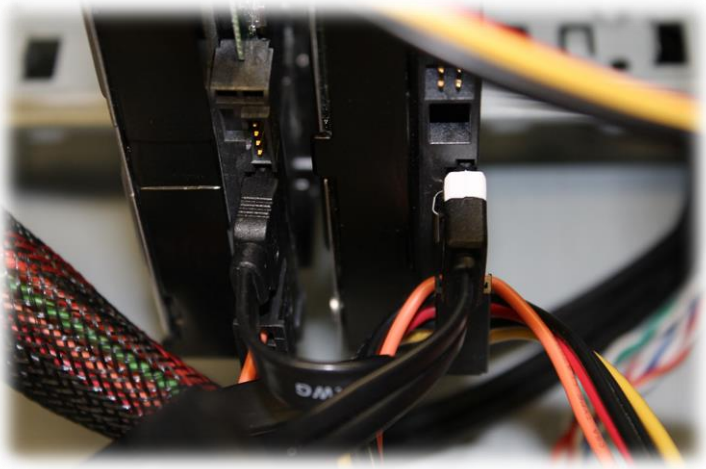

PC WORKSTATION ASSEMBLY GUIDE

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Introduction

This manual is intended to guide an Umbrella Corporation PC Technician through the workstation PC build process for Umbrella Corporation's new workstations. The workstations will arrive at each corporate location in separate pieces; each workstation will need to be assembled by the technician. Before beginning assembly, please consult the parts list and ensure that each has arrived from is respective supplier.

Parts List:

1. Computer Case (including front panel wires)
2. Computer Power Supply (with wires included)
3. Motherboard (with stand-offs)
4. CPU
5. Thermal Paste
6. CPU Cooler
7. RAM
8. Hard Drive(s) with screws
9. Optical Drive

Worker Safety Is Most Important

The first, and most important, element of assembling a PC workstation is ***worker safety***. Be sure not to plug the computer into to any electrical receptacle until explicitly instructed to in this manual. If, for any reason, you need to reach inside the case after the computer is assembled, be sure to shut-down the system and unplug it from the receptacle before opening the computer case! Also, beware of sharp edges within the computer case.

Required Tools

The tools required for this build are minimal. An electro-static discharge wristband and a #2 Phillips (star) screwdriver are all that are required. It is essential that the ESD band be worn whenever computer components are being handled throughout the build process. Attach the alligator clip of the ESD strap to a piece of bare metal within the computer case to ensure that there is no chance of accidental electrical discharge, which can damage delicate components such as the RAM or the CPU.

Figure 1 - ESD Wristband & #2 Phillips Screwdriver

The Computer Case

Figure 2 - Empty Computer Case

The starting point for the assembly is the computer case. Viewing the computer case from the front, open the left side panel. There are two small screws at the back of the case which will need to be removed. Keep the side panel and the screws in a safe place as these will be re-used later.

The case has a wiring harness pre-installed – these are for the front LEDs and power buttons. These will be inserted into the motherboard later; for now, be sure they don't get damaged by sharp edges.

