SISS Workshop
GeoServer in Production – SISS Exemplar

Pavel Golodoniuc
Technical Team Lead
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Highlights

- Process overview
- Configuring a WFS
  - Data mapping
  - Interface to the data
  - WFS configuration
Goal – Interoperable Data Delivery

XML Document

Existing database
Simple vs. Complex features in GeoServer

Simple features
SF Level 0

Complex features
SF Level 1

VS.

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Preserving Original Database Schema

Existing database

- ER_MINERAL_OCCURRENCE
- ER_COMPOSITION
- ER_RESOURCE

app-schema

Complex feature
Data Mapping Process

• Data requirements
  • Requires domain and database knowledge

• Logical data mapping
  • Yields a data mapping document (Excel spreadsheet)

• Data facade implementation
  • Involves SQL programming
  • Conflict resolution

• Physical data mapping
  • GeoServer configuration
Logical Mapping

Spreadsheet data mapping template

<table>
<thead>
<tr>
<th>Property</th>
<th>Mandatory</th>
<th>Present</th>
<th>Mapped</th>
<th>DB Field</th>
<th>Comments</th>
<th>Developer's Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>COMMODITIES_NAME</td>
<td>Sites.COMMODITIES.COMMODITY = [SITE_CODE] [COMMODITIES.COMMODITY]</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>[SITE_CODE] [COMMODITIES.COMMODITY]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID (for grid identifier)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>PRODUCT.COMMODITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category Group</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>SITES.COMMODITY_GROUPS.COMMODITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category Name</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>COMMODITIES_NAME</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance</td>
<td>N</td>
<td>N</td>
<td></td>
<td>SITES.COMMODITIES.RANKING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>SITES_SITE_CODE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DATA REQUIREMENTS
LOGICAL MAPPING
DATA FACADE IMPLEMENTATION
PHYSICAL MAPPING
```sql
CREATE OR REPLACE FORCE VIEW "NTGS"."VW_ER_COMMODITY"
AS
WITH F AS
(
SELECT
  c."Deposit_Id", c."Commodity_Id",
  'http://www.minerals.nt.gov.au/resource/feature/ntgs/commodity/' || c."Deposit_Id" || '/' || c."Commodity_Id" AS GML_NAME,
  'http://www.ietf.org/rfc/rfc2616' AS GML_NAME_CODESPACE,
FROM NTGS."Tbl_Commodity_Summary" c
UNION ALL
SELECT
  c."Deposit_Id", c."Commodity_Id",
  c."Commodity" AS GML_NAME,
  'http://www.minerals.nt.gov.au/ntgs' AS GML_NAME_CODESPACE,
  NULL AS MINOCC_FEATURE_LINK
FROM NTGS."Tbl_Commodity_Summary" c
)

SELECT
  'er.commodity.' || c."Deposit_Id" || '.' || c."Commodity_Id" AS GML_ID,
  F.GML_NAME, F.GML_NAME_CODESPACE,
  'urn.ga_urn' AS COMMODITYNAME,
  'urn:cgi:classifierScheme:GA:commodity' AS COMMODITYNAME_CODESPACE,
  COALESCE(gd."Mineral_Categories", "urn:ogc:def:nil:OGC::missing") AS COMMODITYGROUP,
