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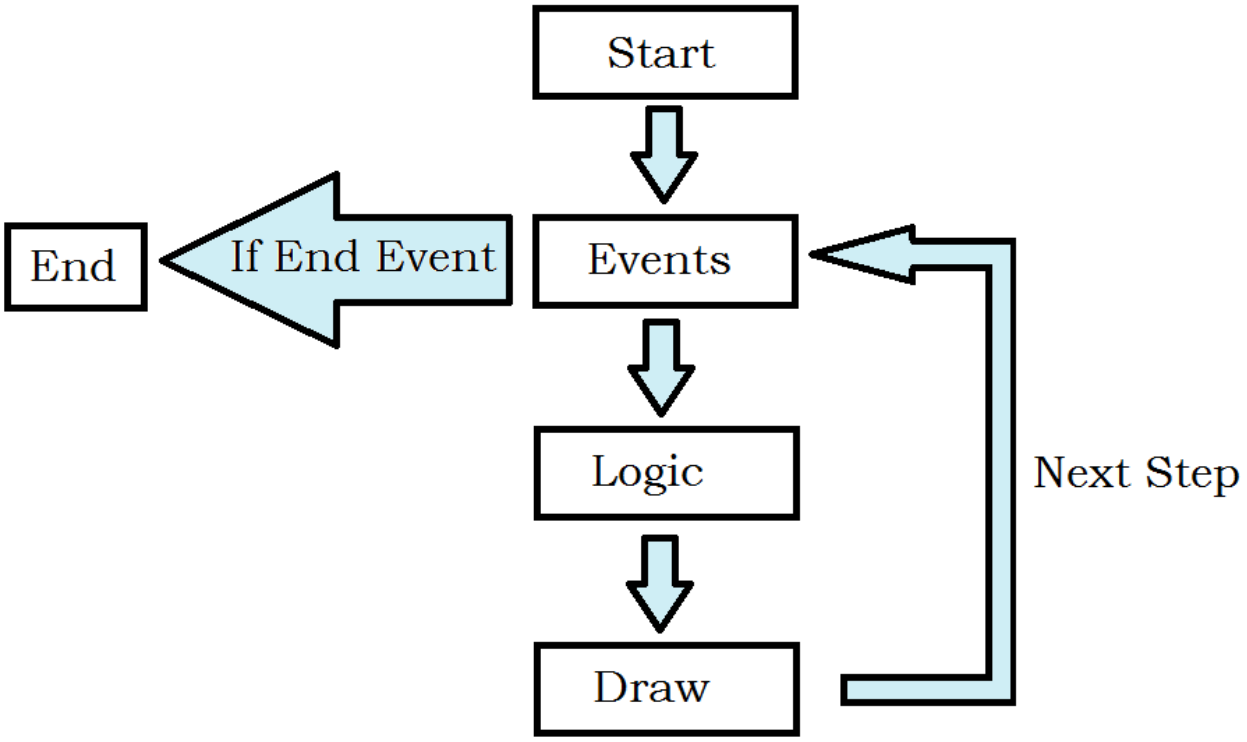
Final Project Report

Introduction

The project goal was to use an external code library for python to create a presentable project. The Library we chose to use was Pygame. Pygame is a library with classes that are meant to be used to code computer games. The goal we set for ourselves was to use Pygame to create a simple game that is playable. We chose that instead of writing code that meets its specific purpose, we chose to write code that could easily be rewritten for future works, or at least easy to change later.

When choosing the structure of our game we considered what Pygame can do, in addition to what would be easy to model beforehand. We chose to make a 2D platformer. We considered doing a top down platformer, but doing so would require more moving parts for the same complexity of game. We did not want to get bogged down by a lot of objects interacting, so we went with the 2D platformer option.

