Networked Environment for Music Analysis (NEMA)

An Overview

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Networked Environment for Music Analysis (NEMA)

- Problems:
  - Music (audio) search requires large amount of calculations and storage (of features)
  - Copyright issues
- Single point of access (portal)
- Search models?
  - Harvesting (centralized), e.g.: Google
  - Federated search (decentralized), e.g.: Kayak

Observations

- Music classification (artist, genre, etc.) is often broken down into a feature extraction stage followed by a machine learning stage
- Some researchers focus only on one stage or the other
- Difficult to evaluate the success of approaches in this case
- Ideally, would evaluate all feature extractors against all classifiers

NEMA
Networked Environment for Music Analysis
Research Grant

- Stephen Downie (UIUC), PI
- Ichiro Fujinaga (McGill), Co-PI
- Other research Partners:
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  - Mark Sandler (Queen Mary, UK)
  - Tim Crawford (Goldsmiths, UK)
  - David Bainbridge (University of Waikato, NZ)
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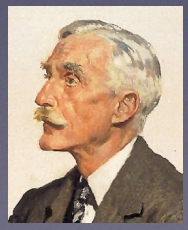

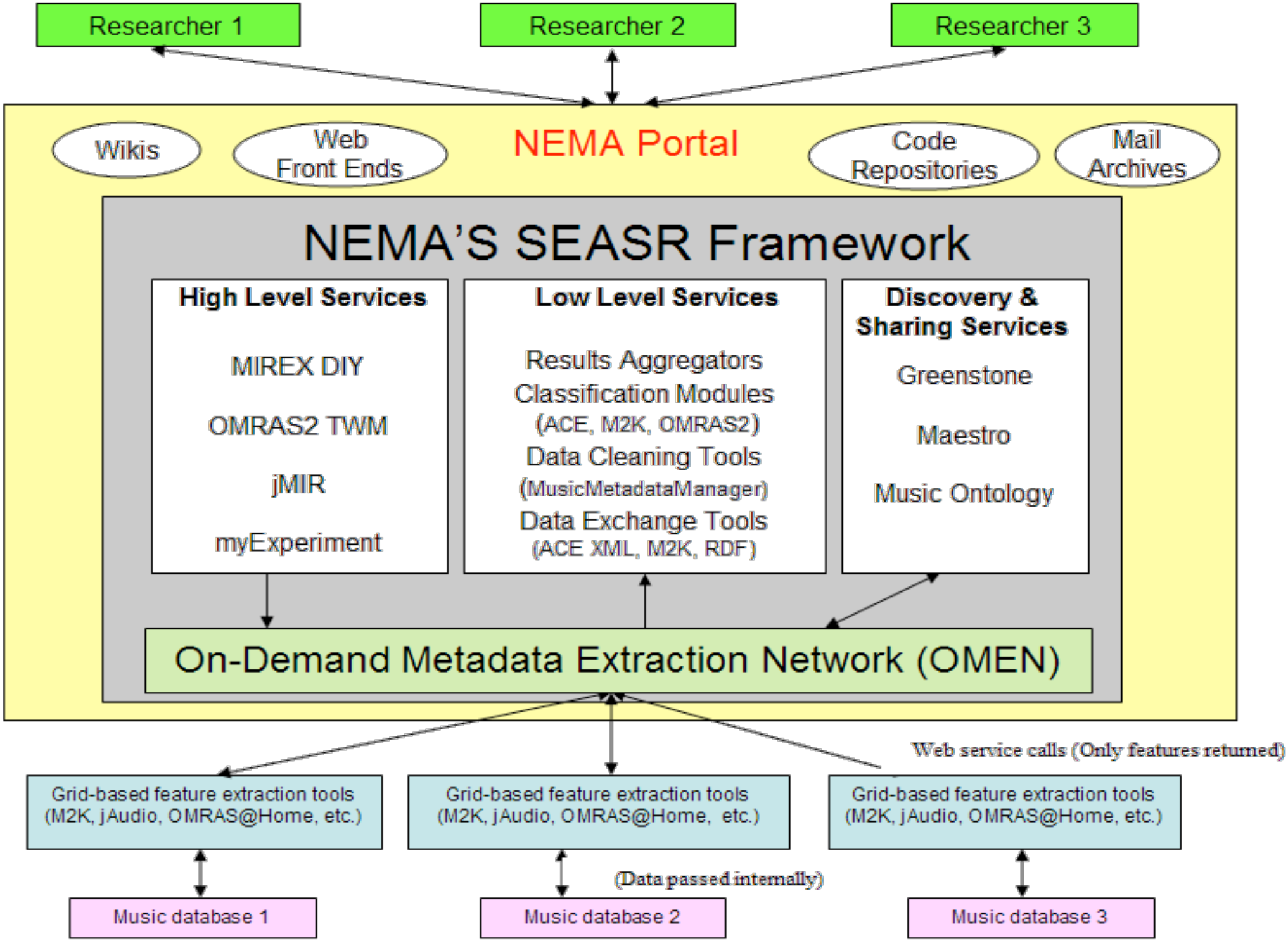
Researcher 1
Researcher 2
Researcher 3
Wikis
Web Front Ends
NEMA Portal
Code Repositories
Mail Archives
NEMA'S SEASR Framework
High Level Services
MIREX DIY
OMRAS2 TWM
jMIR
myExperiment
Low Level Services
Results Aggregators
Classification Modules
(ACE, M2K, OMRAS2)
Data Cleaning Tools
(MusicMetadataManager)
Data Exchange Tools
(ACE XML, M2K, RDF)
Discovery & Sharing Services
Greenstone
Maestro
Music Ontology
On-Demand Metadata Extraction Network (OMEN)
Web service calls (Only features returned)
Grid-based feature extraction tools (M2K, jAudio, OMRAS@Home, etc.)
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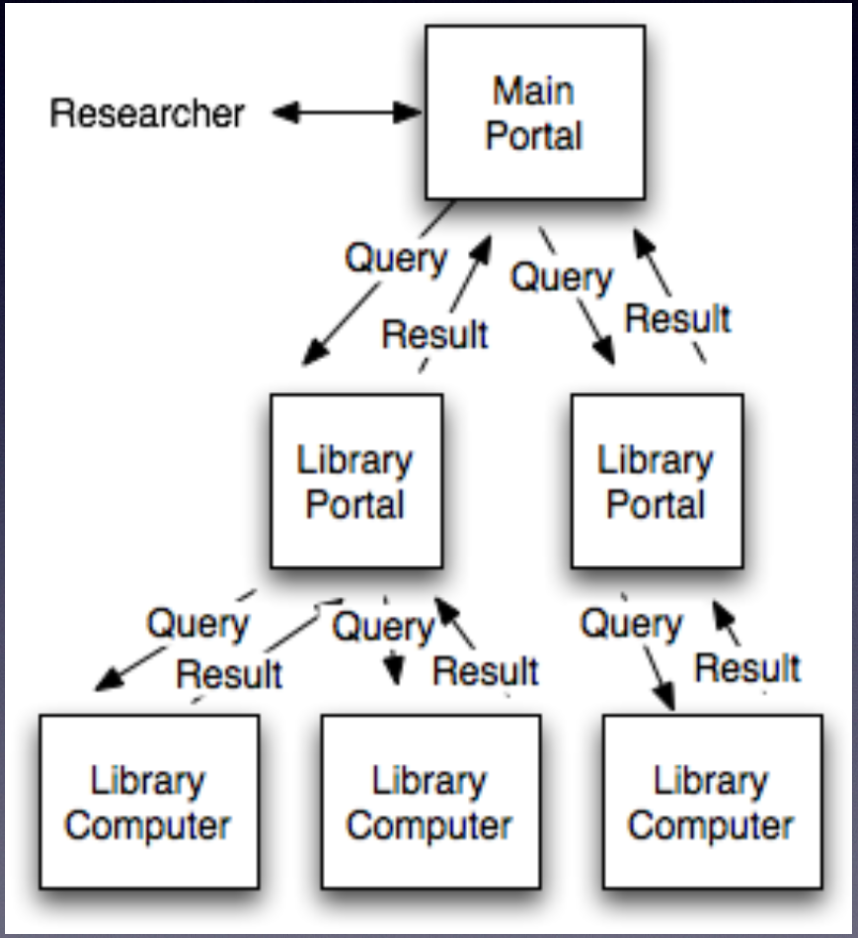
(Data passed internally)
Music database 1
Music database 2
Music database 3

