

Construct a Turing machine that accepts the language:

$$L(M) = \{ww \mid w \in \{a, b\}^*\}$$

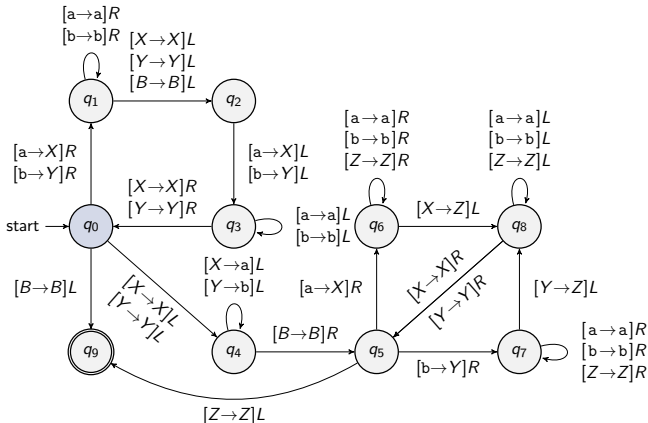
...	B	a	b	b	a	b	b	B	...
-----	---	---	---	---	---	---	---	---	-----

- 1: Find the middle of the input
- 2: Replace all X 's (or Y 's) with a 's (or b 's) in the first half
- 3: **while** there are input symbols in the first half **do**
- 4: Replace a (or b) with X (or Y) in the first half
- 5: Find and Replace X (or Y) with Z in the second half
- 6: **end while**

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-----	---	---	---	---	---	---	---	---	-----

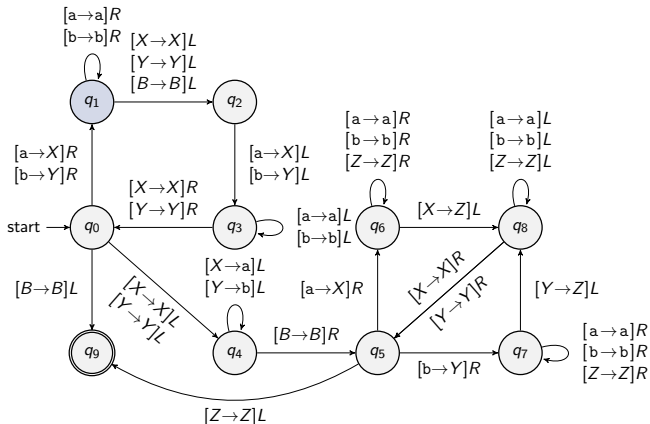


Find the middle of the input.

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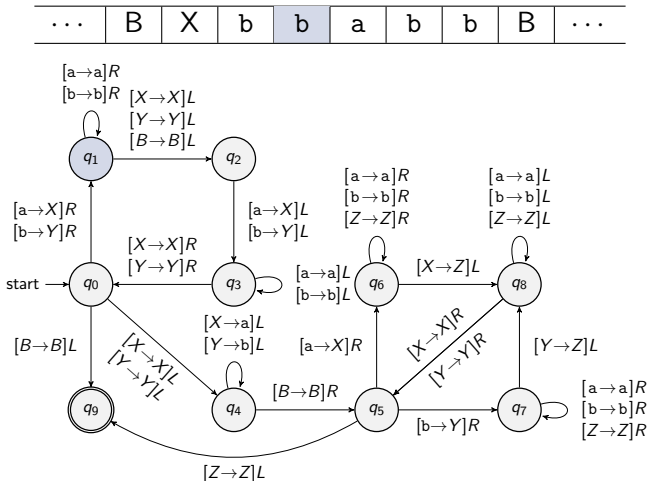
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...	B	X	b	b	a	b	b	B	...
-----	---	---	---	---	---	---	---	---	-----



