

A MAP OF PROCRASTINATION



APPRAISALISTS



LECTURE 13



ARRAYLISTS

Motivation: Wish List

```
public class WishList extends ConsoleProgram {  
  
    public void run() {  
        String wish = readWish();  
        printWish(wish);  
    }  
  
    public String readWish() {  
        return readLine("Enter your wish: ");  
    }  
  
    public void printWish(String wish) {  
        println("Your wish is " + wish);  
    }  
  
}
```

Two wishes?

Motivation: wish List

```
public void run() {  
    String wish1 = readWish();  
    String wish2 = readWish();  
    printWish(wish1);  
    printWish(wish2);  
}
```

Ten wishes?

Motivation: wish List

```
public void run() {  
    String wish1 = readWish();  
    String wish2 = readWish();  
    String wish3 = readWish();  
    String wish4 = readWish();  
    String wish5 = readWish();  
    String wish6 = readWish();  
    String wish7 = readWish();  
    String wish8 = readWish();  
    String wish9 = readWish();  
    String wish10 = readWish();  
    printWish(wish1);  
    printWish(wish2);  
    printWish(wish3);  
    printWish(wish4);  
    printWish(wish5);  
    printWish(wish6);  
    printWish(wish7);  
    printWish(wish8);  
    printWish(wish9);  
    printWish(wish10);  
}
```


Ten thousands
wishes?



I can do this all day

IS THERE



ANOTHER WAY?

memegenerator.net

Meet ArrayList

- A variable type that represents a list of items.
- You access individual items by index.
- Store a single type of object (String, GRect, etc.)
- **Resizable** – can add and remove elements
- Has helpful methods for searching for items



wow! Nice to meet you

variables are like boxes



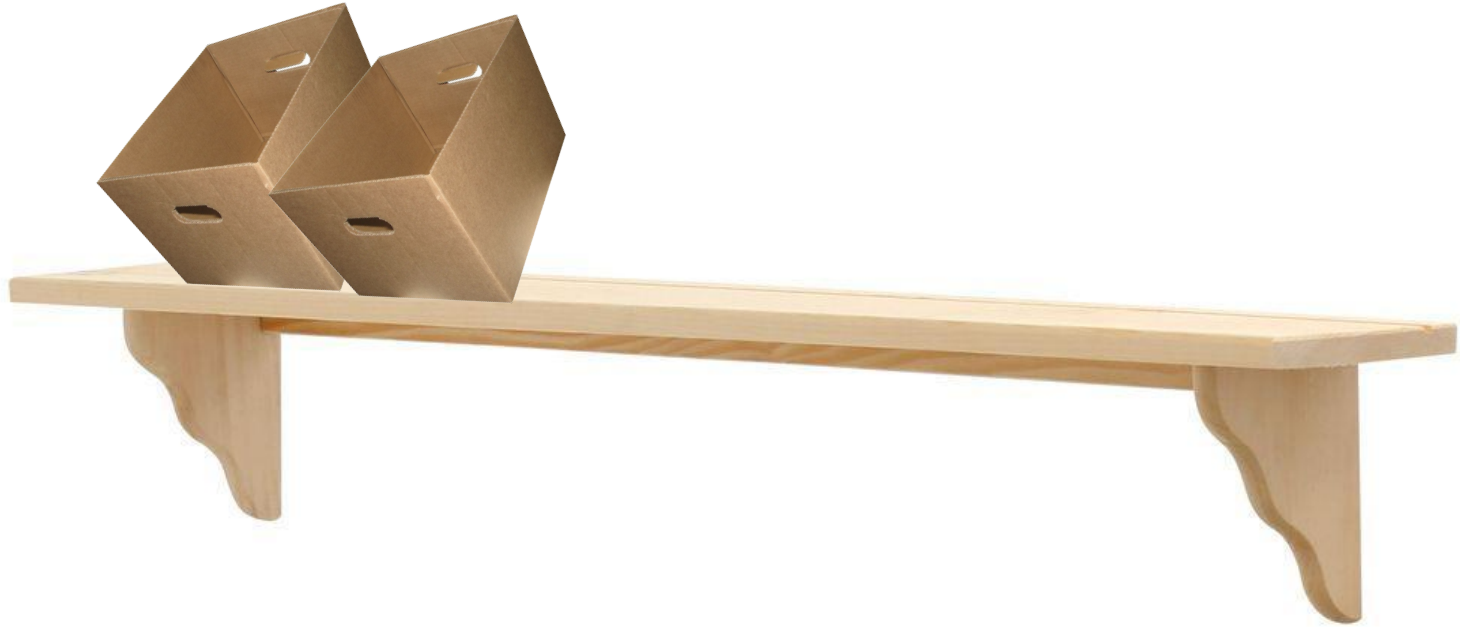
ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



