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(54) **CROSS-PLATFORM IMPLEMENTATION OF CLOUD-BASED APPLICATIONS UTILIZING NOODL PROGRAMMING**

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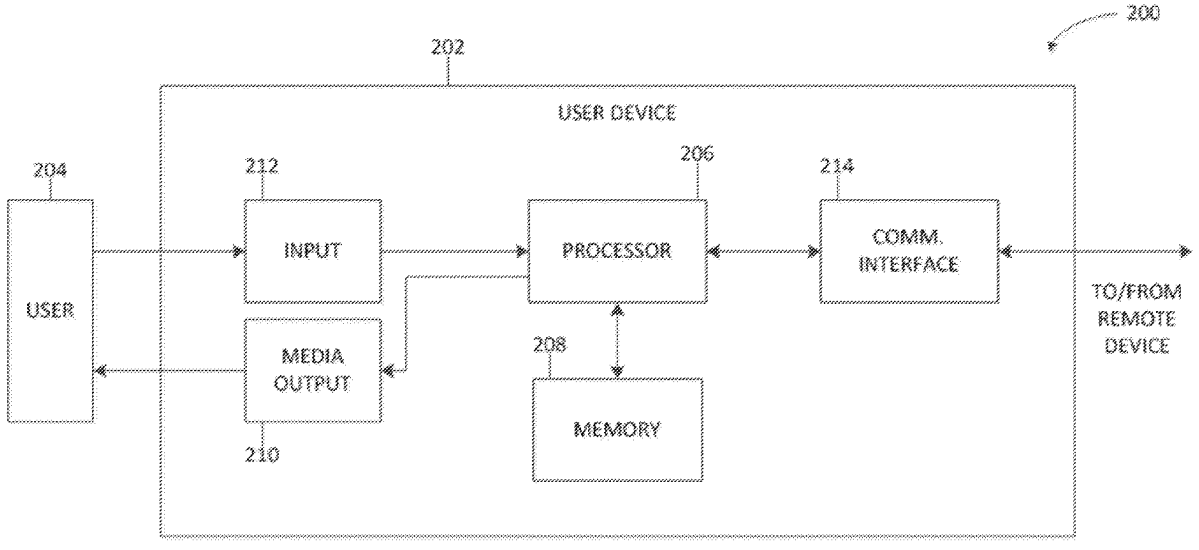
| ***H04L 67/10*** | (2022.01) |

(52) **U.S. Cl.**

CPC ..... ***H04L 65/403*** (2013.01); ***G06F 21/629*** (2013.01); ***H04L 67/10*** (2013.01)

(57) **ABSTRACT**

An edge computing operating system (ECOS) computing system, utilizing an ECOS computing device implements cloud-based applications. The cloud-based applications are implemented based on one or more user-defined attributes, or schema, provided by users of the ECOS computing system. The cloud-based applications are implemented by the ECOS system using one or more neuron organic object data language (NOODL) extension files in combination with one or more NOODL data objects created using the received user-defined attributes, or schema. The NOODL extension files generate a mapping of a computer application usable on a user's device. Secure on-line communications are provided by the implemented applications in accordance with applicable privacy laws.



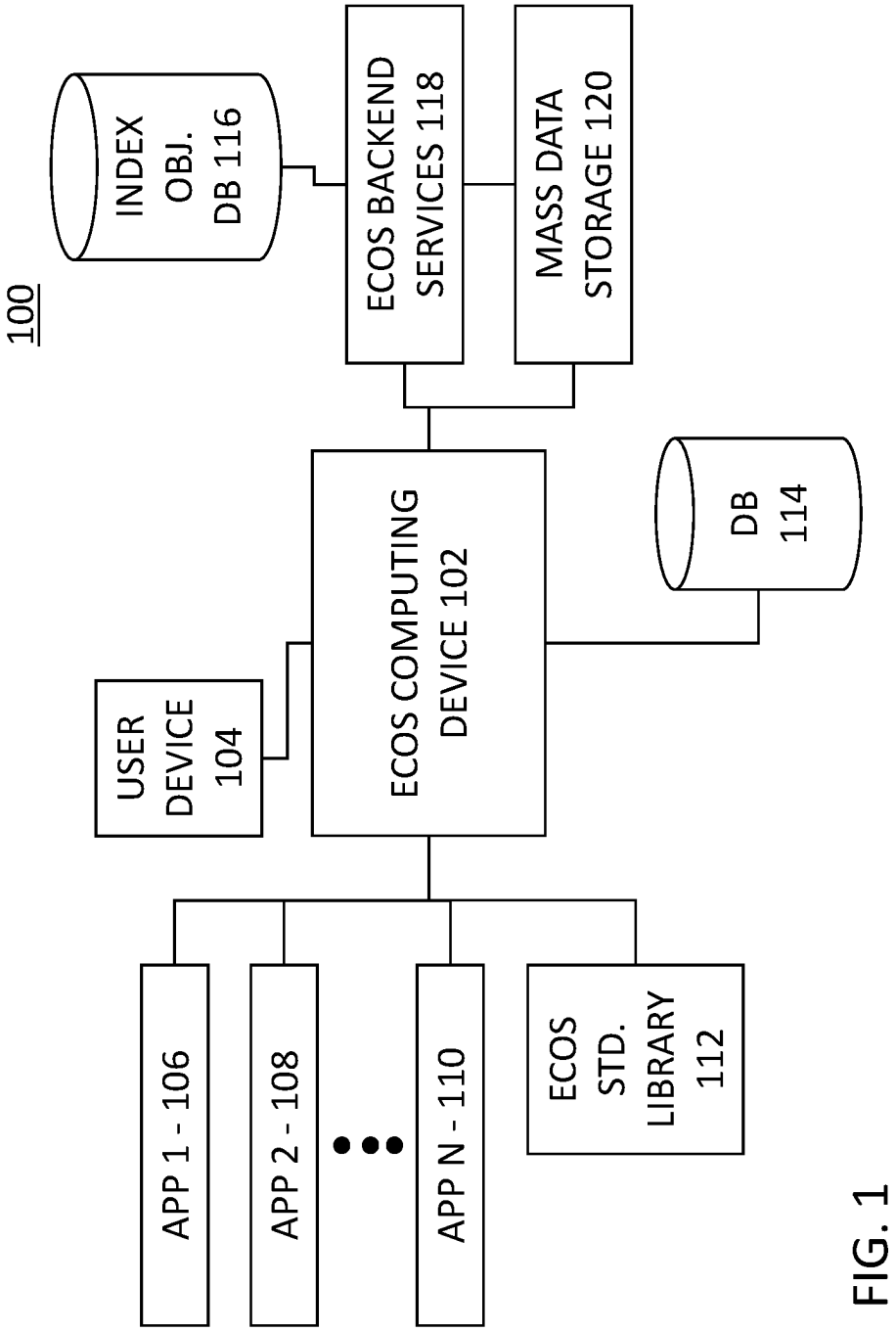

100
INDEX OBJ. DB 116
ECOS BACKEND SERVICES 118
MASS DATA STORAGE 120
DB 114
ECOS COMPUTING DEVICE 102
USER DEVICE 104
APP 1 - 106
APP 2 - 108
APP N - 110
ECOS STD. LIBRARY 112

FIG. 1

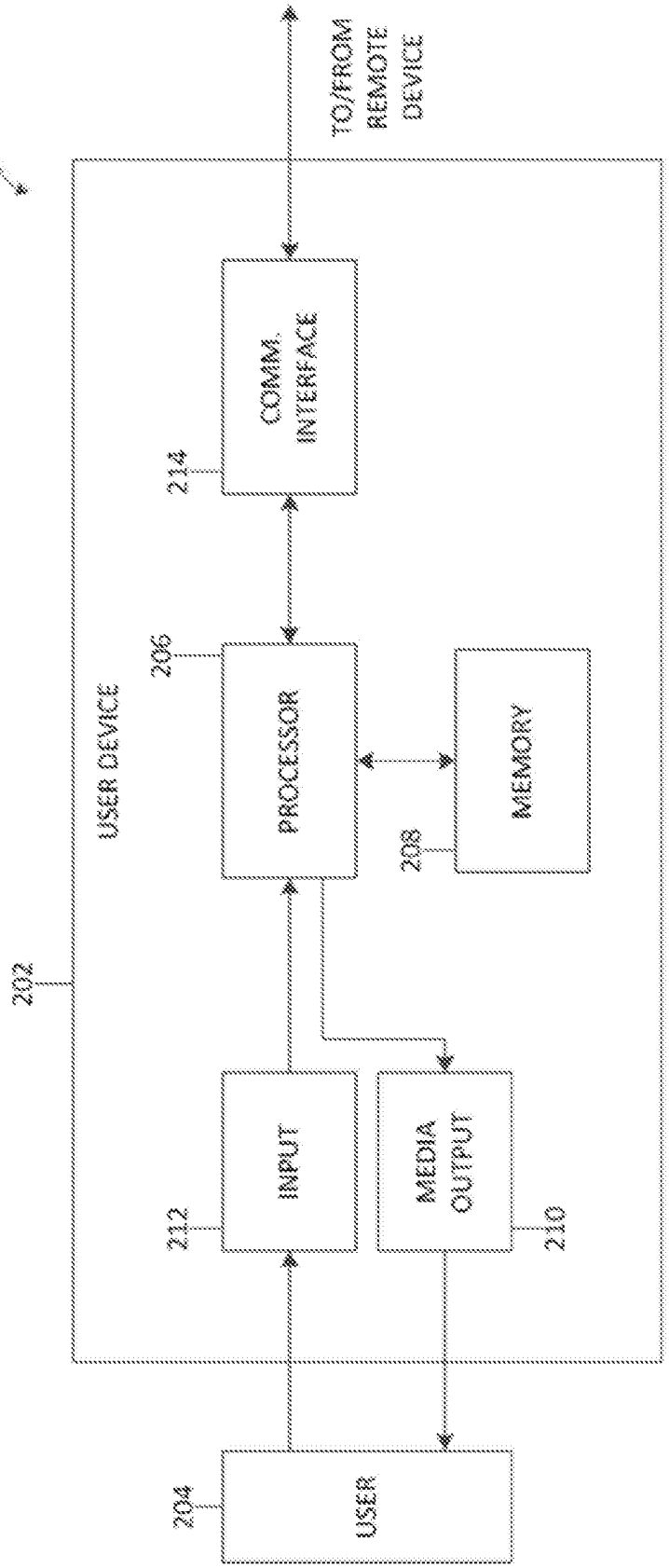

200
TO/FROM REMOTE DEVICE
COMM. INTERFACE
214
206
PROCESSOR
MEMORY
208
USER DEVICE
202
INPUT
212
MEDIA OUTPUT
210
USER
204

FIG. 2

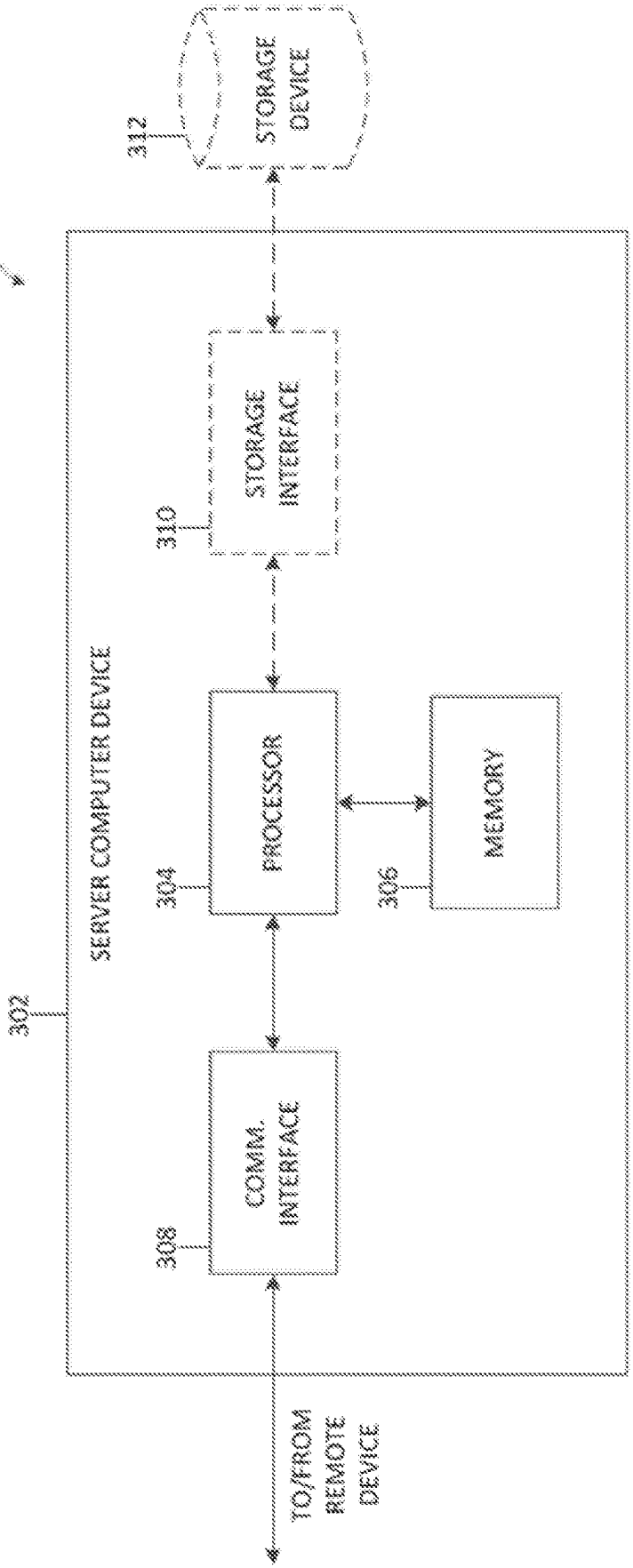

300
312
STORAGE DEVICE
SERVER COMPUTER DEVICE
310
STORAGE INTERFACE
304
PROCESSOR
306
MEMORY
302
308
COMM. INTERFACE
TO/FROM REMOTE DEVICE

