Charter Manufacturing reaps the benefits of a multi-cloud environment with Nutanix

Nutanix Enterprise Cloud improves efficiencies at a family of manufacturing companies serving customers around the world

A few years ago, Charter Manufacturing, a large steel and iron production and manufacturing company, was moving their corporate location to a larger building. It was the perfect opportunity for another kind of move: from traditional blade servers to a hyperconverged infrastructure that could simplify and consolidate the company's enterprise resource planning, supply chain logistics, and virtualized infrastructure. The infrastructure of choice? The Nutanix® Enterprise Cloud Platform™.

In August 2018, our analysts at Principled Technologies set out to learn what the company's IT team thinks about the hyperconverged infrastructure. We talked with the IT Infrastructure Director at Charter Manufacturing, who walked us through his team's Nutanix Enterprise Cloud deployment and ongoing management experience.

This document delves into our conversation about the realities of day-to-day user experience with Nutanix Enterprise Cloud in a multi-location production and manufacturing environment.

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Executive summary

The relatively small IT server infrastructure team (five people) at Charter Manufacturing wanted to simplify and consolidate their disparate management processes for enterprise resource planning (ERP), supply chain logistics, and virtualized infrastructure. With 24/7 manufacturing uptime requirements and no prolonged outage windows available, they were struggling with common maintenance tasks (like providing driver and firmware updates, managing capacity and storage, and fine-tuning for iSCSI) on their traditional hardware solutions.

Previously, they had successfully deployed a small Nutanix Enterprise Cloud cluster in a newly acquired remote division with a few hundred users. Now, with a site evacuation coming up, they decided to migrate their entire operation to Nutanix Enterprise Cloud.

According to Charter Manufacturing, "Charter Manufacturing is a fourth-generation family owned business with a deep history of innovation, entrepreneurial spirit and determination to grow which has made them a market leader in metals manufacturing. Comprised of four distinct businesses including Charter Steel, Charter Wire, Charter Automotive and Charter Dura-Bar, the Company has been on a journey to continuously improve in areas of technology, security and user experience." To learn more, visit their website: https://www.chartermfg.com

Configuring the Nutanix Enterprise Cloud solution at the primary data center took under four hours—and that included racking. With the exception of a few purpose-built use cases, all their primary data center and remote offices now run on Nutanix.

In our interview, the IT Infrastructure Director revealed that the team has benefited from a significant decrease in management tasks and complexity since making the switch. The Nutanix solution has enabled them to efficiently consolidate their infrastructure including day two operations, run ERP and other mission-critical applications, streamline system maintenance, replace various software tools with native built-in management, and make improvements that add resiliency to their disaster recovery strategies through built-in features.

Reasons for shifting away from a traditional architecture

Before the move to Nutanix Enterprise Cloud, the server infrastructure team at Charter Manufacturing ran a large mix of workloads on a variety of hardware setups. They had to deal with everything from traditional server and SAN storage solutions in their primary data center, to isolated server deployments in remote offices, including:

- Virtualized workloads running on VMware®
- An ERP software solution
- Supply chain and logistics solutions
- Data warehouse analytics
- Microsoft Windows workloads:
  - Infrastructure (Active Directory, IIS)
  - Database
  - File and print services
  - Optical character recognition (OCR)
  - Workflow tools
  - Remote desktop services applications
- Middleware and integration systems
- Virtual desktop infrastructure (VDI)

"Given the success of our smaller Nutanix implementations, we realized right away that as hardware came up for refresh, we would move all of those workloads onto Nutanix. That worked out tremendously."

—IT Infrastructure Director

The move to Nutanix Enterprise Cloud not only consolidated and simplified the infrastructure, it also streamlined infrastructure maintenance and provided a rich feature set that simplified and consolidated management processes. The IT Infrastructure Director estimates the time spent managing their Nutanix Enterprise Cloud solutions is in the realm of one-tenth the amount of effort they spent maintaining the traditional legacy environment.

Remote site challenges

About five years ago, the Charter Manufacturing IT server infrastructure team realized they needed a hardware refresh in a newly-acquired remote division. But refreshing with a traditional blade server architecture with SAN and dedicated iSCSI networking, like the one they used at their primary data center, was overkill for this mid-sized location of around 250 users.

