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Declaration under Rule 4.17:
— of inventorship (Rule 4.17(ii)) for US only

(Continued on next page)

(54) Title: APPARATUS AND METHOD FOR SOFTWARE DEBUGGING

(57) Abstract: The software debugging system (10) provides a processor (14) that is executing a software process, and the software process has a bug or other failure. A fast-response reporter circuit (33) connects to a low-level asset in the processor (14), such as a reorder buffer (21), commit buffer, or high speed data path. The fast response reporter circuit is configured to selectively extract data from the low-level asset, and the extracted data is transmitted to an evidence file (39) for review and analysis. In one arrangement, a fast-response Sentry circuit (31) also connects to a low-level asset in the processor (14), and is configured to monitor for a predefined event. When the predefined event occurs, the fast-response Sentry circuit (31) causes an action to occur, such as activation of the reporter fast-response circuit (33).
Published:
— with international search report

(88) Date of publication of the international search report:
28 July 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
   IPC(7) : G06F 11/36
   US CL : 712/227
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)
   U.S. : 712/227; 714/25,38

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 practicable, search terms used)
   EAST, IEEE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 5,740,449 (Densham et al) 14 April 1998 (14.04.1998), column 14, lines 11-61, abstract, Fig.1.2.7.10</td>
<td>1-12, 14-16</td>
</tr>
<tr>
<td>A</td>
<td>US 5,295,260 (Pribnow) 15 March 1994 (15.03.1994), abstract, column 10, lines 18-46</td>
<td>1-12, 14-16</td>
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<tr>
<td>A</td>
<td>US 4,755,997 (Takahashi) 5 July 1988 (5.07.1988)</td>
<td>1-12, 14-16</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

See patent family annex.

Date of the actual completion of the international search
10 March 2005 (10.03.2005)

Date of mailing of the international search report
27 APR 2005

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
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Form PCT/ISA/210 (second sheet) (January 2004)
### INTERNATIONAL SEARCH REPORT

**Box No. II** Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III** Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

Please See Continuation Sheet

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<table>
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<tr>
<td>1.</td>
<td>☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.</td>
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<tr>
<td>2.</td>
<td>☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.</td>
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<tr>
<td>3.</td>
<td>☐ 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.:</td>
</tr>
<tr>
<td>4.</td>
<td>☒ 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.: 1-12 and 14-16</td>
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**Remark on Protest**

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<td>☐ The additional search fees were accompanied by the applicant's protest.</td>
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<td>☐ No protest accompanied the payment of additional search fees.</td>
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Form PCT/ISA/210 (continuation of first sheet(2)) (January 2004)
BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

I. Claims 1-12 and 14-16, drawn to a debugging system including a fast response monitoring circuit which writes data to a file.
II. Claim 13, drawn to a computer-readable evidence file.
III. Claim 17, drawn to an automated method of examining an evidence file including identifying if a branch instruction failed to execute.
IV. Claim 18, drawn to a method of generating an evidence file.

There is a lack of unity between the aforementioned groups because each of the groups, taken as a whole, defines a unique "special technical feature". That is, a debugging circuit for writing to an evidence file, the evidence file itself, examining an evidence file, and generating an evidence file are different technical features.