Mobile Cross Platform Development

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CEE-SEC(R)

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How many smartphone platforms are there?

Some popular ones:

- Android
- Bada
- Blackberry
- iOS
- J2ME (not smartphone in fact)
- Maemo/MeeGo
- RIM
- Symbian
- Windows Mobile
- WP7

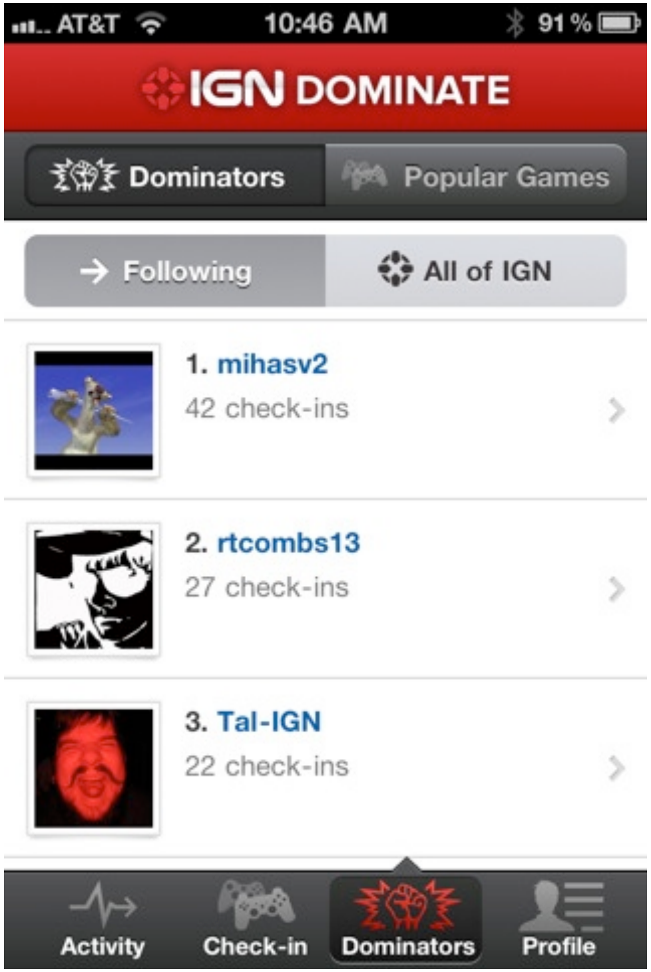
The question

- Is it possible to write a single codebase application for all these platforms?
- Short answer: NO
- Longer answer: It’s possible to find a suitable solution for some of them

Types of mobile application

- Widget-based GUI applications
- Fast animated applications *(i.e. games)*

Typical ‘wigdet based’ app



Typical ‘fast animated’ app

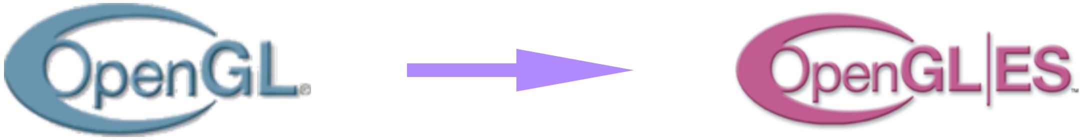
“Desktop” frameworks

- For widget-based: Qt, Swing, WPF, HTML, GTK, MFC, Cocoa, etc
- For game-like: OpenGL, DirectX and various 2D/3D engines on top of them

Approaches differ

- GUI app: why not a mobile webpage?

