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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LEWIS I. McLEAN

Appeal 2019-000425
Application 14/274,058
Technology Center 2100

Before JOHN A. JEFFERY, JUSTIN BUSCH, and CARL L. SILVERMAN,
Administrative Patent Judges.

JEFFERY, *Administrative Patent Judge.*

DECISION ON APPEAL

Under 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–20. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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 SecureWorks Corp. Appeal Br. 3.

STATEMENT OF THE CASE

Appellant's invention orders a set of regular expressions (REs) for matching against a string to determine whether the string is contained in a set of strings described by the RE. Spec. ¶¶ 14, 15. To this end, REs are first placed into parent/child relationships, and a graph is then formed from the REs based on the parent/child relationships. Spec. ¶¶ 19, 35; Fig. 1. The REs are then matched against a string in an order derived from the graph's structure. Spec. ¶ 44; Fig. 1. Claim 1 is illustrative:

1. A method comprising:

placing by an information handling system regular expressions into parent/child relationships wherein a first regular expression is set as a child of a second regular expression based upon obtaining information about whether the first regular expression matches a first string from matching the second regular expression against the first string, wherein matching the first regular expression against the first string includes determining whether the first string is contained in a set of strings described by the first regular expression;

forming the regular expressions into a graph, the graph containing vertices representing the regular expressions and edges representing the parent/child relationships between the regular expressions; and

matching the regular expressions against a second string in an order based upon a structure of the graph, the order comprising matching a third regular expression against the second string before matching a fourth regular expression against the second string based upon a vertex representing the fourth regular expression being a child of a vertex representing the third regular expression.

THE REJECTIONS

The Examiner rejected claims 1–20 under 35 U.S.C. § 101 as directed to ineligible subject matter. Final Act. 5–7.²

The Examiner rejected claims 1, 2, 7, 10, and 11 under 35 U.S.C. § 102(a)(1) as anticipated by Thorup (US 2011/0153641 A1; published June 23, 2011). Final Act. 7–10.

The Examiner rejected claims 3 and 4 under 35 U.S.C. § 103 as unpatentable over Thorup and Gutierrez (US 8,261,241 B2; issued Sept. 4, 2012). Final Act. 10–12.

The Examiner rejected claim 8 under 35 U.S.C. § 103 as unpatentable over Thorup and Duxbury (US 2007/0282835 A1; published Dec. 6, 2007). Final Act. 13.

The Examiner rejected claim 9 under 35 U.S.C. § 103 as unpatentable over Thorup, Gutierrez, and Duxbury. Final Act. 14–15.

The Examiner rejected claims 5, 6, 12, and 14–20 under 35 U.S.C. § 103 as unpatentable over Thorup and Michela Becchi & Patrick Crowley, *Extending Finite Automata to Efficiently Match Perl-Compatible Regular Expressions*, CoNEXT 2008, ACM (2008) (“Becchi”). Final Act. 15–21.

The Examiner rejected claim 13 under 35 U.S.C. § 103 as unpatentable over Thorup, Becchi, and Duxbury. Final Act. 21–22.

² Throughout this opinion, we refer to (1) the Final Rejection mailed January 25, 2018 (“Final Act.”); (2) the Appeal Brief filed June 22, 2018 (“Appeal Br.”); (3) the Examiner’s Answer mailed August 24, 2018 (“Ans.”); and (4) the Reply Brief filed October 24, 2018 (“Reply Br.”).

THE INELIGIBILITY REJECTION

The Examiner determines that the claims are directed to an abstract idea, namely organizing information (regular expressions) through mathematical correlations (matching). *See* Final Act. 5–6; Ans. 9–13. The Examiner adds that the claims do not include elements that add significantly more than the abstract idea, but merely recite a conventional computer implementation of the identified abstract idea. *See* Final Act. 7.

Appellant argues that the claims are eligible because, among other things, they are directed to (1) improvements to a computer’s functioning through improved software, and (2) a specific implementation of a solution to a problem in the software arts by describing a particular method of matching regular expressions against strings—a method whose specified order is said to increase efficiency. Appeal Br. 11–20; Reply Br. 10–17. According to Appellant, the Examiner not only disregarded existing eligibility case law and associated guidelines, but the Examiner also misapplied controlling law. *Id.* Appellant adds that the Examiner failed to provide evidence that the additional elements are well-understood, routine, and conventional. *Id.*

ISSUE

Under § 101, has the Examiner erred in rejecting claims 1–20 as directed to ineligible subject matter? This issue turns on whether the claims are directed to an abstract idea and, if so, whether the recited elements—

considered individually and as an ordered combination—transform the nature of the claims into a patent-eligible application of that abstract idea.

