



## Rights Expression Languages: Characteristics and Applications

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### Agenda

#### Rights Expression Languages (REL):

- *Requirements*
- *Typical Components*
- *Standards and Initiatives*
- *Application Fields*
- *Market Situation and Trends*

#### A REL Application:

“Access Control Decisions based on ODRL Contracts”

## REL Requirements:

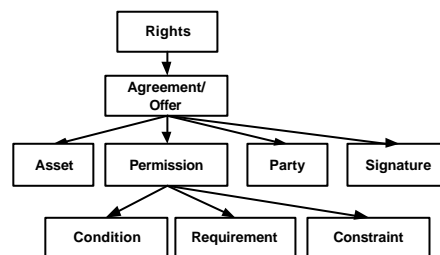
- *express rights of parties over assets/services*
- *being machine readable*
- *formulate business models*
- *articulation of roles*
- *identification mechanisms for resources/parties*
- *express permissions and constraints*
- *express royalties and payment details*
- *security information (digital signature),*
- *etc.*

Official Documents: MPEG 21 REL Requirements

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## REL Components:

Rights Language Concept:



Rights Data Dictionary:

Name	ID	Description	Comment
Play	play	The act of rendering the asset in audio/video form	...
Print	print	The act of rendering the asset on paper or hard copy	...
...	...	form.	...

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## REL Standards and Initiatives:

- Open Digital Rights Language (**ODRL**) - IPR Systems
- eXtensible rights Markup Language (**XrML**) - Contentguard
- **MPEG 21 Part 5** (REL) & Part 6 (Data Dictionary)
- The **<indecs> 2rdd** Project - Rightscom (→ MPEG 21 Part 6)
- IEEE - **Intellectual Property Rights Framework**: Data Model for Reuse Library Interoperability
- Other initiatives:
  - *eXtensible Media Commerce Language* (**XMCL**) - RealNetworks
  - *DREL - Learning Technology Standards Committee* (**LTSC**)
  - *Digital Property Rights Language* (**DPRL**) - Xerox (no further dev.)
  - *eXtensible Access Control Markup Language* (**XACML**) - OASIS
  - **"Rights Grammar"** – eBook
  - *Custom Digital Rights Language* (**CDRL**) - Octalis
  - *Creative Commons*

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## Rights Expression based on Concepts of Logic Programming

- Nick Szabo, "A Formal Language for Analyzing Contracts", unpublished work, 2002.  
*Szabo describes in his work\* an approach expressing contracts by a programming language rather than by a markup language. The formal language that he describes uses the concepts of logic programming, where licenses are represented by clauses and their processing is described by event-driven, predefined functions or rules of the language.*
- Sandro & Co ;-) License Script

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## Differences between XML-based and „rules & facts“-based rights expression

### XML-based

- generalizations
- ambiguous
- express contracts!
- need to be implemented
- exchangeable due to standardization (XML-feature)  
→ readable by third party
- ...

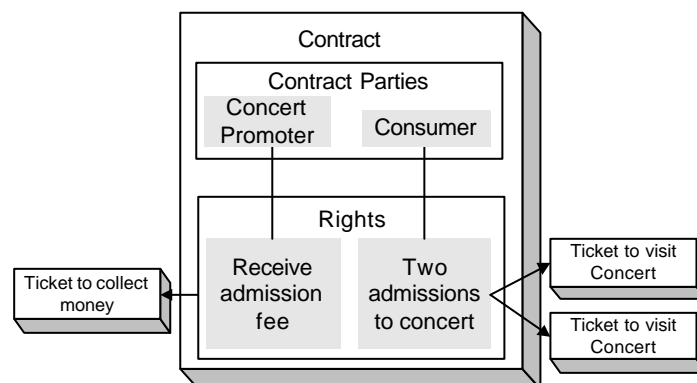
### Rules & Facts - based

- fine grained
- unambiguous
- express licenses!?
- direct processing in software systems
- how to exchange rights information between different systems? and make them readable for lawyers or partners?
- ...