FIG. 3

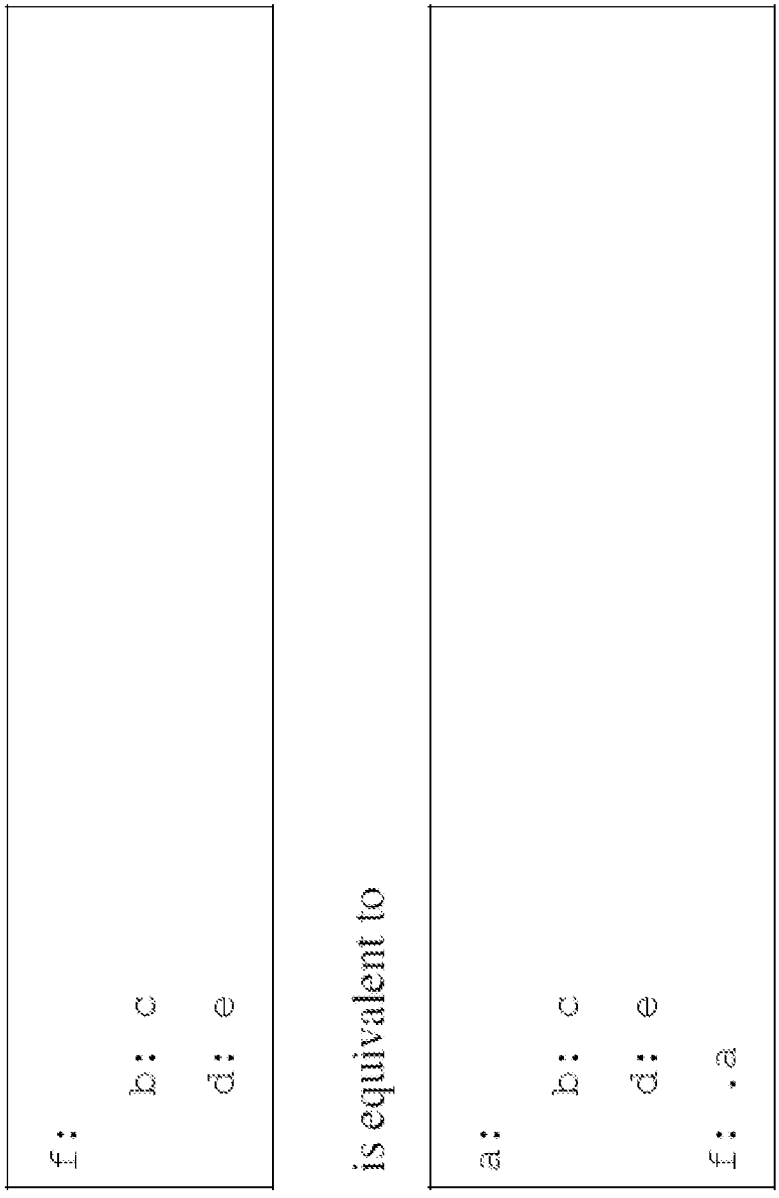



FIG. 4A

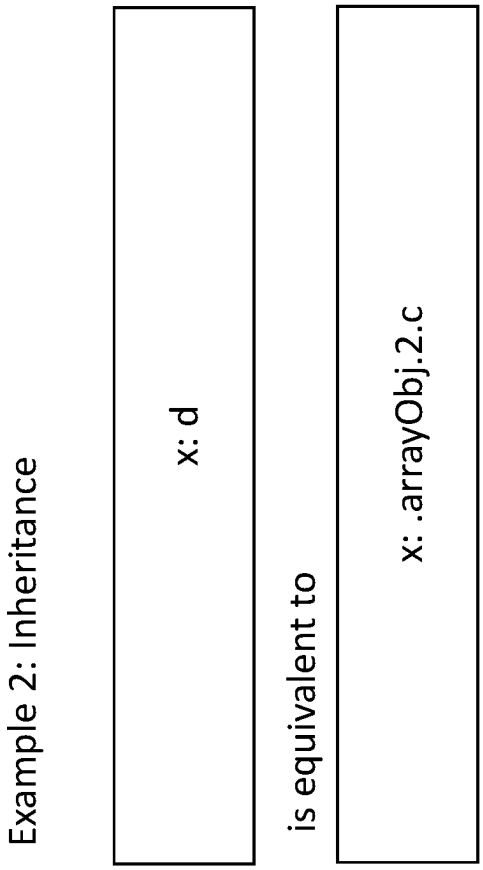



FIG. 4B

Example 3: Extension

```
g::
    b:: c
    a:: e
    x:: y
    z:: a
```

is equivalent to

```
g::
    . a:: " "
    x:: y
    z:: a
```

FIG. 4C

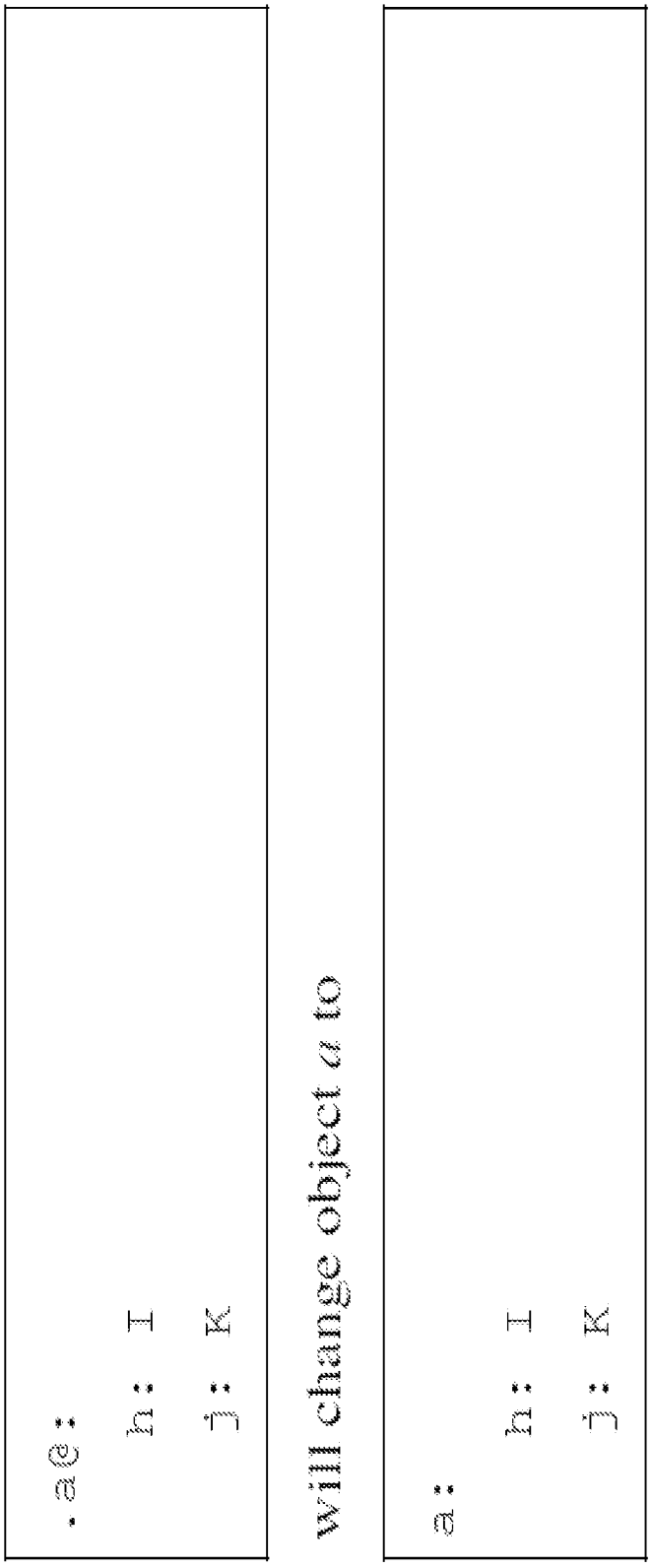



FIG. 4D

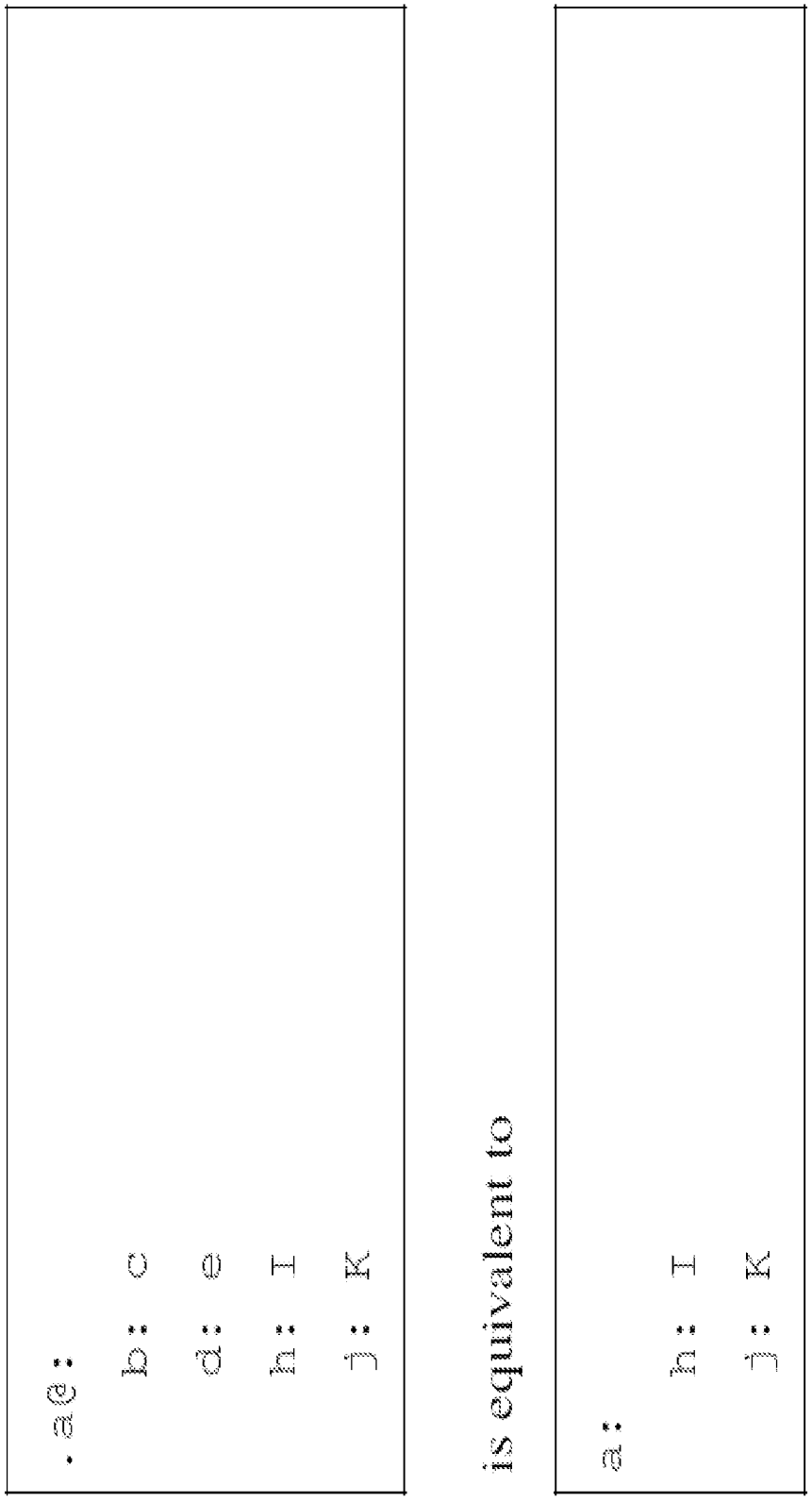



FIG. 4E

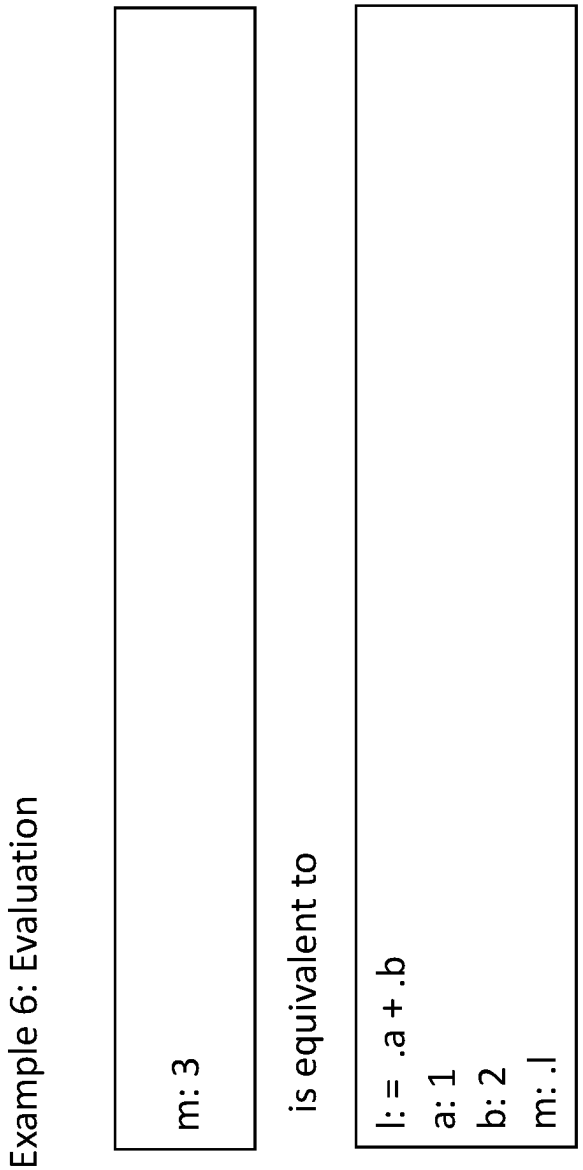



FIG. 4F

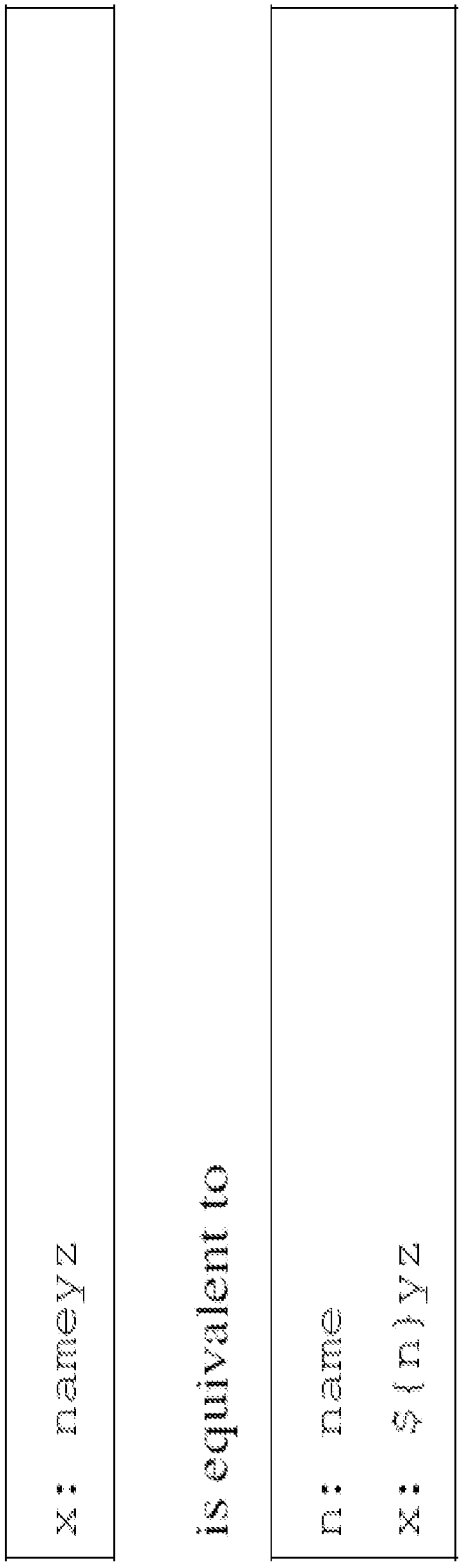



FIG. 4G

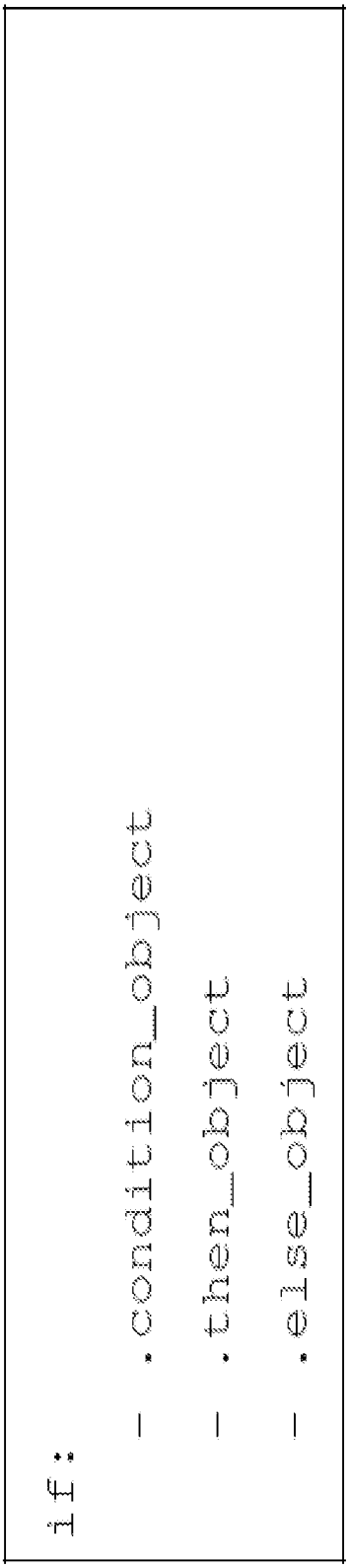



FIG. 4H

Example 8: If-else

```
object:
  a: 1
  b: -1
  - .object.be: 1
  - .object.be: 0
```

FIG. 4I

Example 9: Goto

```
object:
    n: 100
    i: 0

label: .object.i@: .object.i + 1
if:
    - .object.i < .object.n
    - goto: label
    - .object.i
```

