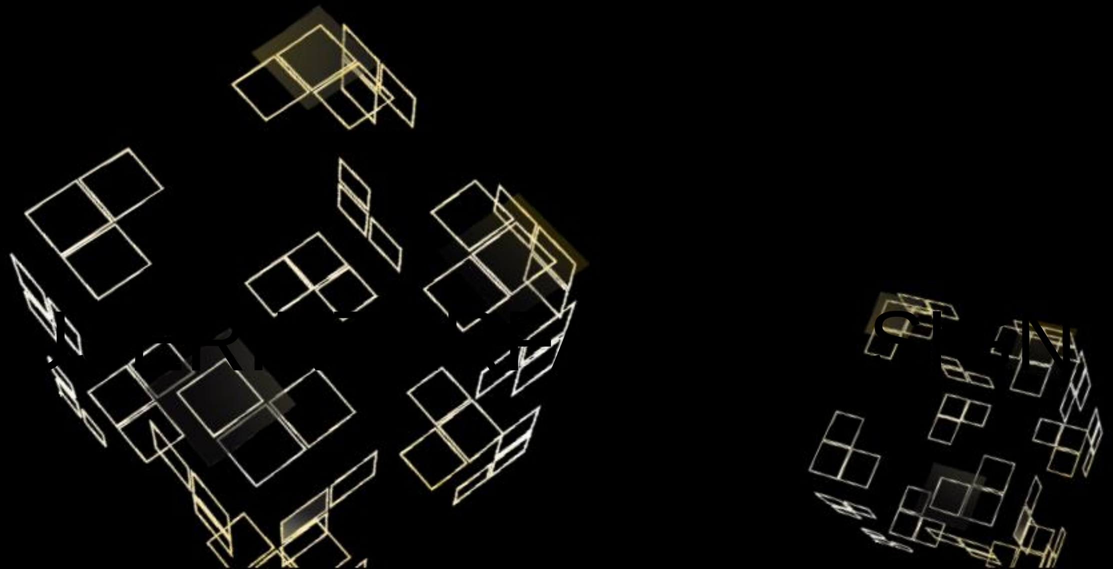
UNIVERSITY
OF TWENTE.



Mobile App Development

MOBILE APP DEV

- Introduction
- Building Apps: general directions
- Prototyping Apps
- App generators
- Hybrid Apps
- Native apps

2 more sessions: 9 and 16 January

Slides are here, including an overview of tutorials to get started

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Introduction

- What is an App
- Types of Apps
- Required background knowledge
  - At least some programming experience
  - Pre: web technology (HTML/CSS/Javascript)
- Tools

- Before you start: *why* an app? *design, prototype, test* *(*course: Userinterface Design and Simulation *)*

App Stores:
Apple's App Store
Google Play (publish for free)

Building Apps: general directions

- Types of Apps
  - Web (Webview)
  - Hybrid
  - Native
- Development environment
  - Online
  - On device (phone or tablet)
  - On Desktop/laptop

Web Apps are coded in HTML/CSS/JavaScript. They are served through the internet and run through a browser.
V/- Access Native APIs
- Distribute through App Stores
V Run on multiple platforms

