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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/902,677	05/24/2013	Jitender Aswani	000005-036200US	2493

58735 7590 03/19/2020

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ART UNIT	PAPER NUMBER
2157	

NOTIFICATION DATE	DELIVERY MODE
03/19/2020	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JITENDER ASWANI, RYAN LEASK, and JENS DOERPMUND

Appeal 2019-001390
Application 13/902,677
Technology Center 2100

Before JASON V. MORGAN, ERIC B. CHEN, and
PHILLIP A. BENNETT, *Administrative Patent Judges.*

BENNETT, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–9 and 11–20. Claim 10 has been cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as SAP SE. Appeal Br. 2.

CLAIMED SUBJECT MATTER

The claims are directed to representing enterprise data in a knowledge graph. Claim 1, reproduced below with the key limitation in italics, is illustrative of the claimed subject matter:

> 1. A computer-implemented method for storing data comprising steps of:
>
> storing a graph that represents relationships among enterprise data that comprise one or more databases in the enterprise, the graph comprising:
>
> *a plurality of first-level nodes, the first-level nodes representative of classes of data among the enterprise data, the first-level nodes having links to each other based on relationships among the first-level nodes*; and
>
> a plurality of second-level nodes that are children nodes of the first-level nodes, the second-levels nodes having links to each other in the same relation as their respective first level nodes;
>
> receiving data that is not search input data, the received data to be stored in the one or more databases in an enterprise;
>
> identifying a first-level node from the plurality of first-level nodes by comparing some of the received data to properties and attributes of the respective classes of data represented by the first-level nodes;
>
> using the identified first-level node to identify a database table in the one or more databases in the enterprise;
>
> storing some of the received data in the identified database table; and
>
> growing the graph, including:
>
> creating one or more second-level nodes;
>
> storing some of the received data in the one or more created second-level nodes;
>
> linking the one or more created second-level nodes as children nodes of the identified first-level node; and
>
> linking the one or more created second-level nodes to other second-level nodes in the graph in the same

> relation as the identified first-level node linked to the respective first-level nodes of the other second-level nodes.

Appeal Br. 23 (Claims Appendix).

REFERENCES

The prior art relied upon by the Examiner is:

Name	**Reference**	**Date**
Das	US 2004/0019672 A1	Jan. 29, 2004
Lee	US 2007/0130133 A1	June 7, 2007
Larson	US 2008/0281801 A1	Nov. 13, 2008
Abbassi	US 2014/0278590 A1	Sept. 18, 2014

REJECTION

Claims 1–9 and 11–20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Abbassi, Larson, Das, and Lee. Final Act. 5–13.

ISSUE

Has the Examiner erred in finding that Larson teaches or suggests "a plurality of first-level nodes, the first-level nodes representative of classes of data among the enterprise data, the first-level nodes having links to each other based on relationships among the first-level nodes," as recited in claim 1?

ANALYSIS

Appellant's Invention

Appellant's invention relates to the construction and use of a knowledge base which is built up by connecting to, and collecting data from, various data sources in an enterprise. Spec. ¶ 20. These data sources may include, for example, backend systems such as customer relationship management (CRM) systems and enterprise resource planning systems (ERM), public data sources, and analytics data. Spec. ¶¶ 20–22. The data collected for the knowledge base is classified according to defined classes of data and inserted into a knowledge graph. Spec. ¶ 34.

The knowledge graph includes two levels of nodes. Spec. ¶ 38. The first-level nodes, referred to as entity nodes, define the classes of data that are represented in the knowledge graph. Spec. ¶ 38–39. The second-level nodes, called instance nodes, represent data that first-level nodes define, and are linked to their respective first-level nodes. Spec. ¶ 40. Thus, first-level nodes can be thought of as representing and defining a category (such as "automobile") and its associated properties (such as "make," "model," and "color"), and the second-level nodes can be thought of as specific items within the defined category having actual data values associated with the properties (such as "Ford," "Mustang," "red"). Spec. ¶ 40–41. The first-level nodes in the knowledge graph may be related or linked to other first-level nodes. Spec. ¶ 39. Those relationship/links are inherited by second-level nodes such that the second-level nodes relate to each other in the same way as their respective first-level nodes. Spec. ¶ 50. Figure 5 of Appellant's Specification is reproduced below with annotations illustrating the relationships between the two levels of nodes.