The game runs off three types of files: the main file(ensgame.py), the game file(game.py), and the sprite files. The main file creates and starts an instance of Pygame while declaring the clock and screen objects. Then the main creates an instance of the game and steps through the three logic steps at 60 ticks per second. The three logic steps that get run from the main are the handle_events, logic, and draw_frame.



Game Flow Diagram

The steps exist in the game file as functions. The handle_events gets user input and makes decisions based on what buttons are pressed. The logic step allows for decisions to be made based on the current game state. Lastly, the draw_frame step allows for all the current objects stored in the game to be drawn to the screen that the user sees.

The final part of the project is the sprite files. The sprite files include objects such as blocks and the player. The sprite files are children of the Sprite class that is a part of Pygame's library. They contain data such as their position and image. The sprite children also have added information based on what actions they need to do and logic that is needed to be performed. These files and objects together form the game we set out to make.

Project Results

The original goal was to make a 2D platformer that played as a Metroidvania. A Metroidvania is a game style that typically involves progressing through a system of room and having to backtrack as new powers or abilities are obtained. The main issue with trying this would not come from level design, but the fact that a Metroidvania would need to incorporate a lot of new mechanics and abilities. Due to the long time it took to make a workable environment with a controllable player, many defining aspects of Metroidvanias were not implemented into out game.

Our game still succeeded on many aspects we wanted to have. The environment consists of rooms that the player can travel between and backtrack through. With the inclusion of splitting paths, this system of rooms slightly mirrors the style we were aiming for. Another pothole in our design was the fact that neither of us were artistic. With no artistic ability between us, we were left with very dull and poorly made sprites.

Looking at the goal to “use Pygame to create a playable game”, we succeeded. The game runs from opening ensgame.py with all other files in the same directory. Python and Pygame are needed to also be installed, but this is easily done with a machine with Python3 and running ‘pip install Pygame’. A python program exporter could be used to get it to run without such, but was not needed.

Since there were many resources online to learn the Pygame library and common practices, the hardest issue was the time constraint. The time given to finish the game was plenty, but not enough to create a full game with many features. The default viewing windows resolution and windowned state was a decision made to focus time on designing the game.

Division of Group Work

There were only two members, Evan and Seth, working on this project; because of this, work mitigation and sharing of responsibilities was easy. Evan started by researching Pygame and finding useful resources to self-teach ourselves Pygame. We collaborated, discussing game design and possibilities for the game's type. Seth, in the end, decided that a 2D Metroidvania-esc game would be better in terms of quality than if we produce a top-down game.

Evan started the code by making the ensgame.py file and creating the game.py file. We both worked together to sort out the sprite's children classes and determined how the player exists and interacts with other objects. Evan wrote most the code for the block and player classes while Seth wrote all the room classes, including their parent class. In the end, all the code was finished up by them both. The sprites and backgrounds were made by Evan, while Seth did some touch-up details.

Self-Assessment Paragraphs:

By Evan:

The project was a very fun thing to work on. My contributions were many but could not have made it all without Seth. I ended up making the platform for the game to run on (ensgame.py and game.py) as well as most of the sprites and backgrounds used. I made the simple item class that was a child of Sprites so that the player and block classes could be used consistently. I also made the player class and the block classes for the most part. I had also made color.py which was meant for easy RGB color usage, but was almost never used.

By Seth:

This was enjoyable and frustrating at the same time. Until Evan finished the platform, I mostly contributed by helping him make design decisions, such as jump heights and decay factors. After the platform was finished, I helmed the level designs and implemented the layout. I drew a grid on a piece of paper, designed the room, wrote pseudo-code for how to implement it in room.py, then hard-coded it, and tested the room. I would then evaluate the difficulty of the room, take note of bugs, and if the room was unique and enjoyable.

Bibliography

Craven, Paul Vincent. "Program Arcade Games With Python And Pygame." *Program Arcade Games With Python And Pygame*. N.p., 2015. Web. 26 Apr. 2017.

