PROJECT REPORT

Developer :

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ATARI BREAKOUT GAME (Assembly Language – 8086 / DOS)**

1. Project Overview

This project implements a classic **Atari Breakout Arcade Game** using **8086 Assembly Language**, BIOS interrupts, real-time keyboard interrupt handling, collision detection, sound effects, and progressive difficulty levels.

The goal of the game is to:

- Control a paddle at the bottom of the screen.
- Bounce a moving ball.
- Break all bricks arranged at the top rows.
- Avoid missing the ball, otherwise a life is lost.

The project mimics real arcade gameplay and includes scoring, levels, sound effects, and high-score saving.

2. Game Layout

Bricks

- 4 rows of visible bricks.
- Each brick is represented by a character and a unique color.
- 32 bricks total (4 rows × 8 columns).

Paddle

- Blue paddle placed at the bottom row.

- Smooth movement with acceleration using **left** and **right arrow keys**.

Ball

- Moves diagonally at **45°** or **90°**.
- Bounces off walls, paddle, and bricks.

Screen

- Game UI drawn using `INT 10h`.
- Score, lives, level, and high score shown at all times.

3. Display Requirements

The game uses **BIOS interrupt 10h** functions to display:

- 4 rows of bricks
- Paddle (colored bar)
- Ball (single character)
- HUD (score, lives, high score, level)

4. Welcome Screen

A user-friendly welcome interface displays:

- Game title
- Names of developers
- Rules:
    - Move paddle using arrow keys
    - Break bricks to win
    - 3 lives available
    - Different brick colors = different points
    - Do not let the ball fall
- Press **ENTER** → Start
- Press **ESC** → Exit

5. Gameplay & Ball Physics

Ball Movement

- Moves based on `ballDirX` and `ballDirY`
- Allowed directions:
    - 45° (±1, ±1)
    - 90° vertical bounce
- Speed controlled using `ballSpeedCounter`

Collision Detection

1. **Walls**
    - Left & right walls: X-direction reverses (`neg ballDirX`)
    - Top wall: Y-direction reverses
2. **Paddle**
    - If ball touches paddle row (row 22)
    - If ballX is within paddle range
    - Reverse Y-direction & play paddle sound
3. **Bricks**
    - Ball position mapped into brick grid
    - If brick exists → clear brick, add points, bounce ball
4. **Bottom boundary (ball missed)**
    - Lose 1 life
    - Reset ball & paddle positions
    - If lives = 0 → Game Over

6. Game Controls

Controlled through **hardware keyboard interrupt (INT 9)**:

- **Left Arrow (4B)** → move paddle left
- **Right Arrow (4D)** → move paddle right
- Smooth motion with acceleration
- ESC (1B) → exit from game loop

The original keyboard ISR is restored on exit.

7. Game Status Display

Always visible:

- **Score**

- **Lives**
- **High Score**
- **Level Progress**

On game end:

- **Game Over** or **You Win**
- **Final Score**
- **New High Score (if achieved)**

8. Audio Feedback

Sound is generated using **PC Speaker** via:

- `INT 1Ah` timing
- Port `0x43` and `0x42` for PIT frequency generation

Sounds include:

- Paddle bounce
- Brick break
- Wall bounce
- Life lost
- Level up
- Win sound

9. Additional Functional Features

1. Progressive Levels

- 3 levels
- Ball speed increases each level
- Level-up message displayed

2. Brick Colors & Points

Stored in arrays:

