

ASSEMBLE AND CONFIGURE A SERVER CLASS COMPUTER

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1. Introduction

We will be building a latest 4th Generation Intel i7 Haswell Architecture based computer which uses the 22nm process. The motherboard will be based out on the LGA 1150 architecture. Along with it liquid cooling will be used which is a highly effective method of removing excess heat. It is important since overclocking will lead to excessive heat generation and can result in damage to internal delicate parts of the microprocessor or motherboard. An SSD will be used which results in high I/O data transfer speeds. This computer will be used for high graphics design and as a media server.



2. Computer Parts to be installed

Parts:

Processor (1)	Intel Core i7-4770K 3.5GHz Quad-Core Processor
CPU Cooler (2)	Corsair H80i 77.0 CFM Liquid CPU Cooler
Motherboard (3)	Asus Z87-PRO ATX LGA1150 Motherboard
Memory (4)	Corsair Vengeance 16GB (2 x 8GB) DDR3-1600 Memory
Primary Storage (5)	Samsung 840 Series 250GB 2.5" Solid State Disk
Secondary Storage (6)	Western Digital Caviar Black 1TB 3.5" 7200RPM Internal Hard Drive
Case (7)	Corsair 500R Black ATX Mid Tower Case
Power Supply (8)	Corsair CX 600W 80 PLUS Bronze Certified ATX12V Power Supply
Optical Drive (9)	LG WH14NS40 Blu-Ray/DVD/CD Writer
Dedicated Graphics (10)	NVIDIA GeForce GT440

3. Step by Step installation of hardware

- a) Installed the processor on the motherboard. The processor was the most delicate part and was to be handled carefully.



- b) Mounted the motherboard onto the case. The motherboard was a full size ATX Motherboard so it had to mount specifically on the ATX screws on the case and the other screws had to be removed.

- c) Mounted the Storage and Optical Drives. The SSD was going to serve as the main OS and apps storage device and the hard drive as the secondary storage device.

1 Preparing the Case for assembly of the motherboard

- d) Installed Power Supply. This was a modular power supply so we had no worry of too many cables

- e) Installed the RAM. This was the easiest part of the build process. Just pushing the memory into the slots and hearing the click sounds



2 Screwing in the Power Supply

- f) Mounted CPU Cooling. This was quite a long task. First we tried assembling the CPU Cooling fans and radiator at the top but the motherboard came in the way. So, we removed the default CPU fan at the back and placed the fans and radiator in such a way, that it would expel air from the system. We



3 Deciding the airflow of the fan. A small arrow on the side of the fan indicated the direction of airflow.

decided the airflow of the system be from bottom to top as there were dust filters at the bottom and the system wouldn't get dusty too easily. We specially did this because Dust is a major problem in Delhi and Gurgaon.

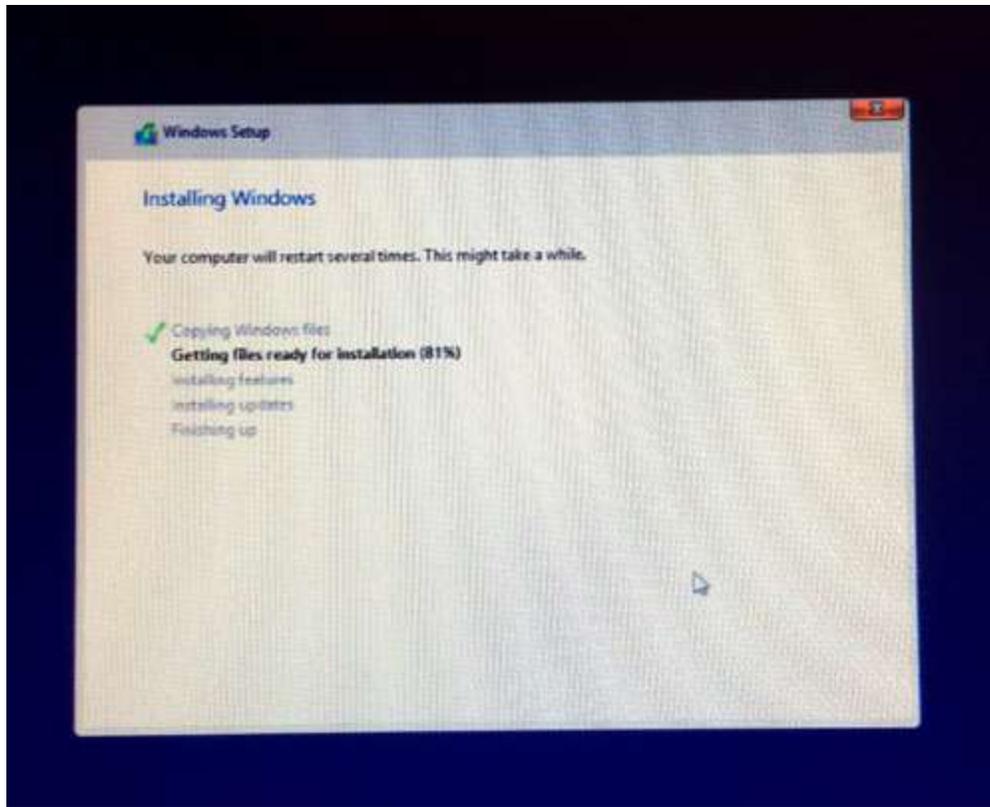
- g) Connected and Sort Cables. This was an easy task

as the Power Supply was Modular and the case had good ways of sorting cables.

