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# Exercise: Rock, Paper, Scissors

In these exercises, you will practice design, implementation and unit test. You will also work with threads and synchronization.

We will implement a silly version of the classic Rock, Paper and Scissors game.

Remember:

Rock beats scissors

Scissors beats paper

Paper beats rock

# Exercise 1: (Design)

Design a game with two players:

Each player rolls a 9-sided dice a 1000 times and counts the number of each outcome. The player then choose rocks, paper, scissors based on which side the dice landed on most:

|  |  |
| --- | --- |
| Side | Weapon |
| 1-3 | Rock |
| 4-6 | Paper |
| 7-9 | Scissors |

At last, the winner is announced.

Explain your design to one or two of your fellow students.

# Exercise 2: (Implementation)

Implement your design as a Console application

Output the total sum for each player in the console and announce the winner.

# Exercise 3: (SRP consideration)

Does your design adhere to the Single Responsibility Principle?

If not, how can you improve your design?

Update the UML diagram(s) and the implementation.

# Exercise 4: (Unit test)

Write NUnit tests for the software.

Make sure to consider boundary values and equivalence partitions.

# Exercise 5: (Threading and synchronization)

Your PC probably has more than one processor. Let’s use that power! Modify your game, so the players roll their dice at the same time.

# Exercise 6: (Design and implementation)

You have a new friend 

Modify the game, so three persons can play.

What changes were needed? Why?

**Exercise 7:**

You are good at getting friends 

Modify the game, so any number of persons can play.

What changes were needed? Why?

# Exercise 8: (Unit test)

Are your unit tests still valid? If not, update the unit tests.

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# Exercise 9: (Unit test)

Do you need some new unit tests?

Discuss this with one or two of your fellow students.

If you find, that you need more tests, implement the tests.

**Exercise 10: (Design and implementation)**

Magically, another side is added to the dice (yes, we can do that in software.. ☺ )

A new weapon is also added to the game: Atomic Bomb.

Atomic Bomb beats all other weapons.

The rules for weapon selection is now:

|  |  |
| --- | --- |
| Side | Weapon |
| 1-3 | Rock |
| 4-6 | Paper |
| 7-9 | Scissors |
| 10 | Atomic Bomb |

Make the necessary changes to your game and update the unit tests.

**Exercise 11:**

How often does each weapon win? (i.e. find the percentage of wins)

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