

FIG. 1

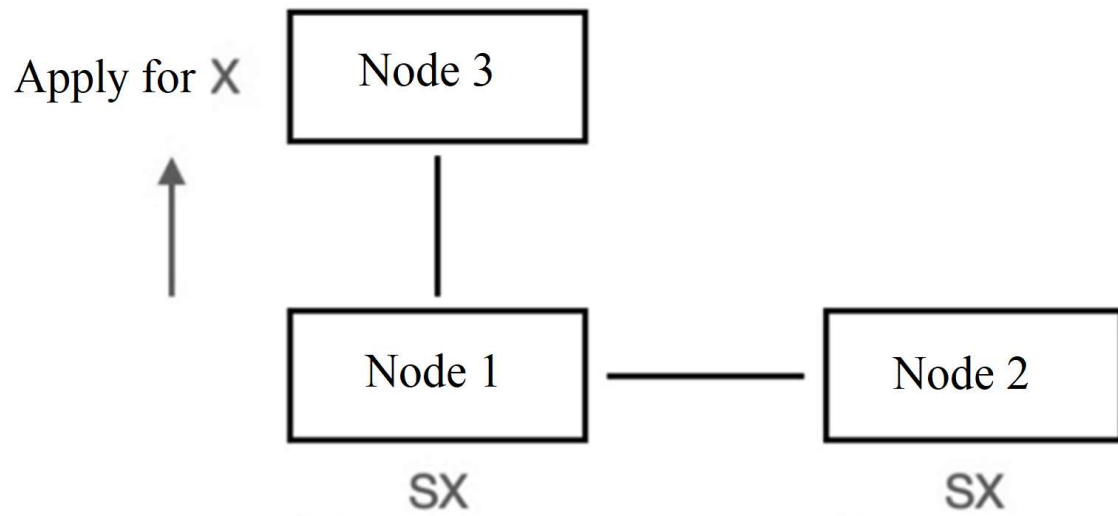


FIG. 2

	S	SX	X
---	+	---	+
S	o	o	x
---	+	---	+
SX	o	x	x
---	+	---	+
X	x	x	x
---	+	---	+

FIG. 3

A writing thread traverses from a root node of the multiway tree to search a target index record matching a search keyword of a writing operation, so as to find a target node where the target index record is located

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If the writing operation needs to trigger a structure modification operation, the writing thread applies for adding, according to a locking rule, exclusive locks for memory pages corresponding to the target node and other nodes needing associated modification, so as to modify the target node and the other nodes accordingly after successfully adding the exclusive locks for the target node and the other nodes; where the locking rule includes: if a direction from any node to an associated node does not meet a requirement of a locking direction, on the basis of holding an exclusive lock of a memory page corresponding to the any node and before applying for adding an exclusive lock for a memory page corresponding to the associated node, the exclusive lock of the memory page corresponding to the any node needs to be released, and a preset mark needs to be set for the memory page corresponding to the any node; and a lock held by itself needs to be released if any memory page for which adding an exclusive lock is applied has been set with the preset mark by another writing thread

