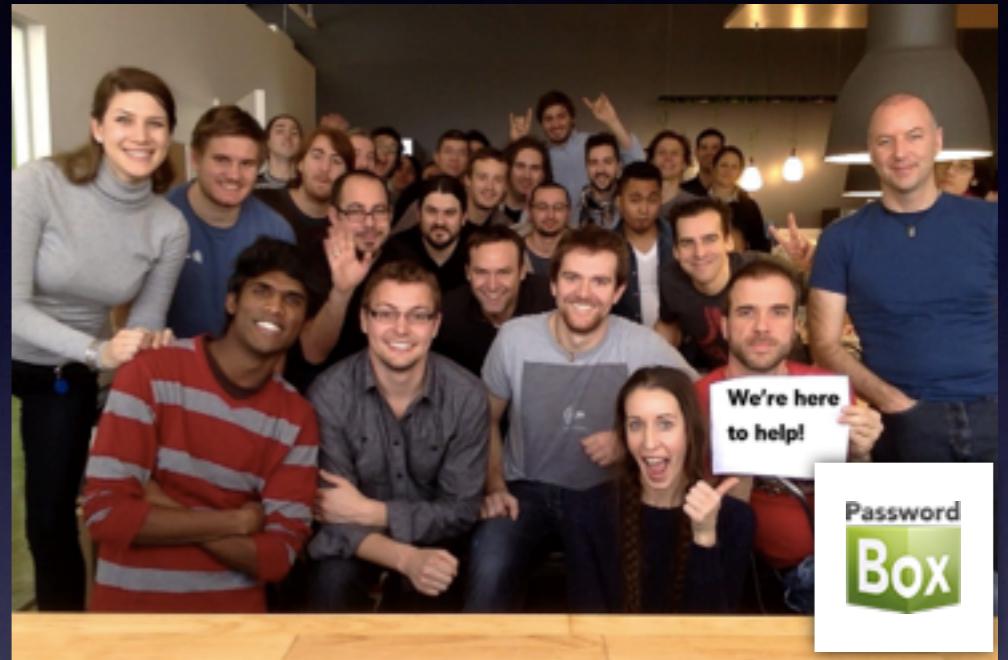


Procedural Content Generation

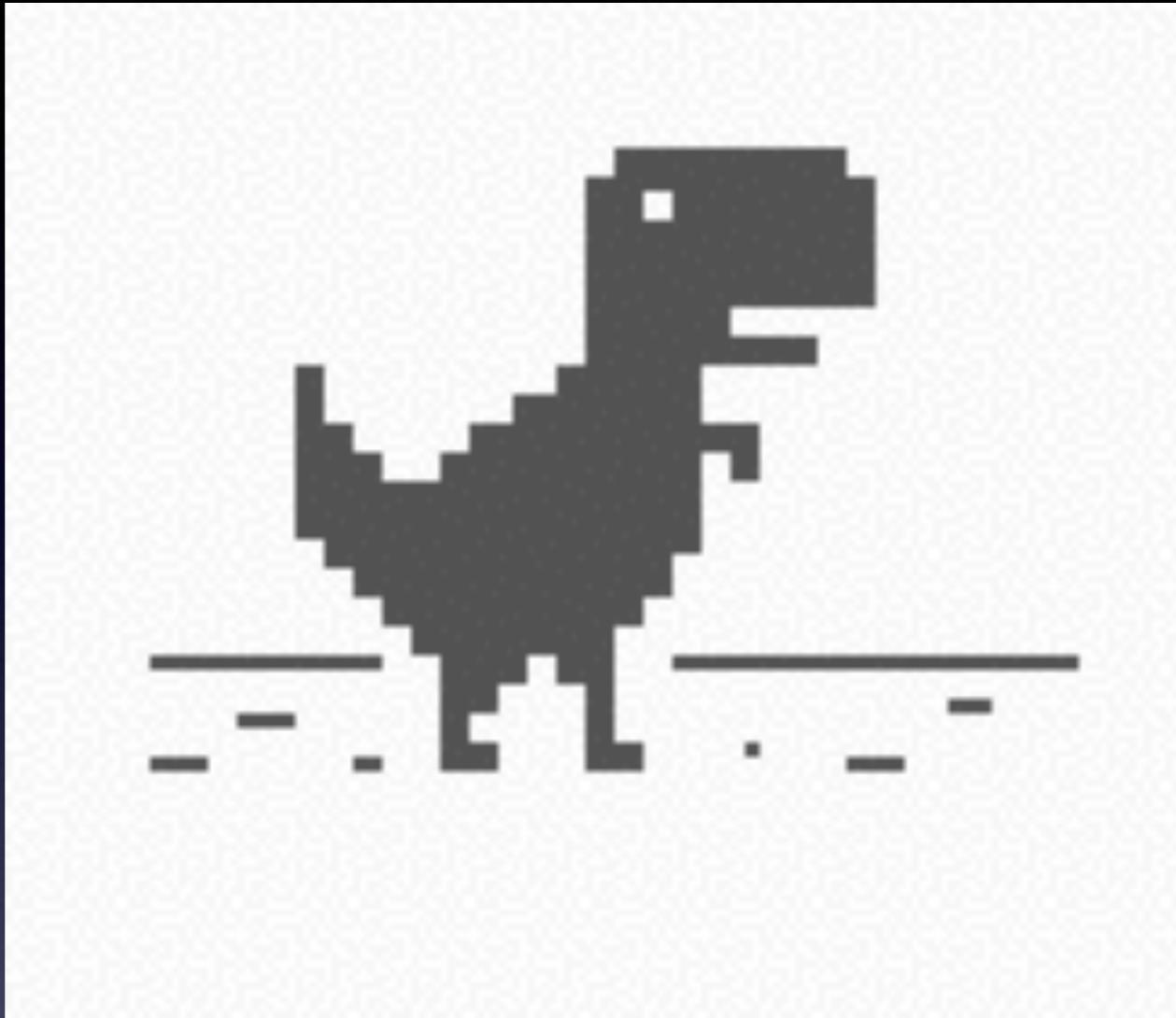
Tools and Techniques for Mobile Platforms

Etienne Caron

- PasswordBox.com
Android Team Lead
- GDG Montreal Android
Organizer



GDG Montréal Android

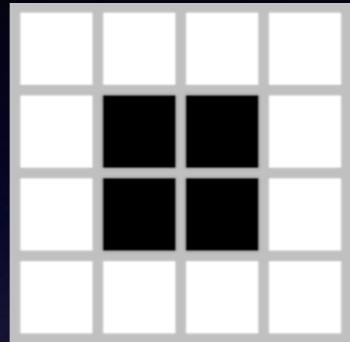


PGC Theory & History

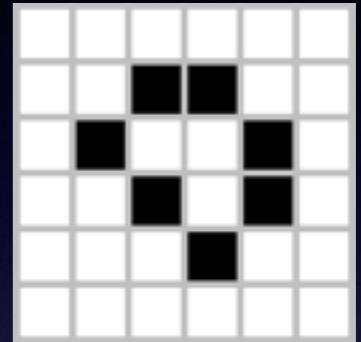
Back in the day...

