Application-level & Server-side Content Adaptation

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Hypermedia presentation adaptation

- Adaptation to address differences in
  - Network, platform, user
- Several aspects of the presentation can be adapted
  - content (media items)
  - space (visual layout)
  - time (temporal order, orchestration and synchronization)
  - interaction (including navigation design)
- Different strategies
  - top-down (goal-driven) vs. bottom-up (data-driven)
  - client-side (SMIL) vs. server-side (Hera, Cuypers)

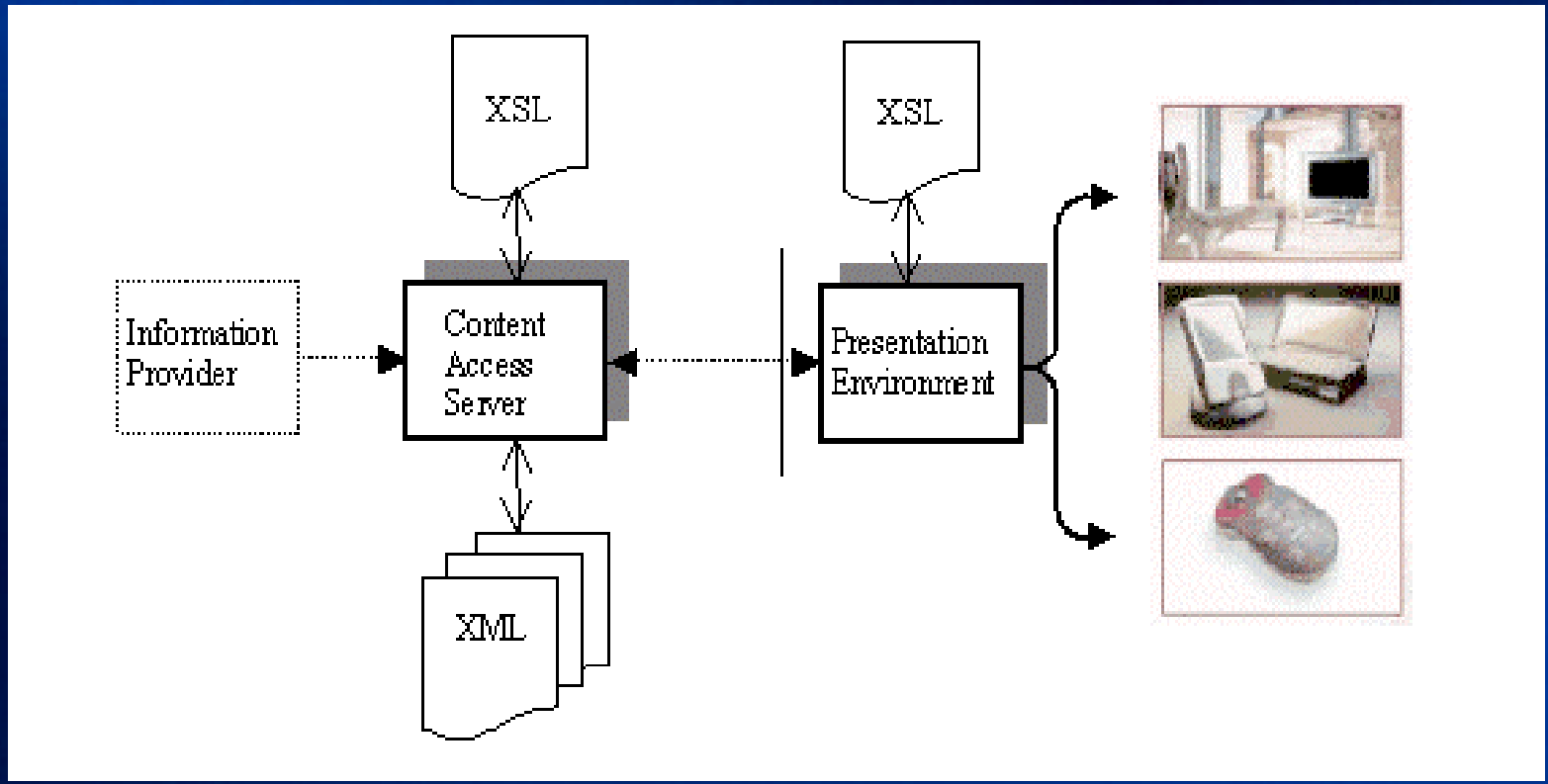
Talk Overview

- Example application: Electronic Program Guide
  - Presentation personalization using XML/XSLT (Philips)
- Adaptive querying and retrieval
  - RMM & slices (TUE)
- Adaptive multimedia presentation generation
  - Cuypers presentation engine: rhetorics & constraints (CWI)
  - SMIL 2.0 for multimedia delivery (CWI, Philips, Oratrix)

