

EsAC to Clay

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A collection of supporting documents for EsacClayConversionApp, a small program designed to convert melodies encoded in the EsAC notation into the Clay programming language, completed as a final assignment in CSC 490/Cog 316 – Cognitive Musicology. Includes basic usage, specifications on input and output files, a testing report, and reflection upon difficulties encountered.

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Usage

Program Usage

To use this program, simply run from the command line:

```
java -jar EsacClayConversionApp.jar
```

From here, you should get a prompt to enter a file name in the format `<file|web> <filename>`. The `<filename>` parameter is the name of the file, and the `<file|web>` parameter is to determine whether or not the file is local or on a remote server. For example, to load a local file called `littletune.esac`, you'd enter

```
file littletune.esac
```

Or, to load a file called `notsolittletune.esac` located on a server called `example.com`, you'd use:

```
web example.com/notsolittletune.esac
```

(Note that the first parameter is not case sensitive, but the second (filename) is.)

After this is entered, the program will attempt to load the file (throwing errors if the file is malformed, or doesn't exist, or such), translate the EsAC into Clay, output the EsAC input and the Clay output on screen, and then prompt for a filename to save the Clay output to. Simply enter a filename (an extension of `.clay` is recommended, but not required) and press enter. For example:

```
yetbiggertune.clay
```

And that's all there is to it.

Input File Specification

EsAC Input Specification

The EsAC input files should have the following format:

```
<optional lines>
KEY[TUNENAME SHORTESTNOTE TONIC METER]
MEL[  BAR 1 BAR 2
    "" ""
    BAR N //]
<optional lines>
```

For the KEY line:

- TUNENAME is the name of the tune, and will be the name of the resulting Clay program
- SHORTESTNOTE and METER are ignored for the purposes of this program.
- TONIC is the key signature (fitting the regex [A-G]).

For the MEL section:

- Each line is a phrase made up of one or more BARs separated by two spaces.
- Each BAR is made up of digits fitting the regex [0-7], #, b, +(plus), -(minus), _(underscore), and .(dot).
- Each digit in a BAR represents a note in relation to the tonic, except for 0, which represents a rest.
- Each underscore following a digit means to double the duration of the note.
- Each dot following a digit means to multiply the duration of the note by 1.5.
- Each plus preceding a digit means to raise the note an octave.
- Each minus preceding a digit means to lower the note an octave.
- A # following a digit means to play the note sharp (raise a half-tone).
- A b following a digit means to play the note flat (lower a half-tone).
- The section is closed by the string "//]".

Other lines in the EsAC specification are ignored for the purposes of this program.

Output File Specification

Clay Output Specification

The Clay output files will have the following format:

```
melody = alphabetic-command PHRASE1 PHRASE2 ... PHRASEN
PHRASE1 = BAR1 BAR2 ... BARN
...
BAR1 = clay-primitives...
...
<PFLAT or PSHARP, if necessary>
```

Where melody is the name of the melody, alphabetic-command is the command for the key the piece is in, and clay-primitives is a list of Clay primitives corresponding to the correct notes in the EsAC file. An additional macro PFLAT or PSHARP may be defined at the bottom of the file if necessary. The definition of these lines is as follows:

- PFLAT >> CHROMATIC LP P
- PSHARP >> CHROMATIC RP P

And the file ends with a newline.

Testing

Procedure

To test this program, I selected a sample of 12 tunes from the Essen Folksong database and ran them through the converter to produce their Clay equivalents. I then examined these Clay files by hand, comparing them to the EsAC notation of the tune, and checking for inconsistencies. I also ran the program under error conditions, with both a malformed file and a non-existent file, and made sure the program exited gracefully. Also, I ran the program on two systems (jake-laptop, my main laptop, and jake-netbook, my netbook) and for the global tests, used two web servers (moxie.cs.oswego.edu, the Apache-based Computer Science server “Moxie” at SUNY Oswego, and mxm.suspended-chord.info, the Lighttpd-based server I have running from my house) to check for compatibility and stability. Following are the results of my various test runs.

Jake-Laptop: Local/Error/Malformed File

Script started on Tue Apr 20 21:15:10 2010

```
[Tue Apr 20 21:15:10] user@Jake-Laptop:~/programming/490/esactoclay
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.
> file A0020C.clay
Class: EsacClayConverter >> Error: malformed file: A0020C.clay
```

```
[Tue Apr 20 21:15:23] user@Jake-Laptop:~/programming/490/esactoclay
$ exit
exit
```

Script done on Tue Apr 20 21:15:25 2010

Evaluation: The program exits gracefully when the local file is malformed.

Jake-Laptop: Local/Error/File Not Found

```
Script started on Tue Apr 20 21:15:31 2010
[Tue Apr 20 21:15:31] user@Jake-Laptop:~/programming/490/esactoclay
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.
> file FILETHATCANNOTPOSSIBLYEXIST
Class: EsacClayConverter >> Error: exception thrown:
java.io.FileNotFoundException: FILETHATCANNOTPOSSIBLYEXIST (The system
cannot find the file specified)
```

```
[Tue Apr 20 21:15:47] user@Jake-Laptop:~/programming/490/esactoclay
$ exit
exit
```

Script done on Tue Apr 20 21:15:51 2010

Evaluation: The program exits gracefully when the local file cannot be found.

Jake-Laptop: Local/Success

Script started on Tue Apr 20 21:14:02 2010

[Tue Apr 20 21:14:11] user@Jake-Laptop:~/programming/490/esactoclay

\$ java -jar EsacClayConversionApp.jar

Enter the name of your EsAC file in the format <file|web> <filename>.

> file A0020C.esac

Incoming EsAC:

ALTDEU

CUT[Tageweis von der Koenigstochter und dem jungen Grafen]

REG[Europa, Mitteleuropa, Deutschland]

KEY[A0020C 04 F 4/2 6/2]

```
MEL[1_ 3_3_4_4_ 5_5_0_
     5_ 5_3_4_5_ 3_2_1_
     1_ 3_3_4_4_ 5_5_0_
     5_ 5_3_4_5_ 3_2_1_
     5_ 5_4_3_2_ 1_2_3_
     5_ 6_5_5_3_ 5_4_3_2_3_0_
     4_ 5_3_4_3_ 2_1_0_ //] >>
```

FCT[Romanze, Ballade, Lied]

CMT[Andere Melodie (1604)]

Outgoing Clay:

A0020C = F-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE6

PHRASE7

PHRASE1 = BAR1 BAR2 BAR3

PHRASE2 = BAR4 BAR5 BAR6

PHRASE3 = BAR7 BAR8 BAR9

PHRASE4 = BAR10 BAR11 BAR12

PHRASE5 = BAR13 BAR14 BAR15

PHRASE6 = BAR16 BAR17 BAR18 BAR19

PHRASE7 = BAR20 BAR21 BAR22

BAR1 = 1X2 P 1S2

BAR2 = 2RP 2X2 P 2S2 2LP 2RP 1X2 P 1S2 2LP 3RP 2X2 P 2S2 3LP 3RP 1X2 P 1S2 3LP

BAR3 = 4RP 2X2 P 2S2 4LP 4RP 2X2 P 2S2 4LP 1LP 1X2 R 1S2 1RP

BAR4 = 4RP 1X2 P 1S2 4LP

BAR5 = 4RP 2X2 P 2S2 4LP 2RP 1X2 P 1S2 2LP 3RP 2X2 P 2S2 3LP 4RP 1X2 P 1S2 4LP

BAR6 = 2RP 2X2 P 2S2 2LP 1RP 1X2 P 1S2 1LP 2X2 P 2S2

BAR7 = 1X2 P 1S2

BAR8 = 2RP 2X2 P 2S2 2LP 2RP 1X2 P 1S2 2LP 3RP 2X2 P 2S2 3LP 3RP 1X2 P 1S2 3LP

BAR9 = 4RP 2X2 P 2S2 4LP 4RP 2X2 P 2S2 4LP 1LP 1X2 R 1S2 1RP

BAR10 = 4RP 1X2 P 1S2 4LP

```

BAR11 = 4RP 2X2 P 2S2 4LP 2RP 1X2 P 1S2 2LP 3RP 2X2 P 2S2 3LP 4RP 1X2 P
1S2 4LP
BAR12 = 2RP 2X2 P 2S2 2LP 1RP 1X2 P 1S2 1LP 2X2 P 2S2
BAR13 = 4RP 1X2 P 1S2 4LP
BAR14 = 4RP 2X2 P 2S2 4LP 3RP 1X2 P 1S2 3LP 2RP 2X2 P 2S2 2LP 1RP 1X2 P
1S2 1LP
BAR15 = 2X2 P 2S2 1RP 1X2 P 1S2 1LP 2RP 2X2 P 2S2 2LP
BAR16 = 4RP 1X2 P 1S2 4LP
BAR17 = 5RP 1X2 P 1S2 5LP 4RP 1X2 P 1S2 4LP 4RP 1X2 P 1S2 4LP 2RP 1X2 P
1S2 2LP
BAR18 = 4RP 2X2 P 2S2 4LP 3RP 1X2 P 1S2 3LP 2RP P 2LP 1RP P 1LP
BAR19 = 2RP 2X2 P 2S2 2LP 1LP 2X2 R 2S2 1RP
BAR20 = 3RP 2X2 P 2S2 3LP
BAR21 = 4RP 2X2 P 2S2 4LP 2RP 1X2 P 1S2 2LP 3RP 2X2 P 2S2 3LP 2RP 1X2 P
1S2 2LP
BAR22 = 1RP 2X2 P 2S2 1LP 2X2 P 2S2 1LP 1X2 R 1S2 1RP

```

Where would you like this file saved?