Conway's Game of Life

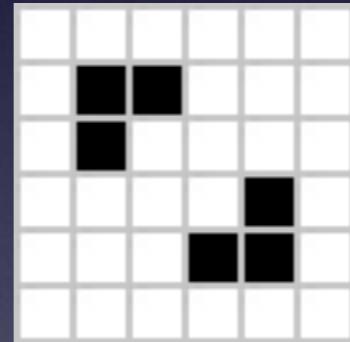
- Created in 1970
- Simple Rules
- Emergent behaviour



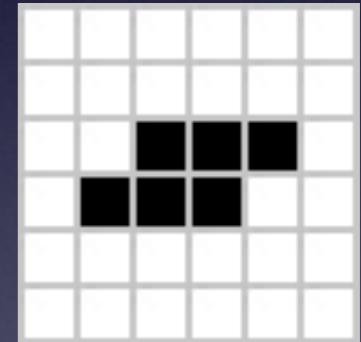
Block



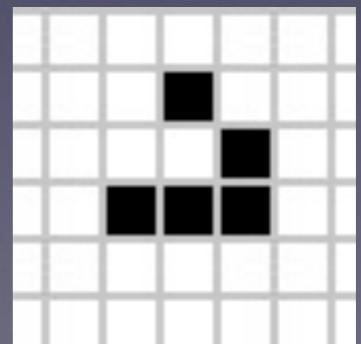
Loaf



Beacon



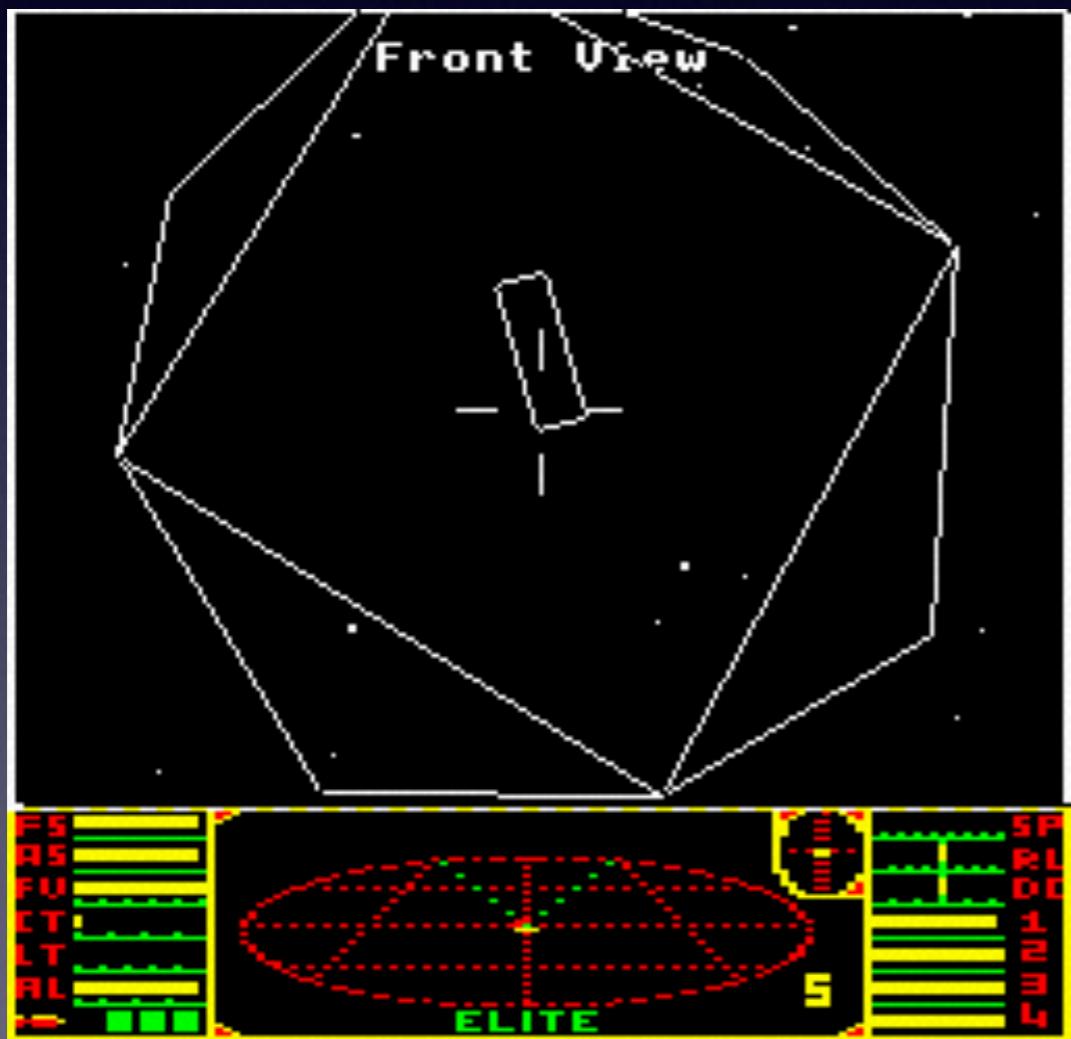
Toad



