SpiceModel

5.1

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Files

- file spice_ephem.hh

  Define class for the SPICE ephemeris model.
- file spice_ephem_orient.hh

  Define class SpiceEphemOrient, which extends EphemerisOrientation for use with the SPICE ephemeris model.
- file spice_ephem_point.hh

  Define class SpiceEphemPoint, which extends EphemerisPoint for use with the SPICE ephemeris model.
- file spice_ephem.cc

  Define the methods for the SPICE ephemeris model class.
- file spice_ephem_orient.cc

  Define the methods for the SPICE-specific ephemeris orientation class.
- file spice_ephem_point.cc

  Define the methods for the SPICE-specific ephemeris point class.

Namespaces

- jeod

  Namespace jeod.

Variables

- static const int MAX_PATH_LENGTH = 129
- static const int MAX_NAME_LENGTH = 33
- static const int MAX_MSG_LENGTH = 1841
- static const int MAX_IDS = 1000

6.3.1 Detailed Description

6.3.2 Variable Documentation

6.3.2.1 const int MAX_IDS = 1000 [static]

Definition at line 57 of file spice_ephem.cc.

Referenced by jeod::SpiceEphemeris::process_spk().

6.3.2.2 const int MAX_MSG_LENGTH = 1841 [static]

Definition at line 56 of file spice_ephem.cc.

Referenced by jeod::SpiceEphemeris::load_spice_files(), and jeod::SpiceEphemeris::update_trans().

6.3.2.3 const int MAX_NAME_LENGTH = 33 [static]

Definition at line 55 of file spice_ephem.cc.

Referenced by jeod::SpiceEphemeris::add_barycenter(), jeod::SpiceEphemeris::mute_spice_errors(), jeod::SpiceEphemeris::name_barycenter_frames(), and jeod::SpiceEphemeris::process_spk().

6.3.2.4 const int MAX_PATH_LENGTH = 129 [static]

Definition at line 54 of file spice_ephem.cc.

Referenced by jeod::SpiceEphemeris::process_spk().

Chapter 7

Namespace Documentation

7.1 jeod Namespace Reference

Namespace jeod.

Data Structures

- class SpiceEphemeris

  The S_define-level class that provides planetary ephemerides.
- class SpiceEphemOrientation

  A SpiceEphemOrientation minimally extends EphemerisOrientation to include the JEOD and SPICE names and an update method for the target ephemeris reference frame.
- class SpiceEphemPoint

  A SpiceEphemPoint minimally extends EphemerisPoint, primarily in order to contain the ID of the SPICE object that will be used to update the state of the target ephemeris reference frame.

7.1.1 Detailed Description

Namespace jeod.

Chapter 8

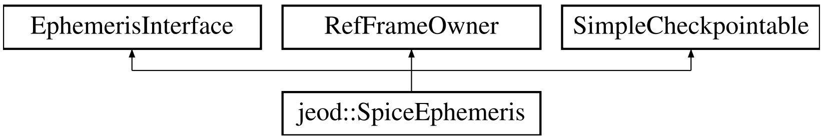
Data Structure Documentation

8.1 jeod::SpiceEphemeris Class Reference

The S_define-level class that provides planetary ephemerides.

```
#include <spice_ephem.hh>
```

Inheritance diagram for jeod::SpiceEphemeris:



Public Member Functions

- SpiceEphemeris (void)

  SpiceEphemeris default constructor.
- ∼SpiceEphemeris (void) override

  SpiceEphemeris destructor.
- void initialize_model (const TimeManager &time_manager, EphemeridesManager &ephem_manager)

  Initialize the SpiceEphemeris model.
- void activate (void) override

  Nominally, activate the object.
- void deactivate (void) override

  Deactivate the SpiceEphemeris object.
- double timestamp (void) const override

  Return time of last update.
- const char ∗ get_name (void) const override

  Return model name.
- void ephem_initialize (EphemeridesManager &ephem_manager) override

  Complete the initialization process.
- void ephem_activate (EphemeridesManager &ephem_manager) override

  Mark appropriate items in the model as active.
- void ephem_build_tree (EphemeridesManager &ephem_manager) override

  Construct the ephemeris model portions of the reference frame tree.
- void ephem_update (void) override

  Update ephemerides for subscribed items.

- void simple_restore (void) override

  Set the SPICE model for a restart.
- void add_planet_name (std::string planet_name)
- void add_orientation (std::string object_name)
- SpiceEphemPoint ∗ find_spice_id (int id_to_find)

  Find a SPICE ID in the loaded list of SPICE objects.

Data Fields

- std::string metakernel_filename

  The name of a text file containing the list of SPICE files to be loaded.

Protected Attributes

- bool inactive

  If set to true, makes the model inactive.

