

# MPEG-21 Rights Expression Language (REL) and Rights Data Dictionary (RDD)

Xin Wang

Chief Scientist  
ContentGuard, Inc.

# Outline

- What are REL and RDD
- Why standardize REL and RDD
- Overview of REL and RDD
- Use of REL and RDD in DRM systems
- REL Software Demo

# What are REL and RDD

- REL is a language used to specify rights and their terms and conditions.
  - E.g., “Alice says that Bob has the right to play a video file for a week if he pays \$3”.
- RDD is a data dictionary that defines semantics of rights and their relationship.
  - E.g., “the right to play is a process to generate a transiently perceivable representation”, and “play is a special type of render”.

# MPEG-21 Part 5: REL

- Goals

- Define syntax and semantics of a machine interpretable language that can be used to specify rights unambiguously
- Provide an authorization model to determine if a principal has the right to perform an action on a resource according to REL expressions
- Support many business models in the end-to-end distribution value chain

- Scope

- Has no intent to replace legal rights
- Does not specify how and when rights should be created, communicated, audited and enforced

- Baseline Technology

- XrML 2.0 from ContentGuard, Inc.
- selected for its expressiveness and unambiguity over ODRL and other proposals

# MPEG-21 Part 6: RDD

- Goals
  - provide a set (dictionary) of clear, consistent, structured, integrated and uniquely identified Terms to support all the rights used in REL
  - Specify how future terms may be defined
  - Facilitate mappings Terms in one namespace to ones in another namespace
- Scope
  - Terms directly defined by RDD do not prescribe intellectual property rights or other legal entities
- Baseline Technology
  - <indec>2 rdd, from a consortium of 8 companies

# Other Standards/Consortiums

- OeBF: eBooks
  - Rights and Rules (extension to MPEG-21 REL)
- ISMA: Streaming Media
  - Digital Rights Management
- IEEE
  - Rights Language for E-Learning
- TvAnytime
  - Rights Management and Protection
- OASIS: XML Standards
  - Rights Language (XrML), Web Service Security
- SPMTE
  - Access Control for Digital Cinema
- TCPA: Trusted Computing Platform Alliance
  - HW, SW, communications and technology vendors

# Why Develop REL and RDD

## **DRM Systems that ...**

- Secure and protect digital contents and services across the end-to-end value chain
- Persistently honor usage rights, conditions and obligations specified for digital contents and services

## **A Common Language that ...**

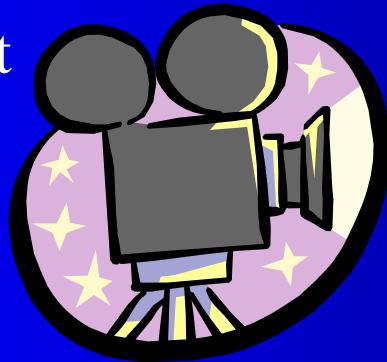
- Provides a uniform mechanism to describe specifications of rights and their conditions and obligations for distributing and using digital contents and services
- Enables trusted systems to exchange digital contents and interoperate for end-to-end DRM

# DRM Concepts

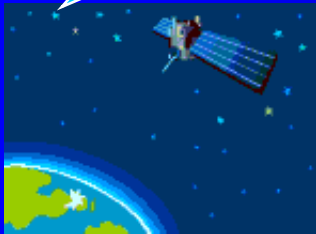
- Digital Assets
  - Any resources, contents and services in digital domain
- Digital Rights
  - Privileges for creating, distributing, using and managing digital assets
  - Digital rights are not just copyrights
- DRM
  - A unified approach to specifying, interpreting, enforcing and managing digital rights

