



BL O/057/06

2nd March 2006

PATENTS ACT 1977

APPLICANT Sun Microsystems, Inc.

ISSUE Whether patent application
GB 2 391 980 A
relates to a patentable invention

HEARING OFFICER Stephen Probert

DECISION

Introduction

- 1 Patent application GB 0324572.7 was filed on 27th March 2002 in the name of Sun Microsystems, Inc. The application is entitled "Enhanced JAVA machine instructions"; it claims priority from a US application that was filed on 27th March 2001. The application was published by WIPO as WO 02/077806 A1 and the front page was reprinted by the UK Office with the serial number GB 2 391 980 A.
- 2 During the course of substantive examination in the UK Patent Office, the Examiner reported that the application relates to a program for a computer as such. After several rounds of correspondence between the Examiner and the applicant's Patent Attorney, they both agreed that further correspondence was unlikely to resolve the issue, and that a hearing would be required.
- 3 A hearing was originally appointed for 15 November 2005, before the applicant decided that it was not necessary to attend a formal hearing. Instead, the applicant's Patent Attorney filed some written submissions, and asked me to consider their previous arguments as expressed in the earlier correspondence on the official file.

The Invention

- 4 The invention concerns what might be described as a rationalised (or reduced) set of Java[®] Bytecode instructions. The Java programming language is designed to be portable enough to be executed on a wide range of computers ranging from small devices (eg. pagers, cell phones and smart cards) up to supercomputers. Computer programs written in the Java programming language (and other languages) may be compiled into Java Bytecode instructions that are suitable for execution by a Java virtual machine. A Java virtual machine is commonly implemented in software by means of an interpreter for the Java virtual machine instruction set but, according to the

application, it may be software, hardware, or a combination of both. (This is still something of a mystery to me. I thought that the fundamental attraction of a Java virtual machine was that it enables a program written in the Java programming language to be executed on a wide range of hardware platforms without requiring modifications or additions to the hardware. I find the concept of a '**virtual**' machine implemented in hardware to be inherently confusing.)

- 5 According to the application, the conventional Java Bytecode instruction set has more than 220 instructions, and there is a significant amount of redundancy (or overlap) between some of these instructions. For example, there are different Java Bytecode instructions for storing (or 'pushing') integer local variables onto the execution stack (eg. iLoad), and storing (or 'pushing') pointer local variables onto the execution stack (eg. aLoad). However, the operations performed by these instructions are identical, namely, storing (or 'pushing') 4 byte values onto the execution stack.
- 6 Furthermore, there are five different Java Bytecode instructions for pushing one byte integer values onto the execution stack (ie. iconst_1, iconst_2, iconst_3, iconst_4 and iconst_5). However, these instructions perform essentially the same operations; namely, pushing a constant one byte integer value onto the execution stack.
- 7 Because the Java Bytecode instruction set has more than 220 instructions, this means that nearly all of the 256 (2^8) allowable Bytecode values have to be assigned to Java instructions (commands or opcodes). As a result, according to the description in this application, Java interpreters are needlessly complex since they need to recognize a relatively large number of Java instructions and possibly implement various mechanisms for executing instructions. Thus, the conventional Java Bytecode instruction set is not a very desirable solution for systems with limited resources (eg. embedded systems).
- 8 The invention provides a reduced set of Bytecode instructions that can nevertheless effectively represent the complete set of operations performed by the conventional Java Bytecode instruction set. The concept of RISC¹ processing is well known in relation to hardware microprocessors, but there appears to be no evidence that anyone has ever suggested developing a RISC version of a virtual (or software-based) processing environment.
- 9 Furthermore, the application asserts that the reduced set of instructions can be used to perform operations that cannot readily be performed by conventional Java Bytecode instructions. Thus it is suggested that a more elegant yet robust virtual machine instruction set can be implemented. This in turn allows implementation of relatively simpler interpreters as well as allowing alternative uses of the limited 256 (2^8) Bytecode representation (eg. a macro representing a set of commands). As a result, the performance of virtual machines, especially, those operating in systems with limited resources, can be improved.

