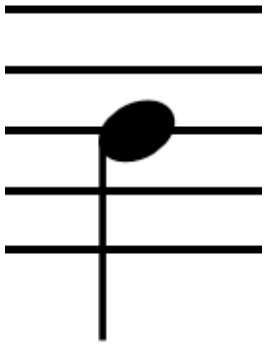


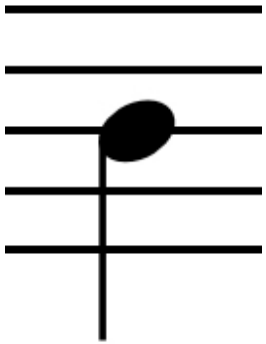
# Basics of Encoding with MEI

# Basic examples

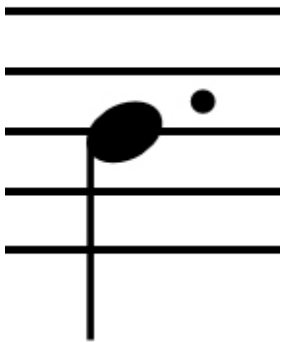


```
<note pname="b" oct="4" dur="4" />
```

# Basic examples



```
<note pname="b" oct="4" dur="4" />
```



```
<note pname="b" oct="4" dur="4" dots="1" />
```



# Beams

<beam>

<note pname="f" oct="4" dur="8" />

<note pname="e" oct="4" dur="8" />

</beam>

<beam>

<note pname="b" oct="4" dur="8" />

<note pname="c" oct="5" dur="8" />

</beam>

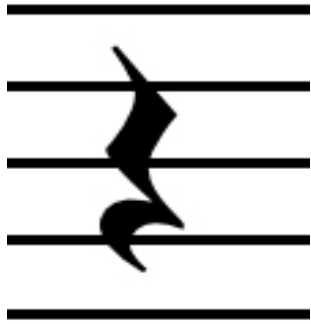
<beam>

<note pname="a" oct="4" dur="8" />

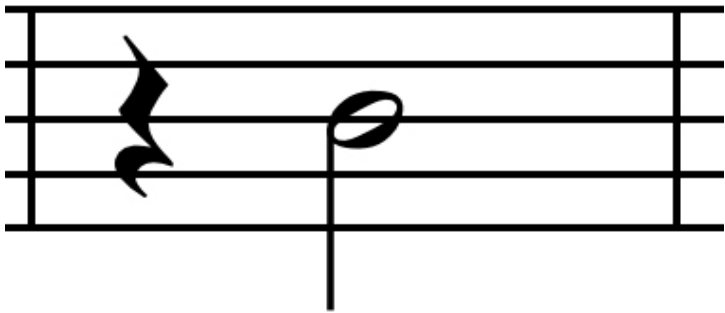
<note pname="f" oct="4" dur="8" />

</beam>

# Rests



`<rest dur="4" />`



`<rest dur="4" />`

`<note pname="b" oct="4" dur="2" />`

# Mary had a little lamb



Please encode the notes within a layer-element!