# A DRM System: Home Theatre

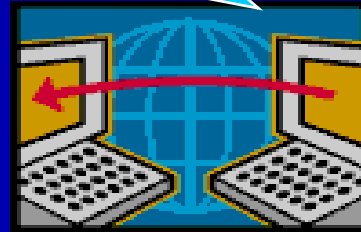
Multi-media content



Satellite communication



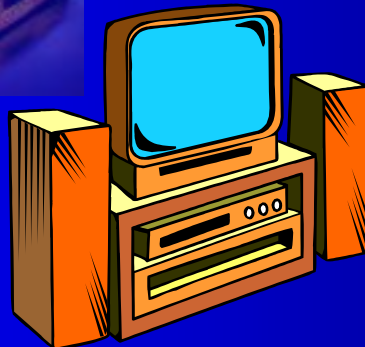
Internet



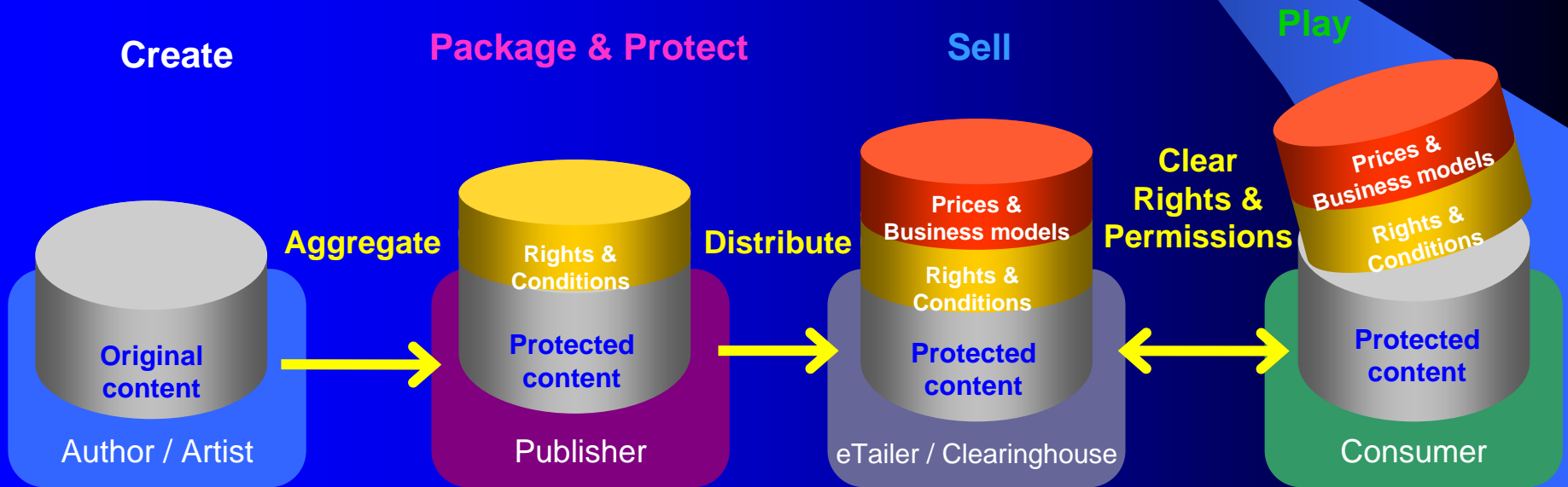
Set-top box



Video-On-Demand

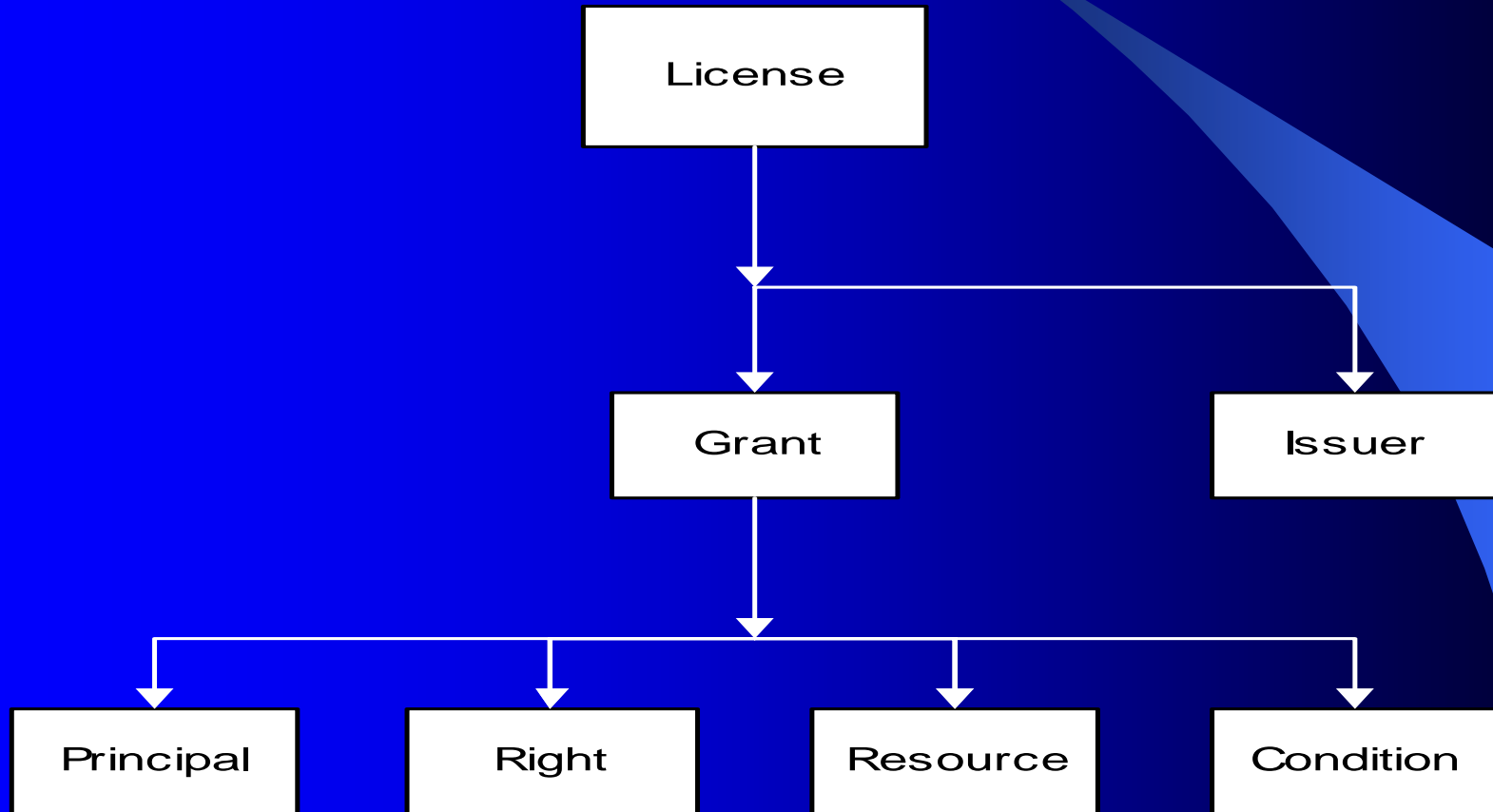


# End-to-End DRM Process



# REL Data Model

A license conveys that an issuer authorizes rights in the forms of grants.



A grant specifies that a principal has a right over a resource under certain conditions.<sub>11</sub>

# A Simple REL License

```
<license xmlns="urn:mpeg:mpeg21:2003:01-REL-R-NS" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#"
  xmlns:mx="urn:mpeg:mpeg21:2003:01-REL-MX-NS" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
  instance" profileCompliance="urn:isma:rel-profile">
  <grant>
    <keyHolder licensePartID="Alice">
      <info><dsig:KeyValue><dsig:RSAKeyValue><dsig:Modulus>oRUTUiTQk ... /dsig:Modulus>
