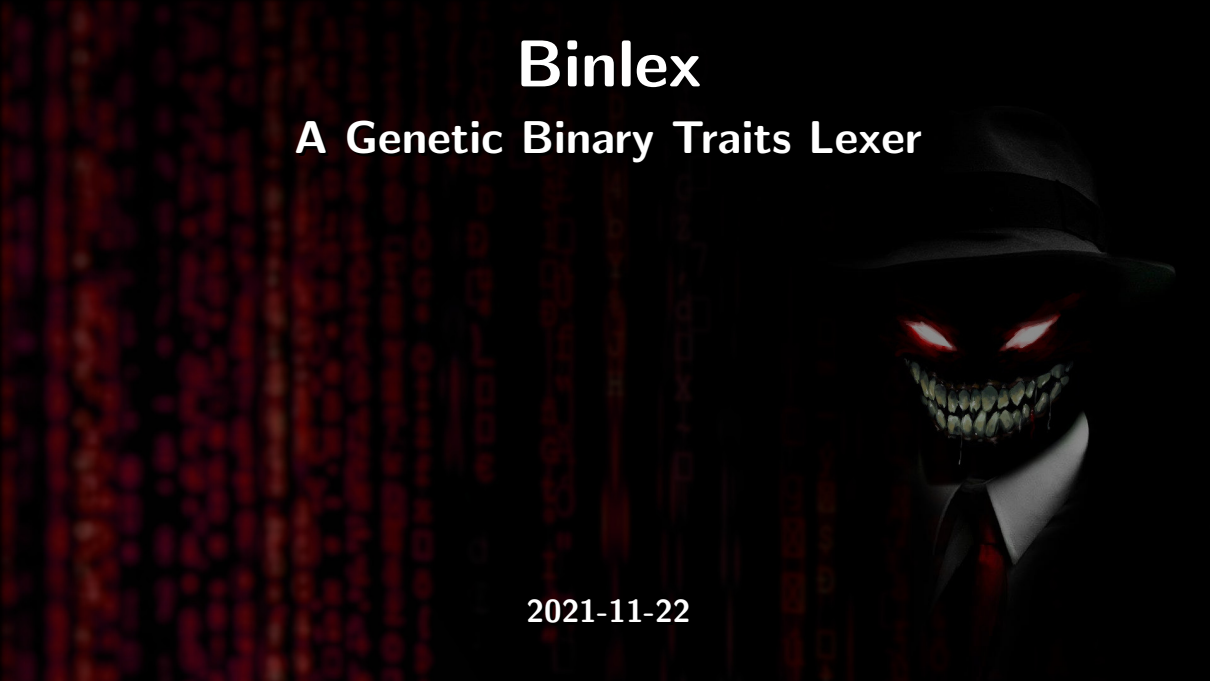
Binlex

A Genetic Binary Traits Lexer



2021-11-22

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whois

terminal

```
c3rb3ru5@d3d53c $ whois c3rb3ru5d3d53c
Job: Director of Malware Lab
Experience: 6+ years
Skills: Reversing Engineering, Malware Analysis, C++, C, Assembly, Python
Hobbies: Guitar, Machine Learning
Twitter: https://twitter.com/c3rb3ru5d3d53c
GitHub: https://github.com/c3rb3ru5d3d53c
```

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Problems Facing Malware Analysts and Devlopers

- Hunting Code-Reuse
- Writing YARA Signatures based on Code
- Binary Genetic Trait Lexer
- Machine Learning Feature Collection

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What is a Lexer?

lexer.log

In computer science, lexical analysis, lexing or tokenization is the process of converting a sequence of characters into a sequence of tokens.

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Installing

terminal

```
c3rb3ru5@d3d53c $ git clone https://github.com/c3rb3ru5d3d53c/binlex.git
c3rb3ru5@d3d53c $ cd binlex/
c3rb3ru5@d3d53c $ sudo apt install -y git libcapstone-dev cmake make
c3rb3ru5@d3d53c $ sudo apt install -y parallel
c3rb3ru5@d3d53c $ make threads=4
c3rb3ru5@d3d53c $ sudo make install
```

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Getting Help

terminal

```
c3rb3ru5@d3d53c $ binlex –help
binlex v1.0.0 - A Binary Genetic Traits Lexer
-i –input input file (required)
-m –mode set mode (required)
-lm –list-modes list modes
-h –help display help
-o –output output file
-v –version display version
Author: @c3rb3ru5d3d53c
```

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Supported Modes

terminal

```
c3rb3ru5@d3d53c $ binlex -lm
elf:x86
elf:x86_64
pe:x86
pe:x86_64
raw:x86
raw:x86_64
raw:cil
```

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Genetic Traits - What are they?

genetic_traits.log

Genetic binary traits consist of byte sequences. These byte sequences consist of hexadecimal strings with memory operands and others subject to change wild carded with question marks.