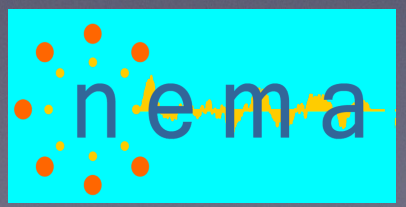
OMEN Topology

- Master Node
- Library Node
- Worker Node

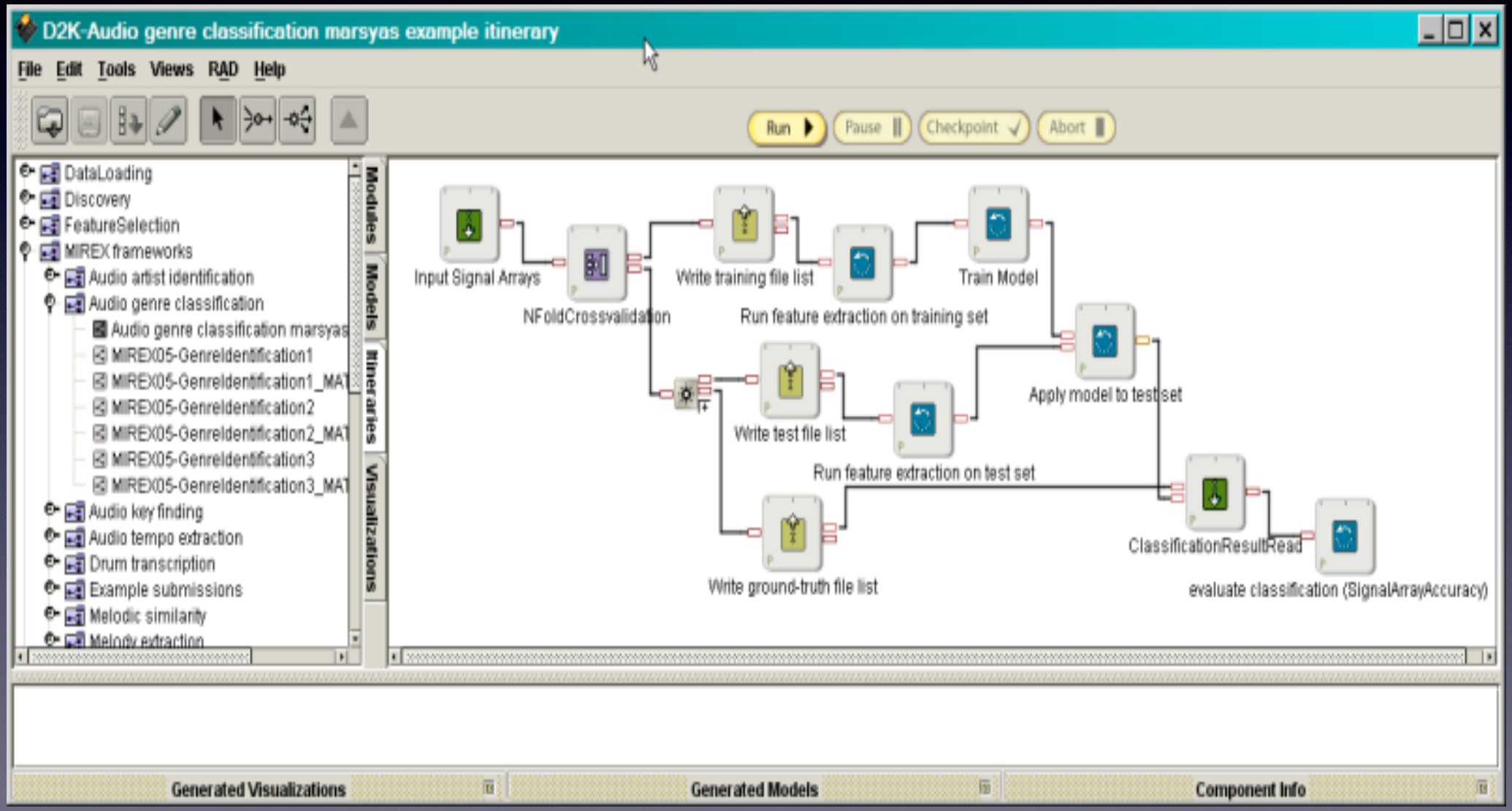


Components for NEMA

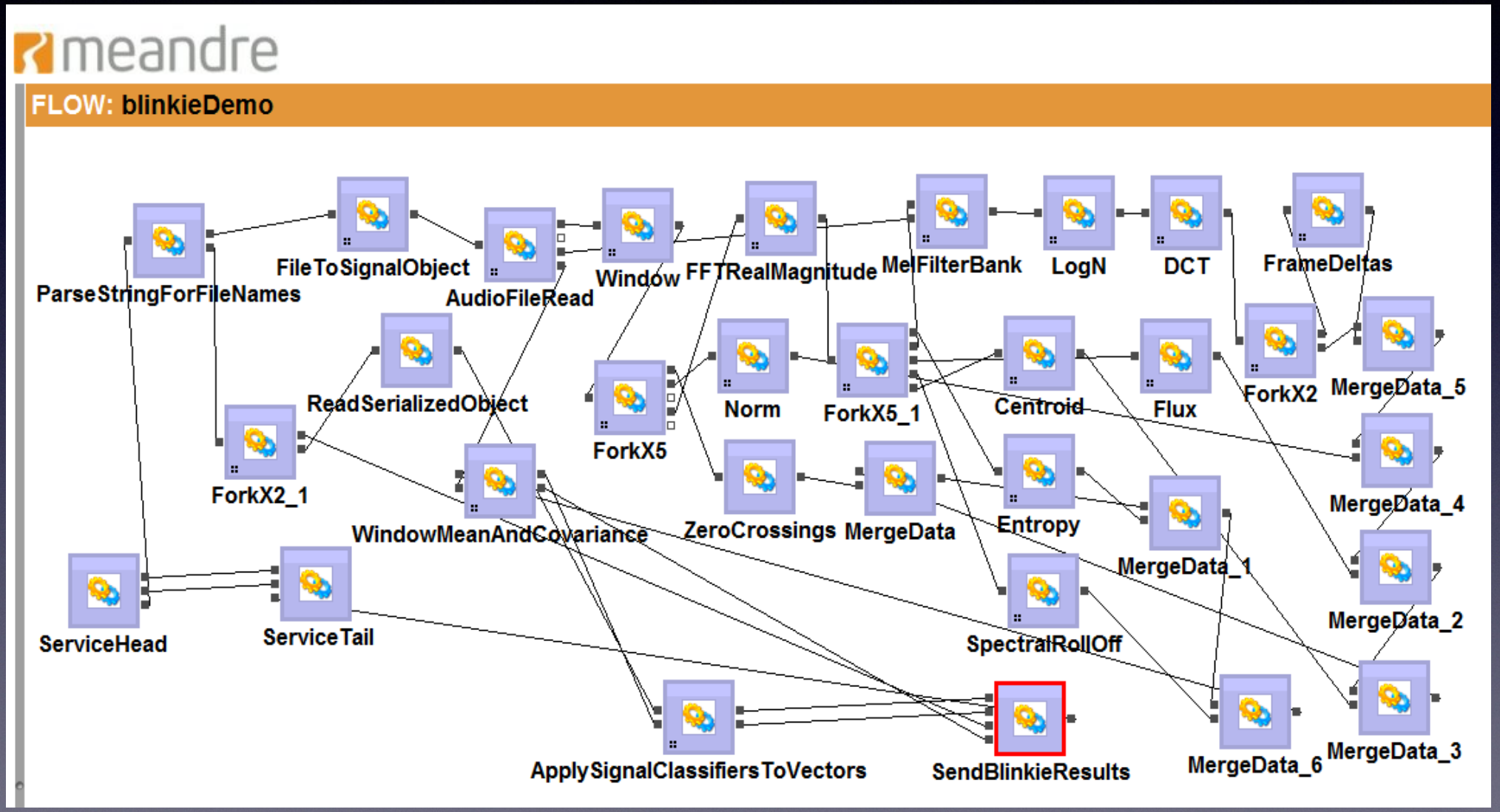
- Feature extractors (e.g., jMIR)
- Distributed computation
  - On-demand Metadata Extraction Network (OMEN)
  - L2L (library-to-library) protocol
    - Web services (remote procedure calls): SOAP
    - Servlets and JavaServer Pages (JSP)
  - Under-utilized library computers



