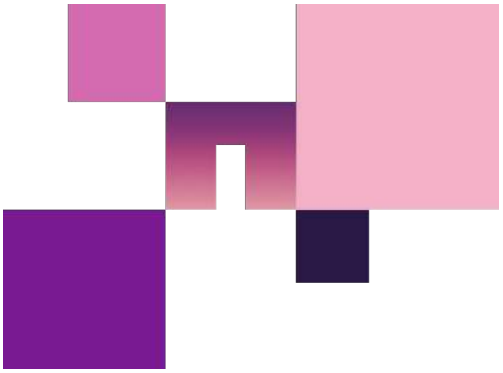
# NetApp Predicts **2019**

From Flying Cars to Linux Domination, Here's What We See Coming



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# Introduction

Did you ever wish you had a crystal ball and could predict the future?

How about those moments when you thought "If only I had invented that first"?

Let's face it. We all work in an industry where changing technologies are driving invention faster than at any other time in history.

Cloud is the disruptor behind most of today's innovation, and here at NetApp we are seeing the cloud enable how quickly companies are able to act, and react, to market demands and competitive pressures.

Everything is moving to the cloud. There are large-scale deployments of old (migration) and new (development) applications in the public cloud. This is true for almost every industry including fin/serve, government, telco, media, retail, manufacturing and more.

It seems like everybody wants to be the next AirBnB. (Who wouldn't?)

But innovation isn't always about turning an entire industry upside down. Whether you are a major or a minor disruptor, you are probably already feeling the pressure to drive greater agility and slash costs, setting the stage to unleash your entrepreneurial nature in your market.

NetApp can help. Together with our technology partners—like Microsoft and Microsoft Azure—we are building data management solutions that free our customers to thrive in the cloud.

We bring a combination of experience, some pretty terrific technology and joint teams of Microsoft and NetApp engineers who have been working together for over eighteen years now.

That's good news for our customers. NetApp and Microsoft have innovated and thrived.

So let's grab our crystal ball once again and share some of our predictions for 2019 and beyond.

We hope you enjoy the read...

According to Gartner[1], while the public cloud provider market will grow by more than 17% in 2019, the fastest-growing segment will be cloud system infrastructure services (Infrastructure-as-a-service, or IaaS), which is forecast to grow 27.6 percent in 2019 to reach $39.5 billion, up from $31 billion in 2018.

**Jeff Whitaker**
As the Sr. Manager, Cloud Solutions Marketing at NetApp, Jeff is a perennial disruptor with a passion for emerging technologies that let start-ups grow up fast, and traditional companies re-discover their entrepreneurial essence. Cool ideas that Jeff considered (but didn't invent) include machine learning, virtual reality and a drone that fetches tapas on demand. You can reach Jeff directly at **jeff.whitaker@netapp.com.**

PREDICTION ONE:

# Mass migration of Linux workloads will move from on-premises to Azure

Linux workloads on Azure have grown dramatically. Even Microsoft has turned to Linux to build new service offerings. Microsoft's Scott Guthrie explained in a recent interview that "native Azure services are often running on Linux. Microsoft is building more of these services. For example, Azure's Software Defined Network (SDN) is based on Linux." [2]

For IT leaders today, managing a data center is all about reducing complexity, simplifying operations, and controlling costs. Cloud has promised to solve all three of those concerns, but for many organizations that are running enterprise Linux, there are challenges when it comes to moving those Linux workloads from on-premises to the cloud.

It has to do with NFS file shares. Traditional applications lifted to the cloud do not support cloud native storage such as Azure Blob Storage. Refactoring these applications is often a non-starter due to the time, cost, and the expertise needed to architect for object storage.

Instead, organizations have to resort to building out complicated, sprawling custom file servers based on IaaS compute and storage resources. Handling storage performance and data management at scale is a huge challenge. RAID is required to string together disks to get the speed, performance, and scale that Linux needs. Add to that, you and your team are also responsible for patching and maintaining the file servers—and you are also on the hook for guaranteeing access to data while ensuring no downtime and protecting against data loss.

