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ORACLE REVISION 2.5

PEOPLESOFT ENTERPRISE FINANCIALS 8.9 (DAY-IN-THE-LIFE BENCHMARK) USING ORACLE10*g* ON AN IBM POWER5+™ 570 SERVER

As a global leader in e-business applications, Oracle is committed to delivering high performance solutions that meet our customers' expectations. Business software must deliver rich functionality with robust performance. This performance must be maintained at volumes that are representative of customer environments.

Oracle benchmarks demonstrate our software's performance characteristics for a range of processing volumes in a specific configuration. Customers and prospects can use this information to determine the software, hardware, and network configurations necessary to support their processing volumes.

The primary objective of our benchmarking effort is to provide as many data points as possible to support this important decision.

SUMMARY OF RESULTS

Day-in-the-Life Benchmark	PeopleSoft Enterprise Financials 8.9	
Batch (Close-the-Books)	Baseline, Batch Only	Batch with 250 Online Users
	14.77 minutes	**14.43 minutes**
	2,927,003 Journal Lines per Hour	**2,994,601 Journal Lines per Hour**
	2,046,527 Ledger Lines per Hour	**2,093,791 Ledger Lines per Hour**
With Reporting	28.25 minutes	28.35 minutes

Note that the Batch run with the background load of online users would be expected to under-perform the batch-only run, if only by a brief interval. There is, however, some run-to-run variation in batch timings in a test this complex. Figure 2 shows that a single "Allocation Process" job stream accounts for the slightly longer execution time of the batch-only run.

BENCHMARK PROFILE

In November 2006, Oracle and IBM conducted a benchmark in Beaverton, OR to measure the concurrent batch and online performance of selected processes in Oracle's PeopleSoft Enterprise Financials 8.9 with Oracle10*g*™ 10.1.0.4. We used an 8-way IBM System p5™ 570 for the database server. Another 8-way 570 was used for the application server and web server. All systems utilized IBM AIX 5L V5.3 ML-3. An IBM System Storage™ DS4800 was used for application data and log files.

Testing showed that concurrent online transactions had a minimal impact on the "Close-the-Books" batch processing.

This 'Day-in-the-Life' benchmark measured the concurrent batch and online performance for a medium database model. *This scenario more accurately represents a production environment where users and scheduled batch jobs must run concurrently. This benchmark measured performance results during a 'Close-the-Books' process.*

Testing was conducted in a controlled environment with no other applications running. The tuning changes, if any, were approved by Oracle Enterprise Development and will be generally available in a future update. **The goal of this Benchmark was to obtain performance results for Oracle's PeopleSoft Enterprise Financials 8.9 on IBM System p™ servers.**

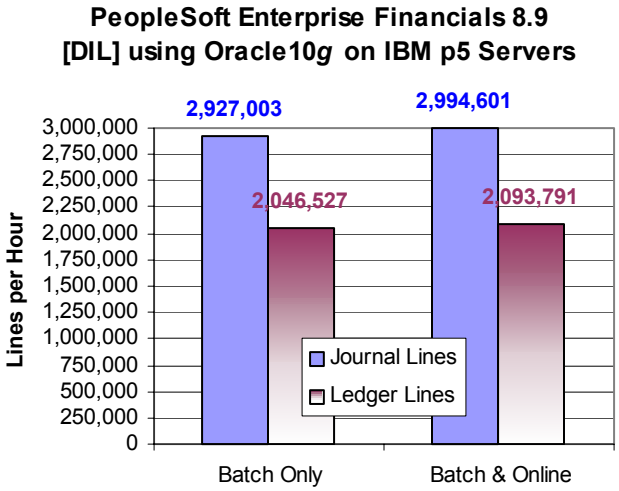

Figure 1: PeopleSoft Enterprise Financials 8.9 Processing Rates

BATCH METHODOLOGY

PeopleSoft Enterprise Financials 8.9 batch processes can be initiated from a browser. For this benchmark, all runs used a browser to initiate Application Engine (AE), SQR, nVision, and COBOL jobs.

