WIP: Towards a Platform to Compare Binary Parser Generators

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- especially when said specifications are ambiguous

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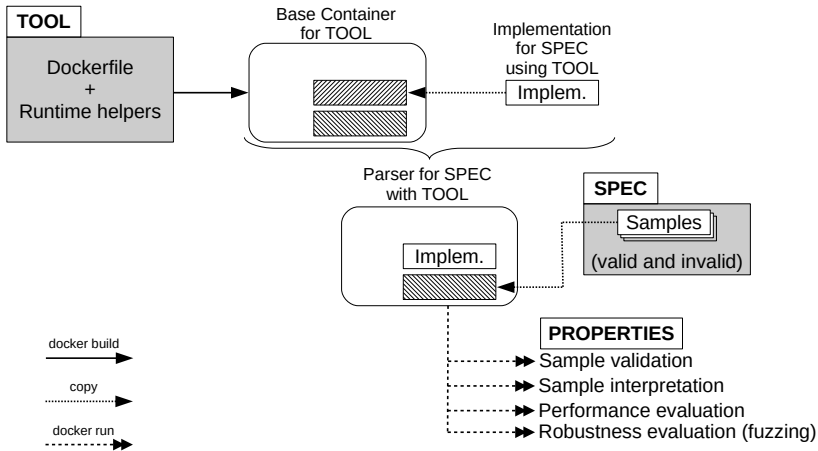
- use a parser generator to transform this “description” into code
- many proposals with different approaches in different languages
  - Nail (LangSec 2014)
  - Parsifal (LangSec 2014)
  - Nom (LangSec 2015 and 2017)
  - Hammer (DNP3 case study at LangSec 2015)
  - Parsley (LangSec 2020)
  - ...

langsec-pf : a platform to compare tools



langsec-pf : current status

Tools

- Hammer (C, 2012)
- Kaitai Struct (various languages, 2016)
- Nail (C, 2014)
- *Netzob (Python, 2011)*
- Nom (Rust, 2014)
- Parsifal (OCaml, 2011)
- *RecordFlux (Python/Ada, 2018)*

Specs

- Basic constructions (magic number, string, list)
- ICMP, IP
- DNS
- ASN.1 / X.509

Demo

Features

The current platform has several features

- sample validation (to compare the implementations)
- fuzzing with AFL and libfuzzer (only for C/C++ programs)
- interactive shell to mess around

Discussion about the expressiveness

Limits to the descriptive part

- DSLs are usually pretty
- but they require external help to handle complex constructions

Comparison of various DNS implementations

	Descr.	**Code**	**Total**	**Comments**
Hammer	105	158	263	No compression
Kaitai Struct	231	0	231	Compression pointers not validated
Nail	39	70	109	Separate files
Parsifal	130	79	209	Many enums and RR interpretation

First results about the robustness

Bugs or interesting behaviours

- assertion failures in DNS Hammer implementation
- strange IO exception on truncated inputs in Kaitai Struct
- integer overflows in the code generated by Nail
- endless loops in DNS label decompression with Nail implementation

Conclusion and perspective

Current status

- an open framework with several parser generators
- mostly trivial specs and implementations for now
- a first lab to experiment on tool expressivity, robustness and performance
- *this is very much a WIP !*

Next steps

- include more tools and more specs
- invite tool developers to contribute
  - an actual documentation of tool languages
  - a framework to compare different approaches

Questions

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