Facebook Open Academy

MIT App Inventor

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Facebook Open Academy Report

Here is a list of posts of my journey in App Inventor 2, under the Facebook Open Academy Program.

If you are at NUS, Facebook Open Academy (listed under CP3101A Global Open Source project) is a really valuable opportunity learn something out of the textbook, contributing to a large-scale open-source project within a community, improving your Git-fu, and being mentored in the whole process, among others. Go for it!

Weekly logs

- Week 1: http://joeltong.org/blog/?p=274
- Week 2: http://joeltong.org/blog/?p=272
- Week 3: http://joeltong.org/blog/?p=270
- Week 4: http://joeltong.org/blog/?p=267
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- Week 9: http://joeltong.org/blog/?p=253
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- Week 11: http://joeltong.org/blog/?p=245
- Week 12: http://joeltong.org/blog/?p=298

Summary

- http://joeltong.org/blog/?p=277

Developer Docs

- **API:** https://docs.google.com/document/d/1s-HOWTea0YBLP4UpYteeS94IgB7H-SlXPmQJ9hxhrGs/edit
- **Working Spec:** https://docs.google.com/document/d/1jcZ3FNsjMZPQVVCyaKAmAktT3MKZLapE3XMJdrMfM9U/edit?usp=sharing

Code

- **Java:** https://github.com/myrtleTree33/appinventor-sources/commit/7b4efa76e31a710bb9aa4c12e2947c108fb846f0
- **Javascript** (hosted on AppSpot): https://github.com/myrtleTree33/TestBlockly/commit/104f63f7a2fae5f19f4065f707d03adaea8e6bdd

PDF Generation

Generated with Gitbook 2.0.1. To compile the PDF, install Gitbook and use:

```
gitbook pdf . book.pdf
```

Facebook OA Kickoff / AI2 – Week 1 (January 28 – February 4)

I arrived in the Bay Area a week earlier on Friday January 23, with the intention of completing and offsetting school coursework on the Stanford premises in addition to getting adjusted to the time-zone and a brief exploration of the area. On the weekend and a day at San Francisco, I made a visit with a friend to Dropbox, Evernote, Google and surrounding startups. It was very exciting to see the work culture in Silicon Valley.

At the Facebook Open Academy kickoff, we were introduced to our team. The current team for App Inventor is in its third iteration, and Jose has had successful runs of a course on App Inventor with students from MIT as a formal course. Our team comprised of five CMU students, one from UIUC and me. Some members of the team had worked extensively with Java and apps via the Android Studio, and appeared to be from a combination of mainly CS, and one student from ECE.

Jose was extremely patient with us and I enjoyed his mentorship. He took great pains to familiarize us with the development environment and was extremely approachable, never out of reach for questions although he was having jet-lag.

For the first day, Jose got us familiarized with the team. We went through presenting our findings and corresponding apps and we broke the issues down into 3 columns, which feature on our trello: https://trello.com/b/hplMVWBb/open-academy-15-projects . The workflow is to create a proposal on Google Docs, receive feedback from the community, before coding it extensively and integrating their feedback such that a pull request can be accepted. Our first day was also spent reading the docs, configuring our IDE (in my case, Eclipse) and getting our hands dirty with the code and tutorials from the course conducted at MIT.

Our second day was spent familiarizing ourselves with the code base. It is interesting to note that AI2 compiles down to scheme, which is then used to generate YAML files for the creation of the program in Java. To support the live functionality of the debugger and official app at the same time, two different workflows are used to generate the Scheme needed. Hence developing a new block would require two different workflows. During the latter part of the second day, Jose got me up and running with the proper workflow of using Git, including the meaning of various branches. I am especially thankful for this run-through and am up to speed with using Git, with reference to a book on Git read on the plane.

It was very great meeting the new members of our team and I am now more confident of contributing to a mature code base, contributing to AI2, and finding the resources for AI2 as and when needed.

Facebook OA / AI2 – Week 2 (February 4 – February 11)

I arrived in Singapore Wednesday 1am. The next few days were spent getting up to speed and catching up with lectures, tutorial classes, TAing and homework. Just to familiarize myself with Git, this week was spent testing out the Git workflow learnt at Open Academy, and utilizing it on mock projects.

I spent the week covering the various documents and workshops we went through at Open Academy, just to make sure I fully understood the development process of working on AI2. The week was spent keeping in mind how to best integrate the Phaser development into the environment. I was perplexed how to multiplex Blockly blocks, which were targeted for code generation into scheme, into Javascript when a Phaser block was detected. I was thinking of using labels, that could be picked up by Java App Inventor framework. However, that is something very sketchy at this point in time and needs much more development.

Facebook OA / AI2 – Week 3 (February 11 – February 18)

I spent the first part of the week catching up with leftover labs and school assignments. I have also migrated my development to IntelliJ instead of Eclipse and it is working much better. Instead of configuring stuff, now more is done by the IDE and this eases my development with working on the large code base.

For this week, I proposed on the forum of moving development to a Docker container. This would make development easier via a single command, instead of running multiple commands in multiple terminal windows as we have to do now. Right now it is not as pressing and am leaving it as a suggestion to the community to develop it.

Facebook OA / AI2 – Week 4 (February 18 – February 25)

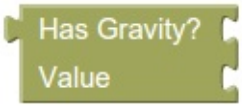
This week was spent thinking of the possible workflow. I have resolved the multiplexing problem by intending to move the Phasor Blockly IDE into a separate pop-up window. Thus the IDE based as a HTML5 webapp will solely output Javascript. As existing components are available in Blockly, such as the creation of lists and arrays, the task is eased somewhat with the provision of core components.

The whole integration is scratch-padded into a webapp document, with package management by Bower. I am pretty satisfied with the organization and this helps in getting up to speed with development. When ready, it may be possible for this IDE to be contained in a separate module (as per standard, modularized practice) and deployed as an iframe component in App Inventor2. This is still sketchy and the aim is to create a simplified game using a simplified Blocks workflow in AI2 first.

To understand the workflow of components, I have followed a tutorial online to create the game shown below. It is a game to collect stars. In addition, as Phasor IO relies heavily on function chains (and thinking in the line of a beginner programmer), I am adamant that these chains would have have to be simplified. For example, the API call to enable physics on an object is

```
rock.physics.enableBody = true;
rock.body.gravity = 300;
```

which probably does not make sense to a beginner programmer! So the Blockly equivalent should be instead should be instead look like



I will be suggesting these to Jose for consideration. We can hopefully move forward with our project next with the creation of a few varying blocks.

Right now, the current mock framework spews out PhaserIO Javascript which can be embedded into a template file. I will look into embedding these live, such that the game can be previewed live as we code.

The next phase of development is to get basic generator going, which can be embedded as a module the App Inventor's repository later.

Facebook OA / AI2 – Week 5 (February 25 – March 4)

For this week, I had a disussion with my mentor Jose about what we should implement for Phaser.

