

**PATENTS ACT 1977**

APPLICANT Micron Europe Limited

ISSUE Whether patent applications
GB0309205.3 and GB0309206.1 comply with
section 1(2)

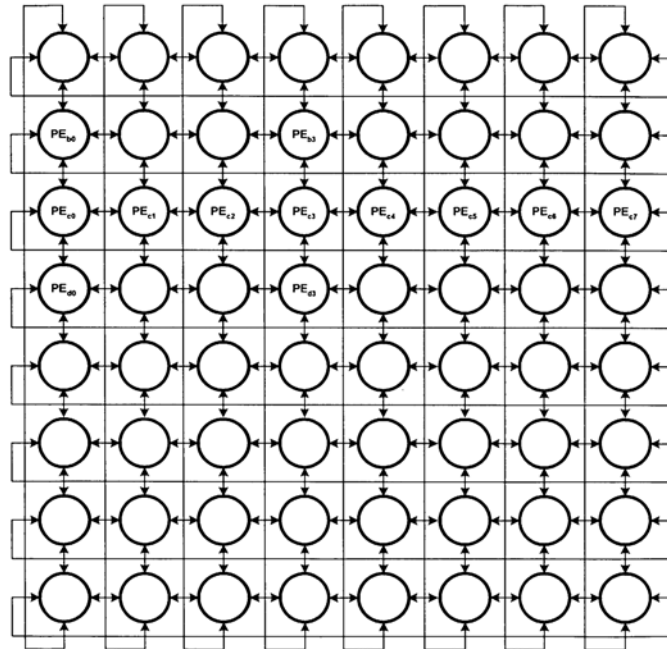
HEARING OFFICER H Jones

DECISION**Introduction**

- 1 The two applications (GB0309205.3 and GB0309206.1) were filed on the same day (23rd April 2003) and claim priority from the same GB application (GB0221563, filed on 17th September 2003). Both applications relate to a method for finding global extrema amongst a set of local extrema distributed across processing elements in a parallel processing environment, the only difference between the two being the size of the local extrema - in GB'205.3, the local extrema have a most significant byte and a least significant byte, whereas in GB'206.1, the local extrema comprise only a single byte.
- 2 It was convenient for the examiner to deal with these applications together during the examination stage, and the objections raised on both applications have been consistent throughout. The only issue that remains to be decided with regard to each application is whether the invention is excluded under section 1(2) of the Act as relating to a computer program. The applicant requested to be heard in the matter, and it was agreed that the two applications would be dealt with at a single hearing held on 27th July 2006. The applicant was represented by Mr Simon Forrester of Forrester Ketley & Co.

The applications

- 3 The applications refer to the use of parallel processing in active memory applications, where an active memory is described as a memory device having a processing resource distributed throughout the memory structure. A typical active memory includes a number of interconnected processing elements (PEs) which are capable of simultaneously executing instructions sent from a central processor or control unit. The PEs may be connected in a variety of different arrangements depending on the design requirements for the active memory, and fig. 7 of both applications (see below) illustrates an example of PEs arranged in a loop-connected 2-dimensional array where adjacent PEs are connected via a transfer network.



- 4 The applications describe how a typical PE may contain a set of values stored in one or more registers, and that in some instances it may be desirable to determine the extrema (e.g. the highest or lowest value) of the set of values within an individual PE. The applications also suggest that it may be desirable to find the extrema for an entire array of PEs, e.g. the 2-dimensional array shown in fig. 7, and that conventional methods for finding such global extrema are inefficient because they result in processing cycles being lost, e.g. a PE must wait to complete a calculation when the necessary data has not been transferred to it via the transfer network. The two applications aim to address this problem by optimizing the transfer of data into and out of each PE in such a way that the resources of the active memory are maximized.
- 5 In both applications, the method for finding a global extrema from a set of local extrema distributed across a plurality of PEs in a 2-dimensional array involves:
 - a) determining local extrema within each PE;
 - b) each PE placing its local extrema onto the transfer network;
 - c) determining the extrema for each line in a first dimension, e.g. for the 8x8 array above, determining the extrema for each row by shifting local extrema from each PE within the row across the transfer network - each PE within the same row will calculate the same row extrema as the other PEs within that row;
 - d) repeating the process for each line in a second dimension using the line extrema determined in the first dimension, e.g. determining the extrema for each column by shifting row extrema from each PE within the column across the transfer network - each PE within the same column will calculate the same column extrema as the other PEs within that column.
- 6 In the example of the 2-dimensional array of PEs given above, a global extrema will

be available to each PE after carrying out a sequential transfer of data along each row and then a sequential transfer of data along each column of the array. The data is transferred from one PE to adjacent PEs via the transfer network.

- 7 Each application has a single independent claim (claim 1), and the only difference between the two independent claims reflects the same difference between the applications outlined above, i.e. the size of the local extrema. For the purpose of this decision, it is necessary for me to recite only one of these independent claims, i.e. claim 1 of GB0309206.1:

“A method for finding a global extrema for a set of local extrema distributed respectively across a plurality of processing elements forming an n-dimensional array, the local extrema each being one byte, the method comprising:

for each set of processing elements extending along a first dimension within said n-dimensional array, inputting the respective set of local extrema to each processing element within said set;

determining within each of the processing elements a first dimensional extrema corresponding to the respective set of local extrema; said dimension extrema being one byte;

for each set of processing elements extending along a next dimension within said n-dimensional array, inputting the respective set of first dimensional extrema to each processing element within said set;

determining within each of the processing elements a next dimensional extrema corresponding to the respective set of first dimensional extrema, said next dimensional extrema being one byte;

repeating said inputting and determining steps for each set of processing elements extending along each of said n-dimensions to determine a global extrema, wherein each of said next dimensional extrema correspond to the respective set of previous dimensional extrema.

