

The Birds Project

The libBirds Library, Software Verification Plan

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1. Purpose of the SVP Document

This is a standard "Software Verification Plan" document, corresponding to the guidelines in RTCA DO-178B. It describes the verification procedures used in the software-development effort.

As a "Plan", the discussion herein does not involve details specific to the software under development. Refer instead to the Software Verification Cases and Procedures.

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2. Software-Component Life Cycles

For this project, there is only one software component, namely the libBirds library, and hence only one life cycle.

2.1. Life Cycle of libBirds Library Development

2.1.1. Life-Cycle

The life cycle of the libBirds library begins with the Planning Process. Upon the end of the planning processes, three separate chains of development begin, and these chains persist until the end of the development effort.

Two of the of the development chains consist of one process each: namely, the SCM Process and the SQA Process.

The third development chain consists of 4 processes: the Requirements Process, followed by the Design Process, the Coding Process, the Integration Process, and the Software Verification Process. For simplicity, we'll refer to this as the "RDCIV chain." The development effort basically progresses through these processes, in the order given, but can backtrack to an earlier process upon discovery of errors that can only be corrected in the earlier process.

Upon completion of the development effort, which is the release of the software by the SQA Process, life cycle data is available for input to a Certification Liaison Process. However, the Certification Liaison Process is really outside of the scope of the libBirds

development effort, since the software produced is merely a reusable library and not a complete system.

Although not possible for the first libBirds release, due to non-availability of personnel, it is hoped that subsequent releases can be reviewed by DER as part of the development effort, allowing very rapid signoff of form 8110 for developers using the libBirds library. When this becomes possible, it will form part of the Certification Liaison Process.

2.1.1.1. Software Verification Process

In the words of DO-178B section 6.1, "The purpose of the software verification process is to detect and report errors that may have been introduced during the software development processes." The libBirds Software Verification Process attempts to address all of the issues outlined in DO-178B chapter 6, except the following:

- 1) The Requirements Process addresses all considerations of DO-178B section 6.3.1. This can be done because at the proposed software level ('C'), there is no requirement of independence.
- 2) The Design Process addresses all considerations of DO-178B sections 6.3.2 & 6.3.3. This can be done because at the proposed software level ('C'), there is no requirement of independence.
- 3) Reviews and analysis of the outputs of the Integration Process (DO-178B section 6.3.5) are not addressed here (or elsewhere) since the entire Integration Process is optional. Refer to the 'Integration Process' section of the PSAC for further explanation.

2.1.1.1.1. Transition Criteria and Satisfaction of Objectives

The Software Verification Process has several outputs:

- a) Review and analysis of the source code.
- b) The SVCP.
- c) Review and analysis of the test results.
- d) The software-test results themselves.

The Software Verification Process can transition to various other life cycle processes:

- 1) To the SQA Process upon successfully creating all Software Verification Process outputs.
- 2) To the Coding Process upon detection of errors in software testing.

3) To the Requirements Process or Design Process upon detection of errors more appropriately resolved in the SRD or SDD than in the code.

2.1.1.2. Organization

The Birds Project differs from most organizations involved in airborne software development, in the sense that it is not a commercial organization engaged in manufacturing a product. Instead, it is an effort to freely provide certification-friendly materials to the aviation community, as a service. Furthermore, at least at the time of inception of the libBirds development effort, it is not really "organized" at all, consisting merely of an ad hoc assemblage of a few individuals.

For this reason, the organization of the libBirds development effort cannot be understood in terms of an "org chart" with a neatly defined flow of authority. Instead, it can only be understood in terms of the actual individuals involved.

2.1.1.3. Organizational Responsibilities

At the proposed software level ('C'), the minimum number of individuals required for the development effort is two, to meet the 'independence' requirements of DO-178B Table A-9: one individual for the SQA Process, and one individual for all other activities. If the optional Certification Liaison Process is undertaken (see the 'Certification Liaison' sub-section of 'Software Component Life Cycles' in the PSAC document), then a third individual (a DER) is required.

For the initial release of libBirds, only the minimum number of personnel is used. For later releases, more or other personnel may be used. In this section, all personnel involved in all releases are identified, and their levels of involvement in these releases are made clear. Because there is no corporate entity providing authority for the development activities, we also provide brief resumes of participating individuals, so that their qualifications for their activities are clear.

Ronald S. Burkey, lead developer for libBirds v1.00, has a B.S. degree in Mathematics and a Ph.D. in Physics. He has been professionally involved in designing electronic hardware and firmware for airborne applications (and non-airborne applications) since 1984. He has been responsible for both DO-178A and DO-178B certification efforts.

TBD, SQA Manager for libBirds v1.00.

3. Independence

TBD

4. Verification Methods

4.1. Review Methods

4.1.1. Checklists

TBD

4.1.2. Other aids

TBD

4.2. Analysis Methods

4.2.1. Traceability

TBD

4.2.2. Coverage Analysis

TBD

4.3. Testing Methods

4.3.1. Guidelines for Test-Case Selection

TBD

4.3.2. Guidelines for Test Procedures

TBD

4.3.3. Guidelines for Test Data

TBD

5. Verification Environment

5.1. Equipment Used for Testing

TBD

5.2. Testing/Analysis Tools

TBD

5.3. Guidelines for Applying Tools/Equipment

TBD

5.4. Differences Between Target and Emulator/Simulator

TBD

6. Transition Criteria

TBD

7. Partitioning Considerations

TBD

8. Binary-Tool Assumptions

8.1. Compiler Assumptions

TBD

8.2. Linker Assumptions

TBD

8.3. Loader Assumptions

TBD

9. Reverification Guidelines

9.1. Methods for Identifying Affected Source Code

TBD

9.2. Methods for Identifying Changed Object Code

TBD

9.3. Elimination of Previously-Reported Errors

TBD

10. Previously Developed Software

TBD

11. Multiple-Version Dissimilar Software

TBD

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