

11811712江川

1.6

a

$$p1 : 1 * 10\% + 2 * 20\% + 3 * 50\% + 3 * 20\% = 2.6CPI$$

$$p2 : 2 * 10\% + 2 * 20\% + 2 * 50\% + 2 * 20\% = 2CPI$$

b

$$p1 : 1E6 * 2.6 = 2600000cycles$$

$$p2 : 1E6 * 2 = 2000000cycles$$

1.8

1.8.1

Pentium 4 Prescott :

$$\frac{1}{2} * C * 1.25^2 * 3.6E9 = 90$$
$$C = 0.000032F$$

Core i5 Ivy Bridge :

$$\frac{1}{2} * C * 0.9^2 * 3.4E9 = 40$$
$$C = 0.000000002905F$$

1.8.2

Pentium 4 Prescott :

$$\frac{static}{total} = \frac{10W}{100W} = 0.1$$
$$\frac{static}{dynamic} = \frac{10W}{90W} = 0.1111$$

Core i5 Ivy Bridge :

$$\frac{static}{total} = \frac{30W}{70W} = 0.4286$$
$$\frac{static}{dynamic} = \frac{30W}{40W} = 0.75$$

1.8.3

reduce 10% voltage

1.15

$2 : \frac{100s}{2} + 4s = 54s$	<i>speedup : 1.85times</i>	<i>radio : 1.08</i>
$4 : \frac{100s}{4} + 4s = 29s$	<i>speedup : 3.45times</i>	<i>radio : 1.16</i>
$8 : \frac{100s}{8} + 4s = 16.5s$	<i>speedup : 6.06times</i>	<i>radio : 1.32</i>
$16 : \frac{100s}{16} + 4s = 10.25s$	<i>speedup : 9.76times</i>	<i>radio : 1.64</i>
$32 : \frac{100s}{32} + 4s = 7.125s$	<i>speedup : 14.04times</i>	<i>radio : 2.28</i>
$64 : \frac{100s}{64} + 4s = 5.5625s$	<i>speedup : 17.98times</i>	<i>radio : 3.56</i>
$128 : \frac{100s}{128} + 4s = 4.78125s$	<i>speedup : 20.92times</i>	<i>radio : 6.12</i>