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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte ERIC HUANG, RONG ZHOU, and
DANIEL DAVIES[1]

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Appeal 2019-002334
Application 14/148,435
Technology Center 3600

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Before JOHN G. NEW, RYAN H. FLAX, and
RACHEL H. TOWNSEND, *Administrative Patent Judges*.

NEW, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] We use the term "Appellant" to refer to the "applicant" as defined in
37 C.F.R. § 1.142. Appellant identifies Palo Alto Research Center
Incorporated as the real party-in-interest. App. Br. 4.

SUMMARY

Appellant files this appeal under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 1–14, 16, 17, and 19–22 as unpatentable under 35 U.S.C. § 101 as being directed to nonstatutory subject matter.

We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

NATURE OF THE CLAIMED INVENTION

Appellant's claimed invention is directed to a system for generating a product recommendation by translating transaction data to graph representation for input to a graph analytics application. Abstr.

REPRESENTATIVE CLAIM

Claim 1 is representative of the claims on appeal and recites:

1. A computer-executable method, comprising:

   generating, by a processor, a table containing topology information of a graph, wherein each edge of the graph represents a transaction and connects a vertex representing a respective customer with a vertex representing a respective product;

   generating files containing one or more headers that include at least graph metadata describing a plurality of tables with graph information;

   generating files containing data from the plurality of tables including the topology information table;

storing the generated files with table data at a first storage location;

storing the generated header files at a second storage location separate from the first storage location;

loading graph metadata stored separately from topology information as needed based on processing of the graph; and

generating data identifying a selected vertex representing an associated product based on the graph processing.

App. Br. 38.

ISSUES AND ANALYSES

We adopt the Examiner's findings, reasoning, and conclusion that the claims on appeal are directed to nonstatutory subject matter. We address the arguments raised by Appellant below.

A.   Appellant argues that the claims are not directed to an abstract idea
Issue 1

Appellant argues that the Examiner erred in finding that the claims are directed to an abstract idea and, therefore, patent-ineligible subject matter. App. Br. 17.

The Examiner finds that the steps recited in the claims describe the concept of storing data in a graph to generate a product recommendation, which the Examiner finds corresponds to concepts identified as abstract ideas by the courts, such as "an idea of itself," as described in *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 218 (2014) (quoting *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972). Final Act. 3. The Examiner finds that one

example of "an idea of itself" is "collecting information, analyzing it, and displaying certain results of the collection and analysis." *Id.* (quoting *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016)). The Examiner finds that, in this instance, the claims recite receiving user data, processing previously stored data, and generating a product recommendation. The Examiner therefore finds that the concept to which the claim is directed is not meaningfully different from those previously found by the courts to be abstract ideas. *Id.* As such, concludes the Examiner, the claims recite an abstract idea and, further, do not include additional elements that, when considered both individually and as an ordered combination, are sufficient to amount to significantly more than the abstract idea. *Id.*

Specifically, the Examiner finds that the claims also recite "[a] computer processor being used to store graph data as table and files." Final Act. 3. The Examiner finds that the "computer processor" is recited with a high level of generality as performing generic computer functions routinely used in computer applications. *Id.* The Examiner notes that this generic computer processor, recited as performing generic computer functions that are well understood, routine, and conventional, amounts to no more than implementing the abstract idea *via* a computerized system. *Id.* at 3–4.

Even more specifically, the Examiner finds that the claimed computer processor is recited as representing data in graph form to generate a product recommendation. Final Act. 4. The Examiner finds that such use of generic computer components to process data according to programmed software algorithm does not impose any meaningful limit on the computer implementation of the abstract idea. *Id.* The Examiner therefore concludes

that this additional element does not amount to significantly more than the judicial exception (i.e., the abstract idea). *Id.* The Examiner also finds that there is no indication that the combination of elements improves the functioning of a computer or improves any other technology, but rather merely provides conventional computer implementation. *Id.*

Appellant argues that the claims on appeal are directed to a "solution necessarily rooted in computer technology," and are therefore not directed to an abstract data. App. Br. 17 (emphasis omitted) (quoting *DDR Holdings, LLC v. Hotels.com, LP*, 773 F.3d 1245, 1257 (Fed. Cir. 2014)). Appellant notes that the PTO Eligibility Guidelines state that "[w]hile improvements were evaluated in *Alice Corp.* as relevant to the search for an inventive concept (Step 2B), several decisions of the Federal Circuit have also evaluated this consideration when determining whether a claim was directed to an abstract idea (Step 2A)." *Id.* (alteration in original). Furthermore, Appellant argues, § 2106.05(a) of the MPEP provides "[e]xamples that the courts have indicated may show an improvement in computer-functionality" and that one such example is "modification of conventional Internet hyperlink protocol to dynamically produce a dual-source hybrid webpage." *Id.* at 17–18 (alteration in original) (citing *DDR*).

Appellant argues that, as in *DDR Holdings*, the claimed embodiments are necessarily rooted in computer technology. App. Br. 18. Appellant points to the Specification as disclosing that the claimed embodiments may be used in analyzing digital data using a graph analytics application to perform collaborative filtering. *Id.* (citing Spec. ¶ 24). Appellant further contends that the Specification discloses that the exemplary graph analytics application requires as input "a text file which is formatted in a very specific

way, with certain constraints and formatting requirements." *Id.* (emphasis omitted) (citing Spec. ¶ 25).

