

## NAME \_\_\_\_\_

gvgen – generate graphs

## SYNOPSIS

**gvgen** [ **-dv?** ] [ **-in** ] [ **-cn** ] [ **-Cx,y** ] [ **-g/f/x,y** ] [ **-G/f/x,y** ] [ **-hn** ] [ **-kn** ] [ **-b,x,y** ] [ **-B,x,y** ] [ **-mn** ] [ **-M,x,y** ] [ **-pn** ] [ **-r,x,y** ] [ **-Rx** ] [ **-sn** ] [ **-Sn** ] [ **-Sn,d** ] [ **-tn** ] [ **-td,n** ] [ **-Tx,y** ] [ **-Tx,y,u,v** ] [ **-useed** ] [ **-wn** ] [ **-nprefix** ] [ **-Nname** ] [ **-ooutfile** ]

## DESCRIPTION

**gvgen** generates a variety of simple, regularly-structured abstract graphs.

## OPTIONS

The following options are supported:

- c**  $n$  Generate a cycle with  $n$  vertices and edges.
- C**  $x, y$  Generate an  $x$  by  $y$  cylinder. This will have  $x*y$  vertices and  $2*x*y - y$  edges.
- g** [**f**]/ $x, y$   
Generate an  $x$  by  $y$  grid. If **f** is given, the grid is folded, with an edge attaching each pair of opposing corner vertices. This will have  $x*y$  vertices and  $2*x*y - y - x$  edges if unfolded and  $2*x*y - y - x + 2$  edges if folded.
- G** [**f**]/ $x, y$   
Generate an  $x$  by  $y$  partial grid. If **f** is given, the grid is folded, with an edge attaching each pair of opposing corner vertices. This will have  $x*y$  vertices.
- h**  $n$  Generate a hypercube of degree  $n$ . This will have  $2^n$  vertices and  $n*2^{(n-1)}$  edges.
- k**  $n$  Generate a complete graph on  $n$  vertices with  $n*(n-1)/2$  edges.
- b**  $x, y$  Generate a complete  $x$  by  $y$  bipartite graph. This will have  $x+y$  vertices and  $x*y$  edges.
- B**  $x, y$  Generate an  $x$  by  $y$  ball, i.e., an  $x$  by  $y$  cylinder with two "cap" nodes closing the ends. This will have  $x*y + 2$  vertices and  $2*x*y + y$  edges.
- m**  $n$  Generate a triangular mesh with  $n$  vertices on a side. This will have  $(n+1)*n/2$  vertices and  $3*(n-1)*n/2$  edges.
- M**  $x, y$  Generate an  $x$  by  $y$  Moebius strip. This will have  $x*y$  vertices and  $2*x*y - y$  edges.
- p**  $n$  Generate a path on  $n$  vertices. This will have  $n-1$  edges.
- r**  $x, y$  Generate a random graph. The number of vertices will be the largest value of the form  $2^{n-1}$  less than or equal to  $x$ . Larger values of  $y$  increase the density of the graph.
- R**  $x$  Generate a random rooted tree on  $x$  vertices.
- s**  $n$  Generate a star on  $n$  vertices. This will have  $n-1$  edges.
- S**  $n$  Generate a Sierpinski graph of order  $n$ . This will have  $3*(3^{(n-1)} + 1)/2$  vertices and  $3^n$  edges.
- S**  $n, d$  Generate a  $d$ -dimensional Sierpinski graph of order  $n$ . At present,  $d$  must be 2 or 3. For  $d$  equal to 3, there will be  $4*(4^{(n-1)} + 1)/2$  vertices and  $6 * 4^{(n-1)}$  edges.
- t**  $n$  Generate a binary tree of height  $n$ . This will have  $2^{n-1}$  vertices and  $2^n - 2$  edges.
- t**  $h, n$  Generate a  $n$ -ary tree of height  $h$ .
- T**  $x, y$
- T**  $x, y, u, v$   
Generate an  $x$  by  $y$  torus. This will have  $x*y$  vertices and  $2*x*y$  edges. If  $u$  and  $v$  are given, they specify twists of that amount in the horizontal and vertical directions, respectively.
- u** *seed*  
Specify the initial state for the random number generator. If this option is not given, the current time is used to derive a seed.

- w *n***   Generate a path on *n* vertices. This will have *n-1* edges.
- i *n***   Generate *n* graphs of the requested type. At present, only available if the **-R** flag is used.
- n *prefix***  
Normally, integers are used as node names. If *prefix* is specified, this will be prepended to the integer to create the name.
- N *name***  
Use *name* as the name of the graph. By default, the graph is anonymous.
- o *outfile***  
If specified, the generated graph is written into the file *outfile*. Otherwise, the graph is written to standard out.
- d**   Make the generated graph directed.
- v**   Verbose output.
- ?**   Print usage information.

## EXIT STATUS

**gvgen** exits with 0 on successful completion, and exits with 1 if given an ill-formed or incorrect flag, or if the specified output file could not be opened.

## AUTHOR

Emden R. Gansner <erg@research.att.com>

## SEE ALSO

gc(1), acyclic(1), gvpr(1), gvcolor(1), ccomps(1), sccmap(1), tred(1), libgraph(3)