Batch processes are background processes, requiring no operator intervention or interactivity. Results of these processes are automatically logged in the database. The runtimes are posted to the Process Request database table where they are stored for subsequent analysis.

BATCH BUSINESS PROCESSES

The PeopleSoft Enterprise Financials 8.9 processes included in this benchmark are as follows:

Journal Generator: (AE) This process creates journals from accounting entries generated from various data sources, including non-PeopleSoft systems as well as PeopleSoft applications.

Allocation: (AE) This process allocates balances held or accumulated in one or more entities to more than one business unit, department or other entities based on user-defined rules.

Journal Edit & Post: (AE & COBOL) Journal Edit validates journal transactions before posting them to the ledger. This validation ensures that journals are valid, for example: valid ChartFields values and combinations, debits and credits equal, and inter/intra-unit balanced, Journal Post process posts only valid, edited journals, ensures each journal line posts to the appropriate target detail ledgers, and then changes the journal's status to posted.

Summary Ledger: (AE) Summary Ledger processing summarizes detail ledger data across selected GL BUs. Summary Ledgers can be generated for reporting purposes or used in consolidations.

Consolidations: (COBOL) Consolidation processing summarizes ledger balances and generates elimination journal entries across business units based on user-defined rules.

SQR & nVision Reporting: Reporting will consist of nVision and SQR reports. A balance sheet and income statement will be generated for each GL BU as well as the consolidated results (nVision). Additionally, an income statement will be generated for each Department (nVision). We will also generate a Trial Balance (SQR) and Ledger Activity Report (SQR).

BATCH JOB ALLOCATION

Each of the batch processes except for Consolidations was run as parallel job streams. The SQR and nVision processes are combined for timing purposes. They also, along with the Journal Generator process, run concurrent parallel job streams one after the other until all are complete.

For example, SQRs are run as 7 parallel job streams, followed by another 7 job streams, followed by another 7 job streams, followed by another 7 job streams, followed by another 7 job streams, followed by the final 5 parallel job streams (7 + 7 + 7 +7 + 7 + 5 = 40 job streams).

Close the Books	# Jobs	
Process	Concurrent	Total
Journal Generator	13	78
Journal Edits	13	20
Allocation	5	5
Journal Edits	5	5
Summary Ledger	13	20
Consolidation	1	1
SQRs	7	40
nVision Reports	1	16

Table 1: Batch Job Streams

BATCH RESULTS

Close the Books Process	Time	Hourly Journal Lines	Hourly Ledger Lines
Journal Generator	4.45	3,685,186	
Journal Edits	0.4	40,997,700	1,981,650
Allocation	6.38	4,201,491	
Journal Edits	1.43	18,711,293	15,196,688
Summary Ledger	1.27		
Consolidation	0.83		
Subtotal	**14.77**	**2,927,003**	**2,046,526**
SQRs	11.78		
nVision Reports	1.7		
Overall Total:	**28.25**		

Table 2: Baseline Batch-Only Results

BATCH RESULTS WITH ONLINE ACTIVITY

Close the Books Process	Time	Hourly Journal Lines	Hourly Ledger Lines
Journal Generator	4.53	3,617,444	
Journal Edits	0.38	42,780,208	2,067,808
Allocation	5.98	4,482,371	
Journal Edits	1.4	19,156,800	15,558,514
Summary Ledger	1.28		
Consolidation	0.85		
Subtotal	**14.43**	**2,994,601**	**2,093,790**
SQRs	12.38		
nVision Reports	1.53		
Overall Total:	**28.35**		

Table 3: Batch Results with Online Users Active

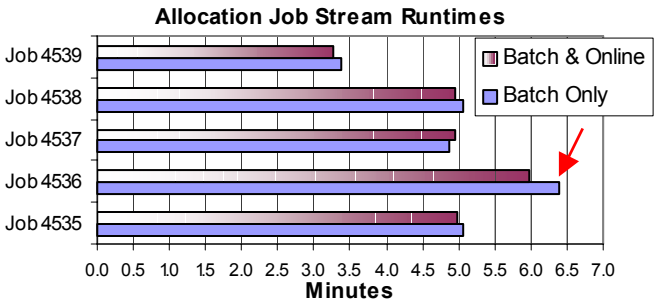

Figure 2: 'Allocation Batch Process' Job Streams

ONLINE METHODOLOGY

Mercury Interactive LoadRunner® was used as the load driver, simulating concurrent users. It submitted a business transaction at an average rate of one every 3–15 minutes for each concurrent user to the application servers via the web servers.

