Platformer Tutorial

In this tutorial, we will create a simple platformer. This tutorial will primarily be focused on creating the basic element of a working game using Tiled as the level editor.

Introduction

To work through this tutorial, you need the following:

- The Tiled Map Editor (http://www.mapeditor.org/), installed and running (0.9.0 or later)
- The melonJS boilerplate (https://github.com/melonjs/boilerplate/archive/master.zip), that we will use as default template project for our tutorial.
- The tutorial data files (tutorial_data.zip), to be uncompressed into the (here above) template data directory, and which contains the following :
  - a level tileset
  - two backgrounds for parallax layers
  - some basic spritesheets
  - some audio sfx and music
  - a title screen background
- The melonJS library (http://www.melonjs.org/download.html), to be copied under the /lib directory (be sure to download both the minified and plain version, as the latter might potentially be required for debugging purpose)
- The melonJS documentation (http://www.melonjs.org/docs/index.html) for more details

Testing/debugging :
If you just want to use the filesystem, the problem is you'll run into "cross-origin request" security errors. With Chrome, you need to use the "--disable-web-security" parameter or better "--allow-file-access-from-files" when launching the browser. This must be done in order to test any local content, else the browser will complain when trying to load assets through XHR. **Though this method is not recommended,** since as long as you have the option enabled, you're adding security vulnerabilities to your environmnet.

A second and easier option is to use a local web server, as for example detailed in the melonJS boilerplate (https://github.com/melonjs/boilerplate) README, by using the **grunt serve** tool, and that will allow you to test your game in your browser using the http://localhost:8000 (http://localhost:8000) url.

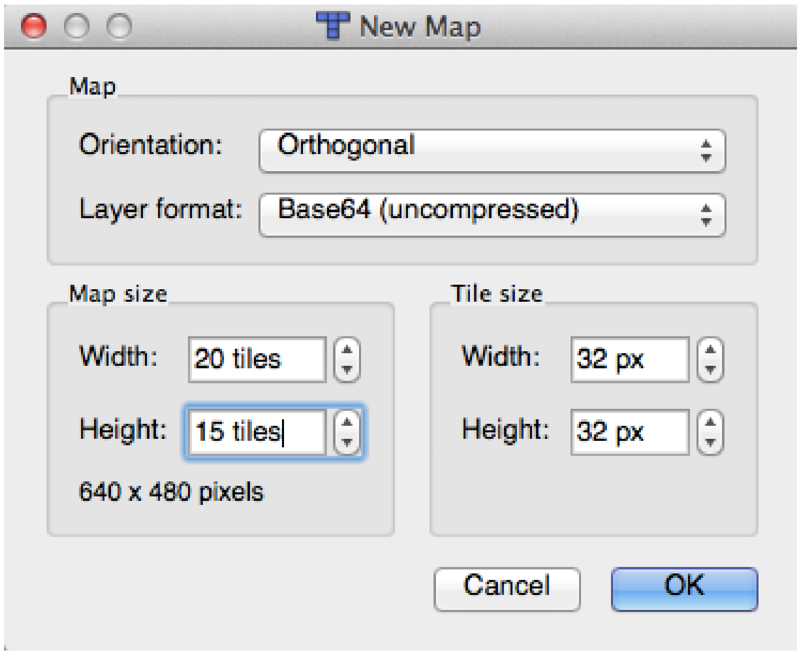
Additional Credits :

- SpicyPixel.NET (http://www.spicypixel.net/2008/01/10/gfxlib-fuzed-a-free-developer-graphic-library/) for the GfxLib-Fuzed assets
- noSoapRadio (http://www.nosoapradio.us/) for the in game music

Feel free to modify whatever you want. We also assume here, that you are already familiar with Tiled; if you need more help with the tool, you can check the Tiled homepage and wiki (https://github.com/bjorn/tiled/wiki) for further help.

Part 1: Creating a level using Tiled

First let's open Tiled and create a new map : for this tutorial we will we use a 640x480 canvas, and since we have 32x32 tiles, we must specify at least 20 and 15 for the map size. In my example I'll define a **40x15** level, so we can play with scrolling background later.


New Map

Map

Orientation: Orthogonal

Layer format: Base64 (uncompressed)

Map size

Width: 20 tiles

Height: 15 tiles

640 x 480 pixels

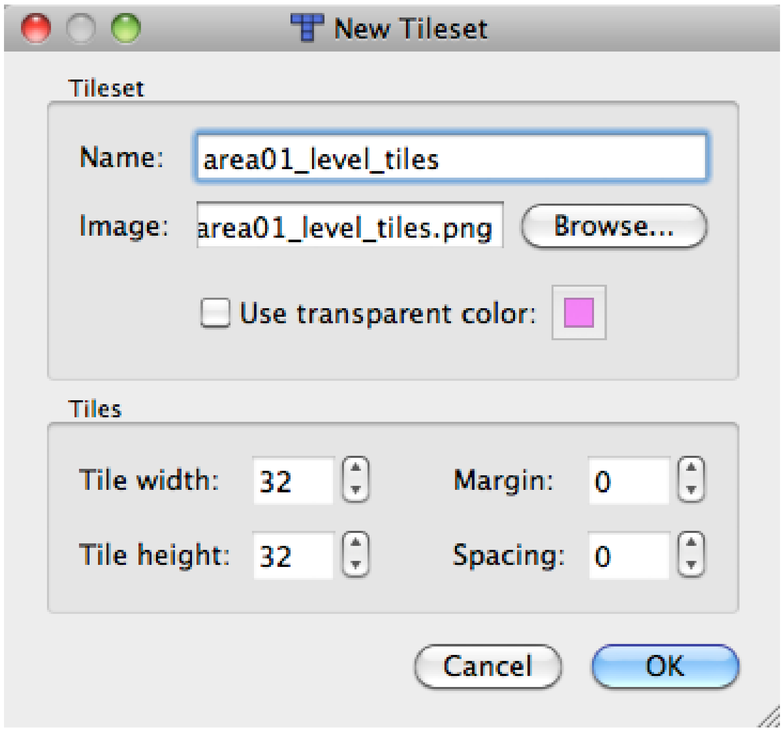
Tile size

Width: 32 px

Height: 32 px

Also, as melonJS supports only ***uncompressed*** tilemaps, please be sure that your settings are correct. We do recommend the Base64 encoding, since it produces a smaller file, but it's really up to you.

Then let's add our tileset using Map/New Tileset. Be sure to configure the tileset spacing and margin to zero in tiled.



Tileset

Name: area01_level_tiles

Image: area01_level_tiles.png

Use transparent color:

Tiles

Tile width: 32

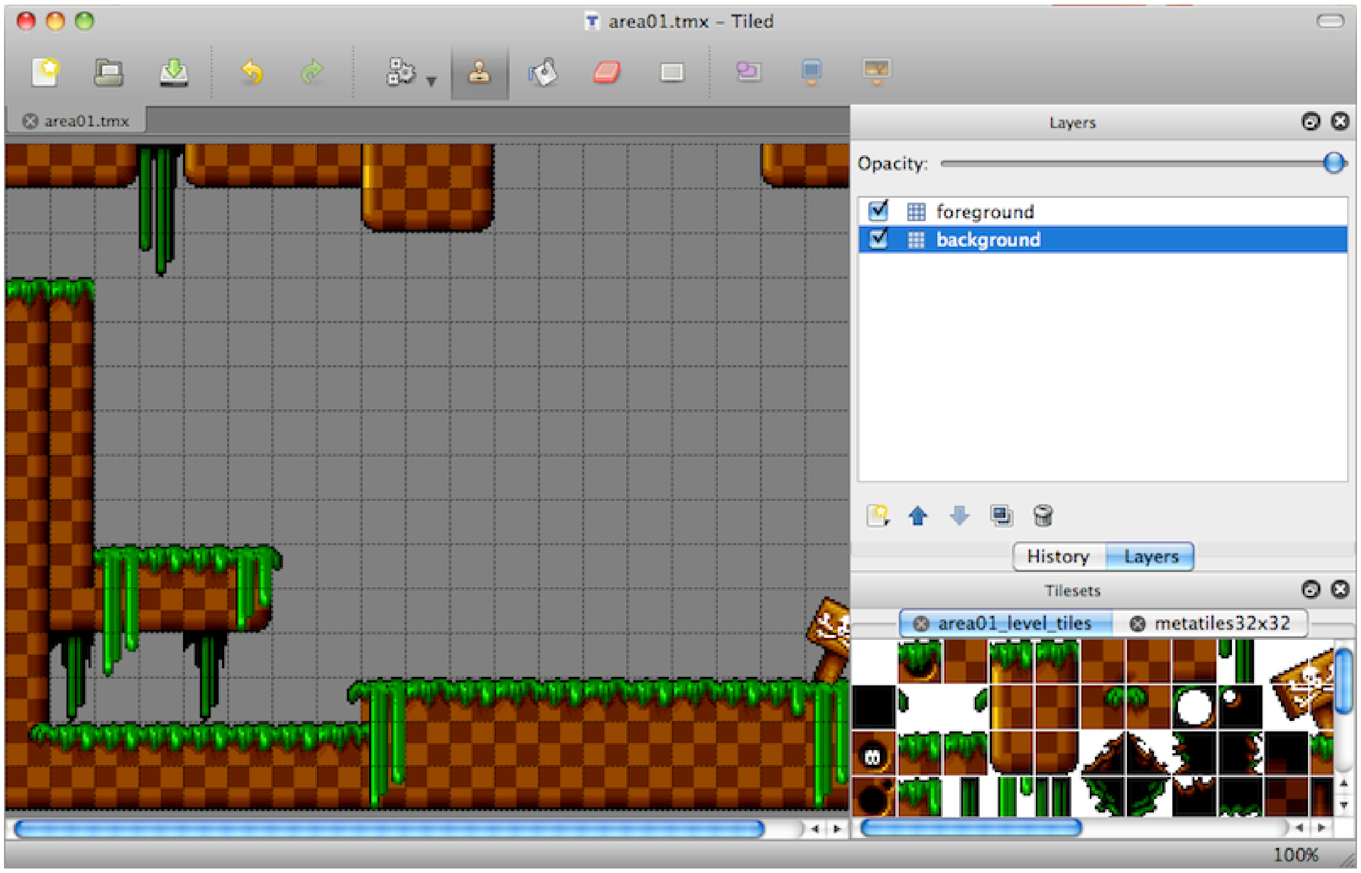
Tile height: 32

Margin: 0

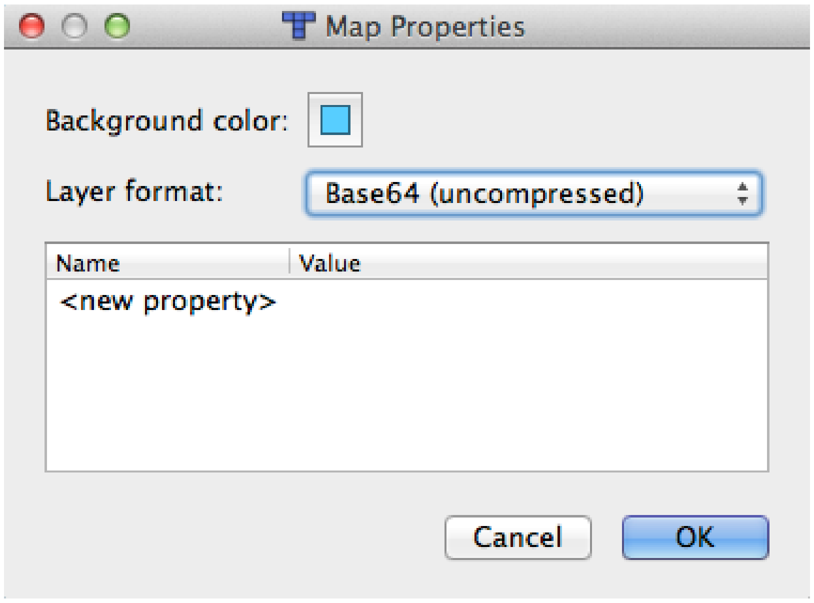
Spacing: 0

For the beauty of it, we will create two layers - one background layer, and one foreground layer. Feel free to use your imagination and do whatever you want. I named them logically "background" and "foreground", but you can put whatever you want.