"It's about half now, but it varies on the day because a lot of these workloads are elastic, but sometimes slightly over half of Azure VMs are Linux."[3]

**Scott Guthrie**
Microsoft's Executive Vice President of the Cloud and Enterprise Group



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### The Capability Gap

While currently there is a capability gap—the enterprise cannot simply, quickly and seamlessly move from on-premises to the cloud without the need to refactor an application or build and manage file server infrastructure to support application scale and growth—this will change as new Azure cloud services offer bare-metal-like performance on demand. For cloud architects and Linux application owners, the ability to eliminate data center complexity for cloud applications—even mission-critical, tier-one applications—will make cloud a preferred choice.

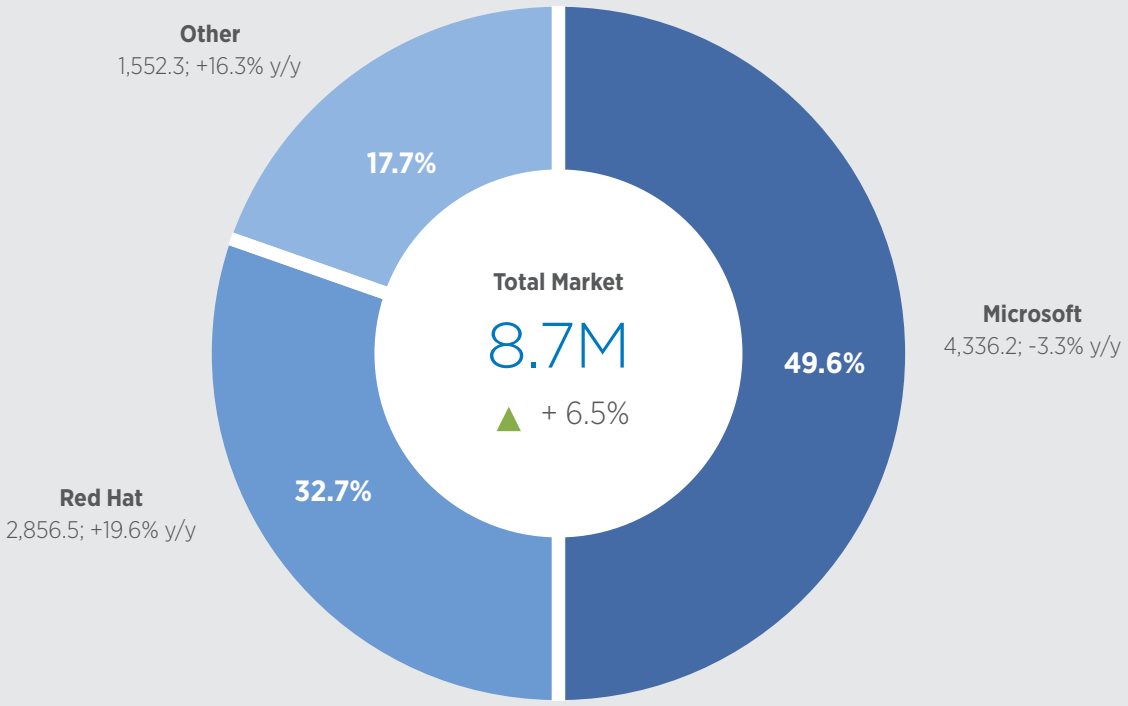
**Questions to consider:**

- Do you have Linux-based applications requiring NFS file shares? Do they demand high performance or high availability?
- Are you spending too much time managing resources that do not directly translate to your bottom line?
- Are you in need of an architecture that does not require specialized knowledge to support? Resources that can be deployed and used directly by the application owner or developer?

## NetApp PREDICTS

NetApp predicts that as the capability gap is eliminated, cloud architects and Linux application owners will move more of their existing on-premises applications to the Azure cloud, and that by 2020 more than 80% of Azure VMs will be Linux.

Worldwide Server Operating Environments 2017 Share Snapshot




Note: 2017 Share (%), Paid Shipments/Subscriptions (000), And Growth (%)

Source: https://www.redhat.com/en/blog/red-hat-continues-lead-linux-server-market

PREDICTION TWO:

# Analytics will pave the way for flying cars

Analytics is changing the way we move. From self-driving cars to flying cars to safer airplanes, the ability to capture, analyze, and process data promises to take human error out of the transportation equation.

