

Tech Outlook

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LOOKING AHEAD

Cloud, mobile and analytics remain among the top strategic technologies for 2017.

Prognostication season has begun in earnest, with consultants, analysts and futurists attempting to identify technologies likely to gain traction in the coming months. Augmented reality, autonomous vehicles and robotics are among the trendy picks.

For most businesses, however, the compelling technologies for 2017 are likely to seem more familiar. Initiatives surrounding cloud, mobile and analytics will remain high priorities during the ongoing shift in business processes known as “digital transformation.”

“Digital transformation is not just a technology trend, it is at the center of business strategies across all indus-

try segments and markets,” said Robert Parker, group vice president at IDC. “Digital transformation represents a critical opportunity for companies to redefine their customers’ experience, achieve new levels of enterprise productivity and create competitive advantage.”

Cloud, mobile and analytics are powering this transformation, changing both the way we work and the workplace itself. Data, services and applications can now be delivered almost anywhere on the planet via a growing array of devices. Industry leaders say a continued focus on these technologies will bring new opportunities for innovation, process improvement and customer engagement.

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Cloud

The cloud is the foundation for business agility. As a consumption-based and service-driven computing model, it eliminates the need to build infrastructure to support new ideas and initiatives. The cloud is more than an infrastructure alternative, however. Organizations are increasingly turning to cloud providers for application, management and security services.

Most analysts expect continued migration to public cloud platforms as organizations seek the flexibility to match services with a range of requirements. To achieve this flexibility, 451 Research anticipates the rise of a “cloud-tasking” philosophy. Rather than working with a single cloud provider for all requirements, cloud-tasking involves engaging with multiple service providers for individual functions.

A big shift is coming from the enterprise. Until recently, large organizations with data centers, big budgets and complex applications typically considered the cloud as useful only in special cases for convenience or cost-savings purposes. Now they increasingly see the cloud as a viable place to run core business applications.

A report by Cisco finds that more than four-fifths of all data center traffic — 83 percent — will be based in the cloud within the next three years. 451 Research predicts that more than one-third of IT budgets will be spent on cloud in 2017.

“Cloud computing is the agent of digital disruption, and we can see that there are significant benefits to be had by businesses that pursue both digital transformation and cloud strategies in tandem,” said Alex Hilton, CEO of the Cloud Industry Forum. “Cloud services, which effectively offer unlimited and dynamic IT resources, form the foundation of digital transformation and can facilitate rapid business change.”

Mobile

From a practical standpoint, digital transformation only occurs with the effective convergence of mobile and cloud. The massive compute and storage capabilities of the cloud enable anywhere/anytime access to data, applications and services from a continually enhanced array of mobile devices.

Mobile applications represent the intersection of these two technologies. By enabling us to share and sync data in real time with multiple users across many different devices, mobile apps have become integral to business operations. Research and Markets predicts the global market for mobile apps will increase from \$12.2 billion in 2017 to nearly \$24.0 billion in 2021 at a compound annual growth rate of 14.4 percent.

Moving beyond an outward focus on downloadable apps, organizations are greatly expanding efforts to create mobile versions of all the enterprise apps they’ve been using for years. In a recent Adobe survey, respondents said app development efforts are being driven by the need to connect with customers and stakeholders, equip employees with good information and increase productivity.

However, some analysts say organizations must take a new look at how they develop mobile apps. Oracle estimates that 87 percent of enterprises update or release new mobile apps every six months or less. The need to address constantly shifting user requirements requires a continuous delivery process.

As such, Forrester Research anticipates a radical change in app development philosophy in 2017. The firm predicts that organizations will increasingly move away from coding applications to composing them with reusable APIs that can be mixed and matched “like Lego bricks.”

Analytics

The rise of the Internet of Things (IoT) is delivering on the expected data growth and is driving a surge in data analytics initiatives. IoT makes it possible to examine specific patterns that deliver specific business outcomes, and this has to increasingly be done in real time. This will drive a healthier investment, and faster return in big data projects.

In a recent global survey, the Economist Intelligence Unit found that a majority of executives across various industries rank big data and analytics as the key to their digital transformation efforts. Fifty-eight percent said they plan to invest heavily in big data and analytics technologies in 2017, compared to 36 percent for mobile computing and 29 percent for cloud-based applications.