Private Member Functions

- void initialize_time (const TimeManager &time_manager)

  Initialize SpiceEphemeris timing.
- void load_spice_files (void)

  Load SPICE kernel files containing ephemeris data.
- void process_spk (void)

  Process spk objects and store array of loaded spk IDs.
- void process_orientations (void)

  Load and locate all planetary orientation frames.
- void introduce_item (EphemerisItem &item)

  Introduce an EphemerisItem to the EphemeridesManager.
- void populate_item (EphemerisItem &item, const std::string &name)

  Populate basic attributes of a new SpiceEphemPoint.
- SpiceEphemPoint ∗ create_new_ephem_point (std::string object_name, const std::string &spice_name)

  Create a new SpiceEphemPoint.
- SpiceEphemOrientation ∗ create_new_ephem_orientation (std::string jeod_name)

  Create a new SpiceEphemOrientation.
- void initialize_items ()

  Initialize the SpiceEphemeris item data.
- std::string spice_2_jeod (std::string spice_name)

  Convert SPICE names to JEOD nomenclature.
- std::string jeod_2_spice_pfix (std::string jeod_name)

  Convert JEOD body name to SPICE pfix frame name.
- void name_barycenter_frames ()

  Name all the planetary barycenters with their JEOD identifiers.
- void add_barycenter (int spice_id)

  Add a barycenter corresponding to the given SPICE ID.
- void create_barycenters ()

  Check what if any barycenters need creating and do so.
- void determine_root_node (void)

  Determine which item should be the root of the ref frame tree.
- void add_descendants_r (SpiceEphemPoint ∗parent)

Add all offspring from a given node of the ref frame tree.

- int find_parent_id (int obj_id)

    Find the ID of the parent of a given SPICE object.

- void update_trans ()

    Update ephemerides of inertial frames supplied by spk files.

- void update_rot ()

    Update planetary orientations.

- void mute_spice_errors ()

    Mute SPICE errors so that they can be handled by the MessageHandler.

- SpiceEphemeris (const SpiceEphemeris &)

    Not implemented.

- SpiceEphemeris & operator= (const SpiceEphemeris &)

    Not implemented.

Private Attributes

- bool force_update

    Is an update needed even if the time hasn't changed?

- JeodObjectVector< std::string >
  ::type planet_names

    The names of all planets to load into the simulation.

- JeodObjectVector< std::string >
  ::type orientation_names

    The names of all objects for which orientation is required.

- JeodPointerVector
  < SpiceEphemPoint >::type loaded_spk

    All the spk objects tracked by this ephemeris.

- JeodPointerVector
  < SpiceEphemOrientation >
  ::type planetary_orientations

    Objects defining planet-fixed reference frames.

- std::string ident

    Identifier for this model, set by the constructor.

- double update_time

    Time of last update, dynamic time seconds.

- EphemerisRefFrame barycenter_frames [10]

    Array of barycenter frames corresponding to SSBary and the planets.

- SpiceEphemPoint * root_item

    The root point in the reference frame tree.

- const double * tdb_seconds

    The source of ephemeris time information.

- const double * dyn_seconds

    The source of dynamic time information.

- EphemeridesManager * ephem_mngr_local

    Local ephem manager pointer to eliminate cascading passes in methods where possible (note some in inherited methods must remain).

Friends

- class InputProcessor
- void init_attrjeod__SpiceEphemeris ()

8.1.1 Detailed Description

The S_define-level class that provides planetary ephemerides.

The SpiceEphemeris class constructs the ephemeris reference frame tree and updates the states of the planets based on data from a SPICE file or files.

Definition at line 92 of file spice_ephem.hh.

8.1.2 Constructor & Destructor Documentation

8.1.2.1 jeod::SpiceEphemeris::SpiceEphemeris (void)

SpiceEphemeris default constructor.

Definition at line 66 of file spice_ephem.cc.

References loaded_spk, orientation_names, planet_names, and planetary_orientations.

8.1.2.2 jeod::SpiceEphemeris::∼SpiceEphemeris (void) [override]

SpiceEphemeris destructor.

Definition at line 90 of file spice_ephem.cc.

References loaded_spk, orientation_names, planet_names, and planetary_orientations.

8.1.2.3 jeod::SpiceEphemeris::SpiceEphemeris (const SpiceEphemeris &) [private]

Not implemented.

8.1.3 Member Function Documentation

8.1.3.1 void jeod::SpiceEphemeris::activate (void) [override]

Nominally, activate the object.

In the case of a SpiceEphemeris object, an inactive object cannot be activated once the simulation starts. Note that a SpiceEphemeris is active by default.

Definition at line 123 of file spice_ephem.cc.

References inactive.

8.1.3.2 void jeod::SpiceEphemeris::add_barycenter (int *id*) [private]

Add a barycenter corresponding to the given SPICE ID.

Parameters

in	*id*	id of barycenter to add

Definition at line 672 of file spice_ephem.cc.

References barycenter_frames, create_new_ephem_point(), ephem_mngr_local, loaded_spk, and MAX_NAME_L-ENGTH.

Referenced by create_barycenters().

8.1.3.3 void jeod::SpiceEphemeris::add_descendants_r (SpiceEphemPoint * *parent*) [private]

Add all offspring from a given node of the ref frame tree.

Parameters

`in,out`	*parent*	Frame to attach to

Definition at line 848 of file spice_ephem.cc.

References ephem_mngr_local, get_name(), jeod::SpiceEphemPoint::get_spice_id(), and loaded_spk.

Referenced by ephem_build_tree().

8.1.3.4 void jeod::SpiceEphemeris::add_orientation (std::string *object_name*) `[inline]`

Definition at line 136 of file spice_ephem.hh.

