

# Digital notated music

Hands-on (ish) with MEI

Davids and Andrew

# Music notation

- Why write music down?
- Who makes and uses music notation?

# How is notation organised?

- What aspects of notation would you want to record?
- Is there anything other than the symbols that you see?

What else might we want to record in the file?

# 'Impossible' notation

Variatio 26. a 2 clav.



# 'Impossible' notation



Schubert, *Winterreise* autograph, 1827 (Facsimile by Bärenreiter, 1966)

# 'Impossible' notation

Andante espressivo.

Nº 1.

The musical score consists of two staves for piano. The top staff is in common time (indicated by a '2 over 4'). The bottom staff is also in common time (indicated by a '4 over 4'). The tempo is marked 'Andante espressivo.' The dynamics include 'mf' (mezzo-forte) and 'p' (pianissimo). The performance instructions 'Rw.' (Ritardando), '\*' (a small asterisk), and 'Ped.' (pedal) are placed under specific notes. The second staff concludes with a dynamic 'cresc.'

Felix Mendelssohn, *Lieder ohne wörter* Op 85 No 1, Breitkopf & Härtel (1877)

# ‘Impossible’ notation

Musical score for piece N° 37, Andante espressivo. The score consists of two staves. The top staff is in treble clef, B-flat major, and 2/4 time. The bottom staff is in bass clef, B-flat major, and 2/4 time. The music features sixteenth-note patterns with grace marks and dynamic markings like "f", "p", and "cresc.". The score includes several measures of music with specific fingerings (e.g., 1, 2, 3, 4) and performance instructions like "Ped." and asterisks.

Felix Mendelssohn, *Lieder ohne wörter* Op 85 No 1, Peters (1895)

# Unspecific notation



Louis Couperin, Bauyn MS, F-Pn Rés. Vm7 674-675 (ca. 1690)



# What is digitisation?

c. 14,000 bytes



c. 11 bytes

# Treble clef

```
{ type: clef  
subtype: G  
position: 2  
}
```

c. 47 bytes

# Encoding and editing



B♭  
Tie  
B♭

B♭  
Slur  
B♭

B♭  
choice:  
> Slur [1], [2]  
> Tie [3]

# Why digitise?

- Reproducible – copy without loss of information
- Citable – put online and get a web address
- Accessible – can be transformed for e.g. braille
- Multi-dimensional – versions and variants
- Interactive – change notation, choose paths, re-edit
- Machine readable – search and analyse in bulk

# Who is the user? What do they need?

- Plaine and Easie Code
  - Invented by Barry Brooke in 1965
  - Strengths:
    - Speed of typing or punching
    - Brevity (fits on one card)
    - Support for ‘legacy’ systems

```
=4/2-,1G2G/2.F4E2DF/2.E4DCDEF/9G/
```

# Who is the user? What do they need?

- MIDI
  - Standardised by an industry panel in 1983
  - Strengths:
    - Live synchronisation control of electronic equipment
    - Interchange of music between synthesisers

# Who is the user? What do they need?

- HUMDRUM
  - Created by David Huron in the 1980s
  - Strengths:
    - Comes with a toolkit
    - Extensive, expandable table format
    - Files can be edited in a text editor
    - Can use existing text-processing tools

