

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)**

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2018/072560

International filing date (day/month/year)
21.08.2018

Priority date (day/month/year)
29.09.2017

International Patent Classification (IPC) or both national classification and IPC
INV. G06F9/38 G06F9/30

Applicant
ARM LIMITED

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of this opinion

see form
PCT/ISA/210

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	<u>1-22</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-22</u>
Industrial applicability (IA)	Yes: Claims	<u>1-22</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Reference is made to the following document; the numbering will be adhered to in the rest of the procedure.

D1 US 2010/023703 A1 (CHRISTIE DAVID S [US] ET AL) 28 January 2010
(2010-01-28)

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.
- 1.1 D1 discloses an apparatus comprising:
 - an instruction decoder to decode instructions (implicit in figure 2); and
 - processing circuitry to perform data processing in response to the instructions decoded by the instruction decoder, the processing circuitry comprising transactional memory support circuitry to support execution of a transaction within a thread of data processing by the processing circuitry (paragraph 32), the transaction comprising instructions of the thread executed speculatively between a transaction start instruction and a transaction end instruction (paragraphs 33, 45,47 and 96) , for which the processing circuitry is configured to prevent commitment of results of the speculatively executed instructions of the transaction until the transaction end instruction is reached, and to abort processing of the transaction when an abort event occurs before reaching the transaction end instruction (paragraphs 36,47,50);
 - wherein in response to decoding of a transaction nesting depth testing instruction by the instruction decoder, the processing circuitry is configured to set at least one status value to one of a plurality of states selected dependent on a transaction nesting depth indicative of a number of executed transaction start instructions of a given thread for which the corresponding transaction remains unaborting and uncommitted, the plurality of states including a first state selected when the transaction nesting depth equals a predetermined number greater than zero, and at least one further state selected when the transaction nesting depth is greater than or less than the predetermined number (implied in paragraphs 32 and 94) ; and
 - the instruction decoder is configured to support an instruction set architecture

comprising at least one type of conditional branch instruction enabling the instruction decoder, in response to a single transaction nesting depth testing instruction followed by a single conditional branch instruction, to control the processing circuitry to set the at least one status value dependent on the transaction nesting depth and perform a conditional branch conditional on the at least one status value being in the first state (paragraphs 94).

- 2 The same reasoning applies mutatis mutandis to the subject-matter of independent claims 20 and 21 which are therefore also not new.
- 3 Dependent claims 2-19 and 22 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty and/or inventive step, since they are either disclosed in D1 (paragraphs 32-36, 47-54, 94-96) or well-known options in the art of computers.
- 4 Claims 1-22 address a technical problem in the field of computer architectures and as such they fulfill the requirements for industrial applicability (Article 33(4) PCT).
