Unikernel-Based Real-Time Virtualization Under Deferrable Servers: Analysis and Realization (Artifact)

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Abstract

This artifact provides the source code to validate and reproduce the numerical results of the associated paper “Unikernel-Based Real-Time Virtualization under Deferrable Servers: Analysis and Realization”. Due to the nature of a close-source project with the company, i.e., EMVICORE GmbH, the source code of the case study in Section 6.2 is not included in this artifact.

2012 ACM Subject Classification
Computer systems organization → Embedded and cyber-physical systems; Software and its engineering → Real-time systems software

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Related Article

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1 Scope

This artifact presents the source code of the response-time analysis used in the numerical simulation reported in Section 6.1. Particularly, two figures, i.e., Figure 6 and 7 in the paper, can be reproduced by executing auto.sh. It thereby supports our claim, that the proposed analysis outperforms the state of the art, i.e., the converted Real-Time Calculus-based approach.

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2:2  Unikernel-Based Real-Time Virtualization (Artifact)

2  Content

The artifact package includes the analysis implementation and the setup of numerical simulation. In particular, the res directory contains:
- benchmark.py: Server and task creation
- our_analysis.py: Our analysis
- plot.py: Plotting functionality
- rtc_cb.py: RTC-based analysis

In addition, a bash-script auto.sh is provided to automate the evaluation. The detailed document can be found as a README.md with installation and usage instructions.

3  Getting the artifact

The artifact endorsed by the Artifact Evaluation Committee is available free of charge on the Dagstuhl Research Online Publication Server (DROPS). In addition, the artifact is also available at: https://github.com/tu-dortmund-12-rt/unikernel-based_deferrable_server_analysis.

4  Tested platforms

The artifact was tested on a laptop computer using 64-bit Arch Linux 5.17.3 with i7-10610U CPU and 16GB main memory; it does not assume or require any particular hardware configuration. It took about 170 seconds with this machine to obtain Figure 6 and 7, when set num_processors = 5 in main.py. The artifact should work on any system that supports Python 3.9 and Python 3.10.

5  License

The artifact is available under the MIT License.

6  MD5 sum of the artifact

e3c69a027defea668a42c6abe4019d00

7  Size of the artifact

12.6 KiB