Design Overview for Dragon Raider

Summary of Program

The program is a multilevel game where the player must move around platform-based stages in order to collect enough of the coins located throughout the stage to proceed to the next level. The player must also avoid fireballs that explode when they make contact with the player and are fired by dragons that fly across the screen. The difficulty of the levels increases by increasing the number of dragons that appear in each stage and increasing the frequency at which each dragon fires.
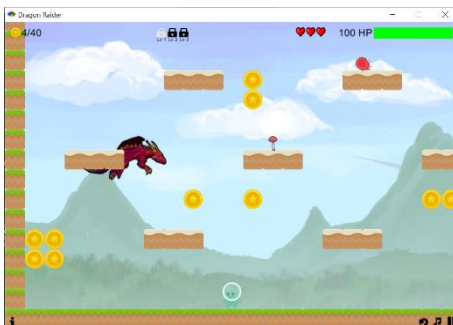

Figure 3. Level 1 *Figure 3. Level 2* *Figure 3. Level 3*

The player has a hp bar that decreases each time they are hit by a fireball. When the hp bar runs out the player loses one of their 'lives,' which are displayed at the top of the screen, and the level resets. The player starts which three lives at the beginning of each level and therefore has three attempts at completing each level. When all the players lives run out the player is sent back to the beginning of the first level. The game is complete after the player passes all of the levels.
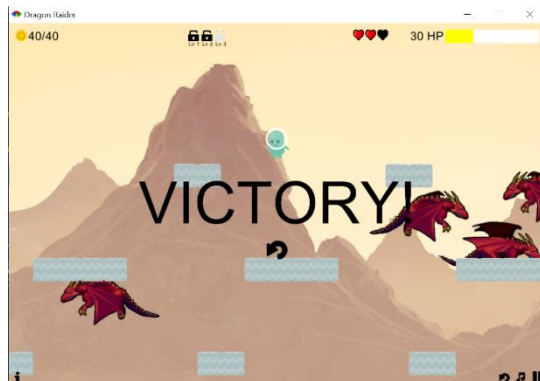

Figure 5. Start Menu *Figure 5. Screen shown at end of game*

The player can also collect mushrooms which are placed across the stage at each level. The mushrooms are of two types, and each affects the player's speed for a set period of time. The red mushrooms increase the player's speed, and the blue mushroom decreases the player's speed. While the player is affected by one of the mushrooms an icon displaying its effect is displayed onscreen along with a countdown until the effect wears off. Collecting another mushroom replaces the effect of any mushroom the player has already collected regardless of the timer.

Required Data Types

Records

Table 1: Level details

Field Name	Type	Notes
max_level_index	Integer	Index of final level
backgrounds	String	Array of background images
platform_set	String	Array of platform images
ground_set	String	Array of ground images
maps	String	Array of terrain text files
num_enemies	Integer	Array of number of enemies that appear in each level
fireball_freq	Integer	Array giving frequency dragons fire in each level

Table 2: Stage details

Field Name	Type	Notes
width	Integer	Width of stage determined by terrain text file
height	Integer	Height of stage determined by terrain text file
coins	Class	Array of all coins
mushrooms	Class	Array of all mushrooms
tile_set	String	Array of terrain images for current level
tiles	Class	Array of terrain in current level

Table 3: Player details

Field Name	Type	Notes
x	Integer	X-axis position
y	Integer	Y-axis position
direction	Integer	Whether player is traveling left or right
x_vel	Integer	Speed player traveling in x direction
y_vel	Integer	Speed player is traveling in y direction
effect	Integer	Factor by which player speed is altered for period of time after collecting mushroom
timer	Integer	Time left under mushroom's effect
stage	Class	Contains information about stage
images	String	Array of images for animation
current_image	String	Image from images currently being displayed
lives	Integer	Amount of lives player has left
hp	Integer	Amount of hp player has left
score	Integer	Number of coins collected

Table 4: Enemy details

Field Name	Type	Notes
x	Integer	X-axis position
y	Integer	Y-axis position
direction	Integer	Whether dragon is traveling left or right
speed	Integer	Speed dragon travels
flyingimages	String	Array of images for flying animation
firingimages	String	Array of images for shooting fireball animation

current_image	String	Image from images currently being displayed
firing	Boolean	Whether or not dragon is shooting fireball
count	Integer	Number of dragons on screen

Table 5: Fireball details

Field Name	Type	Notes
x	Integer	X-axis position
y	Integer	Y-axis position
direction	Integer	Whether fireball is traveling left or right
images	String	Array of images for animation
current_image	String	Image from images currently being displayed
x_vel	Integer	Speed fireball travels in x direction
y_vel	Integer	Speed fireball travels in y direction
angle	Integer	Angle fireball image is rotated so that it faces the direction it is traveling

Table 6: Explosion details

Field Name	Type	Notes
x	Integer	X-axis position
y	Integer	Y-axis position
images	String	Array of images for animation
finished	Boolean	Stage explosion is in

Table 7: Coin details

Field Name	Type	Notes
x	Integer	X-axis position
y	Integer	Y-axis position
images	String	Array of images for spinning animation
sound	String	Sound effect when collected

