

Abstraction

Classes and Methods

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Topic List

- Abstract vs Concrete
- Abstract Methods and Classes
- Network-V4 (recap)
- Network-V5 (with abstraction)

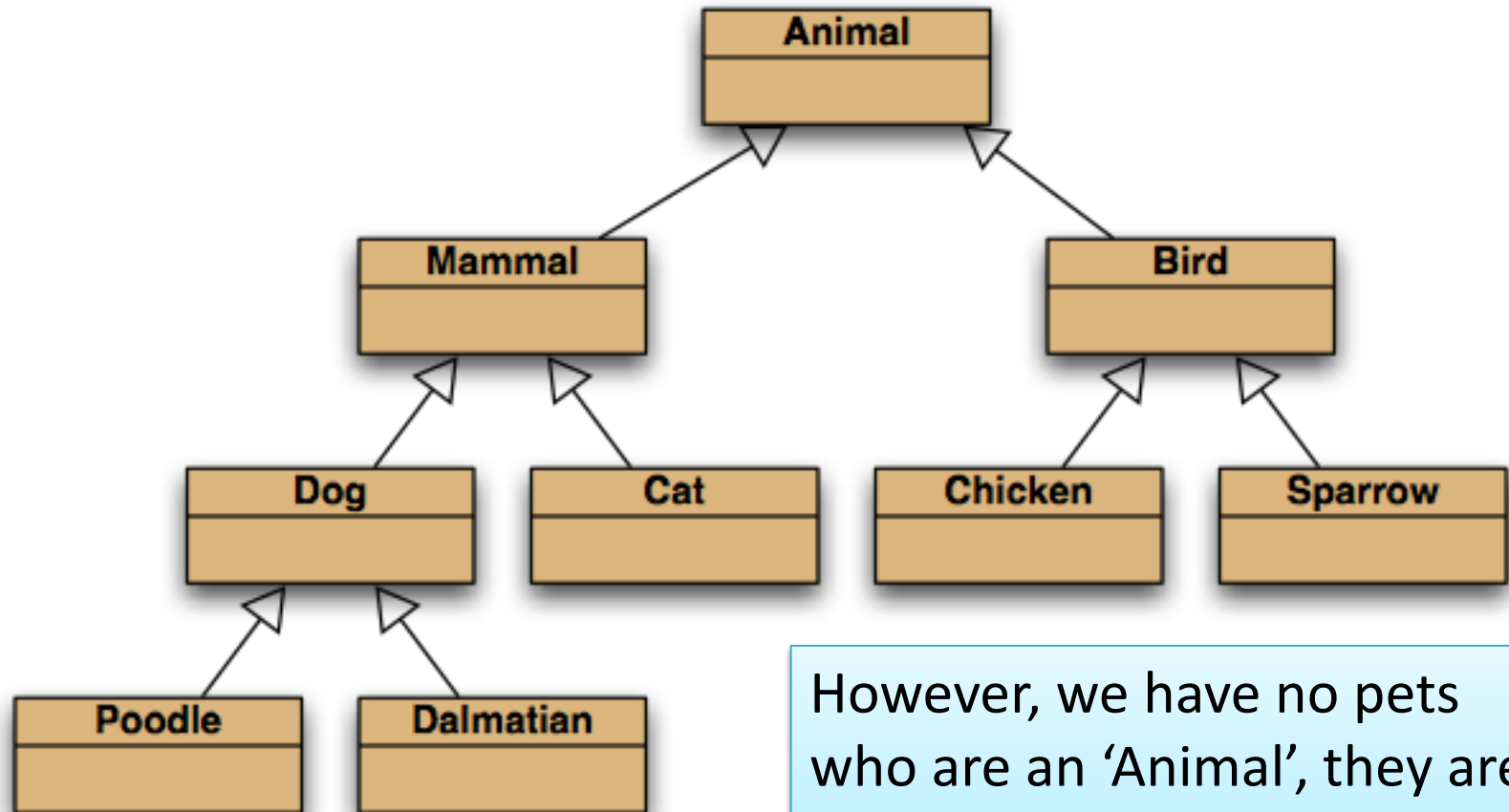
Abstract vs Concrete

- Abstract
 - Implementation delayed
 - abstract method has no code
 - cannot instantiate an abstract class (it has, by definition “unfinished” methods)
- Concrete
 - Ready to go.
 - Everything up to now has been concrete.

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Recap: Inheritance hierarchies



However, we have no pets who are an 'Animal', they are either a Dog, a Cat, a Chicken, etc.

