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Datasheet for the decision of 10 July 2017

Case Number: T 2492/11 - 3.5.06

Application Number: 08158739.6

Publication Number: 2015175

IPC: G06F9/38

Language of the proceedings: EN

Title of invention:
Data transfer system, data transfer method, host apparatus and image forming apparatus

Applicant:
NEC Solution Innovators, Ltd.

Headword:
Data transfer/NEC SOLUTION INNOVATORS

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

Europäisches Patentamt
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Boards of Appeal
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Case Number: T 2492/11 - 3.5.06

D E C I S I O N
of Technical Board of Appeal 3.5.06
of 10 July 2017

Appellant: (Applicant)	NEC Solution Innovators, Ltd. 1-18-7, Shinkiba, Koto-ku Tokyo 136-8627 (JP)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB Siebertstrasse 3 81675 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 8 July 2011 refusing European patent application No. 08158739.6 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	W. Sekretaruk
Members:	A. Teale
	S. Krischer

Summary of Facts and Submissions

I. This is an appeal against the decision, dispatched with reasons on 8 July 2011, refusing European patent application No. 08 158 739.6 on the basis that the four independent claims contained added subject-matter, Article 123(2) EPC, were unclear, Article 84 EPC, and that their subject-matter did not involve an inventive step, Article 56 EPC, in view of D1 and common general knowledge, as exemplified by D4. These documents are as follows:

D1: US 2003/0033455 A1
D4: US 2004/0207630 A1.

II. A notice of appeal was received on 17 August 2011 in which the appellant requested that the decision be set aside and the patent granted. The appellant also made an auxiliary request for oral proceedings. The appeal fee was paid on the same day.

III. With a statement of grounds of appeal, received on 16 November 2011, the appellant filed a new set of claims. The appellant requested interlocutory revision by the examining division and, regarding the board, that the decision be set aside and a patent granted on the basis of said new set of claims. The appellant reiterated the auxiliary request for oral proceedings.

IV. In an annex to a summons to oral proceedings the board expressed its provisional opinion on the appeal that, although the claims overcame the objections under Articles 84 and 123(2) EPC in the decision, claim 6 was regarded as unclear for other reasons. Moreover all of the independent claims seemed not to involve an inventive step, Article 56 EPC.

V. In a letter received on 18 May 2017 the appellant stated that it did not intend to participate in the oral proceedings and therefore withdrew its request for oral proceedings. The appellant did not submit amendments or substantive arguments on the case and requested a decision based on the state of the file. The board subsequently cancelled the oral proceedings.

VI. The application is being considered in the following form:

Description:
pages 1 and 3 to 30, as originally filed,
page 2, received on 24 August 2010.

Claims:
1 to 6, received with the grounds of appeal.

Drawings:
Pages 1/11 to 11/11, as originally filed.

VII. Claim 1 reads as follows:

"A data transfer system having a host apparatus (1) and an image forming apparatus (2) connected thereto by a bus (3), the host apparatus (1) including: a memory device (11); a command separate/storage unit (101) that separates an image forming command set (110; 110A, 110B) which is a set of a plurality of image forming commands for controlling an image forming process in the image forming apparatus, each image forming command including a context command relating to setting of an operation mode needed for image forming and an object command relating to setting for specifying an image forming target, into a context command set (111; 111A,

111B) that includes a plurality of context commands and may be identical with respect to at least two image forming command sets (110A, 110B) and an object command set (121; 121A, 121B; 121A-121D) that includes a plurality of object commands and is different with respect to each image forming command set (110A. 110B), and stores the context command set and the object command set in the memory device (11) in such a manner that the context command set (111A) which is identical for a plurality of image forming command sets (110A, 110B) is stored at the same storage address and the object command sets are stored at respective different storage addresses: and a command read instruction transmission unit (102) that transmits a command read instruction (105; 105A, 105B; 105A-105D) including a transfer size of each of the context command set and the object command set, and a storage address of each of the context command set and the object command set in the memory device (11) to the image forming apparatus (2), the image forming apparatus including a memory access controller (20) that receives the command read instruction, and reads the context command set and the object command set according to a content of the command read instruction, the memory access controller (20) having a command information hold unit (200; 200A, 200B) that holds the storage address of the context command set included in the command read instruction received, and the read context command set, the memory access controller (20) is adapted, upon successive reception of a plurality of command read instructions, with respect to each of the command read instructions, to compare the storage address of the context command set included in said each of the command read instructions with a storage address of a previous context command set held in the command information hold unit, to read the context command set from the

memory device (11) according to the storage address of the context command set relating to present reception only when both of the storage addresses differ from each other, to read the context command set from the command information hold unit when the storage addresses match with each other, and to read the object command set corresponding to said read context command set from the memory device according to the storage address of said object command set, said storage address being included in said each of the command read instructions."