Glider

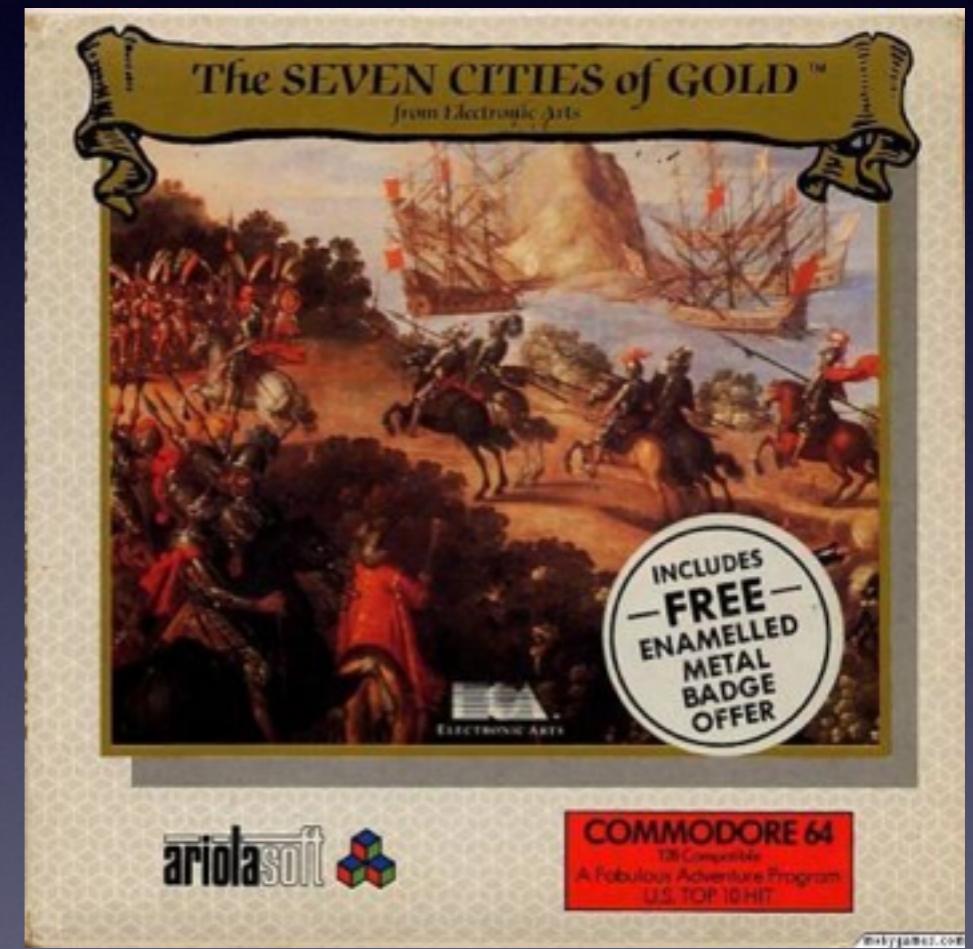
Early Games

Elite



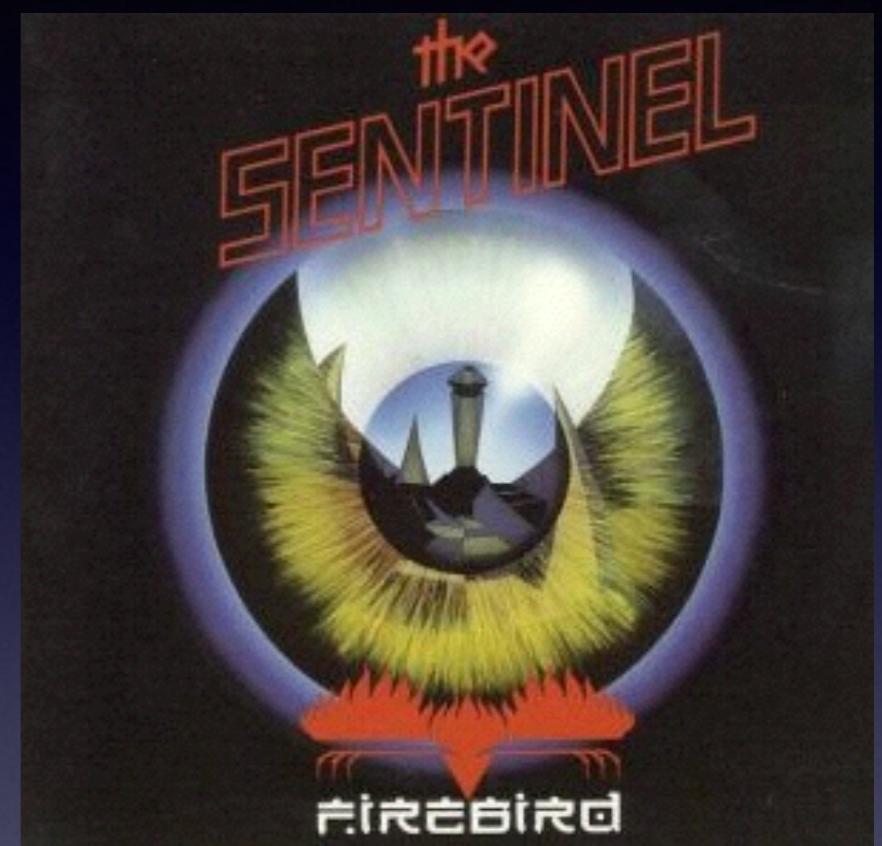
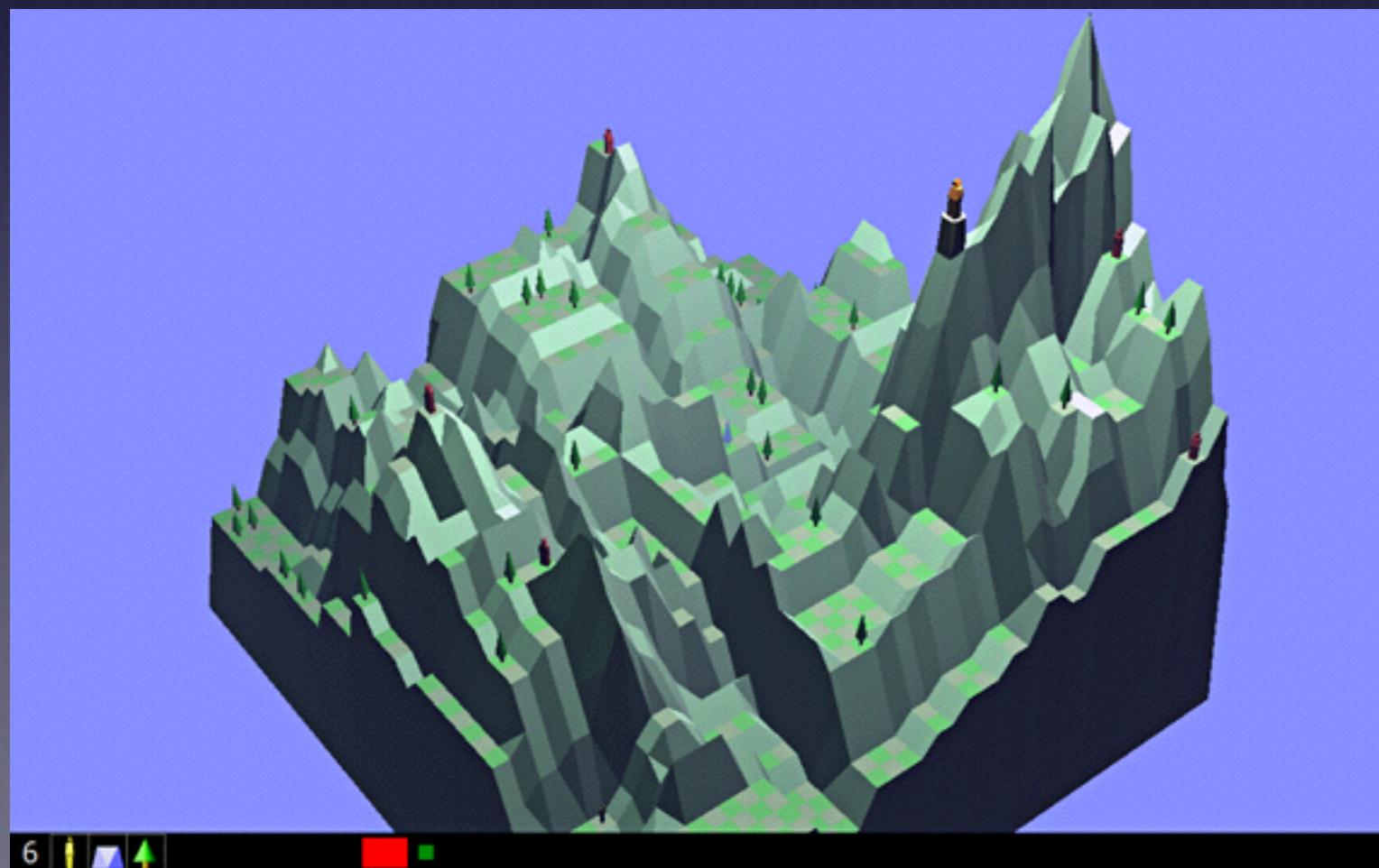
Early Games

Seven Cities of Gold



Early Games

The Sentinel

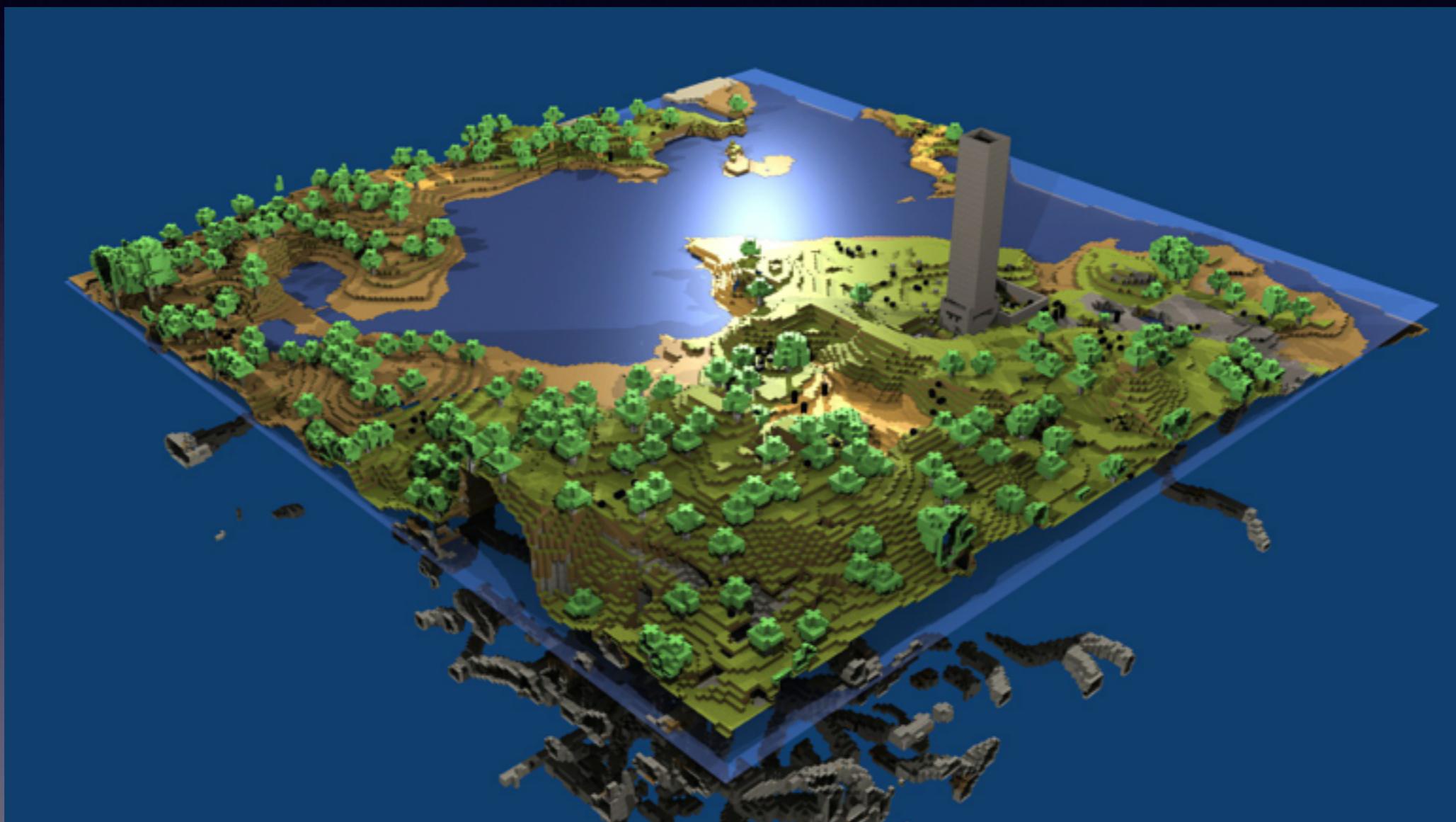


Old is new again...