Originally, we discussed about implementing Phaser as-is, using blocks and building a separate add-on. This was submitted as Version 1 of the API. However, Jose cautioned against doing that and instead asking me questions about:

> What do you really like to see being carried forward?
>
> Think from the perspective of the user, a person who might just have had his first experience with programming.

He advised that instead of coding a solution, on roadmap should be instead listening to the user, drafting a proposal to the Open-Source community, create something fast and sketchy, and find out what they think about it. Then, improve and refactor later, add more new features later.

I found this to be really insightful and proceeded to follow his advice.

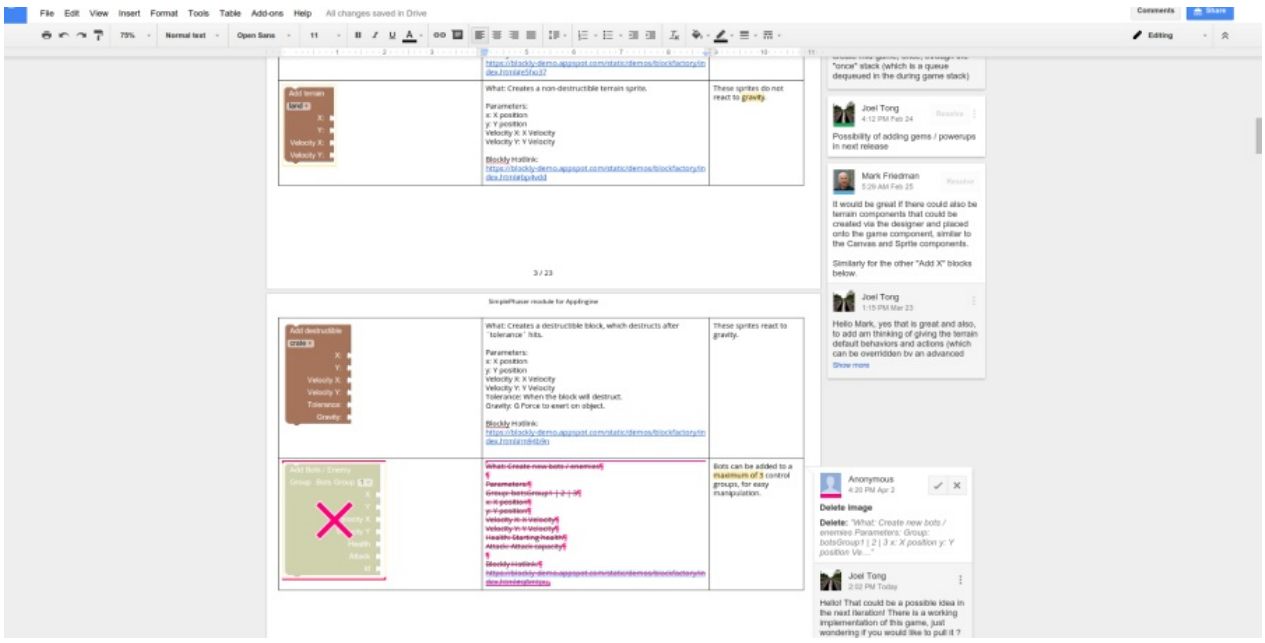
The week was spent playing around with Blockly factory, drafting a proposal and mocking components and thinking *what* should *really* developed, and what I would like to see in the game.

There are many types of games for example:

- Top-level games
- RPG
- RTS
- Arcade

I came to the conclusion that given our need for a certain degree of flexibility, we have to restrain our implementation to a certain type of game. And for this, we chose the **arcade** game type which is really fun to explore, to develop as a phone app, and really interesting for end-users to view.

So here's how the working spec proposal (Version 2 of the API) looks like on Google Docs! And we received some feedback here: https://docs.google.com/document/d/1jcZ3FNsjMZPQVVCyaKAmAktT3MKZLapE3XMJdrMfM9U/edit?usp=sharing



Next steps

Am really happy with the feedback and will proceed to implement the basics of the features.

Facebook OA / AI2 – Week 6 (March 4 – March 11)

This week, I am down with Dengue, a mosquito-born ailment in Singapore. Hence went slow on coding.

This week, I managed to churn a Gulp script together with Browserify. Previously, the build was a rough sketchup and hence utilized many `<script>` tags. Talk about having multiple scripts, handling dependencies, ensuring that things are called properly and the like. This is my first time using Gulp, and its going pretty well!

Now is is really simple, following NodeJS's pattern.

Dependencies: Managed with Bower

Build: Gulp

Minification: Browserify

So now we can simply do the usual node `require()` and dependencies will be automatically handled across modules.

```
require('../bla.js');
...
```

For sprites, I have settled on an inheritance pattern enforced by mixins. There will be a basic sprite which handles garbage collection methods in the background. Hence, the idea is that these sprites will feature very high-level methods to the user and will not bother about how to, for example, load a texture for the tree sprite or perhaps even configuring collision and physics behavior for a rock.

So after much experimentation, here is the final pattern for a basic sprite!

```
__generators.SimpleSprite = function(name) {
    var _scope = undefined;

    var _kill = function() {
    delete this;
    }

    var _init = function(scope) {
    _scope = scope;
    ...
    }

    /**
     * Override this implementation.
     */
    var init = function() {
    /** Insert code here **/
    /** End insert code here **/
    _init(this);
    }

    /**
     * Override this implementation.
     */
    var kill = function() {
    /** Insert code here **/
    /** End insert code here **/
    _kill();
    }

    return {
    _init: _init,
    _kill: _kill,
```

```
    init: init,
    kill: kill
    }
}
```

All future sprites implement the kill and init functions, instead of letting the user do so. No need for the user to program an explosion animation, no need to care for mass and etc. Take for example, the rock sprite:

```
__generators.rock = function (group, name, x, y, gravity) {
    //var nativeObject = __generators.SimpleSprite('rock1');
    var nativeObject = __generators.SimpleSprite(name);

    var init = function () {
    var rock = $blast._groups[group].create(x, y, 'rock1');
    rock.group = group;
    rock.body.gravity.y = gravity;
    rock.body.bounce.y = 0.7 + Math.random() * 0.2;
    rock.outOfBoundsKill = true;
    rock.body.collideWorldBounds = true;
    this.obj = rock; // add to object
    nativeObject._init(this);
    console.debug("Init rock at x=" + x + ',' + y);
    };

    var kill = function () {
    console.log("=KILL= I got called");
    __generators.explosion(this.obj.x, this.obj.y);  // plays an explosion
    this.obj.destroy();
    nativeObject._kill();
    };

    return _.extend({}, nativeObject, {
    init: init,
    kill: kill
    });
};
```

Here's a few sprites and the garbage collector dump, just to test things out on the backend:

Looking good! For next steps, will attempt to link the Java and Javascript sides together.