¹RISC = **R**educed **I**nstruction **S**et **C**omputer

- 10 One of the examples described in the application concerns the virtual machine instruction ALoad. This is one of the ‘new’ instructions (ie. according to the invention) that can stand in place of several conventional JAVA Bytecode instructions, and load values from an array, onto the top of the execution stack. Whereas the conventional JAVA Bytecode instruction set provides different instructions depending on the type of array to be accessed (eg. 1 byte, 2 bytes, 4 bytes, 8 bytes array), the ‘new’ ALoad instruction is able to replace any of them because the virtual machine reads the header of the array to determine the array’s type and is therefore able to work out for itself what type of data to load from the array onto the execution stack.

The Law

- 11 The examiner has reported that the application relates to a program for a computer as such. This objection is based on section 1(2) of the Act, the essential parts of which are shown in bold below:

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) a discovery, scientific theory or mathematical method;
- (b) a literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;
- (c) a scheme, rule or method for performing a mental act, playing a game or doing business, or **a program for a computer**;
- (d) the presentation of information;

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

- 12 In the written submissions presented on their behalf, the applicant argues that the overriding precedent in the UK at this time is the decision of the Court of Appeal in *Fujitsu*². They submit that “any subsequent case law emanating from the High Court must be read so as to be consistent with that decision.” Furthermore, they point out that in recent judgments both Mr Justice Pumfrey (in *Halliburton*³, *Shopalotto*⁴, and *RIM v Inpro*⁵) and Mr Justice Kitchin (in *Crawford*⁶) have emphasised that the correct test for patentability still involves the concept of “technical contribution”. It is therefore their submission that any invention providing a technical contribution is not excluded from patentability by virtue of section 1(2) of the Patents Act 1977.
- 13 Although the applicant is clearly keen to present their case along the lines of the “technical contribution” test that was established in *Fujitsu*, they have

² *Fujitsu Limited’s Application* [1997] RPC 14.

³ *Halliburton Energy Services, Inc. v Smith International* [2005] EWHC 1623 (Pat)

⁴ *Shopalotto.com Ltd’s Application* [2005] EWHC 2416 (Pat)

⁵ *Research In Motion UK Ltd v Inpro Licensing* [2006] EWHC 70 (Pat)

⁶ *Cecil Lloyd Crawford’s Application* [2005] EWHC 2417 (Pat)

recognised earlier in the correspondence in this application that the Patents Court has provided some helpful guidance explaining how this section of the Act should be interpreted in the *CFPH* case⁷. More specifically, they agreed that the appropriate test is the two stage test set out by the deputy judge in *CFPH*. That is:

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

(2) 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) — broadly corresponding to section 1 of the Patents Act 1977.

14 Notwithstanding their acceptance of this two stage test, the applicant has argued that it should be interpreted in the light of additional comments made by Mr Prescott QC in his judgment. They say that Mr Prescott attaches great weight to the fact that computer programs are mostly provided in binary and cannot be sensibly searched, and that this justifies their exclusion from patentability. But they go on to say that Mr Prescott clearly considered that the exclusion was only meant to relate to computer programs **as such**; not to other methods which happen to be implemented by a computer. I think this is right, and at some point I will need to decide whether this invention is a method which happens to be implemented by a computer, or whether the invention is a computer program as such.

15 The applicant has also used *CFPH* to argue that the law of copyright protects computer programs, and that this provides “some justification for their exclusion from patent protection.” The argument is then developed as follows:

“However this comment must mean that, in general terms, computer programs are only excluded from patentability at the level at which they are protected by copyright law. This submission finds support in the general and longstanding principle that while patents protect technical improvements in methods and apparatus, copyright simply protects the expression of ideas (eg. source code).”

