Exercise 10.2

After creating a comment on the `MessagePost` object it is also displayed when listing the news feed, even though the `MessagePost` was added to the news feed before setting the comment.

This is because the `NewsFeed` has a reference to the `MessagePost` object and uses this reference to get the information about the object each time it prints the list. Only one `MessagePost` object has been created so the `NewsFeed` must be storing the one that has the comment.

Exercise 10.4

When the `'extends Item'` is removed from the source of the `MessagePost` class, then the inheritance arrow in the diagram disappears.

Exercise 10.5

Yes, it is possible to call inherited methods through the sub-menu called '*inherited from Post*'

Exercise 10.6

Add the `getUserName` method to `Post`:

```
public String getUserName()
{
    return username;
}
```

Define `printShortSummary` in `MessagePost`:

```
public void printShortSummary()
{
    System.out.println("Message post from " + getUserName());
}
```

Exercise 10.7

First, the *Step Into* button takes us to the superclass constructor, which on the subsequent *Step Into* initializes the fields: `username`, `timestamp`, `likes` and `comments`. Then it returns back to the `MessagePost` constructor and initializes the last field: `message`.

Exercise 10.8

The `EventPost`:

```
/**
 * This class stores information about a post in a social network
news feed.
```

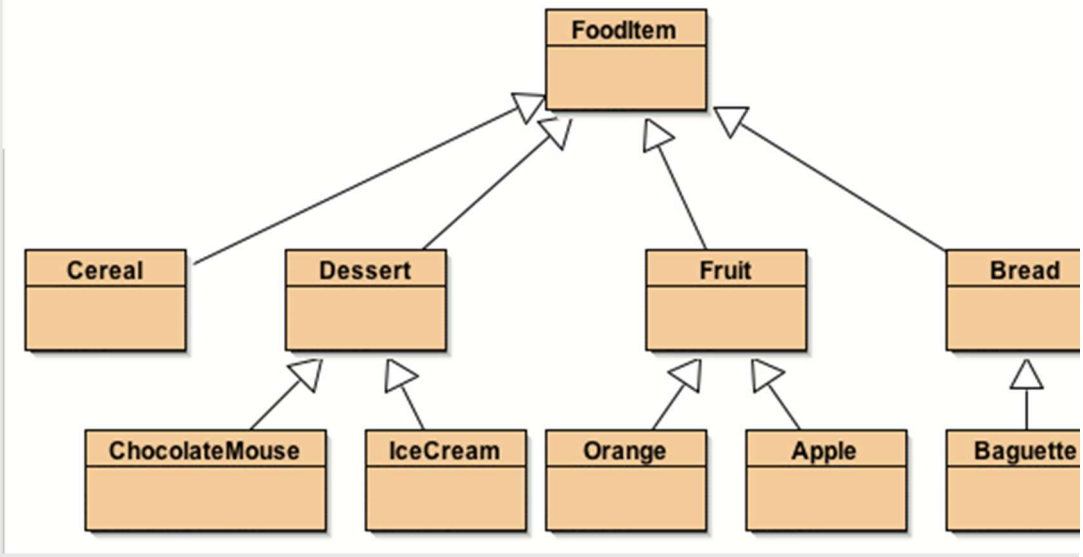
```
 * The main part of the post consists of a (possibly multi-line)
 * text message. Other data, such as author and time, are also
stored.
 *
 * @author Michael Kölling and David J. Barnes
 * @version 0.2
 */
public class EventPost extends Post
{
    // The type of event.
    private String eventType;

    /**
     * Constructor for objects of class EventPost
     * @param author The author of the post.
     * @param eventType The type of event.
     */
    public EventPost(String author, String eventType)
    {
        super(author);
        this.eventType = eventType;
    }

    /**
     * Return the type of event.
     *
     * @return The type of event.
     */
    public String getEventType()
    {
        return eventType;
    }
}
```

Exercise 10.9.

One possible hierarchy:



Exercise 10.10

A touch pad and mouse are both input devices for a computer. They are very similar and they could either have a common superclass (`InputDevice`) or one could be a superclass of the other.

Exercise 10.11

Argument for a square being a subclass of a rectangle:

- a square is just a rectangle where the sides are restricted to be of equal length.

Argument for a rectangle being a subclass of a square:

- a rectangle is a square that just has an extra attribute: the ratio between the sizes of the width and height.

