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Infrastructure Modernization

for dummies®

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Uncomplicate hybrid cloud infrastructure

Deploy AI rapidly without risk

Save costs with superior sustainability

Steve Kaelble

Brian Ferrar

Pure Storage Special Edition

About Pure Storage

Pure is redefining the storage experience and empowering innovators by simplifying how people consume and interact with data. The company's all-flash-based technology, combined with its customer-first approach, drives business and IT transformation with a Modern Data Experience that's effortless, efficient, and evergreen. Pure Storage offers two flagship products: FlashArray//X, optimized for structured workloads, and FlashBlade, ideal for unstructured data. With Pure's industry-leading Medallia-certified NPS score of 82, Pure customers are some of the most satisfied in the world and include organizations of all sizes across an ever-expanding range of industries.

Infrastructure Modernization

Pure Storage Special Edition

by Steve Kaelble and Brian Ferrar

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Introduction

Information technology (IT) teams are stretched awfully thin these days, trying to meet the ever-increasing demands of a world that revolves around data. If their organizations are saddled with outdated, inflexible IT infrastructure, the road to success is going to be rocky. Infrastructure modernization can't happen fast enough.

It's vital, though, to modernize in a way that is, well, modern. Some management solutions just make things more complex because they don't encompass all layers of the infrastructure. They take multiple tools and dedicated dashboards to manage everything. Infrastructure may be tied to old business models, as well as technologies that gobble energy, eat data center space, or require regular forklift upgrades. Security gaps may create risks. None of this sounds like a modern data experience.

What *is* a modern data experience is one that offers simplicity, observability, and efficiency. It's one that makes it easy to support hybrid environments and cloud-native workloads that deliver high performance, that's flexible and scalable, and that can be consumed more like a utility. It integrates on-premises and multi-cloud landscapes, is software-defined, and leverages artificial intelligence (AI)-based management. A single pane of glass views it all. And IT teams get bandwidth back so they can help innovate.

That infrastructure modernization isn't a pipe dream. It's out there now, accessible today, and designed to last.

About the Book

Infrastructure Modernization For Dummies, Pure Storage Special Edition, is your guide to the changing nature of IT, how modern infrastructure should work, and how the hybrid multi-cloud is impacting IT decisions. You find out more about the economics of modernization and the kinds of risks that it addresses. You also learn how modernization can turn the data center green, how to ensure the highest levels of security, and how IT can slide into becoming more of an operational expense than a capital cost. This book outlines some of the leading use cases for modernization, too, and then talks about how your organization can make it happen.

Foolish Assumptions

In preparing this book, we've made a few assumptions about you, the reader:

- You're an IT decision maker, perhaps an infrastructure administrator or CIO.
- You're frustrated by the state of your infrastructure, its cost, its inefficiency, and the toll it takes on your people.
- You'd appreciate a bit of good news about how modernization is powerful and attainable.

Icons Used in This Book

In the margins of the book are some clues to the most important info. If you don't have time to read every word, please don't miss these points:

REMEMBER

This icon points to one of the key messages that we hope will sink in and provide insight.

TIP

Adjacent to this icon is an actionable tip to help your organization move down the path to modernization.

WARNING

You know it's impossible to write an IT book without talk about risks. This icon points to something to ponder.

Beyond the Book

This book is full of answers, but not *all* the answers. If you're ready for more insights, check out these links:

- `FlashStack.com`: Best-of-class modernization from Pure Storage and Cisco
- `PureStorage.com`: Leaders in simplified data storage

IN THIS CHAPTER

- Understanding the requirements of modern IT infrastructure
- Thriving in a hybrid multi-cloud world
- Seeing the benefits of on-demand infrastructure

Chapter 1
Understanding the Changing Nature of IT

It would be a vast understatement to say that information technology (IT) changes everything. It's also true to state that everything changes IT. The demands for greater performance, flexibility, and security are unrelenting, and an aging infrastructure just can't cut it. In this chapter, you explore the requirements for a modern IT infrastructure, including readiness for artificial intelligence (AI), how today's multi-cloud hybrid environment impacts IT decisions, and how a modernized, on-demand infrastructure brings the future into the present.

Explaining Modern Infrastructure

It's entertaining to look back at Hollywood depictions of what once was considered a modern IT infrastructure. Think about, for example, the early NASA computing that's a novelty in such flicks as *Hidden Figures* and *Apollo 13.* Rooms were full of spinning tapes and card readers and people uttering acronyms such as IBM for the first time. But you don't have to go back to the days of the Space Race to recall seemingly modern infrastructures built with rigid, stand-alone components that were both complicated and

(by today's standards) not terribly powerful or functional. What passes for modern infrastructure for today and tomorrow bears little resemblance to that.

REMEMBER

Businesses and other end-users now have exacting requirements and high expectations when it comes to performance, scalability, ease of management, security, hybrid cloud compatibility, and efficient data management. To remain agile and highly competitive, modern infrastructure requirements include the things covered in this section.

