device, the information processing apparatus including: an encryption~~encrypting~~ unit configured to encrypt storage target data; a transmitter configured ~~transmitting unit~~ to transmit the encrypted storage target data encrypted by the encryption ~~encrypting~~ unit to the mobile terminal device; a receiver configured ~~receiving unit~~ to receive the encrypted storage target data stored in the mobile terminal device; and a decryption ~~decrypting~~ unit configured to decrypt the encrypted storage target data received by the ~~receiving unit~~ receiver, wherein: the receiver is further configured to receive information indicating a communication state of the mobile terminal device from the mobile terminal device, and the transmitter is further configured to transmit a data erasure request of the storage target data stored in the mobile terminal device to the mobile terminal device, when the communication state does not satisfy a predetermined level.

[0008a] ~~A second aspect of the present invention provides~~There is disclosed a mobile terminal device communicably connected to an information processing apparatus, the mobile terminal device comprising:

a receiving unit to receive storage target data from the information processing apparatus;

an encrypting unit to encrypt the storage target data received by the receiving unit;

a recording unit to record the storage target data encrypted by the encrypting unit; and

a transmitting unit to transmit the storage target data recorded by the recording unit to the information processing apparatus, wherein

the storage target data transmitted by the transmitting unit is decrypted in the information processing apparatus.

[0008b] A ~~third~~ second aspect of the present invention provides a control method of an information processing apparatus communicably connected to a mobile terminal device, the control method comprising:

an encrypting step of encrypting storage target data;

a transmitting step of transmitting the encrypted storage target data encrypted by the encrypting step to the mobile terminal device;

a receiving step of receiving the encrypted storage target data stored in the mobile terminal device; ~~and~~

a decrypting step of decrypting the encrypted storage target data received by the receiving step;

a receiving step of receiving information indicating a communication state of the mobile terminal device from the mobile terminal device; and

a transmitting step of transmitting a data erasure request of the storage target data stored in the mobile terminal device to the mobile terminal device, when the communication state does not satisfy a predetermined level.

[0008c] ~~A fourth aspect of the present invention provides~~ There is also disclosed a control method of a mobile terminal device communicably connected to an information processing apparatus, the control method comprising:

a receiving step of receiving storage target data from the information processing apparatus;

an encrypting step of encrypting the storage target data received by the receiving step;

a recording step of recording the storage target data encrypted by the encrypting step; and

a transmitting step of transmitting the storage target data recorded by the recording step to the information processing apparatus, wherein

the storage target data transmitted by the transmitting step is decrypted in the information processing apparatus.

[0008d] A ~~fifth~~ third aspect of the present invention provides a program causing a computer which controls an information processing apparatus communicably connected to a mobile terminal device to execute:

an encrypting step of encrypting storage target data;

a transmitting step of transmitting the encrypted storage target data ~~encrypted~~ by the encrypting step to the mobile terminal device;

a receiving step of receiving the encrypted storage target data stored in the mobile terminal device; ~~and~~

a decrypting step of decrypting the encrypted storage target data received by the receiving step;

a receiving step of receiving information indicating a communication state of the mobile terminal device from the mobile terminal device; and

a transmitting step of transmitting a data

erasure request of the storage target data stored in the mobile terminal device to the mobile terminal device, when the communication state does not satisfy a predetermined level.

[0008e] ~~A sixth aspect of the present invention provides~~There is also disclosed a program causing a computer which controls a mobile terminal device communicably connected to an information processing apparatus to execute:

a receiving step of receiving storage target data from the information processing apparatus;

an encrypting step of encrypting the storage target data received by the receiving step;

a recording step of recording the storage target data encrypted by the encrypting step; and

a transmitting step of transmitting the storage target data recorded by the recording step to the information processing apparatus, wherein

the storage target data transmitted by the transmitting step is decrypted in the information processing apparatus.

ADVANTAGEOUS EFFECTS OF INVENTION

[0009] According to embodiments of the present invention, it is possible to provide a secure virtual storage using mobile terminal devices.

BRIEF DESCRIPTION OF DRAWINGS

[0010] [Fig. 1] Fig. 1 is a diagram illustrating the configuration of a data storage system.

[Fig. 2] Fig. 2 is a diagram illustrating a hardware configuration of a management server.

[Fig. 3] Fig. 3 is a flowchart illustrating a

storage process in the data storage system.

[Fig. 4A] Fig. 4A is an explanatory chart of a division process and an encryption process.

