



While it seems ridiculous to a modern viewer, the IBM System 360 was a much smaller version of a computer than what had existed prior to 1965.

■ IBM System 360 Announcement

Date: April 7, 1964

Authors: Thomas J. Watson, Jr. and IBM

Genre: Report

Summary Overview

Although early forms of modern computers had been around for a few decades, the ability to use them to assist governments or businesses had been quite limited. Hardware developments, such as the invention of the transistor, and software advances, such as the COBOL and FORTRAN programming languages, expanded the usefulness of computers. However, the machines based on System/360 created a new era in computing. This was not just an advertising gimmick. The advances made by IBM to create a family of computers, rather than individualized hardware/software configurations, revolutionized the field.

International Business Machines Corporation (IBM), under the leadership of Thomas J. Watson Jr., was one of the leaders in the development and production of computers during the 1950s. Understanding the limitations of the 1950s computers and business model, Watson pushed for innovations that would allow the company to dominate the computer market, and make more money, through the development of a computer operating system that could work on a range of computers. The IBM System/360 was the first such system, and it did allow IBM to dominate.

Defining Moment

The corporate announcement by IBM, regarding its new operating system, was the first step in marketing its new generation of computers. Although the transistor had been around since 1947, the creation of a chip holding an integrated circuit had only been developed in 1958. Using these two relatively new forms of “micro-electronic technology,” and creating upgraded transistors for the System/360, the new system was being touted as faster, and with more capabilities, than previous computers. Seeking corporate orders for the range of new computers using the System/360, the announcement was made to “100,000 businessmen.” The importance of the unveiling of this new product by IBM was demonstrated by the fact that the chairman of the board was part of the team that made the announcement.

While IBM had been one of several companies successful in selling computers in the 1950s (all computers available at that time would now be considered mainframe computers), Watson wanted to develop a technological advancement that would allow IBM to dominate the market. Until the introduction of System/360, each computer system that was developed was different from others. The peripheral equipment and program codes used by/in one computer would not necessarily work in another, similar computer. For example, with the IBM 1400 series of computers, the programming for the 1401 would not automatically work in a 1440. This meant that a change in systems involved not just the expense of the new hardware but also work on the program to make it compatible. This made advances in computer applications slow, and their adoption even slower. The family of computers based on System/360 was the

first for which the user could be assured that the software and peripheral devices (hardware) from one computer could work with another in the same series. A user could purchase equipment with a satisfactory level of computing power needed at the time, knowing that in the future an upgrade would not necessitate a total reworking of the business' software and peripherals. This opened the door to the computerization of many businesses, as the thousands of businessmen who heard the presentation realized the possibilities. System/360 allowed IBM to prosper as the dominate force in mainframe computing during the next few decades. The advancements represented by the System/360 made computers part of the general public's vision for the future. In fact, IBM had a futuristic pavilion at the 1964 New York World's Fair to showcase its products.

Author Biography

The corporate history of IBM began in 1911 with the merger of three companies (the origins of which extended back to the 1880s) to form the Computing-Tabulating-Recording Company. In 1914, Thomas Watson Sr. was hired to be the company's general manager, a move that shaped the years to come. In 1924, the company

was renamed International Business Machines Corporation, and greatly expanded its European operations. (One of its divisions had been using the IBM name for seven years.) What would generally be considered IBM's first computer, the Mark I (created in cooperation with Harvard University) began operations in 1944.

In 1952, Thomas Watson Jr. became the president of IBM, beginning a new generation of corporate leadership in a year that also saw a new emphasis for the company with the introduction of the IBM 701 computer, which allowed the movement of computers from scientific/mathematical venues into broader business applications. A decade later, System/360 was the crowning achievement in the initial phase of this movement.

Thomas J. Watson Jr. (1914–93), the second generation of his family to lead IBM, oversaw the movement of the corporation from a general business machine company to a dominant player in computers, a field that he and IBM helped create. He was educated at Brown University, worked for IBM, before and after serving in the Army Air Corp in World War II, and became the company's president in 1952, CEO in 1956, and chairman of the board in 1961. He retired in 1971, later serving as ambassador to the Soviet Union from 1979 to 1981.

HISTORICAL DOCUMENT: IBM System 360 Announcement

IBM Board Chairman Thomas J. Watson Jr. called the event the most important product announcement in the company's history.

The new equipment is known as the IBM System/360.

It combines microelectronic technology, which makes possible operating speeds measured in billionths of a second, with significant advances in the concepts of computer organization.

At a press conference at the company's Poughkeepsie facilities, Mr. Watson said:

"System/360 represents a sharp departure from concepts of the past in designing and building computers. It is the product of an international effort in IBM's laboratories and plants and is the first time IBM has redesigned the basic internal architecture

of its computers in a decade. The result will be more computer productivity at lower cost than ever before. This is the beginning of a new generation—not only of computers—but of their application in business, science and government.”