Appellant points to the Specification as recognizing that generating and analyzing voluminous amounts of data can be "a time-consuming, inefficient process, especially when large relational tables are involved." App. Br. 19 (quoting Spec. ¶ 31). Appellant asserts that the embodiments of the claimed invention solve the inefficiencies involved in mining digital data by separately generating and storing a topology table and graph metadata for a graph, in which:

> [T]he system may generate a bipartite graph with purchase transaction data extracted from a retailer's database. A bipartite graph is a graph with vertices that can be divided into two disjoint sets U and V such that every edge connects a vertex in set U to a vertex in set V. Vertices representing products make up one set of the bipartite graph and vertices representing customers make up the other set of the bipartite graph. The graph represents the retailer's database of transaction data. [A graph analytics application] may then traverse the bipartite graph to generate a product recommendation.

Id. (quoting Spec. ¶ 30). Appellant therefore contends that, as in *DDR*, the claimed system provides a solution necessarily rooted in computer technology (i.e., data mining and collaborative filtering), and is not directed to an abstract idea.

The Examiner responds that, unlike Appellant's claims on appeal, *DDR* addressed a technological problem specific to a particular technological environment by implementing a specific solution for that technological environment and different from the routine or conventional use for that environment. Ans. 3 (citing *DDR*, 773 F.3d at 1258–59) (finding "the claims at issue here specify how interactions with the Internet

are manipulated to yield a desired result—a result that overrides the routine and conventional sequence of events ordinarily triggered by the click of a hyperlink"). The Examiner finds that Appellant's claims are more akin to a generic computer programmed with conventional steps to be carried out in a conventional manner, and therefore fail to recite an inventive concept. *Id.* The Examiner finds that Appellant has not shown that translating does anything more than conventionally reformatting data. *Id.* (citing *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1332 (Fed. Cir. 2015) (quoting *Alice*, 573 U.S at 223) (holding an inventive concept requires more than simply stating an abstract idea while adding the words "apply it" or "apply it with a computer").

The Examiner further finds that the claims recite generating data, storing the generated data into files, and loading previously stored data for further processing. Ans. 4. The Examiner concludes that the manner in which the claims recite this translating is not commensurate with the portion(s) of the Specification argued by Appellant. *Id.* Specifically, the Examiner finds, the features upon which Appellant relies (*viz.*, a specifically formatted text file, processing voluminous amounts of data beyond simpleton embodiments, etc.) are not recited in the rejected claim(s).

Issue 2

Appellant argues that the claims are directed to an improvement in computer functionality. App. Br. 20. Appellant argues that, as in *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016), the focus of the claims on appeal is on improvements in computer capabilities, which includes the ability of the computer to analyze a voluminous amount of

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digital data from large relational tables, and identify, in a graph model, a vertex which represents a product to be recommended to a specific user. *Id.* (citing *Enfish*, 822 F.3d at 1335–36). According to Appellant, the claims are directed to a specific implementation which solves the problem of analyzing very large input graph datasets, e.g., in conventional systems, "when the input graph dataset is on the order of several hundred gigabytes, one cannot even sort the data on a standard machine because of the time, disk space, and memory space required." *Id.* (quoting Spec. ¶ 3). Appellant asserts that the claimed system improves computer functionality by storing the graph topology separately from the graph metadata, which "facilitates efficient processing of the graph by allowing the system not to load the metadata until needed." *Id.* at 20–21 (quoting Spec. ¶ 49).

Appellant argues that, rather than performing database joins (as in the conventional systems), the claimed system traverses a bipartite graph to generate a product recommendation, which is much faster than performing a database join with data from relational tables, especially as the size and volume of the data in the relational tables increases (e.g., on the order of several hundred gigabytes). App. Br. 21 (citing Spec. ¶¶ 30–31). Appellant contends that, by providing a specific translation system, the instant claims provide a scalable solution to the problem of culling a voluminous amount of data into an input graph dataset which can be analyzed by a graph analytics application to perform a concrete task. *Id.*

The Examiner responds that, rather than resembling the claims in *Enfish*, the instant claims are more akin to those for collecting, analyzing, and displaying information found to be patent ineligible in *Electric Power Group*, or the claims directed to image data processing discussed in *Digitech*

Image Technologies.. Ans. 4–5 (citing *Electric Power Grp.*, 830 F.3d at 1353–54; *Digitech Image Techs., LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014) (holding that "a process that employs mathematical algorithms to manipulate [data or] information to generate additional information is not patent eligible")). Furthermore, the Examiner finds, nothing in the claims, when viewed in light of the Specification, requires anything other than an off-the-shelf, conventional computer used for collecting and processing/analyzing various information/data. *Id.* at 5.

Issue 3

Appellant next argues that the claims use limited rules in a process specifically designed to achieve an improved technological result in a conventional industry practice. App. Br. 21. Appellant points to *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299 (Fed. Cir. 2016), in which, Appellant argues, the Federal Circuit held the claims at issue to be patent eligible because the claim(s) "uses the limited rules in a process specifically designed to achieve an improved technological result in conventional industry practice" and were thus "not directed to an abstract idea." *Id.* (quoting *McRO*, 837 F.3d at 1316). Appellant further quotes *McRO* as holding that: "it is the incorporation of the claimed rules, not the use of the computer, that 'improved [the] existing technological process.'" *Id.* at 21–22 (quoting *McRO*, 837 F.3d at 1314 (quoting *Alice*, 573 U.S. 208 at 223)).

Appellant contends that, similar to the invention of *McRO*, embodiments of the claimed invention incorporate "rules" (e.g., generating topology information of a graph; generating header files of graph metadata;

and storing the generated topology information and the generated header files of graph metadata separately) that improve the technological process of data mining of a voluminous digital data (e.g., loading graph metadata stored separately from topology information and traversing a bipartite graph instead of performing time-consuming, inefficient database joins of large relational tables). App. Br. 22. Appellant asserts that incorporation of these rules improves the technological process of mining digital data for useful information, and of collaborative filtering. *Id.* (citing Spec. ¶¶ 24–31, 49).