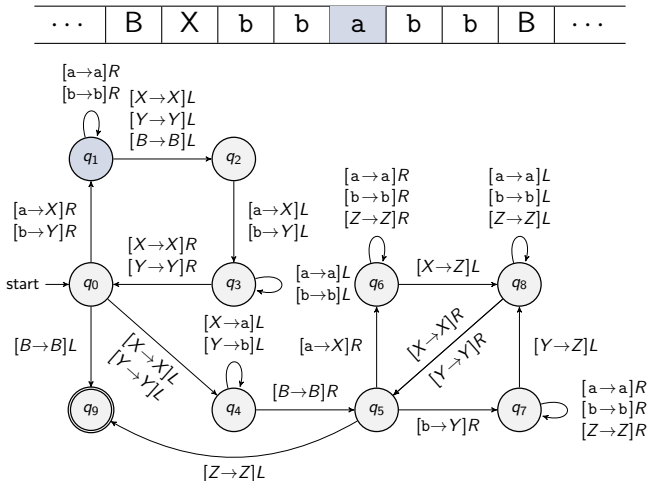
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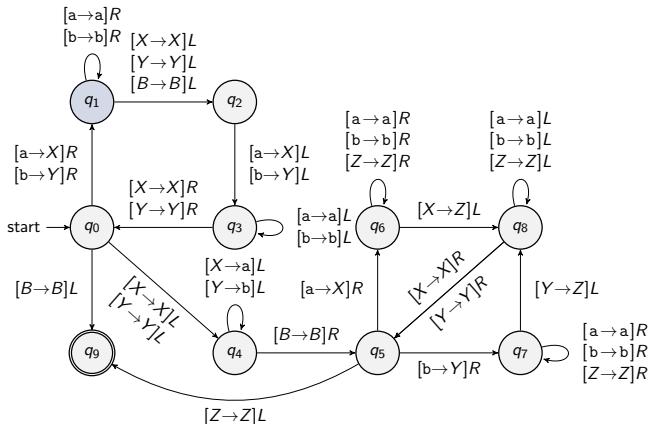
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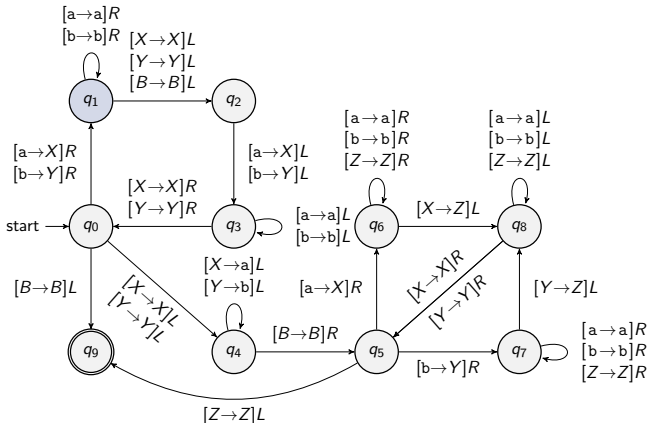
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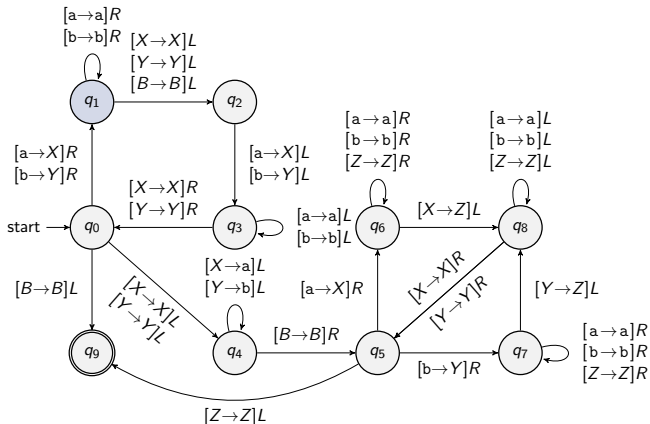
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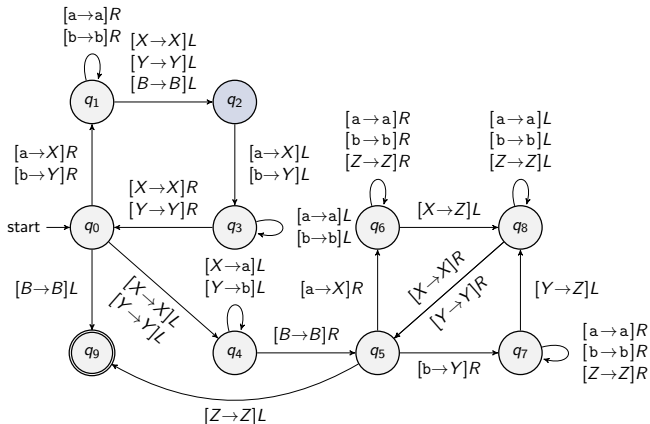
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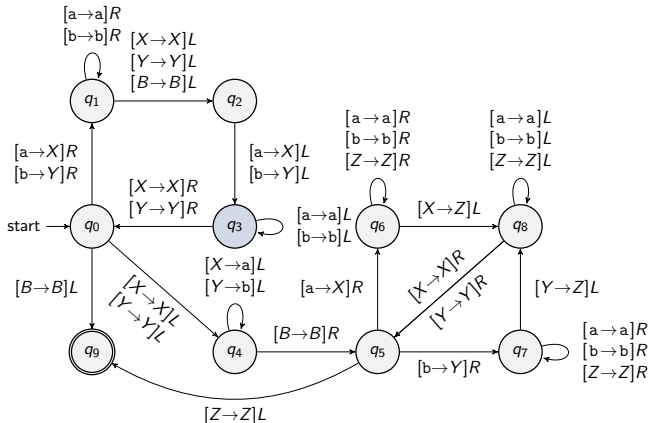
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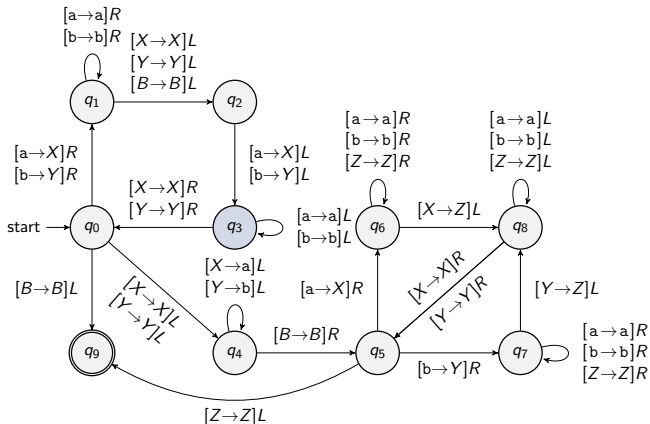
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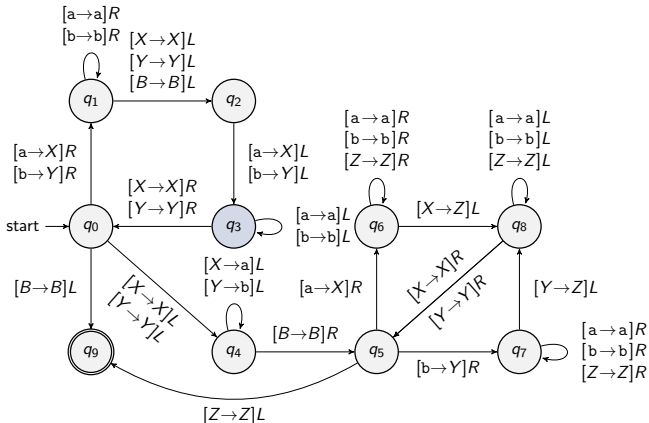
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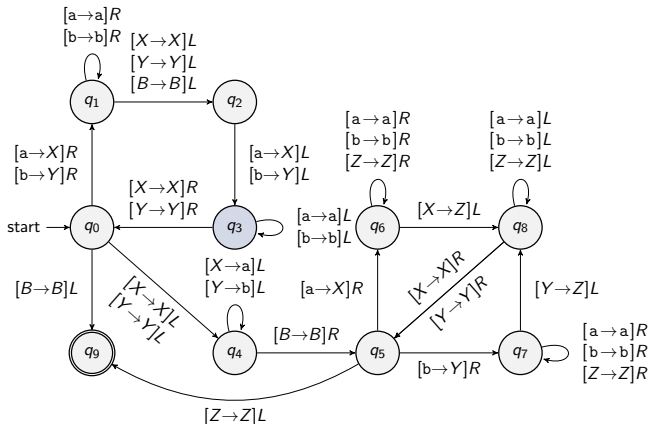
