Dr. Timothy Chou Keynote Speaker at NSTBC on the Internet of Things
February 2017

Dr. Timothy Chou presented a keynote address at the recent 2016 NonStop Technical Boot Camp, held last November in San Jose, California, U.S.A. His topic was the Internet of Things (IoT). While a Thing could be a toaster or a Fitbit, Dr. Chou focused his talk on the machines that are the backbone for the planet's power, water, food, and healthcare infrastructures – things like combine-harvesters, wind turbines, submergible pumps or blood analyzer.[1]

Dr. Chou has published numerous books. His first, "The End of Software: Transforming Your Business for the On Demand Future," discusses Software as a Service (SaaS), in which software and the services that support it are moved to the Cloud. Dr. Chou emphasizes the point that every business-application software company that has gone public since 1999 has used the SaaS model. Prior to the model's acceptance, the customer was responsible for installing the software and for managing its security, availability, and performance. Under SaaS, it is the software vendor who now performs all these functions.

Another book, "Cloud: Seven Clear Business Models," focuses on models that underlie most of the business and consumer technology industries. It is based on Dr. Chou's lectures at Stanford University. He dwells deeply into the Internet of Things in "Precision: Principles, Practices, and Solutions for the Internet of Things."[2] In the first part, "Precision: Principles and Practices," he introduces a vendor-neutral IoT framework and discusses how this framework is put into practice. The second part, "Precision: Solutions," uses his IoT framework to highlight fourteen real-world solutions for manufacturers that are building precision machines. If you're interested, an online course is being made available at www.precisionstory.com/class. It will take you less than a morning to complete and it's free for now.

Dr. Chou received his PhD in Electrical Engineering from the University of Illinois. Before striking out on his own, he worked at Tandem Computers, Oracle, and Reasoning, Inc. Tandem was his first job out of University. He began as a programmer, left as a director twelve years later, and earned the following praise from his boss Jimmy Treybig: Tim has "always been at the cutting edge of technology." From 1999 to 2005, Dr. Chou served as President of Oracle on Demand. The company focused on enterprise applications delivered as a cloud service.

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[1] This paper was first published in the January/February issue of The Connection. It is republished here with the kind permission of The Connection.
[2] https://amzn.com/1329843568

Dr. Chou is a worldwide keynote speaker and teaches at Tsinghua University in Beijing, China, and at Stanford University, where he has been active since 1982. He started Stanford's first course on cloud computing.

Dr. Chou is on the Board of Directors of Blackbaud, a NASDAQ-listed company.

Following his NSTBC keynote address, a group of us had the privilege to interview Dr. Chou. The following discussion addresses the highlights of our interview.

Dr. Chou's Consulting Activities

Most of Dr. Chou's consulting is at a very high business level. He focuses on an enterprise's use of cloud strategy from a software distribution perspective. Dr. Chou noted that although corporations have been outsourcing all of their software needs, they are beginning to appreciate the fact that software sits at the hub of their enterprise operations. With that realization has come a reality check. Many of these companies have insufficient in-house staff devoted to their software applications; and those individuals now are more in demand than ever. Who, then, will fill these in-house positions? According to Dr. Chou, it will be a challenge. Nowadays, students from Stanford and other top schools are going to Google, Facebook, Amazon, and new startups - in other words, the "cool" places to work.

Companies also are having trouble attracting recruits if corporate campuses are not located properly. This is why General Electric recently moved its headquarters to Boston, Massachusetts, from Fairfield, Connecticut, which GE had called home for 42 years. New recruits do not want to move to Connecticut, nor do they want to move to Palo Alto for that matter. They want to live in active hubs such as San Francisco, Chicago, Brooklyn, or Boston where they don't need a car, are near to their friends, and can walk to restaurants for dinner.

Dr. Chou tells his Stanford students that if they lived in a community of 100 people, they would all be generalists. They would bake their own bread and fix their own cars. But in a world of five billion people, one must be a specialist. But of what? Dr. Chou recommends a ten-year career cycle – two years to learn and eight years to work. Then respecialize. His advice to older people is to go back and hit the books to find a new specialty. He counsels young people not to sit still either. "Think of your career in ten year cycles, 2 to learn, 8 to execute and start all over again"

His own career is an example of ongoing respecialization. As an electrical engineering student, he focused on VLSI design in graduate school. VLSI, Very Large Scale Integration, is the process of creating an integrated circuit by combining thousands of transistors into a single semiconductor chip. As he approached graduation, Dr. Chou took fourteen interviews, which resulted in thirteen job offers. Twelve were for engineering jobs – right up his alley. One was for a software job. Even then, he sensed that the future would hold only limited opportunities for computer architects. So he took the software job at Tandem Computers and worked on the NonStop operating system.

