
ANGRY BIRDS™ 2

# Next-Gen Audio in Only 10 Megabytes

Jonatan Crafoord
Audio Director

Elvira Björkman
Composer


ANGRY
BIRDS
2


20.000
LEAGUES ABOVE THE
CLOUDS

# Under Pigstruction

”Next-gen” mobile game

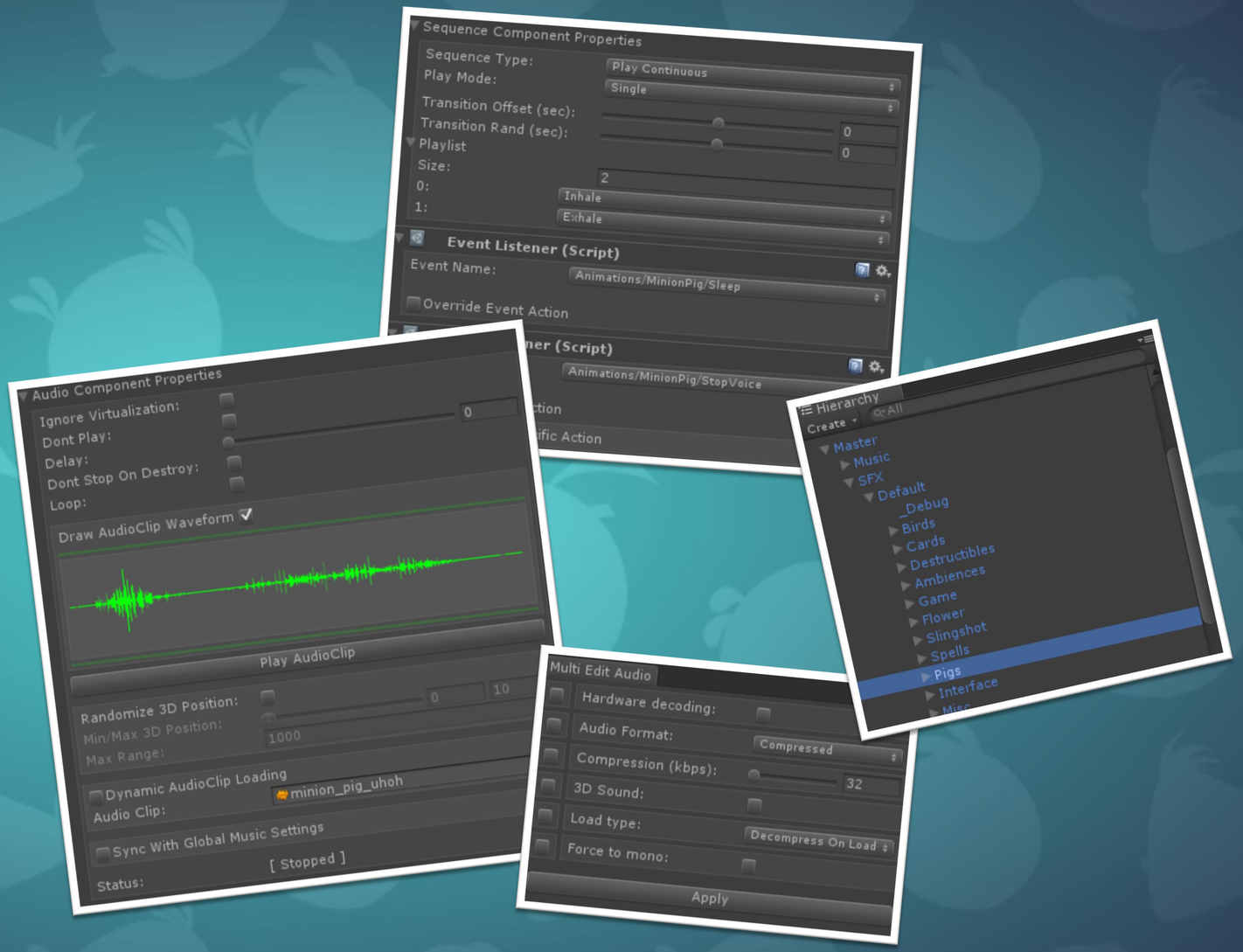
Triple-A console quality

Former DICE, Avalanche, Crytek

… and oh, you only get ~~6mb~~ 10mb for audio


TNT
UNDER CONSTRUCTION

# Fabric

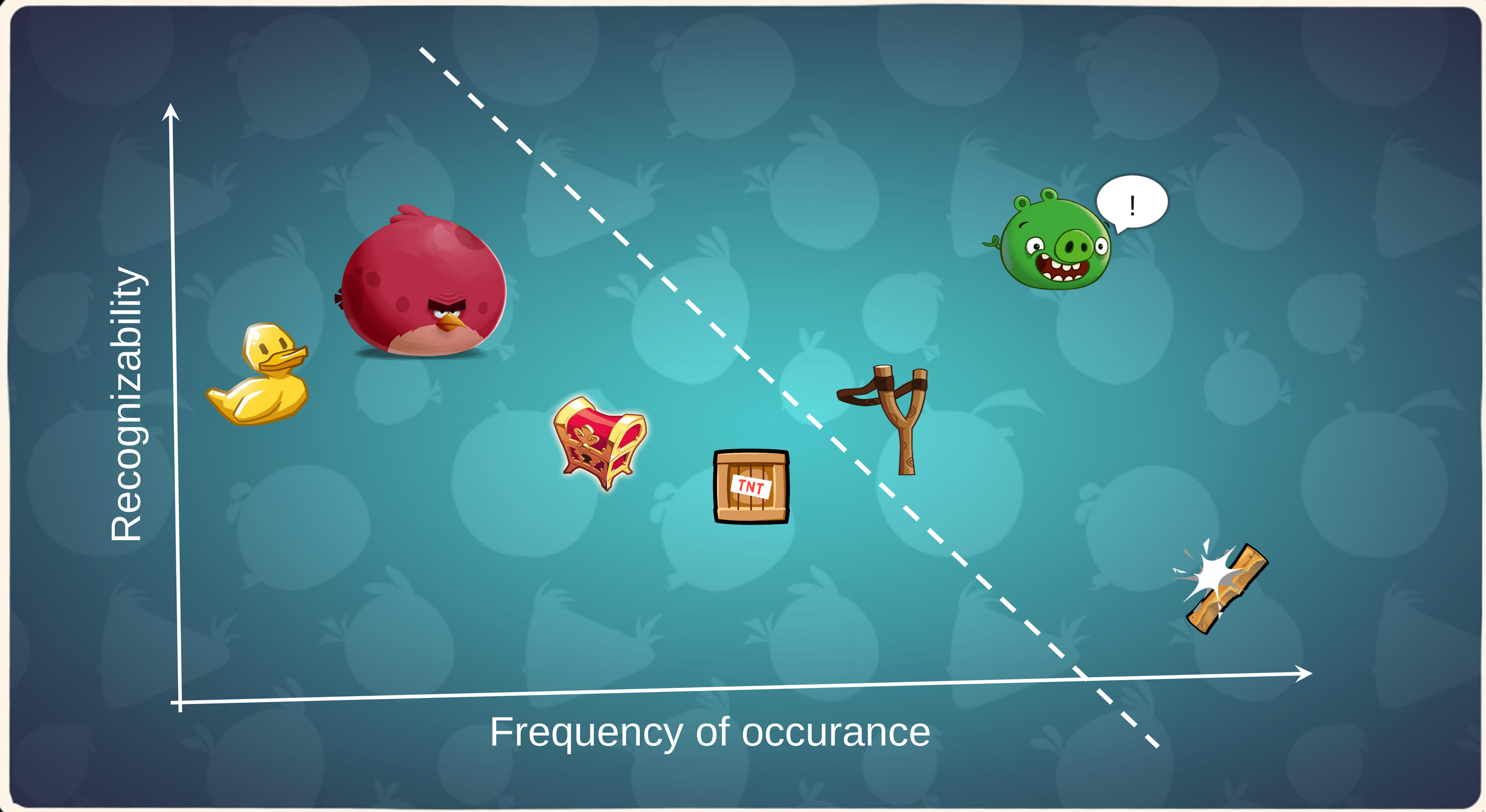

Sequence Component Properties
Sequence Type:
Play Mode:
Transition Offset (sec):
Transition Rand (sec):
Playlist
Size:
0:
1:
Play Continuous
Single
Inhale
Exhale
Event Listener (Script)
Event Name:
Override Event Action
