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POLYTECHNIC UNIVERSITY OF TIRANA

Deparment of Computer Engineering

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Prof.Asoc.Elinda Kajo Mece
Thursday 24th August, 2016

16th Workshop on "Software Engineering Education and Reverse Engineering"

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RS500GA-
UNSUPERVISED PLAYLIST GENERATOR

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Overview

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RS500GA

RS500GA - Rolling Stone 500 Greatest Albums

- 500 greatest albums of all times
- 271 artists, producers, industry executives and journalists
- 6500+ tracks → heterogeneous data

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Issues and Hints

Playlist compilation issue

Heterogeneous Data, Multiple sources

- Local Media Storage
- Cloud Storage and Streaming

↓

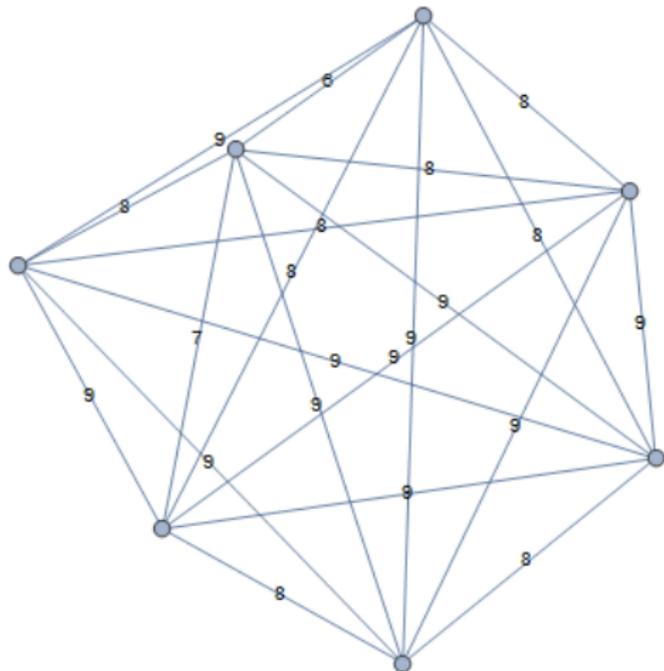## Music exploration issues

- music selection
- playlist generation

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Issues and Hints

Similarity and Distance

Mutual Relationship Graph

- tracks' similarity
- artists' similarity
- tags' similarity
  ↓
- distance

Playlist Generators

Playlist Generator Tools:

- **Winamp** → local library
- **Samsung Square** → *local library*
- **Spotibot** → *Spotify streaming*
- **Playlist.net** → *Spotify streaming*

Limitations:

- poor input choice
    - no specific track selection (artists only)
    - fixed track output number
- low output rigorousness
    - input choice missing in output list

Last.Fm API

- external information and data provider
- *Last.Fm* web services
- data available for custom applications
- social music playground
- **REST** style xml

Album

Album.addTags
Album.getInfo
Album.getTags
Album.getTopTags
Album.removeTag
Album.search

Artist

Artist.addTags
Artist.getCorrection
Artist.getInfo
Artist.getSimilar
Artist.getTags
Artist.getTopAlbums
Artist.getTopTags
Artist.getTopTracks
Artist.removeTag

Track

Track.addTags
Track.getCorrection
Track.getInfo
Track.getSimilar
Track.getTags
Track.getTopTags
Track.love
Track.removeTag
Track.scrobble
Track.search
Track.unlove
Track.updateNowPlaying

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Architecture

RS500GA Architecture

Presentation Tier

User Interface applications which interact with the bottom layers.
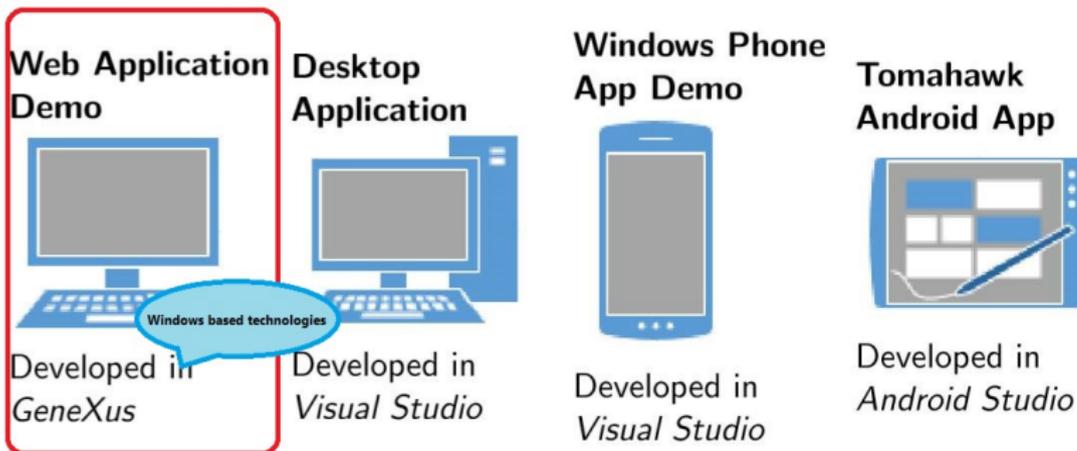
Application/Business Tier

