

# CODES FOR DATA ARCHIVING, INTERCHANGE, AND ANALYSIS: **MUSEDATA**

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Music 253/CS 275A

Stanford University

# Distinguishing features

- Neither *time* nor *space* is a dominant consideration
- Focus is on **repurposable data**, interoperability
- Examples
  - *Archiving*: canonical format that facilitates interoperability
  - *Interchange*: canonical format that is easily interpreted by sending and receiving systems whose formats may be unknown
  - *Analysis*: flexible format that can be modified to suit a range of needs (can sometimes be distilled from richer format)

# Distinguishing features

- Neither *time* nor *space* is a dominant consideration
- *Environment* may be extensive; focus on interoperability
- Examples
  - *Archiving*: EsAC (monophonic), **MuseData** (polyphonic)
  - *Interchange*: **MusicXML**, **MEI**
  - *Analysis*: **Humdrum Toolkit** (main format = *kern*)

# MuseData: Turkish march



Print suggestions

Sound suggestions

chord

Print  
suggestion

```

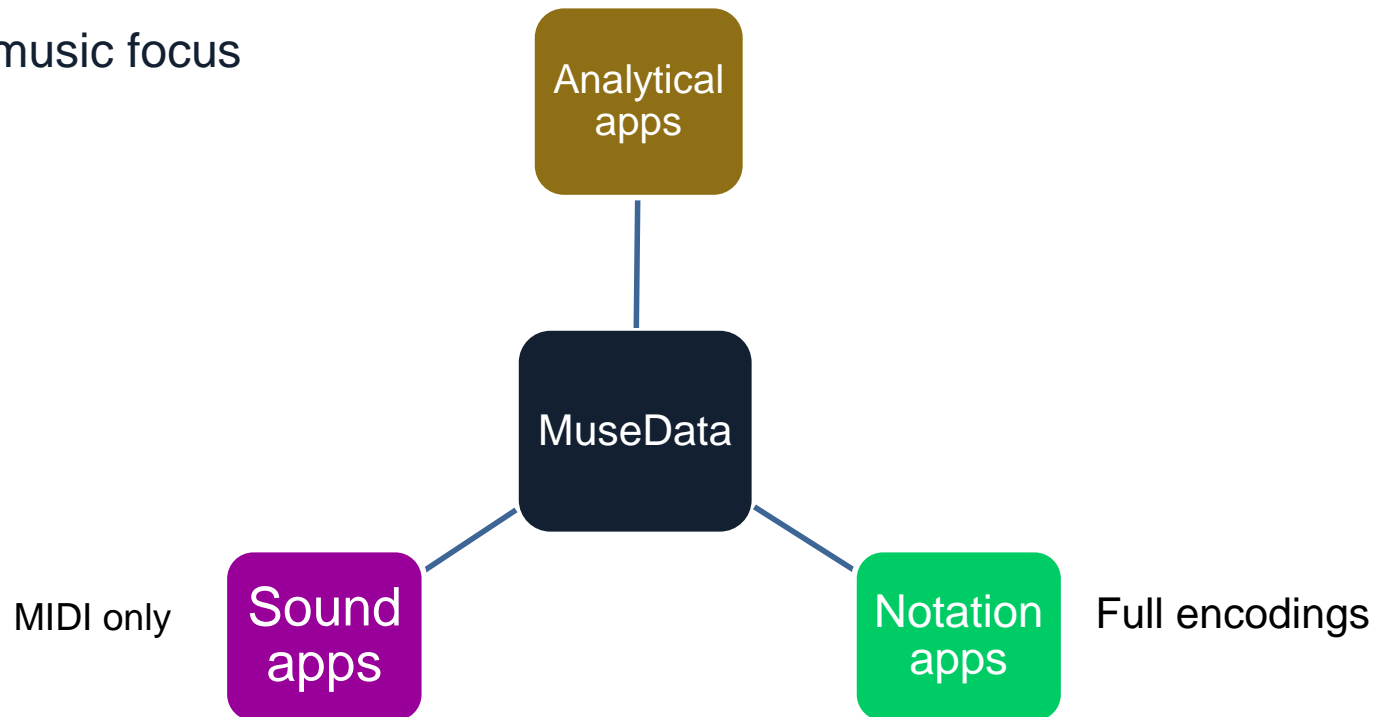
Wk#:331      MV#:3
Breitkopf & H\u00e4rtel
Piano Sonata

1 0
Group memberships: sound, score
sound: part 1 of 1
score: part 1 of 1
&
Initial conversion from stage 1 to
stage 2
&
$ K:3 Q:4 T:2/4 C1:4 C2:22
C#6 8 h u1 S
back 8 1
A5 4 q d1
E5 4 q d1
C#5 4 q d1
back 4
gA2 4 t u2 [[[ [
P C33:o
gC#3 4 t u2 ===
gE3 4 t u2 ]]]
A3 2 e d2 [ ]
A3 2 e d2 =
A3 2 e d2 =
A3 2 e d2 ]
measure 2
D6 1 s d1 [( (
C#6 1 s d1 == )
B5 1 s d1 == .
C#6 1 s d1 ]] .
D6 1 s d1 [( (
C#6 1 s d1 == )
B5 1 s d1 == .

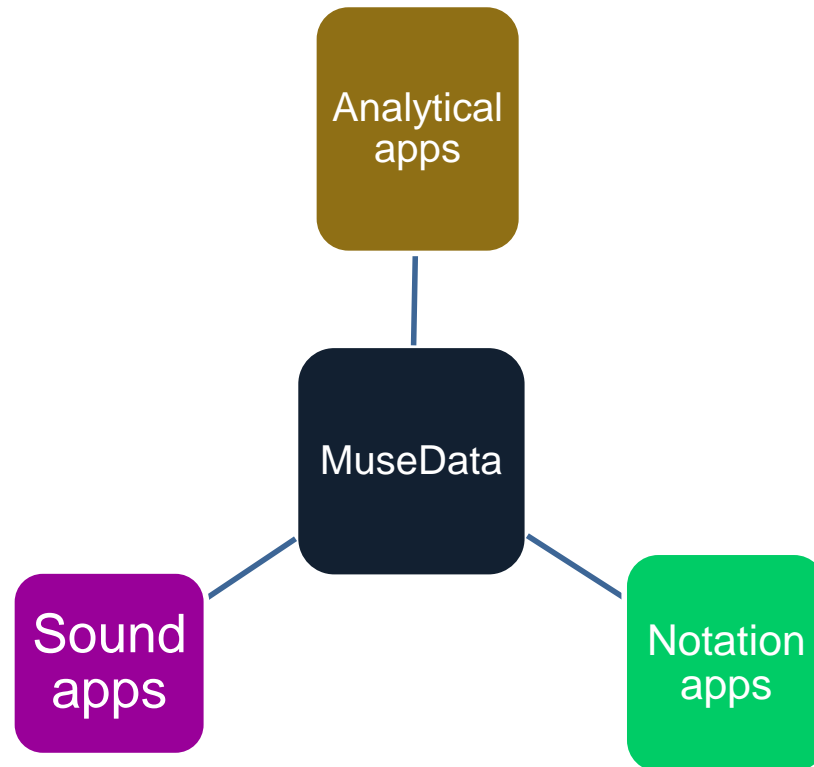
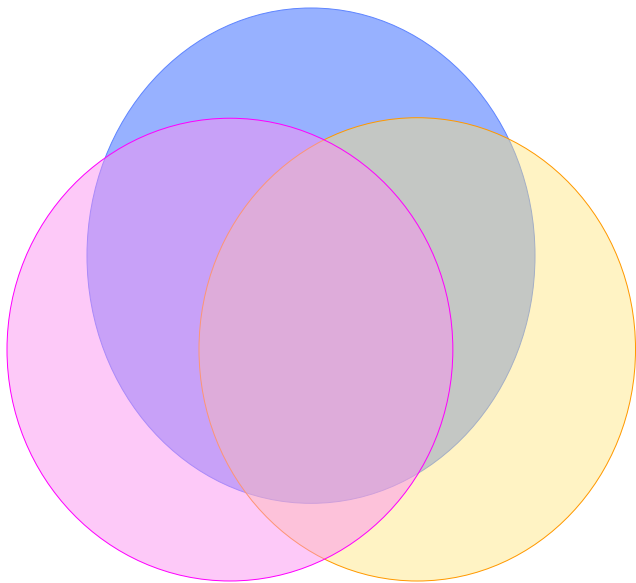
```