Here's what my level looked like when I finished it :



Finally, let's define a background color for our level, by using the color picker tool (Map/Map Properties), and just specify any color you prefer.



Background color: 🟦

Layer format: Base64 (uncompressed)

To finish, let's save our new map as "area01" under the "data" folder. We are done with the first step!

Part 2: Loading our level

First of all, and after unzipping the tutorial assets into the boilerplate directory structure, you should have something like this:

```
data/
  bgm/
    dst-inertexponent.mp3
    dst-inertexponent.ogg
  img/
    font/
     32x32_font.png
    gui/
     title_screen.png
    map/
     area01_level_tiles.png
     license.txt
    sprite/
     gripe_run_right.png
     spinning_coin_gold.png
     wheelie_right.png
    area01_bkg0.png
    area01_bkg1.png
   map/
   sfx/
    cling.mp3
    cling.ogg
    jump.mp3
    jump.ogg
    stomp.mp3
    stomp.ogg
js/
  game.js
  resources.js
  entities/
    HUD.js
    entities.JS
  screens/
    play.js
    title.js
index.html
index.css
```

The boilerplate also provides a bunch of default code, but first let's have a look at our js/game.js skeleton::

```
/* game namespace */
var game = {

  /**
  * an object where to store game global data
  */

  data : {
    score : 0
  },

  // Run on page load.
  "onload" : function () {

    // Initialize the video.
    if (!me.video.init(640, 480, {wrapper : "screen", scale : "auto"})) {
      alert("Your browser does not support HTML5 canvas.");
      return;
    }

    // add "#debug" to the URL to enable the debug Panel
    if (me.game.HASH.debug === true) {
      window.onReady(function () {
        me.plugin.register.defer(this, me.debug.Panel, "debug", me.input.
      });
    }

    // Initialize the audio.
    me.audio.init("mp3,ogg");

    // Set a callback to run when loading is complete.
    me.loader.onload = this.loaded.bind(this);

    // Load the resources.
    me.loader.preload(game.resources);

    // Initialize melonJS and display a loading screen.
    me.state.change(me.state.LOADING);
  },

  // Run on game resources loaded.
  "loaded" : function () {
    me.state.set(me.state.MENU, new game.TitleScreen());
    me.state.set(me.state.PLAY, new game.PlayScreen());

    // add our player entity in the entity pool
    me.pool.register("mainPlayer", game.PlayerEntity);

    // Start the game.
    me.state.change(me.state.PLAY);
  }
};
```

This is very simple. Once the page is loaded, the **onload()** function is called, the display and audio is initialized, and all game resources begin loading. We also define a callback to be called when everything is ready to be used. Within the callback, we define a new state that will be used for the in game stuff, together with a **PlayScreen** object (http://melonjs.github.io/docs/me.ScreenObject.html) that we will use to manage the game event (reset, etc...).

The only change we will do in the default project template is the given video resolution for the `me.video.init()` function, as for the tutorial we will create a 640x480 canvas.

The boilerplate automatically builds the resources list and exposes it to your app as **game.resources** (build/js/resources.js) when using the **grunt serve** task.

WARNING: If you are not using the boilerplate, you will have to manage the resources.js manually (it is time-consuming, and error-prone). If managing resources.js manually, you can see an example on the git repo (https://github.com/melonjs/tutorial-platformer/blob/ghpages/tutorial_step9/js/resources.js).

Also note that although we use here directly the tmx file, for production we do recommend using the json format (that can also be exported directly from Tiled), as it gives a smaller file size, allows for much faster level loading and prevents from any server issue with the .tmx extension.

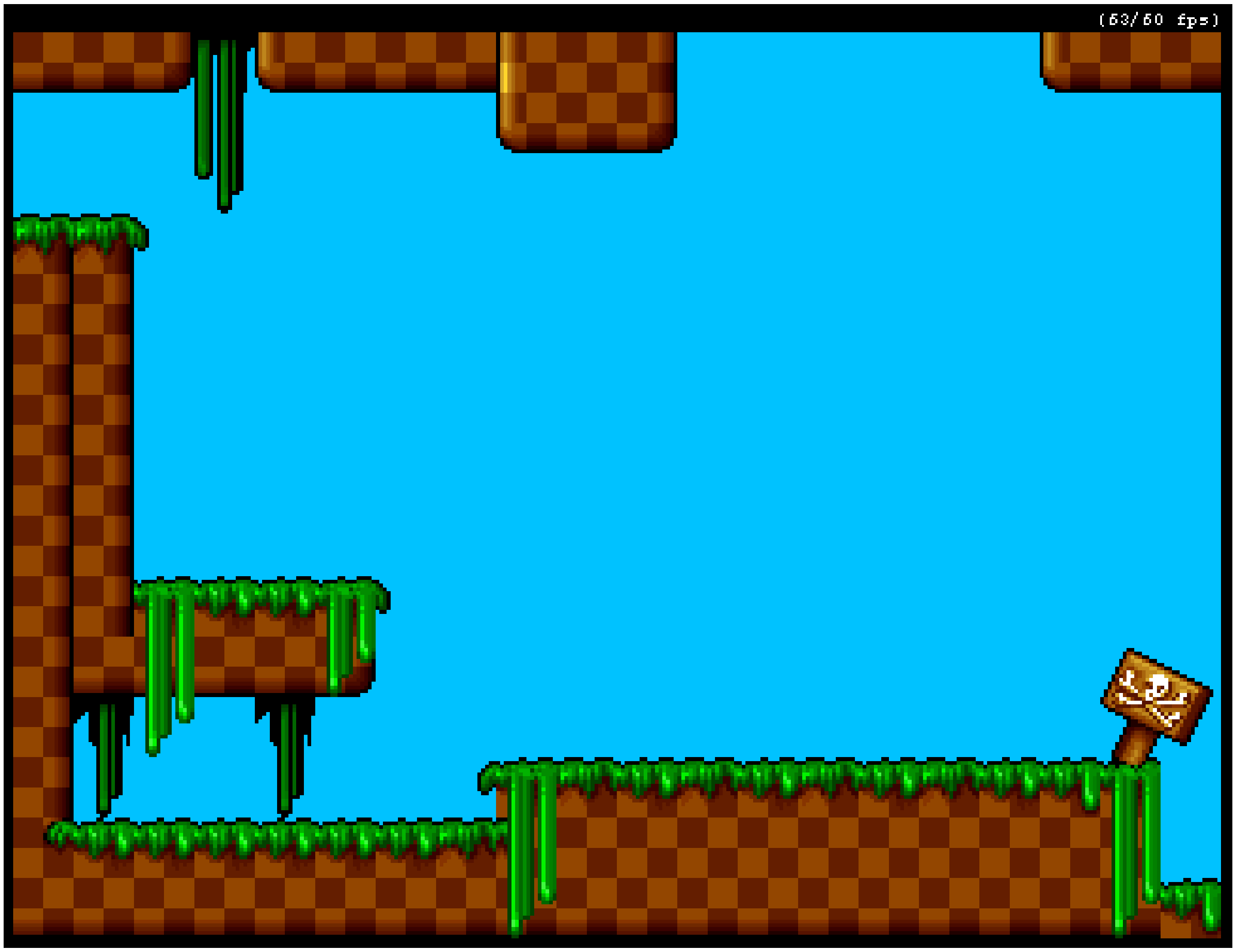
Finally, let's open the js/screens/play.js file and in the onResetEvent() (http://melonjs.github.io/docs/me.ScreenObject.html#onResetEvent) function (which is called on a state change), we ask the level director (http://melonjs.github.io/docs/me.levelDirector.html) to display our previously preloaded level, by adding a call to the **loadLevel** function and our default level name :

```
game.PlayScreen = me.ScreenObject.extend({
  /**
  *  action to perform on state change
  */
  onResetEvent: function() {

    // load a level
    me.levelDirector.loadLevel("area01");

    // reset the score
    game.data.score = 0;

    // add our HUD to the game world
    this.HUD = new game.HUD.Container();
    me.game.world.addChild(this.HUD);

  },

  /**
   *  action to perform when leaving this screen (state change)
   */
  onDestroyEvent: function() {
    // remove the HUD from the game world
    me.game.world.removeChild(this.HUD);
  }
});
```

That's all! If you did everything correctly, and open your index.html (Remember that if you don't use a web server, you will need to allow your browser to access local files, please refer to the "Testing/debugging" at the beginning of the tutorial if required).

Try it out

(click on the image to see it running in your browser), you should see something like this

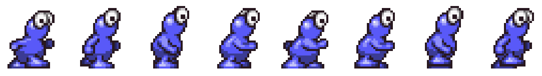


(./tutorial_step2/index.html)
Yes, nothing fancy yet, but that's only the beginning!

Also in case you didn't notice, since we defined a 640x480 display in our application, we only see a part of the map (the half of it to be exact), which is normal. **melonJS** automatically creates a corresponding viewport, and we will be able to navigate through the map in the next step, when we will add a "main player"

Part 3: Add a main player

Here we will create a new object by extending the default me.Entity (http://melonjs.github.io/docs/me.Entity.html), to create our player. We will use the provided simple spritesheet **(gripe_run_right.png)** to animate our character, and define a basic walking and standing animation. It's of course possible to define more complex animations for the same entity (jumping, crouching, when hurt, etc...), but let's keep things simple for now.



Then it's time to create our entity, open the `js/entities/entities.js` example file, and let's complete it to match with the following :

```
/*-------------------
a player entity
-------------------------------- */
game.PlayerEntity = me.Entity.extend({

  /* -----

  constructor

  ------ */

  init: function(x, y, settings) {
    // call the constructor
    this._super(me.Entity, 'init', [x, y, settings]);

    // set the default horizontal & vertical speed (accel vector)
    this.body.setVelocity(3, 15);

    // set the display to follow our position on both axis
    me.game.viewport.follow(this.pos, me.game.viewport.AXIS.BOTH);

    // ensure the player is updated even when outside of the viewport
    this.alwaysUpdate = true;

    // define a basic walking animation (using all frames)
    this.renderable.addAnimation("walk",  [0, 1, 2, 3, 4, 5, 6, 7]);
    // define a standing animation (using the first frame)
    this.renderable.addAnimation("stand",  [0]);
    // set the standing animation as default
    this.renderable.setCurrentAnimation("stand");
  },

  /* -----

  update the player pos

  ------ */
  update: function(dt) {

    if (me.input.isKeyPressed('left')) {
      // flip the sprite on horizontal axis
      this.renderable.flipX(true);
      // update the entity velocity
      this.body.vel.x -= this.body.accel.x * me.timer.tick;
      // change to the walking animation
      if (!this.renderable.isCurrentAnimation("walk")) {
        this.renderable.setCurrentAnimation("walk");
      }
    } else if (me.input.isKeyPressed('right')) {
      // unflip the sprite
      this.renderable.flipX(false);
      // update the entity velocity
      this.body.vel.x += this.body.accel.x * me.timer.tick;
      // change to the walking animation
      if (!this.renderable.isCurrentAnimation("walk")) {
        this.renderable.setCurrentAnimation("walk");
      }
    } else {
      this.body.vel.x = 0;
      // change to the standing animation
      this.renderable.setCurrentAnimation("stand");
    }

    if (me.input.isKeyPressed('jump')) {
      // make sure we are not already jumping or falling
      if (!this.body.jumping && !this.body.falling) {
        // set current vel to the maximum defined value
        // gravity will then do the rest
        this.body.vel.y = -this.body.maxVel.y * me.timer.tick;
        // set the jumping flag
        this.body.jumping = true;
      }

    }

    // apply physics to the body (this moves the entity)
    this.body.update(dt);

    // handle collisions against other shapes
    me.collision.check(this);

    // return true if we moved or if the renderable was updated
    return (this._super(me.Entity, 'update', [dt]) || this.body.vel.x !==
  },

  /**
   * colision handler
   * (called when colliding with other objects)
   */
  onCollision : function (response, other) {
    // Make all other objects solid
    return true;
  }
});
```

I think the above code is quite easy to understand. Basically, we extend the Entity (http://melonjs.github.io/docs/me.Entity.html), configure the default player speed, tweak the camera, test if some keys are pressed and manage our player movement (by setting player speed, and then calling the entity Body update (http://melonjs.github.io/docs/me.Body.html#update) function). Also, you may notice that I'm testing the final velocity (this.body.vel.x and this.body.vel.y) of my object, which allows me to know if my object actually moved, and control if I want the sprite animation to run or not.

