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## Building a Reliable Storage Stack

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# Building a Reliable Storage Stack

David van Moolenbroek

Computers may encounter all sorts of problems. For example, the hard disk may break down, the power may go out, or a software programming error may cause the computer to behave in erratic ways. Such problems are bad enough by themselves, but they can also go from bad to worse. In the worst case, a simple issue such as a power outage may result in the user losing all their files. It is typically not possible to resolve the root cause of the problem, but it is possible to limit further damage, which makes the computer more reliable. Improving reliability often only requires changes in software. However, since these kinds of problems do not occur very often, such changes should not make the computer significantly slower.

In the research presented in this dissertation, we explore ways to improve the reliability of computer systems through changes in software. We focus on the operating system, and in particular the part of the operating system that takes care of files, disks, and everything else related to data storage: the storage stack. We build a new storage stack with reliability in mind, and we show that it is able to deal much better with a number of important reliability issues than the traditional storage stack. We exploit tight integration of partial solutions and specific domain knowledge, in order to keep the performance overhead of the improvements as low as possible.



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