PRINCIPLES OF LAW

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 Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: “[I]aws of nature, natural phenomena, and abstract ideas” are not patentable. *See, 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 Supreme Court’s two-step 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 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 187 n.7 (quoting *Corning v. Burden*, 56 U.S. (15 How.) 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 Supreme 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 176; *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.”). That said, the Supreme 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.* (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 (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.*

In January 2019, the United States Patent and Trademark Office (“USPTO”) published revised guidance on the application of § 101. *See* USPTO’s 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) (“Guidance”). Under that guidance, 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); and
- (2) additional elements that integrate the judicial exception into a practical application (*see* MANUAL OF PATENT EXAMINING PROCEDURE (MPEP) §§ 2106.05(a)–(c), (e)–(h) (9th ed. Rev. 08.2017, Jan. 2018)).

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

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

See Guidance, 84 Fed. Reg. at 56.

ANALYSIS

Claims 1–20: Alice/Mayo Step One

Representative independent claim 1 recites a method comprising three steps. First, an information handling system places regular expressions (REs) into parent/child relationships where a first RE is set as a child of a second RE when information about matching the first RE against a first string is obtained by matching the second RE against the first string.

Second, REs are formed into a graph, where the graph contains vertices representing the REs and edges representing the parent/child relationships between the REs.

Third, REs are matched against a second string in an order based upon the graph's structure, the order comprising matching a third RE against the second string before matching a fourth RE against the second string based upon a vertex representing the fourth RE being a child of a vertex representing the third RE.

As the disclosure explains, Appellant's invention orders a set of REs, namely a description of a set of strings over an alphabet, such as the letters of the Roman alphabet, for matching against a string to determine whether the string is contained in a set of strings described by the RE. Spec. ¶¶ 14–15. To this end, REs are first placed into parent/child relationships by transforming the REs into deterministic finite automatas (DFAs), namely finite state machines that (1) input finite symbol strings, and (2) output acceptance or rejection. Spec. ¶¶ 14–16; Fig. 1 (block 110). DFAs may be represented as graphs whose vertices and edges may represent portions of circuits or programs. Spec. ¶ 16.

Classes of relationship rules are then applied to generate the parent/child relationships, where the rules can be based on information about matching one RE against a string that is obtained from attempting to match the string against another RE. Spec. ¶ 19; Fig. 1 (block 115). For example, a first RE may be placed in a parent/child relationship with a second RE if the first RE's (1) matching string implies that the second RE is a possible match, and (2) not matching the string implies that the second RE is not a possible match. Spec. ¶ 19. Moreover, information about the number of characters in the first RE matched by the string may provide information about the number of characters in the second RE matched by the string. *Id.* The character match (CM) may be counted only for matches of characters specified explicitly in the RE. *Id.* For example, a match of the RE “.*ab” to the string “zzzab” returns CM=2 because the only characters listed explicitly in the RE that were part of the match were “a” and “b.” *Id.*

In one embodiment, four classes of relationship rules can be applied as shown in Figures 2 to 5, where the four rules are described in paragraphs 20 to 33. If one of the rules applies to two REs, namely REs 1 and 2, then a parent/child relationship is created between those REs. Spec. ¶ 20; Fig. 1 (block 117).

A graph is then formed from the REs based on the parent/child relationships. Spec. ¶ 35; Fig. 1 (block 120). One such graph, shown in Figure 7, is formed from seven REs based on the classes of rules, where the graph has seven vertices representing REs 1 to 7, respectively, and associated connecting edges that indicate (1) whether the parent/child relationship is transitive, and (2) the relevant CM value. Spec. ¶¶ 35–36.

The REs are then matched against a string in an order derived from the graph's structure. Spec. ¶ 44; Fig. 1 (block 125). When a parent vertex is a parent of a child vertex, traversing the graph matches the RE represented by the parent vertex against a string before matching the RE represented by the child vertex against the string. Spec. ¶ 44. As paragraph 47 explains, matching parent vertices ahead of child vertices may increase efficiency by obviating matching a child vertex against the string.

Turning to claim 1, we first note that the claim recites a method and, therefore, falls within the process category of § 101. But despite falling within this statutory category, we must still determine whether the claim is directed to a judicial exception, namely an abstract idea. *See Alice*, 573 U.S. at 217. To this end, we must determine whether the claim (1) recites a judicial exception, and (2) fails to integrate the exception into a practical application. *See Guidance*, 84 Fed. Reg. at 52–55. If both elements are satisfied, the claim is directed to a judicial exception under the first step of the *Alice/Mayo* test. *See id.*

In the rejection, the Examiner determines that claim 1 is directed to an abstract idea, namely organizing information (regular expressions) through mathematical correlations (matching). *See Final Act*. 5–6. To determine whether a claim recites an abstract idea, we (1) identify the claim's specific limitations that recite an abstract idea, and (2) determine whether the identified limitations fall within certain subject matter groupings, namely,

(a) mathematical concepts³; (b) certain methods of organizing human activity⁴; or (c) mental processes.⁵

Here, apart from the recited “information handling system” that places REs into parent/child relationships—the sole function performed by this system⁶—all of claim 1’s recited limitations fit squarely within at least one of the above categories of the USPTO’s guidelines. When read as a whole, the recited limitations are directed to matching REs against a string in an order according to a hierarchy of other REs, where the hierarchy is based on the other REs matching another string.