Table 8: Mushroom details

Field Name	Type	Notes
x	Integer	X-axis position
y	Integer	Y-axis position
type	Integer	Corresponds to mushroom colour image, sound effect and effect on player speed
effects	Integer	Array of factors that player speed is altered by for a period of time after mushroom is collected
images	String	Array of images for types
sounds	String	Array of sound effects for when mushrooms of different types are collected

Enumerations

Table 9: ZOrder details

Value	Notes
BACKGROUND, ENEMY, MIDDLE, PLAYER, UI = *0..4	

Table 10: Sprite details

Value	Notes
Standing, Walk1, Walk2, Walk3, Jump = *0..4	Indexes for images in player sprite sheet

Table 11: Tiles details

Value	Notes
Platform, Ground = *0..1	Indexes for terrain types

Table 12: Mushrooms details

Value	Notes
Red, Blue = *0..1	Indexes for mushroom types

Overview of Program Structure
Methods

DragonRaider	
initialize	Initialises the start menu
initialize_game	Initialises up the game the first time gameplay begins
initialize_level	Takes level_index and initialises new level
update	Calls update_win_status once game has begun, as well as calling update_game while gameplay is active
update_win_status	Pause game and display appropriate message if player has completed a level
update_game	Updates gameplay (player, coins collected, mushrooms collected, enemies, fireballs, explosions and scrolling)
change_firing	Takes enemy, updates its count and determines when it will fire
draw	Calls draw_intro or draw_game depending on whether or not gameplay has begun
draw_intro	Draws start menu
draw_game	Draws gameplay
draw_coin_score	Displays coin icon and the number of coins collected out of the total number of coins in the stage
draw_mushroom_effect	Display symbol for the effect of collected mushroom and display countdown to effect ending
draw_lives	Draw full or empty life symbol to indicate number of lives left
draw_hp	Displays HP and HP bar with appropriate colour and flashing for amount of HP

draw_level_navigation	Draw Locked or Unlocked symbol to represent status of each level, highlight current level and unlocked level if hovered on
draw_pause_play_button	Draws Pause button if game is playing and Play button if game is paused
draw_mute_button	Draws Mute button if audio is on and Audio On button if audio is muted
draw_restart_icon	Draws restart icon in bottom right corner of screen
draw_info_icon	Draws info icon in bottom right corner of screen and pauses gameplay and displays information box when hovered over
draw_game_messages	Display messages for changing of gameplay status and displays restart button is game over or game complete
draw_message	Takes message and displays it in a large font in the middle of the screen
draw_restart_button	Displays restart button and highlights when hovered over
remove_enemies	Remove enemies when they move off the stage
remove_fireballs	Removes fireballs when they collide with a player of move off the stage
remove_explosions	Removes explosions when animation is finished
pause_game	Switches game status from playing to paused and vice versa depending on current paused status
mute_game	Changes game volume form full to muted and vice versa depending on current volume
button_down	Calls button_down_intro or button_down_game depending on whether or not gameplay has begun
button_down_intro	Starts gameplay when start button or enter is press, also exits game if esc is pressed
button_down_game	Check if any of the buttons on the gameplay screen have been pressed, calls initiate_jump when spacebar is pressed, and exits game when esc is pressed
needs_cursor?	Displays cursor so that the player is able to click on the buttons on the gameplay and menu screens

Level	
initialize	Sets up max_level_index and generates an array for each attribute that have the level data which can be accessed by the level index

Stage	
initialize	Generates coins and mushrooms at positions given by terrain file, and creates tiles array containing non-nil entries at array indexes corresponding to the tile positions in the terrain file
draw	Draws information given in terrain file
draw_coins	Takes location then draws coin at specified location
draw_mushrooms	Takes mushroom type and location then draws appropriate mushroom image at given location

Player	
initialize	Generates player at given position, with specified lives, hp and score, or re-sets values if not specified
update	Updates player's y_vel and timer for mushroom effects
move	Directional walking, horizontal movement
initiate_jump	Allow player to start jumping if standing of ground, or start double jump if at top of jump arc
would_fit	Check to see if collision with stage will occur
solid?	Takes position and stage and returns true if there is a platform of ground in that position
collect_coins	Removes coin if player collides with it and plays sound effect at given volume
collect_mushrooms	Removes mushroom if player collides with it and plays sound effect for specified mushroom type at given volume, and updates player effect and timer
draw	Draws player's current image at player position and in player direction

Enemy	
initialize	Generates enemy at a random position just outside the stage with a random direction and speed
update	Updates x position and image to next image to the appropriate sprite sheet for whether the dragon is firing or not
draw	Draws enemy at appropriate position and facing the correct direction

Fireball	
initialize	Generates a fireball at the enemy location with enemy direction, random x and y velocities, and plays firing sound at given volume
update	Updates the position and image of the fireball
draw	Draws current fireball image at the appropriate angle for the direction it's travelling in

Explosion	
initialize	Generates an explosion at the location the fireball collided with the player and plays the explosion sound at given volume
draw	Draws the next image in the explosion sprite sheet and determines when explosion animation is finished

Coin	
initialize	Generates coin at a given location

Mushroom	
initialize	Generates a mushroom of a specified types at a specified location

Structure Diagram