Flexibility with Dell PowerEdge FX converged architecture

A look at hardware options and systems management.

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Converge like never before

Built on new 13th generation Dell PowerEdge technology, FX re-interprets the server and combines rack and blade technologies, allowing you to incrementally add or swap small IT building blocks, including servers with different processor architectures and memory sizes, direct attached storage units, IO modules, all into a 2U converged-infrastructure rack mount and rack-managed chassis.

FX2 excels with flexibility in all aspects of its design. With four compute node options, a storage block option, up to eight PCIe 3 expansion slots, and combinations of IO modules including Ethernet and combination Fibre Channel/Ethernet to choose from, data center managers can adjust the architecture of the system to fit the needs of their particular applications. This could range from using Intel Atom processor-based FM120 microservers for a scale-out high-density–based application, to using FC630 servers, a new workhorse powered by the Intel Xeon processor E5-2600 v3 product family, for heavier workloads. Other combinations could include 1.8" SSDs with the FD332 storage unit, with the flexibility to add storage software such as SanDisk DAS Cache or VMware Virtual SAN for the perfect all-in-one solution for software-defined storage technology.

By combining concepts from traditional blade and hyper-scale architecture technologies with proven rack-based approaches to management and cabling, the FX is designed to appeal to both customers new to the converged space and customers who are experienced with using shared infrastructure.

While the flexibility of the compute and storage blocks is revolutionary for the converged space, FX's flexible management makes an even bigger splash. As one of the first converged infrastructure systems with the ability to be managed like a rack or a blade, FX is breaking down the barriers that previously kept customers from playing in the hyper-dense converged space.

The building blocks of Dell PowerEdge FX Architecture

Figure 1. Dell PowerEdge FX server options

The Dell FX Architecture consists of several components: the revolutionary 2U PowerEdge FX2 enclosure, flexible server block options that can scale performance and density to meet every need, a half-width direct attached storage (DAS) block designed specifically for the FX platform, and networking IO aggregators.

The PowerEdge FX2 Enclosure is a sleek 2U chassis that supports all the different resource blocks you need to power your environment and applications. The FX2 fits servers, storage, and networking into one easy-to-manage chassis, sliding components into half-height sleds that connect to the shared infrastructure via a flexible IO fabric. The blocks share power, networking, I/O fabric, PCIe fabric, and have the ability to share management capabilities through the FX2 enclosure like a typical blade server, or can be managed on a per-node basis, like a traditional rack server.

With the PowerEdge FD332 (coming soon), a half-width storage block, comes a scale-out computing solution that's truly flexible, housing up to 16 direct-attached small form factor storage devices. Dense environments in need of a software-defined storage solution, such as VMware Virtual SAN or Microsoft Storage Spaces shine with the FD332 storage.

FX architecture has a number of servers to choose from. Looking for a power-efficient server for your scale-out Web server farm? The PowerEdge FM120x4 server is the right server block for you. Built on the Intel Atom processor C2000 product family, the FM120X4 is a cost-effective and highly dense option for workloads such as Web server hosting.

Perhaps you need servers for general-purpose workloads such as virtualization, analytics, or dedicated hosting. The PowerEdge FC430 (coming soon) can meet your needs. The FC430 is perfect for those with an emphasis on high reliability, density, and IO throughput.

If you're running a heavy virtualization environment or plan to run business intelligence applications, databases, or private clouds, the FC630 is your block of choice. This half-width, half-height server block has powerful Intel Xeon E5-2600 v3 processors and a large memory footprint ideal for powering these types of applications.

The full-width, half-height PowerEdge FC830 (coming soon) fits up to four processors in its server block and boasts dense compute and memory scalability along with an expandable storage subsystem. This makes it the perfect choice for large enterprise data centers running intense CPU and memory-hungry applications.

For an in-depth look at the technical specs for FX architecture server options, see Appendix A.

