

PROJECT 3

ITCS 6166

Computer Communication and Networking

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Implementation of the Distance Vector Routing:

Programming Language used: JAVA

OS: Windows 10.1

IDE: Eclipse Oxygen

Implementation:

The distance vector routing protocol in our case is implemented using JAVA. There are two java files primarily:

- 1) Master.java – The purpose of the master is to take the input as a directory path as an input. It then gets access to the number of routers present in the path and assigns port numbers to each of those corresponding routers.
- 2) MainRouter.java – The purpose of the main router is to find the shortest distance to other routers. The other functions are it also detecting link cost changes and cost recalculating. The wait time we had allowed for both receiving the distance vector from neighbours and after recomputing is 6 and 9 seconds.

We are using a single host machine for project 3.

Running Instructions:

- Firstly, in the command prompt navigate to the “src” folder and compile the files by running the command “javac *.java”.
- Then give the following command “java Master <path to the “Dataabcdef” >”
- If we are checking for the link cost and the re-computation of the shortest path, then the command is “java Master <path to the “xyz” required for DVT computation>

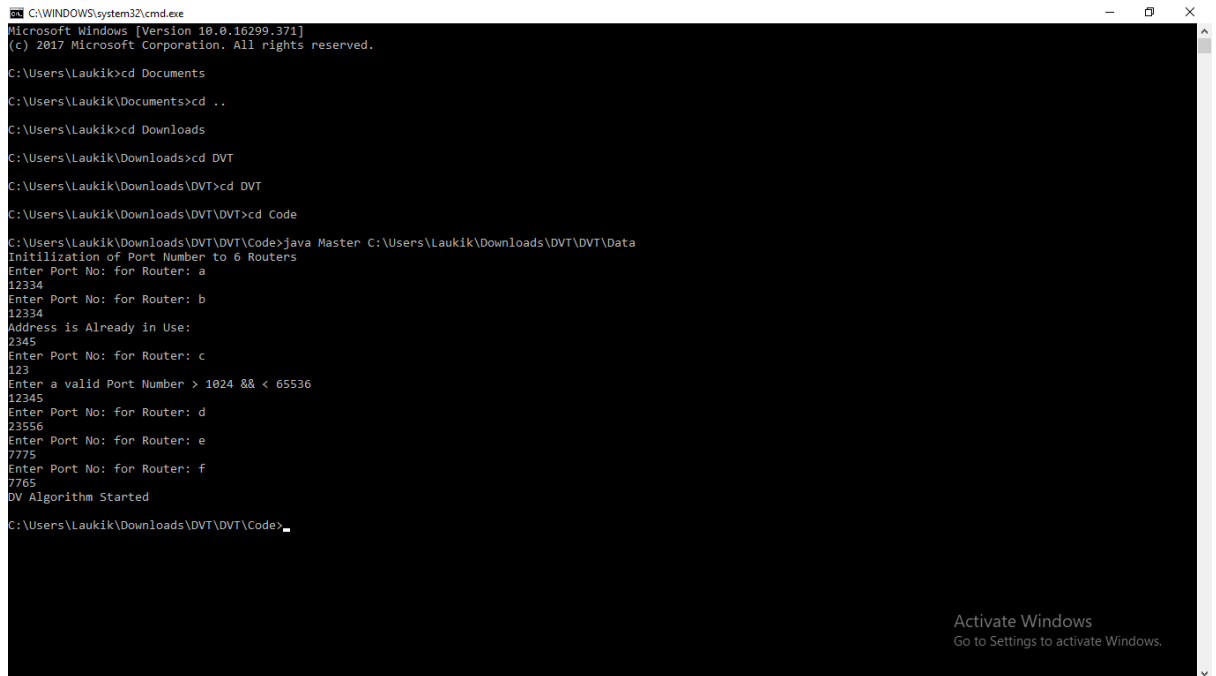
Key points:

- The wait time we had allowed for both receiving the distance vector from neighbours and after recomputing is 6 and 9 seconds.
- We made use of the process builder to invoke multiple processes for the different routers.
- There are two threads used respectively for reading and writing the distance vectors.
- Error Handling mechanism for entering the invalid port number has been included.

