

# Variables as Remote Control

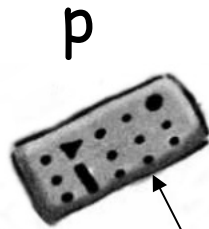
A useful memory aid  
used in *Head First Java*

# A Variable is a Reference

`Person p = new Person( )`

a *reference* for sending  
commands to object

object



buttons on  
remote  
control are  
methods

**Person**

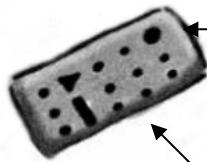
```
#clone()  
equals(Object)  
finalize()  
getClass()  
hashCode()  
toString()  
wait()  
getName() : Str
```

# The Compiler decides what Buttons

Person p = xxxxxxxxxxxxxxxx

Compiler uses the declared type of variable to decide what buttons (methods) the remote has.

Person  
remote

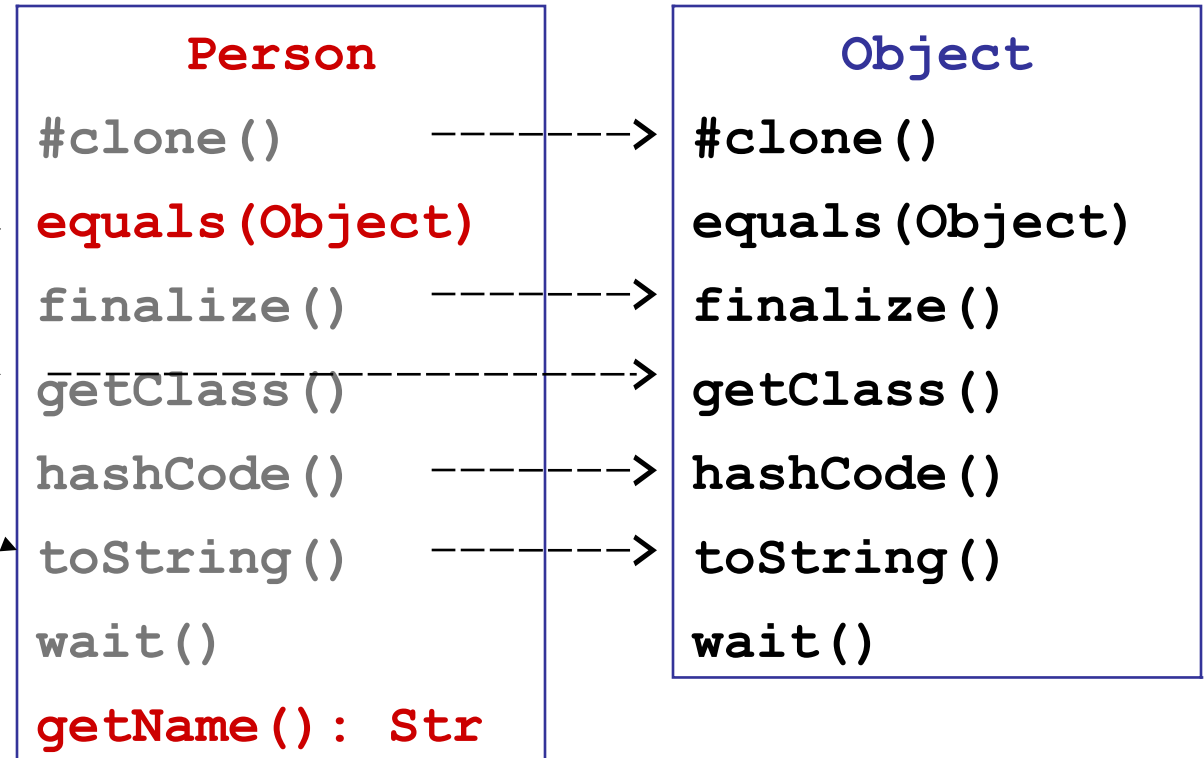
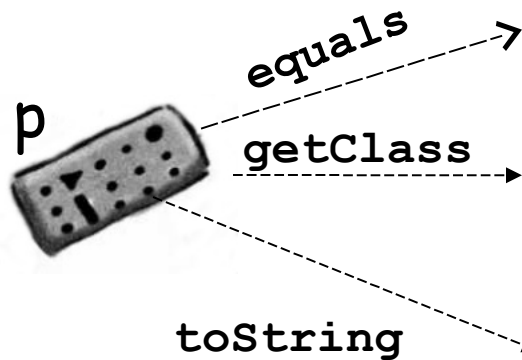


