globus rsl Reference Manual

9.1

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The Globus RSL library is provides the following functionality:

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2.1 globus rsl Modules

Here is a list of all modules:

3 globus rsl 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()** (p. 2) 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:

ast Pointer to an RSL parse tree structure.

Returns:

The **globus_rsl_is_relation()** (p. 2) 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()** (p. 3) 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:

ast Pointer to an RSL parse tree structure.

Returns:

The **globus_rsl_is_boolean()** (p. 3) 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()** (p. 3) 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:

ast Pointer to an RSL parse tree structure.

Returns:

The **globus_rsl_is_relation_eq()** (p. 3) 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()** (p. 3) 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:

ast Pointer to an RSL parse tree structure.

Returns:

The **globus_rsl_is_relation_lessthan()** (p. 3) 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()** (p. 4) 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 comparision is case-insensitive.

Parameters:

ast Pointer to an RSL parse tree structure.

attribute Name of the attribute to test

Returns:

The **globus_rsl_is_relation_attribute_equal()** (p. 4) 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()** (p. 4) 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:

ast Pointer to an RSL parse tree structure.

Returns:

The **globus_rsl_is_boolean_and()** (p. 4) 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()** (p. 4) 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:

ast Pointer to an RSL parse tree structure.

Returns:

The **globus_rsl_is_boolean_or()** (p. 4) 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()** (p. 5) 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 multie-request relation is

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

Parameters:

ast Pointer to an RSL parse tree structure.

Returns:

The **globus_rsl_is_boolean_multi()** (p. 5) 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()** (p. 5) 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:

ast Pointer to an RSL value structure.

Returns:

The **globus_rsl_value_is_literal()** (p. 5) 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()** (p. 5) function tests whether the 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:

ast Pointer to an RSL value structure.

Returns:

The **globus_rsl_value_is_sequence()** (p. 5) function returns GLOBUS_TRUE if the RSL value pointed to by *ast* is a value sequnce; 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()** (p. 6) function tests whether the 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:

ast Pointer to an RSL value structure.

Returns:

The **globus_rsl_value_is_sequence()** (p. 5) function returns GLOBUS_TRUE if the RSL value pointed to by *ast* is a value sequnce; 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()** (p. 6) function tests whether the 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:

ast Pointer to an RSL value structure.

Returns:

The **globus_rsl_value_is_concatenation()** (p. 6) 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()** (p. 6) 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:

operator The boolean RSL operator to use to join the RSL parse tree list pointed to by the *children* parameter. This value must be one of GLOBUS_RSL_AND, GLOBUS_RSL_OR, GLOBUS_RSL_MULTIREQ in order to create a valid RSL tree.

children Pointer to a list of RSL syntax trees to combine with the boolean operation described by the *operator* parameter.

Returns:

The **globus_rsl_make_boolean()** (p. 6) 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()** (p. 6) 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()** (p. 7) 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:

operator The RSL operator to use to relate the RSL attribute name pointed to by the *attributename* parameter and the values pointed to by the *value_sequence* 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.

attributename Pointer to a string naming the attribute of the new RSL relation.

value_sequence Pointer to a sequence of RSL values to use in the new RSL relation.

Returns:

The **globus_rsl_make_relation()** (p. 7) 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()** (p. 7) 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()** (p. 7) 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:

string The literal string to be used in the new value.

Returns:

The **globus_rsl_value_make_literal()** (p. 7) 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()** (p. 7) 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()** (p. 8) 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:

value_list A pointer to a list of globus_rsl_value_t pointers.

Returns:

The **globus_rsl_value_make_sequence()** (p. 8) 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()** (p. 8) 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()** (p. 8) 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:

sequence A pointer to a RSL value sequnce.

Returns:

The **globus_rsl_value_make_variable()** (p. 8) 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()** (p. 8) 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()** (p. 8) 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:

left_value A pointer to a RSL value to act as the left side of the concatenation. This must be a string literal or variable reference.

right_value 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()** (p. 8) 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()** (p. 8) 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()** (p. 9) 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:

ast_node An RSL syntax tree to copy.

Returns:

The **globus_rsl_copy_recursive()** (p. 9) 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()** (p. 9) 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()** (p. 9) 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:

globus_rsl_value_ptr A pointer to an RSL value to copy.

