

E-BUSINESS SUITE APPLICATIONS R12 (R12.1.3) HR (OLTP) BENCHMARK - USING ORACLE DATABASE 11g ON FUJITSU'S M10-4S SERVER RUNNING SOLARIS 11

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

This OLTP benchmark test was run on two 16-core servers.

Online Workload		
Number of Users	Average Response (Sec)	90 th Percentile Response Time (Sec)
800 Users Cash Expense	0.25	0.29
800 Users Credit Expense	0.25	0.3
1,200 Users Submit Timecard	0.16	0.25
1,200 Users View Payslip		
(Search)	(0.17)	(0.22)
Net Weighted Averages	0.21	0.27
(Search)	(0.17)	(0.22)

Many factors can influence performance and your results may differ. Notes times are Save/Update or (Search).

BENCHMARK PROFILE

In June 2014 Fujitsu® conducted a benchmark in Japan to measure the online (OLTP) performance of the Oracle E-Business HR business flow in an environment running Oracle E-Business Suite R12 (12.1.3) using the Oracle Database 11g with Oracle Solaris 11.1 operating system (OS) on a Fujitsu SPARC M10-4S™ (16-core) database server. A second 16-core M10-4S was used for the application-tier server. Moreover, one of Fujitsu's ETERNUS™ DX410 S2 systems was used for data storage (~264 GB).

The benchmark measured the HR Self-Service OLTP business process response times for an Extra-Large database model. Testing was conducted in a controlled environment with no other applications running. **The goal of this Benchmark was to obtain reference online response times for the Oracle E-Business Suite R12 Benchmark, using Fujitsu's SPARC servers running Oracle Solaris 11 OS.**

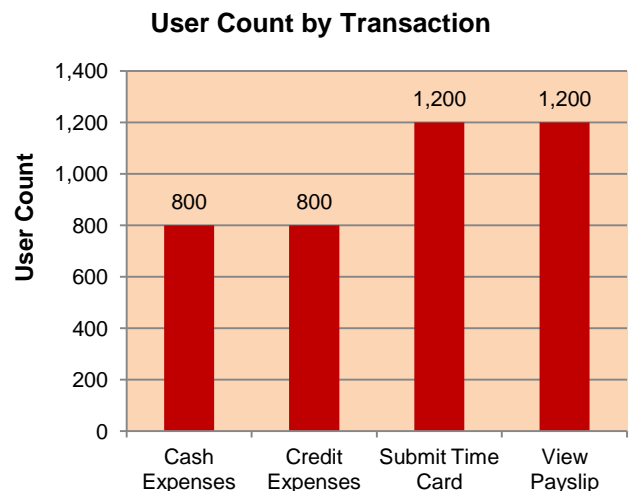


Figure 1: Oracle E-Business Suite Benchmark Concurrent User Distribution

BENCHMARK METHODOLOGY

E-Business Suite 12 Benchmark 12.1.3 online processes can be initiated from a browser. For this benchmark, all runs used a browser to initiate the on-line user transactions.

Oracle® OATS® was used as the load driver, simulating concurrent users. It submitted transactions at an average rate of one every 6 minutes for each concurrent user.

Measurements were recorded on all of the servers when the user load was attained and the environment reached a steady state. Note that the measured response times may be shorter than a live user would experience as client and browser latency is not simulated by this load test system.

Figure 2 shows the configuration used for this benchmark run.

The complete E-Business Suite benchmark consists of a mix of on-line transactions and batch processes running in parallel. This test utilized one flow of OLTP transactions. The following table describes the on-line transactions included in the benchmark run.

Oracle Application Product Flow	Users	Pacing in Min
HR Self-Service	(4,000)	
Cash Expenses	800	6
Credit Expenses	800	6
Submit Time Card	1,200	6
View Payslip	1,200	6
	4,000	

Table 1: Online Transaction Mix




	<p>Fujitsu M10-4S</p> <p>App/Web Server</p> <p>4-CPU, 64-core (128 Threads)</p> <p>256 GB</p> <p>~34% Utilized</p> <p>* Only 16 cores (32 Threads) were activated</p>
	<p>Fujitsu M10-4S</p> <p>DB Server</p> <p>4-CPU, 64-core (128 Threads)</p> <p>1 TB</p> <p>~21% Utilized</p> <p>* Only 16 cores (32 Threads) were activated</p>
	<p>ETERNUS DX410 S2</p> <p>Storage System</p>

Figure 2: 3-Tier Configuration

This benchmark was run as a “Physical” 3-Tier configuration with discrete machines hosting the Database and Application/Web server instances.

