UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/491,391	09/19/2014	PETER JOSEPH HEYRMAN	AUS920130224US2	5801

124677 7590 09/13/2019

Russell Ng PLLC (IBM AUS)
8729 Shoal Creek Blvd., Suite 100
Austin, TX 78757

EXAMINER
TEETS, BRADLEY A

ART UNIT	PAPER NUMBER
2195	

NOTIFICATION DATE	DELIVERY MODE
09/13/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

stephanie@russellnglaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PETER JOSEPH HEYRMAN, BRET RONALD OLSZEWSKI, and SERGIO REYES

Appeal 2018-006454
Application 14/491,391
Technology Center 2100

Before LARRY J. HUME, JUSTIN BUSCH, and STEVEN M. AMUNDSON, *Administrative Patent Judges*.

BUSCH, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1 and 5–7, which constitute all the claims pending in this Application. We have jurisdiction over the pending claims under 35 U.S.C. § 6(b).

We AFFIRM.

CLAIMED SUBJECT MATTER

Appellant's disclosure generally relates to a "technique for assigning physical resources of a data processing system to a virtual machine (VM)"

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as International Business Machines Corporation. Appeal Br. 2.

by reading a fold factor attribute, which "defines an anticipated usage of physical resources" by the VM and mapping virtual processors of the VM to physical resources "to maximize processor core access to local memory for ones of the allocated virtual processors that are anticipated to be utilized." Spec. Abstract. The claimed invention relates to reading, in response to a VM being instantiated, a fold factor attribute that defines the VM's anticipated usage of physical resources and mapping allocated virtual processors of the VM to physical resources based on that attribute to maximize processor core access to local memory for allocated virtual processors anticipated to be utilized. *See* Appeal Br. 14 (claim 1). The claims recite the fold factor attribute includes a processor fold factor attribute (defining a percentage of a VM's allocated virtual processors anticipated to be used) and a memory fold factor attribute (defining a percentage of required VM memory anticipated to be used). Claim 1 is the only independent claim and is reproduced below:

> 1. A method of assigning physical resources of a data processing system to a virtual machine, comprising:
>
> in response to a virtual machine (VM) being instantiated, reading, by a hypervisor executing on a data processing system, a fold factor attribute for the VM, wherein the fold factor attribute defines a user specified anticipated usage of physical resources of the data processing system by the VM; and
>
> mapping based on a value of the fold factor attribute, by the hypervisor, allocated virtual processors of the VM to the physical resources such that processor core access to local memory that is not located within a processor is maximized for ones of the allocated virtual processors that are anticipated to be utilized, wherein the fold factor attribute includes a processor fold factor attribute that defines a percentage of the allocated virtual processors of the VM that are anticipated to be utilized

> and a memory fold factor attribute that defines a percentage of required memory of the VM that is anticipated to be utilized.

REJECTIONS

Claims 1 and 5–7 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting. Final Act. 3–8.

Claims 1 and 5–7 stand rejected under 35 U.S.C. § 103 as obvious in view of Floyd (US 2012/0096293 A1; Apr. 19, 2012), Smith (US 2004/0117519 A1; June 17, 2004), and Behera (US 8,738,333 B1; May 27, 2014). Final Act. 8–15.

ANALYSIS

THE DOUBLE-PATENTING REJECTION

Appellant does not address the Examiner's provisional rejection of claims 1 and 5–7. *See generally* Appeal Br. 2–13 (addressing only the rejection of claims 1 and 5–7 under 35 U.S.C. § 103); Reply Br. 2–4. Appellant has not filed a terminal disclaimer, nor has the Examiner withdrawn the provisional rejection. In provisionally rejecting claims 8, 12–15, 19, and 20, the Examiner relies on claims 1 and 5–7 of U.S. Application No. 14/491,391.[2]

To the extent Appellant has not advanced separate, substantive arguments for particular claims or issues, such arguments are considered waived. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2016); *see also Hyatt v. Dudas*, 551 F.3d 1307, 1314 (Fed. Cir. 2008) ("When the appellant fails to contest a ground of rejection to the Board, . . . the Board may treat any argument with

[2] Co-pending Application Serial No. 14/306,640 is also on appeal (Appeal No. 2018-006414).

respect to that ground of rejection as waived."). Because Appellant does not argue the merits of this rejection, we summarily sustain the Examiner's provisional rejection of claims 1 and 5–7 under the doctrine of nonstatutory obviousness-type double patenting.

