# How to use Graphviz

## A. Introduction

"Graphviz" is a graph visualization software developed by AT&T research lab. It's an open source software and can be download from: http://www.graphviz.org/.

In the provided BDD package, you can output the BDD into the "dot" language format by the function (One of the TODO's):

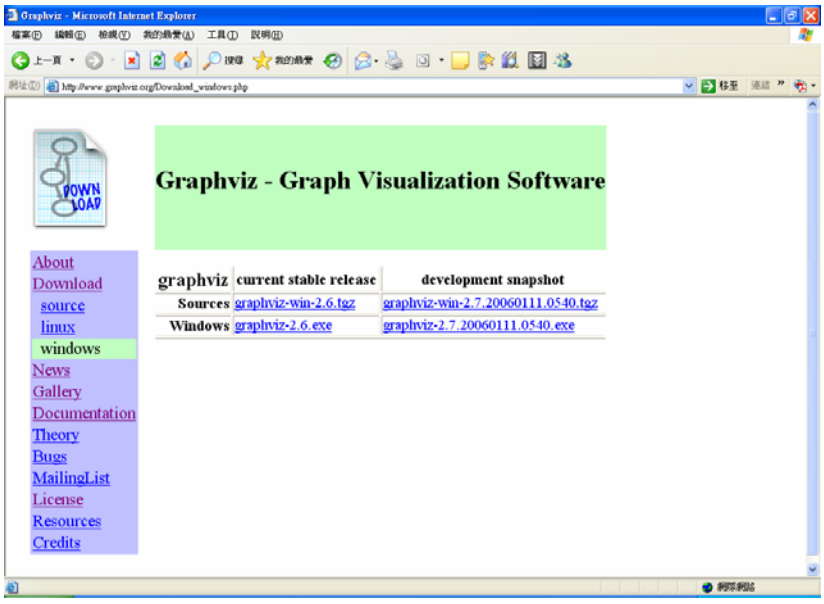
```
void BddNode::drawBdd(const string& nodeName, ofstream& fileName) const;
```

To use it, you can refer to the test program in ".../src/bdd/test/testBdd.cpp" for an example.

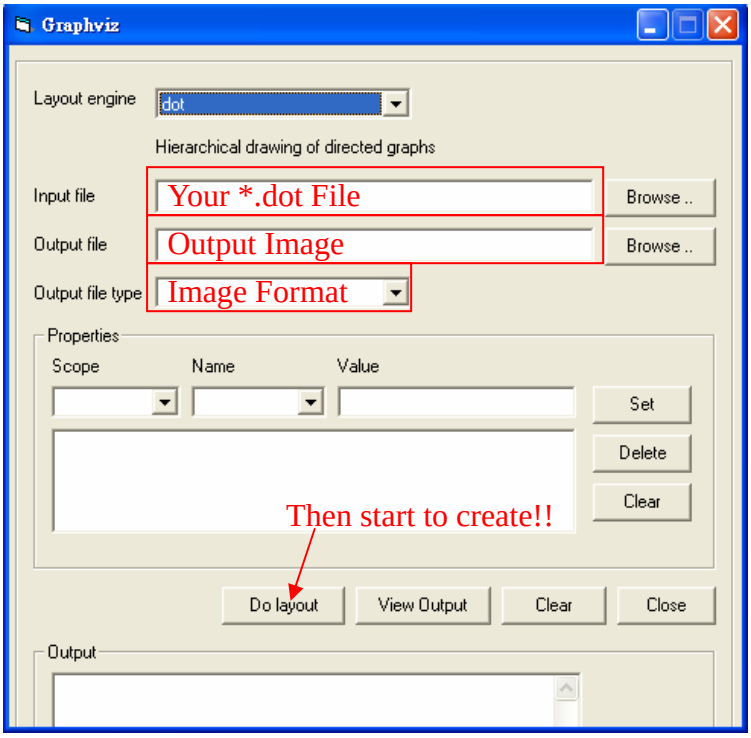
Moreover, you can convert the "dot" file into a graphic file (e.g. png, jpg, etc). The following is a simple guide about how to use "Graphviz".

