Contents

Bench32 Application

This Application is a benchmark program that   attempts to test the total system performance on machines that have 486 DX-33 processors and higher.   This program was not intended to run on any CPU without a math coprocessor.   The benchmarks attempt to use all of the relevant functionality that is present in Win32 applications like multithreading, 2-D, 3-D graphics, cached, uncached disk performance, etc.   It even supports drag and drop file management and internet mail.   It tests CPU performance by running a variety of CPU intensive <u>tests</u> that are relevant to many of the algorithms programs will use to do various mathematical and analytical tasks that test how well a microprocessor can run these tasks.   The software was made for long, accurate, testing and also for quick analysis.   This version was compiled using Borland ®   C++ version 4.51 with optimization switches turned on.   This version was made to run under both Microsoft Windows NT ® 3.5x and above, and on Microsoft Windows 95 ® .   It will not run the Win32s patch for Microsoft Windows 3.11 (nor OS/2 for that matter).   Please contact me, Edmond Underwood, if you have any questions.   E-mail: underwoe@Colorado.Edu.

Running Bench32

To run Bench32, simply choose the New Test item under the File Menu. The test will ensue from there.

I.   CPU Test

There are many individual tests under 10 main categories:

1.)   Hashing/Sorting - Loads a hashing table and performs relevant sorting algorithms on the table.

2.)   BitWise - Performs bit operations including xor, or, and, or, and shifts. These are the operations that all microprocessors use to manipulate data.

3.)   Flops - A typical flops test that is recorded in flops/second, which tests how fast data is exchanged and manipulated in the FPU.

4.)   Integration - A Fourier Integration which solves equations of the form $\int \cos(ax+b)\cos \omega \; xdx$, where a and b are the constants of integration.

5.)   Transformation - A Fourier Transformation algorithm which solves for phase relationships in spectral analysis.

6.)   Linear Pointer arithmetic - Simple pointer arithmetic of scalar quantities. This test is extremely recursive.

7.)   Modular algorithms - based on code that was posted on-line.   It uses modular mathematics to basically put a lot of load onto the CPU.

8.)   Zip/Unzip algorithm - This algorithm does 4 things:
   (a.) It compressed data using the popular zip algorithm.
   (b.) It encrypts data using the zcrypt algorithm.
   (c.) It the decompresses data using the popular unzip algorithm.
   (d.) Finally, it de-encrypts the data using the zcrypt algorithm.

9.)   Fuzzy Learning Algorithms - Typical neural network pattern recognition. This net has 5 layers and 25 nodes.   There are also 2 hidden layers in this network.

10.)   Non-Linear Matrix Operations - An Eigensystem that implements non-linear, partial differential equations.   This is very FPU intensive.

II.   Disk Test

This test attempts to test disk performance in two separate ways:

1.) First, Bench32 tests the cached disk performance.   This one is the most relevant since it is likely that your programs will be using cached file I/O. The test does read, write, and random read, write, and search operations.

2.) Second, Bench32 tests the unchached disk performance.   This will occur when you run out of cache while doing file I/O, or when a program specifically uses uncached file I/O (like a low level disk utility, mission critical application, etc.).   This test is much slower than the cached test.   The test does the same read, write, and random read, write, and search operations as the cached test.

Note: Take the results you get from this test with a grain of salt.   This test tries as hard as it can to give a justifiable result for actual hard disk performance, but this of course varies due to the size of the data being written and the size of each read/write operation.   This test tries a sustained transfer rate of 8k per transfer using dynamic block sizes starting from 100 bytes.   The total score is the important number for comparisons.

III.   Video Test

There are several tests which are used to test your video speed: (higher resolution = more accurate test; test will fail without a minimum of 1024x768 monitor resolution).   Also be sure and TURN OFF ALL SCREEN SAVERS before running this test.

1.)   Figure Drawing Test: This test draws 3 types of figures: boxes, ellipses, and pies.

2.)   Font Scroll Test: This test draws 4 different fonts of various sizes and features (e.g. italics, underlined, bold, etc.).   Colors are also used randomly.

3.)   Line/Arc drawing test: This test draws various types of arcs/lines: Bezier curves, lines, polylines, polygons, arcs, pies, chords, inflated rectangles, and polypolylines.   Scoring can vary slightly here as each figure has its own thread.

4.)   BMP drawing test: This test draws various bitmaps and sometimes runs them around the screen.

5.)   Window Invocation test: This test invokes 100 windows, updates them, redraws them, then destroys them.

6.)   3-D Render test: This test uses OpenGL libraries and is best suited for graphics cards that can render OpenGL graphics.

For more information on how to run the tests, see <u>Using the Menu Items</u>

Using the Menu Items

These are the instructions for using the menu items.