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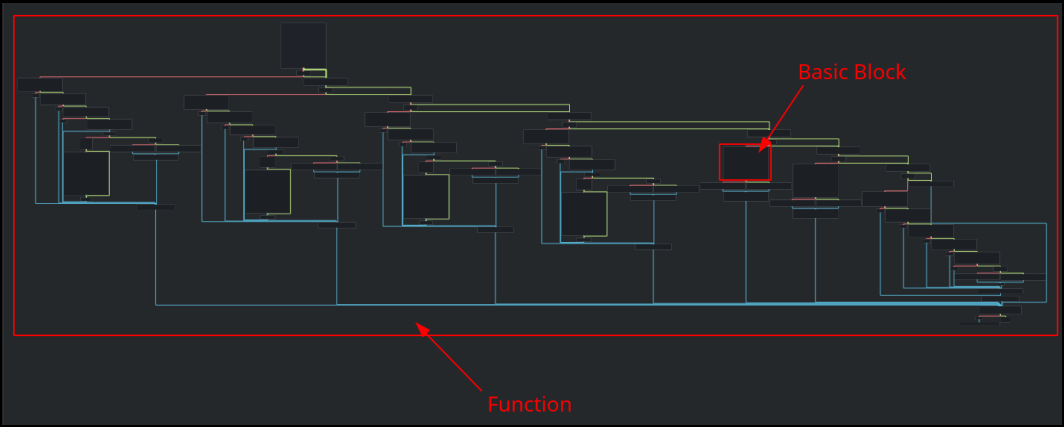
What Makes a Trait?



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What Makes a Trait?

- Basic Blocks
  - jmp
  - jne
  - jz
- Functions
  - ret

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Extracting Traits

terminal

```
c3rb3ru5@d3d53c $ binlex -m pe:x86 -i tests/pe/pe.x86 | head -2
50 b9 60 44 41 ?? c7 00 40 05 41 ?? e8 78 46 ?? ?? c3
c7 41 ?? e0 e0 e0 ?? 89 51 ?? 39 50 ?? 56 8b 74 24 ?? 74 12
```

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Difference from Other Tools

- Current Tools
  - VirusTotal Diff
  - Intezer
  - Yargen
  - yara-signator
- Differences
  - Wildcarding
  - Framework
  - Write your own Logic
  - Not a Blackbox, It's OPEN!

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Build your Own!

genetic_programming.log

In artificial intelligence, genetic programming (GP) is a technique of evolving programs, starting from a population of unfit (usually random) programs, fit for a particular task by applying operations analogous to natural genetic processes to the population of programs.

fitness.log

A fitness function is a particular type of objective function that is used to summarise, as a single figure of merit, how close a given design solution is to achieving the set aims. Fitness functions are used in genetic programming and genetic algorithms to guide simulations towards optimal design solutions.

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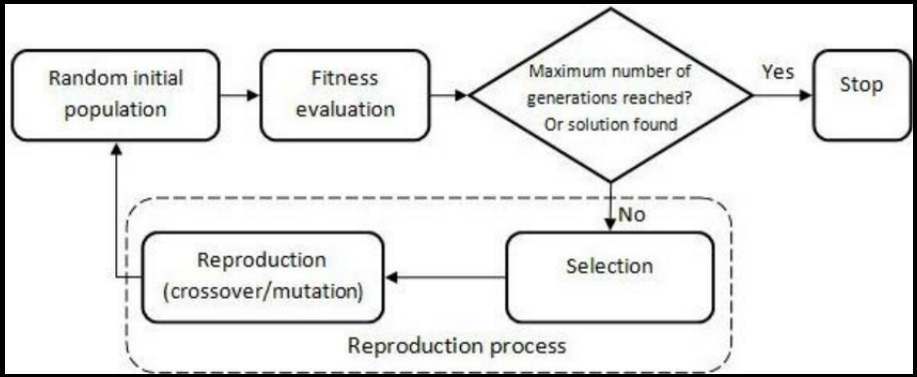
Building your Detection Logic - Fitness