Animations/MinionPig/Sleep
Animations/MinionPig/StopVoice
Audio Component Properties
Ignore Virtualization:
Dont Play:
Delay:
Dont Stop On Destroy:
Loop:
Draw AudioClip Waveform
Play AudioClip
Randomize 3D Position:
Min/Max 3D Position:
Max Range:
Dynamic AudioClip Loading
Audio Clip:
minion_pig_uhoh
Sync With Global Music Settings
Status:
[ Stopped ]
Hierarchy
Create
Master
Music
SFX
Default
_Debug
Birds
Cards
Destructibles
Ambiences
Game
Flower
Slingshot
Spells
Pigs
Interface
Multi Edit Audio
Hardware decoding:
Audio Format:
Compression (kbps):
3D Sound:
Load type:
Force to mono:
Compressed
Decompress On Load
Apply

Center

Left

Right


SCORE
179,827
NEW
HIGHSCORE!


Recognizability
Frequency of occurance
!
TNT


5

# The exception – human voices

# Sound Summary

- Variation is key to quality, but variation is also the size budget killer
- Much variation was achieved by talking to other disciplines
- We also used middleware – it really helped!

# Sound Summary

- Sounds use random pitch for variation; volume and pan are handled by game
- Most events have only one sound file
- Extra files were made for recognizable sounds + sounds that play repeatedly
- Variation files were usually three with random no repeat
- No upper limit for amount of voice variation files


