CS50 Supersection

More Comfortable

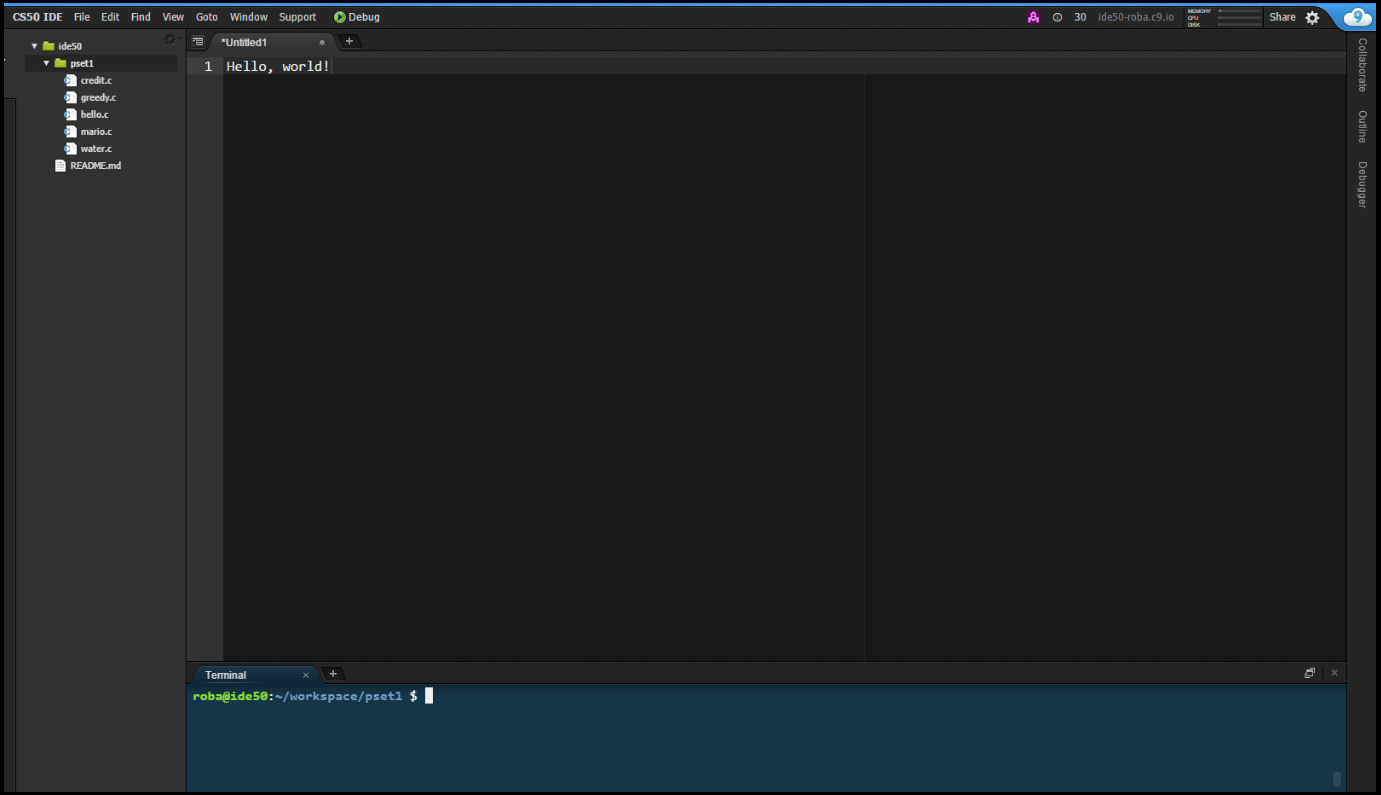
Hannah Blumberg and Rob Bowden

Sunday, September 13th

Logistics

- sections
- office hours

IDE



```
Hello, world!
```

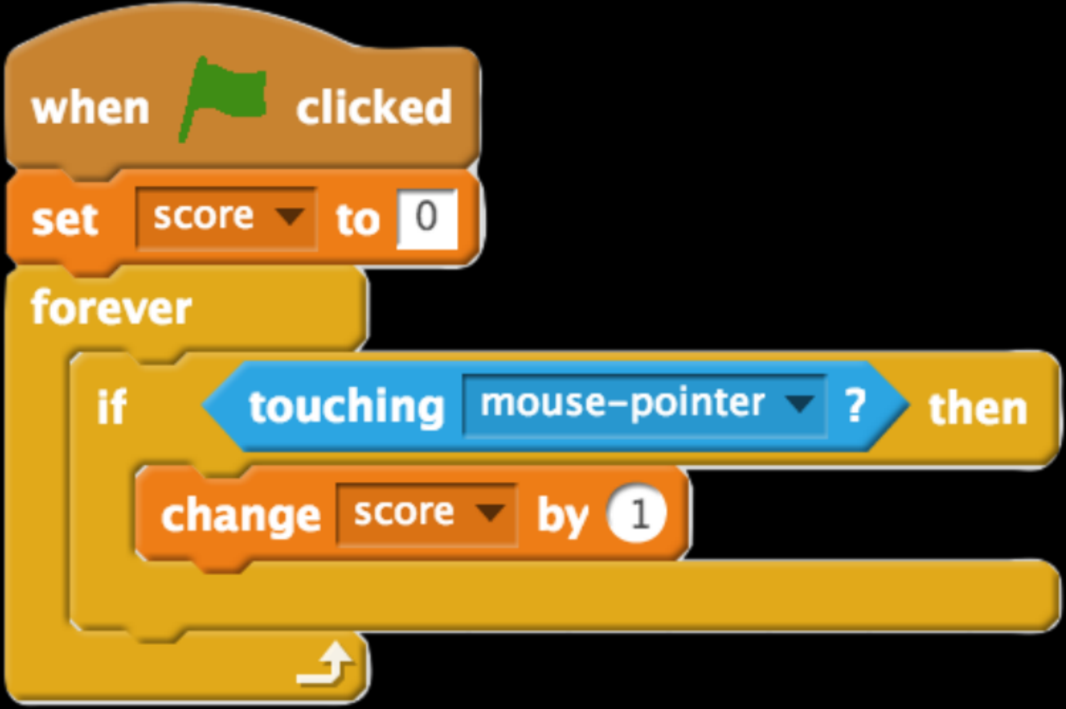
```
roba@ide50:~/workspace/pset1 $
```

Linux Commands

```
cd
rm
mkdir
mv
ls
touch
```

```
man
grep
find
<
>
|
```

Variables



```
when ⚑ clicked
set score ▾ to 0
forever
    if touching mouse-pointer ▾ ? then
        change score ▾ by 1
