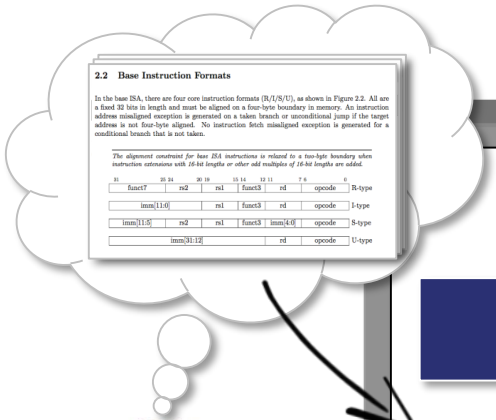
Test Generator **MicroTESK for** RISC-V



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MicroTESK (Open-Source Framework)

Translator

Processor Model

Specifications (nML)

Generation Core

Test Templates (Ruby)

- *Randomization*
- *Constraint Solving*
- *Self Checking*

Test Programs
(Assembly Code)

```
lui a0, 0xdead
ori a0, a0, 0x0
lui a1, 0xbeef
ori a1, a1, 0xf
add t0, a0, a1
sub t1, a0, t1
add t0, t0, t1
```

ISP RAS

MicroTESK is being developed at Ivannikov Institute for System Programming of the Russian Academy of Sciences (ISP RAS)
It is an open-source framework distributed under Apache License, Version 2.0 (http://www.microtesk.org)

RISC-V Specifications and Test Templates

Instruction Set Architecture	RISC-V
RISC-V Instruction Set Manual Volume I: User-Level ISA (v. 2.2)	**145** pages
Specified Instructions	**226** instructions
ISA Specifications	**3300** LOC

```
// ISA Specification in nML
op add(rd: X, rs1: X, rs2: X)
 syntax = format("add %s, %s, %s",
   rd.syntax, rs1.syntax, rs2.syntax)
 image = format("0000000%s%s000%s0110011",
   rs2.image, rs1.image, rd.image)
 action = {
   rd = rs1 + rs2;
 }
```

```
# Test Program Template in Ruby
class MyTemplate < RiscVBaseTemplate
 def run
  block(:combinator => 'product') {
   iterate {
    xor x(_), x(_), x(_)
    lui x(_), _
   }
   iterate {
    and x(_), ...
    or  x(_), ...
   }
   iterate {
    auipc x(_), _
   }
  }.run
 end
end
```

$2 \times 2 \times 1 = 4$ test cases

```
# Test Program
# Initialization
ori   a7, a7, 0x2d7
slli  a7, a7, 11
ori   a7, a7, 0x1
slli  a7, a7, 11
ori   a7, a7, 0x3d2
ori   t3, t3, 0x164
slli  t3, t3, 11
ori   t3, t3, 0x52b
slli  t3, t3, 11
ori   t3, t3, 0x24e
# Stimulus
and   s4, a7, a7
xor   s8, s4, t3
auipc t2, 0xafc37
```