



Budapest University of Technology and Economics
Faculty of Electrical Engineering and Informatics

Basics of Programming 1

CTETRIS USER GUIDE

VERSION 1.0.0

Author

Diego Davidovich Gomes

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1 Introduction

CTetris is a terminal-based game version of the classic game **Tetris**, originally created in 1985. In Tetris, you should complete lines by moving differently shaped pieces tetrominoes, which slowly descend into the playing field. When a line is completed, the line disappears and the pieces on top drop one rank, and you get points. Multiple lines can be completed at once, which grants more points. The game ends when the uncleared lines reach the top and a piece gets locked outside of the playfield. The longer the player can delay the gameover, the higher their score will be.

2 Getting Started

2.1 Requirements

CTetris requires a **terminal program**, either the default installed in your computer or a terminal of your choice. For the best experience, it is recommended to use a modern terminal which supports multiple colors and features. It should run on the following operating systems:

- macOS Sequoia 15.0 (Tested) and earlier versions
- Linux

Additionally, the program requires the **ncurses** library. Ensure that ncurses is installed on your system to run the game, otherwise follow the instructions in the next section.

2.2 Installation

Follow the following steps to download and install the necessary dependencies to run the game:

1. Install Dependencies

Before executing the game, make sure you have the ncurses library installed.

- **On macOS:**

Check if brew is installed, if not, install from [homebrew](#):

```
brew --version
```

If it is installed, execute the following:

```
brew install ncurses
```

- **On Linux:**

Execute the following command in the terminal:

```
apt-get install libncurses5-dev
```

2. Download the executable file

- The source code can be downloaded at [GitHub](#) or by executing in the terminal:

```
git clone https://github.com/DiegoGomesDG/CTetris.git
```
- Place the folder in the desired location and do not delete any file

2.3 Running

As a final step to run the game, we will need to execute it from the terminal. We suggest that in the terminal, you should type **cd** and then drag the folder **ctetris** into the terminal. Something similar will appear and you should press **Enter**:

```
cd /home/username/Downloads/ctetris
```

After pressing Enter, you will be inside the **ctetris** folder and ready to run the game. You can run the game by typing:

```
./ctetris
```

You should now be in the main menu and ready to proceed to the **Game Instructions** section to learn how to use the program.

3 Game Instructions

In this section, you will get knowledge on how to play the CTetris game and learn about the available features.

3.1 Main Menu

To launch into the main menu, follow the instructions listed in **2.3**. Once the steps are completed and the program is successfully launched, the main menu should appear on your screen.



Figure 1: Main Menu

To navigate between the options, simply use the \uparrow and \downarrow of your keyboard to go up and down and to select an option, press **Enter**. In the menu, there are four options:

- **Play**: launches the game
- **Scoreboard**: creates a table where you can sort your games according to the points or time

- **Info:** displays general information about the program and provides a quick reference guide
- **Exit:** terminates the program execution

3.2 Play

After selecting '**Play**' from the menu and pressing Enter, the game window will launch (or it can ask you to resize the window to make it bigger). Your goal is to clear as many lines as possible while preventing the blocks from reaching the top of the playfield.

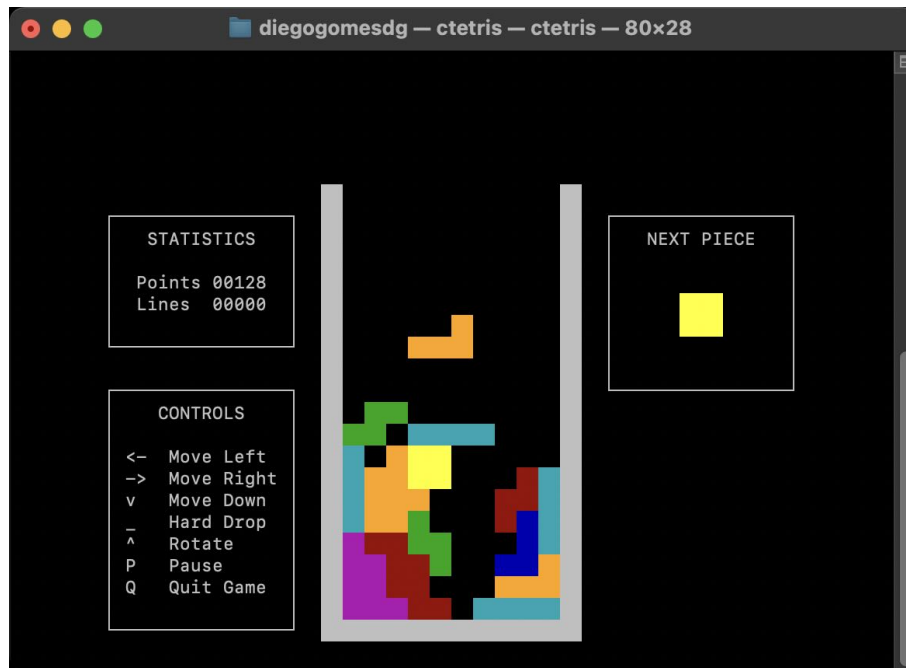


Figure 2: Game Window

The game window has four key elements that are essential to the gameplay:

- **Playfield:** where the action happens
- **Statistics:** shows how many points you have earned by completing lines and dropping pieces, as well as how many lines you have completed and cleared
- **Controls:** tells what are the game controls and their functionality in case you forget while playing
- **Next Piece:** displays what is the next piece that will be dropped into the playfield, giving a preview and the chance of planning ahead

There are 7 unique pieces called **Tetraminoes** which will descent into the playfield. These are the pieces that will descend into the playfield, and your goal is to rotate and place them to clear full lines

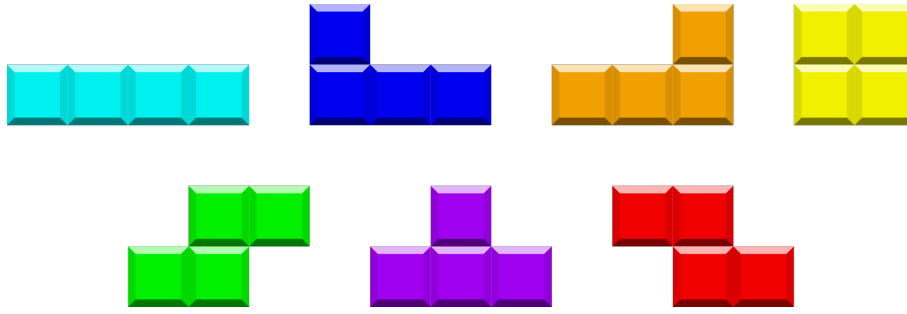


Figure 3: Tetraminoes

To manipulate the tetraminoes, there are 5 available controls:

- ← shift the piece to the left by one column
- → shift the piece to the right by one column
- ↓ shift the piece down by one row (**Soft Drop**)
- ↑ rotate the piece clockwise
- ⌵ the piece will immediately fall to the bottom of the playfield, landing on top of the nearest solid piece or the bottom of the playfield (**Hard Drop**)

Additionally, you can press **P** to pause the game, from where you can either quit the game or resume it, or press **Q** to immediately quit the game and go back to the main menu.

If you continue playing, you might eventually reach a situation where you have plenty of incomplete lines. In this case, if a piece reaches the top of the screen and above, the game will be over.



Figure 4: Gameover

The statistics of the game and the date will be saved into `/files/scores.txt` and you will be returned to the menu. The score of the game is also saved if the game is quitted prematurely.

Points are awarded based on the number of lines cleared and the action of dropping a piece. Clearing multiple lines at once will result in higher points, with bonuses for certain actions like dropping pieces quickly.

- **Single line:** 100 points
- **Double line:** 300 points
- **Triple line:** 500 points
- **Tetris:** 800 points
- **Soft drop:** 1 point per row
- **Hard drop:** 2 points per row

Remarks:

- You should not resize the window while playing, specially if you want to make it smaller than the game itself.
- You should not hold the keys down, as due to implementation details, it will not go down. This is an unintended behavior and it will not give points

3.3 Leaderboard

The Leaderboard allows you to see, analyze, and remember your previous games. It provides a summary of your games, helping you track your progress. The leaderboard provides the following informations for each game:

- Overall rank according to the sorting
- Points achieved
- Number of cleared lines
- Date of the played game
- Time of the played game



The screenshot shows a terminal window titled "ctetris — ctetris — 80x26". Inside, a table titled "Top Scores" displays the top four game records. The table has five columns: RANK, POINTS, LINES, DATE, and TIME. The data is as follows:

RANK	POINTS	LINES	DATE	TIME
01	001666	009	2024-11-21	14:58:00
02	000304	000	2024-11-20	17:28:16
03	000284	000	2024-11-20	17:28:28
04	000278	000	2024-11-20	17:28:01

Below the table, there are control instructions:

```
<- -> Change Sorting
D      Delete Files
ESC    Exit Scoreboard
```

Figure 5: Leaderboard

It is possible to sort the table in four different ways, which can be easily done using the \leftarrow and \rightarrow keys of your keyboard. The sorting modes are:

- **Top Scores:** displays the Top 10 games according to their points in descending order (highest to lowest)
- **Worst Scores:** sorts the worst 10 games according to their points in an ascending order (lowest to highest)
- **Most Recent Games:** shows the 10 most recent games played
- **Oldest Games:** displays the 10 oldest games recorded

If you did not like your performance and want to give yourself another chance, you can delete the file responsible for registering the scores. To do that, you will need to press **D** in your keyboard and press **Shift + Y** to confirm the operation. After that, the previous scores are cleared and the table will be empty.

If you wish to leave the window, just press **Esc**. One important remark is that a sorted file will be generated in `/files/` with name `scores_sorted.txt`.

3.4 Informations

In this window, you can access important information about the game and browse through a short version of this user guide. There are three pages available for your reference:

- **About:** about the purpose of the project and the developers
- **Quick Guide:** explains the goal of the game briefly
- **Controls:** lists all the game controls

To change pages, simply press **Space** and if you would like to exit the window, press **Esc**.