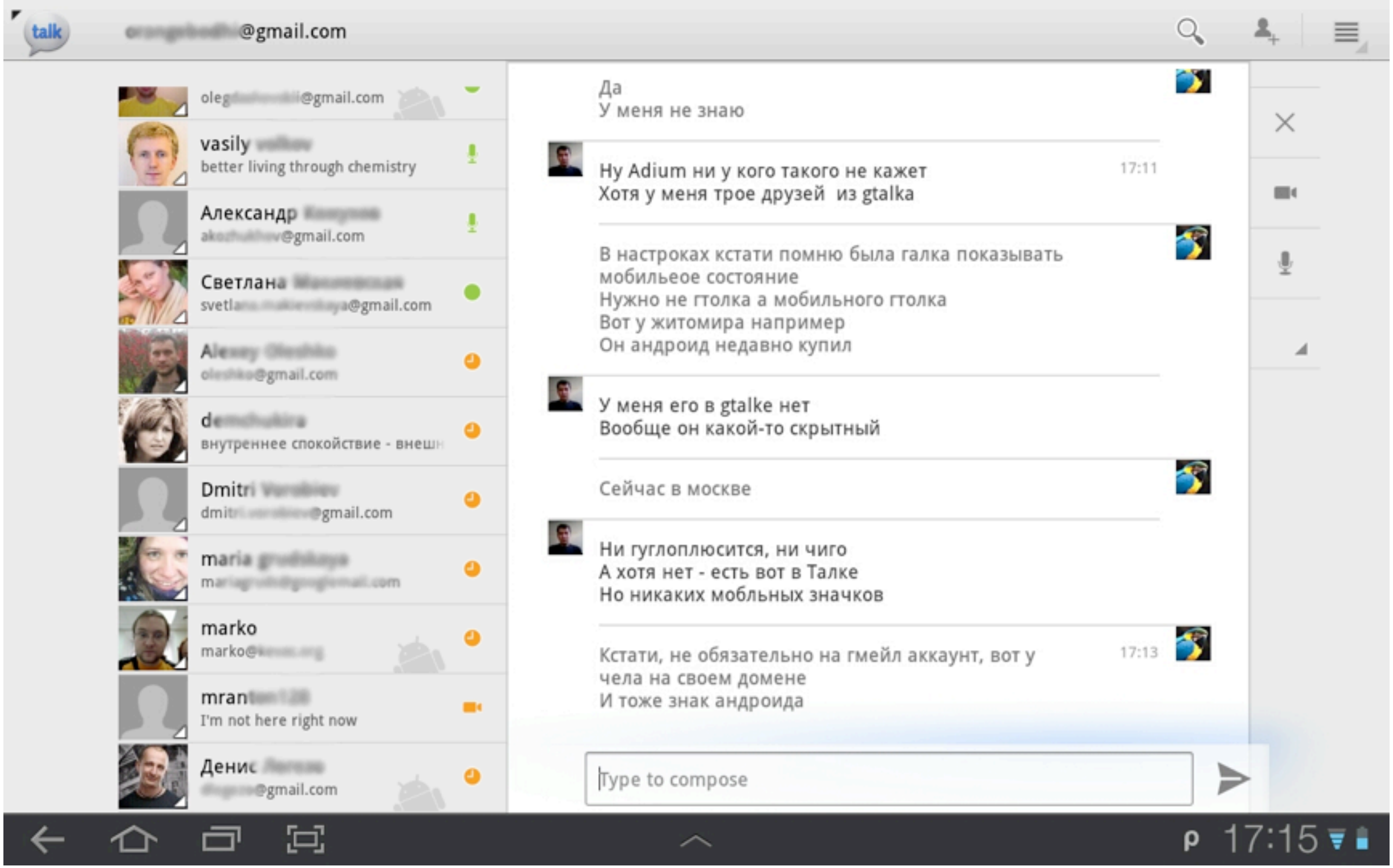
- Game-like app: how to port it to mobiles?



GUI: why not a mobile webpage indeed?

- Offline access
- Device integration
- Greater UX
- Flexible synchronization
- Push capabilities

One more widget-based example



[redacted]@gmail.com

oleg[redacted]@gmail.com

vasily [redacted]
better living through chemistry

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Dmitri [redacted]
dmitri[redacted]@gmail.com

maria [redacted]
ma[redacted]

marko
marko@[redacted]

mran[redacted]
I'm not here right now

Денис [redacted]
[redacted]@gmail.com

Да
У меня не знаю

Ну Adium ни у кого такого не кажет 17:11
Хотя у меня трое друзей из gtalka

В настроках кстати помню была галка показывать мобильеое состояние
Нужно не гтолка а мобильного гтолка
Вот у житомира например
Он андроид недавно купил

У меня его в gtalke нет
Вообще он какой-то скрытный

Сейчас в москве

Ни гуглоплюсится, ни чиго
А хотя нет - есть вот в Талке
Но никаких мобльных значков

Кстати, не обязательно на гмейл аккаунт, вот у 17:13
чела на своем домене
И тоже знак андроида

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GUI frameworks: Short list for starters

- Appcelerator Titanium Mobile
- Adobe PhoneGap
- Rhomobile Rhodes
- MoSync
- over 9000 more

Why there are so many?

- What language should I write?
- Which platforms are supported?
- How do they work?

