BilVideo

MPEG-7 Compliant Video Database Management System

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  - Video processing – Feature extraction
  - Implementation
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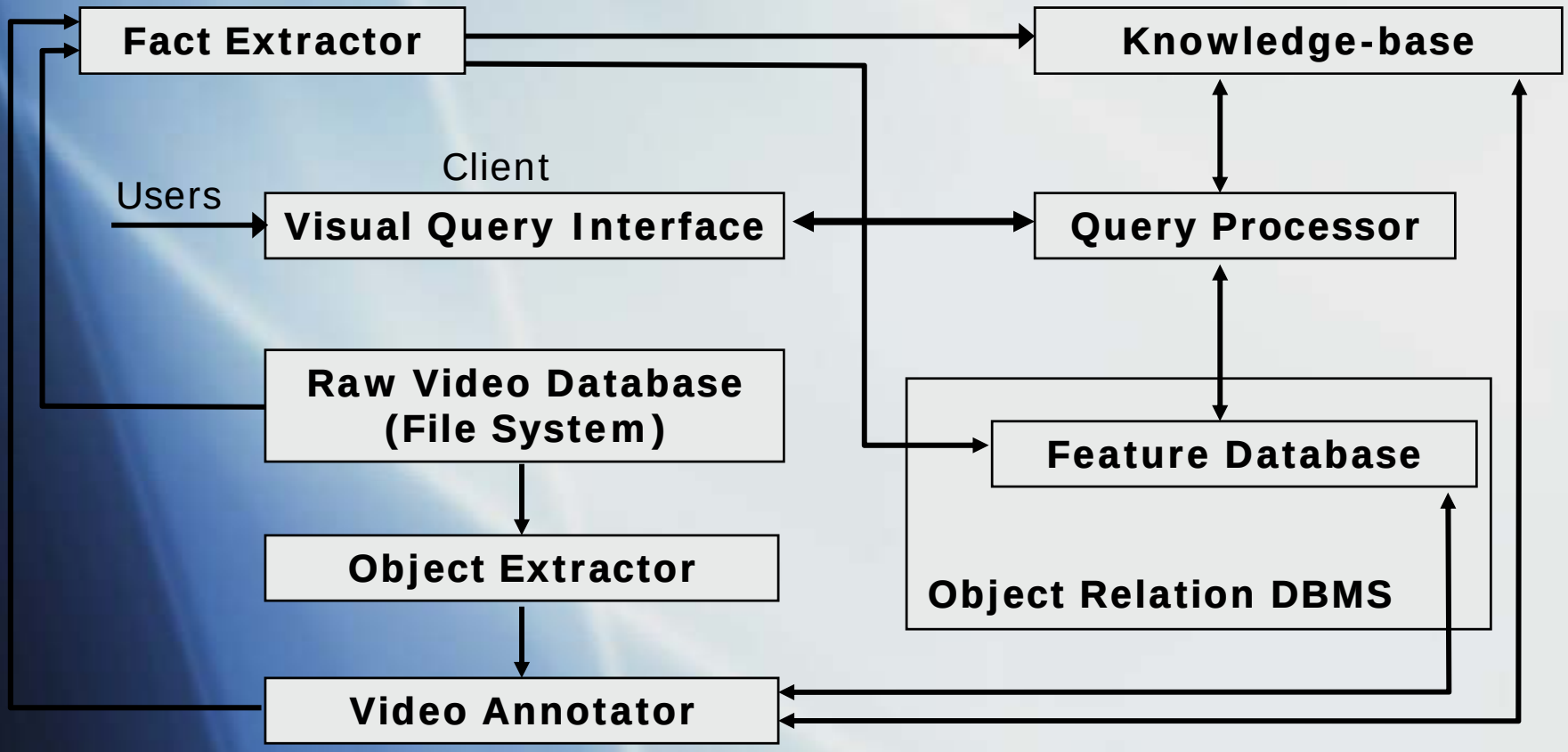
BilVideo v1.0