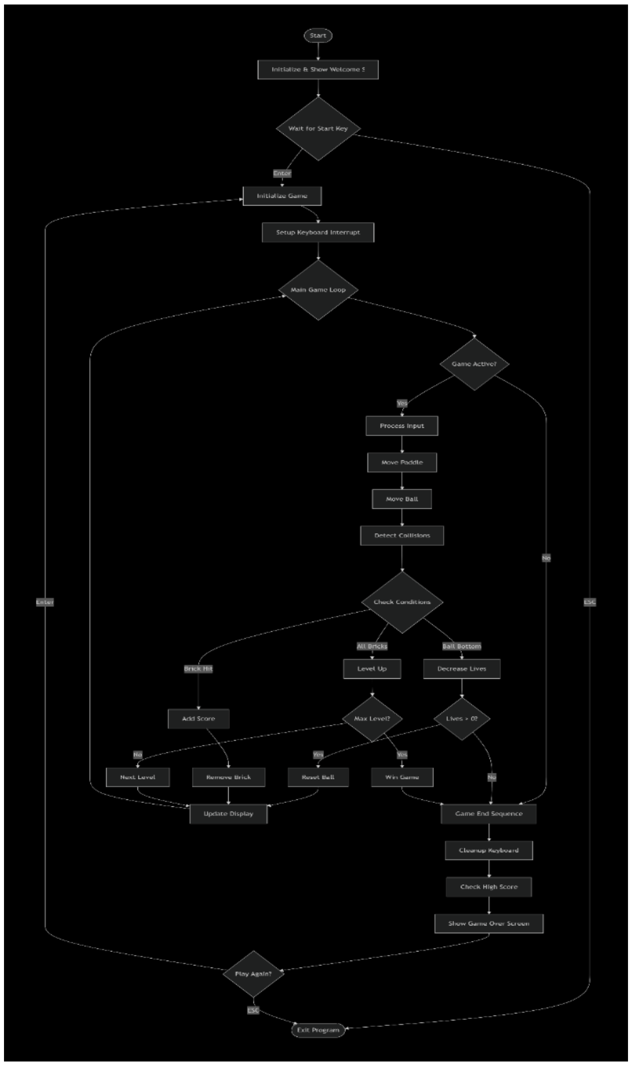
Row	Color Code	Points
1	0x4C	40

Row	Color Code	Points
2	0x4E	30
3	0x4A	20
4	0x4B	10

3. High Score Saving (File I/O)

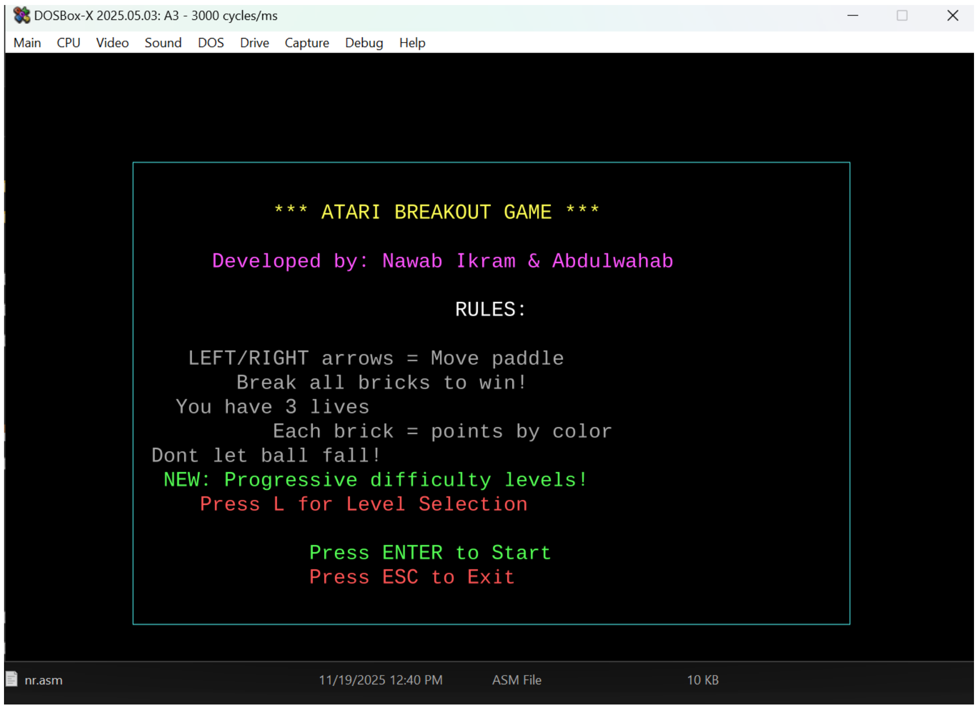
- Saves high score to `HIGHSCR.DAT`
- Backup file also created
- Displays **NEW HIGH SCORE** message

