ORACLE APPLICATIONS CLOUD

Oracle Fusion Human Capital Management Cloud Service: Scalability

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Introduction

Oracle Fusion Applications were designed from the ground up using the latest technology advances and incorporating the best practices gathered from Oracle's thousands of customers. They are 100 percent open-standards-based business applications that set a new standard to the way we innovate, work, and adopt technology. For a comprehensive overview of Oracle Fusion Applications, visit http://www.oracle.com/us/products/applications/fusion/overview/index.html

Oracle's Fusion Human Capital Management (HCM), a component of the Oracle Fusion Applications suite, enables you to architect a global infrastructure for HR data and improved business processes. Fusion HCM delivers a robust set of best-in-class human resources functionality that enables you to increase productivity, accelerate business performance, and lower your cost of ownership. Created by industry veterans, Fusion HCM solutions combine advanced technology, tight integration, and best HR practices. From recruiting and managing talent, to accurately forecasting future workforce needs, Fusion HCM enables you to proactively manage HR operations while focusing on strategic business initiatives. Oracle Fusion HCM Cloud will bring power to your people. It is a software-as-a-service (SaaS) HCM solution available by subscription.

Scalability across increasing concurrent user load levels is an important consideration for customers implementing a SaaS solution to ensure the solution can grow with their business. This white paper demonstrates Oracle Fusion HCM Cloud Service's linear scalability across multiple product areas. The study simulates a large customer deployment with up to 100k employees.

Scalability Methodology and Environment

The throughput scalability metric in this study is the total business flows completed per hour, where each business flow consists of the multiple UI steps performed to complete a logical business task. For example, the Compensation Workbench business flow includes logging in, navigating to Compensation Workbench, viewing the Annual plan, etc., and eventually logging out. Multiple business flows were executed concurrently to provide a realistic mixed load. See Appendix A for the complete listing of business flows and steps.

Concurrent load was generated via Oracle Application Testing Suite (OATS), and used parameterized searches and values to mimic multiple real-world users. A randomized think time, averaging to 30 seconds, was used between steps within each business flow. All statistics and measurements across tiers were captured during the steady state period of at least 3 hours. Static content was not downloaded to the client, to realistically model client browser caching behavior. This environment did not use a content delivery network.

Throughput and system resource usage measurements were taken under 500, 1000, 1500, and 2000 concurrent user loads. These measurements will change depending on factors such as the amount of customization implemented in a customer environment.

Hardware, Software, Network:

- Oracle Fusion HCM Applications Release 9

- Application tier: 2 nodes: Intel® Xeon® Processor E5-2690 (20M Cache, 2.90 GHz, 2P 16 Cores HT, 256 GB RAM), OEL 5.8 64bit, 2.6.32-400.1.3.el5uek

- RDBMS tier: 1 node: Intel® Xeon® Processor E5-2690 (20M Cache, 2.90 GHz, 2P 16 Cores HT, 256 GB RAM), OEL 5.8 64bit, 2.6.32-400.1.3.el5uek, Oracle RDBMS 11.2.0.3

- Load Simulation tier: 1 node: Intel® Xeon® Processor X5540 (8M Cache, 2.53 GHz), virtual OS instance using 2 cores and 16GB RAM, OEL 5.8 64bit, 2.6.32-400.1.3.el5uek, Oracle Application Testing Suite 12.1.0.2.0 Build 65.