Remote site legacy IT

- Traditional servers and storage
- No shared storage
- Virtualized using standalone VMware deployment

Primary data center challenges

Meanwhile, maintaining Charter Manufacturing's primary data center had become very labor intensive. The five-person IT team struggled to keep up with common maintenance tasks across the traditional blade server platform. Meanwhile, iSCSI SAN deployments required significant planning to ensure availability, forcing the team to bring in third-party specialists to help. But, even with outside help, full execution and resolution could take several months because of production and manufacturing demands.

The IT server infrastructure team had to keep various virtualization software components running and up-to-date—an increasingly onerous task as the hardware aged. When component failures or outages arose, the team had to update all drivers and firmware before they could even begin to address and ultimately resolve the issue.

Legacy IT pain points included:

- Sluggish performance due to aging hardware, increased production, and growing business
- Insufficient on-site IT management resources
- Administrative overhead from time- and cost-heavy traditional deployments

"There were many times where we'd call support for a goofy performance problem or outage. And their first response was 'Update all your drivers and firmware.' With Nutanix, we don't have to worry about that anymore. Anyone in a complex environment will understand the value of the one-click upgrade process. It's tremendous."

Primary data center legacy IT

- Traditional blade servers/enclosures
- iSCSI SAN storage and dedicated switching
- Virtualized and managed using VMware tools
  - vSphere® (vCenter, ESXi, Platform Services Controller™, etc.)
  - vRealize® Orchestrator™
  - Site Recovery Manager™

The Nutanix Enterprise Cloud journey

The Charter Manufacturing IT server infrastructure team took a slow and steady approach to their deployment of the Nutanix Enterprise Cloud across their entire company. First, they researched hyperconverged solutions. Then they selected a small Nutanix Enterprise Cloud cluster to replace the standalone VMware servers at a remote site with aging hardware. The team chose Nutanix Enterprise Cloud hyperconverged infrastructure because Nutanix addressed three key issues:

- They needed a compact solution appropriate for a mid-sized remote site with a few hundred users.
- This solution needed to provide advanced features and enable full hypervisor functionality through shared storage vs. standalone instances for workload mobility/flexibility.
- They wanted to avoid the administrative overhead that would come with deploying a feature-equivalent traditional infrastructure.

After a successful proof of concept at the remote site, the IT team discovered that the Nutanix Enterprise Cloud is:

- Easy to maintain and manage, which could save administrator costs.
- Independent and HTML-based—this means it's not dependent on a specific hypervisor.
- Convenient, because it allows administrators to issue commands through the API.
- Adaptable—it offers flexible hypervisor options, allowing IT teams to choose what fits their workloads best.
- Fully featured and delivers robust storage performance in addition to storage efficiency features and integrations, reducing the need for additional software tools.

Even better, when the time came to deploy and migrate the remote site's standalone servers to the Nutanix Enterprise Cloud, Charter Manufacturing didn't need to contract the work out—the process required little planning, and deployment was seamless.

The IT Infrastructure Director also told us that downtime was minimal, involving only the amount of time it required to migrate the VM file system from the old servers to the new Nutanix cluster using vMotion® and reboot the virtual machines on the Nutanix cluster.

After they worked with the Nutanix architecture for about six months at the new site, they noticed there were even more key advantages that could apply to their entire organization when the time came to refresh.

When it was time to replace the traditional blade server and iSCSI SAN storage in their primary data center the five-person IT server infrastructure team at Charter Manufacturing agreed that the Nutanix Enterprise Cloud was the logical choice.

"The Nutanix architecture is far better than and more reliable than what we had in our main data centers. So, as the hardware supporting lower-criticality workloads in our main data centers started to age, we would replace them with Nutanix."

Benefits of hyperconverged architecture

According to our interviewee, there are many benefits to switching to hyperconverged architecture. Here are five of them:

- **Workload mobility**: Hyperconverged infrastructures are software-defined, not hardware-defined like traditional solutions. This minimizes downtime through workload mobility, increases IT productivity by consolidating management tools, and speeds application and resource provisioning.

"We were wary about extending our traditional model because it was causing a lot of administrative overhead. We reached out to one of our partners and they suggested hyperconverged options. So, we checked it out."

