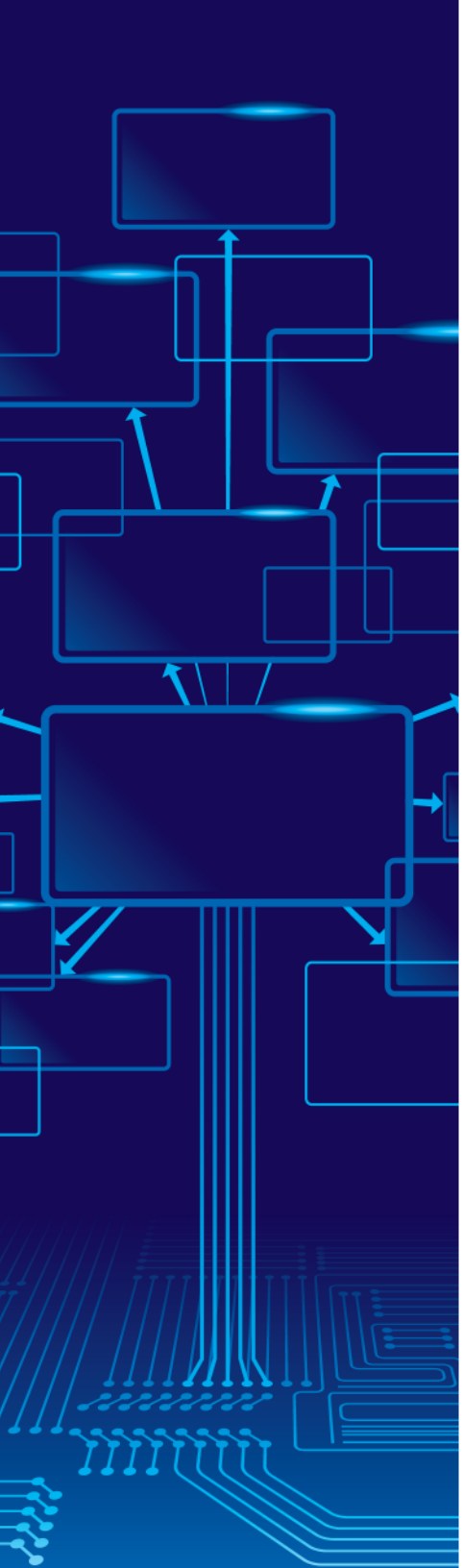

Pros & Cons of Cloud Computing

- Explore 4 cloud performance issues that can negatively impact your applications
- Learn about the top benefits of cloud computing & how you can take advantage of these features

TechTarget

In this handbook:

Top cloud performance issues that bog down enterprise apps

CHRIS TOZZI, ANALYST, FIXATE IO

The public cloud has become the popular option for hosting enterprise applications. That doesn't mean that every application is ideally suited for the cloud. Some apps perform better -- or cost less -- if you run them using on-premises infrastructure or a private cloud.

To determine whether your app belongs in the cloud, monitor application performance and keep an eye out for four cloud performance issues that disrupt enterprise apps hosted in public cloud environments.

SLOW RESPONSE TIME

Workloads depend on the internet to connect to users. There is more latency on the public internet than on local networks, so apps hosted in the cloud can be slow to respond. This is especially true if users are geographically distant from the data center where the cloud apps are hosted.