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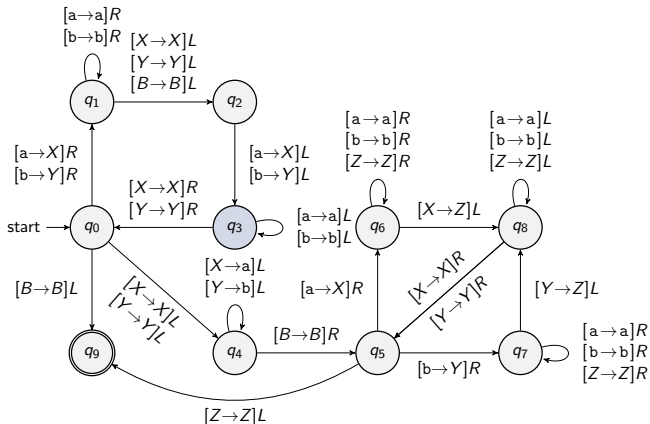
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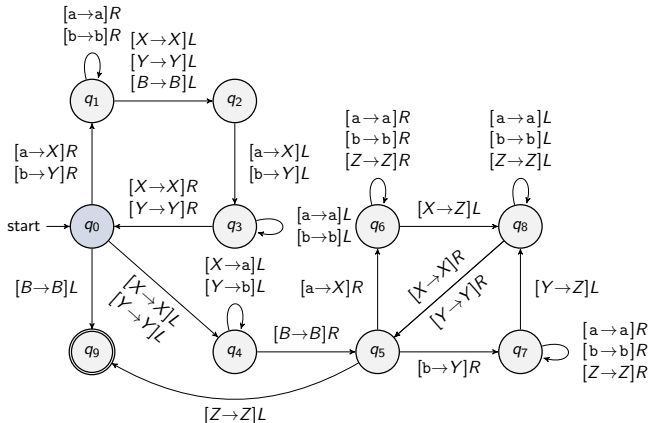
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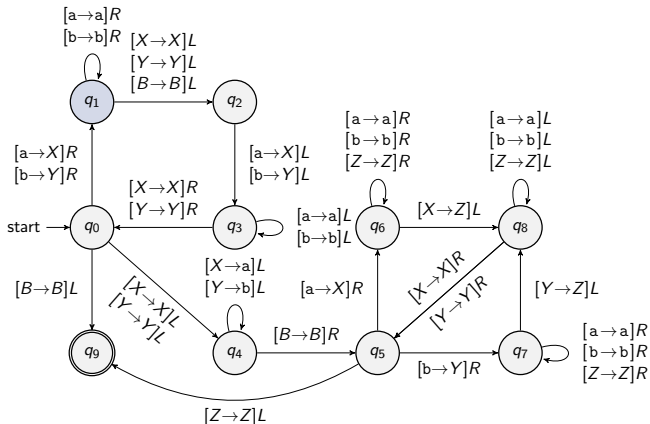
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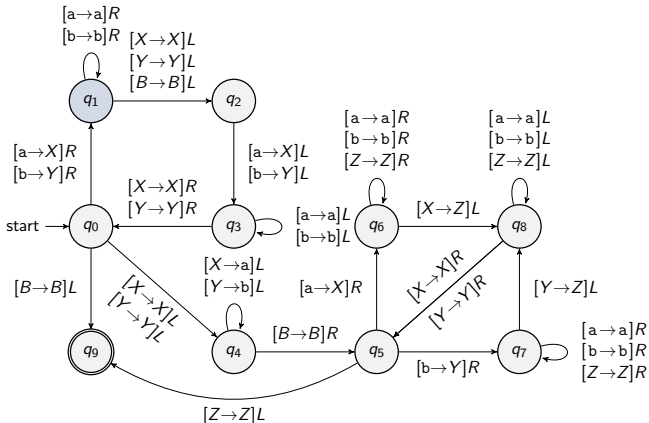
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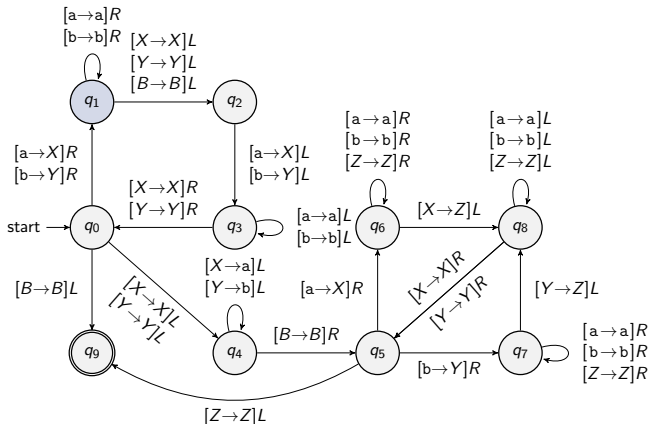
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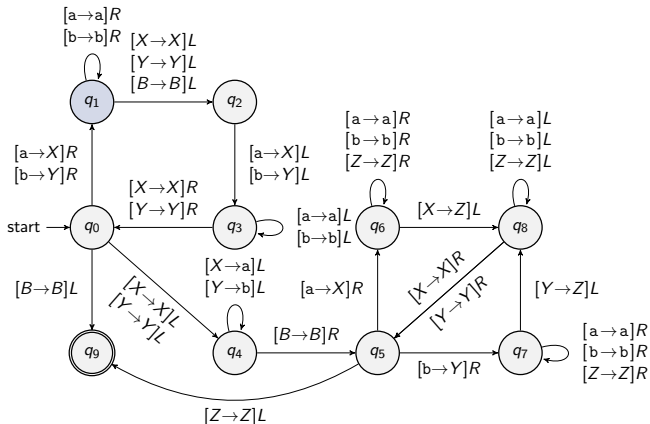
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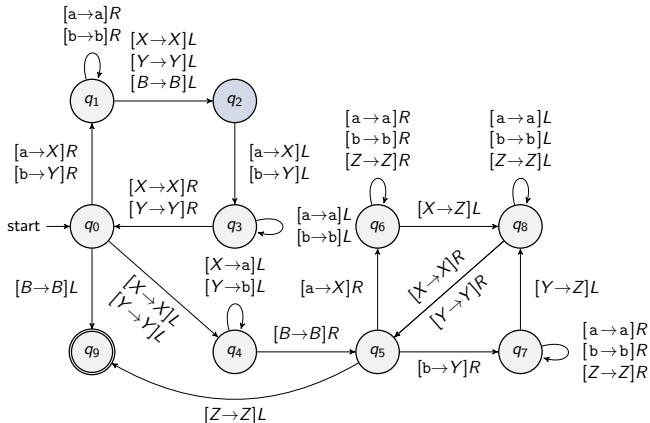
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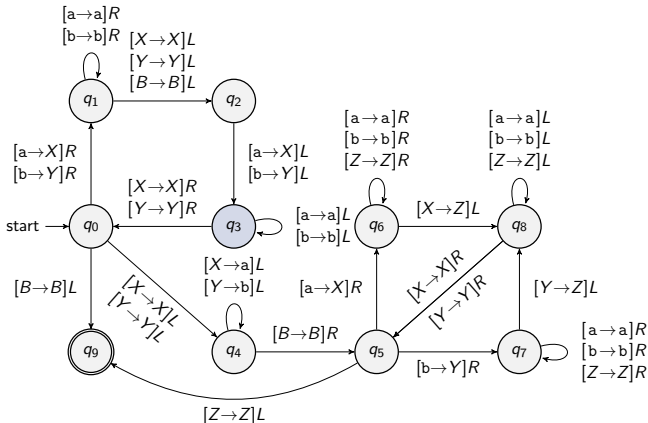
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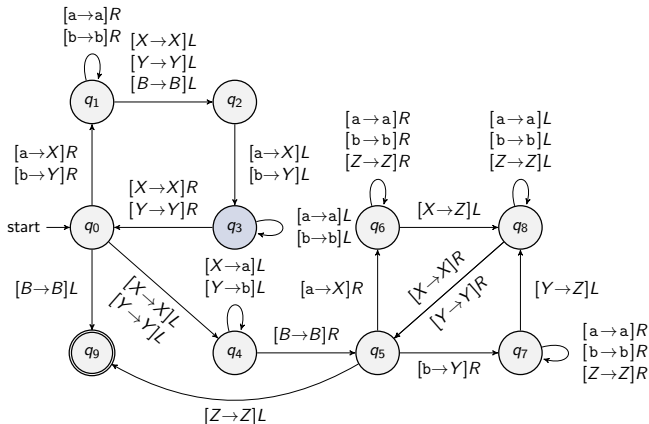
