Phaser, Part II

Understanding more about Phaser

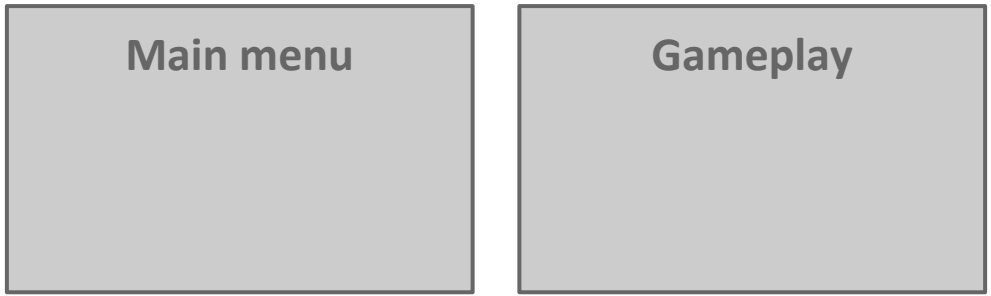
Today we'll learn about:

- How to use game states
- Animating objects
- Adding interactivity to your game
- Using variables to store important information

Game States

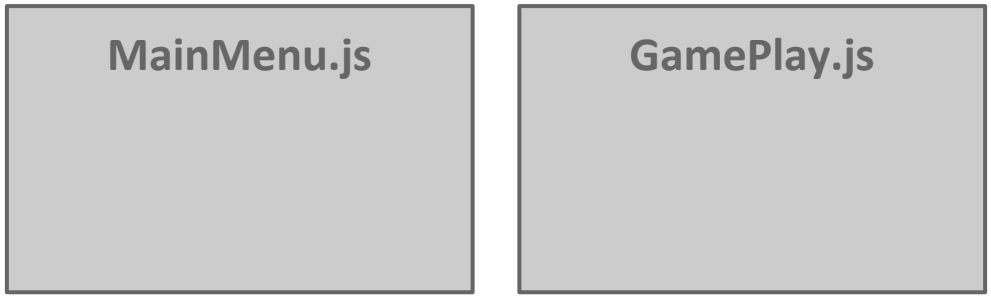
Game States

Most games have at least 2 states.



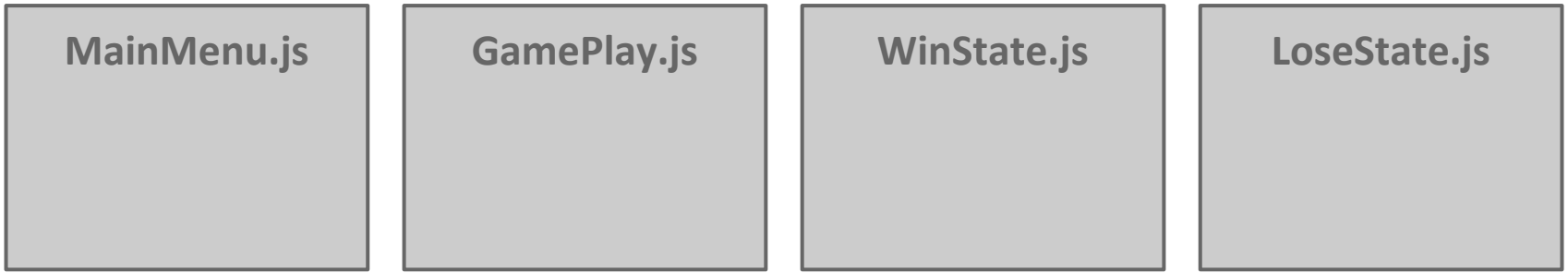
Game States

In JavaScript, we can separate each game state into its own file. This makes our code easier to manage.



Game States

In some games, you might want to separate the win and lose states from gameplay.



Creating a Game State

To create a main menu state, **add** it to the **state** list. This should be done near your game instance code so it applies globally.

```
var game = new Phaser.Game(GAME_WIDTH, GAME_HEIGHT, Phaser.AUTO);

//state is added below the game instantiation
game.state.add('MainMenu', myGame.MainMenu);
```

State name

JavaScript object to reference

Starting your game with a state

Command your game to begin with a certain state using the **state.start()** function.

```
game.state.start('MainMenu');
```

State name

Switching game states

You can also start another game state after the game begins.

```
myGame.mainMenu = function(game) {}

myGame.mainMenu.prototype = {
    preload: function() {
        /* stuff goes here */
    },
    create: function() {
        this.state.start('GamePlay');
    }
}
```

Loading images

The **preload()** function

Phaser needs to know what images to prepare before the game can be displayed.

