

Reference Manual

Generated by Doxygen 1.6.3

Sun Dec 12 20:39:43 2010

Contents

1	TinkerCell C API	1
2	Module Index	3
2.1	Modules	3
3	Class Index	5
3.1	Class List	5
4	Module Documentation	7
4.1	Basic operations	7
4.1.1	Detailed Description	9
4.1.2	Function Documentation	9
4.1.2.1	tc_appendColumns	9
4.1.2.2	tc_appendRows	9
4.1.2.3	tc_createItemsArray	9
4.1.2.4	tc_createMatrix	9
4.1.2.5	tc_createStringsArray	10
4.1.2.6	tc_createTable	10
4.1.2.7	tc_deleteItemsArray	10
4.1.2.8	tc_deleteMatrix	10
4.1.2.9	tc_deleteStringsArray	11
4.1.2.10	tc_deleteTable	11
4.1.2.11	tc_getColumnName	11
4.1.2.12	tc_getItem	11
4.1.2.13	tc_getMatrixValue	11
4.1.2.14	tc_getRowName	12
4.1.2.15	tc_getString	12
4.1.2.16	tc_getTableValue	12
4.1.2.17	tc_printMatrixToFile	12

4.1.2.18	tc_printOutMatrix	13
4.1.2.19	tc_printOutTable	13
4.1.2.20	tc_printTableToFile	13
4.1.2.21	tc_setColumnName	13
4.1.2.22	tc_setItem	13
4.1.2.23	tc_setMatrixValue	14
4.1.2.24	tc_setRowName	14
4.1.2.25	tc_setString	14
4.1.2.26	tc_setTableValue	14
4.2	Appearance	15
4.2.1	Detailed Description	16
4.2.2	Function Documentation	16
4.2.2.1	tc_changeArrowHead	16
4.2.2.2	tc_changeNodeImage	16
4.2.2.3	tc_getAngle	16
4.2.2.4	tc_getColor	16
4.2.2.5	tc_getHeight	17
4.2.2.6	tc_getPos	17
4.2.2.7	tc_getWidth	17
4.2.2.8	tc_getX	17
4.2.2.9	tc_getY	18
4.2.2.10	tc_moveSelected	18
4.2.2.11	tc_setAngle	18
4.2.2.12	tc_setColor	18
4.2.2.13	tc_setPos	18
4.2.2.14	tc_setPosMulti	19
4.2.2.15	tc_setSize	19
4.3	Get items	20
4.3.1	Detailed Description	21
4.3.2	Function Documentation	21
4.3.2.1	tc_alignParts	21
4.3.2.2	tc_allItems	21
4.3.2.3	tc_find	21
4.3.2.4	tc_findItems	22
4.3.2.5	tc_getChildren	22
4.3.2.6	tc_getName	22

4.3.2.7	tc_getNames	22
4.3.2.8	tc_getParent	23
4.3.2.9	tc_getUniqueName	23
4.3.2.10	tc_getUniqueNames	23
4.3.2.11	tc_itemsOfFamily	23
4.3.2.12	tc_itemsOfFamilyFrom	24
4.3.2.13	tc_partsDownstream	24
4.3.2.14	tc_partsIn	24
4.3.2.15	tc_partsUpstream	24
4.3.2.16	tc_rename	24
4.3.2.17	tc_select	25
4.3.2.18	tc_selectedItems	25
4.4	Annotations	26
4.4.1	Detailed Description	26
4.4.2	Function Documentation	26
4.4.2.1	tc_getAnnotation	26
4.4.2.2	tc_getFamily	27
4.4.2.3	tc_getName	27
4.4.2.4	tc_getNames	27
4.4.2.5	tc_getUniqueName	27
4.4.2.6	tc_getUniqueNames	27
4.4.2.7	tc_isA	28
4.4.2.8	tc_rename	28
4.4.2.9	tc_setAnnotation	28
4.5	Input and Output	29
4.5.1	Detailed Description	31
4.5.2	Function Documentation	31
4.5.2.1	tc_addInputWindowCheckbox	31
4.5.2.2	tc_addInputWindowOptions	31
4.5.2.3	tc_askQuestion	31
4.5.2.4	tc_clear	31
4.5.2.5	tc_createInputWindow	31
4.5.2.6	tc_createInputWindowFromFile	32
4.5.2.7	tc_createSliders	32
4.5.2.8	tc_displayNumber	32
4.5.2.9	tc_displayText	32

4.5.2.10	tc_errorReport	33
4.5.2.11	tc_getFilename	33
4.5.2.12	tc_getNumber	33
4.5.2.13	tc_getNumbers	33
4.5.2.14	tc_getStringFromList	33
4.5.2.15	tc_highlight	34
4.5.2.16	tc_messageDialog	34
4.5.2.17	tc_openFile	34
4.5.2.18	tc_openNewWindow	34
4.5.2.19	tc_print	35
4.5.2.20	tc_printFile	35
4.5.2.21	tc_printMatrix	35
4.5.2.22	tc_saveToFile	35
4.5.2.23	tc_screenHeight	35
4.5.2.24	tc_screenshot	36
4.5.2.25	tc_screenWidth	36
4.5.2.26	tc_screenX	36
4.5.2.27	tc_screenY	36
4.5.2.28	tc_setDisplayLabelColor	36
4.5.2.29	tc_zoom	36
4.6	System information	37
4.6.1	Detailed Description	37
4.6.2	Function Documentation	37
4.6.2.1	tc_appDir	37
4.6.2.2	tc_homeDir	37
4.6.2.3	tc_isLinux	38
4.6.2.4	tc_isMac	38
4.6.2.5	tc_isWindows	38
4.7	Network data	39
4.7.1	Detailed Description	39
4.7.2	Function Documentation	39
4.7.2.1	tc_getAllTextNamed	39
4.7.2.2	tc_getNumericalData	40
4.7.2.3	tc_getNumericalDataNames	40
4.7.2.4	tc_getTextAttribute	40
4.7.2.5	tc_getTextData	40

4.7.2.6	tc_getTextDataNames	41
4.7.2.7	tc_setNumericalData	41
4.7.2.8	tc_setTextAttribute	41
4.7.2.9	tc_setTextData	41
4.8	Graphing	42
4.8.1	Detailed Description	42
4.8.2	Function Documentation	42
4.8.2.1	tc_errorBars	42
4.8.2.2	tc_getPlotData	43
4.8.2.3	tc_gnuplot	43
4.8.2.4	tc_hist	43
4.8.2.5	tc_multiplot	43
4.8.2.6	tc_plot	43
4.8.2.7	tc_savePlot	44
4.8.2.8	tc_scatterplot	44
4.8.2.9	tc_surface	44
4.9	Modeling	45
4.9.1	Detailed Description	46
4.9.2	Function Documentation	46
4.9.2.1	tc_addEvent	46
4.9.2.2	tc_addForcingFunction	47
4.9.2.3	tc_getEventResponses	47
4.9.2.4	tc_getEventTriggers	47
4.9.2.5	tc_getFixedVariables	47
4.9.2.6	tc_getForcingFunctionAssignments	47
4.9.2.7	tc_getForcingFunctionNames	48
4.9.2.8	tc_getInitialValues	48
4.9.2.9	tc_getParameter	48
4.9.2.10	tc_getParameters	48
4.9.2.11	tc_getParametersAndFixedVariables	49
4.9.2.12	tc_getParametersExcept	49
4.9.2.13	tc_getParametersNamed	49
4.9.2.14	tc_getRate	49
4.9.2.15	tc_getRates	50
4.9.2.16	tc_getStoichiometry	50
4.9.2.17	tc_getStoichiometryFor	50

4.9.2.18	tc_setInitialValues	50
4.9.2.19	tc_setParameter	50
4.9.2.20	tc_setRate	51
4.9.2.21	tc_setRates	51
4.9.2.22	tc_setStoichiometry	51
4.9.2.23	tc_setStoichiometryFor	51
4.9.2.24	tc_writeModel	51
4.10	Connections	52
4.10.1	Detailed Description	53
4.10.2	Function Documentation	53
4.10.2.1	tc_getCenterPointX	53
4.10.2.2	tc_getCenterPointY	53
4.10.2.3	tc_getConnectedNodes	53
4.10.2.4	tc_getConnectedNodesWithRole	53
4.10.2.5	tc_getConnections	54
4.10.2.6	tc_getConnectionsWithRole	54
4.10.2.7	tc_getControlPointX	54
4.10.2.8	tc_getControlPointY	55
4.10.2.9	tc_insertConnection	55
4.10.2.10	tc_setAllStraight	55
4.10.2.11	tc_setCenterPoint	55
4.10.2.12	tc_setControlPoint	56
4.10.2.13	tc_setLineWidth	56
4.10.2.14	tc_setStraight	56
4.11	Import/Export	57
4.11.1	Detailed Description	57
4.11.2	Function Documentation	57
4.11.2.1	tc_CopasiModel	57
4.11.2.2	tc_exportSBML	57
4.11.2.3	tc_importSBML	57
4.12	copasi	58
5	Class Documentation	59
5.1	copasi_compartment Struct Reference	59
5.1.1	Detailed Description	59
5.2	copasi_model Struct Reference	60
5.2.1	Detailed Description	60

5.3	copasi_reaction Struct Reference	61
5.3.1	Detailed Description	61
5.4	tc_items Struct Reference	62
5.4.1	Detailed Description	62
5.5	tc_matrix Struct Reference	63
5.5.1	Detailed Description	63
5.6	tc_strings Struct Reference	64
5.6.1	Detailed Description	64
5.7	tc_table Struct Reference	65
5.7.1	Detailed Description	65

Chapter 1

TinkerCell C API

The TinkerCell C API is a collection of functions that allow C programs to directly interact with TinkerCell's visual interface. SWIG is used to extend this API to other languages, such as Python, Perl, R, etc. The functions provided in this API are converted to Signals, which are much slower than function calls. But they can be used to communicate between threads, which is the main reason why they are used in TinkerCell. The API uses **six main data structures**:

item: just a reference to a TinkerCell object. Items are represented as integers in Python and Octave and as long ints in C.

string: a string of characters used. Represented as const char* in C.

tc_items array of items

```
tc_items A = tc_allItems()
A.length
tc_getItem(A,3)

long x = tc_find("x")
tc_setItem(A,3,x)
tc_items A2 = tc_createItemsArray(10) //array of length 10
```

tc_strings: array of strings

```
tc_items A = tc_allItems()
tc_strings S = tc_getNames( A )
S.length
tc_getString(S,3)
tc_setString(S,3,"hello")
tc_strings S2 = tc_createStringsArray(10) //array of length 10
```

tc_matrix: Two dimensional array of reals with row and column names. The rownames and colnames fields are **tc_strings** objects

```
long x = tc_find("x")
tc_matrix M = tc_getNumericalData( x, "Parameters" )
int r = M.rows
int c = M.cols
tc_getColumnName(M,2)
tc_setColumnName(M,2,"col2")
tc_getRowName(M,1)
tc_setRowName(M,1,"row1")
tc_getMatrixValue(M,2,3)
tc_setMatrixValue(M,2,3,0.5)

tc_matrix M2 = tc_createMatrix(5,4)
```

tc_table: Two dimensional array of Strings with row and column names. The rownames and colnames fields are [tc_strings](#) objects

```
long x = tc_find("x")
tc_table S = tc_getTextData( x, "Text Attributes" )
S.rows
S.cols
tc_getString( S.rownames, 1)
tc_getString( S.colnames, 2)
tc_getTableValue(S,2,3)
tc_setTableValue(S,2,3,"hello")
tc_table S2 = tc_createTable(4,5)
```

