Melody: A Music Programming Language

Final Report

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Contents

1. Introduction

Melody is a music programming language used to create music. It is a high level language in which musical elements, including pitches, nodes, bars, rhythms, tracks, and melodies can be specified. Music is created by adding basic music elements into tracks and synthesizing one or more tracks into a melody. It also provides fundamental control-flow constructions required for well-constructured programs, which allow users to manipulate nodes or bars more efficiently. After creation, music can be saved into files.

2. Language Tutorial

This part gives a basic tutorial of Melody. Through a sample program, users would get familiar with the fundamentals of Melody.

/* the program starts from the main() function, and it ends when the main function ends */
```
function melody main(){
```
    `bar b1;` /* declare a bar variable */

    /* assign value to the bar variable with [-b...] with notes*/
```
        b1=[-b (~C6;1),(~C6;1),(~G6;1),(~G6;1)];
        bar b2;
        b2=[-b (~A6;1),(~A6;1),(~G6;1),(~;1)];
        bar b3;
        b3=[-b (~F6;1),(~F6;1),(~E6;1),(~E6;1)];
        bar b4;
        b4=[-b (~D6;1),(~D6;1),(~C6;1),(~;1)];
```
    /* declare a track variable attributes including instruments, fraction, beats per bar, beats per minute, and volume */
```
        track<<sax, 1,4,60,90>> t1;
```
    `t1=[-t b1,b2,b3,b4];` /* assign value to the track variable with [-t …] with bars */
```
        track<<sax, 1,4,60,90>> t2;
        t2=[-t b3,b4];
        track<<sax,1,4,60,90>> t3;
```
    `t3=toneUp(t2,2);` /* use built-in function to raise the tone of track t2 by one degree*/
```
        bar tmp;
```
    /* use built-in function to get the first bar in track t3 and assign its value to bar tmp*/
```
        tmp=at(t3,0);
```
    `note tmpn1;` /* declare a note variable tmpn1*/

    /* functions can be nested*/
```
        tmpn1=toneDown(at(tmp,2),1);
        bar newb;
```
    /* assignment can be done with functions' return value*/
```
        newb=[-b at(tmp,0),at(tmp,1),tmpn1,tmpn1];
        t3=[-t newb,at(t3,1)];
        track<<sax,1,4,60,90>> t4;
```
    `t4=t3+t3;` /* tracks can be concatenated*/
```
        track<<sax,1,4,60,90>> tall;
        tall=t1+t4+t1;
```

```
        track<<banjo,1,4,60,90>> tchor;
```
```
        track<<>> tchor1;
``` /* tracks would be given default attributes if not specified when declared*/
```
        track<<>> tchor2;
        track<<>> tchor3;
```
```
        tchor1=[-t [-b (~C4;1),(~C5;1),(~E5;1),(~C5;1),(~F5;1),(~C5;1),(~E5;1),(~C5;1)]];
        tchor2=[-t [-b (~D5;1),(~B4;1),(~C5;1),(~A4;1),(~F4;1),(~G4;1),(~C5;1)]];
        tchor3=[-t [-b (~E5;1),(~G4;1),(~D5;1),(~G4;1),(~C5;1),(~G5;1),(~B5;1),(~G5;1)]];
        tchor=tchor1+tchor2+tchor3+tchor3+tchor1+tchor2;
```
```
        melody twinkle;
``` /* declare melody variable*/
```
        twinkle=syn(tall,tchor);
```  /* synthesize tracks into one melody*/

/* this returned melody value would be compiled and a .csv file would be generated*/
```
        return twinkle;
```
```
}
```
/*self-defined function to synthesize tracks into melody*/
```
function melody syn(track t1, track t2){
        melody m1;
        m1=t1&t2;
        return m1;
}
```

Besides the used features, Melody also supports self-defined functions.

The source file should be saved as .mc file. To compile the program, use the `melody -c <filename.mc>` `filename.out`. A .csv file would be generated. Then run the CSV2JAVA.java file as assembler to convert the .csv file into a standard .midi file.

3. Language Reference Manual

3.1. Lexical Conventions

There are six classes of tokens: identifiers, keywords, constants, string literals, operators, and other separators. Blanks, horizontal and vertical tabs, newlines, formfeeds, and comments as described below are ignored except when they separate tokens. One white space is required to separate adjacent identifiers, keywords, and constants. What's more, Melody is a case sensitive programming language.

3.1.1 Comments
The characters '/*' is used to start a comment and '*/' is used to terminate comments. Comments cannot nest, and they cannot occur within string or character literals.

3.1.2 Identifiers
An identifier is a sequence of letters and digit. The first character must be a letter; the underscore '_' counts as a letter. Upper and lower case letters are different.

3.1.3 Keywords

The following identifiers are reserved as keywords. They cannot be used as self-defined identifiers:

int	string	bool	true	false
pitch	bar	rhythm	track	while
melody	if/else	for	return	
function	null	void	main	

3.2. Type

3.2.1 Integers

Integers are represented by one or more digits.
It is declared by the keyword int.
It uses 32 bits to represent values from -32768 to 32768.

3.2.2 String

Strings consists of one or more letters or digits.
It is declared by the keyword string.
A string-typed value should be specified with double quotation marks ("").

3.2.3 Boolean

Boolean values are represented by the keywords true or false.
It is declared by the key word bool.

3.2.4 Pitch

Pitch represents the pitch of a note. Or it can represent a rest.
It is declared by the keyword pitch.
A pitch-typed value should be in such format: ~(['A'-'G']['b'|'#']?['1'-'7']?)?. 'b' or '#' represents the modifier. It is optional in the pitch format. The letter represents the base note. Only one letter is allowed in the format. The number represents the octave, which is also optional in the format. If there is only '~' in a note, it represents the rest.
The duration of a note (or a rest) is not defined until notes are defined (introduced later).

3.2.4.1 Pitch reference table

As a .csv file will be generated after the compilation, a reference table here is needed to map the defined note to a reference number, then to the absolute pitch in note system by the Java interpretor.

		1	2	3	4	5	6	7
~C	0	12	24	36	48	60	72	84
~C#/~Db	1	13	25	37	49	61	73	85
~D	2	14	26	38	50	62	74	86
~D#/~Eb	3	15	27	39	51	63	75	87
~E	4	16	28	40	52	64	76	88

~F	5	17	29	41	53	65	77	89
~F#/~Gb	6	18	30	42	54	66	78	90
~G	7	19	31	43	55	67	79	91
~G#/~Ab	8	20	32	44	56	68	80	92
~A	9	21	33	45	57	69	81	93
~A#/~Bb	10	22	34	46	58	70	82	94
~B	11	23	35	47	59	71	83	95

Figure.1 defined note and reference number reference table

3.2.5 Note

Note represents the basic unit of one single note to make up a bar. A note-typed value should be in such format: (pitch1;fraction1). It is constructed by a pitch-typed value (pitch1) and a int-typed value (fraction1). The pitch-typed value represents the pitch of this note, and the int-typed value represents the duration of this note. For the int-typed value, it represents the note type of this note. But it uses a reciprocal format as int type can be conveniently used here. For example, 4 means a quarter note. Both the pitch-typed value and the int-typed value can be represented in either pre-defined variables (pitch1;int1) or absolute value (~Cb;4).
A note type variable is declared by the keyword note.

3.2.6 Bar

Bar represents the unit to make up a track.
It is declared by the key word bar.
Square brackets are used when bar assignment occurs. For example, [-b note1, note2, note3].
A bar-typed value can be defined in two ways:
- By enumerating every note inside: [-b note1, note2, note3]. The note-typed variable can either be a pre-defined variable, or an absolute note value.
- By applying an pre-defined rhythm and put notes into corresponding positions: [-b rhythm1;(pitch1,pitch2)]. The rhythm type would be introduced later. The rhythm-typed variable and the pitch-typed variable can either be a pre-defined variable or an absolute value.

in which the note-typed variable can either be a pre-defined variable or an absolute value.

3.2.7 Rhythm

Rhythm can be pre-defined and applied to bar.
It is declared by the keyword rhythm.
Square brackets are used when bar assignment occurs.
A rhythm-typed value is defined in such format: [-r fraction1, fraction2, fraction3], in which the fraction is an integer.
rhythm a=[-r 3,2,4,5];
The sum of each fraction's reciprocal in one rhythm should be the beats number per bar.
rhythm a=[-r 2,2,2,2]; ½+½+½+½=2, and 2 is the number of beats per bar.

3.2.8 Track

Track consists of bars with specified attributes including instrument, fraction (the unit note, for example, 4 means that a quarter note equals to one beat, 8 means an eighth note equals to one beat), beats_per_bar (how many beats are in one bar), beats_per_minutes (how many beats are in one minute), and the volumn (the volumn of this track when played). The instrument would be tokened as an identifier, and the other attributes are all of type int.

It is declared by the key word track<<[instrument, fraction, beats_per_bar, beats_per_minute, volumn]?>>.

There are some kinds of instruments existing. A track cannot be specified with an unexisted instrument.

Track-typed value assignment uses square brackets. For example [-t bar1, bar2].

If the optional argument is null, the track would have a set of default attributes.

3.2.9 Melody

Melody consists of parallel synthesized tracks.

It is declared by the keyword melody.

Synthesizing operator '&' is used to represent the parallel synthesizing of several tracks, which will be introduced later.

The tracks must be of same fraction and same beats_per_minute.

3.3. Syntax

3.3.1 Operators

3.3.1.1 expression1 = expression2

This expression assigns expression2 to expression1 and both expressions must of the same type. The whole expression is ended by ';'.

This assignment can be used for int, string, pitch, note, bar, rhythm, track, and melody type variable.

It can be represented as:

variable1=variable2, in which variable2 can be a pre-defined variable or absolute value of that type. When such an assignment happens, the attributes of variable2 will be assigned to variable1 at the same time. (such for bar, track)

3.3.1.2 expression1 + expression2

This expression adds two numbers or concatenate two tracks or two strings. So it is used for int, string, and track.

int1=int2+int3; int1 has the value of int2 plus int3.

stringA=stringB+stringC; stringA is a string by concatenating stringB and stringC.

track A = trackB + trackC, which concatenates the whole trackC to the trackB, and assigns them to new trackA, such that trackA has the concatenated trackB and trackC.

3.3.1.3 expression1 * expression2

This expression repeats expression1(of type pitch, note, or bar) several times (expression2 must return an int value which is the number of repetitions) or does multiplication of two int values.

int1 = int2 * int3; does multiplication of int2 and int3 and returns an integer int1.

3.3.1.4 expression1 & expression2

This expression combines several tracks in parallel into a melody.

melody1 = track1 & track2; which synthetizes two tracks into one melody. track1 and track2 would be played simultaneously.

3.3.1.5 expression1 == expression2

This expression checks whether two same-typed expression are equal in value. If equal, return true, otherwise return false.

int1==int2 returns true if int1 and int2 are same integers

string1==string2 returns true if they are of same length and they consists of same letters

pitch1==pitch2 returns true if the two pitches are of same value

note1==note2 returns true if either the notes in them are equal and the durations are equal

3.3.1.6 expression1 != expression2

This expression checks whether two same-typed expressions are not equal in value. If so, return true, otherwise return false.

int1!= int2 returns true if int1 and int2 are different integers

string1!= string2 returns true if they are of different length or they consists of different letters

pitch1!=pitch2 returns true if the two pitches are not of same value

note1!= note2 returns true if either the notes in them are not equal or the durations are not equal

3.3.1.7 expression1 && expression2

Logical AND. If both expression returns true, the whole expression returns true, otherswise the whole expression returns false.

bool&&bool returns a boolean value

3.3.1.8 expression1 || expression2

Logical OR. If both expression returns false, the whole expression returns false, otherswise the whole expression returns true.

bool||bool returns a boolean value

3.3.1.9 expression1 <- expression2

This expression adds one bar (expression2) at the end of a track (expression1), or add one note (expression2) at the end of a bar (expression2).

track<-bar; a new track value is obtained and can be assigned to some track variable

bar<-note; a new bar value is obtained and can be assigned to some bar variable

3.3.1.10 expression1 > expression2

This expression checks whether the first integer expression1 is larger than the second integer expression2. If so return true, else return false.

int1>int2 returns true if int1 is larger than int2

3.3.1.11 expression1 >= expression2

This expression checks whether the first integer expression1 is larger than or equal to the second integer expression2. If so return true, else return false.

int1>=int2 returns true if int1 is larger than or equal to int2

3.3.1.12 expression1 < expression2

This expression checks whether the first integer expression1 is less than the second integer expression2. If so return true, else return false.

int1<int2 returns true if int1 is less than int2

3.3.1.13 expression1 <= expression2

This expression checks whether the first integer expression1 is less than or equal to the second integer expression2. If so return true, else return false.

int1<=int2 returns true if int1 is less than or equal to int2

3.3.2 Variable Declaration and Assignment

In Melody, the scope of identifier begins directly after declaration and exists throughout the whole program. There are slight differences in the declaration of different types of variables because each music element has its own required attributes.

3.3.2.1 Declaration of int, string, bool, pitch, note

type var_name;

var_name is the name of variable defined by users.

```
e.g.    int number;
        number = 5;

        string str;
        str = "melody";

        bool b;
        b = true;

        pitch myNote;
        myNote = ~B6;
```

```
    note n1;
    n1 = (myNote;number);


          OR


    note n2;
    n2 = (~Cb;3);
    note n3;
    n3 = (myNote;4);
```

3.3.2.2 Declaration of bar
As described in 2.4.2, there are two ways to declare a bar.

bar var_name;
var_name = [-b note1, note2, …]];

bar var_name;
var_name = [-b note1, note2, …]];

bar var_name;
var_name = [-b note1, note2, …]];
              OR
bar var_name;
var_name = [-b rhythm1; (pitch1, pitch2, …)];

e.g. ```
bar bar1;
   bar1=[-b rhythm1; (p1, p2, p, p2)];

   bar bar2;
   bar2=[-b n1,n2,n3,n2];
```

### 3.3.2.3 Declaration of rhythm
For rhythm's value, the fraction should be an integer value, but not pre-defined variable.


rhythm var_name = [-r fraction1, fraction2, fraction3...]


e.g. ```
rhythm rhythm1;
    rhythm1=[-r 2,4,4,2,4,4];
```

3.3.2.4 Delaration of track
 As described in 2.4.2, there are two ways to declare a track, by concatenating bars or by linking tracks.

track<<instrument, fraction, beats_per_bar, beats_per_minute, volumn>> var_name = [-t bar1, bar2, bar3, …];
                    OR

track<<>> var_name = track1 + track2 + ...;

```
e.g. track<<violin, 4, 2, 60, 90>> track1;
     track1=[-t bar1, bar2, bar1, bar2];

  track<<violin, 4,2, 60,90>> track3;
 track3 = track1 + [-t[-b(~B2;4), (~C2;4), (~C3;4), (~B2;4)]] + track2;
```

3.3.2.5 Declaration of melody

Melody can be constructed by pre-defined track variable. It can be constructed by '&' operation, which will be further discussed later.

melody var_name = track1 & track2 & …;

```
e.g. melody m1;
    m1=track1&track2&track3;

  melody m2;
  m2=track1+[-t[-b(~B2;4), (~C2;4), (pitch1;4), (~B2;4)]];
```

3.3.3 Function Declaration

Functions are defined using the keyword 'function' in the following format,

```
function return_type func_name(para_type parameter1, para_type parameter2, …){
        statement 1;
        statement 2;
        ...
}
```

`func_name` is the name of function defined by users.

The input parameters of a self-defined function are optional.

A function must have a return type or use *void* and a function can have zero or more arguments.

```
       e.g. function track WaveUpDown(int i) {...}
```

3.3.4 Function Evaluation

Functions are evaluated with the following construct,

func_name(parameter1, parameter2, …);

parameter1,parameter2, … are parameters passed into the function. There can be zero or one or more parameters in a function. Types of all paremeters must exactly match the type defined when the function is declared.

```
       e.g. WaveUpDown(track1,8);
```

3.4. Functions

3.4.1 Main function

The main function is where the music program starts. It has no argument and nor return value return value. It is declared as *function void main(){...}*

3.4.2 **bar at(track track1, int i)** and **note at(bar bar1, int i)**

This function returns the (i+1)th bar-typed value in a track, or the (i+1)th note-typed value in a bar. It can also be used to set value to the corresponding bar or note.

The index starts from 0. The index i must be less than the length of the target track or bar.

bar bar1;

bar1=at(track1, 0); returns the first bar in track track1.

note note1;

note1=at(bar1, 5); returns the 6th note in bar bar1.

3.4.3 **pitch toneUp(pitch p, int i)** and **pitch toneDown(pitch p, int i)**
note toneUp(note n, int i) and **note toneDown(note n, int i)**
bar toneUp(bar b, int i) and **bar toneDown(bar b, int i)**
track toneUp(track t, int i) and **track toneDown(track t, int i)**

These methods can be applied to pitch type, note type, bar type, or track type.

They are used to raise or lower the tone of all pitch in the passed parameter by half the degree for i times. If they are applied to a bar or a track, all pitches inside are being modified.

toneUp(pitch1, 5);

toneDown(track1, 1);

3.4.4 int length(bar b) and int length(track t)

This method can be applied to bar type or track type.

It returns the number of bars contained in a track or the number of notes contained in a bar.

int number_in_bar;

number_in_bar=length(bar1);

3.5 Statement

All statements below are considered to be sequential in nature. Statements are used to perform operations, assignments, function calls, or denote control flow.

3.5.1 Expression Statement

                          expression;

This statement, the most common of all statements in a Melody program, is used to denote an assignment, an operation, or a function call.

3.5.2 Conditional Statement

```
if(expression){
        Statement1;
        Statement2;
}
```

```
                        else{
                                Statement3;
                        }
```

The if/else statement will take an expression as an argument and determine whether or not the expression is true. The argument must take the form of a boolean expression. If this expression is true then the statement list enclosed by the braces immediately after the expression in parentheses will be executed. Otherwise, the statement list enclosed in braces following the else keyword will be executed. The else statement is optional.

3.5.3 Iteration Statement

The for loop iterates the statements block for certain times:

```
                for( i=0; i<10; i=i+1){
                        statement1;
                        statement2;
                }
```

The for statement use a pivot to control the iteration process. Here the int i is used to make 10 times iterations, and in each iteration it will go through statement1 and statement2.

3.5.4 Conditional Iteration Statement

```
                while(condition){
                        statement1;
                        statement2;
                        … …
                }
```

The while statement is called conditional iteration statement here. It takes an expression as an argument and executes the code within the statement list repeatedly until the condition specified by the argument is no longer true. The conditional expression is evaluated at the beginning of each cycle of execution and must take the form of an equality expression as shown in Section 6.1.6 and Section 6.1.7.

3.6 File format and program output

The source code is stored in a .mc file. Output in Melody follows the pipeline below:

.mc ->.csv -> .midi

.mc file is the source code with Melody. It is compiled into the Bytecode with a .mc type. This .mc file is a standard csv file. Finally the .mc file will be interpreted into .midi using open source CSV2MIDI.java.

4. Project Plan

4.1 Process Overview

4.1.1 Planning

Our team decided to implement a music programming language because three of us are all music fans. We tried to make the grammer as simple and understandable as possible so that even users with a little music knowledge can manage to use it. According to the most common way use which people create music, we defined basic types and functions for the language.

4.1.2 Development & Testing

After the goal is decided, our team met once a week to continue working on the implementation. We held group discussion and worked on each milestone together and reported our progress to our TA every Tuesday to get suggestions.
We used Github to work on the code together and used Google doc to store notes. During the implementation, we used the develop/test phase. We wrote new tests while still tested the old one when each module was added to the program. When we met with any difficulties or inconsistencies in existing code, we discuss together to solve the problem.

4.2 Programming Style Guide

We basically followed the coding style of the MicroC compiler. Although we used different IDEs, our code did not involve anything specific to different IDE, so no conflicts or inconsistencies in coding style occured during the development process.

4.3 Project timeline

The following table shows the target dates of each milestone:

Milestone	Date
Complete the proposal	09-28-2013
Complete the language reference manual	10-31-2013
Complete the scanner, parser and ast	11-19-2013
Complete the Java part	11-30-2013
Complete the code generation part	12-12-2013
Complete the whole compiler	12-19-2013

4.4 Roles and Responsibilities

Common part: Scanner, parser, ast
Shuo Yang: Implement the part of code generation
Tong Ge: Implement the part of code generation
Jingsi Li: Implement the code generation

4.5 Development Enviroment

Github Repository
Java JDK 1.6
Ocaml binaries installed on desktop
Notepad++ on Windows
Sublime / Vim on Mac

4.6 Log

commit 51704719d03f5c299004be61ae36e4ec5e02d07b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 13:54:02 2013 -0500

    anthem revision

 songs/chinese-anthem.mc | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 4c568f102f4233ea3ad5ecf85a003f2ca6c39579
commit 51704719d03f5c299004be61ae36e4ec5e02d07b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 13:54:02 2013 -0500

    anthem revision

 songs/chinese-anthem.mc | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 4c568f102f4233ea3ad5ecf85a003f2ca6c39579
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 20 11:04:10 2013 -0500
commit 51704719d03f5c299004be61ae36e4ec5e02d07b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 13:54:02 2013 -0500

anthem revision

 songs/chinese-anthem.mc | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 4c568f102f4233ea3ad5ecf85a003f2ca6c39579
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 20 11:04:10 2013 -0500

    change output

 tests/test-declare.mc | 39 +++++++++++++++++++++++++++++---------
 1 file changed, 30 insertions(+), 9 deletions(-)

commit 96a9673b17fe785604fe47574e1019a57ac09863
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 20 10:13:32 2013 -0500

    check match of rhythm number and pitch number

 compile.ml | 6 ++++--
 1 file changed, 4 insertions(+), 2 deletions(-)

commit dd6c10282a951090d028f013df77fee7eff7e612
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 03:14:39 2013 -0500

    clean

 test-bar2.mc | 18 ------------------
 1 file changed, 18 deletions(-)

commit 91c10ab4c91be708a67c86092287339fdf8a9be4
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 02:58:00 2013 -0500

    anthem done

 compile.ml | 4 ++--
 melody | Bin 133517 -> 133834 bytes
 songs/chinese-anthem.mc | 56 +++++++++++++++++++++++++++++--------------------
 3 files changed, 33 insertions(+), 27 deletions(-)

commit 5dd0c8403cde355a79bd6b6db3dd2bd3826f9a34
Merge: 2417099 8282bbe
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:36:39 2013 -0500

   Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 2417099742b654cf475f8d8b013ae295a0e3d660
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:36:36 2013 -0500

q

```
test-bar2.mc | 18 +++++++++++++++++
1 file changed, 18 insertions(+)
```

commit 8282bbea49e16fd00e1cb3a8d2fdb9530512ce41
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 01:22:39 2013 -0500

    change default value to speed

```
compile.ml | 7 ++++---
1 file changed, 4 insertions(+), 3 deletions(-)
```

commit 36f678923353d58fcb93c8b79b1c8fd1252e1247
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:20:37 2013 -0500

    store

```
songs/chinese-anthem.mc | 4 ++--
1 file changed, 2 insertions(+), 2 deletions(-)
```

commit 04b587e39f01b55fc749fb018654956924439c0c
Merge: 6922c14 9af3ffb
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:13:41 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 6922c1480a3973328a000c62bdc01e4caea98ae6
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:13:30 2013 -0500

    anthem

```
compile.ml              |  11 +++++-
melody                  | Bin 133111 -> 133517 bytes
songs/chinese-anthem.mc | 100 ++++++++++++++++++++++++++++++++++++++++++++-----
3 files changed, 100 insertions(+), 11 deletions(-)
```

commit 9af3ffbeb8c507d847c3651d74b2b308db7c76ca
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:55:34 2013 -0500

    add default value to speed

```
compile.ml | 2 +-
1 file changed, 1 insertion(+), 1 deletion(-)
```

commit e7a04fa21d38874f526fdc99dd914b2a596a236c
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:52:46 2013 -0500

add default value to speed

 compile.ml | 6 +++---
 1 file changed, 3 insertions(+), 3 deletions(-)

commit e0d6fe6bf1e997bb83a5a560c8e9a2d6dd8ccf4d
Merge: 266d6a7 4b8d1d8
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:52:27 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 266d6a76535ffc39d7fda8fb269583097e7b4c7e
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:49:44 2013 -0500

    can adjust volumn

 compile.ml | 7 +++++--
 1 file changed, 5 insertions(+), 2 deletions(-)

commit 4b8d1d815718dfc3f5445605641782ed9b78419d
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 19 21:58:34 2013 -0500

    getong hehe

 CSV2MIDI/bin/.gitignore | 1 +
 CSV2MIDI/bin/melody/CSV2MIDI.class | Bin 5053 -> 5078 bytes
 compile.ml | 6 +++---
 melody | Bin 133165 -> 133111 bytes
 4 files changed, 4 insertions(+), 3 deletions(-)

commit d09e6412b05ae99b265584740d63c7b9b4882f9d
Author: lljjssljsljs <493926113@qq.com>
Date: Thu Dec 19 21:29:13 2013 -0500

    add default value to speed

 compile.ml | 1 +
commit 51704719d03f5c299004be61ae36e4ec5e02d07b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 13:54:02 2013 -0500

    anthem revision

 songs/chinese-anthem.mc | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 4c568f102f4233ea3ad5ecf85a003f2ca6c39579
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 20 11:04:10 2013 -0500

20

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 1 file changed, 30 insertions(+), 9 deletions(-)

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Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 20 10:13:32 2013 -0500

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commit dd6c10282a951090d028f013df77fee7eff7e612
:
commit 51704719d03f5c299004be61ae36e4ec5e02d07b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 13:54:02 2013 -0500

    anthem revision

 songs/chinese-anthem.mc | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 4c568f102f4233ea3ad5ecf85a003f2ca6c39579
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 20 11:04:10 2013 -0500

    change output

 tests/test-declare.mc | 39 +++++++++++++++++++++++++++++---------
 1 file changed, 30 insertions(+), 9 deletions(-)

commit 96a9673b17fe785604fe47574e1019a57ac09863
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 20 10:13:32 2013 -0500

check match of rhythm number and pitch number

```
 compile.ml | 6 ++++--
 1 file changed, 4 insertions(+), 2 deletions(-)
```

commit dd6c10282a951090d028f013df77fee7eff7e612
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 03:14:39 2013 -0500

    clean

```
 test-bar2.mc | 18 ------------------
 1 file changed, 18 deletions(-)
```

commit 91c10ab4c91be708a67c86092287339fdf8a9be4
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 02:58:00 2013 -0500

    anthem done

```
 compile.ml            |  4 ++--
 melody                | Bin 133517 -> 133834 bytes
 songs/chinese-anthem.mc |  56 ++++++++++++++++++++++++++++--------------------
 3 files changed, 33 insertions(+), 27 deletions(-)
```

commit 5dd0c8403cde355a79bd6b6db3dd2bd3826f9a34
Merge: 2417099 8282bbe
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:36:39 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 2417099742b654cf475f8d8b013ae295a0e3d660
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:36:36 2013 -0500

    q

```
 test-bar2.mc | 18 +++++++++++++++++
 1 file changed, 18 insertions(+)
```

commit 8282bbea49e16fd00e1cb3a8d2fdb9530512ce41
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 01:22:39 2013 -0500

    change default value to speed

```
 compile.ml | 7 ++++---
 1 file changed, 4 insertions(+), 3 deletions(-)
```

commit 36f678923353d58fcb93c8b79b1c8fd1252e1247
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:20:37 2013 -0500

store

```
 songs/chinese-anthem.mc | 4 ++--
 1 file changed, 2 insertions(+), 2 deletions(-)
```

commit 04b587e39f01b55fc749fb018654956924439c0c
Merge: 6922c14 9af3ffb
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:13:41 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 6922c1480a3973328a000c62bdc01e4caea98ae6
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 20 01:13:30 2013 -0500

    anthem

```
 compile.ml              |  11 +++++-
 melody                  | Bin 133111 -> 133517 bytes
 songs/chinese-anthem.mc | 100 +++++++++++++++++++++++++++++++++++++++++++-----
 3 files changed, 100 insertions(+), 11 deletions(-)
```

commit 9af3ffbeb8c507d847c3651d74b2b308db7c76ca
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:55:34 2013 -0500

    add default value to speed

```
 compile.ml | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)
```

commit e7a04fa21d38874f526fdc99dd914b2a596a236c
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:52:46 2013 -0500

    add default value to speed

```
 compile.ml | 6 +++---
 1 file changed, 3 insertions(+), 3 deletions(-)
```

commit e0d6fe6bf1e997bb83a5a560c8e9a2d6dd8ccf4d
Merge: 266d6a7 4b8d1d8
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:52:27 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 266d6a76535ffc39d7fda8fb269583097e7b4c7e
Author: lljjssljsljs <493926113@qq.com>
Date: Fri Dec 20 00:49:44 2013 -0500

    can adjust volumn

compile.ml | 7 +++++--
 1 file changed, 5 insertions(+), 2 deletions(-)

commit 4b8d1d815718dfc3f5445605641782ed9b78419d
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 19 21:58:34 2013 -0500

    getong hehe

 CSV2MIDI/bin/.gitignore | 1 +
 CSV2MIDI/bin/melody/CSV2MIDI.class | Bin 5053 -> 5078 bytes
 compile.ml | 6 +++---
 melody | Bin 133165 -> 133111 bytes
 4 files changed, 4 insertions(+), 3 deletions(-)

commit d09e6412b05ae99b265584740d63c7b9b4882f9d
Author: lljjssljsljs <493926113@qq.com>
Date: Thu Dec 19 21:29:13 2013 -0500

    add default value to speed

 compile.ml | 1 +
 1 file changed, 1 insertion(+)

commit 9a9adb57b51eced49ee0de650afff638d4a4c8d5
Author: lljjssljsljs <493926113@qq.com>
Date: Mon Dec 16 14:15:31 2013 -0500

