



USITS 2001 Abstract

Alpine: A User-Level Infrastructure for Network Protocol Development

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Abstract

In traditional operating systems, modifying the network protocol code is a tedious and error-prone task, largely because the networking stack resides in the kernel. For this reason, among others, many have proposed moving the net-working stack to user-level. Unfortunately, implementations of this design have never entered widespread use due to the impractical requirements they place on the user: either the kernel or applications must be modified; or code cannot be moved seamlessly between the user-level and kernel stacks. In this paper, we present Alpine, a user-level networking infrastructure free from these drawbacks. Alpine supports a FreeBSD networking stack on top of a Unix operating system. It is freely available as source code. In this paper, we discuss the challenges we faced in virtualizing the FreeBSD networking stack without compromising on kernel, networking stack, and application compatibility. We then show how Alpine is effective at easing the burden of debugging and testing protocol modifications or new network protocols. In our experience, Alpine can reduce the overhead of modifying a protocol from hours to minutes.

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