

What makes a great Digital Audio Workstation?

Welcome!

Presented by Dan Scherbarth
Owner of DAWSTORE.com | Architect of the Groove
Machine™ line of DAW PCs and Storage Solutions.

What makes a great Digital Audio Workstation?

IT'S QUIZ TIME!!!!

Question #1: MACs are more stable than PC's.
TRUE OR FALSE?

Question #2: I should spend as little as possible on a computer for Music Production since they will all be obsolete in a year or two. TRUE OR FALSE?

Question #3: Purchasing a computer designed and optimized for audio is worth the extra cost. TRUE OR FALSE?

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IT'S QUIZ TIME!!!!

Question #1: MACs are more stable than PC's.

ANSWER: FALSE

Question #2: I should spend as little as possible on a computer for Music Production since they will all be obsolete in a year or two.

ANSWER: FALSE – BIG WASTE OF \$'s!!!!!!

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IT'S QUIZ TIME!!!!

Question #3: Purchasing a computer designed and optimized for audio is worth the extra cost.

ANSWER: TRUE

- but does it really cost more in the long run?

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What makes a great Digital Audio Workstation?

FACT #1 : Today's demanding music production applications require specialized hardware as well as software.

FACT #2: Off the shelf PC's are not created with the HUGE processing demands required for music production in mind. They are designed for surfing the web and handling e-mail.

FACT #3: Most computers used for music production today will be unusable for music production within 2 years.

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What makes a great Digital Audio Workstation?

FACT #4: DAW software design/implementation and hardware design is more important than the OS you choose.

FACT #5: Storage technology is very rapidly becoming more important than processor/memory technology when it comes to max. track counts.

FACT #6: You will do more inside your DAW this year than last year.

Name a major technological breakthrough that was not software based...

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What makes a great Digital Audio Workstation?

Objectives for this event

1. Help you maximize productivity – time is money.
2. Help you understand how the components & configuration of your DAW affect overall reliability and performance.
3. Provide insight into the latest trends in technology and how they affect DAW design and construction.
4. Examine the latest options for session storage and backup.

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What makes a great Digital Audio Workstation?

Factors for an Optimized DAW

1. Reliability/Stability – Do you trust your DAW?
2. Speed/Throughput - Track count, plug-in/soft synth/sampler performance, latency. Was it designed for audio production?
3. Adaptability – Can your DAW adapt to the demands of your work environment?
4. Noise Level – Does Workstation noise affect your workflow?
5. Interface possibilities with other systems/hardware (Firewire, USB, OMF).
6. Expandability – Will your DAW become an e-mail machine in a year?
7. Archiving/Backup Strategy – Can you restore and recall a project 2 years down the road?

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What makes a great Digital Audio Workstation?

Two Main Areas Of Optimization

- Hardware – Important Components –
 1. Front Side Bus Speed
 2. Processor(s) Speed
 3. Memory Speed, Type and Size
 4. Hard Drive(s) Speed Type and Size
 5. Peripherals Interfaces
 6. Power Supply.
- Software –
 1. Operating System (OS) type, modification and optimization.

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What makes a great Digital Audio Workstation?

Reliability/Stability

What does this mean to you?

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What makes a great Digital Audio Workstation?

Reliability/Stability

What does this mean to you?

Problems can be software-related, hardware-related, or a combination

- No Crashes/Lockups/"Blue Screen Of Death"
- No Driver Conflicts/Chipset interference
- No Virus-related problems
- No OS Bottlenecks
- No Latency-Related issues
- Fast, Easy and Reliable Backup and Recovery Strategy

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What makes a great Digital Audio Workstation?

Reliability/Stability

TIP #1 - For a stable DAW, dedicate your music PC to recording, editing and mixing music productions. Use your old machine for e-mail, Internet access and downloads.

Reason: Viruses and virus-related problems consume over 30% of IT budgets in the US*

* Source: Information Technology 2004 IT Poll

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What makes a great Digital Audio Workstation?

