such controller-based devices may communicate with one another and/or to a gateway such that the gateway becomes a proxy for the Internet communications for the so-called edge devices. Edge devices may communicate through one or more gateways, or directly as independent devices. Within a group, all the devices (gateway and edge) must be programmed in a compatible manner to facilitate interoperability, which further increases the complexity of programming such devices significantly. Further, managing compatibility every time a customization is implemented may also be excessively time consuming. Programming groups of controller-based devices is very challenging for users as one has to memorize coding commands, understand hierarchies, utilize proper calling syntaxes, and the like. Even if one device is programmed incorrectly, a written program for that or another controller-based device in the group may fail to run, or produce errors.

[0004] Thus, there is a need in the art for simplifying programming for controller-based devices, while automatically doing so for a group of controller-based devices.

SUMMARY OF THE INVENTION

[0004a] According to a first aspect of the present invention, there is provided a computer-implemented method for automatic generation of a program for a controller-based device in a group of controller-based devices, comprising: receiving, at a code virtualization servers (CVS) from a user device, for a controller-based device from a plurality of controller-based devices displayed on a graphical user interface (GUI) on the user device, a selection including: a controller type of the controller-based device, a communication protocol to be used by the controller-based device for communicating with another controller-based device in a group of controller-based devices, the group comprising the plurality of controller-based devices, and a function to be performed on the CVS based on a remote call from the controller-based device to the CVS; and automatically generating , on the CVS, a first code, for execution on the controller-based device, the first code based on the controller type, the communication protocol, and the function, the first code comprising the remote call for performing

the function on the CVS, and capable of routing the remote call from the controller-based device to the CVS; dispatching the first code to the controller based device, for installation on the controller-based device; receiving the remote call from the first code installed on the controller-based device; and executing a second code including one or more predefined processes on the CVS based on receiving the remote call, wherein each of the user device, the CVS and the controller-based device is remote from each other.

[0004b] According to a second aspect of the present invention, there is provided an apparatus for automatic software development for a group of controller-based devices, comprising: a processor; and a memory comprising executable instructions, which when executed using the processor, cause execution of a method comprising: receiving, at a code virtualization servers (CVS) from a user device, for a controller-based device from a plurality of controller-based devices displayed on a graphical user interface (GUI) on the user device, a selection including a controller type of the controller-based device, a communication protocol to be used by the controller-based device for communicating with another controller-based device in a group of controller-based devices, the group comprising the plurality of controller-based devices, and a function to be performed on the CVS based on a remote call from the controller-based device to the CVS, and automatically generating, on the CBS, a first code, for execution on the controller-based device, the first code based on the controller type, the communication protocol, and the function, the first code comprising the remote call for performing the function on the CVS, and capable of routing the remote call from the controller-based device to the CVS, dispatching the first code to the controller based device, for installation on the controller-based device; receiving the remote call from the first code installed on the controller-based device; and executing a second code including one or more predefined processes on the CVS based on receiving the remote call, wherein each of the user device, the CVS and the controller-based device is remote from each other.

[0004c] Disclosed herein is a non-transitory computer readable medium for storing computer instructions that, when executed by at least one processor

cause the at least one processor to perform a method for automatic generation of a program for a controller-based device in a group of controller-based devices, comprising: displaying a plurality of controller-based devices from a group of controller-based devices on a graphical user interface (GUI) on a user device; receiving, for a controller-based device from the group, a selection of: a controller type of the controller-based device, a communication protocol to be used by the controller-based device for communicating with another controller-based device in the group, and a function to be performed based on a remote call from the controller-based device; and sending the selection to a code virtualization server.

[0005] Embodiments of the present invention generally relate to a method and apparatus for automatic software development for a group of controller-based devices, substantially as shown in and/or described in connection with at least one of the figures, as set forth more completely in the claims.