The Examiner responds that claim 1, when viewed as a whole, focuses on translating data into a graph for storage and subsequent retrieval for further processing, which is an effect and not an improvement in relevant technology, e.g., chip architecture, etc. Ans. 5 (citing Spec. ¶ 4). The Examiner finds that, insofar as Appellant maintains that the claims provide certain efficiencies, the claims do not recite any particular volume of data, and thus simple embodiments would meet the scope of the claims. *Id.* at 5–6. The Examiner also finds that the claims are not limited to a particular type of graphing technique (or even a specific data translation technique) as argued by Appellant. *Id.* Rather, the Examiner finds, the claims merely recite generic data processing to translate input data into graph data (which the Examiner finds is similar to the case in *Gottschalk v. Benson*, 409 U.S. 63 (1972), and then loading the stored graph data via a generic processing technique using the computer as a generic tool invoked to implement the abstract concept. *Id.* (*see Benson*, 409 U.S. at 65).

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Issue 4

Appellant next argues that the claims are patent eligible because they are directed to a technological improvement of an improved computer system with multiple benefits. App. Br. 23. Appellant invokes *Visual Memory LLC v. Nvidia Corp.*, 867 F.3d 1253 (Fed. Cir. 2017) as holding that claims "directed to a technological improvement: an enhanced computer memory system" were patent eligible and that "the specification discuss the advantages offered by the technological improvement." *Id.* (quoting *Visual Memory*, 867 F.3d at 1259, 1260).

Appellant also points to the Federal Circuit's finding that the specification in *Visual Memory* disclosed that "using a programmable operational characteristic can also improve the main memory" and that "[t]aken together, the 'multiple mode operation' of the '740 patent confers a substantial advantage by 'allowing different types of processors to be installed with the same subject memory system without significantly comprising their individual performance.'" App. Br. 23–24 (quoting *Visual Memory*, 867 F.3d at 1256, 1256–57 (internal citations omitted)).

Appellant argues that the Specification, similar to that described in *Visual Memory*, discloses advantages offered by the technological improvement. App. Br. 24. Appellant contends that, in a conventional system, translating voluminous data to an appropriately formatted input graph dataset which can be easily read and processed by a graph analytics application can be limited, i.e., "one cannot even sort the data on a standard machine because of the time, disk space, and memory space required." *Id.* (quoting Spec. ¶ 3). In contrast, argues Appellant, the embodiments disclosed in Appellant's Specification provide a system for efficiently

translating transaction data into a graph representation for input to a graph analytics application. *Id.* (citing Spec. ¶ 3).

Appellant asserts that, like the system in *Visual Memory*, the claimed system confers a substantial advantage by allowing the system to efficiently generate graph topology and metadata, and to translate the generated information as a graph input dataset to a graph analytics application, which can subsequently analyze the graph, and identify a specific vertex (i.e., provide a product recommendation to a specific customer based on voluminous transactional data from multiple relational databases involving a given retailer). App. Br. 25. This is possible, Appellant contends, because of the system's ability to perform the translation, which eliminates the need to perform database joins with data from multiple other large relational tables. *Id.*

The Examiner responds that, unlike the claims at issue in *Visual Memory*, Appellant's claims do not recite any particular implementation of memory, but merely invoke a computer, in its generic capacity, to perform a data translation, which itself is recited as an effect and not achieved by any particularly claimed technical solution. Ans. 6. The Examiner finds that the computer is then invoked to store and retrieve data for processing without specifically reciting any particular storage or data processing technique, as was the case in *Visual Memory*. *Id.* (*see Visual Memory*, 867 F.3d at 1257).

Issue 5

Finally, Appellant argues that, contrary to the Examiner's finding, the claims on appeal are unlike the claims in *Electric Power Group*. App. Br. 25. Appellant argues that, unlike *Electric Power Group*, Appellant's claims

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on appeal advance an "assertively inventive technology for performing [the claimed] functions." *Id.* at 26 (quoting *Electric Power Grp.*, 830 F.3d at 1354). Appellant asserts that the Specification expressly discusses the advantages offered by the technological improvement by efficiently translating transaction data to a graph input dataset which can be processed by a graph analytics application, without being limited by the size of the original transaction data. *Id.* (citing Spec. ¶¶ 3, 4, 24–31). Unlike the claims in *Electric Power Group*, argues Appellant, the claimed method confers a substantial advantage by allowing the system to consequently process the data by loading the metadata separately from the topology information, and by identifying a selected vertex, which corresponds to, e.g., a product recommendation for a specific customer in a database of a retailer. *Id.*

We have considered, but are not persuaded by Appellant's arguments. In performing an analysis of patentability under 35 U.S.C. § 101, we follow the framework set forth by the Supreme Court in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66 (2012). We are also mindful of, and guided by, the United States Patent and Trademark Office's *2019 Revised Patent Subject Matter Eligibility Guidance*, 84(4) Fed. Reg. 50 (January 7, 2019) (the "2019 Guidance").

Appellant's independent claim 1 recites: "A computer-executable method, comprising: …." Following the first step of the *Mayo* analysis, we find that the claims are directed to a method or process and therefore fall into one of the broad statutory categories of patent-eligible subject matter under 35 U.S.C. § 101.

In the next step of the *Mayo* analysis, we determine whether the claim at issue is directed to a nonstatutory, patent-ineligible concept, i.e., a law of

nature, a phenomenon of nature, or an abstract idea. *Mayo*, 566 U.S. at 70–71. If the claim is so directed, we next consider the elements of the claim both individually and "as an ordered combination" to determine whether additional elements "transform the nature of the claim" into a patent-eligible application. *Id.* at 78–79; *see also Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1375 (Fed. Cir. 2015). Specifically, the Supreme Court considered this second step as determining whether the claim recites an element or combination of elements that is "sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself." *Mayo*, 566 U.S. at 72–73.

