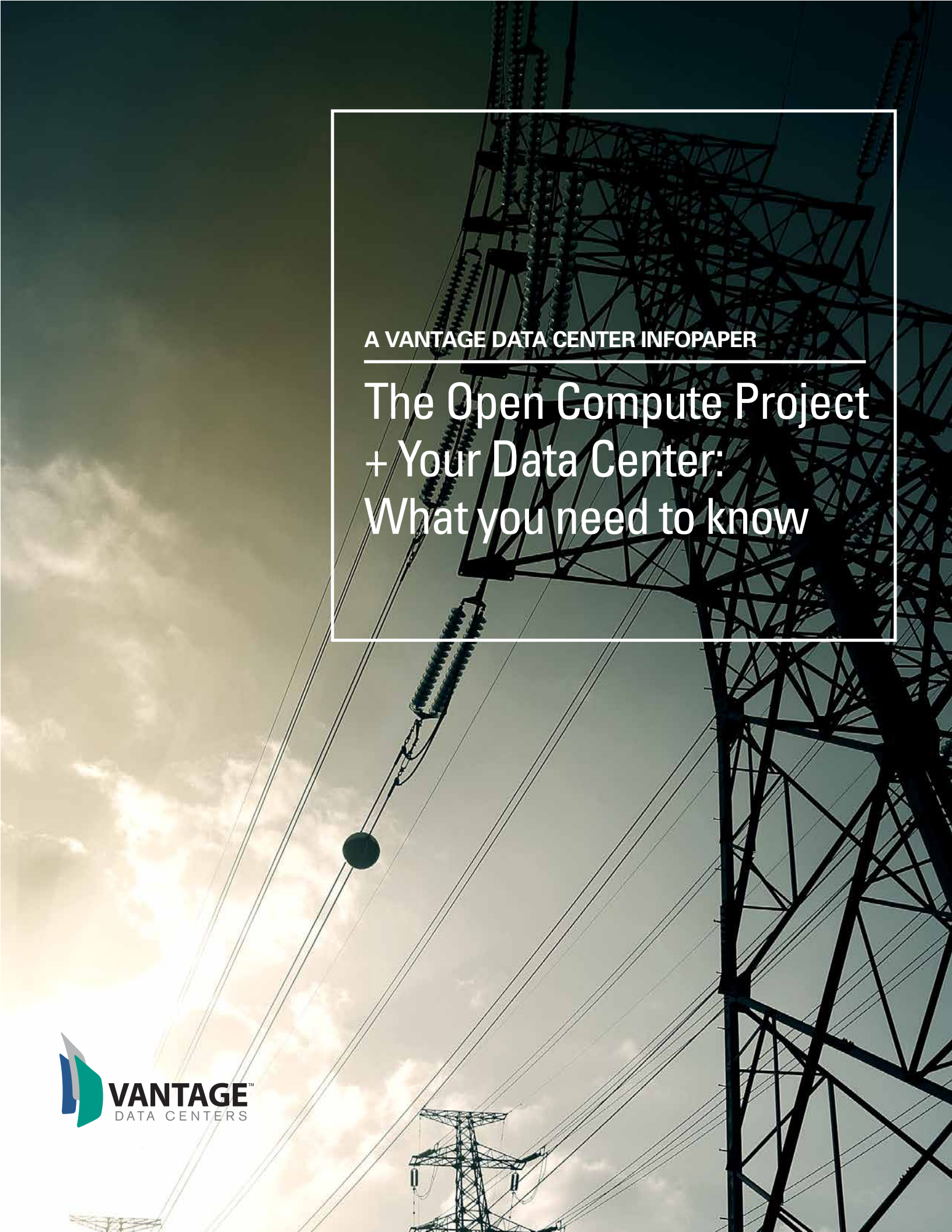

A VANTAGE DATA CENTER INFOPAPER

The Open Compute Project + Your Data Center: What you need to know

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DATA CENTERS

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The Open Compute Project + Your Data Center: What you need to know

If you're in the data center business, you've probably been following the Open Compute Project (OCP).