New Test -Runs Bench32.
Open - Opens a Bench32 database file.
Close - Closes any Open files.
Save - Saves the current test results or file.
Save As - Does the same as Save.
Mail - Mails the test results via sockets transfer (internet IP).
Print - Print's the current results.
Printer Setup - For Choosing a different printer other than the default.
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<u>Preferences</u>- This option allows you to change the settings of Bench32.
Result Comparisons - A table of results to compare to your own.
<u>Configuration</u>- This option allows you to configure your machine data (e.g.
processor speed, amount of video ram, etc.).

Run All Tests - this is automatically checked when you start Bench32.   It will
run the entire suite of tests.
Run CPU Test - check this item to run only the CPU Test.
Run Disk Test - check this item to run only the Disk Test.
Run Video Test - check this item to run only the Video Test.
Test Drives - a popup menu for your system hard disks.   This will
dynamically popup menus for the current systems drives.

Check EACH drive that you want tested before performing All Tests or the
Disk Test.   Your primary drive will be the default.   (Also, Bench32 will only
use the root directory for now, and not your home directory).   You need write
permission to the root directory of the drive you are testing to run Bench32
Disk Test.
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Index - Brings you to the Help Menu.
Using Help - Does the same.
About - Gives the signature of the application.

Interpreting the Scores

The scores are reported in percentage-type format.   The scores are based on comparison to a typical workstation type PC, a Micron PowerStation P90 with a 512 kb cache running Windows NT 3.51.   This station is given the score of 100 as a reference.   Anything above 100 is better and anything below 100 is worse.   110 would then be 10% faster than the Micron P90 while 30 would be 70% lower.   This test does not calculate decimal values, so scores less than 100% slower (386 speed) will probably fail the test.   This benchmark wasnt developed for systems that low.   It is mostly for high end (486-DX and above) systems that can handle an advanced OS like Windows NT ® or Windows 95 ®.

The Disk Test can vary due to the amount of system cache.   Windows NT uses a dynamic caching algorithm that designates the amount of cache that the system uses in proportion to the amount of ram the system has.   Therefore, increasing ram increasing disk performance.   The Disk Test is no exception and can be a good barometer for how much memory you need to have good disk performance.   NT users should run this test a few times to get a good result as the system cache size will change between tests.   Scores again are gathered in the percentage format (100% is the reference EIDE Seagate Decathlon - Mode 3 PIO).   Since the reference machine uses PIO, the amount of processor clock you have available can affect your overall score.   To alleviate some of this hassle, I also included the actual overall throughput in Megabytes/sec.   A dynamic block size algorithm was used for variance, since it isnt likely that every program uses the same block size scheme to read and write data.   Therefore, the overall Megabytes/sec. gives a reasonable overall disk performance score for any system.

The Video Test also uses the scoring scheme to score individual video test results.   With the score, the actual data drawn per second is included (for reference).   This test can vary as resolutions decrease even though Bench32 goes out of its way to make sure that the tests transcend video resolutions.   Run the long test to improve accuracy.   Important: Turn off ALL screen savers before running Bench32 to preserve the integrity of the test.

Make sure that there are no other programs that are using precious clock cycles and GDI.   This will surely give you lower scores than you could attain.

Bench32 scores should be run, for complete accuracy, with only low priority background services or VxDs (do not run Diskkeeper ® for NT).   Scores will improve with the amount of CPU clock and memory that Bench32 has available.

Help on Preferences

SMTP Server: The name of the Server that can deliver your mail.   This must include the full name of the server.   i.e. plato.indiana.edu.

E-mail address: This is your E-mail address that the SMTP Server can use when looking up your name.   i.e. donb@plato.indiana.edu.

Multithread on: Set this value to yes for SMP.   It will allow the program to set tasks onto different CPU's.   Set this value to off for single execution threads.   Results vary slightly between the two on single CPU tests, but Bench32 detects which test is being done and gives the proper comparison table on completion.

Long test on: Set this value to yes for a statistically correct test.   Set this value to no to get a one run test that may have inconsistent results but will give you an idea of what the system can do.   The short test is best for quick comparisons, such as those you might do at an exposition or a computer store.   The long test is for professional analysis.

The signature file box will allow you to add a signature to your e-mail. Just make a signature file from using your favorite word processor (I use my Netscape .sig file and this seems to work fine) and save it as an ASCII file. Push the browse button to allow you to browse through your systems directories and choose the appropriate signature file.

The OK button will save the values you entered, while Cancel will not save any newly formed information.   The Help button will get you to this screen.

Help on Mail

From: This field is the e-mail name that the SMTP server needs to run.   This value will default to the last value given to the registry.

To: This field is the receivers address, or the address of the person to whom you are mailing.   This field needs to be a full address or the SMTP server will default to a local address.   i.e.johnny@dent.cosmic.com.