getName( ) button for Person

buttons inherited from Object

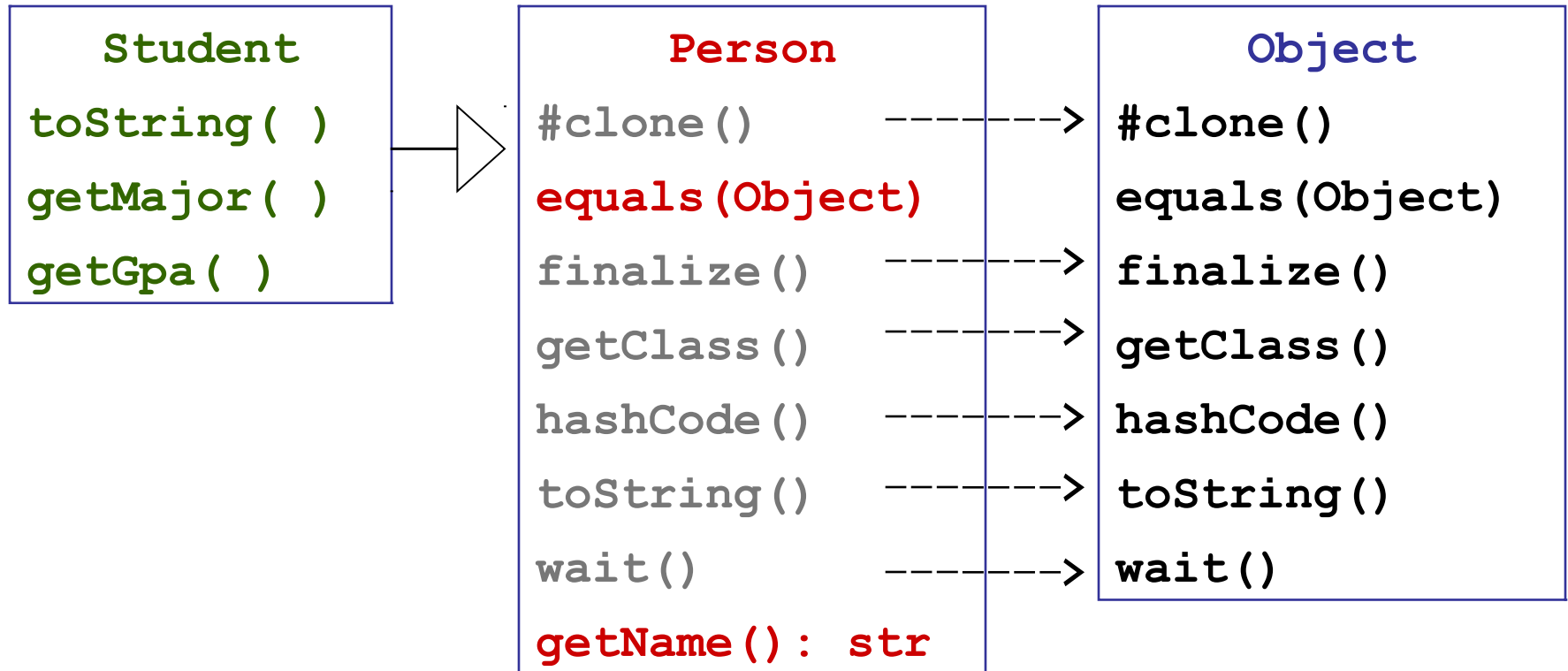
# Invoking Methods

Person p = new  
Person( )



At **runtime**, JVM invokes method on **actual object type**. If a class **overrides** a method, the override is used.