The claims also comprise three further independent claims to a data transfer method, a host apparatus and an image forming apparatus, respectively.

Reasons for the Decision

1. The admissibility of the appeal

In view of the facts set out at points I to III above, the appeal fulfills the admissibility criteria under the EPC and is consequently admissible.

2. Summary of the invention

2.1 As illustrated in figure 1, the application relates to transferring a command set for controlling an image forming process from a host apparatus (1), such as a PC, to an image forming apparatus (2), for instance a graphics card for producing an expanded image. The host has a CPU (10) and a main memory (11) and is connected via an external bus (3) to the image forming apparatus, having a memory access controller (20) and a command processor (21); see page 1, lines 5 to 17. When the image forming apparatus receives a read instruction for

commands (the image forming command set) from the host, a memory access controller (20) in the image forming apparatus reads said image forming command set from the host main memory device (11) and executes a command process, for instance an image forming process, according to the read image forming command set.

2.2 Said read instruction, illustrated in figure 5, comprises a transfer size of each of a context command set (111) and an object command set (121), and a storage address for the two command sets in the memory (200) of the image forming apparatus. Each image forming command in the command set includes a context command and an object command. A context command relates to the setting of an operation mode needed for image forming, for instance the top address of buffers in memory, a pixel size and a colour format, such as RGB or YUV; see page 1, lines 18 to 24, and page 7, line 22, to page 8, line 1. An object command relates to a setting specifying an image forming target, for example coordinate data and coordinate conversion parameters for enlarging, reducing or rotating images; see page 1, line 25, to page 2, line 2, and page 8, lines 1 to 4.

2.3 As shown in the flow chart in figure 8 (described from page 13, line 3, to page 14, line 18), the memory access controller in the image forming apparatus stores (in the "command information hold unit 200") the addresses of the context command set included in the command read instruction and those of the context command sets that have already been read and stored in the image forming apparatus. If the storage addresses differ then the context command set is transferred from the host main memory (11) to that (200) in the image

forming apparatus (steps S107 to S109); see also page 10, line 22, to page 11, line 16.

2.4 The description acknowledges a prior art image forming apparatus which transfers the whole image forming command sets including a context command set from the host to the image forming device one after another; see page 2, lines 3 to 7. This involves transferring a large amount of data from the host to the image forming apparatus, and the data transfer efficiency is low. JP-A-2003-50774, corresponding to D1, is acknowledged as reducing the amount of data transferred when transferring an image forming command set. There are many cases when transferring an image forming command set from the host to the image forming device in which commands in the context command set "become identical plural times successively", which the board understands to mean "are repeated multiple times". This is described as the context command set having "continuity". The document corresponding to D1 does not however take advantage of this continuity to further improve the efficiency of data transfer; see page 2, lines 17 to 19.

2.5 The invention seeks to efficiently transfer a command set for controlling an image forming apparatus from the host to the image forming apparatus; see page 2, lines 20 to 23. As shown in figure 8, this increase in efficiency is achieved by always transferring the object command set (see figure 8; step S110), but not always transferring the context command set; see steps S106-S107 and page 8, line 25, to page 9, line 3.

2.6 In the second embodiment of the invention, the "command information hold unit 200" not only stores addresses (201) but also stores command sets (202); see figure 9

and page 15, lines 18 to 25. Such locally stored context command sets can then be read by the memory access controller of the image forming apparatus, rather than transferring them via the bus from the host memory device (11).

3. The prior art on file

3.1 Document D1

As set out in the decision, figure 1 discloses a data transfer system having a host apparatus (see CPU 10, bus controller 11 and main memory 20) connected via a bus (see main bus 5) to an image forming apparatus (see drawing processing unit 30 and drawing memory 40). The main memory (20) stores, amongst other things, drawing commands sent from the host CPU; [0051], lines 2 to 4, and [0121]. The host comprises a command read instruction transmission unit (see figure 5, step S13 and [0065]) that transmits a command read instruction including a transfer size (see paragraph [0065], "number of words to be transferred" in control register 35) of the image forming command set ("drawing command set") and a storage address (see [0065], "destination address"/"head address" in control register 35 (see paragraph [0061) and parameters in figure 4) thereof in the memory device to the image forming apparatus. The image forming apparatus (3) includes a Direct Memory Access (DMA) controller 34 that receives the command read instruction and reads the image forming command set (drawing command set) from the memory device (20) according to a content of the command read instruction; see paragraph [0053], figure 5, step 16 and paragraph [0066]. According to paragraph [0009], D1 seeks to reduce the load on the host CPU during data transfer by the data processor in the image forming apparatus

acting as a bus master to control the DMA transfer to the memory of the image processing apparatus, based on storing an address and a number of words to transfer stored in register 35; see paragraph [0011].

