To Improving Fault Tolerance in Transmission line in Distributed Systems By using SCADA System

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Abstract: **The use of technology SCADA system has been improving the fault tolerance in distributed system in transmission line and today computer systems are interconnected and different communication medium. The use of distributed systems in our day to day activities has slightly improved fault tolerance in power system. Adding fault tolerance to any software application is becoming an issue of great significance as these applications . As new technologies are developed and new applications arise, new fault- tolerance approaches are also needed. A great deal of current research are move for implementing fault tolerance using SCADA.. In this paper we focused to improve the fault tolerance of the transmission line distributed system so that it will take less time for execution when one node moves from its position as compared to other systems.**

1Introduction:

After generation of power in power system , the main purpose of the electrical transmission and distribution system is transmit electrical energy .A faulty system creates a human/ economic cost loss, air and rail traffic control ,telecommunication loss, etc. The need for reliable fault tolerance mechanism reduces these risks a minimum. In distributed systems, faults or failures are limited or part problems and tolerance of devices which are need to be indicated in reliable and accurate manner for the analysis. Fault tolerance is the dynamic method that's used to keep the interconnected systems together, sustain reliability and availability in distributed systems. The hardware and software redundancy methods are the known techniques of fault tolerance in power system . Efficient fault tolerance mechanism helps in detecting of faults and if possible recovers from it. Computing System is a system which is a combination of number of computers network in line and associated software sharing common memory. It can be peer-to-peer and multi-hop also.

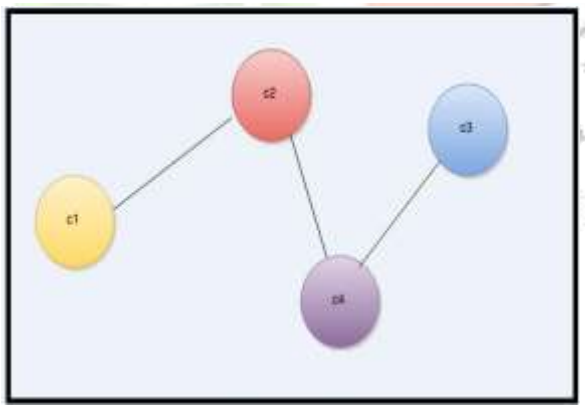

Fig 1: Distributed system

1.1 Fault Tolerance: Capacity of a system to continue functioning in the event of a partial fault .The system continues to functions but overall performance may get affected. Distributed systems are made up of large number of components, developing a system which is hundred % fault tolerant is practically very difficult .

Two main factor for the occurrence of a fault.

- Node failure - hardware and software failure.
- Malicious error - caused by unknown access.

1.2 Need of Fault tolerance: Fault tolerance is needed in order to provide three main feature to distributed system in transmission line.

1. **Reliability:** Focuses on continuous service without any brake down.
2. **Availability:** Concerned with read of the system.

3. **Security:** Prevents any unauthorized access. example : flight control system banking services etc.

1.3 Three phase in faults tolerance: Implementation of fault tolerance technique depends on the design , configuration and application of a distributed system.

i. Fault Detection
ii. Fault Diagnosis
iii. Evidence Generation
iv. Assessment
v. Recovery

1.4 Issues in Distributed Computing System: There are some issues in power system which is responsible to lower down its rate.

1. Flexibility: The distributed system should be flexible so that modifications and enhancement can be done easily by the users.

2. Scalability: System should be designed in this manner that it is easily coping up with it increase growth of the system. It should avoid central algorithms and central entities. It should be perform most of the operation at the client work station.

3. Fault Tolerance: The system must be resistance to faults. In future if any fault may occur it doesn't degrade its performance. Fault can be occur due to mobility, overloading, load imbalance and many more factors.

4. Security: In order that the users can trust the system and rely on it, the various resources of a computer system must be protected against destruction and unauthorized access. Enforcing security in a distributed system is more difficult than in a centralized system because of the lack of a single point of control and the use of insecure networks for data communication.

2. Review of Literature:

We have studied various papers to improve fault tolerance of the system. In this section we will be discussed various techniques and algorithms for improving performance of the system . they proposed a model in SCADA system which have two scenarios. They considered two cases one case is when mobile hosts connect with the fixed network. Second case is when mobile host does not connect with the host. It has one decision tree algorithm which decides when node has to connect with the fixed network and when node has to disconnect.

