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$$\begin{cases} x^y = 2 \rightarrow x = \sqrt[y]{2} \\ (2x)^{y^2} = 64 \rightarrow \downarrow (2\sqrt[y]{2})^{y^2} = 64 \end{cases}$$

$$2y^2 \cdot 2^y = 64$$

$$2y^2 + y = 2^6$$

$$y^2 + y = 6 = 0 \rightarrow \begin{cases} y = -3 \rightarrow (2^{-\frac{1}{3}}, -3) \\ y = 2 \rightarrow (\sqrt[2]{2}, 2) \end{cases}$$