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Information technology — Coding of audio-visual objects —

Part 4: Conformance testing

AMENDMENT 29: Symbolic Music Representation conformance

Technologies de l'information — Codage des objets audiovisuels —

Partie 4: Essai de conformité

AMENDEMENT 29: Conformité de la représentation musicale symbolique

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 29 to ISO/IEC 14496-4:2004 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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Information technology — Coding of audio-visual objects —

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In Clause 2 "Normative references" add:

ISO/IEC 14496-23:2008, *Information technology — Coding of audio-visual objects — Part 23: Symbolic Music Representation*

Add a new Clause 11 "Symbolic Music Representation":

11 Symbolic Music Representation

11.1 General

This clause specifies how tests can be designed to verify whether bitstreams and decoders meet requirements specified in ISO/IEC 14496-23. In this part of ISO/IEC 14496, encoders are not addressed specifically. An encoder may be said to be an ISO/IEC 14496-23 encoder if it generates bitstreams compliant with the syntactic and semantic bitstream requirements specified in ISO/IEC 14496-23.

Procedures are described for testing conformance of bitstreams and decoders to the requirements defined in ISO/IEC 14496-23. Given the set of characteristics claimed, the requirements that must be met are fully determined by ISO/IEC 14496-23. This clause summarizes the requirements; cross references them to characteristics, and defines how conformance with them can be tested. Guidelines are given on constructing tests to verify bitstream and decoder conformance. In addition, some test bitstreams implemented according to those guidelines are provided as an electronic annex.

Symbolic Music Representation (SMR) objects allow modeling the visual aspects of a music score, and audio information or annotations related to the music piece.

SMR includes the definition of XML schemas (for representing music symbols composing the music score and describing the rules to be used for placement of music symbols) and additional binary information (for presenting the music score synchronously with a multimedia scene).

This clause describes criteria to test SMR Conformance for bitstreams and decoders.

11.2 SMR Conformance testing

11.2.1 AudioSpecificConfig characteristics

The bitstream provider may apply restrictions to the following parameters of the AudioSpecificConfig:

1) **audioObjectType**: AOT 40 (uncompressed/Gzip-ed XML) or AOT 41 (BiM encoded XML)
2) **numberOfParts**: the number of parts composing the score
3) **notationFormat:** can be CWMN, BRAILLE, SPOKENMUSIC, OTHER
4) **codingType:** can be XML, GZIP, BIM

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AccessUnit characteristics

The bitstream provider may apply no restrictions to any parameters of the bitstream

11.2.2 Procedure to test Bitstream Conformance

According to the restriction on the **codingType** field, the decoder shall be tested first for the exact bitstream decoding from binary format to the corresponding xml files.

The Conformance Bitstreams described later shall be decoded using the codingType(s) supported by the decoder under test. To be called an ISO/IEC 14496-23 SMR decoder, the decoder shall provide an output where xml information (SM-XL, SM-FL) is identical to the reference file provided by ISO for the same bitstream.

Please note that a decoder, for efficiency or other reason, may be implemented in a way that a textual xml representation is not necessary to process information. Nevertheless, for testing purposes, a textual xml file dumping is required.

11.2.3 Decoder characteristics and computational complexity

The SMR Decoder, after having decoded the binary stream, produces a corresponding rendering (graphics, audio or other) and periodically refreshes it according to dynamic updates that may come from access units or user interaction (through the **MusicScore** node).

A very few points in the decoding process may need a meaningful amount of computing resources (both CPU and/or memory) according to the specific implementation: the generation of a view, and some of the most typical updates (transposition, jump to, etc.).

Possible features which may be used to characterize from this point of view the complexity of a bitstream are: the number of symbols present for a certain unit of time, the number of dynamic operations on the score (such as transposing, etc.), and memory allocation.

At this time no needs were identified to define different complexity levels but in case the music industry needs them the document will be amended.

11.3 Procedure to test SMR decoder conformance

SMR Decoder conformance must be tested in terms of real-time decoding capabilities, and quality assessment of its rendering in terms of graphics, or audio when required.

The rendering of a score must obey to important rules, while some additional detail belongs to the domain of subjective (or style) preferences, and then should not be assessed by conformance testing. For a more comprehensive understanding of the required formatting and rendering rules, see ISO/IEC 14496-23, Clause 11.

Graphical features that shall be considered for conformance testing are:

- correct vertical note/rest alignment
- logical articulation placement, e.g.
    - text and lyrics placement
    - no overlap of symbols
- necessity to display all the required symbols
- possible skipped (not displayed) symbols

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To be called an ISO/IEC 14496-23 SMR decoder, the decoder shall provide an output that does not meaningfully diverges from the reference output provided by ISO for the several test bitstreams described below. *Meaningful divergence* means that once considered the small stylistic differences that may come from the usage of different font characters, different horizontal spacing, and different view formatting when allowed, the output rendered score still presents visually evident differences (that means, a human expert can detect them) from the reference output in terms of the features listed above. This shall be true for all test bitstreams with no exception.

