Cloud Solutions

How AWS Cloud Solutions Can Help Your Manufacturing Enterprise Maintain Its Competitive Edge

SPK and Associates

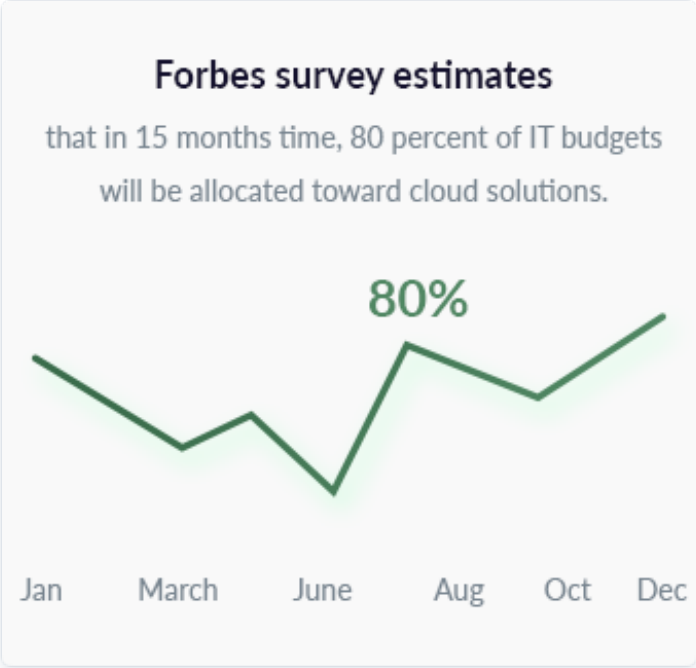
2020 is rapidly approaching. That's the year public and private cloud-based solutions like Amazon Web Services are set to **surpass traditional data centers** in terms of overall spending. In 2017, nearly two thirds of spending went toward private cloud solutions. Cloud usage exploded in 2017, to the tune of threefold. A Forbes survey estimates that in 15 months time, **80 percent of IT budgets** will be allocated toward cloud solutions like Amazon Web Services, which currently has a **$12.3 billion annual run rate**.

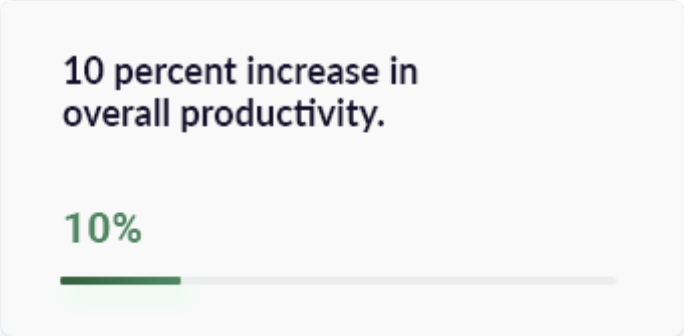
In manufacturing, cloud solutions provide breathtaking results. **An American Enterprise Institute** white paper reported cloud-based solutions reduced line stoppages by 98 percent, an 86 percent reduction in on-site inventory and a 10 percent increase in overall productivity. The same report stated that 85 percent of SMBs were not currently leveraging digital manufacturing and design tools, primarily because of a lack of expertise and know how.

Small- and medium-sized businesses are in an ideal position to migrate to Amazon Web Services. Your server infrastructure is probably a lot creakier than you think it is. In fact, it's common for SMBs to constantly move upgrading their server infrastructure down the road. However, all this accomplishes is making your organization's data less secure and responsive to your needs.

If you're like a lot of SMBs, you probably avoid thinking about your server infrastructure. But you shouldn't, because the solution is a lot simpler -- and cheaper -- than you think. In fact, cloud solutions reduce cost of ownership by a whopping **40 percent**. Cloud-based infrastructure like Amazon Web Services is flexible, secure and able to meet the budgets of virtually any organization. You're going to pay less and get more. But you need to ensure your cloud solutions are set up properly for maximum efficacy.

Indeed, the above mentioned Forbes survey found nearly half of all organizations delay cloud adoption due to a lack of skills. Among engineering organizations, 60 percent worried that their in-house team couldn't handle the security challenges posed by cloud solutions. The good news is, your organization doesn't need to have an in-house IT team capable of handling a sophisticated cloud migration to Amazon Web Services to enjoy all the same benefits.





