White Paper

FUJITSU Server PRIMERGY and PRIMEQUEST in the SAP® BW Edition for SAP HANA® Standard Application Benchmark Version 2

FUJITSU Server PRIMERGY RX4770 M4 and FUJITSU Server PRIMEQUEST 3800B achieved outstanding results running the SAP® BW Edition for SAP HANA® Standard Application Benchmark Version 2 in the 1.3 and 5.2 billion initial records categories. This white paper provides an overview of the benchmark tests and findings.

Content

Management summary

Fujitsu has demonstrated the excellent performance of its PRIMERGY RX4770 M4 and PRIMEQUEST 3800B servers in SAP BW Edition for SAP HANA Standard Application Benchmark Version 2. The two servers, which are central components of the FUJITSU Integrated System PRIMEFLEX, have achieved outstanding results and each received SAP's benchmark certificate.

Since it is crucial for customers to be able to install important patches without having to cope with dramatic performance losses, the benchmarks were conducted with the latest Meltdown and Spectre patches applied and activated.

For the PRIMEQUEST 3800B, Fujitsu also examined how performance develops when the SAP HANA function "materialization of intermediate results" is activated. It turned out that activation of the SAP HANA function considerably improves performance. This means that results differ significantly depending on whether the function is activated during the benchmark or not.

Speed is key … but not only that

As the amount of data that needs to be processed and analyzed in digital business increases, companies need to act and react faster and faster. The main reason SAP developed HANA in-memory technology was to speed up analysis and transaction data access. Today organizations around the world rely on this technology to process data, run reports and analyze data sets much faster, no matter how rapidly data volumes grow. The prerequisite for this is a hardware platform that optimally utilizes the potential of SAP HANA or SAP S/4HANA. In addition to the performance aspect, extensive scaling scope and built-in system features for maximum availability enable enterprises to operate SAP HANA environments with the future-proof reliability they need.

The SAP BW Edition for SAP HANA Standard Application Benchmark Version 2

The performance requirements of the new SAP BW Edition for SAP HANA benchmarks raise the bar in order to ensure that platforms fully utilize the inherent performance of SAP HANA. Three key performance indicators (KPIs) are significant in the benchmark:

1. the Data Load Phase,
2. the Query Throughput Phase,
3. the Query Runtime Phase.

One of the central rules of the benchmark stipulates that the memory utilization must be at least 65%. The permissible data volumes are a multiple of 1.3 billion initial data records.

Fujitsu used the benchmark tests to prove the performance of PRIMERGY RX4770 M4 and PRIMEQUEST 3800B for running SAP HANA and to explore the impact of additional factors on performance.

TESTED SETUP* FUJITSU SERVER PRIMERGY RX4770 M4

- 4 processors, Intel® Xeon® Platinum 8180, 112 cores, 224 threads
- 1,536 GB main memory
- 6x960 GB internal SSDs used for SAP HANA log files
- 2 FUJITSU Storage ETERNUS JX40 S2 with a total of 16x960 GB SSDs for SAP HANA database files
- Separate RAID controllers for SAP HANA data and log

TESTED SETUP* FUJITSU SERVER PRIMEQUEST 3800B

- 8 processors, Intel® Xeon® Platinum 8180, 224 cores, 448 threads
- 3,072 GB main memory
- 2 FUJITSU Storage ETERNUS JX40 S2 with a total of 16x960 GB SSDs for SAP HANA database files
- 1 FUJITSU Storage ETERNUS JX40 S2 with 6x960 GB SSDs for SAP HANA log files
- Separate RAID controllers for SAP HANA data and log

* All benchmarks were run with SUSE® Linux Enterprise Server 12, SAP NetWeaver® 7.50 and SAP HANA 1.0.

Benchmark category 1.3 billion initial records: results for PRIMERGY RX4770 M4

In this benchmark, the latest Meltdown and Spectre Patches were activated, as in this context there is often talk of significant performance losses due to patches. However, the results of the benchmark for PRIMERGY RX4770 M4 show no substantial impact.

The results speak for themselves: The performance of PRIMERGY RX4770 M4 was impressive in all three benchmark phases. In benchmark phase 1 (data load phase), the server was at the top with others. And in phases 2 and 3, PRIMERGY RX4770 M4 outperformed all of the systems tested (as of June 14, 2018), which were run in the 1.3 billion initial records category without activation of the SAP HANA performance function "materializing of intermediate results."