Facilitating innovation while reducing risk

An infrastructure that simplifies the hybrid cloud is essential for reducing risk, speeding deployment, and freeing up the resources required for innovation, as well as supporting the diverse needs of each line of business. Simplifying tasks and freeing up resources requires an infrastructure that leverages automation and AI.

Ensuring a future-proof architecture

The keys of ensuring a future-proof architecture are superior agility and flexibility, without disruption to business operations. The uncomplicated hybrid cloud infrastructure of your organization's dreams must easily adapt to changing business requirements.

This modern infrastructure is full stack, best-of-breed, and integrated and supported with designs that are pre-validated. It's stateless, too — software-defined. It's all monitored, managed, operated, and orchestrated by software, whether on-premises or in the cloud.

Scaling up and down

The modern infrastructure requires scalability on-demand. Each layer — compute, network, and storage — needs to be provisioned discretely and independently of each other. Who wants a forklift upgrade just to grow capacity?

Enterprises are also demanding holistically managed architecture. That means a common AI-based interface that provides a single pane of glass to monitor, control, and provision each layer. An AI-based solution means that the modern infrastructure is always watching and learning — recognizing and responding to

the status of each layer and taking smart, proactive, and instant actions to stay on top of business needs.

Achieving superior sustainability

The worsening headlines related to climate change have folks demanding a greater focus on the environment and sustainability. Power consumption and associated energy costs create a challenge for data centers, too. These requirements are putting added demands on the modern IT infrastructure and calling for greater data density, a smaller footprint, and reduced needs for power and cooling. It's incredibly helpful to have infrastructure that's been engineered with sustainability goals in mind from the start.

Consuming as a service

Better scalability allows for a smarter approach from a cost and usage perspective. Those old days of IT infrastructure, somewhere between the Space Race and today, featured data palaces built for the potential needs of tomorrow, whether those needs arrived as expected or not.

Modern infrastructure aligns IT costs with usage, so your organization only pays for what it uses, consuming by means of an as-a-Service or subscription model whenever possible. Of course, you can't afford to be caught with insufficient capacity as your business needs grow, but you also can't afford to pay for more capacity than you need.

Taking a defense-in-depth security approach

Modern infrastructure requires multiple layers of security measures for end-to-end protection. That includes firewalls to immutable encryption and snapshots to the most powerful cybersecurity systems, with a constant eye out for gaps. This type of defense-in-depth security strategy ensures that even if one security layer is compromised, others remain intact. Prevention and resilience go hand in hand.

Embracing the future of AI

A modern infrastructure must be ready to deliver on the promise of AI. Deploying suitable AI infrastructure can be incredibly complicated. Software and hardware needs can be highly specialized,

and data sources can be diverse in format and all over the place in terms of location.

Enterprises need to simplify and accelerate deployment of AI infrastructure. And it shouldn't be a luxury reserved for mega-projects and super users — a modern infrastructure will democratize AI so that it's available for projects of all sizes. The future of AI is here now, and if your infrastructure doesn't enable AI deployment without serious headaches and elbow grease, it's not modern.

Making IT Decisions with the Hybrid Multi-Cloud in Mind

One thing you can say with a fair amount of certainty is that modern IT infrastructure is a hybrid multi-cloud architecture. A multi-cloud environment is certainly more complex than running everything in-house, but these days it's much more the rule than the exception.

Why? Because it's capable of delivering all the things mentioned in the previous section, "Explaining Modern Infrastructure," and in fact, you'd be hard-pressed to satisfy those requirements without a hybrid multi-cloud approach.

REMEMBER

The hybrid multi-cloud is a ticket to scalability and automation and if done well can allow the necessary ease of management and full observability. As decision makers know, simplicity is a critical factor, and IT decisions are attracting the attention of folks higher up in the organization than was common in the past. These higher-ups know that the ability to execute smoothly has a major impact on competitive capabilities.

All that said, a hybrid multi-cloud environment is also a risk-rich environment. All the usual IT decision-making factors are present when pondering hybrid multi-cloud, from security to return on investment to sustainability to all the other things that matter, but there's a whole extra complexity layer.

There are multiple sites and geographies, perhaps co-locations with different infrastructure environments. Your aim is always to reduce risk, so a more complex environment requires additional ways to mitigate risks.

TIP

Organizations are, for example, looking for pre-validated designs and reference designs to trim the risk. Whether they're running databases or traditional enterprise applications or whatever, whether they're running container applications or any kind of cloud-native use, they'd love to see a validated design for their workload.

The complexity, the need for risk reduction, importance of scalability, the competitive requirements of innovation, the desire for a sensible cost structure that aligns with usage, the imperative of sustainability. No wonder enterprises are demanding infrastructure modernization.

They want to tackle the risk, reduce the complexity, and move forward on the road to success. And as they move on down that road, they would rather not have to get bogged down in forklift upgrades every two or three years.

Appreciating an On-Demand Infrastructure

Regardless of what business you're in, your organization's IT infrastructure enables pretty much everything you do. It's right there in the thick of operations, imperative for a smooth supply chain, central to product development, vital for reaching customers, and essential for connecting collaborative teams in disparate places.