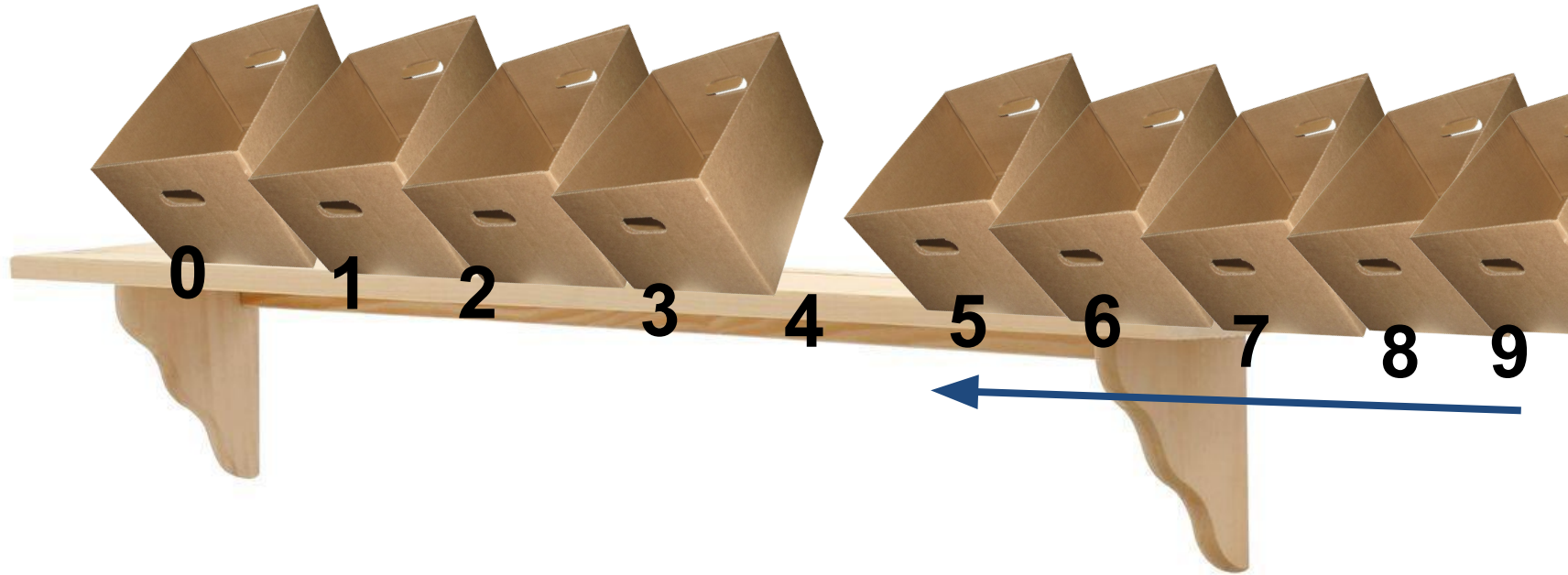
ArrayLists are like shelves



ArrayLists are like shelves



