Extended CTF

- Some Modern IS Tools

- By M4x@10.0.0.55

Why Play CTF?

- Learn vulnerabilities quickly(MSRC)
- Inspire new ideas(SROP, BROP, house of *, ...)
- Make friends
- A bridge between theory and reality
- It's so INTERESTING(打怪，升级，吊打全场)

Modern CTF

- QWB2018 - xx_game
- CGC超级挑战赛
- Defcon final
- pwn2own
- ...

结构原来越复杂
环境越来越真实
代码量越来越大
漏洞越来越隐蔽

What Are Vulnerabilities?

Errors introduced in the design or implementations of software/system/hardware/protocol/algorithms, that could be exploited to break victims' **CIA** attributes.

机密性C：Heartbleed，meltdown，spectre

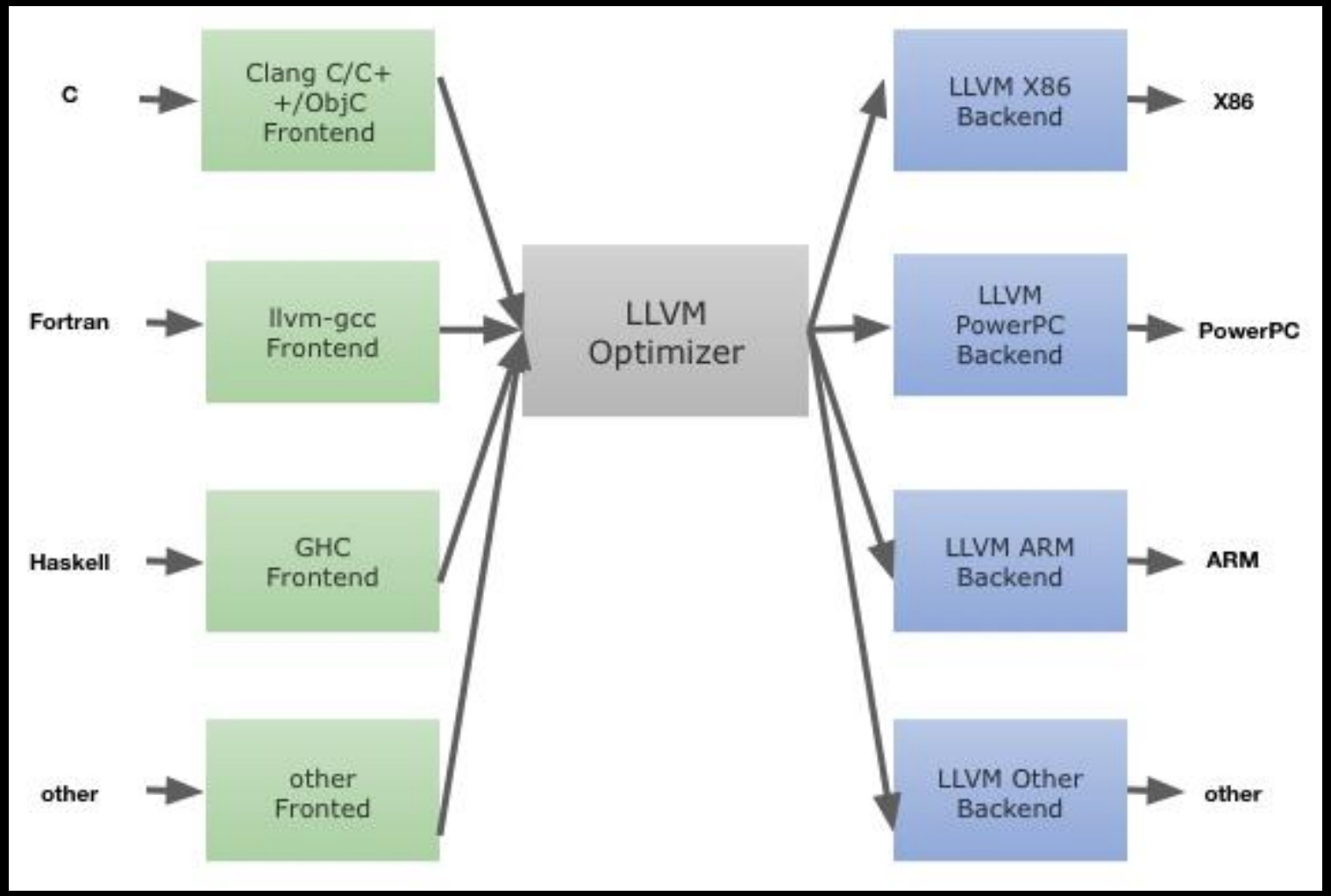
完整性I：Man-in-the-middle attack

可用性A：DDOS，CC，crash

Modern Tools

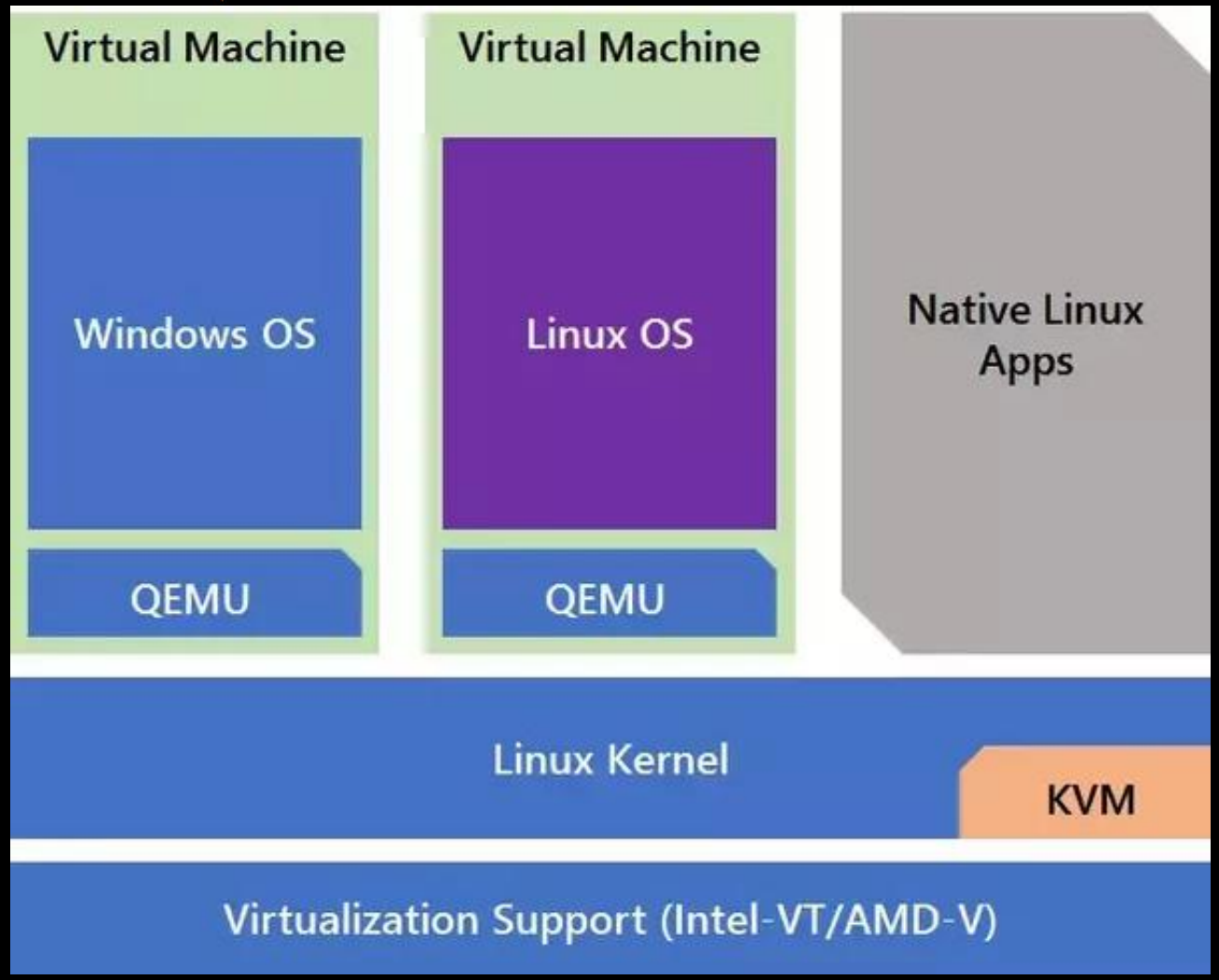
- LLVM(clang)
- qemu
- unicorn
- ...