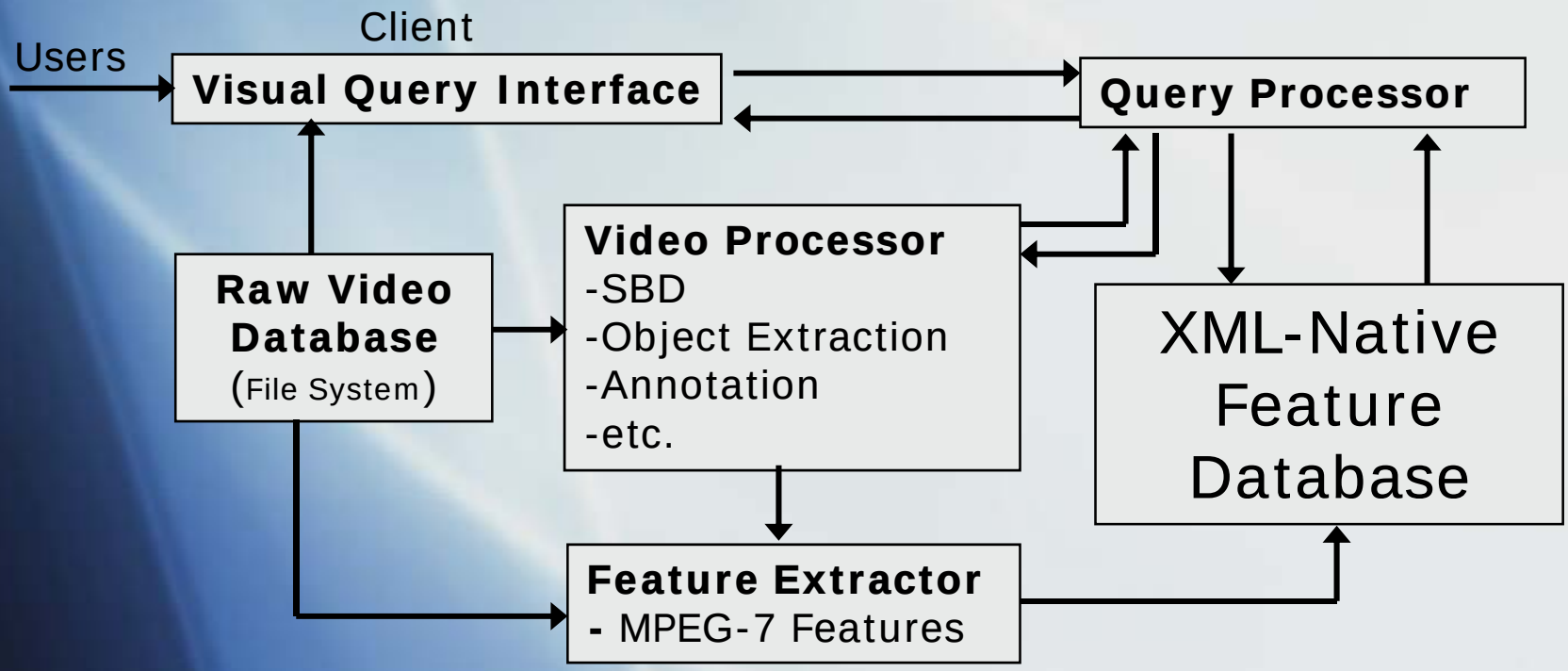


BilVideo v1.0 system architecture

BilVideo v1.0 features

- Client-server architecture
- Visual query interface
  - SQL-like query interface
  - QBE (sketches)
  - Simple natural language queries
- Spatio-temporal object querying
- Query processing
  - Powerful spatio-temporal query processing

