

PRIME-Ring Artifact Appendix (USENIX Security '26)

1 Artifact overview

This artifact package regenerates the quantitative tables reported in the PRIME-Ring paper from the bundled datasets and the released evaluation scripts. The artifact is non-destructive and runs offline (no network scanning, no privileged actions).

2 Hardware and software requirements

OS: Linux or macOS recommended.

CPU: 2+ cores.

RAM: 8 GB.

Software (native): Python 3.10+ and a POSIX shell.

Software (Docker): Docker 24+ (recommended for consistent evaluation).

GPU: Not required.

3 Quickstart

3.1 Docker (recommended)

```
docker build -t primering-ae .
docker run --rm -it primering-ae bash -lc "bash scripts/run_all.sh"
```

3.2 Native Python

```
python -m venv .venv
source .venv/bin/activate
pip install -U pip
pip install -r requirements.txt
bash scripts/run_all.sh
```

4 Claims and reproduction roadmap

The paper’s main empirical claims are expressed as tables. Table 1 maps each claim to the exact command and the expected output files. All outputs are written under `./results/`. Each table directory contains: (i) intermediate CSV summaries, and (ii) the final `.tex` table used in the paper.

Single-table execution. Each table can be reproduced independently by running the corresponding script under `artifacts/`. For example, to reproduce Table 12 (epoch freshness / forward security):

```
python artifacts/prime_ring_epoch_fs_artifact/prime_ring_
prime_ring_eval_epoch_forward_security.py \
--data_dir ./data --out_dir ./results/epoch_fs --seed
```

5 Expected runtime and determinism

On a 2–4 core laptop, the full `run_all.sh` pipeline completes in minutes (each table script runs on a small evaluation slice). All scripts accept a `--seed` option; `run_all.sh` uses fixed seeds by default. For the certified-release table, `run_all.sh` sets `--runs_per_domain 20` and `--max_osn_users 2000` to keep the evaluation bounded for reviewers. For the constant-shape table, `run_all.sh` sets `--runs 50`. If you update Python package versions, small floating-point differences may appear, but the relative trends and table structure should match.

6 How to compare with the paper

For each table, compare the regenerated `.tex` in `./results/<table_dir>/` to the table source used in the camera-ready paper. The `.csv` files in the same directory provide the raw aggregates used to produce the `.tex`.

7 Safety statement

This artifact is **non-destructive**. It does not exploit real systems, scan networks, or require elevated privileges.

Claim	Paper table(s)	Command	Output directory	Main output
C1	Table 2–3	bash scripts/run_all.sh	results/aov_hiding/	table_aov_hiding.tex
C2	Table 4–5	bash scripts/run_all.sh	results/cert_release/	table_cert_release.tex
C3	Table 6–7	bash scripts/run_all.sh	results/sparsity_churn/	table_sparsity_churn.tex
C4	Table 8	bash scripts/run_all.sh	results/shape/	table_shape.tex
C5	Table 9	bash scripts/run_all.sh	results/comparison_matrix/	table_comparison_matrix.tex
C6	Table 10	bash scripts/run_all.sh	results/overhead_by_scheme/	table_overhead_by_scheme.tex
C7	Table 11	bash scripts/run_all.sh	results/governed_opening/	table_governed_opening.tex
C8	Table 12	bash scripts/run_all.sh	results/epoch_fs/	table_epoch_fs.tex

Table 1: Claim-to-command mapping for reproducibility.