

4月4日.

3-1.

$$(1). T_{\text{pipe}} = \max \{ IF, ID, EX, MEM, WB \} + T_{\text{delay}} = 2.1 \text{ ns}.$$

$$(2). \cancel{T_{\text{new}}} \cdot T_{\text{pi}} \cdot \frac{T_{\text{old}}}{T_{\text{new}}} = \frac{T_{\text{cycle}}}{T_{\text{pipe}}} \cdot \frac{CPI_{\text{cycle}}}{CPI_{\text{pipe}}} = \frac{7}{2.1} \cdot \frac{N}{N+4}$$

$$\lim_{N \rightarrow \infty} \frac{T_{\text{old}}}{T_{\text{new}}} = \frac{7}{2.1} \approx 3.3. \text{ 故流水化后加速比为 } 3.3.$$

$$(2). \lim_{k \rightarrow \infty} \left(\frac{7}{2.1} \cdot \frac{N}{N+k-1} \right)$$

$$(3). k = \infty \text{ 时, } T_{\text{pipe}} = \frac{T_{\text{cycle}}}{k} + T_{\text{delay}} = \cancel{T_{\text{delay}}} = 0.1 \text{ ns}.$$

$$\lim_{\substack{N \rightarrow \infty \\ k \rightarrow \infty}} \frac{T_{\text{old}}}{T_{\text{new}}} = \lim_{\substack{N \rightarrow \infty \\ k \rightarrow \infty}} \left(\frac{7}{k} + 0.1 \right) \cdot \frac{N}{N+k-1} = 70.$$

故加速比极限为 70