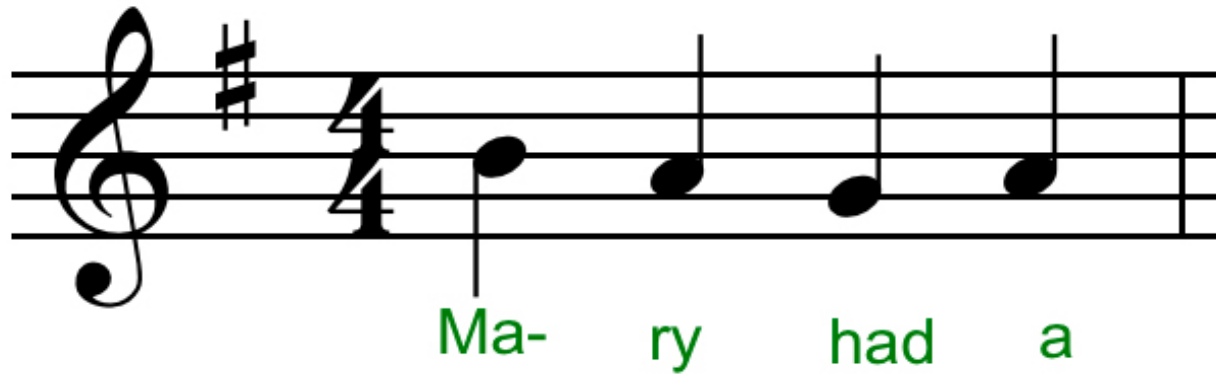
# Encoding

<layer>

```
<note pname="b" oct="4" dur="4" stem.dir="down" />  
<note pname="a" oct="4" dur="4" stem.dir="up" />  
<note pname="g" oct="4" dur="4" stem.dir="up" />  
<note pname="a" oct="4" dur="4" stem.dir="up" />
```

</layer>

# Mary had a second lamb





# Encoding with lyrics

<layer>

```
<note pname="b" oct="4" dur="4" stem.dir="down" syl="Ma-" />  
<note pname="a" oct="4" dur="4" stem.dir="up" syl="ry" />  
<note pname="g" oct="4" dur="4" stem.dir="up" syl="had" />  
<note pname="a" oct="4" dur="4" stem.dir="up" syl="a" />
```

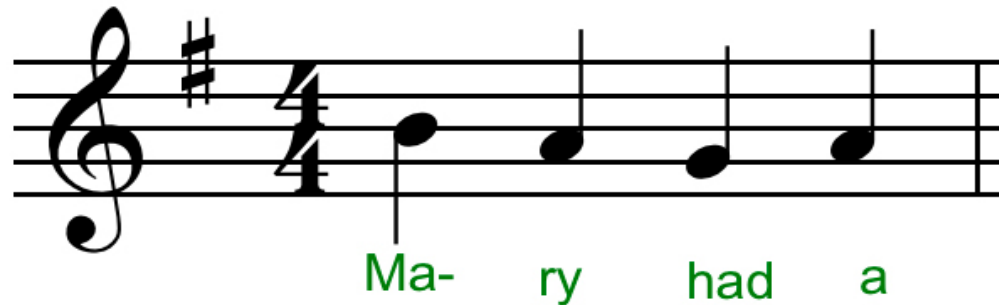
</layer>

# Example with two layers



```
<staff>
  <layer n="1">
    <note pname="d" oct="5" dur="4" stem.dir="up"/>
    <note pname="d" oct="5" dur="4" stem.dir="up"/>
    <beam>
      <note/>
      <note/>
    </beam>
    <note/>
  </layer>
  <layer n="2">
    <note pname="d" oct="4" dur="4" stem.dir="down"/>
    <beam>
      <note/>
      <note/>
    </beam>
    <note/>
    <note/>
  </layer>
</staff>
```

# Encoding a complete measure



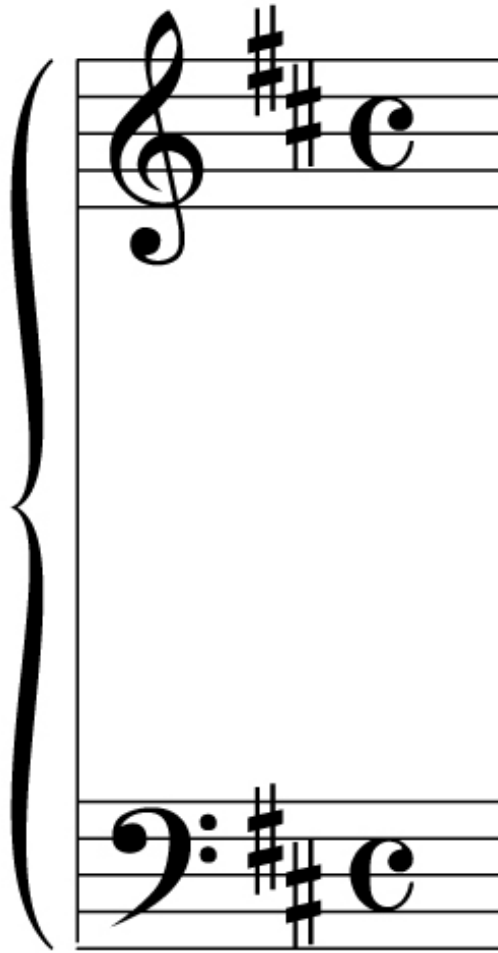
```
<measure n="1">  
  <staff>  
    <layer>  
      <note pname="b" oct="4" dur="4" stem.dir="down" syl="Ma-" />  
      <note pname="a" oct="4" dur="4" stem.dir="up" syl="ry" />  
      <note pname="g" oct="4" dur="4" stem.dir="up" syl="had" />  
      <note pname="a" oct="4" dur="4" stem.dir="up" syl="a" />  
    </layer>  
  </staff>  
</measure>
```

