environments.
- A PeopleSoft Expert has examined the Production environments and has made recommendations for performance improvement. There have been no plans to acquire new hardware for the production environment.
- The Tiger Team has been able to identify minor business process improvements that have slightly improved the performance in production.

Recently FHASL has purchased two new PeopleSoft Applications, Customer Relationship Management (CRM) and Revenue Management (RM). With the purchase of two more applications, it necessitates the use of PeopleSoft Portal, which HUD had previously licensed. This new architecture requires four databases for each PeopleSoft instance. For example, the development environment will require four databases: Financials v8.8 development, CRM development, RM development and Portal development. Regardless of previous performance problems, with the purchase of two new applications, the hardware is insufficient to hold the volume of data and scope of databases required to set up all applications. It is logical to assume that the existing boxes will also not be able to handle the processing needs of all of the applications.

1.2 Assumptions

- Current hardware will not be sufficient to handle the data volume, processing load, or future growth of the PeopleSoft Modules, especially with the recent purchase of two new PeopleSoft Applications, Customer Relationship Management and Revenue Management.
- Capacity Estimates will be based on several estimated values
 - Number of Users
 - Number of Transactions
 - Volume of Data
 - Growth of User Population
 - Growth of Data Volume
 - Random Access Memory Requirements
 - Disk Storage Requirements
- The FHASL project has operated on the UNIX/ORACLE platform since initially going live on PeopleSoft Financials Version 7.5. Changing the database (ORACLE) and operating platform (UNIX) would adversely affect the overall system continuity.

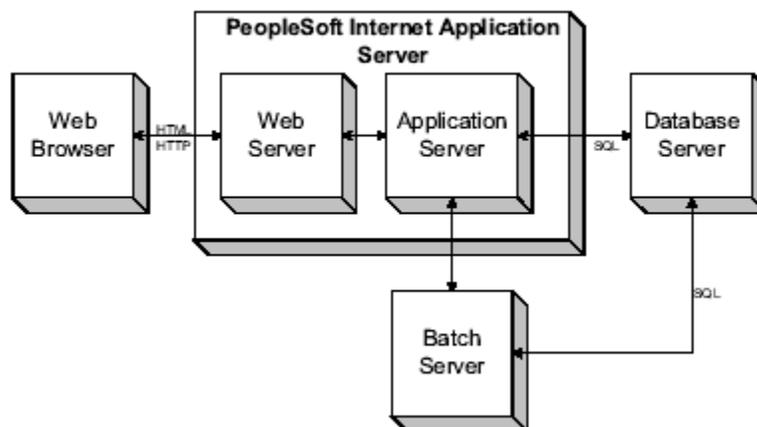
2 PEOPLESOFT ARCHITECTURE

2.1 Understanding PeopleSoft Pure Internet Architecture

The following is from PeopleSoft "Enterprise PeopleTools 8.45 Hardware and Software Requirements" Documentation (Chap. 1, pg. 2)

PeopleTools v8.4x is the technical foundation of PeopleSoft 8 and the PeopleSoft Pure Internet Architecture. With the release of PeopleSoft 8, PeopleSoft made the transition from a client/server applications vendor to an Internet applications vendor. Because this required major architecture changes, it is important to have a good understanding of the new PeopleSoft Pure Internet Architecture to fully understand the platforms being supported in PeopleTools v8.4x. These architecture changes have had a major impact on the platform support plans, in many cases simplifying them, and in the long run lowering costs.

The PeopleSoft Pure Internet Architecture is server-centric execution architecture for deploying Internet applications to end users who access the applications through a web browser. These Internet applications are built using PeopleTools v8.4x. The following diagram illustrates the various architecture pieces involved in this deployment architecture:



2.2 Logical vs. Physical 3-Tier Architecture

The following is from PeopleSoft “Enterprise PeopleTools 8.45 Hardware and Software Requirements” Documentation (Chap. 4, pg. 25-26)

PeopleSoft Pure Internet Architecture consists of an application server and a web server. The application server serves as an intermediary between the user workstation and the database server. It connects to the PeopleSoft database and handles almost all SQL-intensive interaction with the database server required during online transaction processing. The application server interacts with the end user workstation (which only needs a supported browser) via the web server. The application server also provides functionality required for application messaging and for implementing the PeopleSoft Pure Internet Architecture. When using the PeopleTools Development Environment, the developer’s workstation machine communicates with the application server using Tuxedo messages. All application servers require database connectivity to the database server.

There are two configuration methods to set up the application server: Logical Three-Tier and Physical Three-Tier. When installing a UNIX-based RDBMS such as Oracle for UNIX, the application server is generally installed on the same machine as the database server, a configuration called *logical three-tier*. The application server can also be installed on one or more separate UNIX or Windows machines. This configuration is called *physical three-tier*. If the physical three-tier option is chosen, the application server should be connected to the database using the highest bandwidth connection available to ensure optimum performance.

Note: The logical and physical configuration principles can also be applied to the web server configuration.

Whether the configuration of three-tier environment is physical or logical depends on the combination of the RDBMS and the operating system. When implementing an application server, pay close attention to the operating systems on which application servers are supported. For PeopleTools 8.45, application servers are supported on Windows 2000 and UNIX operating systems from Hewlett Packard, IBM, Sun Microsystems, and some Linux implementations.

Note. In all cases, PeopleSoft encourages that the application server is provided with the most RAM and processing speed available to take full advantage of the three-tier configuration. Memory may need to be increased to attain desirable performance.

2.3 Instance Needs

The infrastructure for FHASL will contain all elements of development and test architectures to support Financials, CRM and RM, and Portal thru 2006. The legacy systems and PeopleSoft will be running in parallel for six months after the April 2005 release of CRM, RM and portal.