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FIG. 4

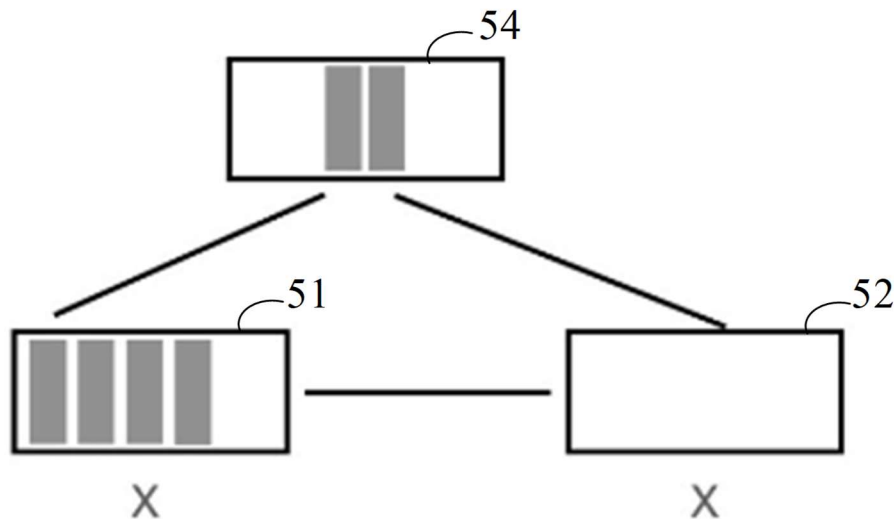


FIG. 5A

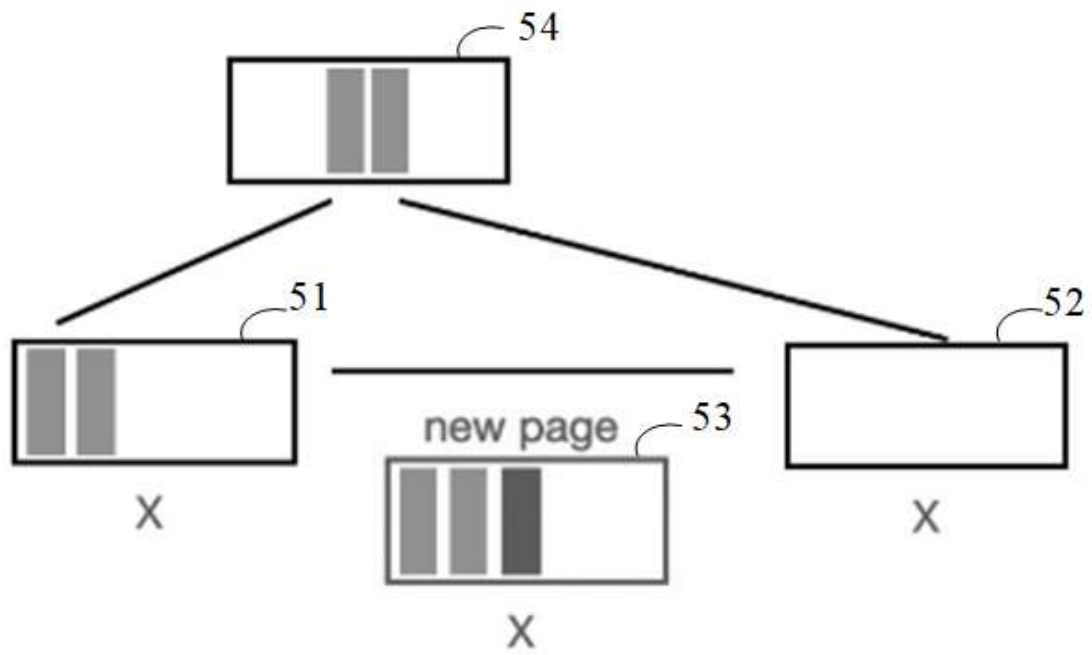


FIG. 5B