    Jingsi modified the mote length handling

 compile.ml | 31 ++++++++++++++++---------------
 1 file changed, 16 insertions(+), 15 deletions(-)

commit c8d6780b1fddb9031a4e9a95a9980c0ed652d1c8
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Dec 16 01:00:51 2013 -0500

    clean

 CSV2MIDI/bin/.gitignore | 1 -
 1 file changed, 1 deletion(-)

commit 37e6198350f7b98402a5bc2ba741cc0842133198
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Dec 16 00:59:31 2013 -0500

    clean

 CSV2MIDI/bin/.gitignore | 1 +
 1 file changed, 1 insertion(+)

commit 4846bdef7247f78e374587af2a9c5fe1c1f20b11
Author: morrisyoung <sdmorrisys@gmail.com>

Date: Mon Dec 16 00:56:29 2013 -0500

    cleam

 CSV2MIDI/.classpath | 6 ------
 CSV2MIDI/.project | 17 ----------------
 CSV2MIDI/.settings/org.eclipse.jdt.core.prefs | 11 -----------
 3 files changed, 34 deletions(-)

commit 4eced4604eef55496bcbe2ffa1bf5370e6219f0b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Dec 16 00:55:10 2013 -0500

    clean

 CSV2MIDI/.gitignore | 11 +++++++++++
 1 file changed, 11 insertions(+)

commit 26661bc7d4262f8e5e2544d38aafe4bead3eaaec
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Dec 16 00:52:42 2013 -0500

    clean

 .metadata/.lock | 0
 .metadata/.log | 10 -
 .../.history/31/50edbc410f660013120db77b99a09805 | 193 --
 .../.history/41/00a227180f660013120db77b99a09805 | 7 -
 .../.history/69/8062bd410f660013120db77b99a09805 | 309 ----
 .../.history/bf/703bbd410f660013120db77b99a09805 | 33 -
 .../.history/d6/6014bd410f660013120db77b99a09805 | 281 ---
 .../.history/e5/1051bc410f660013120db77b99a09805 | 98 -
 .../.projects/CSV2MIDI/.indexes/af/history.index | Bin 70 -> 0 bytes
 .../CSV2MIDI/.indexes/e4/d2/history.index | Bin 285 -> 0 bytes
 .../.projects/CSV2MIDI/.markers | Bin 3655 -> 0 bytes
 .../CSV2MIDI/org.eclipse.jdt.core/state.dat | Bin 184600 -> 0 bytes
 .../.root/.indexes/history.version | 1 -
 .../.root/.indexes/properties.index | Bin 151 -> 0 bytes
 .../.root/.indexes/properties.version | 1 -
 .../org.eclipse.core.resources/.root/1.tree | Bin 1065 -> 0 bytes
 .../.safetable/org.eclipse.core.resources | Bin 630 -> 0 bytes
 .../.settings/org.eclipse.core.resources.prefs | 2 -
 .../.settings/org.eclipse.debug.ui.prefs | 3 -
 .../.settings/org.eclipse.jdt.core.prefs | 11 -
 .../.settings/org.eclipse.jdt.launching.prefs | 2 -
 .../.settings/org.eclipse.jdt.ui.prefs | 14 -
 .../.settings/org.eclipse.team.ui.prefs | 2 -
 .../.settings/org.eclipse.ui.editors.prefs | 2 -
 .../.settings/org.eclipse.ui.ide.prefs | 5 -
 .../.settings/org.eclipse.ui.prefs | 2 -
 .../org.eclipse.e4.workbench/workbench.xmi | 1895 --------------------
 .../.plugins/org.eclipse.jdt.core/1271342938.index | Bin 8442 -> 0 bytes
 .../.plugins/org.eclipse.jdt.core/1384487945.index | Bin 3689 -> 0 bytes
 .../.plugins/org.eclipse.jdt.core/156905802.index | Bin 9833 -> 0 bytes

```
.../.plugins/org.eclipse.jdt.core/1819685514.index | Bin 53602 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1833648217.index | Bin 19798 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2188913262.index | Bin 5215 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2326659272.index | Bin 21328 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2545238116.index | Bin 117142 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/272178059.index  | Bin 182658 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3000285004.index | Bin 11765383 -> 0 bytes
...skipping...
.../CSV2MIDI/.indexes/e4/d2/history.index      | Bin 285 -> 0 bytes
.../.projects/CSV2MIDI/.markers             | Bin 3655 -> 0 bytes
.../CSV2MIDI/org.eclipse.jdt.core/state.dat    | Bin 184600 -> 0 bytes
.../root/.indexes/history.version          |   1 -
.../root/.indexes/properties.index         | Bin 151 -> 0 bytes
.../root/.indexes/properties.version       |   1 -
.../org.eclipse.core.resources/.root/1.tree    | Bin 1065 -> 0 bytes
.../.safetable/org.eclipse.core.resources    | Bin 630 -> 0 bytes
.../.settings/org.eclipse.core.resources.prefs   |   2 -
.../.settings/org.eclipse.debug.ui.prefs     |   3 -
.../.settings/org.eclipse.jdt.core.prefs     |  11 -
.../.settings/org.eclipse.jdt.launching.prefs    |   2 -
.../.settings/org.eclipse.jdt.ui.prefs       |  14 -
.../.settings/org.eclipse.team.ui.prefs      |   2 -
.../.settings/org.eclipse.ui.editors.prefs     |   2 -
.../.settings/org.eclipse.ui.ide.prefs       |   5 -
.../.settings/org.eclipse.ui.prefs          |   2 -
.../org.eclipse.e4.workbench/workbench.xmi     | 1895 --------------------
.../.plugins/org.eclipse.jdt.core/1271342938.index | Bin 8442 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1384487945.index | Bin 3689 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/156905802.index  | Bin 9833 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1819685514.index | Bin 53602 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1833648217.index | Bin 19798 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2188913262.index | Bin 5215 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2326659272.index | Bin 21328 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2545238116.index | Bin 117142 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/272178059.index  | Bin 182658 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3000285004.index | Bin 11765383 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3004609673.index | Bin 45494 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3266567714.index | Bin 29837 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3302703152.index | Bin 500923 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3321539481.index | Bin 335071 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3712507179.index | Bin 442191 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3954040986.index | Bin 473925 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4238209716.index | Bin 558724 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4249315662.index | Bin 92792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/450555687.index  | Bin 35792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/765977872.index  | Bin 149334 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/770573466.index  | Bin 19301 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/84777399.index   | Bin 4219 -> 0 bytes
.../org.eclipse.jdt.core/externalLibsTimeStamps   | Bin 1533 -> 0 bytes
.../org.eclipse.jdt.core/invalidArchivesCache    | Bin 4 -> 0 bytes
.../org.eclipse.jdt.core/javaLikeNames.txt      |   1 -
.../org.eclipse.jdt.core/nonChainingJarsCache    | Bin 1365 -> 0 bytes
.../org.eclipse.jdt.core/savedIndexNames.txt     |  23 -
.../variablesAndContainers.dat             | Bin 36675 -> 0 bytes
```

```
.../org.eclipse.jdt.launching/.install.xml          |   4 -
.../org.eclipse.jdt.launching/libraryInfos.xml      |  24 -
.../org.eclipse.jdt.ui/OpenTypeHistory.xml          |   2 -
.../QualifiedTypeNameHistory.xml                    |   2 -
.../org.eclipse.jdt.ui/dialog_settings.xml          |  19 -
.../CSV2MIDI/2013/12/51/refactorings.history        |   4 -
.../CSV2MIDI/2013/12/51/refactorings.index          |   1 -
.../dialog_settings.xml                             |   7 -
.../org.eclipse.ui.workbench/dialog_settings.xml    |  15 -
.../org.eclipse.ui.workbench/workingsets.xml        |   4 -
.metadata/version.ini                               |   1 -
66 files changed, 2978 deletions(-)


.../.plugins/org.eclipse.jdt.core/3321539481.index |  Bin 335071 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3712507179.index |  Bin 442191 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3954040986.index |  Bin 473925 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4238209716.index |  Bin 558724 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4249315662.index |  Bin 92792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/450555687.index  |  Bin 35792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/765977872.index  |  Bin 149334 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/770573466.index  |  Bin 19301 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/84777399.index   |  Bin 4219 -> 0 bytes
.../org.eclipse.jdt.core/externalLibsTimeStamps    |  Bin 1533 -> 0 bytes
.../org.eclipse.jdt.core/invalidArchivesCache      |  Bin 4 -> 0 bytes
.../org.eclipse.jdt.core/javaLikeNames.txt         |   1 -
.../org.eclipse.jdt.core/nonChainingJarsCache      |  Bin 1365 -> 0 bytes
.../org.eclipse.jdt.core/savedIndexNames.txt       |  23 -
.../variablesAndContainers.dat                     |  Bin 36675 -> 0 bytes
.../org.eclipse.jdt.launching/.install.xml          |   4 -
.../org.eclipse.jdt.launching/libraryInfos.xml      |  24 -
.../org.eclipse.jdt.ui/OpenTypeHistory.xml          |   2 -
.../QualifiedTypeNameHistory.xml                    |   2 -
.../org.eclipse.jdt.ui/dialog_settings.xml          |  19 -
.../CSV2MIDI/2013/12/51/refactorings.history        |   4 -
.../CSV2MIDI/2013/12/51/refactorings.index          |   1 -
.../dialog_settings.xml                             |   7 -
.../org.eclipse.ui.workbench/dialog_settings.xml    |  15 -
.../org.eclipse.ui.workbench/workingsets.xml        |   4 -
.metadata/version.ini                               |   1 -
66 files changed, 2978 deletions(-)


commit c46360c6480d4919013f52a554543c0ba532c405
.../.plugins/org.eclipse.jdt.core/3712507179.index |  Bin 442191 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3954040986.index |  Bin 473925 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4238209716.index |  Bin 558724 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4249315662.index |  Bin 92792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/450555687.index  |  Bin 35792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/765977872.index  |  Bin 149334 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/770573466.index  |  Bin 19301 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/84777399.index   |  Bin 4219 -> 0 bytes
.../org.eclipse.jdt.core/externalLibsTimeStamps    |  Bin 1533 -> 0 bytes
.../org.eclipse.jdt.core/invalidArchivesCache      |  Bin 4 -> 0 bytes
.../org.eclipse.jdt.core/javaLikeNames.txt         |   1 -
.../org.eclipse.jdt.core/nonChainingJarsCache      |  Bin 1365 -> 0 bytes
```

```
.../org.eclipse.jdt.core/savedIndexNames.txt        |   23 -
.../variablesAndContainers.dat              | Bin 36675 -> 0 bytes
.../org.eclipse.jdt.launching/.install.xml          |    4 -
.../org.eclipse.jdt.launching/libraryInfos.xml      |   24 -
.../org.eclipse.jdt.ui/OpenTypeHistory.xml          |    2 -
.../QualifiedTypeNameHistory.xml            |    2 -
.../org.eclipse.jdt.ui/dialog_settings.xml          |   19 -
.../CSV2MIDI/2013/12/51/refactorings.history        |    4 -
.../CSV2MIDI/2013/12/51/refactorings.index          |    1 -
.../dialog_settings.xml                 |    7 -
.../org.eclipse.ui.workbench/dialog_settings.xml    |   15 -
.../org.eclipse.ui.workbench/workingsets.xml        |    4 -
.metadata/version.ini                   |    1 -
66 files changed, 2978 deletions(-)

commit c46360c6480d4919013f52a554543c0ba532c405
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Mon Dec 16 00:51:22 2013 -0500

    clean

 .gitignore | 1 +
 1 file changed, 1 insertion(+)

commit d171fef6e18261915787ec853e5b4bbd08b08b68
Author: getonggetong <getong.1016@gmail.com>
Date:   Mon Dec 16 00:12:37 2013 -0500

    a

 compile.ml |   9 ++++++---
 melody     | Bin 133061 -> 133165 bytes
 2 files changed, 6 insertions(+), 3 deletions(-)

commit b94c1e6349d0befb3f2e584d88b1e859d5f78c7d
Merge: 2ebef85 533c946
Author: getonggetong <getong.1016@gmail.com>
Date:   Mon Dec 16 00:09:45 2013 -0500

    a

commit 533c94683d5338212656561837057e1b7f555908
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Mon Dec 16 00:06:50 2013 -0500

    clean

 CSV2MIDI/README.md | 1 +
 1 file changed, 1 insertion(+)

commit 2ebef85bf1c8dd8d9242c2ee1749b8c95a0301c4
Author: getonggetong <getong.1016@gmail.com>
Date:   Mon Dec 16 00:06:47 2013 -0500
```

2 track twinkle

 twinkle.mc | 18 +++++++++++++++---
 1 file changed, 15 insertions(+), 3 deletions(-)

commit a2bf566169eba587bd77870802e9dce23ce2862f
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Dec 16 00:04:44 2013 -0500

    clean

 .metadata/.lock | 0
 .metadata/.log | 10 +
 .../.history/31/50edbc410f660013120db77b99a09805 | 193 ++
 .../.history/41/00a227180f660013120db77b99a09805 | 7 +
 .../.history/69/8062bd410f660013120db77b99a09805 | 309 +++
 .../.history/bf/703bbd410f660013120db77b99a09805 | 33 +
 .../.history/d6/6014bd410f660013120db77b99a09805 | 281 +++
 .../.history/e5/1051bc410f660013120db77b99a09805 | 98 +
 .../.projects/CSV2MIDI/.indexes/af/history.index | Bin 0 -> 70 bytes
 .../CSV2MIDI/.indexes/e4/d2/history.index | Bin 0 -> 285 bytes
 .../.projects/CSV2MIDI/.markers | Bin 0 -> 3655 bytes
 .../CSV2MIDI/org.eclipse.jdt.core/state.dat | Bin 0 -> 184600 bytes
 .../.root/.indexes/history.version | 1 +
 .../.root/.indexes/properties.index | Bin 0 -> 151 bytes
 .../.root/.indexes/properties.version | 1 +
 .../org.eclipse.core.resources/.root/1.tree | Bin 0 -> 1065 bytes
 .../.safetable/org.eclipse.core.resources | Bin 0 -> 630 bytes
 .../.settings/org.eclipse.core.resources.prefs | 2 +
 .../.settings/org.eclipse.debug.ui.prefs | 3 +
 .../.settings/org.eclipse.jdt.core.prefs | 11 +
 .../.settings/org.eclipse.jdt.launching.prefs | 2 +
 .../.settings/org.eclipse.jdt.ui.prefs | 14 +
 .../.settings/org.eclipse.team.ui.prefs | 2 +
 .../.settings/org.eclipse.ui.editors.prefs | 2 +
 .../.settings/org.eclipse.ui.ide.prefs | 5 +
 .../.settings/org.eclipse.ui.prefs | 2 +
 .../org.eclipse.e4.workbench/workbench.xmi | 1895 ++++++++++++++++++
 .../.plugins/org.eclipse.jdt.core/1271342938.index | Bin 0 -> 8442 bytes
 .../.plugins/org.eclipse.jdt.core/1384487945.index | Bin 0 -> 3689 bytes
 .../.plugins/org.eclipse.jdt.core/156905802.index | Bin 0 -> 9833 bytes
 .../.plugins/org.eclipse.jdt.core/1819685514.index | Bin 0 -> 53602 bytes
 .../.plugins/org.eclipse.jdt.core/1833648217.index | Bin 0 -> 19798 bytes
 .../.plugins/org.eclipse.jdt.core/2188913262.index | Bin 0 -> 5215 bytes
 .../.plugins/org.eclipse.jdt.core/2326659272.index | Bin 0 -> 21328 bytes
 .../.plugins/org.eclipse.jdt.core/2545238116.index | Bin 0 -> 117142 bytes
 .../.plugins/org.eclipse.jdt.core/272178059.index | Bin 0 -> 182658 bytes
 .../.plugins/org.eclipse.jdt.core/3000285004.index | Bin 0 -> 11765383 bytes
 .../.plugins/org.eclipse.jdt.core/3004609673.index | Bin 0 -> 45494 bytes
 .../.plugins/org.eclipse.jdt.core/3266567714.index | Bin 0 -> 29837 bytes
 .../.plugins/org.eclipse.jdt.core/3302703152.index | Bin 0 -> 500923 bytes
 .../.plugins/org.eclipse.jdt.core/3321539481.index | Bin 0 -> 335071 bytes
 .../.plugins/org.eclipse.jdt.core/3712507179.index | Bin 0 -> 442191 bytes
 .../.plugins/org.eclipse.jdt.core/3954040986.index | Bin 0 -> 473925 bytes

```
.../.plugins/org.eclipse.jdt.core/4238209716.index  |  Bin 0 -> 558724 bytes
.../.plugins/org.eclipse.jdt.core/4249315662.index  |  Bin 0 -> 92792 bytes
.../.plugins/org.eclipse.jdt.core/450555687.index   |  Bin 0 -> 35792 bytes
.../.plugins/org.eclipse.jdt.core/765977872.index   |  Bin 0 -> 149334 bytes
.../.plugins/org.eclipse.jdt.core/770573466.index   |  Bin 0 -> 19301 bytes
.../.plugins/org.eclipse.jdt.core/84777399.index    |  Bin 0 -> 4219 bytes
.../org.eclipse.jdt.core/externalLibsTimeStamps     |  Bin 0 -> 1533 bytes
.../org.eclipse.jdt.core/invalidArchivesCache       |  Bin 0 -> 4 bytes
.../org.eclipse.jdt.core/javaLikeNames.txt          |   1 +
.../org.eclipse.jdt.core/nonChainingJarsCache       |  Bin 0 -> 1365 bytes
.../org.eclipse.jdt.core/savedIndexNames.txt        |   23 +
.../variablesAndContainers.dat                      |  Bin 0 -> 36675 bytes
.../org.eclipse.jdt.launching/.install.xml          |   4 +
.../org.eclipse.jdt.launching/libraryInfos.xml      |   24 +
.../org.eclipse.jdt.ui/OpenTypeHistory.xml          |   2 +
.../QualifiedTypeNameHistory.xml                    |   2 +
.../org.eclipse.jdt.ui/dialog_settings.xml          |   19 +
.../CSV2MIDI/2013/12/51/refactorings.history        |   4 +
.../CSV2MIDI/2013/12/51/refactorings.index          |   1 +
.../dialog_settings.xml                             |   7 +
.../org.eclipse.ui.workbench/dialog_settings.xml    |   15 +
.../org.eclipse.ui.workbench/workingsets.xml        |   4 +
.metadata/version.ini                               |   1 +
CSV2MIDI/.classpath                                 |   6 +
CSV2MIDI/.project                                   |   17 +
CSV2MIDI/.settings/org.eclipse.jdt.core.prefs       |   11 +
CSV2MIDI/bin/melody/CSV.class                       |  Bin 0 -> 3304 bytes
CSV2MIDI/bin/melody/CSV2MIDI.class                  |  Bin 0 -> 5053 bytes
CSV2MIDI/bin/melody/MessageInfo.class               |  Bin 0 -> 6853 bytes
CSV2MIDI/bin/melody/listInstruments.class           |  Bin 0 -> 1656 bytes
CSV2MIDI/bin/melody/rym2MIDI.class                  |  Bin 0 -> 7199 bytes
MEL2MIDI/.metadata/.lock                            |   0
MEL2MIDI/.metadata/.log                             |   571 ------
.../.history/51/e0132b87ff6500131fd695f2d899ee48    |   193 --
.../.history/7b/a0b94231fb6500131fd695f2d899ee48    |   193 --
.../.history/8f/c0a9aea9066600131fd695f2d899ee48    |   193 --
.../.history/b7/f0a997c4fa6500131fd695f2d899ee48    |   8 -
.../.history/c3/d0600e76fa6500131fd695f2d899ee48    |   7 -
.../.history/f8/900beb58076600131fd695f2d899ee48    |   193 --
.../.projects/Melody/.indexes/af/history.index      |  Bin 70 -> 0 bytes
.../.projects/Melody/.indexes/e4/10/history.index   |  Bin 182 -> 0 bytes
.../.projects/Melody/.indexes/properties.index      |  Bin 80 -> 0 bytes
.../.projects/Melody/.markers                       |  Bin 3645 -> 0 bytes
.../.projects/Melody/.markers.snap                  |  Bin 16 -> 0 bytes
.../.projects/Melody/.syncinfo.snap                 |  Bin 16 -> 0 bytes
.../GitProjectData.properties                       |   3 -
.../Melody/org.eclipse.jdt.core/state.dat           |  Bin 184654 -> 0 bytes
.../.root/.indexes/history.version                  |   1 -
.../.root/.indexes/properties.index                 |  Bin 151 -> 0 bytes
.../.root/.indexes/properties.version               |   1 -
.../org.eclipse.core.resources/.root/.markers.snap  |  Bin 43 -> 0 bytes
.../org.eclipse.core.resources/.root/1.tree         |  Bin 1108 -> 0 bytes
.../.safetable/org.eclipse.core.resources           |  Bin 1065 -> 0 bytes
.../.plugins/org.eclipse.core.resources/.snap       |  Bin 113 -> 0 bytes
```

```
.../.settings/org.eclipse.core.resources.prefs    |   2 -
.../.settings/org.eclipse.debug.ui.prefs          |   3 -
.../.settings/org.eclipse.egit.core.prefs         |   2 -
.../.settings/org.eclipse.help.base.prefs         |   2 -
.../.settings/org.eclipse.jdt.core.prefs          |  11 -
.../.settings/org.eclipse.jdt.launching.prefs     |   2 -
.../.settings/org.eclipse.jdt.ui.prefs            |  16 -
.../.settings/org.eclipse.team.ui.prefs           |   2 -
.../.settings/org.eclipse.ui.browser.prefs        |   2 -
.../.settings/org.eclipse.ui.editors.prefs        |   2 -
.../.settings/org.eclipse.ui.ide.prefs            |   5 -
.../.settings/org.eclipse.ui.prefs                |   2 -
.../.launches/CSV2MIDI.launch                     |  11 -
.../org.eclipse.debug.ui/dialog_settings.xml      |   8 -
.../launchConfigurationHistory.xml                |  23 -
.../org.eclipse.e4.workbench/workbench.xmi        | 2046 --------------------
.../.plugins/org.eclipse.jdt.core/1271342938.index |  Bin 8442 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1384487945.index |  Bin 3689 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1556010009.index |  Bin 5215 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/156905802.index |  Bin 9833 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1819685514.index |  Bin 53602 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/1833648217.index |  Bin 19798 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2326659272.index |  Bin 21328 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/2545238116.index |  Bin 117142 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/272178059.index |  Bin 182658 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3000285004.index |  Bin 11765383 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3004609673.index |  Bin 45494 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3266567714.index |  Bin 29837 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3302703152.index |  Bin 500923 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3321539481.index |  Bin 335071 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3712507179.index |  Bin 442191 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/3954040986.index |  Bin 473925 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4238209716.index |  Bin 558724 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/4249315662.index |  Bin 92792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/450555687.index |  Bin 35792 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/765977872.index |  Bin 149334 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/770573466.index |  Bin 19301 -> 0 bytes
.../.plugins/org.eclipse.jdt.core/84777399.index  |  Bin 4219 -> 0 bytes
.../org.eclipse.jdt.core/externalLibsTimeStamps   |  Bin 1533 -> 0 bytes
.../org.eclipse.jdt.core/indexNamesMap.txt        |   1 -
.../org.eclipse.jdt.core/invalidArchivesCache     |  Bin 4 -> 0 bytes
.../org.eclipse.jdt.core/javaLikeNames.txt        |   1 -
.../org.eclipse.jdt.core/nonChainingJarsCache     |  Bin 1365 -> 0 bytes
.../org.eclipse.jdt.core/savedIndexNames.txt      |   2 -
.../variablesAndContainers.dat                    |  Bin 36659 -> 0 bytes
.../org.eclipse.jdt.launching/.install.xml        |   4 -
.../org.eclipse.jdt.launching/libraryInfos.xml    |  24 -
.../org.eclipse.jdt.ui/OpenTypeHistory.xml        |   2 -
.../QualifiedTypeNameHistory.xml                  |   2 -
.../org.eclipse.jdt.ui/dialog_settings.xml        |  19 -
.../.plugins/org.eclipse.jdt.ui/jdt-images/0.png  |  Bin 283 -> 0 bytes
.../.plugins/org.eclipse.jdt.ui/jdt-images/1.png  |  Bin 509 -> 0 bytes
.../.plugins/org.eclipse.jdt.ui/jdt-images/2.png  |  Bin 210 -> 0 bytes
.../Melody/2013/12/51/refactorings.history        |   4 -
```

```
.../Melody/2013/12/51/refactorings.index        |   1 -
.../dialog_settings.xml                         |   7 -
.../org.eclipse.ui.ide/dialog_settings.xml      |   8 -
.../org.eclipse.ui.workbench/dialog_settings.xml |  17 -
.../org.eclipse.ui.workbench/workingsets.xml    |   4 -
MEL2MIDI/.metadata/version.ini                  |   1 -
MEL2MIDI/Melody/.classpath                      |   6 -
MEL2MIDI/Melody/.gitignore                      |   1 -
MEL2MIDI/Melody/.gitignore                      |   1 -
MEL2MIDI/Melody/.project                        |  17 -
.../Melody/.settings/org.eclipse.jdt.core.prefs |  11 -
MEL2MIDI/Melody/src/melody/CSV.java             |  98 -
MEL2MIDI/Melody/src/melody/CSV2MIDI.java        | 193 --
MEL2MIDI/Melody/src/melody/MessageInfo.java     | 281 ---
MEL2MIDI/Melody/src/melody/listInstruments.java |  33 -
MEL2MIDI/Melody/src/melody/rym2MIDI.java        | 309 ---
MEL2MIDI/README.md                              |   1 -
167 files changed, 3012 insertions(+), 4549 deletions(-)
```

commit 200fbd0ca37146dde4d087cfda25a758b15c623c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:59:33 2013 -0500

    clean

```
.../org.eclipse.e4.workbench/workbench.xmi      | 2698 ++++++++++----------
README.md                                       |    2 -
2 files changed, 1349 insertions(+), 1351 deletions(-)
```

commit dfcae46c1dcdabcbb5b44daedf5d0af88e5464e3
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:58:19 2013 -0500

    clean

```
tests/README.md | 3 +++
1 file changed, 3 insertions(+)
```

commit 78829aac34d29a01d16b0cadfff27c8bb0369286
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:55:54 2013 -0500

    clean

```
.../org.eclipse.e4.workbench/workbench.xmi      | 2698 ++++++++++----------
songs/README.md                                 |    2 +
2 files changed, 1351 insertions(+), 1349 deletions(-)
```

commit 7ca5e0fd67fc747f67a7e6ca645eafaaf8af9d55
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:54:07 2013 -0500

    clean

songs/README.md | 3 +++
1 file changed, 3 insertions(+)

commit a0e425cb76c87eee800de138f215ab124c83ab35
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:50:11 2013 -0500

    clean

 .../org.eclipse.e4.workbench/workbench.xmi | 2698 ++++++++++----------
 test-binop.mc | 76 -
 test-builtinfunc.mc | 92 -
 test-compile.mc | 56 -
 test-concat.mc | 20 -
 test-ctrflow.mc | 38 -
 test-declare.mc | 12 -
 test-expr.mc | 39 -
 test-inter-1.mc | 8 -
 test-selffunc.mc | 19 -
 testctrflow.mc | 22 -
 11 files changed, 1349 insertions(+), 1731 deletions(-)

commit d9642c4cfb3173ad0d85925fa946d1f2fa46ecf9
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:47:07 2013 -0500

    clean

 .../org.eclipse.e4.workbench/workbench.xmi | 2698 ++++++++++----------
 test-interpret.mc | 43 -
 tests/test-binop.mc | 76 +
 tests/test-builtinfunc.mc | 92 +
 tests/test-compile.mc | 56 +
 tests/test-concat.mc | 20 +
 tests/test-ctrflow.mc | 38 +
 tests/test-declare.mc | 12 +
 tests/test-expr.mc | 39 +
 tests/test-inter-1.mc | 8 +
 tests/test-selffunc.mc | 19 +
 tests/testctrflow.mc | 22 +
 12 files changed, 1731 insertions(+), 1392 deletions(-)

commit df6a0a740c125f9e2737d4dd0c397e33d95d56d9
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:41:17 2013 -0500

    clean

 chinese-anthem.mc | 41 --
 merryXmas.mc | 40 ---------------------------------------
 twinkle.mc | 34 ---------------------------------
 3 files changed, 115 deletions(-)

commit 42eb87ac8a32e049861388ce261f547cccba245e

Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:39:53 2013 -0500

    clean

 .../org.eclipse.e4.workbench/workbench.xmi | 2708 ++++++++++----------
 compile | Bin 50581 -> 0 bytes
 songs/chinese-anthem.mc | 41 +
 songs/merryXmas.mc | 40 +
 songs/twinkle.mc | 34 +
 5 files changed, 1469 insertions(+), 1354 deletions(-)

commit f5b776ab00705bb7c13fe3fde9f0c8f28b12d690
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:37:47 2013 -0500

    clean

 .../.projects/Melody/.markers.snap | Bin 5531 -> 16 bytes
 .../.projects/Melody/.syncinfo.snap | Bin 64 -> 16 bytes
 .../org.eclipse.core.resources/.root/.markers.snap | Bin 91 -> 43 bytes
 .../.safetable/org.eclipse.core.resources | Bin 746 -> 1065 bytes
 .../.plugins/org.eclipse.core.resources/.snap | Bin 1566 -> 113 bytes
 .../org.eclipse.e4.workbench/workbench.xmi | 2756 ++++++++++----------
 .../org.eclipse.jdt.core/externalLibsTimeStamps | Bin 4 -> 1533 bytes
 .../variablesAndContainers.dat | Bin 36673 -> 36659 bytes
 chinese-anthem.mc | 41 +
 test-chinese-anthem.mc | 41 -
 10 files changed, 1466 insertions(+), 1372 deletions(-)

commit 89b2c1cb93718bfc5a3f89d6c278f224c29c4e19
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:33:51 2013 -0500

    clean

 MEL2MIDI/.metadata/.log | 10 ++
 MEL2MIDI/CSV.class | Bin 2844 -> 0 bytes
 MEL2MIDI/CSV.java | 98 -------------
 MEL2MIDI/CSV2MIDI.class | Bin 4128 -> 0 bytes
 MEL2MIDI/CSV2MIDI.java | 193 ------------------------
 MEL2MIDI/ExampleMIDI.csv | 57 --------
 MEL2MIDI/ExampleMIDI.midi | Bin 302 -> 0 bytes
 MEL2MIDI/ExampleMIDI_backup.csv | 57 --------
 MEL2MIDI/MessageInfo.class | Bin 5777 -> 0 bytes
 MEL2MIDI/MessageInfo.java | 281 -----------------------------------
 MEL2MIDI/listInstruments.class | Bin 1406 -> 0 bytes
 MEL2MIDI/listInstruments.java | 33 -----
 MEL2MIDI/rym2MIDI.class | Bin 5071 -> 0 bytes
 MEL2MIDI/rym2MIDI.java | 309 --------------------------------------
 14 files changed, 10 insertions(+), 1028 deletions(-)

commit f0ed1492069f9215946ae344bdd205e9335d27cf
Author: morrisyoung <sdmorrisys@gmail.com>