> A0020C.clay

File written successfully.

[Tue Apr 20 21:14:38] user@Jake-Laptop:~/programming/490/esactoclay

\$ exit

exit

Script done on Tue Apr 20 21:14:41 2010

Evaluation: The program behaves as expected.

Jake-Laptop: Global/Error/Malformed File

Script started on Tue Apr 20 21:17:54 2010

[Tue Apr 20 21:17:54] user@Jake-Laptop:~/programming/490/esactoclay

\$ java -jar EsacClayConversionApp.jar

Enter the name of your EsAC file in the format <file|web> <filename>.

> web moxie.cs.oswego.edu/~jpeck2/index.html

Class: EsacClayConverter >> Error: malformed file:

http://moxie.cs.oswego.edu/~jpeck2/index.html

[Tue Apr 20 21:18:16] user@Jake-Laptop:~/programming/490/esactoclay

\$ exit

exit

Script done on Tue Apr 20 21:18:18 2010

Evaluation: The program exits gracefully when the global file is malformed.

Jake-Laptop: Global/Error/File Not Found

Script started on Tue Apr 20 21:18:24 2010

[Tue Apr 20 21:18:24] user@Jake-Laptop:~/programming/490/esactoclay

```
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.

> web moxie.cs.oswego.edu/~jpeck2/filethatdoesnthaveahome
Class: EsacClayConverter >> Error: exception thrown:
java.io.FileNotFoundException:
http://moxie.cs.oswego.edu/~jpeck2/filethatdoesnthaveahome

[Tue Apr 20 21:18:44] user@Jake-Laptop:~/programming/490/esactoclay
$ exit
exit
```

Script done on Tue Apr 20 21:18:47 2010

Evaluation: The program exits gracefully when the global file doesn't exist.

Jake-Laptop: Global/Success

```
Script started on Tue Apr 20 21:17:03 2010
[Tue Apr 20 21:17:03] user@Jake-Laptop:~/programming/490/esactoclay
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.
> web moxie.cs.oswego.edu/~jpeck2/V0001A.esac
Incoming EsAC:

VARIANT
CUT[liabi liabi muatar gotis]
REG[Europa, Mitteleuropa, Schweiz, Oberwallis]
KEY[V0001A 08 G FREI]
MEL[11111 1_2_
    1_11112_
    1111-7b-7b 1_0_ 0__
    1111 1_2_
    1111 22_
    11-7b-7b 1_0_ //] >>
FCT[Brauchtum, Beschwoerung (Nebel)]
```

Outgoing Clay:

```
V0001A = G-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE6
PHRASE1 = BAR1 BAR2
PHRASE2 = BAR3
PHRASE3 = BAR4 BAR5 BAR6
PHRASE4 = BAR7 BAR8
PHRASE5 = BAR9 BAR10
PHRASE6 = BAR11 BAR12
BAR1 = P P P P P P
BAR2 = 1X2 P 1S2 1RP 1X2 P 1S2 1LP
BAR3 = 1X2 P 1S2 P P P P 1RP 1X2 P 1S2 1LP
BAR4 = P P P P 1LP PFLAT 1RP 1LP PFLAT 1RP
BAR5 = 1X2 P 1S2 1LP 1X2 R 1S2 1RP
BAR6 = 1LP 2X2 R 2S2 1RP
BAR7 = P P P P
```

```

BAR8 = 1X2 P 1S2 1RP 1X2 P 1S2 1LP
BAR9 = P P P P
BAR10 = 1RP P 1LP 1RP P 1LP
BAR11 = P P 1LP PFLAT 1RP 1LP PFLAT 1RP
BAR12 = 1X2 P 1S2 1LP 1X2 R 1S2 1RP
PFLAT >> CHROMATIC LP P

```

```

Where would you like this file saved?
> V0001A.clay
File written successfully.

```

```

[Tue Apr 20 21:17:47] user@Jake-Laptop:~/programming/490/esactoclay
$ exit
exit

```

Script done on Tue Apr 20 21:17:49 2010

Evaluation: The program acts as expected.

Jake-Netbook: Local/Error/Malformed File

```

Script started on Tue 20 Apr 2010 20:41:14 EDT
[Tue Apr 20 20:41:15] jake@jake-netbook:~/programming/490/esactoclay
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.
> file A0001.clay
Class: EsacClayConverter >> Error: malformed file: A0001.clay
[Tue Apr 20 20:41:37] jake@jake-netbook:~/programming/490/esactoclay
$ exit
exit

```

Script done on Tue 20 Apr 2010 20:41:42 EDT

Evaluation: The program exits gracefully when the local file is malformed.

Jake-Netbook: Local/Error/File Not Found

```

Script started on Tue 20 Apr 2010 20:42:41 EDT
[Tue Apr 20 20:42:42] jake@jake-netbook:~/programming/490/esactoclay
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.
> file FILETHATDOESNTEXIST
Class: EsacClayConverter >> Error: exception thrown:
java.io.FileNotFoundException: FILETHATDOESNTEXIST (No such file or
directory)
[Tue Apr 20 20:43:05] jake@jake-netbook:~/programming/490/esactoclay

$ exit
exit

```

Script done on Tue 20 Apr 2010 20:43:14 EDT

Evaluation: The program exits gracefully when the local file is not found.

Jake-Netbook: Local/Success

```
Script started on Tue 20 Apr 2010 20:42:04 EDT
[Tue Apr 20 20:42:06] jake@jake-netbook:~/programming/490/esactoclay
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.
> file A0001.esac
Incoming EsAC:
ALTDEU
CUT[Das Hildebrandslied]
REG[Europa, Mitteleuropa, Deutschland]
KEY[A0001 04 G 4/2]
MEL[1_ 3b_3b_4_4_ 5_5_
    0_5_5_ 5_6_7b_5_ 5_0_
    5_5_6_7b_5_ 6b_5_
    0_5_4_3b_ 5_3b_3b_
    0_3b_3b_3b_ 4_4_5_ 5_0_
    5_4_3b_3b_3b_ 2_1_
    0_5_5_.4_ 3b_0_
    5_6b_5_5_3b_ 4_5_
    0_4_3b3b1_ 1_-6_-7_ 1_. //] >>
FCT[Romanze, Ballade, Lied]

Outgoing Clay:
A0001 = G-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE6 PHRASE7
PHRASE8 PHRASE9
PHRASE1 = BAR1 BAR2 BAR3
PHRASE2 = BAR4 BAR5 BAR6
PHRASE3 = BAR7 BAR8 BAR9
PHRASE4 = BAR10 BAR11
PHRASE5 = BAR12 BAR13 BAR14
PHRASE6 = BAR15 BAR16 BAR17
PHRASE7 = BAR18 BAR19
PHRASE8 = BAR20 BAR21 BAR22
PHRASE9 = BAR23 BAR24 BAR25
BAR1 = 1X2 P 1S2
BAR2 = 2RP 1X2 PFLAT 1S2 2LP 2RP 1X2 PFLAT 1S2 2LP 3RP 1X2 P 1S2 3LP
3RP 1X2 P 1S2 3LP
BAR3 = 4RP 2X2 P 2S2 4LP 4RP 2X2 P 2S2 4LP
BAR4 = 1LP 1X2 R 1S2 1RP 4RP 2X2 P 2S2 4LP 4RP 1X2 P 1S2 4LP
BAR5 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P 1S2 5LP 6RP 1X2 PFLAT 1S2 6LP 4RP
1X2 P 1S2 4LP
BAR6 = 4RP 2X2 P 2S2 4LP 1LP 1X2 R 1S2 1RP
BAR7 = 4RP 1X2 P 1S2 4LP
BAR8 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P 1S2 5LP 6RP 1X2 PFLAT 1S2 6LP 4RP
1X2 P 1S2 4LP
BAR9 = 5RP 2X2 PFLAT 2S2 5LP 4RP 2X2 P 2S2 4LP
BAR10 = 1LP 1X2 R 1S2 1RP 4RP 1X2 P 1S2 4LP 3RP 1X2 P 1S2 3LP 2RP 1X2
PFLAT 1S2 2LP
BAR11 = 4RP 1X2 P 1S2 4LP 2RP 1X2 PFLAT 1S2 2LP 2RP 2X2 PFLAT 2S2 2LP
BAR12 = 1LP 1X2 R 1S2 1RP 2RP 1X2 PFLAT 1S2 2LP 2RP 1X2 PFLAT 1S2 2LP
2RP 1X2 PFLAT 1S2 2LP
```

```

BAR13 = 3RP 1X2 P 1S2 3LP 3RP 1X2 P 1S2 3LP 4RP 2X2 P 2S2 4LP
BAR14 = 4RP 2X2 P 2S2 4LP 1LP 1X2 R 1S2 1RP
BAR15 = 4RP 1X2 P 1S2 4LP
BAR16 = 3RP 1X2 P 1S2 3LP 2RP 1X2 PFLAT 1S2 2LP 2RP 1X2 PFLAT 1S2 2LP
2RP 1X2 PFLAT 1S2 2LP
BAR17 = 1RP 2X2 P 2S2 1LP 2X2 P 2S2
BAR18 = 1LP 1X2 R 1S2 1RP 4RP 1X2 P 1S2 4LP 4RP 1X2 1X2 1X3 P 1S2 1S3
1S2 4LP 3RP P 3LP
BAR19 = 2RP 2X2 PFLAT 2S2 2LP 1LP 1X2 R 1S2 1RP
BAR20 = 4RP 1X2 P 1S2 4LP
BAR21 = 5RP 1X2 PFLAT 1S2 5LP 4RP 1X2 P 1S2 4LP 4RP 1X2 P 1S2 4LP 2RP
1X2 PFLAT 1S2 2LP
BAR22 = 3RP 2X2 P 2S2 3LP 4RP 2X2 P 2S2 4LP
BAR23 = 1LP 1X2 R 1S2 1RP 3RP 1X2 P 1S2 3LP 2RP PFLAT 2LP 2RP PFLAT 2LP
1X2 P 1S2
BAR24 = 1X2 P 1S2 2LP 1X2 P 1S2 2RP 1LP 2X2 P 2S2 1RP
BAR25 = 2X2 1X2 1X3 P 2S2 1S3 1S2
PFLAT >> CHROMATIC LP P

