

A Artifact Appendix for Probabilistic Concurrency Testing for Weak Memory Concurrency

A.1 Abstract

This is a VagrantBox package, containing the artifact for the paper **Probabilistic Testing for Weak Memory Concurrency**. This vagrant package offers the experimental environment, which contains all code, benchmarks, and scripts to reproduce the experimental results in the paper.

A.2 Artifact check-list (meta-information)

- **Algorithm:** This environment contains results for two advanced algorithms, PCT and PCTWM. The scripts are offered to reproduce the result of these two benchmarks. The result of C11Tester are listed in the C11Tester paper and we just quote them in our paper.
- **Metrics:** The metric for evaluating the bug detection ability of each algorithm is **Bug Hitting Rate(%)**. It refers to the number of hitting the bug in the benchmark over 1000 rounds or 500 rounds. **Average Running time(ms)** is evaluated for each data structure benchmarks and real applications to show the speed of detecting the bug. **Throughput(ops/sec)** is another metric when evaluating the real applications.
- **How much time is needed to prepare workflow (approximately)?:** Installing VirtualBox(<https://www.virtualbox.org/wiki/Changelog-6.1#v26>) takes around 15 minutes. Installing VagrantBox(<https://www.vagrantup.com/intro/v2.2.18>) takes around 10 minutes.
- **How much time is needed to complete experiments (approximately)?:** Running results for PCTWM algorithm takes around 45 minutes(based on the computer setting). Running results for PCT algorithm takes around 45 minutes(based on the computer setting). Total experimental time is around 1h30minutes.
- **Publicly available?:** Yes. The code are given on the GitHub(https://github.com/GMYMingyu/C11_PCT_PCTWM.git).

A.3 Description

This section describes the required computer properties and software to run this artifact.

A.3.1 Hardware dependencies

The PC or computer should have memory larger than 64GB, RAM larger than 16GB.

A.3.2 Software dependencies

We implemented the experiments in the vagrant box. So we advise you to install the same version of VirtualBox and VagrantBox.

- Install VirtualBox 6.1.26(<https://www.virtualbox.org/wiki/Changelog-6.1#v26>).
- Install Vagrant Box 2.2.18(<https://www.vagrantup.com/intro/v2.2.18>).

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A.4 Installation

Downloading the package of the Vagrantfile from the Google Drive(<https://drive.google.com/drive/folders/1w8JKGRvxLyGSKm4y4VDqsMy9RUuojPMT?usp=sharing>). The vagrantBox size is about 6 GB. The download time is around 30 minutes.

After downloading the vagrant box, you can enter the folder of this vagrant box. Then open the command prompt. To Run the vagrant box, please execute the commands below:

- vagrant up
- Sometimes you need run: vagrant provision
- vagrant ssh

A.5 Experiment workflow

The picture1 simply introduces the structure of experiments.

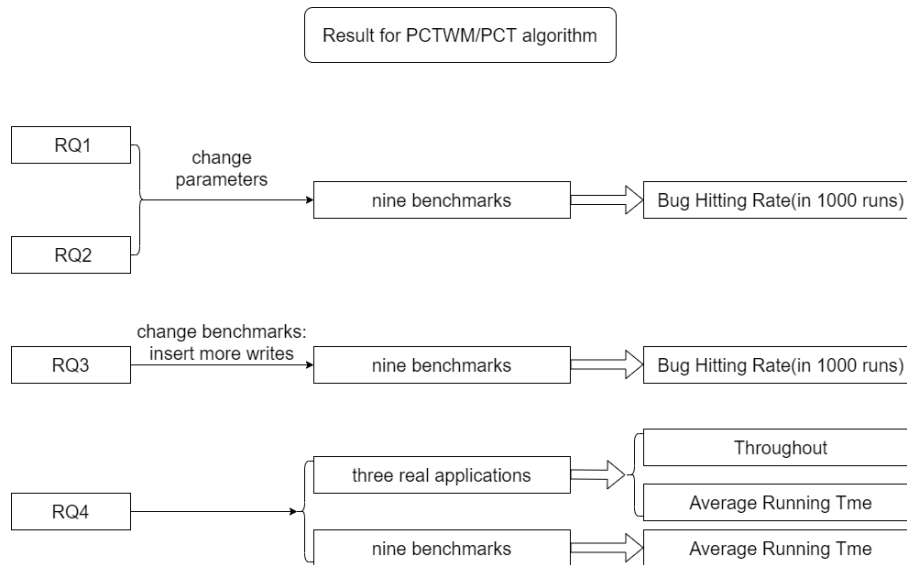


Figure 1: Workflow of experiments.

A.6 Evaluation and expected results

The evaluation result are given in the paper.

A.7 Experiment customization

The parameters in our algorithms are adjustable.

For PCT algorithm:

- -b: Bug Depth.
- -l: Number of Shared Access Events.
- -s: Seed Number.

For PCT algorithm:

- -d: Bug Depth.
- -k: Number of Communication Events.
- -y: History.
- -s: Seed Number.