Reliability/Stability

TIP #2 – Make sure your “Internet” PC/MAC is up to date with anti-virus software, an up-to-date software firewall, a hardware firewall (router w/ IP masking), and two spyware/ad-ware removal tools.

Check <http://www.digital-groove.com/gm/support.asp> for links to these applications!

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Reliability/Stability

TIP #3 – Use the “Internet” machine to create virus-free update CD’s of program patches/updates and apply those to your DAW computers.

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Reliability/Stability

TIP #4 – Ensure your DAW is on a separate network from the Internet machine. Viruses can travel across Ethernet connections.

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What makes a great Digital Audio Workstation?

Reliability/Stability

TIP #5 – Use only authorized “legally purchased” software applications in your studio. A seemingly trivial “KRACKed” plug-in can bring your audio production process to a sudden halt.

If you're having a new problem with your existing DAW, start here!!

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What makes a great Digital Audio Workstation?

Reliability/Stability

TIP #6 – If your DAW is already isolated from the outside world, apply OS patches ONLY when required for general stability or needed functionality.

“If it’s not broke, don’t fix it”

Current recommendations –

Windows - XP PRO SP 1a

MAC – OS X 10.3.3 Panther

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What makes a great Digital Audio Workstation?

Reliability/Stability

TIP #7 – There are issues with certain Oxford 922 Firewire devices and OS X 10.3.3 and the FW800 ports on G5's. A patch is available from Oxford or you can apply OS X 10.3.4

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What makes a great Digital Audio Workstation?

Reliability/Stability

TIP #8 – One HUGE advantage of a custom-built DAW is that you can avoid having programs you do not need that demand precious system resources that you can utilize for audio recording.

Examples

- Instant Messenger pops and interrupts the best take of the day from your premium “voice-over” talent.
- Anti-Virus software that constantly monitors your system in the background.

Install only what you need, leave out (or uninstall) what you don't.

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Reliability/Stability

TIP #8 – Windows Users – Upgrade to a “DAW Optimized” version of XP Pro Sp1a

WHY?

- Memory leakage/application crash problems prevalent in Win98SE have been addressed in XP Pro. Each application runs in its own area of “protected memory”.
- Most applications show greater throughput (higher track counts/less OS overhead) on XP Pro on identical hardware-who can't use that

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Reliability/Stability

TIP #8 – Windows Users – Upgrade to an DAW Optimized version of XP Pro Sp1a

WHY?

- Microsoft dropped support for WIN98SE and NT 4.0 in July 2003.
- Most popular Audio Software Applications are now optimized for a Windows XP Pro environment-some are only supported in XP (PT LE 5.3.1 and 6.1.1 is XP only).
- Some offer significant decreases in latency (3x or higher) running with ASIO, WDM or other drivers in XP.
- Offers support for multiple processors where 98SE, XP Home does not.

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What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Factors involved in speed & capacity of your DAW:

1. Front Side Bus Speed
2. Processor Speed
3. Memory Type/Speed
4. Hard Drive Speed/Interface Type
5. PCI Bus Type/Speed
6. OS Optimization

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Speed/Throughput

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Front Side Bus Speed-

What is it? FSB measures your computers ability to transfer data from memory to the CPU for processing. Think of it as the speed limit on the freeway. It does not increase the amount of lanes, just the rate the information travels.

- Extremely important for audio/video applications since files sizes are very large.
- Typical bus speeds for Intel machines are 400, 533, and 800 Mhz.
These are achieved by a multiplier of the core 133 Mhz clock speed.

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Front Side Bus Speed-

<u>FSB Speed</u>	<u>Max. Throughput</u>
400 MHz	3.2 GB/sec.
533 MHz	4.3 GB/sec.
800 MHz	6.4 GB/sec.
1 GHz	8.0 GB/sec.
1.25 GHz	10.0 GB/sec.