HR Self-Service OLTP Processes

Cash Expenses: The user navigates to the “Expenses Home” and enters various travel and lodging expenses including airfare, car rental, hotel, entertainment, meals, etc. Finally, the user clicks on “Submit” to enter the completed expense report. The response time is to ‘save’ the entry.

Credit Card Expenses: The user navigates to the “Expenses Home” and enters various travel and lodging expenses including airfare, car rental, hotel, entertainment, meals, etc. Finally, the user clicks on “Submit” to enter the completed expense report. The response time is to ‘save’ the entry.

Create Timecard: The user navigates to the “Create Timecard” button and enters information about their project, the type(s) of tasks undertaken and the hours spent. Finally, the user clicks on “Submit” to enter the completed time card. The response time is to ‘save’ the entry.

View Payslip: The user navigates to the “Employee Self-Service” page and clicks on ‘Payslip.’ The response time is for the ‘retrieval’ of the search.

BENCHMARK RESULTS

Online Business Metrics	Achieved Output
Number of Cash Expenses Created	7,572
Number of Credit Expenses Created	7,573
Number of Timecards Created	11,401

Table 2: Online Transactions Completed (4,000 Users)

R12 Application changes, data model additions and test methodology improvements render direct comparison to previous Oracle E-Business release 11.5.10 and 11.5.9 results invalid.

	4,000 Users	
	Avg. (Sec)	90 th % (Sec)
HR Self-Service		
Submit Cash Expenses	0.246	0.290
Submit Credit Card Expenses	0.247	0.298
Submit Project Timecard	0.159	0.249
View Emp. Payslip Search	0.171	0.216
Weighted Average Saves	0.209	0.275
Weighted Avg. Searches	0.171	0.216
Transactions/min	~660	

Table 3: Detailed Online Transaction Response Times

The transaction rate is estimated by dividing the number of running users by the average pacing. The OATS output suggested that the realized rate was closer to 640 transactions per minute.

SERVER PERFORMANCE

Figure 3 shows the Steady-State CPU for the database server.

Oracle EBS 12.1.3 OLTP HR Self-Service Using Oracle DB 11g on Fujitsu M10-4S Servers

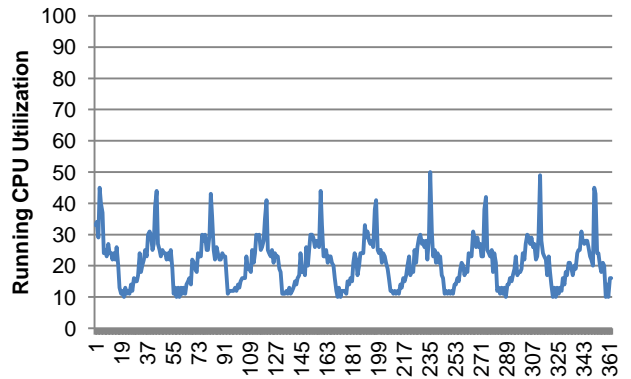


Figure 3: Running DB Server CPU Utilization

Each server scaled smoothly as users were added, keeping the load fairly constant over the steady state period.

Online Workload	% User	% System	% I/O Wait	% Idle
Database Server	18.6	2.7	0	78.8
App/Web Server	28.7	3.2	0	66.2

Table 4: Average CPU Utilization Breakout

Total Memory Used By:	4,000 Users
Database Server	418 GB
App/Web Server	118 GB

Table 5: Average Memory Utilization Breakout

I/O PERFORMANCE

A Fujitsu ETERNUS DX410 S2 was used for storage. The batch workload requires optimal I/O performance.

I/O Performance		4,000 Users
Writes/Sec	Avg	26.0
	Peak	197.4
Reads/Sec	Avg	0.4
	Peak	18.9
KB Written/Sec	Avg	1,277
	Peak	16,527
KB Read/Sec	Avg	59.9
	Peak	3,076.6
Avg Service Time (ms)	Avg	1.0
	Peak	24.9

Table 6: Average I/O Utilization Breakout

DATA COMPOSITION DESCRIPTION

Major data components for the model under test are summarized in the following table.

