Internet communication

- The internet
  - A redundant, decentralized communication network connecting computers all over the world
  - Data is sent in *packets* between machines
  - Communication between computers is *routed* using the *Internet Protocol* (IP)
    - Every machine gets a unique IP address (e.g. 129.113.132.182)
    - The *Domain Name System* (DNS) maps readable names to IP addresses

Internet communication

- Connections
  - The transmission control protocol (TCP) abstracts from packets to *connections*
  - A connection between two machines allows back-and-forth communication
  - Connections are given a *port* number, so that a single machine can have multiple connections

Client/Server

- Clients and servers
  - Most internet communication is based on a *client/server* model
  - The server waits for connections on a certain port
  - The client initiates a connection to that port

Protocols

- Protocol
  - A set of rules for communication
    - I hold out my hand towards you, vertically
    - You grasp my hand
    - We shake our hands up and down
    - Etc...

HTTP and URL

- HyperText Transfer Protocol (HTTP)
  - The dominant protocol for internet applications
  - Used by clients to retrieve *resources* from servers
  - Entirely text-based (simple, easy to read)
  - Stateless
    - Each request/response pair is independent from all others
- Uniform Resource Locator (URL)
  - Format for global specification of resources

HTTP request/response

Server

HTTP request
http://faculty.utrgv.edu/emmett.tomai/test.txt

Client

- Hostname is resolved to IP address (e.g. 129.113.132.218)
- Request type is GET or POST
- Request headers give information about the *agent*
  - (Additional data may be sent)

HTTP request/response

Server

HTTP request
http://faculty.utrgv.edu/emmett.tomai/test.txt

HTTP response

Client

- If the request specifies a static file
  - HTML, image, video, text, etc…
  - The file is retrieved from the server filesystem
- Response headers specify type of data
  - Using MIME types (e.g. text/html)
- The file contents are *streamed* (printed) back to the client