

erence number A6. In this way, a multi-user environment is implemented.

[0032] For a detailed description of the above connection procedure, refer to U.S. Patent Application No. 08/678,340.

[0033] While the 3-dimensional virtual space is used under a multi-user environment in this case, the 3-dimensional virtual space may be used under an environment other than a multi-user environment as well. That is to say, the 3-dimensional virtual space may be used under an environment which is referred to hereafter as a single-user environment for the sake of convenience. In a single-user environment, the avatar of another user is not let appear in the 3-dimensional virtual space and the avatar of a user herself/himself is not let appear in the 3-dimensional virtual space of the client PC other than the particular user initiating the pieces of processing indicated by reference numbers A1 and A2. For the sake of convenience, the avatar of another user and the avatar of the particular user are referred to as a drawn avatar and a pilot avatar, respectively. In order to establish a single-user environment, it is not necessary to carry out the pieces of processing indicated by reference numbers A3 to A6.

[0034] Next, an aura is explained by referring to Fig. 6. As shown in the figure, an aura 52 with a spherical shape having a predetermined radius is formed around a pilot avatar 51 with the center of the sphere coinciding with pilot avatar 51. The pilot avatar 51 is capable of receiving information from another object located inside the aura 52. That is to say, the pilot avatar 51 is capable of visually recognizing a drawn avatar 53-1 and an application object (AO) 54-1 which are located inside the aura 52. To put it concretely, the pictures of the drawn avatar 53-1 and the object 54-1 are displayed on the CRT monitor of the client PC of the pilot avatar 51. However, the pilot avatar 51 is capable of visually recognizing neither a drawn avatar 53-2 nor an application object (AO) 54-2 which are located outside the aura 52. To put it concretely, the pictures of the drawn avatar 53-2 and the object 54-2 are not displayed on the CRT monitor of the client PC of the pilot avatar 51.

[0035] By the same token, an aura is also set for each of the other objects, namely, the drawn avatar 53-1 and the object 54-1, the drawn avatar 53-2 and the object 54-2. In this system, the size of each aura is uniform for all client PCs. It should be noted, however, that the aura of an AO can be set with a size different from the aura of the avatar if necessary.

[0036] With the aura 52 prescribed as described above, it becomes necessary for the pilot avatar 51 to acquire information from the drawn avatar 53-1 and the object 54-1, but not from the drawn avatar 53-2 and the object 54-2 which are located outside the aura 52. The amount of information to be received can thus be reduced.

[0037] Consider an example shown in Fig. 7. When the avatar 51 moves, information on its new position is

transmitted to the shared server 12. Upon receiving the information on the new position of the avatar 51, the shared server 12 identifies what objects (including avatars) are located inside the aura 52 centered at the new position of the avatar 51 and transmits information on the objects to the client PC of the avatar 51. In the example shown in Fig. 7, since an object 54-1 is identified as an object located inside the aura 52 centered at the new position of the avatar 51 after the movement, the shared server 12 transmits information on the object 54-1 to the client PC of the avatar 51. Upon receiving the information on the object 54-1, the client PC of the avatar 51 displays the picture of the object 54-1, allowing the user of the avatar 51 to visually recognize the object 54-1.

[0038] Fig. 8 is an explanatory diagram used for describing a case in which a number of avatars exist in an aura. When only an avatar 61 exists in the aura 52 of a pilot avatar 51, the pilot avatar 51 and the avatar 61 share pieces information owned by them. At that time, the shared server 12 receives the information owned by the pilot avatar 51 and the avatar 61, and transmits the information owned by the avatar 61 to a client PC 1 associated with the pilot avatar 51 and the information owned by the pilot avatar 51 to the client PC 2 associated with the avatar 61.

[0039] As shown in Fig. 8, however, avatars 63 and 64 exist in the aura 62 of the avatar 61 in addition to the pilot avatar 51. In this case, the avatar 61 shares pieces information owned by the pilot avatar 51, the avatar 63 and the avatar 64. At that time, the shared server 12 receives the pieces of information owned by the pilot avatar 51, the avatar 61, the avatar 63, and the avatar 64, transmitting the pieces of information owned by the pilot avatar 51, the avatar 63 and the avatar 64 to a client PC associated with the avatar 61, and the pieces of information owned by the avatar 61 to the client PC1 associated with the pilot avatar 51.

[0040] In this way, when a number of objects exist in an aura, the load borne by the shared server 12 increases all of a sudden and, in addition, the amount of traffic in the Internet 7 and the LAN 9 also rises as well.

[0041] Fig. 9 is an explanatory diagram used for describing an operation to set a state in which the information of the guest avatar 61 is not communicated with the pilot avatar 51 in order to prevent a load borne by the shared server 12 from increasing all of a sudden even if a number of objects exist in the aura 52 of the pilot avatar 51. In the state where the information of the guest avatar 61 is not to be communicated with the pilot avatar 51, the shared server 12 transmits information owned by the pilot avatar 51 to a client PC associated with the avatar 61, but the shared server 12 does not transmit the information owned by the avatar 61 to the client PC 1 associated with the pilot avatar 51. As a result, the load of processing borne by the shared server 12 and the amount of traffic on the transmission line do not increase all of a sudden even if there are many avatars such as