

1 1 1 1
1 1 1 1

1 1 1 0

1110

1 0 0
- 1 1

0 1

0-1 → + 111

2-bit

r8 > r9 unisized

1 0 → ?

→

10
11

00
01

1 00
- 10

1 0

0

1 00
- 01

1 1

1 00
- 11

0 1

1 10
- 11

0 1

0

?

1

UNUSED

34

12

00

00

00

00

00

00

More Stack

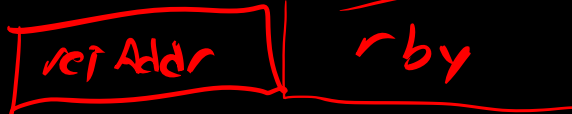


RSP

=

0x122F8

Rby (000000)



POP %rby



$$\begin{array}{r}
 \begin{array}{cc}
 \underline{x} & \underline{y} \\
 x_0 & y_0 \\
 \hline
 x_0 \wedge y_0 & y_0 \\
 x_0 \wedge y_0 & y_0 \wedge (x_0 \wedge y_0) \\
 & x_0
 \end{array} \\
 \hline
 (x_0 \wedge y_0) \wedge y_0 & x_0
 \end{array}
 = (y_0 \wedge y_0) \wedge x_0$$

bit fiddle

int as bit vector $\left\{ \begin{array}{l} \text{list} \\ \text{operation on elements} \end{array} \right.$

$$\begin{array}{r} \\ 1100 \\ \& 0110 \\ \hline 0100 \end{array}$$

Bit-wise operations

$\&$ and

$|$ or

\wedge xor

\sim not

truthy $\rightarrow 0$

! falsish (i.e. 0) $\rightarrow 1$

!!x

\gg signed - copy HOB
 $x \ll 3$ unsigned - HOB becomes 0
~~abc~~defgh $\ll 2$
cdefgh00