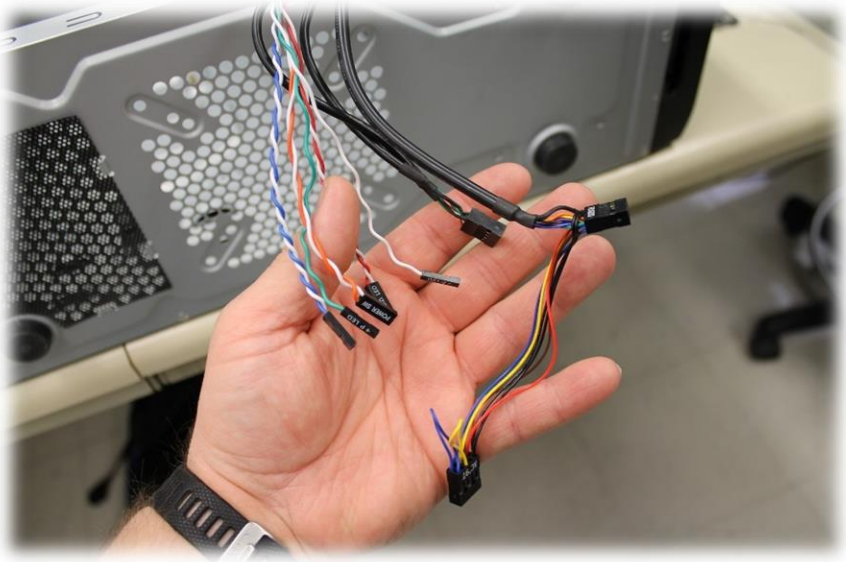

Figure 3 - Wires from Case Faceplate

Installing the Power Supply

The first component to be installed inside the case is the power supply. The power supply has several wires protruding from it – keep these wires from getting damaged by the possibly sharp edges of the computer case interior. Note that in these workstations, the power supply is in the bottom of the case (as most are in the top). The installation is pictured below:

Figure 4 - Installing the Power Supply

The power supply is kept in place by 4 screws, which are packaged with the power supply.

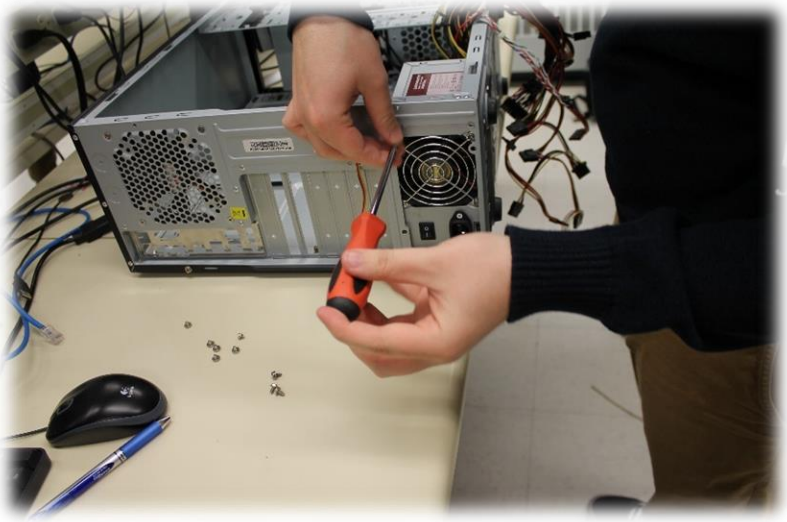

Figure 5 - Securing Power Supply with Supplied Screws

Installing Optical and Hard Drives

The next step is to install the hard drive and the optical drive into their appropriate bays. The uppermost bay of the computer case is for the optical drive. It is attached with a plastic clip that comes with the case.

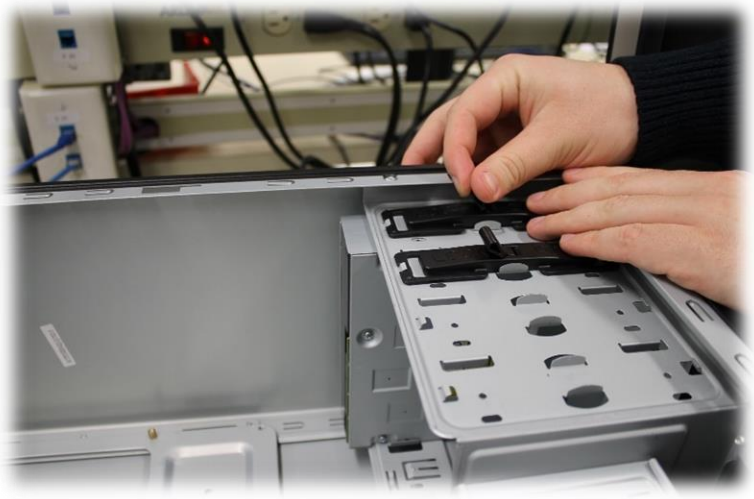

Figure 6 - The Optical Drive, Secured with a Clip

The hard drive bay is lower in the case, with an opening that is 3.5 inches wide. It is secured in place by screws. Align the screws with the corresponding holes in the drive. Be sure to use the correct screws that came with the hard drive – if the screws used are too long, it is possible to puncture the hard drive enclosure and ruin the hard drive.