# staff definition



```
<staffDef n="1" lines="5" clef.line="2" clef.shape="G"  
meter.count="4" meter.unit="4" key.sig="1s"/>
```

# score definition



```
<scoreDef meter.count="4" meter.unit="4"  
  meter.sym="common" key.sig="2s"  
  key.mode="major">  
  <staffGrp symbol="brace">  
    <staffDef n="1" lines="5"  
      clef.line="2" clef.shape="G"/>  
    <staffDef n="2" clef.shape="F"  
      clef.line="4" lines="5"/>  
  </staffGrp>  
</scoreDef>
```

# Common structure

```
<mei xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns="http://www.music-encoding.org/ns/mei"
  meiversion="2012"> → root-element
  <meiHead> → container for metadata
    <fileDesc>
      <titleStmt>
        <title>Title of the Sample</title>
      </titleStmt>
      <pubStmt/>
    </fileDesc>
  </meiHead>
  <music/> → container for musical texts
</mei>
```

# Container for the music

Score

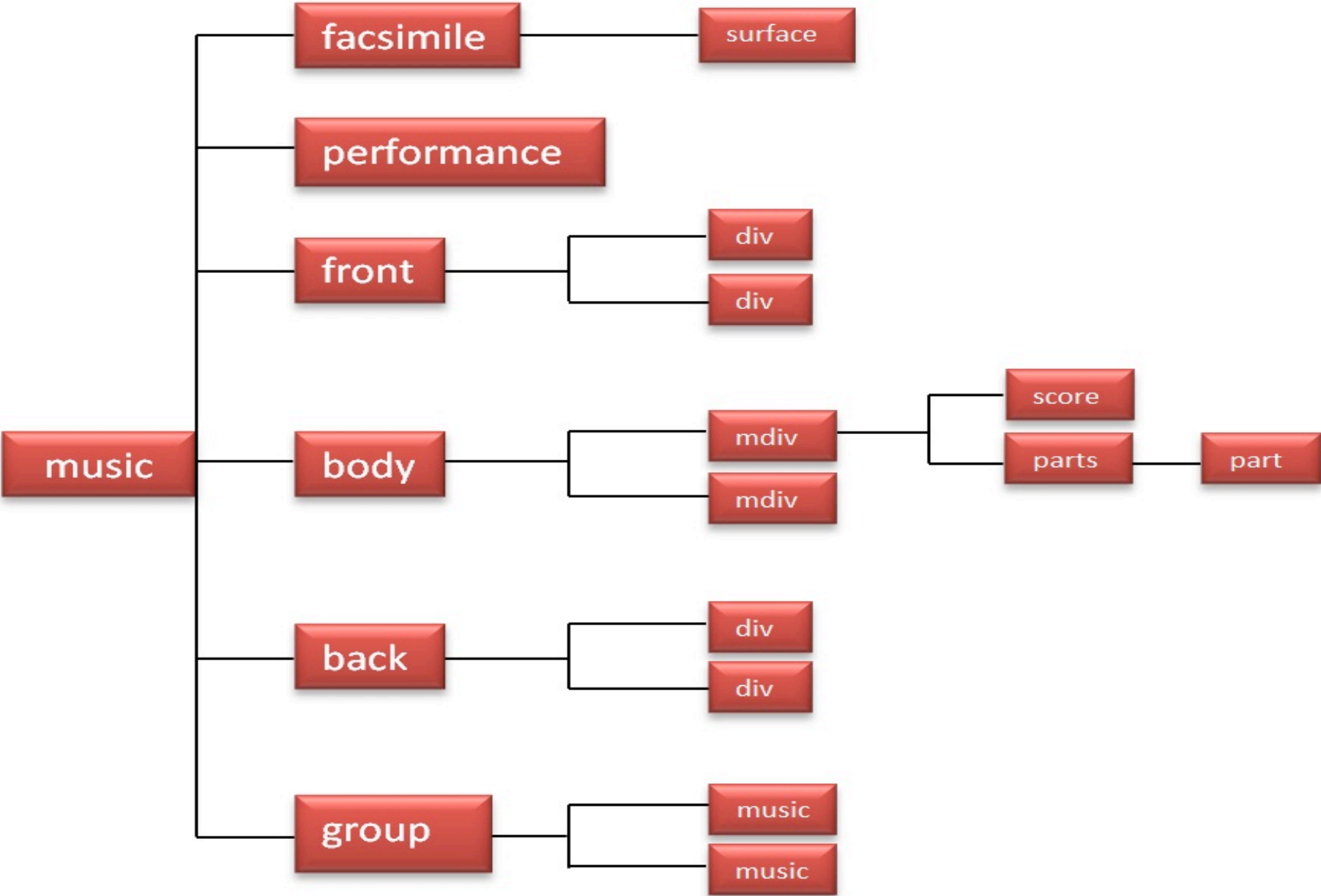
```
<music>
  <body>
    <mdiv>
      <score>
        ...
      </score>
    </mdiv>
  </body>
</music>
```