THE 35 U.S.C. § 103 REJECTION

The Examiner finds the combination of Floyd, Smith, and Behera teaches or suggests every limitation recited in independent claim 1. Final Act. 8–13. The Examiner finds Floyd teaches or suggests the majority of limitations recited in independent claim 1, including: in response to a VM being instantiated, Final Act. 8–9 (citing Floyd ¶¶ 28, 36–37); reading a fold factor attribute, which defines usage of physical resources, for the VM, Final Act. 9–10 (citing Floyd ¶¶ 17–18, 44, 57–68, 70); mapping the VM's virtual processors to physical resources based on a fold factor attribute value, Final Act. 10 (citing Floyd ¶¶ 18, 78); and that the fold factor attribute includes processor and memory fold factor attributes, Final Act. 11 (citing Floyd ¶¶ 74, 77). The Examiner finds that, although Floyd teaches folding to optimize local memory, Floyd fails to specifically teach maximizing processor core access to local memory; however, the Examiner finds Smith cures this deficiency. Final Act. 11–12 (citing Smith ¶ 66). The Examiner further finds that, although Floyd and Smith fail to teach the fold factor attribute defines a user-specified anticipated percentage usage of physical resources, Behera teaches these recited aspects of claim 1. Final Act. 12–13 (citing Behera 2:63–3:3, 3:46–51, 5:46–6:12, 9:13–29, 10:42–45, 14:43–48, Figs. 6, 28).

Appellant argues the rejection of claims 1 and 5–7 as a group. Appeal Br. 2–3, 13 ("For at least the reasons set forth above, independent claim 1 is

patentable over the combination of Floyd, Smith, and Behera. Additionally, claims 5-7 are allowable for at least the reason that the claims depend upon allowable claims."). We select independent claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(iv).

In particular, Appellant argues Floyd teaches folding (i.e., unmapping) resources based on the folding desirability metric (FDM), but folding or not folding does not teach or suggest mapping a VM's allocated virtual processors to physical resources based on a fold factor attribute and "Floyd is devoid of any teaching directed to specifically how virtual processors of a VM are mapped to physical resources of a data processing system." Appeal Br. 11; *see* Reply Br. 2. Appellant further contends that, to the extent Floyd teaches unfolding resources based on Floyd's FDM, the FDM is based on current conditions associated with each resource, not a processor fold factor attribute defining a percentage of virtual processors anticipated to be used and a memory fold factor attribute defining a percentage of required memory anticipated to be used. Reply Br. 2. Appellant also argues that, to the extent Floyd teaches reallocating folded resources, Floyd fails to teach reallocating resources based on a fold factor attribute read in response to a VM being instantiated. Reply Br. 2.

We disagree with Appellant that Floyd lacks any teaching regarding assigned virtual processors to physical resources, teaches only folding resources based on the FDM, and fails to teach reallocating resources based on the FDM. Instead, we agree with the Examiner that Floyd explicitly discloses allocating resources based on the FDM. Floyd ¶¶ 18 (explaining that Floyd's "hypervisor manages a dynamic mapping between virtual processors and physical processors" and "released processor resources may

subsequently be 'unfolded' or reclaimed"), 73 (disclosing "it is also possible . . . to use the FDM measure . . . to decide which ones of resources 312 to use for any scheduling," by unfolding (i.e., reallocating) folded resources when the FDM surpasses a given threshold).

