CLAIMS

What is claimed is:

1. A secure service request processing method, executed by a trusted application that is deployed in a trusted execution environment (TEE) of an end-user device, wherein the trusted application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, the end-user device further comprises a rich execution environment (REE), a client application is deployed in the REE, and the method comprises:

receiving, from the client application, a first service request for requesting the trusted application to execute a first service, wherein the first service request comprises a first expression and an input parameter of the first expression, and the first expression specifies a plurality of target interfaces related to the first service and an invoking sequence of the plurality of target interfaces;

executing, based on the input parameter, the plurality of target interfaces in turn in the invoking sequence to obtain a target execution result; and

using the target execution result as a processing result of the first service request, and returning the processing result of the first service request to the client application~~.~~

~~2. The method according to claim 1~~, wherein the executing, based on the input parameter, the plurality of target interfaces in turn in the invoking sequence to obtain a target execution result comprises:

determining, based on the input parameter, a first parameter of a first interface among the plurality of target interfaces, and executing the first interface by using the first parameter; and

determining, based on the input parameter and/or an execution result of a previous interface, a second parameter of any second interface other than the first interface, and executing the second interface by using the second parameter,

wherein when the second interface is the last interface, an execution result of the last interface is used as the target execution result.

~~3~~2. The method according to claim 1, wherein each of the several interfaces corresponds to a serial number;

the executing the plurality of target interfaces in turn in the invoking sequence comprises:

recording a serial number of any first interface among the plurality of target interfaces when or after executing the any first interface among the plurality of target interfaces in turn in the invoking sequence; and

forming, based on a recorded serial number of each interface, a serial number sequence after completing execution of the plurality of target interfaces; and

the returning the processing result of the first service request to the client application comprises:

returning the processing result of the first service request and the serial number sequence to the client application, such that the client application verifies the correctness of the processing result based on the serial number sequence.

~~4~~3. The method according to claim ~~3~~2, wherein the returning the processing result of the first service request and the serial number sequence to the client application comprises:

signing the serial number sequence by using a pre-generated private key to obtain a signed serial number sequence; and

returning the processing result of the first service request and the signed serial number sequence to the client application.

~~5~~4. The method according to claim 1, wherein the returning the processing result of the first service request to the client application comprises:

determining whether the processing result is sensitive data;

if yes, encrypting the processing result to obtain a ciphertext of the processing result; and

returning the ciphertext of the processing result to the client application.

~~6~~5. The method according to claim 1, wherein the first service comprises any one of the following: fingerprint payment, facial recognition payment and iris recognition payment.

~~7. A secure service request processing method, executed by a trusted application that is deployed in a TEE of an end user device, wherein the trusted application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, the end user device further comprises an REE, a client application is deployed in the REE, and the method comprises:~~

~~receiving, from the client application, a current service request for requesting the trusted application to execute a first service, wherein the current service request comprises a current interface and an input parameter of the current interface; and the~~

current interface is any one of a plurality of target interfaces that are related to the first service and are in a specified invoking sequence;

executing the current interface based on the input parameter to obtain a current execution result; and

returning an indication of the current execution result to the client application, such that the client application determines a target execution result based on the indication of the current execution result when determining that the current interface is the last interface.

8. The method according to claim 7, wherein the indication of the current execution result is either an identifier of the current execution result or a position identifier.

9. The method according to claim 7, wherein the first service comprises any one of the following: key management, data storage and data signing.

10. A secure service request processing method, executed by a client application that is deployed in an REE of an end user device, wherein the end user device further comprises a TEE, a trusted application is deployed in the TEE, the trusted application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, and the method comprises:

obtaining a first expression related to a first service when a user triggers the client application to execute the first service, wherein the first expression specifies a plurality of target interfaces related to the first service and an invoking sequence of the plurality of target interfaces;

determining an input parameter of the first expression;

transmitting, to the trusted application, a first service request for requesting the trusted application to execute the first service, wherein the first service request comprises the first expression and the input parameter; and

receiving a target execution result returned by the trusted application after the trusted application executes the plurality of target interfaces based on the input parameter.

11. A secure service request processing method, executed by a client application that is deployed in an REE of an end user device, wherein the end user device further comprises a TEE, a trusted application is deployed in the TEE, the trusted application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, and the method comprises:

~~obtaining a plurality of target interfaces that are related to a first service and are in a specified invoking sequence when a user triggers the client application to execute the first service;~~

~~using the plurality of target interfaces as a current interface in turn, and invoking the current interface, wherein the invoking the current interface comprises: determining an input parameter of the current interface; transmitting a current invoking request that comprises the current interface and the input parameter of the current interface to the trusted application; and receiving an indication of a current execution result returned by the trusted application after the trusted application executes the current interface based on the input parameter; and~~

~~determining a target execution result based on the indication of the current execution result after all the plurality of target interfaces are invoked.~~

~~12~~6. A secure service request processing apparatus, provided at a trusted application that is deployed in a TEE of an end-user device, wherein the trusted application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, the end-user device further comprises an REE, a client application is deployed in the REE, and the apparatus comprises:

a receiving unit, configured to receive, from the client application, a first service request for requesting the trusted application to execute a first service, wherein the first service request comprises a first expression and an input parameter of the first expression, and the first expression specifies a plurality of target interfaces related to the first service and an invoking sequence of the plurality of target interfaces;

an execution unit, configured to execute, based on the input parameter, the plurality of target interfaces in turn in the invoking sequence to obtain a target execution result; and

a return unit, configured to use the target execution result as a processing result of the first service request, and return the processing result of the first service request to the client application~~.~~

~~13. The apparatus according to claim 12~~, wherein the execution unit is specifically configured to:

determine, based on the input parameter, a first parameter of a first interface among the plurality of target interfaces, and execute the first interface by using the first parameter; and

determine, based on the input parameter and/or an execution result of a previous interface, a second parameter of any second interface other than the first interface, and execute the second interface by using the second parameter,

wherein when the second interface is the last interface, an execution result of the last interface is used as the target execution result.