Then, although the default game.PlayerEntity is already declare in the boilerplate, we have to modify our "main" to actually declare our new entity in the object pool (http://melonjs.github.io/docs/me.pool.html) (that is used by the engine to instantiate object), and finally to map the keys we will use for the player movement. So our **loaded()** function will become:

```
/* ---

callback when everything is loaded

---  */
```

```

"loaded" : function () {
  // set the "Play/Ingame" Screen Object
  me.state.set(me.state.PLAY, new game.PlayScreen());

  // register our player entity in the object pool
  me.pool.register("mainPlayer", game.PlayerEntity);

  // enable the keyboard
  me.input.bindKey(me.input.KEY.LEFT,  "left");
  me.input.bindKey(me.input.KEY.RIGHT, "right");
  me.input.bindKey(me.input.KEY.X,     "jump", true);

  // start the game
  me.state.change(me.state.PLAY);
}
```

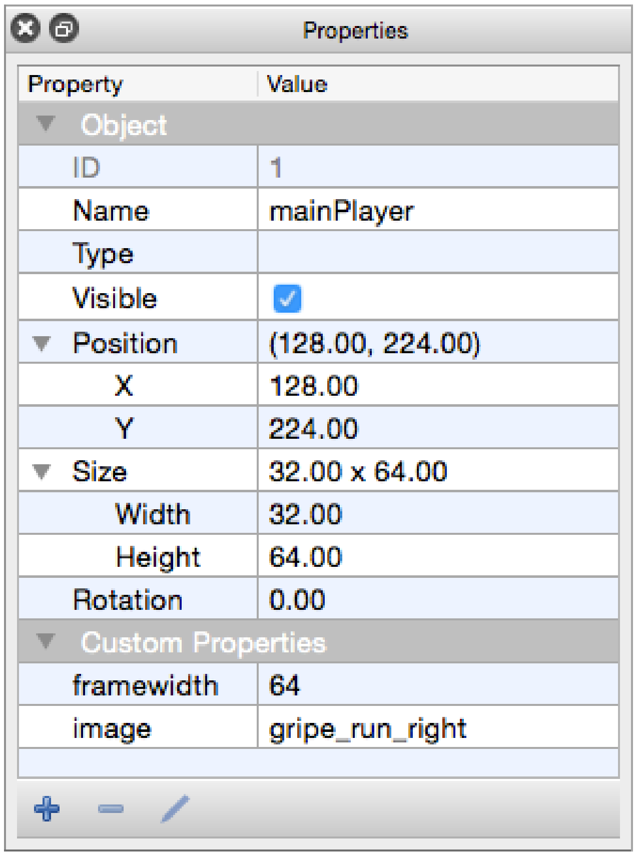
And now we can add our entity into the level! Go back to Tiled, add a new Object Layer, and finally a new Entity. To create a new Entity use the "Insert Rectangle" Tool to add a rectangle to the object layer, then you can right click the object and add the properties below.

Name it (case does not matter) **mainPlayer** (or using the same name you used when registering our Object into the Object Pool), and add two properties to the Object:

- **image** : with the **gripe_run_right** value (name of our resource
- **framewidth** : with the value **64** which is the size of a single sprite in the spritesheet
- **frameheight** : we don't define this value here since we use a single line spritesheet, and since in this case the engine will take the actual image height as a value for it.

These two parameters will be passed as parameters (**settings** object (http://melonjs.github.io/docs/me.ObjectSettings.html) here above used by the constructor) when the object will be created. Now you can either specify these fields here in Tiled, or directly in your code (when dealing with multiple objects, it can be easier to just specify the name in Tiled, and manage the rest in the constructor directly).

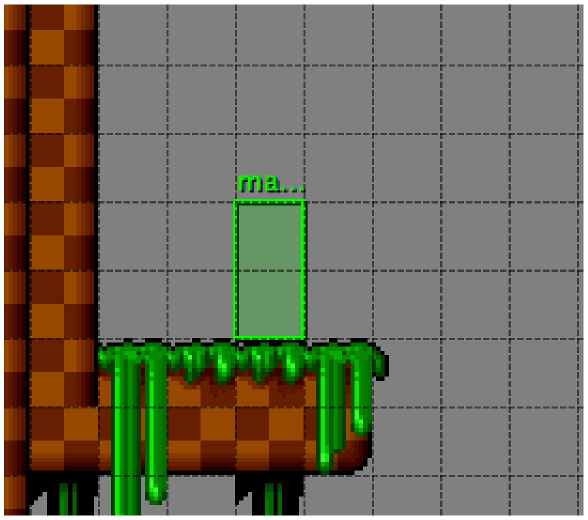
Note: You also free to add as many properties as you want, they will all be available in the settings object passed to your constructor.



Properties

Property	Value
Object	
ID	1
Name	mainPlayer
Type	
Visible	✓
Position	(128.00, 224.00)
X	128.00
Y	224.00
Size	32.00 x 64.00
Width	32.00
Height	64.00
Rotation	0.00
Custom Properties	
framewidth	64
image	gripe_run_right

Once the object is created just positionate your entity in the level, and as in the below example make sure you are also resizing the object rectangle in Tiled to match with your actual sprite size.

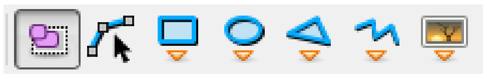


Define the collision layer

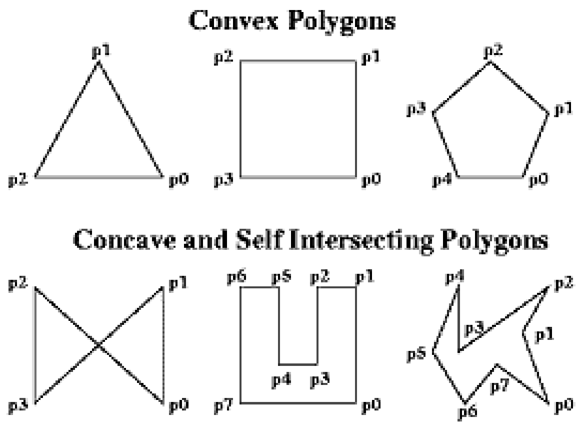
We are almost done! The last step is to define the collision layer. For this we simply need to create a new object layer named "collision" and add some basic shapes to it. That's all it takes!

So now add a new Object Group Layer. This layer's name **MUST contain the keyword "collision"** for the engine to recognize it as a collision object layer.

Once the layer is added, select it, and just "draw" your level collision map by adding any shape using the object toolbar



Please note that melonJS implements collision detection using the Separating Axis Theorem algorithm. All polygons used for collision are required to be *convex* with all vertices defined with clockwise winding. A polygon is convex when all line segments connecting two points in the interior do not cross any edge of the polygon (which means that all angles are less than 180 degrees), as shown here below:

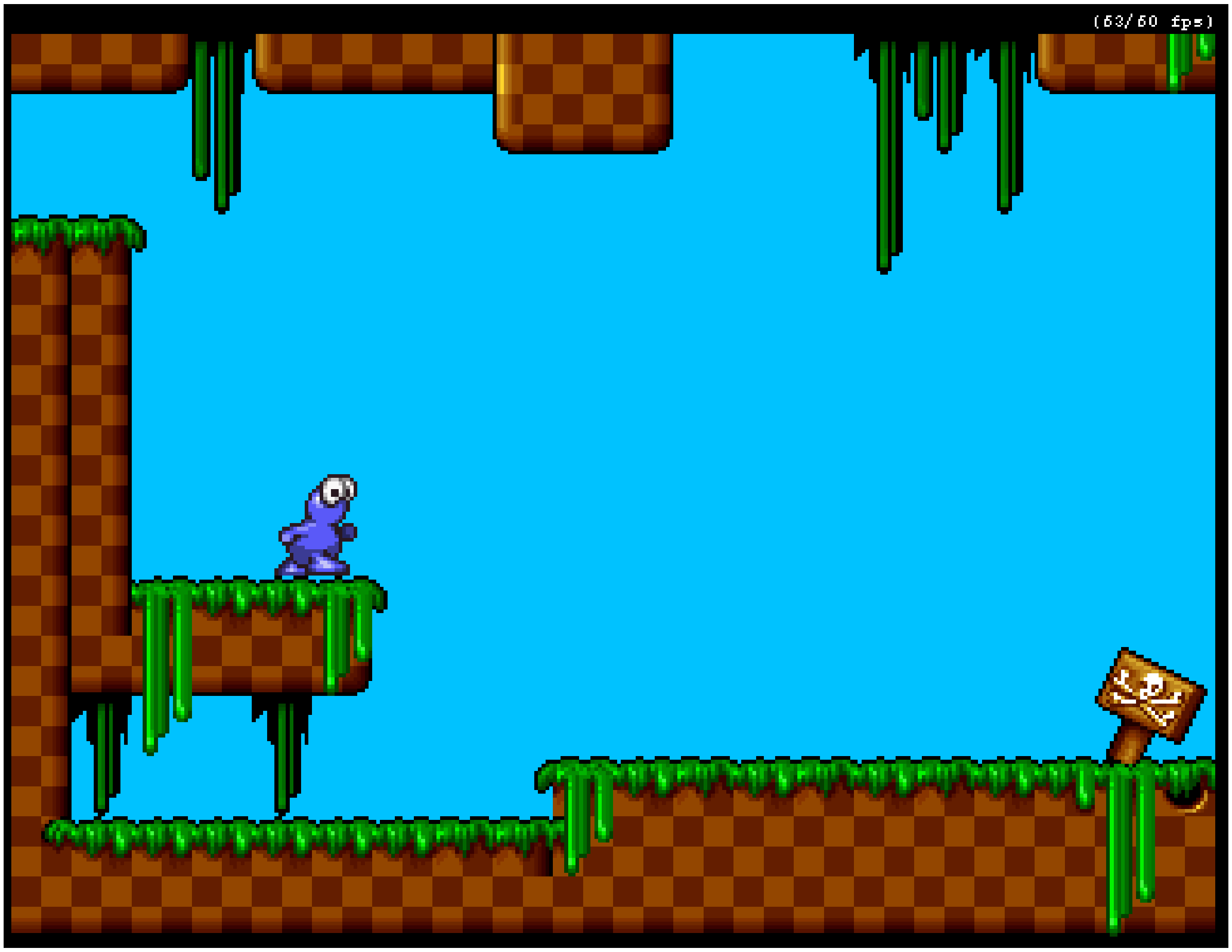


A polygon's "winding" is clockwise iff its vertices (points) are declared turning to the right (Secondary note: The image above shows COUNTERCLOCKWISE winding.)