First, placing REs into parent/child relationships where a first RE is set as a child of a second RE when information about matching the first RE against a first string is obtained by matching the second RE against the first string involves at least mental processes, at least to the extent that a person

³ Mathematical concepts include mathematical relationships, mathematical formulas or equations, and mathematical calculations. *See* Guidance, 84 Fed. Reg. at 52.

⁴ Certain methods of organizing human activity include fundamental economic principles or practices (including hedging, insurance, mitigating risk); commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations); managing personal behavior or relationships or interactions between people (including social activities, teaching, and following rules or instructions). *See* Guidance, 84 Fed. Reg. at 52.

⁵ Mental processes are concepts performed in the human mind including an observation, evaluation, judgment, or opinion. *See* Guidance, 84 Fed. Reg. at 52.

⁶ The information handling system of claim 1 is recited *only* in connection with placing REs into parent/child relationships, but is not recited as performing the other two method steps, namely (1) forming the REs into a graph, and (2) matching the REs against a second string in an order based on the graph’s structure.

could merely (1) think about—or write down—the REs and strings; (2) cognitively compare the REs and strings to determine a match; and, based on that information, (3) graphically represent a hierarchical parent/child RE relationship by using a pen and paper. In short, these steps involve mere observation and logical reasoning. *Cf. CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1372 (Fed. Cir. 2011) (noting that a recited step that utilized a map of credit card numbers to determine the validity of a credit card transaction could be performed entirely mentally by merely using *logical reasoning* to identify a likely instance of fraud by merely *observing* that numerous transactions using different credit cards all originated from the same IP address); *see also id.* (noting that a person could construct a map of credit card numbers by merely *writing down a list* of credit card transactions made from a particular IP address); *In re Morinville*, 767 F. App'x 964, 966–70 (Fed. Cir. 2019) (unpublished) (holding ineligible recited method for dynamically generating a hierarchical functional structure from a hierarchical operational structure); *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1312, 1330–36 (Fed. Cir. 2015) (holding ineligible claims directed to product price determination using sorted pricing information according to, among other things, arranged hierarchies of organizational and product groups); *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1234–43 (Fed. Cir. 2016) (holding ineligible claims reciting information management system that can generate a second menu from a first menu by allowing (1) selecting categories and items from the first menu; (2) adding menu categories to the first menu; (3) assigning parameters to items in the second menu using a graphical user interface); *Evolutionary Intelligence LLC v. Sprint Nextel Corp.*, 677 F. App'x 679, 679–81 (Fed.

Cir. 2017) (unpublished) (holding ineligible computer-implemented method of U.S. Patent 7,702,682 reciting, among other things, (1) receiving a search query; (2) searching, using the computer, first container registers encapsulated and logically defined in plural containers to identify identified containers responsive to the search query; (3) encapsulating the identified containers in a new container; (4) updating second container registers of the identified containers with data associated with interactions of the identified containers with the new container; and (5) providing a list characterizing the identified containers as directed to the abstract idea of selecting and sorting information by user interest or subject matter—a longstanding activity of libraries and other human enterprises); *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 1313–16 (Fed. Cir. 2016) (holding ineligible claim reciting (1) determining whether received file content identifiers matched characteristics of other identifiers, and (2) outputting an indication of the data file characteristics based on that determination); *Intellectual Ventures I LLC v. Erie Indemnity Co.*, 850 F.3d 1315, 1326–29 (Fed. Cir. 2017) (holding ineligible claim reciting searching an information database where a set of XML tags from query results were combined into a key that was used to search the database for records with the tags as directed to the abstract idea of creating an index to search for and retrieve data).