```

Defining Variables

```
type variable_name;
```

examples:

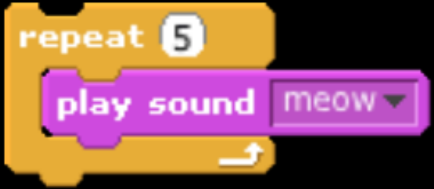
```
char grade = 'A';
float x, y, z;
int score = 7, num_of_teams = 4;
```

Conventions

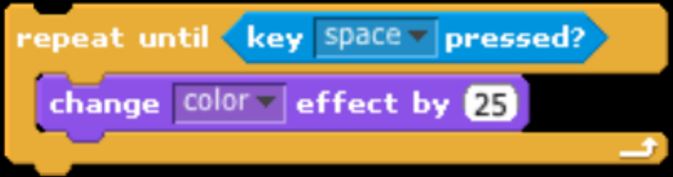
- meaningful names
  - single character variables are fine
- consistent initialization

```
int quarters, dimes, nickels, pennies;
```

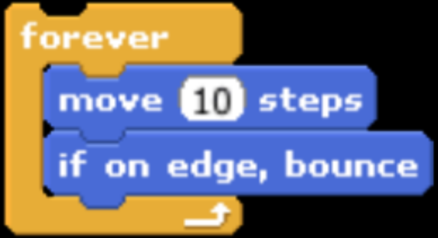
Loops



```
repeat 5
    play sound meow
```