Abstract Methods

- Abstract methods have `abstract` in the signature.
- Abstract methods have no body.
 - ‘We promise to write this later. Every (concrete) subclass of this class will have this implemented in the subclass.’
- Abstract methods make the class abstract.
 - Think about why this is?

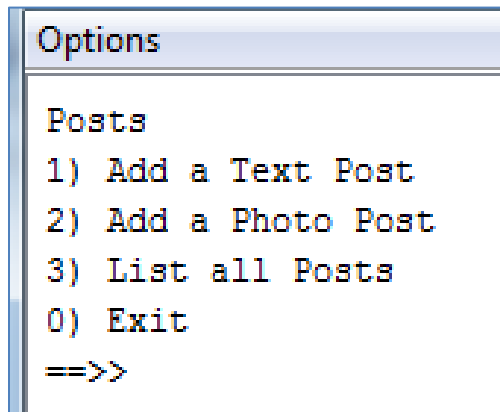
Abstract Classes

- An abstract class is a class that contains zero or more abstract methods.
- An class that has an abstract method must be declared abstract.
- Abstract classes cannot be instantiated.
- Abstract classes function as a “base” for subclasses.
 - abstract classes can be subclassed.
- Concrete subclasses complete the implementation.

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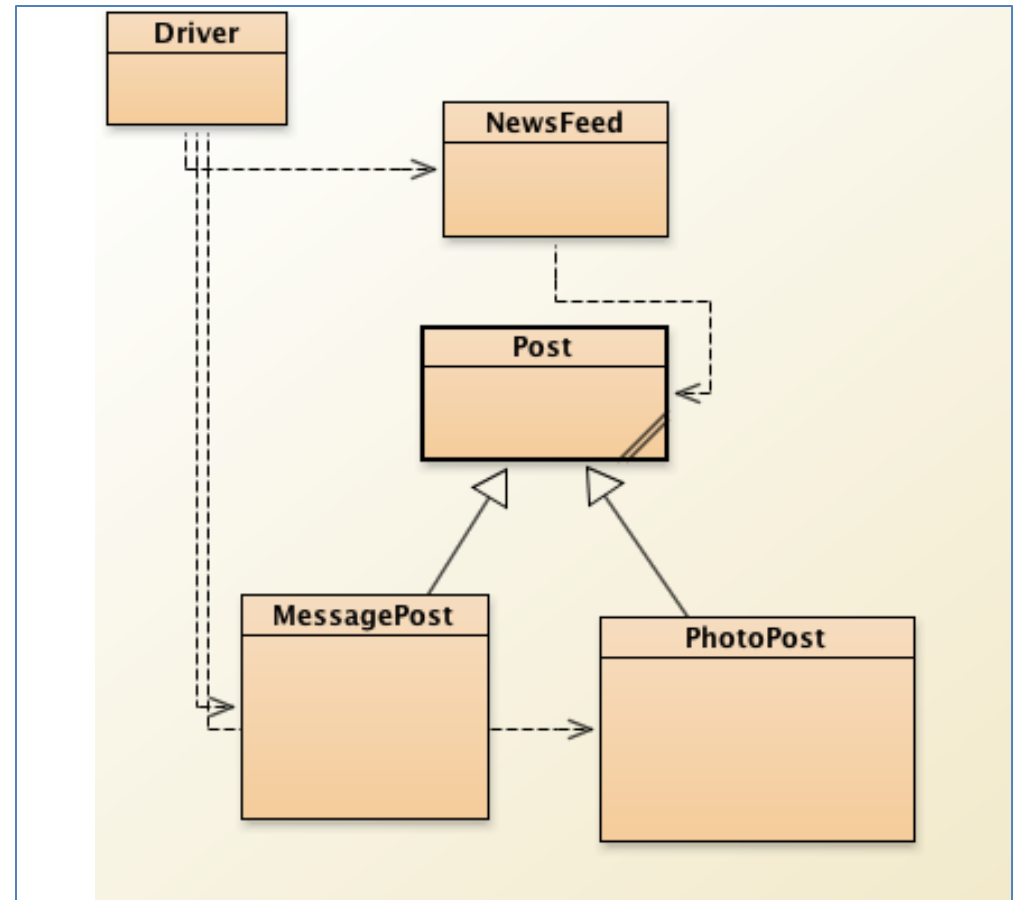
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Recap: Network-V4



Our news feed displays either MessagePost or PhotoPost objects.

We never create a Post object but our ArrayList is of Post.