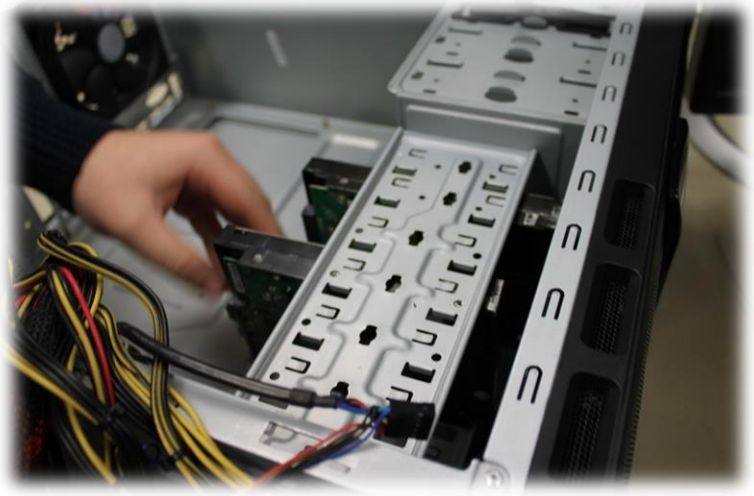

Figure 7 - Inserting the Hard Drive

Assembling the Motherboard

The CPU, CPU cooler and RAM are all installed directly onto the motherboard before it is inserted into the case. Start with the motherboard itself:

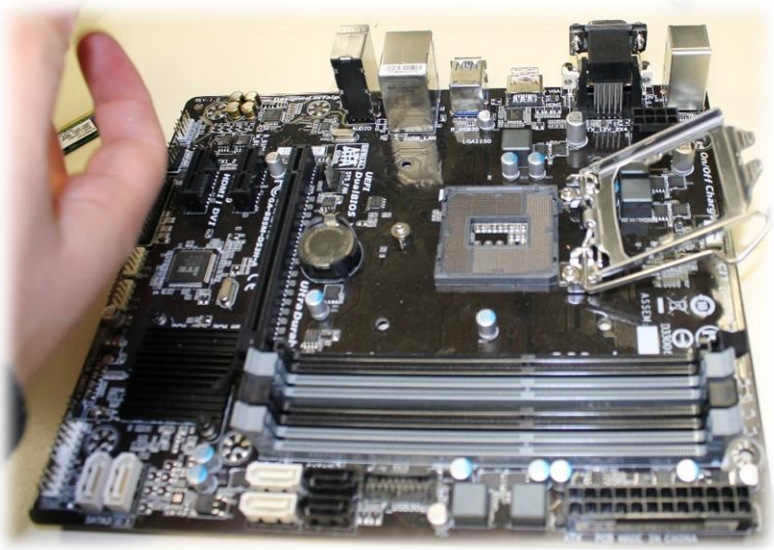

Figure 8 - The Motherboard, Ready for CPU Install

Installing the CPU

The CPU is installed directly on the motherboard. Open the cover of the socket using the Zero-Insertion Force (ZIF) lever (see Figure 8). Be sure to align the chip with the socket – there is a corner that has a chamfer which dictates the CPU alignment. Once the CPU is gently seated in place, close the socket cover by pulling down on the ZIF. If there is resistance, stop immediately and check the alignment of the CPU.

