What is claimed is:

1. A software-defined networking (SDN) system for implementing data forwarding, comprising:

an SDN control device; and

n switching devices, a first of the n switching devices being connected to a source end of data, an n^{th} switching device being connected to a destination end of the data, where $n \geq 3$, and wherein:

the first switching device is configured to request a forwarding rule from the SDN control device, the request including characteristic information of the data, and to receive a first forwarding rule returned by the SDN control device, the first forwarding rule comprising a match condition which includes the characteristic information of the data and an execution action which indicates to encapsulate information about a path from the first switching device to the n^{th} switching device in the data and to send, to a port on the first switching device directed to a second switching device the encapsulated data, wherein the information about the path from the first switching device to the n^{th} switching device comprises a device identifier of each switching device from a third switching device to the n^{th} switching device that is in the path from the first switching device to the n^{th} switching device; and

the second switching device is configured to receive the encapsulated data and acquire the information about the path from the first switching device to the n^{th} switching device from the encapsulated data, query according to a device identifier of the third switching device in the information, a second forwarding rule stored in the second switching device, and obtain on the second switching device a port directed to the third switching device for forwarding the data to the third switching device through the port on the second switching device.

2. The SDN system according to claim 1, wherein: the second forwarding rule comprises a match field that includes the device identifier of the third switching device.

3. The SDN system according to claim 2, wherein when $n \geq 4$, the second switching device is further configured to send, to the third switching device, information about a path from the second switching device to the n^{th} switching device, the information about the path from the second switching device to the n^{th} switching device including device identifiers of a

fourth switching device to the n^{th} switching device that are in the path from the second switching device to the n^{th} switching device.

4. The SDN system according to claim 3, wherein an i^{th} switching device is configured to receive the data and information about a path from an $i-1^{th}$ switching device to the n^{th} switching device that are sent by the $i-1^{th}$ switching device, i being an integer greater than or equal to 3 and less than n, wherein the information about the path from the $i-1^{th}$ switching device to the n^{th} switching device comprises device identifiers of an $i+1^{th}$ switching device to the n^{th} switching device that are in the path from the $i-1^{th}$ switching device to the n^{th} switching device; and

the i^{th} switching device is configured to query, according to a device identifier of the $i+1^{th}$ switching device, an i^{th} forwarding rule stored in the i^{th} switching device, and according to the i^{th} forwarding rule, determine a port directed to the $i+1^{th}$ switching device on the i^{th} switching device and forward the data to the $i+1^{th}$ switching device through the port on the i^{th} switching device.

5. The SDN system according to claim 4, wherein if the $i+1^{th}$ switching device is located between the first and n^{th} switching device, the i^{th} switching device being configured to send, to the $i+1^{th}$ switching device, information about a path from the i^{th} switching device to the n^{th} switching device according to the i^{th} forwarding rule, wherein the information about the path from the i^{th} switching device to the n^{th} switching device comprises device identifiers of an $i+2^{th}$ switching device to the n^{th} switching device that are in the path from the i^{th} switching device to the n^{th} switching device, the $i+2^{th}$ switching device being connected to the $i+1^{th}$ switching device.

6. The SDN system according to claim 5, the i^{th} switching device is configured to remove the device identifier of the $i+1^{th}$ switching device from the information about the path from the $i-1^{th}$ switching device to the n^{th} switching device to obtain the device identifiers of the $i+2^{th}$ switching device to the n^{th} switching device, and send, to the $i+1^{th}$ switching device, the device identifiers of the $i+2^{th}$ switching device to the n^{th} switching device, according to the i^{th} forwarding rule.

7. The SDN system according to claim 1, wherein:

the first switching device is configured to successively push the device identifiers of the third switching device to the n^{th} switching device that are in the path from the first switching device to the n^{th} switching device into a protocol stack, wherein a device identifier of the n^{th} switching device is shifted into the bottom of the stack, and the device identifier of the third switching device is shifted into the top of the stack and the device identifier of each successive switching device sequentially follow thereafter, so that the protocol stack carries the information about the path from the first switching device to the n^{th} switching device.

8. The SDN system according to claim 7, wherein the protocol stack comprises a Multiprotocol Label Switching (MPLS) stack, and one MPLS header of the MPLS stack carries a device identifier of one of the n switching devices.

9. The SDN system according to claim 1, wherein:

the second switching device is configured to identify, according to the device identifier of the third switching device, that a next-hop switching device of the data is the third switching device.

