CLIENT-SERVER ARCHITECTURE & HTTP

CLIENTS & SERVERS

- Client requests a resource
- Server responds with resource
- These are *roles* — not technical specs or computer types

CLIENTS & SERVERS

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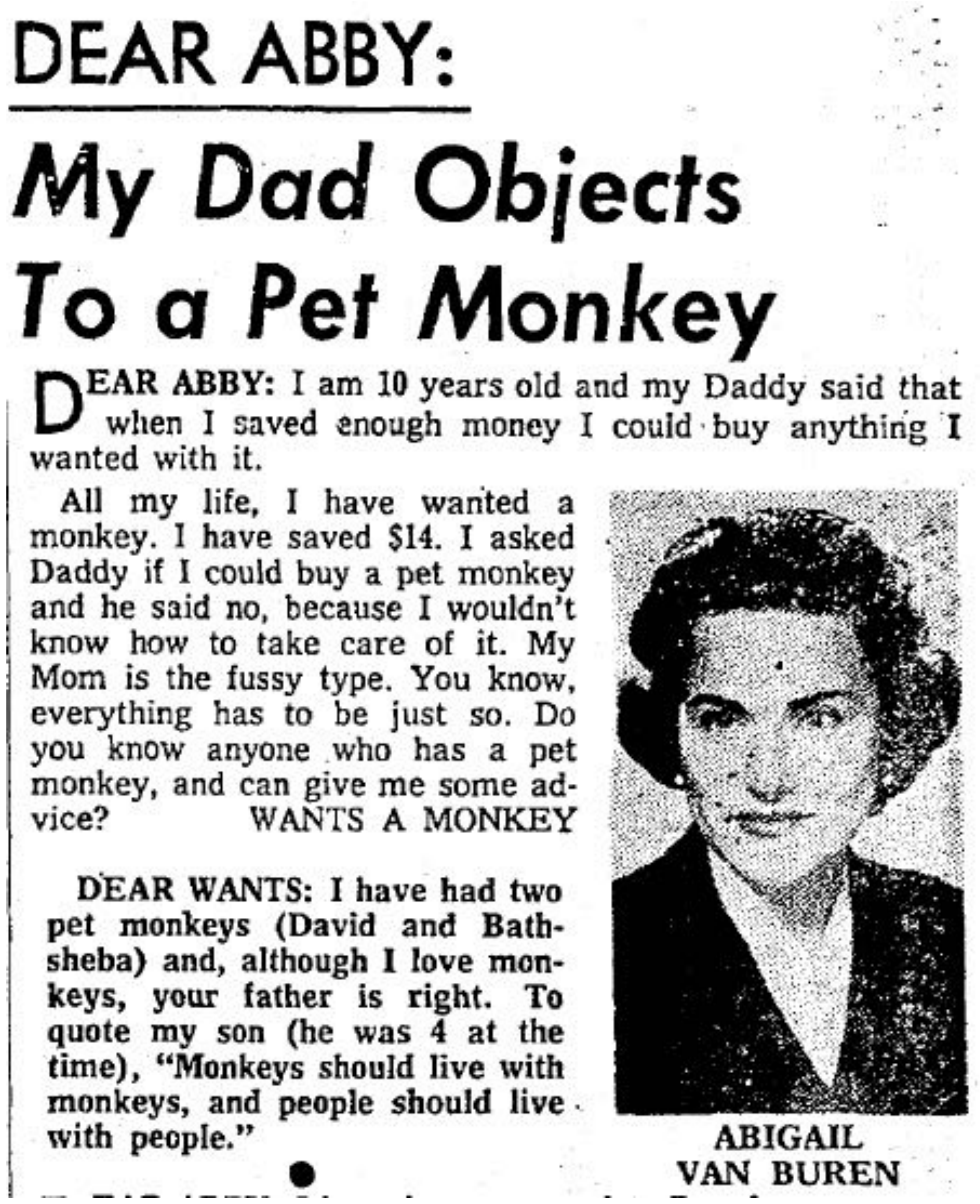


DEAR ABBY:

My Dad Objects To a Pet Monkey

DEAR ABBY: I am 10 years old and my Daddy said that when I saved enough money I could buy anything I wanted with it.

