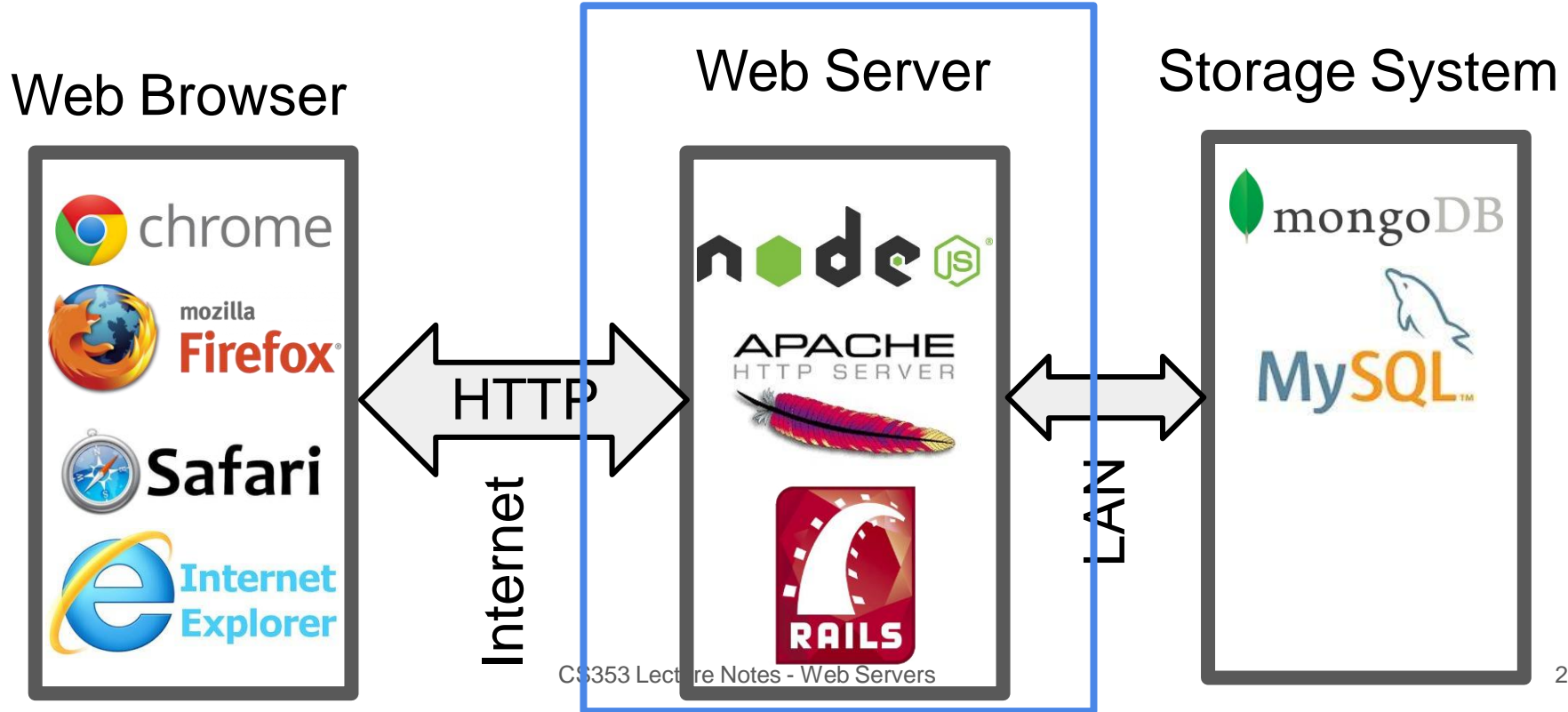


Web Servers

Web Application Architecture



Web Servers

- Browsers speak HTTP and Web Servers speak HTTP
 - Browsers: send HTTP request and get HTTP responses
 - Web Server: get HTTP requests and send HTTP responses
- HTTP is layered on TCP/IP so a web server:
loop forever doing:
 - accept TCP connection from browser
 - read HTTP request from TCP connection
 - process HTTP request
 - write HTTP response to TCP connection
 - shutdown TCP connection (except if Connection: keep-alive)

Processing HTTP requests - File reads

- Process HTTP GET index.html

```
int fd = open("index.html");  
int len = read(fd, fileContents, sizeofFile(fd));  
write(tcpConnection, httpResponseHeader, headerSize);  
write(tcpConnection, fileContents, len);
```

- Note open and read may have to talk to a slow disk device
 - Can process requests concurrently by starting a new thread or a new process per request

Processing HTTP requests - cgi-bin

- Process HTTP GET of index.php

```
runProgramInNewProcess(tcpConnection);
```

- Template processing program fetches models from database system

2nd Generation Web App Frameworks

Web server runs a program per request - the **controller**:

1. Parse URL and/or HTTP request body to get parameters to view
2. Use parameters to fetch **model** data from DBMS (typically a SQL relational DBMS)
3. Run HTML **view** template with model data to generate the HTML
4. Send a HTTP response with the HTML back to the browser

Rails runs a controller program per URL. Example: URL `/rails_intro/hello`

Runs controller `hello.rb` (Ruby program fetches models - ORM)

Applies to view template `hello.html.erb` (HTML embedded with Ruby)

JavaScript?: An asset (like an image or css) you can include

Web servers for JavaScript frameworks

- Most of the web app is simple static files - any web server speaking HTTP
 - View templates (HTML, CSS)
 - JavaScript files
- Remaining browser \leftrightarrow server communication around model data
 - CRUD (Create Read Update Delete) of model data
 - Session info (e.g. login, etc.) (Later...)
- Low requirements on web request processing
 - HTTP GET static files
 - Model data operation - mostly doing DBMS operations

Few more Servers

- Servers are not limited to only Web Servers
 - File Server
 - To Manage the files across the network.
 - Time Server
 - To Manage the Time across the network. (NTP protocol)
 - DB Server
 - To Manage the Database across the network.