

globus rsl
7.3

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1 Main Page

The Globus RSL library is provides the following functionality:

- [RSL Predicates](#)
- [RSL Constructors](#)
- [RSL Memory Management](#)
- [RSL Accessor Functions](#)
- [RSL Value Accessors](#)
- [RSL Display](#)
- [RSL Parsing](#)
- [List Functions](#)

2 Module Index

2.1 Modules

Here is a list of all modules:

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3 Module Documentation

3.1 RSL Predicates

The functions in this group return boolean values indicating whether an RSL syntax tree is of a particular type.

Functions

- int [globus_rsl_is_relation](#) (globus_rsl_t *ast)
- int [globus_rsl_is_boolean](#) (globus_rsl_t *ast)
- int [globus_rsl_is_relation_eq](#) (globus_rsl_t *ast)
- int [globus_rsl_is_relation_lessthan](#) (globus_rsl_t *ast)
- int [globus_rsl_is_relation_attribute_equal](#) (globus_rsl_t *ast, char *attribute)
- int [globus_rsl_is_boolean_and](#) (globus_rsl_t *ast)
- int [globus_rsl_is_boolean_or](#) (globus_rsl_t *ast)
- int [globus_rsl_is_boolean_multi](#) (globus_rsl_t *ast)
- int [globus_rsl_value_is_literal](#) (globus_rsl_value_t *ast)
- int [globus_rsl_value_is_sequence](#) (globus_rsl_value_t *ast)
- int [globus_rsl_value_is_variable](#) (globus_rsl_value_t *ast)
- int [globus_rsl_value_is_concatenation](#) (globus_rsl_value_t *ast)

3.1.1 Detailed Description

The functions in this group return boolean values indicating whether an RSL syntax tree is of a particular type.

3.1.2 Function Documentation

3.1.2.1 int [globus_rsl_is_relation](#) (globus_rsl_t * *ast*)

RSL relation test.

The [globus_rsl_is_relation\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is a relation. The RSL syntax supports the following relation operations:

- = Equal
- != Not Equal
- > Greater Than
- >= Greater Than or Equal
- < Less Than
- <= Less Than or Equal
- <= Less Than or Equal

Some examples of RSL relations are

```
"queue" = "debug"
"queue" != "slow"
"min_memory" > "1000"
"max_wall_time" >= "60"
"count" < "10"
"host_count" <= "5"
```

GRAM only supports equality relations.

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
------------	---

Returns

The [globus_rsl_is_relation\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is a relation; otherwise, it returns GLOBUS_FALSE.

3.1.2.2 int globus_rsl_is_boolean (globus_rsl_t * ast)

RSL boolean test.

The [globus_rsl_is_boolean\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is a boolean composition of other RSL parse trees. The syntactically understood boolean compositions are "&" (conjunction), "|" (disjunction), and "+" (multi-request). Some bexamples of RSL booleans are

```
& ( "queue" = "debug" ) ( "max_time" = "10000" )
| ( "count" = "1" ) ( "count" = "10" )
+ ( & ( "executable" = "1.exe" ) ) ( & ( "executable" = "2.exe" ) )
```

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
------------	---

Returns

The [globus_rsl_is_boolean\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is a boolean composition; otherwise, it returns GLOBUS_FALSE.

3.1.2.3 int globus_rsl_is_relation_eq (globus_rsl_t * ast)

RSL equality operation test.

The [globus_rsl_is_relation_eq\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is an equality relation. An example of an equality relation is

```
"queue" = "debug"
```

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
------------	---

Returns

The [globus_rsl_is_relation_eq\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is an equality relation; otherwise, it returns GLOBUS_FALSE.

3.1.2.4 int globus_rsl_is_relation_lessthan (globus_rsl_t * *ast*)

RSL less than operation test.

The [globus_rsl_is_relation_lessthan\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is a less-than relation. An example of a less-than relation is

```
"count" = "10"
```

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
------------	---

Returns

The [globus_rsl_is_relation_lessthan\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is a less-than relation; otherwise, it returns GLOBUS_FALSE.

3.1.2.5 int globus_rsl_is_relation_attribute_equal (globus_rsl_t * *ast*, char * *attribute*)

RSL attribute name test.

The [globus_rsl_is_relation_attribute_equal\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is a relation with the attribute name which matches the string pointed to by the *attribute* parameter. This attribute name comparison is case-insensitive.

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
<i>attribute</i>	Name of the attribute to test

Returns

The [globus_rsl_is_relation_attribute_equal\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is a relation and its attribute name matches the *attribute* parameter; otherwise, it returns GLOBUS_FALSE.

3.1.2.6 int globus_rsl_is_boolean_and (globus_rsl_t * *ast*)

RSL boolean and test.

The [globus_rsl_is_boolean_and\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is a boolean "and" composition of RSL trees. An example of a boolean and relation is

```
& ( "queue" = "debug" ) ( "executable" = "a.out" )
```

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
------------	---

Returns

The [globus_rsl_is_boolean_and\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is a boolean and of RSL parse trees; otherwise, it returns GLOBUS_FALSE.

3.1.2.7 int globus_rsl_is_boolean_or (globus_rsl_t * *ast*)

RSL boolean or test.

The [globus_rsl_is_boolean_or\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is a boolean "or" composition of RSL trees. An example of a boolean or relation is

```
| ( "count" = "2" ) ( "count" = "4" )
```

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
------------	---

Returns

The [globus_rsl_is_boolean_or\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is a boolean and of RSL parse trees; otherwise, it returns GLOBUS_FALSE.

3.1.2.8 int globus_rsl_is_boolean_multi (globus_rsl_t * *ast*)

RSL boolean multi test.

The [globus_rsl_is_boolean_multi\(\)](#) function tests whether the the RSL pointed to by the *ast* parameter is a boolean "multi-request" composition of RSL trees. An example of a boolean multi-request relation is

```
+ ( &( "executable" = "exe.1" ) ( "count" = "2" ) )  
  ( &( "executable" = " exe.2" ) ( "count" = "2" ) )
```

Parameters

<i>ast</i>	Pointer to an RSL parse tree structure.
------------	---

Returns

The [globus_rsl_is_boolean_multi\(\)](#) function returns GLOBUS_TRUE if the RSL parse tree pointed to by *ast* is a boolean multi-request of RSL parse trees; otherwise, it returns GLOBUS_FALSE.