References orientation_names.

8.1.3.5 void jeod::SpiceEphemeris::add_planet_name (std::string *planet_name*) `[inline]`

Definition at line 131 of file spice_ephem.hh.

References planet_names.

8.1.3.6 void jeod::SpiceEphemeris::create_barycenters (void) `[private]`

Check what if any barycenters need creating and do so.

Any new barycenters are added to the all_loaded_items list and registered with the dynamics manager.

Definition at line 705 of file spice_ephem.cc.

References add_barycenter(), and loaded_spk.

Referenced by initialize_items().

8.1.3.7 SpiceEphemOrientation ∗ jeod::SpiceEphemeris::create_new_ephem_orientation (std::string *jeod_name*) `[private]`

Create a new SpiceEphemOrientation.

Returns

Pointer to object

Parameters

`in`	*jeod_name*	Name of new object

Definition at line 518 of file spice_ephem.cc.

References jeod_2_spice_pfix(), populate_item(), jeod::SpiceEphemOrientation::set_spice_frame_name(), tdb_seconds, and jeod::SpiceEphemOrientation::validate().

Referenced by process_orientations().

8.1.3.8 SpiceEphemPoint ∗ jeod::SpiceEphemeris::create_new_ephem_point (std::string *object_name,* const std::string & *spice_name*) `[private]`

Create a new SpiceEphemPoint.

Returns

Pointer to object

Parameters

in	*object_name*	Name of new object
in	*spice_name*	SPICE lookup name

Definition at line 479 of file spice_ephem.cc.

References find_parent_id(), populate_item(), jeod::SpiceEphemPoint::set_parent_id(), and jeod::SpiceEphemPoint::set_spice_id().

Referenced by add_barycenter(), and process_spk().

8.1.3.9 void jeod::SpiceEphemeris::deactivate (void) [override]

Deactivate the SpiceEphemeris object.

Definition at line 140 of file spice_ephem.cc.

References inactive.

8.1.3.10 void jeod::SpiceEphemeris::determine_root_node (void) [private]

Determine which item should be the root of the ref frame tree.

Definition at line 752 of file spice_ephem.cc.

References find_spice_id(), loaded_spk, and root_item.

Referenced by ephem_build_tree(), and initialize_items().

8.1.3.11 void jeod::SpiceEphemeris::ephem_activate (EphemeridesManager & *ephem_manager*) [override]

Mark appropriate items in the model as active.

Parameters

in,out	*ephem_manager*	Ephemerides manager

Definition at line 830 of file spice_ephem.cc.

8.1.3.12 void jeod::SpiceEphemeris::ephem_build_tree (EphemeridesManager & *ephem_manager*) [override]

Construct the ephemeris model portions of the reference frame tree.

Parameters

in,out	*ephem_manager*	Ephemerides manager

Definition at line 888 of file spice_ephem.cc.

References add_descendants_r(), determine_root_node(), inactive, loaded_spk, and root_item.

8.1.3.13 void jeod::SpiceEphemeris::ephem_initialize (EphemeridesManager & *ephem_manager*) [override]

Complete the initialization process.

This method should be called after all other ephemeris models have completed their basic initialization and after all planets have registered themselves with the ephemeris manager.

Parameters

in,out	*ephem_manager*	Ephemerides manager

Definition at line 812 of file spice_ephem.cc.

8.1.3.14 void jeod::SpiceEphemeris::ephem_update (void) [override]

Update ephemerides for subscribed items.

Definition at line 936 of file spice_ephem.cc.

References dyn_seconds, force_update, inactive, update_rot(), update_time, and update_trans().

8.1.3.15 int jeod::SpiceEphemeris::find_parent_id (int *obj_id*) [private]

Find the ID of the parent of a given SPICE object.

Here "parent" means both:

1. the frame to which the object is connected in the JEOD reference frame tree (the "parent" frame).
2. the object that will be used as the "observer" in the calls to SPICE to obtain the state of the given object.

Returns

of parent
Units: ID

Parameters

in	*obj_id*	child ID of which parent is to be found

Definition at line 993 of file spice_ephem.cc.

Referenced by create_new_ephem_point().

8.1.3.16 SpiceEphemPoint ∗ jeod::SpiceEphemeris::find_spice_id (int *id_to_find*)

Find a SPICE ID in the loaded list of SPICE objects.

Returns

Pointer to object

Parameters

in	*id_to_find*	SPICE lookup name

Definition at line 965 of file spice_ephem.cc.

References loaded_spk.

Referenced by determine_root_node().

8.1.3.17 const char ∗ jeod::SpiceEphemeris::get_name (void) const [override]

Return model name.

Returns

Name

Definition at line 167 of file spice_ephem.cc.

References ident.

Referenced by add_descendants_r(), and update_trans().

8.1.3.18 void jeod::SpiceEphemeris::initialize_items (void) [private]

Initialize the SpiceEphemeris item data.

Definition at line 537 of file spice_ephem.cc.

References create_barycenters(), determine_root_node(), introduce_item(), loaded_spk, planetary_orientations, and root_item.

Referenced by initialize_model().