Mercury Interactive QuickTest® Professional was used to automatically submit transactions and to record the benchmark measurements on the client PC.

Measurements were recorded when the user load was attained and the environment reached a steady state.

Figure 3 shows a typical 4-tier benchmark configuration. This benchmark was run using a logical 4–tier configuration; with the database server, the application/web server being hosted on separate boxes.

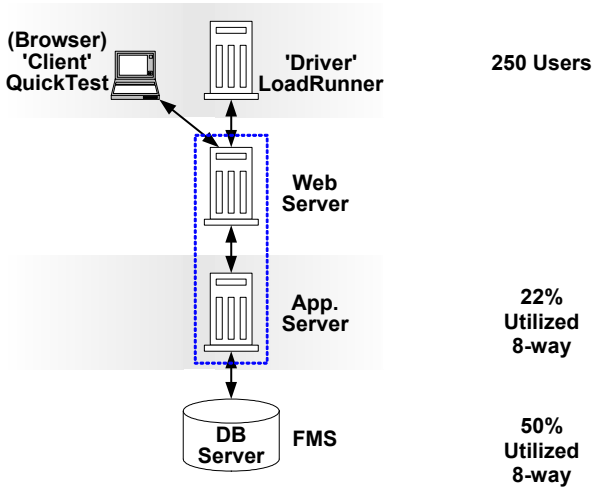

Figure 3: 4-Tier Configuration

Load times were measured from the time the user clicks a hyperlink or push button until the new HTML page has been rendered. Update times were measured from the time the user clicks the <SAVE> button until the new HTML page has been rendered. In this test, the total transaction time is reported.

Measurements were recorded on the servers when the user load was attained and the environment reached a steady state.

ONLINE BUSINESS PROCESSES

Oracle defines a business transaction as a series of HTML pages that guide a user through a business process, such as entering a new asset.

The thirty-six PeopleSoft Enterprise Financials 8.9 business transactions tested in this benchmark are as follows:

ASSET MANAGEMENT (AM)

Asset Additions: Add capitalized assets automatically, with most of the information defaulted from an asset profile.
AM01: Asset Add

Asset Update: Change an existing asset's Tag number
AM02: Asset Update
AM03: Update Acquisition Details

Asset Inquiry: Retrieve non-financial descriptive information, detailed depreciation by period or by year, and detailed historical cost information for assets.
AM04: Calculate Net Book Value (NBV)

PAYABLES (AP)

Maintain Vendor Information: Create or update profiles for all types of vendors.
AP01: Vendor Add

Review Vendor Information: Review payment status, then link to detailed voucher information.
AP02: Inquire Payment Information
AP03: Inquire Voucher

Enter Vouchers: Record vendor invoice information on pages that are the equivalent of electronic voucher forms.
AP04: Voucher Add
AP05: Voucher Entry with On-Demand Processing to GL

RECEIVABLES (AR)

Maintain Customers: Establish and maintain customer processing requirements and attributes.
AR01: Customer Add
AR02: Customer Update

Apply Payments: Apply payments to open items through the use of a payment worksheet.
AR03: Apply Payments

Customer Item Inquiry: Sift through a customer's account looking for trends in open items, closed items, or both.
AR04: Inquire Customer Item
AR05: Build Maintenance Worksheet On-Demand Processing to GL

GENERAL LEDGER (GL)

Journal Entry: Enter Journal Header and line information in domestic or foreign currencies.
GL01: Journal Add
GL02: (Background batch Edit/Post run at intervals)

Ledger Inquiry: Pinpoint ledger balances using intuitive views based on specific Chart Field combinations.
GL03: Inquire Ledger

Journal Inquiry: Access detailed journals lines based on the Journal Header selected.
GL04: Inquire Journal