More than 100,000 businessmen in 165 American cities today attended meetings at which System/360 was announced.

Single system

System/360 is a single system spanning the performance range of virtually all current IBM computers—from the widely used 1401 to nearly twice that of the most powerful computer previously built by the company. It was developed to perform information handling jobs encompassing all types of applications.

System/360 includes in its central processors 19 combinations of graduated speed and memory capacity. Incorporated with these are more than 40 types of peripheral equipment which store information and enter it into and retrieve it from the computer. Built-in communications capability makes System/360 available to remote terminals, regardless of distance.

The equipment is supported by programs which enable System/360 to schedule its own activities for non-stop computing that makes most efficient use of system capabilities.

Internal processing power of the largest System/360 configuration is approximately 50 times greater than that of the smallest. The system's machine cycle time—basic pulse beat of a computer—ranges from one millionth-of-a-second to only 200 billionths-of-a-second.

System/360 core storage memory capacity ranges from 8,000 characters of information to more than 8,000,000. Information storage devices linked to the system can store additional billions of characters of data and make them available for processing at varying speeds, depending on need.

It is the balancing of these factors—all available within a single system using one set of programming instructions—that will make it possible for a user to select a configuration suited to his own requirements for both commercial and scientific computing. With the same type of input/output devices, a user can expand his System/360 to any point in its performance range, without reprogramming.

Computer advances

Some of the most significant advances represented by the new IBM System/360 include:

- **Solid Logic Technology.** Microelectronic circuits—product of IBM's Solid Logic Technology -- make up the system's basic componentry. System/360 is the first commercially available data processing system whose design is based on the use of microminiaturized computer circuits.

Called logic circuits because they carry and control the electrical impulses which represent information within a computer, these tiny devices operate at speeds ranging from 300 down to six billionths-of-a-second. Transistors and diodes mounted on the circuits are only 28 thousandths-of-an-inch square and are protected by a film of glass 60 millionths-of-an-inch thick.

- **Memory power.** A hierarchy of memories within System/360 makes information in core storage available at varying speeds. Small local store memories operate in as little as 200 billionths-of-a-second. Control memories operate in as little as 250 billionths-of-a-second. Powerful main memories—containing up to 524,000 characters of information—range from 2.5 millionths-of-a-second down to one millionth-of-a-second.

A key development provides 8,000,000 characters in bulk core storage—each character available in eight millionths-of-a-second and each at the direct command of a computer programmer. This is over sixty times more directly addressable characters than were previously available in IBM computers. The computer's historic limitations on memory size are overcome by this development.

- **Application versatility.** The traditional distinction between computers for commercial and scientific use is eliminated in System/360. Users will be able to process both business and scientific problems, or a combination of the two, with equal effectiveness. This versatility is reinforced by the variety of peripheral equipment which is part of the system.
- **Communications capability.** Built into System/360 is the ability to respond to inquiries and messages from remote locations at any time. Hundreds of terminal devices can communicate simultaneously with a system while the computer continues to process the basic job on which it is working.

System/360 monthly rentals will range from \$2,700 for a basic configuration to \$115,000 for a typical large multisystem configuration. Comparable purchase prices range from \$133,000 to \$5,500,000.

Deliveries of the small configurations of System/360 are scheduled to begin in the third quarter of 1965. Deliveries of the largest configurations are scheduled to begin in the first quarter of 1966.

GLOSSARY

1401: IBM 1401 computer, the first mass-produced computer sold from 1959 to 1971 at about the same price as the cheapest System/360

characters of information: basically, what is now called a byte

Document Analysis

The announcement of the creation of the IBM System/360 computers was said to be “the most important product announcement” ever for IBM. In this case, the hype surrounding the product launch was true. IBM’s president, Thomas J. Watson Jr., offered the world a gigantic leap forward in computing and a new vision of what would be possible through the use of computers. The redesign of the internal architecture for this series of computers made possible these great strides. With the System/360 having “19 combinations of graduated speed and memory capacity,” which included the use of five different processors, it offered potential clients a larger range of choice than any other family of computers available at that time. The “40 types of peripheral equipment” available to fill out the system were also designed to serve a variety of client needs. Although the advertised cost was very reasonable for its time, the success of System/360 made IBM the dominate computer company, and a profitable one as well.

As the first series of computers that only used solid state technology, speed and reliability were guaranteed. In addition, its “solid logic technology” used newly upgraded transistors and other chips for even greater speed. The description of its speed as doing operations in a few hundred billionths of a second, was hard for most readers to imagine in 1964. This speed, in conjunction with greater storage capability, allowed the company to offer a “single system spanning the performance of virtually all current IBM computers.” In addition to that, System/360 machines

could be linked together for instantaneous communication, as well as be linked remotely to peripheral devices for greater usefulness.

