Principled Technologies®

TEST REPORT SUMMARY
MAY 2009

Initial investment payback analysis summary report: Dell PowerEdge R710 solution with Hyper-V vs. HP ProLiant DL385 solution

Executive summary

Dell Inc. (Dell) commissioned Principled Technologies (PT) to estimate how many months it would take to recapture initial investment costs when consolidating multiple 4-year-old HP ProLiant DL385 server and storage solutions onto a Dell™ PowerEdge™ R710 server and storage solution using Microsoft® Windows Server® 2008 with Hyper-V™ technology (Hyper-V). In this report, we estimate both the number of older solutions each Dell PowerEdge R710 solution can replace and the payback period for replacing those older solutions. We compare the following two solutions:

- Intel® Xeon® Processor X5550-based Dell PowerEdge R710 server with 96 GB of memory using Hyper-V and Dell™ EqualLogic™ PS6000XV storage (Dell PowerEdge R710 solution)
- AMD Opteron 254-based HP ProLiant DL385 server with 4 GB of memory and HP StorageWorks MSA30 storage (HP ProLiant DL385 solution)

KEY FINDINGS

- Each Dell PowerEdge R710 solution with Microsoft® Windows Server® 2008 with Hyper-V™ technology can replace up to seven HP ProLiant DL385 solutions, and could yield a payback in around 16 months.[1] (See Figure 1.)
- The Dell PowerEdge R710 solution with Hyper-V delivered seven virtual servers, each of which yielded performance equivalent to or better than the performance of one physical HP ProLiant DL385 solution. [1]
- The Dell PowerEdge R710 solution with Hyper-V used little more than 1/5th of the power, just under 1/2 of the software costs, and 1/7th of the data center rack space of the seven HP ProLiant DL385 solutions. [1]

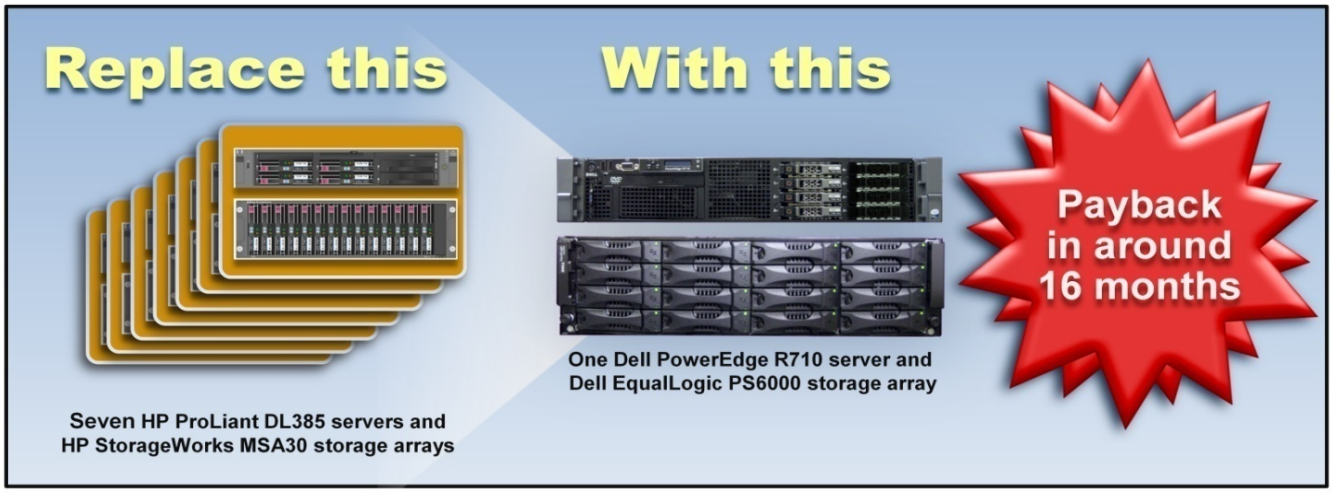

Figure 1: A single Intel Xeon Processor X5550-based Dell PowerEdge R710 solution with Hyper-V allows you to consolidate seven AMD Opteron 254-based HP ProLiant DL385 solutions, with an initial investment payback period of around 16 months. We base this estimation on our specific database workload.

