Welcome to the Windows User Benchmarks. These benchmarks have been devised to test all aspects of your Windows system and provide the most accurate real world Windows tests available. This document details the exact tests carried out by the program - for a full tutorial on running the benchmarks, see the March 1993 issue of Windows User magazine.

The Windows User Benchmarks were designed by Mark Stephens and Sean Geer, and written by Mark Stephens. Additional input from Glyn Moody, Mike Hardaker and Andrew Pickering.

The Benchmark tests

The Windows User Benchmark tests are grouped into five categories: processor, memory, display, disk and general Windows tests. Each component set of tests is built from between ten and forty individual tests.

Our prime purpose in devising the Windows User Benchmarks has been to create an overall set of tests which mimic the operation of "real" Windows programs as closely as possible.

Obviously all Windows programs use a different subset of Windows' features, so our research has investigated the performance of a wide range of common Windows programs. Application *profiling* was used to determine how much of its time an application spent calling Windows functions, and which were the functions most commonly used.

After extensive research we have created a set of tests which should apply in the majority of cases. All tests are not weighted equally - fine tuning was achieved by measuring both objective and subjective speeds amongst a group of the most common Windows applications. For instance, floating point performance is not important under Windows for most applications other than for spreadsheets, statistics and computer aided design, so it is weighted correspondingly in the processor tests. However, this component alone will mean that a 486DX will benchmark faster than a 486SX of the same clock speed.

You may also find that you wish to ignore some individual components of the benchmarks if you have a single use in mind, or if you only use a small number of Windows programs. For instance, if you never run DOS applications under Windows then the final general Windows tests would be of minor importance, since a large part of these involve testing DOS applications running in windowed and full screen DOS sessions.

The individual tests are described below.

Processor tests

The processor tests performed range from simple movements between registers and memory locations, to mathematical operations with both integers and floating point numbers. Both "standard" and IEEE standard floating point representations are used, to simulate both general floating point applications and statistical packages. If your system does not have a maths co-processor then the floating point calculations will be performed by the WIN87EM.DLL library which will be much slower.

In addition to these "raw" operations, the processor tests also perform function calls to both near and far functions, simulating the normal operation of an application program. These tests also analyse how well the processor uses the stack for passing parameters and creating local function variables.

Memory tests

The memory tests analyse the two types of memory available under Windows. Local memory is available from the data segment of the application program. The maximum size of local memory that can be allocated is 64K less the stack size, so local memory is often used for storing temporary data. As such, local memory allocation speed does not have a huge bearing on the overall speed of most applications, particularly outside the initialisation stages.

Of more importance is global memory. This refers to the global memory pool maintained by Windows for the use of all applications. Programs use global memory for storing their data

and as a workspace for involved calculations such as those involved in image manipulation. The benchmarks test both the speed of access of global memory, and the speed at which global memory blocks can be increased and decreased in size.

Display tests

The display is one of the most important components of your Windows system. Virtually all Windows programs use the display in some fashion: from just putting up a dialog box to drawing complex graphics.

The Windows User Benchmarks test the display in a variety of ways. Firstly a number of tests using bitmaps are performed. These include painting the bitmap onto the screen, stretching it and changing its number of colours. Line drawing functions are also tested by drawing a metafile consisting of straight and curved lines. The other important low level graphics function in Windows is that of drawing rectangles. The benchmarks use a variety of different techniques (including ExtTextOut) to draw multi-coloured rectangles on the display. These are then scrolled back and forth to test scrolling speed.

The final tests display text in a variety of fonts. This should be performed with TrueType active, although it will work with Adobe Type Manager or just the plain bitmapped fonts.

Hard disk tests

The hard disk tests simulate the loading and saving of data files, the loading of program segments and the creation of temporary files. The standard Windows mechanism (unbuffered access) for file handling is used on a variety of file sizes.

In our tests we found that hard disk performance is greatly affected by the amount of free space on your drive. With under 1Mb of free space, the speed index will start to decrease with decreasing space. Therefore you should always run the benchmarks with at least 2Mb of free space on the drive to which your TEMP variable points.

Windows tests

Windows tests covers a multitude of general Windows functions. Firstly, dialog display and window creation are tested by showing a dialog containing all the standard controls. (The 3-D nature of these controls do not have a significant impact on overall performance.)

Secondly the performance of a DOS session is tested - in both windowed and full screen DOS modes. This tests both the performance of the system in invoking a DOS session, and the video display speed under DOS.

Finally the Windows tests check the performance of the key Windows functions which were highlighted by our profiling process as being the most significant.

WARNING

Every possible effort has been made to ensure that this software will run correctly, but Reed Business Publishing cannot guarantee that the software will run and can accept no responsiblity for any errors or for any consequences of any actions taken or not taken as a result of using this software. Users are strongly advised to make appropriate backups of their system and applications software before attempting to use the Windows User Benchmarks. This software is for use in the UK only.