Argument for neither:

- a rectangle has two attributes determining its shape and a square has just one.

If the two attributes of a Rectangle have the same value, is it equivalent to a Square object?

Exercise 10.12

a) Which of the following assignments are legal, and why or why not?

- `Person p1 = new Student();`

- This is legal because `Student` is a subclass of `Person`.

- `Person p2 = new PhDStudent();`

- This is legal because `PhDStudent` is a subclass of `Person` (because it is a subclass of `Student` which is a subclass of `Person`)

- `PhDStudent phd1 = new Student();`

- This is not legal, because `Student` is not a subclass of `PhDStudent`.

- `Teacher t1 = new Person();`

- This is not legal because `Person` is not a subclass of `Teacher`.

- `Student s1 = new PhDStudent();`

- This is legal, because `PhDStudent` is a subclass of `Student`.

b) Assume that the two illegal lines above are changed to:

```
PhDStudent phd1;
Teacher t1;
```

- `s1 = p1;`

- This is not legal, because `erson` is not a subclass of `Student`. The compiler only knows the static type of `p1` which is `Person` - it does not know the dynamic type which is `Student`.

- `s1 = p2;`

- This is not legal, because a `Person` is not a subclass of `Student` (same arguments the previous case).

- `p1 = s1;`

- This is legal because `Student` is a subclass of `Person`.

- `t1 = s1;`

- This is not legal because `Student` is not a subclass of `Teacher`.

- `s1 = phd1;`

- This is legal because `PhDStudent` is a subclass of `Student`.

- `phd1 = s1;`

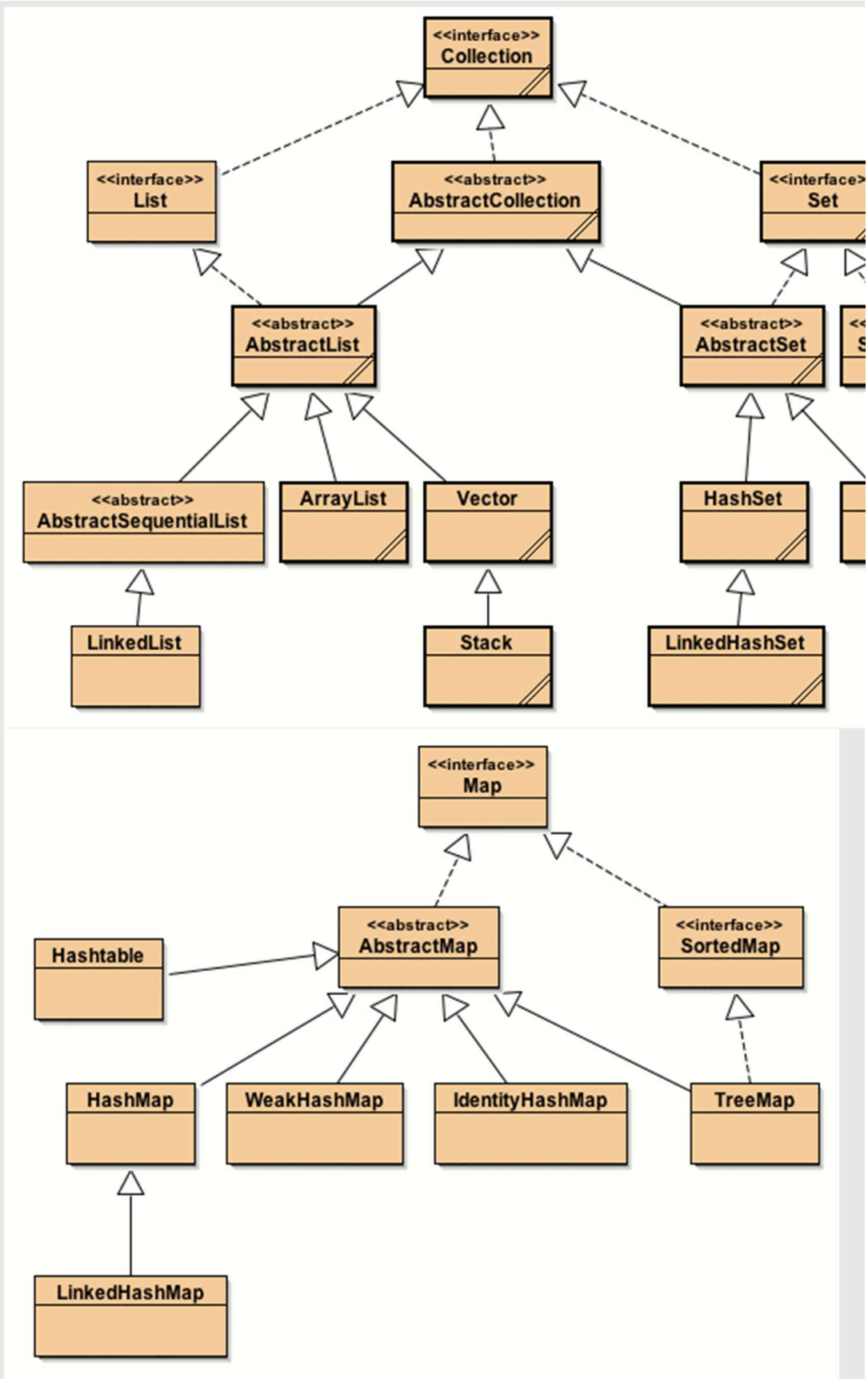
- This is not legal because `Student` is not a subclass of `PhDStudent`.