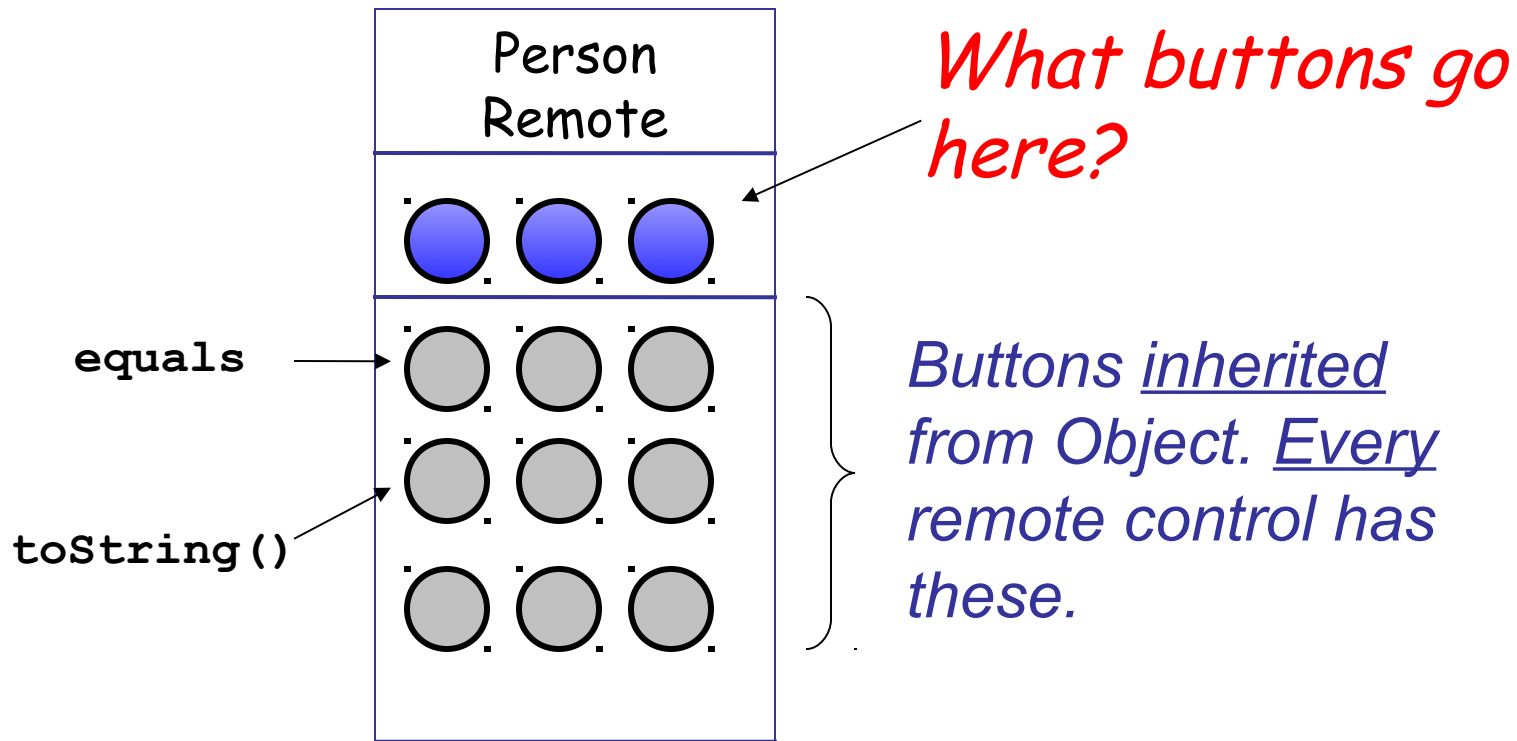
# Student - Person - Object



```
class Student extends Person {
```