After Tandem, Dr. Chou went to Oracle. He initially was there for two years, helped to deliver Oracle 8, and then moved on to another company. Several years later, he returned to Oracle as President of Oracle on Demand, which provides software applications via the cloud as Software as a Service. To Dr. Chou, this was a case of respecializing. Now he was a cloud specialist.

The Hardware Manufacturers' Syndrome

Dr. Chou noted that hardware manufacturers like Dell, HP, Huawei, are facing a predicament. Fewer customers are buying and managing their own servers. Instead, they are moving applications to the public cloud, where they can rent server space for as little 12¢ USD per hour. Some hardware manufacturers even have attempted to implement their own public clouds, but

they have found that they cannot compete with large cloud providers like Amazon, Google, and Microsoft Azure.

Therefore, hardware manufacturers are targeting cloud providers for server sales. Unfortunately, the large cloud providers are building their own servers. They go directly to the parts manufacturers like Flextronics, which builds servers to each provider's specifications.

Support is easier for large cloud providers than it is for large organizations that buy hundreds or thousands of servers and distribute them throughout their enterprise offices. The large cloud providers do not deploy their thousands of servers to hundreds of buildings. Rather, they are housed in a small number of data centers, where they are easily manageable. Furthermore, if the cloud provider is a Software-as-a-Service company such as Facebook, which has hundreds of thousands of servers, the hardware can be optimized to support the company's specific applications.

Consequently, hardware manufacturers are targeting companies that are setting up their own private clouds or hybrid clouds (private clouds that interact with one or more public clouds). Availability is typically not an issue since the applications running in the clouds are not transaction-processing applications. They are context-free. If an application fails, it simply can be restarted.

Also, many private clouds run in a global active/active configuration. The processing load is balanced across the multiple systems around the world, thus smoothing out the peaks and valleys in traffic. This also provides a high degree of availability. There are no passive systems sitting in the dark that may or may not prove to be operational when needed to take over processing from a failed production server.

The Chinese Culture

Every year, Dr. Chou lectures at Tsinghua University in China. Tsinghua is one of the country's top schools for studying sciences. It is often referred to as "China's MIT," and every Chinese leader for the last thirty years has studied at Tsinghua. Only the best and the brightest are admitted. China administers extensive college entrance exams, and the students who get the highest grades get first choice as to the university they wish to attend. Tsinghua is everyone's first choice. It was rated first among 250 universities ranked by U.S. News (MIT ranked second).

Dr. Chou noted that one significant difference between Chinese students and students at schools like Stanford is that the Chinese students do not ask questions. It is a cultural phenomenon. The teacher stands up and teaches, and the students listen. The teacher then hands out an exam, and the students hope they do well on it. Chinese students need help to encourage them to be more curious and to participate in classroom discussions. There is gradual movement in this direction.

With respect to information technology, China may be well ahead of the United States on the consumer side. While the U.S. put computers to work in businesses first and focused next on social networks like Facebook, the Chinese focused initially on the consumer. Two examples are Alibaba and WeChat.

Alibaba is a Chinese e-commerce company that provides consumer-to-consumer, business-to-consumer, and business-to-business sales services via web portals. It also provides electronic payment services, a shopping search engine, and data-centric cloud services.

WeChat is a free cross-platform and instant messaging service application developed by Tencent, Inc. It is one of the world's largest standalone messaging applications and currently has almost 900 million active users, including Dr. Chou.[3] Facebook is not allowed in China.

According to Dr. Chou, two major systems are running – Amazon in the West and Alibaba in the East. Both are trying to figure out how to expand to the rest of the world.

What's Next?

In addition to his consulting with large, existing corporations, Dr. Chou invests both time and money in small start-ups. Having begun his career with a start-up called Tandem Computers, he is an adherent to the concept of supporting upcoming technologies. He is the Chairman, IoT, at Alchemist Accelerator. The company provides seed funding for startups whose revenue comes from enterprises rather than consumers. As part of this company's activities, Dr. Chou has become acquainted with another company, UniquID, whose focus is on security without passwords. The technology is based on block chains, a technology Dr. Chou admits he is still trying to understand.

As for his belief in the need for technologists to continually reinvent themselves, Dr. Chou is now trying to determine his own next area of pursuit. As he told us, "All the stars are lined up for IoT." He recently cofounded a new company, Lecida, with one of his former Stanford students. Lecida is focused on machine learning for the Industrial Internet of Things, bringing artificial intelligence to deep learning for the IoT.

What's the next focus for Dr. Chou? Stay tuned. We thank him for his presentations at NSTBC and for the time he took for our interview.

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[3] See Alibaba, Tencent in Wikipedia.