Date: Sun Dec 15 23:27:09 2013 -0500

    clean

 melody.csv | 29 ----------------------------
 1 file changed, 29 deletions(-)

commit 910d137756fc6bcd1a437ee535949a9a9cf793f6
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:26:09 2013 -0500

    clean

 .gitignore | 3 +
 CSV.java | 98 -
 CSV2MIDI.java | 193 --
 .../.projects/Melody/.indexes/e4/10/history.index | Bin 0 -> 182 bytes
 .../.projects/Melody/.markers | Bin 0 -> 3645 bytes
 .../Melody/org.eclipse.jdt.core/state.dat | Bin 0 -> 184654 bytes
 .../.root/.indexes/history.version | 1 +
 .../.root/.indexes/properties.index | Bin 108 -> 151 bytes
 .../.root/.indexes/properties.version | 1 +
 .../org.eclipse.core.resources/.root/1.tree | Bin 0 -> 1108 bytes
 .../.safetable/org.eclipse.core.resources | Bin 1124 -> 746 bytes
 .../.settings/org.eclipse.team.ui.prefs | 2 +
 .../.settings/org.eclipse.ui.editors.prefs | 2 +
 .../.settings/org.eclipse.ui.ide.prefs | 5 +
 .../org.eclipse.debug.ui/dialog_settings.xml | 8 +
 .../org.eclipse.e4.workbench/workbench.xmi | 2799 ++++++++++----------
 .../org.eclipse.jdt.core/externalLibsTimeStamps | Bin 1533 -> 4 bytes
 .../org.eclipse.jdt.core/indexNamesMap.txt | 1 +
 .../org.eclipse.jdt.core/invalidArchivesCache | Bin 0 -> 4 bytes
 .../org.eclipse.jdt.core/nonChainingJarsCache | Bin 0 -> 1365 bytes
 .../org.eclipse.jdt.core/savedIndexNames.txt | 21 -
 .../org.eclipse.jdt.ui/OpenTypeHistory.xml | 2 +
 .../QualifiedTypeNameHistory.xml | 2 +
 .../org.eclipse.jdt.ui/dialog_settings.xml | 19 +
 .../dialog_settings.xml | 7 +
 .../org.eclipse.ui.ide/dialog_settings.xml | 8 +
 .../org.eclipse.ui.workbench/dialog_settings.xml | 17 +
 MessageInfo.java | 281 --
 listInstruments.java | 33 -
 melody | Bin 133065 -> 133061 bytes
 melody.csv | 23 +-
 merryXmas.ml | 23 -
 twinkle.midi | Bin 238 -> 0 bytes
 33 files changed, 1411 insertions(+), 2138 deletions(-)

commit 211da40a396349a99c65bcf60e49589e159df627
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:13:32 2013 -0500

    add instru

compile.ml | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit f4cb05266eb4b5e665ab1a9aeb4812ed3e15040c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:12:49 2013 -0500

    add instru

 compile.ml | 5 ++--
 melody | Bin 132917 -> 133065 bytes
 melody.csv | 94 +++++++++++++++++++++++++++-----------------------------
 3 files changed, 50 insertions(+), 49 deletions(-)

commit 9171ffcffed7961be3378f69b16066c993e2087c
Merge: 9ae2313 3c103b0
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:10:23 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 9ae2313abc4d1412d8916799b8093cea147084a3
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 23:10:17 2013 -0500

    anthem

 .../.history/8f/c0a9aea9066600131fd695f2d899ee48 | 193 ++
 .../.history/f8/900beb58076600131fd695f2d899ee48 | 193 ++
 .../.projects/Melody/.markers.snap | Bin 4672 -> 5531 bytes
 .../.projects/Melody/.syncinfo.snap | Bin 48 -> 64 bytes
 .../org.eclipse.core.resources/.root/.markers.snap | Bin 75 -> 91 bytes
 .../.safetable/org.eclipse.core.resources | Bin 814 -> 1124 bytes
 .../.plugins/org.eclipse.core.resources/.snap | Bin 1351 -> 1566 bytes
 .../org.eclipse.e4.workbench/workbench.xmi | 2718 ++++++++++----------
 .../.plugins/org.eclipse.jdt.ui/jdt-images/1.png | Bin 0 -> 509 bytes
 .../.plugins/org.eclipse.jdt.ui/jdt-images/2.png | Bin 0 -> 210 bytes
 MEL2MIDI/ExampleMIDI.csv | 88 +-
 MEL2MIDI/ExampleMIDI_backup.csv | 57 +
 MEL2MIDI/Melody/src/melody/CSV2MIDI.java | 4 +-
 melody.csv | 82 +-
 merryXmas.mc | 40 +
 merryXmas.ml | 23 +
 test-chinese-anthem.mc | 26 +-
 17 files changed, 1983 insertions(+), 1441 deletions(-)

commit 3c103b08f22d4c7de91ea349079967633ef0665b
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Dec 15 23:09:59 2013 -0500

    hehe

 compile.ml | 4 +++-
 1 file changed, 3 insertions(+), 1 deletion(-)

commit 87273d6c2839a87eeac2c26a709e92a235ad4eb2
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 22:23:11 2013 -0500

    he

 .../.history/51/e0132b87ff6500131fd695f2d899ee48 | 193 ++
 .../.projects/Melody/.markers.snap | Bin 3813 -> 4672 bytes
 .../.projects/Melody/.syncinfo.snap | Bin 32 -> 48 bytes
 .../org.eclipse.core.resources/.root/.markers.snap | Bin 59 -> 75 bytes
 .../.safetable/org.eclipse.core.resources | Bin 504 -> 814 bytes
 .../.plugins/org.eclipse.core.resources/.snap | Bin 1136 -> 1351 bytes
 .../.settings/org.eclipse.debug.ui.prefs | 1 +
 .../org.eclipse.e4.workbench/workbench.xmi | 2714 ++++++++++----------
 .../.plugins/org.eclipse.jdt.core/1556010009.index | Bin 5215 -> 5215 bytes
 MEL2MIDI/Melody/src/melody/CSV2MIDI.java | 2 +-
 melody | Bin 132917 -> 132917 bytes
 test-chinese-anthem.mc | 21 +
 12 files changed, 1573 insertions(+), 1358 deletions(-)

commit f98669fd48f3ee5c5dc7316c55d363afd6a17056
Merge: f852873 b407ae9
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 22:12:04 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit b407ae9b032f822c437946a5d19c40f7c6e3db7b
Author: lljjssljsljs <493926113@qq.com>
Date: Sun Dec 15 22:06:10 2013 -0500

    >200

 compile.ml | 506 +---
 1 file changed, 1 insertion(+), 505 deletions(-)

commit f852873bebd1e50a2c4fefc42d8c02d338e29c2c
Merge: 423ee59 093916a
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 22:05:03 2013 -0500

    working on java

commit 423ee596fbb8eb0002ae4f7e7c99a07ff6a7632e
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 21:43:49 2013 -0500

    add mel2modi

 MEL2MIDI/.metadata/.lock | 0
 MEL2MIDI/.metadata/.log | 561 ++++++
 .../.history/7b/a0b94231fb6500131fd695f2d899ee48 | 193 ++
 .../.history/b7/f0a997c4fa6500131fd695f2d899ee48 | 8 +

```
.../.history/c3/d0600e76fa6500131fd695f2d899ee48   |   7 +
.../.projects/Melody/.indexes/af/history.index     | Bin 0 -> 70 bytes
.../.projects/Melody/.indexes/properties.index     | Bin 0 -> 80 bytes
.../.projects/Melody/.markers.snap                 | Bin 0 -> 3813 bytes
.../.projects/Melody/.syncinfo.snap                | Bin 0 -> 32 bytes
.../GitProjectData.properties                      |   3 +
.../.root/.indexes/properties.index                | Bin 0 -> 108 bytes
.../org.eclipse.core.resources/.root/.markers.snap | Bin 0 -> 59 bytes
.../.safetable/org.eclipse.core.resources          | Bin 0 -> 504 bytes
.../plugins/org.eclipse.core.resources/.snap       | Bin 0 -> 1136 bytes
.../.settings/org.eclipse.core.resources.prefs     |   2 +
.../.settings/org.eclipse.debug.ui.prefs           |   2 +
.../.settings/org.eclipse.egit.core.prefs          |   2 +
.../.settings/org.eclipse.help.base.prefs          |   2 +
.../.settings/org.eclipse.jdt.core.prefs           |  11 +
.../.settings/org.eclipse.jdt.launching.prefs      |   2 +
.../.settings/org.eclipse.jdt.ui.prefs             |  16 +
.../.settings/org.eclipse.ui.browser.prefs         |   2 +
.../.settings/org.eclipse.ui.prefs                 |   2 +
.../.launches/CSV2MIDI.launch                      |  11 +
.../launchConfigurationHistory.xml                 |  23 +
.../org.eclipse.e4.workbench/workbench.xmi         | 2087 +++++++++++++++++++++
.../.plugins/org.eclipse.jdt.core/1271342938.index | Bin 0 -> 8442 bytes
.../.plugins/org.eclipse.jdt.core/1384487945.index | Bin 0 -> 3689 bytes
.../.plugins/org.eclipse.jdt.core/1556010009.index | Bin 0 -> 5215 bytes
.../.plugins/org.eclipse.jdt.core/156905802.index  | Bin 0 -> 9833 bytes
.../.plugins/org.eclipse.jdt.core/1819685514.index | Bin 0 -> 53602 bytes
.../.plugins/org.eclipse.jdt.core/1833648217.index | Bin 0 -> 19798 bytes
.../.plugins/org.eclipse.jdt.core/2326659272.index | Bin 0 -> 21328 bytes
.../.plugins/org.eclipse.jdt.core/2545238116.index | Bin 0 -> 117142 bytes
.../.plugins/org.eclipse.jdt.core/272178059.index  | Bin 0 -> 182658 bytes
.../.plugins/org.eclipse.jdt.core/3000285004.index | Bin 0 -> 11765383 bytes
.../.plugins/org.eclipse.jdt.core/3004609673.index | Bin 0 -> 45494 bytes
.../.plugins/org.eclipse.jdt.core/3266567714.index | Bin 0 -> 29837 bytes
.../.plugins/org.eclipse.jdt.core/3302703152.index | Bin 0 -> 500923 bytes
.../.plugins/org.eclipse.jdt.core/3321539481.index | Bin 0 -> 335071 bytes
.../.plugins/org.eclipse.jdt.core/3712507179.index | Bin 0 -> 442191 bytes
.../.plugins/org.eclipse.jdt.core/3954040986.index | Bin 0 -> 473925 bytes
.../.plugins/org.eclipse.jdt.core/4238209716.index | Bin 0 -> 558724 bytes
.../.plugins/org.eclipse.jdt.core/4249315662.index | Bin 0 -> 92792 bytes
.../.plugins/org.eclipse.jdt.core/450555687.index  | Bin 0 -> 35792 bytes
.../.plugins/org.eclipse.jdt.core/765977872.index  | Bin 0 -> 149334 bytes
.../.plugins/org.eclipse.jdt.core/770573466.index  | Bin 0 -> 19301 bytes
.../.plugins/org.eclipse.jdt.core/84777399.index   | Bin 0 -> 4219 bytes
.../org.eclipse.jdt.core/externalLibsTimeStamps    | Bin 0 -> 1533 bytes
.../org.eclipse.jdt.core/javaLikeNames.txt         |   1 +
.../org.eclipse.jdt.core/savedIndexNames.txt       |  23 +
.../variablesAndContainers.dat                     | Bin 0 -> 36673 bytes
...skipping...
.../Melody/2013/12/51/refactorings.history         |   4 +
.../Melody/2013/12/51/refactorings.index           |   1 +
.../org.eclipse.ui.workbench/workingsets.xml       |   4 +
MEL2MIDI/.metadata/version.ini                     |   1 +
MEL2MIDI/CSV.class                                 | Bin 0 -> 2844 bytes
```

```
MEL2MIDI/CSV.java                          |  98 +
MEL2MIDI/CSV2MIDI.class                    |  Bin 0 -> 4128 bytes
MEL2MIDI/CSV2MIDI.java                     | 193 ++
MEL2MIDI/ExampleMIDI.csv                   |  57 +
MEL2MIDI/ExampleMIDI.midi                  |  Bin 0 -> 302 bytes
MEL2MIDI/Melody/.classpath                 |   6 +
MEL2MIDI/Melody/.gitignore                 |   1 +
MEL2MIDI/Melody/.project                   |  17 +
.../Melody/.settings/org.eclipse.jdt.core.prefs   |  11 +
MEL2MIDI/Melody/src/melody/CSV.java        |  98 +
MEL2MIDI/Melody/src/melody/CSV2MIDI.java   | 193 ++
MEL2MIDI/Melody/src/melody/MessageInfo.java | 281 +++
.../Melody/2013/12/51/refactorings.history |   4 +
.../Melody/2013/12/51/refactorings.index   |   1 +
.../org.eclipse.ui.workbench/workingsets.xml |   4 +
MEL2MIDI/.metadata/version.ini             |   1 +
MEL2MIDI/CSV.class                         |  Bin 0 -> 2844 bytes
MEL2MIDI/CSV.java                          |  98 +
MEL2MIDI/CSV2MIDI.class                    |  Bin 0 -> 4128 bytes
MEL2MIDI/CSV2MIDI.java                     | 193 ++
MEL2MIDI/ExampleMIDI.csv                   |  57 +
MEL2MIDI/ExampleMIDI.midi                  |  Bin 0 -> 302 bytes
MEL2MIDI/Melody/.classpath                 |   6 +
MEL2MIDI/Melody/.gitignore                 |   1 +
MEL2MIDI/Melody/.project                   |  17 +
.../Melody/.settings/org.eclipse.jdt.core.prefs   |  11 +
MEL2MIDI/Melody/src/melody/CSV.java        |  98 +
MEL2MIDI/Melody/src/melody/CSV2MIDI.java   | 193 ++
MEL2MIDI/Melody/src/melody/MessageInfo.java | 281 +++
MEL2MIDI/Melody/src/melody/listInstruments.java |  33 +
MEL2MIDI/Melody/src/melody/rym2MIDI.java   | 309 +++
MEL2MIDI/MessageInfo.class                 |  Bin 0 -> 5777 bytes
MEL2MIDI/MessageInfo.java                  | 281 +++
MEL2MIDI/listInstruments.class             |  Bin 0 -> 1406 bytes
MEL2MIDI/listInstruments.java              |  33 +
MEL2MIDI/rym2MIDI.class                    |  Bin 0 -> 5071 bytes
MEL2MIDI/rym2MIDI.java                     | 309 +++
melody                                     | Bin 132881 -> 132917 bytes
81 files changed, 4916 insertions(+)


.../.history/c3/d0600e76fa6500131fd695f2d899ee48 |   7 +
.../.projects/Melody/.indexes/af/history.index   |  Bin 0 -> 70 bytes
.../.projects/Melody/.indexes/properties.index   |  Bin 0 -> 80 bytes
.../.projects/Melody/.markers.snap               |  Bin 0 -> 3813 bytes
.../.projects/Melody/.syncinfo.snap              |  Bin 0 -> 32 bytes
.../GitProjectData.properties                    |   3 +
.../.root/.indexes/properties.index              |  Bin 0 -> 108 bytes
.../org.eclipse.core.resources/.root/.markers.snap | Bin 0 -> 59 bytes
.../.safetable/org.eclipse.core.resources        |  Bin 0 -> 504 bytes
.../.plugins/org.eclipse.core.resources/.snap    |  Bin 0 -> 1136 bytes
.../.settings/org.eclipse.core.resources.prefs   |   2 +
.../.settings/org.eclipse.debug.ui.prefs         |   2 +
.../.settings/org.eclipse.egit.core.prefs        |   2 +
```

```
.../.settings/org.eclipse.help.base.prefs        |    2 +
.../.settings/org.eclipse.jdt.core.prefs        |   11 +
.../.settings/org.eclipse.jdt.launching.prefs   |    2 +
.../.settings/org.eclipse.jdt.ui.prefs          |   16 +
.../.settings/org.eclipse.ui.browser.prefs      |    2 +
.../.settings/org.eclipse.ui.prefs              |    2 +
.../.launches/CSV2MIDI.launch                   |   11 +
.../launchConfigurationHistory.xml              |   23 +
.../org.eclipse.e4.workbench/workbench.xmi      | 2087 +++++++++++++++++++
.../.plugins/org.eclipse.jdt.core/1271342938.index | Bin 0 -> 8442 bytes
.../.plugins/org.eclipse.jdt.core/1384487945.index | Bin 0 -> 3689 bytes
.../.plugins/org.eclipse.jdt.core/1556010009.index | Bin 0 -> 5215 bytes
.../.plugins/org.eclipse.jdt.core/156905802.index  | Bin 0 -> 9833 bytes
.../.plugins/org.eclipse.jdt.core/1819685514.index | Bin 0 -> 53602 bytes
.../.plugins/org.eclipse.jdt.core/1833648217.index | Bin 0 -> 19798 bytes
.../.plugins/org.eclipse.jdt.core/2326659272.index | Bin 0 -> 21328 bytes
.../.plugins/org.eclipse.jdt.core/2545238116.index | Bin 0 -> 117142 bytes
.../.plugins/org.eclipse.jdt.core/272178059.index  | Bin 0 -> 182658 bytes
.../.plugins/org.eclipse.jdt.core/3000285004.index | Bin 0 -> 11765383 bytes
.../.plugins/org.eclipse.jdt.core/3004609673.index | Bin 0 -> 45494 bytes
.../.plugins/org.eclipse.jdt.core/3266567714.index | Bin 0 -> 29837 bytes
.../.plugins/org.eclipse.jdt.core/3302703152.index | Bin 0 -> 500923 bytes
.../.plugins/org.eclipse.jdt.core/3321539481.index | Bin 0 -> 335071 bytes
.../.plugins/org.eclipse.jdt.core/3712507179.index | Bin 0 -> 442191 bytes
.../.plugins/org.eclipse.jdt.core/3954040986.index | Bin 0 -> 473925 bytes
.../.plugins/org.eclipse.jdt.core/4238209716.index | Bin 0 -> 558724 bytes
.../.plugins/org.eclipse.jdt.core/4249315662.index | Bin 0 -> 92792 bytes
.../.plugins/org.eclipse.jdt.core/450555687.index  | Bin 0 -> 35792 bytes
.../.plugins/org.eclipse.jdt.core/765977872.index  | Bin 0 -> 149334 bytes
.../.plugins/org.eclipse.jdt.core/770573466.index  | Bin 0 -> 19301 bytes
.../.plugins/org.eclipse.jdt.core/84777399.index   | Bin 0 -> 4219 bytes
.../org.eclipse.jdt.core/externalLibsTimeStamps    | Bin 0 -> 1533 bytes
.../org.eclipse.jdt.core/javaLikeNames.txt         |    1 +
.../org.eclipse.jdt.core/savedIndexNames.txt       |   23 +
.../variablesAndContainers.dat                     | Bin 0 -> 36673 bytes
...skipping...
.../Melody/2013/12/51/refactorings.history         |    4 +
.../Melody/2013/12/51/refactorings.index           |    1 +
.../org.eclipse.ui.workbench/workingsets.xml        |    4 +
MEL2MIDI/.metadata/version.ini                     |    1 +
MEL2MIDI/CSV.class                                 | Bin 0 -> 2844 bytes
MEL2MIDI/CSV.java                                  |   98 +
MEL2MIDI/CSV2MIDI.class                            | Bin 0 -> 4128 bytes
MEL2MIDI/CSV2MIDI.java                             |  193 ++
MEL2MIDI/ExampleMIDI.csv                           |   57 +
MEL2MIDI/ExampleMIDI.midi                          | Bin 0 -> 302 bytes
MEL2MIDI/Melody/.classpath                         |    6 +
MEL2MIDI/Melody/.gitignore                         |    1 +
MEL2MIDI/Melody/.project                           |   17 +
.../Melody/.settings/org.eclipse.jdt.core.prefs    |   11 +
MEL2MIDI/Melody/src/melody/CSV.java                |   98 +
MEL2MIDI/Melody/src/melody/CSV2MIDI.java           |  193 ++
MEL2MIDI/Melody/src/melody/MessageInfo.java        |  281 +++
MEL2MIDI/Melody/src/melody/listInstruments.java    |   33 +
```

```
MEL2MIDI/Melody/src/melody/rym2MIDI.java        | 309 +++
MEL2MIDI/MessageInfo.class                      | Bin 0 -> 5777 bytes
MEL2MIDI/MessageInfo.java                       | 281 +++
MEL2MIDI/listInstruments.class                  | Bin 0 -> 1406 bytes
MEL2MIDI/listInstruments.java                   | 33 +
MEL2MIDI/rym2MIDI.class                         | Bin 0 -> 5071 bytes
MEL2MIDI/rym2MIDI.java                          | 309 +++
melody                                          | Bin 132881 -> 132917 bytes
81 files changed, 4916 insertions(+)
```

commit 093916a53ab4b8f55a7f049ea7ffbce4349a1f73
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Dec 15 21:19:03 2013 -0500

    aa

```
 twinkle.mc   | 34 ++++++++++++++++++++++++++++++
 twinkle.midi | Bin 0 -> 238 bytes
 2 files changed, 34 insertions(+)
```

commit 3fa3001ecd5d3f0b9353b55ff187093627104342
Merge: f80d122 76df36f
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Dec 15 21:17:19 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

    Conflicts:
        compile.ml

commit f80d122b579f84336f1ee875efcebb7fd007d85f
Merge: dedcc53 8e57bbd
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Dec 15 21:15:06 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

    Conflicts:
        compile.ml

commit 76df36fa9fc91f3549755f523f16513a8309cac0
Author: lljjssljsljs <493926113@qq.com>
Date: Sun Dec 15 21:14:30 2013 -0500

    modify how to deal with rest

```
 compile.ml | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)
```

commit dedcc5328dad1e15498fddde634cbcb17f8358cf
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Dec 15 20:54:59 2013 -0500

    add speed attribute to track

compile.ml | 7 +++++--
 1 file changed, 5 insertions(+), 2 deletions(-)

commit 8e57bbd145e9e3876518ca5774f367baa3c5a77f
Author: lljjssljsljs <493926113@qq.com>
Date: Sun Dec 15 20:49:49 2013 -0500

    add java files
...skipping...
 listInstruments.java | 33 ++++++
 4 files changed, 605 insertions(+)

commit 952ea2e34ca8f1e3349e88ae6facee7d41b132a6
Author: lljjssljsljs <493926113@qq.com>
Date: Sun Dec 15 20:43:20 2013 -0500

    Modify the speed attribute

 compile.ml | 3 ++-
 1 file changed, 2 insertions(+), 1 deletion(-)

commit e28b9eb9449e7c5b4294d079be6cdc5ef6b9a281
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 14:02:12 2013 -0500

    revise

 compile.ml | 1 -
 1 file changed, 1 deletion(-)

commit ca8572599b89a35bc6606c484ebf2aa7036f68ed
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 13:54:14 2013 -0500

    change the instrument to ID

 compile.ml | 2 +-
 melody | Bin 144829 -> 132881 bytes
 parser.mly | 4 ++--
 scanner.mll | 2 +-
 4 files changed, 4 insertions(+), 4 deletions(-)

commit 34536eed87ad29a8afb7c3d8498c61fc20501f1b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 02:05:21 2013 -0500

    we are nearly done:)

 ast.ml | 3 +-
 compile.ml | 95 +++++++++++++++++-------------------------------------
 melody | Bin 123574 -> 144829 bytes
 melody.csv | 38 ++++++++++++----------
 parser.mly | 44 +++----------------------

```
scanner.mll     |   6 ++--
test-compile.mc |   2 ++
7 files changed, 59 insertions(+), 129 deletions(-)
```

commit 2cc80b2386ac6a247c24badb9068525aace97426
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 15 01:12:51 2013 -0500

    q

```
compile.ml      | 23 ++++++----------------
melody          | Bin 145621 -> 123574 bytes
test-compile.mc |  11 ++++++-----
3 files changed, 12 insertions(+), 22 deletions(-)
```

commit c5328cf5a6c64e18280987468c02a390ae371a50
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 23:14:05 2013 -0500

    test

```
compile.ml       | 127 +++++++++++++++++++++++++++++---------------------
melody           | Bin 122272 -> 145621 bytes
melody.csv       |  18 ++++++++
test-builtinfunc.mc |   4 +-
4 files changed, 94 insertions(+), 55 deletions(-)
```

commit e6741a830ad4125e200a5f83bc7b1ef2fe37a337
Merge: 4b6284c 43b27ba
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 22:14:06 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 4b6284cc1056eb53777bbaf16dee47b6ea3be969
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 22:14:03 2013 -0500

    add string_of_track and melody

```
compile.ml |   6 +++---
melody     | Bin 110332 -> 122272 bytes
2 files changed, 3 insertions(+), 3 deletions(-)
```

commit 43b27ba7bbabd8f2c9b5ade837c9c9b8479491fc
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Dec 14 22:13:33 2013 -0500

    add rest

```
compile.ml | 3 ++-
1 file changed, 2 insertions(+), 1 deletion(-)
```

commit c7371e8ca0587e3f4a9a89b1adc0e498440a63dd

Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 21:43:14 2013 -0500

    rm some unnecessary files

 open.ml | 65 ---
 open3.ml | 63 ---
 2 files changed, 128 deletions(-)

commit 4a8aee6d1a5308a74a2a3dfe056c7b6cef3cfee9
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 21:41:39 2013 -0500

    delete some unuseful files

 example2.csv | 22 ---------------------
 open | Bin 50575 -> 0 bytes
 2 files changed, 22 deletions(-)

commit 7fdc1a34a81a746e84acb8e4c0e8ba86a39b07a2
Merge: 351e560 10b99b8
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Dec 14 21:39:01 2013 -0500

    aa

commit 351e56018e801846a9ac465bffec2f415e565924
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Dec 14 21:38:11 2013 -0500

    match instrument

 compile.ml | 14 +++++++++++---
 scanner.mll | 2 +-
 2 files changed, 12 insertions(+), 4 deletions(-)

commit 10b99b8f3af88c5f4905a83f24d7698b47263544
Merge: 4d159ca e2dda03
...skipping...
    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 4d159cac88d08d34299a9e9c2b5a698f33187208
Author: lljjssljsljs <493926113@qq.com>
Date: Sat Dec 14 21:35:55 2013 -0500

    convert to CSV

 open3.ml | 63 +++
 1 file changed, 63 insertions(+)

commit e2dda030dd0d67711074669a7c53ae66a6769695
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 21:27:19 2013 -0500

match instruments

```
compile.ml |  9 +++++----
melody     | Bin 110335 -> 110332 bytes
2 files changed, 5 insertions(+), 4 deletions(-)
```

commit c1dd5180ee1e905125a6c21f279143450ed700a4
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 21:16:23 2013 -0500

　　working on the track's attributes

```
ast.ml           |  8 ++---
compile.ml       | 88 ++++++++++++++++++++++++++++++++++++++-------------------
melody           | Bin 130300 -> 110335 bytes
parser.mly       | 10 ++++--
scanner.mll      |  1 +
test-builtinfunc.mc |  4 +--
test-compile.mc   | 12 ++++---
7 files changed, 78 insertions(+), 45 deletions(-)
```

commit 59f3f23c40e6c1d4e3ff9d80f9b36738317dada9
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 14 14:22:50 2013 -0500

　　tiny problem

```
ast.ml     |  2 +-
compile.ml | 16 ++++++++--------
parser.mly |  5 +++--
3 files changed, 12 insertions(+), 11 deletions(-)
```

commit 09efe6a9852fef17513e64cff9a4ae7d9d791d89
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 23:43:02 2013 -0500

　　add attributes

```
ast.ml     |  3 +++
compile.ml | 17 +++++++++-------
parser.mly |  4 ++--
3 files changed, 15 insertions(+), 9 deletions(-)
```

commit 412c824d3563fbd511499b89258de0054ad45c0e
Merge: bd361e0 17af431
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 23:24:54 2013 -0500

