CLAIMS

1. A system comprising:

a blockchain-based legal documentation tool configured to process information for conducting a service; and

a trusted service layer comprising a trusted timing module, a trusted identity module, and a trusted computing module;

wherein the blockchain-based legal documentation tool is configured to:

receive a request for providing the service and that is initiated from an account of a user associated with a blockchain-based application, wherein the request comprises an identity associated with the user;

invoke the trusted identity module to determine that the user is a registered user of the blockchain-based application based on matching the identity with an identity included in registration information of the user associated with the blockchain-based application and recorded on a blockchain;

identify one or more electronic forms to be filled out and submitted in a plurality of steps, wherein the plurality of steps comprise a first plurality of steps performed by the user and a second plurality of steps performed by a service provider associated with the blockchain for providing the service;

at each step of the first plurality of steps performed by the user:

invoke the trusted timing module to generate a first time that the step is performed;

generate a first unique identifier (ID) based on the first time that the step is performed and first digital content on the electronic form, wherein the first digital content is filled in by the user at the first time;

invoke the trusted computing module to record the first unique ID, the first time, and the first digital content on the blockchain;

embed the first unique ID in the first digital content at the first time by changing one or more attributes associated with the first digital content to be representative of the first unique ID, wherein embedding the first unique ID in the first digital content

produces first information-embedded digital content that enables retrieval of the first time and the first digital content from the blockchain based on the first unique ID; and

invoke the trusted computing module to record the first information-embedded digital content to the blockchain; and

at each step of the second plurality of steps performed by the service provider:

generate a second unique ID based on a second time that the step is performed and second digital content on the electronic form, wherein the second digital content is filled in by the service provider at the second time;

embed the second unique ID in the second digital content filled in by the service provider, wherein embedding the second unique ID in the second digital content produces second information-embedded digital content; and

invoke the trusted computing module to record the second information-embedded digital content to the blockchain.

2. The system of claim 1, wherein the request is a first request, and the blockchain-based legal documentation tool is further configured to:

receive a second request for handling the first request initiated from an account of the service provider associated with the blockchain-based application, wherein the second request comprises an identity associated with the service provider; and

determine that the service provider is a registered service provider of the blockchain-based application based on matching the identity associated with the service provider with an identity included in registration information of the service provider recorded on the blockchain.

3. The system of any preceding claim, wherein a visual difference between the electronic form and the first information-embedded digital content or the second information-embedded digital content is not apparent to an unaided human eye.

4. The system of any preceding claim, wherein the first unique ID or the second unique ID is generated based on at least one of a hash function or an asymmetric encryption.

5. The system of any preceding claim, wherein the embedding the first unique ID or the second unique ID is performed based on digital watermarking using one or more of a discrete wavelet transform, a discrete cosine transform, a singular value decomposition, a least significant bit, or undetectable steganography.

6. The system of any preceding claim, wherein the one or more attributes associated with the first digital content or the second digital content include one or more of color, size, orientation, shape, and font of the first digital content or the second digital content.

7. The system of any preceding claim, wherein the identity includes at least one of (i) a mobile phone number, (ii) a credit card number, (iii) a user ID associated with an online payment system, (iv) a user ID associated with an online shopping account, (v) a user ID associated with a music streaming or downloading account, (vi) a user IDS associated with a movie streaming or downloading account, (vii) a user ID associated with a messaging or chat account, (viii) a user ID associated with an online banking account, (ix) a user ID associated with a ride hailing service, (x) a user ID associated with an online food ordering service, (xi) a social security number, (xii) a driver's license number, (xiii) a passport number, (xiv) a user ID associated with an online gaming service, or (xv) an ID issued by a government entity.

8. A computer-implemented method for blockchain-based information processing performed by a blockchain node, the method comprising:

receiving a request for providing a service and that is initiated from an account of a user associated with a blockchain-based application, wherein the request comprises an identity associated with the user;

determining that the user is a registered user of the blockchain-based application based on matching the identity with an identity included in registration information of the user associated with the blockchain-based application and recorded on a blockchain;

identifying one or more electronic forms to be filled out and submitted in a plurality of steps, wherein the plurality of steps comprise a first plurality of steps performed by the user and a second plurality of steps performed by a service provider associated with the blockchain for providing the service;

at each step of the first plurality of steps performed by the user:

generating a first time that the step is performed;

generating a first unique identifier (ID) based on the first time that the step is performed and first digital content on the electronic form, wherein the first digital content is filled in by the user at the first time;

recording the first unique ID, the first time, and the first digital content on the blockchain;

embedding the first unique ID in the first digital content at the first time by changing one or more attributes associated with the first digital content to be representative of the first unique ID, wherein embedding the first unique ID in the first digital content produces first information-embedded digital content that enables retrieval of the first time and the first digital content from the blockchain based on the first unique ID; and

recording the first information-embedded digital content to the blockchain; and

at each step of the second plurality of steps performed by the service provider:

generating a second unique ID based on a second time that the step is performed and second digital content on the electronic form, wherein the second digital content is filled in by the service provider at the second time;

embedding the second unique ID in the second digital content filled in by the service provider, wherein embedding the second unique ID in the second digital content produces a second information-embedded digital content; and

recording the second information-embedded digital content to the blockchain.

9. The method of claim 8, wherein the request is a first request, and the method further comprising:

receiving a second request for handling the first request initiated from an account of the service provider associated with the blockchain-based application, wherein the second request comprises an identity associated with the service provider; and

determining that the service provider is a registered service provider of the blockchain-based application based on matching the identity associated with the service

provider with an identity included in registration information of the service provider recorded on the blockchain.

10. The method of claim 8 or 9, wherein a visual difference between the electronic form and the first information-embedded digital content or the second information-embedded digital content is not apparent to an unaided human eye.

11. The method of any of claims 8 to 10, wherein the first unique ID or the second unique ID is generated based on at least one of a hash function or an asymmetric encryption.

12. The method of any of claims 8 to 11, wherein the embedding the first unique ID or the second unique ID is performed based on digital watermarking using one or more of a discrete wavelet transform, a discrete cosine transform, a singular value decomposition, a least significant bit, or undetectable steganography.

13. The method of any of claims 8 to 12, wherein the one or more attributes associated with the first digital content or the second digital content include one or more of color, size, orientation, shape, and font of the first digital content or the second digital content.

14. The method of any of claims 8 to 13, wherein the identity includes at least one of (i) a mobile phone number, (ii) a credit card number, (iii) a user ID associated with an online payment system, (iv) a user ID associated with an online shopping account, (v) a user ID associated with a music streaming or downloading account, (vi) a user IDS associated with a movie streaming or downloading account, (vii) a user ID associated with a messaging or chat account, (viii) a user ID associated with an online banking account, (ix) a user ID associated with a ride hailing service, (x) a user ID associated with an online food ordering service, (xi) a social security number, (xii) a driver's license number, (xiii) a passport number, (xiv) a user ID associated with an online gaming service, or (xv) an ID issued by a government entity.

15. An apparatus for blockchain-based information processing, the apparatus comprising a plurality of modules for performing the method of any of claims 8 to 14.