Clouds and the Earth's Radiant Energy System (CERES)

Data Management System

CERES Library (CERESlib)
Test Plan
Release 5
Version 2

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Document Revision Record

The Document Revision Record contains information pertaining to approved document changes. The table lists the date the Software Configuration Change Request (SCCR) was approved, the Release and Version Number, the SCCR number, a short description of the revision, and the revised sections. The document authors are listed on the cover. The Head of the CERES Data Management Team approves or disapproves the requested changes based on recommendations of the Configuration Control Board.

Document Revision Record

SCCR Approval Date	Release/ Version Number	SCCR Number	Description of Revision	Section(s) Affected
04/11/02	R3V3	343	• Updated document to specify that entire contents of the CERESlib subdirectories /bin and /data get promoted to production.	Secs. 4.0
			• F77 added to abbreviation list.	App. A
			• Updated directory structure diagrams.	App. B
			• Updated File Descriptions.	App. C
			• Updated cover information.	Cover
			• Updated format to comply with standards.	All
11/18/05	R4V1	604	• Added new sections pertaining to procedures for IBM/Linux cluster testing.	Secs. 1.1, 1.2, 2.2, & 3.4
			• Updated directory structure diagrams.	App. B
			• Updated format to comply with standards.	All
03/14/06	R4V2	617	• Removed reference to NAG compiler.	Secs. 2.0 & 3.0
			• Added commands to copy the promotion files to the NAG version directory.	Sec. 2.2
			• Updated format to comply with standards.	All
09/18/09	R5V1	724	• Added sections for *AMI* CERESlibs.	Secs. 2.2, 3.4, & 3.5
08/22/11	R5V2	859	• Updated reference to document version number.	Sec. 1.1
			• Removed references to *SGI 3800*.	All
			• Added cereslib_Ed4.a, data_products_Ed3.a, and data_products_Ed4.a.	Sec. 1.2
			• Removed smf_compile step for *AMI* versions of CERESlib.	Sec. 2.2
			• Removed duplicate TRMM acronym expansion.	App. A
			• Formatting was modified for easier testing. (12/11/2012)	All

TABLE OF CONTENTS

TABLE OF CONTENTS

Section Page

LIST OF FIGURES

Figure Page

LIST OF TABLES

Table Page

1.0 Introduction

CERES is a key component of EOS and NPP. The first CERES instrument (PFM) flew on TRMM, four instruments are currently operating on the EOS Terra (FM1 and FM2) and Aqua (FM3 and FM4) platforms, and NPP (FM5) platform. CERES measures radiances in three broadband channels: a shortwave channel (0.3 - 5 μm), a total channel (0.3 - 200 μm), and an infrared window channel (8 - 12 μm). The last data processed from the PFM instrument aboard TRMM was March 2000; no additional data are expected. Until June 2005, one instrument on each EOS platform operated in a fixed azimuth scanning mode and the other operated in a rotating azimuth scanning mode; now all are typically operating in the fixed azimuth scanning mode. The NPP platform carries the FM5 instrument, which operates in the fixed azimuth scanning mode though it has the capability to operate in a rotating azimuth scanning mode.

CERES climate data records involve an unprecedented level of data fusion: CERES measurements are combined with imager data (e.g., MODIS on Terra and Aqua, VIIRS on NPP), 4-D weather assimilation data, microwave sea-ice observations, and measurements from five geostationary satellites to produce climate-quality radiative fluxes at the top-of-atmosphere, within the atmosphere and at the surface, together with the associated cloud and aerosol properties.

The CERES project management and implementation responsibility is at NASA Langley. The CERES Science Team is responsible for the instrument design and the derivation and validation of the scientific algorithms used to produce the data products distributed to the atmospheric sciences community. The CERES DMT is responsible for the development and maintenance of the software that implements the science team's algorithms in the production environment to produce CERES data products. The Langley ASDC is responsible for the production environment, data ingest, and the processing, archival, and distribution of the CERES data products.

1.1 Document Overview

This document, CERES Library Release 5 Test Plan, is part of the CERES Library Release 5 delivery package provided to the Langley Distributed Active Archive Center (DAAC). It provides procedures for installing and testing the CERES Library software. A description of acronyms and abbreviations is provided in Appendix A, a directory structure diagram is contained in Appendix B and a description of the software and data files is contained in Appendix C.

This document is organized as follows:

Section 1.0 - Introduction
Section 2.0 - Software Installation Procedures
Section 3.0 - Test and Evaluation Procedures
Appendix A - Acronyms and Abbreviations
Appendix B - Directory Structure Diagram
Appendix C - File Description Tables

1.2 CERES Library Overview

The CERES library (CERESlib) contains no PGEs. Rather, it is a collection of routines and utilities used by multiple subsystems. Fortran and C routines are contained within five archive library files: **cereslib.a, cereslib_Ed4.a**, **data_products.a, data_products_Ed3.a**, and **data_products_Ed4.a**. Utility scripts are located in the **$CERESLIB/bin** directory.