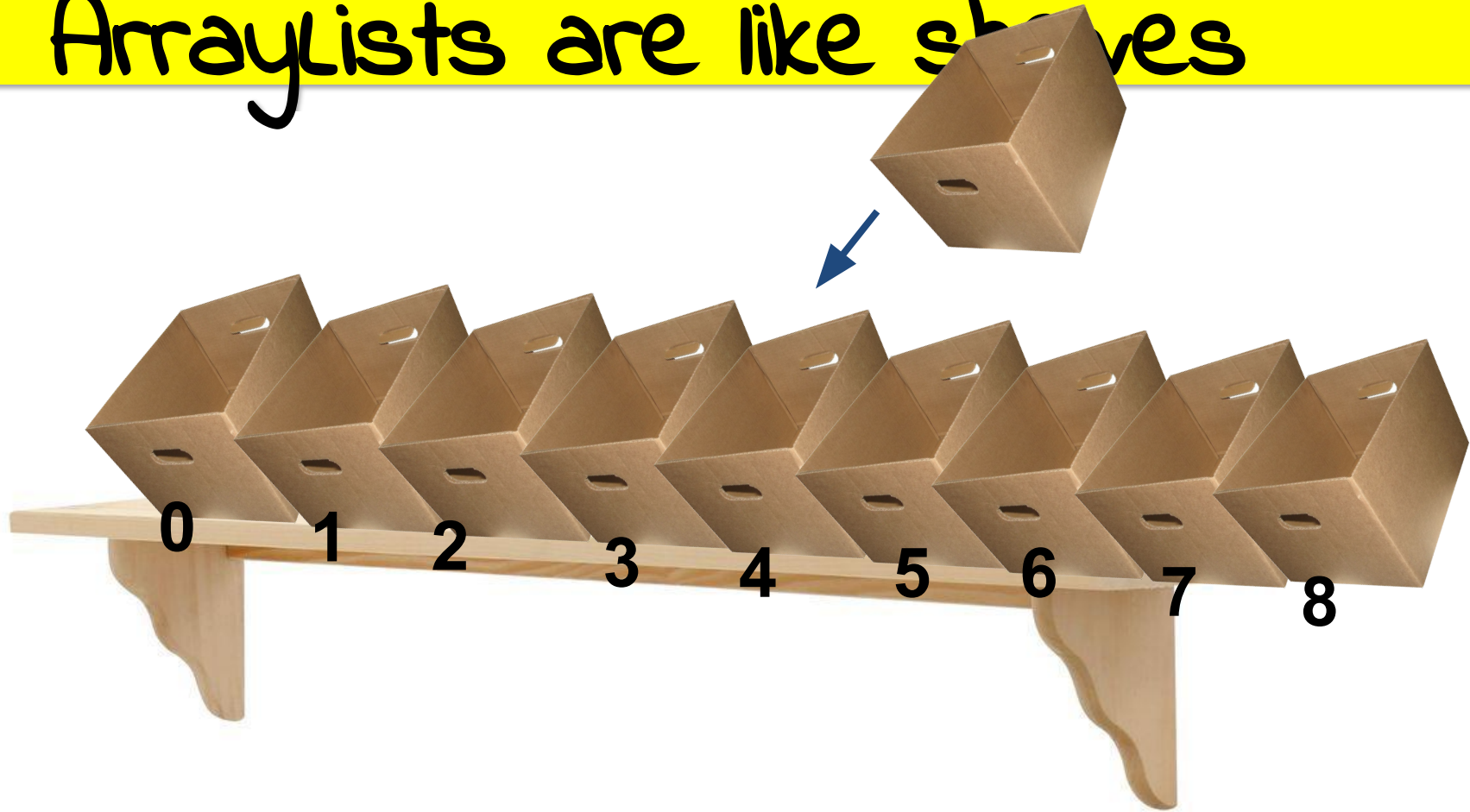
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