

Boxtacle

CGUE project by Salih Gecal and Tom Tucek

Documentation for the second submission

Testing Note: Testing on HAL/CYLON was done using the AMD video card.

Controls

The game is played with mouse and keyboard and uses the following key bindings:

(Some features also work with a gamepad, but were only tested with an Xbox 360 controller.)

Key(s)	Action
W,A,S,D	Movement
Mouse movement	Camera movement
Mouse button 1	Shoot box bullets
Mouse button 2	Shoot hookshot
Space	Jump or ascend (while in flying-noclip-mode)
ESC	Exit the game
X	Descend (while in flying-noclip-mode)
E	Proceed to the next level (if standing close enough to the goal point)
Q	Buy upgrades from the duck merchant.
M	Toggle mute/unmute soundeffects and music.
F2	Toggle fps display and debug output via console
F3	Toggle wire frames
F4	Toggle texture sampling quality
F5	Toggle mip-mapping quality
F6	Toggle flying-noclip-mode (default: off)
F7	Toggle fps lock
F8	Toggle viewfrustum-culling (default: on)
F9	Toggle transparency (default: on)
F10	Toggle shadow mapping (default: on)
F11	Toggle display of depth maps in bottom left corner
F12	Switch between rooms (for testing purposes)

Implementation

- Complex objects
 - The duck sitting in the safe rooms (every second room) is a complex object.
- Animated objects
 - Enemies are hierarchical animated, as their heads spin on top of their bodies.
- View-Frustum culling
 - View-Frustum culling is enabled by default and can be disabled by pressing F8. If console output is activated (F2), the number of drawn objects is shown there as well.
- Transparency
 - Transparency is featured in the games HUD and can be toggled on and off via F9.
- Lightsources
 - There are 4 lightsources in each room - one in each corner - illuminating the scene.

Implemented Effects

- Bloom (1 Pt.)
 - Can be seen by holding the “box-cannon” against a light source.
- Cel-Shading (0.5 Pts.) & Contours (+0.5 Pts.)
 - Can be seen on walls, etc. and the duck in the second room (F12).
- Lens Flares (0.5 Pts.)
 - Can be seen by staring directly into a lightsource.
- Shadow Maps with PCF (1.5 Pts.)
 - Can be seen on walls and on the floor, especially close to lightsources and when shooting bullets.
 - **Shadow Mapping does not seem to work as intended on NVidia GPUs, but seems to work well on AMD and Intel graphics cards.**

Details and links to used tutorials can be found within the code.

Basic Gameplay / Features

Gameplay consists of beating individual levels to get to the next room by reaching a finishing cube and pressing E. After each level there is a safe-room, containing upgrades and a duck merchant, where the player can exchange 5 coins for a random upgrade.

The player can run and jump around and shoot bullets (or bullet-cubes). Enemies can be found in the rooms as well, shooting bullets either randomly or targeted at the player. If an enemy bullet hits the player, they lose one life. If all three lives are lost, a Game Over is printed on the screen and the game ends.

Falling into lava causes an instant Game Over, regardless of remaining lives.

Defeated enemies drop upgrades, which can be collected by running through them. Most collected upgrades immediately empower the main character and affect gameplay.

The player is also able to hook onto enemies or non-wall cubes by pressing the secondary (left) mouse button.

There are currently 9 types of upgrades:

- Coins
- Lives
- +Movement speed
- +Jump height
- +Jumps (Only one jump per default, but with this upgrade one can jump while mid-air.)
- +Bullet speed
- +Bullet acceleration
- +Bullet shooting speed (More bullets can be shot per second.)
- +Hookshot length

After exiting the game, player stats are displayed in the console - showing the effect of collected upgrades.

By pressing F6, flying-noclip-mode can be activated (or deactivated), allowing the main character to fly or run faster, ignore walls and ascend by pressing space, or descend by pressing x.

Pressing F12 causes the player to be teleported to the next room (for testing purposes).

Command line arguments

The game can be given the following arguments via command line:

Resolution (horizontal), Resolution (vertical), Full screen (1 for yes, 0 for no)

For example:

Boxtacle.exe 640 480 1

Additional libraries

Libraries used so far:

- GLEW (<http://glew.sourceforge.net/>)
- GLFW (<http://www.glfw.org/>)
- GLM (<http://glm.g-truc.net/0.9.6/index.html>)
- FreeImage (<http://freeimage.sourceforge.net/>)
- Assimp 3.0 (<http://assimp.sourceforge.net/>)
- DevIL (<http://openil.sourceforge.net/>)
- SDL (<https://www.libsdl.org/>)