

PROGRAMACIÓN ORIENTADA A OBJETOS

TEMA5: Herencia y UML2Java

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PROGRAMACIÓN ORIENTADA A OBJETOS

Antes que nada veamos W5H1
Para ver como funciona herencia.

===[SLIDE #01]===[PUBLIC, FRIENDLY, PROTECTED AND PRIVATE]=====

attribute	Class	Package	Subclass	World	
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+
private	+	-	-	-	
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+
no modifier	+	+	-	-	(friendly)
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+
protected	+	+	+	-	
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+
public	+	+	+	+	
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+

+ : accessible - : not accessible

Friendly (or Package Private or just Package or Default) Can only be seen and used by the package in which it was declared. This is the default in Java (which some see as a mistake).

UML: + public # protected ~ package - private

===[SLIDE #02]===[UML CLASS]=====

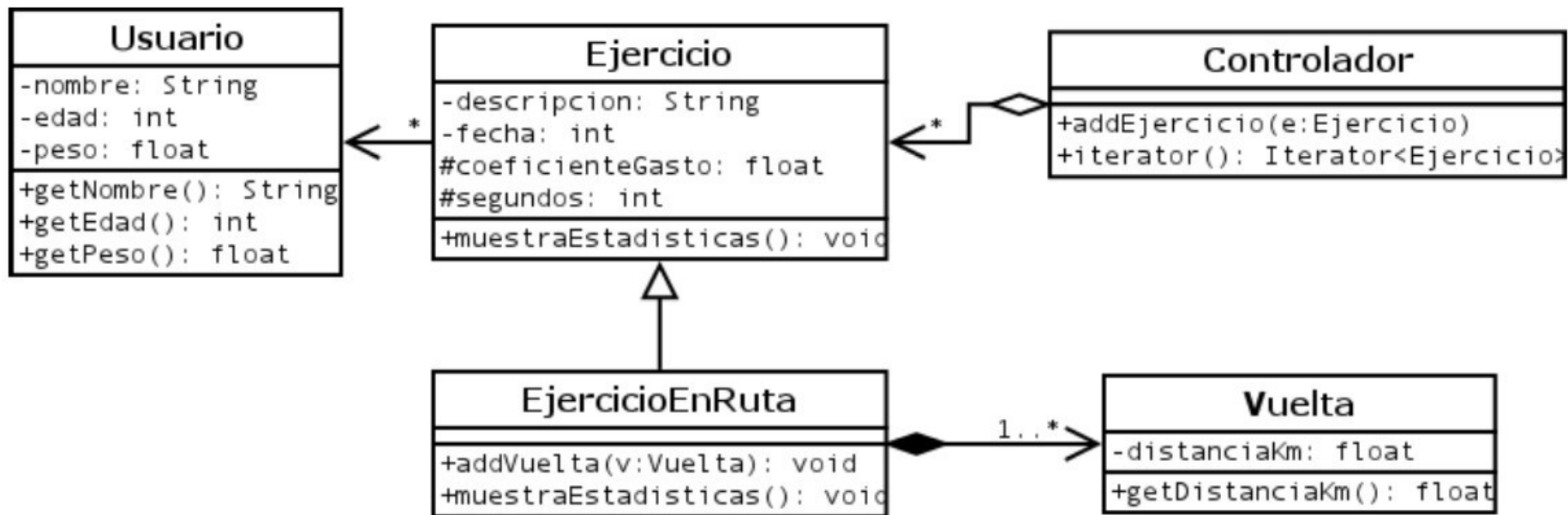
NameClassA	public class NameClassA {
+ int attribA	public int attribA;
# float attribB	protected float attribB;
~ boolean attribC	boolean attribC;
- NameClassB attribD	private NameClassB attribD;
+ CONSTANT_NAME: int 0	public static final int CONSTANT_NAME = 0;
+ nameMethodPublic(nomArgA: typeArgA): retTypeA	
- nameMethodPrivate(nomArgB: typeArgB): retTypeB	

```
public retTypeA nameMethodPublic(typeArgA nomArgA) {  
    ...  
}  
private retTypeB nameMethodPrivate(typeArgB nomArgB) {  
    ...  
}
```