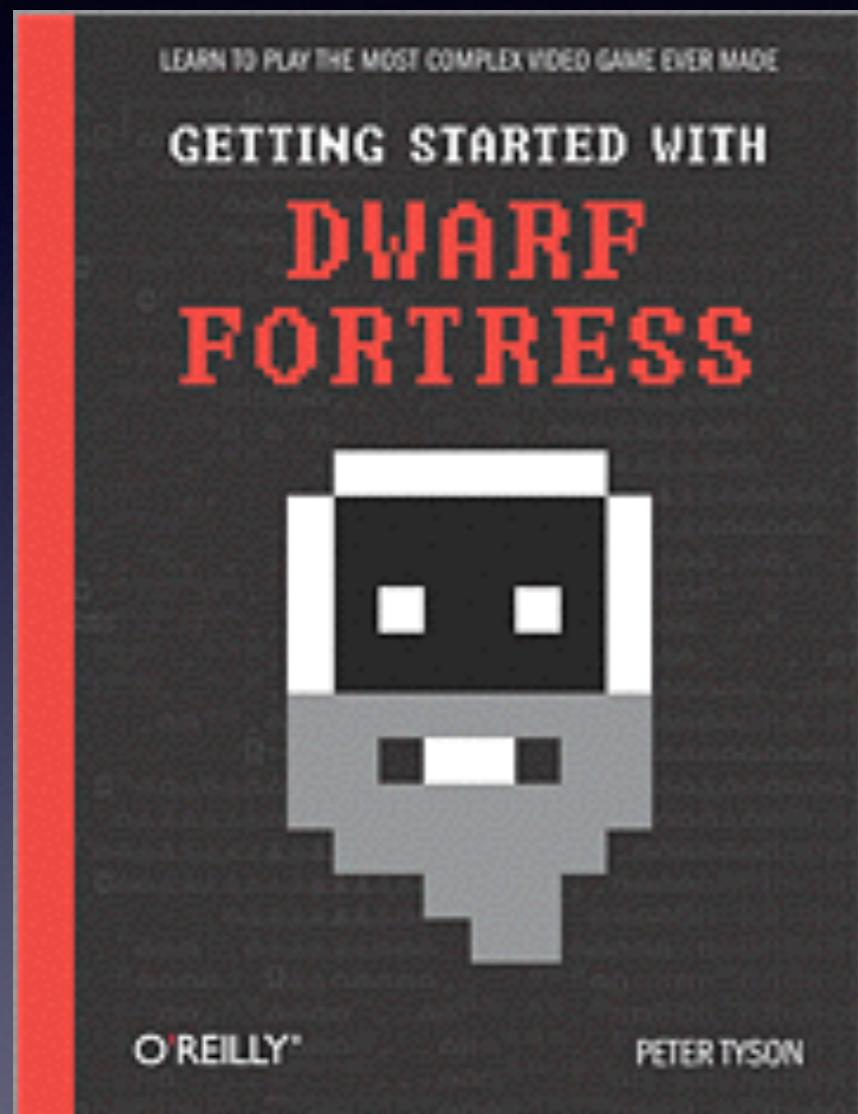
- Rogue (1980), is perhaps the best example for inspiring countless modern games.



Minecraft



Dwarf Fortress: WorldGen



Concepts

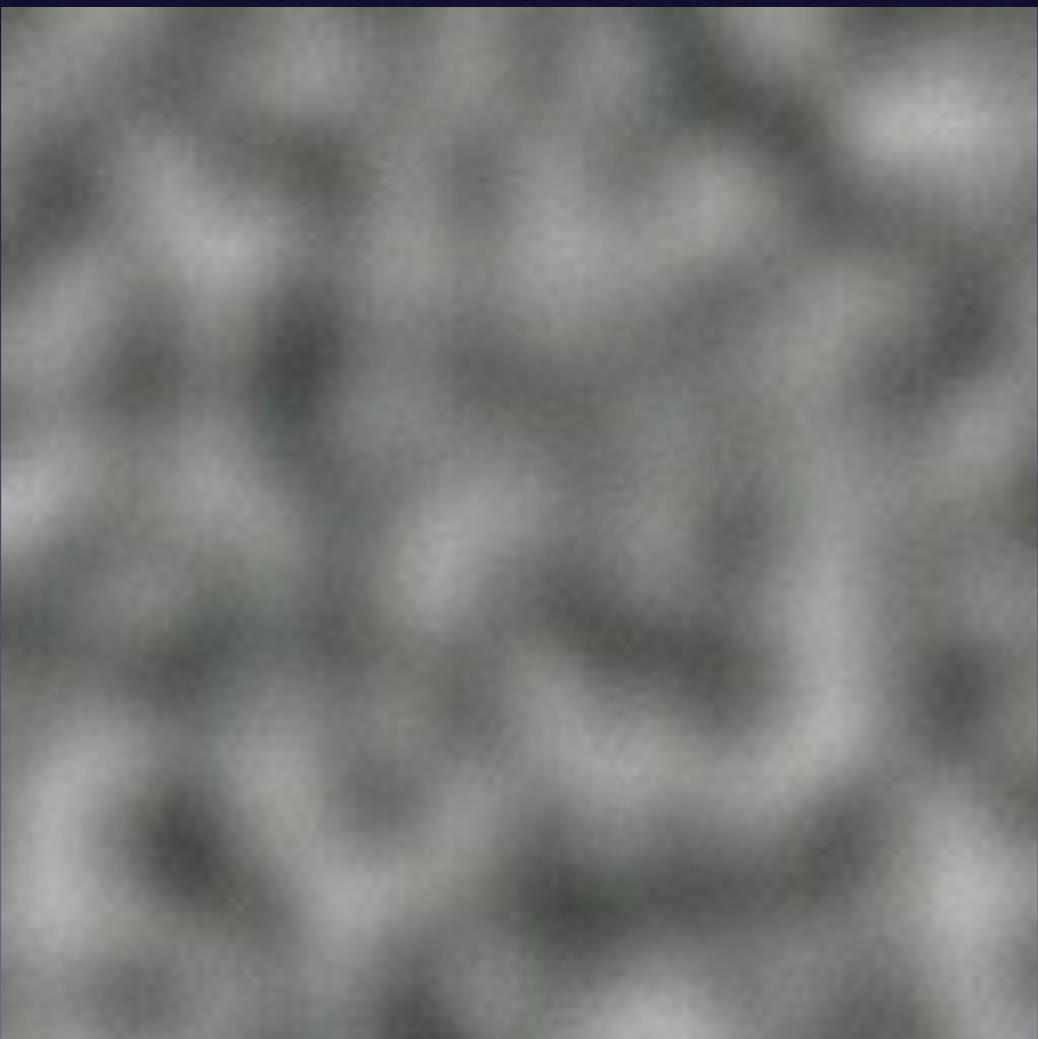
Ontogenetic / Teleological
or
Simulation / Heuristics?



Splitting hairs. Get it?