We reach the same conclusion regarding forming the REs into a graph as claimed with the recited vertices and edges that represent REs and associated parent/child relationships, respectively. Here again, this graphical representation could be performed entirely mentally or with pen and paper as noted above. *Cf. CyberSource*, 654 F.3d at 1372 (noting that a person could construct a map of credit card numbers by merely *writing down a list of*

credit card transactions made from a particular IP address). And, for the reasons noted previously, the recited matching REs against a second string in an order based on the graph's structure as claimed could also be done entirely mentally or with pen and paper. These steps, like the previous steps, involve mere observation and logical reasoning. *See id.*

Therefore, apart from the recited “information handling system”⁷—a system that is recited only in connection with the placing step—all of claim 1's limitations fall squarely within the mental processes category of the USPTO's guidelines and, therefore, recite an abstract idea. *See* Guidance, 84 Fed. Reg. at 52 (listing exemplary mental processes including observation and evaluation).

Here, the recited “information handling system” is the only recited element beyond the abstract idea, but this additional element, considered individually and in combination, does not integrate the abstract idea into a practical application when reading claim 1 as a whole. First, we are not persuaded that the claimed invention improves the computer or its

⁷ Paragraph 2 of Appellant's Specification defines “information handling system” quite broadly as a system that “generally processes, compiles, stores, or communicates information or data for business, personal, or other purposes.” According to paragraph 63, “an information handling system includes any instrumentality or aggregate of instrumentalities operable to compute, classify, process, transmit, receive, retrieve, originate, switch, store, display, manifest, detect, record, reproduce, handle, or use any form of information, intelligence, or data for business, scientific, control, entertainment, or other purposes.” An information handling system can be, for example, “a personal computer, a consumer electronic device, a network server or storage device, a switch router, wireless router, or other network communication device, a network connected device (cellular telephone, tablet device, etc.), *or any other suitable device*, and can vary in size, shape, performance, price, and functionality.” Spec. ¶ 63 (emphasis added).

components' functionality or efficiency, or otherwise changes the way those devices function, at least in the sense contemplated by the Federal Circuit in *Enfish LLC v. Microsoft Corporation*, 822 F.3d 1327 (Fed. Cir. 2016), despite Appellant's arguments to the contrary (Appeal Br. 12, 14, 15, 17; Reply Br. 11, 12). The claimed self-referential table in *Enfish* was a specific type of data structure designed to improve the way a computer stores and retrieves data in memory. *Enfish*, 822 F.3d at 1339. To the extent Appellant contends that the claimed invention uses such a data structure to improve a computer's functionality or efficiency, or otherwise change the way that device functions, there is no persuasive evidence on this record to substantiate such a contention.

To the extent Appellant contends that the claimed invention is rooted in technology because it ostensibly is directed to a technical solution (*see* Appeal Br. 11–15; Reply Br. 2–5), we disagree. Even assuming, without deciding, that the claimed invention can match REs against character strings faster than doing so manually, any speed increase comes from the capabilities of the generic computer components—not the recited process itself. *See FairWarning*, 839 F.3d at 1095 (citing *Bancorp Services, LLC v. Sun Life Assurance Co.*, 687 F.3d 1266, 1278 (Fed. Cir. 2012) (“[T]he fact that the required calculations could be performed more efficiently via a computer does not materially alter the patent eligibility of the claimed subject matter.”)); *see also Intellectual Ventures I LLC v. Erie Indemnity Co.*, 711 F. App'x 1012, 1017 (Fed. Cir. 2017) (unpublished) (“Though the claims purport to accelerate the process of finding errant files and to reduce error, we have held that speed and accuracy increases stemming from the ordinary capabilities of a general-purpose computer do not materially alter

the patent eligibility of the claimed subject matter.”) (quotation marks, bracketed alteration, and citation omitted).

That the disclosed invention’s ordering REs to match parent vertices ahead of child vertices may increase efficiency by obviating matching the child vertex against a string as noted in the Specification’s paragraph 47 does not change our conclusion. As noted previously, the recited ordering can be performed entirely mentally or with pen and paper and, therefore, recites an abstract idea. Although the Specification’s paragraph 47 notes an experiment conducted in connection with a system for detecting malicious events containing a class of over 200,000 REs, where the experiment suggested that matching time can be halved in many cases by eliminating the need to match children, these particulars are not claimed, let alone the particular malicious event detection that was the subject of that experiment. *Accord* Ans. 11 (noting this point); Reply Br. 14, 15 (conceding that the claims do not reflect this particular application). In any event, merely reciting that the claimed invention is for detecting malicious or anomalous events, without more, does not integrate the abstract idea into a practical application, for merely generally linking the use of an abstract idea to a particular technological environment or field of use does not render the claimed invention any less abstract. *See Affinity Labs of Texas, LLC v. DirectTV, LLC*, 838 F.3d 1253, 1259 (Fed. Cir. 2016); *accord Flook*, 437 U.S. at 584, 588–90, 596–97 (holding ineligible method for updating an alarm limit on a process variable, despite the process involving the catalytic chemical conversion of hydrocarbons); *see also* Guidance, 84 Fed. Reg. at 55 (citing MPEP § 2106.05(h)).

