JSON and JSON Schema Support

Octavian Nadolu, Syncro Soft
octavian_nadolu@oxygenxml.com
@OctavianNadolu

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<oXygen/> XML Editor

Agenda

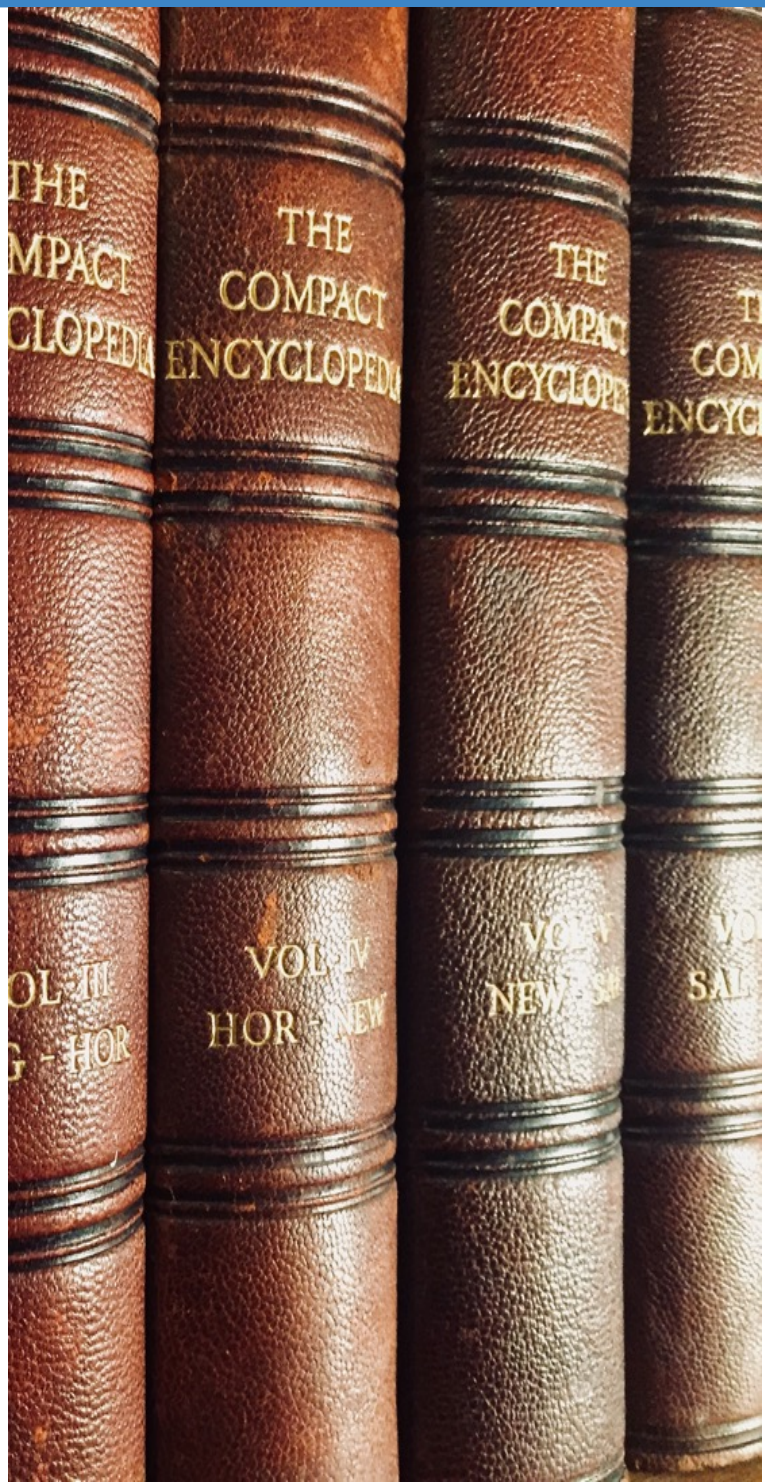
- JSON and JSON Schema in Oxygen
- Validating JSON with Schematron
- Convert between JSON and XML
- XSD to JSON schema converter
- Instance generator from a JSON Schema
- Generate JSON Schema from JSON instance

JSON

(JavaScript Object Notation)

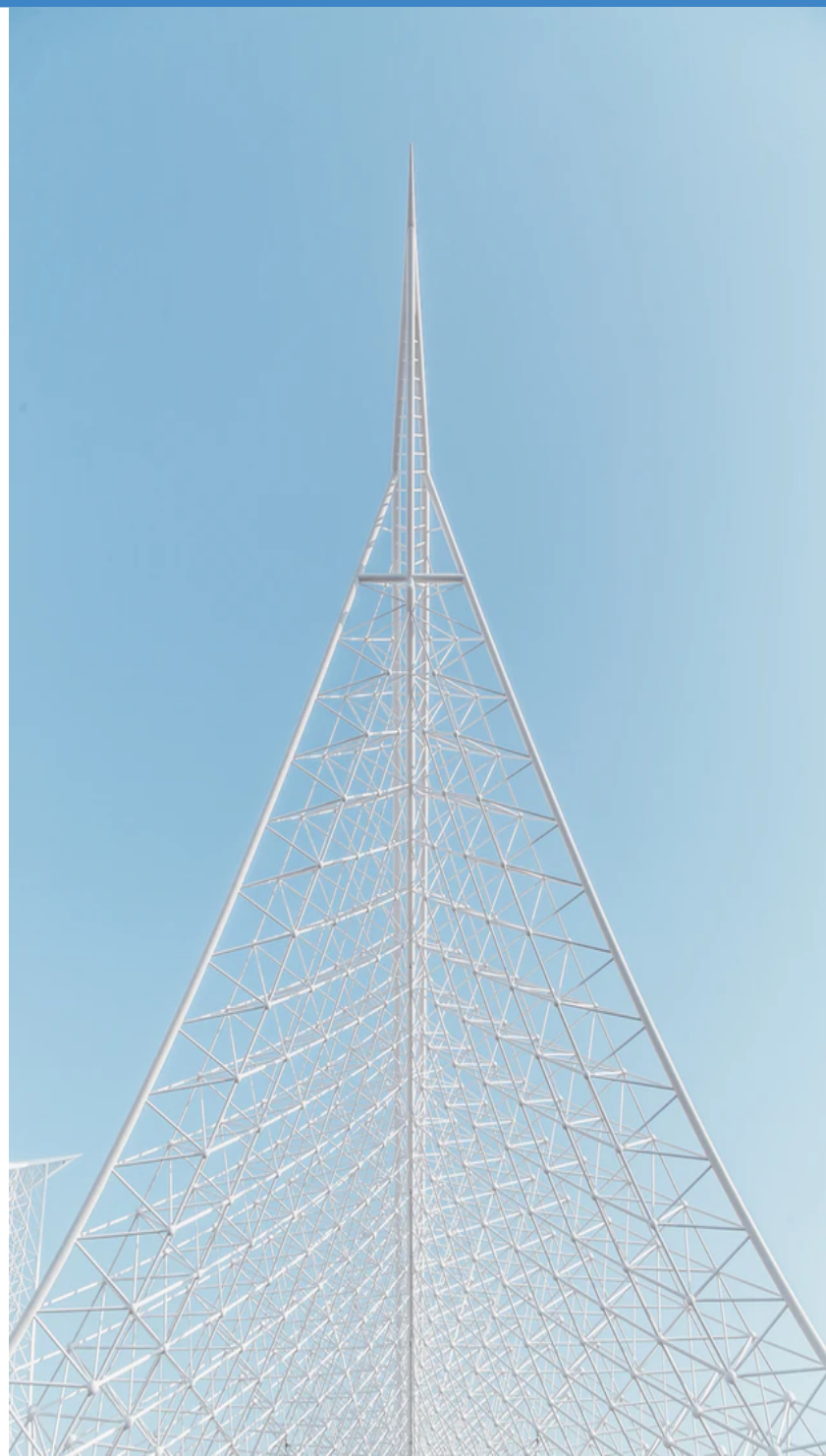
- Data representation format
- Used for API and Configs
- Lightweight and easy to read/write

http://json.org



JSON Documents Structure

- JSON Data – name/value pair
- JSON Object {...}
- JSON Array [...]