3.1.2.9 int globus_rsl_value_is_literal (globus_rsl_value_t * *ast*)

RSL literal string test.

The [globus_rsl_value_is_literal\(\)](#) function tests whether the the RSL value pointed to by the *ast* parameter is a literal string value. An example of a literal string is

```
"count"
```

Parameters

<i>ast</i>	Pointer to an RSL value structure.
------------	------------------------------------

Returns

The [globus_rsl_value_is_literal\(\)](#) function returns GLOBUS_TRUE if the RSL value pointed to by *ast* is a literal

string value; otherwise, it returns GLOBUS_FALSE.

3.1.2.10 int globus_rsl_value_is_sequence (globus_rsl_value_t * *ast*)

RSL value sequence test.

The [globus_rsl_value_is_sequence\(\)](#) function tests whether the RSL value pointed to by the *ast* parameter is a sequence of RSL values. An example of a sequence of values is

```
"1" "2" "3"
```

Parameters

<i>ast</i>	Pointer to an RSL value structure.
------------	------------------------------------

Returns

The [globus_rsl_value_is_sequence\(\)](#) function returns GLOBUS_TRUE if the RSL value pointed to by *ast* is a value sequence; otherwise, it returns GLOBUS_FALSE.

3.1.2.11 int globus_rsl_value_is_variable (globus_rsl_value_t * *ast*)

RSL value variable test.

The [globus_rsl_value_is_variable\(\)](#) function tests whether the RSL value pointed to by the *ast* parameter is a variable reference. RSL values. An example of a variable reference is

```
$( "GLOBUSRUN_GASS_URL" )
```

Parameters

<i>ast</i>	Pointer to an RSL value structure.
------------	------------------------------------

Returns

The [globus_rsl_value_is_variable\(\)](#) function returns GLOBUS_TRUE if the RSL value pointed to by *ast* is a value sequence; otherwise, it returns GLOBUS_FALSE.

3.1.2.12 int globus_rsl_value_is_concatenation (globus_rsl_value_t * *ast*)

RSL value concatenation test.

The [globus_rsl_value_is_concatenation\(\)](#) function tests whether the RSL value pointed to by the *ast* parameter is a concatenation of RSL values. An example of an RSL value concatenation is

```
$( "GLOBUSRUN_GASS_URL" ) # "/input"
```

Parameters

<i>ast</i>	Pointer to an RSL value structure.
------------	------------------------------------

Returns

The [globus_rsl_value_is_concatenation\(\)](#) function returns GLOBUS_TRUE if the RSL value pointed to by *ast* is a value concatenation; otherwise, it returns GLOBUS_FALSE.

3.2 RSL Constructors

Functions

- `globus_rsl_t * globus_rsl_make_boolean` (int operator, `globus_list_t *children`)
- `globus_rsl_t * globus_rsl_make_relation` (int operator, char *attributename, `globus_rsl_value_t *value_sequence`)
- `globus_rsl_value_t * globus_rsl_value_make_literal` (char *string)
- `globus_rsl_value_t * globus_rsl_value_make_sequence` (`globus_list_t *value_list`)
- `globus_rsl_value_t * globus_rsl_value_make_variable` (`globus_rsl_value_t *sequence`)
- `globus_rsl_value_t * globus_rsl_value_make_concatenation` (`globus_rsl_value_t *left_value`, `globus_rsl_value_t *right_value`)

3.2.1 Function Documentation

3.2.1.1 `globus_rsl_t * globus_rsl_make_boolean (int operator, globus_list_t * children)`

RSL boolean constructor.

The `globus_rsl_make_boolean()` function creates a boolean composition of the RSL nodes in the list pointed to by *children*. The new RSL node which is returned contains a reference to the list, not a copy.

Parameters

<i>operator</i>	The boolean RSL operator to use to join the RSL parse tree list pointed to by the <i>children</i> parameter. This value must be one of GLOBUS_RSL_AND, GLOBUS_RSL_OR, GLOBUS_RSL_MULTIREQ in order to create a valid RSL tree.
<i>children</i>	Pointer to a list of RSL syntax trees to combine with the boolean operation described by the <i>operator</i> parameter.

Returns

The `globus_rsl_make_boolean()` function returns a new RSL parse tree node that contains a shallow reference to the list of values pointed to by the *children* parameter joined by the operator value in the *operator* parameter. If an error occurs, `globus_rsl_make_boolean()` returns NULL.

3.2.1.2 `globus_rsl_t * globus_rsl_make_relation (int operator, char * attributename, globus_rsl_value_t * value_sequence)`

RSL relation constructor.

The `globus_rsl_make_relation()` function creates a relation between the attribute named by the *attributename* parameter and the values pointed to by the *value_sequence* list. The new RSL relation node which is returned contains a reference to the *attributename* and *value_sequence* parameters, not a copy.

Parameters

<i>operator</i>	The RSL operator to use to relate the RSL attribute name pointed to by the <i>attributename</i> parameter and the values pointed to by the <i>value_sequence</i> parameter. This value must be one of GLOBUS_RSL_EQ, GLOBUS_RSL_NEQ, GLOBUS_RSL_GT, GLOBUS_RSL_GTEQ, GLOBUS_RSL_LT, or GLOBUS_RSL_LTEQ in order to create a valid RSL node.
<i>attributename</i>	Pointer to a string naming the attribute of the new RSL relation.
<i>value_sequence</i>	Pointer to a sequence of RSL values to use in the new RSL relation.

Returns

The `globus_rsl_make_relation()` function returns a new RSL parse tree node that contains a shallow reference to the attribute name pointed to by the *attributename* parameter and the RSL value sequence pointed to by the *value_sequence* parameter. If an error occurs, `globus_rsl_make_relation()` returns NULL.