Application	Business Objects	Extra-Large Model
TCA	Organizations	1,100,000
	Contacts	4,900,000
	Contact Points	3,700,000
	Accounts	1,100,000
	Account Sites	1,090,000
	Account Site Uses	2,180,000
Contracts	Contracts	222,000
Install Base	Instances	1,300,000
	Trackable Items	5
HR	Managers	800
	Employees	250,000
	Payroll Users	250,000
	Users	20,000
	Credit Card Entries	4,000,000
	Supplier(s)	10,000
Assets	Asset Categories	984
General Ledger	GL Code Combos	93,417

Table 7: Data Composition

PATCHES

The following patches were applied to the benchmark environment on top of Oracle E-Business Applications R12 (12.1.2 and 12.1.3).

applied 9858539
 applied 9583541
 applied 9581788
 applied 9406217
 applied 9369504
 applied 9281404
 applied 9239089
 applied 9204440
 applied 8919491
 applied 8919489
 applied 8502056
 applied 8360494
 applied 8300196
 applied 7580744
 applied 7303033
 applied 7303032
 applied 7281456
 applied 7195389
 applied 7140405
 applied 7121788
 applied 7016961
 applied 6400501
 applied 5651245
 applied 5394728
 applied 3559326
 applied 13723427
 applied 12960302
 applied 12942119
 applied 11683193

TUNING

```
Drop index applsys.wf_notifications_n1;
create index applsys.wf_notifications_n1 on applsys.wf_notifications
(recipient_role, status, message_type);
```

```
exec fnd_stats.gather_table_stats('APPLSYS','WF_ITEMS',
PERCENT=>100, degree=>128);
exec fnd_stats.gather_table_stats('APPLSYS','WF_NOTIFICATIONS',
PERCENT=>35, degree=>128);
```

```
Delete aso.aso_order_feedback_t;
alter table aso.aso_order_feedback_t move;
exec
fnd_stats.gather_table_stats('ASO','ASO_ORDER_FEEDBACK_T');
```

```
Drop index hr.pay_element_entry_values_f_n50;
create index hr.pay_element_entry_values_f_n50 on
hr.pay_element_entry_values_f
(element_entry_id, effective_start_date, effective_end_date, screen_entry
_value);
```

```
update pay_action_parameter_values
set parameter_value = 30
where parameter_name = 'CHUNK_SIZE';
```

```
exec fnd_stats.gather_table_stats
('APPLSYS','FND_CURRENCIES',100,cascade=>TRUE);
exec fnd_stats.gather_schema_stats (schemaname =>
'HR', estimate_percent => 100, degree => 32);
```

```
update fnd_concurrent_programs
set enable_trace = 'N'
where enable_trace = 'Y';
```

```
alter table hr.pay_recorded_requests cache;
alter table hr.per_all_assignments_f cache;
```

```
alter table hr.per_all_assignments_f cache;
select * from hr.per_all_assignments_f where job_post_source_name =
'xxx';
```

```
update ap_credit_card_trxns_all
set report_header_id = null,
expensed_amount=10,
transaction_amount=10,
billed_amount=10,
billed_date = sysdate,
posted_date = sysdate,
transaction_date = sysdate;
```

```
update pa_projects set completion_date = completion_date+365;
update pa_tasks set completion_date = completion_date + 365;
commit;
```

```
update pa_projects_all
set completion_date = completion_date+365;
select project_id, name, segment1, completion_date from
pa_projects_all
where project_id = 2779;
commit;
update pa_tasks set completion_date = '30-DEC-13' where task_id in (
select task_id from pa_tasks a, pa_projects_all b where
a.project_id=b.project_id and b.completion_date = '30-DEC-13');
commit;
```