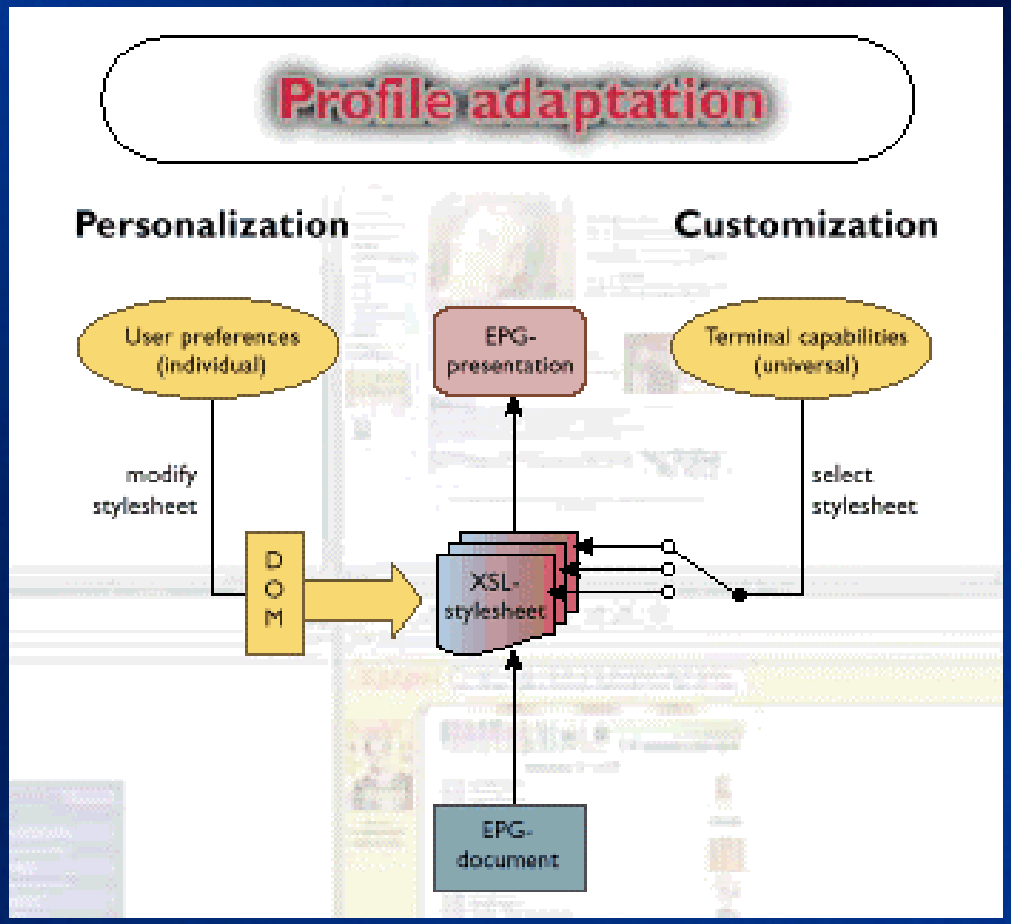
Example: adaptive EPG (Philips)

- Separate data from presentation
  - Separation of the structure of electronic program guide information from its presentation format
  - Not limited to EPG data
- Adaptation
  - Customisation to different platforms (TV, PC, RC)
  - Personalization through personal profiles
  - New user interfaces (presentation styles) can easily be added or removed
- Implementation
  - XSL/XSLT for transforming XML into Web presentation formats