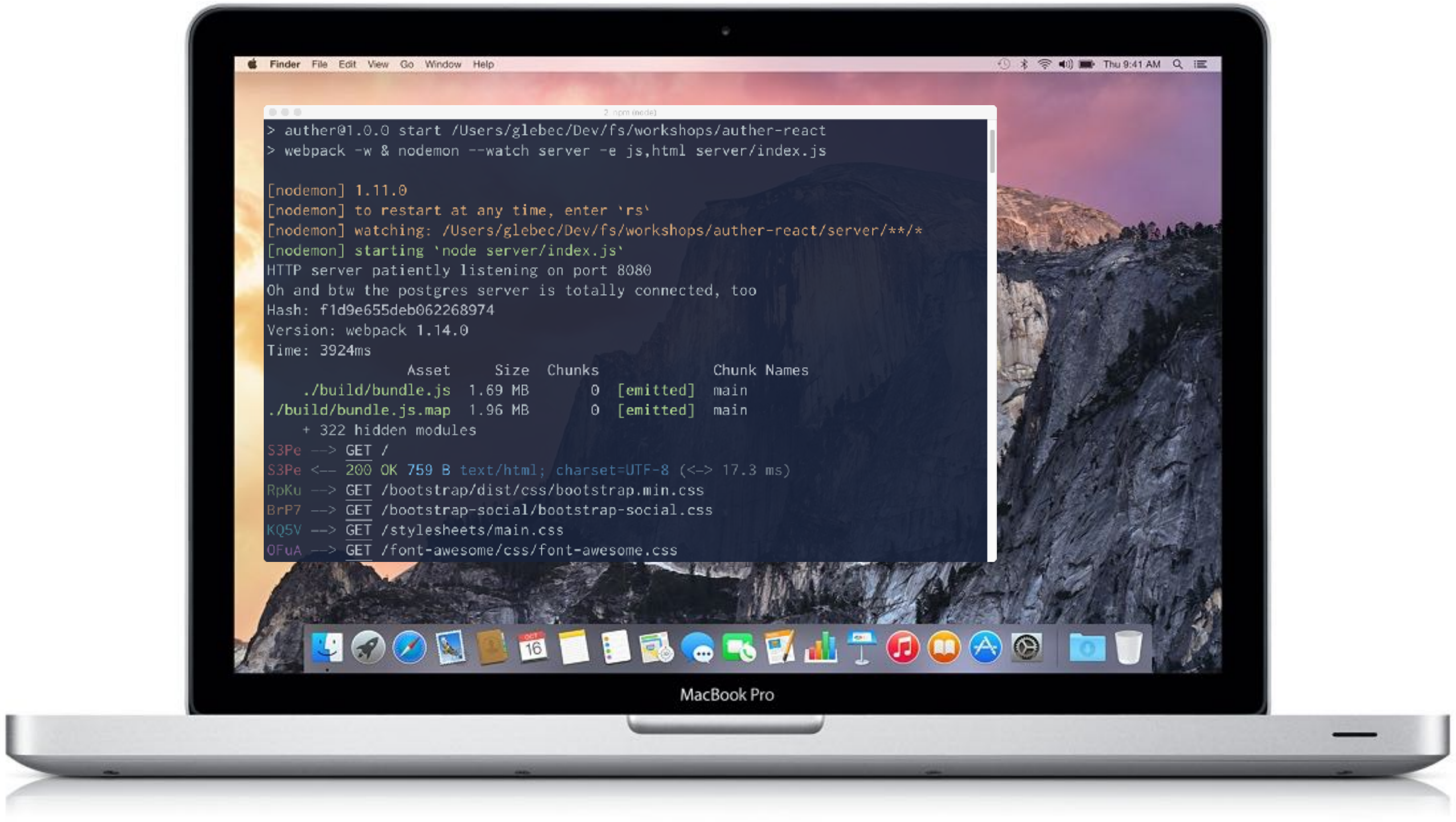
All my life, I have wanted a monkey. I have saved $14. I asked Daddy if I could buy a pet monkey and he said no, because I wouldn't know how to take care of it. My Mom is the fussy type. You know, everything has to be just so. Do you know anyone who has a pet monkey, and can give me some advice? WANTS A MONKEY

DEAR WANTS: I have had two pet monkeys (David and Bathsheba) and, although I love monkeys, your father is right. To quote my son (he was 4 at the time), "Monkeys should live with monkeys, and people should live with people."