FIG. 4J

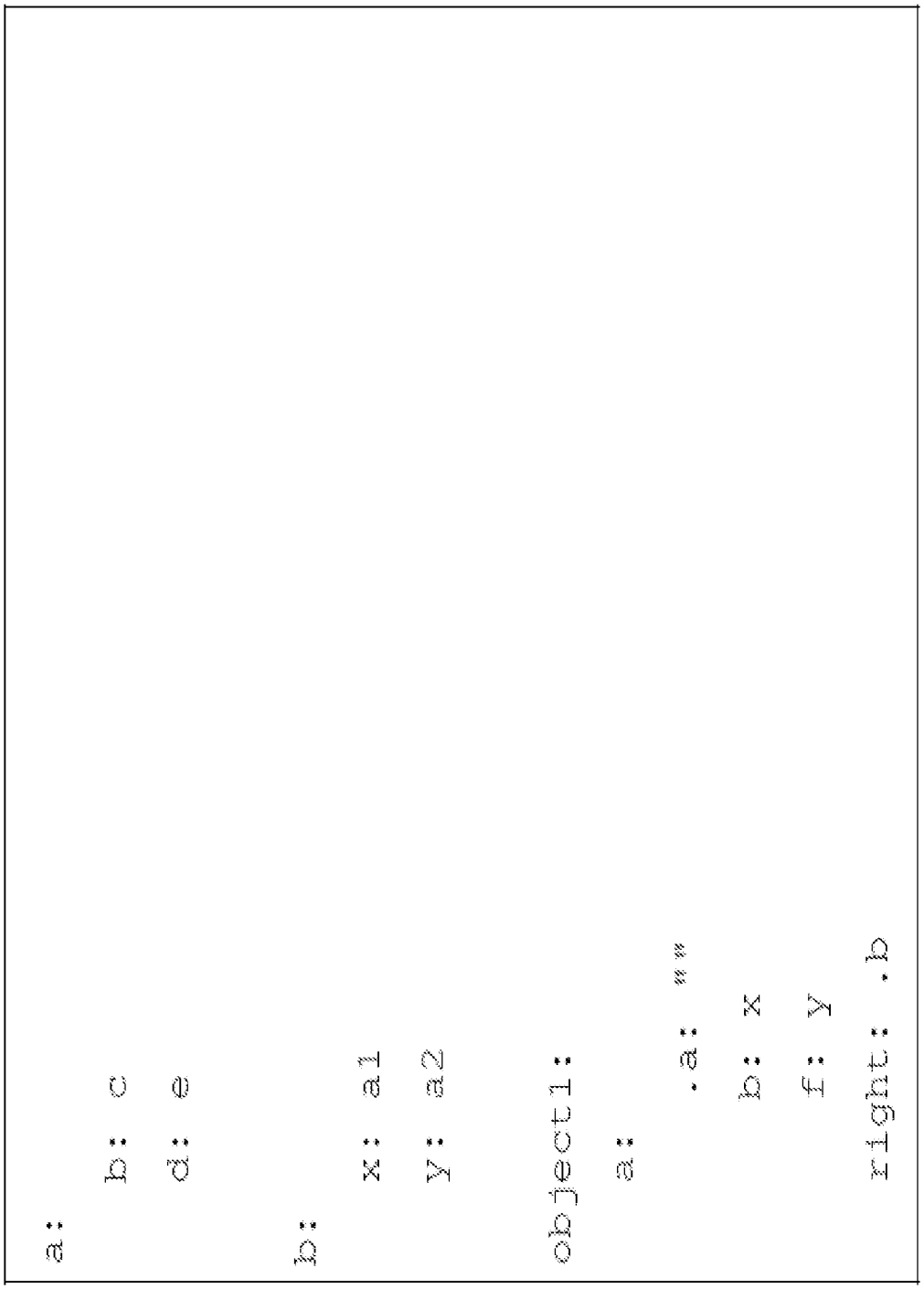



FIG. 5A

Example 10: Evolve

```
evolve: object1
```

FIG. 5B

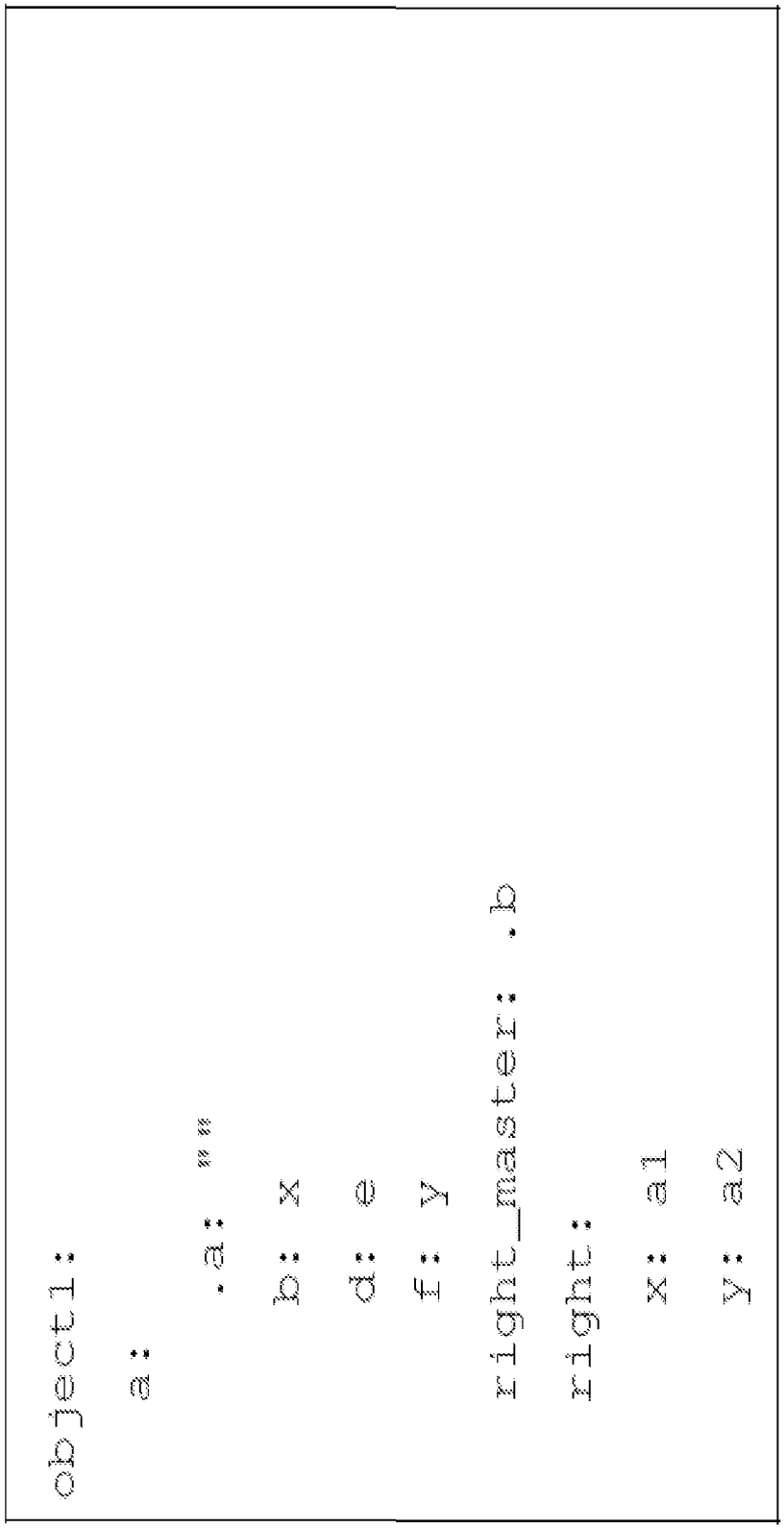



FIG. 5C

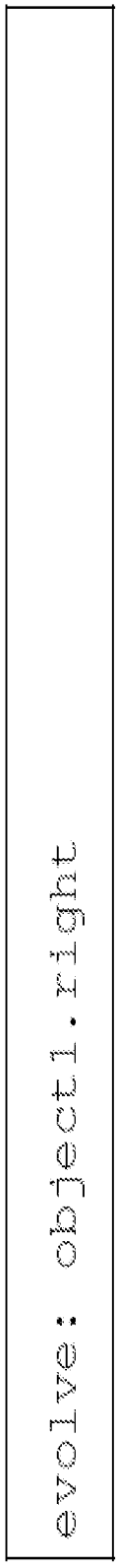



FIG. 5D

Example 11: Elite

```
elite: object
object1:
    a:
        .a: ""
        b: x
        d: e
        f: y
        right:
            x: a1
            y: a2
```

FIG. 5E

Example 12: Convolve

```
object1:
  a:
    .a: ""
    b: x
    d: e
    f: y
  right_master: .b
  right:
    x: a1
    y: a2
convolve: object1
```

FIG. 5F

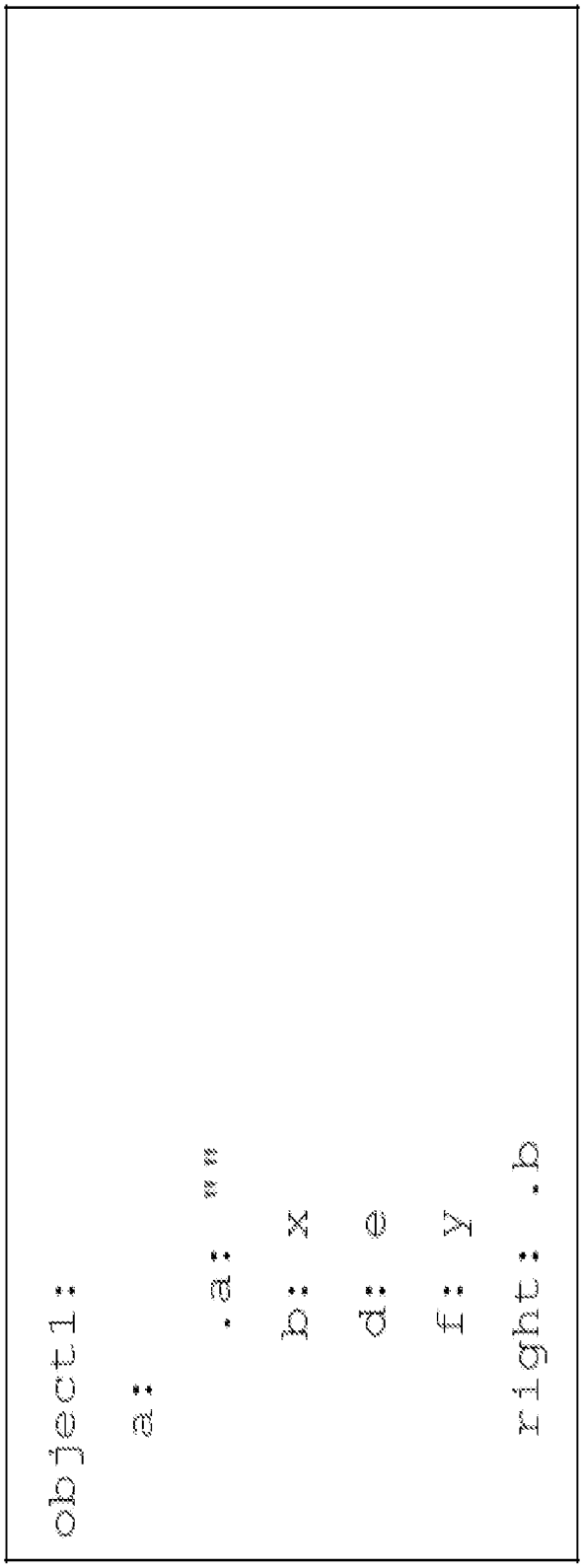



FIG. 5G

Example 13: Emit

```
a:
    b:c
    d:e

object1:
    .a.b@: x

emit: object1
```

After the emit process, object *a* will be changed to

```
a:
    b:x
    d:e
```

FIG. 5H

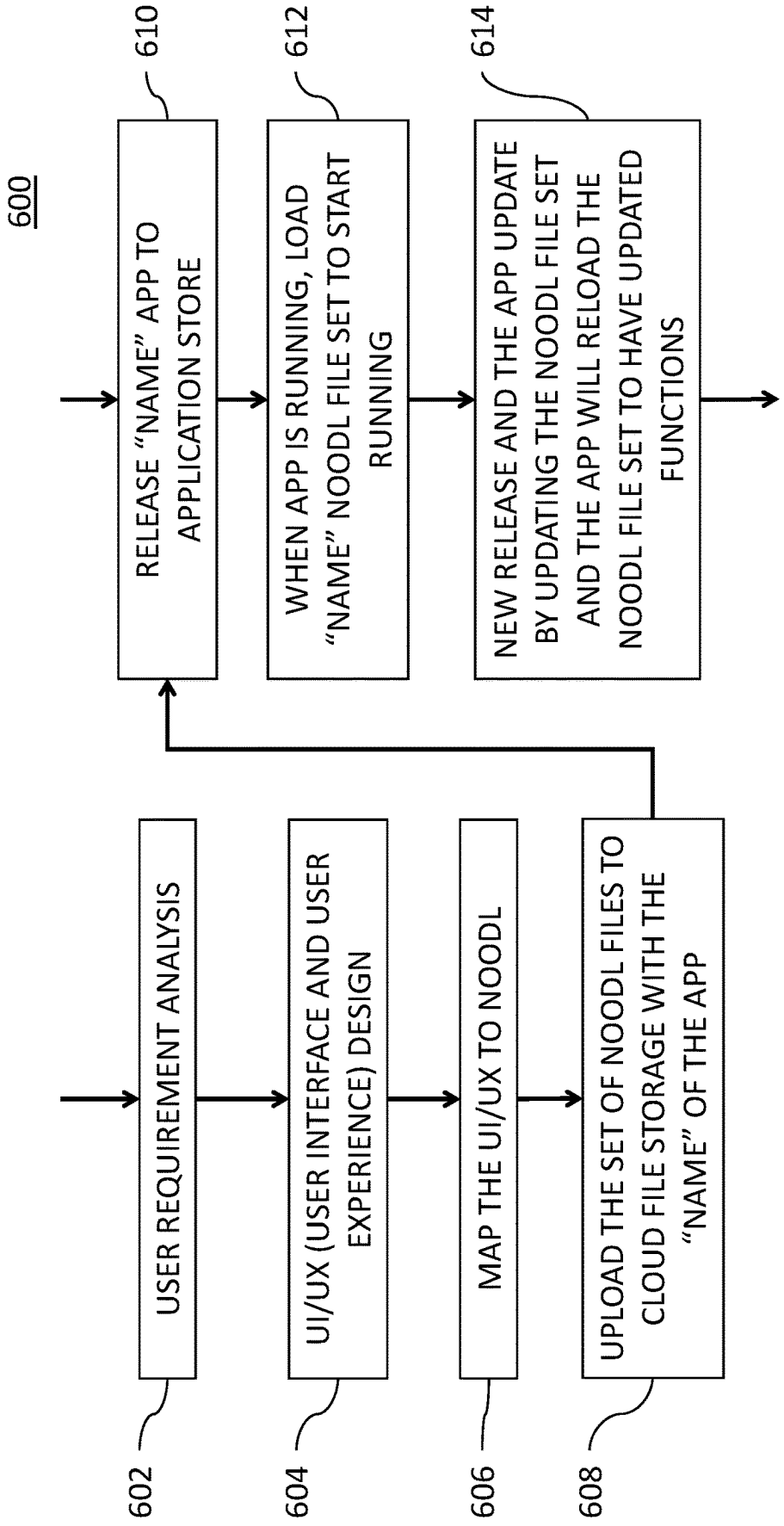

600
USER REQUIREMENT ANALYSIS
UI/UX (USER INTERFACE AND USER EXPERIENCE) DESIGN
MAP THE UI/UX TO NOODL
UPLOAD THE SET OF NOODL FILES TO CLOUD FILE STORAGE WITH THE "NAME" OF THE APP
602
604
606
608
RELEASE "NAME" APP TO APPLICATION STORE
WHEN APP IS RUNNING, LOAD "NAME" NOODL FILE SET TO START RUNNING
NEW RELEASE AND THE APP UPDATE BY UPDATING THE NOODL FILE SET AND THE APP WILL RELOAD THE NOODL FILE SET TO HAVE UPDATED FUNCTIONS
610
612
614

FIG. 6

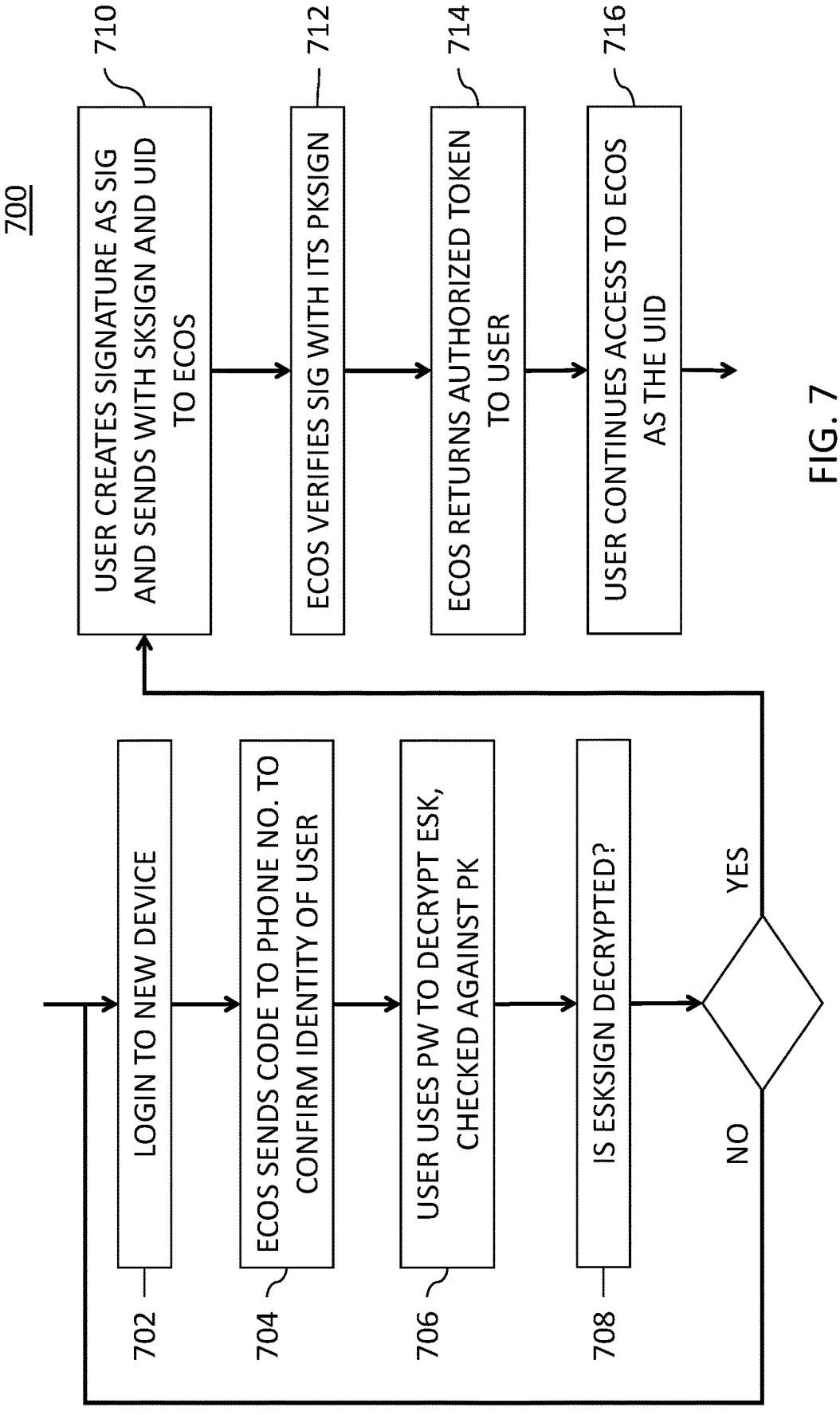

700
LOGIN TO NEW DEVICE
ECOS SENDS CODE TO PHONE NO. TO CONFIRM IDENTITY OF USER
USER USES PW TO DECRYPT ESK, CHECKED AGAINST PK
IS ESKSIGN DECRYPTED?
YES
NO
USER CREATES SIGNATURE AS SIG AND SENDS WITH SKSIGN AND UID TO ECOS
ECOS VERIFIES SIG WITH ITS PKSIGN
ECOS RETURNS AUTHORIZED TOKEN TO USER
USER CONTINUES ACCESS TO ECOS AS THE UID
702
704
706
708
710
712
714
716