- **Reliability**: Nutanix hyperconverged architecture is more reliable than the traditional infrastructure in legacy data centers.

- **Disaster recovery**: Snapshot-based replication means that companies that deploy Nutanix in multiple locations can attain better availability and resiliency from a disaster recovery standpoint.

- **Learning curve**: The switch from traditional architecture to hyperconverged is not significant for experienced engineers. Nutanix also includes ample documentation minimizing administrator costs for education and training.

- **Automation**: Teams can use Nutanix APIs, data protection features, and built-in management tools that simplify day 2 operations as opposed to purchasing and using unnecessary additional tools.

Deploying Nutanix Enterprise Cloud

Pre-deployment

Once the team at Charter Manufacturing decided to refresh to Nutanix Enterprise Cloud throughout their entire organization, they planned and accounted for:

- **Workload compatibility:** The team determined which virtual servers and workloads were ready for migration, which were running on legacy operating systems and needed upgrades, and which ones were custom-built applications or operating systems that needed to stay on dedicated hardware.

- **Hypervisor compatibility:** When considering which hypervisor to deploy on each cluster, the Charter Manufacturing team chose to keep some Nutanix implementations on VMware vSphere for appliances, and deployed Nutanix AHV on others.

Nutanix proof-of-concept cluster deployment and migration*

1. Initialize the Nutanix cluster.
2. Create a container and connect it to the hosts via NFS, one at a time.
3. Perform storage vMotion to migrate workloads to the Nutanix cluster.
4. Shut down virtual machines and use vMotion to migrate them over.
5. Power them up on the Nutanix cluster.
6. Install any applicable new tools or updates.

*The IT Infrastructure Director at Charter Manufacturing described this process. Principled Technologies did not deploy a cluster.

Deployment and migration

The Charter Manufacturing IT server infrastructure team aimed to be methodical and systematic in their refresh approach. Their first deployment in the primary data center was a small Nutanix cluster. After migrating less critical workloads, they took advantage of a data center site move to refresh the business-critical applications. Then, they refreshed the test-dev environment and the remaining remote sites with small Nutanix clusters. Right now, the IT team is in the process of implementing a multi-location disaster recovery solution.

Migrating VMware workloads onto the Nutanix clusters took approximately one month, in part because the legacy servers were slower and the team needed to schedule maintenance windows to meet business service requirements.