　　Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit bd361e0ac41ed6b2c1dc32cad640f8c39d8fb349
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 23:24:51 2013 -0500

add attributes of track

ast.ml | 2 +-
compile.ml | 11 +++++++++-
2 files changed, 11 insertions(+), 2 deletions(-)

commit 17af431f5a9fc80fdcf9f0be7fd456eff4b46565
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 13 22:50:34 2013 -0500

    delete bar attr

ast.ml | 3 +--
parser.mly | 3 ---
scanner.mll | 3 +--
3 files changed, 2 insertions(+), 7 deletions(-)

commit 4986b5daee3e9f0b0f25ea0756e39144eca566e8
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 13 22:49:47 2013 -0500

    delete bar attr

test-builtinfunc.mc | 10 +++++++---
test-concat.mc | 2 +-
...skipping...
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 22:06:09 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 12ae9b5bea6d6e454fb022ab29d93436bffc5ed6
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 22:06:04 2013 -0500

    testing pass

compile | Bin 0 -> 50581 bytes
compile.ml | 71 +++----
example2.csv | 22 ++++++++++++++++++
melody | Bin 109879 -> 130300 bytes
open | Bin 0 -> 50575 bytes
open.ml | 65 +++
scanner.mll | 2 +-
test-compile.mc | 8 ++++---
8 files changed, 159 insertions(+), 9 deletions(-)

commit 53b54047c4107c1d3b238ad532b5f16e4d4c4ca6
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 13 21:06:57 2013 -0500

    test cases

test-builtinfunc.mc | 88 ++

```
test-selffunc.mc    | 16 ++++++++++
2 files changed, 104 insertions(+)


commit 27009235ba74c6da8e7d4025e766ff846be4f147
Merge: c0a9990 7c94156
Author: getonggetong <getong.1016@gmail.com>
...skipping...
    Merge branch 'master' of github.com:morrisyoung/PLT_Melody


commit c0a999077f96cca3c9d4ad0647be4daade84b229
Author: getonggetong <getong.1016@gmail.com>
Date:   Fri Dec 13 20:14:09 2013 -0500

    test case for binop

 test-binop.mc | 44 ++++++++++++++++++++++++++++++++++++++++++++++
 1 file changed, 44 insertions(+)


commit 7c94156a5f7b6a4ba41c1836fbb1da2f7a1de37d
Merge: f6bb090 e419c9f
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Fri Dec 13 20:11:21 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody


commit f6bb090aaef6a72786c8b1c959b6f72f3ff80cfb
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Fri Dec 13 20:10:57 2013 -0500

    done checking function input arguments' types

 ast.ml        |  8 ++------
 compile.ml    | 10 +++++++---
 melody        | Bin 109353 -> 109879 bytes
 parser.mly    |  4 ++--
 test-compile.mc |  2 +-
 5 files changed, 12 insertions(+), 12 deletions(-)


commit e419c9f7e8e12091b933e1cc2fdbea0feec477ad
Author: getonggetong <getong.1016@gmail.com>
Date:   Fri Dec 13 19:59:45 2013 -0500

    test case for concatination

 test-concat.mc | 20 ++++++++++++++++++++
 1 file changed, 20 insertions(+)


commit 2d726ca5ca5b2c9bf319d1dffd72cb8b8d96d4cd
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Fri Dec 13 15:49:35 2013 -0500

    solve func_decl.fbodys printing problem

 ast.ml |  49 +++++------------------------------------
```

melody | Bin 108959 -> 109353 bytes
2 files changed, 5 insertions(+), 44 deletions(-)

commit 1f8a8941161bf8511d39e432e78cde793ed2a0fc
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 15:43:02 2013 -0500

    solve the local-stmt-local-stmt problem

 ast.ml | 7 +++++--
 compile.ml | 8 ++++++--
 melody | Bin 109293 -> 108959 bytes
 parser.mly | 12 ++++++------
 test-compile.mc | 3 ++-
 5 files changed, 19 insertions(+), 11 deletions(-)

commit 7ef10033a9021eac68405dbac563e471eba18103
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 06:05:47 2013 -0500

    done fucntion return type check, and assignment type check.

 compile.ml | 44 ++------
 melody | Bin 107600 -> 109293 bytes
 test-compile.mc | 1 +
 3 files changed, 39 insertions(+), 6 deletions(-)

commit f7933a2f774144cb9fe54501b1659574bfb6938f
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 04:26:37 2013 -0500

    solve the function return value problem. main function can return a melody now

 compile.ml | 13 +++++++------
 melody | Bin 107540 -> 107600 bytes
 test-compile.mc | 2 ++
 3 files changed, 9 insertions(+), 6 deletions(-)

commit e4bfd10364e40e8deb0e8e0242e00266ed973084
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 03:43:07 2013 -0500

    q

 README.md | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 051a8c4958237ad83e142dcf8451a82176f219ba
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 03:41:44 2013 -0500

    clean

 README.md | 2 ++

1 file changed, 2 insertions(+)

commit 9ef4aca5ff8018d46487bc9fe487ebc2d76e92a4
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 03:38:36 2013 -0500

    clean

 README.md | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit c59896ce586fa7df03775c8454398fc961b7ef67
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 03:37:54 2013 -0500

    clean the workbench

 README.md | 8 ++++----
 1 file changed, 4 insertions(+), 4 deletions(-)

commit 000a50c85e24da9f6dfcb85cf4f3b4285fb0352e
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 03:31:43 2013 -0500

    clean the codes and comments

 compile.ml | 138 +++++++++++--
 melody | Bin 107542 -> 107540 bytes
 melody.ml | 17 ++-----
 test-compile.mc | 43 +++++++++++++++++
 4 files changed, 71 insertions(+), 127 deletions(-)

commit 1c3e31360244dde4c61752faaa87ae65f778ec42
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 03:10:59 2013 -0500

    q

 interpret.ml | 470 --
 1 file changed, 470 deletions(-)

commit 9758efa03b72fce04a3a5e5b4829c148ab0045db
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 03:10:00 2013 -0500

    delete

 Makefile | 16 +--
 compile.ml | 470 ++
 2 files changed, 478 insertions(+), 8 deletions(-)

commit 1af42b2321ff9512ee364f1ee0b1308d3a1d2f64
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 02:59:09 2013 -0500

remove some unnecessary files

```
bytecode.ml | 135 ---------------------------------------
compile.ml  | 202 -----------------------------------------------------------
execute.ml  | 127 -------------------------------------
3 files changed, 464 deletions(-)
```

commit ae6bf06af049d6b7a71c7c52d83d10716c18478e
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 02:56:27 2013 -0500

    remove some files

```
function melody main() { |  3 ---
  hehe                   |  3 ---
  reftable.ml            | 59 ----------------------------------------------
3 files changed, 65 deletions(-)
```

commit 77c90b5f15c757380b775f8fd7c9a5a55160ec20
Merge: 3794d09 9fc3b7c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 13 02:54:13 2013 -0500

    q

commit 9fc3b7c10ea2cb015416ca5de5c6bc86ec395a4d
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 12 23:41:02 2013 -0500

    on testing

```
interpret.ml | 6 +++---
1 file changed, 3 insertions(+), 3 deletions(-)
```

commit a621c6629b3b84d4b364ec5c148d9e573f04ae69
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 12 23:40:45 2013 -0500

    test case for binary operation

```
test-binop.mc | 32 ++++++++++++++++++++++++++++++++
1 file changed, 32 insertions(+)
```

commit 3794d09350f6b5b8884efce28b58b81984f159f9
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 23:40:37 2013 -0500

    solve the function call problem

```
hehe             |  1 +
interpret.ml     |  4 ++--
melody           | Bin 107326 -> 107458 bytes
test-interpret.mc |  15 +++++++++++++--
```

4 files changed, 16 insertions(+), 4 deletions(-)

commit 08372f7707190b08306a4c05b6962d60997bcf4b
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 12 23:18:19 2013 -0500

    test case for control_flow

 test-ctrflow.mc | 42 ++++++++++++++++++++++++++++++------------
 1 file changed, 29 insertions(+), 13 deletions(-)

commit d1d3cfcfb96fc63264e1675abd6737422d1b8680
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 12 23:06:48 2013 -0500

    bool

 interpret.ml | 431 ++------
 1 file changed, 389 insertions(+), 42 deletions(-)
...skipping...
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 22:54:16 2013 -0500

    add a print function

 hehe | 3 ++-
 interpret.ml | 32 ++++++++++++++++++++++++------
 melody | Bin 106646 -> 107326 bytes
 scanner.mll | 2 +-
 test-interpret.mc | 26 +++++++++++++++++++++++-
 5 files changed, 54 insertions(+), 9 deletions(-)

commit 7a757b0d9943414e95cdccc65d6c17bcf9632bd3
Merge: 4c4ffd4 429c26c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 21:20:27 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 4c4ffd4b94d0524a64484fec6039b8e6ae8d9e44
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 21:20:09 2013 -0500

    the first success

 hehe | 1 +
 interpret.ml | 67 +++------------
 melody | Bin 104517 -> 106646 bytes
 melody.ml | 6 ++---
 test-interpret.mc | 8 +++++++
 5 files changed, 65 insertions(+), 17 deletions(-)

commit 429c26ca1f794b20cc6f32e05e5641cdd561e8ba
Author: getonggetong <getong.1016@gmail.com>

Date: Thu Dec 12 20:58:18 2013 -0500

    add interpret.cmo, interpret.cmx

 Makefile | 4 ++--
 1 file changed, 2 insertions(+), 2 deletions(-)

commit 9faf926b929dd00bf78e05ce616478276d250a19
Merge: 7ffade2 8dca407
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 20:00:05 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 8dca407732960c8a64838cc2dd94c7e134fa21f6
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 12 19:59:57 2013 -0500

    parser undo

 parser.mly | 1 -
 1 file changed, 1 deletion(-)

commit 7ffade29fc76949093f951004bb3fe964a2e4107
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 19:57:04 2013 -0500

    in testing process

 ast.ml | 2 ++
 interpret.ml | 56 ++-------
 melody | Bin 104275 -> 104517 bytes
 3 files changed, 51 insertions(+), 7 deletions(-)

commit 789d31028f9f7b06c42913e2b048d9dc5a47846d
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 12 19:29:46 2013 -0500

    add Melody

 parser.mly | 1 +
 1 file changed, 1 insertion(+)

commit c46a8d16ea92ca563f9e0875d969b22eb2a2d60c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 02:57:26 2013 -0500

    no errors in interpret.ml

 ast.ml | 5 ++-
 interpret.ml | 97 +++++++++++++++++++++++++++++-----------------------------
 melody | Bin 108070 -> 104275 bytes
 3 files changed, 51 insertions(+), 51 deletions(-)

commit 90c928bd051f75353eab92d6573a2d8f5584372b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 02:20:44 2013 -0500

    clean

 hehe | Bin 38391 -> 0 bytes
 1 file changed, 0 insertions(+), 0 deletions(-)

commit 2b7753e1cd64d1ab97bd35ceedae05dbbd75b8d1
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 01:01:32 2013 -0500

    interpret.ml nearly done

 interpret.ml | 66 ++----------------
 1 file changed, 49 insertions(+), 17 deletions(-)

commit c8ced9041253254b1c2f8a8966156f8f844f3753
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 12 00:06:46 2013 -0500

    dealing with the env problem

 interpret.ml | 21 +++++++++++++++++----
 1 file changed, 17 insertions(+), 4 deletions(-)

commit e8a63320c852f798a1e11ce76fde38d5c62e34c4
Merge: 6de05ff 3ada0c2
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Wed Dec 11 23:34:45 2013 -0500

    on unexhausive cases

commit 6de05ff434b8bcb9d81d77de3d92c81625e0e135
Merge: a5a6114 24d673e
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Wed Dec 11 23:03:43 2013 -0500

    hehe

commit 3ada0c2f9751efbe93d60c198db71c51dbb6bc5f
Author: getonggetong <getong.1016@gmail.com>
Date: Wed Dec 11 22:35:24 2013 -0500

    delete Not

 ast.ml | 2 --
 1 file changed, 2 deletions(-)

commit a5a61147d40736efb9412a28c4da8542a5434dd3
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Wed Dec 11 22:28:35 2013 -0500

hehe

 ast.ml | 4 ++--
 interpret.ml | 14 +++++++-------
 melody | Bin 82112 -> 104640 bytes
 parser.mly | 2 +-
 4 files changed, 10 insertions(+), 10 deletions(-)

commit 24d673eeb3ebdd4a431aadce55a25f5cf8a185c2
Author: getonggetong <getong.1016@gmail.com>
Date: Wed Dec 11 22:15:46 2013 -0500

    add Track_value and change Not to Nte

 interpret.ml | 27 +++++++++++++++-------------
 1 file changed, 14 insertions(+), 13 deletions(-)

commit c31bb7d6a493cfc988a7f4cbe74ae3bb87afb1b7
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Wed Dec 11 21:57:11 2013 -0500

    element type evaluation problem left

 interpret.ml | 159 ++++++++++++++++++++++++++----------------------------
 1 file changed, 80 insertions(+), 79 deletions(-)

commit 1579d6c57f42d2a59f09f6232098afd3be571128
Author: getonggetong <getong.1016@gmail.com>
Date: Mon Dec 9 22:34:46 2013 -0500

    debugging

 interpret.ml | 151 ++++++++++++++++++++++++++---------------------------
 1 file changed, 75 insertions(+), 76 deletions(-)

commit 888f4543f231836b314f3de3d56f9f9c784bb2b6
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Dec 8 23:58:05 2013 -0500

    debugging

 interpret.ml | 19 +++++++++----------
 1 file changed, 9 insertions(+), 10 deletions(-)

commit 7a8db31f63584d434d07e679fd825f48d559d6ce
Author: getonggetong <getong.1016@gmail.com>
...skipping...
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 8 23:19:48 2013 -0500

    work on built in function

 interpret.ml | 124 +++++++++++++++++++++++++++++++++-----------------
 1 file changed, 71 insertions(+), 53 deletions(-)

commit 0ab2ea4906b3092448639b29d0430bbc7a18167d
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 8 22:41:11 2013 -0500

    done something

 interpret.ml | 167 +++++++++++++++++++++++++++++++--------------------------
 1 file changed, 92 insertions(+), 75 deletions(-)

commit 5bea65237e51facd03b91daea98890dff40d8f75
Merge: eda501f 497edef
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 8 22:02:19 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit eda501fc151ef9e5530c21a1063bcee0b741bab5
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 8 22:02:15 2013 -0500

    wlgq

 interpret.ml | 10 ++++++++++
 1 file changed, 10 insertions(+)

commit 497edef4385b2b97a11821cf57b27650b68e2841
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Dec 8 22:01:52 2013 -0500

    locals on interpret.ml

 interpret.ml | 70 +++++++++++++++++++-----------------------------------
 1 file changed, 20 insertions(+), 50 deletions(-)

commit 1a05b9ac87ab7e4522ee381eeedcee2d59c9bcc3
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 8 21:36:58 2013 -0500

    i will be killed

 ast.ml | 10 ++--
 interpret.ml | 180 ++--
 melody | Bin 82547 -> 82112 bytes
 parser.mly | 6 +-
 4 files changed, 183 insertions(+), 13 deletions(-)

commit 87e860f5b7edd1ac31215548ffb0ceceec743d77
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Dec 8 12:55:17 2013 -0500

    add a interpret.ml

 ast.ml | 11 +++--

```
interpret.ml | 143 +++++++++++++++++++++++++++++++++++++++++++++++++++
parser.mly   |   2 +-
3 files changed, 151 insertions(+), 5 deletions(-)

commit f58da974ead9bd8e1ba0b5ac1db1c3f1c3348d03
Merge: 91aec27 24ee6d5
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Sat Dec 7 21:45:11 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 91aec272086f145814019be56db0bbedc6e328cb
Merge: bb3142c 3339c10
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Sat Dec 7 21:45:05 2013 -0500

    hehe

commit 24ee6d5b617559e8006038a17af050610a2e364c
Author: lljjssljsljs <493926113@qq.com>
Date:   Sat Dec 7 21:44:28 2013 -0500

    Add not match operation-- Jingsi

 execute.ml | 7 +++++++
 1 file changed, 7 insertions(+)

commit bb3142ccdd52249338cad94cd8d16a438e183b68
Merge: daebcba 79a0c65
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Sat Dec 7 21:31:34 2013 -0500

    change reftable.ml

commit 3339c100fc6ea29e471b9815509fb8f801b05bbc
Author: lljjssljsljs <493926113@qq.com>
Date:   Sat Dec 7 21:30:33 2013 -0500

    Implemented function Oat, Tup, Tdn -- Jingsi

 execute.ml | 33 +++++++++++++++++++++++++--------
 1 file changed, 25 insertions(+), 8 deletions(-)

commit 248c98084e20bcb80cd945090e1797f8b013e9e6
Author: lljjssljsljs <493926113@qq.com>
Date:   Sat Dec 7 20:55:51 2013 -0500

    change the type of Nva to int*int-- Jingsi

 bytecode.ml | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit df9325573752e31b8c41c487fff000635d2d4301
Merge: 010d6c8 79a0c65
```

Author: lljjssljsljs <493926113@qq.com>
Date: Sat Dec 7 20:27:44 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 010d6c8213676572d0f18448acd9bc00b7b00e5a
Author: lljjssljsljs <493926113@qq.com>
Date: Sat Dec 7 20:22:22 2013 -0500

    add some operation to bytecode.ml -- Jingsi

 bytecode.ml | 19 ++++++++++++++++---
 1 file changed, 16 insertions(+), 3 deletions(-)

commit daebcbae33ff58dcf59e04c0fe9890d46485675d
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 7 19:56:10 2013 -0500

    hehe

 bytecode.ml | 6 ++--
 compile.ml | 91 +++----
 reftable.ml | 77 ---
 3 files changed, 90 insertions(+), 84 deletions(-)

commit 79a0c658e248b1f57aff11989c3c51ee0b504840
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Dec 7 19:54:56 2013 -0500

    retype

 reftable.ml | 109 ++++++++++++++++++++++++++++++-----------------------------
 1 file changed, 55 insertions(+), 54 deletions(-)

commit 236efdc2e59fe9789e6a44cd30bc43691ca14d18
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Dec 7 19:01:37 2013 -0500

    ->

 reftable.ml | 4 ++--
 1 file changed, 2 insertions(+), 2 deletions(-)

...skipping...
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 7 02:55:52 2013 -0500

    come on

 bytecode.ml | 27 +++++++++++-----------
 compile.ml | 27 +++++++++++++++-------
 reftable.ml | 78 +++++++++++++++++++++++++++++++------------------------
 3 files changed, 71 insertions(+), 61 deletions(-)

commit 32f273aa63571b9dd428aaf13d81ab6b04b22f74
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 7 01:59:56 2013 -0500

    test the expr after using [-b etc.

 ast.ml | 12 ++++++++----
 melody | Bin 86886 -> 82547 bytes
 parser.mly | 2 +-
 scanner.mll | 2 +-
 test-expr.mc | 31 +++++++++++++++----------------
 5 files changed, 25 insertions(+), 22 deletions(-)

commit df8de49e4cdd52cf264632654f643cf24fa104e6
Merge: 679f2f8 8d974b3
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 7 01:28:43 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 679f2f836154743c3c54809612eae84b2210235c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Dec 7 01:28:30 2013 -0500

    change the method to built-in functions

 ast.ml | 20 +++++------
 bytecode.ml | 114 +++
 compile.ml | 113 ++
 parser.mly | 3 +-
 reftable.ml | 77 ++
 scanner.mll | 1 -
 6 files changed, 314 insertions(+), 14 deletions(-)

commit 8d974b3d2e587d13ccbabe946cd7b9103f9d7415
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Dec 7 00:06:24 2013 -0500

    add Concate to execute.ml

 execute.ml | 5 +++++
 1 file changed, 5 insertions(+)

commit 7cf3e5ba357ae3a1547633873b76c68286187841
Author: lljjssljsljs <493926113@qq.com>
Date: Sat Dec 7 00:03:31 2013 -0500

    Add variable store of execute.ml

...skipping...
    execute binop finish

 execute.ml | 37 +++++++++++++++++++++++++++++--------
 1 file changed, 29 insertions(+), 8 deletions(-)

commit 9c6022a3df9c1b0779d7e285262fc76cd63291e4
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 6 23:33:17 2013 -0500

    delete NOT operator

 ast.ml | 2 --
 parser.mly | 7 ++-----
 scanner.mll | 1 -
 3 files changed, 2 insertions(+), 8 deletions(-)

commit 4ec455064b08759f0c311eed423ff54b99731256
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 6 22:57:08 2013 -0500

    execute still on binop

 execute.ml | 64 ++
 1 file changed, 64 insertions(+)

commit 243bf915964a11d8e6ae424fb4bcc292b131fc0c
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 6 22:10:43 2013 -0500
...skipping...
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 21:39:00 2013 -0500

    try

 ast.ml | 2 +-
 melody | Bin 87291 -> 86886 bytes
 2 files changed, 1 insertion(+), 1 deletion(-)

commit d1f0dc19a78fcb784157e7e15bc9565309d79d9c
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 6 21:36:34 2013 -0500

    delete CARET

 parser.mly | 5 ++---
 1 file changed, 2 insertions(+), 3 deletions(-)

commit eb14ccc14409ef73f5c82123c0631ab2b1f2ad3b
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 6 21:36:09 2013 -0500

    delete CARET

 ast.ml | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit e3b9d4bf57ec42db164df1ecc179382dd2d9fd86
...skipping...

Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 7fc74ea4c44dc7f747c478b8295056fdd8a214bd
Author: getonggetong <getong.1016@gmail.com>
Date: Fri Dec 6 21:34:13 2013 -0500

    delete CARET

 scanner.mll | 1 -
 1 file changed, 1 deletion(-)

commit 0e03497d2aa1fd2066773470dc1c43cacb645ebf
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 13:13:13 2013 -0500

    revise the string containing any kind of char problem.

 melody | Bin 87863 -> 87291 bytes
 scanner.mll | 3 ++-
 test-expr.mc | 2 +-
 3 files changed, 3 insertions(+), 2 deletions(-)

commit ab64c77ed9e0e861403794be5656a5ad23563d36
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 03:00:49 2013 -0500

    remove the DOT in parser

 melody | Bin 87794 -> 87863 bytes
 parser.mly | 2 +-
 2 files changed, 1 insertion(+), 1 deletion(-)

commit c2e59a978268d878abd2159ed919b818cec81d42
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 02:54:17 2013 -0500

    I add the at/toneUp/toneDown/length methods to the scanner/parser/ast, and I have tested them. By now,

 ast.ml | 7 ++++++-
 melody | Bin 83142 -> 87794 bytes
 parser.mly | 2 ++
 scanner.mll | 1 +
 test-expr.mc | 12 +++++++++++-
 5 files changed, 20 insertions(+), 2 deletions(-)

commit 765a4fdf51c9a4cbcf08562e465793da51251e23
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 01:54:50 2013 -0500

    expr test done.

 test-expr.mc | 34 +++++++++++++++++++++++-----------
 1 file changed, 23 insertions(+), 11 deletions(-)

commit 4ec94e1f929648f7692d5e1e002ce1fdb7c9b922
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 01:06:42 2013 -0500

    edit the ignore file

 test-expr.out | 16 ----------------
 1 file changed, 16 deletions(-)

commit 244b949c6443707aea6de11a48c278b69bbeb78c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 01:05:54 2013 -0500

    edit the ignore file

 .gitignore | 1 +
 1 file changed, 1 insertion(+)

commit dfda07b12d795837508abd1ebf07811f44c5b919
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 00:58:15 2013 -0500

    clean the repository

 compile_script | 9 ---------
 interpret.ml | 4 ----
 test.ml | 20 --------------------
 testctrflow.mc | 22 ----------------------
 4 files changed, 55 deletions(-)

commit 59699c452db3ea9ac5b3f4faa61d84378d6e9860
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Fri Dec 6 00:54:16 2013 -0500

    now we are studying the ASAT, for type check

 test-ctrflow.mc | 22 ++++++++++++++++++++++
 test-expr.out | 29 +++++++++++++----------------
 tests/test-declare.mc | 12 ------------
 tests/test-expr.out | 16 ----------------
 4 files changed, 35 insertions(+), 44 deletions(-)

commit 1d0a0686c98a7de7d84e443e8b9d0d25d2cb0d34
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 23:29:13 2013 -0500

    test nearly done

 ast.ml | 2 +-
 melody | Bin 82813 -> 83142 bytes
 parser.mly | 4 ++--
 scanner.mll | 4 ++--
 test-expr.mc | 21 +++++++++++++--------
 test-expr.out | 19 +++++++++++++++++++

```
 tests/test-declare.mc |  12 ++++++++++++
 tests/test-expr.out   |  16 ++++++++++++++++
 8 files changed, 65 insertions(+), 13 deletions(-)


commit 95d9bfd9b81e889b7467993b806f0e59fe84a253
Merge: 5b325b6 f876d96
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Thu Dec 5 22:55:21 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 5b325b6a98a9e8ff51fdb909bd45ca838f340bbe
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Thu Dec 5 22:51:14 2013 -0500

    test-declare added

 test-arith1.out | 16 ----------------
 test-declare.mc | 12 ++++++++++++
 test-expr.mc    | 13 +++++++++++++
 3 files changed, 25 insertions(+), 16 deletions(-)


commit f876d96f69ae82202dca39a80647a4304e4bbb73
Author: getonggetong <getong.1016@gmail.com>
Date:   Thu Dec 5 22:48:48 2013 -0500

    remove useless test-arith1.mc

 test-arith1.mc | 12 ------------
 1 file changed, 12 deletions(-)


commit fae23ba0a3d2e4846b04fddaa36cfd840ead827f
Author: getonggetong <getong.1016@gmail.com>
Date:   Thu Dec 5 22:43:56 2013 -0500

    control flow test pass

 testctrflow.mc | 22 ++++++++++++++++++++
 1 file changed, 22 insertions(+)

...skipping...
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Thu Dec 5 22:36:50 2013 -0500

    <<

 ast.ml     | 4 ++--
 scanner.mll | 4 ++--
 2 files changed, 4 insertions(+), 4 deletions(-)


commit a623ae52a374c7894adce81fbb100d9a0e4186de
Author: morrisyoung <sdmorrisys@gmail.com>
Date:   Thu Dec 5 22:05:10 2013 -0500
```

orders of global variables and function declarations are now OK

```
ast.ml          |  11 +++++++----
melody          | Bin 82253 -> 82813 bytes
parser.mly      |   7 +++----
test-arith1.mc  |  14 +++++++++++---
test-arith1.out |  16 ++++++++++++++++
5 files changed, 37 insertions(+), 11 deletions(-)
```

commit 5ad00281a19523a4fe71f4b57a880ef1d816ec68
Merge: 39492d9 3470512
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 5 20:41:30 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 39492d99bb3dff3929fe2c43170a3d2646d33ce0
Author: getonggetong <getong.1016@gmail.com>
Date: Thu Dec 5 20:41:11 2013 -0500

    a test testfile

```
test-arith1.mc | 4 ++++
1 file changed, 4 insertions(+)
```

commit 3470512887b549671be6a84380cffb7b7fcdb1b7
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 20:38:58 2013 -0500

    Makefile succeed (just for AST)

```
ast.ml    |  28 +++++++++++++++-------------
melody    | Bin 0 -> 82253 bytes
melody.ml |  13 ++++++++-----
3 files changed, 23 insertions(+), 18 deletions(-)
```

commit d7622cdcbf1c99e3fcb5a137e8e78023d0cc8ccb
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 20:15:59 2013 -0500

    hai shi da jia yi qi jin zhan kuai

```
ast.ml      | 7 +++----
melody.ml   | 1 -
parser.mly  | 8 ++++----
scanner.mll | 1 -
4 files changed, 7 insertions(+), 10 deletions(-)
```

commit e6d9097d874fcdc7f1951056d16e178259ddea0e
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 19:56:39 2013 -0500

    hehe

```
 ast.ml     | 8 +++++---
 parser.mly | 2 +-
 2 files changed, 6 insertions(+), 4 deletions(-)
```

commit 5ad01617f24296194a7f5307f6181418f7b62946
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 19:34:26 2013 -0500

    kai gao

```
 parser.mly | 14 +++++++-------
 1 file changed, 7 insertions(+), 7 deletions(-)
```

commit e419d9122b399ea87423aace9b13e6d79c509b54
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 17:54:49 2013 -0500

    come on guys

```
 ast.mli    | 113 -------------------------------------------------------------
 parser.mly |   4 +--
 2 files changed, 2 insertions(+), 115 deletions(-)
```

commit 16b0a858f94c81faf975ad9f0f35e6ac76fafe8b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 17:42:05 2013 -0500

    change something in Makefile

```
 Makefile | 31 +++++++++++++++++--------------
 1 file changed, 17 insertions(+), 14 deletions(-)
```

commit 2b639a7233eab082312659a251a626dd70d9c184
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Dec 5 17:12:36 2013 -0500

    hello world

```
 Makefile  |  0
 ast.ml    | 18 ++++++++----------
 melody.ml | 20 ++++++++++++++++++++
 3 files changed, 28 insertions(+), 10 deletions(-)
```

commit d771bd96f051d2d6ba2d853a3250d94b2a25c55f
Author: getonggetong <getong.1016@gmail.com>
Date: Wed Dec 4 00:09:44 2013 -0500

    Makefile

```
 Makefile | 49 +++++++++++++++++++++++++++++++++++++++++++++++++++
 1 file changed, 49 insertions(+)
```

commit 33a0f9b6a025d2ec4b388c0fffeda6d13bfc9427
Author: getonggetong <getong.1016@gmail.com>

Date: Tue Dec 3 23:31:28 2013 -0500

    test starter from microc

 test.ml | 20 +++++++++++++++++++
 1 file changed, 20 insertions(+)

...skipping...
    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 5101999d49557143a726fd87e1aeb98b2f5d8fad
Author: getonggetong <getong.1016@gmail.com>
Date: Tue Dec 3 23:28:06 2013 -0500

    useless

 ast.mli | 4 ++--
 1 file changed, 2 insertions(+), 2 deletions(-)

commit 50d11dcd92c40a8a510c8e5243032516142fe095
Author: getonggetong <getong.1016@gmail.com>
Date: Tue Dec 3 23:25:04 2013 -0500

    change the file type so that it can be compiled. also complete initial testcases below

 ast.ml | 113 +++
 1 file changed, 113 insertions(+)

commit 835140ca8065f713e0b6abe8432fae0df2ba6491
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 25 12:24:56 2013 -0500

    add the intermediate files into the .gitignore list so that they will not be pushed into the repository

 README.md | 2 ++
 1 file changed, 2 insertions(+)

commit b9888b76eedf29abcbdabed4a2c975777bae0a67
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 25 12:20:58 2013 -0500

    typo revised

 MEL2MIDI/README.md | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 831ded19a39b0201109621370e6f5239bf2784be
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 25 01:09:00 2013 -0500

    Jingsi can add the mel2MIDI source code into MEL2MIDI folder.

