Alcester Grammar School Computer Science A Level Sixth Form Entry Programming Challenge

Created by:

Alex Briggs-Davies

Head of Computing

Alcester Grammar School

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Introduction:

Program the Challenge below in a programming language with which you are familiar. Complete each part of the program that you are able and submit it to a.briggs-davies@alcestergs.com. Send the program-files and any sample text files. NB – It's possible that some exe files might be blocked by Gmail so it might be a good idea to zip your files and documents in a zip file then send it. Please make sure that your file names are clear as to what each file is.

If you can complete the whole challenge then you will probably be fine with the programming content, which the A-Level CS course will require of you. If you can program most of the main elements (e.g. Sections 1 & 2) then you might need a bit of initial support but will probably be okay. If you are only able to complete Section 1 then you will definitely need to develop your coding skills before taking this course. If you cannot complete Section 1 then your programming skills probably are not at a level appropriate to cope with this course.

Submit what you can, however, if submitting a partial program please make sure you submit a readme file to explain which bits you have been able to do and which bits your program cannot do – I need to be able to run the program to test it.

A complete program would normally contain appropriate validation, however, since this is a significant challenge on its own, I am okay if your program does not contain any validation.

The program will be black-box tested first (tested by running it) then I will look at the code to see how efficient it is. I will be looking for appropriate variable names, comments and appropriate use of programming structures such as loops and subroutines.

This challenge might seem daunting at first, however, remember that any problem can be decomposed into sections. I suggest that you attempt this challenge in the following order:

Section 1: Create the part of the program, which allows you to create a new party of four characters.

Section 2: Create the part of the program, which allows you to run challenges

Section 3: Create the part of the program, which allows you to read a party from a file then save a party to a file at the end.

If you work in this order then even if you cannot do all of it, you still have a program which works and which you can submit as part of your application.

One last tip – save Section 1 as Section 1. Then when you are ready to start Section 2, re-save your program as Section 2. Do the same for the third section as Section 3. If you do this then you will not 'break' your program if you cannot complete one of the sections.

The Challenge:

A text-based fantasy role-playing computer game allows the player to have a party of four characters. Each character will have a name and five characteristics; Strength, Agility, Magic, Luck and Hit Points.

The first stage of the game involves choosing to import a party from a file or to create a new party.

Section 1: Creating the Party:

Creating a new party involves generating characteristics for each character. The player will enter the name of the first character and the computer will randomly generate a set of four attributes. Each attribute is generated by the computer rolling four six sided 'dice', dropping the lowest then adding up the remaining three dice (This give a range of 3 to 18 for each attribute and makes it more likely an attribute will be 9-11 than 3 or 18). The player will then have the option to reroll the lowest score, though they must then keep whatever result has been rerolled. The player then can assign each value to the first four attributes (Strength, Agility, Magic & Luck) in any order they wish. Each character starts with two Hit Points. Once the character has been created, they then move on to the next character until all four characters have been created.

Section 2: The Adventure Begins:

Once a party has four characters, the adventure begins. The computer will output some text then present the player with a challenge which will have a challenge rating between five and fifteen. The challenge will be linked to one of the four main attributes; Strength, Agility, Magic or Luck. The player will choose one of their characters to accept the challenge. The computer will roll a twenty sided dice (generate a number between one and twenty) and will add the challenge rating to produce a challenge total. The computer will then roll another twenty-sided dice and will add the character's attribute linked to the challenge to produce the character's total. The two numbers will then be compared. If the character's total exceeds or equals the challenge total then that character defeats the challenge. If the character defeats the challenge then they may add a Hit Point to their total up to a maximum of four. If the character is defeated by the challenge then they lose a Hit Point. If they lose their last Hit Point then the character is killed and may not be used again in a future challenge. Whether the character wins or loses the challenge, they become fatigued and may not be used until another challenge has been completed (won or lost). There should be appropriate text output at all stages of the challenge to describe what is going on.

Section 3: Saving & Importing a Party:

Once five challenges have been completed, the adventure is over and the player should have the option of saving their party to a file. If a character has been killed during the adventure then they should not be saved to the file.

When starting the game again the user should have the option of Importing a party from a file; which involves reading data stored in a file in a way which can then be used in the program. If there are less than four characters in the file then new characters must be generated, using the same rules as above, until the party contains four characters in total.

An example Output is on the next few pages. User input is in bold. Your output does not have to use an identical layout to this one, however, it should give you a good idea as to what might be expected:

Example Output:

Welcome to the adventure. Do you wish to create a new party (c) or use a party you have used before (b)? **b**

Please write the file name of the party you wish to use: **The Brave**

Adventurers Okay importing The Brave Adventurers. Your party consists of:

Hank
Strength: 16
Agility: 12
Magic: 6
Luck: 8
Hit Points: 4

Carrie
Strength: 12
Agility: 18
Magic: 4
Luck: 10
Hit Points: 2

Ambrose
Strength: 8
Agility: 10
Magic: 14
Luck: 12
Hit Points: 1

Your party currently only has 3 members you will need to generate a new character. Please enter the name of the new character: **Magellan**

Okay. The following attributes have been generated: 15, 13, 12, 8. Would you like to reroll your lowest attribute y/n? **y**

Okay a new attribute of 6 has been rolled. Your attributes are now 15,13,12,6.