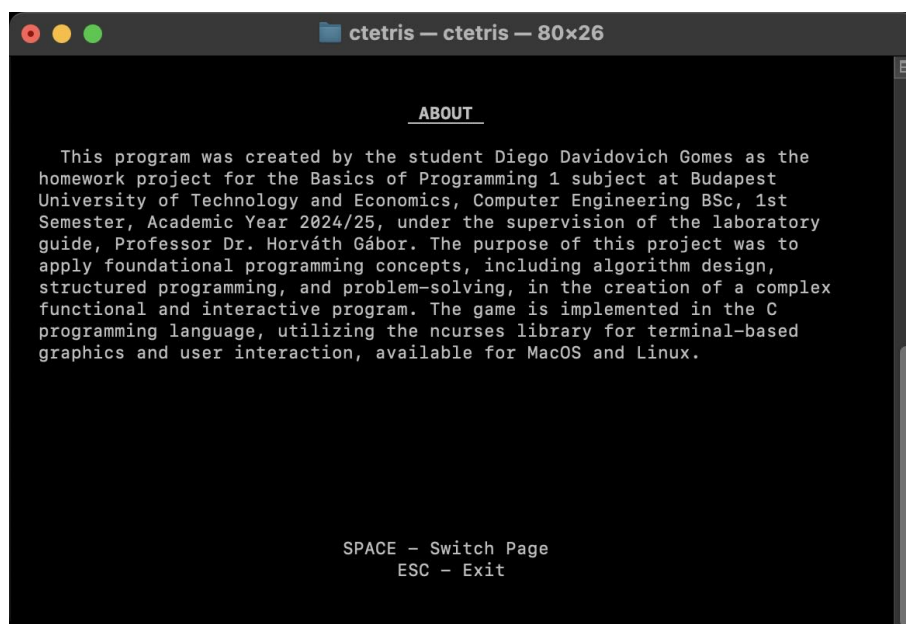


Figure 6: Info window

3.5 File Management

To ensure the proper working of the game, it is important to discuss the files that will be used and generated. The source code has the following structure:

```
ctetris/
├── ctetris
├── makefile
├── docs/
│   ├── devguide.pdf
│   └── userguide.pdf
├── files/
│   ├── scores.txt
│   └── scores_sorted.txt
├── include/
│   └── ...
└── src/
    └── ...
```

Figure 7: File Structure

There are other folders that are not relevant in case you do not pretend to see the source of the program. In this case, you can safely delete **include**, **src** and **makefile**. In order to the program run correctly, you will need to have always the **files** folder where the scores will be stored. If you find issues that the leaderboard does not work, check if the files folder is created and is in the same folder as the **ctetris** compiled program.

4 Troubleshooting and Support

This section is to provide possible solutions to some possible errors or unexpected behavior. Please note that due to the program being recently launched, some bugs might not be known.

1. **I accidentally resized the game window and the parts of the game disappeared**
In this scenario, the best way to solve this problem is to press **Ctrl + C** to terminate the game process and re-run the game
2. **The piece just keeps rotating or it is stuck in the borders when a press a key**
As it was written in the remark, this happens due to some implementation details and a better solution for that is still to be found. It is an unintended behavior, so just keep pressing keys one by one and it will not be a problem
3. **The scores of the games are not being registered**
As described in 3.5, this is probably due to the folder **files/** missing. Simply add this folder and it should work normally
4. **The menu got duplicated after resizing, weird behavior in the screen**
In this case, if the problem is persistent, i.e. it is not a random occasional problem,

please report it to the developer (information below). Some bugs might be related to the operating system that you are using, which is possible due to the source code be only verified for **macOS**.

5. I accidentally deleted the compiled executable file

Download it again at the provided link in 2.2.

In case you find any other error/bug/problem in the program that is not documented here, please write an email to **diego.gomes@edu.bme.hu** with a screenshot of the problem and a description. Alternatively you can create an issue in [GitHub](#).

5 Conclusion

Tetris is a classic, simple, and highly addictive puzzle game that is both fun and challenging. Its lightweight design makes it highly portable, allowing it to run smoothly on virtually any machine, old or new. Tetris not only offers an entertaining gameplay experience but also helps players improve their problem-solving and spatial reasoning skills, all while providing a satisfying sense of accomplishment with every cleared line.

6 About the Project

This program was created by the student **Diego Davidovich Gomes** as the homework project for the **Basics of Programming 1** subject at **Budapest University of Technology and Economics**, Computer Engineering BSc, 1st Semester, Academic Year 2024/25, under the supervision of the laboratory guide, **Professor Dr. Gábor Horváth**. The purpose of this project was to apply foundational programming concepts, including algorithm design, structured programming, and problem-solving, in the creation of a complex functional and interactive program. The game is implemented in the C programming language, utilizing the ncurses library for terminal-based graphics and user interaction, available for MacOS and Linux.

7 Disclaimer

This game is a clone of the original **Tetris** game, created by **Alexey Pajitnov** in 1984. The Tetris name and logo are trademarks of **The Tetris Company**. This version was developed as a **personal project** and is not affiliated with or endorsed by The Tetris Company or its creators. **The purpose of this project is purely educational and for the purpose of learning fundamental programming concepts.**

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