Model-to-Model Transforming with ODL/plastic

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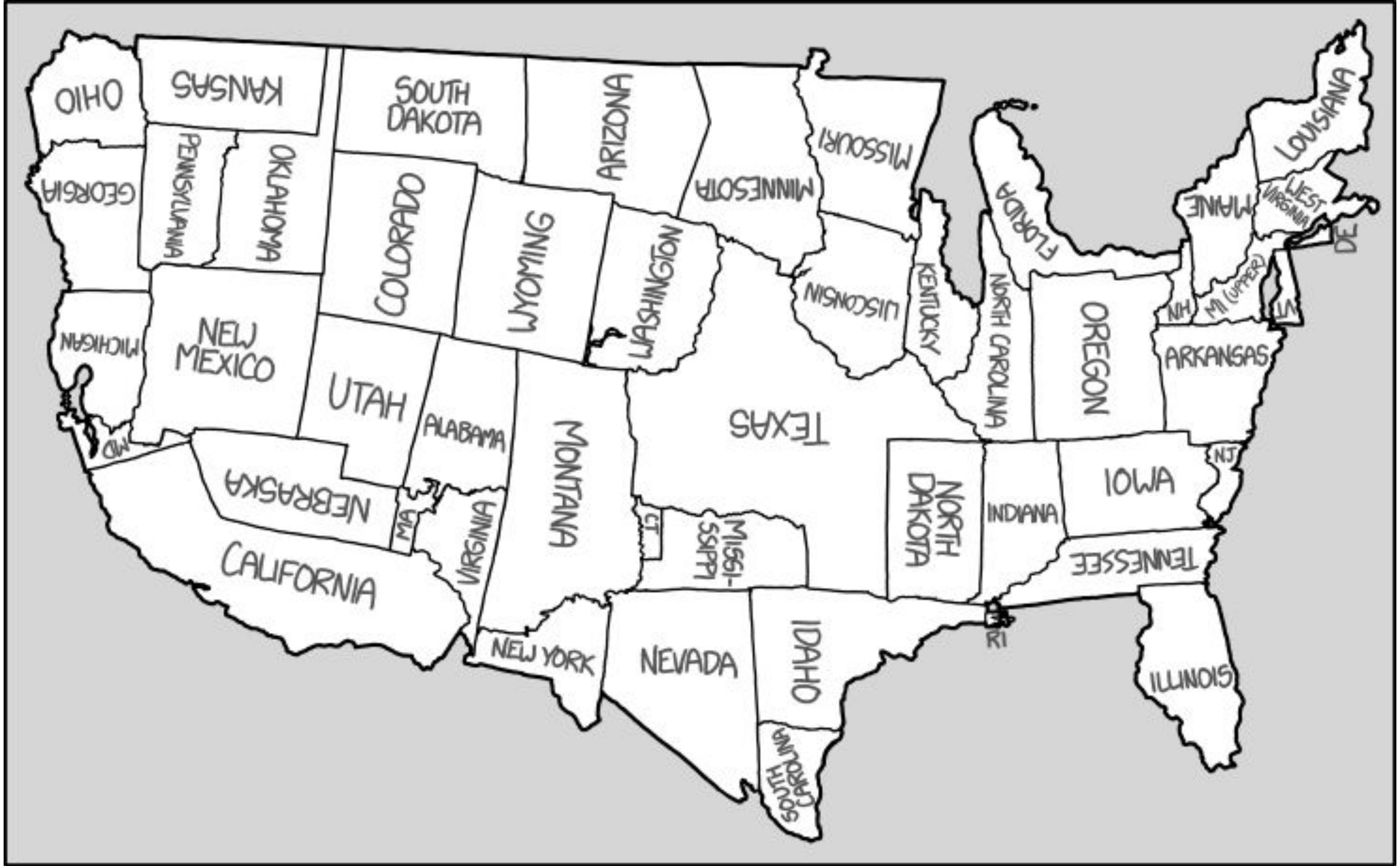
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Why are you here?

- **First public disclosure** of intent to upstream Plastic* into ODL
- Give an understanding of what this feature is
- Show kinds of problems it can help solve
- Want to get enthusiasm for adoption

* Brand new name (internal name was *Cartographer*)

What is the mapping problem?

What is a mapping problem?

- Occurs in internals of a system behind endpoints
- ODL context – moving from northbound to southbound representations
- Sometimes need to trivially convert data representation
    - JSON, XML, YML, other parse-able formats
- Sometimes need to change abstractions (1:1, N:1, N:N)
    - Morph one model into completely different model
    - Morph N models into one model

Available Solutions

What solutions are there today?

- Venerable XML/XSD/XSLT
- Apache Velocity
- DSLs
- Jolt
- Ad hoc programming
- Others

Everything has a tradeoff…

What are advantages and disadvantages?

- Can be very comfortable if you know underlying language
- Can be comforting to programmers
- Need to learn another language regardless of mapping complexity
- Imperative representation of conversions (hiding schemas in code)

Why ODL/plastic?

