CMU 18-746	Storage Systems	Assigned: 13 Jan 2010
Spring 2010	Homework 0	Due: 20 Jan 2010

Our intent with this homework is to get you thinking about storage-related topics from your previous courses. You should make sure you can answer these questions easily; if not, please review the appropriate undergraduate OS material. This homework does not need to be turned in.

Problem 1 : Locality of reference.

Define *spatial locality* and *temporal locality* in the context of a file system's buffer cache.

Problem 2 : Virtual memory.

(a) What is *swapping* and when does it occur?

(b) What is a *page fault*? List the steps involved in handling a page fault.

Problem 3 : Polling and interrupts.

Define *polling* and *interrupt-driven notification* in the context of I/O devices. Give one advantage of each approach.

Problem 4 : Application I/O.

(a) Explain the difference between an *I/O-bound process* and a *CPU-bound process*.

(b) Explain the difference between *blocking I/O* and *non-blocking I/O*.

Problem 5 : Programmed I/O and DMA.

(a) What is *DMA*? What is *Programmed I/O*?

(b) Give an example of a device in a typical computer system that uses DMA, and a device that uses Programmed I/O. In general, when is it better to use DMA?

Problem 6 : Communications networks.

(a) Define *latency* and *bandwidth* in the context of the World Wide Web.

(b) Explain what a *Hamming code* is. How does the use of Hamming codes differ from parity-based error detection?