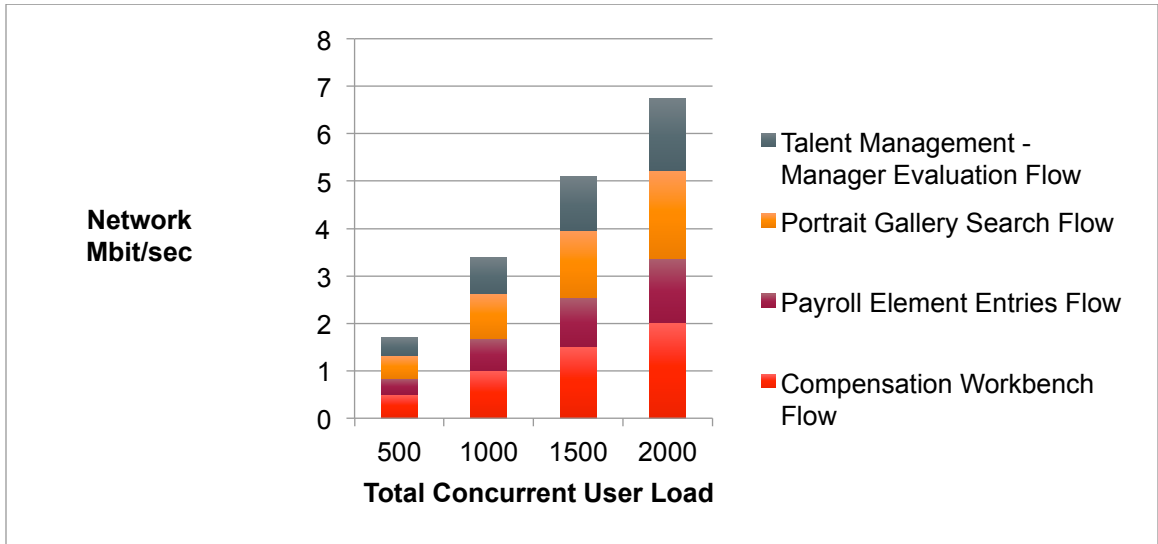- Network: LAN with <1ms latency between tiers

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Scalability Measurements on Oracle Fusion Human Capital Management Cloud Service

Ideal linear scalability means that as the user load is doubled, the resulting business flow throughput is also doubled, while consuming twice as many resources. The following charts demonstrate linear scalability: for example, the total business-flow-per-hour throughput increases are within 2% of the predicted ideal.
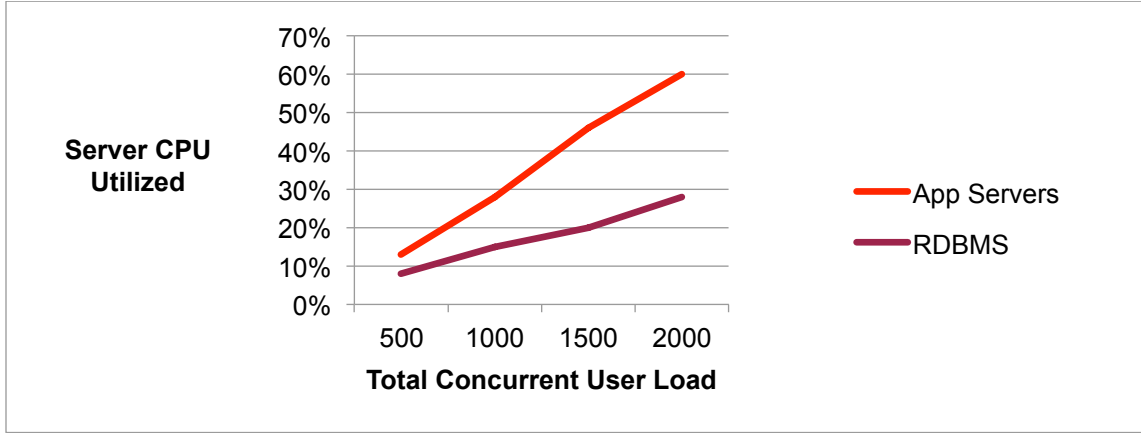
THROUGHPUT SCALABILITY, ORACLE FUSION HCM CLOUD SERVICE
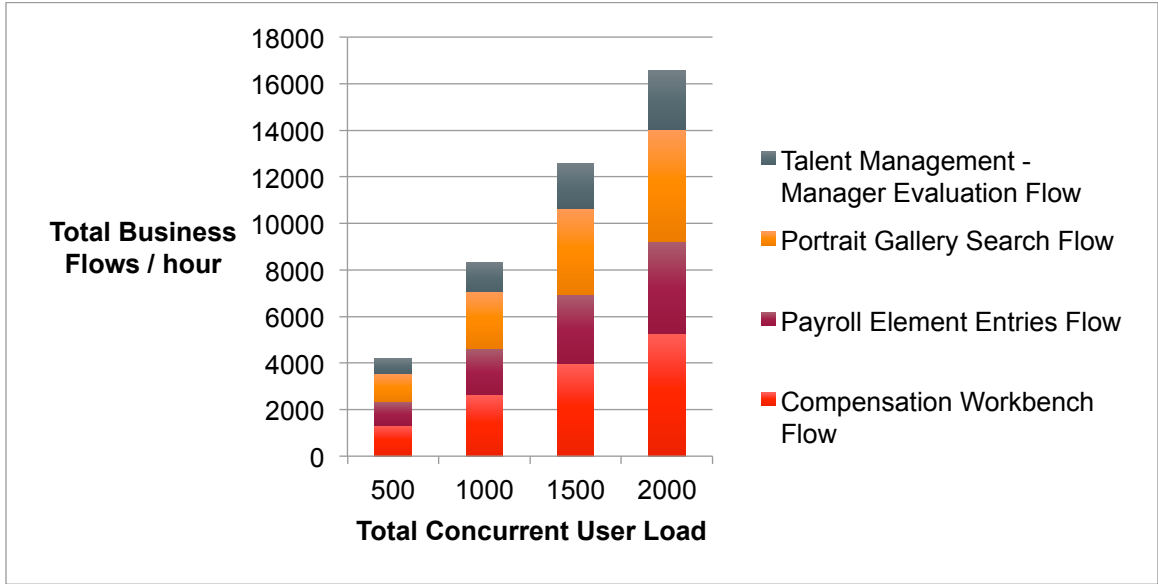
NETWORK SCALABILITY, ORACLE FUSION HCM CLOUD SERVICE