To run a modern data center, understanding OCP is a must because it is poised to disrupt the marketplace. That doesn't mean you have to forego traditional designs and gear. But it does mean that getting a grasp on OCP will help you make decisions for your business' data infrastructure and total cost of ownership (TCO) in the long run.

This infopaper is intended to give a foundational understanding of Open Compute designs, why it is an important movement within the data center industry, the benefits, and how the gear could work in your data center set up. Whether you're interested in testing out what OCP has to offer or if you're just curious to know more, the following guide is here to help.

2010

Data Centers Taking the Heat

The 2012 New York Times expose series "The Cloud Factories" focused on data centers and the complexities of housing data. The articles, which The Times spent a year researching and reporting, emphasized the wastefulness in traditional data center practices and the industry's reliance on unsustainable methods, from only using a small fraction of the power they pull from the utility grid, to deploying diesel generators for backup, to allowing vast numbers of servers to run idle with no computational workloads.

The high-profile series brought into stark relief how the majority of data infrastructure solutions hinged on questionable practices. Against this backdrop, the surge in Big Data coverage (NPR noted that "Big Data" had replaced "YOLO"—you only live once—as the word of the year!) brought the public's attention to the fact that the amount of data in the world is growing at exponential rates—and all the data has to live in a physical location.

> *The 2010s may very well be a decade defined by technologists as one in which the old ways of doing things demand a revolutionary upgrade.*

Just as the health of one's business cannot rely on wasteful practices, so too must a business' data infrastructure strategy look towards smart solutions driven by energy efficiency and cost-effectiveness.

RESPONSE TO AN UNSUSTAINABLE SITUATION

Open Compute Project

In April 2011, Facebook announced an initiative to openly share designs of data center products. The idea is to improve energy efficiency as measured by power usage effectiveness (PUE). For Facebook specifically, because they are dealing with such massive economies of scale, the challenge is to build their computing infrastructure in the most efficient and economical way possible.

Thus far, the initiative has resulted in new thinking around data center gear, including custom-designed servers, power supplies, minimalist server racks, and battery backup systems that help reduce energy expenditure on redundant systems.

In the following sections, we'll talk about key aspects of this new way of thinking, focusing on:

- how rack design emphasizes power effectiveness and density,
- how localized back up power minimizes the need for redundant energy waste, and
- how the evolved machinery empowers companies to take greater control of their data center.

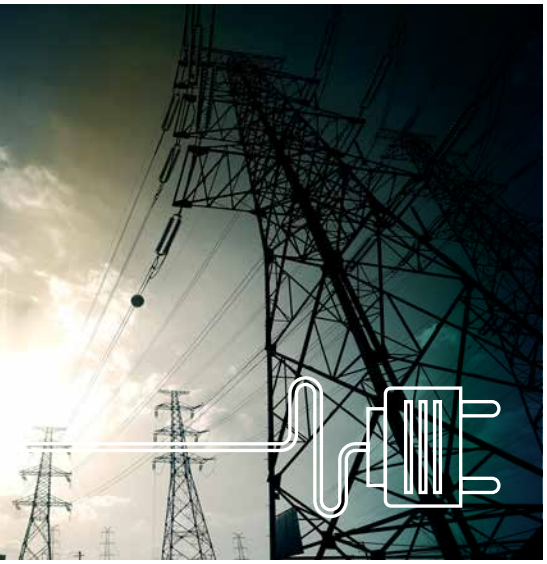
OPEN COMPUTE PROJECT

Rack Design

OCP server racks do two very important things.

First, they minimize the amount of metal around the servers. The design takes away traditional rack facades and bezels. That way nothing blocks airflow. The minimalist design keeps everything cooler and uses less energy per work unit, pushing toward ultra-low PUE.

Second, new server designs make it so racks can hold more, thereby benefiting from power density. The new designs strip out the excess components and skinny down the server size. Traditionally, you would have a rack full of servers, up to 40 one-rack-unit pizza-box-style servers right on top of each other. OCP racks can fit three servers side by side in a two-rack-unit height, so you can fit 60 in the same height.