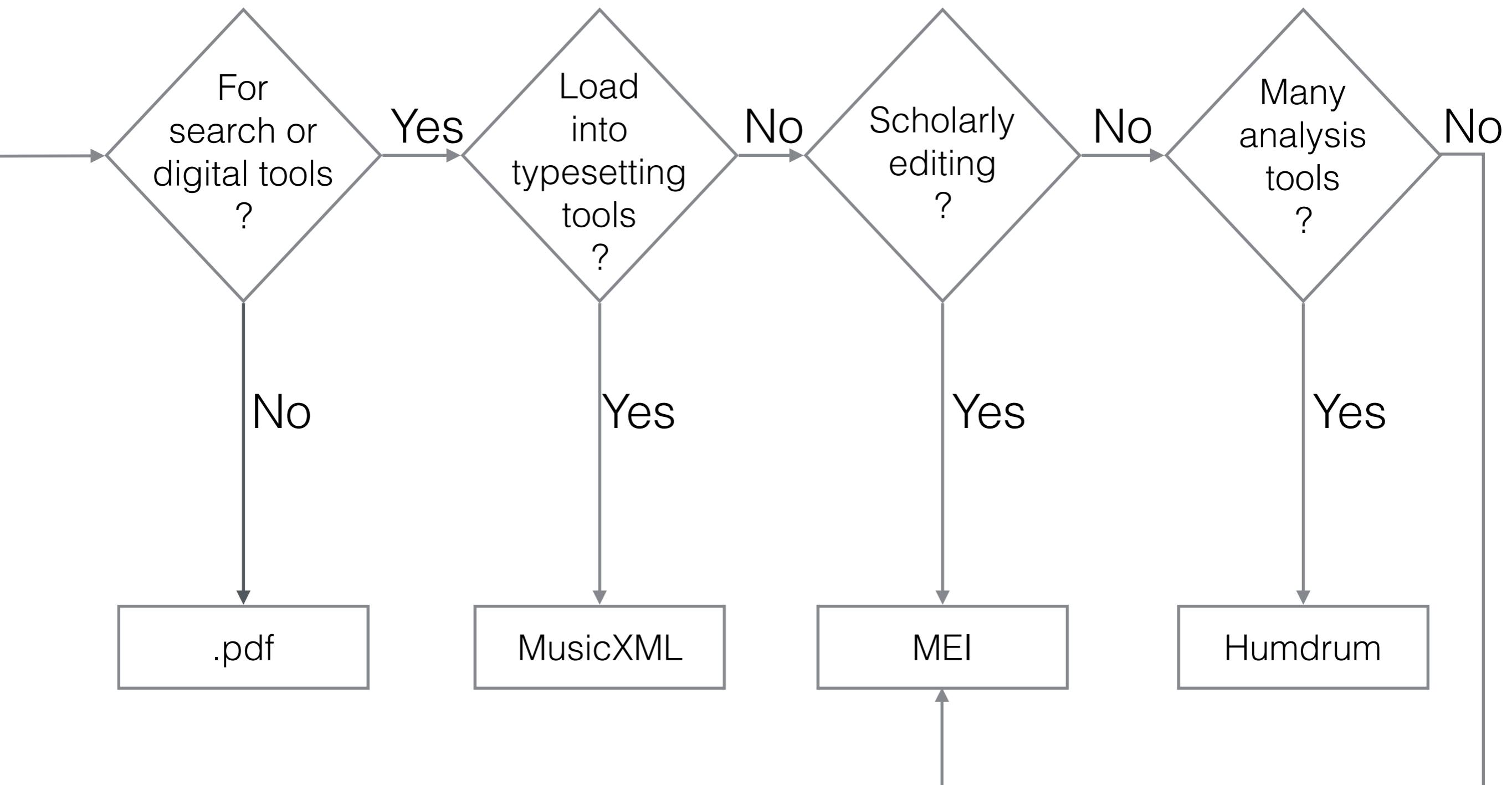
# Who is the user? What do they need?

- MusicXML
  - Created by Michael Good in the early 2000s
  - Strengths:
    - Interchange:
      - Implements the core of CMN relatively unambiguously
      - Supported by Sibelius, Finale, Cubase, Music21, etc.
    - Open format

# Who is the user? What do they need?

- MEI
  - Created by Perry Roland in 2002, inspired by TEI
  - Strengths:
    - Support for variety of notations, easily extensible
    - Support for critical apparatus, images and audio
    - Catalogue information
    - Community-based, collaborative, open and free

