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# System/390 Division

# Year 2000: A Perspective

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If your computer system or its applications use two digits to represent the year, and many do, the change from dates of 1999 to 2000 and beyond may skew the accuracy of the data created by every application from word processors to databases.

If it is not addressed quickly, this date change could affect calculations, comparisons, and data sorting in applications from the desktop on up to the largest server. The price tag for potential errors could be high and could have a major impact on commercial, industrial, educational and governmental operations of all types.

This is a challenge for a world economy that depends on information technology. It can exist in any level of hardware or software, in the microcode, in new and old applications, in files and databases, and on any computing platform.

Many computer operating systems and applications use a standard two-digit format to generate a date. A computer would write January 1, 1996 as 01/01/96. January 1, 1999 would be 01/01/99. When the year rolls over to 2000, computers that use the two-digit format might write 01/01/00. And therein lies the challenge.

Many programs calculate the length of time between dates by subtracting two-digit years from each other. For example, a bank computer does this simple calculation when it figures the principal and interest on a 30-year mortgage. There is no concern if the mortgage was issued in 1965 and paid in full in 1995. But if the mortgage is issued today and the application uses the two-digit date format, it may well read the year as “00” and be unable to do the calculation or may produce incorrect results. The application may assume the year is 1900 and return an error message.

The same error may occur with invoices, payrolls, credit card transactions, bill payments, inventory systems, auto loans, databases that sort by year, and many other computer operations upon which daily business depends.

Why didn't the Information Technology industry foresee from the beginning that two-digit dates would be a concern and use four digits to represent the year?

In the 1960s and 1970s, when many computer programs were created, programmers had incentives to abbreviate dates and save data entry time. Computer memory and storage were costly and in short supply. Saving several characters in every database with millions of records was worth it. Early programming languages and standards didn't offer application programming interfaces (APIs) for four-digit years. And even if they were aware of the pitfall, programmers may have assumed that the applications they were writing would be scrapped long before they could cause concerns. Remarkably, many of those early programs are still in use, often as the core of company information systems, and the data is still in the same format.

A few industries have been working on the two-digit date issue since 1970. That is when bank application and insurance programs first began to have difficulties with interest table calculations and amortization.

Why have many companies waited to grapple with the Year 2000 date challenge? Often, date fields cannot be easily expanded to include 4-digit years. Nor can computers be globally instructed to insert digits “one” and “nine” or “two” and “zero” into existing 2-digit years, because some of these years may represent different centuries.

The task of addressing this challenge is daunting. Organizations need to analyze, possibly change, and test many hundreds of applications consisting of millions of lines of codes, all in a coordinated effort. The GartnerGroup, which consults on information technology, estimates that a medium-sized company with 8,000 programs will spend between $3.6 and $4.2 million to repair “date-challenged” software.

IBM has taken a lead in working with others in the Information Technology industry to develop methodologies and solutions for the Year 2000. IBM has published a detailed guide for information system managers, programmers, consultants, and computer users in general who will be dealing with Year 2000 conversions. Titled “The Year 2000 and 2-Digit Dates: A Guide for Planning and Implementation,” it is available at no charge on the Web through the Software Group Home Page at http://www.software.ibm.com. A hardcopy of this guide can be ordered for a small handling fee by calling 1-800-879-2755 (US only) or 1-404-238-1234.

We have become so dependent on technology that no one—individual or large corporation—can afford the consequences of not making the investment in a Year 2000 project. The authors of *The Year 2000 and 2-Digit Dates: A Guide for Planning and Implementation* (referred to as the IBM Planning Guide) stress that solving the two-digit date challenge is not technically difficult. The project may be large, but like most tasks, it can be managed with careful planning. The guide offers clear instructions on how to plan and test systems and how to reformat them. IBM and other developers also have a wide array of solutions, tools, services and support.

By year-end 1996, IBM intends to have the most recent versions of its software products able to work with dates from the next century. Hardware timers for many IBM platforms, including S/390, AS/400, RISC System/6000, and IBM Personal Systems using PowerPC technology are not affected by the end-of-century problem. All of IBM′s personal systems and IBM PC Servers introduced after January 1, 1996, will automatically update the century. Earlier IBM PC Servers and IBM Personal Systems need to be tested because there are different BIOS, or basic input/output system, handling the timing routine. For some, users may need to enter a command or use a special utility.

The IBM Planning Guide has simple steps to test whether a personal computer will update to the new century. The IBM Planning Guide also shows how to test the personal computer′s operating system and time-sensitive programs.

IBM also has a range of tools to help its customers make the transition to the year 2000.

There are tools to support different programming languages such as COBOL, PL/I and REXX.

There are also special test systems for System/390 customers such as VM guest, PC Server 500 System/390, and RISC System/6000 with Server-on-Board (R/390).

For companies seeking additional services or help, IBM′s Integrated System Solutions Corporation has a broad range of offerings. Called TRANSFORMATION 2000, this approach can help enterprises address the year 2000 challenge and, at the same time, help to make their information systems more efficient.

Companies often need to analyze their entire technology infrastructure in detail to get ready for the year 2000. TRANSFORMATION 2000 offerings include assessing a company′s application portfolio, developing a strategy, planning and implementing it. IBM also will test application modifications after the changes are made.

The year 2000 is approaching quickly. Now is the time to update programs and systems to make the change. For more information, contact an IBM marketing representative.

## Trademarks

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