- Many of them are web based
- So a web developer can use her experience
- HTML(5)/JavaScript

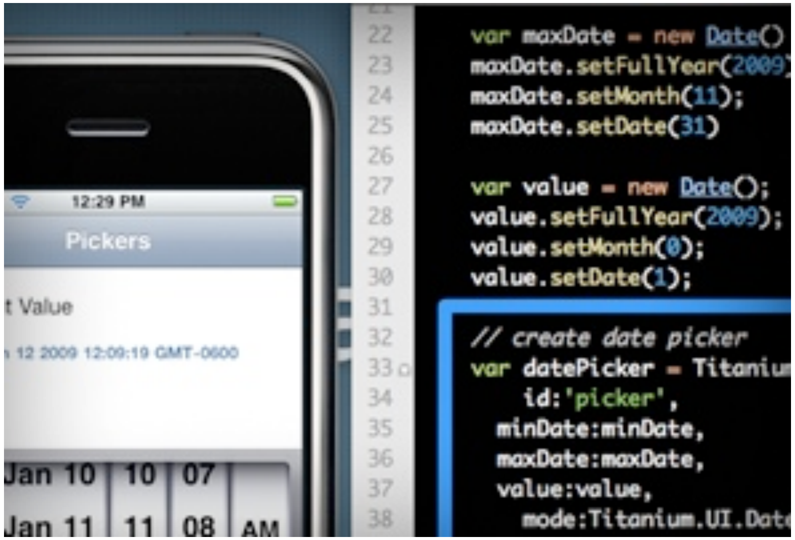
Appcelerator Titanium Mobile

- The actual logic is written in JS
- The application is build to native code
- So “native” controls are displayed

Titanium Mobile

- Titanium Studio is intended for development
- ... which is Eclipse based
- Android and iPhone supported
- But you cannot cross-compile for free

- The same project is built for the both platforms
- Launched on emulator or real device



```
var maxDate = new Date()
maxDate.setFullYear(2009)
maxDate.setMonth(11);
maxDate.setDate(31)

var value = new Date();
value.setFullYear(2009);
value.setMonth(0);
value.setDate(1);

// create date picker
var datePicker = Titaniu
    id:'picker',
  minDate:minDate,
  maxDate:maxDate,
  value:value,
    mode:Titanium.UI.Dat
```

Example code, part 1

```
var label = Titanium.UI.createLabel({
    color: '#999',
    text: 'Угадайте число от 1 до 1000',
    font: {fontSize:20, fontFamily: 'Helvetica Neue'},
    textAlign: 'center',
    width: 'auto',
    height: 30,
    top: 50
});
```

Example code, part 2

```
var numberField = Ti.UI.createTextField({
    left: 10,
    hintText: 'Число?',
    right: 10,
    height: 44,
    textAlign: 'center',
    font: {fontSize:20, fontFamily: 'Helvetica Neue'},
    top:90
});
```

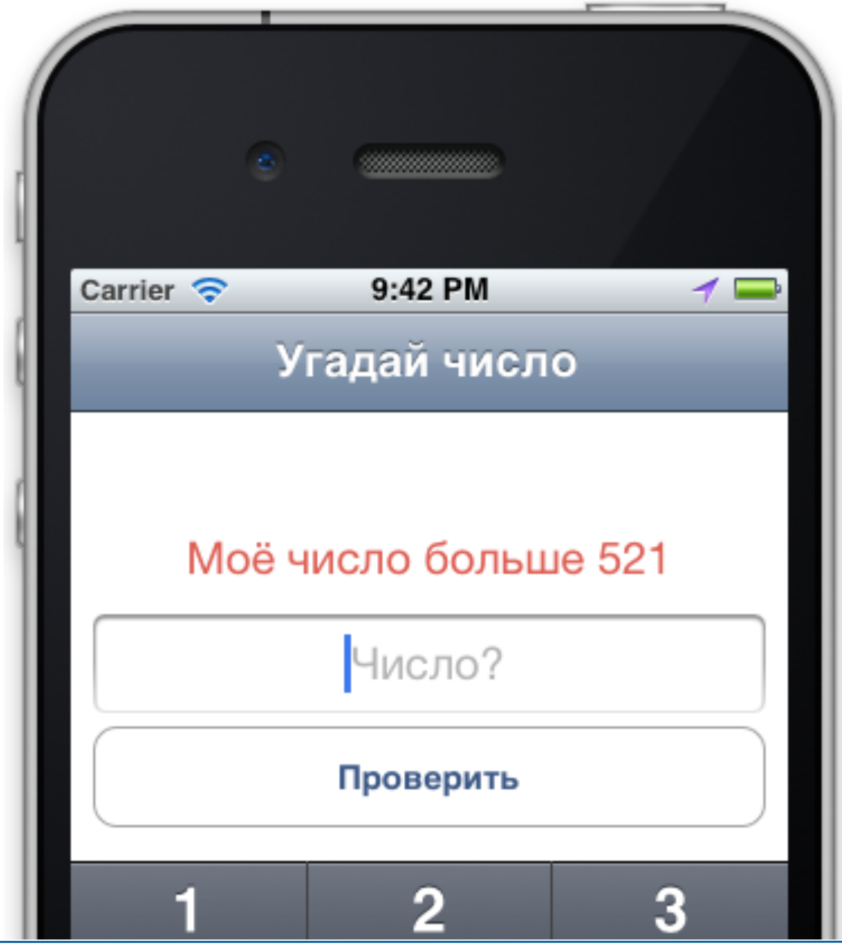
Example code, part 3

```
var button = Ti.UI.createButton({
    title: "Проверить",
    height:45,
    width:300,
    top:140
});

button.addEventListener('click', check);
numberField.addEventListener('return', check);
```

Example code, part 4

```
tab1.add(label);
tab1.add(button);
tab1.add(numberField);

tabGroup.addTab(tab1);
```

Example launched on the iPhone emulator



Угадай число

Моё число больше 521

Число?