Code Appendix

```
#ensgame.py
#Contains the main and initializes both the Game and Pygame
#ensgame stands for Evan and Seth's game

import pygame as p
from game import Game
import constants

def main():
  #Initializes pygame
  p.init()

  #Creates a display that the game prints objects to
  size = [constants.SCREEN_WIDTH, constants.SCREEN_HEIGHT]
  display = p.display.set_mode(size)

  #Sets window's name and icon
  p.display.set_caption('Evan and Seth\'s Game!')
  p.display.set_icon(p.image.load('Images\\icon.png'))

  #If True, the game closes and ends
  done = False

  #Clock lets the game pause for a tiny bit so that the target framerate is not
exceeded
  clock = p.time.Clock()
```

```
  #initializes Game from game.py
  game = Game()

  while not done:
    done = game.handle_events()
    game.logic()
    game.draw_frame(display)

    clock.tick(60)#Target framerate is 60 frames per second

  p.quit()

if __name__ == '__main__':
  main()

#game.py
#Contains all the information needed to run the game

import pygame as p
from item import Item
from block import Block
from player import Player
from room import *
import color

class Game():

  def __init__(self):
```

```
#Flag for if player finds secret room
self.flag = 0

#Initialize list of rooms
self.rooms = []
room = Room0()
self.rooms.append(room)
room = Room1()
self.rooms.append(room)
room = Room2()
self.rooms.append(room)
room = Room3()
self.rooms.append(room)
room = Room4()
self.rooms.append(room)
room = Room5()
self.rooms.append(room)
room = Room6()
self.rooms.append(room)
room = Room7()
self.rooms.append(room)
room = Room8()
self.rooms.append(room)
room = Room9()
self.rooms.append(room)
room = Room10()
self.rooms.append(room)
room = Room11()
self.rooms.append(room)
```

```
    room = Room12()
    self.rooms.append(room)
    room = Room13()
    self.rooms.append(room)
    #Initialize starting room
    self.current_room = self.rooms[0]
    #Initialize all the blocks and sprites
    self.blocks = p.sprite.Group()
    self.blocks = p.sprite.Group()
    self.sprites = p.sprite.Group()
    #Starting position for player
    self.player = Player(pos = (200,200))
    self.sprites.add(self.player)
    self.blocks = self.current_room.block_list
    self.paused = False
    for block in self.blocks:
      block.followers = self.sprites

def handle_events(self):
  #Event handling here
  for event in p.event.get():
    #If statement to end game
    if event.type == p.QUIT:
      return True
    #Key press events
    elif event.type == p.KEYDOWN:
      if event.key == p.K_SPACE:
        self.player.jump_start()
      elif event.key == p.K_a or event.key == p.K_LEFT:
```

```
            self.player.left = True
        elif event.key == p.K_d or event.key == p.K_RIGHT:
            self.player.right = True
        elif event.key == p.K_ESCAPE:
            self.paused = not self.paused
    elif event.type == p.KEYUP:
        if event.key == p.K_SPACE:
            self.player.jump_stop()
        elif event.key == p.K_a or event.key == p.K_LEFT:
            self.player.left = False
        elif event.key == p.K_d or event.key == p.K_RIGHT:
            self.player.right = False

  return False

def logic(self):
  #Logic goes here

  #Player goes too far right
  if self.player.rect.x > constants.SCREEN_WIDTH - 16:
      if self.current_room.right != None:
          self.current_room = self.rooms[self.current_room.right]
          self.current_room.__init__()
      self.player.rect.x = -16
  #Player goes too far left
  if self.player.rect.x < -16:
      if self.current_room.left != None:
          self.current_room = self.rooms[self.current_room.left]
          self.current_room.__init__()
```

```
    self.player.rect.x = constants.SCREEN_WIDTH - 16
#Player goes too far down
if self.player.rect.y > constants.SCREEN_HEIGHT:
    if self.current_room.down != None:
