

# Operation System Homework #1: System Structure

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## Enviroment

Host Operation System: Microsoft Windows7 x64

Guset Operation System: Microsoft Windows7 x64

## CPU benchmark (by [NovaBench 3.0.4](#))

Host	Guest
<div><b>Processor:</b> Intel Core i5 M 480 2.67GHz @ 2.7 GHz <b>Instructions:</b> MMX SSE SSE2 SSE3 <b>Memory:</b> 4GB System RAM <b>Graphics:</b> Intel(R) HD Graphics</div>	<div><b>Processor:</b> Intel Core i5 M 480 2.67GHz @ 2.6 GHz <b>Instructions:</b> MMX SSE SSE2 SSE3 <b>Memory:</b> 1GB System RAM <b>Graphics:</b> VirtualBox Graphics Adapter for Windows Vista and 7</div>
<div><b>NovaBench Score: 564</b></div> <div>2013/10/27 09:43:35 Microsoft Windows 7 64-bit Intel Core i5 M 480 2.67GHz @ 2667 MHz Graphics Card: Intel(R) HD Graphics <b>3765 MB System RAM (Score: 114)</b> - RAM Speed: 4898 MB/s <b>CPU Tests (Score: 391)</b> - Floating Point Operations/Second: 102880896 - Integer Operations/Second: 315254868 - MD5 Hashes Generated/Second: 887573 <b>Graphics Tests (Score: 32)</b> - 3D Frames Per Second: 110 <b>Hardware Tests (Score: 27)</b> - Primary Partition Capacity: 290 GB - Drive Write Speed: 83 MB/s</div>	<div><b>NovaBench Score: 250</b></div> <div>2013/10/27 09:41:35 Microsoft Windows 7 Home Premium Intel Core i5 M 480 2.67GHz @ 2633 MHz Graphics Card: VirtualBox Graphics Adapter for Windows Vista and 7 <b>1024 MB System RAM (Score: 92)</b> - RAM Speed: 4433 MB/s <b>CPU Tests (Score: 151)</b> - Floating Point Operations/Second: 25659096 - Integer Operations/Second: 77956992 - MD5 Hashes Generated/Second: 835302 <b>Graphics Tests (Score: 0)</b> - 3D Frames Per Second: 0 <b>Hardware Tests (Score: 7)</b> - Primary Partition Capacity: 25 GB - Drive Write Speed: 61 MB/s</div>

Integer and floating-point operations done in host OS are much faster than in guest OS, but the test results of md5 algorithm between host OS and guest OS is relatively close.

## Memory benchmark (by [MaxxMEM2 1.99](#))

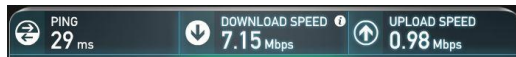
Host	Guest
<div><b>MaxxMEM2- PreView</b> File Options Submit Screenshot Comparisons Help <b>CPU:</b> Intel Core i5 M 480, 2926 MHz [NB: ** MHz] <b>OS:</b> Win 7 Home Premium, SP1, 64bit, Desktop system <b>MEMORY1:</b> DDR3-532 (1064) MHz, Single-Channel (7-7-7-20-1T) <b>MEMORY2:</b> G.Skill (F3-8500CL7-4GBSQ), Total 4096 MByte Start benchmark Benchd in: 00h 00m 36s 668ms 500ms Displayed in: 00h 00m 00s 060ms 515ms <b>Memory-Copy: 6694 MByte/sec.</b> <b>Memory-Read: 7254 MByte/sec.</b> <b>Memory-Write: 5397 MByte/sec.</b> Reached memory score: 6.33 GB/sec. <b>Memory-Latency: 112.2 ns</b> Reached latency score: 112.2 ns v1.9927/10/2013 - 19:38:5 www.MaxxPI.net N ?M.Bicak 2012</div>	<div><b>MaxxMEM2- PreView</b> File Options Submit Screenshot Comparisons Help <b>CPU:</b> Intel Core i5 M 480, 3002 MHz [NB: ** MHz] <b>OS:</b> Win 7 Home Premium, SP1, 64bit, Desktop system <b>MEMORY1:</b> FPG-1000 (1000) MHz, **-Channel (**_**_**_**_***) <b>MEMORY2:</b> **, **, Total 1024 MByte Start benchmark Benchd in: 00h 00m 22s 922ms 000ms Displayed in: 00h 00m 00s 037ms 846ms <b>Memory-Copy: 5009 MByte/sec.</b> <b>Memory-Read: 5144 MByte/sec.</b> <b>Memory-Write: 4946 MByte/sec.</b> Reached memory score: 5.05 GB/sec. <b>Memory-Latency: 116.4 ns</b> Reached latency score: 116.4 ns v1.99 27/10/2013 - 18:05:18 www.MaxxPI.net N ?M.Bicak 2012</div>

Although RAMs' storage in host OS is four times larger than guest OS, the results of memory-copy/-read/-write speed are not so different.