## Self-Driving Cars

When a team of engineers made history by completing a 3,400 mile[4] cross-country journey in an automated driving car nicknamed "Roadrunner", they set the stage for the car of the future. Equally adept at navigating dense commuter traffic, high-speed freeways, city streets or country roads, Roadrunner stopped, slowed, accelerated, and avoided collisions.

Relying on multiple sensors, computers, and a high-performance environment, the vehicle also collected 50 terabytes of data over nine days to enable ongoing research and development.

To support this kind of innovation, teams of engineers need a responsive and agile high-computing environment that will supply greater computing power and high-speed data access. This allows applications and people to simultaneously access millions of rows of data coming from multiple sources, enabling everything from sensors and cameras to radar and engine controls. Being able to spin up highly available environments on demand removes infrastructure bottlenecks and provides engineers with greater control and capability.

"By 2026, annual data generation should reach 98 billion gigabytes, or 98 million terabytes. The newest-generation aircraft by then will be spewing out between five and eight terabytes per flight, up to 80 times what older planes today generate."[5]

**Oliver Wyman**
Management Consulting



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### Flying Cars

*"Where we're going, you don't need roads."* Back to the Future[6]

Not the stuff of science fiction anymore, flying cars are real and they are here. Although the prototypes don't resemble cars at all (instead, they range from drone-like structures to helicopters), there is little doubt that one day your Uber[7] app could hail a ride from the sky rather than from around the corner.

Of course, safety and the FAA[8] will play significant roles in how and when flying cars are licensed and regulated, and for that they need data. Similar to their self-driving cousins, flying cars will rely on sensors capturing terabytes of data that will be used both for technology advancement as well as real-time monitoring, feedback, and safety controls. Cloud infrastructure can provide the performance, scale, and reliability for both development and operational environments, increasing capabilities and accelerating time-to-market.

### Airlines and Airliners

Commercial airliners, one of the safest methods of transportation[9], are about to get a whole lot safer. It has to do with the number of smart sensors and digital systems built into the latest generation of jets. Planes rolling off of production lines today are capable of generating 30 times the data of their predecessors.[10]

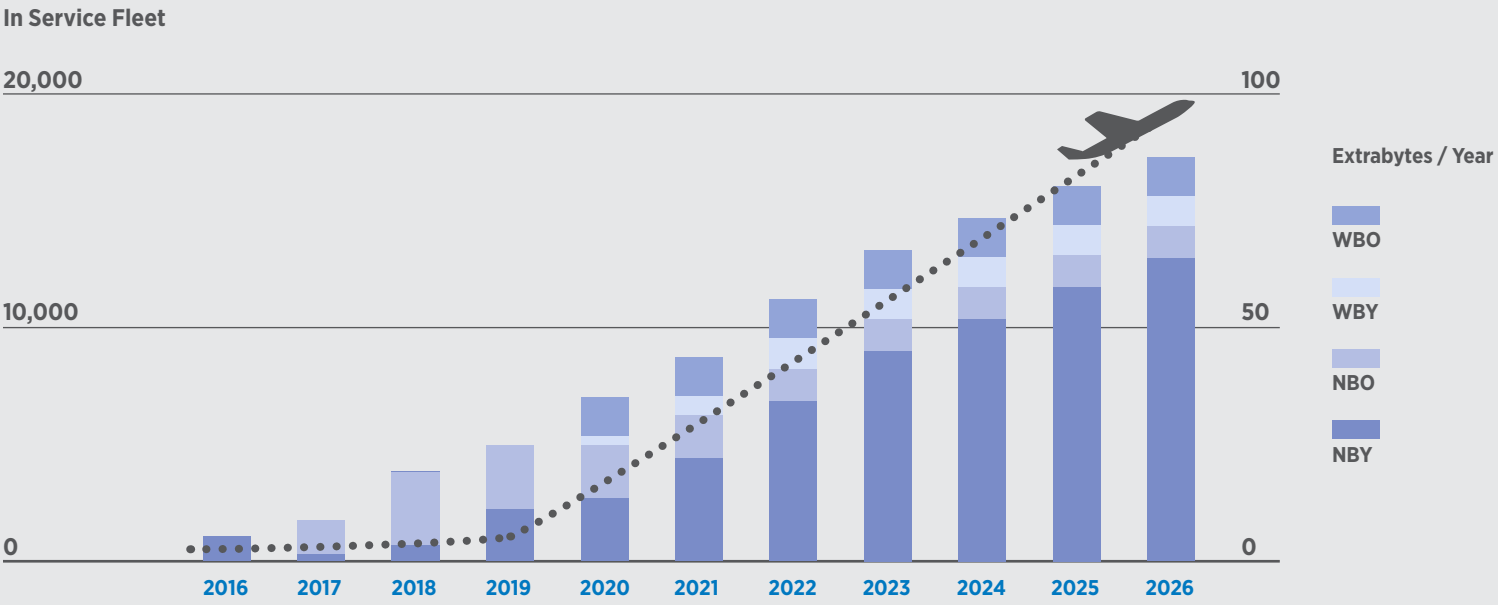
That data is now rolling up to cloud-based, high-compute environments that are capable of processing data from multiple sources including weather systems, flight routes and more, so that recommendations for transportation improvements can be implemented, such as safety enhancements, better security, weather impact recommendations, and cost reductions.

