

# globus rsl

## 9.1

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## 1 Main Page

The Globus RSL library is provides the following functionality:

- **RSL Predicates** (p. 2)
- **RSL Constructors** (p. 7)
- **RSL Memory Management** (p. 9)
- **RSL Accessor Functions** (p. 13)
- **RSL Value Accessors** (p. 19)
- **RSL Display** (p. 21)

- **RSL Parsing** (p. 24)
- **List Functions** (p. 18)

## 2 Module Index

### 2.1 Modules

Here is a list of all modules:

<b>RSL Predicates</b>	<b>2</b>
<b>RSL Constructors</b>	<b>7</b>
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## 3 Module Documentation

### 3.1 RSL Predicates

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

#### Functions

- int **globus\_rsl\_is\_relation** (globus\_rsl\_t \*ast)
- int **globus\_rsl\_is\_boolean** (globus\_rsl\_t \*ast)
- int **globus\_rsl\_is\_relation\_eq** (globus\_rsl\_t \*ast)
- int **globus\_rsl\_is\_relation\_lessthan** (globus\_rsl\_t \*ast)
- int **globus\_rsl\_is\_relation\_attribute\_equal** (globus\_rsl\_t \*ast, char \*attribute)
- int **globus\_rsl\_is\_boolean\_and** (globus\_rsl\_t \*ast)
- int **globus\_rsl\_is\_boolean\_or** (globus\_rsl\_t \*ast)
- int **globus\_rsl\_is\_boolean\_multi** (globus\_rsl\_t \*ast)
- int **globus\_rsl\_value\_is\_literal** (globus\_rsl\_value\_t \*ast)
- int **globus\_rsl\_value\_is\_sequence** (globus\_rsl\_value\_t \*ast)
- int **globus\_rsl\_value\_is\_variable** (globus\_rsl\_value\_t \*ast)
- int **globus\_rsl\_value\_is\_concatenation** (globus\_rsl\_value\_t \*ast)

#### 3.1.1 Detailed Description

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

### 3.1.2 Function Documentation

#### 3.1.2.1 `int globus_rsl_is_relation (globus_rsl_t * ast)`

RSL relation test. The **globus\_rsl\_is\_relation()** (p. 3) 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. 3) 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. 4) 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. 4) 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. 4) 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. 4) 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 comparison 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. 5) 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. 5) 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. 5) 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. 5) 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. 6) 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. 6) 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. 6) 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. 6) 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 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. 6) 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. 7) 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. 7) 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. 7) 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. 7) 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. 7) 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. 8) 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. 8) 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. 8) 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. 8) 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. 8) 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. 8) 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. 9) 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. 9) 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. 9) 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. 9) 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. 9) 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. 9) 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. 10) 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. 10) 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. 10) 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. 10) 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. 10) 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. 10) 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. 11) 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. 11) 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. 11) returns.

##### Parameters:

*globus\_rsl\_value\_ptr* An RSL value node to free.

##### Returns:

The **globus\_rsl\_value\_free\_recursive()** (p. 11) 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. 11) 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. 11) returns.

##### Parameters:

*ast\_node* An RSL parse tree to free.

##### Returns:

The **globus\_rsl\_value\_free\_recursive()** (p. 11) 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 substitutions in an RSL value node. The **globus\_rsl\_value\_eval()** (p. 12) 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. 11).

**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. 12) 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. 12) 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. 12) 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. 11).

**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. 12) 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. 12) 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. 13) 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. 13) returns one of *GLOBUS\_RSL\_AND*, *GLOBUS\_RSL\_OR*, *GLOBUS\_RSL\_MULTIREQ*. If an error occurs, **globus\_rsl\_boolean\_get\_operator()** (p. 13) 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. 14) 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. 14) 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. 14) 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. 14) 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. 14) 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. 14) 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. 14) 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. 14) returns a pointer to the name of the attribute of the relation. If an error occurs, **globus\_rsl\_relation\_get\_attribute()** (p. 14) 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. 14) 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. 14) 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. 14) 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. 15) 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. 15) 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. 15) 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. 15) 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. 15) 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. 15) 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. 15) 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. 15) 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. 15) 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. 16) 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. 16) 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. 15) 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. 16) 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. 16) 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. 16) 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. 16) 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. 16) 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. 16) 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. 17) 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. 17) 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. 17) 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. 17) 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. 17) 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. 17) 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. 17) 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. 17) 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. 18) 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. 18) 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. 18) 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. 18) 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. 18) 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. 18) 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. 18) 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. 18) 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. 18) 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. 19) 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. 19) 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. 19) 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. 19) 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. 19) 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. 19) 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. 20) 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. 20) 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. 20) 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. 20) 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. 20) 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. 20) 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. 21) 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. 21) function returns *GLOBUS\_SUCCESS* and modifies the *values* parameter as described above. If an error occurs, **globus\_rsl\_param\_get()** (p. 21) 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. 21) 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. 21) 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. 22) 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. 22) returns a pointer to the string "??"

#### Parameters:

*my\_op* The RSL operator to return.

#### Returns:

The **globus\_rsl\_get\_operator()** (p. 22) 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. 22) 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. 22) 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. 22) 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. 22) 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. 22) 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. 22) 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. 22) 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. 22) 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. 23) 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. 23) 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. 23) 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. 24) 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. 11).

**Parameters:**

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

**Returns:**

Upon success, the **globus\_rsl\_parse()** (p. 24) function returns the parse tree generated by processing its input. If an error occurs, **globus\_rsl\_parse()** (p. 24) returns NULL.

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