Returns:

The **globus_rsl_value_copy_recursive()** (p. 9) 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()** (p. 9) 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()** (p. 10) 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:

val The RSL value node to free.

Returns:

The **globus_rsl_value_free()** (p. 10) 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()** (p. 10) 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:

ast_node The RSL syntax tree node to free.

Returns:

The **globus_rsl_value_free()** (p. 10) 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()** (p. 10) 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()** (p. 10) returns.

Parameters:

globus_rsl_value_ptr An RSL value node to free.

Returns:

The **globus_rsl_value_free_recursive()** (p. 10) 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()** (p. 10) 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()** (p. 10) returns.

Parameters:

ast_node An RSL parse tree to free.

Returns:

The **globus_rsl_value_free_recursive()** (p. 10) 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()** (p. 11) 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:

value_list The RSL value list to modify by replacing its first element.

string_value The new string value to use as a literal first element of the list pointed to by the *value_list* parameter.

Returns:

Upon success, **globus_rsl_value_list_literal_replace()** (p. 11) 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()** (p. 11) 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 substitions in an RSL value node.

The **globus_rsl_value_eval()** (p. 11) 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()** (p. 10).

Parameters:

ast_node A pointer to the RSL value node to evaluate.

symbol_table A symbol table containing current definitions of the RSL substitutions which can occur in this evaluation scope.

string_value An output parameter which is set to point to the value of the string returned by evaluating the value node pointed to by *ast_node* if it evaluates to a literal value. list pointed to by the *value_list* parameter.

rsl_substitution_flag A flag indicating whether the node pointed to by the *ast_node* parameter defines RSL substition variables.

Returns:

Upon success, **globus_rsl_value_eval()** (p. 11) returns *GLOBUS_SUCCESS*, and replaces any RSL substitution values 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()** (p. 11) 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()** (p. 11) 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()** (p. 10).

Parameters:

ast_node A pointer to the RSL syntax tree to evaluate.

symbol_table A symbol table containing current definitions of the RSL substitutions which can occur in this evaluation scope.

Returns:

Upon success, **globus_rsl_eval()** (p. 11) 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()** (p. 11) 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)**
- **char * globus_rsl_value_variable_get_default (globus_rsl_value_t *variable_node)**
- **int globus_rsl_value_variable_get_size (globus_rsl_value_t *variable_node)**
- **globus_rsl_value_t * globus_rsl_value_concatenation_get_left (globus_rsl_value_t *concatenation_node)**
- **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()** (p. 12) function returns the operator that is used by the boolean RSL composition.

Parameters:

ast_node The RSL syntax tree to inspect.

Returns:

Upon success, **globus_rsl_boolean_get_operator()** (p. 12) returns one of GLOBUS_RSL_AND, GLOBUS_RSL_OR, GLOBUS_RSL_MULTIREQ. If an error occurs, **globus_rsl_boolean_get_operator()** (p. 12) 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()** (p. 13) function returns the list of RSL syntax tree nodes that is joined by a boolean composition.

Parameters:

ast_node The RSL syntax tree to inspect.

Returns:

Upon success, **globus_rsl_boolean_get_operand_list()** (p. 13) 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()** (p. 13) 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()** (p. 13) 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:

boolean_node The RSL syntax tree to inspect.

Returns:

Upon success, **globus_rsl_boolean_get_operand_list_ref()** (p. 13) returns a pointer to the list pointer in the RSL syntax tree data structure. This list can be modified to change the oprands of the boolean operation. If an error occurs, **globus_rsl_boolean_get_operand_list_ref()** (p. 13) 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()** (p. 13) 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:

ast_node The RSL relation node to inspect.

Returns:

Upon success, **globus_rsl_relation_get_attribute()** (p. 13) returns a pointer to the name of the attribute of the relation. If an error occurs, **globus_rsl_relation_get_attribute()** (p. 13) 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()** (p. 13) function returns the operation type represented by the RSL relation node pointed to by the *ast_node* parameter.

Parameters:

ast_node The RSL relation node to inspect.

Returns:

Upon success, **globus_rsl_relation_get_operator()** (p. 13) 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()** (p. 13) 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()** (p. 14) function returns the value of an RSL relation node pointed to by the *ast_node* parameter.

Parameters:

ast_node The RSL relation node to inspect.

Returns:

Upon success, **globus_rsl_relation_get_value_sequence()** (p. 14) 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()** (p. 14) 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()** (p. 14) 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:

ast_node The RSL relation node to inspect.