# What is important to you?



# Have cake and eat it

Simple conversion between formats is now easy

Perfect conversion is probably impossible

# Encoding in MEI

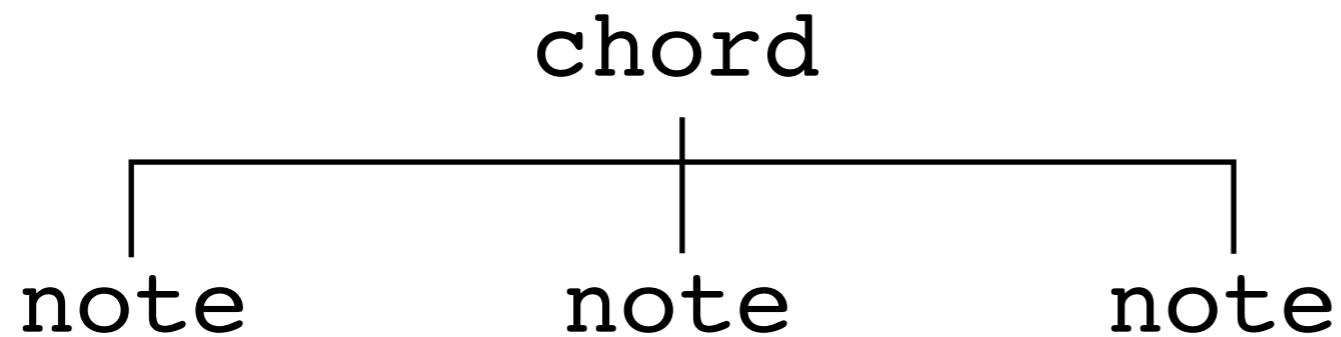
For more details, why not visit

<http://music-encoding.org/documentation/3.0.0/chapters/>

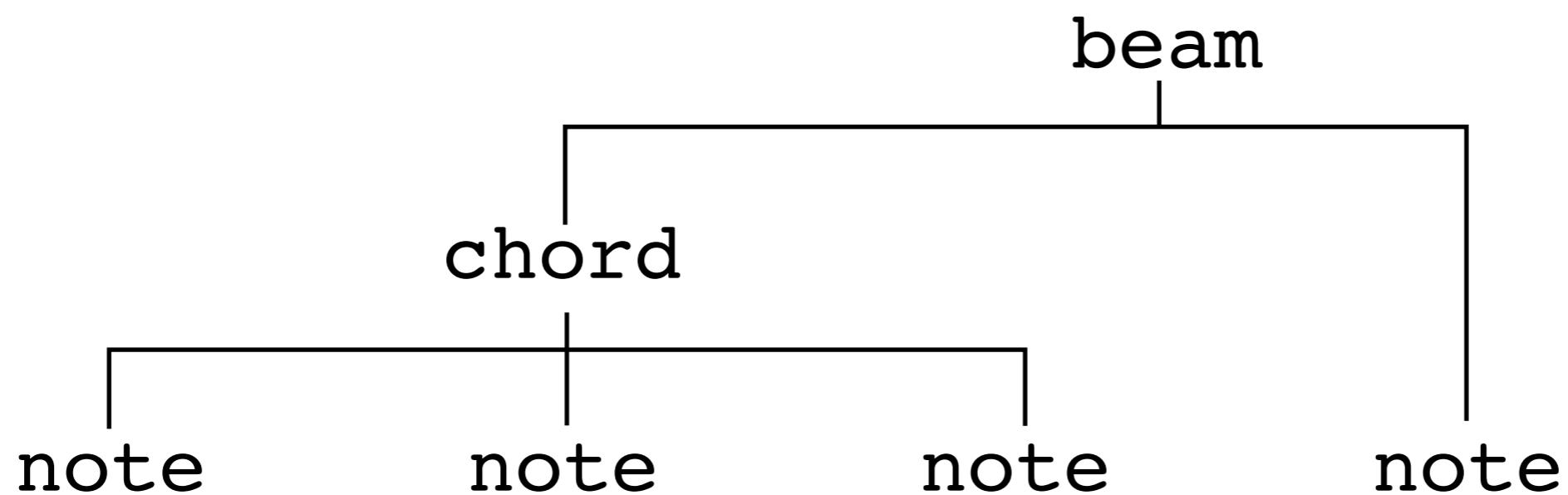
# Brief introduction to XML

- An XML document consists of **elements**
- Each element can itself contain other elements