 MEL2MIDI/README.md | 1 +
 1 file changed, 1 insertion(+)

commit c38fe2caa3795455c03b50bc37233f6a7e2e8817
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 25 00:40:32 2013 -0500

 ast.cmi | Bin 1891 -> 0 bytes
 parser.cmi | Bin 1220 -> 0 bytes
 scanner.cmi | Bin 700 -> 0 bytes
 scanner.cmo | Bin 28285 -> 0 bytes
 4 files changed, 0 insertions(+), 0 deletions(-)

commit 7819ecaa8e1ff64c6f8c4839fe6c844fba54a61d
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 25 00:33:27 2013 -0500

    change some tiny problems with var_decl and par_decl. Update the ignore file because new intermediate f

 .gitignore | 2 ++
 1 file changed, 2 insertions(+)

commit b02b44fc67d103f652134c62855bd2efe2d07642
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 25 00:31:33 2013 -0500

    change some tiny problems with var_decl and par_decl

 ast.cmi | Bin 0 -> 1891 bytes
 ast.mli | 22 +++++++++++------------
 parser.cmi | Bin 0 -> 1220 bytes
 parser.mly | 8 ++++----
 scanner.cmi | Bin 0 -> 700 bytes
 scanner.cmo | Bin 0 -> 28285 bytes
 scanner.mll | 13 +++++--------
 7 files changed, 19 insertions(+), 24 deletions(-)

commit 9aa1b7d0f6ccf874c9c8191b054dc5a8f40a8573
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 24 23:54:14 2013 -0500

    Thank God I come back again. I delete the hilarious comments in the parser.mly. Come on guys

 parser.mly | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 219f9d140ba465124ea54446be8e771555466c3f
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Nov 24 21:23:10 2013 -0500

    alter order of type decl. compile succeed

 ast.mli | 16 ++++++++++-------
 parser.mly | 6 +++---

2 files changed, 12 insertions(+), 10 deletions(-)

commit 104628161eb0aa10396e7e858878e3cc73ce2d9f
Merge: eadff8a 8266faf
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Nov 24 20:23:40 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit eadff8ae422e90fac79982c67fbdbe9018676725
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Nov 24 20:22:53 2013 -0500

    change vdecl so that assign can be done during declaration

 parser.mly | 6 +++---
 1 file changed, 3 insertions(+), 3 deletions(-)

commit 8266faf52c60f8135d9d1c2c240140605fe14d98
Author: lljjssljsljs <493926113@qq.com>
Date: Sun Nov 24 19:30:40 2013 -0500

    jingsi love shuo

 parser.mly | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit 38b20462cd07b1b2100aea55e99f0dbfa718f1f9
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Nov 24 19:21:31 2013 -0500

    shuo is charming

 parser.mly | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit f378c198a8853e6618bdab64fbfed8da1a6dbf15
Merge: 21e9a87 cbaa41c
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Nov 24 19:20:43 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 21e9a87d1dcb844d15d0e77a3ac06267fc5b5ae6
Author: getonggetong <getong.1016@gmail.com>
Date: Sun Nov 24 19:20:12 2013 -0500

    hehe

 parser.mly | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)

commit cbaa41c1e29e7686f2ff43602e5c2f7f86c315fb
Merge: 9656d6c 09f0d24

Author: Shuo Yang <sdmorrisys@gmail.com>
Date: Sun Nov 24 16:16:20 2013 -0800

    Merge pull request #1 from morrisyoung/getong1123solving-r/r-s/r-conflicts

    Getong1123solving r/r s/r conflicts

commit 09f0d241e5334378ddaac67a2430f800a962894e
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Nov 23 20:59:32 2013 -0500

    0 conflicts!

    We changed the COMMA in bar definition2 into SEMI. Now no conflicts

 parser.mly | 6 ++++--
 1 file changed, 4 insertions(+), 2 deletions(-)

commit e1f1aee62ccb1cdd80c516caef57742e23a6b2b2
Author: getonggetong <getong.1016@gmail.com>
Date: Sat Nov 23 20:13:21 2013 -0500

    1 s/r conflict now

    I delete the three explicitly defined built-in method parse, change
    some small notations, change the definition of track type from {} to
    [], merge some reduce productions so that conflicts are eliminated

 ast.mli | 19 ++++++++++---------
 parser.mly | 48 +++++++++++++++++++++++++++++++----------------
 scanner.mll | 14 +++++++-------
 ...skipping...
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Thu Nov 21 18:52:14 2013 -0500

    I changed a lot, but there still exists some conflicts.

 ast.mli | 28 +++++++--------------
 parser.mly | 79 ++++++++++++++---
 scanner.mll | 6 +++--
 3 files changed, 34 insertions(+), 79 deletions(-)

commit a58e69e45a206c349a7f6c83bffaabb2a7226ab7
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 20:42:49 2013 -0500

    revise some tiny problems

 ast.mli | 2 +-
 parser.mly | 6 +++---
 scanner.mll | 2 +-
 3 files changed, 5 insertions(+), 5 deletions(-)

commit ef630d7211ff9dabb69f16b37e8986da11ad0f57

Merge: 9b462f1 cf60448
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 14:45:05 2013 -0500

    Merge branch 'master' of github.com:morrisyoung/PLT_Melody

commit 9b462f1003aaa3fb8427c22155144997e72568de
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 14:44:39 2013 -0500

    use this script to compile the codes

 compile_script | 2 ++
 1 file changed, 2 insertions(+)

commit cf604482ae6c2253f245bfd550c5dfe3c0ed0601
Author: Shuo Yang <sdmorrisys@gmail.com>
Date: Mon Nov 18 14:36:55 2013 -0500

    Update README.md

    give you some test instructions

 README.md | 2 ++
 1 file changed, 2 insertions(+)

commit 9bb46225cd056d1e59c5ee9b80d023eac715239f
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 14:34:24 2013 -0500

    11 s/r conflicts, 2 r/r conflicts

 ast.mli | 21 +++++++++++++++-----
 parser.mly | 64 +++-----------
 scanner.mll | 1 -
 3 files changed, 69 insertions(+), 17 deletions(-)

commit 89dbe4cbe4e17c6a14371327f546bf7f1c61719d
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 04:27:13 2013 -0500

    remove the swap files

 .ast.mli.swp | Bin 20480 -> 0 bytes
 .gitignore | 1 +
 .parser.mly.swp | Bin 20480 -> 0 bytes
 .scanner.mll.swp | Bin 12288 -> 0 bytes
 4 files changed, 1 insertion(+)

commit 6743590422abdf027642e34a6ac0e6b3a5dfca61
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 04:25:25 2013 -0500

    still has some conflicts

```
.ast.mli.swp    | Bin 0 -> 20480 bytes
.gitignore      |   3 +++
.parser.mly.swp | Bin 0 -> 20480 bytes
.scanner.mll.swp | Bin 0 -> 12288 bytes
ast.mli         |  11 +++++++----
parser.mly      |  47 +++++++++++++++++++++++++++++------------------
scanner.mll     |   2 +-
7 files changed, 40 insertions(+), 23 deletions(-)
```

commit a3fa7b63a77d4eca690dd42bba1d2a8eb21e691b
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 03:02:31 2013 -0500

```
 ast.ml        | 108 --------------------------------------------------------
 compile_script |   7 ++++
 2 files changed, 7 insertions(+), 108 deletions(-)
```

commit 5cc9094091c67a6f51a02f4864ec37aa444d9d5a
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Mon Nov 18 03:01:17 2013 -0500

    change the ast. file type

```
 ast.mli | 108 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 1 file changed, 108 insertions(+)
```

commit c37a16301845d7290ad008ba395feb4b647b5ebe
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 17 23:45:37 2013 -0500

    revise some actuals_opt related problem

```
 parser.mly | 20 ++------------------
 1 file changed, 2 insertions(+), 18 deletions(-)
```

commit 52c49873e74ba23d99c800f0726d97ef0c011e8c
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 17 23:13:23 2013 -0500

    solved the type merge problem

```
 parser.mly | 9 ++++++---
 1 file changed, 6 insertions(+), 3 deletions(-)
```

commit f36918268a69fd95bdf5fa896b90b26f12073820
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 17 22:44:54 2013 -0500

    I have finished the first three files, but I have not tested them. It will be done soon.

```
 ast.ml        | 27 +++++++++++++++++++-------
```

parser.mly | 34 +++++++++++++++++++++++++++++++-
scanner.mll | 4 +++-
3 files changed, 56 insertions(+), 9 deletions(-)

commit cc315cff37ab95e1237fc4e852c4c5e7437d5a1e
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 17 19:23:05 2013 -0500

    I parse the 'method' and build their ast, still the variable_definition problem has not been solved

 ast.ml | 32 +++++++++++++++++++++++--------
 parser.mly | 36 +++++++++++++++++++++---------------
 scanner.mll | 20 +++++++-------------
 3 files changed, 52 insertions(+), 36 deletions(-)

commit 29a8d28a3f9b921078748fbf7134c0513b452705
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Nov 16 12:57:26 2013 -0500

    change a little in ast.

 ast.ml | 4 ++--
 1 file changed, 2 insertions(+), 2 deletions(-)

commit 97cbc401693c6af620ad7a62b02161c417abd161
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Nov 16 07:38:53 2013 -0500

    I have nearly finished the scanner. ast. and parser. files, excepting for the variable definition probl

 ast.ml | 83 +++---
 parser.mly | 114 +++--
 scanner.mll | 63 ++++++++++++++++++++++++++++++++--
 3 files changed, 250 insertions(+), 10 deletions(-)

commit 41427f6f0b19fc132ba27da919f0a8764d35fe75
Merge: 003d765 1860527
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 13:36:43 2013 -0500

    Merge branch 'develop'

commit 186052776b8512925be9a65443ab066383982b12
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 13:35:45 2013 -0500

    change inter

 interpret.ml | 1 +
 1 file changed, 1 insertion(+)

commit c845f8130c4b86c4fef9bf3d8c0bc346a21fdbd5
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 13:34:39 2013 -0500

try

 interpret.ml | 3 +++
 1 file changed, 3 insertions(+)

commit 003d76548fe67ec5343031fb6de22ca751e19a13
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 13:20:52 2013 -0500

 interpret.ml | 3 ---
 1 file changed, 3 deletions(-)

commit aa8b2af42bf674879c37f9a0778099baa50a0373
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 13:13:24 2013 -0500

   I add a interpret.ml in the develop branch

 interpret.ml | 3 +++
 1 file changed, 3 insertions(+)

commit c2ef62e6afa758cea1764016261c22baaffcd747
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 09:38:45 2013 -0500

   This is the ignored files list

 .gitignore | 1 +
 1 file changed, 1 insertion(+)

commit e0deec2edf972d41be13f16e7b1aeca3b6671863
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 09:34:53 2013 -0500

   None

 .gitignore | 3 +++
 1 file changed, 3 insertions(+)

commit 9baa1cafb7b32b9a647560ece87fc161f0239dc8
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 02:08:06 2013 -0500

   I delete the try.mll file

 try.mll | 3 ---
 1 file changed, 3 deletions(-)

commit 009533821b6e41f47c9518e3e5e2e5dc159c85bb
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 02:06:47 2013 -0500

I create a try.mll file

try.mll | 3 +++
1 file changed, 3 insertions(+)

commit f6e2e8b4c95075137b21e591b2a5a4469fd15739
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 01:57:03 2013 -0500

   I delete the try

try | 1 -
1 file changed, 1 deletion(-)

commit 472f42bb9d165c6d7c8d0776e75e783b79cf2033
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 01:55:54 2013 -0500

   I have changed the README.md file

README.md | 2 +-
1 file changed, 1 insertion(+), 1 deletion(-)

commit b264cb21e390fc98af521cb3ff4d4c2a11eb898a
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 01:49:03 2013 -0500

   add a try file

try | 1 +
1 file changed, 1 insertion(+)

commit 95a9a36ed570e0d9f9187e0ca36bc379d2203a70
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 01:47:34 2013 -0500

   I remove the try

try | 1 -
1 file changed, 1 deletion(-)

commit 65382dad282d38525e1031890e0d9d73e533c5df
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 01:44:46 2013 -0500

   we are winners

try | 1 +
1 file changed, 1 insertion(+)

commit 7bdd58bf3f6886231731806d8afdb8662ee25b54
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sun Nov 10 01:41:14 2013 -0500

I have added the scanner.mll

```
 ast.ml     | 1 +
 scanner.mll | 3 +++
 2 files changed, 4 insertions(+)
```

commit e829ead8ece6cdab5876ca2ea0ab305c88087606
Author: Shuo Yang <sdmorrisys@gmail.com>
Date: Sun Nov 10 01:26:36 2013 -0500

    Update README.md

```
 README.md | 4 +++-
 1 file changed, 3 insertions(+), 1 deletion(-)
```

commit 6899f8ab964d774db065a0922ef0e2099208ccf2
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Nov 9 23:40:28 2013 -0500

    I create the hehe

```
 try | 1 -
 1 file changed, 1 deletion(-)
```

commit 06f549a98cc06930c08b763ba90d5e19f36d15de
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Nov 9 23:36:51 2013 -0500

    I delete the scanner.mll

```
 scanner.mll | 3 ---
 1 file changed, 3 deletions(-)
```

commit b5149612f4e85f62ba023e4338b8c5699cfe1656
Author: morrisyoung <sdmorrisys@gmail.com>
Date: Sat Nov 9 23:34:23 2013 -0500

    hehe

```
 try | 1 +
 1 file changed, 1 insertion(+)
```

commit 9767afa87ee6fee6bf68ba8ccc72b0dac540423a
Author: Shuo Yang <sdmorrisys@gmail.com>
Date: Sat Nov 9 22:19:55 2013 -0500

    Delete unnecessary files

```
 hello_world.ml | 1 -
 1 file changed, 1 deletion(-)
```

commit a276761e16e9bd682bde35c1ef8485e062d59619
Author: Shuo Yang <sdmorrisys@gmail.com>

Date: Sat Nov 9 22:17:21 2013 -0500

    I have created the three starting files in the repository

 ast.ml | 3 +++
 parser.mly | 3 +++
 scanner.mll | 3 +++
 3 files changed, 9 insertions(+)

commit 507fdac07e52f1da30b192a579012e64a13f3de6
Author: Shuo Yang <sdmorrisys@gmail.com>
Date: Sat Nov 9 22:09:44 2013 -0500

    Create README.md
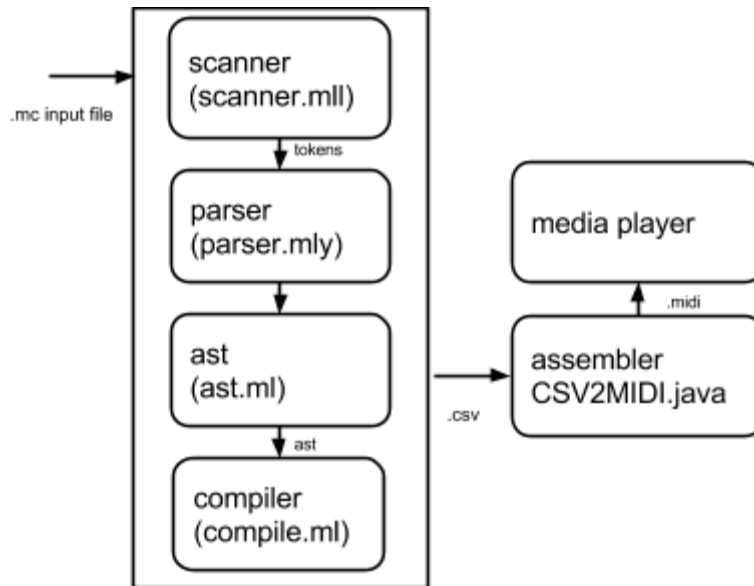
 README.md | 3 +++
 1 file changed, 3 insertions(+)

commit d593b4c94e22dfd79c9f4d5b7bacbee7d8cc7259
Author: Shuo Yang <sdmorrisys@gmail.com>
Date: Sat Nov 9 22:06:11 2013 -0500

    the welcome file

 hello_world.ml | 1 +
 1 file changed, 1 insertion(+)

5. Architectural Design

5.1 Architectual Design Diagram

5.2 Interface

The input file is a .mc source file programmed in Melody. Through the procedure showed in above block diagram, the source file is first converted into tokens by the scanner. Then it is parsed by the parser combined with the ast file to generate an abstract syntax tree. The compiler then takes the abstract syntax tree to generate .csv file, which is converted to .midi afterwards by CSV2JAVA.java file.

The scanner is implemented with Ocamllex, the parser is implemented by Ocamlyacc, and the ast file is implemented with Ocaml. The assembler is a .java file.

5.3 Responsibility

scanner: Tong GE, Jingsi LI, Shuo YANG
parser: Tong GE, Jingsi LI, Shuo YANG
ast: Tong GE, Jingsi LI, Shuo YANG
compile: Tong GE, Jingsi LI, Shuo YANG

6. Test Plan

6.1 Goals

The tests carried out are aimed at testing every feature and function of Melody. Melody is tested on parts including binary operations, built-in functions, element concatenation, control flow, declaration, basic expression, and self-defined functions. Tests start along with the completio of scanner, parser, and the ast file. As we were implementing the compiler, we improved our test cases along with the process to make them cover more possibilities.

Each test case is located in the test folder in the root folder of Melody. To run the test cases, using the command melody -c/-a <testfilename.mc> testfilename.out, the -c is to test the compile.ml, and the -a is to test the ast.ml.

6.2 Test cases

6.2.1 binary operations

```
/*
test case for binary operation:
+,*,&,==,!=,<,<=,>,>=,&&,||
*/

function melody main(){
/*Add*/
       int i;
       int j;
       int r1;
       int r2;
       note n1;
       note n2;
       n1=(~B;4);
       n2=(~B;4);
       string s1;
       string s2;
       string s;
       pitch p;
       p=~C;
       track<<>> t1;
       track<<>> t2;
       track<<>> t;
       t1=[-t [-b (~A;1)]];
       t2=[-t [-b (~B;2)]];
       s1="hello ";
       s2="world!";
       i=2;
       j=3;
       r1=i+j;
       print(r1);
/*Multiply*/
       r2=i*j;
       print(r2);
       s=s1+s2;
       print(s);
       t=t1+t2;
```

```
        print(t);
        melody m;
        m=t1&t2&t1;
        print(m);
        string seq;
        seq="== ok";
        string sneq;
        sneq="!= ok";
        string bigger;
        string less;
        string geq;
        string leq;
        if(1==1&&~A==~A&&n1==n2&&"1"=="1"){
                print(seq);
        }
        if(1!=2||p!=~A||s1!=s2||n1!=n2){
                print(sneq);
        }
        if(11>2){

                bigger="> ok";
                print(bigger);
        }
        if(1<2){

                less="< ok";
                print(less);
        }
        if(4>=4){

                geq=">= ok";
                print(geq);
        }
        if(55<=100){

                leq="<= ok";
                print(leq);
        }
        return m;
}
```

output:
```
/*addition test*/
Lit(5)
/*muliplication test*/
```

```
Lit(6)
/*string concatenation test*/
Stg(hello world!)
/*track concatenation test*/
Tra(Attr(0,0,0,0,0) ; (Bar(Nte(9,1)) Bar(Nte(11,2))))
/*melody test*/
Mel(Attr((0,0,0,0,0),(0,0,0,0,0),(0,0,0,0,0)) ; (Tra(Bar(Nte(9,1)))
Tra(Bar(Nte(11,2))) Tra(Bar(Nte(9,1))))))
/*equality test*/
Stg(== ok)
/*inequality test*/
Stg(!= ok)
/*greater than test*/
Stg(> ok)
/*less than test*/
Stg(< ok)
/*greater than or equality test*/
Stg(>= ok)
/*less than or equality test*/
Stg(<= ok)
```

6.2.2 built-in functions test

```
/*
test case for built-in functions:
print(element);
at(bar/track,int);
toneUp(pitch/note/bar/track,int);
toneDown(pitch/note/bar/track,int);
length(bar/track);
*/

function melody main(){
    track<<piano,1,2,3,4>> t;
    t=[-t[-b(~A;1),(~B;2),(~C;3)],[-b(~A;1),(~B;2),(~C;3),(~D;4)]];
    bar b;
    note n;
    b=at(t,1);
    n=at(b,3);
    string sat;
    sat="-------------at";
    print(sat);
    print(b);
    print(n);
    print(sat);
    string sup;
```

```
sup="-------------toneUp";
/* for pitch-------------------*/
pitch p;
pitch pup;
p=~D;
print(sup);
print(p);
pup=toneUp(p,1);
print(pup);
/* for note-------------------*/
note n;
n=(p;5);
note nup;
nup=toneUp(n,2);
print(n);
print(nup);
/* for bar-------------------*/
bar b;
b=[-b(n)];
print(b);
bar bup;
bup=toneUp(b,3);
print(bup);
/* for track-------------------*/
track<<piano,1,2,3,4>> t;
t=[-tb];
print(t);
track<<drums,1,2,3,4>> tup;
tup=toneUp(t,4);
print(tup);
print(sup);
sup="-------------toneDown";
/* for pitch-------------------*/
p=~B7;
print(sup);
print(p);
pup=toneDown(p,1);
print(pup);
/* for note-------------------*/
n=(p;5);
nup=toneDown(n,2);
print(n);
print(nup);
/* for bar-------------------*/
b=[-b n,n,n,n,n,n];
```

```
        print(b);
        bup=toneDown(b,3);
        print(bup);
        /* for track------------------*/
        t=[-tb];
        print(t);
        tup=toneDown(t,4);
        print(tup);
        print(sup);

        string slength;
        slength="-------------length";
        print(slength);
        int i;
        i=length(b);
        int j;
        j=length(t);
        print(i);
        print(j);

        melody m;
        m=t&tup;
        return m;
}
```
output:
```
Stg(-------------at)
Bar(Nte(9,1) Nte(11,2) Nte(0,3) Nte(2,4))
Nte(2,4)
Stg(-------------at)
Stg(------------toneUp)
Pit(2)
Pit(3)
Nte(2,5)
Nte(4,5)
Bar(Nte(2,5))
Bar(Nte(5,5))
Tra(Attr(193,1,2,3,4) ; (Bar(Nte(2,5))))
Tra(Attr(114,1,6,3,8) ; (Bar(Nte(6,5))))
Stg(-------------toneUp)
Stg(------------toneDown)
Pit(95)
Pit(94)
Nte(95,5)
Nte(93,5)
Bar(Nte(95,5) Nte(95,5) Nte(95,5) Nte(95,5) Nte(95,5) Nte(95,5))
```

```
Bar(Nte(92,5) Nte(92,5) Nte(92,5) Nte(92,5) Nte(92,5) Nte(92,5))
Tra(Attr(193,1,2,3,4) ; (Bar(Nte(95,5) Nte(95,5) Nte(95,5) Nte(95,5)
Nte(95,5) Nte(95,5))))
Tra(Attr(114,1,6,3,8) ; (Bar(Nte(91,5) Nte(91,5) Nte(91,5) Nte(91,5)
Nte(91,5) Nte(91,5))))
Stg(-------------toneDown)
Stg(------------length)
Lit(6)
Lit(1)
```

6.2.3 element concatenation test

```
/*
test case for concatination '<-'
*/

function melody main(){
    melody m1;
    note n1;
    track<<>> t1;
    bar b1;
    n1=(~A;6);
    b1=[-b (n1)];

    t1=[-t b1];
    m1=t1&t1;
    b1=b1<-n1;
    print(b1);
    t1=t1<-b1;
    print(t1);
    return m1;
}
```
output:
```
Bar(Nte(9,6) Nte(9,6))
Tra(Attr(0,0,0,0,0) ; (Bar(Nte(9,6)) Bar(Nte(9,6) Nte(9,6))))
```


6.2.4 control flow test

```
pitch p1;


function melody main(){
    melody m1;
    int j;
    int i;
    track<<>> t1;
```

```
        track<<>> t2;
        bool flag;
        p1=~B;
        t1=[-t [-b (p1;4)]];
        t2=[-t [-b (~A;16)]];


        m1=t1&t2;
        j=0;
        i=0;
        flag=false;
        if(flag){
              for(i;i<5;i=i+1){
                    if(j==0){
                          print(m1);
                          for(i;i<5;i=i+1){
                                print(i);
                          }
                    }
              }
        }
        else{
              while(j<3){
                    j=j+1;
                    print(j);
              }
        }
        return m1;
}
```
output:
```
note n1 = ~C;

function melody main()
{
melody m1 = t1 & t2;
int j = 0;
int i = 0;
bool flag = true;
if (flag)
{
for (i ; i < 5 ; i = i + 1) {
if (i == 4)
{
break;
```

```
}
else
{
while (j < 3) {
j = j + 1;
}
}
}
}
return m1;
}
```

6.2.5 self-defined function test

```
/*test case for self-defined function*/

function melody main(){
    track<<>> t;
    t = [-t[-b(~A;4),(~B;5)]];
    t = test(2,t);
    print(t);
    melody m;
    m=t&t;
    return m;
}


function track test(int i,track t){
    track<<>> tr;
    print(t);
    tr = toneUp(t,i);
    return tr;
}
```

output:
```
/*track returned by self-defined function*/
Tra(Attr(0,0,0,0,0) ; (Bar(Nte(9,4) Nte(11,5)))))
/*track printed by main function*/
Tra(Attr(0,0,0,0,0) ; (Bar(Nte(11,4) Nte(13,5)))))
```

6.2.6 declaration test

```
pitch p1;
note n1;
bar b1;
```

```
function pitch test (note n2, track t1)
{
    pitch p2;
    p2 = ~D;
    print(p2);
    pitch p3;
    p3 = ~E;
    print(p3);
    return p3;
}
function melody main ()
{

    p1=~C;
    print(p1);
    n1 = (p1;8);
    print(n1);
    b1=[-b n1,n1,n1,n1];
    print(b1);
    track<<violin, 1,2,3,4>> track1;
    track1=[-t [-b (~C;4)]];
    print(track1);
    track<<piano, 1,2,3,4>> track2;
    track2=[-t [-b (~D;4)]];
    print(track2);
    melody m1;
    m1=track1&track2;
    print(m1);
    return m1;
}
```

output:
```
Pit(0)
Nte(0,8)
Bar(Nte(0,8) Nte(0,8) Nte(0,8) Nte(0,8))
Tra(Attr(40,1,2,160,4) ; (Bar(Nte(0,4))))
Tra(Attr(0,1,2,160,4) ; (Bar(Nte(2,4))))
Mel(Attr((40,1,2,160,4),(0,1,2,160,4)) ; (Tra(Bar(Nte(0,4)))
Tra(Bar(Nte(2,4)))))
```