Chapter 2

Module Index

2.1 Modules

Here is a list of all modules:

Basic operations	7
Appearance	15
Get items	20
Annotations	26
Input and Output	29
System information	37
Network data	39
Graphing	42
Modeling	45
Connections	52
Import/Export	57
copasi	58

Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

copasi_compartment (This struct is used to contain a pointer to an instance of a COPASI class) .	59
copasi_model (This struct is used to contain a pointer to an instance of a COPASI class)	60
copasi_reaction (This struct is used to contain a pointer to an instance of a COPASI class) . . .	61
tc_items (An array of int objects with length information. Use tc_getItem(M,i) to get the i-th item)	62
tc_matrix (A 2D table of doubles with row and column names. Use tc_getMatrixValue(M,i,j) to get the i,j-th value in tc_matrix M)	63
tc_strings (An array of strings with length information. Use tc_getString(M,i) to get the i-th string)	64
tc_table (A 2D table of strings with row and column names. Use tc_getTableValue(M,i,j) to get the i,j-th value in tc_matrix M)	65

Chapter 4

Module Documentation

4.1 Basic operations

basic functions for getting and setting matrices, arrays, tables, etc.

Functions

- TCAPIEXPORT `tc_matrix tc_createMatrix` (int rows, int cols)
Create a matrix with the given rows and columns.
- TCAPIEXPORT `tc_table tc_createTable` (int rows, int cols)
Create a strings table with the given rows and columns.
- TCAPIEXPORT `tc_strings tc_createStringsArray` (int len)
Create an array of strings.
- TCAPIEXPORT `tc_items tc_createItemsArray` (int len)
Create an array of items.
- TCAPIEXPORT double `tc_getMatrixValue` (`tc_matrix` M, int i, int j)
get i,jth value from a `tc_matrix`
- TCAPIEXPORT void `tc_setMatrixValue` (`tc_matrix` M, int i, int j, double d)
set i,jth value of a `tc_matrix`
- TCAPIEXPORT const char * `tc_getRowName` (`tc_matrix` M, int i)
get ith row name from a `tc_matrix`
- TCAPIEXPORT void `tc_setRowName` (`tc_matrix` M, int i, const char *s)
set ith row name for a `tc_matrix`
- TCAPIEXPORT const char * `tc_getColumnName` (`tc_matrix` M, int j)
get jth column name of a `tc_matrix`
- TCAPIEXPORT void `tc_setColumnName` (`tc_matrix` M, int j, const char *s)

set jth column name of a `tc_matrix`

- TCAPIEXPORT const char * `tc_getTableValue` (`tc_table` S, int i, int j)
get i,j-th string in a table
- TCAPIEXPORT void `tc_setTableValue` (`tc_table` S, int i, int j, const char *s)
set i,jth string in a table
- TCAPIEXPORT const char * `tc_getString` (`tc_strings` S, int i)
get ith string in array of strings
- TCAPIEXPORT void `tc_setString` (`tc_strings` S, int i, const char *c)
set ith string in array of strings
- TCAPIEXPORT long `tc_getItem` (`tc_items` A, int i)
get ith long item in array of items
- TCAPIEXPORT void `tc_setItem` (`tc_items` A, int i, long o)
set ith long item in array of items
- TCAPIEXPORT void `tc_deleteMatrix` (`tc_matrix` M)
delete a matrix
- TCAPIEXPORT void `tc_deleteTable` (`tc_table` M)
delete a strings table
- TCAPIEXPORT void `tc_deleteItemsArray` (`tc_items` A)
delete an array of items
- TCAPIEXPORT void `tc_deleteStringsArray` (`tc_strings` C)
delete an array of strings
- TCAPIEXPORT `tc_matrix` `tc_appendColumns` (`tc_matrix` A, `tc_matrix` B)
combine two matrices by appending their columns. row size must be equal for both matrices
- TCAPIEXPORT `tc_matrix` `tc_appendRows` (`tc_matrix` A, `tc_matrix` B)
combine two matrices by appending their row. column sizes must be equal for both matrices
- TCAPIEXPORT void `tc_printMatrixToFile` (const char *file, `tc_matrix` M)
print a matrix to file
- TCAPIEXPORT void `tc_printOutMatrix` (`tc_matrix` M)
print a matrix to stdout
- TCAPIEXPORT void `tc_printTableToFile` (const char *file, `tc_table` M)
print a table to file
- TCAPIEXPORT void `tc_printOutTable` (`tc_table` M)
print a table to stdout

4.1.1 Detailed Description

basic functions for getting and setting matrices, arrays, tables, etc.

4.1.2 Function Documentation

4.1.2.1 TCAPIEXPORT tc_matrix tc_appendColumns (tc_matrix *A*, tc_matrix *B*)

combine two matrices by appending their columns. row size must be equal for both matrices

Parameters

tc_matrix first matrix

tc_matrix fsecond matrix

Returns

tc_matrix new combined matrix

4.1.2.2 TCAPIEXPORT tc_matrix tc_appendRows (tc_matrix *A*, tc_matrix *B*)

combine two matrices by appending their row. column sizes must be equal for both matrices

Parameters

tc_matrix first matrix

tc_matrix fsecond matrix

Returns

tc_matrix new combined matrix

4.1.2.3 TCAPIEXPORT tc_items tc_createItemsArray (int *len*)

Create an array of items.

Parameters

int number of items

Returns

tc_items

4.1.2.4 TCAPIEXPORT tc_matrix tc_createMatrix (int *rows*, int *cols*)

Create a matrix with the given rows and columns.

Parameters

int number of rows

int number of columns

Returns

[tc_matrix](#)

4.1.2.5 TCAPIEXPORT tc_strings tc_createStringsArray (int *len*)

Create an array of strings.

Parameters

int length

Returns

[tc_strings](#)

4.1.2.6 TCAPIEXPORT tc_table tc_createTable (int *rows*, int *cols*)

Create a strings table with the given rows and columns.

Parameters

int number of rows

int number of columns

Returns

[tc_table](#)

4.1.2.7 TCAPIEXPORT void tc_deleteItemsArray (tc_items *A*)

delete an array of items

Parameters

&tc_items pointer to array

4.1.2.8 TCAPIEXPORT void tc_deleteMatrix (tc_matrix *M*)

delete a matrix

Parameters

&tc_matrix pointer to matrix

4.1.2.9 TCAPIEXPORT void tc_deleteStringsArray (tc_strings C)

delete an array of strings

Parameters

&tc_strings pointer to array

4.1.2.10 TCAPIEXPORT void tc_deleteTable (tc_table M)

delete a strings table

Parameters

&tc_table pointer to table

4.1.2.11 TCAPIEXPORT const char* tc_getColumnName (tc_matrix M, int j)

get jth column name of a [tc_matrix](#)

Parameters

[tc_matrix](#) matrix

int column

Returns

string column name

4.1.2.12 TCAPIEXPORT long tc_getItem (tc_items A, int i)

get ith long item in array of items

Parameters

[tc_items](#) array

int index

Returns

long value

4.1.2.13 TCAPIEXPORT double tc_getMatrixValue (tc_matrix M, int i, int j)

get i,jth value from a [tc_matrix](#)

Parameters

[tc_matrix](#) matrix

int row

int column

Returns

double value at the given row, column

4.1.2.14 TCAPIEXPORT const char* tc_getRowName (tc_matrix *M*, int *i*)

get ith row name from a [tc_matrix](#)

Parameters

[tc_matrix](#) matrix

int row

Returns

string row name

4.1.2.15 TCAPIEXPORT const char* tc_getString (tc_strings *S*, int *i*)

get ith string in array of strings

Parameters

[tc_strings](#) array

int index

Returns

string value

4.1.2.16 TCAPIEXPORT const char* tc_getTableValue (tc_table *S*, int *i*, int *j*)

get i,j-th string in a table

Parameters

[tc_table](#) table

int row

int column

Returns

string value at row,column

4.1.2.17 TCAPIEXPORT void tc_printMatrixToFile (const char **file*, tc_matrix *M*)

print a matrix to file

Parameters

*char** file name

[tc_matrix](#)

4.1.2.18 TCAPIEXPORT void tc_printOutMatrix (tc_matrix *M*)

print a matrix to stdout

Parameters

*char** file name

tc_matrix

4.1.2.19 TCAPIEXPORT void tc_printOutTable (tc_table *M*)

print a table to stdout

Parameters

tc_table

4.1.2.20 TCAPIEXPORT void tc_printTableToFile (const char **file*, tc_table *M*)

print a table to file

Parameters

*char** file name

tc_table

4.1.2.21 TCAPIEXPORT void tc_setColumnName (tc_matrix *M*, int *j*, const char **s*)

set *j*th column name of a *tc_matrix*

Parameters

tc_matrix matrix

int column

string column name

4.1.2.22 TCAPIEXPORT void tc_setItem (tc_items *A*, int *i*, long *o*)

set *i*th long item in array of items

Parameters

tc_items array

int index

long value

4.1.2.23 TCAPIEXPORT void tc_setMatrixValue (tc_matrix *M*, int *i*, int *j*, double *d*)

set i,jth value of a [tc_matrix](#)

Parameters

[tc_matrix](#) matrix
int row
int column
double value at the given row, column

4.1.2.24 TCAPIEXPORT void tc_setRowName (tc_matrix *M*, int *i*, const char * *s*)

set ith row name for a [tc_matrix](#)

Parameters

[tc_matrix](#) matrix
int row
string row name

4.1.2.25 TCAPIEXPORT void tc_setString (tc_strings *S*, int *i*, const char * *c*)

set ith string in array of strings

Parameters

[tc_strings](#) array
int index
string value

4.1.2.26 TCAPIEXPORT void tc_setTableValue (tc_table *S*, int *i*, int *j*, const char * *s*)

set i,jth string in a table

Parameters

[tc_table](#) table
int row
int column
string value at row,column

4.2 Appearance

get/set position, color, size, etc

Functions

- double `tc_getY` (long item)
get the x location of an item
- double `tc_getX` (long item)
get the y location of an item
- `tc_matrix tc_getPos` (`tc_items` items)
get the y location of a list item. Output is a N x 2 matrix
- void `tc_setPos` (long item, double x, double y)
set the x and y location of an item
- void `tc_setPosMulti` (`tc_items` items, `tc_matrix` positions)
set the x and y location of a list of N items. Input a matrix of positions, with N rows and 2 columns (x,y)
- void `tc_moveSelected` (double dx, double dy)
move all the selected items by a given amount
- void `tc_setSize` (long item, double width, double height, int permanent)
Change the size of an item.
- double `tc_getWidth` (long item)
get the width of an item
- double `tc_getHeight` (long item)
get the width of an item
- void `tc_setAngle` (long item, double t, int permanent)
get the width of an item
- double `tc_getAngle` (long item)
get the angle of an item
- const char * `tc_getColor` (long item)
get the color of the item
- void `tc_setColor` (long item, const char *name, int permanent)
set the color of the item and indicate whether or not the color is permanenet
- void `tc_changeNodeImage` (long item, const char *filename)
change the graphics file for drawing one of the nodes
- void `tc_changeArrowHead` (long connection, const char *filename)
change the graphics file for drawing the arrowheads for the given connection

