LOOKING AHEAD

The future is software deploying software delivering software.
Lori MacVittie, Principal Technical Evangelist, F5 Networks

To help manage, monitor, and secure the next-generation of enterprise mobile apps, IT will need to incorporate dynamic policy rules that change instantly based on the behaviors of the applications.
Alan Murray, Sr. VP of Products, Apperian

INTRODUCTION

Ten years ago, there were no smartphones or other individual mobile devices that allowed employees to check email, access work systems, or share information with colleagues. In the past 10 years, technologies matured to produce cloud computing, mobile, big data, and social media, and over the next 10 years, we expect to see these new technologies fueling the digital transformation of work and changing the face of application management.

Gone are the days when the responsibilities of an application manager focused on what applications they had, where they were, when they were used, and keeping everything running. The focus today is on managing and automating integration and security in the cloud, **software-defined data centers (SDDCs)**, as well as mobile devices and optimizing application performance. The key changes in **application lifecycle management** that evolved as the computing environment moved from a stable to an agile environment are captured in Table 17.1.[1]

Although application management has matured greatly in the past 10 years, the next 10 years will see many ways in which the running of mobile and cloud applications will change significantly. **Hyperavailability** will become an absolute requirement and an executive-led, enterprise-wide **digital transformation strategy** to leverage technology to improve business processes will be necessary for organizations to stay competitive. Just as IT professionals 10 years ago would never have imagined they could set up and provide access to multiple servers, storage, and various new applications to employees around the globe within 24 hours, we anticipate that many more changes than we can imagine will occur.

The next sections present and discuss expected changes in application management that will occur within the next 10 years. Based on current indicators, and in the absence of the IT equivalent of *Gray's Sports Almanac* that Biff found in "Back to the Future," these are our best predictions of how application management will change as we move forward into the next decade.

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[1]Craig, J., 2011. Modernizing application lifecycle management through software as a service. EMA Research Report.

Table 17.1 Evolution of ALM Practices

Stable	Agile
Structured ALM practices siloed by discipline (development, quality assurance, etc.)	Team collaboration and changing requirements necessitate improved traceability among project artifacts, adherence to established process and workflow Dynamic and real-time access to project state through KPIs Ongoing stakeholder input, evolving requirements across the lifecycle
Point development and testing solutions	Solutions integrated to one central repository
Teams co-located, working in isolation issues handled through whiteboards	Ability to accommodate and facilitate geographically distributed teams with external contributors (e.g., suppliers)
Rigid, sequential ALM methodologies	Flexible, iterative ALM methodologies
Monolithic applications	Composite applications

CLOUD COMPUTING INNOVATIONS

It is most likely that future breakthroughs in application management will occur through innovations in cloud computing. For example, some cloud vendors are already offering built-in management functions to shift the burden from the development organization to the cloud vendor. While this approach does not entirely relieve developers of the management burden, it does shift the nature of the work from primary responsibility to that of an assistant. Examples include data center-wide patch management (the cloud patching service) or abstracting **middleware as a service (MaaS).** MaaS delivers built-in monitoring, problem and change management services, pooled support resources, policies for scaling up and down, and metering and optional chargeback on consumed resources.

THE CHANGING FACE OF APPLICATIONS

Applications will continue to proliferate, particularly as the concept and reality of the **Internet of Things (IoT)** matures. The numbers of apps will be staggering. We will see discrete pieces of code that are smaller, but nanotechnology will have all these codes doing their own thing.

Applications are also going to be less visible as more human-like interfaces become available, such as IpSoft Amelia chat sessions. User perspective apps will be thought of in a different way. Applications will just be there, always on, always available, and the functions they perform will be more complex. Increasing dependencies between applications will prevent one application from functioning. As processors get bigger and faster, the speed of management and line of business applications will increase. As a result, the requirement will be for faster time to resolve problems, enabling faster problem resolution time. Thus, the complexity of applications themselves will grow along with the complexities of managing them.

