

# INCREASING DENSITY AND SIMPLIFYING SETUP WITH INTEL PROCESSOR-POWERED DELL POWEREDGE FX2 ARCHITECTURE

## DELL™ POWEREDGE™ FX2 SOLUTION SAVED TIME AND LABOR ON DEPLOYMENTS

Advanced architecture and management features saved time and labor during server deployments on Dell PowerEdge FX2 enclosures with FC630 servers\*.

**133 FEWER STEPS**

to deploy 42 servers

Dell

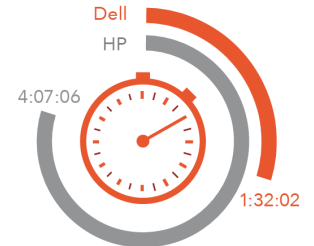


HP



**62.8% LESS TIME**

to deploy 42 servers



**POWERED BY THE INTEL® XEON® PROCESSOR E5-2600 V3 PRODUCT FAMILY**



\*compared to HP ProLiant DL360 Gen9 rack servers

As your business grows, it faces the challenge of deploying, operating, powering, and maintaining an increasing number of servers in a limited amount of space. Blade servers can increase density, but require a large upfront investment for a full-sized blade enclosure and may be too large an infrastructure for some use cases. Traditional rack servers, while proven, don't take advantage of recent advances in consolidated cabling and fabric-sharing technologies. The new Dell PowerEdge FX2 converged architecture, powered by Intel Xeon E5-2600 v3 processors, combines elements from both approaches, using higher-density server and storage blocks with IO aggregators that fit into a sleek 2U rack enclosure.

In our labs at Principled Technologies, we compared the deployment of an HP rack server against the new Dell PowerEdge FX2 rack enclosure with a half-height, Intel processor-powered Dell PowerEdge FC630 server block. Each FX2 enclosure can house four PowerEdge FC630s, so four FC630 servers fit into just 2U of space. Based on this comparison, we found that 42 PowerEdge FC630 servers would fit in nearly half the space as the same number of 1U HP ProLiant DL360 Gen9 servers. Due to the compact, enclosure-and sled-based nature of the Dell PowerEdge FX2 solution, we found cabling and setting up 42 PowerEdge FC630 servers would take 77 steps and 92 minutes.



Compared to the 210 steps and 247 minutes it would take to set up a full rack of 42 HP servers, that's 133 less steps and a time savings of 62.8 percent, in addition to a space savings of 50 percent.

The benefits of such a solution and its eased deployment are clear. Increasing density with the Dell PowerEdge FX2 rack enclosure and Dell PowerEdge FC630 fits more computing power into less physical space, which can save in infrastructure costs and simplify your data center. In addition, IT staff can focus on strategic tasks to help your business thrive with this extra time, instead of focusing on rote deployment tasks.

## DEPLOYMENT ADVANTAGES WITH DELL POWEREDGE FX2 & DELL POWEREDGE FC630

Increasing the compute density of existing space by selecting the Dell PowerEdge FX2 enclosure, with its shared infrastructure approach, can be a better business decision than other available options, such as expanding the size of your data center. You can deploy your FX2 solution like a traditional rack-mounted server while gaining the benefits and features provided by more expensive, dense blade solutions. The Dell PowerEdge FX2 enclosure has a standard 2U footprint, fits four half-width or eight quarter-width compute nodes, and features a modular design that can hold different combinations of compute and storage nodes. Important features of the PowerEdge FX2 enclosure include the following:

- Up to eight low-profile PCIe® expansion slots
- Two pass-through or optional networking FN I/O Aggregator modules
- Embedded network adapters within the server nodes
- Offers both chassis-based management through the Chassis Management Controller (CMC) and rack-based management through Integrated Dell Remote Access (iDRAC) with Lifecycle Controller on each compute node

The Dell PowerEdge FX2 enclosure can be configured with a number of server and storage options, including the PowerEdge FM120, PowerEdge FC430, PowerEdge FC630 servers, PowerEdge FC830 and PowerEdge FD332 storage nodes—all powered by Intel.

Intel processor-powered Dell PowerEdge FC630 servers are half-width, half-height compute nodes designed for hosting virtualized environments, business intelligence applications, database workloads, and private clouds. Each PowerEdge FC630 features two Intel Xeon E5-2600 v3 processors and up to 24 DIMMs. Each enclosure can hold four two-socket Dell PowerEdge FC630 server nodes. For more information about the Dell PowerEdge FX2 solution and Intel processor-powered Dell PowerEdge FC630 server, visit [www.dell.com/us/business/p/poweredge-fx/pd](http://www.dell.com/us/business/p/poweredge-fx/pd).

