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From iOS to Android
Galaxy on Fire 2 does the green robot

Köln, August 2011



Why?



- **Pocketgamer.biz:**
 - **Android growing at 5 times the rate of iOS in US as share tops 40%**

Top Smartphone Platforms			
3 Month Avg. Ending Jun. 2011 vs. 3 Month Avg. Ending Mar. 2011			
Total U.S. Smartphone Subscribers Ages 13+			
Source: comScore MobiLens			
	Share (%) of Smartphone Subscribers		
	Mar-11	Jun-11	Point Change
Total Smartphone Subscribers	100.0%	100.0%	N/A
Google	34.7%	40.1%	5.4
Apple	25.5%	26.6%	1.1
RIM	27.1%	23.4%	-3.7
Microsoft	7.5%	5.8%	-1.7
Symbian	2.3%	2.0%	-0.3

comScore
4th August
2011

Galaxy on Fire 2



Evolution



Evolution



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NVIDIA TEGRA™

WWW.FISHLABS.NET



iOS → Xperia PLAY

- **iPhone4:** approx. 28 mill. polygons per second
- **Adreno 205:** approx. 40 million polygons per second
- **Graphics**
 - Same assets as iPhone version
- **Code**
 - Engine
 - Framework
- **Sound**
 - Same as iPhone (FMod)

iOS → Xperia PLAY



- **New Input Methods**
 - Touchpad
 - Dedicated Gamebuttons
- **Clean Up Ingame-Interface**



iOS → Android THD

- **iPhone4:** approx. 28 mill. Polygons per second
- **NVIDIA Tegra 2:** approx. 71 million polygons per second
- **Graphics**
 - Meshes
 - Textures
- **Code**
 - Vertex/Pixel Shader support

iOS → Android THD

Meshes



REGULAR GRAPHICS VS.
TEGRA™ 2 ENHANCED

GALAXY
ON
FIRE 2™

NON-ENHANCED



ENHANCED



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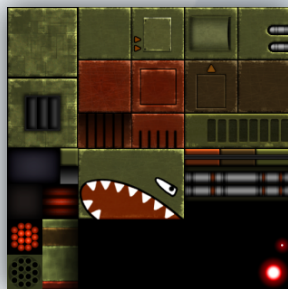


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iOS → Android THD



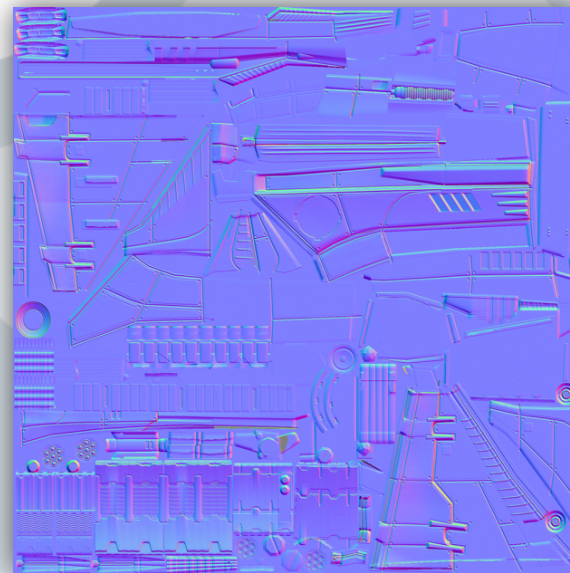
Textures



Diffuse



Specular



Normal

iOS → Android



- **Texture Compression**
 - **Imagination Technologies : PVRTC**
 - **Tegra2: DXT 1,3,5**
 - **ATI**
 - **ETC**