REMEMBER

Your infrastructure is paving the way toward success, but you don't want it to get in the way of your success. In fact, the less you have to think about it, the more bandwidth you have for thinking about all of the other things that are unique to your success. One of the selling points of an on-demand modern infrastructure is that it's a way of maintaining that backbone of your organizational success while benefiting from automation and the management capability of scalability.

On-demand infrastructure means you're able to burst when needed and create capacity for such things as DevOps. You're handicapping your IT organization if this characteristic is lacking.

Indeed, infrastructure should not only be flexible and agile but also able to align itself to business needs automatically at any time. The management interface should keep watch over physical infrastructure *and* keep tabs on subscription-based compute and storage capacity, adjusting them as needed.

A modern infrastructure should, in fact, be observing and learning, recognizing patterns and understanding needs so it can discretely scale infrastructure. That means scaling only what needs to be scaled. If more storage is needed, great, but that doesn't mean you want to buy more compute. Or if you're hitting the wall in an online transactional processing application, maybe you need more compute but not more storage.

REMEMBER

That's the whole point of discrete scalability — acquire what your business needs, right when it's needed, not a bit more and not a minute too soon or too late. And, by the way, be able to see what's happening from a single pane of glass, even as all of this happens across a complex, hybrid multi-cloud environment.

That, in a nutshell, is the nature of today's modern IT infrastructure. At least what it should aspire to be. Now your organization just needs to determine how to make it happen.

IN THIS CHAPTER

- Achieving flexibility and scalability
- Understanding infrastructure modernization economics
- Reducing a variety of risks
- Building IT solutions that last

Chapter 2
Identifying Keys to Modernization

This chapter explores the keys to modernizing infrastructure, including ensuring readiness for artificial intelligence (AI) deployments. It explores why flexibility and scalability are imperatives, not luxuries, and it details the economic impacts of modernization on the organization's operations. You also discover the risks that modernization can reduce (and it's a lot more than just data security risks). And you get some thoughts about making modernization choices that futureproof your IT.

Meeting Flexibility and Scalability Demands

Change is, of course, nothing new. And people have been observing for generations that the pace of change seems to always be accelerating. But, whew! Nothing is quite like the modern business environment when it comes to ultra-competitiveness, a fast pace, and changes that happen at lightning speed.

REMEMBER

That's the first compelling reason why IT infrastructure modernization is essential. Enterprises truly can't continue to succeed if their infrastructures can't keep up the pace, and yesterday's approaches just don't cut it. Here are some of the drivers of the need for modernized infrastructure:

- **Evolving business needs:** Maybe it would be better to say "exploding" business needs. New products and services need to be developed, deployed, and marketed more quickly, and an IT angle is invariably required to enable that. A rigid infrastructure can torpedo any competitive edge. Your infrastructure needs to adapt instantly, which means that if you have to put in a PO for added storage or compute capabilities, an opportunity will likely be long gone before you're ready.
- **Getting ready for AI:** Just about every business beyond the street-corner hot dog stand is figuring out how AI fits into the future. The need to be AI-ready is a growing motivator for infrastructure modernization. That means not only taming the complexities related to hardware, software, and data sources but also opening the door for smaller players to be part of the AI future.
- **Data and more data:** Here's another thing that's exploding — the amount of data being generated, processed, and stored. The growth is literally exponential, coming in by way of online transactions, social media, Internet of Things (IoT) devices, and countless other places. Scaling to keep up with the explosion is crucial.
- **Managing costs:** No one, and no business, is made of money. Businesses living with legacy systems have higher maintenance and operational costs, not to mention opportunity costs. Modernized infrastructure can deliver lower costs in terms of power, data center square footage, maintenance, and operation while also offering more flexible cost structures that better align costs with usage.
- **Sustainability mandates:** Some of the features related to cost also play a large role in the impact the infrastructure has on the planet. Corporate sustainability goals often call for use of less power and a smaller data center footprint, which reduces the need for cooling. In this case, what's good for the budget is environmentally friendly, too.
- **The call of the hybrid multi-cloud:** The capabilities of cloud computing are essential and irresistible, and a key to the

flexibility and scalability required for ongoing success. Infrastructure modernization is needed to take full advantage of the possibilities.

- **Rapid application development and deployment:** Fast-paced work is the DevOps and continuous integration/continuous deployment folks' lives now, and modernized infrastructure is the price of admission.
- **The need for resilience:** It's a 24/7 world, and the winners require uptime as close to 100 percent as possible. You can't be certain of that with old technology, either.
- **Security concerns:** No organization wants to be the next IT security nightmare headline. The attack surface is continually growing, but modernization can ensure the most effective security measures.
- **Easing management headaches:** Who wants to waste a brilliant IT mind on tasks of infrastructure management? A modernized system can reduce administrative burdens and costs and free up bandwidth for innovation.

Tallying the Economics of Modernization

Only pay for what you need and use. What's surprising is how often companies spend a fair amount of money on things they don't need, or at least things they don't need yet. Still, that's how things tended to work in the not-that-long-ago old days of IT infrastructure. Getting things done today and being ready for tomorrow required major upfront capital investments in hardware and software technologies.