more than one mdiv

```
<music n="opera">
  <body>
    <mdiv n="act_1">
      <mdiv n="scene_1">
        <score/>
      </mdiv>
    </mdiv>
    <mdiv n="act_2">
      <score/>
    </mdiv>
    <mdiv n="act_3">
      <score/>
    </mdiv>
  </body>
</music>
```



# <music>



# Rests and Chords



# Rests and Chords



```
<chord dur="8" stem.dir="up">  
  <note pname="c" oct="4"/>  
  <note pname="g" oct="4"/>  
</chord>
```

<layer>

<rest dur="8"/>

<chord dur="8" stem.dir="up">

<note pname="c" oct="4"/>

<note pname="g" oct="4"/>

</chord>

<rest dur="8"/>

<chord dur="8" stem.dir="up">

<note pname="f" oct="4"/>

<note pname="g" oct="4"/>

<note pname="b" accid="n" oct="4"/>

</chord>

<rest dur="8"/>

<chord dur="8" stem.dir="up">

<note pname="e" oct="4"/>

<note pname="g" oct="4"/>

<note pname="c" oct="5"/>

</chord>

<chord dur="4" stem.dir="up">

<note pname="e" oct="4"/>

<note pname="g" oct="4"/>

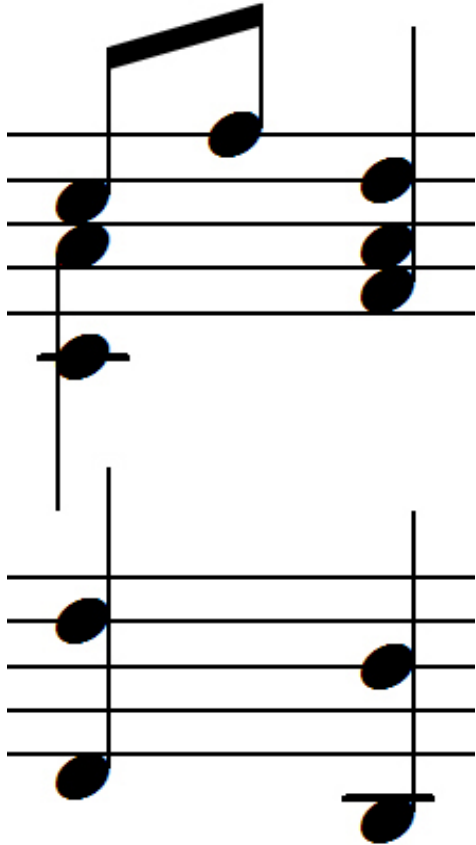
<note pname="c" oct="5"/>

</chord>

</layer>

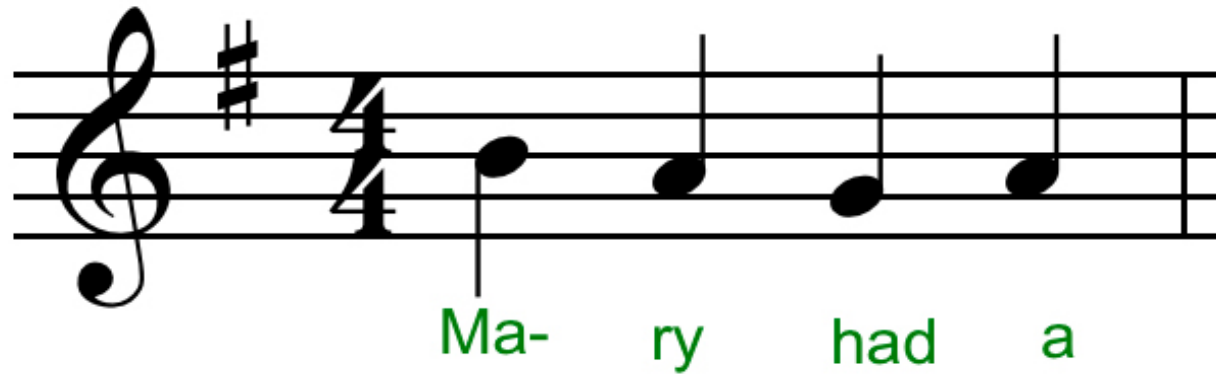


# Chord or layer?



Encoding as a chord  
with three notes or  
encoding as two  
separate layers?

# Complete Mary



# Dynamic, text and articulation

Frisch und munter



*f*

This musical score shows the beginning of a piece in 2/4 time, marked 'Frisch und munter'. The right hand starts with a whole rest, followed by a series of chords. The left hand begins with a quarter note, followed by a dotted quarter note and an eighth note. A dynamic marking of *f* (forte) is placed above the first measure of the right hand.



This section of the score shows a vocal melody line with two staves. The melody is marked with a slur and an accent (>) over the first note. The notes are quarter notes and dotted quarter notes. The accompaniment consists of eighth notes and quarter notes.

# Dynamic and text



```
<measure>
```

```
  <!-- content of staves -->
```

```
</measure>
```

```
<measure>
```

```
  <!-- content of staves -->
```

```
  <dir place="above" staff="1" tstamp="0.5">Frisch und munter</dir>
