Paging III

CS 241
Sept. 18, 2013
int subtract(int a, int *b) {
    int c = a - *b;
    return c;
}

int add(int a, int *b) {
    int c = a + *b;
    return c;
}

void main() {
    int a = 4;
    int *b = malloc(sizeof(int));
    *b = 7;
    int c = add(a, b);
    int d = subtract(c, b);
}
int subtract(int a, int *b) {
    int c = a - *b;
    return c;
}

int add(int a, int *b) {
    int c = a + *b;
    return c;
}

void main() {
    char *b = malloc(sizeof(int));
    *(b + 1000) = 9;
}
Segmentation Faults

- A “Seg Fault” occurs when an access is made to a virtual memory address that cannot be resolved.
x86 Page Table

• In x86:
  – Pages are 4 KB in size
  – Virtual Addresses are 32-bits
  – Each PTE is 4 B in size

• How large is the Page Table for each process?
Multi-Level Page Table

• **Solution**: Create multiple levels of tables to look up a physical memory address.
Multi-Level Page Tables

• Each virtual address can now be divided into (n+1) different pieces for an (n) level page table.
  – **Example:** Two Level Page Table:
    • First Level Page Number
    • Second Level Page Number
    • Page Offset
• Given
  – 32-bit Virtual Addresses
  – 4 KB Pages
  – 12-bit First Level Page Table Number

• What are the components of the address: 0x48503423