1.2.1 Archive Library Files: cereslib.a, cereslib_Ed4.a, data_products.a, data_products_Ed3.a, and data_products_Ed4.a.

For implementation purposes, the Fortran and C routines in CERESlib are divided between five different archive library files: **cereslib.a**, **cereslib_Ed4.a**, **data_products.a**, **data_products_Ed3.a**, and **data_products_Ed4.a**. The data_products archive files contains modules related to CERES data products: CERES Editions 1 through 2 in **data_products.a**, CERES Edition 3 in **data_products_Ed3.a**, and CERES Edition 4 in **data_products_Ed4.a**. All other library modules and routines are located within the cereslib archive files; CERES Editions 1-3 in **cereslib.a** and CERES Edition 4 in **cereslib_Ed4.a**.

1.2.2 Multiple Compiler Versions

There are two different versions of CERESlib included with the CERESlib delivery for the *AMI* Linux platform and one version for the CERESlib delivery for the IBM/Linux cluster. These versions correspond to the varied Fortran compiler needs of the different CERES subsystems as well as multiple architectures. The first version of CERESlib for *AMI* X86_64 Linux is located in the **$CERESHOME/lib/x86-gnu** directory and uses the GNU Fortran compiler in 64-bit mode. The second, for *AMI* PPC64 Linux, is located in the **$CERESHOME/lib/p6-xlf** directory and uses the IBM XL Fortran compiler in 64-bit mode. The single library for the IBM/Linux cluster is located in the **$CERESHOME/lib** directory and uses the IBM XL Fortran compiler in 64-bit mode.

1.2.3 CERESlib Version Definition

The CERESlib version is defined by the date of the latest change to the source code within the library. The format of the version is given as YYYYMMDD. The current version of the CERESlib will be documented in the Delivery Memo.

2.0 Software Installation Procedures

This section describes how to install the CERESlib software in preparation for making the necessary test runs at the Langley DAAC. The installation procedures include instructions for uncompressing and untarring the delivered tar files, properly defining environmental variables, and compiling the code to create the CERES library files.

2.1 Installation

1. The scripts and makefiles in the CERESlib delivery package expect the CERES environment variable, **$CERESENV**, to point to a file which sets the following environment variables:

   CERESHOME - Top directory for CERES software
   CERESLIB - Top directory for CERESlib software (this location will be different for the different CERESlib versions)
   PGSDAT - Toolkit database directory. (This variable is set by the Toolkit pgs-dev-env.csh script.)
   PGSLIB - Directory containing the PGSTK Toolkit library
   PGSBIN - Directory location of Toolkit scripts (e.g. smfcompile)
   F90 - Pointer to the F90 compiler
   F90COMP - Pointer to the Fortran 90 compilation flags
   F90LOAD - Pointer to the Fortran 90 load flags
   CC - Pointer to the C compiler
   CFLAGS - Pointer to the C compiler compilation flags
   PGSINC - Directory for Toolkit and CERES Message Include Files
   PGSMSG - Directory for Toolkit and CERES Message Files
   PGSDIR - Directory for Toolkit libraries
   ADD_LFLAGS - A DAAC required environment variable
   ADD_LIBS - A DAAC required environment variable

2. In the installation instructions below, use the following definition for the TAG variable, which is included in the file name of the delivery files.

   TAG = **R{R#}-{SCCR#}**

   where R# = CERES Software Release Number
   SCCR# = SCCR Number for the CERESlib Delivery

   Ex: **TAG = R2-050**
   for CERES Software Release 2 and GGEO SCCR #050

3. Follow the steps below to install the CERESlib software.

   source $CERESENV (any version)
   mv CERESlib_src_{TAG}.tar.gz $CERESHOME
   cd $CERESHOME

uncompress CERESlib_src{TAG}.tar.gz
tar xf CERESlib_src{TAG}.tar

2.2 Compilation

Complete the following steps to compile the CERESlib source code.

On *AMI* with PPC64 arch:

1. Compile the PPC64 CERESlib version.

source $CERESENV
cd $CERESLIB/src
./makeall clean
./makeall

On *AMI* with X86_64 arch:

1. Compile the X86_64 CERESlib version.

source $CERESENV
cd $CERESLIB/src
./makeall clean
./makeall

On IBM/Linux cluster:

1. Create the message and message include files.

source $CERESENV
cd $CERESLIB/smf
$CERESLIB/bin/smfcompile_all.csh
cd $CERESLIB/bin
./cp_inc_and_msg_files.csh

2. Compile the XLF F90 CERESlib version

source $CERESENV
cd $CERESLIB/src
./makeall clean
./makeall

Notes:

- When moving from one version of CERESlib to the other, do not simply change directory locations, but be sure that the appropriate start-up script has been sourced. Failure to do so will cause errors to occur.
- The **smfcompile_all.csh** script and the makeall scripts will report at the end whether all the operations performed were successful. If problems are encountered, contact one of the CERESlib analysts before proceeding further.
- DAAC personnel may have an alternate procedure for compiling the message files. Any alternate procedure should copy all *message include files* to the **$PGSINC** directory and all *message files* to the **$PGSMSG** directory.