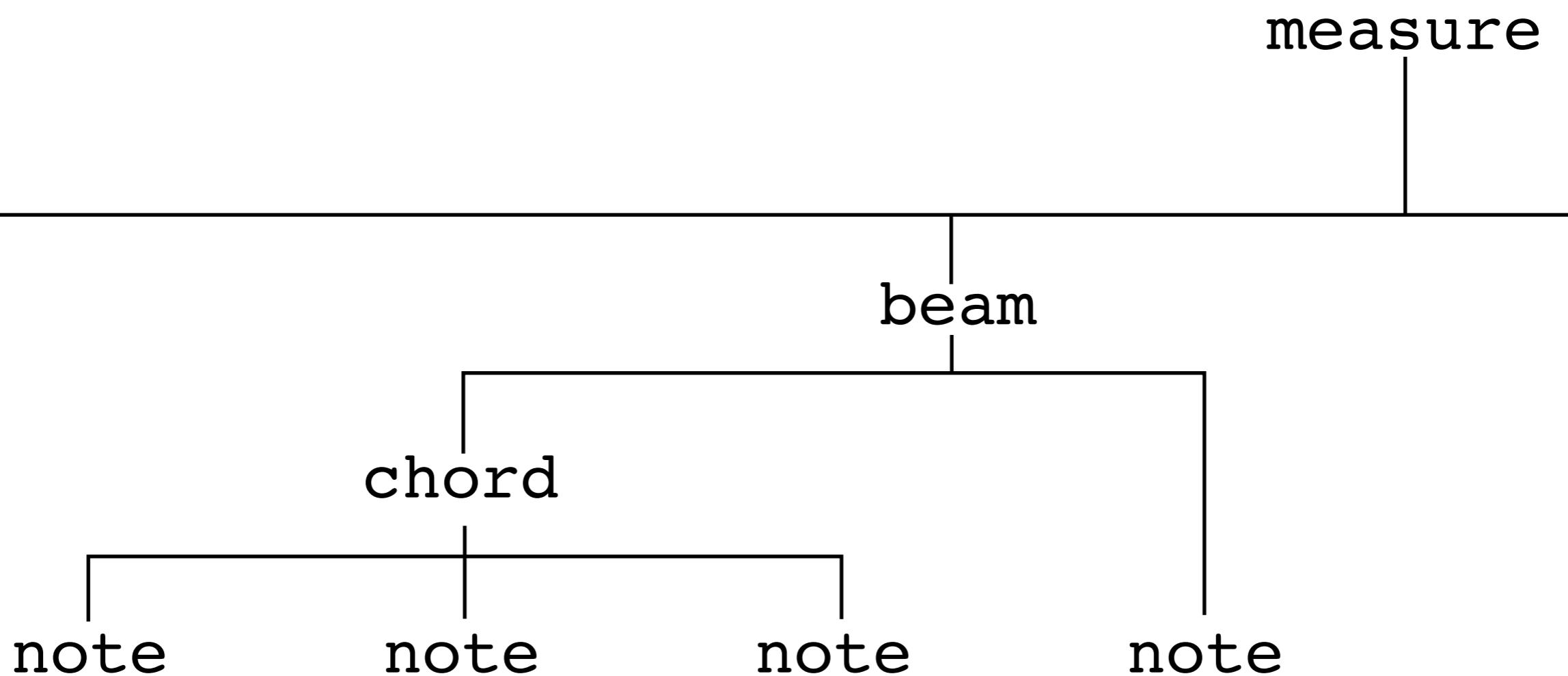
# Brief introduction to XML



# Brief introduction to XML



# Brief introduction to XML



# Brief introduction to XML

```
<measure>
  [...]
  <beam>
    <chord>
      <note></note>
      <note></note>
      <note></note>
    </chord>
    <note></note>
  </beam>
  [...]
</measure>
```

