

- No "Collaborative" effort allowed. Students are expected to work themselves.
 - Penalty for late submissions.
 - *Severe penalty for academic dishonesty.*
1. The serial portion of an algorithm constitutes 20 %.
 - (a) What is the maximum achievable speedup for this algorithm? [5pts]
 - (b) If the desirable speedup is 50. What should be maximum percentage of the serial portion for the algorithm? [5pts]
 2. Consider a hypothetical Von Neumann type machine shown in the figure. This machine has a cache of 1 KiloByte and a main memory of 10 MegaBytes. The cost of fetching one floating point number (8 bytes in size) from the cache is 1 CPU cycle (or one clock tick). In the event the data needed is not in the cache, a chunk of data 1 KiloByte in size is fetched from the main memory to cache, replacing the contents of the cache. The cost of fetching data from main memory is 150 CPU cycles.

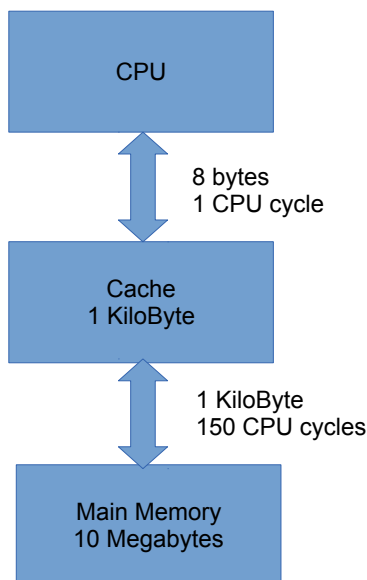


Figure 1: Hypothetical Von Neumann Machine

Now, considering the following snippet code, where matrix A is initialised to some integer values

```
#define N 1024
sum = 0;
for( i=0; i<=N; i++ )
    for( j=0; j<=N; j++ )
sum = sum + A[i][j];
```

- (a) What is the cost in CPU cycles to fetch the requisite data for the matrix A to perform the computation (code is in C)? Disregard the cost for the variable "sum". [20pts]
- (b) What will be the cost again in terms of CPU cycles, if the exact same code is written in FORTRAN? [20pts]