Like the claims in *FairWarning*, the focus of claim 1 is not on an improvement in computer processors as tools, but on certain independently abstract ideas that use generic computing components as tools. *See FairWarning*, 839 F.3d at 1095 (quotation marks and citations omitted). As with the ineligible claimed invention in *BSG Tech LLC v. BuySeasons, Inc.*, 899 F.3d 1281, 1284–91 (Fed. Cir. 2018), the claimed invention does not improve a computer’s functionality or that of its associated components, but rather the benefits flow from performing the abstract idea in conjunction with those generic computer components. *See BSG*, 899 F.3d at 1288 (“While the presentation of summary comparison usage information to users improves the quality of the information added to the database, an improvement [in] . . . the information stored by a database is not equivalent to an improvement in the database’s functionality.”).

Nor is this a case involving eligible subject matter as in *DDR Holdings, LLC v. Hotels.Com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014) despite Appellant’s arguments to the contrary (Appeal Br. 15–16). There, instead of a computer network operating in its normal, expected manner by sending a website visitor to a third-party website apparently connected with a clicked advertisement, the claimed invention in *DDR* generated and directed the visitor to a hybrid page that presented (1) product information from the third party, and (2) visual “look and feel” elements from the host website. *DDR*, 773 F.3d at 1258–59. Given this particular Internet-based solution, the court held that the claimed invention did not merely use the Internet to perform a business practice known from the pre-Internet world, but rather was necessarily rooted in computer technology to overcome a problem specifically arising in computer networks. *Id.* at 1257.

That is not the case here. As noted previously, Appellant’s claimed invention, in essence, is directed to matching REs against a string in an order according to a hierarchy of other REs, where the hierarchy is based on the other REs matching another string—albeit using computer-based components to achieve that end.⁸ The claimed invention here is not necessarily rooted in computer technology in the sense contemplated by *DDR* where the claimed invention solved a challenge particular to the Internet. Although Appellant’s invention uses computer-based components as noted previously, the claimed invention does not solve a challenge particular to the computing components used to implement this functionality.

Nor is this invention analogous to that which the court held eligible in *McRO, Inc. v. Bandai Namco Games America, Inc.*, 837 F.3d 1299 (Fed. Cir. 2016) despite Appellant’s arguments to the contrary (Appeal Br. 13; Reply Br. 12). There, the claimed process used a combined order of specific rules that rendered information in a specific format that was applied to create a sequence of synchronized, animated characters. *McRO*, 837 F.3d at 1315. Notably, the recited process *automatically animated characters* using particular information and techniques—an improvement over manual three-dimensional animation techniques that was not directed to an abstract idea. *Id.* at 1316.

But unlike the claimed invention in *McRO* that improved how the physical display operated to produce better quality images, the claimed invention here merely uses generic computing components to match REs

⁸ As noted previously, the recited information handling system is used only in claim 1’s placing step—not the forming and matching steps.

against a string in an order according to a hierarchy of other REs, where the hierarchy is based on the other REs matching another string. This generic computer implementation is not only directed to mental processes, but also does not improve a display mechanism as was the case in *McRO*. See *SAP Am. v. InvestPic, LLC*, 898 F.3d 1161, 1167 (Fed. Cir. 2018) (distinguishing *McRO*).

Appellant's reliance on the decision in *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288 (Fed. Cir. 2016) (App. Br. 15; Reply Br. 12) is unavailing. There, the court held that a claim directed to using accounting information with which a network accounting record is correlated to enhance the record was held eligible because the claim involved an *unconventional* technological solution (enhancing data in a distributed fashion) to a technological problem (massive record flows which previously required massive databases). Although the court recognized that this solution used generic components, the recited enhancing function necessarily required these generic components to operate in an *unconventional* manner to achieve an improvement in computer functionality. *Id.* at 1300–01. Notably, the recited enhancement in *Amdocs* depended on not only the network's distributed architecture, but also on the network devices and “gatherers” working together in a distributed environment. *Id.* at 1301. In reaching its eligibility conclusion, the court noted the patent's emphasis on the drawbacks of previous systems where all network information flowed to one location making it very difficult to keep up with massive record flows from network devices and requiring huge databases. *Id.* at 1300. The court also noted similar network-based drawbacks that were overcome by similar

unconventional distributed solutions in other patents at issue. *See id.* at 1305–06.

That is not the case here. Although the claimed invention uses conventional computing components that store and process data—at least with respect to the placing step—there is no persuasive evidence on this record to show that these generic components operate in an *unconventional* manner to achieve an improvement in computer functionality as in *Amdocs*.