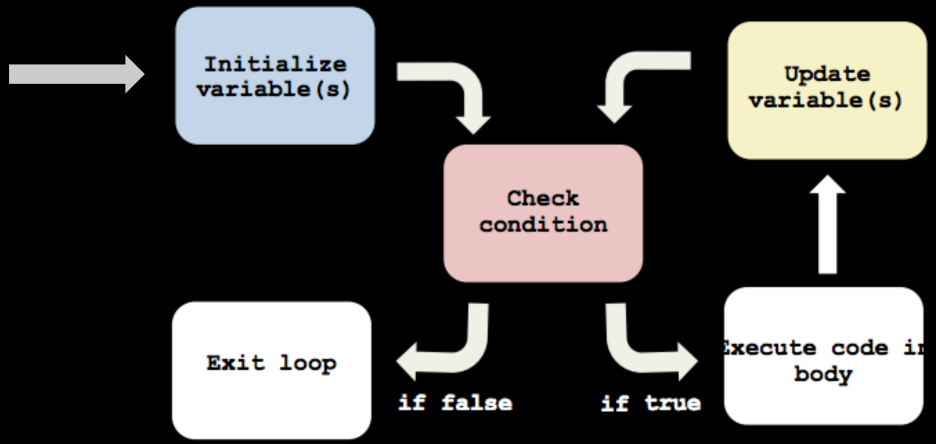
```
repeat until key space pressed?
    change color effect by 25
```



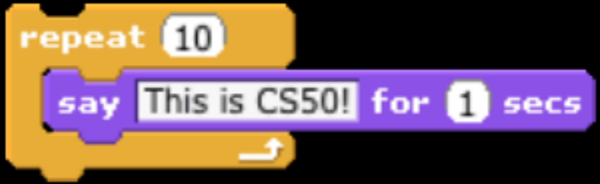
```
forever
    move 10 steps
    if on edge, bounce
```

For Loops

```
for (initialization; condition; update)
{
    // execute this code
}
```



Example

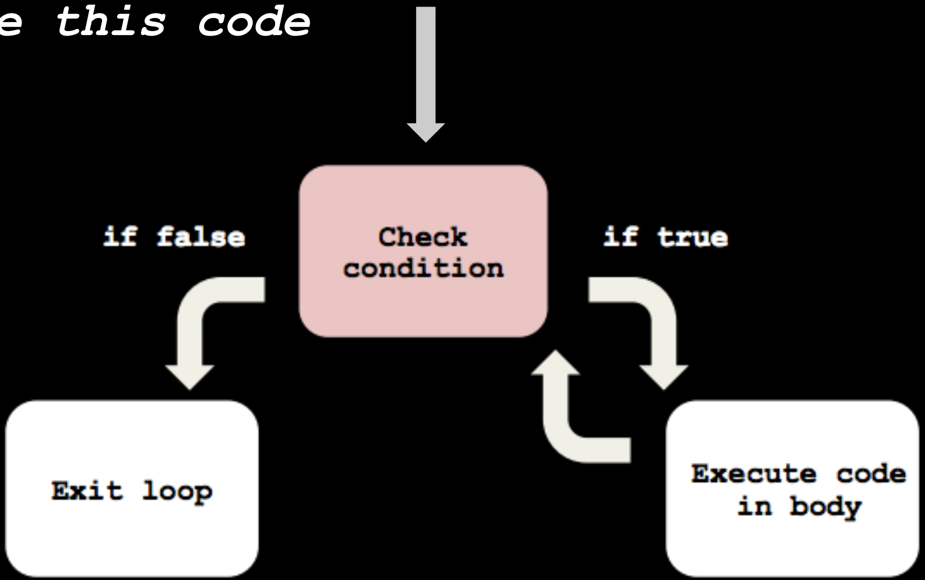


```
repeat 10
    say This is CS50! for 1 secs
```

```
for (int i = 0; i < 10; i++)
{
    printf("This is CS50!\n");
}
```

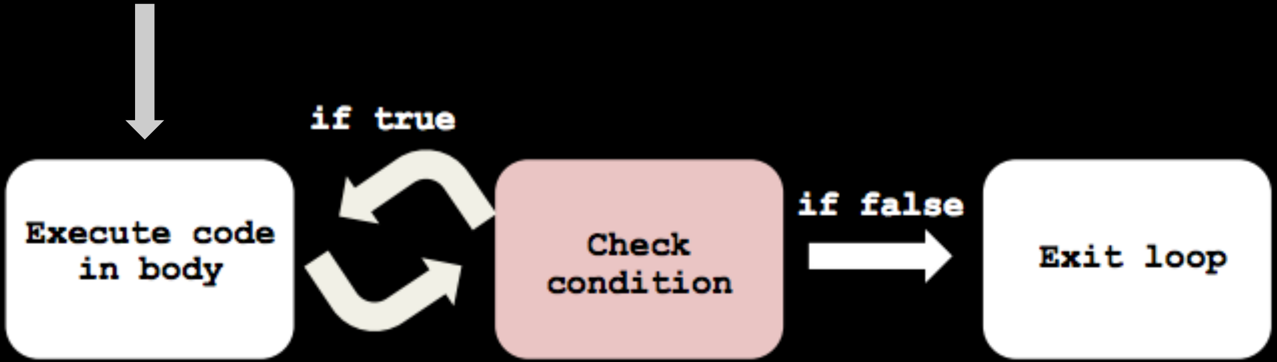
While Loops

```
while (condition)
{
    // execute this code
}
```