Проверить

Some Titanium-based applications

Caesars Palace
$149 $239
Tonight
ELEGANT
Stay 1-2 night

Palms Casino Resort
$69 $100
Tonight
HIP
Stay 1-4 night

YOUR SPANISH LINGO STATUS:

76% UNTIL NEXT BADGE | 11 OF 15

Accounts

A.G. Parr PLC
2010-10-26 11:54

Sunyvale Reporting Ltd
2010-10-26 11:44

Contacts

Autumn Schick
2010-10-26 11:54

PhoneGap

PhoneGap

- Just a browser window inside a native application
- Can do things all webpages can do
- And a lot more: location, camera, accelerometer access
- Of course it can work offline

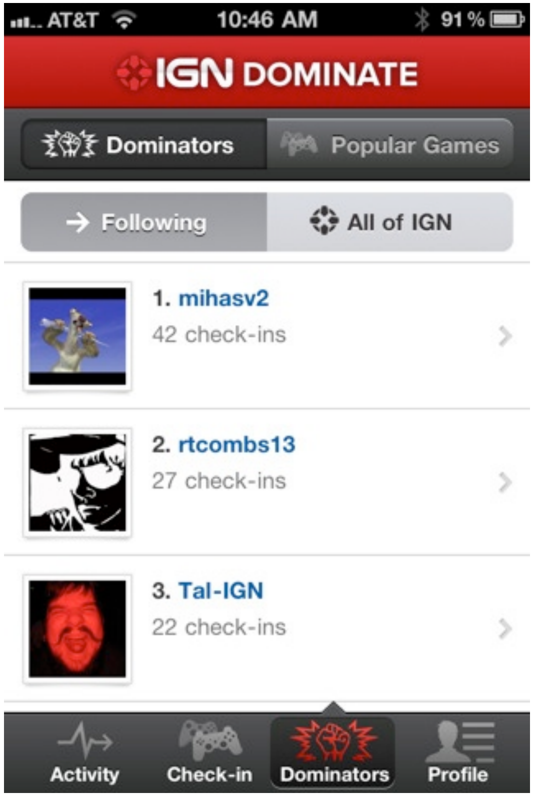
Code example

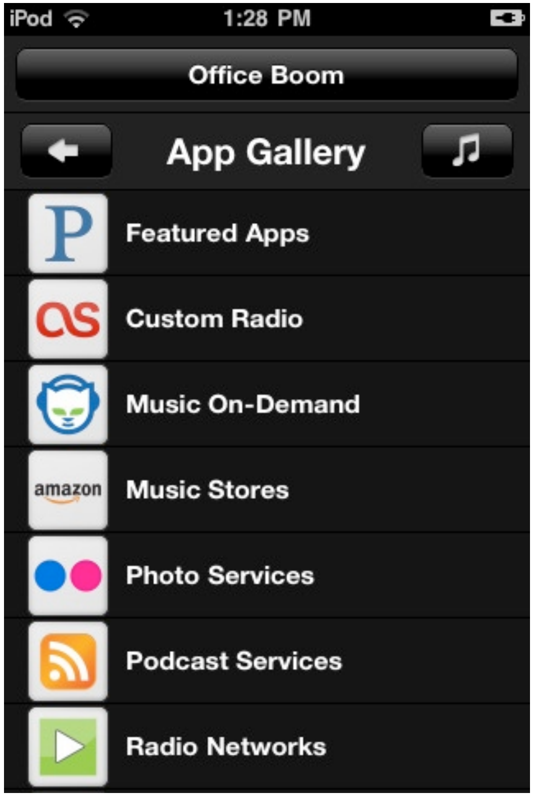
```
<html>

        Imagine HTML and JS code here

</html>
```