Architecture

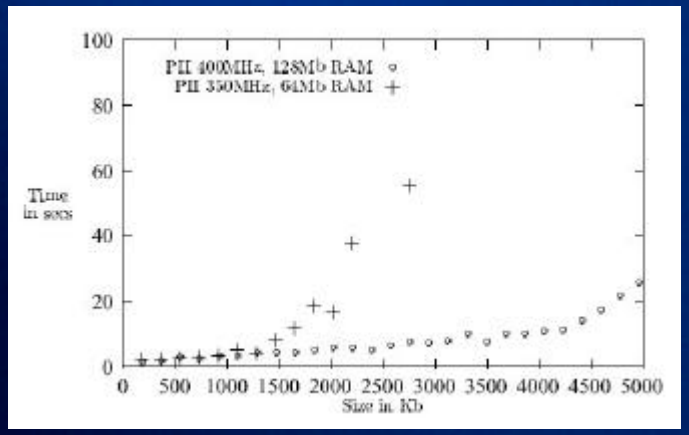


Style sheet adaptation



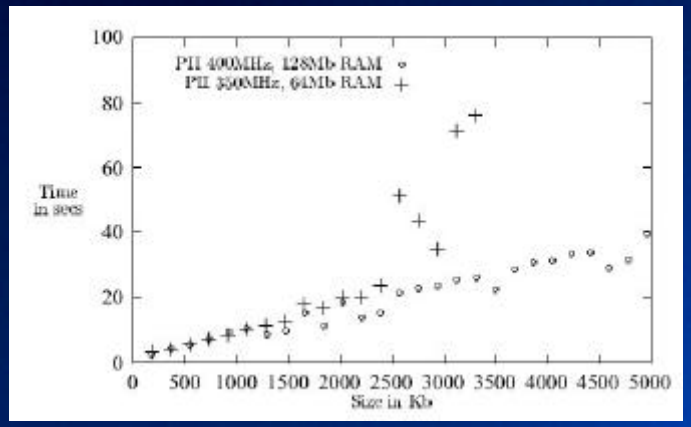
Different machines, different looks...

