

CLAIMS

1. An apparatus, comprising:

a memory associated with an instance of a distributed database at a compute device configured to be included within a plurality of compute devices that implement the distributed database via a network operatively coupled to the plurality of compute devices, the plurality of compute devices being associated with a first configuration of an event consensus protocol associated with the distributed database; and

a processor operatively coupled to the memory,

the processor configured to:

receive a set of events from a set of compute devices from the plurality of compute devices, each event from the set of events associated with (1) a set of transactions, and (2) a received round number,

determine an order for each event from the set of events based on:

(1) the first configuration of the event consensus protocol when the received round number associated with that event is not greater than a received round number threshold identified by the instance of the distributed database, and

(2) a second configuration of the event consensus protocol when the received round number associated with that event is greater than the received round number threshold,

determine a current state associated with the instance of the distributed database based on the order determined for each event from the set of events,

generate a signed state associated with the instance of the distributed database based on a hash value associated with the current state, the hash value digitally signed with a private key associated with the compute device,

send a signal to post into the instance of the distributed database an event that includes a transaction indicative of the signed state.

2. The apparatus of claim 1, wherein the compute device is a first compute device and the plurality of compute devices is a first plurality of compute devices that implement the distributed database during a first time period, the received round number threshold being defined based on a received round of an event that includes a

transaction to add a second compute device to the first plurality of compute devices to define a second plurality of compute devices.

3. The apparatus of claim 1, wherein the compute device is a first compute device and the plurality of compute devices is a first plurality of compute devices that implement the distributed database during a first time period, the received round number threshold being defined based on a received round number of an event that includes a transaction to remove a second compute device from the first plurality of compute devices to define a second plurality of compute devices.

4. The apparatus of claim 1, wherein the compute device is a first compute device from the plurality of compute devices and each compute device from the plurality of compute devices is logically related to a stake value used in the event consensus protocol,

the received round number threshold being defined based on a received round number of an event that includes a transaction to change the stake value logically related to a second compute device from the plurality of compute devices.

5. The apparatus of claim 1, wherein the received round number threshold is a first received round number threshold and the current state is a first state associated with the instance of the distributed database, the processor is further configured to:

define a second received round number threshold corresponding to a received round number of an event from the set of events that includes a transaction to update the first state associated with the instance of the distributed database, the second received round number threshold associated with a third configuration of the event consensus protocol, the second received round number threshold being greater than the first received round number threshold,

the processor configured to determine the order for each event from the set of events based on:

the second configuration of the event consensus protocol when the received round number associated with that event is greater than the first received round number threshold and not greater than the second received round number threshold,

the third configuration of the event consensus protocol when the received round number associated with that event is greater than the second received round number threshold.

6. The apparatus of claim 1, wherein the processor is configured to determine the current state associated with the instance of the distributed database by executing the set of transactions associated with each event from the set of events in a suborder corresponding to an order in which that set of transactions is specified in that event.

7. The apparatus of claim 1, wherein the compute device is a first compute device from the plurality of compute devices,
the received round number threshold being defined based on a received round number of an event that includes a software change associated with the event consensus protocol.

8. A method, comprising:
receiving, from a set of compute devices from a plurality of compute devices that implement a distributed database via a network, a set of events;
determining an order for each event from the set of events based on:
(1) a first configuration of the distributed database when an attribute associated with that event meets a criterion when the attribute is calculated based on the first configuration; and
(2) a second configuration of the distributed database when the attribute associated with that event does not meet the criterion when the attribute is calculated based on the first configuration; and
determining a current state associated with the distributed database based on the order determined for each event from the set of events.

9. The method of claim 8, further comprising:
transitioning the distributed database from the first configuration to the second configuration based on at least one of adding a compute device to the plurality of compute devices, removing a compute device from the plurality of compute devices, updating a stake associated with a compute device from the plurality of compute devices, or updating a consensus protocol associated with the distributed database.

10. The method of claim 8, wherein the criterion is based on the attribute for an event having a transaction that transitions the distributed database from the first configuration to the second configuration.
11. The method of claim 8, further comprising:
 - generating a signed state associated with the distributed database based on a hash value associated with the current state, the hash value digitally signed with a private key; and
 - sending a signal to post into the distributed database an event that includes a transaction indicative of the signed state.
12. The method of claim 8, wherein the attribute is a received round number.
13. The method of claim 8, wherein each event from the set of events includes a set of transactions,
 - the determining the current state includes determining the current state by executing the set of transactions associated with each event from the set of events in a suborder corresponding to an order in which that set of transactions is specified in that event.
14. The method of claim 8, wherein the criterion is based on the attribute for an event having a transaction that transitions the distributed database from the first configuration to the second configuration, the attribute for the event being calculated based on a consensus protocol of the distributed database and based on the first configuration.
15. A non-transitory processor-readable medium storing code representing instructions to be executed by a processor, the code comprising code to cause the processor to:
 - receive, from a compute device from a plurality of compute devices that implement a distributed database via a network, an event having a transaction to change the distributed database from a first configuration to a second configuration;

calculate, based on the first configuration, an attribute for the event, the attribute indicating a received round in which the distributed database will transition from the first configuration to the second configuration;

determine an order for each event from a set of events based on:

(1) the first configuration of the distributed database when the attribute associated with that event and as calculated based on the first configuration is less than or equal to the received round; and

(2) the second configuration of the distributed database when the attribute associated with that event and as calculated based on the first configuration will not be less than or equal to the received round; and

determine a current state associated with the distributed database based on the order determined for each event from the set of events.

16. The non-transitory processor-readable medium of claim 15, wherein the transaction is a transaction to at least one of add a compute device to the plurality of compute devices, remove a compute device from the plurality of compute devices, update a stake associated with a compute device from the plurality of compute devices, or update a consensus protocol associated with the distributed database.

17. The non-transitory processor-readable medium of claim 15, further comprising code to cause the processor to:

generate a signed state associated with the distributed database based on a hash value associated with the current state, the hash value digitally signed with a private key; and

send a signal to post into the distributed database an event that includes a transaction indicative of the signed state.

18. The non-transitory processor-readable medium of claim 15, wherein each event from the set of events includes a set of transactions,

the code to cause the processor to determine the current state includes code to cause the processor to determine the current state by executing the set of transactions associated with each event from the set of events in a suborder corresponding to an order in which that set of transactions is specified in that event.

19. The non-transitory processor-readable medium of claim 15, wherein the plurality of compute devices is a first plurality of compute devices, the transaction is a transaction to remove a compute device from the first plurality of compute devices to define a second plurality of compute devices,

the order of an event from the set of events is defined based on a consensus of the first plurality of compute devices when the first configuration of the distributed database is used, the order of the event from the set of events is defined based on a consensus of the second plurality of compute devices when the second configuration of the distributed database is used.

20. The non-transitory processor-readable medium of claim 15, wherein the code to cause the processor to calculate includes code to cause the processor to calculate the attribute for the event based on a consensus protocol of the distributed database.