3.2.1.3 globus_rsl_value_t* globus_rsl_value_make_literal (char * *string*)

RSL literal constructor.

The [globus_rsl_value_make_literal\(\)](#) function creates a string literal RSL value node containing the value pointed to by the *string* parameter. The new RSL value node which is returned contains a reference to the *string* parameter, not a copy.

Parameters

<i>string</i>	The literal string to be used in the new value.
---------------	---

Returns

The [globus_rsl_value_make_literal\(\)](#) function returns a new RSL value node that contains a shallow reference to the string pointed to by the *string* parameter. If an error occurs, [globus_rsl_value_make_literal\(\)](#) returns NULL.

3.2.1.4 globus_rsl_value_t* globus_rsl_value_make_sequence (globus_list_t * *value_list*)

RSL value sequence constructor.

The [globus_rsl_value_make_sequence\(\)](#) function creates a value sequence RSL node referring to the values pointed to by the *value_list* parameter. The new node returned by this function contains a reference to the *value_list* parameter, not a copy.

Parameters

<i>value_list</i>	A pointer to a list of globus_rsl_value_t pointers.
-------------------	---

Returns

The [globus_rsl_value_make_sequence\(\)](#) function returns a new RSL value node that contains a shallow reference to the list pointed to by the *value_list* parameter. If an error occurs, [globus_rsl_value_make_sequence\(\)](#) returns NULL.

3.2.1.5 globus_rsl_value_t* globus_rsl_value_make_variable (globus_rsl_value_t * *sequence*)

RSL variable reference constructor.

The [globus_rsl_value_make_variable\(\)](#) function creates a variable reference RSL node referring to the variable name contained in the value pointed to by *sequence* parameter. The new node returned by this function contains a reference to the *sequence* parameter, not a copy.

Parameters

<i>sequence</i>	A pointer to a RSL value sequence.
-----------------	------------------------------------

Returns

The [globus_rsl_value_make_variable\(\)](#) function returns a new RSL value node that contains a shallow reference to the value sequence pointed to by the *sequence* parameter. If an error occurs, [globus_rsl_value_make_variable\(\)](#) returns NULL.

3.2.1.6 globus_rsl_value_t* globus_rsl_value_make_concatenation (globus_rsl_value_t * *left_value*, globus_rsl_value_t * *right_value*)

RSL concatenation constructor.

The [globus_rsl_value_make_concatenation\(\)](#) function creates a concatenation of the values pointed to by the *left_* -

value and *right_value* parameters. The new node returned by this function contains a reference to these parameters' values, not a copy.

Parameters

<i>left_value</i>	A pointer to a RSL value to act as the left side of the concatenation. This must be a string literal or variable reference.
<i>right_value</i>	A pointer to a RSL value to act as the right side of the concatenation. This must be a string literal or variable reference.

Returns

The [globus_rsl_value_make_concatenation\(\)](#) function returns a new RSL value node that contains a shallow reference to the values pointed to by the *left_value* and *right_value* parameters. If an error occurs, [globus_rsl_value_make_concatenation\(\)](#) returns NULL.

3.3 RSL Memory Management

Functions

- [globus_rsl_t * globus_rsl_copy_recursive](#) ([globus_rsl_t *ast_node](#))
- [globus_rsl_value_t * globus_rsl_value_copy_recursive](#) ([globus_rsl_value_t *globus_rsl_value_ptr](#))
- [int globus_rsl_value_free](#) ([globus_rsl_value_t *val](#))
- [int globus_rsl_free](#) ([globus_rsl_t *ast_node](#))
- [int globus_rsl_value_free_recursive](#) ([globus_rsl_value_t *globus_rsl_value_ptr](#))
- [int globus_rsl_free_recursive](#) ([globus_rsl_t *ast_node](#))
- [int globus_rsl_value_list_literal_replace](#) ([globus_list_t *value_list](#), [char *string_value](#))
- [int globus_rsl_value_eval](#) ([globus_rsl_value_t *ast_node](#), [globus_symboltable_t *symbol_table](#), [char **string_value](#), [int rsl_substitution_flag](#))
- [int globus_rsl_eval](#) ([globus_rsl_t *ast_node](#), [globus_symboltable_t *symbol_table](#))

3.3.1 Function Documentation

3.3.1.1 [globus_rsl_t * globus_rsl_copy_recursive \(globus_rsl_t * ast_node \)](#)

Create a deep copy of an RSL syntax tree.

The [globus_rsl_copy_recursive\(\)](#) function performs a deep copy of the RSL syntax tree pointed to by the *ast_node* parameter. All RSL nodes, value nodes, variable names, attributes, and literals will be copied to the return value.

Parameters

<i>ast_node</i>	An RSL syntax tree to copy.
-----------------	-----------------------------

Returns

The [globus_rsl_copy_recursive\(\)](#) function returns a copy of its input parameter that that can be used after the *ast_node* and its values have been freed. If an error occurs, [globus_rsl_copy_recursive\(\)](#) returns NULL.

3.3.1.2 [globus_rsl_value_t * globus_rsl_value_copy_recursive \(globus_rsl_value_t * globus_rsl_value_ptr \)](#)

Create a deep copy of an RSL value.

The [globus_rsl_value_copy_recursive\(\)](#) function performs a deep copy of the RSL value pointed to by the *globus_rsl_value_ptr* parameter. All variable names, attributes, literals, and value lists will be copied to the return value.

Parameters

<i>globus_rsl_value_ptr</i>	A pointer to an RSL value to copy.
-----------------------------	------------------------------------

Returns

The [globus_rsl_value_copy_recursive\(\)](#) function returns a copy of its input parameter that that can be used after the *globus_rsl_value_ptr* and its values have been freed. If an error occurs, [globus_rsl_value_copy_recursive\(\)](#) returns NULL.

3.3.1.3 int globus_rsl_value_free (globus_rsl_value_t * val)

Free an RSL value node.