Appellant’s reliance on *Finjan, Inc. v. Blue Coat Systems, Inc.*, 879 F.3d 1299 (2018) (Appeal Br. 16) is likewise unavailing. There, the court held eligible claims directed to a behavior-based virus scanning system. In reaching this conclusion, the court noted that the claimed invention employed a new kind of file that enabled a computer security system to do that which could not be done previously, including accumulating and using newly-available, behavior-based information about potential threats. *Finjan*, 879 F.3d at 1305.

That is not the case here. To the extent Appellant contends that the claimed invention is directed to such improvements in computer capabilities (*see* App. Br. 16), there is no persuasive evidence on this record to substantiate such a contention.

We also find unavailing Appellant’s contention that the claimed invention is eligible because it is tied to a “particularized structure,” namely an information handling system. *See* Appeal Br. 18–19; Reply Br. 15. To be sure, the machine-or-transformation test, although not the only test, can nevertheless provide a “useful clue” to patent eligibility in the *Alice/Mayo* framework. *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 716 (Fed. Cir. 2014) (quoting *Bilski v. Kappos*, 561 U.S. 593, 594 (2010)). Under the

machine-or-transformation test, a claimed process is patent-eligible if it: (1) is tied to a particular machine or apparatus, or (2) transforms a particular article into a different state or thing. *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008), *aff'd sub nom. Bilski*, 561 U.S. at 593. Therefore, satisfying either prong of the machine-or-transformation test may integrate an abstract idea into a practical application. *See* Guidance, 84 Fed. Reg. at 55 nn. 27–28 (citing MPEP §§ 2106.05(b)–(c)).

It is well settled, however, that whether a recited device is a tangible system or, in 35 U.S.C. § 101 terms, a “machine,” is not dispositive to eligibility. *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 770 (Fed. Cir. 2019) (quoting *In re TLI Commc'ns*, 823 F.3d 607, 611 (Fed. Cir. 2016) (“[N]ot every claim that recites concrete, tangible components escapes the reach of the abstract-idea inquiry.”). For a machine to impose a meaningful limit on the claimed invention, it must play a significant part in permitting a claimed method to be performed, rather than function solely as an obvious mechanism for permitting a solution to be achieved more quickly. *Versata*, 793 F.3d at 1335; *see also* MPEP § 2106.05(b)(II) (citing *Versata*).

The latter role is the case here. Leaving aside the fact that the information handling system is used only in claim 1’s placing step—not the other recited steps—the recited information handling system is merely an obvious mechanism that achieves the recited solution more quickly, namely matching REs against a string in an order according to a hierarchy of other REs, where the hierarchy is based on the other REs matching another string. That is, despite the computing device’s components that are used to achieve this end, the focus of the claim is nonetheless directed to an abstract idea, albeit using computer-based components to achieve that end. *Cf.*

ChargePoint, 920 F.3d at 772–73 (holding ineligible claim reciting a network-controlled charge transfer system for electric vehicles comprising, among other things, a communication device configured to connect a controller to a mobile wireless communication device for communication between the electric vehicle operator and the controller); *see also id.* at 772 (noting that the lack of an indication that (1) the disclosed invention was intended to improve the recited components, including the communications devices, or (2) that the inventors viewed the combination of those components as their invention).

That the recited information handling system is described quite broadly and at a high level of generality only underscores the claimed invention not being tied to a particular machine. Paragraph 2 of Appellant’s Specification defines “information handling system” quite broadly as a system that “generally processes, compiles, stores, or communicates information or data for business, personal, or other purposes.” The Specification adds that “an information handling system includes *any* instrumentality or aggregate of instrumentalities operable to compute, classify, process, transmit, receive, retrieve, originate, switch, store, display, manifest, detect, record, reproduce, handle, or use *any* form of information, intelligence, or data for business, scientific, control, entertainment, or other purposes.” Spec. ¶ 63 (emphasis added). An information handling system can be, for example, “a personal computer, a consumer electronic device, a network server or storage device, a switch router, wireless router, or other network communication device, a network connected device (cellular telephone, tablet device, etc.), or *any other suitable device*, and can vary in size, shape, performance, price, and functionality.” *Id.* (emphasis added).

Given this broad, general, and non-limiting description of an information handling system, the claimed invention is not tied to a particular machine or, in Appellant’s parlance, a “particularized structure” (Appeal Br. 19), to satisfy the machine-or-transformation test. To the extent Appellant contends otherwise, we disagree.

We also find unavailing Appellant’s contention that the claimed invention does not preempt related technologies. Appeal Br. 19. Where, as here, the claims cover a patent-ineligible concept, preemption concerns “are fully addressed and made moot” by an analysis under the *Alice/Mayo* framework. *See Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015).

