

**NAME**

gv\_io - graph manipulation in io

**SYNOPSIS****USAGE****INTRODUCTION**

**gv\_io** is a dynamically loaded extension for **io** that provides access to the graph facilities of **graphviz**.

**COMMANDS****New graphs**

New empty graph

```
graph_handle gv.graph (name);
graph_handle gv.digraph (name);
graph_handle gv.strictgraph (name);
graph_handle gv.strictdigraph (name);
```

New graph from a dot-syntax string or file

```
graph_handle gv.readstring (string);
graph_handle gv.read (string filename);
graph_handle gv.read (channel);
```

Add new subgraph to existing graph

```
graph_handle gv.graph (graph_handle, name);
```

**New nodes**

Add new node to existing graph

```
node_handle gv.node (graph_handle, name);
```

**New edges**

Add new edge between existing nodes

```
edge_handle gv.edge (tail_node_handle, head_node_handle);
```

Add a new edge between an existing tail node, and a named head node which will be induced in the graph if it doesn't already exist

```
edge_handle gv.edge (tail_node_handle, head_name);
```

Add a new edge between an existing head node, and a named tail node which will be induced in the graph if it doesn't already exist

```
edge_handle gv.edge (tail_name, head_node_handle);
```

Add a new edge between named tail and head nodes which will be induced in the graph if they don't already exist

```
edge_handle gv.edge (graph_handle, tail_name, head_name);
```

**Setting attribute values**

Set value of named attribute of graph/node/edge - creating attribute if necessary

```
string gv.setv (graph_handle, attr_name, attr_value);
string gv.setv (node_handle, attr_name, attr_value);
string gv.setv (edge_handle, attr_name, attr_value);
```

Set value of existing attribute of graph/node/edge (using attribute handle)

```
string gv.setv (graph_handle, attr_handle, attr_value);
string gv.setv (node_handle, attr_handle, attr_value);
string gv.setv (edge_handle, attr_handle, attr_value);
```

**Getting attribute values**

Get value of named attribute of graph/node/edge

```
string gv.getv (graph_handle, attr_name);
string gv.getv (node_handle, attr_name);
string gv.getv (edge_handle, attr_name);
```

Get value of attribute of graph/node/edge (using attribute handle)

```
string gv.getv (graph_handle, attr_handle);
string gv.getv (node_handle, attr_handle);
string gv.getv (edge_handle, attr_handle);
```

#### Obtain names from handles

```
string gv.nameof (graph_handle);
string gv.nameof (node_handle);
string gv.nameof (attr_handle);
```

#### Find handles from names

```
graph_handle gv.findsubg (graph_handle, name);
node_handle gv.findnode (graph_handle, name);
edge_handle gv.findedge (tail_node_handle, head_node_handle);
attribute_handle gv.findattr (graph_handle, name);
attribute_handle gv.findattr (node_handle, name);
attribute_handle gv.findattr (edge_handle, name);
```

#### Misc graph navigators returning handles

```
node_handle gv.headof (edge_handle);
node_handle gv.tailof (edge_handle);
graph_handle gv.graphof (graph_handle);
graph_handle gv.graphof (edge_handle);
graph_handle gv.graphof (node_handle);
graph_handle gv.rootof (graph_handle);
```

#### Obtain handles of proto node/edge for setting default attribute values

```
node_handle gv.protonode (graph_handle);
edge_handle gv.protoedge (graph_handle);
```

#### Iterators

Iteration termination tests

```
bool gv.ok (graph_handle);
bool gv.ok (node_handle);
bool gv.ok (edge_handle);
bool gv.ok (attr_handle);
```

Iterate over subgraphs of a graph

```
graph_handle gv.firstsubg (graph_handle);
graph_handle gv.nextsubg (graph_handle, subgraph_handle);
```

Iterate over supergraphs of a graph (obscure and rarely useful)

```
graph_handle gv.firstsupg (graph_handle);
graph_handle gv.nextsupg (graph_handle, subgraph_handle);
```

Iterate over edges of a graph

```
edge_handle gv.firstedge (graph_handle);
edge_handle gv.nextedge (graph_handle, edge_handle);
```

Iterate over outedges of a graph

```
edge_handle gv.firstout (graph_handle);
edge_handle gv.nextout (graph_handle, edge_handle);
```

Iterate over edges of a node

```
edge_handle gv.firstedge (node_handle);
edge_handle gv.nextedge (node_handle, edge_handle);
```

Iterate over out-edges of a node

```
edge_handle gv.firstout (node_handle);  
edge_handle gv.nextout (node_handle, edge_handle);
```

Iterate over head nodes reachable from out-edges of a node

```
node_handle gv.firsthead (node_handle);  
node_handle gv.nexthead (node_handle, head_node_handle);
```

Iterate over in-edges of a graph

```
edge_handle gv.firstin (graph_handle);  
edge_handle gv.nextin (node_handle, edge_handle);
```

Iterate over in-edges of a node

```
edge_handle gv.firstin (node_handle);  
edge_handle gv.nextin (graph_handle, edge_handle);
```

Iterate over tail nodes reachable from in-edges of a node

```
node_handle gv.firsttail (node_handle);  
node_handle gv.nexttail (node_handle, tail_node_handle);
```

Iterate over nodes of a graph

```
node_handle gv.firstnode (graph_handle);  
node_handle gv.nextnode (graph_handle, node_handle);
```

Iterate over nodes of an edge

```
node_handle gv.firstnode (edge_handle);  
node_handle gv.nextnode (edge_handle, node_handle);
```

Iterate over attributes of a graph

```
attribute_handle gv.firstattr (graph_handle);  
attribute_handle gv.nextattr (graph_handle, attr_handle);
```

Iterate over attributes of an edge

```
attribute_handle gv.firstattr (edge_handle);  
attribute_handle gv.nextattr (edge_handle, attr_handle);
```

Iterate over attributes of a node

```
attribute_handle gv.firstattr (node_handle);  
attribute_handle gv.nextattr (node_handle, attr_handle);
```

### Remove graph objects

```
bool gv.rm (graph_handle);  
bool gv.rm (node_handle);  
bool gv.rm (edge_handle);
```

### Layout

Annotate a graph with layout attributes and values using a specific layout engine

```
bool gv.layout (graph_handle, string engine);
```

### Render

Render a layout into attributes of the graph

```
bool gv.render (graph_handle);
```

Render a layout to stdout

```
bool gv.render (graph_handle, string format);
```

Render to an open file

```
bool gv.render (graph_handle, string format, channel fout);
```

Render a layout to an unopened file by name

```
bool gv.render (graph_handle, string format, string filename);
```

Render to a string result

```
string gv.renderresult (graph_handle ing, string format);  
gv.renderresult (graph_handle, string format, string outdata);
```

Render to an open channel

```
bool gv.renderchannel (graph_handle, string format, string channelname);
```

Render a layout to a malloc'ed string, to be free'd by the caller

(deprecated - too easy to leak memory)

```
(still needed for "eval [gv::renderdata $G tk]" )  
string gv.renderdata (graph_handle, string format);
```

Writing graph back to file

```
bool gv.write (graph_handle, string filename);  
bool gv.write (graph_handle, channel);
```

Graph transformation tools

```
bool gv.tred (graph_handle);
```

## KEYWORDS

graph, dot, neato, fdp, circo, twopi, io.