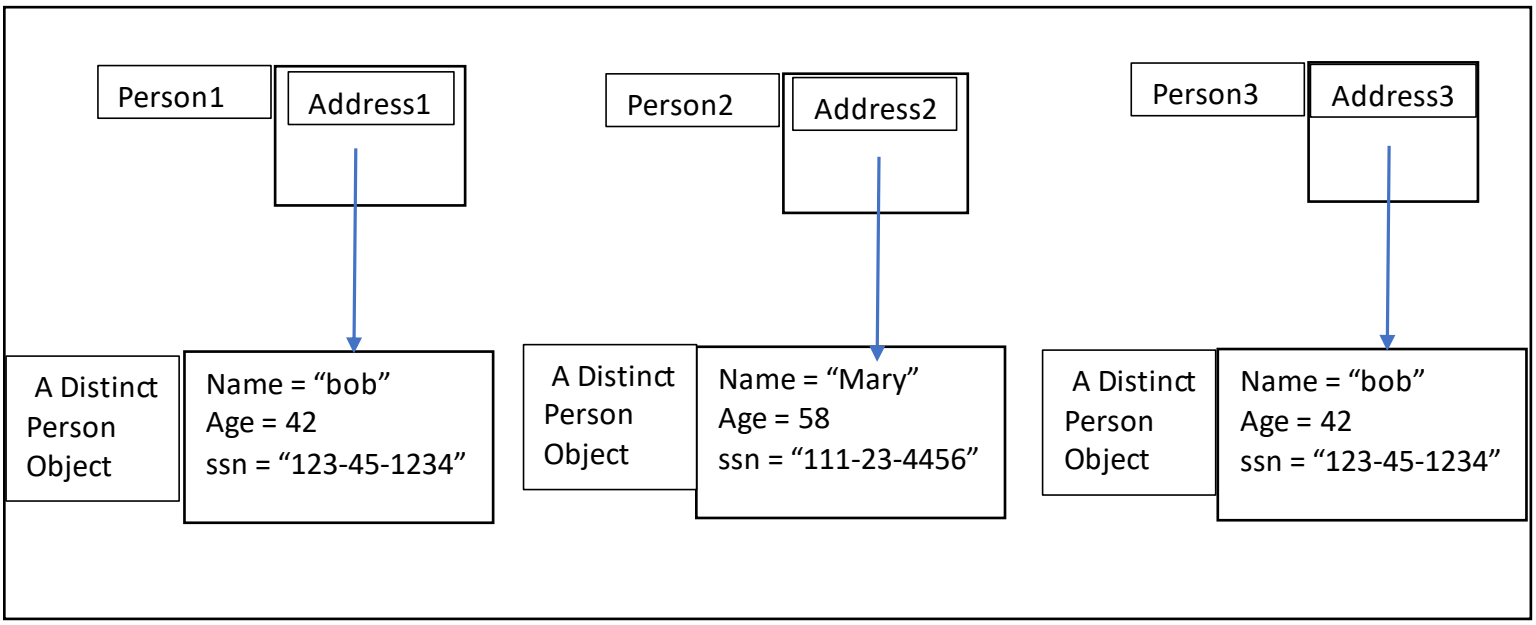
7/5/21
Summer 2021

**Recitation 0: Equals Method, Clone Method, Documentation**

*Making Equals Easy*

- Using the "==" operator
  - Compares *Addresses* NOT *objects*
  - Example 1:

```
Person person1 = new Person("bob",42,"123-45-1234");
Person person2 = new Person("Mary",58,"111-23-4456");
Person person3 = new Person("bob",42,"123-45-1234");
```




What is the result of: person1 == person3
Answer: False

Why?

== Compares addresses not objects

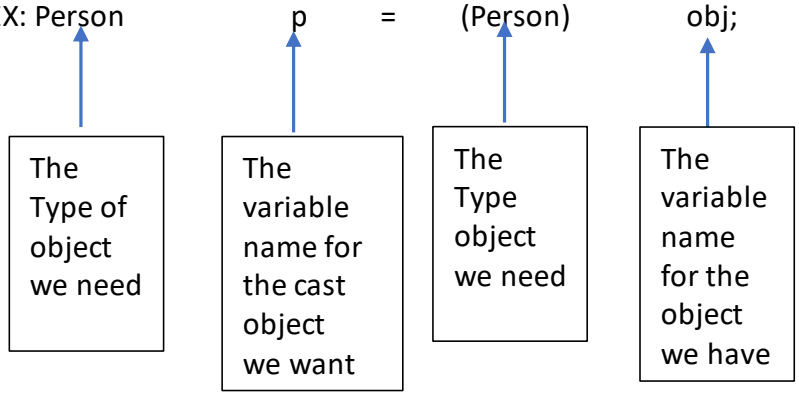
How do we check for object Equality?

".equals()" Method

- The pseudo-code of the equals method:

```
public boolean equals(Object obj){

    If(obj is actually a person){        <-- (obj instanceof Person)

    Person p = (Person)obj;              <-- Typcasting

    return true if all fields are equal

    }

    return false;
}
```

- ***Typecasting****
  - The equals method accepts an object as an argument
  - To tell the compiler that the object is actually a "Person" we typecast
  - EX: Person p = (Person) obj;




The full person equals method:

```
public boolean equals(Object obj) {
   if(obj instanceof Person) {
      Person p = (Person)obj;
      return this.age == p.age && this.name.equals(p.name) && this.ssn.equals(p.ssn);
   }

   return false;
}
```

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*Clarifying the Clone Method*

- The clone method:

```
public Person clone(){

Person newPerson = new Person(this.name,this.age,this.ssn);

return newPerson;

}
```