## NetApp PREDICTS

NetApp predicts that high-compute cloud infrastructure will be a significant partner in the disruption of the transportation industry by enabling faster analysis in scale-up environments. High performance data access opens the door for analysis of the massive amounts of data required to support autonomous vehicle operation, improvements in airline performance, and the safe evolution of flying cars.

### Data generated from projected global fleet

In 2026, the global fleet will generate 98 exabytes of data.




Source: Oliver Wyman Fleet & MRO Forecast, www.planestats.com/betterinsight

PREDICTION THREE:

# More SAP HANA will move to the cloud—data center refresh costs will plummet

SAP HANA was first released in 2010[11] as an in-memory solution designed to perform real-time analytics, and has since gained widespread adoption at companies such as Nike, Verizon, Home Depot, Cardinal Health[12] and more.

But using SAP HANA to process high-speed analytics is intensive, and requires a high-performing and highly available data center infrastructure to minimize latency and deliver reliable and dynamic results.

Many companies have been reluctant to move these tier-one SAP HANA workloads to the cloud without end-to-end performance and availability guarantees.

Public cloud providers have been making tremendous gains in delivering more robust environments with guaranteed service levels to meet the needs of enterprise clients who need to find ways to leverage the public cloud to reduce operational costs.

"A key consideration for firms that are planning to migrate to HANA is that the infrastructure addresses the I/O bottleneck that characterizes analytical systems and update-intensive transaction processing systems. The selected solution must be extremely robust and scalable, have high reliability, availability and serviceability features, and be capable of massively parallel processing and in-memory processing."[13]

**IDC Report**



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**Some of the trends that will drive SAP adoption of public cloud include:**

- Guaranteed service levels—workloads can be assigned one of three service levels: standard, enterprise or ultra, where the performance of the ultra tier gets to the coveted sub-millisecond latencies required for SAP HANA production workloads
- High availability on demand—native service delivery will ensure maximum performance with the option to spin up volumes on demand that can scale to 100TB in seconds
- Data center migration to Azure Cloud—infrastructure renewals or data center refresh projects will benefit from fast migration tools

**If the cost of running your mission-critical applications is exceeding your budget expectations, here are some questions to consider:**

- Do you have a data center refresh planned in the next 12-18 months?
- Have you completed a TCO analysis of your SAP HANA infrastructure needs, including both hardware and services?
- What service levels do you need?
- How will your service level needs change as your datasets grow?
- How much data needs to be migrated initially?
- What support levels do you need from your cloud provider?

## NetApp PREDICTS

NetApp predicts that the introduction of high-performance and reliable tiered service levels in the Azure public cloud will promote a massive movement of SAP HANA workload migrations from on-premises to Azure, saving enterprises millions of dollars in infrastructure costs.