Our test case modeled a typical enterprise datacenter with multiple legacy Dell PowerEdge 2850 solutions running high-demand database workloads. The legacy servers each used 4 GB of memory. The enterprise in this

[1] Based on the Principled Technologies report, "Initial investment payback analysis: Dell PowerEdge R710 solution with Hyper-V vs. HP ProLiant DL385 solution," commissioned by Dell, May 2009.

test case seeks to consolidate several of these legacy workloads onto Dell PowerEdge R710 solutions using Hyper-V and configured with sufficient processors, memory, and storage to handle these workloads.

We used benchmark results from the Dell DVD Store Version 2.0 (DS2) performance benchmark to determine the number of older servers with accompanying storage that a Dell PowerEdge R710 solution could replace. To define the replacement factor, we measured the number of orders per minute (OPM) that the HP ProLiant DL385 solution could perform when running a demanding DS2 workload. We then ran DS2 in virtual machines (VMs) on the Dell PowerEdge R710 solution and measured how many VMs this newer solution could run, while obtaining OPM in each VM equivalent to that of the HP ProLiant DL385 solution. The total number of VMs the Dell PowerEdge R710 solution could handle determines the replacement factor. Based on our specific workload, the replacement factor is seven. Figure 1 depicts this replacement factor for replacing seven AMD Opteron 254-based HP ProLiant DL385 solutions with a single Intel Xeon Processor X5550-based Dell PowerEdge R710 solution, as well as the initial investment payback time of around 16 months.

Figure 2 graphs the payback period and the cost savings of the Dell PowerEdge R710 solution. Savings continue after the initial investment payback period. By the end of year two, we project a savings of $20,379. The line representing the Dell PowerEdge R710 solution accumulates the initial investment cost and the monthly costs of the solution. The initial investment cost includes the list price of the server and half of the cost of the shared storage, as well as the costs of migrating from the seven HP ProLiant DL385 solutions to the newer Dell PowerEdge R710 solution. The line for the seven HP ProLiant DL385 solutions shows the accumulated monthly costs of seven HP ProLiant DL385 solutions. The lines cross at the end of the payback period.