- Because the compiled message and include files go to the **$PGSMSG** and **$PGSINC** directories respectively, and because the CERES subsystems will look for these files in these directories and not in the **$CERESLIB** subdirectories, it is only necessary that the message files be compiled for one of the CERESlib versions.

3.0 Test and Evaluation Procedures

This section provides instructions for compiling and executing the CERESlib test suite. (See Section 2.1 for an explanation of the CERESENV environment variable.)

The test suite will be executed once for each version of CERESlib. In each case, the runtest script will print a warning message to the screen and pause processing for each problem discovered during execution. If no problems are encountered, then the script will complete without interruption until the end. If problems are encountered, then contact one of the CERESlib analysts.

3.1 Compiling and Executing the XLF CERESlib Test Suite

1. Compile XLF F90 CERESlib test suite.

```
source $CERESENV
cd $CERESLIB/test_suites
./makeall clean
./makeall
```

2. If the makeall script reports SUCCESS, then proceed with the testing.

```
./runtest
```

3.2 Compiling and Executing the *AMI* PPC64 CERESlib Test Suite

1. Compile XLF F90 CERESlib test suite.

```
source $CERESENV
cd $CERESLIB/test_suites
./makeall clean
./makeall
```

2. If the makeall script reports SUCCESS, then proceed with the testing.

```
./runtest
```

3.3 Compiling and Executing the *AMI* X86_64 CERESlib Test Suite

1. Compile Gfortran F90 CERESlib test suite.

```
source $CERESENV
cd $CERESLIB/test_suites
./makeall clean
./makeall
```

2. If the makeall script reports SUCCESS, then proceed with the testing.

```
./runtest
```

4.0 CERESlib File Promotion into Production

After CERESlib testing is complete, the following subdirectories and all their contents should be promoted to the production directories:

1. **$CERESLIB/bin**
2. **$CERESLIB/data**

It doesn't matter from which version of CERESlib these files are moved.

Appendix A
Acronyms and Abbreviations

CERES	Clouds and the Earth's Radiant Energy System
CERESlib	CERES library
DAAC	Distributed Active Archive Center
EOS	Earth Observing System
EOS-AM	EOS Morning Crossing Mission
EOS-PM	EOS Afternoon Crossing Mission
ERBE	Earth Radiation Budget Experiment
ERBS	Earth Radiation Budget Satellite
F77	Fortran 77
F90	Fortran 90
F95	Fortran 95
NAG	Numerical Algorithms Group
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
SGI	Silicon Graphics Incorporated
TRMM	Tropical Rainfall Measuring Mission

