DFDL Enhancements

SOA Subcommittee

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Agenda

- Brief Intro
- What's New
- What's Next

What is DFDL?

- Data Format Description Language (not related to TPFDF)
- A standardized way of describing data.
- Allows for data transformation services both on and off z/TPF. For example, data can be transformed from native format to XML, JSON, BSON, etc and vice versa.

DFDL Enablement:

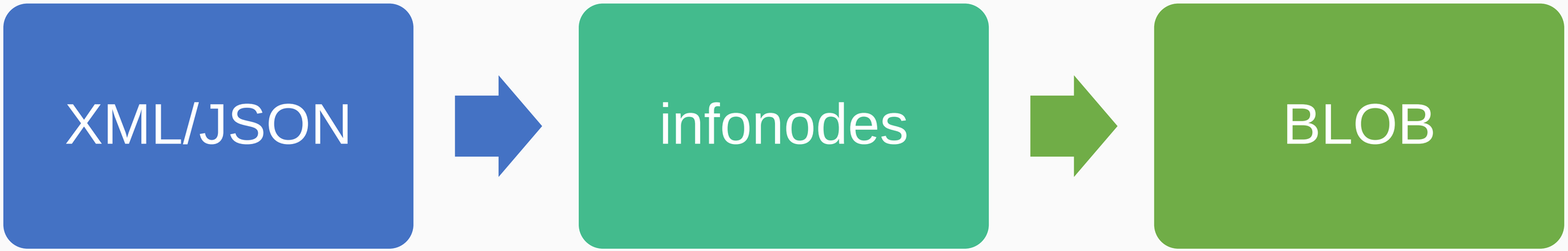
- Data Events (2014)
  - transform data to XML or JSON
- z/TPF support for MongoDB (2015)
  - transform data to/from BSON
- DFDL Serializer (2016)
  - transform XML or JSON to data
- REST/Java interfaces (2017)

DFDL Serializer (PJ44104)

The z/TPF parser APIs in conjunction with the DFDL serialize API can be used to easily convert XML or JSON documents to a data stream.

XML/JSON serialization

tpf _doc_parseDocument



tpf_dfdl_serializeData

JSON -> binary

```
{
        stdhd: {
                stdbid: "BD",
                stdchk: 1,
                stdctl: 0,
                stdpgm: "ABCD",
                stdfch: 0,
                stdbch: 0
        }
}
```

```
C2C40100C1C2C3C4
00000000 00000000
```

XML Serialization (EBCDIC)

```
XMLHandle xh;
DFDLHandle dh;
rc = tpf_doc_initialize_handle(&xh, B2B_XML_SCANNER, NULL);
rc = tpf_doc_parseDocument(xh, XMLdoc, TPF_CCSID_UTFEBCDIC, docLen,
                                                    &parse_rc, 0);
try {
    tpf_dfdl_initialize_handle(&dh, “stdhd.gen.dfdl.xsd”, “stdhd”, 0);
    struct stdhd *hdrInfo = (struct stdhd *) tpf_dfdl_serializeData(dh, xh, NULL, 0);
} catch (std::exception &e) {
}
```

JSON Serialization (UTF-8)

```
XMLHandle xh;
DFDLHandle dh;
rc = tpf_doc_initialize_handle(&xh, B2B_JSON_PARSER, NULL);
rc = tpf_doc_parseDocument(xh, JSONdoc, TPF_CCSID_IBM1047, docLen,
                                                    &parse_rc, 0);
try {
    tpf_dfdl_initialize_handle(&dh, "stdhd.gen.dfdl.xsd", "stdhd", 0);
    struct stdhd *hdrInfo = (struct stdhd *) tpf_dfdl_serializeData(dh, xh, NULL, 0);
} catch (std::exception &e) {
}
```

Data buffer allocation

DFDL serializer uses ECB heap if no data buffer is associated with the DFDL handle.

```
tpf_dfdl_initialize_handle(&dh, "stdhd.gen.dfdl.xsd", "stdhd", 0);
struct stdhd *hdrInfo = (struct stdhd *) tpf_dfdl_serializeData(dh, xh, NULL, 0);
```

Alternatively, a data buffer address can be provided.

```
struct stdhd hdrInfo;
memset(&hdrInfo, 0, sizeof(hdrInfo));
tpf_dfdl_initialize_handle(&dh, "stdhd.gen.dfdl.xsd", "stdhd", 0);
tpf_dfdl_setData(dh, &hdrInfo, sizeof(hdrInfo));
tpf_dfdl_serializeData(dh, xh, NULL, 0);
```

Start serializing anywhere

The XML/JSON handle's position pointer is used to determine where to begin at.

{"inmsg":
  {"msgInfo": { .... },
   "msgdata": { .... }
  }
}

tpf_doc_positionBeforeElementTagName(**xh**, "msgdata");
tpf_dfdl_serializeData(dh, **xh**, NULL, 0);

Subset serialization

An absolute XPath is used to set which piece to serialize within the DFDL description.

```
struct big_struct {
    struct struct1 s1;
    struct struct2 s2;
    ...
} workarea;

tpf_dfdl_initialize_handle(&dh, “big_struct.gen.dfdl.xsd”, “big_struct”, 0);
tpf_dfdl_setData(dh, &workarea, sizeof(struct big_struct));
tpf_dfdl_serializeData(dh, xh, “/big_struct/s2”, 0);
```

XML/JSON Considerations

XML attributes are not supported by DFDL and are ignored during serialization.

<label attr="val">label_val</label>

JSON elements must maintain order (out of order sequences not yet supported) &

JSON does not require the "root element" name for serialization.

```
{"stdhd":
    {"stdbid":"BD", .... }
}
```

- is the same as -

{"stdbid":"BD", ... }

Future Tentative Plans

- Generate DFDL for assembler DSECTs via maketpf
- Support binary coded decimal (BCD) format
- Greatly improve performance of JSON transformation

DFDL generator for DSECTs

- Use same maketpf "dfdl" target to generate DFDL for either assembler or C/C++
  - maketpf PRG1 dfdl
- Use maketpf TPF_DFDL_DIR environment variable to control where files are written
- Generate DFDL for all referenced DSECTs

Support BCD format

Binary Coded Decimal numbers can be defined by setting the DFDL **binaryNumberRep** attribute to "**bcd**" for decimal and integer types.

"1234"

00001234

Improve JSON conversion

New APIs to convert directly from a data stream to JSON and vice versa

- REST and Java linkage improved with no application changes

THANK YOU

Questions or comments?

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