Datasheet for the decision of 21 September 2006

Case Number: T 0942/03 - 3.5.01
Application Number: 96309360.4
Publication Number: 0780770
IPC: G06F 12/08

Language of the proceedings: EN

Title of invention:
Hybrid numa coma caching system and methods for selecting between the caching modes

Applicant:
SUN MICROSYSTEMS, INC.

Opponent:
-

Headword:
Hybrid caching system/SUN MICROSYSTEMS

Relevant legal provisions:
EPC Art. 54

Keyword:
"Novelty (yes)"

Decisions cited:
-

Catchword:
-
Case Number: T 0942/03 - 3.5.01

DECISION
of the Technical Board of Appeal 3.5.01
of 21 September 2006

Appellant: SUN MICROSYSTEMS, INC.
4150 Network Circle
Santa Clara, California 95054   (US)

Representative: Harris, Ian Richard
D Young & Co
120 Holborn
London EC1N 2DY   (GB)

Decision under appeal: Decision of the Examining Division of the European Patent Office posted 18 February 2003 refusing European application No. 96309360.4 pursuant to Article 97(1) EPC.

Composition of the Board:
Chairman: S. Steinbrener
Members: R. Zimmermann
          G. Weiss


Summary of Facts and Submissions

I. European patent application number 96 309 360.4 claiming a priority date from 1995 concerns a multiprocessing system with a distributed shared memory which is based on a hybrid NUMA/COMA (non-uniform-memory /cache-only-memory) architecture.

II. The European search report cited, among other prior art documents, the following publications:


III. The examining division refused the application, considering a set of claims filed as main request on 11 November 2002 and a further set of claims filed as an auxiliary request in oral proceedings held before the examining division on 9 December 2002. According to the written decision, dated 18 February 2003, the subject-matter of the independent claims submitted as main request did not meet the patentability requirement of novelty, whereas the auxiliary request was not allowable under Rule 86(4) EPC. Lack of novelty was derived from document D2, sections 2.1, 3.1 and 5.2 concerning a method for page migration in a CC-NUMA (cache-coherent NUMA) system. In the context of page
migration, the CC-NUMA system of document D2 behaved temporarily as a COMA system, destroying novelty of the claimed invention.

Furthermore, under the heading "additional comments", the decision cited some passages in documents D1 and D2 and indicated that a mere combination of the known COMA and NUMA architectures, behaviour, or modes of performing would be obvious in the light of the prior art of documents D1 and D2.

IV. The applicant lodged an appeal against the refusal decision. The notice of appeal, including an order for payment of the appeal fee, was filed on 15 April 2003, the written statement setting out the grounds of appeal was filed on 17 June 2003. With the statement of appeal grounds, the appellant filed various requests related to different sets of claims, claim 1 of the "primary request" reading as follows:

"1. A method of storing data in a computer system (300) having a plurality of subsystems (310, 320, 380) coupled to each other by a system interconnect (390), each said sub-system including a processor (311a), a COMA cache (314) configured to store a plurality of pages each comprising a plurality of data lines, a directory (316), and a hybrid non-uniform-memory-architecture/cache-only-memory-architecture (NUMA/COMA) cache (313a) configured to store at least one of said data lines, said method comprising the steps of: setting a cache mode for a data line, wherein said cache mode is one of a COMA cache mode and a NUMA cache mode;
a processor (311a) of one said sub-system (310) initiating a data transaction associated with said data line;
changing said cache mode for said data line from said one of said COMA and NUMA cache modes to the other of said COMA and NUMA cache modes in response to identifying a pattern of data access from tracking cache activity;
storing data associated with said data line in said hybrid NUMA/COMA cache of said one sub-system;
storing said data in said COMA cache (314) of said one sub-system where said cache mode for said data line is said COMA mode."

As indicated by the appellant, the application documents filed with the "primary request" corresponded to the documents identified as main request in the decision under appeal, with a minor clerical change in dependent claim 25.

V. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the application documents filed as primary request. In the event the Board did not grant the primary request, the appellant requested oral proceedings and grant of a patent on the basis of application documents according to a first, second and third auxiliary request.

VI. According to the appellant's submissions, the examining division applied an unjustified distortion of the terminology used in the claims and the prior art. Neither document D1 nor D2 was directed to a hybrid NUMA/COMA system. The page migration described in
document D2, section 5.2 was a NUMA mode of operation as correctly indicated in D2. If the authors had considered it as a form of COMA operation they had said so. Moreover, the claimed invention involved an inventive step having regard to the prior art cited by the examining division. Both documents, document D1 and D2, only compared and contrasted separate NUMA and COMA systems, without giving any hint to combine them together into a hybrid NUMA/COMA system.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC and is thus admissible.

2. The appeal leads to the reversal of the decision under appeal and to the remittal of the case to the examining division since the finding of lack of novelty does not hold and the substantive examination has not yet been completed in the first instance proceedings.

Novelty

3. Novelty of the claimed invention is provided by the claimed combination of a Non-Uniform Memory Architecture (NUMA) and a Cache-Only Memory Architecture (COMA), which is the subject-matter of the method, computer system, and computer program product claims of the main request. The essential features of this combination result from the definition of a hybrid NUMA/COMA cache and the function of changing between COMA and NUMA cache modes in response to identifying a
pattern of data access from tracking cache activity (see independent claims 1, 16, and 19).

4. The Board does not agree with the examining division's interpretation of the CC-NUMA with page migration (NUMA-M) in document D2, page 87, section 5.2, 2nd paragraph as a (temporary) COMA mode indistinguishable from the claimed invention. The page migration in NUMA-M is merely an operation on the distributed main memory of a (normal) CC-NUMA system. It does neither transform the NUMA memory into an "attraction memory" characteristic of the COMA design, nor does it imply the implementation of a COMA specific coherence and communication protocol. In NUMA-M, there are no tags associated with each memory block or data line; nor does NUMA-M provide a total decoupling of the location of data items from their physical addresses (see document D2, page 80, right-hand column, 2nd paragraph, and page 90, left-hand column, section 6, 2nd paragraph). The algorithm of Black, Gupta, and Weber applied in NUMA-M for page migration was explicitly developed for application with multiprocessors of the type implementing NUMA memory (see the citation in document D2, page 87, section 5.2, 1st and 2nd paragraphs).

Inventive step

5. Referring to the comments made in the decision under appeal in respect to inventive step (see point III "Additional comments" of the decision under appeal), the Board notes that these comments are very preliminary and have rather the character of mere assertions than of a reasoned conclusion on which the applicant could make relevant observations.
Remittal

6. Since the only ground for refusal, lack of novelty, cannot be upheld and the substantive examination in respect to inventive step in particular has apparently not yet been completed, the case is to be remitted to the first instance to continue the examination on the basis of the main request.

As the Board has not refused the appellant's main request, the appellant's auxiliary requests including a request for oral proceedings if the Board were mindful not to grant the main request, need not be considered.

Order

For these reasons it is decided that:

The decision under appeal is set aside. The case is remitted to the first instance for further prosecution.

The Registrar: The Chairman:

P. Guidi S. V. Steinbrener