



## **HP DL785: 'The BI Power Server' by HP**

### **An architect's review of HP's newest AMD-based server for Microsoft Business Intelligence Applications**

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#### **Abstract**

Business Intelligence (BI) continues its trend in becoming more prevalent in enterprises across the globe. BI solutions are not simple, nor are they technology driven. BI solutions are driven by business and their key measurements of success. With the upcoming release of the DL785, HP is once again proving they are a strong SQL Server DW/BI server vendor. On November 17, 2008, the DL785 set a new world record in the TPC-H@300 GB decision support benchmark.

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## **The Role of the SQL Server DW/BI Server**

The workload of DW/BI servers is quite different from that of On-line Transaction Processing (OLTP). OLTP servers are designed to support thousands of concurrent transactions while preserving data integrity. DW/BI and thus On-line Analytical Processing (OLAP) servers are read intensive environments. The DW/BI environment is designed to provide detailed reporting for operational and strategic reporting needs. Executives will view their dashboards and scorecards. Business Analysts (BA) will perform ad-hoc exploration via analytical tools. And managers will perform operational reporting throughout the business day. When you aggregate all of this read activity you end up with a potentially heavy workload for the DW/BI server.

DW/BI has intense CPU, memory, and I/O workload(s) based on the above requirements. Multi-core CPUs are beneficial for DW/BI servers as is 64-bit technology. The SQL Server relational database engine, SQL Server Integration Services (SSIS), and SQL Server Analysis Services (SSAS) all directly benefit from both multi-core as well as 64-bit technologies.

For disk usage, Microsoft recommends configuring SQL Server with many small dedicated disks and do not share them with other applications as this creates potential disk contention. Analysis Services I/O benefits from having its data and temporary files placed onto a fast disk subsystem such as RAID. Furthermore, table (and index) partitioning in the SQL Server relational database engine can benefit from having multiple underlying file groups placed on separate disks.

Memory is the most critical component for DW/BI systems built on the Microsoft platform. Integration Services will attempt to perform all transformations in memory given enough free space exists. Analysis Services performance increases substantially with larger memory available to cache common MDX queries (calculation results) as well as faster processing of objects. With enough memory available you can severely limit the number of I/O operations Analysis Services needs to perform and thus increase its overall responsiveness.

## **Scaling-Up with the HP DL785**

The HP DL785 is an AMD-based server equipped with the 8300 series, Quad-Core Opteron. The system can be configured to support up to eight of the Opteron CPUs. The 8300 series has 512KB of level 2 cache per core and 2MB of level-3 onboard cache. The server currently supports a maximum of 512GB of PC2-5300 memory using 8GB sticks.

For I/O, the server leverages HP's P400i Smart Array for increased performance and reliability via its support of the latest SCSI and RAID technologies. The DL785 supports a maximum of 16 hot plug SFF SAS drives for internal storage. Eleven PCI express expansion slots allow you to extend the systems capabilities and there is an optional redundant power supply for higher availability. In addition to the industry leading hardware, the server comes equipped with HP's award winning system management and monitoring software.

SQL Server 2008 x64 Enterprise Edition supports the maximum supported memory by its host Operating System (OS). Windows Server 2008 x64 in turn supports a maximum of two terabytes (TB) of memory. The DL785 that set the benchmark I will discuss momentarily has this software

configuration and thus provides an extreme amount of available memory to all SQL Server components. In addition, the DL785's AMD processors provide SQL Server components with massive parallelism opportunities. Finally, the support for up to sixteen internal disks leveraging the latest in RAID technologies provide an optimal I/O environment for when the various SQL Server services must resort to disk I/O!

## **Scaling-Out with the HP DL785**

In addition to the scale-up capabilities of the HP DL785, the server can provide enterprises with high levels of scalability when used in conjunction with scale-out methodologies. SQL Server 2008 in particular provides the enterprise with both relational as well as analytical scalable-shared database features. Scalable-shared databases require the use of a SAN to centrally provide a read-only database that multiple SQL Server 2008 instances can read from.