“Ontogenetic” Tools

Perlin and Simplex Noise



“Ontogenetic” Tools

Fractals

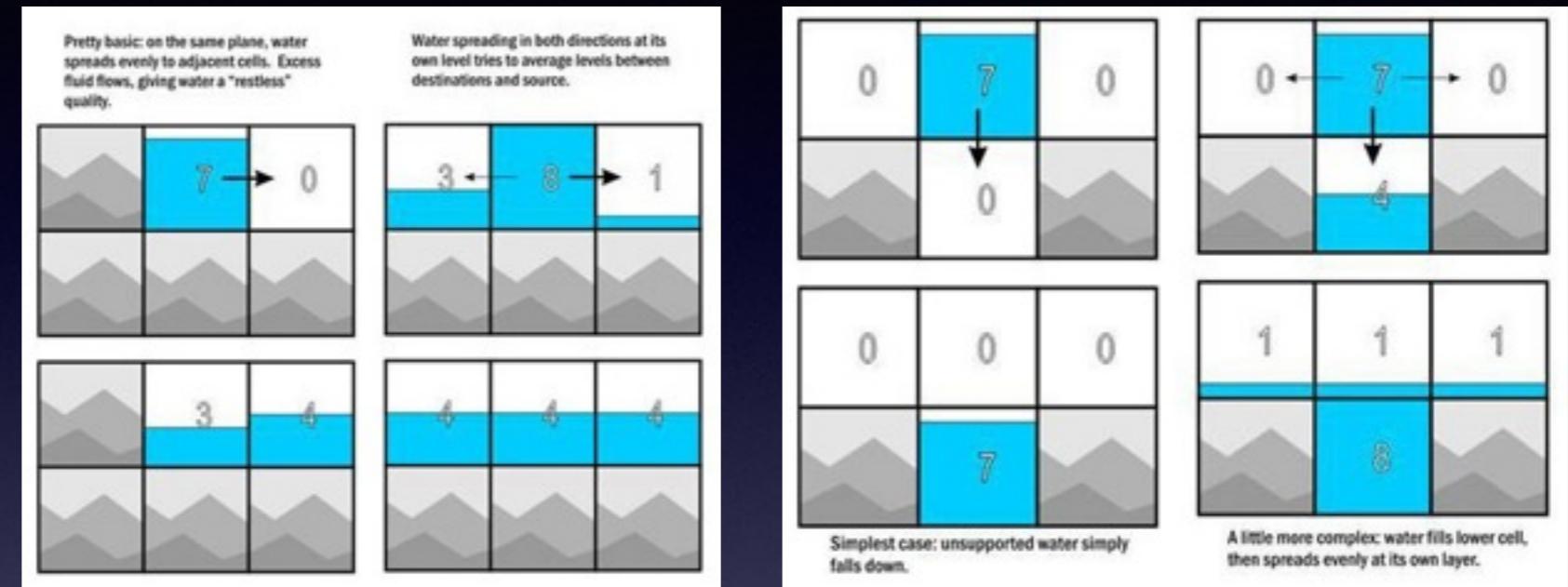


L-Systems

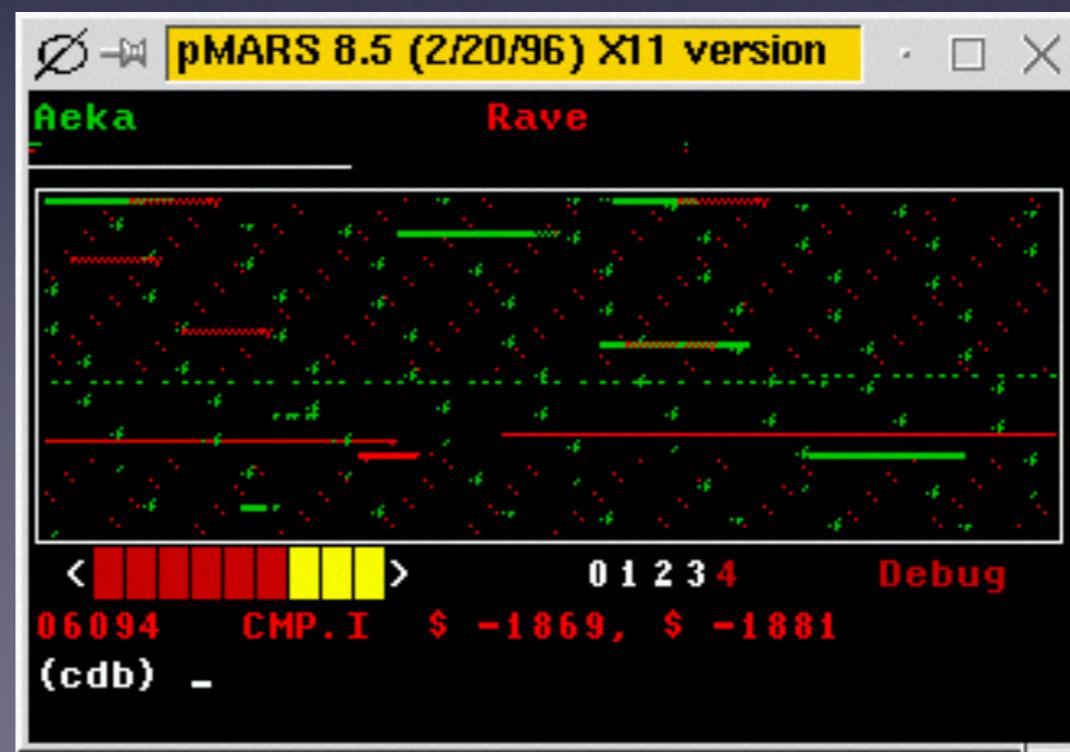


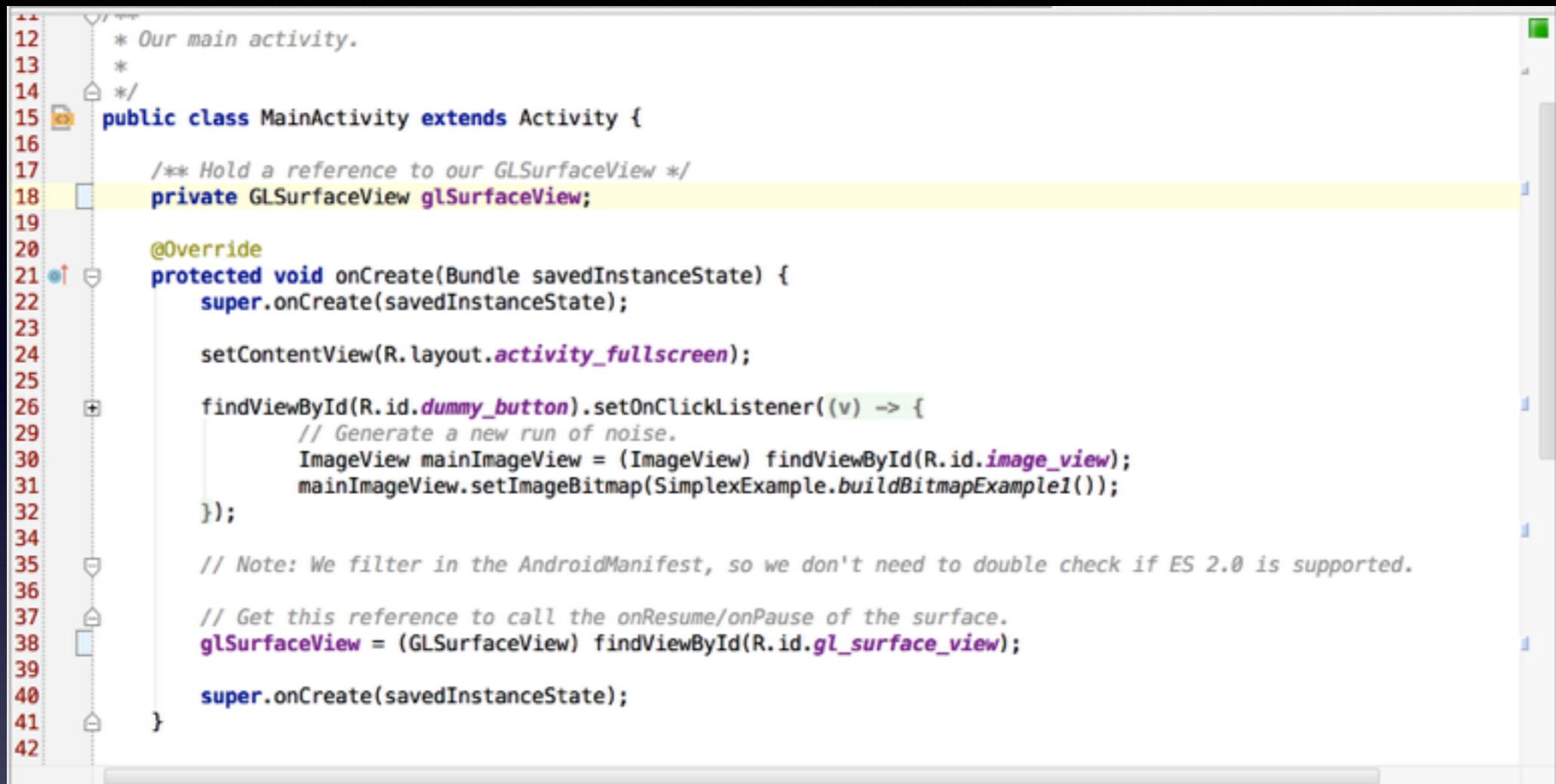
“Teleological” Tools

Cell Automata



Genetic algorithms





The screenshot shows the code editor of an Android application. The file is `MainActivity.java`. The code defines a `MainActivity` class that extends `Activity`. It holds a reference to a `GLSurfaceView` and sets its content view to a fullscreen layout. It also handles button clicks and retrieves a reference to the `GLSurfaceView` for resume/pause callbacks.

```
11 * Our main activity.  
12 *  
13 */  
14  
15 public class MainActivity extends Activity {  
16  
17     /** Hold a reference to our GLSurfaceView */  
18     private GLSurfaceView glSurfaceView;  
19  
20     @Override  
21     protected void onCreate(Bundle savedInstanceState) {  
22         super.onCreate(savedInstanceState);  
23  
24         setContentView(R.layout.activityFullscreen);  
25  
26         findViewById(R.id.dummy_button).setOnClickListener(v -> {  
27             // Generate a new run of noise.  
28             ImageView mainImageView = (ImageView) findViewById(R.id.imageView);  
29             mainImageView.setImageBitmap(SimplexExample.buildBitmapExample1());  
30         });  
31  
32         // Note: We filter in the AndroidManifest, so we don't need to double check if ES 2.0 is supported.  
33  
34         // Get this reference to call the onResume/onPause of the surface.  
35         glSurfaceView = (GLSurfaceView) findViewById(R.id.glsurfaceview);  
36  
37         super.onCreate(savedInstanceState);  
38     }  
39  
40     @Override  
41     protected void onPause() {  
42         super.onPause();  
43         glSurfaceView.onPause();  
44     }  
45  
46     @Override  
47     protected void onResume() {  