Power supplies that minimize costly redundancy

Traditionally, you run two power supplies per server. If one fails, the backup is always there. It's extremely wasteful, though.

Imagine driving around with two engines in your car on the off-chance one choked up.

OCP designs share power supply for the entire rack. Instead of 80 supplies for 40 servers, you have six or so larger supplies. They run more efficiently, and maybe you need a seventh or eighth for an N+1 or N+2 configuration. OCP design puts batteries right in the rack, eliminating the need for data center sized uninterruptible power supplies (UPS).

This also means you can control the power supplies with software and turn off those supplies that aren't in use. If a supply fails, the local batteries cover the power, while a new supply comes online in your N+1 configuration and a call goes out to your techs, telling them which power supply to replace. Fewer components (power supplies) and lower power consumption with the same availability allows you to run more servers for the same watts and not sacrifice availability.

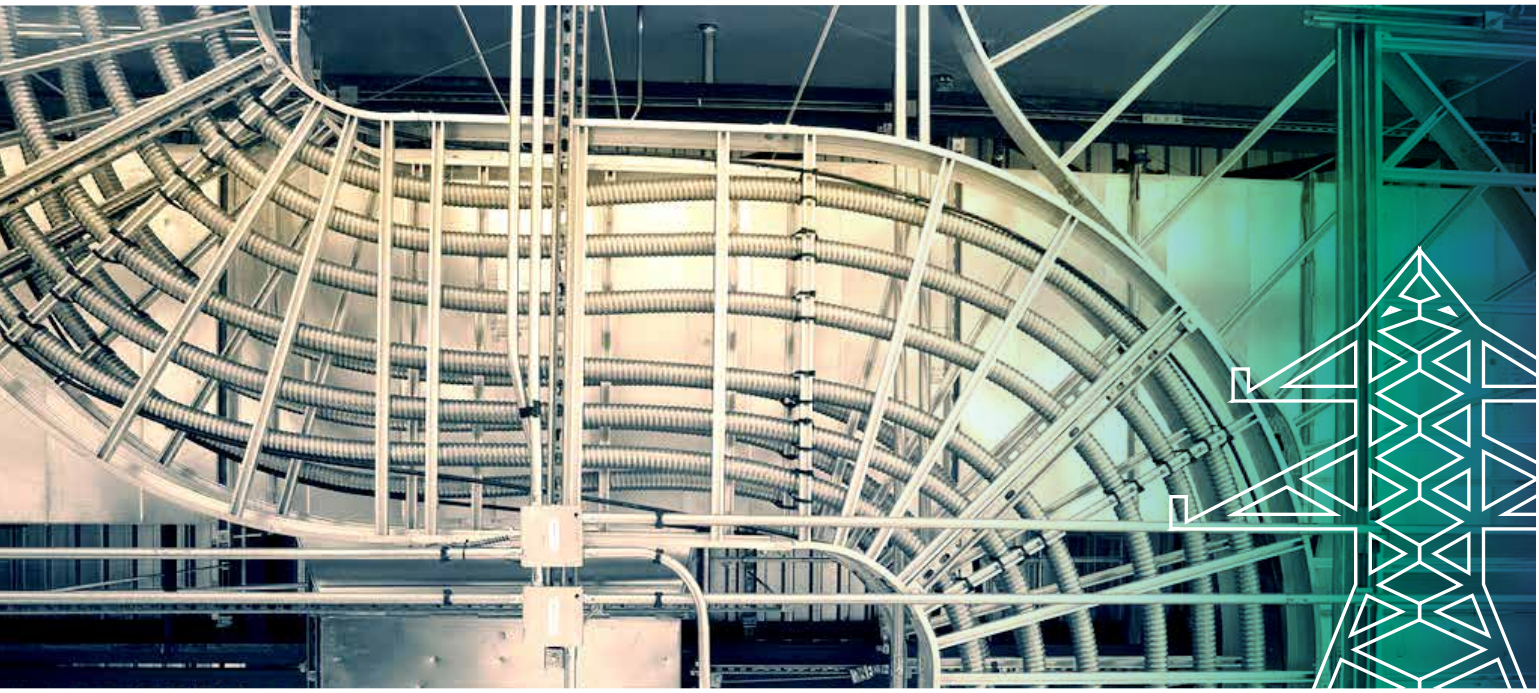
OPEN COMPUTE PROJECT

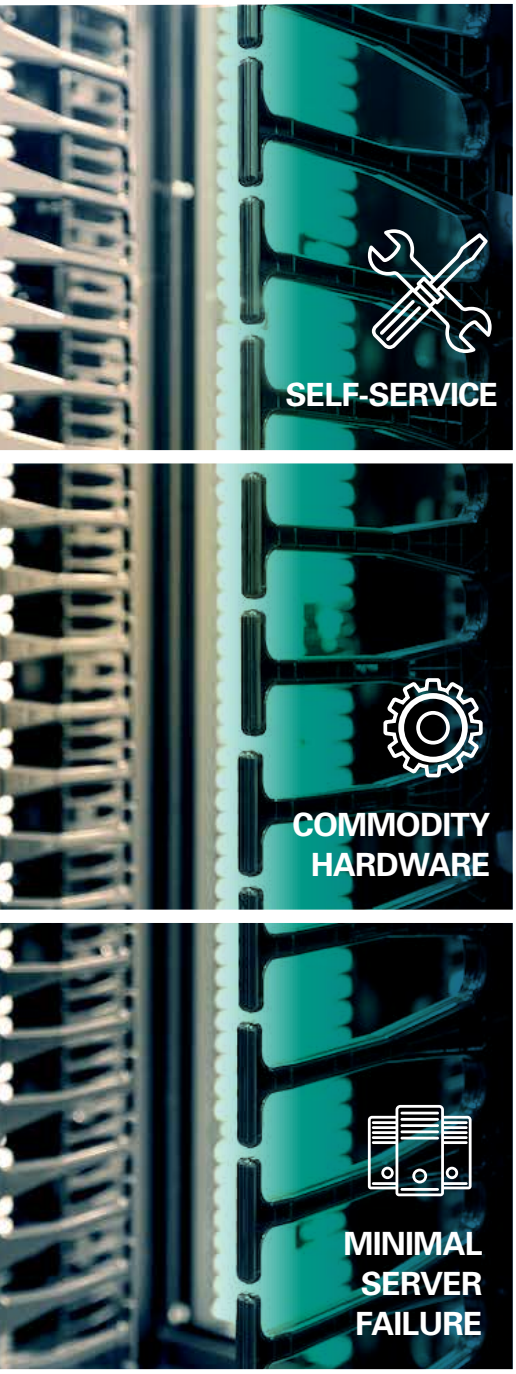
Power exchanges add up

If you're running a data center, you have two major costs: rent and power. How you create infrastructure in regards to your power supplies and power expenditure is extremely important. That includes how you conduct power to the racks and the conversions that are needed to keep your system running.

> *OCP designs make it easy to bring high-power, high-voltage straight out to the rack, minimizing power losses.*

Additionally, in a traditional system, the UPS will do two conversions from AC to DC then DC to AC in order to run the computers and backup power supplies. With every conversion you lose a small percent of power. With OCP, there is only one conversion. That may not sound like a huge difference, but all these little streams add up to a big river of savings.





THE SOLUTION

Resilient software and hardware that empowers

If you needed to change a light bulb in your kitchen, would you hop on the phone to call an electrician? No, you wouldn't think twice about pulling out the ladder and replacing the bulb on your own. In a similar way, the new OCP designs encourage a mindset around self-service and optimal use.