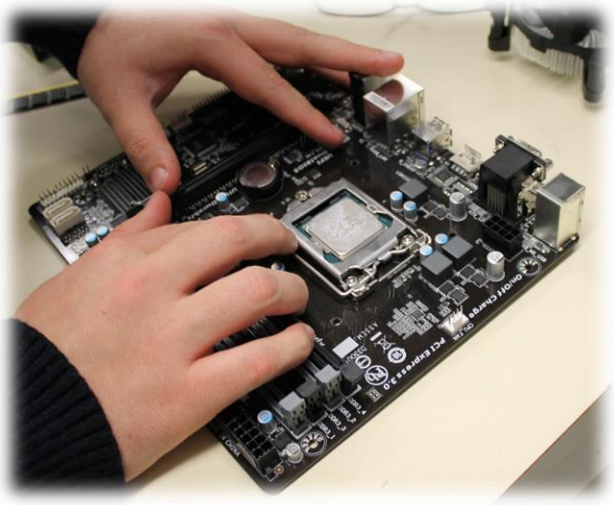

Figure 9 - Closing the ZIF Lever with the CPU Properly Seated

Installing the CPU Cooler

The next component to be installed is the CPU Cooler. A small amount of thermal paste must be added to the back of the CPU prior to installation. Thermal paste ensures even heat transfer away from the CPU. Using the supplied tube of thermal paste, add an amount approximately the size of a grain of rice to the back of the CPU (the part exposed after installation). Ensure that this paste is spread across the entire area, so that when the CPU cooler is installed, it provides even coverage across the CPU.

The CPU cooler is applied directly to the back of the CPU at this stage. It is secured to the motherboard by four clips which twist to tighten. Corners should be clipped down diagonally as pictured below:

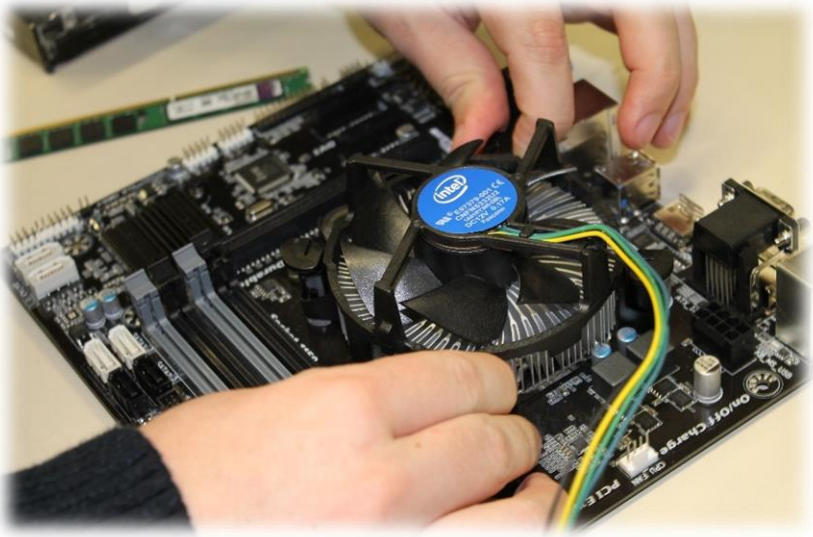

Figure 10 - Installing the CPU Cooler

The CPU cooler has its own wired connection to the motherboard (the yellow, green, black and blue wire pictured). The connection for this wire is near the cooler:

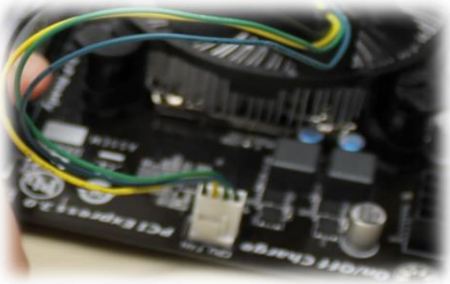

Figure 11 – CPU Cooler Plugin

Installing RAM

Random-Access Memory (RAM) is inserted in the slots next to the CPU. Each RAM component has special slots which allow it to be inserted only one way. Align the RAM in the slot nearest the CPU and gently push down. When correctly seated, there will be an audible click as the clips on both ends of the slot close. Be gentle – this does not require a great deal of force.

