Side By Side Comparison of Kawaguchi Translations

1207 v. 2009

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Specification

1. Title of the Invention

SCSI Device Converter

2. Claims

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(54) TITLE OF THE INVENTION SCSI DEVICE ADAPTER

(21) JAPANESE PATENT APPLICATION H2-120493

(22) DATE OF APPLICATION MAY 9, 1990

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SPECIFICATION

1. TITLE OF THE INVENTION

SCSI Device Adapter

2. SCOPE OF PATENT CLAIMS

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(1) A SCSI device converter comprising: a SCSI interface connected to a SCSI interface in an engineering workstation (EWS) for connecting a hard disk;

a device interface for connecting a peripheral device;

a data writing unit, data reading unit, control data writing unit, and an interrupt data reading unit each identified by the EWS through the SCSI interface by a different ID number (or by the same ID number but a different unit number);

a code converting unit interposed between the data writing unit, the reading unit, and the device interface for converting data between the SCSI format and the peripheral device bus format;

a control unit for controlling the transmission/reception of data between the EWS and the peripheral device through the data writing unit and reading unit are interrupted; and

an interrupt control unit for outputting a disconnect signal via the SCSI interface to the EWS to release an EWS line when the data reading unit has not prepared interrupt data for an interrupt data read command sent from the EWS, and afterwards for sending a reconnect signal to the EWS via the SCSI interface to enable the EWS to read interrupt data when interrupt data has been inputted from a device to the interrupt data reading unit.

3. Detailed Description of the Invention (Field of Industrial Applicability)

The present invention relates to a general SCSI device converter which is able to easily connect a device such as a PC peripheral device or a sequencer to a SCSI interface on an engineering workstation (EWS).

(Prior Art and Problem Solved by the Invention)

Engineering workstations (EWS) include a collection of inexpensive devices which facilitate high-speed processing via multi-tasking and multi-window processing.

An EWS includes, as a standard interface, a SCSI interface used to connect hard disks and magnetic disk drives.

(1) A SCSI device adapter, comprising:

a SCSI interface that is connected to a SCSI interface for connecting an EWS (Engineering WorkStation) device;

a device interface for connecting to a peripheral device;

a data writing portion, a data reading portion, a control data writing portion, and an interrupt data reading portion that are identified with different ID numbers (or with identical ID numbers and different unit numbers) from the EWS through the SCSI interface;

a code converting portion for converting data between a SCSI format and a peripheral device bus format, positioned between the data writing portion and data reading portion and a device interface;

a controlling portion for controlling sending and receiving of data between the EWS and the peripheral device, carried out through relaying through the data writing portion and reading portion; and

an interrupt controlling device for outputting, to the EWS, through the SCSI interface, a disconnect signal when, for an interrupt data read command sent from the EWS, the interrupt data is not ready in the interrupt data reading portion, to release the EWS circuit, and for sending, to the EWS, through the SCSI interface, a reconnect signal when interrupt data has been inputted from the interrupt data reading portion thereafter, to enable the EWS to read out the interrupt data.

3. DETAILED EXPLANATION OF THE INVENTION [STAMP INDICATING THAT THIS IS A VALID AMENDMENT TO A DIFFERENT SPELLING OF THE SAME MESSAGE]

[AREA OF USE IN INDUSTRY]

The present invention relates to a general-use SCSI device able to connect easily PC peripheral devices and devices such as sequencers to a SCSI interface of an EWS (Engineering WorkStation).

[PRIOR ART AND PROBLEM SOLVED BY THE PRESENT INVENTION]

Engineering workstations, given their multi-tasking, multi-windowing processing and comparatively inexpensive equipment structure enable high-speed data processing, and are used by consumers.

An EWS is equipped with a SCSI interface, as a standard interface, for the purpose of connecting a hard disk or a magnetic tape device. However, it does not have a slot

personal computers. As a result, output devices such as plotters and sequencers which have a personal computer I/O bus or bi- directional parallel bus with interrupt for a personal computer cannot be connected directly to an EWS. In other words, because current EWS only have an initiator function, a circuit connection cannot be established from a converter to an EWS.

While a personal computer can be connected to a wider variety of peripheral devices by using the expansion slot, it has a slower processing speed and not practical because of single-task processing. An higher grade EWS has a dedicated bus for connecting peripheral devices, but it is for specific device, so it cannot be connected to any peripheral device and the system configuration is very expensive.

When an EWS is connected to a peripheral device with a PC-compatible bus, the process requires a standard SCSI interface designed to accommodate a hard disk, a PC-compatible GPIB interface, and a code converter connected to these interfaces to perform the necessary code conversion.

However, current SCSI interfaces designed for hard disks do not have an interrupt function, and the device which is required to interrupt on the host end such as by a sequencer cannot be connected.

Therefore, it is an object of the present invention to provide a general SCSI device converter which enables a peripheral device having a bus standard differ from SCSI such as PC bus to be easily connected to the SCSI interface on a EWS designed to connect a hard disk, and especially allows the peripheral device end to interrupt.