6.3. Intergreted test

6.3.1 merryXmas (merryXmas.mc)

```
function melody main(){
    bar b1;
```

```
        b1=[-b (~G6;1),(~C7;1),(~C7;1),(~D7;1)];
        bar b2;
        b2=[-b (~C7;1),(~B6;1),(~A6;1),(~A6;1)];
        bar b3;
        b3=[-b (~A6;1),(~D7;1),(~D7;1),(~E7;1)];
        bar b4;
        b4=[-b (~D7;1),(~C7;1),(~B6;1),(~G6;1),(~G6;1)];
        bar b5;
        b5=[-b (~E7;1),(~E7;1),(~F7;1),(~E7;1),(~D7;1)];
        bar b6;
        b6=[-b (~C7;1),(~A6;1),(~G6;1),(~G6;1),(~A6;1),(~D7;1),(~B6;1)];
        bar b7;
        b7=[-b (~C7;1),(~;1),(~G6;1)];
        bar b8;
        b8=[-b (~C7;1),(~C7;1),(~C7;1),(~B6;1),(~;1),(~B6;1)];
        bar b9;
        b9=[-b (~C7;1),(~B6;1),(~A6;1)];
        bar b10;
        b10=[-b (~G6;1),(~;1),(~D7;1),(~E7;1),(~D7;1),(~C7;1)];
        bar b11;
        b11=[-b (~G7;1),(~G6;1),(~G6;1),(~G6;1)];
        bar b12;
        b12=[-b (~A6;1),(~D7;1),(~B6;1)];
        bar b13;
        b13=[-b (~C7;1),(~;1),(~;1)];
        track<<banjo, 1,4,120,90>> t1;
        t1=[-t b1,b2,b3,b4,b5,b6,b7,b8,b9,b10,b11,b12,b13];

        melody merryXmas;
        merryXmas=t1&t1;
        print(merryXmas);
        return merryXmas;
}
```

Bytecode output:
```
4
105,105
0,79,90,0,79,90
4,84,90,4,84,90
8,84,90,8,84,90
12,86,90,12,86,90
16,84,90,16,84,90
20,83,90,20,83,90
24,81,90,24,81,90
28,81,90,28,81,90
```

```
32,81,90,32,81,90
36,86,90,36,86,90
40,86,90,40,86,90
44,88,90,44,88,90
48,86,90,48,86,90
52,84,90,52,84,90
56,83,90,56,83,90
60,79,90,60,79,90
64,79,90,64,79,90
68,88,90,68,88,90
72,88,90,72,88,90
76,89,90,76,89,90
80,88,90,80,88,90
84,86,90,84,86,90
88,84,90,88,84,90
92,81,90,92,81,90
96,79,90,96,79,90
100,79,90,100,79,90
104,81,90,104,81,90
108,86,90,108,86,90
112,83,90,112,83,90
116,84,90,116,84,90
120,20,90,120,20,90
124,79,90,124,79,90
128,84,90,128,84,90
132,84,90,132,84,90
136,84,90,136,84,90
140,83,90,140,83,90
144,20,90,144,20,90
148,83,90,148,83,90
152,84,90,152,84,90
156,83,90,156,83,90
160,81,90,160,81,90
164,79,90,164,79,90
168,20,90,168,20,90
172,86,90,172,86,90
176,88,90,176,88,90
180,86,90,180,86,90
184,84,90,184,84,90
188,91,90,188,91,90
192,79,90,192,79,90
196,79,90,196,79,90
200,79,90,200,79,90
204,81,90,204,81,90
208,86,90,208,86,90
```

```
212,83,90,212,83,90
216,84,90,216,84,90
220,20,90,220,20,90
224,20,90,224,20,90
```

6.3.2 Chinese-anthem (Chinese-anthem.mc)

```
function melody main (){
pitch p1;
p1=~G4;
pitch p2;
p2=~A4;
pitch p3;
p3=~B4;
pitch p4;
p4=~C5;
pitch p5;
p5=~D5;
pitch p6;
p6=~E5;
pitch p7;
p7=~F5;
pitch p8;
p8=~G5;
pitch p9;
p9=~A5;
pitch p10;
p10=~B5;
pitch p11;
p11=~C6;
track<<piano,16,8,480,0>>t1;
bar b1;bar b2;bar b3;bar b4;bar b5;bar b6;bar b7;bar b8;bar b9;bar
b10;bar b11;bar b12;bar b13;bar b14;bar b15;bar b16;bar b17;bar
b18;bar b19;bar b20;bar b21;bar b22;bar b23;bar b24;bar b25;bar
b26;bar b27;bar b28;bar b29;bar b30;bar b31;bar b32;bar b33;bar
b34;bar b35;bar b36;bar b37;bar b38;/*we must declare a variable
first*/
b1=[-b (~C;2)];/*here the ~C means the lowest pitch, which is used as
a rest as it actually has no sound*/
b2=[-b (~C;2)];
b3=[-b (~C;2)];
b4=[-b (~C;2)];
b5=[-b (p1;16),(p1;16),(p1;8),(p1;8),(p1;16),(p1;16)];
b6=[-b (p4;4),(p4;16),(~C;16),(p1;8)];
b7=[-b (p4;4),(~C;8),(p4;8)];
```

```
b8=[-b (p4;8),(p4;8),(p1;8),(p2;16),(p3;16)];
b9=[-b (p4;4),(p4;4)];
b10=[-b (~C;8),(p6;8),(p4;8),(p5;16),(p6;16)];
b11=[-b (p8;4),(p8;4)];
b12=[-b (p6;8),(~C;16),(p6;16),(p4;8),(~C;16),(p6;16)];
b13=[-b (p8;8),(~C;16),(p6;16),(p5;4)];
b14=[-b (p5;2)];
b15=[-b (p9;4),(p8;4)];
b16=[-b (p5;4),(p6;4)];
b17=[-b (p8;8),(p6;4),(p8;8)];
b18=[-b (p6;8),(p5;16),(p6;16),(p4;4)];
b19=[-b (p6;4),(~C;4)];
b20=[-b (p1;8),(~C;16),(p2;16),(p4;8),(p4;8)];
b21=[-b (p6;8),(~C;16),(p6;16),(p8;8),(p8;8)];
b22=[-b (p5;8),(p5;16),(p5;16),(p2;4)];
b23=[-b (p5;4),(~C;8),(p1;8)];
b24=[-b (p4;4),(~C;8),(p4;8)];
b25=[-b (p6;4),(~C;8),(p6;8)];
b26=[-b (p8;2)];/*here I use a first note to represent the two bars'
duration*/
b27=[-b (p4;8),(~C;16),(p6;16),(p8;8),(p8;8)];
b28=[-b (p9;4),(p8;4)];
b29=[-b (p6;8),(~C;16),(p4;16),(p8;8),(p8;16),(p8;16)];
b30=[-b (p6;8),(~C;8),(p4;8),(~C;8)];
b31=[-b (p1;4),(p4;4)];
b32=[-b (p6;8),(~C;16),(p4;16),(p8;8),(p8;16),(p8;16)];
b33=[-b (p6;8),(~C;8),(p4;8),(~C;8)];
b34=[-b (p1;8),(~C;8),(p4;8),(~C;8)];
b35=[-b (p1;8),(~C;8),(p4;8),(~C;8)];
b36=[-b (p8;8),(~C;8),(p11;8),(~C;8)];
b37=[-b (p11;4),(~C;4)];
t1=[-t
b1,b2,b3,b4,b5,b6,b7,b8,b9,b10,b11,b12,b13,b14,b15,b16,b17,b18,b19,b20
,b21,b22,b23,b24,b25,b26,b27,b28,b29,b30,b31,b32,b33,b34,b35,b36,b37];
pitch p12;pitch p13;pitch p14;pitch p15;pitch p16;pitch p17;pitch
p18;pitch p19;pitch p20;pitch p21;pitch p22;
p12=~G2;
p13=~A2;
p14=~B2;
p15=~C3;
p16=~D3;
p17=~E3;
p18=~F3;
p19=~G3;
p20=~A3;
```

```
p21=~B3;
p22=~C4;


track<<trombone,16,8,480,0>>t2;
bar b38;
b38=[-b
(~C;2),(~C;2),(~C;2),(~C;2),(p18;16),(p18;16),(p18;8),(p18;8),(p18;16)
,(p18;16),(p17;4),(~C;4),
(p22;8),(~C;8),(p19;8),(~C;8),
(p20;8),(~C;8),(p19;8),(p18;8),
(p17;8),(~C;8),(p15;8),(~C;8),
(p15;4),(p15;8),(p15;8),
(p14;8),(~C;8),(p14;8),(~C;8),
(p15;8),(~C;8),(p13;8),(~C;8),
(p15;8),(~C;8),(p16;8),(~C;8),
(p14;4),(~C;4),
(p16;8),(~C;8),(p15;8),(~C;8),
(p14;8),(~C;8),(p15;8),(~C;8),
(p15;8),(p15;8),(~C;8),(p15;8),
(p14;8),(~C;8),(p13;8),(~C;8),
(p17;4),(~C;4),
(p15;2),(toneDown(p14,1);2),
(p20;16),(~C;16),(p19;16),(~C;16),(p18;16),(~C;16),(p17;16),(~C;16),
(p16;16),(~C;16),(p15;16),(~C;16),(p14;16),(~C;16),(p12;16),(~C;16),
(p15;4),(~C;8),(p15;8),
(p15;4),(~C;8),(p15;8),
(p14;4),(~C;4),
(p12;8),(~C;8),(p15;8),(~C;8),
(p15;8),(~C;8),(p12;8),(~C;8),
(p12;8),(~C;8),(p15;8),(~C;8),
(p12;8),(~C;8),(p12;8),(~C;8),
(p19;16),(~C;16),(p18;16),(~C;16),(p17;16),(~C;16),(p16;16),(~C;16),
(p12;8),(~C;8),(p15;8),(~C;8),
(p12;8),(~C;8),(p12;8),(~C;8),
(p19;16),(~C;16),(p18;16),(~C;16),(p17;16),(~C;16),(p16;16),(~C;16),
(p19;16),(~C;16),(p18;16),(~C;16),(p17;16),(~C;16),(p16;16),(~C;16),
(p19;16),(~C;16),(p18;16),(~C;16),(p17;16),(~C;16),(p16;16),(~C;16),
(p15;4),(~C;4)
];
t2=[-t b38];


track<<trumpet,16,8,480,0>>t3;
bar b39;
b39=[-b
(p4;8),(~C;16),(p6;16),(p8;8),(p8;8),(p9;4),(p8;4),(p6;8),(~C;16),(p4;
```

```
16),(p8;8),(p8;16),(p8;16),(p6;4),(p4;4),(p1;16),(p1;16),(p1;8),(p1;8)
,(p1;16),(p1;16),(p4;4),(~C;4),(~C;2),(~C;2),(~C;2),(~C;2),(~C;2),(~C;
2),(~C;2),(~C;8),(~C;16),(p8;16),(p8;16),(p8;16),(p8;16),(p8;16),(p9;8
),(~C;8),(p8;8),(~C;8),(p5;8),(~C;8),(p6;8),(~C;8),(p8;8),(p6;8),(~C;8
),(p8;8),(p6;8),(p5;16),(p6;16),(p4;4),(p6;2),(~C;2),(~C;2),(~C;2),(~C
;8),(~C;16),(p5;16),(p5;16),(p3;16),(p5;16),(p5;16),(p4;8),(p8;16),(p8
;16),(p8;4),(~C;8),(p8;16),(p8;16),(p8;4),(~C;8),(p8;16),(p8;16),(p8;1
6),(p8;16),(p8;16),(p8;16),(p4;8),(~C;16),(p6;16),(p8;8),(p8;8),(p9;4)
,(p8;4),(p6;8),(~C;16),(p4;16),(p8;8),(p8;16),(p8;16),(p6;8),(~C;8),(p
4;8),(~C;8),(p1;4),(p4;4),(p6;8),(~C;16),(p4;16),(p8;8),(p8;16),(p8;16
),(p6;8),(~C;8),(p4;8),(~C;8),(p1;16),(p1;16),(p1;8),(p4;8),(~C;8),(p5
;16),(p5;16),(p5;8),(p6;8),(~C;8),(p8;16),(p8;16),(p8;8),(p11;4),(p11;
2)];
t3=[-t b39];

melody m;
m=t1&t2&t3;
return m;
}
```

Bytecode output:
```
4
56,57,0
0,60,90,0,0,90,0,0,90
2,0,90,8,0,90,8,0,90
3,64,90,16,0,90,16,0,90
4,67,90,24,0,90,24,0,90
6,67,90,32,41,90,32,55,90
8,69,90,33,41,90,33,55,90
12,67,90,34,41,90,34,55,90
16,64,90,36,41,90,36,55,90
18,0,90,38,41,90,38,55,90
19,60,90,39,41,90,39,55,90
20,67,90,40,40,90,40,60,90
22,67,90,44,0,90,44,60,90
23,67,90,48,48,90,45,0,90
24,64,90,50,0,90,46,55,90
28,60,90,52,43,90,48,60,90
32,55,90,54,0,90,52,0,90
33,55,90,56,45,90,54,60,90
34,55,90,58,0,90,56,60,90
36,55,90,60,43,90,58,60,90
38,55,90,62,41,90,60,55,90
39,55,90,64,40,90,62,57,90
40,60,90,66,0,90,63,59,90
```

```
44,0,90,68,36,90,64,60,90
48,0,90,70,0,90,68,60,90
56,0,90,72,36,90,72,0,90
64,0,90,76,36,90,74,64,90
72,0,90,78,36,90,76,60,90
80,0,90,80,35,90,78,62,90
88,0,90,82,0,90,79,64,90
96,0,90,84,35,90,80,67,90
104,0,90,86,0,90,84,67,90
106,0,90,88,36,90,88,64,90
107,67,90,90,0,90,90,0,90
108,67,90,92,33,90,91,64,90
109,67,90,94,0,90,92,60,90
110,67,90,96,36,90,94,0,90
111,67,90,98,0,90,95,64,90
112,69,90,100,38,90,96,67,90
114,0,90,102,0,90,98,0,90
116,67,90,104,35,90,99,64,90
118,0,90,108,0,90,100,62,90
120,62,90,112,38,90,104,62,90
122,0,90,114,0,90,112,69,90
124,64,90,116,36,90,116,67,90
126,0,90,118,0,90,120,62,90
128,67,90,120,35,90,124,64,90
130,64,90,122,0,90,128,67,90
132,0,90,124,36,90,130,64,90
134,67,90,126,0,90,134,67,90
136,64,90,128,36,90,136,64,90
138,62,90,130,36,90,138,62,90
139,64,90,132,0,90,139,64,90
140,60,90,134,36,90,140,60,90
144,64,90,136,35,90,144,64,90
152,0,90,138,0,90,148,0,90
160,0,90,140,33,90,152,55,90
168,0,90,142,0,90,154,0,90
176,0,90,144,40,90,155,57,90
178,0,90,148,0,90,156,60,90
179,62,90,152,36,90,158,60,90
180,62,90,160,34,90,160,64,90
181,59,90,168,45,90,162,0,90
182,62,90,169,0,90,163,64,90
183,62,90,170,43,90,164,67,90
184,60,90,171,0,90,166,67,90
186,67,90,172,41,90,168,62,90
187,67,90,173,0,90,170,62,90
```

```
188,67,90,174,40,90,171,62,90
192,0,90,175,0,90,172,57,90
194,67,90,176,38,90,176,62,90
195,67,90,177,0,90,180,0,90
196,67,90,178,36,90,182,55,90
200,0,90,179,0,90,184,60,90
202,67,90,180,35,90,188,0,90
203,67,90,181,0,90,190,60,90
204,67,90,182,31,90,192,64,90
205,67,90,183,0,90,196,0,90
206,67,90,184,36,90,198,64,90
207,67,90,188,0,90,200,67,90
208,60,90,190,36,90,208,60,90
210,0,90,192,36,90,210,0,90
211,64,90,196,0,90,211,64,90
212,67,90,198,36,90,212,67,90
214,67,90,200,35,90,214,67,90
216,69,90,204,0,90,216,69,90
220,67,90,208,31,90,220,67,90
224,64,90,210,0,90,224,64,90
226,0,90,212,36,90,226,0,90
227,60,90,214,0,90,227,60,90
228,67,90,216,36,90,228,67,90
230,67,90,218,0,90,230,67,90
231,67,90,220,31,90,231,67,90
232,64,90,222,0,90,232,64,90
234,0,90,224,31,90,234,0,90
236,60,90,226,0,90,236,60,90
238,0,90,228,36,90,238,0,90
240,55,90,230,0,90,240,55,90
244,60,90,232,31,90,244,60,90
248,64,90,234,0,90,248,64,90
250,0,90,236,31,90,250,0,90
251,60,90,238,0,90,251,60,90
252,67,90,240,43,90,252,67,90
254,67,90,241,0,90,254,67,90
255,67,90,242,41,90,255,67,90
256,64,90,243,0,90,256,64,90
258,0,90,244,40,90,258,0,90
260,60,90,245,0,90,260,60,90
262,0,90,246,38,90,262,0,90
264,55,90,247,0,90,264,55,90
265,55,90,248,31,90,266,0,90
266,55,90,250,0,90,268,60,90
268,60,90,252,36,90,270,0,90
```

```
270,0,90,254,0,90,272,55,90
272,62,90,256,31,90,274,0,90
273,62,90,258,0,90,276,60,90
274,62,90,260,31,90,278,0,90
276,64,90,262,0,90,280,67,90
278,0,90,264,43,90,282,0,90
280,67,90,265,0,90,284,72,90
281,67,90,266,41,90,286,0,90
282,67,90,267,0,90,288,72,90
284,72,90,268,40,90,292,0,90
288,72,90,269,0,90,,,
,,,270,38,90,,,
,,,271,0,90,,,
,,,272,43,90,,,
,,,273,0,90,,,
,,,274,41,90,,,
,,,275,0,90,,,
,,,276,40,90,,,
,,,277,0,90,,,
,,,278,38,90,,,
,,,279,0,90,,,
,,,280,43,90,,,
,,,281,0,90,,,
,,,282,41,90,,,
,,,283,0,90,,,
,,,284,40,90,,,
,,,285,0,90,,,
,,,286,38,90,,,
,,,287,0,90,,,
,,,288,36,90,,,
,,,292,0,90,,,
```

7. Lessons Learned

7.1 Shuo Yang

From this project experience, I feel that "writing a good software" is not that easy. When we have finished something, we will find that more interesting and challenging things should also be done. But if there is no enough time, the only thing left is pity. So the first thing I learned is that, no matter what we are dealing with, we should start as early as possible. Enough time will give us the opportunity to product a better work, not just a finished work although it can also work. To tell the truth, we have some delays during the project process, and we have experienced a very tough month in the last 30 days, handing in

only a finished software. I admit that we have truly gained a lot from this project, for both language translator itself and the team developing. But it is really a pity, at least for me, that I have not enough time to make a better work. By now, I have a thorough understanding about the programming language and compiler, and I know how to make our language better (for Music only because we write a music language). But I just don't have time to make it. I'm sorry about this.

It's my fault to make our whole project in a single file (compile.ml). I think this kind of thing should be avoided in software engineering, especially for the team developing. Putting nearly everything in a single file means that all of us should work on that single file, which further means that there is huge possibility that we will tough others' codes when we solve the problem of ourselves, bringing more bugs. I have experienced this in our development, and I definitely believe that an appropriate developing style can enable us to avoid this kind of problem. We should keep different codes with different functions in different modules, and keep their interface between the modules as consistent as possible. When someone is responsible for one specific module, that person should guarantee that he can use the input from last module appropriately, and generate the right output format for the following module. By doing this, we can keep the wasting time of the team as less as possible. And for each member itself, he should have the ability to separately handle the problem from the module himself. We can make whole bunch of things more easily work in order by doing this.

Actually, it is not a good thing to start programming right after you get an idea. A whole project is not a programming game. We should schedule the structure of our project first. We should get a general idea about what features we should implement, otherwise in the future, when we want to implement a new idea, maybe we should go through the whole project, from scanner to compiler in the present case. By having a full idea first, we can avoid working on 500 lines codes in whole 20 days, revising after revising. A good start is half done, and we will never forget it.

Programming is very interesting, and exciting. I cannot describe the happiness after I write several effective codes, or find out some problems in my program. During the final's week, I just gave about 4 days to the other 3 courses' review, and the other time is all spent on this programming project, even during my sleeping. I don't care so much about the scores of my courses. I think I should do the right thing as a 23 young man, a future's software engineer. Unfortunately, I am not a clever problem-solver, at least by now. But it doesn't matter. I believe I will become one in the future.

7.2 Tong Ge

At the beginning of our development process, our group met once a week. The interval between two meetings was too long that we needed to spend plenty of time to resume from the breaking point. In the last half month, we met everyday to work on our project and made progress really fast. We remembered clearly where we stopped the day before so that we could start quickly and make full use of time.

The second lesson I learnt is that collaboration is significant in team work. Although each team member can does their own work independently, sometimes it is not as efficient as working together. For example,

when we need to think of a new idea, group brainstorm can provide a better solution because different member can discover the pros and cons of each solution from different perspective. When we need to debug, group work is also more efficient and can avoid the waste of a lot of time on a simple bug when working individually.

It is important that if a team member makes a change to some aspects of the program when working individually, all team members must be informed of the change to avoid inconsistency.

7.3 Jingsi Li

Although our team started early, we made progress slowly at first until the deadline is approaching. At the last two weeks, our group worked on this project 5 hours everyday, and at the same time, every member needed to do homework and final reviews. Three of us were really exhausted. So, I learnt that we should have made an effective plan in advance rather than postpone every milestone to the last allowable day.

Besides, this is the first time that I used Github. It really facilitated group coding a lot. At first, I thought it was tricky to use it. Along with the development process, I have become more and more familiar with its operations. However, I only used its most basic functions, there's still a lot to explore.

I think the most challenging part is to manage O'Caml. When O'Caml is firstly introduced in class, I thought it really hard to understand. At first, it cost me a lot of time to read the O'Caml code of the Microc compiler. But now, I can implement a function using O'Caml much faster. In the process of studying O'Caml, I found it magical and could do lots of work in just a few lines of code.

8. Appendix -- Source Code

8.1 scanner.mll

```
{ open Parser }

rule token = parse
  [' ' '\t' '\r' '\n'] { token lexbuf } (* Whitespace *)
| "/*"      { comment lexbuf }          (* Comments *)
| '('       { LPAREN }
| ')'       { RPAREN }
```

```
| "[-t"        { LBRACKETT}
| "[-r"        { LBRACKETR}
| "[-b"      { LBRACKETB}
| ']'        { RBRACKET }
| '{'        { LBRACE }
| '}'        { RBRACE }
| "<<"        { LABRACKET }
| ">>"        { RABRACKET }
| ';'        { SEMI }
| ','        { COMMA }
| '+'        { PLUS }
| '*'        { TIMES }
| '='        { ASSIGN }
| '&'        { SYNTHESIZE }
| "<-"        { CONCAT }
| "=="        { EQ }
| "!="        { NEQ }
| "&&"        { AND }
| "||"        { OR }
| '<'        { LT }
| "<="        { LEQ }
| '>'        { GT }
| ">="        { GEQ }
| "if"        { IF }
| "else"     { ELSE }
| "for"      { FOR }
| "while"    { WHILE }
(*| "break"   { BREAK }   *)
| "return"  { RETURN }
| "function"{ FUNCTION }
| "int" | "string" | "bool" | "pitch" | "note" | "rhythm" | "melody" |
"void" | "bar" as typ { TYPE(typ) }
(*| "piano" | "banjo" | "drums" | "clarinet" | "sax" | "guitar" |
"violin" | "french horn" | "goblins" | "cello" as lxm { INSTRU(lxm) }
*)
| "track" as lxm { TRACK(lxm) }
| "true" | "false" as bool_val { BOOL_VALUE(bool_val) }
| ['0'-'9']+ as lxm { LITERAL(int_of_string lxm) }
| ['a'-'z' 'A'-'Z']['a'-'z' 'A'-'Z' '0'-'9' '_']* as lxm { ID(lxm) }
| ('"')[^ '"']+('"') as lxm { STR(lxm) }
| '~'(['A'-'G']['b' '#']?['1'-'7']?)? as lxm { PITCH_VALUE(lxm) }
| "null"  as lxm { NULL(lxm) }
| eof { EOF }
| _ as char { raise (Failure("illegal character " ^ Char.escaped
char)) }
```

```
and comment = parse
  "*/" { token lexbuf }
| _     { comment lexbuf }
```

8.2 Parser.mly

```
%{ open Ast %}

%token SEMI LPAREN RPAREN LBRACKETT LBRACKETB LBRACKETR RBRACKET
LBRACE RBRACE LABRACKET RABRACKET COMMA
%token PLUS TIMES ASSIGN SYNTHESIZE CONCAT
%token EQ NEQ AND OR LT LEQ GT GEQ
%token IF ELSE FOR WHILE RETURN
%token FUNCTION NULL
%token <string> MAIN
%token <string> TYPE
/*%token <string> INSTRU*/
%token <string> TRACK
%token <int> LITERAL
%token <string> ID
%token <string> STR
%token <string> PITCH_VALUE
%token <string> BOOL_VALUE
%token <string> NULL
%token EOF

%nonassoc NOELSE
%nonassoc ELSE
%nonassoc LBRACE
%nonassoc LBRACKET
%nonassoc LPAREN
%left COMMA
%right ASSIGN
%left OR
%left AND
%left EQ NEQ
%left LT GT LEQ GEQ
%left PLUS SYNTHESIZE CONCAT
%left TIMES
```

```
%start program
%type <Ast.program> program

%%
program:
    /* nothing */    { [],[] }
  | program var_decl { List.rev ($2 :: List.rev (fst $1)), snd $1 }
  | program func_decl { fst $1, List.rev ($2 :: List.rev (snd $1)) }

func_decl:
    FUNCTION all_type func_name LPAREN formals_opt RPAREN LBRACE
func_bodys RBRACE
      { { rtype= $2;
          fname = $3;
    formals = $5;
    fbodys = $8;} }

all_type:
      TYPE  { $1 }
   | TRACK  { $1 }

func_name:
      MAIN  { $1 }
   | ID     { $1 }

formals_opt:
      /* nothing */ { [] }
   | formal_list { List.rev($1) }

formal_list:
      par_decl { [$1] }
   | formal_list COMMA par_decl { $3 :: $1 }

par_decl:
      all_type ID    {{p_type=$1;p_name=$2}}

func_bodys:
    /* nothing */    { [],[] }
  | func_bodys var_decl { List.rev ($2 :: List.rev (fst $1)), snd $1 }
  | func_bodys stmt { fst $1, List.rev ($2 :: List.rev (snd $1)) }

var_decl:
      TYPE ID SEMI
{{ v_type=$1;v_name=$2;v_attr=("",0,0,0,0)}}
```

```
   | TRACK LABRACKET ID COMMA LITERAL COMMA LITERAL COMMA LITERAL COMMA
LITERAL RABRACKET ID SEMI


     {{ v_type=$1;v_name=$13;v_attr=($3,$5,$7,$9,$11)}}
   | TRACK LABRACKET RABRACKET ID SEMI


     {{ v_type=$1;v_name=$4;v_attr=("",0,0,0,0)}}



stmt_list:
    /* nothing */  { [] }
  | stmt_list stmt { $2 :: $1 }

stmt:
    expr SEMI { Expr($1) }
  | RETURN expr SEMI { Return($2) }
/*  | BREAK SEMI  { Break } */
  | LBRACE stmt_list RBRACE { Block(List.rev $2) }
  | IF LPAREN expr RPAREN stmt %prec NOELSE { If($3, $5, Block([])) }
  | IF LPAREN expr RPAREN stmt ELSE stmt    { If($3, $5, $7) }
  | FOR LPAREN expr_opt SEMI expr_opt SEMI expr_opt RPAREN stmt
      { For($3, $5, $7, $9) }
  | WHILE LPAREN expr RPAREN stmt { While($3, $5) }

expr_opt:
    /* nothing */ { Noexpr }
  | expr          { $1 }

expr:

  LPAREN expr SEMI LITERAL RPAREN { Note_value($2,$4) }
  | LBRACKETT actuals_opt RBRACKET      { Track_value($2)} /*getong
changed, solve 1 r/r conflict, bring 1 s/r, not differentiate bar or
rhythm right here*/
  | LBRACKETB actuals_opt RBRACKET      { Bar_value1($2)} /*getong
changed, solve 1 r/r conflict, bring 1 s/r, not differentiate bar or
rhythm right here*/
  | LBRACKETR actuals_opt RBRACKET      { Rhythm_value($2)} /*getong
changed, solve 1 r/r conflict, bring 1 s/r, not differentiate bar or
rhythm right here*/

  | LBRACKETB expr SEMI LPAREN actuals_opt RPAREN RBRACKET
{ Bar_value2($2,$5) }
  | LITERAL           { Literal($1) }
  | PITCH_VALUE       { Pitch_value($1) }
```

```
   | STR              { Str($1) }
   | BOOL_VALUE       { Bool($1) }
   | NULL             { Null($1) }
   | ID               { Id($1) }
   | ID LPAREN actuals_opt RPAREN { Call($1, $3)}
   | expr PLUS    expr { Binop($1, Add,    $3) }
   | expr TIMES   expr { Binop($1, Mult,   $3) }
   | expr SYNTHESIZE expr { Binop($1, Paral, $3) }
   | expr EQ      expr { Binop($1, Equal, $3) }
   | expr NEQ     expr { Binop($1, Neq,    $3) }
   | expr LT      expr { Binop($1, Less,   $3) }
   | expr LEQ     expr { Binop($1, Leq,    $3) }
   | expr GT      expr { Binop($1, Greater,  $3) }
   | expr GEQ     expr { Binop($1, Geq,    $3) }
   | expr AND     expr { Binop($1, And,    $3) }
   | expr OR      expr { Binop($1, Or,     $3) }
   | ID ASSIGN expr    { Assign($1, $3) }
   | expr CONCAT expr { Concat($1, $3) }
   | LPAREN expr RPAREN { $2 }

actuals_opt:
   /* nothing */ { [] }
   | actuals_list  { List.rev $1 }

actuals_list:
   expr                     { [$1] }
   | actuals_list COMMA expr { $3 :: $1 }
```