```

```
  <dynam place="above" staff="2" tstamp="4.5">f</dynam>
```

```
</measure>
```



# Articulation



Possible encodings:

1. `<note artic="acc"/>`
2. `<note>`  
    `<artic artic="acc"/>`  
    `</note>`

# Slurs and Ties

One-pass-encoding and  
standoff-markup



Waf — - fen.  
trof — - fen.

The image shows a musical score with two staves. The top staff contains a melody with a slur over the first four notes. Below the staff, the lyrics "Waf — - fen." and "trof — - fen." are written, with horizontal lines indicating the duration of the notes. The bottom staff contains a bass line with a slur over the first four notes. The score is enclosed in a large bracket on the left side.



The image shows a musical score with a single staff. A slur is placed over a sequence of notes that spans across a barline. The notes are: a dotted quarter note, an eighth note, a quarter note, and a quarter note. The slur is a single continuous line that starts before the barline and ends after it, indicating that the notes should be played without a breath or rest at the barline.

Slur across the  
barline

# Possible encodings

## One-pass-encoding using attributes

Waf \_\_\_\_\_ - fen.  
trof \_\_\_\_\_ - fen.

The image shows a musical score for a vocal line. The lyrics are "Waf - fen. trof - fen." The melody consists of a series of notes: a half note (E4), a quarter note (D4), a quarter note (C4), and a half note (E4). The notes are connected by a slur. The lyrics are aligned with the notes: "Waf" under the first note, "fen." under the second, "trof" under the third, and "fen." under the fourth. The score is written on a single staff with a treble clef and a key signature of one flat (Bb).

```
<layer>  
  <note pname="e" oct="4" dur="8"  
    stem.dir="down" slur="i1"/>  
  <note pname="d" oct="4" dur="4"  
    stem.dir="down"/>  
  <note pname="c" oct="4" dur="8"  
    stem.dir="down" slur="t1"/>  
</layer>
```

# Possible encodings 2

## Standoff-markup using pointers

Waf - fen.  
trof - fen.

