



Variations2:

The Indiana University Digital Music Library Project

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Outline

- Overview
- Project status
- Data model
- Demonstration
- Usability
- Future directions, issues



Variations2

- Four-year project
 - Started October 1, 2000
 - Funding from NSF and NEH through Digital Libraries Phase 2 (DLI2) program
 - Large interdisciplinary team of investigators
 - Faculty: Music, Information Science, Law, Computer Science
 - Librarians and technologists: Libraries, University Information Technology Services
 - Bloomington and Indianapolis campuses



Project goals

- Establish a digital music library testbed system supporting multiple formats: audio, video, score images, score notation
- Develop multiple interfaces for specific user applications in the music library and the classroom
- Conduct research in metadata, usability, copyright, and networking



Partners: "Satellite Sites"

- United States
 - University of Illinois at Urbana-Champaign
 - University of Massachusetts at Amherst
 - Northwestern University
- United Kingdom
 - Kings College - London
 - Loughborough University
 - University of Oxford
- Japan
 - Waseda University
- Evaluation...potential for co-development



Variations(1)

- Variations2 builds upon previous work:
Variations
 - Production DL of sound recordings (~8000 titles) and scores (~200 titles) in IU Cook Music Library
 - Used for course reserves and general collection access
- Variations2 = R&D system
- Variations = production service
- Content for Variations2 draws upon existing Variations collection



The Variations2 System

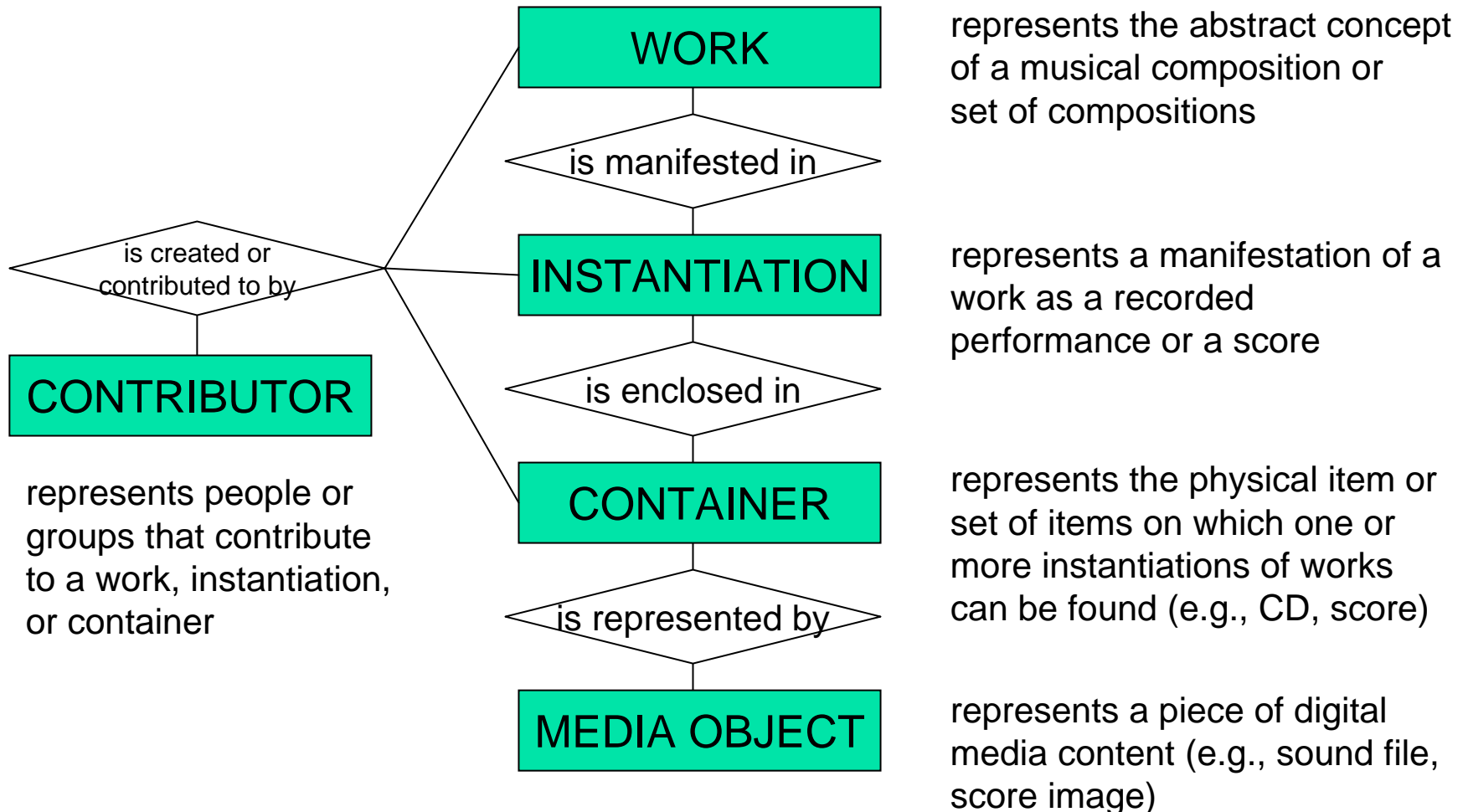
- Integrated access to music in all formats
 - Digital audio recordings
 - Score images
 - Score notation
 - Video
- Delivery to wide range of users
 - Faculty: teaching, course design, research
 - Students: coursework, independent study
 - Music librarians, other library users
- Extensible
- Multiple user interfaces
- Staged development