4.2.1 Detailed Description

get/set position, color, size, etc

4.2.2 Function Documentation

4.2.2.1 TCAPIEXPORT void tc_changeArrowHead (long *connection*, const char * *filename*)

change the graphics file for drawing the arrowheads for the given connection

Parameters

int address of connection, e.g. obtained using tc_find

string file name of the new graphics file

4.2.2.2 TCAPIEXPORT void tc_changeNodeImage (long *item*, const char * *filename*)

change the graphics file for drawing one of the nodes

Parameters

int address of item, e.g. obtained using tc_find

string file name of the new graphics file

4.2.2.3 TCAPIEXPORT double tc_getAngle (long *item*)

get the angle of an item

Parameters

int address of item, e.g. obtained using tc_find

Returns

double angle

4.2.2.4 TCAPIEXPORT const char * tc_getColor (long *item*)

get the color of the item

Parameters

int address of item, e.g. obtained using tc_find

Returns

string Hex code for color

4.2.2.5 TCAPIEXPORT double tc_getHeight (long *item*)

get the width of an item

Parameters

int address of item, e.g. obtained using tc_find

Returns

double height

4.2.2.6 TCAPIEXPORT tc_matrix tc_getPos (tc_items *items*)

get the y location of a list item. Output is a N x 2 matrix

Parameters

tc_items addresses of items

Returns

tc_matrix x,y positions of items

4.2.2.7 TCAPIEXPORT double tc_getWidth (long *item*)

get the width of an item

Parameters

int address of item, e.g. obtained using tc_find

Returns

double width

4.2.2.8 TCAPIEXPORT double tc_getX (long *item*)

get the y location of an item

Parameters

int address of item

Returns

double y position

4.2.2.9 TCAPIEXPORT double tc_getY (long *item*)

get the x location of an item

Parameters

int address of item

Returns

double x position

4.2.2.10 TCAPIEXPORT void tc_moveSelected (double *dx*, double *dy*)

move all the selected items by a given amount

Parameters

double change in x

double change in y

4.2.2.11 TCAPIEXPORT void tc_setAngle (long *item*, double *t*, int *permanent*)

get the width of an item

set the angle of an item

Parameters

int address of item, e.g. obtained using tc_find

double angle

4.2.2.12 TCAPIEXPORT void tc_setColor (long *item*, const char * *name*, int *permanent*)

set the color of the item and indicate whether or not the color is permanent

set the rgb color of the item and indicate whether or not the color is permanent

Parameters

int address of item, e.g. obtained using tc_find

string Hex code for color

int 0(temporary) or 1 (permanent color change)

4.2.2.13 TCAPIEXPORT void tc_setPos (long *item*, double *x*, double *y*)

set the x and y location of an item

Parameters

int address of item

double x position

double y position

4.2.2.14 TCAPIEXPORT void tc_setPosMulti (tc_items *items*, tc_matrix *positions*)

set the x and y location of a list of N items. Input a matrix of positions, with N rows and 2 columns (x,y)

Parameters

tc_items addresses of items

tc_matrix x,y positions

4.2.2.15 TCAPIEXPORT void tc_setSize (long *item*, double *width*, double *height*, int *permanent*)

Change the size of an item.

Parameters

int address of item, e.g. obtained using tc_find

double width

double height

int 0 (temporary size change) or 1 (permanent size change)

4.3 Get items

get selected items or items of a family

Functions

- [tc_items tc_partsIn](#) (long o)
Get all DNA parts inside the given container or module.
- [tc_items tc_partsUpstream](#) (long o)
Get all DNA parts upstream of the given part.
- [tc_items tc_partsDownstream](#) (long o)
Get all DNA parts downstream of the given part.
- void [tc_alignParts](#) ([tc_items](#) a)
Align the given DNA parts in the order given.
- [tc_items tc_allItems](#) ()
get all visible items
- [tc_items tc_selectedItems](#) ()
get all selected items
- [tc_items tc_itemsOfFamily](#) (const char *family)
get all items of the given family items
- [tc_items tc_itemsOfFamilyFrom](#) (const char *family, [tc_items](#) itemsToSelectFrom)
get subset of items that belong to the given family
- long [tc_find](#) (const char *fullname)
get the first item with the given name (full name)
- [tc_items tc_findItems](#) ([tc_strings](#) names)
get all items with the given names (full names)
- void [tc_select](#) (long item)
select an item
- void [tc_deselect](#) ()
deselect all items
- [tc_items tc_getChildren](#) (long o)
get child items of the given item
- long [tc_getParent](#) (long o)
get parent item of the given item
- TCAPIEXPORT const char * [tc_getName](#) (long item)

get the name of an item

- TCAPIEXPORT const char * [tc_getUniqueName](#) (long item)
get the full name of an item
- TCAPIEXPORT void [tc_rename](#) (long item, const char *name)
set the name of an item (not full name)
- TCAPIEXPORT [tc_strings](#) [tc_getNames](#) ([tc_items](#) items)
get the names of several items
- TCAPIEXPORT [tc_strings](#) [tc_getUniqueNames](#) ([tc_items](#) items)
get the full names of several items

4.3.1 Detailed Description

get selected items or items of a family

4.3.2 Function Documentation

4.3.2.1 TCAPIEXPORT void [tc_alignParts](#) ([tc_items](#) a)

Align the given DNA parts in the order given.

Parameters

[tc_items](#) a list of items

4.3.2.2 BEGIN_C_DECLS TCAPIEXPORT [tc_items](#) [tc_allItems](#) ()

get all visible items

Returns

[tc_items](#) list of all items in the network

4.3.2.3 TCAPIEXPORT long [tc_find](#) (const char * *name*)

get the first item with the given name (full name)

Parameters

string name of an item. use full name whenever possible

Returns

int address of item with the name

4.3.2.4 TCAPIEXPORT tc_items tc_findItems (tc_strings *names*)

get all items with the given names (full names)

Parameters

tc_string names of one or more items

Returns

[tc_items](#) addresses of all the items. For nonexistent names, a 0 will be placed in the list

4.3.2.5 TCAPIEXPORT tc_items tc_getChildren (long *o*)

get child items of the given item

Parameters

int address of item

Returns

[tc_items](#) list of child items

4.3.2.6 TCAPIEXPORT const char* tc_getName (long *item*)

get the name of an item

Parameters

int address of the item

Returns

string name (not full name)

4.3.2.7 TCAPIEXPORT tc_strings tc_getNames (tc_items *items*)

get the names of several items

Parameters

[tc_items](#) addresses of the items

Returns

tc_string list of names (not full names)

4.3.2.8 TCAPIEXPORT long tc_getParent (long *o*)

get parent item of the given item

Parameters

int address of item

Returns

int address of parent item (0 if no parent)

4.3.2.9 TCAPIEXPORT const char* tc_getUniqueName (long *item*)

get the full name of an item

Parameters

int address of the item

Returns

string full name of the item (always unique)

4.3.2.10 TCAPIEXPORT tc_strings tc_getUniqueNames (tc_items *items*)

get the full names of several items

Parameters

tc_items addresses of the items

Returns

tc_string list of names (unique names)

4.3.2.11 TCAPIEXPORT tc_items tc_itemsOfFamily (const char **family*)

get all items of the given family items

Parameters

string name of a type

Returns

tc_items list of all items in network belonging under the given type

4.3.2.12 TCAPIEXPORT tc_items tc_itemsOfFamilyFrom (const char * *family*, tc_items *itemsToSelectFrom*)

get subset of items that belong to the given family

Parameters

string name of a type

tc_items list of items to select from

Returns

tc_items list of all items in the list belonging under the given type

4.3.2.13 TCAPIEXPORT tc_items tc_partsDownstream (long *o*)

Get all DNA parts downstream of the given part.

Parameters

int address of an item in the network

4.3.2.14 BEGIN_C_DECLS TCAPIEXPORT tc_items tc_partsIn (long *o*)

Get all DNA parts inside the given container or module.

Parameters

int address of an item in the network

4.3.2.15 TCAPIEXPORT tc_items tc_partsUpstream (long *o*)

Get all DNA parts upstream of the given part.

Parameters

int address of an item in the network

4.3.2.16 TCAPIEXPORT void tc_rename (long *item*, const char * *name*)

set the name of an item (not full name)

Parameters

int address of item

Returns

string new name (not full name)

4.3.2.17 TCAPIEXPORT void tc_select (long *item*)

select an item

Parameters

int address of the item

4.3.2.18 TCAPIEXPORT tc_items tc_selectedItems ()

get all selected items

Returns

[tc_items](#) list of all items currently selected by user

4.4 Annotations

get annotation information about items

Functions

- `const char * tc_getName` (long item)
get the full name of an item
- `const char * tc_getUniqueName` (long item)
get the full name of an item
- `void tc_rename` (long item, `const char *name`)
set the name of an item (not full name)
- `tc_strings tc_getNames` (`tc_items` items)
get the full names of several items
- `tc_strings tc_getUniqueNames` (`tc_items` items)
get the full names of several items
- `const char * tc_getFamily` (long item)
get the family name of an item
- `int tc_isA` (long item, `const char *family`)
check is an item belongs in a family (or in a sub-family)
- `tc_strings tc_getAnnotation` (long o)
get annotation for this item, i.e. family, author, descriptions, etc.
- `void tc_setAnnotation` (long o, `tc_strings` annot)
set annotation for this item, i.e. family, author, descriptions, etc.

4.4.1 Detailed Description

get annotation information about items

4.4.2 Function Documentation

4.4.2.1 `BEGIN_C_DECLS TCAPIEXPORT tc_strings tc_getAnnotation` (long o)

get annotation for this item, i.e. family, author, descriptions, etc.

