Data Structures + Algorithms

goal: Many ways to solve a problem
  * learn about the most efficient ways
  * very often this involves the data structures + algorithms used

Data Structures - systems used to store data
Algorithms - steps (we use) to solve problem.

1. **Searching** - in a sorted list of size n, find the index of a number x.

**Simplest Way?** Linear Search Time \( \Theta(n) \)

**Better:** Binary Search
- like searching a phone book
- start at middle element, compare element to \( x \),
- continue searching either left or right of \( x \)

```python
i

if y > x:  # if y < x
    search here
if y == x:
    return i
```
COURSE INFO

Java

Java has data types

(i) primitive data type - stores basic data
   - built into Java language

int: 10, -5, 0 ([-2 billion, 2 billion])
double: 5.63, -7.1, 10.0
char: 'a', 'A', 'ß', '8'
boolean: true, false

Each data type has: value (10, 5.63, 'a', true)
   - set of operations

ex: int operations: + - * / % =,<,>,<=>,>=

int x(int) declaration: set type + name
x = 5; assignment/definition: set value
int y = 10; initialization: declare + assign
int sum = x + y; initialization + operation

<Sample Code>