8.3 ast.ml

```
type op = Add | Mult | Paral | Equal | Neq | Less | Leq | Greater |
Geq | And | Or

type expr =
    Note_value of expr * int
  | Track_value of expr list
  | Bar_value1 of expr list
  | Rhythm_value of expr list
  | Bar_value2 of expr * expr list
  | Literal of int
  | Pitch_value of string
```

```
  | Str of string
  | Bool of string
  | Null of string
  | Id of string
  | Binop of expr * op * expr
  | Assign of string * expr
  | Concat of expr * expr
  | Call of string * expr list
  | Noexpr

type stmt =
    Block of stmt list
  | Expr of expr
  | Return of expr
(*  | Break *)
  | If of expr * stmt * stmt
  | For of expr * expr * expr * stmt
  | While of expr * stmt

type var_decl = {
    v_type: string;
    v_name: string;
    v_attr: string * int * int * int * int;
  }

type par_decl = {
    p_type: string;
    p_name: string;
  }

type func_decl = {
    rtype: string;
    fname : string;
    formals : par_decl list;
    fbodys : var_decl list * stmt list;
  }

type program = var_decl list * func_decl list


let rec string_of_expr = function
    Note_value(e,l) -> "(" ^ string_of_expr e ^ "; " ^ string_of_int
l ^ ")"
  | Track_value(el) -> "[" ^ String.concat ", " (List.map
string_of_expr el) ^ "]"
```

```
  | Bar_value1(el) -> "[" ^ String.concat ", " (List.map
string_of_expr el) ^ "]"
  | Rhythm_value(el) -> "[" ^ String.concat ", " (List.map
string_of_expr el) ^ "]"
  | Bar_value2(e, el) ->
     "[" ^ string_of_expr e ^ ";" ^ "(" ^ String.concat ", "
(List.map string_of_expr el) ^ ")]"
  | Literal(l) -> string_of_int l
  | Pitch_value(s) -> s
  | Str(s) -> s
  | Bool(s) -> s
  | Null(s) -> s
  | Id(s) -> s
  | Binop(e1, o, e2) ->
     string_of_expr e1 ^ " " ^
     (match o with
   Add -> "+" | Mult -> "*" | Paral -> "&"
     | Equal -> "==" | Neq -> "!="
     | Less -> "<" | Leq -> "<=" | Greater -> ">" | Geq -> ">="
     | And -> "&&" | Or -> "||") ^ " " ^
     string_of_expr e2
  | Assign(s, e2) -> s ^ " = " ^ string_of_expr e2
  | Concat(e1, e2) -> string_of_expr e1 ^ " <- " ^ string_of_expr e2
  | Call(s, el) -> s ^ "(" ^ String.concat ", " (List.map
string_of_expr el) ^ ")"
  | Noexpr -> ":)"

let rec string_of_stmt = function
    Block(stmts) ->
      "{\n" ^ String.concat "" (List.map string_of_stmt stmts) ^ "}\n"
  | Expr(expr) -> string_of_expr expr ^ ";\n";
  | Return(expr) -> "return " ^ string_of_expr expr ^ ";\n";
(*  | Break -> "break;\n"  *)
  | If(e, s, Block([])) -> "if (" ^ string_of_expr e ^ ")\n" ^
string_of_stmt s
  | If(e, s1, s2) ->  "if (" ^ string_of_expr e ^ ")\n" ^
     string_of_stmt s1 ^ "else\n" ^ string_of_stmt s2
  | For(e1, e2, e3, s) ->
     "for (" ^ string_of_expr e1  ^ " ; " ^ string_of_expr e2 ^ " ; "
^
     string_of_expr e3  ^ ") " ^ string_of_stmt s
  | While(e, s) -> "while (" ^ string_of_expr e ^ ") " ^
string_of_stmt s
```

```
let string_of_var_decl var_decl = match var_decl.v_type with
     "track"-> let (s,i1,i2,i3,i4) = var_decl.v_attr in
          var_decl.v_type ^ "<<" ^ s ^ "," ^ string_of_int i1 ^ "," ^
string_of_int i2 ^ "," ^ string_of_int i3 ^ "," ^ string_of_int i4 ^
">> " ^ var_decl.v_name  ^ ";\n"
     |_ -> var_decl.v_type ^ " " ^ var_decl.v_name  ^ ";\n"


let string_of_par_decl par_decl =
  par_decl.p_type ^ " " ^ par_decl.p_name


let string_of_func_decl func_decl = (let (func_locals,func_bodys) =
func_decl.fbodys in
  "function " ^ func_decl.rtype ^ " " ^ func_decl.fname ^ "(" ^
  String.concat ","(List.map string_of_par_decl func_decl.formals) ^
")\n{\n" ^
  String.concat "" (List.map string_of_var_decl func_locals) ^
  String.concat "" (List.map string_of_stmt func_bodys) ^
  "}\n")

let string_of_func_decl func_decl = ""

let string_of_program (vars, funcs) =
  String.concat "" (List.map string_of_var_decl vars) ^ "\n" ^
  String.concat "\n" (List.map string_of_func_decl funcs)
```

8.4 compile.ml

```
open Ast
open Printf

module NameMap = Map.Make(struct
  type t = string
  let compare x y = Pervasives.compare x y
end);;

module StringMap = Map.Make(struct
  type t = string
  let compare x y=Pervasives.compare x y
end);;
```

```
module IntMap = Map.Make(struct
  type t = int
  let compare x y = Pervasives.compare x y
end);;

type element =
   Nte of int * int
  |Bar of (int * int) list
  |Tra of (int list) * ((int * int) list list)
  |Mel of (int list list) * ((int * int) list list list)
  |Rhy of int list
  |Pit of int
  |Lit of int
  |Stg of string
  |Bol of int

(*
brief description of variables initialization:
Pit:int;                              (     as 0)
Not:(int,int)                         (initialize as
(0,0)                                          )
Bar:[(int,int);(int,int);...]        (initialize as
[(0,0)]                                        )
Tra:[bar;....]                       (initialize as
[[(0,0)]        ]                              )
Mel:[Tra;...]                        (initialize as
[[[(0,0)]        ]               ]          )
Rhy:[int;int;...]                         ([0])
Str:string                               ("")
Bol:int                                   (0)
*)

exception ReturnException of element * element NameMap.t

let maxStringInt = 95;;
let minStringInt = 0;;

let str2int = StringMap.empty;;
let str2int = StringMap.add "~C" 0 str2int;;
let str2int = StringMap.add "~C#" 1 str2int;;
let str2int = StringMap.add "~Db" 1 str2int;;
let str2int = StringMap.add "~D" 2 str2int;;
let str2int = StringMap.add "~D#" 3 str2int;;
let str2int = StringMap.add "~Eb" 3 str2int;;
```

```
let str2int = StringMap.add "~E" 4 str2int;;
let str2int = StringMap.add "~F" 5 str2int;;
let str2int = StringMap.add "~F#" 6 str2int;;
let str2int = StringMap.add "~Gb" 6 str2int;;
let str2int = StringMap.add "~G" 7 str2int;;
let str2int = StringMap.add "~G#" 8 str2int;;
let str2int = StringMap.add "~Ab" 8 str2int;;
let str2int = StringMap.add "~A" 9 str2int;;
let str2int = StringMap.add "~A#" 10 str2int;;
let str2int = StringMap.add "~Bb" 10 str2int;;
let str2int = StringMap.add "~B" 11 str2int;;
let int2str = IntMap.empty;;
let int2str = IntMap.add 0 "~C" int2str;;
let int2str = IntMap.add 1 "~C#" int2str;;
let int2str = IntMap.add 2 "~D" int2str;;
let int2str = IntMap.add 3 "~D#" int2str;;
let int2str = IntMap.add 4 "~E" int2str;;
let int2str = IntMap.add 5 "~F" int2str;;
let int2str = IntMap.add 6 "~F#" int2str;;
let int2str = IntMap.add 7 "~G" int2str;;
let int2str = IntMap.add 8 "~G#" int2str;;
let int2str = IntMap.add 9 "~A" int2str;;
let int2str = IntMap.add 10 "~A#" int2str;;
let int2str = IntMap.add 11 "~B" int2str;;

let mapstr2int = function
x ->
let octave = String.get x ((String.length x)-1) in
if (octave = '1')||(octave = '2')||(octave = '3')||(octave =
'4')||(octave = '5')||(octave = '6')||(octave = '7') then
(let s = (String.sub x 0 ((String.length x) - 1)) in
StringMap.find s str2int + ((int_of_char octave) - 48) * 12)
else if x = "~" then 250
else(StringMap.find x str2int);;

let mapint2str = fun x ->
if x > maxStringInt then raise (Failure ("String higher than allowable
reference threshold"))
else if x < minStringInt then raise (Failure ("String lower than
allowable reference threshold"))
else if x > 11 then (IntMap.find (x - 12*(x/12)) int2str) ^
(string_of_int (x/12))
else (IntMap.find x int2str);;
```

```
let rec string_of_element = function
    Nte(p,d) -> "Nte(" ^ (string_of_int p) ^ "," ^ (string_of_int
d)^")"
  |Bar(l) ->  let readNote (p,d) = "Nte(" ^ (string_of_int p) ^ "," ^
(string_of_int d)^")" in
                      "Bar(" ^ (String.concat " "(List.map (fun (p,d) ->
readNote (p,d)) l)) ^")"
  |Tra(attr,ll) ->  let readNote p d = ("Nte(" ^ (string_of_int p) ^
"," ^ (string_of_int d)^")" )in
                      let readBar l = ("Bar(" ^ (String.concat "
"(List.map (fun (p,d) -> readNote p d) l)) ^")")
                      in ("Tra(Attr(" ^ (String.concat "," (List.map
string_of_int attr)) ^
                      ") ; (" ^ (String.concat " " (List.map readBar
ll)) ^"))")
  |Mel(attr,lll) ->let readNote p d = ("Nte(" ^ (string_of_int p) ^
"," ^ (string_of_int d)^")" )in
                      let readBar l = ("Bar(" ^ (String.concat "
"(List.map (fun (p,d) -> readNote p d) l)) ^")")
                        in let readTra l = "Tra(" ^(String.concat " "
(List.map readBar l))^")"
                      in "Mel(Attr(" ^ (String.concat "," (List.map
(fun l-> "(" ^ (String.concat "," (List.map string_of_int l)) ^ ")" )
(List.rev attr))) ^ ") ; (" ^ (String.concat " " (List.map readTra
(List.rev lll))) ^"))"
  |Rhy(il) ->  "Rhy(" ^ (String.concat " "(List.map string_of_int il))
^")"
  |Pit(i) -> "Pit(" ^ string_of_int(i) ^ ")"
  |Lit(i) -> "Lit(" ^ string_of_int(i) ^ ")"
  |Stg(s) -> "Stg(" ^ s ^ ")"
  |Bol(b) ->"Bol(" ^ string_of_int(b) ^ ")"

let get_type = function
    Nte(p,d) -> "note"
  |Bar(l) -> "bar"
  |Tra(attr,l) -> "track"
  |Mel(attr,l) -> "melody"
  |Rhy(l) -> "rhythm"
  |Pit(i) -> "pitch"
  |Lit(i) -> "int"
  |Stg(s) -> "string"
  |Bol(i) -> "bool"

let get_attr=function x->(*to get the track's attributes, especially
for the instrument*)
```

```
      let (s,i1,i2,i3,i4) = x in
      let instrument=(match s with
            "banjo" -> 105
            |"drums" -> 114
            |"clarinet" -> 71
            |"sax" -> 65
            |"guitar" -> 221
            |"piano" -> 0
            |"violin" -> 40
            |"french horn" -> 60
            |"goblins" -> 101
            |"cello" -> 42
            |"bassoon" -> 70
            |"trombone" -> 57
            |"brass_ensemble" -> 61
            |"trumpet" -> 56
            | "" -> 0
            |_ -> raise (Failure ("unknown instrument of \"" ^ s ^ "\",
you should choose from \"banjo, drums, clarinet, sax, guitar, piano,
violin, french horn, goblins, cello\", exactly one of them!")))
      in
      if i3!=0 then
            (let speed = (60*8/i3) in
                  if speed > 0 then [instrument;i1;i2;speed;i4]
                  else raise (Failure("speed is too fast")))
      else [instrument;i1;i2;i3;i4]


let file = "melody.csv";;

(* Main entry point: run a program *)

let run (vars, funcs) =
  (* Put function declarations in a symbol table *)
  let func_decls = List.fold_left
      (fun funcs fdecl -> NameMap.add fdecl.fname fdecl funcs)
      NameMap.empty funcs
  in

  (* Invoke a function and return an updated global symbol table *)
  let rec call fdecl actuals globals =

    (* Evaluate an expression and return (value, updated environment)
*)
    let rec eval env = function
      Pitch_value(s) -> Pit(mapstr2int s), env
```

```
     | Note_value(e,i) ->(match (eval env e) with
             Pit(p),env -> ((Nte(p,i)),env)
             |_-> raise (Failure ("wrong type in
Note_value!")) )(*env right*)
     | Bar_value1(el) ->let actuals, env = List.fold_left (fun
(actuals, env) actual ->
                              let v, env = (match eval env actual
with
                                  Nte(p,d),env->(p,d),env
                                  |_->raise (Failure ("wrong type
in Bar_value!")) )
                              in v :: actuals, env)
                        ([], env) (List.rev el)
             in Bar(actuals),env(*env right*)
     | Rhythm_value(el) ->let actuals, env = List.fold_left (fun
(actuals, env) actual ->
                              let v, env = (match eval env actual
with
                                  Lit(i),env->i,env
                                  |_->raise (Failure ("wrong type
in Bar_value!")) )
                              in v :: actuals, env)
                        ([], env) (List.rev el)
             in Rhy(actuals),env(*env right*)
     | Bar_value2(e,el) -> let l1,env = (match (eval env e) with
             Rhy(l1),env -> l1,env
             |_-> raise (Failure ("wrong type in Rhythm_value!")) )
             in
             let l2, env = List.fold_left (fun (actuals, env)
actual ->
                              let v, env = (match eval env actual
with
                                  Pit(i),env->i,env
                                  |_->raise (Failure ("wrong type
in Bar_value!")) )
                              in v :: actuals, env)
                        ([], env) (List.rev el)
             in
             if (List.length l1==List.length l2) then
                  (let l = (List.fold_left2 (fun l p d ->
((p,d)::l)) [] l2 l1)
                       in Bar(List.rev l), env(*env right*))
             else raise (Failure ("unmatched number of rhythm and
pitches"))
```

```
      | Track_value(el) -> let actuals, env =List.fold_left (fun
(actuals, env) actual ->
                           let v, env = (match eval env actual with
                                 Bar(l),env -> l,env
                                 |_ -> raise (Failure ("wrong type in
Track_value!")))
                           in v :: actuals, env)
                             ([], env) (List.rev el)
                             in Tra([0;0;0;0;0],actuals),env(*env
right*)
      | Literal(i) -> Lit(i), env
      | Str(s) -> let s1=String.sub s 1 ((String.length s)-2) in
Stg(s1),env
      | Bool(s) -> if s = "true" then (Bol(1),env)
          else if s = "false" then (Bol(0),env)
          else raise (Failure ("Not a Bool type"))
      | Null(s) -> Stg(s),env
      | Id(s) ->
       let locals, globals = env in
       if NameMap.mem s locals then
         (NameMap.find s locals), env
       else if NameMap.mem s globals then
         (NameMap.find s globals), env
       else raise (Failure ("undeclared identifier " ^ s))
      | Binop(e1,op,e2)-> (let op1,env = (eval env e1) in let op2,env
= (eval env e2) in
       let boolean i = if i then 1 else 0 in
        match op with
     Add     -> (match (op1,op2) with
            (Lit(op1), Lit(op2)) -> Lit(op1+op2),env
            | (Stg(op1), Stg(op2)) -> Stg(op1^op2),env
            | (Tra(l1,op1),Tra(l2,op2)) -> Tra(l1,op1@op2),env
            | _ -> raise (Failure ("unexpected type for +")))
       | Mult    -> (match (op1,op2) with
               (Lit(l1), Lit(l2)) -> Lit(l1*l2),env
               | (Nte(p,l1), Lit(l2)) -> Nte(p,l1/l2),env
               | _ -> raise (Failure ("unexpected type for *")))
       | Paral   -> (match (op1,op2) with
(*            (Pitch_value(t1), Pitch_value(t2))   -> (*chord
part have not been done by now*)*)
                 (Tra(l1,t1), Tra(l2,t2)) ->
(Mel(([l2;l1]),([t2;t1]))),env
                 | (Mel(lm,m), Tra(tl,t)) ->
(Mel((tl::lm),(t::m))),env
                 | _ -> raise (Failure ("unexpected type for &")))
```

```
         | Equal   -> (match (op1,op2) with
                   (Lit(l1),Lit(l2)) -> Bol(boolean (l1=l2)),env
                   | (Stg(s1),Stg(s2))   -> Bol(boolean (s1=s2)),env
                   | (Pit(p1),Pit(p2))  -> Bol(boolean (p1=p2)),env
                   | (Nte(p1,d1), Nte(p2,d2)) -> Bol(boolean
((p1=p2)&&(d1=d2))),env
                   | _ -> raise (Failure ("unexpected type for =="))) 
         | Neq     -> (match (op1,op2) with
                   (Lit(l1),Lit(l2)) -> Bol(boolean (l1!=l2)),env
                   | (Stg(s1),Stg(s2))   -> Bol(boolean (s1!=s2)),env
                   | (Pit(p1),Pit(p2))  -> Bol(boolean (p1!=p2)),env
                   | (Nte(p1,l1), Nte(p2,l2)) -> Bol(boolean
((p1!=p2)||(l1!=l2))),env
                   | _ -> raise (Failure ("unexpected type for !="))) 
         | Less    -> (match (op1,op2) with
                   (Lit(l1),Lit(l2)) -> Bol(boolean (l1 < l2)),env
                   | _ -> raise (Failure ("unexpected type for <"))) 
         | Leq     -> (match (op1,op2) with
                   (Lit(l1),Lit(l2)) -> Bol(boolean (l1 <= l2)),env
                   | _ -> raise (Failure ("unexpected type for <="))) 
         | Greater -> (match (op1,op2) with
                   (Lit(l1),Lit(l2)) -> Bol(boolean (l1 > l2)),env
                   | _ -> raise (Failure ("unexpected type for >"))) 
         | Geq     -> (match (op1,op2) with
                   (Lit(l1),Lit(l2)) -> Bol(boolean (l1 >= l2)),env
                   | _ -> raise (Failure ("unexpected type for >="))) 
         | And     -> (match (op1,op2) with
                   (Bol(b1),Bol(b2)) -> Bol(boolean (b1==1 &&
b2==1)),env
                   | _ -> raise (Failure ("unexpected type for &&"))) 
         | Or      -> (match (op1,op2) with
                   (Bol(b1),Bol(b2)) -> Bol(boolean (b1==1 ||
b2==1)),env
                   | _ -> raise (Failure ("unexpected type for ||")))) 

    (*here for the melody, we have a problem, when we defined it we
have not the opportunity to give it some attributes, but when the
assignment happens, it will have some attributes. so we will use the
attributes that transfered to it. but for the track type, when a
variable is defined, its attributes should not be changed any more.*)
     | Assign(var,e) ->(*have done the type check here*)
       let v, (locals, globals) = eval env e in
       if NameMap.mem var locals then
          let va = NameMap.find var locals in
          let t1 = get_type v and t2 =get_type va in
```

```
            if t1 = t2 then (match t1 with
            "track"-> let attr = (match (NameMap.find var locals) with
Tra(attr, l) -> attr |_-> [0]) in
                        let l2 = (match v with Tra(at2,l2) -> l2 |_->
[[0,0]]) in
                                (v, (NameMap.add var (Tra(attr,l2)) locals,
globals))
            |_ -> v, (NameMap.add var v locals, globals)  )
            else raise (Failure("type wrong in assignment for \"" ^ var
^ "\"! it has a type of \"" ^ t2 ^ "\" but an \"" ^ t1 ^ "\" type data
is assigned to it!"))
        else if NameMap.mem var globals then
            (let va = NameMap.find var globals in
            let t1 = get_type v and t2 =get_type va in
            if t1 = t2 then (match t1 with
            "track"-> let attr = (match (NameMap.find var globals) with
Tra(attr, l) -> attr |_-> [0]) in
                        let l2 = (match v with Tra(at2,l2) -> l2 |_->
[[0,0]]) in
                                (v,(locals, NameMap.add var (Tra(attr,l2))
globals))
            |_ -> v, (NameMap.add var v locals, globals)  )
            else raise (Failure("type wrong in assignment for \"" ^ var
^
                "\"! it has a type of \"" ^ t2 ^ "\" but an \"" ^ t1 ^
"\" type data is assigned to it!")))
        else raise (Failure ("undeclared identifier " ^ var))


    | Concat(e1,e2) -> (let op1,env = (eval env e1) in let op2,env =
(eval env e2) in
        match (op1,op2) with
        (Tra(l,t), Bar(b)) -> Tra(l,List.rev (b::(List.rev t))), env
        |(Bar(b),Nte(p,d)) -> Bar(List.rev ((p,d)::(List.rev b))), env
        |_ -> raise (Failure ("unexpected type for Concat")))
    | Call(f, el) -> (match f with
    "print" ->let actuals, env = (List.fold_left (fun (actuals, env)
actual ->
                        let v, env = eval env actual
                        in v :: actuals, env)
                        ([], env) (List.rev el) ) in
            print_endline (String.concat "\n" (List.map
string_of_element actuals));
                Lit(0),env
    |"at" -> (let v,env = eval env (List.nth el 0) in
        match v    with
```

```
                (Bar(l)) -> (match eval env (List.nth el 1) with
                      Lit(i),env ->  let (p,d)=(List.nth l i) in
Nte(p,d),env
                      |_-> raise (Failure ("wrong type in
Rhythm_value!"))   )
            | (Tra(attr,ll)) -> (match eval env (List.nth el 1) with
                      Lit(i), env-> let l=(List.nth ll i) in Bar(l),env
                      |_->raise (Failure("unexpected type for
at()"))   )
            |_->raise(Failure("obj at type failed! maybe some
unsupported data type for this function is applied!")))
      | "toneUp" -> (let v,env = eval env (List.nth el 0) in
          match v with
          (Pit(p)) -> (match eval env (List.nth el 1) with
                Lit(i),env -> (Pit(p+i)),env
                |_ -> raise(Failure"toneUp type failed"))
          |(Nte(p,d)) -> (match eval env (List.nth el 1) with
                Lit(i),env -> (Nte(p+i,d)),env
                |_ -> raise (Failure("toneUp type failed")))
          |(Bar(l)) -> (match (eval env (List.nth el 1)) with
                Lit(i),env -> Bar(List.map (fun (p,d) -> (p+i,d))
l),env
                |_ -> raise (Failure("toneUp type failed")))
          |(Tra(attr,ll)) -> (match (eval env (List.nth el 1)) with
                Lit(i),env -> Tra(attr,(List.map (List.map (fun (p,d)
-> (p+i,d))) ll)),env
                |_ -> raise (Failure("toneUp type failed")))
          |_->raise(Failure("toneUp type failed! maybe some
unsupported data type for this function is applied!")))
      | "toneDown" -> (let v,env = eval env (List.nth el 0) in
          match v with
          (Pit(p)) -> (match eval env (List.nth el 1) with
                Lit(i),env -> (Pit(p-i)),env
                |_ -> raise(Failure"toneDown type failed"))
          |(Nte(p,d)) -> (match eval env (List.nth el 1) with
                Lit(i),env -> (Nte(p-i,d)),env
                |_ -> raise (Failure("toneDown type failed")))
          |(Bar(l)) -> (match (eval env (List.nth el 1)) with
                      Lit(i),env -> Bar(List.map (fun (p,d) -> (p-i,d))
l),env
                      |_ -> raise (Failure("toneDown type failed")))
          |(Tra(attr,ll)) -> (match (eval env (List.nth el 1)) with
                      Lit(i),env -> Tra(attr,(List.map (List.map (fun
(p,d) -> (p-i,d))) ll)),env
```

```
                          |_ -> raise (Failure("toneDown type failed!
maybe some unsupported data type for this function is applied!")))
          |_->raise(Failure("toneDown type failed")))
      | "length" -> (let e,env = (eval env (List.nth el 0)) in
          match e with
          (Bar(l)) -> Lit(List.length l),env
          |(Tra(attr,ll)) -> Lit(List.length ll),env
          |_->raise(Failure("Check length type failed! maybe some
unsupported data type for this function is applied!")))
      |_ ->(*other self-defined functions*)
        let fdecl =
          try NameMap.find f func_decls
          with Not_found -> raise (Failure ("undefined function " ^ f))
        in
        let actuals, env = List.fold_left
            (fun (actuals, env) actual ->
            let v, env = eval env actual in v :: actuals, env)
            ([], env) (List.rev el)
        in
        let (locals, globals) = env in
        try
          let globals = call fdecl actuals globals
          in Lit(0), (locals, globals)
        with ReturnException(v, globals) -> v, (locals, globals)  )
      | Noexpr -> Lit(1), env (* must be non-zero for the for loop
predicate *)
    in


    (* Execute a statement and return an updated environment *)
    let rec exec env = function
     Block(stmts) -> List.fold_left exec env stmts
      | Expr(e) -> let _, env = eval env e in env
      | If(e, s1, s2) ->
       let v, env = eval env e in
       exec env (if v = Bol(1) then s1 else s2)
      | While(e, s) ->
       let rec loop env =
         let v, env = eval env e in
         if v = Bol(1) then loop (exec env s) else env
       in loop env
      | For(e1, e2, e3, s) ->
       let _, env = eval env e1 in
       let rec loop env =
         let v, env = eval env e2 in
         if v = Bol(1) then
```

```
                  let _, env = eval (exec env s) e3 in
                  loop env
              else
                  env
          in loop env
      | Return(e) ->
        let v, (locals, globals) = eval env e in
            (let t = get_type v in
            if t = fdecl.rtype then raise (ReturnException(v, globals))
            else raise (Failure ("Function \"" ^ fdecl.fname ^ "\"
return type wrong, it should be \"" ^ fdecl.rtype ^ "\" type other
than the returned \"" ^ t ^ "\" type!")))
    in

    (* Enter the function: bind actual values to formal arguments *)
    let formals = fdecl.formals in (*formal is a par_decl list*)
    let locals =
      try (List.fold_left2
      (fun locals formal actual-> if formal.p_type = (get_type actual)
then (NameMap.add formal.p_name actual locals)
                               else raise (Failure ("wrong input argument
type for function \"" ^ fdecl.fname ^
                               "\"! a \"" ^ formal.p_type ^ "\" type is
asked for argument \"" ^ formal.p_name ^
                               "\" but a \"" ^ (get_type actual) ^ "\"
type data is input!")) )
        NameMap.empty formals actuals )
      with Invalid_argument(_) ->
      raise (Failure ("wrong number of arguments passed to " ^
fdecl.fname))
    in

    let (func_locals,func_bodys) = fdecl.fbodys
    in

    (* Initialize local variables to 0 *)
    let locals = List.fold_left (fun locals var_decl -> match
var_decl.v_type with
      "note" -> NameMap.add var_decl.v_name (Nte(0,0)) locals
      | "track" -> NameMap.add var_decl.v_name (Tra((get_attr
var_decl.v_attr),[[(0,0)]])) locals
      | "bar" -> NameMap.add var_decl.v_name (Bar([(0,0)])) locals
      | "rhythm" -> NameMap.add var_decl.v_name (Rhy([0])) locals
      | "melody" -> NameMap.add var_decl.v_name (Mel([[0]],[[[(0,0)]]]))
locals
```

```
          | "int" -> NameMap.add var_decl.v_name (Lit(0)) locals
          | "pitch" -> NameMap.add var_decl.v_name (Pit(0)) locals
          | "string" -> NameMap.add var_decl.v_name (Stg("")) locals
          | "bool" -> NameMap.add var_decl.v_name (Bol(0)) locals
          |_ -> raise (Failure ("undefined type!"))  ) locals func_locals


    in
    (* Execute each statement in sequence, return updated global
symbol table *)
    snd (List.fold_left exec (locals, globals) func_bodys)


    (* Run a program: initialize global variables to "0", find and run
"main" *)
  in let globals = List.fold_left
          (fun globals var_decl -> match var_decl.v_type with
      "note" -> NameMap.add var_decl.v_name (Nte(0,0)) globals
      |"track" -> NameMap.add var_decl.v_name (Tra((get_attr
var_decl.v_attr),[[(0,0)]])) globals
      |"bar" -> NameMap.add var_decl.v_name (Bar([(0,0)])) globals
      |"rhythm" -> NameMap.add var_decl.v_name (Rhy([0])) globals
      |"melody" -> NameMap.add var_decl.v_name (Mel([[0]],[[[(0,0)]]]))
globals
      |"int" -> NameMap.add var_decl.v_name (Lit(0)) globals
      |"pitch" -> NameMap.add var_decl.v_name (Pit(0)) globals
      |"string" -> NameMap.add var_decl.v_name (Stg("")) globals
      |"bool" -> NameMap.add var_decl.v_name (Bol(0)) globals
      |_ -> raise (Failure ("undefined type!"))   ) NameMap.empty vars


  in let melody,globals =
      try (try (let globals = call (NameMap.find "main" func_decls) []
globals in Lit(0),globals)
          with Not_found -> raise (Failure ("did not find the main()
function")))
      with ReturnException(v, globals) -> v,globals
(*  in print_endline (string_of_element melody);; *)


  in
(*  let
input=([[105;4;2;1;1];[193;4;2;1;1]],[[[(34,2);(250,2);(12,2);(12,2)];
[(55,1);(78,1)]];[[(34,2);(13,1);(88,2)];[(88,2);(81,2);(18,2);(22,2)]
]]]) in   *)
  (* Write message to file *)
  let trackInfo,message = match melody with
      Mel(l1,l2) -> l1,l2
```

```
      |_-> raise (Failure("the main function should return a \"melody\"
type variable!"))
      in
                let volumnArray= Array.make (List.length trackInfo) 0
in
                let (volumnArray,_) = List.fold_left (fun (a,n) e ->
a.(n)<-(let vol = (List.nth e 4) in if vol==0 then 90 else vol) ;a,
n+1) (volumnArray,0) trackInfo in

     let first_trackInfo = List.nth trackInfo 0 in
          let first_fraction = List.nth first_trackInfo 1 in
          let speed = List.nth first_trackInfo 3 in
          let speed = if speed==0 then 4 else speed in
            let a = (List.fold_left (fun fst e ->
                let next_fraction = List.nth e 1 in
                    if fst!=next_fraction then raise(Failure
("Incosistent fractions!")) else fst
               ) first_fraction trackInfo)  in ignore(a);
          let first_speed = List.nth first_trackInfo 3 in
            let a = (List.fold_left (fun fst e ->
                let next_fraction = List.nth e 3 in
                    if fst!=next_fraction then raise(Failure
("Incosistent speed!")) else fst
               ) first_speed trackInfo)  in ignore(a);
  (*let trackInfo=[[105;4;2;1;1];[193;4;2;1;1]] in*)
     (*let instrumentNo =  List.fold_left (fun s e -> s^string_of_int
(List.nth e 0) ^",") "" trackInfo in*)
      let instrumentNo = ( List.fold_left (fun s e -> let num =
(List.nth e 0 ) in
                                      let num = (if num==0 then 0 else
num) in
                                      s^string_of_int num ^",")
"" trackInfo) in
            let instrumentNo = String.sub instrumentNo 0
(String.length instrumentNo-1) in
                let instrumentNo = instrumentNo ^"\n" in
                    let firstEle= List.nth trackInfo 0 in
                        let basicbeat = List.nth firstEle 1 in
                            let basicbeat = if basicbeat==0 then 4
else basicbeat in
  (*let message =
[[[(34,2);(56,2);(12,2);(12,2)];[(55,1);(78,1)]];[[(34,2);(13,1);(88,2
)];[(88,2);(81,2);(18,2);(22,2)]]]*)
     let list_of_tracks = List.map (fun e -> List.concat e) message
in
```

```
(*let  n_track= List.length list_of_tracks in*)
(*let  basicbeat=4 in let count=0 in*)
let rec makeStrList n pitch alist=   (*convert every note
into a string in csv for n times*)
                    if n=0 then alist else
                              (*(let astring = (string_of_int
count) ^ "," ^ (string_of_int pitch) ^ ",90" in*)
                              (let astring = (if pitch > 199
then "," ^ "20,"
                                             else "," ^
(string_of_int pitch) ^ "," )in
                              (*(let astring =  "," ^
(string_of_int pitch) ^ ",90" in*)
                                        (*let count=count+1
in*)
                                        makeStrList (n-1)
pitch (astring::alist)) in
          let readTrack input=  (*concatenate all strings into
one list for each track*)
                    let str_track = List.map (fun (p,d) ->(*let
n=basicbeat/d in *) makeStrList 1 p []) input  in
                         List.concat str_track
                              (*in  List.map (fun e -> readTrack e)
list_of_tracks*)
                    in let list_of_strings = List.map (fun e ->
readTrack e) list_of_tracks in (*do that to every track*)
                         let max_len = List.fold_left (fun max e->
if (List.length e)>max then (List.length e) else max ) 0
list_of_strings in
                              let tickArray= Array.make
(List.length trackInfo) 0 in
          let oc = open_out file in    (* create or truncate file,
return channel *)
          (*fprintf oc "%s\n" message;   (* write something *)  *)
          (*fprintf oc "%d\n" n_track;*)
          fprintf oc "4\n";
          fprintf oc "%s" instrumentNo;
          (*fprintf oc "Instrument,105,Banjo,Instrument,114,Steel
Drum\n";*)
               for count = 0 to max_len-1 do
                              let (l, _) = (List.fold_left
                              (fun (l, n) e ->
                                        let
volumn=volumnArray.(n) in
```

```
                                                  let nthTrack=
(List.nth list_of_tracks n) in

                                                  if count<List.length
e

                                                  then (let(_,d) =
(List.nth nthTrack count) in

                                                                let
nbeats=basicbeat/d in

      let old_tick = tickArray.(n) in

      let new_tick=old_tick + speed* nbeats in

            tickArray.(n)<-new_tick;(*fprintf oc "count is %d\n"
count;*)

                l^","^(string_of_int old_tick)^(List.nth e
count)^(string_of_int volumn),n+1 )
                                                  else l^",,,",n+1)  ("",
0) list_of_strings)
                                    in let l= String.sub l 1
((String.length l)-1) in
                                    let l = l^"\n"
                                    in (fprintf oc "%s" l);
                  done;
               close_out oc;                      (* flush and close the
channel *)
```

