Report 2: Routy - A Routing Network

Pethrus Gärdborn

October 12, 2017

1 Introduction

In this assignment, we have studied how routers work over the link-state routing protocol and, with the help of some guiding code, implemented a routing network represented by Erlang processes. A router by itself unconnected to anything else is of course useless. Once it becomes connected to more and more routers it becomes a vital part in a distributed system that forwards messages from endpoints attached to the network. Routers are part of the fundamental infrastructure of almost any network, most notably the Internet. When developing other distributed systems, one will in most cases work over networks that are bound together by routers. Understanding how they work may help in designing other distributed systems. Moreover, one may also choose to specialize in designing router systems, and in that case this assignment would be incredibly useful; it is like having your own simulation of a router network without any need of actual hardware. Going further with this assignment, there is a lot of experimentation that can be done, such as observing what happens if nodes go down or if a node starts malfunctioning.

2 Main problems and solutions

This assignment was a lot larger than the previous one and less code was given, so the amount of lines of code to be written was quite substantial. There were some parts that were trickier than others. Most notably, the dijkstra module had some tricky functions. The dijkstra module was the hardest one to understand, especially the procedures "iterate" and "table." One of my strategies to comprehend these procedures was to simply scratch down notes and models on paper with concrete examples. Sketching out concrete examples of networks and data structures helped me to reason better about the algorithm and finding a good way to implement it.

Sometimes, I had problems with how to implement something in Erlang but usually it did not take that long to find a solution with the help of

the online Erlang documentation as well as stackoverflow.com and learnyousomeerlang.com. Overall, I am glad that I already took a course with Johan Montelius in Erlang programming, otherwise I am sure I would have had a lot more problems with how to implement things.

Since the assignment consisted of modules which in turn built on the procedures in other modules, I found that it was important to try to make sure that each module with its procedures worked properly before moving on to the other modules. When I had not tested early constructed procedures well enough, that sometimes resulted in later constructed procedures not working because they made use of the earlier faulty ones.

3 Evaluation

For this assignment, I did not find it especially useful to create any plots or diagrams. The way I tested the routing processes was to create Erlang nodes representing different countries and routing processes within these nodes representing different cities. Then I connected them one by one and tried out the different messages to see that they responded as they should, updated their maps and routing tables appropriately and so forth.

4 Conclusions

Although large, this was a very fun and inspiring assignment, especially considering that I am very interested in networks already. The best way to really learn how a system works seem to be experimenting with it yourself. Reading about it can only take you so far, but actually building it gives you new insights that are much harder to get by solely reading a book. It was also fun to practice my Erlang skills more, having the language flowing more naturally than before.