10. A method for implementing data forwarding to a software-defined networking (SDN) system, the SDN system comprising an SDN control device and n switching devices, a first switching device being connected to a source end of data, an n^{th} switching device being connected to a destination end of the data, where $n \geq 3$, wherein the method comprises:

requesting, by the first switching device, a forwarding rule from the SDN control device, the request carrying characteristic information of the data;

receiving, by the first switching device, a first forwarding rule returned by the SDN control device, the first forwarding rule comprising a match condition which includes the characteristic information of the data and an execution action which indicates to encapsulate information about a path from the first switching device to the n^{th} switching device in the data and to send, to a port on the first switching device directed to a second switching device the encapsulated data, the information about the path from the first switching device to the nth switching device comprising a device identifier of each switching device from a third switching device to the nth switching device that is in the path from the first switching device to the nth switching device;

sending, by the first switching device, to the second switching device, the encapsulated data according to the first forwarding rule; and

receiving, by the second switching device, the encapsulated data and acquiring the information about the path from the first switching device to the n^{th} switching device from the encapsulated data, querying, according to a device identifier of the third switching device in the information about the path from the first switching device to the n^{th} switching device, a second forwarding rule stored in the second switching device, and obtaining on the second switching device, a port directed to the third switching device, and forwarding the data to the third switching device through the port on the second switching device.

11. The method according to claim 10, wherein: the second forwarding rule comprises a match field that includes the device identifier of the third switching device.

12. The method according to claim 11, wherein when $n \geq 4$, the method comprises:

sending, by the second switching device, to the third switching device, information about a path from the second switching device to the n^{th} switching device, wherein the information about the path from the second switching device to the n^{th} switching device comprises device identifiers of a fourth switching device to the n^{th} switching device in the path from the second switching device to the n^{th} switching device.

13. The method according to claim 12, wherein the method comprises:

receiving, by an i^{th} switching device, i being an integer greater than or equal to 3 and less than n, data and information about a path from an $i-1^{th}$ switching device to the n^{th} switching device that are sent by the $i-1^{th}$ switching device, wherein the information about the path from the $i-1^{th}$ switching device to the n^{th} switching device comprises device identifiers of an $i+1^{th}$ switching device to the n^{th} switching device in the path from the $i-1^{th}$ switching device to the n^{th} switching device; and

querying, by the i^{th} switching device, according to a device identifier of the $i+1^{th}$ switching device, an i^{th} forwarding rule stored in the i^{th} switching device, and according to the i^{th} forwarding rule, determines a port, on the i^{th} switching device, directed to the $i+1^{th}$ switching device, and forwards the data to the $i+1^{th}$ switching device through the port, on the i^{th} switching device, of the $i+1^{th}$ switching device.

14. The method according to claim 13, wherein if the $i+1^{th}$ switching device is located between the first switching device and the n^{th} switching device, the method comprises:

sending, by the i^{th} switching device, to the $i+1^{th}$ switching device, information about a path from the i^{th} switching device to the n^{th} switching device according to the i^{th} forwarding rule, wherein the information about the path from the i^{th} switching device to the n^{th} switching device comprises device identifiers of an $i+2^{th}$ switching device to the n^{th} switching device that are in the path from the i^{th} switching device to the n^{th} switching device.

15. The method according to claim 14, wherein the sending, by the i^{th} switching device, to the $i+1^{th}$ switching device, information about a path from the i^{th} switching device to the n^{th} switching device according to the i^{th} forwarding rule, comprises:

removing, by the i^{th} switching device, the device identifier of the $i+1^{th}$ switching device from the information about the path from the $i-1^{th}$ switching device to the n^{th} switching device to obtain device identifiers of the $i+2^{th}$ switching device to the n^{th} switching device, and sending to the $i+1^{th}$ switching device, the device identifiers of the $i+2^{th}$ switching device to the n^{th} switching device, according to the i^{th} forwarding rule.

16. The method according to claim 10, wherein the method comprises:

successively pushing, by the first switching device, the device identifiers of the third switching device to the n^{th} switching device that are in the path from the first switching device to the n^{th} switching device into a protocol stack, wherein a device identifier of the n^{th} switching device is shifted to a lower portion of the stack, and the device identifier of the third switching device is shifted to an upper portion of the stack and the device identifier for each successive switching device sequentially follow thereafter, so that the protocol stack carries the information about the path from the first switching device to the n^{th} switching device.