FIG. 7

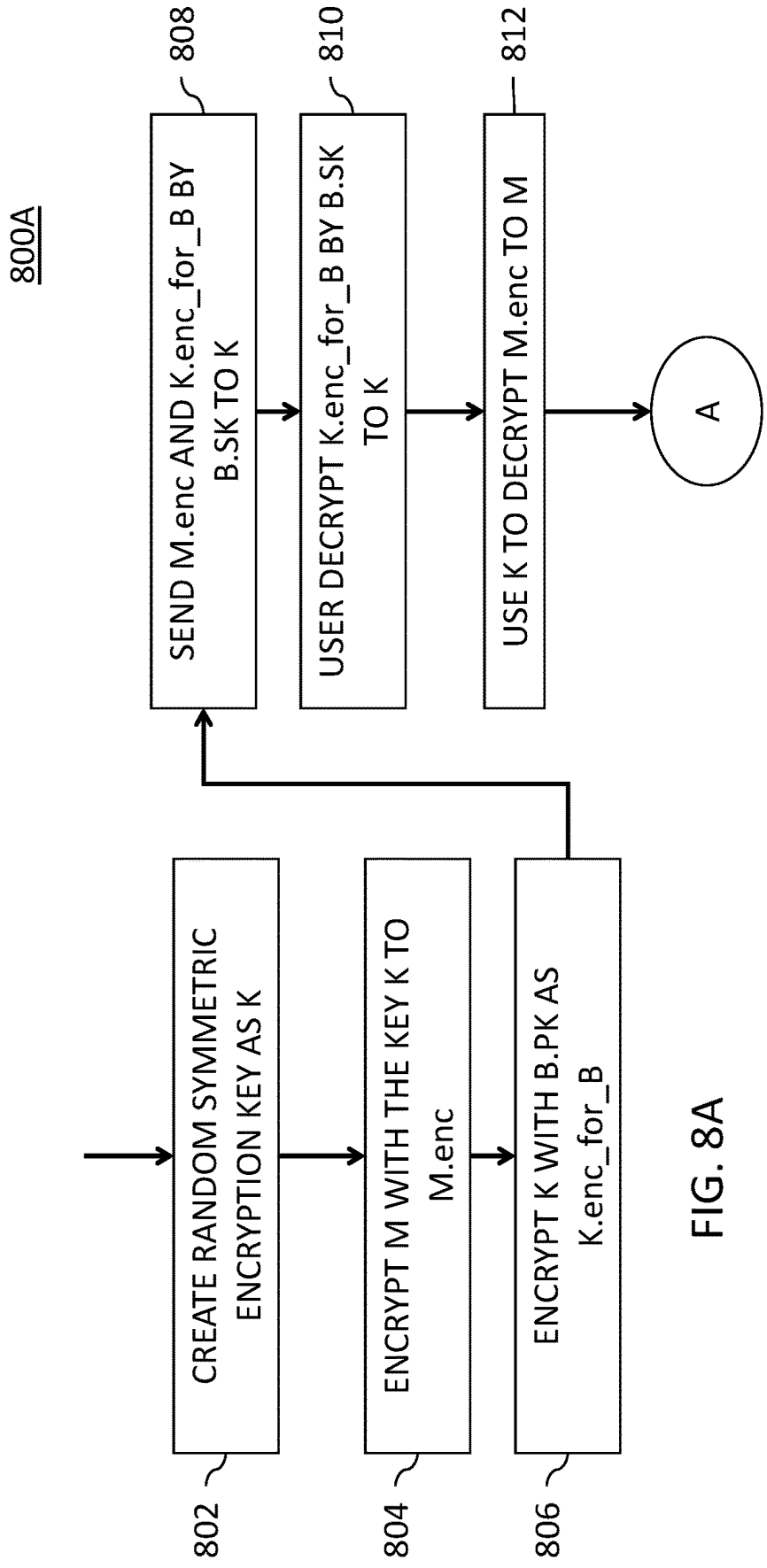

800A
CREATE RANDOM SYMMETRIC ENCRYPTION KEY AS K
802
ENCRYPT M WITH THE KEY K TO M.enc
804
ENCRYPT K WITH B.PK AS K.enc_for_B
806
SEND M.enc AND K.enc_for_B BY B.SK TO K
808
USER DECRYPT K.enc_for_B BY B.SK TO K
810
USE K TO DECRYPT M.enc TO M
812
A

FIG. 8A

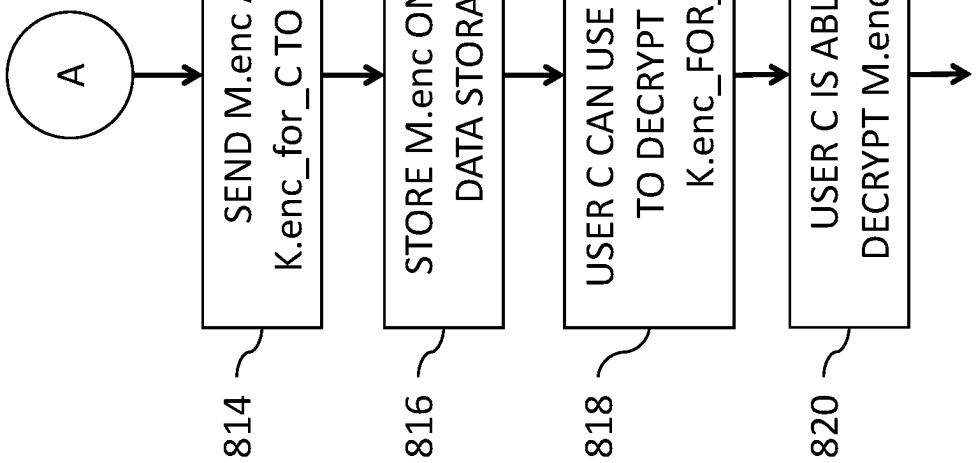

800B
A
SEND M.enc AND K.enc_for_C TO USER C
STORE M.enc ON MASS DATA STORAGE
USER C CAN USE ITS C.SK TO DECRYPT THE K.enc_FOR_C
USER C IS ABLE TO DECRYPT M.enc TO M
814
816
818
820

FIG. 8B

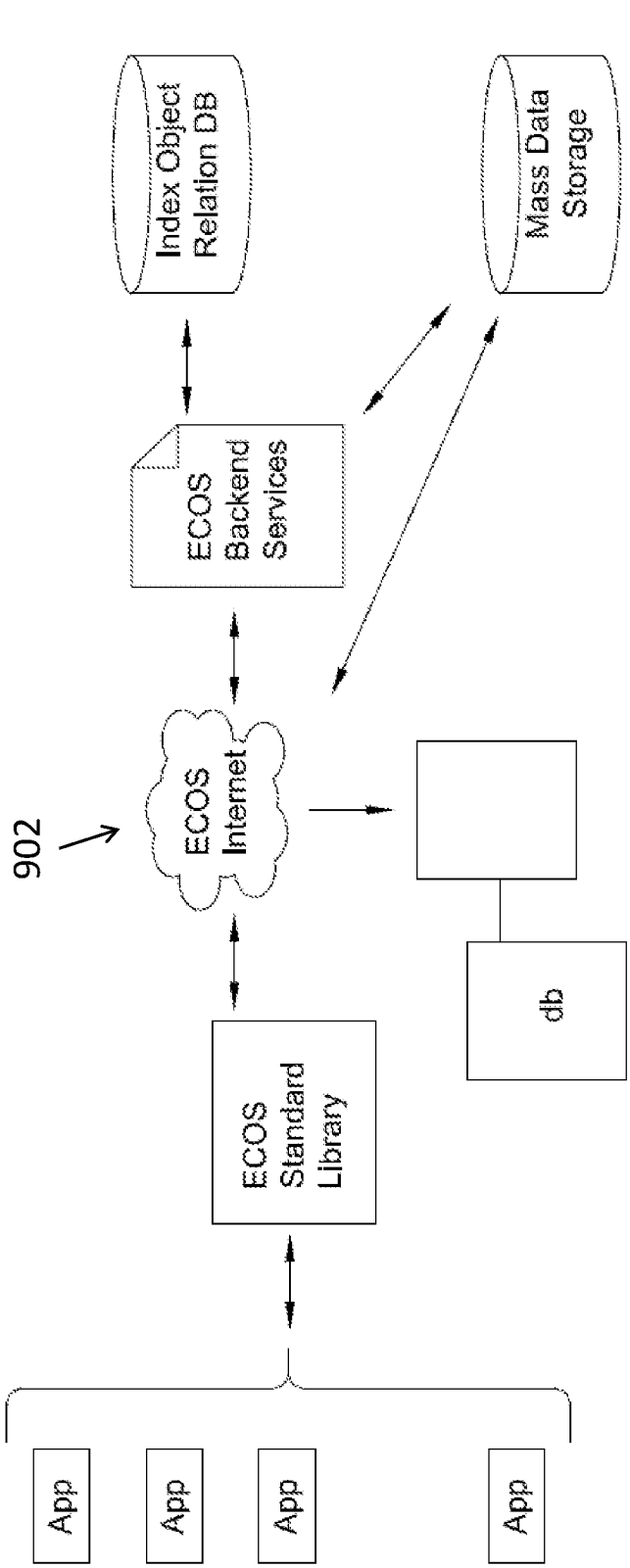

900A
Index Object Relation DB
Mass Data Storage
ECOS Backend Services
902
ECOS Internet
db
ECOS Standard Library
App
App
App
App

FIG. 9A

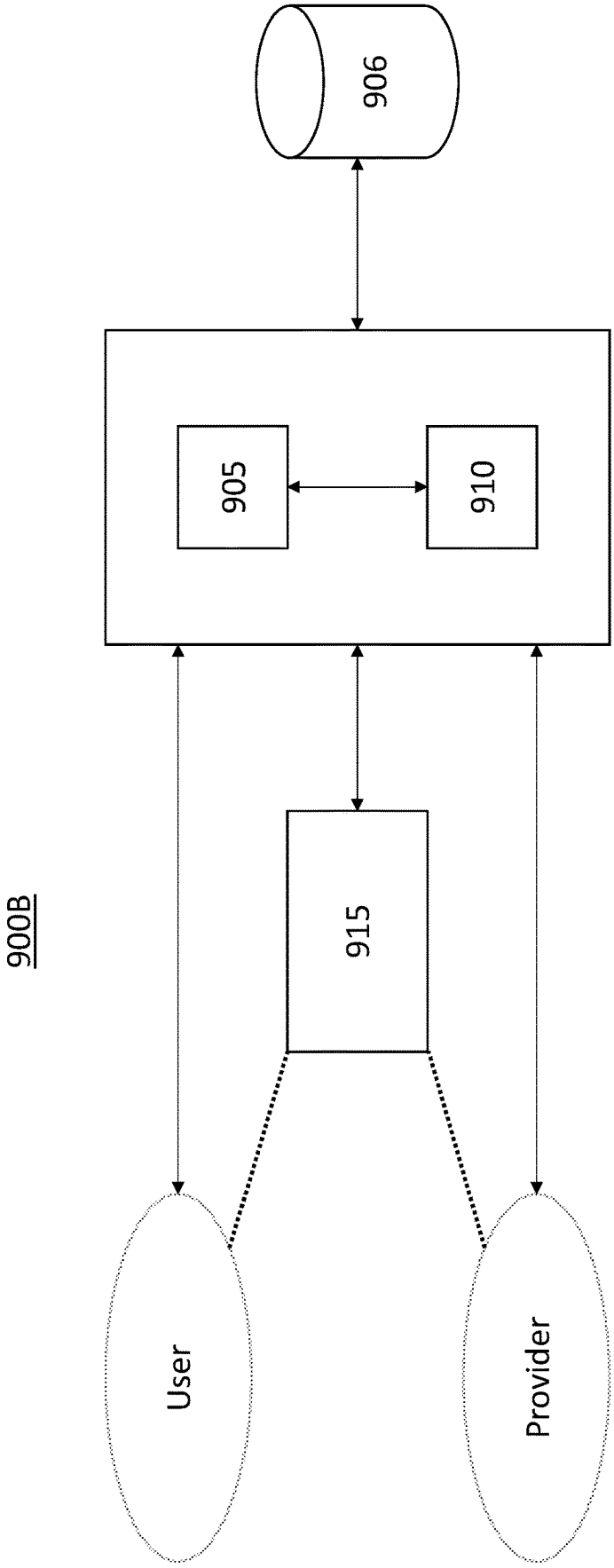



FIG. 9B

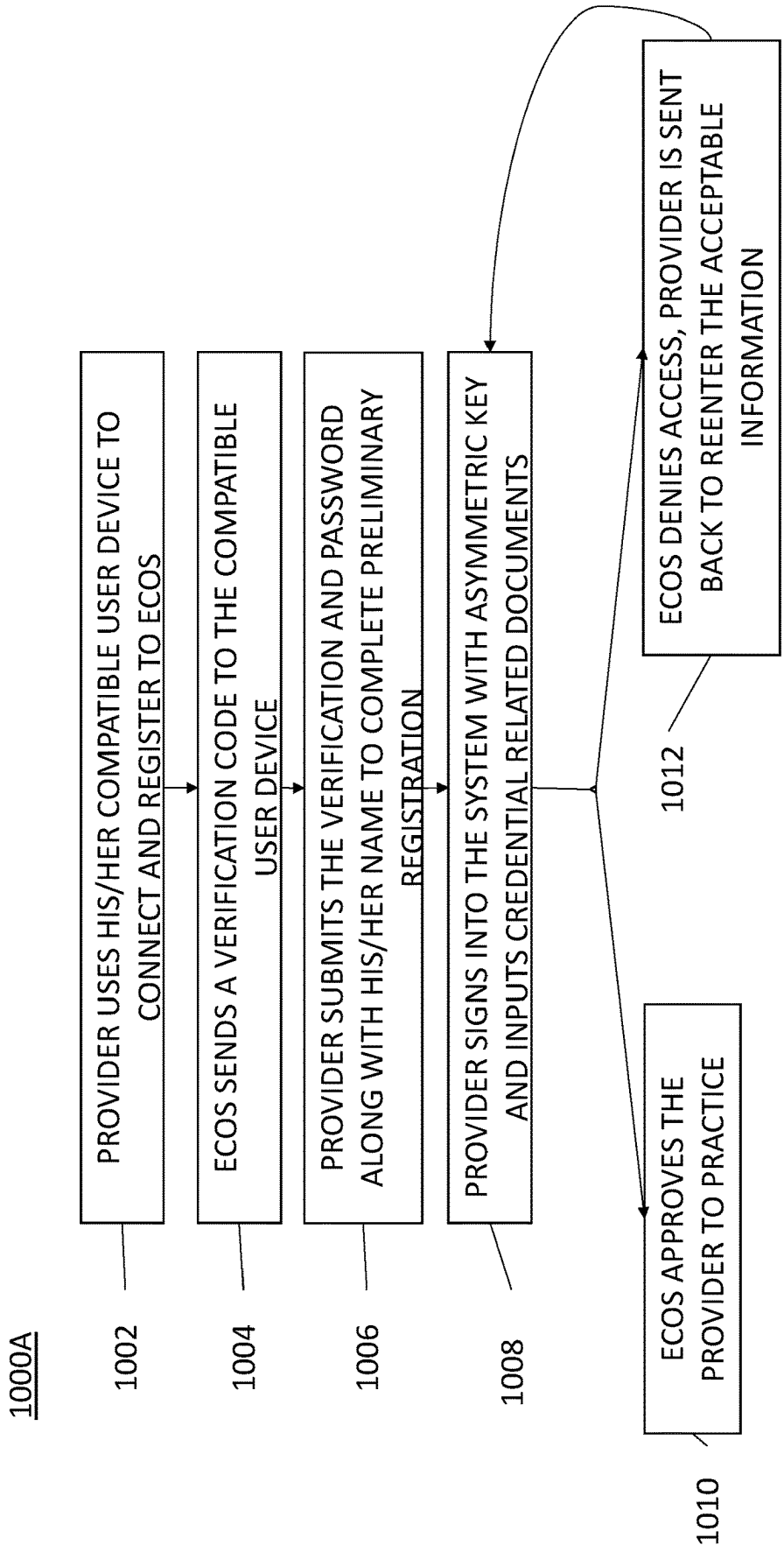

1000A
1002
PROVIDER USES HIS/HER COMPATIBLE USER DEVICE TO CONNECT AND REGISTER TO ECOS
1004
ECOS SENDS A VERIFICATION CODE TO THE COMPATIBLE USER DEVICE
1006
PROVIDER SUBMITS THE VERIFICATION AND PASSWORD ALONG WITH HIS/HER NAME TO COMPLETE PRELIMINARY REGISTRATION
1008
PROVIDER SIGNS INTO THE SYSTEM WITH ASYMMETRIC KEY AND INPUTS CREDENTIAL RELATED DOCUMENTS
1010
ECOS APPROVES THE PROVIDER TO PRACTICE
1012
ECOS DENIES ACCESS, PROVIDER IS SENT BACK TO REENTER THE ACCEPTABLE INFORMATION