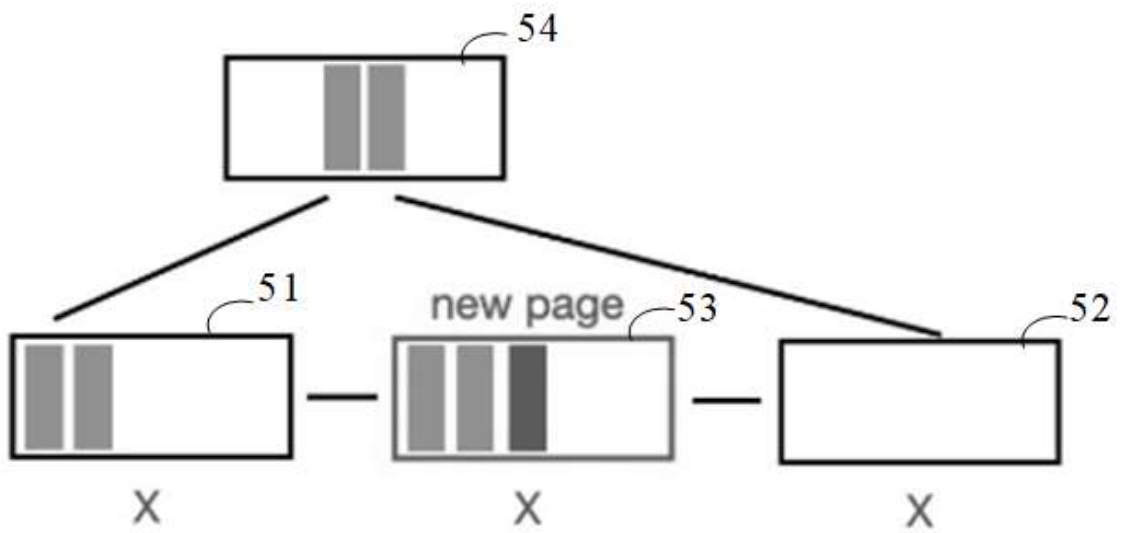


FIG. 5C

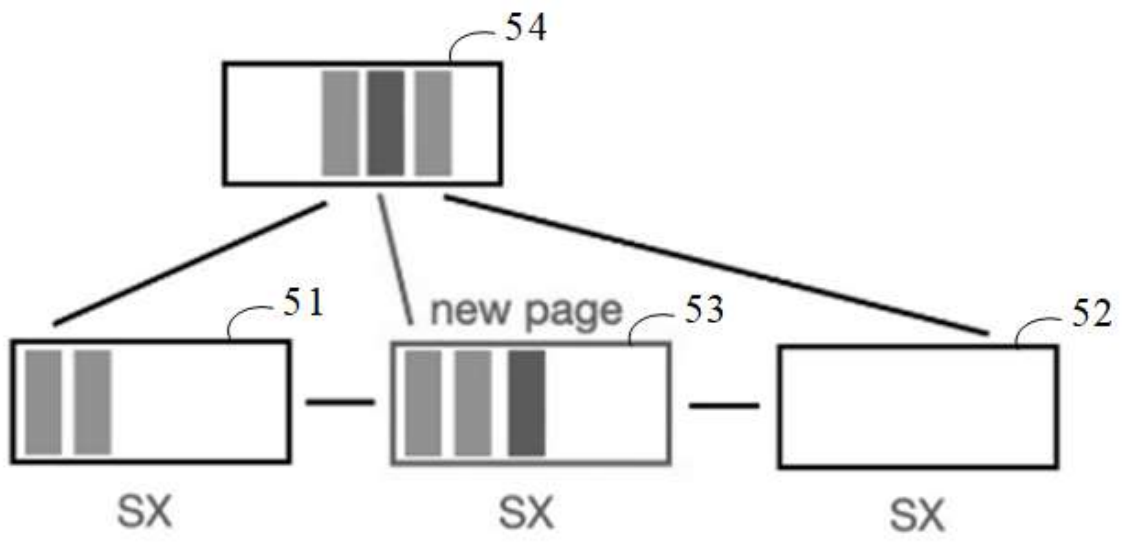


FIG. 5D

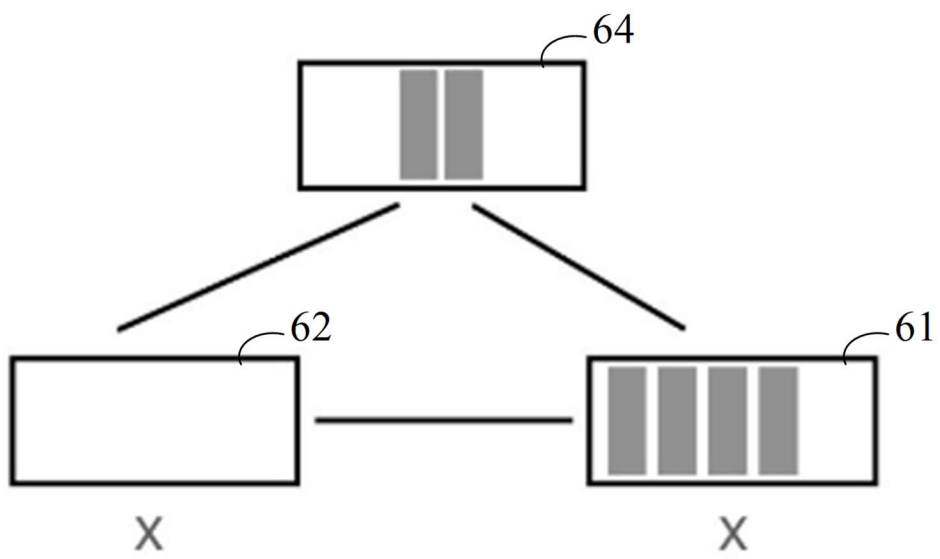


FIG. 6A

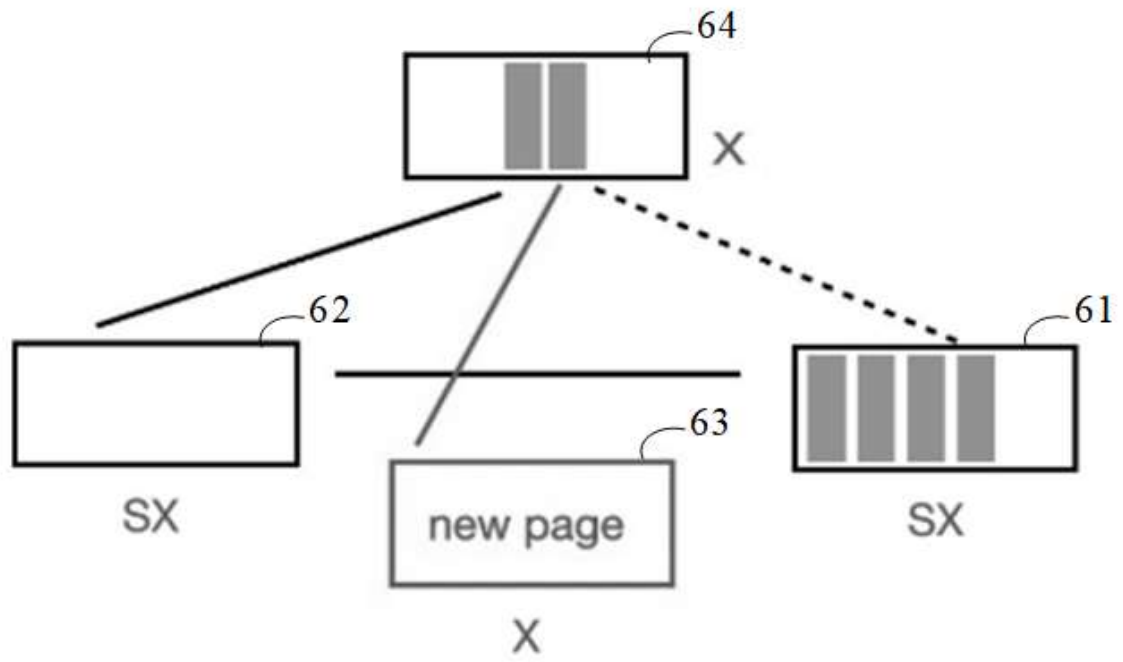