An External Classification Algorithm (UIUC: D2K / M2K)



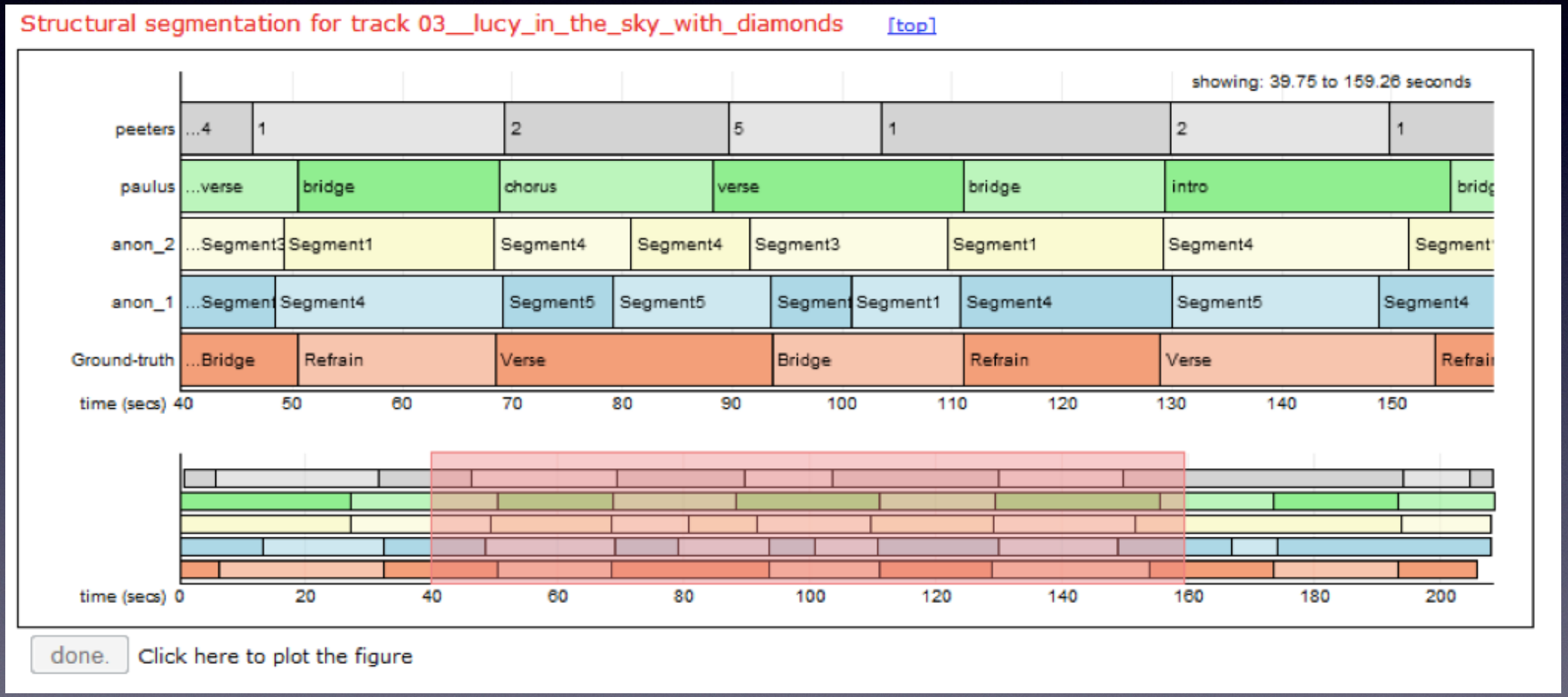
Meandre (UIUC)