Low-Level-Virtual-Machine



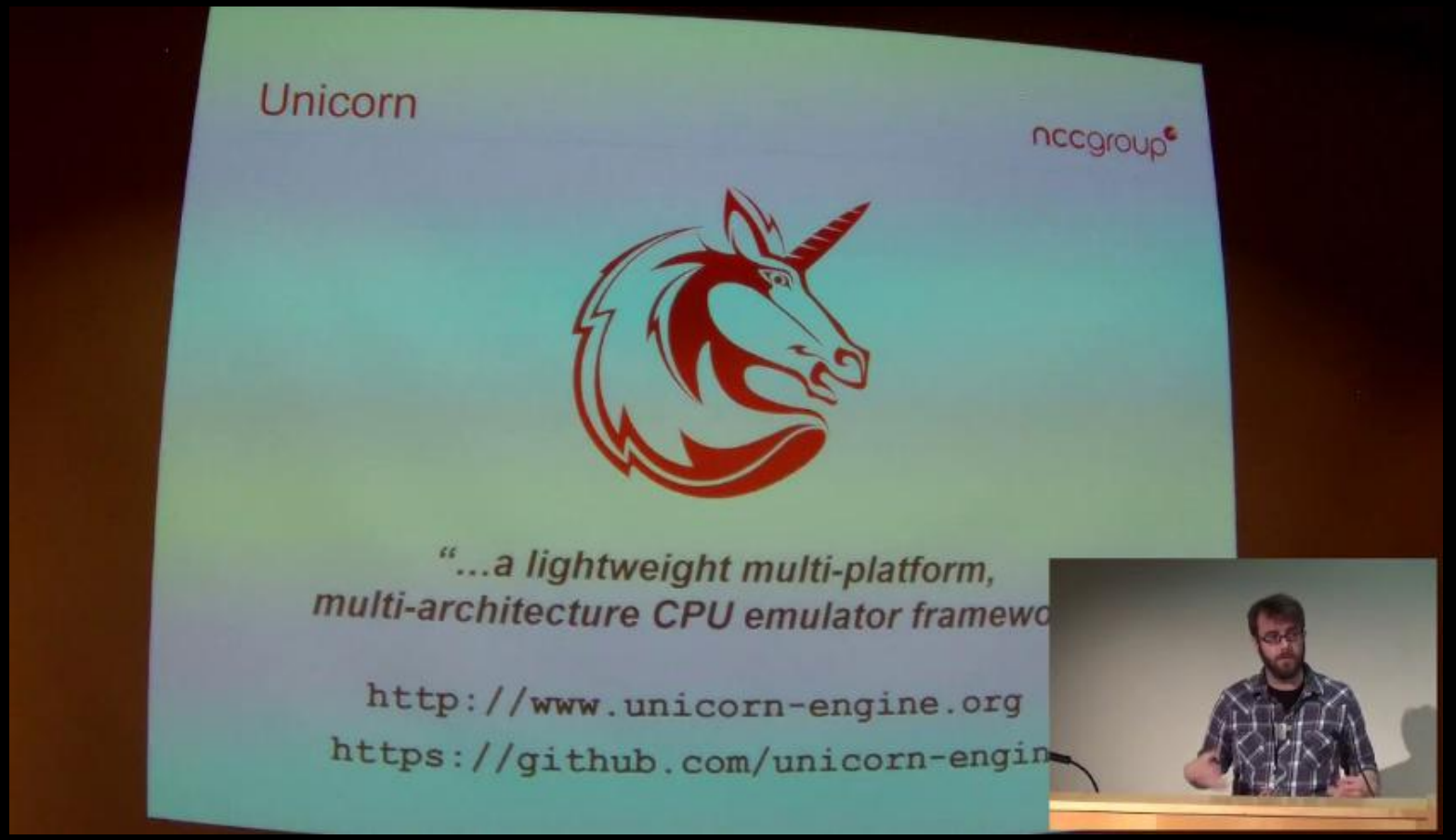
- 编译器基础设施
- 为了任意一种编程语言
- IR

qemu



- 模拟处理器
- the FAST! processor emulator

Unicorn



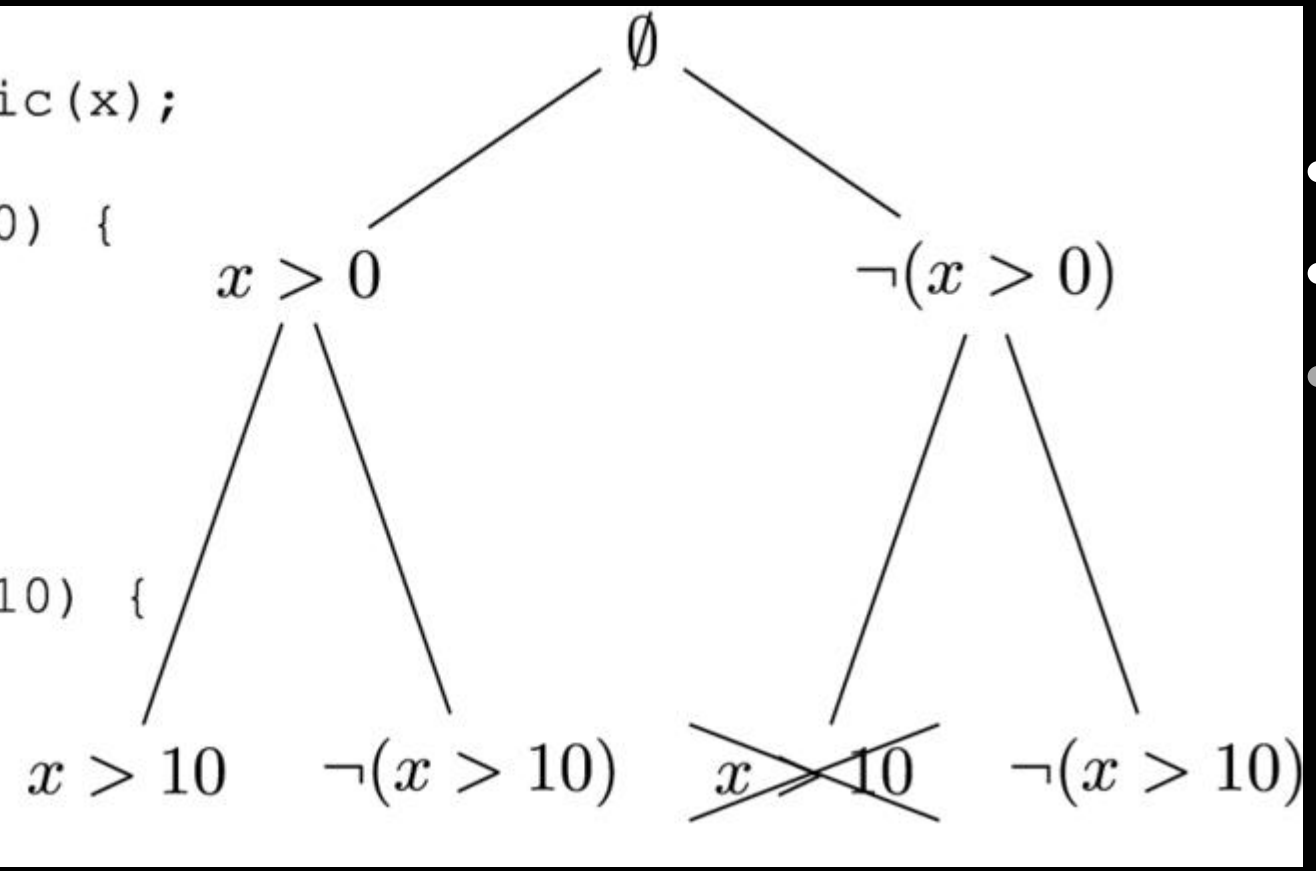