ABIGAIL VAN BUREN

CLIENTS & SERVERS

CLIENTS & SERVERS



```
> auther@1.0.0 start /Users/glebec/Dev/fs/workshops/auther-react
> webpack -w & nodemon --watch server -e js,html server/index.js

[nodemon] 1.11.0
[nodemon] to restart at any time, enter `rs`
[nodemon] watching: /Users/glebec/Dev/fs/workshops/auther-react/server/**/*
[nodemon] starting `node server/index.js`
HTTP server patiently listening on port 8080
Oh and btw the postgres server is totally connected, too
Hash: f1d9e655deb062268974
Version: webpack 1.14.0
Time: 3924ms
                Asset     Size  Chunks             Chunk Names
    ./build/bundle.js  1.69 MB       0  [emitted]  main
./build/bundle.js.map  1.96 MB       0  [emitted]  main
    + 322 hidden modules
S3Pe --> GET /
S3Pe <-- 200 OK 759 B text/html; charset=UTF-8 (<-> 17.3 ms)
RpKu --> GET /bootstrap/dist/css/bootstrap.min.css
BrP7 --> GET /bootstrap-social/bootstrap-social.css
KQ5V --> GET /stylesheets/main.css
OFuA --> GET /font-awesome/css/font-awesome.css
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CLIENTS & SERVERS

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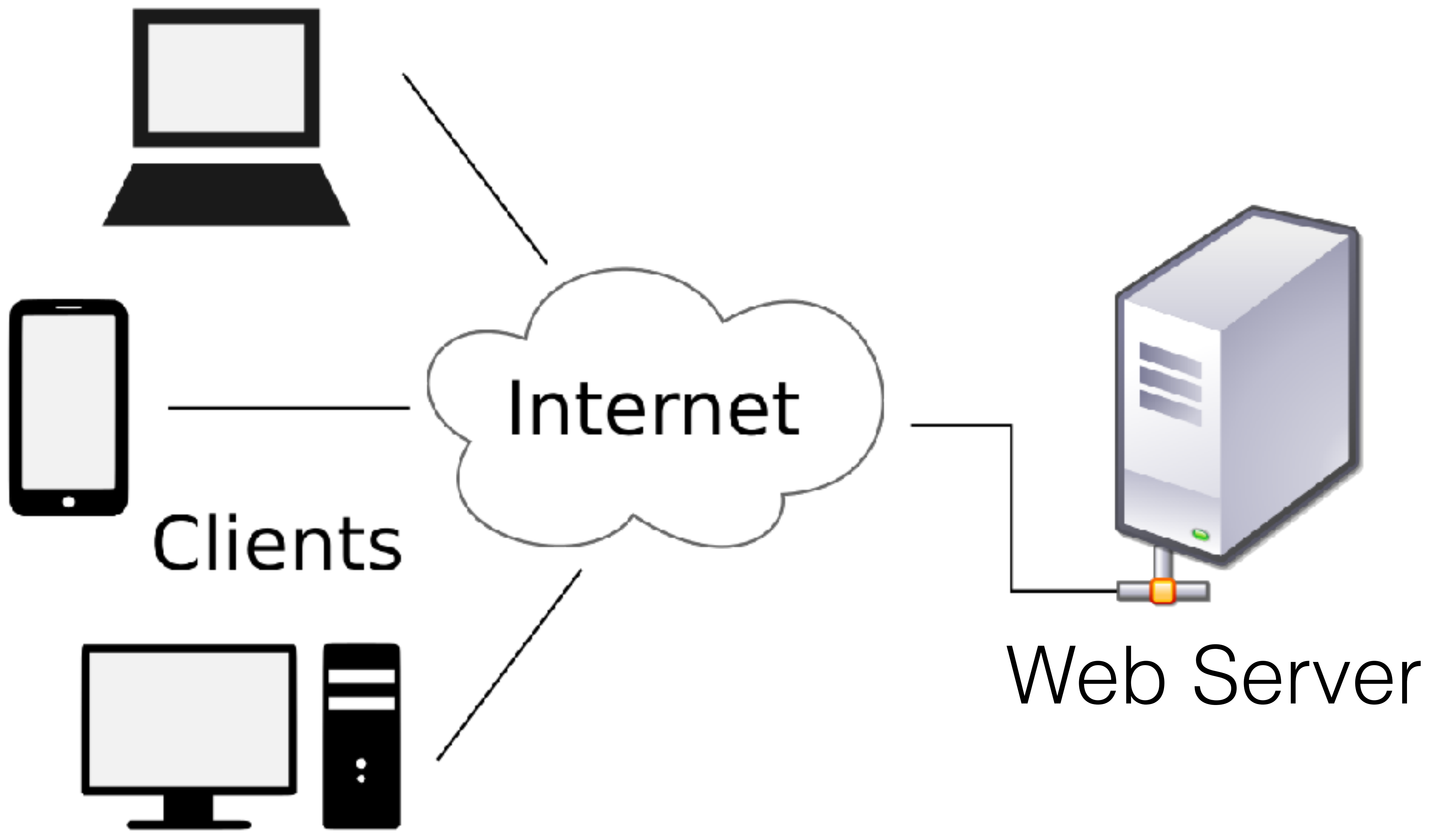
WEB SERVERS

- **Processes (running programs) not physical machines**
  - Might be running on a laptop,
  - or a Raspberry Pi,
  - or an enterprise-grade workstation…
- **Listening on a port for incoming requests**
- **Send back responses**



INTERNET COMMUNICATION PROTOCOLS

AFP

BitTorrent