Performance analysis

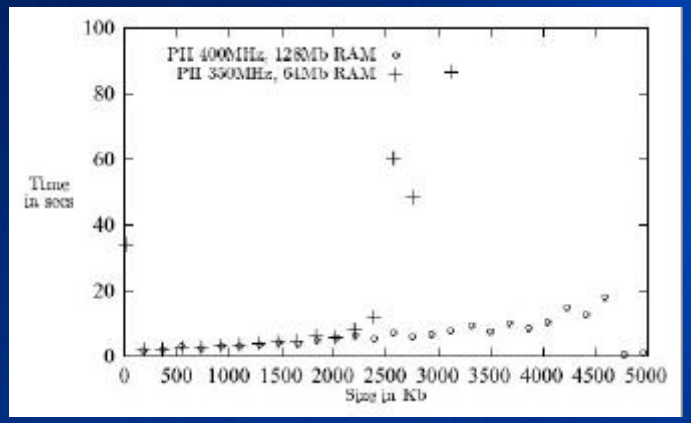


XML

XSLT



complex style sheet



simple style sheet

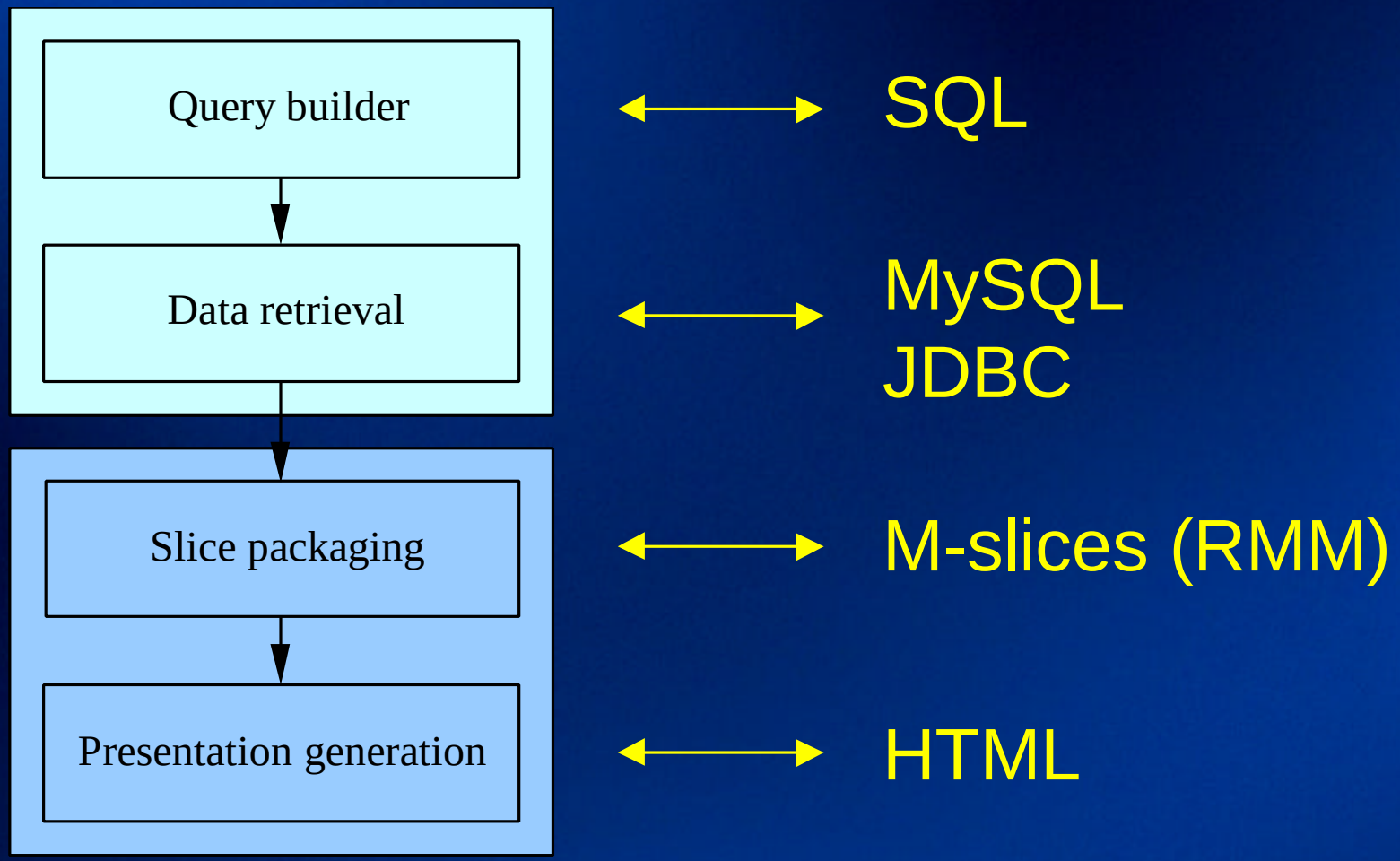
Evaluation

- XML/XSL can be used to present well-defined program information on a wide-range of CE devices
- XSL/XSLT only works for domains whose structure can be well-defined by a DTD/Schema
  - different solutions needed for presenting information retrieved from the Web
- XML parsing and XSL processing of large EPG documents in memory is time-consuming for large XML documents
  - XSL is not meant for and should certainly not be used as a selection mechanism for retrieving items

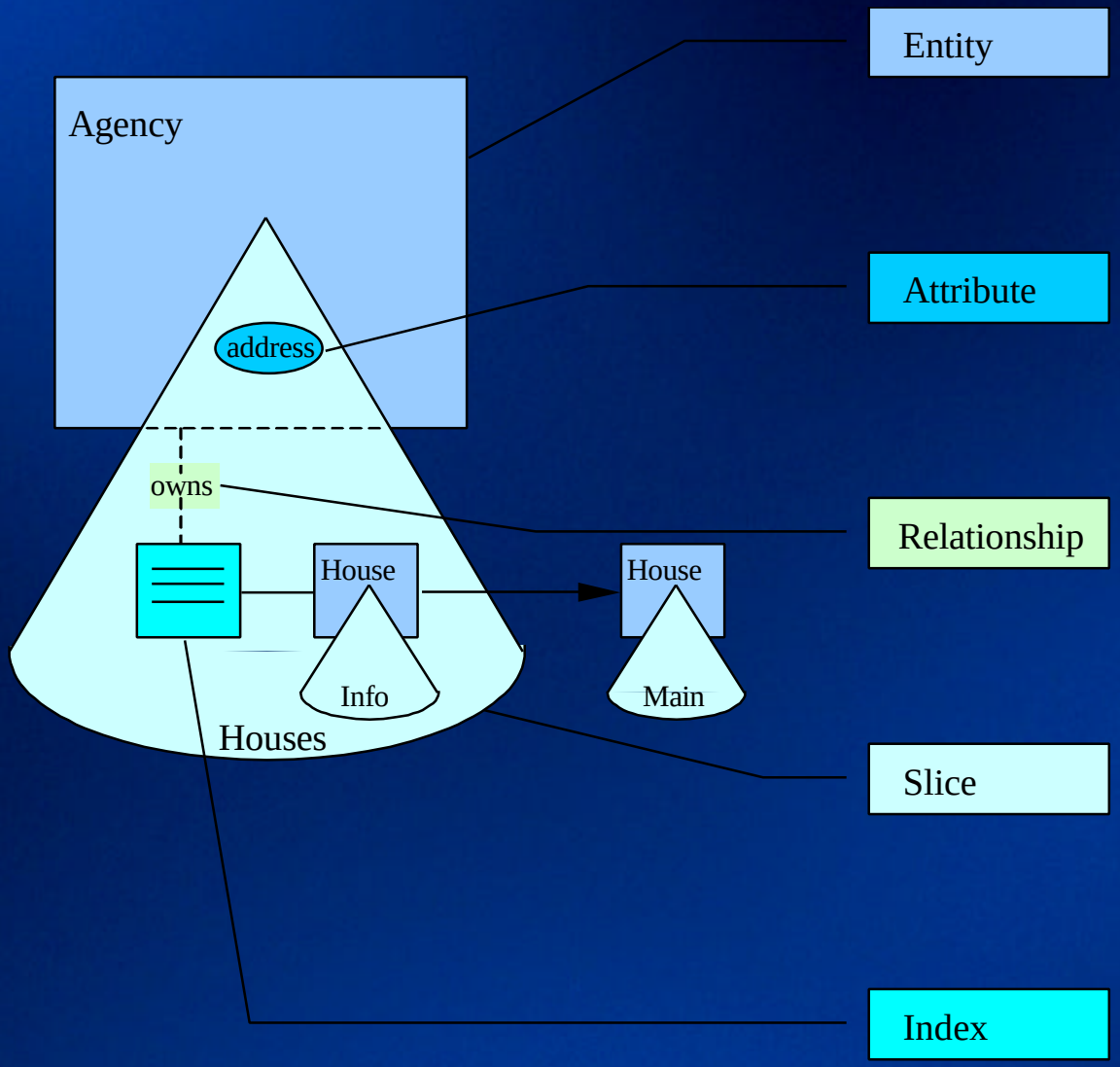
Adaptive querying and retrieval (TUE)