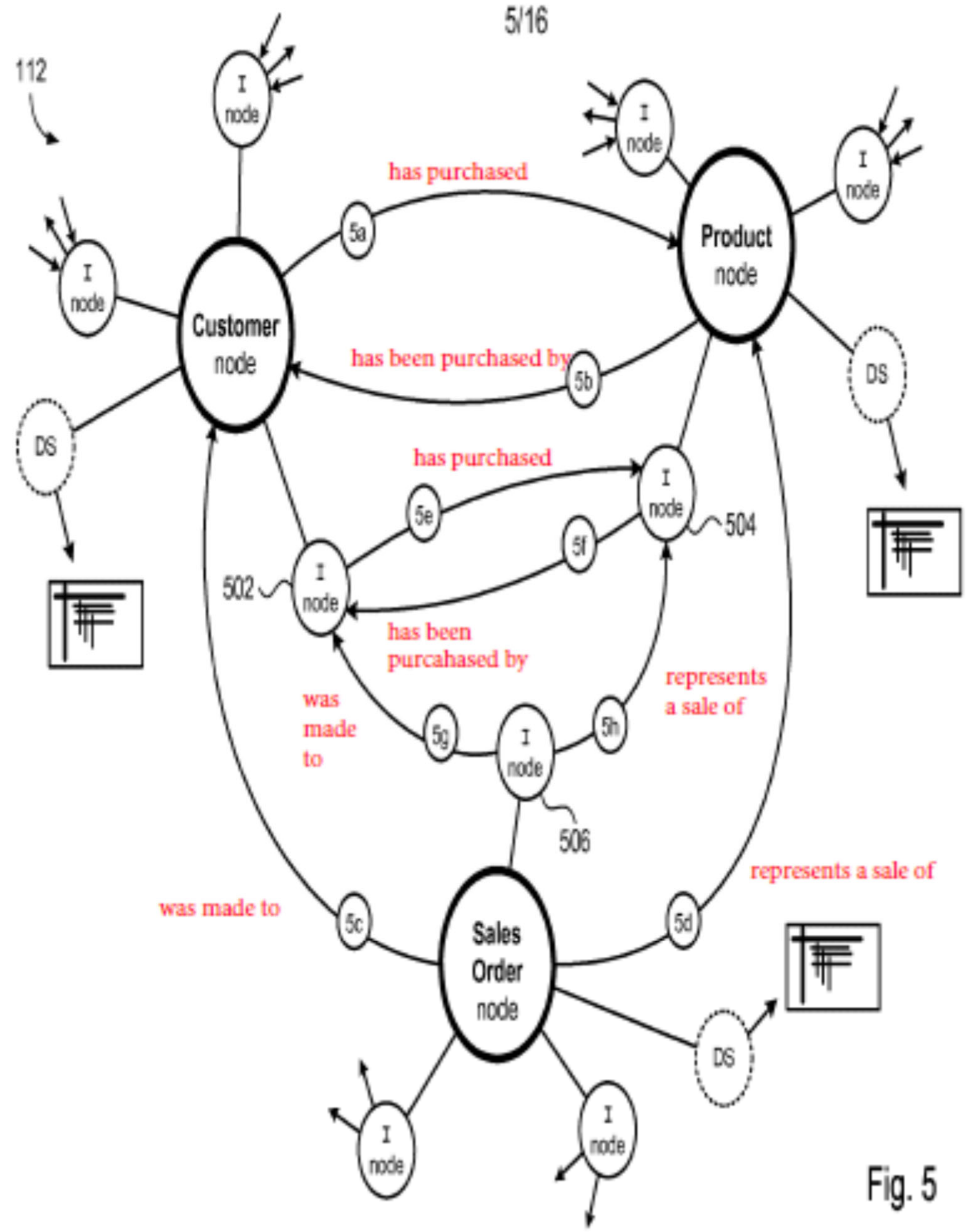

Figure 5 of Appellant's Specification (annotations added) illustrates that each first level node may be linked to several second level instance nodes.