        self.current_room = self.rooms[self.current_room.down]
        self.current_room.__init__()
    self.player.rect.y = 0
#Player goes too far up
if self.player.rect.y < 0:
    if self.current_room.up != None:
        self.current_room = self.rooms[self.current_room.up]
        self.current_room.__init__()
    self.player.rect.y = constants.SCREEN_HEIGHT

#Player found secret room
if self.current_room.id == 6:
    self.flag = 1
elif self.current_room.id == 13:
    if self.flag == 1:
        self.current_room.update()
#Update blocks if room changed
self.blocks = self.current_room.block_list
for block in self.blocks:
  block.followers = self.sprites
if self.paused == False:
  self.player.blocks = self.blocks # Get player from list first
  self.sprites.update()
  self.blocks.update()
```

```
  def draw_frame(self, screen):
    #Drawing goes here
    if self.paused == False:
      screen.blit(self.current_room.background, dest = (0,0))

      self.sprites.draw(screen)
      self.blocks.draw(screen)

      p.display.flip()

#room.py
#Contains classes of every room in the room, as well as the parent class

import pygame as p
import constants
from block import Block

#Parent room class with basic data
class Room():
    def __init__(self):
        #Integer value of room
        self.id = None
        #References to adjacent rooms
        self.left = None
        self.right = None
        self.up = None
        self.down = None
        #Initialize group of blocks
        self.block_list = p.sprite.Group()
        #Initialize default background
```

```
        self.background = p.image.load("Images\\default_background.png")

class Room0(Room):
    def __init__(self):
        super().__init__()
        self.id = 0
        self.left = None
        self.right = 1
        self.up = None
        self.down = None

        i = 0
        while i <= constants.SCREEN_WIDTH:
            self.block_list.add(Block(pos = (i,0)))
            self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
            self.block_list.add(Block(pos = (0, i+64)))
            i += 64

class Room1(Room):
    def __init__(self):
        super().__init__()
        self.id = 1
        self.left = 0
        self.right = 2
        self.up = None
        self.down = None

        i = 0
        while i <= constants.SCREEN_WIDTH:
            self.block_list.add(Block(pos = (i,0)))
            self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
```

```
            if i >= 320 and i <= 448:
                self.block_list.add(Block(pos = (704, i)))
            i += 64
        self.block_list.add(Block(pos = (320, 384)))
        self.block_list.add(Block(pos = (512, 256)))

class Room2(Room):
    def __init__(self):
        super().__init__()
        self.id = 2
        self.left = 1
        self.right = 3
        self.up = 6
        self.down = None

        i = 0
        while i < constants.SCREEN_WIDTH:
            if i <= 192 or i >= 512:
                self.block_list.add(Block(pos = (i,0)))
            if i >= 320 and i <= 448:
                self.block_list.add(Block(pos = (0, i)))
                self.block_list.add(Block(pos = (constants.SCREEN_WIDTH-64, i)))
            if i <= 256 or i >= 448:
                self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
            i += 64
        self.block_list.add(Block(pos = (640,128), moving = (2,640,256,0,0,0)))
        self.block_list.add(Block(pos = (64,384)))
        self.block_list.add(Block(pos = (64, 448)))

class Room3(Room):
    def __init__(self):
```

```
        super().__init__()
        self.id = 3
        self.left = 2
        self.right = None
        self.up = None
        self.down = 4

        i = 0
        while i < constants.SCREEN_WIDTH:
            self.block_list.add(Block(pos = (i,0)))
            self.block_list.add(Block(pos = (constants.SCREEN_WIDTH-64, i+64)))