Do While Loops

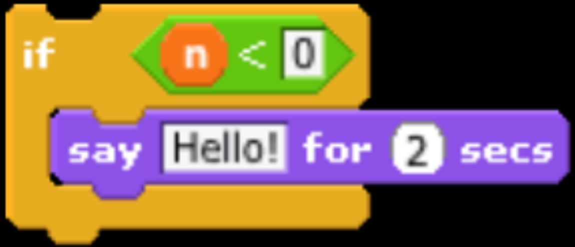
```
do
{
    // execute this code
}
while (condition)
```



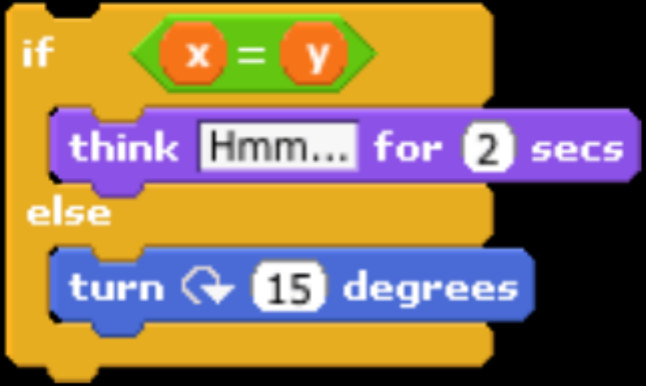
Example

```
int input;
do
{
    printf("Enter a positive number: ");
    input = GetInt();
}
while(input < 1);
```

Conditions and Boolean Expressions



```
if <(n) < [0]>
    say [Hello!] for (2) secs
```



```
if <(x) = (y)>
    think [Hmm...] for (2) secs
else
    turn ↻ (15) degrees
```

Example: If

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer: ");
    int n = GetInt();
    if (n > 0)
    {
        printf("You picked a positive number!\n");
    }
}
```

Example: If… Else

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer: ");
    int n = GetInt();
    if (n > 0)
    {
        printf("You picked a positive number!\n");
    }
    else
    {
        printf("You picked a negative number!\n");
    }
}
```

Example: If… Else if… Else

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer: ");
    int n = GetInt();
    if (n > 0)
    {
        printf("You picked a positive number!\n");
    }
    else if (n < 0)
    {
        printf("You picked a negative number!\n");
    }
    else
    {
        printf("You picked 0!\n");
    }
}
```

```c
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer between 1 and 3, inclusive: ");
    int n = GetInt();
    if (n == 1)
    {
        printf("You picked a low number!\n");
    }
    else if (n == 2)
    {
        printf("You picked a medium number!\n");
    }
    else if (n == 3)
    {
        printf("You picked a high number!\n");
    }
}
```

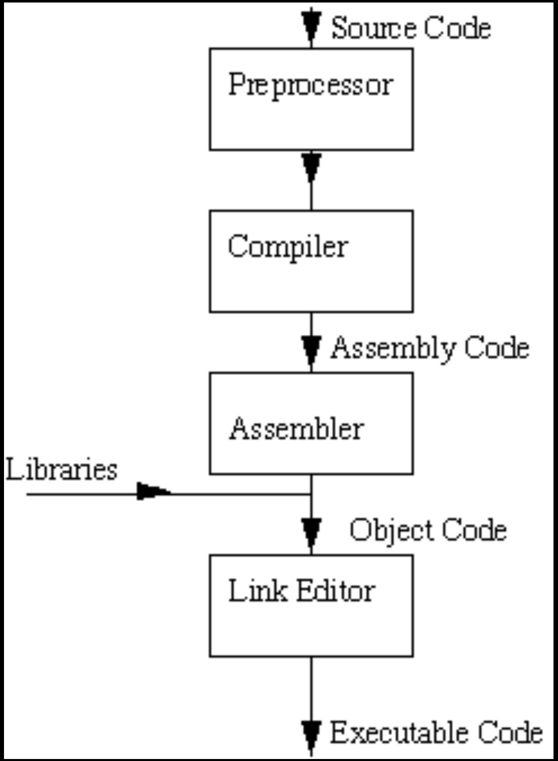
Example: Switch Statements