- provides an API interface for the upper layer
- manages the business logics of the application

Data Tier

- provides Stored Procedures as interface to the business logics
- manages the data and the related logics

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Architecture

Presentation Layer

User Interface application developed in different technologies

Web Application Demo

Developed in *GeneXus*

Desktop Application

Developed in *Visual Studio*

Windows based technologies

Windows Phone App Demo

Developed in *Visual Studio*

Tomahawk Android App
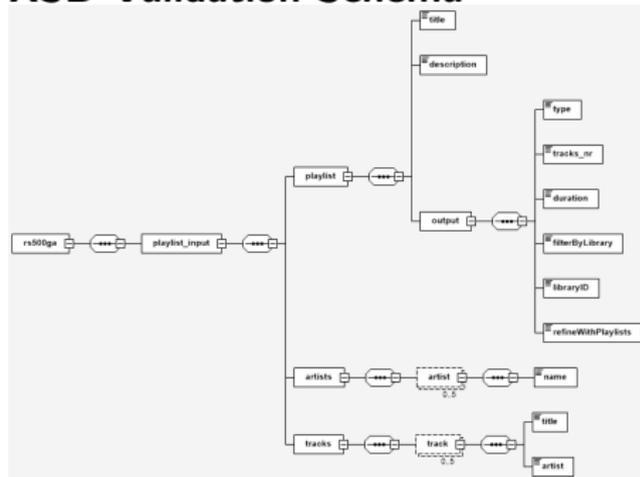
Developed in *Android Studio*

Architecture

Actors

- **Generate Pl. WCF Service**
- **Web Service Manager**
- **Methods Manager**
- **Last.Fm methods Maanager**
- **Last.Fm web service**
- **Database Manager**
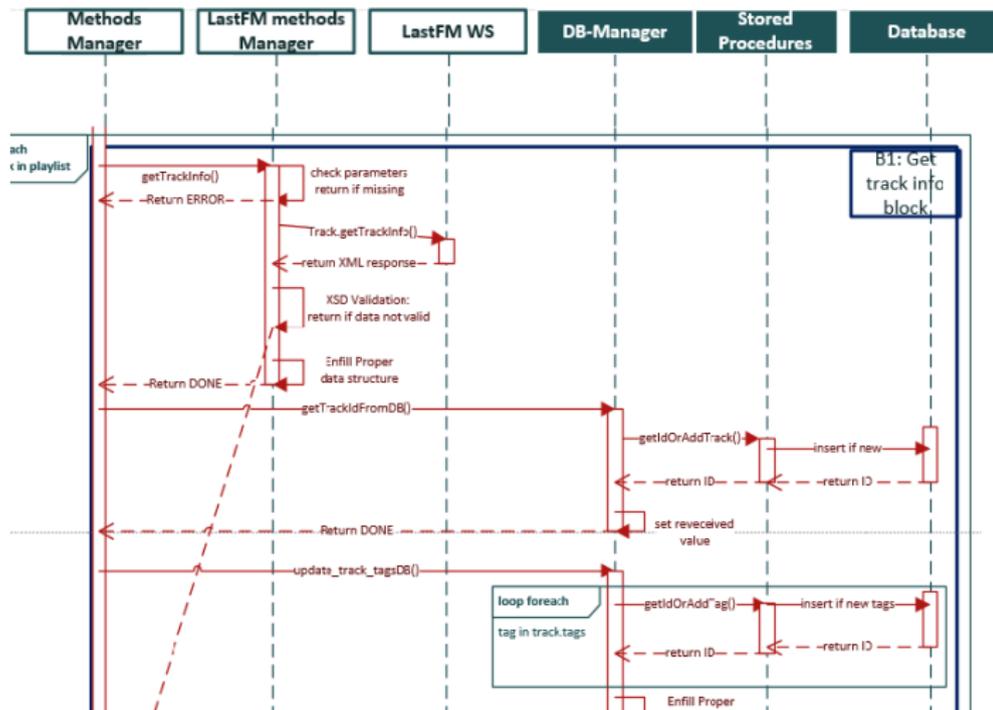- **Stored Procedure**
- **Database**