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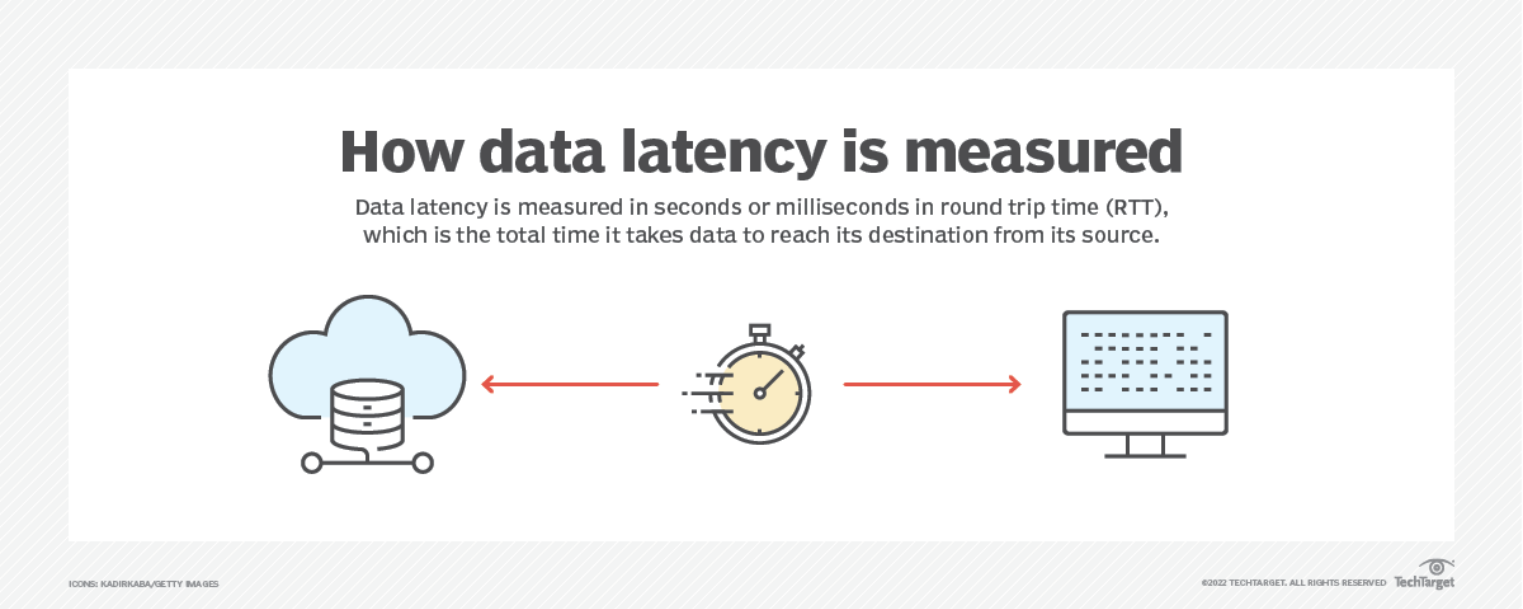
Delays can equate to a matter of seconds, but for workloads that require true real-time performance -- such as interactive video streams or applications that control vehicles in motion -- those delays might be too much. Your app might be a better fit for an alternative hosting method that delivers better latency rates.



LIMITED BANDWIDTH

Bandwidth available to cloud-hosted apps is limited. Local networks powered by enterprise-grade networking infrastructure can move hundreds of gigabytes per

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second. In contrast, public internet connections are can deliver only several megabytes per second of bandwidth. For most applications, this is sufficient.

However, if you find that your application can't send or receive the volumes of data it requires at the speeds it requires, then the app would perform better on premises. Bandwidth limitations tend to be problematic for applications that need to transit high-resolution video or images.

CLOUD PERFORMANCE/COST SAVINGS

While the types of performance issues described here aren't directly tied to public cloud costs, improving cloud application performance tends to result in cost savings, too. A high cloud computing bill could be a sign that your application is a better fit for an on-premises environment.

For instance, if your application consumes a lot of bandwidth, you'll end up with high egress fees because public clouds charge for all outgoing data. There's a good chance that an on-premises environment would lead to better performance and cost outcomes in that case. High-availability setups can also be more cost-effective on premises.

AVAILABILITY ISSUES

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Public clouds tend to be at least as reliable as the best-managed enterprise data centers. Most businesses can tolerate the minimal downtime that occurs in public clouds, which is outlined in a service-level agreement. But if your application requires ultra-high availability, you might want to host it outside of the public cloud.

Creating fallback or automated failover setups are more expensive to host in the public cloud than they are on premises. You can configure automated failover in the public cloud. But, if you want failover to happen instantly, you would need to pay for double the number of hosting resources. This gets pricey when you're paying by the minute or the second to run virtual servers, as you would in the public cloud.

