

# globus rsl Reference Manual

## 9.1

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# Contents

<b>1</b>	<b>globus rsl Main Page</b>	<b>1</b>
<b>2</b>	<b>globus rsl Module Index</b>	<b>1</b>
<b>3</b>	<b>globus rsl Module Documentation</b>	<b>2</b>

## 1 globus rsl Main Page

The Globus RSL library is provides the following functionality:

- **RSL Predicates** (p. 2)
- **RSL Constructors** (p. 6)
- **RSL Memory Management** (p. 9)
- **RSL Accessor Functions** (p. 12)
- **RSL Value Accessors** (p. 17)
- **RSL Display** (p. 20)
- **RSL Parsing** (p. 22)
- **List Functions** (p. 17)

## 2 globus rsl Module Index

### 2.1 globus rsl Modules

Here is a list of all modules:

<b>RSL Predicates</b>	<b>2</b>
<b>RSL Constructors</b>	<b>6</b>
<b>RSL Memory Management</b>	<b>9</b>
<b>RSL Accessor Functions</b>	<b>12</b>
<b>List Functions</b>	<b>17</b>
<b>RSL Value Accessors</b>	<b>17</b>
<b>RSL Display</b>	<b>20</b>
<b>RSL Helper Functions</b>	<b>21</b>
<b>RSL Parsing</b>	<b>22</b>

## 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\_less than (globus\_rsl\_t \* *ast*)

RSL less than operation test.

The **globus\_rsl\_is\_relation\_less than()** (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 multi-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 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()** (p. 6) 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:

*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 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()** (p. 6) 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:

*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 sequence.

##### **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\_rsl\_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 substitutions 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 substitution 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 operands 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* parameters 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 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 node 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 lower-case, 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.

## Index

- globus\_list
  - globus\_list\_copy\_reverse, 17
- globus\_list\_copy\_reverse
  - globus\_list, 17
- globus\_rsl\_accessor
  - globus\_rsl\_boolean\_get\_operand\_list, 12
  - globus\_rsl\_boolean\_get\_operand\_list\_ref, 13
  - globus\_rsl\_boolean\_get\_operator, 12
  - globus\_rsl\_relation\_get\_attribute, 13
  - globus\_rsl\_relation\_get\_operator, 13
  - globus\_rsl\_relation\_get\_single\_value, 14
  - globus\_rsl\_relation\_get\_value\_sequence, 14
  - globus\_rsl\_value\_concatenation\_get\_left, 16
  - globus\_rsl\_value\_concatenation\_get\_right, 16
  - globus\_rsl\_value\_literal\_get\_string, 14
  - globus\_rsl\_value\_sequence\_get\_list\_ref, 17
  - globus\_rsl\_value\_sequence\_get\_value\_list, 14
  - globus\_rsl\_value\_variable\_get\_default, 15
  - globus\_rsl\_value\_variable\_get\_name, 15
  - globus\_rsl\_value\_variable\_get\_sequence, 15
  - globus\_rsl\_value\_variable\_get\_size, 16
- globus\_rsl\_assist
  - globus\_rsl\_assist\_attributes\_canonicalize, 21
  - globus\_rsl\_assist\_string\_canonicalize, 22
- globus\_rsl\_assist\_attributes\_canonicalize
  - globus\_rsl\_assist, 21
- globus\_rsl\_assist\_string\_canonicalize
  - globus\_rsl\_assist, 22
- globus\_rsl\_boolean\_get\_operand\_list
  - globus\_rsl\_accessor, 12
- globus\_rsl\_boolean\_get\_operand\_list\_ref
  - globus\_rsl\_accessor, 13
- globus\_rsl\_boolean\_get\_operator
  - globus\_rsl\_accessor, 12
- globus\_rsl\_constructors
  - globus\_rsl\_make\_boolean, 6
  - globus\_rsl\_make\_relation, 7
  - globus\_rsl\_value\_make\_concatenation, 8
  - globus\_rsl\_value\_make\_literal, 7
  - globus\_rsl\_value\_make\_sequence, 7
  - globus\_rsl\_value\_make\_variable, 8
- globus\_rsl\_copy\_recursive
  - globus\_rsl\_memory, 9
- globus\_rsl\_eval
  - globus\_rsl\_memory, 11
- globus\_rsl\_free
  - globus\_rsl\_memory, 10
- globus\_rsl\_free\_recursive
  - globus\_rsl\_memory, 10
- globus\_rsl\_get\_operator
  - globus\_rsl\_print, 20
- globus\_rsl\_is\_boolean
  - globus\_rsl\_predicates, 2
- globus\_rsl\_is\_boolean\_and
  - globus\_rsl\_predicates, 4
- globus\_rsl\_is\_boolean\_multi
  - globus\_rsl\_predicates, 4
- globus\_rsl\_is\_boolean\_or
  - globus\_rsl\_predicates, 4
- globus\_rsl\_is\_relation
  - globus\_rsl\_predicates, 2
- globus\_rsl\_is\_relation\_attribute\_equal
  - globus\_rsl\_predicates, 3
- globus\_rsl\_is\_relation\_eq
  - globus\_rsl\_predicates, 3
- globus\_rsl\_is\_relation\_lessthan
  - globus\_rsl\_predicates, 3
- globus\_rsl\_make\_boolean
  - globus\_rsl\_constructors, 6
- globus\_rsl\_make\_relation
  - globus\_rsl\_constructors, 7
- globus\_rsl\_memory
  - globus\_rsl\_copy\_recursive, 9
  - globus\_rsl\_eval, 11
  - globus\_rsl\_free, 10
  - globus\_rsl\_free\_recursive, 10
  - globus\_rsl\_value\_copy\_recursive, 9
  - globus\_rsl\_value\_eval, 11
  - globus\_rsl\_value\_free, 9
  - globus\_rsl\_value\_free\_recursive, 10
  - globus\_rsl\_value\_list\_literal\_replace, 10
- globus\_rsl\_param
  - globus\_rsl\_param\_get, 19
  - globus\_rsl\_param\_get\_values, 19
  - globus\_rsl\_value\_concatenation\_set\_left, 18
  - globus\_rsl\_value\_concatenation\_set\_right, 18
  - globus\_rsl\_value\_list\_param\_get, 18
- globus\_rsl\_param\_get
  - globus\_rsl\_param, 19
- globus\_rsl\_param\_get\_values
  - globus\_rsl\_param, 19
- globus\_rsl\_parse
  - globus\_rsl\_parse, 22
- globus\_rsl\_predicates
  - globus\_rsl\_is\_boolean, 2
  - globus\_rsl\_is\_boolean\_and, 4
  - globus\_rsl\_is\_boolean\_multi, 4
  - globus\_rsl\_is\_boolean\_or, 4
  - globus\_rsl\_is\_relation, 2
  - globus\_rsl\_is\_relation\_attribute\_equal, 3
  - globus\_rsl\_is\_relation\_eq, 3
  - globus\_rsl\_is\_relation\_lessthan, 3
  - globus\_rsl\_value\_is\_concatenation, 6
  - globus\_rsl\_value\_is\_literal, 5
  - globus\_rsl\_value\_is\_sequence, 5
  - globus\_rsl\_value\_is\_variable, 5