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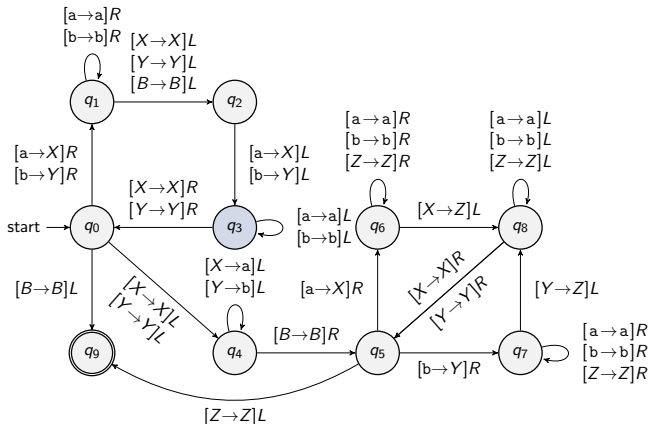
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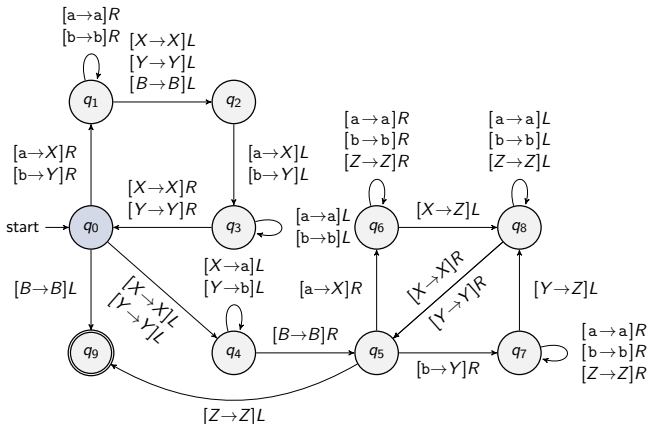
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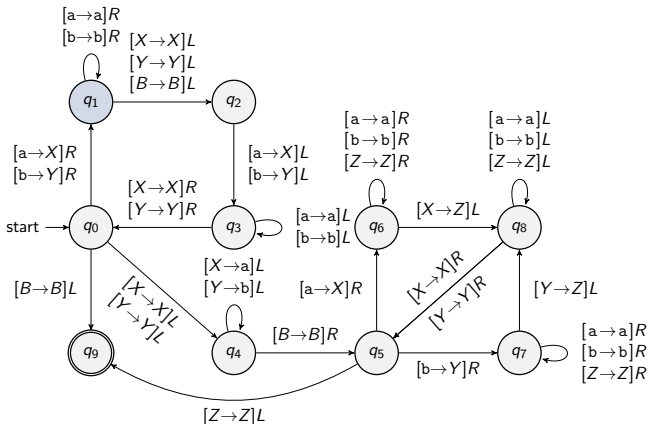
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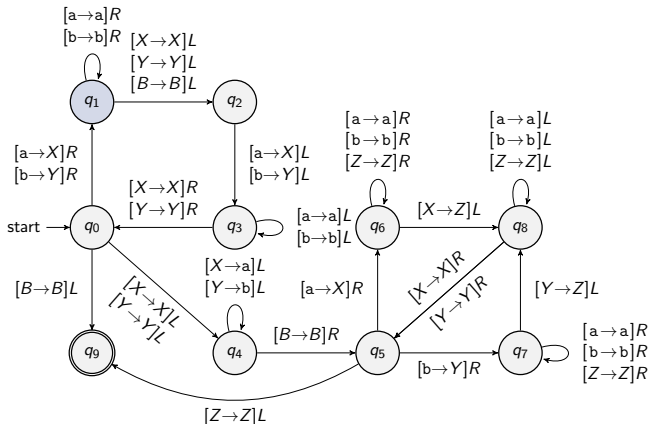
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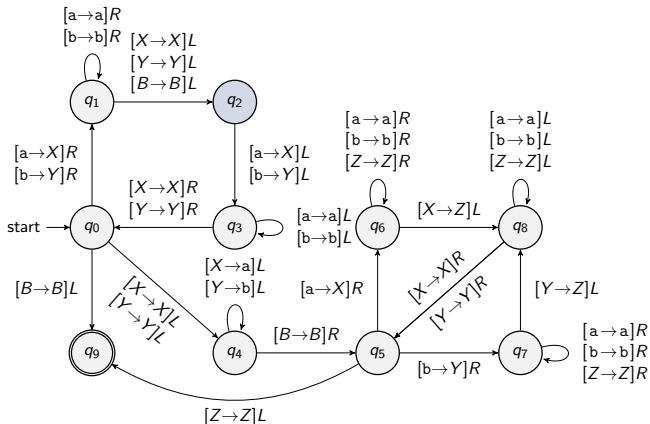
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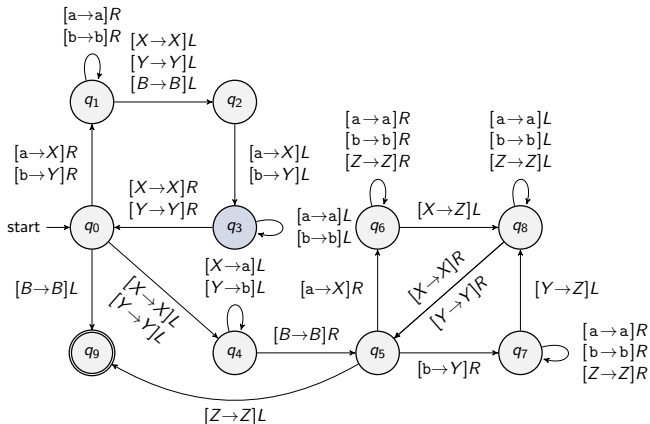
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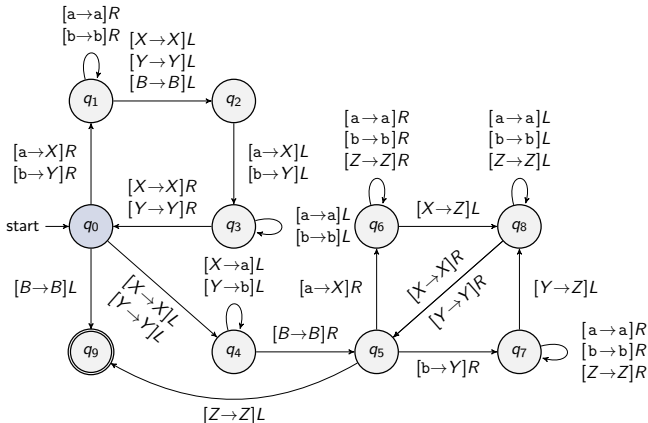
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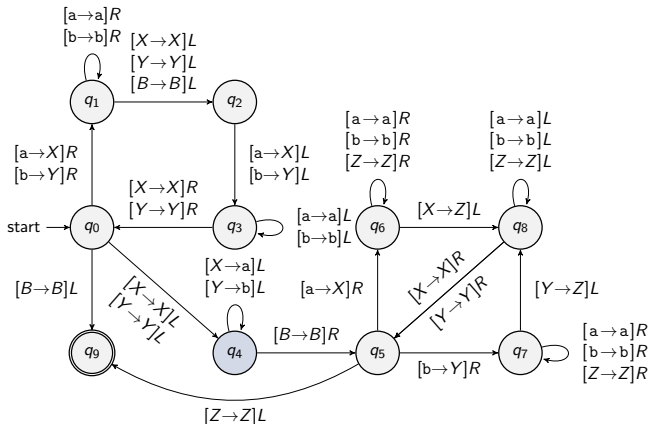