```

Where would you like this file saved?

> A0001.clay

File written successfully.

[Tue Apr 20 20:42:26] jake@jake-netbook:~/programming/490/esactoclay

\$ exit

exit

Script done on Tue 20 Apr 2010 20:42:34 EDT

Evaluation: The program behaves as expected.

Jake-Netbook: Global/Error/Malformed File

Script started on Tue 20 Apr 2010 20:48:07 EDT

[Tue Apr 20 20:48:07] jake@jake-netbook:~/programming/490/esactoclay

\$ java -jar EsacClayConversionApp.jar

Enter the name of your EsAC file in the format <file|web> <filename>.

> web mxm.suspended-chord.info/robots.txt

Class: EsacClayConverter >> Error: malformed file:

http://mxm.suspended-chord.info/robots.txt

[Tue Apr 20 20:48:26] jake@jake-netbook:~/programming/490/esactoclay

\$ exit

exit

Script done on Tue 20 Apr 2010 20:48:29 EDT

Evaluation: The program exits gracefully when the global file is malformed.

Jake-Netbook: Global/Error/File Not Found

Script started on Tue 20 Apr 2010 20:48:37 EDT

[Tue Apr 20 20:48:38] jake@jake-netbook:~/programming/490/esactoclay

\$ java -jar EsacClayConversionApp.jar

Enter the name of your EsAC file in the format <file|web> <filename>.

```
> web mxm.suspended-chord.info/filethatdoesnotexist
Class: EsacClayConverter >> Error: exception thrown:
java.io.FileNotFoundException: http://mxm.suspended-
chord.info/filethatdoesnotexist
[Tue Apr 20 20:48:57] jake@jake-netbook:~/programming/490/esactoclay
$ exit
exit
```

Script done on Tue 20 Apr 2010 20:49:07 EDT

Evaluation: The program exits gracefully when the global file does not exist.

Jake-Netbook: Global/Success

```
Script started on Tue 20 Apr 2010 20:47:10 EDT
[Tue Apr 20 20:47:11] jake@jake-netbook:~/programming/490/esactoclay
$ java -jar EsacClayConversionApp.jar
Enter the name of your EsAC file in the format <file|web> <filename>.
> web mxm.suspended-chord.info/F0014.esac
Incoming EsAC:
FINK
CUT[ALS ICH AUF MEINER BLEICHE]
REG[Europa, Mitteleuropa, Deutschland]
KEY[F0014 08 A 4/4]
MEL[-5_ 1_3_3_2_ 2_1_1_
    1_ 2_.3421-7 1_0_
    -5_ 1_3_3_2_ 2_1_1_
    1_ 2_.3421-7 1_0_
    3_ 2_5_4#_3_ 3_2_2_
    1_ -7_.321-7-6 -5_0_
    5_ 5_4#_4#_4_ 4_3_3_
    1_ 2_.3421-7 1_0_ //] >>
FCT[erzaehlendes Volks - Lied, Ballade? Gefangenschaft, Flucht]

Outgoing Clay:
F0014 = A-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE6 PHRASE7
PHRASE8
PHRASE1 = BAR1 BAR2 BAR3
PHRASE2 = BAR4 BAR5 BAR6
PHRASE3 = BAR7 BAR8 BAR9
PHRASE4 = BAR10 BAR11 BAR12
PHRASE5 = BAR13 BAR14 BAR15
PHRASE6 = BAR16 BAR17 BAR18
PHRASE7 = BAR19 BAR20 BAR21
PHRASE8 = BAR22 BAR23 BAR24
BAR1 = 4RP 1X2 P 1S2 4LP
BAR2 = 1X2 P 1S2 2RP 1X2 P 1S2 2LP 2RP 1X2 P 1S2 2LP 1RP 1X2 P 1S2 1LP
BAR3 = 1RP 1X2 P 1S2 1LP 1X2 P 1S2 1X2 P 1S2
BAR4 = 1X2 P 1S2
BAR5 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP 3RP P 3LP 1RP P 1LP
P 1LP P 1RP
BAR6 = 1X2 P 1S2 1LP 2X2 R 2S2 1RP
BAR7 = 4RP 1X2 P 1S2 4LP
BAR8 = 1X2 P 1S2 2RP 1X2 P 1S2 2LP 2RP 1X2 P 1S2 2LP 1RP 1X2 P 1S2 1LP
```

```

BAR9 = 1RP 1X2 P 1S2 1LP 1X2 P 1S2 1X2 P 1S2
BAR10 = 1X2 P 1S2
BAR11 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP 3RP P 3LP 1RP P 1LP
P 1LP P 1RP
BAR12 = 1X2 P 1S2 1LP 2X2 R 2S2 1RP
BAR13 = 2RP 1X2 P 1S2 2LP
BAR14 = 1RP 1X2 P 1S2 1LP 4RP 1X2 P 1S2 4LP 3RP 1X2 PSHARP 1S2 3LP 2RP
1X2 P 1S2 2LP
BAR15 = 2RP 1X2 P 1S2 2LP 1RP 1X2 P 1S2 1LP 1RP 1X2 P 1S2 1LP
BAR16 = 1X2 P 1S2
BAR17 = 6RP 1X2 1X2 1X3 P 1S2 1S3 1S2 6LP 2RP P 2LP 1RP P 1LP P 1LP P
1RP 2LP P 2RP
BAR18 = 4RP 1X2 P 1S2 4LP 1LP 2X2 R 2S2 1RP
BAR19 = 4RP 1X2 P 1S2 4LP
BAR20 = 4RP 1X2 P 1S2 4LP 3RP 1X2 PSHARP 1S2 3LP 3RP 1X2 PSHARP 1S2 3LP
3RP 1X2 P 1S2 3LP
BAR21 = 3RP 1X2 P 1S2 3LP 2RP 1X2 P 1S2 2LP 2RP 1X2 P 1S2 2LP
BAR22 = 1X2 P 1S2
BAR23 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP 3RP P 3LP 1RP P 1LP
P 1LP P 1RP
BAR24 = 1X2 P 1S2 1LP 2X2 R 2S2 1RP
PSHARP >> CHROMATIC RP P

```

Where would you like this file saved?

> F0014.clay

File written successfully.

[Tue Apr 20 20:47:49] jake@jake-netbook:~/programming/490/esactoclay

\$ exit

exit

Script done on Tue 20 Apr 2010 20:47:51 EDT

Evaluation: The program behaves as expected.

EsAC Test Suite and Program Output

What follows is the test suite of EsAC tunes (left) side by side with the respective Clay output file (right). The EsAC tunes were chosen from the various collections in a manner so as to be as representative of all of the intricacies of EsAC as possible. The formatting has been warped due to space constraints, but the data has been retained.

