



## Initial investment payback analysis summary report: Dell PowerEdge R710 solution with VMware ESX vs. Dell PowerEdge 2850 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 Dell™ PowerEdge™ 2850 server and storage solutions onto a Dell PowerEdge R710 server and storage solution using VMware ESX. 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 VMware ESX and Dell™ EqualLogic™ PS6000XV storage (Dell PowerEdge R710 solution)
- Intel Xeon Processor 3.6 GHz-based Dell PowerEdge 2850 server with 4 GB of memory and Dell PowerVault™ 220S storage (Dell PowerEdge 2850 solution)

#### KEY FINDINGS

- Each Dell PowerEdge R710 solution with VMware® ESX™ can replace seven Dell PowerEdge 2850 solutions, and could yield a payback in under 18 months.<sup>1</sup> (See Figure 1.)
- The Dell PowerEdge R710 solution with VMware ESX delivered seven virtual servers, each of which yielded performance equivalent to or better than the performance of one physical Dell PowerEdge 2850 solution.<sup>1</sup>
- The Dell PowerEdge R710 solution with VMware ESX used little more than 1/5th of the power, about 4/5 of the software costs, and 1/7th of the data center rack space of the seven Dell PowerEdge 2850 solutions.<sup>1</sup>



**Figure 1: A single Intel Xeon Processor X5550-based Dell PowerEdge R710 solution with VMware ESX allows you to consolidate seven Intel Xeon Processor 3.6 GHz-based Dell PowerEdge 2850 solutions, with an initial investment payback period of under 18 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

<sup>1</sup> Based on the Principled Technologies report, "Initial investment payback analysis: Dell PowerEdge R710 solution with VMware ESX vs. Dell PowerEdge 2850 solution," commissioned by Dell, May 2009.

test case seeks to consolidate several of these legacy workloads onto Dell PowerEdge R710 solutions using VMware ESX 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 Dell PowerEdge 2850 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 Dell PowerEdge 2850 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 Intel Xeon Processor 3.6 GHz-based Dell PowerEdge 2850 solutions with a single Intel Xeon Processor X5550-based Dell PowerEdge R710 solution, as well as the initial investment payback time of under 18 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 \$15,176. 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 Dell PowerEdge 2850 solutions to the newer Dell PowerEdge R710 solution. The line for the seven Dell PowerEdge 2850 solutions shows the accumulated monthly costs of seven Dell PowerEdge 2850 solutions. The lines cross at the end of the payback period.

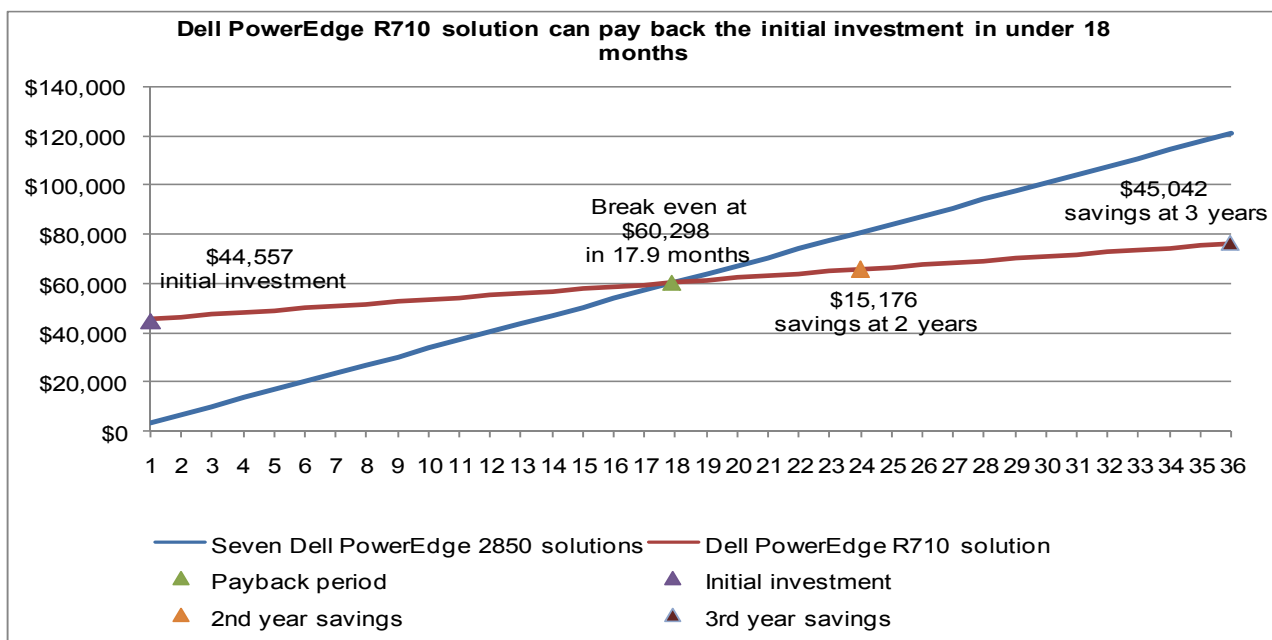


Figure 2: The payback period and cumulative estimated costs for the seven Dell PowerEdge 2850 solutions and the Dell PowerEdge R710 solution with VMware ESX. Lower costs and higher savings are better.

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

- **Replaces up to seven Dell PowerEdge 2850 servers with Dell PowerVault 220S 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 slightly more than one-fifth of the power of the seven Dell PowerEdge 2850 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 Dell PowerEdge 2850 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 Dell PowerEdge 2850 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	Dell PowerEdge 2850
CPU name	Dual Intel Xeon Processor X5550	Dual Xeon Processor 3.6 GHz
CPU core frequency (GHz)	2.66	3.60
System/vendor and model number	Dell PowerEdge R710	Dell PowerEdge 2850
RAM	96GB PC3-8500 DDR3	4GB PC2-3200 DDR
RAM speed (MHz)	1,066	400
RAM speed in the system currently running @ (MHz)	800	400
Operating system	VMware ESX Build 148592	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 Dell PowerVault 220S with 14 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:

<http://principledtechnologies.com/Clients/Reports/Dell/Paybackperiod-DellR710vDell2850ESX.pdf>.

Principled Technologies, Inc. 1007 Slater Road, Suite 250, Durham, NC 27703 [www.principledtechnologies.com](http://www.principledtechnologies.com)

Principled Technologies is a registered trademark of Principled Technologies, Inc. All other product names are the trademarks of their respective owners. Disclaimer of Warranties; Limitation of Liability: PRINCIPLED TECHNOLOGIES, INC. HAS MADE REASONABLE EFFORTS TO ENSURE THE ACCURACY AND VALIDITY OF ITS TESTING, HOWEVER, PRINCIPLED TECHNOLOGIES, INC. SPECIFICALLY DISCLAIMS ANY WARRANTY, EXPRESSED OR IMPLIED, RELATING TO THE TEST RESULTS AND ANALYSIS, THEIR ACCURACY, COMPLETENESS OR QUALITY, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE. ALL PERSONS OR ENTITIES RELYING ON THE RESULTS OF ANY TESTING DO SO AT THEIR OWN RISK, AND AGREE THAT PRINCIPLED TECHNOLOGIES, INC., ITS EMPLOYEES AND ITS SUBCONTRACTORS SHALL HAVE NO LIABILITY WHATSOEVER FROM ANY CLAIM OF LOSS OR DAMAGE ON ACCOUNT OF ANY ALLEGED ERROR OR DEFECT IN ANY TESTING PROCEDURE OR RESULT.