It was pretty much necessary to own it all, and that's just the way it was, but the "being ready for tomorrow" part meant buying a lot of capacity today that you didn't yet need. The legacy approach has seen businesses investing in infrastructure two or three times bigger than needed in the short term, under the assumption that the needs would grow. Businesses are increasingly dissatisfied with this approach.

REMEMBER

The good news is that for some time now, the IT world has been moving its way toward that sensible idea of paying only for what you need when you need it. One of the drivers down this path has been the growth of getting things "aaS" or "as-a-Service,"

which has been a real game-changer. All kinds of IT resources can now be acquired as a service, just as software licenses can be acquired on a subscription basis rather than having to be purchased outright.

To put it into textbook accounting terms, it's a major shift from CapEx to OpEx:

- **CapEx:** Short for *capital expenditure,* CapEx is the upfront costs of purchasing assets that'll be useful into the future. In the case of IT infrastructure, these things include data centers and the hardware in them, servers, storage devices, and the like.
- **OpEx:** In the older way of thinking about IT infrastructure, *operational expenditures* were the ongoing costs of running all those assets that you bought as CapEx. In the context of IT modernization, businesses are increasingly paying for their IT resources as they use them, kind of like a monthly utility bill, without having to foot that upfront CapEx.

REMEMBER

There are a lot of good economic reasons for making this shift. For starters, and this is a biggie, organizations can avoid much of that large upfront expense. That can free up funding to spend on some other important strategic need. The shift from CapEx to OpEx, as enabled by IT infrastructure modernization, can also make spending more predictable. A subscription-based approach to paying for IT resources can be plugged into the budget as an easy-to-understand monthly or annual expense.

Those keeping an eye on tax implications may find benefits from the shift, too. CapEx costs tend to be capitalized and depreciated over several years, but OpEx costs tend to be deductible in the year they're incurred.

There can also be some inherent economic risk of going with yesterday's more CapEx-based approach. Businesses must make significant upfront investments based on return on investment (ROI) predictions, hoping that the technology will, indeed, deliver the expected return. An OpEx, subscription-based model reduces that initial risk and provides quick verification that the services are delivering the expected economic benefit.

The CapEx approach can lead to higher ongoing maintenance costs, particularly as equipment ages. A subscription-based OpEx approach means maintenance is someone else's problem and not a cost to be concerned about.

Reducing Risks

IT infrastructure is complex with a lot of parts and pieces. Keeping it all running effectively isn't easy, and doing so carries with it a lot of different risks. Modernizing IT is vital for mitigating the risks, whether they be operational, financial, or strategic in nature.

WARNING

Perhaps the biggest risk, the one causing the biggest anxieties and headaches, is data security risk. Data is a lifeblood for every organization, and it's just as valuable to bad actors as it is to you. Your business must protect data and strategic assets.

Non-modernized legacy systems may have outdated security tools and protocols and may not even be compatible with the most modern security and encryption standards. There may be unpatched vulnerabilities. Monitoring capabilities may not be up to date, either. All of this means that older systems may be more vulnerable to breaches.

Add to that the financial risks in such areas as ROI and spend. An older system may be consumed by maintenance and operational costs that crowd out budgetary room for innovation. If you fail to modernize, you may be missing out on innovation opportunities. That leads to strategic risks. If the organization is missing out on innovation opportunities, that increases the risk of falling behind competitors. If a modernized architecture is more agile, a less agile legacy system makes it harder to pivot and adapt to the changes that are always happening.

Operational risks exist, too, but they can be mitigated through infrastructure modernization. Older systems can have challenges integrating with newer technologies, which can lead to inefficiencies and silos. Productivity is bound to be lower with an older system.

All of these risks can lead to HR-related risks. You need the best people on the payroll, but the best people often prefer to work with the latest technologies. Modernization reduces talent acquisition and retention risks.

WARNING

No conversation about risk would be complete without discussing compliance. Regulations are getting stricter all the time, and the consequences of being noncompliant are becoming increasingly costly and devastating. A more modern architecture is able to keep up with compliance requirements.

Don't forget reputational risks, too. Being on the outs with regulatory agencies is bad enough, but consider the kind of hit your organization may take in customer trust and brand perception if an older IT architecture leads to data breaches — especially those that include customer data.

The bottom line is that the accumulated risks of not modernizing IT can result in significant challenges in security, finance, operations, and strategy. As your organization considers what it costs to modernize, don't forget to think about what it may cost if you *don't.*

Futureproofing IT

Infrastructure modernization may seem like an exercise in bringing old infrastructure into the modern day, and it is. But why stop with the present when you can think about the future? You're not just catching up; you're futureproofing IT so your infrastructure gets modernized and stays modernized as time goes by.


TIP

Think about it this way. How much do you enjoy forklift IT upgrades? It's probably something you'd prefer not to do very often. Rather than go down a path where forklift upgrades will be needed every three or four years, why not choose a path that won't force you to repurchase IT regularly?

A real key to effective modernization is gaining the ability to run uninterrupted indefinitely. That means not just achieving six nines (99.9999%) of reliability, but also being able to upgrade as needed without taking the system down or changing the operating system.

