

The Birds Project

# The libBirds Library, Software Code Standards

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# 1. Purpose of the SCS Document

This is a standard "Software Code Standards" document, corresponding to the guidelines in RTCA DO-178B. In the words of DO-178B, it defines "the programming languages, methods, rules and tools to be used to code the software."

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## 2. Programming Languages

The C programming language shall be used exclusively. The acceptable C dialect is that recognized by the GNU `gcc` compiler, version 2.92.2.

The C dialect is specified by compiler rather than by a standard (such as ANSI C), because the aim of libBirds is to provide a library portable across all CPU types supported by GNU `gcc`.

## 3. Source-Code Presentation Standards

### 3.1. Internal Identification and Documentation

*File headers.* Each source-code file and each process file (such as makefiles or linker scripts) shall begin with a header containing the following elements:

1. A statement of copyright.
2. The name of the file.
3. A brief summary of the purpose of the file.
4. A modification history of the file.
5. A notice of GNU LGPL licensing.
6. An optional, more detailed statement of purpose of the file.
7. All `#include` statements.
8. All `#define` statements not provided by header files.
9. All datatype definitions such as `typedef` not provided by header files.

10. Active source-code lines.

11. For header files, the active elements of the file (items 7-10 above) are expected to be within a conditional compilation block protecting against double-inclusion of the header file. For example, for a header file named `MyFile.h`, we would expect something like this:

```
// Here's where the file begins.

// Copyright:  (c)2001 Ronald S. Burkey
// Filename:    SampleFile.h
// Purpose:     For demonstrating conditional header inclusion.
// Mods:       10/30/01 RSB   Wrote example.

// ... GNU LGPL disclaimer goes here ...

#ifndef _INCLUDED_MYFILE_H
#define _INCLUDED_MYFILE_H

// Active elements ...
// ...
// ... end of active elements.

#endif    // _INCLUDED_MYFILE_H

// Here's the end of the file.
```

*Comments.* It is expected that each function definition will be preceded by a comment describing the purpose of the function, its input parameters, and its outputs, including its return value.

Comments should be used liberally throughout the code, such as:

1. Prior to significant code blocks;
2. Near each change to the source code (after initial release);
3. After `#endif` statements.

However, while these are desirable, no *specific* requirements are placed on the number, positioning, or contents of comments, other than those mentioned in the preceding paragraphs.

## 3.2. Formatting

C-language source code shall be formatted in a manner consistent with the output format of the GNU **indent** program, when run without command-line switches. (GNU **indent** is a C source-code formatter.)

Obviously, by definition, this effect can be achieved by actually running the GNU **indent** program.

## 4. Naming Conventions

### 4.1. Components

A C-language header files shall have filenames ending in ".h", and all other C-language source files shall have filenames ending in ".c". For example, "foobar.h" and "foobar.c".

Where a source file contains a single externally accessible function (and possibly other, `static` functions), the source file shall be named consistently with the name of the function. For example, "foobar.c" would contain the `foobar` function.

### 4.2. Subprograms

C-functions are preferentially named by means of juxtaposed words, each one of which is capitalized, forming a description of the function. This perhaps best understood with an example:

```
int
AddTwoIntegers (int i, int j)
{
    return (i + j);
}
```

Thus, the function which adds two integers is called `AddTwoIntegers`.

### 4.3. Variables

Refer to the 'Subprograms' section above. Variables are named according to the same principles as functions.

Additionally, certain single-character lower-case variable names are used:

```
int i, j, k, l, m, n;  
char c;  
char *s;  
char s[];  
float t, x, y, z;
```

### 4.4. Constants

Names of constants should be in all capital letters. They can also contain underline-characters or digits. For example:

```
#define MAX_FILES 12  
#define INPUT_MASK 0x122  
#define ADD2INTEGERS(x,y) ((x)+(y))
```

## 5. Conditions and Constraints on Coding Conventions

It is desired, but not required, that each C source-code file contain a single externally accessible C function (possibly with `static` functions used only within the file).

It is desired, but not required, that each C function (and, indeed, each C source file) be short enough to occupy only a single piece of paper when printed.

## 6. Constraints on Coding Tools

The C compiler (GNU `gcc`) shall be used with the following command-line options:

- ansi Restricts C dialect to ISO-9899 (1990).
- Wall Displays all warning messages.

All warning messages displayed by the compiler shall be resolved; i.e., no warnings shall be allowed.

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