48         super.onResume();  
49         glSurfaceView.onResume();  
50     }  
51  
52     @Override  
53     protected void onStart() {  
54         super.onStart();  
55         glSurfaceView.onStart();  
56     }  
57  
58     @Override  
59     protected void onStop() {  
60         super.onStop();  
61         glSurfaceView.onStop();  
62     }  
63  
64     @Override  
65     protected void onDestroy() {  
66         super.onDestroy();  
67         glSurfaceView.onDestroy();  
68     }  
69  
70     @Override  
71     protected void onLowMemory() {  
72         super.onLowMemory();  
73         glSurfaceView.onLowMemory();  
74     }  
75  
76     @Override  
77     protected void onConfigurationChanged(Configuration newConfig) {  
78         super.onConfigurationChanged(newConfig);  
79         glSurfaceView.onConfigurationChanged(newConfig);  
80     }  
81  
82     @Override  
83     protected void onWindowFocusChanged(boolean hasFocus) {  
84         super.onWindowFocusChanged(hasFocus);  
85         glSurfaceView.onWindowFocusChanged(hasFocus);  
86     }  
87  
88     @Override  
89     protected void onAttachedToWindow() {  
90         super.onAttachedToWindow();  
91         glSurfaceView.onAttachedToWindow();  
92     }  
93  
94     @Override  
95     protected void onDetachedFromWindow() {  
96         super.onDetachedFromWindow();  
97         glSurfaceView.onDetachedFromWindow();  
98     }  
99 }
```

And now, some code!

a Lightweight Mobile Prototyping Framework

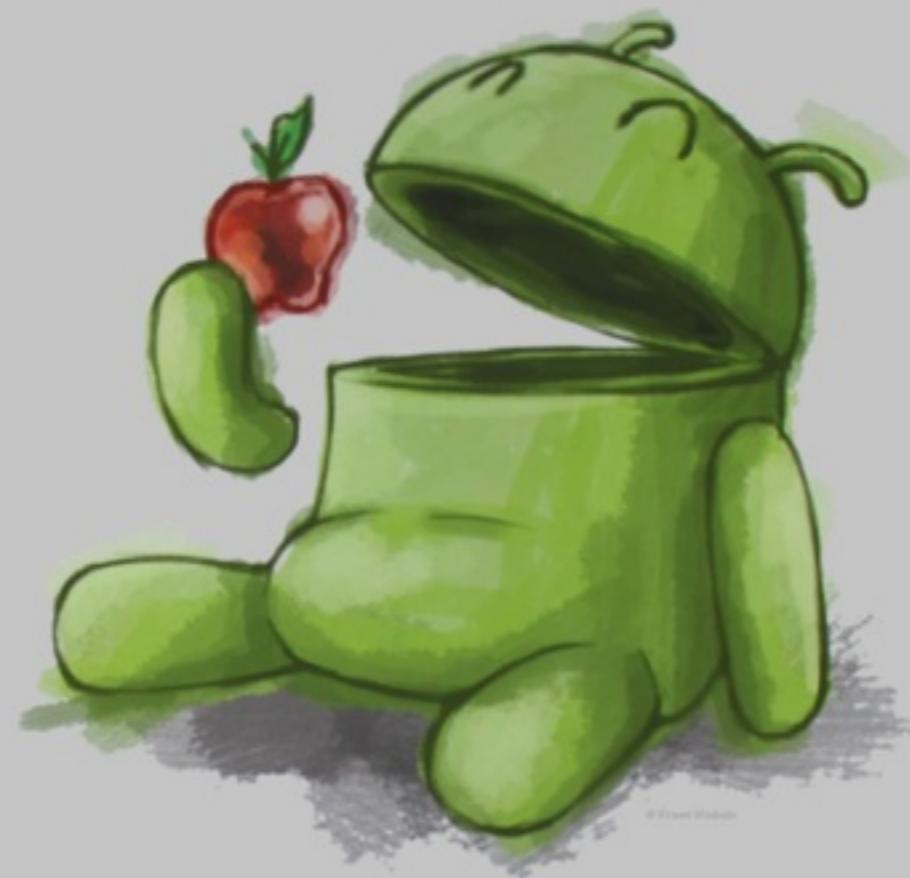
Android Tech Landscape



OpenGL ES 2.0, 3.0 and 3.1



RenderScript



Tegra 4 / K1



Mobile Tech Landscape

- OpenGL ES SL
- RenderScript



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1 commit 2 branches 0 releases 1 contributor

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Started this project for my Seminar at NVScene 2014. ...