FIG. 10A

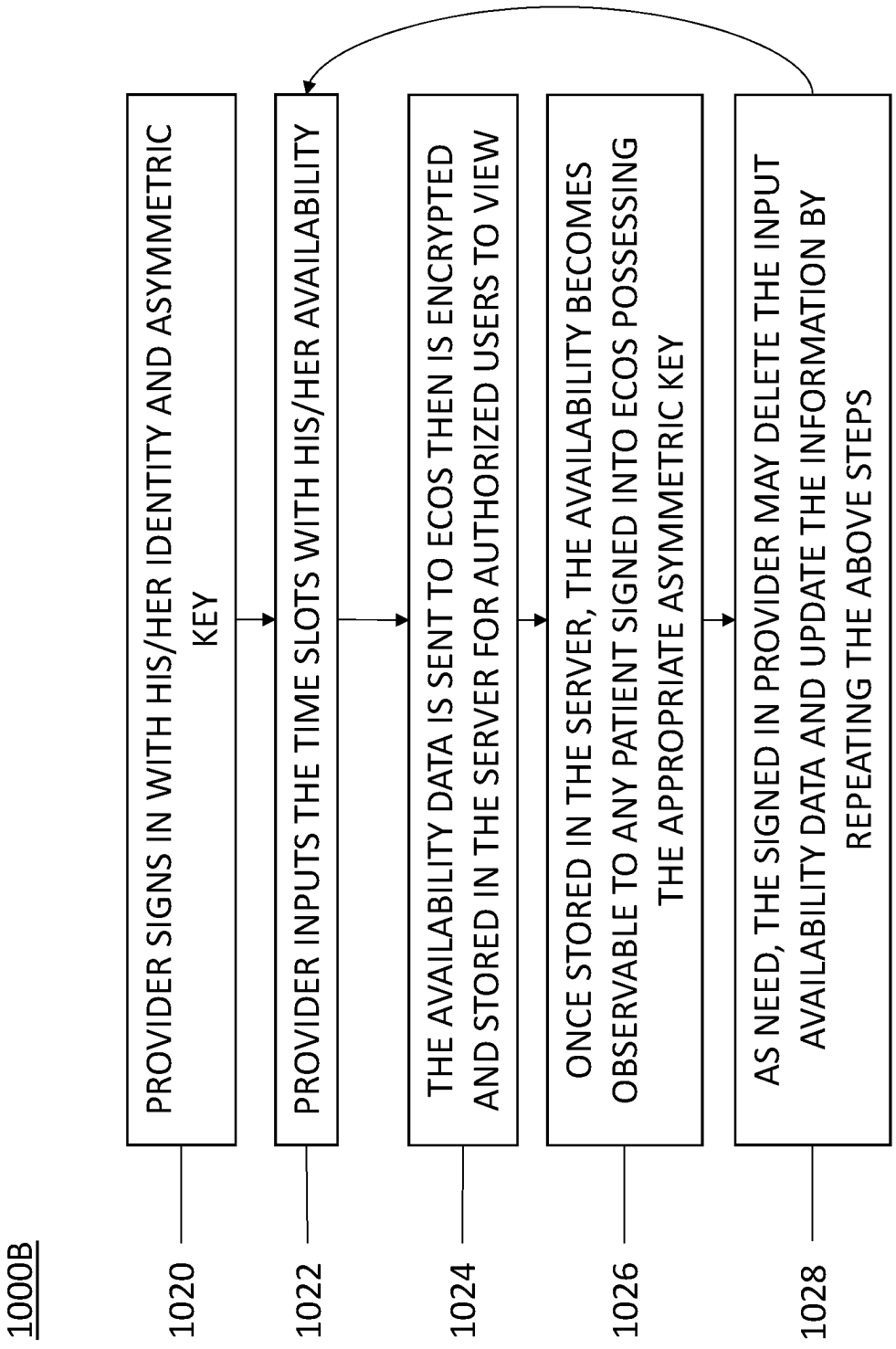

1000B
1020
PROVIDER SIGNS IN WITH HIS/HER IDENTITY AND ASYMMETRIC KEY
1022
PROVIDER INPUTS THE TIME SLOTS WITH HIS/HER AVAILABILITY
1024
THE AVAILABILITY DATA IS SENT TO ECOS THEN IS ENCRYPTED AND STORED IN THE SERVER FOR AUTHORIZED USERS TO VIEW
1026
ONCE STORED IN THE SERVER, THE AVAILABILITY BECOMES OBSERVABLE TO ANY PATIENT SIGNED INTO ECOS POSSESSING THE APPROPRIATE ASYMMETRIC KEY
1028
AS NEED, THE SIGNED IN PROVIDER MAY DELETE THE INPUT AVAILABILITY DATA AND UPDATE THE INFORMATION BY REPEATING THE ABOVE STEPS

FIG. 10B

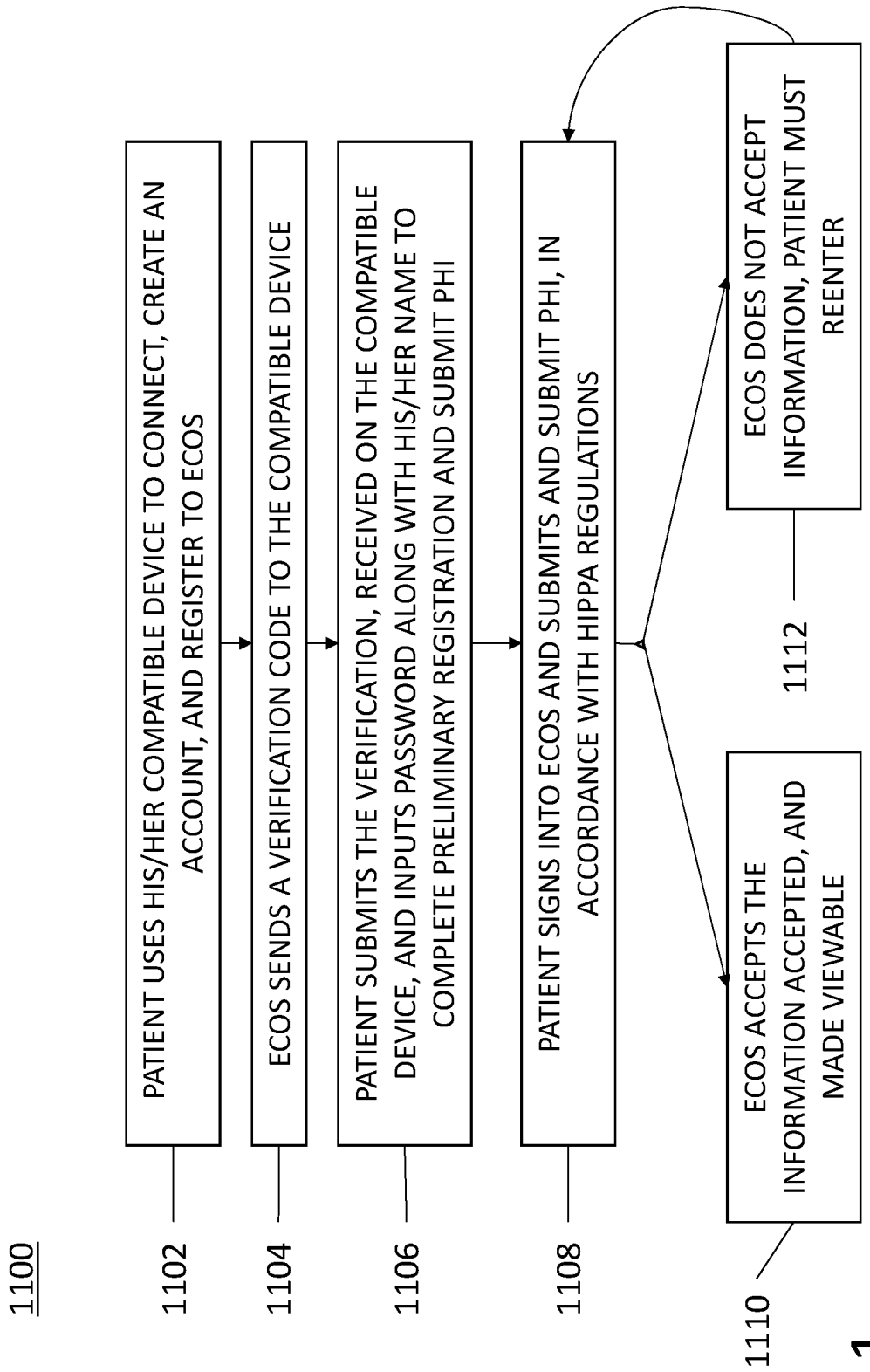

1100
1102
PATIENT USES HIS/HER COMPATIBLE DEVICE TO CONNECT, CREATE AN ACCOUNT, AND REGISTER TO ECOS
1104
ECOS SENDS A VERIFICATION CODE TO THE COMPATIBLE DEVICE
1106
PATIENT SUBMITS THE VERIFICATION, RECEIVED ON THE COMPATIBLE DEVICE, AND INPUTS PASSWORD ALONG WITH HIS/HER NAME TO COMPLETE PRELIMINARY REGISTRATION AND SUBMIT PHI
1108
PATIENT SIGNS INTO ECOS AND SUBMITS AND SUBMIT PHI, IN ACCORDANCE WITH HIPPA REGULATIONS
1110
ECOS ACCEPTS THE INFORMATION ACCEPTED, AND MADE VIEWABLE
1112
ECOS DOES NOT ACCEPT INFORMATION, PATIENT MUST REENTER

FIG. 11

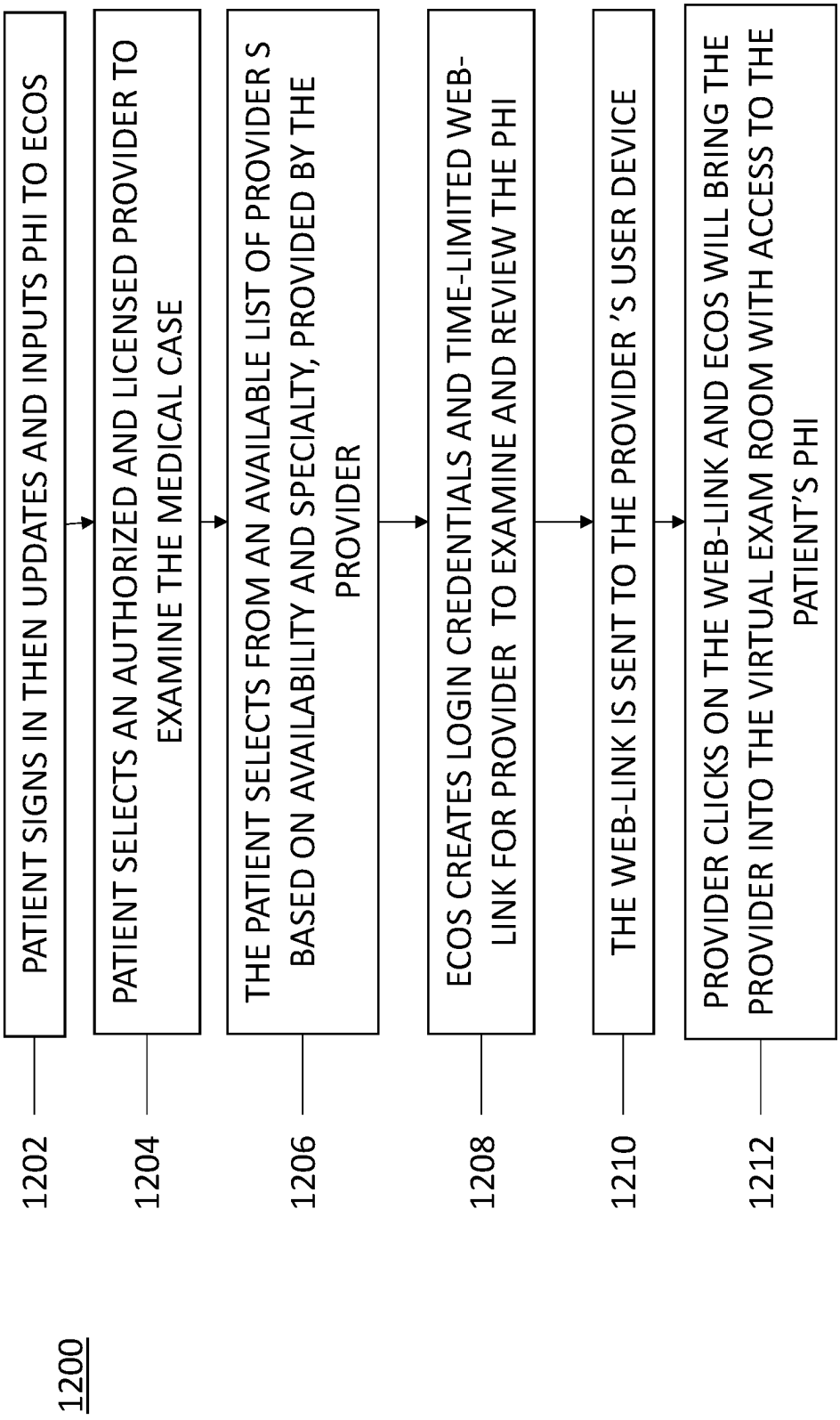

1200
1202
PATIENT SIGNS IN THEN UPDATES AND INPUTS PHI TO ECOS
1204
PATIENT SELECTS AN AUTHORIZED AND LICENSED PROVIDER TO EXAMINE THE MEDICAL CASE
1206
THE PATIENT SELECTS FROM AN AVAILABLE LIST OF PROVIDER S BASED ON AVAILABILITY AND SPECIALTY, PROVIDED BY THE PROVIDER
1208
ECOS CREATES LOGIN CREDENTIALS AND TIME-LIMITED WEB-LINK FOR PROVIDER TO EXAMINE AND REVIEW THE PHI
1210
THE WEB-LINK IS SENT TO THE PROVIDER 'S USER DEVICE
1212
PROVIDER CLICKS ON THE WEB-LINK AND ECOS WILL BRING THE PROVIDER INTO THE VIRTUAL EXAM ROOM WITH ACCESS TO THE PATIENT'S PHI

FIG. 12

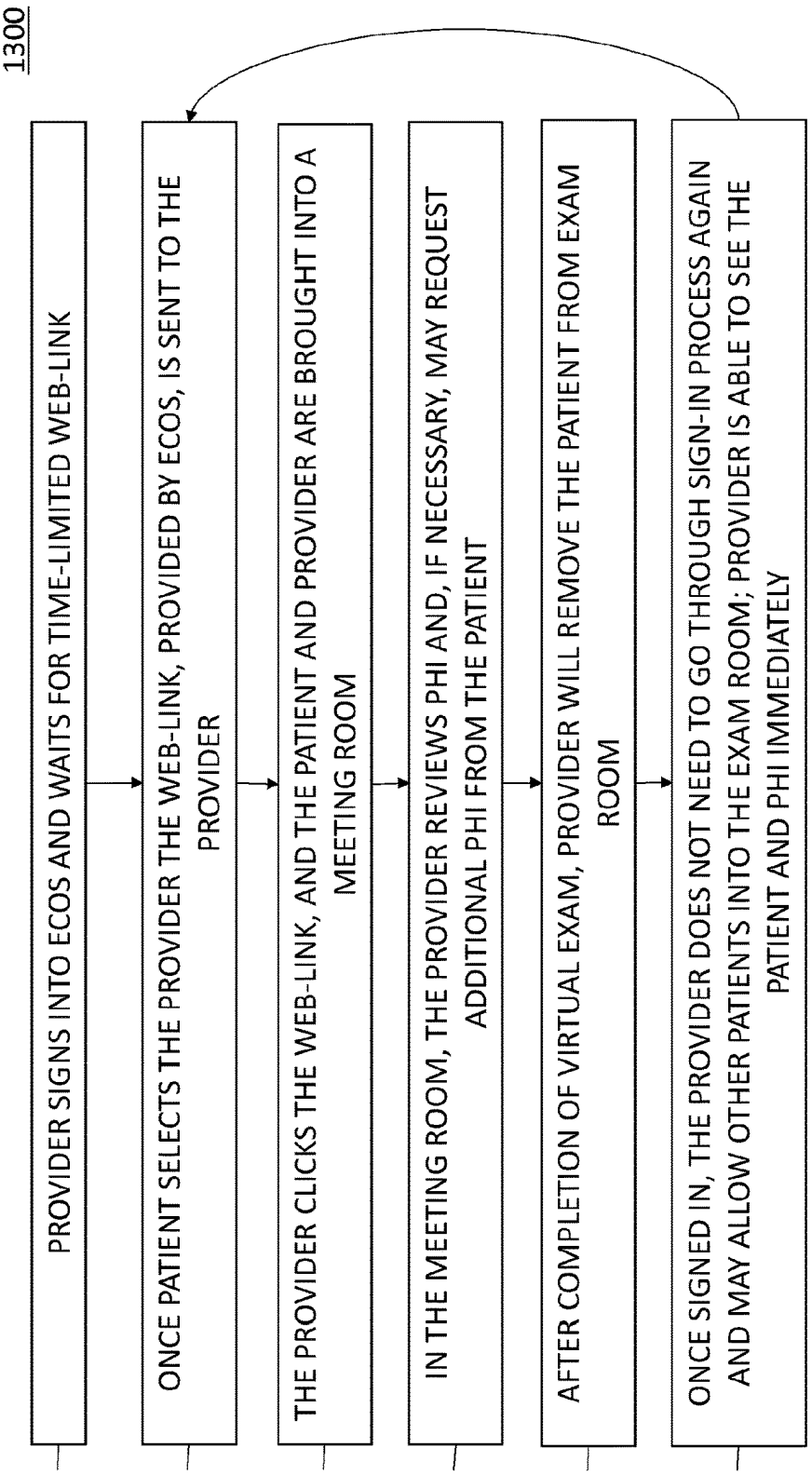

1300
PROVIDER SIGNS INTO ECOS AND WAITS FOR TIME-LIMITED WEB-LINK
ONCE PATIENT SELECTS THE PROVIDER THE WEB-LINK, PROVIDED BY ECOS, IS SENT TO THE PROVIDER
THE PROVIDER CLICKS THE WEB-LINK, AND THE PATIENT AND PROVIDER ARE BROUGHT INTO A MEETING ROOM
IN THE MEETING ROOM, THE PROVIDER REVIEWS PHI AND, IF NECESSARY, MAY REQUEST ADDITIONAL PHI FROM THE PATIENT
AFTER COMPLETION OF VIRTUAL EXAM, PROVIDER WILL REMOVE THE PATIENT FROM EXAM ROOM
ONCE SIGNED IN, THE PROVIDER DOES NOT NEED TO GO THROUGH SIGN-IN PROCESS AGAIN AND MAY ALLOW OTHER PATIENTS INTO THE EXAM ROOM; PROVIDER IS ABLE TO SEE THE PATIENT AND PHI IMMEDIATELY
1302
1304
1308
1308
1310
1312