This increased demand for the deployment of huge numbers of hyperavailable cloud and mobile applications will require organizations to be proactive in adequately funding, staffing, and training their infrastructure and operations teams to handle increasing demands in terms of quantity, accessibility, and reliability. It is also important to realize that not all applications will be running in public or private clouds. It is probable that we will see greater use of virtualized technologies over the next several years.

SOFTWARE-DEFINED EVERYTHING

Recent data collected on the use of **software-defined networking (SDN)** and SDDCs shows they are already adopted fairly widely. However, companies do not yet have a good handle on how these factors will affect their enterprise management initiatives going forward. From our perspective, the move toward software-defined versus hard-wired configurations will increase rates of change in a similar way as vMotions changed the virtualization story. As companies become more adept at rolling out these technologies, network and data center configurations can change based on time of day, time of month, etc., or, ultimately, in real-time based on applications in use and their bandwidth requirements. Just as network **QoS** specifications changed the game in the past, via SDN entire network segments will ultimately be provisioned, de-provisioned, or configured in real-time based on a given set of rules. In a similar way, network definitions may well become part of application deployment, such that network configurations are built at the same time the application is deployed to production.

All of these things lead up to one key point, and this was the crux of application management for many years. IT is still struggling with topologies, that is, the ability to relate underlying hardware and software to the applications they support (ideally in an automated fashion). Recent research shows that this is still a major problem, both with applications hosted on-site and hybrid apps executing across on-site and third party systems. As infrastructure becomes increasingly defined and provisioned as software, changing topologies will create an even bigger support challenge, as support personnel may well have no idea when, where, and how configurations are being changed. The bottom line relative to software-defined everything is that troubleshooting and root cause analysis will become increasingly difficult, and **application performance management (APM)** and **app discovery/dependency mapping (ADDM)** vendors will have to develop increasingly innovative ways of discovering and mapping application execution paths.

ADVANCED PREDICTIVE ANALYTICS FOR PERFORMANCE MANAGEMENT

As distributed applications in virtual environments and cloud computing increase in complexity, application performance management will become overwhelming. **Advanced predictive analytics** may hold the answer to easing the burden on application managers of the future by sifting through mounds of log and performance data to learn how systems work together and predict problems related to workload slowdowns and outages. Properly configured and used predictive analytics not only report on application, database, network, and storage performance, but also can detect issues from the end user's perspective.

Choosing the best, advanced predictive analytics software will require diligence. Steps to follow in making this choice should include:

1. Determining if the software can deal with the newest generation of BYODs.
2. Ensuring the software can detect everything in use in the IT infrastructure and suggest needed changes.
3. Determining if the software can manage workloads and not just provide alerts and reporting.
4. Requesting a demo or proof-of-concept to experience how complex and time-consuming installation, configuration, testing, and use will be.

5. Talking to references who already implemented the software.
6. Considering the cost-effectiveness of the software in the environment in which you will use it.

DYNAMIC POLICY RULES

The command-and-control approach to mobile device management is rapidly becoming outdated. As the behavior of enterprise applications changes based on how employees use them, rules and security measures will be created and integrated into mobile applications based on employee roles, location, and manner in which the application is being used. Application provisioning and security settings will also mature to accommodate heightened employee mobility, changing work styles, and increased collaboration with colleagues across multiple time zones.

To help manage, monitor, and secure future enterprise mobile applications, **dynamic policy rules** that change instantly will be essential to send updates and alerts and alleviate the need for the continual monitoring of employee application usage. Foreseeing this turn of events, Apperian recently released its patented Dynamic Policy Engine. The Dynamic Policy Engine provides customers with a diverse set of app wrapping policies that administrators can directly apply to applications to enhance behavior and functionality, depending on the policy. Moving forward, other vendors are expected to follow Apperian's lead in developing products that apply business and security logic to individual applications that already compiled.

AUTONOMICS AND COGNITIVE COMPUTING

In the future, **autonomics and cognitive systems** will become the norm. As result, we will see a dramatic improvement in application availability, a significant reduction in the lower-skilled IT services industry workforce, and the aggressive adoption of intelligent automation by service providers.

