

Three Useful Things

As you come in:

- Get into a group of *Better* two or three with at least one laptop.
- Snarf FemtoFacebook
- Read through the `Person` class
- (and read and run `SmallSocialNetwork`)
- Are these one-way or two-way friends?

Multiple laptops in your group? Pick just one to use for today's coding. Huddle!

The Plan:

Learn some built-in Java that will be needed for Hangman. Practice with Objects.

Write some code!



What if I do this?

Step 1: Take one minute with your group (and without your laptop) to form a hypothesis.

Step 2: Try it out by adding it to `SmallSocialNetwork` just before the printing.

Step 3: Form a hypothesis about what happened (and how to fix it).



What if I do this?

Step 1: Take one minute with your group (and without your laptop) to form a hypothesis.

Step 2: Try it out by adding it to `SmallSocialNetwork` just before the printing.

Step 3: Form a hypothesis about what happened (and how to fix it).

```
for (int i = 0 ; i < 25 ; ++i) {  
    d.addFriend("" + i);  
}
```

*Trick to make a String
from an int, like "15"*



Live debugging!



Dead Debugging

```
Console Snarfer Site Browser
<terminated> SmallSocialNetwork [Java Application] /System/Library/Java/JavaVirtualMachines/1.6.0.jdk/Contents/Home/bin/java (Sep 3, 2012 9:00:54 PM)
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: 10
    at Person.addFriend(Person.java:31)
    at SmallSocialNetwork.main(SmallSocialNetwork.java:40)
```

That's called a *stack trace*.

The 10 after java.lang... means that 10 was the illegal index.

Person.java:31 means the error occurred in Person.java on line 31.

SmallSocialNetwork.java:40 is where the method that broke was called.



And adding print statements is a great idea!

So what do we do?



1/3: ArrayList

Array means that an array is used behind the scenes. Like the Terminator, we'll be back to this fact.

A *list* is something that's easy to add elements to.

```
// new, empty, ArrayList.
```

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

```
l.get(5); // Get fifth element.
```

```
l.set(5, "R2D2"); // Set 5th element.
```

```
l.add("C3PO"); // Add an element to the list (at the end).
```

```
l.size(); // Return the size.
```

Note that we must specify the type!



This distinction between interface (what it does) and implementation (how it does it) is going to reappear. Many times.

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Replace array-based friends with ArrayList-based friends!

Hint: you'll need to change two methods, and do something with the data too.

Try adding 25 friends. How about 50? 500? 5000? 500,000?

More? *← Watch out that you don't crash your laptop!*

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Are we done?



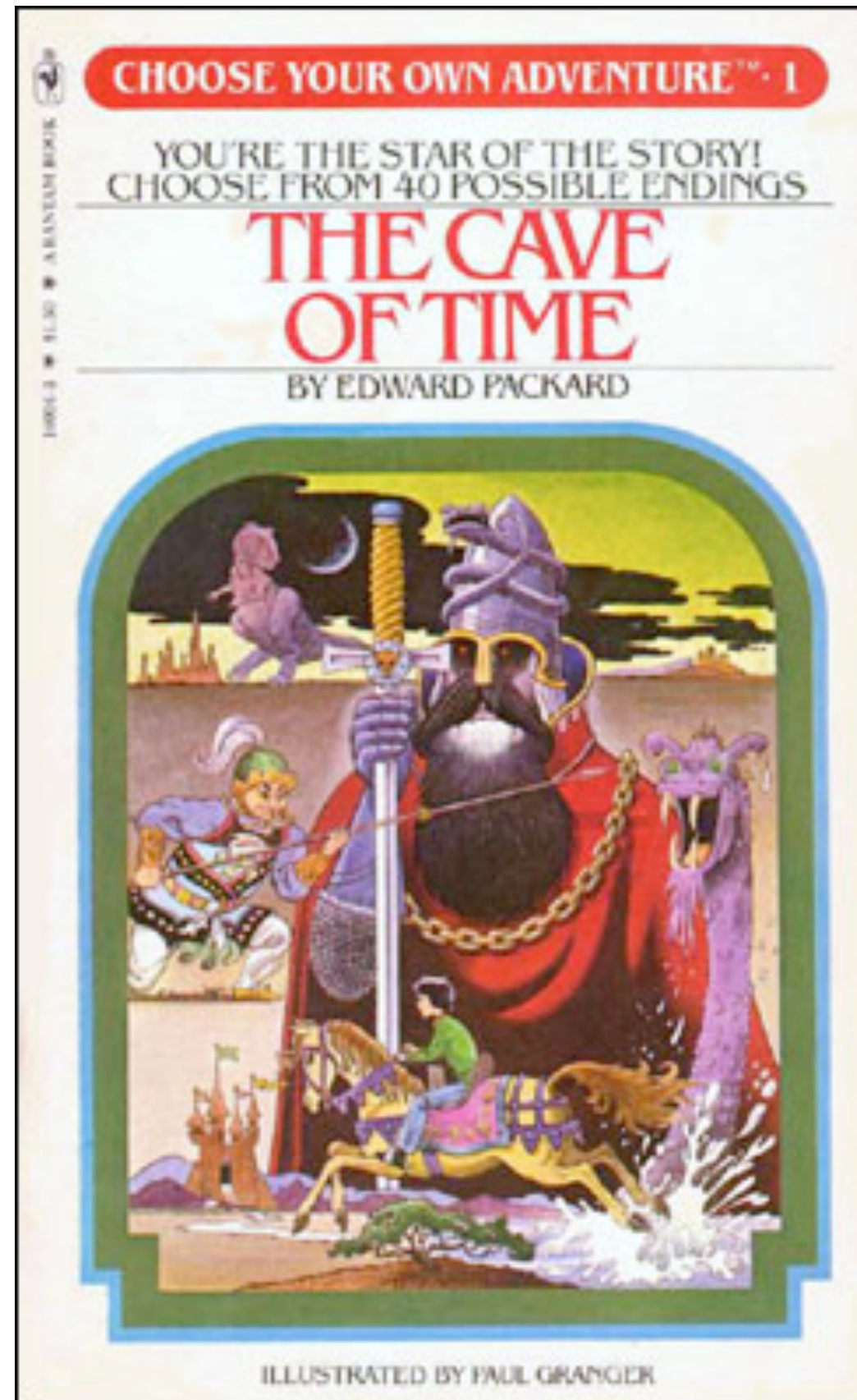
What does it mean when a Professor asks this question?