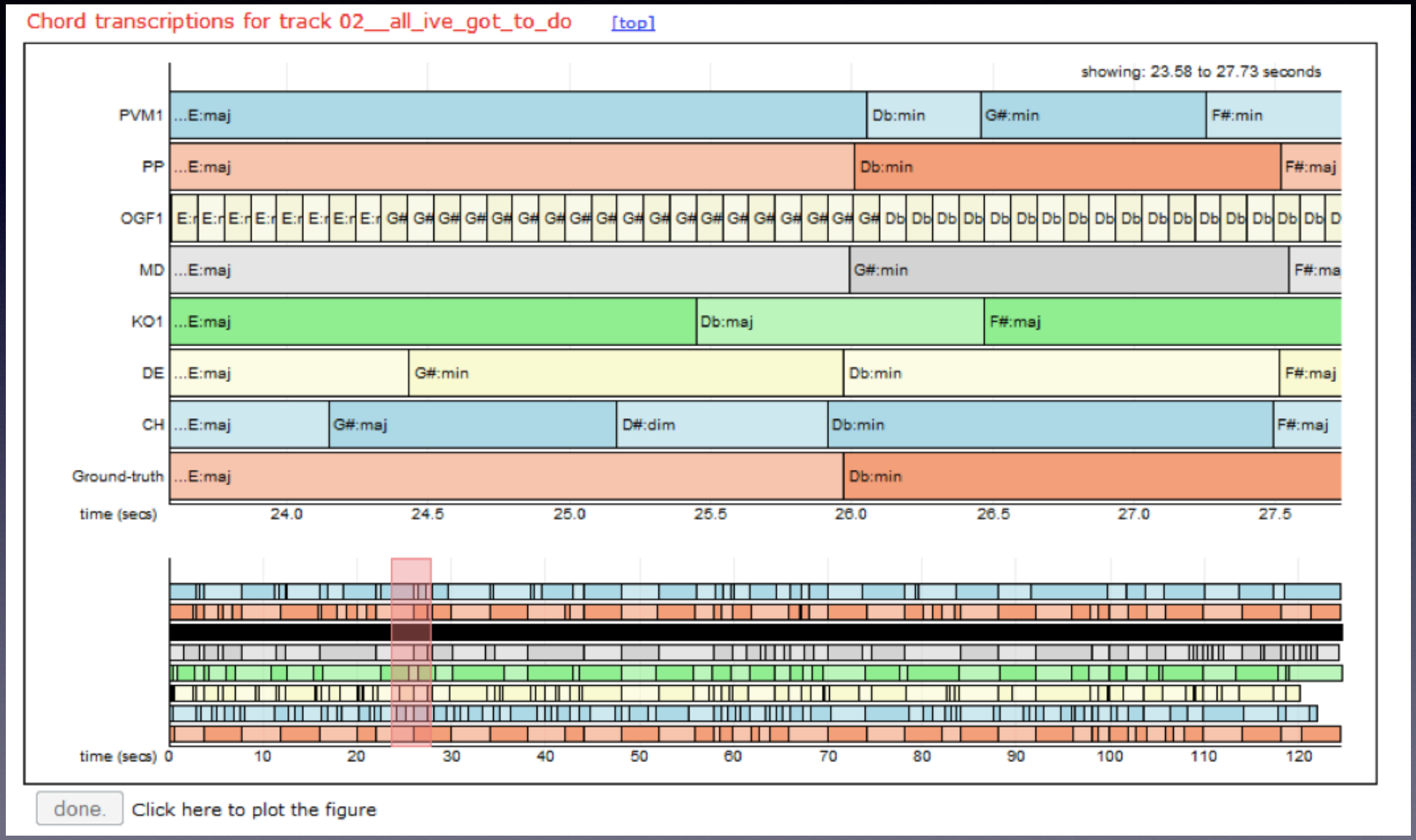
Integrating Other Tools

- Provide a means of support for all the other toolsets people use:
  - MARSYAS, Weka, Clam, ACE, jMIR, etc.
- External integration modules allow for custom-built non-M2K/Meandre programs (i.e., non-Java):
  - C/C++ compiled binaries, MATLAB, etc.

NEMA: Structural Analysis (screenshot)



NEMA: Chord Transcription (screenshot)



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