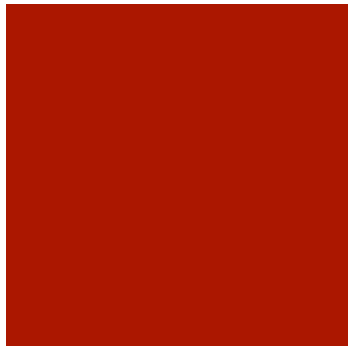
CS50
Walkthrough #3

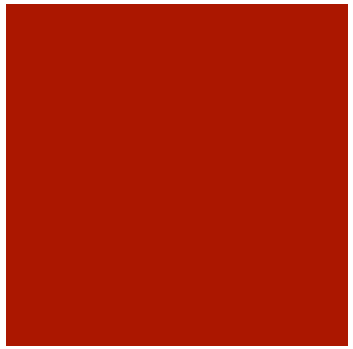
Marta Bralic
mbralic@fas.harvard.edu

Agenda



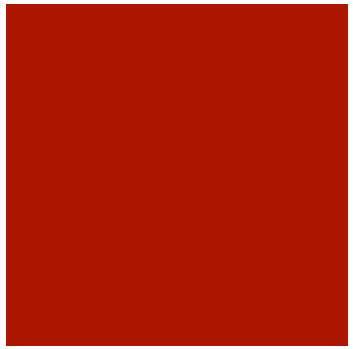
- generate.c
- Makefile
- find.c
  - search
  - sort
- fifteen.c
  - distribution code
    - gdb
  - init
  - draw
  - move
  - won

generate.c



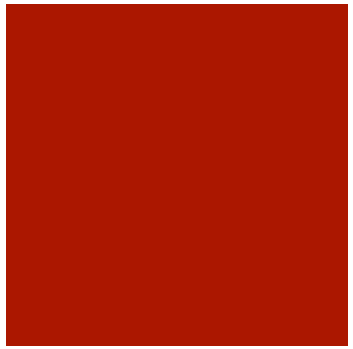
- what does it do?
  - comments!

Makefile



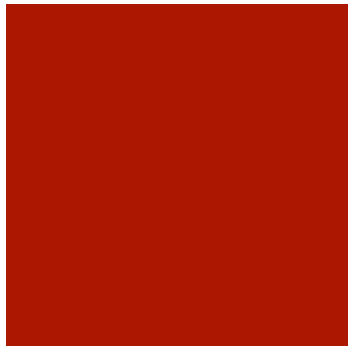
- what does it do?

Search



- Linear Search
- Re-implement as binary!
  - why?
- 2 main ways
  - iterative
  - recursive

Binary Search: Iterative

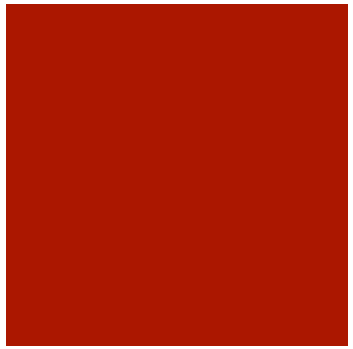


Go to middle

- if k < value at middle
  - search for k between first and the one before the middle
- if k > value at middle
  - search for k between one after the middle and last
- if k = value at middle
  - return true

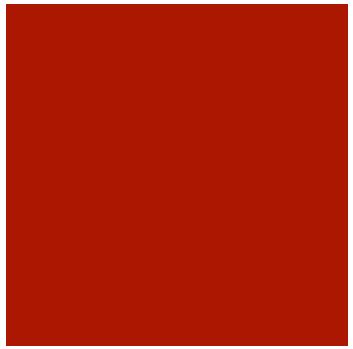
If you haven't found k after this loop, return false

Binary Search: Recursive



```
search(array, first, last, k)
   if first > last
      return false
   else if k < array[middle]
      search(array, first, middle-1, k)
   …
```

Sort: Bubble



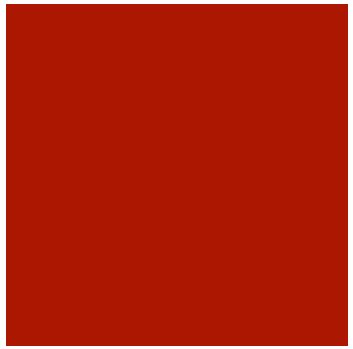
repeat n times

    for each element i

        if i and its neighbor are out of order, swap them

what is the running time?

