

Capture1 Example3 用Amdahl Law求解

方案1:更改所有浮点数（FP）的CPI

$$Se = \frac{T_{改进部分改进前}}{T_{改进部分改进后}} = \frac{CPI_{原FP}}{CPI_{改进FP}} = 2$$
$$Fe = \frac{T_{FP}}{T_{FP}+T_{other}} = \frac{CPI_{FP} \times FP\%}{CPI_{FP} \times FP\% + CPI_{other} \times other\%} = \frac{0.25 \times 4}{0.25 \times 4 + 0.75 \times 1.33} = 0.5$$
$$S_1 = \frac{1}{1 - Fe + \frac{Fe}{Se}} = 1.33$$

方案2:更改浮点数开方（FPSQR）的CPI

$$Se = \frac{T_{改进部分改进前}}{T_{改进部分改进后}} = \frac{CPI_{原FPSQR}}{CPI_{改进FPSQR}} = 10$$
$$Fe = \frac{T_{FPSQR}}{T_{FPSQR}+T_{other}} = \frac{CPI_{FPSQR} \times FPSQR\%}{CPI_{FP} \times FP\% + CPI_{other} \times other\%} = \frac{0.02 \times 20}{0.25 \times 4 + 0.75 \times 1.33} = 0.2$$
$$S_2 = \frac{1}{1 - Fe + \frac{Fe}{Se}} = 1.21$$

结论

可见 $S_1 > S_2$ ，但是两者差别不是很大，如果对全部的浮点数操作进行优化的话可能会耗费很多的资金成本，但是如果单纯优化浮点数开方运算的话，既可以节约一些成本又可以取得还不错的加速比，这样看来优化浮点数开方运算更具性价比。