

## CLAIMS

1. A computer-implemented method for blockchain-based notification, comprising:
  - determining, by a server, a current state of a workflow by obtaining information in a block of a blockchain, wherein a blockchain contract deployed in the blockchain is executable to update the current state among a plurality of states of the workflow;
  - updating, by the server, a local state machine based on the determined current state, wherein:
    - the local state machine is maintained off the blockchain by the server,
    - the local state machine comprises a plurality of local states configured in a cycle,
    - the plurality of states of the workflow are configured in a different cycle, and
    - the plurality of local states are respectively mapped to the plurality of states of the workflow; and
  - in response to determining that the updated local state machine corresponds to one of the plurality of states, transmitting, by the server, a notification message to one or more computing devices of one or more subscribers subscribing to the one state.
2. The method of claim 1, wherein determining, by the server, the current state of the workflow comprises:
  - obtaining, by the server from the blockchain through a blockchain node that maintains the blockchain, a blockchain transaction in one or more blocks of the blockchain, wherein the blockchain transaction updates the current state of the workflow by triggering execution of the blockchain contract; and
  - determining, by the server, the current state of the workflow according to the obtained blockchain transaction.
3. The method of claim 1, before determining the current state of the workflow, further comprising:
  - obtaining, by the server from a blockchain node that maintains the blockchain, a reply message indicating completion of a preceding state of the determined current state among the plurality of states in the different cycle.

4. The method of claim 1, before determining the current state of the workflow, further comprising:

obtaining, by the server, an update of a preceding state of the one state;

generating, by the server, a blockchain transaction for updating the preceding state;

and

transmitting, by the server, the blockchain transaction to one or more blockchain nodes that add the blockchain transaction to the blockchain, wherein adding the blockchain transaction to the blockchain causes the current state of the workflow to update to the one state.

5. The method of claim 1, wherein:

the notification message includes a message indicating that the one state is current and a result returned from completion of a preceding state of the one state among the plurality of states in the different cycle.

6. The method of claim 1, wherein:

the server comprises the local state machine; and

the local state machine exists in one of the plurality of local states at any given time.

7. The method of claim 1, wherein:

the cycle starts with a starting local state of the plurality of local states, passes through each of the plurality of local states once in one direction till an ending local state, and returns to the starting local state.

8. The method of claim 7, wherein:

the different cycle starts with a starting state of the plurality of states, passes through each of the plurality of states once in one direction till an ending state, and returns to the starting state;

each of the plurality of states is triggered by completion of a preceding state in the different cycle; and

the starting local state is mapped to the starting state.

9. The method of claim 1, further comprising:

obtaining, by the server, a request for deactivating the one state; and

in response to the request for deactivating the one state:  
generating, by the server, a first blockchain transaction comprising instructions for shortcutting the one state from the different cycle;  
transmitting, by the server, the first blockchain transaction to one or more blockchain nodes that add the first blockchain transaction to the blockchain; and  
shortcutting, by the server, a local state of the local state machine mapped to the one state from the cycle.

10. The method of claim 9, further comprising:  
obtaining, by the server, a request for reactivating the one state; and  
in response to the request for reactivating the one state:  
generating, by the server, a second blockchain transaction comprising instructions for restoring the one state in the different cycle;  
transmitting, by the server, the second blockchain transaction to one or more blockchain nodes that add the second blockchain transaction to the blockchain; and  
restoring, by the server, the local state of the local state machine mapped to the one state in the cycle.

11. The method of claim 1, wherein:  
the one state is configurable by a subscriber to comprise one or more sub-states; and  
the one or more sub-states and the one state form another different cycle connected to the different cycle through the one state.

12. The method of claim 11, wherein:  
the method further comprises: establishing, by the server, an association between the subscriber and the one or more sub-states for transmitting notifications associated with the one or more sub-states to the subscriber; and  
the one or more sub-states are private to the subscriber.

13. The method of claim 1, wherein transmitting the notification message to one or more computing devices of the one or more subscribers subscribing to the one state comprises:

placing, by the server, a notification message into a message queue for the one or more computing devices associated with the one or more subscribers to obtain the notification message.

14. A system for blockchain-based notification, the system comprising one or more processors and one or more non-transitory computer-readable memories coupled to the one or more processors and configured with instructions executable by the one or more processors to cause the system to perform operations comprising:

- determining a current state of a workflow by obtaining information in a block of a blockchain, wherein a blockchain contract deployed in the blockchain is executable to update the current state among a plurality of states of the workflow;

- updating a local state machine based on the determined current state, wherein:

- the local state machine is maintained off the blockchain,

- the local state machine comprises a plurality of local states configured in a cycle,

- the plurality of states of the workflow are configured in a different cycle, and

- the plurality of local states are respectively mapped to the plurality of states of the workflow; and

- in response to determining that the updated local state machine corresponds to one of the plurality of states, transmitting a notification message to one or more computing devices of one or more subscribers subscribing to the one state.

15. The system of claim 14, wherein determining the current state of the workflow comprises:

- obtaining, from the blockchain through a blockchain node that maintains the blockchain, a blockchain transaction in one or more blocks of the blockchain, wherein the blockchain transaction updates the current state of the workflow by triggering execution of the blockchain contract; and

- determining the current state of the workflow according to the obtained blockchain transaction.

16. The system of claim 14, wherein, before determining the current state of the workflow, the operations further comprise:

obtaining, from the blockchain through a blockchain node that maintains the blockchain, a reply message indicating completion of a preceding state of the determined current state among the plurality of states in the different cycle.

17. A non-transitory computer-readable storage medium for blockchain-based notification, the storage medium configured with instructions executable by one or more processors to cause the one or more processors to perform operations comprising:

determining a current state of a workflow by obtaining information in a block of a blockchain, wherein a blockchain contract deployed in the blockchain is executable to update the current state among a plurality of states of the workflow;

updating a local state machine based on the determined current state, wherein:

the local state machine is maintained off the blockchain,

the local state machine comprises a plurality of local states configured in a cycle,

the plurality of states of the workflow are configured in a different cycle, and

the plurality of local states are respectively mapped to the plurality of states of the workflow; and

in response to determining that the updated local state machine corresponds to one of the plurality of states, transmitting a notification message to one or more computing devices of one or more subscribers subscribing to the one state.

18. The storage medium of claim 17, wherein determining the current state of the workflow comprises:

obtaining, from the blockchain through a blockchain node that maintains the blockchain, a blockchain transaction in one or more blocks of the blockchain, wherein the blockchain transaction updates the current state of the workflow by triggering execution of the blockchain contract; and

determining the current state of the workflow according to the obtained blockchain transaction.

19. The storage medium of claim 17, wherein, before determining the current state of the workflow, the operations further comprise:

obtaining, from the blockchain through a blockchain node that maintains the blockchain, a reply message indicating completion of a preceding state of the determined current state among the plurality of states in the different cycle.

20. The storage medium of claim 17, wherein, before determining the current state of the workflow, the operations further comprise:

obtaining an update of a preceding state of the one state;

generating a blockchain transaction for updating the preceding state; and

transmitting the blockchain transaction to one or more blockchain nodes that add the blockchain transaction to the blockchain, wherein adding the blockchain transaction to the blockchain causes the current state of the workflow to update to the one state.