Tipus de relacions entre classes

Relació	Gràfic	Significat
Associació		Els objectes de la classe origen gestionen objectes de la classe destí.
Agregació		És una manera de definir directament una relació que s'anomenaria "conté" o "desa", on l'objecte contingut no és imprescindible dins el conjunt (exemple: un ànec a un llac, un llapis a una capsa).
Composició		Com la composició, però els objectes de la classe origen no tenen sentit sense cap objecte de la classe destí (exemple: les pàgines d'un llibre, els alumnes d'una classe)

Exemple de diagrama UML



```
A 1 -----> 1 B
A 1 -----> * B
A * -----> * B
A * -----> 1 B
Si no aparece una cardinalidad es 1:
A -----> * B          es          A 1 -----> * B
A -----> B            es          A 1 -----> 1 B
```

===[SLIDE #04]===[MULTIPLICITY...?]==

El nombre de la relacion sera el nombre del attribute/Collection.

A 1	One only	A.attribute de tipo B
A 0..1	Zero or one	A.attribute que puede ser null o no
A 0..*	Zero or more	A.Collection de Bs
A *	Zero or more	A.Collection
A 1..*	One or more	A.Collection
A 3	Three only	A.Collection or A.ClassB[3] attributeName;
A 0..5	Zero to Five	A.Collection
A 5..15	Five to Fifteen	A.Collection

table from: <http://www.ibm.com/developerworks/rational/library/content/RationalEdge/sep04/bell/>

A 1 ... B 1	in classA attributeB	
A * ... B 1	in classA attributeB	
A 1 ... B *	in classA Collection of Bs	
A * ... B *	in classA Collection of Bs	and
	in classB Collection of As	

===[SLIDE #05]===[WHICH COLLECTION ALGORITHM]=====

If classA has a collection of Bs, which Collection for B should I use?

if (B has an attribute that is a unique identifier)

 // Map<K,V>

 if (want to be able to sort it by the comparator of K)

 TreeMap<K,V>

 else

 HashMap<K,V>

else if (B cannot have to elements that are equal &&

 we don't need to order them in a particular order)

 // Set<E>

 if (want to be able to sort it by the comparator of K)

 TreeSet<K,V>

 else

 HashSet<K,V>

else

 //List<E>

 if (want efficiency in adding/removing elements)

 LinkedList<E>

 else // want efficiency in accessing to a certain position?

 ArrayList<E>

===[SLIDE #06]===[COMPOSICION]=====

- COMPOSICION 1 A 1:

Automovil <*>1---conte---1->Diposit

```
public class Automovil {  
    private Diposit diposit;
```

- COMPOSICION 1 A N DONDE B _NO_TIENE ATRIBUTO IDENTIFICADOR:

Benzinera <*>1---disposa de---1..*-> Sortidor

```
public class Benzinera {  
    private Set<Sortidor> sortidors; // Tambe podria ser List
```

- COMPOSICION 1 A N DONDE B TIENE ATRIBUTO IDENTIFICADOR:

Benzinera <*>1---disposa de---1..*-> Sortidor

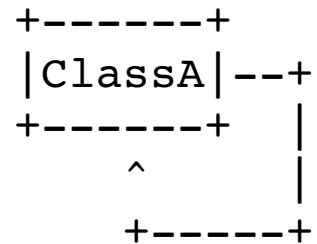
- identificador: int

```
public class Benzinera {  
    private HashMap<Integer,Sortidor> sortidors;  
public class Sortidor {  
    private int identificador;
```

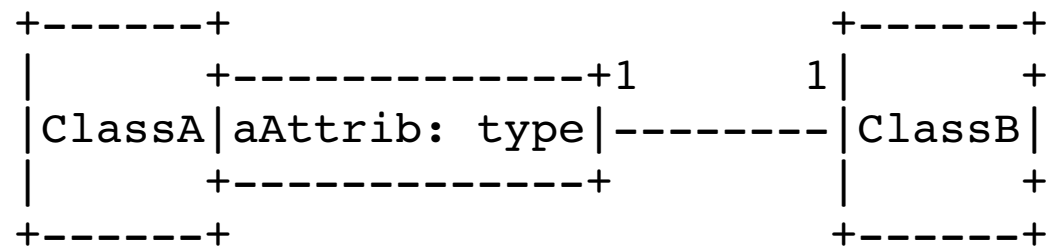
===[SLIDE #07]===[STATIC, REFLEXIVE ASSOCIATIONS AND QUALIFIERS]=====

- Static classNames, attributes and methods are underlined.

