NAME

libxdot – parsing and deparsing of xdot operations

SYNOPSIS

```
#include <graphviz/xdot.h>
typedef enum {
  xd_none,
  xd_linear,
  xd_radial
} xdot_grad_type;
typedef struct {
  float frac;
  char* color;
} xdot_color_stop;
typedef struct {
  double x0, y0;
  double x1, y1;
  int n_stops;
  xdot_color_stop* stops;
} xdot_linear_grad;
typedef struct {
  double x0, y0, r0;
  double x1, y1, r1;
  int n_stops;
  xdot_color_stop* stops;
} xdot_radial_grad;
typedef struct {
  xdot_grad_type type;
  union {
             char* clr;
             xdot_linear_grad ling;
             xdot_radial_grad ring;
  } u;
} xdot_color;
typedef enum {
  xd_left, xd_center, xd_right
} xdot_align;
typedef struct {
  double x, y, z;
} xdot_point;
typedef struct {
  double x, y, w, h;
} xdot_rect;
typedef struct {
  int cnt;
  xdot_point* pts;
```

```
} xdot_polyline;
typedef struct {
 double x, y;
 xdot align align;
 double width;
 char* text;
} xdot_text;
typedef struct {
  xdot_rect pos;
  char* name;
} xdot_image;
typedef struct {
  double size;
  char* name;
} xdot_font;
typedef enum {
  xd_filled_ellipse, xd_unfilled_ellipse,
  xd_filled_polygon, xd_unfilled_polygon,
  xd_filled_bezier, xd_unfilled_bezier,
  xd_polyline,
                  xd_text,
                 xd_pen_color, xd_font, xd_style, xd_image,
  xd_fill_color,
  xd_grad_fill_color, xd_grad_pen_color,
  xd_fontchar
} xdot_kind;
typedef enum {
  xop_ellipse,
  xop_polygon,
  xop_bezier,
  xop_polyline,
                    xop_text,
  xop_fill_color,
                   xop_pen_color, xop_font, xop_style, xop_image,
  xop_grad_color,
  xop_fontchar
} xop_kind;
typedef struct _xdot_op xdot_op;
typedef void (*drawfunc_t)(xdot_op*, int);
typedef void (*freefunc_t)(xdot_op*);
struct _xdot_op {
  xdot_kind kind;
  union {
   xdot_rect ellipse;
                        /* xd_filled_ellipse, xd_unfilled_ellipse */
   xdot_polyline polygon; /* xd_filled_polygon, xd_unfilled_polygon */
   xdot_polyline polyline; /* xd_polyline */
   xdot_polyline bezier; /* xd_filled_bezier, xd_unfilled_bezier */
   xdot_text text;
                       /* xd_text */
   xdot_image image;
                          /* xd_image */
   char* color;
                      /* xd_fill_color, xd_pen_color */
   xdot_color grad_color; /* xd_grad_fill_color, xd_grad_pen_color */
```

```
xdot_font font;
                        /* xd_font */
   char* style;
                      /* xd_style */
   unsigned int fontchar; /* xd_fontchar */
  drawfunc t drawfunc;
};
#define XDOT_PARSE_ERROR 1
typedef struct {
  int cnt;
  int sz;
  xdot_op* ops;
  freefunc_t freefunc;
  int flags;
} xdot;
typedef struct {
  int cnt; /* no. of xdot ops */
  int n_ellipse;
  int n_polygon;
  int n_polygon_pts;
  int n_polyline;
  int n_polyline_pts;
  int n_bezier;
  int n_bezier_pts;
  int n_text;
  int n_font;
  int n_style;
  int n_color;
  int n_image;
  int n_gradcolor;
  int n_fontchar;
} xdot_stats;
xdot* parseXDotF (char*, drawfunc_t opfns[], int sz);
xdot* parseXDotFOn (char*, drawfunc_t opfns[], int sz, xdot*);
xdot* parseXDot (char*);
char* sprintXDot (xdot*);
void fprintXDot (FILE*, xdot*);
void jsonXDot (FILE*, xdot*);
void freeXDot (xdot*);
int statXDot (xdot*, xdot_stats*);
xdot_grad_type colorType (char*);
xdot_color* parseXDotColor (char*);
void freeXDotColor (xdot_color*);
```

DESCRIPTION

libxdot provides support for parsing and deparsing graphical operations specified by the xdot language.

