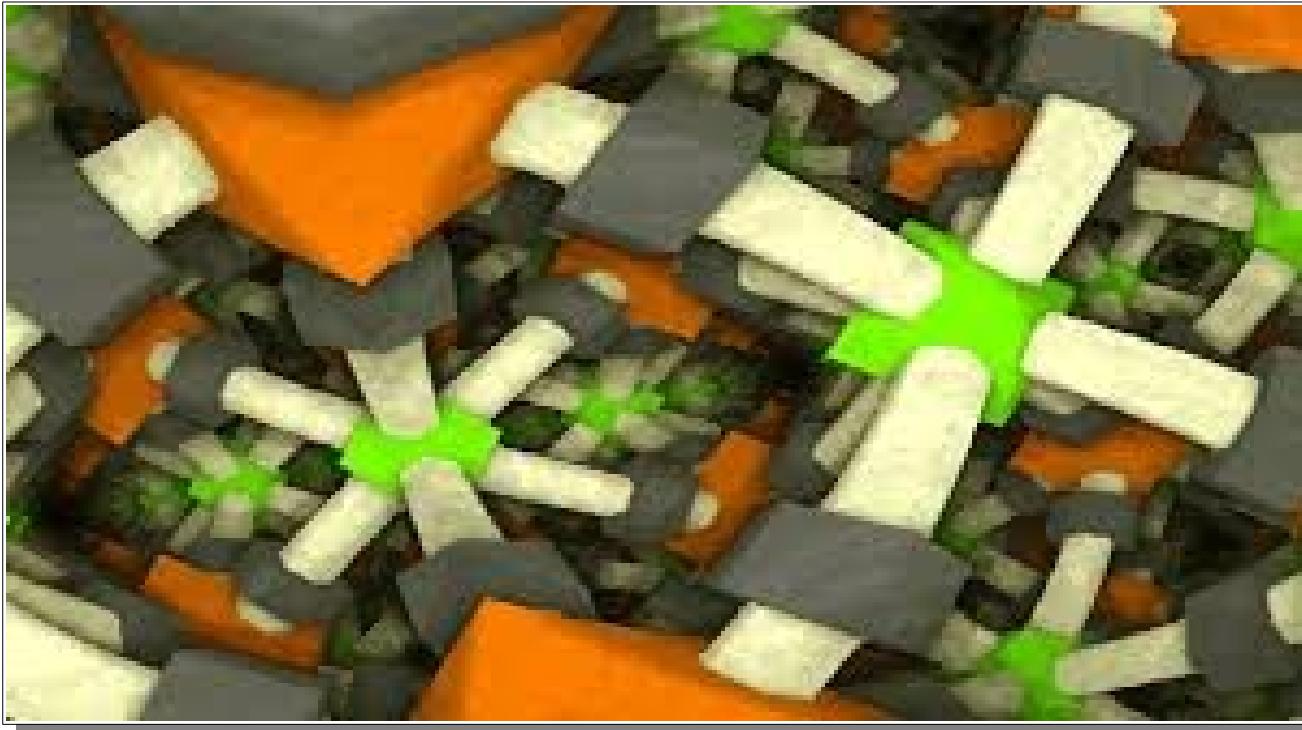


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# 256-byte demoscene: extremly strong competition

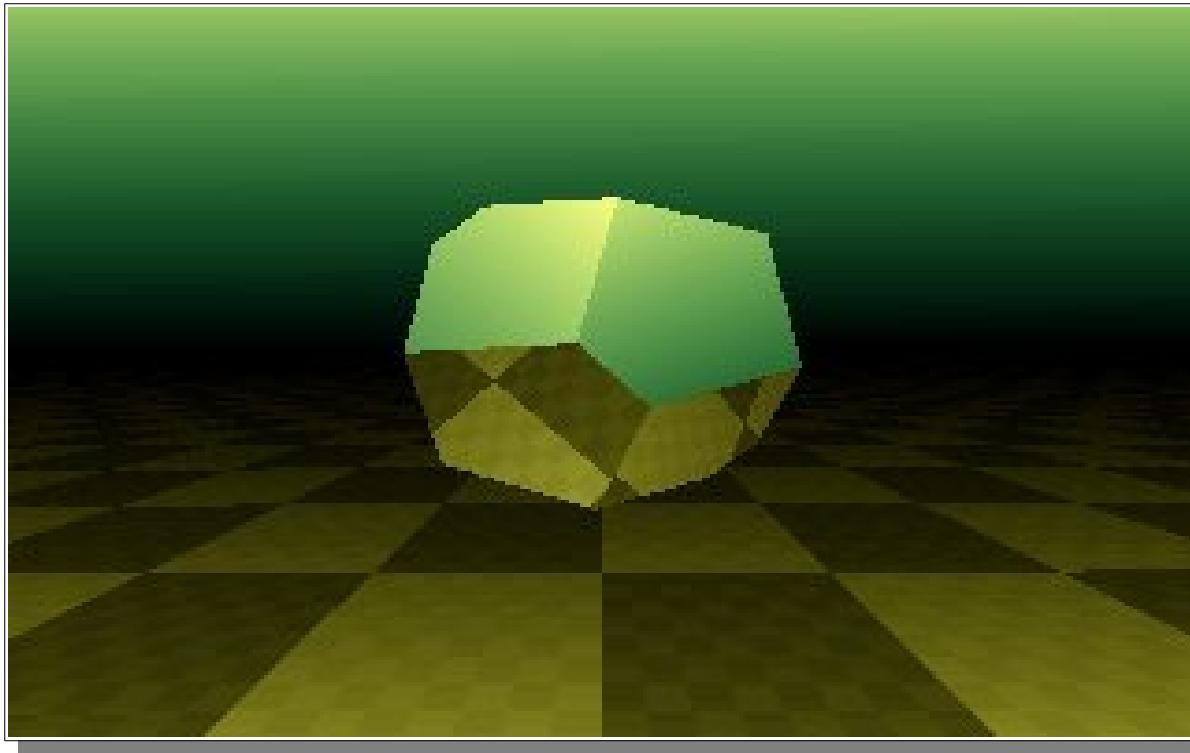


256-byte demoscene: extremly strong competition



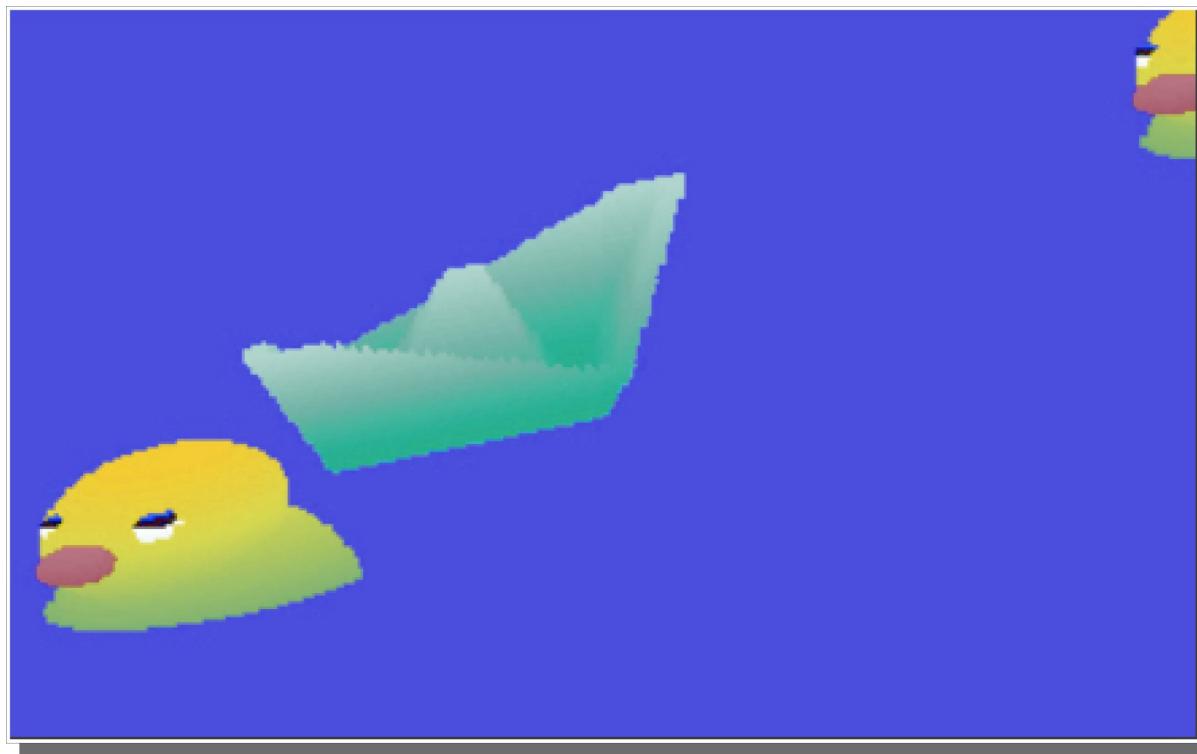
*Řrřola: Puls*

256-byte demoscene: extremly strong competition



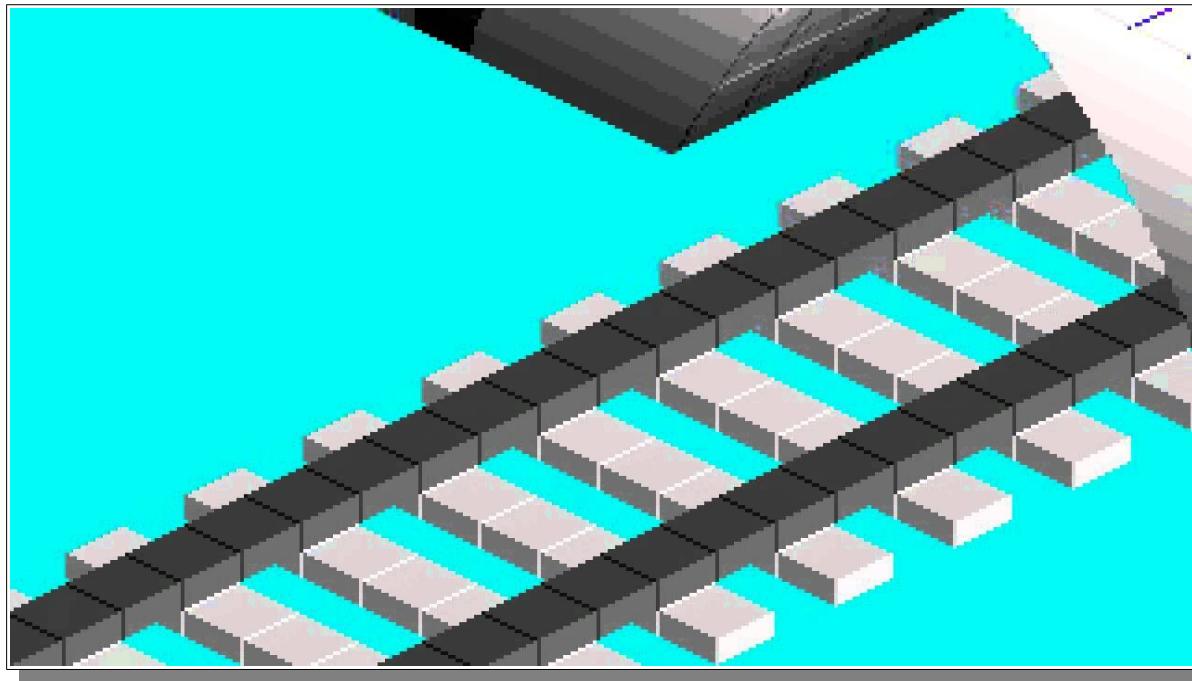
*Řrřola: Pyrit*

256-byte demoscene: extremly strong competition



*Digimind: Pool Patrol*

256-byte demoscene: extremly strong competition



*Digimind: Immediate Railways*

256-byte demoscene: extremly strong competition

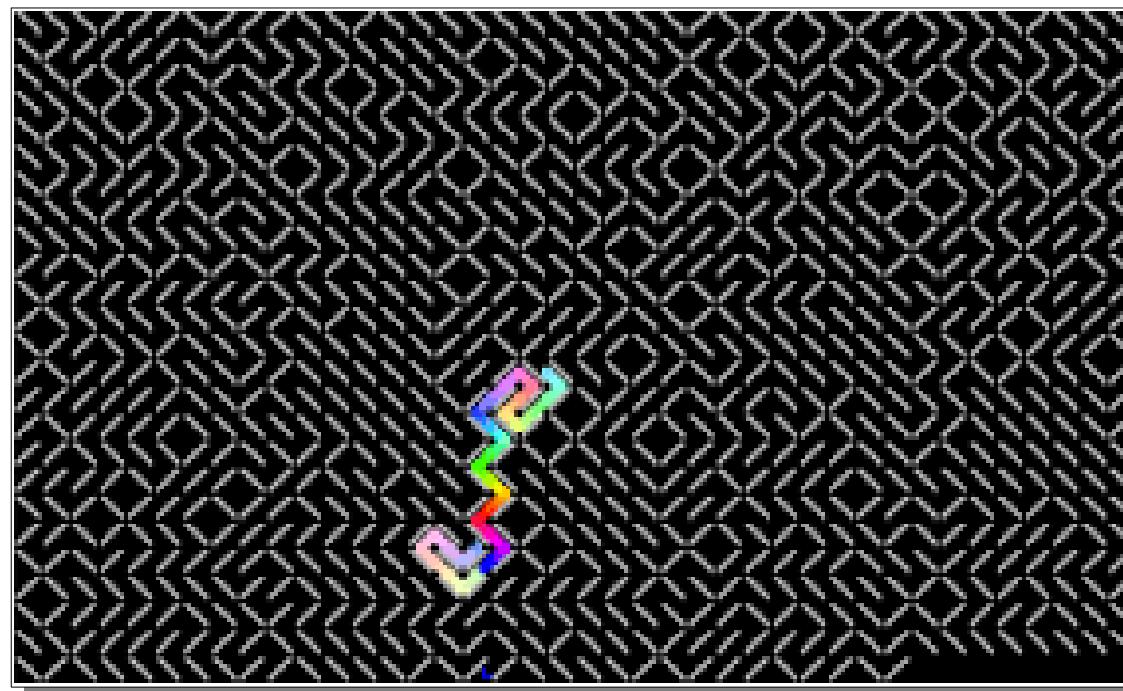


How to shine out of crowd?