Facebook OA / AI2 – Week 7 (March 11 – March 18)

This week, I was just up recovering from Dengue. Missed a midterm, but making up for it after the period. Lots of schoolwork catching up this week.

I have managed to connect the interface between Java and SimplePhaser, and it looks really neat now. It is a relief as the theory behind our program implementation works!

Wrote an app to test things out. And so this is how bi-directional callbacks actually work!

Java to JS

```
WebView.loadUrl("javascript:myJavascriptFunction()");
```

JS to Java

This is what you do on the Java side, exposing the interface:

```
/** Java **/
@JavascriptInterface
public void showToast(String toast) {
    Toast.makeText(mContext, toast, Toast.LENGTH_SHORT).show();
}
...
// from http://developer.android.com/guide/webapps/webview.html
WebView webView = (WebView) findViewById(R.id.webview);
webView.addJavascriptInterface(new WebAppInterface(this), "Android");
```

And on the JS side, call it like this:

```
function showAndroidToast(toast) {
    Android.showToast(toast);
}
```

For next steps, I will work on the collision handling.

Facebook OA / AI2 – Week 8 (March 18 – March 25) - Added a collision manager!

For this week, I have successfully implemented the collision manager. It builds on top of PhaserIO's collision manager, which already supports some basic collision handling across groups.

Triggering an event in PhaserIO can be done through the following:

```
_game.physics.arcade.collide(__._groups.destructibles, __._groups.bullet, function () {
    console.log("triggered!")
}, null, this);
```

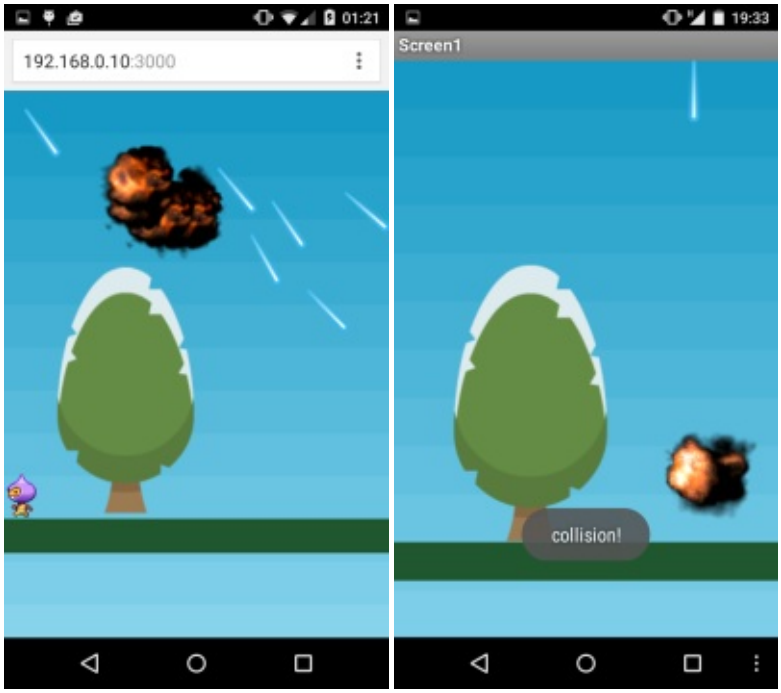
Helpful, but too low-level in my opinion for our needs of code blocks.

Our idea was to make it really easy for the user to write code, certain objects (bullets) have automatic collision behavior embedded in them. For example, bullets should blow up when coming into contact with a sprite group.

So here is the new block!

So, when Sprite A collides with Sprite B, we worked this event to fire, on the Java end, behind the scenes. It it works fine!!

Below shows 2 different scenes in action (one in the browser, the other a native app created through the code blocks.)



It comes with a nice destruction animation, upon being destroyed.

Implementation

Behind the scenes, a centralized collision manager handles the collisions between sprites. If you recall, we decided upon setting SimplePhaser to utilize fixed groups, instead of letting the user control the collision groups (doing otherwise would be really messy and too low-level setting up collisions, as users would have to tweak a little of the low-level code, at least 3 to 4 steps before doing anything. By attaching pre-defined collision hooks to these sprites in a given fashion, we avoid having to attach collision callbacks for every single sprite to every other sprite in the world.

As it is, this is pretty heavy in SimplePhaser and here is how it looks like:

```
        // collision detection
        /** terrain 1 **/
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.terrain1);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.terrain2);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.powerups);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.destructibles);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.player1);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.player2);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.enemy1);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.enemy2);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.enemy3);

        /** Terrain 2 **/
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.terrain2);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.terrain1);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.powerups);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.destructibles);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.player1);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.player2);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.enemy1);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.enemy2);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.enemy3);

        /** Bullet **/
            //__._game.physics.arcade.collide(__._groups.bullet, __._groups.destructibles);
            //__._game.physics.arcade.collide(__._groups.bullet, __._groups.terrain1);
            //__._game.physics.arcade.collide(__._groups.bullet, __._groups.terrain2);
        __._game.physics.arcade.collide(__._groups.destructibles, __._groups.bullet, _collisionManager, null, this);
        __._game.physics.arcade.collide(__._groups.terrain1, __._groups.bullet, _collisionManager, null, this);
        __._game.physics.arcade.collide(__._groups.terrain2, __._groups.bullet, _collisionManager, null, this);
```

All the unified collision manager has to do now is to send the signal over to Java, and raise an event:

```
    if (hasAndroid) {
        Android.onCollision(spriteA.name, spriteA.obj.group, spriteB.name, spriteB.obj.group);
    }
```

Other blocks

In addition, I have added deletion, setting the XY coordinates of a sprite, this week.

Next steps

Next steps will be adding getters and setters to sprite blocks.

