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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:

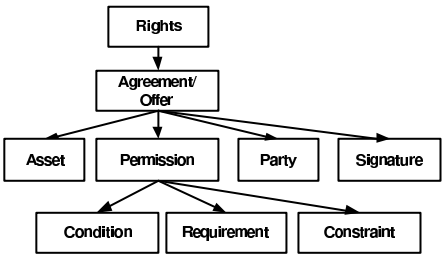
- *express rights of parties over assets/services*
- *being machine readable*
- *formulate business models*
- *articulation of roles*
- *identification mechanisms for resources/parties*
- *express permissions and constraints*
- *express royalties and payment details*
- *security information (digital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

Official Documents: MPEG 21 REL Requirements

Right Expression Languages: Characteristics and Application

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.	...
...	...		...

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*

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- Nick Szabo, "A Formal Language for Analyzing Contracts", unpublished work, 2002.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-drawn, predefined functions or rules of the language.*

- Sandro & Co ;-) License Script

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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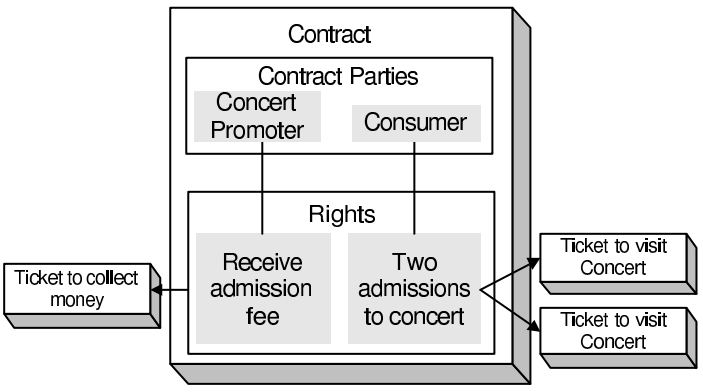
Excurs: Tickets versus Contracts



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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?? ...

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.*
  - → Taylored Contract!

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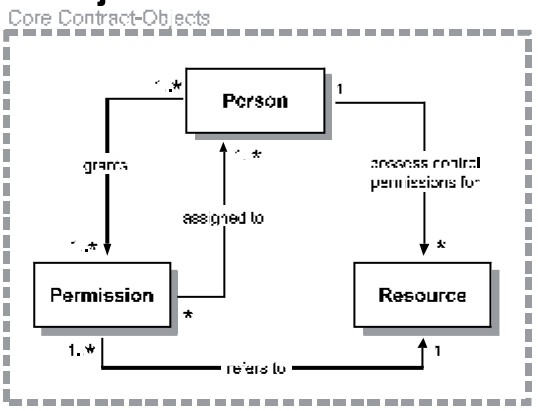
Tayloring Contracts: General Contract Objects



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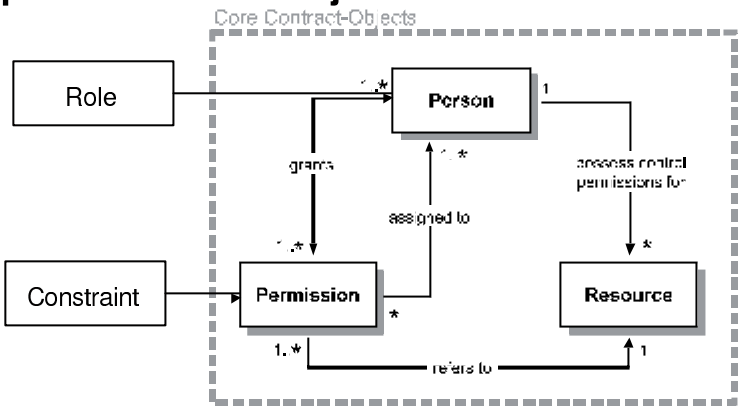
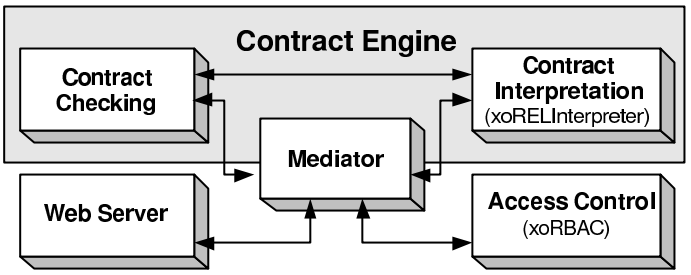
Tailoring Contracts:
Required Contract Objects for Access Control