ANGRY
BIRDS
2


MONSTERS


TOCA
BLOCKS


TOCA
LIFE
SCHOOL


2


TOCA
LIFE
CITY


SELFIE
SLAM

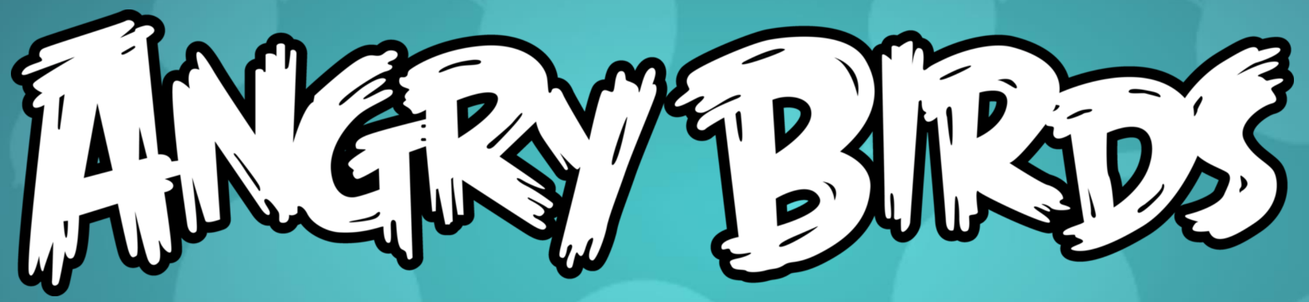

HAMMERWATCH

# The Music in Angry Birds 2

… One Big Tiny Problem

~~6~~ minutes of music
15

Following the

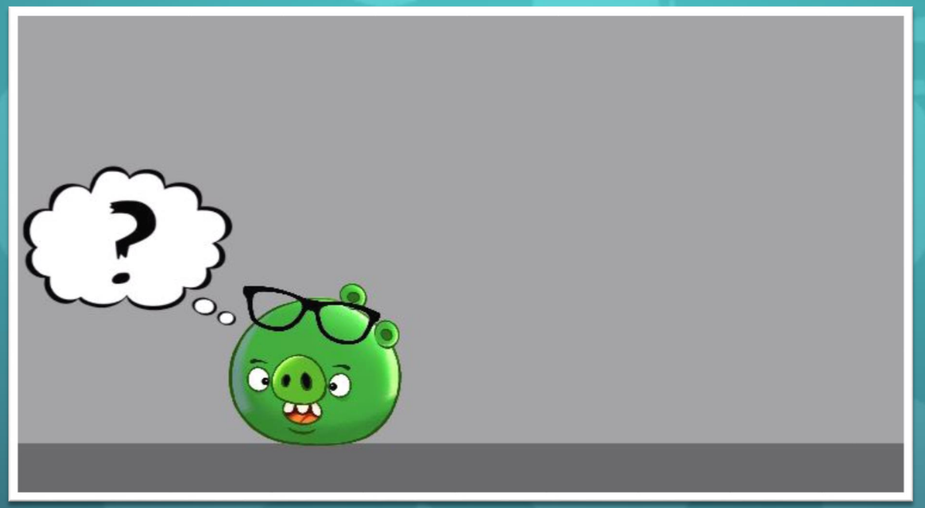



brand


ANGRY BIRDS
EPIC
FREE RPG ADVENTURE!
ROVIO


ANGRY
BIRDS
2
ROVIO

# To synthesize…
# … or not to synthesize?



# Levels and Chapters


# Chapters

0.5mb

0.5mb

0.5mb

0.5mb

0.5mb

0.5mb

= 3mb

0.5mb

0.5mb

0.5mb

= 1.5mb


5
FULL
146
10
11
12
14
15
TOONS.TV

# Levels

How would we keep one track interesting over so many levels?

- When does it start to feel repetitive?
- What can we afford?