- globus\_rsl\_print
  - globus\_rsl\_get\_operator, 20
  - globus\_rsl\_print\_recursive, 20
  - globus\_rsl\_unparse, 20
  - globus\_rsl\_value\_print\_recursive, 20
  - globus\_rsl\_value\_unparse, 21
- globus\_rsl\_print\_recursive
  - globus\_rsl\_print, 20
- globus\_rsl\_relation\_get\_attribute
  - globus\_rsl\_accessor, 13
- globus\_rsl\_relation\_get\_operator
  - globus\_rsl\_accessor, 13
- globus\_rsl\_relation\_get\_single\_value
  - globus\_rsl\_accessor, 14
- globus\_rsl\_relation\_get\_value\_sequence
  - globus\_rsl\_accessor, 14
- globus\_rsl\_unparse
  - globus\_rsl\_print, 20
- globus\_rsl\_value\_concatenation\_get\_left
  - globus\_rsl\_accessor, 16
- globus\_rsl\_value\_concatenation\_get\_right
  - globus\_rsl\_accessor, 16
- globus\_rsl\_value\_concatenation\_set\_left
  - globus\_rsl\_param, 18
- globus\_rsl\_value\_concatenation\_set\_right
  - globus\_rsl\_param, 18
- globus\_rsl\_value\_copy\_recursive
  - globus\_rsl\_memory, 9
- globus\_rsl\_value\_eval
  - globus\_rsl\_memory, 11
- globus\_rsl\_value\_free
  - globus\_rsl\_memory, 9
- globus\_rsl\_value\_free\_recursive
  - globus\_rsl\_memory, 10
- globus\_rsl\_value\_is\_concatenation
  - globus\_rsl\_predicates, 6
- globus\_rsl\_value\_is\_literal
  - globus\_rsl\_predicates, 5
- globus\_rsl\_value\_is\_sequence
  - globus\_rsl\_predicates, 5
- globus\_rsl\_value\_is\_variable
  - globus\_rsl\_predicates, 5
- globus\_rsl\_value\_list\_literal\_replace
  - globus\_rsl\_memory, 10
- globus\_rsl\_value\_list\_param\_get
  - globus\_rsl\_param, 18
- globus\_rsl\_value\_literal\_get\_string
  - globus\_rsl\_accessor, 14
- globus\_rsl\_value\_make\_concatenation
  - globus\_rsl\_constructors, 8
- globus\_rsl\_value\_make\_literal
  - globus\_rsl\_constructors, 7
- globus\_rsl\_value\_make\_sequence
  - globus\_rsl\_constructors, 7
- globus\_rsl\_value\_make\_variable
  - globus\_rsl\_constructors, 8

- globus\_rsl\_value\_print\_recursive
  - globus\_rsl\_print, 20
- globus\_rsl\_value\_sequence\_get\_list\_ref
  - globus\_rsl\_accessor, 17
- globus\_rsl\_value\_sequence\_get\_value\_list
  - globus\_rsl\_accessor, 14
- globus\_rsl\_value\_unparse
  - globus\_rsl\_print, 21
- globus\_rsl\_value\_variable\_get\_default
  - globus\_rsl\_accessor, 15
- globus\_rsl\_value\_variable\_get\_name
  - globus\_rsl\_accessor, 15
- globus\_rsl\_value\_variable\_get\_sequence
  - globus\_rsl\_accessor, 15
- globus\_rsl\_value\_variable\_get\_size
  - globus\_rsl\_accessor, 16

List Functions, 17

RSL Accessor Functions, 12

RSL Constructors, 6

RSL Display, 20

RSL Helper Functions, 21

RSL Memory Management, 9

RSL Parsing, 22

RSL Predicates, 1

RSL Value Accessors, 17