# *MuseData* network models

Classical music focus

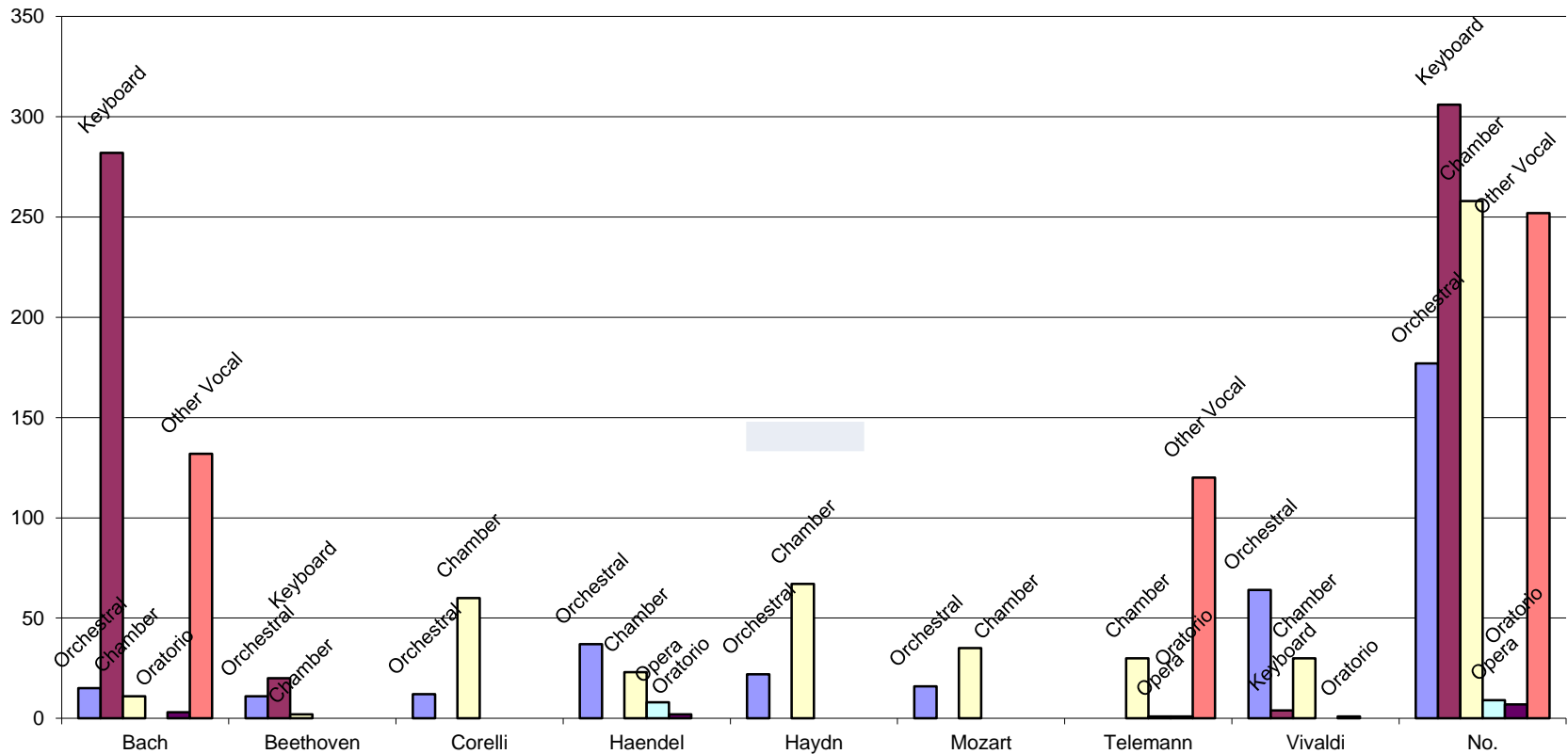


# Comparison of models



# MuseData encodings (2012)

c. 1250 works



# Part/score orientation in *MuseData*

1. Encode voice by voice for full movement
2. Add lyrics, other refinements
3. Repeat until all movements are encode
4. Assemble score

The image displays two examples of musical score orientation in *MuseData*. The top example shows a part-oriented score with individual staves for 'clarinet in A', 'violino I', 'violino II', 'viola', and 'violoncello'. The bottom example shows a score-oriented score with a single staff for the 'S' (Soprano) voice and four staves for the piano accompaniment, labeled 'p1--', 'p2--', 'p3--', and 'p4--'.



# MuseData: encoding

- Two-step process
  - MIDI-level data
  - Non-sounding data
- Serial processes
- Storage formats
  - Stage 1 (pitch, duration)
  - Stage 2 (stems, lyrics, etc)
  - Internal format (notation)

[About \*MuseData\*](#)      [Sources](#)  
[Repertoires](#)      [Data Formats \[ \*MuseData\* | Humdrum | MIDI1 | MIDI+ \]](#)  
[Works and Title Numbers](#)      [Legal Considerations](#)

Search:

[ Printable Scores/Parts | MIDI1 files for listening ]