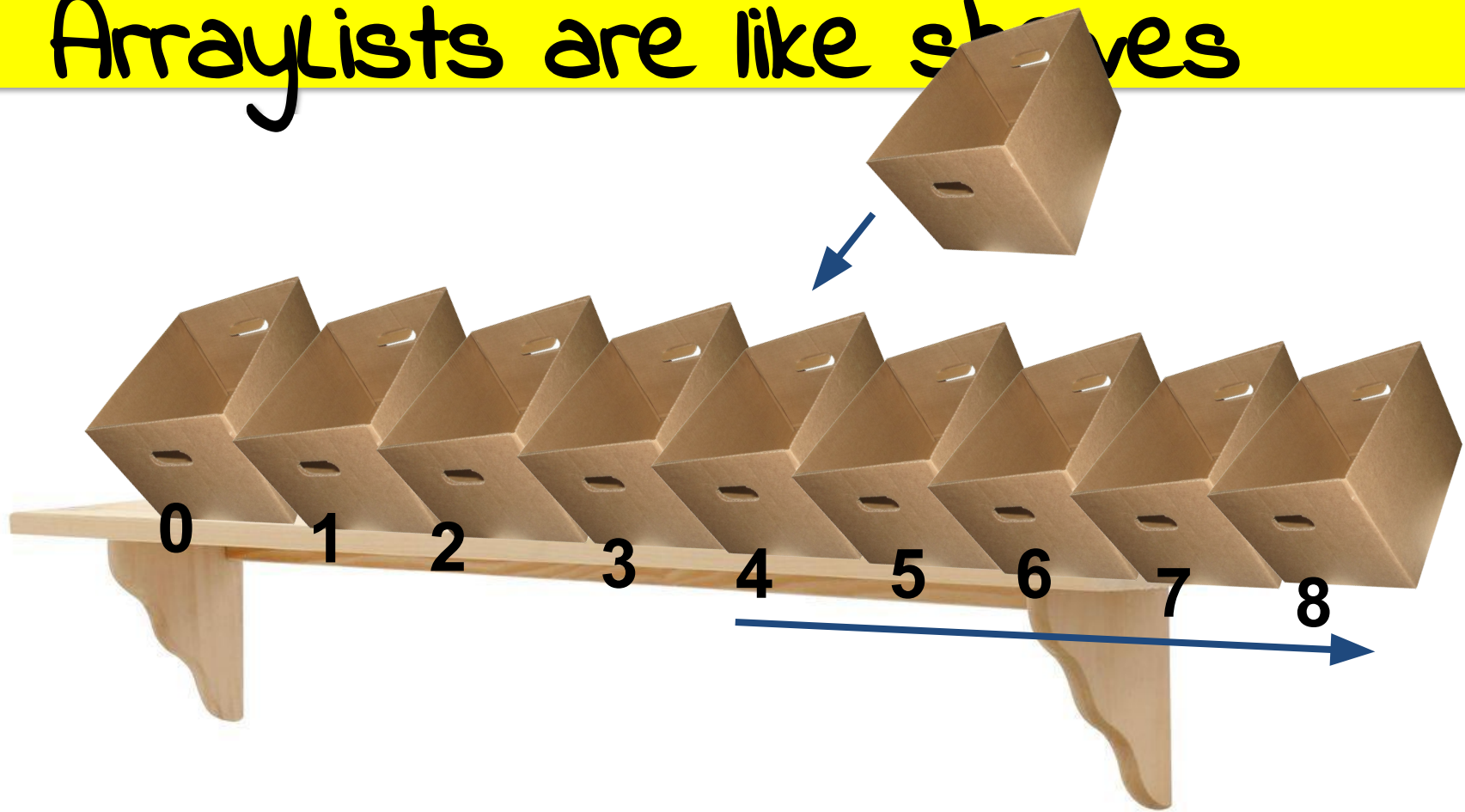
ArrayLists are like shelves