What would you like to assign 15 to; Strength (s), Agility (a), Magic (m) or Luck (l)?

l

Okay 15 assigned to Luck. What would you like to assign 13 to; Strength (s), Agility (a) or Magic (m)?
a

Okay 13 assigned to Agility. What would you like to assign 12 to; Strength (s) or Magic (m)?

m Okay 12 assigned to Magic. 6 is assigned to Strength. The new character looks like this:

Magellan
Strength: 6
Agility: 13
Magic: 12

Luck: 15
Hit Points: 2
You now have a full party. The adventure begins.

The party stand before a cavern in the heights of the Mountains of Mourn; the rumoured lair of the Dragon King. A foul stench issues from the opening. A sudden rumble from above warns the party of a rock fall. Quickly the party dash forward into the opening. Three of the party get in, however, the last one to dash in risks being hit by falling rocks (Agility Challenge rating 10).

Hank
Strength: 16
Agility: 12
Magic: 6
Luck: 8
Hit Points: 4

Carrie
Strength: 12
Agility: 18
Magic: 4
Luck: 10
Hit Points: 2

Ambrose
Strength: 8
Agility: 10
Magic: 14
Luck: 12
Hit Points: 1

Magellan
Strength: 6
Agility: 13
Magic: 12
Luck: 15
Hit Points: 2

Who was the last one to dash in? **Carrie**

Computer rolls 13; added to the challenge rating the total is 23.
Carrie rolls 12; added to Agility is 30.
Carrie is victorious and gains a Hit Point. Carrie is fatigued.

At the last second Carrie avoids the falling rocks and enters the cavern.

The cavern slopes down steeply. From above water drips constantly. The way is treacherous. One by one the characters make their way cautiously down the slope; each one wary that the slightest misstep could cause a dangerous fall. Suddenly one of the party loses their balance (Agility Challenge rating 12).

Hank
Strength: 16
Agility: 12
Magic: 6
Luck: 8
Hit Points: 4

Ambrose
Strength: 8
Agility: 10
Magic: 14
Luck: 12
Hit Points: 1

Magellan
Strength: 6
Agility: 13
Magic: 12
Luck: 15
Hit Points: 2

Who lost their balance? **Magellan**

Computer rolls 16; added to the challenge rating the total is 28.
Magellan rolls 8; added to Agility is 21.
Magellan fails the challenge and loses a Hit Point. Magellan is fatigued. Carrie is no longer fatigued.

Magellan slips, leg going out from under and slides down into the darkness bouncing off protruding, jagged rocks.

The slope eventually levels out into a wide cave, its ceiling lost in darkness. The air is foetid and foul. Gnawed upon bones completely cover the floor. The party pick their way carefully across the bone pile hoping that they don't step onto anything dangerous (Luck Challenge rating 12).

Hank
Strength: 16
Agility: 12
Magic: 6
Luck: 8
Hit Points: 4

Carrie
Strength: 12
Agility: 18
Magic: 4
Luck: 10
Hit Points: 3

Ambrose
Strength: 8

Agility: 10
Magic: 14
Luck: 12
Hit Points: 1
Who will take this Luck challenge? **Ambrose**

Computer rolls 14; added to the challenge rating the total is 24.
Ambrose rolls 4; added to Luck is 16.
Ambrose fails the challenge and loses a Hit Point. Ambrose is killed. Magellan is no longer fatigued.

The floor gives way beneath Ambrose revealing a spiked pit. Ambrose falls in.

Suddenly there is a terrifying roar. A blood-maddened Mountain Troll charges out of a side passage and attacks (Strength Challenge rating 14).

Hank
Strength: 16
Agility: 12
Magic: 6
Luck: 8
Hit Points: 4

Carrie
Strength: 12
Agility: 18
Magic: 4
Luck: 10
Hit Points: 3

Magellan
Strength: 6
Agility: 13
Magic: 12
Luck: 15
Hit Points: 1

Who will fight the troll and defend the party? **Hank**

Computer rolls 16; added to the challenge rating the total is 30.
Hank rolls 15; added to Strength is 31.
Hank is victorious. Hank cannot gain a Hit Point as they are already at maximum. Hank is fatigued.

Here the game continues for six more challenges.

You defeat the final challenge and emerge blinking, weary, and wounded into bright-sunlight at the foot of the mountain. The Dragon King is dead and his treasure is yours.

Would you like to save your party y/n? **y**

Enter a name for your party: **The Brave Adventurers**

Okay.

Hank
Strength: 16
Agility: 12
Magic: 6
Luck: 8
Hit Points: 2

Carrie
Strength: 12
Agility: 18
Magic: 4
Luck: 10
Hit Points: 2

Magellan
Strength: 6
Agility: 13
Magic: 12
Luck: 15
Hit Points: 2

These characters have been saved as The Brave Adventurers.

Thanks for playing. Until next time!