

Moves

$a = b$
 $a = M[b]$ $a = M[23]$
 $M[b] = a$
 $a = F3$

Math

$a += b$ $a += 11$
 $a \&= b$ $a \&= FF$
 $a = \sim a$
 $a = -a$
 $a = !a$

Jumps

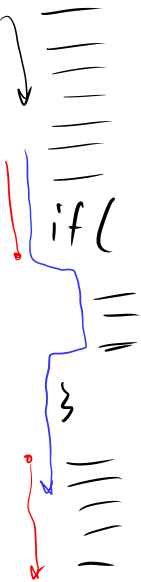
if $a \leq 0$, jump to b

Jumps

Change the PC

if () { } →
if () { } else { }

if → if / else
for (; ;) ← for (a in b)
while () ← do { } while ()



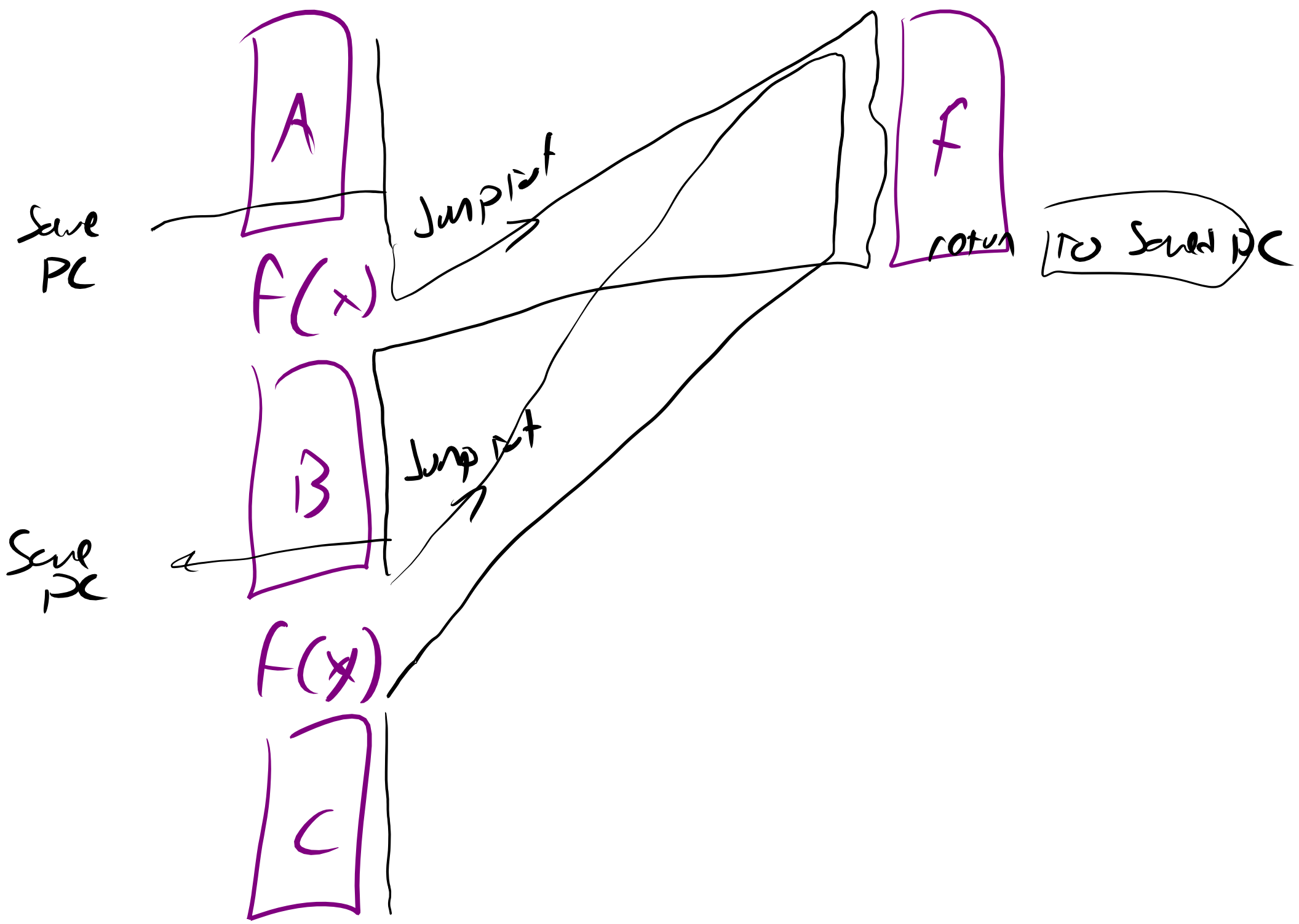
if (D) {
A
} else {
B
}
C

if (!D) Jump to B
A
Jump to C
B
C

while (E) {
A
}
B

if (!C) Jump to B
A
if (C) Jump to A
B
option 2

Option 2
D → if (!C) Jump to B
A
Jump to D
B



$$a \ll b$$

$$a += a \equiv a \ll 1$$

repeat B times:

$$a += a$$

while $b > 0$

$$a += a$$

$$b -= 1$$

$$) \quad b += -1$$

$$c = -b + 1$$

while $c \leq 0$

$$a += a$$

$$c += 1$$

$$\begin{array}{l} r_0 = a \\ r_1 = b \\ r_2 = c \end{array} \quad \text{Packed}$$

$$a += a$$

$$r_0 += r_0$$

$$\boxed{1 \mid 0 \mid 0} = 10$$

$$c += 1$$

$$\boxed{6 \mid 2 \mid 1} = 69$$

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