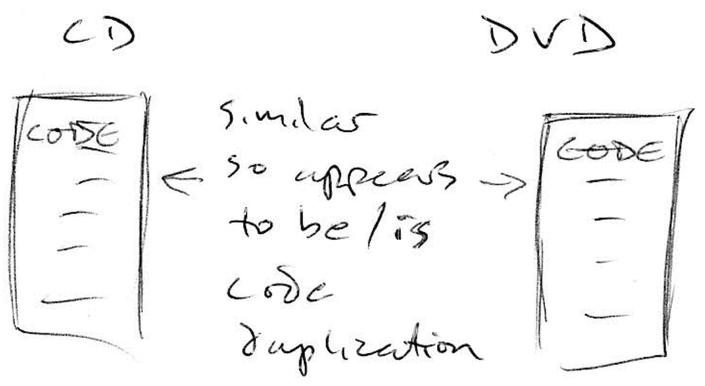
Programming
wk 7
9th Nov 2015

Duplication in Classes

Jed Gibbs
for
Charlton Rodda

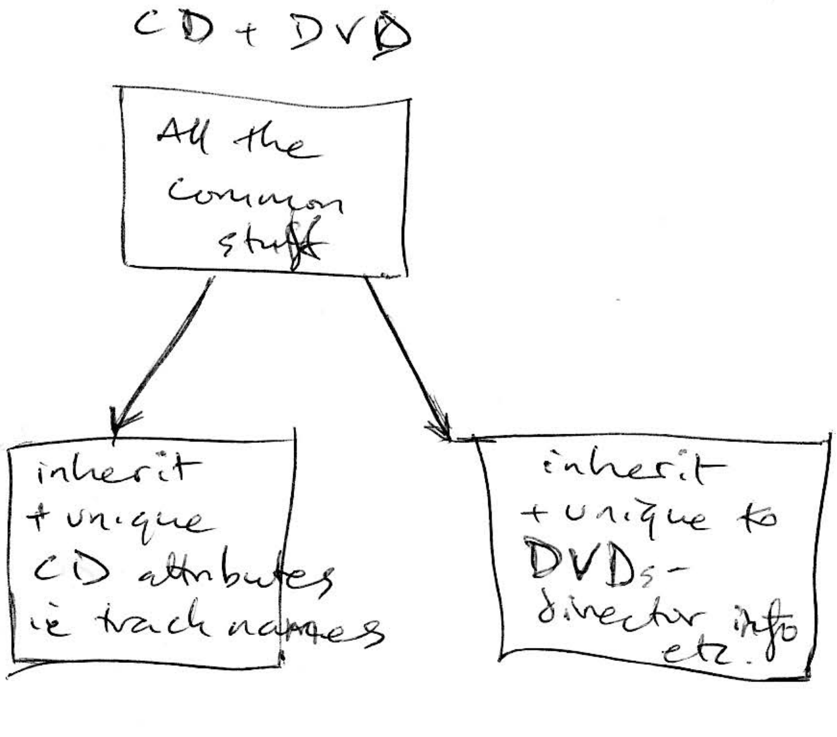
duplication generally bad as room for errors, longer code etc. But also consider encapsulation needs.

DoME classes



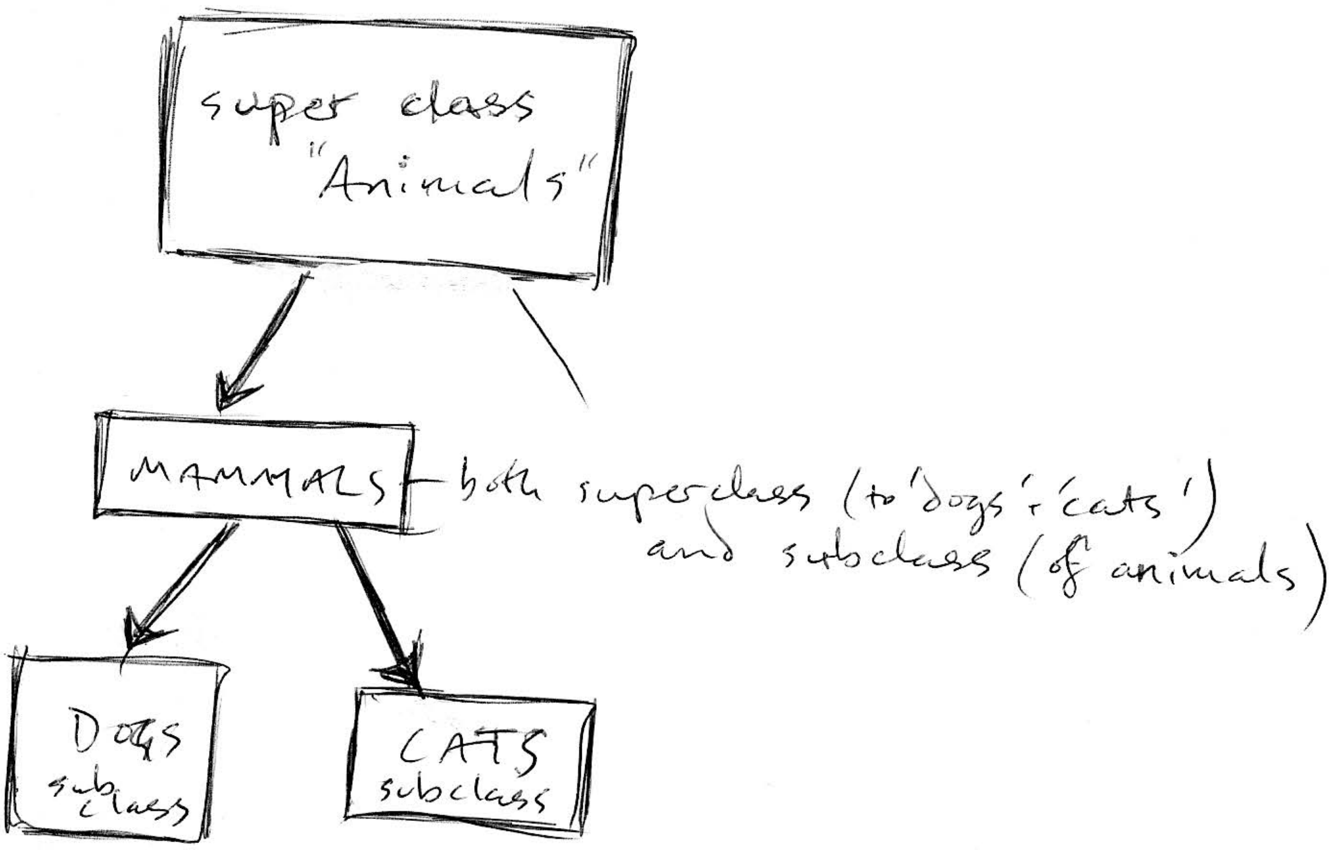
The duplication is bad because when you find a bug in one you will need to debug all other code duplicated from it.