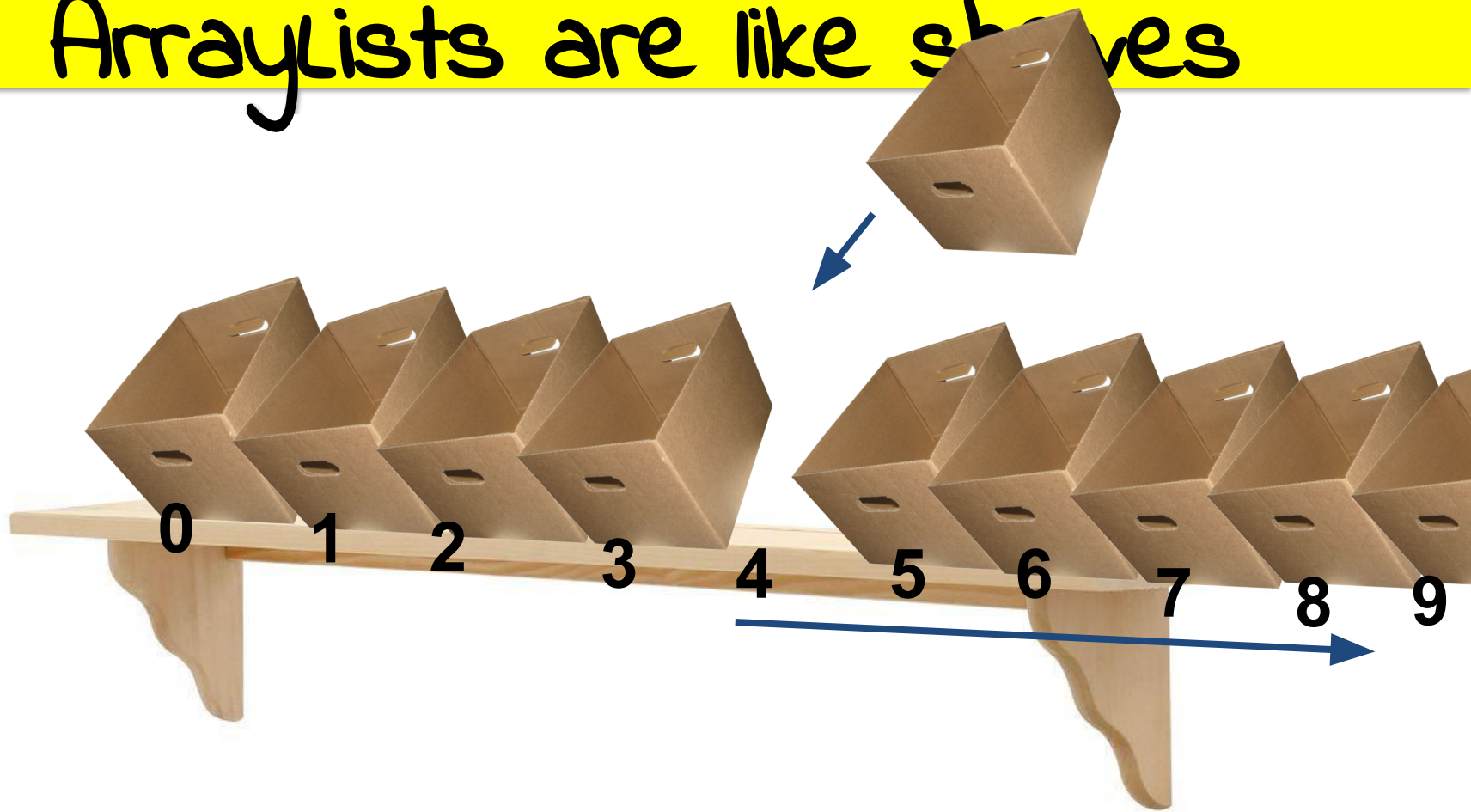
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ArrayLists are like shelves