FIG. 6B

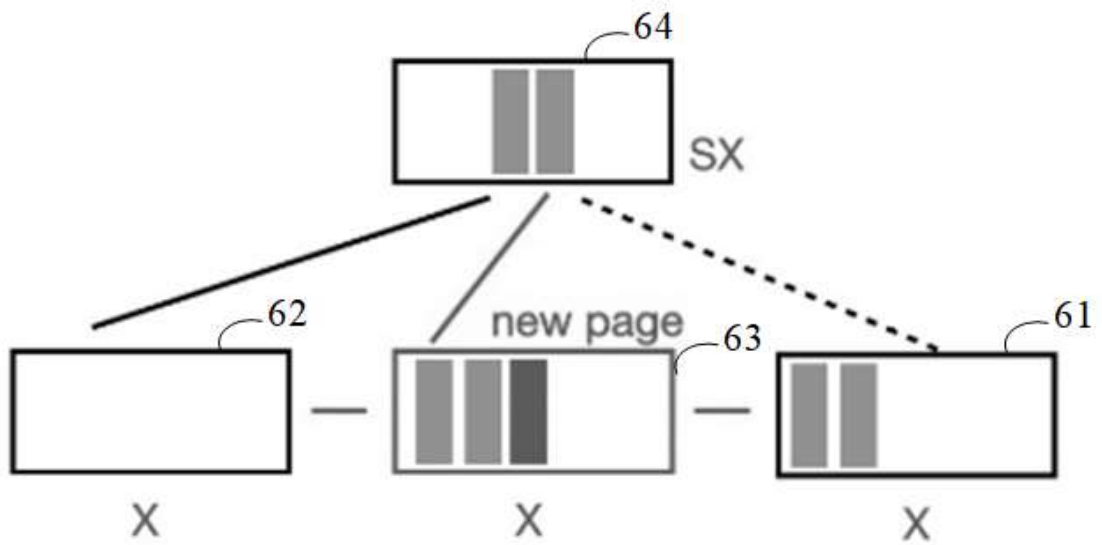


FIG. 6C

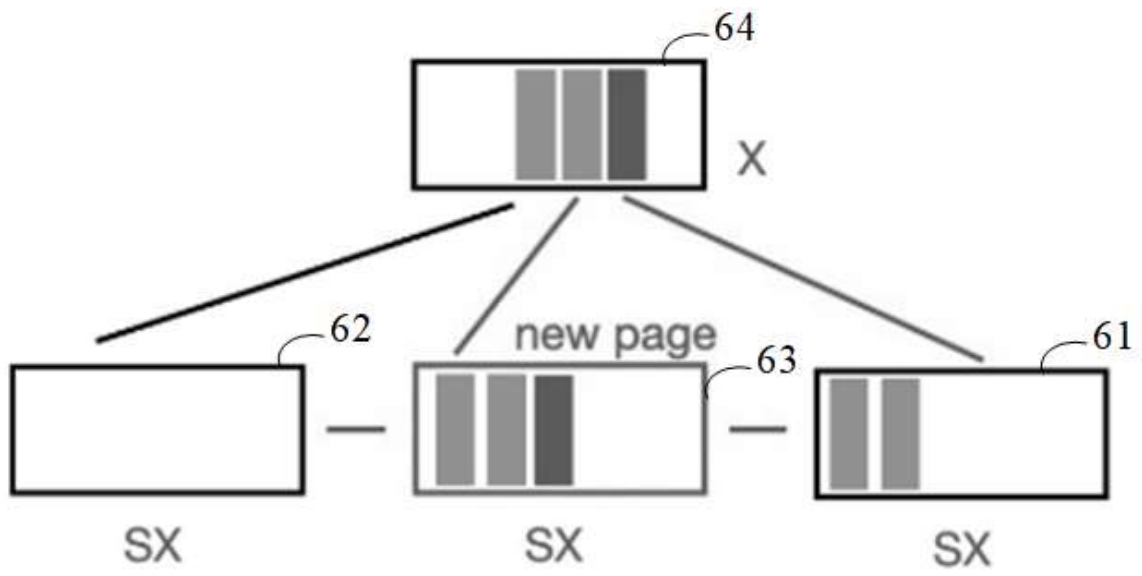


FIG. 6D

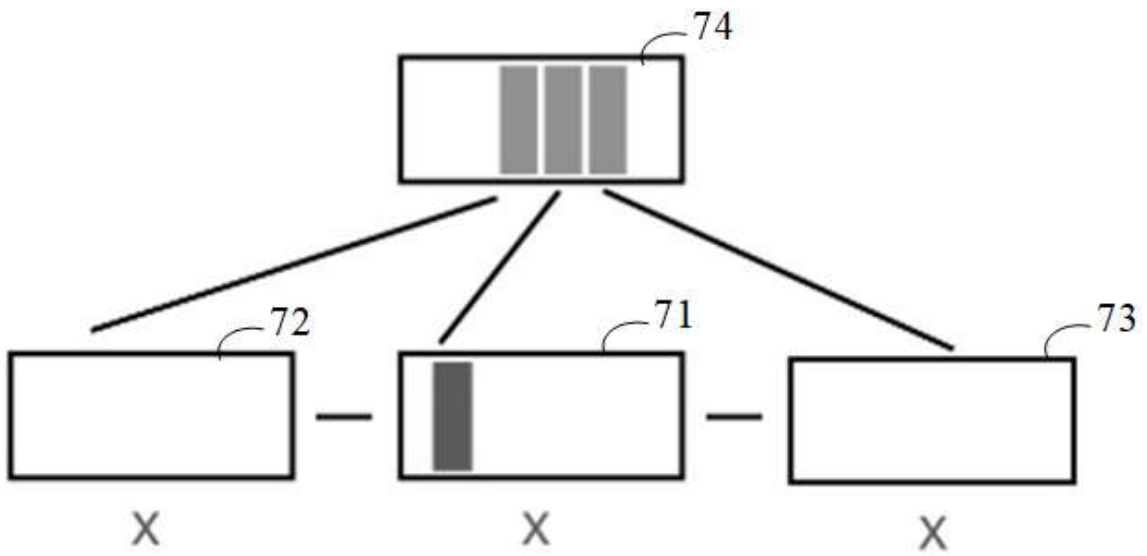