- Reflexive associations: ClassA ----> ClassA



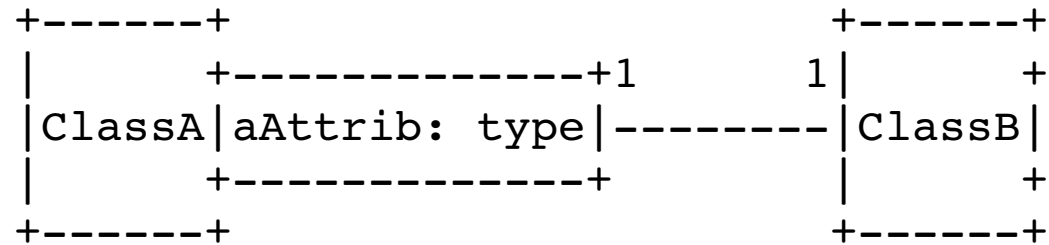
- Association Qualifier: (you could have reflexive qualified associations)



```
class ClassA {
    type aAttrib;
    Map<type,ClassB>;
    ...
}
```

===[SLIDE #08]===[MORE ON QUALIFIERS]=====

- The use of explicitly using an association qualifier ...

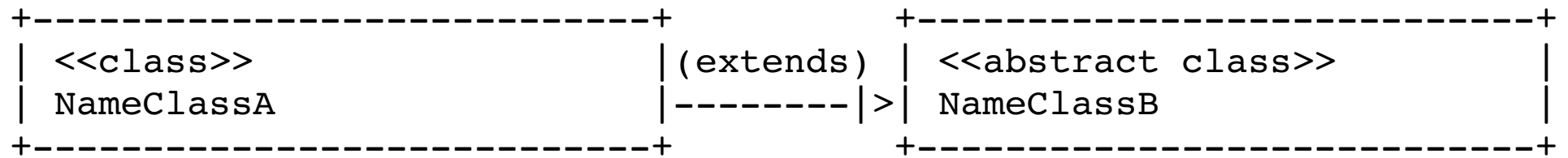


```
class ClassA {
    type aAttrib;
    Map<type,ClassB>; // Map<K,V>
    ...
}
```

... is needed when:

- K is not an attribut of V.
- The association is a reflexive one.
- When K is not a unique identifier of V.

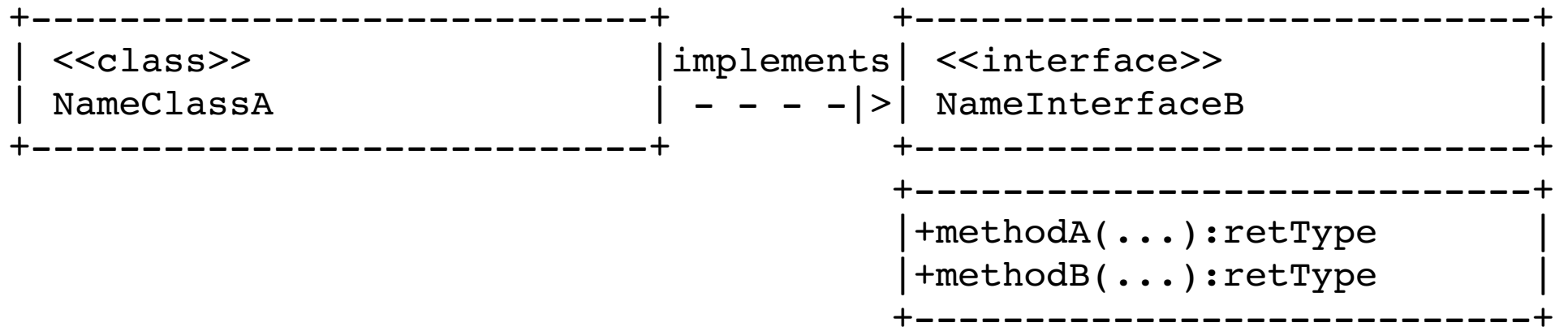
===[SLIDE #09]===[ABSTRACT CLASSES]=====



```
public class NameClassA extends NameClassB { ...// lo veremos cuando  
hagamos  
public abstract Name ClassB { ...                // herencia y polimorfismo
```