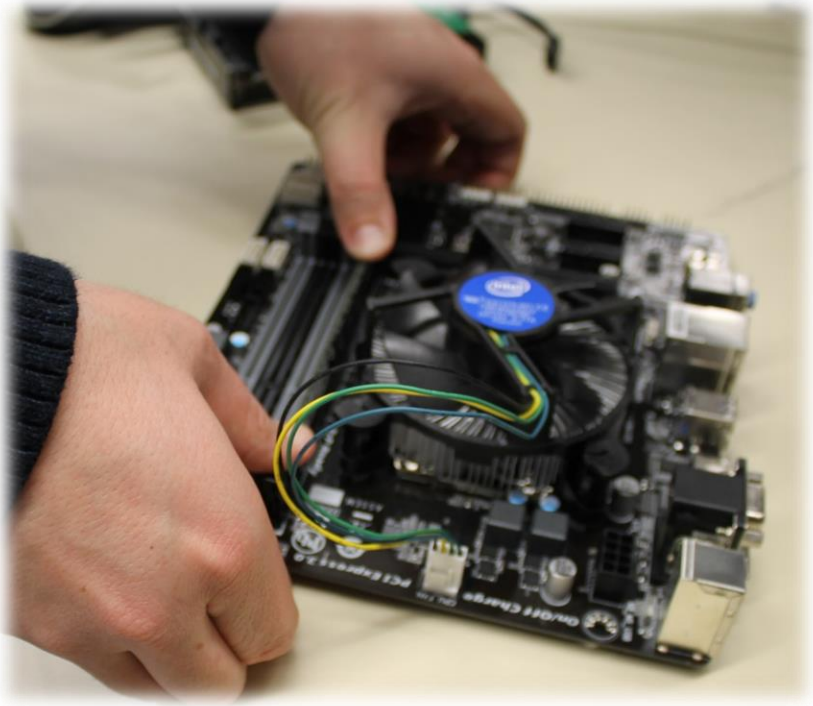

Figure 12 - Seating the RAM

Inserting Motherboard into Case

The motherboard assembly is now ready to be inserted into the case. The standoffs (which came with the motherboard) need to be installed first, as these shield the motherboard from grounding on the metal computer case. Check the holes in the motherboard to see where the stand-offs need to be installed. Next, the motherboard is attached with 6 supplied Phillips screws. These screws go through the appropriate holes in the motherboard into the stand-offs.

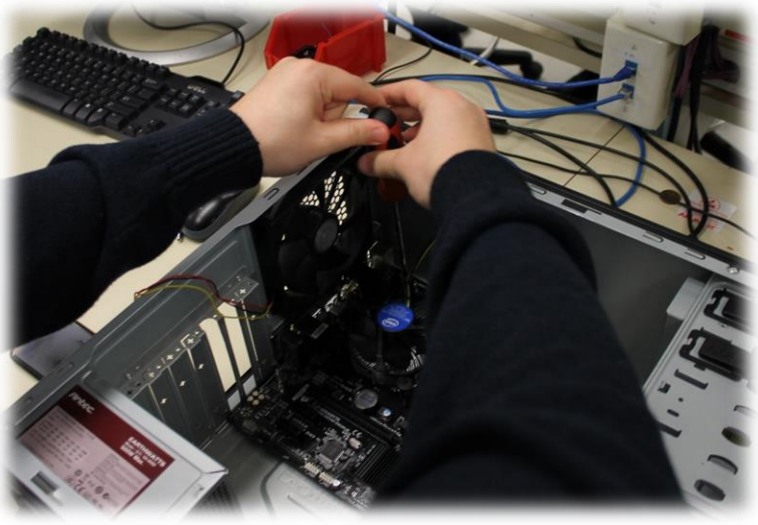

Figure 13 - Screwing Down the Motherboard

After correctly installing the motherboard, it should fit into the computer case with the back showing as below:

Figure 14 - Correctly Installed Motherboard from Behind Case

Connecting Wires

There are many wires to connect inside the computer after installation of the components. Firstly, the P1 connector, the connector which powers the entire motherboard, needs to be plugged in. This is the largest connector on the power supply, and only fits in one way on the motherboard.

