GD50
Lecture 6: Angry Birds

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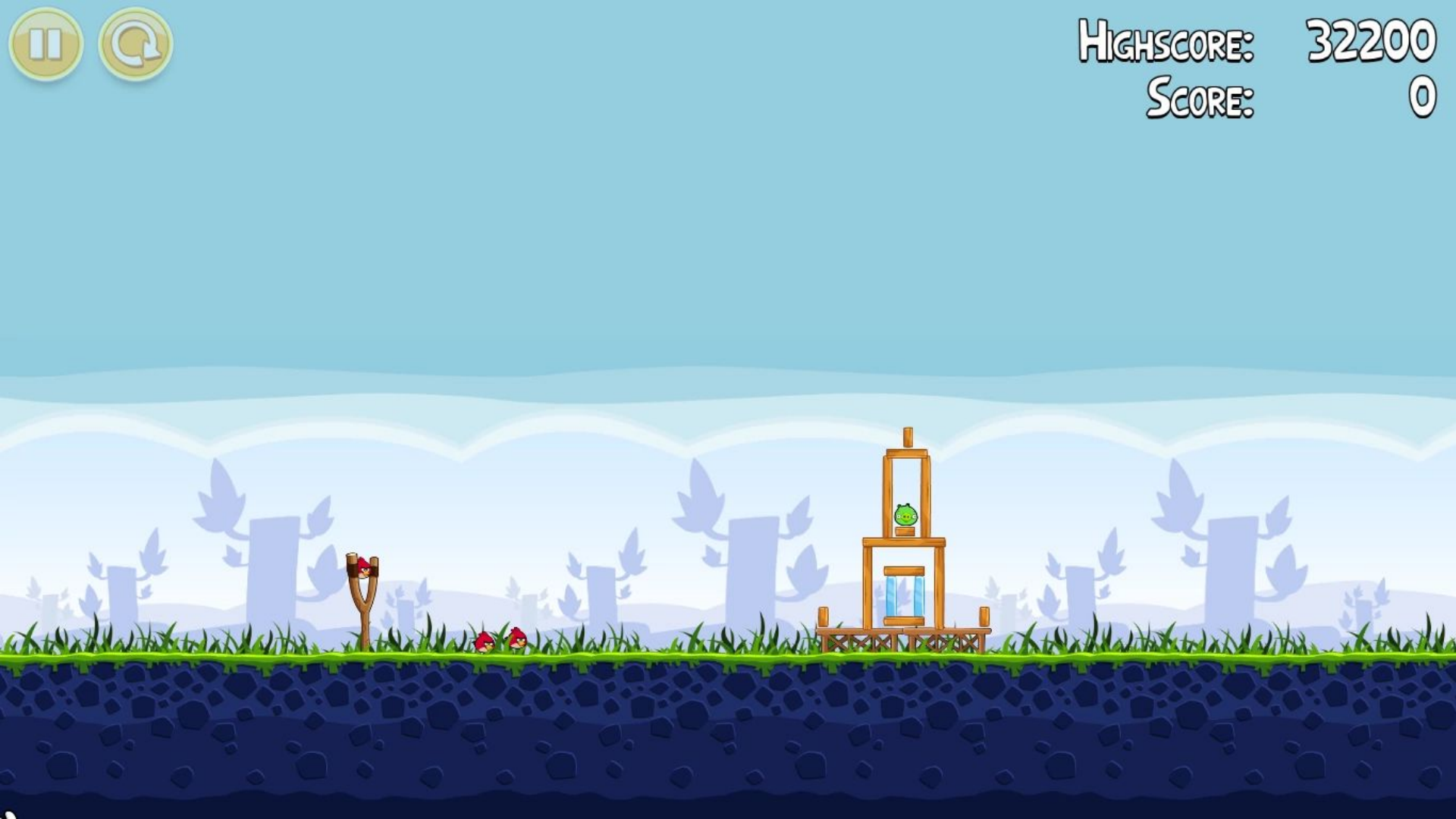