TUNING CONTINUED

```
Drop index inv.mtl_system_items_b_tn3;
create index inv.mtl_system_items_b_tn3 on inv.mtl_system_items_b
(organization_id, upper(segment1), customer_order_enabled_flag);
```

```
exec fnd_stats.gather_table_stats('APPLSYS','WF_ITEMS',
PERCENT=>100);
```

```
Drop index hr.pay_action_information_N2 ;
create index hr.pay_action_information_n2 on
hr.pay_action_information(action_context_id, action_context_type,
action_information_category) parallel nologging ;
alter index hr.pay_action_information_n2 noparallel logging ;
```

```
Drop index hr.pay_action_information_n5 ;
create index hr.pay_action_information_n5 on
hr.pay_action_information (assignment_id, effective_date,
action_information_category, action_context_id, action_information16)
parallel nologging;
alter index hr.pay_action_information_n5 noparallel logging ;
```

```
Drop index hr.pay_legislative_field_info_n1 ;
create index hr.pay_legislative_field_info_n1 on
hr.pay_legislative_field_info ( field_name, legislation_code, rule_type) ;
```

```
exec
fnd_STATS.load_histogram_cols('INSERT',801,'PAY_ACTION_INF
ORMATION','EFFECTIVE_DATE');
exec
fnd_STATS.load_histogram_cols('INSERT',801,'PAY_ACTION_INF
ORMATION','ACTION_CONTEXT_TYPE');
exec
fnd_STATS.load_histogram_cols('INSERT',801,'PAY_ACTION_INF
ORMATION','ACTION_INFORMATION_CATEGORY');
exec
fnd_stats.gather_table_stats('HR','PAY_ACTION_INFORMATION',P
ERCENT=>35);
```

```
analyze index hr.pay_action_information_n2 compute statistics;
analyze index hr.pay_action_information_n5 compute statistics;
analyze index hr.pay_legislative_field_info_n1 compute statistics;
quit
```

BENCHMARK ENVIRONMENT

HARDWARE CONFIGURATION

DATABASE SERVER

A Fujitsu M10-4S server was used as the database server. Only 16 cores (32 threads) were activated by the Fujitsu M10 CPU Core-Activation key. It was equipped with the following:

- 4 × 3.7 GHz SPARC64™ X+ Sixteen-Core processors each with 64 Kilobytes of Instruction and 64 Kilobytes of Data Level-1 on core cache, and 24 Megabytes of Level-2 on-chip cache (64 cores total – 128 vcpus/threads)
- 1024 Gigabytes of Memory (~415 GB used at peak load)
- 1 × PCI Express 2-Port 8Gbps FC HBA
- 1 × 600 GB SAS Internal Drive

One Fujitsu's ETERNUS DX410 S2 was used for storage. The storage system was equipped with the following:

- ~3.3 Terabytes of total disk space available. Approximately 264 GB was used for the database from the 656 GB of storage allocated to the database instance.
- 1 × 7 RAID 0+1 Volumes

APPLICATION/WEB SERVER(S)

A Fujitsu M10-4S server was used as the application-tier server. Only 16 cores (32 threads) were activated by the Fujitsu M10 CPU Core-Activation key. It was equipped with the following:

- 4 × 3.7 GHz SPARC64™ X+ Sixteen-Core processors each with 64 Kilobytes of Instruction and 64 Kilobytes of Data Level-1 on core cache, and 24 Megabytes of Level-2 on-chip cache (64 cores total – 128 vcpus/threads)
- 256 Gigabytes of Memory
- 1 × PCI Express 2-Port 8Gbps FC HBA
- 1 × 600 GB SAS Internal Drive

LOAD DRIVER SERVER(S)

Three of Fujitsu's PRIMERGY TX200 S7 servers were used as load drivers. They were equipped with the following:

- 2 × 2.93 GHz Intel Xeon 5570 Quad-Core processors, each with 8 Megabytes of on-chip cache (8 cores total)
- 24 Gigabytes of Memory

SOFTWARE VERSIONS

Oracle's E-Business Suite (E-Business Suite Kit) R12.1.3

Oracle11g 11.2.0.3.0 (64-bit)

Oracle Solaris 11.1 on the database server

Oracle Solaris 11.1 on the app/web server

Microsoft® Windows® Server 2008 R2 Standard SP1 (64-bit) on the OATS controller and drivers

Oracle® Application Test Suite 9.3.1 (OATS)

Glossary and Acronyms:

OASB Oracle Applications Standard Benchmark

OATS Oracle Application Test Suite

OLTP On Line Transaction Processing

RAC Real Applications Clusters



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