EXPENSES (EX)

Employee Self-Service
Expense Entry: - Enter a variety of Travel-related expenses.
EX01: Expense Entry

Cash Advance Entry: - Enter details for a cash advance and submit for approval.
EX02: Cash Advance Entry

Time Entry: - Enter details for two projects and submit for approval.
EX03: Time Entry

Travel Auth Entry: - Enter details for an extended trip and submit for approval.
EX04: Travel Authorization Entry

Manager Self-Service
Expense Approval: - Select an expense report and click the 'Approve Report' button.
EX05: Expense Approval

Cash Advance Approval: - Select a cash advance and click the 'Approve Request' button.
EX06: Cash Advance Approval

Time Entry Approval: - Select a time report and click the 'Approve Report' button.
EX07: Time Entry Approval

Travel Auth Approval: - Select a travel authorization and click the 'Approve Request' button.
EX08: Travel Authorization Approval

CASH MANAGEMENT (CM)

Bank Account Add: Select an existing bank and add a new Bank Account.
CM01: Bank Account Add

EFT Transfers: Add and EFT request and change the default amount then hit 'Save.'
CM02: EFT Transfers

Bank Reconciliation: Select a specified bank and account. Search on a date range and select one bank statement from the returned rows to run the reconciliation on.
CM03: Bank Reconciliation

Cash Position: Select a specified worksheet, node and calculation preference. Push the 'Calculate' button.
CM04: Cash Position Worksheet

The following table shows how the business transactions were weighted in the measurements of this benchmark. The weightings are intended to simulate a typical user environment.

Application	Transaction	% within App.	% Overall	Pacing in Min.
AM	AM01	15%	0.75%	12
5%	AM02	50%	2.5%	6
	AM03	25%	1.25%	4
	AM04	10%	0.5%	12
AP	AP01	5%	1.25%	12
25%	AP02	10%	2.5%	4
	AP03	10%	2.5%	4
	AP04	74%	18.5%	6
	AP05	1%	0.25%	4
AR	AR01	5%	0.75%	15
15%	AR02	10%	1.5%	12
	AR03	20%	3%	6
	AR04	55%	8.25%	12
	AR05	10%	1.5%	12
GL	GL01	55%	11%	12
20%	GL02	5%	1%	15
	GL03	25%	5%	6
	GL04	15%	3%	12
EX	EX01	20%	6%	6
30%	EX02	5%	1.5%	4
	EX03	45%	13.5	12
	EX04	5%	1.5%	12
	EX05	5%	1.5%	6
	EX06	5%	1.5%	4
	EX07	10%	3%	4
	EX08	5%	1.5%	12
CM	CM01	10%	0.5%	15
5%	CM02	20%	1%	3
	CM03	40%	2%	15
	CM04	30%	1.5%	15
Totals:			**100%**	

Table 4: Business Transaction Mix

Once every 15, 30 or 60 minutes several ancillary batch processes are executed to consolidate data input by the online users. These are shown in the dark shaded boxes of Table 5. Note that these are separate from the "Close-the-Books" processes, which are consolidating data from a previous period.

ONLINE RESULTS

Table 5 shows the 'start-to-finish' **total processing times**, in seconds, for each business transaction. It also shows the approximate overall transaction rate.

