EMF, JSON and XML

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Context: Typical Scenario

Example:

HTTP GET http://eclipsecon.org/visitors/92813

Response:

```
{ "name": "Maximilian Koegel",
  "tickettype": "allaccess",
  "role": "speaker" }
```

Protocol:
JSON/XML RPC, (RESTful) HTTP, SOAP

Data representation:
JSON, XML

Web: JavaScript, TypeScript
Desktop: Java, C#, ++
Mobile: Java, Kotlin, ObjectiveC, Swift

Java
JavaScript, TypeScript
C#, C++
What is EMF and Ecore?

- **“EMF EObjects”**
  - are Java objects (instances)
  - represent a data object
  - with getters and setters for attributes
  - Classes are generated from an Ecore

- **EMF Ecore**
  - describes the structure of data objects
  - is used as a source for code generation
  - is an XML document
What is XML and XML Schema?

● XML is a text document format
  ○ human-readable?
  ○ machine-readable
  ○ often used to send data

● XML Schema (XSD)
  ○ describes the structure of XML docs
  ○ is an XML document itself
  ○ XML docs can be validated against an XSD

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XML Schema

```xml
<xsd:complexType name="User">
  <xsd:sequence>
    <xsd:element maxOccurs="unbounded" minOccurs="0" name="tasks" type="xsd:string"/>
  </xsd:sequence>
  <xsd:attribute name="firstName" type="xsd:string"/>
  <xsd:attribute name="lastName" type="xsd:string" use="required"/>
  <xsd:attribute name="email" type="xsd:string" use="required"/>
</xsd:complexType>
```

XML

```xml
<users firstName="Maximilian" lastName="Koegel" height="175" email="mkoegel@eclipsesource.com">
  <tasks name="Prepare EMF, JSON & I Talk" done="true"/>
  <tasks name="Hold EMF, JSON & I Talk"/>
</users>
```
What is JSON and JSON Schema?

- **JSON** is a text document format
  - human-readable
  - machine-readable
  - often used to send data

- **JSON Schema**
  - describes the structure of **JSON** docs
  - is an **JSON** document itself

```json
{  
  "firstName": "Maximilian",
  "lastName": "Koegel",
  "email": "mkoegel@eclipsesource.com"
}
```
XML vs. EMF vs. JSON

1. XML Schema → EMF Ecore
2. XML → EObject
3. EMF Ecore → JSON Schema
4. EObject → JSON

Model / Schema

Instance / Document
Demo 1: From XML Schema to Ecore
From XML Schema to Ecore

- Mature converters with near complete coverage of xsd concepts
- Very few concepts are mapped with some complexity (e.g. mixed content)
- Only very few things cannot be mapped (e.g. identity constraints)
Demo 2: From EMF to XML and back again

Model / Schema

XML Schema  ➔  EMF Ecore  ➔  JSON Schema

Instance / Document

XML  ➔  EObject  ➔  JSON
From EMF to XML and back again

- Very mature XML-based serialization and deserialization
- Default serialization for EMF
- Many options to influence serialization
- Allows for performance trade-offs
- Is relatively fast even for large object graphs (e.g. 1,000,000 objects)
Demo 3: From Ecore to JSON Schema

Model / Schema

XML Schema → EMF Ecore → JSON Schema

Instance / Document

XML → EObject → JSON
From Ecore to JSON Schema

- Exporter is not feature complete
- Tooling limited:
  - Workarounds through viewmodel
  - No batch export of all classes in an Ecore
- Mapping limited conceptually:
  - Cross references
  - Subclassing
Demo 4: From EMF to JSON and back again

Model / Schema

- XML Schema
- EMF Ecore
- JSON Schema

Instance / Document

- XML
- EObject
- JSON
From Ecore to JSON Schema

- JSON Resource less mature than XML Resource
- Limitations:
  - Generated JSON does not conform to exported JSON Schema
  - Cross reference handling is EMF specific
  - Serialization contains references to EClasses
Summary

- EMF supports JSON and XML de-/serialization well
- Ecore can be converted to JSON Schema and XML Schema
- XML functionality is more mature than JSON functionality
- Git Repo with code: https://github.com/eclipsesource/EMF-JSON-AND-I
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