More specifically, in this second step of the *Mayo* analysis, we look to whether the claim recites one of the judicially-created exceptions to 35 U.S.C. § 101, i.e., an abstract idea, a law of nature, or a natural phenomenon. *See* 2019 Guidance 54 (Step 2A, Prong 1). If we determine that the claim recites a judicial exception, we then determine whether the limitations of the claim reciting the judicial exception are integrated into a practical application. *Id.* (Step 2A, Prong 2).

Finally, if we determine that the claim is directed to a judicially-created exception to Section 101, we evaluate the claim under the next step of the *Mayo* analysis, considering the elements of each claim both individually and "as an ordered combination" to determine whether additional elements "transform the nature of the claim" into a patent-eligible application. *Mayo*, 566 U.S. at 78–79; 2019 Guidance 56 (Step 2B).

"In cases involving software innovations, th[e] inquiry often turns on whether the claims focus on 'the specific asserted improvement in computer capabilities . . . or, instead, on a process that qualifies as an 'abstract idea'

for which computers are invoked merely as a tool.'" *Finjan, Inc. v. Blue Coat Sys., Inc.*, 879 F.3d 1299, 1303 (Fed. Cir. 2018) (quoting *Enfish*, 822 F.3d at 1335–36).

Claim 1 recites the steps of: (1) generating a table containing topology information of a graph; (2) generating files that include metadata describing a plurality of tables with graph information; (3) generating files containing data from the plurality of tables including the topology information table; (4) storing the generated files with table data at a first storage location; (5) storing the generated header files at a second storage location; (6) loading graph metadata stored separately from topology information as needed; and (7) generating data identifying a selected vertex representing an associated product. Each of these steps deals with the manipulation and/or storage of information in a generic computer processor.

Appellant's Specification discloses that a primary purpose of the claimed method is

> to provide recommendations to a customer. A retailer may sell products to customers, and in order to provide recommendations to customers, the system may perform collaborative filtering. But collaborative filtering requires an analysis of customer transaction data, including purchase data. The system may examine a customer's purchase item, and then determine the purchases made by other customers who also purchased the same item as the first customer. The system may then recommend an item to the first customer. The customer transaction data may be mixed with other data and stored in a relational database (or some other format unsuitable for direct input to Hipergraph [a commercially-available graph analytics application]).

Spec. ¶ 29. Specifically, Appellant's Specification discloses that:

> During operation, the system generates a transaction table to store transaction data, a customer table to store customer data, and a product table to store products data. The system then

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generates, with data from the transaction table, a table containing topology and edge identifier information and a table containing edge attribute information. Next, the system generates one or more headers that include data describing the customer table and/or the product table and/or the table containing edge attribute information. Subsequently, the system generates one or more files containing the one or more headers and data from the tables, in which the data describes a graph with edges representing transactions and vertices representing customers or products. The system then submits the one or more files as input to the graph analytics application to generate a product recommendation.

Spec. ¶ 4. The Specification further discloses that:

Embodiments of the present invention solve the problem of translating transaction data to a format suitable for input to a graph analytics application by automatically compiling the data and translating the data to a graph model representation. A graph translation system may extract data from a data source, such as a relational table storing various types of data. The system processes and projects the data into intermediate tables, generates headers, and then writes the tables, headers, and additional tables with data describing a graph topology and associated edge attribute data into a suitably formatted text file. The generated graph reflects transaction relationships found in the extracted data. The graph translation system may then submit the generated graph data as input to a graph analytics application (e.g., Hipergraph) for analysis.

Id. ¶ 24. In summary, the method comprises extracting data from a source (i.e., a databases), and creating intermediate tables (i.e., a transaction table, a customer table, and a product table). From the intermediate tables headers are generated as well as other necessary formatting information to describe a graph that may then be submitted to a commercially-available graph analytics program (i.e., Hipergraph) for analysis of the data contained therein. *Id.*

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However, the software that performs such tasks is identified in the Specification as existing products. More specifically, Appellant's Specification discloses that:

> In one implementation, the system utilizes data warehousing software such as Hive built on top of Hadoop. Hive is a data warehouse system for Hadoop. Hive facilitates easy data summarization, ad-hoc queries, and the analysis of large datasets residing in distributed storage with Hadoop-compatible file systems. Hive provides a SQL [Structured Query Language] interface to access the stored data. Hadoop is the storage layer. Hadoop is a framework for the distributed processing of large data sets across clusters of machines, pulling together the machines' and CPU power. Hadoop provides for storage of data across the clusters, and allows for scaling from a single server to thousands of machines. It provides a scalable distributed file system that spans all the nodes in the clusters. Retailers may store hundreds of gigabytes of data in a Hadoop cluster. *One may use Hive with Hadoop and Bash scripting in order to automatically compile data from typical relational database tables into a format appropriate for Hipergraph.* Bash is a Unix shell. Bash can read commands from a script file and execute the commands within the script.
> …
> *The input to Hipergraph is a set of tables and headers generated with Hive.*

Spec. ¶¶ 26–27 (emphases added). In other words, Appellant's Specification discloses that, in an embodiment, commercially available or open-source software applications (Hive, Hadoop, and Bash) can be used to generate the intermediate tables and formatting data into a graph format suitable for analysis by a graph analytics program such as Hipergraph.

Finally, Appellant's Specification discloses that:

> [W]ithout the translation process disclosed herein, one would need to perform database joins with data from a relational table, which is a time-consuming, inefficient process, especially when

> large relational tables are involved. Rather than performing database joins, the system traverses the bipartite graph with Hipergraph. For example, Hipergraph may traverse the bipartite graph to generate a product recommendation. Performing graph traversal in order to generate a product recommendation is much faster than performing a join with database tables.

