

Saturday, 18 July 15

Crux

Lecture -5

Programming Fundamentals -3

Arrays, Recursion

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- Selection Sort ?
- Insertion Sort ?

Binary Search

Multi dimensional arrays

- How to declare?
- How are they stored in memory?

Lets write some code

- Lets take input in to 2D Array
- Lets print it out

Your turn

- Wave print
- Spiral print

Recursion

Recursion in computer science is a method where the solution to a problem depends on solutions to smaller instances of the same problem.

Lets write some code

- Factorial
- Fibonacci
- Check if an array is sorted

Your Turn

- Write code for a function `power(x,n)` which evaluates x^n .
- Given an array
 - Check if it contains 7
 - Find First Index of 7
 - Find Last Index of 7
 - Return an array containing all indices of 7

Lets write some code

- Selection Sort

Your Turn

- Implement Bubble Sort recursively
- Merge two sorted Arrays

Merge Sort

Order Complexity Analysis

Amount of time/space taken by the algorithm
to run as a function of the input size

Experimental Analysis

- Selection Sort vs Merge Sort

Theoretical Analysis

- Bubble Sort
- Binary Search
- Factorial
- Polynomial Evaluation

Your turn

- Insertion sort
- Fibonacci
- Assignment 3 and assignment 4 solutions

Complexity Analysis Examples

```
for (i=0; i<=n-1; i++){  
    for (j=i+1; j<=k; j++){  
        constant number of operations.  
    }  
}
```

Complexity Analysis Examples

```
for (i=0; i<=n-1; i++){  
    for (j=i+1; j<=n; j++){  
        constant number of operations.  
    }  
}
```

Complexity Analysis Examples

```
for (i=0; i<=n-1; ){  
    for (j = 0; j<=5; j++){  
        constant number of operations.  
    }  
    i = i + j;  
}
```

What is space complexity?

What in case of recursion?

Time for more Brain Teasers!

BT – 8: Daughters' Ages

Local Berkeley professors Dr. X and Dr. Y bump into each other after a long time.

X hey! how have you been?

Y great! i got married and i have three daughters now

X really? how old are they?

Y well, the product of their ages is 72, and the sum of their ages is the same as the number on that building over there

X right, ok ... oh wait ... hmm, i still don't know

Y oh sorry, the oldest one just started to play the piano

X wonderful! my oldest is the same age!

How old are the daughters?





Thank You!

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