10. Flowchart of Game Logic



Screenshot :

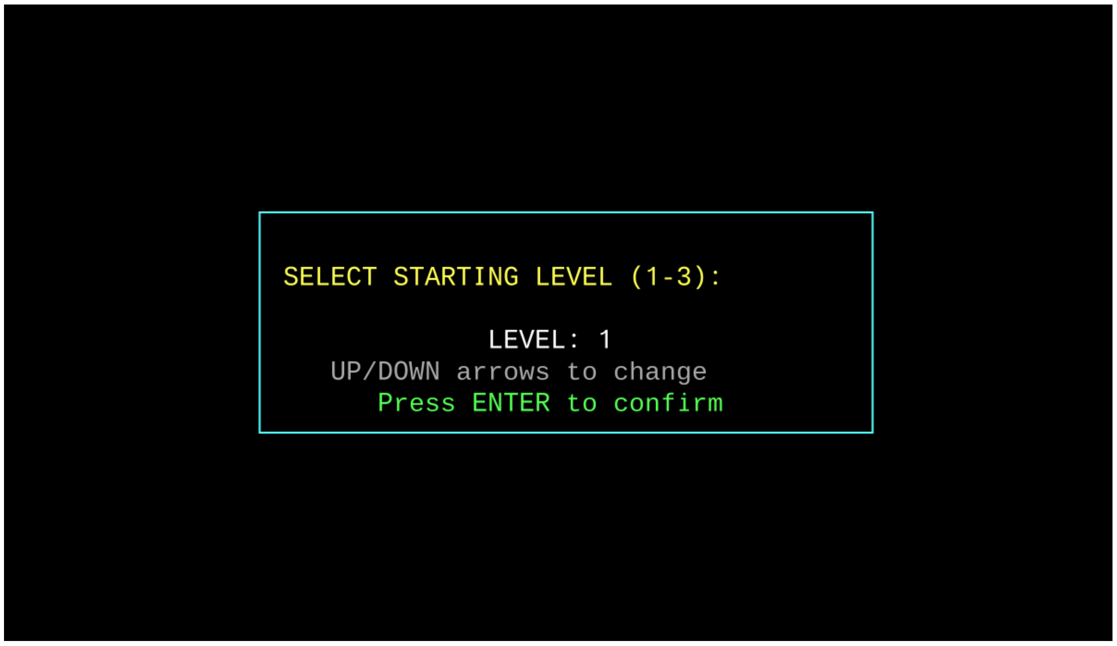
Menu Selection :


DOSBox-X 2025.05.03: A3 - 3000 cycles/ms
Main CPU Video Sound DOS Drive Capture Debug Help

```
              *** ATARI BREAKOUT GAME ***

       Developed by: Nawab Ikram & Abdulwahab

                          RULES:

   LEFT/RIGHT arrows = Move paddle
       Break all bricks to win!
  You have 3 lives
          Each brick = points by color
Dont let ball fall!
 NEW: Progressive difficulty levels!
    Press L for Level Selection

             Press ENTER to Start
             Press ESC to Exit
```