(Means of Solving the Problem)

The present invention is a SCSI device converter comprising: a SCSI interface connected to a SCSI interface in an engineering workstation (EWS) for connecting a hard disk; a device interface for connecting a peripheral device; a data writing unit, data reading unit, control data writing unit, and an interrupt data reading unit each identified by the EWS via the SCSI interface by a different ID number (or by the same ID number but a different unit number); a code converting unit interposed between the data writing

has not been possible to connect directly, to an EWS, output devices such as plotters, or sequencers, or the like, that have a PC I/O bus or a bidirectional parallel bus with interrupts, which are PC-compatible buses. That is to say, because the existing EWS has only an initiator function, adapters cannot be wired and connected to an EWS.

Note that while a personal computer has a high degree of flexibility in connecting peripheral devices through the use of expansion slots, the processing uses a single stack, so the processing speed is slow and impractical. Moreover, while high-end EWSs are provided with specialized buses for connecting peripheral devices, they are compatible only with specific devices, and are unable to connect freely to arbitrary devices, and the system structure is extremely expensive.

If peripheral devices that have PC-compatible buses are to be connected to EWSs, then a code converter for converting codes between [those of] the SCSI interface that is the standard equipment that is designed compatible with the existing hard disks, and [those of] the GPIB interface, for example, that is a PC-compatible bus, should be manufactured.

However, the existing SCSI interface that is designed for hard disk use has no interrupt function, and thus cannot be connected to a device that requires interrupts to be applied to the host side, such as a sequencer, or the like.

Given this, the object of the present invention is to provide a general-use SCSI device adapter that can easily connect a peripheral device that has a standard bus that is different from that of an SCSI bus, such as a PC-compatible bus, or the like, to the SCSI interface of an EWS that was built for the purpose of connecting with a hard disk, and, in particular, to provide a general-use SCSI device adapter that can apply an interrupt from the peripheral device side.

[MEANS FOR SOLVING THE PROBLEM]

The present invention provides a SCSI device adapter, comprising: a SCSI interface that is connected to a SCSI interface for connecting an EWS (Engineering WorkStation) device; a device interface for connecting to a peripheral device; a data writing portion, a data reading portion, a control data writing portion, and an interrupt data reading portion that are identified with different ID numbers (or with identical ID numbers and different unit numbers) from the EWS through the SCSI interface; a

unit, the reading unit, and the device interface for converting data between the SCSI format and the peripheral device bus format; a control unit for managing the transmitting/receiving of data between the EWS and the peripheral device via the data writing unit and reading unit are interrupted; and an interrupt control unit for outputting a disconnect signal (conforming to SCSI standards) via the SCSI interface to the EWS to release an EWS line when the data reading unit has not prepared interrupt data for an interrupt data read command sent from the EWS, and afterwards for sending a reconnect signal (conforming to the SCSI standards) to the EWS via the SCSI interface to enable the EWS to read interrupt data when interrupt data has been inputted from a device to the interrupt data reading unit.

(Operation)

The above-described SCSI device converter is able to input and output data to a SCSI interface of an EWS using the same standards as SCSI interface for a hard disk, and enables the above-described four units, i.e., the data writing units and data reading units, which allow the EWS to operate as a data relay point with a peripheral device, to write and read data.

This SCSI device converter also inputs data to and outputs data from a peripheral device via a device interface by using a device bus standard, and the data is converted into SCSI standard data by a code converting unit, and is inputted to and outputted from the above-described four units, i.e., the data writing units and data reading units.

To an interrupt data read command from the EWS, the interrupt control unit temporarily releases the line to the EWS using a disconnect signal and reconnect signal of SCSI standards when data is not prepared in the interrupt data reading unit, and data reading is performed when the data is prepared thereafter.

This operation enables the SCSI interface of the EWS, which is not equipped to handle an interrupt from a device, to perform a virtual-interrupt operation, and enables the SCSI interface of the EWS, which is designed for connecting a hard disk, to connect a device requiring an interrupt.

(Embodiment)

The following is an explanation of a configuration shown in FIG. 1 in which a peripheral device is connected to an EWS using a SCSI device converter in an embodiment of the

SCSI format and a peripheral device bus format, positioned beteen the data writing portion and data reading portion and a device interface; a controlling portion for controlling sending and receiving of data between the EWS and the peripheral device, carried out through relaying through the data writing portion and reading portion; and an interrupt controlling device for outputting, to the EWS, through the SCSI interface, a disconnect signal when, for an interrupt data read command sent from the EWS, the interrupt data is not ready in the interrupt data reading portion, to release the EWS circuit, and for sending, to the EWS, through the SCSI interface, a reconnect signal when interrupt data has been inputted from the interrupt data reading portion thereafter, to enable the EWS to read out the interrupt data.

[OPERATION]

The SCSI device adapter performs input/output of data to/from an EWS SCSI interface through the same standard as the SCSI interface for a hard disk, the EWS to write and read arbitrary data to/from four types of data writing portions and reading portions that function as data relays with the peripheral device.