FIG. 7A

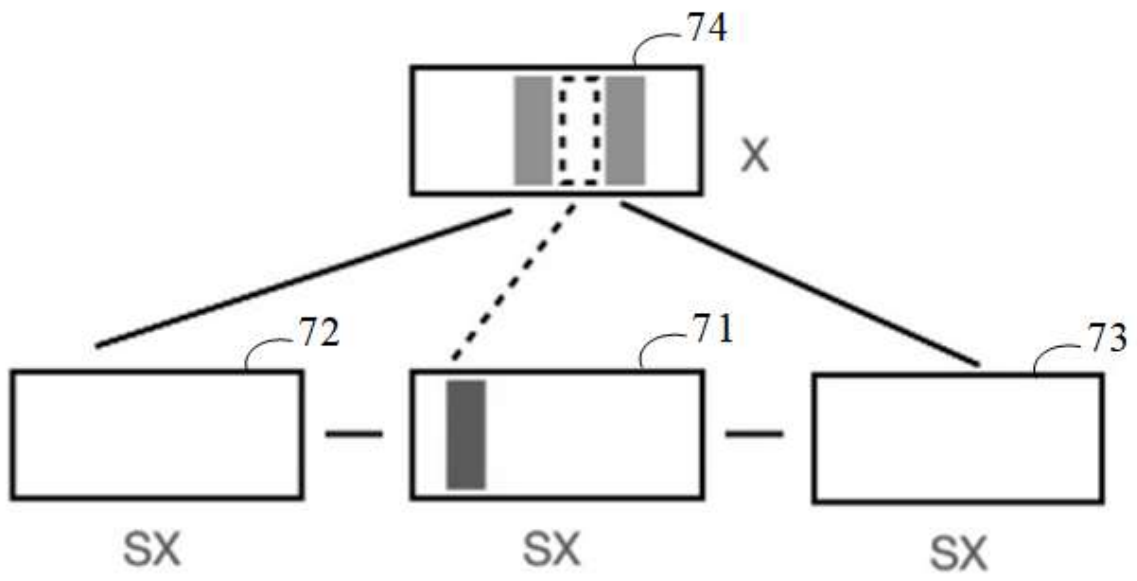


FIG. 7B

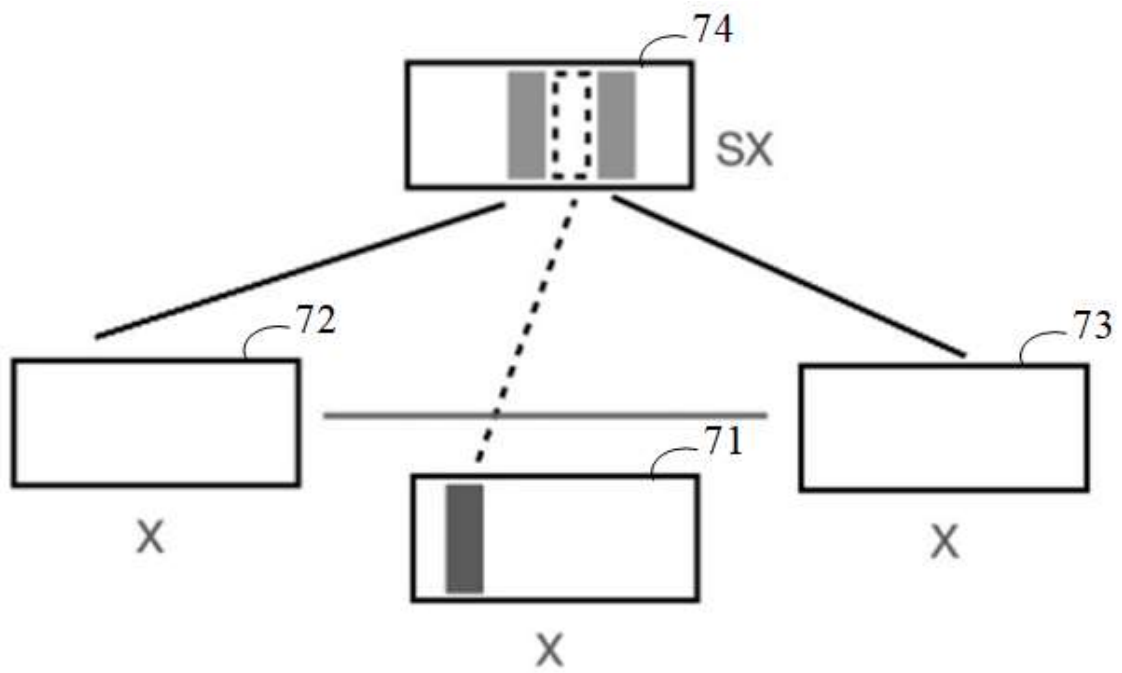


FIG. 7C

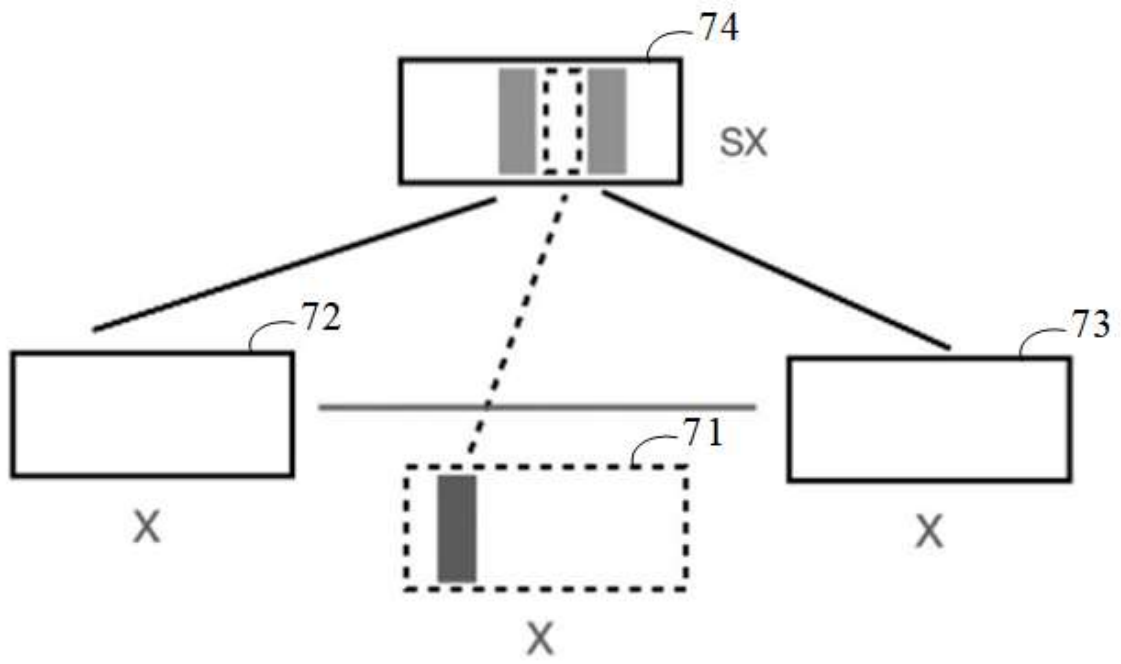


FIG. 7D

