

README

(What the Artifact Does)

This artifact performs automatic differential testing on RPC Services of four major Ethereum node implementations.

(Where It Can Be Obtained)

You have two options to obtain the artifact.

1. The replication package is publicly available at both Figshare and GitHub. Please download the artifact(v1.0) from [Figshare Repository Link](#) or [GitHub Repository Link](#).
2. We provide a docker image with all dependency packages pre-installed. You can obtain the image by the following command:

```
$ docker pull josephkim95/etherdiffer:latest
```

(How to Repeat/Replicate/Reproduce)

1. For Replication Package

You first need to install dependency packages:

- Node v19.4.0
- .NET SDK 6.0
- OpenJDK JRE 16
- libsnappy-dev, libc6-dev, libc6

Please follow the instructions below to install each package:

(Node v19.4.0) We recommend the installation using NVM(Node Version Manager)

```
$ curl -o- https://raw.githubusercontent.com/nvm-sh/nvm/v0.39.3/install.sh | bash
$ source $HOME/.nvm/nvm.sh
$ nvm install 19.4.0 && nvm alias default 19.4.0 && nvm use default
```

(.NET SDK 6.0)

```
$ wget https://packages.microsoft.com/config/ubuntu/20.04/packages-microsoft-prod.deb -O
packages-microsoft-prod.deb
$ sudo dpkg -i packages-microsoft-prod.deb
$ rm packages-microsoft-prod.deb
$ sudo apt-get update && sudo apt-get install -y dotnet-sdk-6.0
```

(OpenJDK JRE 16)

```
$ sudo apt-get -y install openjdk-16-jre
```

(libsnappy-dev, libc6-dev, libc6)

```
$ sudo apt-get -y install libsnappy-dev libc6-dev libc6
```

Once installed, enjoy EtherDiffer with the following command from the package root:

```
$ node src/main.js
```

Optionally, you can specify parameters.

```
--chain value      (default: 300)
    Height of non-deterministic chain to generate
--tc value         (default: 600)
    Number of test cases to generate
--mut-prob value   (default: 50)
    Probability of invalid test case mutation
```

```
$ node src/main.js --chain 30 --tc 60 --mut-prob 0
```

* NOTE: The default setting takes a while during the chain generation.

2. For Docker Image

To run the docker image with the default setting, execute the following command:

```
$ docker run -it -v $PWD/out:/app/out/ josephkim95/etherdiffer:latest
```

You can specify parameters as for the replication package. For example, the following command is possible:

```
$ docker run -it -v $PWD/out:/app/out/ josephkim95/etherdiffer:latest node src/main.js --
chain 30 --tc 60 --mut-prob 0
```

(How to Explore the Results)

In both cases, EtherDiffer creates **out** directory that contains report files:

- **exec-results**: Execution results from each target node
- **reports/**: Error and value deviations found by EtherDiffer

Also, the directory contains all other resources to reproduce deviations:

- **configs/**: Network configuration files for each target node
- **data/**: Chain data directory for each target node
- **testcases/**: Generated test cases

(Tested Environments)

- Replication package: Ubuntu 20.04
- Docker image: Docker version 20.10.17