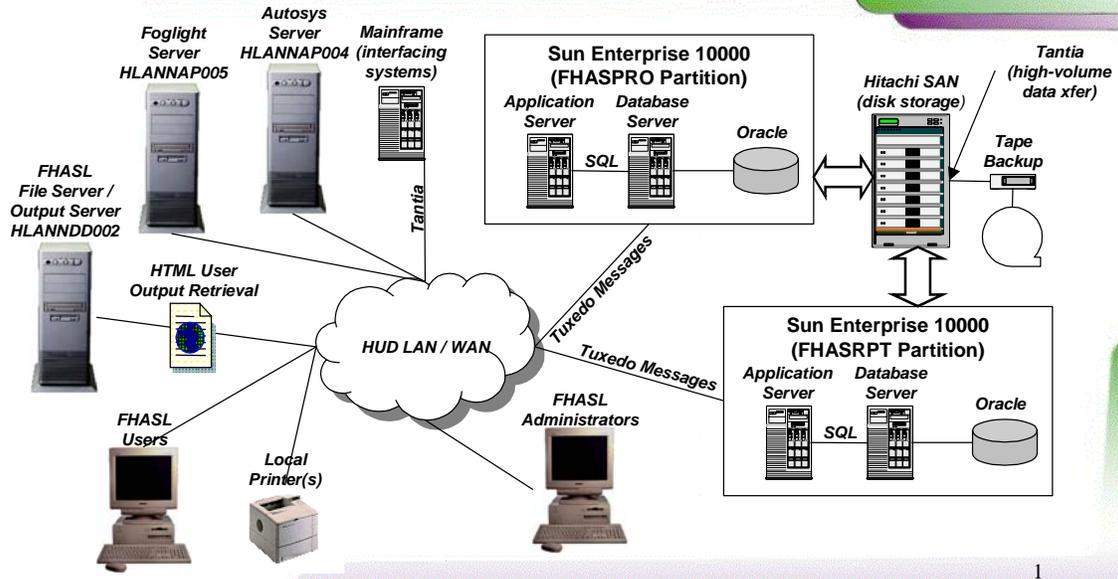
The architecture for the PeopleSoft version 8.4 has a logical PeopleSoft web server, application server, batch (process scheduler) server, database server, and PeopleSoft file/reports server. The reports server incorporates an embedded copy of Crystal Reports provided by PeopleSoft, which only runs on Windows servers. It will be hosted on a Dell 6650 server with Windows 2000. The other logical servers will be hosted on two Sun Unix servers, consistent with HUD's existing PeopleSoft installation. Due to resource constraints, the PeopleSoft web server is hosted on the same physical server as the database server.

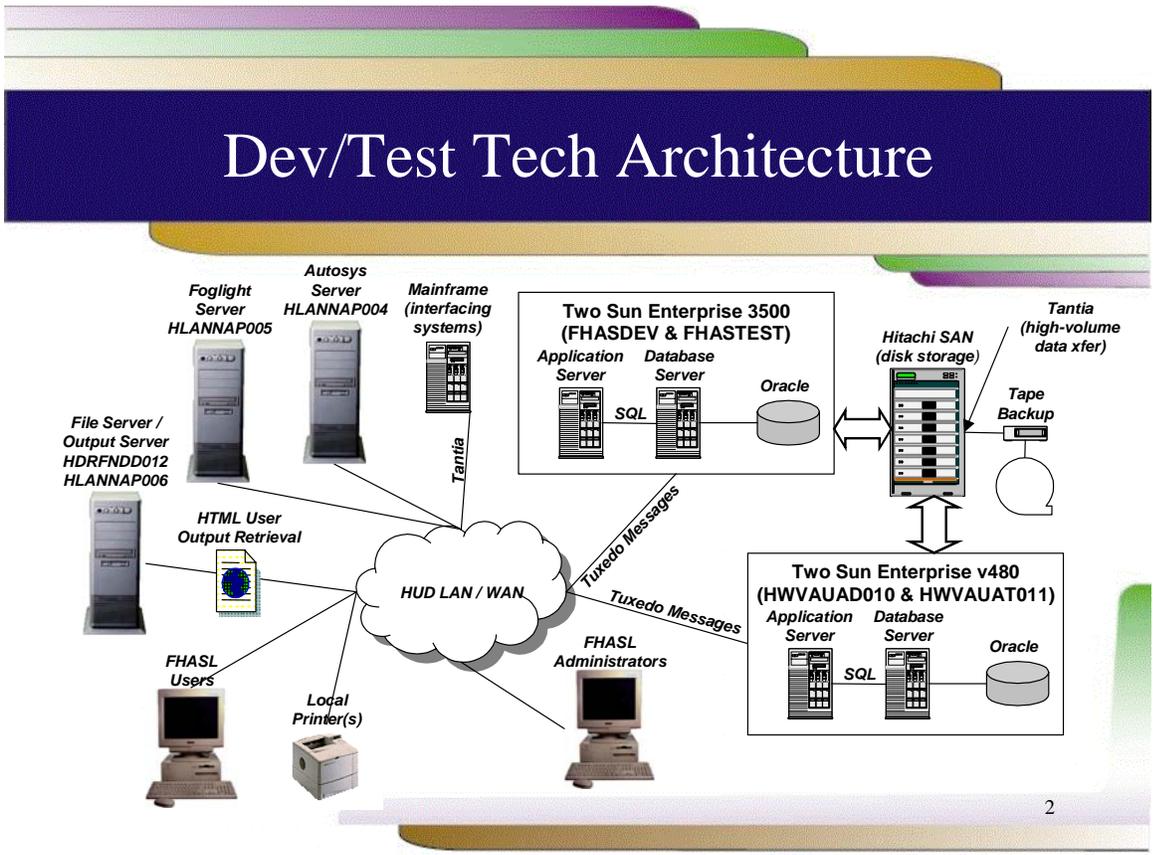
The architectural components for the PeopleSoft version 8.8 will not change for the Financials application. There will still be a web server, application server, batch (process scheduler) server, database server, and PeopleSoft file/reports server. These components are also required for PeopleSoft CRM v8.9 and PeopleSoft RM v8.9. A decision needs to be made to continue with the current logical 3-tier architecture or convert to a physical 3-tier architecture.

