Search: Computational Thinking

looking across three high school courses

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Cyber-capable Citizenry

“Our species needs, and deserves, a citizenry with minds wide awake and a basic understanding of how the world works.”

-Carl Sagan
what is computer science?

- write your own definition (paper)
- share and refine with elbow partner (paper)
- develop common definition with group of two elbow partners
http://www.bing.com/images/search?q=what+is+computer+science&FORM=HDRSC2
A search by any other name ...

http://www.bing.com/images/search?q=what+is+computer+science&FORM=HDRSC2

https://www.google.com/search?q=what+is+computer+science&safe=off&espv=2&source=lnms&tbm=isch&sca=X&ei=36PCU4jhKceYyATUrYLVLDg&sqi=2&ved=0CAcQ_AUoAg&biw=1178&bih=639&dpr=2
Query strings/URLs?

● Information encoded in URL? Why?
  o What is role of ampersand & ?
  o What is role of ?
  o Differences between services?

● Question you have related to URL?
Plan for what’s next?

- Look at three kinds of search
  - Attempt to model classroom usage

- Engage in activities, discussion
  - Julia Child school of learning
Plan for today
# Three Searches, Three Courses

<table>
<thead>
<tr>
<th></th>
<th>Binary Search</th>
<th>Content ID</th>
<th>Pagerank</th>
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<tbody>
<tr>
<td>ECS</td>
<td>blue</td>
<td>pink</td>
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<td>CSP</td>
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<td>APCS A</td>
<td>blue</td>
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not so binary Search?
http://www.youtube.com/watch?v=AEBbsZK39es
Price is Right

- Why “I’m gonna have to sit down”?

- Guesses: $193, $540, $820, $700, $749. Are these reasonable?
  - Discuss with shoulder (30 sec)
Exploring Binary Search

Guess a number between 1 and 1024
I’ll tell you high, low, or correct
What’s a good first guess?

About how many guesses needed for guessing a number between 1 and a million?
what is search?

binary search
Overflow of love and emotion?

http://bit.ly/1ih2HX8

See Python and Java programs
Peer learning in three minutes
public class Looper {
    public static void main(String[] args) {
        int x = 0;
        while (x < x + 1) {
            x = x + 1;
        }
        System.out.println("value of x = "+x);
    }
}
public class Looper {
    public static void main(String[] args) {
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    }
}

A. Runs forever
B. Runs until memory exhausted, about 4 minutes w/ 8Gb
C. Runs for 1 second, prints ~ +2 billion
D. Runs for 1 second, prints ~ -2 billion
public static int binarySearch(int[] elements, int target) {
    int left = 0;
    int right = elements.length - 1;
    while (left <= right) {
        int mid = (left + right) / 2;
        if (target < elements[mid]) right = mid - 1;
        else if (target > elements[middle]) left = mid + 1;
        else return mid;
    }
    return -1;
}
Three views of binary search

*Exploring Computer Science*

Construct understanding via activity/game

*Computer Science Principles*

If 20 guesses for a million, what’s a billion?

*AP Computer Science A*

How many times \((\text{left + right})/2\) executed when elements.length == one million
Don’t know much about ... 

history, biology, science book, french I took
One way YouTube makes money ...

- http://www.youtube.com/watch?v=xhrBDcQq2DM
- https://www.youtube.com/watch?v=XUZqeajn0aU

content ID
search
(audio/video)
● 25 million reference files in database
● we scan 400 years of video every day
● made hundreds of millions of $$ for partners

www.youtube.com/yt/press/statistics.htm
Think, Write, Share

- 25 million reference files in database, we scan 400 years of video every day

Think and write about this for one minute:
explain 25 million and 400 years
Each person shares with group, one result
Content ID, aka Audio Fingerprint

https://musicbrainz.org/doc/Fingerprinting
Generate ID
Look up ID
https://acoustid.org/
Lessons from Content ID

Key features of “looking up song or video”
What are they? Why? howstuffworks

Why have views of DMCA changed in last few years, “safe harbor”
From technology to policy to business
Three views of Content ID

Computer Science Principles
   Explore/Impact performance task and more
AP Computer Science A
   API for String to SHA-1 Hash,
Musicbrainz,
Exploring Computer Science
   Final project, Upload Educational Content
all web pages are important

some pages are more important than others
Searching the web

- What pages returned, in what order, for
  - CSTA 2014

How Google determines order for results

Work with partner, 30-60 seconds
PageRank

- Time before Google (BG and AG)
  - How did Altavista work?

- link from page A > link from page B?

Exploring a current event

“Mugged by a Mugshot”
Mugged by a Mugshot Online

sites like mugshotsonline.com & removemymug.com: display mugshots of people who have been arrested and charge to remove photos.

Mugged by a Mugshot Online

An arrest does not mean that the individual has been convicted of the crime. Individuals on this website are innocent until proven guilty by a court of law. The information related to charges and arrest or booking information is provided through public domain and in accordance with the Freedom of Information Act.
Mugged by a Mugshot Online

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Mugged by a Mugshot Online

Legal question vs. Ethical question: companies like mugshotsonline.com & removemymug.com may be acting legally, but do you think what they’re doing is ethical?

- What’s your point-of-view? (think)
- Discuss with elbow partner (pair)
- Share with room (share)
Thinking about online services

- Information is publically accessible
  - question: How is it obtained and used?
- Website appears on first page of search
  - question: Why does this matter?
- Google changed search/pagerank algorithm
  - question: What does this mean?
- Mastercard and Paypal stopped service
  - question: What are the ethics of this?
Goal of this activity

Experience and explore CS concepts and the impact of CS by exploring current events.

- Follow up: http://nyti.ms/152VggY
what is search?

what is the connection between the three different kinds of search we have investigated and the common themes from your definitions of computer science?
What is search?

What’s in common across these courses and types of search?

●

●

●

● (one response from me)