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OpenKODE Developer Perspectives

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Futuremark Corporation



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- Established in 1997
- HQ in Espoo, Finland
- Private and profitable
- Products
 - Industry standard benchmark software
 - Performance related web applications
 - Custom technology demos

- Mission

to increase growth within IT industry by showing the performance of new PC and mobile technology, simultaneously taking into account the end user satisfaction

Agenda



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- *Motivation*
- Futuremark engines
- Content path



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Motivation - Variations

- Handheld market ISVs need to cope with variations:
 - OS
 - Display capabilities
 - Audio capabilities
 - Controls
 - Performance

Where handheld devices come from?



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- Operator
- Mobile device manufacturer
- Integrator
- Operating system
- CPU IP
- OpenGL ES IP, OpenVG IP



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Motivation - APIs

- We can not change the actual hardware variations. Hardware variations are good for the consumer.
- From developers perspective it is the APIs – not the hardware – that matters.
- Good API helps developers to live happily with the hardware variations.



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What about Java?

- Java and JSRs are good in theory
- ISVs need to cope with varying implementation bugs
- Performance varies a lot and is often far from optimal
- Even when these get fixed, there will always be some amount of native code development

Agenda



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- *Futuremark engines*
- Content path

Futuremark Mobile Engines



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- Developed in house since 2003
- Used in multiple demos, custom benchmarks, SPMark04, 3DMarkMobile06
- Two content paths:
 - Avid Softimage XSI
 - NewTek LightWave

Futuremark Mobile Engines Requirements



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- Highly portable
- Single source for all platforms, ANSI C
- Flexible source code sharing with partners
- Version controlling

Futuremark Mobile Engines

Design: Layers



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- Application

Demos, Benchmarks

- Engine

OpenGL ES e., OpenVG e.

- OS Abstraction

Desktop Windows

Nokia Series 60 Symbian

Dell Axim X50v/X51v

Futuremark Mobile Engines

Design: Configuration Variables



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- CPU data type: Floating or fixed point
- GPU data type: Floating or fixed point
- Skinning: CPU or GPU
- OpenGL API: Desktop or ES
- Primitive type: Triangle strips or lists
- Various OpenGL ES extensions

Futuremark Mobile Engine OS Abstraction Layer



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- Roughly equals OpenKODE APIs:
 - Memory
 - File IO
 - Input
 - Timer
 - Graphics
- But is also an application framework.

Application framework requirements



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- Startup code
- Default configuration discovery
- Event handling
- Threads
- Timer procedures
- Library loading
- Power management

OS Abstraction: Application entrypoints



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- `Int main(int argc, char** argv) ?`
- `create()`
- `configure()`
- `init()`
- `deinit()`
- `update()`
- `exit()`



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Experiences

- With layers and configuration variables, the code is very portable
- Even a single binary can work on different hardware thanks to standard OpenGL ES library naming
- Changing OS abstraction layer API means every implementation needs to be updated

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Content path

- Very important component
- Prefer data driven solutions
- Intermediate data format
- Do as much as possible in the content path and minimize runtime processing
- Try embedding engine inside the content path, or setup realtime update link



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Content path: Budgets

- Frames per second
- Vertex processing per frame
- Fragment processing per frame
- State changes per frame
- CPU processing per frame
- Texture memory, texture sizes
- Vertex and index buffer memory

Summary



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- OpenKODE APIs will make source portable software easier
 - Application frameworks and middleware can be written on top of OpenKODE – Less or no platform specific code needed
 - COLLADA shows the right direction for content paths

Thank You !



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