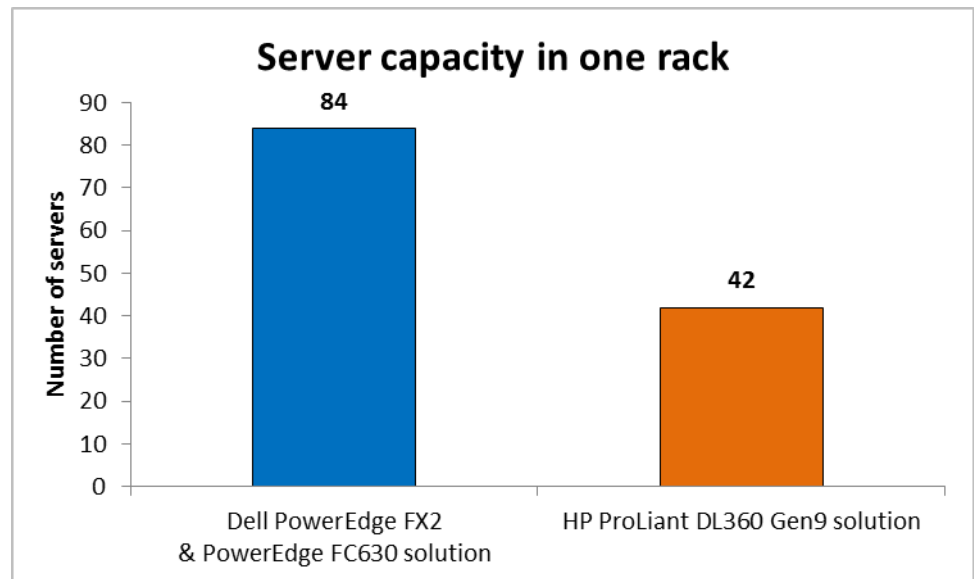
## THE DEPLOYMENT BENEFITS OF DELL POWEREDGE FX2

First, we set up and cabled a traditional two-socket 1U HP ProLiant DL360 Gen9 rack server. We counted the number of steps and timed how long it took from the box to just before OS deployment. We extrapolated this data for a full 42U rack of the HP servers. Then, we set up and cabled a Dell PowerEdge FX2 enclosure with four PowerEdge FC630 servers. We extrapolated the data to set up 42 PowerEdge FC630 servers in 11 PowerEdge FX2 enclosures to equal the full rack of HP servers. For more information on our test systems, see [Appendix A](#). For information on how we tested, see [Appendix B](#).

## WHAT WE FOUND

### Saving space + increasing rack density

We found that the Dell PowerEdge FX2 and PowerEdge FC630 solution could house the same number of processors in a much smaller space than racks of 1U HP ProLiant DL360 Gen9 servers. The increased density of the Dell PowerEdge FX2 solution means that it would take only 22 U of rack space (11 FX2 enclosures) to match the number of servers in a full 42U rack of 1U HP ProLiant DL360 Gen9 servers, with a space savings of nearly 50 percent. Put differently, you can double your rack density by fitting 21 PowerEdge FX2 enclosures into one 42U rack, housing 84 PowerEdge FC630 servers in the same space you'd need for only 42 HP ProLiant DL360 Gen9 servers with similar processing power (see Figure 1).



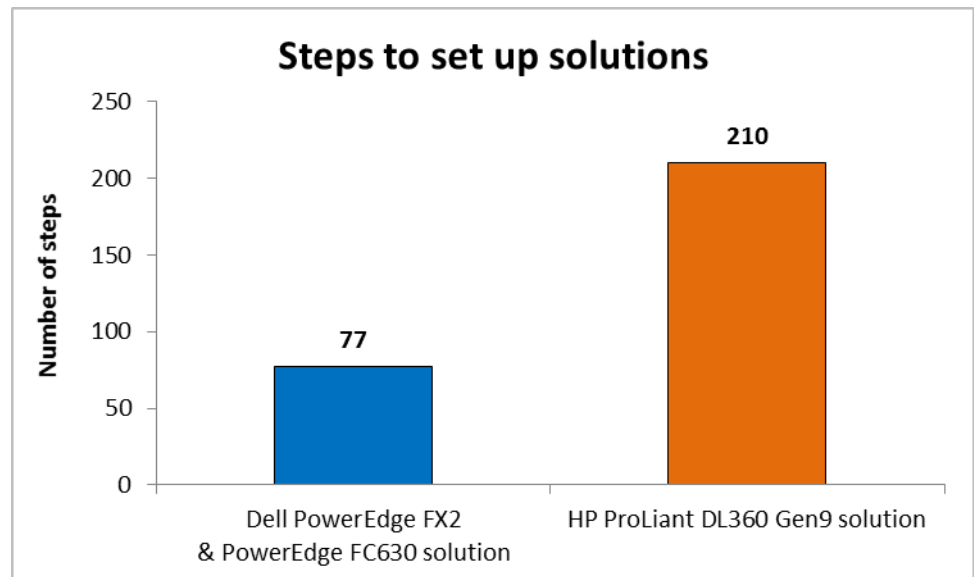
**Figure 1: The Dell PowerEdge FX2 solution increased rack density over the traditional HP rack server solution. Higher numbers are better.**