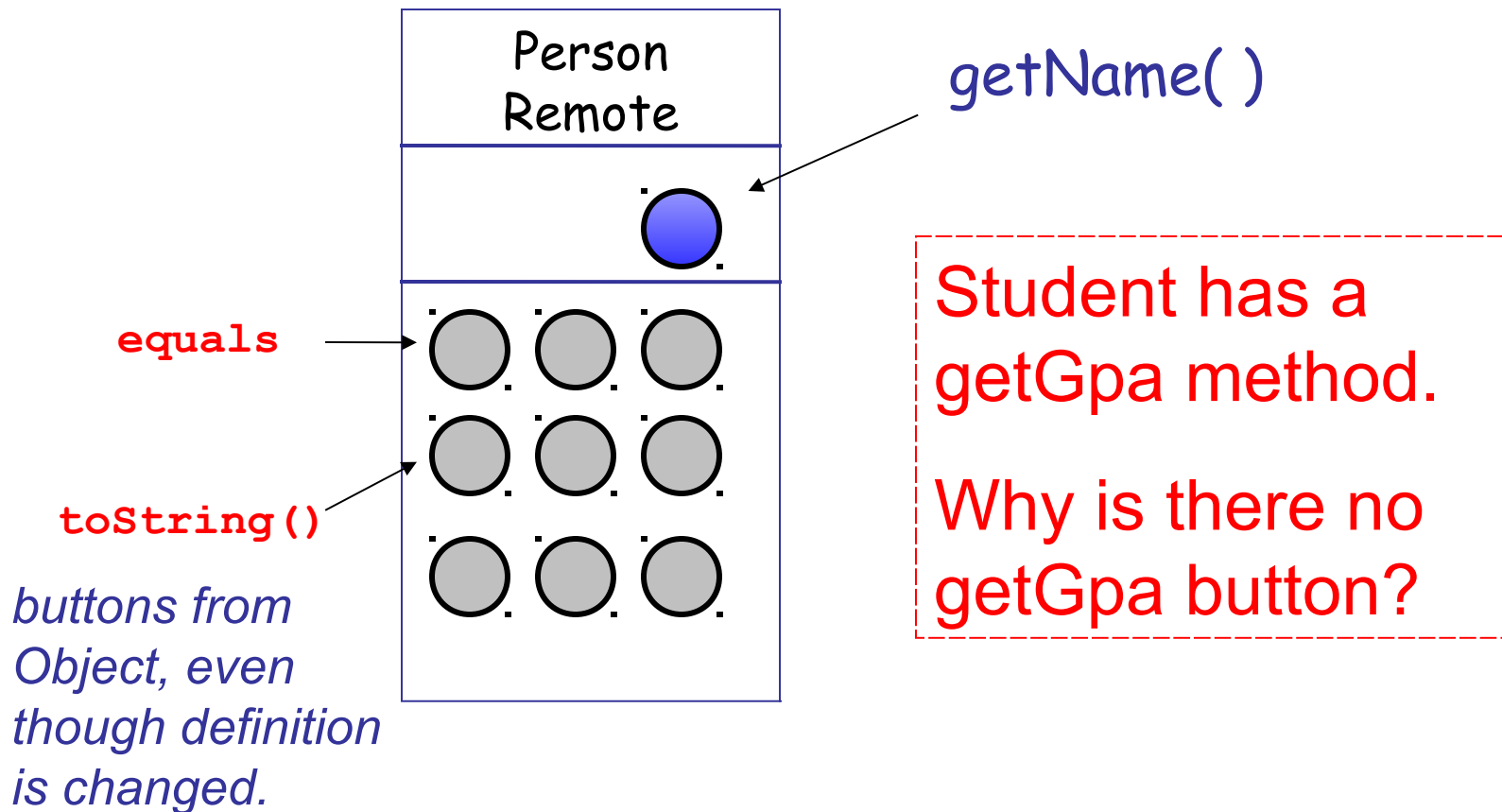
# What Buttons Do You Have?

```
Person x = new Student( );
```



# What Buttons Do You Have?

```
Person p = new Student( );
```



# Method Signature includes Parameter

Student

toString( )

equals (Student)

getGpa( )

Person

equals (Object)

getName( )

Object

equals (Object)

toString( )

etc.

