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Week 3 Assignment

Using APA format, give short answers to each of the following:

1. Describe current and emerging nonvolatile RAM technologies. What advantages are potentially offered by the emerging technologies as compared to current flash RAM technology?

Flash RAM is the most common Nonvolatile Memory (NVM) in use today; however, it performs much slower than DRAM and suffers cell destruction after 100k or more write operations. Ferroelectric RAM embeds a crystal of metallic compound within the bit circuitry, where a center atom is moved across the crystal to represent a binary state; however, this form of RAM is subject to cell-destruction despite increased access speeds. Polymer Memory uses plastic with electrical resistance that can be increased or decreased with an electrical field. Polymer Memory is lower-cost and nondestructive; however, research is still focused on efficiency.

2. What problems contribute to read/write errors on magnetic tapes? Are these problems also present with other magnetic storage media/devices?

Magnetic tapes, like other magnetic storage devices, is subject to magnetic decay; however, this problem is elevated in magnetic tapes, because the tape is wound upon itself, pushing more magnetic charges together and weakening their strength. Additionally, magnetic tapes are subject to stretching and friction from being wound, unwound, and rubbing against mechanical components.

3. What is an interrupt? How is an interrupt generated? How is it processed?

An interrupt is a signal from a hardware device or software to the CPU. An interrupt can be generated from an error or state in the machine. When the CPU receives an interrupt, it takes its current list of processes and puts them on the stack for processing after it handles the interrupt. Too many interrupts from devices can cause an Interrupt Storm, where the CPU gets stuck in an endless process of handing interrupts.

Rosenthal, Scott, *Interrupts might seem basic, but many programmers still avoid them.*

SLTF Consulting. Retrieved January 28, 2009 from the SLTF website:

<http://www.sltf.com/articles/pein/pein9505.htm>

Evilbitz, Interrupts and Interrupt-Controllers. The Zana Zen. Retrieved January 28, 2009

from evilbitz website: <http://www.evilbitz.com/2006/12/08/interrupts-and-interrupt-controllers/>

4. What is the difference between lossy and lossless compression? For what types of data

is lossy compression normally used?

Lossless compression suffers no data loss in the compression process, while lossy compression does lose some data. Lossy compression is normally used in the storage of audio and video data, where the human senses don't mind a slight loss of quality. For instance, MP3 audio compression is able to compress audio data into very small files by eliminating any sounds the human ear cannot detect.

Thomas Wilburn, *The AudioFile: Understanding MP3 compression*, ars technical, December 2007. Retrieved from the internet on Feb 2, 2009:

<http://arstechnica.com/old/content/2007/10/the-audiofile-understanding-mp3-compression.ars>

5. What is a multicore processor? What are its advantages compared to multi-CPU architecture? Why have multicore processors only recently become available?

A multicore processor stores multiple processors and cache memory on a single chip, while multi-CPU processors store multiple processors on a single bus. Multicore processors are much faster than multi-CPU processors due to this compounding of components. Multicore processors are more expensive than multi-CPU, and are expected to gain market share as prices decrease.