

VERIAL: Verification-Enabled Runtime Integrity Attestation of Linux

Michael Neises ^a
neisesmichael@gmail.com

Keywords: Runtime Attestation, Remote Attestation, Virtual Machine Introspection, seL4, Operating Systems, Integrity, Confidentiality.

Abstract: Runtime attestation is a way to gain confidence in the current state of a remote target. That confidence is valuable in safety-critical systems such as those involving health-care or finance. Layered attestation is a way of extending that confidence from one component to another. Solutions for layered attestation require strict isolation. Without that isolation, the boundaries between components are blurred, and trustworthy components become intermingled with untrustworthy ones. The seL4 is uniquely well-suited to offer kernel properties sufficient to achieve such isolation. While not the world's only kernel with some formal verification, the seL4 is significantly more advanced than any other solution while uniquely offering the possibility of real-time computation. I design, implement, and evaluate introspective measurements and the layered runtime attestation of a Linux kernel hosted by the seL4. VERIAL can detect diamorphine-style rootkits with performance cost comparable to previous work.

1 INTRODUCTION

Your paper will be part of the conference proceedings therefore we ask that authors follow the guidelines explained in this example in order to achieve the highest quality possible (Smith, 1998).

Be advised that papers in a technically unsuitable form will be returned for retyping. After returned the manuscript must be appropriately modified.

2 MANUSCRIPT PREPARATION

We strongly encourage authors to use this document for the preparation of the camera-ready. Please follow the instructions closely in order to make the volume look as uniform as possible (Moore and Lopes, 1999).

2.1 First Section

This section must be in one column.

2.1.1 Title and Subtitle

Use the command `\title` and follow the given structure in "example.tex". The title and subtitle must be with initial letters capitalized (titlecased). The separation between the title and subtitle is done by adding a

colon ":" just before the subtitle beginning. In the title or subtitle, words like "is", "or", "then", etc. should not be capitalized unless they are the first word of the title or subtitle. No formulas or special characters of any form or language are allowed in the title or subtitle.

2.2 Second Section

Files "example.tex" and "example.bib" show how to create a paper with a corresponding list of references.

2.2.1 Section Titles

The heading of a section title should be in all-capitals.
Example: `\section{FIRST TITLE}`


2.2.2 Tables

Tables must appear inside the designated margins or they may span the two columns.

Tables in two columns must be positioned at the top or bottom of the page within the given margins. To span a table in two columns please add an asterisk (*) to the table *begin* and *end* command.

Example: `\begin{table*}`
`\end{table*}`

Tables should be centered and should always have a caption positioned above it. The font size to use is

^a  <https://orcid.org/0000-0002-5464-3269>

9-point. No bold or italic font style should be used.

The final sentence of a caption should end with a period.

Table 1: This caption has one line so it is centered.

Example column 1	Example column 2
Example text 1	Example text 2

Table 2: This caption has more than one line so it has to be justified.

Example column 1	Example column 2
Example text 1	Example text 2

Please note that the word "Table" is spelled out.

2.2.3 Figures

Figures must appear inside the designated margins or they may span the two columns.

Figures in two columns must be positioned at the top or bottom of the page within the given margins. To span a figure in two columns please add an asterisk (*) to the figure *begin* and *end* command.

Example: `\begin{figure*}`
`\end{figure*}`

Figures should be centered and should always have a caption positioned under it. The font size to use is 9-point. No bold or italic font style should be used.



Figure 1: This caption has one line so it is centered.



Figure 2: This caption has more than one line so it has to be justified.

The final sentence of a caption should end with a period.

Please note that the word "Figure" is spelled out.

2.2.4 Equations

Equations should be placed on a separate line, numbered and centered.

The numbers accorded to equations should appear in consecutive order inside each section or within the contribution, with the number enclosed in brackets and justified to the right, starting with the number 1.

Example:

$$a = b + c \quad (1)$$

2.2.5 Algorithms and Listings

Algorithms and Listings captions should have font size 9-point, no bold or italic font style should be used and the final sentence of a caption should end with a period. The separator between the title of algorithms/listings and the name of the algorithm/listing must be a colon. Captions with one line should be centered and if it has more than one line it should be set to justified.

Data: this text

Result: how to write algorithm with L^AT_EX2e initialization;

while *not at end of this document* **do**

 read current;

if *understand* **then**

 go to next section;

 current section becomes this one;

else

 go back to the beginning of current section;

end

end

Algorithm 1: How to write algorithms.

2.2.6 Program Code

Program listing or program commands in text should be set in typewriter form such as Courier New.

Example of a Computer Program in Pascal:

```
Begin
  Writeln('Hello World!!');
End.
```

The text must be aligned to the left and in 9-point type.

3 CONCLUSIONS

We hope you find the information in this template useful in the preparation of your submission.

REFERENCES

- Moore, R. and Lopes, J. (1999). Paper templates. In *TEMPLATE'06, 1st International Conference on Template Production*. SCITEPRESS.
- Smith, J. (1998). *The Book*. The publishing company, London, 2nd edition.

APPENDIX

If any, the appendix should appear directly after the references without numbering, and not on a new page. To do so please use the following command:
`\section*{APPENDIX}`