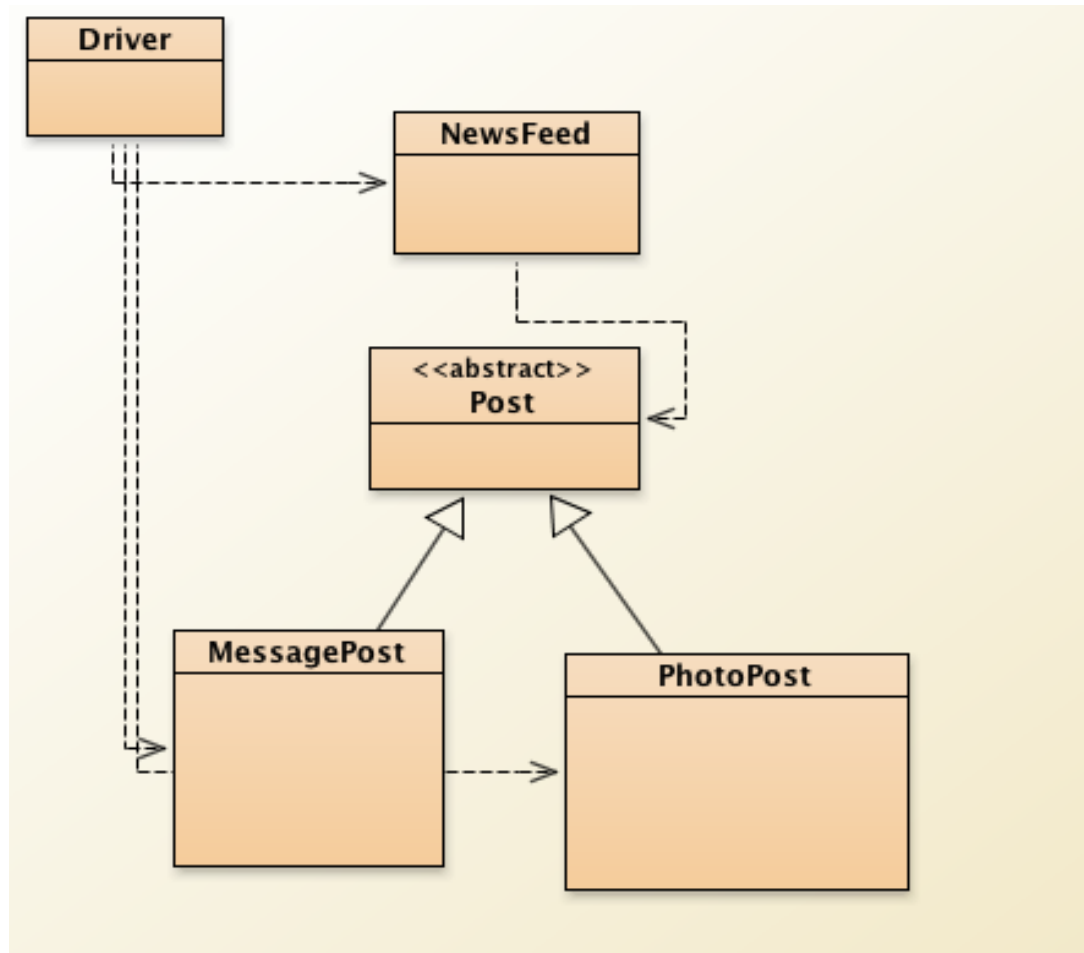
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Network-V5 (Post as an abstract class)

- We can never create a 'post' object
 - We cannot instantiate one.
- In Post, we define fields, methods that can be used later for all subclasses (using super)
 - e.g. display(), constructor..

Network-V5 (Post as an abstract class)



Syntax for abstract classes



```
public abstract class Post
{
    private String username; // username of the post's author
    private long timestamp;
    private int likes;
    private ArrayList<String> comments;
```

displayExcerpt() as an abstract method

- If you wish all subclasses of a class to implement a particular method as part of its code, simply write an abstract method heading in superclass.
- Each subclass must have this method fully coded.

displayExcerpt() as an abstract method

```
abstract String displayExcerpt();
```

Post

```
/**
 * return a short extract of the post message
 * @return A string containing the first 10 chars of the post
 */
String displayExcerpt()
{
    return "Message extract " + message.substring(0,10) + "....";
}
```

MessagePost

```
/**
 * return a short extract of the photo caption
 * @return A string containing the first 10 chars of the caption
 */
String displayExcerpt()
{
    return "Photo caption: " + caption.substring(0,10) + "....";
}
```

PhotoPost

Later

- We will come back to looking at interfaces which are used when you can see a 'multiple inheritance' in your class design.
- Multiple inheritance is not allowed in Java so we use interfaces instead.

**Any
Questions?**





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