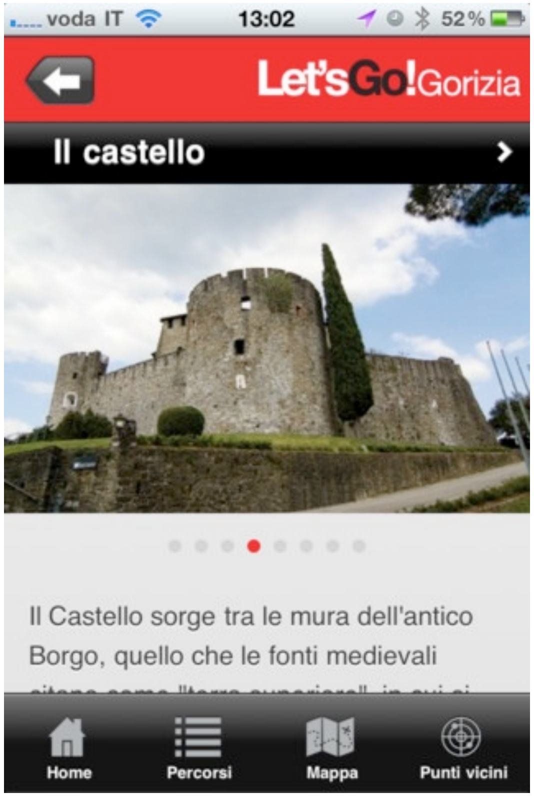
Camera access code example

```
navigator.camera.getPicture(onSuccess, onFail,
                        { quality: 50 });

function onSuccess(imageData) {
    var image = document.getElementById('myImage');
    image.src = "data:image/jpeg;base64," + imageData;
}

function onFail(message) {
    alert('Failed because: ' + message);
}
```

Some PhoneGap-based applications







Il Castello sorge tra le mura dell'antico Borgo, quello che le fonti medievali

Shortcomings of such the approach

- Some GUI elements look not native
- Some elements behave slightly different
- e.g. scrolling momentum

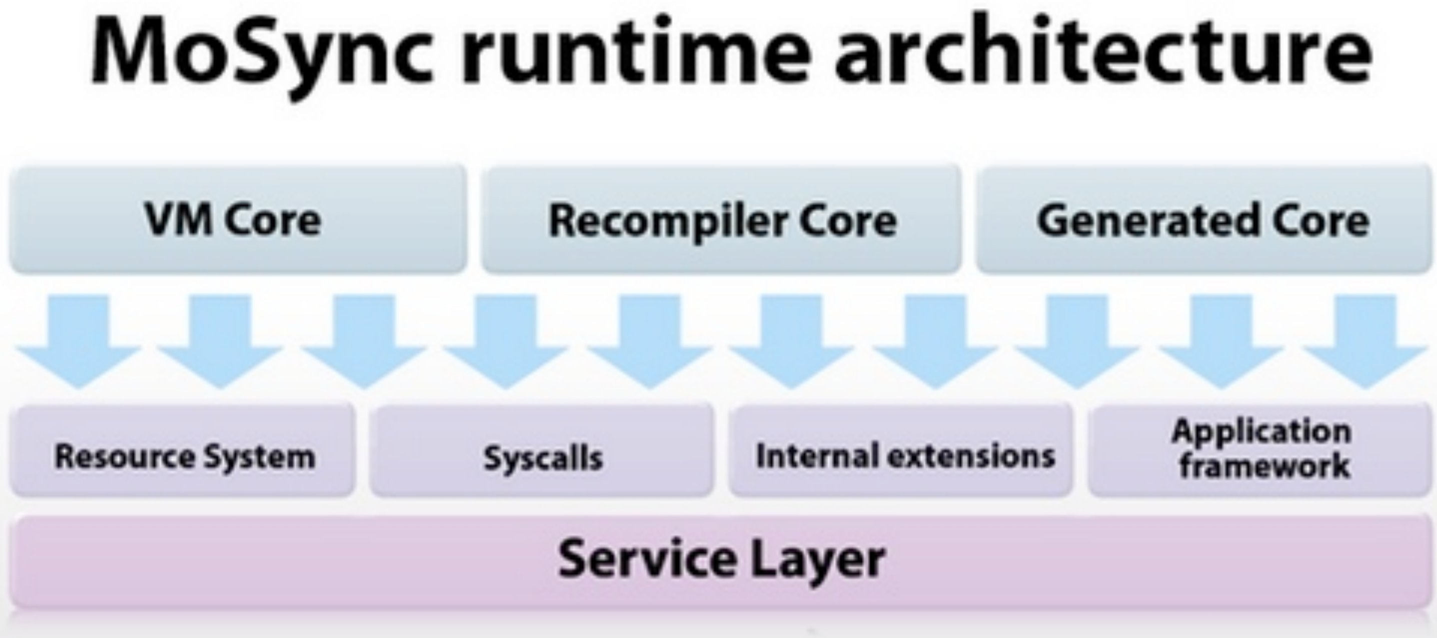
MoSync Development

- The code is in C++
- ... which is compiled to bytecode
- MoSync SDK
- Eclipse

Suppoted platforms

- Java ME
- Windows Mobile
- Symbian S60
- Android
- iOS
- Moblin/MeeGo
- Blackberry