Output Simulation:

We would like to document some of our output results:

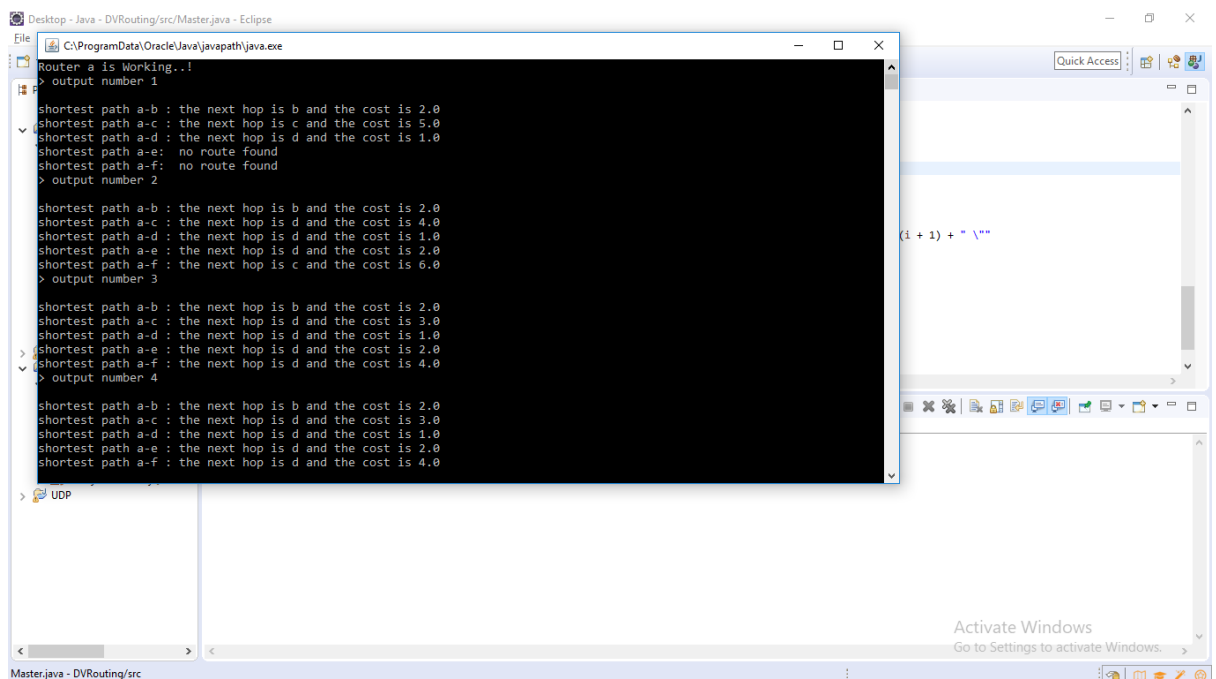
- Accessing the .dat files and then assigning the port numbers to each(6) of the routers.



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.16299.371]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\Users\Laukik>cd Documents
C:\Users\Laukik\Documents>cd ..
C:\Users\Laukik>cd Downloads
C:\Users\Laukik\Downloads>cd DVT
C:\Users\Laukik\Downloads\DVT>cd DVT
C:\Users\Laukik\Downloads\DVT>cd Code
C:\Users\Laukik\Downloads\DVT\Code>java Master C:\Users\Laukik\Downloads\DVT\Code\Data
Initialization of Port Number to 6 Routers
Enter Port No: for Router: a
12334
Enter Port No: for Router: b
12334
Address is Already in Use:
2345
Enter Port No: for Router: c
123
Enter a valid Port Number > 1024 && < 65536
12345
Enter Port No: for Router: d
23556
Enter Port No: for Router: e
7775
Enter Port No: for Router: f
7765
DV Algorithm Started
C:\Users\Laukik\Downloads\DVT\Code>
```

- The initial terminal output:



```
Desktop - Java - DVRouting/src/Master.java - Eclipse
C:\ProgramData\Oracle\Java\javapath\java.exe
Router a is Working..!
> output number 1
shortest path a-b : the next hop is b and the cost is 2.0
shortest path a-c : the next hop is c and the cost is 5.0
shortest path a-d : the next hop is d and the cost is 1.0
shortest path a-e : no route found
shortest path a-f : no route found
> output number 2
shortest path a-b : the next hop is b and the cost is 2.0
shortest path a-c : the next hop is d and the cost is 4.0
shortest path a-d : the next hop is d and the cost is 1.0
shortest path a-e : the next hop is d and the cost is 2.0
shortest path a-f : the next hop is c and the cost is 6.0
> output number 3
shortest path a-b : the next hop is b and the cost is 2.0
shortest path a-c : the next hop is d and the cost is 3.0
shortest path a-d : the next hop is d and the cost is 1.0
shortest path a-e : the next hop is d and the cost is 2.0
shortest path a-f : the next hop is d and the cost is 4.0
> output number 4
shortest path a-b : the next hop is b and the cost is 2.0
shortest path a-c : the next hop is d and the cost is 3.0
shortest path a-d : the next hop is d and the cost is 1.0
shortest path a-e : the next hop is d and the cost is 2.0
shortest path a-f : the next hop is d and the cost is 4.0
> UDP
```

- Initial outputs of the rest of the routers from (b-f):

Desktop - Java - DVRouting/src/Master.java - Eclipse

File C:\ProgramData\Oracle\Java\javapath\java.exe

Router b is Working..!