ODL/plastic Advantages

- Pay-as-you-go for complexity (field deployable changes)
- Declarative representations are emphasized (clear schemas)
- *Translation-by-intent* (say what you want, not how to do it)
- Deeper levels of abstraction to help keep custom logic schema-independence
- Can specify arbitrary morphing via plug-ins in JVM language
- Understands breaking large mapping problems up (both time and space) into small chunks

Justification

Solves problems like…

- Schema changes for device configurations across releases
- No more hard-wired dependency on vendor libraries
- In-the-field updating to support multiple versions of devices
- Light weight specifications avoid religiosity around “DRY"

Should you use ODL/plastic?

- Probably no, if your mapping problem rarely changes
- No, if you have abundant access to inexpensive programmer time
- No, if you don't care how hard it is to understand your translations
- No, if you are not particularly sensitive to regression breakages
- Probably no, if you have sub-millisecond throughput requirements

Plastic Mapping Specification

- Input schema
  - Exemplar-based specification (XML/JSON/…)
  - Variables defining important values
- Output schema
  - Exemplar-based specification (XML/JSON/…)
  - Variables defining bound values that are substituted
- Input payload
  - Same format of input schema
  - Partial match required against input schema
- Invoke
  - Plastic.**translate**("ELN", "1.0", "JSON", "AA", "1.1", "XML")
  - Schemas is an arbitrary file system hierarchy

Examples

Example-1: no coding - array expansion

Example-2: least schema-dependent coding using morpher “plug-in”

Example-3: highly dependent coding using classifier “plug-in”

Translation pipeline showing how all “plug-in”s relate to the flow

Example-2: schema-independent coding

- Via simplest possible “morpher” plug-in
- Shows manipulation AFTER variable binding
- Below is written in Java-style, not idiomatic Groovy

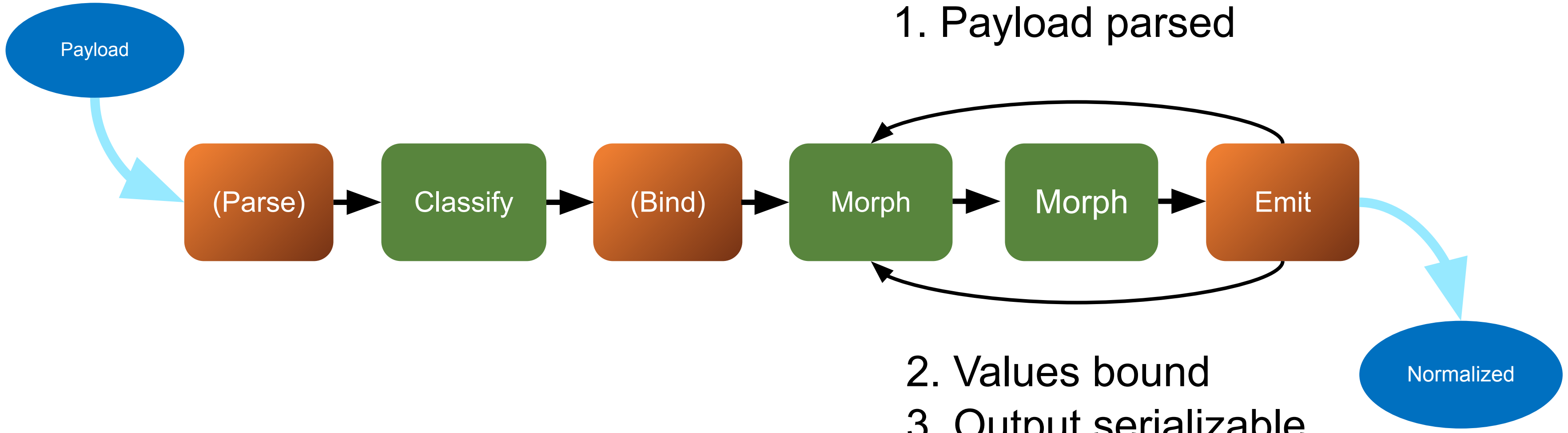
```
class MyMorpher
{
          def tweakValues(Map inputs, Map outputs)
          {
                    outputs[‘ENDPOINT'] = inputs[‘ADDR-IN'] + ”:" + inputs[‘PORT-IN']
          }
}
```

Example-3: schema-dependent coding

- Via simplest possible “classifier” plug-in
- Shows just-in-time schema name resolution
- Payload is parsed JSON (ie, arrays/maps)
- Below is written in Java-style, not idiomatic Groovy

```
class MyClassifier extends SimpleClassifier
{
        String classify(Object parsedPayload) // payload is parsed JSON
        {
                if (parsedPayload.astuff)
                        return “schema-A”
                else
                        return “schema-B”
        }
}
```

Plastic Pipeline



1. Payload parsed
2. Values bound
3. Output serializable

More Good Stuff

- **Default values** (in schema, passed in, or ad hoc logic)
- **Multiple** morphers
- Run-time **reload** of schemas and translation logic
- Multithreaded “**batch**” processing
- Simple synchronous API
- Command line **runner** for quick development
- **Tutorial**

Takeaways

- **General-purpose facility** usable in many contexts
- **Declaratively** manage schema changes
- Sometimes **no coding** required
- Insulate your code from changes

Open Questions

Thanks!

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