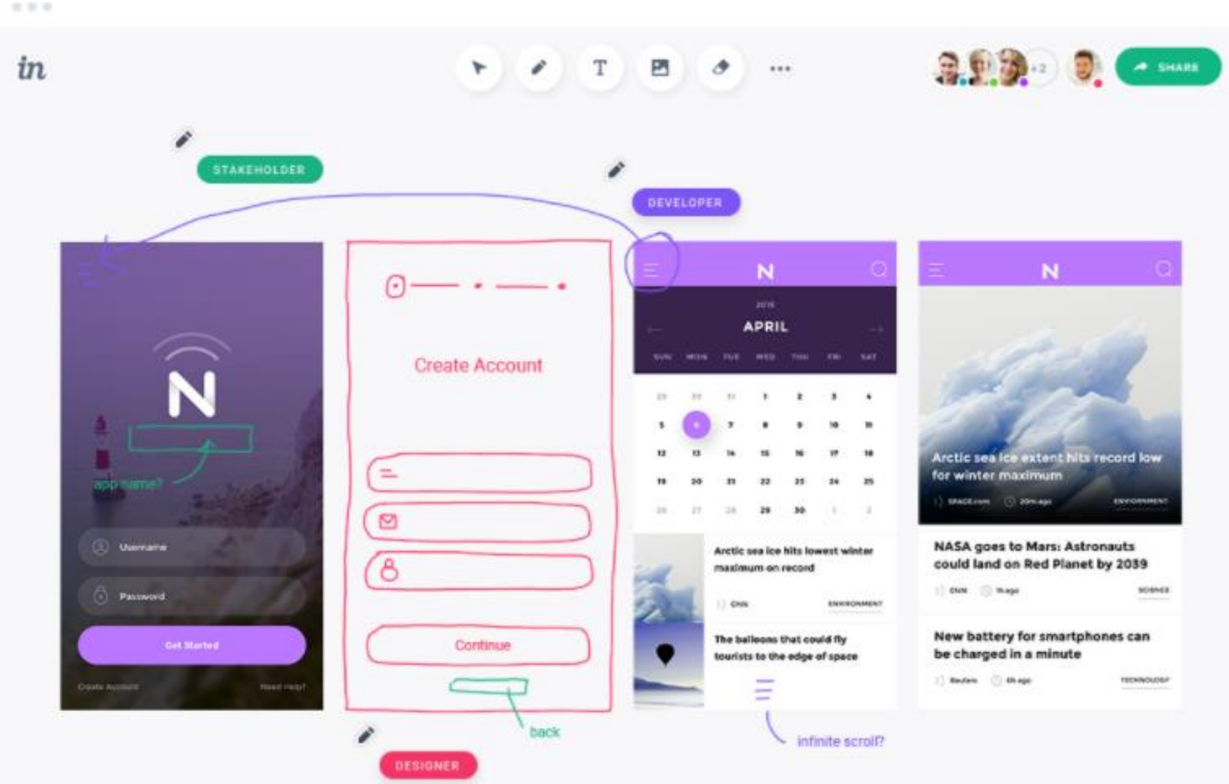
Hybrid Apps are coded in HTML/CSS/JavaScript. They are run through an invisible browser (webview) that is packaged into a native application.
V Access Native APIs
V Distribute through App Stores
V Run on multiple platforms

Native Apps are coded in the native language of the device (e.g. Objective-C for IOS, Java for Android). They are run directly on the device.
V Access Native APIs
V Distribute through App Stores
- Run on multiple platforms

Skill level: beginner

Prototyping Apps

- Build a ‘presentation’ or simulation
- Used in design phase e.g. for usability tests
- Quicker to develop
- Might look real, but limited functionality



in
SHARE
STAKEHOLDER
DEVELOPER
DESIGNER
app name?
Username
Password
Get Started
Create Account
Continue
back
APRIL
infinite scroll?
Arctic sea ice extent hits record low for winter maximum
Arctic sea ice hits lowest winter maximum on record
The balloons that could fly tourists to the edge of space
NASA goes to Mars: Astronauts could land on Red Planet by 2039
New battery for smartphones can be charged in a minute