On June 29, 2016, Chetan Dube, CEO of IPsoft, opened the IPsoft Autonomic Center and previewed Apollo, IPsoft's next-generation cognitive IT management platform. Apollo layers cognitive competence on an autonomic backbone to disintermediate large components of IT overhead and leads the way for running unmanned network operations. As this type of innovative technology matures, IT applications of the future will be able to understand the business directly, eliminate the need for large service centers, and drive the market toward a digital labor model. Other vendors who are developing products in this space include IBM Watson, Ikarus, Ayehu, Ignio, and Syntbots.

HEIGHTENED SECURITY NEEDS

As organizations continue to enjoy the opportunities afforded them by cloud and mobile applications, companies will have to relax traditional boundaries and connect greater amounts of valuable and sensitive data to external sources to meet customer needs. These needs will drive businesses to work hard to meet the demand for online shopping, banking, and leisure (such as reading online, sharing social media links, gaming, and watching movies). At the same time, organizations will need to stay abreast of the extreme security threats posed by these cloud and mobile initiatives. As hackers become more and more sophisticated, including those in China, the importance of developing and deploying complex security

measures will increase. Unfortunately, all indications are that organizations will continue to ignore the need for security. If application management is an afterthought, then the need for security in particular will be overlooked as companies continue to fail to acknowledge the importance of putting in place effective security initiatives unless and until they find themselves in a Target or Home Depot situation.

NORMALIZING DEVOPS

The best practice of integrating engineers, developers, operations managers, application managers, and business leaders, that is, **DevOps**, will come of age over the next 5 years and obliterate the distinction between development and operations. To fully realize the full benefits of mobile and cloud computing, virtualization, SDE, and cognitive computing, DevOps must become the norm in application management. Without it, the barriers between siloes of IT workers will adversely affect the benefits that each of these IT innovations has to offer. One of the harsh realities is that creating technology solutions is the easiest part. Processes that must change to accommodate the new technologies, along with new marketplace demands, are more difficult to achieve. Most difficult of all can be the cultural change needed to achieve best results. DevOps requires a major culture change, so achieving the normalization of DevOps will not be easy, but those companies that persevere and make it a priority will reap the benefits.

CLOUD MANAGEMENT STANDARDS

It has been a long struggle with application management standards overall, and **cloud standards** in particular are just emerging. In the future, standards will become more important as they establish a norm for vendors to follow and facilitate application choice. As the ISO/IEC and **IEEE** formally acknowledge cloud standards, more vendors will develop standards-based products and continue to do so to stay competitive.

An interesting twist would be the standardizing of the actual enterprise application management strategy to enable comparable reporting across programs and projects. However, organizations considering this move would need to build in some flexibility in their standard to accommodate the different needs of individual programs and projects within an organization's portfolio and the different methodologies used.

CHANGING OF THE GUARD

Many high-revenue companies already traded in MS Servers for Linux servers and all indications are that this trend will continue. Linux is open-source based and runs on everything. Microsoft runs only on X86 and, like Apple, has a long history of being a closed system. Although Microsoft is trying hard to reverse this trend, it is likely that they will have difficulty matching their more agile competitors. On the desktop, Google is merging its chrome OS (which runs on devices) with the chrome browser. In addition, there are rumors to the effect that Google is in the process of merging chrome OS with Android. As a result, thousands of android apps running on mobile devices will be able to run on a Linux-based Android desktop/laptop. If and when this happens, Microsoft's effectiveness will be limited to its Azure assets. The transition will take a while due to the millions of desktops running .NET front ends, even after

Google makes its move. However, it is anticipated that Google will ultimately assume leadership in the desktop market, starting primarily with the non-US market followed by domination in the US market. This will cause APM vendors to ramp up support for Linux, Chrome OS, and Android since Android, in particular, becomes the front end for a new breed of complex, component-based applications.

Increasingly, component-based applications will reintroduce issues relating to latency (with many more network interactions, the potential for performance impact increases). APIs will supplant traditional methods of integration, particularly for those integrations that are not performance critical (in other words, most of the financial world will still run on proprietary platforms and/or high-scale integration pipes). From the app perspective, "big operational data" coming from IoT can go into a similar (separate but equal) bucket as the "big operational data" coming from execution systems. This makes analytics the key differentiator between management solutions—this is the case today, and the transition from pure analytics to actionable analytics is already under way.