11.4 Description of the SMR Conformance Bitstreams

For each of the conformance bitstreams shortly described in this clause, ISO provides in form of electronic attachment the following files:

- An mp4 file with flat xml information (stxx-xml.mp4)
- An mp4 file with gzip-ped xml information (stxx-gzip.mp4)
- An mp4 file with xml information coded through BiM (to be used when supported) (stxx-bim.mp4)
- Reference xml files (in directory stxx.xsm)
- Reference output with short description (MS Word files in Annex) (st-xx.doc)

The following conformance bitstreams are defined:

st01 – "**Classical orchestra score**". This bitstream tests several common music symbols, and particularly acciaccaturas and rehearsal marks.

st02 – "**Voices with lyrics and keyboard summary**". This bitstream tests several common music symbols, and particularly lyrics and voice crossings.

st03 – "**Soloist**". This bitstream tests classical symbols for multiple rests, dynamics, trills, and appoggiaturas.

st04 – "**Classical score**". This bitstream tests in particular changes of clef, ornaments with accidentals, trill, grace notes, and acciaccaturas.

st05 – "**Romantic orchestra score**". This bitstream tests complex accidentals, complex micro-spacing, different kinds of accent, bowing, slurs in brackets, and special performance instructions.

st06 – "**Romantic score**". This bitstream tests complex spacing (chords with accidentals), complex slurs, beams which cross staves, fingerings, triplets, and pedal markings.

st07 – "**Late romantic string quartet**". This bitstream tests performance indications (pizz., arco, etc.), stop harmonics, tempo changes, tremolo on stem, subtle dynamics, accent, phrasing marks across rests, beams including rests.

st08 – "**Jazz**". This bitstream tests jazz rhythmic section notation and the use of chord names as Symbolic Qualifiers.

st09 – "**Big Band score**". This bitstream tests Big Band scores, including jazz chords symbols, jazz rhythmic section notation, and common jazz symbolic events.

st10 – "**pop/rock**". This bitstream encodes a typical pop/rock music score and it is intended to tests simple guitar tablature/chord boxes/fretboard, chord names, lyrics (with word extenders), simple repeat signs, slash notation (scansion).

st11 – "**Multiple modeling of duration 1**". In this bitstream the "visual duration" (i.e., horizontal distance) associated with each duration class symbol is not constant, and is also only distantly related to the logical meanings of the symbols. The visual durations of the symbols are related primarily to legibility considerations

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and the visual context, including the width of the staff, the widths of the symbols, and the existence of other parallel/simultaneous symbols.

st12 – "**Multiple modeling of duration 2**". This bitstream tests different kind of tuplets including nested tuplets.

st13 – "**Ordering relationships**". This bitstream tests several advanced ordering relationships for symbols.

st14 – "**Symbolic selections**". This bitstream tests graphic and audio rendering of symbolic selections.

st15 – "**Percussion 1**". This bitstream tests common symbolic representation for percussion instruments.

st16 – "**Percussion 2**". This bitstream tests common symbolic representation for percussion instruments including the use of player's voice.

st17 – "**Unbarred music**". This bitstream tests unbarred music rendering.

st18 – "**Context changes**". This bitstream tests changes of octave, of clef, of tempo, of metronomic indication, of key signature, and of dynamic indication.

st19 – "**Korean ornaments and voices with Unicode lyrics**". This bitstream tests Korean ornaments and Unicode lyrics and text inside the score.

st20 – "**New defined symbols**". This bitstream tests the definition of new symbols carried with a specific font and with a specific SMFL file.

st21 – "**SM-FL custom rules**". This bitstream tests the definition of custom rules to change the standard formatting behavior.

st22 – "**Multi-language lyrics**". This bitstream tests the possibility to have lyrics in multiple languages associated with the same score.

st23 – "**SMR and MIDI**". This bitstream tests the possibility of the decoder to get MIDI information and display it.

11.5 Procedure to test decoder conformance for SMR BIFS nodes

In ISO/IEC 14496-11:2005/Amd.5 two new nodes (*ScoreShape* and *MusicScore*) are defined to handle SMR content inside a BIFS multimedia scene. To test the conformance of a BIFS decoder supporting these new nodes, reference sequences and related bitstreams are provided.

The conformance sequences contain:

- a textual file with the definition of the BIFS scene as text (.txt)
- a textual file with the definition of the object descriptors (.scr)
- a media directory with the media files and SMR files needed for the scene; *.smr files contain the binary encoding for the access units while the *.smr.config files contain the binary encoding of the decoder specific info
- an encoded bifs file (.bifs)
- an encoded object descriptors file (.od)
- an MP4 file (.mp4)

A conformant decoder shall load the streams coming from the mp4 file and behave as described in the description associated with the conformance bitstream.