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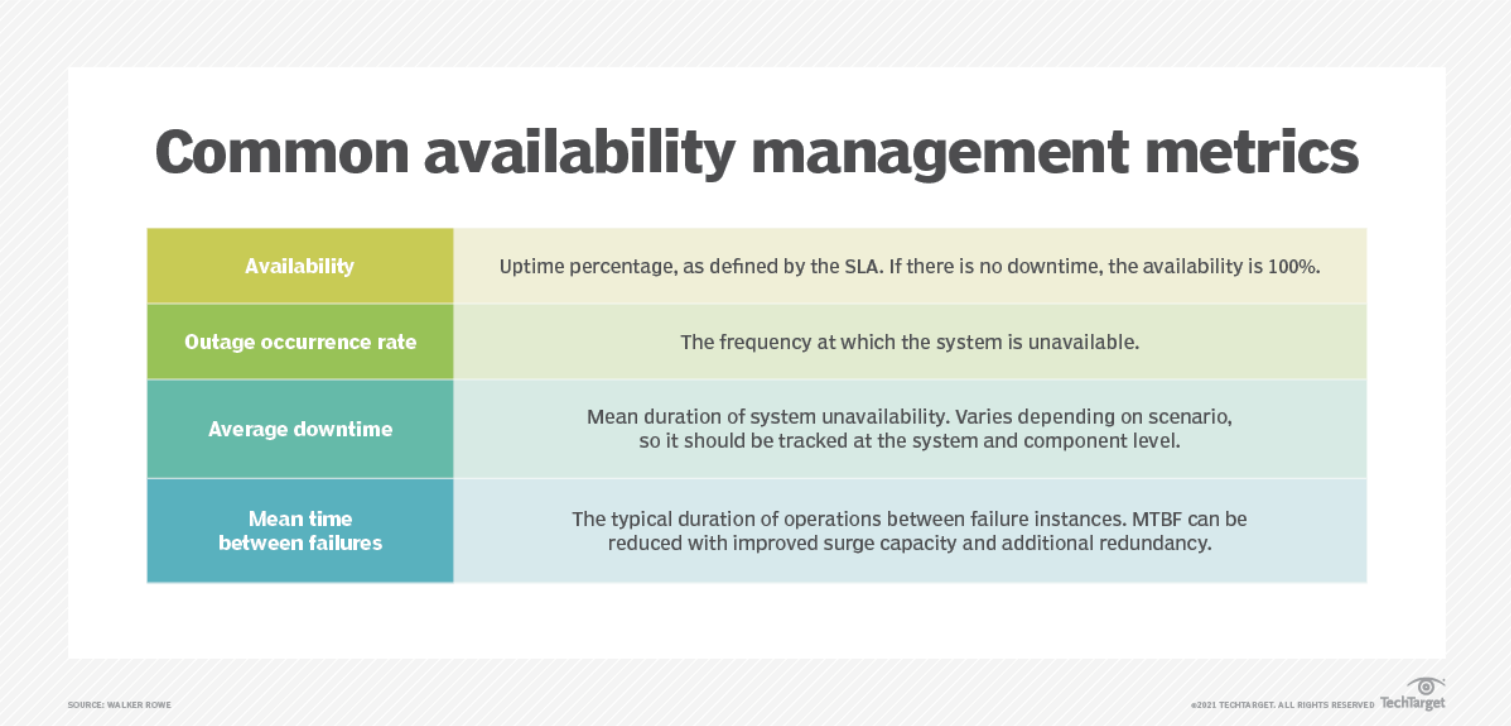

HIGH INTEGRATION-RELATED ERROR RATES

There are many causes of application errors, ranging from buggy source code to insufficient hosting resources.

In the public cloud, problems related to integrations with cloud services can be a common trigger of application errors. Given that cloud services are less flexible in

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terms of which APIs they offer and which integrations they support, you're more likely to run into integration-related errors in the cloud than you would on premises.

If you're seeing lots of API-related issues or integrations with cloud services, you might want to explore moving your app to a different hosting environment.

NEXT ARTICLE

Top 11 benefits of cloud computing

DARCY DECLUTE, AGILE COACH & SCRUM MASTER

Organizations with on-premises data centers are sometimes reluctant to move their IT operations to the cloud. Also, some startups want to buy powerful, expensive servers of their own so they can be in full control of their IT infrastructure.

Despite these initial instincts, organizations that require significant compute capacity should know the benefits of cloud computing, such as high availability, cost savings and environmental sustainability.

HIGH AVAILABILITY

A highly available system is one that experiences negligible downtime. Downtime is typically counted in seconds rather than minutes or hours, since cloud-based services rarely go down. Common causes of downtime in an on-premises data center include the following:

- power outages
- natural disasters
- hardware failures

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- understaffed IT departments
- sabotage

"One of the primary benefits of moving an organization's services to the cloud is near real-time deployment capabilities in a highly available architecture," said John Breth, an architect and managing principal at consulting firm JBC.

AWS, Microsoft Azure, Google Cloud and other cloud computing platforms provide service level agreements, or SLAs, that guarantee uptime at 99.95% for the majority of their services. Through additional configurations, such as the use of multizone regions in the IBM Cloud or multiple availability zones in Azure and AWS, the guarantee rises.