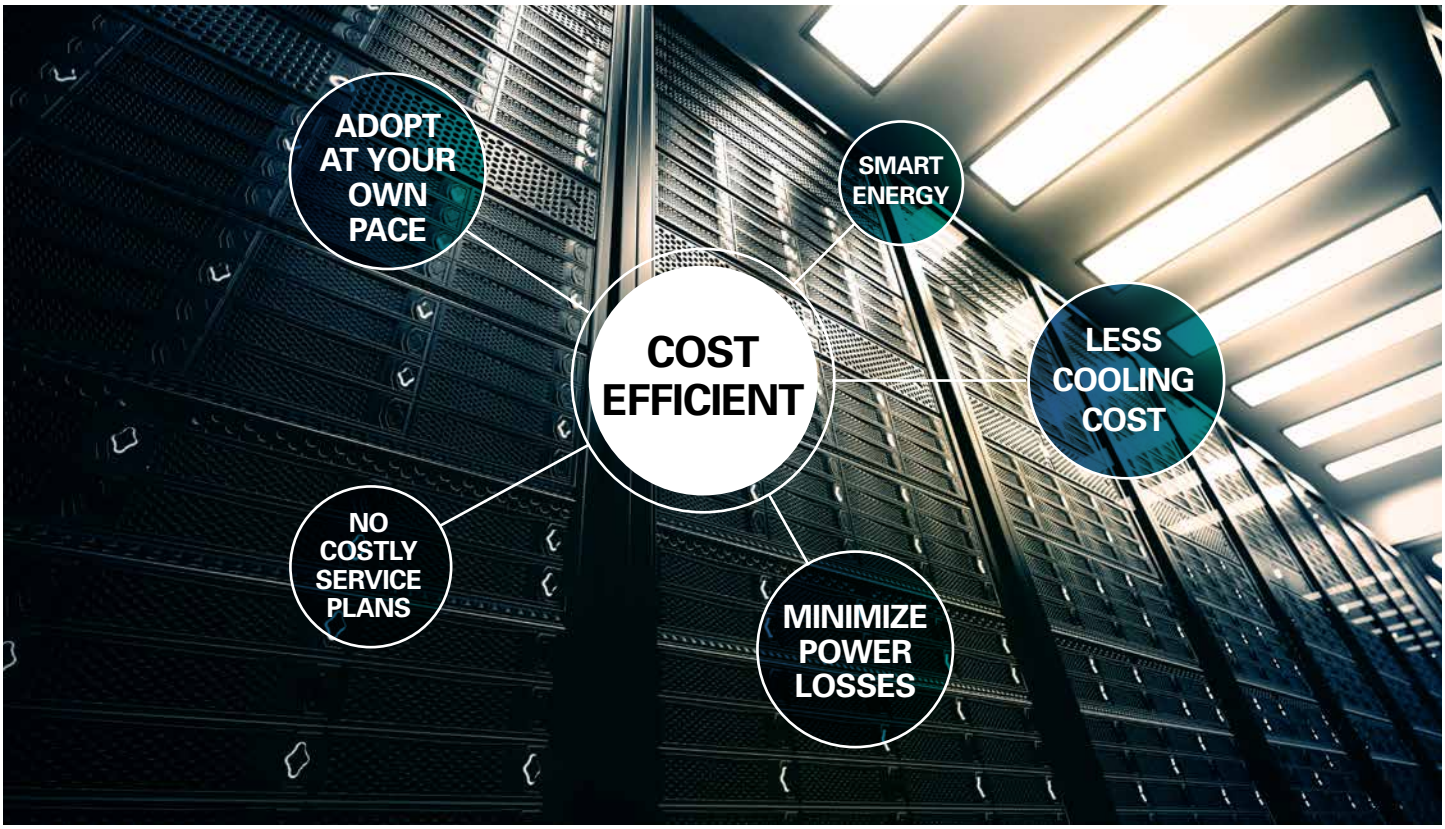
In the past, traditional legacy vendors built hardware in such a manner that it had to be treated with kid gloves. The hardware was seen as so delicate that servers were run well below their optimal effectiveness. This not only created a situation in which energy was being wasted on using more machines than necessary, but the servers running at sub-optimal rates would also give off additional heat, meaning even more power was needed to keep them cool.