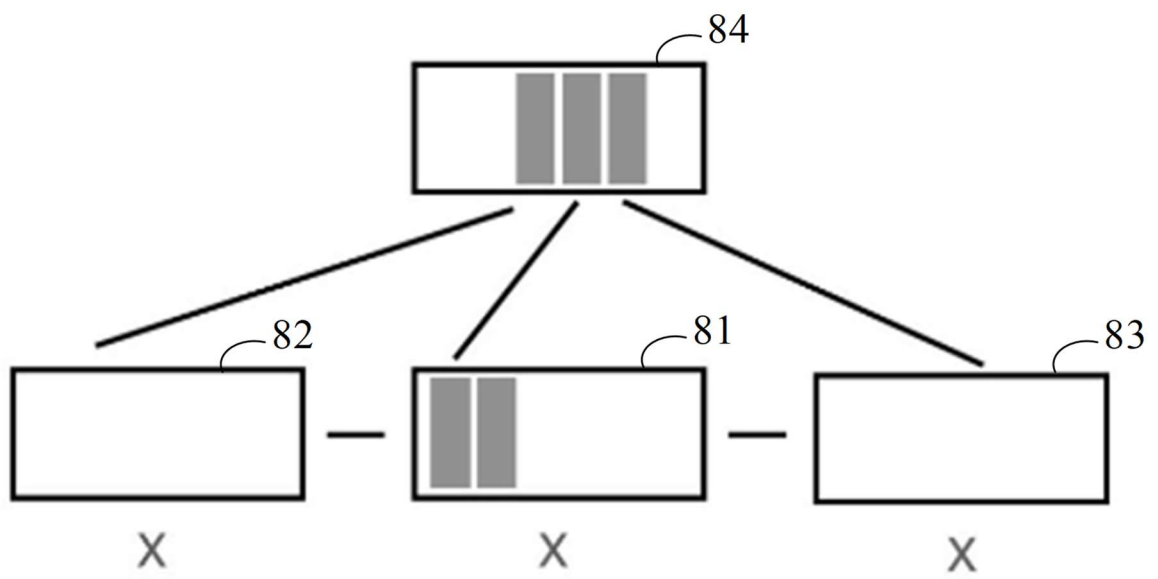


FIG. 8A

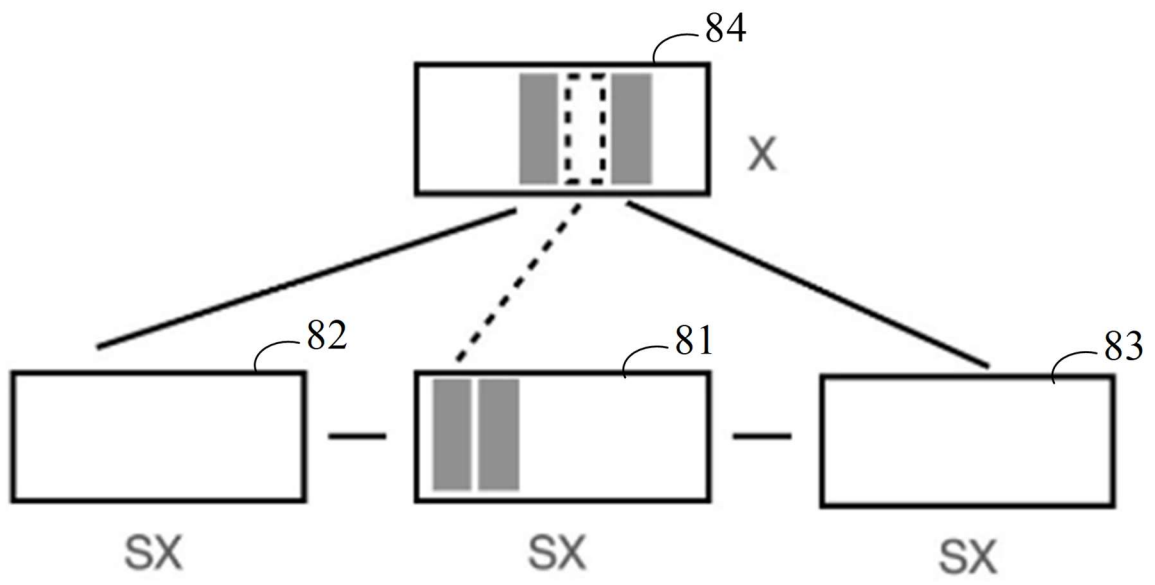


FIG. 8B

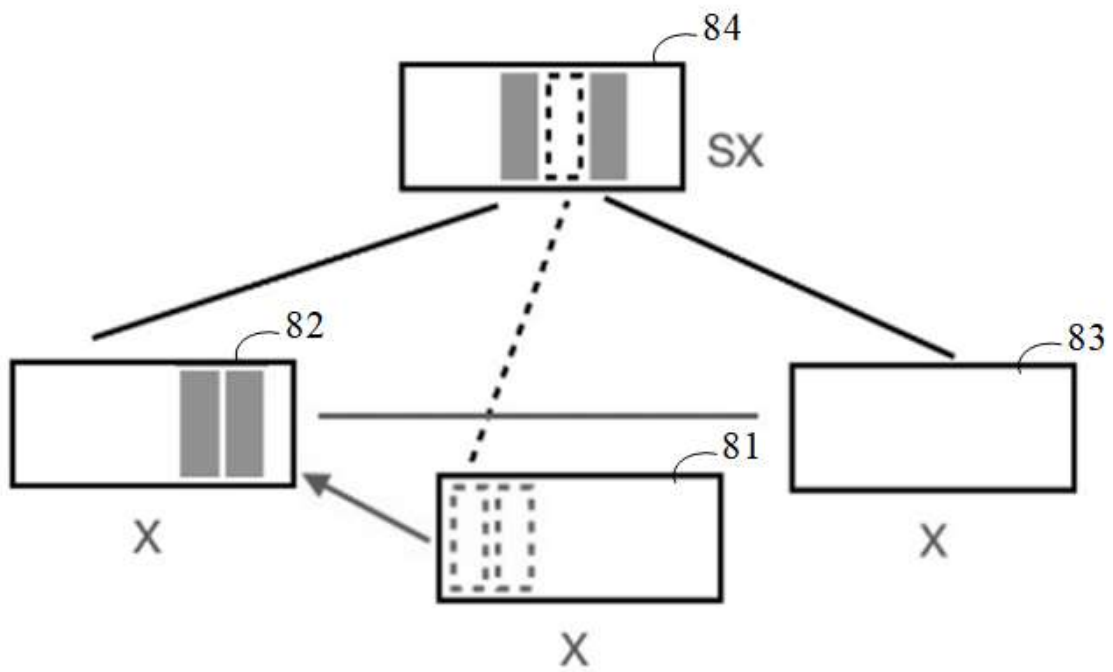


FIG. 8C

