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THESIS WORK Evaluating Service Mesh as a Network Monitoring Solution
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A new way of detecting network faults

POPULAR SCIENCE SUMMARY **Elias Frykholm, Ennio Mara**

Computer networks, the backbone of the modern, distributed software systems, are susceptible to different types of failures, which is why network monitoring and detection of network faults is of utmost importance. A new way of detecting network faults using a recent technology called service mesh is presented in this master thesis work.

Everyone has at some point in their life had problems with computer networks. Websites being slow to load, computers not connecting to the network, and even the network stops working because of a severed cable. These problems can depend on numerous things, and finding out why things break is not easy. More often than not, one first checks their computer to find that fault, then their router, and call their internet service provider (ISP) for support as a last resort.

Large and small software systems that use the network to communicate suffer from the same problems. If a system suddenly starts responding slowly, an engineer has to spend time finding out the slow-down cause. She has to first determine if the fault is caused by, for example, bugs in the application before deciding if the fault is caused by the network. If the fault lies on the network, a network engineer (equivalent to the ISP) might need to be contacted. This process is time-consuming, time that engineers can spend on better things.

Our thesis evaluates if a recent technology called service mesh can be used to identify network faults and, therefore, quickly rule out if the network causes a problem. Software systems often are comprised of components called services, which are responsible for a portion of the system. For example, suppose a service requires users to log in. In that case, the login operation, e.g. verifying the user's credentials, can be done in a service. A service mesh works by acting as a proxy between these services and handling all traffic they send and receive. It also calculates different metrics such as the number of calls between services and their duration, used to monitor the application.

In our thesis, the metrics provided by the service mesh are combined to provide an overview of the health of the network, instead of the application. By using this approach, an engineer can detect network faults without having information on the network infrastructure.

The evaluation in this thesis was done by creating a software system resembling a modern system using a service mesh, divided into smaller services connected through a simulated network. Different network faults (bandwidth, latency & packet loss) were then introduced with the goal of detecting them using the metrics provided by the service mesh. We also measured the impact of using a service mesh on the application performance, i.e., how much slower the application got.

By using our solution in this thesis, a bandwidth limit and increased latency, not packet loss, can be identified. The measured performance impact of a service mesh on the application was a slow-down of about 24% to 43%.