            if i <= 448:
                self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
            if i >= 320:
                self.block_list.add(Block(pos = (0,i)))
            i += 64
        self.block_list.add(Block(pos = (64,384)))
        self.block_list.add(Block(pos = (64, 448)))

class Room4(Room):
    def __init__(self):
        super().__init__()
        self.id = 4
        self.left = None
        self.right = None
        self.up = 3
        self.down = 5

        i = 0
        while i < constants.SCREEN_WIDTH:
            if i <= 384:
```

```
            self.block_list.add(Block(pos = (i,0)))
        self.block_list.add(Block(pos = (448, i)))
        if i > 128:
            self.block_list.add(Block(pos = (320,i)))
        if i != 384:
            self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
        i += 64
    self.block_list.add(Block(pos = (512,384), moving = (2,704,512,0,0,0)))
    self.block_list.add(Block(pos = (0,256), moving = (4,192,0,0,0,0)))

class Room5(Room):
    def __init__(self):
        super().__init__()
        self.id = 5
        self.left = 10
        self.right = 7
        self.up = 4
        self.down = None

        self.background = p.image.load("Images\\fork.png")

        i = 0
        while i < constants.SCREEN_WIDTH:
            if i != 384:
                self.block_list.add(Block(pos = (i, 0)))

            if i != 384 and i != 448:
                self.block_list.add(Block(pos = (0, i)))
            self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
            if i >= 64 and i <= 640:
                self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-128)))
```

```
            if i >= 128 and i <= 576:
                self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-192)))
            i += 64


class Room6(Room):
    def __init__(self):
        super().__init__()
        self.id = 6
        self.left = None
        self.right = None
        self.up = None
        self.down = 2


        self.background = p.image.load("Images\\secret_background.png")
        i = 0
        while i < constants.SCREEN_WIDTH:
            if i != 320 and i != 384:
                self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
            i += 64
        self.block_list.add(Block(pos = (320,constants.SCREEN_HEIGHT+64), moving =
(0,0,0,2,576,320)))
        self.block_list.add(Block(pos = (384,constants.SCREEN_HEIGHT+64), moving =
(0,0,0,2,576,320)))


class Room7(Room):
    def __init__(self):
        super().__init__()
        self.id = 7
        self.left = 5
        self.right = None
        self.up = 8
        self.down = None
```

```
        i = 0
        while i <= constants.SCREEN_WIDTH:
            self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
            if i != 64:
                self.block_list.add(Block(pos = (i, 0)))
            i += 64
        self.block_list.add(Block(pos = (384,448), moving = (0,0,0,1,448,256)))
        self.block_list.add(Block(pos = (256,192), moving = (2,320,128,0,0,0)))
        self.block_list.add(Block(pos = (64,256), moving = (0,0,0,2,256,0)))

class Room8(Room):
    def __init__(self):
        super().__init__()
        self.id = 8
        self.left = None
        self.right = None
        self.up = 9
        self.down = 7

        i = 0
        while i <= constants.SCREEN_WIDTH:
            self.block_list.add(Block(pos = (0, i)))
            if i != 64:
                self.block_list.add(Block(pos = (i, constants.SCREEN_HEIGHT-64)))
            if i >= 192:
                self.block_list.add(Block(pos = (i, 448)))
            if i >= 256:
                self.block_list.add(Block(pos = (i, 384)))
            if i >= 320:
                self.block_list.add(Block(pos = (i, 320)))
```

```
            if i >= 384:
                self.block_list.add(Block(pos = (i, 256)))
