

Extending FME Programmatically



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- What is Tele Atlas?
 - Digital map and dynamic content provider
 - Source of data for personal navigation, in-car navigation, mobile and internet map solutions
 - Coverage of 87 countries, 29.9 million km of roads, and 24 million POIs
- Who is Gabriel Reid?
 - Senior Software Engineer at Tele Atlas
 - Responsible for creation data conversion software for MultiNet line of data products



Agenda

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- Introduce the main categories of programming interfaces in FME
- Run through each main programming interface and show examples and lessons learned for each

- Two main programmatic interfaces to FME:
 - Extend functionality of FME
 - Added functionality within a workspace
 - PythonCaller/TCLCaller
 - Python/TCL Startup & Shutdown scripts
 - PythonCreator
 - Added functionality via Plug-In SDK
 - Extend other functionality of other software with FME functionality (FME Objects)

When to Extend Functionality of FME

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- Doing something relatively simple in FME becomes overly complex
- FME is too inefficient because it doesn't know enough about your data
- Required functionality is missing from FME

Don't do it unless you have a (really) good reason to!

Adding code to FME can potentially:

- Increase complexity
- Decrease maintainability
- Decrease compatibility

"With great power comes great responsibility"

- Uncle Ben (Spiderman)

Demo of Reducing Complexity via PythonCaller

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- Input data contains a number of fixed-width fields, as well as repeating fixed-width fields containing coordinates

ID FEATCLASS COUNT COORDINATES

100	4110	3	1234.5	2345.6	3456.7	4567.8	5678.9	6789.0
200	4110	2	1234.5	2345.6	3456.7	4567.8		
300	4110	2	3456.7	4567.8	5678.9	6789.0		
500	4110	3	1234.5	2345.6	3456.7	4567.8	5678.9	6789.0

Lessons Learned from Repeating Fixed-Width Field Iterations

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- Don't start adding code unless it's really going to simplify your workspace
- If you start copying/pasting code and changing it slightly, it's time to use a library
- Externalizing code makes sharing a workspace more difficult, but allows much better (unit) testing
- Set up of Python path

Increasing Efficiency Through Extensions

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- Sometimes you know something about your data that you can't communicate to FME
- Programmatic extensions can make huge differences in some of these cases

- GDF ASCII-Relational is a Tele Atlas MultiNet product format
 - Consists of a set of 46 fixed-width text files
 - Textfile-based relational database
 - Data is sorted and grouped based on dataset/section information

826	26000007	165000543	28000	100000025	00
826	26000007	165000946	28000	100000049	00
826	26000007	165001021	28000	100000023	00
826	26000007	165001185	28000	100000001	00
826	26000007	165001395	28000	100000058	00
826	26000007	165001754	28000	100000002	00

Comparison Between Pure FME and FME/Python Solutions

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- Pure FME solution takes over an hour for a simple linking between PNT and NDE tables of Northern Ireland (770,000 point features)
- FME/Python solution takes under two minutes for the same data
- Extending the pure FME workspace to a full GDF-AR schema is not workable

Lessons Learned from Mini GDF-AR Reader

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- Knowing some rules about your data can make a huge difference in performance
- Try to keep FME-specific code separated from libraries (using wrappers, etc)
- Use unit testing if possible

- Check input directory structure, files, etc
- Check validity of composition of published parameters
- Zip files after creation
- Set up PYTHONPATH variable

- Provides the option to create FME Functions, Transformers, Readers, and Writers
- More access to the inner workings of FME
- Available for development in Java and C++
- More involved than using Python and TCL within FME

- Golden rule of FME extension counts double here: adding compiled code to FME can make things become really complex
- Keep a clear layer between FME-specific code and generic code

- By far the most simple of all FME Plug-In functionality
- Sufficient if you just need to calculate something for each feature at a time
- Can also offer major power for a relatively small price
 - Implement IFMEFunction
 - Drop the compiled .jar or .dll in \$FME_HOME/plugins
 - Optionally add a Transformer definition

Function Implementation

Example: Soundex

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- Soundex functionality is available in a Jakarta (Java) library
- Can be almost directly plugged into a IFMEFunction implementation

```
import org.apache.commons.codec.language.Soundex;
public class SoundexFunction implements IFMEFunction {
    public String execute(IFMEFeature feature, ArrayList parameters) {
        String attributeName = parameters.get(0).toString();
        String attributeValue = feature.getStringAttribute(attributeName);
        return new Soundex().encode(attributeValue);
    }

    // Empty method implementations down here...
}
```

- Slightly more complex than implementing a Function plug-in
- Options are virtually limitless with Factory plug-ins
- Can be turned into a Transformer by adding a .fmx file in `$FME_HOME/transformers`
- Demo: FME Debugger

- Most complex functionality that can be added to FME
- Almost shouldn't be attempted without Professional Services support
 - Schema feature setup
 - Datatype mappings
 - Difficult to debug
- Wrap your reader/writer in an FME-interface layer to allow easier development and testing

- Only use extensions where they really have added value
- Find a balance between most simple and most testable solution
- Try to keep FME-specific details separate from your code
- If there's useful functionality that FME is missing, let Safe Software know!

- Oliver's Python Corner
([http://www.fmepedia.com/index.php/Oliver%27s Python Corner](http://www.fmepedia.com/index.php/Oliver%27s_Python_Corner))
- Python FME Object API
(`$FME_HOME/fmeobjects/python/apidocs/index.html`)
- Plug-In Builder documentation
(`$FME_HOME/pluginbuilder`)

Thank You!

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- Questions?
- For more information
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