Blending the rack and the blade approach

For years, data center managers have had to choose between rack or blade servers. Rack-based servers aren't the densest option, but are easy to deploy, easily managed with straightforward toolsets, and require less upfront investment. Blade servers are highly dense, but are more complex to deploy, require special networking components, and require more upfront capital expense for the accompanying infrastructure. Blade infrastructures also may have different management tools than rack server infrastructure, requiring two sets of skills necessary for your staff. Dell FX architecture removes this rack versus blade decision by blending the benefits of both and leaving the drawbacks behind.

- **Get the high density of blades.** The FX architecture offers a wide variety of incredible densities to help you make the most of your physical data center space, ranging from full-width (FC830), half-width (FC630), quarter width (FC430), to half-width x4 micro servers (FM120x4).. With these densities, amazing processing capabilities converge in a single rack – ranging from 2,688 Intel Atom processor cores in a rack of FM120x4 servers to 3,024 Intel Xeon processor cores in a rack of FC630 servers.
- **Everything you need for minimal investment.** These bite-sized building blocks are less expensive than blade server infrastructures which may be too large for your current needs, so you can break even far sooner with an FX architecture than with large blade server deployments. And, with the flexibility to add as you grow, you can add more nodes as your business needs change. This eliminates the risk of making poor investments on hardware that may not serve your needs five years down the road.

- **Management tools for maximum efficiency.** Manage your FX architecture with the approach that fits for you – either using per-server rack management tools with the integrated Dell Remote Access Controller (iDRAC), or monitoring the shared infrastructure elements such as fans, power supplies, and PCIe devices via the Chassis Management Controller (CMC).

Flexibility in networking, IO, and fabric for maximum savings

The flexibility of FX architecture doesn't stop at the compute layer. Each FX chassis supports two networking IO modules that give you blazing fast performance and ultra-low latency. Shared infrastructure networking options for the FX2 chassis include three options: the Dell Networking FN410s, the FN410T, and the FN2210S IO aggregators.

Table 1. IO aggregator options for the FX Architecture

	FN410S IOA	FN410T IOA	FN2210S IOA
Port availability	4x 1Gb/10GbE SFP+ ports, 8 internal ports	4x 100Mb/1Gb/10Gb BASE-T ports, 8 internal ports	Either 4x 2/4/8Gb Fibre Channel ports, 8 internal ports OR 2x 2/4/8GB Fibre Channel plus 2x 1Gb/10GbE SFP+ ports, 8 internal ports

For data centers that have already moved to converged networking, this combination of ports on the IO aggregators allows for true network convergence. Data centers that haven't yet made that move still have the option of native Ethernet and Fibre Channel.

These FN IO aggregator modules remove the hassles of cable management by reducing the number of cables by as much as 8-to-1. They also cut down on up-stream top-of-rack (ToR) switches by as much as 75 percent, reducing cost and maintenance of these and other enabling devices. Administrators can also manage the IOA units via the GUI, or through a CLI using Dell Networking OS 9.

