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1. A:5 B:2 C:4

2. (a) It may be dead lock.

(b)
```
for (i=0; i<dims[0]; i++) {
    Matrix.Multiply(nlocal, a, b, c);

    MPI_Sendrecv_replace(a, nlocal*nlocal, MPI_DOUBLE, left, 1, right, 1,
                         comm_2d, &status);

    MPI_Sendrecv_replace(b, nlocal*nlocal, MPI_DOUBLE, up, 1,
                         down, 1, comm_2d, &status);

}
```

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3\. (a) me: 0 them: 1

me: 0 them: 4

(b) me: 0 them: 1 :

me: 0 them: 4

4\. 4: 1, 3, 6, 10

4: 4

5\.

6\.

```
int t = threadIdx.x;
for (int stride = blockDim.x; stride>1; stride>>=1)
{   __syncthreads();
    if (t < stride)
        outdata[t] += in_data[t+stride]
}
```

7\. ~~$\frac{9^3 \cdot 81}{9} + \frac{27 \cdot 9}{\sqrt{9}} \log 9$~~ = 81 + 27 log 9

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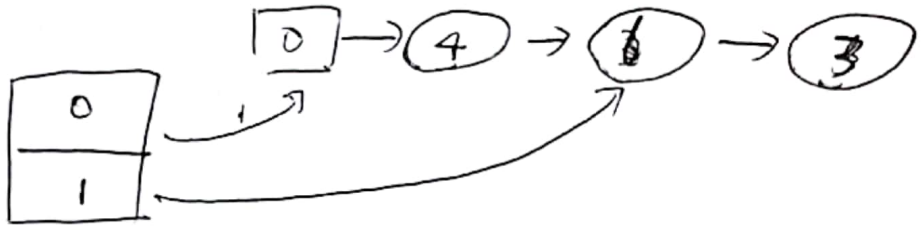
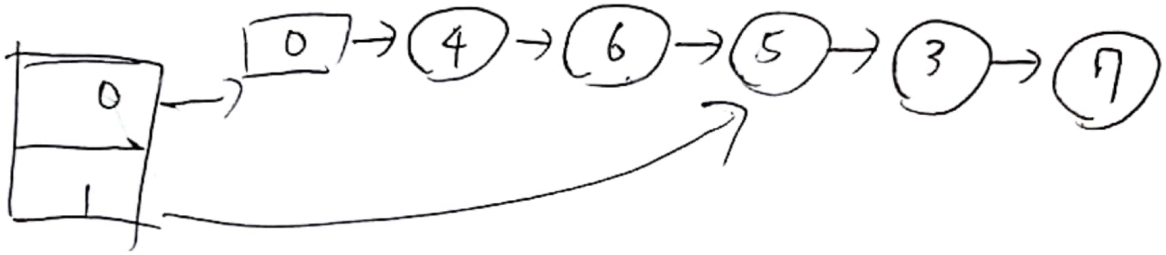
8. (a)



(b)



10. (a) It is impossible for a web service to provide three guarantees (consistency, Availability, Partition-tolerance) at the same time.

(b)

(c)

(d) AP and CP systems can offer a degree of consistency and availability, as well as partition tolerance.

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7. broadcast : $\frac{9 \log 9}{\sqrt{9}} \cdot 9 = 27 \log 9$

synchronization : $\log 9$

computation : $\frac{9^2}{9} \cdot 9 = 81$

12. (a) needs for big data processing

(b)

(c)

(d) unstructured data......