            if i >= 448:
                self.block_list.add(Block(pos = (i, 192)))
            if i >= 512:
                self.block_list.add(Block(pos = (i, 128)))
            if i >= 576:
                self.block_list.add(Block(pos = (i, 64)))
            i += 64
            self.block_list.add(Block(pos = (640, 0)))
            self.block_list.add(Block(pos = (704, 0)))

#Complete
class Room9(Room):
    def __init__(self):
        super().__init__()
        self.id = 9
        self.left = 13
        self.right = None
        self.up = None
        self.down = 8

        i = 0
        while i < 768:
            self.block_list.add(Block(pos = (i, 0)))
            self.block_list.add(Block(pos = (704, i)))
            if i != 512 and i != 576:
                self.block_list.add(Block(pos = (i, 512)))
            i += 64

class Room10(Room):
```

```
    def __init__(self):
        super().__init__()
        self.id = 10
        self.left = None
        self.right = 5
        self.up = 11
        self.down = None

        i = 0
        while i < 768:
            self.block_list.add(Block(pos = (0,i)))
            if i != 384 and i != 448:
                self.block_list.add(Block(pos = (704,i)))
            if i >= 64 and i <= 512:
                self.block_list.add(Block(pos = (320,i)))
            i += 64
        self.block_list.add(Block(pos = (256, 512), moving = (2,256,64,0,0,0)))
        self.block_list.add(Block(pos = (64,0), moving = (0,0,0,2,448,0)))

class Room11(Room):
    def __init__(self):
        super().__init__()
        self.id = 11
        self.left = None
        self.right = None
        self.up = 12
        self.down = 10

        i = 0
        while i < 768:
            if i != 320 and i != 384:
```

```
            self.block_list.add(Block(pos = (i, 0)))
        i += 64

    self.block_list.add(Block(pos = (320, 128), moving = (0,0,0,2,192,0)))
    self.block_list.add(Block(pos = (192, 192), moving = (2,256,64,0,0,0)))
    self.block_list.add(Block(pos = (512, 256), moving = (2,640,512,0,0,0)))
    self.block_list.add(Block(pos = (0, 320), moving = (2,128,0,0,0,0)))
    self.block_list.add(Block(pos = (384, 320), moving = (2,384,256,0,0,0)))
    self.block_list.add(Block(pos = (704, 448), moving = (2,640,512,0,0,0)))

    self.block_list.add(Block(pos = (0, 512)))
    self.block_list.add(Block(pos = (704, 512)))



class Room12(Room):
    def __init__(self):
        super().__init__()
        self.id = 12
        self.left = None
        self.right = 13
        self.up = None
        self.down = 11

        i = 0
        while i < 768:
            self.block_list.add(Block(pos = (448, i)))
            if i != 320 and i != 384:
                self.block_list.add(Block(pos = (i, 512)))
            i += 64

class Room13(Room):
```

```
    def __init__(self):
        super().__init__()
        self.id = 13
        self.left = 12
        self.right = 9
        self.up = None
        self.down = None
        self.background = p.image.load("Images\\win.png")

        i = 0
        while i < 768:
            self.block_list.add(Block(pos = (i, 0)))
            self.block_list.add(Block(pos = (i, 512)))
            i += 64

    #In case player finds the secret room
    def update(self):
        self.background = p.image.load("Images\\true_win.png")
#block.py
#Contains the block class used for the walls, floorws, etc.
import pygame as p
from item import Item

class Block(Item):

  def __init__(self, pos=(0,0), moving=[0,0,0,0,0,0]):
    super().__init__(pos=pos, img = p.image.load('Images\\block.png'))
    self.moving = moving
    self.followers = None
```

```
  def update(self):
    #for moving
    moved_y = False
    if self.moving[0] > 0:
      if self.rect.x < self.moving[1]:
        if not self.followers == None:
            self.rect.x += 2
            self.rect.y -= 2