## What is workload in the context of SAP HANA?

General Definition

**Workload is a set of requests with common characteristics; e.g.**

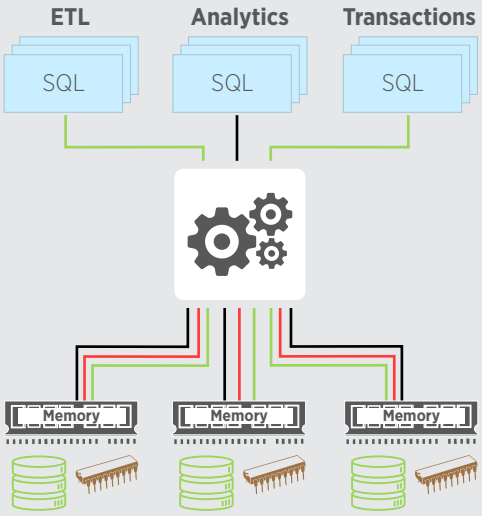
- Source of request (user, application, etc.)
- Type of query (analytical, transactional, etc.)
- Business importance (high, low, etc.)

**Workload has certain resource demands to the system; e.g.**

- CPU
- Memory
- Disk I/O
- Network bandwidth

**Mixed Workloads compete for shared system resources…**

- If a request consumes a significant amount of system resources, other requests are subject to queuing effect
- Waiting workloads might fail to meet their expected performance
- Overall system performance degradation may occur




Source: Presentation by Lucas Kiesow, SAP HANA Product Management, Introduction to Workload Management

PREDICTION FOUR:

# Artificial intelligence will accelerate cancer cures

Healthcare is changing. From integrating different data types—including genomic data, electronic medical reports, demographics, biological data, text analysis, imaging, radiology, and pathology—healthcare providers are able to individualize healthcare plans to accelerate and promote healing.

Dr. Eric Green explains that research and technology are the reasons why healthcare is advancing so rapidly.

"The first change is an incredible increase in our knowledge about the human genome, which came out of the Human Genome Project. And from that, an increased understanding of how the genome works, and how changes or differences between peoples' genomes influence health and confer risk for disease."[14]

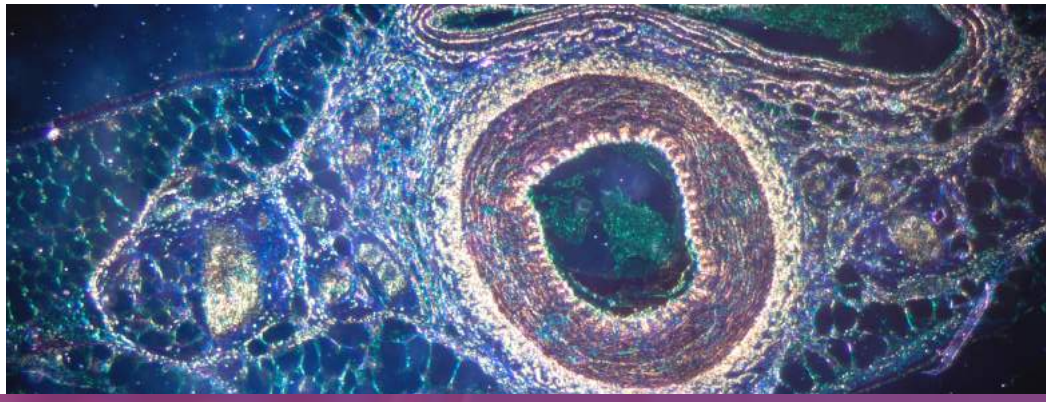
Genome research is exciting because it essentially provides a map—or an instruction manual—for each individual. A genome is comprised of DNA, and there is a copy in almost every cell in your body.

Genomics enables healthcare providers to individualize healthcare plans because it provides a much more precise set of guidelines for practitioners to build more effective treatment programs.