8.5 melody.ml

```
type action = Ast | Compile

let _ =
  let action = if Array.length Sys.argv > 1 then
    List.assoc Sys.argv.(1) [ ("-a", Ast);("-c", Compile)]

  else Compile in
  let lexbuf = Lexing.from_channel stdin in
  let program = Parser.program Scanner.token lexbuf in
  match action with
```

```
    Ast -> let listing = Ast.string_of_program program
           in print_string listing
  | Compile -> ignore (Compile.run program)
```

8.6 Makefile

```
OBJS = ast.cmo parser.cmo scanner.cmo compile.cmo melody.cmo

TESTS = \
arith1

TARFILES = Makefile scanner.mll parser.mly \
      ast.ml melody.ml compile.ml \
      #$(TESTS:%=tests/test-%.mc) \
      $(TESTS:%=tests/test-%.out)

melody : $(OBJS)
      ocamlc -o melody $(OBJS)

#.PHONY : test
#test : melody testall.sh
#     ./testall.sh

scanner.ml : scanner.mll
      ocamllex scanner.mll

parser.ml parser.mli : parser.mly
      ocamlyacc parser.mly

%.cmo : %.ml
      ocamlc -c $<

%.cmi : %.mli
      ocamlc -c $<

#melody.tar.gz : $(TARFILES)
#     cd .. && tar czf PLT_Melody/melody.tar.gz
$(TARFILES:%=PLT_Melody/%)

.PHONY : clean
#clean :
```

```
#      rm -f melody parser.ml parser.mli scanner.ml testall.log \
      *.cmo *.cmi *.out *.diff
clean :
      rm -f melody parser.ml parser.mli scanner.ml \
      *.cmo *.cmi

# Generated by ocamldep *.ml *.mli
ast.cmo:
ast.cmx:
compile.cmo: ast.cmo
compile.cmx: ast.cmx
melody.cmo: scanner.cmo parser.cmi compile.cmo\
    ast.cmo
melody.cmx: scanner.cmx parser.cmx compile.cmx\
    ast.cmx
parser.cmo: ast.cmo parser.cmi
parser.cmx: ast.cmx parser.cmi
scanner.cmo: parser.cmi
scanner.cmx: parser.cmx
parser.cmi: ast.cmo
```

8.7 CSV.java

```
package miditest;

/**
 * CSV.java
 * June 11, 2003
 * @author: Stephen Steffes
 * Purpose: fill and extract data from a CSV file
 */

import java.util.*;
import java.io.*;

class CSV{
        public FileOutputStream outstr;
        PrintWriter writer;
        FileInputStream instr;
        BufferedReader reader;
```

```java
        Vector data;
//holds data from the CSV file, commas, new lines and all
        String fileName;                                        //name
of CSV file to write or read

        //open the csv file
        public CSV(String fileName){
                this.fileName=fileName;
                data=new Vector();
        }
        public CSV(){
        }

        //put string into the vector
        public void addLineToVector(String str){
                long i=0;
                StringTokenizer st=new
StringTokenizer(str,"\n\r,",true);                              //seperate
str into an array where elements are seperated by commas or new lines,
keep the commas and new lines
                while(st.hasMoreTokens()){
                        //System.out.println("adding Element "+i++);
                        data.addElement(st.nextToken());
//put all the strings into the data vector
                }
        }

        //removes all instances of the string str from the data
        public void removeString(String str){
                for(int i=0;i<data.size();i++){

if(data.elementAt(i).toString().compareTo(str)==0){
                                data.remove(i);
                                i--;
                        }
                }
        }

        //fill the data Vector from the CSV file
        public Vector fillVector(){
                //Open and save the file
                try{
                        FileInputStream instr=new
FileInputStream(fileName);
```

```java
                              BufferedReader reader=new BufferedReader(new
InputStreamReader(instr));
                              String csvText="",line="";
                              while((line=reader.readLine())!=null){
                                      csvText+=line+"\n";
//                                       System.out.println("read line: "+line);
                              }

                              reader.close();
                              instr.close();

                              //Parse the csv data and put into a vector
//                            data=new Vector();
                              data.removeAllElements();
                              addLineToVector(csvText);
                      } catch(FileNotFoundException e){
                              //if no data file exists
                              System.out.println("FileNotFoundException
(fillVector): "+e);
                              data.removeAllElements();
                      } catch(IOException e){
                              System.out.println("IOException (fillVector):
"+e);
                      }

                      return data;
          }

          //update the csv file with the data
          public void fillCSV(){
                  System.out.println("Saving File: "+fileName);
                  try{
                          FileOutputStream outstr=new
FileOutputStream(fileName);
                          PrintWriter writer=new PrintWriter(outstr);

                          for(int i=0;i<data.size();i++)
//go through the data vector

writer.print(data.elementAt(i).toString());
//write each element to the CSV file

                          writer.close();
                          outstr.close();
                  } catch(FileNotFoundException e){
```

```
                        System.out.println("FileNotFoundException
(fillCSV): "+e);
                } catch(IOException e){
                        System.out.println("IOException (fillCSV):
"+e);
                }
        }
}
```

8.8 CSV2MIDI.java

```java
package miditest;

import java.io.*;
import javax.sound.midi.*;
import java.lang.*;


public class CSV2MIDI{

        public static void main(String[] args)  throws
InvalidMidiDataException {

                //***** Get Inputs *****
                // if (args.length != 2)
                //          printUsageAndExit();

                //File outputFile = new File(args[1]);
                File outputFile = new
File("E://Columbia//S1//PLT//cw//merryXmas.midi");
                Sequence sequence = null;

                //Open and save the CSV file
                //CSV csvFile=new CSV(args[0]);
                CSV csvFile=new
CSV("E://Columbia//S1//PLT//cw//melody.csv");
                csvFile.fillVector();


                //figure out how many channels there are
                //nChannels=number of integers in the first line
containing any numbers, skipping the first number encountered
```

```java
                    int nChannels=0,temp=0;
                    for(int i=0;i<csvFile.data.size();i++){

try{

//check if this is an integer

Integer.parseInt(csvFile.data.elementAt(i).toString());
                                temp++;
//counts number of instruments
                        }catch(NumberFormatException
e){

//not a number

if(temp>1){

//if other than first number

if(csvFile.data.elementAt(i).toString().compareTo("\n")==0){
  //if a new line
                                        nChannels=temp-1;
                                        break;
//found nChannels, so stop for loop.  this is the number of
instruments counted
                                    }
                                }
                        }
                    }

                    System.out.println("nChannels= "+nChannels);
/*              for(int i=0;i<csvFile.data.size();i++)
                        System.out.println(csvFile.data.elementAt(i));
*/


                    //***** Read in timing resolution and instruments
*****
                    int currentCSVPos=0, timingRes=1, instrument[]=new
int[nChannels];

                    //read in timing resolution
                    for(;currentCSVPos<csvFile.data.size();currentCSVPos++)

try{
```

```java
//check if this is an integer

timingRes=Integer.parseInt(csvFile.data.elementAt(currentCSVPos).toStr
ing()); //this is the first number, therefore, it's the timing
resolution
                                System.out.println("\nTiming
Resolution set to "+timingRes+" PPQ\n");
                                currentCSVPos++;
                                break;
                        }catch(NumberFormatException e){
                        }

                //read in instrument numbers
                temp=0;
                for(;currentCSVPos<csvFile.data.size();currentCSVPos++)

try{

//check if this is an integer

instrument[temp]=Integer.parseInt(csvFile.data.elementAt(currentCSVPos
).toString()); //this is a number, it has to be an intrument
                                System.out.println("Instrument set to
"+instrument[temp]+" on channel "+temp);
                                temp++;

if(temp>=nChannels){

//collect numbers until you've reached the number of channels
                                currentCSVPos++;
                                break;
                        }
                        }catch(NumberFormatException e){
                        }


                //***** Initialize Sequencer *****
                try{
                        sequence = new Sequence(Sequence.PPQ,
timingRes);    //initialize sequencer with timingRes
                }catch (InvalidMidiDataException e){
                        e.printStackTrace();
                        System.exit(1);
                }
```

```
//***** Create tracks and notes *****
/* Track objects cannot be created by invoking their
constructor
    directly. Instead, the Sequence object does the job.
So we
    obtain the Track there. This links the Track to the
Sequence
    automatically.
*/
Track track[] = new Track[nChannels];
for(int i=0;i<nChannels;i++){
    track[i]=sequence.createTrack();
//create tracks

    ShortMessage sm = new ShortMessage( );
    sm.setMessage(ShortMessage.PROGRAM_CHANGE, i,
instrument[i], 0);  //put in instrument[i] in this track
    track[i].add(new MidiEvent(sm, 0));
}

int channel=0,note=0,tick=0,velocity=90,column=0;

//go through each of the following lines and add notes

for(;currentCSVPos<csvFile.data.size();){
    //loop through rest of CSV file

try{

//check that the current CSV position is an integer

tick=Integer.parseInt(csvFile.data.elementAt(currentCSVPos).toString()
);  //first number is tick
    currentCSVPos+=2;

note=Integer.parseInt(csvFile.data.elementAt(currentCSVPos).toString()
);  //next number is note
    currentCSVPos+=2;

velocity=Integer.parseInt(csvFile.data.elementAt(currentCSVPos).toString());  //next number is velocity
    currentCSVPos++;
    channel=column/3;
```

```
                                          column+=2;


track[channel].add(createNoteOnEvent(note,tick,channel,velocity));
//add note to this track
//
track[channel].add(createNoteOffEvent(note,tick+5,channel));
                          }catch(NumberFormatException
e){

//current CSV position not an integer

if(csvFile.data.elementAt(currentCSVPos).toString().compareTo("\n")==0
){  //if it's a new line
                                          column=0;
//go back to 1st column
                                }else
if(csvFile.data.elementAt(currentCSVPos).toString().compareTo(",")==0)
{ //if it's just a comma
                                          column++;
                                }
                                currentCSVPos++;
                        }
                }


                // Print track information
                System.out.println();
                if ( track != null ) {
                        for ( int i = 0; i < track.length; i++ ) {
                                System.out.println( "Track " + i +
":" );

                for ( int j = 0; j < track[i].size(); j++ ) {
                                        MidiEvent event =
track[i].get( j );
                                        System.out.println(" tick
"+event.getTick()+", "+MessageInfo.toString(event.getMessage()));
                                } // for
                        } // for
                } // if



                /* Now we just save the Sequence to the file we
specified.
```

```
                        The '0' (second parameter) means saving as SMF type
0.
                        (type 1 is for multiple tracks).
                */
                try{
                        MidiSystem.write(sequence, 1, outputFile);
                }catch (IOException e){
                        e.printStackTrace();
                        System.exit(1);
                }
        }




  //turns note on
        private static MidiEvent createNoteOnEvent(int nKey, long
lTick,int channel,int velocity){
                return
createNoteEvent(ShortMessage.NOTE_ON,nKey,velocity,lTick,channel);
        }

        //turns note off
        private static MidiEvent createNoteOffEvent(int nKey, long
lTick,int channel){
                return
createNoteEvent(ShortMessage.NOTE_OFF,nKey,0,lTick,channel);  //set
note to 0 velocity
        }

        //turns note on or off
        private static MidiEvent createNoteEvent(int nCommand,int
nKey,int nVelocity,long lTick,int channel){
                ShortMessage message = new ShortMessage();
                try{

message.setMessage(nCommand,channel,nKey,nVelocity);
                }catch (InvalidMidiDataException e){
                        e.printStackTrace();
                        System.exit(1);
                }
                MidiEvent event = new MidiEvent(message,lTick);
                return event;
```

```java
        }

        private static void printUsageAndExit(){
                out("usage:");
                out("java CSV2MIDI <infile.csv> <outfile.midi>");
                System.exit(1);
        }

        private static void out(String strMessage){
                System.out.println(strMessage);
        }
}
```

8.9 listInstruments.java

```java
package miditest;

/**
 * listInstruments.java
 * June 11, 2003
 * @author: Stephen Steffes
 * Purpose: prints out a list of available instruments in the java
synthesizer and their instrument number
 */

import java.io.*;
import javax.sound.midi.*;

public class listInstruments{
  public static Synthesizer synth;

  public static void listAvailableInstruments(){
    Instrument[] instrument = synth.getAvailableInstruments();
    for (int i=0; i<instrument.length; i++){
      System.out.println(i + "   " + instrument[i].getName());
    }
  }

  public static void main(String[] args)        throws
InvalidMidiDataException {
    try {
```

```java
      synth = MidiSystem.getSynthesizer();
      synth.open();
    } catch (MidiUnavailableException e) {
      e.printStackTrace();
    }
    listAvailableInstruments();
    System.exit(0);
  }
}
```

8.10 messageInfo.java

```
/*******************************************************************
******/
/*
*/
/* (c) Copyright IBM Corp. 2001  All rights reserved.
*/
/*
*/
/* This sample program is owned by International Business Machines
*/
/* Corporation or one of its subsidiaries ("IBM") and is copyrighted
*/
/* and licensed, not sold.
*/
/*
*/
/* You may copy, modify, and distribute this sample program in any
*/
/* form without payment to IBM, for any purpose including developing,
*/
/* using, marketing or distributing programs that include or are
*/
/* derivative works of the sample program.
*/
/*
*/
/* The sample program is provided to you on an "AS IS" basis, without
*/
```

```
/**********************************************************************
******/
/*
*/
/* This file accompanies the article "Understanding and using Java
MIDI    */
/* audio." This article was published in the Special Edition 2001
issue    */
/* of the IBM DeveloperToolbox Technical Magazine at
*/
/* http://www.developer.ibm.com/devcon/mag.htm.
*/
/*
*/
/**********************************************************************
******/
```

```java
//-------------------------------------------------------------------
----
// File Name:     MessageInfo
// Description:   Converts MidiMessages to meaningful English strings.
//-------------------------------------------------------------------
----
package miditest;
import java.io.PrintStream;
import javax.sound.midi.*;


/**
 * MessageInfo Converts MidiMessages to meaningful English strings.
 *
 * Much of the MidiMessage information comes from
 * information provided by Matthias Pfisterer's Java Examples
 * at http://rupert.informatik.uni-stuttgart.de/~pfistere/jsexamples
 */
public class MessageInfo {
   public static String [] keyNames =
      { "C", "C#", "D", "D#", "E", "F", "F#", "G", "G#", "A", "A#",
"B" };

   public static String [] keySignatures =
      { "Cb", "Gb", "Db", "Ab", "Eb", "Bb", "F", "C", "G", "D", "A",
"E", "B", "F#", "C#" };

   /** Converts the given MidiMessage to a String. */
   public static String toString( MidiMessage message ) {
      if ( message instanceof ShortMessage )
        return toString( (ShortMessage) message );
      else if ( message instanceof SysexMessage )
        return toString( (SysexMessage) message );
      else if ( message instanceof MetaMessage )
        return toString( (MetaMessage) message );
      return "unknown midi message " + message;
   } // toString( MidiMessage )

   /** Converts the given ShortMessage to a String. */
   public static String toString( ShortMessage message ) {
      String strMessage = null;
      switch ( message.getCommand() ) {
         case ShortMessage.NOTE_OFF:
            strMessage= "note off " + getKeyName(message.getData1()) +
", velocity: " + message.getData2();
```

```java
            break;
        case ShortMessage.NOTE_ON:
            strMessage = "note " + getKeyName(message.getData1()) + "
on velocity: " + message.getData2();
            break;
        case ShortMessage.POLY_PRESSURE:
            strMessage = "polyphonic key pressure " +
getKeyName(message.getData1()) + " pressure: " + message.getData2();
            break;
        case ShortMessage.CONTROL_CHANGE:
            strMessage = "control change " + message.getData1() + "
value: " + message.getData2();
            break;
        case ShortMessage.PROGRAM_CHANGE:
            strMessage = "program change " + message.getData1();
            break;
        case ShortMessage.CHANNEL_PRESSURE:
            strMessage = "key pressure " +
getKeyName(message.getData1()) + " pressure: " + message.getData2();
            break;
        case ShortMessage.PITCH_BEND:
            strMessage = "pitch bend " +
get14bitValue(message.getData1(), message.getData2());
            break;
        case 0xF0:
            switch ( message.getChannel() ) {
                case 0x0:
                    strMessage = "System Exclusive (should not be in
ShortMessage)";
                    break;
                case 0x1:
                    strMessage = "Undefined";
                    break;
                case 0x2:
                    strMessage = "Song Position: " +
get14bitValue(message.getData1(), message.getData2());
                    break;
                case 0x3:
                    strMessage = "Song Select: " + message.getData1();
                    break;
                case 0x4:
                    strMessage = "Undefined";
                    break;
                case 0x5:
                    strMessage = "Undefined";
```

```
                         break;
                    case 0x6:
                       strMessage = "Tune Request";
                       break;
                    case 0x7:
                       strMessage = "end of SysEx (should not be in
ShortMessage)";
                       break;
                    case 0x8:
                       strMessage = "Timing clock";
                       break;
                    case 0x9:
                       strMessage = "Undefined";
                       break;
                    case 0xA:
                       strMessage = "Start";
                       break;
                    case 0xB:
                       strMessage = "Continue";
                       break;
                    case 0xC:
                       strMessage = "Stop";
                       break;
                    case 0xD:
                       strMessage = "Undefined";
                       break;
                    case 0xE:
                       strMessage = "Active Sensing";
                       break;
                    case 0xF:
                       strMessage = "System Reset";
                       break;
                } // switch
                break;

            default:
                strMessage = "unknown message: status = " +
message.getStatus() + ", byte1 = " + message.getData1() + ", byte2 = "
+ message.getData2();
                break;
        } // switch

        if ( message.getCommand() != 0xF0 ) {
            int nChannel = message.getChannel() + 1;
            String strChannel = "channel " + nChannel + ": ";
```

```
            strMessage = strChannel + strMessage;
        }
        return strMessage;
    } // toString( ShortMessage )


    /** Converts the given SysexMessage to a String. */
    public static String toString( SysexMessage message ) {
        byte [] abData = message.getData();
        String strMessage = null;
        if ( message.getStatus() == SysexMessage.SYSTEM_EXCLUSIVE ) {
            strMessage = "Sysex message: F0" +
MessageInfo.getHexString( abData );
        } else if ( message.getStatus() ==
SysexMessage.SPECIAL_SYSTEM_EXCLUSIVE ) {
            strMessage = "Special Sysex message (F7):" +
MessageInfo.getHexString(abData);
        }
        return strMessage;
    } // toString( SysexMessage message )


    /** Converts the given MetaMessage to a String. */
    public static String toString( MetaMessage message ) {
        byte [] abData = message.getData();
        int nDataLength = message.getLength();
        String strMessage = null;
        switch ( message.getType() ) {
            case 0:
                int nSequenceNumber = abData[0] * 256 + abData[1];
                strMessage = "Sequence Number: " + nSequenceNumber;
                break;
            case 1:
                String strText = new String(abData, 0, nDataLength);
                strMessage = "Text Event: " + strText;
                break;
            case 2:
                String strCopyrightText = new String(abData, 0,
nDataLength);
                strMessage = "Copyright Notice: " + strCopyrightText;
                break;
            case 3:
                String strTrackName = new String(abData, 0, nDataLength);
                strMessage = "Sequence/Track Name: " +  strTrackName;
                break;
            case 4:
```

```
                String strInstrumentName = new String(abData, 0,
nDataLength);
                strMessage = "Instrument Name: " + strInstrumentName;
                break;
            case 5:
                String strLyrics = new String(abData, 0, nDataLength);
                strMessage = "Lyric: " + strLyrics;
                break;
            case 6:
                String strMarkerText = new String(abData, 0, nDataLength);
                strMessage = "Marker: " + strMarkerText;
                break;
            case 7:
                String   strCuePointText = new String(abData, 0,
nDataLength);
                strMessage = "Cue Point: " + strCuePointText;
                break;
            case 0x20:
                int nChannelPrefix = abData[0];
                strMessage = "MIDI Channel Prefix: " + nChannelPrefix;
                break;
            case 0x2F:
                strMessage = "end of track";
                break;
            case 0x51:
                int   nTempo = signedByteToUnsigned(abData[0]) * 65536 +
                               signedByteToUnsigned(abData[1]) * 256 +
                               signedByteToUnsigned(abData[2]);
                // TDebug.out("tempo (us/quarter note): " + nTempo);
                strMessage = "Set Tempo (us/quarter note): " + nTempo;
                break;
            case 0x54:
                strMessage = "SMTPE Offset: " + abData[0] + ":" + abData[1]
+ ":" + abData[2] + "." + abData[3] + "." + abData[4];
                break;
            case 0x58:
                strMessage = "Time Signature: " + abData[0] + "/" + (1 <<
abData[1]) + ", MIDI clocks per metronome tick: " + abData[2] + ",
1/32 per 24 MIDI clocks: " + abData[3];
                break;
            case 0x59:
                String strGender = (abData[1] == 1) ? "minor" : "major";
                strMessage = "Key Signature: " + keySignatures[abData[0] +
7] + " " + strGender;
                break;
```

```java
        case 0x7F:
            String strDataDump = "";
            strMessage = "Sequencer-Specific Meta event: " +
strDataDump;
            break;
        default:
            String strUnknownDump = "";
            strMessage = "unknown Meta event: " + strUnknownDump;
            break;
    }
    return strMessage;
}


/** Converts a given number to a note and a key. */
public static String getKeyName( int nKeyNumber ) {
    if ( nKeyNumber > 127 )
        return "illegal value";
    int nNote = nKeyNumber % 12;
    int nOctave = nKeyNumber / 12;
    return keyNames[ nNote ] + (nOctave - 1);
} // getKeyName


public static int get14bitValue( int lowPart, int highPart ) {
    return (lowPart & 0x7F) | ((highPart & 0x7F) << 7);
}


/** Converts a a signed byte to unsigned. */
public static int signedByteToUnsigned( byte b ) {
    if ( b >= 0 )
        return (int) b;
    return 256 + (int) b ;
}


/** Converts a byte aarray to a corresponding hex string. */
public static String getHexString( byte [] aByte ) {
    StringBuffer buf = new StringBuffer( aByte.length * 3 + 2 );
    for ( int i = 0; i < aByte.length; i++ ) {
        buf.append( ' ' );
        byte bhigh = (byte) ((aByte[i] &  0xf0) >> 4);
        buf.append((char) (bhigh > 9 ? bhigh + 'A' - 10: bhigh +
'0'));
        byte blow = (byte) (aByte[i] & 0x0f);
        buf.append((char) (blow > 9 ? blow + 'A' - 10: blow + '0'));
    }
    return new String( buf );
```

```
    }
} // class MessageInfo
```