OCP promotes commodity hardware rather than buying gear from legacy vendors. This achieves two important things. First, it transfers the intelligence out of the machines and into the software. That is to say, you can then treat the machines as what they are—a stack of metal rather than a delicate brain in a jar. If the intelligence of the system resides in the software, the emphasis moves from babying the hardware and into creating resilient computational systems.

Second, racks and servers from legacy vendors also often come with pricey service plans. OCP designs are meant to create better options for self-service than ever before.

That's the mentality that OCP creates with its designs. Without the bezels and extra metal, all the components are there to see. You don't have to be afraid of opening anything up—it's all right there. The racks are designed with replaceable units that can snap in and out with just your hands. Battery supplies, memory cards—all the gear can be pulled out and replaced without any expensive service technician needing to come in.

Likewise, when the software that can move workloads around is intelligent and resilient, data centers can run their machines hotter, in a more humid environment, without fear of server failure. If one does falter, the software shifts the workload to a working server. The old machine is then easy to replace, and will cost a lot less in spend than pulling down all the extra energy to keep every server under icy air conditioning.



THE SOLUTION

Total Cost of Ownership

While OCP racks might appear to cost more than today's traditional racks, you have to consider the cost-savings over time. Factor in the savings in power along with reduced server spend on power supplies (which are external to the servers in a shared configuration per rack), along with the opportunity to move the UPS to the rack (lower blast radius for failures and opportunity to virtualize power), and the true cost of ownership for OCP is less than that of traditional server configurations.

You'll see the cost for the new gear upfront, but after that the incremental savings from the new designs will add up, making a positive impact on your TCO.

THE SOLUTION

Does my company need to be the size of Facebook to use OCP?

Even though OCP is Facebook's response to dealing with a server count that likely exceeds a million, any size company can benefit from OCP. You don't have to be even close to the size of Facebook. If you're running 30 or more racks, OCP designs will start to make a cost savings difference. If you're running 250 or more racks, you can take full advantage of OCP, and the drop in overall costs will be stunning.

For large-scale companies, OCP is downright compelling. As noted earlier, other than rent, what you'll spend the most money on in your data center is power. Any time you can save on power, that's smart business. In the preceding sections, we talked about how OCP designs create more airflow for servers, cutting down on air conditioning costs; they cut down on unneeded power redundancy and on power losses during AC to DC exchanges; they eliminate the need for costly service plans; and they create more power density per rack, helping to consolidate energy expenditure.

But what about for small companies? Let's say you have 10 racks, and you don't plan on growing—does OCP make sense for you?

We can look at it like this: the industry is bound to change over time, and OCP is a major disruptor in the marketplace. Most racks have a three to five year life span. In the timeline of your company you will have to replace racks no matter what. As you go through each refresh cycle, you can replace an entire rack of gear with OCP. You can start slow and it will put you on the path to what computing will look like five years from now.

OCP makes sense for companies of any size, as the industry will likely move in that direction over the next five, ten, fifteen years. But, again, that doesn't mean you need to do away with traditional designs. OCP can work right alongside traditional racks. You can put in a couple, become familiar with them, and begin to see firsthand how OCP works. You can start slow and decide to accelerate at your own tempo.

THE SOLUTION

Vantage Data Centers: OCP-ready

As mentioned earlier, embracing OCP does not mean rejecting tradition. OCP can work alongside traditional and legacy racks. However, not all data centers are equipped to handle new OCP models. If you're interested in reducing your TCO with savings on power and services, Vantage can help tailor a solution specific to your unique needs.

Vantage's facilities were built with more flexibility than traditional data centers. We can handle both legacy models and OCP designs, and are doing just that today. If you're interested in knowing more, we can walk you through how OCP could work for your set up and connect you to the vendors who create OCP racks and gear. If you'd like to learn more, don't hesitate to ask.

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