Exercise 10.14

Nothing has to change in the `NewsFeed` class when we add a new `Post` subclass. This is because the `NewsFeed` never worries about the actual subclass, but treats all objects as `Posts`.

Exercise 10.15

http://media.pearsoncmg.com/intl/ema/ema_uk_he_barnes_bluej_3/solutions/resources/zuul-even-better.zipFrom the JDK API documentation, the following class hierarchies can be drawn:

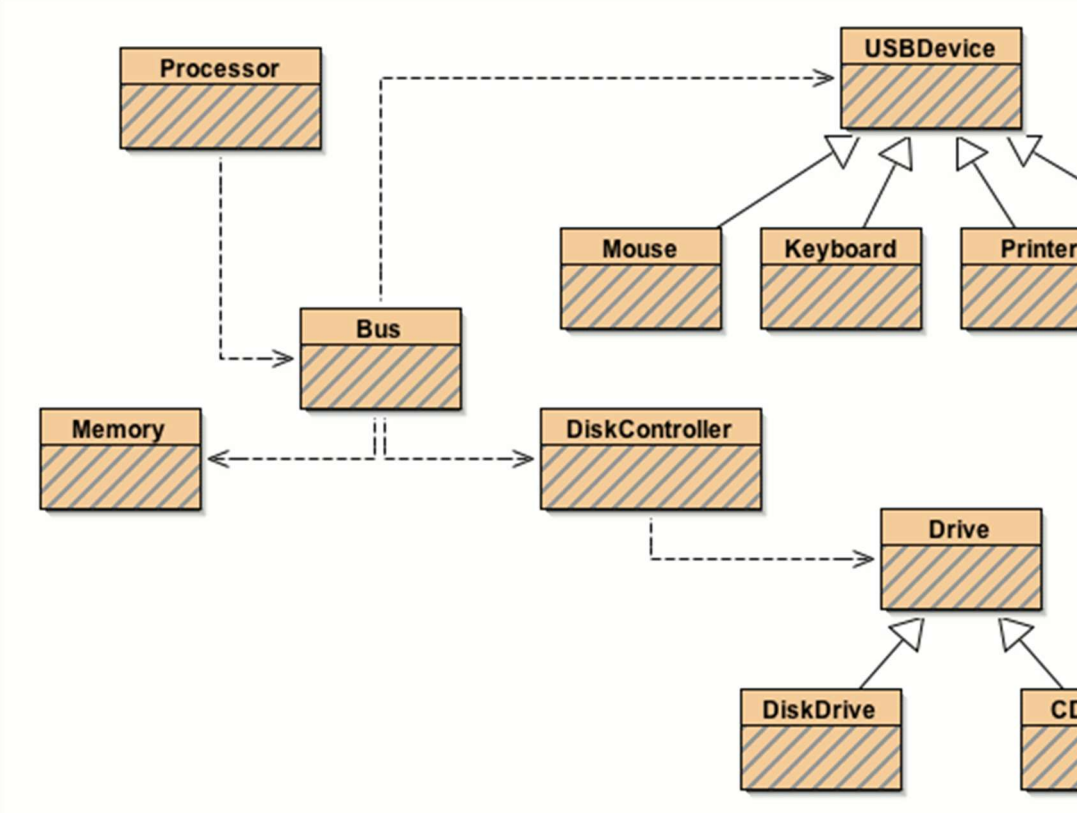


Exercise 10.16

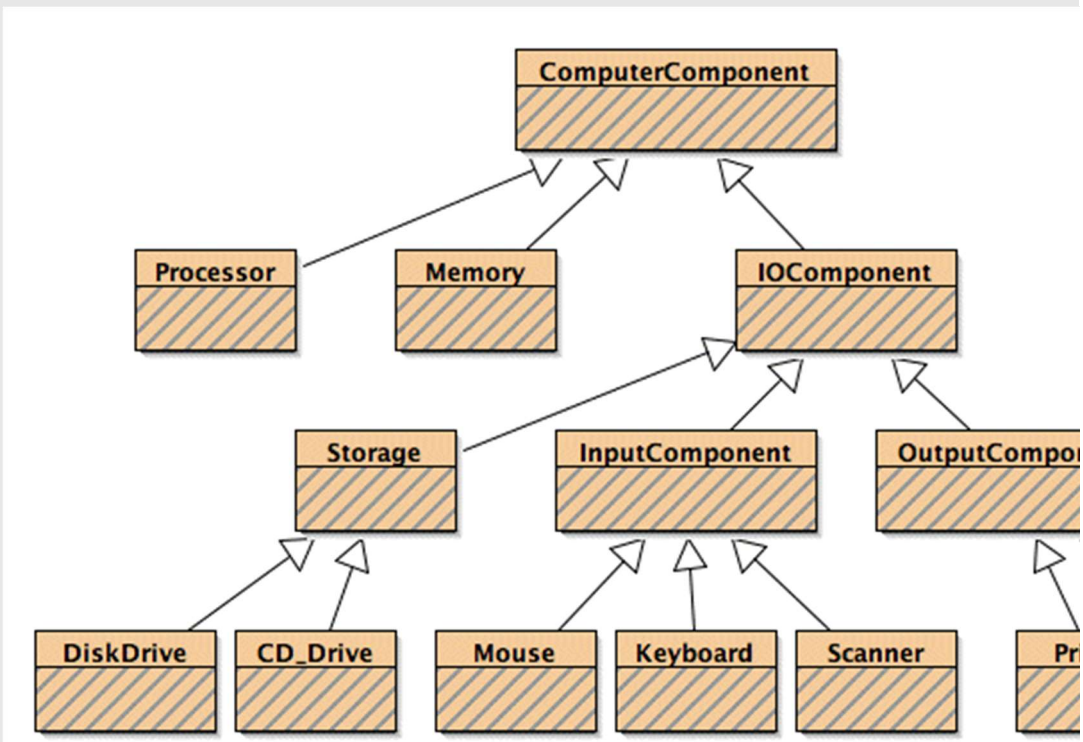
The solution is in: `08-16-lab-classes`

Exercise 10.17

An example of a class hierarchy of some of the components in a computer. Note that the question refers to a DVD drive rather than a CD drive, but the change is trivial.



