3.1 Using class

Description

Instead of describing each account object separately, we may describe a *class* that defines a template/pattern for accounts in general as in the following example:

```
class Account:
   owner: val "???"
   balance: var float
   interestRate: var float
   addInterest:
      balance := balance + (balance * interestRate) / 100
   deposit(amount: var float):
      balance := balance + amount
   withdraw(amount: var float) -> newB: var float:
      balance:= balance - amount
      newB := balance
```

The keyword **`class`** specifies that we describe a class as opposed to an object (using **`obj`**).

We may use a class as a template to generate an arbitrary number of objects having the *structure* as described by the class. All objects generated according to class `Account` thus have the attributes that are described in class `Account`. Each `Account` object will thus have data-items `owner` and `balance` and methods `addInterest`, `deposit` and `withdraw`. An `Account` object is also referred to as an *instance* of `Account`.

Different `Account` objects will typically have different values of the data-items `owner`, `balance` and `interestRate`. The methods in class `Account` may be invoked on different `Account` objects.

We say that these objects are *`Account` objects* or *instances of `Account`*.

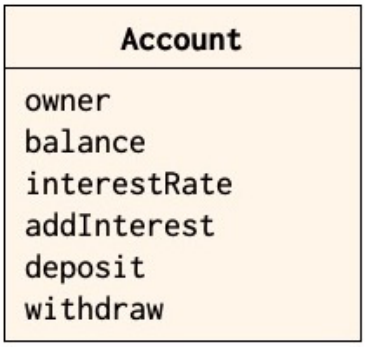
Before we show how to generate `Account` object using class `Account`, we have to fix a problem with the above description of class `Account`. The problem is that the value of `owner` is specified to be the string `"???"`. John Smith and Liza Jones and other accounts have different values of `owner`.

To handle this, we may make `owner` be a parameter of class `Account`. The actual value of `owner` must then be supplied when we create objects from class `Account`. This is similar to how parameters works for methods as described in section . Class `Account` with a parameter is shown below:

```
class Account(owner: var String):
   balance: var float
   interestRate: var float
   addInterest:
      balance := balance + (balance * interestRate) / 100
   deposit(amount: var float):
      balance := balance + amount
   withdraw(amount: var float) -> newB: var float:
      balance:= balance - amount
      newB := balance
```

Data-items specified within the parentheses are the parameters of the class, in this case `owner`. A parameter like `owner` is also a local data-item similar to `balance`. As for methods, the actual value of `owner` may be supplied later as a string literal, see below.

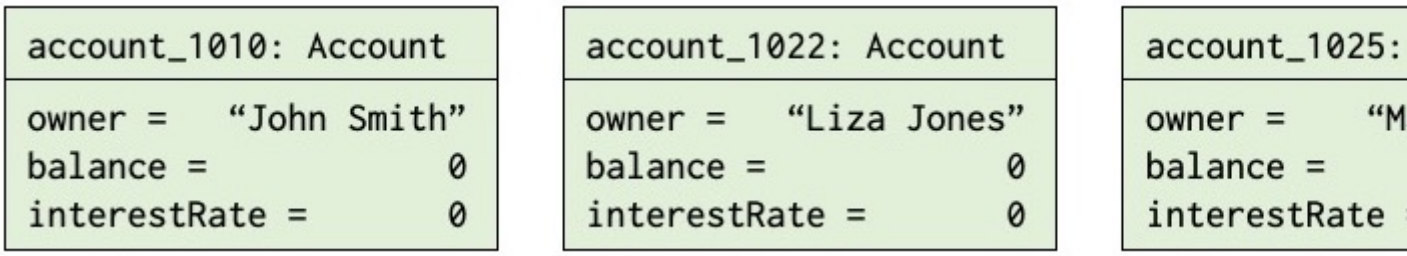
We use a *class-diagram* as shown here to illustrate a class – se chapter for an explanation of the form of a class-diagram.