*Let's discuss this!*

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## Excurs: Tickets versus Contracts



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## REL Application Fields:

Access Control:

1. *Rights expressions in licenses of a secure container*
2. *Rights expressions separately from digital content*

other potential applications of digital contracts/rights expressions:

1. *Processing in book keeping/accounting software*
2. *Customer Relationship Management (CRM)*
3. *Disbursement to content providers (IPR)*
4. ...

Prerequisite for XML-based REL Application:

1. Rights Expression Generator
2. REL Interpreter

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## REL Current Market Situation & Trends:

XrML

1. ... is used in Microsoft's Media Rights Manager. Secure Viewer: Windows Media Player , Format: \*.wma-files
2. ... is used as basis REL for MPEG 21 part 5 (MPEG REL)
3. ... XrML does not experience further development

ODRL

1. ... is used in Nokia & IBM products (mobile services)
2. ... is used as basis REL in OMA (open mobile alliance)
3. ... Version 2.0 is in development and will be released in Summer 2004

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## A REL Application:

### Access Control Decisions based on ODRL contracts.

- *Use Case Description*
- *Tailoring Contracts for Efficient Processing*
  1. General Contract Objects
  2. Required Contract Objects for Access Control
  3. Accordingly fill ODRL template with contract data
- *Required Software Components*
  1. REL Interpreter
  2. Access Control Mechanism
  3. Mediator
- *Contract Processing Steps*

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## A REL Application:

### Use Case Description:

Customer Mary Smith (id ***msmith***) purchases at the e-commerce platform XY the ebook of her favorite author Emiliano Rossi with the id "***rossi-12345***" with the right to ***print*** and ***display***. The right print is restricted to ***2 times***, the right display is restricted to a certain ***cpu-id (Intel-12345)***. The value of receiving these rights is ***AUD 20.00*** with a ***10 %*** tax. The contract is legally concluded in ***Sydney/Australia***.

Mary Smith now would like to conclude a contract and access the ebook. How does this technically work?? ...

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## Tayloring Contracts for efficient processing:

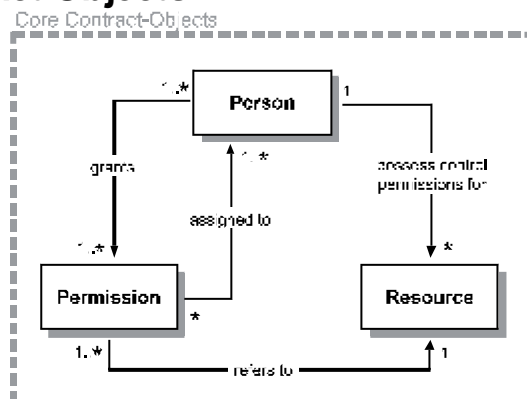
We can't use any ODRL contract in sophisticated access control!

- *What application has to be served? (here: Access Control)*
- *What information is needed for the application?*
- *Determine the required information objects and their attributes.*
- *Derive the respective ODRL contract template.*
- *Fill contract template with information.*

→ Tailored Contract!

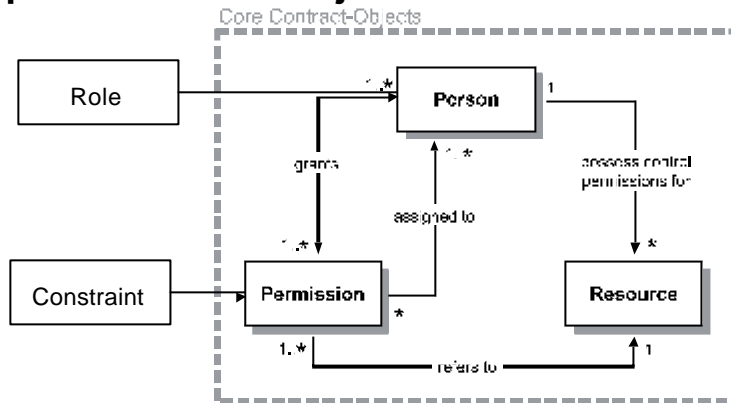
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## Tayloring Contracts: General Contract Objects



