Year 2000 - you can not be late!

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Abstract

The so called *Year 2000 Problem* was noticed some 20 years ago, but no one took it seriously then. It's only last few years we seem to be doing something to face it. However, even having filtered out all the media hype about it, the matter remains as it is - year 2000 will arrive on time and we all will be a subject to that unique test. Seeing it from a darker side one can quote Bruce K Brickman, one of many consultants on the matter. In a report for Datapro Information Services he writes : *At or a second after 12:00 midnight on January 1, 2000, hundreds of thousands of computers throughout the world will be unable to boot or accurately process information. Databases will be corrupted and records will become unreliable. Businesses and governments will be in turmoil. Employees will not be paid. Inventory won't be correctly aged, insurance policies will either not be issued or issued at the wrong rates, etc. Economic consequences will be calamitous.*[1]

Does the future look that gloomy or is it only kind of cyber scarecrow? The text below tries to delve deeper into the matter and to relate it to conditions prevailing in East European IT.

Author of these words lectures and writes about *Year 2000 Problem* at numerous places. He welcomes invitations to speak and also any comments and ideas on the matter. He can be reached at the address specified above, by letter, phone, fax and e-mail. Every message will be answered!

Background

What is really causing all that havoc in the first place? It results from much of the software currently used not being able to handle the transition from year 1999 to 2000. Most application programs use two digits to indicate a year. According to this convention the day 1/1/00 will follow after 31/12/99. Immediate effect of that will be erroneous comparison result, placing the older records before their younger database-mates. This will happen simply because most programs will expand the date 1/1/00 as 1/1/1900 and not 1/1/2000. To make the picture complete (and complicated even more) one must also say - the year 2000 is also a leap year.

Some authors see the initial source of the problem in an attempt of programmers of the 60's and 70's saving the amount of disc space used because it was so expensive. Others think those writing programs at that time never believed those programs were to stay in use for so long.[2] No one however seems to have noticed it

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also resulted from simply transferring into computer programs the common practice of indicating the year with two digits, which is used in notes, letters, documents, newspapers and common language. To support that concept one can quote Mark Sokol, former vice-president of Computer Associates Inc., who said in an interview for Datapro Information Services in October 1996 : *"... this problem exists in all of computing : software, hardware, mainframe, midrange, desktop. It is a pervasive, ubiquitous problem. It has no platform-centricity."*[3]

This opinion is shared by *Year 2000 Task Force* set up by Information Technology Association of America (ITAA). In it's special report issued on the occasion one reads : *"The problem exists for mainframe, midrange and PC computers alike; the two-digit year field can be found in microcode, operating systems, software compilers, applications, queries, procedures, screens, data bases, and data"*. Kevin Shick, former director of research company Gartner Group, and now vice president in Viasoft company says *"A medium-sized company has approximately 8,000 programs that support business operations, comprising about 12 million lines of source code with date referenced in every 50-th line. That means to solve the year 2000 problem requires 240 thousand of lines of source code to be identified, analysed and - possibly - corrected."* According to *Gartner Group* such a operation is to cost 30-40 US cents per line. The *Byte* monthly from February 1996, quotes Software Productivity Group, which estimates this cost as $1-1.5 per line.[4]

The above mentioned *Year 2000 Task Force* predicts that millennium systems conversions could cost $600 billion world-wide. *Computer Horizons*, one of many US companies offering Year 2000 help, advise and services, estimates United States alone will soon be short of about 40 thousand programmers to do the job[5], and those organisations which start looking for help at the end of 1997 or later, can never find it. And what is really menacing - the advent of year 2000 can not be postponed. As Allan Graham, senior vice president of Comdisco Disaster Recovery Services Inc., has pointed out : *"This is the first information technology program in history that we can't be late on".*[6]

Above opinion has been repeated by independent consultant and year 2000 world guru - *Peter de Jager*. In his testimony *"Unjustified Optimism"* given before the Science Subcommittee of House of Representatives in May 1996 he indicated four reasons for which any year 2000 project is completely different to any IT projects known so far. These were :

- the deadline cannot be missed - when the year 2000 arrives, the programs we used yesterday will be useless,
- December 31, 1999 will arrive on time,
- it bears no relationship to the size of the task - regardless of whether you have a single program to fix, or 75000 programs to fix, the deadline is the same,
- we share the same deadline - what will organisations do to make sure they do not miss a deadline they cannot afford to miss? They will raid other organisations for the best, most skilled, most respected.