Modernization is truly successful when it takes away the surprises that the future may bring. That means an infrastructure with a long-supported lifespan and the promise of seamless, nondisruptive upgrades. That's futureproofing.

IN THIS CHAPTER

- Achieving sustainability
- Working to keep data safe
- Exploring subscription models
- Taking the complexities out of AI

Chapter 3
Understanding the New IT Imperatives: The Four S's

This chapter aims to make things simple by boiling down the need for modernization into four basic imperatives — and to make it even simpler, they all begin with the letter S.

Sustainability: Turning the Data Center Green

REMEMBER

Sustainability is vital in all parts of your operation, and IT is no exception. In ten years, the world's connected electronic devices will produce more carbon emissions than all the automobiles in the world combined. It takes a lot of power to make the IT-enabled world go around, and that's a growing problem.

The IT sector as a whole is a huge and growing energy user. It's not just bitcoin miners and power-hungry GPUs for AI that have created additional demands for even more data center energy consumption. In fact, many data centers are running out of available kilowatts of power, making it tough for them to handle AI requirements.

Sustainability is an issue for the planet as well as for corporate bottom lines. The good news is that this issue is very much on the minds of the IT world. Take as one example FlashStack, a validated, full stack infrastructure developed by Cisco and Pure Storage to handle demanding workloads. As the technology underwent a blank slate redesign a couple of years ago, a lot of different requirements were on the to-do list, and high on that list was sustainability. Always-on data reduction significantly reduces storage requirements, power supplies and cooling systems have become more efficient, and increased storage and compute density mean a decrease in both the physical and carbon footprint.

As a 2023 Enterprise Strategy Group whitepaper on greener data centers observes, implementing FlashStack reduces the data center's footprint, energy consumption, carbon emissions, and e-waste. Not only does the data center require less floor space, but power and cooling needs and costs are lower. That's a bonus for both the planet and the budget but also can be leveraged into improved brand reputation and equity.

An IT provider serving a national postal service, for example, satisfied its vital sustainability aims and also saved money when it implemented the technology and slashed related electricity usage by as much as 90 percent. A financial services company cut its electric bill by a million dollars in the first year with the improved technology, reduced space required by 86 percent, and achieved a 6:1 data reduction.

REMEMBER

A green solution also financially pays off. Lower power and cooling requirements are money savers and environmental gains. Reduced need for data center floor space cuts the real estate bill, and fewer racks of storage and networking means a lower administrative and maintenance burden and cost. Those ramping up AI uses benefit from the extra energy headroom provided by a modern IT infrastructure, freeing up kilowatts for power-hungry AI projects.

Security: Keeping Data Safe

TIP

Keeping your organization's valuable data safe is critically important. The best approach can be viewed as a belt-and-suspenders strategy. Don't rely on just one security approach to feel safe; instead, create a layered defense-in-depth strategy. If

cyber-actors with ill intent make it through one layer, be sure there's another one ready to catch them.

Using FlashStack as an example, defense-in-depth means tapping into all aspects of Cisco's comprehensive cybersecurity suite, SecureX, which many experts will tell you is the best defense out there. The defense includes contextual awareness across the security ecosystem, with better detection and faster response times.

A full menu of Cisco defenses is there for user and device security, network security, and cloud and application security. Even in the worst-case scenario, if someone makes it all the way through to the data, it's encrypted with SafeMode immutable snapshots that can't be unlocked without a key that's safely in the hands of Pure Storage.

In addition, other industry-leading partners lending a defense-in-depth hand include Veeam and Comvault, ensuring best-of-class backup and rapid recovery. Indeed, backup and restore is three times faster than alternative options.

Subscriptions: Aligning IT Costs with Usage

Subscription models provide for a future that's more flexible, powerful, and predictable. Your organization should have flexible consumption options so that your IT costs are aligned with your usage. This approach is ideal for both the bottom line and for establishing the greenest possible infrastructure.

FlashStack, for example, explores how this can work in practice; the idea is to provide flexible purchasing options that ensure all needed capacity is there at the right time so the user doesn't miss any opportunities or fail at delivering service-level agreements.

For those with a CapEx-focused procurement and accounting approach, that's an option, but it's future-proofed with Evergreen refresh cycles. The Evergreen//One for Storage option recognizes that extreme growth in data and users is pretty much the norm these days, and that many users have found storage to be the most dynamic infrastructure layer. Again, the aim is never being caught without needed capacity.

REMEMBER

There's also the fully pay-as-you-go model known as FlashStack as-a-Service for the Full Stack. It taps into Cisco Intersight monitoring, management, and provisioning for deployment reliability. Risk is reduced through the use of pretested validated designs. You can align costs with usage and still be ready for future unknowns.

Simple AI: An Easier Path to Business Insights

Simple artificial intelligence (AI) infrastructure provides an environment that's ready for deployment of AI advancements. The benefits of AI are many and they're real, but so is the complexity and time it takes to set up a functioning AI environment.