- 无法模拟整个程序
- 不支持系统调用
- 需要手动映射内存

Modern Teches

- 符号执行(z3, angr)
- 污点分析
- 插桩(pintool)
- 模糊测试(afl, peach, libFuzzer)
- ...

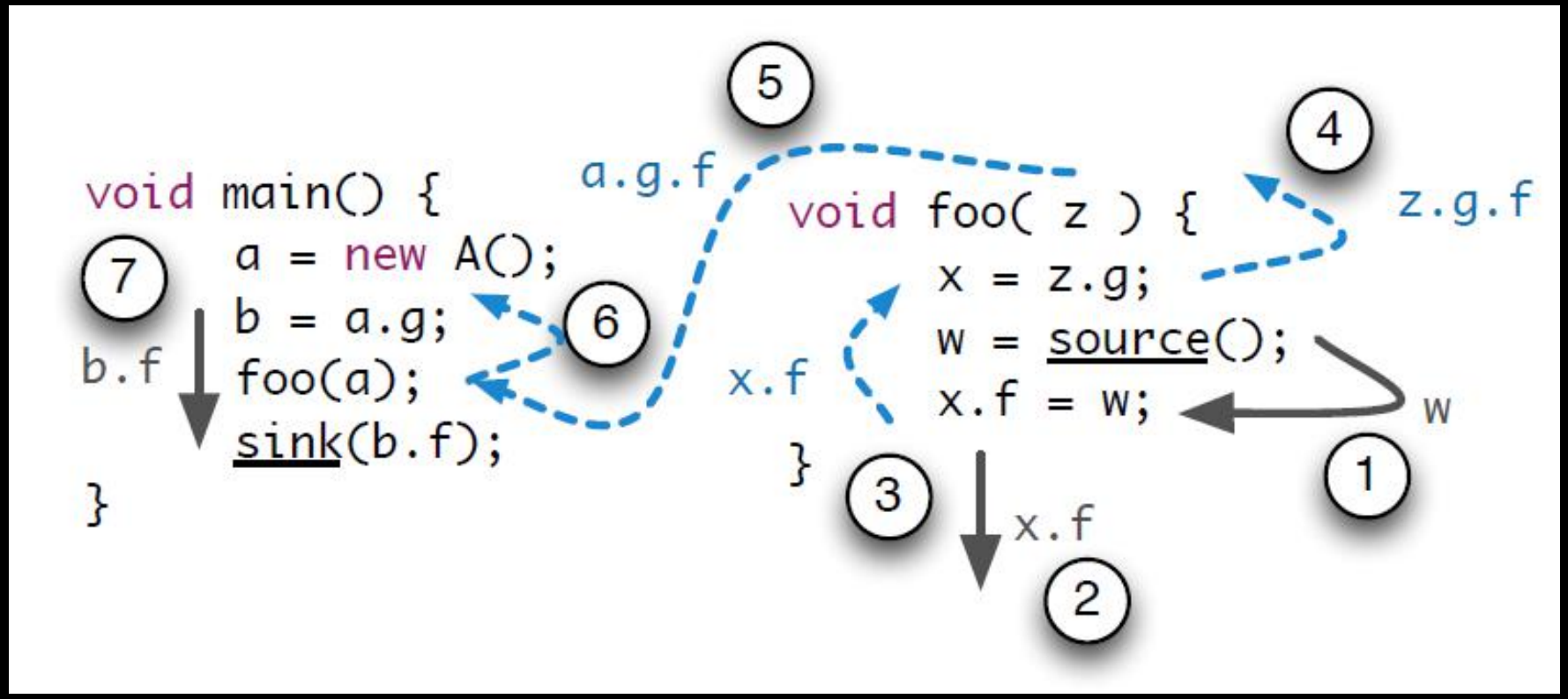
Symbolic Execution

```
1   int x;
2   mksymbolic(x);
3
4   if (x > 0) {
5     ...
6   } else {
7     ...
8   }
9
10  if (x > 10) {
11    ...
12  } else {
13    ...
14  }
```