      <dsig:Exponent>AQABAA==</dsig:Exponent></dsig:RSAKeyValue></dsig:KeyValue></info>
    </keyHolder>
    <mx:play/>
    <mx:diReference>
      <mx:identifier>urn:PDQRecords:song:WhenTheThistleBlooms.mp3</mx:identifier>
    </mx:diReference>
    <validityInterval>
      <notBefore>2003-02-13T15:30:00</notBefore>
      <notAfter>2003-03-13T15:30:00</notAfter>
    </validityInterval>
  </grant>
  <issuer>
    <dsig:Signature>
      <dsig:SignatureValue>zIRYaxl5EX ... /dsig:SignatureValue>
      <dsig:KeyInfo><dsig:KeyValue><dsig:RSAKeyValue> <dsig:Modulus>yQ== ... </dsig:Modulus>
      <dsig:Exponent>AQAB==</dsig:Exponent></dsig:RSAKeyValue></dsig:KeyValue></dsig:KeyInfo>
    </dsig:Signature>
  </issuer>
</license>
```

Alice can play a song for a month.

# REL Predefined Elements

- Principal
  - keyHolder, allPrincipal
- Right
  - play, print, modify, adapt, ...
  - issue, obtain, revoke
- Resource
  - diReference, digitalResource, ...
- Condition
  - validityInterval, exerciseLimit, flatFee, perUseFee, ...

