Abstract.

The main subject of this thesis is the problem of the black virus disinfection using mobile agents model in a synchronous execution. The black virus is a harmful faulty node that destroys any visiting agent with no traceable signs; moreover, once the black virus is triggered by an agent, it spreads by creating clones of itself, each moves to a neighbouring site. Such threats are destroyed if and only if they move to nodes that are occupied by agents.

In this thesis, we consider the problem in a widely used topology, the chordal ring. The system initially has only one black virus that resides in unknown location.

We propose a solution that locates the original black virus and then clear the damage caused upon triggering it. In other words, our solution protocol can be divided into: searching the graph until activating the black virus, sending agents to occupy the neighbours of the new black viruses, and then activating all the black viruses at once. Our solution is monotone, which means once a node is explored it stays clean and never gets infected. The measures of efficiency we consider are: the total number of agents, the overall number of black viruses and the number of moves.

For surrounding the black viruses, we propose local and non-local strategies.

For the number of moves, we provide tight bounds for some types of chordal rings while we provide upper bounds for others.