The Law

- 8 The examiner has argued that the claimed invention is excluded under section 1(2) of the Act in that it relates to a program for a computer. The relevant parts of section 1(2) read:

1(2) It is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of -

(a) ...

(b) ...

(c) a scheme, rule or method for performing a mental act, playing a game or doing business, or a program for a computer;

(d) ...

but the foregoing provision shall prevent anything from being treated as an invention for the purpose of this Act only to the extent that a patent or application for a patent relates to that thing as such.

- 9 Mr Forrester agreed that the starting point for determining whether an invention falls

within the exclusions of section 1(2) is the two-stage test proposed by the Deputy Judge in CFPH¹ and accepted by the Patent Office in its notice of 29th July 2005². The test can be summarized as follows:

Identify what is the advance in the art that is said to be new and not obvious (and susceptible of industrial application).

Determine whether it is both new and not obvious (and susceptible of industrial application) under the description “an invention” in the sense of Article 52 of the European Patent Convention (EPC) – which section 1(2) reflects.

- 10 Once the new and non-obvious advance has been identified, the Deputy Judge suggests that it would often be possible to determine whether this was an advance under the description of an invention by asking “Is this a new and non-obvious advance in technology”. However, because of the difficulty sometimes associated in determining what is meant by technology, the Deputy Judge says that if there is any doubt in this regard then it will be necessary to have recourse to the terms of Article 52 of the EPC. Subsequent judgments issued by the High Court all point to a similar requirement for a technical advance in order to pass the test for patentability.

Arguments and analysis

- 11 Setting aside the size of the local extrema employed in the two applications, the examiner has identified the advance in the art made by the claimed inventions to be a method used to determine overall extrema in sets of data having local extrema. He argues that when taking into account that only conventional hardware is being used, the advance would appear to lie merely in the method for determining extrema and, therefore, to a computer program as such.
- 12 Mr Forrester argues that the advance made by the inventions is not simply a method for determining extrema in the abstract sense, but that it is intrinsically linked to the physical hardware and to the need to overcome inefficiencies in data transfer at a physical level. He accepts the examiner’s assertion that hardware in the form of an array of processors in an active memory is conventional, but does not accept that one should simply strip away the conventional elements and forget about them altogether. He contends that when assessing the advance in the art, account should be taken of the physical context in order to characterize the improved method for determining global extrema, because it is at the physical level that the advance is made.
- 13 Mr Forrester’s suggestion is that the advance lies in a method of coordinating operation of an array of processing elements so as to optimize determination of a global extrema from a set of local extrema distributed across an array of processing elements. This differs to the advance identified by the examiner, but only in terms of the emphasis placed upon the role of the processing elements and the optimized determination of global extrema. The advance proposed by Mr Forrester is, however, clearly supported by the two applications, and I fully understand his point that the inventions are aimed at improving the efficiency of data transfer between processing elements in this particular example of determining global extrema.
- 14 If I were to accept the examiner’s argument that the advance lies merely in a method for determining extrema, I would be bound to conclude that this fell wholly within the meaning of a computer program set out in section 1(2) - the method simply requires calculation of one value from a set of input data under program control. Mr Forrester

¹ CFPH LLC’s Application [2005] EWHC 1589 (Pat), [2006] RPC 5

² “Examining for patentability”; <http://www.patent.gov.uk/patent/notices/practice/examforpat.htm>

agreed, but argued that this was not the advance made by the inventions upon which I should decide. If I were to accept the advance suggested by him, i.e. the method of coordinating operation of an array of processing elements outlined above, I would conclude that the advance were of a technical nature as required by the second step of *CFPH*. In this regard, Mr Forrester points to the technical benefits of optimizing data transfer through the processing elements, and suggests that at the heart of this advance is the need to solve the technical problem of losing cycles whilst waiting for relevant data to be transferred across a data network.

- 15 The difficulty that I have with Mr Forrester's formulation of the advance is that it lends heavily on what is disclosed in the description but bears very little resemblance to what is defined by the claims. I have very little doubt that he is right in saying that there is a technical problem to be solved by these inventions, and that the descriptions disclose a technical solution for solving such a problem. The solution does not simply provide a computer program structured or written in a particular way, but relies on what the computer program must do, i.e. shifting data around a transfer network under clock control. If what it does is to improve the efficiency of transferring data through an active memory when performing a certain calculation then I see that as providing a technical advance that takes it beyond the exclusion of section 1(2).
- 16 As I have said, the claims as they currently stand do not define the inventions in terms of the advance proposed by Mr Forrester. They do, however, support the examiner's view of the advance and his argument that the invention relates to a computer program as such, i.e. the method of finding global extrema is not tied to the processing elements in any strict sense, but instead relates to the structured and sequential processing of data.

Conclusion

- 17 As they currently stand, I have found that the claims of GB0309205.3 and GB0309206.1 define inventions that lie wholly within the meaning of a computer program set out in section 1(2)(c). I have also found that the descriptions lend support to an advance that can be regarded as technical in nature, and therefore invite the applicant to submit amended claims for further consideration by the examiner. The rule 34 period for putting the application in order expires 17th March 2007; I shall give the applicant a period of two months from the date of this decision in which to file amended claims. Otherwise the application will be refused.

Appeal

- 18 Under the Practice Direction to Part 52 of the Civil Procedure Rules, any appeal must be lodged within 28 days.

H Jones

Deputy Director acting for the Comptroller