# Typical REL Licenses

- End-user license
  - rights to *play, print, modify, ...*
- Attribute license
  - right to *possessProperty*
- Distribution license
  - right to *issue* other rights
- Offer license
  - right to *obtain* other rights
- Revocation license
  - right to *revoke* other rights

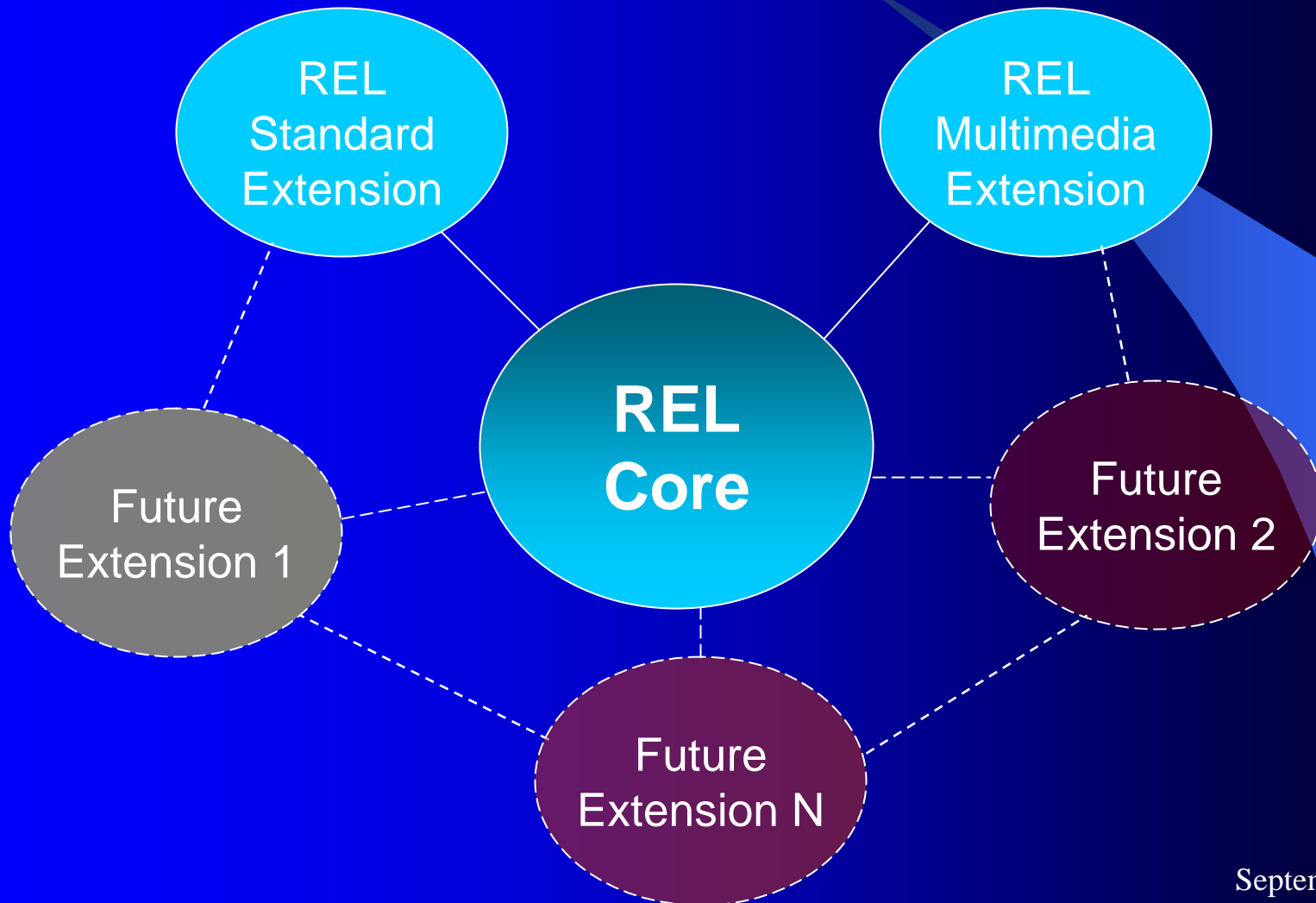
# REL Advanced Features

- Variable
  - Flexibility to specify an element instance at the time of exercising right (i.e., not at the time of specifying a right)
- Pattern
  - Capability of specifying a set of element instances according to some rules
- Service Reference
  - Encapsulation of information necessary to interact with a service.
  - Usefulness for stateful conditions.
- Delegation
  - Allowance and control on how rights can be delegated and transferred.