Bubble sort: improvement

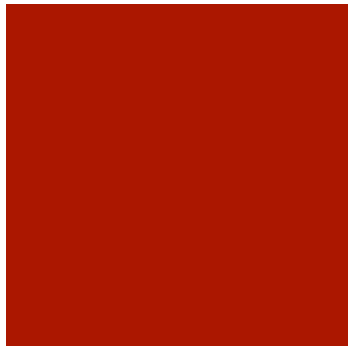


if you've made no swaps

- stop sorting – you're done

what is the running time?

Selection Sort

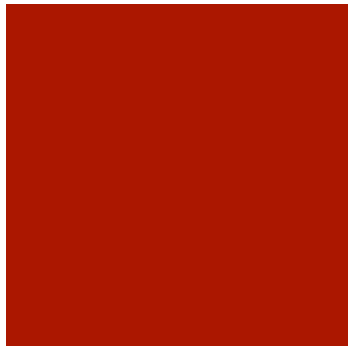


i = 0

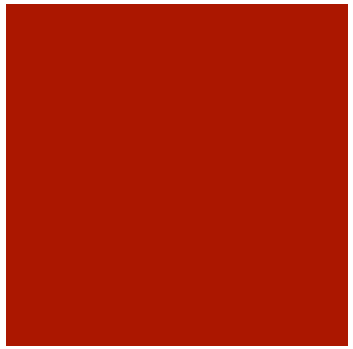
repeat n times

- find the smallest value (s) between i and the end
- swap s with element at location i
- i++

fifteen.c



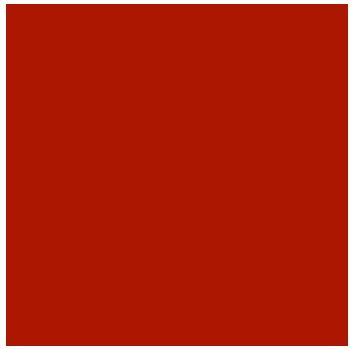
- distribution code → main
- gdb



init()

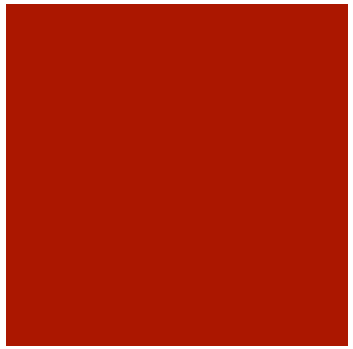
- two dimensional array to store board values
  - what type are these values?
  - how do we initialize them?
- don't forget!
  - swap tiles for even d
  - initialize the empty tile

draw()



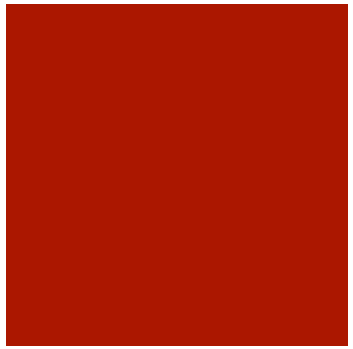
- what tool do we use to draw?
- how do we access the values we need?
  - where are they stored?

move()



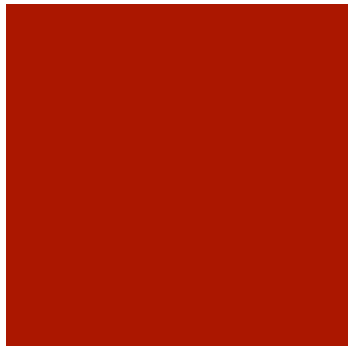
- bool
- check for a blank space
  - if possible, swap
  - do not check for a blank outside the bounds of the array

won()



- bool
- several ways
  - check that numbers are sorted from least to greatest
  - use a counter variable to ensure each value is in place
  - other ways?

Questions?



Please email me feedback: mbralic@fas.harvard.edu