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High availability percentages of SLAs

PERCENTAGE	YEARLY DOWNTIME*
99.9	8hr 45m 57s
99.99	52m 35.7s
99.999	5m 15.6s
99.9999	31.6s
99.99999	3.2s
99.999999	0.3s
99.9999999	31.6 ms

*APPROXIMATE VALUES; SOURCE: HTTPS://UPTIME.IS/

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RELIABILITY

Reliability describes how well a service performs the tasks it promises to do. It ensures highly available databases don't randomly corrupt records or delete messages. Cloud providers routinely upgrade, update, patch and test their systems to make sure their services perform as promised. They further guarantee the reliability of their services in SLAs.

For example, Azure locally redundant storage, Google Cloud Storage and Amazon S3 Glacier Deep Archive all promise eleven nines of durability for the data they maintain. That's a 99.999999999% promise of reliability.

AWS chief evangelist Jeff Barr put eleven nines into perspective: "If you store 10,000 objects with us, on average we may lose one of them every 10 million years or so."

SCALABILITY

What happens with an on-premises workload when demand outstrips capacity? To scale an on-premises data center, you would need to buy additional servers, install more CPUs, add memory to existing systems, expand the network and hope your upgraded infrastructure keeps pace with demand. Taking these steps is costly, time-consuming and error prone.

If you store 10,000 objects with us, on average we may lose one of them every 10 million years or so.

Jeff Barr

Chief evangelist, AWS

If you need more processing power, you can add more virtual CPUs to your EC2 instances on AWS. Or, just add virtual RAM to your ECS instances on Alibaba. Also, if your Kubernetes cluster needs more throughput, you can add new replica sets via a few clicks.

In the cloud, you can scale your architecture in minutes and with the click of a button.

ELASTICITY

The extra hardware you scale up can meet a temporary spike in demand, but what happens when demand trails off? You can scale cloud-based services as needed.

"Having the ability to scale out or in depending upon the current need presents a lower operational expense contrasted with the capital expense required to purchase hardware that is scaled to support your maximum need," Breth said.

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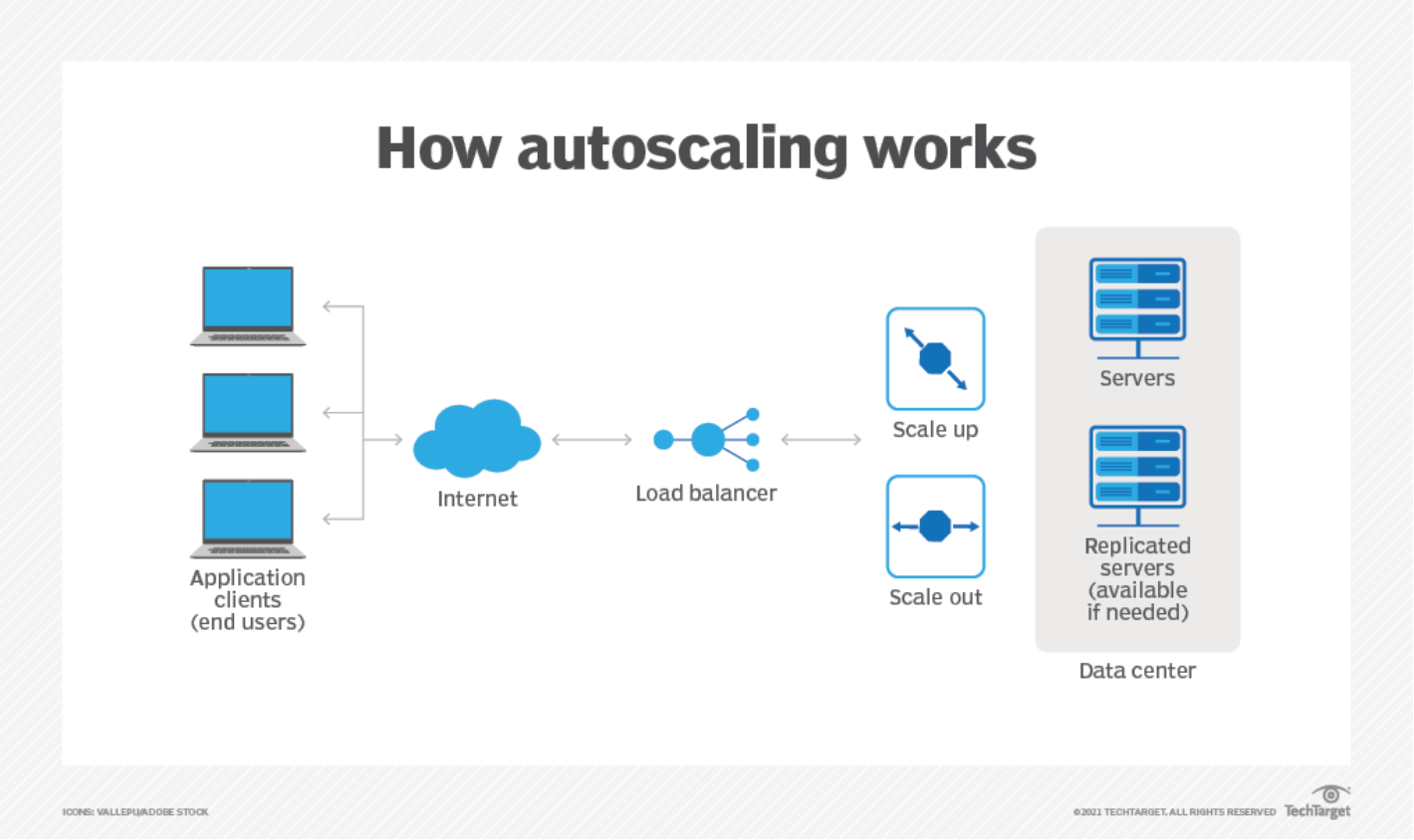