# Brief introduction to XML

<note></note>

# Brief introduction to XML

```
<chord>
  <note></note>
</chord>
```

# Brief introduction to XML

```
<chord>
  <note />
</chord>
```

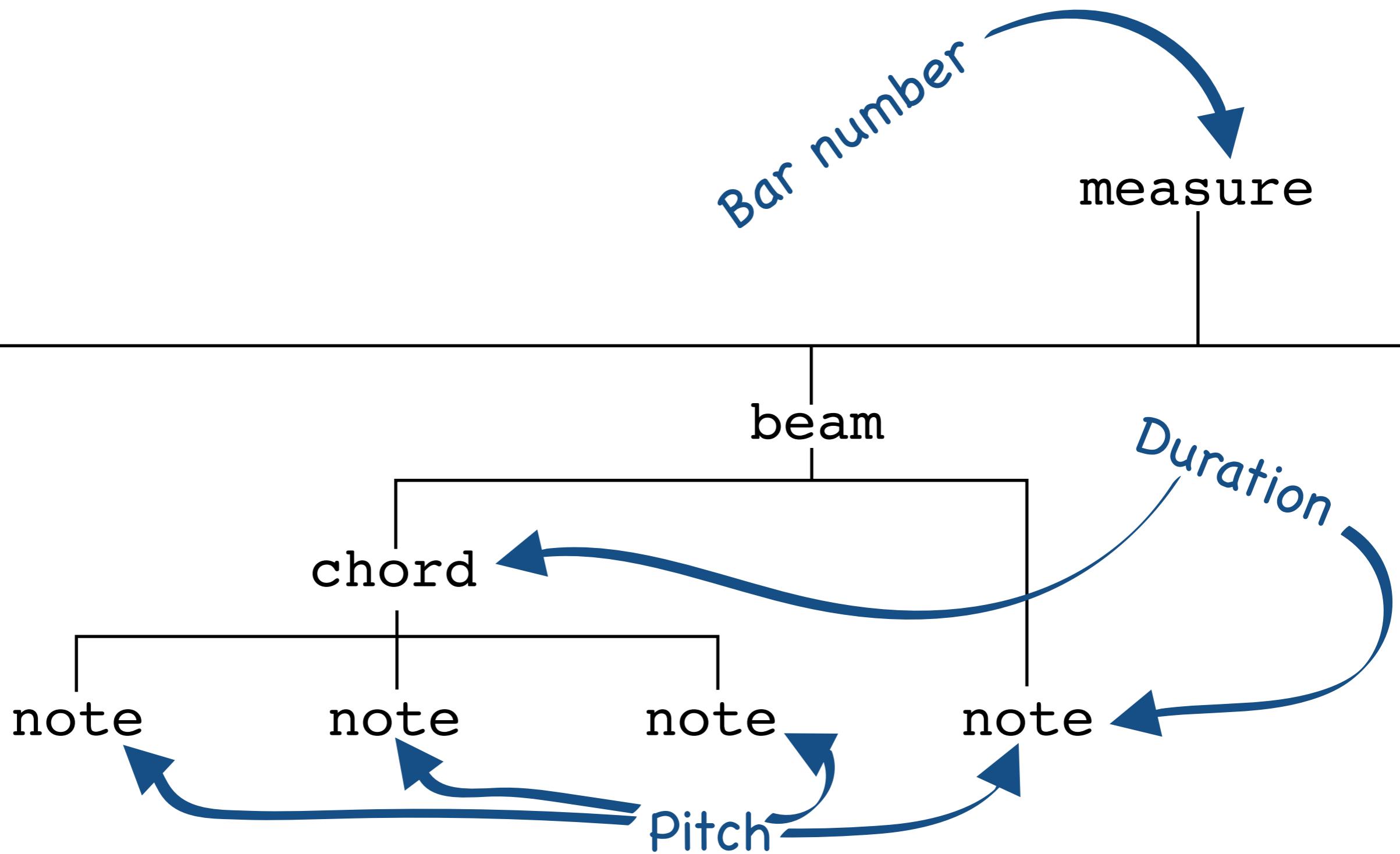
# Brief introduction to XML

```
<measure>
  [...]
  <beam>
    <chord>
      <note />
      <note />
      <note />
    </chord>
    <note />
  </beam>
  [...]
</measure>
```

# Brief introduction to XML

- An XML document consists of **elements**
- Each element can itself contain other elements
- Each element can be described by **attributes**

# Brief introduction to XML



# Brief introduction to XML

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

# MEI Notes



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



```
<note pname="c" oct="4"  
accid="s" dur="4" />
```

# MEI Notes



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



```
<note pname="c" oct="4"  
dur="4">  
  <artic artic="stacc" />  
</note>
```