Parameters

int address of item, e.g. obtained from `tc_find`

4.4.2.2 TCAPIEXPORT const char * tc_getFamily (long *item*)

get the family name of an item

Parameters

int address of the item

Returns

string type of the item

4.4.2.3 const char* tc_getName (long *item*)

get the full name of an item

get the name of an item

4.4.2.4 tc_strings tc_getNames (tc_items *items*)

get the full names of several items

get the names of several items

4.4.2.5 const char* tc_getUniqueName (long *item*)

get the full name of an item

Parameters

int address of the item

Returns

string full name of the item (always unique)

4.4.2.6 tc_strings tc_getUniqueNames (tc_items *items*)

get the full names of several items

Parameters

tc_items addresses of the items

Returns

tc_string list of names (unique names)

4.4.2.7 TCAPIEXPORT int tc_isA (long *item*, const char * *family*)

check if an item belongs in a family (or in a sub-family)

Parameters

int address of the item

string name of the family type

Returns

int 0(no) or 1(yes)

4.4.2.8 void tc_rename (long *item*, const char * *name*)

set the name of an item (not full name)

Parameters

int address of item

Returns

string new name (not full name)

4.4.2.9 TCAPIEXPORT void tc_setAnnotation (long *o*, tc_strings *annot*)

set annotation for this item, i.e. family, author, descriptions, etc.

Parameters

int address of item, e.g. obtained from tc_find

tc_strings pair of annotations, e.g. "name", "Don", "age", "93", "place", "Hawaii"

4.5 Input and Output

display dialogs or get user inputs

Functions

- void `tc_displayText` (long item, const char *text)
displays the given text on the given item (the text is temporary)
- void `tc_displayNumber` (long item, double number)
displays the given number on the given item (the text is temporary)
- void `tc_setDisplayLabelColor` (const char *a, const char *b)
set the color for the number or text when using `tc_displayNumber` and `tc_displayText`
- void `tc_highlight` (long item, const char *color)
highlights an item (the highlight is temporary) with the given color (hex)
- void `tc_print` (const char *text)
show text in the output window.
- void `tc_errorReport` (const char *text)
show error text in the output window.
- void `tc_printMatrix` (`tc_matrix` data)
show table in the output window.
- void `tc_printFile` (const char *filename)
show file contents in the output window.
- void `tc_clear` ()
cleat the contents in the output window.
- void `tc_createInputWindowFromFile` (`tc_matrix` input, const char *filename, const char *functionname, const char *title)
create an input window that can call a dynamic library
- void `tc_createInputWindow` (`tc_matrix` input, const char *title, void(*f)(`tc_matrix`))
create an input window that can call a dynamic library
- void `tc_addInputWindowOptions` (const char *title, int i, int j, `tc_strings` options)
add options to an existing input window at the i,j-th cell. Options will appear in a list
- void `tc_addInputWindowCheckbox` (const char *title, int i, int j)
add a yes or no type of option to an existing input window at the i,j-th cell
- void `tc_openNewWindow` (const char *title)
open a new graphics window

- void [tc_zoom](#) (double factor)
zoom by the given factor (0 - 1)
- const char * [tc_getStringDialog](#) (const char *title)
get a text from the user (dialog)
- const char * [tc_getFilename](#) ()
get a file from the user (dialog)
- int [tc_getStringFromList](#) (const char *title, [tc_strings](#) list, const char *selectedString)
get a text from the user (dialog) from a list of selections
- double [tc_getNumber](#) (const char *title)
get a number from the user (dialog)
- void [tc_getNumbers](#) ([tc_strings](#) labels, double *result)
get a list of numbers from the user (dialog) into the argument array
- int [tc_askQuestion](#) (const char *message)
display a dialog with a text and a yes and no button
- void [tc_messageDialog](#) (const char *message)
display a dialog with a text message and a close button
- void [tc_openFile](#) (const char *message)
open file
- void [tc_saveToFile](#) (const char *message)
save to file
- void [tc_createSliders](#) ([tc_matrix](#) input, void(*f)([tc_matrix](#)))
create a window with several sliders. when the sliders change, the given function will be called with the values in the sliders
- void [tc_screenshot](#) (const char *filename, int width, int height)
save screenshot in a file
- void [tc_showProgress](#) (int progress)
show progress of current operation
- TCAPIEXPORT int [tc_screenWidth](#) ()
get width of current canvas
- TCAPIEXPORT int [tc_screenHeight](#) ()
get height of current canvas
- TCAPIEXPORT int [tc_screenX](#) ()
get x position of current canvas
- TCAPIEXPORT int [tc_screenY](#) ()
get y position of current canvas

4.5.1 Detailed Description

display dialogs or get user inputs

4.5.2 Function Documentation

4.5.2.1 TCAPIEXPORT void tc_addInputWindowCheckbox (const char * *title*, int *i*, int *j*)

add a yes or no type of option to an existing input window at the i,j-th cell

Parameters

int row number

int column number

4.5.2.2 TCAPIEXPORT void tc_addInputWindowOptions (const char * *title*, int *i*, int *j*, tc_strings *options*)

add options to an existing input window at the i,j-th cell. Options will appear in a list

Parameters

string name of an input window that was just created

int row number

int column number

tc_string place these options (drop-down meny) at the (row,column) location of the table

4.5.2.3 TCAPIEXPORT int tc_askQuestion (const char * *message*)

display a dialog with a text and a yes and no button

Parameters

*const char** displayed message or question

string displayed message or question

4.5.2.4 TCAPIEXPORT void tc_clear ()

cleat the contents in the output window.

cleat the contents in the output window

4.5.2.5 TCAPIEXPORT void tc_createInputWindow (tc_matrix *input*, const char * *title*, void(*) (tc_matrix) *f*)

create an input window that can call a dynamic library

create an input window that will call a function

Parameters

tc_matrix input window's arguments a default values
string name of this program
*void** pointer to a 1-argument function that takes *tc_matrix* argument

4.5.2.6 TCAPIEXPORT void tc_createInputWindowFromFile (tc_matrix *input*, const char * *filename*, const char * *functionname*, const char * *title*)

create an input window that can call a dynamic library
create an input window that will run a function inside a C library

Parameters

tc_matrix input window's arguments a default values
string C library file
string function inside the C library that takes *tc_matrix* argument
string name of this program

4.5.2.7 TCAPIEXPORT void tc_createSliders (tc_matrix *input*, void(*) (tc_matrix) *f*)

create a window with several sliders. when the sliders change, the given function will be called with the values in the sliders

Parameters

tc_matrix names of variables and initial values for the sliders
*void** callback function with *tc_matrix* as the argument

4.5.2.8 TCAPIEXPORT void tc_displayNumber (long *item*, double *number*)

displays the given number on the given item (the text is temporary)

Parameters

int address of item in model, e.g. obtained from tc_find
double number to display

4.5.2.9 TCAPIEXPORT void tc_displayText (long *item*, const char * *text*)

displays the given text on the given item (the text is temporary)

Parameters

int address of item
string text to display

4.5.2.10 TCAPIEXPORT void tc_errorReport (const char * *text*)

show error text in the output window.

show error text in the output window

Parameters

string error message

4.5.2.11 TCAPIEXPORT const char * tc_getFilename ()

get a file from the user (dialog)

popup dialog asking user to select a file

Returns

string the filename selected by the user

4.5.2.12 TCAPIEXPORT double tc_getNumber (const char * *title*)

get a number from the user (dialog)

popup dialog asking user for a number

Parameters

string text presented to the user

Returns

double user's response

4.5.2.13 TCAPIEXPORT void tc_getNumbers (tc_strings *labels*, double * *result*)

get a list of numbers from the user (dialog) into the argument array

popup dialog asking user for several numbers (with labels)

Parameters

tc_strings labels for each number to get

*double** array that will store the results

4.5.2.14 TCAPIEXPORT int tc_getStringFromList (const char * *title*, tc_strings *list*, const char * *selectedString*)

get a text from the user (dialog) from a list of selections

popup dialog asking user to select one item from a list

Parameters

string title of dialog
tc_string list of options
string the option that is selected by default

Returns

int index of the user's selection, -1 if canceled

4.5.2.15 TCAPIEXPORT void tc_highlight (long *item*, const char * *color*)

highlights an item (the highlight is temporary) with the given color (hex)
highlights an item (the highlight is temporary) with the given color

Parameters

int address of item in model, e.g. obtained from tc_find
string HEX code for color

4.5.2.16 TCAPIEXPORT void tc_messageDialog (const char * *message*)

display a dialog with a text message and a close button

Parameters

const char* displayed message
string displayed message

4.5.2.17 TCAPIEXPORT void tc_openFile (const char * *message*)

open file
open a file

Parameters

const char* file
string file name

4.5.2.18 TCAPIEXPORT void tc_openNewWindow (const char * *title*)

open a new graphics window

Parameters

string title of the new window

4.5.2.19 TCAPIEXPORT void tc_print (const char * *text*)

show text in the output window.

show text in the output window

Parameters

string text message

4.5.2.20 TCAPIEXPORT void tc_printFile (const char * *filename*)

show file contents in the output window.

show file contents in the output window

Parameters

string file name

4.5.2.21 TCAPIEXPORT void tc_printMatrix (tc_matrix *data*)

show table in the output window.

show table in the output window

Parameters

tc_matrix table

4.5.2.22 TCAPIEXPORT void tc_saveToFile (const char * *message*)

save to file

save current network

Parameters

const char* file

string filename

4.5.2.23 TCAPIEXPORT int tc_screenHeight ()

get height of current canvas

Returns

int height

4.5.2.24 TCAPIEXPORT void tc_screenshot (const char **filename*, int *width*, int *height*)

save screenshot in a file

Parameters

string filename (PNG)

int width of image

int height of image

4.5.2.25 TCAPIEXPORT int tc_screenWidth ()

get width of current canvas

Returns

int width

4.5.2.26 TCAPIEXPORT int tc_screenX ()

get x position of current canvas

Returns

int x

4.5.2.27 TCAPIEXPORT int tc_screenY ()

get y position of current canvas

Returns

int y

4.5.2.28 TCAPIEXPORT void tc_setDisplayLabelColor (const char **color1*, const char **color2*)

set the color for the number or text when using tc_displayNumber and tc_displayText

Parameters

string HEX code for text color

string HEX code for background color

4.5.2.29 TCAPIEXPORT void tc_zoom (double *factor*)

zoom by the given factor (0 - 1)

Parameters

double zoom factor between 0 and 1

4.6 System information

get information about the OS and program directory

Functions

- int `tc_isWindows ()`
is this running in MS windows?
- int `tc_isMac ()`
is this running in a Mac?
- int `tc_isLinux ()`
is this running in Linux?
- const char * `tc_appDir ()`
TinkerCell application folder.
- const char * `tc_homeDir ()`
TinkerCell home folder.

4.6.1 Detailed Description

get information about the OS and program directory

4.6.2 Function Documentation

4.6.2.1 TCAPIEXPORT const char * `tc_appDir ()`

TinkerCell application folder.

Returns

string application folder path

4.6.2.2 TCAPIEXPORT const char * `tc_homeDir ()`

TinkerCell home folder.

Returns

string home folder path

4.6.2.3 TCAPIEXPORT int tc_isLinux ()

is this running in Linux?

is this running in a Unix system (excluding Mac)?