# 256-byte demoscene: how to beat competition?

## Fun

(if you are not a hardcore sizecoder)



*ern0: Maze Solver*

# 256-byte demoscene: how to beat competition?

## Image processing



*TomCat: She – Weak Signal*

# 256-byte demoscene: how to beat competition?

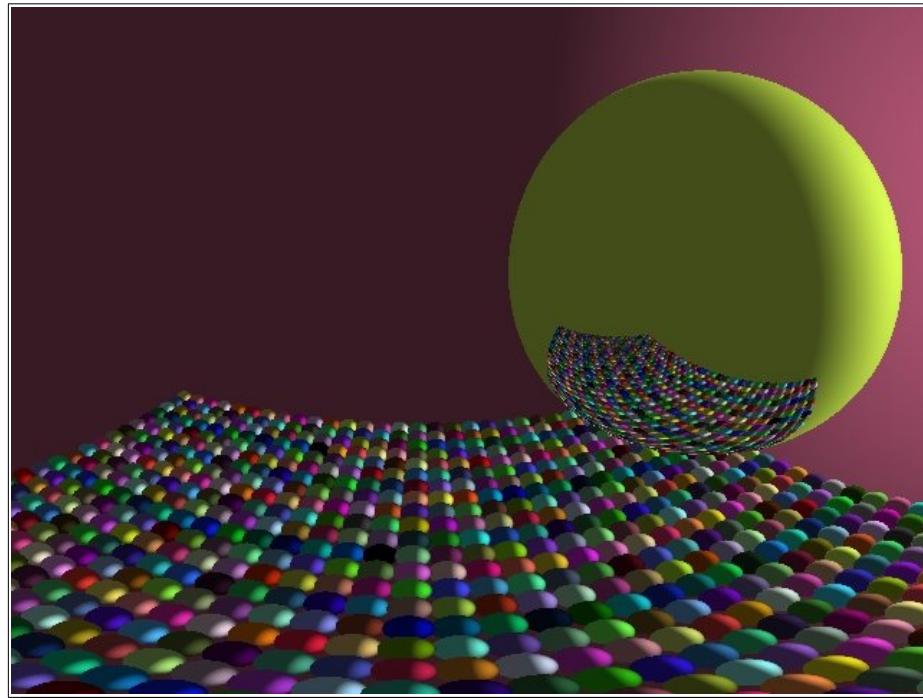
Image processing + fun



*TomCat: Be Happy!*

# 256-byte demoscene: how to beat competition?

## Raytracing



*TomCat: Colorful*

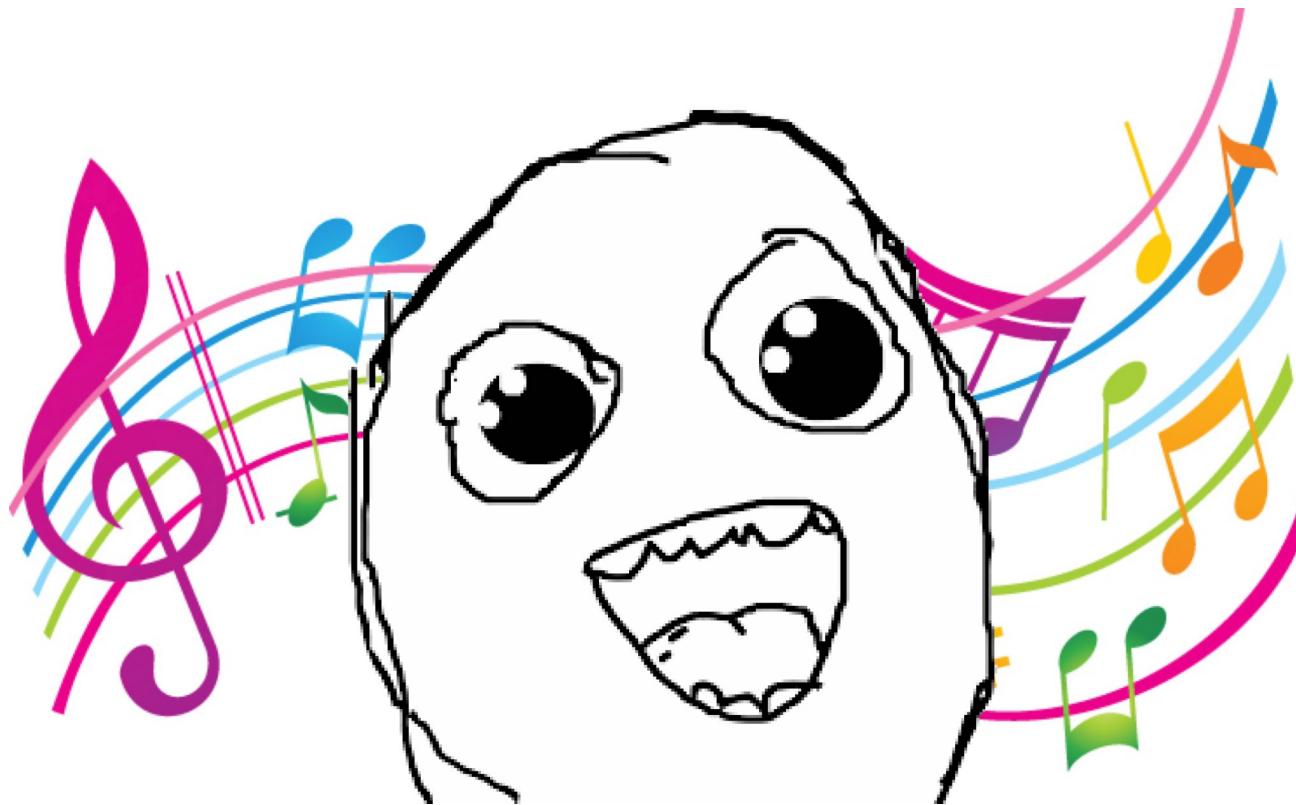
# 256-byte demoscene: how to beat competition?

Raytracing + fun



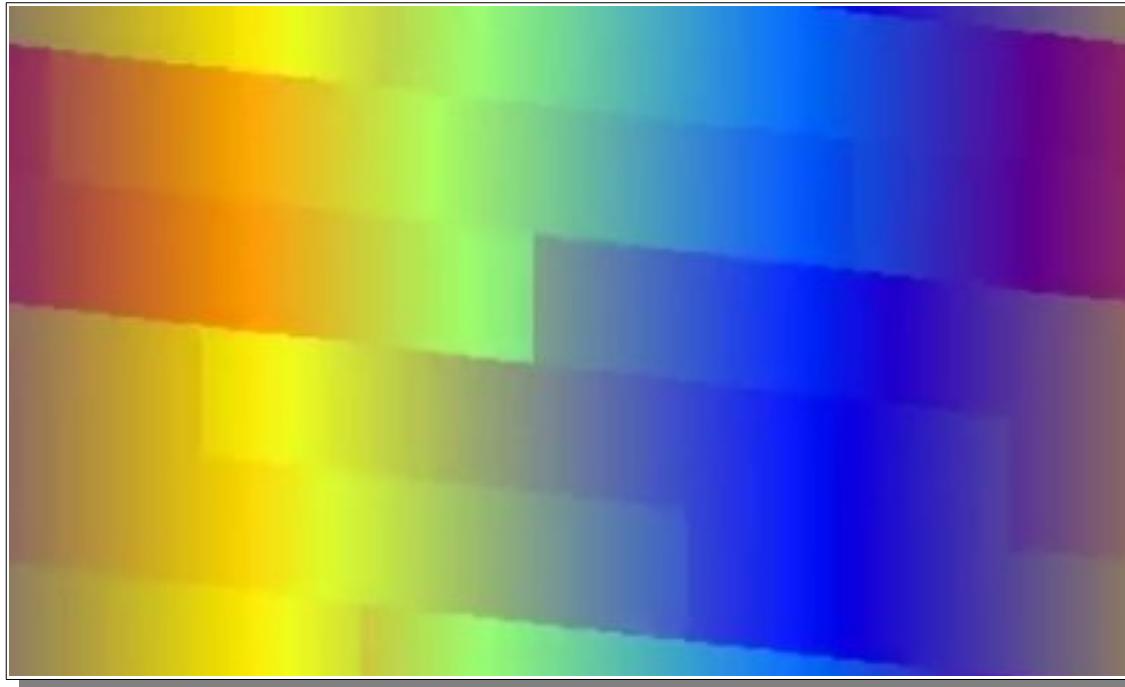
*TomCat: Pokeball*

# 256-byte demoscene: how to beat competition?



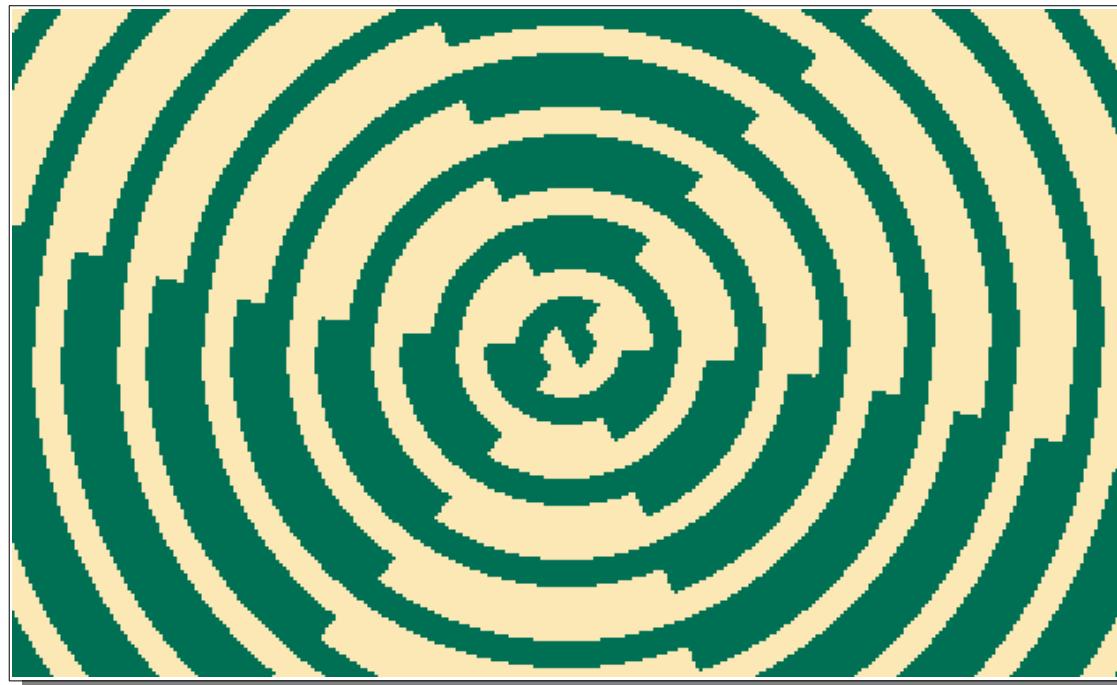
Music! Add music in 256-byte intros!

# 256 byte intro with music



*TomCat: 2(56)unlimited  
(bytebeat music by ern0)*

# 256 byte intro with music



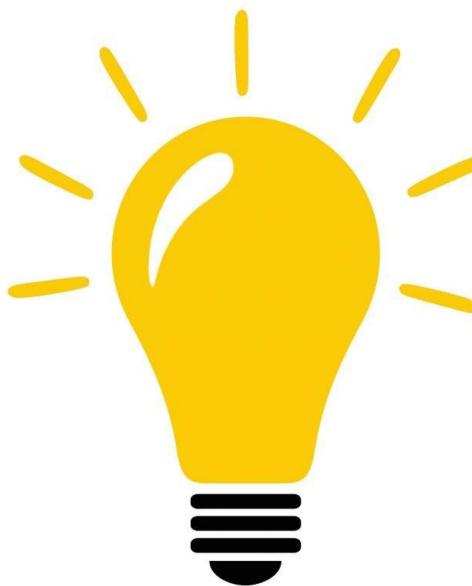
*TomCat: No Sleep!*  
*(buzzer music by ern0)*

256 byte intro with music

Everyone loves it!



