The C Language

CS238P: Operating Systems - Fall '18

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Data and Computation
Data

Data can be of different types.

- char (1 byte)
- int, long (4/8 bytes)
- pointer (1 byte), structs, etc.

They can also be:

- constants
- variables
A data type therefore determines two things\(^1\):

- the size of the data variable
- how the data is to be interpreted.

\(^1\)https://www.tutorialspoint.com/cprogramming/c_data_types.htm
Computation
Statements

• declarations
• assignments
• for, do...while, while
Hw1 (xv6 shell)

- if...else
Hw1(xv6 shell)

- if...else
- switch...case
Hw1 (xv6 shell)

- if...else
- switch...case
- Functions
  - Process creation (fork, exec)
  - File I/O (open, close, read, write)
Pointers

Fig. 1(a). Simple illustration of how a pointer points to data in the memory. (b) Corresponding C code for Fig. 1(a).

(a)  
\[
\begin{align*}
\text{int } a &= 5; \\
\text{int } *p &= &a;
\end{align*}
\]

(b)

p points to integer a's address. 1 byte is used. (not showing how the address is actually stored here in binary) 

Integer a stored in the memory containing the decimal value 5. 4 bytes are used.
Arrays

- Collection of objects of the same data type
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- Collection of objects of the same data type
- Accessed by index \((0 \ldots \text{size} - 1)\)
Arrays

- Collection of objects of the same data type
- Accessed by index (0 ... size - 1)
- String is an array of characters
Designated Initializers\textsuperscript{2} Initialize the array elements 0x3A, 0x45, 0x46 only \textsuperscript{3}

\textsuperscript{2}http://gcc.gnu.org/onlinedocs/gcc-4.0.4/gcc/Designated-lnits.html
\textsuperscript{3}sheet 77, xv6-rev9.pdf
Examples
(arrays-ptrs.c & arrays-strings.c)