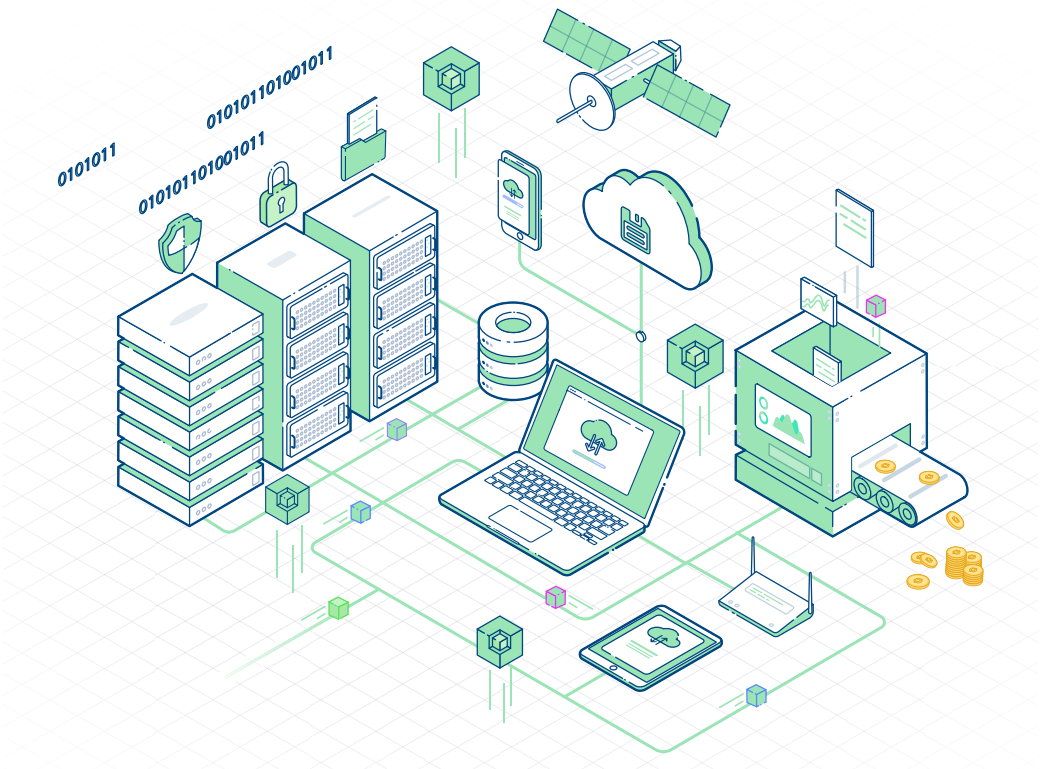
What Is the Cloud?

"The cloud" has been a tech buzzword for years. But what really are cloud solutions like the kind offered by Amazon Web Services.

Simply put, the cloud is a network of servers accessible anywhere. Indeed, Amazon Web Services boasts servers all around the world. Some servers store data, others run applications and processes. Some application providers, such as Adobe, offer their applications as cloud applications, meaning you don't have to install or run them on your servers. Similarly, you can store your information, tools and applications "in the cloud" somewhere off-site, or on-premises but accessible from anywhere.

So how is the cloud a solution to your server woes? Because cloud technology offers a number of advantages over traditional, on-premises servers.

- Cloud-based servers require no capital expenditure.
- Instead, cloud solutions charge based on usage, like a phone bill. You only pay for what you use and nothing more.
- Your cloud services can scale up (or down) to meet your needs in real time, compared to on-premises servers, which must be robust enough for your busiest day.



- Because they do not require capital investment, cloud-based infrastructure is not a depreciating asset like on-premises servers.

These are the main advantages of cloud infrastructure for your organization. There are more, including security and automation, but we'll get to those later.

There are three main types of cloud services. They are

- **Public cloud** allows access to data and applications on third-party servers located off premises. You share assets with other organizations leveraging similar services from the same providers. You're probably already using the public cloud for services such as web-based email.
- **Private cloud** means the network will be just that -- private. Often times this is a "cloud in a box" local network or a platform as a service (PaaS) hosted on premises. Teams in far-flung corners of the globe will have access to the same data and the same information at the same time.
- **Hybrid cloud** isn't really a type of cloud. It's a method of leveraging the best admixture of public and private cloud solutions.