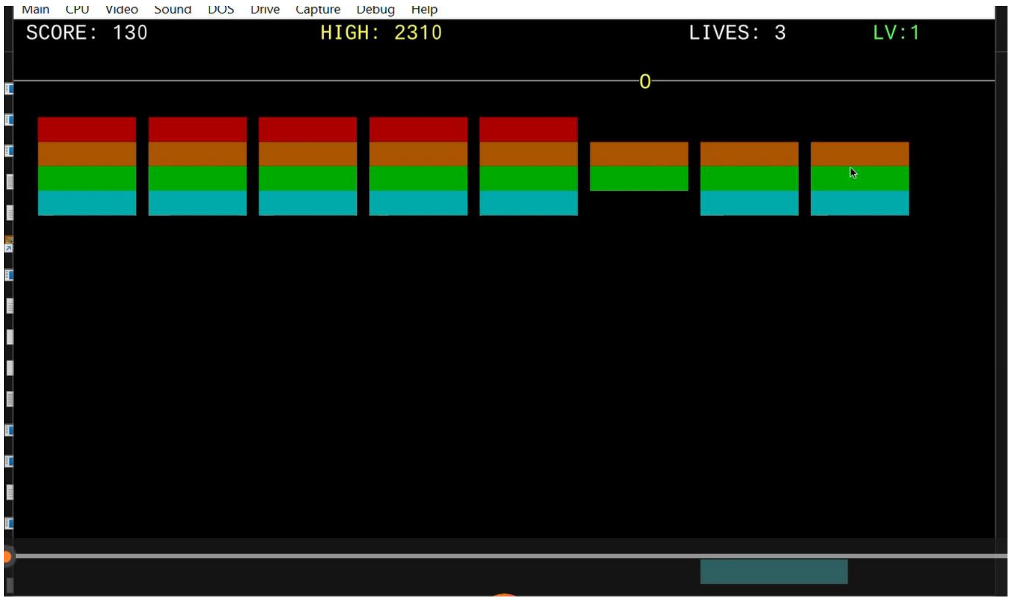
nr.asm
11/19/2025 12:40 PM
ASM File
10 KB

Level Selection :

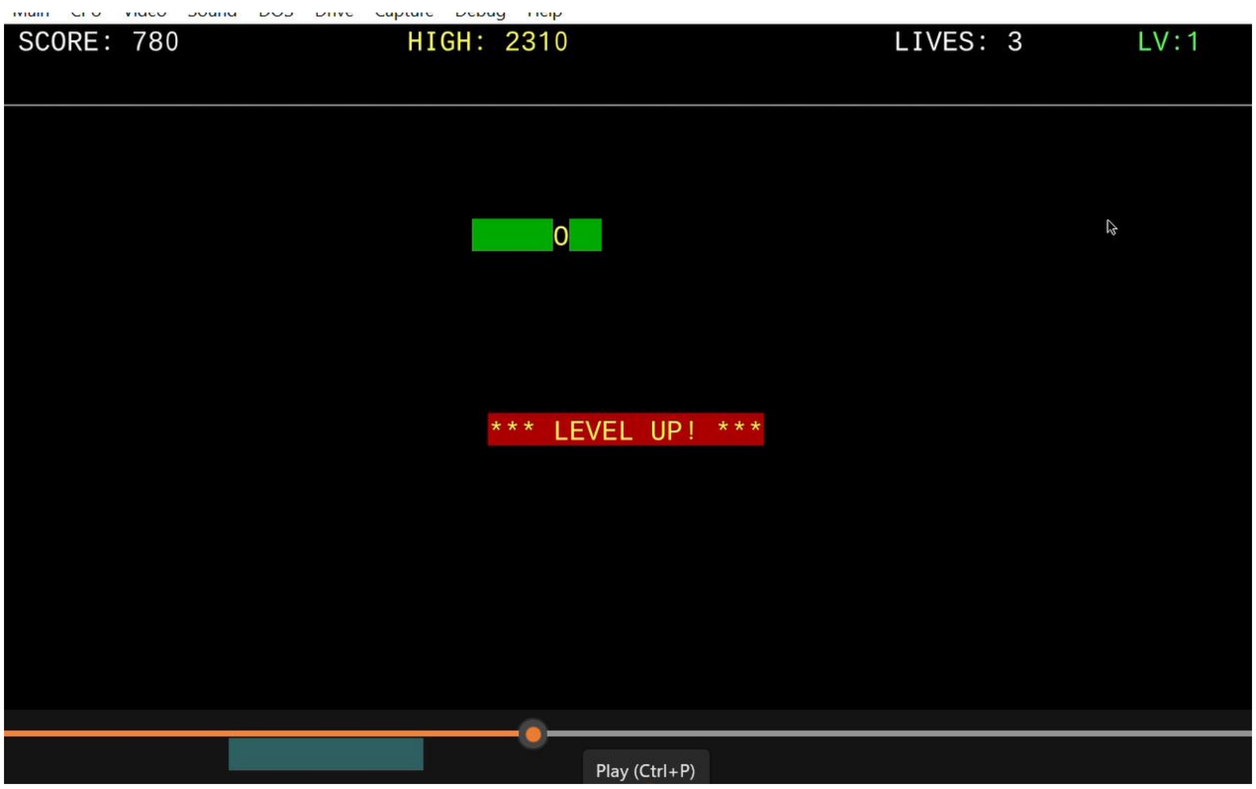


```
SELECT STARTING LEVEL (1-3):

          LEVEL: 1
   UP/DOWN arrows to change
      Press ENTER to confirm
```