Hubert Yoshida, chief technology officer of Hitachi Data Systems, says he expects organizations to expand their use of in-memory databases and streaming analytics platforms to provide real-time analysis of developing trends. He says real-time analytics will be connected with Hadoop analytics for further analysis, and results will be stored in an object store for the possibility of future analysis. Analytic tools such as Pentaho will combine structured and unstructured data from different sources to provide a 360-degree view for analysis.

“The highly disruptive digital juggernauts teach us that the ability to wield data effectively is extremely valuable,” said Yoshida. “Many of these businesses are fundamentally data-driven with a simple interface and insightful business logic. Traditional enterprises realize now that they have not used their valuable data as effectively as they might have.”

News Briefs

IoT Growing Rapidly but Challenges Remain

The Internet of Things (IoT) is expanding rapidly, with the number of connected devices, sensors and actuators expected to reach more than 46 billion in 2021 — a 200 percent increase from 2016 — according to new data from Juniper Research.

The firm says this growth is being driven in large part by a reduction in the unit costs of hardware. Juniper forecasts that costs will average close to the magic \$1 per “thing” throughout the period.

Juniper's latest research, *The Internet of Things: Consumer, Industrial & Public Services 2016-2021*, finds that industrial and public services will post the highest growth over the forecast period, averaging over 24 percent annually.

However, Juniper cautioned that both providers and end-users will face tremendous challenges when considering IoT deployments at scale. The IoT requires a robust technology stack that includes connectivity, enterprise applications and databases, and an IoT platform for communicating with and controlling IoT devices.

“The platform landscape is flourishing,” noted research author Steffen Sorrell. “However, analytics and database systems are, for the most part, not architected to handle the Big Data 2.0 era that the IoT brings.”

Juniper also notes a number of security threats that could threaten IoT growth. Distributed denial-of-service botnet attacks, data theft and asset damage are likely to be the primary goals for hackers, the research firm says. While enterprises and industry are investing heavily in IoT security, regulatory, corporate and media collaboration is needed to improve the overall threat landscape.

New Language Boosts Big Data Speed

A new programming language introduced by researchers at MIT promises to make the code operating on big data sets about four times faster than with existing languages. Researchers say the new language, called Milk, lets application developers manage memory more efficiently in programs that deal with scattered data points in large data sets.

Researchers from MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) note that typical memory management is based on what computer scientists call the principle of locality: If a program needs a chunk of data stored at some memory location, it probably needs the neighboring chunks as well.

However, in the age of big data, programs typically must act on just a few data items scattered arbitrarily across huge data sets. Finding and fetching this scattered data is the major performance bottleneck in today's chips.

“It's as if, every time you want a spoonful of cereal, you open the fridge, open the milk carton, pour a spoonful of milk, close the carton, and put it back in the fridge,” said Vladimir Kiriansky, a doctoral student in electrical engineering and computer science at MIT.

With Milk, a programmer inserts a couple additional lines of code around any instruction that is seeking searching a large data set. Milk's compiler then figures out how to manage memory accordingly.

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Editorial Correspondence:

10221 E. 61st Street
Tulsa, OK 74133
Phone (800) 726-7667
Fax (918) 270-7134

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ProSys locations

Atlanta, GA
(Headquarters)
Phone: 678-268-1300
Toll-Free: 888-337-2626
chash@prosysis.com

Atlanta, GA
(Integration Center)
Phone: 678-268-9000
Toll Free: 888-337-2626
twheless@prosysis.com

Austin, TX
Phone: 512-658-5847
Toll Free: 888-337-2626
jwestmoreland@prosysis.com

Birmingham/Montgomery, AL
Phone: 205-314-5746
Toll-Free: 800-863-9778
birminghamsales@prosysis.com