Site evacuation

The Charter Manufacturing team decided to migrate the business-critical Tier 1 production workloads because Charter Manufacturing was moving their corporate location to a larger building.
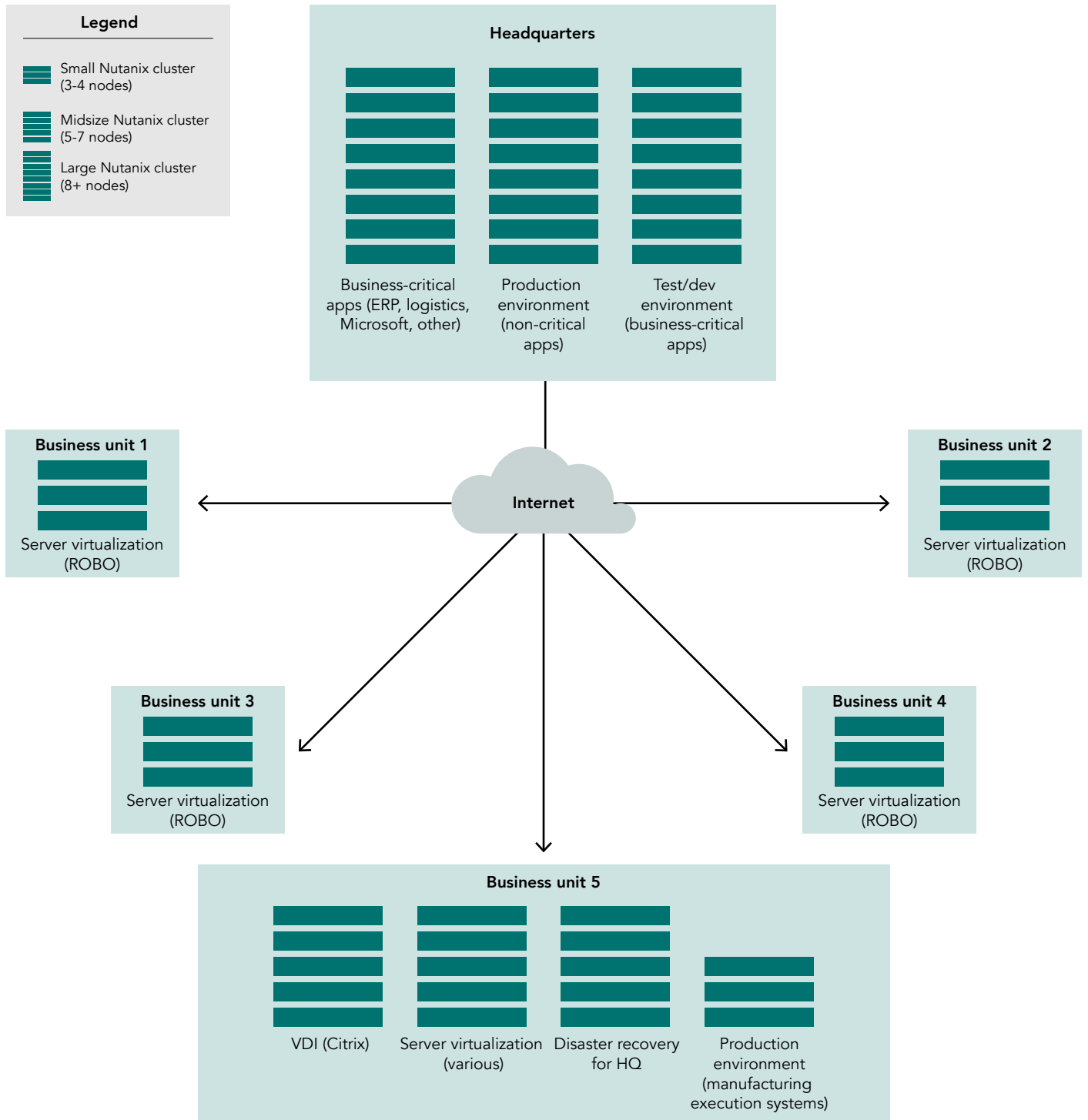
For the site evacuation, the team temporarily staged the applications onto existing Nutanix implementations from the traditional blade/iSCSI SAN hardware in the original data center. They deployed the Nutanix infrastructure in the new data center as the permanent home for these business-critical production applications. Then they used data protection, snapshots, and replication to move the workloads over.

The Charter team orchestrated the majority of the data center move for their production environment using Nutanix tools and features. The team was relieved to find that, once the workloads had been staged onto the Nutanix implementation in the old data center, racking, deploying, and migrating the production workloads took under four hours.

> *"We had to evacuate our main data center because we bought a new site. That's when we decided to replace the existing Tier 1 application hardware with Nutanix. First, we staged our existing Tier 1 applications to the Nutanix that we had in our old data center. Then, we used data protection, snapshots, and replication to move workloads over to the new data center."*

> *"We don't have long outage windows where we can take everything down for a couple of days and do everything and make sure everything works. So, we have to do it in a very controlled and careful way, sometimes shuffling things around in the process so that they can remain available. And that was very difficult to do under the old architecture."*

Recently, they refreshed the remaining test-dev hardware and are in the process of deploying additional disaster recovery now. According to our interviewee, except for a few very specific use cases (IP-enabled cameras, etc.), Charter manufacturing is essentially an all-Nutanix deployment.

Legend

- Small Nutanix cluster (3-4 nodes)
- Midsize Nutanix cluster (5-7 nodes)
- Large Nutanix cluster (8+ nodes)

Headquarters

Business-critical apps (ERP, logistics, Microsoft, other)

Production environment (non-critical apps)

Test/dev environment (business-critical apps)

Internet

Business unit 1

Server virtualization (ROBO)

Business unit 2

Server virtualization (ROBO)

Business unit 3

Server virtualization (ROBO)

Business unit 4

Server virtualization (ROBO)

Business unit 5

VDI (Citrix)

Server virtualization (various)

Disaster recovery for HQ

Production environment (manufacturing execution systems)

Hypervisors, virtual servers, and applications

Charter Manufacturing runs a mixture of both Nutanix AHV™ and VMware vSphere hypervisors. Currently, their production environment runs on VMware (approximately 60 percent), and test-dev clusters and remote offices run on Nutanix AHV (approximately 40 percent). Certain applications only support VMware (e.g., OVA appliances), so a mixed environment is appropriate.