16 In other words, if I have understood this argument correctly, the applicant should have the option of protecting with a patent, anything that would not be protected by copyright. This is not how I read *CFPH*. In the first instance, while Mr Prescott does indeed say that copyright protects computer programs, he is careful to add that it protects computer programs “**against copying**”. He then immediately points out that “a patent on a computer program would stop others from using it **even though there had been no copying at all.**” Thus I find it impossible to accept the argument that computer programs were excluded from patentability because (or to the extent that) they were already protected by copyright. They are different forms of protection, and they could not operate interchangeably even in the absence of the computer program

⁷ *CFPH LLC's Application* [2005] EWHC 1589 Pat.

exclusion for precisely the reason given in *CFPH*. Rather, *CFPH* tells us that computer programs were excluded from patentability because it was felt in the computer industry that such patents were not really needed⁸.

17 The applicants have also drawn my attention to paragraph 104 of *CFPH*, which begins:

“104. But the mere fact that a claimed artefact includes a computer program, or that a claimed process uses a computer program, does not establish, in and of itself, that the patent would foreclose the use of a computer program.”

18 From which I deduce that some inventions may include, or use, a computer program and still be patentable. I note also that Mr Prescott QC goes on to provide, in the same paragraph, several examples of inventions that involve computer programs and which he says “*ought, in principle, to be patentable*”.

Applying the Law to the Facts

19 In this case, the advance in the art that is said to be new and non-obvious is the provision of a single virtual machine instruction that represents two or more Java[®] Bytecode executable instructions. The crucial question is whether this is both new and non-obvious under the description ‘an invention’ (in the sense of Article 52).

20 After giving the matter much careful thought, I have reached the conclusion that it is both new and non-obvious under the description ‘an invention’. There is no doubt that the invention as claimed would involve a computer program for its implementation; the applicant also says that this is the case. But as *CFPH* indicates, that does not establish, in and of itself, that the invention is not patentable. To put it another way, it does not follow that the invention is only new and non-obvious insofar as it is a computer program (and hence not ‘an invention’ in the sense of Article 52).

21 Following *RIM v Inpro*, the applicant says that the second step (of the *CFPH* test) “must involve a consideration of whether the advance involves a technical effect”. I think that must be right, particularly having regard to all of the recent judgments that I have listed in paragraph 12 above. Neither do I think that it is inconsistent with the judgment of the court in *CFPH*, for I am conscious that *CFPH* does **not** say that “technical effect” is necessarily the wrong approach. For instance, at the end of paragraph 14 Mr Prescott QC says:

“I am not claiming that it is wrong to decide cases with reference to the word ‘technical’. It happens all the time. What I am saying is that it is not a panacea. It is a useful servant but a dangerous master.”

22 In reaching my decision in this case, I have been influenced by a number of things. For example, it seems to me that no-one would have questioned the

⁸ See *CFPH* paragraph 35.

patentability of hardware-based RISC processors. The concept of a microprocessor architecture that has reduced chip complexity by using a reduced set of simpler processing instructions clearly provides a technical effect. It is faster than its more complex counterparts, thanks to its simplicity, and is also designed and built more economically. That being so, why should a virtual (or software-based) RISC processor be treated differently? Just because it is implemented using a programmed computer? That cannot be right. As Pumfrey J observed in *RIM v Inpro* (paragraph 187):

“All modern industry depends upon programmed computers, and one must be astute not to defeat patents on the ground that the subject matter is excluded under Article 52 unless the invention lies in excluded subject matter as such.”

- 23 In this case, I do not consider that the invention lies in excluded subject matter as such ie. a computer program. The invention was almost certainly made at a much earlier stage in the creative process, before any computer program had been written (or flowcharts generated) with a view to implementing the invention. Moreover, even allowing for the fact that the invention would ultimately be implemented by means of a computer program, the invention has nothing to do with **how** that computer program would be structured or **how** it would be written, but with **what** the program must do. The program will be merely a tool, provided in this case as the most convenient means of implementing this particular invention.

Conclusion

- 24 I have decided that the advance in the art that is said in this application to be new and not obvious (and susceptible of industrial application) satisfies these criteria under the description “an invention”. Consequently the invention claimed in this application is not excluded from patentability by section 1(2)(c). I am therefore returning the application to the examiner in order for him to send the application forward to grant.

S J PROBERT

Deputy Director acting for the Comptroller