Introduction:

WDSchain is an open-source object-oriented MATLAB® toolbox, it extends the EPANET features to simulate blockchain of the hydraulic data at sensing nodes or any other system asset (e.g., tanks, valves, pipelines). The developed toolbox can simulate two options; 1) static blockchain that adds static data (any one-time interval) of WDS into blockchain at a time, and 2) Dynamic blockchain, which establishes a chain of time-series data of a complete WDS. Five tailored consensus mechanisms for different-security-level (PoW, PoS, PBFT, PoA, and through-authentication) are developed for data verification.

Please cite the followed toolbox paper if you used this code for a publication.

Requirements:

* EPANET2.0 and EPANET2 Programmer's Toolkit can be downloaded from the EPA website (<https://www.epa.gov/water-research/epanet>).
* MATLAB: WDSchain has been tested on MATLAB 2014b, 2018a, and 2020a. Some MATLAB versions may require installing of MinGW-w64 C/C++ Compiler (<https://uk.mathworks.com/matlabcentral/fileexchange/52848-matlab-support-for-mingw-w64-c-c-compiler>) or from the MATLAB Add-ons library to invoke the DLLs files.

Usage:

* Execute the simulation from the ‘WDSchain.m’ file. The users shall be asked whether would like to use static or dynamic blockchain and with the needed consensus mechanism.
* To change the used Water Distribution System (WDS) modelling file in the static blockchain, Add the \*.inp file in the networks folder and edit line 2 with the modelling name in ‘Static\_blockchain.m’. In the dynamic blockchain, line 7 or lines 10-13 can be edited to change in ‘Dynamic\_blockchain’ to import time-series data from excel file (\*.csv) or from water modelling file (\*.inp), respectively.
* For developers, other new consensus mechanisms can be further developed in new files and called after line 53 in the ‘blockchain.m’ with another if-else condition.

License:

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Email: Haitham.Mahmoud@bcu.ac.uk - Haithamhassanmahmoud@gmail.com