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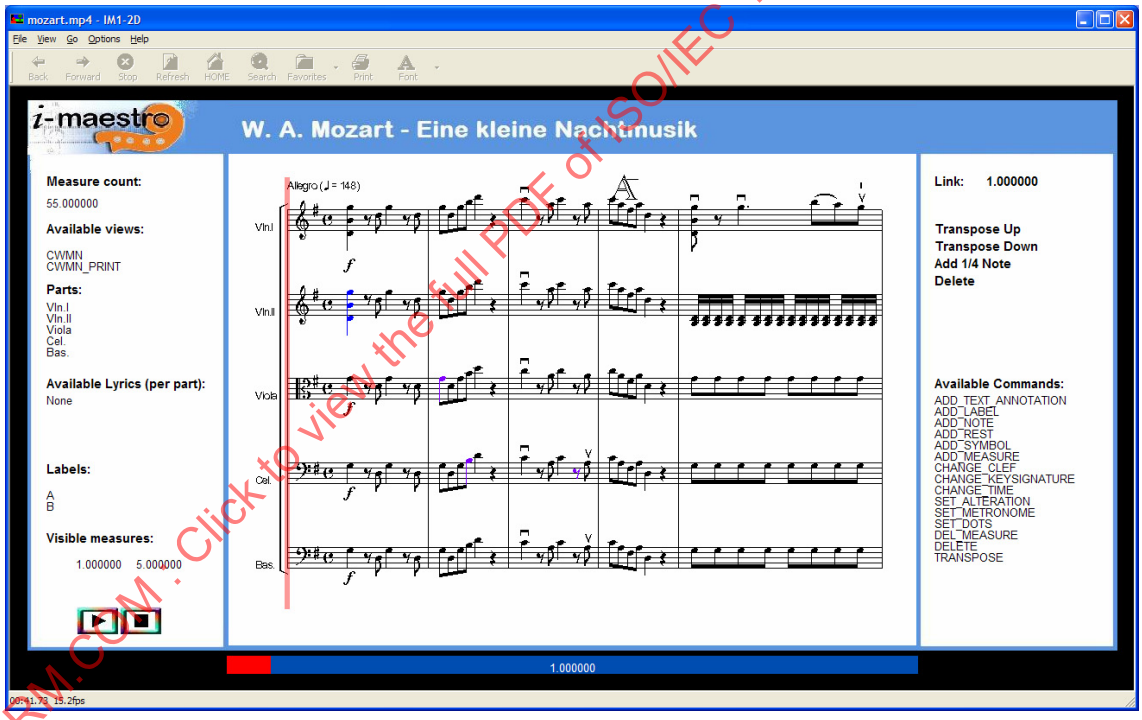
SMRBIFS01 - **Mozart**

This bitstream is able to test most of the features provided by the MusicScore node:

- basic rendering (fields: url, size)
- access to decoder information (fields: AvaliableCommands, AvailableViewTypes)
- access to score information (fields: numMeasures, partNames, AvailableLabels)
- view main score or single part (fields: partsShown)
- score browsing (fields: gotoMeasure, gotoLabel, firstVisibleMeasure, lastVisibleMeasure)
- hyperlink support (fields: hyperlinkEnable, executeCommand, mousePosition, activatedLink)
- score playing (fields: startTime, stopTime, highlightPosition)
- score editing (fields: commandOnExecute, argumentsOnExecute, mousePosition, executeCommand)

When opened the mozart.mp4 file in a MP4Player the following data should be present:



NOTE Different decoders may implement custom commands and custom views, for this reason the output may differ in this case in the text below the "Available views" and below the "Available Commands". Moreover the SMR content may be displayed differently (e.g. using different fonts, having different spacing, using antialiasing, etc.).

