[TAP:KYGAU] Static Variables

order of execution

```
public class Baby {
  private static int count = 0;
  private String name;

  public Baby(String theName){
     count++;
     name = theName;
  }
  public static getCount(){
     return count;
  }
  public static void main(String[] args){
     Baby baby1 = new Baby("Arjun");
     System.out.println(Baby.getCount());
     Baby baby2 = new Baby("Candy");
     System.out.println(Baby.getCount());
  }
}
```

0 (private static int count = 0;

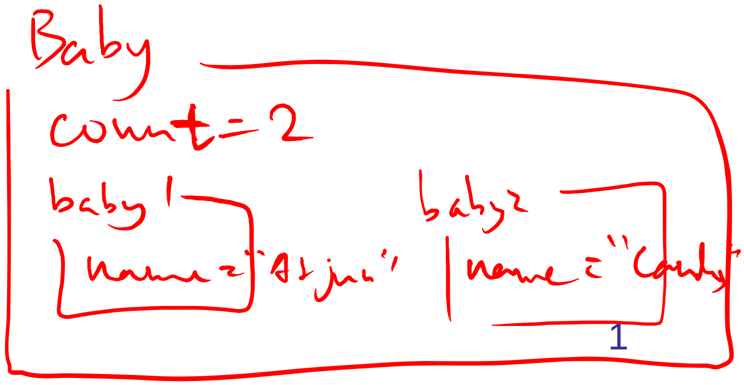
2 (private String name; = "baby": var initializn

1 super()

3 (count++; name = theName;

int

- What does the program output?
  - A. 1 then 1
  - [✓ B.] 1 then 2
  - C. 2 then 2
  - [✓ D.] Compiler error
  - E. Whatever



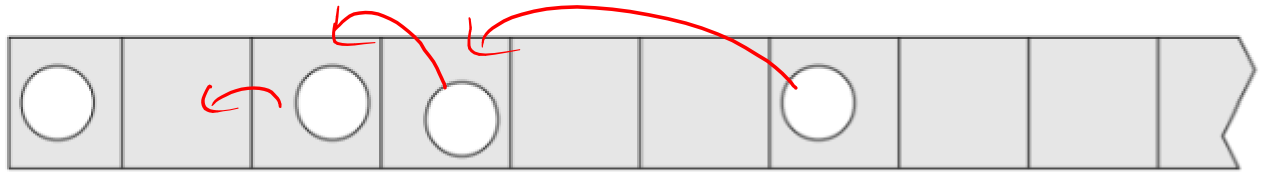
Administrative Details

- Let me know if you haven’t picked up your course packet
- Piazza Sign Up
    - Everyone’s been invited, but not every has signed up
- First Lab today!
    - Prelab
        - Set up accounts and submit google form (if you haven’t already!)
        - Complete Lab 1 design doc

Agenda

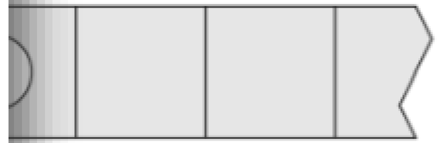
- Lab 1
  - Static variable & method
  - toString()
  - equals()
  - import

