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1 Quicks2(ck0cmBTF194.346T43k0.2t)]TET0.13004600j0w00934.69m0.917.710.

3 Installation

 $\label{libsbml} \mbox{ I ibsbml depends on Apache's Xerces-} \mbox{C_{++} XML library for low-level XML tokenizing and } \mbox{T_{++} XML library for low-level XML tokenizing and } \mbox{T_{++} XML library for low-level XML tokenizing and } \mbox{T_{-+} XML library for library for low-level XML library for library$

SBML Class	C Class (typedef struct)
SBase	SBase_t
Model	Model_t
UnitDefinition	Uni tDefi ni ti on_t
Unit	Uni t_t
Compartment	Compartment_t
Parameter	Parameter_t
Species	Speci es_t
Reaction	Reaction_t
SpeciesReference	Speci esReference_t
KineticLaw	KineticLaw_t
Rule	Rul e_t
AssignmentRule	AssignmentRule_t
AlgebraicRule	Al gebrai cRul e_t
CompartmentVolumeRule	CompartmentVolumeRule_t
ParameterRule	ParameterRule_t
SpeciesConcentrationRule	Speci esConcentrati onRul e_t
SBML Enumeration	C Enumeration (typedef enum)
UnitKind	Uni tKi nd_t
RuleType	Rul eType_t

Table 1: SBML classes and enumerations and their corresponding C class. Italicized classes are abstract, which sets their C implementation slightly apart from the others. See SemBathe (c.m.84.6e)g (the months) for the corresponding C class. Italicized classes are abstract, which sets their C implementation slightly apart from the others. See SemBathe (c.m.84.6e)g (the months) for the corresponding C class.

To instantiate (create) an object use either the

```
/**

* Prints Species to stream (good for debugging).

*/

void
myPrintSpecies (Spece0]Od_0]Odt * , FILE *-161(e)-90(n)-90010m0. Oe d
```

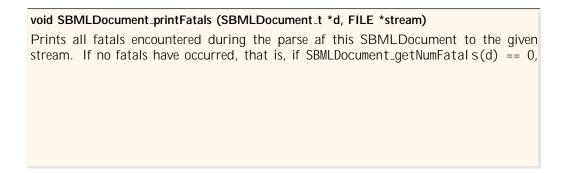
void UnitDefinition_

4.5 Enumerations

4.6 Abstract Classes

The SBML specification defines three classes that have no representation apart from subclasses that specialize (inherit from) them. In OOP parlance, these types are termed abstract. The abstract SBML classes are:

contains a list of rules, but a Rul e



```
28
29     siari = getCurrentMillis();
30     d = readSBML(argv[1]);
31     siop = getCurrentMillis();
32
33     m = d->model;
34
35     printf( "File: %s\n", argv[1]);
36     printf( " model name: %s\n", m->name );
37     printf( " unitDefinitions: %d\n", Model_getNumUnitDefinitions(m())) );
38
```

 ${\tt SBMLWri\ ter.\ h\ defines\ the\ following\ functions:}$

SBMLWriter_t *SBMLWriter_create (void)

7 Handling of Mathematical Foralulas and MathML

libsbml can read and write MathML 2.0 (W3C, 2000 streams, as well as translate between MathML and the text-string formulas used in SBML Level 1. This section describes the MathML and mathematics handling capabilities of the library.

7.1 Reading and Writing Formulas in Text-String Foral

```
"1 + -2e-100 / 3",
"1 - -foo / 3",
"2 * foo^bar + 3.1",
"foo()",
"foo(1)",
"foo(1, bar)",
"foo(1, bar, 2^-3)",
""

};

ASTNode_t *n;
char *s;
int i;

for (i = 0; i < *formulae[i]; i++)
{
    n = SBML_parseFormula( formulae[i] ); /* Convert string to AST */
    s = SBML_formulaToString(n); /* Convert AST back to string */
    fail_unless(!strcmp(s, formulae[i]), NULL );

ASTNode_free(n);
safe_free(s);
}</pre>
```

A Lists

While List convenience methods (e.g., XXX_getNumYYY()) are provided for every class, it is

An AST node is a recursive structure containing a pointer to the node's value (e.g., a number

References

Bornstein, B. (2003). Libsbml API reference manual. Available via the World Wide Web at http://www.sbml.org.

Finney, A. (2003). Systems Biology Markup Language (SBML) Level 2: Structures and