# Larger structures

mei

music

body

mdiv

score

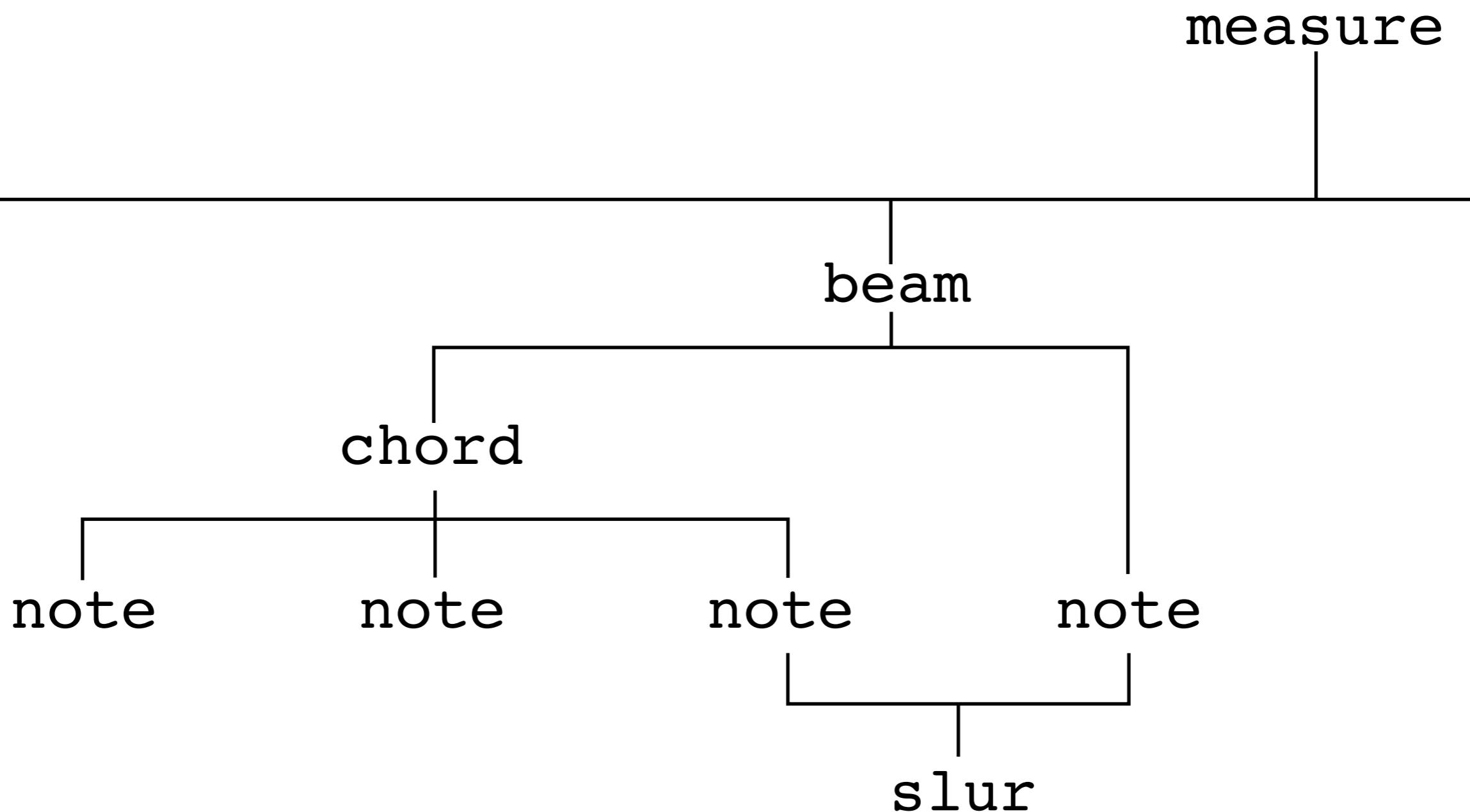
measure

staff

layer

note

# Is music like a tree?



# Brief introduction to XML

```
<chord>
  <note />
  <note />
  <slur>
    <note />
  </chord>
  <note />
</slur>
```

# Is music like a tree?

```
<chord>
    <note />
    <note />
    <note id="note4"/>
</chord>
<note id="Bob"/>

<slur startid="#note4"
      endid="#Bob" />
```