2.4 Current FHASL Architecture

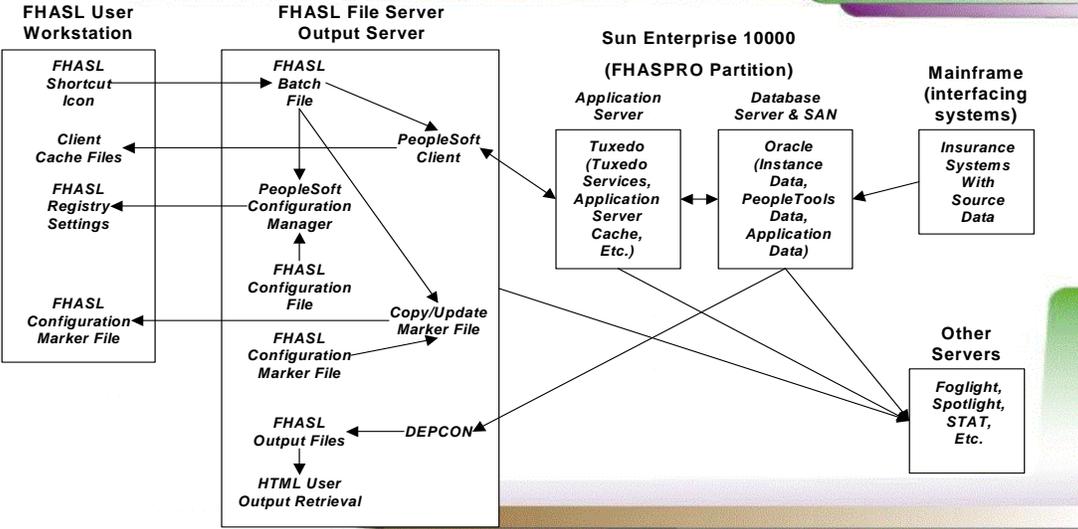
The following are pictorial views of the current FHASL architecture for the v8.4 production environment and the development and test environments for v8.4 and v8.8. The architecture for the new CRM and RM applications will be set up the same as the current Financials environments. With the implementation of PeopleSoft Portal, the number of web servers may be reduced, since Portal will bring all applications together under one-web interface. Before the architecture design is finalized to include the three new applications, the infrastructure team will need to conduct more research and testing.

Current Production Tech Architecture





FHASL Production Application Architecture



2.5 Current Resources

The following information consists of the current configurations and the minimum requirements to continue with FHASL’s development schedule. Recommendations are provided based on capacity requirements and the impact that a platform change would have on the project. While the PeopleSoft application is designed to be portable to different platforms, there are changes that would be required, and these changes would impact the project schedule. Any changes to the operating platform would require close coordination between the Client-Server group and FHASL staff to ensure schedule impacts were reflected in the project plan and technical support contracts.

2.5.1 Development and Test Servers

- Two identical Sun midrange systems with 400 MHz SPARC2 processors
 - FHASTEST – 16 GB of RAM
 - FHASDEV – 12 GB of RAM
- Two identical Sun Fire V480 Servers with 1.2 GHz UltraSPARC III CPUs

- HWVAUAD010 – 32 GB of RAM
- HWVAUAT011 – 32 GB of RAM

2.5.2 Production Server

- Currently using the Sun Enterprise E10K Server
 - 16 GB of RAM
 - 16 Processors (400 MHz each)
- The E10K technology is 5 years old and uses the obsolete UltraSPARC II processor running at 400 MHz.
- Currently Sun offers the UltraSPARC IV processor running at 1.2 GHz.
- Any hardware change at the enterprise level causes additional issues of re-licensing for application support software.

Recommendation:

- Implement Archiving Strategy to manage the size of the database.
- Maintain the current Sun hardware platform and upgrade to new processors.
- Redirect Report Processing to a separate Reporting Instance.
- Implement Replication Strategy.

2.5.3 Reporting Server (Production Support)

- Currently using the Sun Enterprise E10K Server
 - 8 GB of RAM
 - 8 Processor (400 MHz each)
- The E10K technology is 5 years old and uses the obsolete UltraSPARC II processor running at 400 MHz.
- Currently Sun offers the UltraSPARC IV processor running at 1.2 GHz.
- Any hardware change at the enterprise level causes additional issues of re-licensing for application support software.

2.5.4 Hitachi San (File Server)

- The Hitachi SAN used by HUD appears to have different read and write speeds at different times of the day and utilizes a RAID-5 disk layout so that the data is written to multiple disks in case of disk failure.

Recommendation:

- Oracle recommends a Stripe-and-Mirror-Everything (SAME) approach to provide optimal disk performance for large databases.
- This will require more disk drives to house a SAME based file system.

2.5.5 NT Servers

There are multiple NT Servers supporting the FHASL project.

Table 1: Current NT Servers

Server Name	Environment	Purpose
hlannap001 *	Production	Autosys Tie Breaker
hlannap002	Dev/Test	NT Process Scheduler for F88DEV, F88VVT, F88UAT, F88PDM, F88ADM, F88UPG, F88PAT, etc.
hlannap003 *	Production	Autosys Server
hlannap004 *	Production	Autosys Server
hlannap005 *	Production	Foglight Server
hlannap006 *	Production	NT Process Scheduler for F88PRO, F88SUP, F88HTC, F88ARC, etc.
hdrfndd012 *	Dev/Test	NT Process Scheduler for v8.4 instances
hwvanrp009 *	Upgrade	PeopleTools Upgrade Server
hdrfndp005 *	Upgrade	Application Upgrade Server

*Information on the NT Servers may have changed. The technical services team does not have full visibility to the NT Servers.

2.5.6 User Desktops

- Users are encountering Virtual Memory errors on a daily basis because their desktops have only 128MB of RAM and 800 MHz CPU.
- User desktops are being upgraded to 512MB of RAM, but no firm plans for upgrading the CPUs have been made.
- Not all users were included in the original request for upgrading the RAM so a second upgrade process is required.
- There have been many delays with acquiring the RAM to upgrade User desktops. The process has been very slow.
- PeopleSoft Minimum requirements
 - 256 MB of RAM
 - 800 MHz CPU

Consideration:

- The Windows XP operating system requires more PC resources than other versions of Windows, increasing the actual minimum desktop requirements.