- They mentioned a brief categorization of errors, faults and failures that are encountered in a distributed environment.
- They presented a technique to remove the problem occurred due to failure of permanent node. they tried to remove overcome the complexity which is occurred due mobility of the node. They proposed a load sharing technique to maintain the performance of the system
- They proposed an algorithm which is based upon the checkpoint technique. It is used to and improve their performance based upon the antecedence graphs. Graph and non-graph based scheme to get high fault tolerance system.
- They proposed an approach to introduce fault tolerance in multi agent system through check pointing based on updating of weights from time to time while calculating the dependence of hosts.

3. Fault Tolerance in Transmission line:

The real time distributed systems like grid, robotics, nuclear air traffic control systems etc. are highly responsible on deadline. Any mistake in real time distributed system can cause a system into collapse if not properly detected and recovered at time. Fault-tolerance is the important method which is often used to continue reliability in these systems. Software and hardware infrastructure provides consistence, dependable and inexpensive to accesses high end computations. A task which is working on real time distributed system should be achievable, dependable and scalable

In software fault tolerance tasks, to deal with faults messages are added into the system. Distributed computing is different from traditionally distributed system. Fault Tolerance is important method in grid computing because grids are distributed geographically in this system under different geographically domains throughout the web wide. The most difficult task in grid computing is design of fault tolerant is to verify that all its reliability requirements are meet

3.1 Techniques for Fault Tolerance: The best is considering that system which is free from all the faults and has immaculate and impeccable performance. So there are various techniques which premeditated to make the system fault tolerant. These techniques are:

3.1.1 Hardware Resilience: Hardware Resilience is the technique which is related to the hardware transparency. In this technique unit hardware transparency is used to handle the reliability of the network. It is memory error correction technique .

3.1.2 Replications: Replication means to make multiple copies of similar data on the servers**.** To make any action successful replication is needed.

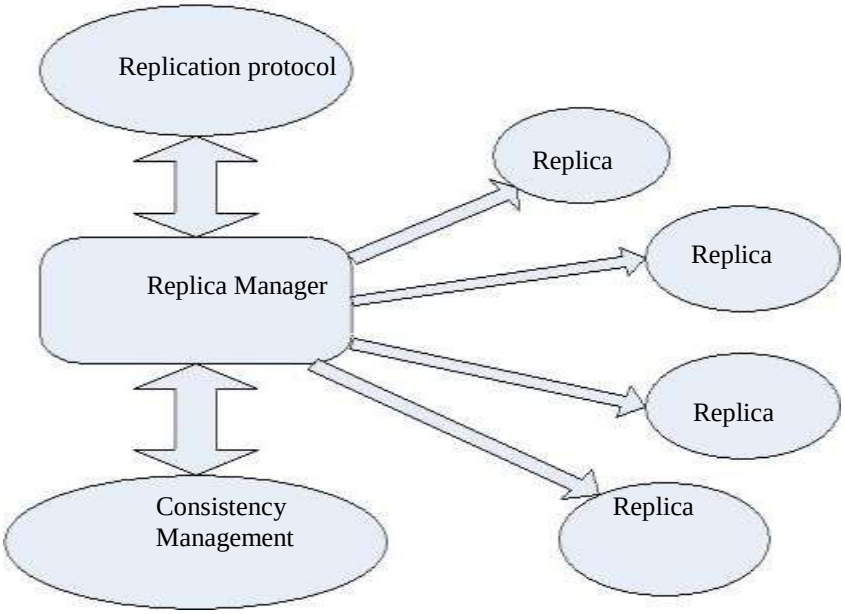

fig.2 Replication techniques

3.1.5: Load Balancing Algorithm: Load balancing algorithm is based on the reallocation of processes during execution time among the processors. The main aim of the system is to improve performance of the system. This can be done by allocating task to the light weighted task from heavy weighted task. Run-time overhead is the disadvantage of dynamic load balancing schemes due to the load information transfer among processors, the decision-making process for the selection of processes and processors for job transfers, and the communication delays due to task relocation itself .

3.1.6: Check pointing: Basically this technique is used to restore the process to certain point after failure occurs. Fault Tolerance can be achieved through various types of redundancy. Check-point start is the common method. In this method an application starts from the earlier checkpoint after a fault. Application may not be able to meet strict timing targets.