The Carolinas
Toll-Free: 888-337-2626
chash@prosysis.com

Indianapolis, IN
Phone: 317-688-1283
Bill.sanders@prosysis.com

Knoxville, TN
Phone: 865-310-8843
Toll-Free: 800-863-9778
info@prosysis.com

Louisville, KY
Phone: 502-719-2101
Toll-Free: 800-863-9778
info@prosysis.com

Mexico City
Phone: +52 (55) 3601 3755
info@prosysis.com

Miami, FL
Phone: 305-256-8382
Toll-Free: 800-891-8123
lspivot@prosysis.com

Mid-Atlantic
Phone: 800-634-2588 ext 2
midatlantic@prosysis.com

Nashville, TN
Phone: 615-301-5200
Toll-Free: 800-863-9778
info@prosysis.com

New England
Toll Free: 800-634-2588 ext 1
newengland@prosysis.com

Seattle, WA
Phone: 425-939-0342
sballantyne@prosysis.com

Tampa, FL
Phone: 813-440-2410
800-891-8123
lspivot@prosysis.com



SEEING is BELIEVING

Microsoft Power BI visualization tools improve big-data analytics.

Studies show data stores are growing by as much as 65 percent annually, and that isn't likely to slow anytime soon with the continuing emergence of the Internet of Things. In the age of big data, organizations are scrambling to find the best way to mine these growing volumes for operational insights.

Organizations around the globe are clamoring for powerful analytics tools so they can evaluate large datasets in search of patterns and insights that can be used to guide corporate decisions and policies. In a recent survey of more than 2,100 decision makers across 15 industries, PwC found that executives



are eager to increase the speed and sophistication of their data analysis — both to understand what has happened and to predict what will happen.

“Data can be an extremely underutilized tool, and a company’s capability to access the right data, at the right time, and then look at it through the right lens, can make or break a bottom line,” said Dan DiFilippo, PwC’s Global and US Data and Analytics Leader.

Microsoft Power BI is giving organizations that lens.

Picture This

Microsoft Power BI is a cloud-scale analytics service featuring interactive dashboards and data visualization tools that give users the power to create com-

PELLING graphical formats. This allows users to quickly and easily analyze a broad range of data types and present that information visually so decision-makers can more easily grasp difficult concepts or identify new patterns.

“The idea of using pictures to better understand data has been around for long time,” said Michael Hritz, Vendor Alliance Manager, ProSys. “Just like maps, it’s all about providing context in a way that words alone can’t accomplish. Being able to see things as they relate to other factors helps us make more sense of it.

“Power BI is a big step forward in data analytics by making it really easy to transform complex data into something that is easy to understand. That leads to improved decision-making, faster action and competitive advantage.”

Organizations that have been using business intelligence and analytics tools for years often remain uncertain how to fully utilize them to improve business decision-making. In an Accenture survey of 600 executives in the U.S. and U.K., only 39 percent said the data they generate through their analytics tools is actually relevant to their business strategies, and only 50 percent said that their data is consistent, accurate, formatted and complete.

“The point of analytics is to become a smarter and more effective organization through data-driven decisions,” said Hritz. “But that doesn’t work if the data doesn’t provide clear insight. If you don’t trust your data, or if you’re unsure about where it is pointing you, you’re not likely to depend on that data to make important decisions.”

Power BI dashboards can be created and customized to suit specific business needs and data analysis requirements. Dashboards provide a consolidated view of all relevant data sets, regardless of where they reside, while metrics are displayed as tiles. Users can update, share, edit, add and remove dashboards as needed.

Real-Time Views

Working in conjunction with Microsoft Azure Stream Analytics, Power BI makes it possible create real-time dashboard tiles in minutes without the need for technical savvy or IT involvement. A DirectQuery function allows very large datasets to be visually represented from a variety of cloud sources — Azure SQL Database, Azure SQL Data Warehouse, Azure HDInsight, Azure Blob Storage and more — without needing to actually move the data into Power BI.

“Dashboard tiles can be as simple or complex as the user desires,” said Hritz. “You can even create different reports for different audiences using the same data connections and even the same query. You just build a new report page and refine your visualizations in a way that makes most sense for a particular audience.”

Power BI is also available for all major mobile platforms. Power BI Mobile Apps enables users to access business analytics on the go.

These capabilities are extremely beneficial for a number of use cases, especially as the IoT continues to expand. For example, warehouses, manufacturing plants, transportation companies and utilities can monitor the health of their equipment in real time and schedule proactive maintenance to avoid downtime. Retailers can monitor and respond to customer behavior in real time to boost sales. Marketing firms can “listen” to and engage with social media followers in real time, share relevant content or promotional offers, and maximize social ROI.