BilVideo v2.0 – MPEG-7 compatibility

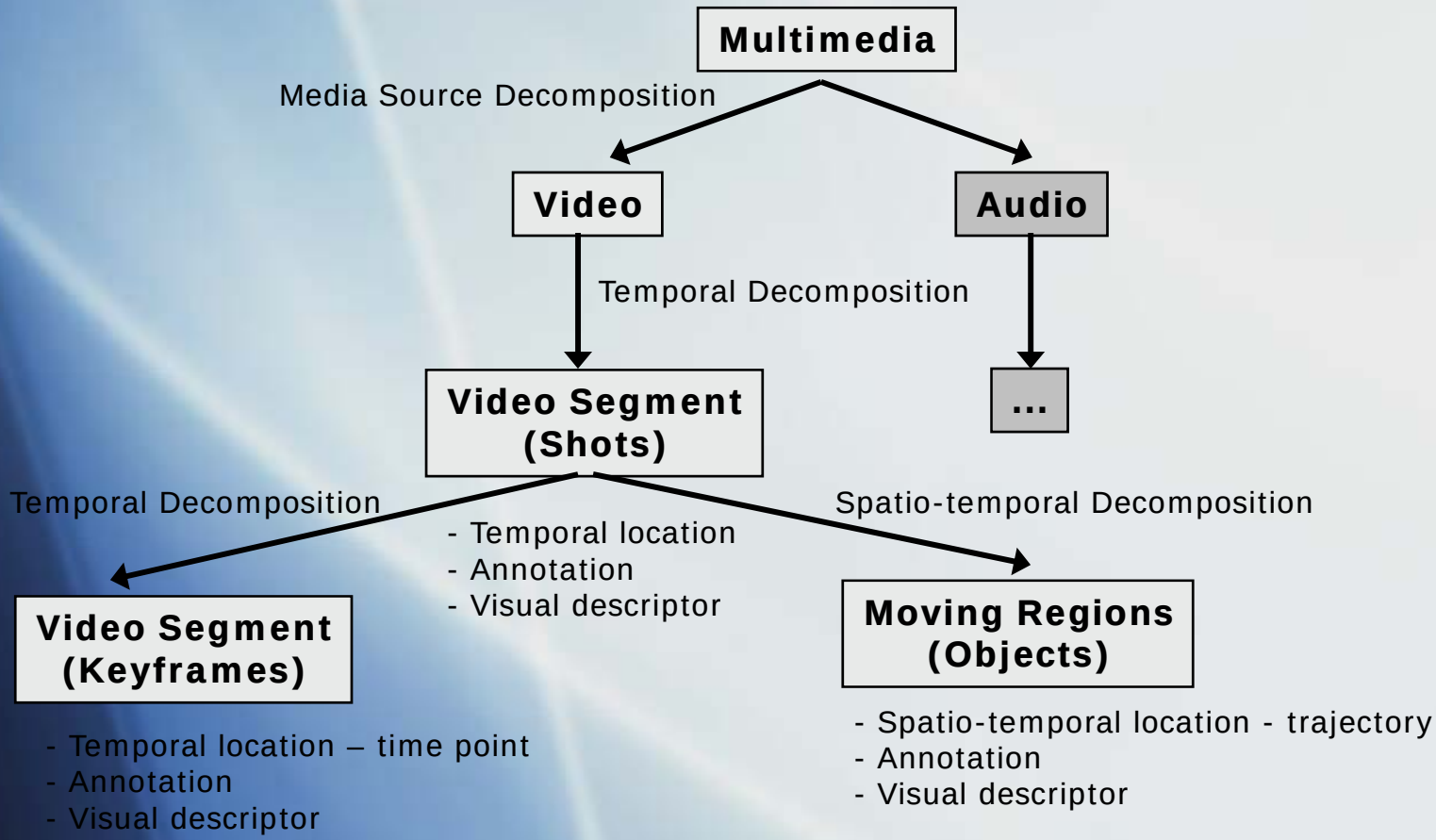


BilVideo v2.0 system architecture

BilVideo v2.0 – MPEG-7 compatibility

- Client-server architecture
- Each video is represented by one MPEG-7 XML file
  - Stored in XML-native feature database (Tamino)
  - Efficient indexing techniques to search the stored XML files
  - Querying by standard XQuery language
- Visual query interface & Query Processing
  - Queries converted to XQuery by Query Processor
  - Results combined by Query Processor