The image shows two staves of musical notation. The top staff contains a melody with four notes: E4 (quarter), D4 (quarter), C4 (quarter), and another E4 (quarter). The bottom staff contains a bass line with four notes: C3 (quarter), D3 (quarter), E3 (quarter), and F3 (quarter). A slur is placed below the first two notes of the bottom staff, indicating a slur over the first two notes of the melody.

```
<staff>  
  <layer>  
    <note pname="e" oct="4" dur="8"  
      stem.dir="down" xml:id="note1"/>  
    <note pname="d" oct="4" dur="4"  
      stem.dir="down"/>  
    <note pname="c" oct="4" dur="8"  
      stem.dir="down" xml:id="note2"/>  
  </layer>  
</staff>  
<slur startid="#note1" endid="#note2"  
  curvedir="below"/>
```

Red arrows indicate the mapping between the XML code and the musical notation. One arrow points from the first note element to the first note on the top staff. Another arrow points from the second note element to the second note on the top staff. A third arrow points from the slur element to the slur on the bottom staff.

# Possible encodings 3

## Standoff-markup using semantic positioning



The image shows a musical score for a vocal line. The lyrics are "Waf - fen. trof - fen.". The notes are: a half note G4 (Waf), a quarter note F4 (fen.), a quarter note E4 (trof), and a half note D4 (fen.). A slur is placed below the notes, starting under the first note and ending under the second note. The staff is a single five-line staff.

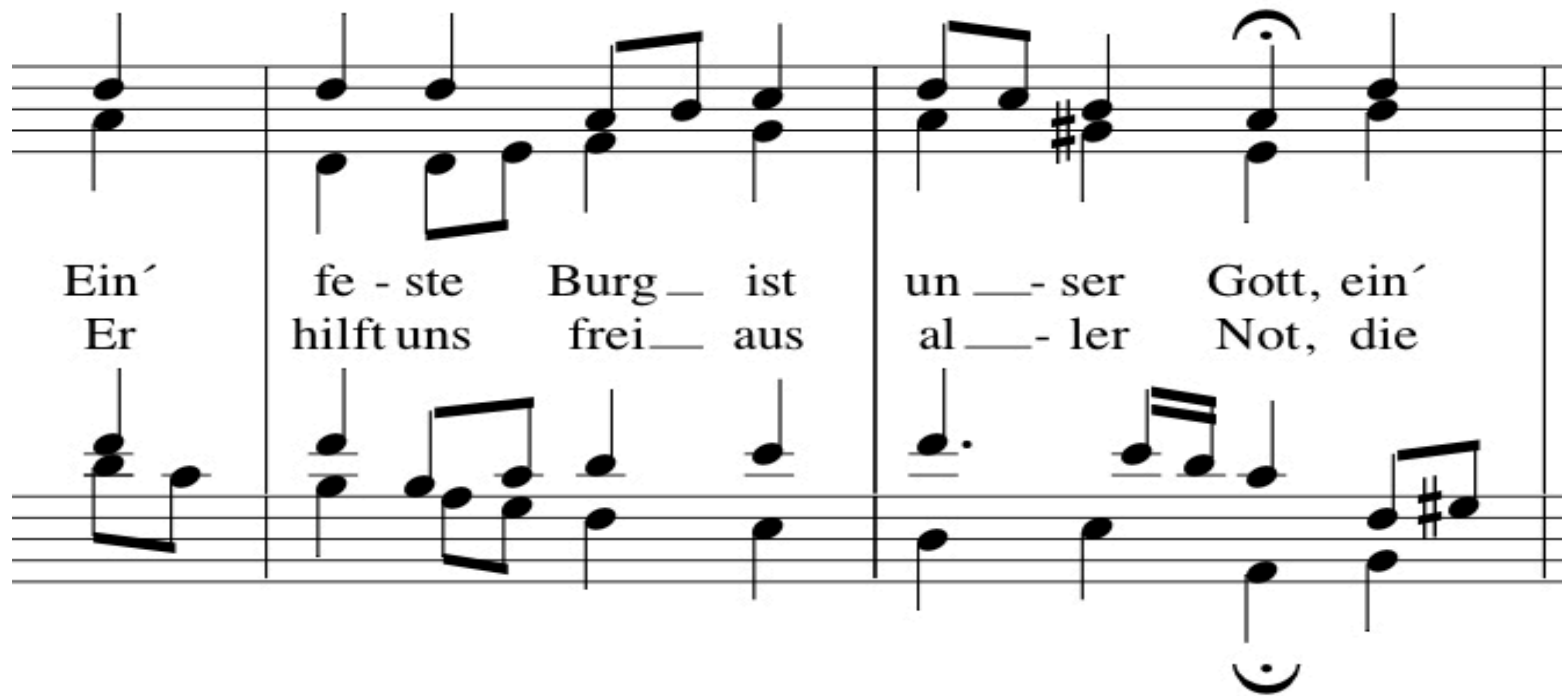
```
<staff>  
  <layer>  
    <note pname="e" oct="4" dur="8"  
      stem.dir="down"/>  
    <note pname="d" oct="4" dur="4"  
      stem.dir="down"/>  
    <note pname="c" oct="4" dur="8"  
      stem.dir="down"/>  
  </layer>  
</staff>  
<slur staff="1" layer="2"  
  tstamp="1" dur="0m+2.5"  
  curvedir="below"/>
```