Also if you need complex shapes to specify the parimeter of the environment, then it is recommended to use separate line segments. Lines can also be used for example when defining platform or wall elements, where you only need a specific side of the object to be collidable

Try it out

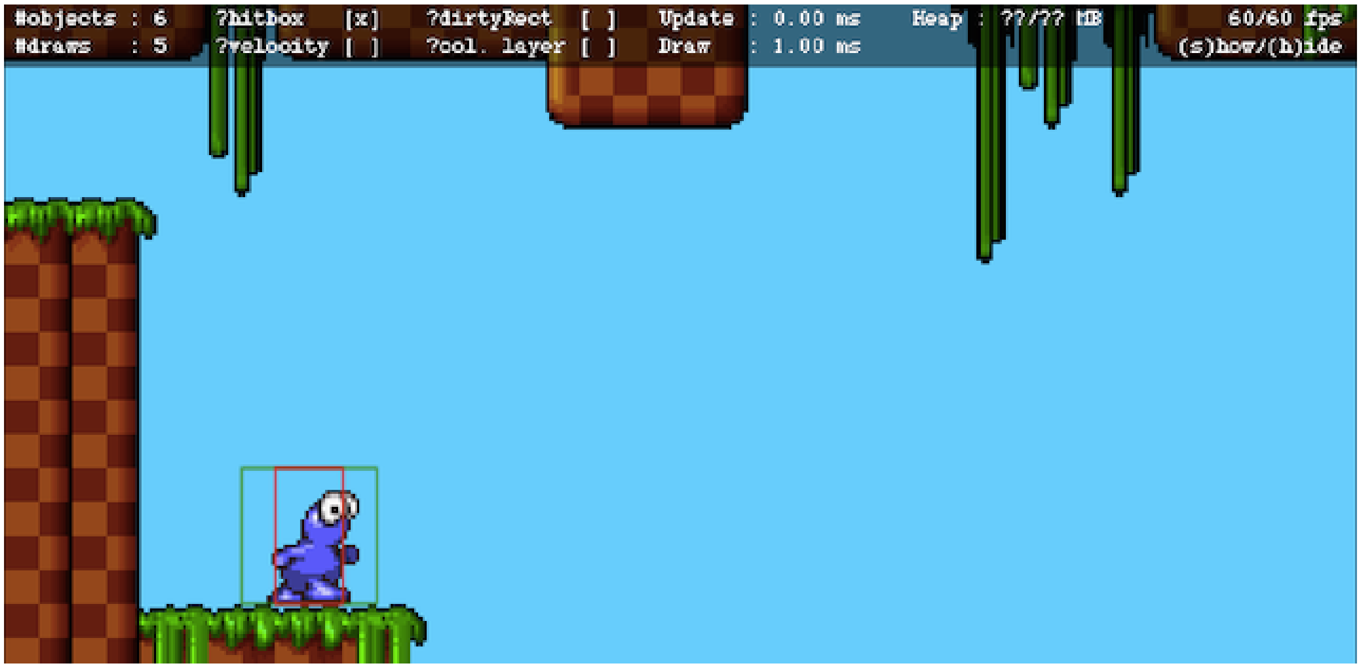
Save everything, and if you now re-open your index.html, you should see something like this: (click on the image to see it running in your browser)



(./tutorial_step3/index.html)
You will also notice that the display is automatically following our player, scrolling the environment.

One last thing - when creating an object, a default collision shape is automatically created to manage collision between objects, based on the object size you defined in Tiled. For debugging purposes, you can enable the debug panel by adding **#debug** to URL in the browser URL bar.

If you reload the game, and enable "hitbox" you will see this:



```
#objects : 6    ?hitbox   [x]   ?dirtyRect  [ ]   Update : 0.00 ms   Heap : ??/?? MB        60/60 fps
#draws   : 5    ?velocity [ ]   ?col. layer [ ]   Draw   : 1.00 ms                     (s)how/(h)ide
```

The collision box can be adjusted from Tiled by changing the size of the object and match the above example. (Collision Shape can also manually adjusted by accessing the entity body shapes (http://melonjs.github.io/docs/me.Body.html#shapes) property).

Note : When using the debug Panel, the sprite border is drawn in green, the defined collision shape(s) is/are drawn in red, and if you use something else/more than a rectangular collision shape, you should also see an orange box that is corresponding to the smallest rectangle containing all the defined collision shapes (and also called the entity body bounding box).

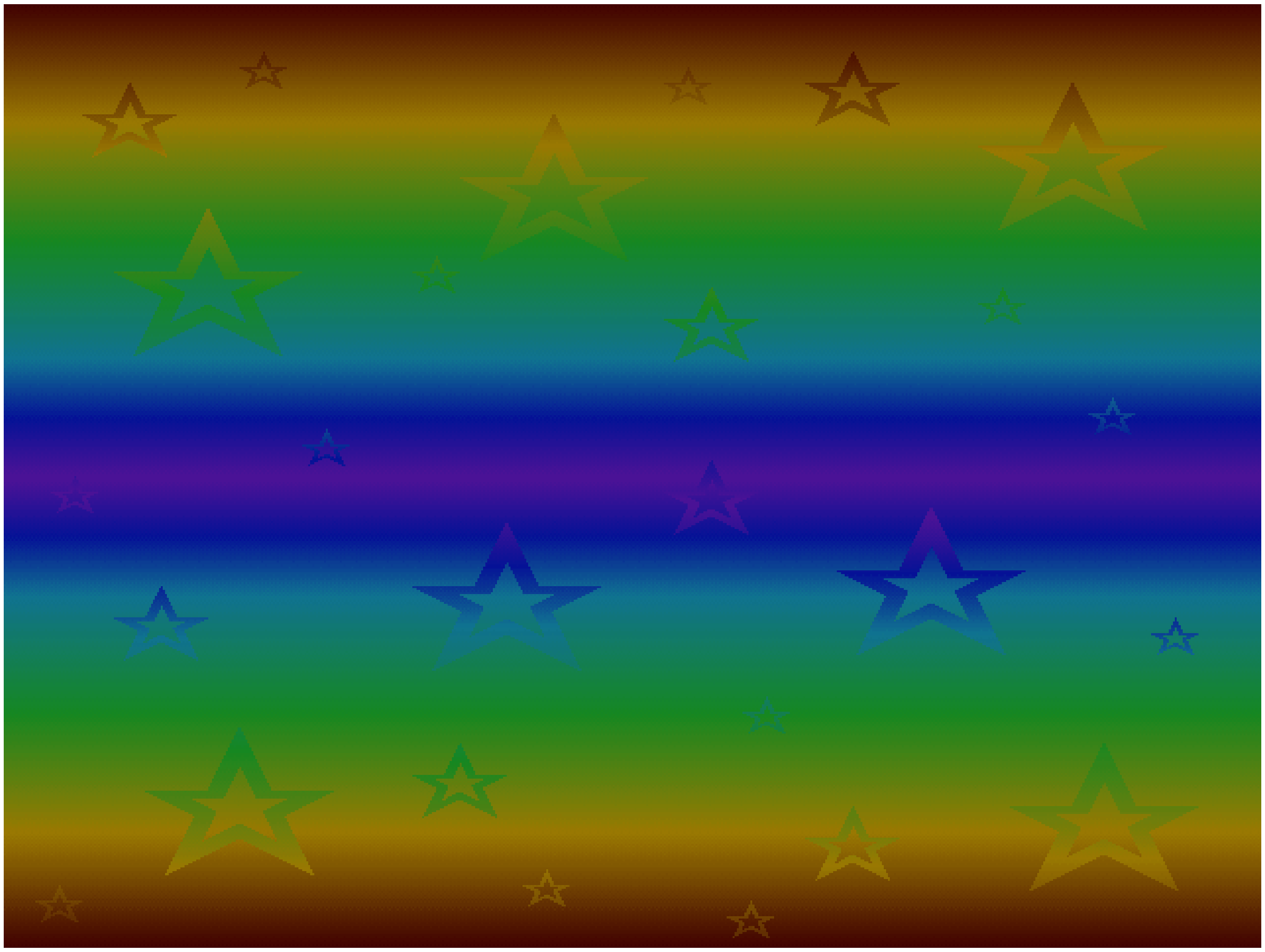
Part 4: Add a scrolling background

This one is very easy. We don't even have to add a single line of code, since everything is done through Tiled.

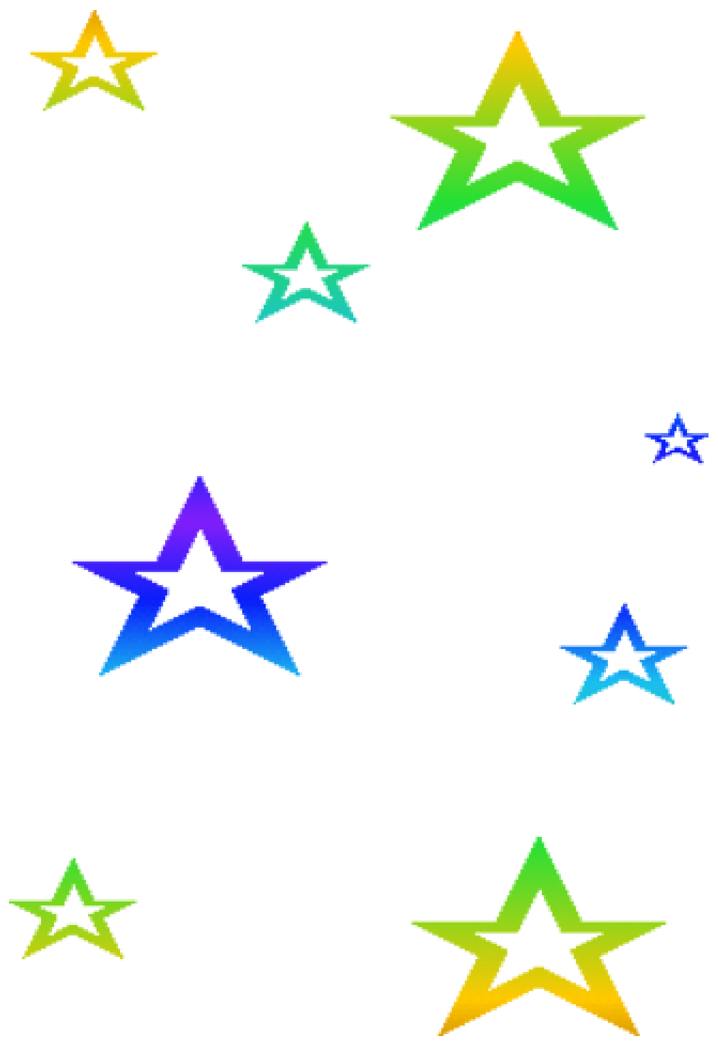
First, remove the background color that we added previously at the end of Part 1. (to do so, you will need to text edit the TMX file and remove the `backgroundcolor` property). Since the background will be filled with our scrolling layers, we don't need the display to be cleared with a specific color (furthermore it will save some precious frames).