The [globus_rsl_value_free\(\)](#) function frees the RSL value pointed to by the *val* parameter. This only frees the RSL value node itself, and not any sequence or string values associated with that node.

Parameters

<i>val</i>	The RSL value node to free.
------------	-----------------------------

Returns

The [globus_rsl_value_free\(\)](#) function always returns GLOBUS_SUCCESS.

3.3.1.4 int globus_rsl_free (globus_rsl_t * ast_node)

Free an RSL syntax tree node.

The [globus_rsl_free\(\)](#) function frees the RSL syntax tree node pointed to by the *ast_node* parameter. This only frees the RSL syntax tree node itself, and not any boolean operands, relation names, or values associated with the node.

Parameters

<i>ast_node</i>	The RSL syntax tree node to free.
-----------------	-----------------------------------

Returns

The [globus_rsl_value_free\(\)](#) function always returns GLOBUS_SUCCESS.

3.3.1.5 int globus_rsl_value_free_recursive (globus_rsl_value_t * globus_rsl_value_ptr)

Free an RSL value and all its child nodes.

The [globus_rsl_free_recursive\(\)](#) function frees the RSL value node pointed to by the *globus_rsl_value_ptr*, including all literal strings, variable names, and value sequences. Any pointers to these are no longer valid after [globus_rsl_value_free_recursive\(\)](#) returns.

Parameters

<i>globus_rsl_value_ptr</i>	An RSL value node to free.
-----------------------------	----------------------------

Returns

The [globus_rsl_value_free_recursive\(\)](#) function always returns GLOBUS_SUCCESS.

3.3.1.6 int globus_rsl_free_recursive (globus_rsl_t * *ast_node*)

Free an RSL syntax tree and all its child nodes.

The [globus_rsl_free_recursive\(\)](#) function frees the RSL syntax tree pointed to by the *ast_node* parameter, including all boolean operands, attribute names, and values. Any pointers to these are no longer valid after [globus_rsl_free_recursive\(\)](#) returns.

Parameters

<i>ast_node</i>	An RSL parse tree to free.
-----------------	----------------------------

Returns

The [globus_rsl_value_free_recursive\(\)](#) function always returns `GLOBUS_SUCCESS`.

3.3.1.7 int globus_rsl_value_list_literal_replace (globus_list_t * *value_list*, char * *string_value*)

Replace the first value in a value list with a literal.

The [globus_rsl_value_list_literal_replace\(\)](#) function replaces the first value in the list pointed to by the *value_list* parameter with a new value node that is a literal string node pointing to the value of the *string_value* parameter, freeing the old value.

Parameters

<i>value_list</i>	The RSL value list to modify by replacing its first element.
<i>string_value</i>	The new string value to use as a literal first element of the list pointed to by the <i>value_list</i> parameter.

Returns

Upon success, [globus_rsl_value_list_literal_replace\(\)](#) returns `GLOBUS_SUCCESS`, frees the current first value of *value_list* and replaces it with a new literal string node pointing to the value of the *string_value* parameter. If an error occurs, [globus_rsl_value_list_literal_replace\(\)](#) returns 1.

3.3.1.8 int globus_rsl_value_eval (globus_rsl_value_t * *ast_node*, globus_symboltable_t * *symbol_table*, char ** *string_value*, int *rsl_substitution_flag*)

Evaluate RSL substitutions in an RSL value node.

The [globus_rsl_value_eval\(\)](#) function modifies the value pointed to by its *ast_node* parameter by replacing all RSL substitution variable reference nodes with the literal values those variables evaluate to based on the current scope of the symbol table pointed to by the *symbol_table* parameter. It also combines string concatenations into literal string values. Any nodes which are replaced by this function are freed using [globus_rsl_value_free_recursive\(\)](#).

Parameters

<i>ast_node</i>	A pointer to the RSL value node to evaluate.
<i>symbol_table</i>	A symbol table containing current definitions of the RSL substitutions which can occur in this evaluation scope.
<i>string_value</i>	An output parameter which is set to point to the value of the string returned by evaluating the value node pointed to by <i>ast_node</i> if it evaluates to a literal value. list pointed to by the <i>value_list</i> parameter.
<i>rsl_substitution_flag</i>	A flag indicating whether the node pointed to by the <i>ast_node</i> parameter defines RSL substitution variables.

Returns

Upon success, [globus_rsl_value_eval\(\)](#) returns `GLOBUS_SUCCESS`, and replaces any RSL substitution val-

ues in the node pointed to by the *ast_node* parameter. If the node evaluates to a single literal, the *string_value* parameter is modified to point to the value of that literal. If an error occurs, [globus_rsl_value_eval\(\)](#) returns a non-zero value.

3.3.1.9 int globus_rsl_eval (globus_rsl_t * ast_node, globus_symboltable_t * symbol_table)

Evaluate an RSL syntax tree.

The [globus_rsl_eval\(\)](#) function modifies the RSL parse tree pointed to by its *ast_node* parameter by replacing all RSL substitution variable reference nodes with the literal values those variables evaluate to based on the current scope of the symbol table pointed to by the *symbol_table* parameter. It also combines string concatenations into literal string values. Any nodes which are replaced by this function are freed using [globus_rsl_value_free_recursive\(\)](#).

Parameters

<i>ast_node</i>	A pointer to the RSL syntax tree to evaluate.
<i>symbol_table</i>	A symbol table containing current definitions of the RSL substitutions which can occur in this evaluation scope.

Returns

Upon success, [globus_rsl_eval\(\)](#) returns *GLOBUS_SUCCESS*, and replaces all RSL substitution values and concatenations in *ast_node* or its child nodes with the evaluated forms described above. If an error occurs, [globus_rsl_eval\(\)](#) returns a non-zero value.