Amazon Web Services supports each of these forms of the cloud. Public and private cloud each come with their own specific set of advantages:

- **Public cloud** is cheaper than private cloud, requires no maintenance, is highly reliable and can be scaled up or down to your precise needs.
- **Private cloud** solutions are more flexible, allowing for a greater degree of customization for your specific organizational needs. Resources aren't shared, so you have greater control and increased security without sacrificing scalability.

What Is the Hybrid Cloud?

You can have the best of all worlds with hybrid cloud, which makes it an attractive solution for many organizations.

Here's an example of how a hybrid cloud solution could be executed:

- **Public cloud** handles high-volume, low-security needs.
- **Private cloud** deals with sensitive data requiring greater levels of security.
- **On-premises servers** handles certain functions until they can't. At this point, they could tap on cloud resources for increased power.

For organizations transitioning to the cloud, hybrid solutions allow you to decide which workloads to migrate onto the cloud and when to migrate them. For example, there's little need to move legacy systems onto the cloud. Or your IT administrators might desire a greater degree of control over some systems, meaning they're best kept on premises or in a private cloud. Organizations with high regulatory burdens might find it far more expedient to keep certain data and applications in the private cloud.

Hybrid cloud is distinct from multi-cloud, where one organization leverages two or more cloud providers. However hybrid cloud and multi-cloud solutions can be used together. In fact, two-thirds of all organizations using IaaS/PaaS reported using multi-cloud solutions with nearly half using three or more different cloud providers.

Multi-cloud might be the right solution for your organization, whether or not you ultimately decide to leverage hybrid cloud. However, multi-cloud complicates things greatly. When data and processes are architected on different servers, you need expertise to make sure they play nice together, with adequate performance. If you don't have that expertise on site, you need to hire an organization who does.

Benefits of Hybrid Cloud

Hybrid cloud solutions have tangible benefits far beyond simply being "the best of both worlds." When we say cloud offers "the best of both worlds" these are the features we're talking about.

- **Security:** When configured properly, hybrid cloud is more secure than either private cloud or public cloud solutions. The key phrase here is "when configured properly." Control over architecture cuts both ways. The challenge for many SMBs is attaining improved security without a robust in-house IT department. Partnering with outside consultants can allow your organization to leverage hybrid cloud solutions securely.
- **Cost Savings:** Public cloud solutions offer cost savings and do not require capital investment. Rather, they are a pay-as-you-go service. While hybrid cloud solutions might require some capital investment on your part, the investment is significantly less than pure on-premises solutions.
- **Agility:** Hybrid cloud solutions allow your organization to be as agile as your competitors already are. The public cloud steps in to provide extra bandwidth when you need it, including during product development. When developing and testing new applications you can leverage hybrid cloud solutions while deciding where their final homes will ultimately be.
- **Continuity:** Forget about disaster recovery. Hybrid cloud solutions allow your organization to stay online during the disaster. Your data will almost always be accessible, no matter what's happening on premises. Even physical disasters where your cloud servers are located probably won't impact you much, as hybrid cloud solutions often include data redundancies. 100 percent uptime is highly unlikely, but you're almost guaranteed better uptime with hybrid cloud than with public or private alone.
- **Scalability:** Contemporary organizations need scalable storage solutions. Hybrid cloud offers optimum scalability. While cloud-based storage is generally not quite as fast as on-premises solutions, the difference might be negligible for your business. What's more, you can use your on-premises architecture to handle data you need access to the fastest while using cloud-based solutions for backup.
- **Accessibility:** Your employees can access everything in your cloud no matter where in the world they are. This allows employees to handle critical tasks without regard to time or place.
- **Integration:** Many of the applications your organization is already using come with built-in hybrid cloud integration options. A number of management suites allow for seamless management of on-premises, private cloud and public cloud solutions. Your organization can quickly access best-in-class business intelligence and analytics services.

Hybrid Cloud and Amazon Web Services

Amazon Web Services can handle nearly all of the data needs of the modern manufacturing enterprise. Its scalable solutions make it a particularly attractive option for small- and medium-sized businesses. Amazon Web Services suite of products includes:

- **Web and Web Application Hosting:** Your company website and related applications can be hosted on AWS. Amazon Web Services is content management system neutral, meaning you can leverage any CMS you like.
- **Backup and Recovery:** The more diversified your data, the more difficult it is to secure it against disastrous losses. AWS offers a secure, compliant, cost efficient means of backing up your data and protecting against catastrophic data loss.
- **DevOps:** DevOps leveraging Amazon Web Services is scalable, programmable and built with automation in mind. Continuous integration and delivery allow for easy building, testing and deployment of code. This can dramatically streamline your workflow and development calendars.
- **Big Data:** Think you need to be a big company to afford big data? Think again. Your organization can leverage all the benefits of big data on a budget you can afford. That includes access to real-time analytics, data warehousing and business intelligence tools allowing your manufacturing enterprise to compete on a grander stage.
- **Serverless Computing and Applications:** Ever felt like your servers get in the way of building and running applications? Enter serverless computing. This means more time for your engineers and developers to work on designing new products and services.
- **Internet of Things Services:** The Internet of Things (IoT) is huge, especially in the manufacturing sector. AWS provides a number of tools to integrate and manage your IoT and Industrial Internet of Things (IIoT) services. AWS allows for easy, secure, centralized management of your IoT and IIoT devices with analytics to help you get the most out of your investment.
- **Business Application Support:** It doesn't matter if you're trying to run your back office or your front line, whether they're out of the box, highly customized or total homebrew solutions. You need mission critical business applications online around the clock. AWS provides that, alongside agility and flexibility.
- **AWS Mobile:** If you need to build custom apps for your business, you can easily leverage AWS Mobile for that purpose.
- **Research and Technical Computing Power:** Amazon Web Services offers access to computer power to drive your research and development. That means a lower budget for servers and more money for developing new products. Within minutes you can be up and crunching the numbers on one computing machine or a whole cluster of them.

Amazon Web Services boasts a wide array of solutions. Many go far beyond simple storage and backup typically associated with the cloud. What's more, with the right partner, you can easily taylor these solutions to fit your business' unique challenges.

Amazon Web Services and Cloud Migration Options

Amazon Web Services includes a suite specifically designed to make your cloud migration as painless as possible. All told, there are no fewer than four native solutions offered by Amazon Web Services to assist with cloud migration when you decide to move your data into a hybrid cloud solution such as Amazon Web Services.

However, the more complicated your existing infrastructure the more difficult it will be to execute a smooth migration, to say nothing of a seamless one. Getting your data and applications into a cloud infrastructure might be relatively easy. Getting all of that data to function in the cloud in the same way it did with your on-premises servers is a whole other kettle of fish.

Moving everything to the cloud haphazardly and uniformly is not the best solution for most manufacturing enterprises. The more moving parts you have, the more difficult it will be to move them all to a hybrid cloud solution and keep everything functioning smoothly. The right partner can help you to decide what gets moved to the cloud, where it slots in best and how to get all of those moving parts moving together again. Even with the superior migration tools of Amazon Web Services, there's no substitute for an experienced partner to help you come up with a migration strategy.

Evaluating Hybrid Cloud Options

With so many hybrid cloud combinations available, it can be hard to determine which is the right one for your organization.

And certainly, there's not one perfect cloud solution that's going to be right for every organization. Instead, there are some general parameters to consider when evaluating hybrid cloud options.

- **Mission Critical Data:** Mission critical data must be kept on premises in many cases. For example, there are high regulatory burdens for certain industries such as pharmaceutical and automotive that require you to be in control of your data at all times. For other organizations, it just makes sense to keep mission critical information on site.

- **Offshoring Data:** Similarly, some organizations have compliance and regulatory requirements demanding that information stay within the United States, even when it's not on premises.

- **Requirements Communication:** It's important to communicate all organizational needs to your service provider. They can help you to find the best solution. Service providers not able or willing to listen to your organization's specific needs are best avoided.

- **Connectivity:** Your Internet connection speed must be capable of transmitting your data workload. In some cases this might mean upgrading your equipment to meet your organization's needs. Effective cloud connectivity sometimes requires fast connections of up to 100 Mb/s.

- **Security:** The most important fact to consider when selecting a cloud provider or hybrid cloud managed solution is security. Even if your organization is not in a heavily regulated field, you owe it to yourself and to your customers to keep information secure at all times -- on premises, off premises and during all transmissions.

Risks of Hybrid Cloud and How to Mitigate Them

There's no two ways about it: Like any other technology, hybrid cloud comes with risks. However, these risks are manageable for any organization taking the time to understand and address them. Many smaller and medium-sized enterprises will require a partner to help mitigate at least some of the risks associated with hybrid cloud solutions. Understanding the risks involved is part and parcel of finding the right partners to help.

