

NETAPP ON NETAPP EBOOK

NetApp IT's Digital Transformation Journey

Content

01

Managing and evolving a digital transformation

02

How NetApp products power our cloud transformation

03

Managing the storage lifecycle

04

Infrastructure as code empowers us to meet needs

Authors

Managing and evolving a digital transformation

By Umesh Manathkar
CIO

Digital transformations mean different things to different enterprises. For NetApp IT, digital transformation means reacting to company changes – we are not just a storage and hardware company anymore – and a changing business landscape. Our consumers are evolving. How we deliver products is changing. Processes are revamped.

They all feed into how we approach our own digital transformation.

Change is constant, but it does not have to be scary. Our defined approach to digital transformation brings clarity to the process and guides our decision-making to ensure we are fully meeting the needs of the organization.

The NetApp IT strategy for our digital transformation

So, where do you start turning needs into an IT strategy? We started by evaluating all our applications and placing them into one of four buckets:

- Tolerate – No incremental investment required
- Eliminate – Investment required to sunset the application and free up resources
- Invest-Strategic – Investment required to deploy new capabilities and/or enhance current functionality
- Migrate – Investment required to migrate functionality to a different application

For the latter two buckets, we defaulted to asking how many could move to the cloud, be it Software as a Service, Infrastructure as a Service, or Platform as a Service. From there, we mapped all applications to determine what can stay on-premises and what can go to the cloud – and once in the cloud, is it in our private cloud or a hyperscaler.

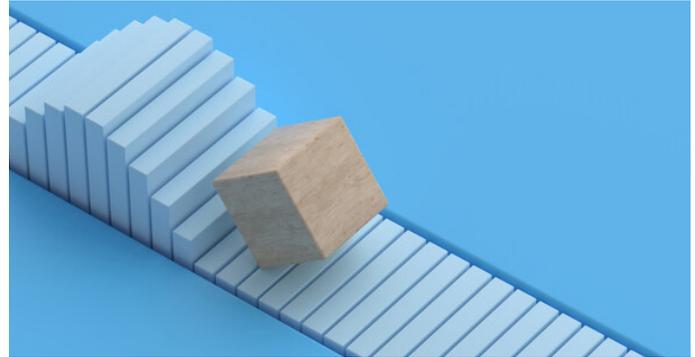
Here, our transformation journey mapped to our IT strategy.

An IT strategy based in the cloud

The hybrid cloud is paramount to our success. It enables us to best serve the company and give developers and engineers what they need, when they need it. It was an easy decision for us.

Drive the business

Our internal processes are evolving to keep up with the speed of business. To



continue to support development, we must leverage new capabilities and out-of-the-box solutions that get us going – quickly. SaaS solutions minimize the need for customization and get us to market faster.

Advanced capabilities

Some modern technologies, like AI, machine learning, or advanced analytics, are only available in the cloud. Using these systems is necessary to get the most out of our IT spend.

Efficiencies

Having spending based on consumption and that spans all geographies means that we can support a global workforce, without costs that spiral out of control.

We have an end-state goal of having 80 percent of our applications in the cloud and 20 percent on-prem.

How NetApp powers our own transformation

The beauty of our transformation is in

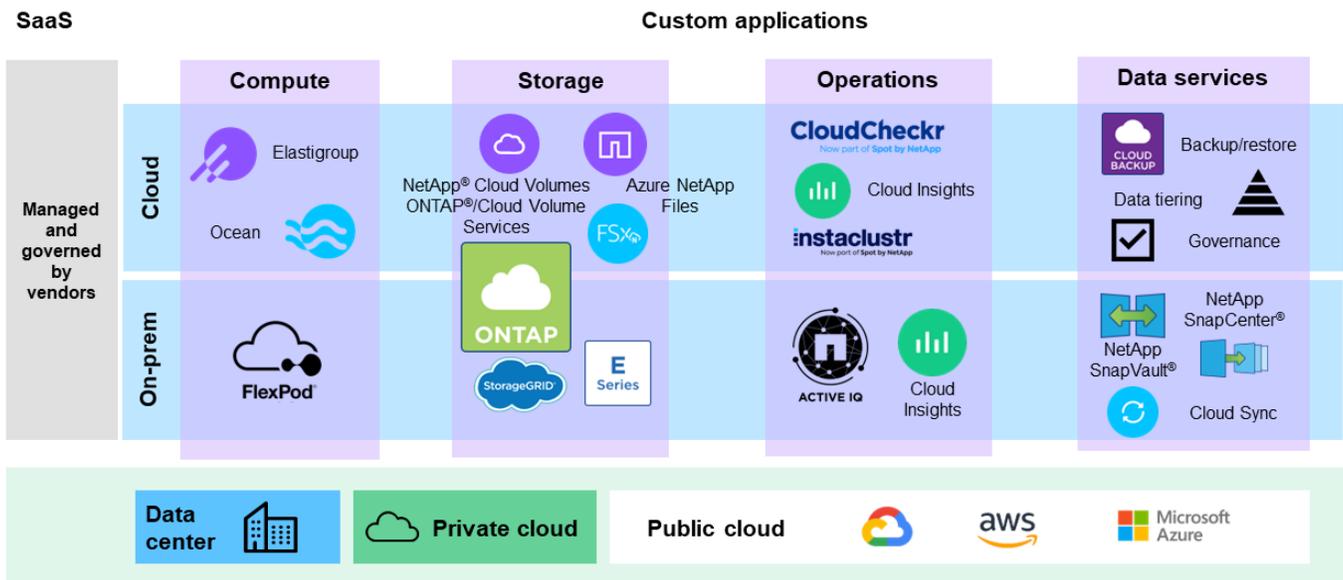
how we are using our own products to make it happen. Our strategy is a bold one and it cannot happen without NetApp products.