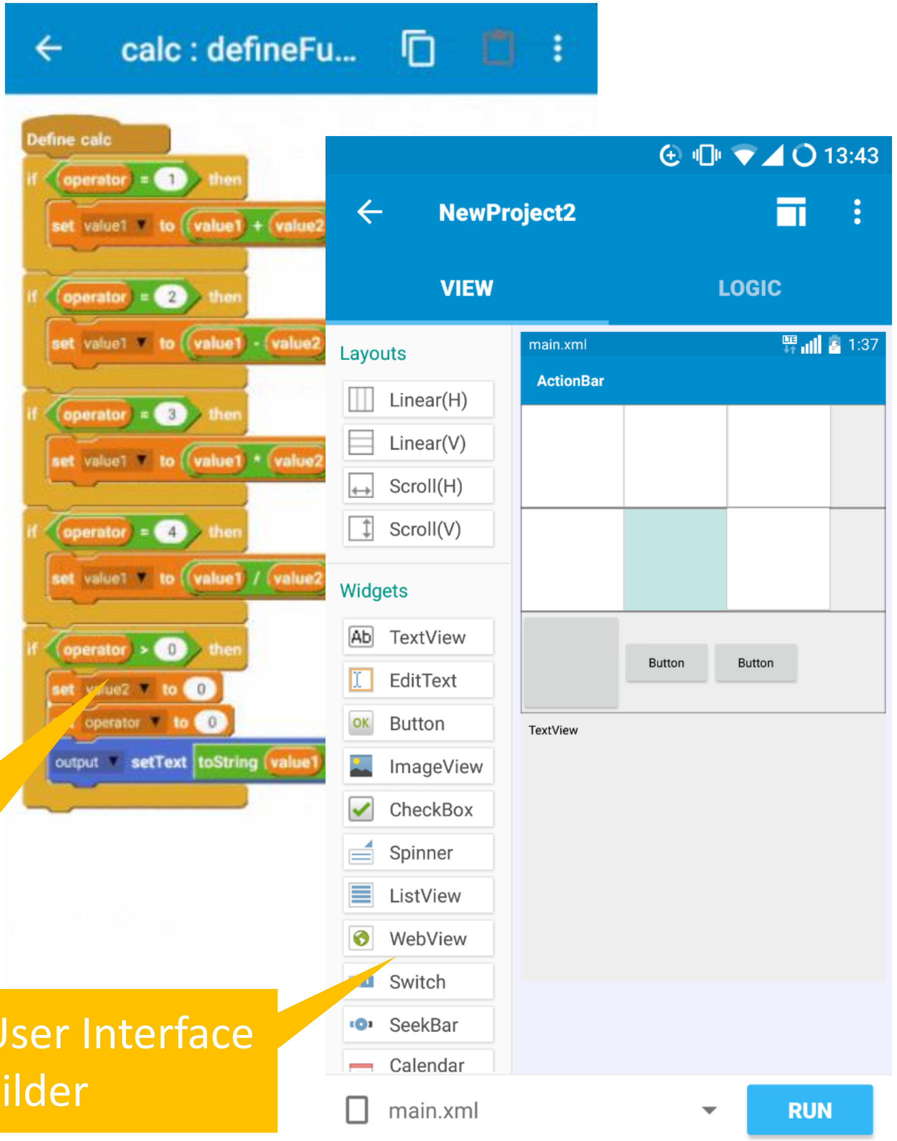
- Tools: Axure*, Invision (+ Sketch$^{\text{Mac only}}$)
- Course: Userinterface Design and Simulation (including Axure tutorial)

* license available from teacher

Skill level: beginner

App generators

- App Inventor (online service)
- Sketchware (create Apps on your phone) GET IT ON Google Play
- Tasker+Tasker App Factory (Paid App)

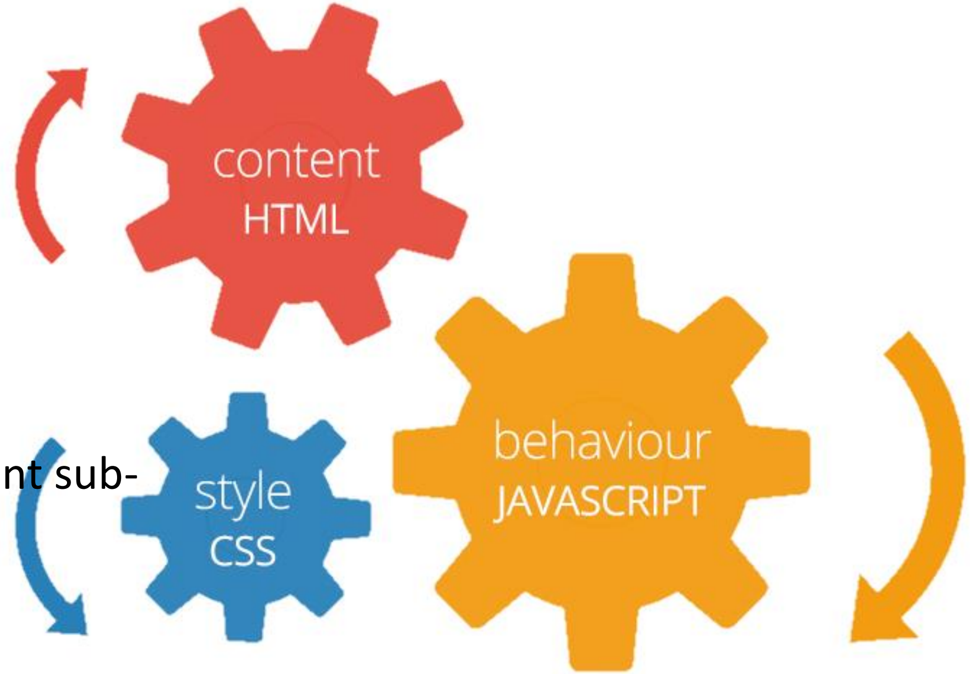


Sketchware and App Inventor use ***Block Language*** programming

Graphical User Interface Builder

Skill level: intermediate

Hybrid Apps



- Lots of competition
- HTML/CSS/JavaScript based
- Often immature (version hell, poor documentation, different sub-platforms, mixed-up online info)