CPU SCALABILITY, ORACLE FUSION HCM CLOUD SERVICE

Server CPU Utilized

App Servers
RDBMS

Total Concurrent User Load

(chart: Server CPU Utilized, y-axis 0% to 70%, x-axis Total Concurrent User Load 500, 1000, 1500, 2000)

500 CONCURRENT USER LOAD, ORACLE FUSION HCM CLOUD SERVICE

Business Flow	Concurrent User Load	Avg. Hits / sec	Business Flows / hour / user	Total Business Flows / hour	Network Mbit/sec
Compensation Workbench	125	12.9	10.7	1335	0.51
Payroll Element Entries	125	7.9	8.0	995	0.34
Portrait Gallery Search	125	12.8	9.8	1220	0.47
Talent Management - Manager Evaluation	125	8.1	5.1	636	0.38
TOTAL	500	41.7	8.4	4186	1.70

Servers	Concurrent User Load	CPU Usage
Average of App Servers	500	13%
Average of RDBMS	500	8%

1000 CONCURRENT USER LOAD, ORACLE FUSION HCM CLOUD SERVICE

Business Flow	Concurrent User Load	Avg. Hits / sec	Business Flows / hour / user	Total Business Flows / hour	Network Mbit/sec
Compensation Workbench	250	25.7	10.6	2652	1.01
Payroll Element Entries	250	15.9	7.9	1982	0.68
Portrait Gallery Search	250	25.5	9.7	2430	0.94
Talent Management - Manager Evaluation	250	16.0	5.1	1267	0.76
TOTAL	1000	83.1	8.3	8331	3.39

Servers	Concurrent User Load	CPU Usage
Average of App Servers	1000	28%
Average of RDBMS	1000	15%

1500 CONCURRENT USER LOAD, ORACLE FUSION HCM CLOUD SERVICE

Business Flow	Concurrent User Load	Avg. Hits / sec	Business Flows / hour / user	Total Business Flows / hour	Network Mbit/sec
Compensation Workbench	375	38.5	10.6	3988	1.52
Payroll Element Entries	375	23.8	7.9	2971	1.02
Portrait Gallery Search	375	38.8	9.9	3700	1.42
Talent Management - Manager Evaluation	375	24.1	5.1	1896	1.14
TOTAL	1500	125.2	8.4	12555	5.10