## B. Preparing work

1. Go to http://www.graphviz.org to download the software




2. Read the file "INSTALL". In short, to install the tools---
   * ./configure  // You may want to specify "--prefix=<dir>"
   * make
   * make install
3. Then we use "Grapviz->dot" to convert "dot" to graphic file




or use the non-GUI command ---

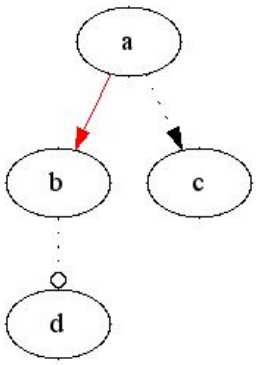
```
> dot <dotFile> -o<outFile> -T<format>
  (for example: “dot 22.dot -o 22.png -Tpng”)
```

## C. Dot format

Reference to http://www.graphviz.org/Documentation/dotguide.pdf

Example:

```
digraph {
"a" -> "b" [color = red];
"a" -> "c" [style = dotted ];
"b" -> "d" [arrowhead = odot ] [style = dotted ];
}
```

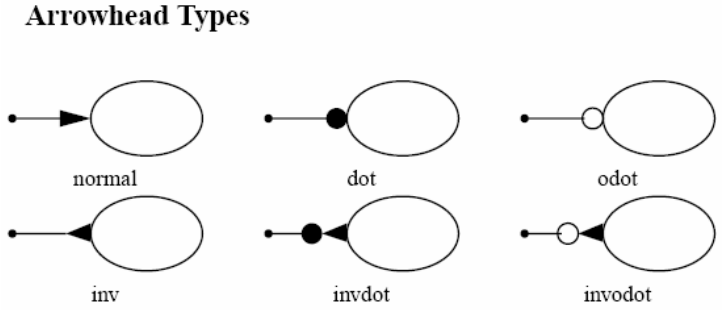



1.”digraph” means directed graphic. There are choices for “graph” or “digraph”.

2. "a" means a node of label name "a".

   "a" -> "b" means a link of two nodes

3.[parameter = xxx], there are many parameters.




For more, see http://www.graphviz.org/doc/info/attrs.html
http://www.graphviz.org/doc/info/shapes.html
http://www.graphviz.org/doc/info/arrows.html
http://www.graphviz.org/doc/info/colors.html
All in their website

## D. Use Graphviz to Draw BDD

1. Use BFS or DFS etc. to scan all nodes in BDD tree.
2. Output every link between nodes and their parent nodes in *.dot file.
   Their format is like "parent node" -> "child node";
4. For different types of links, choose different colors and arrows for them.
5. For subgraph, cluster, or layer etc., see
   http://www.graphviz.org/Documentation/dotguide.pdf
   for more details.
6. For example: 22GAT$PO for C17.cir

```
digraph {
   node [shape = plaintext];
   4 -> 3 -> 2 -> 1 -> 0 [style = invis];
   { rank = source; "9"; }
   node [shape = ellipse];
   "9" -> "0x54c6d0" [color = blue];
   { rank = same; 4; "0x54c6d0"; }
   "0x54c6d0" -> "0x54c190";
   "0x54c6d0" -> "0x54c510"[style = dotted ] [color=red];
   { rank = same; 3; "0x54c190"; }
   "0x54c190" -> "0x542300";
   "0x54c190" -> "0x542350"[style = dotted ] [color=red];
   { rank = same; 1; "0x542300"; }
   "0x542300" -> "One";
   "0x542300" -> "One"[style = dotted ] [color=red] [arrowhead=odot]
```

```
  { rank = same; 2; "0x542350"; }
  "0x542350" -> "One";
  "0x542350" -> "One"[style = dotted ] [color=red] [arrowhead=odot]
  { rank = same; 3; "0x54c510"; }
  "0x54c510" -> "0x54c350";
  "0x54c510" -> "0x542350"[style = dotted ] [color=red];
  { rank = same; 2; "0x54c350"; }
  "0x54c350" -> "One";
  "0x54c350" -> "0x542300"[style = dotted ] [color=red];
  { rank = same; 0; "One"; }
}
```