Newspaper Digitisation

Policy driven validation of JPEG 2000 files based on Jpylyzer

Rune Bruun Ferneke-Nielsen

State and University Library, Denmark

SCAPE Information Day
State and University Library, Denmark, June 25th 2014

Agenda

- Newspaper Digitisation Project
- User Story & Experiment
- Results

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Newspaper Digitisation Project

- Preservation of Danish cultural heritage
- 32 million pages scanned from microfilm
- Quality assurance of digitised pages
- Online access through Mediestream

- Project Period: 2013 - 2016
- State and University Library, Denmark
- Ninestars Information Technologies Ltd, India

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

User Story

Validation of Archival Content Against an Institutional Policy

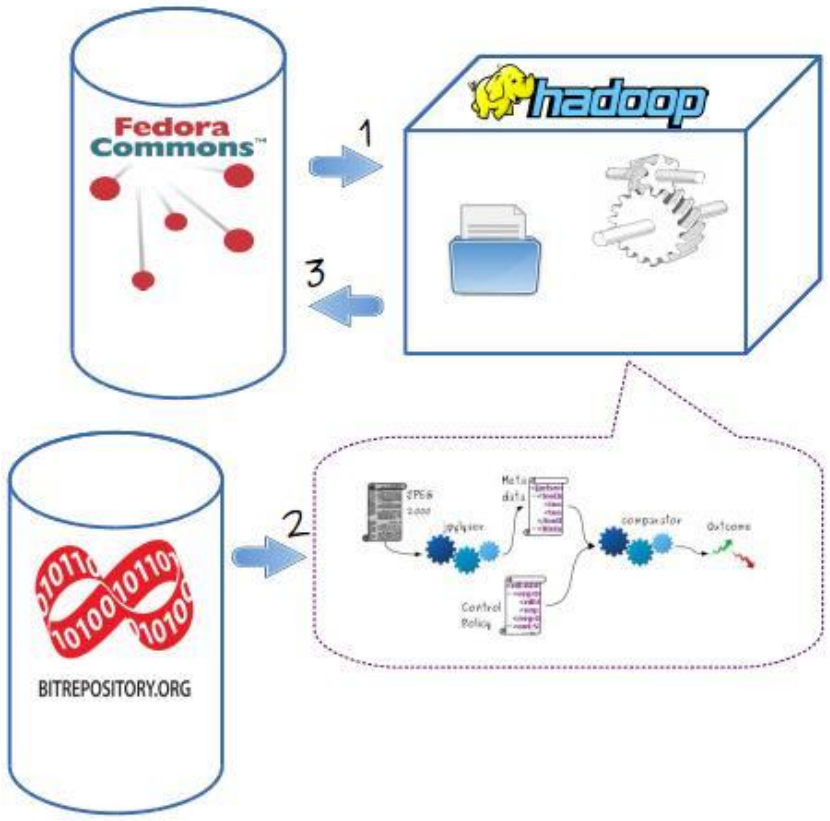
As a memory institution, we want

- content in our repositories to conform to the corresponding file format specification
- the file format profile to conform to our institutional policies

So that our content - existing as well as future - always has the appropriate quality as specified by the file format specification and our institutional policies.

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Experiment



1. Extracting metadata from Fedora-based repository
2. Performing quality assurance on Hadoop platform
3. Storing metadata into Fedora-based repository

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Extracting metadata from Fedora-based repository

- Stager component input

```
uuid:723110d9-c76d-4e1b-870d-4968c3ebdf51
uuid:1c0194a3-c5af-4b40-b140-5ac64cfa43af
uuid:ef88a6b3-2ce3-4dd5-b0c7-8bebe1656aa5
uuid:d7183549-f108-40a3-81a8-704114667174
uuid:548a7a25-82d6-47b5-9e14-eae3adabd423
```