- Requires: intermediate programming knowledge, and web tech (HTML/CSS/JavaScript)
- Tools: Code editor/IDE e.g.: Atom, Visual Studio Code, Brackets
- Learn basics: course Web Tech, App Dev, w3schools

Hybrid Apps Frameworks

Based on Web Technology

- Ionic
- NativeScript (delivers Native App)
- PhoneGap (Adobe)
- React Native (delivers Native App)
- Xamarin (Microsoft, C#) (delivers Native App)
- jQuery Mobile

Ionic	NativeScript
Quick build & test	Build/test takes longer (wait each time you change)
Preview in browser or on Phone	Preview on Phone or Emulator
App: renders in Webview	Converts to native (small performance gain)
Create UI based on HTML/CSS	Create UI with own elements

Ionic: getting started

ionicframework.com/getting-started

Code with the CLI

Use our CLI tool to build your apps.

1 Install Ionic

```
npm install -g cordova ionic
```

npm = package manager for the JavaScript runtime environment Node.js, install that first! (TLS version)

2 Start an App

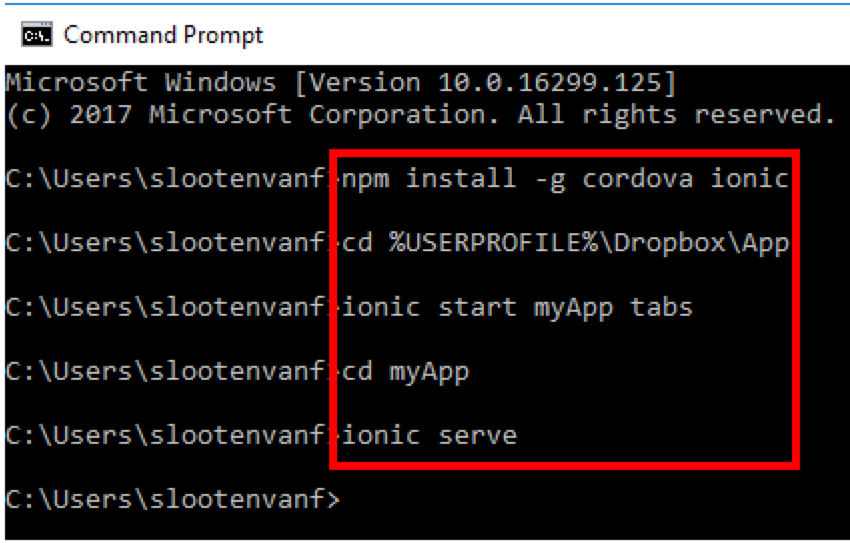
```
ionic start myApp tabs
```

Change to Documents folder first, eg:

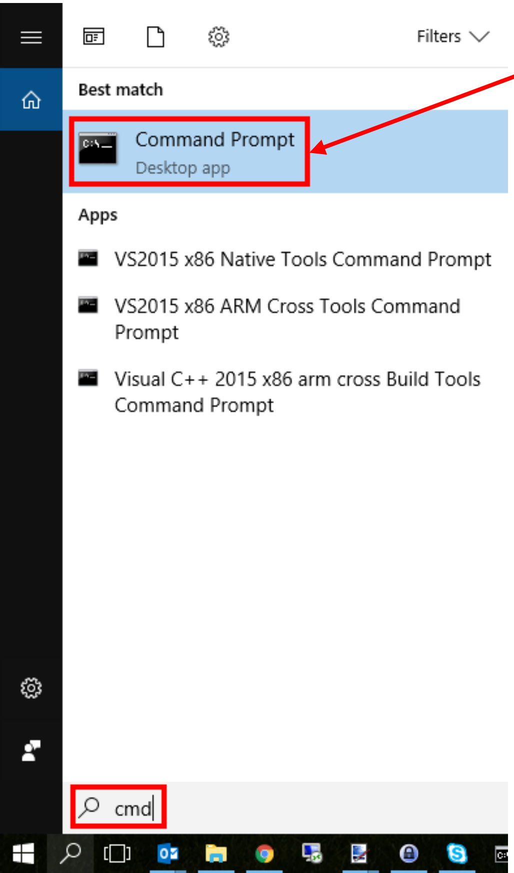
cd %USERPROFILE%\Dropbox\App

Name of your App

Template to use

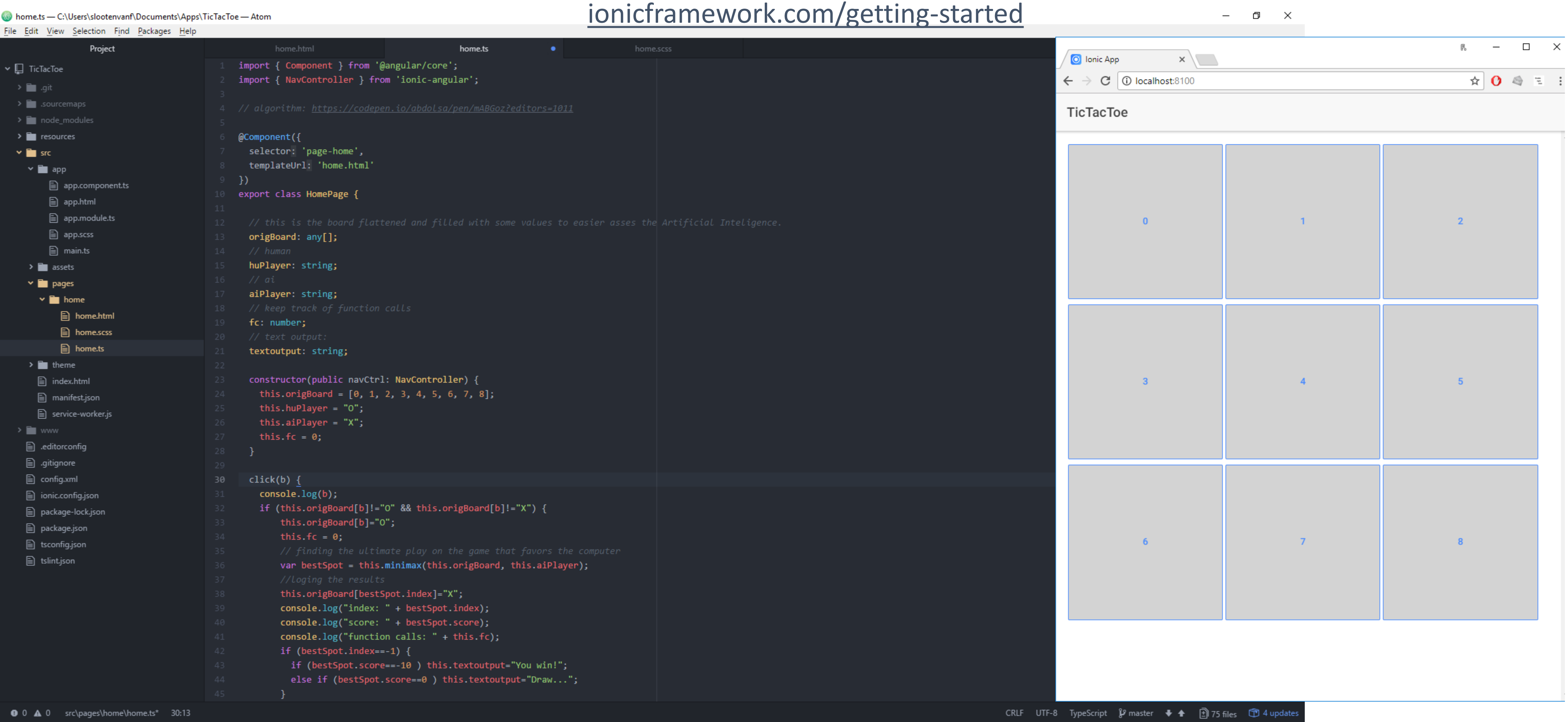


```
Microsoft Windows [Version 10.0.16299.125]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\Users\slootenvanf>npm install -g cordova ionic

C:\Users\slootenvanf>cd %USERPROFILE%\Dropbox\App

C:\Users\slootenvanf>ionic start myApp tabs

C:\Users\slootenvanf>cd myApp

C:\Users\slootenvanf>ionic serve

C:\Users\slootenvanf>
```