3.4 RSL Accessor Functions

Functions

- int [globus_rsl_boolean_get_operator](#) (globus_rsl_t *ast_node)
- globus_list_t * [globus_rsl_boolean_get_operand_list](#) (globus_rsl_t *ast_node)
- globus_list_t ** [globus_rsl_boolean_get_operand_list_ref](#) (globus_rsl_t *boolean_node)
- char * [globus_rsl_relation_get_attribute](#) (globus_rsl_t *ast_node)
- int [globus_rsl_relation_get_operator](#) (globus_rsl_t *ast_node)
- globus_rsl_value_t * [globus_rsl_relation_get_value_sequence](#) (globus_rsl_t *ast_node)
- globus_rsl_value_t * [globus_rsl_relation_get_single_value](#) (globus_rsl_t *ast_node)
- char * [globus_rsl_value_literal_get_string](#) (globus_rsl_value_t *literal_node)
- globus_list_t * [globus_rsl_value_sequence_get_value_list](#) (globus_rsl_value_t *sequence_node)
- globus_rsl_value_t * [globus_rsl_value_variable_get_sequence](#) (globus_rsl_value_t *variable_node)
- char * [globus_rsl_value_variable_get_name](#) (globus_rsl_value_t *variable_node)
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- globus_rsl_value_t * [globus_rsl_value_concatenation_get_right](#) (globus_rsl_value_t *concatenation_node)
- globus_list_t ** [globus_rsl_value_sequence_get_list_ref](#) (globus_rsl_value_t *sequence_node)

3.4.1 Function Documentation

3.4.1.1 int globus_rsl_boolean_get_operator (globus_rsl_t * ast_node)

Get the RSL operator used in a boolean RSL composition.

The [globus_rsl_boolean_get_operator\(\)](#) function returns the operator that is used by the boolean RSL composition.

Parameters

<i>ast_node</i>	The RSL syntax tree to inspect.
-----------------	---------------------------------

Returns

Upon success, [globus_rsl_boolean_get_operator\(\)](#) returns one of GLOBUS_RSL_AND, GLOBUS_RSL_OR, GLOBUS_RSL_MULTIREQ. If an error occurs, [globus_rsl_boolean_get_operator\(\)](#) returns -1.

3.4.1.2 `globus_list_t** globus_rsl_boolean_get_operand_list (globus_rsl_t * ast_node)`

Get the RSL operand list from a boolean RSL composition.

The [globus_rsl_boolean_get_operand_list\(\)](#) function returns the list of RSL syntax tree nodes that is joined by a boolean composition.

Parameters

<i>ast_node</i>	The RSL syntax tree to inspect.
-----------------	---------------------------------

Returns

Upon success, [globus_rsl_boolean_get_operand_list\(\)](#) returns a pointer to a list of RSL syntax tree nodes that are the operand of a boolean composition operation. If an error occurs, [globus_rsl_boolean_get_operand_list\(\)](#) returns NULL.

3.4.1.3 `globus_list_t** globus_rsl_boolean_get_operand_list_ref (globus_rsl_t * boolean_node)`

Get a reference to the RSL operand list from a boolean RSL composition.

The [globus_rsl_boolean_get_operand_list_ref\(\)](#) function returns a pointer to the list of RSL syntax tree nodes that is joined by a boolean composition. If this list is modified, then the value of boolean syntax tree is modified.

Parameters

<i>boolean_node</i>	The RSL syntax tree to inspect.
---------------------	---------------------------------

Returns

Upon success, [globus_rsl_boolean_get_operand_list_ref\(\)](#) returns a pointer to the list pointer in the RSL syntax tree data structure. This list can be modified to change the operands of the boolean operation. If an error occurs, [globus_rsl_boolean_get_operand_list_ref\(\)](#) returns NULL.

3.4.1.4 `char* globus_rsl_relation_get_attribute (globus_rsl_t * ast_node)`

Get an RSL relation attribute name.

The [globus_rsl_relation_get_attribute\(\)](#) function returns a pointer to the name of the attribute in an RSL relation. This return value is a shallow reference to the attribute name.

Parameters

<i>ast_node</i>	The RSL relation node to inspect.
-----------------	-----------------------------------

Returns

Upon success, [globus_rsl_relation_get_attribute\(\)](#) returns a pointer to the name of the attribute of the relation. If an error occurs, [globus_rsl_relation_get_attribute\(\)](#) returns NULL.

3.4.1.5 `int globus_rsl_relation_get_operator (globus_rsl_t * ast_node)`

Get an RSL relation operator.

The [globus_rsl_relation_get_operator\(\)](#) function returns the operation type represented by the RSL relation node pointed to by the *ast_node* parameter.

Parameters

<i>ast_node</i>	The RSL relation node to inspect.
-----------------	-----------------------------------

Returns

Upon success, [globus_rsl_relation_get_operator\(\)](#) returns one of GLOBUS_RSL_EQ, GLOBUS_RSL_NEQ, GLOBUS_RSL_GT, GLOBUS_RSL_GTEQ, GLOBUS_RSL_LT, or GLOBUS_RSL_LTEQ. If an error occurs, [globus_rsl_relation_get_operator\(\)](#) returns -1.

3.4.1.6 `globus_rsl_value_t* globus_rsl_relation_get_value_sequence (globus_rsl_t * ast_node)`

Get the value of an RSL relation.

The [globus_rsl_relation_get_value_sequence\(\)](#) function returns the value of an RSL relation node pointed to by the *ast_node* parameter.

Parameters

<i>ast_node</i>	The RSL relation node to inspect.
-----------------	-----------------------------------

Returns

Upon success, [globus_rsl_relation_get_value_sequence\(\)](#) returns the value sequence pointer in the RSL relation pointed to by the *ast_node* parameter. If an error occurs, [globus_rsl_relation_get_value_sequence\(\)](#) returns NULL.

3.4.1.7 `globus_rsl_value_t* globus_rsl_relation_get_single_value (globus_rsl_t * ast_node)`

Get the single value of an RSL relation.

The [globus_rsl_relation_get_single_value\(\)](#) function returns the value of an RSL relation node pointed to by the *ast_node* parameter if the value is a sequence of one value.

Parameters

<i>ast_node</i>	The RSL relation node to inspect.
-----------------	-----------------------------------

Returns

Upon success, [globus_rsl_relation_get_single_value\(\)](#) returns the value pointer at the head of the RSL relation pointed to by the *ast_node* parameter. If the value sequence has more than one value or the *ast_node* points to an RSL syntax tree that is not a relation, [globus_rsl_relation_get_value_sequence\(\)](#) returns NULL.