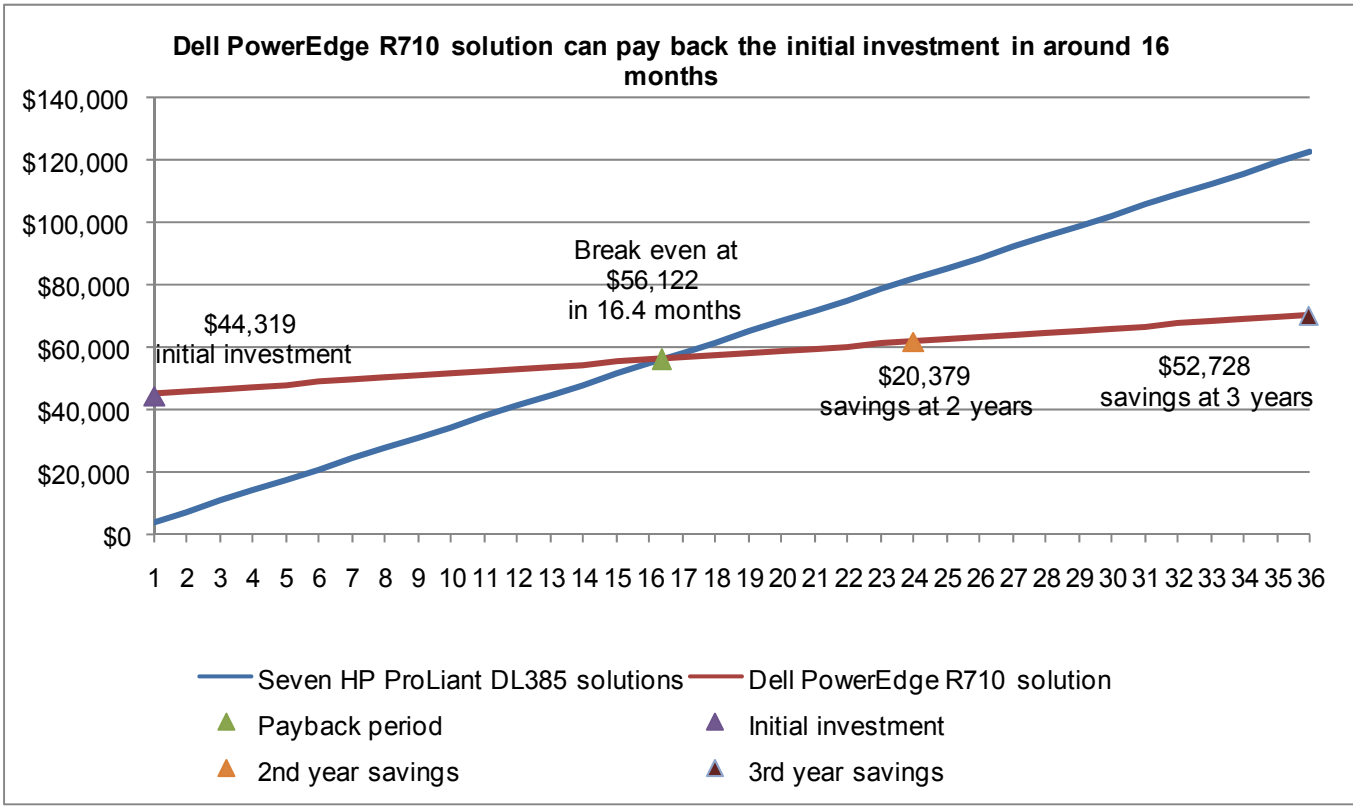

Figure 2: The payback period and cumulative estimated costs for the seven HP ProLiant DL385 solutions and the Dell PowerEdge R710 solution with Hyper-V. Lower costs and higher savings are better.

Four benefits of the Dell PowerEdge R710 solution contribute significantly to the cost savings for this solution:

- **Replaces up to seven HP ProLiant DL385 servers with HP StorageWorks MSA30 storage arrays.** The increased I/O capacity, database performance, and memory efficient design of the Dell PowerEdge R710 solution enables consolidation of multiple older systems for the specific workload we tested.
- **Uses little more than one-fifth of the power of the seven HP ProLiant DL385 solutions it replaces.** The consolidated Dell PowerEdge R710 solution provides considerable energy savings because it requires less than 22 percent of the power of the older HP ProLiant DL385 solutions that it replaces. We gain additional savings in energy costs because the test workload requires at most half the shared storage array.
- **Frees up five Windows Server® licenses.** Consolidation provides software savings if the organization maintains software assurance agreements or can reuse elsewhere the licenses that consolidation frees. We do not include license costs for either solution, as the enterprise would already have paid for the licenses used on the older solution and would transfer them to the new solution. We do include the costs of ongoing software agreements. For the calculations in this paper, we assume that the target organization maintains software agreements for OS and database software and that it can choose to renew or cancel them at the time of consolidation.
- **Requires approximately one-seventh of the data center rack space.** The consolidated Dell PowerEdge R710 solution requires 2u of rack space for the server and 3u for the storage array. The older HP ProLiant DL385 solution requires 5u for each of the seven server-and-storage-array pairs, for a total of 35u; by contrast, the single Dell R710 solution consumes only 5u.

Server configuration information

Figure 3 presents detailed information for the test servers we used in this report.

Servers	Dell PowerEdge R710	HP ProLiant DL385
CPU name	Dual Intel Xeon Processor X5550	Dual AMD Opteron 254
CPU core frequency (GHz)	2.66	2.80
System/vendor and model number	Dell PowerEdge R710	HP ProLiant DL385 G1
RAM	96GB PC3-8500 DDR3	4GB PC-3200 DDR
RAM speed (MHz)	1,066	400
RAM speed in the system currently running @ (MHz)	800	400
Operating system	Windows Server 2008 Enterprise Edition x64	Windows Server 2003 R2 Enterprise Edition
SQL Server version	SQL Server 2008	SQL Server 2005
Storage arrays	iSCSI-attached Dell EqualLogic PS6000XV with 16 450GB 15K RPM SAS drives	SCSI-attached HP StorageWorks MSA30 with 12 146GB 10K RPM U320 SCSI drives

Figure 3: Detailed system configuration information for the two test servers.

For more information on these tests, and to see the full test report, visit: www.principledtechnologies.com.