Validating JSON Documents

- Checking Well-Formedness in JSON Documents
- Validating JSON Documents Against JSON Schema
- Validating JSON Schema According to the Specification

Checking Well-Formedness

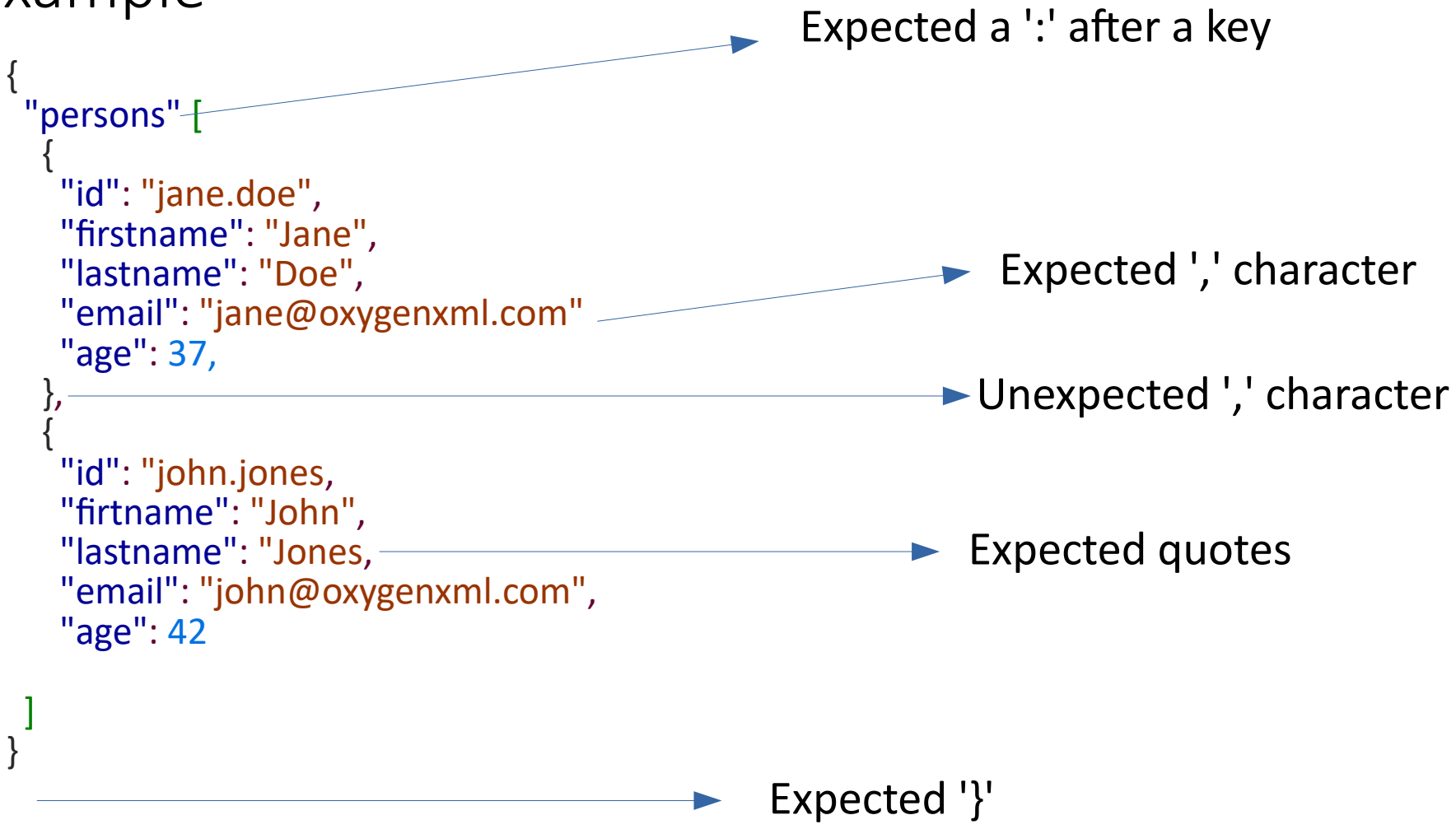
Check if the JSON document respects the JSON specification

```
{
  "id": "jane.doe",
  "firstname": "Jane",
  "lastname": "Doe",
  "email": "jane@oxygenxml.com",
  "age": 37
 }
```