Problems with MARC catalogs

- Traditional MARC-based online catalogs not ideal for music
 - Large number of works by single author
 - Multiple works in single container
 - Relationships of performers and other fields to works
 - Multiple roles of “authors”
 - Importance of *work*: uniform titles
 - Not always possible to easily get one version of a work to others
 - Many variant forms of titles
 - Problems with LC subject headings
 - e.g. “Songs (High voice) with orchestra, Arranged”
 - Isolating / sorting by format

Variations2 Data Model

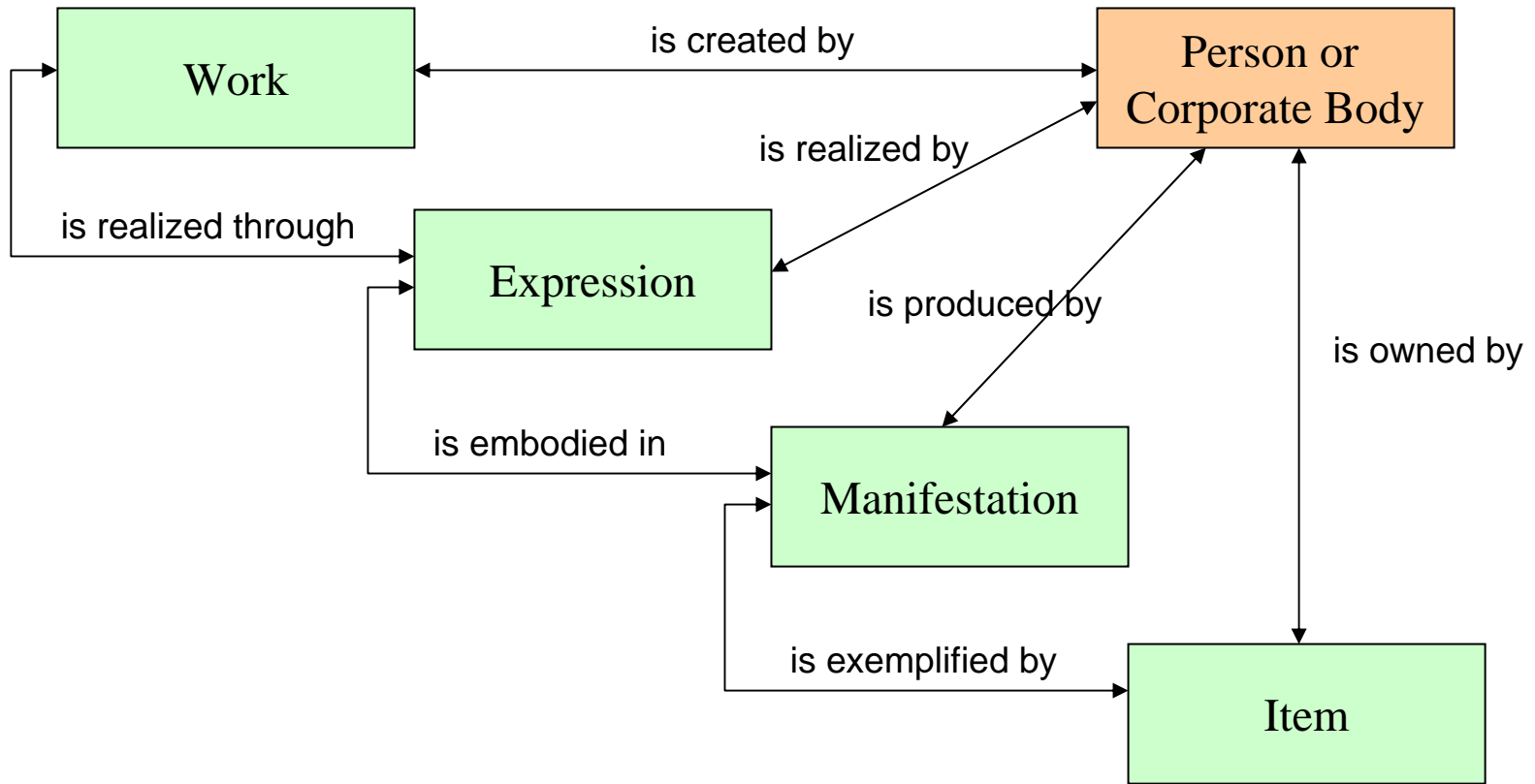




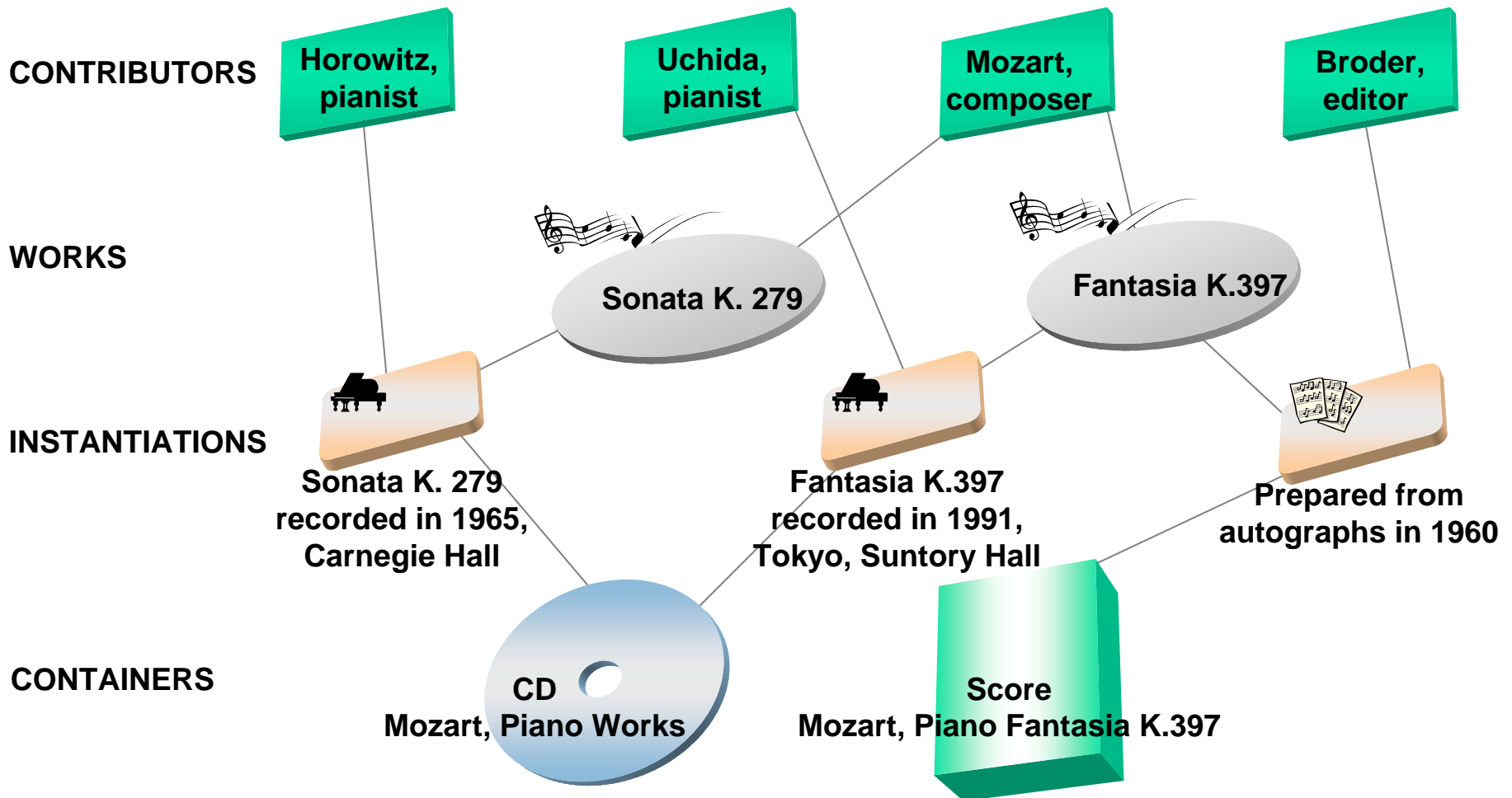
Variations2 Data Model

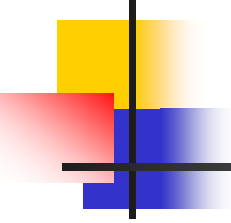
- Appropriate metadata elements attached to each entity
- Import mapping from MARC
- Closely related to FRBR
 - International Federation of Library Associations *Report on the Functional Requirements of Bibliographic Records*, 1997

IFLA FRBR Entities



Variations2 Data Model: Example





Variations2 Structural Metadata: 3 Types

- Container Structure
 - attached to container objects
 - defines track information, time, and page offsets
- Work Structure
 - outlines abstract structure of the work (movements, acts, scenes, etc.)
- Work Bindings
 - associated with instantiations
 - links particular time and page ranges of instantiations represented by media objects to the abstract work structure

Work Structure: Example

Beethoven, Symphony No. 7

- Movement 1: Poco sostenuto
- Movement 2: Allegretto
- Movement 3: Presto
- Movement 4: Allegretto con brio