# Create universal bytebeat tool



# Create universal bytebeat tool

- Bytebeat player & editor

*TomCat*



# Create universal bytebeat tool

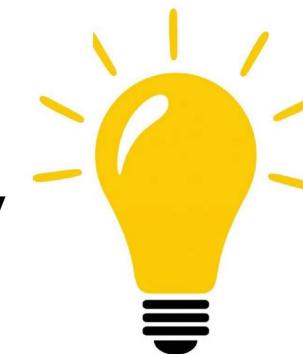
- Bytebeat player & editor

*TomCat*



- Formula compiler for assembly

*ern0*



# Create universal bytebeat tool

- Bytebeat player & editor  
*TomCat*
- Formula compiler for assembly  
*ern0*



# Create universal bytebeat tool

- Bytebeat player & editor

*TomCat*



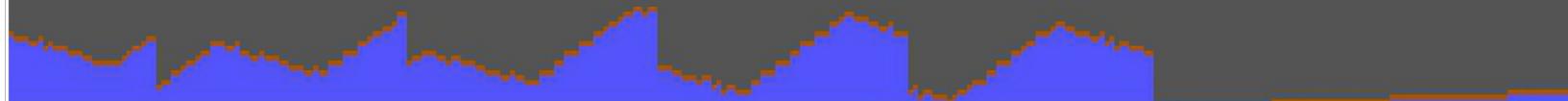
- Formula compiler for assembly

*ern0*



# Bytebeat Editor (TomCat)

```
BYTEBEAT by TomCat/Abaddon 7 24632
freq:18939 zoom:1 out:7 vol:11173
Kick drum no:CMP1Z skip:TSTONZ
rate:16383 len:24576 vol:64
Hihat no:CMP3B skip:TST96NZ
rate:63 ien:22 rnd:99 vol:64 fade:1
Instrument1 no:CMP1B wave:sawtooth
idx:0 mask:15 len:8 tune:4 fade:1
Instrument2 no:CMP5B wave:triangle
idx:16 mask:31 len:4 tune:16 fade:1
Arpeggio no:CMP4B
idx:48 mask:7 rate:4 len:4 vol:31
```



```
9405450574B445B425B4744525059474
4 405A405743474 4 405A405743474
0525352535052505 4 405A405743474
042474 4043474 4 3 3 3 3 3 3 3 3 3
```

# *Bytebeat Editor (TomCat)*

## *Features:*

- realtime feedback

The screenshot shows the Bytebeat Editor interface. At the top, there is a text area containing the configuration for a bytebeat piece. Below this is a waveform visualization consisting of several blue triangles on a grey background. At the bottom, there is a hex dump of the bytebeat data.

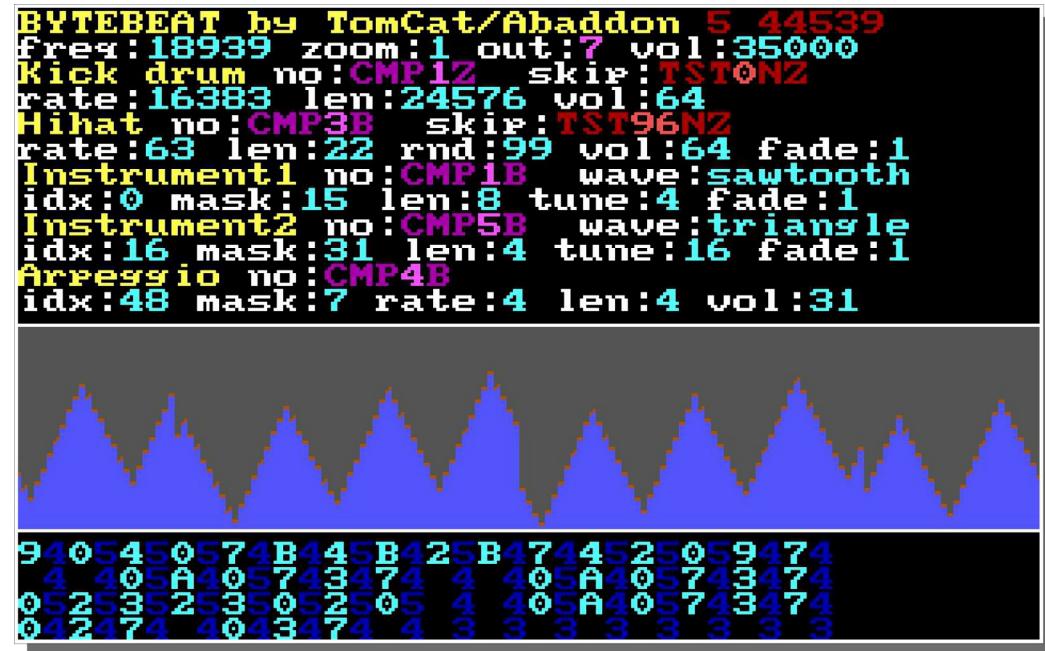
```
BYTEBEAT by TomCat/Abaddon 2 12981
freq:18939 zoom:1 out:7 vol:35000
Kick drum no:CMP1Z skip:TSTONZ
rate:16383 len:24576 vol:64
Hihat no:CMP3B skip:TST96NZ
rate:63 len:22 rnd:99 vol:64 fade:1
Instrument1 no:CMP1B wave:sawtooth
idx:0 mask:15 len:8 tune:4 fade:1
Instrument2 no:CMP5B wave:triangle
idx:16 mask:31 len:4 tune:16 fade:1
Arpeggio no:CMP4B
idx:48 mask:7 rate:4 len:4 vol:31
```

```
9405450574B445B425B4744525059474
4 405A405743474 4 405A405743474
0525352535052505 4 405A405743474
042474 4043474 4 3 3 3 3 3 3 3 3
```

# *Bytebeat Editor (TomCat)*

## *Features:*

- realtime feedback
- graphical sound wave



# *Bytebeat Editor (TomCat)*

## *Features:*

- realtime feedback
- graphical sound wave
- save/restore modified code

The screenshot shows a window titled "BYTEBEAT by TomCat/Abaddon 2 12981". Inside, there's a text-based configuration section and a graphical representation of a sound wave.

**Configuration (Text):**

```
BYTEBEAT by TomCat/Abaddon 2 12981
freq:18939 zoom:1 out:7 vol:35000
Kick drum no:CMP1Z skip:TSTONZ
rate:16383 len:24576 vol:64
Hihat no:CMP3B skip:TST96NZ
rate:63 len:22 rnd:99 vol:64 fade:1
Instrument1 no:CMP1B wave:sawtooth
idx:0 mask:15 len:8 tune:4 fade:1
Instrument2 no:CMP5B wave:triangle
idx:16 mask:31 len:4 tune:16 fade:1
Arpeggio no:CMP4B
idx:48 mask:7 rate:4 len:4 vol:31
```

**Graphical Sound Wave:**

A dark gray rectangular area containing a series of blue triangular peaks of varying heights, representing the amplitude of the sound over time.

**Hex Dump (Text):**

```
9405450574B445B425B4744525059474
4 405A405743474 4 405A405743474
0525352535052505 4 405A405743474
042474 4043474 4 3 3 3 3 3 3 3 3
```

# *Bytebeat Editor (TomCat)*

## *Features:*

- realtime feedback
- graphical sound wave
- save/restore modified code

## *Issues:*

- more than 70 hotkeys

The screenshot shows the Bytebeat Editor interface. At the top, there is a text-based configuration file with various parameters for instruments and effects. Below this is a graphical waveform visualization of the bytebeat pattern. At the bottom, there is a hex dump of the bytebeat data.

```
BYTEBEAT by TomCat/Abaddon 5 44539
freq:18939 zoom:1 out:7 vol:35000
Kick drum no:CMP1Z skip:TSTONZ
rate:16383 len:24576 vol:64
Hihat no:CMP3B skip:TST96NZ
rate:63 len:22 rnd:99 vol:64 fade:1
Instrument1 no:CMP1B wave:sawtooth
idx:0 mask:15 len:8 tune:4 fade:1
Instrument2 no:CMP5B wave:triangle
idx:16 mask:31 len:4 tune:16 fade:1
Arpeggio no:CMP4B
idx:48 mask:7 rate:4 len:4 vol:31
```

9405450574B445B425B4744525059474  
4405A4057434744405A405743474  
05253525350525054405A405743474  
042474404347443333333333333333

# *Bytebeat Editor (TomCat)*

## Features:

- realtime feedback
- graphical sound wave
- save/restore modified code



## Issues:

- more than 70 hotkeys

BYTHEBEAT by TomCat/Abaddon 5 44539  
freq:18939 zoom:1 out:7 vol:35000  
Kick drum no:CMP1Z skip:TSTONZ  
rate:16383 len:24576 vol:64  
Hihat no:CMP3B skip:TST96NZ  
rate:63 len:22 rnd:99 vol:64 fade:1  
Instrument1 no:CMP1B wave:sawtooth  
idx:0 mask:15 len:8 tune:4 fade:1  
Instrument2 no:CMP5B wave:triangle  
idx:16 mask:31 len:4 tune:16 fade:1  
Arpeggio no:CMP4B  
idx:48 mask:7 rate:4 len:4 vol:31

9405450574B445B425B4744525059474  
4405A4057434744405A405743474  
05253525350525054405A405743474  
042474404347443333333333333333

# *Bytebeat Editor (TomCat)*

## Features:

- realtime feedback
  - graphical sound wave
  - save/restore modified

## **Issues:**

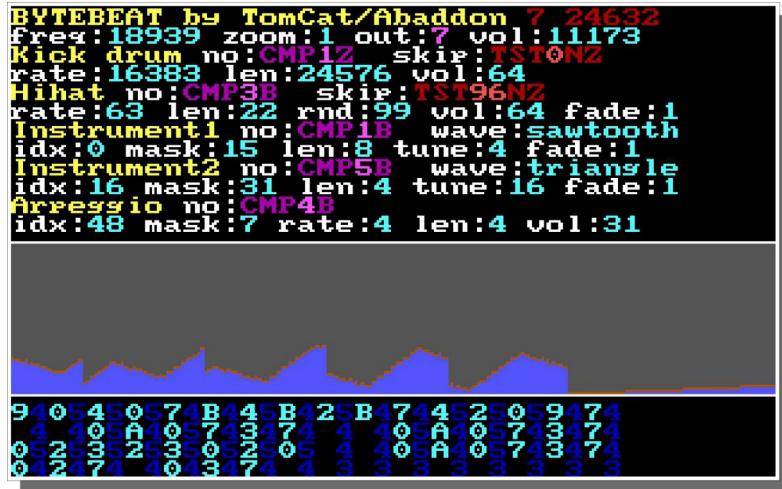
- more than 70 hotkeys
  - needs some x86 coder knowledge  
e.g. you can set any flag for a conditional jump

BYTEBEAT by TomCat/Abaddon 2 12981  
freq: 18939 zoom: 1 out: 7 vol: 35000  
Kick drum no: CMP1Z skip: TSTONZ  
rate: 16383 len: 24576 vol: 64  
Hihat no: CMP3B skip: TST96NZ  
rate: 63 len: 22 rnd: 99 vol: 64 fade: 1  
Instrument1 no: CMP1B wave: sawtooth  
idx: 0 mask: 15 len: 8 tune: 4 fade: 1  
Instrument2 no: CMP5B wave: triangle  
idx: 16 mask: 31 len: 4 tune: 16 fade: 1  
Arpeggio no: CMP4B  
idx: 48 mask: 7 rate: 4 len: 4 vol: 31



9405450574B445B425B4744525059474  
4 405A405743474 4 405A405743474  
0525352535052505 4 405A405743474  
042474 4043474 4 3 3 3 3 3 3 3 3

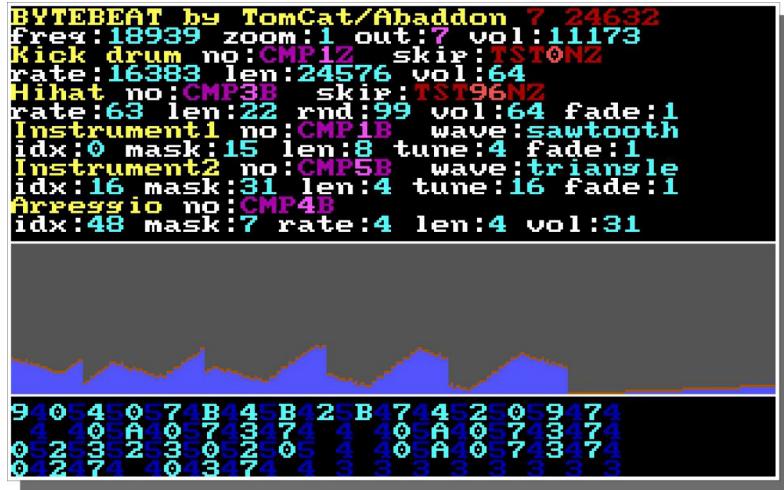
# *Bytebeat Editor (TomCat)*



Verdict:

- too complex, especially for musicians #UX

# *Bytebeat Editor (TomCat)*



## Verdict:

- too complex, especially for musicians #UX
- does not provide enough freedom

# *Bytebeat Editor (TomCat)*



A screenshot of the Bytebeat Editor interface. On the left, there is a text editor window displaying assembly-like code for a Bytebeat track. On the right, there is a waveform visualization and a hex dump of the track's data.

```
BYTEBEAT by TomCat/Abaddon 7 24632
freq:18939 zoom:1 out:7 vol:11173
Kick drum no:CMP1Z skip:TST0NZ
rate:16383 len:24576 vol:64
Hihat no:CMP3B skip:TST96NZ
rate:63 len:22 rnd:99 vol:64 fade:1
Instrument1 no:CMP1B wave:sawtooth
idx:0 mask:15 len:8 tune:4 fade:1
Instrument2 no:CMP5B wave:triangle
idx:16 mask:31 len:4 tune:16 fade:1
Arpeggio no:CMP4B
idx:48 mask:7 rate:4 len:4 vol:31
```

9405450574B445B425B474452:0  
4405A4057434744405A40574  
0029352935092509400A40074  
04217440134744333333333333

Verdict:

- Too Complex, especially for music fans
- UX does not provide enough freedom



# *Assemblyzator (ern0)*

Transform bytebeat formula to assembly code...

