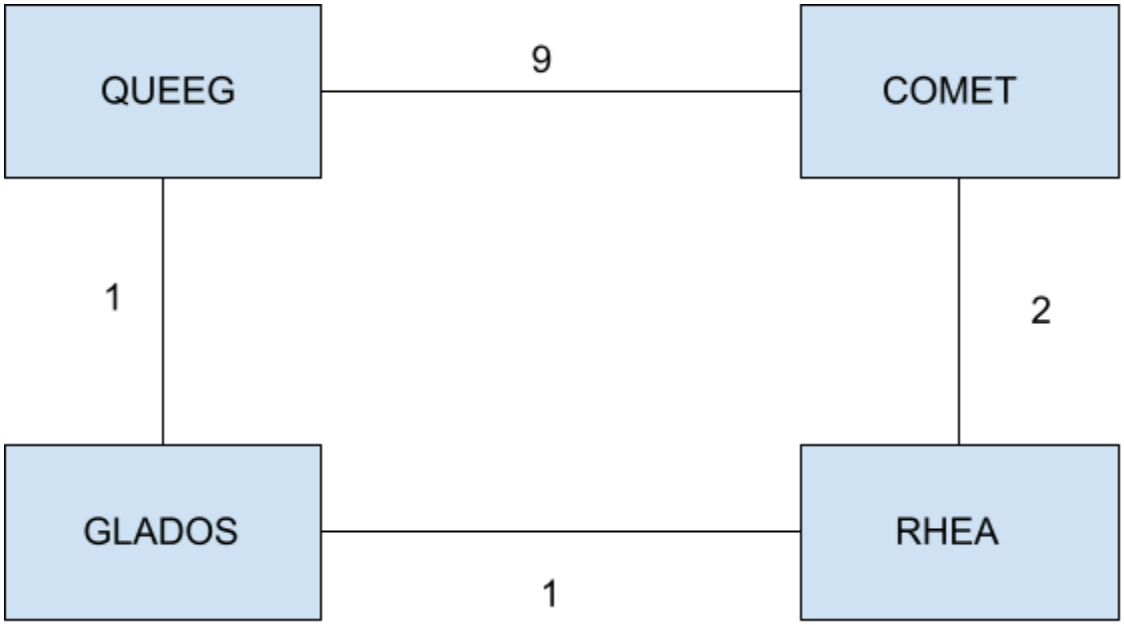
Project 5 Distance-Vector Routing Suraj Sureshkumar(ss7495)

There are four code files and each code has functions for send, receive, update, display, split horizon poison reverse, initializing the tables.

Video link -
https://drive.google.com/file/d/1M02NAFf6kLvy5X5i9u-SX90hfHr__Hra/view?usp=sharing
If any issues with accessing the video let me know through email : ss7495@rit.edu

TASK 1

The topology with the costs and the routers connected in a ring:



Each router has the following initial setting of the neighbor and the cost to each:

Queeg:

```
self.routers = {
    'glados': ('127.0.0.1', 1, 4504),
    'comet': ('127.0.0.1', 9, 4502),
    'rhea': ('127.0.0.1', 16, 4503)}
```

Comet:

```
self.routers = {
    'rhea': ('127.0.0.1', 2, 4503),
    'queeg': ('127.0.0.1', 9, 4501),
    'glados': ('127.0.0.1', 16, 4504)}
```

Rhea:

```
self.routers = {
    'comet': ('127.0.0.1', 2, 4502),
    'glados': ('127.0.0.1', 1, 4504),
    'queeg': ('127.0.0.1', 16, 4501)}
```

Glados:

```
self.routers = {
    'queeg': ('127.0.0.1', 1, 4501),
    'rhea': ('127.0.0.1', 1, 4503),
    'comet': ('127.0.0.1', 16, 4502)}
```

TASK 2

The four routers were connected as shown above. I used "from multiprocessing import Process". I implemented using local as subnetting is not required when implementing it locally.
The link cost can be changed in the program where "self.router=" is defined in the constructor.

Run the scripts in the order: comet, rhea, glados and queeg

Queeg initial table:

```
glados      1           glados
comet       9           comet
rhea        16          -
```

Comet initial table:

```
rhea        2           rhea
queeg       9           queeg
glados      16          -
```

Rhea initial table:

```
comet       2           comet
glados      1           glados
queeg       16          -
```

Glados initial table:

```
queeg       1           queeg
rhea        1           rhea
comet       16          -
```

Queeg table optimized after learning new routers:

glados	1	glados
comet	4	glados
rhea	2	glados

Comet table optimized after learning new routers:

rhea	2	rhea
queeg	9	queeg
glados	3	rhea

Rhea table optimized after learning new routers:

comet	2	comet
glados	1	glados
queeg	2	glados

Glados table optimized after learning new routers:

queeg	1	queeg
rhea	1	rhea
comet	3	rhea

TASK 3

1) How does RIP broadcast route messages?

Ans: RIP broadcasts route messages using distance vector algorithm. When there is a change in network topology each router learns the changes after routers sends updates to all of its neighboring routers. The update consists of the the cost to reach each destination network. When each router receives the routing update the routers update their table. The router can learn new destinations from the update and adds the network to the routing table and begins sending packets. Broadcast takes place every 30 seconds to make sure that all routers have the updated network information. Updates are sent to neighboring routers when one of the router fails and there by updating the routing table with the new cost.

2) How does RIP handle incoming messages?

Ans: When a router receives an incoming message from another router it first checks the source to ensure that it is coming from its neighbor. The router checks the RIP version number, if there is a change in version then the message is discarded. The router broadcasts their own routing table to neighbors which is know as response messages as they contain information about the sending router. The messages can be update, response or request. If the message is update meaning there might be some change to routing table entries. The request messages asks for updates on networks or the routing table.

3) How does RIP support CIDR?

Ans: Only RIP version 2 supports CIDR(Classless Inter-Domain Routing) which is used to allocate IP addresses and traffic based on variable-length subnet mask. When CIDR is used RIP can send and receive updates from networks that are not classful which allows for the maximizing and efficient use of the address space. Routers use subnet mask in RIP version 2 to advertise their routing information. The prefix length is checked to determine the best route to a particular network.

4) What does a routing table look like?

Ans: Routing table contains the information of a particular network, the available routes to a particular network. Routing tables are used to determine the best path to a destination.The routing table consists of the destination address the address the router needs to reach, subnet mask specifies the length of the prefix, next-hop, metric is the cost to reach the destination, routing protocol that was used to learn the path to the destination. Below is an example of how a routing table looks like.

Destination	Subnet Mask	Next-Hop	Metric	Interface	Protocol
10.0.0.0	255.255.0.0	10.1.1.1	1	eth0	OSPF
172.16.0.0	255.255.255.0	192.168.1.2	2	eth1	RIP
192.168.1.0	255.255.255.0	0.0.0.0	0	eth1	Connected