For example, the Oracle Cloud Infrastructure Container Engine for Kubernetes will scale cloud-native applications across VMs that it can stop and start as needed. AWS provides a specialized Auto Scaling tool that helps companies dynamically rightsize EC2 instances, Aurora DB and NoSQL databases.

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It's almost impossible to rightsize on-premises infrastructure because you must build a system that can meet your peak annual demand. An organization with a highly seasonal business, for example, could have millions of dollar's worth of hardware and software sitting idle during slow months. That's not a good allocation of capital.

AGILITY

Productive developers need to experiment with new software and test their changes against various server configurations. This can be time-consuming, even for the most experienced developer. In the cloud, it takes only seconds for a developer to start an IBM Virtual Server or a DigitalOcean Droplet that runs a fully configured application stack.

One of the cloud computing benefits developers love is that it frees them from the time-consuming chore of managing infrastructure.

COST SAVINGS

In the cloud, capacity planning is no longer guesswork. You simply scale up and down as needed. You don't have to spend millions of dollars up front for software licenses or mainframe servers. And you'll never run into the problem of having bought too much hardware. With autoscaling, you always have a rightsized environment.

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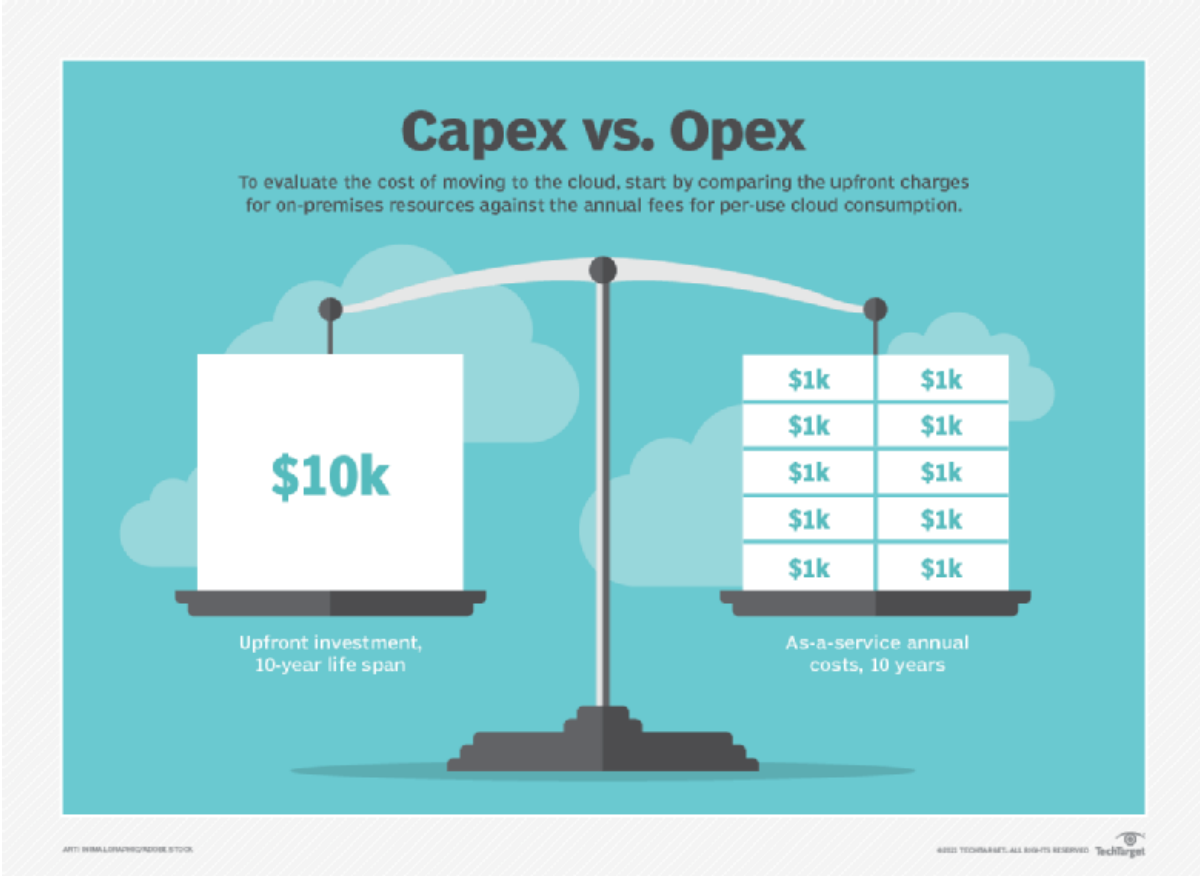
Also, you only pay for what you use, as you use it. Since there's no big, upfront expenditures to make, your costs become operational expenses. Also, because of the cost efficiencies that come with the cloud's economics of scale, costs are often lower than what you could achieve by running an on-premises data center of your own.



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GLOBAL REACH

To reduce application latency, a data center should reside near its users.

AWS and Azure have data centers located on six of the seven continents; Google and IBM are on five. That immediate global reach is one of the most compelling benefits of cloud computing, especially for organizations that service customers around the globe.

With cloud-based services, you can deploy applications into any region on the globe. You can also use edge locations around the world that have the power to cache data and further reduce application latency.

Achieving this type of global reach on your own would be incredibly difficult and prohibitively expensive. In the cloud, worldwide deployment of your applications is instant and relatively inexpensive.

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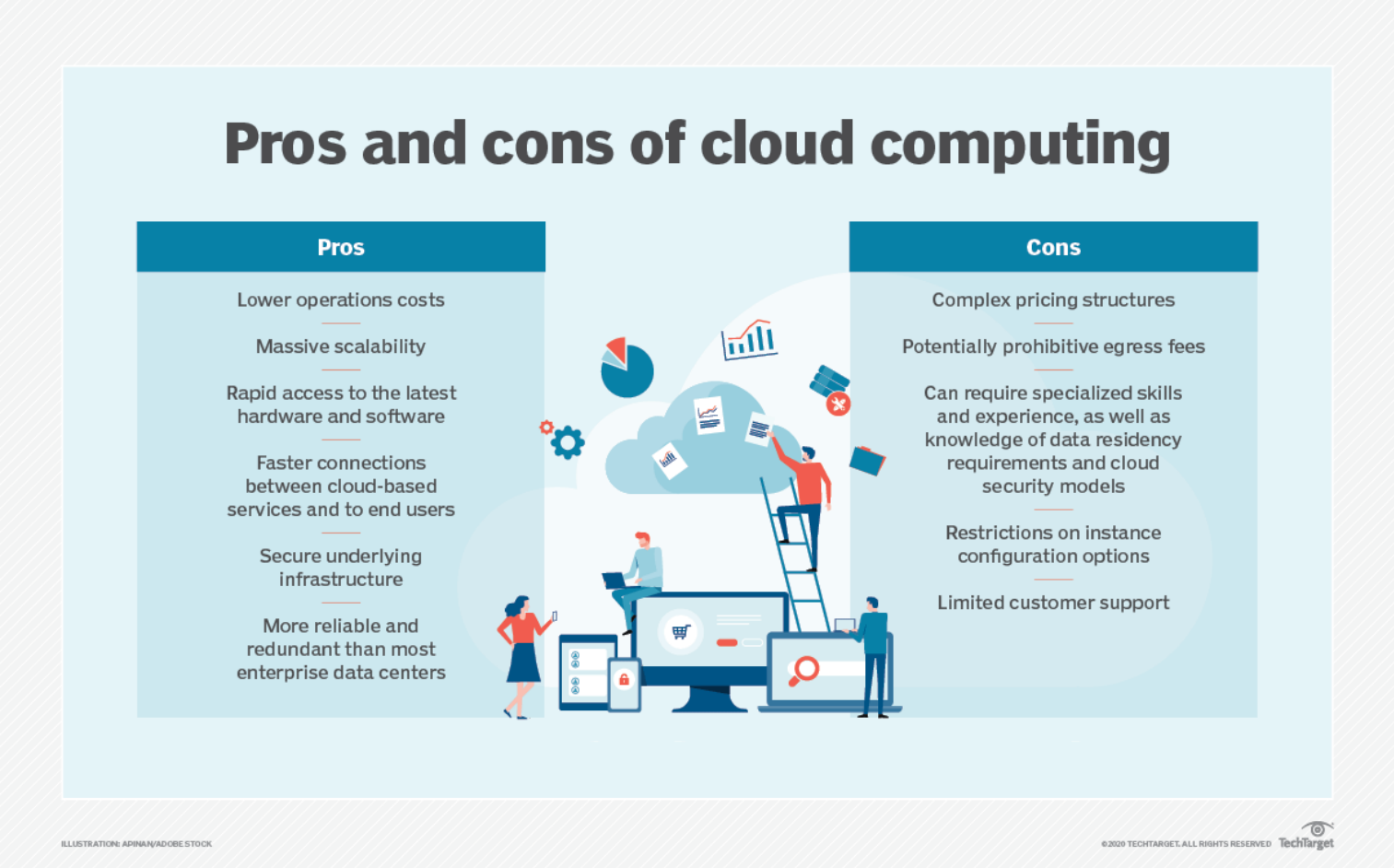