Spec. ¶ 31. Appellant argues that the claimed method is therefore patent-eligible because it is a "solution necessarily rooted in computer technology," and therefore represents an improvement in computer functionality, rather than an abstract idea. *See* App. Br. 18–20.

We disagree. As an initial matter, Appellant's Specification discloses that the purpose of the claimed method is to provide purchase recommendations to a consumer, based upon that consumer's past transaction history. *See, e.g.*, Spec. ¶ 29. As such, we conclude that the claims are therefore related to a fundamental economic and conventional business practice and, therefore, to an abstract idea. *See Bilski v. Kappos*, 561 U.S. 593, 611 (2010); *Alice*, 573 U.S. 219.

Appellant points to *DDR* in support of their contention that the claimed method represents a solution to a problem (dealing with large relational databases) that are necessarily rooted in computer technology. In *DDR*, the claims of the patent-in-suit were directed to addressing the problem of "retaining website visitors that, if adhering to the routine, conventional functioning of Internet hyperlink protocol, would be instantly transported away from a host's website after 'clicking' on an advertisement and activating a hyperlink." *DDR*, 773 F.3d at 1257. The solution, recited by the claims, was to "direct[ ] the visitor to an automatically-generated hybrid web page that combines visual 'look and feel' elements from the host

website and product information from the third-party merchant's website related to the clicked advertisement." *Id.*

The court in *DDR* therefore held that "[w]hen the limitations of the '399 patent's asserted claims are taken together as an ordered combination, the claims recite an invention that is not merely the routine or conventional use of the Internet." *Id.* at 1259. Consequently, "the claimed solution is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks" and was patent eligible. *Id.* at 1257.

However, we find that Appellant's claims are closer to the claims at issue in *Electric Power Group.* In *Electric Power Group*, the court found that the claims of the patent-in-suit were directed to "the abstract idea of monitoring and analyzing data from disparate sources." 830 F.3d at 1352. The court initially found that:

> The focus of the asserted claims, as illustrated by claim 12 quoted above, is on collecting information, analyzing it, and displaying certain results of the collection and analysis. We need not define the outer limits of "abstract idea," or at this stage exclude the possibility that any particular inventive means are to be found somewhere in the claims, to conclude that these claims focus on an abstract idea—and hence require stage-two analysis under § 101.

Id. at 1353. The court, proceeding thence to the first step of the *Alice* analysis, found that "the focus of the claims is not on such an improvement in computers as tools, but on certain independently abstract ideas that use computers as tools." *Id.* at 1354.

Continuing to the second step of the analysis, the court found that:

> The claims at issue do not require any nonconventional computer, network, or display components, or even a "non-

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conventional and non-generic arrangement of known, conventional pieces," but merely call for performance of the claimed information collection, analysis, and display functions "on a set of generic computer components" and display devices.

Electric Power Grp., 830 F.3d at 1355. More specifically, the court found that:

Nothing in the claims, understood in light of the specification, requires anything other than off-the-shelf, conventional computer, network, and display technology for gathering, sending, and presenting the desired information…. We have repeatedly held that such invocations of computers and networks that are not even arguably inventive are "insufficient to pass the test of an inventive concept in the application" of an abstract idea.

Id. (citations omitted). The court continued:

Nor do the claims here require an arguably inventive distribution of functionality within a network, thus distinguishing the claims at issue from those in *Bascom* [*Global Internet Servs., Inc. v. AT&T Mobility LLC*].… The claims in this case specify what information in the power-grid field it is desirable to gather, analyze, and display, including in "real time"; but they do not include any requirement for performing the claimed functions of gathering, analyzing, and displaying in real time by use of anything but entirely conventional, generic technology. The claims therefore do not state an arguably inventive concept in the realm of application of the information-based abstract ideas.

Id. at 1355–56 (internal citation omitted).

We find that the claims on appeal are similarly directed to an abstract idea. As explained *supra*, the claims recite steps of, briefly, generating and formatting tables, storing them, and generating data. None of these steps requires a specialized processor to perform and, furthermore, the steps can be performed using commercially available software programs (e.g., Hive, Hadoop, and Bash). *See* Spec. ¶¶ 26–27. Consequently, not only are these

steps performed using a generic computer processor, they do not alter or require changes in the *functionality* of the computer *itself.* *See, e.g.,* *Customedia Techs., LLC v. Dish Network Corp.*, 951 F.3d 1359, 1364 (Fed. Cir. 2020) (holding that, "[t]o be a patent-eligible improvement to computer functionality, [...] the claims [must] be directed to an improvement in the functionality of the computer or network platform itself").

Appellant argues that the claimed method is a faster and more efficient way of producing data suitable for graph analytics than those relying upon database joins with data from a relational table. *See* Spec. ¶ 31. That may well be so, but it nevertheless does not raise the subject matter of the recited claims above the level of an abstract idea, i.e., the organization, manipulation, and presentation of data. That is because the claimed manner of achieving that result does not alter the functionality of the computer, but can be embodied using available software on a generic computer processor. We find *Customedia* to be particularly instructive upon this point:

> Customedia argues that by providing a reserved and dedicated section of storage, *the claimed invention improves the data delivery system's ability to store advertising data, transfer data at improved speeds and efficiencies, and prevent system inoperability due to insufficient storage.* In short, by dedicating a section of the computer's memory to advertising data, the claimed invention ensures memory is available for at least some advertising data. *This does not, however, improve the functionality of the computer itself.*

Customedia, 951 F.3d at 1363 (emphases added). Similarly, Appellant argues that the claimed method "solves the problem of analyzing very large input graph datasets ...., [by] improv[ing] computer functionality by storing the graph topology separately from the graph metadata, which 'facilitates efficient processing of the graph by allowing the system not to load the

metadata until needed.'" App. Br. 20–21 (quoting Spec. ¶ 49).
Nevertheless, the claimed method does not, Appellant's arguments
notwithstanding, alter the claimed functionality of the generic processor
itself, but rather uses commercially available software to provide a more
efficient method of processing the abstract idea.

