

Tech Outlook

February 2017

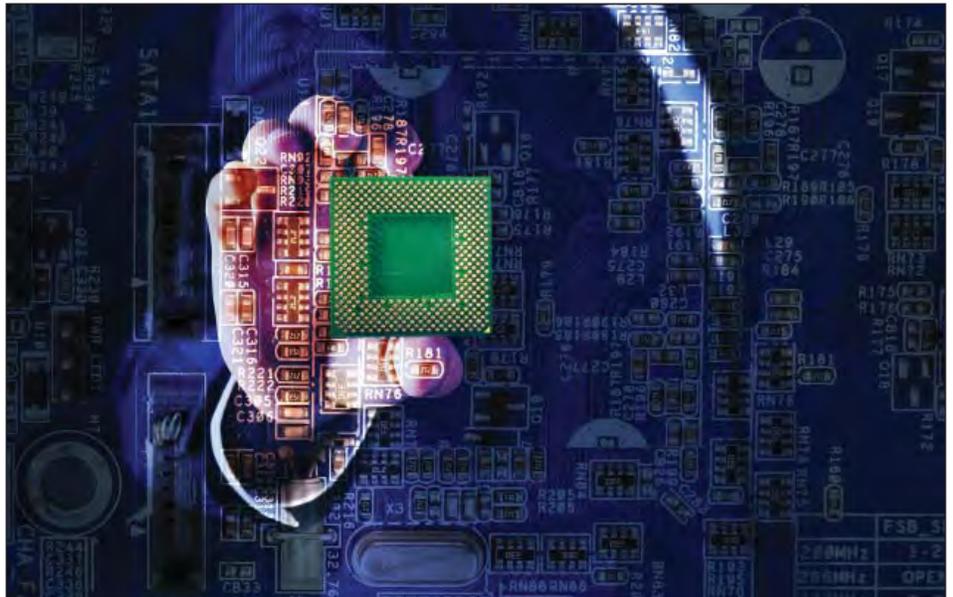
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Ahead of the Game

Artificial intelligence has arrived, with a boost from graphics-processing pioneer Nvidia.

Artificial intelligence (AI) has long been used as a story-telling device, but the technology has actually moved well beyond the realm of science fiction. AI-powered chatbots, virtual personal assistants and smart toys are already popular with consumers, and applications such as driverless cars, healthcare diagnostics and advanced robotics are expected to experience rapid growth in the near term.

“A lot of folks view artificial intelligence as this futuristic technology that has no practical application in their businesses, but that’s really not accurate,” said Michael Hritz, Vendor Alliance Manager, ProSys. “We may not have humanoid robots running around the office, but there are a surprising number of AI applications that are



useful for businesses today. You might even be using AI without realizing it.”

Siri, Google Now and Cortana virtual assistants are becoming commonplace. Many retailers are using AI pre-

dictive analytics to offer personalized advertising, coupons and discounts. Apps such as Spotify, Pandora and Netflix use similar systems to recommend music and movies. Countless other organizations use basic AI apps to automate data entry, analyze contracts, manage investment portfolios, filter job applicants and more.

Tractica, a research firm focused on the AI market, has identified nearly 200 real-world AI uses across 27 industries. The firm forecasts that revenue for enterprise AI applications will increase

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from \$358 million in 2016 to \$31.2 billion by 2025, representing a compound annual growth rate of 64.3 percent.

Processing Power

AI is actually an umbrella term for a number of technologies such as deep learning, machine learning, computer vision and natural language processing. All are aimed at embedding machines with the ability to analyze massive data sets, identify patterns and make autonomous decisions — eliminating the need for programmers to write code for every function.

Rapid advances in AI are being enabled by more powerful hardware, sophisticated algorithms and big data analytics. However, the greatest breakthrough in AI development may have come from a company most closely associated with the video game market.

Nvidia gained prominence for revolutionizing computer gaming through the development of its graphics processing unit (GPU). These specialized circuits perform multiple mathematic calculations simultaneously to manipulate and alter memory in order to produce cleaner, faster and smoother motion in video games. In 2007, Nvidia pioneered the concept of using GPUs in massively parallel processing environments designed to make compute-intensive programs run faster. This brought dramatic improvements over previous methods that relied on linking together multiple computer processing units (CPUs).