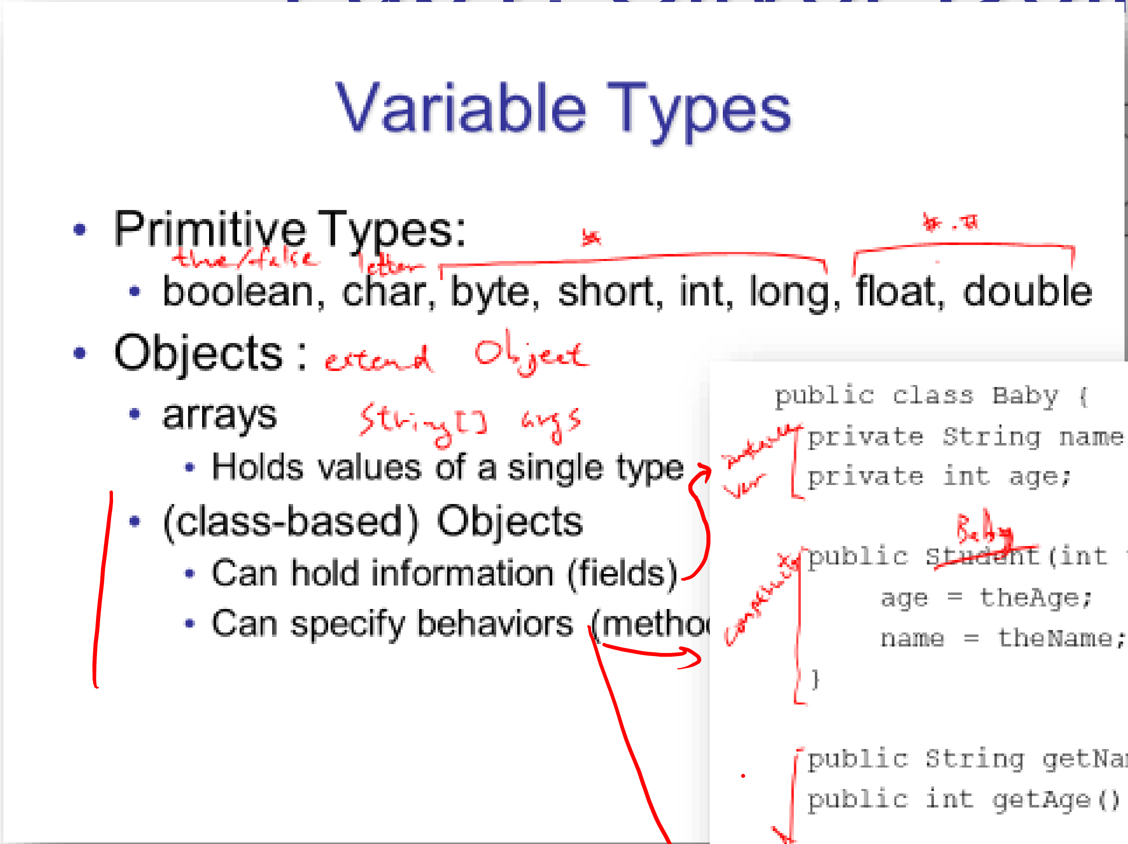
Lab1: Silver Dollar Game



- 2 Player Game
- Players take turns and move a coin left
  - Restrictions:
    - Each square holds at most 1 coin
    - Coins can be moved any # of squares, but can't "jump over" other coins.
- The last player to move wins!