HTTPS

TCP

POP

9P

IMAP

BGP

HTTP

UDP

SCP

SSL

ICMP

FTP

SSH

IP

PPP

NFS

SMTP

PROTOCOL

- Rules for interaction / communication
- Specification, not implementation

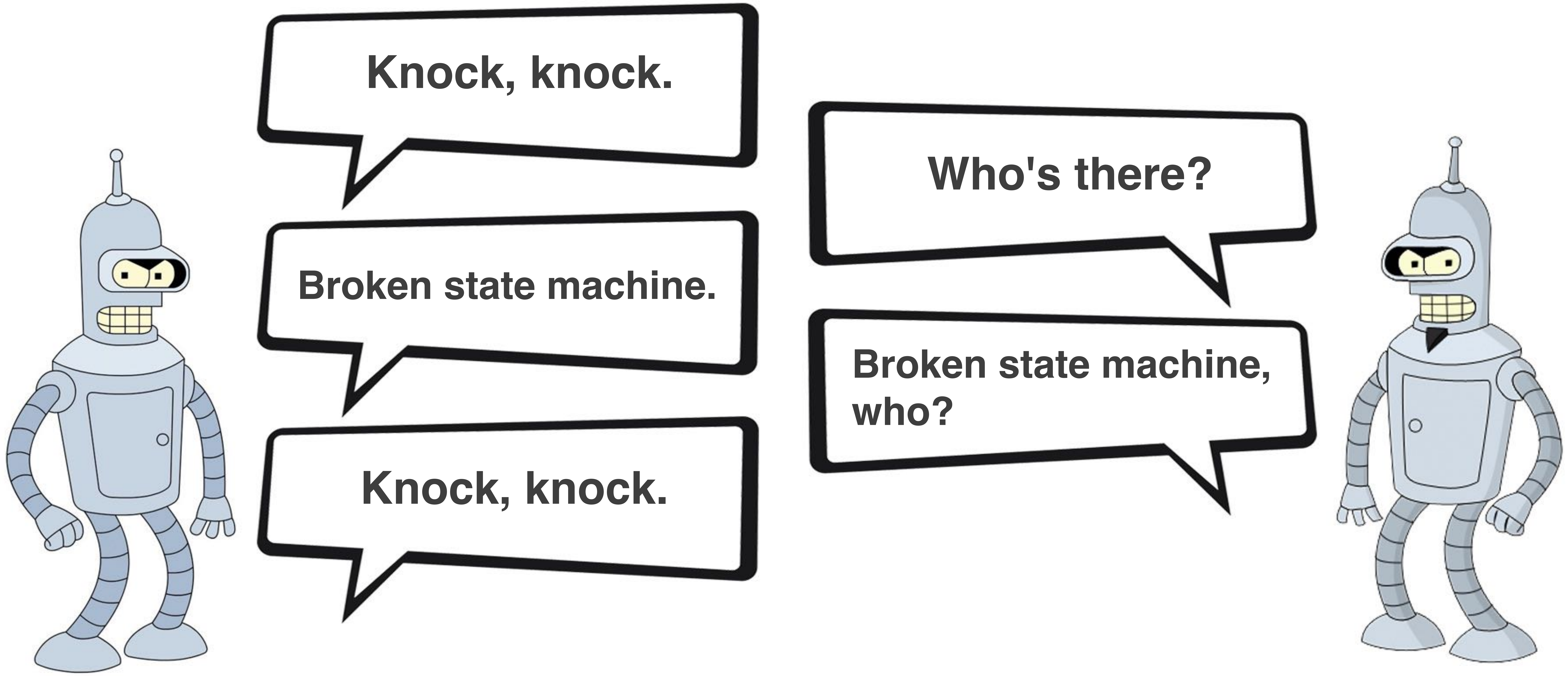
THE KNOCK-KNOCK MESSAGE PROTOCOL

- Joker opens connection with "knock, knock."
- Victim completes handshake with "who's there?"
- Joker transmits identity label: "<IDENTITY>"
- Victim requests clarification: "<IDENTITY> who?"
- Joker delivers payload: "<PUNCHLINE>"
- Joke is now delivered, close connection. Participants may optionally laugh and/or dodge fists.

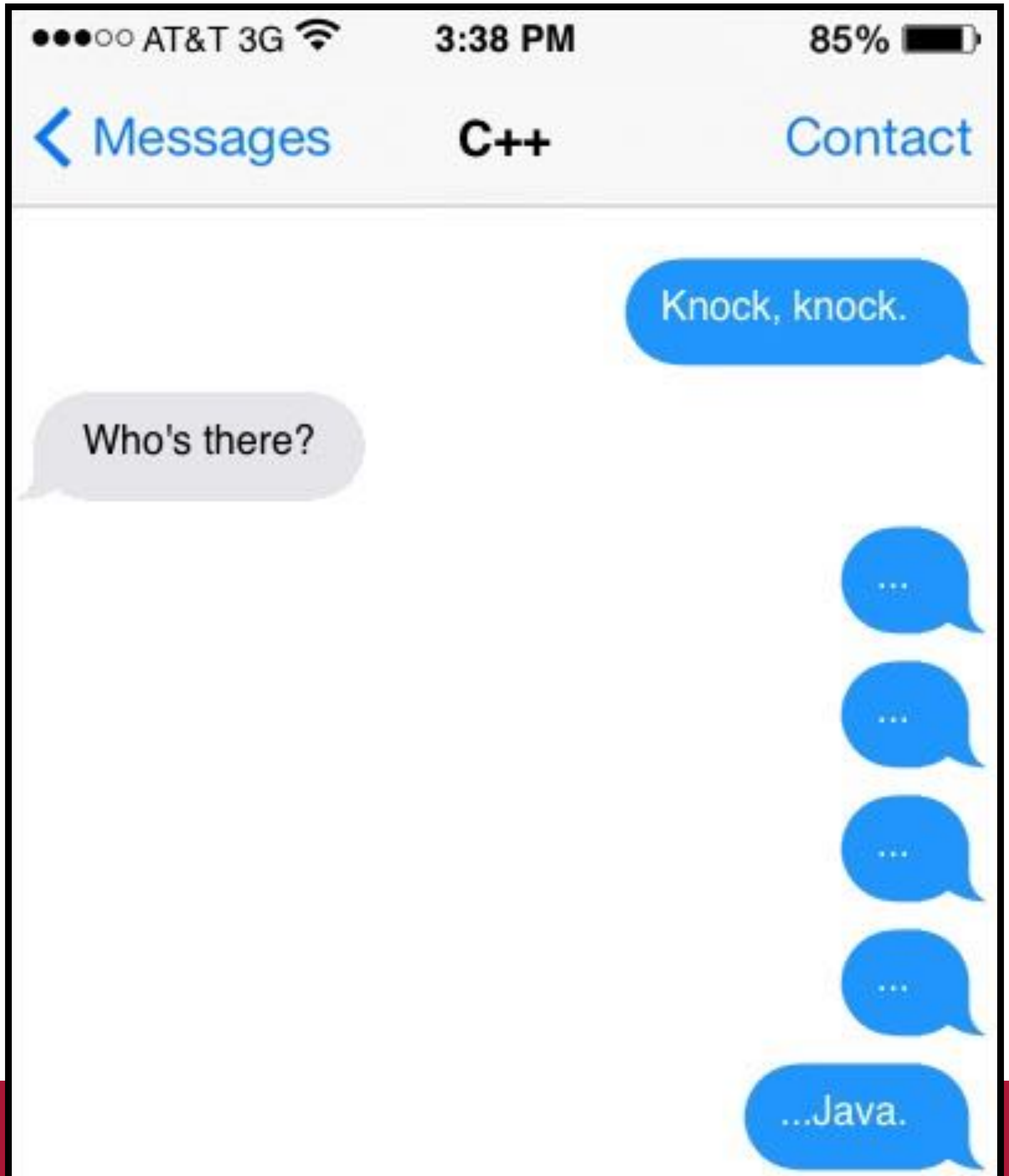
MESSAGING / APP VS. TRANSMISSION

- KnockKnock is an *application level* protocol
- It specifies the sequence and content of messages