Class `Account` may be used to create different `Account` objects as in the example below:

```
account_1010: obj Account("John Smith")
account_1022: obj Account("Liza Jones")
account_1025: obj Account("Mary Pole")
```

The following diagram illustrates the state of these objects after they have been generated:



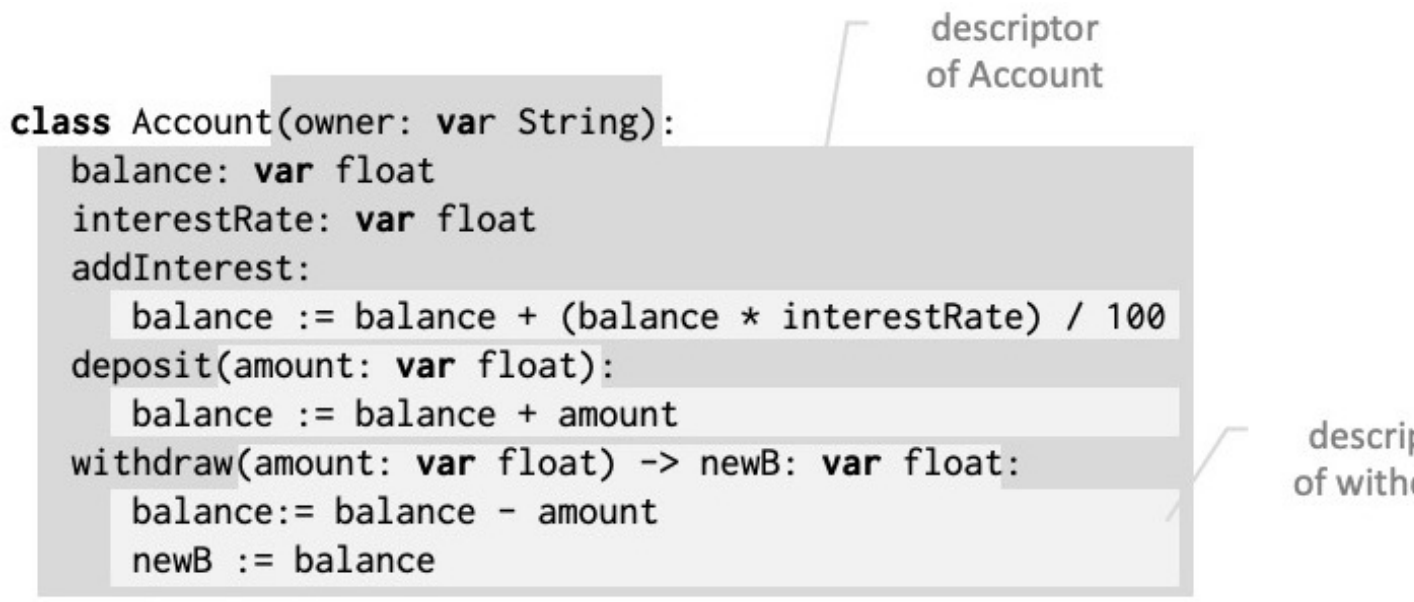
The objects described in the previous chapter 2 are called singular objects since there is only one of its kind for each of them. Objects generated using a class are called *class-defined* objects.

We of course need to be able to handle more than the three accounts shown above. We show how to do that in chapter .

The representation of an account by class `Account` as shown does not include all properties of an account needed for a real bank system. In the paper-based version as shown in section , we have an account number, which so far is encoded in the names of the `Account`-objects. In a proper model, it should be represented as an attribute of an `Account`-object. We leave this out to keep the examples small.

Terminology: object-descriptor again

A class is a name associated with an object-descriptor and in the figure below, the object-descriptor for `Account` is enclosed in a box. An object-descriptor may thus be used to describe a singular object and/or a *class-defined object* as shown in this chapter.



As can be seen, the object-descriptor includes the parameter of class `Account`.