## *Assemblyzator (ern0)*

Transform bytebeat formula to assembly code  
using a modern C compiler!

# Assemblyzator (ern0)

Transform bytebeat formula to assembly code using a modern C compiler!

```
int main() {  
    int result = 0;  
  
    for (int i = 0; i < 100; i++) {  
        for (int j = 0; j < 100; j++) {  
            result += i * j;  
        }  
    }  
  
    return result;  
}
```

```
b8 e4 e0 75 01  
5c3
```

```
main:  
    mov     eax,0x175e0e4  
    ret
```

# Assemblyzator (ern0)

Transform bytebeat formula to assembly code using a modern C compiler!

```
int main() {  
    int result = 0;  
  
    for (int i = 0; i < 100; i++) {  
        for (int j = 0; j < 100; j++) {  
            result += i * j;  
        }  
    }  
  
    return result;  
}
```

```
b8 e4 e0 75 01  
5c3
```

```
main:  
    mov     eax, 0x175e0e4  
    ret
```

Very optimized!  
Such compiler!



# Assemblylyzator (ern0)

Transform bytebeat formula to assembly code  
using a modern C compiler!

```
int main() {  
    int result = 0;  
  
    for (int i = 0; i < 100; i++) {  
        for (int j = 0; j < 100; j++) {  
            result += i * j;  
        }  
    }  
  
    return result;  
}
```

```
main:    .text  
        .globl  main  
        .type   main, function  
        .code32  
        .align  16, 0x90  
        .pushl  %ebp  
        .movl   %ebp, %esp  
        .andl   $-16, %esp  
        .subl   $16, %esp  
        .pushl  %eax  
        .pushl  %esi  
        .pushl  %edi  
        .pushl  %ebp  
        .movl   %esp, %ebp  
        .subl   $16, %esp  
        .pushl  %eax  
        .pushl  %esi  
        .pushl  %edi  
        .pushl  %ebp  
        .addl   $16, %esp  
        .popl   %ebp  
        .movl   %esp, %ebp  
        .subl   $16, %esp  
        .popl   %eax  
        .popl   %esi  
        .popl   %edi  
        .popl   %ebp  
        .addl   $16, %esp  
        .popl   %ebp  
        .movl   %eax, 0x175e0e4  
        .ret
```

VC, optimized!  
such compiler!



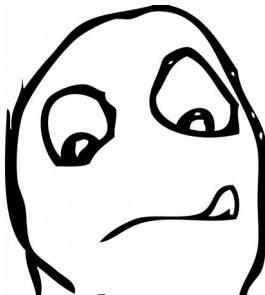
No modern compiler exists for **16-bit** target.

# *Assemblyzator (ern0)*

Let's write a compiler thing!

# *Assemblylyzator (ern0)*

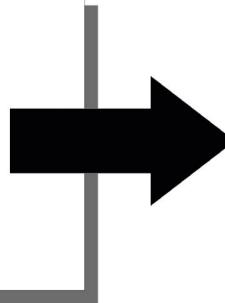
Let's write a compiler thing!



Split complex bytebeat formula  
to series of simple formulas,  
which is close to assembly

# Assemblyzator (ern0)

```
((t<<1) ^ ((t<<1) +  
(t>>7) &t>>12)) |  
t>>(4- (1^7&(t>>19)))  
| t>>7
```



```
var3 = t << 1  
var7 = t >> 7  
var5 = var3 + var7  
var6 = t >> 12  
var4 = var5 & var6  
var1 = var3 ^ var4  
var12 = t >> 19  
var11 = 7 & var12  
var10 = 1 ^ var11  
var9 = -var10  
var9 = var9 + 4  
var8 = t >> var9  
var2 = var8 | var7  
result = var1 | var2
```

# *Assemblyzator (ern0)*

*Features:*

- split formula

# *Assemblyzator (ern0)*

## *Features:*

- split formula
- handle num arrays

# *Assemblyzator (ern0)*

## *Features:*

- split formula
- handle num arrays
- handle string arrays

# *Assemblyzator (ern0)*

## *Features:*

- split formula
- handle num arrays
- handle string arrays
- remove duplications

# *Assemblyzator (ern0)*

## *Features:*

- split formula
- handle num arrays
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- remove duplications

## *Design Flaws:*

- 3-op ( $A = B \text{ op } C$ )  
8086 assembly instructions are 2-operand

# *Assemblyzator (ern0)*

## *Features:*

- split formula
- handle num arrays
- handle string arrays
- remove duplications

## *Design Flaws:*

- 3-op ( $A = B \text{ op } C$ )  
8086 assembly instructions are 2-operand
- can't handle cond. op.  
 $A = ( B \text{ op } C ? D : E )$   
improperly designed Abstract Syntax Tree

# *Assemblyzator (ern0)*

## *Features:*

- split formula
- handle num arrays
- handle string arrays
- remove duplications

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- 3-op ( $A = B \text{ op } C$ )  
8086 assembly instructions are 2-operand
- can't handle cond. op.  
 $A = ( B \text{ op } C ? D : E )$   
improperly designed Abstract Syntax Tree

## *Verdict:*

- nice try, but does not help much

# *Assemblyzator (ern0)*

## *Features:*

- split formula
- handle num arrays
- handle string arrays
- remove duplications

## *Design Flaws:*

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8086 assembly instructions are 2-operand
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 $A = ( B \text{ op } C ? D : E )$   
improperly designed Abstract Syntax Tree

## *Verdict:*

- nice try, but does not help much
- writing a compiler is not as easy as it looks first

# Assemblyzator (ern0)

## Features:

- split formula
- handle num arrays
- handle string arrays
- remove duplications

## Verdict:

- nice try, but it does not help much
- writing a compiler is not as easy as it looks first

## Design Flaws:

- 3-op ( $A = B \text{ op } C$ )  
8086 assembly instructions are 2-operand  
can't handle cond. op.  
(A op, B ? C : D )  
improperly designed Abstract Syntax Tree



[TomCat] *Instead of creating universal tools,  
we should choose one song and  
optimize for it*

[ern0] *Right, I'll pick a song*

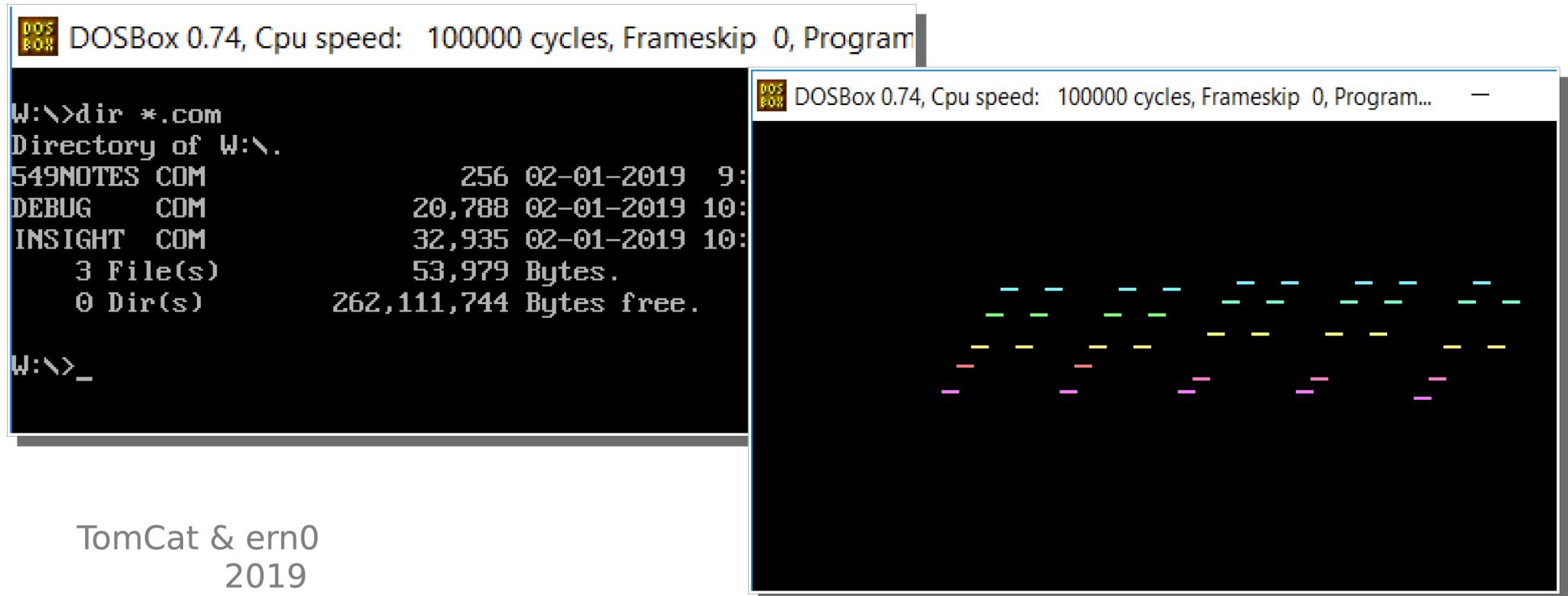


*Some hours later...*

[ern0] *I got the perfect one.*

# Making of **549NOTES.COM**

## the 256-byte intro for PC-DOS which plays 549 notes



## *Table Of Contents*

I. Song ★★★★☆

II. Data ★★★★★☆

III. Code ★★★★★★

# I. Song

# Prelude I

In C major

BWV 846

Johann Sebastian Bach (1685 - 1750)

Piano

This system shows the beginning of the prelude. The treble staff consists of eighth-note pairs followed by a rest. The bass staff consists of quarter notes with fermatas. The key signature is C major.

This system continues the pattern established in the first system. The treble staff has eighth-note pairs followed by rests. The bass staff has quarter notes with fermatas. A sharp sign appears in the key signature, indicating a temporary change to G major.

# *J. S. Bach: Prelude I. in C Major (BWV 846)*

1. Popular, well-known piece

# *J. S. Bach: Prelude I. in C Major (BWV 846)*

1. Popular, well-known piece
2. Written for piano: optimal for MIDI...

# *J. S. Bach: Prelude I. in C Major (BWV 846)*

- Piano (patch 1) is the default instrument on all channels for all General MIDI instruments

# J. S. Bach: Prelude I. in C Major (BWV 846)

- Piano (patch 1) is the default instrument on all channels for all General MIDI instruments

*Switch sound card  
to MIDI mode:*

```
mov    al,3fH
mov    dx,331H
out    dx,al
```

# J. S. Bach: Prelude I. in C Major (BWV 846)

- Piano (patch 1) is the default instrument on all channels for all General MIDI instruments
- Chord breaks: no „key up” message needed

*Switch sound card  
to MIDI mode:*

```
mov    al,3fH
mov    dx,331H
out    dx,al
```

# J. S. Bach: Prelude I. in C Major (BWV 846)

- Piano (patch 1) is the default instrument on all channels for all General MIDI instruments
- Chord breaks: no „key up” message needed

*Switch sound card  
to MIDI mode:*

```
mov    al,3fH
mov    dx,331H
out   dx,al
```

*Play a note:*

```
dec    dx
mov    al,90H ; key down, ch=1
out   dx,al
lodsb          ; pitch
out   dx,al
mov    al,7fH ; velocity=127
out   dx,al
```

# J. S. Bach: Prelude I. in C Major (BWV 846)

- Piano (patch 1) is the default instrument on all channels for all General MIDI instruments
- Chord breaks:

*Switch sound card to MIDI mode:*

```
mov al,3fH  
mov dx,331H  
out dx,al
```



```
mov al,3fH ; key down, ch=1  
out dx,al ; pitch  
  
mov al,7fH ; velocity=127  
out dx,al
```

# *J. S. Bach: Prelude I. in C Major (BWV 846)*

1. Popular, well-known piece
2. Written for piano: optimal for MIDI
3. Simple rhythm, only a few tempo changes...

# *J. S. Bach: Prelude I. in C Major (BWV 846)*

Tempo changes:

- slow down around the end

# *J. S. Bach: Prelude I. in C Major (BWV 846)*

Tempo changes:

- slow down around the end
- set minimal pause for the last 5-note chord

## *J. S. Bach: Prelude I. in C Major (BWV 846)*

1. Popular, well-known piece
2. Written for piano: optimal for MIDI
3. Simple rhythm, only a few tempo changes
4. Contains repeating patterns...

J. S. Bach: *Prelude I. in C Major (BWV 846)*

Repeating patterns 1/2:

Piano

The musical score consists of two staves of piano music. The top staff is in common time (4/4) and the bottom staff is also in common time (4/4). Both staves feature repeating patterns of eighth-note pairs and sixteenth-note pairs, with bass notes providing harmonic support. The music is divided into measures by vertical bar lines.

# J. S. Bach: Prelude I. in C Major (BWV 846)

Repeating patterns 1/2:

Piano

The image shows two staves of a piano musical score. The top staff is in treble clef and 4/4 time, and the bottom staff is in bass clef and 4/4 time. Both staves feature a series of eighth-note patterns. The first pattern (measures 1-2) consists of a dotted half note followed by an eighth-note pair. This is followed by a measure of rests, then a repeating pattern of a dotted quarter note followed by a sixteenth-note pair. The second staff follows a similar pattern but includes a key change to G major (one sharp) at the start of the second section. The music is divided into measures by vertical bar lines, and the notes are placed on the appropriate staff lines or spaces.