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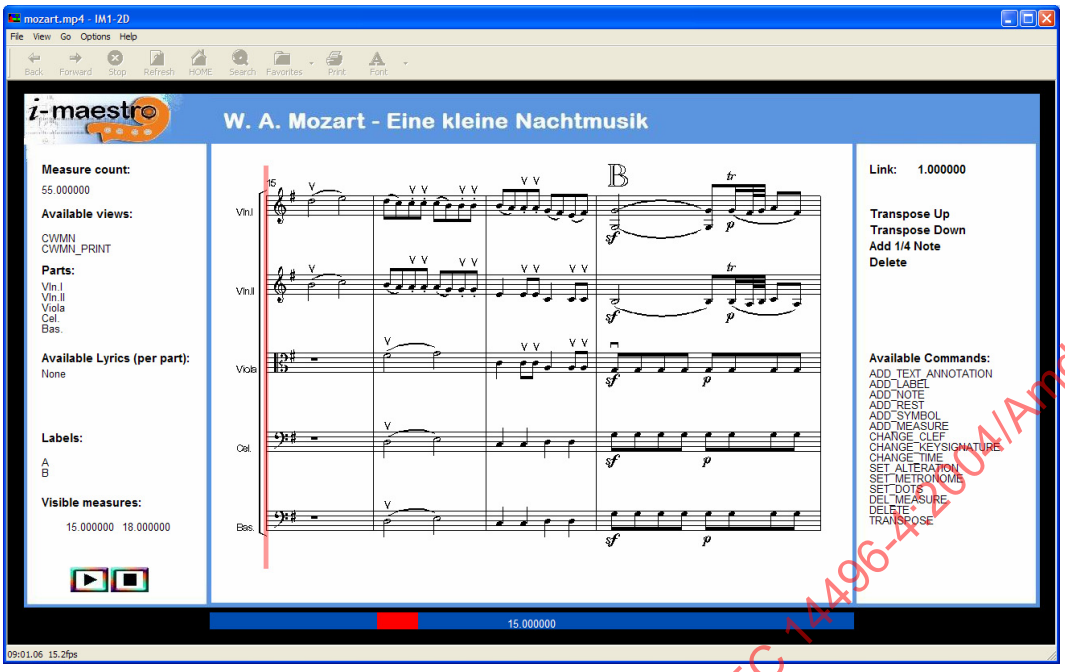
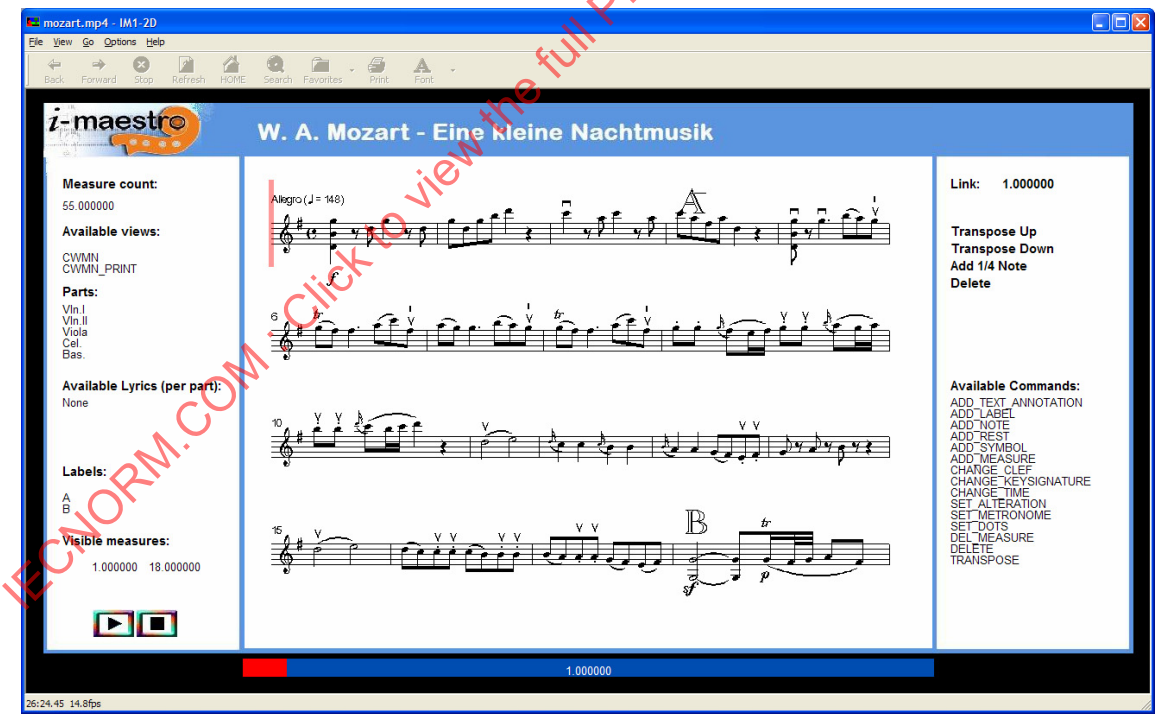
1. dragging the slider at the bottom, the first measure displayed in the MusicScore area have to change:



and the indication of the first visible measure and the last visible measure have to be updated accordingly (measure 15 and measure 18 in the depicted case)