Or maybe this:



Exercise 10.18

The legal statements tells us the following:

a) m = t
This tells us that T is subclass of M

b) m = x
This tells us that X is a subclass of M

c) o = t
This tells us that T is a subclass of O. But T was also a subclass of M, and Java does not allow multiple inheritance. Therefore M must be a subclass of O or vice versa.

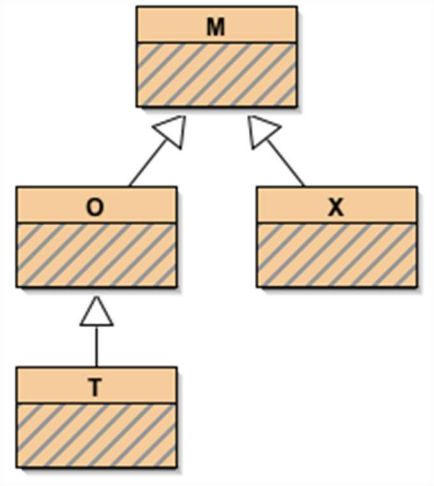
And the illegal statements gives us:

d) o = m
M is **not** a subclass of O. Hence from c) we have that O is a subclass of M.

e) o = x
X is **not** a subclass of O

f) x = o
O is **not** a subclass of X

From this information we can be sure that the following relations exist:



Exercise 10.19

See the diagram in the solution to exercise 10.15.