J. S. Bach: *Prelude I. in C Major (BWV 846)*

Repeating patterns 1/2:

Piano

16 → 8 notes

J. S. Bach: *Prelude I. in C Major (BWV 846)*

Repeating patterns 2/2:

Piano

The musical score consists of two staves for piano. The top staff is in common time (4/4) and the bottom staff is also in common time (4/4). Both staves feature a repeating pattern of eighth-note pairs followed by a sixteenth-note pair, with a bass note on the first beat of each measure. The pattern repeats four times in the top staff and five times in the bottom staff.

J. S. Bach: *Prelude I. in C Major (BWV 846)*

Repeating patterns 2/2:

Piano

The image displays two staves of a musical score for piano, labeled "Piano" on the left. The top staff is in common time (indicated by a "4") and the bottom staff is in common time (indicated by a "4"). Both staves begin with a bass clef and a treble clef. The music consists of eighth-note patterns. In the first measure, the right hand has a pattern of eighth notes (purple highlights) and the left hand has a sustained note followed by a bass note. This pattern repeats three times. In the fourth measure, there is a change in the right-hand pattern, highlighted in green, while the left hand continues its sustained note and bass note. The bottom staff follows a similar pattern, starting with a bass note and a sustained note, followed by a series of eighth notes highlighted in purple, blue, yellow, and red.

J. S. Bach: *Prelude I. in C Major (BWV 846)*

Repeating patterns 2/2:

Piano

A musical score for the piano. The top staff is in common time (4/4) and the bottom staff is also in common time (4/4). The music features a repeating eighth-note pattern. The first four measures are highlighted with purple shading, and the last three measures are highlighted with green shading. The bass line consists of sustained notes with short vertical stems.

**8 → 5 notes**

A musical score for the piano. The top staff is in common time (4/4) and the bottom staff is also in common time (4/4). The music features a repeating eighth-note pattern. The first four measures are highlighted with blue shading, and the last three measures are highlighted with red shading. The bass line consists of sustained notes with short vertical stems.

# Raw Data

<i>part</i>	<i>effective notes</i>	<i>raw data</i>
<i>repeating</i>	512	160
<i>non-repeating</i>	32	32
<i>final chord</i>	5	5
<b><i>total</i></b>	<b>549</b>	<b>197</b>

## II. Data

# Data analysis

```
"c-3","e-3","g-3","c-4","e-4",
"c-3","d-3","a-3","d-4","f-4",
"h-2","d-3","g-3","d-4","f-4",
"c-3","e-3","g-3","c-4","e-4",
"c-3","e-3","a-3","e-4","a-4",
"c-3","d-3","f#3","a-3","d-4",
"h-2","d-3","g-3","d-4","g-4",
"h-2","c-3","e-3","g-3","c-4",
"a-2","c-3","e-3","g-3","c-4",
"d-2","a-2","d-3","f#3","c-4",
"g-2","h-2","d-3","g-3","h-3",
"g-2","a#2","e-3","g-3","c#4",
"f-2","a-2","d-3","a-3","d-4",
"f-2","g#2","d-3","f-3","h-3",
"e-2","g-2","c-3","g-3","c-4",
"e-2","f-2","a-2","c-3","f-3",
"d-2","f-2","a-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-2","e-2","g-2","c-3","e-3",
"c-2","g-2","a#2","c-3","e-3",
"f-1","f-2","a-2","c-3","e-3",
"f#1","c-2","a-2","c-3","e-3",
"g#1","f-2","h-2","c-3","d-3",
"g-1","f-2","g-2","h-2","d-3",
"g-1","e-2","g-2","c-3","e-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"g-1","d#2","a-2","c-3","f#3",
"g-1","e-2","g-2","c-3","g-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-1","c-2","g-2","a#2","e-3"
```

## Part 1:

# Data analysis

```
"c-3","e-3","g-3","c-4","e-4",
"c-3","d-3","a-3","d-4","f-4",
"h-2","d-3","g-3","d-4","f-4",
"c-3","e-3","g-3","c-4","e-4",
"c-3","e-3","a-3","e-4","a-4",
"c-3","d-3","f#3","a-3","d-4",
"h-2","d-3","g-3","d-4","g-4",
"h-2","c-3","e-3","g-3","c-4",
"a-2","c-3","e-3","g-3","c-4",
"d-2","a-2","d-3","f#3","c-4",
"g-2","h-2","d-3","g-3","h-3",
"g-2","a#2","e-3","g-3","c#4",
"f-2","a-2","d-3","a-3","d-4",
"f-2","g#2","d-3","f-3","h-3",
"e-2","g-2","c-3","g-3","c-4",
"e-2","f-2","a-2","c-3","f-3",
"d-2","f-2","a-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-2","e-2","g-2","c-3","e-3",
"c-2","g-2","a#2","c-3","e-3",
"f-1","f-2","a-2","c-3","e-3",
"f#1","c-2","a-2","c-3","e-3",
"g#1","f-2","h-2","c-3","d-3",
"g-1","f-2","g-2","h-2","d-3",
"g-1","e-2","g-2","c-3","e-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"g-1","d#2","a-2","c-3","f#3",
"g-1","e-2","g-2","c-3","g-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-1","c-2","g-2","a#2","e-3"
```

## Part 1:

- 32 lines x 5 notes

# Data analysis

```
"c-3","e-3","g-3","c-4","e-4",
"c-3","d-3","a-3","d-4","f-4",
"h-2","d-3","g-3","d-4","f-4",
"c-3","e-3","g-3","c-4","e-4",
"c-3","e-3","a-3","e-4","a-4",
"c-3","d-3","f#3","a-3","d-4",
"h-2","d-3","g-3","d-4","g-4",
"h-2","c-3","e-3","g-3","c-4",
"a-2","c-3","e-3","g-3","c-4",
"d-2","a-2","d-3","f#3","c-4",
"g-2","h-2","d-3","g-3","h-3",
"g-2","a#2","e-3","g-3","c#4",
"f-2","a-2","d-3","a-3","d-4",
"f-2","g#2","d-3","f-3","h-3",
"e-2","g-2","c-3","g-3","c-4",
"e-2","f-2","a-2","c-3","f-3",
"d-2","f-2","a-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-2","e-2","g-2","c-3","e-3",
"c-2","g-2","a#2","c-3","e-3",
"f-1","f-2","a-2","c-3","e-3",
"f#1","c-2","a-2","c-3","e-3",
"g#1","f-2","h-2","c-3","d-3",
"g-1","f-2","g-2","h-2","d-3",
"g-1","e-2","g-2","c-3","e-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"g-1","d#2","a-2","c-3","f#3",
"g-1","e-2","g-2","c-3","g-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-1","c-2","g-2","a#2","e-3"
```

## Part 1:

- 32 lines x 5 notes
- last 3 notes are repeated

# Data analysis

```
"c-3","e-3","g-3","c-4","e-4",
"c-3","d-3","a-3","d-4","f-4",
"h-2","d-3","g-3","d-4","f-4",
"c-3","e-3","g-3","c-4","e-4",
"c-3","e-3","a-3","e-4","a-4",
"c-3","d-3","f#3","a-3","d-4",
"h-2","d-3","g-3","d-4","g-4",
"h-2","c-3","e-3","g-3","c-4",
"a-2","c-3","e-3","g-3","c-4",
"d-2","a-2","d-3","f#3","c-4",
"g-2","h-2","d-3","g-3","h-3",
"g-2","a#2","e-3","g-3","c#4",
"f-2","a-2","d-3","a-3","d-4",
"f-2","g#2","d-3","f-3","h-3",
"e-2","g-2","c-3","g-3","c-4",
"e-2","f-2","a-2","c-3","f-3",
"d-2","f-2","a-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-2","e-2","g-2","c-3","e-3",
"c-2","g-2","a#2","c-3","e-3",
"f-1","f-2","a-2","c-3","e-3",
"f#1","c-2","a-2","c-3","e-3",
"g#1","f-2","h-2","c-3","d-3",
"g-1","f-2","g-2","h-2","d-3",
"g-1","e-2","g-2","c-3","e-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"g-1","d#2","a-2","c-3","f#3",
"g-1","e-2","g-2","c-3","g-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-1","c-2","g-2","a#2","e-3"
```

## Part 1:

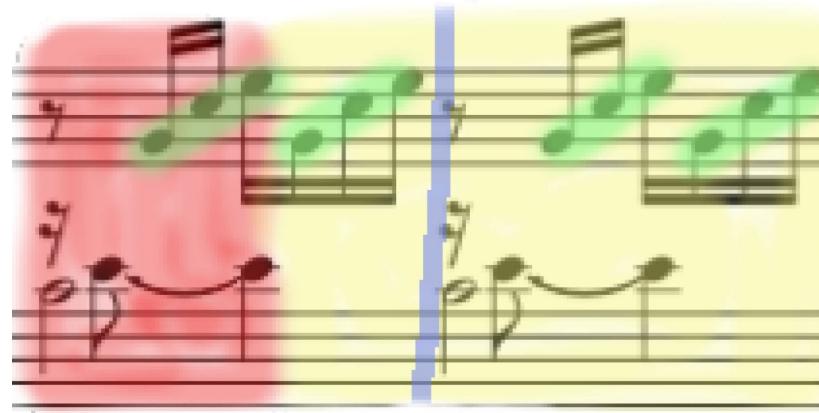
- 32 lines x 5 notes
- last 3 notes are repeated
- (8-note) lines are repeated

# Data analysis

```
"c-3", "e-3", "g-3", "c-4", "e-4",
"c-3", "d-3", "a-3", "d-4", "f-4",
"h-2", "d-3", "g-3", "d-4", "f-4",
"c-3", "e-3", "g-3", "c-4", "e-4",
"c-3", "e-3", "a-3", "e-4", "a-4",
"c-3", "d-3", "f#3", "a-3", "d-4",
"h-2", "d-3", "g-3", "d-4", "g-4",
"h-2", "c-3", "e-3", "g-3", "c-4",
"a-2", "c-3", "e-3", "g-3", "c-4",
"d-2", "a-2", "d-3", "f#3", "c-4",
"g-2", "h-2", "d-3", "g-3", "h-3",
"g-2", "a#2", "e-3", "g-3", "c#4",
"f-2", "a-2", "d-3", "a-3", "d-4",
"f-2", "g#2", "d-3", "f-3", "h-3",
"e-2", "g-2", "c-3", "g-3", "c-4",
"e-2", "f-2", "a-2", "c-3", "f-3",
"d-2", "f-2", "a-2", "c-3", "f-3",
"g-1", "d-2", "g-2", "h-2", "f-3",
"c-2", "e-2", "g-2", "c-3", "e-3",
"c-2", "g-2", "a#2", "c-3", "e-3",
"f-1", "f-2", "a-2", "c-3", "e-3",
"f#1", "c-2", "a-2", "c-3", "e-3",
"g#1", "f-2", "h-2", "c-3", "d-3",
"g-1", "f-2", "g-2", "h-2", "d-3",
"g-1", "e-2", "g-2", "c-3", "e-3",
"g-1", "d-2", "g-2", "c-3", "f-3",
"g-1", "d-2", "g-2", "h-2", "f-3",
"g-1", "d#2", "a-2", "c-3", "f#3",
"g-1", "e-2", "g-2", "c-3", "g-3",
"g-1", "d-2", "g-2", "c-3", "f-3",
"g-1", "d-2", "g-2", "h-2", "f-3",
"c-1", "c-2", "g-2", "a#2", "e-3"
```

## Part 1:

- 32 lines x 5 notes
- last 3 notes are repeated
- (8-note) lines are repeated



# Data analysis

```
"c-3","e-3","g-3","c-4","e-4",
"c-3","d-3","a-3","d-4","f-4",
"h-2","d-3","g-3","d-4","f-4",
"c-3","e-3","g-3","c-4","e-4",
"c-3","e-3","a-3","e-4","a-4",
"c-3","d-3","f#3","a-3","d-4",
"h-2","d-3","g-3","d-4","g-4",
"h-2","c-3","e-3","g-3","c-4",
"a-2","c-3","e-3","g-3","c-4",
"d-2","a-2","d-3","f#3","c-4",
"g-2","h-2","d-3","g-3","h-3",
"g-2","a#2","e-3","g-3","c#4",
"f-2","a-2","d-3","a-3","d-4",
"f-2","g#2","d-3","f-3","h-3",
"e-2","g-2","c-3","g-3","c-4",
"e-2","f-2","a-2","c-3","f-3",
"d-2","f-2","a-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-2","e-2","g-2","c-3","e-3",
"c-2","g-2","a#2","c-3","e-3",
"f-1","f-2","a-2","c-3","e-3",
"f#1","c-2","a-2","c-3","e-3",
"g#1","f-2","h-2","c-3","d-3",
"g-1","f-2","g-2","h-2","d-3",
"g-1","e-2","g-2","c-3","e-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"g-1","d#2","a-2","c-3","f#3",
"g-1","e-2","g-2","c-3","g-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-1","c-2","g-2","a#2","e-3"
```

## Part 1:

- 32 lines x 5 notes
- last 3 notes are repeated
- (8-note) lines are repeated

```
"c-1","c-2","f-2","a-2","c-3","f-3","c-3","a-2",
"c-3","a-2","f-2","a-2","f-2","d-2","f-2","d-2",
"c-1","h-1","g-3","h-3","d-4","f-4","d-4","h-3",
"d-4","h-3","g-3","h-3","d-3","f-3","e-3","d-3"
```