Reporting Services 2008 can also be scaled-out by installing and configuring multiple instances of the report server. In addition to SQL Server, Performance Point Server can be scaled-out in much the same methodology by installing multiple instances of its monitoring server. As the number of users or amount of data queried increases, you can continue to scale-out a Microsoft DW/BI solution by adding additional nodes. By implementing scale-out models with the HP DL785 and HP Storage Works SANs you can obtain comparable levels of scalability that the more expensive scale-up servers offer.

## **A Large Retailer's Benefit**

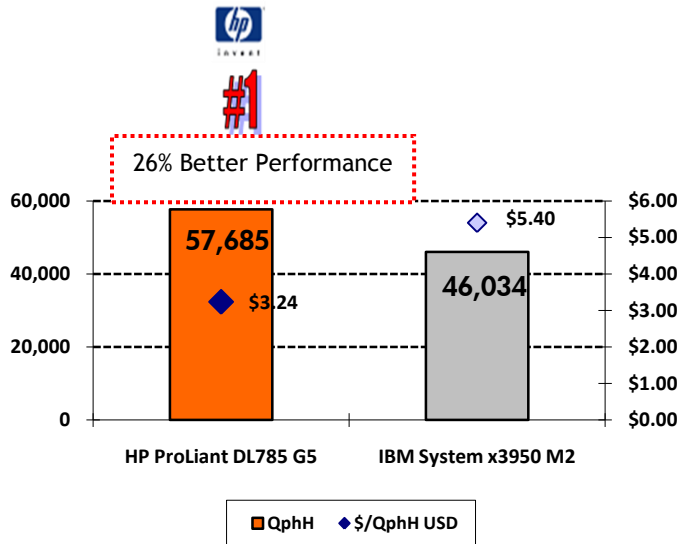
One of Scalability Expert's Business Intelligence clients is a large retailer (one of the largest) that is deploying a new Microsoft DW/BI solution built on HP DL 785 servers. The deployment initially uses two HP DL785s, however as the architecture needs to scale the client can simply add additional HP DL785s to scale-out.

The solution entails a relational data warehouse (RDW) built using the methodologies prescribed by Mr. Ralph Kimball and is housed in a Microsoft SQL Server database. The RDW is approximately 7 Terabytes (TB) in volume. Additionally, we leverage the power of Online Analytical Processing (OLAP) with Microsoft SQL Server Analysis Services multidimensional objects (cubes). The cubes are approximately 3 TB in volume. As you can see, the client is powering a very high-end Microsoft DW/BI solution on the HP DL785!

## **The TPC-H@300GB Benchmark**

TPC-H is a decision support benchmark developed and administered by the Transaction Processing Performance Council (TPC). The test is focused on ad-hoc queries submitted to a data warehouse residing in a relational database at various data volumes. These tests use industry relevant data and queries to simulate real-world workload(s). The main metric reported by the TPC-H is Composite Query-per-Hour (QphH@Size). A similar metric reported by the TPC-H is the price/performance, \$/QphH@Size.

On November 17, 2008 a world record was set in the TPC-H benchmark using the new HP DL785 server. The DL785 was configured with Microsoft Windows Server 2008 x64 along with SQL Server 2008 x64 Enterprise edition. The DL785's reported QphH@300GB was 57,685 queries per hour while its \$/QphH@300GB was \$3.24/57,685 queries per hour. The previous record was set with an IBM x3950 M2 system. The IBM server obtained a QphH@300GB of 46,034 and a \$/QphH@300GB of \$5.40.



- ✓ Best non-clustered performance on TPC-H@300GB
- ✓ Best 8P TPC-H@300GB price/performance
- ✓ 26% better performance than IBM x3950 M2
- ✓ 40% lower price/performance than IBM x3950 M2

## Conclusion

HP has once again proved it is a premier provider of Microsoft DW/BI servers. The DL785 has been designed to serve as an excellent database server and this includes Microsoft Business Intelligence applications. With the recent world record obtained in the TPC-H@300GB benchmark the server is well on its way to becoming a dominant force in the Microsoft DW/BI industry.

## About Scalability Experts

Scalability Experts is a leader in data management and business intelligence for complex data platforms. With recognized expertise and proven methodologies, Scalability Experts delivers solutions-based services, consulting and training that help mid-to-large-scale enterprises drive business performance with improved decision making and operational efficiencies