- It does NOT specify how those messages are transmitted

KNOCK KNOCK OVER VOX



KNOCK KNOCK OVER TEXT



●●●○○ AT&T 3G 3:38 PM 85%

Messages C++ Contact

Knock, knock.

Who's there?

...

...

...

...

...Java.

KNOCK KNOCK OVER BLACKBOARD

Knock, knock...

who's there?

HTTP

HTTP

- An *application-level* communications protocol. You might call it a *messaging* protocol.
- Specifies allowable *metadata* and *content* of messages.
- Does *NOT* specify *how* messages are transmitted!
- STATELESS: does *not* need to remember previous req-res!

HTTP PROTOCOL

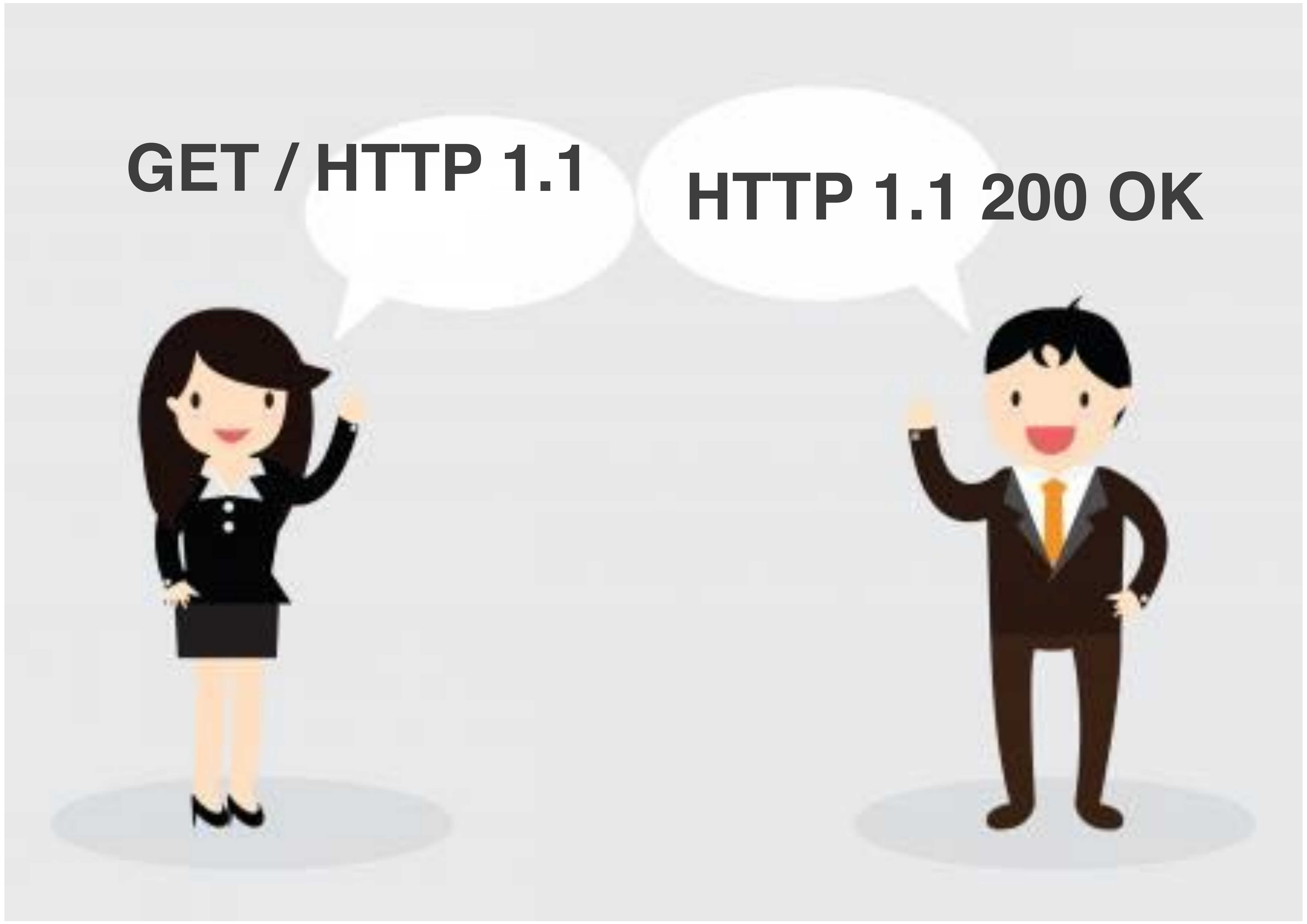
- **RFC (Request For Comments) 7230 (link)**
- **By the IETF (Internet Engineering Task Force)**