8.1.3.19 void jeod::SpiceEphemeris::initialize_model (const TimeManager & *time_manager,* EphemeridesManager & *ephem_manager*)

Initialize the SpiceEphemeris model.

This method is called before the planets have been registered with the reference frame manager, so we don't know whether the ephemeris items should be enabled or disabled.

Parameters

in	*time_manager*	Time manager
in	*ephem_manager*	Incoming ephem manager

Definition at line 184 of file spice_ephem.cc.

References ephem_mngr_local, inactive, initialize_items(), initialize_time(), load_spice_files(), mute_spice_errors(), name_barycenter_frames(), process_orientations(), and process_spk().

8.1.3.20 void jeod::SpiceEphemeris::initialize_time (const TimeManager & *time_manager*) [private]

Initialize SpiceEphemeris timing.

Parameters

in	*time_manager*	Time manager

Definition at line 242 of file spice_ephem.cc.

References dyn_seconds, and tdb_seconds.

Referenced by initialize_model().

8.1.3.21 void jeod::SpiceEphemeris::introduce_item (EphemerisItem & *item*) [private]

Introduce an EphemerisItem to the EphemeridesManager.

Parameters

in	*item*	Item to introduce

Definition at line 575 of file spice_ephem.cc.

References ephem_mngr_local.

Referenced by initialize_items().

8.1.3.22 std::string jeod::SpiceEphemeris::jeod_2_spice_pfix (std::string *jeod_name*) [private]

Convert JEOD body name to SPICE pfix frame name.

Returns

name of pfix frame that SPICE associates with the given body. Handles high precision frames for Earth and Moon unless IAU is specified by user

Parameters

in	*jeod_name*	Name of the JEOD body.

Definition at line 621 of file spice_ephem.cc.

Referenced by create_new_ephem_orientation().

8.1.3.23 void jeod::SpiceEphemeris::load_spice_files (void) [private]

Load SPICE kernel files containing ephemeris data.

Definition at line 272 of file spice_ephem.cc.

References MAX_MSG_LENGTH, and metakernel_filename.

Referenced by initialize_model().

8.1.3.24 void jeod::SpiceEphemeris::mute_spice_errors (void) [private]

Mute SPICE errors so that they can be handled by the MessageHandler.

Definition at line 1098 of file spice_ephem.cc.

References MAX_NAME_LENGTH.

Referenced by initialize_model().

8.1.3.25 void jeod::SpiceEphemeris::name_barycenter_frames (void) [private]

Name all the planetary barycenters with their JEOD identifiers.

Definition at line 641 of file spice_ephem.cc.

References barycenter_frames, MAX_NAME_LENGTH, and spice_2_jeod().

Referenced by initialize_model().

8.1.3.26 SpiceEphemeris& jeod::SpiceEphemeris::operator= (const SpiceEphemeris &) [private]

Not implemented.

8.1.3.27 void jeod::SpiceEphemeris::populate_item (EphemerisItem & *item*, const std::string & *object_name*) [private]

Populate basic attributes of a new SpiceEphemPoint.

Parameters

in,out	*item*	Pointer to item to populate
in	*object_name*	Name of the item

Definition at line 460 of file spice_ephem.cc.

Referenced by create_new_ephem_orientation(), and create_new_ephem_point().

8.1.3.28 void jeod::SpiceEphemeris::process_orientations (void) [private]

Load and locate all planetary orientation frames.

Definition at line 438 of file spice_ephem.cc.

References create_new_ephem_orientation(), orientation_names, and planetary_orientations.

Referenced by initialize_model().

8.1.3.29 void jeod::SpiceEphemeris::process_spk (void) [private]

Process spk objects and store array of loaded spk IDs.

Definition at line 304 of file spice_ephem.cc.

References create_new_ephem_point(), loaded_spk, MAX_IDS, MAX_NAME_LENGTH, MAX_PATH_LENGTH, and planet_names.

Referenced by initialize_model().

8.1.3.30 void jeod::SpiceEphemeris::simple_restore (void) [override]

Set the SPICE model for a restart.

Definition at line 230 of file spice_ephem.cc.

8.1.3.31 std::string jeod::SpiceEphemeris::spice_2_jeod (std::string *spice_name*) [private]

Convert SPICE names to JEOD nomenclature.

Returns

JEOD-friendly name of a SPICE name

Parameters

in	*spice_name*	Name of a SPICE object.

Definition at line 603 of file spice_ephem.cc.

Referenced by name_barycenter_frames().

8.1.3.32 double jeod::SpiceEphemeris::timestamp (void) const [override]

Return time of last update.

Returns

Timestamp
Units: day

Definition at line 154 of file spice_ephem.cc.

References update_time.

8.1.3.33 void jeod::SpiceEphemeris::update_rot (void) [private]

Update planetary orientations.

Definition at line 1082 of file spice_ephem.cc.

References dyn_seconds, planetary_orientations, and tdb_seconds.

Referenced by ephem_update().

8.1.3.34 void jeod::SpiceEphemeris::update_trans (void) [private]

Update ephemerides of inertial frames supplied by spk files.

Definition at line 1020 of file spice_ephem.cc.

References get_name(), loaded_spk, MAX_MSG_LENGTH, root_item, tdb_seconds, and update_time.

Referenced by ephem_update().