Returns

0 (not Linux) or 1 (is Linux)

4.6.2.4 TCAPIEXPORT int tc_isMac ()

is this running in a Mac?

Returns

0 (not Mac OS) or 1 (is Mac OS)

4.6.2.5 TCAPIEXPORT int tc_isWindows ()

is this running in MS windows?

Returns

0 (not windows OS) or 1 (is windows OS)

4.7 Network data

get/set information about the individual items in the network

Functions

- TCAPIEXPORT const char * [tc_getTextAttribute](#) (long item, const char *attribute)
get the text attribute with the given name for the given item
- TCAPIEXPORT [tc_strings](#) [tc_getAllTextNamed](#) ([tc_items](#) a, [tc_strings](#) attributes)
get all text Modeling with the given name for the given items
- TCAPIEXPORT void [tc_setTextAttribute](#) (long item, const char *attribute, const char *value)
set text attribute for the given item
- TCAPIEXPORT [tc_matrix](#) [tc_getNumericalData](#) (long item, const char *data)
get the entire data matrix for the given numerical data table of the given item
- TCAPIEXPORT void [tc_setNumericalData](#) (long o, const char *title, [tc_matrix](#) data)
set a new data matrix for an item or replace an existing one
- TCAPIEXPORT [tc_table](#) [tc_getTextData](#) (long item, const char *data)
get the entire data table for the given strings data table of the given item
- TCAPIEXPORT void [tc_setTextData](#) (long o, const char *title, [tc_table](#) data)
set or replace the entire data matrix for the given strings data table of the given item
- TCAPIEXPORT [tc_strings](#) [tc_getNumericalDataNames](#) (long o)
get all the numeric data table names for the given item
- TCAPIEXPORT [tc_strings](#) [tc_getTextDataNames](#) (long o)
get all the text data table names for the given item

4.7.1 Detailed Description

get/set information about the individual items in the network

4.7.2 Function Documentation

4.7.2.1 TCAPIEXPORT [tc_strings](#) [tc_getAllTextNamed](#) ([tc_items](#) a, [tc_strings](#) attributes)

get all text Modeling with the given name for the given items

Parameters

[tc_items](#) a list of items

[tc_strings](#) a list of text attribute name that exists in each of the given items

Returns

[tc_strings](#) the set of all text attribute values, one for each item in the input

4.7.2.2 TCAPIEXPORT tc_matrix tc_getNumericalData (long item, const char * data)

get the entire data matrix for the given numerical data table of the given item

Parameters

int address of item. use 0 for the model item

string name of numerical data table

Returns

[tc_matrix](#) the numerical data table for the given item

4.7.2.3 TCAPIEXPORT tc_strings tc_getNumericalDataNames (long o)

get all the numeric data table names for the given item

Parameters

int address of item. use 0 for the model item

Returns

tc_string list of names of all numerical tables inside this item

4.7.2.4 TCAPIEXPORT const char* tc_getTextAttribute (long item, const char * attribute)

get the text attribute with the given name for the given item

Parameters

int item in the model, e.g. something returned from tc_find

string name of the attribute

Returns

string attribute

4.7.2.5 TCAPIEXPORT tc_table tc_getTextData (long item, const char * data)

get the entire data table for the given strings data table of the given item

Parameters

int address of item. use 0 for the model item

string name of text data table

Returns

[tc_table](#) the text data table for the given item

4.7.2.6 TCAPIEXPORT tc_strings tc_getTextDataNames (long *o*)

get all the text data table names for the given item

Parameters

int address of item. use 0 for the model item

Returns

tc_string list of names of all text tables inside this item

4.7.2.7 TCAPIEXPORT void tc_setNumericalData (long *o*, const char * *title*, tc_matrix *data*)

set a new data matrix for an item or replace an existing one

Parameters

int address of item. use 0 for the model item

string name of numerical data table

tc_matrix the new numerical data table for the given item

4.7.2.8 TCAPIEXPORT void tc_setTextAttribute (long *item*, const char * *attribute*, const char * *value*)

set text attribute for the given item

Parameters

int item in model

string name of text attribute

4.7.2.9 TCAPIEXPORT void tc_setTextData (long *o*, const char * *title*, tc_table *data*)

set or replace the entire data matrix for the given strings data table of the given item

Parameters

int address of item. use 0 for the model item

string name of text data table

Returns

tc_table the new text data table for the given item

4.8 Graphing

display graphs, save graphs, get graph values

Functions

- void `tc_surface` (`tc_matrix` z, const char *title)
plot 3D data. Input matrix has x,y on the first two columns and z on the third column
- void `tc_plot` (`tc_matrix` data, const char *title)
plot the data in the matrix (with headers) with the given x-axis and title
- void `tc_scatterplot` (`tc_matrix` data, const char *title)
plot the 2-columns in the matrix (with headers) as a scatter plot
- void `tc_errorBars` (`tc_matrix` data, const char *title)
plot the data in the matrix (with headers) with the given x-axis and title. For each column i, the i+1 and i+2 columns should contain the upper and lower bounds (errors).
- void `tc_hist` (`tc_matrix` data, const char *title)
plot histogram for each column of the given matrix with the given bin size.
- void `tc_multiplot` (int rows, int cols)
enable multi-plot, i.e. multiple plots on one screen. specify the number of rows and columns for the layout.
- `tc_matrix` `tc_getPlotData` (int whichPlot)
get the data that is currently in the plot window
- void `tc_gnuplot` (const char *s)
gnuplot
- void `tc_savePlot` (const char *filename)
save plot

4.8.1 Detailed Description

display graphs, save graphs, get graph values

4.8.2 Function Documentation

4.8.2.1 TCAPIEXPORT void `tc_errorBars` (`tc_matrix` data, const char * title)

plot the data in the matrix (with headers) with the given x-axis and title. For each column i, the i+1 and i+2 columns should contain the upper and lower bounds (errors).

Parameters

`tc_matrix` data
string title of plot

4.8.2.2 TCAPIEXPORT tc_matrix tc_getPlotData (int *whichPlot*)

get the data that is currently in the plot window

get the data in the plot window

Parameters

int index of the plot (if multiple plots are being displayed)

Returns

tc_matrix data

4.8.2.3 TCAPIEXPORT void tc_gnuplot (const char *)

gnuplot

plot the specific script using gnuplot

Parameters

string gnuplot commands

4.8.2.4 TCAPIEXPORT void tc_hist (tc_matrix *data*, const char * *title*)

plot histogram for each column of the given matrix with the given bin size.

Parameters

tc_matrix data

string title of plot

4.8.2.5 TCAPIEXPORT void tc_multiplot (int *rows*, int *cols*)

enable multi-plot, i.e. multiple plots on one screen. specify the number of rows and columns for the layout.

Parameters

int number of rows

int number of columns

4.8.2.6 TCAPIEXPORT void tc_plot (tc_matrix *data*, const char * *title*)

plot the data in the matrix (with headers) with the given x-axis and title

Parameters

tc_matrix data with first column being the x-axis

string title of plot

4.8.2.7 TCAPIEXPORT void tc_savePlot (const char * *filename*)

save plot

save the current plot as a PDF file

Parameters

string filename (PDF suffix)

4.8.2.8 TCAPIEXPORT void tc_scatterplot (tc_matrix *data*, const char * *title*)

plot the 2-columns in the matrix (with headers) as a scatter plot

plot the data in the matrix (with headers) as a scatter plot

Parameters

tc_matrix data with first column as x-axis

string title of plot

4.8.2.9 BEGIN_C_DECL TCAPIEXPORT void tc_surface (tc_matrix *z*, const char * *title*)

plot 3D data. Input matrix has x,y on the first two columns and z on the third column

Parameters

tc_matrix tree column matrix

string title of plot

4.9 Modeling

get/set parameters, equations, and so on

Functions

- BEGIN_C_DECLS TCAPIEXPORT `tc_matrix tc_getParameters (tc_items a)`
get all the parameters for the given items. use `tc_allItems()` as argument to get all parameters
- TCAPIEXPORT `tc_matrix tc_getInitialValues (tc_items a)`
get initial values of the given items. Fixed variables are included. use `tc_allItems()` for all items in the model.
- TCAPIEXPORT void `tc_setInitialValues (tc_items items, tc_matrix values)`
set initial values of the given items.
- TCAPIEXPORT `tc_matrix tc_getFixedVariables (tc_items a)`
get all fixed variables
- TCAPIEXPORT `tc_matrix tc_getParametersAndFixedVariables (tc_items a)`
get all the parameters and fixed variables
- TCAPIEXPORT double `tc_getParameter (long item, const char *attribute)`
get the parameter with the given name for the given item
- TCAPIEXPORT `tc_matrix tc_getParametersNamed (tc_items a, tc_strings attributes)`
get all numerical Modeling with the given names for the given items
- TCAPIEXPORT `tc_matrix tc_getParametersExcept (tc_items a, tc_strings attributes)`
get all numerical Modeling EXCEPT the given names
- TCAPIEXPORT void `tc_setParameter (long item, const char *attribute, double value)`
set a parameter value for the given item
- BEGIN_C_DECLS TCAPIEXPORT `tc_strings tc_getEventTriggers ()`
get the event triggers for a set of items
- TCAPIEXPORT `tc_strings tc_getEventResponses ()`
get the event responses for a set of items
- TCAPIEXPORT void `tc_addEvent (const char *trigger, const char *event)`
set the event trigger and response
- TCAPIEXPORT `tc_strings tc_getForcingFunctionNames (tc_items a)`
get the forcing function names for a set of items
- TCAPIEXPORT `tc_strings tc_getForcingFunctionAssignments (tc_items a)`
get the forcing function definitions for a set of items

- TCAPIEXPORT void [tc_addForcingFunction](#) (long item, const char *variable, const char *formula)
set the forcing function for an item
- int [tc_writeModel](#) (const char *file, [tc_items](#) items)
write the ODE, stoichiometry, and rates functions to a file
- BEGIN_C_DECLS TCAPIEXPORT [tc_matrix](#) [tc_getStoichiometry](#) ([tc_items](#) A)
get Modeling for the given items
- TCAPIEXPORT void [tc_setStoichiometry](#) ([tc_items](#) A, [tc_matrix](#) N)
set Modeling for the given items (must be labeled)
- TCAPIEXPORT [tc_strings](#) [tc_getRates](#) ([tc_items](#) A)
get rates for the given items
- TCAPIEXPORT void [tc_setRates](#) ([tc_items](#) A, [tc_strings](#) rates)
set rates for the given items (same order as N)
- TCAPIEXPORT [tc_matrix](#) [tc_getStoichiometryFor](#) (long x)
get Modeling for the given items
- TCAPIEXPORT const char * [tc_getRate](#) (long x)
get rate for the given items
- TCAPIEXPORT void [tc_setRate](#) (long x, const char *r)
set rate for the given items
- TCAPIEXPORT void [tc_setStoichiometryFor](#) (long x, [tc_matrix](#) N)
set Modeling for the given items
- TCAPIEXPORT void [tc_StoichiometryTool_api](#) ([tc_matrix](#)(*getStoichiometry)([tc_items](#)), void(*setStoichiometry)([tc_items](#), [tc_matrix](#)), [tc_strings](#)(*getRates)([tc_items](#)), void(*setRates)([tc_items](#), [tc_strings](#)))
initialize stiochiometry plug-in

