Supporting skills for lab and DNS

10/23/15
Recall: Requesting a webpage

GET / HTTP/1.1
Host: cs.knox.edu

What the client thinks the server is called (⁈)

requested action

filename
protocol version number
And now I want interactive web pages and shopping carts...
Automating a web page request

• Read URL and split into hostname and file

• Open the socket:
  
  int sock = SetupTCPClientSocket(hostname, "http");

• Send the request
  
  send(sock, "GET ", 4, 0);  //check return val
  send(sock, file, strlen(file), 0);
  send(sock, "\nHost: ", 7, 0);
  ...

• Receive the response
Recall: Programs in multiple files

• Provide prototypes for functions in other files:
  
  ```
  #include "Practical.h"
  ```

• Compile all the code together:
  
  ```
  gcc ... browser.c TCPClientUtility.c DieWithMessage.c
  ```
Recall: Programs in multiple files

- Provide prototypes for functions in other files:
  
  \#include "Practical.h"

- Compile all the code together:
  
  gcc ... browser.c TCPClientUtility.c DieWithMessage.c

Quotes instead of <> because this isn’t a system .h file
Separate compilation

• When a program contains multiple .c files, can compile them separately:
  
gcc –Wall –std=gnu99 –c file1.c //creates file1.o
  
gcc –Wall –std=gnu99 –c file2.c //creates file2.o

• Then combine them in a final step:
  
gcc –Wall –std=gnu99 –o program file1.o file2.o

• Can be automated with a Makefile
Why would you want to use separate compilation?

A. Faster to compile just 1 file when looking for errors
B. Can result in a more efficient executable
C. Don’t have to recompile unchanged files during development
D. Mastery of obscure command line options earns extra “geek cred”
E. Not exactly one of the above
Why would you want to use separate compilation?

A. Faster to compile just 1 file when looking for errors
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D. Mastery of obscure command line options earns extra “geek cred”
E. Not exactly one of the above (A and C)
Debugging with GDB

• Compile –g flag
• Start gdb: gdb executable
• Useful commands:
  b  Set a breakpoint  e.g. b main
  r  Run
  n  Next line, going over functions on that line
  s  As n, but stepping into the function
  p  Print a variable  e.g. p x
  bt  Print stack trace that got to current place
Domain Name Service (DNS)

Converting hostnames into IP addresses
Getting address: System perspective

- Look it up in hosts.txt file, downloaded nightly from central server

(For some reason, this approach didn’t scale)
Delegating authority

Top-level domains: .com .edu ... .jp
Delegating authority

Top-level domains: .com .edu ...

created subdomains: knox.edu

specific hosts: www.knox.edu cs.knox.edu
Delegating authority

Top-level domains: .com .edu ... .jp

created subdomains: knox.edu

specific hosts: www.knox.edu cs.knox.edu

Each domain provides nameserver that knows its children’s IP addresses; same servers used by members of that domain
Looking up a name

www.cs.huji.ac.il?

my computer

Knox NS
Looking up a name

www.cs.huji.ac.il?

Knox NS -> .il NS

www.cs.huji.ac.il?

my computer
Looking up a name

www.cs.huji.ac.il?

Knox NS

.il NS

www.cs.huji.ac.il?

my computer

.ac.il NS

www.cs.huji.ac.il?
Looking up a name

my computer

Knox NS

.il NS

.ac.il NS

huji.ac.il NS

www.cs.huji.ac.il?
Looking up a name

Knox NS → .il NS

my computer → www.cs.huji.ac.il?

www.cs.huji.ac.il? → .ac.il NS

www.cs.huji.ac.il? → huji.ac.il NS

www.cs.huji.ac.il? → .cs.huji.ac.il NS
Looking up a name
How messages would this protocol require to provide my computer (on campus) with the IP address of mail.google.com?

A. 3
B. 4
C. 6
D. 8
E. Some other value
How messages would this protocol require to provide my computer (on campus) with the IP address of mail.google.com?

A. 3
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