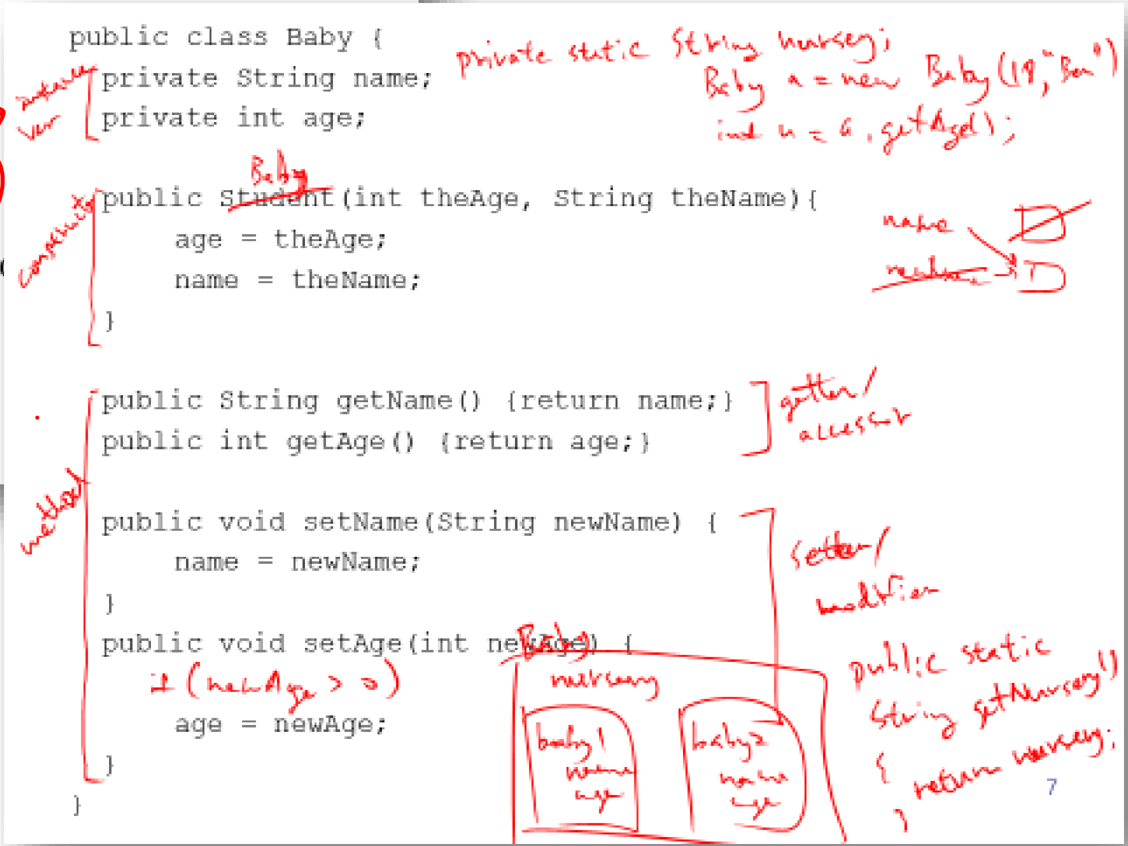
Lab1: Silver Dollar Game





Variable Types

- Primitive Types:
  - boolean, char, byte, short, int, long, float, double
    true/false · letter · 整 · [illegible]
- Objects : extend Object
  - arrays String[] args
    - Holds values of a single type
  - (class-based) Objects
    - Can hold information (fields)
    - Can specify behaviors (metho



```
public class Baby {
    private String name;
    private int age;

    public ~~Student~~ Baby(int theAge, String theName){
        age = theAge;
        name = theName;
    }

    public String getName() {return name;}
    public int getAge() {return age;}

    public void setName(String newName) {
        name = newName;
    }
    public void setAge(int newAge) {
        if (newAge > 0)
        age = newAge;
    }
}
```

instance var

constructor

method

private static String nursery;
Baby a = new Baby(19, "Ben")
int n = a.getAge();

name → ~~▭~~
~~name~~ → ▭

getter/accessor

setter/modifier

public static String getNursery()
{ return nursery;
}

Baby

nursery

baby1 name age

baby2 name age

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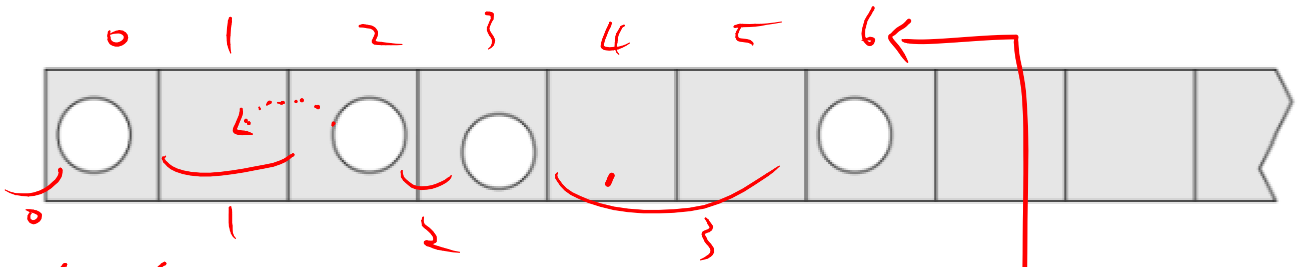
Lab1: Silver Dollar Game



class CoinStrip

Instance Variables

any of these

int[] location // [0, ~~1~~, 3, 6]

boolean[] coinstrip // [t, ~~f~~, ~~t~~, t, f, f, t, f, f, f, ..]

int[] gaps // [0, ~~1~~, ~~0~~, 2]

Constructor

CoinStrip()

CoinStrip(.., ...)

Method

move Coin

is Over

display (= toString())

Agenda

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static variable

- Static variables are shared by all instances of class
- Any variable shared by all instances should be declared **static**
  - E.g. nursery name, baby count
- Any constant (=variable shared by "the universe") should be declared **static final**
  - E.g. static final double PI = 3.141592653589793;

value cannot be changed

static methods

- Static methods are shared by all instances of class & can only access static variables and other static methods
- Any method that does not access instance variables should be declared "static"
  - E.g. Baby.getCount(), Math.pow(), Integer.parseInt()

Math m = new Math();

Math.pow(2,2); vs m.pow(2,2);

$\uparrow$ reality

$\uparrow$ (if pow() were not static)

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toString()