We also disagree with Appellant's contention that Floyd fails to teach its FDM is based on processor and memory fold factor attributes respectively defining a percentage of virtual processors anticipated to be used and required memory anticipated to be used. Rather, we agree with the Examiner that Floyd's FDM includes processor and memory fold factor attributes because Floyd explicitly discloses its FDM "value is computed from the conditions associated with each" resource, where the resources include processors and memory and the exemplary conditions at least suggest processor and memory fold factory attributes. Floyd ¶ 70; *see* Floyd ¶¶ 57–68 (describing exemplary resource usage properties and conditions), 69 (explicitly identifying "processor cores" as an exemplary resource entity), 74 (describing "virtual processor, physical memory" as exemplary resource types). Appellant's argument that Floyd fails to teach the details regarding percentages of resources anticipated to be used is unpersuasive because the Examiner finds Behera, not Floyd, teaches the memory fold factor attribute defines a percentage of required memory anticipated to be used and the processor fold factor attribute defines a percentage of allocated virtual processors anticipated to be used. *See* Final Act. 12–13.

Next, we address Appellant's argument that Floyd fails to teach or suggest reading the FDM in response to a VM being instantiated. As noted above, the Examiner finds Floyd teaches or suggests "in response to a virtual machine (VM) being instantiated, reading . . . a fold factor attribute." The

Examiner breaks this limitation into two parts and cites paragraphs 28, 36, and 37 as teaching "in response to a virtual machine (VM) being instantiated." Final Act. 8–9. Paragraph 18 describes operating system (OS) storage and startup and explains that an OS, among other things, controls program execution and allocates resources. Floyd ¶ 18. Paragraphs 36 and 37 describe logical partitions, including instantiation of logical partitions. Floyd ¶¶ 36–37. Floyd explains that, when logical partitions are instantiated, a virtual machine monitor loads "a copy of the boot strap code" into the logical partitions and transfers control to the boot strap code, the boot strap code loads necessary firmware and software, and then "processors associated or assigned to logical partitions" are "dispatched to the logical partition's memory to execute the logical partition firmware." Floyd ¶ 37.

The Examiner finds paragraphs 17, 18, 44, 57 through 68, and 70 teach or suggest the "reading . . . a fold factor attribute" step. Final Act. 9–10. Paragraphs 17 and 44 describe the concept of folding resources to free up resources so the resources can be used for other tasks, assigned to other resource pools, or placed in an idle mode to reduce power consumption. Floyd ¶¶ 17, 44. Paragraph 18 provides an example in which the system may fold a virtual processor when the aggregate load on a partition is low so the physical processor corresponding to the freed virtual processor can be placed in an idle mode or used for other partitions, but the system may reclaim the processor resources when the partition's load increases. Floyd ¶ 18. Paragraph 70 explains that the system may use "the conditions associated with each" resource to compute a "Folding Desirability Metric (FDM)" value for each resource that may be used to determine the correct resources to fold or unfold. Floyd ¶ 70. Paragraphs 57 through 68 describe various

exemplary resource usage properties or conditions that may be used to compute the FDM. Floyd ¶¶ 57–68.

The Examiner's findings, however, are insufficient to demonstrate that Floyd teaches or suggests the recited limitation of "*in response to* a virtual machine (VM) being *instantiated, reading* . . . a fold factor attribute for the VM" because the Examiner fails to explain how Floyd's cited passages teach or suggest the FDM is read *in response to* a VM being instantiated. Rather, the Examiner merely points to Floyd's separate disclosures regarding instantiating a partition, which the Examiner presumably finds teach the recited VM, and *computing* the FDM. *See Am. Calcar, Inc. v. Am. Honda Motor Co.*, 651 F.3d 1318, 1340 (Fed. Cir. 2011) ("'In response to' connotes that the second event occur in reaction to the first event."). The Examiner provides insufficient findings and explanation to demonstrate Floyd explicitly teaches the FDM is read in response to instantiating a VM. Furthermore, the Examiner provides insufficient evidence or explanation demonstrating that an ordinarily skilled artisan would have understood the cited passages require or at least suggest storing the FDM and reading the FDM when instantiating a VM in order to allocate resources to the VM.

On this record, for the reasons discussed above, we are constrained to reverse the § 103 rejection of representative independent claim 1. For the same reasons, we cannot sustain the rejection of dependent claims 5–7, which ultimately depend from claim 1 and inherit claim 1's limitations.

CONLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1, 5–7	Provisional Obviousness-Type Double Patenting	1, 5–7	
1, 5–7	§ 103 Floyd, Smith, Behera		1, 5–7
Overall Outcome		1, 5–7	

AFFIRMED