<i>composer's name</i>	<i>number of encoded compositions</i>	<i>movements (approx.)</i>	<i>PDF files (by work)</i>
Johann Sebastian Bach	417	1534	51 (418 pages)
Ludwig van Beethoven	10	58	9 (1339 pages)
Arcangelo Corelli	72	363	0
Antonin Dvorák	1	0	0
George Frederick Handel	80	904	0
Franz Josef Haydn	87	352	12 (693 pages)
Benedetto Marcello	1	3	0
Wolfgang Amadeus Mozart	47	171	0
Giovanni Rovetta	1	9	0
Georg Philipp Telemann	109	553	0
Antonio Vivaldi	56	168	12

# MuseData: instantiations

- |                 |  |
|-----------------|--|
| • <i>sound</i>  | used to compile MIDI sound files   |
| • <i>score</i>  | used to print scores   |
| • <i>parts</i>  | used to print parts  |
| • <i>short</i>  | used to print short scores   |
| • <i>tracks</i> | used for analysis  |
| • <i>midi</i>   | data specifically used to compile MIDI files (e.g.,<br>channel assignments and instrument assignments) |
| • <i>data</i>   | anything and everything  |

## input keys

FIELD TYPE	FIELD IDENTIFIER	FIELD DATA TYPE
key	K:	integer (positive or negative)
divisions per quarter note	Q:	integer (positive only)
time designation	T:	two integers (positive only)
clef	C:	integer (positive only)
clef	Cn:	integer
transposing part	X:	integer (positive or negative)
number of staves for part	S:	integer (positive only; default = 1)
number of instruments represented	I:	integer (positive only; default = 1)
directive (last field on line)	D:	ASCII string
directive (last field on line)	Dn:	ASCII string

# MuseData: Conventional input files

```

measure 1
E4 2
D4 2
C4 2
rest 2
measure 2
E4 2
D4 2
C4 2
rest 2

measure 3
G4 2
F4 1
F4 1
E4 4
measure 4
G4 2
F4 1
F4 1
E4 4

```

Figure 27.3 Sample file for openings measures of “Three Blind Mice.”

Input data (Stage 1)

Enhanced data  
(Stage 2)

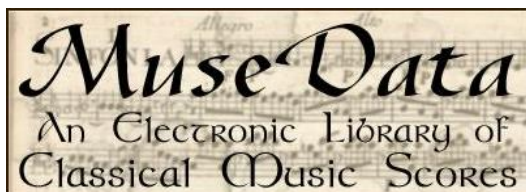
Mozart trio: V1

```

04/16/93 E. Correia
WK#:581 MV#:3c
Breitkopf & Härtel, Vol. 13
Clarinet Quintet
Trio II
Clarinet in A
1 0
Group memberships: sound, score
sound: part 1 of 5
score: part 1 of 5
$ K:0 Q:6 T:3/4 X:-11 C:4
C5 3 e d [ (&0p
E5 3 e d ]
measure 1
G5 3 e d [
E5 3 e d ]
C6 6 q d )
G5 3 e d [ (
E5 3 e d ]
measure 2
D5 3 e d [
F5 3 e d ]
A5 6 q d )
F5 3 e d [ (
D5 3 e d ]
measure 3
C5 3 e d [
B4 3 e d =
E5 3 e d =
D5 3 e d =
G5 3 e d =
F5 3 e d ] )
measure 4
D#5 6 q # d (
E5 6 q d )
C5 3 e d [ (
E5 3 e d ]
measure 5
G5 3 e d [
E5 3 e d ]

```

# Encoding in multiple domains: Actualities



## Work Information

<i>Composer</i>	Haydn, Franz Joseph
<i>Title</i>	Symphony in E-flat Major
<i>Popular Title</i>	Drumroll
<i>Scholarly catalog num.</i>	H I:103
<i>Copyright notice</i>	Copyright (c) 1994, 2000 Center for Computer Assist
<i>Copyright message</i>	Rights to all derivative editions reserved.
<i>Copyright message</i>	Refer to licensing agreement for further details.
<i>Scholarly catalogue</i>	Thematisch-bibliographisches Werkeverzeichniss (A.
<i>Derived from</i>	Dover Edition; reprint of Eulenburg Edition
<i>Encoding state</i>	stage2
<i>Error reports</i>	None [Submit error report]

