Summary

- AXMEDIS Authoring Tool/Player Scenario
- MPEG21 Overview
  - Digital Item (DIDL)
  - Rights Expression Language (REL)
  - Intellectual Property Management and Protection (IPMP)
- AXMEDIS Tool Core
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    - The Controller
    - The Protection Processor
  - Authoring Tool User Interface
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- Conclusions
Authoring tool scenario

- A typical scenario for authoring tool
  - the creation of a digital item
    → from other digital items
  - on the basis of acquired licenses (DRM)
  - embedding digital resources: e.g. mp3 files, pdf files, etc.
- Authoring Tool is also a Player
  - To be able to preview the authored content

Player scenario

- A typical scenario for AXMEDIS player
  - the rendering of a digital item
    → requires synchronization with other digital items content
  - on the basis of acquired licenses (DRM)
  - rendering embedded digital resources
    → e.g., mp3 files, pdf files, etc.
MPEG21 Overview: Digital Item Concept

- Extremely flexible content packaging

**Container**

- **Item**
  - **Descriptor**
  - **Component Descriptor**
  - **Resource**

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MPEG21 Rights Expression Language

- **REL**
  - can declare rights and permissions

- **REL grant consist of**
  - principal to whom grant is issued
  - rights the grant specifies
  - resource to which right in grant applies
  - condition to be met before grant can be exercised
MPEG21 Intellectual Property Management and Protection

- Terminal can get IPMP Tools
- embedded in content
- by downloading it

AXMEDIS Tool Core: General Architecture

- **Model-View-Controller design pattern**
  - use the Observer (event driven) and Command design pattern

- **Model Status Manager**
  - ensure a correct manipulation of the Model
  - avoiding simultaneous read/write access to the same data (locks)

- **Controller**
  - intermediary of every action performed on the Model.
  - Executes/Inhibits operations with respect to rights and produce logs

![Diagram of AXMEDIS Tool Core: General Architecture]
AXMEDIS Tool Core: General Architecture (2)

- **Model data-indexing**
  - mechanism to refer the content outside the model
  - views can refer a specific element and does not hold a memory pointer to it
  - it allows only authorized access

- **Content manipulation walk-through**
  1. User acts on a view
  2. View prepares a command to be executed (using indexes)
  3. Controller checks authorization and resolves indexes and uses Model
  4. Model raises “change” events
  5. View updates itself

AXMEDIS Tool Core: Controller

- **Commands**
  - actions which can be performed on the Model.
  - derives from a common base class (Command)
  - provides undo support and grant verification.
  - rights must be declared in order to be authorized
AXMEDIS Tool Core: Controller (2)

- **AddCommand** contains two parameters,
  - new element to be attached to the structure
  - the index of the parent element the new one should be added to
- A view deals with ElementIndex objects
- It asks AxCommandManager to obtain data objects referred by indexes
- It receives a clone of the data element
  - purified from references to the Model
- It uses cloned data objects for rendering

### Diagram

#### AXMEDIS Tool Core: Protection Processor

- **Protection Processor**
  - verifies the integrity of the software
  - protects/unprotects the elements of the Model.
  - MPEG21 IPMP
- **Protection Manager Support**
  - is a remote service
  - checks the grants needed to execute an action (authorization algorithm)
  - is used by Protection Processor through a built-in client
  - MPEG21 REL
- **DRM governed manipulation also in offline context**
AXMEDIS Tool Core: Protection Processor (2)

1. local verification of tool integrity
2. remote verification of tool integrity
3. evaluation of requested grants
4. update of tool status
   - on the basis of the previous evaluation result.

MPEG21-compliant Authoring Tool: User Interface

- Manages several documents
  - a Controller for each document
- Manages several views on each document
  - connected with the proper Controller
- TreeView
- AttributeEditor
Browsing an MPEG21 Digital Item

- renders the hierarchical structure of MPEG-21 DI
- adds/deletes DI elements
- cut-copy-paste and drag-drop
- exploits Commands provided by the Controller
  - Expand, Add, Delete, Move, Copy...

Editing attributes of the MPEG21 Digital Item elements

- dynamically configured on the basis of the target element
  - the schema of the MPEG21 element
- exploits Commands provided by the Controller
  - Edit
Conclusions

- The MPEG21 standard has been intensively studied
- The tool core can manipulate MPEG21 digital items following the standard guidelines
- The architecture benefits of the most advanced design patterns
- The Authoring Tool has been easily developed on the basis of the Command Manager interface
- A flexible approach to DRM has been realized
  - Remote service or local verification
  - It considers device/application trustiness
- The tool core architecture has been used to realize the AXMEDIS Editor