# A simple solution for a complex problem

Full song

# A simple solution for a complex problem


TUTORIAL

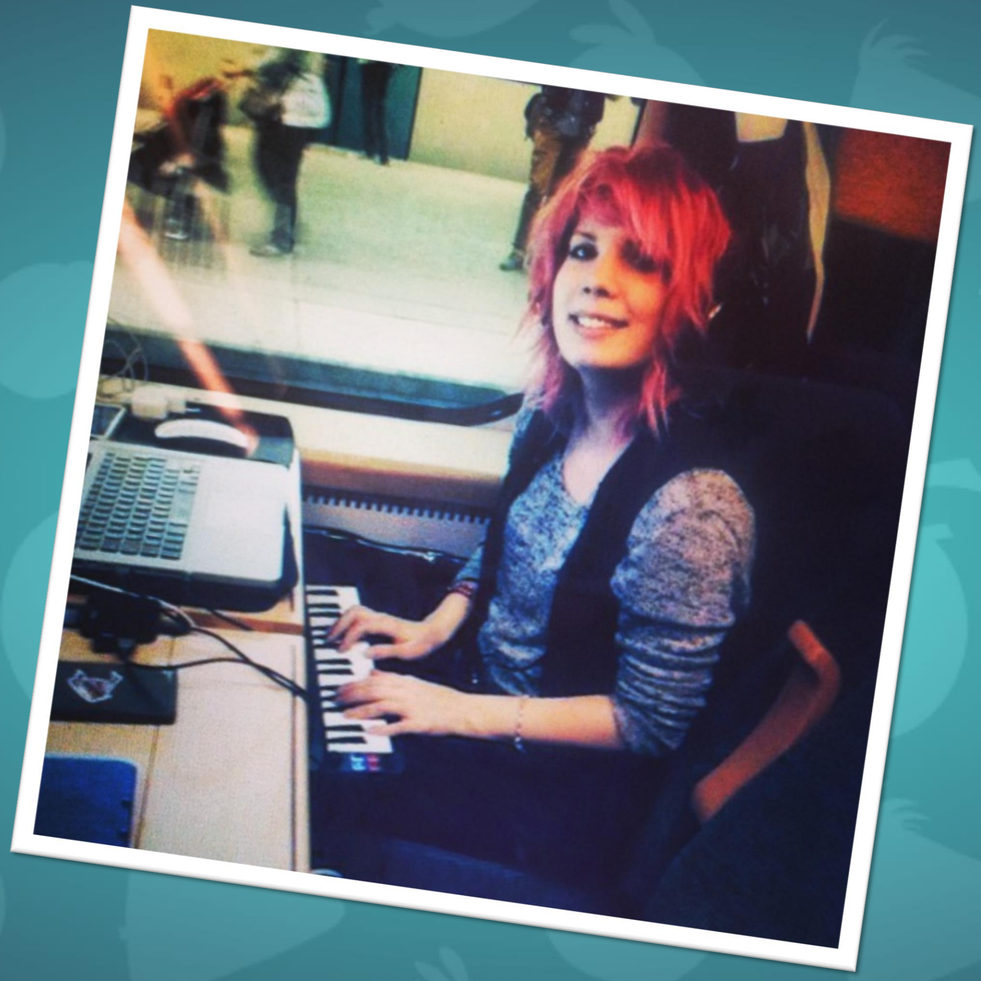
# Music summary

Chapter screen

- A one-minute identically paced looping track per setting
- Cross-fade the tracks when moving between chapters

Levels

- A 2-3 minute looping track per in-game setting
- Chop up into parts with short unique intros based on background lighting
- Play from new part when progressing, randomize on repeat




ANGRY
BIRDS
2

# Compression

# All these settings…?

- Compressed in memory: takes less memory but more CPU
- Decompress on load: takes more memory but less CPU
- Stream from disk: takes less memory for big files (200kb+)
- Memory is usually the bottleneck for sound on mobile

Music

7 tracks averaging 2+ minutes  (15 minutes)

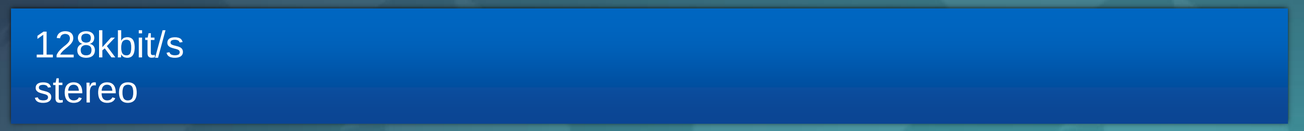
Sfx

300+ effects averaging 1.2 seconds  (6 minutes)

Voice

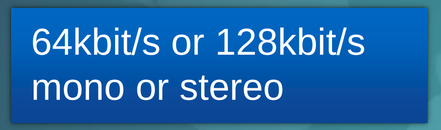
400+ samples averaging 0.7 seconds  (4.5 minutes)