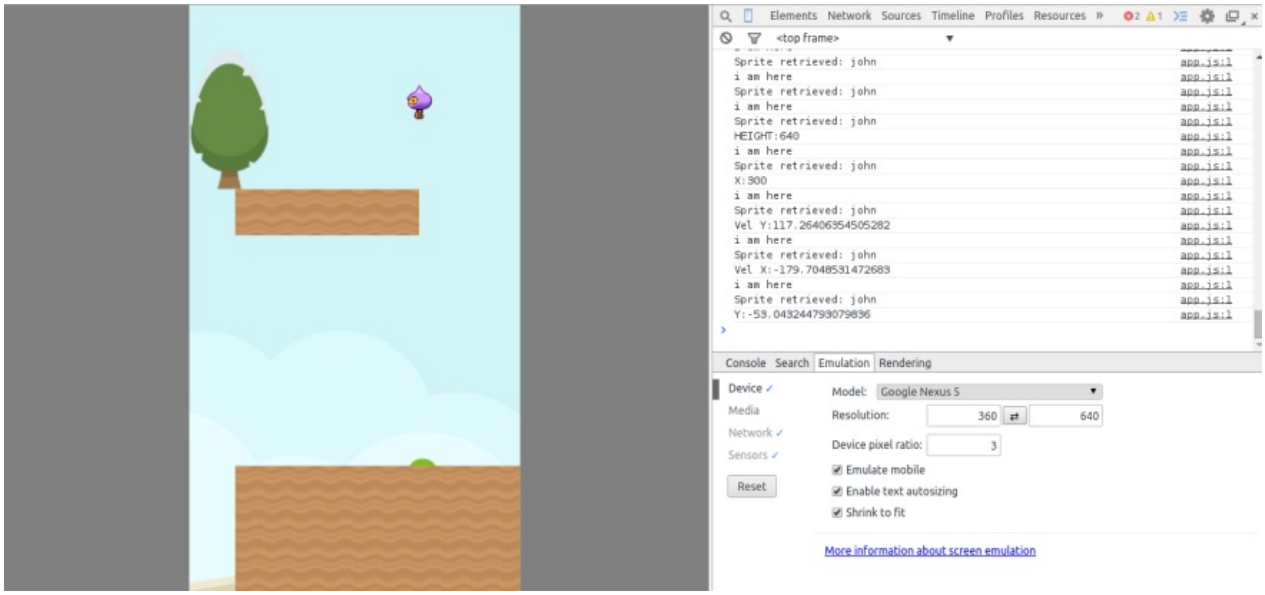
Facebook OA / AI2 – Week 9 (March 25 – April 1)

For this week, I added new components to the game. One of these components is a flexible platform.

Recalling our previous implementation of platform, there was no support for custom-sized platforms. In the latest iteration however, this is possible.

I also added a couple of animated sprites to control the user animations. However, instead of dealing with the low-end Blockly code, it is possible to change the state of the player sprite (running / moving / left / right) via a simple function call. Phaser already does some of the heavy-lifting (For example, cutting up the spritesheet into the various frames), however this is not intuitive and may be too slow for the novice user if it were implemented through blocks.

So here is the game in action, with a couple of new sprites:

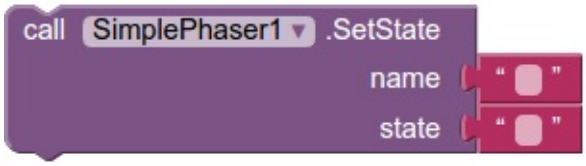


Oh and, you could change the texture of the custom platform!

And the blocks:

Create a user:

Ever wanted the user to turn left? No problem!



And the custom platform block:

For next steps, I am debugging the getter function. Right now the issue with the getter is, synchronizing a bi-directional callback between the Java and Javascript endpoints. Its using an event-driven callback, and while it seems alright, the game somehow hangs every time. Debugging it for next week! (Pressing issue).

Facebook OA / AI2 – Week 10 (April 1 – April 8)

This week, I am into my third week resolving the getter / setter bug, and finally managed to solve it!

The problem

To recap, the setter was working all fine, as the game state was maintained on the Javascript end and altering was simply performed through a one-time function call. However, the getter was slightly different. The event had to be triggered from the Java end, calling a Javascript function and somehow returning a value back to Java, in-order and synchronous. There was no method existing to directly retrieve a Javascript function call's routine directly, so a method had to be devised.

Previously, this was done through an event-driven method. Java would call the Javascript function with a unique UUID as a reference. Upon completing the routine, the Javascript function call another universal Java function to put it into a key-value data structure, using the UUID given. The original Java function would be polling this data structure in the meantime, and upon finding a UUID which matches, would deque the entry, and return the value to the user.

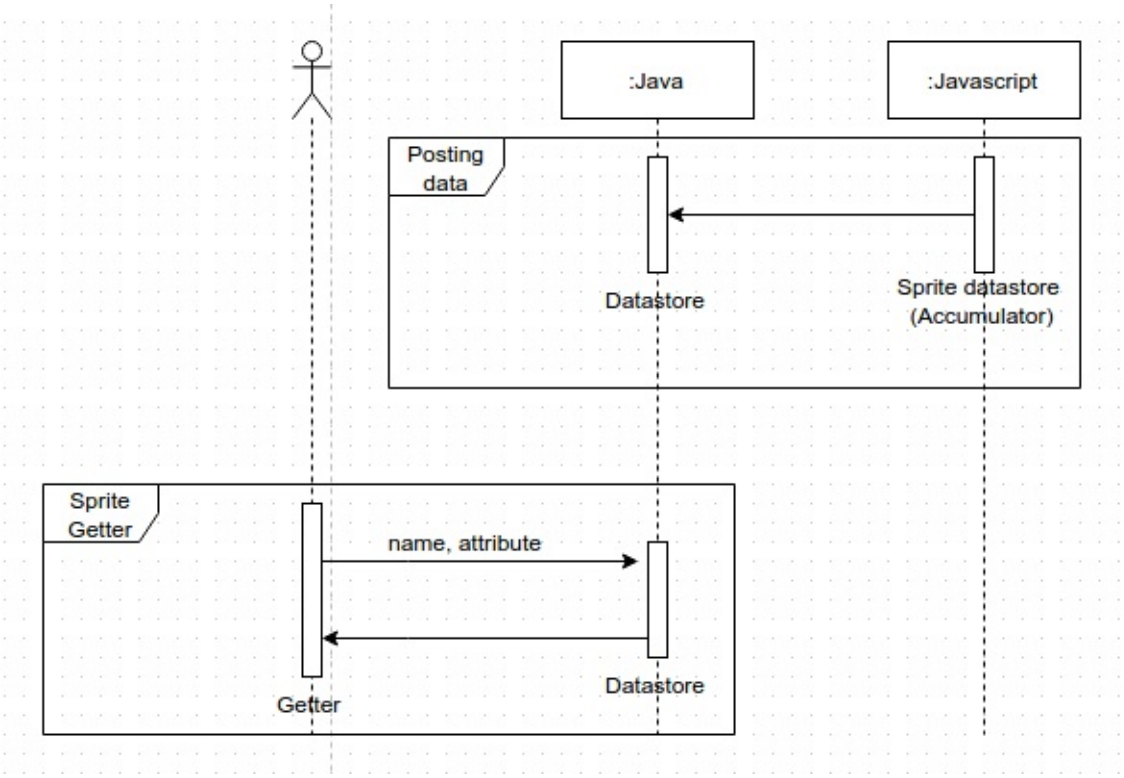
This method did not work! After numerous checks, there was no reason why it should not work and the problem was isolated to a possible way Java webview might have handled the thread calls. Apparently, there was a blocking thread somewhere after the original Java function was called, leading to the game blocking on this thread and hence hanging. Given not much form of debugging and a relatively long build time, this was frustrating and took a long time to trace. But nevertheless fun indeed!

