

WHAT IS CLAIMED IS:

- 1 1. A method for performing a key range lookup, comprising:
2 receiving a first key;
3 identifying a key range tree map associated with the first key from a
4 plurality of key range tree maps, individual key range tree maps mapping a set of
5 minimum range values to a set of index values;
6 determining an index value associated with a second key using the
7 identified key range tree map, the second key being associated with the first key;
8 determining transaction processing data associated with the first key
9 using the index value, wherein utilizing the plurality of key range tree maps enables a
10 key range search to be performed using on-board memory of an electronic device;
11 and
12 providing the determined transaction processing data associated with
13 the first key.
- 1 2. The method of claim 1, wherein the second key is a minimum
2 range value corresponding to a range.
- 1 3. The method of claim 1, wherein identifying the key range tree
2 map associated with the first key from the plurality of key range tree maps
3 comprises:
4 hashing the first key to produce a hashed key;
5 obtaining a hash map that maps a set of hashed keys to the plurality of
6 key range tree maps, the hash map being configured to be loaded into on-board
7 memory of the electronic device;
8 inputting the hashed key into the hash map; and
9 outputting the key range tree map corresponding to the hashed key.
- 1 4. The method of claim 1, wherein determining the index value
2 associated with the second key comprises:
3 determining the second key from the first key, the second key
4 corresponding to a minimum range value;

5 inputting the second key into the key range tree map, the key range
6 tree map being configured to be loaded into on-board memory of the electronic
7 device; and
8 outputting the index value corresponding to the second key.

1 5. The method of claim 1, wherein determining transaction
2 processing data associated with the first key using the index value comprises:
3 obtaining an indexed list, the indexed list mapping a plurality of index
4 values to a plurality of transaction processing data, the indexed list being configured
5 to be loaded into on-board memory of the electronic device;
6 inputting the index value into the indexed list; and
7 outputting the transaction processing data corresponding to the index
8 value.

1 6. The method of claim 1, further comprising determining a
2 maximum range value associated with the first key using the index value.

1 7. The method of claim 6, wherein determining the maximum
2 range value associated with the key using the index value comprises:
3 obtaining an indexed list, the indexed list mapping a plurality of index
4 values to a plurality of maximum range values, the indexed list being configured to
5 be loaded into on-board memory of the electronic device;
6 inputting the index value into the indexed list; and
7 outputting the maximum range value corresponding to the index value.

1 8. The method of claim 1, wherein the method is performed on a
2 single computing device of a distributed computing system.

1 9. The method of claim 1, wherein the method enables a key
2 range search to be performed in constant $\log(n)$ algorithmic efficiency.

1 10. The method of claim 1, wherein the plurality of key range tree
2 maps comprise the minimum range values associated with a data set, and wherein
3 the identified key range tree map associated with the first key comprises a subset of
4 the minimum range values associated with the data set.

1 10. A system, comprising:
2 one or more manager nodes, a manager node comprising:
3 a first processor, and
4 a first computer readable medium coupled to the first processor,
5 the computer readable medium comprising code, executable by the first
6 processor, for implementing a first method comprising:
7 receiving a request message, the request message
8 comprising a first key;
9 transmitting at least a portion of the request message to
10 one or more worker nodes of the plurality of worker nodes;
11 receiving a response message associated with the
12 request message; and
13 transmitting the response message;
14 the plurality of worker nodes, a worker node of the plurality of worker
15 nodes comprising:
16 a second processor, and
17 a second computer readable medium coupled to the second
18 processor, the computer readable medium comprising code, executable by
19 the second processor, for implementing a second method comprising:
20 identifying a tree map of the plurality of tree maps using
21 the first key and a hash map;
22 determining an index value associated with a second key
23 using the identified tree map, wherein using the identified tree map
24 enables the index value to be determined using on-board memory of
25 the worker node;
26 determine transaction processing data associated with
27 the second key utilizing the index value and an indexed list, the
28 indexed list comprising a plurality of index values individual associated
29 with a set of transaction processing data; and
30 providing the determined transaction processing data.

1 11. The system of claim 10, wherein the first key is an
2 alphanumeric value and the second key is a minimum range value corresponding to
3 a range that is associated with the first key.

1 12. The system of claim 10, wherein identifying a tree map of the
2 plurality of tree maps using the first key and the hash map comprises:
3 hashing the first key to produce a hashed key;
4 obtaining a hash map configured to be stored in on-board memory of
5 the manager node, the hash map mapping a plurality of keys to the plurality of tree
6 maps;
7 inputting the hashed key into the hash map; and
8 outputting the tree map of the plurality of tree maps, the tree map
9 corresponding to the hashed key.

1 13. The system of claim 10, wherein determining the index value
2 associated with the second key comprises:
3 determining the second key using the first key, the second key
4 corresponding to a minimum range value of a range;
5 inputting the second key into the tree map, the tree map being
6 configured to be loaded into on-board memory of the electronic device; and
7 outputting the index value corresponding to the second key.

1 14. The system of claim 10, wherein determining the transaction
2 processing data associated with the first key using the index value comprises:
3 accessing an indexed list, the indexed list mapping a plurality of index
4 values to a plurality of transaction processing data;
5 inputting the index value into the indexed list; and
6 outputting the transaction processing data corresponding to the index
7 value.

1 15. The system of claim 10, wherein the second method further
2 comprises determining a maximum range value associated with the first key using
3 the index value and an additional indexed list.

1 16. The system of claim 15, wherein determining the maximum
2 range value associated with the first key using the index value comprises:
3 accessing the additional indexed list, the additional indexed list
4 mapping a plurality of index values to a plurality of maximum range values;
5 inputting the index value into the additional indexed list; and
6 outputting the maximum range value corresponding to the index value.

1 17. The system of claim 10, wherein the first method and the
2 second method enable the transaction processing data to be determined with
3 constant $\log(n)$ algorithmic efficiency.

4 18. The system of claim 10, wherein the plurality of tree maps
5 comprise minimum range values associated with a data set, and wherein the tree
6 map associated with the first key comprises a subset of the minimum range values
7 associated with the data set.

1 19. An electronic device, comprising:
2 a processor, and
3 a computer readable medium coupled to the processor, the computer
4 readable medium comprising code, executable by the processor, for implementing a
5 method comprising:
6 receiving an identifier associated with a dataset;
7 generating an indexed list from a data set, the indexed list
8 mapping a plurality of index values to a plurality of transaction processing
9 data of the data set;
10 storing the indexed list; and
11 for each entry of the indexed list:
12 determining a minimum range value of a range
13 associated with the entry of the indexed list;
14 updating a tree map comprising the minimum range value
15 and an index value associated with the entry of the indexed list; and
16 updating a hash map with an alphanumeric identifier and
17 an identifier of the tree map.

1 20. The electronic device of claim 19, wherein the method further
2 comprises:
3 determining that a set of ranges associated with the transaction
4 processing data of the data set are non-contiguous;
5 in response to determining that the set of ranges associated with the
6 transaction processing data of the data set are non-contiguous, generating an
7 additional indexed list from the data set, the additional indexed list mapping the
8 plurality of index values to a plurality of maximum range values of the set of ranges;
9 and
10 storing the additional indexed list.