4.9.1 Detailed Description

get/set parameters, equations, and so on

4.9.2 Function Documentation

4.9.2.1 TCAPIEXPORT void [tc_addEvent](#) (const char * *trigger*, const char * *event*)

set the event trigger and response

Parameters

string trigger, e.g. a > 2

string response to trigger, e.g. x = 5

4.9.2.2 TCAPIEXPORT void tc_addForcingFunction (long *item*, const char * *variable*, const char * *formula*)

set the forcing function for an item

Parameters

int address of an item, e.g. obtained from tc_find

string name of existing variable or new variable

string formula for the variable

4.9.2.3 TCAPIEXPORT tc_strings tc_getEventResponses ()

get the event responses for a set of items

Returns

[tc_strings](#) all event trigger responses, e.g. A = 10; B = 2

4.9.2.4 BEGIN_C_DECLS TCAPIEXPORT tc_strings tc_getEventTriggers ()

get the event triggers for a set of items

Returns

[tc_strings](#) all event trigger equations, e.g. A > 10

4.9.2.5 TCAPIEXPORT tc_matrix tc_getFixedVariables (tc_items *a*)

get all fixed variables

Parameters

[tc_items](#) list of items for which fixed attribute are set

[tc_matrix](#) matrix with 1 (fixed) or 0 (floating) in the same order as the list of items

4.9.2.6 TCAPIEXPORT tc_strings tc_getForcingFunctionAssignments (tc_items *a*)

get the forcing function definitions for a set of items

Parameters

[tc_items](#) list of items. use [tc_allItems\(\)](#) to get all forcing functions

Returns

[tc_strings](#) list of assignment equations

4.9.2.7 TCAPIEXPORT tc_strings tc_getForcingFunctionNames (tc_items a)

get the forcing function names for a set of items

Parameters

tc_items list of items. use *tc_allItems()* to get all forcing functions

Returns

tc_strings list of variable names

4.9.2.8 TCAPIEXPORT tc_matrix tc_getInitialValues (tc_items a)

get initial values of the given items. Fixed variables are included. use *tc_allItems()* for all items in the model.

Parameters

tc_items list of items for which the initial values are returned

Returns

tc_matrix initial values in the same order as the input list

4.9.2.9 TCAPIEXPORT double tc_getParameter (long item, const char * attribute)

get the parameter with the given name for the given item

Parameters

int item in the model, e.g. something returned from *tc_find*

string name of the parameter

Returns

double value

4.9.2.10 BEGIN_C_DECLS TCAPIEXPORT tc_matrix tc_getParameters (tc_items a)

get all the parameters for the given items. use *tc_allItems()* as argument to get all parameters

Parameters

tc_items list of items for which the parameters are returned

Returns

tc_matrix parameter values in the same order as the input list

4.9.2.11 TCAPIEXPORT tc_matrix tc_getParametersAndFixedVariables (tc_items a)

get all the parameters and fixed variables

Parameters

tc_items list of items. use *tc_allItems()* to get all items in the model

Returns

tc_matrix list of parameters and fixed variables. order is not preserved from the input

4.9.2.12 TCAPIEXPORT tc_matrix tc_getParametersExcept (tc_items a, tc_strings attributes)

get all numerical Modeling EXCEPT the given names

Parameters

tc_items a list of items

tc_strings a list of parameter names that exist in one or more of the given items

Returns

tc_matrix the set of parameters with rownames as parameter names

4.9.2.13 TCAPIEXPORT tc_matrix tc_getParametersNamed (tc_items a, tc_strings attributes)

get all numerical Modeling with the given names for the given items

Parameters

tc_items a list of items

tc_strings a list of parameter names that exist in one or more of the given items

Returns

tc_matrix the set of parameters with rownames as parameter names

4.9.2.14 TCAPIEXPORT const char* tc_getRate (long x)

get rate for the given items

Parameters

int address of a connection item

Returns

tc_matrix reaction rate equations for given item

4.9.2.15 TCAPIEXPORT tc_strings tc_getRates (tc_items A)

get rates for the given items

Parameters

tc_items list of items to get reaction rate equations from. use *tc_allItems()* for whole model.

Returns

tc_strings reaction rate equations for given items

4.9.2.16 BEGIN_C_DECLS TCAPIEXPORT tc_matrix tc_getStoichiometry (tc_items A)

get Modeling for the given items

Parameters

tc_items list of items to get stoichiometry matrix from. use *tc_allItems()* for whole model.

Returns

tc_matrix stoichiometry matrix with rownames (molecules) and column names (reactions)

4.9.2.17 TCAPIEXPORT tc_matrix tc_getStoichiometryFor (long x)

get Modeling for the given items

Parameters

int address of a connection item

Returns

tc_matrix stoichiometry matrix for the item

4.9.2.18 TCAPIEXPORT void tc_setInitialValues (tc_items items, tc_matrix values)

set initial values of the given items.

Parameters

tc_items list of items for which initial values are set

tc_matrix the initial values in the same order as the list of items

4.9.2.19 TCAPIEXPORT void tc_setParameter (long item, const char * attribute, double value)

set a parameter value for the given item

Parameters

int item in model

string name of parameter

4.9.2.20 TCAPIEXPORT void tc_setRate (long *x*, const char * *r*)

set rate for the given items

Parameters

int address of a connection item
tc_matrix reaction rate equations for given item

4.9.2.21 TCAPIEXPORT void tc_setRates (tc_items *A*, tc_strings *rates*)

set rates for the given items (same order as *N*)

Parameters

tc_items list of items to set reaction rate equations for. use *tc_allItems()* for whole model.

Returns

tc_strings reaction rate equations for given items

4.9.2.22 TCAPIEXPORT void tc_setStoichiometry (tc_items *A*, tc_matrix *N*)

set Modeling for the given items (must be labeled)

Parameters

tc_items list of items to set stoichiometry matrix for. use *tc_allItems()* for whole model.
tc_matrix new stoichiometry matrix with rownames (molecules) and column names (reactions) \

4.9.2.23 TCAPIEXPORT void tc_setStoichiometryFor (long *x*, tc_matrix *N*)

set Modeling for the given items

Parameters

int address of a connection item
tc_matrix stoichiometry matrix for given item

4.9.2.24 int tc_writeModel (const char * *file*, tc_items *items*)

write the ODE, stoichiometry, and rates functions to a file

Parameters

string output filename
tc_items items to include in the model. use *tc_allItems* for the whole model

4.10 Connections

change appearance of connection arcs

Functions

- long [tc_insertConnection](#) (tc_items parts, const char *name, const char *family)
connect a set of parts (in) to another (out). give the connection name and family. returns the inserted connection
- tc_items [tc_getConnectedNodes](#) (long connection)
get the connected parts for a connection
- tc_items [tc_getConnectedNodesWithRole](#) (long connection, const char *role)
get the parts with a role in a connection, such as reactants
- tc_items [tc_getConnections](#) (long part)
get connections for a part
- tc_items [tc_getConnectionsWithRole](#) (long part, const char *role)
get connections where the given part has the given role, e.g. reactant
- BEGIN_C_DECLS TCAPIEXPORT double [tc_getControlPointX](#) (long connection, long part, int whichPoint)
get x position of a control point
- TCAPIEXPORT double [tc_getControlPointY](#) (long connection, long part, int whichPoint)
get y position of a control point
- TCAPIEXPORT void [tc_setControlPoint](#) (long connection, long part, int whichPoint, double x, double y)
set x and y position of a control point
- TCAPIEXPORT void [tc_setCenterPoint](#) (long connection, double x, double y)
set x and y position of the central control point
- TCAPIEXPORT double [tc_getCenterPointX](#) (long connection)
get x position of the central control point
- TCAPIEXPORT double [tc_getCenterPointY](#) (long connection)
get y position of the central control point
- TCAPIEXPORT void [tc_setStraight](#) (long item, int straight)
switch between beziers and lines for drawing the connector, where 1 = line, 0 = bezier
- TCAPIEXPORT void [tc_setAllStraight](#) (int straight)
switch between beziers and lines for drawing ALL connectors
- TCAPIEXPORT void [tc_setLineWidth](#) (long item, double width, int permanent)
set the line width. Indicate whether the change should be temporary or permanent.

4.10.1 Detailed Description

change appearance of connection arcs

4.10.2 Function Documentation

4.10.2.1 TCAPIEXPORT double tc_getCenterPointX (long *connection*)

get x position of the central control point

Parameters

int address of a connection, e.g. obtained using tc_find

Returns

double x position

4.10.2.2 TCAPIEXPORT double tc_getCenterPointY (long *connection*)

get y position of the central control point

Parameters

int address of a connection, e.g. obtained using tc_find

Returns

double y position

4.10.2.3 TCAPIEXPORT tc_items tc_getConnectedNodes (long *connection*)

get the connected parts for a connection

Parameters

int address of a connection, e.g. obtained using tc_find

Returns

[tc_items](#) all nodes connection by the given connection

4.10.2.4 TCAPIEXPORT tc_items tc_getConnectedNodesWithRole (long *connection*, const char * *role*)

get the parts with a role in a connection, such as reactants

get the parts with a specific role in the given connection, such as reactant

Parameters

int address of a connection, e.g. obtained using tc_find

string a role, e.g. Reactant

Returns

[tc_items](#) all nodes in the given connection with the given role

4.10.2.5 TCAPIEXPORT [tc_items](#) tc_getConnections (long *part*)

get connections for a part

Parameters

int address of a node, e.g. obtained using [tc_find](#)

Returns

[tc_items](#) all connections linked to the given node

4.10.2.6 TCAPIEXPORT [tc_items](#) tc_getConnectionsWithRole (long *part*, const char * *role*)

get connections where the given part has the given role, e.g. reactant

get connections where the given parts has a specific role, such as reactant

Parameters

int address of a node, e.g. obtained using [tc_find](#)

string a role, such as reactant

Returns

[tc_items](#) connections linked to the given node with the given role

4.10.2.7 BEGIN_C_DECLS TCAPIEXPORT double tc_getControlPointX (long *connection*, long *part*, int *whichPoint*)

get x position of a control point

Parameters

int address of a connection, e.g. obtained using [tc_find](#)

int address of a node, e.g. obtained using [tc_find](#)

int index of the control point related to the given connection and the given node

Returns

double x position

4.10.2.8 TCAPIEXPORT double tc_getControlPointY (long *connection*, long *part*, int *whichPoint*)

get y position of a control point

Parameters

int address of a connection, e.g. obtained using tc_find

int address of a node, e.g. obtained using tc_find

int index of the control point related to the given connection and the given node

Returns

double y position

4.10.2.9 BEGIN_C_DECLS TCAPIEXPORT long tc_insertConnection (tc_items *parts*, const char * *name*, const char * *family*)

connect a set of parts (in) to another (out). give the connection name and family. returns the inserted connection

connect a set of parts. The role of each part is automatically determined by its type. Give the connection name and family. returns the inserted connection

Parameters

tc_items nodes to be connected

string name of new connection

string type of the new connection, i.e. one of the connection types in the catalog

4.10.2.10 TCAPIEXPORT void tc_setAllStraight (int *straight*)

switch between beziers and lines for drawing ALL connectors

Parameters

int 0 (Bezier) or 1 (straight lines)

4.10.2.11 TCAPIEXPORT void tc_setCenterPoint (long *connection*, double *y*, double *x*)

set x and y position of the central control point

Parameters

int address of a connection, e.g. obtained using tc_find

double x position

double y position

4.10.2.12 TCAPIEXPORT void tc_setControlPoint (long *connection*, long *part*, int *whichPoint*, double *x*, double *y*)

set x and y position of a control point

Parameters

long the connection

long the node that is associated with the particular curve of interest

int the index of the point on that curve of interest

double x value

double y value

4.10.2.13 TCAPIEXPORT void tc_setLineWidth (long *item*, double *width*, int *permanent*)

set the line width. Indicate whether the change should be temporary or permanent.

