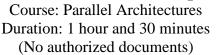
Kasdi Merbah University - OUARGLA

Faculty of New Information and Communication Technologies (FNTIC)

**Department of Computer Science and Information Technologies** 

## Exam (Semester 1)

# -MASTER 2 - Fundamental Computer Science





- 1) Which of the following is a characteristic of the Von Neumann architecture?
  - 1. Separate data and instruction buses
  - 2. Single unified memory for data and instructions
  - 3. Harvard architecture with separate memory spaces
  - 4. Parallel processing units
- 2) In Harvard architecture, what is the main advantage of having separate memory spaces for data and instructions?
  - 1. Simplified control unit
  - 2. Faster access to instructions
  - 3. Reduced power consumption
  - 4. Improved parallel processing
- 3) Which architecture allows simultaneous access to data and instructions, potentially speeding up processing?
  - 1. Von Neumann architecture
  - 2. Harvard architecture
  - 3. RISC architecture
  - 4. CISC architecture
- 4) Flynn's taxonomy is commonly used to classify:
  - 1. Operating systems
  - 2. Programming languages
  - 3. Parallel processing systems
  - 4. Networking protocols
- 5) SISD architecture is typically associated with:
  - 1. Vector processors
  - 2. SIMD processors
  - 3. Sequential processing
  - 4. Multiprocessor systems

- 6) What is the primary limitation of SISD architecture in terms of performance?
  - 1. Lack of parallelism
  - 2. High power consumption
  - 3. Complexity of design
  - 4. Limited memory capacity
- 7) In SIMD architecture, how many processing units are there?
  - 1. One
  - 2. Two
  - 3. Multiple
  - 4. None
- 8) In MISD architecture, how many processing units are there?
  - 1. One
  - 2. Two
  - 3. Multiple
  - 4. None
- 9) SIMD architecture is often associated with:
  - 1. Vector processors
  - 2. SISD processors
  - 3. Sequential processing
  - 4. Multiple control units
- 10) What term is often used to describe the execution flow in SIMD systems?
  - 1. Pipelining
  - 2. Parallelism
  - 3. Concurrency
  - 4. Vectorization
- 11) Which of the following is an example of an MIMD system?
  - 1. Multi-core processor
  - 2. SIMD processor
  - 3. GPU
  - 4. MISD processor
- 12) Which of the following about OpenMP is incorrect?
  - 1. OpenMP is an API that enables explicit multi-threaded parallelism
  - 2. The primary components of OpenMP are compiler directives, runtime library, and environment variables
  - 3. OpenMP implementations exist for the Microsoft Windows platform
  - 4. OpenMP is designed for distributed memory parallel systems and guarantees efficient use of memory

13) Code in an OpenMP program that is not covered by a pragma is executed by how many threads?

- 1. Single thread
- 2. Two threads
- 3. All threads
- 14) What does the MPI\_Finalize function do in MPI?
  - 1. Finalize the MPI environment and terminate the program
  - 2. Finalize a specific MPI communicator
  - 3. Free memory allocated by MPI
  - 4. Finalize the MPI library
- 15) What does MPI\_COMM\_WORLD represent in MPI?
  - 1. A specific communicator
  - 2. The entire MPI world
  - 3. World Communication Interface
  - 4. World Communication Network
- 16) What is printed when executing the below code?

```
int a = 5;

int b = 23;

int c = -3;

#pragma omp parallel num_threads(4) private(a) reduction(+:c) {

  int d = omp_get_thread_num();

  a = 4 + d;

  #pragma omp critical

  b = 2;

  c += a + b;

}

c = c / 2;

printf("a=%d, b=%d, c=%d\n", a, b, c);
```

## Answer: a=5; b=2; c=20

17) What is the output of the following program?

```
#pragma omp parallel num_threads(3)
{
    #pragma omp single
    printf("read input\n");
    printf("compute results\n");
    #pragma omp single
    Printf("write output\n");
}
```

Answer: read input, compute results, compute results, compute results, write output

18) What is the output of the following program (We assume that we have 2 threads)?

```
int count = 0;
    #pragma omp parallel for firstprivate(count)
    for (int i = 0; i < 2; i++) {
        count += 1;
        printf(("NT=%d, C=%d\n", omp_get_thread_num(), count);
        }
        printf(count);</pre>
```

### Answer: NT=1, C=1 NT=1, C=2 NT=2, C=1 NT=2, C=2 0

19) What is the output of the following program (We assume that we have 4 threads)?

```
printf("A\n");
#pragma omp parallel if(0)
{
    printf("B\n");
}
printf("C\n");
```

#### Answer: A C

20) What is the output of the following program (We assume that we have 4 threads)?

```
MPI_Init(NULL, NULL);
int rank, size, data;
MPI_Comm_rank(MPI_COMM_WORLD, &rank);
MPI_Comm_size(MPI_COMM_WORLD, &size);
if (rank == 0) {
    data = 22;
}
MPI_Bcast(&data, 1, MPI_INT, 0, MPI_COMM_WORLD);
printf("R %d D: %d\n", rank, data);
MPI_Finalize();
```

#### Answer

R 0 D: 22

R 1 D: 22

R 2 D: 22

R 3 D: 22