~~14~~7. The apparatus according to claim ~~12~~6, wherein each of the several interfaces corresponds to a serial number; and the execution unit comprises:

a recording module, configured to record a serial number of any first interface among the plurality of target interfaces when or after executing the any first interface among the plurality of target interfaces in turn in the invoking sequence; and

a formation module, configured to form, based on a recorded serial number of each interface, a serial number sequence after completing execution of the plurality of target interfaces; and

the return unit is specifically configured to:

return the processing result of the first service request and the serial number sequence to the client application, such that the client application verifies the correctness of the processing result based on the serial number sequence.

~~15~~8. The apparatus according to claim 7~~14~~, wherein the return unit is further specifically configured to:

sign the serial number sequence by using a pre-generated private key to obtain a signed serial number sequence; and

return the processing result of the first service request and the signed serial number sequence to the client application.

~~16~~9. The apparatus according to claim ~~12~~6, wherein the return unit is specifically configured to:

determine whether the processing result is sensitive data;

if yes, encrypt the processing result to obtain a ciphertext of the processing result; and

return the ciphertext of the processing result to the client application.

~~17~~10. The apparatus according to claim ~~12~~6, wherein the first service comprises any one of the following: fingerprint payment, facial recognition payment and iris recognition payment.

~~18. A secure service request processing apparatus, provided at a trusted application that is deployed in a TEE of an end-user device, wherein the trusted~~

application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, the end-user device further comprises an REE, a client application is deployed in the REE, and the apparatus comprises:

a receiving unit, configured to receive, from the client application, a current service request for requesting the trusted application to execute a first service, wherein the current service request comprises a current interface and an input parameter of the current interface, and the current interface is any one of the plurality of target interfaces that are related to the first service and are in a specified invoking sequence;

an execution unit, configured to execute the current interface based on the input parameter to obtain a current execution result; and

a return unit, configured to return an indication of the current execution result to the client application, such that the client application determines a target execution result based on the indication of the current execution result when determining that the current interface is the last interface.

19. The apparatus according to claim 18, wherein the indication of the current execution result is either an identifier of the current execution result or a position identifier.

20. The apparatus according to claim 18, wherein the first service comprises any one of the following: key management, data storage and data signing.

21. A secure service request processing apparatus, provided at a client application that is deployed in an REE of an end-user device, wherein the end-user device further comprises a TEE, a trusted application is deployed in the TEE, the trusted application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, and the apparatus comprises:

an acquisition unit, configured to obtain a first expression related to a first service when a user triggers the client application to execute the first service, wherein the first expression specifies a plurality of target interfaces related to the first service and an invoking sequence of the plurality of target interfaces;

a determining unit, configured to determine an input parameter of the first expression;

a transmitting unit, configured to transmit, to the trusted application, a first service request for requesting the trusted application to execute the first service, wherein the first service request comprises the first expression and the input parameter; and

~~a receiving unit, configured to receive a target execution result returned by the trusted application after the trusted application executes the plurality of target interfaces based on the input parameter.~~

~~22. A secure service request processing apparatus, provided at a client application that is deployed in an REE of an end user device, wherein the end user device further comprises a TEE, a trusted application is deployed in the TEE, the trusted application externally provides several interfaces, each interface corresponds to one functional unit of the trusted application, and the apparatus comprises:~~

~~an acquisition unit, configured to obtain a plurality of target interfaces that are related to a first service and are in a specified invoking sequence when a user triggers the client application to execute the first service;~~

~~an invoking unit, configured to use the plurality of target interfaces as a current interface in turn, and invoke the current interface, wherein the invoking the current interface comprises: determining an input parameter of the current interface; transmitting a current invoking request that comprises the current interface and the input parameter of the current interface to the trusted application; and receiving an indication of a current execution result returned by the trusted application after the trusted application executes the current interface based on the input parameter; and~~

~~a determining unit, configured to determine a target execution result based on the indication of the current execution result after all the plurality of target interfaces are invoked.~~

~~23~~11. A computer readable storage medium, which stores computer programs, wherein when the computer programs are executed in a computer, the computer implements the method according to any one of claims 1 to ~~6, the method according to any one of claims 7 to 9, the method according to claim 10, or the method according to claim 11~~5.

~~24~~12. A computing device, comprising a memory and a processor, wherein the memory stores executable codes, and when executing the executable codes, the processor implements the method according to any one of claims 1 to ~~6, the method according to any one of claims 7 to 9, the method according to claim 10, or the method according to claim 11~~5.