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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GABRIEL TARASUK-LEVIN and REILLY GRANT

Appeal 2018-007820
Application 14/752,635
Technology Center 2400

Before MAHSHID D. SAADAT, DENISE M. POTHIER, and
CATHERINE SHIANG, *Administrative Patent Judges*.

POTHIER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant^{1,2} appeals from the Examiner's decision to reject claims 1–20. Appeal Br. 3. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as VMware, Inc. Appeal Br. 1.

² Throughout this opinion, we refer to the Non-Final Action (Non-Final Act.) mailed September 7, 2017, the Appeal Brief (Appeal Br.) filed March 5, 2018, the Examiner's Answer (Ans.) mailed May 25, 2018, and the Reply Brief (Reply Br.) filed July 23, 2018.

CLAIMED SUBJECT MATTER

The Specification describes live migration programs for migrating a memory state of a source host computer to a destination host computer. Spec. ¶ 1. The Specification indicates receiving the memory state consumes bandwidth and resources and can act as a bottleneck. *Id.* Encryption (e.g., end-to-end encryption used by government) also increases the bandwidth and resources consumed and can impact live migration performance. *Id.* ¶ 5. The claims are directed to “enabl[ing] rapid encrypted live migration of virtual machines (VMs) using asynchronous encryption and decryption.” *Id.* ¶ 6. Illustrative claim 1 is reproduced below:

A system comprising:
a memory area associated with a computing device, said memory area storing memory blocks; and
a processor programmed to:
 encrypt, at a first host, one or more memory blocks associated with a source virtual machine (VM);
 transfer the one or more encrypted memory blocks to one or more second hosts; and
 decrypt, at the one or more second hosts, only those memory blocks of the one or more encrypted memory blocks needed to execute a destination VM at the one or more second hosts.

Appeal Br. A-1 (Claims App.) (emphasis added).

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Feldman	US 2004/0047466 A1	Mar. 11, 2004
Nam	US 2004/0247295 A1	Dec. 9, 2004
Factor	US 2007/0168284 A1	July 19, 2007
Spohrer	US 2008/0065902 A1	Mar. 13, 2008
Patel	US 2008/0137837 A1	June 12, 2008
Kaabouch	US 2010/0064144 A1	Mar. 11, 2010
Lee	US 2010/0281273 A1	Nov. 4, 2010
Tsirkin	US 2015/0212839 A1	July 30, 2015 (filed Jan. 28, 2014)

OBVIOUSNESS REJECTION BASED ON TSIRKIN AND KAABOUCH

Claims 1, 2, 9, 11–13, 15–17, and 20 are rejected under 35 U.S.C. § 103 as being unpatentable over Tsirkin and Kaabouch. Non-Final Act. 3–8. The Examiner cites to Tsirkin to teach all limitations in claim 1 (*id.* at 3–4 (citing Tsirkin ¶¶ 8, 24, 35, Fig. 1)), except for a processor programmed to decrypt “only those memory blocks of the one or more encrypted memory blocks needed for execution.” *Id.* at 4. The Examiner turns to Kaabouch in combination with Tsirkin to teach this missing feature. *Id.* at 4–5 (citing Kaabouch ¶¶ 13–14).

Appellant asserts “no combination of Tsirkin and Kaabouch describes or suggests ‘decrypt, at the one or more second hosts, only those memory blocks of the one or more encrypted memory blocks needed to execute a destination VM at the one or more second hosts,’ as recited in claim 1.” Appeal Br. 8. Specifically, Appellant states Tsirkin relates to excluding redundant transformation of memory pages on a running virtual machine on host B that is attempting to access a memory page. *Id.* at 9. Appellant further asserts Kaabouch does not describe decrypting “only those memory blocks of the one or more encrypted memory blocks that are needed to

execute a destination VM at the host” as claim 1 recites. *See id.* at 10; see Reply Br. 4.

ISSUE

Under § 103, has the Examiner erred by determining that Tsirkin and Kaabouch collectively would have taught or suggested “a processor programmed to . . . decrypt, at the one or more second hosts, only those memory blocks of the one or more encrypted memory blocks needed to execute a destination VM at the one or more second hosts”?

ANALYSIS

On the record before us, Appellant has persuaded us the Examiner has erred. The Examiner states Tsirkin teaches “decrypt[ing], at the one or more second hosts, the one or more encrypted memory blocks to execute a destination VM at the one or more second host.” Non-Final Act. 4 (citing Tsirkin ¶ 35). Tsirkin teaches a live migration of the virtual machine execution state from an origin host to a destination host (e.g., from host A to host B in Figure 1), including transmitting the encrypted virtual machine execution state as memory blocks to a destination host (e.g., host B). Tsirkin ¶ 24. Tsirkin further teaches reverse transforming (e.g., decrypting) “*the* memory block.” *Id.* ¶ 35 (emphasis added). When viewing this cited passage in the context of Tsirkin as a whole, Tsirkin teaches reverse transforming “the transformed memory block corresponding to the memory page being accessed [by the virtual machine].” *Id.* ¶ 34.