FIG. 13

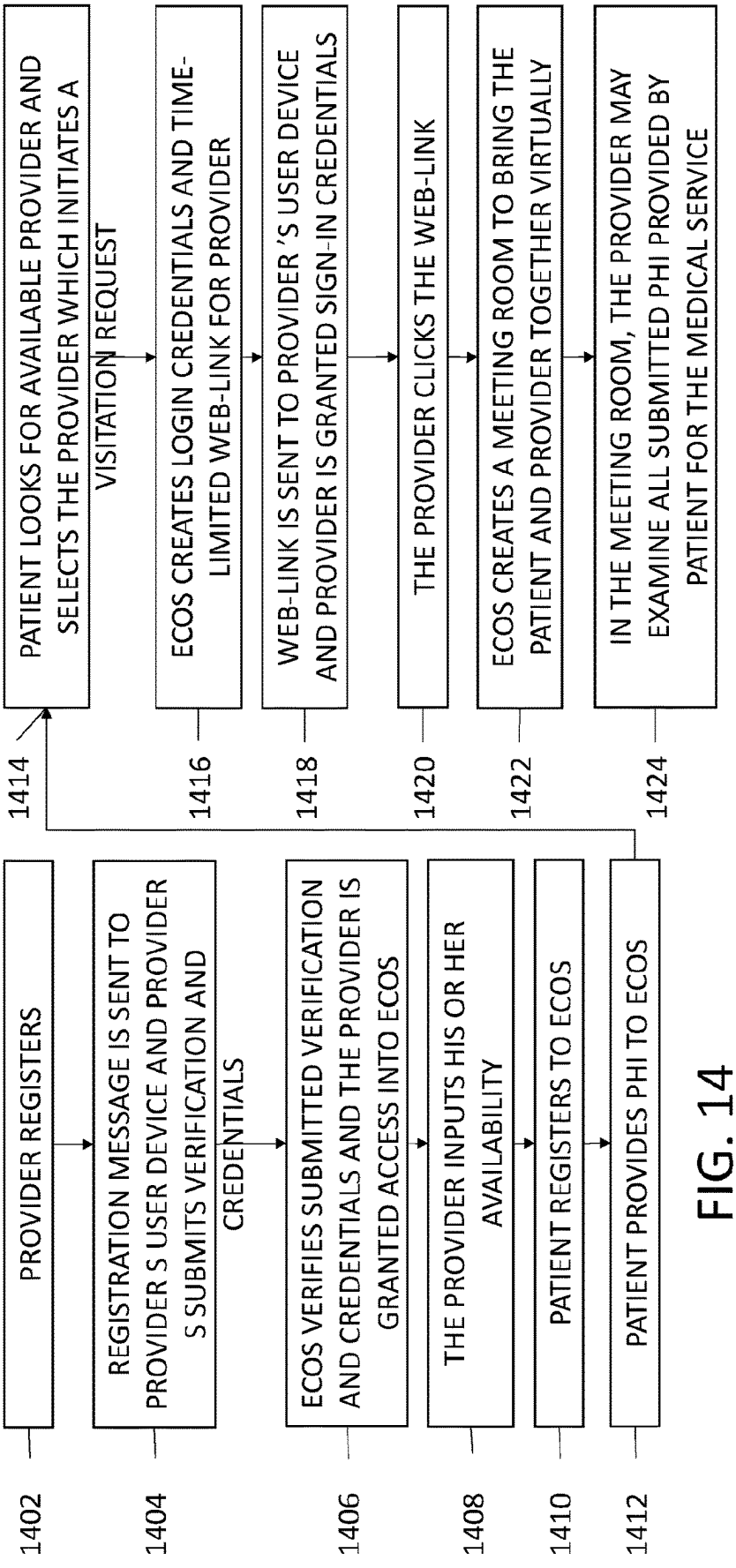

1400
PROVIDER REGISTERS
REGISTRATION MESSAGE IS SENT TO PROVIDER S USER DEVICE AND PROVIDER S SUBMITS VERIFICATION AND CREDENTIALS
ECOS VERIFIES SUBMITTED VERIFICATION AND CREDENTIALS AND THE PROVIDER IS GRANTED ACCESS INTO ECOS
THE PROVIDER INPUTS HIS OR HER AVAILABILITY
PATIENT REGISTERS TO ECOS
PATIENT PROVIDES PHI TO ECOS
1402
1404
1406
1408
1410
1412
1414
PATIENT LOOKS FOR AVAILABLE PROVIDER AND SELECTS THE PROVIDER WHICH INITIATES A VISITATION REQUEST
ECOS CREATES LOGIN CREDENTIALS AND TIME-LIMITED WEB-LINK FOR PROVIDER
WEB-LINK IS SENT TO PROVIDER 'S USER DEVICE AND PROVIDER IS GRANTED SIGN-IN CREDENTIALS
THE PROVIDER CLICKS THE WEB-LINK
ECOS CREATES A MEETING ROOM TO BRING THE PATIENT AND PROVIDER TOGETHER VIRTUALLY
IN THE MEETING ROOM, THE PROVIDER MAY EXAMINE ALL SUBMITTED PHI PROVIDED BY PATIENT FOR THE MEDICAL SERVICE
1416
1418
1420
1422
1424

FIG. 14

# CROSS-PLATFORM IMPLEMENTATION OF CLOUD-BASED APPLICATIONS UTILIZING NOODL PROGRAMMING

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims the benefit of U.S. Provisional 62/132,388, filed Dec. 30, 2020, U.S. Provisional 63/171,971, filed Apr. 7, 2021, and U.S. Provisional 63/172,339, filed Apr. 8, 2021, which are hereby incorporated by reference.

## FIELD OF THE INVENTION

**[0002]** The present invention relates to implementing cloud-based applications between multiple entities, and, more particularly, implementing cloud-based applications cross-platform and thereby providing secure on-line communications between endpoints in accordance with compliance standards.

## BACKGROUND

**[0003]** Turing completeness is a statement on the expressive power of a programming language, or an arbitrary computation machine. Turing machines are known to be the most powerful computation machines that exist. Turing completeness of a programming language means that anything that can be computed at all can be computed by that language. Turing completeness is an important feature of any programming language, since it allows the user to express or computer what the user wants. In 1952, it was proposed to use so-called recursive functions for computations on natural numbers as the equivalent definition of the Turing complete computations. Typically, the recursive functions are inductively defined and consists of basic functions (e.g., a set of functions that always return the number zero (0), a set of functions that select a component out of tuple, and the successor function, which adds one (1) to any given natural number). More complex functions can be constructed by base functions using different schemas (e.g., a composition of functions or primitive recursion, which allows to define the value of a function for some number n based on the value this function returns for its predecessor n−1. Most programming languages are Turing complete, such as widely used general-purpose languages (e.g., C, C++, Java, Pascal, Python, etc.). Unintentional Turing complete software or video games exist, such as PowerPoint® or Minecraft®, for example.

**[0004]** Common object-oriented programming languages, such as Java or C++, rely on defining classes for creating objects. Further, certain behaviors may be defined based on these defined classes. Conventional programming languages lack the ability to do actions beyond the design of the class. Further, conventional programming languages are limited to finite computer algorithms (e.g., a Turing machine).

## BRIEF SUMMARY OF THE INVENTION

**[0005]** The present embodiments may relate to, inter alia, systems and methods for providing cross-platform implementation of cloud-based applications.

**[0006]** In an exemplary embodiment, systems and methods may be provided for an edge computing operating system (ECOS) configured to implement cloud-based applications, the ECOS comprising, at least one ECOS computing device including a memory and a processor, and a plurality of user devices implementing at least one application in communication with the at least one ECOS computing device, wherein ones of the plurality of user devices receive NOODL code in response to an identifying attribute of a user device.

**[0007]** In one aspect, an edge computing operating system (ECOS) computing device including at least one processor in communication with a memory device may be provided. The at least one processor may be configured to provide at least one ECOS code library accessible to at least one of the plurality of user device.

**[0008]** The ECOS computing device may include additional, less, or alternate actions, including those discussed elsewhere herein.

**[0009]** The computer-implemented method may be implemented by an edge computing operating system (ECOS) computing device including at least one processor in communication with a memory device. The computer-implemented method may include NOODL code for unifying communications between HTML, CSS and java script code and facilitating communication between a user interface operable on a first operating system and a database operable with a second operating system. The computer-implemented method may include additional, less, or alternate actions, including those discussed elsewhere herein.

**[0010]** The present invention may provide an edge computing operating system (ECOS) configured to implement cloud-based applications, the ECOS comprising, at least one ECOS computing device including a memory and a processor, and a plurality of user devices implementing at least one application in communication with the at least one ECOS computing device, wherein ones of the plurality of user devices receive NOODL code in response to an identifying attribute of a user device.

**[0011]** The present invention may provide a method for establishing secure communications between a plurality of entities in accordance with one or more compliance standards. In at least one embodiment, two of the plurality of entities may include a patient and a provider, such as a doctor, for example. Via a one-click operation, such as a selection of a web link, the patient and the doctor may be connected to one another via a secure communication link. The connection may provide a virtual exam room for the patient and the provider. The virtual exam room may include audio and video capabilities. Further, the virtual exam room may provide secure access to health records data. In some embodiments, the virtual exam room is established in accordance with applicable compliance laws or standards, such as HIPAA compliance laws.

**[0012]** Advantages will become more apparent to those skilled in the art from the following description of the preferred embodiments which have been shown and described by way of illustration. As will be realized, the present embodiments may be capable of other and different embodiments, and their details are capable of modification in various respects. Accordingly, the drawings and description are to be regarded as illustrative in nature and not as restrictive.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0013]** The Figures described below depict various aspects of the systems and methods disclosed therein. It should be understood that each Figure depicts an embodiment of a

particular aspect of the disclosed systems and methods, and that each of the Figures is intended to accord with a possible embodiment thereof. Further, wherever possible, the following description refers to the reference numerals included in the following Figures, in which features depicted in multiple Figures are designated with consistent reference numerals.

**[0014]** There are shown in the drawings arrangements which are presently discussed, it being understood, however, that the present embodiments are not limited to the precise arrangements and are instrumentalities shown, wherein:

**[0015]** FIG. **1** is a simplified functional block diagram of an edge computing operating system (ECOS) system in accordance with the embodiments of the disclosed invention;

**[0016]** FIG. **2** illustrates an exemplary client computing device that may be used with the computing system illustrated in FIG. **1**;

**[0017]** FIG. **3** illustrates an exemplary server system that may be used with the computing system illustrated in FIG. **1**;

**[0018]** FIGS. **4**A-**4**J illustrate exemplary basic operations by a language used by the ECOS system illustrated in FIG. **1**;

**[0019]** FIGS. **5**A-**5**H illustrate exemplary organic operations by a language used by the ECOS system illustrated in FIG. **1**;

**[0020]** FIG. **6** illustrates an exemplary method **600** for cross-platform implementations of cloud-based applications using the ECOS system illustrated in FIG. **1**;

**[0021]** FIG. **7** illustrates an exemplary method **700** for a sign-on process for accessing the ECOS system illustrated in FIG. **1** using asymmetric keys;

**[0022]** FIG. **8** illustrates an exemplary method **800** for initial user registration flow with the ECOS system illustrated in FIG. **1**;

**[0023]** FIG. **9**A illustrates another exemplary system **900**A for providing access to a PHI database to one or more system users;

**[0024]** FIG. **9**B illustrates another exemplary system **900**B for providing secure communications between a patient and an access provider;

**[0025]** FIGS. **10**A and **10**B illustrate exemplary methods **1000**A and **1000**B for providing system registration with the ECOS system illustrated in FIG. **1**;

**[0026]** FIG. **11** illustrates an exemplary method **1100** for registration of a patient with the ECOS system illustrated in FIG. **1**;

**[0027]** FIG. **12** illustrates an exemplary method **1200** for a one-click process for a virtual session using the ECOS system illustrated in FIG. **1**;

**[0028]** FIG. **13** illustrates an exemplary method **1300** for a one-click process for a provider to initiate a virtual visit using the ECOS system illustrated in FIG. **1**; and

**[0029]** FIG. **14** illustrates an exemplary method **1400** for a virtual meeting using the ECOS system illustrated in FIG. **1**.

**[0030]** The Figures depict preferred embodiments for purposes of illustration only. One skilled in the art will readily recognize from the following discussion that alternative embodiments of the systems and methods illustrated herein may be employed without departing from the principles of the invention described herein.

## DETAILED DESCRIPTION

**[0031]** The present embodiments may relate to, inter alia, systems and methods for mapping computer applications among disparate devices. In some embodiments, the systems and methods described herein may include connecting a UI/UX design with a frontend application, a backend data-model design, and or a human-machine information exchange input-output. Additionally, or alternatively, a single computing language may uniform multiple computer languages at a high level of abstraction. In one exemplary embodiment, the process may be performed by an Edge Computing Operating System (ECOS) computing system. Additionally, or alternatively, the process may be performed using a Neuron Organic Object Description Language (NOODL).

### Neuron Organic Object Description Language (NOODL)

**[0032]** In some embodiments a data definition language may be defined as a human-readable data-serialization language for the storing and transmitting of data files. For example, the data definition language may be a YAML, known as Yet Another Markup Language or YAML Ain't Markup Language. The data definition language described herein will be referred to as a Neuron Organic Object Description Language, or NOODL. A NOODL may define its own set of vocabulary and may include organic operations in addition to, or in combination with, basic operations. Further, it may also define its own special syntax. In some embodiments, a NOODL may use key-value pairs to define hierarchical data objects. Additionally, objects may be define and can either be inherited or extended. In some embodiments, the value of an object may be changed. A key that may be provided at the beginning of a line may be denoted as a root-level object. In a NOODL, everything may be based on an object and the interaction, described herein and below, differentiates NOODL from other common programming languages.

**[0033]** As described below, systems and methods described herein may include a NOODL that includes an evolutionary capability. More than a programming language, NOODL is an organic combination between a programming language and a biological system. NOODL, with the capability to evolve, in some embodiments, becomes a bionic system. For example, an object may behave like a DNA sequence where an expression may be dependent on the environment or another object it may encounter.

**[0034]** In some embodiments, the disclosed systems and methods may include a Neuron Organic Object Description Language (NOODL), a Yet Another Markup Language (YAML), that is formatted as a data definition language. For example, as a language, it may define its own set of vocabulary and may also include its own special syntax. In some embodiments, the NOODL may use a key-value pair to define hierarchical data objects. In a NOODL, for example, only objects may be defined and may be inherited or extended. In some embodiments, the value of an object, for example, may be changed. Additionally, at the beginning of a line of an object, a key may be provided and denoted as a root-level object. In a NOODL, as objects interact, the objects may be adaptive and may be naturally changed based on the information that the objects may carry. Adaptive objects described herein may, for example, enable artificial intelligence (AI) behavior.

**[0035]** In some embodiments, the disclosed systems and methods may include a Neuron Organic Object Description Language (NOODL) that may include several useful basic operations in addition to one or more organic operations. FIGS. **4**A-**4**J illustrate exemplary basic operations of the disclosed NOODL Language. These basic operations may include, but are not limited to, inheritance, extension, override, and evaluation. The organic operations may include, but are not limited to, evolve, elite, emit, and convolve. Additional operations may be utilized without departing from the spirit and scope of the disclosed embodiments.

**[0036]** In some embodiments, in view of FIGS. **4**A and **4**B, an inheritance operation may enable the copying of all or part of an object into another object. For example, attributes of an object may be inherited using an operator for syntax, such as a dot operator (.), for example. Inheritance saves not only time, but also space. Additionally, inheritance may be enabled from a root level to its child descendants. Array objects may be defined using certain syntax, such as a dash operator (-), or the like. Additionally, or alternatively, the inheritance of an element of an array object may be accomplished by using a corresponding subscript number of a member.

**[0037]** An extension operation, as illustrated in FIG. **4**C, may enable the expansion of an object. In some embodiments, an extension operation may be used in combination with an inheritance operator. Example extension operator syntax, such as a colon (:), may be used, for example. Additionally or alternatively, an object a may be created by extension of another object, such as object b, where object a is created having all of the same attributes set forth by object b. In the example shown in FIG. **4**C, an object g may be created by extension from object a.

**[0038]** In yet another example embodiment as shown in FIG. **4**D, another basic operation, called an override, may be used to allow modifications to one or more existing objects. In FIG. **4**D, the override operation may be exploited to make changes to an existing object a. Additionally, an override operation may be used in combination with an inheritance operation, as shown in FIG. **4**E. A key difference between an override operation and an extension operation lies in that whether a reference object has changed. For example, if a new object is to be created without a need to change a reference, then an extension operation should be used. Alternatively, if an object is to be completely changed, then the basic operation of override should be used instead of an extension operation.

**[0039]** In another embodiment, another basic operation, called an evaluation, may be implemented by a NOODL. An evaluation may be used in combination with or as part of the one or more of the other basic operations, such as an inheritance operation. Additionally, an evaluation operation may be utilized to evaluate numerical values. For example, an evaluation may use "=" syntax. An example of this is shown in FIG. **4**F. Additionally, or alternatively, an evaluation operation may be utilized to evaluate string or character values, using syntax that may include a dollar sign ($) and/or a curly bracket ({ }), or the like. An example evaluation operation for string or character values is shown in FIG. **4**G.

**[0040]** Implementations of a NOODL may include one, some, or all of the basic operations described herein. Further, NOODL implementations may include basic operations not described herein and it is understood that the operations set forth are merely meant to illustrate example embodiments of the disclosure.

**[0041]** Even further, a NOODL may include one or more loop operations, such as if-else loop operations or goto operations, as shown in FIGS. **4**H-J. If-else loop operations, or conditional statements, may be used to specify new conditions for one or more objects based on one or more defined conditions. Alternatively, goto operations, or goto commands, may be utilized to, for example, as an unconditional change or jump action to other points within programming code.

**[0042]** The proof of Turing completeness of NOODL is similar to the proof of any common programming language by showing the μ-recursion capability. It is understood that the other methods of proofing may be implemented without departing from the spirit and scope of the disclosed embodiments.

**[0043]** FIGS. **5**A-**5**H illustrate organic operations of the disclosed NOODL Language. In some embodiments, the disclosed systems and methods may include a NOODL Language that may include several organic operations in addition to, or in combination with, the one or more basic operations illustrated in FIGS. **4**A-**4**J and described herein and above. Organic operations, for example, may provide an organic combination between a programming language and a biological system. In a complete cycle of organic operations, an implementation of a NOODL may become a bionic system that may mimic the whole life of a biological creature. For example, the life of an object (i.e., the complete cycle of organic operations), is similar to the process of egg-chicken-hen-egg.

