

# Tower of Hanoi

## ISE-2 Group activity

Students : Anupam Tiwari and Sanket Kshirsagar

### Description

The Tower of Hanoi is a mathematical game which comes under Puzzles genre. It consists of three poles/rods and n number of disks with different diameters, which can slide onto any pole.

The puzzle starts with the discs stacked on top of each other on one pole, in the order of decreasing size of the discs with the smallest at the top, while making a conical shape.

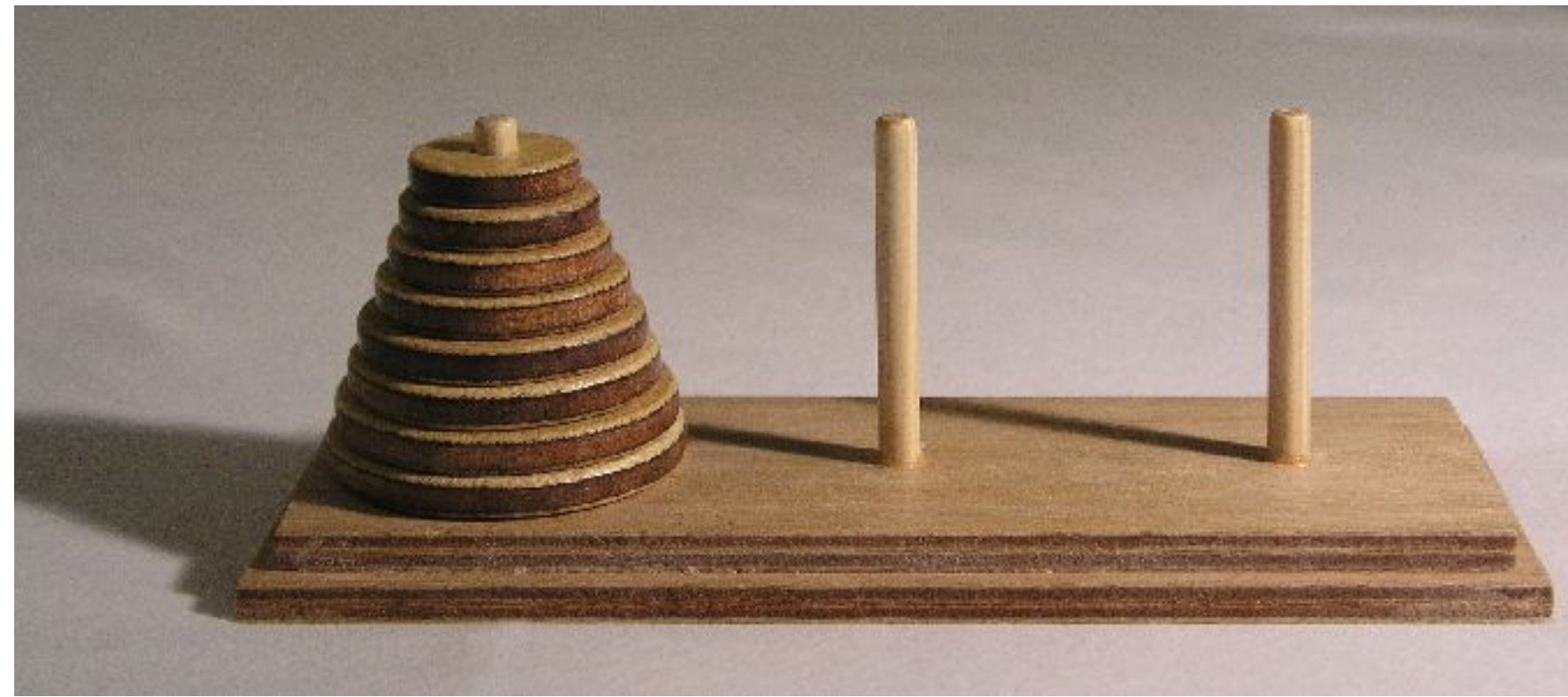
The objective of this puzzle is to move the entire stack of discs to the last rod.

The rules of this puzzle includes :

1. Only one disc can be moved at a time.
2. Each move consists of taking the upper disc from one of the stacks and placing it on top of another stack or an empty pole.
3. No disc should be placed on top of a disc that is smaller than it.

