



NATIONAL TECHNICAL UNIVERSITY OF ATHENS
SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING

DIVISION OF COMPUTER SCIENCE

Efficient file sharing between host and unikernel

DIPLOMA THESIS

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Supervisor: Nectarios Koziris
Professor, NTUA

Athens, October 2020



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Abstract

Cloud computing is the dominant approach to compute infrastructure, established on the technology of virtualization. As the cloud expands, efficient utilization of its compute resources by software becomes imperative. One solution towards that are *unikernels*, operating system kernels specialized to run a single application, sparing resources compared to a general-purpose kernel. Efficient access from virtualized guests to the underlying host's resources is a substantial challenge in virtualization. In this aspect, *virtio* has been a significant contribution, as a specification of paravirtual devices enabling efficient usage of the host's resources. For host-guest file sharing, *virtio-fs* has been proposed, as a virtio device offering guest access to a file system directory on the host, providing high performance and local file system semantics.

This thesis is concerned with the implementation and evaluation of *virtio-fs* in the context of the OSvunikernel. We demonstrate that combining the two offers great benefits, both with regard to performance achieved, which is comparable to local file systems, and the operational aspect in a cloud context. Moreover, the above are carried out fully within the open-source project behind the unikernel we based our work on. This way, the resulting product gains practical value, being a useful contribution to the project, thus achieving a pivotal, non-technical goal. Furthermore, we explore how open-source software projects and the communities around them work, as we become active members of one.

Keywords

virtualization, cloud, file system, unikernel, virtio, OSv, virtio-fs, QEMU

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