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Datasheet for the decision
of 6 June 2018

Case Number: T 1225/16 - 3.5.06

Application Number: 01923030.9

Publication Number: 1342156

IPC: G06F9/00

Language of the proceedings: EN

Title of invention:
RESOURCE MANAGER ARCHITECTURE

Applicant:
Zhigu Holdings Limited

Headword:
Resource management/ZHIGU

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

Case Number: T 1225/16 - 3.5.06

D E C I S I O N
of Technical Board of Appeal 3.5.06
of 6 June 2018

Appellant: (Applicant)	Zhigu Holdings Limited Harneys Services (Cayman) Limited 4th Floor, Harbour Place 103 South Church Street George Town P.O. Box 10240 Grand Cayman KY1-1002 (KY)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Decision under appeal:	Decision of the Examining Division of the European Patent Office posted on 7 December 2015 refusing European patent application No. 01923030.9 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman	W. Sekretaruk
Members:	M. Müller
	A. Teale

Summary of Facts and Submissions

I.   The appeal is against the decision of the examining
        division, dispatched with reasons dated 7 December 2015
        to refuse European patent application No. 01 923 030.9
        for lack of inventive step over the document

        D3: US 5 640 569 A.

II.   Notice of appeal was filed on 15 February 2016, the
        appeal fee being paid on the same day. A statement of
        grounds of appeal was received on 18 April 2016. The
        appellant requested that the decision under appeal be
        set aside and a patent be granted on the basis of the
        main request or the auxiliary request on file.

III.   In an annex to a summons to oral proceedings, the board
        informed the appellant of its preliminary opinion that
        the claimed invention indeed lacked inventive step
        over D3.

IV.   In response to the summons, by letter dated 4 May 2018,
        the appellant filed amended claims according to
        auxiliary requests 1 and 2.

V.   During the oral proceedings, which took place on
        6 June 2018, and after the board's indication that it
        would admit the new auxiliary requests, the appellant
        withdrew the main request and requested the grant of a
        patent on the basis of the claims of auxiliary
        requests 1 and 2 as filed on 4 May 2018.

VI.   Claim 1 of auxiliary request 1 reads as follows:

        "A computing system (20) implementing a resource
        management architecture including multiple consumers

(32) at a user level and including at a kernel level
multiple resource providers (104) and a resource
manager (102), the consumers being applications,
wherein:

said resource manager (102) exposes an application
programming interface, API, including API calls in
kernel mode;

said multiple consumers being adapted to use said
API calls in kernel mode to create an activity (122) at
said resource manager and to build one or more resource
configurations (124), each resource configuration
describing a set of resources required to perform the
activity;

said multiple resource providers (104) are
associated with said resources adapted to be utilized
by said multiple consumers (32), wherein each of said
resources is a finite quantity of a computing component
in the computer system; and

said resource manager (102) is further adapted to
arbitrate access to the resources provided by the
resource providers by using one of a plurality of
resource configurations that are specified for an
activity (122) created by one of said customers."

Claim 1 of auxiliary request 2 differs from claim 1 of
auxiliary request 1 in that at the end of the third
paragraph the following text has been inserted:

"... wherein each resource configuration comprises one
or more resource descriptors (126) each representing an
instance of a resource required by said one consumer,
wherein each resource descriptor comprises an identity
field (128) to hold an identity of a specific resource
provider that owns the required resource, an amount
field (130) to hold the quantity of resource needed for

that configuration, and an attribute field (132) to
list one or more resource attributes; ..."

VII.   At the end of the oral proceedings, the chairman
         announced the decision of the board.

Reasons for the Decision

The invention

1.   The application generally relates to resource
         management in a distributed system in which multiple
         consumers compete for various resources such as, for
         instance, CPU time, USB bandwidth, virtual memory and
         audio volume (see page 8, penultimate paragraph, and
         page 15, lines 6-8; all references being to the
         description as originally filed).

1.1   Since resources are usually limited, it may not be
         possible to grant all resource requests simultaneously.
         Requests may be in conflict with each other (see, e.g.,
         page 1, last paragraph, to page 2, paragraph 2). The
         invention proposes a resource management architecture
         with a conflict resolution mechanism.

1.2   The scenario considered in the application is depicted
         in figure 2 (see also page 3, paragraph 2, and page 14,
         last paragraph *et seq.*). Typical resource consumers
         (see figure 2, no. 32 and 35) are user-level computer
         applications, but kernel-level resource consumers are
         also possible (see page 15, lines 3-5; page 17,
         paragraph 3; and page 44, last paragraph *et seq.*).
         Resources are accessed via "resource providers" (see
         figure 2, no. 104) such as associated drivers (see

page 15, lines 8-15), which typically run on kernel
level, even though user-level resource providers are
also mentioned (page 15, lines 14-15). To arbitrate
resource access, a kernel-level resource manager is
provided (see figure 2, no. 102, and page 16,
paragraph 3, to page 17, paragraph 1).

1.3   A consumer intent on carrying out a certain task will
use an application programming interface (API) provided
by the resource manager to request access to one or
more alternative sets of resources required for that
purpose. Each such set of resources is stored in a data
structure called a "configuration", and all of them are
bundled in a container data structure called an
"activity" (see page 3, paragraphs 4 and 5; page 17,
paragraph 5, to page 18, paragraph 2; figure 2, no. 122
and 124; and figure 4, nos. 400 and 402). The data
structures may specify which configurations are
preferred and which are provided as "fallback" options
(see e.g. page 35, paragraph 2).