Filters
Best match
Command Prompt
Desktop app
Apps
VS2015 x86 Native Tools Command Prompt
VS2015 x86 ARM Cross Tools Command Prompt
Visual C++ 2015 x86 arm cross Build Tools Command Prompt
cmd

Ionic: getting started

ionicframework.com/getting-started



```
import { Component } from '@angular/core';
import { NavController } from 'ionic-angular';

// algorithm: https://codepen.io/abdolsa/pen/mABGoz?editors=1011

@Component({
  selector: 'page-home',
  templateUrl: 'home.html'
})
export class HomePage {

  // this is the board flattened and filled with some values to easier asses the Artificial Inteligence.
  origBoard: any[];
  // human
  huPlayer: string;
  // ai
  aiPlayer: string;
  // keep track of function calls
  fc: number;
  // text output:
  textoutput: string;

  constructor(public navCtrl: NavController) {
    this.origBoard = [0, 1, 2, 3, 4, 5, 6, 7, 8];
    this.huPlayer = "O";
    this.aiPlayer = "X";
    this.fc = 0;
  }

  click(b) {
    console.log(b);
    if (this.origBoard[b]!="O" && this.origBoard[b]!="X") {
        this.origBoard[b]="O";
        this.fc = 0;
        // finding the ultimate play on the game that favors the computer
        var bestSpot = this.minimax(this.origBoard, this.aiPlayer);
        //loging the results
        this.origBoard[bestSpot.index]="X";
        console.log("index: " + bestSpot.index);
        console.log("score: " + bestSpot.score);
        console.log("function calls: " + this.fc);
        if (bestSpot.index==-1) {
          if (bestSpot.score==-10 ) this.textoutput="You win!";
          else if (bestSpot.score==0 ) this.textoutput="Draw...";
        }
```

Skill level: pro

Native apps

developer.android.com
developer.apple.com

- Platform: IOS (Apple), Android (Google)
- Android:
  - Andoid Studio (Java)
- IOS
  - Xcode (Objective-C)
  - Swift

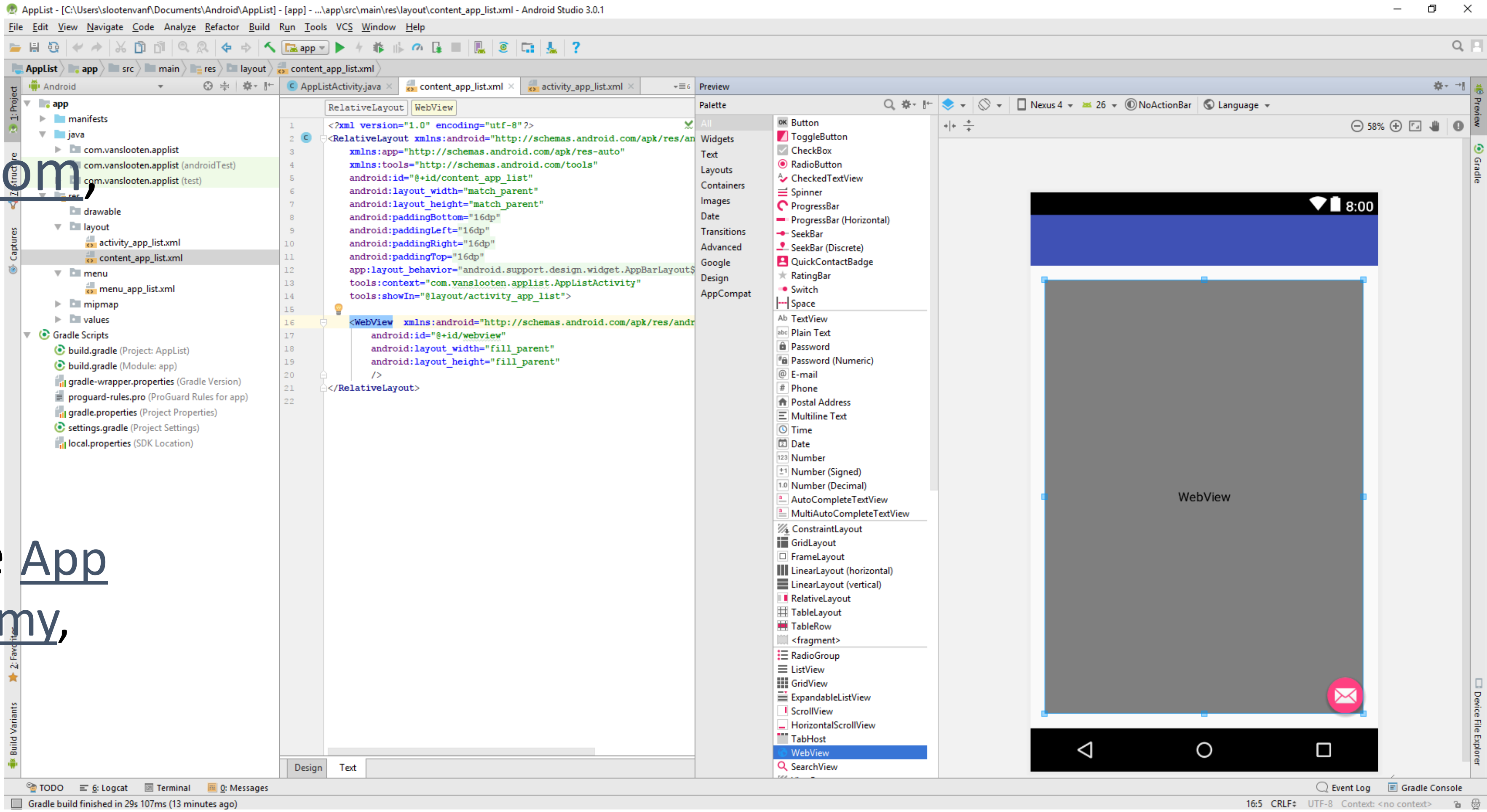
- Requires: programming knowledge, and preferably web tech
- Learn IOS: Everyone can code, App development with Swift

