Technology Dependencies

During the heyday of mainframe computing, users accessed computing power over low-speed facilities via so-called "dumb terminals." All of the processing power was concentrated in the mainframe, as were the applications. Furthermore, most of the applications were batch-oriented: enter a request for information and some amount of time later the information would be delivered. The concept of interactive, real-time computing had not yet arrived.

The 1980s saw the arrival of the personal computer, the local area network, and true desktop-resident applications. The centralized computing power of the mainframe went by the wayside, replaced by distributed computing resources that were either standalone or interconnected by a low-cost, high-speed Ethernet network.

As Moore's Law kicked in and processors became faster and cheaper and hard drive prices fell through the floor, computers became more capable. In parallel, the applications that ran on them became more complex and capable, soon requiring multiple megabytes of disk and RAM to execute properly.

It's interesting to note that the "capability bottleneck" that limited the capability of modern computing networks has been a moving target since the introduction of the capability in the 1960s. First, it was the computer resource, a single-thread device capable of supporting multiple users but only because of a front end that handled communications between the users and the mainframe in a high speed, round-robin fashion. Then, as mainframe technology advanced, the facility became the bottleneck. Users that were originally happy with 300 bps circuits began to complain when their circuits could not exceed 19.2 Kbps.

Next came the PC. Its limited RAM, hard drive space and CPU speed were governing factors, and when the LAN became a reality in the enterprise, contention across the shared medium became the bottleneck du jour.

If HP knew what HP knows, we'd be three times more profitable.

-- Lou Platt, HP

As PCs followed the mandates of Moore's Law and the facilities became faster in response to user demand, all eyes turned to the bloated application and system software as the next culprit. Microsoft Word went from requiring 640 KB on my Macintosh to requiring 600 MB on my PC. Yes, it has additional capabilities, but I don't use most of them.

As the applications became more complex and megabyte hungry, they also became significantly more capable. At the same time, it began to dawn on corporations that the information in their corporate databases could be harvested, resulting in customer knowledge of incalculable competitive value. Unfortunately, these applications (data mining, customer relationship management and enterprise resource planning, for example) require tremendous computer resources to analyze the data from which they generate management reports. They also require dedicated storage resources. And because they offer significant advantages for the enterprise, demand for these additional resources increased, resulting in a collection of "new" technologies:

storage area networks (SANs) for housing the data in dedicated storage arrays; high-speed interfaces for access to and transport of the data resources, such as Fibre Channel and Gigabit Ethernet; and a new model for computing called grid or utility computing. In utility computing, servers, mainframes and other powerful resources are interconnected via high-speed facilities, creating a virtual, global supercomputer. Users of machine cycles (the measurable resource generated by computers) simply pay for what they use, pulled from the grid. Computer cycles, then, become the next utility, along with water, natural gas, and electricity.

Meanwhile, another evolution is underway. Users are becoming more mobile, and the devices they use to access network resources are changing. They are becoming smaller, often rely on wireless connectivity, and may have fewer processing resources than a full-blown computer. In response, bellwether companies like Microsoft announce the age of network-based applications, an age in which users no longer own application software; they rent it. The applications reside in the network, not in the user's device, and are accessed via broadband wired or wireless facilities. And because of mobility, users must be able to access applications and their own data from any location – which means that enhanced signaling that goes well beyond call setup and delivery of supplementary services must be created and put into place.

This list of innovations, of course, goes on and on. We will see network management and OSS systems that not only monitor network resources, they also observe customer activities. We will see the addition of location-based services and the further integration of devices to create the all-in-one phone, PDA, wireless computer, MP3 player, voice and video recorder, and digital camera. We will see the development of powerful new applications based on the concept of network-based computing that allow users to take advantage of the grid/utility computing model, allowing them to have a supercomputer in their pocket and to access any resource at any time from any place on the planet. And, we will see the development of enterprise applications that improve the relationship between suppliers and consumers.

In many ways, this is a return to the days of 1970s service bureau computing – but with some remarkable differences. Today, we have broadband access, massive volumes of easily attainable (and creatable) digital content, immensely powerful components, innovative applications, and widely dispersed computer and network resources. We also have an intelligent, informed user community that drives the technology forward, constantly chanting the mantra that "technology without application is useless."

In with the old, out with the new!

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