ECMA-404 The JSON Data Interchange Standard

http://json.org/

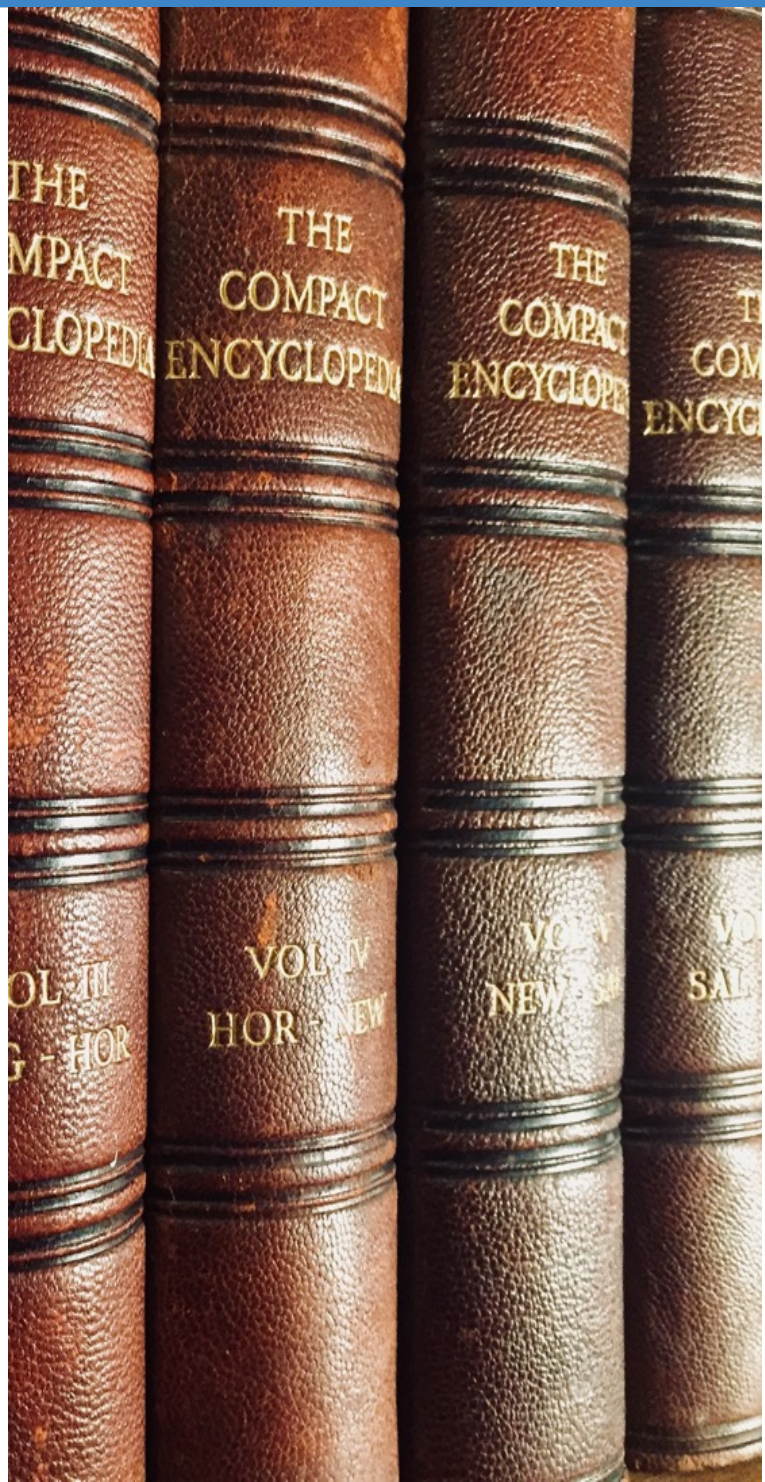
Example


{
"persons" [
{
"id": "jane.doe",
"firstname": "Jane",
"lastname": "Doe",
"email": "jane@oxygenxml.com"
"age": 37,
},
{
"id": "john.jones,
"firtname": "John",
"lastname": "Jones,
"email": "john@oxygenxml.com",
"age": 42
]
}
Expected a ':' after a key
Expected ',' character
Unexpected ',' character
Expected quotes
Expected '}'

JSON Schema

JSON Schema is a vocabulary that allows you to annotate and validate JSON documents

http://json-schema.org



Defining JSON Schema

- Similar to XML Schema, RNG, or DTD
- Written in JSON
- Used to define the structure of a JSON data

```
{"type": "string"}
```

JSON Schema

```
"I'm a string"
```

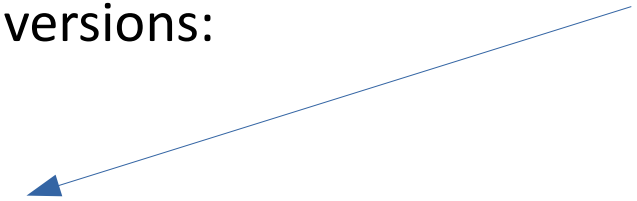
JSON Instance

JSON Schema Definition

- It is recommended to to have the schema definition on the first level

  "$schema": "http://json-schema.org/draft-07/schema#"

- JSON Schema used versions:
  - Draft 4
  - Draft 6
  - Draft 7
  - Draft 8 (2019-09)



Associate JSON Schema

- Associating a Schema to JSON Documents
  - Directly in JSON document – using $schema property
  - In application options

Absolute or relative URI

```
{
  "$schema": "person-schema.json",
  "persons" [ ... ]
}
```

Validating JSON Schema

- Check for well-formedness
- Validate accordingly to the Internet Engineering Task Force (IETF) Specification

Validating JSON with Schematron

- Specify the JSON structure using JSON Schema
- Express co-constraints and define custom rules using Schematron