# REL Supported Business Models

- Unlimited usage
- Flat fee sale
- Pay per view
- Preview
- Promotion
- Subscription/Membership
- Transfer
- Gifting
- Personal lending
- Library loan
- Site/volume license
- Rent
- Multi-tier models
- Territory restricted
- Component based model
- User types based model
- Payment to multiple rights Holders
- Super-distribution
- Composite content

# REL Structure and Extensibility



# RDD

- A static dictionary
  - For interpreting the meanings of terms
  - For mapping terms among different domains
- A dynamic process
  - For incorporating new terms from other sources into RDD

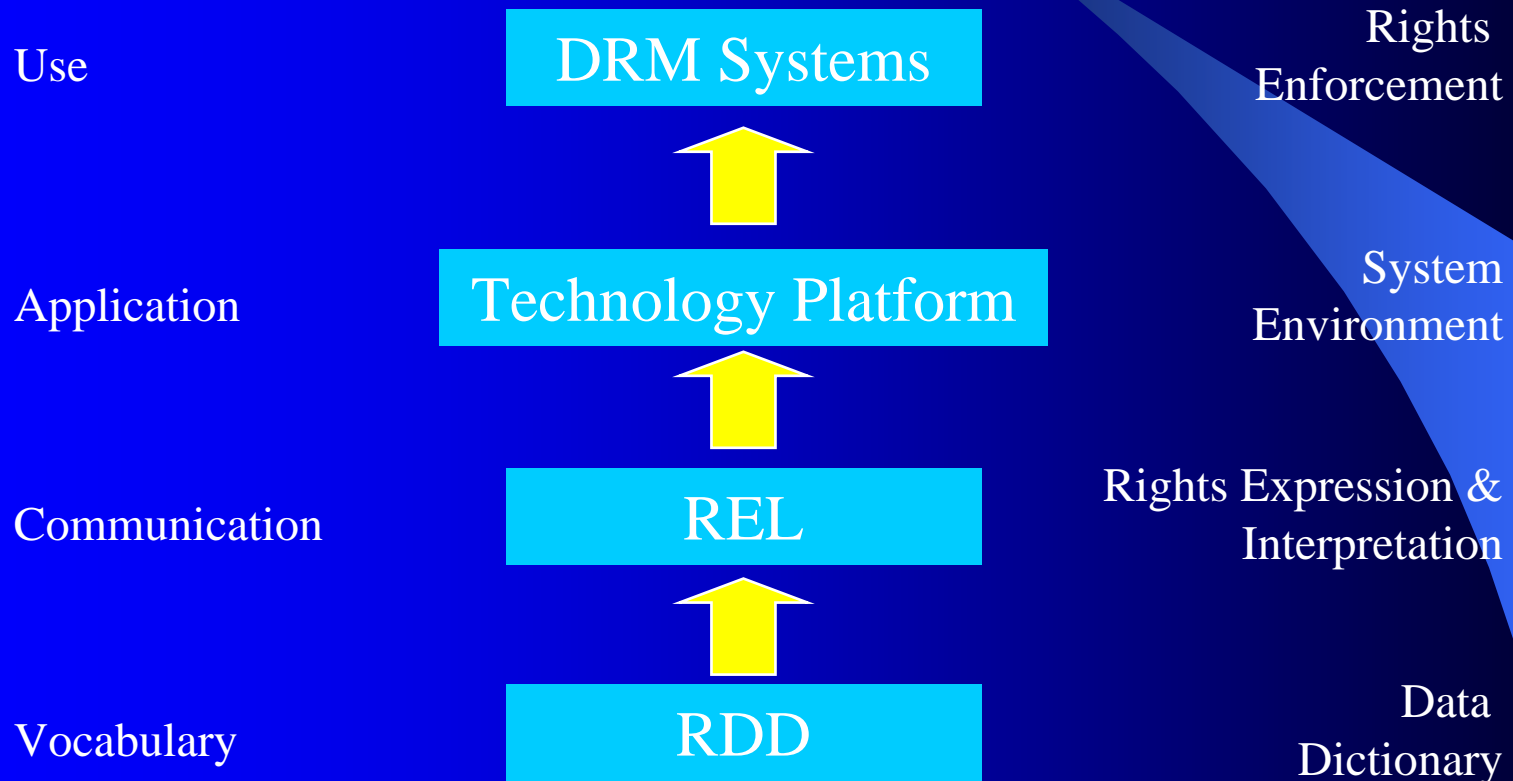
# RDD Standardized ActTypes for REL

ActType	Parent(s)
Modify	Change
Enlarge	Modify
Reduce	Modify
Move	Modify
Adapt	Derive, ChangeTransiently
Diminish	Adapt
Enhance	Adapt
Embed	Relate
Play	Render, Perform
Print	Render, Fix
Install	UseTool
Execute	Activate
Read	InteractWith
Uninstall	UseTool
Delete	Destroy