[Fig. 4B] Fig. 4B is an explanatory chart of the division process and the encryption process.

[Fig. 4C] Fig. 4C is an explanatory chart of the division process and the encryption process.

[Fig. 5] Fig. 5 is an explanatory view of a redundancy process.

[Fig. 6] Fig. 6 is a flowchart illustrating the encryption process of numeric data.

CLAIMS

[Claim 1] An information processing apparatus communicably connected to a mobile terminal device, the information processing apparatus comprising:

an encryption ~~encrypting~~ unit configured to encrypt storage target data;

a ~~transmitting unit~~ transmitter configured to transmit the encrypted storage target data encrypted by the encryption ~~encrypting~~ unit to the mobile terminal device;

a receiver configured ~~receiving unit~~ to receive the encrypted storage target data stored in the mobile terminal device; and

a decryption ~~decrypting~~ unit configured to decrypt the encrypted storage target data received by the receiver~~receiving unit~~, wherein:

the receiver is further configured to receive information indicating a communication state of the mobile terminal device from the mobile terminal device; and

the transmitter is further configured to transmit a data erasure request of the storage target data stored in the mobile terminal device to the mobile terminal device, when the communication state does not satisfy a predetermined level.

[Claim 2] The information processing apparatus according to claim 1, wherein the transmitter is further configured to transmit ~~transmitting unit transmits~~ the same encrypted storage target data to a plurality of terminal devices including the mobile terminal device.

[Claim 3] The information processing apparatus according to claim 1 or 2, further comprising

a divider configured ~~dividing unit~~ to divide the storage target data, wherein:

the encryption ~~encrypting~~ unit is further configured to encrypt ~~encrypts~~ each divided storage target data generated by a division process by the divider~~dividing unit~~; and

the transmitter is further configured to transmit ~~transmitting unit~~ transmits the divided encrypted storage target data encrypted by the encryption ~~encrypting~~ unit to the mobile terminal device.

[Claim 4] The information processing apparatus according to claim 3, wherein the transmitter is further configured to transmit ~~transmitting unit transmits~~ each of the

divided encrypted storage target data encrypted by the encryption ~~encrypting~~ unit to a plurality of terminal devices including the mobile terminal device ~~devices~~ different from each other.

[Claim 5] The information processing apparatus according to claim 3 or 4, wherein the divider is further configured to divide ~~dividing unit divides~~ the storage target data so that a ratio of a size of the divided storage target data to a size of the storage target data becomes a predetermined ratio or less.

[Claim 6] The information processing apparatus according to any one of claims 3 to 5, further comprising:

an assessor configured ~~assessing unit~~ to assess validity of the divided encrypted storage target data received by the receiver ~~receiving unit~~ from the mobile terminal device; and

an integrator configured ~~integrating unit~~ to integrate the divided encrypted storage target data whose validity is confirmed by the assessor ~~assessing unit~~ to restore the storage target data.

[Claim 7] The information processing apparatus according to any one of claims 1 to 6, further comprising:

a monitor ~~monitoring unit~~ to monitor an operating state of the mobile terminal device; and

an eraser ~~erasing unit~~ to cause the encrypted storage target data stored in the mobile terminal device to be erased, wherein according to a result of the monitoring, causing the encrypted storage target data stored in the mobile terminal

device to be erased ~~by the monitoring unit~~.

[Claim 8] The information processing apparatus according to any one of claims 2 to 6, wherein:

when the transmitter transmits the data erasure request to the mobile terminal device, the receiver receives the same encrypted storage target data as the encrypted storage target data stored in the mobile terminal device from a second mobile terminal device, and

the transmitter transmits the encrypted storage target data received from the second mobile terminal device to a third mobile terminal device. ~~further comprising:~~

~~a monitoring unit to monitor an operating state of the~~

~~mobile terminal device; and~~

~~an erasing unit to cause the storage target data stored in the mobile terminal device to be erased, according to a result of the monitoring by the monitoring unit, wherein:~~

~~when the storage target data stored in a first mobile terminal device is erased by the erasing unit, the receiving unit receives the same storage target data as the erased storage target data from a second mobile terminal device; and~~

~~the transmitting unit transmits the storage target data received from the second mobile terminal device to a third mobile terminal device.~~

[Claim 9] The information processing apparatus according to any one of claims 1 to 8, wherein:

the transmitter ~~transmitting unit~~ transmits, to the mobile terminal device, the encrypted storage target data ~~encrypted~~ and an instruction of a second process for the encrypted storage target data ~~encrypted~~, the second process corresponding to a first process for the storage target data ~~not encrypted~~; and

the receiver ~~receiving unit~~ receives a result of the second process for the encrypted storage target data encrypted, from the mobile terminal device; and

the information processing apparatus further comprises: ~~comprising~~

a converter configured ~~converting unit~~ to convert the result of the second process into a result of the first process for the storage target data ~~not encrypted~~.