Cc: This field is an extra receivers address.   Use it to mail to another person if along with the To: receivers address for mailing to multiple persons.

Subject: This field gives the receiver a subject for your message.

The large text box will automatically put the results in the box for you.   You can then add whatever message you want to the text.   This box automatically contains your signature file also if you specified one in the preferences section.

The aAddress book allows you to add e-mail addresses on the fly.

The OK button will send the message, and Cancel will cancel not send the message.   Help will get you this screen.

Help With Configuration

This box is to allow you to easily send mail and benchmark files without the hassle of giving configuration details every time. These values will automatically be added to your benchmark data including files and e-mail. Below it is described how to fill in the blanks appropriately.

Computer Manufacturer: Simply, who makes your computer. Valid answers are Acer, Dell, Micron, Gateway, Packard Bell, Compaq, Hewlett Packard, Digital (DEC), or anybody else who makes computers.

Computer Make: This option is for the actual model of your computer. For instance, if you have a Dell XPS P90c then your make is XPS P90c. If you have a Gateway 200 P5-120 Family PC, then your make is P5-120 Family PC. If you have a Toshiba T2110CS, then your make is T2110CS.

Video Adapter: This field describes your video card in your PC. For instance, if you have an MGA Millennium, then put in Matrox Millennium. If you have a Diamond Speedstar 64, then put in Diamond Speedstar 64.

Video Ram: This field allows you to specify the amount of Video ram in your system. This amount is typically in megabytes (will need 1 megabyte to pass the video test). For instance, a Diamond 64 Video 2 MB VRAM should have 2 in its Video Ram field.

Video Ram options (DRAM, VRAM, WRAM): Choose the appropriate Video ram type for your video card. If you do not know, check your systems documentation.

Processor: This field will be setup automatically for you.

CPU Cache size: This field allows you to specify the cache size of your CPU. If you do not know this one, check your systems documentation. The value is in kilobytes. A Micron Millinium comes with 256 kbs of cache. So 256 would go into the CPU Cache size field for that machine.

CPU Speed: This field is for the speed of your microprocessor. The speed is reported in Megahertz. Please check your documentation for this one if you are unsure as it is very important. Overclockers, please specify the overclocked CPU speed.

Physical Ram: This field is for the physical ram in your system. Set this in Megabytes to the physical storage of your systems ram. In other words, how much memory do you have in your system in the form of SIMMs/SIPPs?

This does not include virtual memory.   Please specify the parameter in megabytes.

Operating System: This field is for your systems operating system (OS). Bench32 will only work on Windows NT 3.5x or Windows 95, so your system is running either one of those OSs.   Simply type in the OS that you are using.

Physical Disk section:

Manufacturer/Make: This field is for the manufacturer of your hard drive. For instance, if you have a Seagate Decathlon 0850x, put in Seagate Decathlon 0850x.   If you have a Conner FilePro 1000A, then put in Conner FilePro 1000A.

The next group of fields specifies very specific data for your hard drive that is needed to correctly score your system.   If you have a Fast SCSI II hard drive and adapter, then check the radio button Fast SCSI II.   If you have an EIDE (mode 3)-Fast ATA-1 drive in your system, then check that radio button. EIDE (mode 3)and Fast ATA-1 are literally synonymous with DMA Mutipart-I. Also, make sure that you distinguish your EIDE disk as either mode 3 or mode 4.   Mode 3 is for transfer rates between 11 and 13 megabytes per second by manufacturers rating.   Mode 4 is for transfer rates between 16 and 17 megabytes per second by the manufacturers rating.   Fast/Wide SCSI II does 20 MB/s by manufactures rating and Ultra SCSI is at 40 MB/s.

The OK button will save all of your configured data.   The Cancel button will ignore anything you typed in.   The Help button gets you this help page.

Help With Address Book

Add User dialog box.

Add Address: Single click on this button to get the <u>add user</u> dialog box. This will allow you to add an e-mail address to the list box.   Nicknames can also be added.

Remove Address: Just single click on one of the addresses in the list box and press this button to remove it.   Its that simple.

The OK button saves the currently selected address and puts it in the To: field in the Mail dialog box.

The Cancel button ignores any chosen addresses.

The Help button brings up this screen.

Help With Add User

This dialog box allows you to specify both the actual e-mail address and an appropriate nick name for that user.

The <u>E-mail Address</u>:   field is for the users e-mail address.   For Instance, my e-mail address is: underwoe@Colorado.Edu.   You need to specify the full address in order for mail to be sent properly.

The <u>Nickname</u>:   field allows you to specify an appropriate nickname for the e-mail user so that you can have a name that is easily distinguished since billg@microsoft.com isnt exactly informative.   Bill Gates could be put into this field to remember exactly who that person is.

The OK button again saves the data.   The Cancel button ignores any values entered and the Help button gets you this help screen.