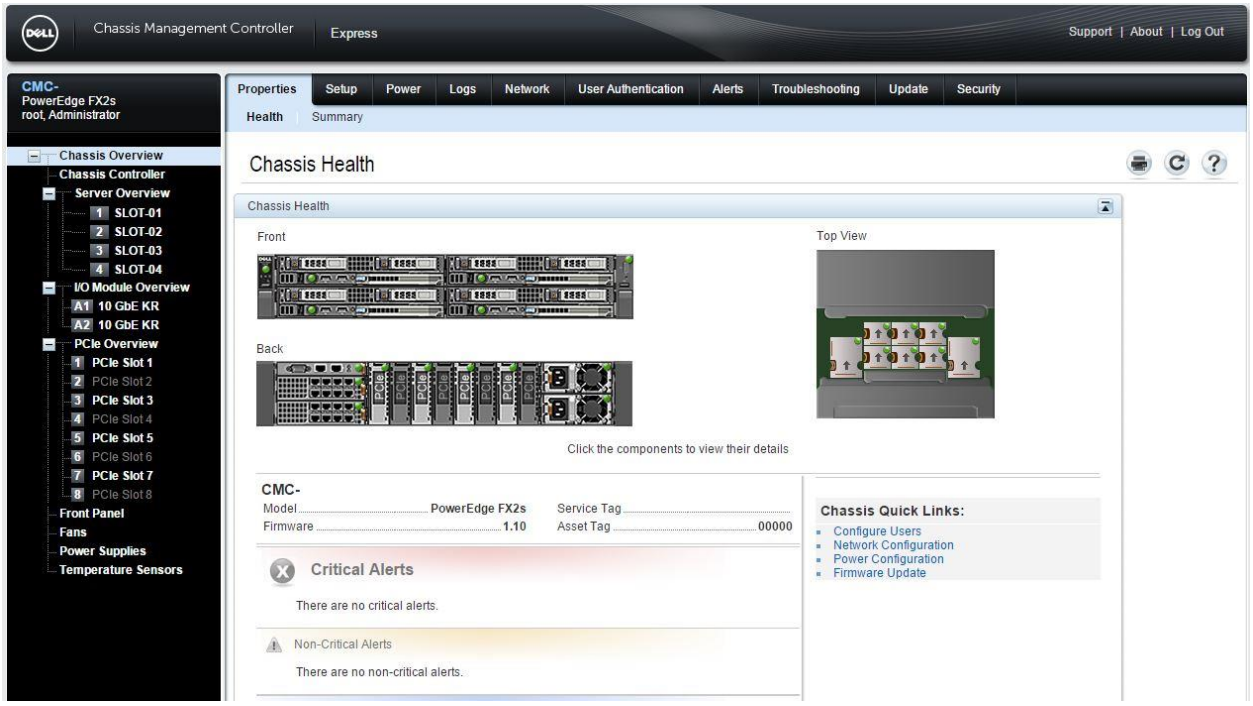
Save big with flexible, streamlined management

Systems management can be a challenge for business of all sizes—it takes a lot of time and money to get servers up and running and continue routine maintenance tasks once they're in production. Dell PowerEdge FX converged architecture solves these challenges with built-in management tools that automate many routine tasks to make life easier for administrators. Dell Chassis Management Controller and the embedded iDRAC with Lifecycle Controller work together to give you the flexibility to manage your FX2 chassis how you choose.

Intuitive management with CMC

Blending the capabilities of rack and blade server management tools, the integrated management tools that PowerEdge FX converged architecture features allow you to manage the entire system—storage, servers, networking, and power—through a single pane of glass, eliminating the need for multiple tools. With Dell CMC, administrators get the benefit of a secure browser-based interface that uses policy-based controls and one-to-many XML profile replication to an entire chassis at once. CMC is also able to perform iDRAC functions such as updates, settings changes, and remote sessions directly from the CMC console.

Figure 2. Dell CMC console for the PowerEdge FX



Using CMC, one PowerEdge FX2 chassis can manage as many as 19 other chassis, each one able to inherit the profile and settings of the original. That makes it a snap for administrators to deploy new chassis; no longer must you configure each solution individually.

CMC FlexAddress technology is another win for administrators using FX2 architecture, and brings some of the blade management capabilities to the rack form factor of the FX2. It removes the network and storage identity from the server hardware itself and instead links it to its chassis slot. When servicing or upgrading a server or mezzanine card, the CMC maintains mapping to Ethernet and storage fabrics and handles everything for you. This means that you can upgrade or replace components inside the FX2 chassis resulting in reduced downtime and saved administrator time, money, and resources.

Yet another way CMC simplifies data center management is through policy-based controls with Quick Deploy and Server Configuration Replication. Just as FlexAddress links settings to a chassis slot rather than servers themselves, Quick Deploy lets you assign a server profile to a chassis slot. Once you've preconfigured and linked a profile to a slot through the CMC console, just insert a server into the slot to have it configure itself. Through this process, you can easily test and deploy settings to multiple servers and skip the tedious process of coordinating and providing infrastructure, configuring servers, and installing the server OS and applications individually. Quick Deploy and Server Configuration Replication not only save time, they also ensure consistency across your PowerEdge FX converged architecture and guarantee that your organization's standards are in place across all servers.