Servers	Concurrent User Load	CPU Usage
Average of App Servers	1500	46%
Average of RDBMS	1500	20%

2000 CONCURRENT USER LOAD, ORACLE FUSION HCM CLOUD SERVICE

Business Flow	Concurrent User Load	Avg. Hits / sec	Business Flows / hour / user	Total Business Flows / hour	Network Mbit/sec
Compensation Workbench	500	51.1	10.6	5288	2.02
Payroll Element Entries	500	31.6	7.9	3946	1.35
Portrait Gallery Search	500	50.6	9.6	4820	1.86
Talent Management - Manager Evaluation	500	31.8	5.0	2504	1.51
TOTAL	2000	165.1	8.3	16558	6.73

Servers	Concurrent User Load	CPU Usage
Average of App Servers	2000	60%
Average of RDBMS	2000	28%

Conclusion

As mentioned earlier, scalability is an important consideration for customers implementing a SaaS solution to ensure the solution can grow with the customer's business. The above test results demonstrate Oracle Fusion Human Capital Management Cloud Service predictable linear scalability across business flow throughput, CPU usage, and network usage.

Other Oracle Fusion Applications Cloud Service products, such as Oracle Fusion Customer Relationship Management Cloud Service, are based on the same UI technology and application patterns, and have similar scalability characteristics.

Appendix A: Sample Business Flow Steps, Oracle Fusion HCM Cloud Service

- Benefits – Employee Check Benefits: Bring-up URL, Login, Click Navigator, Home Page, Change Benefits, Check Medical, Check Medical 1, Check Medical Next, Un-check Dental, Check Dental, Dental Next, Un-check LI, Check LI, Ll Next, Un-check FSA, Check FSA, FSA Next, Un-check Mis, Check Mis, Mis Next, Submit, Done, Sign Out

- Compensation Workbench Business Flow Steps: Bring-up URL, Login, Nav_WorkComp, Click Annual Plan, Click Compensation History, Click Done, Sort By Job Title, Click Tree Icon, Enter Bonus Amount, Click Cancel, Sign Out

- Payroll Element Entries Business Flow Steps: Bring-up URL, Login, Click on Manage EE Link, Enter Data and Search, Drill Down EE, Click Create Button, Click Search Link, EE Search, Select Row and Ok, Click Continue, Enter Amount and Tab-out, Click Cancel, Click Done, Sign Out

- Portrait Gallery Search Business Flow Steps: Bring-up URL, Login, Click Navigator, Click Gallery, Search Maria Williams, Click First Record, Click Experience Sub-Tab, Click Contact Sub-Tab, Click Org Chart Tab, Click UP Hierarchy Button, Sign Out

- Talent Management – Manager Evaluation Business Flow Steps: Bring-up URL, Login, Navigator, Click Career Performance, Click Search Performance Doc Link, Search Evaluation Doc, Click Manager Evaluation of Workers, Create Doc Continue, Create Doc Confirm OK, Proficiency Level Rating, Performance Rating, Goals Tab, Click Add Goal, Save and Close Goal, Goal Performance Rating, Over All Summary Tab, Competencies Section Rating, Goal Section Rating, Overall Rating, Submit, Submit Warning Yes, Submit Confirmation Ok, Sign Out

- Workforce Management – Create Time Card: Bring-up URL, Login, Click Navigator, Create Time, Enter Month, Enter Year, Enter Date, Regular Search, Perform Regular Search, Select Row OK, Enter Data1, Enter Data2, Enter Data3, EnterData4, Vacation Search, Perform Vacation Search, Vacation Row OK, Enter Friday Data, Click Next, Click Submit, Submit OK, Sign Out

Appendix B: Additional Business Flow Measurements

The following business flows were measured on separate runs, using the same methodology as the other flows in this paper.

Business Flow	Concurrent User Load	Avg Think Time (sec)	Avg. Hits / sec	Business Flows / hour / user	Total Business Flows / hour
Benefits Employee Review	120	16	13	10	1200
Workforce Management – Create Time Card	100	30	8	6	600

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Hardware and Software, Engineered to Work Together

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