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Zen and the Art of Computer Building

It was time for a new computer. My little brother’s computer had finally become too old and unreliable for daily use, therefore, I decided to sell him most of the components of what was then my current desktop PC to partially finance a new computer for myself. My desktop, though nearly 4 years was still a rather powerful machine by modern standards, and would be more than sufficient for his needs. Unfortunately for me, I would have to use my laptop while I planned out my new computer, so I was anxious to get started.

My first step was to determine what my new computer would be used for. I knew I needed my computer to be suitable for a wide variety of uses. These Uses included gaming, graphics production and editing, data recovery, and other requirements of my computer repair business, therefore, I knew I needed a computer with robust capabilities. For uses such as gaming and data recovery, I knew a powerful Central Processing Unit (CPU or Processor) would be needed. Graphics production and gaming are both very demanding on video hardware, so I decided to retain the powerful graphics from my previous desktop in order to keep the cost of the new build down.

To build a computer there were several parts that I would need. First, I would need a motherboard, the main circuit board of the system to which all of the other components of the system connect. Second, a processor, which connects to the motherboard via a specially designed socket and acts as the brain of the system by processing all of the data in and out of the system. Third, system memory or R.A.M., short for Random Access Memory, which stores all of the programs actively running on the system. A video card would be needed to perform graphic operations such as graphic design, as well as providing output to my monitors. A power supply would be needed to convert outlet power into power that the computer can use internally. In addition, I knew I needed a hard drive or drives would be needed to store all of my data and to install my Operating System, in this case Microsoft Windows 7, on and a CD/DVD drive for backing up data or watching movies. Last I would need a computer case to mount all of the parts in.

After determining which parts I would need, the next step was to determine my price range for this build and select the specific parts for my new computer. I settled on a total build price of no more than $800 due to having sold my computer for $400 and not wanting to have to spend more than $400 in addition to that. With this $800 price range in mind I went about conducting research and weighing my options as to what hardware to use for my new computer. I decided to stick with Intel brand processors, due to have a long history of good experiences with them. The processor I chose, an Intel Core i7 2600K, cost roughly $320, the largest single portion of my budget. Then, I picked out the motherboard, an ASRock Fatal1ty Professional board, chosen for its myriad of available connections, which cost approximately $180. Then, 8 Gigabytes of Patriot brand Viper Xtreme memory for $45. Finally, I chose my power supply unit, an Apevia Iceberg 680 Watt unit that I had used in previous builds, which cost $60. The case, a Cooler Master CMStacker 830 would be reused from my previous desktop. These parts totaled to roughly $600, well within my pre-determined price range. I ordered my parts and eagerly awaited their arrival.

My computer parts arrived a few days after I ordered them, but before I could begin to assemble my new computer I had to ensure that my work area was clean and well lit. After tending to my workspace I began to unpack and lay out my hardware. First, I removed the motherboard tray from the case and set it aside. Next, I removed the motherboard from its packaging and laid it out on a similarly sized sheet of foam to protect it during assembly. After that, I removed the processor from its retail box, and laid it aside in its protective plastic cover along with the included heatsink and fan assembly and my tube of silver thermal grease. Then, I laid out my video card on another sheet of foam, along with the memory modules. Last, I mounted the power supply, CD/DVD drive, and hard drives into the case and set it aside for later.

After laying everything out, it was time to begin assembly of the core components, the motherboard, processor and heatsink, memory, and graphics card. The first step was to release the retention bracket from the CPU socket on the motherboard and remove the plastic guard that protects the pins in the socket. Next, I removed the processor from its protective cover. Then I gently inserted it into the CPU socket on the motherboard, carefully aligning it with notches in the socket to ensure correct orientation, and then I re-secured the retention bracket. After that, I applied 4 tiny blobs of thermal grease slightly inward from each corner of the processor, and one large one, roughly the size of a small grain of rice, at the center. Then, I placed the heatsink over the processor, turning it to take up as much slack as possible in the fan cable. I then secured each of the 4 retaining clips that attach the heatsink to the motherboard, connected the fan power/speed control cable, and thus finished the installation of the processor.

Once the processor and heatsink were correctly installed on the motherboard I turned my attention to the remaining core components. First, I inserted two the memory modules into alternating slots on the motherboard, taking care to align the notches in the modules with the corresponding notches in the slots, and then secured the retention clips. Next, I snapped the rear connector panel for the motherboard into place in the rear of the motherboard tray and then guided the motherboard into place and secured it with screws. Then I firmly inserted the video card into a free PCI Express x16 Slot and secured it with two screws, thus completing the assembly of the motherboard and core components.

After assembling the motherboard and core components and then securing them to the motherboard tray, it was time to insert the motherboard tray assembly into the case. I slid the tray assembly into place and engaged the clips to secure it. Then, I began routing the internal connections of the computer. First, I routed the motherboard power cabling and tucked it against the back of the case. Next, I ran the cables for the power/activity lights, power button, and reset button from the front of the case to the appropriate connectors on the motherboard, and then tucked the excess wiring underneath the motherboard. Then, I routed the power cables for the hard drives, CD/DVD drive, and graphics card and tucked them alongside the power cabling for the motherboard. Next came all of the Serial ATA data cables for the hard drives and CD/DVD drive, also tucked alongside the power cabling. Finally, I ran a power cable across the top of the case and connected it to the fans on the side of the case.

The final step in assembly was to secure the internal cabling in as compact and discrete a manner as possible. Building on the initial cable routing I performed during assembly, I began to find ways to take up any slack that could make securing the wires messy or difficult. Since one of the easiest ways of taking up slack is bundling unused wires, zip-tying them, and then tucking them out of sight, I did that to most of the power cables that were not used. After cleaning up the unused cabling and getting all of the in-use cabling routed I began to secure the wiring with plastic zip-ties, creating neat bundles out of all of the wiring and then securing it to the back of the case. Securing all of the wiring this way gets it out of the way and improved airflow through the case, thus ensuring better cooling and reliability and improving the overall appearance within the computer.

With everything assembled and the internal cabling nice and neat it was time for me to put the side panels back on the case and secure them. All that now stood between me and my brand new computer at this point was hooking the up my monitors, keyboard, mouse, and speakers, and installing Windows 7.