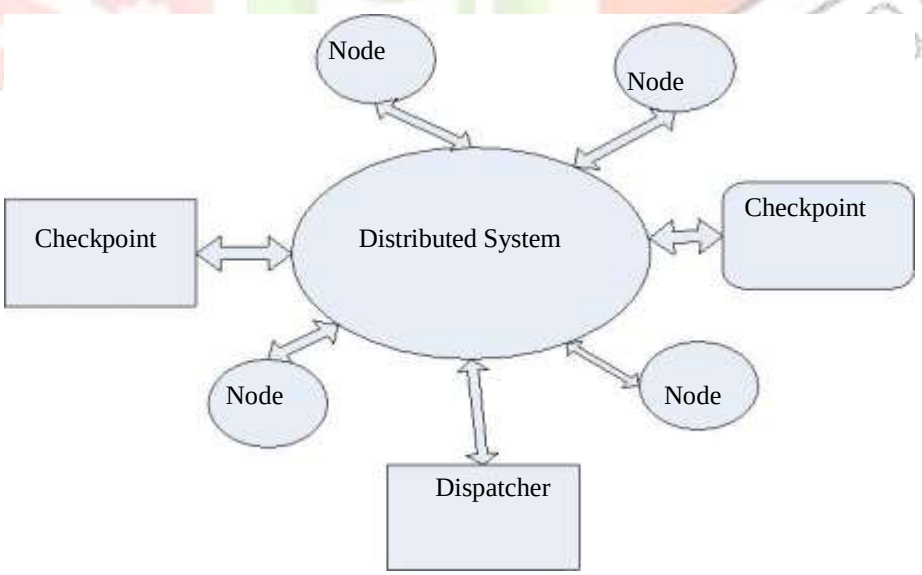

Fig.3 Check Pointing Techniques

4. SCADA SYSTEM: The number of users of distributed systems and networks considerably increases with the increasing complexity of their services and policies, system administrators attempt to ensure high quality of services each user requires by maximizing utilization of system resources. To achieve this goal, correct, real-time and efficient management and monitoring mechanisms are essential for the systems.

4.1 Introduction of SCADA System: Supervisory control and data acquisition (SCADA) is an power control system in transmission line which is used in many modern power system like energy, manufacturing, power, water transportation, etc. SCADA systems organize multiple technologies that allows to process, gather and monitor data at the same time to send instructions to those points that transmit data. In today's world, almost anywhere you can observe SCADA system whether it's a waste water treatment plant, supermarkets, industries or even in your home and power control system and improving the Fault tolerance in transmission line . SCADA systems range from simple to large configurations. Most of the SCADA applications use human machine interface (HMI) software that permits users to interact with machines to control the devices. HMI is connected to the motors, valves and many more devices. SCADA software receives the information from remote terminal units (RTUs), which in turn receive their information from the sensors or inputted values which we have given manually. SCADA in a power system is used to collect monitoring which will reduce the waste potentially and improve the efficiency of the entire system by saving money and time.

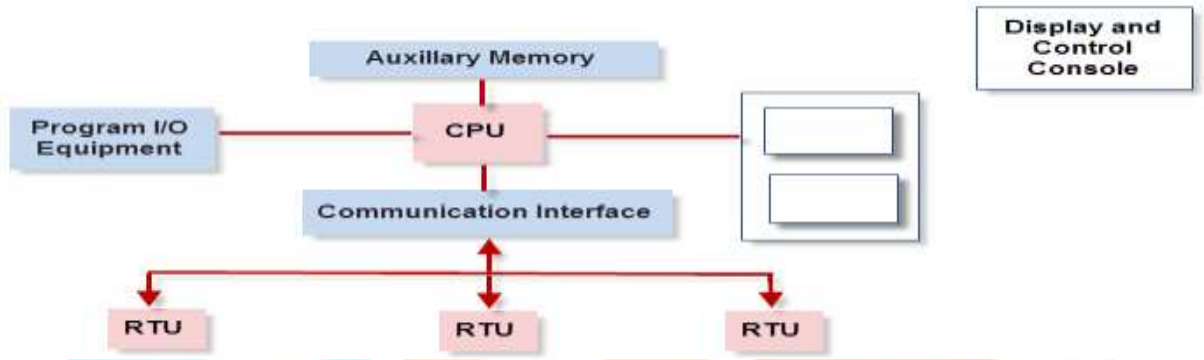

fig4 Functional Units of SCADA

4.2The functions of SCADA in power generation and fault controlling system include : There are some function are taken to improving the fault tolerance of the power system .

- Continuous monitoring of Speed and Frequency
- Geographical monitoring of coal delivery and water treatment processes
- Supervising the status of circuit breakers, protective relays and other safety related operations
- Generation operations planning
- Active and reactive power control
- Turbine protection
- Load scheduling
- Historical data processing of all generation related parameters

4.3SCADA for fault tolerance in power system : Power distribution system deals with transmission of electric power from generating station to the loads with the use of transmission and distribution substations. Most of the power distribution or utility companies rely on manual labor to perform the distribution tasks like interrupting the power to loads, all the parameter hourly checking, fault diagnosis, etc.

