5 Language Overview

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A C-program (usually) consists of

- a set of global variables
- a set of (sub-)functions
  - a set of local variables
  - a set of instructions
- the function `main()`, which is the entry point for any execution
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// include files
#include <led.h>

// global variables
LED nextLED = RED0;

// subfunction 1
LED lightLED(void) {
    if (nextLED <= BLUE1) {
        sb_led_on(nextLED++);
    }
    return nextLED;
}

// subfunction 2
void wait(void) {
    volatile unsigned int i;
    for (i = 0; i < 0xffff; i++)
    {
    }
}

// main function
void main() {
    while (lightLED() < 8) {
        wait();
    }
}

Names given by the developer for certain elements of the program
- element: type, variable, constant, function, jump mark
- structure: [ A-Z, a-z, _ ] [ A-Z, a-z, 0-9, _ ]*
  - one letter, followed by a combination of letters, numbers and underscores
  - underscore can be used as a first symbol, however, this is usually reserved for compiler manufacturers
- every identifier has to be declared prior to being used
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Literals

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(Expression of) constants in the code

- For every primitive data type, there is at least one literal form.
  - for integers: decimal (base 10: 65535), hexadecimal (base 16, leading 0x: 0xffff), octal (base 8, leading 0: 0177777)
- The programmer can then choose the best suited form.
  - 0xffff is more handy than 65535 to represent the maximal value of a 16-bit integer
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Outline the actual procedure of the program

They are hierarchically made up from three basic forms

- single instruction – expression followed by 
  - single semicolon → empty instruction
- block – sequence of instructions, wrapped in {...}
- control structures, followed by instructions
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Valid combination of **operators**, **literals**, and **identifiers**

- "valid" in the sense of syntax and types
- priority rules for operators determine the order, in which the expressions get handled
  - order of execution can be explicitly forced with the help of brackets (`()`)
  - the compiler is allowed to evaluate partial expressions in the most efficient order