Types xdot

This encapsulates a series of *cnt* xdot operations, stored in the array pointed to by *ops*. The *sz* indicates the size of each item stored in *ops*. If the user sets the *freefunc* field, this function will be called on each item in *ops* during *freeXDot* before the library does its own clean up of the item. This allows the user to free any

resources stored in the item by using an expansion of the *xdot_op* structure.

xdot_op

A value of this type represents one xdot operation. The operation is specified by the kind field. The corresponding data is stored in the union u, with the subfield associated with a given kind indicated by the comments.

The *drawfunc* field allows the user to attach a drawing-specific function to the operation, providing an object-based interface. These functions can be automatically attached during parsing by providing a non-NULL second argument to **parseXDotF**.

xop_kind

This type provides an enumeration of the allowed xdot operations. See

https://graphviz.org/docs/outputs/canon/#xdot

for the specific semantics associated with each operation.

xdot rect

This represents a rectangle. For ellipses, the x and x fields represent the center of the rectangle, and w and h give the half-width and half-height, respectively. For images, (x,y) gives the lower left corner of the rectangle, and w and h give the width and height, respectively.

xdot_polyline

This type encapsulates a series of *cnt* points.

xdot text

A value of this type corresponds to printing the string *text* using the baseline point (x,y). The *width* field gives an approximation of how wide the printed string will be using the current font and font size. The *align* field indicates how the text should be horizontally aligned with the point (x,y).

xdot_image

This denotes the insertion of an image. The image source is given by *name*. The images is to be placed into the rectangle *pos*.

xdot_font

The fields give the name and size, in points, of a font.

xdot align

This enumeration type corresponds to the xdot alignment values -1, 0 and 1 used with the text operator, or '\l', '\n' and '\r' used in dot text.

Functions

xdot* parseXDotF (char *str, drawfunc_t* opfns, int sz)

Parses the string *str* as a sequence of xdot operations and returns a pointer to the resulting *xdot* structure. The function parses as many xdot operations as it can. If some unknown or incorrect input was encountered in *str*, the *ops* and *cnt* fields will reflect the operations parsed before the error, and the *XDOT_PARSE_ER-ROR* bit will be set in the *flags* field. The function returns NULL if it cannot parse anything.

If sz is non-zero, it is assumed to be the size of some structure type containing xdot_op as a prefix. In this case, the elements in the array pointed to by ops will each have size sz.

If *opfns* is non-zero, it is taken to be any array of functions indexed by *xop_kind*. During parsing, the *draw-func* member of *xop_op* will be set to the corresponding function in *opfns*.

xdot* parseXDotFOn (char *str, drawfunc_t* opfns, int sz, xdot* x)

The same as *parseXDotF*, but append to the given *xdot* object *x*.

xdot* parseXDot (char *str)

This is equivalent to parseXDotF(str, 0, 0).

void freeXDot (xdot* xp)

This frees the resources associated with the argument. If xp is NULL, nothing happens.

extern char* sprintXDot (xdot* xp) extern void fprintXDot (FILE* fp, xdot* xp)

These two functions deparse the argument xdot structure, producing a string representation. *fprintXDot* writes the output onto the open stream *fp*; *sprintXDot* returns a heap-allocated string.

The color string with fill and draw operations can encode linear and radial gradients. These values are parsed automatically by **parseXDotF** or **parseXDot**, with *xdot_op* having kind *xd_grad_pen_color* or *xd_grad_fill_color* and the value is stored in *grad_color*.

For an application that handles its own parsing of xdot, the library provides three helper functions.

void jsonXDot(FILE * fp, xdot * x)

Translate a given *xdot* object to a JSON representation. This functionality is currently considered experimental and the format of the JSON output may not be stable across Graphviz releases.

xdot_grad_type colorTypeXDot (char *str)

returns the color type described by the input string.

char* parseXDotColor (char *str, xdot color* clr)

attempts to parse the string str as a color value, storing the result in clr. It returns NULL on failure.

void freeXDotColor (xdot_color* cp)

This frees the resources associated with a value of type *xdot_color*.

int statXDot (xdot *x, xdot_stats *sp)

This function is provided for retrieving various statistics about an *xdot* object. Returns 0 on success and populates the output parameter *sp* with counts of various entities in the *xdot* object.

BUGS

Although some small checking is done on the *sz* argument to *parseXDotF*, it is assumed it is a valid value from *sizeof* applied to some structure type containing *xdot_op* as its first field. There can be no validation of the *opfns* argument.

AUTHORS

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