In conclusion, although the recited functions may be beneficial by matching REs against a string in an order according to a hierarchy of other REs, where the hierarchy is based on the other REs matching another string, a claim for a useful or beneficial abstract idea is still an abstract idea. *See id.* at 1379–80.

We, therefore, agree with the Examiner that claim 1 is directed to an abstract idea.

Claim 1: Alice/Mayo Step Two

Turning to *Alice/Mayo* step two, claim 1’s additional recited element, namely the recited “information handling system,” does not provide an inventive concept such that this additional element amounts to significantly more than the abstract idea when reading claim 1 as a whole. *See Alice*, 573 U.S. at 221; *see also* Guidance, 84 Fed. Reg. at 56. As noted above, the

claimed invention merely uses generic computing components to implement the recited abstract idea.

To the extent Appellant contends that the recited limitations, including those detailed above in connection with *Alice* step one, add significantly more than the abstract idea to provide an inventive concept under *Alice/Mayo* step two (*see* Appeal Br. 19–20; Reply Br. 16–17), these limitations are not *additional* elements *beyond* the abstract idea, but rather are directed to the abstract idea as noted previously. *See BSG*, 899 F.3d at 1290 (explaining that the Supreme Court in *Alice* “only assessed whether the claim limitations *other than the invention’s use of the ineligible concept* to which it was directed were well-understood, routine and conventional”) (emphasis added); *see also* Guidance, 84 Fed. Reg. at 56 (instructing that *additional* recited elements should be evaluated in *Alice/Mayo* step two to determine whether they (1) *add* specific limitations that are not well-understood, routine, and conventional in the field, or (2) simply *append* well-understood, routine, and conventional activities previously known to the industry (citing MPEP § 2106.05(d)).

Rather, the recited “information handling system” is the only additional recited element whose *generic computing functionality* is well-understood, routine, and conventional. *See* Spec. ¶¶ 2, 55–67 (describing exemplary information handling systems that use generic computing components); *see also FairWarning*, 839 F.3d at 1096 (noting that using generic computing components like a microprocessor or user interface does not transform an otherwise abstract idea into eligible subject matter); *Mortgage Grader Inc. v. First Choice Loan Services, Inc.*, 811 F.3d 1314, 1324–25 (Fed. Cir. 2016) (noting that components such as an “interface,”

“network,” and “database” are generic computer components that do not satisfy the inventive concept requirement); *accord* Final Act. 7 (concluding that the recited functions merely provide a *conventional* computer implementation of the identified abstract idea).

Our emphasis on “conventional” underscores that the Examiner’s rejection was apparently premised on the notion that the *computer implementation* of the recited abstract idea was well-understood, routine, and conventional. *See id.*⁹ As noted above, this record is replete with evidence that such a computer implementation, namely an information handling system, was well-understood, routine, and conventional. Therefore, Appellant’s contention that there is no evidence that the additional elements are well-understood, routine, and conventional (Appeal Br. 19, 20; Reply Br. 16, 17) is unavailing, for there is ample evidence on this record that the sole additional element—the information handling system—was well-understood, routine, and conventional.

In conclusion, the additional recited element—considered individually and as an ordered combination—does not add significantly more than the abstract idea to provide an inventive concept under *Alice/Mayo* step two

⁹ Although the Examiner indicates that such a rationale was allegedly not used in the rejection, the Examiner nonetheless indicates in the Final Rejection that the recited functions merely provide a *conventional* computer implementation of the identified abstract idea. *Compare* Ans. 13 *with* Final Act. 7. Given this explicit finding of *conventional* computer implementation in the Final Rejection from which this appeal was taken, we treat the Examiner’s apparent contradictory statement in the Answer as harmless error.

when the claim is read as a whole. *See Alice*, 573 U.S. at 221; *see also* Guidance, 84 Fed. Reg. at 56.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 1, and claims 2–20 not argued separately with particularity.

THE ANTICIPATION REJECTION

The Examiner finds that Thorup discloses every recited element of claim 1 including an information handling system that places REs into parent/child relationships, where a “first RE,” namely the expression “b” in Figure 4A, is set as a child of a “second RE,” namely expression “a,” based on obtaining information about whether the first RE matches a first string from matching the second RE against that string. Final Act. 7–8.

Appellant argues that Thorup does not show setting a first RE as a child of a second RE based on obtaining information about whether the first RE matches a first string from matching the second RE against the first string. Appeal Br. 6–8; Reply Br. 3–6. According to Appellant, not only does Thorup match substrings by their order of occurrence in the RE containing those substrings—not by information gained by matching separate REs against the same string—but Thorup also does not describe how the parent/child relationships in the graph of Figure 4A were generated, let alone that they are based on the particular relationships claimed. *Id.* Appellant adds that Thorup’s REs that are said to correspond to the recited third and fourth REs are not matched to the same string as claimed, but are rather matched to different strings. Appeal Br. 8–9; Reply Br. 7.