Appendix B
Directory Structure Diagrams

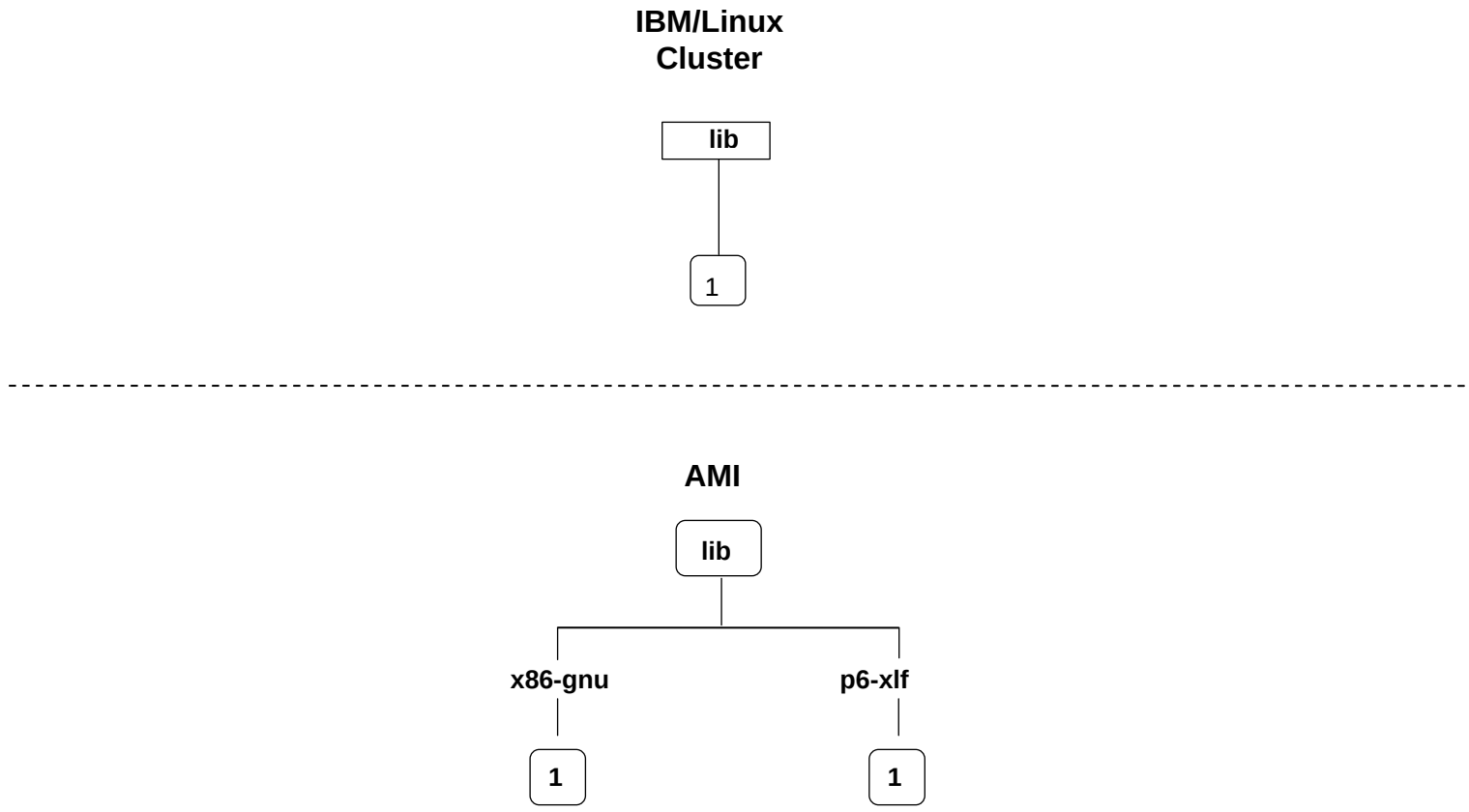

Figure B-1. CERES Library Directory Structure

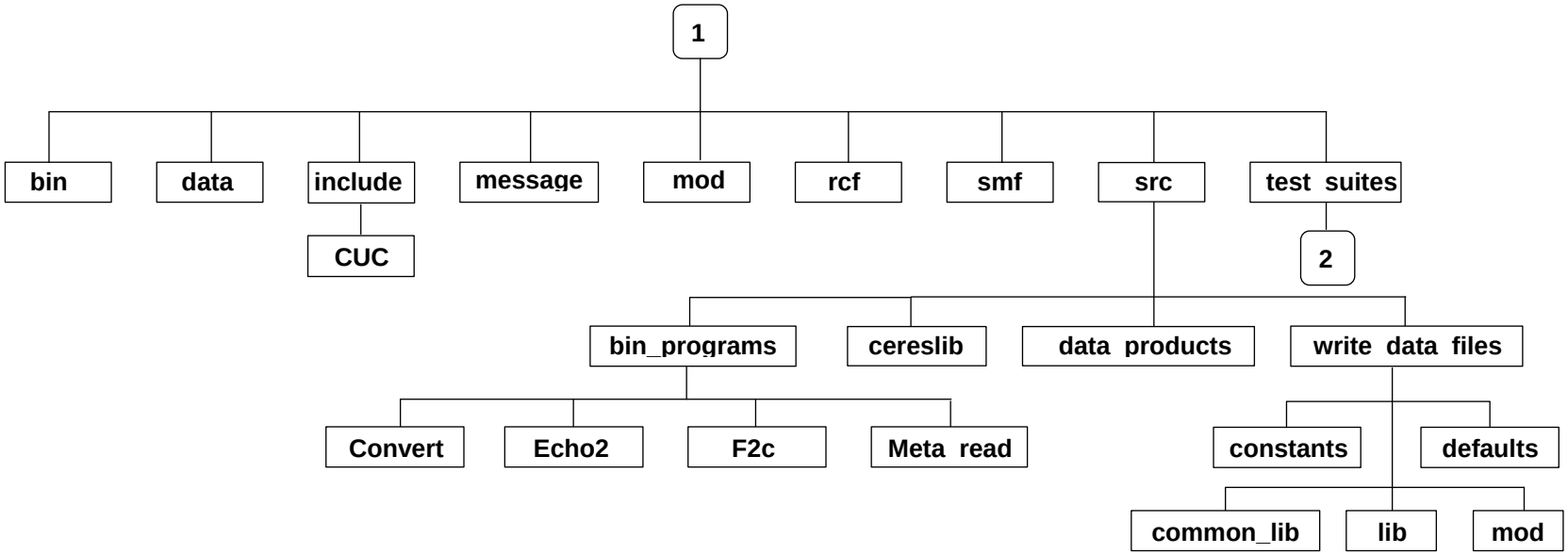

Figure B-2. CERES Library Directory Structure

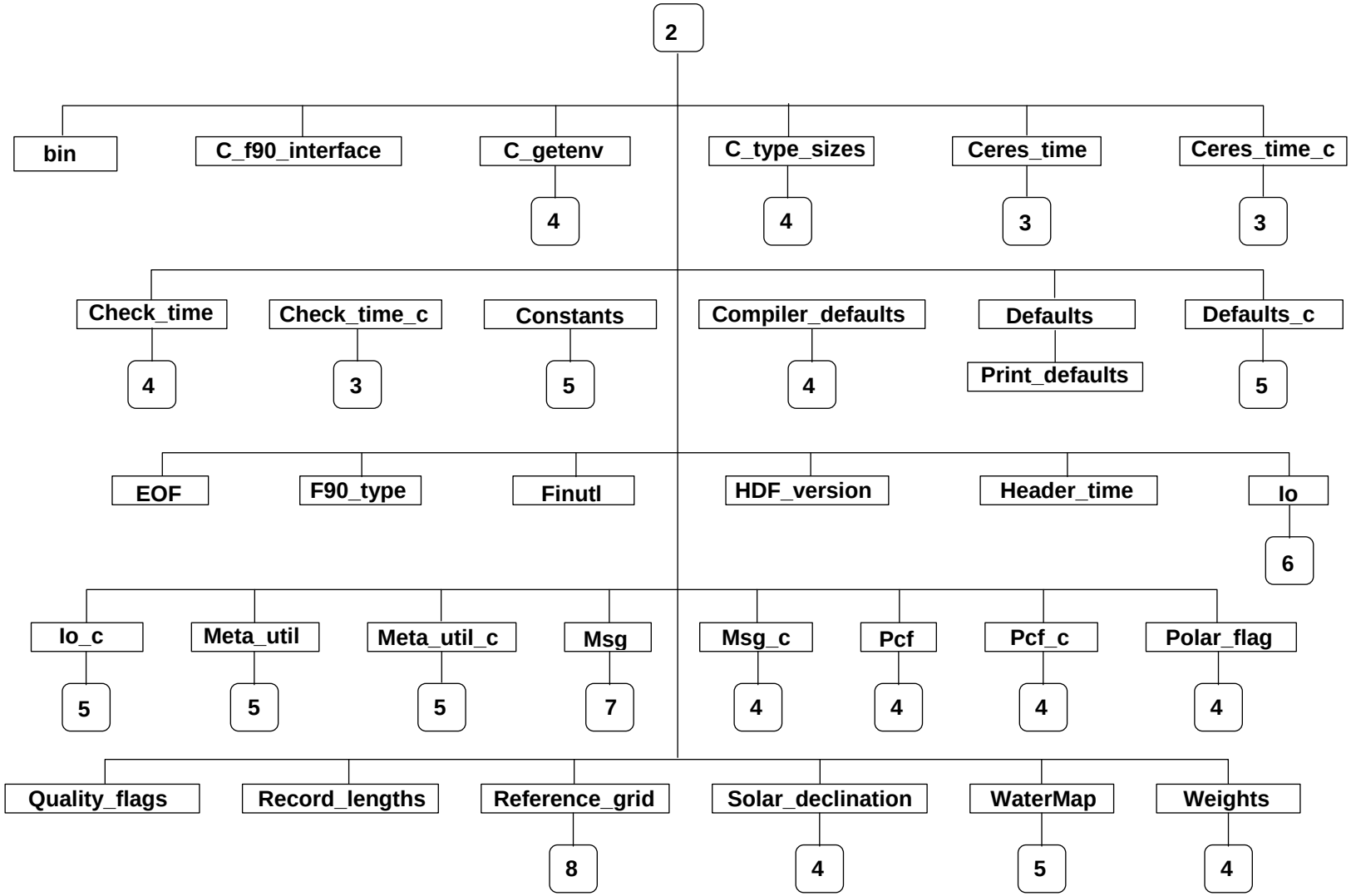

Figure B-3. CERES Library Directory Structure

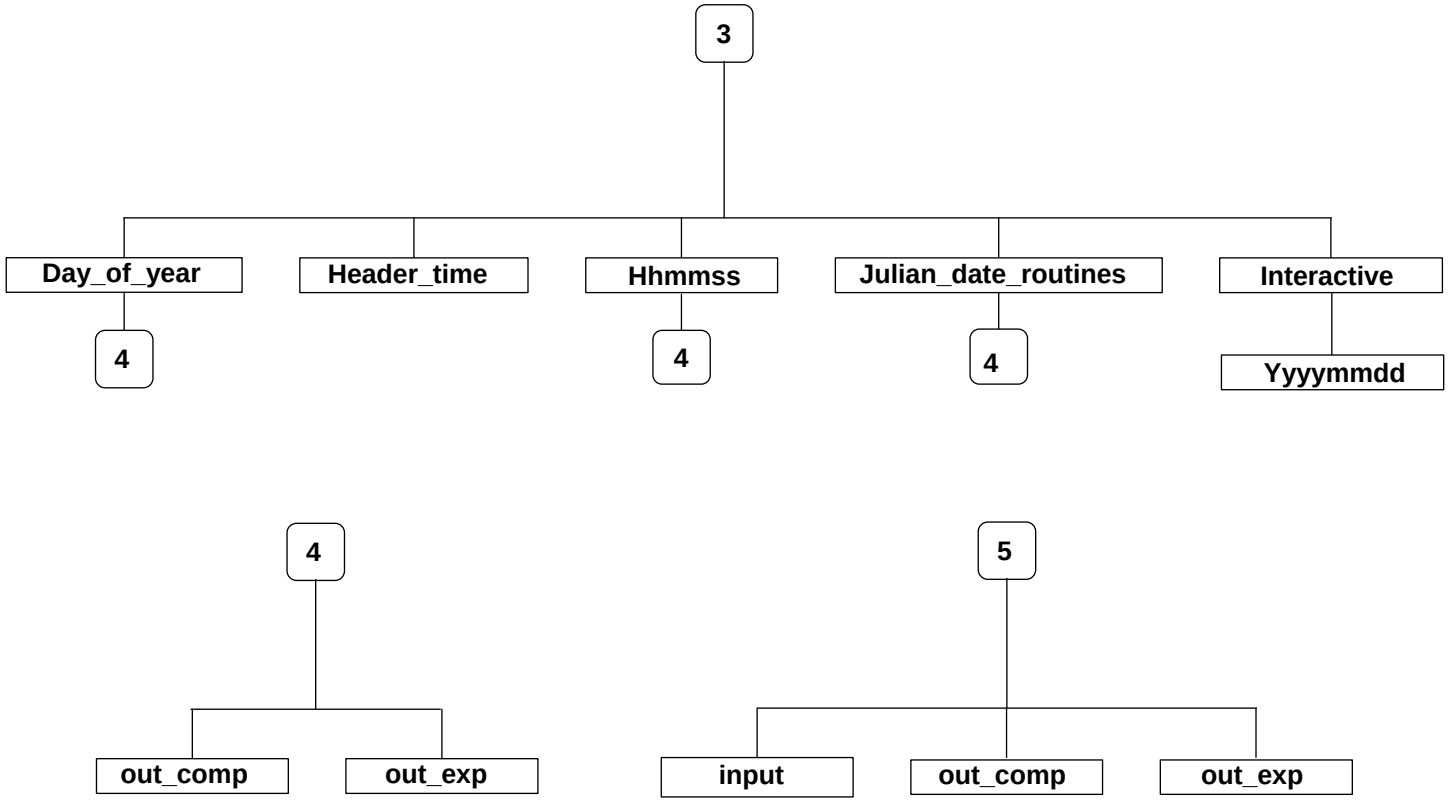

Figure B-4. CERES Library Directory Structure

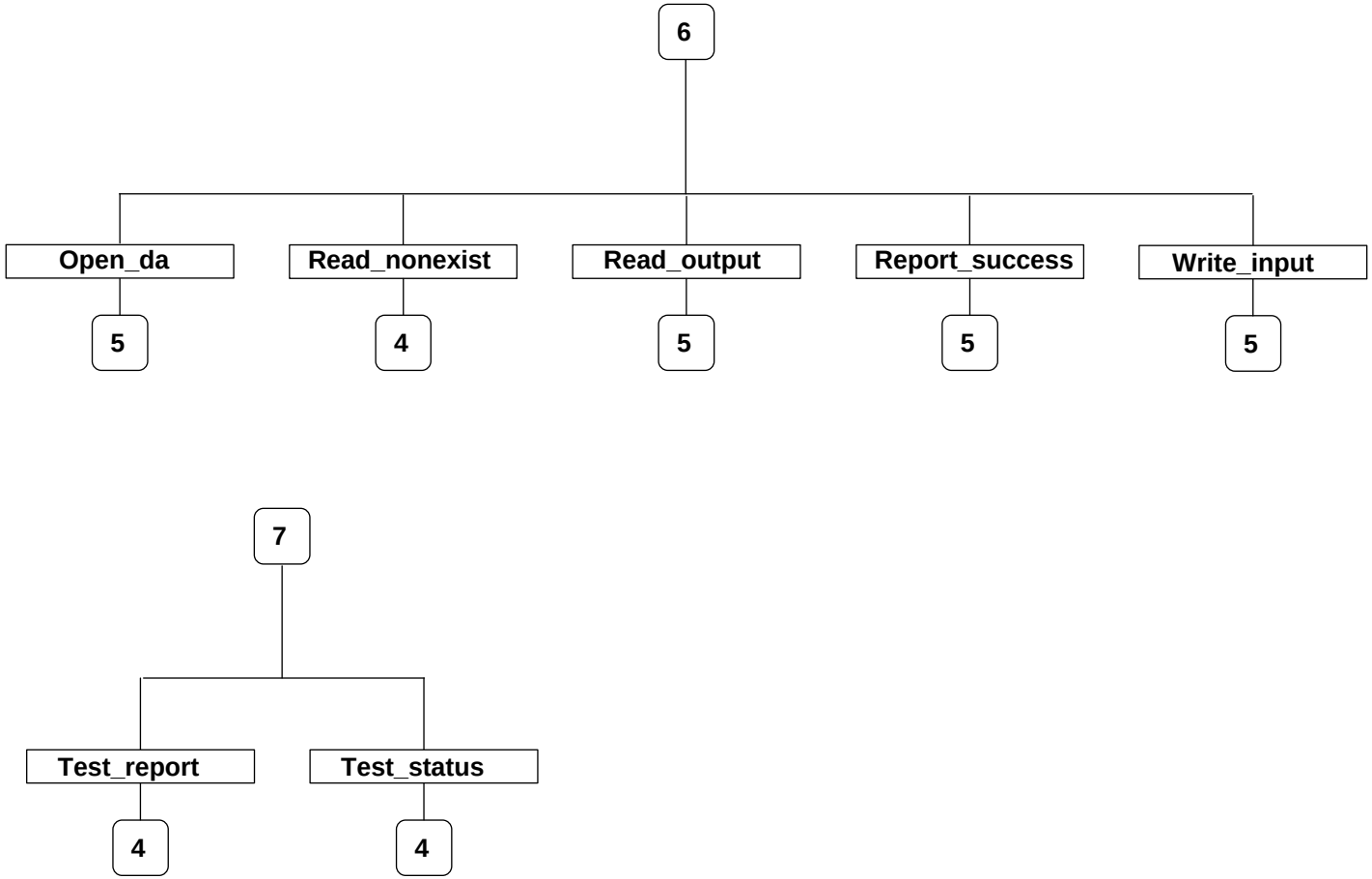

Figure B-5. CERES Library Directory Structure

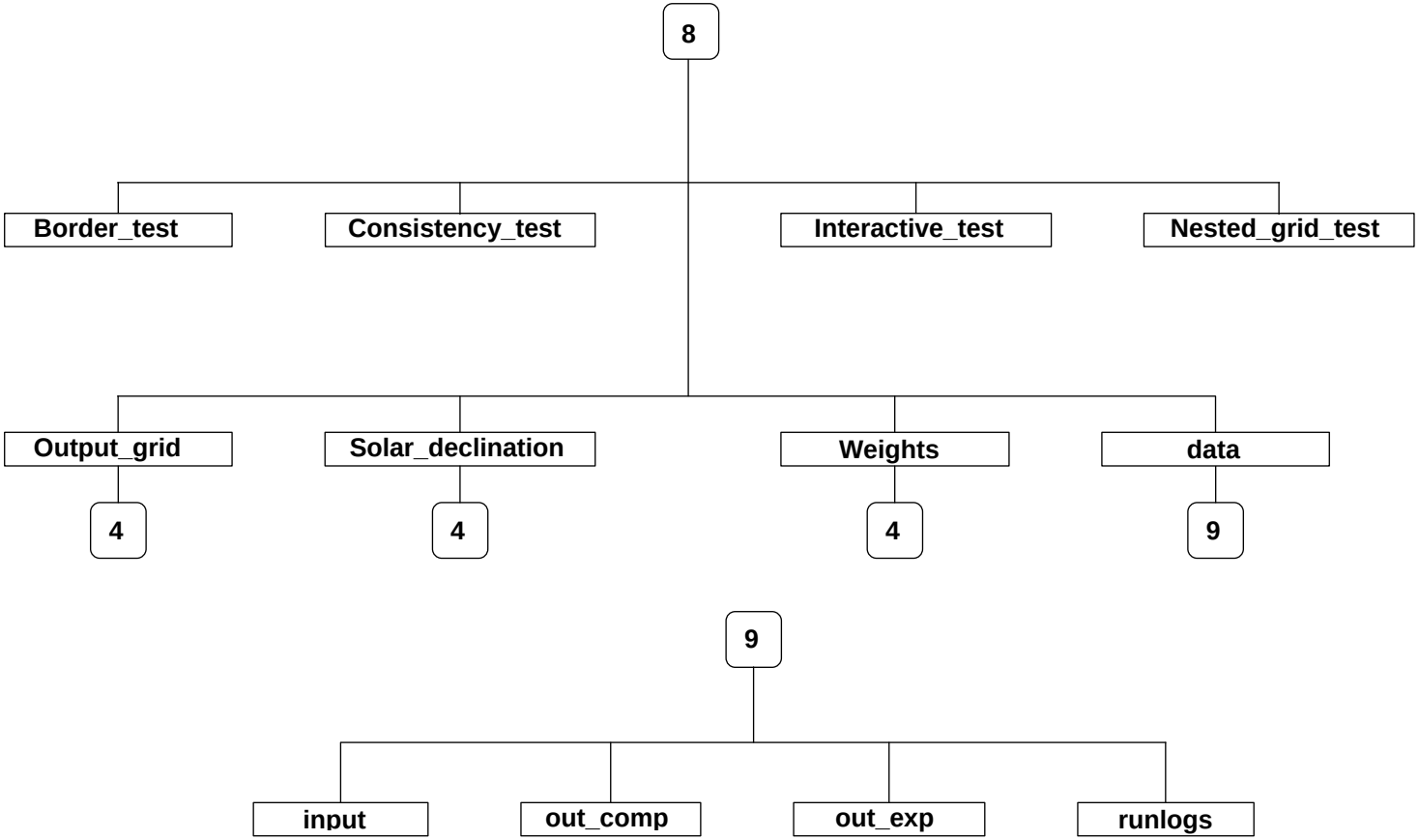

Figure B-6. CERES Library Directory Structure

Appendix C
File Description Tables

C.1 Production Scripts and Executables

Table C-1. lib/bin/ subdirectory

File Name	Format	Description
border_echo.csh	ASCII	echoes a string with a border
ceresutil	ASCII	CERES utility scripts
check_files.csh	ASCII	checks existence of files