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	Started this project for my Seminar at NVScene 2014.	a month ago
SeminarNVS14	Started this project for my Seminar at NVScene 2014.	a month ago
gradle	Started this project for my Seminar at NVScene 2014.	a month ago
.gitignore	Started this project for my Seminar at NVScene 2014.	a month ago
build.gradle	Started this project for my Seminar at NVScene 2014.	a month ago
gradlew	Started this project for my Seminar at NVScene 2014.	a month ago
gradlew.bat	Started this project for my Seminar at NVScene 2014.	a month ago
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GitHub Project

<http://github.com/kanawish/SeminarNVScene2014>



Modern Android Toolchain

- Android Studio / IntelliJ
- Gradle
- Genymotion



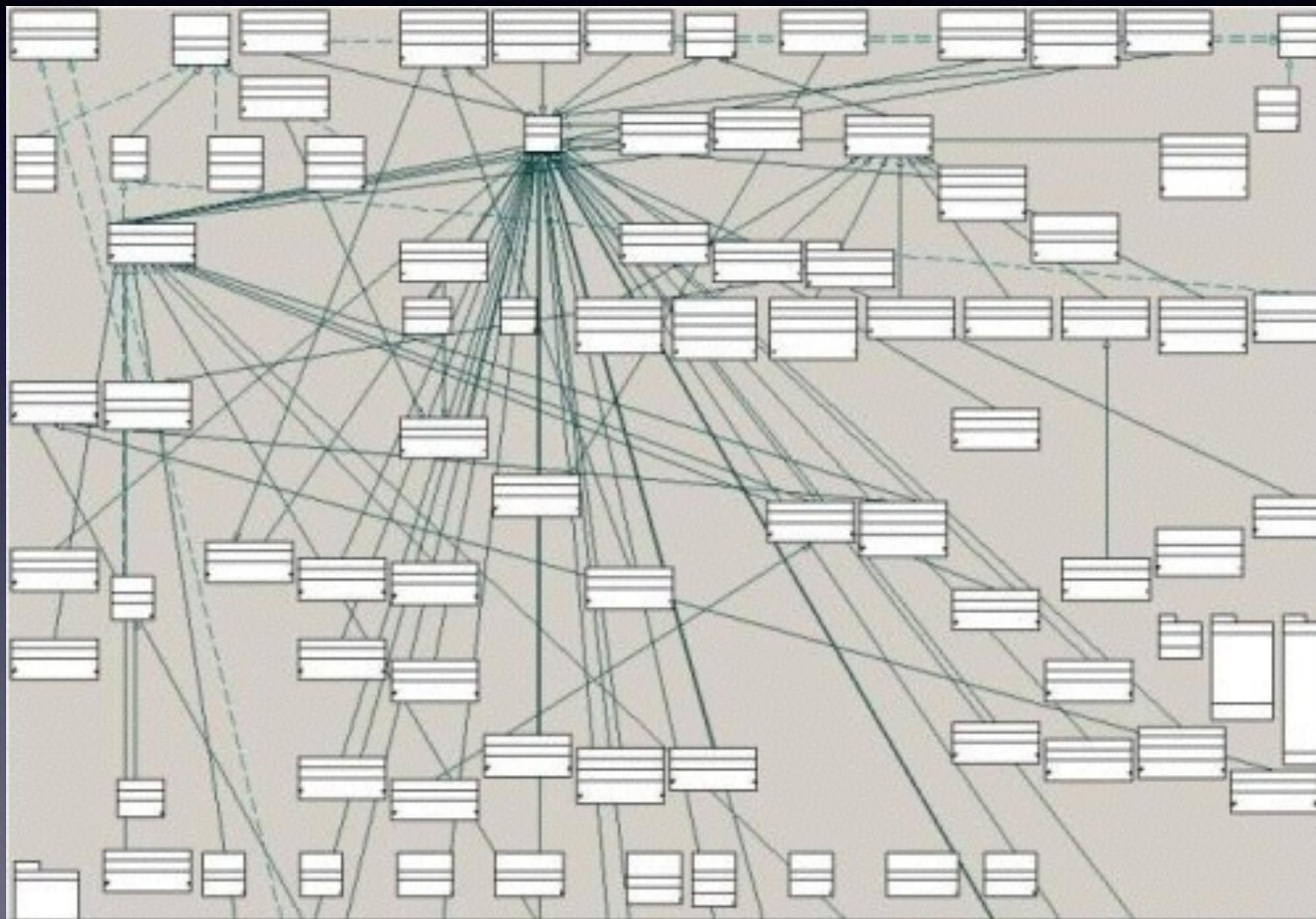
IntelliJIDEA



gradle

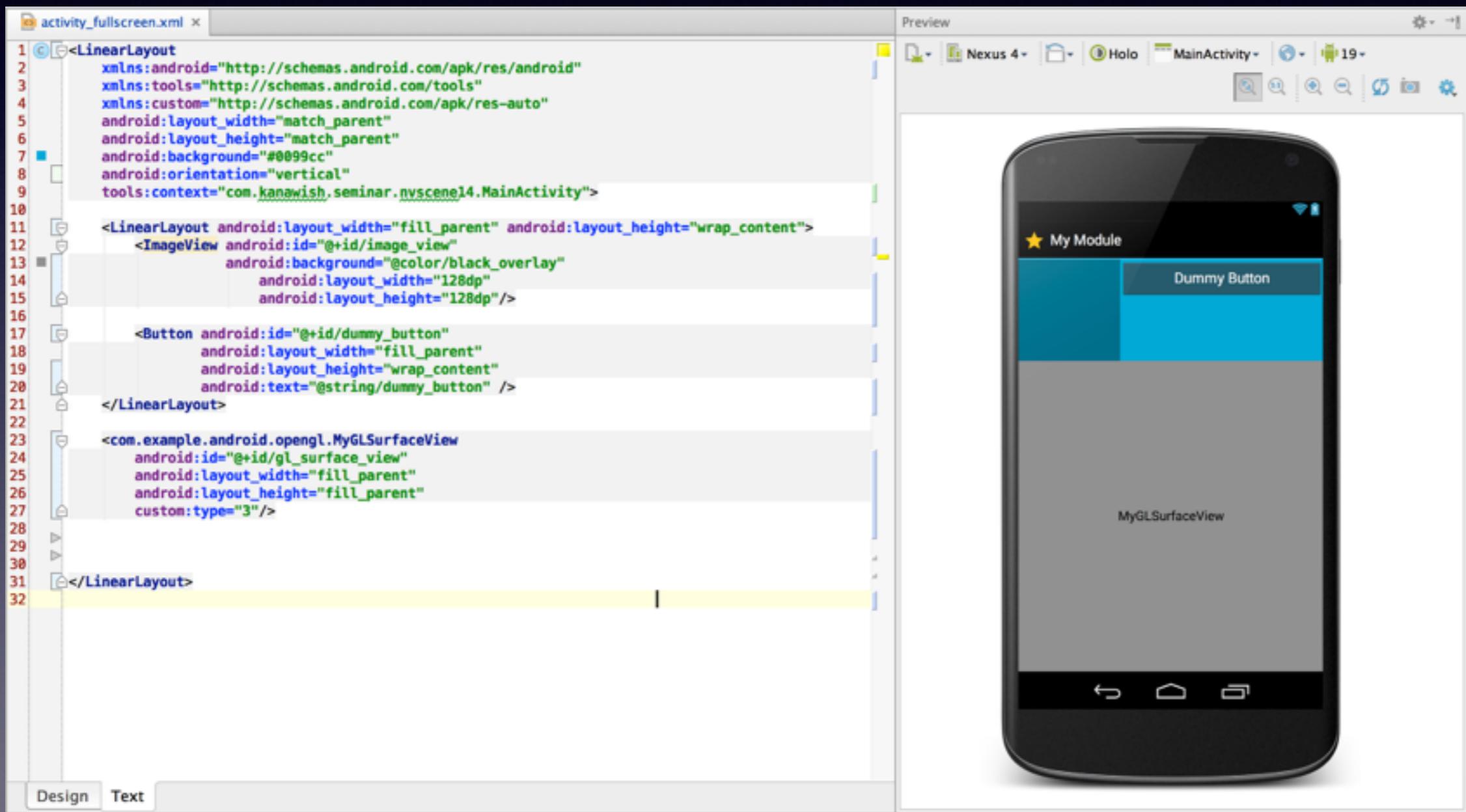
GENYMOTION^{OO}

Framework Architecture

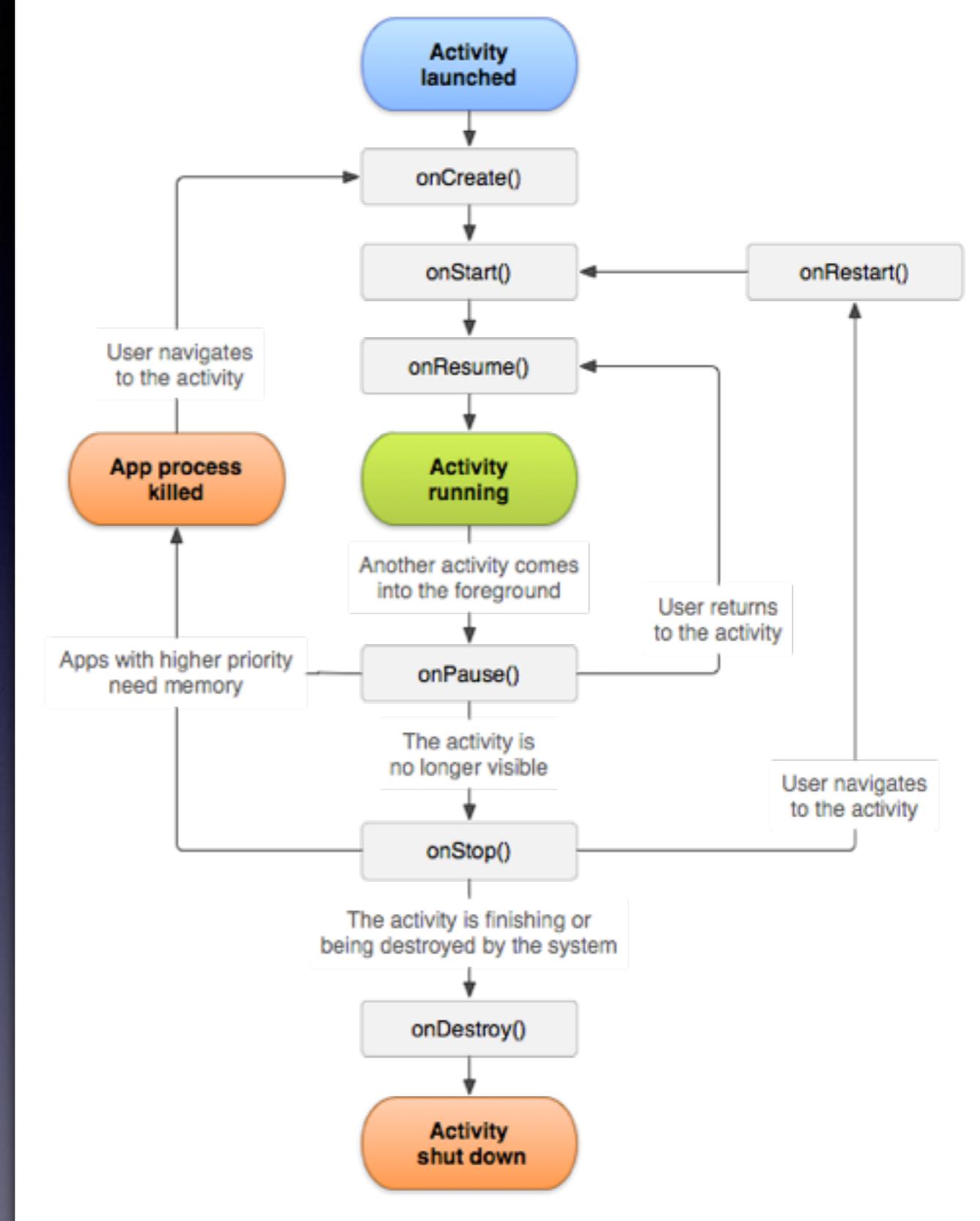


GLSurfaceView

Leveraging the Android Platform



Lifecycle:



(Android Health & Safety requires us to put this here.)

GLSurfaceView.Renderer

Simple Shader “Gadgets”



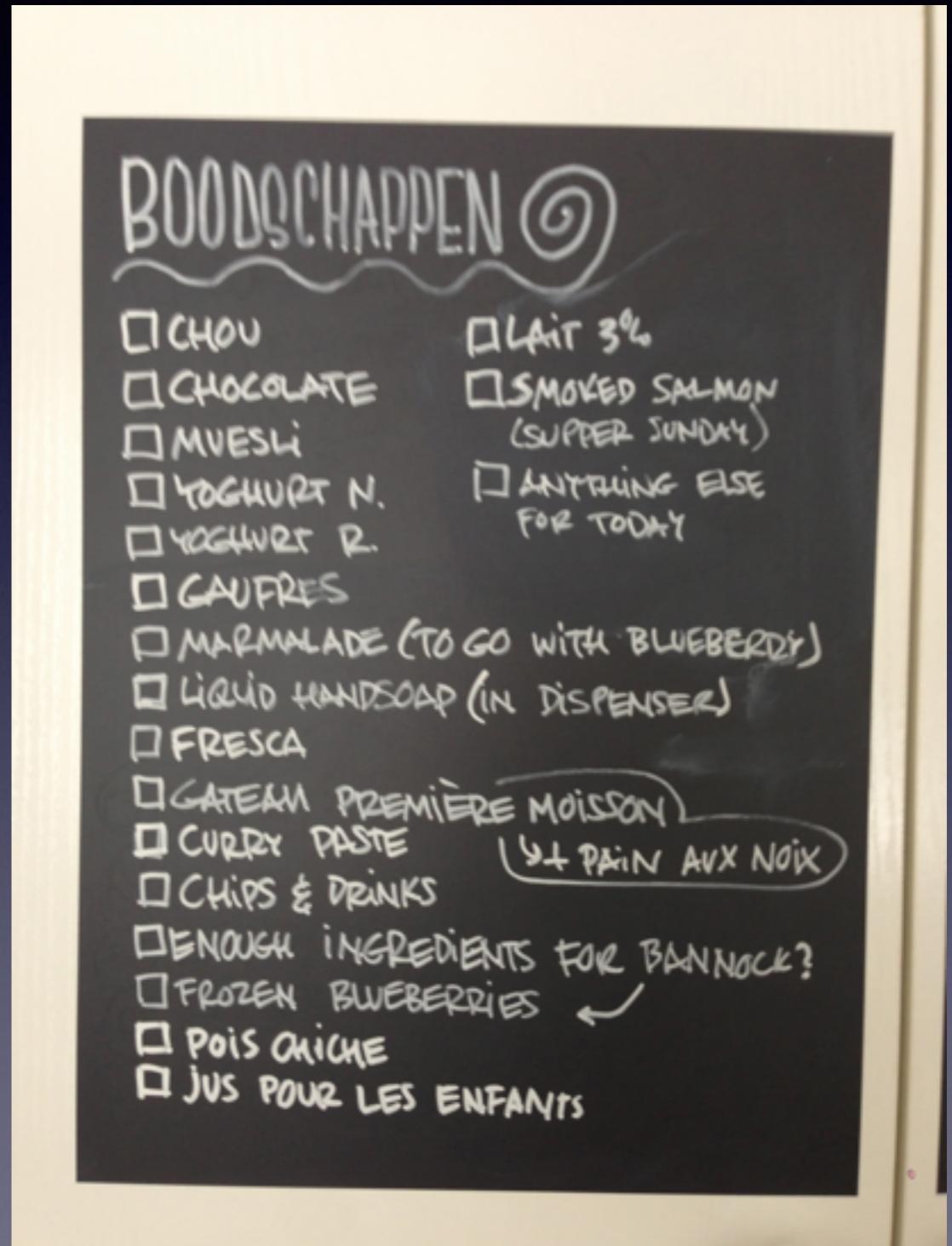
GLSurfaceView.Renderer

Simple GPGPU Gadget™



TODOs

- REST shader repo
- In-app shader editor
- Raspberry Pie support
- OpenGL ES 3.1





Quick Demonstration

Quick Demonstration

- Simplex
- Shaders (Plasma/Fractal)
- REST Repo (?)
- Cell Automata



Thank you!

Contact info:

etienne.caron@gmail.com

<http://plus.google.com/+EtienneCaron>

@kanawish on Twitter



GitHub Project