Three Useful Things

As you come in:
• Get into a group of 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?

The Plan:
Learn some built-in Java that will be needed for Hangman. Practice with Objects.
Write some code!

800 million Facebook users means one femtofacebook is 0.8 microperson.

Better

Multiple laptops in your group? Pick just one to use for today’s coding. Huddle!
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).
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```java
for (int i = 0 ; i < 25 ; ++i) {
    d.addChildFriend("" + i);
}
```

Trick to make a String from an int, like “15”
Live debugging!
Dead Debugging

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?
A list is something that’s easy to add elements to.

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

// 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.

This distinction between interface (what it does) and implementation (how it does it) is going to reappear. Many times.
1/3: ArrayList

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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?

```cpp
for (int i = 0; i < 250; ++i) {
    d.addFriend("James Bond");
}
```
So what do we do?
A set enforces uniqueness

HashSet

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

// 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(“C3PO”); // 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

Phone books

Tables of contents

Encyclopedias

Color-coding

Sometimes called “dictionaries.”

Does anybody still use phone books? I may need a new example...
Examples of Real-Life Maps

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

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Sometimes called “dictionaries.”
Examples of Real-Life Maps

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 => ...?

Sometimes called “dictionaries.”

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.

```java
// 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

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

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...

“Who has been friended the most?”
“Who has the most friends?”

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).

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