A simple AI infrastructure provides an AI-ready environment that eliminates much of the time and risk of creating the kind of robust, easily managed AI platform that your business clients are demanding. Faster, risk-free AI infrastructure means simpler data set management as well as faster time to business insights. And it takes less staff to get you there.

This is where FlashStack for AI comes into the picture. It's a solution tackling three significant challenges:

- **AI simplicity and readiness:** This isn't easy work, and it often requires a lot of time for data scientists and administrators. FlashStack for AI employs Cisco Validated Designs to slash up to 60 percent of the time normally needed for piecing together AI infrastructure. It also reduces the risk of failure because following the CVDs is the best way to get green lights on your system.
- **AI democratization:** The product makes AI accessible for projects of all sizes. It can certainly run up to supercomputer scale, but it can also deliver foolproof AI infrastructure at even the smallest scale.
- **AI accessibility:** For those already happily using UCS or FlashStack deployments, FlashStack for AI is the easiest way to integrate AI into the operation.

IN THIS CHAPTER

- Keeping up with AI, database, and big data demands
- Dealing with the threat of ransomware
- Evolving from CapEx to OpEx
- Achieving application modernization

Chapter 4
Exploring the Real-World Use Cases for Modernization

This chapter outlines a few of the most common real-world use cases that motivate companies to modernize. The demands of databases and big data are compelling, as is the threat of ransomware. Moving expenditures from the capital column to operational expenses is a driver, along with the need to modernize your applications so they meet demands.

Dealing with AI, Databases, and Big Data

Operations that involve databases and big data can benefit tremendously from modernization. End-users may see it as working with their own application, but that application is likely to be ultimately running on something like Oracle, SAP HANA, MongoDB, MySQL, or emerging open databases.

The value is in improved performance. Take SAP HANA, for example. It's already a compressed database, but it's possible with modernization to get 2:1 additional compression, perhaps even 4:1 data

reduction. Or consider a growing company with increasing MySQL data running on an aging IT infrastructure that puts a crimp in both the number of applications and the ability to upgrade. That's a situation ripe for infrastructure modernization, and doing so can cut the need for data center space dramatically. Modernization can mean that latencies are no longer an issue, and application deployments and updates can happen as often as needed.

Those deep into big data analytics also benefit greatly from infrastructure modernization with benefits depending on how much artificial intelligence (AI) involvement there is. Flexibility and scalability are essential and are at the center of a modernization initiative.

One user in the defense industry needed high-performance AI to provide insights for improvements in training fighter pilots. Its legacy infrastructure couldn't keep up with the data collection needed, and beyond that, its mandated sustainability goals were out of reach. A modernized infrastructure simplified IT and data management while raising the bar on performance to feed the AI beast with large volumes of unstructured data. Mission-critical Internet of Things (IoT) data drove analysis that quite literally has helped boost national air defenses. All the while, sustainability goals were no longer a problem.

Protecting Data and Foiling Ransomware

Protecting data and preventing ransomware is the use case most important for those on the security team who lose sleep over the safety of your data and your overall IT infrastructure. Valuable data is vulnerable to malware and ransomware attacks, and it's pretty much inevitable that an attack will happen.

That's where a defense-in-depth strategy comes in quite handy, with a comprehensive and layered approach. The idea is to present multiple defenses so if a threat gets past one, there's another standing by.

Having traditional data protection is essential, along with rapid recovery. Adding in a top-notch cybersecurity suite is a good idea, too. The aim is to have both reactive and proactive protections, including strong security at the borders of the infrastructure, encrypted backups, and snapshots for effective ransomware mitigation.

REMEMBER

Immutable snapshots are absolutely essential for getting back up and running quickly in the event of a successful ransomware attack. In a typical ransomware situation, an intruder gains access to a server or storage device and starts encrypting data. Operations go offline until the organization pays a ransom (and that's the best-case scenario).

Here's a much better scenario. If an operation is protected with snapshots, an intruder may gain access and start encrypting data, but operations are only minimally interrupted, if at all. The snapshots are locked and protected and provide the organization with what's needed to stay up and running — without having to pay a ransom.

Moving from CapEx to OpEx

The importance of moving from capital expenditures (CapEx) to operational expenditures (OpEx) varies from one company to the next and may also vary based on geography. Many have a comfort level with a fairly traditional business model that's built around making significant CapEx with lower OpEx. This model continues to work for them across the organization, including in IT.

But businesses are increasingly shifting from the so-called CapEx approach to an OpEx mindset. For them, it's worthwhile to reduce upfront CapEx and move more of the spending to OpEx. There can be significant cash flow benefits and often greater predictability, and it carries the logic of paying only for what you need and use right now.

REMEMBER

For those determined to make this move in the IT infrastructure, modernization is key. A software-defined architecture that takes full advantage of the hybrid cloud is essential for eliminating the big, upfront CapEx that used to be the norm in IT — such as the big spending for on-premise hardware and outright ownership of software licenses.

A modernized infrastructure provisions what's needed now and scales up or down as necessary. It often taps into a subscription-based model or an as-a-Service approach, the bills for which will count as OpEx.

The end result is significant financial flexibility. An OpEx model can allow businesses to plug their funds into innovative projects and strategic thinking as the landscape and demands change.