FlexPod helps power our applications. ONTAP manages our storage across all environments. CloudCheckr optimizes cloud operations. SnapVault ensures data backup. We use dozens of NetApp solutions across our hybrid cloud environment.

This journey is one that will never be completed, only improved. We are confident in our commitment to the cloud and how it will enable NetApp

to innovate now and in the future. However, with a clear strategy and the tools to execute, we will continue to deliver our best to the enterprise, who deliver their best to our customers.

NetApp technologies in our cloud transformation journey



How NetApp products power NetApp IT's cloud transformation

By Umesh Manathkar
CIO

NetApp IT's evolving digital strategy and embrace of the hybrid cloud has transformed how we serve the enterprise. This evolution couldn't happen without NetApp products impacting most of what we do. Whether it's on-prem or in the cloud, tools like ONTAP, Spot by NetApp, and StorageGRID are enabling us to support the organizations at all levels.

Compute

Cloud

Elastigroup – We use Elastigroup for workloads that run on one or more virtual machines. We manage a pool of VMs with different lifecycle types, such as those running on demand and those running on spot instances. This ensures that application uptime is not impacted.

Spot Ocean – Spot Ocean enables us to manage worker nodes running on spot instances. NetApp IT uses it to determine the most cost-effective instance type and right sizes them to best meet demand.

On-Prem

FlexPod – Used to manage our converged infrastructure,

including Kubernetes clusters, storage, and automation.

Storage

Cloud and On-Prem

ONTAP – At the center of much of what we do, ONTAP is the most critical piece of our data management operation. We would not be able to live in the hybrid cloud without ONTAP to manage security, automation, costs, and data. It's the key to working seamlessly on-prem and in the cloud.

- **All Flash FAS** – Enables us to deploy and rely on virtualized environments, providing a similar experience regardless of location.
- **Cloud Volumes ONTAP (CVO)** – CVO is used to manage data and workloads in the cloud. This includes security using snapshot recovery, data compression to reduce storage costs, and data replication that makes it easy to move resources from on-prem into the cloud.
- **Azure NetApp Files** – Azure NetApp Files enables us to migrate and run complex applications in Azure. We're able to effectively lift and shift Linux and Windows apps without impacting performance.
- **Amazon FSx for ONTAP** – FSx enables NetApp IT to fully leverage the agility of the cloud, while using our familiar ONTAP system. We reduce costs,

scale quicker, reduce management burdens, and meet performance standards while living in AWS.

On-Prem

StorageGRID – The software-defined storage suite allows us to easily manage unstructured data and provides a fast, secure way to move massive files. It helps keep our on-prem applications moving with the agility of the cloud.

E-Series – These hybrid-flash arrays provide simple and reliable storage for high-performance applications, backup, and recovery.

Operations

Cloud and On-Prem

Cloud Insights – Across our entire hybrid cloud portfolio, Cloud Insights provides us the monitoring and observability to fully understand the state of our IT environment. Advanced metrics help us make the best decision for the enterprise, with the data to back them up.

Cloud

CloudCheckr – A key part of our FinOps strategy, CloudCheckr provides in depth insights on where our cloud spend is going and how we may optimize it. It shows us where idle resources are occurring and high-cost resources that aren't being used to their full potential. Avoiding these reduces costs and

enables us to get more for less.