ISSUE

Under § 102, has the Examiner erred in rejecting claim 1 by finding that Thorup's information handling system sets a first RE as a child of a second RE based on obtaining information about whether the first RE matches a first string from matching the second RE against the first string?

ANALYSIS

As noted above, claim 1 recites, in pertinent part, *placing* REs into parent/child relationships, where a first RE is *set as a child* of a second RE based on the recited obtained information. Our emphasis underscores that a key aspect of the claimed invention is the very creation of a hierarchy of REs based on their matching the same string.

The Examiner's reliance on Thorup's Figure 4A is unavailing in this regard. As Appellant indicates (Appeal Br. 7), Thorup's Figure 4A shows a graph depicting the order in which RE subexpressions "a" and "b"¹⁰ are checked for matches against a string. *See* Thorup ¶ 48. As shown by the arrows in that graph, Thorup's system checks for "a" in a string before checking for "b" as Appellant indicates. *See* Thorup ¶¶ 48, 114 (noting that the end of an occurrence of substring in a multi-string matching process can lead to another substring start state); *see also* Appeal Br. 7. Once subexpression "a" is found in a string, the next part of the string is checked for subexpression "b." *See* Thorup ¶¶ 48, 114; Appeal Br. 7.

The clear import of this functionality is the order of matching illustrated in Thorup's Figure 4A is consistent with the subexpressions'

¹⁰ As noted previously, the Examiner maps subexpressions "a" and "b" to the recited second and first REs, respectively. *See* Final Act. 8; Ans. 5, 6.

order of occurrence in the RE as Appellant indicates. Appeal Br. 7; Reply Br. 6. A similar multi-string matching scheme based on order of occurrence is described in Thorup's paragraph 115, where the output or accept state from one substring can create the input for another. For example, when matching the RE "(woman|man)kind" to the string "woman-kind," the system cannot start matching the substring "kind" until it accepts one of the substrings "woman" or "man." Thorup ¶ 117. Thus, like the sequence illustrated in Thorup's Figure 4A, the order of matching in Thorup's example in paragraph 117 is by order of occurrence in the RE. *Accord* Appeal Br. 7 (noting this point).

Although the functionality associated with Thorup's graph in Figure 4A dictates the order of matching RE-based substrings, and, in that sense, reflects a hierarchy of REs based on that order, Thorup nonetheless says nothing about how that hierarchy was created in the first instance, let alone that it was created based on information obtained about whether the first RE matches a first string from matching the second RE against that string as claimed. *Accord* Reply Br. 6 (noting this point). As Appellant indicates, the subexpression "a" is a parent of "b" in Thorup's Figure 4A because "a" appears before "b" in the RE—not because of the particular first-string RE matching relationship recited in claim 1. *See id.*

The Examiner's findings are problematic on this record. According to the Examiner, information on which Thorup's parent/child relationship in Figure 4A is based is obtained when "a" is found in a string—information that is also said to be about whether "b" *could possibly* match the first string. *See* Ans. 6. Even if we were to accept this premise, it still says nothing about how the parent/child relationships in Thorup's Figure 4A were created

in the first instance, including *setting* a first RE *as a child* of a second RE based on the recited obtained information as claimed.

Therefore, we are persuaded that the Examiner erred in rejecting (1) independent claim 1, and (2) dependent claims 2, 7, 10, and 11 for similar reasons. Because this issue is dispositive regarding our reversing the Examiner’s rejection of these claims, we need not address Appellant’s other associated arguments.

THE OBVIOUSNESS REJECTIONS

Because the Examiner has not shown that the additional cited prior art cures the foregoing deficiencies regarding the rejection of independent claim 1, and because the rejection of independent claims 12 and 17 contains similar deficiencies, we will not sustain the obviousness rejections of claims 3–6, 8, 9, and 12–20 (Final Act. 10–21) for similar reasons.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/ Basis	Affirmed	Reversed
1–20	101	Eligibility	1–20	
1, 2, 7, 10, 11	102(a)(1)	Thorup		1, 2, 7, 10, 11
3, 4	103	Thorup, Gutierrez		3, 4
8	103	Thorup, Duxbury		8
9	103	Thorup, Duxbury, Gutierrez		9
5, 6, 12, 14–20	103	Thorup, Becchi		5, 6, 12, 14–20
13	103	Thorup, Becchi, Duxbury		13
Overall Outcome			1–20	

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TIME PERIOD FOR RESPONSE

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).

AFFIRMED