cleanpath	ASCII	removes duplicates entries from path
cmp_binary.csh	ASCII	compares binary files
day_and_hour.csh	ASCII	prints day and hour from the hour of the month
day_of_year.csh	ASCII	prints day of year from year, month, and day
diff_ascii.csh	ASCII	takes a difference between two ASCII files
diff_logs.csh	ASCII	takes a difference between production log files
directory_listing.csh	ASCII	creates a listing of files in a directory
echo_border.csh	ASCII	echoes a string with a border
echo_string.csh	ASCII	echoes a string follows by dots
echo_underline.csh	ASCII	echoes and underlines a string
hour_of_month	ASCII	prints hour of the month from day and hour
last_day.csh	ASCII	prints last day of month given month and year
local_version.csh	ASCII	echoes the local CERESlib version date
numeric_check.csh	ASCII	checks whether an input parameter is numeric
setVariables.csh	ASCII	creates a file with variables identifying the local environment
smfcompile_all.csh	ASCII	compiles and places message files
tarfile_listing.csh	ASCII	creates a listing of files contained in a tarfile
three_digits.csh	ASCII	echoes three-digit numeral from input parameter
tk_version.csh	ASCII	echoes Toolkit version number
two_digits.csh	ASCII	echoes three-digit numeral from input parameter
version.csh	ASCII	echoes the local CERESlib version date and the DAAC CERESlib version date

Table C-1. lib/bin/ subdirectory

File Name	Format	Description
year_month_day.csh	ASCII	echoes yyyy/mm/dd from year and day of year

C.2 Executables

Table C-2. lib/bin subdirectory

File Name	Byte Size	Description
convert.exe	Binary	Converts F77 files to F90
echo2.exe	Binary	echoes to standard error
f2c.exe	Binary	Converts F77 files to C
grid_interactive.exe	Binary	Runs reference_grid routines interactively