```
#include <cs50.h>
#include <stdio.h>

int main(void)
{
     printf("Give me an integer between 1 and 3, inclusive: ");
     int n = GetInt();
     switch (n)
     {
          case 1:
               printf("You picked a low number!\n");
               break;
          case 2:
               printf("You picked a medium number!\n");
               break;
          case 3:
               printf("You picked a high number!\n");
               break;
          default:
               printf("Invalid!\n");
               break;
     }
}
```

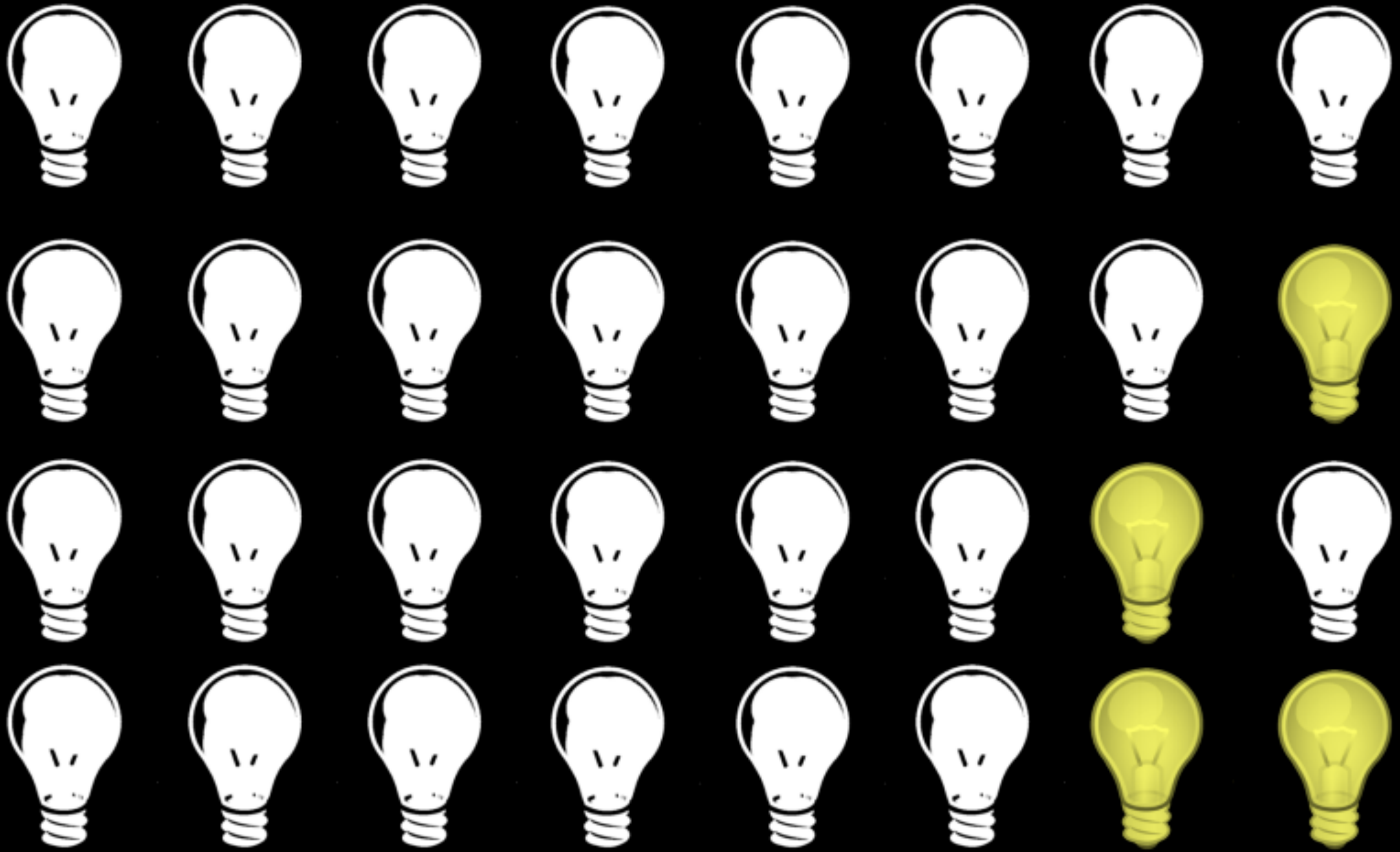
Example: Ternary Operator