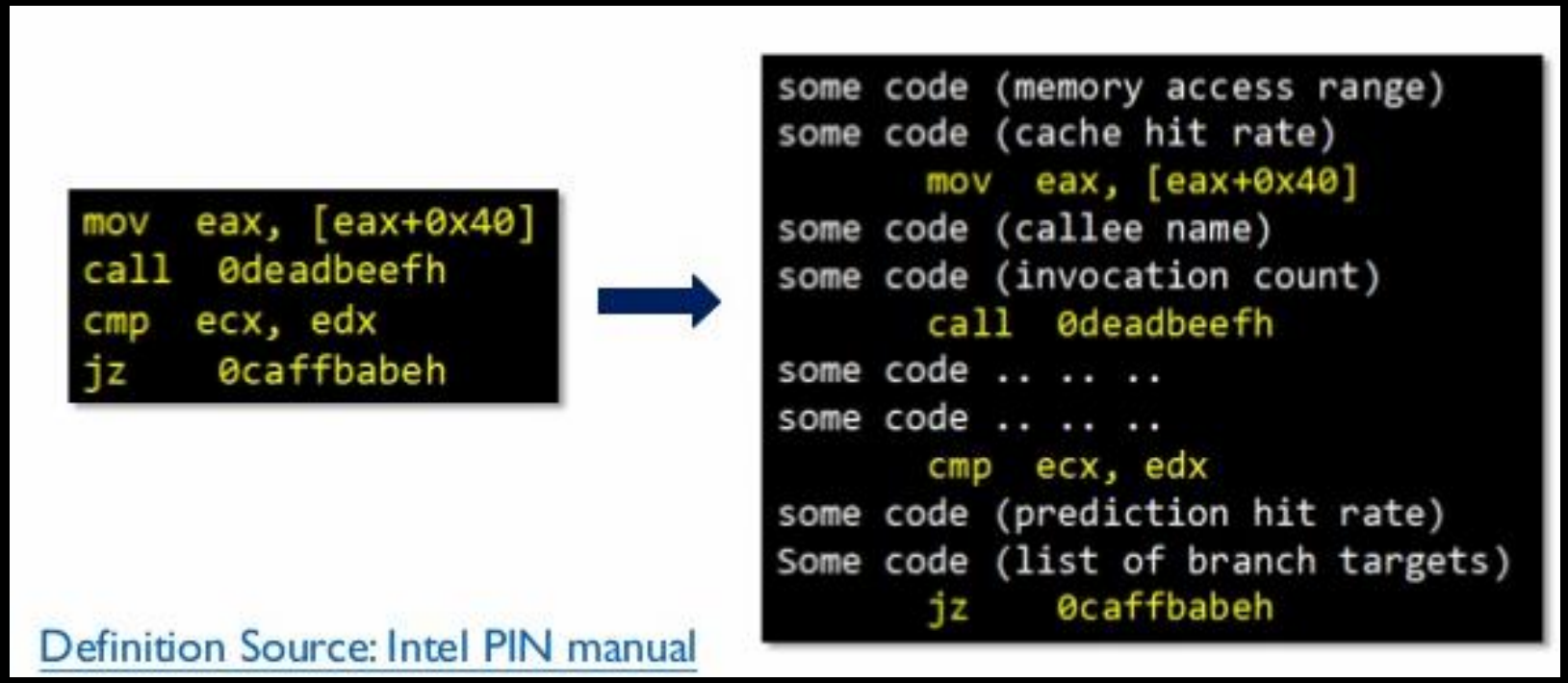
- 符号
- 约束(Constraints)
- 解方程？

Taint Analysis



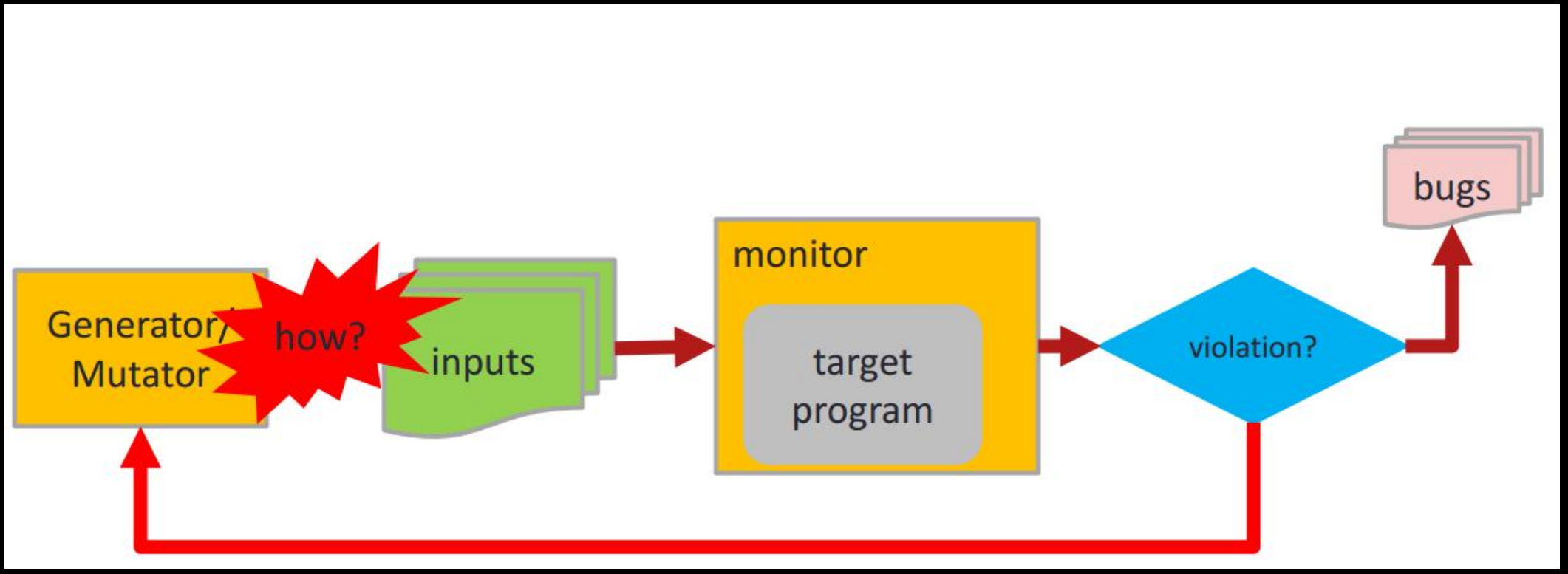
- 污点
- 信息流

Instrument



- 探针/桩
- 粒度

Fuzz



- Seeds
- Binary
- mutate
- crash

And more and more teches and tools are coming up