	Results
Benchmark Phase 1: Total Runtime of Data Load/Transformation (seconds)	14,333
Benchmark Phase 2: Query Executions per Hour Records selected CPU utilization of database server	6,901 373,741,654,744 96%
Benchmark Phase 3: Total Runtime of Complex Query Phase (seconds)	102

Date of certification: June 14, 2018
Certification number: 20180017

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Benchmark category 5.2 billion initial records: results for PRIMEQUEST 3800B

For the PRIMEQUEST 3800B, Fujitsu conducted the benchmark in two variants to examine to what impact the SAP HANA function "materialization of intermediate results" has on performance. Initially, testing was performed without activating the function by default. Again, the latest Meltdown and Spectre patches were activated.

The PRIMEQUEST 3800B demonstrated its impressive performance, especially in the query throughput phase, where it achieved the highest throughput (as of August 20, 2018). What is also important for customers: With considerable scope in terms of throughput scaling, the system also offers sustainable investment protection in the event that requirements increase.

	Results
Benchmark Phase 1: Total Runtime of Data Load/Transformation (seconds)	89,915
Benchmark Phase 2: Query Executions per Hour Records selected CPU utilization of database server	5,352 1,021,720,476,100 80%
Benchmark Phase 3: Total Runtime of Complex Query Phase (seconds)	229

Date of certification: August 20, 2018
Certification number: 2018031

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Impact of materializing intermediate query results

In order to investigate the impact of materializing intermediate query results, Fujitsu performed a second benchmark test on the same PRIMEQUEST 3800B environment with that feature activated. This benchmark has not been published, but all certification criteria were fulfilled. This was confirmed by SAP on August 1, 2018. The effect that can be achieved by activating the SAP HANA performance enhancement function is significant in benchmark phases 2 and 3. Compared to the benchmark with deactivated function, 112% more query executions were executed per hour. In addition, the complex query runtime was reduced by 31%. This means that the SAP HANA function is an effective adjusting tool. Depending on whether the function is activated or not, benchmark results cannot be compared.

	Materializing Disabled	Materializing Enabled*	Measured deviation
Benchmark Phase 2: Query Executions per Hour	5,353	11,355	**112% more executions per hour**
Benchmark Phase 3: Total Runtime of Complex Query Phase (seconds)	229	158	**31% shorter runtime**

* These results have not been published

Conclusion

The BW Edition for SAP HANA Version 2 Benchmark confirms the unprecedented performance of the PRIMERGY RX4770 M4 and PRIMEQUEST 3800B servers. Both systems also offer an extremely wide range of configuration options, for example when equipped with the latest Intel Xeon Gold or Platinum processors, as well as wide-ranging in-system upgrade options. For example, with the PRIMERGY RX4770 M4, the main memory can be expanded up to 6 TB, and the PRIMEQUEST 3800B even up to 12 TB. Advanced RAS features for business-critical workloads and state-of-the-art management functions make the systems very reliable and efficient components in the modern data center.

PRIMERGY and PRIMEQUEST are central building blocks of FUJITSU Integrated System PRIMEFLEX. With PRIMEFLEX for SAP HANA Fujitsu offers complete, seamless integrated infrastructures that support the digital strategies of business enterprises with high levels of efficiency and flexibility. The pre-defined and pre-tested infrastructure solutions are based on SAP certified components and cover everything, from pre-installed scale-up systems and VMware virtualized platforms, as well as individual scale-up and scale-out concepts in line with the SAP HANA Tailored Data Center Integration (TDI) approach, right through to customized disaster-tolerant setups.

Further links:

- PRIMEFLEX for SAP (Internet)

- FUJITSU Server PRIMEQUEST (Internet)

- FUJITSU Storage Systems (Internet)

- PRIMERGY RX4770 M4
  Certification 20180017 (PDF)

- PRIMEQUEST 3800B
  Certification 2018031 (PDF)

- Website SAP Benchmarks (Internet)

FUTURE-PROOF THROUGH PARTNERSHIPS

For years Fujitsu has been working very closely with partners such as SAP and Intel in developing solutions that deliver tangible value to our customers.

The partnership with SAP has grown over a period of more than 40 years, and Fujitsu is one of the few SAP partners having Global Partnership Status for Technology, Services and Hosting.

Fujitsu can offer customers in-depth know-how and support, ranging from consulting to the actual operation of the SAP HANA business data platform.