8.1.4 Friends And Related Function Documentation

8.1.4.1 void init_attrjeod__SpiceEphemeris ( ) [friend]

8.1.4.2 friend class InputProcessor [friend]

Definition at line 94 of file spice_ephem.hh.

8.1.5 Field Documentation

8.1.5.1 EphemerisRefFrame jeod::SpiceEphemeris::barycenter_frames[10] [private]

Array of barycenter frames corresponding to SSBary and the planets.

trick_units(–)

Definition at line 207 of file spice_ephem.hh.

Referenced by add_barycenter(), and name_barycenter_frames().

8.1.5.2 const double∗ jeod::SpiceEphemeris::dyn_seconds [private]

The source of dynamic time information.

trick_units(–)

Definition at line 222 of file spice_ephem.hh.

Referenced by ephem_update(), initialize_time(), and update_rot().

8.1.5.3 EphemeridesManager∗ jeod::SpiceEphemeris::ephem_mngr_local [private]

Local ephem manager pointer to eliminate cascading passes in methods where possible (note some in inherited methods must remain).

trick_units(–)

Definition at line 228 of file spice_ephem.hh.

Referenced by add_barycenter(), add_descendants_r(), initialize_model(), and introduce_item().

8.1.5.4 bool jeod::SpiceEphemeris::force_update [private]

Is an update needed even if the time hasn't changed?

trick_units(–)

Definition at line 172 of file spice_ephem.hh.

Referenced by ephem_update().

8.1.5.5 std::string jeod::SpiceEphemeris::ident [private]

Identifier for this model, set by the constructor.

trick_units(–)

Definition at line 197 of file spice_ephem.hh.

Referenced by get_name().

8.1.5.6 bool jeod::SpiceEphemeris::inactive [protected]

If set to true, makes the model inactive.

This is set to false (i.e., model is active) by the constructor. Setting this flag to true prior to initialization time will result in the model never doing anything. Setting this flag to true after the model has been active for some time turns it off from that point forward. Turning on the model after it has been inactive for some time is not supported.trick_units(–)

Definition at line 162 of file spice_ephem.hh.

Referenced by activate(), deactivate(), ephem_build_tree(), ephem_update(), and initialize_model().

8.1.5.7 JeodPointerVector<SpiceEphemPoint>::type jeod::SpiceEphemeris::loaded_spk [private]

All the spk objects tracked by this ephemeris.

trick_io(∗∗)

Definition at line 187 of file spice_ephem.hh.

Referenced by add_barycenter(), add_descendants_r(), create_barycenters(), determine_root_node(), ephem_build_tree(), find_spice_id(), initialize_items(), process_spk(), SpiceEphemeris(), update_trans(), and ∼SpiceEphemeris().

8.1.5.8 std::string jeod::SpiceEphemeris::metakernel_filename

The name of a text file containing the list of SPICE files to be loaded.

Must be in format needed by SPICE furnsh_c() function. See comments for method load_spice_files() in spice_ephem.cc for format details.trick_units(–)

Definition at line 149 of file spice_ephem.hh.

Referenced by load_spice_files().

8.1.5.9 JeodObjectVector<std::string>::type jeod::SpiceEphemeris::orientation_names [private]

The names of all objects for which orientation is required.

trick_io(∗∗)

Definition at line 182 of file spice_ephem.hh.

Referenced by add_orientation(), process_orientations(), SpiceEphemeris(), and ∼SpiceEphemeris().

8.1.5.10 JeodObjectVector<std::string>::type jeod::SpiceEphemeris::planet_names [private]

The names of all planets to load into the simulation.

trick_io(∗∗)

Definition at line 177 of file spice_ephem.hh.

Referenced by add_planet_name(), process_spk(), SpiceEphemeris(), and ∼SpiceEphemeris().

8.1.5.11 JeodPointerVector<SpiceEphemOrientation>::type jeod::SpiceEphemeris::planetary_orientations [private]

Objects defining planet-fixed reference frames.

trick_io(∗∗)

Definition at line 192 of file spice_ephem.hh.

Referenced by initialize_items(), process_orientations(), SpiceEphemeris(), update_rot(), and ∼SpiceEphemeris().

8.1.5.12 SpiceEphemPoint∗ jeod::SpiceEphemeris::root_item [private]

The root point in the reference frame tree.

trick_units(–)

Definition at line 212 of file spice_ephem.hh.

Referenced by determine_root_node(), ephem_build_tree(), initialize_items(), and update_trans().

8.1.5.13 const double∗ jeod::SpiceEphemeris::tdb_seconds [private]

The source of ephemeris time information.

trick_units(–)

Definition at line 217 of file spice_ephem.hh.

Referenced by create_new_ephem_orientation(), initialize_time(), update_rot(), and update_trans().

8.1.5.14 double jeod::SpiceEphemeris::update_time [private]

Time of last update, dynamic time seconds.

trick_units(s)

Definition at line 202 of file spice_ephem.hh.

Referenced by ephem_update(), timestamp(), and update_trans().

