MODULE O ROBUST PROGRAMS · O4

Authentication in programs

Original practice questions · 22 marks · ~25 minutes · OCR J277 specification 2.3.1 (with 2.1.2 and 2.2.3)

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. All questions are about a box-office program used by the staff of a small theatre. The total for this worksheet is **22 marks**.

1

Total: 4 marks

The theatre's box-office program uses defensive design.

(a) State what is meant by **authentication**. **[1]**

(b) Tick (✓) **one** box in each row to show whether each check is an example of authentication or of input validation. **[3]**

Check carried out by the program	Authentication	Input validation
The number of seats booked must be between 1 and 8		
A staff member must enter their own password again before a booking can be deleted		
The username and password entered are compared with the ones stored for that staff member		

2 **Total: 5 marks**

Staff log in to the program with a username and password. The first version of the login code is shown in **Fig. 1**.

```
01 const storedUser = "boxoffice2"
02 const storedPass = "Curtain#47"
03 user = input("Enter username")
04 pwd = input("Enter password")
05 if user == storedUser AND pwd == storedPass then
06     print("Access granted")
07 else
08     print("Access denied")
09 endif
```

Fig. 1

(a) Complete the table to show the output from Fig. 1 for each set of inputs. **[3]**

Username entered	Password entered	Output
boxoffice2	Curtain#47	
boxoffice2	Curtain#74	
boxoffice3	Curtain#47	

(b) A programmer changes `AND` to `OR` on line 05. Describe the effect this change would have on who can log in to the program. **[2]**

3 **Total: 6 marks**

The program is improved so that a staff member has a limited number of attempts to enter the password. The new code is shown in **Fig. 2**.

```
01 attempts = 0
02 loggedIn = false
03 while attempts < 3 AND loggedIn == false
04     pwd = input("Enter password")
05     if pwd == "Curtain#47" then
06         loggedIn = true
07     else
08         print("Try again")
09     endif
10     attempts = attempts + 1
11 endwhile
12 if loggedIn == true then
13     print("Welcome")
14 else
15     print("Locked")
16 endif
```

Fig. 2

(a) Complete the trace table for Fig. 2 when the passwords entered are `Curtain47`, then `Curtain#74`, then `Curtain#47`. The first row has been completed for you. You may not need to use all the rows. **[4]**

attempts	loggedIn	pwd	Output
0	false		

(b) Explain why the program limits the number of attempts to enter the password. **[2]**

4

Total: 5 marks

The theatre now has 20 staff accounts. The usernames are stored in the global array `users` and the passwords in the global array `passwords`. The password for `users[i]` is stored in `passwords[i]`. Both arrays have 20 items and are indexed from 0. The first three items are shown below.

Index	0	1	2
users	`"mpatel"`	`"rokafor"`	`"jlind"`
passwords	`"Velvet!29"`	`"Encore#81"`	`"Stalls$56"`

(a) Complete the function `checkLogin()` so that it: **[5]**

- takes the username and password entered as the parameters `user` and `pwd`
- checks the usernames in the array `users`
- returns `true` if `user` matches a stored username **and** `pwd` matches the password stored at the same index
- returns `false` if no matching username and password pair is found.

You must use either OCR Exam Reference Language or a high-level programming language that you have studied.

```
function checkLogin(user, pwd)









endfunction
```

5

Total: 2 marks

Other than limiting the number of attempts, describe **one** way the programmer could make it harder for someone who is not a member of staff to log in to the box-office program. **[2]**

Total for this worksheet: 22 marks