

CS528-Quiz 1

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Points: 29/36

1. Roll No

*

190101102

2. Name *

Aniket Kumar Mishra

✓ **Correct** 1/1 Points

3. Given OMP code with 4 threads. Suppose the run time function ReL is proportional to $1/i$. Which of the scheduling strategy will be beneficial for better performance?

```
#pragma omp parallel for schedule (X, Y)
{
    for (i=1; i<1000; i++) A[i]=ReL(i);
}
```

- ☐ X = static, Y=10
- ☐ X = static, Y=20
- ☐ X = dynamic, Y=10
- ☒ X = guided, Y=10 ✓

✓ **Correct** 2/2 Points

4. Tick the correct statement about loop parallelization using simdization process of the given loop.

```
for (i=0; i<N; i++){
    p=3*i+4; q=6*i+7; r=2*i*i+25;
    X[p]=X[q]+r;
}
```

- ☐ Parallelization is definitely possible and there is no dependency between iteration
- ☐ Parallelization is may be possible and there may be not having dependency between iterations
- ☒ Parallelization is not possible and there is a dependency between iteration ✓
- ☐ We cannot say

✗ **Incorrect** 0/1 Points

5. Which of the tool among these can be used to generate a graphical call graph profile for an application

- ☐ Valgrind ✓
- ☒ Gprof
- ☐ Gcov
- ☐ GCC

✓ **Correct** 1/1 Points

6. Good thread-safe functions and thread-safe data structure are used to implement multithreaded applications: All these thread safe functions and thread safe DS ensure

- ☐ High performance
- ☒ Ensure data safety
- ☐ Endure both performance and data safely ✓
- ☐ Not of these.

✓ **Correct** 1/1 Points

7. Row major access of matrix is better as compared to column-major access of the matrix as it exhibits ____.

- ☒ Spatial locality ✓
- ☐ Temporal locality
- ☐ Both spatial and temporal locality
- ☐ We cannot say.

✓ **Correct** 1/1 Points

8. Every thread of a process

- ☒ Shares code, data space, and kernel context with other threads but have their own logical control flow and stack areas for variables and function calls.
- ☐ Shares code and data space with other threads but have their own logical control flow, kernel context, and stack areas for variables and function calls.
- ☐ It Shares data space and kernel context with other threads but have their own code logical control flow and stack areas for variables and function calls. ✓
- ☐ None of the above.

✓ **Correct** 1/1 Points

9. Why heterogeneous multiprocessor SoC is better as compared to homogeneous multiprocessor SoC?

- ☐ Homogeneous multiprocessor SoC have all generic cores may not be best for specific tasks
- ☐ Homogeneous cores of SoC may not be energy efficient
- ☐ As SoC is used for much specialized works, generalized cores in homogeneous systems do not give better power and performance tradeoff
- ☒ All of the Above ✓

✓ **Correct** 1/1 Points

10. Avoiding branches in loop code results

- ☐ Reduce scope of simdization but enable software pipelining
- ☐ Increase the scope of simdization but disable software pipelining
- ☒ Enable the simdization to use the AVX and can also be pipelined using software pipelining ✓
- ☐ None of the above.

✓ **Correct** 2/2 Points

11. Calculate code balance of the following code in B/F, (assume write allocate)

```
for(i=0;i<N;i++) //double a[], b[], s  
    a[i]=a[i]+s*b[i];
```

12

✓ **Correct** 1/1 Points

12. What are typical the benefits of anti-aliasing the array access during function declaration?

- ☐ Can be vectorized the loop
- ☐ Can apply software pipelining on the loop
- ☐ Can perform group load-store transformation in the loop
- ☒ All of the above ✓

✓ **Correct** 2/2 Points

13. Given the following kernel, the best way to speed up this in Modern day processors of a single machine (PC/Laptop)

```
unsigned char x[N], w[N], k;  
for(i=0;i<N;i++) x[i]=(w[i]*x[i])-k;
```

- ☐ Using AVX
- ☒ Using OpenMP and AVX ✓
- ☐ Using MPI
- ☐ None of the above

✗ **Incorrect** 0/2 Points

14. Suppose you want to optimize the code using LUT; How many times you can avoid calling the transcendental functions (sin/cos).

```
double S,X;  
X=getInputFromKeyBoard();  
for(i=0;i<10000;i++) S=S+cos(X/(i%10))+ sin(X/(10-i%10));
```

9980

Correct answers: 19980

✓ **Correct** 1/1 Points

15. Data coherence problem in a multiprocessor system is about

- ☐ All the cores need to execute the same program
- ☐ All the cores need to run at the same frequency
- ☒ All the places value of the considered shared variable need to be the same. ✓
- ☐ All the cores have to finish the program at the same time.

