

Hawk (extension of Dove)

$\langle \text{expr} \rangle ::= \dots \mid (\langle \text{expr} \rangle, \langle \text{expr} \rangle) \mid \text{fst}(\langle \text{expr} \rangle) \mid \text{snd}(\langle \text{expr} \rangle)$

$(1, 2+3) \Rightarrow (1, 5)$

$\text{fst}(\langle \text{false}, \text{true} \rangle) \Rightarrow \text{false}$

$\text{snd}(\langle 1+\text{true}, 2 \rangle) \Rightarrow \text{error}$

Bird

5

false

$(1, 2)$

Machine

0xa

end in 0

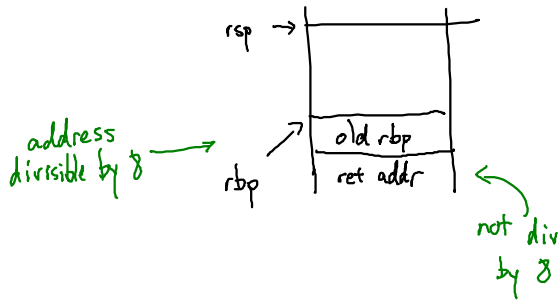
0x7FFF.....FFF

end in 111

0x5001

end in 001

(pointer that points
to a pair on
heap)



```
global bird-main
extern printValue
....
```

.section data

align 8

heap-cursor:

dq 0 ; 0 for initialization (not meaningful)

.section text

bird-main:

push rbp

mov rbp, rsp

sub rsp, #

mov [heap-cursor], rdi

mov r10, [heap-cursor]

mov r11, r10

add r10, 16

mov [heap-cursor], r10

mov [rbp-8], r11

mov rax, 12

mov r11, [rbp-8]

mov [r11], rax

mov rax, 20

add rax, 2

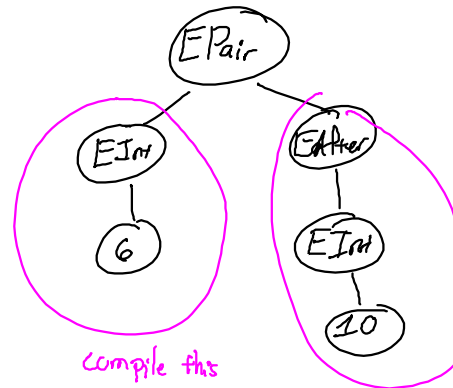
mov r11, [rbp-8]

mov [r11+8], rax

mov rax, r11

inc rax

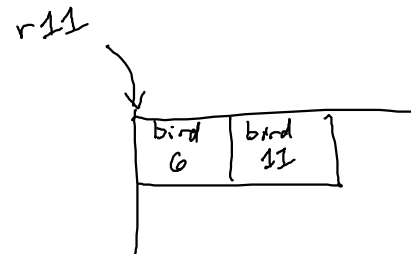
```
int main (int argc, char** argv) {
    uint64_t* heap_ptr = malloc(4*1024*1024);
    uint64_t result = bird-main(heap_ptr);
}
```



(6, after(10))

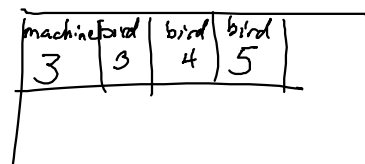
Compile this

put both values in heap
advance heap cursor
give back bird ptr in rax



In Eagle

(3,4,5)



(NOT REAL NUMBERS)

.section data

bar:

dq 0

cmp rax, 0

0xcf300 0x0000000000000000
0xcf308 0x10 0x00 0x00000000

.section text

cmp rax, 0

je foo

mov rbx, 2

foo:

mov rax, 3

0xfed30 0x10 0x00 0x00000000
0xfed36 0x32 0x000000000000fed45
0xfed3f 0x01 0x01 0x00000002
0xfed45 0x01 0x00 0x00000003