Then we will use the two following backgrounds:

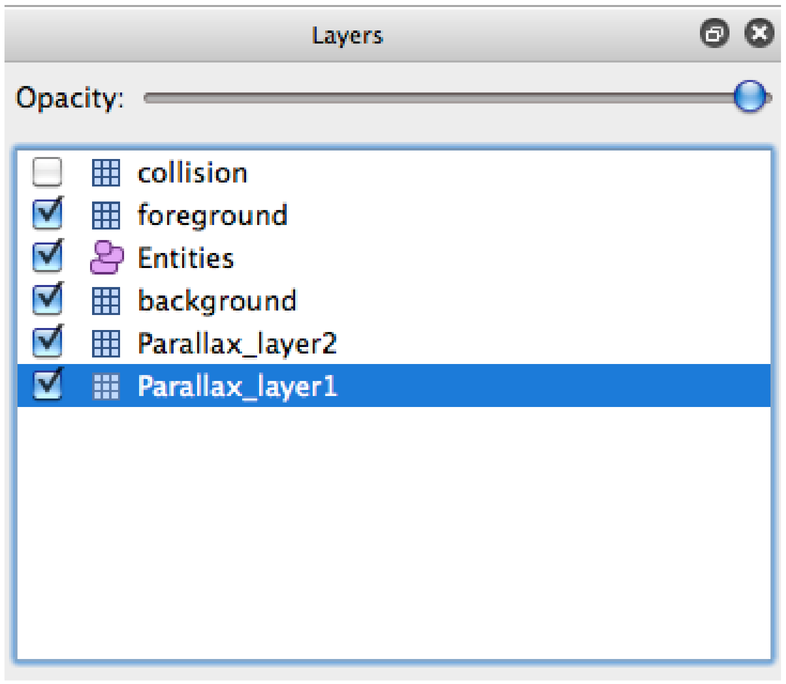
/data/img/area01_bkg0.png for the first background layer



/data/img/area01_bkg1.png for the second background layer



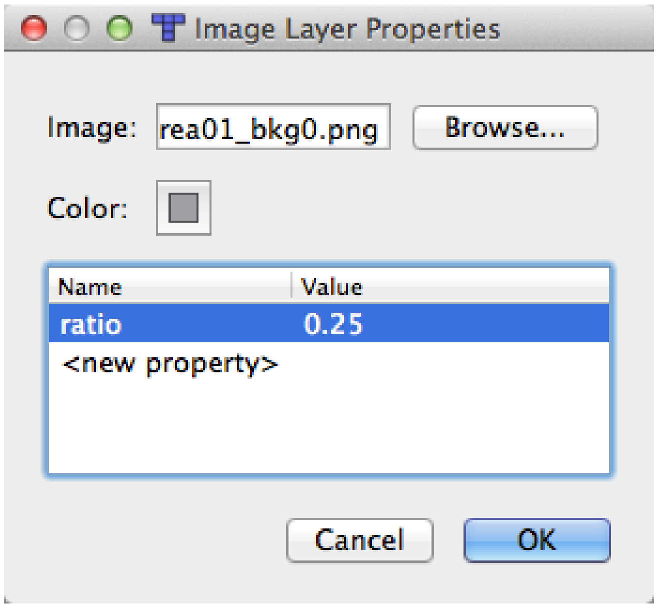
Open Tiled, and add two new **Image Layers** (http://melonjs.github.io/docs/me.ImageLayer.html), name them to whatever you like and make sure to adjust correctly the layer order (the display order being from bottom to top)



- [ ] collision
- [x] foreground
- [x] Entities
- [x] background
- [x] Parallax_layer2
- [x] Parallax_layer1

Now right-click the layers to define their properties and set the following property :

- Click the **browse** button and select the **area01_bkg0** image for the first layer (**Parallax_layer1** on the picture)
- Do this again for the second layer (Parallax_layer2)



rea01_bkg0.png

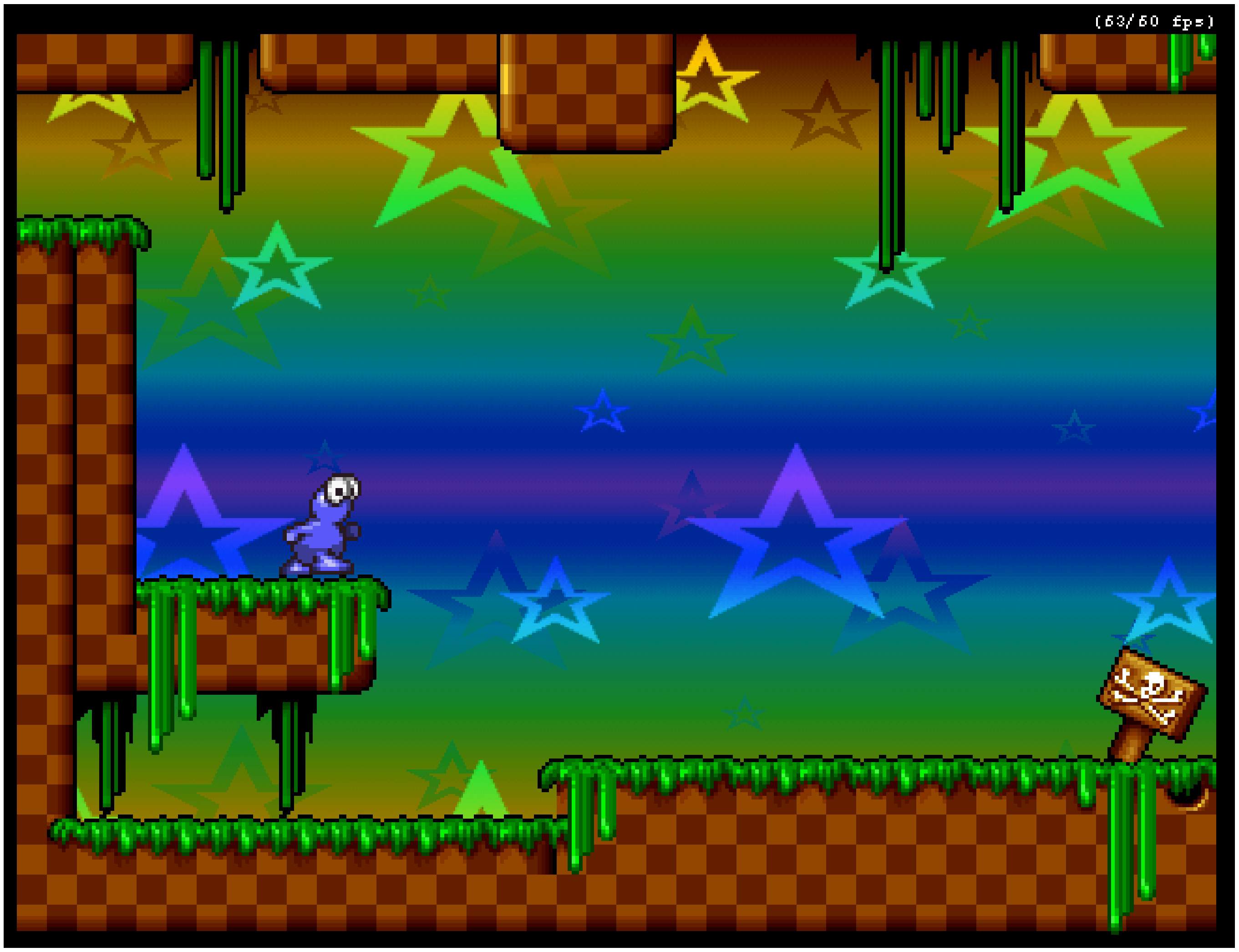
Name	Value
ratio	0.25

And finally add a **ratio** (http://melonjs.github.io/docs/me.ImageLayer.html#ratio) property to specify the scrolling speed of each layer : we will specify the **0.25** value for the first layer (**Parallax_layer1** on the picture) and the **0.35** value for the second (keep in mind that the smaller the ratio is, the slower the scrolling speed will be).

Note that default behavior for Image Layer is to be automatically **repeated** (http://melonjs.github.io/docs/me.ImageLayer.html#repeat) on both x and y axis, which is exactly what we want here to create the parallax effect.

Try it out

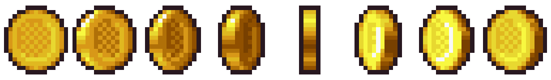
"Et voila!". If you now open your index.html, you should see:



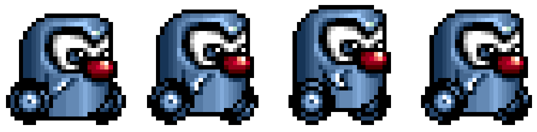
(./tutorial_step4/index.html)
Play around with your player, and enjoy the view :)

Part 5: Adding some basic objects and enemies

In this part we will add a collectible coin (that we will use later to add to our score), using the **spinning_coin_gold.png** spritesheet:



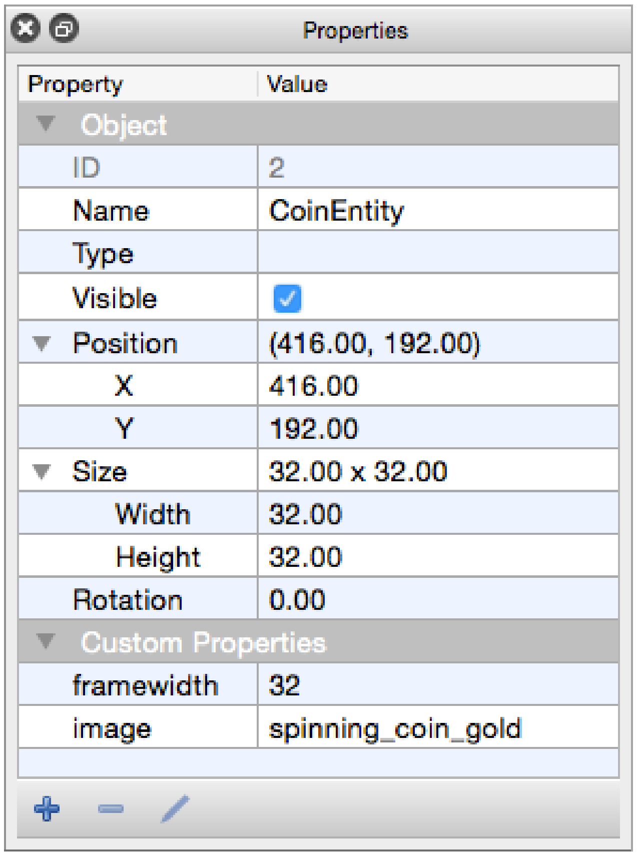
And a basic enemy, using the **wheelie_right.png** spritesheet:



The coin itself is pretty easy; we just extend the me.CollectableEntity (http://melonjs.github.io/docs/me.CollectableEntity.html). Actually, we could directly use it in Tiled (without needing to create CoinEntity here), but since we will add some score and some audio sfx later when the coin is collected, let's do it directly this way.

```
/*----------------
  a Coin entity
 ----------------- */
game.CoinEntity = me.CollectableEntity.extend({
  // extending the init function is not mandatory
  // unless you need to add some extra initialization
  init: function(x, y, settings) {
    // call the parent constructor
    this._super(me.CollectableEntity, 'init', [x, y , settings]);

  },

  // this function is called by the engine, when
  // an object is touched by something (here collected)
  onCollision : function (response, other) {
    // do something when collected

    // make sure it cannot be collected "again"
    this.body.setCollisionMask(me.collision.types.NO_OBJECT);

    // remove it
    me.game.world.removeChild(this);

    return false
  }
});
```

Also, just to be sure it's clear for you that both ways of doing this is possible, we will define the Coin object properties directly in Tiled, so we don't need to add anything else in the constructor for now:



Property	Value
Object	
ID	2
Name	CoinEntity
Type	
Visible	✓
Position	(416.00, 192.00)
X	416.00
Y	192.00
Size	32.00 x 32.00
Width	32.00
Height	32.00
Rotation	0.00
Custom Properties	
framewidth	32
image	spinning_coin_gold

