

Recommendations on the Y2K problem

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The Y2K problem is already showing itself in many companies, and this is only just the beginning. The aim of this article the is to offer a number of technical recommendations in order to try to avoid, or at least minimise, the effects of the change in millennium. In reality this article is a summary of part of a document entitled "The **Behaviour of Computer** Systems with the Arrival of the Year 2000: The Y2K **Problem and its Solutions**" which is available on **MAPFRE RE's web site at:** http://www.mapfre.com/2000.

Computer hardware is based on processors, and these have a microprogram written in machine language or "firmware" which is saved in non-erasable (it is not erased after switching off the computer) internal memory. This micro-program is called the BIOS, and carries out a number of routines involving dates. It is possible that these routines will not be able to handle dates AFTER 1999. and therefore after December 31, 1999 the BIOS will cause the processor either not to work at all, to malfunction or simply to assume that the date is 1900.

It is important to note that not only processors have a BIOS; many other computer components may have their own BIOS in order to allow them to work in a specific manner (disk controller cards, modems, network cards, etc.).

The following steps should be carried out with regard to the hardware and the operating system:

1. Make an inventory of existing computers — remember that not all computers have the physical shape of a computer. The first recommendation with respect to this inventory is to replace all computers manufactured earlier than 1995 with new equipment. Independently of this, the supplier of each piece of equipment should be asked to provide a certificate stating that it is year 2000 compliant.

2. The following actions should be carried out in each piece of hardware on the inventory, first at setup level and then at operating system level (if the piece of hardware does not have setup, then the action should only be carried out on an operating system level): a) First change the date, verifying that it will accept dates higher than 2000 (that it will allow this number to be entered in the date option of setup), and then that the equipment will boot with the new date and that it works correctly.

b) At setup level, change the date and time to 31-12-1999, 23:55, boot the machine and wait to see if the date and time changes to 01-01-2000, 00:01, verify that this change has also occurred correctly at setup level.

c) At setup level, change the date and time to 31-12-1999, 23:55, switch off the machine, wait, and then boot the computer again. Verify that the change has been accepted correctly and that after booting the system the time and date is 01-1-2000, 00:01 or greater, also at setup level.

d) Change the date to check that it will accept 29-02-2000 (that it will allow this figure to be entered into the date option of setup), and then check that the hardware boots with the new date, and that it works correctly.

e) Change the date and time at setup level to 28-02-2000, 23:55, reboot the computer and wait to see that the date and time changes correctly to 29-02-2000, 00:01, check that this change has also occurred at setup level.

f) Change the date and time at setup level to 28-02-2000, 23:55, switch off the computer, wait, and then reboot, check that the change has occurred correctly and that on booting the system the date is 29-02-2000, 00:01 or greater, also at setup level.

3. Carry out an inventory of each computer's peripherals and ancillary equipment and determine



whether their behaviour depends on the date (paying special attention to those components which have their own BIOS, as these may have their own setup). Knowing the functioning of each component at the present date, the equipment's date is changed (setup), it is then rebooted. Checks are made to ensure that each of the components on the inventory functions in exactly the same way as previously.

4. If there have been any failures when carrying out the above steps, then the manufacturer or supplier of components which have not functioned correctly should be contacted in order to request a new BIOS. If, for some reason, it is foreseen that an updated BIOS will not be available before 31-12-1999, then, depending on the criticality of the system, the equipment may have to be replaced.

The supplier of new purchases should give a written guarantee that the system is year 2000 compliant, and in each case this should be independently verified before accepting delivery of equipment.

With regard to **programs**, these may either be "off the shelf" or "tailor made".

For off the shelf programs, the best solution is to acquire an updated version, or to replace it with another program with similar functionality which is year 2000 compliant. In general, the supplier will already have solved the problem in an updated version and the cost of upgrading the program is always lower than the costs which are incurred whilst trying to solve the problem.

«Tailor made» programs usually cause the greatest problems, as there tend to be many of them, they may be very large and they may be used in different systems etc. The solution depends on the computing and time resources which are available (in general, assets which are in scarce supply).

There are however various ways of solving the problem:

3. Replacing tailor made applications with off the shelf packages.

4. Increasing the date to four digits.

5. Interpretation of dates.

6. Windows techniques.

7. Compression systems.

There is no one perfect solution, and which one is adopted depends on the environment, programs, quantity of data, human resources etc. In many cases it is necessary to adopt a hybrid solution.

Greater details on these techniques are available at: http://www. mapfrere.com/2000.

With respect to the **data**, depending on the technique used for the programs, the structure of the data should be changed, without forgetting about legacy data, back-ups etc. It is however normal to carry this out simultaneously with the transformation of programs.

Lastly, with regard to **communi**cations, apart from the hardware which has already been examined, it is possible that the system under study communicates electronically with other companies (via EDI or similar) and may therefore send and/ or receive data to/from other external applications. In these cases, it is necessary above all to reach an agreement with these other companies so that the solution which is adopted for the format of the data is the same. It is of little use if one company uses a compression system, another an interpretation system another a windows system etc.

It is true that to achieve agreement amongst various companies with the different I. T. systems can be a rather difficult task, the best solution would be for the exchange of data to be done using an established format (preferably data expansion), for each company to use the techniques which it wishes and to construct routines which isolate the applications from the data to be exchanged, which would in turn be converted in both directions according to need.