- **Lack of Control:** There's no getting around the fact that your CIO or head of IT will have less control over hybrid cloud solutions than they would strictly on-premises solutions. You're giving up some control over to your cloud provider. Applications will update on their own, causing potential problems with integration on your end.
- **Security:** Unless you have a robust in-house IT team versed in hybrid cloud security best practices, you'll need to partner with someone capable of configuring your cloud solutions properly. Specific security risks related to hybrid cloud (poor data ownership, lack of encryption, denial-of-service attacks, data leakage and a host of others) could form an entire book on their own.
- **Compliance Due Diligence:** You can totally get a fully compliant hybrid cloud solution, even in a heavily regulated industry like automotive, aerospace, fintech or medtech. However, your organization has a greater due diligence burden. If your team isn't familiar with current regulations and how they apply to hybrid cloud transitions, you need to partner with someone who does.
- **Integration:** Hybrid cloud opens the promise of greater integration. However, much like security, this increased integration requires know-how not every organization's IT department can muster. Getting applications hosted in the cloud to play nice with on-premises data is just one of many integration challenges.
- **Compatibility:** With hybrid cloud, you're marrying two architectures: Your on-premises architecture where you have almost total control over and cloud architecture, ultimately controlled by your cloud provider. These two architectures will probably run different stacks. These two stacks might come with two different sets of tools, one of which your team is completely unfamiliar with.
- **Innovation:** Hybrid cloud is a future-oriented technology allowing your organization to quickly take advantage of emerging cloud-based applications and tools. The future of business and engineering applications lies in the cloud. A cloud presence creates immediate access to those tools. What's more, you can test and prototype your own innovations in a hybrid cloud environment with reduced capital expenditure. These prototypes can then quickly be deployed.

All of these can be mitigated by working with a managed services partner relieving your IT department of the burdens of this highly complex transition. Ultimately, the challenge is one your organization can overcome with the right partner, reaping the significant benefits of hybrid cloud.

Data Security and Privacy With Amazon Web Services

Amazon Web Services places a high priority on the security and privacy of its clients. To that end, there are a number of built-in security features that are best in class, including:

- **Security Standards:** AWS leverages a wide array of security standards, standing in full compliance with SOC 1/SSAE 16/ISAE 3402, SOC2, SOC3, FISMA, DIACAP, FedRAMP, PCI DSS Level 1, ISO 27001, ITAR, HIPPA, and Cloud Security Alliance.
- **Identity and Access Management:** Identity and Access Management (IAM) allows for highly detailed and personalized access management for every member of your team. You can further enable multi-factor authentication for every member of your team. Similarly, AWS includes security groups and network access control lists.
- **AWS Cloud Trail:** With AWS, you get AWS Cloud Trail, which tracks every API call made to your account resources. That's important data for tailoring your security solutions.
- **Virtual Private Clouds:** Virtual Private Clouds (VPCs) allow for easy provisioning of your cloud resources. That allows for total control of network traffic -- and the increased security that comes with it.
- **AWS Direct Connect:** Another built-in feature, AWS Direct Connect allows for private virtual interfaces between Amazon Web Services and your on-premises servers. This direct connection allows for a high level of security without sacrificing much in the way of bandwidth.
- **Data Encryption:** Amazon's service-side encryption is 256-bit Advanced Encryption Standard (AES-256), the gold standard when it comes to encrypting sensitive data. SSL certificates are generated for encrypted transmissions for every transfer.

Still, as with any cloud solution, you accept part of the responsibility for your own security. That's why having a partner help you with the setup on your end can be extremely valuable.

What Does Hybrid Cloud Offer Manufacturing Organizations?

The manufacturing industry is undergoing yet another revolution right now thanks in no small part to cloud-based solutions. The Industrial Internet of Things (IIoT), 3D printing, generative design and other emerging technologies don't require hybrid cloud solutions as such. They do, however, get a lot more powerful when cloud solutions are leveraged. **Industry Week** estimates that by 2020, three quarters of manufacturing organizations will leverage the cloud with a third monetizing data contributions. The same article predicts half of all manufacturing organizations will leverage cloud-based crowdsourcing, virtual reality, and product virtualization, improving product success by a quarter. 80 percent of all supply chain interactions will happen in the cloud. The numbers are clear: the future of manufacturing is in the cloud.

By 2020, three quarters of manufacturing organizations will leverage the cloud

Manufacturing firms feel the scalability issue far more acutely than other industries. What's more, cloud portability applies to software as well as hardware. ERP, CRM and other softwares can be purchased affordably leveraging cloud solutions as a service rather than as a depreciating capital expenditure.