For our enemy, it's a bit longer :

```
/* --------------------------
an enemy Entity
------------------------ */
game.EnemyEntity = me.Entity.extend({
  init: function(x, y, settings) {
    // define this here instead of tiled
    settings.image = "wheelie_right";

    // save the area size defined in Tiled
    var width = settings.width;
    var height = settings.height;

    // adjust the size setting information to match the sprite size
    // so that the entity object is created with the right size
    settings.framewidth = settings.width = 64;
    settings.frameheight = settings.height = 64;

    // redefine the default shape (used to define path) with a shape matc
    settings.shapes[0] = new me.Rect(0, 0, settings.framewidth, settings.

    // call the parent constructor
    this._super(me.Entity, 'init', [x, y , settings]);

    // set start/end position based on the initial area size
    x = this.pos.x;
    this.startX = x;
    this.endX   = x + width - settings.framewidth
    this.pos.x  = x + width - settings.framewidth;

    // to remember which side we were walking
```

```
      this.walkLeft = false;

      // walking & jumping speed
      this.body.setVelocity(4, 6);

    },

    // manage the enemy movement
    update: function(dt) {

      if (this.alive) {
        if (this.walkLeft && this.pos.x <= this.startX) {
        this.walkLeft = false;
      } else if (!this.walkLeft && this.pos.x >= this.endX) {
        this.walkLeft = true;
      }
      // make it walk
      this.renderable.flipX(this.walkLeft);
      this.body.vel.x += (this.walkLeft) ? -this.body.accel.x * me.timer.ti

      } else {
        this.body.vel.x = 0;
      }

      // update the body movement
      this.body.update(dt);

      // handle collisions against other shapes
      me.collision.check(this);

      // return true if we moved or if the renderable was updated
      return (this._super(me.Entity, 'update', [dt]) || this.body.vel.x !==
    },

    /**
     * colision handler
     * (called when colliding with other objects)
     */
    onCollision : function (response, other) {
      if (response.b.body.collisionType !== me.collision.types.WORLD_SHAPE)
        // res.y >0 means touched by something on the bottom
        // which mean at top position for this one
        if (this.alive && (response.overlapV.y > 0) && response.a.body.fall
          this.renderable.flicker(750);
        }
        return false;
      }
      // Make all other objects solid
      return true;
    }
  });
```

As you can see here, I specified the **settings.image** and **settings.framewidth** properties in the constructor directly, meaning that in Tiled, I won't have to add these properties to my Object (Once again, it's up to you to decide how to use it).

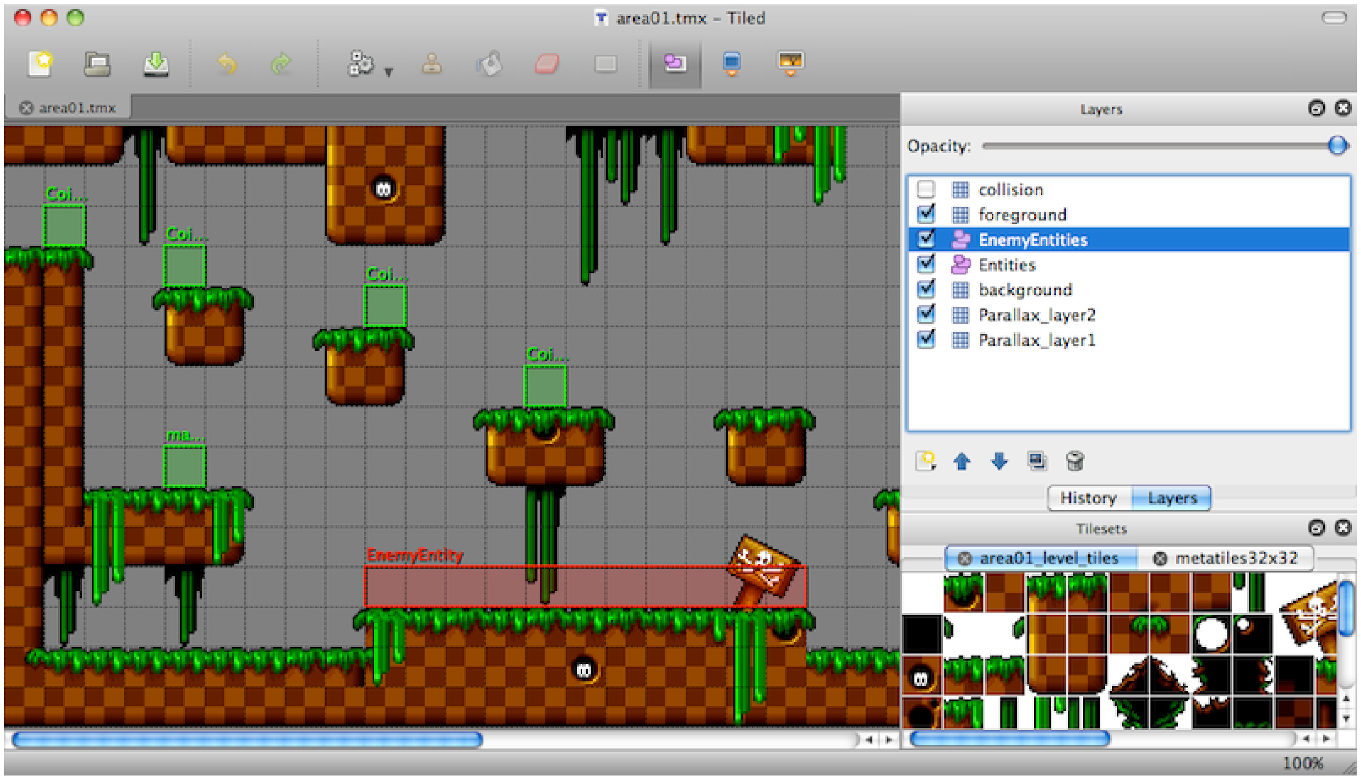
Also, I am using the **width** property given by Tiled to specify a path on which this enemy will run. Finally, in the onCollision method, I make the enemy flicker if something is jumping on top of it.

Note that an Object Entity drawable component (either a single sprite of animation) is accessible through the Entity `renderable` property, which explains here why we do here the following : `this.renderable.flicker(750);`

Then again, we add these new objects in the Object Pool

```
// register our object entities in the object pool
me.pool.register("mainPlayer", game.PlayerEntity);
me.pool.register("CoinEntity", game.CoinEntity);
me.pool.register("EnemyEntity", game.EnemyEntity);
```

And we are ready to complete our level in Tiled. Create a new object layer, and use the Insert Object tool to add coins and enemies where you want. Right-click on each object and make sure to set their name to either CoinEntity or EnemyEntity.



Before testing, we also need to modify our player to check for collision with other entities. In order to do this, if not yet done we need to add a call to the **me.collision.check(this)** (http://melonjs.github.io/docs/me.Collision.html#check) function in our mainPlayer code, see below :

```
/* -----
   update the player pos
------ */
update: function(dt) {

  if (me.input.isKeyPressed('left')) {
    // flip the sprite on horizontal axis
    this.renderable.flipX(true);
    // update the entity velocity
    this.body.vel.x -= this.body.accel.x * me.timer.tick;
    // change to the walking animation
    if (!this.renderable.isCurrentAnimation("walk")) {
        this.renderable.setCurrentAnimation("walk");
    }
  }  else if (me.input.isKeyPressed('right')) {
    // unflip the sprite
    this.renderable.flipX(false);
    // update the entity velocity
    this.body.vel.x += this.body.accel.x * me.timer.tick;
     // change to the walking animation
    if (!this.renderable.isCurrentAnimation("walk")) {
        this.renderable.setCurrentAnimation("walk");
    }
  } else {
    this.body.vel.x = 0;
    // change to the standing animation
    this.renderable.setCurrentAnimation("stand");
  }

  if (me.input.isKeyPressed('jump')) {
    if (!this.body.jumping && !this.body.falling) {
      // set current vel to the maximum defined value
      // gravity will then do the rest
      this.body.vel.y = -this.body.maxVel.y * me.timer.tick;
      // set the jumping flag
      this.body.jumping = true;
    }
  }

  // apply physics to the body (this moves the entity)
  this.body.update(dt);

  // handle collisions against other shapes
  me.collision.check(this);

  // return true if we moved or if the renderable was updated
  return (this._super(me.Entity, 'update', [dt]) || this.body.vel.x !== 0
},
```

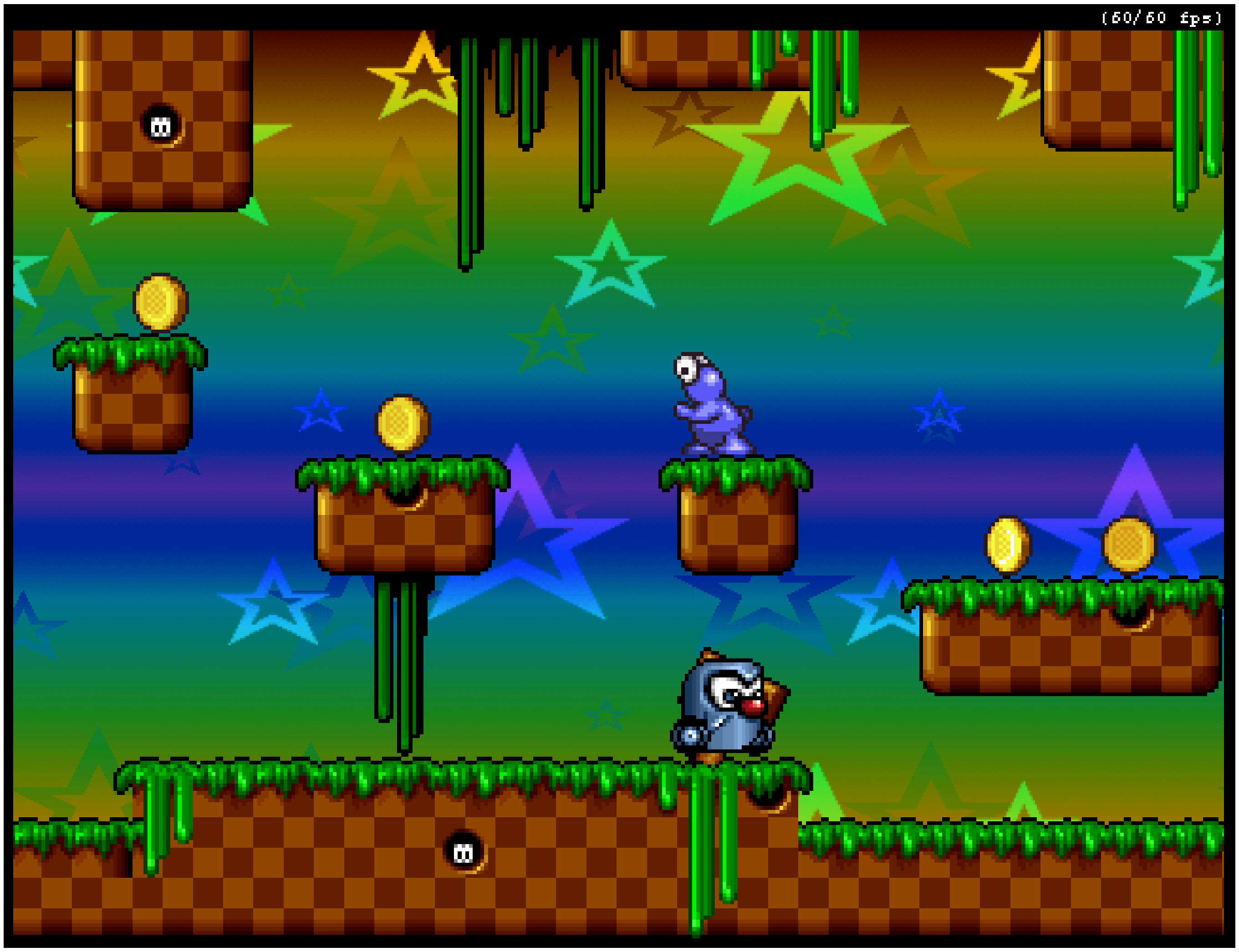
Last but not least, as we added some platform in our level, let's modify the onCollision handler to add a custom bevahior for the "WORLD_SHAPE" type and simulate a "platform" element, as shown below.