As far as virtualized workloads go, Charter runs approximately 800VMs across their entire environment, with 10 VMs in the small ROBOs, 75 VMs in the mid-size clusters, 550 VMs in the main data center, and 165 VMs devoted to disaster recovery. Most workloads run on either Windows (2012R2 or higher) or Red Hat Linux derivative operating systems.

Their workload mix includes:

- ERP software solution
- Supply chain and logistics solutions
- Data warehouse analytics
- Microsoft Windows-based workloads:
  - Infrastructure (Active Directory, IIS)
  - Database
  - File & print services
  - Optical character recognition (OCR)
  - Workflow tools
  - Remote desktop services applications
- Middleware and integration systems
- Virtual desktop infrastructure (VDI)

"From a resourcing and team standpoint, the number one biggest benefit that we get out of this is that we don't have to spend time and effort and energy trying to make all these disparate components talk and making sure that they're updated and adhere to best practices. We focus on the workloads. We focus on designing data protection. We focus on disaster recovery and performance. So, we've been able to shift a lot of our focus towards that and towards automation and improvement rather than just babysitting."

Best practices

When deploying applications, the Charter Manufacturing IT server infrastructure team follows standard best practices. And, as the IT Infrastructure Director told us, it's easy to find standard best practices documentation for running most common workloads on Nutanix Enterprise Cloud.

Specific best practices recommended by our interviewee included using APIs to orchestrate and automate reporting tasks. He also recommended scripting and running regular snapshots directly from the systems themselves for supported applications. For example, a script running on a database application server can place the database in hot backup mode and initiate the snapshot through Nutanix tools. The Charter Manufacturing team found this to be an efficient way of capturing snapshots—it takes only a few seconds—and the database can return to normal mode quickly. Finally, the Charter team is beginning to use automation to efficiently clone application VMs, such as databases, from one environment to another.

Networking details

For their primary data center, remote sites, and disaster recovery site, Charter manufacturing deployed Cisco Nexus switches throughout. All sites are interconnected using Cisco software-defined networking in a wide area network (SD-WAN) with a dedicated E-line for Multiprotocol Label Switching (MPLS) and an Internet connection as backup. Additionally, the primary and disaster recovery sites have 1Gb Layer 3 Internet Protocol Virtual Private Network (IP VPN) connections for replication traffic.

The Nutanix advantage

Performance and speed improvements

The Charter Manufacturing group has noticed an overall storage performance improvement after switching to Nutanix Enterprise Cloud. Additionally, they have benefited from time savings while deploying these data protection features: snapshot-based cloning for dozens of VMs, cloning VMs from a template, or restoring VMs from snapshots. According to the IT Infrastructure Director, these Nutanix features take a matter of seconds.

Smaller footprint

The infrastructure server team was able to consolidate and achieve significant space savings, both in their primary data center and in their remote sites. Replacing their traditional SAN and blade server architecture in their primary data center with 1U Nutanix nodes resulted in a two-thirds reduction of rack space requirements – they were able to consolidate over three racks of hardware down to 1-1.5 racks. They also achieved significant consolidation going from stand-alone VMware servers to the small Nutanix clusters in their remote sites. According to the IT Infrastructure Director, the space savings resulted from both the greater density of Nutanix hyperconverged architecture and its deduplication and compression features.

Ongoing management

The IT server infrastructure team at Charter Manufacturing had grown accustomed to having to maintain disparate hardware and software components, with extended engagements that sometimes involved bringing in additional contracted specialists just to be able to patch and update their legacy infrastructure. This included tasks such as:

- Fine-tuning network drivers for iSCSI

- Maintaining drivers and firmware

- Confirming adherence to best practices between the multiple hardware vendors

- Ensuring disparate hardware components were working properly together

- Troubleshooting performance issues or outage blips, which often included contacting vendor technical support and updating all drivers and firmware before being able to proceed with solving the actual issue

"You know, when a salesperson comes in and tells you, 'Hey this is going to be low maintenance and you really won't have to do much.'? In this case, it's true. There just isn't much to do anymore. You create containers, you set the kind of storage efficiencies you want in a container, and deploy VMs. That's about it."