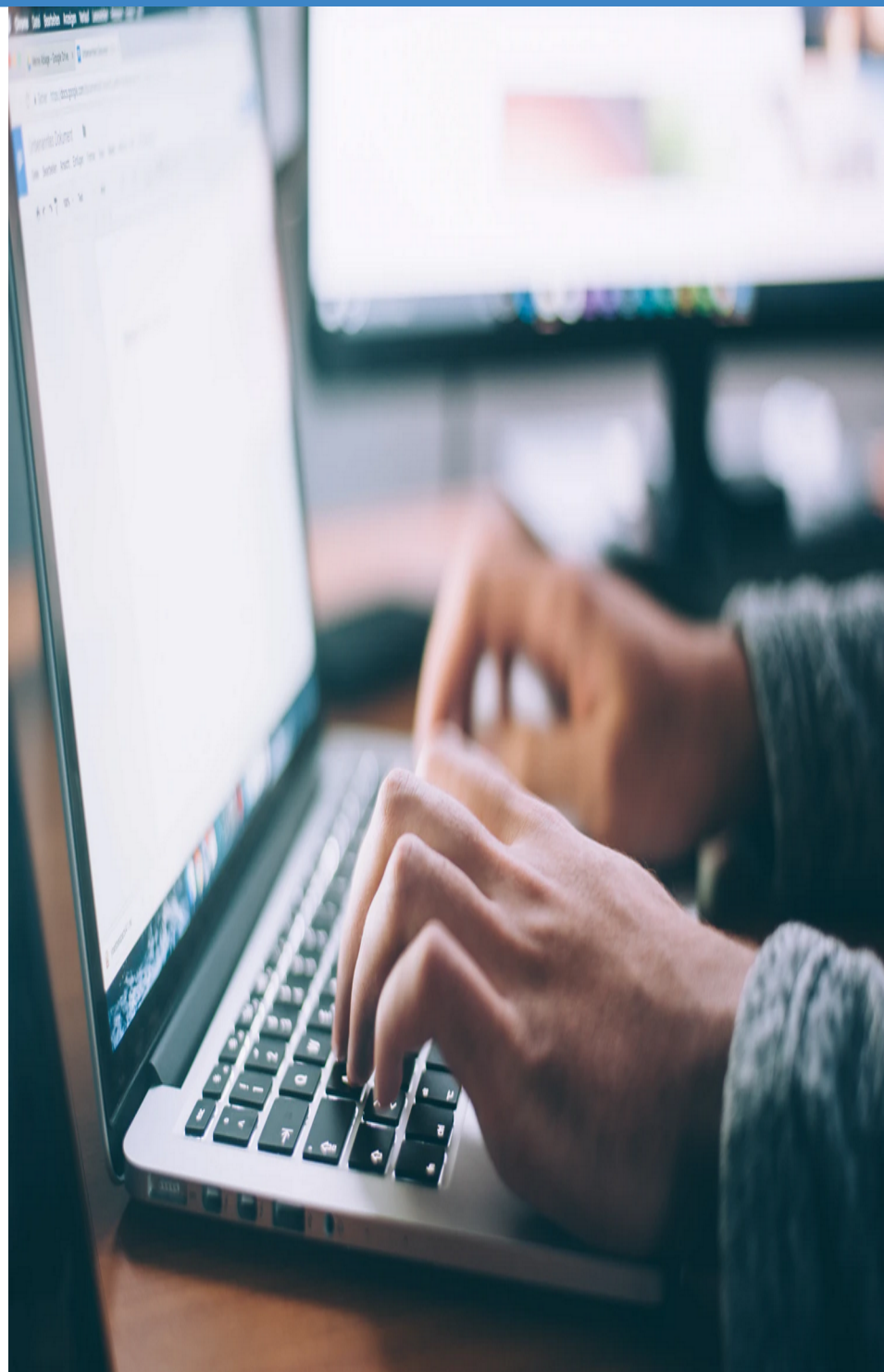
Schematron for JSON

- Use XPath to express the rules

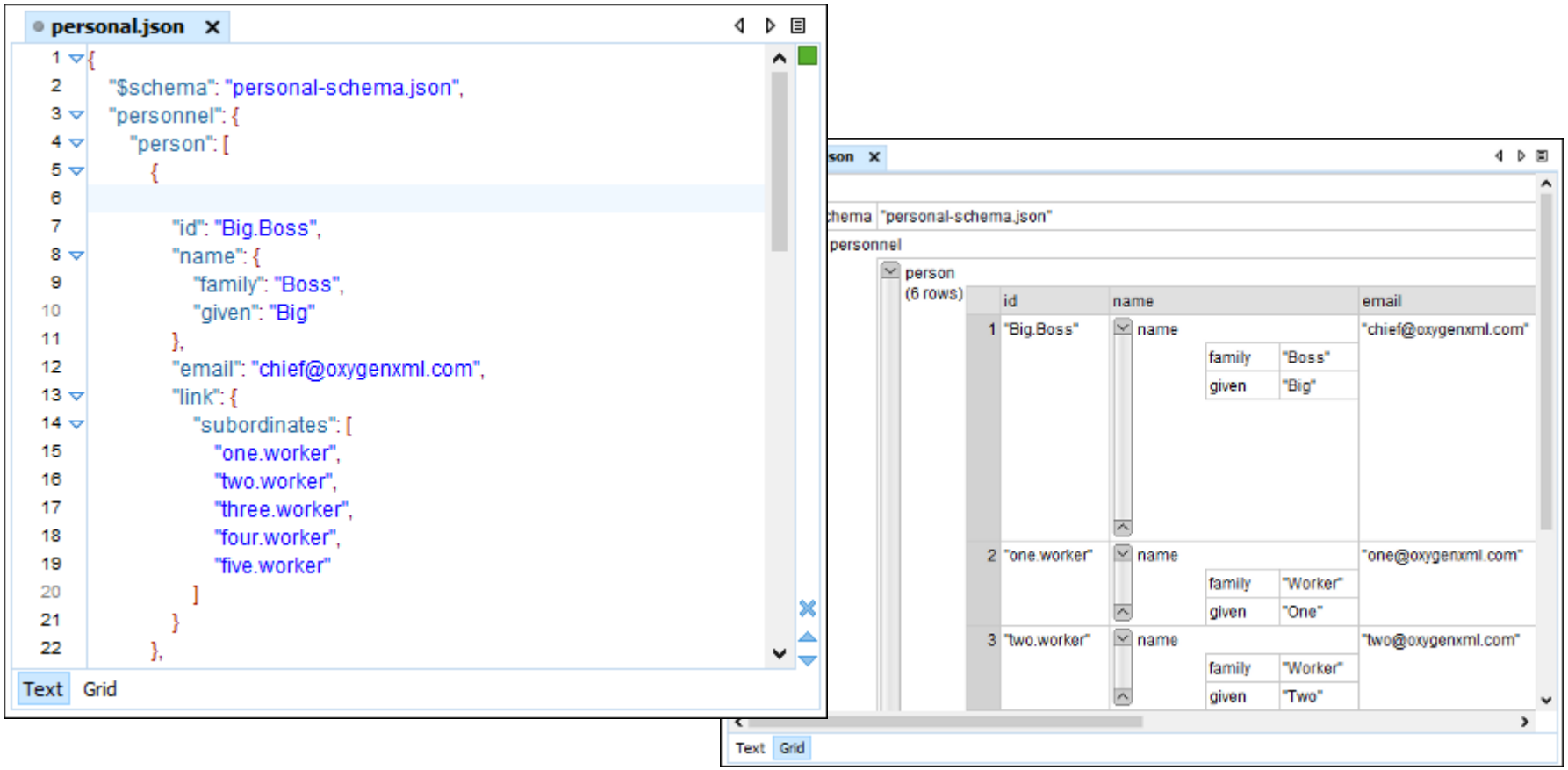
```
<sch:rule context="persons">
   <sch:assert test="number(age) > preceding-sibling::node()/age ">
      The person age must be grater than the previous person age </sch:assert>
</sch:rule>
```

Editing JSON

- JSON Text and Grid Editing Mode
- JSON Outline View
- Content Completion Assistant in JSON
- Associate JSON Schema to JSON Documents