Skill level: pro

Andoid Studio (Java)

Android Studio
Version 3.0

- Tutorials: [Android Developer fundamentals](), [developer.android.com](), [more]()
- Requires: Java programming experience
- Learn basics: course [App Dev](), [Udemy](), [Codecademy](), [Learnjavaonline.org](), …



AppList - [C:\Users\slootenvanf\Documents\Android\AppList] - [app] - ...\app\src\main\res\layout\content_app_list.xml - Android Studio 3.0.1

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
AppList app src main res layout content_app_list.xml
AppListActivity.java content_app_list.xml activity_app_list.xml
Android
app
manifests
java
com.vanslooten.applist
com.vanslooten.applist (androidTest)
com.vanslooten.applist (test)
drawable
layout
activity_app_list.xml
content_app_list.xml
menu
menu_app_list.xml
mipmap
values
Gradle Scripts
build.gradle (Project: AppList)
build.gradle (Module: app)
gradle-wrapper.properties (Gradle Version)
proguard-rules.pro (ProGuard Rules for app)
gradle.properties (Project Properties)
settings.gradle (Project Settings)
local.properties (SDK Location)
RelativeLayout WebView
Preview
Palette
Widgets Text Layouts Containers Images Date Transitions Advanced Google Design AppCompat
Button ToggleButton CheckBox RadioButton CheckedTextView Spinner ProgressBar ProgressBar (Horizontal) SeekBar SeekBar (Discrete) QuickContactBadge RatingBar Switch Space
TextView Plain Text Password Password (Numeric) E-mail Phone Postal Address Multiline Text Time Date Number Number (Signed) Number (Decimal) AutoCompleteTextView MultiAutoCompleteTextView
ConstraintLayout GridLayout FrameLayout LinearLayout (horizontal) LinearLayout (vertical) RelativeLayout TableLayout TableRow <fragment>
RadioGroup ListView GridView ExpandableListView ScrollView HorizontalScrollView TabHost WebView SearchView
Nexus 4 26 NoActionBar Language 58%
8:00
WebView
Design Text
TODO 6: Logcat Terminal 0: Messages Event Log Gradle Console

```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/an
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/content_app_list"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="16dp"
    android:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingTop="16dp"
    app:layout_behavior="android.support.design.widget.AppBarLayout$
    tools:context="com.vanslooten.applist.AppListActivity"
    tools:showIn="@layout/activity_app_list">

    <WebView  xmlns:android="http://schemas.android.com/apk/res/andr
        android:id="@+id/webview"
        android:layout_width="fill_parent"
        android:layout_height="fill_parent"
        />
</RelativeLayout>
```

Gradle build finished in 29s 107ms (13 minutes ago)

16:5 CRLF: UTF-8 Context: <no context>

Deploy?

