



(51) International Patent Classification:
G06Q 20/00 (2012.01) *H04L 29/06* (2006.01)

(21) International Application Number:
PCT/CN2020/124066

(22) International Filing Date:
27 October 2020 (27.10.2020)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **ALIPAY (HANGZHOU) INFORMATION TECHNOLOGY CO., LTD.** [CN/CN]; No. 556 Xixi Road, 8th Floor, Section B, Suite 801-11, West Lake District, Hangzhou, Zhejiang 310000 (CN).

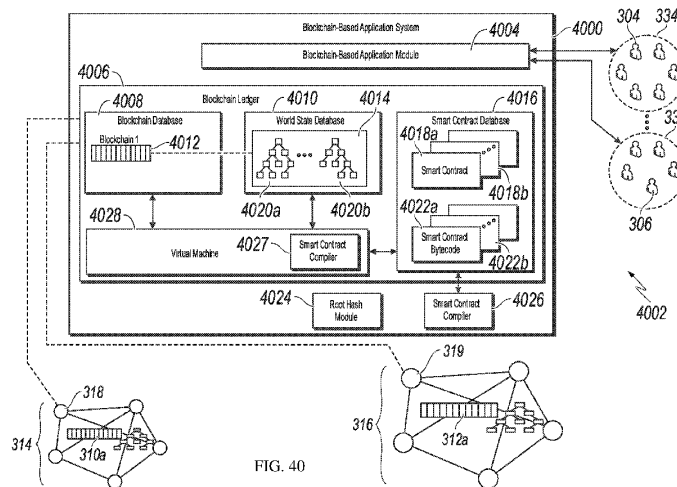
(72) Inventor: **ZHUO, Haizhen**; No. 556 Xixi Road, 8th Floor, Section B, Suite 801-11, West Lake District, Hangzhou, Zhejiang 310000 (CN).

(74) Agent: **BEIJING BESTIPR INTELLECTUAL PROPERTY LAW CORPORATION**; Room 409, Tower B, Ka Wah Building, No. 9 Shangdi 3rd Street, Haidian District, Beijing 100085 (CN).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,

(54) Title: BLOCKCHAIN SYSTEM HAVING EFFICIENT WORLD STATE DATA STRUCTURES



(57) Abstract: Disclosed herein are methods, systems, and apparatus, including computer programs encoded on computer storage media, for processing world state information associated with a blockchain. One of the systems includes: a blockchain database configured to store a blockchain that is managed by a blockchain network, in which blockchain data are stored on the blockchain through consensus of blockchain nodes of the blockchain network, and the blockchain includes one or more blocks that store transaction data associated with user accounts associated with the blockchain; a world state database configured to store a world state data structure comprising a plurality of digital trees, in which the world state stores information about states of the user accounts; a smart contract database storing a plurality of smart contracts associated with the blockchain, in which a first smart contract among the plurality of smart contracts comprises first code that identifies first state data and a first digital tree among the plurality of digital trees for storing the first state data; and a virtual machine associated with the blockchain corresponding to the first smart contract, in which the virtual machine is configured to execute the first smart contract to cause the first state data to be stored in the first digital tree.

UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*