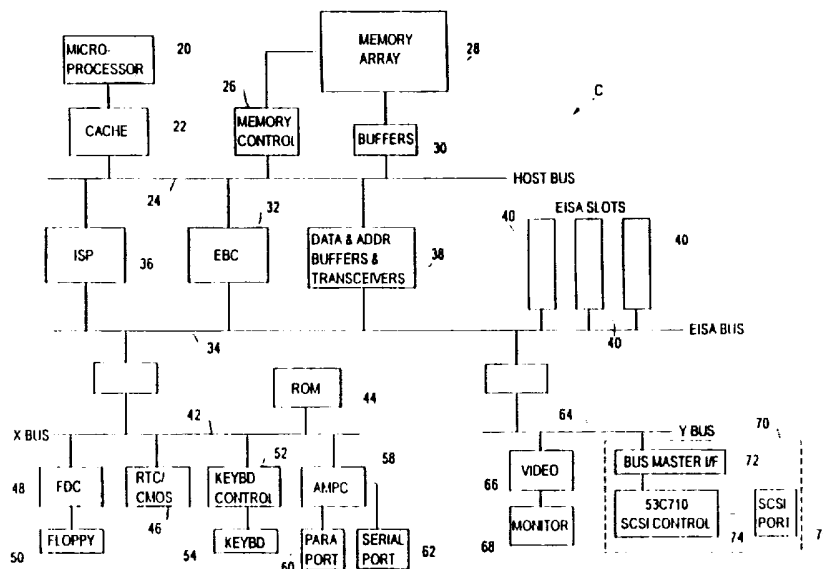


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant: COMPAQ COMPUTER CORPORATION [US/US]; 20555 State Highway 249, Houston, TX 77070 (US).			
(72) Inventor: GALLOWAY, William, C. ; 14902 Mesita Drive, Houston, TX 77083 (US).		(88) Date of publication of the international search report: 21 July 1994 (21.07.94)	
(74) Agent: BURDETT, James, R.; Compaq Computer Corporation, Mail Stop 060803, 20555 State Highway 249, Houston, TX 77070 (US).			

(54) Title: METHOD FOR IMPROVING SCSI OPERATIONS BY ACTIVELY PATCHING SCSI PROCESSOR INSTRUCTIONS



(57) Abstract

A method for improving SCSI controller operations by actively patching SCSI processor instructions. In a first case, tag values assigned to queues for tagged queue operation are a multiple of the SCSI processor jump instruction length. When reselected, the tag value is patched or overwritten as the least significant byte of the address of a jump instruction. The upper bytes point to the beginning of a jump table. Each entry in the jump table is a jump instruction to the sequence for a particular queue or thread. Thus simple entry is made to the desired thread without a conditional branch tree. In a second case, special SCSI operations are directly handled by the host device driver and the SCSI processor only performs conventional data transfers and similar operations. The device driver patches the message length of the SCSI processor code to an illegal value, so that an illegal instruction develops, prompting the host device driver to perform the operation at a register level. This approach allows removal of all special operation conditional branching from the SCSI processor, greatly speeding up operations.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 93/09363

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 G06F13/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	COMPUTERS IN PHYSICS vol. 5, no. 4, July 1991, NEW YORK, US pages 386 - 395 NOBLE 'Avoid Decisions' see page 388, right column, paragraph 3 ---	1-3
A	SOFTWARE PRACTICE & EXPERIENCE vol. 11, 19 February 1981, CHICHESTER GB pages 929 - 942 SALE 'The Implementation of Case Statements in Pascal' see page 929, line 1 - page 934, line 6 ---	1-3
A	PATENT ABSTRACTS OF JAPAN vol. 012, no. 331 (P-755)7 September 1988 & JP,A,63 094 352 (FUJITSU) 25 April 1988 see abstract --- -/--	1-3

☒ Further documents are listed in the continuation of box C.

☐ Patent family members are listed in annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

2 June 1994

Date of mailing of the international search report

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gill, S

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 93/09363

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	IBM TECHNICAL DISCLOSURE BULLETIN. vol. 15, no. 4 , September 1972 , NEW YORK US pages 1248 - 1250 'Dynamic Patch via Invalid Operations' see the whole document -----	4,5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 93/09363

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See annexed sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

1. Claims 1-3: SCSI reselection operation where a jump table is used to select among tagged queues using and indexing tag.
2. Claims 4-6: Causing host device driver to carry out special operations by sending illegal instruction codes to SCSI controller which subsequently causes interrupts to host.

The special technical feature of the invention is carrying out the SCSI reselection operation using a jump table to select among tagged queues by means of an indexing tag.

According to rule 13 of the PCT, non-unity a priori has been detected for a second invention which deals with causing a host device driver to carry out special operations by sending illegal instruction codes to a SCSI controller thereby causing it to interrupt the host. No technical link can be established between the two inventions.