# Possible encodings 4



```
<measure>
  <staff>
    <layer>
      <note/>
      <note/>
    </layer>
  </staff>
  <slur staff="1" layer="1"
    tstamp="3" dur="1m+2"
    curvedir="above"/>
</measure>
<measure>
  <staff>
    <layer>
      <note/>
      <note/>
    </layer>
  </staff>
</measure>
```

# Lyrics



The image shows a musical score for two verses of a hymn. It consists of two staves of music. The top staff is the vocal line, and the bottom staff is the piano accompaniment. The lyrics are written below the vocal line. The first verse is: "Ein' Er fe - ste Burg ist un - ser Gott, ein' hilft uns frei aus al - ler Not, die". The second verse is: "Ein' Er fe - ste Burg ist un - ser Gott, ein' hilft uns frei aus al - ler Not, die". The music is in a simple, homophonic style with a clear melody and accompaniment.

Ein' Er fe - ste Burg ist un - ser Gott, ein' hilft uns frei aus al - ler Not, die

Encoding of two verses

# Two verses

```
<layer n="1">  
  <note pname="d" oct="5" dur="4" stem.dir="up">  
    <verse n="1">  
      <syl>Ein´ </syl>  
    </verse>  
    <verse n="2">  
      <syl>Er</syl>  
    </verse>  
  </note>  
</layer>
```



# Others...



`<arpeg/>`



`<note grace="unacc" size="cue"/>`



`<hairpin form="cresc"/>`

`<hairpin form="dim"/>`

# Others...



```
<trill staff="1" layer="1"  
  tstamp="1" dur="0m+4"  
  place="above"/>
```



```
<tuplet num="3">  
  <note/>  
  <note/>  
  <note/>  
</tuplet>
```

# Ossia

Andante

The musical score is written in bass clef with a 4/4 time signature and a key signature of one flat (B-flat). The tempo is marked 'Andante' and the dynamic is 'mf' (mezzo-forte). The score consists of two staves. The upper staff contains a melody of five notes: G2, F2, E2, D2, and C2, all marked with accents. The lower staff contains a bass line starting with a dynamic marking 'mf'. It begins with two measures of quarter notes (G2, F2) and (E2, D2), each with a slur. The third and fourth measures contain eighth notes: G2, F2, E2, D2 in the third measure, and G2, F2, E2, D2 in the fourth measure, also slurred. The fifth measure has a quarter note G2, and the sixth measure has a quarter note F2. The seventh measure has a quarter note E2, and the eighth measure has a quarter note D2. The final measure has a half note C2.