From a day-to-day management perspective, Nutanix Enterprise Cloud solved the technical hurdles the team was facing with the legacy hardware. The Charter team immediately noticed a decrease in management tasks and complexity. Built-in management tools, including a robust HTML5 interface, allow for streamlined, efficient processes. The interviewee also noted that the hyperconverged model, by design, requires little time and effort compared to their legacy blade server solution—which, because of its many disparate servers and siloed components required more effort.

The IT Infrastructure Director estimates the time spent managing their Nutanix Enterprise Cloud solution is in the realm of one-tenth the amount of effort they spent maintaining the traditional legacy environment. Charter admins now have more time to focus on new strategic initiatives that include improving workload performance, automation, data protection, and disaster recovery.

Automation

Nutanix Enterprise Cloud has provided significant management time savings for the IT team through its automation capabilities. Nutanix documentation, along with REST APIs, provides the how-to and tools the team needs to orchestrate one-click hardware updates through Nutanix. This means maintenance can occur non-disruptively across the nodes in the various clusters. Charter admins can also orchestrate VMware hypervisor updates through Nutanix. These one-click upgrades function reliably and save significant time.

"All the one-click upgrades have always worked. You know, there's just not much there for us to do."

Data protection and disaster recovery

The IT Infrastructure Director revealed that the Charter IT team was able to simplify their data protection strategy after migrating to Nutanix. Since Nutanix includes data protection, they were able to use the built-in tools as opposed to having to run VMware Site Recovery Manager. The built-in tools provide them with significant data protection features, such as snapshots and rapid cloning of VMs, cross-data center replications (using data protection domains and snapshots between remote sites and their primary data center), and system recovery through data protection domains.

Since migrating to Nutanix architecture, the team at Charter has also replaced their traditional backup software with Cohesity. This new and improved backup and business continuity model not only integrated seamlessly into Nutanix—it also doubled as a hyperconverged backup and secondary data management platform.

Technical support and online resources

The Charter Manufacturing team has found Nutanix support to be responsive, helpful, and very knowledgeable when they've had to reach out for assistance. In their experience, technical support has been able to help them resolves issues within a day. They also found many of the online tools, documentation, and training resources to meet their needs.

Advanced functionality

The IT team has benefited from having additional features and functionality available to the team. The company itself has also realized a substantial cost savings from not having to buy additional capacity management, automation, and planning tools.

Spotlight on Nutanix Capacity Advisor

Charter Manufacturing is in the planning and budgeting stages of adding storage-only nodes to their Nutanix environment, and for this they are relying on Nutanix Capacity Advisor. Their plan:

- Let the cluster reach a steady state after significant events, such as workload migrations
- Allow Nutanix Capacity Advisor to establish a baseline
- Nutanix Capacity Advisor will provide information to help admins plan for future upgrades

Current evaluations and future plans

The Charter IT team is in the process of implementing a new disaster recovery location, which will add a large cluster to their hardware environment. Even though they have mixed VMware and AHV hypervisor environments, this will be the first time the team has performed cross-hypervisor replication onto a new cluster.

Aside from this, current evaluations and future plans focuses primarily on making the most of the platform they already have implemented. This includes:

- Deploying synchronous/asynchronous replication to improve upon the current disaster recovery design
- Using Nutanix to help migrate lower-impact workloads to the cloud
- Using Acropolis file services where applicable
- Evaluating possible workload performance improvements from adding NVMe into their environment

Conclusion

After talking with the IT Infrastructure Director at Charter Manufacturing, we can conclude that migrating their entire operation to Nutanix Enterprise Cloud simplified and consolidated disparate systems spread across many Charter Manufacturing locations. According to our interviewee, the Charter IT server infrastructure team has benefited from a significant decrease in management tasks and complexity since making the switch. They can now more efficiently perform system maintenance, replace various software tools with native built-in management, and make improvements that add resiliency to their disaster recovery strategies.

This project was commissioned by Nutanix.