

22C:160/55:132 Homework 5 sample solutions

Chen Zhang

Question 1.

First distribute the calculation of $A(j)$ and $B(j)$ to module j . Then use the divide and conquer approach to minimize memory location contention.

```
Initially Sum[] = 0
for(j = 1; j < 64; j++)
    Sum(j) = A(j) * B(j);
for(i = 1; i < 64; i = i * 2)
    for(j = 0; j < 64; j = j + 2 * i)
        Sum(j) = Sum(j) + Sum(j + i);
The final result is in Sum(0)
```

Question 2.

```
for(j = 0; j < 1024; j = j + 4){
    S[j] = 0;
    S[j + 1] = 0;
    S[j + 2] = 0;
    S[j + 3] = 0;
    for(k = 0; k < 1024; k = k + 1){
        S[j] = S[j] + B[j, k];
        S[j + 1] = S[j + 1] + B[j + 1, k];
        S[j + 2] = S[j + 2] + B[j + 2, k];
        S[j + 3] = S[j + 3] + B[j + 3, k];
    }
}
```

Question 3.

Assume that the file is stored continuously, and the head only needs to seek the start of the file once.

Seek time = 4ms

Rotational latency = $\frac{0.5R}{\frac{10033RPM}{60s/m}} = 3ms$

Queuing delay = 20ms

Transfer time = $\frac{100M}{80M/s} = 1.25s = 1250ms$

So average time to read the file is $4+3+20+1250 = 1277$ ms