The solution

In the end, I adopted another alternative (thank God!) that solved the issue. Instead of storing state on the Javascript function, sprite states were also posted frequently (~0.2 secs, any slower would report the wrong value) to the Java end. These reports were stored in Java, and upon requesting for a getter function call, the Java function would return its last reported value back to the program executed. Dirty, quick, and somewhat sounding a little inefficient, but it works!

TL;DR

This might be getting a little hard to see without visuals, so here is a callback diagram:



Just to test the piece works, I wrote a program to set the value of a sprite using its getter (which should effectively not hang the game and run as per normal).

Phew. It worked.

For next steps, I will be moving on to adding user interfacing and packaging the game for release to the public.

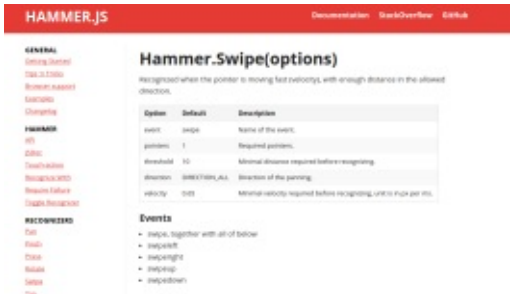
Facebook OA / AI2 - Week 11 (April 8 - April 15)

This week, I spent some time wrapping up the functionality of the SimplePhaser component. To recap, I am developing a component that allows one to easily create games via blocks through the App Inventor framework.

The previous few weeks were intense as the getter code functions refused to work, and was finally narrowed down to a thread issue.

For this week, I worked on adding some touch interactivity to SimplePhaser. Now, there is an integrated event manager(s) for the tracking of swipe (up/down/left/right), in addition to single taps and drags. This was accomplished via HammerJS, and for the record, this added some nice swipe on the Javascript end:

```
// for swiping features
var _bindHammer = function () {
    var ele = document.getElementsByTagName('body')[0];
    var hammertime = Hammer(ele);

    hammertime.on('swipeup', function (event) {
        _inputManager.onSwipe('up');
    });

    hammertime.on('swipedown', function (event) {
        _inputManager.onSwipe('down');
    });

    hammertime.on('swipeleft', function (event) {
        _inputManager.onSwipe('left');
    });

    hammertime.on('swiperight', function (event) {
        _inputManager.onSwipe('right');
    });

    hammertime.on('swipe', function (event) {
        _inputManager.onSwipe('swipe');
    });
    console.log('--- Attached Hammer.JS ---');
};
```

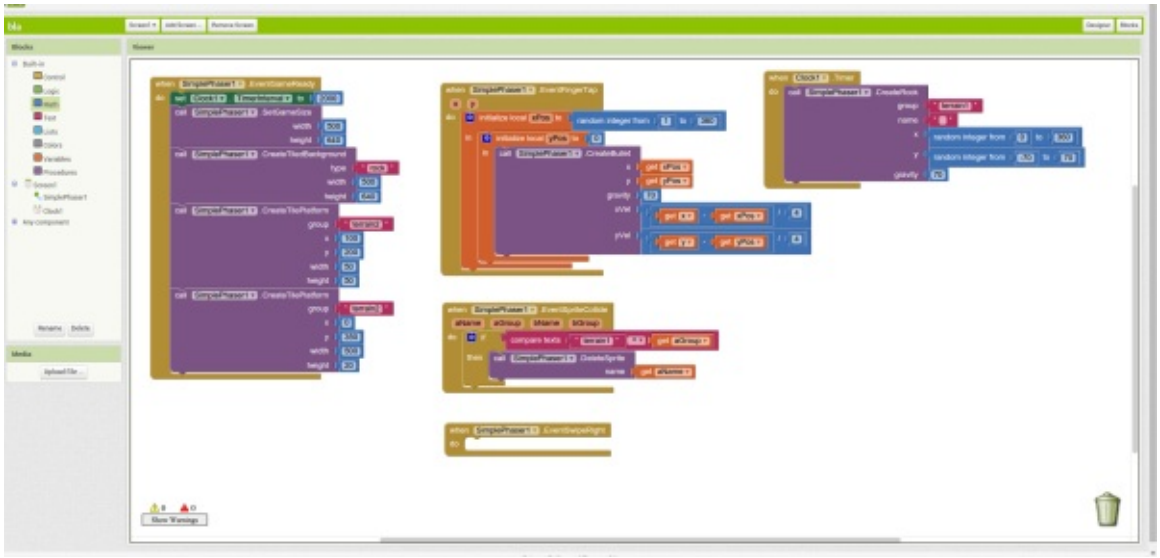


Also coded this week is the ability to increase world size, and also the ability to move the camera around the world, in addition to being able to track a sprite object with the camera.

Testing

A small game using the code blocks was written to test the functionality of the game. In this game, rocks fall down from the sky. It is the user's duty to clear the rocks by tapping on the screen, causing them to explode. Bullets in the direction of the user's tap fall from the sky, and are influenced by gravity. The game in action:

Here is the program. It also uses another external component, the Timer compoent. The inspiration is that users will mix and match components / sensors in future, to create something interesting! (Proximity?)



Code base for v0.1-alpha

Code bases have been tagged as v0.1-alpha and released as the following. Still planning to work on a couple of additions / bugs so there might be hotfixes along the way. In either case, this is stable.

- The Javascript at https://github.com/myrtleTree33/TestBlockly/releases/tag/v0.1-alpha and is hosted on my remote server.
- The Java at https://github.com/myrtleTree33/appinventor-sources/releases/tag/SimplePhaser-v0.1-alpha .

Next steps

For the next week, I will concentrate on improving the official documentation. Right now there's still some online proposal going on at https://docs.google.com/document/d/1jcZ3FNsjMZPQVVCyaKAmAktT3MKZLapE3XMJdrMfM9U/edit?usp=sharing , which is targeted as a proposal for features and discussion. The official spec will have information how to properly enforce tasks, for e.g. specifying the correct groups, as well as getting up and running with the game. Hopefully, that can be a testbed to see how quickly users adapt to the SimplePhaser framework, and future adjustments made

accordingly.

Also to be added are bux fixtures and introducing this to the community.

