Ping-Ping Game Inference Report

LAB 4

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Overview:

The Pygame Ping Pong project evolved from a basic skeleton into a complete, interactive 2D game with sound feedback, scoring, replay options, and accurate ball-paddle physics. The final version includes a fully functional game loop, stable frame rate, and improved user experience.

Key Improvements:

-> Game Engine & Structure

Added a modular GameEngine class to handle input, updates, rendering, and replay flow.
Implemented Ball and Paddle classes with encapsulated movement and collision logic.
Added winning score selection (3/5/7) through a replay menu after each match.
Integrated check_game_over() for displaying winner overlay and pausing gameplay.

-> Physics & Collisions

Improved ball-paddle collision using pre-move detection and velocity reversal to prevent tunneling.
Added wall collision handling with accurate Y-inversion.
Implemented automatic ball reset on scoring with direction reversal.
AI paddle now tracks the ball position smoothly for balanced gameplay.

-> Input & Game Flow

Player controls: W (up), S (down).
ESC to quit anytime; 3/5/7 to restart the match.
Ball, paddle, and score logic fully synchronized at 60 FPS.

-> Audio Feedback Integration

Initialized pygame.mixer and loaded three .wav files:
paddle_hit.wav, wall_hit.wav, score.wav.
Sounds play on corresponding events where ball velocity changes.
Volume of wall sound reduced for balance (set_volume(0.5)).
Audio tested for fallback on systems without mixer support.

Bug Fixes:

-> Resolved the error where the ball penetrated the paddle.
-> Fixed the issue where the ball glued itself to the wall.
-> Limit the maximum speed the ball can obtain.
-> Fixed the sound volumes and overall file structure.

Verification

-> Paddle collision → bounce + paddle hit sound.
-> Wall bounce → velocity Y invert + wall sound.
-> Scoring → score increment + score sound + ball reset.
-> Winning condition triggers overlay and replay menu.
-> Replay via 3/5/7 confirmed functionality.

Result:

The game runs at a stable 60 FPS, sound effects consistent, no runtime errors or logic faults.
All updates verified successfully.