Key architectural differences between a CPU and GPU make the difference. A CPU has a few cores with lots of cache memory that can handle a few software threads at a time, but a GPU has hundreds of cores that can handle thousands of threads at the same time. Plus, CPUs are optimized for sequential processing — the execution of processes in the order they are received — as opposed to the GPU's ability to execute multiple processes at the same time.

“GPU-accelerated computing can run some software 100 times faster than with a CPU alone,” said Hritz. “Plus, it conserves power and is more cost-efficient. That makes it perfect for the deep learning type of algorithms that are powering a range of AI applications.”

Deep Learning

Deep learning is a form of AI designed to loosely mimic the way the human brain works with neurons and synapses. Nvidia's GPUs are used to create so-called “artificial neural networks” that use a large number of highly interconnected nodes working in unison to analyze large datasets.

“Nvidia's GPUs provide the computational muscle to unlock the value of big data,” said Hritz. “The ability to

discover patterns or trends — and learn from those discoveries — is the essence of artificial intelligence. Deep learning is what allows a personal digital assistance to learn your preferences, a smart thermostat to learn your schedule or a self-driving car to learn the rules of the road.”

Nvidia GPUs are being used to accelerate more than 400 applications for uses such as quantum chemistry, fluid dynamics, video editing, medical imaging and geosciences. Over the past two years, the number of companies collaborating with Nvidia on deep learning has jumped to nearly 20,000.

To fully exploit the capabilities of its GPUs, Nvidia recently introduced the DGX-1 server. This so-called “AI supercomputer in a box” delivers 170 teraflops of processing power in a single system and is purpose-built for deep learning and AI accelerated analytics. It comes fully integrated with hardware, deep learning software and development tools, and runs popular accelerated analytics applications.

The DGX-1 software stack includes DIGITS deep-learning training module, the CUDA programming model and a library of neural network designs. It also includes optimized versions of several widely used deep learning frameworks such as Caffe, Theano and Torch.

AI in the Cloud

Because deep learning involves analysis of large datasets, AI platforms need a cloud element for accessing cloud storage. DGX-1 provides access to cloud management tools, software updates and a repository for containerized applications.

The cloud, in fact, represents a vital intersection for AI. It is inevitable that organizations will look to utilize deep learning and AI applications without implementing an AI framework onsite. This is why Nvidia recently partnered with Microsoft to allow users to run GPU-accelerated workloads in Microsoft's Azure cloud platform. Customers will be able to use Azure N-Series virtual machines powered by Nvidia Tesla K80 GPUs to run deep learning training jobs, high-performance computing simulations, data rendering, real-time analytics, DNA sequencing and other accelerated tasks.

“We're working hard to empower every organization with AI, so that they can make smarter products and solve some of the world's most pressing problems,” said Harry Shum, executive vice president of the Artificial Intelligence and Research Group at Microsoft. “AI is now within reach of any business.”

News Briefs

Few Prepared for Looming Regulations

A set of wide-ranging data security and governance regulations are scheduled to go into effect in May 2018, but a new Dell survey finds that few organizations know anything about the rules and most have no plans for achieving compliance.

The European Union's General Data Protection Regulation (GDPR) requires greater oversight of where and how sensitive data is stored, accessed and transferred. This includes personal, credit card, banking and health information.

While GDPR is designed to protect European Union (EU) citizens, the rules will extend globally to the U.S. and any other countries that conduct business in the region or with any EU organizations. Those not fully compliant when GDPR goes into effect risk significant fines, potential breaches and loss of reputation.

However, the Dell survey of 821 international IT and business professionals found that 97 percent have not yet begun preparations. More than 80 percent said they know very little or nothing at all about GDPR, and only 9 percent say they are confident they'll be ready by the deadline.

In an executive brief on GDPR, analysts with IDC warn against putting off planning for the regulations. "The scale, complexity, cost and business criticality of GDPR means that it will take (at least) two years for most companies to achieve full compliance. Most companies need to start now."