The cloud allows for increased and easier integration for manufacturing enterprises. For example, everything from your supply chain solutions to your warehouse and manufacturing floor IIoT devices can be intelligently integrated, even if they're provided by multiple partners. What's more, you can achieve this integration with increased security that few organizations are able to pull off without having a robust and experienced IT department. This is attractive for all manufacturing enterprises, especially those in such highly regulated fields as medtech, aerospace and automotive.

Manufacturing Execution Systems (MES) are increasingly moving into the cloud. These sophisticated software suites coordinate everything from inventory to quality control. Whether you're using this to manage one production line, an entire plant, or several plants, the cloud offers many of the same scalability advantages other cloud solutions do.

Executed properly, hybrid cloud can make your organization more competitive both domestically and abroad.

Some of the most attractive features of cloud solutions for manufacturing organizations include:

- **Cost Savings:** Hybrid cloud solutions offer cost savings regardless of industry, however these savings are needed much more acutely in an increasingly competitive manufacturing sector.
- **Security:** Again, security is a benefit for any industry. However, for the manufacturing sector, hybrid cloud solutions offer you the ability to integrate more closely with your partners along your supply chain without providing them with access to sensitive private servers. You define your own access rules for partners.
- **M2M Traffic:** Cisco estimates a **24-fold explosion explosion** in M2M traffic between the years 2012 and 2016. Hybrid cloud can help your organization scale up to accommodate a host of new Industrial Internet of Things tools, improving your overall production process.
- **Innovation:** Properly configured hybrid cloud solutions mean less time setting up, reduced cost and greater complexity. This allows you to spend more time and money on innovation. Increased integration means easier collaboration between departments, speeding up experimentation and lowering cost.

Getting Your Cloud Migration Right

So the cloud offers a myriad of benefits for your organization. However, it's very important that you migrate there correctly. Here are some early steps every organization must go through before they begin migrating to cloud solutions:

- Audit your applications and understand their workloads -- both the "how much?" and the "why?" This provides you with a basis for deciding between putting the workload into the cloud or keeping it on premises.
- Consider interdependencies between applications. Relatively independent applications are much easier to migrate than applications with greater interdependency.
- Begin thinking about what data will work better on a private cloud and what belongs on a public cloud.

Hybrid Cloud and Automation

Manufacturing automation gets lots of headlines. Less talked about is how IT and engineering processes can be automated away.

In fact, your organization probably spends tens or even hundreds of thousands of dollars annually on tasks which can easily be automated. Not only does this save you money on payroll, it also allows you to direct your team toward more productive and fulfilling tasks, creating a greater value for your organization.

Hybrid cloud can make automation easier for your organization. However, much like security, it's important to have a team up to the task of automating processes. Many organizations think basic scripting can automate processes away, but in many cases such simply coding will not be up to the task of automating essential processes. Scripting has its place, but the more complex your systems, the more complex your automation solutions must be.

What's more, hybrid cloud automation offers benefits beyond a mere cost savings and redirection of resources toward higher priority tasks. Additional benefits of automation in the context of hybrid cloud include:

- **Workload Abstraction:** With workload abstraction you can make reusable templates for any automated project. Once templates are created they can be modified to meet the needs of similar processes. SPK and Associates has a number of templates it has developed over the years which it can easily modify to meet your specific organizational needs.
- **Synchronization:** Offices in different parts of the country need to have access to the same resources at the same time, increasing organizational integration. Hybrid cloud allows you to create business triggers for automation processes taking place at multiple locations at the same time.
- **Data Segmentation:** Big data is… big. This frequently requires it to be broken down into something a little more bite-sized for your servers, both on-premises and in the cloud. Automation can segment your big data into something all your servers can use.

Meeting the Challenge of Hybrid Cloud

Amazon Web Services is unmistakably a powerful solution nearly every organization can benefit from. However, unless you have a large and experienced IT team, you're likely not going to get the most out of a hybrid cloud-based solution. In fact, you might not even get all you need. Partnering with SPK and Associates, an engineering-focused consulting firm can help your organization to migrate to hybrid cloud solutions that supercharge your business.

If you want to learn more about how manufacturers deploy Amazon Web Services cloud solutions, schedule a free one-on-one briefing with an SPK and Associates expert today.

AUTOMATION

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