A class with all attributes and methods static will be declared as abstract even if it's not explicitly said in the UML.

===[SLIDE #10]===[INTERFACES]=====



```
public NameClassA implements NameInterfaceB { ...  
interface NameInterfaceB { ...
```

We say: an interface has no state.
So it can only have methods, and constants.

Variables can be defined in interfaces, but they do not behave as might be expected: they are treated as final static.)

===[SLIDE #11]===[MORE]=====

- Constructors, getters and setters are usually not represented in the UML.

More on collections:

[http://www.codejava.net/java-core/collections/
overview-of-java-collections-framework-api-uml-diagram](http://www.codejava.net/java-core/collections/overview-of-java-collections-framework-api-uml-diagram)

More on UML:

<http://www.uml-diagrams.org/class-reference.html>
http://www.codemanship.co.uk/parlezuml/tutorials/umlforjava/java_class_basics.pdf

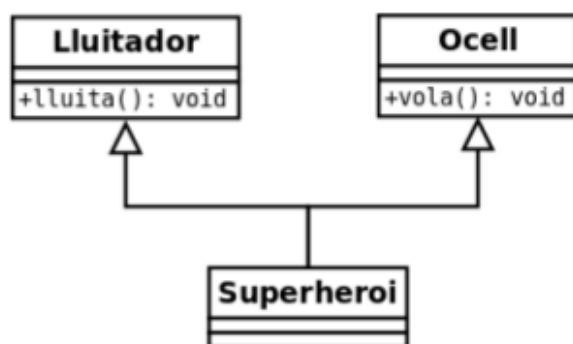
A book with many UML diagrams and the corresponding code:

[http://www.bk.psu.edu/faculty/bowers/ist311/morelli/instructor/resources/
instructors_manual/morelliim.2e.pdf](http://www.bk.psu.edu/faculty/bowers/ist311/morelli/instructor/resources/instructors_manual/morelliim.2e.pdf)

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Interfaces i herència múltiple en Java

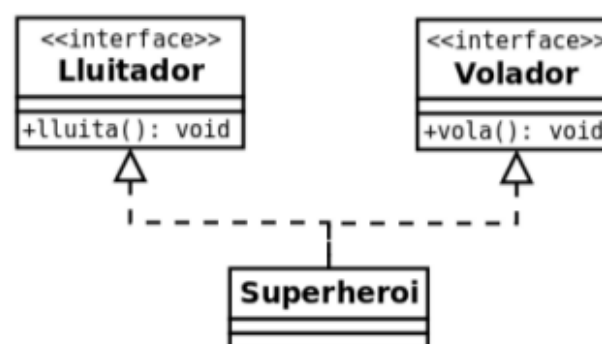
- **L'herència múltiple**, entesa com a una subclasse que hereta de diverses superclasses, **no està permesa en Java**. Una subclasse pot heretar com a màxim d'una única superclasse
- No obstant això, **les interfaces ens permeten “simular” una espècie d'herència múltiple, limitada a l'adopció de comportament (mètodes)**



```
public class Superheroi extends
Lluitador, Ocell {
    //...
}
```

NO PERMÈS !

≈



```
public class Superheroi implements
Lluitador, Volador {
    //...
}
```

OK !

PROGRAMACIÓN ORIENTADA A OBJETOS

Preguntas