The documentation for this class was generated from the following files:

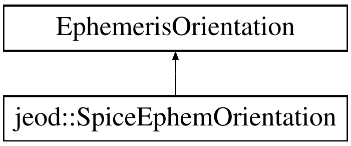
- spice_ephem.hh
- spice_ephem.cc

8.2 jeod::SpiceEphemOrientation Class Reference

A SpiceEphemOrientation minimally extends EphemerisOrientation to include the JEOD and SPICE names and an update method for the target ephemeris reference frame.

```
#include <spice_ephem_orient.hh>
```

Inheritance diagram for jeod::SpiceEphemOrientation:



Public Member Functions

- SpiceEphemOrientation ()

  SpiceEphemOrientation default constructor.
- ∼SpiceEphemOrientation () override

  SpiceEphemOrientation destructor.
- void update (double time_tdb, double time_dyn)

  Update the rotational state of the target frame.
- void validate (double time_tdb)

  Confirm that the target frame exists in the loaded SPICE kernels.
- void get_spice_transformation (double time_tdb, double trans6x6[6][6])

  Populate the SPICE 6 x 6 matrix via sxform_c().
- void set_spice_frame_name (const std::string &new_name)

  Setter for the name of the SPICE frame.

Private Member Functions

- SpiceEphemOrientation (const SpiceEphemOrientation &)

  Not implemented.
- SpiceEphemOrientation & operator= (const SpiceEphemOrientation &)

  Not implemented.

Private Attributes

- std::string spice_frame_name

  SPICE name of the target reference frame.

Friends

- class InputProcessor
- void init_attrjeod__SpiceEphemOrientation ()

8.2.1 Detailed Description

A SpiceEphemOrientation minimally extends EphemerisOrientation to include the JEOD and SPICE names and an update method for the target ephemeris reference frame.

Definition at line 85 of file spice_ephem_orient.hh.

8.2.2 Constructor & Destructor Documentation

8.2.2.1 jeod::SpiceEphemOrientation::SpiceEphemOrientation (void)

SpiceEphemOrientation default constructor.

Definition at line 45 of file spice_ephem_orient.cc.

8.2.2.2 jeod::SpiceEphemOrientation::∼SpiceEphemOrientation (void) [override]

SpiceEphemOrientation destructor.

Definition at line 56 of file spice_ephem_orient.cc.

8.2.2.3 jeod::SpiceEphemOrientation::SpiceEphemOrientation (const SpiceEphemOrientation &) [private]

Not implemented.

8.2.3 Member Function Documentation

8.2.3.1 void jeod::SpiceEphemOrientation::get_spice_transformation (double *time_tdb*, double *trans6x6[6][6]*)

Populate the SPICE 6 x 6 matrix via sxform_c().

Parameters

in	*time_tdb*	Ephem time (TDB)
out	*trans6x6*	Spice matrix

Definition at line 145 of file spice_ephem_orient.cc.

References spice_frame_name.

Referenced by update(), and validate().

8.2.3.2 SpiceEphemOrientation& jeod::SpiceEphemOrientation::operator= (const SpiceEphemOrientation &) [private]

Not implemented.

8.2.3.3 void jeod::SpiceEphemOrientation::set_spice_frame_name (const std::string & *new_name*) [inline]

Setter for the name of the SPICE frame.

Parameters

new_name	Name of the SPICE frame

Definition at line 111 of file spice_ephem_orient.hh.

References spice_frame_name.

Referenced by jeod::SpiceEphemeris::create_new_ephem_orientation().

8.2.3.4 void jeod::SpiceEphemOrientation::update (double *time_tdb*, double *time_dyn*)

Update the rotational state of the target frame.

Parameters

in	*time_tdb*	Ephemeris time (TDB) Units: s
in	*time_dyn*	dyn time for timestamp Units: s

Definition at line 69 of file spice_ephem_orient.cc.

References get_spice_transformation().

8.2.3.5 void jeod::SpiceEphemOrientation::validate (double *time_tdb*)

Confirm that the target frame exists in the loaded SPICE kernels.

Parameters

in	*time_tdb*	Ephemeris time (TDB)

Definition at line 123 of file spice_ephem_orient.cc.

References get_spice_transformation().

Referenced by jeod::SpiceEphemeris::create_new_ephem_orientation().

8.2.4 Friends And Related Function Documentation

8.2.4.1 void init_attrjeod__SpiceEphemOrientation ( ) [friend]

8.2.4.2 friend class InputProcessor [friend]

Definition at line 86 of file spice_ephem_orient.hh.

8.2.5 Field Documentation

8.2.5.1 std::string jeod::SpiceEphemOrientation::spice_frame_name [private]

SPICE name of the target reference frame.

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Definition at line 122 of file spice_ephem_orient.hh.

Referenced by get_spice_transformation(), and set_spice_frame_name().

The documentation for this class was generated from the following files:

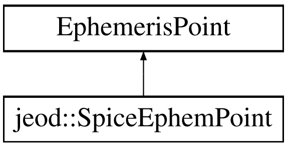
- spice_ephem_orient.hh
- spice_ephem_orient.cc

8.3 jeod::SpiceEphemPoint Class Reference

A SpiceEphemPoint minimally extends EphemerisPoint, primarily in order to contain the ID of the SPICE object that will be used to update the state of the target ephemeris reference frame.

```
#include <spice_ephem_point.hh>
```

Inheritance diagram for jeod::SpiceEphemPoint:



Public Types

- enum Status { IsRoot = 0, InTree = 1, Active = 2 }

    Enumerates the status values of a SpiceEphemPoint.