## Part 2:

- 32 notes
- no tricks

# Data analysis

```
"c-3","e-3","g-3","c-4","e-4",
"c-3","d-3","a-3","d-4","f-4",
"h-2","d-3","g-3","d-4","f-4",
"c-3","e-3","g-3","c-4","e-4",
"c-3","e-3","a-3","e-4","a-4",
"c-3","d-3","f#3","a-3","d-4",
"h-2","d-3","g-3","d-4","g-4",
"h-2","c-3","e-3","g-3","c-4",
"a-2","c-3","e-3","g-3","c-4",
"d-2","a-2","d-3","f#3","c-4",
"g-2","h-2","d-3","g-3","h-3",
"g-2","a#2","e-3","g-3","c#4",
"f-2","a-2","d-3","a-3","d-4",
"f-2","g#2","d-3","f-3","h-3",
"e-2","g-2","c-3","g-3","c-4",
"e-2","f-2","a-2","c-3","f-3",
"d-2","f-2","a-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-2","e-2","g-2","c-3","e-3",
"c-2","g-2","a#2","c-3","e-3",
"f-1","f-2","a-2","c-3","e-3",
"f#1","c-2","a-2","c-3","e-3",
"g#1","f-2","h-2","c-3","d-3",
"g-1","f-2","g-2","h-2","d-3",
"g-1","e-2","g-2","c-3","e-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"g-1","d#2","a-2","c-3","f#3",
"g-1","e-2","g-2","c-3","g-3",
"g-1","d-2","g-2","c-3","f-3",
"g-1","d-2","g-2","h-2","f-3",
"c-1","c-2","g-2","a#2","e-3"
```

## Part 1:

- 32 lines x 5 notes
- last 3 notes are repeated
- (8-note) lines are repeated

```
"c-1","c-2","f-2","a-2","c-3","f-3","c-3","a-2",
"c-3","a-2","f-2","a-2","f-2","d-2","f-2","d-2",
"c-1","h-1","g-3","h-3","d-4","f-4","d-4","h-3",
"d-4","h-3","g-3","h-3","d-3","f-3","e-3","d-3"
```

## Part 2:

- 32 notes
- no tricks

```
"c-1","c-2","e-3","g-3","c-4"
```

## Part3:

- 5 notes
- no tricks

# Histogram of raw (31 values, 197 notes)

; c-1:36	4	####		;	1.	c-3:60	23	#####
; f-1:41	1	#		;	2.	g-2:55	14	#####
; f#1:42	1	#		;	3.	e-3:64	14	#####
; g-1:43	9	#####		;	4.	g-3:67	13	#####
; g#1:44	1	#		;	5.	d-3:62	12	#####
; h-1:47	1	#		;	6.	a-2:57	12	#####
; c-2:48	6	#####		;	7.	f-2:53	11	#####
; d-2:50	9	#####		;	8.	f-3:65	10	#####
; d#2:51	1	#		;	9.	h-2:59	9	#####
; e-2:52	5	####		;	10.	g-1:43	9	#####
; f-2:53	11	#####		;	11.	d-2:50	9	#####
; g-2:55	14	#####		;	12.	d-4:74	8	#####
; g#2:56	1	#		;	13.	c-4:72	7	#####
; a-2:57	12	#####		;	14.	h-3:71	6	#####
; a#2:58	3	##		;	15.	c-2:48	6	#####
; h-2:59	9	#####		;	16.	e-2:52	5	#####
; c-3:60	23	#####		;	17.	c-1:36	4	#####
; d-3:62	12	#####		;	18.	a-3:69	4	#####
; e-3:64	14	#####		;	19.	f-4:77	3	###
; f-3:65	10	#####		;	20.	f#3:66	3	###
; f#3:66	3	##		;	21.	e-4:76	3	###
; g-3:67	13	#####		;	22.	a#2:58	3	###
; a-3:69	4	##		;	23.	h-1:47	1	#
; h-3:71	6	##		;	24.	g-4:79	1	#
; c-4:72	7	##		;	25.	g#2:56	1	#
; c#4:73	1	#		;	26.	g#1:44	1	#
; d-4:74	8	##		;	27.	f-1:41	1	#
; e-4:76	3	##		;	28.	f#1:42	1	#
; f-4:77	3	##		;	29.	d#2:51	1	#
; g-4:79	1	#		;	30.	c#4:73	1	#
; a-4:81	1	#		;	31.	a-4:81	1	#

# Histogram of raw (31 values, 197 notes)

; c-1:36	4	####		; 1. c-3:60	23	#####
; f-1:41	1	#		; 2. g-2:55	14	#####
; f#1:42	1	#		; 3. e-3:64	14	#####
; g-1:43	9	#####		; 4. g-3:67	13	#####
; g#1:44	1	#		; 5. d-3:62	12	#####
; h-1:47	1	#		; 6. g-2:53	11	#####
; c-2:48	6	#####		; 7. f-2:53	11	#####
; d-2:50	9	#####		; 8. f-3:65	10	#####
; d#2:51	1	#		; 9. h-2:59	9	#####
; e-2:52	5	#####		; 10. g-1:47	8	#####
; f-2:53	11	#####		; 11. d-2:53	8	#####
; g-2:55	14	#####		; 12. d-4:74	8	#####
; g#2:56	1	#		; 13. c-4:72	7	#####
; a-2:57	12	#####		; 14. h-3:71	6	#####
; a#2:58	3	##		; 15. c-2:48	6	#####
; h-2:59	9	#####		; 16. e-2:52	5	#####
; c-3:60	23	#####		; 17. c-1:36	4	#####
; d-3:62	12	#####		; 18. a-3:69	4	#####
; e-3:64	14	#####		; 19. f-4:77	3	###
; f-3:65	10	#####		; 20. f#3:66	3	###
; f#3:66	3	##		; 21. e-4:76	3	###
; g-3:67	13	#####		; 22. a#2:58	3	###
; a-3:69	4	##		; 23. h-1:47	1	#
; h-3:71	6	##		; 24. g-4:79	1	#
; c-4:72	7	##		; 25. g#2:56	1	#
; c#4:73	1	#		; 26. g#1:44	1	#
; d-4:74	8	##		; 27. f-1:41	1	#
; e-4:76	3	##		; 28. f#1:42	1	#
; f-4:77	3	##		; 29. d#2:51	1	#
; g-4:79	1	#		; 30. c#4:73	1	#
; a-4:81	1	#		; 31. a-4:81	1	#

**notes: 5 bit x 197 = 124 byte**  
**table: 31 byte**  
**total: 155 byte**

# Histogram of raw (31 values, 197 notes)

; c-1:36	4	####		; 1. c-3:60	23	#####
; f-1:41	1	#		; 2. g-2:55	14	#####
; f#1:42	1	#		; 3. e-3:64	14	#####
; g-1:43	9	#####		; 4. g-3:67	13	#####
; g#1:44	1	#		; 5. d-3:62	12	#####
; h-1:47	1	#		; 6. a-2:53	12	#####
; c-2:48	6	####		; 7. f-2:53	11	#####
; d-2:50	9	####		; 8. f-3:65	10	#####
; d#2:51	1	#		; 9. h-2:59	9	#####
; e-2:52	5	##		; 10. g-1:43	9	#####
; f-2:53	11	+		; 11. d-2:50	9	#####
; g-2:55	14	#####		; 12. d-4:74	8	#####
; g#2:56	1	#		; 13. c-4:72	7	#####
; a-2:57	12	#####		; 14. h-3:71	6	#####
; a#2:58	3	##		; 15. c-2:48	6	#####
; h-2:59	9	#####		; 16. e-2:52	5	#####
; c-3:60	23	#####		; 17. c-1:36	4	#####
; d-3:62	12	#####		; 18. a-3:69	4	#####
; e-3:64	14	#####		; 19. f-4:77	3	#####
; f-3:65	10	#####		; 20. f#3:66	3	#####
; f#3:66	3	##		; 21. e-4:76	3	#####
; g-3:67	13	#####		; 22. a#2:58	3	#####
; a-3:69	4	##		; 23. h-1:47	1	#
; h-3:71	6	##		; 24. g-4:79	1	#
; c-4:72	7	##		; 25. g#2:56	1	#
; c#4:73	1	#		; 26. g#1:44	1	#
; d-4:74	8	##		; 27. f-1:41	1	#
; e-4:76	3	##		; 28. f#1:42	1	#
; f-4:77	3	##		; 29. d#2:51	1	#
; g-4:79	1	#		; 30. c#4:73	1	#
; a-4:81	1	#		; 31. a-4:81	1	#

**note range: 36 .. 81: 45 values**

**values: 6 bit x 197 = 148 byte**

# Think Diff

```

; c-3:60  e-3:64  g-3:67  c-4:72  e-4:76  (...) ; c-1:36  c-2:48  f-2:53  a-2:57  c-3:60  f-3:65  c-3:60  a-2:57
; c-3:60  d-3:62  a-3:69  d-4:74  f-4:77  (...) ; c-3:60  a-2:57  f-2:53  a-2:57  f-2:53  d-2:50  f-2:53  d-2:50
; h-2:59  d-3:62  g-3:67  d-4:74  f-4:77  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71
; c-3:60  e-3:64  g-3:67  c-4:72  e-4:76  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62
; c-3:60  e-3:64  a-3:69  e-4:76  a-4:81  (...) ; c-1:36  c-2:48  e-3:64  g-3:67  c-4:72
; c-3:60  d-3:62  f#3:66  a-3:69  d-4:74  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; h-2:59  d-3:62  g-3:67  d-4:74  g-4:79  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; h-2:59  c-3:60  e-3:64  g-3:67  c-4:72  (...) ; a-2:57  c-3:60  e-3:64  g-3:67  c-4:72  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; a-2:57  c-3:60  e-3:64  g-3:67  c-4:72  (...) ; d-2:50  a-2:57  d-3:62  f#3:66  c-4:72  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; d-2:50  a-2:57  d-3:62  f#3:66  c-4:72  (...) ; g-2:55  h-2:59  d-3:62  g-3:67  h-3:71  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-2:55  h-2:59  d-3:62  g-3:67  h-3:71  (...) ; g-2:55  a#2:58  e-3:64  g-3:67  c#4:73  (...) ; a-2:57  c-3:60  e-3:64  g-3:67  c-4:72  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-2:55  a#2:58  e-3:64  g-3:67  c#4:73  (...) ; f-2:53  a-2:57  d-3:62  a-3:69  d-4:74  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; f-2:53  g#2:56  d-3:62  f-3:65  h-3:71  (...) ; e-2:52  g-2:55  c-3:60  g-3:67  c-4:72  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; e-2:52  g-2:55  c-3:60  g-3:67  c-4:72  (...) ; e-2:52  f-2:53  a-2:57  c-3:60  f-3:65  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; e-2:52  f-2:53  a-2:57  c-3:60  f-3:65  (...) ; d-2:50  f-2:53  a-2:57  c-3:60  f-3:65  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; d-2:50  f-2:53  a-2:57  c-3:60  f-3:65  (...) ; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; c-2:48  e-2:52  g-2:55  c-3:60  e-3:64  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; c-2:48  e-2:52  g-2:55  c-3:60  e-3:64  (...) ; c-2:48  g-2:55  a#2:58  c-3:60  e-3:64  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; c-2:48  g-2:55  a#2:58  c-3:60  e-3:64  (...) ; f-1:41  f-2:53  a-2:57  c-3:60  e-3:64  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; f-1:41  f-2:53  a-2:57  c-3:60  e-3:64  (...) ; f#1:42  c-2:48  a-2:57  c-3:60  e-3:64  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; f#1:42  c-2:48  a-2:57  c-3:60  e-3:64  (...) ; g#1:44  f-2:53  h-2:59  c-3:60  d-3:62  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g#1:44  f-2:53  h-2:59  c-3:60  d-3:62  (...) ; g-1:43  f-2:53  g-2:55  h-2:59  d-3:62  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  f-2:53  g-2:55  h-2:59  d-3:62  (...) ; g-1:43  e-2:52  g-2:55  c-3:60  e-3:64  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  e-2:52  g-2:55  c-3:60  e-3:64  (...) ; g-1:43  d-2:50  g-2:55  c-3:60  f-3:65  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  d-2:50  g-2:55  c-3:60  f-3:65  (...) ; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; g-1:43  d#2:51  a-2:57  c-3:60  f#3:66  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  d#2:51  a-2:57  c-3:60  f#3:66  (...) ; g-1:43  e-2:52  g-2:55  c-3:60  g-3:67  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  e-2:52  g-2:55  c-3:60  g-3:67  (...) ; g-1:43  d-2:50  g-2:55  c-3:60  f-3:65  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  d-2:50  g-2:55  c-3:60  f-3:65  (...) ; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72
; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; c-1:36  c-2:48  g-2:55  a#2:58  e-3:64  (...) ; c-3:60  a-2:57  c-3:60  f-3:65  e-3:64  g-3:67  c-4:72

