L3: Naming systems

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http://web.mit.edu/6.033
Fundamental abstractions

- Memory
  - Read/write
- Interpreter
  - Instruction repertoire
  - Environment
  - Instruction pointer
- Communication links
  - Send/receive

(loop (print (eval (read))))
World-wide Web

Figure 2  Three-tier architecture
Web names

http://web.mit.edu/6.033

3 naming systems

https://apply.eecs.mit.edu/ex?whatnext=ctlmyfolders&submitted=on&onlyreader=kaashoek

name overloading: user query in the name

ex is a new interpreter
PC board
address is overloaded name with location info

LOAD 1742, R1
Names

- R1
- 1742
- 18.7.22.69
- web.mit.edu
- http://web.mit.edu/6.033
- 6.033-staff@mit.edu
- amsterdam
- /mit/6.033/www
- foo.c
- .. (as in cd .. or ls ..)
- wc
- (617)253-7149, x37149
- 021-84-2030
Naming example

foo (...) {
    int x, y;
    init()
    x = bar(...) 
    y = sqrt(x)
    printf ("answer is %d", y)
}

init() { ...}
Step 1: compilation

foo (...) {
    int x, y;
    init();
    x = bar(...);
    y = sqrt(x);
    printf ("answer is %d", y);
}

init() {
...
}

gcc -c foo.c

foo.o:
- Text:
  0xff00: // foo:
    jmp +20 // init()
    ...
    jmp ??? // sqrt
    ....
- Symbol table:
  [init, L, +20]
  [bar, U, ??]
  [sqrt, U, ??]
  [printf, U, ??]
Step 2: linking

- Gcc foo.o bar.o /usr/lib/libm.a /usr/lib/libc.a

foo.o:
- Text:
  0xff00: // foo:
  jmp +20 // init()

- Symbol table:
  [init, L, +20]
  [bar, U, ??]
  [sqrt, U, ??]
  [printf, U, ??]

+ 

libm.a (sqrt.o, foo.o):

sqrt.o:
- Text:
  0xff00: // sqrt:
  jmp +20 // init()

- Symbol table:
  [init, L, +20]
  [sqrt, G, +100]
Step 3: loading

- Load in memory and adjust addresses:

```
0xff00: // foo:
  ...
  jmp 0xff20 // init
  ...
  jmp 0xffd0 // bar
  ....
  jmp 0xffc0 // sqrt
  ...
  jmp 0xdc00 // printf
```
Sophistication: dynamic linking

- Resolve names at runtime through indirection
Summary

• Understanding a naming system:
  • What is the syntax for name?
  • What are the values?
  • What is the naming resolution algorithm?
  • Where does a name’s context from?