Updating your drivers and firmware has never been easier. With One-To-Many Updates, CMC can deliver the latest firmware and driver versions to all of your FX architecture with the click of a button. Gone are the days of going server by server, update by update. Simply define the updates you wish to use and replicate them to your other managed chassis for a speedy, sustainable solution that saves big on administrator time.

Integration with iDRAC to save even more time

Keeping the consistency in management tools and approaches constant across generations of Dell servers, embedded in every Dell PowerEdge FX architecture server is an integrated Dell Remote Access Controller (iDRAC) with Lifecycle Controller, an agent-free tool that helps you deploy, update, monitor, and maintain your PowerEdge FX servers. The iDRAC communicates with the CMC to give you great access and flexibility in managing the building blocks that make up your FX converged architecture.

New server node? No problem.

iDRAC makes deploying your servers a breeze with zero-touch Auto Configuration, which automates server profile application. With Auto-Configuration, all you need to do is fit your PowerEdge server into the FX2 chassis, connect to the network, and power it on—iDRAC automatically retrieves and applies the desired profile from your pre-configured DHCP server. These profiles are stored on a shared repository. By quickly and correctly applying your desired hardware settings, Auto Configuration removes the potential for error and gets your servers up and running in no time. A recent Principled Technologies study found that iDRAC Auto Configuration could save an organization deploying 100 servers nearly three days of administrator time and eliminate 21,300 manual steps, which frees up administrators to focus on more strategic initiatives.[1]

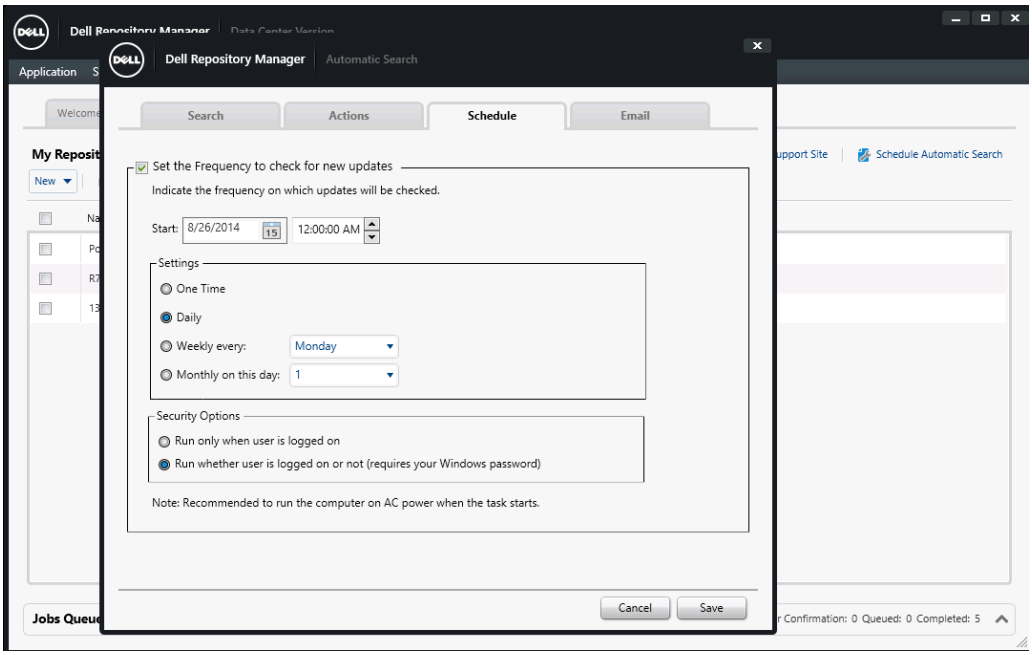
Another time saving feature that iDRAC delivers for PowerEdge FX architecture is Easy Restore. With Easy Restore, you can replace a system motherboard without dealing with new service tags and system discovery and tracking. Rather than wasting time reconfiguring settings manually, administrators can automatically restore BIOS, NIC, iDRAC, and license settings, or can use the front panel to restore them.

