

Design Document

Group Members

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Grammar

We decided to use the EBNF grammar, as described here:

http://www.mit.edu/~6.005/fa12/projects/abcPlayer/assignment_files/abc_subset_bnf.txt

The only modification to that grammar that we made is that tuples can **only** of size 2, 3, or 4, and Nth repeats can only be of the form “[1” or “[2”. The EBNF description allows for any digits in those two cases.

Tokens for Lexing:

For Header:

INDEX – of the form (X: integer \n)

TITLE – of the form (T: text \n)

COMPOSER – of the form (C: text \n)

LENGTH – of the form (L: fraction \n)

METER – equal to “C” or “C|” or of the form (M: fraction \n)

TEMPO – of the form (Q: integer \n)

VOICE – of the form (V: text \n)

KEY – of the form (K: validKeyString \n)

For Body:

OCTAVE - some number of one type of octave character (e.g. ‘)

BASENOTE - a letter that can be a note (e.g. A-Ga-g]

ACCIDENTAL - (one of “_”, “__”, “^”, “^^”, “=”)

REST - z

DURATION - in regex its DIGIT* (SLASH DIGIT*)?

BAR – (one of “|”, “||”, “|]”, “:|”, “|:”)

NTH_REPEAT - (one of “[1” or “[2”)

TUPLE_START – (one of “(2” or “(3” or “(4”

CHORD_START – just an open bracket

CHORD_END – just a close bracket

VOICE_BODY – an in-body voice field, such as “V: upper\n”

COMMENT – a comment of the form (% text \n)

Parsing Strategy

1) Parse header

2) Parse body

- whenever we hit a token that can start a measure, we descend into a routine called `parseMeasure()`. Similarly, within `parseMeasure()`, we discover when we're hitting the beginning of a note or chord we descend into those subroutines and so forth.

Class hierarchy (theme: "cascading interfaces")

Interface `HighElement` (these are at the "measure, bar" level)

- extended by `Element`
- implemented by `Measure`
- implemented by `NthRepeatElement`
- implemented by `BarlineElement`

Interface `Element` (these are entirely within measures)

- extends `HighElement`
- extended by `SyncElement`
- implemented by `TupletElement`

Interface `SyncElement` (these are things that start at one specific time)

- extends `Element`
- implemented by `ChordElement`
- implemented by `NoteElement`
- implemented by `RestElement`

One major function of the interfaces is to group classes

Data Structures:

```
class Song {
```

```
    Header header;
```

```
    List<Voice> voices;
```

```
}
```

```
class Header {
```

```
    // fields like beats per minute, etc go here
```

```
}
```

```
class Voice {
```

```
    List<HighElement> measures;
```

```

}

class Measure extends HighElement {
    List<Element> elements;
}

class NthRepeatElement extends HighElement {
    //represents Nth repeat
}

class BarlineElement extends HighElement {
    //represents some sort of bar line
}

class TupletElement implements Element {
    List<SyncElement> elements;
}

class ChordElement implements SyncElement {
    List<NoteElement> notes;
}

class NoteElement implements SyncElement {
    //represents a single note
}

class RestElement implements SyncElement {
    //represents a rest
}

```

We also created a useful PlayableNote class that represents a note ready to be loaded in a SequencePlayer.

Evaluation Strategy

- 1) Go through Song and expand out tuplets, making step 2 possible
- 2) Go through Song and determine necessary number of ticks
- 3) Expand repeats out so we're just evaluating a list of measures
- 4) Descend into each measure and compile a list of PlayableNote as we go

- 5) After iterating through whole piece, we load our PlayableNote objects into the SequencePlayer() and play().