meta_read.exe	Binary	program for reading meta_data

C.3 Status Message Files

Table C-3. lib/smf subdirectory

File Name	Format	Description
CERES_25000.t	ASCII	CERES utility module messages
GFDLAER_25716.t	ASCII	gfdl_aer_clim.f90 module messages
PMOA_FILE_26210.t	ASCII	post_moa_file.f90 module messages
SOLDEC_26400.t	ASCII	solar_declination.f90 module messages
TISA_FSW_25899.t	ASCII	fsw.f90 and fsw_file.f90 module messages
TISA_SFC_26299.t	ASCII	sfc.f90 and sfc_file.f90 module messages
TSI_25910.t	ASCII	tsi_type_mod.f90 module messages
VALREG_25714.t	ASCII	valreg_utils.f90 module messages
crs_io_25700.t	ASCII	crs_io.f90 module messages
ggeofile.t	ASCII	ggeo.f90 and ggeo_file.f90 module messages
moa_io_26500.t	ASCII	moa_io module messages
refgrid.t	ASCII	reference grid module messages

Table C-3. lib/smf subdirectory

File Name	Format	Description
surf_io_26550.t	ASCII	surfmap_io.f90 module messages
syn_index_26001.t	ASCII	syn_index.f90 module messages
syn_io_26000.t	ASCII	syn_io.f90 module messages

C.4 PCF/MCF Templates

Not Applicable

C.5 HDF Read Software

Not Applicable

C.6 Ancillary Input Files

Table C-4. lib/data subdirectory

File Name	Format	Description
CERES_constants.dat	ASCII	CERES constants accessible through Toolkit
CERES_defaults.dat	ASCII	CERES default values accessible through Toolkit
ceres_SI_FM1_day.20020328	ASCII	Static spectral response functions & spectral correction coefficient files
ceres_SI_FM2_day.20020328	ASCII	same as above
ceres_SI_PFM_day.20020328	ASCII	same as above
ceres_SI_FM1_night.20020328	ASCII	Static spectral correction coefficient files
ceres_SI_FM2_night.20020328	ASCII	same as above
ceres_SI_PFM_night.20020328	ASCII	same as above

C.7 Temporary Files

Not Applicable