  'http://www.minerals.nt.gov.au/ntgs' AS COMMODITYGROUP_CODESPACE,
  COALESCE(LOWER(c."Major_Minor"), "major") AS COMMODITYIMPORTANCE,
  'http://www.minerals.nt.gov.au/resource/feature/ntgs/mineraloccurrence/' || c."Deposit_Id" AS SOURCE_URN,
  F.MINOCC_FEATURE_LINK
FROM NTGS."Tbl_Commodity_Summary" c
INNER JOIN F ON F."Deposit_Id" = c."Deposit_Id" AND F."Commodity_Id" = c."Commodity_Id"
LEFT OUTER JOIN NTGS."Tbl_General_Data" gd ON gd."Deposit_Id" = c."Deposit_Id"
LEFT OUTER JOIN NTGS.TBL_COMMODITY_URN urn ON urn.commodity = c."Commodity"
ORDER BY c."Deposit_Id", c."Commodity_Id";
```
CREATE VIEW [dbo].[VW_ER_COMMODITY] AS
SELECT
    'er.commodity.' + unpvt.SITE_CODE + '.' + CAST(unpvt.COMM_ID AS VARCHAR(10)) AS GML_ID,
    unpvt.GML_NAME,
    CASE
        WHEN unpvt.GML_NAME_SRC = 'GML_NAME_1' THEN GML_NAME_CODESPACE_1
        ELSE GML_NAME_CODESPACE_2
    END AS GML_NAME_CODESPACE,
    'urn:cgi:classifier:GA:commodity:' + COALESCE(ga.GA_TERM, 'UN') AS COMMODITYNAME,
    'urn:cgi:classifierScheme:GA:commodity' AS COMMODITYNAME_CODESPACE,
    unpvt.COMMODITYGROUP AS COMMODITYGROUP,
    unpvt.RANKING AS COMMODITYRANK,
    'http://services-test.auscope.org/resource/feature/gswa/mineraloccurrence/' + unpvt.SITE_CODE AS SOURCE_URI,
    CASE
        WHEN unpvt.GML_NAME_SRC = 'GML_NAME_1' THEN MINOCC_FEATURE_LINK_1
        ELSE MINOCC_FEATURE_LINK_2
    END AS MINOCC_FEATURE_LINK
FROM
    (SELECT
        F.SITE_CODE,
        F.COMM_ID,
        CONVERT(VARCHAR(255), 'http://services-test.auscope.org/resource/feature/gswa/commodity/' + F.SITE_CODE + '/' + CAST(F.COMM_ID AS VARCHAR(10)))) AS GML_NAME_1,
    CONVERT(VARCHAR(50), 'http://www.ietf.org/rfc/rfc2616') AS GML_NAME_CODESPACE_1,
    'http://services-test.auscope.org/resource/feature/gswa/mineraloccurrence/' + F.SITE_CODE AS MINOCC_FEATURE_LINK_1,
    CONVERT(VARCHAR(255), c.NAME) AS GML_NAME_2,
    CONVERT(VARCHAR(50), 'http://www.dmp.wa.gov.au/371.aspx') AS GML_NAME_CODESPACE_2,
    NULL AS MINOCC_FEATURE_LINK_2,
    F.RANKING,
    cg.NAME AS COMMODITYGROUP
FROM
    (SELECT
        sc.SITE_CODE, sc.COMM_ID, MIN(RANKING) AS RANKING
    FROM
        XMLDEV.MINEDEX.dbo.SITES_COMMODITIES sc
    GROUP BY sc.SITE_CODE, sc.COMM_ID
    UNION
    SELECT
        re.SITE_CODE, rc.COMM_ID, NULL AS RANKING
    FROM
        XMLDEV.MINEDEX.dbo.RESOURCE_COMMODITIES rc
    INNER JOIN XMLDEV.MINEDEX.dbo.RESOURCE_ESTIMATES re ON re.RESE_ID = rc.RESE_ID
    GROUP BY re.SITE_CODE, rc.COMM_ID
    UNION
    SELECT
        ps.SITE_CODE, psc.COMM_ID, NULL AS RANKING
    FROM
        XMLDEV.MINEDEX.dbo.PRODUCTION_SITE_COMMODITIES psc
    INNER JOIN XMLDEV.MINEDEX.dbo.PRODUCTION_SITES ps ON ps.PROS_ID = psc.PROS_ID
    GROUP BY ps.SITE_CODE, psc.COMM_ID
) T
INNER JOIN dbo.VW_ER_MINERALOCCURRENCE mo ON mo.SITE_ID = T.SITE_CODE
GROUP BY T
) pvt
UNPIVOT (GML_NAME FOR GML_NAME_SRC IN (pvt.GML_NAME_1, pvt.GML_NAME_2)) AS unpvt
LEFT OUTER JOIN XMLDEV.MINEDEX.dbo.GS_LOOKUP_COMMODITY_GA_TERMS ga ON ga.COMM_ID = unpvt.COMM_ID;
Physical Data Mapping in GeoServer