Because Tsirkin’s virtual machine at the destination (e.g., a destination VM) is attempting to access a virtual machine’s memory page,

the noted passages (*id.* ¶¶ 6, 34–35, Fig. 3) suggest the virtual machine at the destination (e.g., a destination VM) *has been executed* as Appellant indicates (see Appeal Br. 9–10) and thus does not teach decrypting “those memory blocks . . . needed to execute a destination VM at the one or more second hosts” as claim 1 recites. On the record, the Examiner fails sufficiently to explain how *decrypting the memory block corresponding to a virtual machine memory page being accessed* in Tsirkin corresponds to decrypting memory blocks “needed to execute a destination VM” at the second host as claim 1 recites. See Ans. 15–16 (repeating that Tsirkin teaches reverse transforming *the* memory block and focusing on Kaabouch); Reply Br. 4 (stating “the Examiner omits the part of the claimed invention that is directed to decrypting only those memory blocks [that are] needed to execute a destination VM at the one or more second hosts.”). The record also does not explain clearly how the memory block comprising or corresponding to one or more virtual machine memory page in Tsirkin (*see* Tsirkin ¶¶ 32, 34) is a block needed to execute a destination VM.

Additionally, to the extent Kaabouch is cited to teach or suggest the above-noted feature missing from Tsirkin, including those related memory blocks needed to execute a destination VM as claim 1 requires (see Non-Final Act. 4–5 (citing Kaabouch ¶¶ 13–14)), we agree with Appellant that Kaabouch fails to teach or suggest what is missing. Appeal Br. 10–11; Reply Br. 4.

The Examiner states that Kaabouch teaches “[t]he data needed for execution in Kaabouch is inside the memory block and according to Kaabouch, when the data is needed for execution, only the memory block containing that data is decrypted.” Ans. 16. Kaabouch teaches retrieving

“the memory block containing the [requested] data and pass[ing] the memory block to the decryption engine” for decryption, storage, and retrieval. Kaabouch ¶ 14. Although this passage teaches decrypting a memory block that contains the *requested* data, this passage as well as cited paragraph 13 do not teach or suggest decrypting memory blocks needed to *execute* data (e.g., perform an instruction), let alone decrypting “*only those memory blocks . . . needed to execute a destination VM*” (emphasis added) as claim 1 requires. For this reason and given the present record, we agree with Appellant that Kaabouch does not teach or suggest “the feature of ‘blocks needed to execute a destination VM at the one or more second hosts[,]’ . . . in claim 1.” Reply Br. 4.

Independent claims 9 differs in scope from claim 1, such as claiming “decrypting only those memory blocks of the one or more encrypted memory blocks that are *required to perform a checkpoint restore operation of a source virtual machine* at the one or more destination hosts” (Appeal Br. A-2 (Claims App.) (emphasis added)) instead of “decrypt[ing], at the one or more second hosts, only those memory blocks of the one or more encrypted memory blocks needed to execute a destination VM at the one or more second hosts” (*id.* at A-1 (Claims App.)). Independent claim 17 is commensurate in scope with claim 9. *Compare id.* at A-4 (Claims App.), *with id.* at A-2 (Claims App.). The Examiner relies on the same passages in Tsirkin and Kaabouch to teach or suggest the recitations in claims 9 and 17. Non-Final Act. 5 (stating “[c]laims 9 and 17 are rejected under the same reason set forth in rejection of claim 1”). For reasons similar to those previously indicated, the Examiner has not explained sufficiently how the passages Tsirkin and Kaabouch, alone or in combination, relied upon in the

rejection (*id.* at 3–5; see Ans. 15–16) teach or suggest “decrypting *only those memory blocks* of the one or more encrypted memory blocks that are *required to perform a checkpoint restore operation* of a source virtual machine at the one or more destination hosts” as claims 9 and 17 similarly recite. *Id.* at A-2, A-4 (Claims App.) (emphasis added).

For the foregoing reasons, Appellant has persuaded us of error in the rejection of (1) independent claim 1, 9 and 17 and (2) dependent claims 2–8, 10–16, and 18–20 for similar reasons.

THE REMAINING OBVIOUSNESS REJECTIONS

Claims 3–8, 14, 18, and 19 are rejected under 35 U.S.C. 103 as being unpatentable over Tsirkin, Kaabouch, and one additional reference (e.g., Feldman, Spohrer, Nam, Factor, Patel, and Lee). Non-Final Act. 8–14. The Examiner has not relied upon the additional references to teach or suggest the above-identified limitation in claims 1, 9, and 17 missing from Tsirkin and Kaabouch. *See id.* Accordingly, for reasons similar to those above for independent claims 1, 9, and 17 and because each of the rejected claims ultimately depends from one of claims 1, 9, and 17, we do not sustain the remaining rejections.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1, 2, 9, 11–13, 15–17, 20	103	Tsirkin, Kaabouch		1, 2, 9, 11–13, 15–17, 20
3, 14, 18	103	Tsirkin, Kaabouch, Feldman		3, 14, 18

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4	103	Tsirkin, Kaabouch, Spohrer		4
5, 10, 19	103	Tsirkin, Kaabouch, Nam		5, 10, 19
6	103	Tsirkin, Kaabouch, Factor		6
7	103	Tsirkin, Kaabouch, Patel		7
8	103	Tsirkin, Kaabouch, Lee		8
Overall Outcome				1–20

REVERSED