As of this testimony for many it's already to late. There are less than 140 weekends[7] left before December 31, 1998. You should be complete by then so you can allocate all of 1999 to test hundreds of thousands of error prone changes you have introduced into your systems.[8]

Press release issued in April 1996 by Coopers & Lybrand auditors named the problem as „Millennium Bug" which won't yield to any quick fixes, repair kits or anti-virus diskettes.[9]

According to ISO standards, most computer magnetic tapes use two-digit year in their expiry dates. These dates are further used to qualify those tapes for re-use. That will result in all tapes written in 21st century being immediately marked as free for use, since their expiry date year („00") will be expanded with „19" in front, giving „1900" as a year when the tape was written. The same applies to most banking cards, where also two-digit expiry date year is used.

In American banks they think new data exchange agreements will take 2-3 years to be made. Only after having completed that, they will be able to start the proper design and programming work.[10]

There are numerous programs where over years values of 00 and 99 have been used to indicate states or conditions and not any real values. That situation was very common for instance in Poland, before the monetary reform of 1990s. The data fields used for hundredth parts of currency lost their meaning because of inflation and gradually were utilised to store various things, not having anything in common with their original functions. This had then an enormous negative impact on all those systems after a new currency has been introduced.

The year 2000 problem can reach even those hiding in such a neutral and seemingly safe areas like computer aided design and scientific calculations. This is because some software packages can have hidden software licence dates and can possibly refuse to work in next century.[11]

What to do then to avoid pitfall?

All that above does not mean the users are left alone to help themselves with their problems. To the contrary - trouble for some means business for others. October 1995 issue of *LAN Times* monthly says : *„The situation is creating a gold rush for consultants. One example is Data Dimensions Inc. in Bellevue, Washington, which exists solely to consult on year 2000 problems. The 80-person company expects to double in size in the next 12 months".*[12]

The Datapro Information Services report quotes names and addresses of sixteen companies providing services of that kind.[13] Next several dozen of addresses one can find on the Internet web pages. An ample list prepared by ITAA is there among others.[14] Many of those companies can be guessed by names : *Millennium Update*

Service, Transition 2000, Signature 2000, Trans Millennium Services, Enterprise 2000, Century Conversion Software Complex, Year 2000 TransFormation.

The biggest computer companies offer extensive help (for money, of course) to their customers to cope with the matter. One of these - ACT Kindle, specialising in banking applications, ensures its flagship product *Bankmaster* has been already made to stand any year 2000 challenge.[15]

The world giant Microsoft has issued the statement they will not make any of their current software year 2000 compliant, however all their products brought to market after 1997, will be year 2000-proof.

The offers of all those companies are quite distinct from each other. One can find there various philosophies, different analytical methods and also some automated tools. Some of them apply more than one technique.

Report of Datapro Information Services written by Peter Saldtas[16] advises to begin with forming an enterprise-wide *Millennium Committee* members of which should include top management representatives, chief information officer, computer security director and internal audit manager. According to that report, the basic methodology should embrace the following stages :

1. Inventory of application software assets
2. Discovery and analysis
3. Finalise strategy, priorities and plans
4. Implementation
5. Testing
6. Year 2000 Simulation Testing
7. Installation

One could think stage one seems to be obsolete since any organisation should always have a list of software currently used. In reality however usually the opposite is true : reorganisations, processes of re-engineering, mergers and acquisitions, and - above all - reluctance to document result in those lists being far from accurate, if they exist at all.

The objective of the second stage is to analyse each application (seperately), data, procedures, instructions and manuals, and then estimate the cost expected. This can be then compared with cost of migrating to client/server architecture (if finishing it well before year 2000 is at all feasible). Some authors propose even the use of so called *Cyclomatic Complexity Metrics* developed by T. J. McCabe[17] to evaluate the expected difficulty of year 2000 software transition.

Phase three consists of four steps. First of them is to bring a detail specification and to establish priorities for conversion of applications, files, databases, manuals etc. Second step is to define strategy which best suites each applications. The author of

Datapro Report emphasises on importance of converting important, mission-critical systems in-house, while those less important parts can be outsourced to outside companies. Only really large, global organisations can try to do the whole task themselves. Third step of this stage assumes establishing tight control on planning and supervising the project. Finally - in fourth step - one is to define the means for managing the project.

Fourth phase deals with the implementation issues - of how to apply the modifications to programs affected by the problem. Even having most sophisticated, automated tools, some changes will still have to be applied manually, says the author.

Testing, which is the subject of stages five and six can account for between 30 to 50 % of the total development effort. That is more than enough to have it well planned and prepared, and to give it most careful consideration. Users are advised to use test data rich in dates and to make any possible attempt to crash the system while testing. Having all the program modules past the integration test (using regression testing when needed) one can proceed with year 2000 simulation testing. The author emphasises on its importance : „Simulation testing should be considered the most important test in the entire testing process because its success assures that the year 2000 conversion has been successfully completed. This effort takes a minimum of three months."

Phase seven, which is installation phase, is to move everything produced so far into production. This needs to be carried out smoothly without any brakes or interruptions to current service.

One can easily see from above the whole thing will last long, it will not be easy, and definitely it will not be cheap to complete.