Replace all X 's (or Y 's) with a 's (or b 's) in the first half.

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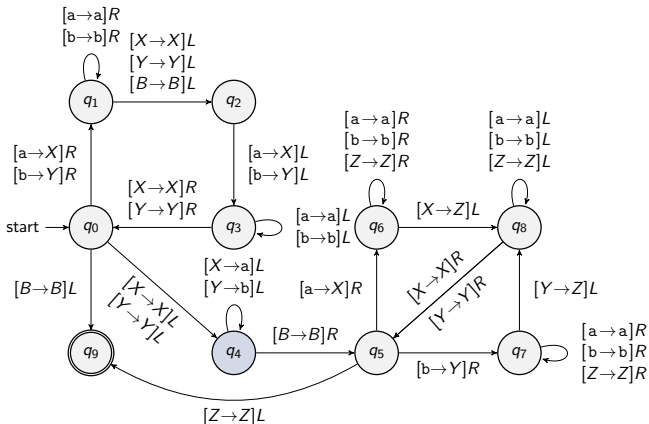
...	B	X	Y	Y	X	Y	Y	B	...
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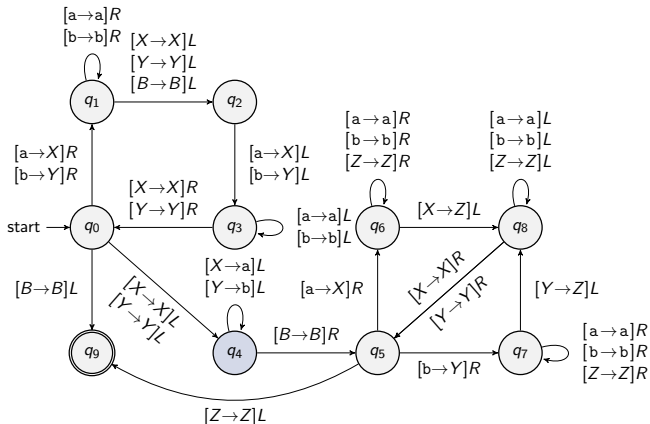
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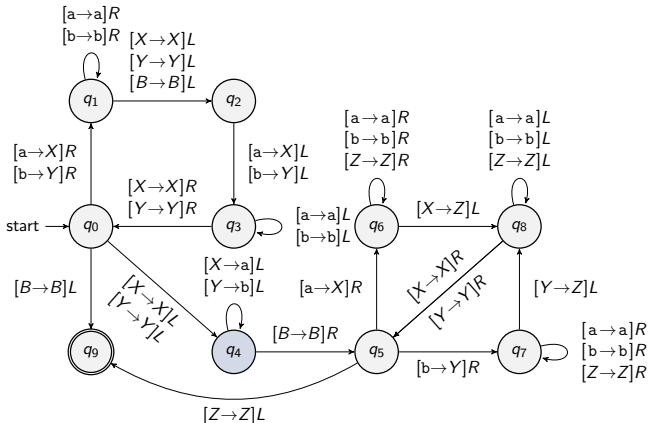
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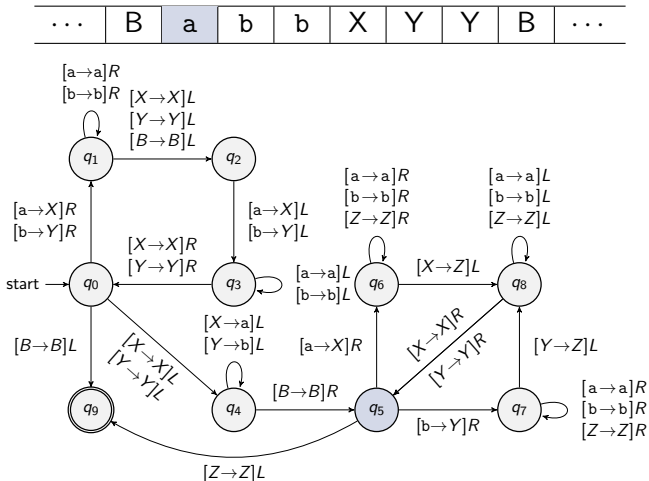
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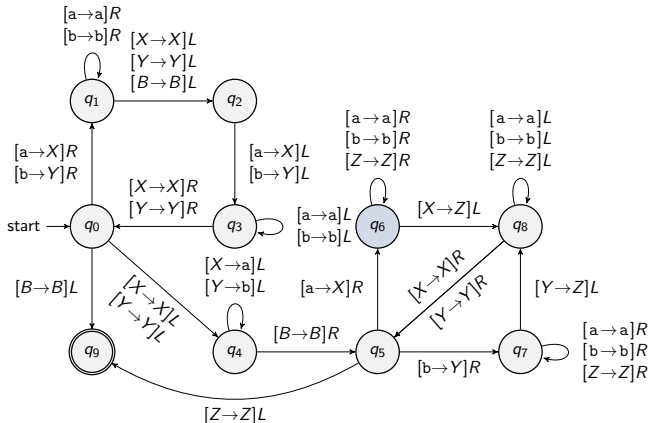