Appellant also points to *Enfish* and *McRO* as supporting the patent
eligibility of the claims on appeal. *See* App. Br. 20–22. We do not find
these arguments persuasive. In *Enfish*, the Federal Circuit emphasized that
the claimed invention (a self-referential table for a computer database) was
"directed to a specific improvement to the way computers *operate*,
embodied in the self-referential table." 822 F.3d at 1336 (emphasis added).
Specifically, the court held that "the self-referential table recited in the
claims on appeal is a specific type of data structure designed to improve the
way a computer stores and retrieves data in memory." *Id.* at 1339.

We acknowledge that the court in *Enfish* stated that: "The
specification's disparagement of conventional data structures, combined
with language describing the 'present invention' as including the features
that make up a self-referential table, confirm that our characterization of the
'invention' for purposes of the § 101 analysis has not been deceived by the
'draftsman's art.'" *Enfish*, 822 F.3d at 1339. Appellant argues that their
Specification similarly points out the advantages of the claimed methods
over other "conventional" practices, such as effecting database joins. *See*
App. Br. 20–21 (citing Spec. ¶¶ 31–32). Nevertheless, the court in *Enfish*
emphasized that the key question is "whether the focus of the claims is on
the specific asserted improvement in computer *capabilities* (i.e., the self-
referential table for a computer database) or, instead, on a process that

qualifies as an 'abstract idea' for which computers are invoked merely as a tool." *Enfish*, 822 F.3d at 1335–36. We are consequently not persuaded that Appellant's claims are directed to altering the way a computer functions or improving its functional capabilities, but, rather, are directed to conventional means by which data is organized (generating tables of information and files therefrom with conventional processors) and prepared for use by a graph analytics application, using commercially-available software. As such, we conclude that the claims are not directed to changing the functionality of the computer, but are directed instead to the abstract idea of organizing and storing information.

Similarly, in *McRO*, the Federal Circuit stated that the claimed invention, a method of producing accurate and realistic lip synchronization and facial expressions in animated characters,

> goes beyond merely "organizing [existing] information into a new form" or carrying out a fundamental economic practice. The claimed process uses a combined order of specific rules that renders information into a specific format that is then used and applied to create desired results: a sequence of synchronized, animated characters.

McRO, 837 F.3d at 1315 (alteration in original) (citations omitted). By contrast, Appellant's claimed method is directed to "organizing [existing] information into a new form," i.e., generating tables and headers to prepare information from a database for use in a graph analytics application. We are consequently not persuaded that the holding of *McRO* necessitates a conclusion that Appellant's claimed method is patent-eligible.

Appellant next points to *Visual Memory* in support of its argument that its claimed method is not directed to an abstract idea, noting that "the Federal Circuit finds that the relevant claims 'are directed to a technological

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improvement: an enhanced computer memory system' and that 'the specification discuss[es] the advantages offered by the technological improvement.'" App. Br. 23 (quoting *Visual Memory*, 867 F.3d at 1259, 1260). The invention in *Visual Memory* was a "memory system with programmable operational characteristics that can be tailored for use with multiple different processors without the accompanying reduction in performance." *Visual Memory*, 867 F.3d at 1255. In holding that the claims were patent eligible, the court in *Visual Memory* stated that:

> As with *Enfish*'s self-referential table and the motion tracking system in *Thales*[2], the claims here are directed to a technological improvement: an enhanced computer memory system. The '740 patent's claims focus on a "specific asserted improvement in computer capabilities"—the use of programmable operational characteristics that are configurable based on the type of processor—instead of "on a process that qualifies as an 'abstract idea' for which computers are invoked merely as a tool."

Id. at 1259–60 (quoting *Enfish*, 822 F.3d at 1336).

But, as we have explained, we are not persuaded by Appellant's arguments that the claimed method is directed to an improvement to computer functionality. Rather, we again conclude that the use of available software to reorganize and format data for use by a graph analysis application results in the claimed method being an abstract idea implemented on a generic processor. And, while we acknowledge that the court in *Visual Memory* states "[a]nd like the patents at issue in *Enfish* and *Thales*, the specification discusses the advantages offered by the technological improvement," we are not, for the reasons explained,

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[2] *Thales Visionix Inc. v. United States*, 850 F.3d 1343 (Fed. Cir. 2017).

persuaded that Appellant's Specification's extolling of the benefits of the claimed method rises to the level of explaining an improvement in computer functionality, but, rather, we find it represents the benefits of a new and efficient method of arranging and formatting data from a spreadsheet for use in a commercially-available graph analysis program. We consequently conclude that the claims are directed to an abstract idea.

Having identified the judicial exceptions recited by the claims, we determine whether the limitations of the claims reciting the judicial exceptions are integrated into a practical application. 2019 Guidance 54 (Step 2A, Prong 2). The 2019 Guidance provides additional context for this analysis, stating that: "A claim that integrates a judicial exception into a practical application will apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception." *Id.* at 53.

We conclude that the claims are not integrated into a practical application because the claims recite no additional limitations that extend the scope of the claims beyond the abstract idea itself. In other words, the language of the claims provides no meaningful limitation upon the abstract idea of organizing and formatting data for use by a graph analysis application, and merely claims the abstract idea itself. Our reviewing court has repeatedly found that abstract concepts that merely collect, classify, or otherwise filter data are patent-ineligible. *See Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 1327 (Fed. Cir. 2016); *see also In re TLI Commc'ns LLC Patent Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016); *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat'l Ass'n*, 776 F.3d

1343, 1347 (Fed. Cir. 2014); *BASCOM*, 827 F.3d at 1348–49. We consequently conclude that the claims are not integrated into a practical application.