Recommendation:

- Minimum of
 - 512 MB of RAM
 - 2.4 GHz CPU

3 INFRASTRUCTURE NEEDS

3.1 Current, Near Future, and Extended Future Computing Volumes

Currently FHASL has only PeopleSoft Financials 8.8 in production. PeopleSoft CRM v8.9 and PeopleSoft RM v8.9 are scheduled to go live in October 2005 or after. In addition to the two new PeopleSoft Applications, approximately 15 more legacy systems will be integrated into PeopleSoft over the next three years.

Table 2: Current and Near Future Volumes

	Current Usage	Projected (2007) Usage
User Base	227	1500
Avg. # of Concurrent Users	40 (~18% of users)	450 (~30% of users)
Database Volume	100 GB	300 GB
Avg. Database Growth	7 GB per month	15 GB per month

Table 3: Future Systems to be Fully Integrated by 2008

Legacy System	Number of Users	Number of Transactions per Month
A80D	100	100,000 Accounts 100,000 Service Agreements 100,000 Service Points 100,000 Adjustment Payments 100,000 GL Entries (FIN) 100,000 Vouchers (FIN) There will be 1,500 Online (User Initiated) Adjustments Daily.
A80S – Estimated Numbers	1,094	5,000 Cases 33,000 Vouchers 7,500 Collections
F75	30	1,200 Bills 210 Adjustments 15,000 Characteristics 1,200 Lockbox Uploads 1,200 Match Events 600 Vouchers (FIN) 600 GL Entries (FIN)

F47	50	2 Bills 2,000 Adjustments 180 Characteristics 0 Lockbox Uploads 0 Match Events 840 Vouchers (FIN) 300 GL Entries (FIN)
43C* – Estimated Numbers	15	1,500 Bills 30,000 Adjustments 1,500 Payments 31,500 Vouchers (FIN) 31,500 GL Entries (FIN)
80R – Estimated Numbers	8	5,000 Bills 5,000 Payments 1,000 Adjustments 15,000 Vouchers (FIN) 15,000 GL Entries (FIN)
80B – Estimated Numbers	15	30,000 Bills 30,000 Payments 6,000 Adjustments 66,000 Vouchers (FIN) 66,000 GL Entries (FIN)
F71* – Estimated Numbers	12	55,359 Payments 55,359 Adjustments 55,359 Journals
F71A* – Estimated Numbers	5	5511 Payments 5511 Journals
A80N* – Estimated Numbers	10	22937 Payments 22937 Adjustments 22937 Journals
F72		14,000 Cases *
F17 (CHUMS)		100,000 Cases *
F12 (HECM)		5,000 Cases *

* Current project plans indicate that these systems will be integrated via an interface.

Based on information that is currently available, the table below details the additional legacy systems that will be integrated into the FHASL PeopleSoft system.

Table 4: FHASL Phase III Plan

System	System Description	Integration Type	Function	Annual Transaction Volume	Annual Transaction Value	Users
A80S	Single Family Property Management Integration	Re-engineer	Property Acquisition; Payments for property mgmt and disposition services; Property disposition	180,000 Cases	\$10.5 Billion	HOC's; Field Offices; M&M's
A80D	Single Family Distributive Shares	Re-engineer	Recording and maintaining payables– for both lenders and homeowners; preparing payment voucher line-item records for Treasury disbursement	1,000,000 Cases	\$950 Million	FHA Headquarters staff
F47	Multi-Family Insurance System	Replace	Endorsements; Billing lenders and collecting premiums – case level		\$7.7 Billion \$269 Million	FHA Comptroller's Office of Financial Services, Multifamily Financial Operations Division
F75	Multi-Family Claims	Replace	Record and track claims ; Create voucher and voucher line items for claims payments	527 Cases; 527 Cases	\$1 Billion; \$1 Billion	FHA Comptroller's Office of Financial Services, Multifamily Financial Operations Division

System	System Description	Integration Type	Function	Annual Transaction Volume	Annual Transaction Value	Users
A43C	Single Family Insurance Claims	Interface	Claim qualification and tracking ; Receivables for overpayments and indemnified mortgages; Qualification and tracking lender payments for loss mitigation; Tracking and accounting for cancelled checks; Miscellaneous payments	70,000 Cases; 70,000 Cases; 240 Cases; 600 Cases	\$6 Billion; \$22 Million; \$204 Million	The FHA Comptroller's Office of Financial Services, Single Family Post Insurance Division
A80R	Single Family Premium Collection Subsystem - Upfront	Replace	Collecting premiums – case level	1.3 Million	\$1.7 Billion	Lenders
A80B	Single Family Premium Collection Subsystem - Periodic	Replace or Interface	Billing lenders and collecting premiums	5 Million	\$2.2 Billion	Lenders
F46/F49	Multi-Family Asset Management Services	Interface	Manage FHA-held properties; Payments for property management and disposition services; Property dispositions	39 Cases; 39 Cases; 27 Cases	\$132 Million; \$61 Million	HUD Headquarters, HUB and field office staffs
F72	Title I Insurance and Claims System	TBD	Endorsements Insurance in Force Record and Track Claims	8400 150,000 11,000	\$127 Million \$2.8 Billion \$28 Million	Lenders and Albany Financials Operations
F17	Computerized Home Underwriting Management System	TBD	Mortgage Insurance Endorsements	1.2 Million	\$145 Billion	Lenders
F71/F71A	Debt Collection and Asset Management System	Interface	Title I Notes held Title I Note collections Generic FHA debt Generic FHA Collections	38,200 1048	\$472 Million \$31 Million \$84 Million \$0.8 Million	Lenders and Albany Financials
F12	Home Equity Conversion Mortgage	TBD	Billing and Collecting Premiums from Lenders	60,000	\$90 Million	Lenders

System	System Description	Integration Type	Function	Annual Transaction Volume	Annual Transaction Value	Users
A80N	Single Family Notes	Interface	Recording Acquisitions Collections for notes held Record & track subordinated Mortgages Support of partial Claims	660 33,000	\$25 Million \$400 Million \$200 Million \$1.6 Million	First Madison Services

With the data from Table 3, the transaction volumes can be projected following the current schedule of legacy system integration seen below in Table 5.

