

Data Center Profitability Skyrockets but Serious Challenges Remain

Data center growth is at an all-time high, but sustainability issues loom on the horizon. What are tech companies doing to solve these problems?

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EINPresswire.com/ -- The Pandemic Is Driving Cloud Computing/Data Center Revenue Sky High

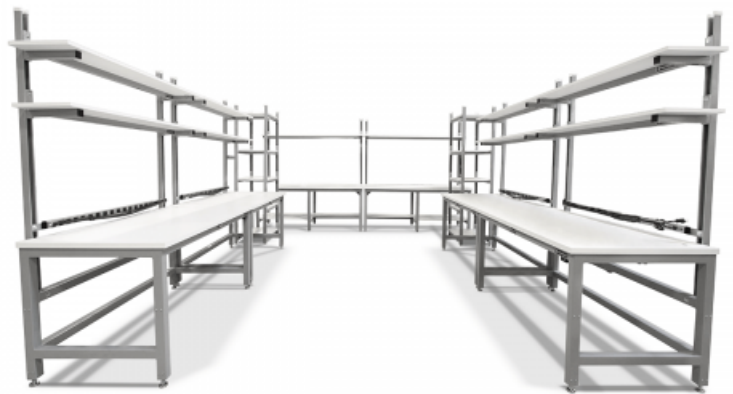
Whether it's working from home, meeting colleagues via Zoom, shopping for goods and services online, taking part in online classes, or playing a video game in the living room, the coronavirus pandemic has changed how we work, collaborate, shop, study, and play.

Given that most of these revolve around online activities, what's been the effect on cloud computing and the data center market?

The short answer to the question is that services powered by data centers are booming, particularly among the big players that dominate the cloud computing and data center landscape.

As the pandemic set in, the leader in cloud computing operations, Amazon Web Services (AWS), set a new quarterly revenue record in early 2020 of \$10.22 billion (up 33% from the previous year) – representing over 75% of Amazon's overall operating income during the quarter.

The revenue for Microsoft's online services (which includes its Azure cloud computing platform,



Custom tech lab furniture installations from Formaspace transform IT departments into efficient work environments.

Office 365, and other online services) was up 39% to \$13.3 billion. (The company reported Azure revenue was up nearly 60%, but no dollar figure was broken out.)

Google Cloud reported its revenue reached \$2.8 billion (up 52%) during the same timeframe; this figure includes revenue from its online SaaS G Suite software tools. Facebook, which, like Google, builds its own enterprise data centers to power their sprawling online services, reported revenues of \$17.7 billion during the same quarter, up 18% year over year.

Data Center Best Practices: How To [Design A Data Facility](#) From A Network Engineer's Perspective

Over the last 20+ years, modern data center facilities have evolved from their roots hosting Internet Service

Providers and co-located corporate servers into the highly sophisticated enterprise-class data operators of today, responsible for powering a range of mission-critical online services in the cloud, including: remote power-by-the-hour computing, on-demand digital storage solutions, carrier hotels (the modern evolution of server co-location), as well as software-as-a-service (SaaS), network-as-a-service (NaaS) and platform-as-a-service (PaaS) offerings.

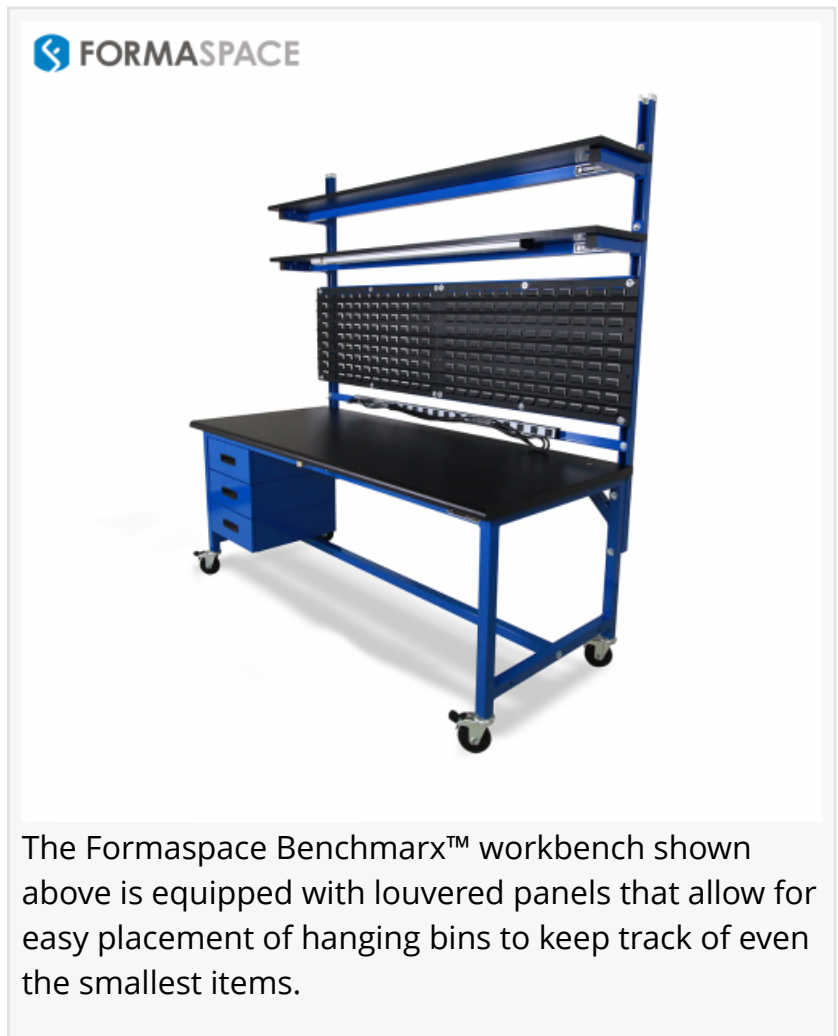
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During this timeframe, data center operations have converged on what we might call a reference design that solves a series of fairly rigid design constraints. In the following section, we'll touch on some of the “best practices” that have evolved to satisfy these requirements.

