Homework 5: Segmentation, Interrupts and Polling

Answer the following questions.

1. What are the pros and cons of interrupts and polling? [0.5]

2.
```
struct list {
    int value;
    struct list *next;
};

int readval(struct list *node) {
    return node->value;
}

readval:
mov 4(%esp), %eax
mov (%eax), %eax
ret
```

   Consider the linked list implementation above. A node in the linked list contains a `value`. `readval` routine takes a pointer to a linked list node as an argument and returns the `value` of the node. The assembly corresponding to `readval` is also shown above. The OS is using segmentation hardware for memory isolation. The GDT contains only one entry corresponding to the process that contains the base and size of the process. The GDT indexes in `cs`, `ds`, `ss`, and `es` registers are always set to the index of the process's entry in GDT. The process is not using `fs` and `gs` registers.

   How do you design a system where the process can share the nodes in the linked list with all processes via shared memory. In other words, all processes should be able to access the linked list directly in the user-mode via the virtual addresses. You can assume that none of the processes are using `fs` and `gs` registers. What support will be needed from the OS? What will be the assembly code corresponding to `readval` in your scheme? [1.5]

3. Suppose, apart from DMA, the network device also provides an interface to write a network packet to the device memory using MMIO. If you have

a choice between MMIO and DMA for sending network packets, what will be your preference? Justify your answer. [1]

How to submit

Submit your handwritten homework in the submission box placed at the old academic building (2nd floor). The box will be placed on days when the homework is due.