```
#include <cs50.h>
#include <stdio.h>

int main(void)
{
    printf("Give me an integer: ");
    int n = GetInt();

    string s = (n > 100) ? "high" : "low";

    printf("You picked a %s number!\n", s);
}
```

Compilation Process



source: http://www.cs.cf.ac.uk/Dave/C/node3.html



Addition and Subtraction

$$\begin{array}{r} 1\;0\;1\;0^{1}\;1^{1}\;1 \\ +\;\;0\;1\;0\;0\;0\;1 \\ \hline 1\;1\;1\;1\;0\;0 \end{array}$$

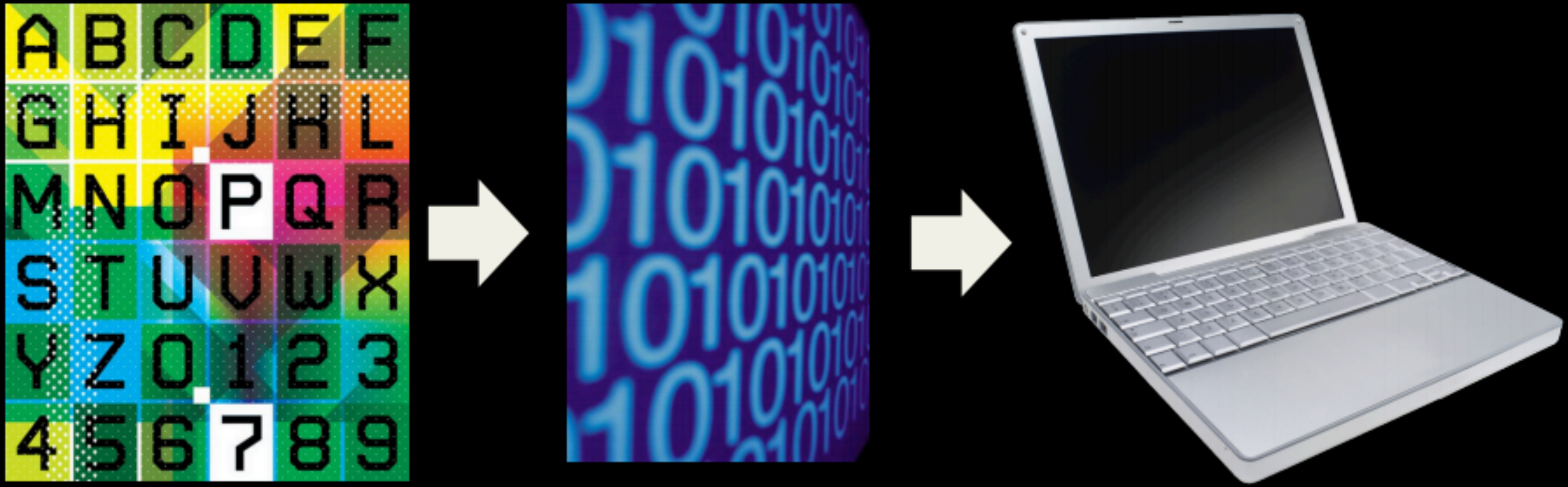
$$\begin{array}{r} 1\;1\;\cancel{1}^{0}\;\cancel{0}^{10}\;0 \\ -\;\;0\;0\;0\;1\;0 \\ \hline 1\;1\;0\;1\;0 \end{array}$$

How can we represent -1?

- signed magnitude
- ones’ complement
- two’s complement

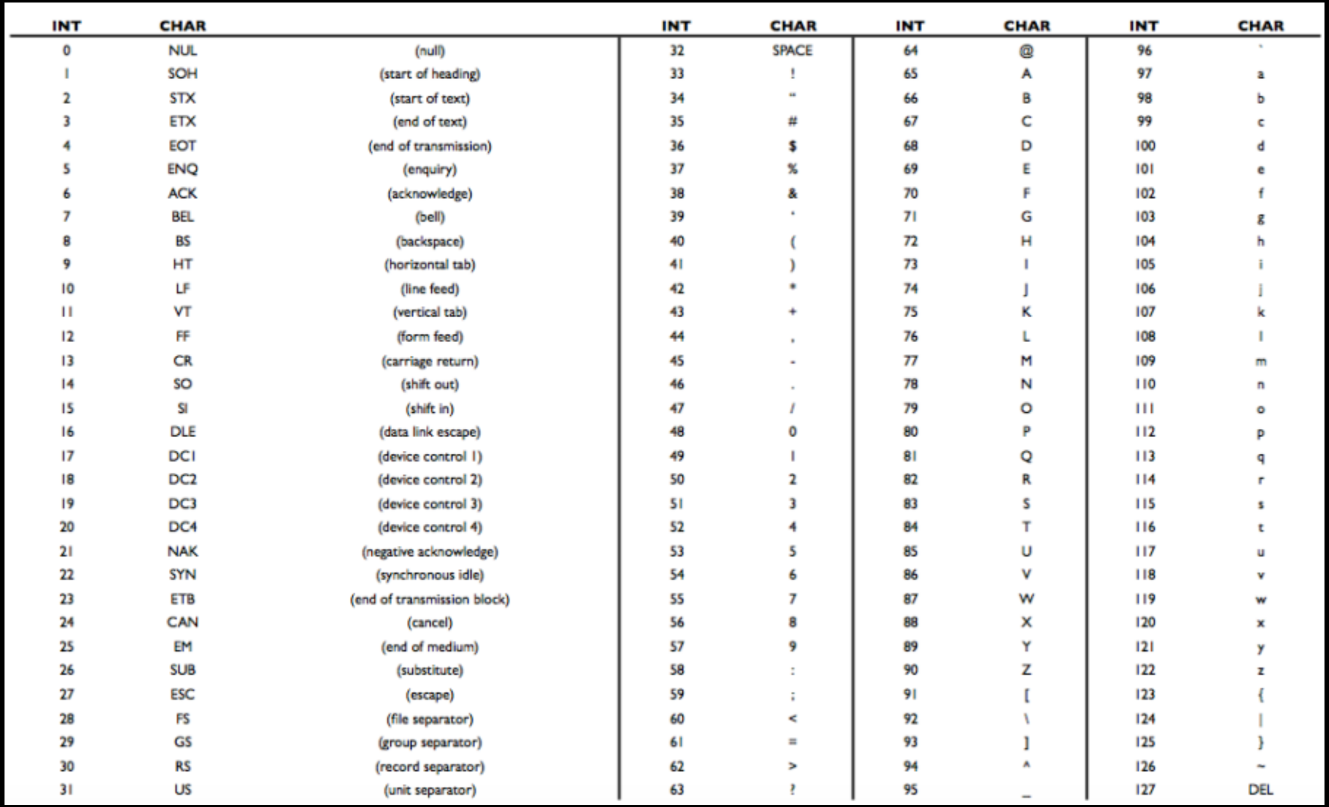
Integer Overflow

Characters must also be encoded in binary



source: https://study.cs50.net/ascii

ASCII



INT	CHAR		INT	CHAR	INT	CHAR	INT	CHAR
0	NUL	(null)	32	SPACE	64	@	96	`
1	SOH	(start of heading)	33	!	65	A	97	a
2	STX	(start of text)	34	"	66	B	98	b
3	ETX	(end of text)	35	#	67	C	99	c
4	EOT	(end of transmission)	36	$	68	D	100	d
5	ENQ	(enquiry)	37	%	69	E	101	e
