

**NAME**

gvgen – generate graphs

**SYNOPSIS**

**gvgen** [ **-dv?** ] [ **-in** ] [ **-cn** ] [ **-C<sub>x,y</sub>** ] [ **-g/f<sub>x,y</sub>** ] [ **-G/f<sub>x,y</sub>** ] [ **-hn** ] [ **-kn** ] [ **-b<sub>x,y</sub>** ] [ **-B<sub>x,y</sub>** ] [ **-mn** ] [ **-M<sub>x,y</sub>** ] [ **-pn** ] [ **-r<sub>x,y</sub>** ] [ **-R<sub>x</sub>** ] [ **-sn** ] [ **-Sn** ] [ **-S<sub>n,d</sub>** ] [ **-tn** ] [ **-td,n** ] [ **-T<sub>x,y</sub>** ] [ **-T<sub>x,y,u,v</sub>** ] [ **-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 <sub>x,y</sub>**   Generate an  $x$  by  $y$  cylinder. This will have  $x*y$  vertices and  $2*x*y - y$  edges.
- g /f<sub>x,y</sub>**     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<sub>x,y</sub>**     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 <sub>x,y</sub>**     Generate a complete  $x$  by  $y$  bipartite graph. This will have  $x+y$  vertices and  $x*y$  edges.
- B <sub>x,y</sub>**     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 <sub>x,y</sub>**     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 <sub>x,y</sub>**     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 <sub>n,d</sub>**     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 <sub>h,n</sub>**     Generate a  $n$ -ary tree of height  $h$ .
- T <sub>x,y</sub>**     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.
- T <sub>x,y,u,v</sub>**     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)