Transaction	Single User (sec)	250 Users (sec)	250 Users & Batch Activity (sec)
AM			
Asset Basic Add	12.67	13.33	12.6
Cost/Adjust Transfer	24.01	25.99	26.27
Asset Search	6.76	6.52	6.61
Calc NBV	9.51	10.56	11.23
AP			
Vendor Add	9.06	9.39	9.28
Payment Inquiry	3.32	3.36	3.3
Voucher Inquiry	3.29	3.41	3.31
Voucher Entry	8.97	9.05	9.53
VE w/On-Demand to GL		20.13*	22.17*
Run V Post every 30 min		10	12.75
AR			
Customer Add	11.5	11.66	11.51
Customer Update	6.72	6.83	7.1
Apply Payments - Wrksht	20.63	21.31	20.84
Inquire Customer Balance	3.31	3.11	2.97
Build Maintenance Wrksht		55.36*	31.6*
Run AR Up every 60 min		45	45
CM			
Bank Account Add	20.14	21.62	21.43
EFT Transfers	3.53	3.98	3.55
Bank Reconciliation		11.63*	11.05*
Cash Position Worksheet	3.79	3.8	5.08
Run Acctng every 60 min		0.34	0.96
EX			
Expense Entry	13.02	13.48	13.29
Cash Advance Entry	4.07	4.14	4.33
Time Entry	7.46	7.33	7.44
Travel Auth. Entry	16.81	17.75	18.69
Expense Approval	4.42	4.89	4.54
Cash Advance Approval	4.47	4.52	4.28
Time Entry Approval	4.34	4.48	4.62
Travel Auth. Approval	4.51	4.3	4.35
Run Stg Tm every 30 min		10	10
Run Post L every 30 min		10.25	10.25
GL			
Journal Entry	19.04	19.11	18.76
Journal Entry Edit/Post		11.57*	15.45*
Inquire Ledger	8.03	8.17	8.02
Inquire Journal	3.08	3.11	3.18
Run J E/P every 15 min		10	10
Transactions/minute	N/a	34	34

Table 5: Baseline Business Transaction Times

* Times from LoadRunner, rather than QuickTest. These also include related batch processing time.

The end-to-end (total) online transaction timings did not grow appreciably with the addition of the "Close-the-Books" batch processes.

The database and application servers were processing a total of ~34 business transactions per minute at the peak load of 250 concurrent users. The transaction rate is calculated by dividing the number of users by the corresponding pacing.

Performance may vary on other hardware and software platforms and with other data composition models.

SERVER PERFORMANCE

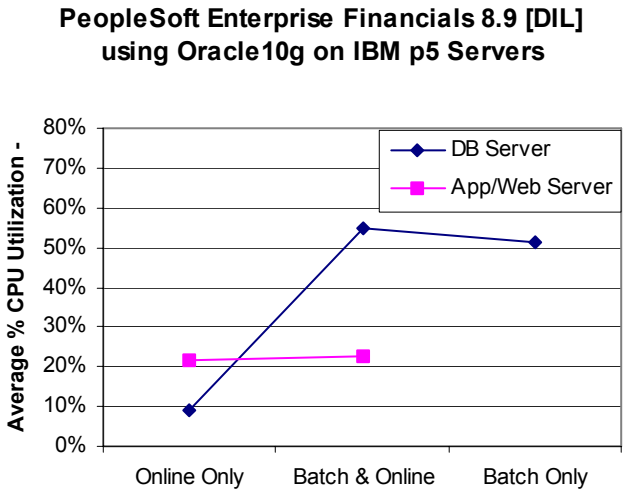

Figure 3: Average CPU Utilization

DB Server	User	System	Idle	I/O Wait
Online Only	8.62%	0.18%	90.96%	0.01%
Batch & Online	52.26%	1.26%	45.26%	1.16%
Batch Only	49.02%	1.00%	48.67%	1.21%

Table 6: Average CPU Utilization – DB Server

App/Web Server	User	System	Idle	I/O Wait
Online Only	16.25%	1.89%	78.37%	3.47%
Batch & Online	16.87%	2.18%	77.20%	3.76%

Table 7: Average CPU Utilization – App/Web Server

DB Server	Process	Cache	System	Free
Online Only	11.26	49.22	2.88	0.68
Batch & Online	11.60	49.22	2.88	0.33
Batch Only	*11.58*	*49.22*	*2.88*	*0.37*

Table 8: Average Memory Utilization – DB Server (GB)

Note that the available memory not drawn upon by the application is made available for caching. This may improve performance and reduce the corresponding disk storage system activity.