- Using Stager component
  - Reading DOMS objects

- Using sequence file
  - Sequence files are flat files consisting of key/value pairs

key	value
uuid:723110d9-c76d-4e1b-870d-4968c3ebdf51	<metadata>
uuid:1c0194a3-c5af-4b40-b140-5ac64cfa43af	<metadata>
uuid:ef88a6b3-2ce3-4dd5-b0c7-8bebe1656aa5	<metadata>
uuid:d7183549-f108-40a3-81a8-704114667174	<metadata>
uuid:548a7a25-82d6-47b5-9e14-eae3adabd423	<metadata>

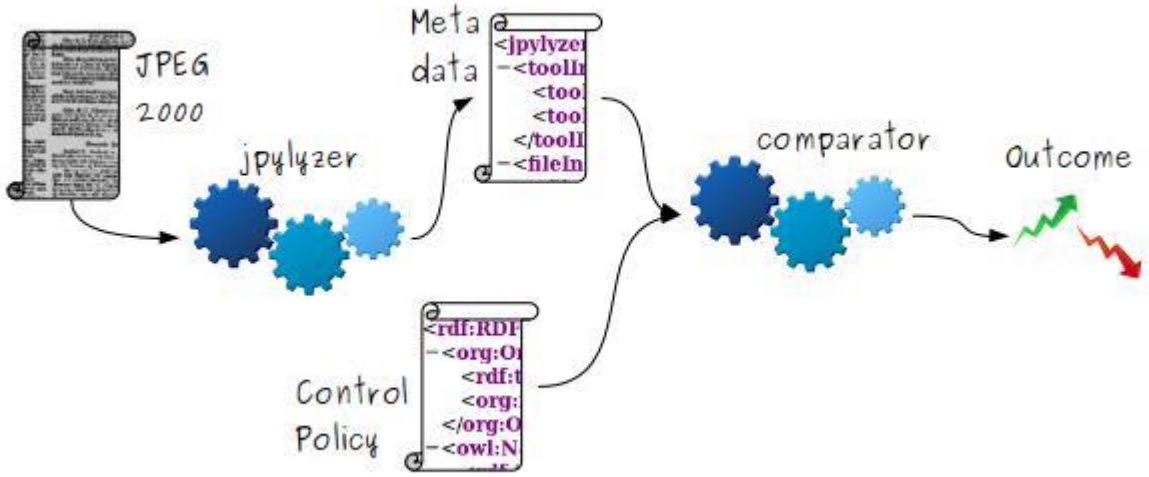
This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