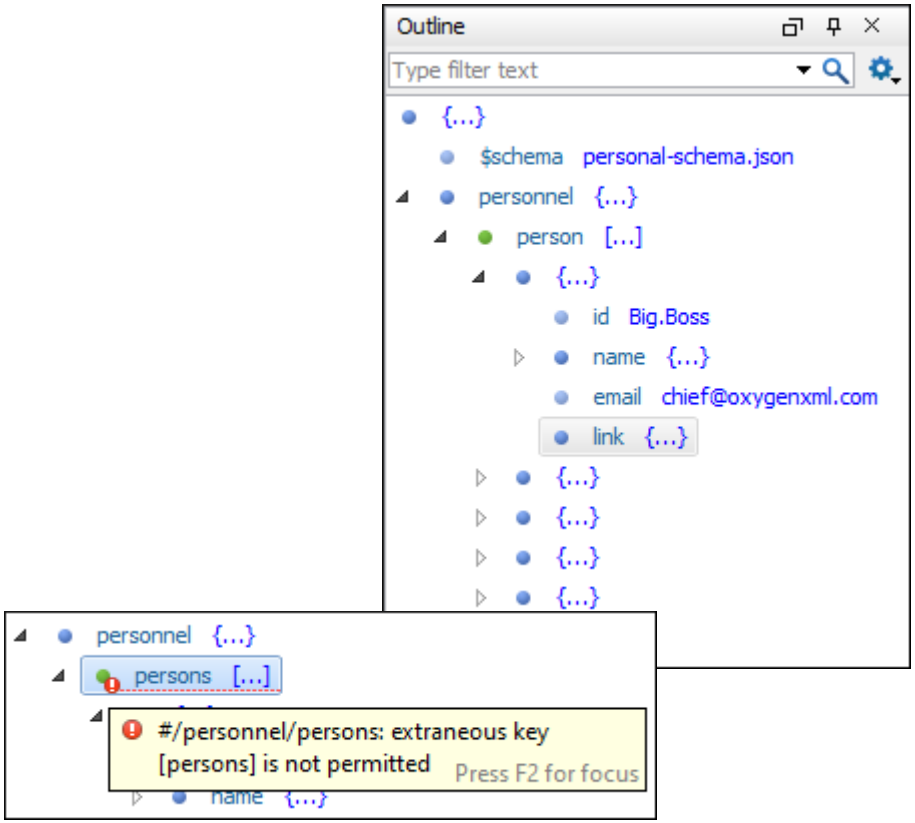


Text and Grid Editing Mode



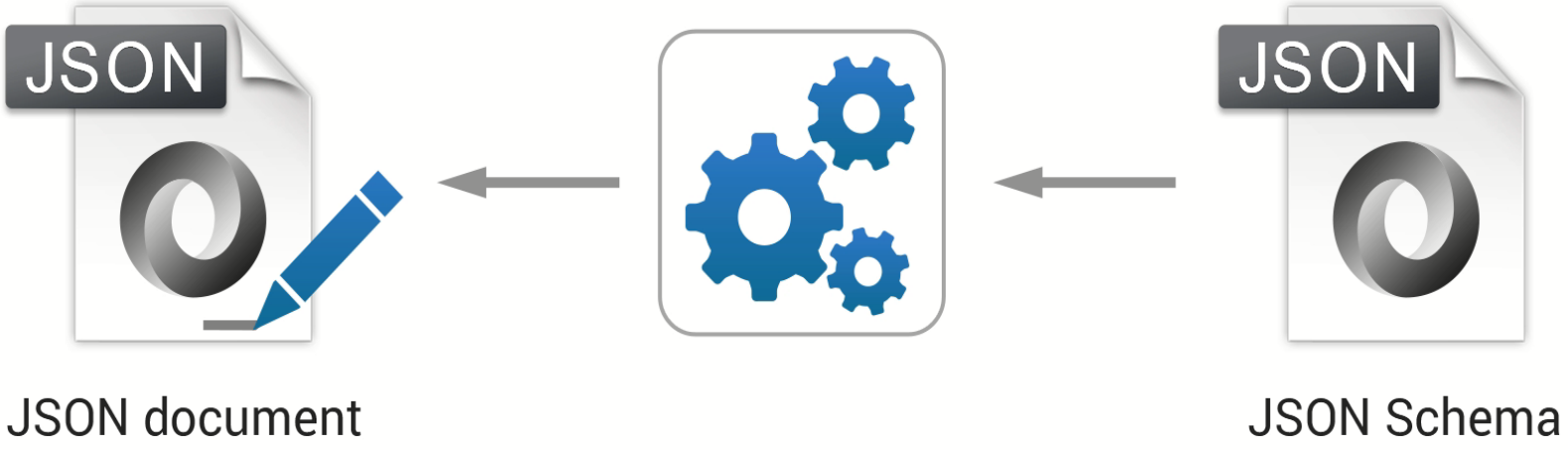
JSON Outline View

- Document Overview
- Synchronization with Editor
- Filtering
- Error Markers



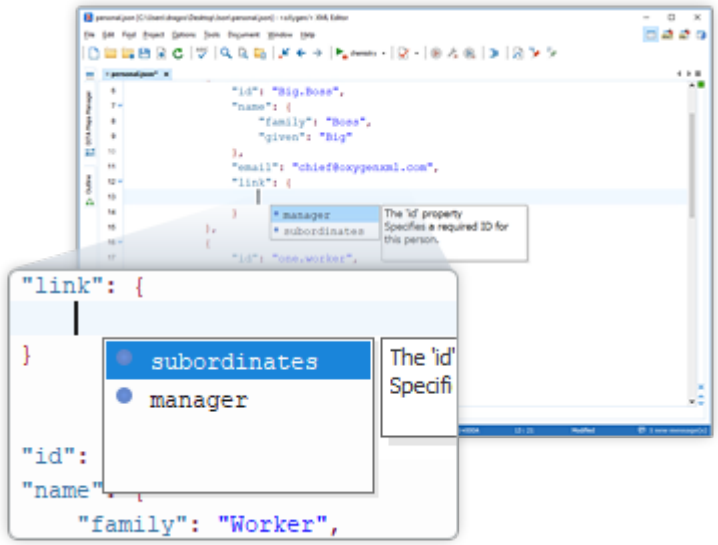
Associate JSON Schema

- Associating a Schema to JSON Documents
  - Directly in JSON Documents
  - Through a Validation Scenario



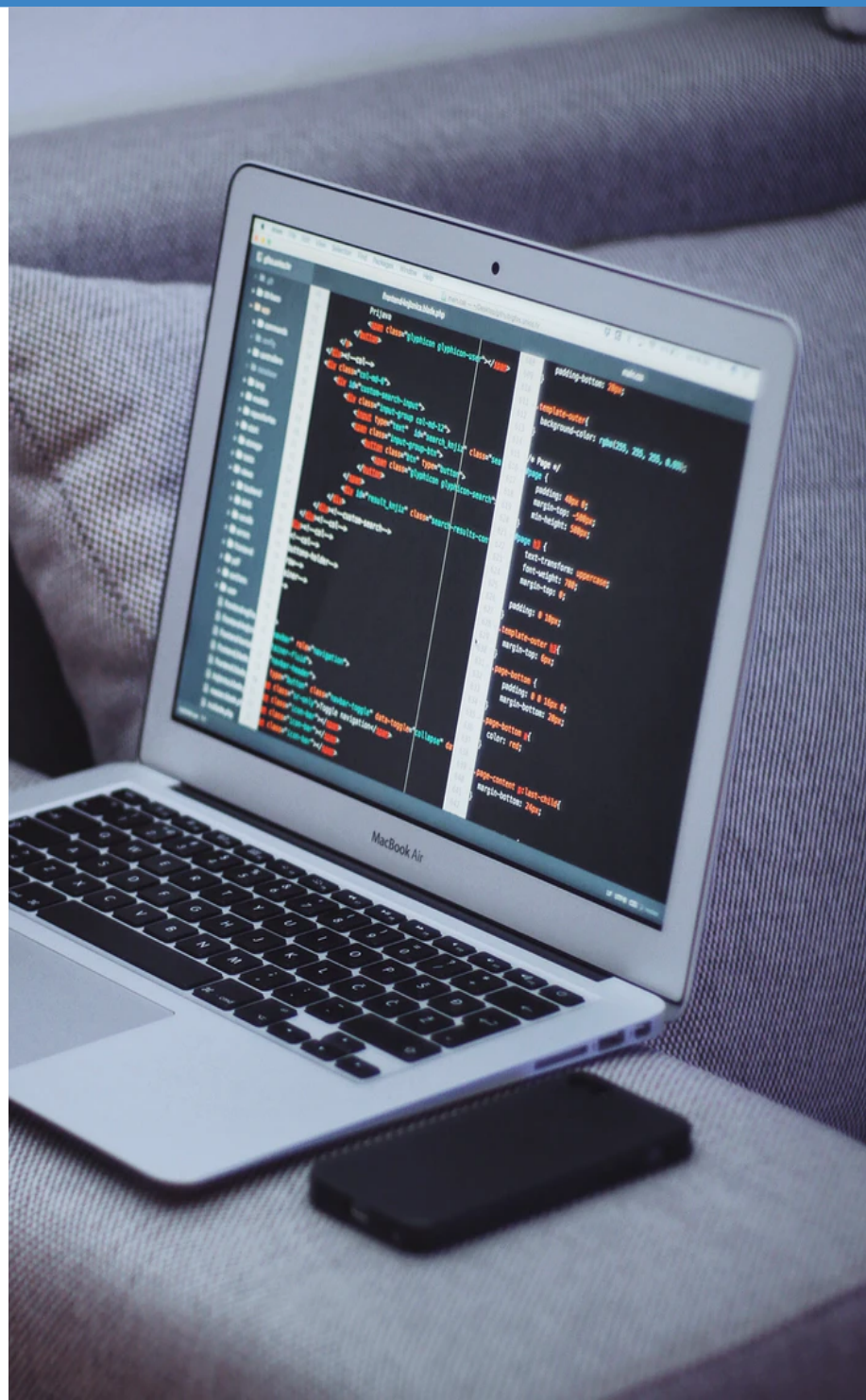
Content Completion

- Context-Sensitive
- Valid Proposals
- Documentation from Schema
- Code Templates