Runtime



MoSync runtime architecture

VM Core | Recompiler Core | Generated Core

Resource System | Syscalls | Internal extensions | Application framework

Service Layer

Qt

- Desktop platforms
- Mobile platforms
- Non official ports to mobile platforms

Qt on mobile platforms

- Official for Maemo/Moblin/MeeGo
- For Symbian, starting from S60v3
- Zaurus, Openmoko
- Experimental port to Android
- Very experimental port to iOS

Qt application

Jon Reece: Hi, do you want to come over and see a movie on friday? The whole crew is coming over for a get together! 15:14

You: Hey there! Sure! What time should I be there? 15:18

Jon Reece: How does 7 sound? We've got about 5 people coming so far. If you want to bring a friend along, feel free! 15:22

You: Oh great! I was going to ask if I can bring someone. Ashley wants to tag along. Need us to bring anything? 15:28

Jon Reece: Popcorn! 15:31

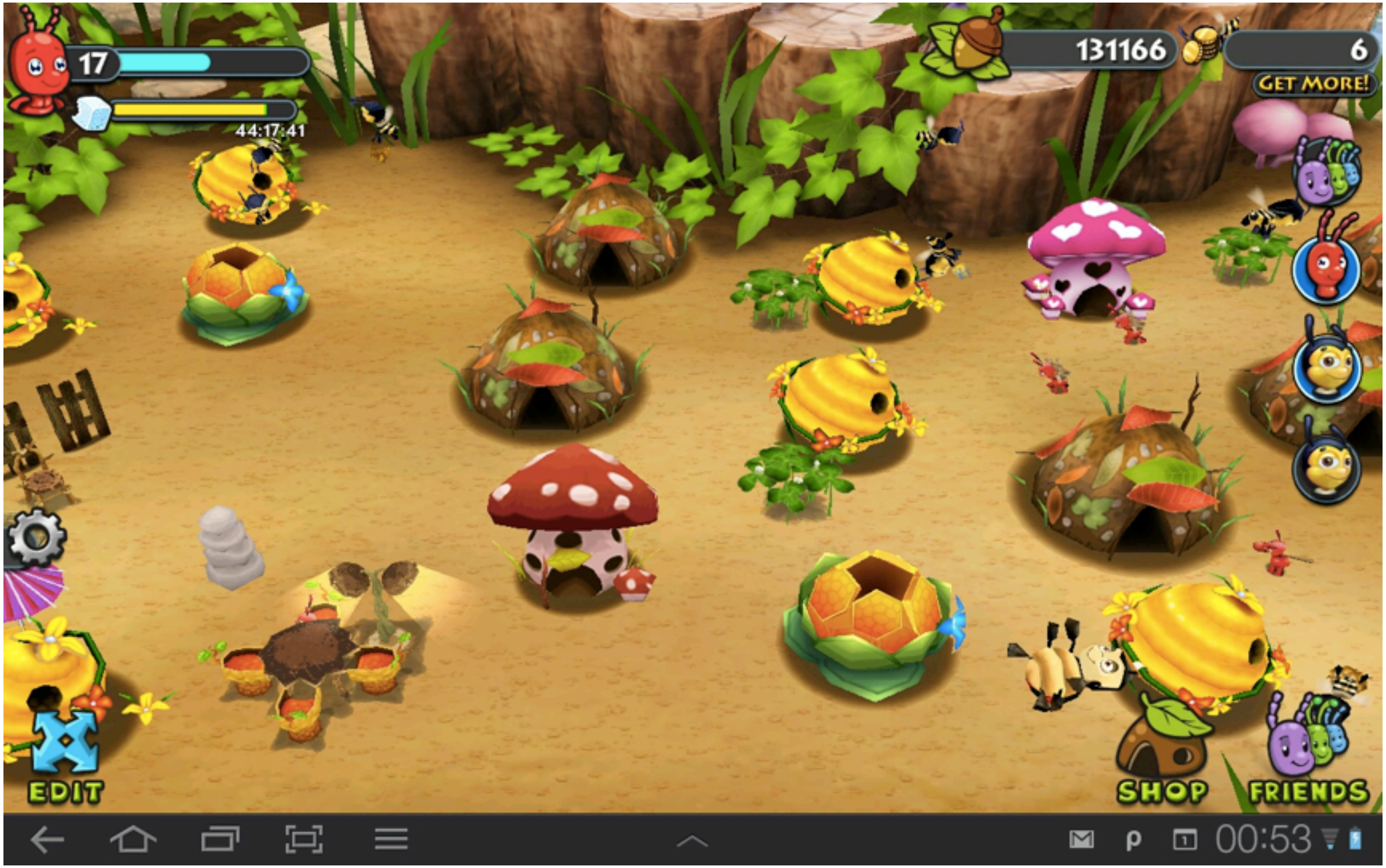
Games

- Main approach: the code is native
- ... because we need FPSes!
- But there are some execptions

