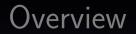


A universal structured data language

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Motivation

Object Oriented Forth Code as Data

A Few Examples



Requirements for secure communication (secure as in "no exploitation through misinterpretation")

- Extremely simple interpreter
- Extensible, but extensions must be allowed by the receiver Universal, i.e. only one interpreter to audit and verify
- Triviality makes it difficult to explain



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- Five data types: Integer (64 bits signed+unsigned), flag, string (generic byte array), IEEE double float, objects
- Instructions and data encoding derived from Protobuf (7 bits per byte, MSB=1 means "data continues", most significant part first)
- Four stacks: integer, float, objects, strings
- endwith and endcmd for ending object message blocks and commands
- oswap to transfer the current object to the object stack, to be inserted in the outer object
- words for reflection (words are listed with token number, identifier and stack effect to make automatic bindigs possible)





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- Ability to enter commands on the fly in text form through a frontend interpreter still exists
- Debugging with a de-tokenizer is also very easy
 Object-oriented approach makes writing application-specific logic extremely simple



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- Implement only the things you need but you shouldn't have to implement more than *one* generic interpreter
- Typical idea of sending remote procedure calls: serialize the entire object (with subobjects), and call a function on that object
- Net2o idea (derived from ONF): Keep the entire object synchronized by sending only the changes to it — these changes are simple messages (setters)
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Security



Lemma: every sufficiently complex format can be exploited Therefore stick to a very simple format, i.e.: simplify and factor the code

Interpreter

: cmd@ (-- u)

buf-state 20 over + >r p0+ r> over - buf-state 2! 64>n;

- : n>cmd (n -- addr) cells >r
- o IF token-table ELSE setup-table THEN
 \$@ r@ u<= IF net2o-crash THEN r> + ;
- : cmd-dispatch (addr u -- addr' u') buf-state 2! cmd@ n>cmd @ ?dup IF execute ELSE net2o-crash THEN buf-state 2@;
- : cmd-loop (addr u --)

BEGIN cmd-dispatch dup 0<= UNTIL 2drop ;</pre>

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Reading Files



reading three files

0 lit, file-id "net2o.fs" \$, 0 lit, open-file <req-file get-size get-stat req> endwith 1 lit, file-id "data/2011-05-13_11-26-57-small.jpg" \$, 0 lit, open-file <req-file get-size get-stat req> endwith 2 lit, file-id "data/2011-05-20_17-01-12-small.jpg" \$, 0 lit, open-file <req-file get-size get-stat req> endwith

Reading Files: Reply



reading three files: replies

0 lit, file-id 12B9A lit, set-size 138D607CB83D0F06 lit, 1A4 lit, set-stat endwith 1 lit, file-id 9C65C lit, set-size 13849CAE1F3B6EA8 lit, 1A4 lit, set-stat endwith 2 lit, file-id 9D240 lit, set-size 13849CAE2643FDCC lit, 1A4 lit, set-stat endwith

Messages



messages

- \$, push-\$ push' nest 0 lit, ok?

Structured Text a la HTML



HTML-like structured text

```
body
   p "Some text with " text
       bold "bold" text oswap add
       " markup" text
   oswap add
   li
       ul "a bullet point" text oswap add
       ul "another bullet point" text oswap add
   oswap add
oswap add
```

Literature&Links



BERND PAYSAN

net2o fossil repository
http://fossil.net2o.de/net2o,