Extensible ArcMap WPS Client

Esri European User Conference 2015

Salzburg, 15th October 2015

Benjamin Pross, 52°North GmbH
Christoph Stasch, 52°North GmbH
What is WPS?
Why Standards?

- Models/
- Simulations
OGC Services

- **WMS**
  - Maps as Images
  - (jpg, tiff, …)

- **WCS**
  - Coverages
  - (geoTiff, netCDF, …)

- **WFS**
  - Vector Data
  - (GML, shp)

- **SOS**
  - Observations
  - (O&M, SweCommon, …)

- **WPS**
  - Geoprocesses, Simulations, …

ArcMap WPS Client
OGC Web Processing Service (WPS)

- OGC Standard since late 2007 (Version 1.0), Version 2.0 released in 2015
  
  http://www.opengeospatial.org/standards/wps

- Standardized service interface to publish and execute geospatial processes over the web
  - How to describe process offerings
  - How to describe input/output parameters
  - No processes are specified

- Supported Processes
  - Simple geometric calculations (e.g. intersect algorithm)
  - Complex simulation models (e.g. weather forecast)
  - Interface to legacy software (e.g. ArcGIS Server, GRASS GIS)
  - ..
WPS Standard

- **Operations:**
  - GetCapabilities
    - Returns information about the service and a list of processes
  - DescribeProcess
    - Returns information about a specific process
      - Identifier, inputs/outputs,…
  - Execute
    - Executes a process
WPS - Synchronous Execution

Sequence Diagram

- Client sends request
- WPS receives request and processes output
- Client waits for response
- WPS sends results
- Client receives response and starts using it
WPS – Asynchronous Execution (Pull Model)

Sequence Diagram

- Client
  - sends request
  - does something else
  - sends status request
  - does something else
  - receives response and starts using it

- WPS
  - receives request
  - processes output
  - sends status
  - finalizes output
  - sends results
  - reference
  - e.g. 33 %
  - result

ArcMap WPS Client
WPS Implementations

- 51 listed by OGC
  - Proprietary
  - Open Source
- ArcGIS Server supports WPS interface since version 10.1
- ArcGIS for Desktop cannot consume WPS services yet
WPS Use cases

Some application patterns that provide real advantages in practice are:

- Accessing functional views on very large data volumes (e.g. satellite data and other large sensor data archives)

- Accessing remote legacy software such as large and complex computational models
WPS Client for ArcMap
WPS Client for ArcMap

- Enables ArcMap to use remote processing services via the OGC WPS interface standard
  - Fully embedded in ArcMap 10.X
  - Adds remote processing tools to the ArcGIS toolbox
  - Web processing services can be used with model builder just as any native ArcGIS tool

- Lean and generic approach
  - Can be used to work with any WPS server
  - Takes care of creating the execute request and returns the results from WPS instances
  - Uses data transformation tools for mapping input/output data formats
  - Does not validate complex inputs/outputs
ArcMap WPS Client

Button in Catalog Window calls Dialog for connecting to WPS and selecting processes creates Generic tools wrapping WPS processes connects Model Builder

- ArcObjects .Net extension
- ArcObjects Java
- ArcMap feature

Any other tools
Adding WPSs to ArcMap

- Connect to the WPS server via ArcCatalog and select processing tools from any source
WPS processes as native ArcGIS tools

1. invoke WPS from the toolbox menu
2. specify input data, parameters, output data
3. execute process and receive output data
Using WPS in the Model Builder
Converting ArcMap data formats and WPS input/output data formats

- Use existing data conversion tools
- Some basic data conversion tools are shipped with the ArcMap WPS Client:
  - Base64 conversion, zipping/unzipping shape files
Conclusions

- ArcMap WPS clients allows to
  - Access external remote geoprocessing facilities
  - Can work with different WPS implementations
  - Offers tools for data conversion
  - Results of external processes can be directly visualised and explored in ArcMap
Next steps

- Streaming of process in-/outputs
- Embedded transformation and validation of data formats
- Geoprocessing Appstore -> better support for finding/accessing WPS
EDC Award

- EDC Student of the Year Award 2013 for Alber Sanchez, Institute for Geoinformatics, Münster, who contributed significantly to the conceptional and implementation work.
Further Information

Points of contact at 52N:

- Benjamin Proß  
  b.pross@52north.org
- Christoph Stasch  
  c.stasch@52north.org

52N geoprocessing community

http://52north.org/geoprocessing