6	ACK	(acknowledge)	38	&	70	F	102	f
7	BEL	(bell)	39	'	71	G	103	g
8	BS	(backspace)	40	(	72	H	104	h
9	HT	(horizontal tab)	41	)	73	I	105	i
10	LF	(line feed)	42	*	74	J	106	j
11	VT	(vertical tab)	43	+	75	K	107	k
12	FF	(form feed)	44	,	76	L	108	l
13	CR	(carriage return)	45	-	77	M	109	m
14	SO	(shift out)	46	.	78	N	110	n
15	SI	(shift in)	47	/	79	O	111	o
16	DLE	(data link escape)	48	0	80	P	112	p
17	DC1	(device control 1)	49	1	81	Q	113	q
18	DC2	(device control 2)	50	2	82	R	114	r
19	DC3	(device control 3)	51	3	83	S	115	s
20	DC4	(device control 4)	52	4	84	T	116	t
21	NAK	(negative acknowledge)	53	5	85	U	117	u
22	SYN	(synchronous idle)	54	6	86	V	118	v
23	ETB	(end of transmission block)	55	7	87	W	119	w
24	CAN	(cancel)	56	8	88	X	120	x
25	EM	(end of medium)	57	9	89	Y	121	y
26	SUB	(substitute)	58	:	90	Z	122	z
27	ESC	(escape)	59	;	91	[	123	{
28	FS	(file separator)	60	<	92	\	124	|
29	GS	(group separator)	61	=	93	]	125	}
30	RS	(record separator)	62	>	94	^	126	~
31	US	(unit separator)	63	?	95	_	127	DEL

source: https://study.cs50.net/ascii

ASCII Math

What will print?