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Architecture

Input

- **content compliant with the XSD schema**
- **Constraints**
    - **Title**
    - **Description**
    - **Type**
    - **Tracks Nr**
    - **Duration**
- **Artists**
- **Tracks**

XSD Validation Schema

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Architecture

Execution - Update Base Set Info - (1)

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Architecture

Execution - Update Base Set Info - (2)

FIGURE 4.1: RS500GA - 3-tier Architecture

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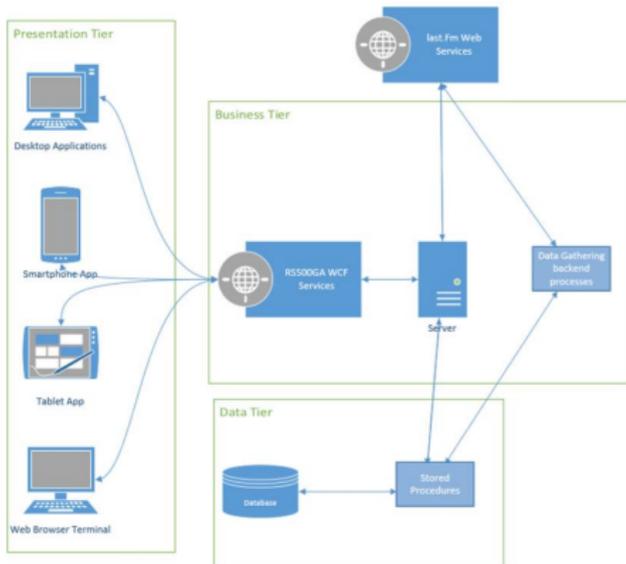
Architecture

Execution - Update Base Set Info - (3)

Track Info Update

- STEP 1: get Track Info
- STEP 2: get Track Id From DB
- STEP 3: update Track Tags DB
- STEP 4: get Similar Tracks

Artist Info Update

- STEP 1: get Artist Info
- STEP 2: get Artist Id Form DB
- STEP 3: update ArtistTags DB
- STEP 4: get Artist Top Tracks
- STEP 5: select one of the top Tracks

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Execution - Base Set Mapping

- STEP 1: generate Playlist Matrix
- STEP 2: enfill Matrix Recursively
- STEP 3: compute Matrix Tracks Pair Distance
- STEP 4: generate Playlist Hamiltonian Path
- STEP 5: compute average distance in the path

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Architecture

Execution - Hamiltonian Path

- STEP 1: order relationship table by distance
- STEP 2: pop the two nearest nodes and add edge
- STEP 3: check if edge is valid or cycles
- STEP 4: if not valid, remove edge
- STEP 5: if edges left, loop from STEP 2

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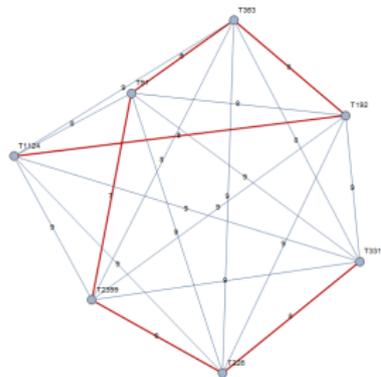
Execution - Matrix Completition

Add Track to Playlist Matrix

- STEP 1: pick two random nodes in the matrix
- STEP 2: get nearest neighbour
- STEP 3: add track to playlist
- STEP 4: enfill/update relationship matrix
- STEP 5: regenerate Hamiltonian Path
- STEP 6: update playlist information

Check input playlist constraints

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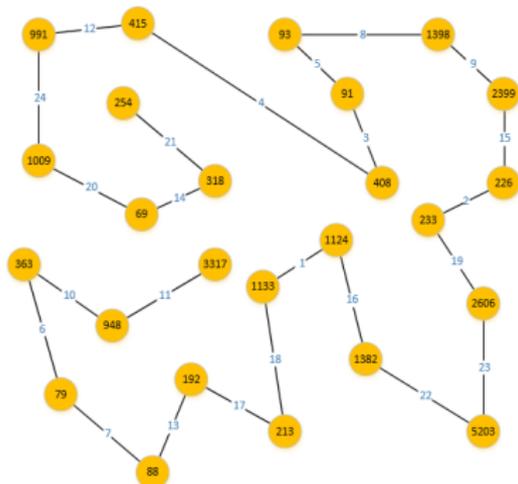
Example

Example - Input from web app (1)

- **Title**: *Demo Example*
- **Description**: *an example of the execution as demo*
- **Oputput**: *m3u*
- **Tracks Nr.**: *25*
- **Duration**: *120*
- **Filter by existing Library**: if checked, there is enabled a combo box which cointains the list of existing libreries among which could be choosen the target one

