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SUJET

Simulation and Implementation of Routing Algorithm

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INDEX

I. A brief history about the algorithm	18
II. Centralized View: General Introduction	20
III. Distributed View: Bellman-Ford Algorithm	23
IV. The distributed view VS the centralized view of Bellman-Ford	26
General introduction	2

Chapter 1

Overview On Network Addressing And Routing Basics

1. Introduction	5
2. Network addressing	5
2.1 IP address	6
I. Public and private IP addresses	7
II. Addressing Class Schemes.....	7
III. Sub netting / net mask	9
2.2 TCP/IP Protocols	11
2.2.1 Brief on the ISO 7-Layer Reference Model.....	11
I. A look at each of the OSI layers, and the role it plays	11
3. Overview on routing.....	13
3.1. Routing Table.....	14
I. Filtering.....	14
4. Conclusion	15

Chapter 2

Routing Algorithms: Shortest Path Algorithms

1. Introduction	17
2. Shortest path algorithms.....	17
2.1 Bellman-Ford algorithm	18

INDEX

1.1	I. A brief history about the algorithm	18
	II. Centralized View: Bellman–Ford Algorithm.....	20
	III. Distributed View: Bellman–Ford Algorithm	23
3.1	IV. The distributed view VS the centralized view of Bellman-Ford	26
3.1	V. bellman ford negative cycle detection	26
4.0	2.2 Dijkstra’s Algorithm	28
	I. A brief history about the algorithm	28
	II. The Algorithm	28
	III. Centralized Approach	31
	IV. Distributed Approach.....	32
1.1	2.3 Differences and similarities between Dijkstra and Bellman-Ford	33
2.0	2.4 k- Shortest Paths Algorithm	34
2.1	I. A brief history of the problem.....	34
	II. Several algorithms dealing with the problem	35
1.1	3. Conclusion	36

Chapter 3

Routing Protocols And Concepts

1.0	1. Introduction	38
	1.1 Overview of routing	38
	1.2 Routing Static and Dynamic	39
	1.3 Routing protocol’s families	39
2.0	2. Distance vector routing protocols	40
3.0	2.1 Types of routing updates	40
	2.1.1 Periodic updates	40
	2.1.2 Broadcast updates	41
4.0	2.1.3 Routing by Rumor	41
	2.1.4 Asynchronous updates	42

Realization

1.0	1. Introduction	77
-----	-----------------------	----

INDEX

2.2 IP Routing and Distance Vector Protocol Family	43
2.2.1 Routing Table	43
2.2.2 Routing Information Protocol, Version 1 (RIPv1)	46
3. Link state protocols	58
3.1 General Link State Operation	58
4. Conclusion	61

Chapter 4

Simulation of Routing Algorithms

1. Introduction	63
2. Modeling tools	64
2.1 The queues	64
2.1.1 Representing a queue	64
2.1.2 Queue implementation.....	65
2.2 Petri net.....	65
3. Network routing simulation.....	66
3.1 Definition.....	66
4. Analysis and description of the simulation algorithm.....	67
4.1 Termination	67
4.2 Events classification.....	67
4.3 Processing of the event.....	68
4.4 Statistics.....	68
5. Description of entities and system events.....	69
5.1 How to deal with the record?.....	69
5.2 Conception of the algorithms	71
4. Conclusion	75

Chapter 5

Realization

1. Introduction	77
-----------------------	----

INDEX

2.The description of the general program form.....	78
3.The description of the functioning of the program.....	78
4. Example.....	84
5.Conclusion.....	86

General Conclusion

Genérale Conclusion	88
---------------------------	----

Chapter 2

Routing Algorithms: Shortest Path Algorithms

Figure 2.1: A six-node network.....	19
Figure 2.2: Centralized Bellman-Ford Algorithm	21
Figure 2.3: Distance vector view for computing the shortest path.....	24
Figure 2.4 : the initial state of the graph	30
Figure 2.5 the steps of Dijkstra's algorithm	31

Chapter 3

Routing Protocols And Concepts

Figure 3.1 : Distance vector protocols converge hop-by-hop	41
Figure 3.2 : shows a group of routers connected to an Ethernet backbone	43
Figure 3.3 : IP network illustration	45
Figure 3.4 : Figure 3.4: The RIP message format	49
Figure 3.5 : the format of RIP v2 header	52
Figure 3.6 : the format of RIP v2 header (Authentication).....	53
Figure 3.7 : IGRP packet format.....	55