**[0044]** In some embodiments, organic operations may include, but are not limited to, evolve, elite, emit, and convolve. Additional operations may be utilized without departing from the spirit and scope of the disclosed embodiments. Additionally, or alternatively, the four organic operations of evolve, elite, emit, and convolve, may represent a complete lifecycle. For example, the implementation of a NOODL, or implementation of a NOODL object, may undergo a complete cycle of the four organic operations. Additionally, or alternatively, a NOODL object may include less, or even more, additional operations, such as a combination of either one or more basic operations, one or more organic operations, or a mixture of both basic and organic operations, for example.

**[0045]** In an example embodiment, a first organic operation, as illustrated by FIG. **5**A, may be referred to as an evolve operation. An evolve operation for a NOODL may, for example, be compared to an evolution from an egg to a chicken. In simple terms, the evolve operation de-references all pointers and may make a deep copy of an object. Additionally, an evolve operation may be considered an organic operation that is an information absorbing procedure. Typically, the evolve operation may be implemented by using an evolve method. In some embodiments, a part of an object, instead of the entire object, may be evolved.

**[0046]** An example evolve operation is shown in FIG. **5**A using three objects, a, b, and object**1**. The evolve command may be run by using the syntax of FIG. **5**B, for example. FIG. **5**C shows what object**1** becomes. In FIG. **5**C, .b is de-referenced, and the pointer itself is still kept in the right_master. The value or attributes of .b are copied to right. Subsequently, when b has any changes, its change may lead

to the change of object**1** if object**1** evolves again. A part of an object may be evolved. The same result may be retrieved through the example syntax shown in FIG. **5**D.

**[0047]** Further, with respect to the organic operation of an evolve method, and continuing with the egg/chicken analogy, the chicken, or object, still as the ability to evolve again, since the pointer is still kept in the master key. In some embodiments, during the process of an evolve operation, any override operations may be omitted. Override operations may be executed in an emit method, described below.

**[0048]** In an example embodiment, a second organic operation may be referred to as an elite operation. An example is shown in FIG. **5**E. An elite operation for a NOODL may, for example, may be compared to the evolutionary process of a chicken to a hen. In an elite organic operation, the process may remove any and all master pointers and only preserve their values. For an elite process, an object, such as a NOODL object, may mature but cannot evolve again.

**[0049]** In an example embodiment, a third organic operation may be referred to as a convolve operation. An example convolve operation is shown in FIGS. **5**F and **5**G. A convolve operation for a NOODL object may, for example, may be compared to the process of a hen to an egg. In other words, a convolve organic operation may be the exact reverse of an evolve operation. In some embodiments, a convolve operation removes all object attributes but preserves the master pointers.

**[0050]** In yet another example embodiment, a fourth organic operation may be referred to as an emit operation. An example emit operation is shown in FIG. **5**H. An emit operation for a NOODL object may, for example, cause certain information to be emitted during a process. For example, any changes to an object may be emitted to the environment through an emit organic operation.

**[0051]** In some embodiments of the disclosed systems and methods, a NOODL implementation may be applied to a machine learning model. For example, a machine learning model may be used to detect the species of animals in an image. Further, the model may be pre-trained and saved. When a new object containing a new image encounters the pre-trained image, an evolution may happen to both images. First, a prediction of the possible species may occur and may then be applied to the machine learning model. Second, if an image carries a true label of a species, such as one given by a human or an expert, the model image data may absorb the new data and the model may be re-trained and updated. Errors may be corrected in the same manner if predictions are found to be incorrect.

**[0052]** In some embodiments, a NOODL may generate, or map, a computer application for a specific device, such as an Android device, an Apple iOS device, or a desktop device, such as macOS or Windows. Further, a NOODL may connect UI/UX design with a frontend application, a backend data-model design, and/or a Human-Machine Information Exchange input-output. Additionally, a NOODL may uniform HTML, CSS or even Javascript at a higher level of abstraction.

Exemplary Computing System for Cross-Platform Implementation of Cloud-Based Applications

**[0053]** FIG. **1** illustrates a block diagram **100** of an exemplary computing network architecture. In some embodiments, computing network architecture **100** may include, for example, a cloud-computing architecture.

**[0054]** An ECOS, or Edge Computing Operating System for an Information Object, may modularize and standardize one or more frontend, or edge, computing function blocks. In some embodiments, a simple server implementation with a combination of SQL and non-SQL data storage may be provided. In some instances, a server may be limited for data storage, data retrieval, and data exchange. The server may be expected to maintain not only data relation but also data integrity. Additionally, an ECOS may provide clients, or users, with so-called WYS-WYG, or What You Save and What You Get. Additionally, or alternatively, a data scheme may be defined by clients, or users, and used by the clients, or users, in the frontend.

**[0055]** In one implementation example, methods and systems may be provided for cross-platform implementation of cloud-based applications. A client may provide one or more elements for user requirement analysis that may then be applied to the design of a user interface and a user experience (i.e. UI/UX). This UI/UX may then be mapped to a NOODL and a series of NOODL files may be created and stored. In some embodiments, the NOODL files may be stored in a cloud file storage and follow a defined naming convention. For example, NOODL files may be organized or associated with a certain application, or app. An app that is loaded into an app store, such as a mobile device application store, may be downloaded to a mobile device. When the app is run by the mobile device, for example, the one or more NOODL files associated with the app may be loaded onto the mobile device from the cloud file storage location. Additionally, app updates may be accomplished by using the NOODL file sets and may be reloaded in response to the NOODL file sets.

**[0056]** FIG. **1** depicts an exemplary ECOS computing system **100**. ECOS computer system **100** may include an ECOS computing device **102** (also referred to herein as ECOS server or ECOS computer device). ECOS computing device **102** may include a database server. ECOS computing device **102** may be in communication with, for example, one or more of a database **114**, one or more user devices **104**, one or more applications **106**, **108**, **110**, ECOS standard library **112**, index object database **116**, backend services **118**, and/or mass data storage **120**. While a single user device is shown with respect to user device **104**, it is understood that multiple user devices may be provided.

**[0057]** In the exemplary embodiment, user device **104** may be a computer that includes a web browser or a software application, which enables user device **104** to access remote computer devices, such as ECOS computing device **102**, using the Internet or other network. More specifically, user device **104** may be communicatively coupled to ECOS computing device **102** through many interfaces including, but not limited to, at least one of the Internet, a network, such as the Internet, a local area network (LAN), a wide area network (WAN), or an integrated services digital network (ISDN), a dial-up-connection, a digital subscriber line (DSL), a cellular phone connection, and a cable modem. User device **104** may be any device capable of accessing the Internet including, but not limited to, a desktop computer, a laptop computer, a personal digital assistant (PDA), a cellular phone, a smartphone, a tablet, a phablet, wearable electronics, smart watch, or other web-based connectable equipment or mobile devices.

**[0058]** Applications **106**, **108**, **110** may be accessed by user device **104** via ECOS computing device **102**. While being accessed by user device **104** via ECOS computing device **102**, user device **104** may retrieve information from applications **106**, **108**, **110** and/or send information to applications **106**, **108**, **110**. Such information that may be received/sent may include, for example, medical records and/or other medical information.

**[0059]** When establishing connection with applications **106**, **108**, **110** via ECOS computing device **102**, a sign-in process may be used to verify user device **104**. Such a sign-in process may use a combination of private keys, public keys, and/or one or more key signatures, such as the sign-in processes detailed herein and below.

**[0060]** ECOS computing device **102** may be communicatively coupled to database **114** that stores data. In one embodiment, database **114** may include medical data associated with users, healthcare contact information, etc. In the exemplary embodiment, database **114** may be stored remotely from ECOS computing device **102**. In some embodiments, database **114** may be decentralized. In the exemplary embodiment, a user may access database **114** and/or ECOS computing device **102** via user device **104**.

**[0061]** ECOS computing device **102** may be communicatively coupled to ECOS backend services **118** and mass data storage **120**. Additionally, ECOS backend services **118** may be communicatively coupled to mass data storage **120** and index object database **116**.

**[0062]** ECOS backend services **118** may provide general services and maintenance to ECOS computing device **102**, index object database **116**, and/or mass data storage **120**. Mass data storage **120** may store information relayed from ECOS computing device **102** and/or ECOS backend services **118**. Mass data storage **120** may also provide information to ECOS computing device **102** and/or ECOS backend services **118**.

**[0063]** ECOS computing device **102** may be communicatively coupled to ECOS standard library **112**. ECOS standard library **112** may also be communicatively coupled to applications **106**, **108**, **110**.

Exemplary Client Computing Device

**[0064]** FIG. **2** illustrates a block diagram **200** of an exemplary client computing device **202** that may be used with the computing device **102** shown in FIG. **1**. Client computing device **202** may be, for example, at least one of user device **104** (shown in FIG. **1**).

**[0065]** Client computing device **202** may be accessible to a user **204**, such as an end user accessing one of Apps **106-110** of FIG. **1** via a user device. Device **202** may include a processor **206** for executing instructions. In some embodiments, executable instructions may be stored in a memory area **208**. Processor **206** may include one or more processing units (e.g., in a multi-core configuration). Memory area **208** may be any device allowing information such as executable instructions and/or other data to be stored and retrieved. Memory area **208** may include one or more computer readable media.

**[0066]** In one or more exemplary embodiments, client computing device **202** may also include at least one media output component **210** for presenting information to a user **204**. Media output component **210** may be any component capable of conveying information to user **204**. In some embodiments, media output component **210** may include an output adapter such as a video adapter and/or an audio adapter. An output adapter may be operatively coupled to processor **206** and operatively coupled to an output device such as a display device (e.g., a liquid crystal display (LCD), a light emitting diode (LED) display, an organic light emitting diode (OLED) display, a cathode ray tube (CRT) display, an "electronic ink" display, a projected display, etc.) or an audio output device (e.g., a speaker arrangement or headphones).

**[0067]** Client computing device **202** may also include an input device **212** for receiving input from a user **204**. Input device **212** may include, for example, a keyboard, a pointing device, a mouse, a stylus, a touch sensitive panel (e.g., a touch pad or a touch screen), a gyroscope one or more sensors or an audio input device. A single component, such as a touch screen, may function as both an output device of media output component **210** and an input device of input device **212**.

**[0068]** Client computing device **202** may also include a communication interface **214**, which can be communicatively coupled to a remote device, such as ECOS computing device **102**, shown in FIG. **1**. Communication interface **214** may include, for example, a wired or wireless network adapter or a wireless data transceiver for use with a mobile phone network (e.g., Global System for Mobile communications (GSM), 3G, 4G, or Bluetooth) or other mobile data networks (e.g., Worldwide Interoperability for Microwave Access (WIMAX)). The systems and methods disclosed herein are not limited to any certain type of short-range or long-range networks.

**[0069]** Stored in memory area **208** may be, for example, computer readable instructions for providing a user interface to user **204** via media output component **210** and, optionally, receiving and processing input from input device **212**. A user interface may include, among other possibilities, a web browser or a client application, such as a mobile application. Web browsers may enable users, such as user **204**, to display and interact with media and other information typically embedded on a web page or a website.

**[0070]** Memory area **208** may include, but is not limited to, random access memory (RAM) such as dynamic RAM (DRAM) or static RAM (SRAM), read-only memory (ROM), erasable programmable read-only memory (EPROM), electrically erasable programmable read-only memory (EEPROM), and non-volatile RAM (NVRAN). The above memory types are exemplary only, and are thus not limiting as to the types of memory usable for storage of a computer program.

Exemplary Server Computing Device

**[0071]** FIG. **3** depicts a block diagram **300** showing an exemplary server system **302**. Server system **302** may be, for example, computing device **102**, a database server, or back end server **118** (shown in FIG. **1**).

**[0072]** In exemplary embodiments, server system **302** may include a processor **304** for executing instructions. Instructions may be stored in a memory area **306**. Processor **304** may include one or more processing units (e.g., in a multi-core configuration) for executing instructions. The instructions may be executed within a variety of different operating systems on server system **302**, such as UNIX, LINUX, Microsoft Windows®, etc.

**[0073]** It should also be appreciated that upon initiation of a computer-based method, various instructions may be

executed during initialization. Some operations may be required in order to perform one or more processes described herein, while other operations may be more general and/or specific to a particular programming language (e.g., C, C#, C++, Java, or other suitable programming languages, etc.).

**[0074]** Processor **304** may be operatively coupled to a communication interface **308** such that server system **302** is capable of communicating with computing device **102** or user device **104** (all shown in FIG. **1**), and/or another server system. For example, communication interface **308** may receive data from user device **104** via the Internet or a mobile network.

**[0075]** Processor **304** may also be operatively coupled to a storage device **312**, such as database **114** (shown in FIG. **1**), via a storage interface **310**. Storage device **312** may be any computer-operated hardware suitable for storing and/or retrieving data. In some embodiments, storage device **312** may be integrated in server system **302**. For example, server system **302** may include one or more hard disk drives as storage device **312**.

**[0076]** In other embodiments, storage device **312** may be external to server system **302** and may be accessed by a plurality of server systems. For example, storage device **312** may include multiple storage units such as hard disks or solid state disks in a redundant array of inexpensive disks (RAID) configuration. Storage device **312** may include a storage area network (SAN) and/or a network attached storage (NAS) system.

**[0077]** In some embodiments, processor **304** may be operatively coupled to storage device **312** via a storage interface **310**. Storage interface **310** may be any component capable of providing processor **304** with access to storage device **312**. Storage interface **310** may include, for example, an Advanced Technology Attachment (ATA) adapter, a Serial ATA (SATA) adapter, a Small Computer System Interface (SCSI) adapter, a RAID controller, a SAN adapter, a network adapter, and/or any component providing processor **304** with access to storage device **312**.

**[0078]** Memory area **306** may include, but is not limited to, random access memory (RAM) such as dynamic RAM (DRAM) or static RAM (SRAM), read-only memory (ROM), erasable programmable read-only memory (EPROM), electrically erasable programmable read-only memory (EEPROM), and non-volatile RAM (NVRAM). The above memory types are exemplary only, and are thus not limiting as to the types of memory usable for storage of a computer system.

Method for Cross Platform Implementing Cloud-Based Applications

**[0079]** In some embodiments, an environment for implementing a cloud-based applications cross-platform may be provided. As illustrated in FIG. **6**, the present invention may be utilized within a cross-platform linking algorithm and method to facilitate the accessibility and use of a use-specific application on various devices and in various operating system environments. A user of a device may engage or be engaged by an application having at least one operationally specific use, such as, for example, a video chat application. For example, if a user seeks to deploy an application for a video chat with a user of another device having a different operating system, then the present invention may access tools to allow for the same application to execute on each of the devices being used with the differing operating systems.

**[0080]** In an embodiment of the present invention, a query may be run to determine the requirements of the user which may include the type of application sought to be run and/or the capabilities and/or characteristics of the at least one device utilizing the application, for example. In addition, the UI/UX of the target application may be selected and mapped, through at least one cloud-based address to at least one NOODL object or NOODL system. Upon identification of the targeted NOODL code, at least a portion of the code may be uploaded to at least one cloud location accessible by the at least one device. The NOODL code may form a portion of a NOODL file which may include NOODL portions from any cloud accessible platform and may be named and designated to be unique to the at least one device and to the application sought to be utilized on or by the at least one device. An application platform, such as an app store, for example, may receive at least one identifying indication of the NOODL file and may allow the NOODL file to be loaded into at least one target application resident on the application platform. The application in communication with at least an aspect of the NOODL file may form a novel application compatible with the at least one device by having at least one set of instructions of the existing application affected by at least a portion of the NOODL file. The novel application may remain resident remotely from the at least one device, may be at least partially downloaded by the at least one device, and/or may be shared by at least two devices in part to drive at least some portion of shared communications between the devices.

Asymmetric Key Base Sign-In Process

**[0081]** In some embodiments, a sign-in process for accessing the ECOS using asymmetric keys may be provided. The integrity of digital information as it passes between systems may be bolstered by using a digital signature such that a sender may use cryptographic algorithms to create a data structure that is associated with the information to be sent. A recipient with access to the information may cryptographically verify that the message hasn't been modified since the sender has signed it. In cases where the recipient doesn't have access to the same key used by the sender for verification, a digital signing scheme that uses asymmetric keys is useful. The sender can make the public portion of the key available to any recipient to verify the signature, but the sender may retain control over using the private portion of the key.

**[0082]** As illustrated in FIG. **7**, the present invention provides for the ECOS system to send at least one code to a known user contact address, such as a mobile phone number, to confirm the identity or authorization of the login of the user of a first device in connection with an application in accordance with the present invention. If the authenticity of the user is confirmed, the system may decrypt the generated and encrypted signed key (ESK) which is verified against the public key (PK). If decryption fails to occur, the user may be required to login to their device once more and begin the process again.

**[0083]** Successful decryption of the ESK may allow the ECOS system to receive from the user an identifying signature (or an object indicative of an identifying signature) which may then be combined with the secret key (SK) and

a system maintained user id to an aspect of the ECOS system to be verified. Upon verification, the ECOS system produces and returns an authorized token that is accessible by the user and may sent to the user to be resident on the user's local device which may be used to access and allow access by others to encrypted applications, information, and other areas controlled in the ECOS system. The user may or may not need to implement the authorized token to access some areas of the ECOS system which may be accessible through the use of the user's id.

Doctor Registration Flow

**[0084]** In an embodiment of the present invention, as illustrated in FIGS. **8**A and **8**B, single-key encrypted document sharing may occur amongst and between multiple participants of the ECOS system and related applications. Each user may have an asymmetric key pair, a PK and SK, wherein User A may share a message M with User B. First, a random symmetric encryption key (K) is generated which is then in turn used to encrypt the message M. The key K is itself then encrypted with a PK of user B and then sent with the encrypted message and the encrypted K. User B may then decrypt the received K using a SK and then ultimately use the K to decrypt the message M. As illustrated in FIG. **8**B, following similar logic, either User A or User B is able to re-encrypt the K for a new User C with C.pk. These encryption techniques may be used in a number of ECOS-based applications and may, for example, be used to transfer and convey sensitive healthcare information.

