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The original C, designed by Brian Kernighan and Dennis Ritchie (K&R C) was later modified and updated by the standards organisation ANSI

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C is very much still a living language

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But also in many other situations: it is very flexible and lends itself to many kinds of problem

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There is a price to pay for this, though

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The point is that for **experts**, such a thing can be useful, e.g., generating random numbers by reading uninitialised memory

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Exercise. Read about buffer overflow bugs, use after free bugs, the Heartbleed bug

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It is up to the programmer choosing the language to decide which way they want to go

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For example, FORTRAN (1960s) is procedural

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There is no coursework for C in this Unit: the main practice for coding in C will be (a) self motivated and (b) in other Units

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In fact, C has been the inspiration or starting point for many languages, e.g., Java, C++, C#, Swift, Rust, and so on, that have tried to fix the “problems” with C

C

Now, C and Java look similar on the page, but are very different languages

Now, C and Java look similar on the page, but are very different languages

C and Java are very different languages

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A lot of what you learned in Java simply does not apply to C

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Which C adapted from BCPL

Which it adapted from Algol, etc.

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But you need to approach C afresh

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Warning: I might use the word “object” in a C context. This is the normal English usage of the word meaning “thing”

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In fact, if they had spent a little more time on the language design, they could have eliminated this from Java (see later OO languages for evidence!)

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In C, all types are primitive!

C

C does not have methods

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C has structures (and unions)

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That’s not such a bad way of thinking about it

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Unlike Java, which tries to hide the hardware from the programmer: the programmer only sees the abstract “java machine”

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Unlike Java, which tries to hide the hardware from the programmer: the programmer only sees the abstract “java machine”

Again: this is not a judgement of which language is “better”

C

The only question is “which language is better suited **to the problem in hand**”

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This is a common theme of this Unit: no one language is better or worse than another. It’s all a matter of the *right tool for the job*

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This is a common theme of this Unit: no one language is better or worse than another. It’s all a matter of the *right tool for the job*

Exercise. Which is the better tool: a screwdriver or a hammer?

C

There is only one way to learn C (or any language)

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Write C programs

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Lots of C programs

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If you don't bother, it will cost you dear later

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I've lost count of the number of students who have handed in pitiful coursework while saying "I wish I'd had more practice before starting this"

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Practice, practice, practice

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Programming is a very practical skill

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Practice!

C

We start with a couple of examples of C programs

```
main(t,_,a )
char
*
a;
{
return!

0<t?
t<3?

main(-79,-13,a+
main(-87,1-_,
main(-86, 0, a+1 )


+a)):

1,
t<_?
main( t+1, _, a )
:3,

main ( -94, -27+t, a )
&&t == 2 ?_
<13 ?

main ( 2, _+1, "%s %d %d\n" )
```

```
"@n'+,#'/*{}w+/w#cdnr/+,{}r/*de}+,/*{*+,/w{%+,/w#q#n+,/#{l,+,/n{n+,/+#n+,/#;#q#
:'d*'3,}{w+K w'K:'+}e#';dq#'l
q#'+d'K#!/+k#;q#'r}eKK#}w'r}eKK{nl]'/#;#q#n'){)#}w'){){nl]'/+#n';d}rw'
i;# ){nl]!/n{n#'; r{#w'r nc{nl]'/#{l,+'K {rw' iK{;[{nl]'/w#q#n'wk nw'
iwk{KK{nl]!/w{%'l##w#' i; :{nl]'/*{q#'ld;r'}{nlwb!/*de}'c
;;{nl'-{}rw]'/+,}##'*}#nc,',#nw]'/+kd'+e}+;#'rdq#w! nr'/ ') }+}{rl#'{n'
')# }'+}##(!!/")
:
t<-50?
_==*a ?
putchar(31[a]):

main(-65,_,a+1)
:
main((*a == '/') + t, _, a + 1 )
:

0<t?

main ( 2, 2 , "%s")
:*a=='/'||

main(0,

main(-61,*a, "!ek;dc i@bK'(q)-[w]*%n+r3#l,{}:\nuwloca-O;m
.vpbks,fxntdCeghiry")
```

C

Written by Ian Phillipps

C

Written by Ian Phillipps

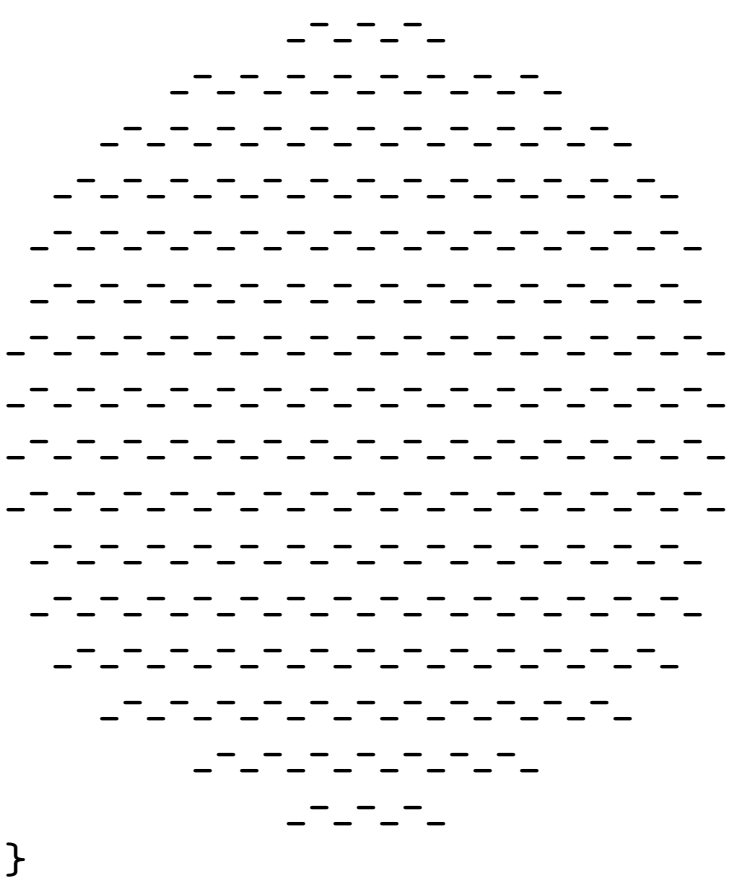
When run this produces...

C

```
On the first day of Christmas my true love gave to me
a partridge in a pear tree.

On the second day of Christmas my true love gave to me
two turtle doves
and a partridge in a pear tree.

On the third day of Christmas my true love gave to me
three french hens, two turtle doves
and a partridge in a pear tree.

On the fourth day of Christmas my true love gave to me
four calling birds, three french hens, two turtle doves
and a partridge in a pear tree.

On the fifth day of Christmas my true love gave to me
five gold rings;
four calling birds, three french hens, two turtle doves
and a partridge in a pear tree.

On the sixth day of Christmas my true love gave to me
six geese a-laying, five gold rings;
four calling birds, three french hens, two turtle doves
...
```

C

```
#define _ F-->00||-F-00--;
int F=00,00=00;main(){F_00();printf("%1.3f\n",4.*-F/00/00);}F_00()
{
```



```
}
```

C

Written by Brian Westley

C

Written by Brian Westley

When run this produces...

C

Written by Brian Westley

When run this produces...

```
3.141
```

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These are taken from the Obfuscated C Competition: a competition to see how unreadable you can make a C program: `http://www.no.ioccc.org/years.html`

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So you need to be extra-careful on layout and presentation when writing C!