2. Clicking on any of the part names below the "Parts" menu the MusicScore should display the Vln.I part



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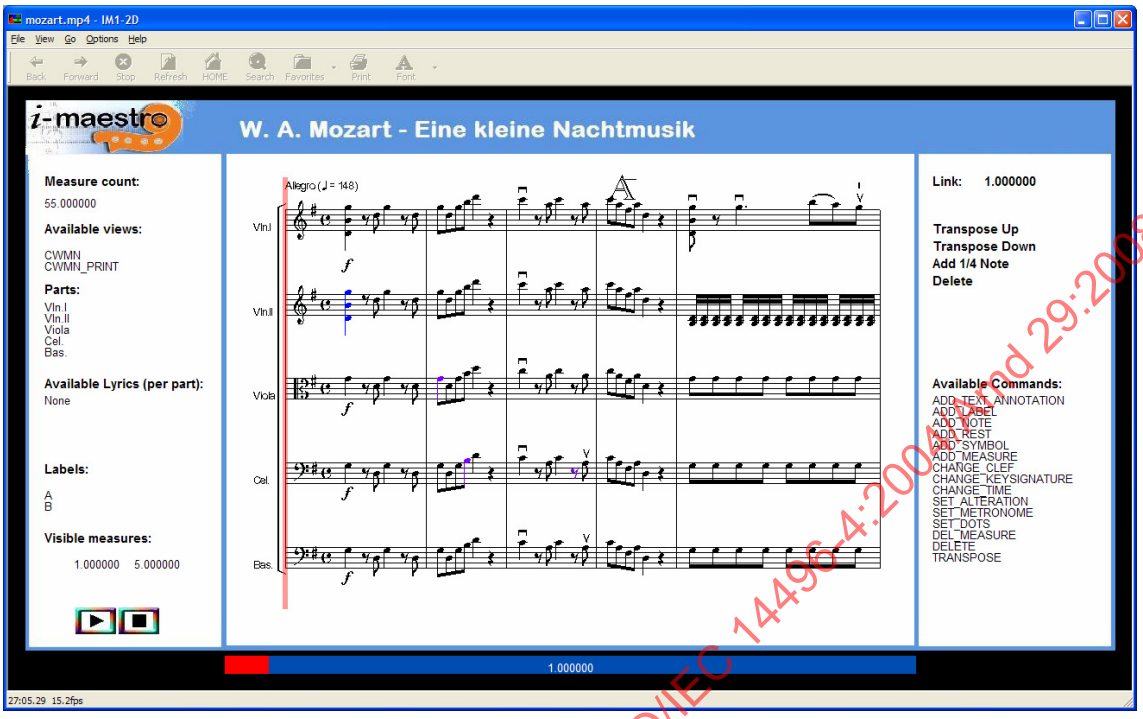
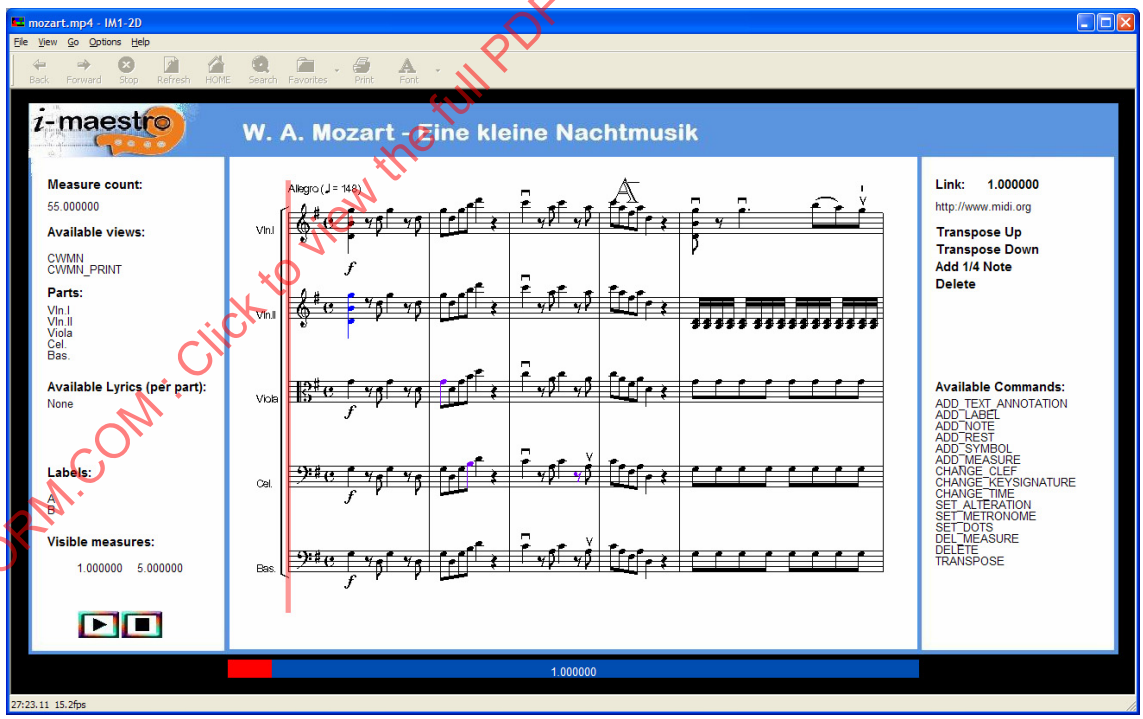
3. Clicking on the "Parts:" string it has to return to the Main score view:



4. Clicking on the blue chord the link event have to be generated and the link "http://www.midi.org" displayed below the "Link:" string on the right column