Table 5: Schedule of Legacy System Integration by Start Date

	April 2004	April 2005	July 2005	October 2005	Jan 2006	April 2006	January 2007	October 2007
Legacy Systems	A80D F47 F75 A80S	F46 F49	A80R	A43C	A80B F71 F71A	A80N	F72	F17 F12

3.2 High Level Resource Estimates and Timeline

The table below explains the total number applications components that will be required at various milestone dates without distinguishing between instances.

Table 6: Component Needs Timeline

	March 2005	Oct 2005	April 2006	Oct 2006	2007
# of Dev DBs	30	28	32	44	24
# of Test DBs	26	24	28	40	20
# of Production Support DBs	26	24	24	28	24
# of Production DBs	14	9	9	13	9
Total Databases	96	85	93	125	77

3.3 Infrastructure Needs

The diagrams below depict the instance requirements to continue with FHASL’s development and implementation schedules at each phase. To calculate the estimated resource need, estimates for RAM, CPU, and disk space were used. These estimates were derived from PeopleSoft sizing documents (Enterprise PeopleTools 8.45 Hardware and Software Requirements), observations of the resource consumption by the current live system, and projections for system growth with future legacy integration. Each estimate is for an entire instance, which means all components necessary to complete tasks for each phase. For example, the Development Instance will have four major applications, PeopleSoft Financials, PeopleSoft CRM, PeopleSoft RM, and PeopleSoft Portal.

Table 7: RAM per Database Application Component

	FIN	CRM	RM	Portal	Total
Database Server (UNIX only)	2 GB	512 MB	512 MB	512 MB	3.5 GB
Application Server (UNIX or Windows)	2.5 GB	1.5 GB	1 GB	1 GB	6 GB
Unix Process Scheduler (UNIX only)	256 MB	256 MB	256 MB	256 MB	1 GB
NT Process Scheduler (Windows Only)	256 MB	256 MB	256 MB	256 MB	1 GB
Web Server (UNIX or Windows)	256 MB	256 MB	256 MB	256 MB	1 GB
TOTAL	~5 GB	~2.5 GB	~ 2 GB	~ 2GB	~12.5 GB

Table 8: Current Average Hard Disk per Application

	Hard Disk
<i>PeopleSoft Financials</i>	60 GB *
PeopleSoft CRM	20 GB
PeopleSoft RM	15 GB
PeopleSoft Portal	5 GB
TOTAL	100 GB

*Note: These average sizing estimates are for a database that does not contain File Transfer Repository (FTR) data. FTR data is not accessed on a daily basis, and it can be archived. When a development or testing environment is created, the DBA removes the FTR transactions to minimize the size of the database. Currently, the FTR data adds approximately 30 GB to a database.

Server Needs October 31, 2005 (PS 8.8 Upgrade, CRM, CR and Portal in Production, Parallel Production Process complete)