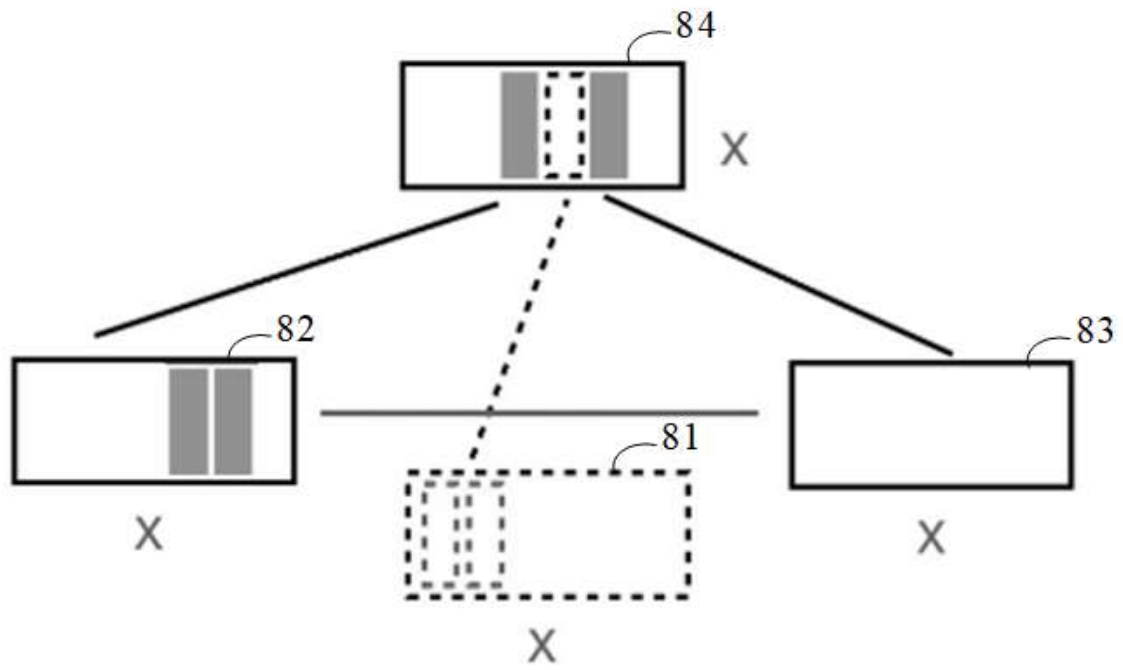


FIG. 8D

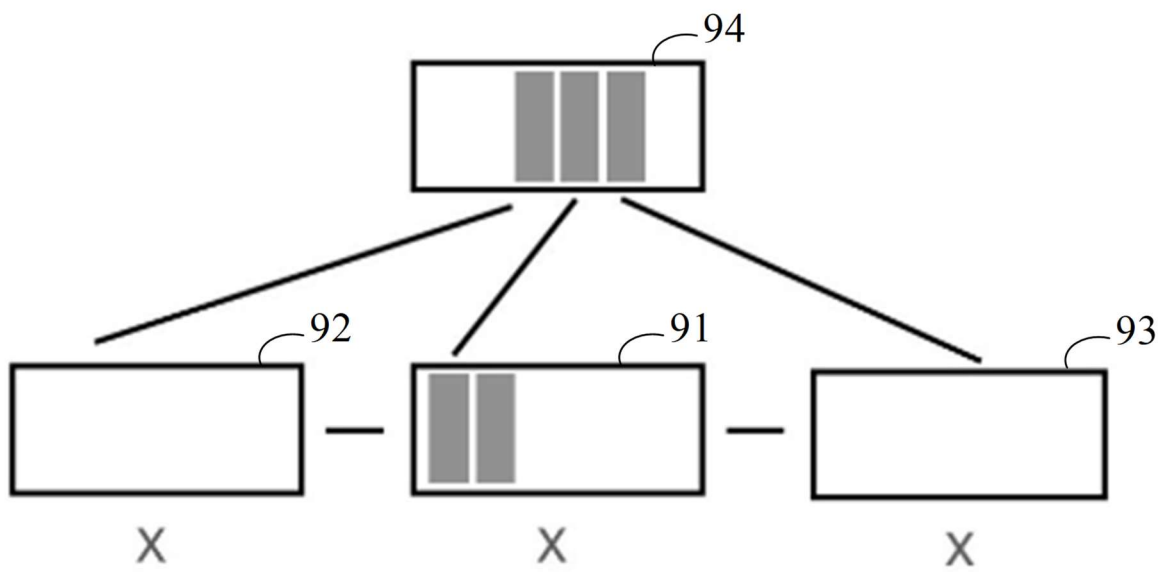


FIG. 9A

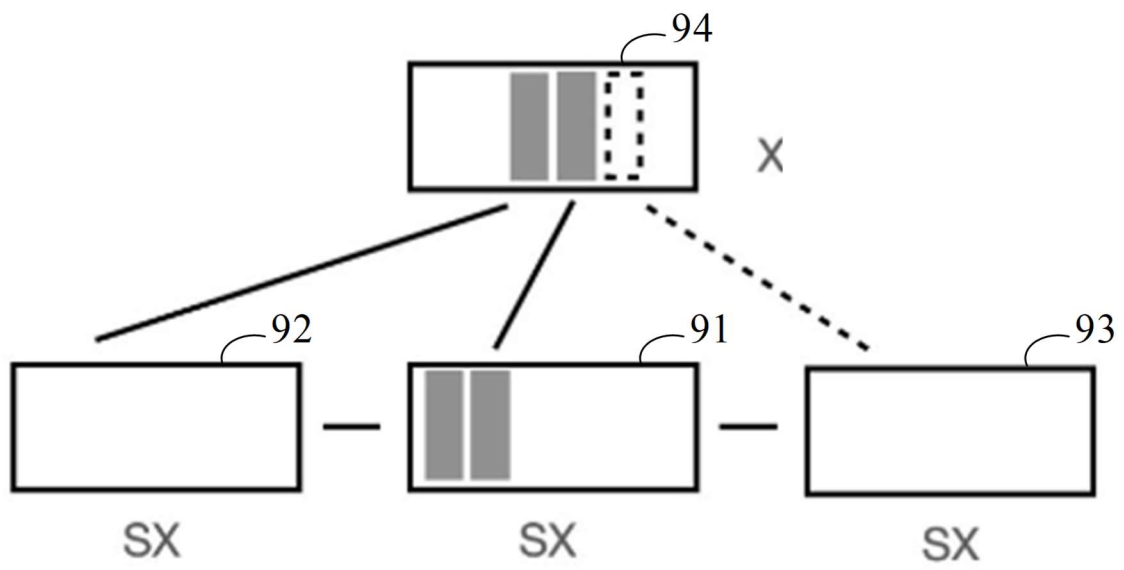


FIG. 9B

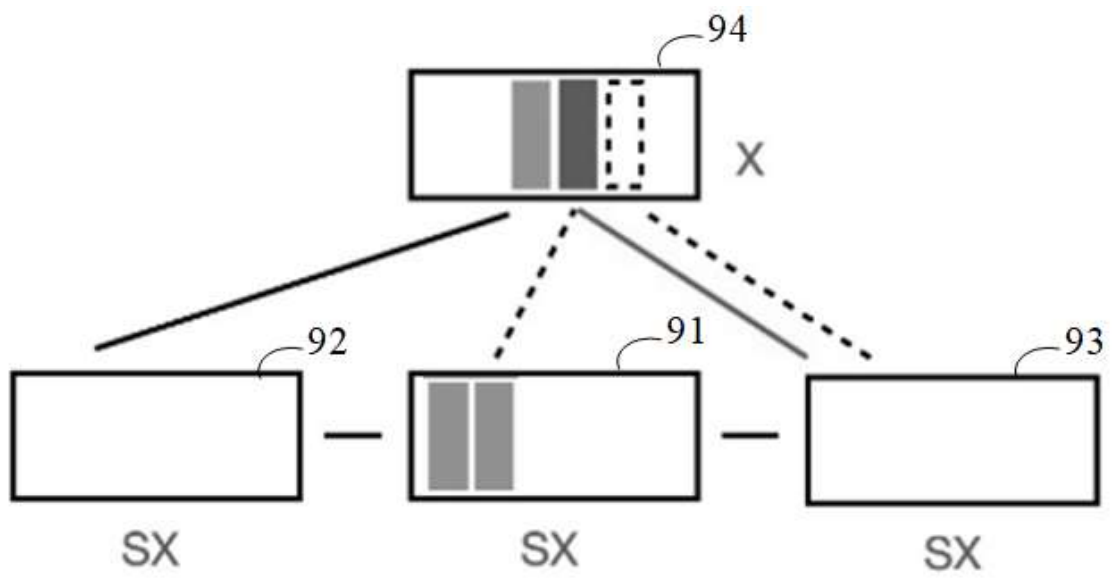