Figure 15 - P1 Connector Plugged into the Motherboard

The CPU also requires its own power supply – the yellow and black wires which plug into a black 8-pin connector on the motherboard near the CPU. This is required as the CPU draws so much electricity that it needs its own electrical connector.

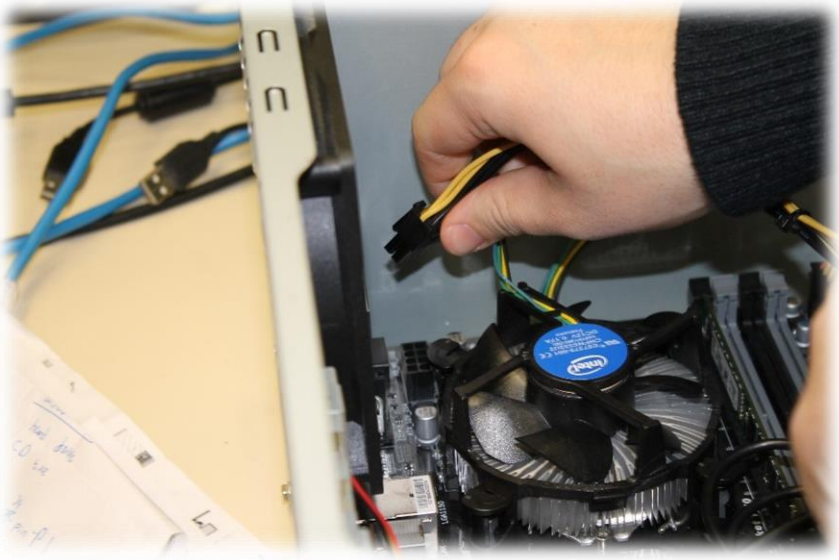

Figure 16 - Plugging in CPU Power

The optical drive requires power and data (SATA) connectors, pictured below:

Figure 17 – Power and Data to Optical Drive

The hard drive(s) also need a data (SATA) connection as well as power. Note that in the picture below, there are two hard drives.

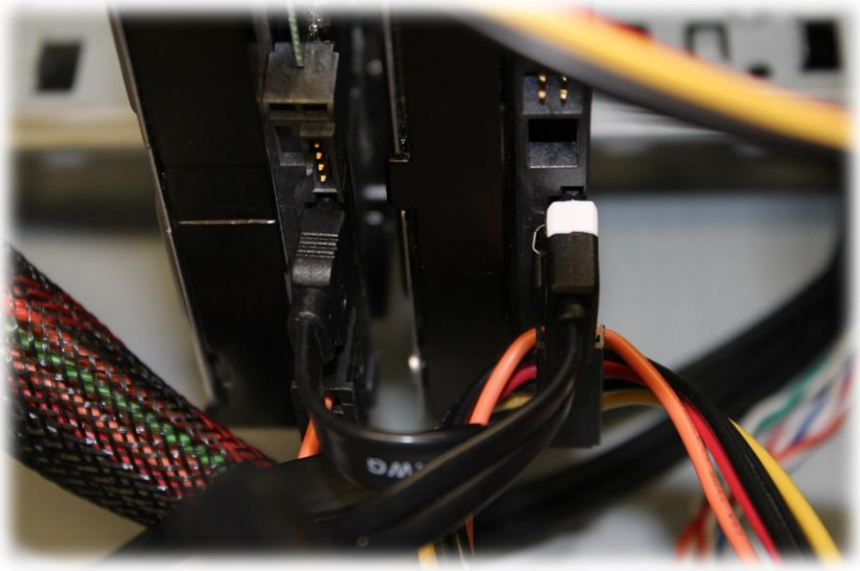

Figure 18 - Data and Power Connections for Hard Drive

The data connectors from the optical and hard drives will also need to be connected to the motherboard. The plugins are white and are pictured in Figure 19 (see below).