Arturo Toscanini, NBC Symphony Beethoven, *Symphonies No. 7 and No. 2*

Symphony No. 7

- 0:00 to 11:07
- 11:07 to 19:11
- 19:11 to 26:10
- 26:10 to 33:02



Pierre Monteaux, London Symphony Beethoven, *Symphonies No. 2, 4, 5, 7*

Symphony No. 7

- 30:31 to 42:35
- 42:35 to 51:19
- 51:19 to 60:31
- 60:31 to 67:10

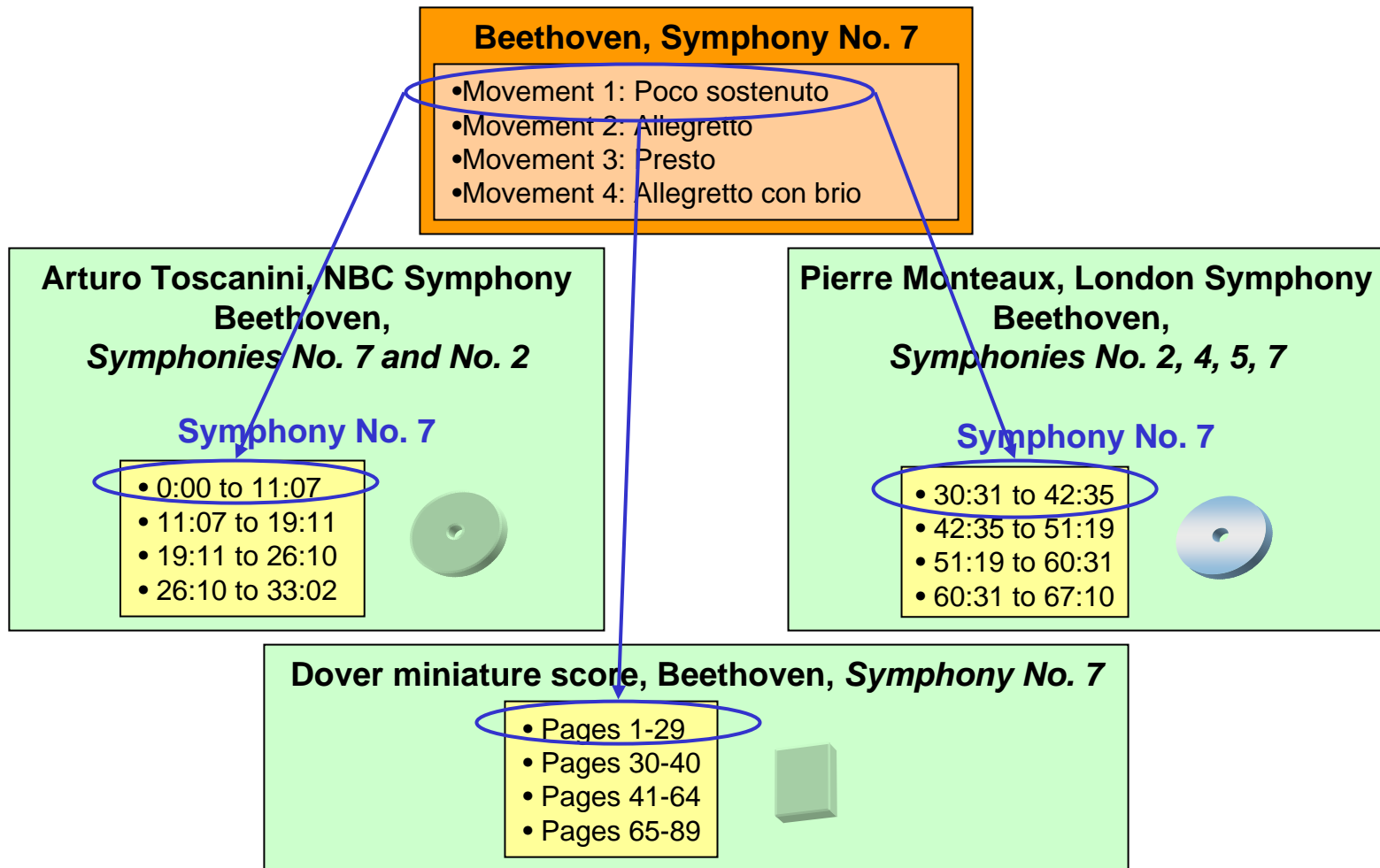


Dover miniature score, Beethoven, *Symphony No. 7*

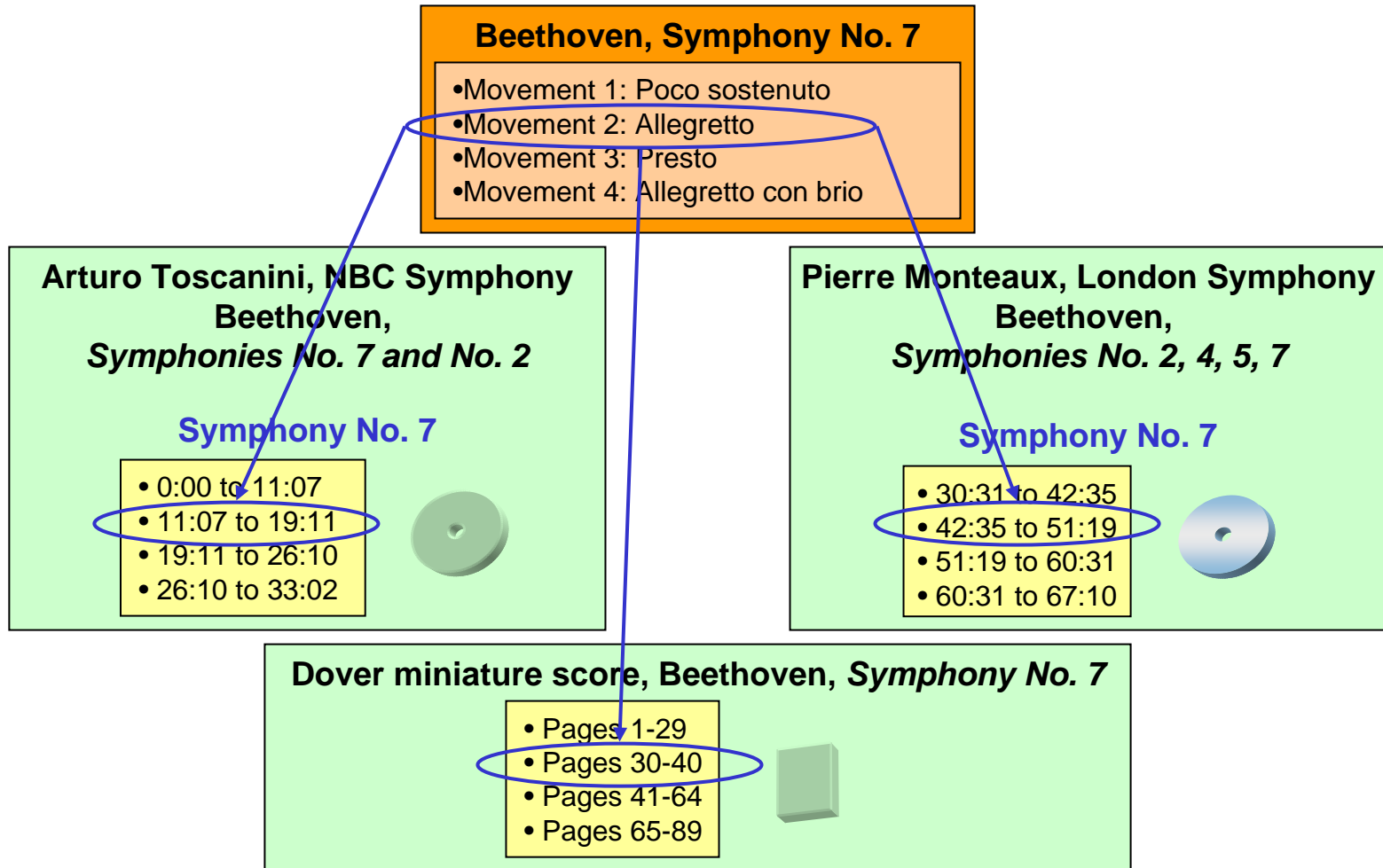
- Pages 1-29
- Pages 30-40
- Pages 41-64
- Pages 65-89