R&D Spending Shifts to Software, Services

By 2020, companies will have shifted the majority of their research and development (R&D) spending away from product-based offerings to software and services, according to the 2016 Global Innovation 1000 Study from PricewaterhouseCoopers's strategy consulting business.

The need to stay competitive is the top reason cited by companies who reported this shift in R&D budgets. The study found that companies reporting faster revenue growth relative to key competitors allocated 25 percent more of their R&D budgets to software offerings than companies that reported slower revenue growth.

The average allocation of R&D spending for software and services increased from 54 percent to 59 percent between 2010 and 2015. Over that same period, global spending on software offerings increased by 65 percent from \$86 billion to \$142 billion.

"Many of the world's major innovators are in the midst of a transformational journey mostly driven by changing — and rising — customer expectations," said Barry Jaruzelski, innovation and R&D expert for Strategy& and principal with PwC US. "The shift is also being driven by the supercharged pace of improvement in what software can do, including the increasing use of embedded software and sensors in products, the ability to reliably and inexpensively connect products, customers and manufacturers via the Internet of Things (IoT), and the availability of cloud-based data storage."

Tech Outlook

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Enterprise NFV

Network functions virtualization cuts costs, streamlines management and creates a more agile IT infrastructure.

Corporate networks do a lot more than shuttle data from one place to another. In addition to routing and switching, the typical LAN provides services such as load balancing, WAN optimization and firewalling. Traditionally these services have been delivered by dedicated hardware appliances installed on the network.

That hardware-centric model is slowly giving way to a software-orient-

ed approach that builds upon key virtualization concepts. Network functions virtualization (NFV) replaces dedicated appliances with software running as virtual machines on commodity servers. As a result, NFV enables organizations to reduce the amount of hardware in their network environment and the costs and complexity that go along with it.

NFV is closely related to software-defined networking (SDN), which also involves the decoupling of network services from hardware. However, SDN is focused on the control of the network



— policy-based management of network devices is handled by software, enabling a centralized view of network resources and a high degree of automation. NFV is concerned with the optimized delivery of network services through virtualization and consolidation.

Developed by a group of telecom network operators, NFV is primarily used by service providers. In a recent NFV strategy survey by IHS Markit, 81 percent of service providers said they have deployed NFV or plan to do so by the end of 2017.

However, enterprises are starting to take a look at NFV. In a 2015 ZK Research survey, 9 percent of enterprises said they had already deployed NFV, 10 percent planned to deploy it within 12 to 24 months and 29 percent were re-

searching it. Only 39 percent said they had no plans to adopt NFV.

How It Works

In essence, NFV works the same way as server virtualization — a hypervisor separates operating systems and applications from hardware, so that one server can run multiple virtual workloads. The guest virtual machines share the physical resources of the server. With NFV, a network hypervisor encapsulates the software that delivers the virtualized network functions (VNFs), which run on a commodity hardware platform. One NFV platform can host multiple VNFs.

NFV Management and Organization (MANO) is a framework for provisioning, managing and orchestrating VNFs, and controlling and managing the compute, storage and network resources that support them. The reference architecture was developed by the NFV MANO working group of the European Telecommunications Standards Institute Industry Specification Group. It works with a variety of VNFs so that users have the flexibility to choose the resources deployed on the NFV platform.

All of this is highly complex, and designed for a service provider environment. However, enterprise-class solutions are emerging that provide a fully integrated and optimized software stack that can run on various physical platforms. A graphical user interface makes it easy for network managers to provision network services based upon predefined templates. Software automatically installs the VNF on an available virtual machine and configures it according to established profiles.

Faster, Easier

Like server virtualization, NFV enables organizations to reduce capital investments in hardware, and the power

and space requirements that go along with it. NFV also decreases management complexity — network administrators gain a consistent, unified platform that eliminates the need to learn multiple device interfaces and operating systems. As a result, enterprises can cut capital costs by 50 percent and operational costs by up to 70 percent with NFV, according to ZK Research.

NFV increases IT agility by enabling administrators to spin up network services on demand instead of purchasing, installing and testing a different appliance for each function. It also improves resource utilization by eliminating the need to provision multiple appliances as a hedge against downtime. At the same time, NFV improves network availability by reducing maintenance windows and allowing faster response to issues.