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Speed/Throughput

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Processor Speed-

- Measured by clock speed and FSB speed
- Two major competitors – Intel and AMD – on Windows side

INTEL

- Recently issued the P4 Extreme Edition chips – 2 MB L3 Cache and the P5 Prescott Chip - Basically the XEON in a with a different pin configuration and PCI-Express x1 (500 MB/sec.) bus capability XP3.4 GHz-5GHz by next year!
- Also released chipsets for 800 MHz FSB XEON processors that will be DDR 533 RAM and 64-bit capable with 2 PCI-X buses allowing transfers of > 1GB/s each!

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Processor Speed-

Question - Hyperthreading (HT)? Is it good or bad for audio applications?

Independent test have concluded the following:

1. HT only benefits applications that are optimized for it (Cubase SX running plug-ins and soft synths/samplers) while others can crash and burn (Gigastudio 2.53) and require you to turn it off.
2. If an application continually crashes, try turning off HT in the BIOS.

Tip # 9 - Two processors will perform much better than HT if the application is optimized for them (Sonar, Vegas, Nuendo, Cubase SX, etc.)

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Processor Speed-

AMD Opteron and Athlon 64

- Beat INTEL to the 64-bit punch, but for how long? Cache wars...
- 64-bit capable processors available in 2.8 GHz Intel equivalents
- Athlon FX-53 Chip is 64-bit capable and has 1 MB L2 cache
- Opteron is currently the leading 64-bit chip in new dual processor installations, but Intel is fighting back with the XEON.
- 64-bit version of Windows XP is in beta right now.

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Processor Speed- So what about 64-bit?

- Currently technology without application - but not for long
- PowerMAC G5, Intel XEON, AMD Athlon64 and AthlonFX series are all 32-bit and 64-bit capable.
- 64-bit processing will have largest impact on reverb and calculation intensive operations and mix-bus bit depth (headroom).
- 64-bit version of Windows XP will be released Q3 2004.

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Processor Speed- So what about MAC G5 vs. DUAL XEON's
From the Apple Website-

Over Four Times More Plug-ins Than Pentium 4

To quantify the performance advantages of the Power Mac G5 for audio production, Apple tested Logic Pro 6.4.1. A Dual XEON was tested using Steinberg Cubase SX 2.0.1. Apple created a processor-intensive workload containing multiple unique audio tracks, assigned five default reverb plug-ins to each audio track and tested each platform to see which application could play more plug-ins.

Results- Apple G5 Dual 2.0 - 153 Plug-ins | Dual XEON – 106 plug-ins

Is this a fair test?

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Processor Speed- So what about MAC G5 vs. DUAL XEON's

- Is this a fair test? Not really. The plug-in's on the Apple were optimized for the G5 environment and Logic, while the plug-in's for Cubase were the 32-bit versions and not optimized.
- Conclusion #1: Use the real world, a fair test is almost impossible to pull-off.
- Conclusion #2: How fast is fast? If you design and optimize all aspects of the DAW, you should be able to do just about what ever you want.

Tip # 10 – Do not believe everything you read about speed test from a manufacturer. Look to independent tests

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Memory Type/Speed

RAMBUS –

- Fastest RAM available - Currently top speed is 1200 MHz (4.8 GB/Sec.)
- Chipset support is VERY rare. Only 7 currently produced motherboards support RAMBUS RAM
- RAMBUS memory is going up in price

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Memory Type/Speed

DDR – Double Data Rate

- DDR1 (current standard) is maxed out at DDR400/PC3200 400 MHz.
- Less expensive than RAMBUS by a factor of 2 or 3.
- DDR2 will start out as DDR2 533/PC5400 RAM 533 MHz.
- DDR2 533 RAM will provide 4.3 GB/Sec.
- Expect first chips in Summer 2004.
- DDR2 667 chips should arrive in the 2005-2006 time frame.
- DDR2 667 chips will provide 5.4 GB/Sec.