Parameters

int address of a connection, e.g. obtained using tc_find

double line width

int 0 (temporary change) or 1 (permanent change)

4.10.2.14 TCAPIEXPORT void tc_setStraight (long *item*, int *straight*)

switch between beziers and lines for drawing the connector, where 1 = line, 0 = bezier

Parameters

int address of a connection, e.g. obtained using tc_find

int 0 (Bezier) or 1 (straight lines)

4.11 Import/Export

Import/Export different file formats.

Functions

- `copasi_model tc_CopasiModel ()`
get the COPASI model from current TinkerCell model
- `void tc_exportSBML (const char *s)`
save sbml format to a file
- `void tc_importSBML (const char *s)`
load sbml model as string

4.11.1 Detailed Description

Import/Export different file formats.

4.11.2 Function Documentation

4.11.2.1 BEGIN_C_DECLS TCAPIEXPORT copasi_model tc_CopasiModel ()

get the COPASI model from current TinkerCell model

Returns

`copasi_model`

4.11.2.2 BEGIN_C_DECLS TCAPIEXPORT void tc_exportSBML (const char * s)

save sbml format to a file

Parameters

const char* file name

4.11.2.3 TCAPIEXPORT void tc_importSBML (const char * s)

load sbml model as string

Parameters

const char* sbml model file or string

4.12 copasi

Simulations and other numerical analysis.

Simulations and other numerical analysis.

Chapter 5

Class Documentation

5.1 copasi_compartment Struct Reference

this struct is used to contain a pointer to an instance of a COPASI class

```
#include <copasi_api.h>
```

Public Attributes

- void * **CopasiCompartmentPtr**
- void * **CopasiModelPtr**
- void * **qHash**

5.1.1 Detailed Description

this struct is used to contain a pointer to an instance of a COPASI class

The documentation for this struct was generated from the following file:

- copasi_api.h

5.2 copasi_model Struct Reference

this struct is used to contain a pointer to an instance of a COPASI class

```
#include <copasi_api.h>
```

Public Attributes

- void * **CopasiModelPtr**
- void * **CopasiDataModelPtr**
- void * **qHash**

5.2.1 Detailed Description

this struct is used to contain a pointer to an instance of a COPASI class

The documentation for this struct was generated from the following file:

- copasi_api.h

5.3 copasi_reaction Struct Reference

this struct is used to contain a pointer to an instance of a COPASI class

```
#include <copasi_api.h>
```

Public Attributes

- void * **CopasiReactionPtr**
- void * **CopasiModelPtr**
- void * **qHash**

5.3.1 Detailed Description

this struct is used to contain a pointer to an instance of a COPASI class

The documentation for this struct was generated from the following file:

- copasi_api.h

5.4 tc_items Struct Reference

An array of int objects with length information. Use tc_getItem(M,i) to get the i-th item.

```
#include <TC_structs.h>
```

Public Attributes

- int **length**
- long * **items**

5.4.1 Detailed Description

An array of int objects with length information. Use tc_getItem(M,i) to get the i-th item.

The documentation for this struct was generated from the following file:

- TC_structs.h

5.5 `tc_matrix` Struct Reference

A 2D table of doubles with row and column names. Use `tc_getMatrixValue(M,i,j)` to get the *i,j*-th value in `tc_matrix` *M*.

```
#include <TC_structs.h>
```

Public Attributes

- `int` **rows**
- `int` **cols**
- `double *` **values**
- `tc_strings` **rownames**
- `tc_strings` **colnames**

5.5.1 Detailed Description

A 2D table of doubles with row and column names. Use `tc_getMatrixValue(M,i,j)` to get the *i,j*-th value in `tc_matrix` *M*.

The documentation for this struct was generated from the following file:

- `TC_structs.h`

5.6 tc_strings Struct Reference

An array of strings with length information. Use `tc_getString(M,i)` to get the i-th string.

```
#include <TC_structs.h>
```

Public Attributes

- `int` **length**
- `char **` **strings**

5.6.1 Detailed Description

An array of strings with length information. Use `tc_getString(M,i)` to get the i-th string.

The documentation for this struct was generated from the following file:

- `TC_structs.h`

5.7 `tc_table` Struct Reference

A 2D table of strings with row and column names. Use `tc_getTableValue(M,i,j)` to get the *i,j*-th value in `tc_matrix` *M*.

```
#include <TC_structs.h>
```

Public Attributes

- `int` **rows**
- `int` **cols**
- `char **` **strings**
- `tc_strings` **rownames**
- `tc_strings` **colnames**

5.7.1 Detailed Description

A 2D table of strings with row and column names. Use `tc_getTableValue(M,i,j)` to get the *i,j*-th value in `tc_matrix` *M*.

The documentation for this struct was generated from the following file:

- `TC_structs.h`

Index

Annotation

- [tc_getAnnotation, 26](#)
- [tc_getFamily, 26](#)
- [tc_getName, 27](#)
- [tc_getNames, 27](#)
- [tc_getUniqueName, 27](#)
- [tc_getUniqueNames, 27](#)
- [tc_isA, 27](#)
- [tc_rename, 28](#)
- [tc_setAnnotation, 28](#)

Annotations, 26

Appearance, 15

- [tc_changeArrowHead, 16](#)
- [tc_changeNodeImage, 16](#)
- [tc_getAngle, 16](#)
- [tc_getColor, 16](#)
- [tc_getHeight, 16](#)
- [tc_getPos, 17](#)
- [tc_getWidth, 17](#)
- [tc_getX, 17](#)
- [tc_getY, 17](#)
- [tc_moveSelected, 18](#)
- [tc_setAngle, 18](#)
- [tc_setColor, 18](#)
- [tc_setPos, 18](#)
- [tc_setPosMulti, 18](#)
- [tc_setSize, 19](#)

Basic

- [tc_appendColumns, 9](#)
- [tc_appendRows, 9](#)
- [tc_createItemsArray, 9](#)
- [tc_createMatrix, 9](#)
- [tc_createStringsArray, 10](#)
- [tc_createTable, 10](#)
- [tc_deleteItemsArray, 10](#)
- [tc_deleteMatrix, 10](#)
- [tc_deleteStringsArray, 10](#)
- [tc_deleteTable, 11](#)
- [tc_getColumnName, 11](#)
- [tc_getItem, 11](#)
- [tc_getMatrixValue, 11](#)
- [tc_getRowName, 11](#)
- [tc_getString, 12](#)
- [tc_getTableValue, 12](#)

- [tc_printMatrixToFile, 12](#)
- [tc_printOutMatrix, 12](#)
- [tc_printOutTable, 13](#)
- [tc_printTableToFile, 13](#)
- [tc_setColumnName, 13](#)
- [tc_setItem, 13](#)
- [tc_setMatrixValue, 13](#)
- [tc_setRowName, 14](#)
- [tc_setString, 14](#)
- [tc_setTableValue, 14](#)

Basic operations, 7

Connections, 52

- [tc_getCenterPointX, 53](#)
- [tc_getCenterPointY, 53](#)
- [tc_getConnectedNodes, 53](#)
- [tc_getConnectedNodesWithRole, 53](#)
- [tc_getConnections, 54](#)
- [tc_getConnectionsWithRole, 54](#)
- [tc_getControlPointX, 54](#)
- [tc_getControlPointY, 54](#)
- [tc_insertConnection, 55](#)
- [tc_setAllStraight, 55](#)
- [tc_setCenterPoint, 55](#)
- [tc_setControlPoint, 55](#)
- [tc_setLineWidth, 56](#)
- [tc_setStraight, 56](#)

copasi, 58

copasi_compartment, 59

copasi_model, 60

copasi_reaction, 61

Export

- [tc_CopasiModel, 57](#)
- [tc_exportSBML, 57](#)
- [tc_importSBML, 57](#)

Get

- [tc_alignParts, 21](#)
- [tc_allItems, 21](#)
- [tc_find, 21](#)
- [tc_findItems, 21](#)
- [tc_getChildren, 22](#)
- [tc_getName, 22](#)
- [tc_getNames, 22](#)

