

# Replicated Redis List: An Operational Transformation Approach

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$$\text{OT}(\text{INS}(i_1, e_1, p_1), \text{INS}(i_2, e_2, p_2)) = \begin{cases} i_1 < i_2 \\ i_1 > i_2 \\ i_1 = i_2 \wedge e_1 = e_2 \\ i_1 = i_2 \wedge e_1 \neq e_2 \wedge p_1 > p_2 \\ i_1 = i_2 \wedge e_1 \neq e_2 \wedge p_1 \leq p_2 \end{cases} \quad (1)$$

$$\text{OT}(\text{TRIM}(i, j), \text{TRIM}(m, n)) = \begin{cases} \text{TRIM}(0, -1) & (i, j) \cap (m, n) = \emptyset \\ \dots \end{cases} \quad (2)$$

$$\text{OT}(\text{TRIM}(i, j), \text{DEL}(k)) = \begin{cases} \text{TRIM}(i-1, j-1) & k < i \leq j \\ \text{TRIM}(i, j-1) & k = i < j \\ \text{TRIM}(0, -1) & k = i = j \\ \text{TRIM}(i, j-1) & i < k < j \\ \text{TRIM}(i, j-1) & i < k = j \\ \dots \end{cases} \quad (3)$$

$$\text{OT}(\text{DEL}(k), \text{TRIM}(i, j)) = \begin{cases} \text{DEL}(k) & k < i \leq j \\ \text{DEL}(k) & k = i < j \\ \text{DEL}(0) & k = i = j \\ \text{DEL}(k-i) & i < k < j \\ \text{DEL}(k-i) & i < k = j \\ \dots \end{cases} \quad (4)$$

(5)

**Figure 1.** Operational Transformations for the Redis List.

## 1 Operational Transformations for the Redis List

According to the official document, a Redis list supports 17 operations [1]. Among the 14 non-blocking operations, we study the following ones: LPUSH, RPUSH, LPUSHX, RPUSHX, LPOP, RPOP, INSERT, SET, TRIM, and REM. We also consider DEL and INS, deletions and insertions by indices. Table 1 presents the (informal) sequential specification of these 16 Redis list operations.

**Table 1.** Redis list operations.

Operations	Parameters	Return Value	Notes
INS	index		
DEL	index		
SET	index		
TRIM	start, stop	$L[\text{start}] \dots L[\text{stop}]$	−1 means the last element

221	<b>References</b>	276
222	[1] [n. d.]. ([n. d.]).	277
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