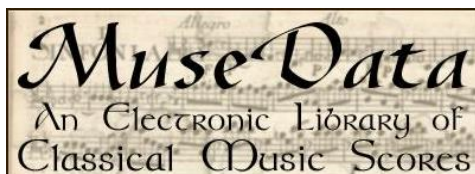
## Musical Data

	<i>kern</i>	<i>MIDI</i>	<i>PDF</i>	<i>SCORE</i>	<i>stage2</i>	<i>parts</i>
<i>Entire work</i>	all	all	all	all	all	
<i>By movement:</i>						
1. Adagio -- Allegro con spirito	01	01	01	01	01	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11 s12
2. Andante	02	02	02	02	02	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11
3. Menuetto and Trio	03	03	03	03	03	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11
4. Finale	04	04	04	04	04	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 s01 s02 s03 s04 s05 s06 s07 s08 s09 s10 s11

Adagio

[musedata.org](http://musedata.org)

# Encoding in multiple domains: samples



## From PDF list

Haydn, Franz Joseph	<a href="#">Symphony in E-flat Major, H I:99</a>
	<a href="#">Symphony in G Major ("Military"), H I:100</a>
	<a href="#">Symphony in D Major ("The Clock"), H I:101</a>
	<a href="#">Symphony in B-flat Major, H I:102</a>
	<a href="#">Symphony in E-flat Major ("Drumroll"), H I:103</a>
Vivaldi, Antonio	<a href="#">Concerto in E Major ("La Primavera"), Op. 8, No. 1</a>
	<a href="#">Concerto in G Minor ("L'Estate"), Op. 8, No. 2</a>
	<a href="#">Concerto in F Major ("L'Autunno"), Op. 8, No. 3</a>
	<a href="#">Concerto in F Minor ("L'Inverno"), Op. 8, No. 4</a>
	<a href="#">Concerto in E-flat Major ("La Tempesta di Mare"), Op. 8, No. 5</a>
	<a href="#">Concerto in C Major ("Il Piacere"), Op. 8, No. 6</a>
	<a href="#">Concerto in D Minor, Op. 8, No. 7</a>
	<a href="#">Concerto in G Minor, Op. 8, No. 8</a>
	<a href="#">Concerto in D Minor, Op. 8, No. 9</a>
	<a href="#">Concerto in B-flat Major ("La Caccia"), Op. 8, No. 10</a>
	<a href="#">Concerto in D Major, Op. 8, No. 11</a>
	<a href="#">Concerto in C Major, Op. 8, No. 12</a>

## From MIDI file list

Beethoven, Ludwig van	<a href="#">Piano Concerto No. 2 in B-flat Major, Op. 19</a>
	<a href="#">Violin Concerto in D Major, Op. 61</a>
	<a href="#">Symphony No. 5 in C Minor, Op. 67</a>
Haydn, Franz Joseph	<a href="#">Symphony in D Major, H I:1</a>
	<a href="#">String Quartet in C Major, H III:57</a>
	<a href="#">Symphony in E-flat Major, H I:99</a>
	<a href="#">Symphony in G Major ("Military"), H I:100</a>
	<a href="#">Symphony in D Major ("The Clock"), H I:101</a>
	<a href="#">Symphony in B-flat Major, H I:102</a>
	<a href="#">Symphony in E-flat Major ("Drumroll"), H I:103</a>
<a href="#">Symphony in D Major ("London"), H I:104</a>	

## Work Information

Composer	Haydn, Franz Joseph
Title	Symphony in E-flat Major
Popular title	Drumroll
Scholarly catalog num.	H I:103
Copyright notice	Copyright (c) 1994, 2000 Center for Computer Assisted Research in the Humanities
Copyright message	Rights to all derivative editions reserved.
Copyright message	Refer to licensing agreement for further details.
Scholarly catalogue	Thematisch-bibliographisches Werkeverzeichnis (A. van Hoboken)
Derived from	Dover Edition, reprint of Eulenburg Edition.
Encoding state	page2
Error reports	None [Submit error report]

## Musical Data

	kern	MIDI	PDF	SCORE	stage2	parts
Entire work	all	all	all	all	all	
By movement:						
1. Adagio -- Allegro con spirito	01	01	01	01	01	01 02 03 04 05 06 07 08 09 10 11 12 1312i14i151617 #01 #02 #03 #04 #05 #06 #07 #08 #09 #10 #11 #12
2. Andante	02	02	02	02	02	01 02 03 04 05 06 07 08 09 10 11 121314151617 #01 #02 #03 #04 #05 #06 #07 #08 #09 #10 #11
3. Menuetto and Trio	03	03	03	03	03	01 02 03 04 05 06 07 08 09 10 11 121314151617 #01 #02 #03 #04 #05 #06 #07 #08 #09 #10 #11
4. Finale	04	04	04	04	04	01 02 03 04 05 06 07 08 09 10 11 12131415161718 #01 #02 #03 #04 #05 #06 #07 #08 #09 #10 #11