App/Web Server	Process	Cache	System	Free
Online Only	4.70	0.57	2.50	56.24
Batch & Online	4.99	0.64	2.62	55.75

Table 9: Average Memory Utilization – App/Web Server (GB)

STORAGE SYSTEM PERFORMANCE

An IBM System Storage™ DS4800 disk array was used for data storage. I/O performance is crucial to batch [and Online] performance and is summarized as follows:

DB Server		Reads KB/Sec	Writes KB/Sec	I/Os per Sec	Serv. Time (ms)
Online Only	Avg.	566.9	973.1	179.6	0.83
	Peak	6,295.6	5,742.3	1,239.9	
Batch & Online	Avg.	4,806.5	21,742	1,258.6	1.24
	Peak	45,710	121,110	8,266	
Batch Only	Avg.	4,127	16,771	1,016.1	1.08
	Peak	63,943	133,616	11,290.6	

Table 10: I/O Performance – DB Server

DATA COMPOSITION DESCRIPTION

Number of Business Units	Medium
General Ledger	20
Payables	10
Receivables	5
Asset Management	5
Cash Management	5
Expenses	5
Inter-Unit activity as a % of Trans/Run	20%

Table 11: Data Composition – Business Units

ChartFields	Medium
Operating Unit	500
Account	2,500
Department	5,000
Product	1,000
Project	10,000
Affiliate	250

Table 12: Data Composition – ChartFields

General Ledger Data Comp & Volumes	Medium
Business Units	20
Volume of Existing Ledger Data (3 Years)	30,000,000
Current Journals Lines	
Journal Headers	1,500
Average Lines per Header	35
Journal Lines	52,500
Historical Journal Headers	375,000
Historical Avg. Lines per Header	40
Historical Journal Lines (1 year)	15,000,000
Allocations Business Units	5
Allocations Steps	500
Allocations Groups	50
Groups per Business Unit	10
Allocations Steps per Group	10
Pool Rows to be Selected	500,000
Basis Rows to be Selected	100,000
Allocation Journal Headers in output	1,250
Allocation Journal Lines per Header	200
Allocation Journal Lines total in output	250,000
BUs that have Inter-Unit Activity (20% BUs)	10
Inter-Unit Activity as a % of Journal Trans/run	20%
Total Journal Headers – Incl. GL & Subsys.	2,845
Total Journal Lines -Incl. GL & subsystems	561,715

Table 13: Data Composition – General Ledger

Asset Management Data Comp & Volumes	Medium
Business Units	5
Current Total Assets	250,000
Current Retires	1,500
Current Transfers	500
Other (Adds/Adj)	3,000
Total Current Transactions	5,000
Current Depreciation (DIST_LN_JG_VW)	187,500
Current Accounting Results	395,000
Number of Journal Headers Generated	5
Average number of Journal Lines Generated per Header	3,000
Total journal lines	15,000
I/U Activity as a % of Trans/run	20%
Historical Cost and Depreciation (3 years)	15,000,000

Table 14: Data Composition – Asset Management

Expenses Data Comp & Volumes	Medium
Business Units	5
Employees	10,000
Current Expense Activity (EX_ACCTG_LINE)	2,520
Current Expense Report Headers	500
Current Expense Report Lines	2,500
Average lines per header	5
Current Cash Advances	20
Number of Journal Headers Generated	5
Average number of Journal Lines Generated per Header	400
Current Total Journal Lines Generated	2,000
I/U Activity as a % of Trans/run	20%
Historical Expense Activity (1 year)	250,000
Expense Report Headers	49,520
Average lines per header	5
Cash Advances	2,400

Table 15: Data Composition – Expenses

Cash Management Data Comp & Volumes	Medium
Cash Management	5
Banks	5
Bank Accounts	250
Current Bank/EFT Transfers	100
Current Deal Transactions	50
Current External Transactions	500
Current Total Accounting Transactions (TRA_ACCTG_LINE)	1,300
Number of Journal Headers Generated	5
Average number of Journal Lines Generated per Header	50
Total Journal Lines	250
I/U Activity as a % of Trans/run	20%
Historical Bank/EFT Transfers	24,000
Historical Deal Transactions	10,000
Historical Total Accounting Transactions (TRA_ACCTG_LINE)	68,000