Replace a (or b) with X (or Y) in the first half.

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...	B	X	b	b	X	Y	Y	B	...
-----	---	---	---	---	---	---	---	---	-----

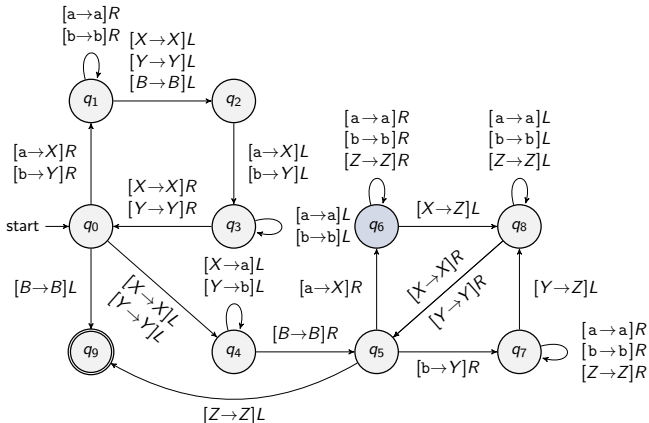


Find and Replace X (or Y) with Z in the second half.

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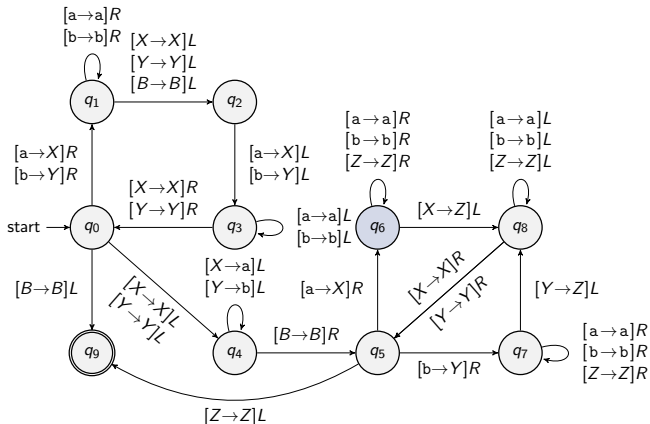
...	B	X	b	b	X	Y	Y	B	...
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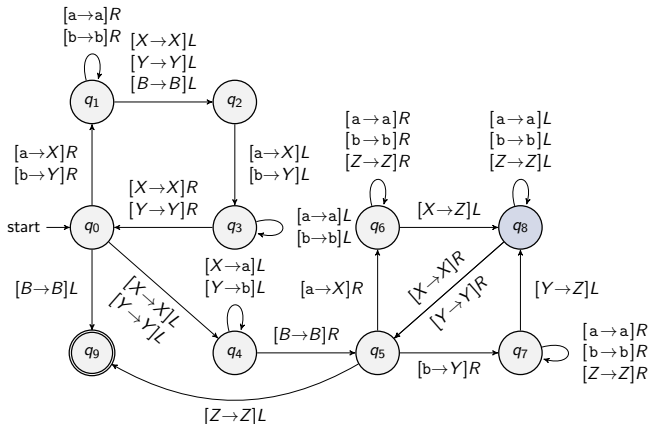
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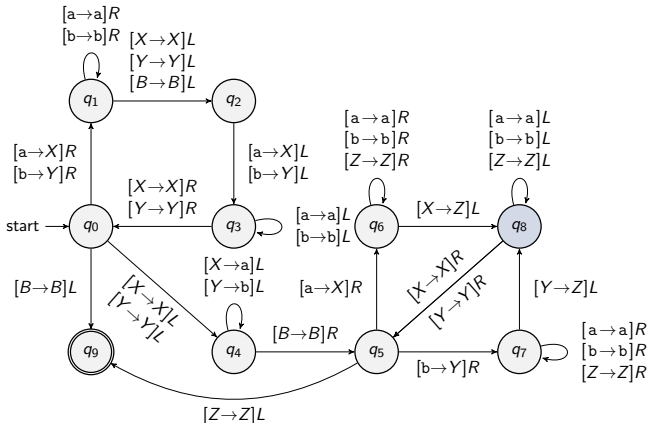
...	B	X	b	b	Z	Y	Y	B	...
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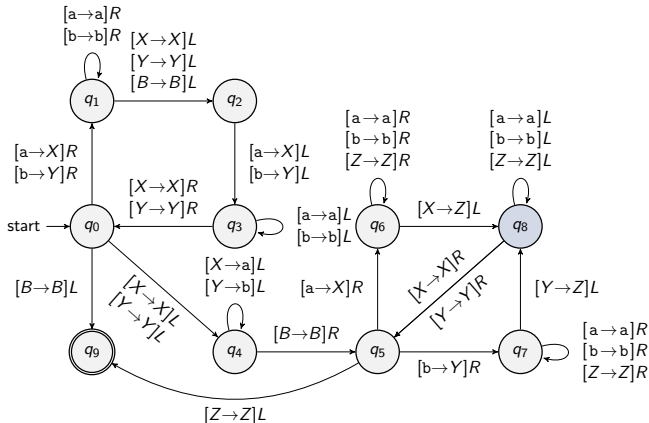
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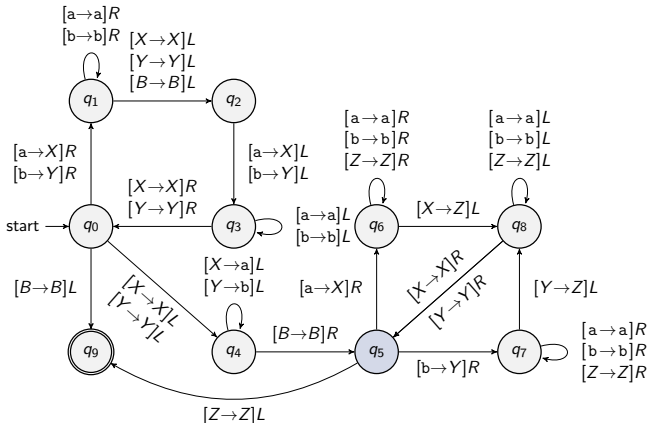
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-----	---	---	---	---	---	---	---	---	-----

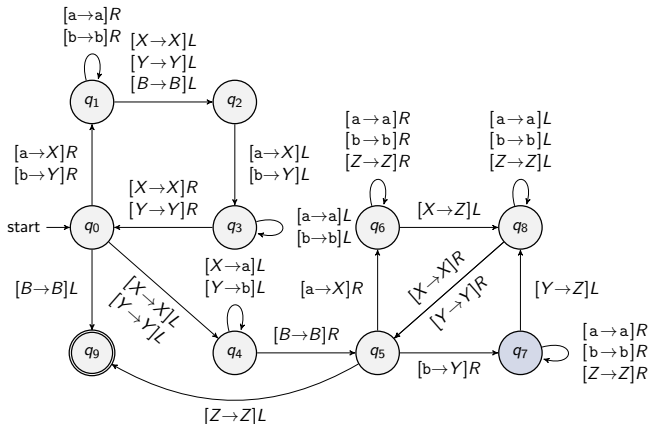


Repeat until no input symbols in the first half.