PRE-CERTIFIED COMPLIANCE

In this handbook:

It is difficult to achieve government and industry compliance certification in the fields of privacy, security and regulated standards. Thus, pre-certified compliance is one of the biggest benefits cloud computing can bring to highly regulated industries.

AWS, Azure, Google and IBM cloud-based infrastructure comes pre-certified in a multitude of fields, including the following:

- **Healthcare.** Health Insurance Portability and Accountability Act (HIPAA)
- **Legal.** Criminal Justice Information Services (CJIS)
- **Privacy.** Personal Information Protection and Electronic Documents Act (PIPEDA)
- **Regulatory.** International Standards Organization (ISO)
- **Audit.** System and Organization Controls (SOC)

Each cloud vendor maintains a public list of their compliance certifications. If the vendor cites your industry's standards as pre-certified, you can run your applications in their cloud.

Even so, security and compliance require the cloud customer to do its part. Cloud-based infrastructure can provide systems that meet strict requirements and standards, but your organization still has to know the local regulatory rules that apply to your customers, industry, government and legal system.

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ENHANCED SECURITY

Some detractors suggest that moving data and applications to the cloud creates a security risk, but that is not the case.

Take AWS, for example: All data that flows across the AWS global network is automatically encrypted. Most AWS services, such as S3, provide the option to encrypt all data at rest, so that if a data storage device is compromised, the information on it is indecipherable.

Top cloud vendors provide many built-in tools to monitor for security noncompliance. For example, AWS Config, Google Cloud Asset Inventory and Azure Security Control monitor assets across projects and can complete compliance checks.

Built-in encryption options, mandated encryption between data centers, and the various tools that help you track user changes and identify noncompliant configurations are not available out of the box in an on-premises data center.

AUTOMATION

Every AWS, Azure, Google Cloud and IBM component comes with an API interface that makes it fully programmable. Developers can create, configure, query and

destroy cloud-based resources with SDKs written in Java, Python, JavaScript and C++.

This built-in API interface allows developers to execute the following:

- fully code around the provisioning of infrastructure;
- program around mundane, manual tasks; and
- automate complex, high-risk, error-prone tasks.

With the cloud, you can automate difficult tasks that could threaten the sanctity of your data center when performed improperly.

"Cloud-certificate rotation, applying a different encryption algorithm or even the configuration of Perfect Forward Secrecy is a matter of a few API calls," said Java champion Adam Bien. "Even disaster recovery is just a matter of configuration. It can be fully automated through infrastructure as code."