```



## Think Diff

```
; c-3:60  e-3:64  g-3:67  c-4:72  e-4:76  (...) ; c-1:36  c-2:48  f-2:53  a-2:57  c-3:60  f-3:65  c-3:60  a-2:57  
; c-3:60  d-3:62  a-3:69  d-4:74  f-4:77  (...) ; c-3:60  a-2:57  f-2:53  a-2:57  f-2:53  d-2:50  f-2:53  d-2:50  
; h-2:59  d-3:62  g-3:67  d-4:74  f-4:77  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; c-3:60  e-3:64  g-3:67  c-4:72  e-4:76  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; a-3:60  e-3:64  a-3:69  e-4:76  a-4:81  (...) ; c-1:36  c-2:48  e-3:64  g-3:67  c-4:72  
; c-3:60  d-3:62  f#3:66  a-3:69  d-4:74  (...) ; c-3:60  a-2:57  f-2:53  a-2:57  f-2:53  d-2:50  f-2:53  d-2:50  
; h-2:59  d-3:62  g-3:67  d-4:74  g-4:79  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; h-2:59  c-3:60  e-3:64  g-3:67  c-4:72  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; a-2:57  c-3:60  e-3:64  g-3:67  c-4:72  (...) ; c-1:36  c-2:48  e-3:64  g-3:67  c-4:72  
; d-2:50  a-2:57  d-3:62  f#3:66  c-4:72  (...) ; c-3:60  a-2:57  f-2:53  a-2:57  f-2:53  d-2:50  f-2:53  d-2:50  
; g-2:55  h-2:59  d-3:62  g-3:67  h-3:71  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; g-2:55  a#2:58  e-3:64  g-3:67  c#4:73  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; f-2:53  a-2:57  d-3:62  a-4:74  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; f-2:53  g#2:56  d-3:62  a-4:74  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; e-2:52  g-2:55  c-3:60  g-3:67  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; e-2:52  f-2:53  a-2:57  c-3:60  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; d-2:50  f-2:53  a-2:57  c-3:60  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; c-2:48  e-2:52  g-2:55  c-3:60  e-3:64  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; c-2:48  g-2:55  a#2:58  c-3:60  e-3:64  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; f-1:41  f-2:53  a-2:57  c-3:60  e-3:64  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; f#1:42  c-2:48  a-2:57  c-3:60  e-3:64  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; g#1:44  f-2:53  h-2:59  c-3:60  d-3:62  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; g-1:43  f-2:53  g-2:55  h-2:59  d-3:62  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; g-1:43  e-2:52  g-2:55  c-3:60  e-3:64  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; g-1:43  d-2:50  g-2:55  c-3:60  f-3:65  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; g-1:43  d#2:51  a-2:57  c-3:60  f#3:66  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; g-1:43  e-2:52  g-2:55  c-3:60  g-3:67  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; g-1:43  d-2:50  g-2:55  c-3:60  f-3:65  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62  
; g-1:43  d-2:50  g-2:55  h-2:59  f-3:65  (...) ; c-1:36  h-1:47  g-3:67  h-3:71  d-4:74  f-4:77  d-4:74  h-3:71  
; c-1:36  c-2:48  g-2:55  a#2:58  e-3:64  (...) ; d-4:74  h-3:71  g-3:67  h-3:71  d-3:62  f-3:65  e-3:64  d-3:62
```

We should focus on Part 1

# *Think Diff: focusing on Part 1*

c-3:60	e-3:64	g-3:67	c-4:72	e-4:76	d-2:50	f-2:53	a-2:57	c-3:60	f-3:65
c-3:60	d-3:62	a-3:69	d-4:74	f-4:77	g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
h-2:59	d-3:62	g-3:67	d-4:74	f-4:77	c-2:48	e-2:52	g-2:55	c-3:60	e-3:64
c-3:60	e-3:64	g-3:67	c-4:72	e-4:76	c-2:48	g-2:55	a#2:58	c-3:60	e-3:64
c-3:60	e-3:64	a-3:69	e-4:76	a-4:81	f-1:41	f-2:53	a-2:57	c-3:60	e-3:64
c-3:60	d-3:62	f#3:66	a-3:69	d-4:74	f#1:42	c-2:48	a-2:57	c-3:60	e-3:64
h-2:59	d-3:62	g-3:67	d-4:74	g-4:79	g#1:44	f-2:53	h-2:59	c-3:60	e-3:64
h-2:59	c-3:60	e-3:64	g-3:67	c-4:72	g-1:43	f-2:53	g-2:55	h-2:59	d-3:62
a-2:57	c-3:60	e-3:64	g-3:67	c-4:72	g-1:43	e-2:52	g-2:55	c-3:60	d-3:62
d-2:50	a-2:57	d-3:62	f#3:66	c-4:72	g-1:43	d-2:50	g-2:55	c-3:60	e-3:64
g-2:55	h-2:59	d-3:62	g-3:67	h-3:71	g-1:43	d-2:50	g-2:55	c-3:60	f-3:65
g-2:55	a#2:58	e-3:64	g-3:67	c#4:73	g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
f-2:53	a-2:57	d-3:62	a-3:69	d-4:74	g-1:43	d#2:51	a-2:57	c-3:60	f#3:66
f-2:53	g#2:56	d-3:62	f-3:65	h-3:71	g-1:43	e-2:52	g-2:55	c-3:60	g-3:67
e-2:52	g-2:55	c-3:60	g-3:67	c-4:72	g-1:43	d-2:50	g-2:55	c-3:60	f-3:65
e-2:52	f-2:53	a-2:57	c-3:60	f-3:65	g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
					c-1:36	c-2:48	g-2:55	a#2:58	e-3:64

# *Think Diff: focusing on Part 1*

c-3:60	e-3:64	g-3:67	c-4:72	e-4:76	d-2:50	f-2:53	a-2:57	c-3:60	f-3:65
c-3:60	d-3:62	a-3:69	d-4:74	f-4:77	g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
h-2:59	d-3:62	g-3:67	d-4:74	f-4:77	c-2:48	e-2:52	g-2:55	c-3:60	e-3:64
c-3:60	e-3:64	g-3:67	c-4:72	e-4:76	c-2:48	g-2:55	a#2:58	c-3:60	e-3:64
c-3:60	e-3:64	a-3:69	e-4:76	a-4:81	f-1:41	f-2:53	a-2:57	c-3:60	e-3:64
c-3:60	d-3:62	f#3:66	a-3:69	d-4:74	f#1:42	c-2:48	a-2:57	c-3:60	e-3:64
h-2:59	d-3:62	g-3:67	d-4:74	g-4:79	g#1:44	f-2:53	h-2:59	c-3:60	d-3:62
h-2:59	c-3:60	e-3:64	g-3:67	c-4:72	g-1:43	f-2:53	g-2:55	h-2:59	d-3:62
a-2:57	c-3:60	e-3:64	g-3:67	c-4:72	g-1:43	e-2:52	g-2:55	c-3:60	e-3:64
d-2:50	a-2:57	d-3:62	f#3:66	c-4:72	g-1:43	d-2:50	g-2:55	c-3:60	f-3:65
g-2:55	h-2:59	d-3:62	g-3:67	h-3:71	g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
g-2:55	a#2:58	e-3:64	g-3:67	c#4:73	g-1:43	d#2:51	a-2:57	c-3:60	f#3:66
f-2:53	a-2:57	d-3:62	a-3:69	d-4:74	g-1:43	e-2:52	g-2:55	c-3:60	g-3:67
f-2:53	g#2:56	d-3:62	f-3:65	h-3:71	g-1:43	d-2:50	g-2:55	c-3:60	f-3:65
e-2:52	g-2:55	c-3:60	g-3:67	c-4:72	g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
e-2:52	f-2:53	a-2:57	c-3:60	f-3:65	c-1:36	c-2:48	g-2:55	a#2:58	e-3:64

# Think Diff: focusing on Part 1

c-3:60	e-3:64	g-3:67	c-4:72	e-4:76
c-3:60	d-3:62	a-3:69	d-4:74	f-4:77
h-2:59	d-3:62	g-3:67	d-4:74	f-4:77
c-3:60	e-3:64	g-3:67	c-4:72	e-4:76
c-3:60	e-3:64	a-3:69	e-4:76	a-4:81
c-3:60	d-3:62	f#3:66	a-3:69	d-4:74
h-2:59	d-3:62	g-3:67	d-4:74	g-4:79
h-2:59	c-3:60	e-3:64	g-3:67	c-4:72
a-2:57	c-3:60	e-3:64	g-3:67	c-4:72
d-2:50	a-2:57	d-3:62	f#3:66	c-4:72
g-2:55	h-2:59	d-3:62	g-3:67	h-3:71
g-2:55	a#2:58	e-3:64	g-3:67	c#4:73
f-2:53	a-2:57	d-3:62	a-3:69	d-4:74
f-2:53	g#2:56	d-3:62	f-3:65	h-3:71
e-2:52	g-2:55	c-3:60	g-3:67	c-4:72
e-2:52	f-2:53	a-2:57	c-3:60	f-3:65

d-2:50	f-2:53	a-2:57	c-3:60	f-3:65
g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
c-2:48	e-2:52	g-2:55	c-3:60	e-3:64
c-2:48	g-2:55	a#2:58	c-3:60	e-3:64
f-1:41	f-2:53	a-2:57	c-3:60	e-3:64
f#1:42	c-2:48	a-2:57	c-3:60	e-3:64
g#1:44	f-2:53	h-2:59	c-3:60	d-3:62
g-1:43	f-2:53	g-2:55	h-2:59	d-3:62
g-1:43	e-2:52	g-2:55	c-3:60	e-3:64
g-1:43	d-2:50	g-2:55	c-3:60	f-3:65
g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
g-1:43	d#2:51	a-2:57	c-3:60	f#3:66
g-1:43	e-2:52	g-2:55	c-3:60	g-3:67
g-1:43	d-2:50	g-2:55	c-3:60	f-3:65
g-1:43	d-2:50	g-2:55	h-2:59	f-3:65
c-1:36	c-2:48	g-2:55	a#2:58	e-3:64

## *Think Diff: why raw-diff-5?*

### Why raw?

- Raw MIDI note values are used
- Other option was indexed data
- There are 31 values in range of 45
- Peak diff values are similar for raw and indexed, 31-byte index table just does not pay off

## *Think Diff: why raw-diff-5?*

Why diff-5? \*it is only a hypothesis\*image

- Part 1 contains chord breaks
- Chords are evolving slowly to next one
- Slowness is emphasized by repeating all chord breaks twice (not stored)
- Slow change means small diffs
- Chord breaks are 8 notes long
- They are stored in 5 bytes

bingo! image

# *Think Diff: explaining raw-diff-5*

*explain.....*

c-3:60:/00	e-3:64:/00	g-3:67:/00	c-4:72:/00	e-4:76:/00
c-3:60:=00	d-3:62:-02	a-3:69:+02	d-4:74:+02	f-4:77:+01
h-2:59:-01	d-3:62:=00	g-3:67:-02	d-4:74:=00	f-4:77:=00

# Think Diff: raw-diff-5 data overview

c-3:60:/00	e-3:64:/00	g-3:67:/00	c-4:72:/00	e-4:76:/00							
c-3:60:=00	d-3:62:-02	a-3:69:+02	d-4:74:+02	f-4:77:+01							
h-2:59:-01	d-3:62:=00	g-3:67:-02	d-4:74:=00	f-4:77:=00	d-2:50:-02	f-2:53:=00	a-2:57:=00	c-3:60:=00	f-3:65:=00		
c-3:60:+01	e-3:64:+02	g-3:67:=00	c-4:72:-02	e-4:76:-01	g-1:43:-07	d-2:50:-03	g-2:55:-02	h-2:59:-01	f-3:65:=00		
c-3:60:=00	e-3:64:=00	a-3:69:+02	e-4:76:+04	a-4:81:+05	c-2:48:+05	e-2:52:+02	g-2:55:=00	c-3:60:+01	e-3:64:-01		
c-3:60:=00	d-3:62:-02	f#3:66:-03	a-3:69:-07	d-4:74:-07	c-2:48:=00	g-2:55:+03	a#2:58:+03	c-3:60:=00	e-3:64:=00		
h-2:59:-01	d-3:62:=00	g-3:67:+01	d-4:74:+05	g-4:79:+05	f-1:41:-07	f-2:53:-02	a-2:57:-01	c-3:60:=00	e-3:64:=00		
h-2:59:=00	c-3:60:-02	e-3:64:-03	g-3:67:-07	c-4:72:-07	f#1:42:+01	c-2:48:-05	a-2:57:=00	c-3:60:=00	e-3:64:=00		
a-2:57:-02	c-3:60:=00	e-3:64:=00	g-3:67:=00	c-4:72:=00	g#1:44:+02	f-2:53:+05	h-2:59:+02	c-3:60:=00	d-3:62:-02		
d-2:50:-07	a-2:57:-03	d-3:62:-02	f#3:66:-01	c-4:72:=00	g-1:43:-01	f-2:53:=00	g-2:55:-04	h-2:59:-01	d-3:62:=00		
g-2:55:+05	h-2:59:+02	d-3:62:=00	g-3:67:+01	h-3:71:-01	g-1:43:=00	e-2:52:-01	g-2:55:=00	c-3:60:+01	e-3:64:+02		
g-2:55:=00	a#2:58:-01	e-3:64:+02	g-3:67:=00	c#4:73:+02	g-1:43:=00	d-2:50:-02	g-2:55:=00	c-3:60:=00	f-3:65:+01		
f-2:53:-02	a-2:57:-01	d-3:62:-02	a-3:69:+02	d-4:74:+01	g-1:43:=00	d-2:50:=00	g-2:55:=00	h-2:59:-01	f-3:65:=00		
f-2:53:=00	g#2:56:-01	d-3:62:=00	f-3:65:-04	h-3:71:-03	g-1:43:=00	d#2:51:+01	a-2:57:+02	c-3:60:+01	f#3:66:+01		
e-2:52:-01	g-2:55:-01	c-3:60:-02	g-3:67:+02	c-4:72:+01	g-1:43:=00	e-2:52:+01	g-2:55:-02	c-3:60:=00	g-3:67:+01		
e-2:52:=00	f-2:53:-02	a-2:57:-03	c-3:60:-07	f-3:65:-07	g-1:43:=00	d-2:50:-02	g-2:55:=00	c-3:60:=00	f-3:65:-02		
					g-1:43:=00	d-2:50:=00	g-2:55:=00	h-2:59:-01	f-3:65:=00		
					c-1:36:-07	c-2:48:-02	g-2:55:=00	a#2:58:-01	e-3:64:-01		