ALTDEU	A0001 = G-MAJOR PHRASE1 PHRASE2
CUT[Das Hildebrandslied]	PHRASE3 PHRASE4 PHRASE5 PHRASE6
REG[Europa, Mitteleuropa,	PHRASE7 PHRASE8 PHRASE9
Deutschland]	PHRASE1 = BAR1 BAR2 BAR3
KEY[A0001 04 G 4/2]	PHRASE2 = BAR4 BAR5 BAR6
MEL[1_ 3b 3b 4_ 4_ 5_ 5_	PHRASE3 = BAR7 BAR8 BAR9
0_ 5_ 5_ 5_ 6_ 7b 5_ 5_ 0_	PHRASE4 = BAR10 BAR11
5_ 5_ 6_ 7b 5_ 6b 5_	PHRASE5 = BAR12 BAR13 BAR14
0_ 5_ 4_ 3b_ 5_ 3b 3b_	PHRASE6 = BAR15 BAR16 BAR17
0_ 3b 3b 3b_ 4_ 4_ 5_ 5_ 0_	PHRASE7 = BAR18 BAR19
5_ 4_ 3b 3b 3b_ 2_ 1_	PHRASE8 = BAR20 BAR21 BAR22

```

0_5_5_.4 3b_0_
5_6b_5_5_3b_4_5_
0_4_3b3b1_1_-6_-7_1_. //]
>>
FCT[Romanze, Ballade, Lied]

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```

PHRASE9 = BAR23 BAR24 BAR25
BAR1 = 1X2 P 1S2
BAR2 = 2RP 1X2 PFLAT 1S2 2LP 2RP 1X2
PFLAT 1S2 2LP 3RP 1X2 P 1S2 3LP 3RP
1X2 P 1S2 3LP
BAR3 = 4RP 2X2 P 2S2 4LP 4RP 2X2 P
2S2 4LP
BAR4 = 1LP 1X2 R 1S2 1RP 4RP 2X2 P
2S2 4LP 4RP 1X2 P 1S2 4LP
BAR5 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P
1S2 5LP 6RP 1X2 PFLAT 1S2 6LP 4RP 1X2
P 1S2 4LP
BAR6 = 4RP 2X2 P 2S2 4LP 1LP 1X2 R
1S2 1RP
BAR7 = 4RP 1X2 P 1S2 4LP
BAR8 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P
1S2 5LP 6RP 1X2 PFLAT 1S2 6LP 4RP 1X2
P 1S2 4LP
BAR9 = 5RP 2X2 PFLAT 2S2 5LP 4RP 2X2
P 2S2 4LP
BAR10 = 1LP 1X2 R 1S2 1RP 4RP 1X2 P
1S2 4LP 3RP 1X2 P 1S2 3LP 2RP 1X2
PFLAT 1S2 2LP
BAR11 = 4RP 1X2 P 1S2 4LP 2RP 1X2
PFLAT 1S2 2LP 2RP 2X2 PFLAT 2S2 2LP
BAR12 = 1LP 1X2 R 1S2 1RP 2RP 1X2
PFLAT 1S2 2LP 2RP 1X2 PFLAT 1S2 2LP
2RP 1X2 PFLAT 1S2 2LP
BAR13 = 3RP 1X2 P 1S2 3LP 3RP 1X2 P
1S2 3LP 4RP 2X2 P 2S2 4LP
BAR14 = 4RP 2X2 P 2S2 4LP 1LP 1X2 R
1S2 1RP
BAR15 = 4RP 1X2 P 1S2 4LP
BAR16 = 3RP 1X2 P 1S2 3LP 2RP 1X2
PFLAT 1S2 2LP 2RP 1X2 PFLAT 1S2 2LP
2RP 1X2 PFLAT 1S2 2LP
BAR17 = 1RP 2X2 P 2S2 1LP 2X2 P 2S2
BAR18 = 1LP 1X2 R 1S2 1RP 4RP 1X2 P
1S2 4LP 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2
4LP 3RP P 3LP
BAR19 = 2RP 2X2 PFLAT 2S2 2LP 1LP 1X2
R 1S2 1RP
BAR20 = 4RP 1X2 P 1S2 4LP
BAR21 = 5RP 1X2 PFLAT 1S2 5LP 4RP 1X2
P 1S2 4LP 4RP 1X2 P 1S2 4LP 2RP 1X2
PFLAT 1S2 2LP
BAR22 = 3RP 2X2 P 2S2 3LP 4RP 2X2 P
2S2 4LP
BAR23 = 1LP 1X2 R 1S2 1RP 3RP 1X2 P
1S2 3LP 2RP PFLAT 2LP 2RP PFLAT 2LP
1X2 P 1S2
BAR24 = 1X2 P 1S2 2LP 1X2 P 1S2 2RP
1LP 2X2 P 2S2 1RP
BAR25 = 2X2 1X2 1X3 P 2S2 1S3 1S2
PFLAT >> CHROMATIC LP P

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ALTDEU

CUT[Tageweis von der Koenigstochter
und dem jungen Grafen]REG[Europa, Mitteleuropa,
Deutschland]

KEY[A0020C 04 F 4/2 6/2]

MEL[1_ 3_ 3_ 4_ 4_ 5_ 5_ 0_
 5_ 5_ 3_ 4_ 5_ 3_ 2_ 1_
 1_ 3_ 3_ 4_ 4_ 5_ 5_ 0_
 5_ 5_ 3_ 4_ 5_ 3_ 2_ 1_
 5_ 5_ 4_ 3_ 2_ 1_ 2_ 3_
 5_ 6_ 5_ 5_ 3_ 5_ 4_ 3_ 2_ 3_ 0_
 4_ 5_ 3_ 4_ 3_ 2_ 1_ 0_ //] >>

FCT[Romanze, Ballade, Lied]

CMT[Andere Melodie (1604)]

A0020C = F-MAJOR PHRASE1 PHRASE2
PHRASE3 PHRASE4 PHRASE5 PHRASE6
PHRASE7

PHRASE1 = BAR1 BAR2 BAR3

PHRASE2 = BAR4 BAR5 BAR6

PHRASE3 = BAR7 BAR8 BAR9

PHRASE4 = BAR10 BAR11 BAR12

PHRASE5 = BAR13 BAR14 BAR15

PHRASE6 = BAR16 BAR17 BAR18 BAR19

PHRASE7 = BAR20 BAR21 BAR22

BAR1 = 1X2 P 1S2

BAR2 = 2RP 2X2 P 2S2 2LP 2RP 1X2 P
1S2 2LP 3RP 2X2 P 2S2 3LP 3RP 1X2 P
1S2 3LPBAR3 = 4RP 2X2 P 2S2 4LP 4RP 2X2 P
2S2 4LP 1LP 1X2 R 1S2 1RP

BAR4 = 4RP 1X2 P 1S2 4LP

BAR5 = 4RP 2X2 P 2S2 4LP 2RP 1X2 P
1S2 2LP 3RP 2X2 P 2S2 3LP 4RP 1X2 P
1S2 4LPBAR6 = 2RP 2X2 P 2S2 2LP 1RP 1X2 P
1S2 1LP 2X2 P 2S2

BAR7 = 1X2 P 1S2

BAR8 = 2RP 2X2 P 2S2 2LP 2RP 1X2 P
1S2 2LP 3RP 2X2 P 2S2 3LP 3RP 1X2 P
1S2 3LPBAR9 = 4RP 2X2 P 2S2 4LP 4RP 2X2 P
2S2 4LP 1LP 1X2 R 1S2 1RP

BAR10 = 4RP 1X2 P 1S2 4LP

BAR11 = 4RP 2X2 P 2S2 4LP 2RP 1X2 P
1S2 2LP 3RP 2X2 P 2S2 3LP 4RP 1X2 P
1S2 4LPBAR12 = 2RP 2X2 P 2S2 2LP 1RP 1X2 P
1S2 1LP 2X2 P 2S2

BAR13 = 4RP 1X2 P 1S2 4LP

BAR14 = 4RP 2X2 P 2S2 4LP 3RP 1X2 P
1S2 3LP 2RP 2X2 P 2S2 2LP 1RP 1X2 P
1S2 1LPBAR15 = 2X2 P 2S2 1RP 1X2 P 1S2 1LP
2RP 2X2 P 2S2 2LP

BAR16 = 4RP 1X2 P 1S2 4LP

BAR17 = 5RP 1X2 P 1S2 5LP 4RP 1X2 P
1S2 4LP 4RP 1X2 P 1S2 4LP 2RP 1X2 P
1S2 2LPBAR18 = 4RP 2X2 P 2S2 4LP 3RP 1X2 P
1S2 3LP 2RP P 2LP 1RP P 1LPBAR19 = 2RP 2X2 P 2S2 2LP 1LP 2X2 R
2S2 1RP

BAR20 = 3RP 2X2 P 2S2 3LP

BAR21 = 4RP 2X2 P 2S2 4LP 2RP 1X2 P
1S2 2LP 3RP 2X2 P 2S2 3LP 2RP 1X2 P
1S2 2LPBAR22 = 1RP 2X2 P 2S2 1LP 2X2 P 2S2
1LP 1X2 R 1S2 1RP

CHINA

C0328 = D-MAJOR PHRASE1 PHRASE2

STN[00000] ST[00]
 FA[NN]
 CUT[Moli hua]
 CNR[NN]
 REG[China, Jiangsu]
 ETH[Han]
 SRC[III, 482]
 KEY[C0328 16 D 2/4]
 MEL[323565+16 535__6_
 +1_+2+3+2+16+1 5__
 535__6_ +1_+2+3+165_ 5_2_3532
 1-61__.
 321_2_.3 5_6+16_5_ 532_3532
 12-6__1_
 2_.3121-6 1-6-5__.
 323565+16 535__6_
 +1_+2+3+2+16+1 5__
