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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* KEVIN J. BOWERS, RON O. DOR, and DAVID E. SHAW

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Appeal 2019-003049  
Application 13/329,852  
Technology Center 2100

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Before ROBERT E. NAPPI, THU A. DANG, and JOHN P. PINKERTON,  
*Administrative Patent Judges.*

NAPPI, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellant<sup>1</sup> appeals under 35 U.S.C. § 134(a) from the Examiner's Final rejection of claims 1, 6, 8 through 45, 131, and 133 through 140. Oral arguments were heard on June 17, 2020. A transcript of the hearing will be added to the record in due course. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE and enter a NEW GROUND OF REJECTION pursuant to our authority under 37 C.F.R. § 41.50(b).

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<sup>1</sup> We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). According to Appellant, D.E. Shaw Research, LLC is the real party in interest. Appeal Br. 1.

## INVENTION

The invention relates generally to hardware to improve the overall computation time for simulation of multiple body interaction, such as celestial dynamics and computational chemistry (biomolecular or electrostatic particle interaction simulation). Spec., para 004-005. Claims 1 and 25 are reproduced below.

1. A non-abstract method comprising causing an improvement in computer technology,

wherein causing said improvement comprises causing a parallel-processing system that comprises a plurality of nodes to conceal communication delays within computations and to simplify interaction filtering,

wherein, details of how said non-abstract method would conceal communication delays comprise by creating opportunities for concurrency between communications and computations,

wherein further details of how said non-abstract method would conceal communication delays and simplify interaction filtering by creating said opportunities for concurrency between communications and computations comprise executing the detailed steps of causing said parallel processing system to perform computations that are associated with bodies that are located in a global cell that has been divided into a plurality of home boxes,

wherein, as a result of having caused said parallel processing system to perform computations that are associated with bodies that are located in a global cell that has been divided into a plurality of home boxes, communication delays within said computations are concealed and interaction filtering is simplified,

wherein further details of causing said parallel-processing system to perform said computations, and thereby causing concealment of said communication delays and simplification of interaction filtering comprise causing a node

of said parallel processing system to carry out the steps of importing data, defining a set of zones, executing a first subset of said computations, executing a second subset of said computations, and executing a third subset of said computations,

whereby, as a result of having caused said node to import said data, to define said set of zones, and to execute said first, second, and third subsets of computations, concealment of said communication delays and simplification of interaction filtering is achieved,

wherein said data that has been imported is data that is indicative of bodies that are located in at most one import region,

wherein a union of said import region and a homebox that is associated with said node comprises said set of zones,

wherein said set of zones comprises at least a first zone, a second zone, and a third zone,

wherein said set of bodies comprises a first subset of bodies, a second subset of bodies, and a third subset of bodies,

wherein bodies in said first subset of bodies are located in said first zone,

wherein bodies in said second subset of bodies are located in said second zone, and

wherein bodies in said third subset of bodies are located in said third zone, defining a first combination, said first combination being a combination of said first zone and said second zone, defining a second combination, said second combination being a combination of said first zone and said third zone, defining a

third combination, said third combination being a combination of said second zone and said third zone,

wherein said first subset of computations comprises computations that are associated with a first set of bodies,

wherein said second subset of computations comprises computations that are associated with a second set of bodies,

wherein said third subset of computations comprises computations that are associated with a third set of bodies,

wherein said first set of bodies comprises a first body that is located in said first zone and a second body that is located in said second zone,

wherein said second set of bodies comprises a first body that is located in said first zone and a second body that is located in said third zone, and

wherein said third set of bodies comprises a first body that is located in said second zone and a second body that is located in said third zone.

25.A method comprising performing computations associated with bodies located in a global cell that has been divided into a plurality of home boxes, each of the computations in the set of computations being associated with a pair of the bodies, wherein performing said computations comprises causing a node of a parallel-processing system to execute the steps of: accepting data for bodies located in a neighborhood that, in union with a home box of said node, comprises at least a first zone, a second zone, and a third zone and performing computations associated a first body and a second body, wherein said first body is in said first zone, wherein said second body is in said second zone, and wherein a spatial extent of at least one of the zones is determined to eliminate at least some bodies in one of the zones that are further away than a minimum distance from all bodies in another of the zones.

#### EXAMINER'S REJECTION<sup>2</sup>

The Examiner rejected claims 1, 6, 8 through 45, 131, and 133

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<sup>2</sup> Throughout this Decision we refer to the Appeal Brief filed October 4, 2018 ("Appeal Br."); Reply Brief filed March 8, 2019 ("Reply Br."); Final

through 140 under 35 U.S.C. § 101 for being directed to patent-ineligible subject matter. Final Act. 4–7.