Solution = inheritance



CD + DVD
All the common stuff
inherit + unique CD attributes ie track names
inherit + unique to DVDs - director info etc.

Inheritance hierarchies


super class "Animals"
MAMMALS
both superclass (to 'dogs' + 'cats')
and subclass (of animals)
DOGS subclass
CATS subclass

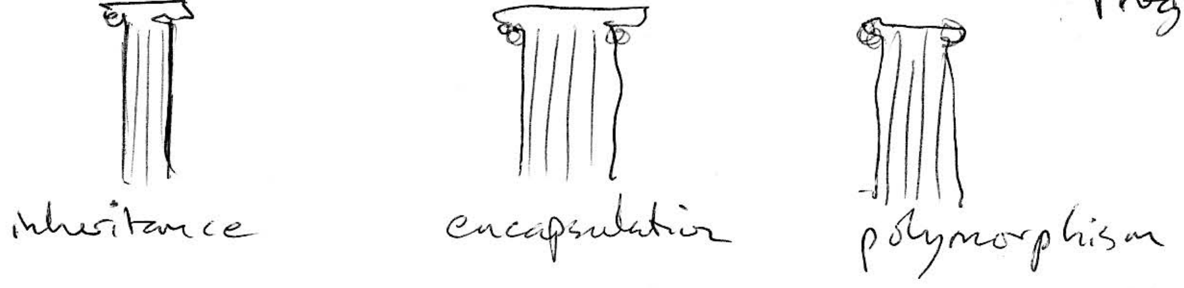
Superclass just looks like any other class - all definition of inheritance is done with the subclasses. using the ~~ex~~ extends keyword.

result - you can inherit from any class - even those you did not create or cannot edit.

```
public class CD extends Item
```

Inheritance and Encapsulation

The 3 Pillars of OOP (Object Oriented Programming)



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Encapsulation Expanded

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several keywords:

Public - everyone can see it.

Protected - only this class, its sub-classes and the package can see it.

Default (no keyword) only this class and the package can see it.

Private - only this class can see it.

suggested - start with 'protected' then make a conscious decision whether class should be Public or Private

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"So Are these Classes Encapsulated?"

2 problems with slide - duplication between 'Item' and 'CD'

Also CD has responsibility for some info used by item so encapsulation fails within each class

it should not just occur within the hierarchy

We can call the super-class constructor using the super keyword. But now we have proper encapsulation and can make properties 'Private'

SUPER must be the first line of the subclass, to ensure all variables are available from the superclass.

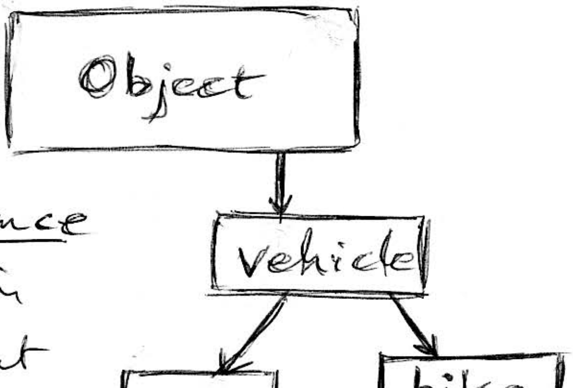
Inheritance, references

An item reference can store any sub-class of item.
called substition. Very useful in collections.
Note that in example slide you can only call
methods from the Item not the DVD/CD methods -
so unable to compile if you attempt 'numberOfTracks'
for example as no Method available for that in Item.

Inheritance is a Core Part of Java

The Object Class

All classes automatically extend Object
(as does string. etc.)



Multiple Inheritance
- not supported in
Java as such but
using 'interfaces'
can work around this.

Polymorphism deals with the issue of over-riding
an inherited method etc. - Looked at in detail
tomorrow - 10th Nov 2015.