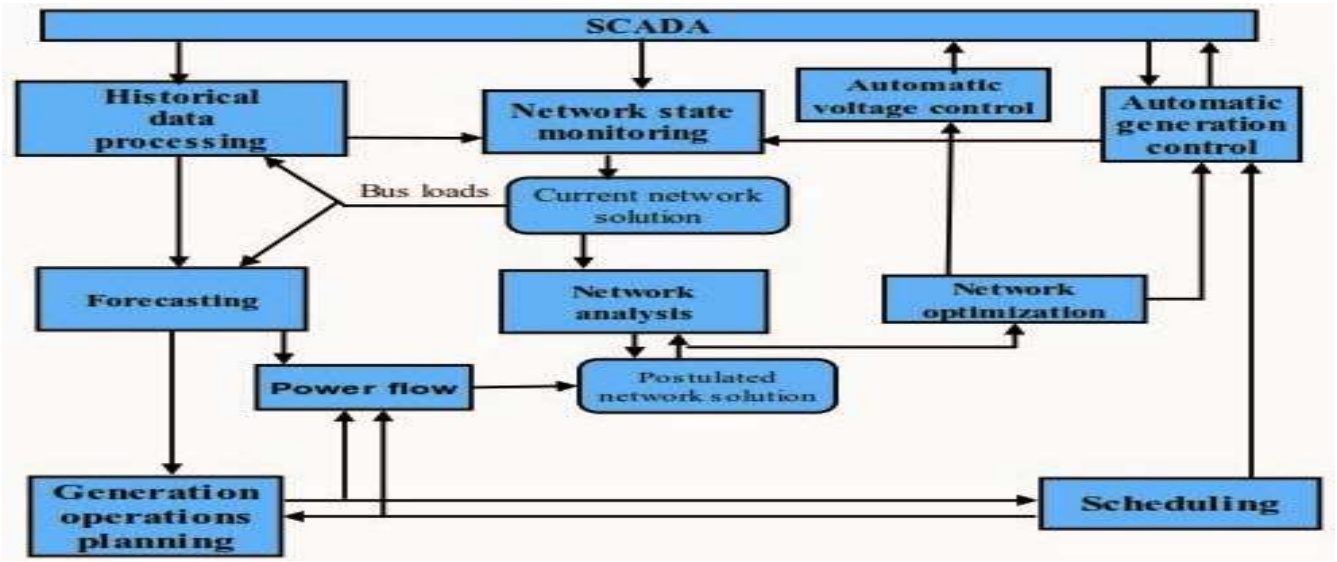

fig.5 SCADA for Power Generating Stations

4.4 Application Of SCADA System in Fault Tolerance in power system: Some of the application of SCADA for Fault Tolerance in power system are given below.

- Continuous monitoring of Speed and Frequency
- Geographical monitoring of coal delivery and water treatment processes
- Load scheduling
- Supervising the status of circuit breakers, protective relays and other safety related operations
- Improving power system efficiency by maintaining an acceptable range of power factor
- Quick response to customer service interruptions
- Continuous monitoring and controlling of various electrical parameters in both normal and abnormal conditions

5. Proposed Methodology: To achieve this goal, correct, real-time and efficient management and monitoring mechanisms are essential for the systems. But, as the infrastructures of the systems rapidly scale up, a huge amount of monitoring information is produced by a larger number of managed nodes and resources and so the complexity of network monitoring function becomes extremely high.

The major problem in this architecture is task scheduling, if one slave node get failed the task allocated by master node will not get completed and fault occurred. In this work, we will work on technique which helps to reduce fault tolerance of the system and increase performance of the system.

we have tray to controlling the fault tolerance and improving the performance in transmission line in power system, so we are discuss about the wireless controlling of fault tolerance and improving the performance of power system . By using the SCADA system in transmission line in power system. On the basis of these two and number of tasks which are going to be executed, reliability valu is calculated. The node which has maximum reliability value will execute the task on the node .

CONCLUSION : Distributed Computing System is wireless system are used in nature. Due to it varied nature there is a need of various hardware's and software's of different kind. Mobile computing is one of the types of distributed computing. There are various issues of distributed computing like scalability, availability and fault tolerance. In this paper, various techniques of fault tolerance in distributed computing system have been studied. Every technique has its pros as well as cons also. In this paper a new technique has been proposed to improve the performance of the system. During the case of node mobility and node failure it can be used to improve performance and makes system fault tolerant. it can provide the fast response in power system. it can reduce real-time response in fault control in power system.

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