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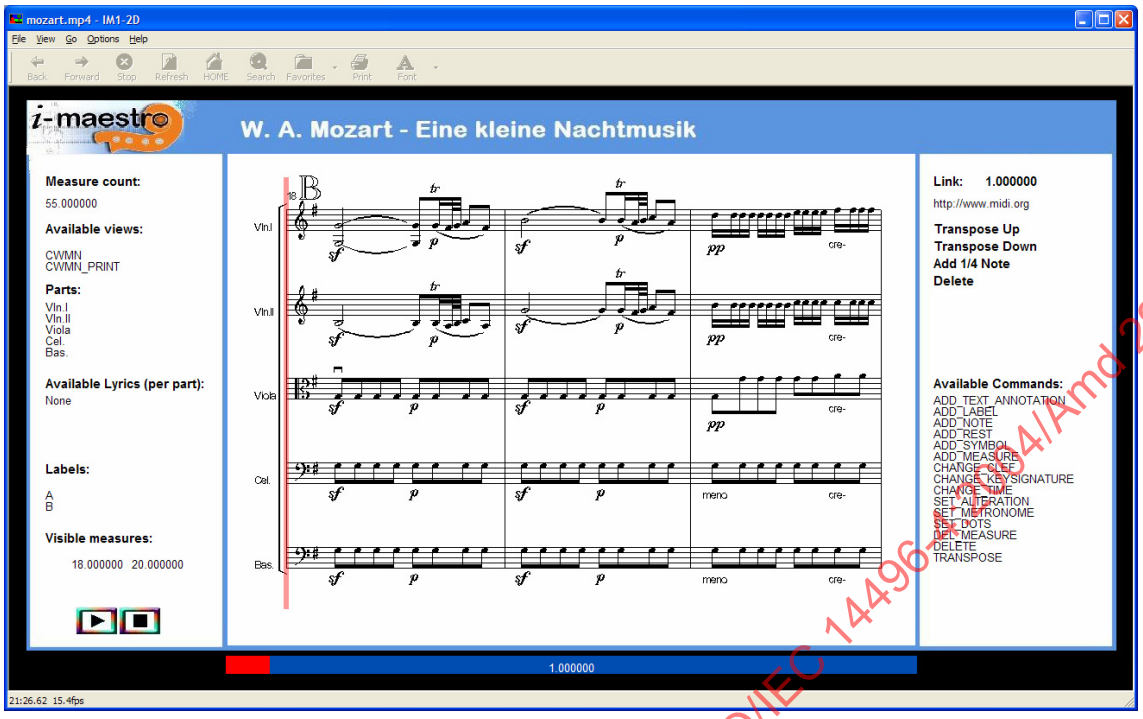
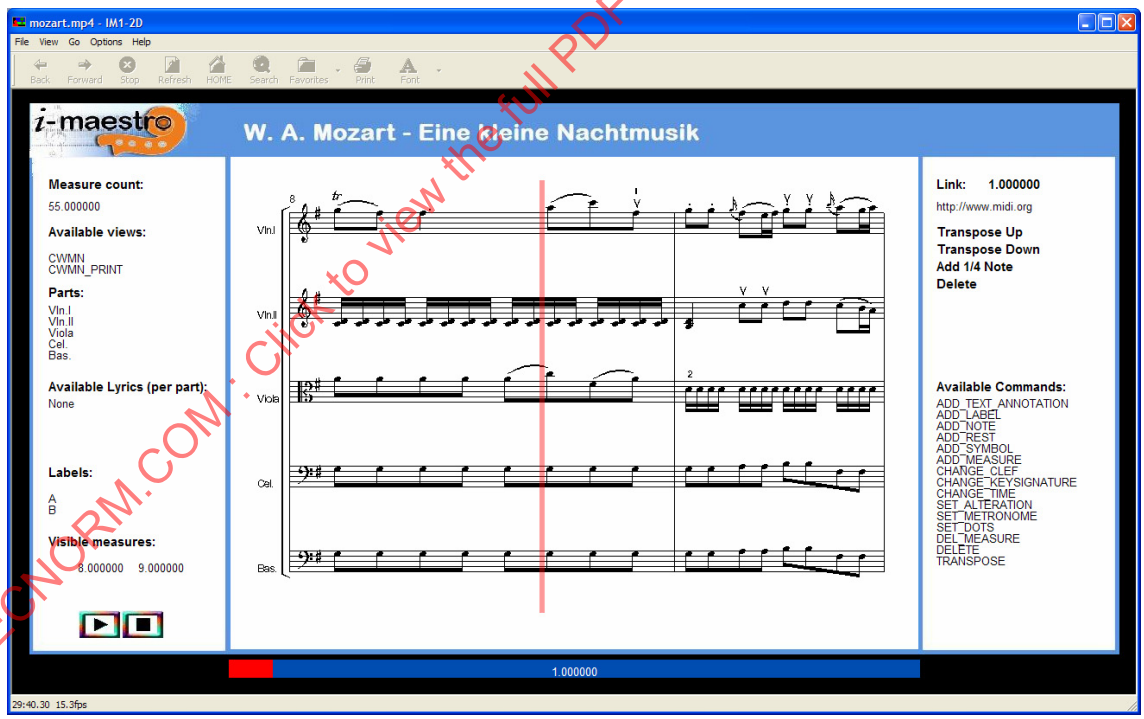
5. Clicking on any label (A or B) on the left it has to jump to measure containing label B:



6. Pressing the Play button the score shall begin "playing", in this case no audio will be generated, the red semi transparent bar has to begin moving from left to right to indicate the current playing position:



NOTE Different decoders may decide to implement in different ways how the current playing position is updated.