Work Structure: Example



Work Structure: Example





Work Structure Example

```
<Structure id="1" label="Symphony no. 7 (Ludwig van Beethoven)">
  <Section id="2" label="Movement 1">
    <Section id="3" label="Introduction"/>
    <Section id="4" label="Exposition"/>
    <Section id="8" label="Development"/>
    <Section id="9" label="Recapitulation"/>
    <Section id="10" label="Coda"/>
  </Section>
  <Section id="5" label="Movement 2 - Allegretto"/>
  <Section id="6" label="Movement 3 - Presto"/>
  <Section id="7" label="Movement 4 - Allegro con brio"/>
</Structure>
```



Instantiation Bindings Example

```
<StructureBindings structureID="IU/Work/2001">
  <Binding nodeRef="3">
    <ContentInterval mediaRef="IU/MediaObject/4021" begin="0" end="234975"/>
  </Binding>
  <Binding nodeRef="4">
    <ContentInterval mediaRef="IU/MediaObject/4021" begin="234975" end="360255"/>
  </Binding>
  <Binding nodeRef="8">
    <ContentInterval mediaRef="IU/MediaObject/4021" begin="360255" end="468400"/>
  </Binding>
  <Binding nodeRef="9">
    <ContentInterval mediaRef="IU/MediaObject/4021" begin="468400" end="596229"/>
  </Binding>
  ...

```

Variations2

Version 1.0 Features

- Infrastructure
 - Data/metadata repositories, authentication, logging
- Search and retrieval interface
 - Based on new data model
- Presentation/navigation of audio and scanned scores
- Bookmarking



