Computer Science 50

Introduction to Computer Science I

Harvard College

Week 4

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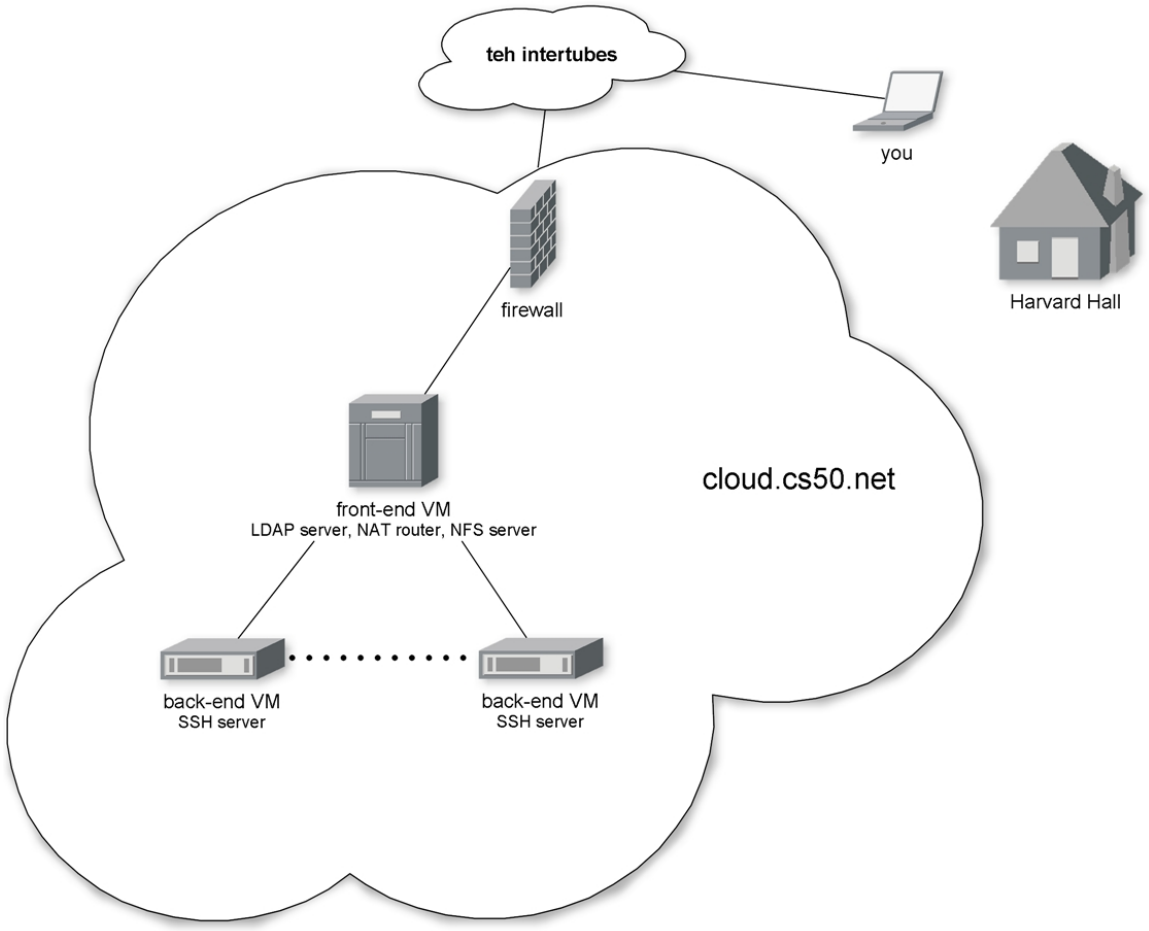
Thanks to Amazon



Thanks to Microsoft

Passing by Value

```
void
swap(int a, int b)
{
    int tmp;

    tmp = a;
    a = b;
    b = tmp;
}
```

see
`buggy3.c`

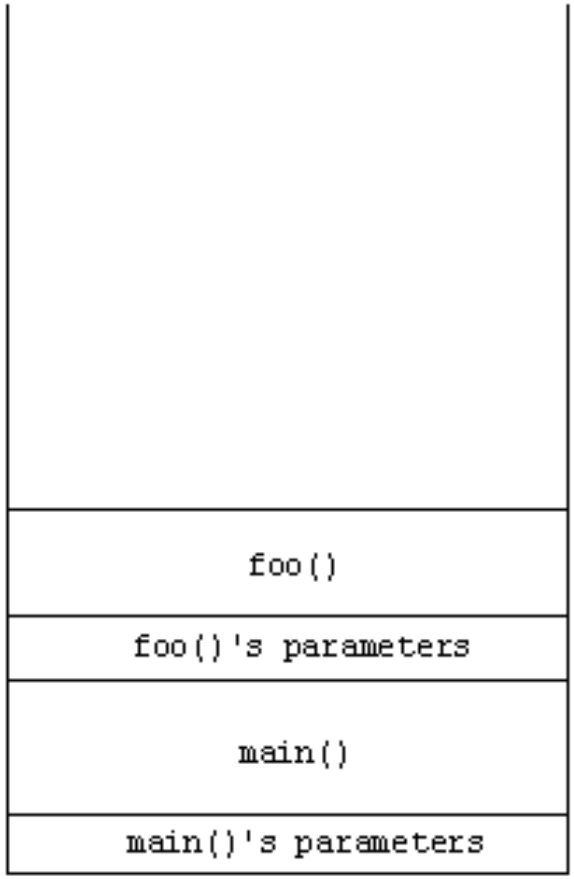
Passing by Reference

```
void
swap(int *a, int *b)
{
    int tmp;

    tmp = *a;
    *a = *b;
    *b = tmp;
}
```