The minimal number of moves required to solve a Tower of Hanoi puzzle is  $2^n - 1$ . n is the number of discs. With 3 discs, the puzzle can be solved in 7 moves.

The puzzle can be played with any number of discs.



The Tower of Hanoi is frequently used in psychological research on problem-solving.

The Tower of Hanoi is popular for teaching recursive algorithms to beginner programmers.

We have implemented the game through C++ programming language using graphics and run it on Turbo C++.

### Data Structures used

The Data Structures used in implementing this game are as follows :

1. Stack
2. Priority Queue

### Algorithm used

The Algorithm used in implementing this game is Recursive Implementation

Recursion is the process of repeating items in a self-similar way.

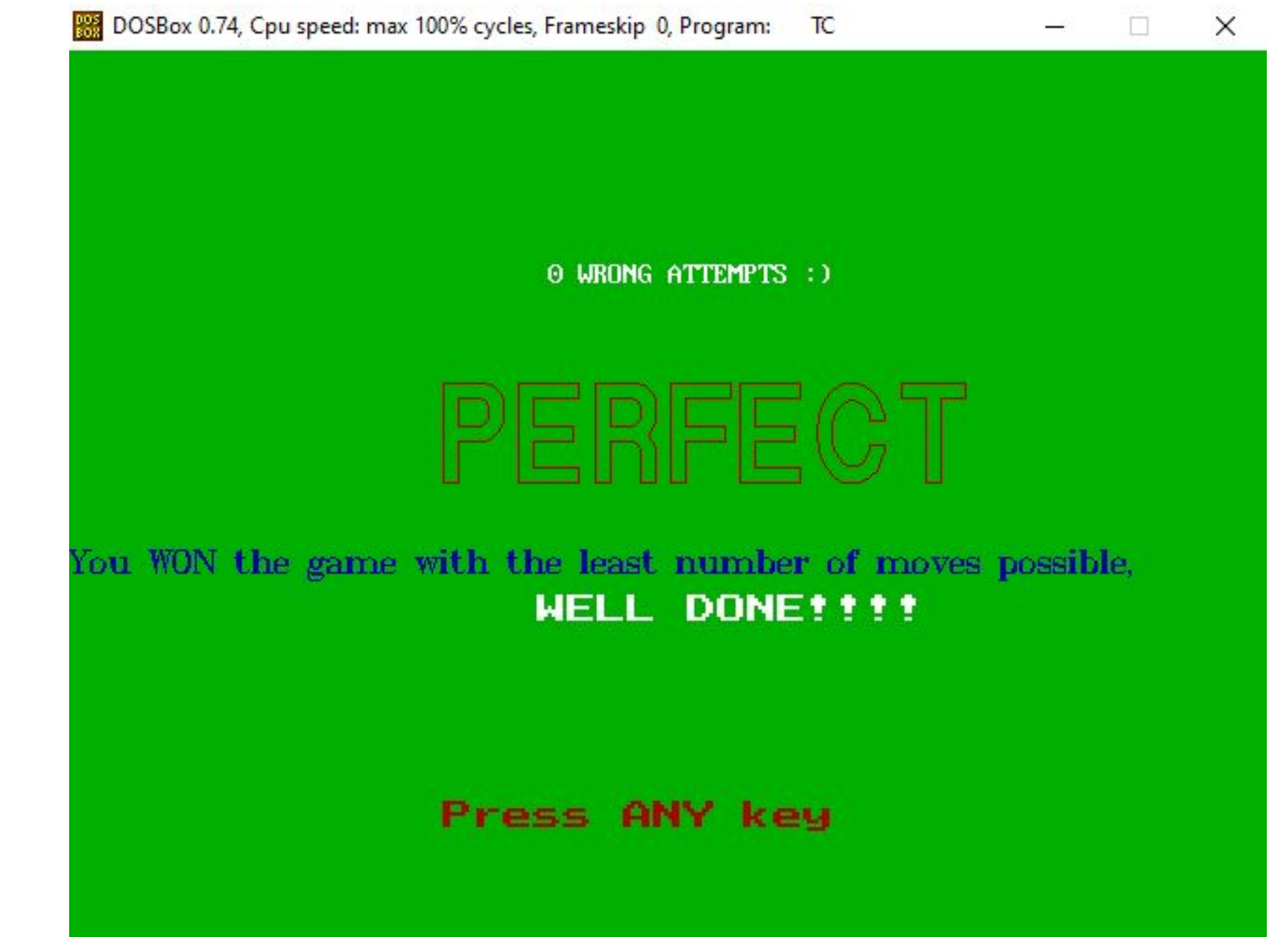
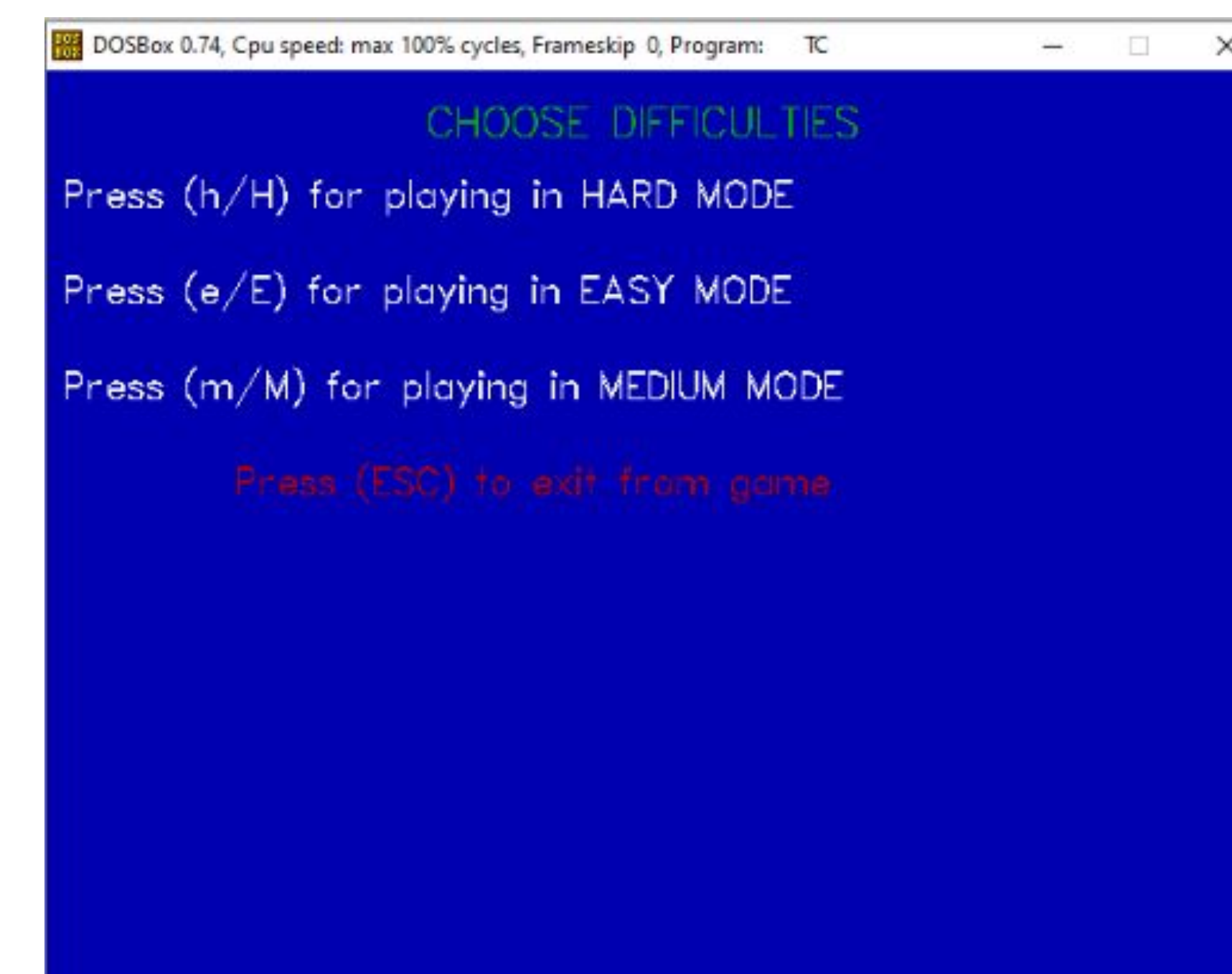
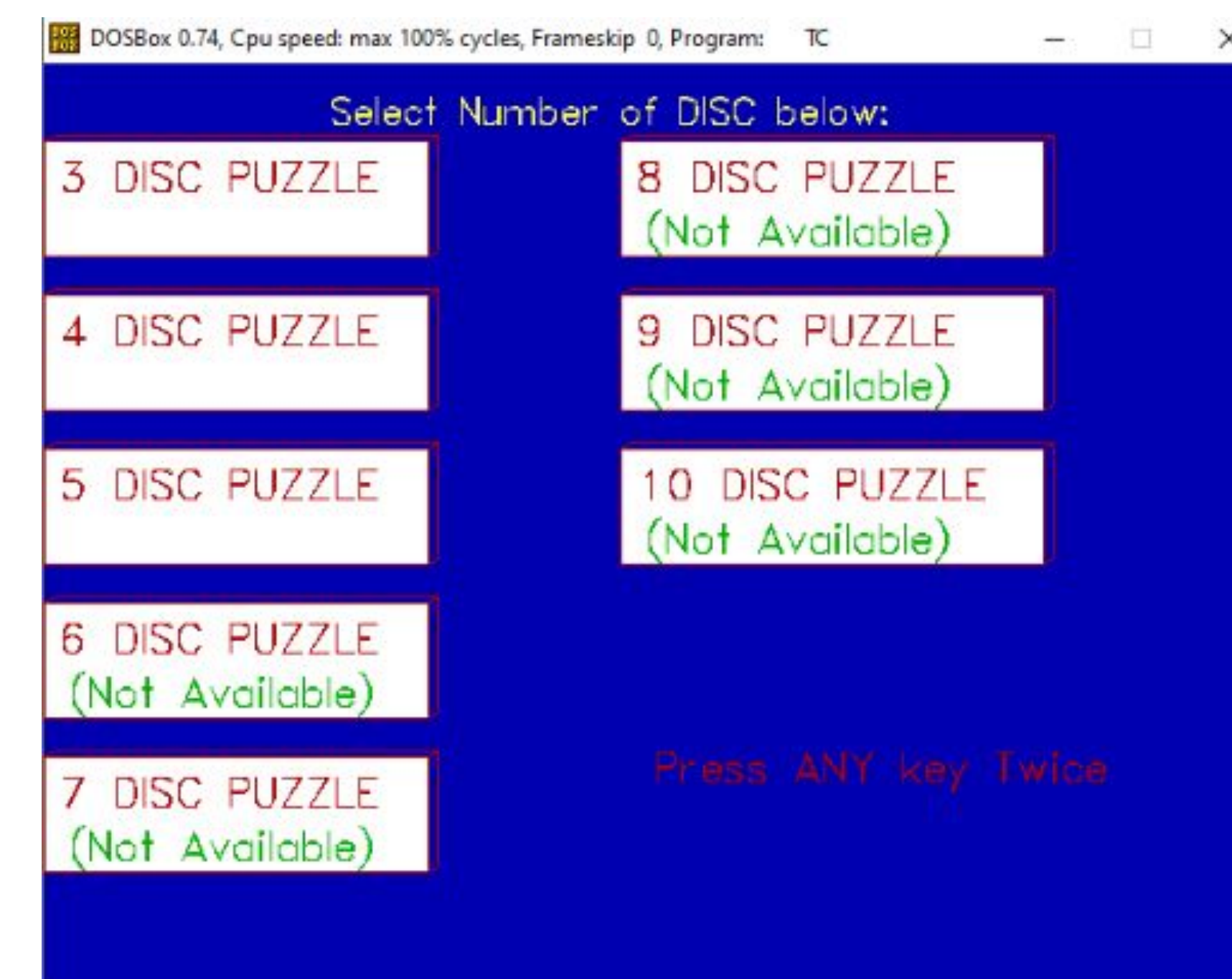
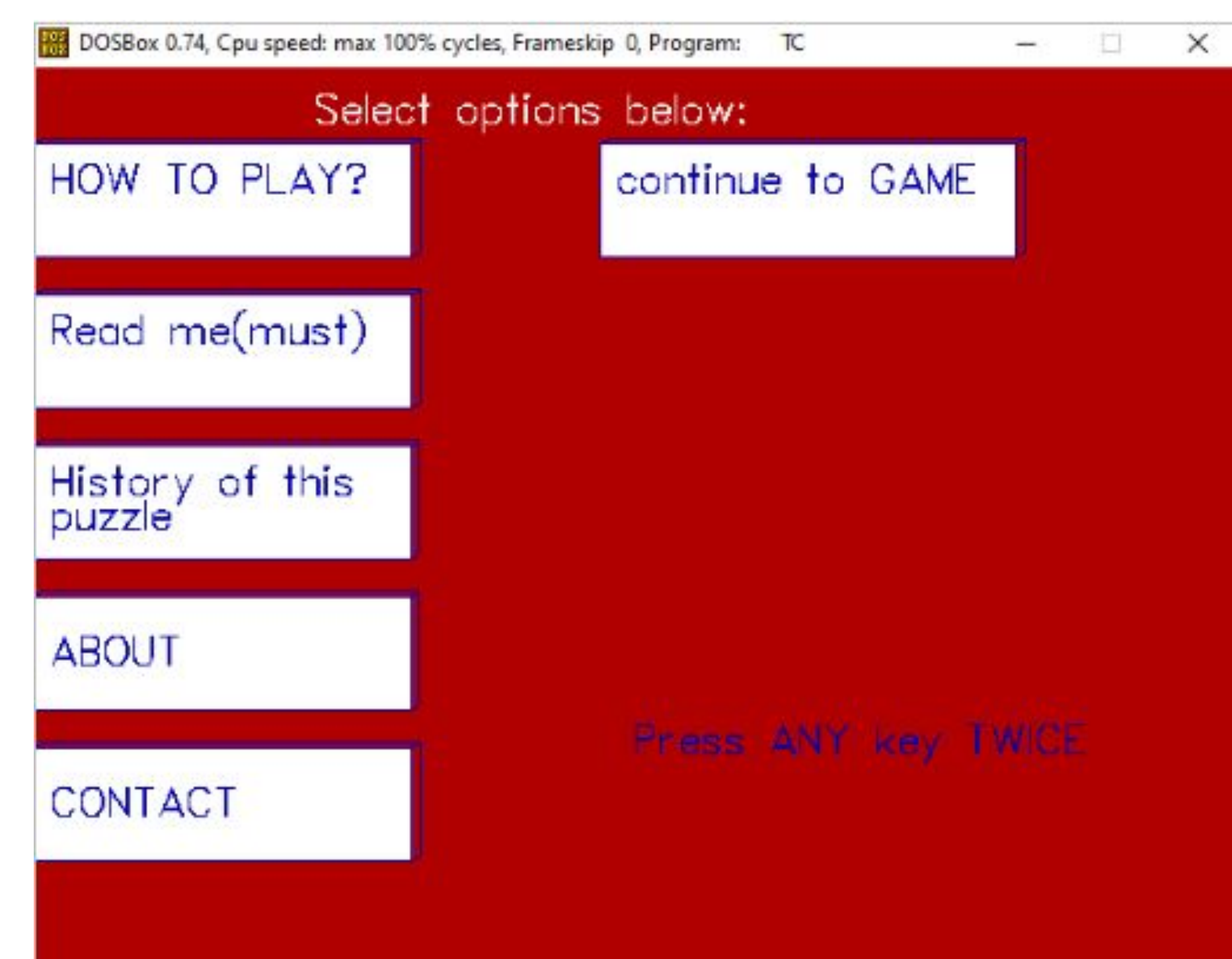