Override  
equals(Object)

New method:  
equals(Student)

```
class Student extends Person {  
    public boolean equals( Student s ) // BAD IDEA  
    public String toString( )
```



# Which equals( ) is called?

**Student**

`toString( )`

`equals(Student)`

**Person**

`equals(Object)`

`getValue( )`

**Object**

`equals(Object)`

`toString()`

`etc.`

```
Student a = new Student();
```

```
Person b = new Student( );
```

```
//1.
```

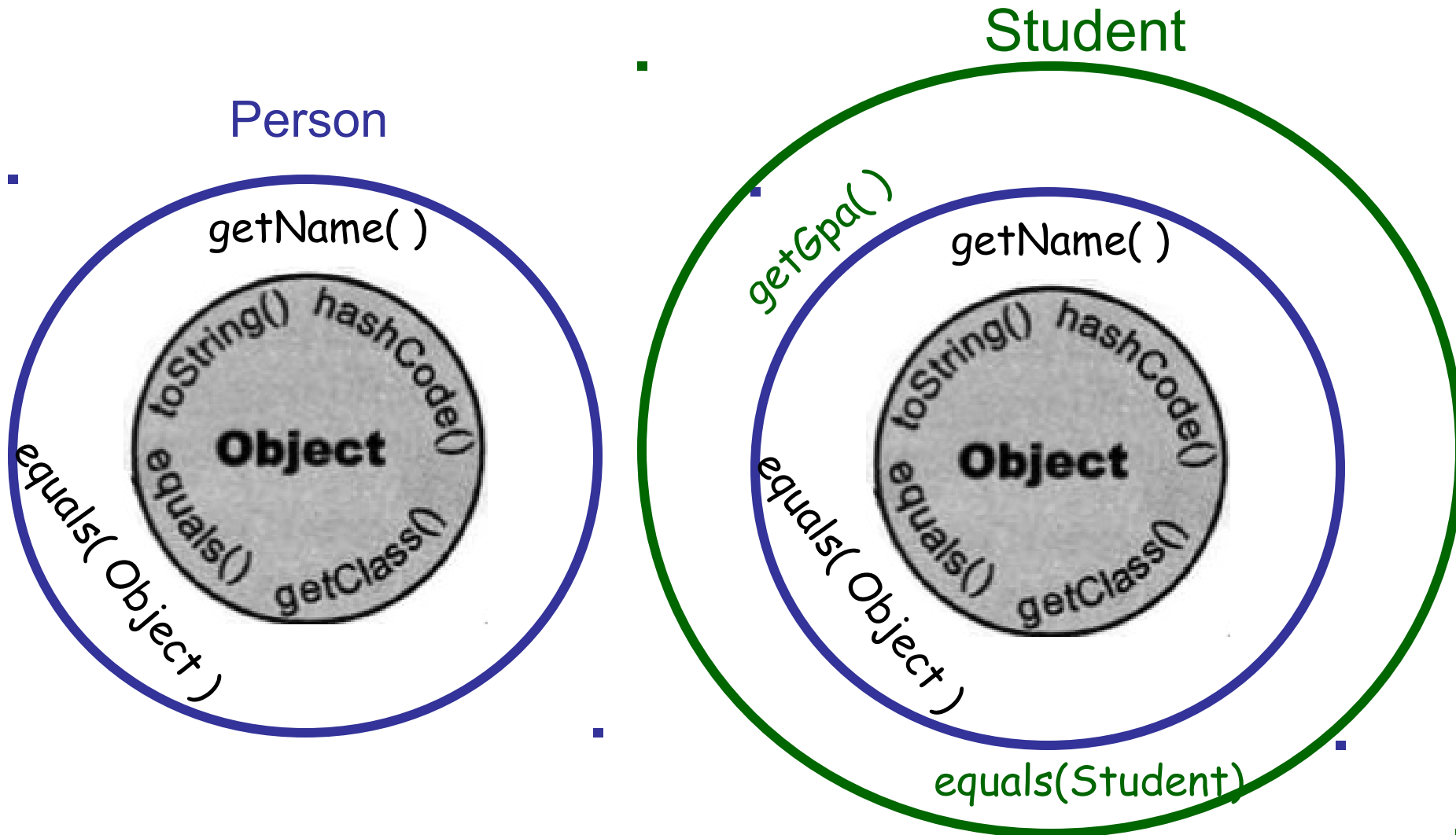
```
b.equals( a )
```

```
//2.
```

```
a.equals( b )
```

Draw the remote control !

