

Task 1: software design and development

Problem description

The manager of a theme park would like a program to provide him with data on the park's 26 attractions.



Purpose

The program is required to read the attraction data from a CSV file into parallel arrays. The file contains the attraction name, category of attraction, total number of visitors, number of days open and the height restriction.

The program will find the names of the least visited attraction(s) and the most visited attraction(s).

Attractions in the category 'Roller Coaster' are serviced every 90 days. The program is required to calculate the number of days until the next service. It will use this information to produce an output that identifies all roller coasters that need to be serviced within the next 7 days.

Assumptions

- ◆ the CSV data file is formatted correctly, is error-free and is updated every day

An example of the data in the file is shown below:

```
Aftershock,Roller Coaster,510324,695,1.2m
Aqua Loop,Water,157288,542,0.9m
Asteroid Belt,Roller Coaster,551218,623,1.4m
Attack of the Smartphones,Simulation,548630,663,1.0m
Beaver Falls,Water,95970,695,1.2m
Bug Blaster,Simulation,293033,542,0.9m
Bumblebee Flyer,Kids,104010,715,0.9m
Candyfloss Carousel,Kids,95970,663,0.9m
...
```

Task 1: software design and development (part A)

1a One process for the program is stated below.

Using the problem description and purpose, identify the remaining processes for the program.

(3 marks)

Find the name(s) of the attraction(s) with the lowest number of visitors.

Candidate name_____ Candidate number_____

1b The top level design for the program is shown below.

Complete the design to show the missing data flow for each step.

(2 marks)

Top level design		
Read data from file into parallel arrays	IN	
	OUT	attraction(), category(), visitors(), daysOpen(), height()
Find and display the names of the least visited and most visited attractions	IN	
	OUT	
Write to file the names of roller coasters that need a service within 7 days	IN	
	OUT	

- ◆ Check your answers carefully, as you cannot return to part A after you hand it in.
- ◆ When you are ready, hand part A to your teacher or lecturer and collect part B.

Candidate name_____ Candidate number_____

Task 1: software design and development (part B)

Your teacher or lecturer will provide you with a file called 'attractions.csv'.

The design for the program is shown below.

1	Read data from file into parallel arrays	OUT	attraction(), category(), visitors(), daysOpen(), height()
2	Find and display the names of the least visited and most visited attractions	IN	attraction(), visitors()
3	Write to file the names of roller coasters that need a service within 7 days	IN	attraction(), category(), daysOpen()
Refinements			
3.1	Create 'service.csv' file		
3.2	Loop for each attraction		
3.3	If current category is 'Roller Coaster' then		
3.4	Set days to current daysOpen modulus 90		
3.5	If (90 - days) is less than or equal to 7 then		
3.6	Write current attraction to file		
3.7	End if		
3.8	End if		
3.9	End loop		
3.10	Close 'service.csv' file		

1c(i) Using the problem description and design, implement the program in a language of your choice.

Your program should:

- ◆ read data from the 'attractions.csv' file and store into parallel arrays
- ◆ find and display the name(s) of the:
 - least visited attraction(s)
 - most visited attraction(s)
- ◆ write the names of roller coasters that require a service within 7 days to 'service.csv'
- ◆ be maintainable and modular

(12 marks)

- 1c(ii) The theme park's manager wants an update on attractions with a height restriction of 1.0m and above. Height restrictions range from 0.9m to 1.4m.

Implement a new sub-program to count and display the number of attractions with a height restriction beginning with the character '1'.

(3 marks)

Print evidence of:

- ♦ your program code
- ♦ program outputs from 1c(i) and 1c(ii)
- ♦ the 'service.csv' file

- 1d The sub-program 'Write to file the names of roller coasters that need a service within 7 days' is tested using the sample data below.

```
Aftershock,Roller Coaster,510324,695,1.2m
Aqua Loop,Water,57288,542,0.9m
Asteroid Belt,Roller Coaster,551218,623,1.4m
```

Complete the trace table below to show the values up to the end of the third iteration.

(3 marks)

	If current category is 'Roller Coaster'	days	If (90 - days) is less than or equal to 7
1st iteration			
2nd iteration			
3rd iteration			

Candidate name_____ Candidate number_____