Low level

- OpenGL ES
- JSR239
- WebGL
- XNA
- Good old framebuffer

OpenGL ES example



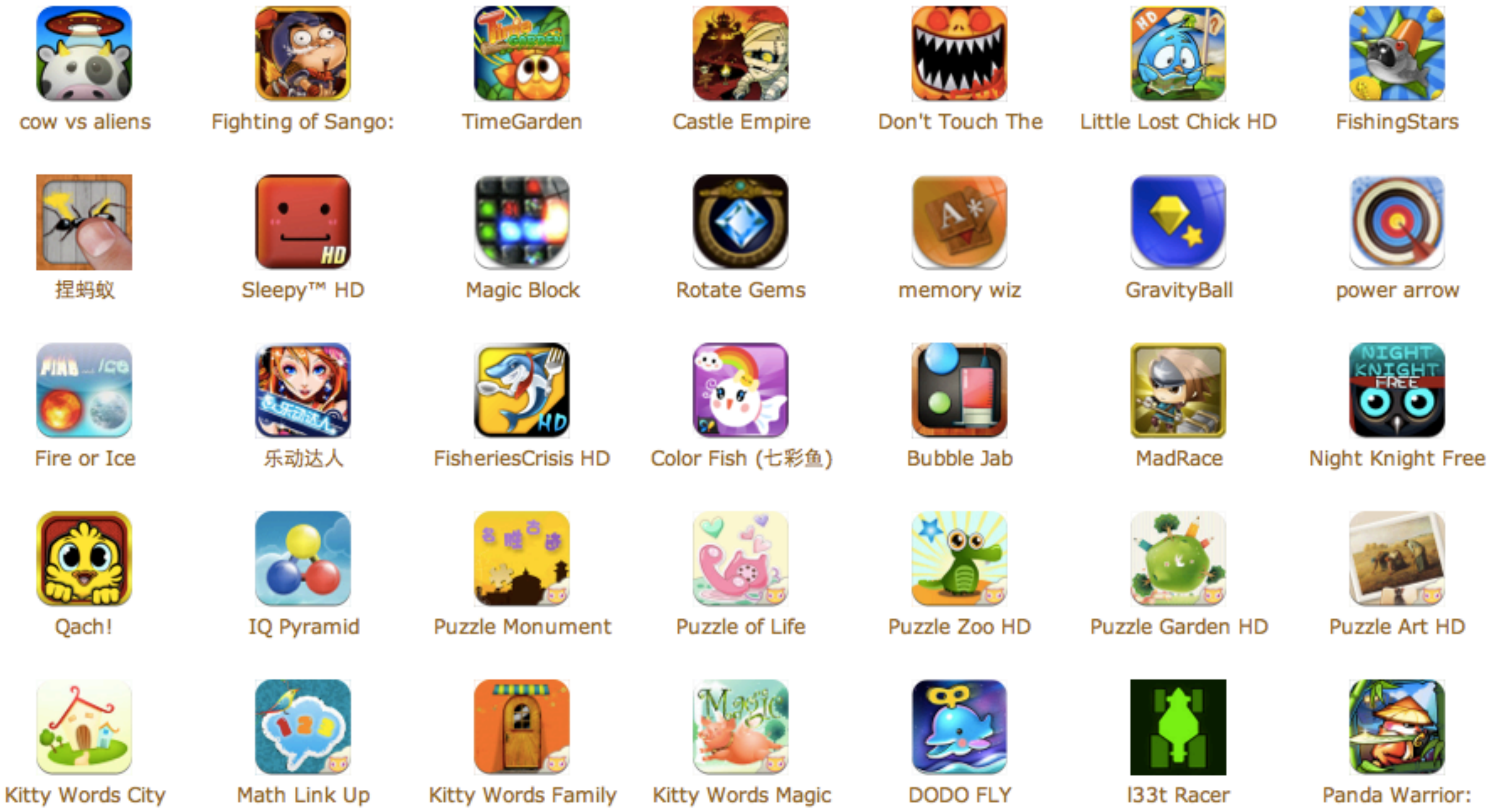
OpenGL ES support

- Android
- iOS
- Symbian OS
- Maemo
- Bada
- J2ME (JSR239)

Cocos2D-x

- 2D game engine
- Runs on iPhone and Android
- Also on win32 & linux for development