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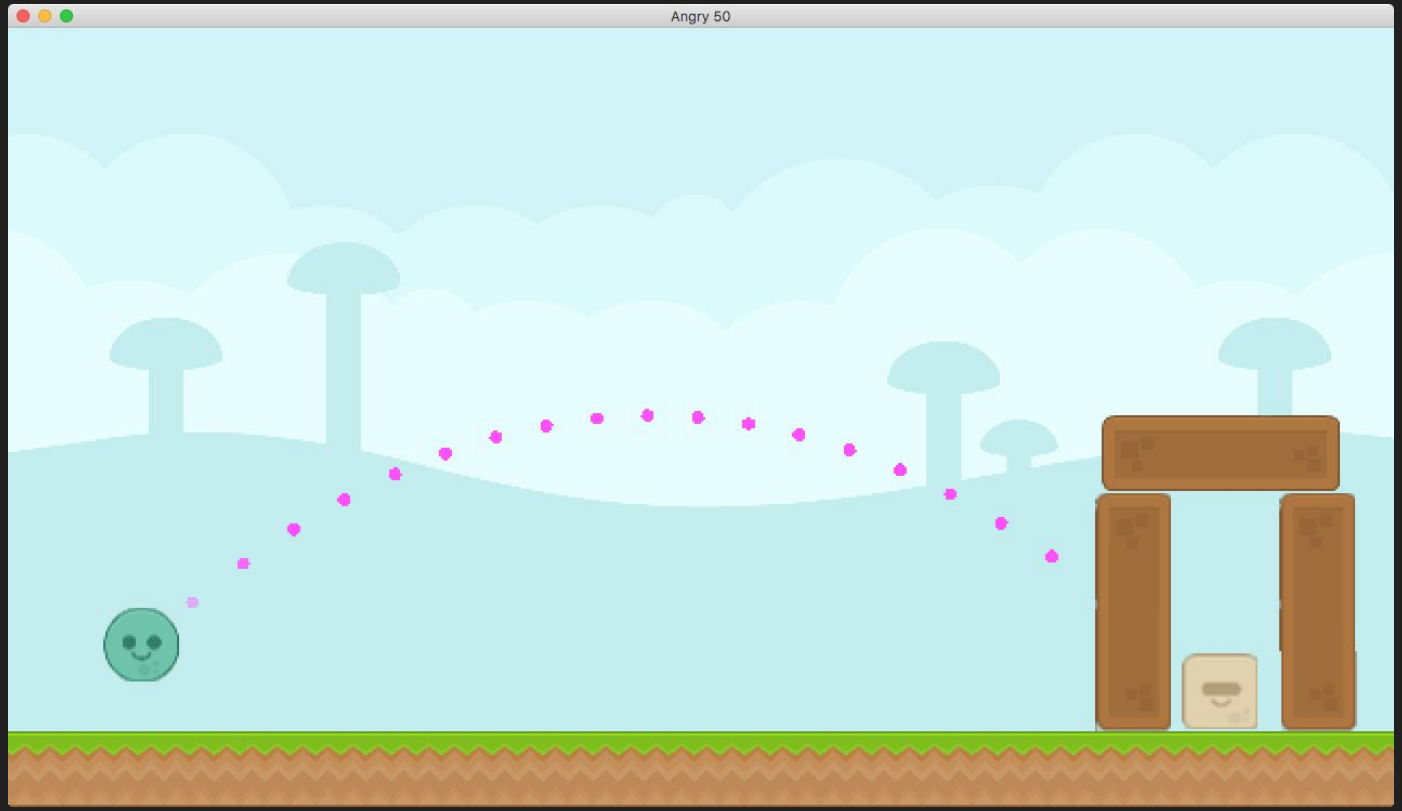
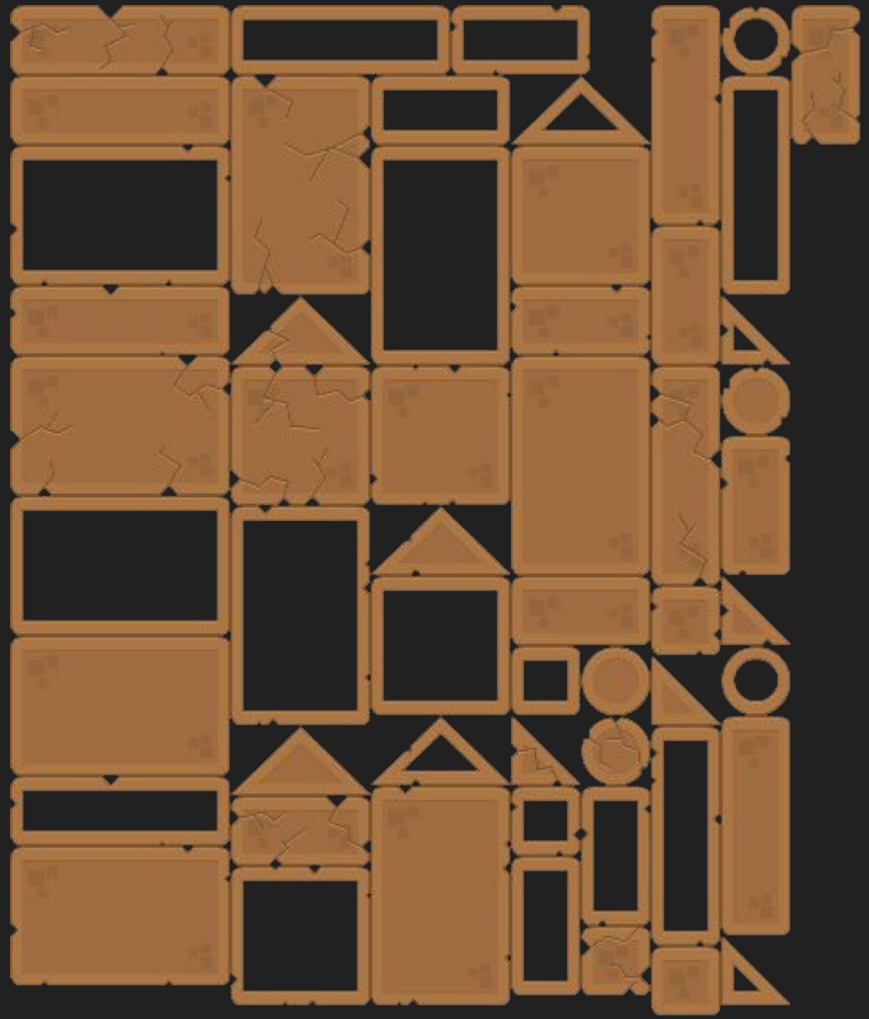
Topics