FIG. 9C

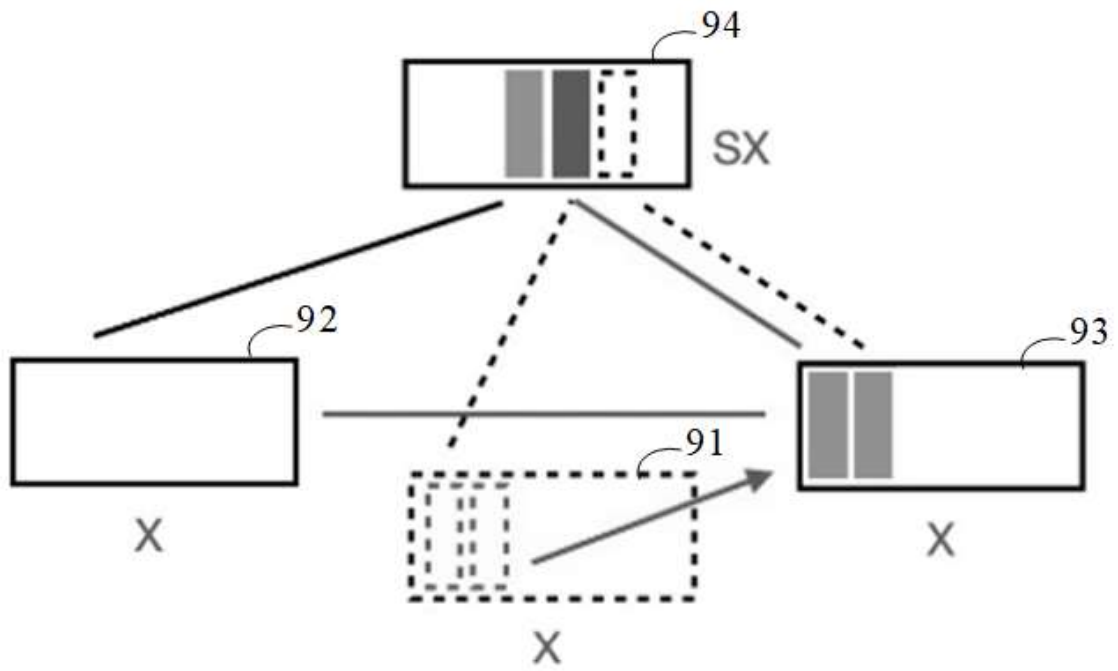


FIG. 9D

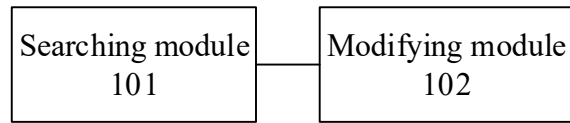


FIG. 10

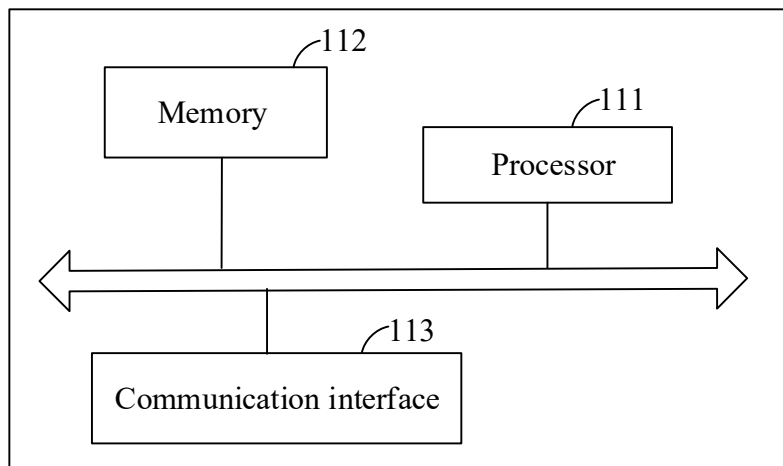


FIG. 11