

COMP 302 Programming Languages and Paradigms

Assignment 6

Due Date: 28th February 2020

[Question 1. 100 points] In class, we have shown you a program which mimics transactions done on a bank account. We will now develop an extended version of this example. For this we have first defined a data-type for transactions:

```
type transaction = Withdraw of int | Deposit of int | CheckBalance |
ChangePassword of string | Close
```

We have added two new transactions to the example done in class.

In class, we defined a function `make-account` which generates a bank account when given an opening balance.

In this exercise, you are asked to modify this code and generate a password-protected bank account. Any transaction on the bank account should only be possible, if one provides the right password. For this, implement the function `makeProtectedAccount` with the arguments and types shown below.

```
val makeProtectedAccount : int * string -> string * transaction -> unit = <fun>
```

This function takes in the opening balance as a first argument and the password as a second, and will return a function which when given the *correct* password and a transaction will perform the transaction. One crucial difference to be noted right away is that in the new code I want you to **print the balance on the screen** instead of returning it as a value.

Here are some examples.

```
# let zoe = makeProtectedAccount(1000, "BiologyRocks");;
val zoe : string * transaction -> unit = <fun>
# let elisa = makeProtectedAccount(500, "ArtsStudentsArePoor");;
val elisa : string * transaction -> unit = <fun>
# let alison = makeProtectedAccount(2500, "MathIsTheBest");;
val alison : string * transaction -> unit = <fun>
# elisa("ArtsStudentsArePoor", Withdraw 100);;
The new balance is: 400.- : unit = ()
# alison("MathIsTheBest", Deposit 200);;
```

```
The new balance is: 2700.- : unit = ()
# zoe("BiologyRocks", CheckBalance);;
The balance is: 1000.- : unit = ()
# zoe("BiologySucks", Withdraw 100);;
Incorrect password.- : unit = ()
# zoe("BiologyRocks", Withdraw 1500);;
Insufficient funds.- : unit = ()
# elisa("ArtsStudentsArePoor", ChangePassword "CSwillMakeMeRich");;
Password changed.- : unit = ()
# elisa("ArtsStudentsArePoor", Deposit 100);;
Incorrect password.- : unit = ()
# elisa("CSwillMakeMeRich", Deposit 200);;
The new balance is: 600.- : unit = ()
# alison("MathIsTheBest", Close);;
Account successfully closed.- : unit = ()
# alison("MathIsTheBest", CheckBalance);;
Account closed.- : unit = ()
```