The prior art

2.   D3 discloses a system in which scarce computing
resources, such as network bandwidth (also referred to
as "goods"), are regulated by a pricing mechanism (see
column 1, lines 32-55, and column 2, line 58, to
column 3, line 2). A resource manager (called an
"agoric arbiter", i.e. utilizing market mechanisms; see
figures 2 and 3, no. 110, and column 4, lines 5-7)
receives, from each of several requesters (see
figure 1), a bid "slate" comprising several bids (see
figure 5, no. 162, and column 5, lines 18-42), each of
which lists a number of requested resources and a price
the requester is willing to pay for them (see column 4,

lines 51-67, and figure 3, nos. 132, 134, 140 and 142).
The resource manager arbitrates (see figure 3, no. 126)
between the bids and the available resources and
produces a "winning bid combination", comprising at
most one bid per bid slate, the combination having the
highest total bid price (see abstract, figure 3,
nos. 144, 146, and 148, and figure 6; column 2,
lines 64-66).

3.   During the oral proceedings, the appellant stated that
it was known in the prior art that operating systems
would provide a kernel-level resource manager to
arbitrate between conflicting user-level requests for
resources, including kernel resources "owned" by
suitable drivers. More specifically, it was known that
user-level applications intent on carrying out a
certain "activity", would request one set of required
kernel-level resources (i.e. a single resource
configuration) from a resource manager which would
decide, in view of other resource requests, whether it
could be served or not. It is common ground between the
board and the appellant that this assumption requires
no further proof.

Inventive step, Article 56 EPC 1973
"Auxiliary request 1"

4.   During examination, in the decision under appeal, and
in the board's preliminary opinion, the inventive step
assessment was carried out starting from D3.

4.1   With the submission dated 4 May 2018, the independent
claims were amended to make clear that the resource
consumers were user-level applications whereas the
"resource providers" and the "resource manager"
operated "in kernel mode". These amendments were meant

to set the claimed invention apart from D3 by stressing that the invention related to an operating-system service on a single computer system rather than to a user-level service in a distributed system as disclosed in D3 (see column 5, lines 1-14, and figure 4).

4.2   In view of these amendments, the appellant argued that it was more appropriate to assess inventive step starting from the known resource management in a conventional computer system such as that sketched above (point 3). The board agrees.

4.3   The board also accepts the appellant's point that the claimed invention according to "auxiliary request 1" differs from this known computer system essentially in that the user-level applications can, via a suitable interface, specify not only a single "resource configuration" but "one or more resource configurations [...] required to perform [an] activity".

4.4   In the known computer system, a user-level application whose request could not be served would either receive a suitable error message or have to wait. Often this would be noticeable to the user, for instance if a high-resolution news video could not be delivered due to a lack of communication bandwidth. The board regards it as obvious that users would then consider alternative ways of completing their "activity". For instance, they might consider requesting, via the appropriate user-level application, a lower bandwidth video stream or merely the audio stream (see, in this regard, also D3, column 4, lines 62-65).

4.5   In similar scenarios, the distinguishing feature relieves the users from the inconvenience - in terms of

time delay and effort - of having to request the potential alternatives one after the other.

4.6   D3 discloses a solution to this type of problem. Users may, in a single request ("bid slate"), specify their alternatives ("bid"), and the "agoric" arbiter selects a combination of bids determining which resources are to be allocated to each requester (see column 4, lines 8-14).

4.7   Incorporating this solution into the known computer system requires modifications to the resource manager and its interface, as both must be able to handle "one or more resource configurations" per request, but is otherwise independent of which type of resources is requested.

4.8   The board thus concludes that the skilled person, setting out to simplify the user interaction with the known computer system in the situations mentioned above, would consider and find a suitable solution in D3. Adapting this solution to the kernel-level resource manager and resource providers would, in the board's judgment, not involve any difficulty for the skilled person.

5.   The appellant has argued that the skilled person would not apply the user-level solution of D3 to improve kernel-level resource management in an operating system because operating systems were generally complex, closed and proprietary.

5.1   The board disagrees that this is necessarily the case. For example, the early Unix-type operating system Minix

released in 1987 was open, free and comparatively
simple.

5.2   Moreover, operating systems are constantly being
        developed further, even if they are complex, closed and
        proprietary. These properties would, therefore, not
        discourage the skilled person from incorporating a
        known user-level solution into an operating system to
        improve a kernel-level service.

6.   In summary, the board concludes that claim 1 of
        "auxiliary request 1" lacks inventive step over the
        known computer system in view of D3, Article 56 EPC
        1973.

"Auxiliary request 2"

7.   Claim 1 of auxiliary request 2 differs from that of
        auxiliary request 1 in specifying that the requested
        resources are described in terms of the identity of the
        corresponding resource provider, the requested resource
        quantity and one or more resource "attributes" (such
        as, for instance, a desired tuner frequency; see the
        sentence bridging pages 18 and 19 of the description).

7.1   The board considers that these are minor implementation
        details which the skilled person would employ without
        exercising an inventive step.

7.2   In its submission of 4 May 2018, the appellant
        characterised the additional features as "further
        clarif[ying] the technical meaning of the resource
        configurations" but did not, beyond that, provide any
        reasons as to why they established an inventive step.
        Also during the oral proceedings, the appellant did not
        argue that the additional features of claim 1 of

auxiliary request 2 could change the board's
assessment.

7.3   The board therefore concludes that also the subject
        matter of claim 1 of auxiliary request 2 lacks
        inventive step, Article 56 EPC 1973.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

B. Atienza Vivancos   W. Sekretaruk

Decision electronically authenticated