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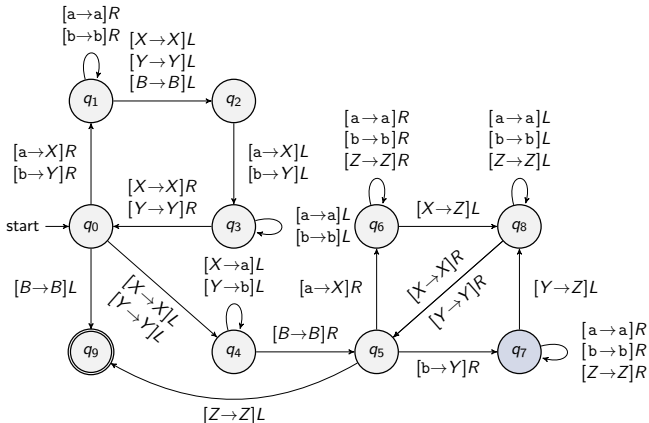
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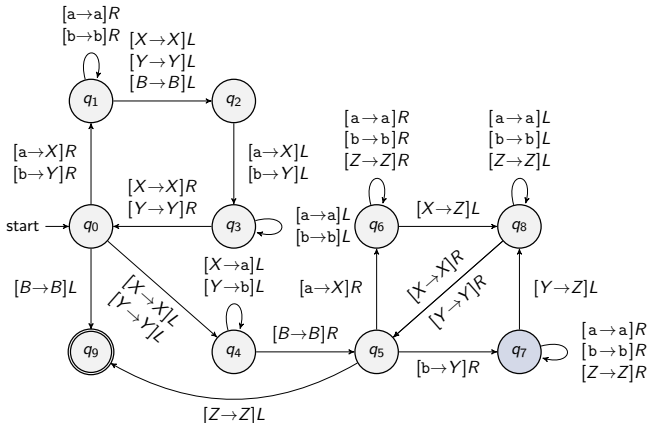
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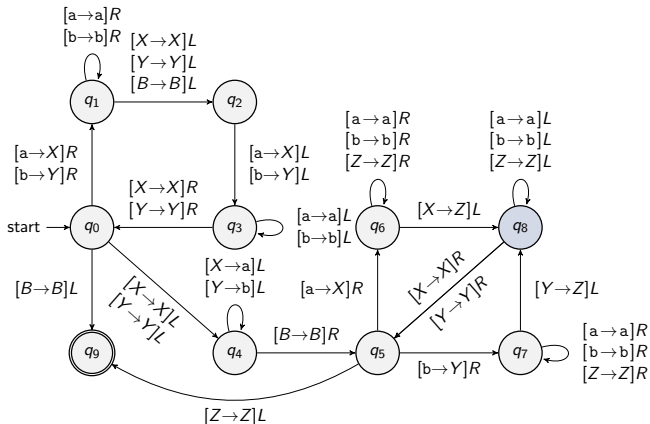
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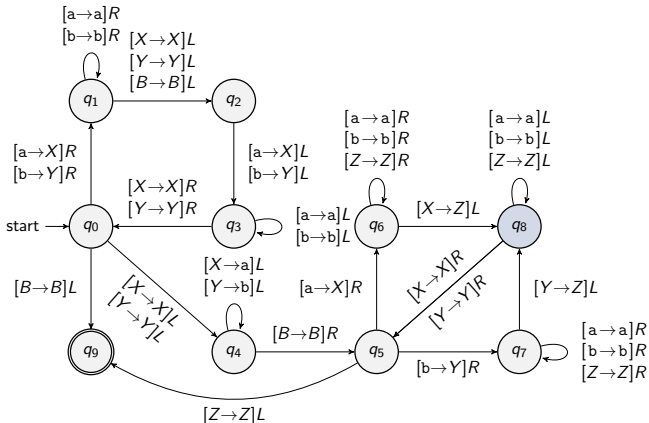
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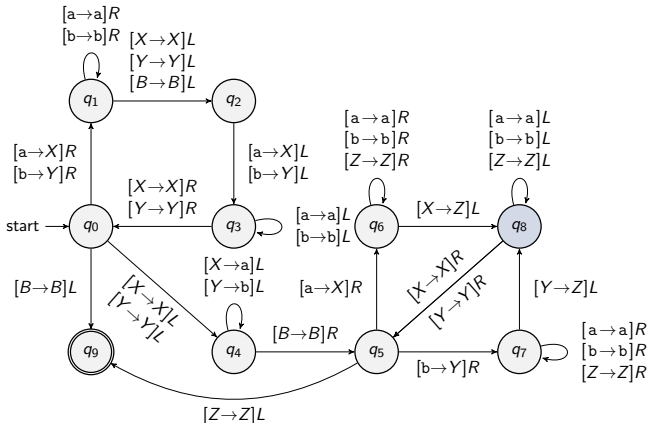
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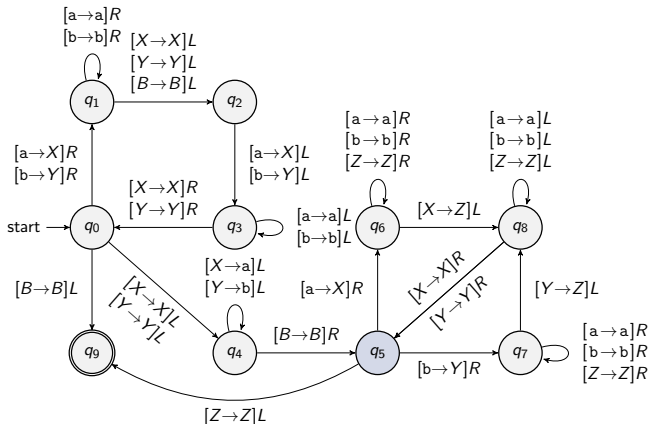
...	B	X	Y	b	Z	Z	Y	B	...
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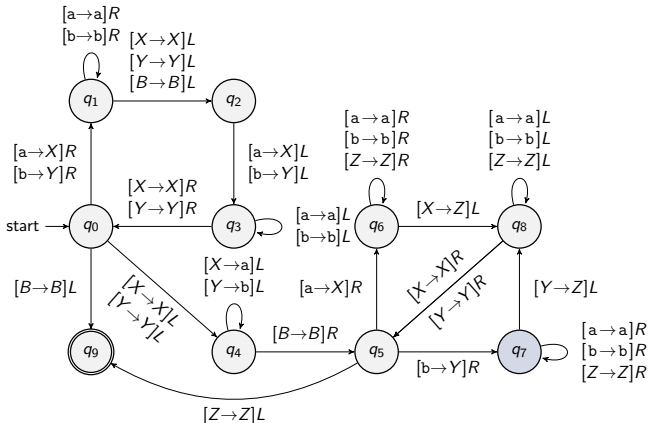
...	B	X	Y	b	Z	Z	Y	B	...
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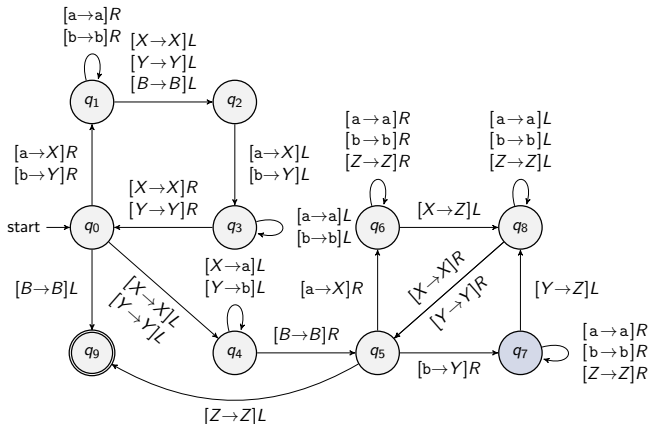
...	B	X	Y	Y	Z	Z	Y	B	...
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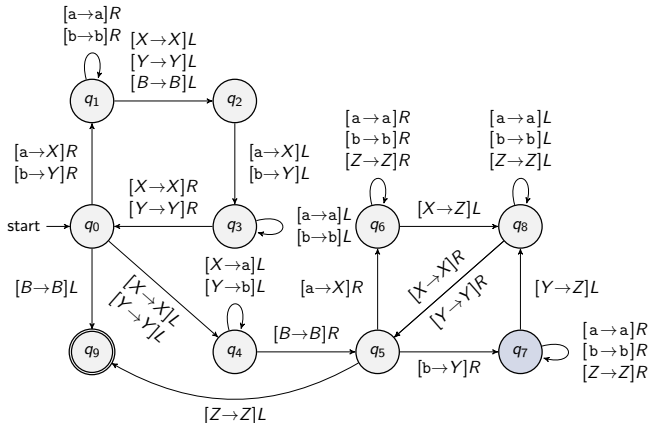
...	B	X	Y	Y	Z	Z	Y	B	...
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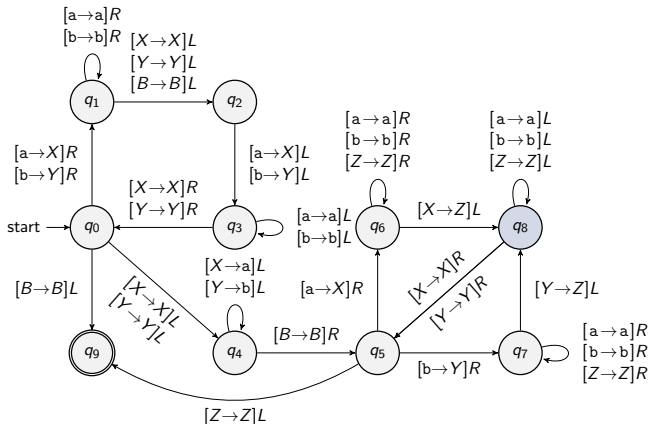
...	B	X	Y	Y	Z	Z	Y	B	...
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Construct a Turing machine that accepts the language:

$$L(M) = \{ww \mid w \in \{a, b\}^*\}$$

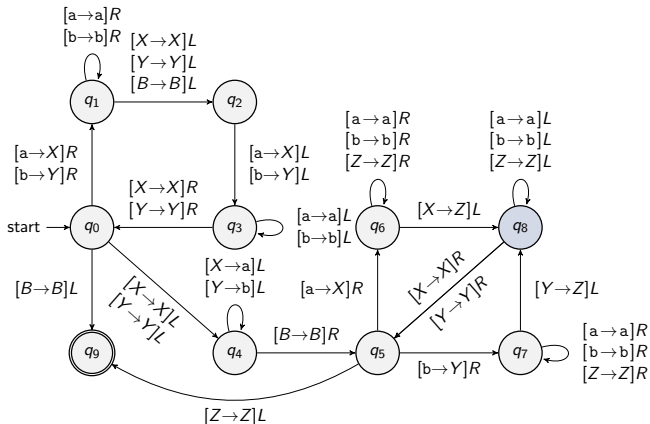
...	B	X	Y	Y	Z	Z	Z	B	...
-----	---	---	---	---	---	---	---	---	-----



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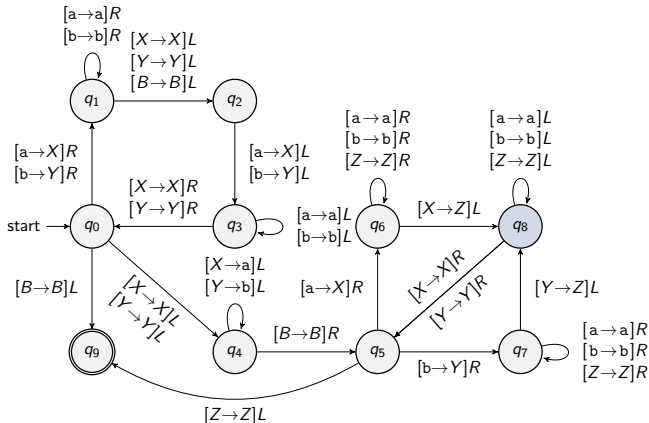
...	B	X	Y	Y	Z	Z	Z	B	...
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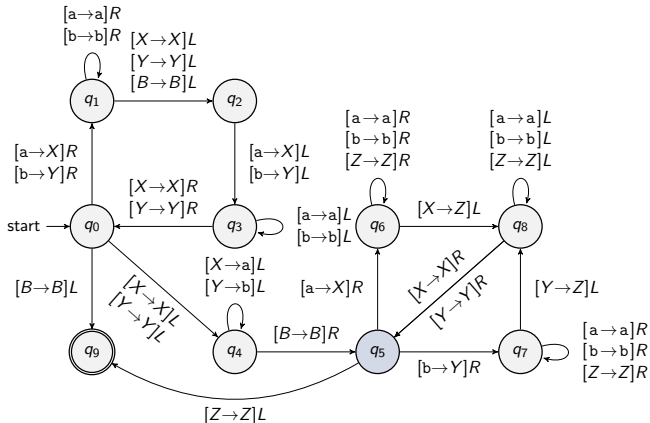
...	B	X	Y	Y	Z	Z	Z	B	...
-----	---	---	---	---	---	---	---	---	-----



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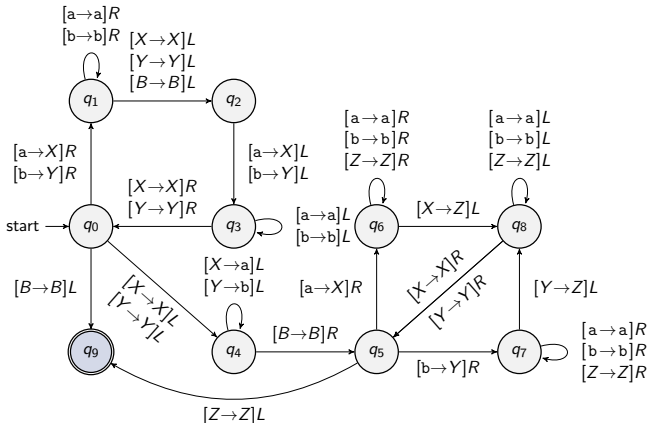
...	B	X	Y	Y	Z	Z	Z	B	...
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...	B	X	Y	Y	Z	Z	Z	B	...
-----	---	---	---	---	---	---	---	---	-----



Accept!