Public Member Functions

- SpiceEphemPoint ()

    SpiceEphemPoint default constructor.
- ∼SpiceEphemPoint () override

    SpiceEphemPoint destructor.
- virtual void set_status (SpiceEphemPoint::Status new_status)

    Set the active status.
- virtual SpiceEphemPoint::Status get_status (void) const

    Return current status.
- virtual void set_spice_id (int new_id)

    Set ID of associated SPICE kernel object.
- virtual int get_spice_id (void) const

    Return ID of associated SPICE kernel object.
- virtual void set_parent_id (int new_id)

    Set ID of associated parent SPICE kernel object.
- virtual int get_parent_id (void) const

    Return ID of associated parent SPICE kernel object.

Protected Attributes

- Status status

    The status for the ephemeris reference frame associated with this item.
- int spice_id

    The SPICE kernel object to be used to maintain the target frame's state.
- int parent_id

    The SPICE ID of the parent to this object.

Private Member Functions

- SpiceEphemPoint (const SpiceEphemPoint &)

    Not implemented.
- SpiceEphemPoint & operator= (const SpiceEphemPoint &)

    Not implemented.

Friends

- class InputProcessor
- void init_attrjeod__SpiceEphemPoint ()

8.3.1 Detailed Description

A SpiceEphemPoint minimally extends EphemerisPoint, primarily in order to contain the ID of the SPICE object that will be used to update the state of the target ephemeris reference frame.

Definition at line 84 of file spice_ephem_point.hh.

8.3.2 Member Enumeration Documentation

8.3.2.1 enum **jeod::SpiceEphemPoint::Status**

Enumerates the status values of a SpiceEphemPoint.

Enumerator

- ***IsRoot*** The target reference frame is extant, active, and is the root of the reference frame tree. Hence its state is the trivial state.
- ***InTree*** The target reference frame is extant and active. However, present responsibility for updating the frame lies with some other ephemeris model.
- ***Active*** The target reference frame is extant, active, and is to be updated by this ephemeris model.

Definition at line 94 of file spice_ephem_point.hh.

8.3.3 Constructor & Destructor Documentation

8.3.3.1 jeod::SpiceEphemPoint::SpiceEphemPoint (void)

SpiceEphemPoint default constructor.

Definition at line 41 of file spice_ephem_point.cc.

8.3.3.2 jeod::SpiceEphemPoint::∼SpiceEphemPoint (void) [override]

SpiceEphemPoint destructor.

Definition at line 55 of file spice_ephem_point.cc.

8.3.3.3 jeod::SpiceEphemPoint::SpiceEphemPoint (const **SpiceEphemPoint** &) [private]

Not implemented.

8.3.4 Member Function Documentation

8.3.4.1 int jeod::SpiceEphemPoint::get_parent_id (void) const [virtual]

Return ID of associated parent SPICE kernel object.

Returns

Name

Definition at line 132 of file spice_ephem_point.cc.

References parent_id.

8.3.4.2 int jeod::SpiceEphemPoint::get_spice_id (void) const [virtual]

Return ID of associated SPICE kernel object.

Returns

Name

Definition at line 106 of file spice_ephem_point.cc.

References spice_id.

Referenced by jeod::SpiceEphemeris::add_descendants_r().

8.3.4.3 SpiceEphemPoint::Status jeod::SpiceEphemPoint::get_status (void) const [virtual]

Return current status.

Returns

Current object status

Definition at line 80 of file spice_ephem_point.cc.

References status.

8.3.4.4 SpiceEphemPoint& jeod::SpiceEphemPoint::operator= (const SpiceEphemPoint &) [private]

Not implemented.

8.3.4.5 void jeod::SpiceEphemPoint::set_parent_id (int *new_id*) [virtual]

Set ID of associated parent SPICE kernel object.

Parameters

in	*new_id*	New SPICE ID

Definition at line 119 of file spice_ephem_point.cc.

References parent_id.

Referenced by jeod::SpiceEphemeris::create_new_ephem_point().

8.3.4.6 void jeod::SpiceEphemPoint::set_spice_id (int *new_id*) [virtual]

Set ID of associated SPICE kernel object.

Parameters

in	*new_id*	New SPICE ID

Definition at line 93 of file spice_ephem_point.cc.

References spice_id.

Referenced by jeod::SpiceEphemeris::create_new_ephem_point().

8.3.4.7 void jeod::SpiceEphemPoint::set_status (SpiceEphemPoint::Status *new_status*) [virtual]

Set the active status.

Parameters

in	*new_status*	New status value

Definition at line 67 of file spice_ephem_point.cc.

References status.

8.3.5 Friends And Related Function Documentation

8.3.5.1 void init_attrjeod__SpiceEphemPoint ( ) [friend]

8.3.5.2 friend class InputProcessor [friend]

Definition at line 85 of file spice_ephem_point.hh.

8.3.6 Field Documentation

8.3.6.1 int jeod::SpiceEphemPoint::parent_id [protected]

The SPICE ID of the parent to this object.

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Definition at line 142 of file spice_ephem_point.hh.

