JSC Engineering Orbital Dynamics Model Template

Simulation and Graphics Branch (ER7)
Software, Robotics, and Simulation Division
Engineering Directorate

Package Release JEOD v5.3

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National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

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Executive Summary

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Chapter 1

Introduction

1.1 Purpose and Objectives of the Model Template

Replace these words with a brief description of the model. Do not use sectioning commands.

1.2 Context within JEOD

The following document is parent to this document:

- *JSC Engineering Orbital Dynamics* [1]

The Model Template forms a component of the utilities suite of models within JEOD v5.3. It is located at models/utils/model_template.

1.3 Document History

Author	Date	Revision	Description
Author Name	Month Year	1.0	Initial Version

1.4 Document Organization

This document is formatted in accordance with the NASA Software Engineering Requirements Standard [2].

The document comprises chapters organized as follows:

Chapter 1: Introduction - This introduction describes the objective and purpose of the Model Template.

Product Requirements - The requirements chapter describes the requirements on the Model Template.

Chapter 3: Product Specification - The specification chapter describes the architecture and design of the Model Template.

Chapter 4: User Guide - The user guide chapter describes how to use the Model Template.

Chapter 5: Verification and Validation - The inspection, verification, and validation (IV&V) chapter describes the verification and validation procedures and results for the Model Template.

Chapter 2

Product Requirements

Requirement Template_1: Top-level requirement

Requirement:
The Model Template shall meet the JEOD project requirements specified in the JEOD v5.3 top-level document.

Rationale:
This model shall, at a minimum, meet all external and internal requirements applied to the JEOD v5.3 release.

Verification:
Inspection

Chapter 3

Product Specification

3.1 Conceptual Design

3.2 Mathematical Formulation

3.3 Detailed Design

3.4 Inventory

All Model Template files are located in `${JEOD_HOME}/models/utils/model_template`. Relative to this directory,

- Header and source files are located in model `include` and `src` subdirectories. See table 3.1 for a listing of the configuration-managed files in these directories.
- Documentation files are located in the model `docs` subdirectory. See table 3.2 for a listing of the configuration-managed files in this directory.
- Verification files are located in the model `verif` subdirectory. See table 3.3 for a listing of the configuration-managed files in this directory.

Table 3.1: Source Files

File Name
include/foo.hh
include/template_messages.hh
src/cmake_file_list.cmake
src/foo.cc
src/template_messages.cc

Table 3.2: Documentation Files

File Name
docs/model_template.pdf
docs/refman.pdf
docs/tex/change_history.tex
docs/tex/guide.tex
docs/tex/intro.tex
docs/tex/ivv.tex
docs/tex/makefile
docs/tex/model_purpose.tex
docs/tex/model_template.bib
docs/tex/model_template.sty
docs/tex/model_template.tex
docs/tex/reqt.tex
docs/tex/spec.tex
docs/tex/summary.tex

Table 3.3: Verification Files

File Name
verif/unit_tests/CMakeLists.txt
verif/unit_tests/foo_ut.cc
verif/unit_tests/makefile
verif/unit_tests/ctor_dtor/CMakeLists.txt
verif/unit_tests/ctor_dtor/main.cc
verif/unit_tests/ctor_dtor/makefile

Chapter 4

User Guide

4.1 Instructions for Simulation Users

4.2 Instructions for Simulation Developers

4.3 Instructions for Model Developers

Chapter 5

Inspection, Verification, and Validation

5.1 Inspection

This section describes the inspections of the Model Template.

5.2 Test

This section describes various tests conducted to demonstrate that the Model Template satisfies the requirements levied against it. The tests described in this section are archived in the JEOD directory FIXME.

5.3 Metrics

Table 5.1 presents coarse metrics on the source files that comprise the model.

Table 5.1: Coarse Metrics

File Name	Number of Lines			
	Blank	**Comment**	**Code**	**Total**
include/foo.hh	15	73	17	105
include/template_messages.hh	20	84	18	122
src/cmake_file_list.cmake	2	0	8	10
src/foo.cc	14	36	46	96
src/template_messages.cc	17	73	10	100
Total	68	266	99	433

Table 5.2 presents the extended cyclomatic complexity (ECC) of the methods defined in the model.

Table 5.2: Cyclomatic Complexity

Method	**File**	**Line**	**ECC**
jeod::Foo::Foo ()	src/foo.cc	35	1
jeod::Foo::~Foo ()	src/foo.cc	43	1
jeod::Foo::set_num (int val)	src/foo.cc	51	4
jeod::Foo::get_num ()	src/foo.cc	82	1

5.4 Requirements Traceability

This section is intentionally left blank for this release.

Bibliography

[1] Jackson, A., Thebeau, C. JSC Engineering Orbital Dynamics. Technical Report JSC-61777-docs, NASA, Johnson Space Center, Houston, Texas, February 2025.

[2] NASA. NASA Software Engineering Requirements. Technical Report NPR-7150.2, NASA, NASA Headquarters, Washington, D.C., September 2004.