            test = p.sprite.spritecollide(self, self.followers, False) # IF COLLISION, test >
            self.rect.x -= 2
            self.rect.y += 2
            if len(test) > 0:
              for follower in test:
                follower.move_x(self.moving[0])
        self.rect.x += self.moving[0]
      else:
        self.moving = (-
self.moving[0],self.moving[1],self.moving[2],self.moving[3],self.moving[4],self.moving[5])
    elif self.moving[0] < 0:
      if self.rect.x > self.moving[2]:
        if not self.followers == None:
            self.rect.x -= 2
            self.rect.y -= 2
            test = p.sprite.spritecollide(self, self.followers, False)
            self.rect.x += 2
            self.rect.y += 2
            if len(test) > 0:
              for follower in test:
                follower.move_x(self.moving[0])
        self.rect.x += self.moving[0]
      else:
```

```
        self.moving = (-
self.moving[0],self.moving[1],self.moving[2],self.moving[3],self.moving[4],self.moving[5])


    if self.moving[3] > 0:
      if self.rect.y < self.moving[4]:
        if not self.followers == None:
          #For pull down
          self.rect.y -= 2
          test = p.sprite.spritecollide(self, self.followers, False)
          self.rect.y += 2
          if len(test) > 0:
            self.rect.y += self.moving[3]
            for follower in test:
                follower.move_y(self.moving[3])
            self.rect.y -= self.moving[3]
          #for push down
          self.rect.y += 2
          test = p.sprite.spritecollide(self, self.followers, False)
          self.rect.y -= 2
          if len(test) > 0:
            self.rect.y += self.moving[3]
            for follower in test:
                follower.move_y(self.moving[3])
            self.rect.y -= self.moving[3]
        self.rect.y += self.moving[3]
      else:
        self.moving = (self.moving[0],self.moving[1],self.moving[2],-
self.moving[3],self.moving[4],self.moving[5])
    elif self.moving[3] < 0:
      if self.rect.y > self.moving[5]:
        if not self.followers == None:
          self.rect.y -= 2
```

```
        test = p.sprite.spritecollide(self, self.followers, False)
        self.rect.y += 2
        if len(test) > 0:
          for follower in test:
              follower.move_y(self.moving[3])
      self.rect.y += self.moving[3]
    else:
      self.moving = (self.moving[0],self.moving[1],self.moving[2],-
self.moving[3],self.moving[4],self.moving[5])


#player.py
#Class for the player's character


import pygame as p
from item import Item
import constants
import color


class Player(Item):


  def __init__(self, pos=(0,0)):
    self.images =
[p.image.load("Images\\stand.png"),p.image.load("Images\\walk.png"),p.image.load("I
mages\\jump.png"),p.image.load("Images\\fall.png"),p.image.load("Images\\hurt.png"
),p.image.load("Images\\dead.png")]#Load all images here
    super().__init__(pos=pos,img=p.image.load("Images\\stand.png"))
    for im in self.images:
      im.set_colorkey(color.BLACK)
    #Jump sounds
    self.jump1 = p.mixer.Sound("Sounds\\jump.wav")
    self.jump2 = p.mixer.Sound("Sounds\\jump2.wav")
```

```
  #action decay
  self.fallen = 0
  self.jump = 0
  self.shot = 0
  self.dead = 0
  self.hurt = 0

  #for movement
  self.xvel = 0
  self.yvel = 0

  #for some sprite calculations
  self.clock = 120

  #for collision testing
  self.blocks = None

  #for walking
  self.right = False
  self.left = False

def update(self):

  #Internal Clock Tick
  self.clock -= 1
  if self.clock <= 0:
    self.clock = 120

  #Falling check
  if not self.grounded() and self.jump == 0:#IF not grounded and not mid jump
    if(self.clock % 3 == 0 or self.yvel == 0):#Calculate gravity
```

```
      self.yvel = min(constants.TERMINAL_VELOCITY, self.yvel + 1)
    else:
      self.yvel = min(0, self.yvel)#If falling, stop. Else: keep going(up)