# Ossia

```
<measure>
  <ossia>
    <staff n="ossia">
      <!-- content of the alternative staff -->
      <layer>
        <note pname="e" oct="4" dur="4" stem.dir="up"/>
        <beam>
          <note pname="g" oct="4" dur="8" stem.dir="up"/>
          <note pname="f" oct="4" dur="8" stem.dir="up"/>
        </beam>
        <note pname="e" oct="4" dur="4" stem.dir="up"/>
      </layer>
    </staff>
    <staff n="1">
      <!-- content of the original staff -->
      <layer>
        <note pname="e" oct="4" dur="4" stem.dir="up"/>
        <note pname="f" oct="4" dur="4" stem.dir="up"/>
        <note pname="e" oct="4" dur="2" stem.dir="up"/>
      </layer>
    </staff>
  </ossia>
</measure>
```

Andante

*mf*

# Whats wrong?

```
<section>
  <measure>
    <staff>
      <note pname="e" oct="4" dur="4" />
      <note pname="d" oct="4" dur="4" />
      <note pname="f" accid="s" oct="4" dur="4" />
      <note pname="a" oct="4" dur="4" />
    </staff>
  </measure>
</section>
```

# How to encode the meter change?

A musical score for piano, consisting of two staves (treble and bass clef) with a brace on the left. The key signature is one flat (B-flat). The score is divided into two measures by a vertical bar line. The first measure is in 5/4 time, and the second measure is in 6/4 time. The notation includes chords, single notes, and melodic lines with slurs.

The first measure (5/4 time) contains the following notes:  
Treble clef: Chords of G4-Bb4-D5 (first two beats), G4-Bb4-D5 (third beat), and a melodic line G4-A4-Bb4 (fourth beat) with a slur.  
Bass clef: Chords of G2-Bb2-D3 (first two beats), G2-Bb2-D3 (third beat), and a melodic line G2-A2-Bb2 (fourth beat) with a slur.

The second measure (6/4 time) contains the following notes:  
Treble clef: Chords of G4-Bb4-D5 (first two beats), G4-Bb4-D5 (third beat), and a melodic line G4-A4-Bb4 (fourth beat) with a slur.  
Bass clef: Chords of G2-Bb2-D3 (first two beats), G2-Bb2-D3 (third beat), and a melodic line G2-A2-Bb2 (fourth beat) with a slur.

# Which encoding is correct?

- a) `<accid accid="s">  
 <note pname="a" dur="1" oct="4"/>  
</accid>`
- b) `<note pname="a" dur="1" oct="4">  
 <accid accid="s"/>  
</note>`
- c) `<note pname="a" dur="1" oct="4" accid="s"/>`

Piano

Allegretto

*p*

The image shows a musical score for a piano piece. It is in 2/4 time and the key signature has one sharp (F#). The tempo is marked 'Allegretto' and the dynamics are marked 'p' (piano). The score consists of two staves, treble and bass clef. The music features a series of slurs and grace notes, particularly in the first few measures.

1. How to encode the upbeat?
2. Which element do you choose for encoding „Allegretto“?
3. What solution do you choose for the slurs?
4. How do you encode the grace-notes?



Schnell. ♩ = 152.

Singstimme.

Pianoforte.

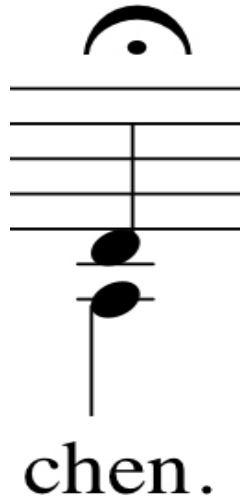
1. Define three staves
2. How do you encode the triplets?
3. How do you encode the tremolos?
4. Where would you encode the labels?
5. Which elements or attributes would you choose to encode the text above the first staff?

Singstimme *Zart*

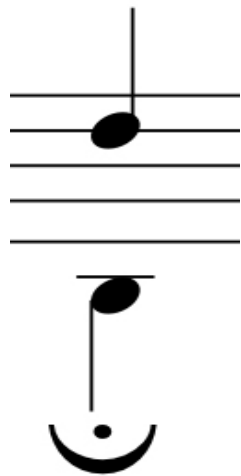
Wie Me-lo - di - en — zieht es mir lei - se durch den

Pianoforte *p sempre dolce*

1. How to encode the beams?
2. How would you encode the clef in the second staff?
3. What about the meter sign?



How to encode the fermatas?



# Further Material

Sehr schnell ♩ = ca 160

*f* *p* *f* *p* *f* *p*

*evenly and mechanically,  
no ritard., decresc., accel. etc.  
(repeat 2 or 3 times)*

*f* *p* *f* *p* *f* *p*