- Every class has a toString method
- “toString()”, **if correctly implemented**, returns a String representation of the given object.
- (Note, `System.out.println(someObject)` automatically calls someObject.toString() unless someObject == null.)
- E.g.:

```
Baby b1 = new Baby(18,"Teresa");
//print “Teresa(age 18)”
System.out.println(b1.toString());
//print “Teresa(age 18)”
System.out.println(b1);
```

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java

== vs equals()

python is ==

- '==' checks whether 2 names refer to same object (memory address)
- Every class has a "equals" method
- "equals()", **if correctly implemented**, checks whether the contents are the same
- E.g.:

```
Baby b1 = new Baby(18,"Teresa");
Baby b2 = new Baby(18,"Teresa");
System.out.println(b1 == b2); // false
System.out.println(b1.equals(b2)); // true
System.out.println(b2.equals(b1));//prints true
```

equals() Example

- Defining equals()
  - Check the object is of the same type
  - Check the contents are the same

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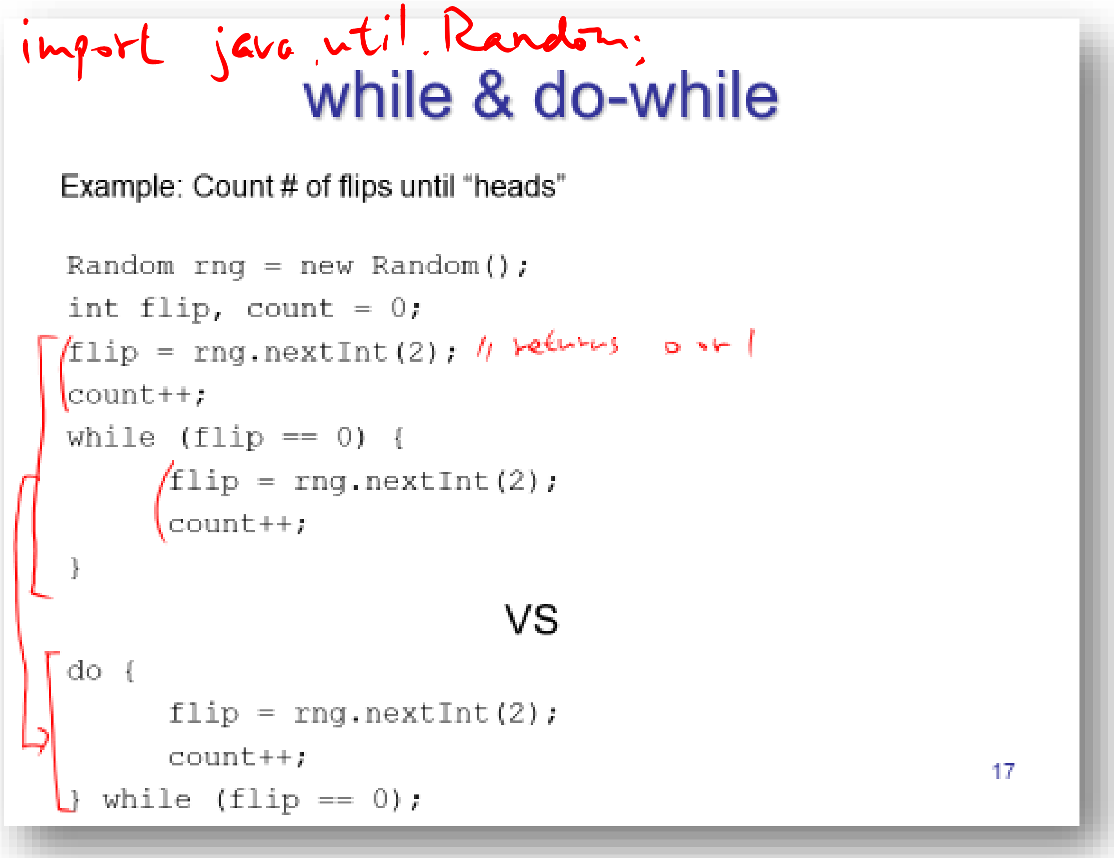
import

- “import”allows to refer to classes which are declared in other packages, e.g. Random.



import java.util.Random;

while & do-while

Example: Count # of flips until “heads”

```
Random rng = new Random();
int flip, count = 0;
flip = rng.nextInt(2); // returns 0 or 1
count++;
while (flip == 0) {
      flip = rng.nextInt(2);
      count++;
}
```

VS

```
do {
      flip = rng.nextInt(2);
      count++;
} while (flip == 0);
```

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