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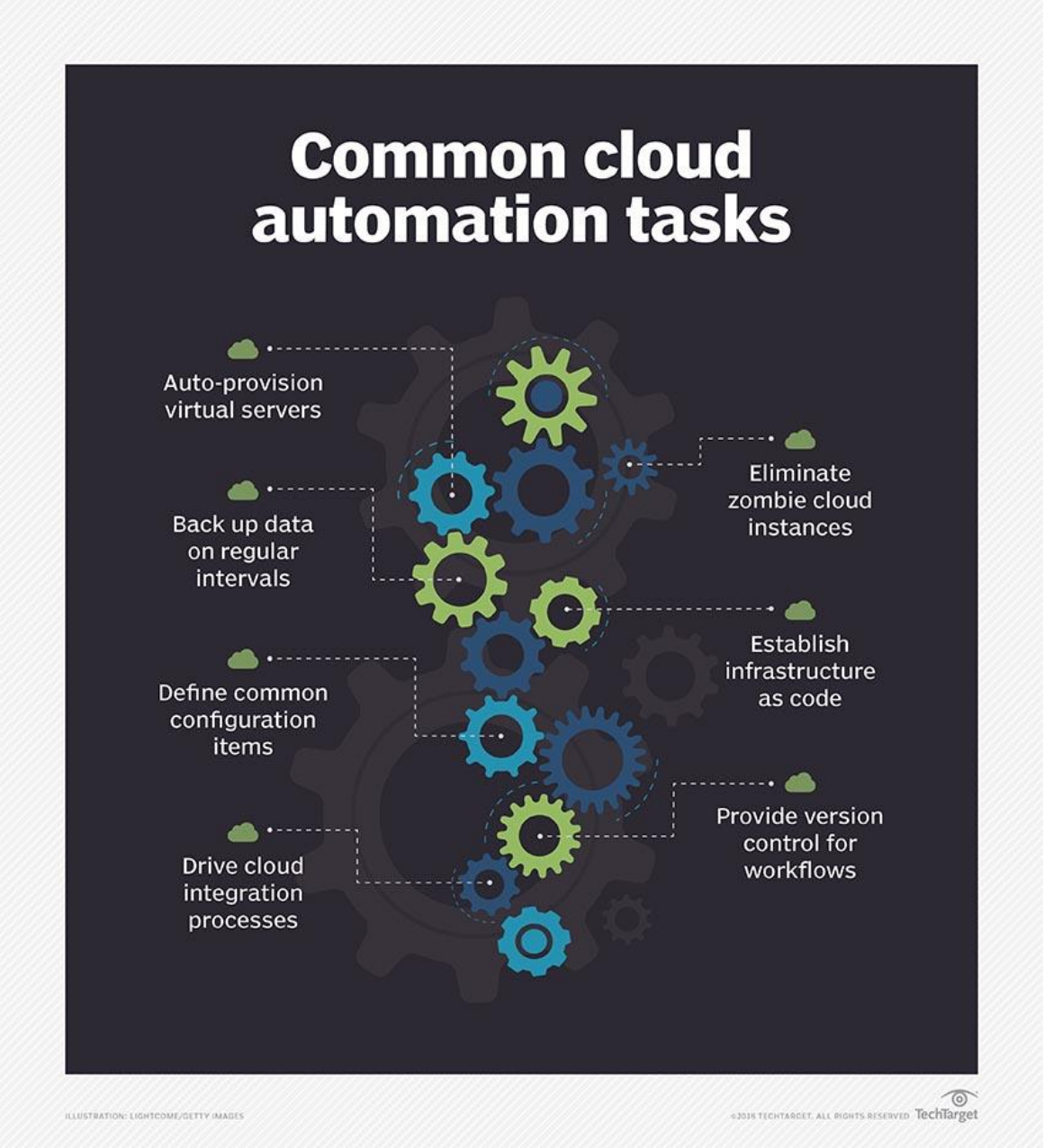

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ENVIRONMENTAL SUSTAINABILITY

It takes resources to power a data center: land, water, energy and -- most importantly -- people.

When a cloud provider builds a massive data center, the economies of scale create efficiencies that an individual company would struggle to attain.

AWS claims customers generally use 77% fewer servers, 84% less power and a 28% cleaner mix of solar and wind power in the AWS cloud versus their own data centers.

You don't generally think of AWS, Azure or Google Cloud as leaders in the fight against climate change, but there would be a positive impact on the environment if smaller companies moved their infrastructure into the cloud rather than running its own less-efficient data centers.