 535__6_ +1_+2+3+165_ 5_2_3532
 1-61__.
 321_2_.3 5_6+16_5_ 532_3532
 12-6__1_
 2_.3121-6 1-6-5__.
 321_2_.3 5_6+16_5_ 532_3532
 12-6__1_
 +2_.+3+1+2+16 56+1+3+2+16+1
 5__ //] >>
 FCT[xiao diao]
 CMT[Jiang nimmt an, es ist das
 Original.
 Vorspiel weggelassen.]

PHRASE3 PHRASE4 PHRASE5 PHRASE6
 PHRASE7 PHRASE8 PHRASE9 PHRASE10
 PHRASE1 = BAR1 BAR2 BAR3 BAR4
 PHRASE2 = BAR5 BAR6 BAR7 BAR8
 PHRASE3 = BAR9 BAR10 BAR11 BAR12
 PHRASE4 = BAR13 BAR14
 PHRASE5 = BAR15 BAR16 BAR17 BAR18
 PHRASE6 = BAR19 BAR20 BAR21 BAR22
 PHRASE7 = BAR23 BAR24 BAR25 BAR26
 PHRASE8 = BAR27 BAR28
 PHRASE9 = BAR29 BAR30 BAR31 BAR32
 PHRASE10 = BAR33 BAR34 BAR35
 BAR1 = 2RP P 2LP 1RP P 1LP 2RP P 2LP
 4RP P 4LP 5RP P 5LP 4RP P 4LP 7RP P
 7LP 5RP P 5LP
 BAR2 = 4RP P 4LP 2RP P 2LP 4RP 2X2 P
 2S2 4LP 5RP 1X2 P 1S2 5LP
 BAR3 = 1X2 P 1S2 8RP P 8LP 9RP P 9LP
 8RP P 8LP 7RP P 7LP 5RP P 5LP 7RP P
 7LP
 BAR4 = 4RP 3X2 P 3S2 4LP
 BAR5 = 4RP P 4LP 2RP P 2LP 4RP 2X2 P
 2S2 4LP 5RP 1X2 P 1S2 5LP
 BAR6 = 1X2 P 1S2 8RP P 8LP 9RP P 9LP
 7RP P 7LP 5RP P 5LP 4RP 1X2 P 1S2 4LP
 BAR7 = 4RP 1X2 P 1S2 4LP 1RP 1X2 P
 1S2 1LP 2RP P 2LP 4RP P 4LP 2RP P 2LP
 1RP P 1LP
 BAR8 = P 2LP P 2RP 2X2 1X2 1X3 P 2S2
 1S3 1S2
 BAR9 = 2RP P 2LP 1RP P 1LP 1X2 P 1S2
 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP
 P 2LP
 BAR10 = 4RP 1X2 P 1S2 4LP 5RP P 5LP
 7RP P 7LP 5RP 1X2 P 1S2 5LP 4RP 1X2 P
 1S2 4LP
 BAR11 = 4RP P 4LP 2RP P 2LP 1RP 1X2 P
 1S2 1LP 2RP P 2LP 4RP P 4LP 2RP P 2LP
 1RP P 1LP
 BAR12 = P 1RP P 1LP 2LP 2X2 P 2S2 2RP
 1X2 P 1S2
 BAR13 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2
 1LP 2RP P 2LP P 1RP P 1LP P 2LP P 2RP
 BAR14 = P 2LP P 2RP 3LP 2X2 1X2 1X3 P
 2S2 1S3 1S2 3RP
 BAR15 = 2RP P 2LP 1RP P 1LP 2RP P 2LP
 4RP P 4LP 5RP P 5LP 4RP P 4LP 7RP P
 7LP 5RP P 5LP
 BAR16 = 4RP P 4LP 2RP P 2LP 4RP 2X2 P
 2S2 4LP 5RP 1X2 P 1S2 5LP
 BAR17 = 1X2 P 1S2 8RP P 8LP 9RP P 9LP
 8RP P 8LP 7RP P 7LP 5RP P 5LP 7RP P
 7LP
 BAR18 = 4RP 3X2 P 3S2 4LP
 BAR19 = 4RP P 4LP 2RP P 2LP 4RP 2X2 P

	2S2 4LP 5RP 1X2 P 1S2 5LP BAR20 = 1X2 P 1S2 8RP P 8LP 9RP P 9LP 7RP P 7LP 5RP P 5LP 4RP 1X2 P 1S2 4LP BAR21 = 4RP 1X2 P 1S2 4LP 1RP 1X2 P 1S2 1LP 2RP P 2LP 4RP P 4LP 2RP P 2LP 1RP P 1LP BAR22 = P 2LP P 2RP 2X2 1X2 1X3 P 2S2 1S3 1S2 BAR23 = 2RP P 2LP 1RP P 1LP 1X2 P 1S2 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP BAR24 = 4RP 1X2 P 1S2 4LP 5RP P 5LP 7RP P 7LP 5RP 1X2 P 1S2 5LP 4RP 1X2 P 1S2 4LP BAR25 = 4RP P 4LP 2RP P 2LP 1RP 1X2 P 1S2 1LP 2RP P 2LP 4RP P 4LP 2RP P 2LP 1RP P 1LP BAR26 = P 1RP P 1LP 2LP 2X2 P 2S2 2RP 1X2 P 1S2 BAR27 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP P 1RP P 1LP P 2LP P 2RP BAR28 = P 2LP P 2RP 3LP 2X2 1X2 1X3 P 2S2 1S3 1S2 3RP BAR29 = 2RP P 2LP 1RP P 1LP 1X2 P 1S2 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP BAR30 = 4RP 1X2 P 1S2 4LP 5RP P 5LP 7RP P 7LP 5RP 1X2 P 1S2 5LP 4RP 1X2 P 1S2 4LP BAR31 = 4RP P 4LP 2RP P 2LP 1RP 1X2 P 1S2 1LP 2RP P 2LP 4RP P 4LP 2RP P 2LP 1RP P 1LP BAR32 = P 1RP P 1LP 2LP 2X2 P 2S2 2RP 1X2 P 1S2 BAR33 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 9RP P 9LP 7RP P 7LP 8RP P 8LP 7RP P 7LP 5RP P 5LP BAR34 = 4RP P 4LP 5RP P 5LP 7RP P 7LP 9RP P 9LP 8RP P 8LP 7RP P 7LP 5RP P 5LP 7RP P 7LP BAR35 = 4RP 3X2 P 3S2 4LP
DVA CUT[Der Ring Mein Freund hat mir versprochen etwas] REG[Europa, Mitteleuropa, Lothringen, Weiler] KEY[D0016 08 E 2/4] MEL[1 13b21 -7b_-7b_ 3b554 5_0 1 13b21 -7b_-7b_ 3b554 5_ 3b4 5556b 5_43b 4_ 46b 5_12 1_-7b-6b_-7b_ 24 3b_22 1_0 //] >> FCT[Liebes - Lied] CMT[Verzierungen; Inzipit =	D0016 = E-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE1 = BAR1 BAR2 BAR3 BAR4 BAR5 PHRASE2 = BAR6 BAR7 BAR8 BAR9 BAR10 PHRASE3 = BAR11 BAR12 BAR13 BAR14 PHRASE4 = BAR15 BAR16 BAR17 BAR18 PHRASE5 = BAR19 BAR20 BAR21 BAR1 = P BAR2 = P 2RP PFLAT 2LP 1RP P 1LP P BAR3 = 6RP 1X2 PFLAT 1S2 6LP 1LP 1X2 PFLAT 1S2 1RP BAR4 = 2RP PFLAT 2LP 4RP P 4LP 4RP P 4LP 3RP P 3LP BAR5 = 4RP 1X2 P 1S2 4LP 1LP R 1RP

Transposition zum Lied]

F[ERK2
 CUT[WEINE NUR NICHT]
 REG[Europa, Mitteleuropa,
 Deutschland, Gross - Geräu]
 KEY[E0616 16 C 3/8]
 MEL[5_3_ +1_5_ 5_5_4_ 3_0_
 2_3_4#_ 5_6_7_ +2_+1_6_ 5_0_
 5_6_7_ +1_3_ 5_5_4_ 4_3_
 2_ 2_3_4#_ 5_7_7_ +2_+1_6_
 5_--
 55 +3+3+3+3+2+2 +1+1+1+1
 3_ 5_.42_ 6_5_
 55 +3+3+3+3+2+2 +1+1+1+1
 3_ 5_.42_ 1_0_ //] >>
 FCT[Liebes - Lied]

BAR6 = P
 BAR7 = P 2RP PFLAT 2LP 1RP P 1LP P
 BAR8 = 6RP 1X2 PFLAT 1S2 6LP 1LP 1X2
 PFLAT 1S2 1RP
 BAR9 = 2RP PFLAT 2LP 4RP P 4LP 4RP P
 4LP 3RP P 3LP
 BAR10 = 4RP 1X2 P 1S2 4LP
 BAR11 = 2RP PFLAT 2LP 3RP P 3LP
 BAR12 = 4RP P 4LP 4RP P 4LP 4RP P 4LP