## Saving time and labor + simplifying setup

The shared infrastructure design of the Dell PowerEdge FX2 solution doesn't just increase density to save space—it saves on cabling complexities and simplifies setup because it fits multiple servers into the enclosure. Rather than cabling each server in the enclosure, you need only to cable the enclosure itself, as the networking and I/O fabrics are shared amongst the nodes. In contrast, on the HP ProLiant DL360 Gen9 rack server, you must cable each port, on both data and management networks, individually, resulting in more cable complexity and potentially overburdening top-of-rack switches. Cabling the Dell PowerEdge FX2 enclosure solution reduced the time and number of steps in the setup process compared to the HP solution.

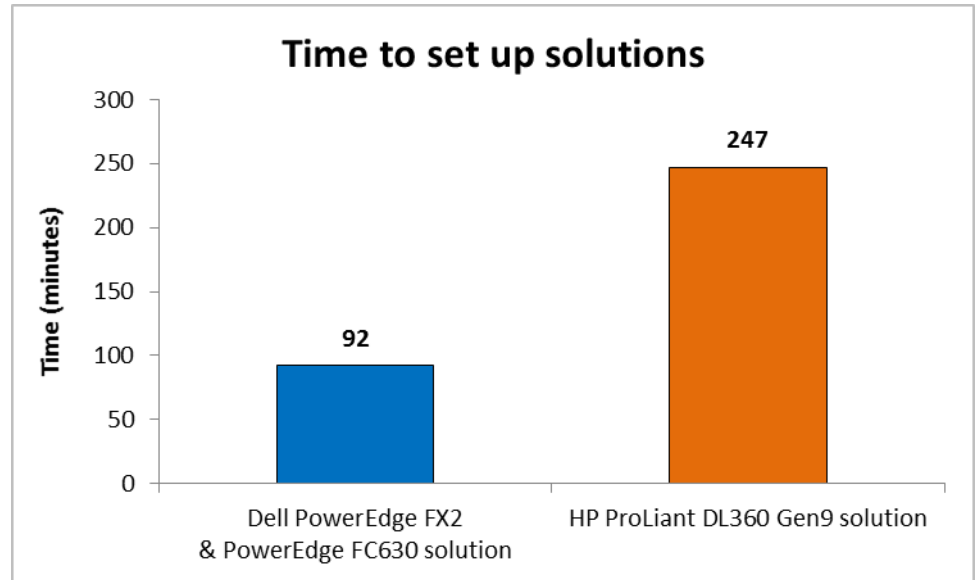
We found that it would take 77 steps to set up 11 Dell PowerEdge FX2 enclosures with 42 PowerEdge FC630 servers and 210 steps to set up the same number of HP ProLiant DL360 Gen9 servers (see Figure 2).

Figure 2: The Dell PowerEdge FX2 solution would take 133 fewer steps to set up than a 1U-based HP full-rack solution. Lower numbers are better.



More steps naturally means more time. We found that it would take 247 minutes to set up a rack of 42 1U HP servers, while the setup of equivalent Dell PowerEdge FC630 servers in Dell PowerEdge FX2 enclosures would take 92 minutes—that's 62.8 percent, or over two and a half hours, less time (see Figure 3). The savings in steps and time with the PowerEdge FX2 and PowerEdge FC630 shared infrastructure solution means that IT staff can operate more efficiently, potentially reallocating saved time and resources toward other strategies and implementations in the data center.

Figure 3: The Dell PowerEdge FX2 enclosure would take 62.8 percent less time to set up than a 1U-based HP full-rack solution.



