CSE 115
Introduction to Computer Science I
FINAL EXAM

Tuesday, December 11, 2018
7:15 PM - 10:15 PM
SOUTH CAMPUS

(Bus schedules posted)
Room assignments will be published on Friday
EXAM RULES

Bring your UB Card

No arrivals after the first 30 minutes

No departures in first 30 minutes

No electronics
(phones, laptops, calculators, earbuds, etc)

Closed books. Closed notes. Closed neighbors
(A) Sat 12/8 2:00PM - 4:00PM in NSC 215

(B) Sat 12/8 6:00PM - 8:00PM in NSC 215

(C) Mon 12/10 2:00PM - 4:00PM in CAPEN 262

Capen 262 is quite a bit smaller than NSC 215, so if you can attend on Saturday please do, and leave Monday's session for students who are unable to attend on Saturday.
Road map

▷ CSE115 Game Recap ◁

Deploying the game
Game Overview

Inspired by Chip's Challenge

Player must collect all crystals then find the end of the level

Collect keys to unlock doors

Avoid lava until the boots are collected
Deployment

**Goal**: Share our project with the world
Deployment
Requirements

This lecture will not be a complete walkthrough of these steps (that would take much longer than 50 minutes!)

Server space

Upload our code to the server

Run our app on the server

Obtain a domain name

Encryption key/certificates
Deployment Requirements

Server space
• We need an Internet connected device that will run our app 24/7
• The server must have a static IP address (does not change)

Upload our code to the server
• Once we have a server we'll need a convenient way to upload our code to the server
• This should be as simple as possible so it's easy to update the app

Run our app on the server
• We'll need a way to run our program in a way that it won't stop when we log off the server. We want it to run 24/7 whether we are watching it or not

Obtain a domain name
• To make it easier to find the app we'll want to get a domain name to share with users

Encryption key/certificates
• We'll encrypt the connections to our app to protect the privacy of our users
Server Space - Codenvy

Codenvy provides free (and ad free) server space

However
1. They will shut down the server after a short amount of time
2. They will not link the server to a domain name

Codenvy provides development environment, not a web hosting service

This is where we build and test our apps, not where we run them
Server Space

There are many web hosting services available (for $) that can be used

A quick Google search will provide a long list of available options

Some popular options
• Digital Ocean
• Heroku
• Amazon Web Services

All will provide static IP addresses
Uploading to Server

How do we move files?
- email
- flash drive
- cloud storage
- etc

But, how do we move files to a server that we can't access?

Options
- ftp
- scp
- or..
Uploading to Server

git
• Version control software designed to store, copy, and update code
• Especially useful when working on a team with a shared codebase
• Code is stored in a repository

GitHub
• A free service providing servers to host git repositories
Uploading to Server

git
- Version control software designed to store, copy, and update code
- Especially useful when working on a team with a shared codebase
- Code is stored in a repository

GitHub
- A free service providing servers to host git repositories

https://github.com/hartloff/CSE115-Game
Uploading to Server

With our code hosted on GitHub we can download the code from the server.

To do this, we first log on to the server using ssh.

This provides us with a command line running on the server just like where we went to install python packages.

    recall: pip install --user bottle

From the server's command line we can download (clone) the repository.
Running Code on the Server

From this command line we can also run our code by typing

```
python3 server.py
```

However, this will shut down the server once we log off

To run the app 24/7 we need to run it in the background

For this app we used PM2 which is software designed for this purpose (http://pm2.keymetrics.io)
Running Code on the Server

Once the app is running we are live to the world

Though the link is a little awkward..

http://104.131.182.94:8100
Running Code on the Server

We want users to be able to use port 80 to connect to the site.

Port 80 is the default HTTP port which is used when you don't add a port number.

We'll add a path of /game on our server that will direct traffic to port 8100 where our app is running.

http://104.131.182.94/game
Domain Name

That's better, but we also don't want users to have to remember our IP address

For this we'll purchase a domain name and add our domain name to the DNS records to point to the IP address of our server

Domain names are about $12/year

http://cse115.com/game
Encryption

The last thing we want to do is add encryption to our app to protect the privacy of our users.

**NOTE:** You should not encrypt web traffic the way we showed in class.

We built our own encryption system in class to show you how encryption works.

In practice we use the HTTPS protocol by obtaining and uploading a certificate to our server as well as a private key.

Encrypts all traffic in both directions without writing encryption code in our app.
The certificate is our public encryption key that is signed by a certificate authority

We used letsencrypt (https://letsencrypt.org) which is a free certificate authority

When a user visits our site they obtain our certificate from letsencrypt and verify that they signed our public key

Adds another layer of assurance that it is our server on the other end of the connection (see https://www.entrustdatacard.com/pages/ssl)

https://cse115.com/game
Course Evaluations and Project Rating
Project Video Rating

https://fury.cse.buffalo.edu/quest/project-videos/
Course Evaluation

This was first offering of completely revamped course.
Course Evaluation

This was first offering of completely revamped course.

Reflect on where you started, what you're now able to do, and (esp. if you're not a CSE major) how what you've learned can be helpful in your future academics and your eventual career.
Course Evaluation

This was first offering of completely revamped course.

Reflect on where you started, what you're now able to do, and (esp. if you're not a CSE major) how what you've learned can be helpful in your future academics and your eventual career.

Tell us what changes would have made the course work better for you.
Course Evaluation

This was first offering of completely revamped course.

Reflect on where you started, what you're now able to do, and (esp. if you're not a CSE major) how what you've learned can be helpful in your future academics and your eventual career.

Tell us what changes would have made the course work better for you.

Tell us what parts of the course worked well for you.