Section 1: UDP, TCP, and addresses
Addressing

- Project o requires sending your own IP address to another client
- Problem: getting own IP address can be hard
- How can we do it?
Getting own IP address: hostname method

Steps

• Get the computer’s host name
• Resolve it into an IP address

Python example

import socket
name = socket.gethostname()
ip = socket.gethostbyname(name)

• Sometimes doesn’t work depending on hostname configuration and/or will just return local host (127.0.0.1)
Getting own IP address: connect to server method

Steps
- Create a socket
- Connect to known server on internet
- Get socket address

Python example
import socket
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
s.connect(('gmail.com', 80))
ip = s.getsockname()[0]

- Useful when previous method doesn’t work
- Similar methods exist for other languages as well
Other Methods

- `getaddrinfo()`
  - E.g., `socket.getaddrinfo(name, 0)`
  - Can return other network interfaces that you don’t want (e.g., IPv6)

- Querying outside URL
  - E.g.,
    ```
    urllib2.urlopen('http://abstract.cs.washington.edu/~zahorjan/ip.cgi').read()
    ```
  - Best method (if you have a dedicated server to tell you your IP)
Ports

- Addresses specific to applications/services on a system
- 16-bit numbers (from 0 to 165535)
Well-Known Ports

• Many applications/services have designated ports

• Examples:
  • ftp: 21
  • ssh: 22
  • telnet: 23
  • http: 80

• Ports from 0 to 1023 are “well-known ports” (don’t use them for protocols you make up!)

• Can see a list of your system’s well known ports in /etc/services (Linux/Unix)
Hostnames map to IP addresses

- Hosts contact DNS (Domain Name System) servers to get IP address of a given name
- E.g., ‘www.gmail.com’ maps to 173.194.33.118
- nslookup demo
TCP vs UDP

- Sockets can implement either protocol
- “Transmission Control Protocol” will guarantee delivery
- “User Datagram Protocol” just sends the requested data (no guarantees)

**Python example**

**UDP Socket**

```python
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
```

**TCP Socket**

```python
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
```