iOS → Android

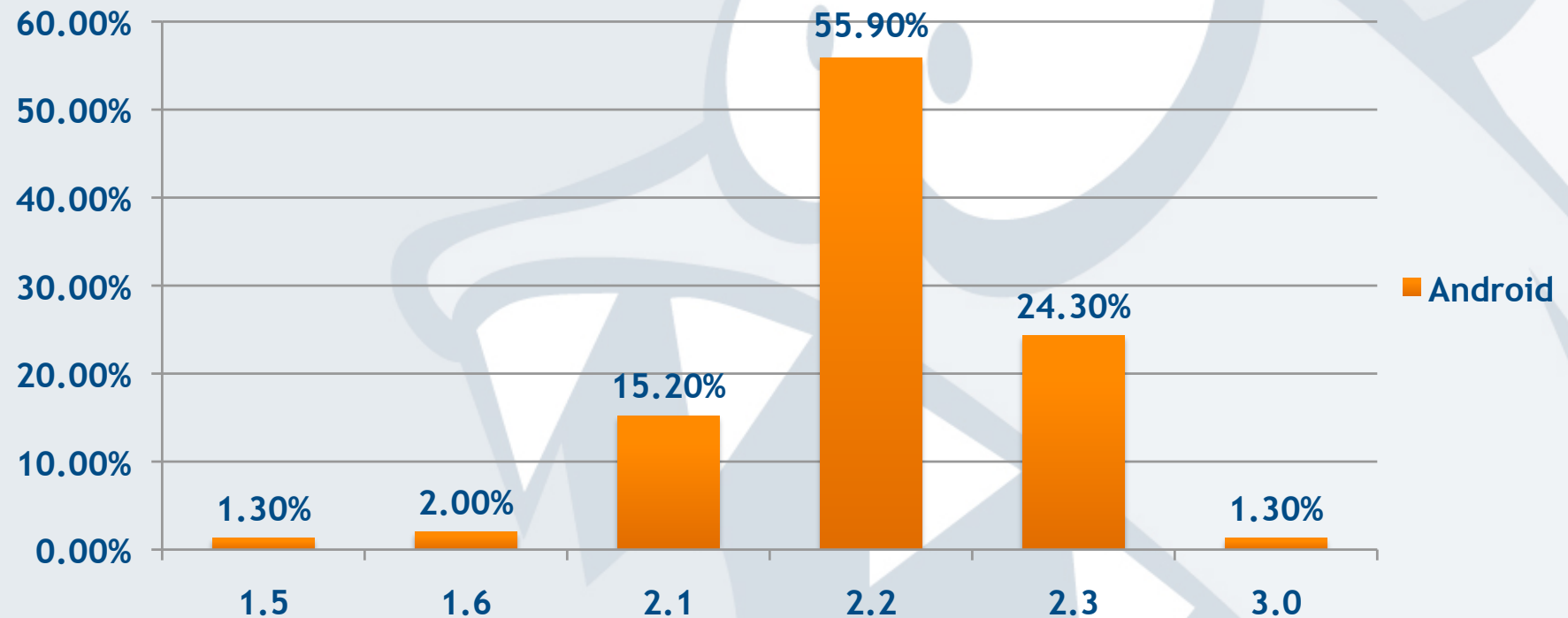


- **Framework**
 - **OS**
 - **GL ES 1.x / 2.0**
 - **Controls**
- **Graphics**
 - **Textures (size and compression)**
 - **Polygon Count**
- **Sound**

