KNOWLEDGE CONNECTIVITY REQUIREMENTS FOR SOLVING BYZANTINE CONSENSUS WITH UNKNOWN PARTICIPANTS

ABSTRACT

- Consensus is a fundamental building block used to solve many practical problems that appear on reliable distributed systems. In spite of the fact that consensus is being widely studied in the context of standard networks, few studies have been conducted in order to solve it in dynamic and self-organizing systems characterized by unknown networks.
- While in a standard network the set of participants is static and known, in an unknown network, such set and number of participants are previously unknown. This work studies the problem of Byzantine Fault-Tolerant Consensus with Unknown Participants, namely BFT-CUP.
- This new problem aims at solving consensus in unknown networks with the additional requirement that participants in the system may behave maliciously.
- It presents the necessary and sufficient knowledge connectivity conditions in order to solve BFT-CUP under minimal synchrony requirements. In this way, it proposes algorithms that are shown to be optimal in terms of synchrony and knowledge connectivity among participants in the system.

EXISTING SYSTEM

- The consensus problem and more generally agreement problems, form the basis for most solutions related to the development of reliable distributed systems. Through these protocols, participants are able to coordinate their actions in order to maintain state consistency and ensure system progress.

- Consensus has been extensively studied in standard networks, where the set of processes involved in a particular computation is static and known by all participants in the system. Nonetheless, even in these environments, the consensus problem has no deterministic solution in presence of one single process crash, when entities behave asynchronously. Due to this limitation, usually some synchrony need to be assumed in the system.

- In self-organizing systems, such as wireless mobile adhoc networks, sensor networks and unstructured peer to peer networks (P2P), solving consensus is even more difficult.

PROPOSED SYSTEM

- In these environments, initial complete knowledge about the participants in the system is a strong assumption since the system composition changes frequently. These environments define indeed a new model of dynamic distributed systems which has essential differences regarding the standard static networks. Consequently, it brings new challenges to the specification and resolution of problems.

- Most of the studies about consensus are not suitable for these systems because they assume a static and known set of participants. Some notably exceptions are the works of Cavin and Greve for the crash failure model and the work of Alchieri for the Byzantine failure model. These works identify necessary and sufficient knowledge connectivity requirements able to solve consensus when the set of participants is unknown in the system.

- The work presented herein extends these previous results providing novel algorithms and knowledge connectivity conditions.

ADVANTAGES

- The advantages are cavin et al defined the CUP problem (consensus with unknown participants) to solve consensus in a failure-free asynchronous network with unknown participants.
- With this aim, the participant detector abstraction (namely, PD) has been defined to provide processes with an initial knowledge about the system membership. The work establishes the necessary and sufficient knowledge connectivity conditions able to solve CUP, which are represented by the One Sink Reducibility participant detector (namely, OSR).

DISADVANTAGES

- In self-organizing systems, such as wireless mobile adhoc networks, sensor networks and unstructured peer to peer networks (P2P), solving consensus is even more difficult.
- Most of the studies about consensus are not suitable for these systems because they assume a static and known set of participants

SOFTWARE REQUIREMENTS

- Operating System : Windows95/98/2000/7
- Application Server : Tomcat5.0/6.X

- Front End : HTML, Java, Jsp.
- Scripts : JavaScript
- Server side Script : Java Server Pages.
- Database : Mysql 5.0.net
- Operating system : Windows 7
- Coding Language : ASP.Net with c#
- Data Base : SQL Server 2005

HARDWARE REQUIREMENTS

- Processor - Pentium –III
- Speed - 1.1 GHz
- RAM - 256 MB(min)
- Hard Disk - 20 GB
- Floppy Drive - 1.44 MB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

- System : Pentium IV 2.4 GHz.
- Hard Disk : 40 GB.
- Floppy Drive : 1.44 Mb.
- Monitor : 15 VGA Colour.
- Mouse : Sony.
- Ram : 512 Mb.

CONCLUSION

- In this paper, we identified necessary and sufficient conditions to solve the BFT-CUP problem in an asynchronous system. These conditions are related with the degree of knowledge about the system composition that participants must initially obtain.
- The proposed protocols complement previous works about consensus with unknown participants by decreasing the minimum degree of knowledge necessary to solve BFT-CUP.
- The new threshold is showed to be optimal. As a side effect, a BFT dissemination primitive, namely reachable reliable broadcast, has been defined and can be used in other protocols for unknown networks.

- The analysis time of the recorded video streams decreased from 27.80 hours to 5.83 hours, when the number of nodes in the cloud varied from 3-15. The analysis time would further decrease when more nodes are added to the cloud.