## ANALYSIS

We have reviewed Appellant’s arguments in the Appeal Brief, the Examiner’s rejections, and the Examiner’s response to Appellant’s arguments. Appellant’s arguments have persuaded us of error in the Examiner’s rejection of all the claims under 35 U.S.C. § 101. Patent eligibility under § 101 is a question of law that may contain underlying issues of fact.

## PRINCIPLES OF LAW

### A. Section 101

An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. However, the U.S. Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: “[l]aws of nature, natural phenomena, and abstract ideas” are not patentable. *E.g.*, *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we are guided by the Court’s two-part framework, described in *Mayo* and *Alice*. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is “directed to.” *See Alice*, 573 U.S. at

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Office Action mailed February 23, 2018 (“Final Act.”); and the Examiner’s Answer mailed January 15, 2019 (“Answer”).

219 (“On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement risk.”); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) (“Claims 1 and 4 in petitioners’ application explain the basic concept of hedging, or protecting against risk.”).

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as “molding rubber products” (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); “tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores” (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1854))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Court held that “a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula.” *Diehr*, 450 U.S. at 187; *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”). Having said that, the Court also indicated that a claim “seeking patent protection for that formula in the abstract . . . is not accorded the protection of our patent laws, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.” *Id.* (citation omitted)

(citing *Benson* and *Flook*); see, e.g., *id.* at 187 (“It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”).

If the claim is “directed to” an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where “we must examine the elements of the claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 221 (internal quotation marks omitted). “A claim that recites an abstract idea must include ‘additional features’ to ensure ‘that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].’” *Id.* (alterations in original) (quoting *Mayo*, 566 U.S. at 77). “[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention.” *Id.*

#### B. USPTO Section 101 Guidance

In January 2019, the U.S. Patent and Trademark Office (USPTO) published revised guidance on the application of § 101. 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) (“2019 Revised Guidance”).<sup>3</sup> “All USPTO personnel are, as a matter of internal agency management, expected to follow the guidance.” *Id.* at 51; see also October 2019 Update at 1.

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<sup>3</sup> In response to received public comments, the Office issued further guidance on October 17, 2019, clarifying the 2019 Revised Guidance. USPTO, *October 2019 Update: Subject Matter Eligibility* (the “October 2019 Update”) (available at [https://www.uspto.gov/sites/default/files/documents/peg\\_oct\\_2019\\_update.pdf](https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf)).



Under the 2019 Revised Guidance and the October 2019 Update, we first look to whether the claim recites:

- (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human activity such as a fundamental economic practice, or mental processes) (“Step 2A, Prong One”); and
- (2) additional elements that integrate the judicial exception into a practical application (*see* MPEP §§ 2106.05(a)–(c), (e)–(h) (9th ed. Rev. 08.2017, Jan. 2018)) (“Step 2A, Prong Two”).<sup>4</sup>

2019 Revised Guidance, 84 Fed. Reg. at 52–55.

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look, under Step 2B, to whether the claim:

- (3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, conventional” in the field (*see* MPEP § 2106.05(d)); or
- (4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

2019 Revised Guidance, 84 Fed. Reg. at 52–56.

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<sup>4</sup> This evaluation is performed by (a) identifying whether there are any additional elements recited in the claim beyond the judicial exception, and (b) evaluating those additional elements individually and in combination to determine whether the claim as a whole integrates the exception into a practical application. *See* 2019 Revised Guidance — Section III(A)(2), 84 Fed. Reg. at 54–55.

## DISCUSSION

The Examiner determines the claims are not patent eligible because they are directed to a judicial exception without reciting significantly more. Final Act. 4–7. Specifically, the Examiner determines the claims are directed to:

a concept of receiving data, organizing data, manipulating them through mathematical correlations, and optimizing partitioning data, which corresponds to concepts identified as abstract ideas by the courts, such as organizing and manipulating information through mathematical correlations in *Digitech* or using an algorithm for determining the optimal number of visits by a business representative to a client in *Maucorps*.

Final Act. 4 (citing *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014), and *In re Maucorps*, 609 F.2d 481, 485 (CCPA 1979)). Further, the Examiner finds that the claims do not include additional elements that amount to significantly more than the judicial exception. Final Act 5. The Examiner states that the additional limitations of a parallel processing system are generic recitations and there is no indication that the combination of elements improves the functioning of the computer or any other technology. Final Act 5.

Appellant argues the Examiner has erred in determining the claims recite an abstract idea. Appeal Br. 7–8. Further, Appellant argues that the claims are directed to an improvement in a computer process and are patent eligible as they are similar to those held patentable in *Enfish*. Appeal Br. 8–14 (citing *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016)).

Appellant’s arguments have persuaded us of error in the Examiner’s rejection of independent claims 1, 25, 34, 42, 131, and 138 under 35 U.S.C. § 101, because the record does not support the Examiner’s determination

that the claims do not recite an improvement in a computer related technology.