3.4.1.8 `char* globus_rsl_value_literal_get_string (globus_rsl_value_t * literal_node)`

Get the string value of an RSL literal.

The [globus_rsl_value_literal_get_string\(\)](#) function returns the string value of an RSL literal node pointed to by the *literal_node* parameter.

Parameters

<i>literal_node</i>	The RSL literal node to inspect.
---------------------	----------------------------------

Returns

Upon success, [globus_rsl_value_literal_get_string\(\)](#) returns a pointer to the string value of the literal pointed to by the *literal_node* parameter. If the value is not a literal, [globus_rsl_value_literal_get_string\(\)](#) returns NULL.

3.4.1.9 `globus_list_t* globus_rsl_value_sequence_get_value_list (globus_rsl_value_t * sequence_node)`

Get the value list from an RSL value sequence.

The [globus_rsl_value_sequence_get_value_list\(\)](#) function returns the list of `globus_rsl_value_t` pointer values associated with the RSL value sequence pointed to by the *sequence_node* parameter.

Parameters

<i>sequence_node</i>	The RSL sequence node to inspect.
----------------------	-----------------------------------

Returns

Upon success, [globus_rsl_value_sequence_get_value_list\(\)](#) returns a pointer to the list of values pointed to by the *sequence_node* parameter. If the value is not a sequence, [globus_rsl_value_literal_get_string\(\)](#) returns NULL.

3.4.1.10 `globus_rsl_value_t* globus_rsl_value_variable_get_sequence (globus_rsl_value_t * variable_node)`

Get the value sequence from an RSL variable reference.

The [globus_rsl_value_variable_get_sequence\(\)](#) function returns the sequence value associated with the RSL variable reference pointed to by the *variable_node* parameter.

Parameters

<i>variable_node</i>	The RSL variable node to inspect.
----------------------	-----------------------------------

Returns

Upon success, [globus_rsl_value_variable_get_sequence\(\)](#) returns a pointer to the rsl value sequence pointed to by the *variable_node* parameter. If the value is not a variable reference, [globus_rsl_value_variable_get_sequence\(\)](#) returns NULL.

3.4.1.11 `char* globus_rsl_value_variable_get_name (globus_rsl_value_t * variable_node)`

Get the name of an RSL variable reference.

The [globus_rsl_value_variable_get_name\(\)](#) function returns a pointer to the name of the RSL variable name pointed to by the *variable_node* parameter.

Parameters

<i>variable_node</i>	The RSL variable node to inspect.
----------------------	-----------------------------------

Returns

Upon success, [globus_rsl_value_variable_get_name\(\)](#) returns a pointer to the string containing the name of the variable referenced by the *variable_node* parameter. If the node is not a variable reference, [globus_rsl_value_variable_get_sequence\(\)](#) returns NULL.

3.4.1.12 `char* globus_rsl_value_variable_get_default (globus_rsl_value_t * variable_node)`

Get the default value of an RSL variable reference.

The [globus_rsl_value_variable_get_default\(\)](#) function returns a pointer to the default value of the RSL variable pointed to by the *variable_node* parameter to use if the variable's name is not bound in the current evaluation context.

Parameters

<i>variable_node</i>	The RSL variable node to inspect.
----------------------	-----------------------------------

Returns

Upon success, [globus_rsl_value_variable_get_default\(\)](#) returns a pointer to the string containing the default value of the variable referenced by the *variable_node* parameter. If the node is not a variable reference or no default value exists in the RSL node, [globus_rsl_value_variable_get_default\(\)](#) returns NULL.

3.4.1.13 `int globus_rsl_value_variable_get_size (globus_rsl_value_t * variable_node)`

Get the size of the value list within an RSL variable reference node.

The [globus_rsl_value_variable_get_size\(\)](#) function returns the number of nodes in the RSL variable reference node pointed to by the *variable_node* parameter.

Parameters

<i>variable_node</i>	The RSL variable node to inspect.
----------------------	-----------------------------------

Returns

Upon success, [globus_rsl_value_variable_get_size\(\)](#) returns the list of values within a RSL variable reference, or -1 if the node pointed to by *variable_node* is not a variable reference. If the return value is 1, then the variable has no default value included in the reference.

3.4.1.14 `globus_rsl_value_t* globus_rsl_value_concatenation_get_left (globus_rsl_value_t * concatenation_node)`

Get the left side of a concatenation value.

The [globus_rsl_value_concatenation_get_left\(\)](#) function returns the left side of an RSL value concatenation pointed to by the *concatenation_node* parameter.

Parameters

<i>concatenation_node</i>	The RSL concatenation node to inspect.
---------------------------	--

Returns

Upon success, [globus_rsl_value_concatenation_get_left\(\)](#) returns a pointer to the left value of the concatenation values pointed to by the *concatenation_node* parameter. If an error occurs, [globus_rsl_value_concatenation_get_left\(\)](#) returns NULL.

3.4.1.15 `globus_rsl_value_t* globus_rsl_value_concatenation_get_right (globus_rsl_value_t * concatenation_node)`

Get the right side of a concatenation value.

The [globus_rsl_value_concatenation_get_right\(\)](#) function returns the right side of an RSL value concatenation pointed to by the *concatenation_node* parameter.

Parameters

<i>concatenation_node</i>	The RSL concatenation node to inspect.
---------------------------	--

Returns

Upon success, [globus_rsl_value_concatenation_get_right\(\)](#) returns a pointer to the right value of the concatenation values pointed to by the *concatenation_node* parameter. If an error occurs, [globus_rsl_value_concatenation_get_right\(\)](#) returns NULL.

3.4.1.16 globus_list_t** globus_rsl_value_sequence_get_list_ref (globus_rsl_value_t * *sequence_node*)

Get a reference to the list of values in a sequence.