Just as the announcement was fairly straightforward and simple in its outline, the possible impacts from adopting computers in this series were just as direct. The announcement promised major advances in computing capabilities for a wide range of organizations, at a lower cost than would have been the case for comparable systems, if they had existed. The new processors, high clock speed, and memory options available, would make the System/360 a viable candidate for any computer application. The range of machines from the basic system to that which was fifty times faster, as well as the memory options ranging from 8,000 to 8,000,000 characters, offered business and governmental entities a way to find a computer that would meet their needs and budgets. This, combined with one type of operating system for all models, allowed one program to be used on all computers within the System/360 family, thereby reducing software expenses. This was a major step forward for most companies. Those who used more than one computer in their business, or who thought they might upgrade in the future, understood the savings in time and money that this offered. It made many more willing to take the leap into becoming a computerized company.

Computers, including the System/360, of this era used magnetic tapes for permanent long-term storage. The fact that it had “sixty times more” internal storage than previous computers built by IBM, not only supported the increased speed, but created the opportunity for a greater

range of applications. It could work both in the laboratory and office. Thus, this announcement of the new family of computers was directed not only at current computer users but at those who in the past had not found computers necessary or capable of doing the work they needed done, at least not at a reasonable cost. Although it would be a year and a half until delivery was guaranteed for any model in this series, many executives who saw the presentation, or read this announcement, were willing to accept IBM's offer to upgrade their computers.

Essential Themes

This announcement from IBM was obviously sent out to encourage businesses and government agencies to buy an IBM System/360 computer. The information contained in this “advertisement” was enticing. The advantages of this system over previous computers from any manufacturer were so great that it resulted in an astounding (for the time) 1,000 orders the very day of the announcement, and another thousand within the next four months. It was a very successful launch for a product not yet in production. (According to some IBM employees, part of the display seen on the day of the launch was made of wood because they had not produced enough prototypes for the desired visual image.) One point of pride for IBM was that the System/360 was to be used by National Aeronautics and Space Administration (NASA) as an integral part of the Apollo program.

Within the announcement itself, the key idea for the businessperson was that this was a true family of computers. It allowed organizations to upgrade their systems more efficiently and at a much lower cost than previously was the case. As an IBM spokesperson said to the British Broadcasting Corporation (BBC), prior to the System/360 “businesses bought a computer, wrote programs for it, and then when it got too old or slow they threw it away and started again

from scratch.” Being able to use the same program on all levels of IBM System/360 computers made this product much more appealing. Moreover, the “application versatility” of the design meant that businesses did not have to purchase different computers for different purposes; they could use the same machine in different applications.

The technological breakthroughs that the System/360 represented were also major themes in this announcement. Although slow and cumbersome by twenty-first century standards, especially for a mainframe, the System/360 was based on cutting-edge hardware and innovative design. Using only transistors and circuit boards—“solid logic technology”—meant that faster operations and longer-term reliability were possible. In addition, the computers had the ability to be used in a remote location. Although there was no internet, of course, or wireless connections, System/360 computers could talk to each other and be operated remotely, as long as they were wired for it. The same option was not available in the previous generation of computers.

The end result was a new generation of computing, a new means of using computers to allow businesses to operate more efficiently, and a new and lucrative era for IBM.

—Donald A. Watt, PhD

Bibliography and Additional Reading

- Amdahl, G.M., G.A. Blaauw, and F.P. Brooks, Jr. “Architecture of the IBM System/360.” *IBM Journal*, April 1964. New York: IBM, 1964. Web. 23 Oct. 2020.
- Cortada, James W. “Building the System/360 Mainframe Nearly Destroyed IBM.” *IEEE Spectrum*. New York: IEEE Spectrum, 2019. Web. 23 Oct. 2020.

Cortada, James W. *IBM: The Rise and Fall and Reinvention of a Global Icon*. (History of Computing.) Cambridge, MA: MIT Press, 2019.

Four Peaks Technology. "IBM 360 System." *Early Computer Central*. Scottsdale AZ: Four Peaks Technology, 2015. Web. 23 Oct. 2020.

Liu, Beyang. "What We Can Learn from the IBM System/360, the First Modular Gen-

eral-Purpose Computer." *Sourcegraph*. San Francisco: Sourcegraph, 2016. Web. 23 Oct. 2020.

Pugh, Emerson W., Lyle R. Johnson, John H. Palmer, and William Aspray, ed. *IBM's 360 and Early 370 Systems*. (History of Computing.) Cambridge, MA: MIT Press, 2003.