4. OS Installation

After the hardware has been completely configured and installed we switched on the setup and get to the BIOS screen. On the bios screen confirm that all the hardware parts are being detected and showing correctly as installed. Also make sure there are no unknown sounds or odd noises like beeps etc.

After confirming everything we changed the boot mode to USB device and inserted a USB drive with bootable Windows 8.1 Enterprise on it. The system will boot and will install the windows operating system. This took around 15 mins. After installation all needed softwares like drivers, windows patches and Antivirus software was installed.



5. Comparison and Benchmarking

Once the system is ready and all needed softwares installed we ran some benchmarking softwares to see the performance of the old and new systems.

Comparison Sheet Specs

Component	Old	New
Memory	4GB	16GB

Motherboard	Gigabyte G31M-ES2L	Asus Z87 Pro
Processor	Intel Core 2 Duo E7500 @ 2.93 GHz	Intel Core i7 4770k @ 3.5GHz base clock
Primary Storage	SATA HDD	SSD Samsung 840 Series
Graphics Processor	NVIDIA GT 440	NVIDIA GT440
Liquid Cooling	-	Corsair H8oi

Benchmark software:

PCMark http://www.pcworld.com/article/232416/pcmark_basic.html

Cinebench <http://www.pcworld.com/article/238229/cinebench.html>

Benchmark Results:

CINEBENCH

Old	New
 <p>CINEBENCH RELEASE 11.5</p> <p>OpenGL: 22.93 fps <input type="button" value="Run"/></p> <p>CPU: 1.61 pts <input type="button" value="Run"/></p> <p>Your System</p> <p>Processor: Intel Core 2 Duo CPU E7500</p> <p>Cores x GHz: 2 Cores, 2 Threads @ 2.94 GHz</p> <p>OS: 64 Bit, Professional Edition (build 9200)</p> <p>CB Version: 64 Bit</p> <p>GFX Board: GeForce GT 440/PCIe/SSE2</p> <p>Info: <input type="text"/></p>	 <p>CINEBENCH RELEASE 11.5</p> <p>OpenGL: 23.43 fps <input type="button" value="Run"/></p> <p>CPU: 7.93 pts <input type="button" value="Run"/></p> <p>Your System</p> <p>Processor: Intel Core i7-4770K CPU</p> <p>Cores x GHz: 4 Cores, 8 Threads @ 3.50 GHz</p> <p>OS: 64 Bit, Enterprise Edition (build 9200)</p> <p>CB Version: 64 Bit</p> <p>GFX Board: GeForce GT 440/PCIe/SSE2</p> <p>Info: <input type="text"/></p>

PCMARK7

<p>Old</p>	 <p>PCMARK 7</p> <p>SCORE 2205 with NVIDIA GeForce GT 440(1x) and Intel Core 2 Duo Processor E7500</p> <p><input type="button" value="VALID RESULT"/> <input type="button" value="Add to compare"/></p>
<p>New</p>	 <p>PCMARK 7</p> <p>SCORE 5110 with NVIDIA GeForce GT 440(1x) and Intel Core i7-4770K</p> <p><input type="button" value="VALID RESULT"/> <input type="button" value="Add to compare"/></p>

6. Conclusion

We have successfully built the PC and installed Windows 8.1 on it. We are now able to run Visual Editing/Graphic Design Software fluidly. We are also now running Video Editing software which renders the videos in a flash as compared to our last build. We can also utilize the processing power of the PC to run various project such as “BOINC” (<http://boinc.berkeley.edu/>). This pc will also be used as media server.

7. Certificate of Completion



15th Oct 2013

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Master Shreyas Sood** has successfully designed, configured and benchmarked a high end 4th Generation i7 (Haswell Intel Architecture) powered Server Computer.

The project was undertaken under the guidance/supervision of Gagandeep Singh Pandher at Hughes Systique India Pvt. Ltd., IT Lab, Gurgaon.

Shreyas is innovative and a keen learner. He has excellent understanding of computer design, latest technology trends and Operating Systems such as Linux, Windows and Android.

A handwritten signature in blue ink, appearing to be "GSP".

Gagandeep Singh Pandher
Lead Engineer



Pradiman Pandita
Head – IT & Quality