Claim 1 recites a particular method for building a data structure such as that illustrated in Figure 5 by receiving data, storing the data in an appropriate enterprise database, and then separately growing the knowledge graph by adding new nodes representing the received data. Under the claimed method, data is received for storing in one or more enterprise databases. The received data is compared to the first-level nodes defined in the knowledge graph, and in particular to properties and attributes of the data categories represented by the first-level nodes. Based on that comparison, a first-level node in the knowledge graph is identified as the correct classification for the received data, and the first-level node is used, in turn, to identify a database table in the enterprise in which to store the received data. The data is stored in the identified database table. Separately, the graph database is grown by creating a new second-level node which stores the received data and by adding two types of links: (1) a link from the newly-created second-level node to the previously identified first-level node, and (2) a link from the second-level node to other second-level nodes which mirrors the links between the previously identified first-level node and other first-level nodes.

Examiner's Findings and Conclusion

The Examiner rejects claim 1 as obvious over Abbassi, Larson, Das, and Lee. Final Act. 5. Relevant to the issues presented here, the Examiner generally relies on Abbassi to show that the use of graph databases and graph nodes was known in the prior art. Final Act. 5–6. The Examiner finds that Abbassi fails to teach a graph database with the specific structure recited in the claim. Specifically, the Examiner finds Abbassi does not teach "a plurality of first-level nodes, the first-level nodes representative of classes of data among the enterprise data, the first-level nodes having links to each other based on relationships among the first level nodes," and "a plurality of second-level nodes that are children nodes of the first-level nodes, the second-level nodes having links to each other in the same relation as their respective first-level nodes." Final Act. 6.

The Examiner turns to Larson for these limitations, finding that Larson's description of "a system where parent nodes are linked based on some sort of common attribute, and child nodes that are linked based on the relationship of the parent nodes," teaches the limitation. Final Act. 7 (citing Larson Figs. 6, 8, 9; ¶¶ 15, 24, 25, 74, 88, and 89) (italics omitted). The Examiner further explains that the movie titles under the heading "Movies" depicted in Larson's Figure 6 correspond to the recited "first-level nodes" and that these nodes have links to each other because "[t]here does not seem to be any limiting factor indicating how the nodes are linked to each other and therefore regardless of the use of a context node or not, the nodes disclosed by Larson are in fact linked together." Ans. 5.

The Examiner concludes it would have been obvious "to have incorporated the database table as taught by Larson into the system of Abbassi . . . [because] [b]oth are directed to a means of organizing data using directed graphs and the combination would further provide[] a database system callable of analyzing source data to extract data in a timely and efficient manner." Final Act. 7 (citing Larson ¶ 29).

Appellant's Argument

Appellant argues the Examiner has erred because the top level node shown in Larson's Figure 8, the node labeled "Movies," is only a single node, and the disputed limitation requires "a plurality of first-level nodes." Appeal Br. 11–12. Appellant further contends that because there is only a single first-level "Movie" node, "Larson does not teach "first-level nodes having links to each other." Appeal Br. 12. According to Appellant, "because FIG. 8 does not show any other nodes that are at the same level as the MOVIES node nor any other classes of data represented by nodes at the same level as the MOVIES node." *Id.* Appellant further argues the Examiner's reliance on the movie titles depicted in Larson's Figure 8 as corresponding to the recited "first-level nodes" is misplaced, as "Larson clearly explains that FIG. 6 illustrate a tree-like structure 100 with elements 110, 114, 118 . . . and 150 as being nodes in a tree-like structure." Reply Br. 4 (citing Larson ¶ 14). Appellant asserts that "[r]eferring to element 110 as a heading . . . does not change the fact that Larson explicitly teaches element 110 to be a node," and that as the top node in the structure, the "Movies" node is the only node in Larson that can be reasonably characterized as a "first-level node." *Id.*

Our Review

We are persuaded the Examiner has erred. As we noted above, the data structure recited in claim 1 includes two different types of nodes – "first-level nodes" which essentially represent classes or categories of data and "second-level nodes" which can be characterized as representing instances of the classes defined at the first-level. The first-level nodes are linked to each other based on relationships between the categories of data they represent. It is these characteristics that are encompassed by the disputed limitation "a plurality of first-level nodes, the first-level nodes representative of classes of data among the enterprise data, the first-level nodes having links to each other based on relationships among the first-level nodes."

The Examiner cites Figure 6 of Larson as teaching this limitation. Ans. 4–5. Larson describes the tree structure of Figure 6 as "sample movie data stored in a tree-like structure 100 of a hierarchical database system." Larson ¶ 14. Larson's Figure 6 is reproduced below.