[Claim 10] The information processing apparatus according to

claim 9, wherein:

the encryption ~~encrypting~~ unit encrypts the storage target data by using an encryption function; and

the converter ~~converting unit~~ converts a result of a second arithmetic process being the second process for the encrypted storage target data ~~encrypted~~, into a result of a first arithmetic process being the first process for the storage target data ~~not encrypted~~, by using an inverse function of the encryption function.

[Claim 11] The information processing apparatus according to claim 9, wherein:

the encryption ~~encrypting~~ unit encrypts the storage target data by adding data to the encrypted storage target data based on a pattern; and

the converter ~~converting unit~~ converts a result of a second search process being the second process for the encrypted storage target data ~~encrypted~~ into a result of a first search process being the first process for the storage target data ~~not encrypted~~, based on the pattern ~~an addition pattern of the data~~.

~~[Claim 12] A mobile terminal device communicably connected to an information processing apparatus, the mobile terminal device comprising:~~

~~a receiving unit to receive storage target data from the information processing apparatus;~~

~~an encrypting unit to encrypt the storage target data received by the receiving unit;~~

~~a recording unit to record the storage target data encrypted by the encrypting unit; and~~

~~a transmitting unit to transmit the storage target data recorded by the recording unit to the information processing apparatus, wherein~~

~~the storage target data transmitted by the transmitting unit is decrypted in the information processing apparatus.~~

[Claim ~~13~~12] A control method of an information processing apparatus communicably connected to a mobile terminal device, the control method comprising:

an encrypting step of encrypting storage target data;

a transmitting step of transmitting the encrypted storage target data encrypted by the encrypting step to the mobile terminal device;

a receiving step of receiving the encrypted storage target data stored in the mobile terminal device; ~~and~~

a decrypting step of decrypting the encrypted storage target data received by the receiving step;

a receiving step of receiving information indicating a communication state of the mobile terminal device from the mobile terminal device; and

a transmitting step of transmitting a data erasure request of the storage target data stored in the mobile terminal device to the mobile terminal device, when the communication state does not satisfy a predetermined level.

~~[Claim 14] A control method of a mobile terminal device communicably connected to an information processing apparatus, the control method comprising:~~

~~a receiving step of receiving storage target data from~~

~~the information processing apparatus;~~

~~an encrypting step of encrypting the storage target data received by the receiving step;~~

~~a recording step of recording the storage target data encrypted by the encrypting step; and~~

~~a transmitting step of transmitting the storage target~~

~~data recorded by the recording step to the information processing apparatus, wherein~~

~~the storage target data transmitted by the transmitting step is decrypted in the information processing apparatus.~~

[Claim ~~15~~13] A program causing a computer which controls an information processing apparatus communicably connected to a mobile terminal device to execute:

an encrypting step of encrypting storage target data;

a transmitting step of transmitting the encrypted storage target data ~~encrypted~~ by the encrypting step to the mobile terminal device;

a receiving step of receiving the encrypted storage target data stored in the mobile terminal device; ~~and~~

a decrypting step of decrypting the encrypted storage target data received by the receiving step;

a receiving step of receiving information indicating a communication state of the mobile terminal device from the mobile terminal device; and

a transmitting step of transmitting a data erasure request of the storage target data stored in the mobile terminal device to the mobile terminal device, when the communication state does not satisfy a predetermined level.

~~[Claim 16] A program causing a computer which controls a mobile terminal device communicably connected to an information processing apparatus to execute:~~

~~a receiving step of receiving storage target data from the information processing apparatus;~~

~~an encrypting step of encrypting the storage target data received by the receiving step;~~

~~a recording step of recording the storage target data encrypted by the encrypting step; and~~

~~a transmitting step of transmitting the storage target data recorded by the recording step to the information~~

~~processing apparatus, wherein~~

~~the storage target data transmitted by the transmitting step is decrypted in the information processing apparatus.~~