 5RP PFLAT 5LP
 BAR13 = 4RP 1X2 P 1S2 4LP 3RP P 3LP
 2RP PFLAT 2LP
 BAR14 = 3RP 1X2 P 1S2 3LP
 BAR15 = 3RP P 3LP 5RP PFLAT 5LP
 BAR16 = 4RP 1X2 P 1S2 4LP P 1RP P 1LP
 BAR17 = 1X2 P 1S2 1LP PFLAT 1RP 2LP
 PFLAT 2RP
 BAR18 = 6RP 1X2 PFLAT 1S2 6LP
 BAR19 = 1RP P 1LP 3RP P 3LP
 BAR20 = 2RP 1X2 PFLAT 1S2 2LP 1RP P
 1LP 1RP P 1LP
 BAR21 = 1X2 P 1S2 1LP R 1RP
 PFLAT >> CHROMATIC LP P

E0616 = C-MAJOR PHRASE1 PHRASE2
 PHRASE3 PHRASE4 PHRASE5 PHRASE6
 PHRASE7 PHRASE8
 PHRASE1 = BAR1 BAR2 BAR3 BAR4
 PHRASE2 = BAR5 BAR6 BAR7 BAR8
 PHRASE3 = BAR9 BAR10 BAR11 BAR12
 PHRASE4 = BAR13 BAR14 BAR15 BAR16
 BAR17
 PHRASE5 = BAR18 BAR19 BAR20
 PHRASE6 = BAR21 BAR22 BAR23
 PHRASE7 = BAR24 BAR25 BAR26
 PHRASE8 = BAR27 BAR28 BAR29
 BAR1 = 4RP 2X2 P 2S2 4LP 2RP 1X2 P
 1S2 2LP
 BAR2 = 2X2 P 2S2 4RP 1X2 P 1S2 4LP
 BAR3 = 4RP 1X2 P 1S2 4LP 4RP 1X2 P
 1S2 4LP 3RP 1X2 P 1S2 3LP
 BAR4 = 2RP 2X2 P 2S2 2LP 1LP 1X2 R
 1S2 1RP
 BAR5 = 1RP 1X2 P 1S2 1LP 2RP 1X2 P
 1S2 2LP 3RP 1X2 PSHARP 1S2 3LP
 BAR6 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P
 1S2 5LP 6RP 1X2 P 1S2 6LP
 BAR7 = 1RP 1X2 P 1S2 1LP 7RP 1X2 P
 1S2 7LP 5RP 1X2 P 1S2 5LP
 BAR8 = 4RP 2X2 P 2S2 4LP 1LP 1X2 R
 1S2 1RP
 BAR9 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P
 1S2 5LP 6RP 1X2 P 1S2 6LP
 BAR10 = 2X2 P 2S2 2RP 1X2 P 1S2 2LP
 BAR11 = 4RP 1X2 P 1S2 4LP 4RP 1X2 P
 1S2 4LP 3RP 1X2 P 1S2 3LP

	BAR12 = 3RP 1X2 P 1S2 3LP 2RP 1X2 P 1S2 2LP BAR13 = 1RP 1X2 P 1S2 1LP BAR14 = 1RP 1X2 P 1S2 1LP 2RP 1X2 P 1S2 2LP 3RP 1X2 PSHARP 1S2 3LP BAR15 = 4RP 1X2 P 1S2 4LP 6RP 1X2 P 1S2 6LP 6RP 1X2 P 1S2 6LP BAR16 = 1RP 1X2 P 1S2 1LP 7RP 1X2 P 1S2 7LP 5RP 1X2 P 1S2 5LP BAR17 = 4RP 2X2 P 2S2 4LP BAR18 = 4RP P 4LP 4RP P 4LP BAR19 = 2RP P 2LP 9RP P 9LP 9RP P 9LP 9RP P 9LP 8RP P 8LP 8RP P 8LP BAR20 = P 7RP P 7LP 7RP P 7LP 7RP P 7LP BAR21 = 2RP 1X2 P 1S2 2LP BAR22 = 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2 4LP 3RP P 3LP 1RP 1X2 P 1S2 1LP BAR23 = 5RP 1X2 P 1S2 5LP 4RP 1X2 P 1S2 4LP BAR24 = 4RP P 4LP 4RP P 4LP BAR25 = 2RP P 2LP 9RP P 9LP 9RP P 9LP 9RP P 9LP 8RP P 8LP 8RP P 8LP BAR26 = P 7RP P 7LP 7RP P 7LP 7RP P 7LP BAR27 = 2RP 1X2 P 1S2 2LP BAR28 = 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2 4LP 3RP P 3LP 1RP 1X2 P 1S2 1LP BAR29 = 2X2 P 2S2 1LP 1X2 R 1S2 1RP PSHARP >> CHROMATIC RP P
FINK CUT[ALS ICH AUF MEINER BLEICHE] REG[Europa, Mitteleuropa, Deutschland] KEY[F0014 08 A 4/4] MEL[-5_ 1_3_3_2_ 2_1_1_ 1_ 2_.3421-7 1_0_ -5_ 1_3_3_2_ 2_1_1_ 1_ 2_.3421-7 1_0_ 3_ 2_5_4#_3_ 3_2_2_ 1_ -7_.321-7-6 -5_0_ 5_ 5_4#_4#_4_ 4_3_3_ 1_ 2_.3421-7 1_0_ //] >> FCT[erzaehlendes Volks - Lied, Ballade? Gefangenschaft, Flucht]	F0014 = A-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE6 PHRASE7 PHRASE8 PHRASE1 = BAR1 BAR2 BAR3 PHRASE2 = BAR4 BAR5 BAR6 PHRASE3 = BAR7 BAR8 BAR9 PHRASE4 = BAR10 BAR11 BAR12 PHRASE5 = BAR13 BAR14 BAR15 PHRASE6 = BAR16 BAR17 BAR18 PHRASE7 = BAR19 BAR20 BAR21 PHRASE8 = BAR22 BAR23 BAR24 BAR1 = 4RP 1X2 P 1S2 4LP BAR2 = 1X2 P 1S2 2RP 1X2 P 1S2 2LP 2RP 1X2 P 1S2 2LP 1RP 1X2 P 1S2 1LP BAR3 = 1RP 1X2 P 1S2 1LP 1X2 P 1S2 1X2 P 1S2 BAR4 = 1X2 P 1S2 BAR5 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP 3RP P 3LP 1RP P 1LP P 1LP P 1RP BAR6 = 1X2 P 1S2 1LP 2X2 R 2S2 1RP BAR7 = 4RP 1X2 P 1S2 4LP BAR8 = 1X2 P 1S2 2RP 1X2 P 1S2 2LP 2RP 1X2 P 1S2 2LP 1RP 1X2 P 1S2 1LP BAR9 = 1RP 1X2 P 1S2 1LP 1X2 P 1S2

	1X2 P 1S2 BAR10 = 1X2 P 1S2 BAR11 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP 3RP P 3LP 1RP P 1LP P 1LP P 1RP BAR12 = 1X2 P 1S2 1LP 2X2 R 2S2 1RP BAR13 = 2RP 1X2 P 1S2 2LP BAR14 = 1RP 1X2 P 1S2 1LP 4RP 1X2 P 1S2 4LP 3RP 1X2 PSHARP 1S2 3LP 2RP 1X2 P 1S2 2LP BAR15 = 2RP 1X2 P 1S2 2LP 1RP 1X2 P 1S2 1LP 1RP 1X2 P 1S2 1LP BAR16 = 1X2 P 1S2 BAR17 = 6RP 1X2 1X2 1X3 P 1S2 1S3 1S2 6LP 2RP P 2LP 1RP P 1LP P 1LP P 1RP 2LP P 2RP BAR18 = 4RP 1X2 P 1S2 4LP 1LP 2X2 R 2S2 1RP BAR19 = 4RP 1X2 P 1S2 4LP BAR20 = 4RP 1X2 P 1S2 4LP 3RP 1X2 PSHARP 1S2 3LP 3RP 1X2 PSHARP 1S2 3LP 3RP 1X2 P 1S2 3LP BAR21 = 3RP 1X2 P 1S2 3LP 2RP 1X2 P 1S2 2LP 2RP 1X2 P 1S2 2LP BAR22 = 1X2 P 1S2 BAR23 = 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP 2RP P 2LP 3RP P 3LP 1RP P 1LP P 1LP P 1RP BAR24 = 1X2 P 1S2 1LP 2X2 R 2S2 1RP PSHARP >> CHROMATIC RP P