'Tailored ODRL instance

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

Required Software Components



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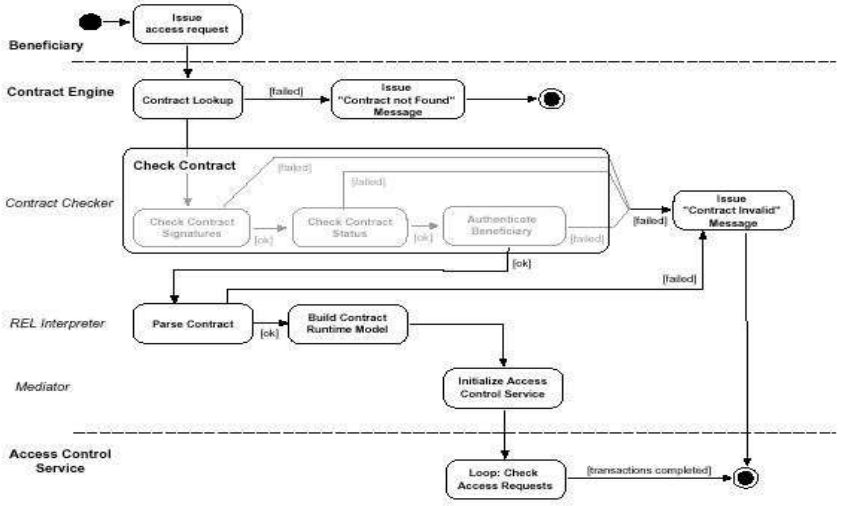
The steps of contract processing:



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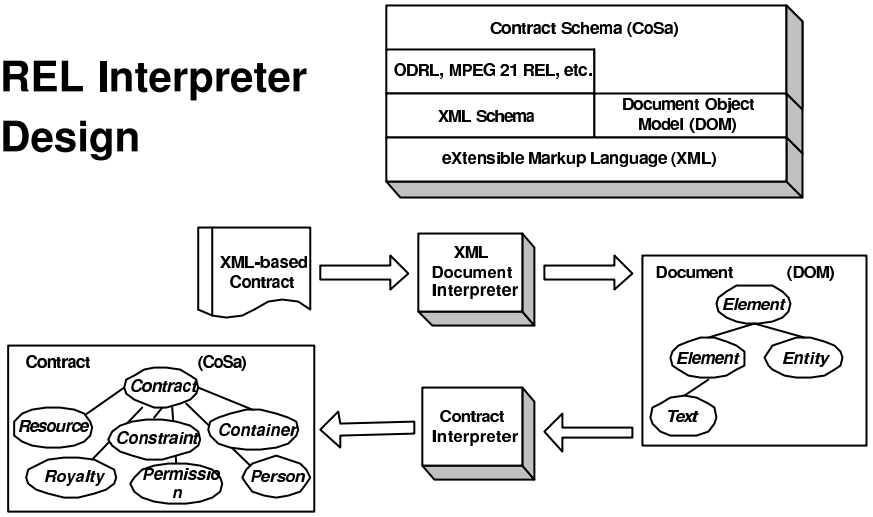
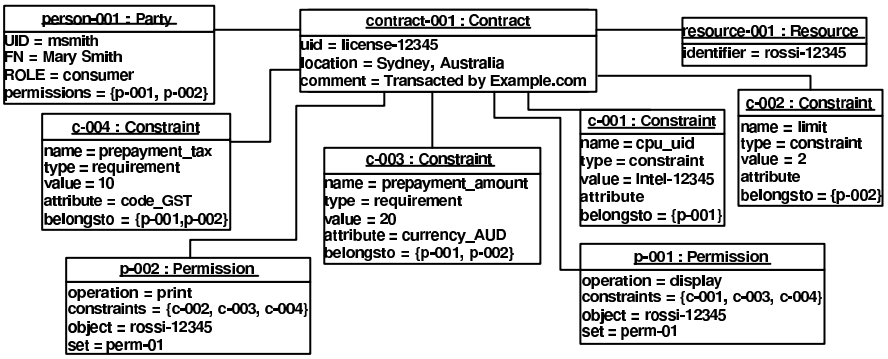
REL Interpreter Design



CoSa Objects - Runtime Model of the ODLR Contract



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).

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 cl $contractInstance
  RightsManager rm
  if {$contractOK == true} {
     set contracts [cl getContracts]
     foreach c $contracts {
        set assets [cl getAssets $c]
        set consumers [cl getConsumers $c]
        foreach asset $assets {
           set assetId [cl getUniqueID $asset]
           foreach con $consumers {
              set conID [cl getUniqueID $con]
              rm createSubject $conID
              set perms [cl getPermission $con]
              foreach p $perms {
                 set perm [cl getName $p]
                 rm createPermission $perm
                 rm subjectPermAssign $conID $perm
              }
           }
        }
     }
  } else {
    #contract checks not successfull, 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
  }
}
```

Finish

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

..... Thanks for listening!

..... Questions?