      if self.jump > 0:
        self.yvel = -constants.JUMP_SPEED
        if self.jump == 1:
          self.yvel = - (2 * constants.JUMP_SPEED) // 3


    #Walking
    if self.left and self.right:
      self.xvel = self.xvel - self.sign(self.xvel)
    elif self.right:
      self.xvel = min(self.xvel + constants.WALK_ACCELERATION,
constants.TOP_SPEED)
    elif self.left:
      self.xvel = max(self.xvel - constants.WALK_ACCELERATION, -
constants.TOP_SPEED)
    elif self.grounded():
      self.xvel = self.xvel - self.sign(self.xvel)



    #Move and Collision
    collided_y = self.move_y(self.yvel)
    if collided_y:
      #If collided on y, either
      self.jump = 0 # if on top
      self.yvel = 0 #either collision on top or bottom


    collided_x = self.move_x(self.xvel)
    if collided_x:
      #If collided on x, either
      self.xvel = 0
```

```
    #Sprite Calculations and Decay(If multiple frames for a sprite, use % on the decay
factor or on clock)
    if self.dead > 0:
      self.image = self.images[5]
      self.dead -= 1
    elif self.yvel < 0 or self.jump > 0:
      self.image = self.images[2]
      self.jump = max(self.jump - 1, 0)
    elif self.yvel > 0:
      self.image = self.images[3]
    elif not self.xvel == 0 and self.grounded():
      self.image = self.images[1]
    else:
      self.image = self.images[0]



  def move_x(self, dist=1):
    #return True on collsion, False otherwise
    if not dist == 0:
      tick = self.sign(dist)
      for i in range(abs(dist)):
        self.rect.x += tick
        collide_blocks = p.sprite.spritecollide(self, self.blocks, False)
        if len(collide_blocks) > 0:
          self.rect.x -= tick
          return True
      return False


  def move_y(self, dist=1):
    #return True on collsion, False otherwise
```

```
  if not dist == 0:
    tick = self.sign(dist)
    for i in range(abs(dist)):
      self.rect.y += tick
      collide_blocks = p.sprite.spritecollide(self, self.blocks, False)
      if len(collide_blocks) > 0:
        self.rect.y -= tick
        return True
    return False

def jump_start(self):
  if self.grounded():
    self.jump = constants.JUMP_TIME
    if self.clock % 2 == 0:
      self.jump1.play()
    else:
      self.jump2.play()

def jump_stop(self):
  self.jump = min(self.jump, 1)

def grounded(self):
  if not self.blocks == None:
    self.rect.y += 1
    grounded_plats = p.sprite.spritecollide(self, self.blocks, False)
    self.rect.y -= 1
    if len(grounded_plats) > 0:
      return True
    else:
      return False
  else:
```

```
      return False


  def sign(self, num):# For Various math
    if num == 0 or num == None:
      return 0
    return num//abs(num)

#item.py
#Base class for player and block to inherit from p.sprite.Sprite
import pygame as p

class Item(p.sprite.Sprite):

  def __init__(self, img=p.image.load('Images\\null.png'), pos=(0,0)):
    super().__init__()
    self.image = img
    self.rect = self.image.get_rect()
    self.rect.x = pos[0]
    self.rect.y = pos[1]

#constants.py
#contains constants used for various calculations

TERMINAL_VELOCITY = 20
SCREEN_WIDTH = 768
SCREEN_HEIGHT = 576
JUMP_SPEED = 8
JUMP_TIME = 15
TOP_SPEED = 3 # for walking
WALK_ACCELERATION = 1
```

```
#color.py
#contains functions to return a color rgb tuple by name of color
def toGrayscale(color):
  avg = (color[0] + color[1] + color[2]) // 3
  return (avg, avg, avg)

RED = (255, 0, 0)

GREEN = (0, 255, 0)

BLUE = (0, 0, 255)

WHITE = (255, 255, 255)

BLACK = (0,0,0)

GREY = (128, 128, 128)

GRAY = (128, 128, 128)

CYAN = (0, 255, 255)

PURPLE = (128, 0, 128)

YELLOW = (255, 255, 0)

ORANGE = (255, 165, 0)

MAROON = (128, 0, 0)
```

DARK_RED = (139, 0, 0)

BROWN = (165, 42, 42)

SALMON = (250, 128, 114)

OLIVE = (128, 128, 0)

TURQOUISE = (64, 224, 208)

NAVY = (0, 0, 128)

INDIGO = (75, 0, 130)

PINK = (255, 192, 203)