COSC364 assignment
RIP ROUTING PROTOCOL IMPLEMENTATION

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Partner contribution

This assignment is done individually due to special consideration. I sent an email to Dr Willig on 17/3/2023 at 10:03 AM that I want to do the assignment without partner contribution.

Questions

There should be a substantial discussion about the testing you have performed (for each test: what was to be tested, what was the expected outcome and what was the actual outcome) and which conclusions these tests allow about the correctness of your design and implementation.

Unit tests

Test config

Configuration files must have three mandatory routing parameters: router-id, input-ports, and outputs. I test read_config(filename) function with configTest1.txt which includes all three parameters as below.

router-id 1
input-ports 10012, 10013
outputs 10021-2-2, 10031-7-3

The expected outcome is a configs dictionary: configs["router-id"] equals 1, configs["Input-ports"] equal [10012, 10013],
configs["outputs"] has a list of two dictionaries ->
configs["outputs"][0] equals {"dest_id": 2, "metric": 2, "next_hop": 10021} and
configs["outputs"][1] equals {"dest_id": 3, "metric": 7, "next_hop": 10031}
The test passes successfully.

Test utils

I test Create_rip_packet, procces_rip_packet, create_server_socket methods.
I make a rip packet with next_hop = 2, metric = 3, and dest_id = 7. When proccessing a rip packet I need to retrieve the exact same data. The tests passes succesfully.
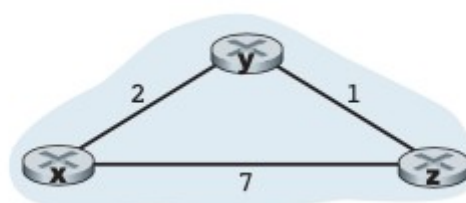Creating a server socket, I test that the socket type eqauls "SOCK_DGRAM", socket family name equals "AF_INIT" and socket is created on correct values of port numbers.

Test Distance Victor

I test routing table, server sockets, source_router_id, and garbage are correctly initialized.

End to end test

Finding shortest path

At time T0 Router 1 is on. Router 2, and 3 are off. Forwarding table is empty.

```
-----------------------------------------------------------------
FORWARDING TABLE OF ROUTER = 1
  Router  | Next-hop | Metric  |  Timer  | Reachable
-----------------------------------------------------------------
```

We turn on router 3 at time T1
at T2 Router 1 updates its forwarding table after hearing from router 3

```
-----------------------------------------------------------------
FORWARDING TABLE OF ROUTER = 1
  Router  | Next-hop | Metric  |  Timer  | Reachable
    3    |   3    |   7   |  1.00  | True
-----------------------------------------------------------------
```

At T3 router 3 updates its forwarding table when hears from Router 1

```
-----------------------------------------------------------------
FORWARDING TABLE OF ROUTER = 3
  Router  | Next-hop | Metric  |  Timer  | Reachable
    1    |   1    |   7   |  1.00  | True
-----------------------------------------------------------------
```

At T4 router 2 is on. First routing table is empty but after a periodic time Router 2 knows about router 1 and 3.

```
-----------------------------------------------------------------
FORWARDING TABLE OF ROUTER = 2
  Router  | Next-hop | Metric  |  Timer  | Reachable
    1    |   1    |   2   |  1.00  | True
    3    |   3    |   1   |  1.00  | True
-----------------------------------------------------------------
```

At T5 router 1 knows that there is a shorter path to router 3 via router 2. it updates its routing table**.**

```
-----------------------------------------------------------------
FORWARDING TABLE OF ROUTER = 1
  Router  | Next-hop | Metric  |  Timer  | Reachable
    2    |   2    |   2   |  1.00  | True
    3    |   2    |   3   |  1.00  | True
-----------------------------------------------------------------
```

At T6 router 3 knows there is a shorter path to router 1 via router 2. it updates its routing table.

```
-----------------------------------------------------------------
FORWARDING TABLE OF ROUTER = 3
  Router  | Next-hop | Metric  |  Timer  | Reachable
    1    |   2    |   3   |  1.00  | True
    2    |   2    |   1   |  1.00  | True
-----------------------------------------------------------------
```

Now all routers have identical routing information.

At T7 we close router 2.
Router 1, and 3 increase the timer. When the timeout occures Router 1, and 3 make reachable to router 2 false and reroute. By the time garbage timer finishes. Router 2 is deleted from routing table.

Router 1 and router 3 routing tables are as follow after convergence.

FORWARDING TABLE OF ROUTER = 1

Router	Next-hop	Metric	Timer	Reachable
3	3	7	1.00	True

FORWARDING TABLE OF ROUTER = 3

Router	Next-hop	Metric	Timer	Reachable
1	1	7	1.00	True

We turn on router 2 again and routers are able to reroute and find the shortest path again.

FORWARDING TABLE OF ROUTER = 1

Router	Next-hop	Metric	Timer	Reachable
2	2	2	1.00	True
3	2	3	1.00	True

FORWARDING TABLE OF ROUTER = 2

Router	Next-hop	Metric	Timer	Reachable
1	1	2	1.00	True
3	3	1	1.00	True

FORWARDING TABLE OF ROUTER = 3

Router	Next-hop	Metric	Timer	Reachable
1	2	3	1.00	True
2	2	1	1.00	True

Cofig file
configuration file format
X = router-id, Y = neighbor, M = metric
router-id X
imput-ports 100XY
outputs 100YXMY

router-id 1
input-ports 10012, 10016, 10017
outputs 10021-1-2, 10061-5-6, 10071-8-7

router-id 2
input-ports 10021, 10023
outputs 10012-1-1, 10032-3-3

router-id 3
input-ports 10032, 10034
outputs 10023-3-2, 10043-4-4

router-id 4
input-ports 10043, 10045, 10047
outputs 10034-4-3, 10054-2-5, 10074-6-7

router-id 5
input-ports 10054, 10056
outputs 10045-2-4, 10065-1-6

router-id 6
input-ports 10061, 10065
outputs 10016-5-1, 10056-1-5

router-id 7
input-ports 10071, 10074
outputs 10017-8-1, 10047-6-4