We concur with the Examiner that the claims recites a concept similar to those found abstract by the courts. Each of claims 1, 25, 34, 42, 131, and 138 recites limitations directed to performing computations associated with bodies that are located in a home box or region (a part of a global cell that has been divided) and their interaction with other bodies in other zones. Thus, we concur with the Examiner that the claims recite a mathematical concept of performing computations of interactions between bodies.

However, as argued by the Appellant, the claims recite these calculations as being performed on a parallel computer system and the use of the home box (or region) and zones operates to improve how the parallel computing system performs computations related to the interaction between bodies. Appeal. Br. 8–12. Specifically, Appellant argues that it simplifies interactive filtering and conceals communication delays. Appeal Br. 10. We concur and consider the claims to be more than just implementing an abstract idea on a computer, but rather to be directed to improving how the computer operates to perform a process, similar to the claims at issue in *Enfish*. In *Enfish*, the invention was directed to a data structure which included a very specifically defined means for configuring a logical data table that required a four-step algorithm to render the table self-referential. *Enfish*, 822 F.3d at 1336. Further, the *Enfish* court found “the plain focus of the claims is on an improvement to computer functionality itself, not on economic or other tasks for which a computer is used in its ordinary capacity.” *Id.* Here, independent claims 1, 34, 131, and 138 expressly recite that performing the computations associated with bodies that are located in a

home box or region, and bodies in other zones as claimed conceal the communication delays in the parallel processing system. Independent claim 42 does not recite the use of parallel processing, but nonetheless discusses performing computations on bodies in regions and bodies in other zones as a part of a method to concealing communication delays. Further, Appellant's Specification identifies, in section 6, paragraphs 331–349, that the use of zones, reduces bandwidth requirements, eliminates some filtering requirements to avoid redundant computations, and thereby allows more concurrent communications (which hides communication delays) when calculating the interactions between bodies. *See* Spec. ¶¶ 343–345. Thus, similar to *Enfish* the focus of the claims is on an improvement in how the computer operates to perform the calculations on the interactions between bodies. Thus, we do not sustain the Examiner's rejection under 35 U.S.C. § 101, as we consider independent claims 1, 25, 34, 42, 131, and 138, and the claims which depend thereupon, to recite an improvement to a computer technology.

*New Rejection of under 35 U.S.C. § 112, second paragraph*

We enter a new rejection against claim 1 under 35 U.S.C. § 112, second paragraph, as it contains several ambiguities. Specifically, claim 1 recites “wherein *said set of bodies* comprises a first subset of bodies, a second subset of bodies, and a third subset of bodies.” The recitation of “said set of bodies” in this limitation, does not have prior antecedent basis in the claim, and it is unclear if this is referring to the “bodies that are located in a global cell that has been divided into a plural home boxes” or the “bodies that are in at most one import region.” Claim 1, further, recites “a first set of bodies,” “a second set of bodies” and “a third set of bodies,”

which further confuses which bodies are being referred to. Thus, we now enter a new ground of rejection of claim 1, and claims 6, 8 through 24, 133 through 137, and 140, which depend from claim 1 and inherit the ambiguity of claim 1.

**CONCLUSION**

We reverse the Examiner’s rejection of claims 1, 6, 8 through 45, 131, and 133 through 140, under 35 U.S.C. § 101. We enter a new ground of rejection under 35 U.S.C. § 112, second paragraph.

In summary:

| <b>Claim Rejected</b>    | <b>35 U.S.C. §</b>    | <b>Basis</b> | <b>Affirmed</b> | <b>Reversed</b>          | <b>New Ground</b>        |
|--------------------------|-----------------------|--------------|-----------------|--------------------------|--------------------------|
| 1, 6, 8–45, 131, 133–140 | 101                   | Eligibility  |                 | 1, 6, 8–45, 131, 133–140 |                          |
| 1, 6, 8–24, 133–137, 140 | 112, second paragraph | Indefinite   |                 |                          | 1, 6, 8–24, 133–137, 140 |
| <b>Overall Outcome</b>   |                       |              |                 | 1, 6, 8–45, 131, 133–140 | 1, 6, 8–24, 133–137, 140 |

This Decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). This section provides that “[a] new ground of rejection . . . shall not be considered final for judicial review.”

37 C.F.R. § 41.50(b) also provides that the Appellant, **WITHIN TWO MONTHS FROM THE DATE OF THE DECISION**, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

- (1) Reopen prosecution. Submit an appropriate amendment of the claims so rejected or new evidence relating

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to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the prosecution will be remanded to the examiner. . . .

(2) Request rehearing. Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv). *See* 37 C.F.R. § 41.50(f).

REVERSED; 37 C.F.R. § 41.50(b)