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Memory Type/Speed

Which type is best for your DAW?

- If your productions include lots of RAM based processing (loops, heavy plug-ins – reverb) spend extra here.
- Using the best memory will have a positive effect on the overall speed of your DAW.
- ECC is best if supported by your motherboard.
- Memory is a cheap way to speed up your machine.
- Memory type is dictated by the chipset on the motherboard.

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Hard Drive Speed/Interface Type-

<u>Interface Type</u>	<u>MAX. Throughput</u>
Firewire 400	50MB/Sec.
USB 2.0	60MB/Sec.
Firewire 800	100MB/Sec
EIDE (ATA100)	100MB/Sec.
EIDE (ATA133)	133MB/Sec.
Serial ATA	150MB/Sec.
SCSI Ultra 160	160MB/Sec.
Serial ATA RAID 0	300MB/Sec.
SCSI Ultra 320	320MB/Sec.

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Hard Drive Speed/Interface Type-

Audio recording is VERY data intensive:

<u>Bit Depth</u>	<u>Sample Rate</u>	<u>MB Per Minute/Track</u>	<u>MB/Sec.</u>
16	44.1 kHz	5	0.083333333
24	44.1 kHz	7.6	0.126666667
24	96 kHz	16.5	0.275
24	192 kHz	33	0.55

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Hard Drive Speed/Interface Type-

Audio recording is VERY data intensive:

<u>Bit Depth</u>	<u>Sample Rate</u>	<u>MB Per Minute/Mono Track</u>	<u>24 Mono Tracks Throughput/Min.</u>
16	44.1 kHz	5	120 MB
24	44.1 kHz	7.6	182.4 MB
24	96 kHz	16.5	396 MB
24	192 kHz	33	792 MB

What makes a great Digital Audio Workstation?

Speed/Throughput

Technology is your friend!

Hard Drive Speed/Interface Type-So how do they compare?

<u>Interface Speed</u>	<u>Tracks 16/44.1</u>	<u>Tracks 24/44.1</u>	<u>Tracks 24/96</u>	<u>Tracks 24/192</u>
100 MB/Sec. (ATA 100)	1200	790	364	182
133 MB/Sec. (ATA 133)	1596	1050	484	242
150 MB/Sec. (Serial ATA)	1800	1184	545	272.5
160 MB/Sec. (SCSI Ultra 160)	1920	1263	582	291
320 MB/Sec. (SCSI Ultra 320)	3840	2526	1164	582

What makes a great Digital Audio Workstation?

Speed/Throughput

Hard Drive Speed/Interface Type-

- So why can't my current music PC handle this many tracks?

Many reasons:

1. Fragmented hard drives – defrag as often as possible
2. Speed ratings are interface maximums, not actual throughputs capability of drives- RAID Arrays solve this.
3. Drives hit their max. throughput before the interface does
4. PCI (legacy) Bus Speed Limitations - 133MB/sec. - PCI-X 2.5 GB/sec.
5. Rotation Speed and Ave. Seek time of drives affects drive throughput.
6. OS overhead.
7. Bus Speed Limits.

What makes a great Digital Audio Workstation?

Speed/Throughput

Hard Drive Speed/Interface Type-

- So what's best for my DAW?
 - SCSI is still the fastest due to faster rotational speeds and lower seek times (15K RPM drives in the 3.6 ms range). If you do recording, editing, mixing on your DAW, SCSI is the best way to go – RAID, etc.
 - SCSI is easily expandable – up to 15 devices on one channel.
 - SCSI is great for networked environments for centralized data storage and backup.
 - SCSI drives are the most expensive and 15K RPM drives are noisy

What makes a great Digital Audio Workstation?

Speed/Throughput

Hard Drive Speed/Interface Type - So what is Serial ATA?