Upping your update game

Updates to firmware or drivers must be carefully tested and planned to ensure optimal performance in production environments. Part of iDRAC 8 is Dell Repository Manager with Zero-Touch Repository Management, which makes it easy for you to plan your organization's update cycle. Administrators can define custom repositories with driver and firmware updates that automatically update their contents as updates become available. No longer do administrators have to hunt for the latest versions: they're all right there, available for testing before you apply them to your FX architecture during your planned maintenance schedule.

[1] http://www.principledtechnologies.com/Dell/13G_Systemsmgmt_0914.pdf

Figure 3. Using Repository Manager to check for updates



It isn't just the repository that you can set for automatic checks for updates. The iDRAC gives administrators the ability to pre-stage maintenance and perform updates automatically during off-peak hours, reducing the burden on IT staff. That means no more treks into the office in the middle of the night to keep your FX2 up to date.

State-of-the-art power management

It's expensive to keep your servers powered and cooled, so lowering those operating expenses can make you a hero to the folks who write your budget. Dell OpenManage Essential Power Center can help you do just that for your FX architecture. In conjunction with the iDRAC, OME Power Center keeps track of the power your PowerEdge servers are using and can use that information to optimize power utilization. When you master your power utilization, you can make power-usage decisions that save money, increase uptime, and even improve the server density of your data center.

Get started with Dell PowerEdge FX architecture

Flexibility? Check. Maximum space efficiency? Check. Easy management? Check. Dell PowerEdge FX converged architecture delivers an unparalleled number of options so you can get exactly what you need from your infrastructure. With the flexibility to diversify your server lineup as your workloads increase and change with your growing business, scale-out storage blocks for maximum density with a number of software options, and FN IO aggregator options for simplified networking, PowerEdge FX architecture has you covered. To get started making your way into the converged architecture space with PowerEdge FX architecture, contact your Dell representative today or learn more at http://www.dell.com/us/business/p/poweredge-fx/pd.

Appendix A – PowerEdge server options for FX

Table 2. Dell PowerEdge compute options for the FX Architecture

PowerEdge model	Processor options	Memory options	PCIe Fabric options	Storage options
PowerEdge FM120x4 (16 per FX2)	One Intel Atom C2000 System on a Chip (SoC) processor with 2-, 4- or 8-core options (up to 128 cores per FX2)	Two DIMMs of memory (up to 32 DIMMs per FX2)	N/A	One 2.5" HDD or two 1.8" SATA SSDs (up to 16 x 2.5" HDDs or 32 x 1.8" SSDs per FX2)
PowerEdge FC430 (8 per FX2)	Two multi-core Intel Xeon® E5-2600 v3 processors	Up to 8 memory DIMMs (up to 64 DIMMs per FX2)	Access to one PCIe expansion slot in the FX2 chassis	Two 1.8" SATA SSDs (w/PCIe access) OR one 1.8" SATA SSD (w/front IB Mezzanine port)
PowerEdge FC630 (4 per FX2)	Two 18-core Intel Xeon E5-2600 v3 processors (up to 144 cores per FX2)	Up to 24 memory DIMMs (up to 96 DIMMs per FX2)	Access to two PCIe expansion slots in the FX2 chassis	Two 2.5" HDDs or up to eight 1.8" SSDs Support for up to two Express Flash NVMe PCIe SSDs
PowerEdge FC830 (2 per FX2)	Up to four next-generation multi-core Intel Xeon processors	Up to 48 memory DIMMs (up to 96 DIMMs per FX2)	Access to four PCIe expansion slots in the FX2 chassis	Up to eight 2.5" HDD/SSDs or 16 1.8" SSDs Support for Express Flash NVMe PCIe SSDs