c-1:36:=00	c-2:48:=00	f-2:53:-02	a-2:57:-01	c-3:60:-04	f-3:65:+29	c-3:60:+12	a-2:57:+04				
c-3:60:+03	a-2:57:-03	f-2:53:-12	a-2:57:-03	f-2:53:-04	d-2:50:-10	f-2:53:-04	d-2:50:-03				
c-1:36:-21	h-1:47:-06	g-3:67:+17	h-3:71:+18	d-4:74:+24	f-4:77:+41	d-4:74:+27	h-3:71:+04				
d-4:74:+03	h-3:71:-03	g-3:67:-10	h-3:71:-03	d-3:62:-09	f-3:65:-09	e-3:64:-07	d-3:62:-05				

c-1:36:-35    c-2:48:-14    e-3:64:-01    g-3:67:+03    c-4:72:+10

# Think Diff: raw-diff-5 data overview

c-3:60:/00	e-3:64:/00	g-3:67:/00	c-4:72:/00	e-4:76:/00
c-3:60:=00	d-3:62:-02	a-3:69:+02	d-4:74:+02	f-4:77:+01
h-2:59:-01	d-3:62:=00	g-3:67:-02	d-4:74:=00	f-4:77:=00
c-3:60:+01	e-3:64:+02	g-3:67:=00	c-4:72:-02	e-4:76:-01
c-3:60:=00	e-3:64:=00	a-3:69:+02	e-4:76:+04	a-4:81:+05
c-3:60:=00	d-3:62:-02	f#3:66:-03	a-3:69:-07	d-4:74:-07
h-2:59:-01	d-3:62:=00	g-3:67:+01	d-4:74:+05	g-4:79:+05
h-2:59:=00	c-3:60:-02	e-3:64:-03	g-3:67:-07	c-4:72:-07
a-2:57:-02	c-3:60:=00	e-3:64:=00	g-3:67:=00	c-4:72:=00
d-2:50:-07	a-2:57:-03	d-3:62:-02	f#3:66:-01	c-4:72:=00
g-2:55:+05	h-2:59:+02	d-3:62:=00	g-3:67:+01	h-3:71:-01
g-2:55:=00	a#2:58:-01	e-3:64:+02	g-3:67:=00	c#4:73:+02
f-2:53:-02	a-2:57:-01	d-3:62:-02	a-3:69:+02	d-4:74:+01
f-2:53:=00	g#2:56:-01	d-3:62:=00	f-3:65:-04	h-3:71:-03
e-2:52:-01	g-2:55:-01	c-3:60:-02	g-3:67:+02	c-4:72:+01
e-2:52:=00	f-2:53:-02	a-2:57:-03	c-3:60:-07	f-3:65:-07

d-2:50:-02	f-2:53:=00	a-2:57:=00	c-3:60:=00	f-3:65:=00
g-1:43:-07	d-2:50:-03	g-2:55:-02	h-2:59:-01	f-3:65:=00
c-2:48:+05	e-2:52:+02	g-2:55:=00	c-3:60:+01	e-3:64:-01
c-2:48:=00	g-2:55:+03	a#2:58:+03	c-3:60:=00	e-3:64:=00
f-1:41:-07	f-2:53:-02	a-2:57:-01	c-3:60:=00	e-3:64:=00
f#1:42:+01	c-2:48:-05	a-2:57:=00	c-3:60:=00	e-3:64:=00
g#1:44:+02	f-2:53:+05	h-2:59:+02	c-3:60:=00	d-3:62:-02
g-1:43:-01	f-2:53:=00	g-2:55:-04	h-2:59:-01	d-3:62:=00
g-1:43:=00	e-2:52:-01	g-2:55:=00	c-3:60:+01	e-3:64:+02
g-1:43:=00	d-2:50:-02	g-2:55:=00	c-3:60:=00	f-3:65:+01
g-1:43:=00	d-2:50:=00	g-2:55:=00	h-2:59:-01	f-3:65:=00
g-1:43:=00	d#2:51:+01	a-2:57:+02	c-3:60:+01	f#3:66:+01
g-1:43:=00	e-2:52:+01	g-2:55:-02	c-3:60:=00	g-3:67:+01
g-1:43:=00	d-2:50:-02	g-2:55:=00	c-3:60:=00	f-3:65:-02
g-1:43:=00	d-2:50:=00	g-2:55:=00	h-2:59:-01	f-3:65:=00
c-1:36:-07	c-2:48:-02	g-2:55:=00	a#2:58:-01	e-3:64:-01

c-1:36:=00	c-2:48:=00	f-2:53:-02	a-2:57:-01	c-3:60:-04	f-3:65:+29	c-3:60:+12	a-2:57:+04
c-3:60:+03	a-2:57:-03	f-2:53:+12	a-2:57:-03	f-2:53:-04	d-2:50:-10	f-2:53:-04	d-2:50:-03
c-1:36:-21	h-1:47:-06	g-3:67:+17	h-3:71:+18	d-4:74:+24	f-4:77:+41	d-4:74:+27	h-3:71:+04
d-4:74:+03	h-3:71:-03	g-3:67:-10	h-3:71:-03	d-3:62:-09	f-3:65:-09	e-3:64:-07	d-3:62:-05

c-1:36:**-35** c-2:48:**-14** e-3:64:-01 g-3:67:+03 c-4:72:+10

# Think Diff: raw-diff-5 data overview

```
c-3:60:/00 e-3:64:/00 g-3:67:/00 c-4:72:/00 e-4:76:/00
c-3:60:=00 d-3:62:-02 a-3:69:+02 d-4:74:+02 f-4:77:+01
h-2:59:-01 d-3:62:=00 g-3:67:-02 d-4:74:=00 f-4:77:=00
c-3:60:+01 e-3:64:+02 g-3:67:+00 c-4:72:-02 e-4:76:-01
c-3:60:=00 e-3:64:=00 a-3:69:+02 e-4:76:+04 a-4:81:+05
c-3:60:=00 d-3:62:-02 f#3:66:-03 a-3:69:-07 d-4:74:-07
h-2:59:-01 d-3:62:=00 g-3:67:+01 d-4:74:+05 g-4:79:+05
h-2:59:=00 c-3:60:-02 e-3:64:-03 g-3:67:-07 c-4:72:-07
a-2:57:-02 c-3:60:=00 e-3:64:=00 g-3:67:=00 c-4:72:=00
d-2:50:-07 a-2:57:-03 d-3:62:-02 f#3:66:-01 c-4:72:=00
g-2:55:+05 h-2:59:+02 d-3:62:=00 g-3:67:+01 h-3:71:-01
g-2:55:+00 a#2:58:-01 e-3:64:+02 g-3:67:=00 c#4:73:+02
f-2:53:-02 a-2:57:-01 d-3:62:-02 a-3:69:+02 d-4:74:+01
f-2:53:=00 g#2:56:-01 d-3:62:=00 f-3:65:-04 h-3:71:-03
e-2:52:-01 g-2:55:-01 c-3:60:-02 g-3:67:+02 c-4:72:+01
e-2:52:=00 f-2:53:-02 a-2:57:-03 c-3:60:-07 f-3:65:-07
```

d-2:50:-02	f-2:53:=00	a-2:57:=00	c-3:60:=00	f-3:65:=00
g-1:43:-07	d-2:50:-03	g-2:55:-02	h-2:59:-01	f-3:65:=00
c-2:48:+05	e-2:52:+02	g-2:55:=00	c-3:60:+01	e-3:64:-01
c-2:48:=00	g-2:55:+03	a#2:58:+03	c-3:60:=00	e-3:64:=00
f-1:41:-07	f-2:53:-02	a-2:57:-01	c-3:60:=00	e-3:64:=00
f#1:42:+01	c-2:48:-05	a-2:57:=00	c-3:60:=00	e-3:64:=00
g#1:44:+02	f-2:53:+05	h-2:59:+02	c-3:60:=00	d-3:62:-02
g-1:43:-01	f-2:53:=00	g-2:55:-04	h-2:59:-01	d-3:62:=00
g-1:43:=00	e-2:52:-01	g-2:55:=00	c-3:60:+01	e-3:64:+02
g-1:43:=00	d-2:50:-02	g-2:55:=00	c-3:60:=00	f-3:65:+01
g-1:43:=00	d-2:50:=00	g-2:55:=00	h-2:59:-01	f-3:65:=00
g-1:43:=00	d#2:51:+01	a-2:57:+02	c-3:60:+01	f#3:66:+01
g-1:43:=00	e-2:52:+01	g-2:55:-02	c-3:60:=00	g-3:67:+01
g-1:43:=00	d-2:50:-02	g-2:55:=00	c-3:60:=00	f-3:65:-02
g-1:43:=00	d-2:50:=00	g-2:55:=00	h-2:59:-01	f-3:65:=00
c-1:36:-07	c-2:48:-02	g-2:55:=00	a#2:58:-01	e-3:64:-01

```
c-1:36:=00 c-2:48:=00 f-2:53:-02 a-2:57:-01 c-3:60:-04 f-3:65:+29 c-3:60:+12 a-2:57:+04
c-3:60:+03 a-2:57:-03 f-2:53:+12 a-2:57:-03 f-2:53:-04 d-2:50:-10 f-2:53:-04 d-2:50:-03
c-1:36:-21 h-1:47:-06 g-3:67:+17 h-3:71:+18 d-4:74:+24 f-4:77:+41 d-4:74:+27 h-3:71:+04
d-4:74:+03 h-3:71:-03 g-3:67:-10 h-3:71:-03 d-3:62:-09 f-3:65:-09 e-3:64:-07 d-3:62:-05
```

```
c-1:36:+35 c-2:48:-14 e-3:64:-01 g-3:67:+03 c-4:72:+10
```

# Think Diff: raw-diff-5 data overview

```

c-3:60:/00 e-3:64:/00 g-3:67:/00 c-4:72:/00 e-4:76:/00
c-3:60:=00 d-3:62:-02 a-3:69:+02 d-4:74:+02 f-4:77:+01
h-2:59:-01 d-3:62:=00 g-3:67:-02 d-4:74:+00 f-4:77:+00
c-3:60:+01 e-3:64:+02 g-3:67:=00 c-4:72:-02 e-4:76:-01
c-3:60:=00 e-3:64:=00 a-3:69:+02 e-4:76:+04 a-4:81:+05
c-3:60:=00 d-3:62:-02 f#3:66:-03 a-3:69:-07 d-4:74:+07
h-2:59:-01 d-3:62:=00 g-3:67:+01 d-4:74:+05 g-4:79:+05
h-2:59:=00 c-3:60:-02 e-3:64:-03 g-3:67:-07 c-4:72:-07
a-2:57:-02 c-3:60:=00 e-3:64:+00 g-3:67:+00 c-4:72:+00
d-2:50:-07 a-2:57:-03 d-3:62:-02 f#3:66:-01 c-4:72:+00
g-2:55:+05 h-2:59:+02 d-3:62:+00 g-3:67:+01 h-3:71:-01
g-2:55:=00 a-2:58:-01 e-3:64:+02 g-3:67:+00 c#4:73:+02
f-2:53:-02 a-2:57:-01 d-3:62:-02 a-3:69:+02 d-4:74:+01
f-2:53:+00 g#2:56:-01 d-3:62:=00 f-3:65:-04 h-3:71:-03
e-2:52:-01 g-2:55:-01 c-3:60:-02 g-3:67:+02 c-4:72:+01
e-2:52:=00 f-2:53:-02 a-2:57:-03 c-3:60:-07 f-3:65:-07

```

<b>c-1:36:=00</b>	<b>c-2:48:=00</b>	<b>f-2:53:-02</b>	<b>a-2:57:-01</b>
<b>c-3:60:-04</b>	<b>f-3:65:<b>+29</b></b>	<b>c-3:60:<b>+12</b></b>	<b>a-2:57:+04</b>

<b>c-3:60:+03</b>	<b>a-2:57:-03</b>	<b>f-2:53:<b>-12</b></b>	<b>a-2:57:-03</b>
<b>f-2:53:-04</b>	<b>d-2:50:-10</b>	<b>f-2:53:-04</b>	<b>d-2:50:-03</b>

<b>c-1:36:<b>-21</b></b>	<b>h-1:47:-06</b>	<b>g-3:67:<b>+17</b></b>	<b>h-3:71:<b>+18</b></b>
<b>d-4:74:<b>+24</b></b>	<b>f-4:77:<b>+41</b></b>	<b>d-4:74:<b>+27</b></b>	<b>h-3:71:+04</b>

<b>d-4:74:+03</b>	<b>h-3:71:-03</b>	<b>g-3:67:-10</b>	<b>h-3:71:-03</b>
<b>d-3:62:-09</b>	<b>f-3:65:-09</b>	<b>e-3:64:-07</b>	<b>d-3:62:-05</b>

**c-1:36:**-35****   **c-2:48:**-14****   **e-3:64:-01**   **g-3:67:+03**   **c-4:72:+10**