ArrayLists are like shelves



ArrayLists are like shelves



wish list with ArrayList

```
import acm.program.ConsoleProgram;

import java.util.ArrayList;

public class WishList extends ConsoleProgram {

    public void run() {

        ArrayList<String> wishlist = new ArrayList<String>();

        int numWishes = readInt("How long is your wishlist? ");

        // enter wish list
        for (int i = 0; i < numWishes; i++) {
            String wish = readWish();
            wishlist.add(wish);
        }

        //print wish list
        for (int i = 0; i < wishlist.size(); i++) {
            String wish = wishlist.get(i);
            printWish(wish);
        }

    }
}
```

wish list with ArrayList

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wish list with ArrayList

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wish list with ArrayList

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    }

}
```


wish list with ArrayList

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        }

    }
}
```

Let's run the program!



```
ArrayList<String> wishlist = new ArrayList<String>();
```

```
int numWishes = readInt("How long is your wishlist? ");
```

```
// enter wish list
```

```
for (int i = 0; i < numWishes; i++) {  
    String wish = readWish();  
    wishlist.add(wish);  
}
```

```
//print wish list
```

```
for (int i = 0; i < wishlist.size(); i++) {  
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for (int i = 0; i < numWishes; i++) {  
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}
```

```
//print wish list
```

```
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```



wishlist

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wishlist

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wishlist



numWishes


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wishlist



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wishlist



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wish

2



numWishes



wishlist

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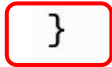
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wish



0

wishlist



numWishes


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"Thor's Hammer"

0

wishlist

2

numWishes


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"Thor's Hammer"

0

wishlist

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"Thor's Hammer"

0

wishlist

2

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wish



"Thor's
Hammer"

0

wishlist

2



numWishes

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0

wishlist

2



numWishes

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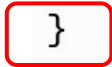
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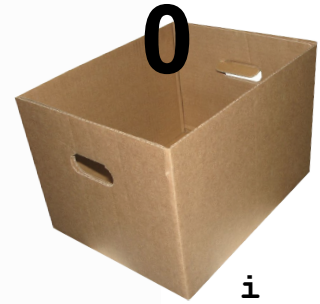
"Thor's
Hammer"

"Captain
America's
Shield"

0

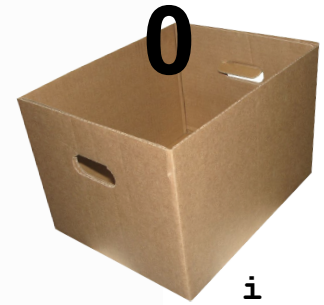
1

wishlist

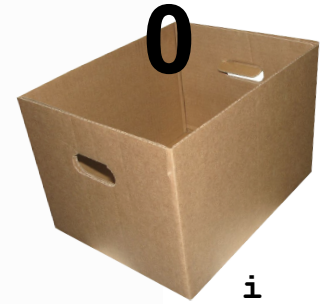


numWishes

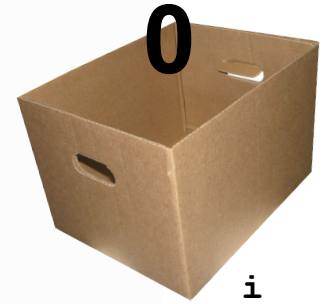
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```

"Thor's
Hammer"

"Captain
America's
Shield"

0

1

wishlist

1

i

2

numWishes

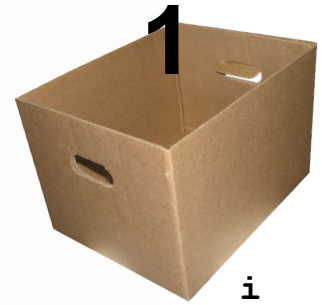
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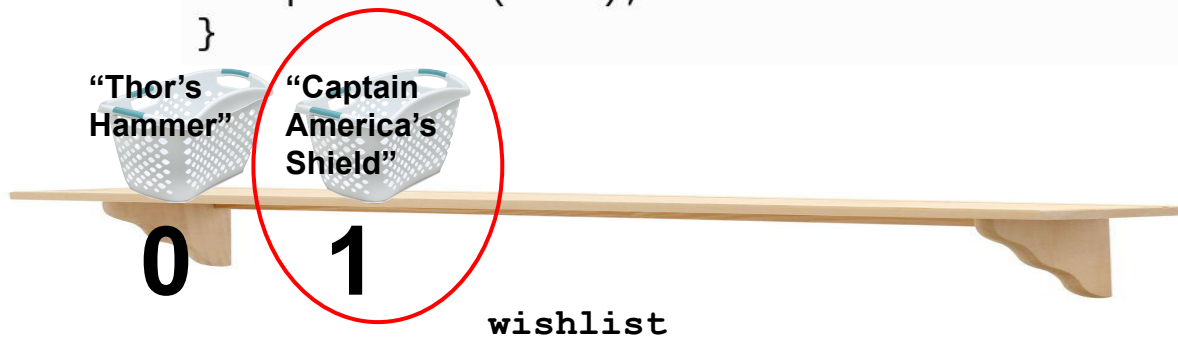
wish



i



numWishes



"Thor's Hammer"

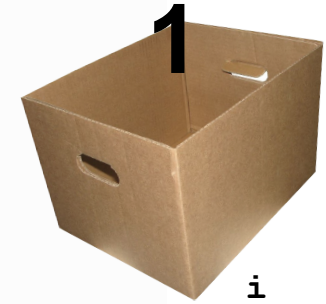
"Captain America's Shield"

0

1

wishlist

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//print wish list  
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    String wish = wishlist.get(i);  
    printWish(wish);  
}
```