17. The method according to claim 16, wherein the protocol stack comprises a Multiprotocol Label Switching (MPLS) stack, and one MPLS header of the MPLS stack carries a device identifier of one switching device.

18. The method according to claim 10, wherein the method comprises:

identifying, by the second switching device, according to the device identifier of the third switching device, a next-hop switching device of the data is the third switching device.

19. A method for implementing data forwarding to a software-defined networking (SDN) system, the SDN system comprising an SDN control device and n switching devices, a first switching device of then switching devices being connected to a source end of data, an n^{th} switching device being connected to a destination end of the data, where $n \geq 3$, wherein the method comprises:

receiving, by the SDN control device, a request for a forwarding rule from the first switching device, the request carrying characteristic information of the data;

sending, by the SDN control device, a first forwarding rule to the first switching device according to the characteristic information of the data, wherein the first forwarding rule comprises a match condition which includes the characteristic information of the data and an execution action which indicates to encapsulate information about a path from the first switching device to the n^{th} switching device in the data and to send, to a port on the first switching device directed to a second switching device the encapsulated data, wherein the information about the path from the first switching device to the n^{th} switching device comprises a device identifier of each switching device from a third switching device to the n^{th} switching device that is in the path from the first switching device to the n^{th} switching device; and

sending, by the SDN control device, an n^{th} forwarding rule to the n^{th} switching device according to the characteristic information of the data.

20. The method according to claim 19, further comprising:

sending, by the SDN control device, a second forwarding rule to a second of n switching devices according to network topology information of the SDN system, wherein the second forwarding rule is configured to instruct the second switching device to: obtain, on the second switching device, a port directed to the third switching device by using a device identifier of the third switching device in the information about the path from the first switching device to the n^{th} switching device, and forward the data to the third switching device through the port, on the second switching device.

21. The method according to claim 20, further comprising:

selecting, by the SDN control, the path from the first switching device to the n^{th} switching device according to the characteristic information of the data and the network topology information of the SDN system; and

the second forwarding rule comprises a match field that includes the device identifier of the third switching device.

22. The method according to claim 21, further comprising:

delivering, by the SDN control device, an i^{th} forwarding rule to an i^{th} switching device according to the network topology information of the SDN system, wherein i is an integer greater than or equal to 3 and less than n, the i^{th} forwarding rule being configured to instruct the i^{th} switching device to obtain a port, on the i^{th} switching device, directed to an $i+1^{th}$ switching device and forward the data to the $i+1^{th}$ switching device through the port on the i^{th} switching device.

23. The method according to claim 22, wherein the information about the path from the $i-1^{th}$ switching device to the n^{th} switching device comprises a device identifier of the $i+1^{th}$ switching device to the n^{th} switching device that is in the path from the first switching device to the n^{th} switching device; and

if the $i+1^{th}$ switching device is not the n^{th} switching device, the i^{th} forwarding rule is further configured to instruct the i^{th} switching device to: remove the device identifier of the $i+1^{th}$ switching device, and send, to the $i+1^{th}$ switching device, information about a path from the i^{th} switching device to the n^{th} switching device comprising a device identifier of an $i+2^{th}$ switching device to the n^{th} switching device that is in the path from the i^{th} switching device to the n^{th} switching device.

24. A software-defined networking (SDN) control device comprising at least one processor, a memory, and a communications port, wherein:

the communications port is configured to communicate with each of a plurality of switching devices in an SDN system, a first switching device of the plurality of switching devices being connected to a source end of data, and an n^{th} switching device of the plurality of switching devices being connected to a destination end of the data, where $n \geq 3$;

the memory is configured to store a program; and

the at least one processor is configured to execute the program to implement the following process:

processing a request for a forwarding rule received from the first switching device, wherein the request carries characteristic information of the data and the first switching device;

sending a first forwarding rule to the first switching device according to the characteristic information of the data, wherein the first forwarding rule comprises a match condition which includes the characteristic information of the data and an execution action which indicates to encapsulate information about a path from the first switching device to the n^{th} switching device in the data and to send, to a port on the first switching device directed to a second switching device the encapsulated data, wherein the information about the path from the first switching device to the n^{th} switching device comprises a device identifier of each switching device from a third switching device to the n^{th} switching device that is in the path from the first switching device to the n^{th} switching device; and

sending an n^{th} forwarding rule to the n^{th} switching device according to the characteristic information of the data.