Claims directed to a judicial exception may be patent eligible if they recite additional elements that provide "significantly more" than the judicial exception. 2019 Guidance 56 (Step 2B). We therefore turn next to Appellant's arguments that the claims recite significantly more than the abstract idea to which they are directed.

B.   Appellant argues that, assuming *arguendo* that the claims are directed to an abstract idea, the claims as a whole amount to significantly more than the abstract idea.

Issue 1

Appellant disputes the Examiner's findings that "the computer is recited to represent data in graph form to generate a product recommendation" that "the use of generic computer components to process data according to programmed software algorithm does not impose any meaningful limit on the computer implementation of the abstract idea" and that generic computer functions are "well-understood, routine, and conventional activities [that] amount to no more than implementing the abstract idea with a computerized system." App. Br. 27–28 (alteration in original) (quoting Final Act. 3–4).

According to Appellant, the Examiner does not cite which specific additional limitations are "well-understood, routine, and conventional," nor does Examiner explain why such additional limitations are "well-understood, routine, and conventional." *Id.* at 28. Appellant contends that

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the Examiner's allegedly conclusory findings are contrary to the guidelines set forth in the USPTO's April 19, 2018 memo *Changes in Examination Procedure Pertaining to Subject Matter Eligibility, Recent Subject Matter Eligibility Decision (Berkheimer v. HP, Inc.)* [3] (the "2018 Memo"). Appellant alleges that the Examiner has failed to provide any of the following required elements: (1) a citation to an express statement in Appellant's Specification; (2) a citation to a court decision; (3) a citation to a publication; or (4) a statement of Office Notice. App. Br. 28 (citing 2018 Memo 3–4).

Issue 2

Appellant points to the Federal Circuit's holding in *BASCOM* that an "inventive concept may be found in non-conventional and non-generic arrangement of additional elements in combination" and that an inventive concept can be found in the ordered combination of claim limitations. App. Br. 29 (quoting *BASCOM*, 827 F.3d at 1350).

Appellant argues that, similar to the situation in *BASCOM*, the claims before us are directed to an inventive concept, namely, of enabling a system to cull through a voluminous amount of data, generate topology information and graph metadata information, input such generated (and separately stored) information into a graph analytics application in an appropriate format, and determine a vertex of the graph which may be of interest given the graph input dataset (e.g., a product recommendation in the case of transaction data of a retailer). App. Br. 30. Appellant contends that that the

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[3] Citing *Berkheimer v. HP Inc.*, 881 F.3d 1360 (Fed. Cir. 2018)

additional limitations of the claims are neither generic nor conventional, and are also a non-generic arrangement when placed in the network. *Id.*

The Examiner responds that nothing in the claims amounts to significantly more than the abstract idea. Ans. 9. The Examiner finds that the claims recite generic computer components (e.g., processor, logic, and storage) and functions (e.g., generating, storing, and loading data). *Id.* (citing *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1355 (Fed. Cir. 2014) (holding that the invocation of computers and generic functionality adds no inventive concept). Furthermore, the Examiner finds, nothing in the claims, when viewed in light of Appellant's Specification, requires anything other than an off-the-shelf, conventional computer used for collecting and processing/analyzing various information/data. *Id.* Therefore, the Examiner concludes, and unlike the claims considered by the Federal Circuit in *Enfish*, Appellant's claims are not directed to an improvement in computer capabilities, but to the results of applying an abstract idea. *Id.*

Issue 3

Appellant argues that the claims are also directed to a specific tangible application. App. Br. 31. Appellant points to *Classen Immunotherapies, Inc. v. Biogen IDEC*, 659 F.3d 1057 (Fed. Cir. 2011) in arguing that the claims are "directed to a specific, tangible application." *Id.* (quoting *Classen*, 659 F.3d at 1066).

Appellant argues that, similar to the patent-eligible claims of *Classen*, the claims on appeal recited "identifying information" (i.e., generating topology information; generating header files with metadata) and "comparing information" (i.e., loading graph metadata as needed based on

graph processing). App. Br. 32. According to Appellant, the claimed
system further includes the subsequent step of generating data identifying a
selected vertex representing an associated product based on the graph
processing. *Id.* Therefore, contends Appellant, and as in *Classen*, the
instant claims are directed to a "specific, tangible application," which is both
"functional and palpable." *Id.* (quoting *Classen*, 659 F.3d at 1066, 1065).

The Examiner responds that the claims on appeal are distinguishable
from *Classen* because the claims do not provide any specific act of
immunizing a patient (or anything else to be physically done to a patient).
Ans. 10. The Examiner finds instead that the claims merely process abstract
data by use of a generic computer performing routine computer functions.
Id.

Issue 4

Appellant next argues that the Examiner erred because the claims
entail a specific, unconventional technological solution to a technological
problem. Appeal Br. 32. Appellant points to *Amdocs (Isr.) Ltd. v. Openet
Telecom, Inc.*, 841 F.3d 1288 (Fed. Cir. 2016). Appellant contends that
Amdocs is relevant because the claimed invention in that case (enhancing
data in a distributed fashion) "entail[ed] an unconventional technological
solution … to a technological problem (massive record flows which
previously required massive databases)." *Id.* (quoting *Amdocs*, 841 F.3d at
1300). Specifically, Appellant notes the *Amdocs* court's finding that the
claims at issue were similar to those in *BASCOM*, because "when all
limitations are considered individually and as an ordered combination, they

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provide an inventive concept through the use of distributed architecture." *Id.* (emphasis omitted) (quoting *Amdocs*, 841 F.3d at 1302).

