

Performance Comparison Macro: *The Value of Integration*

Executive Summary

The Product Marketing Group has said for some time that system performance is a function of more than clock speed alone. This demonstration is an attempt to prove that point in more graphic terms. A folder containing an Excel macro has been included on your CD-ROM. When that macro is installed and run on a 16 MHz Macintosh IICx and a 33 MHz Compaq 386/33, you will find that the "slower" Macintosh completes the exact same tasks in less time.

Background

Purpose:

This demonstration is intended to show the importance of system balance in a product's design. It is an attempt to demonstrate that clock speed is not the sole determinant of system performance. System performance is a function of many factors, including but not limited to: clock speed, video input/output (I/O), disk I/O, system software design, the integration of the graphic interface and system software, and peripheral I/O (e.g. mouse, keyboard, etc.).

Apple emphasizes balance in the design of its Macintosh computers while most MS-DOS hardware firms focus almost exclusively on clock speed. As a result, we find that running the *exact same application*, a Macintosh IIcx (clock speed 16MHz) finishes faster than a 33MHz Compaq 386/33.

Demo Design:

Users do not spend all of their time doing "recalcs" and huge re-formats of their data. We believe that much of the user's time is spent doing tasks that test other aspects of system performance as well: file access, graphic I/O, and data input. This demo is intended to recreate such a computing session.

The demo consists of a Microsoft Excel macro and related spreadsheets. When the macro is started (see "Setup" below), it runs through a series of operations intended to recreate a typical user's computing session. These include:

- Opening files
- Editing files
- Saving files
- Cutting and pasting text, numbers, and graphics
- Updating graphic images
- Recalculating floating-point and integer formulae

In order to make the performance difference visible, the macro puts up a simulated clock face. This "clock" displays the elapsed time. When the macro is finished, the computer will beep and the clock will stop, displaying the total elapsed time. The Macintosh IIcx will finish in about 30 seconds. The Compaq 386/33 will take somewhere between 32 and 36 seconds.

What is even more remarkable about this result is the fact that both machines are running a Microsoft application: Excel. Because Microsoft also wrote Window/386 and MS-DOS, one would assume that they have had every opportunity to tune performance of the MS-DOS version of Excel. Despite this fact, the demo runs faster on a Macintosh.

The Message:

This demonstration shows that system performance is more than a grab-bag of arcane "speed and feed" measurements. Real performance results from a

delicate balancing act among the various components of a computer system's hardware (microprocessor, I/O structure, memory architecture), software (operating system, imaging model, file system), and the user interface. Apple spends a great deal of its design energy trying to find that balance and as a result, Macintosh computers are much faster than their clock speeds might suggest.

Caveats:

- We do **not** want to make the statement that Macintoshes are always faster than MS-DOS machines; they are not. If this demonstration macro did nothing but recalculate net present values, we would almost certainly lose.
- We have not made a scientific attempt to replicate a typical computer session. We have simply included a variety of operations that we believe reflect average usage. One might argue that the macro is heavy on graphics or heavy on file access, but it is difficult to determine what the correct balance of operations should be.
- This demo is run on *standard* Compaq and Macintosh machines. We have not yet run the demo on a Compaq 386/33 with an 80387 math co-processor installed. Although the Macintosh does have a math co-processor on board (the Motorola 68882), this is standard equipment on a Mac. The 80387 is an \$800 option for Compaq machines.

Setup

Hardware Requirements:

Because setting up and using MS-DOS machines can be a complex task, if you are not familiar with MS-DOS we recommend that you involve an SE in the setup procedure.

Set up your machines as follows:

- Macintosh IIx or IIcx with...
 - Color Monitor (Monitor Control Panel set to 16 colors)
 - At least 2MB of RAM
 - Control Panel: RAM cache set to ON at 512K
 - MultiFinder activated
 - Excel 2.2 installed
 - Set "Application Memory Size" to 2048