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## Tailoring Contracts: Required Contract Objects for Access Control



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## 'Tailored ODRL instance

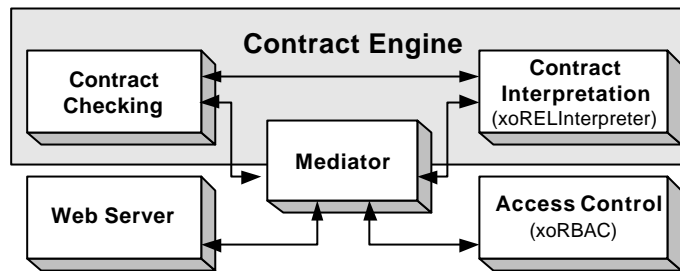
```

<o-ex:rights>
<o-ex:agreement>
<o-ex:context>
<dd:uid> license-12345 </dd:uid>
<dd:pLocation> Sydney, Australia </dd:pLocation>
<dd:remark> Transacted by Example.Com </dd:remark>
</o-ex:context>
<o-ex:asset>
<o-ex:context>
<dd:uid> rossi-12345 </dd:uid>
</o-ex:context>
</o-ex:asset>
<o-ex:permission>
<dd:display>
<o-ex:constraint>
<dd:cpu>
<o-ex:context>
<dd:uid> Intel-12345 </dd:uid>
</o-ex:context>
</o-dd:cpu>
</o-ex:constraint>
</o-dd:display>
<dd:print>
<o-ex:constraint>
<dd:count> 2 </dd:count>
</o-ex:constraint>
</o-dd:print>
<o-ex:requirement>
<dd:prepay>
<dd:payment>
<dd:amount o-dd:currency="AUD"20.00</dd:amount>
<dd:taxpercent o-dd:code="GST"10.00</dd:taxpercent>
</o-dd:payment>
</o-dd:prepay>
</o-ex:requirement>
</o-ex:permission>
<o-ex:party>
<o-ex:context>
<dd:uid> msmith </dd:uid>
<dd:name> Mary Smith </dd:name>
</o-ex:context>
</o-ex:party>
</o-ex:agreement>
</o-ex:rights>
    
```

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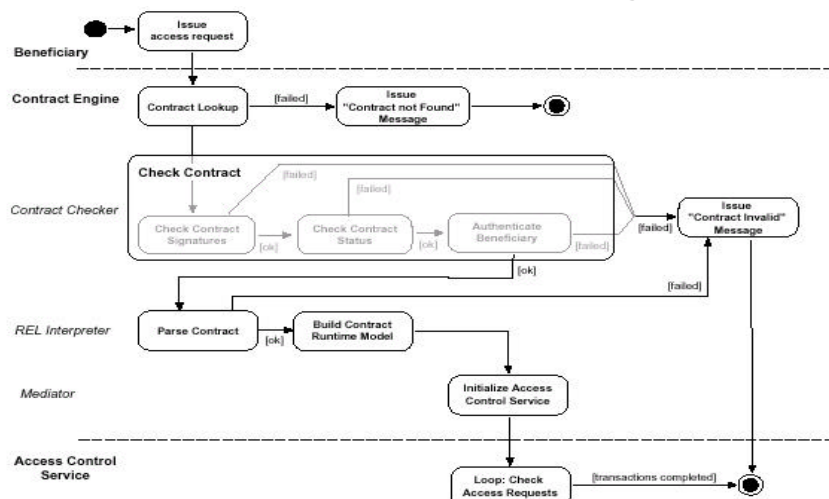