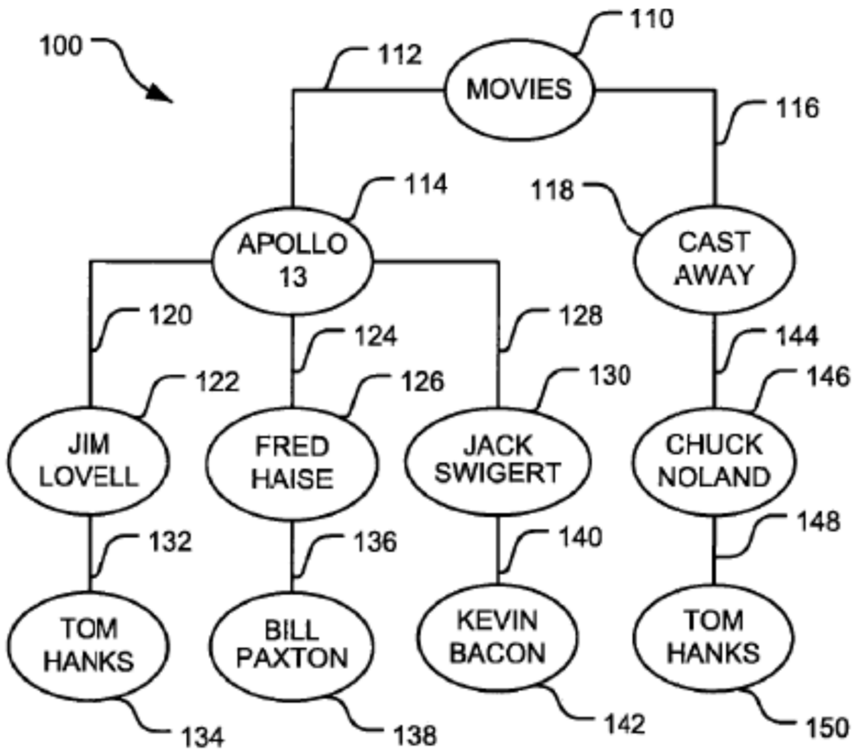

Figure 6
(Prior Art)

Larson's Figure 6 is a block diagram illustrating a tree-like structure of a hierarchical database system.

The Examiner finds that nodes 114 and 118, labeled "Apollo 13" and "Cast Away," respectively, to be "first-level nodes," and that node 110, labeled "Movies" is merely a table heading. We agree with Appellant, however, that the "Apollo 13" and "Cast Away" nodes cannot reasonably be considered "first-level nodes." Appellant's Specification unambiguously states that "first level nodes do not [ ] represent instances of the data they define." Spec. ¶ 40. The nodes relied upon by the Examiner do not meet this requirement. The nodes "Apollo 13" and "Cast Away" represent instances of the movies themselves, and are therefore more akin to the "second-level nodes" recited in claim 1.

Moreover, we also agree with Appellant that even if the "Apollo 13" and "Cast Away" nodes could be considered first-level nodes within the meaning of claim 1, they still would not meet the requirement that the first level nodes "having links to each other based on relationships among the first-level nodes." As illustrated in Appellant's Figure 5, the relationships between first-level nodes represent relationships among them. *See* Spec. ¶ 49 ("For example, link 5a may represent the relationship that a customer 'has purchased' a product, while the link 5b may represent the relationship that a product 'has been purchased by' a customer."). In Larson, the nodes "Apollo 13" and "Cast Away" have no similar relationship. Instead, these nodes are merely depicted as being instances of "Movies" without any meaningful connection between them.

Accordingly, we are persuaded the Examiner has erred in finding that Larson teaches or suggests the disputed limitation in claim 1. We, therefore, do not sustain the rejection of claim 1 under 35 U.S.C. § 103. Independent claims 9 and 17 also recite the disputed limitation, and we do not sustain their rejection under the same reasoning. The remaining claims are dependent and stand for the same reasons.

CONCLUSION

The Examiner's rejection of claims 1–9 and 11–20 under 35 U.S.C. § 103 is reversed.

DECISION SUMMARY

Claims Rejected	**35 U.S.C. §**	**References**	**Affirmed**	**Reversed**
1–9, 11–20	103	Abbassi, Larson, Das, Lee		1–9, 11–20

REVERSED