```
> output number 1
shortest path b-a : the next hop is a and the cost is 2.0
shortest path b-c : the next hop is c and the cost is 3.0
shortest path b-d : the next hop is d and the cost is 2.0
shortest path b-e : no route found
shortest path b-f : no route found
> output number 2
shortest path b-a : the next hop is a and the cost is 2.0
shortest path b-c : the next hop is c and the cost is 3.0
shortest path b-d : the next hop is d and the cost is 2.0
shortest path b-e : the next hop is d and the cost is 3.0
shortest path b-f : the next hop is c and the cost is 4.0
> output number 3
shortest path b-a : the next hop is a and the cost is 2.0
shortest path b-c : the next hop is c and the cost is 3.0
shortest path b-d : the next hop is d and the cost is 2.0
shortest path b-e : the next hop is d and the cost is 3.0
shortest path b-f : the next hop is c and the cost is 4.0
> output number 4
shortest path b-a : the next hop is a and the cost is 2.0
shortest path b-c : the next hop is c and the cost is 3.0
shortest path b-d : the next hop is d and the cost is 2.0
shortest path b-e : the next hop is d and the cost is 3.0
shortest path b-f : the next hop is c and the cost is 4.0
> output number 5
> UDP
```

Master.java - DVRouting/src

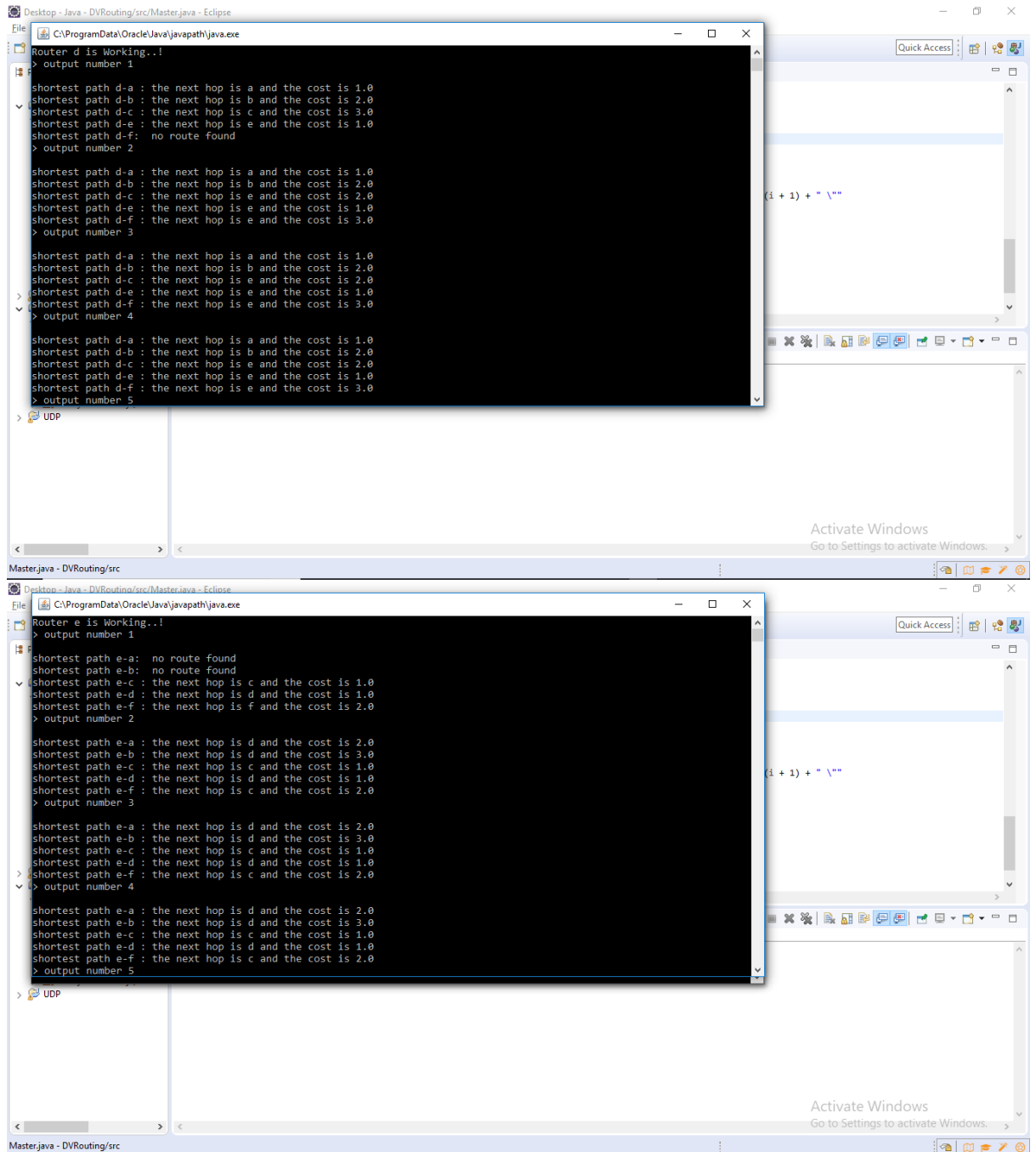
Desktop - Java - DVRouting/src/Master.java - Eclipse

File C:\ProgramData\Oracle\Java\javapath\java.exe

Router c is Working..!

