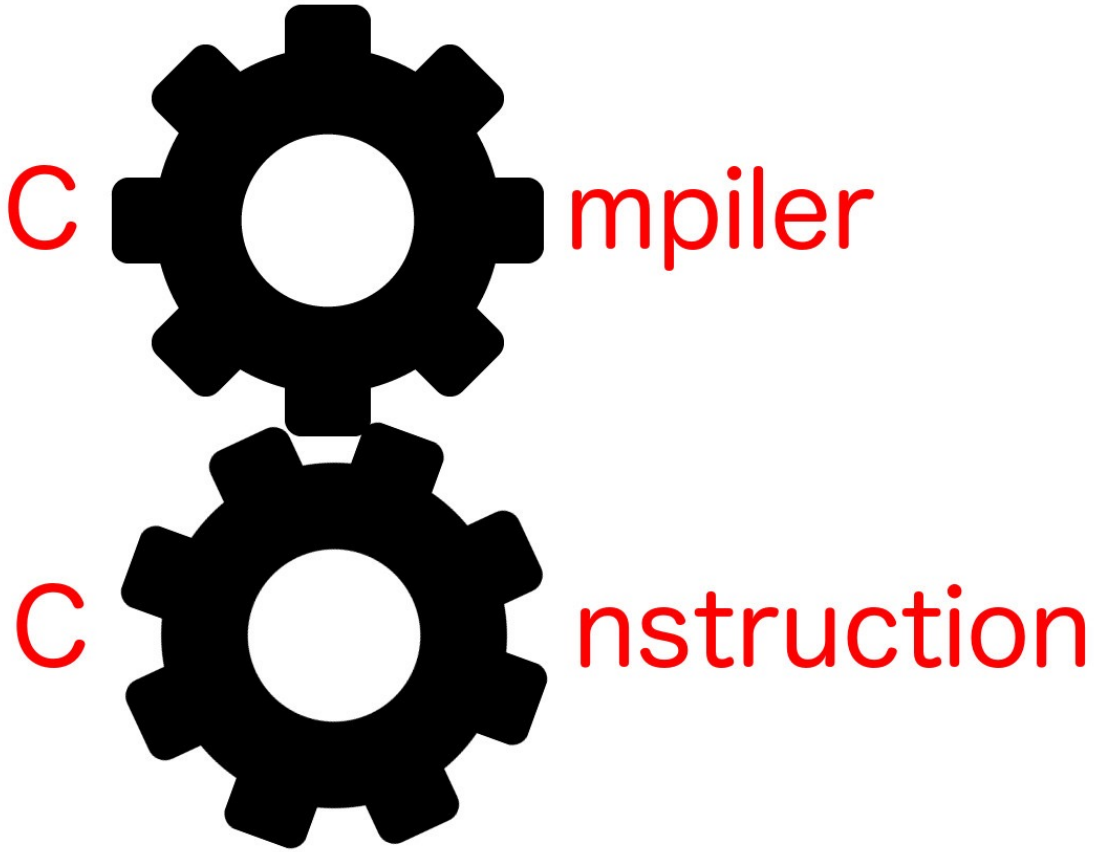

Spilling

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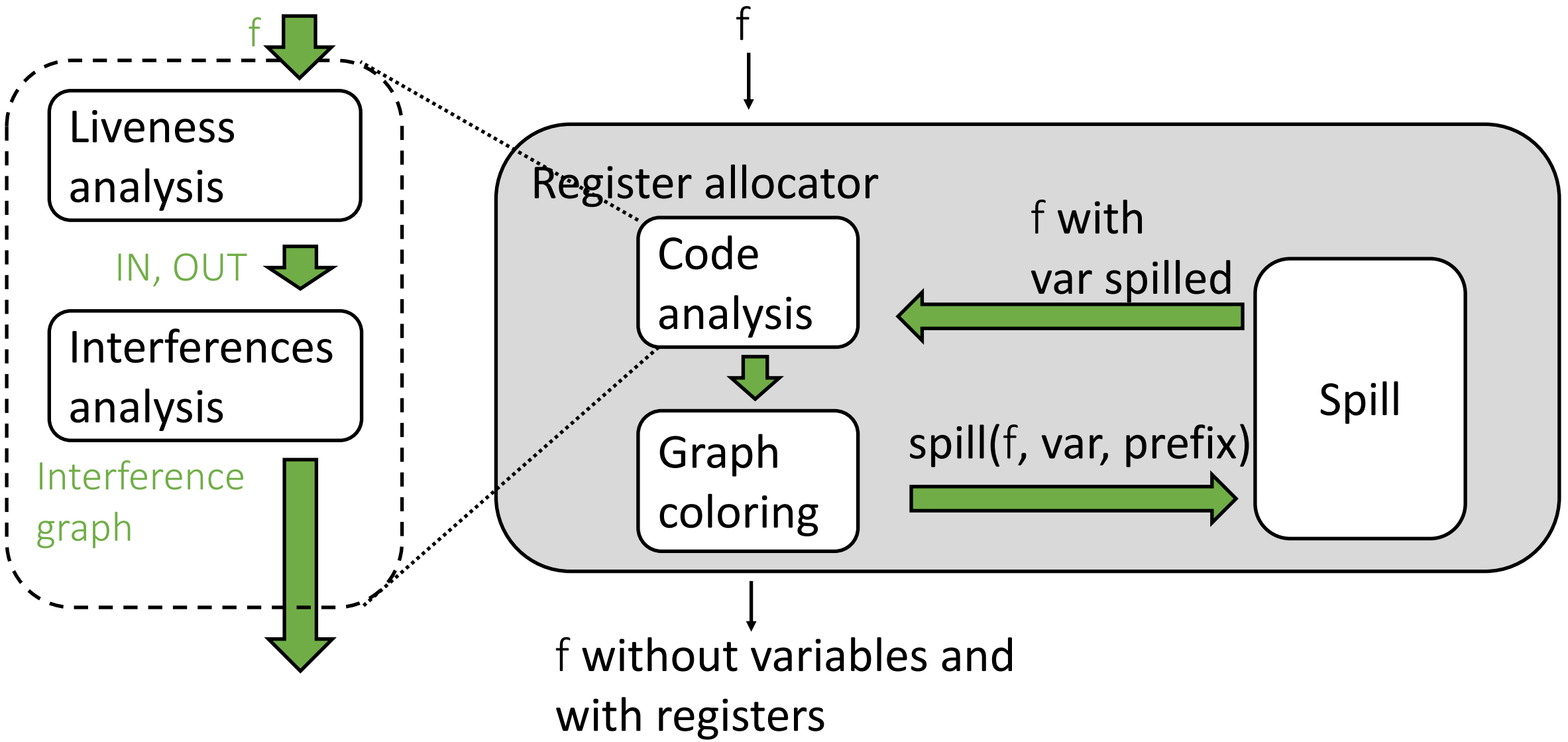
A graph-coloring register allocator structure



Spilling

- Procedure used by a register allocator with the following inputs
  - A function f
  - A variable v that needs to be allocated to the stack (to the vars section)
  - A string (see later)

- This procedure modifies f to allocate v on the stack
  - Make a new location on the stack
  - Replace all writes to v with stores to the new stack location
  - Replace all reads from v with reads from the new stack location

Spilling example

```
(@myF
  0
  %a <- 1
  %x <- %a
  return
)
```

Not possible for L2

idealSpiller(@myF, a)

```
(@myF
  0 1
  mem rsp 0 <- 1
  %x <- mem rsp 0
  return
)
```

2 registers are needed

Only 1 register is now needed!

All L2 instructions can use variables,
but only some L1 instructions can access a memory location!

Spilling example (2)

```
(@myF
  0
  %a <- 42
  %a += %a
  return
)
```

For every instruction that uses the spilled variable:

- Create a new variable that starts with %S and ends with a new number
- Replace the original instruction using the new variable
- Add loads/stores around the new instruction

spillForL1(@myF, %a, %S)

```
(@myF
  0 1
  %S0 <- 42
  mem rsp 0 <- %S0
  %S1 <- mem rsp 0
  %S1 += %S1
  mem rsp 0 <- %S1
  return
)
```

Spilling example (2)

What if we have only 1 register?

```
(@myF
  0
  %a <- 42
  %b <- 40
  %b += 2
  %a *= %a
  return
)
```

spillForL1(@myF, %a, %S)

```
(@myF
  0 1
  %S0 <- 42
  mem rsp 0 <- %S0
  %b <- 40
  %b += 2
  %S1 <- mem rsp 0
  %S1 *= %S1
  mem rsp 0 <- %S1
  return
)
```

Testing your spiller for homework #2

- Under L2/tests/spill there are the tests you have to pass

- To test:
  - To check all tests: make test_spill
  - To check one test: ./spill tests/spill/test1.L2f

- Check out each input/output for each test if you have doubts
  - tests/spill/test1.L2f
  - tests/spill/test1.L2f.out

Always have faith in your ability

Success will come your way eventually

Best of luck!