• Physical data mapping process relates to an actual configuration of GeoServer

• Complexity of the physical mapping depends on the complexity of the information model used

• Leads to the final testing and validation phase according to specific use cases
Other Aspects

- Feature chaining
  - Nested properties
  - Multi-valued properties
- Polymorphism
- Specialised information model profiles
  - Inline or byReference encoding of feature properties
- Performance considerations
- Configurability
  - Property interpolation
  - JNDI Connection Pool
- Resolution of persistent identifiers
- Data integrity tests for data stores
Data Integrity Tests

- Basic consistency checks
- Integrity of feature types relationships
  - Important when using features chained attributes
- Orphaned records search
- Etc.
### EarthResourceML Data Integrity Test Report

<table>
<thead>
<tr>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NI values in er:Commodity/gml:name</td>
<td>Passed</td>
</tr>
<tr>
<td>2 NI values in er:Mine/gml:name</td>
<td>Passed</td>
</tr>
<tr>
<td>3 NI values in er:MineralOccurrence/gml:name</td>
<td>Passed</td>
</tr>
<tr>
<td>4 NI values in er:MiningActivity/gml:name</td>
<td>Passed</td>
</tr>
<tr>
<td>5 NI values in er:MiningFeatureOccurrence/gml:name</td>
<td>Passed</td>
</tr>
<tr>
<td>6 NI value in gml:MappedFeature/gml:name</td>
<td>Passed</td>
</tr>
<tr>
<td>7 Links in er:Commodity/er:resource</td>
<td>10923 violation(s)</td>
</tr>
<tr>
<td>8 Links in er:Mine/er:occurrence</td>
<td>Passed</td>
</tr>
<tr>
<td>9 Links in er:MineralOccurrence/gml:occurrence</td>
<td>Passed</td>
</tr>
<tr>
<td>10 Links in er:MiningActivity/er:occurrence</td>
<td>Passed</td>
</tr>
<tr>
<td>11 Links in er:MiningActivity/er:associatedMine</td>
<td>Passed</td>
</tr>
<tr>
<td>12 Links in er:MiningActivity/er:deposit</td>
<td>Passed</td>
</tr>
<tr>
<td>13 Links in er:MiningFeatureOccurrence/er:specification</td>
<td>Passed</td>
</tr>
<tr>
<td>14 Links in er:CommodityMeasure/er:commodityOfInterest</td>
<td>Passed</td>
</tr>
<tr>
<td>15 Links in er:Nine/er:relatedMine</td>
<td>Passed</td>
</tr>
<tr>
<td>16 Links in gml:MappedFeature/gml:specification</td>
<td>Passed</td>
</tr>
<tr>
<td>17 Links in er:Product/er:resourceCommodity</td>
<td>Passed</td>
</tr>
<tr>
<td>18 Orphaned er:Product records</td>
<td>4007 violation(s)</td>
</tr>
<tr>
<td>19 Orphaned er:EarthResourceMaterial records</td>
<td>18 violation(s)</td>
</tr>
<tr>
<td>20 Orphaned er:MineralDepositModel records</td>
<td>Passed</td>
</tr>
<tr>
<td>21 Orphaned er:MineralOccurrence/er:expression records</td>
<td>11 violation(s)</td>
</tr>
<tr>
<td>22 Orphaned er:MineralOccurrence/er:form records</td>
<td>15 violation(s)</td>
</tr>
<tr>
<td>23 Orphaned er:MineralOccurrence/er:planOrientation records</td>
<td>Passed</td>
</tr>
<tr>
<td>24 Orphaned er:MineralOccurrence/er:shape records</td>
<td>1 violation(s)</td>
</tr>
<tr>
<td>25 Orphaned er:Reserve records</td>
<td>76 violation(s)</td>
</tr>
<tr>
<td>26 Orphaned er:Resource records</td>
<td>181 violation(s)</td>
</tr>
<tr>
<td>27 Orphaned er:CommodityMeasure records</td>
<td>Passed</td>
</tr>
<tr>
<td>28 Orphaned er:Resource records</td>
<td>492 violation(s)</td>
</tr>
</tbody>
</table>
CREATE PROCEDURE [dbo].[DataIntegrityTest]
AS
BEGIN

SELECT     'Nil values in er:Commodity/gml:name' AS Description,
           ISNULL(CAST(NULLIF(COUNT(1), 0) AS VARCHAR(10)) + ' violation(s)', 'Passed') AS Result
FROM dbo.ER_COMMODITY a
WHERE a.GML_NAME IS NULL OR a.GML_NAME LIKE 'urn:ogc:def:nil:%' OR a.GML_NAME LIKE 'http://www.opengis.net/def/nil/%'

UNION ALL /* Omitted for simplicity... */

UNION ALL

SELECT     'Links in er:Mine/er:occurrence',
           ISNULL(CAST(NULLIF(COUNT(1), 0) AS VARCHAR(10)) + ' violation(s)', 'Passed')
FROM dbo.ER_MINE a
LEFT OUTER JOIN dbo.ER_MININGFEATUREOCCURRENCE b ON b.GML_NAME = a.OCCURRENCE_URI
WHERE b.GML_ID IS NULL

UNION ALL /* Omitted for simplicity... */

UNION ALL

SELECT     'Links in er:MineralOccurrence/gsml:occurrence',
           ISNULL(CAST(NULLIF(COUNT(1), 0) AS VARCHAR(10)) + ' violation(s)', 'Passed')
FROM dbo.ER_MINERALOCCURRENCE a
LEFT OUTER JOIN dbo.GSML_MAPPEDFEATURE b ON b.GML_NAME = a.OCCURRENCE_URI
WHERE b.GML_ID IS NULL

END
Useful Resources

- **Property Interpolation**
  - https://www.seegrid.csiro.au/wiki/bin/view/Siss/GeoserverInProduction#Property_Interpolation

- **JNDI Connection Pool**

- **Materialising views**
  - Materialisation routines and refresh policy
  - Indices
  - https://www.seegrid.csiro.au/wiki/bin/view/Siss/GeoserverInProduction#Materialised_Views

- **Data integrity test sample** *
  - https://www.seegrid.csiro.au/wiki/bin/view/Siss/GeoserverInProduction#Data_Integrity_Test_Sample

* Data integrity test provided here is a sample only and is intended to be used with GSWA mineral occurrence data.
CSIRO Earth Science and Resource Engineering
Pavel Golodoniuc
Technical Team Lead

Phone: 08 6436 8776
Email: Pavel.Golodoniuc@csiro.au
Web: www.csiro.au/cesre

Thank you