The [globus_rsl_value_sequence_get_list_ref\(\)](#) function returns a reference to the list of values in a value sequence. Any changes to the elements of this list will affect the *sequence_node* parameter.

Parameters

<i>sequence_node</i>	The RSL sequence node to inspect.
----------------------	-----------------------------------

Returns

Upon success, [globus_rsl_value_sequence_get_list_ref\(\)](#) returns a pointer to the list of the *globus_rsl_value_t* pointer values contained in the *sequence_node* parameter. If an error occurs, [globus_rsl_value_sequence_get_list_ref\(\)](#) returns NULL.

3.5 List Functions

Functions

- *globus_list_t* * [globus_list_copy_reverse](#) (*globus_list_t* **orig*)

3.5.1 Function Documentation

3.5.1.1 globus_list_t* globus_list_copy_reverse (globus_list_t * *orig*)

Create a reverse-order copy of a list.

The [globus_list_copy_reverse\(\)](#) function creates and returns a copy of its input parameter, with the order of the list elements reversed. This copy is a shallow copy of list nodes, so both the list pointed to by *orig* and the returned list point to the same list element data.

Parameters

<i>orig</i>	A pointer to the list to copy.
-------------	--------------------------------

Returns

Upon success, [globus_list_copy_reverse\(\)](#) returns a new list containing the same elements as the list pointed to by *orig* in reverse order. If an error occurs, [globus_list_copy_reverse\(\)](#) returns NULL.

3.6 RSL Value Accessors

Functions

- int [globus_rsl_value_concatenation_set_left](#) (*globus_rsl_value_t* **concatenation_node*, *globus_rsl_value_t* **new_left_node*)
- int [globus_rsl_value_concatenation_set_right](#) (*globus_rsl_value_t* **concatenation_node*, *globus_rsl_value_t* **new_right_node*)

- int [globus_rsl_value_list_param_get](#) (globus_list_t *ast_node_list, int required_type, char ***value, int *value_ctr)
- globus_list_t * [globus_rsl_param_get_values](#) (globus_rsl_t *ast_node, char *param)
- int [globus_rsl_param_get](#) (globus_rsl_t *ast_node, int param_type, char *param, char ***values)

3.6.1 Function Documentation

3.6.1.1 int [globus_rsl_value_concatenation_set_left](#) (globus_rsl_value_t * *concatenation_node*, globus_rsl_value_t * *new_left_node*)

Set the left-hand value of a concatenation.

The [globus_rsl_value_concatenation_set_left\(\)](#) sets the left hand side of a concatenation pointed to by *concatenation_node* to the value pointed to by *new_left_node*. If there was any previous value to the left hand side of the concatenation, it is discarded but not freed.

Parameters

<i>concatenation_node</i>	A pointer to the RSL value concatenation node to modify.
<i>new_left_node</i>	A pointer to the new left hand side of the concatenation.

Returns

Upon success, [globus_rsl_value_concatenation_set_left\(\)](#) returns *GLOBUS_SUCCESS* and modifies the value pointed to by the *concatenation_node* parameter to use the value pointed to by the *new_left_node* parameter as its left hand side value. If an error occurs -1 is returned.

3.6.1.2 int [globus_rsl_value_concatenation_set_right](#) (globus_rsl_value_t * *concatenation_node*, globus_rsl_value_t * *new_right_node*)

Set the right-hand value of a concatenation.

The [globus_rsl_value_concatenation_set_right\(\)](#) sets the right-hand side of a concatenation pointed to by *concatenation_node* to the value pointed to by *new_right_node*. If there was any previous value to the right-hand side of the concatenation, it is discarded but not freed.

Parameters

<i>concatenation_node</i>	A pointer to the RSL value concatenation node to modify.
<i>new_right_node</i>	A pointer to the new right hand side of the concatenation.

Returns

Upon success, [globus_rsl_value_concatenation_set_right\(\)](#) returns *GLOBUS_SUCCESS* and modifies the value pointed to by the *concatenation_node* parameter to use the value pointed to by the *new_right_node* parameter as its right hand side value. If an error occurs -1 is returned.

3.6.1.3 int [globus_rsl_value_list_param_get](#) (globus_list_t * *ast_node_list*, int *required_type*, char *** *value*, int * *value_ctr*)

Get the values of an RSL value list.

The [globus_rsl_value_list_param_get\(\)](#) function copies pointers to literal string values or string pairs associated with the list of globus_rsl_value_t pointers pointed to by the *ast_node_list* parameter to the output array pointed to by the *value* parameter. It modifies the value pointed to by the *value_ctr* parameter to be the number of strings copied into the array.

Parameters

<i>ast_node_list</i>	A pointer to a list of <code>globus_rsl_value_t</code> pointers whose values will be copied to the <i>value</i> parameter array.
<i>required_type</i>	A flag indicating whether the list is expected to contain literal strings or string pairs. This value may be one of <code>GLOBUS_RSL_VALUE_LITERAL</code> or <code>GLOBUS_RSL_VALUE_SEQUENCE</code> .
<i>value</i>	An output parameter pointing to an array of strings. This array must be at least as large as the number of elements in the list pointed to by <i>ast_node_list</i> .
<i>value_ctr</i>	An output parameter pointing to an integer that will be incremented for each string copied into the <i>value</i> array.

Returns

Upon success, the `globus_rsl_value_list_param_get()` function returns `GLOBUS_SUCCESS` and modifies the values pointed to by the *value* and *value_ctr* parameters as described above. If an error occurs, `globus_rsl_value_list_param_get()` returns a non-zero value.

3.6.1.4 `globus_list_t* globus_rsl_param_get_values (globus_rsl_t * ast_node, char * param)`

Get the list of values for an RSL attribute.

The `globus_rsl_param_get_values()` function searches the RSL parse tree pointed to by the *ast_node* parameter and returns the value list that is bound to the attribute named by the *param* parameter.

Parameters

<i>ast_node</i>	A pointer to an RSL syntax tree that will be searched. This may be a relation or boolean RSL string.
<i>param</i>	The name of the attribute to search for in the parse tree pointed to by the <i>ast_node</i> parameter.

