

HCA Technical Note: Building a Compact Low Power HCA Server

Like many HCA users, for years I had been running HCA on a typical desktop PC. Mine was a vintage 2006 Dell XPS 400. When I added a Brultech power monitor to my home so I could track energy usage, I realized just how much the HCA PC was using in electricity—somewhere in the vicinity of 200 watts, 24/7. At 20 cents/kwh, it was costing approx. \$29/mo. to run HCA—way too much. So I started looking around for a lower cost alternative.

Having already built an HCA client around a Shuttle touchscreen computer, I took a look at what Shuttle had to offer in their other “barebones” PCs.* Barebones machines come without memory, hard drive, and operating system. I found they have a model, the XS36VL, that was designed for automation applications. It had a dual core/four thread Intel Atom D2700 processor with built-in Intel graphics, could take up to 4GB of memory on two DIMMs, and had space for a 2.5” hard drive. It was also fanless and very small, measuring approx. 8” x 6 3/8” x 1 1/4”. If I used a solid state drive (SSD), there would be no moving parts at all. Shuttle also stated the machine was designed for industrial applications that required 24/7 operation. Perfect for the HCA Server.

The XS36VL also offered: gigabit Ethernet, WiFi 802.11b/g/n, 5 USB ports, 2 RS-232 serial ports, an SD card slot, VGA, DVI, and HDMI. Having all the USB and serial ports is really useful for connecting automation interfaces. Note that the machine should be installed vertically with the stand as shown in the photos for proper convection cooling. The operating system can be loaded from an external USB optical drive.

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I decided to build the machine with 4GB of memory and an Intel 250GB SSD. I wanted the large hard drive so I could also run iTunes on it and use it as a house music server. If you don't need the capacity, and only want to run HCA, you could use a smaller, less expensive SSD.

I built this computer back in December of 2012 so what I paid was different than now. Here are the costs as of June 2014:

Shuttle XS36VL barebones PC: \$174.82

Memory: (2) Transcend 2GB DDR3 1333 So-DIMM: \$30.18 each

Hard drive: 240 GB SATA 3 Intel 335 Series SSD SSDSC2CT240A4K5: \$188.99
Total hardware \$424.17

The PC and memory were purchased from ProVantage (www.provantage.com) and the Intel Solid State Drive from Amazon at:

www.amazon.com/dp/B009EJ9AFY/ref=pe_175190_21431760_3p_M3T1_SC_dp_1

Note that to determine the type of memory, Shuttle has a page on their website that lists different manufacturers' part numbers for compatible memory

<http://us.shuttle.com/barebone/Models/XS36VL.html>

<http://global.shuttle.com/products/productsSupportList?productId=1673>

If you have never purchased memory for a PC before be prepared for a bit of a fight. Each manufacturer has its own parts numbering system and memory that works may have a very similar part number than memory that doesn't work.

The Shuttle list shows many different manufacturers and part numbers. Any of them from the list should work. I've never found a real difference between vendors or different memory modules by the same vendor. Just try and find the part number you need and then go by user reviews and/or price.

Look carefully at the list of memory modules on the Shuttle web page and then look at your favorite vendor to find one from the Shuttle list with that part number. Some web sites list both their own part number and also the manufactures part number and that's what you need to go by. It can be frustrating but take your time and make sure your order exactly the part number listed on the Shuttle web site.

I already had a copy of Windows Pro 7, and a USB optical drive for loading it. I used Windows Pro rather than Home Edition because I wanted to run the HCA server "headless", i.e. no monitor, and the Pro version is required to use Microsoft Remote Desktop to connect to and manage the machine. (Microsoft also now offers free versions of the Remote Desktop Client that run on Mac, iOS, and Android as well as PC). Note also that this computer will ONLY run Windows 7, and only the 32 bit version, since Intel has not provided 64 bit drivers for the built-in Intel graphics it uses.

When I received the computer hardware, it was extremely simple to install the memory and drive. A single screw on the back of the computer allows both case sides to be easily removed. The memory simply snapped in, and three screws removed the drive mounting plate, which was attached to the SSD with four Intel-supplied screws. The plate was then re-installed with the drive, and the drive connector attached.

I then installed Windows and HCA, which was accomplished without incident. Then I went to the Shuttle website to download the latest BIOS and install it. The Intel Atom processor is very quick, and has more than adequate performance to run an application like HCA.

A word about the BIOS: When the computer ships from Shuttle, it is set for maximum energy savings. This means it will go into sleep mode after a period of inactivity. This is done so the computer meets a certain European energy conservation standard. You want to go into the BIOS and disable this setting, which is "EuP". Once the setting is disabled, you can then change another BIOS setting on the same page so that upon power restore after a power failure the computer will turn itself back on. You can also set Wake On LAN on this page. If you do this, and configure Windows to auto login to the account under which you installed HCA, your automation system will be back up and running once power is restored. Instructions for setting up automatic login on Windows 7 can be found on the Internet. Unlike Windows XP, it doesn't require editing the registry with regedit.

After building the server and getting it running with HCA, I took a wattmeter and measured the power consumption of the system. It was 15 watts, meaning it would cost only \$2.16/mo. to run HCA 24/7, assuming a cost per KWh of \$0.20. The low power consumption also means that it can run for almost 8 hrs. on the uninterruptible power supply I have, should the power failure.

As of May 2014, Shuttle now has an even more powerful version of this computer, the XS36V4. This machine can take 8GB of memory, is build around a quad core Celeron processor with Intel HD graphics, and offers a USB 3.0 port. A DisplayPort video output replaces the VGA connector, but VGA displays can still be accommodated with a DisplayPort to VGA adapter. This computer still offers the same low power consumption as the XS36VL, and can run the 64 bit versions (only) of both Windows 7 and Windows 8 (when upgraded to the latest BIOS from the Shuttle site).

** Disclaimer: The author of this article has no direct business relationship of any kind with Shuttle.*