- A Compaq 386/33 with...
 - VGA or Advanced Graphics Color monitor installed
 - 2MB of RAM
 - Microsoft Mouse installed
 - A 3.5" floppy disk drive (or access to one!)
 - A Hard Disk (ours had 80MB, but you don't need that much)
 - DOS 3.1 (or higher) installed (our tests were run under 4.0)
 - Windows/386 installed in directory "C:\WIN386"
 - Excel 2.1 installed in directory "C:\EXCEL"
 - AUTOEXEC.BAT file should contain the following PATH command:
 - "PATH C:\WIN386;C:\EXCEL"
 - If you have installed Windows or Excel in different directories from those listed above, list them in the path command.
 - Include any other paths that your system requires.
 - CONFIG.SYS file should contain:
 - "files=20"
 - "buffers=20"
 - "DEVICE=C:\SMARTDRV.SYS 512"

- The configurations listed above are designed to make this as fair a comparison as possible.
 - Both machines are running 16 colors.
 - Both machines have 2MB of RAM.
 - Both machines are running a graphical user interface.
 - Both machines are using a 512K disk cache.
 - Both machines are running the most recent version of Excel (as of 10/1/89).

Setting up the Demo Software:

The demo has been delivered to you as a folder on a Macintosh-readable CD-ROM. Before use, an MS-DOS version of the files must be created and copied to the Compaq. The Macintosh files must also be copied to the hard disk of the IIX or IIcx.

Copying the Demo to Your Macintosh IIX or IIcx:

The "Compare1" demo is located in a folder on the CD-ROM we have sent you. Copy it to the hard disk of your IIX or IIcx as you would copy any other folder from a CD-ROM.

Copying the Demo to Your Compaq 386/33:

1. Boot up your IIX or IIcx.
2. If it is not already installed, copy the "Apple File Exchange" folder to your IIX or IIcx hard disk.
3. Open "Apple File Exchange".
4. Insert an unformatted, high-density 3.5" floppy disk into the Macintosh. After a pause, a dialog box will appear asking whether you wish to initialize the disk.
5. Choose "MS-DOS" from the list of disk formats and click on "Initialize". Initialization will take a minute or so...
6. When the Mac asks for a name for the disk, type in "Compare1" and press RETURN. You will then return to the "Apple File Exchange" dialog box with a list of folders and files from your Mac's desktop on the left, and the "Compare1" disk on the right.
7. From the list on the left side of the dialog box, choose the folder "Compare1" by clicking it once. The ">>Translate>>" button should become active at this point.
8. Click the ">>Translate>>" button. The files from the folder "Compare1" will be copied over to the MS-DOS formatted disk "Compare1".
9. When the copying process is complete, click the "Eject" button on the bottom right of the dialog box to eject your new MS-DOS copy of the "Compare1" demo. You may return to the Finder on your Macintosh by choosing "Quit" from the "File" menu on the menu bar.
10. Boot up your Compaq 386/33 under DOS.
11. When the DOS prompt "C:" appears, create a new directory for the "Compare1" demo by typing "mkdir\compare1" and pressing ENTER.
12. Move into the "Compare1" directory by typing "cd\compare1" and pressing ENTER.
13. Insert the newly-created MS-DOS disk version of "Compare1" into the 3.5" floppy drive of your Compaq 386. [I will assume that this disk drive is drive "A:" on your machine. If it is not, substitute "B:" (or whatever drive assignment you have) for "A:" wherever it appears in the following instructions.]
14. Switch to the floppy drive by typing "A:" and pressing ENTER.
15. Type "cd\Compare1" and press ENTER to change to the "Compare1" directory.
16. Type "Dir" and press ENTER to see the list of files. You should have at least the

following files:

- CLICKME.XLM
- CLOCK.XLC
- CLOCK2.XLC
- RENTBUY.XLS
- SOMEDATA.XLS

17. Type "Copy *.* C:\Compare1" and press ENTER to copy these files to the hard disk of your Compaq 386. Note that you must type a space both after the word "Copy" and before the phrase "C:\Compare1".
18. Now switch back over to the hard disk by typing "C:" and pressing ENTER. The demo is now installed and ready to run on your Compaq 386/33 hard disk, but the graphics need to be cleaned up before the first real demo can be run...
19. Type "WIN386 EXCEL CLICKME.XLM" and press ENTER to load the demo. This will take a few seconds. The message "File error: data may have been lost" will appear 3 times. Ignore it and click on the "OK" button each time. Don't worry, no data was really lost!
20. When the "Ready...?" dialog box appears, click on "CANCEL" to stop the macro and edit the spreadsheets.
21. Neaten up the "RENTBUY.XLS" window by dragging its right edge over to the middle of the screen so that it takes up the left half of the screen. Column "F" should be visible, but not column "G". Click on cell "F12" when you are happy with the display. Then save the "RENTBUY" worksheet by choosing "Save" from the "File" menu above.
22. Now click on the pie chart window ("CLOCK.XLC") on the right. Drag it by its title bar into the middle of the screen. Then narrow the window by dragging its right edge in a bit. Make the window fit on the right side of the screen so it just touches the "RENTBUY" window. Then move the title text around until it is neat. When you are happy with it, save it by choosing "Save" from the "File" menu. We still have to neaten up 2 more files before we can start...
23. Open "SOMEDATA.XLS" by choosing "Open" from the "File" menu and double-clicking on "SOMEDATA.XLS". When it appears, move its right edge over to the left until it is even with the right edge of "RENTBUY.XLS". Then save it by choosing "Save" from the "File" menu.
24. Now open "CLOCK2.XLC" by choosing "Open" from the "File" menu and double-clicking on "CLOCK2.XLC". You will get the same "File error:" message you got before; ignore it and click "OK". Then neaten up "CLOCK2.XLC" by positioning it over top of "SOMEDATA.XLS". Then save it by choosing "Save" from the "File" menu.
25. Now close all of the files except "CLICKME.XLM" by double-clicking on the close boxes of each window. When you are asked to save changes, say "No" each time.
26. When "CLICKME.XLM" is the only window left, click on cell "A1" in that window. Then save "CLICKME.XLM" by choosing "Save" from the "File" menu. You are finished with the setup.
26. Get back to DOS by choosing "Exit" from the "File" menus. You need to do this twice: once to get out of Excel and once to get out of Windows. Now you should be back at the DOS prompt and ready to go...

Running the Demo Software

To run the demo, it is recommended that you position your Macintosh IIx or IIcx and your Compaq 386/33 side by side. Make sure both machines are configured as described above (under "Hardware Requirements"). Boot up both machines.

- **On the Mac IIx or IIcx:**

Once the machine has booted up, simply open the "Compare1" folder and double-click on the icon titled "CLICKME.XLM". The demo should load and set itself up automatically. A dialog box with the question "Ready...?" will appear.

- **On the Compaq 386/33:**

Switch to the directory containing the demo by typing "cd\compare1" and pressing ENTER at the DOS prompt.

Load the demo by typing "WIN386 EXCEL CLICKME.XLM" and pressing ENTER. The demo should load and set itself up automatically. A dialog box with the question "Ready...?" will appear.

- To start the demo, press simultaneously the "RETURN" key on the Macintosh and the "ENTER" key on the Compaq. Press the keys only once. The demo will begin running on both machines.

You *could* start the demo by using the mouse on each machine, but the "RETURN" and "ENTER" keys work just as well and avoid the problem of clicking outside the START button.

If you chose instead the "CANCEL" button from the "Ready...?" dialog box, the macro will stop and you will be able to edit the demo spreadsheets. This is not recommended. If you do choose CANCEL accidentally and want to start over, QUIT out of Excel, do *not* save changes when asked to do so, and re-launch the demo.

When the demo is over, the machines will beep and a dialog box with the question "What next?" will appear. The elapsed time will be visible above the pie chart/"clock face" on the right side of the screen.

- To stabilize results, we recommend that you run through the demo once on both machines before showing it to your audience. Performance can vary by a few seconds on each machine, and running the demo once seems to settle things down.
- To run the demo again, choose "Setup Again" from the "What next?" dialog box (by clicking on "Setup Again" or simply pressing "RETURN"). If you wish instead to return to the Finder or DOS, choose "Quit".

By choosing "Setup Again", you are asking the computer to close all files, and set up again at "Ready...?" prompt. You may then run the demo again.

Final Comments:

We have run this demo many times on both a Ilcx and a Compaq 386/33. The Ilcx takes from 27 to 35 seconds to finish. The Compaq takes from 40 to 50 seconds (*this has changed now that we have added titles!*) to finish. If your Compaq takes much longer than this, it may not be configured correctly and you are not making a fair comparison. In that case, you should reinstall Windows and Excel.

If you have problems or questions, you may link me, Ted Barnett, at BARNETT.T.

Good luck!