

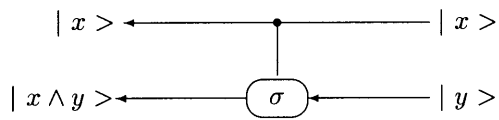
状態の変換ゲート

排他的論理和 (exclusive-or) $f(x, y) = (x, x \oplus y)$

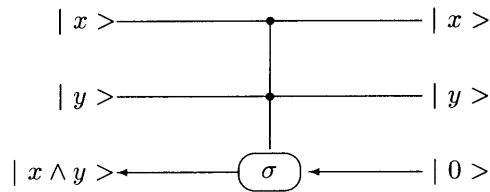
$$U := |0\rangle\langle 0| \otimes I + |1\rangle\langle 1| \otimes \sigma$$

論理積 (logical-and) $\forall x, y = 0, 1 \quad U |x, y, 0\rangle = |x, y, x \wedge y\rangle$

$$U := |0\rangle\langle 0| \otimes |0\rangle\langle 0| + |0\rangle\langle 0| \otimes |1\rangle\langle 1| \otimes I \\ + |1\rangle\langle 1| \otimes |0\rangle\langle 0| + |1\rangle\langle 1| \otimes |1\rangle\langle 1| \otimes \sigma$$



(fig - 1)

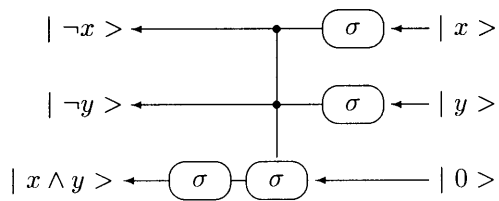


(fig - 2)

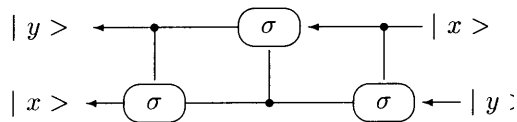
論理和 (logical-or) $\forall x, y = 0, 1 \quad f(x, y, 0) := (\neg x, \neg y, x \vee y)$

$$U := |0\rangle\langle 1| \otimes |0\rangle\langle 1| \otimes \sigma + |0\rangle\langle 1| \otimes |1\rangle\langle 0| \otimes \sigma \\ + |1\rangle\langle 0| \otimes |0\rangle\langle 1| \otimes \sigma + |1\rangle\langle 0| \otimes |1\rangle\langle 0| \otimes I$$

変数入れ替え (reverse) $\forall x, y = 0, 1 \quad f(x, y) := (y, x)$



(fig - 3)



(fig - 4)