OTHER POSSIBLE INNOVATIONS

In the next 10 years, we are likely to see other innovations such as **customizable patterns** in the form of **multiple-use templates** to speed application development and deployment. There are also indicators that **in-context collaboration**, **real-time planning**, **lifecycle traceability**, and **development intelligence** will be available in the cloud as part of a full application lifecycle approach rooted in current practices but extending the model in new ways.

BACK TO THE FUTURE WITH ACME

As we come to the end of this book, it seems appropriate to revisit Acme Manufacturing sometime in the not-too-distant future. Things have changed a lot from the situation portrayed in the earlier chapters. The people we introduced earlier moved on to other jobs, some within Acme and some elsewhere. Acme, unlike some of its competitors, has not outsourced any of its IT functions. Acme management believes that IT is too important and too strategic to put it in the hands of another company. Let's take a look.

Meet Jake. He is a client service manager (CSM) in Acme's IT Department. He graduated 2 years ago with a BS in computer science from nearby NIWOT State College. His is an entry-level position

that Acme uses to onboard most of its new hires in IT Operations. Acme's IT management feels that this is a good spot to give new employees a broad perspective of the role of IT and its importance to the company. It is intended for this to be the beginning of a career path within Acme's IT organization.

Jake's manager, Fiona, stops. She knows from checking an app on her tablet that everything is on track.

Fiona: How's it going, Dave?

Dave: Fine. It's pretty quiet today. (Thinking to himself "Isn't it always?") A couple of hours ago EARL (the autonomic, cognitive management system) detected a voltage fluctuation on the storage system used for the inventory control database. Once he noticed it, he pointed the inventory control system to the backup database and took that storage system off-line for preventive maintenance. He also created a new backup copy on an alternate storage system. That's been about it.

Fiona: That's good. Good, but not unusual.

Dave: I have to say that this job is pretty low-key. Mainly, we need to follow up on things. You know, like making sure that EARL hasn't lost his mind—ensure that the actions that he takes make sense. Also, we need to make sure that changes requested by our clients actually get implemented by LISA (the automated change control and processing system used by both clients and IT staff).

Fiona: (chuckling) Yes, that is true, but you need to keep a couple of things in mind. First, it's very important that someone is looking over the virtual shoulders of systems like EARL and LISA. They're very good and extremely accurate in what they do—far more accurate and reliable than the people who used to do their jobs. However, as you've seen, they aren't perfect. Maybe someday we'll get to the point that we can "fire and forget" with systems like EARL and LISA. The other thing to remember is that this is as much about getting you broad exposure to our systems, our clients, the people in IT, and our overall business. This is a steppingstone for you to more interesting jobs in the future. No matter how good the automation, we always need people for higher-level tasks that can't be automated like planning and strategy, application development, etc.

SUMMARY

Moving forward, many organizations will be creating a malleable hybrid cloud environment that combines public and private cloud computing. This approach will require new strategies for application management that enable software components to create an appropriate image for any target environment. The mix of public and private cloud computing will also require linking resource, configuration, and cloud management. With budget a big concern, organizations will need to update their applications portfolios; review a cost-benefit analysis of cloud, social media, and mobile; and take meaningful action to choose the right providers and negotiating the best terms and conditions from them.

Security will be an ongoing critical part of application management. Organizations that acknowledge and embrace the need for more and stricter security initiatives will benefit from the investment. As new application management techniques and methodologies evolve, tools must evolve to accommodate them to enable organizations to focus on business innovation versus retooling and retraining.

In the future, organizations must embrace and absorb cloud, mobile, social, and big data technologies and recognize digital transformation as an important business strategy, not just as a technology fad. To achieve and maintain a competitive advantage, organizations will need to integrate digital technologies into their business processes to help them solve infrastructure problems, particularly those related to the network, that often cause enterprise-wide application performance issues.