3.2 Document D4

Cache 129 in figure 1 (see paragraph [33], lines 17-20 was cited in the decision as an example of common general knowledge. D4 relates to a similar structure to the invention, since figure 1 shows a host computer 110 linked via a bus 116 to a graphics subsystem 120 containing the cache 129.

4. The inventive step of claim 1, Article 56 EPC

4.1 According to the appealed decision, the subject-matter of *inter alia* claim 1 differed from the disclosure of D1 in the following features:

i. In the host apparatus, each image forming command set is divided into a context forming command set and an object forming command set and, if the context forming command sets are the same in consecutive image forming command sets, it is stored only once in the memory device.

ii. In the image forming apparatus, upon reception of the command read instruction, if the storage address of the context command set is the same as the storage address of a previously read context command set, using said previously read context command set, stored (for example) in a command information hold unit, so that the same context command set need not be read again from the memory device in the host apparatus.

The technical effects of features "i" and "ii" were to save memory space, termed "partial problem one", and to optimize transfer of command sets, termed "partial problem two", respectively, there being no synergistic technical effect of the two distinguishing features in combination. Regarding partial problem one, it was well known in the art to save memory space by storing duplicate information, for instance a context command set, only once. Moreover there was a natural division between a "context command set" and an "object command set". Regarding partial problem two, it was well known in the prior art that data, such as context command sets, referred to by several read instructions, such as address pointers or storage addresses, need only be read once, a locally stored copy being used for subsequent read instructions. D4 (see figure 1 and paragraph [33], lines 17 to 20), relating to a cache 129 for caching graphics data and program instructions was cited as an example.

4.2 The appellant has challenged the statement in the decision that the context information was the same for an entire image. As figures 10 to 13 showed, the context command set could be different or identical for different command read instructions. A context command set comprised a plurality of context commands and changing a single context command resulted in a different context command set. The subject-matter of *inter alia* claim 1 differed from the disclosure of D1 in the feature that the context command set was read from the memory device only when both of the storage addresses matched each other. Regarding difference feature "i", claim 1 now stated that the object command sets were stored at respective different storage addresses in the memory device (11), this not being

known from D1. Even assuming that there was a natural division between the "context command set" and the "object command set", it would not have been obvious to store them separately in the host apparatus. In the appellant's view, the appealed decision was based on an *ex post facto* analysis, since the assumption in section 13.2 that the context forming command sets were the same in consecutive image forming command sets was contradicted by the statement in section 12.2.3 that "the skilled person knows that the context information is the same for an entire image".

4.3 The board finds that the "drawing commands" in D1 can be seen as the "object commands" in claim 1. Hence the subject-matter of claim 1 differs from the disclosure of D1 in the following features:

a. (see difference feature "i" in the decision) the separation of the image forming command set into a context command set, which may be identical in two image forming command sets, in which case it is only stored once in the host memory device, and an object command set,

b. (see difference feature "ii" in the decision) in the image forming apparatus comparing storage addresses of context command sets in command read instructions and only transferring a context command set when the addresses differ and

c. in the image forming apparatus reading the context command set from the command information hold unit when the storage addresses match each other.

These three features address different problems and have no synergistic effect when combined.

4.4 Regarding feature "a"/"partial problem one" in the decision, the board takes the view that, as stated above, the distinction between "object commands" and "context commands" lies in the fact that commands which are always transferred are termed "object commands" and those which need not always be transferred, because they remain the same and thus are redundant, are termed "context commands". The board agrees with the appealed decision that this is a usual measure to save memory space in the host.

4.5 Regarding feature "b"/"partial problem two" in the decision, the board agrees with the appealed decision that not transferring commands to the image processing apparatus which are already there would have been a usual matter of optimizing command set transfer for the skilled person.

4.6 The board regards feature "c" as the use of caching in the image forming apparatus, this being a further measure to optimize command set transfer. This measure would have been usual for the skilled person.

4.7 Hence none of features "a", "b" or "c" lends inventive step to claim 1, and the subject-matter of claim 1 consequently does not involve an inventive step, Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

B. Atienza Vivancos W. Sekretaruk

Decision electronically authenticated