

The is-a relation and subclassing

Subclassing, such as in

```
class A extends B { ... }
```

should model the real world: It should be the case that an A actually *is a* B.

As an example, a marsupial *is a* mammal, and a kangaroo *is a* marsupial. Therefore, the following declarations make sense:

```
class Mammal { ... }
class Marsupial extends Mammal { ... }
class Kangaroo extends Marsupial { ... }
```

It would not make sense to have class Cat or class House extend class Marsupial because cats and houses are not marsupials.

The distinctive feature of marsupials is that they have a pouch —or at least the females do. In the picture of a kangaroo above, you can see the mother kangaroo's joey¹ in her pouch.

This illustrates a general notion that a subclass provides more properties, or more information, in the form of fields or methods. A method could be entirely new or could override a method in the superclass.

Marsupials² have a pouch; other mammals don't. Class Marsupial could have a boolean field `joey` to indicate, for a female, whether she has an infant in her pouch.



unsplash.com/s/photos/kangaroo
by john-torcasio

¹ A marsupial's infant is known as a *joey*.

² *Marsupial* is derived from the word *marsupium*, which is the technical term for the pouch.