Instaclustr – We use Instaclustr to support cloud-based databases. By using the most popular open-source databases as a service, we're able to be more agile and malleable in our approach.

On-Prem

Active IQ – Enables us to proactively understand our storage with full insights into data health. This increased visibility means we are able to address potential storage risks before they happen, ensuring data quality across the enterprise.

Data Services

Cloud

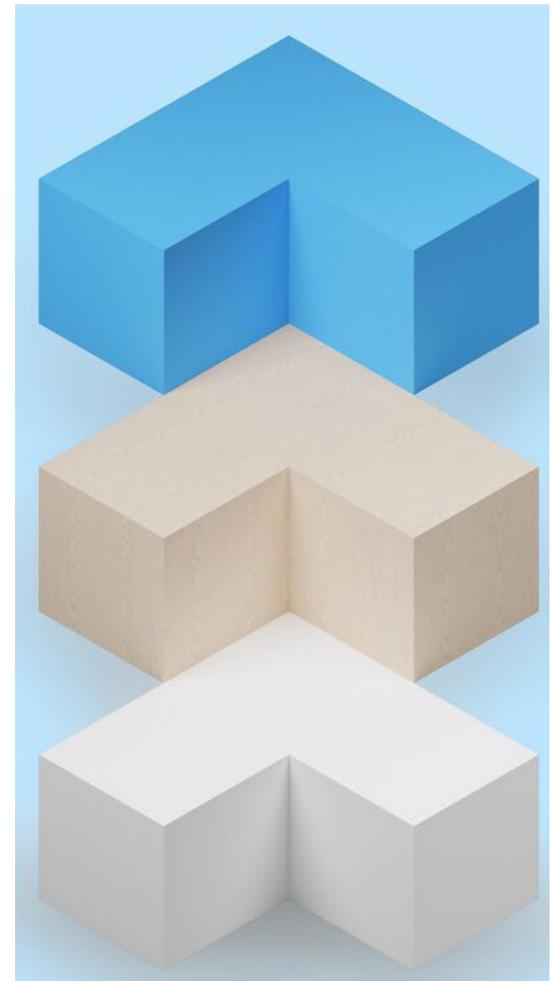
Cloud Backup – Used to protect and archive ONTAP data using object storage. We secure copies of unstructured data, databases, and virtual machines and Kubernetes volumes are automatically created and backed up in AWS, Azure, or Google Cloud Storage.

Data Tiering – Powered by ONTAP, data tiering reduces storage costs on the public cloud by automating the tiering of inactive data to lower-cost storage options. Active data remains in high-performance SSDs, while inactive data lives in lower-performing HDDs.

On-Prem

SnapCenter – Enables us to easily manage backups, restoration, and clones across the environment. It consolidates our data protection across the enterprise into a single platform.

SnapVault – Used to store read-only, immutable Snapshot copies of data across multiple systems. SnapVault retains this data for the long-term



storage and enables us to quickly retrieve when needed.

Cloud Sync – Helps clear the way for easy migrations by ensuring data integrity throughout the process.

Our cloud transformation is an evolving process that will never really reach a final destination. We need tools that can power us through the unknown and give us the flexibility to pivot when necessary.

How NetApp IT manages the storage life cycle

By Peter Han and David Tanigawa
NetApp IT

Managing storage throughout its lifecycle provides multiple unique challenges. A single, end-to-end solution is difficult to establish because of the sheer amount of variables. From legacy systems to incompatible operating systems to significant outages, managing and upgrading storage in an enterprise environment is not easy.

For NetApp IT, this means supporting over 100PB of data that support over 350 unique applications. A major enterprise organization like ours means finding the best location for applications, where they'll be kept secure, for the lowest cost. That's easier said than done.

FAST pass

Storage upgrades need structure and repeatable processes. In response to this requirement, NetApp IT created the First Applications Systems Testing (FAST) program to manage storage lifecycles. It allows NetApp IT to improve application performance, streamline storage upgrades, and create new applications. It includes core NetApp products like ONTAP and StorageGRID.

FAST breaks down product releases into two paths: release candidates, which are almost ready for use, save for major bugs, and general availability, which are ready for customer use. Each go through a four-step process:

- Lab – Product candidates are placed in our lab environment and tested for one week to determine code stability.
- Backup – The product is tested against a backup copy of the production environment for another week
- Sub-Production – Full clusters are created in the sub-production environment, where it is monitored for two weeks
- Production – Only general availability products are moved into production.

We're always concerned with service disruptions or outages. To avoid these, we work closely with the application owners to ensure the smoothest path. We use NetApp Active IQ and Active IQ Config Advisor, among others, to perform pre-upgrade checks and monitor for hardware failures or incompatibilities during the testing process.