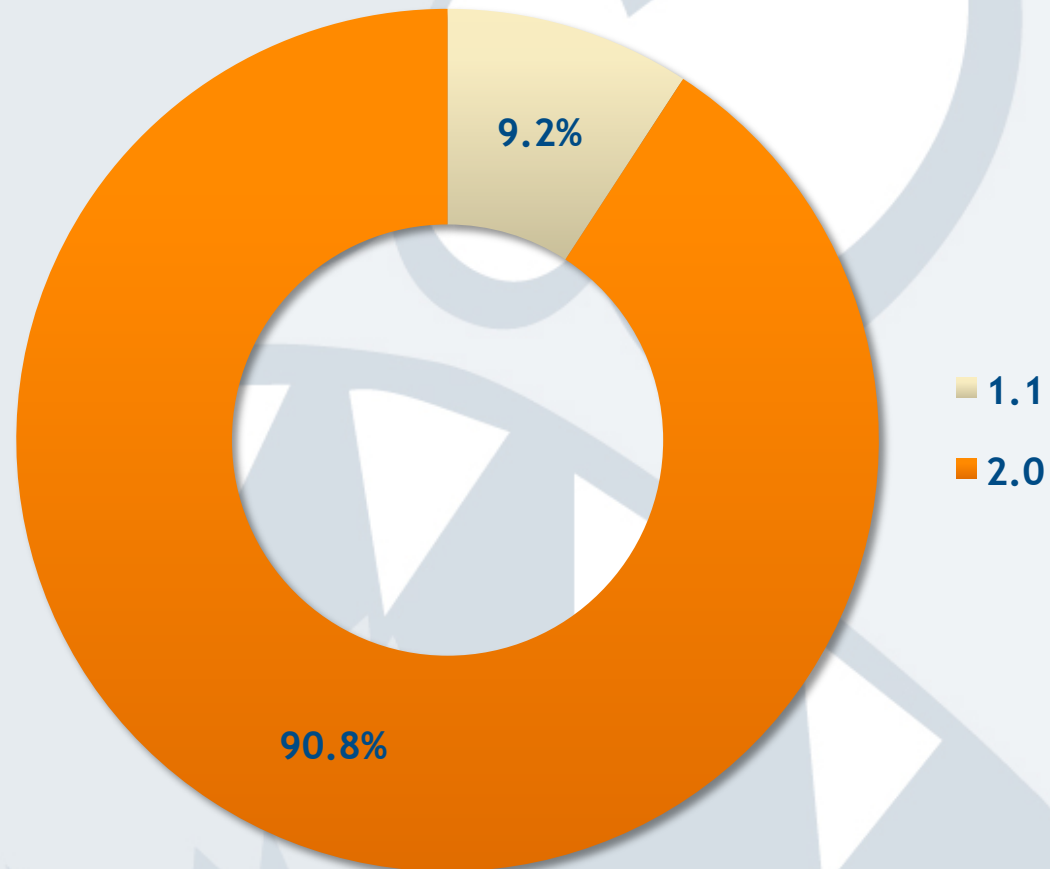
Android



Platform Versions Distribution August 2011



OpenGL ES distributions August 2011





General Android Programming

- **developer.android.com**
- **Eclipse as IDE + ADT + various plugins**
- **Java vs. NDK**
- **MOTODEV Studio** (developer.motorola.com)
- **Debugging not possible inside NDK**
- **Big task for Lifecycle Management with NDK**
- **Xperia PLAY: “Native Activity” for touchpad**
- **Change of APIs**
 - **Xperia PLAY: Device open/close**
- **Different values between Java and NDK**
 - **Xperia PLAY: Device open (3 in java, 2 in C)**



General Android Programming

- **No Open GLES 2.0 support in Emulator**
- **Connection between PC and device**
- **Removal of apk on Platform 2.2 and lower**
- **Sound**
 - **Java until 2.2**
 - **OpenSL with 2.3 and higher**
 - **Hint: Use FMOD**
- **Access to assets only available via zip_fopen**
- **Build of an apk with 500 MB could take up to half an hour → Tip: Copy Assets to SD-Card**

Android Devices



- **Fragmentation**
 - **Some devices have strange touch behavior**
 - **Multitouch support**
 - **Different values for accelerometer**
 - **Screen resolution**
 - **Power of CPU and GPU**
 - **Texture compression**
 - **Many more**

Download Manager



- **20 MB Appsize on Market until Dec. 2010**
- **Currently 50 MB**
- **Rumors of 4 GB since May**
- **THD version over 200 MB**
- **NO Asset hosting from Google**
- **Pirated games steel your bandwidth**
 - **Encrypt download process**
 - **Update Game on Market with new URL**
- **Example: $100.000 * 200 \text{ MB} = 20 \text{ TB}$**



Application Licensing in Theory

- **Possibility to check for valid license**
- **Android version 1.5**
- **Suitable for paid content**
- **Only Java API**
- **Status of license via Callbacks**
- **Caching of license status possible**
- **Only on Android Market**
- **Test-User**



Application Licensing in Practice

- **High Piracy Rate**
- **Google's statement: *BE CREATIVE***
 - **Every developer has to prevent cracking**
 - **Obfuscator**
 - **Modify License Verification Library**
 - **Make your application tamper-resistant**
 - **Valid check on own trusted server**
- **Use Free-To-Play with In-App Billing**



In-App Billing in Theory

- **Buy items through Market in game**
- **Managed and unmanaged items**
- **Android Version 1.6**
- **Only Java API**
- **Status of purchase via Callbacks**
- **Status stored on device**
- **Testaccounts possible**
- **30% Transaction Fee**



In-App Billing in Practice

- **Testaccounts not suitable → real Accounts**
- **Too many requests → Reset needed**
- **Communication is complex → prone to errors**
- **In-App Billing BUG**



In-App Billing in BUG

- **Purchase went wrong**
 - **Callback never get called again**
 - **User tried to purchase again**
 - **User gets charged twice for “managed” items**
 - **Support was crushed by the users**
 - **Manually refund by our support team**
 - **Extra fee for the refund**
- **Valid from April until 2nd July**
- **GOF2 THD launched on 16th June**

Markets



- **Android**
 - **50 MB AppSize**
 - **Open for all developers**
 - **Device filtering via publisher portal**
 - **Device filtering through manifest inside the build**
 - **Texture-compression**
 - **Multi-touch**
 - **OpenGL Renderer**
 - **No Approval Process**

Markets



- **Verizon**
 - **Unlimited filesize**
 - **No In-App Billing**
 - **No License Server check**
 - **Approval Process**
 - **Contract only for selected developers**
- **Vodafone**
 - **20 MB limit**
 - **No In-App Billing**
 - **No License Server check**
 - **Approval Process**
 - **Currently open for all developers**

Thank you for listening!

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