$$B_f = \left\{ \begin{array}{lcl} \mathbf{C}^{2^n} \otimes \mathbf{C}^{2^n} & \to & \mathbf{C}^{2^n} \otimes \mathbf{C}^{2^n} \\ |x\rangle \otimes |y\rangle & \mapsto & |x\rangle \otimes |y \oplus f(x)\rangle \end{array} \right.$$