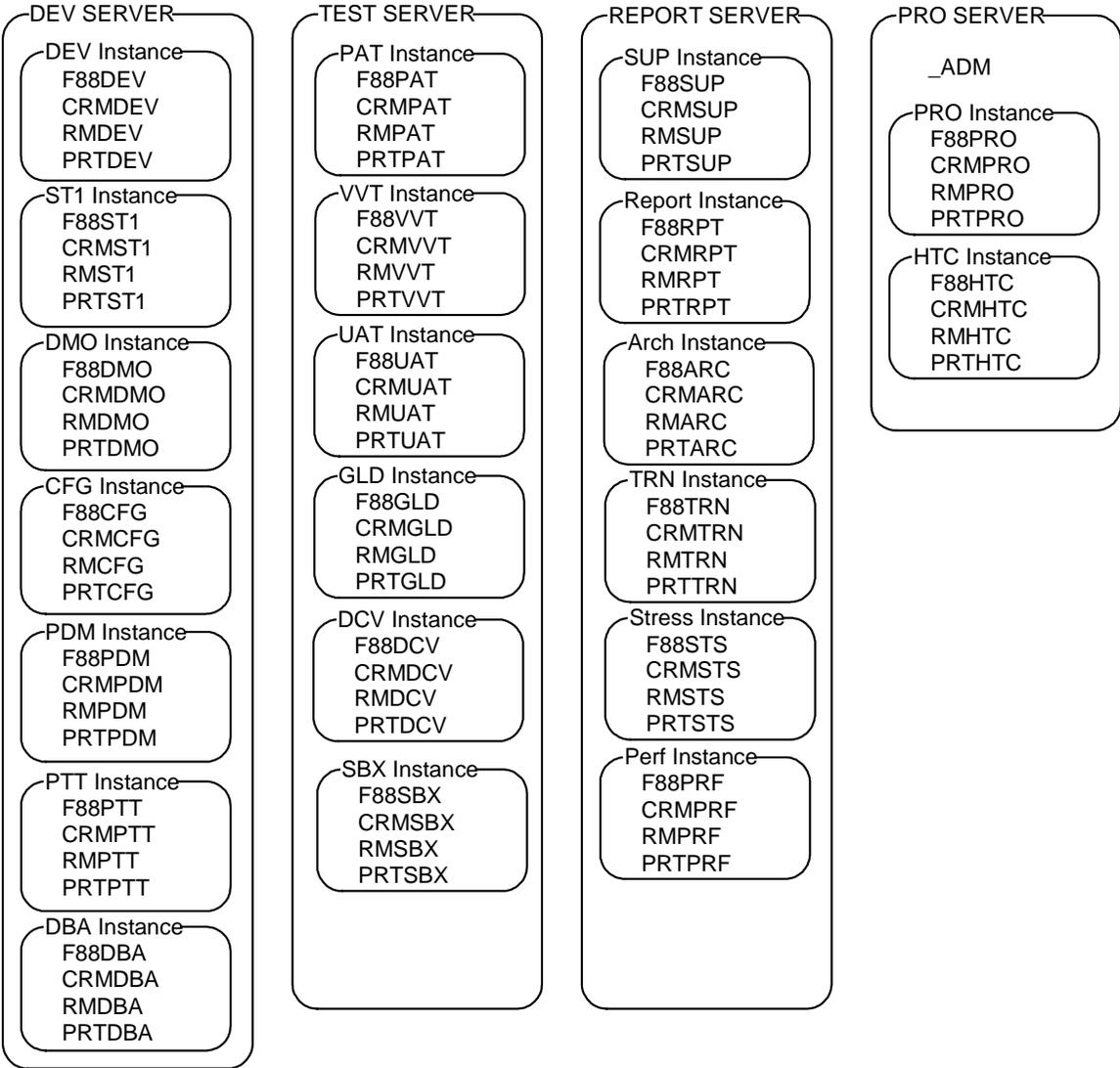


Table 9: October 2005 Resource Needs *

	Development	Test	Report	Production
Disk Space Live Instances	742 GB	642 GB	688 GB	400 GB
Disk Space Backup Instances	742 GB	642 GB	688 GB	400 GB
RAM	87.5 GB	75 GB	78 GB	40 GB

*The above estimates are based on 7 GB monthly growth for the PRO and SUP instances for Financials, RM, and CRM and a 3.5 GB monthly growth for the Development and Test instances.

Server Needs at Approximately Mid-2006 (PS 8.8, CRM, RM, and Portal in Production, Begin PS 9.0 Upgrade Progress)

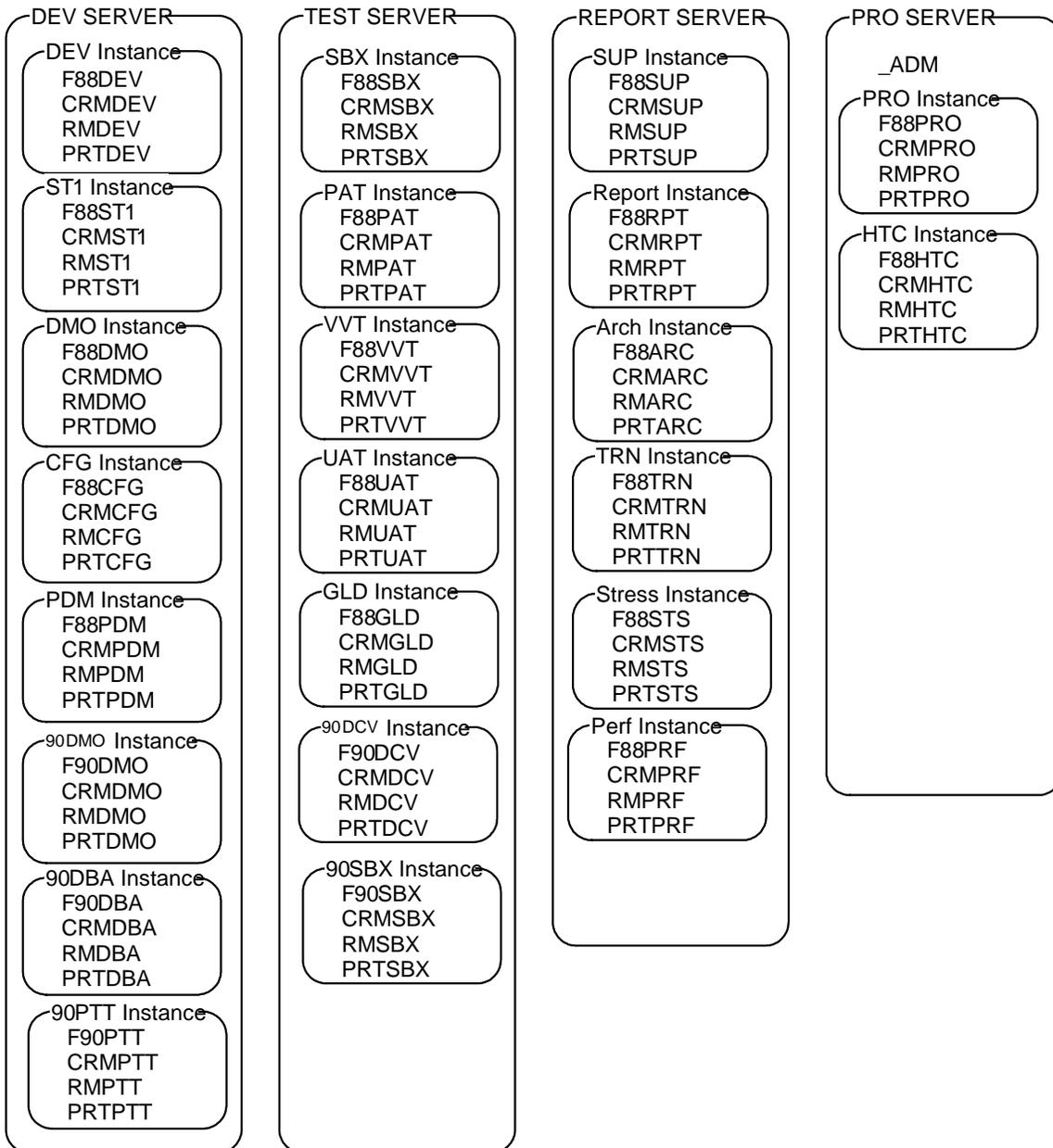


Table 10: Mid-2006 Resource Needs*

	Development	Test	Report	Production
Disk Space Live Instances	840 GB	740 GB	788 GB	526 GB
Disk Space Backup Instances	840 GB	740 GB	788 GB	526 GB
RAM	100 GB	87.5 GB	75 GB	45 GB

*The above estimates are based on 7 GB monthly growth for the PRO and SUP instances of Financials, RM, and CRM and a 3.5 GB monthly growth for the Development and Test instances. The estimate for Report also includes an approximately 100 GB yearly growth in the ARC instance.