METS Document from DOMS

```xml
<?xml version='1.0' encoding='UTF-8'?>
<mets:mets xmlns:mets="http://www.loc.gov/METS/" xmlns:xlink="http://www.w3.org/1999/xlink"
    xmlns:scape="http://scape-project.eu/model" xmlns:dc="http://purl.org/dc/elements/1.1/"
    xmlns:premis="info:lc/xmlns/premis-v2" xmlns:textmd="info:lc/xmlns/textmd-v3"
    xmlns:fits="http://hul.harvard.edu/ois/xml/ns/fits/fits_output"
    xmlns:ns9="http://www.loc.gov/mix/v20" xmlns:gbs="http://books.google.com/gbs"
    xmlns:vmd="http://www.loc.gov/videoMD/" xmlns:ns12="http://www.loc.gov/audioMD/"
    xmlns:marc="http://www.loc.gov/MARC21/slim" ID="uuid:ba6865e5-7682-4cc0-8e80-0f1ccac3c027"
    OBJID="ba6865e5-7682-4cc0-8e80-0f1ccac3c027" PROFILE="scape">
    <mets:metsHdr RECORDSTATUS="NEW" />
    <mets:dmdSec ID="DMD-3f4117c1-dedd-4598-9195-f736b78705eb">
        <mets:mdWrap MDTYPE="Other">
            <mets:xmlData />
        </mets:mdWrap>
    </mets:dmdSec>
    <mets:dmdSec ID="DMD-0273b15f-a3f5-4484-b773-357551800ffa">
        <mets:mdWrap MDTYPE="OTHER">
            <mets:xmlData>
                <scape:versionMD version-number="1" />
            </mets:xmlData>
        </mets:mdWrap>
    </mets:dmdSec>
    <mets:amdSec>
        <mets:techMD
            ID="TMD-ba6865e5-7682-4cc0-8e80-0f1ccac3c028-SCAPE_REPRESENTATION_TECHNICAL">
            <mets:mdWrap MDTYPE="OTHER">
                <mets:xmlData />
            </mets:mdWrap>
        </mets:techMD>
        <mets:techMD
            ID="TMD-ba6865e5-7682-4cc0-8e80-0f1ccac3c029-SCAPE_FILE_TECHNICAL">
            <mets:mdWrap MDTYPE="OTHER">
                <mets:xmlData />
            </mets:mdWrap>
        </mets:techMD>
    </mets:amdSec>
    <mets:fileSec>
        <mets:fileGrp>
            <mets:file ID="ba6865e5-7682-4cc0-8e80-0f1ccac3c029"
                SEQ="0"
                ADMID="TMD-ba6865e5-7682-4cc0-8e80-0f1ccac3c029-SCAPE_FILE_TECHNICAL"
                MIMETYPE="image/jp2">
                <mets:FLocat
                    xlink:href="src/test/resources/sample/adresseavisen1759-1795-06-13-01-0006.jp2"
                    xlink:title="adresseavisen1759-1795-06-13-01-0006.jp2" LOCTYPE="URL" />
            </mets:file>
        </mets:fileGrp>
    </mets:fileSec>
    <mets:structMap>
        <mets:div TYPE="Intellectual entity">
            <mets:div ID="ba6865e5-7682-4cc0-8e80-0f1ccac3c028"
                ADMID="TMD-ba6865e5-7682-4cc0-8e80-0f1ccac3c028-SCAPE_REPRESENTATION_TECHNICAL"
                TYPE="Representation" xlink:label="">
                <mets:fptr FILEID="ba6865e5-7682-4cc0-8e80-0f1ccac3c029" />
            </mets:div>
        </mets:div>
    </mets:structMap>
</mets:mets>
```

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Performing quality assurance on Hadoop platform