in a game with states:

```
preload: function() {
    //commands go here
}
```

in a game without states:

```
function preload() {
    //commands go here
}
```

Loading Images

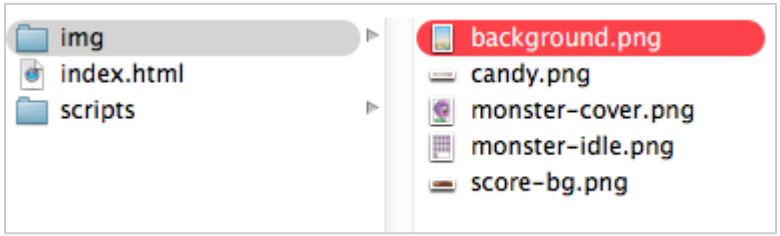
There are several types of images in Phaser:

- **image** - static, no animation
- **spritesheet** - sprite with animation
- **tilemap** - environment objects

Locating image files

All files should be referenced from the **root**, the main folder where your project is located.

```
'img/background.png'
```



Static images

To load a static image, tell your **game** object to load an **image**. Within the parentheses, name the image so it can be referenced later, then tell Phaser where to find it in your folder.

```
this.load.image('background', 'img/background.png');
```

Name of image

Location of image file

Why do we use **this** instead of **game**?

Loading and adding images should always be done in relation to the **game** object, which is referred to in myGame's **GamePlay** state function.

```
var myGame = {
  GamePlay: function(game) {}
};
```

Why do we use **this** instead of myGame?

JavaScript's **this** allows you to create, reference, and modify an object's properties within the scope of a function. In this case, that object is **game**.

```
var myGame = {
  GamePlay: function(game) {}
};
```

Why do we use **this** instead of myGame?

In games without multiple states, you can reference the **game** object directly.

```
var game = new Phaser.Game(640, 960, Phaser.AUTO,
''{
  preload: preload,
  create: create,
  update: update
});

function preload() {
  game.load.image('sky', img/background.png');
}
```

Loading sprites

Sprites require widths and heights since they might have multiple animation frames. The last two numbers are the sprite's **width** and **height**.

```
game.load.spritesheet('player', 'img/player.png', 32, 64);
```

Using images

The **create()** function

Once the preload function is complete, Phaser needs you determine how the game will start.

in a game with states:

```
create: function() {
    //commands go here
}
```

in a game without states:

```
function create() {
    //commands go here
}
```

The **create()** function

The **create()** function lets you set up variables, objects, and the look of your game.

```
function create() {
   myGame.score = 0;
}
```

Drawing objects

You can draw, or place, objects onscreen using Phaser's **add.sprite()** function.

```
game.add.sprite(0, 0, 'background');
```

X, Y

Name of image to use

Drawing objects

For important things like your player character, you can define a **global variable** that can be referenced throughout the game's functions.

```
myGame.player = game.add.sprite(30, 60, 'player');
```

Placing objects in dynamic locations

Want to reference a location that might change?
Use variables or JavaScript's **Math** functions.

Using variables:

```
GAME_WIDTH: 640;
GAME_HEIGHT: 960;
game.add.sprite(GAME_WIDTH,
GAME_HEIGHT, 'player');
```

Using Math:

```
game.add.sprite(100, Math.floor
(Math.random() * 640), 'player');
```

Referencing an object's dimensions

You can also reference the dimensions of your object when placing it in your game.

```
game.add.sprite(24, this.height - 64, 'player');
```

'this' refers to the sprite object

Animating objects

Animate an object by adding to its **animations** list.

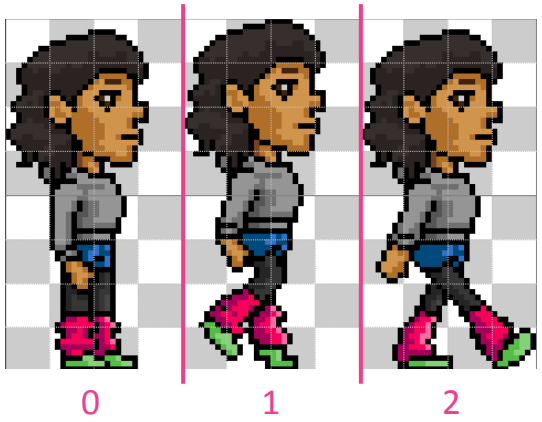
```
myGame.character.animations.add('walk');
```

Animation name

Animating objects

You can choose animation frames using brackets.