- **But a *generic* messaging protocol**
  - *"HTTP is a generic interface protocol for information systems. It is designed to hide the details of how a service is implemented... independent of the types of resources provided."*

HTTP CLIENTS & SERVERS

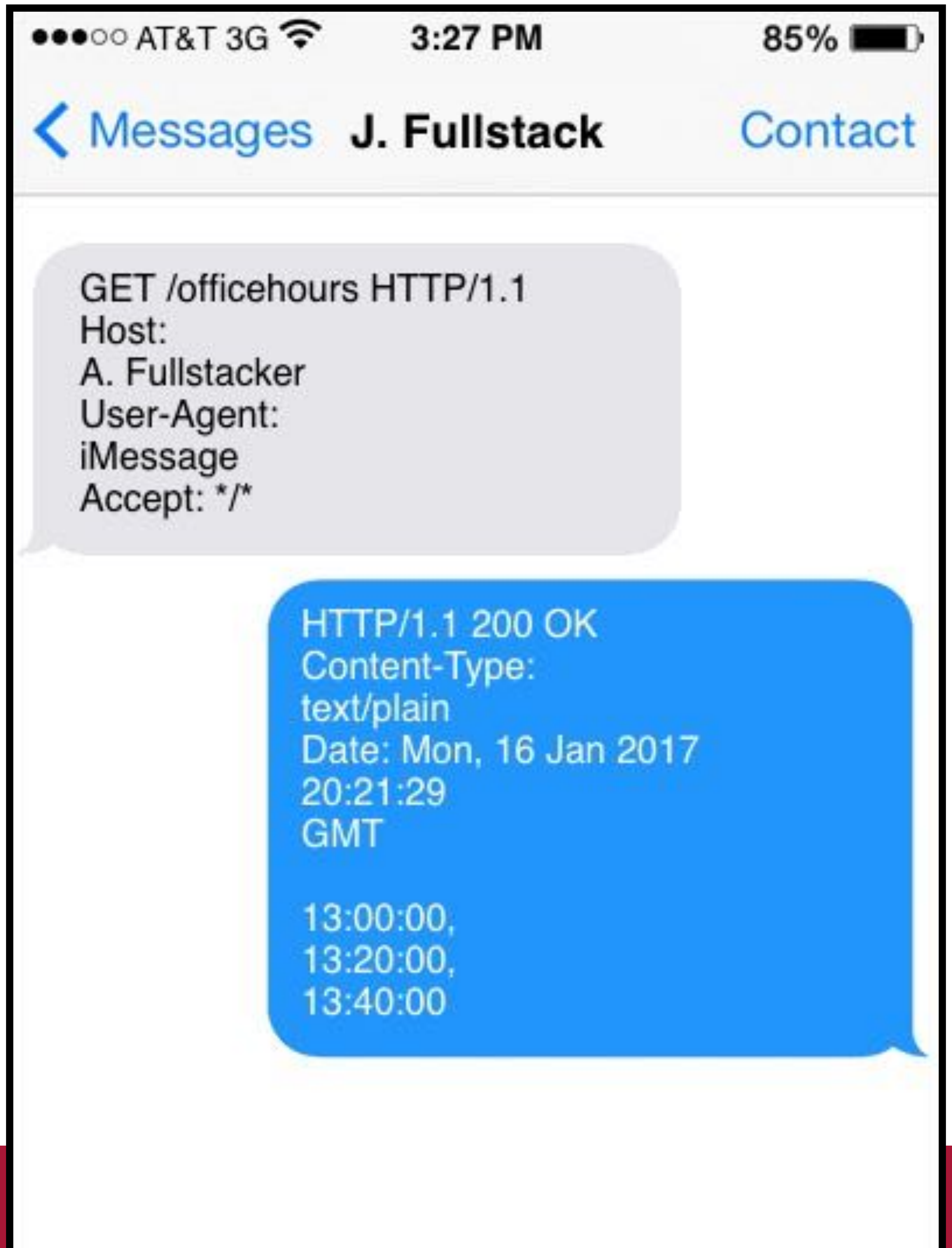
- **Example Clients**
  - web browsers
  - household appliances
  - stereos
  - firmware update scripts
  - command-line programs
  - mobile apps
  - communication devices
- **Example Servers**
  - web servers
  - home automation units
  - networking components
  - office machines
  - autonomous robots
  - news feeds
  - traffic cameras

NOT A TRANSMISSION PROTOCOL!

HTTP OVER VOX



HTTP OVER TEXT

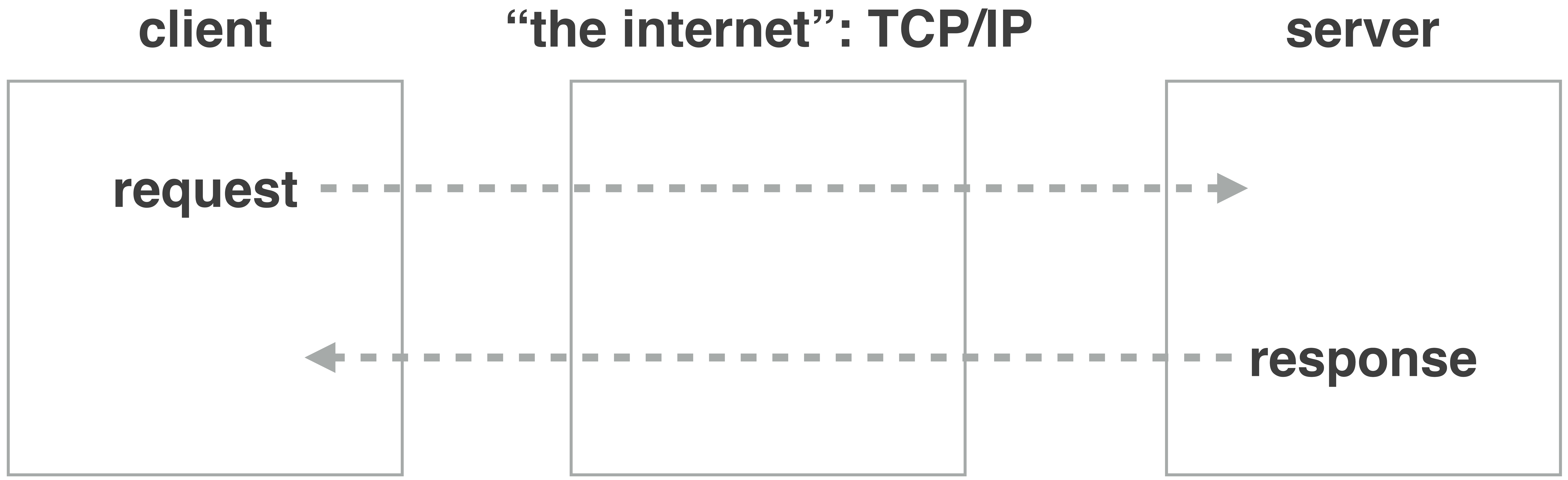