General introduction

ORGANIZATION AND APPROACH

The memo is organized into 3 chapters. We present below a brief overview of each part:

• **Chapter 1:** The first chapter is about the main idea of what the whole network system

In the span of a quarter-century, network routing in communication networks has evolved tremendously. Just a quarter-century ago, the public switched telephone network (PSTN) was running hierarchical routing, ARPANET routing was operational, and the telecommunication infrastructure had fixed static transport routes. In the 1980s, we saw the first tremendous growth in routing: Internet routing was deployed under the TCP/IP stack starting, first with the RIP protocol; the telephone network started deploying dynamic call routing schemes; and the telecommunication transport network deployed SONET transport mechanisms, which could reroute in a ring topology in 40 millisecond in the event of a failure. In the past fifteen years, we have seen the need for policy routing because of multiprovider settings, and the need to develop fast lookup algorithms for packet processing that enables efficient routing. We have also seen interdependency between addressing and routing as first addressed through classless interdomain routing (CIDR) and more recently, because of number portability in the PSTN. More importantly, we saw how the way an addressing scheme is deployed can impact routing and lookup algorithms.

Theme objective:

Network routing can be broadly divided into three basic fundamental categories: packet routing, circuit-switched routing, and transport routing; certainly, a combination is possible. The evolution over the past quarter-century has brought to the foreground the need to understand and examine how the task of routing is done, from algorithms to protocols to architectures, what effect did the different types of networks leave on internet routing algorithms, and where they intersect. Certainly, the goal is to learn from the present experiences and try to implement as much as we can of these algorithms and protocols.

My work was definitely to gain as much as I could of these experiences, studying its origins and why they existed. After that, my gathering of this much of information was

crowned by trying of implementing a well known problem in the network routing which is finding the shortest path to deliver and route the information in a network, and for that I followed two policies the first one finding the shortest distance, and the second is finding the shortest path with less hops to take.

ORGANIZATION AND APPROACH

The memo is organized into 5 chapters. We present below a brief overview of each part:

- **Chapter I:** The first chapter is about the mean idea of what the whole network system is based on, a Brief on the ISO 7-Layer Reference Model and a generality on how information are to be routed from a source to a destination.
- **Chapter II:** The second chapter is divided into two major parts the first is about Bellman-ford algorithm and the second is about Dijkstra algorithm, the chapter mainly discusses the principles of routing algorithms.
- **Chapter III:** the third chapter talks about routing protocols and its concepts which is also divided into two parts the first is distance vector protocols and the second is link state protocols.
- **Chapter IV:** The fourth chapter is the chapter of the concept which is an introduction of the routing simulator's realization; it will include the first and main ideas of the program.
- **Chapter V:** The last chapter is the chapter that we will introduce in it the routing simulator

General Conclusion

Through this modest work, I tried to present the concepts and principles of network routing, by gathering definitions and concepts of this huge domain, firstly I started with generalities on IP addressing, how it works, with brief definition on Open Systems Interconnection (OSI) model, and then an overview on routing where I mention some main ideas.

After that, I started to focus on the most well known problem in network routing which is the shortest path problem, I begin the journey of introducing the problem by determine the algorithms that solve the said problem without getting in the details of how communication network uses these algorithms, I tried to show the centralized and distributed view of each algorithm.

Finally it was time to get into the technical stuff of the problem, I talked about different types routing, after that couple of protocols was introduced (RIPV1,Ripv2..), their definition, historical backgrounds...etc, I organized the protocols according to its families.

On the conception side I tried to give a vision to build a routing simulator to solve the short path problem, I based my algorithms on the policies that the motioned protocols follow; I used the queuing to illustrate the phases and the march of the simulation.

Finally in the end I built the program using -as much as I can- the gained information from the previous search.

My evaluation on my work is not that impressive, it could be a lot better but I think at least I managed o pull off the majority of the wanted work

As for the encountered difficulties, the biggest problem that I faced was time, I tried hardly to improve the simulator and to try and simulate more protocols and algorithms and

come up with a hybrid algorithm in the end, which will cover all the imperfections of the simulated ones. Also not having an electronic trading came as a huge disappointment, not able of buying a useful articles and books that would make a huge leap in my humble work.

In the end I hope that in the future I can cover all the imperfections of my simulator, and add other function to it as a comparison tool between the simulated algorithms.

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