Moreover, this SCSI device adapter performs input and output of data to/from the peripheral device through the interface for the device through the bus standard of that device, and converts the data thereof, through the code converting portion, to data of the SCSI standard, to input/output to/from the four types of data writing portions and reading portions.

When there is no data ready in the interrupt data reading portion in response to an interrupt data read command from the EWS, the interrupt controlling portion uses a SCSI-standard Disconnect signal and Reconnect signal to release the EWS line, and then, thereafter, cause the data to be read out once the data is ready.

This operation enables a device that requires interrupts to be connected to the SCSI interface of an EWS that was designed for connecting a hard disk, through causing a virtual interrupt operation, in a SCSI interface for an EWS that has not been designed for interrupts.

[EMBODIMENTS]

An example of a structure wherein a peripheral device is connected to an EWS using a SCSI interface converter according to one embodiment according to the present

present invention.

In this drawing, (1) indicates a relatively inexpensive EWS (Engineering Workstation) such as a desk top typewhich has a SCSI interface (2) as standard equipment for connecting with the hard disk. (3) indicates a SCSI device converter installed in one boardwhich connects the EWS (1) to a peripheral device, for example, an output device (4) such as a plotter, an input device (5) such as a CD-ROM, and a device (6) that performs interrupt control such as a sequencer.

The SCSI device converter (3) includes a SCSI interface (7) for connecting to the EWS (1), and includes personal computer I/O bus interfaces (8) (9) and an interface for a bi-directional parallel bus interface (10) with interrupt function as interface for connecting peripheral devices. The SCSI device converter (3) also implements a data writing unit (11), a data reading unit (12), a control data writing unit (13), an interrupt data reading unit (14), a code converting unit (15), a control unit (16) and an interrupt control unit (17) by using a microcomputer, ROM and RAM. The data writing unit (11), the data reading unit (12), the control data writing unit (13) and the interrupt data reading unit (14) are identified in different ID numbers N, N+1, …, and N+3 (or by the same ID number but different unit numbers N, N+1, …, and N+3) by the EWS (1) through the SCSI interface (2) (7). The codeconverting unit (15) and the control unit (16) are located between each of the data writing units and reading units (11) (12) (13) (14) and the device interfaces (8) (9) (10). The code converting unit (15) converts the data format between SCSI standards and device-interface bus standards.The control unit (16) controls the data transmission/reception between the EWS and the peripheral devices which is performed by relaying the data writing units and reading units. The interrupt control unit (17) generates a control signal so that the EWS (1) can receive interrupt signals from the devices through the SCSI interfaces (2) and (7) without terminating processing.

In addition to the I/O interfaces (8) (9) and interface for a bi-directional parallel bus with interrupt (10) mentioned above, the SCSI device converter(3) can be adapted to accommodate any other type of device interface. For example, an A/D converter (19) may be installed to receive analog data from an analog device (18) such as a sensor. The device interface used here can be a standard interface such as a RS-232, Centronics, or VME bus, or a special interface such as the expansion buses used in each personal computer.

In this figure, (1) is a relatively inexpensive EWS (Engineering WorkStation) of a desktop type, and has, as standard equipment, a SCSI interface (2) for connecting a hard disk. (3) is a SCSI device adapter that is assembled in a single board, peripheral devices, such as, for example, an output device (4), such as a plotter, an input device (5), such as a CD-ROM, and a device (6) that carries out interrupt control of a sequencer, or the like, are connected to the EWS (1).

The SCSI device adapter (3) has a SCSI interface (7) for connecting to the EWS (1), and has, as a device interface for connecting peripheral devices, PC I/O bus interfaces (8) and (9), and a bidirectional interrupt-capable parallel bus interface (10). Moreover, in the SCSI device adapter (3), a data writing portion (11), a data reading portion (12), a control data writing portion (13), and an interrupt data reading portion (14) that are identified with different ID numbers N, N + 1,…, N + 3 (or with identical ID numbers and different unit numbers N, N + 1,…, N + 3) through the SCSI interfaces (2) and (7) from the EWS (1), a code converting portion (15) for converting to a data format between the SCSI standard and a bus standard of the interface for the device, between the individual data writing portions and data reading portions (11), (12), (13), and (14) and the device interfaces (8), (9), and (10), a controlling portion (16) for controlling sending and receiving of data between the EWS and the peripheral device that is carried out relayed by the aforementioned data writing and reading portions; and an interrupt controlling portion (17) for generating a control signal so as to enable the EWS (1) to receive an interrupt signal from a device through the SCSI interfaces (2) and (7) without interrupting processing, are structured from a microcomputer, a ROM, and a RAM.

Note that the device interface of the SCSI device adapter (3) may also use, depending on the connected device, other types of I/O bus interfaces (8) and (9) and bidirectional interrupt-compatible parallel interfaces (10) from those described above. For example, an A/D converter (19) able to input analog data from an analog device (18), such as a sensor, may be built in. Here the device interface may be an RS-232, a standard interface such as a Centronics or VME bus, or a specialized interface such as an expansion bus of a specific PC.

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