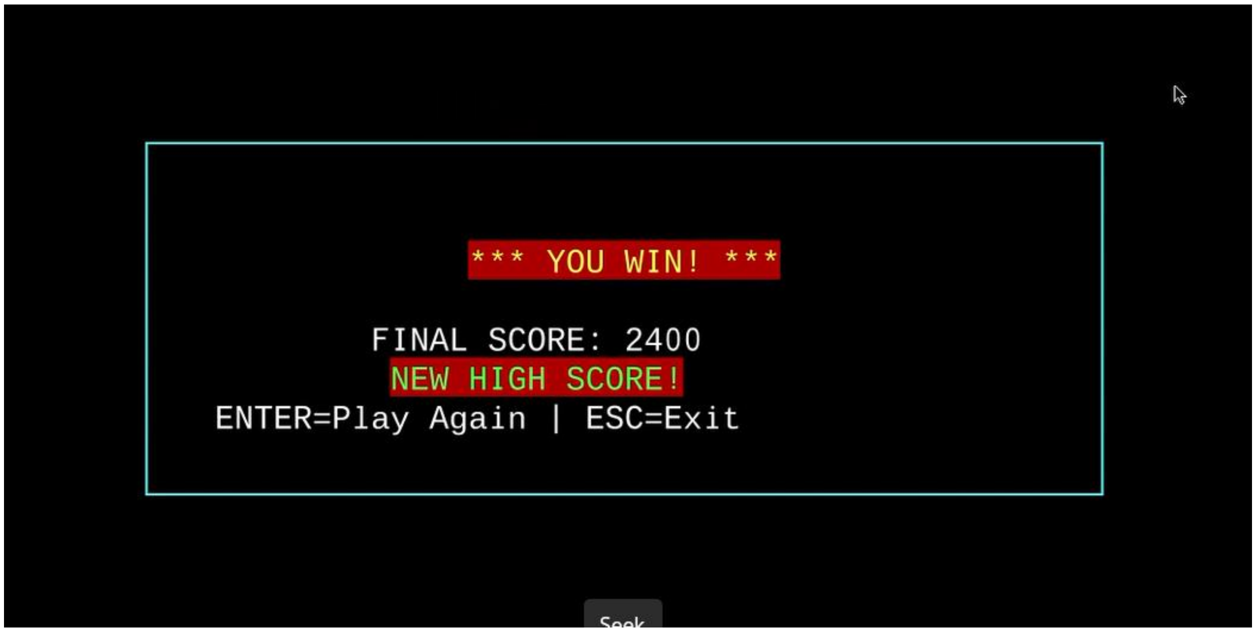
Start of the Game :



When Game Level Ups :



When Game Ends :



```
*** YOU WIN! ***

FINAL SCORE: 2400
NEW HIGH SCORE!
ENTER=Play Again | ESC=Exit
```