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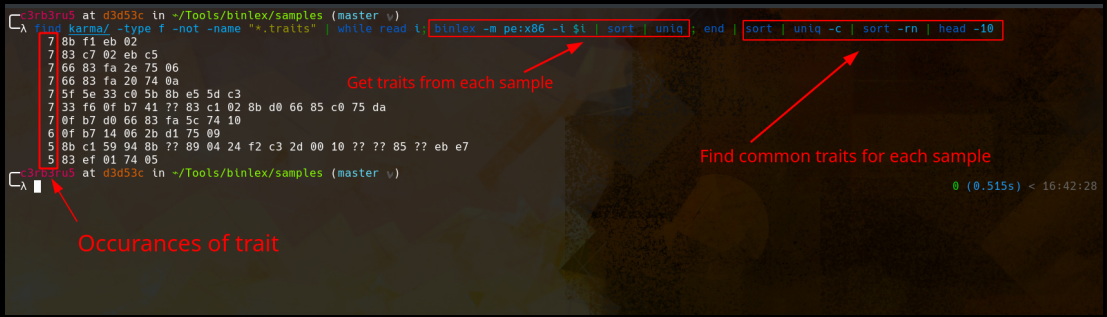
Building your Detection Logic - With Bash



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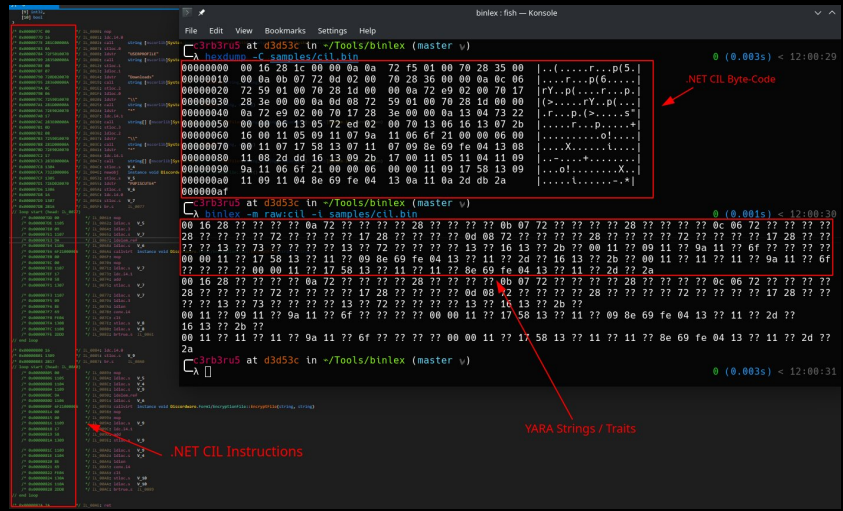
Building your Detection Logic - CIL/.NET



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Building your Detection Logic - C++ API

```
if (strcmp(args.options.mode, (char *)"raw:cil") == 0 &&
    args.options.io_type == ARGS_IO_TYPE_FILE){
    Raw raw_cil;
    if (raw_cil.ReadFile(args.options.input, 0) == false){
        return 1;
    }
    CILDecompiler cil_decompiler;
    if (cil_decompiler.Setup(CIL_DECOMPILER_TYPE_BLCKS) == false){
        return 1;
    }
    if (cil_decompiler.Decompile(raw_cil.sections[0].data, raw_cil.sections[0].size, 0) == false){
        return 1;
    }
    if (cil_decompiler.Setup(CIL_DECOMPILER_TYPE_FUNCS) == false){
        return 1;
    }
    if (cil_decompiler.Decompile(raw_cil.sections[0].data, raw_cil.sections[0].size, 0) == false){
        return 1;
    }
    if (args.options.output == NULL){
        cil_decompiler.PrintTraits();
    } else {
        cil_decompiler.WriteTraits(args.options.output);
    }
    return 0;
}
```

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Future Work

- Cutter Plugin
- Ghidra Plugin
- IDA Plugin
- C++ API Documentation
- Python Bindings
- Machine Learning
- Default Fitness Function (built-in)
- Looking for Developers

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References

- https://en.wikipedia.org/wiki/Fitness_function
- https://en.wikipedia.org/wiki/Genetic_programming
- https://www.capstone-engine.org/

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Demo Time!