## Music




14.3mb

## Sfx



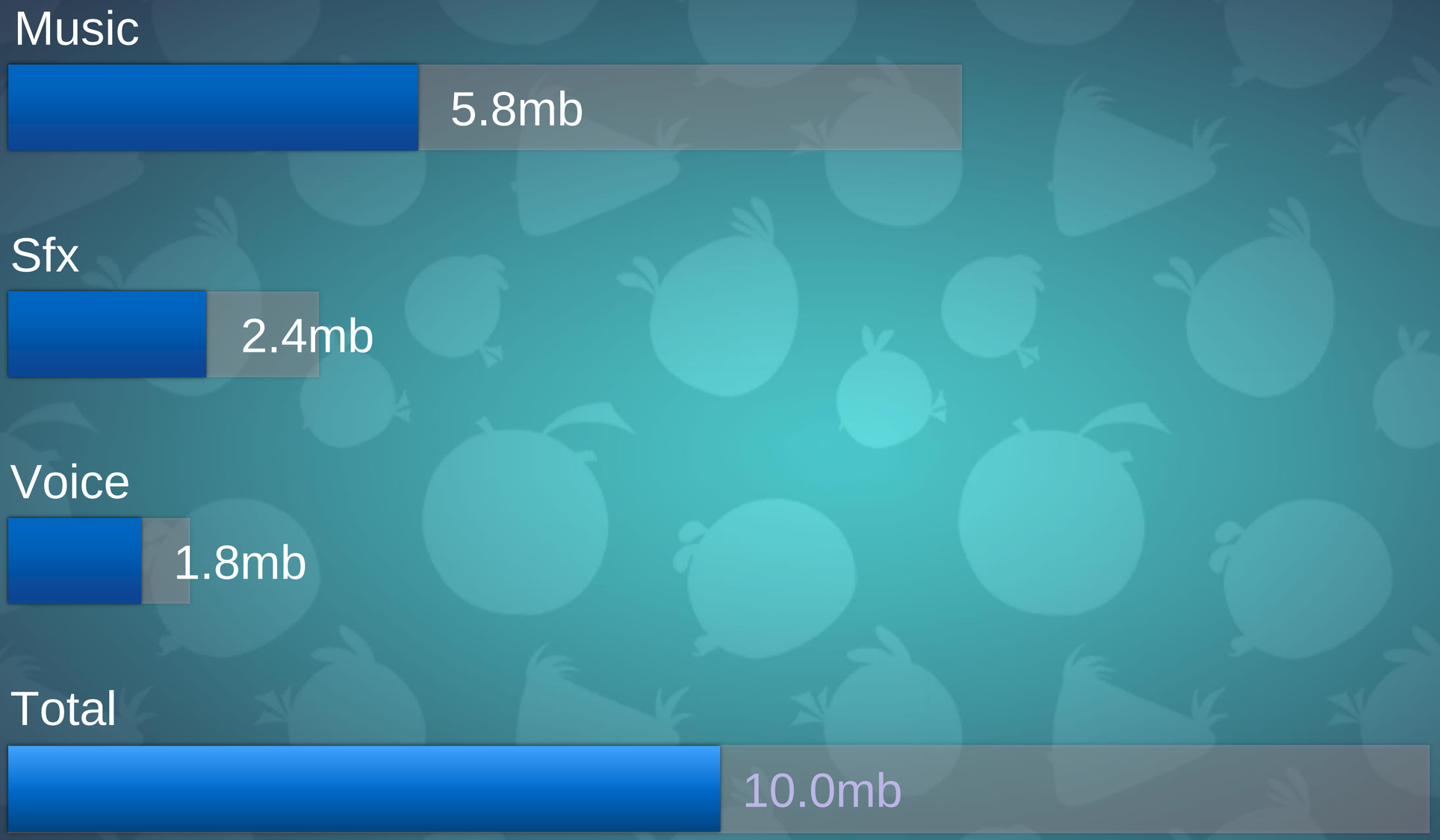

4.0mb

## Voice


2.2mb

## Total

20.5mb


Music
5.8mb
Sfx
2.4mb
Voice
1.8mb
Total
10.0mb

# The case for mono


3% (?)

# Stereo Spreader

L

R

# Original

56kbit/s stereo
(28kbit per channel)

56kbit/s mono
with stereo spreader

52kbit/s

# Compression Summary

- Most assets are compressed to 52kbit/s – it works surprisingly well!
- We prefer Vorbis, but Unity 4 used mp3 for mobile
- Stereo takes up twice as much space as mono
- Most users will have a mono experience anyway due to hardware
- Headphone users can have quality improved by stereo spreader

# 80+ million downloads
# *zero complaints*

that we know of ^.^


jonatan@crafoord.net
@JonatanCrafoord

elvira@twofeathersstudio.com
@BjorkmanElvira