Slightly different approach is represented by Viasoft company offering the tools named Estimate 2000.[18] They advise the users to concentrate on costs involved. According to Viasoft the whole project should be well planned and each problem area discovered should have the financial means directly allocated to clear it. All changes to the company applications should be controlled in this way on both - departmental and enterprise level.

The German company Software AG offers special tools called INSIGHT 2000. They assume three stages while coping with year 2000 problem : inventory of programs, analysis and intervention. For January 1st., 1997 they planned to open special Millennium Center in Denver, Colorado.[19]

Similar product of Computer Associates Inc. has been named CA Discovery 2000.

Lutheran Brotherhood, one of the US insurance and financial services companies, has set up the Year 2000 Compliance project and hired Computer Horizons

company to do the job. Ed Stang, vice-president of Computer Horizons says, they are to use their own *Signature 2000* program which embraces 27 years of their experience. They are to analyse more than 15 million lines of source code in 35,000 modules for this project alone.

In Poland

While the matter remains very hot abroad it is almost non-existent in Poland, where „we will see" approach prevails. Many seem to be believing it can only affect legacy systems designed many years ago for mainframe computers. The press articles are rare and sensational.[20] Most PC users are aware of the problem and convinced they are absolutely free of any risk.

After a period of some stagnation the number of large computer installations in Poland is on the rise again. Most of them are used in big organisations, like banks, industry, commerce, telecommunications, electricity, statistics and state administration. They usually use operating systems, tools, compilers and programs initially designed many years ago, and there is no single reason they should be treated differently to their counterparts in other countries. Many of those computers have been purchased in the late eighties as second hand equipment, together with software without any manufacturer's license . That software has not been maintained for years and its users can not expect any support for it while in trouble.

Many computer programs used in Poland underwent so called localisation, what usually meant translating the messages and screens into Polish. All users of such programs will not be able to make any year 2000 changes without extensive help from companies involved in localisation process and also of owners of the rights.

Many organisations still do run and rely on programs designed and written by companies which do not exist any longer. What's more - the source code for those programs disappeared together with those companies and can not be achieved by any means today.

There is an old Polish proverb saying „Poles are always wise after the damage has been done". It seams this can turn true once again, with the doomsday only little more than two and half years away.

Summary

There are not only computers nor data processing systems to be affected by the year 2000 problem. Our homes, workplaces, cars and utilities are more and more saturated with computer control systems of various nature. There are specialised computers controlling weekly heating cycles in homes; we have them in telephone exchanges, microwave ovens, refrigerators, washing machines, lifts, video recorders, radios, TV sets, and almost everywhere. And they all are also vulnerable to century change problem. February this year, a spokeswoman of British Telecom

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said in an interview for BBC Television, BT did not guarantee any telephone to work after midnight 31 December 1999; what's more, she said the current BT's billing systems will charge 100 years minus duration of the call for any call which would have started before midnight on that day and ended just after midnight.

Final measure of failure or success of any approach to year 2000 problem will be to face the reality. For many this will be the first (and for some also the last) occasion for such a trial, since to avoid disturbances to their current production applications, they would have never tested them before with the date set forward. Many authors say the year 2000 changes will affect the quality of programs in negative way, despite enormous amounts of work and money pumped into them. All those changes will not improve programs in any way, creating many possible damages to them.

Because time runs out, it will not be possible to re-design any systems towards object technology or client-server architecture. That would only raise the risk involved by causing further delays.

The author of these words, feeling sorry for painting all that with rather dark colours, would like however to wish a *Happy New Year 2000!* to anyone who managed to reach to the end of above text.

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The problems with date are nothing new to the mankind. To be exact - these are the problems with proper calculation of the time. All that results from how long it takes for the Earth to move around the Sun (now 365.242199 days, however the older we get, the shorter is from one Christmas to the next). The Romans thought there were only 354 days in an annus. Thus by the time Julius Caesar reformed the calendar year in year 46 BC to 365 ^{21}days, with an extra day every 4th year, it was already two months out of step with the solar year. This has resulted in year 46 BC being increased to 445 days! When pope Gregory XIII reformed calendar once again the difference between the solar and calendar years had accumulated to 11 days. So 15th October 1582 followed after 4th October. He also decreed that every hundredth year is a leap year only when it divides by 400. That means year 2000 is a leap year! The astronomers, however, use the Julian calendar, named so after father Julius of its inventor Joseph Scaliger. We now have Julian year 6710. The Jews have year 5757 now and will celebrate their new year 5758 on midnight 1 October 1997. The followers of Islam live currently in year 1418 which begun on 8th May. The only nation not facing any millennium problem are the Japanese. They measure the passing of the years according to how long their present emperor has been on the throne. They are now in 9th year of Heisei period and it is very unlikely for their calendar ever reaching more than two digits.

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