Out in the real world, one financial services user gained in a number of metrics through infrastructure modernization. Its transformation shrank the data center footprint by a remarkable 86 percent, which is one dramatic illustration of slashing a capital expenditure. The company achieved 6:1 data reduction, upped its uptime to virtually 100 percent, and, adding it all together, saved a million-plus dollars.

Modernizing Applications

REMEMBER

Modernizing the infrastructure allows for modernizing the applications running in that infrastructure. In a nutshell, it means applications are able to run faster, more efficiently, and more reliably. How does this happen? It's a combination of many factors, including reducing the data set, increasing speed, and managing data more effectively.

For example, with SAP HANA, one large public utility found that modernized infrastructure helped raise its app performance dramatically, which translated into much speedier customer service.

Infrastructure modernization transformed a tremendous application and upgraded how it functions — achieving data reduction on top of the compression the application already delivers, while simultaneously moving the user forward on sustainability goals.

In the case of a travel services provider amassing data on MySQL, infrastructure modernization was the key that made app modernization possible in the first place. Although its previous infrastructure put up roadblocks to application deployments and upgrades, a modernized infrastructure helped the user achieve the kind of continuous integration and continuous delivery that's table stakes in a competitive business environment. That's modernization.

IN THIS CHAPTER

- Bringing best-of-breed partners together
- Making hybrid cloud simple to navigate
- Managing infrastructure and apps
- Moving quickly to value with pre-validated designs

Chapter 5
Taking the FlashStack Approach to Modernization

This chapter dives into one approach to modernization. Chapter 3 mentions a solution known as FlashStack. This chapter elaborates and explores how the FlashStack approach can deliver on the imperatives of a modernized infrastructure — how it simplifies the complex hybrid cloud and the management of apps and infrastructure, how it brings best-of-breed value from a powerful team of partners, and how it accelerates time to value.

Partnering to Create a One-Stop Shop

It's vital to get infrastructure modernization right, and it's not exactly a piece of cake to accomplish. That's why it makes sense to pull in the brainpower of recognized industry leaders who've been there and done that countless times.

REMEMBER

Pure Storage and Cisco have worked together for a decade with alignment from engineering to the C-suite. They have rearchitected FlashStack from the ground up as a one-stop shop that creates a modern data experience with exceptional performance on the most demanding workloads.

FlashStack is a single, integrated solution. Yet every layer — compute, network, and storage — can be provisioned selectively, discretely, and independently from one another. That helps avoid overprovisioning or costly upgrades, and it also means never being caught with insufficient resources when demand spikes.

The compute foundation is the Cisco UCS X-Series Modular System, which includes compute-node capabilities and support for future graphics processing unit accelerators that used to only be found in rack servers. Compute nodes have more memory and onboard expansion capabilities for a lot of operational efficiency and agility.

Pure Storage brings FlashArray and FlashBlade solutions to the table to deliver the performance and scalability needed for modern databases and business applications. The power is there for the kinds of super-challenging analytics enabled by artificial intelligence (AI) and machine learning workloads. Latency is extremely low, and file and object storage is fast, so mission-critical work happens flawlessly.

This one-stop shop also includes Cisco Secure Workload, which protects any workload across any cloud or application. Cisco AppDynamics (AppD) lets enterprises monitor, analyze, and optimize complex environments at scale. And because Cisco creates a broad suite of proven cybersecurity solutions, you can also layer-on industry-leading proactive security apps that stop intrusions before they're able to penetrate your network and your infrastructure. SafeMode snapshots provide unlimited immutable backups to thwart ransomware attacks and other cybercrime.

Other partners in the industry such as Veeam and Comvault bring in best-of-class backup and rapid recovery. And the Portworx Enterprise Storage Platform, a Kubernetes platform businesses use for running mission-critical applications in containers, is integrated.

Simplifying the Hybrid Cloud

Modernization is the way to address the challenges of rigid infrastructure and complex architectures. Adopting software-defined infrastructures means being rid of trade-offs once associated with converged infrastructure, hyperconverged infrastructure, or do-it-yourself hybrid cloud approaches.

You can modernize with FlashStack and tame the hybrid cloud with FlashStack as-a-Service. It taps into the capabilities and features of FlashStack with the ability to easily and selectively add capacity with continuous metering and monitoring.

REMEMBER

Everything happens under one subscription, which means you only get one bill for the entire stack. Costs are contained through an intelligent consumption model, and IT assets move from capital expenditures to operational expenses, reducing the impact on the balance sheet.

There's continuous right-scaling for both on-premises and hybrid cloud environments. Flexible storage aligns costs with usage, and upgrades are non-disruptive. That means availability in the stratospheric six-nines range of 99.9999 percent.

Managing Infrastructure and Apps

Hybrid cloud architectures haven't always been known for high visibility or ease of management, which isn't a surprise given their complex hybrid nature. FlashStack threads that needle with true single pane of glass management for infrastructure and apps. It's fully automated and application-aware.