**[0085]** By way of non-limiting example only, a user may access a doctor's advice through limited or a single action on an electronic device through an ECOS or NOODL supported infrastructure. Patients Health Information (PHI) is protected by the commonly known HIPAA laws in the United States. Providers of medical services, such as doctors and technicians, must use secure means to access such PHI electronically, regardless of how, for example, the PHI is stored or provided to the provider. This presents a complicated, costly and time/procedure consuming process which often limits or unnecessarily complicates the providers access to the PHI. Providing a direct and secure link to such PHI, on demand and in a near real-time manner, may help alleviate such obstacles.

**[0086]** In an embodiment of the present invention, an SMS text message, for example, with a time-limited web-link, may provide immediate access to the medical provider of PHI authorized for viewing or other access by the patient or user for a specific medical service. Such secure limitation to the PHI may allow a provider to see necessary patient medical information through a single action, such as by "one-click", greatly speeding and simplify to provisioning of information to a provider by a patient or the patient's otherwise authorized agent and/or medical providers.

**[0087]** By way of non-limiting example only, a doctor's visit may be initiated by a patient and at least aspect of the PHI may be submitted by the patient. The patient may further select and authorize at least one licensed provider to further advise or consult on the exam or the PHI, for example. The patient may choose or have chosen a provider from at least one GUI interface providing information related to the provider, including the specialty and availability of the provider. Through the system of the present invention, a user may create login credentials and one or more unique web-link to allow providers to both to exam and review the at least some aspects of the PHI for the desired medical service(s) with predetermined limitation on access, such as a limitation on time. The system of the present invention may then send the user associated web-link to one or more of a provider which may allow the provider with "one click" access to, for example, a virtual exam room, the necessary PHI, and the patient, in a real time and immediate manner.

**[0088]** Authentication of users of the present invention may happen in various ways and at various points over the chain of communication points within the present invention such that each of a patient and/or provider may be required to authenticated themselves in the system at least once while in communication with some portion of the system. As would be appreciated by those skilled in the art, sign-in (check-in) to the system, such as access into an exam room, may be completed by a provider either at the time of check-in and allow the provider to access an "exam room" while waiting for a patient. As discussed herein, authentication may be multilevel and may include pre-authentication procedures, third-party verification, and/or the use of multifactor authentication techniques, for example.

**[0089]** In an embodiment of the present invention, a service provider may be able to pull out patient PHI by patient name, identification number, and/other credentials. In a situation where a provider may require the patient to provide PHI which has not been submitted to the system where the provider is able to access, the provider may request it of the patient through a secured link which may provide the information directly or, for example, simply provide authorization for access to the PHI is held by a third party, for example. To begin reviewing PHI and/or to enter an exam room space, for example, the provider may not need to engage with a sign-in process and may be authenticated and provided access through exactly one click on a link provided or other activation button correspondent to the present invention. In this way, for example, the provider may be able to see the patient and/or the PHI immediately while complying with rules such as HIPAA.

**[0090]** In an embodiment of the present invention as illustrated in FIG. **9**B, system **900** may provide access to at least one PHI database **906** through application **901** by at least one user and one provider of the system. As discussed herein throughout, an app **901** may be resident and/or accessible by any device utilized by a user and/or provider and may be resident locally to the user of the app **901** or may be resident in a cloud accessible medium, such as through an AWS system, for example. The app **901** may provide a patient interface **905** and a provider interface **910**. Although not shown, app **901**, for example, may be partially resident locally on the user's device allowing for local access to at least a portion of patient interface **905**. In this way, PHI located locally with the user may be accessible into system **900**. PHI may also be aggregated and/or stored securely on database **906**.

**[0091]** A user and a provider may also access a virtual exam room **915** which may be resident outside the app **901** and may include stand-alone security features. Authentication by either of the user and/or provider may be handled through app **901** and, more particularly, by patient interface **905** and provider interface **910**, respectively. Each interface may pre-authenticate its respective user and may provide an on-demand access credential for use in the system for immediate access to aspects of system **900** such as, for

example, exam room **915** and/or database **906**. For example, a user may send a request to a provider to meet in exam room **915**. Such a request may be provided by app **901** and may be authenticated by provider interface **910**. The user may have selected a provider from a list of preferred providers associated with the user at interface **905**, for example, with a link to an exam room **915** sent directly to the provider from app **901** and, more particularly, by interface **910**. The authentication of the provider may be verified by the app **901** upon entrance into the exam room **915**, for example, but the access to exam room **915** by the provider may be instant and through clicking or otherwise activating a simple URL link, for example.

**[0092]** Through exam room **915**, the user and provider may interact either through any means, such as visual in a tele-medicine setting, for example, or over text and/or voice means. The interaction may also be limited to a voice call between those in the exam room **915** paired with the visual inspection of test results and/or other visual information pertinent to the user. PHI from database **906** maybe be shared by the user or fetched by a provider with user permissions into the exam room **915** and/or accessible in app **901** to be sufficiently used by both parties. Certain PHI may require certain functionality for view, such as x-ray results, for example, and may use embedded or third party applications through app **901** to be viewed by the provider and/or user.

**[0093]** In an embodiment of the present invention, illustrated in FIG. **10**A, through flowchart **1000**A a provider, such as a doctor, medical professional, or medical institution, may register into the edge computing operating system (ECOS) computing system **100** utilizing a user device **104**, including a compatible device including, but not limited to, a cellphone, computer, or tablet. Following step **1002**, the provider may use the user device **104** to connect and register with ECOS computing system **100**. Next in step **1004**, the user device **104** is connected to ECOS computing system **100** and a verification code with be sent to the user device **104**. In step **1006**, the provider may use this submit the verification code with a password and his/her name to fill out the preliminary registration. In step **1008**, the signed in provider may be assigned and sent an asymmetric key, and the provider may input information relating to his/her medical credentials and specialties. In some embodiments, the asymmetric key, or code, may be provided upon every log-in attempt, provided for a limited-time use (e.g., for 24 hours, for 72 hours, etc.) or it may be provided a single time and used until changed, either by the system or upon request by the user. In step **1010**, the ECOS computing system **100** may approve the input information and store it in the memory or external database. The information will be available for any registered ECOS computing system user to view. In step **1012**, if the entered credentials are denied by ECOS, the provider may be returned to step **1008** to reenter the appropriate credentials.

**[0094]** In an embodiment of the present invention, illustrated in FIG. **10**B, through flow **1000**B the provider may set up his or her schedule availability. In step **1020**, the provider signs in with his/her identity and asymmetric key. In step **1022**, the provider may input the time slots with his or her availability. In step **1024**, the availability data is sent to ECOS computing system **100** for storage. In some embodiments, the availability data may be stored on a database, such as database **114** (shown in FIG. **1**). Additionally, or alternatively, the availability data may be encrypted prior to storage of the availability data. In step **1026**, the availability data may become observable to an authorized user in ECOS computing system **100** possessing the appropriate asymmetric key. In step **1028**, the signed in provider may modify (e.g., delete) the input availability information and repeat the previous step to update and modify the availability data. In some embodiments, a provider's availability data may dynamically update, such as in response to a patient booking an appointment with a provider, or the like.

Patient Registration Flow

**[0095]** In another embodiment of the present invention, illustrated in FIG. **11**, through flow **1100** a patient may register with a system, such as ECOS computing system **100** illustrated in FIG. **1**. In step **1102**, the patient may use a device, such as a user device **104**, to connect, create an account, and register to ECOS. In Step **1104**, ECOS computing system **100** sends a verification code to the user's device. The verification code may be sent over a network by way of a text message, an e-mail message, or the like, for example. In Step **1106** patient submits the verification code received on the user device **104** along with the input password for the created account along with his or her name to complete the preliminary registration. In step **1108**, once registered, the patient may submit patient health information (PHI) in accordance with HIPPA regulations. In Step **1110**, the ECOS computing system **100** may receive and accept the information allowing it to become viewable to any authorized or selected provider possessing the compatible asymmetric key. In Step **1112**, ECOS computing system **100** receives and does not accept the submitted information; the patient may remain signed in, or sign in again, and attempt to input the information correctly. During registration, other types of information may be associated with a patient, such as health insurance information, preferred providers, preferred hospitals, or the like.

**[0096]** In another embodiment of the present invention, as illustrated in FIG. **12**, through flow **1200** the patient may initiate the virtual visit with another, for example a health provider. In Step **1202**, the patient signs in then updates and inputs PHI, such as to ECOS computing system **100** illustrated in FIG. **1**. In step **1204**, the patient may select an authorized and licensed provider to examine the medical case. In Step **1206**, the patient may select from an available list of providers based on available time slots and specialty. In step **1208**, once selection is made, ECOS computing system **100** may create login credentials and generate a web-link, such as a URL, for the provider to examine and review the PHI. In step **1210**, the web-link is sent the provider's user device **104**. In step **1212**, the provider clicks on the web-link and ECOS computing system **100** will bring provider into the virtual exam room with access to the patient's PHI.

**[0097]** In an embodiment of the present invention, illustrated in FIG. **13**, through flow **1300** a provider may initiate a virtual visit. In step **1302**, a provider may sign into ECOS computing system **100** and wait for a time-limited web-link to be sent to his or her user device **104**, such as via a text message or an e-mail, for example. The web-link may be generated by the ECOS in response to the patient selecting the provider, as described above in step **1206** of FIG. **12**. In step **1304**, the provider may click the ECOS computing system **100** provided time-limited web-link to be brought

into a meeting room with the patient, wherein the meeting room is generated using one or more NOODLs applications, such as APP **1** or APP **2** of FIG. **1**. The meeting room may be loaded using one or more NOODL files loaded from a library, such as the ECOS standard library **112**, or the like. In some embodiments, the web-link may be time limited to prevent unauthorized access as the security is increased to protect PHI. In step **1306**, in the meeting room, the provider may review the patient's PHI and, if necessary, may request additional PHI from the patient. In Step **1308**, after completion of the virtual exam, the provider may remove the patient from the exam room. In Step **1310**, the provider may remain signed into ECOS, avoiding the sign-in process, and may allow other patients to select them as the provider and the steps above repeat. All transmissions of PHI are complying with HIPPA regulations as the information is encrypted and only accessible to the authorized users.

Overview for Virtual Meeting Process

**[0098]** In an embodiment of the present invention, as illustrated in FIG. **14**, flow **1400** provides an overview of a virtual meeting between multiple entities. Step **1402** may require a provider to register with a system, such as ECOS system **100** of FIG. **1**. Registration may be performed using the process described above in FIG. **10**A, flow **1000**A. In step **1404**, the registration message may be sent to the provider's device, such as user device **104**, and the provider may submit his or her verification and credentials as outlined in steps **1004** and **1006**, for example. In step **1406**, ECOS computing system **100** verifies the submitted verification and credentials, and, if accepted, the provider is granted access into ECOS computing system **100** as seen in steps **1008** and **1010**. Alternatively, if the verification or credentials are not accepted by ECOS computing system **100** the provider may be given the opportunity to resubmit the acceptable information. See step **1012**. In step **1408**, the provider, if granted access by ECOS, may input her or her availability as outlined by flow **1000**B. In step **1410** the patient registers to ECOS computing system **100** as outlined by steps **1102**, **1104**, and **1106** of FIG. **11**. In step **1412**, the patient may submit PHI as outlined by steps **1108**,**1110**, and **1112** of FIG. **11**. In step **1414**, the patient may select an available provider which initiates a virtual visitation request. Based on the needs of the virtual visitation, ECOS computing device **102** may load appropriate NOODL files to support the creation of a virtual exam room accessible to appropriate and approved entities (e.g., health care providers, patients, etc.). See steps **1204**-**1206**. In step **1416**, ECOS computing system **100** may generate login credentials and a time-limited web-link for the provider. See step **1208**. In step **1418**, the time-limited web-link is sent to the provider's user device **104** and the provider is granted the sign-in credentials. See step **1304**. In step **1420**, the provider may click the web-link; and in step **1422** ECOS computing system **100** creates a meeting room that brings the patient and provider together virtually. See step **1306**. In step **1424**, the provider may examine all the submitted PHI provided by the patient for the medical service. See step **1308**. At the conclusion of the visit, the provider or patient may end the virtual meeting.

**[0099]** It is appreciated that exemplary computing system **100** is merely illustrative of a computing environment in which the herein described systems and methods may operate, and thus does not limit the implementation of the herein described systems and methods in computing environments having differing components and configurations. That is, the inventive concepts described herein may be implemented in various computing environments using various components and configurations.

**[0100]** Those of skill in the art will appreciate that the herein described apparatuses, engines, devices, systems and methods are susceptible to various modifications and alternative constructions. There is no intention to limit the scope of the invention to the specific constructions described herein. Rather, the herein described systems and methods are intended to cover all modifications, alternative constructions, and equivalents falling within the scope and spirit of the disclosure, any appended claims and any equivalents thereto.

**[0101]** In the foregoing detailed description, it may be that various features are grouped together in individual embodiments for the purpose of brevity in the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that any subsequently claimed embodiments require more features than are expressly recited.

**[0102]** Further, the descriptions of the disclosure are provided to enable any person skilled in the art to make or use the disclosed embodiments. Various modifications to the disclosure will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other variations without departing from the spirit or scope of the disclosure. Thus, the disclosure is not intended to be limited to the examples and designs described herein, but rather is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

**1**. An edge computing operating system (ECOS) computing system, comprising:

a plurality of user devices;

a storage device configured to store one or more neuron organic object description language (NOODL) extension files;

an ECOS computing device comprising at least one processor in communication with a memory device, the at least one processor configured to:

receive, from one or more of the plurality of user devices, at least one user-defined data scheme and at least one attribute;

retrieve, from the storage device, at least one of the one or more NOODL extension files based, at least in part, on the at least one user-defined data scheme and the at least one attribute;

create at least one NOODL data object in accordance with ones of the NOODL extension files;

implement at least one application utilizing at least one aspect of the at least one loaded NOODL extension file or the at least one NOODL data object;

provide the one or more of the plurality of user devices access to the implemented application.

**2**. The ECOS computing system of claim **1**, wherein the at least one application is a cloud-based application.

**3**. The ECOS computing system of claim **1**, wherein at least one NOODL extension file generates a mapping of a computer application for at least one of the plurality of user devices based on the operating system of the at least one of the plurality of user devices.

**4**. The ECOS computing system of claim **1**, wherein the at least one NOODL extension file connects UI/UX design

with a frontend application, a backend data-model design, or a human-machine information exchange input-output.

**5**. The ECOS computing system of claim **1**, wherein the at least one NOODL extension file uniforms HTML, CSS and Javascript at a high level of abstraction.

**6**. The ECOS computing system of claim **1**, wherein implementation of the at least one application includes generation of a virtual exam room and transmission of an access link providing entry to the virtual exam room to at least one of the plurality of user devices.

**7**. The ECOS computing system of claim **6**, wherein entry to the virtual exam room is granted in response to the at least one of the plurality of user devices providing a valid asymmetric key.

**8**. A non-transitory computer readable medium communicatively coupled to a processor, the medium comprising instructions that, when executed by the processor implement:

receiving, from one or more of a plurality of user devices, at least one user-defined data scheme and at least one attribute;

retrieving, from a storage device, at least one or more NOODL extension files based, at least in part, on the at least one user-defined data scheme and the at least one attribute;

creating at least one NOODL data object in accordance with ones of the NOODL extension files;

implementing at least one application utilizing at least one aspect of the at least one loaded NOODL extension file or the at least one NOODL data object; and

providing the one or more of the plurality of user devices access to the implemented application.

**9**. The non-transitory computer readable medium of claim **8**, wherein the at least one application is a cloud-based application.

**10**. The non-transitory computer readable medium of claim **8**, wherein at least one NOODL extension file generates a mapping of a computer application for at least one of the plurality of user devices based on the operating system of the at least one of the plurality of user devices.

**11**. The non-transitory computer readable medium of claim **8**, wherein the at least one NOODL extension file connects UI/UX design with a frontend application, a backend data-model design, or a human-machine information exchange input-output.

**12**. The non-transitory computer readable medium of claim **8**, wherein the at least one NOODL extension file uniforms HTML, CSS and Javascript at a high level of abstraction.

**13**. The non-transitory computer readable medium of claim **8**, wherein implementation of the at least one application includes generation of a virtual exam room and transmission of an access link providing entry to the virtual exam room to at least one of the plurality of user devices.

**14**. The non-transitory computer readable medium of claim **13**, wherein entry to the virtual exam room is granted in response to the at least one of the plurality of user devices providing a valid asymmetric key.

**15**. A method for providing cross-platform communications, the method, with at least one edge computing operating system (ECOS) device, comprising:

storing, on a storage device communicative-coupled to the ECOS device, one or more neuron organic object description language (NOODL) extension files;

receiving, from one or more of a plurality of user devices, at least one user-defined data scheme and at least one attribute;

retrieving, from the storage device, at least one of the one or more NOODL extension files based, at least in part, on the at least one user-defined data scheme and the at least one attribute;

creating at least one NOODL data object in accordance with ones of the NOODL extension files;

implementing at least one application utilizing at least one aspect of the at least one loaded NOODL extension file or the at least one NOODL data object;

providing the one or more of the plurality of user devices access to the implemented application.

**16**. The method of claim **15**, wherein the at least one application is a cloud-based application.

**17**. The method claim **15**, wherein at least one NOODL extension file generates a mapping of a computer application for at least one of the plurality of user devices based on the operating system of the at least one of the plurality of user devices.

**18**. The method of claim **15**, wherein the at least one NOODL extension file connects UI/UX design with a frontend application, a backend data-model design, or a human-machine information exchange input-output.

**19**. The method of claim **15**, wherein the at least one NOODL extension file uniforms HTML, CSS and Javascript at a high level of abstraction.

**20**. The method claim **15**, wherein implementing of the at least one application includes generating of a virtual exam room and transmission of an access link providing entry to the virtual exam room to at least one of the plurality of user devices in response to the least one of the plurality of user devices providing a valid asymmetric key.

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