- Box2D
- Mouse Input

But first, a demo!

Our Goal





Useful Links

- https://love2d.org/wiki/love.physics
- https://love2d.org/wiki/Tutorial:Physics
- http://www.iforce2d.net/b2dtut/introduction

The World

- Performs all physics calculations on all "Bodies" it holds a reference to.
- Possesses a gravity value that affects every Body in the scene in addition to each Body's own characteristics.

world, Important Functions

- `love.physics.newWorld(gravX, gravY, [sleep])`
  - Creates a new `World` object to simulate physics, as provided by Box2D, with `gravX` and `gravY` for global gravity and an optional `sleep` parameter to allow non-moving Bodies in our world to sleep (to not have their physics calculated when they're completely still, for performance gains).

Bodies

- Abstract containers that manage position and velocity.
- Can be manipulated via forces (or just raw positional assignment) to bring about physical behavior when updated by the `World`.

body, Important Functions

- `love.physics.newBody(world, x, y, type)`
  - Creates a new Body in our `world` at `x` and `y`, with `type` being what kind of physical body it is ('static', 'dynamic', or 'kinematic', which we'll explore).

Fixtures

- The individual components of Bodies that possess physical characteristics to influence Bodies' movements.
- Attach shapes to Bodies, influencing collision.
- Have densities, frictional characteristics, restitution (bounciness), and more.

shapes, Important Functions

- love.physics.newCircleShape(radius)
- love.physics.newRectangleShape(width, height)
- love.physics.newEdgeShape(x, y, width, height)
- love.physics.newChainShape(loop, x1, y1, x2...)
- love.physics.newPolygonShape(x1, y1, x2, y2...)

fixtures, Important Functions

- `love.physics.newFixture(body, shape)`
  - Creates a new `Fixture` for a given body, attaching the shape to it relative to the center, influencing it for the `World`'s collision detection.

Body Types

- **Static:** Cannot be moved as by applying force, but can influence other dynamic bodies.
- **Dynamic:** A "normal" body that can move around and interact with other bodies, closest to real life.
- **Kinematic:** Can move but not influenced by the interaction of other bodies; an abstract type of body that's suitable for certain environmental pieces (like indefinitely rotating platforms that defy gravity).

Mouse Input, Important Functions

- `love.mousepressed(x, y, key)`
  - Callback that executes whenever the user clicks a mouse button; has access to the X and Y of the mouse press, as well as the particular "key" (or mouse button).
- `love.mousereleased(x, y, key)`
  - The opposite of `love.mousepressed`, which is fired whenever we release a mouse key in our scene; also takes in the coordinates of the release and the key that was released.

Collison Callbacks

- The World fires four different functions for each collision between any two fixtures: `beginContact`, `endContact`, `preSolve`, and `postSolve`.
- Defining these callbacks allows you to program what happens at any given stage of any collision, beyond just objects bouncing off each other.
- https://love2d.org/wiki/Tutorial:PhysicsCollisionCallbacks

collisions, Important Functions

- `World:setCallbacks(f1, f2, f3, f4)`
- `f1 (beginContact);` fired when a collision begins
- `f2 (endContact);` fired when a collision ends
- `f3 (preSolve);` fired before a collision resolves
- `f4 (postSolve);` fired after a collision resolves, with resolve data

Potential Expanded Features

- More shapes (arbitrary thanks to polygons!)
- Compound obstacles (see pulley, motor, and weld joints, plus more)
- Levels defined as tables
- Birds (aliens) with different shooting mechanics, like explosions
- Different obstacle materials with varying densities

Assignment 5

- When the player hits the space bar after launching the bird, split the bird into three birds (like the blue bird from Angry Birds), the top being angled lower than the middle, the middle being the exact angle as the original, and the lower being of a lower angle than the middle.

Next Time...

https://opengameart.org/content/roguelikerpg-pack-1700-tiles

See you next time!