Since the virtualization technology Second Level Address Translation (e.x. Intel Extended Page Table) translates guest linear addresses into host physical addresses without the Shadow Page Table done by VM which may reduce RAM efficiency.

### Network Benchmark (by [SPEEDTEST](#))

Host



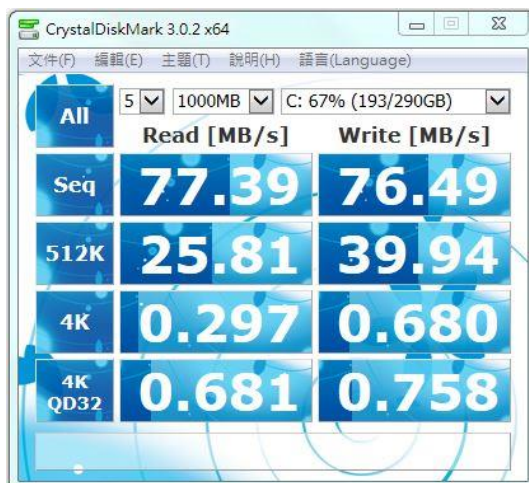
Guest



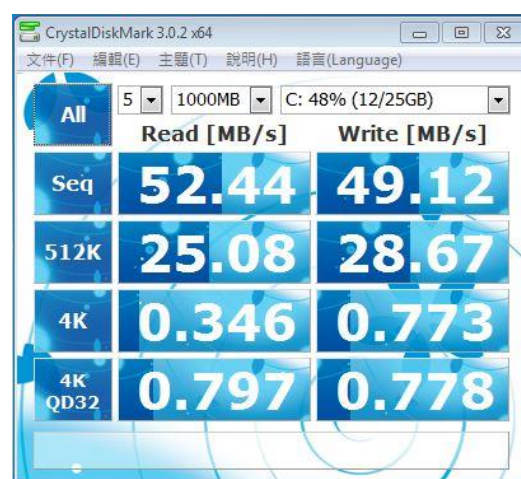
Network speed of guest OS is slower than host OS since it needs to go through VM's NAT.

### Disk Benchmark (by [CrystalDiskMark 3.0.2](#))

Host



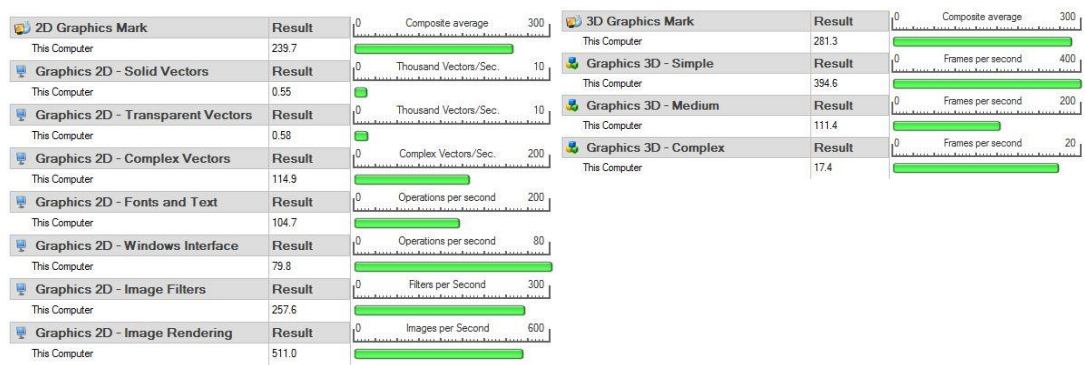
Guest



When the transited data is not so big, the disk I/O performance of host OS and guest OS are quite similar. Since VM can capture the disk I/O requests from the guest, then temporary stored small data in memory, which is much faster than disk.

### GPU Benchmark (by [Performace Test 7.0](#))

Host



GPU virtualization is still not stable in Oracle VM VirtualBox, even the lightweighted GPU testing will cause the guest OS rebooting without warning. In fact, during the installation of Guest Additions, it specifies that Direct3D support for guest is experimental.