- [tc_getParent, 22](#)
 - [tc_getUniqueName, 23](#)
 - [tc_getUniqueNames, 23](#)
 - [tc_itemsOfFamily, 23](#)
 - [tc_itemsOfFamilyFrom, 23](#)
 - [tc_partsDownstream, 24](#)
 - [tc_partsIn, 24](#)
 - [tc_partsUpstream, 24](#)
 - [tc_rename, 24](#)
 - [tc_select, 24](#)
 - [tc_selectedItems, 25](#)
- [Get items, 20](#)
- [Graphing, 42](#)
- [Import/Export, 57](#)
- [Input](#)
 - [tc_addInputWindowCheckbox, 31](#)
 - [tc_addInputWindowOptions, 31](#)
 - [tc_askQuestion, 31](#)
 - [tc_clear, 31](#)
 - [tc_createInputWindow, 31](#)
 - [tc_createInputWindowFromFile, 32](#)
 - [tc_createSliders, 32](#)
 - [tc_displayNumber, 32](#)
 - [tc_displayText, 32](#)
 - [tc_errorReport, 32](#)
 - [tc_getFilename, 33](#)
 - [tc_getNumber, 33](#)
 - [tc_getNumbers, 33](#)
 - [tc_getStringFromList, 33](#)
 - [tc_highlight, 34](#)
 - [tc_messageDialog, 34](#)
 - [tc_openFile, 34](#)
 - [tc_openNewWindow, 34](#)
 - [tc_print, 34](#)
 - [tc_printFile, 35](#)
 - [tc_printMatrix, 35](#)
 - [tc_saveToFile, 35](#)
 - [tc_screenHeight, 35](#)
 - [tc_screenshot, 35](#)
 - [tc_screenWidth, 36](#)
 - [tc_screenX, 36](#)
 - [tc_screenY, 36](#)
 - [tc_setDisplayLabelColor, 36](#)
 - [tc_zoom, 36](#)
- [Input and Output, 29](#)
- [Modeling, 45](#)
 - [tc_addEvent, 46](#)
 - [tc_addForcingFunction, 46](#)
 - [tc_getEventResponses, 47](#)
 - [tc_getEventTriggers, 47](#)
 - [tc_getFixedVariables, 47](#)
 - [tc_getForcingFunctionAssignments, 47](#)
 - [tc_getForcingFunctionNames, 47](#)
 - [tc_getInitialValues, 48](#)
 - [tc_getParameter, 48](#)
 - [tc_getParameters, 48](#)
 - [tc_getParametersAndFixedVariables, 48](#)
 - [tc_getParametersExcept, 49](#)
 - [tc_getParametersNamed, 49](#)
 - [tc_getRate, 49](#)
 - [tc_getRates, 49](#)
 - [tc_getStoichiometry, 50](#)
 - [tc_getStoichiometryFor, 50](#)
 - [tc_setInitialValues, 50](#)
 - [tc_setParameter, 50](#)
 - [tc_setRate, 50](#)
 - [tc_setRates, 51](#)
 - [tc_setStoichiometry, 51](#)
 - [tc_setStoichiometryFor, 51](#)
 - [tc_writeModel, 51](#)
- [Network](#)
 - [tc_getAllTextNamed, 39](#)
 - [tc_getNumericalData, 40](#)
 - [tc_getNumericalDataNames, 40](#)
 - [tc_getTextAttribute, 40](#)
 - [tc_getTextData, 40](#)
 - [tc_getTextDataNames, 40](#)
 - [tc_setNumericalData, 41](#)
 - [tc_setTextAttribute, 41](#)
 - [tc_setTextData, 41](#)
- [Network data, 39](#)
- [Plotting](#)
 - [tc_errorBars, 42](#)
 - [tc_getPlotData, 42](#)
 - [tc_gnuplot, 43](#)
 - [tc_hist, 43](#)
 - [tc_multiplot, 43](#)
 - [tc_plot, 43](#)
 - [tc_savePlot, 43](#)
 - [tc_scatterplot, 44](#)
 - [tc_surface, 44](#)
- [System](#)
 - [tc_appDir, 37](#)
 - [tc_homeDir, 37](#)
 - [tc_isLinux, 37](#)
 - [tc_isMac, 38](#)
 - [tc_isWindows, 38](#)
- [System information, 37](#)
- [tc_addEvent](#)
 - [Modeling, 46](#)
- [tc_addForcingFunction](#)
 - [Modeling, 46](#)

- tc_addInputWindowCheckbox
 - Input, [31](#)
- tc_addInputWindowOptions
 - Input, [31](#)
- tc_alignParts
 - Get, [21](#)
- tc_allItems
 - Get, [21](#)
- tc_appDir
 - System, [37](#)
- tc_appendColumns
 - Basic, [9](#)
- tc_appendRows
 - Basic, [9](#)
- tc_askQuestion
 - Input, [31](#)
- tc_changeArrowHead
 - Appearance, [16](#)
- tc_changeNodeImage
 - Appearance, [16](#)
- tc_clear
 - Input, [31](#)
- tc_CopasiModel
 - Export, [57](#)
- tc_createInputWindow
 - Input, [31](#)
- tc_createInputWindowFromFile
 - Input, [32](#)
- tc_createItemsArray
 - Basic, [9](#)
- tc_createMatrix
 - Basic, [9](#)
- tc_createSliders
 - Input, [32](#)
- tc_createStringsArray
 - Basic, [10](#)
- tc_createTable
 - Basic, [10](#)
- tc_deleteItemsArray
 - Basic, [10](#)
- tc_deleteMatrix
 - Basic, [10](#)
- tc_deleteStringsArray
 - Basic, [10](#)
- tc_deleteTable
 - Basic, [11](#)
- tc_displayNumber
 - Input, [32](#)
- tc_displayText
 - Input, [32](#)
- tc_errorBars
 - Plotting, [42](#)
- tc_errorReport
 - Input, [32](#)
- tc_exportSBML
 - Export, [57](#)
- tc_find
 - Get, [21](#)
- tc_findItems
 - Get, [21](#)
- tc_getAllTextNamed
 - Network, [39](#)
- tc_getAngle
 - Appearance, [16](#)
- tc_getAnnotation
 - Annotation, [26](#)
- tc_getCenterPointX
 - Connections, [53](#)
- tc_getCenterPointY
 - Connections, [53](#)
- tc_getChildren
 - Get, [22](#)
- tc_getColor
 - Appearance, [16](#)
- tc_getColumnName
 - Basic, [11](#)
- tc_getConnectedNodes
 - Connections, [53](#)
- tc_getConnectedNodesWithRole
 - Connections, [53](#)
- tc_getConnections
 - Connections, [54](#)
- tc_getConnectionsWithRole
 - Connections, [54](#)
- tc_getControlPointX
 - Connections, [54](#)
- tc_getControlPointY
 - Connections, [54](#)
- tc_getEventResponses
 - Modeling, [47](#)
- tc_getEventTriggers
 - Modeling, [47](#)
- tc_getFamily
 - Annotation, [26](#)
- tc_getFilename
 - Input, [33](#)
- tc_getFixedVariables
 - Modeling, [47](#)
- tc_getForcingFunctionAssignments
 - Modeling, [47](#)
- tc_getForcingFunctionNames
 - Modeling, [47](#)
- tc_getHeight
 - Appearance, [16](#)
- tc_getInitialValues
 - Modeling, [48](#)
- tc_getItem
 - Basic, [11](#)

- tc_getMatrixValue
 - Basic, 11
- tc_getName
 - Annotation, 27
 - Get, 22
- tc_getNames
 - Annotation, 27
 - Get, 22
- tc_getNumber
 - Input, 33
- tc_getNumbers
 - Input, 33
- tc_getNumericalData
 - Network, 40
- tc_getNumericalDataNames
 - Network, 40
- tc_getParameter
 - Modeling, 48
- tc_getParameters
 - Modeling, 48
- tc_getParametersAndFixedVariables
 - Modeling, 48
- tc_getParametersExcept
 - Modeling, 49
- tc_getParametersNamed
 - Modeling, 49
- tc_getParent
 - Get, 22
- tc_getPlotData
 - Plotting, 42
- tc_getPos
 - Appearance, 17
- tc_getRate
 - Modeling, 49
- tc_getRates
 - Modeling, 49
- tc_getRowName
 - Basic, 11
- tc_getStoichiometry
 - Modeling, 50
- tc_getStoichiometryFor
 - Modeling, 50
- tc_getString
 - Basic, 12
- tc_getStringFromFileList
 - Input, 33
- tc_getTableValue
 - Basic, 12
- tc_getTextAttribute
 - Network, 40
- tc_getTextData
 - Network, 40
- tc_getTextDataNames
 - Network, 40
- tc_getUniqueName
 - Annotation, 27
 - Get, 23
- tc_getUniqueNames
 - Annotation, 27
 - Get, 23
- tc_getWidth
 - Appearance, 17
- tc_getX
 - Appearance, 17
- tc_getY
 - Appearance, 17
- tc_gnuplot
 - Plotting, 43
- tc_highlight
 - Input, 34
- tc_hist
 - Plotting, 43
- tc_homeDir
 - System, 37
- tc_importSBML
 - Export, 57
- tc_insertConnection
 - Connections, 55
- tc_isA
 - Annotation, 27
- tc_isLinux
 - System, 37
- tc_isMac
 - System, 38
- tc_isWindows
 - System, 38
- tc_items, 62
- tc_itemsOfFamily
 - Get, 23
- tc_itemsOfFamilyFrom
 - Get, 23
- tc_matrix, 63
- tc_messageDialog
 - Input, 34
- tc_moveSelected
 - Appearance, 18
- tc_multiplot
 - Plotting, 43
- tc_openFile
 - Input, 34
- tc_openNewWindow
 - Input, 34
- tc_partsDownstream
 - Get, 24
- tc_partsIn
 - Get, 24
- tc_partsUpstream
 - Get, 24

- tc_plot
 - Plotting, [43](#)
- tc_print
 - Input, [34](#)
- tc_printFile
 - Input, [35](#)
- tc_printMatrix
 - Input, [35](#)
- tc_printMatrixToFile
 - Basic, [12](#)
- tc_printOutMatrix
 - Basic, [12](#)
- tc_printOutTable
 - Basic, [13](#)
- tc_printTableToFile
 - Basic, [13](#)
- tc_rename
 - Annotation, [28](#)
 - Get, [24](#)
- tc_savePlot
 - Plotting, [43](#)
- tc_saveToFile
 - Input, [35](#)
- tc_scatterplot
 - Plotting, [44](#)
- tc_screenHeight
 - Input, [35](#)
- tc_screenshot
 - Input, [35](#)
- tc_screenWidth
 - Input, [36](#)
- tc_screenX
 - Input, [36](#)
- tc_screenY
 - Input, [36](#)
- tc_select
 - Get, [24](#)
- tc_selectedItems
 - Get, [25](#)
- tc_setAllStraight
 - Connections, [55](#)
- tc_setAngle
 - Appearance, [18](#)
- tc_setAnnotation
 - Annotation, [28](#)
- tc_setCenterPoint
 - Connections, [55](#)
- tc_setColor
 - Appearance, [18](#)
- tc_setColumnName
 - Basic, [13](#)
- tc_setControlPoint
 - Connections, [55](#)
- tc_setDisplayLabelColor
 - Input, [36](#)
- tc_setInitialValues
 - Modeling, [50](#)
- tc_setItem
 - Basic, [13](#)
- tc_setLineWidth
 - Connections, [56](#)
- tc_setMatrixValue
 - Basic, [13](#)
- tc_setNumericalData
 - Network, [41](#)
- tc_setParameter
 - Modeling, [50](#)
- tc_setPos
 - Appearance, [18](#)
- tc_setPosMulti
 - Appearance, [18](#)
- tc_setRate
 - Modeling, [50](#)
- tc_setRates
 - Modeling, [51](#)
- tc_setRowName
 - Basic, [14](#)
- tc_setSize
 - Appearance, [19](#)
- tc_setStoichiometry
 - Modeling, [51](#)
- tc_setStoichiometryFor
 - Modeling, [51](#)
- tc_setStraight
 - Connections, [56](#)
- tc_setString
 - Basic, [14](#)
- tc_setTableValue
 - Basic, [14](#)
- tc_setTextAttribute
 - Network, [41](#)
- tc_setTextData
 - Network, [41](#)
- tc_strings, [64](#)
- tc_surface
 - Plotting, [44](#)
- tc_table, [65](#)
- tc_writeModel
 - Modeling, [51](#)
- tc_zoom
 - Input, [36](#)