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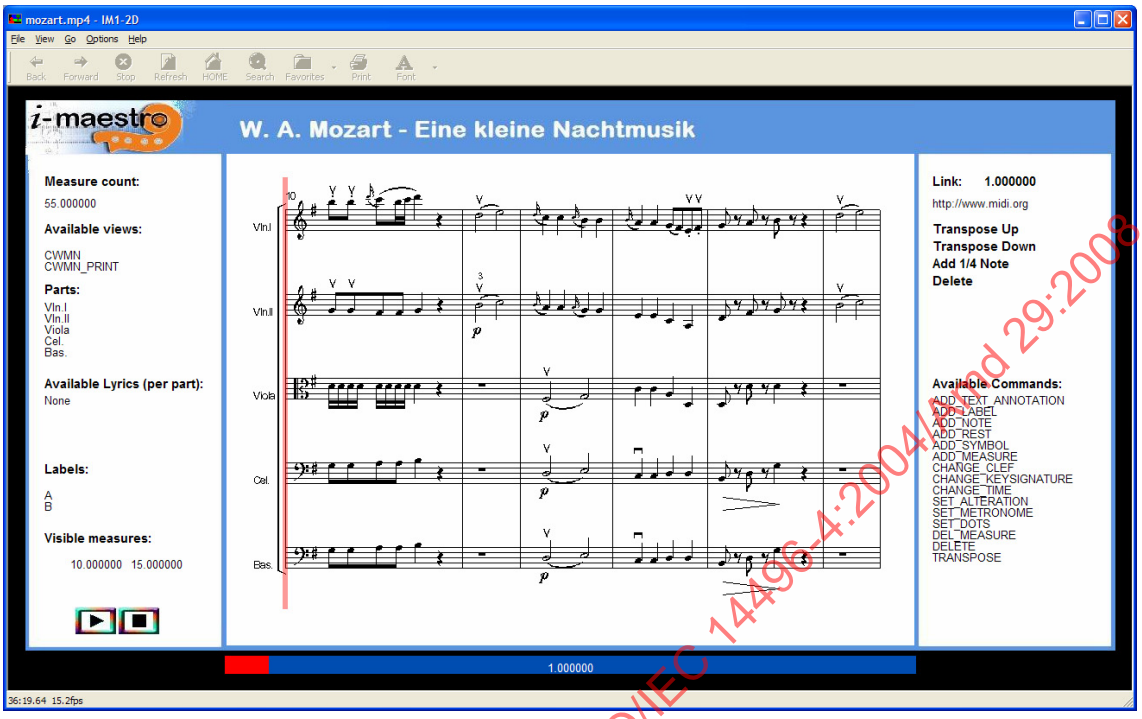
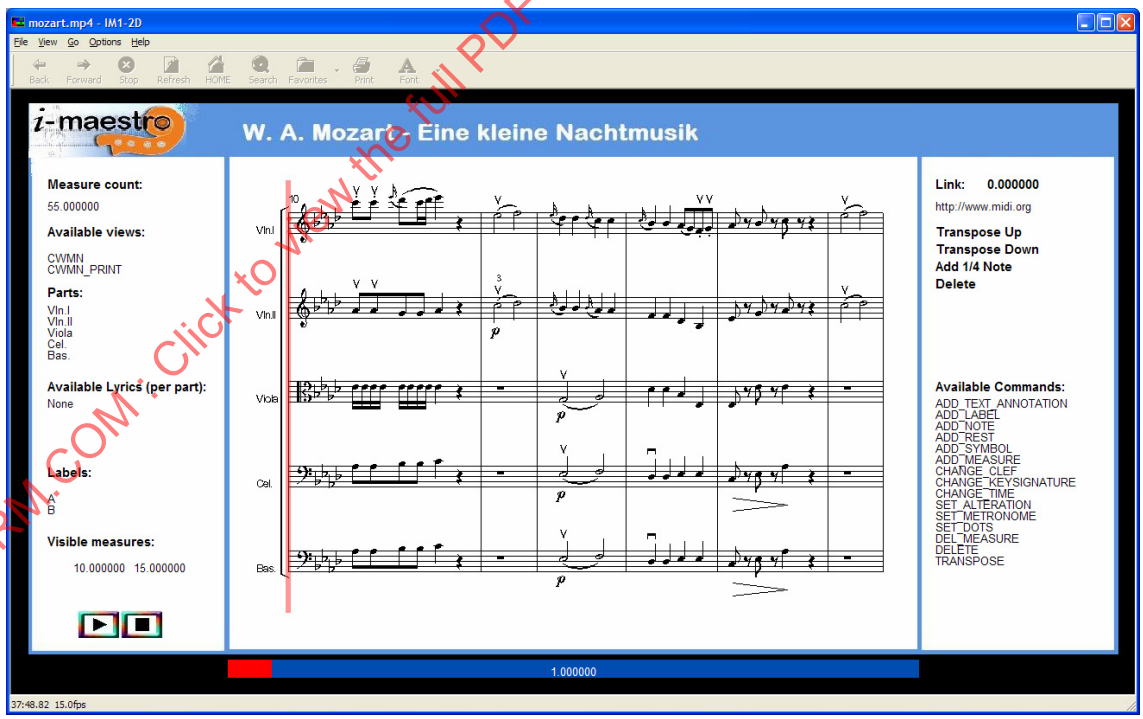
7. Pressing the stop button the playing has to stop:



8. The whole score (all parts and all measures) can be transposed up of a semitone clicking on the "Transpose Up" string:



NOTE When clicking on the transpose up the number besides the "Link:" string shall change to 0.0000 indicating that when the user clicks on the score commands are executed and are not generating events for links.

NOTE The rendering of the transposed score it is not unique thus different decoder may performs the same task in different ways but all of them are acceptable.