Do note that the particular collision shapes that we do want to act as "platforms" are here identified by setting their type property to "platform" in Tiled (Feel free to use whatever you need, as far as you use the same value on both ends).

```
/**
 * colision handler
 */
onCollision : function (response, other) {
  switch (response.b.body.collisionType) {
    case me.collision.types.WORLD_SHAPE:
      // Simulate a platform object
      if (other.type === "platform") {
        if (this.body.falling &&
          !me.input.isKeyPressed('down') &&
          // Shortest overlap would move the player upward
          (response.overlapV.y > 0) &&
          // The velocity is reasonably fast enough to have penetrated to
          (~~this.body.vel.y >= ~~response.overlapV.y)
        ) {
          // Disable collision on the x axis
          response.overlapV.x = 0;
          // Repond to the platform (it is solid)
          return true;
        }
        // Do not respond to the platform (pass through)
        return false;
      }
      break;

    case me.collision.types.ENEMY_OBJECT:
      if ((response.overlapV.y>0) && !this.body.jumping) {
        // bounce (force jump)
        this.body.falling = false;
        this.body.vel.y = -this.body.maxVel.y * me.timer.tick;
        // set the jumping flag
        this.body.jumping = true;
      }
      else {
        // let's flicker in case we touched an enemy
        this.renderable.flicker(750);
      }
      return false;
      break;

    default:
      // Do not respond to other objects (e.g. coins)
      return false;
  }

  // Make the object solid
  return true;
}
```

Try it out

And this is what you should get (note that I completed the level a little bit, adding platforms, etc...):



(./tutorial_step5/index.html)
Try to collect your coins, avoid the enemy or jump on it!

Part 6: Adding some basic HUD information

It's time to display some score when we collect those coins.

We will use a bitmap font **(data/img/font/32x32_font.png)** to display our score

The boilerplate we used earlier already contains a HUD Skeleton that we will use as a base for our game. The skeleton is quite simple and consist of:

- an object called **game.HUD.Container**, that inherits from me.Container (http://melonjs.github.io/docs/me.Container.html)
- a basic score object called **game.HUD.ScoreItem**, that inherits from me.Renderable (http://melonjs.github.io/docs/me.Renderable.html)

The HUD container is just basically an object container, that is defined as **persistent** (so that it can survive level changes), displayed on top of all others object (z propery set to Infinity), and we also make it non collidable so that it just be ignored during collision check.

The Score Object is defined as **floating** (so that when we add it to our HUD container we use screen coordinates) and just for now caches the score value (defined under game.data).

```
**
* a HUD container and child items
*/

game.HUD = game.HUD || {};


game.HUD.Container = me.Container.extend({

  init: function() {
    // call the constructor
    this._super(me.Container, 'init');

    // persistent across level change
    this.isPersistent = true;

    // make sure we use screen coordinates
    this.floating = true;

    // make sure our object is always draw first
    this.z = Infinity;

    // give a name
    this.name = "HUD";

    // add our child score object at the right-bottom position
    this.addChild(new game.HUD.ScoreItem(630, 440));
  }
});

/**
* a basic HUD item to display score
*/

game.HUD.ScoreItem = me.Renderable.extend({

  /**
   * constructor
   */
  init: function(x, y) {

    // call the parent constructor
    // (size does not matter here)
    this._super(me.Renderable, 'init', [x, y, 10, 10]);


    // local copy of the global score
    this.score = -1;
  },

  /**
   * update function
   */
  update : function (dt) {
    // we don't do anything fancy here, so just
    // return true if the score has been updated
    if (this.score !== game.data.score) {
      this.score = game.data.score;
      return true;
    }
    return false;
  },

  /**
  * draw the score
  */
  draw : function (renderer) {
    // draw it baby !
  }
});
```

Now let's display our current score ! For that we will just simply complete the given scoreItem object, by creating a local font property (using the previously bitmap font), and simply draw the score using our bitmap font :

```
/**
* a basic HUD item to display score
*/
game.HUD.ScoreItem = me.Renderable.extend( {
  /**
  * constructor
  */
  init: function(x, y) {

    // call the parent constructor
    // (size does not matter here)
    this._super(me.Renderable, 'init', [x, y, 10, 10]);

    // create a font
    this.font = new me.BitmapFont("32x32_font", 32);
    this.font.set("right");

    // local copy of the global score
    this.score = -1;
  },

  /**
  * update function
  */
  update : function (dt) {
    // we don't draw anything fancy here, so just
    // return true if the score has been updated
    if (this.score !== game.data.score) {
      this.score = game.data.score;
      return true;
    }
    return false;
  },

  /**
  * draw the score
  */
  draw : function (renderer) {
    this.font.draw (renderer, game.data.score, this.pos.x, this.pos.y);
  }
});
```

The HUD is already added and removed when we start the game, so there is nothing to do here :

```
game.PlayScreen = me.ScreenObject.extend({
  /**
  *  action to perform on state change
  */
  onResetEvent: function() {

    // load a level
    me.levelDirector.loadLevel("area01");

    // reset the score
    game.data.score = 0;

    // add our HUD to the game world
    this.HUD = new game.HUD.Container();
    me.game.world.addChild(this.HUD);

  },


  /**
  *  action to perform when leaving this screen (state change)
  */
  onDestroyEvent: function() {
    // remove the HUD from the game world
    me.game.world.removeChild(this.HUD);
  }
});
```

Last step is of course to actually change the score when a coin is collected ! Now let's modify our Coin Object:

```
onCollision : function () {
  // do something when collected

  // give some score
  game.data.score += 250;

  // make sure it cannot be collected "again"
  this.body.setCollisionMask(me.collision.types.NO_OBJECT);

  // remove it
  me.game.world.removeChild(this);
}
```

As you can see, in the **onCollision function**, we just change our game.data.score property by adding some value to it, then we ensure the object cannot be collected again, and remove the coin

Try it out

We can now check the result, and we should now have our score displayed in the bottom-right corner of the screen:

(./tutorial_step6/index.html)

Part 7: Adding some audio

In this section we will add some audio to our game:

- a sound when collecting a coin
- a sound when jumping
- a sound when stomping on enemy
- a background (or in game music)

If we take a look back on how we first initialized the audio, you can see that we passed the **"mp3,ogg"** parameter to the initialization function (http://melonjs.github.io/docs/me.audio.html#init), to indicate that we will provide two audio files format, one as mp3, and one as ogg melonJS will then use the right based on your browser capabilities.

```
// initialize the "audio"
me.audio.init("mp3,ogg");
```

Now let's modify our game :

Collecting a coin

In the CoinEntity code, where we previously managed our earned points, we just need to add a new call to **me.audio.play()** (http://melonjs.github.io/docs/me.audio.html#play) and use the **"cling"** audio resource. that's all!

```
onCollision : function () {
  // do something when collected

  // play a "coin collected" sound
  me.audio.play("cling");

  // give some score
  game.data.score += 250;

  // make sure it cannot be collected "again"
  this.body.setCollisionMask(me.collision.types.NO_OBJECT);

```

```
    // remove it
    me.game.world.removeChild(this);
  }
```

Jumping

In the **update()** function of the mainPlayer, we also add a call to **me.audio.play()** (http://melonjs.github.io/docs/me.audio.html#play) and use the **"jump"** audio resource. You can also note that I added a test on the return value of doJump(). doJump can return false in case you are not allowed to jump (already jumping, etc..) and in that case there is no need to play the sound sfx.

```
if (me.input.isKeyPressed('jump')) {
  if (!this.body.jumping && !this.body.falling) {
    // set current vel to the maximum defined value
    // gravity will then do the rest
    this.body.vel.y = -this.body.maxVel.y * me.timer.tick;
    // set the jumping flag
    this.body.jumping = true;
    // play some audio
    me.audio.play("jump");
  }
}
```

Stomping

And still the same for this one, but using the "stomp" resource, this time in the collision handler function of the mainPlayer:

```
/**
 * colision handler
 */
onCollision : function (response, other) {

   ...

   case me.collision.types.ENEMY_OBJECT:
        if ((response.overlapV.y>0) && !this.body.jumping) {
          // bounce (force jump)
          this.body.falling = false;
          this.body.vel.y = -this.body.maxVel.y * me.timer.tick;
          // set the jumping flag
          this.body.jumping = true;
          // play some audio
          me.audio.play("stomp");
        }
        else {
          // let's flicker in case we touched an enemy
          this.renderable.flicker(750);
        }
        return false;
        break;

      default:
        // Do not respond to other objects (e.g. coins)
        return false;
    }

  // Make the object solid
  return true;
}
```

In-game music

In our main, in the **onResetEvent()** function, we just add a call to the **me.audio.playTrack()** (http://melonjs.github.io/docs/me.audio.html#playTrack) function, specifying the audio track to be used:

```
onResetEvent: function() {
  // play the audio track
  me.audio.playTrack("dst-inertexponent");

  ....
},
```

And we also need to modify the **onDestroyEvent()** function to stop the current track when exiting the game:

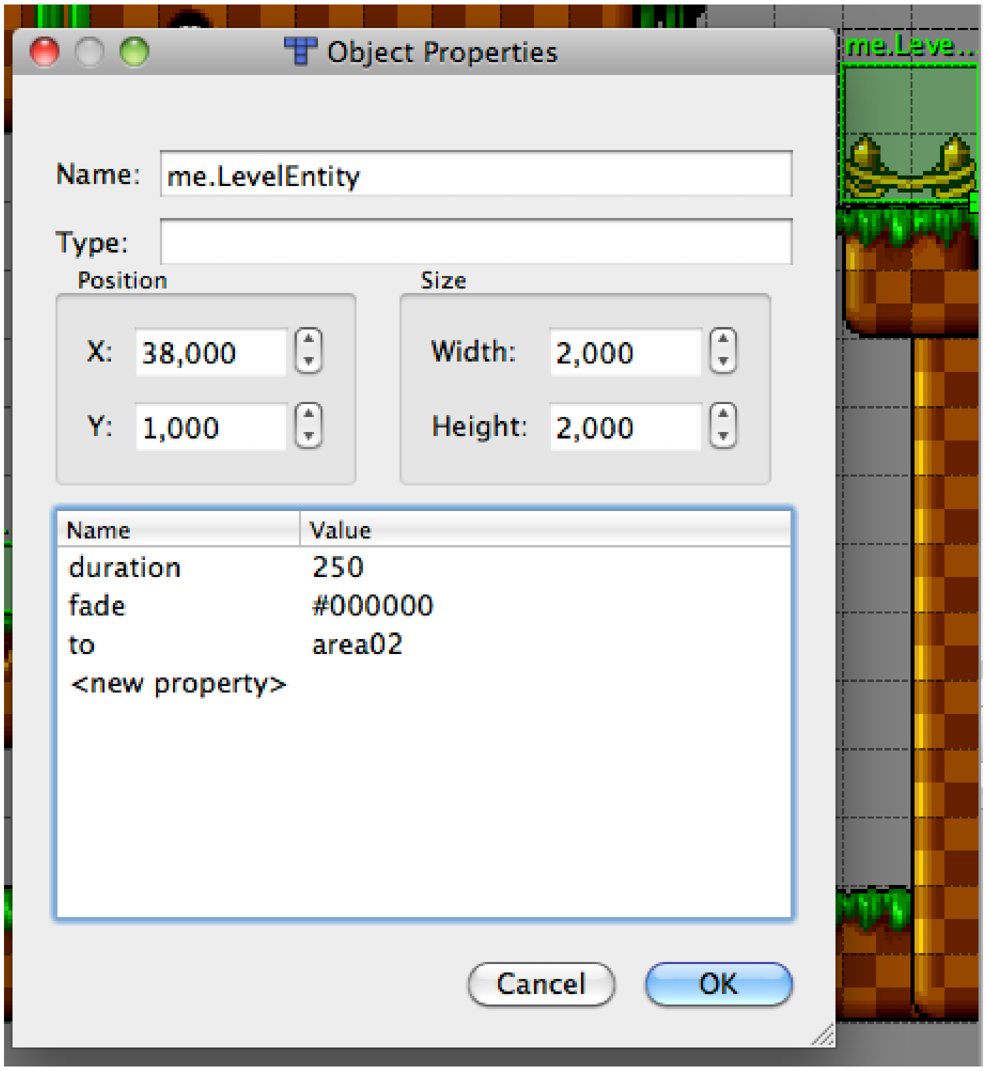
```
onDestroyEvent: function() {

  ....

  // stop the current audio track
  me.audio.stopTrack();
}
```

That's all! click here (./tutorial_step7/index.html) to see the final result.