Table 16: Data Composition – Cash Management

Receivables Data Comp & Volumes	Medium
Business Units	5
Customers	20,000
Current Accounting Lines (ITEM_DST)	15,600
Current New Items/Invoices and closed	3,900
Current Receipt Accounting Lines (PAY_MISC_DST)	4,000
Current Payments (Peak Day)	2,000
Do you use cash control?	Yes
Total Current Accounting Lines	19,600
Number of Journal Headers Generated	5
Average number of Journal Lines Generated per Header	393
Current Total Journal Lines Generated	1,965
I/U Activity as a % of Trans/run	20%
Historical Accounting Lines-ITEM_DST (1 year)	4,200,000
Historical Closed Items (4 ITEM_DST rows/item)	1,000,000
Historical Open Items (2 ITEM_DST rows/item)	100,000

Table 17: Data Composition – Receivables

Payables Data Comp & Volumes	Medium
Business Units	10
Vendors	50,000
Current Voucher Lines (PS_VCHR_ACCTG_LINE)	120,000
Current Voucher Headers	10,000
Average lines per voucher header	10
Current Payments	5,000
Number of Journal Headers Generated	10
Average number of Journal Lines Generated per Header	6,000
Current Total journal lines generated	60,000
I/U Activity as a % of Trans/run	20%
Historical Voucher Lines (PS_VCHR_ACCTG_LINE)	30,000,000
Historical Voucher Headers	2,500,000
Average lines per header	10
Historical Payments	1,250,000

Table 18: Data Composition – Payables

3rd Party, Legacy & Other PS Applications Data Comp & Volumes	Medium
Total Journal Transactions	180,000
Number of Journal Headers Generated	20
Average number of Journal Lines Generated per Header	9,000

Table 19: Data Composition – Miscellaneous

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

Database Server:

An 8-way partition of an IBM p5 570 (9117-570) server was used as the database/batch server. It was equipped with the following:

- 8 × 2.2 GHz IBM POWER5+™ processors, each with 32 Kilobytes of Level-1 Data Cache and 64 Kilobytes of Level-1 Instruction Cache, with an average of 1.9 Megabytes of Level-2 Cache, with an average of 36 Megabytes of Level 3 Cache
- 64 Gigabytes of Memory (~15 GB used)
- ~3713 Gigabytes of total Disk Space (12 × 36.4 GB + 48 × 146 GB) (~550 GB used)
- 8 Disk Controllers (6 × SCSI, 2 × 1 Gbit Fibre Channel)
- One IBM TotalStorage DS4800

Application/Web Server(s):

An 8-way partition of an IBM p5 570 (9117-570) server was used as the Application/Web server. It was equipped with the following:

- 8 × 2.2 GHz IBM POWER5+™ processors, each with 32 Kilobytes of Level-1 Data Cache and 64 Kilobytes of Level-1 Instruction Cache, with an average of 1.9 Megabytes of Level-2 Cache, with an average of 36 Megabytes of Level 3 Cache
- 64 Gigabytes of Memory
- 6 Disk Controllers (6 × SCSI)

QuickTest Client PC:

IBM® x306 with the following:

- 1 × 3.2 GHz Intel® Pentium® IV Processor
- 512 Megabytes of Memory

Load Simulation Driver(s):

1 × IBM® x325 was used as the load driver. It was equipped with the following:

- 2 × 2.0 Gigahertz AMD Opteron™ Processor 246 Processors,
  each with 1 Megabyte of Level-2 Cache
- 3.4 Gigabytes of Memory

SOFTWARE VERSIONS

Oracle's Enterprise Financials 8.9

Oracle's Enterprise (PeopleTools) 8.46.05

Oracle10*g*™ 10.1.0.4

IBM AIX 5L V5.3.0.50 ML03 (64-bit) (on the Database server and Application/Web server)

Microsoft® Windows Server 2003 Standard Edition w/SP 1 (on the Driver)

Microsoft® Windows® 2000 w/SP 4 (on the client)

IBM WebSphere 5.1.1.11

Mercury Interactive LoadRunner® 8.0

Mercury Interactive QuickTest® Professional 6.5

BEA Tuxedo® 8.1 RP89 with Jolt 8.1

Microsoft Internet Explorer® 6.0

JDK 1.4.2

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