## IN CONCLUSION

Adopting shared-infrastructure solutions that increase density can help you make the most out of valuable data center space while also freeing up IT resources to work on other projects. However, this deployment decision should make sense for your business, be streamlined, and optimize your deployment resources. As we found, the Dell PowerEdge FX2 enclosure with Intel processor-powered PowerEdge FC630 servers could help your business do just that. The Dell PowerEdge FX2 solution can pack up to twice as much processing power into a single rack than a full rack of HP ProLiant DL360 Gen9 servers. We also found that the shared infrastructure of the Dell FX2 design would reduce setup by 133 steps and would take 62.8 percent less time, or over two and a half hours, than it would take to cable and set up the same number of HP ProLiant DL360 Gen9 rack servers. By increasing density and simplifying setup, the Dell PowerEdge FX2 enclosure with PowerEdge FC630 servers could let your business get the density benefits of a blade-based solution while maintaining familiarity with rack management toolsets and deployment practices.

## APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 4 provides detailed configuration information for the test systems.

System	Dell PowerEdge FX2	HP ProLiant DL360 Gen9
<b>Power supplies</b>		
Total number	2	1
Vendor and model number	Dell D1600-S0	HP DPS-500AB-13 A
Wattage of each (W)	1,600	500
<b>Cooling fans</b>		
Total number	8	5
Vendor and model number	2 x PIH080Q12H/ 6 x JX1WX-A00	Nidec V40W12BS1M5
Volts	12	12
Amps	8.50/ 3.30	1.10
<b>General</b>		
Number of processor packages	2	1
Number of cores per processor	12	6
Number of hardware threads per core	2	1
<b>CPU</b>		
Vendor	Intel	Intel
Name	Xeon	Xeon
Model number	E5-2690 v3	E5-2609 v3
Socket type	LGA 2011-3	LGA 2011-3
Core frequency (GHz)	2.60	1.90
Bus frequency	9.6 GT/s	6.4 GT/s
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	256 KB (per core)	256 KB (per core)
L3 cache	30 MB	15 MB
<b>Platform</b>		
Vendor and model number	Dell PowerEdge FC630	HP ProLiant DL360 Gen9 (780017-S01)
Motherboard model number	0JXJPT	775400-001
<b>Memory module(s)</b>		
Total RAM in system (GB)	64	8
Vendor and model number	Samsung M393A1G43DB0	Samsung M393A1G40D80
Type	PC4-2133P	PC4-2133P
Speed (MHz)	2,133	2,133
Size (GB)	8	8
Number of RAM module(s)	8	1
Chip organization	Dual sided	Dual sided
Rank	Dual	Dual
<b>RAID controller</b>		
Vendor and model number	Dell H730	HP H240

System	Dell PowerEdge FX2	HP ProLiant DL360 Gen9
<b>Hard drives</b>		
Vendor and model number	Dell ST300MM006	HP AL13SEB300
Number of drives	2	2
Size (GB)	300	300
RPM	10,000	10,000
Type	SAS	SAS
<b>Ethernet adapters</b>		
Vendor and model number	Broadcom 57810-k	HP 331FLR Adapter

Figure 4: System configuration information for the test systems.

## APPENDIX B - HOW WE TESTED

For testing, we installed and cabled a full 42U rack of HP ProLiant DL360 Gen9 1U servers and 11 Dell PowerEdge FX2 enclosures with 42 PowerEdge FC630 servers installed. We did not have a full rack of equipment available, so we timed how long it took to install and cable one of them and extrapolated the results for the total amount.

For both systems, we cabled both network and power cables. For the HP ProLiant DL360 Gen9, we installed network cables to the network and management onboard ports. We connected two ports to the I/O Aggregator on the Dell PowerEdge FX2 enclosure. We cabled two network ports so it would give redundant connections.

In both cases, we assumed the servers came configured with all parts, so there was no reason to open the server case and install additional hardware.

### Dell PowerEdge FX2 enclosure

The Dell PowerEdge FX2 enclosure shipped with four PowerEdge FC630 servers installed. We followed the installation documentation that requested removing the servers before installing the enclosure into the server rack. We used the following steps for the installation:

1. Open and remove outer box.
2. Remove four blades from FX2 chassis.
3. Unbox and install rails.
4. Install FX2 chassis.
5. Insert FC blades.
6. Connect power cables.
7. Connect network cables.

### HP ProLiant DL360 Gen9

We used the following steps for the installation of the HP ProLiant DL360 Gen9 servers:

1. Open and remove outer box.
2. Unbox and install rails.
3. Install HP DL360 Gen9.
4. Connect power cables.
5. Connect network cables.



## ABOUT PRINCIPLED TECHNOLOGIES



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