Returns:

Upon success, **globus_rsl_relation_get_single_value()** (p. 14) 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()** (p. 14) 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()** (p. 14) function returns the string value of an RSL literal node pointed to by the *literal_node* parameter.

Parameters:

literal_node The RSL literal node to inspect.

Returns:

Upon success, **globus_rsl_value_literal_get_string()** (p. 14) 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()** (p. 14) 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()** (p. 15) 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:

sequence_node The RSL sequence node to inspect.

Returns:

Upon success, **globus_rsl_value_sequence_get_value_list()** (p. 15) 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()** (p. 14) 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()** (p. 15) function returns the sequence value associated with the RSL variable reference pointed to by the *variable_node* parameter.

Parameters:

variable_node The RSL variable node to inspect.

Returns:

Upon success, **globus_rsl_value_variable_get_sequence()** (p. 15) 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()** (p. 15) 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()** (p. 15) function returns a pointer to the name of the RSL variable name pointed to by the *variable_node* parameter.

Parameters:

variable_node The RSL variable node to inspect.

Returns:

Upon success, **globus_rsl_value_variable_get_name()** (p. 15) 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()** (p. 15) 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()** (p. 15) 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:

variable_node The RSL variable node to inspect.

Returns:

Upon success, **globus_rsl_value_variable_get_default()** (p. 15) 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()** (p. 15) 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()** (p. 16) function returns the number of nodes in the RSL variable reference node pointed to by the *variable_node* parameter.

Parameters:

variable_node The RSL variable node to inspect.

Returns:

Upon success, **globus_rsl_value_variable_get_size()** (p. 16) 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()** (p. 16) function returns the left side of an RSL value concatenation pointed to by the *concatenation_node* parameter.

Parameters:

concatenation_node The RSL concatenation node to inspect.

Returns:

Upon success, **globus_rsl_value_concatenation_get_left()** (p. 16) 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()** (p. 16) 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()** (p. 16) function returns the right side of an RSL value concatenation pointed to by the *concatenation_node* parameter.

Parameters:

concatenation_node The RSL concatenation node to inspect.

Returns:

Upon success, **globus_rsl_value_concatenation_get_right()** (p. 16) 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()** (p. 16) 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()** (p. 17) 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:

sequence_node The RSL sequence node to inspect.

Returns:

Upon success, **globus_rsl_value_sequence_get_list_ref()** (p. 17) 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()** (p. 17) 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()** (p. 17) 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:

orig A pointer to the list to copy.

Returns:

Upon success, **globus_list_copy_reverse()** (p. 17) 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()** (p. 17) 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()** (p. 18) 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:

concatenation_node A pointer to the RSL value concatenation node to modify.

new_left_node A pointer to the new left hand side of the concatenation.

Returns:

Upon success, **globus_rsl_value_concatenation_set_left()** (p. 18) 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, **globus_rsl_value_concatenation_set_left()** (p. 18) returns -1.

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()** (p. 18) 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:

concatenation_node A pointer to the RSL value concatenation node to modify.

new_right_node A pointer to the new right hand side of the concatenation.

Returns:

Upon success, **globus_rsl_value_concatenation_set_right()** (p. 18) 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, **globus_rsl_value_concatenation_set_right()** (p. 18) returns -1.

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()** (p. 18) 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:

ast_node_list A pointer to a list of globus_rsl_value_t pointers whose values will be copied to the *value* parameter array.

required_type A flag indicating whether the list is expected to contain literal strings or string pairs. This value may be one of *GLOBUS_RSL_VALUE_LITERAL* or *GLOBUS_RSL_VALUE_SEQUENCE*.

value 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 *ast_node_list*.

value_ctr An output parameter pointing to an integer that will be incremented for each string copied into the *value* array.

Returns:

Upon success, the **globus_rsl_value_list_param_get()** (p. 18) function returns GLOBUS_SUCCESS and modifies the values pointed to by the *value* and *value_ctr* prameters as described above. If an error occurs, **globus_rsl_value_list_param_get()** (p. 18) 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()** (p. 19) 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:

ast_node A pointer to an RSL syntax tree that will be searched. This may be a relation or boolean RSL string.

param The name of the attribute to search for in the parse tree pointed to by the *ast_node* parameter.