# Another view of Inheritance



# Object References

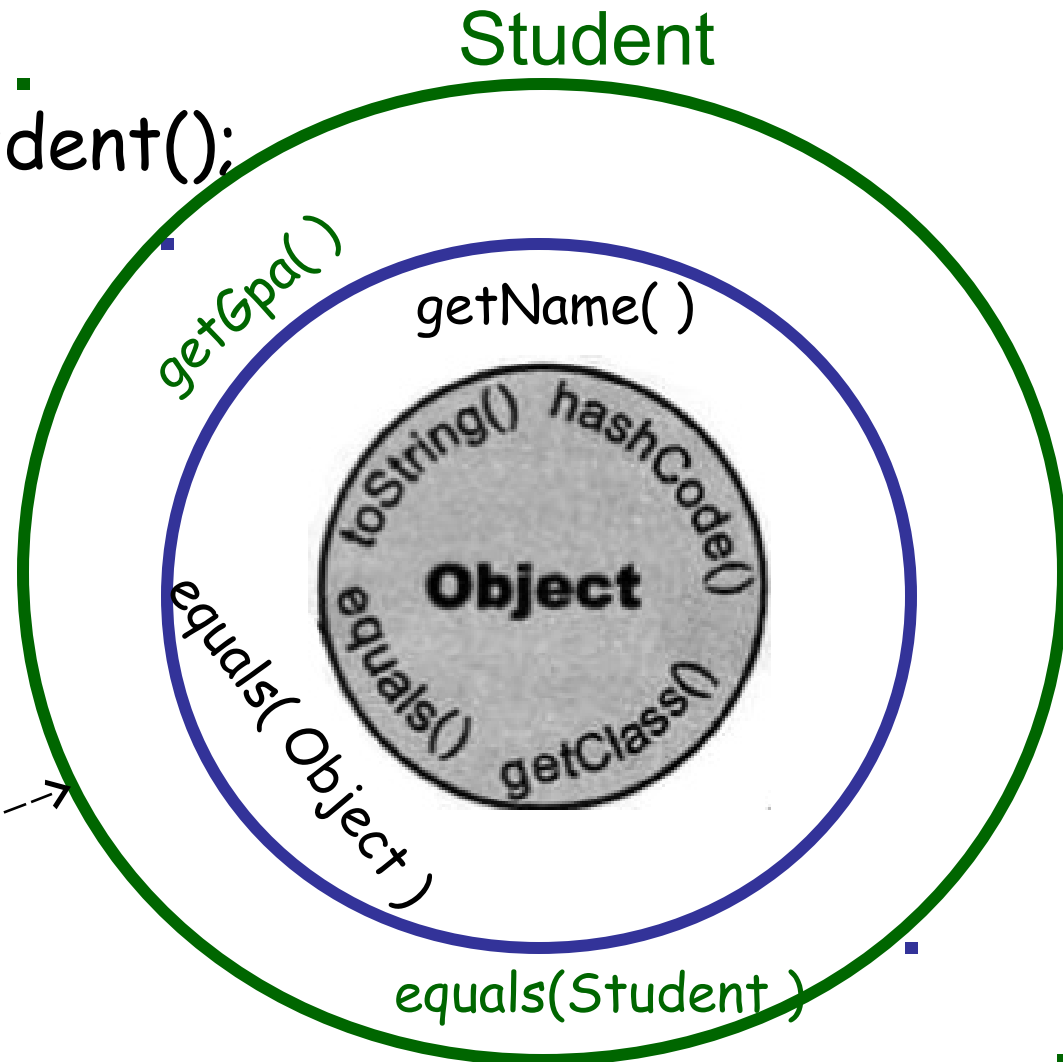
Object obj = new Student();

obj.toString() ???

An "Object" remote control (reference) only knows the methods for object.



obj



# How to Access the Real object

Object obj = new Student()

??? how can we call  
getGpa() using obj ???