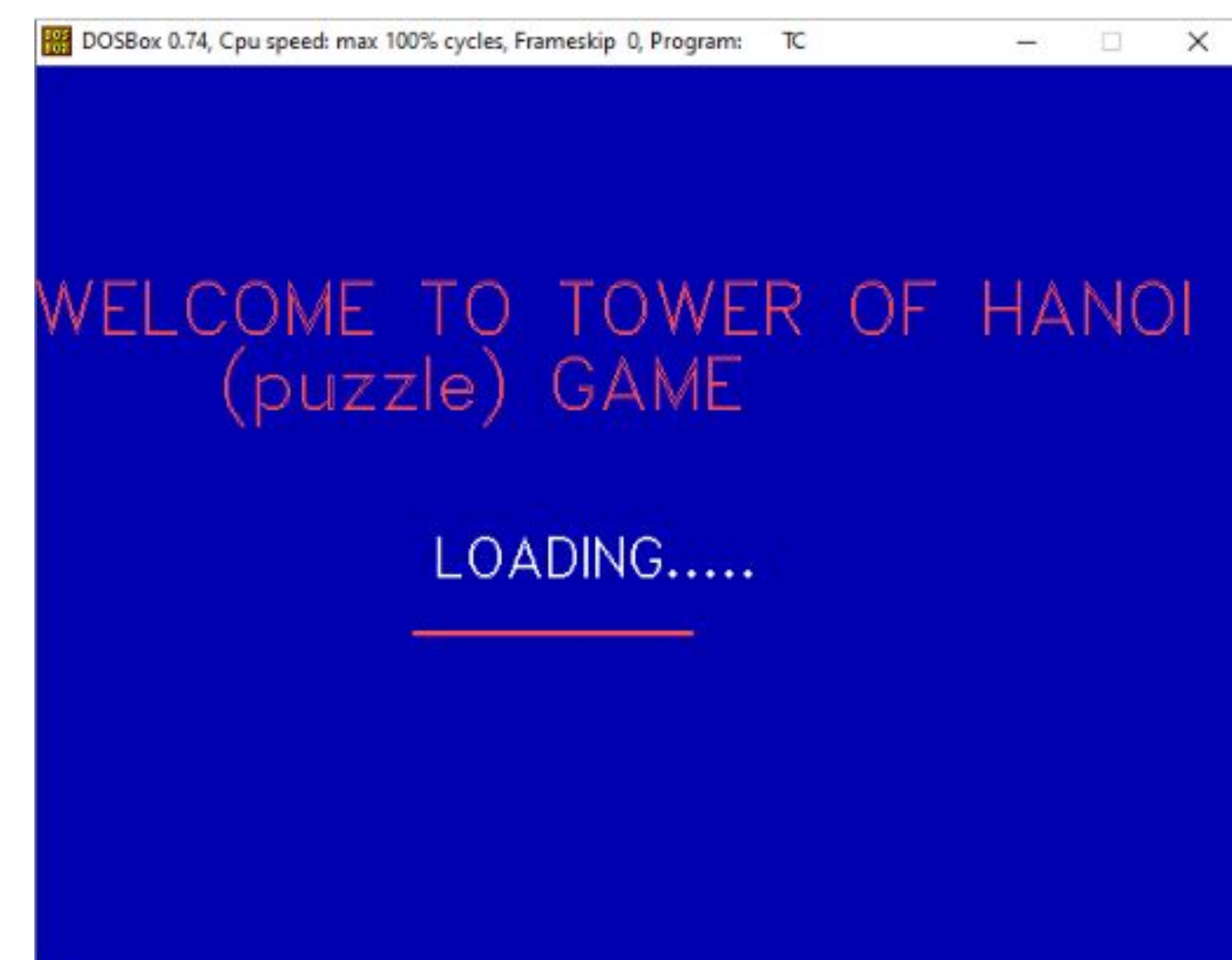
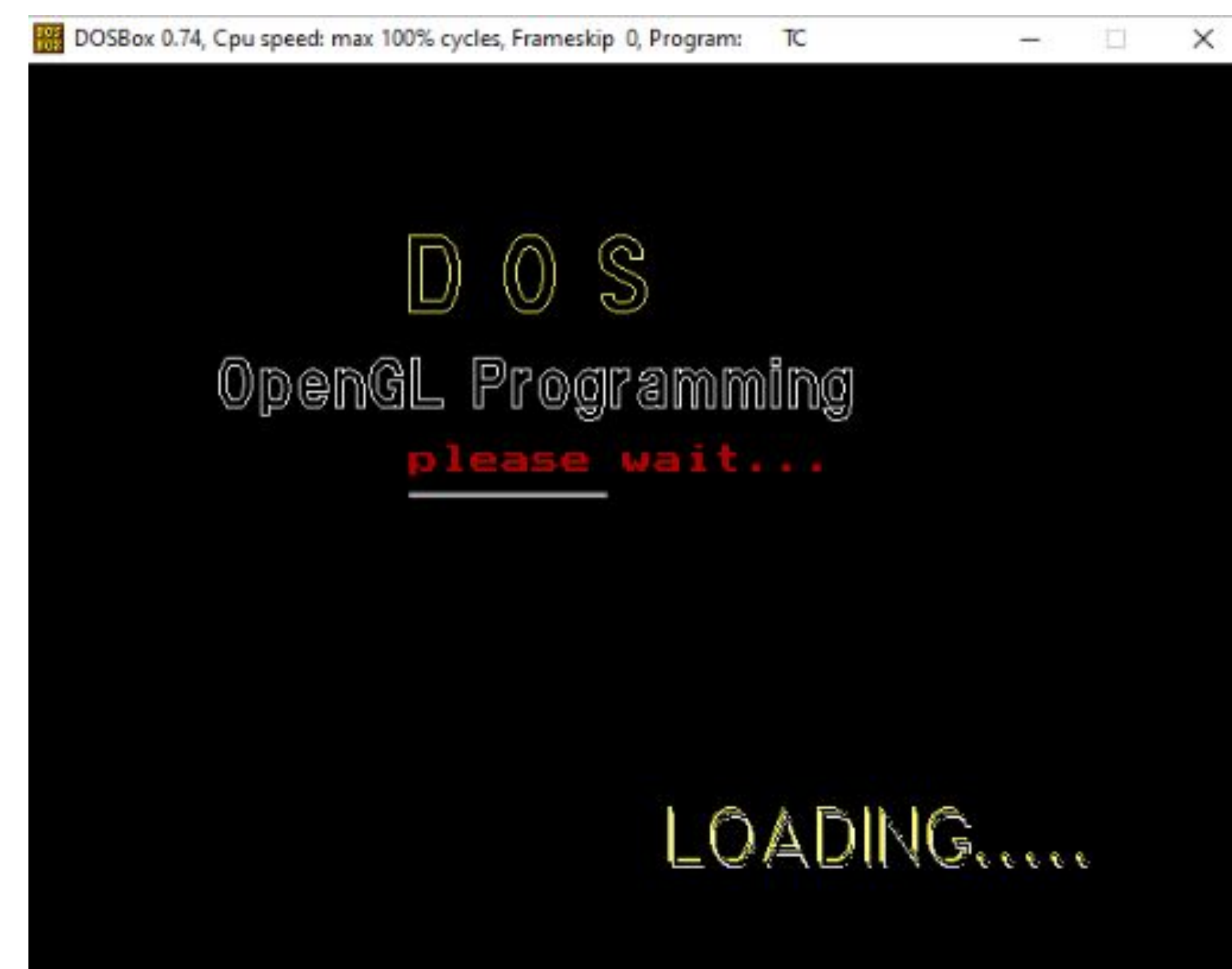
If a program allows to call a function inside the same function, then it is referred to as recursive call of the function.

### Implementation video link

[https://youtu.be/9\\_yUkp3C3yQ](https://youtu.be/9_yUkp3C3yQ)

### Implementation Screenshots

Screenshots of the game :



### References

1. Books :
  - ✓ Game Careers
  - ✓ Ray Tracing from the Ground Up by Kevin Suffern
  - ✓ Unity Shaders and Effects Cookbook by Kenny Lammers
2. Websites
  - ✓ [https://www.tutorialspoint.com/data\\_structures\\_algorithms/index.htm](https://www.tutorialspoint.com/data_structures_algorithms/index.htm)
  - ✓ <https://www.geeksforgeeks.org/c-program-for-tower-of-hanoi>
  - ✓ [https://en.wikipedia.org/wiki/Tower\\_of\\_Hanoi](https://en.wikipedia.org/wiki/Tower_of_Hanoi)
3. YouTube channel
  - ✓ <https://youtu.be/49MokcUXSbg>