- running Jpylyzer
- comparing profile against control policy

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Control Policy

```
<rdf:RDF xml:base="http://www.statsbiblioteket.dk/policies/">
  <org:Organization rdf:about="danish_state_and_university_library">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#NamedIndividual"/>
    <org:identifier>The Danish State and University Library</org:identifier>
  </org:Organization>
  <owl:NamedIndividual rdf:about="danish_newspapers">
    <rdf:type rdf:resource="http://purl.org/DP/preservation-case#ContentSet"/>
  </owl:NamedIndividual>
  <owl:NamedIndividual rdf:about="danish_newspapers_scenario">
    <rdf:type rdf:resource="http://purl.org/DP/preservation-case#PreservationCase"/>
    <skos:prefLabel>Danish newspapers</skos:prefLabel>
    <!-- Colour space test -->
    <preservation-case:hasObjective rdf:resource="ColourSpaceAttribute_meth_MustBeEnumerated"/>
    <preservation-case:hasObjective rdf:resource="ColourSpaceAttribute_enumCS_MustBeGreyscale"/>
    <!-- Colour depth test -->
    <preservation-case:hasObjective rdf:resource="ColourDepthAttribute_bPCDepth_MustBe8"/>
    <preservation-case:hasUserCommunity rdf:resource="researchers"/>
    <preservation-case:hasContentSet rdf:resource="danish_newspapers"/>
  </owl:NamedIndividual>
  <owl:NamedIndividual rdf:about="ColourSpaceAttribute_meth_MustBeEnumerated">
    <rdf:type rdf:resource="http://purl.org/DP/control-policy#FORMAT_OBJECTIVE"/>
    <skos:prefLabel>Colour space attribute 'meth' must be 'Enumerated'</skos:prefLabel>
    <control-policy:value rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Enumerated</control-policy:value>
    <control-policy:measure rdf:resource="http://purl.org/DP/quality/measures#18"/>
    <preservation-case:contentSetScope rdf:resource="danish_newspapers"/>
    <control-policy:modality rdf:resource="http://purl.org/DP/control-policy/modalities#MUST"/>
  </owl:NamedIndividual>
  <owl:NamedIndividual rdf:about="ColourSpaceAttribute_enumCS_MustBeGreyscale">
    <rdf:type rdf:resource="http://purl.org/DP/control-policy#FORMAT_OBJECTIVE"/>
    <skos:prefLabel>
      Colour space attribute 'enumCS' must be 'greyscale'
    </skos:prefLabel>
    <control-policy:value rdf:datatype="http://www.w3.org/2001/XMLSchema#string">greyscale</control-policy:value>
    <control-policy:measure rdf:resource="http://purl.org/DP/quality/measures#19"/>
    <preservation-case:contentSetScope rdf:resource="danish_newspapers"/>
    <control-policy:modality rdf:resource="http://purl.org/DP/control-policy/modalities#MUST"/>
  </owl:NamedIndividual>
  <owl:NamedIndividual rdf:about="ColourDepthAttribute_bPCDepth_MustBe8">
    <rdf:type rdf:resource="http://purl.org/DP/control-policy#FORMAT_OBJECTIVE"/>
    <skos:prefLabel>Colour depth attribute 'bPCDepth' must be '8'</skos:prefLabel>
    <control-policy:value rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">8</control-policy:value>
    <control-policy:measure rdf:resource="http://purl.org/DP/quality/measures#20"/>
    <preservation-case:contentSetScope rdf:resource="danish_newspapers"/>
    <control-policy:modality rdf:resource="http://purl.org/DP/control-policy/modalities#MUST"/>
  </owl:NamedIndividual>
  <foaf:Group rdf:about="researchers">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#NamedIndividual"/>
  </foaf:Group>
</rdf:RDF>
```

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Jpylyzer Metadata

```
<mets:amdSec>
    <mets:techMD
        ID="TMD-uuid:ba6865e5-7682-4cc0-8e80-0f1ccac3c028-uuid:ba6865e5-7682-4cc0-8e80-0f1ccac3c029-jpylyzer">
        <mets:mdWrap MDTYPE="OTHER">
            <mets:xmlData>
                <jpylyzer>
                    <toolInfo>
                        <toolName>jpylyzer.py</toolName>
                        <toolVersion>1.10.1</toolVersion>
                    </toolInfo>
                    <fileInfo>
                        <fileName>adresseavisen1759-1795-06-13-01-0006.jp2</fileName>
                        <filePath>/home/runi/development/scape-jp2-experiment/src/test/resources/sample/adresseavisen1759-1795-06-13-01-0006.jp2
                        </filePath>
                        <fileSizeInBytes>3662332</fileSizeInBytes>
                        <fileLastModified>Fri Jan 24 13:36:13 2014</fileLastModified>
                    </fileInfo>
                    <isValidJP2>True</isValidJP2>
                    <tests />
                    <properties>
                        <signatureBox />
                        <fileTypeBox>
                            <br>jp2 </br>
                            <minV>0</minV>
                            <cL>jp2 </cL>
                        </fileTypeBox>
                        <jp2HeaderBox>
                            <imageHeaderBox>
                                <height>2859</height>
                                <width>2312</width>
                                <nC>1</nC>
                                <bPCSign>unsigned</bPCSign>
                                <bPCDepth>8</bPCDepth>
                                <c>jpeg2000</c>
                                <unkC>yes</unkC>
                                <iPR>no</iPR>
                            </imageHeaderBox>
                            <colourSpecificationBox>
                                <meth>Enumerated</meth>
                                <prec>0</prec>
                                <approx>0</approx>
                                <enumCS>greyscale</enumCS>
                            </colourSpecificationBox>
                            <resolutionBox>
                                <captureResolutionBox>
                                    <vRcN>30000</vRcN>
                                    <vRcD>254</vRcD>
                                    <hRcN>30000</hRcN>
                                    <hRcD>254</hRcD>
                                    <vRcE>2</vRcE>
                                    <hRcE>2</hRcE>
                                    <vRescInPixelsPerMeter>11811.02</vRescInPixelsPerMeter>
                                    <hRescInPixelsPerMeter>11811.02</hRescInPixelsPerMeter>
                                    <vRescInPixelsPerInch>300.0</vRescInPixelsPerInch>
                                    <hRescInPixelsPerInch>300.0</hRescInPixelsPerInch>
                                </captureResolutionBox>
                            </resolutionBox>
                        </jp2HeaderBox>
                        <contiguousCodestreamBox>
                            <siz>
                                <lsiz>41</lsiz>
                                <rsiz>ISO/IEC 15444-1</rsiz>
                                <xsiz>2312</xsiz>
                                <ysiz>2859</ysiz>
                                <xOsiz>0</xOsiz>
                                <yOsiz>0</yOsiz>
                                <xTsiz>1024</xTsiz>
                                <yTsiz>1024</yTsiz>
```