```
printf("%i\n", 'A' + 1);
printf("%c\n", 65 + ('a' – 'A'));
```

Numerical Variables

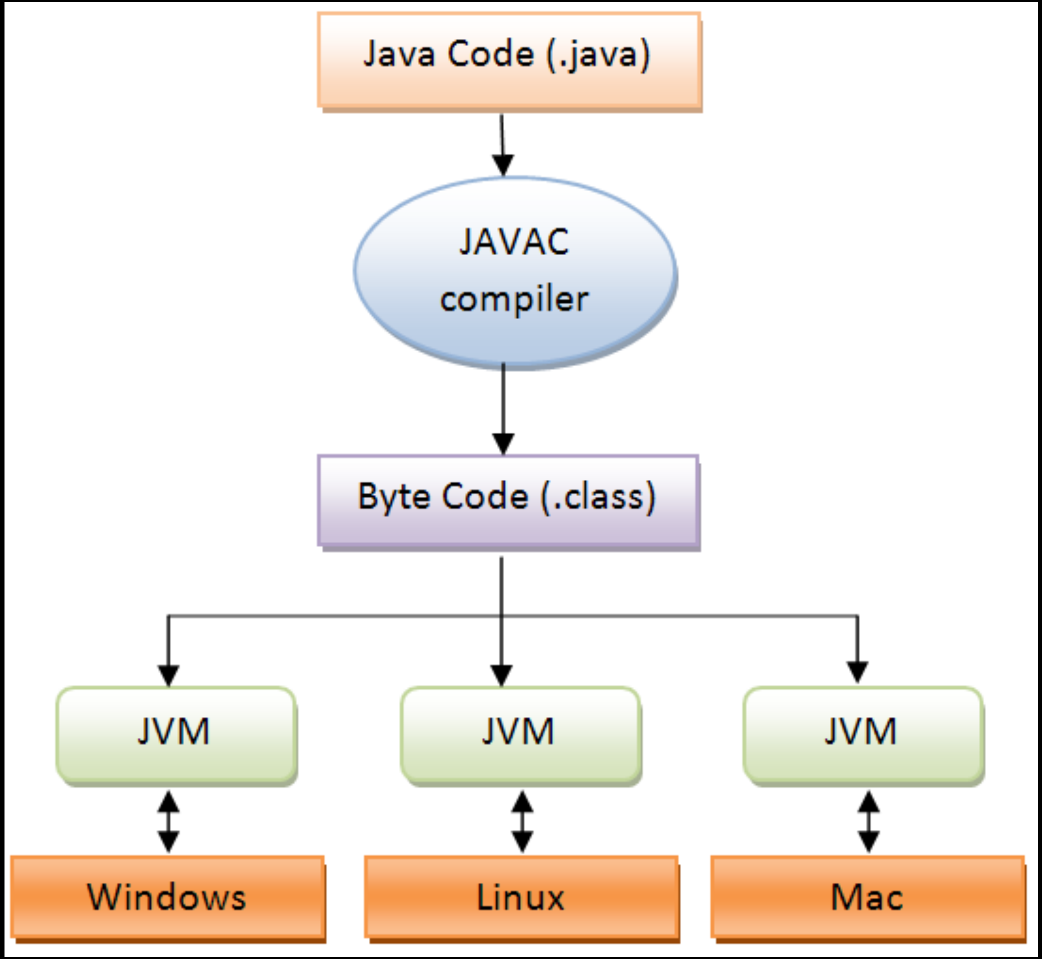
- `int`
- `float`
- `double`
- `long long`

Floating-Point Imprecision

```c
int main(void)
{
    float answer = 1.0 / 10.0;

    // print answer to twenty decimal places
    printf("%.20f\n", answer);
}
```

How are floats stored?

$$1.2345 = \underbrace{12345}_{\text{mantissa}} \times \overbrace{10^{-4}}^{\text{exponent}}$$



Taken from https://javapapers.wordpress.com/2011/11/28/java-virtual-machine-jvm/