Part 8: Adding a second level

You should know how to create a level now. However, here I will show you how to go to another level.

To do this, melonJS has an Object call me.LevelEntity (http://melonjs.github.io/docs/me.LevelEntity.html), that we will add in Tiled and specify what to do when our main player hit it :



Name: me.LevelEntity
Type:
Position
X: 38,000
Y: 1,000
Size
Width: 2,000
Height: 2,000

Name	Value
duration	250
fade	#000000
to	area02
<new property>	

Assuming that our new level is called "area02", we just need to add a **"to"** property with **"area02"** for the value. So that when our player will hit the Object, the engine will automatically load the "area02" level.
Optionally we can also ask the engine to add a fadeOut/fadeIn effect when changing level by adding the **"fade" color** and **"duration" (in ms)** properties (as in the image)

click here (./tutorial_step8/index.html) to see the final result.

Part 9: Adding a title screen

To finish, let's add a title screen to our game, using the **title_screen.png** files in the **"/data/img/gui/"** folder (and of course to be added in the ressource list, as we done it previously for other images):

and on top of it we will add some message, and wait for the user input to start the game!

First let's declare a new Object, extending me.ScreenObject (http://melonjs.github.io/docs/me.ScreenObject.html):

```
/**
* A title screen
**/
game.TitleScreen = me.ScreenObject.extend({
  // reset function
  onResetEvent: function() {

  },

  // destroy function
  onDestroyEvent: function() {

  }
});
```

So now we want to:

- display the above background image
- add some text to the center of the screen ("Press enter to play")
- wait for user input (pressing enter)

Additionally, I also want to add a small scrolling text about this tutorial.

```
game.TitleScreen = me.ScreenObject.extend({

    /**
     *  action to perform on state change
     */
    onResetEvent : function() {

        // title screen
        me.game.world.addChild(
            new me.Sprite(
                0,0, {
                   image: me.loader.getImage('title_screen')
                }
            ),
            1
        );


        // add a new renderable component with the scrolling text
        me.game.world.addChild(new (me.Renderable.extend ({
            // constructor
            init : function() {
                this._super(me.Renderable, 'init', [0, 0, me.game.viewpor
                // font for the scrolling text
                this.font = new me.BitmapFont("32x32_font", 32);

                 // a tween to animate the arrow
                this.scrollertween = new me.Tween(this).to({scrollerpos:

                this.scroller = "A SMALL STEP BY STEP TUTORIAL FOR GAME C
                this.scrollerpos = 600;
            },

            // some callback for the tween objects
            scrollover : function() {
                // reset to default value
                this.scrollerpos = 640;
                this.scrollertween.to({scrollerpos: -2200 }, 10000).onCom
            },

            update : function (dt) {
                return true;
            },

            draw : function (renderer) {
                this.font.draw(renderer, "PRESS ENTER TO PLAY", 20, 240);
                this.font.draw(renderer, this.scroller, this.scrollerpos,
            },
            onDestroyEvent : function() {
                //just in case
                this.scrollertween.stop();
            }
        })), 2);

        // change to play state on press Enter or click/tap
        me.input.bindKey(me.input.KEY.ENTER, "enter", true);
        me.input.bindPointer(me.input.mouse.LEFT, me.input.KEY.ENTER);
        this.handler = me.event.subscribe(me.event.KEYDOWN, function (act
            if (action === "enter") {
                // play something on tap / enter
                // this will unlock audio on mobile devices
                me.audio.play("cling");
                me.state.change(me.state.PLAY);
            }
        });
    },

    /**
     *  action to perform when leaving this screen (state change)
     */
    onDestroyEvent : function() {
        me.input.unbindKey(me.input.KEY.ENTER);
        me.input.unbindPointer(me.input.mouse.LEFT);
        me.event.unsubscribe(this.handler);
   }
});
```

What do we have above?

1. 1) In the onResetEvent function, we create two renderables components and add them to our game world. The first is a basic Sprite object that will display our title background image, and the second handles the "press ENTER" message and a scroller based on a Tween object. Note: Concerning the font, if you check carefully the corresponding asset (32x32_font.png), you will notice that it only contains uppercase letters, so be sure as well to only use uppercase letter in your text.
2. 2) We also register to key event, or mouse/tap event to automatically switch to the PLAY state if pressed.
3. 3) On destroy, we unbind the key and pointer events.

And of course the very last thing is to indicate to the engine we created a new object and associate it to the corresponding state (here, **MENU**). Also, using the transition function of me.state (http://melonjs.github.io/docs/me.state.html), I'm telling the engine to add a fading effect between state changes.

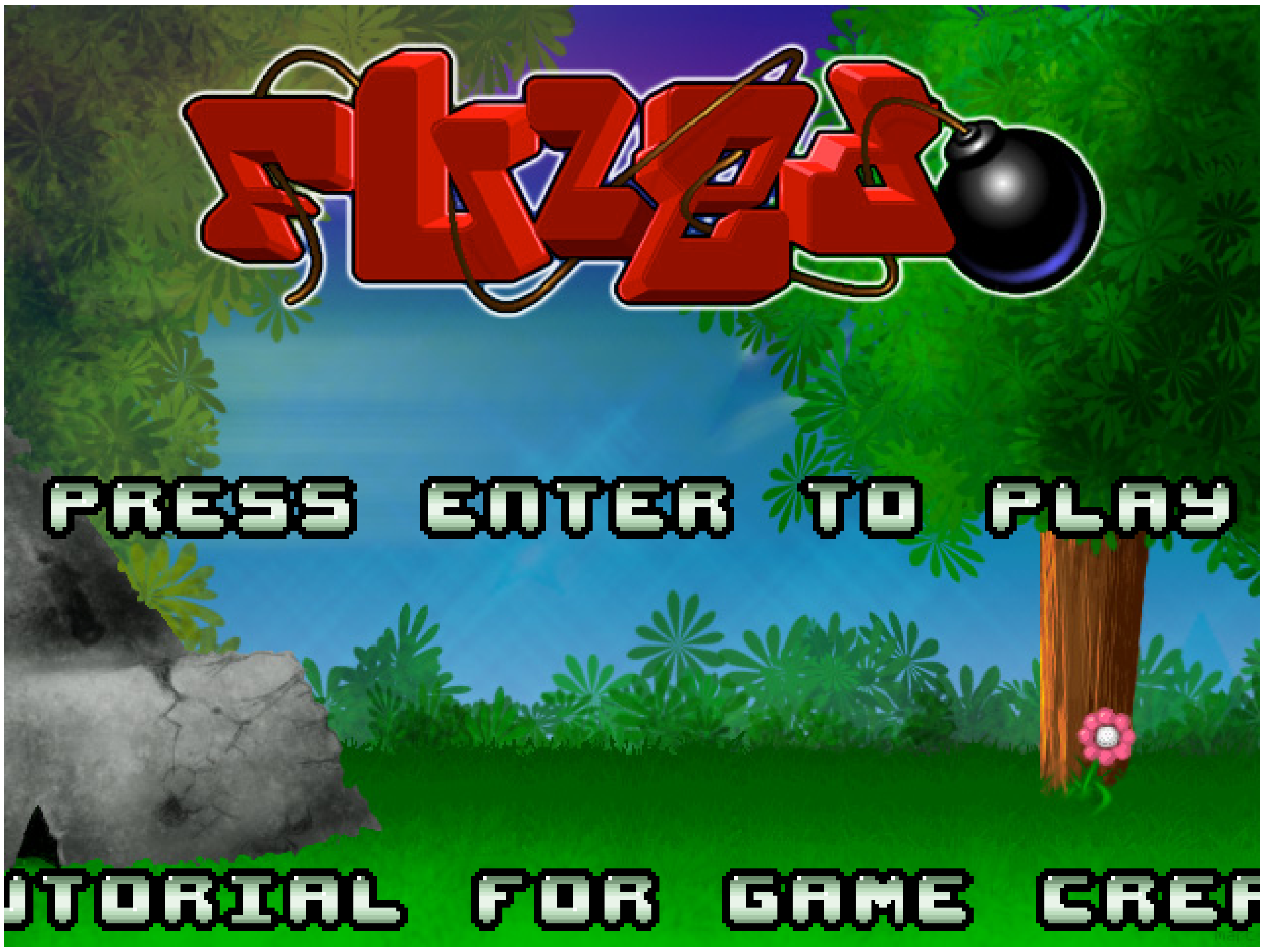
Finally, instead of switching to the **PLAY** state at the end of the loaded function, I'm switching now to the **MENU** state:

```
/* ---

callback when everything is loaded

--- */
"loaded": function() {
  // set the "Play/Ingame" Screen Object
  me.state.set(me.state.MENU, new game.TitleScreen());

  // set the "Play/Ingame" Screen Object
  me.state.set(me.state.PLAY, new game.PlayScreen());

  // set a global fading transition for the screen
  me.state.transition("fade", "#FFFFFF", 250);

  // register our player entity in the object pool
```

```
    me.pool.register("mainPlayer", game.PlayerEntity);
    me.pool.register("CoinEntity", game.CoinEntity);
    me.pool.register("EnemyEntity", game.EnemyEntity);

    // enable the keyboard
    me.input.bindKey(me.input.KEY.LEFT, "left");
    me.input.bindKey(me.input.KEY.RIGHT, "right");
    me.input.bindKey(me.input.KEY.X, "jump", true);

    // display the menu title
    me.state.change(me.state.MENU);
  }
```

Try it out

Congratulations! You reached the end of this tutorial, time to test it, and you should have something like this:



(./tutorial_step9/index.html)

Part 10: Conclusion

Well, I hope that you enjoyed our time spent together with this little introduction of melonJS. I hope you like it and are willing to give it a try! Please keep in mind that melonJS is still in development, so it won't be perfect but remember that it's free! Also, don't hesitate to contact me if you have any feedback, suggestions, or found some bugs in the engine (and for sure you'll find some). I will be very happy to help you!

Never forget that this is all for fun, so have fun!