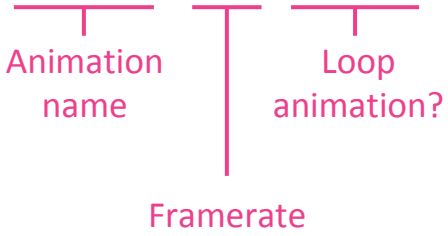
```
myGame.character.animations.add('walk', [0, 1, 2]);
```



Animating objects

To trigger an animation, use the play command.

```
myGame.character.animations.play('walk',30,false);
```



Physics and collision

Physics

Phaser has a set of systems called **Physics** that allow you to check when objects touch. You must enable physics for each object that will be checked.

```
game.physics.enable(object, Phaser.Physics.ARCADE);
```

Object name

Type of physics – must be in CAPS

Physics

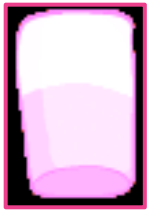
Phaser has 3 types of physics.

- **Arcade**: `Phaser.Physics.ARCADE`
- **Ninja**: `Phaser.Physics.NINJA`
- **P2**: `Phaser.Physics.P2JS`

Arcade Physics

Treats all objects as rectangles. Quickest to load because it only has one type of shape.





Ninja Physics

Allows for slopes and rotation. This means you can create curved shapes and ellipses.

P2 Physics

You can make a full-fledged physics game with polygons, angles, and swinging like Angry Birds.

Using gravity in your game

Want your game to have gravity? Enable a physics system for your entire game in the **create()** function. You can have horizontal & vertical gravity.

```
game.physics.startSystem(Phaser.Physics.ARCADE);
game.physics.arcade.gravity.y = 250;
```

Physics type
(lowercase)

Body settings

All objects with enabled physics have a **body**, which allows you to modify physics-related properties.

To add bodies to objects without physics enabled:

```
game.physics.arcade.enableBody(myGame.object);
```

Object to enable physics on

Body settings

Want to move an object? Use the **body.velocity.x** or **y** property. In Phaser, the **velocity** defines movement in **pixels per second**.

```
myGame.player.body.velocity.x = 150;
```

Body settings

Want an object to ignore being hit by another object? Use the **body.immovable** setting. This is good for things like floors, blocks, and walls.

```
myGame.player.body.immovable = true;
```

Body settings

To stop objects from moving off screen, use the **body.collideWorldBounds** setting.

```
myGame.player.body.collideWorldBounds = true;
```

Adding interactivity

Updating the Game

Unlike preload and create, which only run once each, the **update()** function runs every frame.

in a game with states:

```
update: function() {
    //commands go here
}
```

in a game without states:

```
function update() {
    //commands go here
}
```

Updating the Game

update() is where your player is told to move, the score is updated, and text changes.

```
function update() {
   myGame.score += 1;
}
```

Adding interactivity

You can add interactivity to your game using a variety of **input** types:

- Keyboard
- Mouse
- Touch
- Gamepad

Keyboard input

The **keyboard** input object allows you to create interactivity using keys. Enable the keys you want to use in the **create()** function using **addKey()**.

```
var pauseKey = game.input.keyboard.addKey(Phaser.Keyboard.P);
```

Key to add from Phaser's list of keys

Keyboard input

You can use the **onDown** event listener to trigger a function when a button is pressed.

```
pauseKey.onDown.add(pauseGame, this);
```

Function

Object to reference in function

Keyboard input

This code creates a global object that contains arrow keys:

- up
- right
- down
- left

isDown checks if a key is down and returns a boolean value.

```
var cursors;

function create() {
    cursors = game.input.keyboard.
createCursorKeys();
}

function update() {
    if (cursors.left.isDown) {
      player.body.velocity.x -= 150;
      player.animations.play('left');

    }
}
```

Mouse/touch input

Phaser checks if mouse or touch interactivity is available when **this.input** is used.

```
game.input.onDown.add(startGame, this);
```

Function

Object to reference in function (game)

Mouse/touch location

You can reference the location of the mouse or touch event using **input.x** and **input.y**.

```
myGame.player.x = game.input.x;
myGame.player.y = game.input.y;
```

Gamepad input

Browser-based gamepad input is currently in the infancy stage. At the moment, Phaser supports **Xbox 360 gamepad** input in Chrome.

Gamepad input

Phaser supports up to 4 gamepads. You can reference each using the **input.gamepad** object.

`pad1`

`pad2`

`pad3`

`pad4`

Gamepad input

This code creates the **pad1** object & checks if its **left d-pad button** on is down.