✓ **Correct** 1/1 Points

16. Choose the right answer

- ☐ OpenMP, Pthread can run on one computer and multicomputer whereas MPI can run only multi-computer
- ☒ OpenMP, Pthread can run on only one computer whereas MPI can run both one computer and multi-computer ✓
- ☐ OpenMP, Pthread can run on multicomputer whereas MPI can run both multi-computer and a single computer
- ☐ OpenMP, Pthread, and MPI can run on run both one computer and multi-computer

✓ **Correct** 1/1 Points

17. Why multiprocessor is popular as compared to a single processor

- ☐ Cost and performance effective
- ☐ Power effective
- ☐ Energy effective
- ☒ All the above ✓

✓ **Correct** 2/2 Points

18. Choose the correct statement for optimizing by the compiler?

- ☒ Optimization is limited to within a function, use only static information, and when doubt compiler needs to be conservative ✓
- ☐ Optimization in general use whole program code, with the dynamic view and very aggressive
- ☐ Optimization, in general, uses whole program code, with the static view, and when doubt compiler needs to be conservative
- ☐ All the above

✓ **Correct** 1/1 Points

19. Which of the following tools can be used for Hot Spot Analysis?

- ☐ Gprof
- ☐ Gcov
- ☐ Valgrind
- ☒ All of the above ✓

✓ **Correct** 2/2 Points

20. Given Ppeak and bs a machine 4 GF/s and 10 GB/s respectively, what will be the achieved performance of the following loop in Giga flop per second.
(assume write allocate)

```
for(i=0;i<N;i++) s=s+a[i]*a[i]; //float s, a[N]
```

4

✓ **Correct** 1/1 Points

21. Which level of GCC compiler optimization support vectorization or simidization

- ☐ Level 0
- ☐ Level 1
- ☐ Level 2
- ☒ Level 3 ✓
- ☐ Non of the above

✗ **Incorrect** 0/2 Points

22. Which of the following type of applications cannot be categorized as compute-intensive, cache-friendly, computation up-loadable (acceleration using GPU/Cloud) friendly application

- ☐ $O(N^2)/O(N^2)$ class (Ops/Data) ✓
- ☐ $O(N)/O(N^2)$ class (Ops/Data) ✓
- ☒ $O(N^3)/O(N)$ class (Ops/Data)
- ☒ $O(N^4)/O(N)$ class (Ops/Data)

✓ **Correct** 2/2 Points

23. Given a cache of size 1MB with 4 way set associative and block (or line) size of 64B, calculate the number of bits required for the index field

12

✓ **Correct** 2/2 Points

24. Given a direct mapped cache with 64B line size and 1024 sets, calculate total number of number miss to be occurred for the array accesses of the following loop. Assume address A started from 00000 and scalar i is mapped to register.

```
unsigned char int A[1024];  
for(i=0;i<1024;i++) A[i]=i;
```

16

✗ **Incorrect** 0/2 Points

25. Energy consumption of system running at one-third of maximum capable frequency will be around ___ times lesser energy consumption of the same running at maximum capable frequency?

27

Correct answers:

9

✓ **Correct** 2/2 Points

26. Is this loop is parallelizable using Pthread?

```
void VectorAvg(){  
    for(int j=1;j<SIZE-1;j++)  
        A[j]=(B[j-1]+B[j]+B[j+1])/3.0;  
}
```

- ☐ Maybe
- ☐ May not be
- ☒ Yes ✓
- ☐ NO

✓ **Correct** 1/1 Points

27. What is the best possible optimization, we can think of the following code [hint: code don't take any external input]

```
int X=0, Y=0; N=20;  
For (i=1;i<=N;i++) X=X+i;  
For (i=1;i<=N;i++) Y=X+i*i;  
printf("X=%d, Y=%d",X,Y);
```

- ☐ Merge both the for loop
- ☐ Use AVX and Simidization
- ☒ Use copy propagation and static calculation ✓
- ☐ All of the above

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