Genomics combined with AI and machine-learning will do even more by pulling out key findings within the individual's genomic map; for example, determining cancer risk levels for otherwise healthy individuals. Research published in Great Britain estimates that predictive analytics based on a patient's genomic map could eliminate 22,000 deaths from cancer per year.[16]

## NetApp PREDICTS

By 2020, more than 60% of healthcare research will rely on cloud computing to connect multiple sources of healthcare data, providing high-compute, artificial intelligence and machine-learning environments so that researchers can make medical discoveries faster.



"The first time we ever sequenced the human genome was part of the Human Genome Project, and that cost roughly $1 million. Today it costs about $1,000."[15]

**Dr. Eric Green**
Director of the National Human Genome Research Institute (NHGRI), Bethesda, Md.



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PREDICTION FIVE:

# More than 50% of enterprises will run DR on Microsoft Azure

Ensuring that a corporate compute infrastructure is resilient to disasters has always been a challenge for IT leaders of all levels, from the CIO to the individual team member. In the past, corporations had to build out duplicate data centers and use dedicated network connections to keep compute up-to-date to validate that the site is ready to take over in the case of disaster. These solutions are effective at protecting IT assets against disasters, but they are expensive and manpower-intensive to maintain.

**Business Disruptions Continue to Rise**

According to Gartner, the number of incidents that organizations face continues to rise. In a 2016 survey, 22% of organizations reported a 15% increase in disruptions from the year before. The costs of such incidents are also rising. In 2016, an unplanned data center outage cost $740,000 on average, up 38% from just six years prior.[17]

"We believe that, by 2025, IT organizations will no longer have a need for separate HA and DR infrastructure; rather, hybrid cloud and multicloud environments and the appropriate tools will create continuous application availability without specialized infrastructure or operations. Although markets such as DR-as-a-service, archive-as-a-service, and backup-as-a-service can serve near-term IT needs, IT buyers need to prepare to pivot to application availability in the future."[18]

**Phil Goodwin**
Research Director, IDC's Storage Systems and Software



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## Are Your Applications Available?

A disaster recovery solution is only as good as it has been tested for, and before cloud-based systems existed, comprehensive testing was always difficult, if not impossible. Cloud-based disaster recovery solutions have been designed to make thorough testing much more straightforward.

Because cloud-based solutions are based in hardened IT centers built to exacting, disaster-proof specifications, the likelihood of failures due to local or even statewide events is low to non-existent. In a disaster, moving production applications from local, on-site hardware into the disaster recovery cloud-based system can be as simple as pressing a few buttons or entering the appropriate commands. And because cloud resources are available on demand, the secondary site only needs to have the data replicated from the primary and then spun up for testing or in the event of the disaster. This massively lowers the cost of the secondary DR site due to only paying for the compute resources when needed while ensuring application availability.

**More reasons to architect DR in the cloud:**

- Duplicate computer facilities no longer need to be built out and maintained. Instead, databases and applications that exist in the cloud often exist in all the regions that any given cloud provider offers, so resources allocated from the cloud infrastructure or one region are easily available in another. This allows a production environment designed for one region to be created on the fly in a secondary region.
- Individual corporations no longer need to be concerned about hiring staff to maintain hardware, apply operating system updates, and perform other infrastructure-related tasks.
- Cloud platforms are very secure, and meet the highest standards required for legal and internal privacy and security requirements.
- High-availability is built into the architecture. Operators and managers don't need to worry about the location or resiliency of the cloud infrastructure.

### NetApp PREDICTS

Azure cloud will become the preferred cloud for enterprise DR due to speed, security, scalability, geographic coverage, and support for enterprise workloads.



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# NetApp solutions with Microsoft

In 2019, Microsoft and NetApp will be celebrating an 18-year+ partnership, delivering innovation that has helped organizations manage their data, both in the data center and in the cloud. Whatever your data management needs are, NetApp and Microsoft either have or are building a solution that will increase your agility, reduce your costs and prepared you to disrupt your industry.

Talk to a NetApp specialist today and learn how our Azure solutions can make your predictions come true.

**If you want to learn more about NetApp and Microsoft cloud solutions, schedule a demo or register for a free trial, visit us at:**

**https://cloud.netapp.com/azure-partners**



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