Having Cisco Intersight as the FlashStack management layer makes this functionality and simplicity work. They're a true one-stop monitoring and management solution with a single control center for both infrastructure operations and provisioning — and that's really a central requirement for a modern data experience. Features include

- Management of full stack operations (compute, network, and storage)

- Management of each layer's capacity with visibility that's near real time
- The ability to get updates you when you hit pre-defined consumption thresholds
- A look at the running costs associated with infrastructure consumption, including energy consumption

The whole idea is to reduce IT resources and optimize performance by managing systems and apps together. Infrastructure management tracks the status of each layer and takes proactive action to address any issues or new business requirements. And, FlashStack can even employ Cisco AppD to monitor and manage application performance.

Accelerating Time to Value


TIP

FlashStack users can speed up their time to value with access to Cisco Validated Designs (CVDs). These are pre-tested, validated reference architectures for common workloads that get businesses on the road to solutions quickly. CVDs reduce risk when deploying and managing popular workloads.

Some of the many workloads for which you can access CVDs include

- Traditional enterprise applications, databases, and VMware
- Modern open databases and DevOps use cases
- Cloud-native and container applications
- FlashStack for AI & Big Data Analytics (such as Splunk)
- Healthcare deployments, such as Epic Systems and Meditech

With pre-validated designs, the engineering team can architect one day, deploy the next day with SmartConfig automation, and then operate and continually innovate through integration with Intersight.

IN THIS CHAPTER

- Picking an experienced, winning team
- Keeping data safe and the planet green
- Paying only for what you need and use
- Making the most of your team's brainpower

Chapter 6
Ten Reasons to Modernize with FlashStack

Many organizations need to modernize their information technology infrastructure for countless reasons, and most probably need to do so as fast as yesterday. The question is, what's the simplest, most powerful approach that delivers the most value?

This chapter offers ten reasons (actually, 11 — consider the eleventh reason a bonus!) why the answer to that question is FlashStack. Read on if you need convincing on why you should modernize with FlashStack:

- **World's leading USC-based full-stack solution:** FlashStack is built on a foundation of the Cisco UCS X-Series Modular System, and it's a top pick among companies seeking a USC-based full-stack solution.
- **Mature global partnership:** The IT world is full of exciting new enterprises, but when you're talking about modernizing the architecture on which your whole organization runs, there's something to be said for trusting maturity and

experience. Pure Storage and Cisco have been delivering this solution for a decade.

- **Fastest-growing infrastructure platform:** Check some references (and there are a lot of them). There's a reason FlashStack is growing rapidly, and users have cast their votes with their IT expenditures. Take their word for it.
- **Superior data protection:** Ransomware and cyberattacks are well worth worrying about, but FlashStack users worry less because they benefit from defense-in-depth — a multilayered defense that includes SafeMode snapshots to keep ransomware at bay, plus many more safeguards.
- **A top choice for Epic deployments:** A high percentage of healthcare systems choose Epic Systems applications for their electronic medical records, and if they're running Epic, it's likely on FlashStack.
- **Truly software defined across on-premises and in the cloud:** The path to modernization is software-defined and artificial intelligence (AI)-based.
- **Discrete provisioning:** You're bound to need more capacity, whether compute or storage. Discrete provisioning means you can get there without forklift upgrades and without buying what you don't need.
- **Superior sustainability:** Higher storage and compute density mean a much lower physical and carbon footprint and also big-time savings on energy costs.
- **Pay as you go:** Consuming as-a-Service means your usage and costs go hand-in-hand. The alternative no longer makes sense. Pure Storage's Evergreen//One is a mature Storage as-a-Service offering in the marketplace and FlashStack users are rapidly adopting it.
- **Free up IT resources:** AI-based management and automation in your IT infrastructure open up your team's human bandwidth for revenue-generating projects.
- **Readiness to deploy AI solutions:** IDC's 2024 FutureScape read-out reported that 50 percent of G2000 enterprises are planning to leverage GenAI as a business disrupter. But deploying AI platforms can be a long, challenging process — and that's before you even get to identifying the needed datasets and training your AI models. FlashStack accelerates that process and reduces the risk of not having infrastructure that's ready for whatever scale AI solution you deploy.

Modernize IT from the data center to the cloud

Modern data infrastructure is becoming smarter, simpler, smaller — and more efficient than ever before. Infrastructure *Modernization For Dummies*, Pure Storage Special Edition, is your roadmap to the changing nature of IT. Understand how to mitigate the risks inherent to multi-cloud landscapes and how to deploy an AI-ready environment. Discover what it means to secure your data with a defense-in-depth strategy and if an IT OPEX model is right for you. And finally, learn how to begin your modernization journey.

Inside...

- Simplify multi-cloud operations
- Scale capacity automatically
- Achieve all-flash performance
- Upgrade non-disruptively in real time
- Protect data from ransomware attacks
- Rapidly deploy AI infrastructure
- Eliminate forklift upgrades

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Steve Kaelble has authored many *For Dummies* books and is published in magazines and newspapers. He also engages in healthcare communications. **Brian Ferrar** is the Marketing Director for Pure Storage's infrastructure solutions. He has 25 years of experience in professional services, vertical solutions, and hybrid cloud environments.

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