Finally, the connectors from the front panel LEDs and power buttons need to be connected. The motherboard is labelled, showing where each connects.

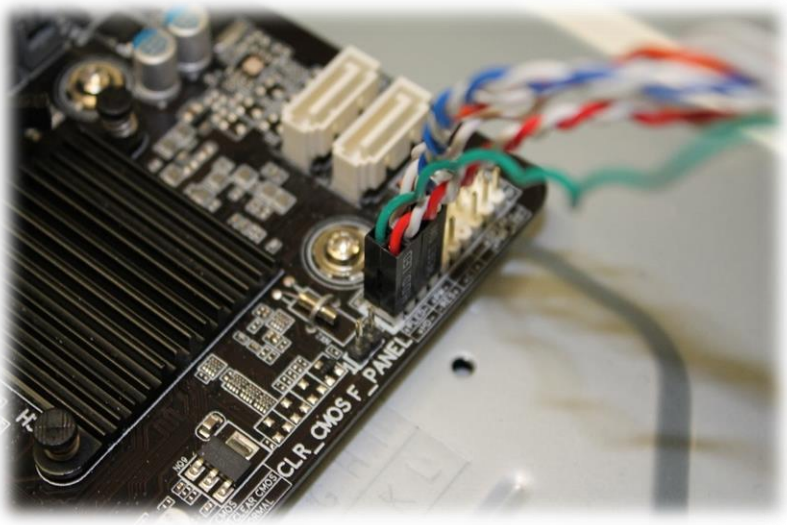

Figure 19 - Front LEDs and Power Connectors (also SATA connections)

Initial Boot-Up

After fully attaching all the required wiring, close the computer case. Tighten the screws on the back that hold the side panel in place.

Now that everything is done and the case is closed, you may attach the black power cable to the power supply outlet on the back of the computer case, and plug it into the wall electrical receptacle. Connect a known-good monitor, keyboard and mouse. Press the front power button and see if the computer boots up. If successful, the result will be the BIOS screen showing on the monitor as another team is to install the operating system. If the computer shows the initial POST procedure, then the build has been a success!

Figure 20 - Finished Build

Troubleshooting

Problem: **The computer doesn't turn on at all.**
Solution: This is likely a connection issue. Disconnect from electrical receptacle, open the case and check to see that everything is plugged in correctly. Pay close attention to the front panel connectors.

Problem: **The computer turns on and beeps (but does nothing else).**
Solution: This is a POST error code. Using another computer, search the Internet for "POST error codes" and identify the beep pattern, which will help to identify the problem.

Problem: **The computer runs for a few moments, then shuts off.**
Solution: It is likely that the CPU is shutting off the computer to protect itself from overheating. The CPU cooler may be improperly seated or there could be too much (or too little) thermal paste.

Problem: **The hard drive is making a ticking or clicking noise.**
Solution: The hard drive may be faulty. Disconnect computer from the electrical receptacle and consult the senior technician.

Problem: **When powered on, the system whines and then shuts off.**
Solution: The power supply is faulty or is not capable of producing enough electricity to power the system up. Replace the current power supply with one capable of producing more wattage.

Resources

Andrews, Jean, Joy Dark & Jill West. *A+ Guide to IT Technical Support*. 9th Ed. Cengage Learning. 2017.

Meyers, Mike. *Comptia A+ Certification Exam Guide*. 9th Ed. McGraw-Hill Publishing. 2016.