Server Needs At Approximately End of 2006 (PS 8.8, CRM, RM, and Portal in Production, Enhancements to PS 8.8, CRM, RM, and Portal, PS 9.0 Upgrade in Progress)

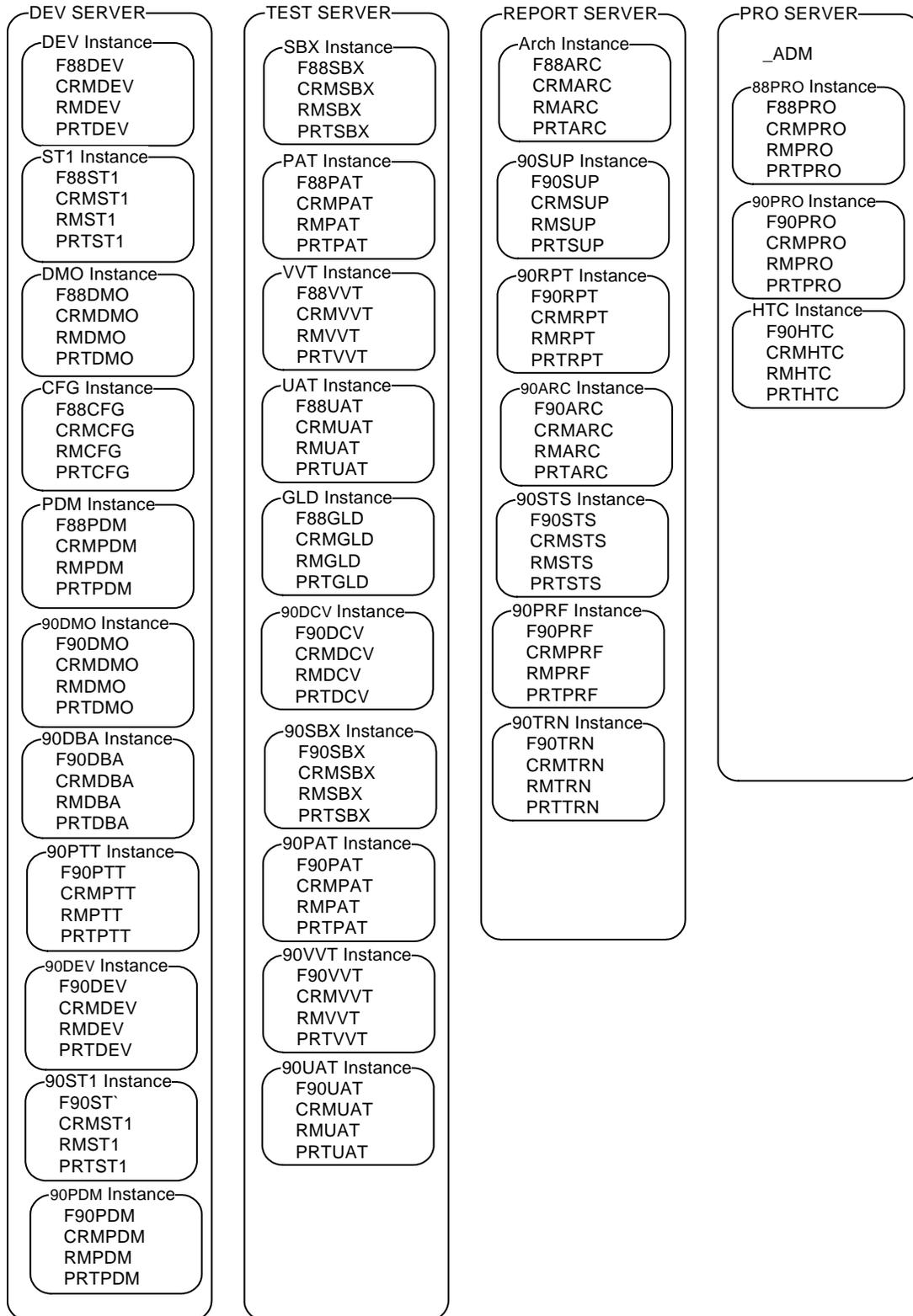


Table 11: End of 2006 Resource Needs*

	Development	Test	Report	Production
Disk Space Live Instances	1140 GB	1040 GB	986 GB	812 GB
Disk Space Backup Instances	1140 GB	1040 GB	986 GB	812 GB
RAM	137.5 GB	125 GB	87.5 GB	65 GB

*The above estimates are based on 12 GB monthly growth for the PRO and SUP instances for Financials, RM, and CRM and a 3.5 GB monthly growth for the Development and Test instances.

Server Needs at Completion of Legacy System Integration and PS Version 9.0 Upgrade complete (2007)