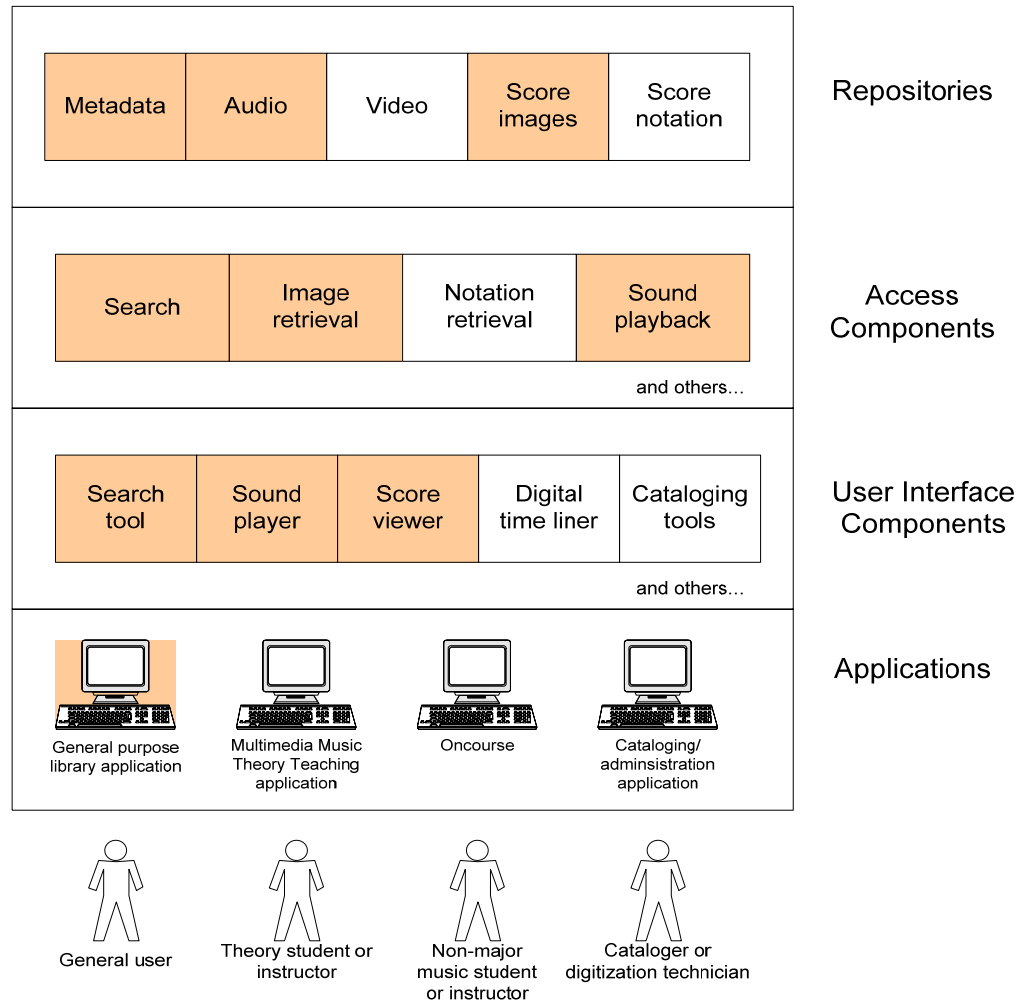
Variations2 Version 1.0

Technical Environment

- Client and server developed in Java
- Windows and Mac OS X client platforms, Unix (AIX/Linux) server
- Audio streaming: QuickTime for Java, Darwin Streaming Server
- Database: IBM DB2, DB2 Text Information Extender
- Image compression: DjVu from AT&T Labs and Lizardtech
- XML/MARC/Z39.50 tools: Saxon, Xerces, Jafer, James