When the left button is down, **player** moves to the left.

```
var pad1;

function create() {
    pad1 = game.input.gamepad.pad1;
}

function update() {
    if(pad1.isDown(Phaser.Gamepad.
    XBOX360_DPAD_LEFT)){
        player.x--;
    }
}
```

Functions & Collision

Checking collision

Using Phaser's physics, you can trigger a function when two objects overlap:

```
game.physics.arcade.overlap(player, enemy, playerDies);
```

- `arcade` — Physics type (lowercase)
- `player` — Object 1
- `enemy` — Object 2
- `playerDies` — Function to run

Global functions

Global functions, or functions defined outside the scope of all objects & functions, can be called anywhere in your code.

When a global function is called, JavaScript jumps to the definition and runs that code.

Global functions

This global function adds 1 to the score & destroys the **meat** object when it is touched by **player**.

The objects that collide are passed through via the function parameters.

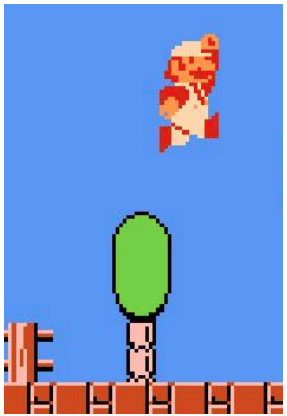
```
var eatMeat = function(player, meat) {
  // If meat is hit, remove it!
  meat.kill();

  //increase score
  myGame.score += 1;

};
```

Question

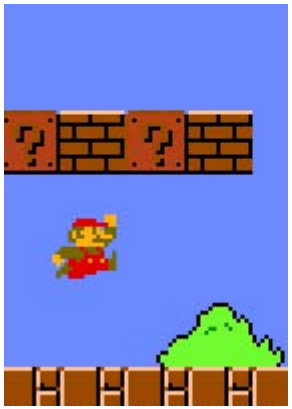
How would you make the following scenarios from Super Mario Bros with functions and physics?



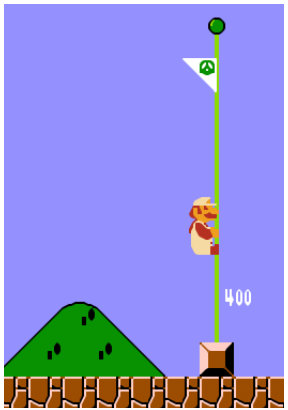
1. Jump

2. Touch enemy

3. Hit brick block



4. Hit “?” box



5. Touch flagpole

Groups

Groups

Have an object you want to repeat onscreen and give the same properties? Make a group.

```
myGame.myGroup = game.add.group();
```

Using Groups

You can instantiate objects and add them to a group in multiple ways.

Creating and adding a new object:

```
// Create an object, name it, and add to group
var item = myGame.myGroup.create(0, 0,
'item');
```

Adding an existing object:

```
// Add an existing object to
a group
myGame.myGroup.add
(groupItem);
```

Group Physics

Want to add a Physics body to all the objects in your group? Use the **enableBody** property.

```
myGame.myGroup.enableBody = true;
```

Collision with groups

You can trigger functions when an object collides with a group. The function below is triggered when **player** collides with an object in **myGroup**.

```
  game.physics.arcade.collide(player, myGroup,
hurtPlayer);
```

Group name

Question

- Why are groups useful in games?
- What kinds of purposes could you use groups for in a game?

Text

Displaying text

To draw text on the screen, **add** it to the game. The text should be instantiated in **create()**.

```
myGame.scoreText = game.add.text(90, 24, '0');
```

X, Y

Text content

Styling text

Style your text using the optional fourth parameter, the **style** object, which can have many properties.

Inline:

```
game.add.text(90, 24, '0', {
     fill: "#ccc"
});
```

With a variable:

```
var fontStyle = {fill: "#ccc"};
game.add.text(90, 24, '0', fontStyle);
```

Styling text

Types of styles you can add to your text:

- **font:** "bold 32px Arial" / "20pt Times New Roman"
- **fill:** "#000" / "#000000" / "red"
- **align:** "center" / "left" / "right"
- **stroke:** "#000" / "#000000" / "red"
- **strokeThickness:** 1
- **wordWrap:** true
- **wordWrapWidth:** 100

Using variables with text

You can use variables in text by replacing (or adding to) the third parameter.

```
myGame.scoreText = game.add.text(90, 24, myGame.score);
```

Updating text

In the **update()** function, you can change text using the **setText()** function.

With a string:

```
myGame.scoreText.setText("1");
```

With a variable:

```
myGame.scoreText.setText(myGame.score);
```

Using variables with strings

JavaScript literally lets you add variables to strings.

```
myGame.scoreText.setText("Score: " + myGame.score);
```

string

variable

To do:

Make a small interactive game in Phaser. Use the things you learned in this lesson:

- States
- Art & animation
- Inputs
- Collision
- Groups
- Text

Thanks! Questions?

@cattsmall
catt@codeliberation.org