

**Singular Systems Programming Challenge - Starship Captain**

You are the captain of a starship. You have been tasked with finding and colonizing habitable planets in your galaxy.

Your home world is located at these coordinates: 123.123.99.1 X & 098.098.11.1 Y & 456.456.99.9 Z

Your coordinate system ranges from 000.000.00.0 to 999.999.99.9, and you live in a three-dimensional universe.

1. Design and code an algorithm to generate a new universe within the bounds of the coordinate system.
2. Design and code an algorithm to populate your universe, by randomly generating 15 000 locations that reside at a coordinate. Each of these locations must be randomly marked as a planet or a very hungry space monster. (Space monsters eat starships and should be avoided at all costs)

- Each of these coordinates marked as a planet must be randomly marked as habitable or not.

- Each Habitable planet must have a surface area randomly ranging from 1 million to 100 million square kilometers.

- In order to inhabit a planet, you have to colonize more than 50% of its surface.

- Colonization takes place at exactly 0.043 seconds per square kilometer.

- Due to the strange construction of the star system you live in, travel time between any planet and its immediate neighbor is always 10 minutes, except if the neighbor is a space monster, in which case travel time doubles because you have to dodge the monster.

Write the results to a .txt file in a format of your choosing. (Please include an explanation of the file format)

1. Design and code an algorithm to read the file created in step 1 which will:
   1. Identify the planets you have to travel to and colonize to achieve the largest amount of colonized space within a 24-hour period.
   2. Optimize your flight plan to avoid space monsters and non-habitable planets, visiting the largest amount of habitable planets, that you are able to colonize, in the 24 hour period
2. Create a report (on-screen or file) that explains the flight plan, which route was taken, and how much surface area was colonized in the 24 hour period.

**Give a detailed explanation of your thought processes used to solve the problem and clearly state any assumptions made – these can and should be done through comments in the code.**

**Complete your solution in a Visual Studio project using the C# programming language. If you do not have Visual Studio you can download the community edition for free from the Internet.**

**PLEASE NOTE:**

1. Make sure you read and understand the challenge 100% before you do any coding
2. Good design will be valued more than absolute output correctness
3. Code efficiency is important
4. Comment your code!
5. If you don’t understand part of the challenge, read it again. If you still do not understand, please feel free to ask us any questions.
6. Have fun!

**Good Luck Captain!**