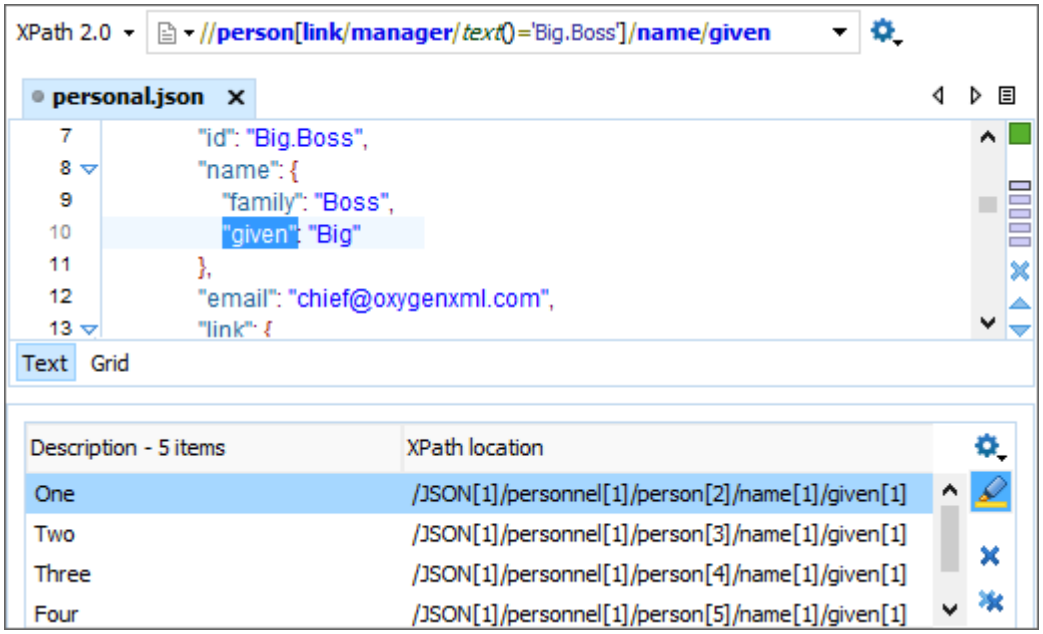
Querying and Transforming

- Query using XPath
- Transform JSON using XSLT and XQuery



XPath

- XPath Toolbar and XPath Builder View
- Content Completion
- XPath Over Multiple Files



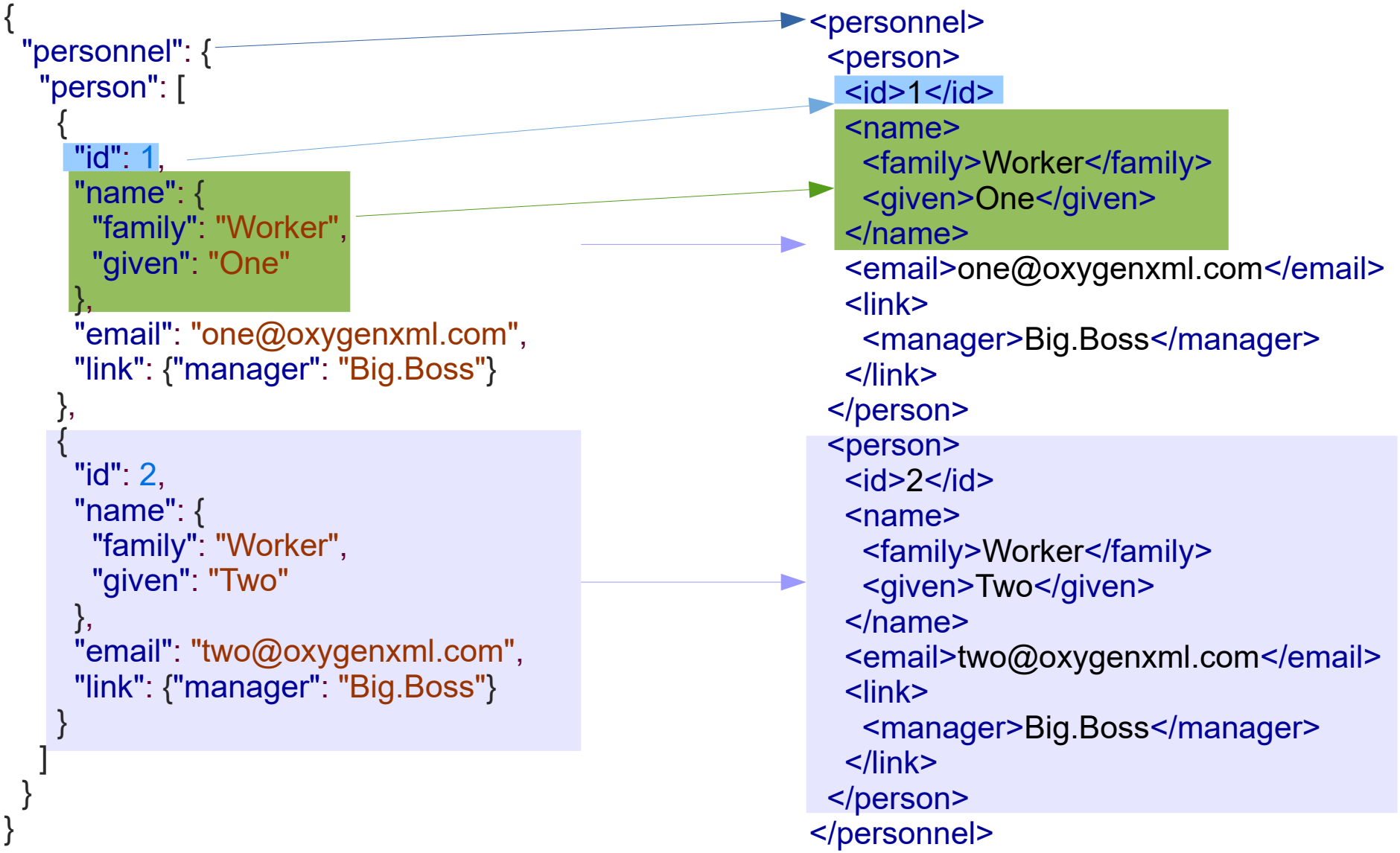
Transform using XSLT/XQuery

- Transform JSON Documents to Different Formats
- Create XSLT/XQuery Transformation Scenario for JSON
- XQuery Builder view
- Functions to process JSON document:
  - json-doc($href as xs:string?) as item()?
  - json-to-xml($json-text as xs:string?) as document-node()?

JSON Tools

- Convert between JSON and XML
- XSD to JSON Schema converter
- Instance generator from a JSON Schema
- Generate JSON Schema from JSON instance

JSON to XML


{
"personnel": {
"person": [
{
"id": 1,
"name": {
"family": "Worker",
"given": "One"
},
"email": "one@oxygenxml.com",
"link": {"manager": "Big.Boss"}
},
{
"id": 2,
"name": {
"family": "Worker",
"given": "Two"
},
"email": "two@oxygenxml.com",
"link": {"manager": "Big.Boss"}
}
]
}
}
<personnel>
<person>
<id>1</id>
<name>
<family>Worker</family>
<given>One</given>
</name>
<email>one@oxygenxml.com</email>
<link>
<manager>Big.Boss</manager>
</link>
</person>
<person>
<id>2</id>
<name>
<family>Worker</family>
<given>Two</given>
</name>
<email>two@oxygenxml.com</email>
<link>
<manager>Big.Boss</manager>
</link>
</person>
</personnel>

JSON to XML Conversion Details

- A <JSON> element is added as root if the converted JSON has multiple properties on the first level

```
{
  "person": "one",
  "id": "personnel-id"
}
```

```
<JSON>
  <person>one</person>
  <id>personnel-id</id>
</JSON>
```