Returns

Upon success, the `globus_rsl_param_get_values()` function returns a pointer to the list of values associated with the attribute named by *param* in the RSL parse tree pointed to by *ast_node*. If an error occurs, `globus_rsl_param_get_values()` returns `NULL`.

3.6.1.5 `int globus_rsl_param_get (globus_rsl_t * ast_node, int param_type, char * param, char *** values)`

Get the value strings for an RSL attribute.

The `globus_rsl_param_get()` function searches the RSL parse tree pointed to by the *ast_node* parameter and returns an array of pointers to the strings bound to the attribute named by the *param* parameter.

Parameters

<i>ast_node</i>	A pointer to an RSL syntax tree that will be searched. This may be a relation or boolean RSL string.
<i>param_type</i>	A flag indicating what type of values are expected for the RSL attribute named by the <i>param</i> parameter. This flag value may be <code>GLOBUS_RSL_PARAM_SINGLE_LITERAL</code> , <code>GLOBUS_RSL_PARAM_MULTI_LITERAL</code> , or <code>GLOBUS_RSL_PARAM_SEQUENCE</code> .
<i>param</i>	A string pointing to the name of the RSL attribute to search for.
<i>values</i>	An output parameter pointing to an array of strings that will be allocated and contain pointers to the RSL value strings if they match the format specified by the <i>param_type</i> flag. The caller is responsible for freeing this array, but not the strings in the array.

Returns

Upon success, the `globus_rsl_param_get()` function returns `GLOBUS_SUCCESS` and modifies the *values* parameter as described above. If an error occurs, `globus_rsl_param_get()` returns a non-zero value.

3.7 RSL Display

Functions

- int [globus_rsl_value_print_recursive](#) (globus_rsl_value_t *globus_rsl_value_ptr)
- char * [globus_rsl_get_operator](#) (int my_op)
- int [globus_rsl_print_recursive](#) (globus_rsl_t *ast_node)
- char * [globus_rsl_unparse](#) (globus_rsl_t *rsl_spec)
- char * [globus_rsl_value_unparse](#) (globus_rsl_value_t *rsl_value)

3.7.1 Function Documentation

3.7.1.1 int globus_rsl_value_print_recursive (globus_rsl_value_t * *globus_rsl_value_ptr*)

Print the value of a globus_rsl_value_t to standard output.

The [globus_rsl_value_print_recursive\(\)](#) function prints a string representation of the RSL value node pointed to by the *globus_rsl_value_ptr* parameter to standard output. This function is not reentrant.

Parameters

<i>globus_rsl_value_ptr</i>	A pointer to the RSL value to display.
-----------------------------	--

Returns

The [globus_rsl_value_print_recursive\(\)](#) function always returns *GLOBUS_SUCCESS*.

3.7.1.2 char* globus_rsl_get_operator (int *my_op*)

Get the string representation of an RSL operator.

The [globus_rsl_get_operator\(\)](#) function returns a pointer to a static string that represents the RSL operator passed in via the *my_op* parameter. If the operator is not value, then [globus_rsl_get_operator\(\)](#) returns a pointer to the string "??"

Parameters

<i>my_op</i>	The RSL operator to return.
--------------	-----------------------------

Returns

The [globus_rsl_get_operator\(\)](#) function returns a pointer to the string representation of the *my_op* parameter, or "??" if that value is not a value RSL operator.

3.7.1.3 int globus_rsl_print_recursive (globus_rsl_t * *ast_node*)

Print the value of an RSL syntax tree to standard output.

The [globus_rsl_print_recursive\(\)](#) function prints a string representation of the RSL syntax tree pointed to by the *ast_node* parameter to standard output. This function is not reentrant.

Parameters

<i>ast_node</i>	A pointer to the RSL syntax tree to display.
-----------------	--

Returns

The [globus_rsl_print_recursive\(\)](#) function always returns *GLOBUS_SUCCESS*.

3.7.1.4 `char* globus_rsl_unparse (globus_rsl_t * rsl_spec)`

Convert an RSL parse tree to a string.

The [globus_rsl_unparse\(\)](#) function returns a new string which can be parsed into the RSL syntax tree passed as the *rsl_spec* parameter. The caller is responsible for freeing this string.

Parameters

<i>rsl_spec</i>	A pointer to the RSL syntax tree to unparse.
-----------------	--

Returns

Upon success, the [globus_rsl_unparse\(\)](#) function returns a new string which represents the RSL parse tree passed as the *rsl_spec* parameter. If an error occurs, [globus_rsl_unparse\(\)](#) returns NULL.

3.7.1.5 `char* globus_rsl_value_unparse (globus_rsl_value_t * rsl_value)`

Convert an RSL value pointer to a string.

The [globus_rsl_value_unparse\(\)](#) function returns a new string which can be parsed into the value of an RSL relation that has the same syntactic meaning as the *rsl_value* parameter. The caller is responsible for freeing this string.

Parameters

<i>rsl_value</i>	A pointer to the RSL value node to unparse.
------------------	---

Returns

Upon success, the [globus_rsl_value_unparse\(\)](#) function returns a new string which represents the RSL value node passed as the *rsl_value* parameter. If an error occurs, [globus_rsl_value_unparse\(\)](#) returns NULL.

3.8 RSL Parsing

Functions

- `globus_rsl_t * globus_rsl_parse (char *buf)`

3.8.1 Function Documentation

3.8.1.1 `globus_rsl_t* globus_rsl_parse (char * buf)`

Parse an RSL string.

The [globus_rsl_parse\(\)](#) function parses the string pointed to by the *buf* parameter into an RSL syntax tree. The caller is responsible for freeing that tree by calling [globus_rsl_free_recursive\(\)](#).

Parameters

<i>buf</i>	A NULL-terminated string that contains an RSL relation or boolean composition.
------------	--

Returns

Upon success, the [globus_rsl_parse\(\)](#) function returns the parse tree generated by processing its input. If an error occurs, [globus_rsl_parse\(\)](#) returns NULL.

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