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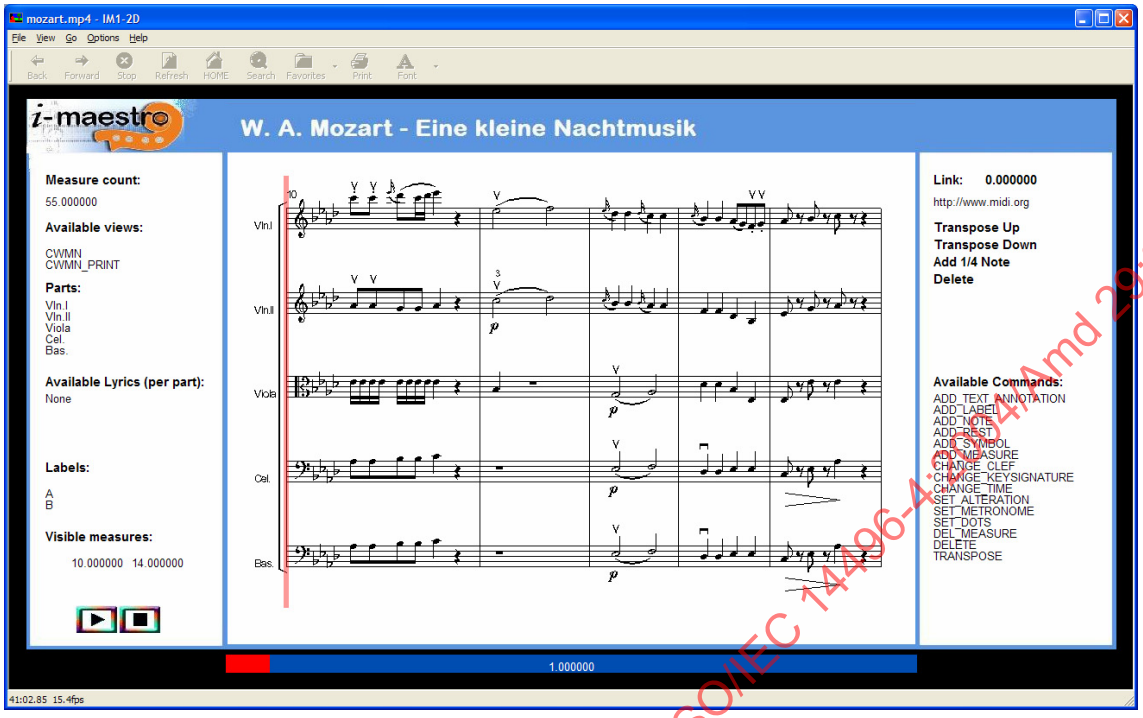
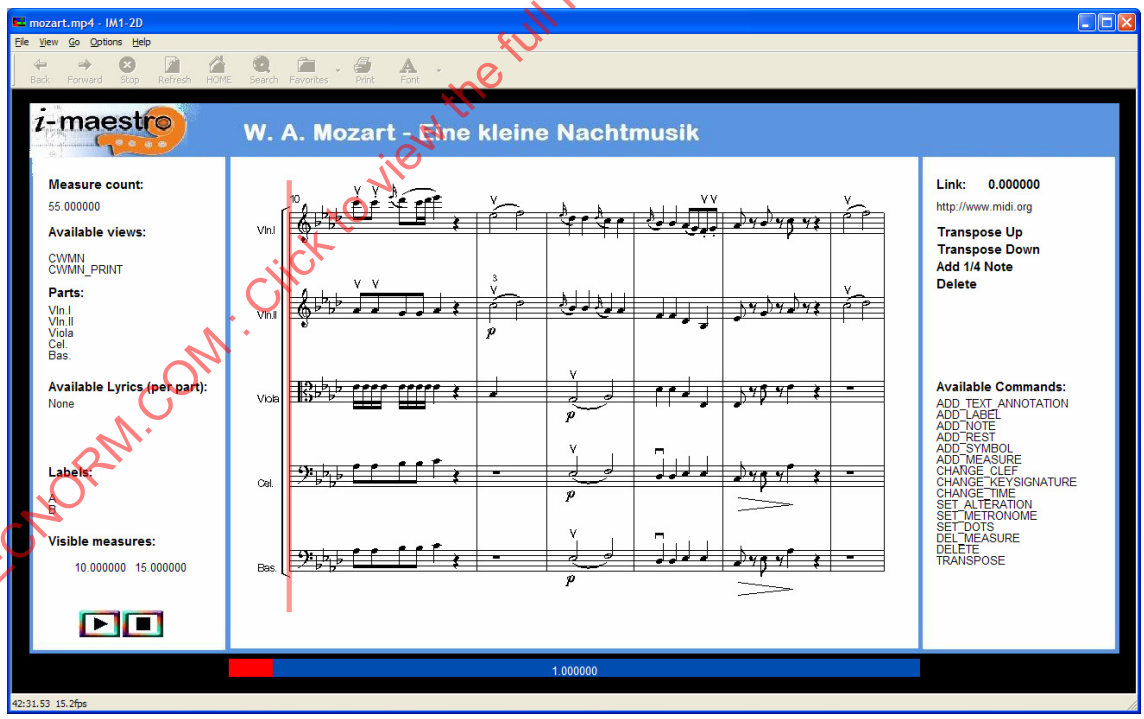
9. Clicking on the "Add 1/4 Note" and then clicking on the score a quarter note have to be added in the place where the user clicks:



NOTE In the example a quarter note is inserted in measure 11 of the Viola part.

10. Clicking on the "Delete" string and then clicking on a symbol it has to be deleted from the score



NOTE In the example a rest is deleted from measure 11 of the Viola part

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