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Example

Example - Input from web app (2)

- **Artists**:
    - *Springsteen*
    - *Nirvana*
    - *The Clash*
- **Tracks**:
    - *Here Comes the Sun - The Beatles*
    - *Goin' Mobile - The Who*
    - *Longview - Green Day*
    - *Enter Sandman - Metallica*

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Example

Example - Base Set

PlaylistID	Title		Artist	
3	91	London Calling	6	The Clash
3	1124	Born in the U.S.A.	12	Bruce Springsteen
3	192	Here Comes The Sun	1	The Beatles
3	226	Come As You Are	11	Nirvana
3	3317	Enter Sandman	145	Metallica
3	363	Goin' Mobile	22	The Who
3	2399	Longview	162	Green Day

Table: Playlist table - Demo playlist Base Set tracks list

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Example

Example - Playlist (1)

nr	Title	Artist	Album
1	The Girl Is Mine	Michael Jackson	Thriller
2	Night Train / Closing	James Brown	Live at the Ape
3	Mercy, Mercy Me (The Ecology)	Marvin Gaye	What's Going C
4	Mashed Potatoes, Part 1	James Brown	Star Time
5	Police & Thieves	The Clash	The Clash
6	53rd & 3rd	Ramones	Ramones
7	I Wanna Be Your Boyfriend	Ramones	Ramones
8	**London Calling**	**The Clash**	**London Callin**
9	Jimmy Jazz	The Clash	London Calling
10	I Dont Care	Ramones	Rocket to Russ
11	**Longview**	**Green Day**	**Dookie**
12	**Come As You Are**	**Nirvana**	**Nevermind**
13	Stay Away	Nirvana	Nevermind

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Example

Example - Playlist (2)

nr	Title	Artist	Album
14	Silence Kit	Pavement	Crooked Rain,
15	The Heart Of Saturday Night	Tom Waits	The Heart of S
16	Oh Baby, Don't You Loose Your Lip on Me	James Taylor	Sweet Baby Ja
17	**Born in the U.S.A.**	**Bruce Springsteen**	**Born in the U**
18	Glory Days	Bruce Springsteen	Born in the U.S
19	Are You Experienced	The Jimi Hendrix Experience	Are You Experi
20	**Here Comes The Sun**	**The Beatles**	**Abbey Road**
21	Stop Breaking Down	The Rolling Stones	Exile on Main :
22	Torn And Frayed	The Rolling Stones	Exile on Main :
23	**Goin' Mobile**	**The Who**	**Who's Next**
24	Have A Drink On Me	AC/DC	Back in Black
25	**Enter Sandman**	**Metallica**	**Metallica**

Table: Playlist table - Final Playlist

Playlist Track Average Distance

Avarage Playlist Distance
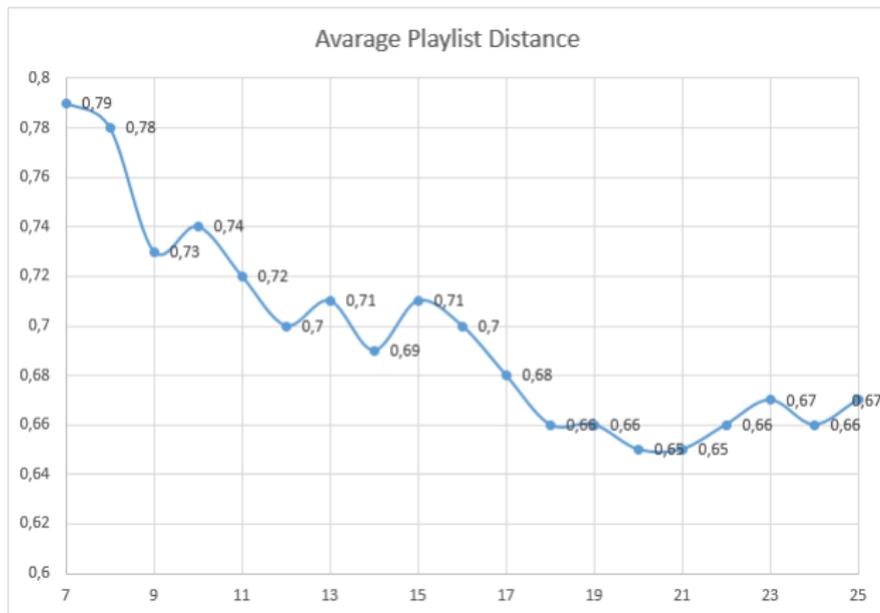
Conclusion

With this tool were achieved the following results:

- Custom Nr of Tracks and Duration
- Possible track selection and not limited to artists only
- all tracks and artists are included
- significant information on tracks relationships

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The End
Thank You!