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Portable Object Format

• Description

• Who is not using POF?

• Features / Time:
  – Annotations
  – Identity and Reference Support
  – Nested Writers
  – POFExtractor / POFUpdater
  – Evolvable
## Deconstruct the Binary

- Decorations used for internal purposes
- Well Defined structure allows traversal (POFExtractor)
- Packed Integers
  - Integer != 4 bytes
  - Sign and continuation bits
- Tiny Strings
- POF Type Id minimum is 1 byte (63 types)
  - int 16 == 0x79 type-id

<table>
<thead>
<tr>
<th>DECO</th>
<th>TypeId (custom)</th>
<th>Attribute Index</th>
<th>TypeId 0x41</th>
<th>23</th>
<th>Attribute Index</th>
<th>TypeId 0x79</th>
<th>Attribute Index</th>
<th>TypeId 0x4E</th>
<th>foo</th>
<th>TypeId (custom)</th>
<th>...</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>
Tips

• String use smallest character set possible

• Nested buffers avoid attribute index collision

• Take advantage:
  – Use integers in the range of -1 to 22
Evolvable

• The ability to maintain heterogeneously versioned objects in a Cluster
  – Lack of control of clients
  – Time window of a rolling restart
  – Just because you can

• Maintain existing structure

• Append new attributes
Still Evolving
Evolve already!

Version 1

deserialize

Version 2

serialize

10110110
00101010
11010011
11101111
11001100
01010101
00111100
10011001

00111100
10011001

Version 1

serialize

Version 2

deserialize

11100110
00101011
11111111
11101111
00101100
11110101

00111100
10011001
Tri-Evolvable

Version 1

Version 2

Version 3

deserialize

serialize
Delta Compressor

• Can be used to create binary diff between two binary objects

• Can be enabled for backups:

```xml
<distributed-scheme>
  <compressor>standard</compressor>
</distributed-scheme>
```

• May be useful in your applications
**BinaryDeltaCompressor#applyDelta**

- Receives the original binary and the delta binary
- The delta is a sequence of instructions for applyDelta to execute
- **First byte suggests mode of operation:**
  - Empty Binary
    - Return an empty byte[]
  - Binary Replace
    - Ignore the old value in favor of the delta in its entirety
  - Binary Diff
    - This delta contains instructions allowing a merge using the old value and the delta
Binary Diff

• Delta is a stack of instructions and operands with the old binary acting as a data register

• Reverse of Java Byte code
  – Instruction followed by operands

• Mnemonics:
  – OP_EXTRACT 0x01 offset, number of bytes
    • Extract from old binary
  – OP_APPEND 0x02 number of bytes
    • Append from delta
  – OP_TERM 0x03
    • Terminate
Collection Manipulation

- Ever wanted to modify a collection without deserializing all elements?

- Binary Old Value:

- Instruction Set & Operands (Binary Delta):
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