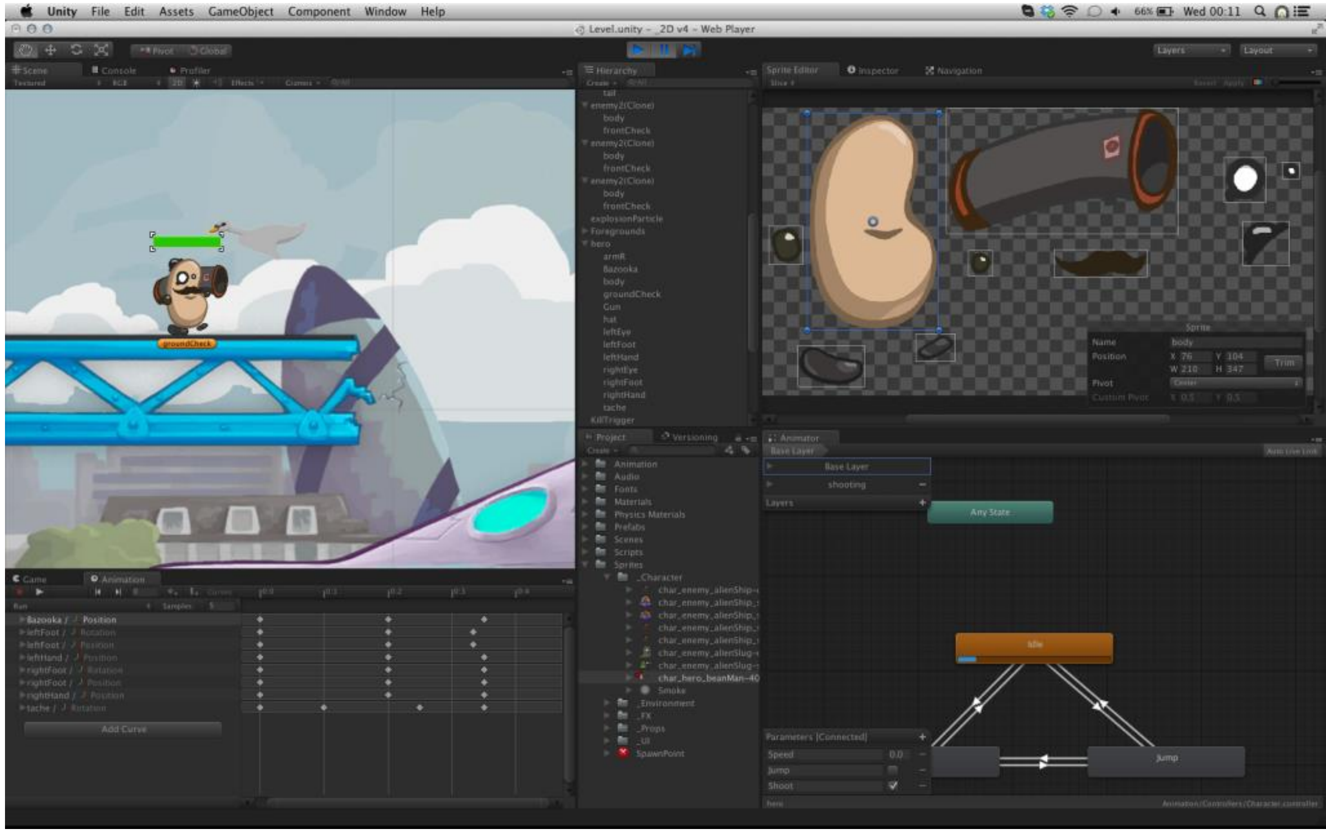
- Deploy: publish in App store
- Requires:
  - IOS: register ($99) with developer.apple.com/programs (more info)
  - Android: register (for free) with play.google.com/apps/publish

- Alternative: test without publishing
  - Android: distribute .apk to testers
  - IOS: have testers get a build via TestFlight: register participants on your personal team

Game engines

Learn more about game development:
emanueleferonato.com
html5gamedevs.com
gamedev.net

- Combine with Native App:
  - Unity: Mobile solutions
  - Unreal: Mobile Development
- Combine with Hybrid framework:
  - Phaser.io:
    - Deploy with Cocoon.io
    - Combine with: Ionic, PhoneGap



QUESTIONS?

WHAT’S NEXT?

I will visit each group to... advise, assist
Do you want another session? (9 and 16 January)

Slides are here, including an overview of tutorials to get started

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