

## DISCUSSION QUESTIONS

1. Think about a company you know well. What would be an example of IT architecture at that company? An example of the IT infrastructure?
2. What, in your opinion, is the difference between a decentralized architecture and a centralized architecture? What is an example of a business decision that would be affected by the choice of the architecture?
3. From your personal experience, what is an example of software as a service? Of BYOD?
4. Each of the following companies would benefit from either software-defined architecture or conventional, owned hardware and software. State which you would advise each of the following fictitious firms (plus the IRS) to adopt and explain why.
  - a. StableCo is a firm that sells industrial paper shredders. Its business has remained steady for two decades and it has a strong and diverse customer base.
  - b. DynamicCo is a fast-growing six-year old firm that has relied on three to five key wholesale customers for its entire existence. However, the list of key customers changes every year, and during two of the years, sales declined sharply.
  - c. Plastics3000 is an old, stable plastics manufacturing firm that has kept its sales steady in the face of competitors as the result of an active research and development team that uses advanced software to analyze large amounts of data to develop new compounds. Once or twice a week, office personnel complain of the network becoming very slow.
  - d. A downtown Las Vegas casino monitors each slot machine continuously for early detection of malfunctions such as winnings or losses trending beyond their threshold limits.
  - e. CallPerfect provides call center services to pharmacies. Phone calls are routed to the company after hours and messages are delivered to the pharmacy manager the next morning.
  - f. At the IRS, tax forms are available online for citizens to complete and file with the IRS electronically by April 15. A call center routes calls to agents who answer taxpayers' questions.
  - g. At LittlePeople, Inc., a day care center, parents are called using software on the administrator's computer when there is a weather emergency. The school has averaged 120 families for many years.

### ■ CASE STUDY 6-1 Enterprise Architecture at American Express

Enterprise architecture (EA) at American Express was the framework the organization used to align IT and the business. EA provided a common language for leaders to use to collaborate and transform the business. At American Express, enterprise architects were the change agents who streamlined processes and designed ways to more effectively do business using IT resources. In 2011, American Express was named an InfoWorld/Forrester Enterprise Architecture Award recipient for its EA practices. As American Express leaders considered new payment methods using mobile devices, the EA guided their progress.

Mobile payments were forcing the payments industry to review their practices and significantly transform the way business was done. The new business environment introduced additional complexity with the addition of new delivery channels and the need for shorter time-to-market of payment products and services. American Express's business strategy for its payments products focused on delivering a "consistent, global, integrated customer experience based on services running on a common application platform."

To achieve this goal, the EA team created reference architectures and road maps for standardized applications across the firm. This team then worked with multiple business solution delivery teams to create and manage the common application architecture and create strategies that facilitated each business's objectives. Each strategy included a road map of initiatives that included a set of actions, the metrics to evaluate the success of these actions, and the commitments IT and the businesses made to make it happen. The road map was American Express's way to standardize language, tools, life cycle management of the applications, and architecture and governance processes. The elements of the road map included technology, reference architecture, and capabilities for the business.

The next steps for American Express were to extend the road maps to cover the maturing of SOA and to develop new reference architectures and a new taxonomy to increasingly align IT with the needs of the business. As new technologies emerged and new ways of doing business over social tools created opportunities for new payment products and services, American Express expected to continually evolve its EA.

#### *Discussion Questions*

1. What are the key components of the architecture American Express has created?
2. Why was it important to standardize so much of the architecture? What are the advantages and disadvantages of a standard EA for American Express?

3. Describe how the new architecture supports the goals and strategy of American Express.
4. What types of future payment products and services should be anticipated and prepared for by the EA group? What is your vision of how payments might work? If you were advising the CIO of American Express, what would you suggest his group prepare for?

Source: Adapted from Phil LeClare and Eric Knorr, "The 2011 Enterprise Architecture Awards" (September 19, 2011), <http://www.infoworld.com/d/enterprise-architecture/the-2011-enterprise-architecture-awards-173372> (accessed August 27, 2015).

## ■ CASE STUDY 6-2 The Case of Extreme Scientists

Scientists doing research often need serious computing capability to run simulations and crunch data. Often that meant working for a large company that could provide the significant investment in information systems infrastructure. But cloud computing changed all that. Consider the case of biologist Dr. Eric Schadt, a researcher who claims that approaches to studying the complexity of living systems have failed. Studying one gene at a time doesn't explain what causes diseases, making it impossible to find the cures sought by the scientific and pharmacology communities. Dr. Schadt's vision is to manage this area of research, and the large amount of data generated, which appears to be too much for any one individual or company to manage, by creating a human social network. He believes that this organization reflects the complexity of the living systems he studies and therefore it's necessary to understand it.

Dr. Schadt cofounded a nonprofit organization dedicated to biological research using an open-source sharing of data, Sage Bionetworks. He deeply believes that sharing is the key to finding cures and creating drugs that will combat diseases. And his company has millions of dollars worth of data from some of the major pharmaceutical companies to use to begin the research. But by day, he's the Chief Scientific Officer of a start-up, Pacific Biosciences (PacBio), whose technology helps biologists look at individual molecules of DNA in real time. His job is to work on how to use this technology for PacBio and to collaborate with others who want to use it for their research. So he travels a lot. But to do his research, he needs access to the capacity of a supercomputer because the amount of data he needs to use for his research is very large.

With the use of the Web, Dr. Schadt is able to do his work anyplace. Planes are especially favored because he has significant uninterrupted time. According to one article about him,

He has the same access to supercomputers that every other American with an Internet connection and a credit card has. He waits till the plane climbs to a cruising altitude, then when allowed to use electronic devices, he uses the plane's WiFi to get on Amazon.

Dr. Schadt is able to initiate a complex analysis of his data using Amazon's services, which crunch the data while he flies across the country. When he lands, the analysis is done and he has the results. This would be equivalent to the computing power of a scientist working on his company's multimillion-dollar supercomputer, but in this case, the cost is just a few hundred dollars.

Companies like Amazon.com have become vendors of extreme computing power. Some have compared the amount of computing power Dr. Schadt uses while flying on an airplane to the amount of computing power available to a scientist at major pharmaceutical companies that have multimillion-dollar supercomputers. With services like the computing power available in the cloud, Dr. Schadt may even have more power available to him than that scientist.

### *Discussion Questions*

1. How would you describe the architecture Dr. Schadt uses to do his research?
2. What are the risks Dr. Schadt faces by using Amazon for his supercomputing? What are the benefits?
3. If you were advising a company trying to make a decision about using cloud computing for key business applications, what would you advise and why?

Source: Adapted from Tom Junod, "Adventures in Extreme Science" (March 22, 2011), <http://www.esquire.com/features/eric-schadt-profile-0411-4> (accessed August 27, 2015).