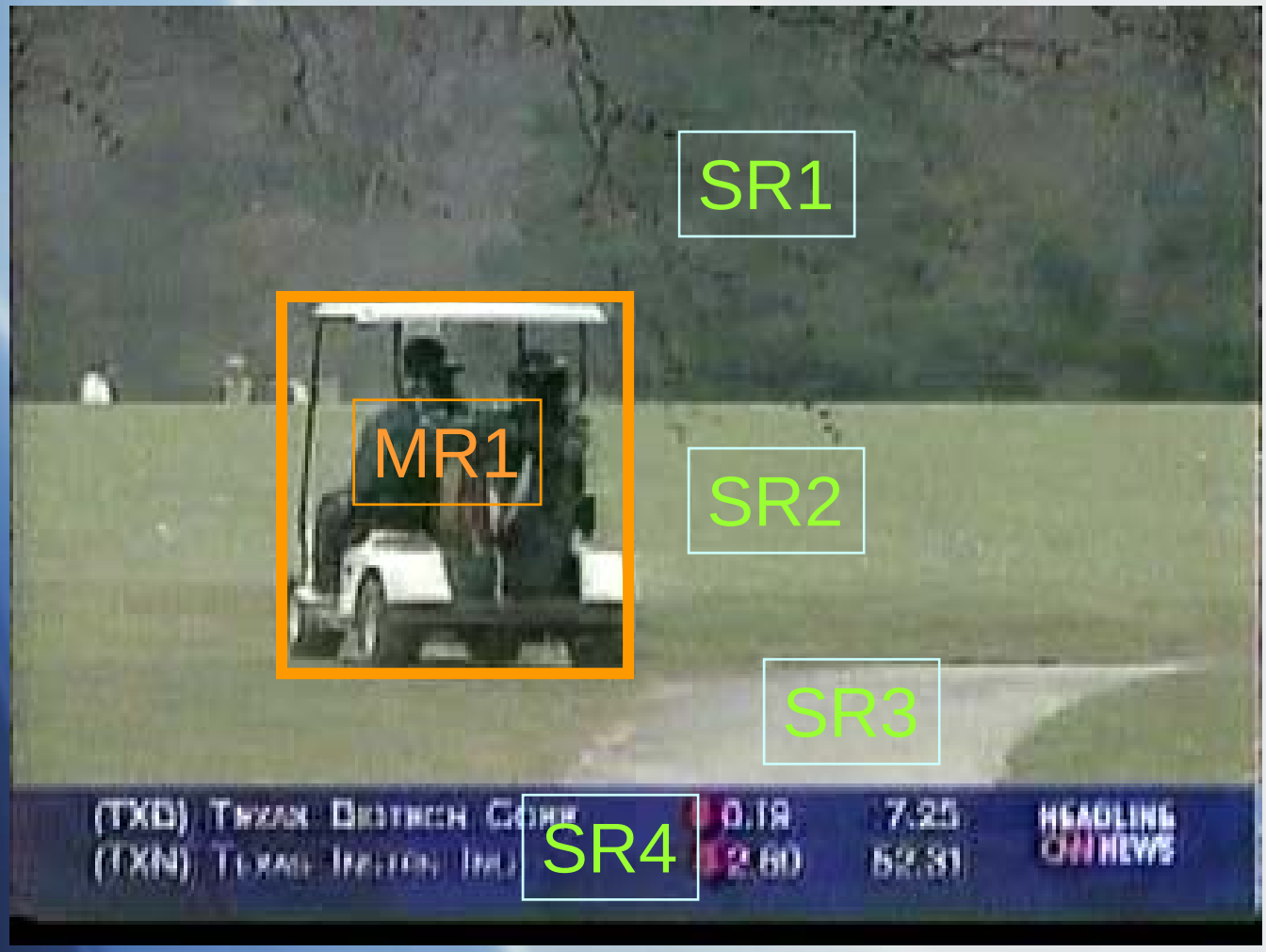
BilVideo v2.0 MPEG-7 profile



BilVideo v2.0 MPEG-7 profile

- Currently only for video
- BilVideo MPEG-7 profile is designed to support:
  - Spatio-temporal object queries by keyword
  - Sketch-based object queries (keyword & low-level)
  - Content-based queries (low-level)
- Query output
  - Whole video, shot, short video segment
  - Keyframes, regions within keyframes

Decomposition example



MR: Moving Region **SR: Still Region**

Video processing

- Shot boundary detection to decompose the videos into shots
- Salient object extraction
  - Process each shot frame by frame
  - Spatially segment each frame (JSeg)
  - Select salient regions using SVMs trained on positive/negative salient region examples.
  - Use regional & interregional color, texture, shape, motion features to decide on the saliency.
  - Track the salient regions throughout the shot

Video processing

- MPEG-7 feature extraction
  - Use XM to extract low level features
    - Color
    - Texture
    - Shape
    - Motion
  - Manual annotation of shots, keyframes, regions
  - Future work: automatic annotation

BilVideo v2.0 implementation

- Platform: Windows (currently)
- Visual Query Interface: to be available online as Java applet
- Video handling & processing: in C++ using OpenCV, FFMPEG libraries
- MPEG-7
  - XM software to extract low-level features
  - MPEG-7 Library (C++) from Joanneum Research to form the MPEG-7 XML representation
  - Database: XML-native database (Tamino)

Summary

- BilVideo v2.0: MPEG-7 compliant video database management system to support complex queries on video
- Implementation ongoing
- Future work: support for video, audio, and image collections