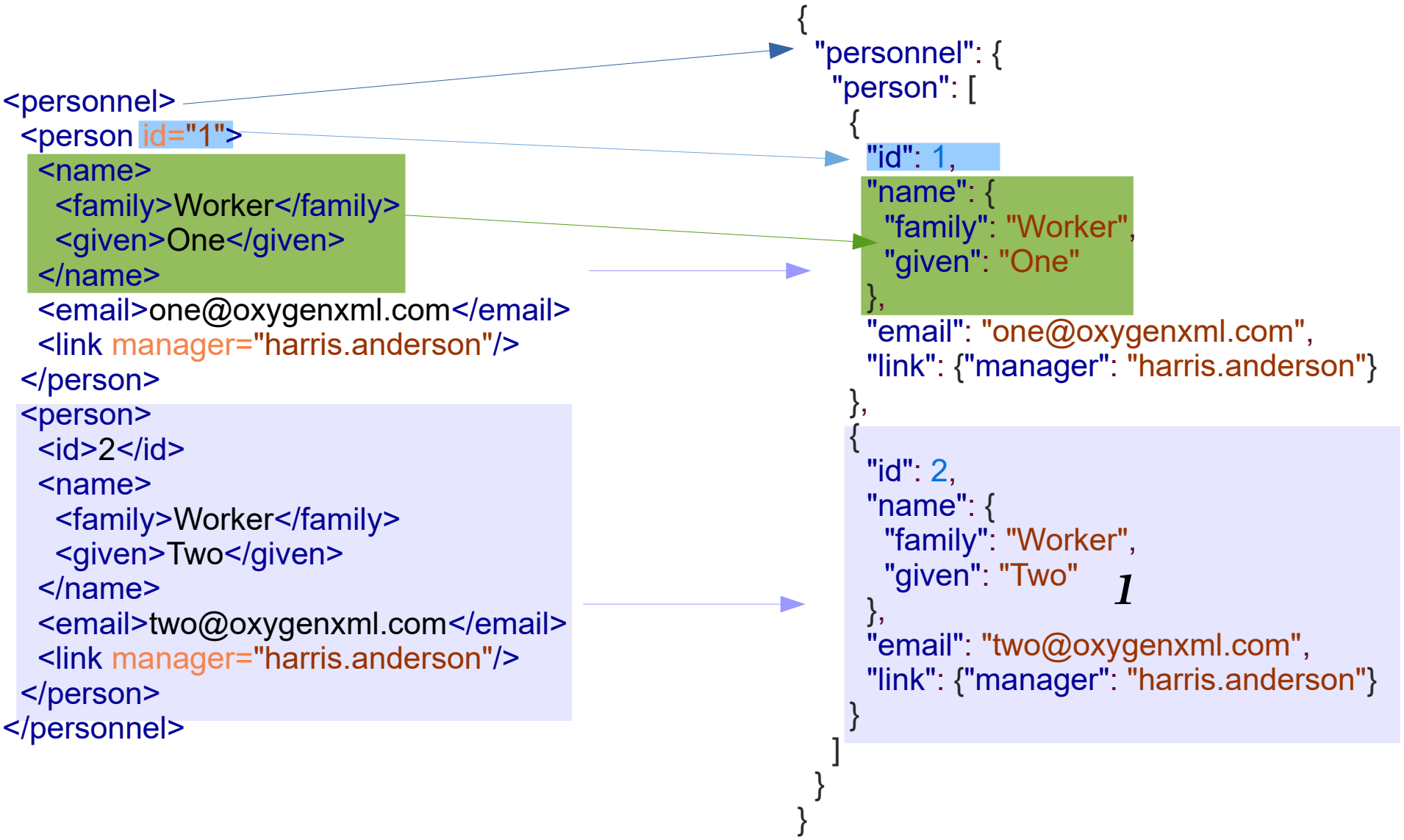
- An <array> element is added as root if the converted JSON is an array

```
[
  {"name": "Boss"},
  {"name": "Worker"}
]
```

```
<array>
  <array>
    <name>Boss</name>
  </array>
  <array>
    <name>Worker</name>
  </array>
</array>
```

oxygenxml.com/doc/ug-editor/topics/convert-JSON-to-XML-x-tools.html

XML to JSON


<personnel>
<person id="1">
<name>
<family>Worker</family>
<given>One</given>
</name>
<email>one@oxygenxml.com</email>
<link manager="harris.anderson"/>
</person>
<person>
<id>2</id>
<name>
<family>Worker</family>
<given>Two</given>
</name>
<email>two@oxygenxml.com</email>
<link manager="harris.anderson"/>
</person>
</personnel>
{
"personnel": {
"person": [
{
"id": 1,
"name": {
"family": "Worker",
"given": "One"
},
"email": "one@oxygenxml.com",
"link": {"manager": "harris.anderson"}
},
{
"id": 2,
"name": {
"family": "Worker",
"given": "Two"
},
"email": "two@oxygenxml.com",
"link": {"manager": "harris.anderson"}
}
]
}
}

XML to JSON Conversion Details

- XML attributes are converted to properties

```
<person id="1"/>
```

```
{"person": {"id": 1}}
```

- Multiple elements with the same name are converted into an array

```
<person>One</person>
<person>Two</person>
```

```
"person": ["One","Two"]
```

- Text in mixed content will be converted in a **#text** property

```
<p>This is an <b>example</b>!</p>
```

```
p": {"#text": "This is an",
    "b": "example",
    "#text1": "!"}
```

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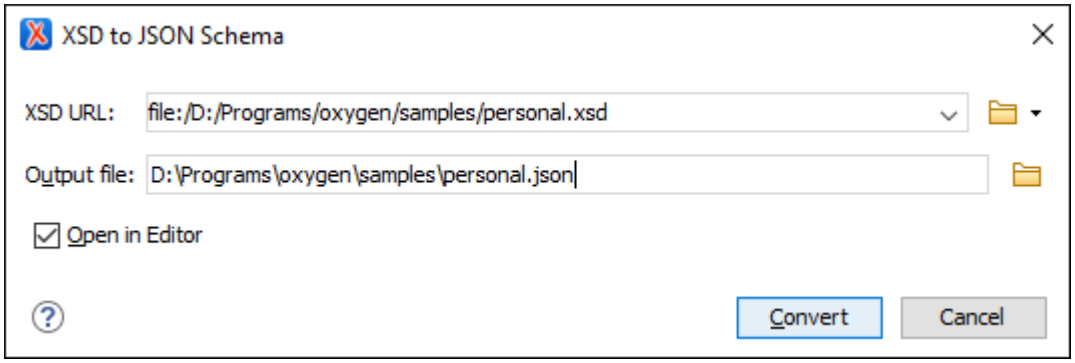
XSD to JSON Schema converter