KINDER CUT[HEILE HEILE SAEJE] REG[Europa, Mitteleuropa, Deutschland; Frankreich, Unter - Elsass] KEY[K3026 08 G 2/4] MEL[5656 5_3_ 5656 5_3_ 5655 +1_0_ 5654 3_0_//] >> FCT[Kinder - Lied, Heil - Spruch]	K3026 = G-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE1 = BAR1 BAR2 PHRASE2 = BAR3 BAR4 PHRASE3 = BAR5 BAR6 PHRASE4 = BAR7 BAR8 BAR1 = 4RP P 4LP 5RP P 5LP 4RP P 4LP 5RP P 5LP BAR2 = 4RP 1X2 P 1S2 4LP 2RP 1X2 P 1S2 2LP BAR3 = 4RP P 4LP 5RP P 5LP 4RP P 4LP 5RP P 5LP BAR4 = 4RP 1X2 P 1S2 4LP 2RP 1X2 P 1S2 2LP BAR5 = 4RP P 4LP 5RP P 5LP 4RP P 4LP 4RP P 4LP BAR6 = 1X2 P 1S2 1LP 1X2 R 1S2 1RP BAR7 = 4RP P 4LP 5RP P 5LP 4RP P 4LP 3RP P 3LP BAR8 = 2RP 1X2 P 1S2 2LP 1LP 1X2 R 1S2 1RP
F[BALLADE CUT[Ritter und Magd Es spielt' ein Graf mit seiner Magd]	Q0055G = C-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE1 = BAR1 BAR2 BAR3 PHRASE2 = BAR4 BAR5 BAR6

CNR[bis an den hellen Morgen,]
 REG[Osteuropa, UdSSR, Russland, Kreis
 Leningrad, Kamenka]
 SRC[3, S. 15
 1926 aufgezeichnet]
 KEY[Q0055G 08 C 2/4]
 MEL[-5 1-5-3-5 111
 3 21-7-6 -6-5-5
 1 -4-41-4 -3-51
 1 -724-7 211 //] >>
 FCT[Ballade, Betrug, Schwangerschaft,
 Tod, Selbstmord, Herr und Magd]
 CMT[Grundton in der eingestrichenen
 Oktave.]

PHRASE3 = BAR7 BAR8 BAR9
 PHRASE4 = BAR10 BAR11 BAR12
 BAR1 = 4RP P 4LP
 BAR2 = P 3LP P 3RP 5LP P 5RP 3LP P
 3RP
 BAR3 = P P P
 BAR4 = 2RP P 2LP
 BAR5 = 1RP P 1LP P 1LP P 1RP 2LP P
 2RP
 BAR6 = 5RP P 5LP 3LP P 3RP 3LP P 3RP
 BAR7 = P
 BAR8 = 3RP P 3LP 4LP P 4RP P 4LP P
 4RP
 BAR9 = 2RP P 2LP 3LP P 3RP P
 BAR10 = P
 BAR11 = 6RP P 6LP 1RP P 1LP 3RP P 3LP
 1LP P 1RP
 BAR12 = 1RP P 1LP P P

F[BALLADE
 CUT[Ritter und Magd
 Stout ruiter en een mooi fiere
 maagd,]
 CNR['t was onder den lindeboom dat
 zij zaten.]
 REG[Mitteleuropa, Niederlande]
 SRC[3, S. 3
 1900 gedruckt in Gent]
 KEY[Q2055B 16 G 3/4 2/4]
 MEL[2 (3_3_5_) 3_4_5_.6 5_.
 3_(4_4_5_) (6_6_6_)(6_5_6_)
 5__3__0
 5_(6_5_6_) 5_5_(5_4_3_) 4__
 5_.4 (3_2_3_)5_.4 2__1__0__
 5_(6_7_+1_) 5_5_.6(5_4_3_) 4__
 5_.4 (3_2_3_)5_.4 2__1__0__
 //] >>
 FCT[Ballade, Betrug, Schwangerschaft,
 Tod, Selbstmord, Herr und Magd]
 CMT[Chaotische Takteinteilung.
 Entsprechend der Originalquelle hier
 Taktwechsel kodiert.
 Niederlaendische Fassung der
 Ballade.]

Q2055B = G-MAJOR PHRASE1 PHRASE2
 PHRASE3 PHRASE4 PHRASE5 PHRASE6
 PHRASE1 = BAR1 BAR2 BAR3
 PHRASE2 = BAR4 BAR5 BAR6 BAR7
 PHRASE3 = BAR8 BAR9 BAR10
 PHRASE4 = BAR11 BAR12 BAR13 BAR14
 PHRASE5 = BAR15 BAR16 BAR17
 PHRASE6 = BAR18 BAR19 BAR20 BAR21
 BAR1 = 1RP 1X2 P 1S2 1LP 2RP 1X2 P
 1S2 2LP 2RP 1X2 P 1S2 2LP 4RP 1X2 P
 1S2 4LP
 BAR2 = 2RP 2X2 P 2S2 2LP 3RP 2X2 P
 2S2 3LP 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2
 4LP 5RP P 5LP
 BAR3 = 4RP 2X2 1X2 1X3 P 2S2 1S3 1S2
 4LP
 BAR4 = 2RP 1X2 P 1S2 2LP 3RP 1X2 P
 1S2 3LP 3RP 1X2 P 1S2 3LP 4RP 1X2 P
 1S2 4LP
 BAR5 = 5RP 1X2 P 1S2 5LP 5RP 1X2 P
 1S2 5LP 5RP 1X2 P 1S2 5LP 5RP 1X2 P
 1S2 5LP 4RP 1X2 P 1S2 4LP 5RP 1X2 P
 1S2 5LP
 BAR6 = 4RP 2X2 P 2S2 4LP 2RP 2X2 P
 2S2 2LP
 BAR7 = 1LP 1X2 R 1S2 1RP
 BAR8 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P
 1S2 5LP 4RP 1X2 P 1S2 4LP 5RP 1X2 P
 1S2 5LP
 BAR9 = 4RP 2X2 P 2S2 4LP 4RP 2X2 P
 2S2 4LP 4RP 1X2 P 1S2 4LP 3RP 1X2 P
 1S2 3LP 2RP 1X2 P 1S2 2LP
 BAR10 = 3RP 2X2 P 2S2 3LP
 BAR11 = 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2
 4LP 3RP P 3LP
 BAR12 = 2RP 1X2 P 1S2 2LP 1RP 1X2 P
 1S2 1LP 2RP 1X2 P 1S2 2LP 4RP 1X2 1X2

	1X3 P 1S2 1S3 1S2 4LP 3RP P 3LP BAR13 = 1RP 2X2 P 2S2 1LP 2X2 P 2S2 BAR14 = 1LP 1X2 R 1S2 1RP BAR15 = 4RP 1X2 P 1S2 4LP 5RP 1X2 P 1S2 5LP 6RP 1X2 P 1S2 6LP 7RP 1X2 P 1S2 7LP BAR16 = 4RP 2X2 P 2S2 4LP 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2 4LP 5RP P 5LP 4RP 1X2 P 1S2 4LP 3RP 1X2 P 1S2 3LP 2RP 1X2 P 1S2 2LP BAR17 = 3RP 2X2 P 2S2 3LP BAR18 = 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2 4LP 3RP P 3LP BAR19 = 2RP 1X2 P 1S2 2LP 1RP 1X2 P 1S2 1LP 2RP 1X2 P 1S2 2LP 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2 4LP 3RP P 3LP BAR20 = 1RP 2X2 P 2S2 1LP 2X2 P 2S2 BAR21 = 1LP 1X2 R 1S2 1RP
TEST CUT[CUCA 2] REG[Amerika, Mittelamerika, Mexiko] KEY[T0008A 08 F 4/4] MEL[0-5-5-5 10_30-5-5-5 10_30__ 01_1-7-7-6-6 -5__ 0-5-5-5 -70_20-5-5-5 -70_20__ 05_65432 3_.10__ 0-5_-51133 5_.3__^ 05_65435 4_.2__^ 0-5_-5-7-722 4_.2__^ 05_65432 3_.1__^ //]	T0008A = F-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE6 PHRASE7 PHRASE8 PHRASE1 = BAR1 BAR2 BAR3 PHRASE2 = BAR4 BAR5 PHRASE3 = BAR6 BAR7 BAR8 PHRASE4 = BAR9 BAR10 PHRASE5 = BAR11 BAR12 PHRASE6 = BAR13 BAR14 PHRASE7 = BAR15 BAR16 PHRASE8 = BAR17 BAR18 BAR1 = 1LP R 1RP 3LP P 3RP 3LP P 3RP 3LP P 3RP BAR2 = P 1LP 1X2 R 1S2 1RP 2RP P 2LP 1LP R 1RP 3LP P 3RP 3LP P 3RP 3LP P 3RP BAR3 = P 1LP 1X2 R 1S2 1RP 2RP P 2LP 1LP 2X2 R 2S2 1RP BAR4 = 1LP R 1RP 1X2 P 1S2 P 1LP P 1RP 1LP P 1RP 2LP P 2RP 2LP P 2RP BAR5 = 4RP 2X2 P 2S2 4LP BAR6 = 1LP R 1RP 3LP P 3RP 3LP P 3RP 3LP P 3RP BAR7 = 6RP P 6LP 1LP 1X2 R 1S2 1RP 1RP P 1LP 1LP R 1RP 3LP P 3RP 3LP P 3RP 3LP P 3RP BAR8 = 6RP P 6LP 1LP 1X2 R 1S2 1RP 1RP P 1LP 1LP 2X2 R 2S2 1RP BAR9 = 1LP R 1RP 4RP 1X2 P 1S2 4LP 5RP P 5LP 4RP P 4LP 3RP P 3LP 2RP P 2LP 1RP P 1LP BAR10 = 2RP 1X2 1X2 1X3 P 1S2 1S3 1S2 2LP P 1LP 2X2 R 2S2 1RP BAR11 = 1LP R 1RP 3LP 1X2 P 1S2 3RP 3LP P 3RP P P 2RP P 2LP 2RP P 2LP BAR12 = 4RP 1X2 1X2 1X3 P 1S2 1S3 1S2 4LP 2RP 2X2 P 2S2 2LP

