

# CS142 Spring 2016 Practice Final

## Crowdsourced Solutions (may be incorrect)

### Problem 1.

Part 1:

CSS style sheets, JavaScript libraries, Model Data, Angular Controllers

Part 2.1:

For static content (loading photos), reduce server load / startup time.

Part 2.2:

Bad for dynamic content, e.g. loading comments

### Problem 2.

Part 1:

JSON

Part 2:

Collections have names, resources have IDs

(e.g. [www.example.com/photo](http://www.example.com/photo) is a collection while [example.com/photo/123098](http://example.com/photo/123098) is a resource)

### Problem 3.

- a. Yes; because XMLHttpRequest is an API provided by the browser, it will begin its execution elsewhere on the runtime and allow following lines of code to run--which could be additional XMLHttpRequest calls. All of the calls' callbacks will be pushed onto the event queue once a response is received. This method of using callbacks to simulate concurrency is what allows multiple outstanding server calls to exist at once.
- b. Scalable -> can distribute independent requests among different servers

## Problem 4.

(6 points):

Web server inner loop

accept TCP connection, read HTTP request, process HTTP, write HTTP response, shutdown TCP connection.

(4 points): Move view template generation to the front end

## Problem 5.

(4 pts) Node.js . . . event queue rather than thread code

(8 points) What does the following . . .

```
//[ran in the code in one of our projects, and the output was. . . ]
  Before async.each
  eachFunc start 10
  eachFunc start 1
  After async.each

  eachFunc done 1
  eachFunc done 10
  doneFunc
```

## Problem 6.

a) fs.readFile loads the entire file into memory through a Buffer, whereas fs.createReadStream reads the file in chunks of memory. The latter can be used to read much larger files since it does not allocate space for the whole file at once.

b)

i) Normal

ii) Error - an event that never has a listener installed will never emit()

1) Are you sure? Because the wording implies “on this particular run of the program”. A listener might only be installed if, say, the user has clicked some option to be notified in real-time or something.

iii) Normal

1) Why is this normal? The program can **never** emit this event, so what’s the point of listening for it?

iv) Error

## Problem 7.

(6 points)

next give other software the ability to interpose on requests.

For examples:

- check to see if user is logged in, otherwise send error response and don't call next()
- parse the request body as json and attached the object to request.body and call next()
- session and cookie management, compression, encryption, etc.

(4 points)

## Problem 8.

- a) Faster lookups
- b) Database uses more space/more storage overhead and it will be slower to update entries
- c) Select/get certain attributes

## Problem 9.

- a) Tables (tuples? - same thing - not really, tables will be collections of tuples) since MySQL is specialized in doing matrix operations to extract information from tables.
- b)

## Problem 10.

Cookies are assigned session IDs so that web server is able to identify a session. Used to let web server know which user generated the request. Would like to authenticate user and have that information available each time we process a request

## Problem 11.

- a) Frontend: quick user input, prevent bad data from going to backend. Backend: hackers still have access to the web server API
- b) promises to avoid pyramid of doom

## Problem 12.

- a) Easily shared among web servers
- b) Bit of overkill to need the storage system's super reliability and it can create too much load for the database
- c) Limited space; also unreliable like cookies

## Problem 13.

Isolate different frames so that trusted and untrusted code do not interact with each other.  
Restrict communication between frames.

## Problem 14.

- a) Certificate Authority issues digital certificates that certify that some public key belongs to a certain server. They give browsers confirmation that a given public key belongs to the server it (the browser) is in communication with.
- b) People know that something only came from you
- c) The key generated and passed to the web browser is encrypted with the public key that was in the certificate.

## Problem 15.

- a) Attacker could get session\_id by guessing or by reading it from the site's cookies.  
With the session\_id they can send "legitimate" requests to the server
- b) Authentication + integrity

## Problem 16.

- a) On server : SQL Injection  
In browser : Cross site Scripting
- b) Stuffing model data into the DOM makes site susceptible to (stored??) Cross Site Scripting.

## Problem 17.

Extended validation certificate: this site has been vetted even more

## Problem 18.

- a) Load balancer
- b) Data-sharding
- c) static/readonly content gets loaded faster