```
GET /officehours HTTP/1.1
Host:
A. Fullstacker
User-Agent:
iMessage
Accept: */*
```

```
HTTP/1.1 200 OK
Content-Type:
text/plain
Date: Mon, 16 Jan 2017
20:21:29
GMT

13:00:00,
13:20:00,
13:40:00
```

HTTP OVER TCP/IP



F 3
G 2
G 2
H
J 3
2006.04.12 13:43

HTTP

Every request gets exactly one (total) response

(sometimes a response is broken up into chunks)

HTTP REQUEST

just a message with a certain format

verb URI

headers

```
POST /docs/1/related HTTP/1.1
Host: www.test101.com
Accept: image/gif, image/jpeg, */*
Accept-Language: en-us
Accept-Encoding: gzip, deflate
User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1)

bookId=12345&author=Nimit
```

body

(from http://www.ntu.edu.sg/home/ehchua/programming/webprogramming/HTTP_Basics.html)

COMMON VERBS

GET	“read”
POST	“create”
PUT	“update”
DELETE	“delete”

HTTP RESPONSE

status

headers

```
HTTP/1.1 200 OK
Date: Sun, 18 Oct 2009 08:56:53 GMT
Server: Apache/2.2.14 (Win32)
Last-Modified: Sat, 20 Nov 2004 07:16:26 GMT
ETag: "10000000565a5-2c-3e94b66c2e680"
Accept-Ranges: bytes
Content-Length: 44
Connection: close
Content-Type: text/html
X-Pad: avoid browser bug

<html><body><h1>It works!</h1></body></html>
```

(from http://www.ntu.edu.sg/home/ehchua/programming/webprogramming/HTTP_Basics.html)

payload/body

COMMON STATUSES

200	“OK”
201	“created”
304	“cached”
400	“bad request”
401	“unauthorized”
404	“not found”
500	“server error”

LAB