Similarly, Appellant argues, the Specification describes how Appellant's claimed system is an advancement over the prior art. App. Br. 33. Appellant asserts that, rather than be limited by the amount of data that a single workstation can handle, the claims on appeal provide a system that efficiently translates transaction data to a graph input dataset for a graph analytics application. *Id.* (citing Spec. ¶¶ 3, 8, 22). Appellant argues that this results in a benefit, i.e., the system can analyze and process a voluminous amount of data by translating the data into a graph input dataset which is appropriately formatted and readable by the graph analytics application, which results in being able to use a standard machine without being limited by the time, disk space, and memory capacity available. *Id.* (citing Spec. ¶ 3). Appellant asserts that these benefits are both an enhancement and an improvement that produce an unconventional result. *Id.*

The Examiner responds that, unlike the claims in *Amdocs*, Appellant's claims do not provide any enhancement that would result in an unconventional result. Ans. 10. The Examiner also finds that the features relied on by Appellant (e.g., providing efficiencies for large data sets) have not been properly claimed. *Id.*

Issue 5

Finally, Appellant repeats the argument, discussed *supra*, that the claims on appeal are unlike the claims in *Electric Power Group*, and are not an abstract idea. App. Br. 33. Appellant asserts that, in analyzing the

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Electric Power Group claims under Step 2B of the *Alice* analysis, the
Federal Circuit held that "merely selecting information, by content or
source, for collection, analysis, and display does nothing significant to
differentiate a process from ordinary mental processes." *Id.* at 34 (quoting
Electric Power Grp., 830 F.3d at 1355).

Appellant argues that the claims presently on appeal do more than
"nothing significant" to "differentiate" the process from (alleged) ordinary
mental processes. App. Br. 34. Appellant contends that: (1) the underlying
process is not a mental process because it involves the use of computers to
gather and translate voluminous digital data (e.g., transaction data from a
retailer, which can include customer information and product information,
purchase or transaction time, and other associated data), to create a graph
input dataset which can be processed and analyzed by a graph analytics
application; (2) the claims require separately storing generated topology
information and header files with metadata, where neither the generating nor
the storing can be performed using a mental process; (3) the claims go
beyond merely collecting information, and analyzing and displaying it, but
also translate the graph data into a graph input dataset which can be
processed by the graph analytics application; (4) these additional limitations
(which are described plentifully in the Specification as the purported
advantage over the conventional systems) comprise not only something that
is not "nothing significant" but are also greatly significant over the alleged
ordinary mental processes of *Electric Power Group*. *Id.*

Appellant also argues that, unlike the claims in *Electric Power Group*,
Appellant's claims do not purport to monopolize every potential solution to
the problem. App. Br. 35. Appellant asserts that the claims are instead

directed to a particular (i.e., "some") implementation to solving the problem of inefficient data translation for graph processing, which prior inefficient data translation does not scale well. *Id.* at 35–36. Appellant argues that the claimed method does not attempt to patent the abstract idea of a solution to a problem in general, but rather seeks to patent a particular concrete solution to the problem. *Id.* at 36.

Analysis

We are not persuaded by Appellant's arguments. In this final step of the *Mayo* analysis, we consider the elements of the claim, both individually and "as an ordered combination," to determine whether additional elements "transform the nature of the claim" into a patent-eligible application. *Mayo*, 566 U.S. at 78–79; 2019 Guidance 56 (Step 2B). The Supreme Court has described this step as "a search for an 'inventive concept'"—i.e., an element or combination of elements that is "sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself." *Alice*, 573 U.S. at 217–18 (alteration in original); *Mayo*, 566 U.S. at 72–73.

As an initial matter, we have already addressed the question of whether the abstract idea recited in the claims is integrated into a practical application (Appellant's issue 3) in Step 2A, Prong 2 of our analysis *supra*. Briefly, we explained that the claims are not integrated into a practical application, because the claims recite no additional limitations that extend the scope of the claims beyond that of the abstract idea itself, i.e., the language of the claims provides no meaningful limitation beyond the

abstract idea of organizing and formatting data for use by a graph analysis application.

This same reasoning undermines Appellant's remaining arguments. Simply put, Appellant's argument that "the claims as a whole amount to significantly more than the abstract idea," fails, because the claims, taken as a whole, recite no more than the abstract idea itself, *viz.*, (1) generating a table containing topology information of a graph; (2) generating files that include metadata describing a plurality of tables with graph information; (3) generating files containing data from the plurality of tables including the topology information table; (4) storing the generated files with table data at a first storage location; (5) storing the generated header files at a second storage location; (6) loading graph metadata stored separately from topology information as needed; and (7) generating data identifying a selected vertex representing an associated product. All of these steps constitute the organizing (i.e., generating date into tables and formatting) and storing steps performed on a generic processor and using commercially-available software. There are no recited extra-processing limitations and, consequently, there are no limitations expanding the scope of the claim to add "significantly more" than the abstract idea itself. And it is well established that "simply implementing an abstract concept on a computer, without meaningful limitations to that concept, does not transform a patent-ineligible claim into a patent-eligible one." *See Accenture Glob. Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1345 (Fed. Cir. 2013) (citing *Bancorp Servs., L.L.C. v. Sun Life Assurance Co. of Can. (U.S.)*, 687 F.3d 1266, 1280 (Fed. Cir. 2012)).

We consequently affirm the Examiner's rejection of the claims.

CONCLUSION

The Examiner's rejection of claims 1–14, 16, 17, and 19–22 under 35 U.S.C. § 101 is affirmed.

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

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–14, 16, 17, 19–22	101	Eligibility	1–14, 16, 17, 19–22	