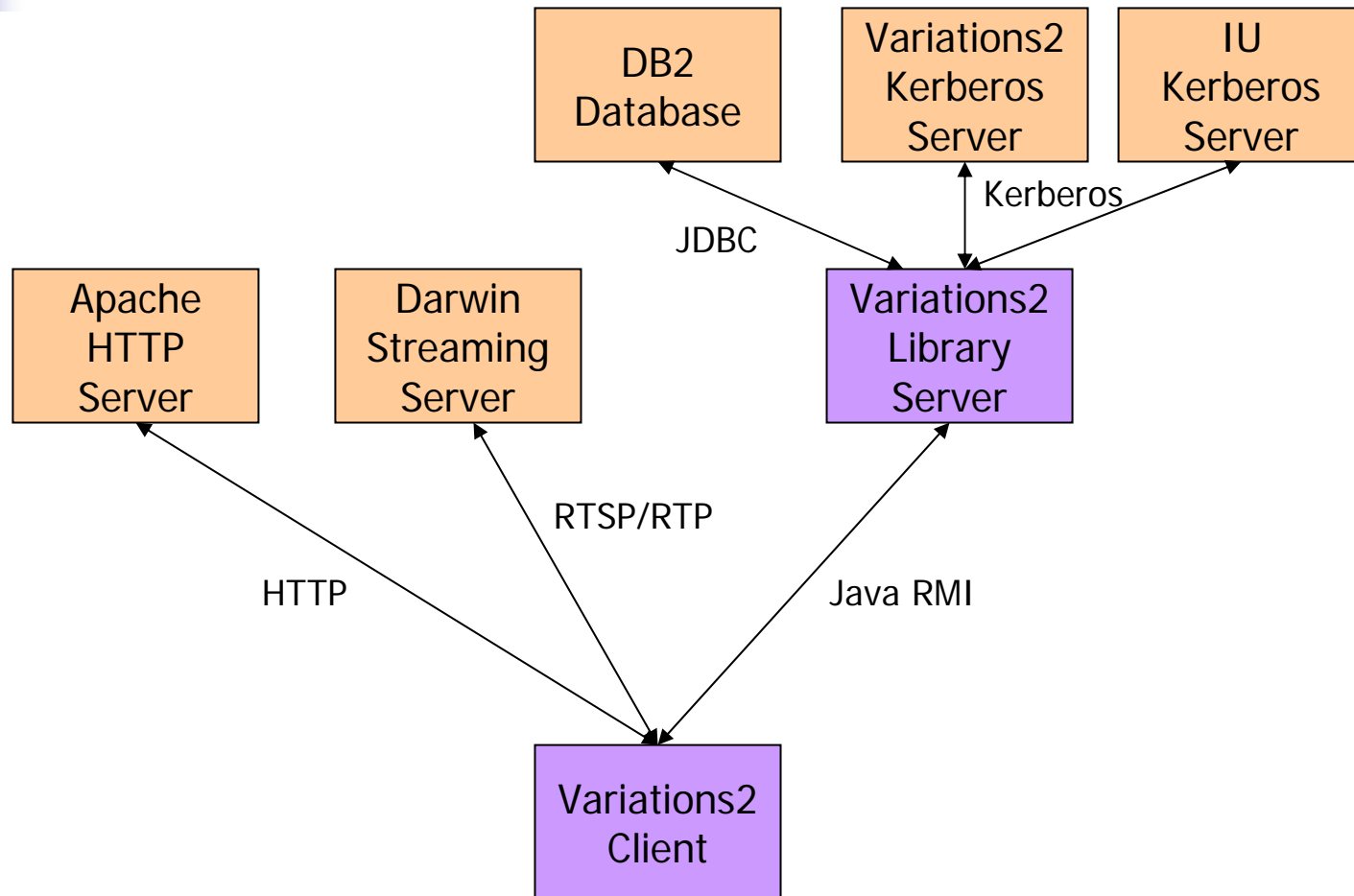
Variations2 1.0

System Architecture: Layer View



Variations2 1.0

Communications





Demonstration

Viewer: Symphony no. 7 in A major, op. 92

Page [1]

Clear Add Full View

Symphony No. 7

in A Major, Op. 92

I.

Poco sostenuto. ♩ = 60.

Flauti.
Oboi.
Clarineti in A.
Fagotti.
Corni in A.
Trombe in D.
Timpani in A.E.
Violino I.
Violino II.
Viola.
Violoncello e Basso.

Creator
(composer, poet, etc.) Examples: bach

Performer
(or conductor, etc.) Examples: Mont

Work Title
Examples: Symp

Key

3 occurrences were found with
 - the Creator matched 'Beethov

1. Work: [Sympho](#)
 From Score: [Symphony n](#)
 Composer: [Beethoven,](#)
 Publisher: Dover
2. Work: [Sympho](#)
 From Recording: [Symphonies](#)
 Composer: [Beethoven,](#)
 Conductor: [Monteux, P](#)
 Performer: [London Sym](#)
 Publisher: London

Player: Symphonies 5 & 7 [sound recording] : Eg...

Browse by 0:31:13 / 1:15:44 Clear Add

Hide Work List

Recordings Form

- ▶▶ Track 3. III Allegro
- ▶▶ Track 4. IV Allegro
- ▼▶▶ Beethoven, Symphony No.7 in A major, op.92
 - ▶▶ **Track 5. I Poco sostenuto-Vivace**
 - ▶▶ Track 6. II Allegretto
 - ▶▶ Track 7. III Presto
 - ▶▶ Track 8. IV Allegro con brio
 - ▶▶ Track 9. Beethoven, Egmont Overture, op.84
- ▶▶ CD 2

Status: Idle



Usability

- Usability = ease of use + *usefulness*
- Established baseline
 - Usability test of existing Variations system
 - Satisfaction study of Variations users
 - Contextual inquiry
- Evaluation of usability of Variations2
 - Prototype interviews
 - Usability tests of preliminary versions
 - Pilot studies
 - Data gathering through satisfaction survey and automated usage logging



Future Versions

- Continuing 6-month development cycle
 - Version 2: Spring 2003
 - Version 3: Fall 2003
 - etc.
- Features to be added include:
 - Support for music notation
 - Support for additional image and audio formats
 - Support for new and emerging streaming technologies
 - Support for video



Future Versions

- Features to be added (continued):
 - Support for supplemental recording materials (e.g., liner notes, booklets)
 - Improved browsing interface
 - User interface support for synchronized navigation and playback
 - Instructional authoring, classroom presentation, and instructional delivery interfaces
 - Structure diagramming/visualization tools (e.g., Digital Timeliner)
 - Web browser interface
 - OnCourse integration
 - Access control based on intellectual property requirements
 - Improved cataloging/administrative interface



Technical Issues

- Result set handling, performance
- XML search engine vs. relational database
- Unicode fonts
- Integration with content-based search
- Repository integration: FEDORA
- Closer alignment with standards: FRBR, METS, MODS
- Level of cataloging
- Copyright, licensing, access control



Disclaimer

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More Information...

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