Organizations with remote office/branch office operations typically derive the greatest value from NFV. Traditional network appliances require a “truck roll” to each site for implementation and configuration. With NFV, network services can be deployed in minutes and managed remotely across all locations.

Industry analyst reports on NFV adoption focus on the service provider sector, which currently accounts for almost all of the market. However, Cisco has predicted that 2017 will be the year that “NFV comes to the enterprise,” and experts are seeing signs that NFV is making inroads into the enterprise environment.

“Increase in the implementation of software-defined networking and network function virtualization solutions will have a significant impact on the adoption of network infrastructure among data centers worldwide,” said Abhishek Sharma, a lead data center research expert from Technavio.



UCaaS Drives Change

Cloud-based communications platforms enable new business models.

Unified-Communications-as-a-Service (UCaaS) is poised for accelerated growth in 2017, analysts say, as organizations look to cloud-based platforms not only to improve communications but to drive a fundamental shift in organizational structure.

Executives worldwide are actively seeking to redesign their organizations to exploit a mobile workforce. With work and location becoming increasingly uncoupled, companies want to create a flattened hierarchy of interconnected, flexible networks of teams to improve agility and customer focus. In a recent Deloitte survey of more than 7,000 human resources and business leaders from 130 countries, 92 percent said they believe their structure must change.

UCaaS underpins the shift. A growing ecosystem of APIs is making it easier

to integrate UCaaS solutions with other cloud applications such as Salesforce, Dropbox and Zendes. By facilitating communications between applications as well as between humans, UCaaS enables the development of so-called “communications-enabled business processes,” or CEBPs, that boost the productivity of mobile workers.

Making Connections

The idea is to improve efficiency and productivity by allowing mobile workers to communicate by voice, text or email from within an application. One of the early examples of CEBP is the integration of customer relationship management (CRM) systems with UCaaS to improve recordkeeping, data entry and call handling. UCaaS has also been effectively integrated with office productivity suites so that users don’t have to break up their workflow by tog-

gling between services as they perform regular tasks.

Additionally, features such as mobile extension or single-number reach make it easy for mobile workers to stay in touch with colleagues and customers. Anytime, anywhere access to essential data and applications make it possible to work seamlessly from the office, at home or on the go. A Global Workplace Analytics report finds that the majority of Fortune 1000 employees are already working more than half the day away from their desks, and the trend will only accelerate as tech-savvy Millennials become an ever-larger segment of the global workforce.

Many organizations have been reluctant to consider cloud-based communications solutions, either because of their investments in premises-based platforms or due to concerns about relinquishing control. However, analysts

note that those barriers are crumbling as UCaaS and application integration enable new levels of mobile efficiency. Gartner says the UCaaS market as a whole is transitioning from the “early adopter phase” to the “early main-stream phase.” Transparency Market Research predicts the global UCaaS market will expand at an impressive compound annual rate of 29.4 percent from 2016 to 2024 to reach a total value of \$79.3 billion.

Money Matters

Not surprisingly, the cost factor also makes UCaaS attractive to many organizations. Instead of purchasing, configuring, deploying and managing an on-premises solution, those costs and responsibilities are assumed by the service provider. For a monthly fee, users can simply access enterprise-class UC technology and applications on any Internet-connected device. Users enjoy a consistent UC experience anytime, anywhere, which allows for greater business agility and productivity.

UCaaS provides the flexibility to quickly scale services up or down according to business needs, creating operational efficiency by enabling organizations to pay only for what they need. Service provider data centers typically have more resiliency and redundancy than customer environments, making it possible to maintain high levels of performance and minimize the risk of downtime and data loss. Similarly, UC support is handled by the service provider’s team of IT specialists, which often improves the speed and quality of support.

Mobile, cloud and collaborative technologies are changing both the way we work and the workplace itself. To keep pace with these changes, business leaders around the world are rethinking their organizational structure. UCaaS is emerging as a powerful tool for enabling a mobile workforce to become more agile, engaged and customer-focused.



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