Referenced by get_parent_id(), and set_parent_id().

8.3.6.2 int jeod::SpiceEphemPoint::spice_id [protected]

The SPICE kernel object to be used to maintain the target frame's state.

trick_units(–)

Definition at line 137 of file spice_ephem_point.hh.

Referenced by get_spice_id(), and set_spice_id().

8.3.6.3 Status jeod::SpiceEphemPoint::status [protected]

The status for the ephemeris reference frame associated with this item.

trick_units(–)

Definition at line 132 of file spice_ephem_point.hh.

Referenced by get_status(), and set_status().

The documentation for this class was generated from the following files:

- spice_ephem_point.hh
- spice_ephem_point.cc

Chapter 9

File Documentation

9.1 spice_ephem.cc File Reference

Define the methods for the SPICE ephemeris model class.

```
#include <cstdarg>
#include <set>
#include <fstream>
#include <algorithm>
#include "SpiceUsr.h"
#include "environment/ephemerides/ephem_interface/include/ephem_messages.hh"
#include "environment/time/include/time_manager.hh"
#include "utils/named_item/include/named_item.hh"
#include "utils/memory/include/jeod_alloc.hh"
#include "utils/message/include/message_handler.hh"
#include "../include/spice_ephem.hh"
```

Namespaces

- jeod

  Namespace jeod.

Variables

- static const int MAX_PATH_LENGTH = 129
- static const int MAX_NAME_LENGTH = 33
- static const int MAX_MSG_LENGTH = 1841
- static const int MAX_IDS = 1000

9.1.1 Detailed Description

Define the methods for the SPICE ephemeris model class.

Definition in file spice_ephem.cc.

9.2 spice_ephem.hh File Reference

Define class for the SPICE ephemeris model.

```
#include <string>
#include "environment/ephemerides/ephem_interface/include/ephem_interface.hh"
#include "environment/ephemerides/ephem_interface/include/ephem_ref_frame.hh"
#include "environment/ephemerides/ephem_manager/include/ephem_manager.hh"
#include "environment/time/include/class_declarations.hh"
#include "utils/container/include/object_vector.hh"
#include "utils/container/include/pointer_vector.hh"
#include "utils/container/include/simple_checkpointable.hh"
#include "utils/ref_frames/include/ref_frame_interface.hh"
#include "utils/sim_interface/include/jeod_class.hh"
#include "spice_ephem_orient.hh"
#include "spice_ephem_point.hh"
```

Data Structures

- class jeod::SpiceEphemeris

  The S_define-level class that provides planetary ephemerides.

Namespaces

- jeod

  Namespace jeod.

9.2.1 Detailed Description

Define class for the SPICE ephemeris model.

Definition in file spice_ephem.hh.

9.3 spice_ephem_orient.cc File Reference

Define the methods for the SPICE-specific ephemeris orientation class.

```
#include "SpiceUsr.h"
#include "environment/ephemerides/ephem_interface/include/ephem_messages.hh"
#include "utils/math/include/vector3.hh"
#include "utils/math/include/matrix3x3.hh"
#include "../include/spice_ephem_orient.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.3.1 Detailed Description

Define the methods for the SPICE-specific ephemeris orientation class.

Definition in file spice_ephem_orient.cc.

9.4 spice_ephem_orient.hh File Reference

Define class SpiceEphemOrient, which extends EphemerisOrientation for use with the SPICE ephemeris model.

```
#include <string>
#include "utils/sim_interface/include/jeod_class.hh"
#include "environment/ephemerides/ephem_item/include/ephem_orient.hh"
```

Data Structures

- class jeod::SpiceEphemOrientation

  A SpiceEphemOrientation minimally extends EphemerisOrientation to include the JEOD and SPICE names and an update method for the target ephemeris reference frame.

Namespaces

- jeod

  Namespace jeod.

9.4.1 Detailed Description

Define class SpiceEphemOrient, which extends EphemerisOrientation for use with the SPICE ephemeris model.

Definition in file spice_ephem_orient.hh.

9.5 spice_ephem_point.cc File Reference

Define the methods for the SPICE-specific ephemeris point class.

```
#include <string>
#include "utils/memory/include/jeod_alloc.hh"
#include "../include/spice_ephem_point.hh"
```

Namespaces

- jeod

  Namespace jeod.

9.5.1 Detailed Description

Define the methods for the SPICE-specific ephemeris point class.

Definition in file spice_ephem_point.cc.

9.6 spice_ephem_point.hh File Reference

Define class SpiceEphemPoint, which extends EphemerisPoint for use with the SPICE ephemeris model.

```
#include "utils/sim_interface/include/jeod_class.hh"
#include "environment/ephemerides/ephem_item/include/ephem_point.hh"
```

Data Structures

- class jeod::SpiceEphemPoint

    A SpiceEphemPoint minimally extends EphemerisPoint, primarily in order to contain the ID of the SPICE object that will be used to update the state of the target ephemeris reference frame.

Namespaces

- jeod

    Namespace jeod.

9.6.1 Detailed Description

Define class SpiceEphemPoint, which extends EphemerisPoint for use with the SPICE ephemeris model.

Definition in file spice_ephem_point.hh.

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