Returns:

Upon success, the **globus_rsl_param_get_values()** (p. 19) 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()** (p. 19) 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()** (p. 19) 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:

ast_node A pointer to an RSL syntax tree that will be searched. This may be a relation or boolean RSL string.

param_type A flag indicating what type of values are expected for the RSL attribute named by the *param* parameter. This flag value may be *GLOBUS_RSL_PARAM_SINGLE_LITERAL*, *GLOBUS_RSL_PARAM_MULTI_LITERAL*, or *GLOBUS_RSL_PARAM_SEQUENCE*.

param A string pointing to the name of of the RSL attribute to search for.

values 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 *param_type* flag. The caller is responsible for freeing this array, but not the strings in the array.

Returns:

Upon success, the **globus_rsl_param_get()** (p. 19) function returns *GLOBUS_SUCCESS* and modifies the *values* parameter as described above. If an error occurs, **globus_rsl_param_get()** (p. 19) 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()** (p. 20) 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:

globus_rsl_value_ptr A pointer to the RSL value to display.

Returns:

The **globus_rsl_value_print_recursive()** (p. 20) 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()** (p. 20) 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()** (p. 20) returns a pointer to the string "??"

Parameters:

my_op The RSL operator to return.

Returns:

The **globus_rsl_get_operator()** (p. 20) 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()** (p. 20) 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:

ast_node A pointer to the RSL syntax tree to display.

Returns:

The **globus_rsl_print_recursive()** (p. 20) 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()** (p. 21) 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:

rsl_spec A pointer to the RSL syntax tree to unparse.

Returns:

Upon success, the **globus_rsl_unparse()** (p. 21) function returns a new string which represents the RSL parse tree passed as the *rsl_spec* parameter. If an error occurs, **globus_rsl_unparse()** (p. 21) 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()** (p. 21) 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:

rsl_value A pointer to the RSL value node to unparse.

Returns:

Upon success, the **globus_rsl_value_unparse()** (p. 21) function returns a new string which represents the RSL value ndoe passed as the *rsl_value* parameter. If an error occurs, **globus_rsl_value_unparse()** (p. 21) returns NULL.

3.8 RSL Helper Functions

Functions

- int **globus_rsl_assist_attributes_canonicalize (globus_rsl_t *rsl)**
- **void globus_rsl_assist_string_canonicalize (char *ptr)**

3.8.1 Detailed Description

The rsl_assist library provide a set of functions to canonicalize RSL parse trees or strings.

3.8.2 Function Documentation

3.8.2.1 int globus_rsl_assist_attributes_canonicalize (globus_rsl_t * *rsl*)

Canonicalize all attribute names in an RSL parse tree.

The **globus_rsl_assist_attributes_canonicalize()** (p. 21) function performs an in-place canonicalization of the RSL parse tree pointed to by its *rsl* parameter. All relation attribute names will be changed so that they lowercase, with all internal underscore characters removed.

Parameters:

rsl Pointer to the RSL parse tree to canonicalize.

Returns:

If **globus_rsl_assist_attributes_canonicalize()** (p. 21) is successful, it will ensure that all attribute names in the given RSL will be in canonical form and return GLOBUS_SUCCESS. If an error occurs, it will return GLOBUS_FAILURE.

Return values:

GLOBUS_SUCCESS Success

GLOBUS_FAILURE Failure

3.8.2.2 void globus_rsl_assist_string_canonicalize (char * *ptr*)

Canonicalize an attribute name.

The **globus_rsl_assist_string_canonicalize()** (p. 22) function modifies the NULL-terminated string pointed to by its *ptr* parameter so that it is in canonical form. The canonical form is all lower-case with all underscore characters removed.

Parameters:

ptr Pointer to the RSL string to modify in place.

Returns:

void

3.9 RSL Parsing

Functions

- globus_rsl_t * **globus_rsl_parse (char *buf)**

3.9.1 Function Documentation

3.9.1.1 globus_rsl_t* globus_rsl_parse (char * *buf*)

Parse an RSL string.

The **globus_rsl_parse()** (p. 22) 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()** (p. 10).

Parameters:

buf A NULL-terminated string that contains an RSL relation or boolean composition.

Returns:

Upon success, the **globus_rsl_parse()** (p. 22) function returns the parse tree generated by processing its input. If an error occurs, **globus_rsl_parse()** (p. 22) returns NULL.

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