

Module Interface Specification for Digital Twin Forest

Team 8, Forest Mirror

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1 Revision History

Date	Version	Notes
Date 1	1.0	Notes
Date 2	1.1	Notes

2 Symbols, Abbreviations and Acronyms

See SRS Documentation at [\[give url —SS\]](#)

[\[Also add any additional symbols, abbreviations or acronyms —SS\]](#)

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3 Introduction

The following document details the Module Interface Specifications for [Fill in your project name and description —SS]

Complementary documents include the System Requirement Specifications and Module Guide. The full documentation and implementation can be found at [provide the url for your repo —SS]

4 Notation

[You should describe your notation. You can use what is below as a starting point. —SS]

The structure of the MIS for modules comes from Hoffman and Strooper (1995), with the addition that template modules have been adapted from Ghezzi et al. (2003). The mathematical notation comes from Chapter 3 of Hoffman and Strooper (1995). For instance, the symbol $:=$ is used for a multiple assignment statement and conditional rules follow the form $(c_1 \Rightarrow r_1 | c_2 \Rightarrow r_2 | \dots | c_n \Rightarrow r_n)$.

The following table summarizes the primitive data types used by Digital Twin Forest.

Data Type	Notation	Description
character	char	a single symbol or digit
integer	\mathbb{Z}	a number without a fractional component in $(-\infty, \infty)$
natural number	\mathbb{N}	a number without a fractional component in $[1, \infty)$
real	\mathbb{R}	any number in $(-\infty, \infty)$

The specification of Digital Twin Forest uses some derived data types: sequences, strings, and tuples. Sequences are lists filled with elements of the same data type. Strings are sequences of characters. Tuples contain a list of values, potentially of different types. In addition, Digital Twin Forest uses functions, which are defined by the data types of their inputs and outputs. Local functions are described by giving their type signature followed by their specification.

5 Module Decomposition

The following table is taken directly from the Module Guide document for this project.

Level 1	Level 2
Hardware-Hiding	
Behaviour-Hiding	Input Parameters Output Format Output Verification Temperature ODEs Energy Equations Control Module Specification Parameters Module
Software Decision	Sequence Data Structure ODE Solver Plotting

Table 1: Module Hierarchy

6 MIS of [Module Name —SS]

[Use labels for cross-referencing —SS]

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hyperlinks to external documents. —SS]

6.1 Module

[Short name for the module —SS]

6.2 Uses

6.3 Syntax

6.3.1 Exported Constants

6.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

6.4 Semantics

6.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

6.4.2 Environment Variables

[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS]

6.4.3 Assumptions

[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS]

6.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]

- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

6.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

7 MIS of JSON File Reader Module

[Use labels for cross-referencing —SS]

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hyperlinks to external documents. —SS]

7.1 Module

JsonFileReader

7.2 Uses

7.3 Syntax

7.3.1 Exported Constants

7.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

7.4 Semantics

7.4.1 State Variables

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7.4.4 Access Routine Semantics

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- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

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8 MIS of JSON File Writer Module

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[It is also possible to use \LaTeX for hyperlinks to external documents. —SS]

8.1 Module

JsonFileWriter

8.2 Uses

8.3 Syntax

8.3.1 Exported Constants

8.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

8.4 Semantics

8.4.1 State Variables

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- output: [if appropriate —SS]
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9 MIS of Pause Manager Module

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9.1 Module

PauseManager

9.2 Uses

9.3 Syntax

9.3.1 Exported Constants

9.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

9.4 Semantics

9.4.1 State Variables

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- output: [if appropriate —SS]
- exception: [if appropriate —SS]

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10 MIS of Player Movement Module

[Use labels for cross-referencing —SS]

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[It is also possible to use L^AT_EX for hyperlinks to external documents. —SS]

10.1 Module

PlayerMovement

10.2 Uses

10.3 Syntax

10.3.1 Exported Constants

10.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

10.4 Semantics

10.4.1 State Variables

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10.4.2 Environment Variables

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11 MIS of New Data Input Box Controller Module

[Use labels for cross-referencing —SS]

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[It is also possible to use \LaTeX for hyperlinks to external documents. —SS]

11.1 Module

NewDataInputBoxController

11.2 Uses

11.3 Syntax

11.3.1 Exported Constants

11.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

11.4 Semantics

11.4.1 State Variables

[\[Not all modules will have state variables. State variables give the module a memory. —SS\]](#)

11.4.2 Environment Variables

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11.4.4 Access Routine Semantics

[\[accessProg —SS\]\(\)](#):

- transition: [\[if appropriate —SS\]](#)
- output: [\[if appropriate —SS\]](#)
- exception: [\[if appropriate —SS\]](#)

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12 MIS of Start Button Controller Module

[Use labels for cross-referencing —SS]

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12.1 Module

StartButtonController

12.2 Uses

12.3 Syntax

12.3.1 Exported Constants

12.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

12.4 Semantics

12.4.1 State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

12.4.2 Environment Variables

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12.4.3 Assumptions

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12.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

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12.4.5 Local Functions

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13 MIS of Instruction Button Controller Module

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13.1 Module

InstructionButtonController

13.2 Uses

13.3 Syntax

13.3.1 Exported Constants

13.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

13.4 Semantics

13.4.1 State Variables

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13.4.2 Environment Variables

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13.4.3 Assumptions

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13.4.4 Access Routine Semantics

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- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

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14 MIS of Update Data Button Controller Module

[Use labels for cross-referencing —SS]

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use \LaTeX for hyperlinks to external documents. —SS]

14.1 Module

UpdateDataButtonController

14.2 Uses

14.3 Syntax

14.3.1 Exported Constants

14.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

14.4 Semantics

14.4.1 State Variables

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- output: [if appropriate —SS]
- exception: [if appropriate —SS]

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15 MIS of Contact Us Button Controller Module

[Use labels for cross-referencing —SS]

[You can reference SRS labels, such as R??. —SS]

[It is also possible to use L^AT_EX for hypperlinks to external documents. —SS]

15.1 Module

ContactUsButtonController

15.2 Uses

ContactUsButton ContactUsInfoDisplay

15.3 Syntax

15.3.1 Exported Constants

15.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

15.4 Semantics

15.4.1 State Variables

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15.4.2 Environment Variables

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16 Appendix

[Extra information if required —SS]