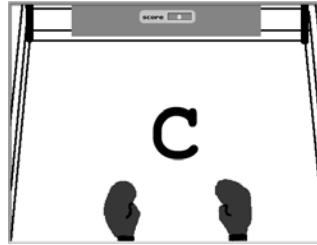


Scratch versus C



O hai, C!

```
#include <stdio.h>

int
main(int argc, char *argv[])
{
    printf("o hai, world!\n");
}

10000011 00000001 00010001 00000000 00111101 11111100 01110100 00111101
00000000 01000000 00000000 00000000 00000000 00000000 00000000 00000000
10010000 00000000 00000000 00000000 00000000 01010000 00000000 00001111 00110000
00001111 00000001 00001111 00000011 00001010 00000000 00000000 00000000
00000000 00100000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00100000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
01110000 00100000 00000000 01000000 00000001 00000000 00000000 00000000
00000000 00000000 00000000 01000000 00000001 00000000 00000000 00000000
00000000 00000000 00000000 01000000 00000001 00000000 00000000 00000000
00000000 01000000 00000000 01000000 00000001 00000000 00000000 00000000
11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
10010000 10000000 00000000 01000000 00000001 00000000 00000000 00000000
00010110 01001000 01111001 01010110 01000001 01010100 01010000 01100001
10110000 00001000 00000000 01000000 00000001 00000000 00000000 00000000
10110000 00001000 00000000 00100000 00000001 00000000 00000000 00000000
11010000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
10110000 00001000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
[...]
```

nice.fas.harvard.edu



cs50.net



Some Commands

```
:: cd
:: cp
:: ls
:: mkdir
:: mv
:: pwd
:: rm
```

Some More Commands

```
:: cat
:: ci
:: co
:: echo
:: gcc
:: gdb
:: less
:: make
:: man
:: more
:: ...
```

How to Write a Program in C

- 1) `nano hail.c`
- 2) `gcc hail.c`
- 3) `a.out`

see
hail.c

How to Write a Program in C (with a better name)

- 1) `nano hail.c`
- 2) `gcc -o hail hail.c`
- 3) `hail`

see
hail.c

How to Write a Program in C

(with fewer keystrokes)

- 1) `nano hail.c`
- 2) `make hail`
- 3) `hail`

see
`hail.c`

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Editors

- :: Emacs
- :: Nano
- :: Vim
- :: ...

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main

```
int main(int argc, char *argv[]);
```

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Standard Output

`printf`

```
int printf(const char *format, ...);
```

see
<http://www.cplusplus.com/stdio/printf.html>

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Escape Sequences

- :: `\n`
- :: `\r`
- :: `\t`
- :: `\"`
- :: `\\`

see
http://www.cplusplus.com/escape_sequences.html

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Variables

Types †

- :: `char`
- :: `double`
- :: `float`
- :: `int`

† `long`, `short`, `signed`, `unsigned`

see
`math1.c`

14

Format Strings

- :: `%c`
- :: `%d`
- :: `%e`
- :: `%E`
- :: `%f`
- :: `%s`
- :: `%u`
- :: `%x`

see
`math2.c`, `sizeof.c`
<http://www.cplusplus.com/stdio/printf.html>

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Arithmetic Operators

- :: `+`
- :: `-`
- :: `*`
- :: `/`
- :: `%`

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Precedence

Operator	Description	Associativity
()	Parentheses (grouping)	left to right
[]	Brackets (array subscript)	left to right
.	Member selection via object name	
->	Member selection via pointer	
++ --	Prefix increment/decrement (see #16)	
* *	Postfix increment/decrement	right to left
! ~	Unary plus/minus	
~	Logical NOT/boolean complement	
(expr) Cast (change type)		
*	Multiplication	
&	Address	
&& &&& &&&&	Bitwise AND/boolean AND	
* / %	Multiplication/division/modulo	left to right
+ -	Addition/subtraction	left to right
<< >>	Bitwise shift left, bitwise shift right	left to right
< <=	Relational less than/less than or equal to	left to right
> >=	Relational greater than/greater than or equal to	left to right
== !=	Relational equal/not equal to	left to right
!	Bitwise NOT	left to right
^	Bitwise XOR	left to right
	Bitwise OR	left to right
	Logical OR	left to right
	Logical AND	left to right
	Logical OR	left to right
?:	Conditional	right to left
=	Assignment	
+= -=	Addition/subtraction assignment	
*= /=	Multiplication/division assignment	
%=	Modulo/remainder AND assignment	
&=	Bitwise AND/boolean OR assignment	
<<= >>=	Bitwise shift left/right assignment	
,	Comma (separate expressions)	left to right

Chart from <http://www.drfanco.net/cpp220top-prec.htm>

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Width and Precision †

```
:: %<width>.<precision>e
:: %<width>.<precision>E
:: %<width>.<precision>f
:: %<width>.<precision>s
```

† -, +

see
math{3,4,5}.c
<http://www.cppreference.com/stdio/printf.html>

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Variables

Types †

```
:: bool
:: string
```

† These are CS 50-specific.

see
hai2.c

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Standard Input †

```
:: char GetChar();
:: double GetDouble();
:: float GetFloat();
:: int GetInt();
:: long long GetLongLong();
:: string GetString();
```

† These are CS 50-specific.

see
hai3.c, adder.c

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How to Write a Program in C (using CS 50's library)

- 1) nano hai3.c
- 2) gcc -o hai3 hai3.c -lcs50
- 3) hai3

see
hai3.c

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Fahrenheit to Celsius

$$C = (5/9) \times (F - 32)$$

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

int
main(int argc, char *argv[])
{
```

```
}
```

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Conditions

if

```
if (condition)
{
    // do this
}
```

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Conditions

if-else

```
if (condition)
{
    // do this
}
else
{
    // do that
}
```

see
conditions1.c

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Conditions

if-else if-else

```
if (condition)
{
    // do this
}
else if (condition)
{
    // do that
}
else
{
    // do this other thing
}
```

see
conditions2.c

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Boolean Expressions

```
if (condition || condition)
{
    // do this
}
else
{
    // do that
}
```

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Boolean Expressions

```
if (condition && condition)
{
    // do this
}
else
{
    // do that
}
```

see
nonswitch.c

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Conditions

switch

```
switch (expression)
{
    case i:
        // do this
        break;
    case j:
        // do that
        break;
    default:
        // do this other thing
}
```

see
switch{1,2}.c

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Loops

for

```
for (initializations; condition; updates)
{
    // do this again and again
}
```

see
progress{1,2}.c

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Loops

while

```
while (condition)
{
    // do this again and again
}
```

see
progress3.c

30

Loops

do-while

```
do
{
    // do this again and again
}
while (condition)
```

see
positive{1,2,3}.c

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Computer Science 50

Introduction to Computer Science I

Harvard College

Week 1

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