What is implemented

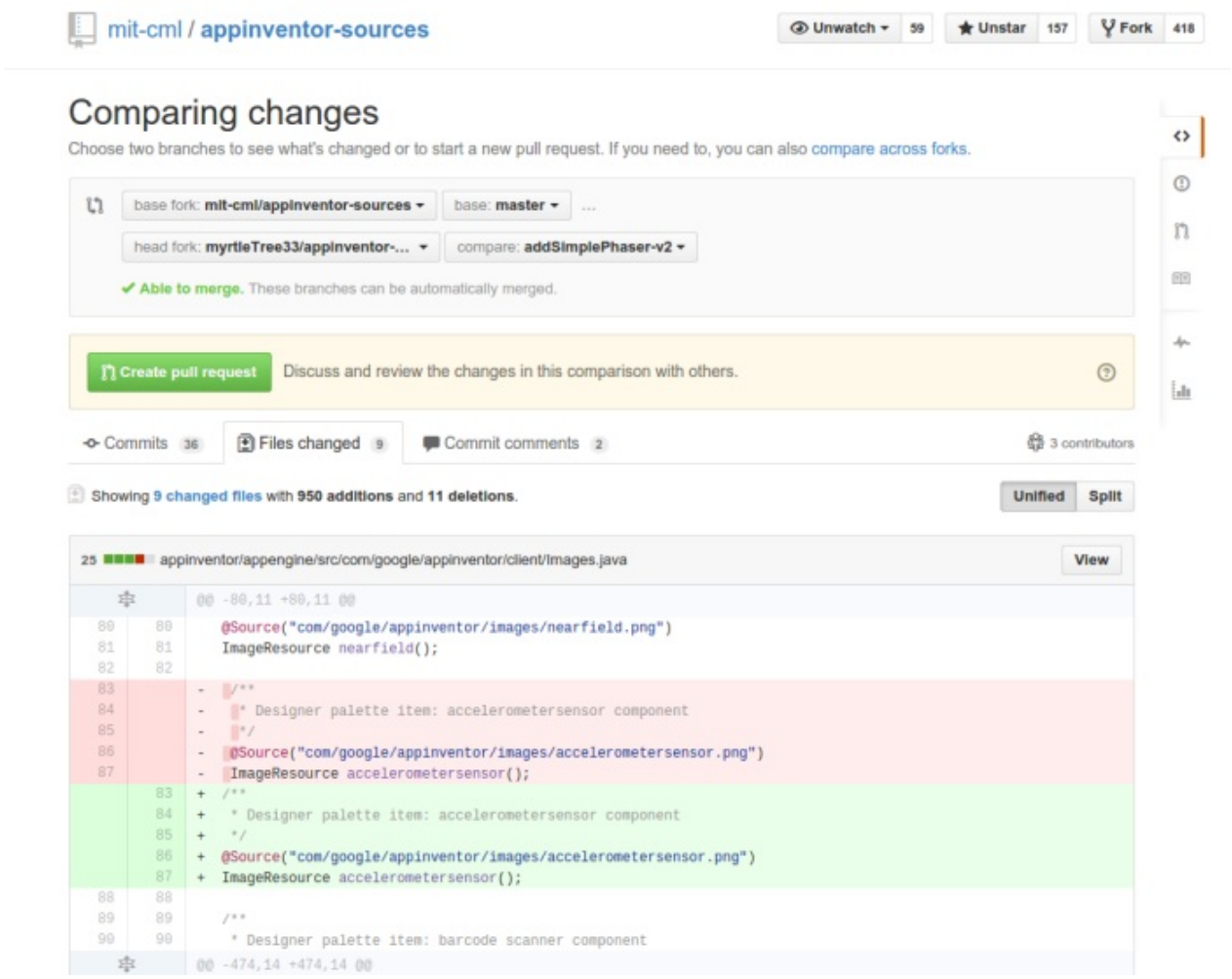
For the record, taken from the release logs, the following are implemented:

```
## Sprites supported:

- Tree
- Player
- Rock
- Sky
- TiledBackground
- TilePlatform
- Platform
- Bullet

## Groups supported:

- bullet
- terrain1
- terrain2
- destructibles


## Collision detection handling

### Bullets

- terrain1
- terrain2
- destructibles


## Camera

- Camera XY setters
- Camera tracking an object


## User Interaction

- Single Tap / drag
- Swipe left / right / up / down / general


## Player

- Ability to change player sprite state (left animation / right animation)


## Features

- Collision detection
- Automated destruction animation and deletion upon sprite destory
- Automated destruction of bullets upon hitting object
- Gravity
- Getters / Setters
- Making world larger than screen size
- Moving camera around world
- Tracking camera on object
- Swipe and touch events


## Production-ready URL

- Loaded from a remote server.  To be implemented on device during production.
```

Facebook OA / AI2 – Week 12 (April 15 – April 22)

The week was spent tidying up SimplePhaser with the master branch for submission. Some comments had to be renamed, accidental indentations had to be removed. The code was not synced with master for a while, and hence needed to be updated with `upstream`.

SimplePhaser is now ready for merging with upstream, as far as the code base is concerned:



Right now, its mainly tidying up the user API, and convincing users to get aboard the system - simplifying workflows which may have been overlooked, and making it not overtly complex such that a beginner has to read a manual. So its refining the workflow, thinking about what the user would have after viewing the prototype.

> What is a callback?
>
> What is SimplePhaser?
>
> what are the sprite groups available and how do I use them?
>
> How do I create many sprites on the canvas?

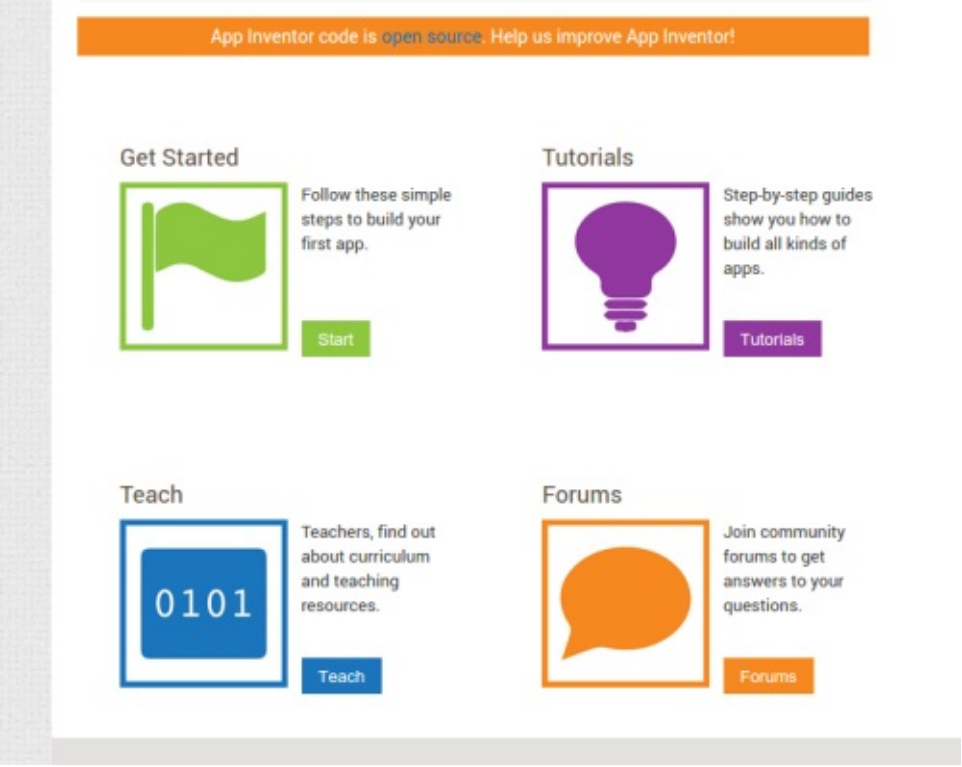
This is crucial, as the whole SimplePhaser package features many blocks (due to its nature of being a game creation engine component), and would need a slightly different approach towards user adoption (Users might be overwhelmed by the blocks).

