CS4F03 ASSIGNMENT 2

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1 Question 1

1.1 Part A

2-D mesh
diameter: $2 \times (\sqrt{36} - 1) = 10$
$width : \sqrt{36} = 6$
2-D torus :
$diameter : 2(\sqrt{36}/2) = 6$
$width : 2\sqrt{36} = 12$
6-D cube :
$diameter : 6$
$width : 18$

The 6-D hypercube is the best alternative, since when we design a high performance multicomputer platform, we expect lower diameter and higher width so that the parallel computer can require communication between pairs of nodes with costing less time and require a large amount of data at one time.

1.2 Part B

The current address X is 101010 for nodes 42 and the destination address Y is 001101 for node 13.

1. Exclusive OR: 100111
2. The most significent 1-bit: 6th bit.
3. Negate the 6th bit address: 001010.
4. Exclusive OR: 000111
5. The most significent 1-bit: 3rd bit
6. Negate the 3rd bit: 001110
7. Exclusive OR: 000011
8. The most significent 1-bit: 2nd bit
9. Negate the 2nd bit: 001100
10. Exclusive OR: 000001

11. The most siginicent 1-bit: 1st bit
12. Exclusive OR: 001101

2 Question 2

2.1 Data size varies

s + np = 0.12 + 0.88 × 56 = 49.4
49.4 × 2.5 = 123.5Gflops

2.2 Data size fixed

1/(0.12 + 0.888/n) = n/(0.12n + 0.88) = 7.36 7.36 × 2.5 = 18.42Gflops

3 Question 3

1. 00 output port0 of A1
2. 10 output port2 of B1
3. 11 output port port3 of C2
4. Arrive at Node 9