Are we done?

```
for (int i = 0 ; i < 250 ; ++i) {  
    d.addFriend("James Bond");  
}
```



So what do we do?



(Part 2!)

2 / 3 : HashSet

Hash means that it uses a technique called “hashing”. More on this later!

A set enforces uniqueness

```
// new, empty, HashSet.  
HashSet<String> s = new HashSet<String>();  
s.contains(“R2D2”); // boolean “Is this in the set?”  
// No more “set” function. (Pun omitted. Thank me later.)  
s.add(“C3P0”); // Add an element to the set.  
s.size(); // Return the size.
```

Replace `ArrayList`-based friends with `HashSet`-based friends!

Hint: Read `SetExample.java`!

Try adding 5000 friends ten times each. How many friends do you have?

This distinction between interface (what it does) and implementation (how it does it) is going to reappear. Many times. As will this message.

Are we done?



Really? He's asking this again? Does he think we'll fall for it again?

Popularity Contest

“Who has been friended the most?”

not

“Who has the most friends?”

Have

Person => friends

Want

Name in => friended-count out

In General

Key => Value



One-way friends complicate everything!

Examples of Real-Life Maps

Sometimes called “dictionaries.”

Phone books

Tables of contents

Encyclopedias

Color-coding



Does anybody still use phone books? I may need a new example...

Examples of Real-Life Maps

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Names => Phone numbers (String => String?)

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Does anybody still use phone books? I may need a new example...

Examples of Real-Life Maps

Sometimes called “dictionaries.”

Phone books

Names => Phone numbers (String => String?)

Tables of contents

Topics => Page Numbers (String => Integer)

Encyclopedias

Names => Articles (String => String)

Color-coding

Colors => Properties

Color => ...?



Does anybody still use phone books? I may need a new example...

3 / 3 : HashMap

Hash means that it uses a technique called “hashing”. More on this later!

A *map* turns keys into values.

```
// new, empty, HashMap from Strings to ints.  
HashMap<String, Integer> m = new HashMap<String, Integer>();
```

Key type. Each key has a (specific) associated value.

Value type. Note that both the Key and Value types *must be classes, not primitives*; hence Integer, not int.



3 / 3 : HashMap

```
// new, empty, HashMap from Strings to ints.  
HashMap<String, Integer> m = new HashMap<String, Integer>();
```

Finish `PopularityContest`. Who is the most popular person? The least popular?

Compare to `getName()`

Hint I: Person is going to need a `getFriends` method. Start by implementing that. What's the return type?

Hint II: Read `MapExample.java` all the way through...

Turn this in by Friday. It's group work, so everybody must contribute. Put everybody's NetID in every file (but only submit it once).

“Who has been friended the most?”

not

“Who has the most friends?”



As always, “by Friday” means “anytime that’s still Friday in this time zone.”