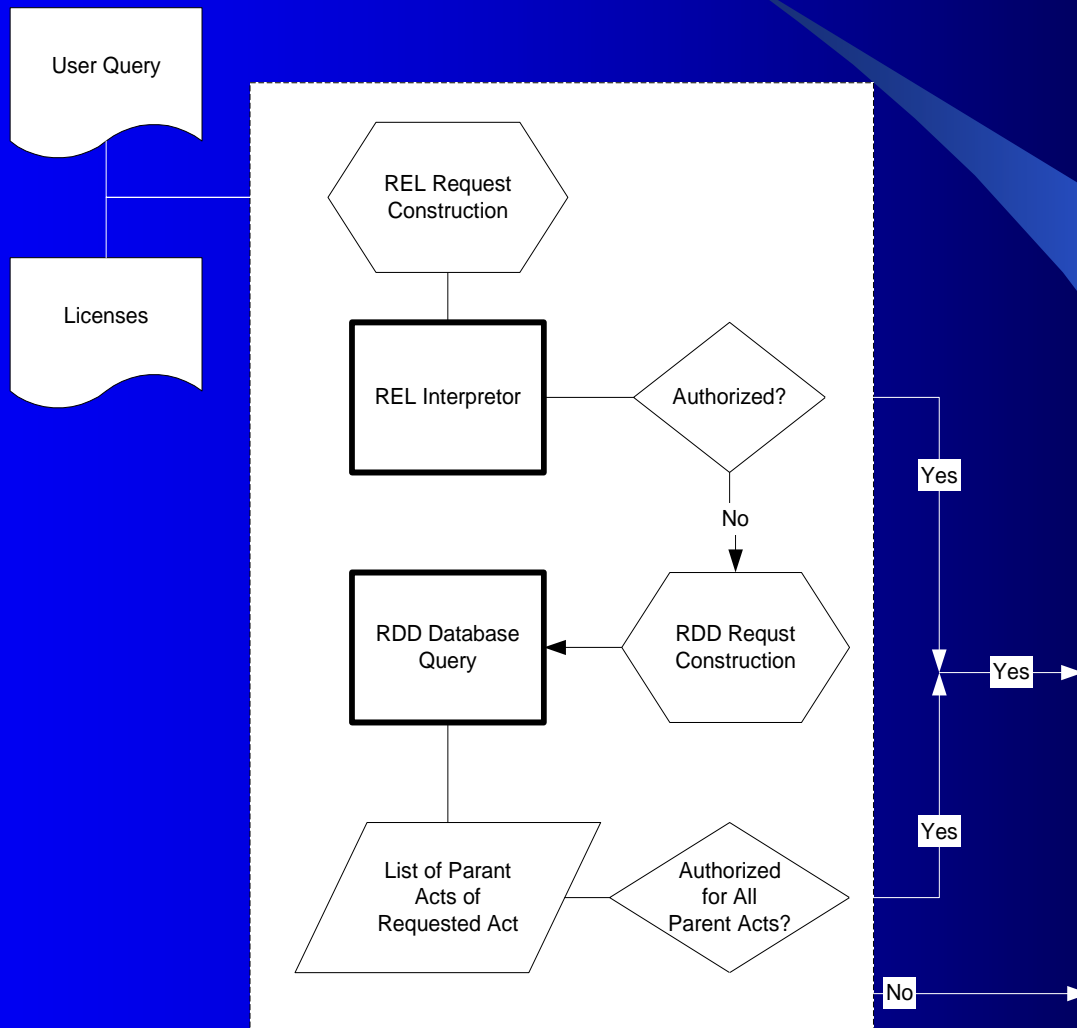
# RDD ActType Family Tree

Act	Do	Make	Derive	Adapt	Diminish	Enhance	Transform	Render	Play	Print	Translate								
												Express	Perform	Play*					
															Fix	Print*			
																	Say	Ascribe*	
												InteractWith	UseAsSource	Derive*					
															UseTool	Install	Uninstall		
													Change	Modify				Enlarge	Reduce
															Change Transiently				
												Enable				Execute			
															Activate				
		Deactivate																	
			Disable																
		Destroy		Delete															
			Relate		Embed														

# Use of REL and RDD in DRM



# REL and RDD in Authorization



# Demo of REL-Based Authorization



# Thank You



[xin.wang@contentguard.com](mailto:xin.wang@contentguard.com)