[0006] These and other features and advantages of the present invention may be appreciated from a review of the following detailed description of the present invention, along with the accompanying figures in which like reference numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] So that the manner in which the above-recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted,

CLAIMS:

1. A computer-implemented method for automatic generation of a program for a controller-based device in a group of controller-based devices, comprising:

receiving, at a code virtualization servers (CVS) from a user device, for a controller-based device from a plurality of controller-based devices displayed on a graphical user interface (GUI) on the user device, a selection comprising:

a controller type of the controller-based device,

a communication protocol to be used by the controller-based device for communicating with another controller-based device in a group of controller-based devices, the group comprising the plurality of controller-based devices, and

a function to be performed on the CVS based on a remote call from the controller-based device to the CVS;

automatically generating, on the CVS, a first code for execution on the controller-based device, the first code based on the controller type, the communication protocol, and the function, the first code comprising the remote call for performing the function on the CVS, and capable of routing the remote call from the controller-based device to the CVS;

dispatching the first code to the controller based device, for installation on the controller-based device;

receiving the remote call from the first code installed on the controller-based device; and

executing a second code including one or more predefined processes on the CVS based on receiving the remote call,

wherein each of the user device, the CVS and the controller-based device is remote from each other.

2. The method of claim 1, wherein each controller-based device is either an edge device or a gateway device, and wherein the group comprises either at least one edge device and at least one gateway device, or at least two gateway devices.

3. The method of claim 2, wherein the first code routes the remote call through the at least one gateway device.

4. The method of claim 2, further comprising receiving, from the GUI, a selection of whether the controller-based device is an edge device or a gateway device, and wherein the generating the first code is further based on the selection of the edge device or the gateway device.

5. The method of claim 2 further comprising:

receiving the remote call from the controller-based device via the at least one gateway device; and

performing the function.

6. The method of claim 1, further comprising dispatching the first code for installation on the controller-based device directly or via the user device.

7. The method of claim 1, further comprising receiving, from the GUI, at least one parameter for performing the function, and wherein the generating the first code is further based on the at least one parameter.

8. An apparatus for automatic software development for a group of controller-based devices, comprising:

a processor; and

a memory comprising executable instructions, which when executed using the processor, cause execution of a method comprising:

receiving, at a code virtualization servers (CVS) from a user device, for a controller-based device from a plurality of controller-based devices displayed on a graphical user interface (GUI) on the user device, a selection comprising

a controller type of the controller-based device,

a communication protocol to be used by the controller-based device for communicating with another controller-based device in a group of

controller-based devices, the group comprising the plurality of controller-based devices, and

a function to be performed on the CVS based on a remote call from the controller-based device to the CVS,

automatically generating, on the CVS, a first code for execution on the controller-based device, the first code based on the controller type, the communication protocol, and the function, the first code comprising the remote call for performing the function on the CVS, and capable of routing the remote call from the controller-based device to the CVS,

dispatching the first code to the controller based device, for installation on the controller-based device;

receiving the remote call from the first code installed on the controller-based device; and

executing a second code including one or more predefined processes on the CVS based on receiving the remote call,

wherein each of the user device, the CVS and the controller-based device is remote from each other.

9. The apparatus of claim 8, wherein each controller-based device is either an edge device or a gateway device, and wherein the group comprises either at least one edge device and at least one gateway device, or at least two gateway device.

10. The apparatus of claim 9, wherein the first code routes the remote call through the at least one gateway device.

11. The apparatus of claim 9, wherein the method further comprises:

receiving, from the GUI, a selection of whether the controller-based device is an edge device or a gateway device, and

wherein the generating the first code is further based on the selection of the edge device or the gateway device.

12. The apparatus of claim 9, wherein the method further comprises:

receiving the remote call from the controller-based device via the at least one gateway device; and

performing the function.

13. The apparatus of claim 8, wherein the method further comprises dispatching the first code for installation on the controller-based device directly or via the user device.

14. The apparatus of claim 8, wherein the method further comprises receiving, from the GUI, at least one parameter for performing the function, and wherein the generating the first code is further based on the at least one parameter.