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

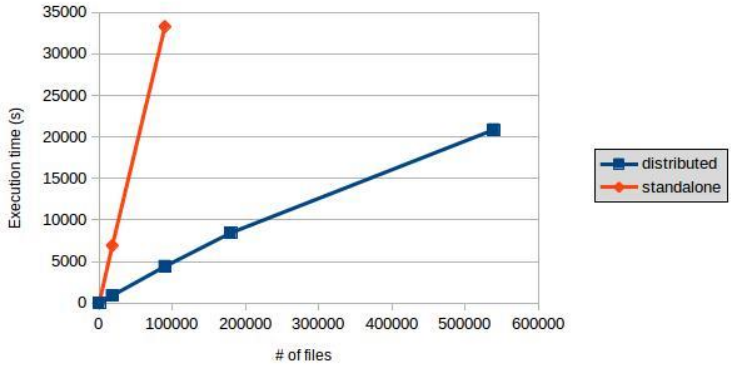
Storing metadata into Fedora-based repository

- Using Loader component
  - Updating DOMS objects

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Results

- Stager timings
  - work in progress
- Validation timings



- Loader timings
  - work in progress

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).

Resources

- Newspaper Digitisation Project:
  http://en.statsbiblioteket.dk/national-library-division/newspaper-digitisation/newspaper-digitization
- State and University Library:
  http://en.statsbiblioteket.dk/
- Ninestars Information Technologies Ltd:
  http://ninestar.co.in/

- Control Policy Driven Validation Experiment:
  http://wiki.opf-labs.org/display/SP/Validate+JPEG2000+Newspapers+Using+Jpylyzer

- DOMS, fedora-based repository:
  http://www.fedora-commons.org/
- BITMAGASIN, BitRepository:
  http://digitalbevaring.dk/det-nationale-bitmagasin/
  https://sbforge.org/display/BITMAG/The+Bit+Repository+project
- Apache Hadoop:
  http://hadoop.apache.org/
- Jpylyzer:
  https://github.com/openplanets/jpylyzer

- METS schema standard:
  http://www.loc.gov/standards/mets/
- JPEG2000:
  http://www.jpeg.org/jpeg2000/
- SCAPE Control Policy:
  http://wiki.opf-labs.org/display/SP/Catalogue+of+Preservation+Policy+Elements

This work was partially supported by the SCAPE Project.
The SCAPE project is co-funded by the European Union under FP7 ICT-2009.4.1 (Grant Agreement number 270137).