

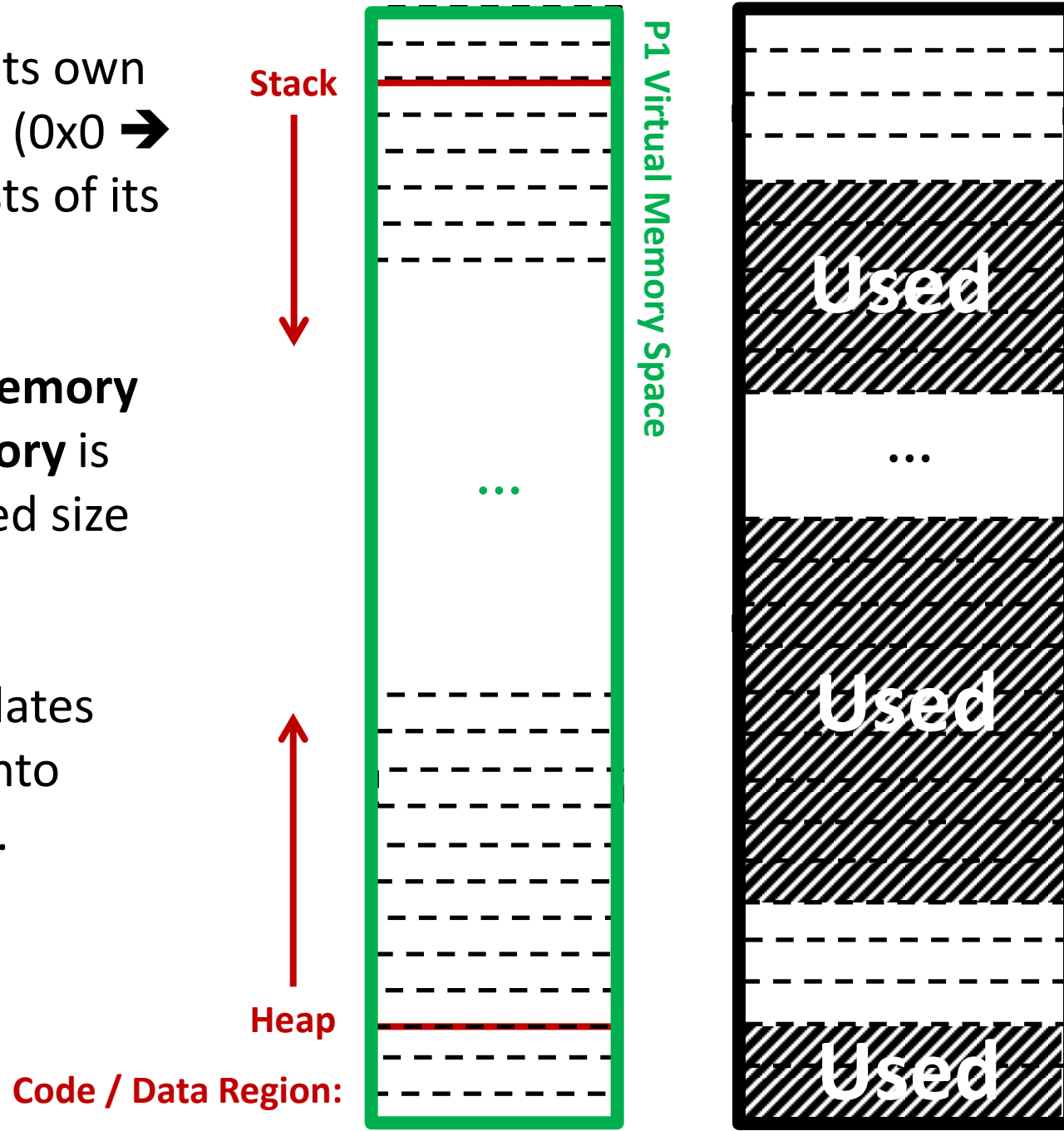
# Heap Memory

CS 241

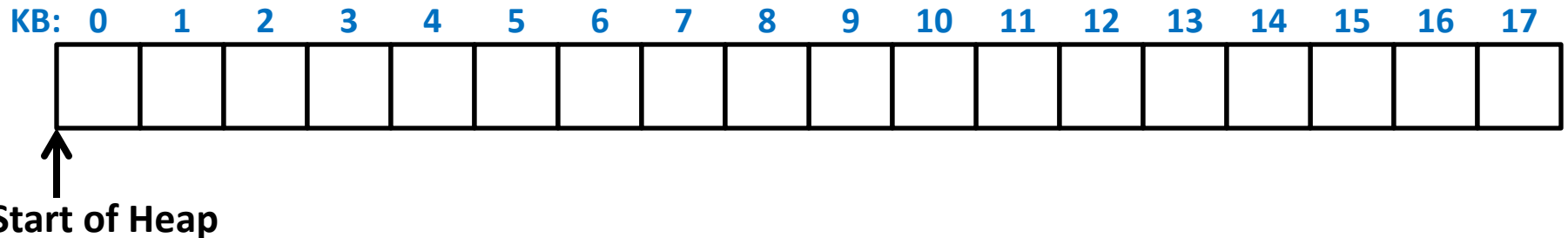
Sept. 8, 2013

## From Friday

- Every process has its own **addressable space** (0x0 → 0xF..FF) that consists of its virtual memory.
- Both the **virtual memory** and **physical memory** is divided up into fixed size **pages**.
- A **page table** translates virtual addresses into physical addresses.



```
void main() {  
    void *a = malloc( 3 * 1024 );  
    void *b = malloc( 6 * 1024 );  
    void *c = malloc( 4 * 1024 );  
    free(b);  
    void *d = malloc( 5 * 1024 );  
    free(c);  
    void *e = malloc( 4 * 1024 );  
}
```