## Required Software Components



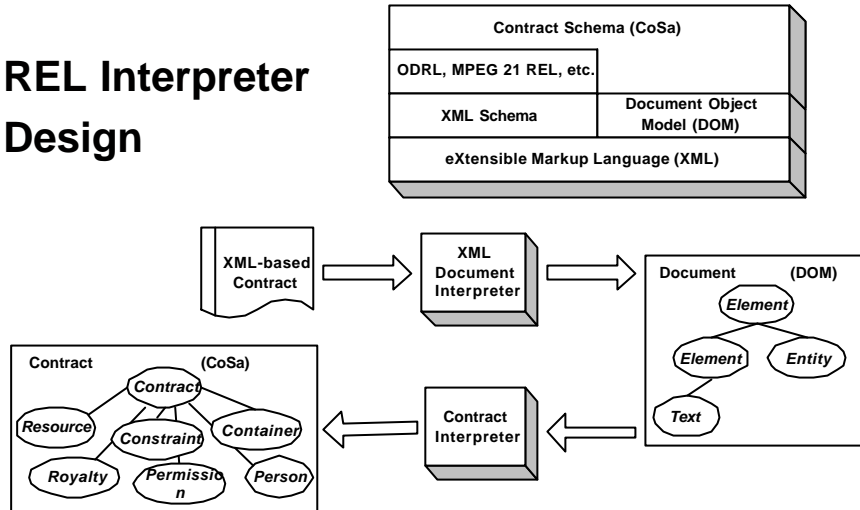
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## The steps of contract processing:



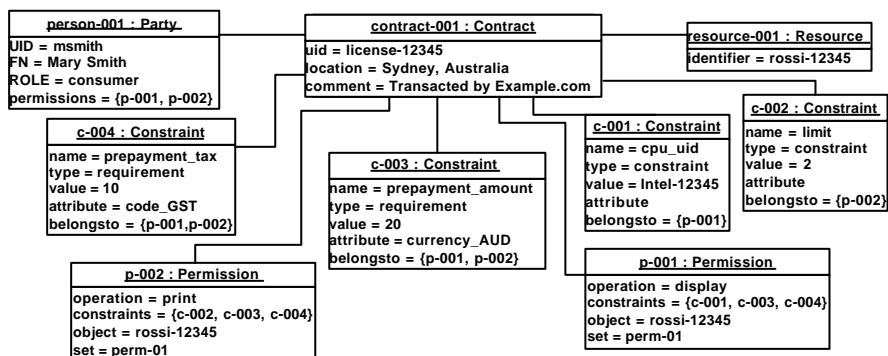
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## REL Interpreter Design



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## CoSa Objects - Runtime Model of the ODLR Contract



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## CoSa Application Programming Interface

`getContracts()` :

Returns a list of all Contract objects registered for the current ODRL instance (an ODRLInterpreter instance can contain more than one contract).

`getAssets(contract)` :

Returns a list of all Asset objects, included in a special contract.

`getConsumers(contract)` :

Return a list of all Consumer objects, included in a special contract.

`getPermission(consumer)` :

Returns a list of all Permission objects, assigned to the respective consumer.

`getUniqueID(object)` :

Return the value of the id attribute of the respective object. The respective object could be of any valid CoSa type (e.g. Party, Resource, or Permission).

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## Mediator: Combining REL Interpreter and Access Control Mechanism Features

```
requestAccess (subject, operation, object, contract-id) {
  #contract lookup
  set contractInstance [contractLookup(contract-id)]
  #check contract
  set contractOK [checkContract(contract-id)]
  #interpret contract and initialize xORBAC instance *rm*
  ODRLContract c1 $contractInstance
  RightsManager rm
  if {$contractOK == true} {
    set contracts [c1 getContracts]
    foreach c $contracts {
      set assets [c1 getAssets $c]
      set consumers [c1 getConsumers $c]
      foreach asset $assets {
        set assetID [c1 getUniqueID $asset]
        foreach con $consumers {
          set conID [c1 getUniqueID $con]
          rm createSubject $conID
          set perms [c1 getPermission $con]
          foreach p $perms {
            set perm [c1 getName $p]
            rm createPermission $perm
            rm subjectPermAssign $conID $perm
          }
        }
      }
    }
  }
  } else {
    #contract checks not successful, access denied.
    return false
  }
  #checkAccess - performed by access control service
  set result [rm checkAccess $subject $operation $object]
  if {$result == 1} {
    return true #access granted
  }
  } else {
    return false #access denied
  }
}
```

er 2003

## Finish

..... Puh, that was hard stuff!

..... Thanks for listening!

..... Questions?