‘Standoff’ notation

# Critical apparatus

```
<app>
  <rdg source="#GB-LBl-K.4.h.1">
    <note pname="c" oct="4" dur="4" />
  </rdg>
  <rdg source="#B-Br-Fétis-2.908">
    <note pname="c" oct="4" dur="4"
          accid="s" />
  </rdg>
</app>
```

# Critical apparatus

```
<app>
  <rdg source="#GB-LBl-K.4.h.1">
    <note pname="c" oct="4" dur="4" />
  </rdg>
  <rdg source="#B-Br-Fétis-2.908">
    <note pname="c" oct="4" dur="4"
          accid="s" />
  </rdg>
</app>
```

# Critical apparatus

```
<app>
  <rdg source="#GB-LBl-K.4.h.1">
    <note pname="c" oct="4" dur="4" />
  </rdg>
  <rdg source="#B-Br-Fétis-2.908">
    <note pname="c" oct="4" dur="4"
          accid="s" />
  </rdg>
</app>
```

# Critical apparatus

```
<app>
  <lem source="#GB-LBl-K.4.h.1"
       resp="http://orcid.org/0000-0003-4151-0499">
    <note pname="c" oct="4" dur="4" />
  </lem>
  <rdg source="#B-Br-Fétis-2.908">
    <note pname="c" oct="4" dur="4"
          accid="s" />
  </rdg>
</app>
```

# Critical apparatus

```
<app>
  <rdg source="#GB-LBl-K.4.h.1">
    <note pname="c" oct="4" dur="4" />
  </rdg>
  <rdg source="#B-Br-Fétis-2.908">
    <note pname="c" oct="4" dur="4"
          accid="s" />
  </rdg>
</app>
```

# Try it out

- Use your file browser to find Frageverbot-1.mei
- Launch the MEI editor
- Drag the file into the web browser
- The score should appear

# Things to try

- Change the pitch of a note
- Find some lyrics and change them
- Change a staccato mark to a tenuto (`ten`)
- Add a slur (you'll need to add `xml:id` to notes)
- Add a measure of music and have it display

# Beyond CMN

- Drag *Tribum / Quoniam* into the editor
- This piece is in *very early* mensural notation
- What do you see? Why?
- Take the opening of the file from the shared drive and load that



# Beyond CMN

- How does the encoding differ from CMN?
- What has the encoding/edition added to the source?
- How was this encoding generated?

# Beyond CMN

- The first extension to MEI was to accommodate Mensural notation.
- Most structures are shared, but duration values (`dur=`) have changed:
  - `longa`
  - `brevis`
  - `semibrevis`
  - `minima`
  - `semiminima`
  - `fusa`
- Other changes include the introduction of mensuration signs, custodes, etc.

# Custom extensions

- Drag Frog-galliard.mei into the editor
- What happens? Why?
- Drag Frog-galliard-cmn.mei into the editor
- What has changed?

# MEI as a catalogue format

```
<mei xmlns="http://www.music-encoding.org/ns/mei"
      xmlns:xlink="http://www.w3.org/1999/xlink"
      meiversion="2013">
<meiHead>
  <fileDesc>
    <titleStmt>
      <title>Romance for cello and piano</title>
    </titleStmt>
    <pubStmt>
      <respStmt>
        <resp>Publisher</resp> ...
      </respStmt>
      <date/>
    </pubStmt>
    <seriesStmt>...</seriesStmt>
  <sourceDesc>
    <source analog="frbr:manifestation">
      <identifier />
      <titleStmt>
        <title>Autograph score</title>
      </titleStmt>
      <pubStmt>
        <publisher />
        <pubPlace />
        <date />
      </pubStmt>
      <physDesc>
```

# Making MEI

- Text editors (!!?)
- Export from Sibelius (sib2mei extension)
- Convert from MusicXML
  - <http://www.verovio.org/musicxml.html>
- Ask Andrew to finish export from MuseScore

# Viewing MEI

- Verovio (<http://www.verovio.org/>)
- ... not a lot else

# Analysing MEI

- Generic XML tools (for counting things)
- Music21