Starting ONTAP upgrades

ONTAP is core to much of what NetApp IT does and upgrades to it must be done

with special consideration. Before any upgrade is done, we ensure that the release:

- Works on all hardware it touches
- Any identified hardware issues are resolved
- ONTAP properly works with other programs, like SnapMirror
- Cluster switches and reference configuration files properly work
- All monitoring tools are properly configured to identify issues
- Any third-party software operates properly

Ending with successful ONTAP upgrades

In our experiences, a successful ONTAP upgrade includes strong processes, collaboration, and data checks. It starts with an accurate view of your foundation. What hardware and software are you using and are there any known issues with either? Work closely with application and infrastructure teams to understand their needs and the unique challenges each have. Finally, maintaining organized and repeatable processes will help ensure success and instill confidence in your team and lead to smoother storage management.

Infrastructure as code empowers us to meet business needs

By Ed Wang
Senior IT Manager

For modern enterprise IT organizations, it's becoming crucial to automate the provisioning and management of infrastructure. With hundreds of deployments and changes, it is increasingly difficult to maintain a consistent infrastructure without variations across systems. Inevitably, trying to manage such an environment creates a massive burden on IT operation, and it is not reasonable to expect this work to be done using traditional methods.

That's the basis for our approach to CloudOne DevOps, NetApp IT's container based (Kubernetes), hybrid cloud platform for application development and operations. It's a dynamic platform that requires us to adopt and embrace Infrastructure as Code (IaC).

IaC enables us to react quicker to changing needs by embracing automation. This approach enables us to take a more agile approach to meeting business needs while providing consistency across the board in the everchanging platform. For example, if we need to quickly deploy additional capacity for CloudOne, we can do so quickly. Adding a new compute blade, managing blade failures are all automated and can be

done with the click of a button. Because it's code-based and doesn't require manual configuration, it minimizes human errors, and every new blade is configured identically to all the other blades. Since all the configuration is driven by version-controlled code, it can be easily rolled back to previous configurations if there are any issues.

Immutable infrastructure helps avoid unexpected alterations

With the IaC approach, we are also able to manage our Kubernetes platform with immutable infrastructure. The CloudOne servers are never edited or updated, they're replaced with a completely new image. Immutable infrastructure ensures that all servers remain identical. When an update is needed across servers, there's a chance of failure in the update process that could lead to a permanent alteration. The more the systems are patched after that, the higher the probability of the unexpected change impacting the system.

With an immutable infrastructure approach, this doesn't happen. NetApp IT doesn't patch CloudOne's containerized platform. Instead, we create a new, updated image of the server, tests for quality, and then new systems with the updated image are created to replace the older servers.

With this approach, the old images are never updated eliminating configuration drift. If there were any issues with the new image, we can easily roll back to an old image without disruptions.

How we use FlexPod

We manage our on-prem Kubernetes clusters running on NetApp's own FlexPod in a "bare metal" configuration using Terraform by HashiCorp. Terraform uses providers as building blocks that makes its operation much simpler. In our journey to IaC and immutable infrastructure, we developed a Terraform provider for Flexpod called "flexbot" which enabled our team to easily manage our own FlexPod infrastructure.

If you're working in FlexPod as well, we've uploaded the provider to the Terraform providers registry. If you are interested in leveraging the automation we created for your FlexPod infrastructure, take a look at the provider and see if you can take advantage of it as well. The flexbot provider has eliminated a significant amount of manual work for us and may be able to do the same for you.

Meet the NetApp IT experts



Umesh Manathkar is SVP and CIO for NetApp and is responsible for leading NetApp IT's continuing digital transformation and delivering business value throughout the organization. He leads NetApp IT's efforts to solve business challenges with technology, reduce costs, and managing enterprise-wide security.



Ed Wang is the Senior IT Manager of DevOps Services at NetApp. Ed and his team design and implement NetApp IT's hybrid cloud, containerized application hosting platform. Ed's team is responsible for the implementation of Kubernetes, building CI/CD pipelines, infrastructure as code (IaC) and other automations to enable our application developers an easy to consume solution for deploying containerized applications with a DevOps focus.



Peter Han is a Sr. Technical Program Manager with NetApp IT. He manages the Cloud Disaster Recovery Program, ensuring that redundancies are in place throughout the IT ecosystem.



David Tanigawa is a Sr. Storage Engineer with NetApp IT and manages all aspects of NetApp storage. He also serves as the lead subject matter expert for NetApp IT's on-premise Data ONTAP infrastructure.