- Goal of the Hera system is to develop a generic WIS (Web Information System) that:
  - Supports queries to semi-structured data
  - Integrates heterogeneous data sources
  - Facilitates presentation adaptation
- Current demo focuses on data adaptation

Hera demo (data adaptation)



Slice diagram (extension of ER)



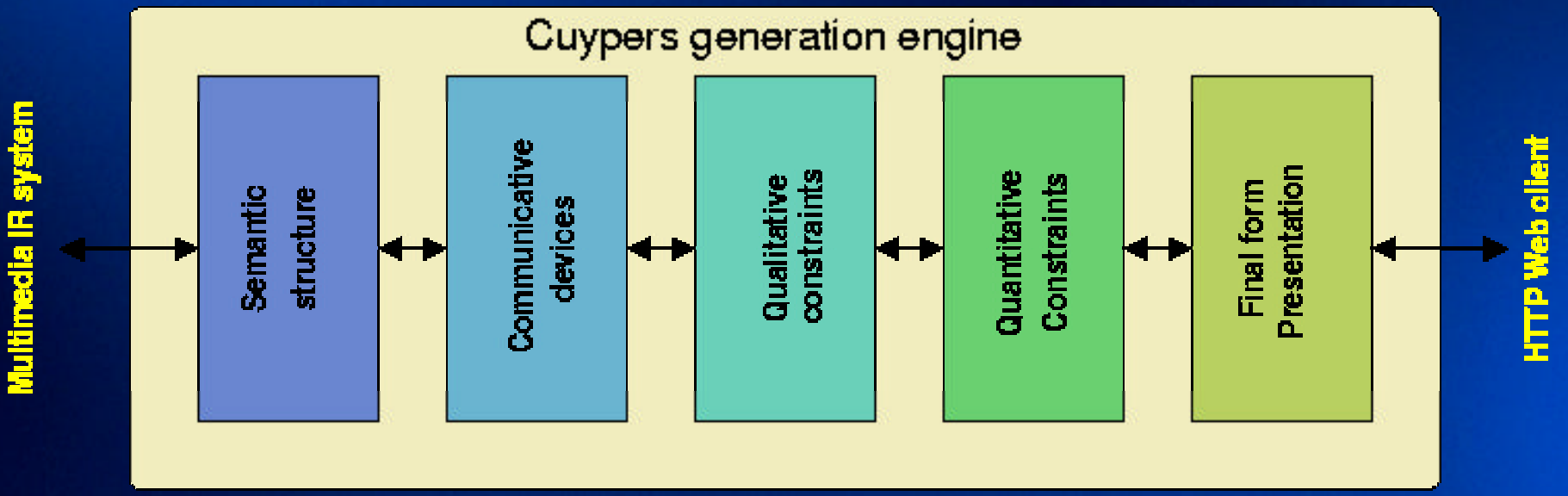
Future

- Query/transformation language for semi-structured data
- Heterogeneous data sources
  - relational databases
  - object-oriented databases
  - XML repositories
  - ...
- Presentation adaptation
  - Data (partially already done at slice level)
  - Navigation
  - Integration with Cuypers