> Follow the principle of least astonishment.

To facilitate user adoption, next steps would fall under two categories:

1. Empowering the user by providing online tutorials on using SimplePhaser to build games. This could be similar to the videos we have started on App Inventor 2 on the main page:
2. Providing a community of support. As it is, to ensure that questions on the component by users get answered responsively and without delay. This would require support from the community, which should be easier if this gets through a couple of vetting / refinement prior to release (Releasing suddenly might surprise the community)
3. Simplifying the workflow of events. This has been considered during the drafting of SimplePhaser in the developer's forum, and should continue to adapt to input based on what the community suggests. More feedback might imply more support from the community.
4. Renaming SimplePhaser to something which says much about its name. Few outside the Javascript / Game development community might have heard about PhaserIO. Hence, renaming the SimplePhaser component to something like ArcadeGame would help user to be less astonished by the introduction of the component.

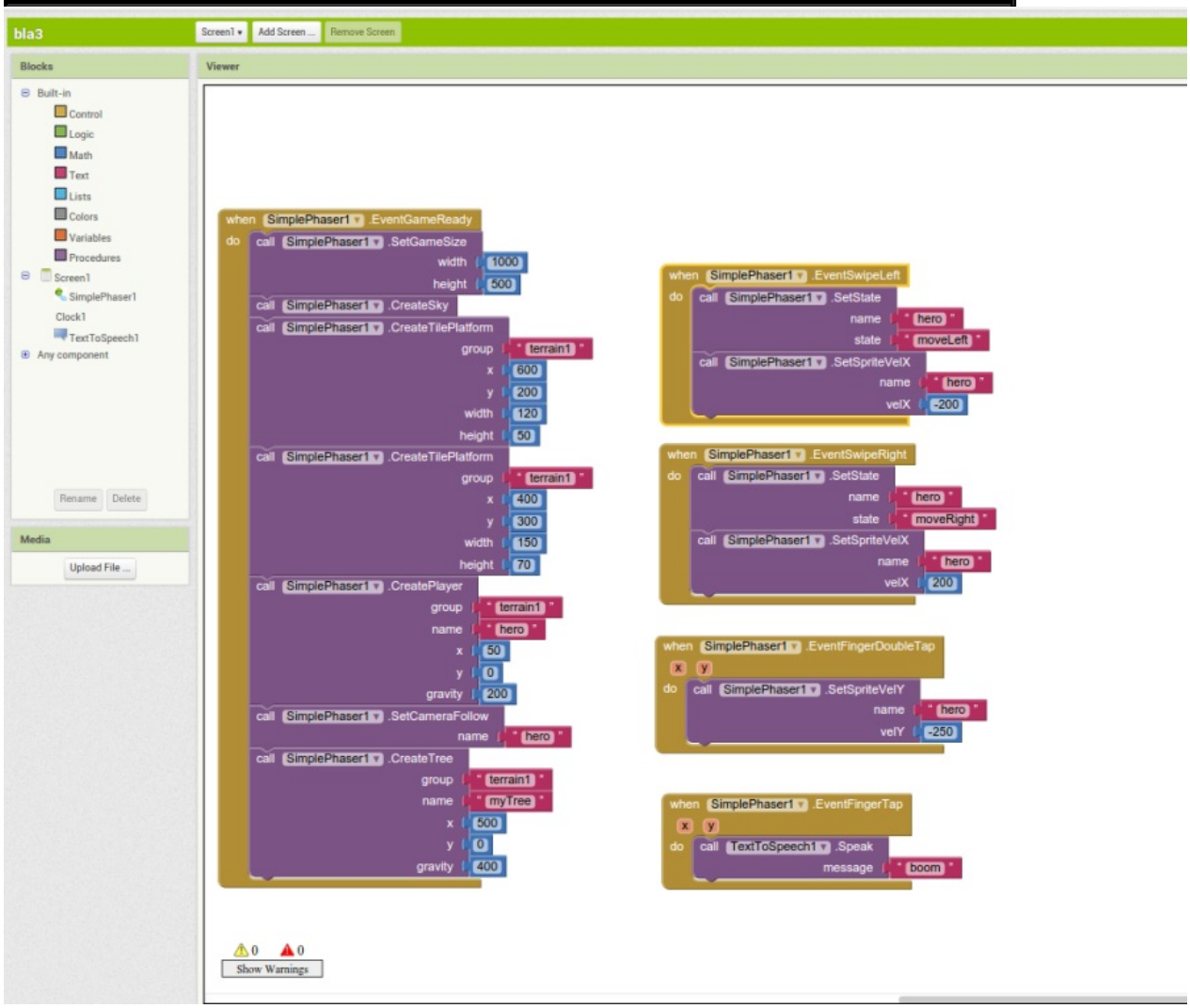
Some thoughts to consider for next steps after initial prototyping and development. The next phase would be an interesting one for me, and I am keen to see SimplePhaser being adopted by the community after Facebook OA.



Adding double-tap functionality

This week was also spent fixing a couple of undetected bugs, and refining the user interaction manager such that it is able to recognize double taps. This was not as trivial as the double-tap handler would have to wait for a while before it can be sent out, and in the event of not detecting a second tap, would fire a single tap event handler.

As the current user interaction system features inputs that are much richer than that supported by pure PhaserIO (for example, taps, pinches, rotations and swipes / drags), the implementation was a coordination between PhaserIO and Hammer.JS, a popular mobile user input framework. Mutex locks were first considered, however they frequently locked and are not recommended in Javascript. Instead, a timed delay of 5ms was given to avoid race condition between the PhaserIO native input and Hammer.JS's event manager, which worked pretty well.



So yes, Phaser can now swipe left and right! To test the functionality, here is a simple game, which moves a player sprite according to the following moves:

- Swipe left: Move left
- Swipe right: Move right
- Double tap: Jump
- Tap: trigger App Inventor's text-to-speech component to say "boom!"

Note how the camera locks onto the player during moves.

TL;DR and next steps

Having seen a component from conceptualization, to grappling with the AI2 framework, to coordinating data synchronization, to the end in a relatively unconventional way (using Java to control Javascript and controlling state!) has been a wonderful experience for me, to challenging things out of the box as well as receiving input from wonderful mentors and the community. The product is done, deliverables submitted, however next steps to its integration would be a different set of learning experiences (less of coding and more of listening and user adoption), which I am keen to continue learning after the completion of the App Inventor program.

Facebook Open Academy: A Summary

12 weeks have passed since my involvement in App Inventor 2, and while it has been a while of a time, it was a really enjoyable one and fulfilling experience - something that cannot just be learnt through books alone.