	BAR13 = 1LP R 1RP 4RP 1X2 P 1S2 4LP 5RP P 5LP 4RP P 4LP 3RP P 3LP 2RP P 2LP 4RP P 4LP BAR14 = 3RP 1X2 1X2 1X3 P 1S2 1S3 1S2 3LP 1RP 2X2 P 2S2 1LP BAR15 = 1LP R 1RP 3LP 1X2 P 1S2 3RP 3LP P 3RP 1LP P 1RP 1LP P 1RP 1RP P 1LP 1RP P 1LP BAR16 = 3RP 1X2 1X2 1X3 P 1S2 1S3 1S2 3LP 1RP 2X2 P 2S2 1LP BAR17 = 1LP R 1RP 4RP 1X2 P 1S2 4LP 5RP P 5LP 4RP P 4LP 3RP P 3LP 2RP P 2LP 1RP P 1LP BAR18 = 2RP 1X2 1X2 1X3 P 1S2 1S3 1S2 2LP 1X2 P 1S2
VARIANT CUT[liabi liabi muatar gotis] REG[Europa, Mitteleuropa, Schweiz, Oberwallis] KEY[V0001A 08 G FREI] MEL[111111 1_2_ 1_11112_ 1111-7b-7b 1_0_ 0_ 1111 1_2_ 1111 22_ 11-7b-7b 1_0_ //] >> FCT[Brauchtum, Beschwoerung (Nebel)]	V0001A = G-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE6 PHRASE1 = BAR1 BAR2 PHRASE2 = BAR3 PHRASE3 = BAR4 BAR5 BAR6 PHRASE4 = BAR7 BAR8 PHRASE5 = BAR9 BAR10 PHRASE6 = BAR11 BAR12 BAR1 = P P P P P P BAR2 = 1X2 P 1S2 1RP 1X2 P 1S2 1LP BAR3 = 1X2 P 1S2 P P P P 1RP 1X2 P 1S2 1LP BAR4 = P P P P 1LP PFLAT 1RP 1LP PFLAT 1RP BAR5 = 1X2 P 1S2 1LP 1X2 R 1S2 1RP BAR6 = 1LP 2X2 R 2S2 1RP BAR7 = P P P P BAR8 = 1X2 P 1S2 1RP 1X2 P 1S2 1LP BAR9 = P P P P BAR10 = 1RP P 1LP 1RP P 1LP BAR11 = P P 1LP PFLAT 1RP 1LP PFLAT 1RP BAR12 = 1X2 P 1S2 1LP 1X2 R 1S2 1RP PFLAT >> CHROMATIC LP P
ZUCCAL CUT[ZU STRASBURG AUF DER SCHANZ] REG[Europa, Mitteleuropa, Deutschland, Westfalen] KEY[Z0005 16 G 4/4] MEL[-5_ 1_.1_-5_-.5_ 1__0_ 1_2_ 3_.3_5_4_2_-7_ 1__0_ 1_2_ 3_.33_.33_2_.3_ 4_2_0_ -7_1_ 2_2_.22_1_.3_ 3_1_0_ 5_4_ 3_2_3_4_ 5_5_4_3_2_ 1__0_ //] >> FCT[Sagen - Lied, Romanze] CMT[Zweistimmigkeit, Terzparallelen]	Z0005 = G-MAJOR PHRASE1 PHRASE2 PHRASE3 PHRASE4 PHRASE5 PHRASE1 = BAR1 BAR2 BAR3 PHRASE2 = BAR4 BAR5 BAR6 PHRASE3 = BAR7 BAR8 BAR9 PHRASE4 = BAR10 BAR11 BAR12 PHRASE5 = BAR13 BAR14 BAR15 BAR16 BAR1 = 4RP 2X2 P 2S2 4LP BAR2 = 2X2 1X2 1X3 P 2S2 1S3 1S2 1X2 P 1S2 3LP 2X2 1X2 1X3 P 2S2 1S3 1S2 3RP 3LP 1X2 P 1S2 3RP BAR3 = 3X2 P 3S2 1LP 2X2 R 2S2 1RP BAR4 = 1X2 P 1S2 1RP 1X2 P 1S2 1LP BAR5 = 2RP 2X2 1X2 1X3 P 2S2 1S3 1S2 2LP 2RP 1X2 P 1S2 2LP 4RP 1X2 P 1S2 4LP 3RP 1X2 P 1S2 3LP 1RP 1X2 P 1S2

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1LP 1LP 1X2 P 1S2 1RP
BAR6 = 3X2 P 3S2 1LP 2X2 R 2S2 1RP
BAR7 = 1X2 P 1S2 1RP 1X2 P 1S2 1LP
BAR8 = 2RP 1X2 1X2 1X3 P 1S2 1S3 1S2
2LP 2RP P 2LP 2RP 1X2 1X2 1X3 P 1S2
1S3 1S2 2LP 2RP P 2LP 2RP 2X2 P 2S2
2LP 1RP 1X2 1X2 1X3 P 1S2 1S3 1S2 1LP
2RP P 2LP
BAR9 = 3RP 2X2 P 2S2 3LP 1RP 2X2 P
2S2 1LP 1LP 2X2 R 2S2 1RP
BAR10 = 6RP 1X2 P 1S2 6LP 1X2 P 1S2
BAR11 = 1RP 2X2 P 2S2 1LP 1RP 1X2 1X2
1X3 P 1S2 1S3 1S2 1LP 1RP P 1LP 1RP
2X2 P 2S2 1LP 1X2 1X2 1X3 P 1S2 1S3
1S2 2RP P 2LP
BAR12 = 2RP 2X2 P 2S2 2LP 2X2 P 2S2
1LP 2X2 R 2S2 1RP
BAR13 = 4RP 1X2 P 1S2 4LP 3RP 1X2 P
1S2 3LP
BAR14 = 2RP 2X2 P 2S2 2LP 1RP 2X2 P
2S2 1LP 2RP 2X2 P 2S2 2LP 3RP 2X2 P
2S2 3LP
BAR15 = 4RP 2X2 P 2S2 4LP 4RP 1X2 P
1S2 4LP 3RP 1X2 P 1S2 3LP 2RP 2X2 P
2S2 2LP 1RP 2X2 P 2S2 1LP
BAR16 = 3X2 P 3S2 1LP 2X2 R 2S2 1RP

```

Conclusion

This program works as expected for the entire test suite, and also performs gracefully under error conditions. This was a challenge to develop and test, though very worthwhile for the experience.

Reflection

Significant Issues Encountered

This program was taxing in several ways. Firstly, I had no idea where to start with the parsing of bars and such, nor how to keep track of the distance from the tonic. In the end, I decided to keep each note semi-invariant in order to keep things organized. This makes for messy, but correct, Clay code.

Another issue I came across was the sharp and flat notations. I was stumped on how to play these notes within a major scale until it was explained in class one day. Then it was trivial to implement.

The changing of octaves with the + and – symbols was tricky, but in the end I got that working. I basically kept a static counter of octaves and worked from there.

Reading from the web was an interesting issue, but easily solved thanks to the availability of the Java API.

The last major hurdle was creating the jar file. I had never made a jar file before, and this was a very informative learning process.