Of course, things are changing all the time, so we'll also follow up with a look at some of the emerging issues (and technological solutions to solve them) that are driving next-generation data center design.



The Formaspace Benchmarx™ workbench shown above is equipped with louvered panels that allow for easy placement of hanging bins to keep track of even the smallest items.

Service Tiers

Our first stop in the survey of best practices that govern data center design is to identify the desired service tier level.

Service tiers represent the level of redundancy built into a data center design, which, in turn, forms the basis of the guarantee of service reliability promised to the end customer.

Service availability is often represented in customer service agreements by an uptime performance guarantee, ranging from a lower figure, such as 96% uptime, to a more robust 99.99% uptime or better, depending on the provider.

Tier I data centers offer the least amount of redundancy and could be knocked offline by a single point of failure. At the other end of the spectrum, engineers build in multiple redundant features into Tier 4 data center networks so that a single mode of failure, such as a server failing, or a hard disk crashing – or even an entire data center going offline – won't interrupt service to the end customer.

Next, let's look at a typical data center from the inside out, starting with the server.

Vertical Rack Designs Minimize Footprint

Vertical racks have become a de facto standard in data center server farms for decades. Vertical rack systems allow data engineers to populate the rack system with individual server motherboards (known as blades) which slide into the rack like a drawer, allowing them to connect to common services such as power supply, networking cables, etc. if a server goes down or needs preplanned maintenance, it can be removed quickly, and another can be snapped into its place.

Open Source Software And Virtualization Reduces Cost

Open source software solutions, such as the famous LAMP stack (which stands for Linux,



Formaspace manufactured this custom “condo rack” for one of the world’s leading electronics manufacturing companies. It features a built-in continuous ESD monitoring system.

Apache, MySQL, PHP), dramatically reduce the cost of provisioning multiple servers in a data center. (Today, of course, there are more options, including NGINX for the webserver or python as an interpretive language, as well as so-called “Cloud-Native” designs that use pure cloud-based software tools, such as those from Amazon’s AWS, Rackspace Cloud, or Microsoft Azure.)

But the biggest cost-saving innovation from a data center perspective was the introduction of virtualization software (also known as a hypervisor), which allows data engineers to operate multiple virtual server sessions on a single server blade. Depending upon the power of the computer’s CPU, memory capacity, and storage, it may be possible to operate half a dozen or more virtual servers on one single server – without making any additional server hardware investments.

Keep The Temperature Under Control

Just one vertical rack kitted out with multiple servers can generate a lot of heat.

The problem gets worse the more racks you have, and in a modern data center, the main machine rooms can have hundreds of racks, lined up neatly in separate aisles.

Data center HVAC specialists pay close attention to creating efficient ductwork to keep the valuable computer equipment cool; options include installing plenums either overhead above the drop ceiling or taking advantage of the raised floor (typically used in computer rooms) to run ductwork. Another common approach is to create so-called “cold aisles” using glass door cabinetry which, much like a glass freezer case, concentrates the cold air flowing through the computer racks toward either a floor or ceiling mounted return air vent.

Given that the energy cost to operate a data center can exceed the cost of the hardware within it, engineers are constantly looking for ways to increase cooling efficiency (more on some of the newest technological ideas later...). Currently available energy-saving systems include the use of heat pumps or even innovative liquid-cooled systems that extract built-up heat from electronic components directly.

Fire Suppression, Flood Control, And Geological Risks

The sheer volume of electronic equipment and power supplies concentrated in a relatively small area increases the potential for fire inside a data center.

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