While Power BI is one of many analytics applications available, Microsoft has differentiated cloud service by making it easier to visualize, analyze, stream and gain insights from real-time data on a user-friendly interface. By allowing more widespread use of analytics, Power BI can help organizations turn information into insight so they can make faster and better decisions.

New Threats Emerging



Experts warn of increasingly targeted attacks that leave fewer clues.

Emerging malware platforms that are functionally disposable, highly targeted and stripped of any of the typical clues that would normally indicate a computer intrusion will create new problems for IT security in the coming months, experts say.

So-called “ephemeral infections” are designed to be deployed in highly sensitive environments by attackers keen to avoid arousing suspicion or discovery, according to Kaspersky Lab’s threat predictions for 2017. The cybersecurity firm says these infections use tiny but malicious PowerShell scripts that are stored in memory or in the registry. They perform reconnaissance, collect sensitive information, and then disappear without a trace when the infected computer is rebooted.

Kaspersky says another particularly insidious threat gaining steam is “bespoke malware.” Unlike most classes of malware that are designed for wide dis-

tribution, this is a custom-designed threat in which every feature was altered for a specific target. A notable example of a bespoke malware is the ProjectSauron platform, which was detected in 2015 after spying on government and corporate computers for five years. It used an executable file that claimed to be a Windows password filter. The executable would start up whenever a user logged on or entered a password. Unlike typical malware, it appeared differently on different systems/networks.

Because of this customization, there are none of the telltale signs — known as Indicators of Compromise (IOCs) — that would point to non-human behavior. Without common IOCs such as suspicious file and registry changes, network traffic spikes or unusual account activity, these threats are nearly impossible to discover using traditional methods.

Kaspersky Lab says ephemeral infections and bespoke malware highlight the need for proactive and sophisticated heuristics in advanced anti-malware

solutions. The firm also advocates the increased use of the open-source YARA tool to scan networks and uncover malware patterns. YARA provides a robust language for identifying and classifying malware, making it easier to reverse engineer malicious code.

“These are dramatic developments, but defenders will not be left helpless,” said Juan Andrés Guerrero-Saade, Senior Security Expert, Global Research and Analysis Team. “We believe that it is time to push for the wider adoption of good YARA rules. These will allow researchers to scan far and wide across an enterprise, inspect and identify traits in binaries at rest, and scan memory for fragments of known attacks. Ephemeral infections highlight the need for proactive and sophisticated heuristics in advanced anti-malware solutions.”

Other emerging threats identified by Kaspersky Lab include:

- **Growing vulnerability to cyber-sabotage:** Critical infrastructure and manufacturing systems that are connected to the Internet, often with little or no protection, will be increasingly targeted.
- **Mobile espionage:** Attacks on mobile platforms will rise as attackers exploit the fact that the security industry has been denied full access to mobile operating systems for forensic analysis.
- **Commoditized financial attacks:** Expect a rise in attacks such as the 2016 SWIFT interbank messaging heists, in which attackers used commoditized malware available for sale in underground forums or through as-a-service schemes.
- **Compromised payment systems:** As payment systems become increasingly popular and common, they will attract greater interest from cyber criminals.
- **The breakdown of “trust” in ransomware schemes:** Ransomware is still on the rise, but there are signs that victims are becoming less likely to trust that attackers will unlock their data upon payment. This could be a turning point in the effectiveness of ransomware.
- **IoT device integrity:** As the Internet of Things grows, manufacturers continue to pump out unsecured devices that cause wide-scale problems. Vigilante hackers may take matters into their own hands and disable as many devices as possible.
- **False flags:** As cyberattacks come to play a greater role in international relations, attackers will use misinformation and misdirection to make it appear that a different entity, group or nation carried out the operation.
- **The rise of information warfare:** The dumping of hacked information for aggressive purposes became pronounced during the U.S. election cycle. In “vigilante hacks,” attackers will hack and dump data, allegedly for the greater good. However, some attackers will try to influence public opinion by manipulating or selectively disclosing information.



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