see
swap.c

The Stack
Revisited



Pointers

```
int i, j;
int *p;
```

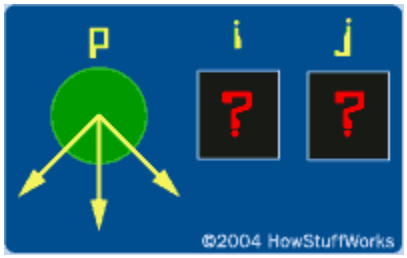


Image from http://computer.howstuffworks.com/c22.htm.

Pointers

```
p = &i;
```

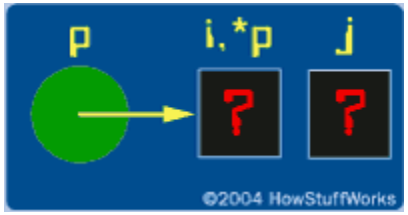


Image from http://computer.howstuffworks.com/c22.htm.

Pointers

```
*p = 5;
```

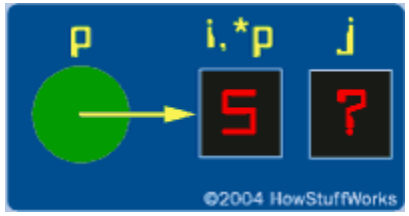
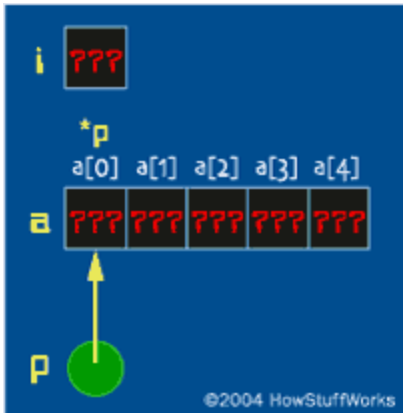


Image from http://computer.howstuffworks.com/c22.htm.

Arrays as Pointers

```
int i;
int a[5];
int *p = a;
```



see
`compare{1,2}.c, pointers{1,2}.c`

Image from http://computer.howstuffworks.com/c22.htm.

Dynamic Memory Allocation

malloc

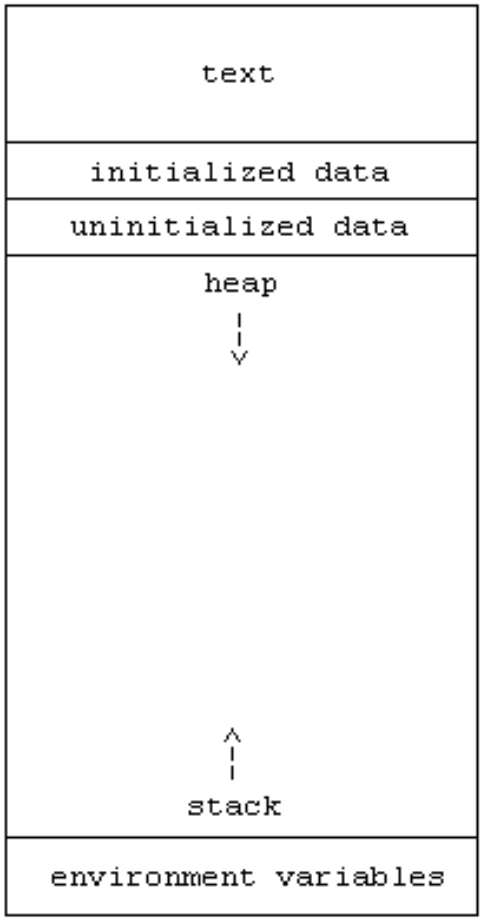
```
// get line of text
printf("Say something: ");
char *s1 = GetString();
if (s1 == NULL)
    return 1;

// allocate enough space for copy
char *s2 = malloc(strlen(s1) * sizeof(char) + 1);
if (s2 == NULL)
    return 1;
```

see
copy{1,2}.c

Memory Management

Revisited



CS 50's Library
Revisited

- `bool`
- `string`

- `char GetChar();`
- `double GetDouble();`
- `float GetFloat();`
- `int GetInt();`
- `long long GetLongLong();`
- `string GetString();`

see
`scanf{1,2,3}.c, http://cs50.net/pub/releases/cs50/cs50.{c,h}`

struct

(and header files)

```
typedef struct
{
    int id;
    char *name;
    char *house;
}
student;
```

see
structs1.c

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