- Tool for converting an XML Schema file (XSD) to a JSON Schema



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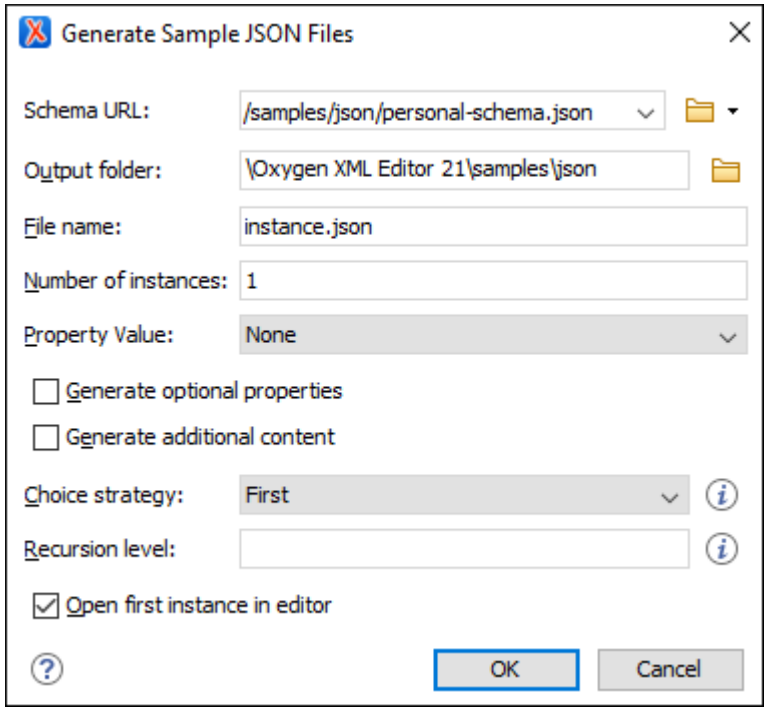
Instance generator from a JSON Schema

- Tool for generating sample JSON files from a JSON Schema



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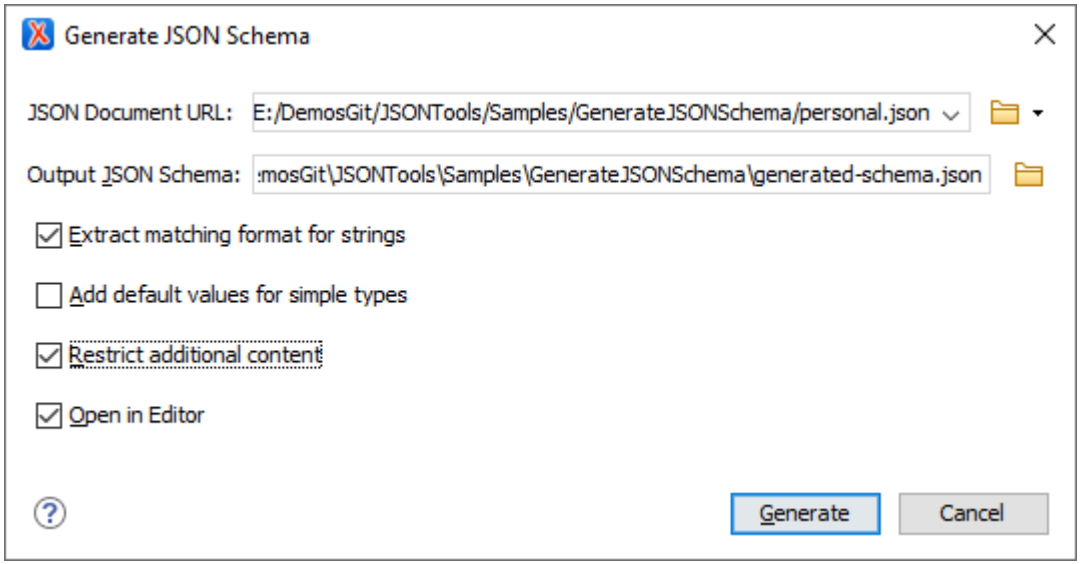
Generate JSON Schema from JSON instance

- Tool for generating JSON Schema



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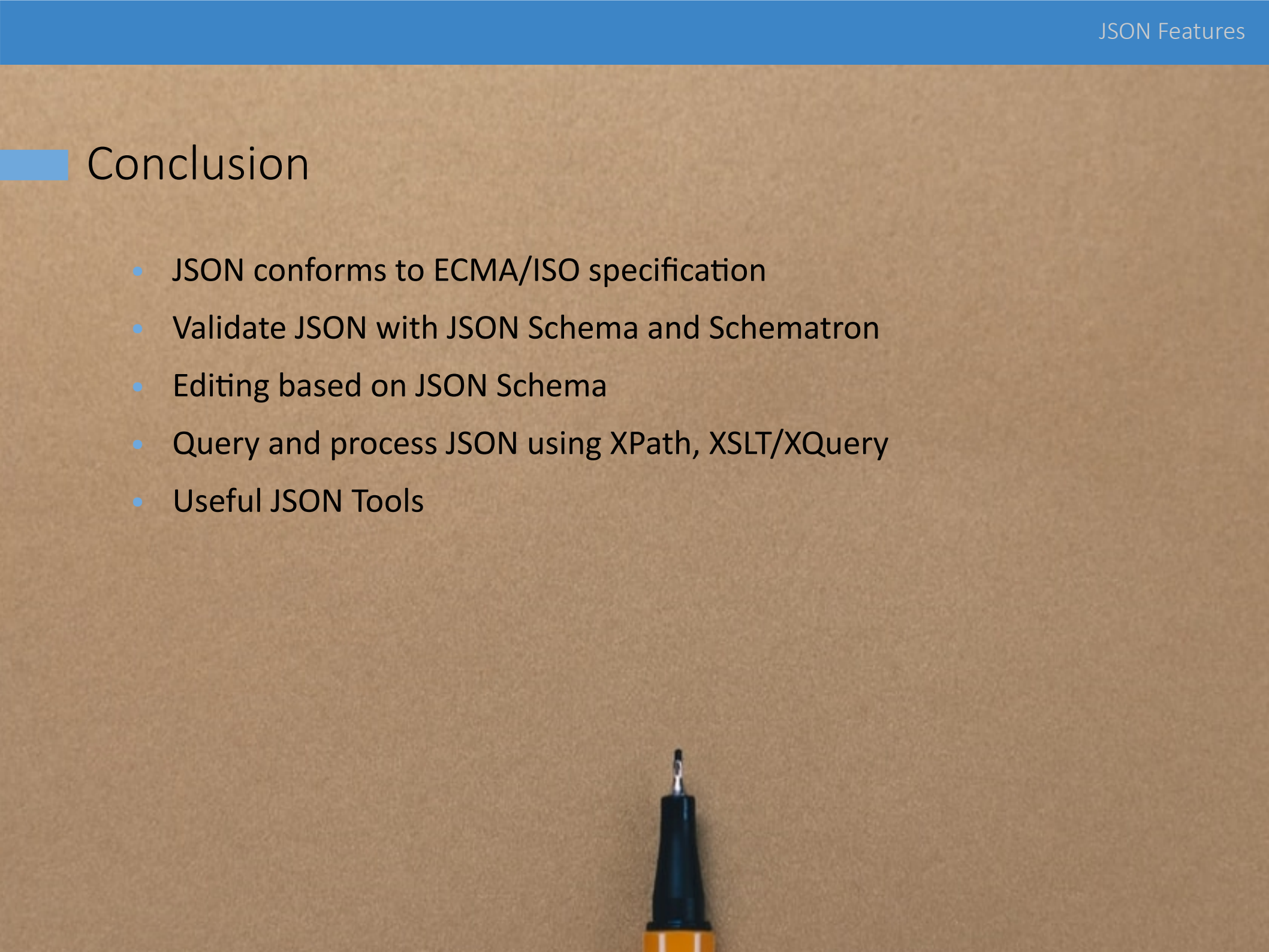
Conclusion

- JSON conforms to ECMA/ISO specification
- Validate JSON with JSON Schema and Schematron
- Editing based on JSON Schema
- Query and process JSON using XPath, XSLT/XQuery
- Useful JSON Tools



Questions?

Octavian Nadolu
Software Architect at Syncro Soft

octavian.nadolu@oxygenxml.com
Twitter: @OctavianNadolu
LinkedIn: octaviannadolu