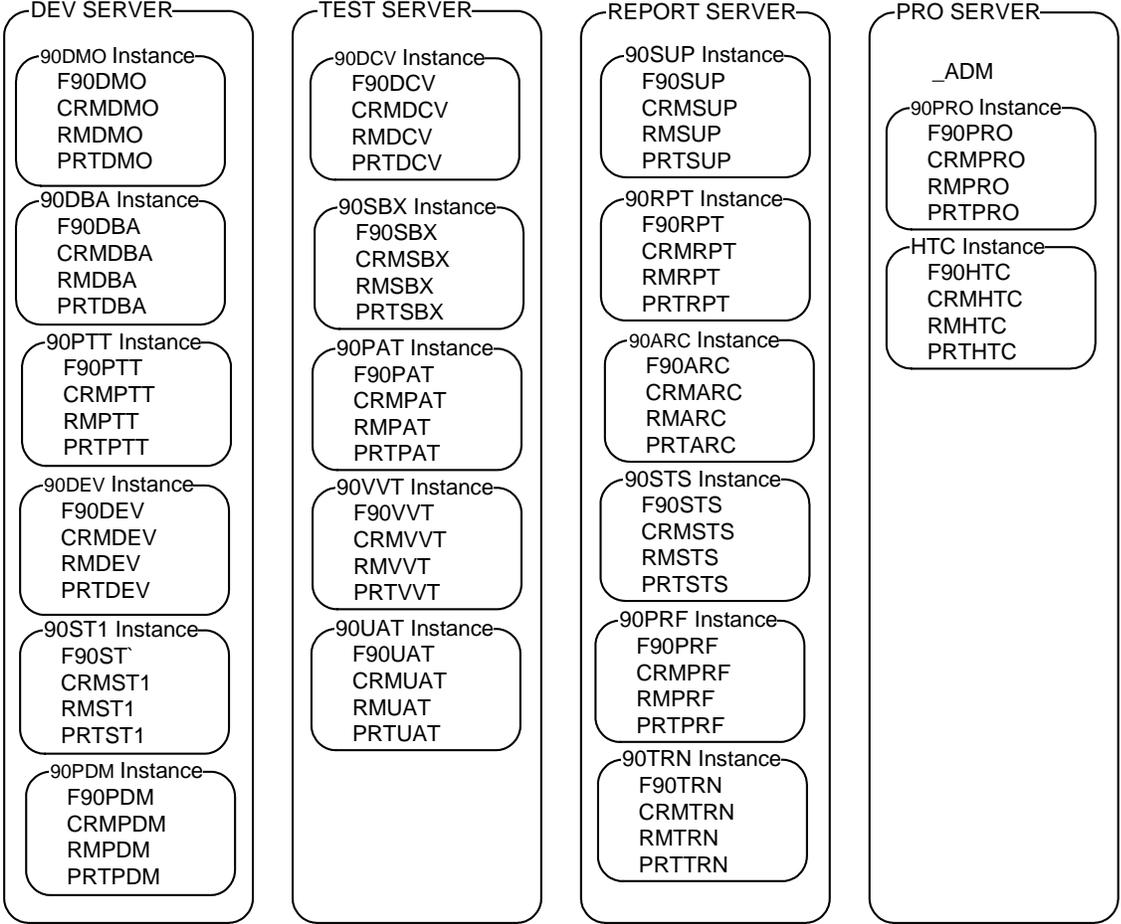


Table 12: 2007 Approximate Resource Needs*

	Development	Test	Report	Production
Disk Space Live Instances	680 GB	580 GB	1312 GB	1260 GB
Disk Space Backup Instances	680 GB	580 GB	1312 GB	1260 GB
RAM	75 GB	62.5 GB	87.5 GB	65 GB

*The above estimates are based on 15 GB monthly growth for the PRO and SUP instances of Financials, RM, and CRM and a 3.5 GB monthly growth for the Development and Test instances. The estimate for Report also includes an approximately 100 GB yearly growth in the ARC instance.

4 RECOMMENDATION TO ADOPT PHYSICAL THREE-TIER ARCHITECTURE CONFIGURATION

Business requirements have led FHASL to procure three additional PeopleSoft Applications, which add to the current project scope. The FHASL will be using Revenue Management (RM) and Customer Relationship Management (CRM), in addition to the PeopleSoft Financials (FIN) Application currently installed. PeopleSoft Portal (PORTAL) will be used to tie all three modules together for seamless user integration and application security management.

The additional three applications will also consume large quantities of system resources – most noticeably random access memory (RAM). Estimates about current RAM usage for the combined 4 modules from both the FHASL technical team observations as well as PeopleSoft Documentation suggest that there are currently needs for approximately 12.5 GB per Application Instance as seen in Table 7 on page 21.

There will be approximately 31 Application Instances at the height of development, testing and production. The median number of instances is approximately 22. These instances will be spread across 6 SUN/Solaris UNIX servers. Because RAM and CPU are the most expensive component of the FHASL ERP configuration, a physical three-tier configuration should be considered at this time as an alternative to the current logical 3-tier setup.

By splitting the application server and web server configurations between separate hardware platforms, performance and cost effectiveness will be maximized.

Table 13: Database RAM Usage by Hardware Platform

	UNIX	WINDOWS
Oracle Databases	3.5 GB	
Web Servers		1 GB.
Application Servers		6 GB
Process Schedulers	1 GB	1 GB
TOTAL:	4.5 GB	8 GB
RAM for 22 Application Instances:	22 * 5.5 GB = 121 GB	22 * 7 GB = 154 GB

Maintaining the FHASL infrastructure with the current logical three-tier configuration will be very expensive as Unix hardware is more expensive to procure. Moving FHASL to a physical 3-tier configuration using Windows servers with INTEL processors would more cost effective and provide several advantages to HUD for the future.

Table 14: PROS

Area	Description
Technology	The Fastest Xenon processors are operating at 3.6 GHZ, The current Sun SPARC II processors which FHASL utilizes in production and the fhasdev servers are clocked at 400 MHZ. The fastest processor SUN now offers is only 1.2 GHZ and that is only on their high-end server platforms, which are extremely expensive. Intel is moving forward rapidly with new processors and technology that SUN and Texas Instruments (TI) probably cannot compete with.
Best of Both Worlds	Running Oracle under the Sun platform provides a very stable and mature database-operating environment with clear upgrade paths. Having the Sun platform dedicated to the database only will likely extend the life of the existing Sun hardware by decreasing overall load on the server.
Performance	Due to the slow speeds of the SPARC II processor, offloading the web server, application server, and Crystal Reports Batch server will increase performance by offloading processing from the current much slower hardware.
Cost	Cheap WINTEL hardware running on rack mounted blade servers are much more cost effective than proprietary SUN Solaris technology.
Automated Load Balancing	Both the BEA Weblogic Web server and BEA Weblogic Tuxedo Application server have built in load-balancing. Users will be automatically spread out across multiple machines.
Automated Failover	Both the BEA Weblogic Web server and BEA Weblogic Tuxedo Application server have a built in failover mechanism. If one server is down or not working the users will automatically be connected to the alternative machine.
Security	Multiple servers offer multiple levels of security. Multiple servers would allow some servers outside/inside firewall/DMZ.
Hardware Transition	Could simplify transition to different database server infrastructure if HUD so desired. Oracle has begun offering blade clustered database solutions that are built from rack mounted INTEL configurations that could be an alternative to FHASL in the future as opposed to current Oracle configuration.
Centralized Management Console	Many blade configurations offer a centralized management platform to manage the group of servers like a single unit.

Table 15: CONS

Area	Description
Network Traffic Increase	The application server and database server will reside on separate machines. This will increase the network traffic between the two sites.
Complex Distributed Environment	Code exists on multiple servers. This will increase the management needed to maintain a single server configuration. There are also more points of failure.