Some Cocos2D-x apps



cow vs aliens	Fighting of Sango:	TimeGarden	Castle Empire	Don't Touch The	Little Lost Chick HD	FishingStars
捏蚂蚁	Sleepy™ HD	Magic Block	Rotate Gems	memory wiz	GravityBall	power arrow
Fire or Ice	乐动达人	FisheriesCrisis HD	Color Fish (七彩鱼)	Bubble Jab	MadRace	Night Knight Free
Qach!	IQ Pyramid	Puzzle Monument	Puzzle of Life	Puzzle Zoo HD	Puzzle Garden HD	Puzzle Art HD
Kitty Words City	Math Link Up	Kitty Words Family	Kitty Words Magic	DODO FLY	l33t Racer	Panda Warrior:

EDGELIB

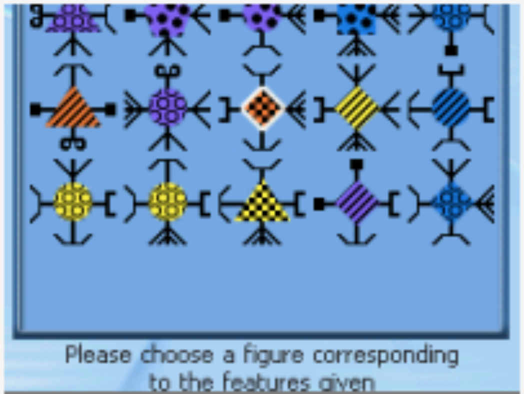
Wizzley Presto and the Vampires Tomb by Spellbound Games

Wordstone by Ocean Breeze Games

Star Defense by Rough Cookie

Dutch Run by Khaeon Group and Elements Interactive Mobile

The Riddle Of Sphinx by U Mobile Game



Please choose a figure corresponding to the features given

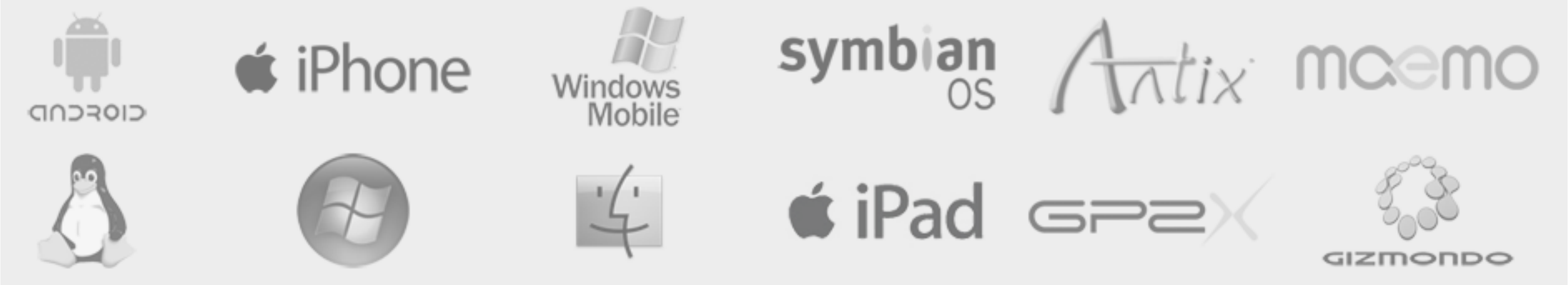
Spb Brain Evolution by Spb Software, Inc

Hello, world

```
//Callback: Called every frame

ERESULT ClassMain::OnNextFrame
        (ClassEDisplay *display,
         unsigned long timedelta)
{
  display->buffer.DrawFont(0, 0,
      &display->fontinternal, "Hello World!");

  return(E_OK);
}
```

Features

- C++ core
- Fast 2D/3D graphics
- Collision detection



Reusing the code: multiplatform libraries

- Choose a common denominator
- Language could be
  - -C
  - -C++
  - -Java
  - -C#
  - -Scripting: Lua, Python, etc

C++ library example

- Runs on iOS using
  - wrapper Objective C class
  - or, Objective C++ usage
- Runs on Android
  - JNI (NDK)

Original C++ class

```
class Territory {
public:
   Territory(int width, int height, uint_8 *map);

   int firstStepDirection(int x1, int y1, int x2, int y2);

   ~Territory();
}
```

Java wrapper class

```
public class Territory {
    public Territory(int [][]map) {
        init(map)
    }

    native void init(int [][]map);
    public native int firstStepDirection(int x1, int y1,
                                         int x2, int y2);
    public native void finalize();
}
```

Objective C wrapper class

```
@interface Territory : NSObject

 - (id)init:(NSData *)map width:(int)w height:(int)h;

- (int)firstStepDirection:(int)x1 y1:(int)y1
                                 x2:(int)x2 y2(int)y2;

 //- (void)dealloc is in @implementation

@end
```

Contacts

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