Being attached to a large code base, and having credits to do that is a rare opportunity, and I am thankful for it. If you're thinking of going for Facebook Open Academy, well, go for it! Here are pointers I have learnt from a somewhat Git-ignorant, Java newbie to someone more comfortable with handling these tools after this semester.

Listen, listen, listen.

Listening is an important skill in any field - and this includes coding. I found this topic resonant throughout the duration of Facebook Open Academy. Code is cheap, but it may not be necessarily so that the code written is useful to others. Learn to listen to them, learn to engage with the community, and implement code that people will use. This is something I am trying to learn still.

In all things, ask the community for their ideas. Find out what is needed from the developers, from the people, and the things they would like to see.

This really struck me during my discussions with my mentor Jose, a key contributor / maintainer of the project. Originally, I had in mind a rough sketch of what the component should look like and proceeded to implement parts of it. However, throughout this process, Jose encouraged me to relook at the process by engaging the community with a proposal. He encouraged me to put a proposal out there with SimplePhaser. While the idea was to implement most parts of Phaser.IO, we eventually restrained it to what the user really needed - building an Arcade game, using high-level blocks that a new beginner programmer would like to use. And we did that.

A proposal was put in place, and there was some feedback gathered. Having to discuss ideas and discuss why some features were needed was a constructive part of the discussion - something that was revisited time and again during the duration of SimplePhaser. Additionally for blocks, we moved away from the notions of low-level code and attempted to offer something new to the table - being motivated to create a Mario-style game with high-level behavior and blocks that a novice user would understand. And it worked - both for the implementation (it appears), as well as for the community and us.

We will still continue in that direction for the next phase of user adoption.

Implement first, think later. Think out of the box.

During the duration of the project, I was stuck for three weeks on a bug which appeared trivial - retrieving a sprite's property through getters. Recalling the blog post, it was not trivial as it involved calling a Javascript function, and awaiting the value of its callback on the Java end - all without direct support of retrieving the return value of the named Javascript function.

Three weeks were spent debugging this issue. The initial implementation was to implement an event-driven framework, whereby the said values would be identified by UUIDs in a key-value Java store. However, in every single instance where the getter was called, the program would hang! There was no idea where it would hang - it just did.

As there was not much form of debugging - there was not much of a debugger in place, and compiling the Java end would take around 7 minutes - leading to 4 changes an hour, debugging was tedious, sometimes tiring and at times painful. Throughout the whole process, I kept with the event-based protocol, having ruled out that constantly parameter polling would be too intensive and inefficient.

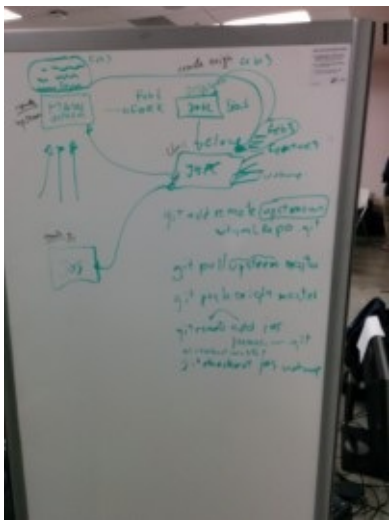
Finally, there was some progress after 2.5 weeks and it appeared that while there did not seem to be a bug with the code, it might be possible that there was an issue with how Javascript's webview functions were called and it appeared while they could be called simultaneously out-of-order, somewhere there was a thread pending internally with the first Javascript call (even thought it appeared calls were out of order).

Whichever the case, things did not seem pretty, and I eventually became open to the method of passing the keystore as a JSON continuously between the Java and Javascript ends, at an interval of 0.2 seconds.

It worked! (With not as much lag, but this remains to be seen with more sprites of course).

Be flexible.

I was hesitant at first contributing to a large code-base, in Java, having come from a C / NodeJS background with little experience in the Java world. IntelliJ was something new to me - what is IntelliJ? Oh and Java - is it inefficient? Why is it using Ant?! The usual stereotypes.



But over time and with prayer, it got better and the more we put our practice into it, the better it became. I was thankful for a good mentor who shared advice on working with App Inventor, getting into Java development in IntelliJ (made the switch from Eclipse and loving it), and even getting up and running with Git through a graphical explanation by my mentor (which I realized, I was using wrongly). Read more books, learn the shortcuts, practice with empty Git repositories, read Stack Overflow, and pray.

Be not afraid to ask, to practice, and learn. It will get better.

Maintaining a large code base isn't that hard.

Prior to AI2, I have never touched a large code base, only started mini-projects / coded stuff in my spare time / did work for school projects. Maybe because there was not a need, but perhaps because it appeared intimidating. Too many lines. Hard to build. How do I navigate / where do I start?! With practice, it got better.

Somehow, IntelliJ helped (especially with the CTRL + SHIFT + N quick navigation keys, and the target buttons), and being exposed to the code base proved helpful. What really helped though was keeping in touch with my mentor, and discussing with him problems which seem to crop up.

A word of advice: If the docs do not seem too informative, and you tried, approach the community online for help! It really helps when you do, and especially when someone can help you navigate through things.

TL;DR

Contributing to the MIT App Inventor 2 codebase under the Facebook Open Academy Program in Winter 2015 was a really enjoyable experience. What worked was having a great mentor, and coding something that we really believed in, and enjoyed doing. A new component was drafted, and we had the opportunity to learn things outside the box and would love to see this project to fruition - adoption to the community at large is another phase of learning.

Gained more confidence with contributing to Open Source? Yes I did. Will do it again? Yes, sure will!

And, thank God for a wonderful semester.

Acknowledgement

The past few weeks were enjoyable, fulfilling and enlightening. Besides levelling up as a web developer, and gaining experience in inter-platform (embedded) development, the following people have contributed greatly to mentoring the project. They are:

Jos Flores My mentor, who was instrumental in bringing the team together, giving advice and advising us to listen to the community's needs instead of jumping into the code straight. He was a great and patient teacher, never discounting any question, despite his busy schedule.

He got me up and running with Git, and through him I have learnt much about the App Inventor workflow, and contributing to the codebase - something that would have taken a considerable longer time had he not been present.

Prof. Ben Leong Our course instructor, who provided us with considerable advice that agurs well beyond the scope of this program.

I recall his ancedotes as a programmer, never failing to give up but more importantly, re-examining the process of learning and making corrections where possible, in addition to the importance of estimating our code speed given the timeframe. He has a heart and passion for teaching, which clearly inspired the whole team here at NUS.

The community The community, for giving ever needed timely advice and support during the development. Their willingness to help on a voluntary project attests to their passion for contributing to App Inventor, as well as helping beginners get involved in code through education (learning via code blocks).

Appendix A: Working Spec

Appendix B: SimplePhaser API v0.1-alpha