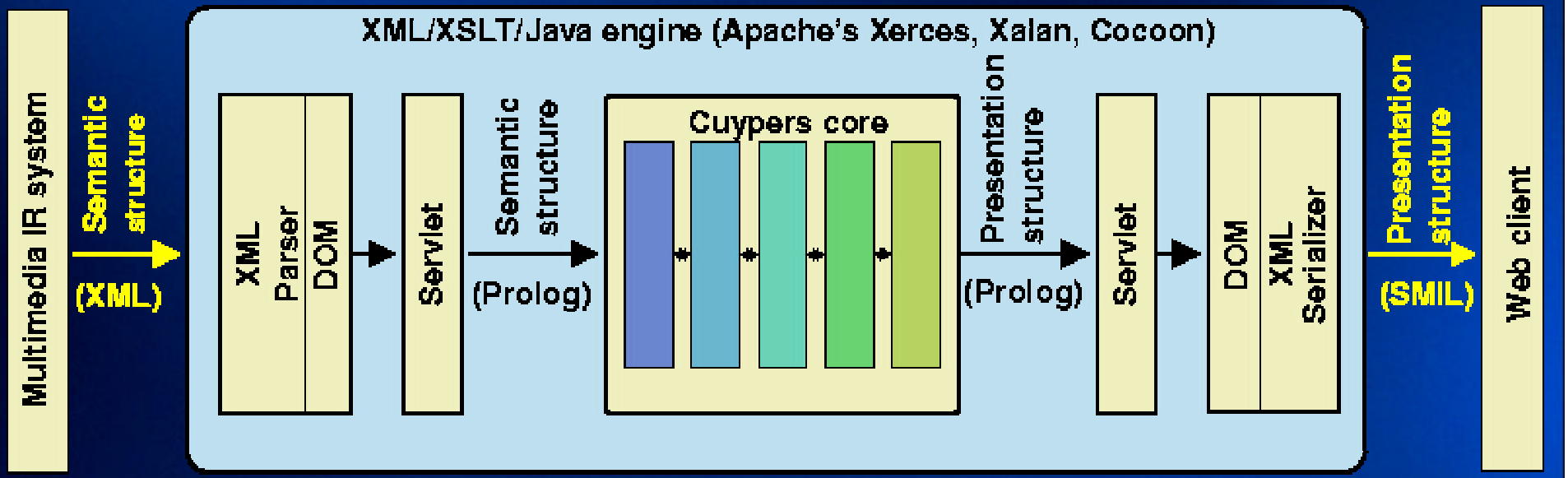
Cuypers Generation Engine (CWI)

- Multimedia document manipulation differs from text because multimedia
  - uses different document and presentation abstractions
  - formatting is not based on text flow
  - transformations need feedback from the formatting back-end
  - transformations are hard to describe in a functional language.
- Cuypers is based on
  - media independent presentation abstractions
  - transformation rules with built-in
    - *backtracking*
    - *constraint solving*

Cuypers Conceptual Layering



Cuypers Web embedding



Opportunities for demonstrator

- server/client-side adaptation to network resources
  - exploit QoS functionality of RTIPA network testbed
- server-side engine generates SMIL 2.0
  - combined Hera/Cuypers approach
- client-side adaptation by Oratrix SMIL 2.0 player
  - adaptive multimedia authoring/playback support by GR*i*NS
- both client and server need a network API
  - query network interface for info about bandwidth, latency etc
  - call-back notification service for significant changes
  - interface for fine-grained manipulation of TOS settings/packet colouring
  - ...

Wrap up

- Server-side generation and adaptation needs sophisticated database support
  - Efficiency: XSLT is not a query language
  - High-level and adaptive view to different sources
- Multimedia transformation differs from text
  - other layout rules
  - other abstractions
  - other tools
- Client-side adaptation
  - need for standardised clients
  - need for authoring support
  - See Dick Bulterman’s talk