Relaxed Memory Concurrency Re-executed

This repository contains the source code of the XMC model checker and the benchmarks, supplementing the paper **Relaxed Memory Concurrency Re-executed** by *Evgenii Moiseenko, Matteo Meluzzi, Innokentii Meleshchenko, Ivan Kabashnyi, Anton Podkopaev, Soham Chakraborty.*

Setup

- Requirement: Docker and Docker Compose
- Import the docker container containing the benchmarks

```
docker import xmm-bench-img.docker xmm-bench
```

- Start the app

```
docker run -it -p 8888:8888 xmm-bench /bin/bash /app/start.sh
```

- Do not Ctrl+C or stop the app in any way
- In a web browser, navigate to http://localhost:8888. This address will reveal notebooks for reporoducing the bechmarks

List of paper claims and definitions Supported by the artifact

The overall structure of the application is as follows:

- `buildroot` directory contains the source code for the model checkers used in the benchmark
  - `genmc-dev` contains the application used to run `GenMC_X` and `HMC`
  - `genmc-wkmo` contains the application used to run `GenMC_W` and `WMC`
  - `genmc-xmm` contains the application used to run `XMC`
- `app` directory contains the Python scripts used to run the tests and the tests themselves
  - **Section 5.1**. Evaluation of XMC on Litmus Tests. All tests are contained in the `app/tests` folder.
  - **Section 5.2**. Evaluation of GeMC-XMM on data-structure benchmarks. All tests are contained in the `app/data-structures` folder.

Reproducing Experiment in Section 5.1

To run the litmus benchmarks, go to http://localhost:8888, open the `litmus-benchmarks.ipynb` notebook and click the `Kernel > restart the kernel and Run all cells`.

Reproducing Experiment in Section 5.2

To run the datastructure benchmarks, go to http://localhost:8888, open the `data-structures-bencmarks.ipynb` notebook and click the `Kernel > restart the kernel and Run all cells`.

Notes

Because of the differences in the hardware, the benchmarks can take more time on your machine, potentially exceeding the timeout of 60 seconds stated in the paper. To increase the timeout, you can change the value of the variable `subprocess_timeout` in the `litmus-benchmarks.ipynb` and `data-structures-benchmarks.ipynb` notebooks.