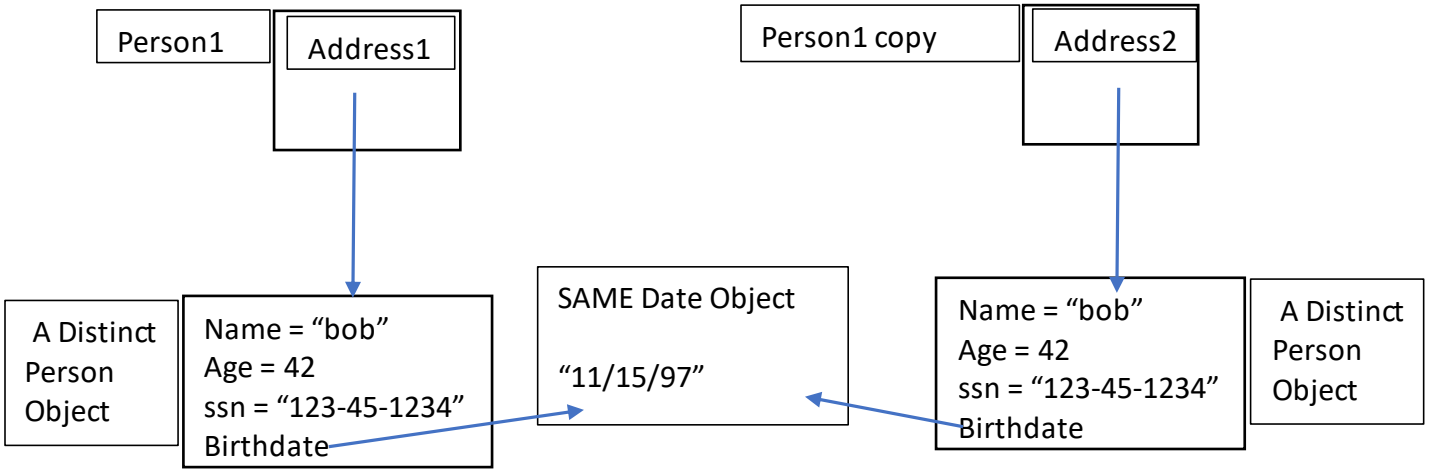
  - Shallow copy:
    - Lets say we add a new field to Person
      - private Date birthdate
        - Which is an object that represents a person's birthday
      - What happens when we try:

```
public Person clone(){

Person newPerson = new Person(this.name,this.age,this.ssn, this.birthdate);

return newPerson;

}
```



- This will create a SHALLOW copy: if we edit the birthdate of one person, the other persons birthdate will also be edited
- How Do we fix this? Clone the birthdate
- Strings do not have to be deep copied because they are immutable (cannot be altered once created)!

```
public Person clone(){

        Person newPerson = new Person(this.name,this.age,this.ssn, this.birthdate.clone());

        return newPerson;
}

        /*Assume that the clone() method Birthdate class has already been implemented
       And that it is a deep cloning method*/
```

*Creating deep Clone (and Equals) methods*

- To create a "deep" clone (or equals) method you use the cloning (or equals) method of one object inside of the cloning (or equals) method of another object.
    - Methods with many lines are hard to read and debug
    - How can we shorten clone and equals method?
    - Cloning example:
        - Let's say we have a UniversityClass object which has a private field Person[] roster
        - We could do:

```
public Class clone(){
        Class classCopy = new Class();
        for(Person p: roster){
                Person newPerson = new Person(p.getName(),p.getAge(),p.getSSN());

                //THIS MAKES US USE TOO MANY GETTERS WHICH IS UNESSECCERY

                classCopy.add(newPerson);
        }

        Return classCopy;
}
```

        - Instead we will do:

```
public Class clone(){

        Class classCopy = new Class();

        for(person p in the class){

                classCopy.add(p.clone());

}

Return classCopy;
}
```

MUCH SHORTER! EASIER TO READ/DEBUG!

*Discovering Documentation*

- API: Application Programmer Interface
  - How can we use the code someone else wrote?
- How can we document how to use our code so that other programmers can use it?
  - *Javadoc*
    - Javadoc creates a set style in which to write documentation so different programmers can communicate how their code works to each other

| Tag | Meaning | Place |
|---|---|---|
| @see | See related content | Class, Method |
| @author | Author of the class | Class |
| @version | The version of the class (Used for updates to code) | Class |
| **@param** | Information on the parameter of a method | Method |
| **@return** | Information of the return value for a method | Method |
| **@exception** | Information on exceptions thrown by a method | Method |
| **@throws** | Information on exceptions thrown by a method | Method |
| @deprecated | Marks an element as deprecated | Class, Method |
| @since | The API version this element was first included | Class, Method |

*Bold tags are the most important ones you will need to know for CSE 214

# *Documentation Examples*

```
/**
 * This class Represents a person which has a name, age and associated SSN
 *
 * @author Juan Tarquino
 */
public class Person {
.....
}

/**
 * This method adds two positive numbers together
 *
 * @param num1
 * The first number to be added
 * @param num2
 * The second number to be added
 *
 * @return
 *The sum of the first and second number
 *
 * @throws IllegalArgumentException
 * when either of the numbers is negative
 */
public int add (int num1, int num2) throws IllegalArgumentException{
   if(num1 < 0 || num2 < 0)
      throw new IllegalArgumentException("One of the numbers is negative!");

   return num1 + num2;
}

/**
 * This is a Constructor used to create a new Person object
 *
 * @param name
 *    The name of the person
 * @param age
 *    The age of the Person
 * @param ssn
 *  The social security number of the person
 */
public Person(String name, int age, String ssn){
   this.name = name;
   this.age = age;
   this.ssn = ssn;
}
```