$$! 0 \rightarrow 1$$

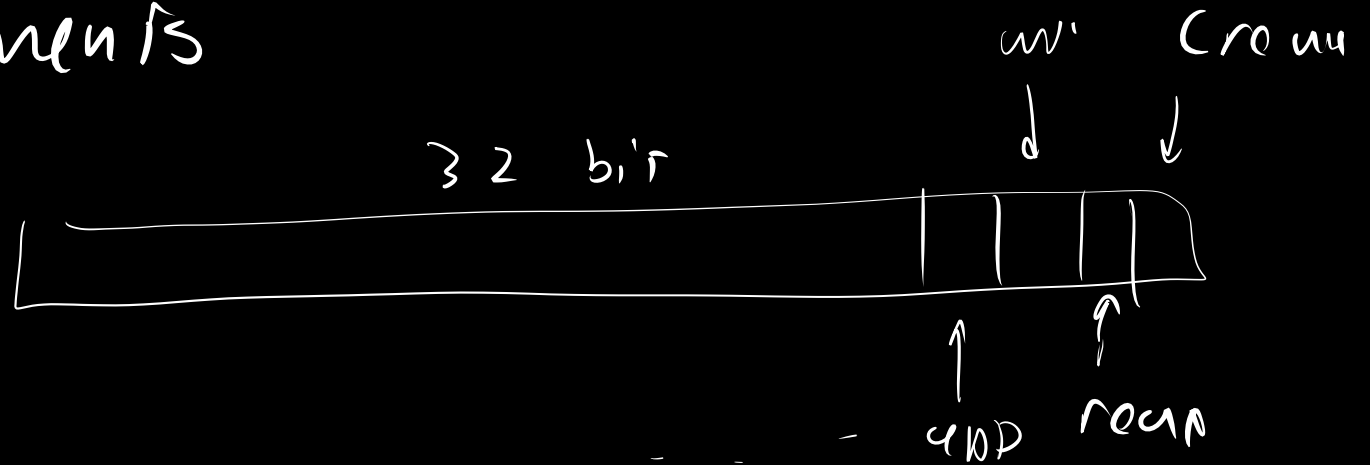
$$! 1 \rightarrow 0$$

$$! -3 \rightarrow 0$$

$$! 3330 \rightarrow 6$$

$$! 123456 \rightarrow 0$$

Flags arguments

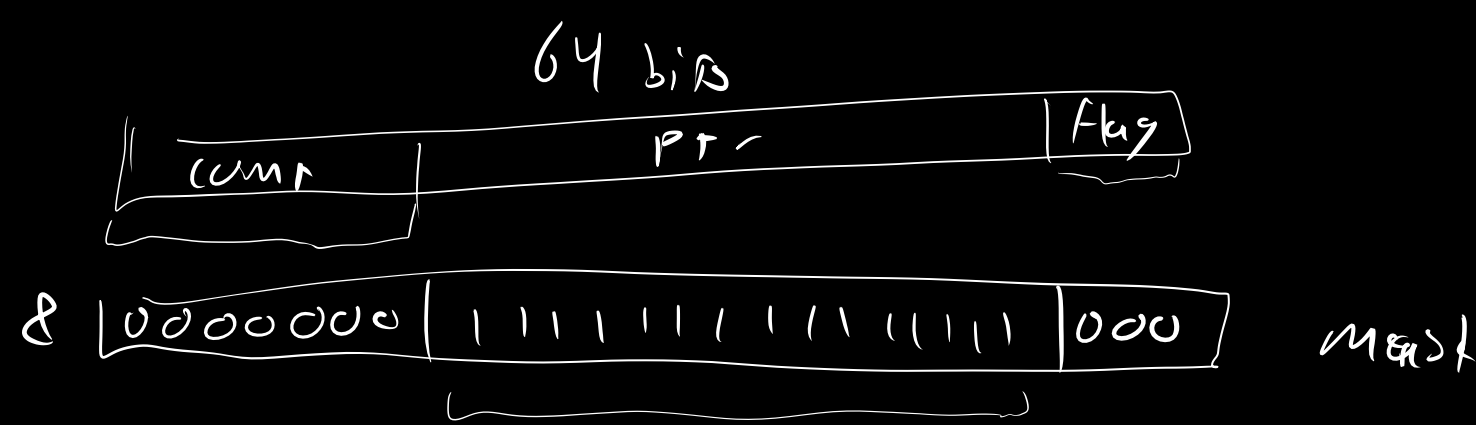


O_APPEND | O_CREAT

```
if (Flags & O_APPEND) {
```

```
}
```

(bit) Mask



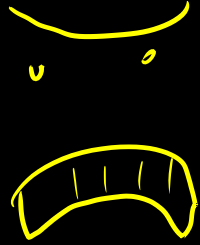
0x003ff800

$$\left(\sim \left(\underbrace{\sim 0}_{111111} \ll 14 \right) \right) \ll 3$$

$$\underbrace{1111 \dots 1100 \dots 00}_{14}$$

$$000 \dots 00 \underbrace{1111 \dots 11}_{14}$$

$$00 \dots 00 \underbrace{11 \dots 11}_{14} \underbrace{00 \dots 0}_{3}$$



```
int x = 1
```

```
x << 33
```

```
assert(x == 2)
```

```
x << (y / 2)
```

```
x << (y - y / 2)
```

```
x << y
```

```
x << (y % bitsize(x))
```

Parity of x $\begin{cases} 0 & \text{if } x \text{ has even number of 1 bits} \\ 1 & \text{if } x \text{ has odd number of 1 bits} \end{cases}$

$$\text{xs2parity} = (x \gg 1) \oplus 1$$

$$(x \& 1) \oplus ((x \gg 1) \& 1) \oplus ((x \gg 2) \& 1) \oplus \dots \oplus ((x \gg 31) \& 1)$$

| a | b | a ^ b |
|---|---|-------|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

$x = abcdefgh$
 $\quad \gg 1$
 $\quad abcdefg$
 $\& 00000001$
 $\quad \uparrow$

$$x_0 \wedge x_1 \wedge x_2 \dots \wedge x_{31}$$

$$(x_0 \wedge x_{16}) \wedge (x_1 \wedge x_{17}) \wedge \dots \wedge (x_{15} \wedge x_{31})$$

$$x \wedge (x \gg 16)$$

$$x \wedge = x \gg 16$$

$$\boxed{\begin{matrix} x_0 \wedge x_{16} \\ x_1 \wedge x_{17} \\ \dots \end{matrix}}$$

$$x \wedge = x \gg 8$$

$$\left(\begin{matrix} (x_0 \wedge x_{16}) \\ \wedge (x_8 \wedge x_{24}) \end{matrix} \right)$$

$$x \wedge = x \gg 4$$

$$x \wedge = x \gg 2$$

$$x \wedge = x \gg 1$$

return x & 1

4 1-byte numbers

