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## Hardware Guide for Amazing Charts V8

# **amazingcharts**




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There are a number of factors that go into ensuring you have a positive experience when implementing version 8. These same guidelines apply to older versions. The purpose of this guide is to provide practices (and their IT Support) with some guidelines for determining which hardware is best for your main computer/server. This guide does not contain specific part numbers as everyone's needs will be different, and new hardware is released every year.

Amazing Charts V8+ uses Microsoft SQL Express 2012 Express. SQL 2012 Express has the following limitations:

- 1GB per instance of SQL Server Database Engine
- Limited to lesser of 1 Socket or 4 Cores
- 10GB Maximum relational Database size

The primary components that determine performance are the memory/RAM, the processor/CPU, and the storage drive/HD. Other components like the motherboard and power supply play an important role in the overall reliability of a system. These requirements will be covered in the order mentioned above as they build on each other.

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## Memory/RAM

The SQL Database Engine is only capable of using 1GB of RAM. But its other components are able to address more than 1GB of RAM. However, it is atypical for SQL memory usage to exceed 4GB. As such, the minimum recommended is 8GB of RAM. However, you may need more (not less) depending on which version of Windows you are using. Here's a list of Windows Versions with their recommended memory amount.

Windows 7/8/8.1/10 x64	8GB
Server 2008/2008R2	8GB
SBS 2011 Essentials	12GB
SBS 2011 Standard	24GB
Server 2012/2012R2	8GB-16GB
Server 2012/2012R2 Essentials	16GB

As a side note, there is a special type of memory called ECC Memory. ECC (which stands for Error Correction Code) does just as its name implies: it checks for errors. It has a very low failure rate compared to the standard memory found in desktops. If an error is found, the server will trigger a shutoff and not boot until the memory is replaced. Regular desktop memory on the other hand will usually keep going. This may seem like an upside, but corrupted data is now being written back to your hard drive. This may go on for weeks or months before it's discovered. In my opinion, it's necessary to use ECC RAM, but you are free to choose. It should be noted that only server-grade processors like the Intel Xeon and AMD Opteron lines can utilize ECC Memory.



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## CPU/Processor

The processor plays an important role in executing the commands or queries it receives from SQL. The faster it can complete those queries, the faster the data will show up on your screen. There are several misconceptions surrounding the issue of processor choice. This is usually because computer salespeople wanting you to buy a more expensive processor that may actually make performance worse.

One big myth is that more cores is better. This is usually not the case and more so with SQL. More cores only come into play with heavily threaded workloads. As mentioned previously, SQL Express can only use 4 cores so having something like an Octocore (8-core) or Decacore (10-core) won't make a difference. Also, SQL usually processes queries on a single core so you want the fastest single core performance possible indicated by a higher clock speed (measured in gigahertz).

Another one is that you can determine the speed based on the specifications of a processor. Specifications are only useful for determining which processors of the **same** family perform better (e.g. a 4 GHz Intel i5 is faster than a 3 GHz Intel i5). Nowadays, the only way to compare the performance of different processors is evaluating benchmarks done by sites like Tom's Hardware and Serve the Home. That also means AMD and Intel specifications are not equivalent. Intel cores are significantly faster. Practices will often use something like an AMD FX-4300 (4-core) or AMD FX-6300 (6-core) processor in their server due to the greater number of cores and/or higher clock speed/frequency. However, these AMD processors will not even outperform a dual core i3 Processor by Intel. As such, Intel processors are strongly recommended over AMD processors.

To sum up the previous points, you want a processor that has at least 4 cores, a fast clock speed, and good single core performance (Note: Avoid low power editions typically denoted by an S or T at the end of the product number. E.g. Intel Core i7-4765T). For desktop servers, I would

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recommend an Intel Core i5 or i7 Processor after 2011. (There have been miniscule improvements in CPU performance since 2011.) It's important to note that only server-grade processors like Intel Xeon or AMD Opteron processors can use ECC Memory. If you plan to use ECC memory, go for an Intel Xeon E3 or E5 series.

## Hard Drive

The last important piece of the pie is your hard drive. A fast storage drive is probably the best investment you can make for your practice. There are two main types of hard drives: hard disk drives (HDD's) and solid state drives (SSD's). Both have been around for quite some time, but it is only recently that we have seen widespread adoption of Solid State Drives. Solid State Drives are 4-6 times faster at sequential reads and writes (reading/copying large files) and 50-100 times faster at random reads and writes (reading/copying small files). Your computer is doing the latter 80-90% of the time.

As mentioned previously, SQL Express can only use 1GB of RAM for its database cache. That means it will have to read data from the hard drive at some point. This will be your biggest bottleneck when using Amazing Charts. The same query on a solid state drive that takes 1 second can easily take 5 or 10 seconds on a regular hard disk drive. These are rarely included as a standard option on desktops/servers. You will need to have these upgraded by a third party or purchase your desktop/server from a place that allows you to customize your desktop/server.

Another recommendation would be to use some type of redundancy or RAID with your storage. We go into more detail in our blog post:

<https://www.ltmedical.net/amazing-charts/best-raid-level/>

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## Additional Recommendations

- If you choose to get a desktop, choose a business-grade desktop from one of the major OEMs like Dell, HP, or Lenovo.  
*Dell OptiPlex, HP EliteDesk, Lenovo ThinkCentre*
- Don't get an extended warranty unless it's an onsite warranty. Regular extended warranties don't make a lot of sense since it can take weeks to get things fixed unless you have something like a Next Business Day Onsite warranty that these guys offer.
- Gigabit is standard nowadays, but Intel-based gigabit NICs are the best. They are standard on the business line of desktops.
- Look for a vPro designation so you can have Remote Management. This means you can get assistance from a technician even if your computer doesn't boot. Servers use proprietary forms of remote management.
- Get a UPS (backup battery) for as low as \$100 at your local superstore. Note: A UPS is a more sophisticated form of an inverter.
- Get a Backup Hard Drive (USB 3.0, if your computer supports it) that is at least 33% larger than your total storage capacity.

## Conclusion

I hope these recommendations are useful during your upgrade to Amazing Charts Version 8. Unless there are major changes to Amazing Charts, it should be a good guideline for future versions as well. Best of luck with your upgrade!

Sandeep Luthra | LT Medical – President

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