- Serial ATA is a "serial" architecture as opposed to "parallel" ATA internal disc drive bus.
- Serial ATA integrates CRC on the command and data packet level for enhanced bus reliability- 99.998% accurate.
- Serial ATA is very cost effective.
- Hot-swappable and scalable – could reach 600 MB/sec. Interface speed in the future once drive manufacturers provide them.
- Motherboard manufacturers supplying onboard controllers common.
- Drive manufacturer support is strong.
- 10K RPM/73 GB drives with 5.6 ms seek time are available/excellent choice.
- Can be configured in a RAID array approaching 300 MB/Sec.

What makes a great Digital Audio Workstation?

Speed/Throughput

Hard Drive Speed/Interface Type-FireWire800

- Advantages and disadvantages of Firewire-based recording

Advantages

- Portability – Can be moved from machine to machine easily
- Removes traffic from the PCI-Bus if Firewire port is integrated on the motherboard
- Hot-swappable
- Cascade-capable

Disadvantages

- Currently slower than ATA or Serial ATA
- Throughput limits are real-chipset dependant

What makes a great Digital Audio Workstation?

Speed/Throughput

Hard Drive Speed/Interface Type-FireWire800

- Solution - Firewire 800-based Storage Arrays- FirePort800

Advantages

- Rackmountable, hot-swappable, portable
- Eliminates internal storage bottlenecks on G5 and others
- Backward compatible with Firewire 400 systems
- Expandable with extra drive trays
- Add extra bullet-proof storage in seconds
- Available in Dual Firewire 800, RAID 0, or RAID 1 arrays
- Great for a backup/restore solution
- Quiet and sturdy – ready for the studio, the road, anywhere

What makes a great Digital Audio Workstation?

Speed/Throughput

Tip #11 - Drive Optimization Drive Partitioning

- Important for audio drives
- Use a tool like Partition Magic or the OS supplied disk tools
- Allows you to create multiple logical drives from one physical drive
- Allows you to reallocate space based on needs
- Always partition your System Drive to isolate important non-system data from the OS partition. If you ever have to re-install the OS, your data is left untouched-Great for backups too
- Large drives will perform better when partitioned
- Partition and name according to workflow (I.e. Pro Tools Drive, Sonic Foundry Drive, Samples Drive, etc.)

What makes a great Digital Audio Workstation?

Speed/Throughput

Win XP Pro Tweaks-

See the updated list at :

http://www.digital-groove.com/gm/win_xp_pro_tweaks.asp

What makes a great Digital Audio Workstation?

Speed/Throughput

OS X Tweaks-

- Update to OSX 10.3.3.
- Update Oxford 922 chipsets for Firewire drives.
- Set Power Scheme to Highest for desktops, default is Automatic.
- When using OSX10.3.4 – disable Indexing Services

What makes a great Digital Audio Workstation?

Noise Level

Custom-built music computers include:

- Silent fans for CPU, case, chipset, and video cards.
- Sound absorbing foam inside the case.
- Sound proof cases made of materials to reduce drive noise and vibration
 - longer lasting drives!
- Quiet Power Supplies and Drives.

What makes a great Digital Audio Workstation?

So why buy a custom built computer designed for music production?

Custom-built music computers include:

- Silent fans for the CPU, case, chipset, and video card.
- Sound absorbing foam inside the case.
- Rack mountable solutions.
- Sound proof cases made of materials to reduce drive noise and vibration – longer lasting drives!
- Quiet Power Supplies and Drives.
- Optimized OS for maximum throughput.
- No cut corners on components that will cost you later.
- Dual Head video cards that are designed for music production, not gaming.
- Greater storage options – 6 drives, removable drive bays, RAID.
- **Expandability = ROI.**

What makes a great Digital Audio Workstation?

Summary

The right combination of software and hardware with the right configuration will keep your DAW happy and you happy with your DAW.

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Thanks for coming!!!!

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