what if I change
my mind?

Replace

"Thor's Hammer"

"Captain America's Shield"

0

1

wishlist

```
wishlist.set(1, "Infinity Stone");
```

"Thor's Hammer"

"Infinity Stone"

0

1

wishlist

Add to specific position



```
wishlist.add(1, "Captain America's Shield");
```



Remove by index



```
wishlist.remove(1);
```



Remove by value



```
wishlist.remove("Infinity Stone");
```



Remove by value is safe



```
wishlist.remove("Infinity Stone");
```



ArrayList methods

<code>List.add(value);</code>	appends value at end of list
<code>List.add(index, value);</code>	inserts given value just before the given index, shifting subsequent values to the right
<code>List.clear();</code>	removes all elements of the list
<code>List.get(index)</code>	returns the value at given index
<code>List.indexOf(value)</code>	returns first index where given value is found in list (-1 if not found)
<code>List.isEmpty()</code>	returns true if the list contains no elements
<code>List.remove(index);</code>	removes/returns value at given index, shifting subsequent values to the left
<code>List.remove(value);</code>	removes the first occurrence of the value, if any
<code>List.set(index, value);</code>	replaces value at given index with given value
<code>List.size()</code>	returns the number of elements in the list
<code>List.toString()</code>	returns a string representation of the list such as "[3, 42, -7, 15]"

Read files into ArrayLists

```
public class WishList extends ConsoleProgram implements FileUtil {  
  
    public void run() {  
  
        ArrayList<String> wishlist = readFile("wishlist.txt");  
  
    }  
}
```


with ArrayList

I can do anything!

I am a superhero!

Almost a superhero

```
ArrayList<int> list = new ArrayList<int>();
```

Almost a superhero

```
ArrayList<int> list = new ArrayList<int>();  
// Does not compile :(
```

Almost a superhero

```
ArrayList<int> list = new ArrayList<int>();  
// Does not compile :(
```



ArrayLists cannot store primitive types!

Wrapper classes for primitives

Primitive	"Wrapper" Class
int	Integer
double	Double
boolean	Boolean
char	Character

Primitives in ArrayLists

```
// Use wrapper classes when making an ArrayList
ArrayList<Integer> list = new ArrayList<Integer>();

// Java converts Integer <-> int automatically!
int num = 123;
list.add(num);

int first = list.get(0);    // 123
```





FINAL PROJECTS

Your turn to be a superhero!