# Heap Memory Strategies

- Best Fit:
- Worst Fit:
- Next Fit:
- First Fit:

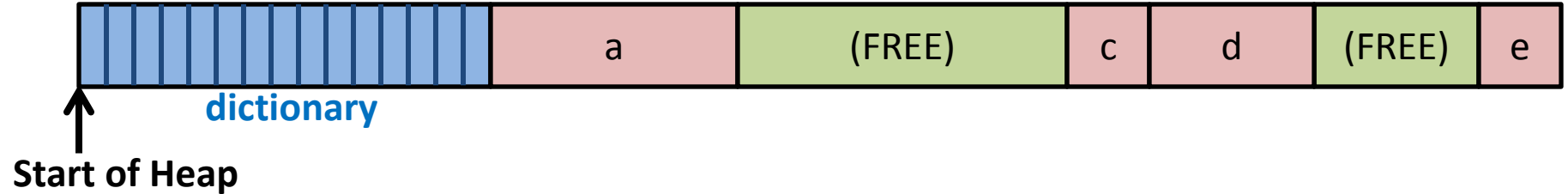


# Heap Allocation Requirements

- **malloc()/free()** requires knowledge about:
  - 1.
  - 2.

# Strategy #1: Dictionary

- Store a dictionary of all heap entries at the beginning of the heap:



# Strategy #1: Dictionary

- Advantages:

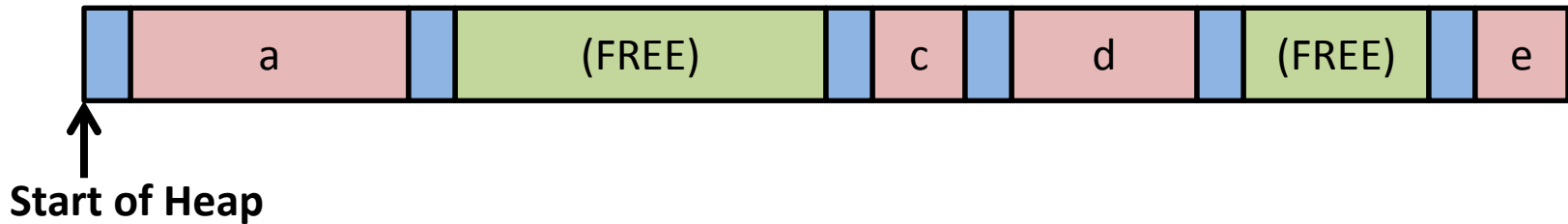
- Disadvantages:





# Strategy #2: Metadata

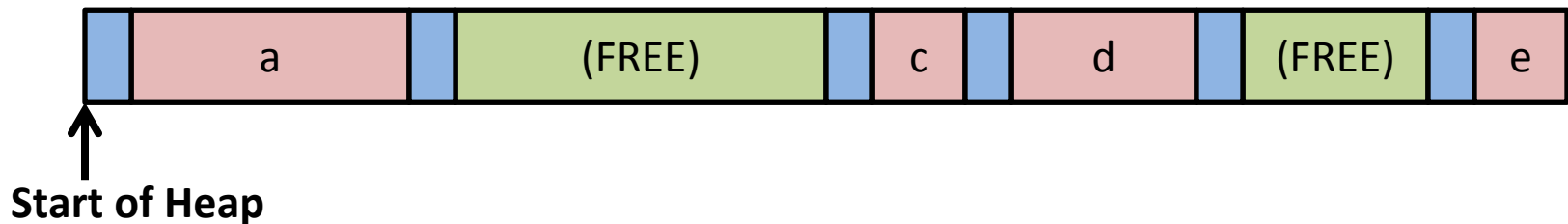
- Before every entry, store metadata about the entry.



# Strategy #2: Metadata

- Advantages:

- Disadvantages:



# Metadata Optimizations



# Metadata Optimizations



# Metadata Optimizations