```
> output number 1
shortest path c-a : the next hop is a and the cost is 5.0
shortest path c-b : the next hop is b and the cost is 3.0
shortest path c-d : the next hop is d and the cost is 3.0
shortest path c-e : the next hop is e and the cost is 1.0
shortest path c-f : the next hop is f and the cost is 1.0
> output number 2
shortest path c-a : the next hop is d and the cost is 4.0
shortest path c-b : the next hop is b and the cost is 3.0
shortest path c-d : the next hop is e and the cost is 2.0
shortest path c-e : the next hop is e and the cost is 1.0
shortest path c-f : the next hop is f and the cost is 1.0
> output number 3
shortest path c-a : the next hop is e and the cost is 3.0
shortest path c-b : the next hop is b and the cost is 3.0
shortest path c-d : the next hop is e and the cost is 2.0
shortest path c-e : the next hop is e and the cost is 1.0
shortest path c-f : the next hop is f and the cost is 1.0
> output number 4
shortest path c-a : the next hop is e and the cost is 3.0
shortest path c-b : the next hop is b and the cost is 3.0
shortest path c-d : the next hop is e and the cost is 2.0
shortest path c-e : the next hop is e and the cost is 1.0
shortest path c-f : the next hop is f and the cost is 1.0
> output number 5
```

Master.java - DVRouting/src



- This is the final output after the re-computation due to a link cost change

The image shows three overlapping terminal windows from a Windows command prompt, displaying the output of a network simulation. The windows are titled 'C:\ProgramData\Oracle\Java\javapath\java.exe'.

Router y is Working..!

```

> output number 1
Enter
1245 shortest path y-x : the next hop is x and the cost is 60.0
Enter
5321 shortest path y-z : the next hop is z and the cost is 1.0
> output number 2
Enter
3456 shortest path y-x : the next hop is z and the cost is 51.0
DV All shortest path y-z : the next hop is z and the cost is 1.0
> output number 3
C:\Us
Initi shortest path y-x : the next hop is z and the cost is 51.0
Enter shortest path y-z : the next hop is z and the cost is 1.0
4646 > output number 4
Enter
4334 shortest path y-x : the next hop is z and the cost is 51.0
Enter shortest path y-z : the next hop is z and the cost is 1.0
3344 > output number 5
DV All
C:\Users\Laukik\Downloads\DVT\DVT\Code>

```

Router x is Working..!

```

> output number 1
shortest path x-y : the next hop is y and the cost is 60.0
shortest path x-z : the next hop is z and the cost is 50.0
> output number 2
shortest path x-y : the next hop is z and the cost is 51.0
shortest path x-z : the next hop is z and the cost is 50.0
> output number 3
shortest path x-y : the next hop is z and the cost is 51.0
shortest path x-z : the next hop is z and the cost is 50.0
> output number 4
shortest path x-y : the next hop is z and the cost is 51.0
shortest path x-z : the next hop is z and the cost is 50.0
> output number 5

```

Router z is Working..!

```

> output number 1
shortest path z-x : the next hop is x and the cost is 50.0
shortest path z-y : the next hop is y and the cost is 1.0
> output number 2
shortest path z-x : the next hop is x and the cost is 50.0
shortest path z-y : the next hop is y and the cost is 1.0
> output number 3
shortest path z-x : the next hop is x and the cost is 50.0
shortest path z-y : the next hop is y and the cost is 1.0
> output number 4
shortest path z-x : the next hop is x and the cost is 50.0
shortest path z-y : the next hop is y and the cost is 1.0
> output number 5
shortest path z-x : the next hop is x and the cost is 50.0
shortest path z-y : the next hop is y and the cost is 1.0
> output number 6
shortest path z-x : the next hop is x and the cost is 50.0

```

-----THANK YOU-----