

## Ex2

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unsigned f(unsigned n) return (n==0) ? 1 : 2*f(n-1);
int main() unsigned x; x = f(3); return 0;
nop // to get the CMD mode of logisim to work jmp main
f: // stack: [retAddr] n ... retAddr: 0 n: 1 ldi a,n // a == 1 add a,d // a == 1+SP == n ld a,(a) // a == a == (n) ==
n and a,a // a = (a a), Z flag is affected // Z==1 iff a==0 jz if_then // n == 0 // n! = 0, n > 0 // else expr // f(n-1) // push n -
1 // regA already has n dec a // a == n-1 dec dst(d), a // push n-1 // push ret addr dec dst(d), a // push ret addr // jmp if_then
2 * f(n-1) jmp if_then : ldi a,1 // ret val of 1
f_ret: ldb, (d) // b == retAddr inc jmp b
main: // [x] x: 0 dec d // we are done allocating for the local var ldi a,3 dec d st (d),a dec d ldi a,. 5 + st (d),a jmp if inc
d ldi b,x // b == 0 add b,d // b == x st (b),a // x = f(3) inc d // dealloc x halt

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