**Dr. D.Y.Patil School of Engineering**

**Department of Computer Engineering**

**B.E. Semester-II ( A.Y. 2015-16)**

**Computer Laboratory-IV**

**Question Bank**

**A-1 : Using Divide and Conquer Strategies design a cluster/Grid of BBB or Rasberi pi or Computers in network to run a function for Binary Search Tree using C /C++/ Java/Python/ Scala**

1. What is Divide and Conquer Strategy?
2. What is Binary Search Tree?
3. Which are the BST Traversal Techniques ? Explain with example.
4. Which traversal gives ordered sequence of elements?
5. Explain Deletion operation in BST with example.
6. Define Height of BST with example.
7. What is the time complexity of various operations in BST?
8. Differentiate between Cluster and Grid.
9. What is Beaglebone Black?
10. What is Raspberry Pi?
11. Differentiate between BBB and Raspberry Pi.
12. What is the IP address of your BBB Kit ?
13. How to run program on BBB Kit ?
14. Which Computer OS you are using? What is the version number?
15. What OS your BBB kit is using ?

**A-2 : Using Divide and Conquer Strategies design a class for Concurrent Quick Sort using C++.**

1. Difference between Parallel and Concurrent Programming
2. What is OpenMP? ( Or What is omp.h)
3. Explain: tid=omp\_get\_thread\_num();
4. Explain : int p = omp\_get\_num\_threads();
5. Explain : #pragma omp parallel sections
6. Explain the concept of Quick Sort with example.
7. Explain the time complexity of Quick Sort with Example.
8. Explain the code of concurrent quick sort program.
9. Explain the use of –fopenmp in command : g++ -fopenmp q1.cpp

**A-3 : Write a MPI program for calculating a quantity called coverage from data files.**

**Hint :- Program distributes computation efficiently across the cluster. The program should be able to work with any number of nodes and should yield the same results as the serial code.**

1. Explain the logic of the program.
2. What is MPI?
3. Explain MPI\_Init() and MPI\_Comm\_rank()functions.
4. Explain MPI\_Scatter()function.
5. Explain MPI\_Gather() Function.
6. Explain MPI\_Finalize() function.

**A-4 : Write a program on an unloaded cluster for several di\_erent numbers of nodes and record the time taken in each case. Draw a graph of execution time against the number of nodes.**

1. Explain the logic of the program.
2. Explain MPI\_Comm\_size() function.
3. Explain MPI\_Send() function.
4. Explain MPI\_Recv() function.
5. Explain MPI\_Wtime() function.

**A-5 : Build a small compute cluster using Raspberry Pi/BBB modules to implement Booths Multiplication algorithm.**

1. Explain the concept of Booths Multiplication Algorithm.
2. Explain the applications of Booths Multiplication Algorithm.
3. Explain the execution of the program and expected output.

**A-a : A. Use Business intelligence and analytics tools to recommend the combination of share purchases and sales for maximizing the profit.**

1. What is meant by Share Market Analysis?
2. What is Hadoop?
3. What is Sqoop?
4. What is Hive ?
5. Explain the expected input and output of the program.

**B-3 : Develop a stack sampling using threads using VTune Amplifier.**

1. What is VTune Amplifier?
2. What are the features of VTune Amplifier?
3. What is meant by Hotspot Analysis?
4. How to get and install VTune Amplifier?
5. How to make the VTune amplifier work on input program?
6. How to analyze the output of VTune Amplifier?

**B-4 : Write a program to check task distribution using Gprof.l**

1. Explain the concept of Profiling.
2. How to use Gprof tool?
3. What is the use of Flat File and call graph?
4. How analyze the output file?

**B-7 : Perform concurrent ODD-Even Merge sort using HPC infrastructure (preferably BBB) using Python/ Scala/ Java/ C++.**

1. Explain the concept of sorting networks.
2. Explain the logic of the program.
3. Explain the expected input and output of the program.

**B-8: Perform DSP(Digital Signal Processing) convolution operation on a given signal stored using XML/JSON/text file using HPC infrastructure.**

1. Explain the process of Convolution.
2. Explain the logic of the program.
3. Explain the expected input and output of the program.
4. Explain linear convolution with example.

**B-A1 : Mall Problem**

1. Explain the concept of Product Analysis.
2. Explain Qlikview tool.
3. Explain the expected input and output of the program.

**B-A2 : Frame the suitable assignment to perform computing using BIA tools effectively.**

1. What case study you are doing under this assignment?
2. Explain the expected input and output.

**C-1 : Write HTML5 programming techniques to compile a text PDF file integrating Latex.**

(1)  Introduction to HTML5

(2)  Features of HTML5

(3)  Introduction to Latex

(4)  Features of Latex

(5)  Converting Latex Source File to PDF

(6)  Latex vs HTML5

**Additional Questions:**

1. What is HPC?
2. Difference between Multicore and Multiprocessor system.
3. Difference between thread and process.
4. What is BI?
5. How to build cluster of computers ?

**Answer :**

Prerequisite: Ubuntu 14.04 (64 bit preferred)

Installations:

1. Execute command: *sudo apt-get update*
2. Install MPI:

*sudo* *apt-get install openmpi-bin openmpi-common libopenmpi1.6 libopenmpi-dev*

1. On Slave nodes install SSH Server: *sudo apt-get install openssh-server*
2. On Master node: *apt-get install openssh-client*
3. Generate ssh key on master as well as slave: *ssh-keygen -t dsa*
4. Enter any string as password on prompted window
5. Execute on Server node

*cp /home/username/.ssh/id\_dsa.pub /home/ username/.ssh/authorized\_keys*

1. Make sure slave machines know that server is authorized to access everything on slave:

*scp /home/mpiuser/.ssh/id\_dsa.pub username@IP\_address:.ssh/authorized\_keys*

1. Change file permissions on both master and slave:

*chmod 700 /home/mpiuser/.ssh*

*chmod 600 /home/mpiuser/.ssh/authorized\_keys*

1. Test ssh connection: *ssh username@IP\_Address*
2. To ensure SSH does not ask for password, use ssh-agent to remember ssh password: *eval `ssh-agent`*
3. Tell ssh-agent the password for the SSH key: *ssh-add ~/.ssh/id\_dsa*
4. Test by logging in that it doesn’t ask for password: *ssh username@IP\_Address*
5. Configuring Open MPI: to let Open MPI know cluster computers information write host\_file:

*Example:*

|  |
| --- |
| *# The Hostfile for Open MPI*  *# The master node, 'slots=2' is used because it is a dual-processor machine.*  *127.0.0.1 slots=2*  *# The following slave nodes are single processor machines:*  *10.10.210.101*  *10.10.210.102*  *10.10.210.103* |

1. Compile MPI program*: mpicc testprogram.c*
2. To run program on two processes on local machine: *mpirun -np 2 ./a.out*
3. To run over 6 processes on cluster: *mpirun -np 6 --hostfile host\_file ./a.out*