International Journal of Advanced Technology in Engineering and Science
Vol. No.5, Issue No. 01, January 2017
www.ijates.com
ijates
ISSN 2348 - 7550

AUTONOMIC COMPUTING: SOLUTION OF GROWING COMPLEXITY IN IT SYSTEMS

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ABSTRACT

The Fundamental Essence of this paper is to reflect the impact of Self-managed Autonomic Systems on traditional IT sector. This paper discusses the basic prototype of Autonomic Systems that needs to be integrated in modern complex IT systems to deal with the ever increasing complexity.

Keywords: Autonomic Computing, Autonomic Dexterous Machines, Autonomic Managers, Artificial Intelligence.

I. INTRODUCTION

A Computing environment with the ability to manage itself and dynamically adapt to changes in accordance with Business policies and objectives . Due to increasing complexity in IT Systems, IBM in 2001 took initiative to develop a kind of self-managed computing environment that can reduce the complexity and ultimately aims to prevent the barrier that complexity posses for further growth. The System makes decisions dynamically depending on the present policies and situation of the administration.

We all know that today's the era of information and technology. IT systems are becoming more and more complex every day due to which users have to suffer and it is difficult for them to look up to the relevant information in the given time frame. Taking this problem into account there is a need for a computing environment that can manage itself and take the decisions automatically without any interference. The systems will configure automatically, protect themselves from any malicious virus or malware, capable of self healing and optimize themselves according to required results. So far, the study in this field has revealed that the development of such kind of systems required four primary self-management properties. Here is brief description of those properties

1. Self-Configuring:- An Autonomic Systems are required to configure themselves according to the specified goals of the administration. This can mean being able to install and set it up based on the needs of the platform and the user.
2. Self-Optimizing:- An Autonomic System analyzes the situation and can optimize itself according to the present situation of resources and condition of the company.
3. Self-healing:- An Autonomic Systems detects and performs a complete diagnosis of the problem. A problem may be as low as a minute bit error or as high as a huge disruptive software failure.
4. Self-Protection:- An Autonomic System prevents internal attacks such as viruses or external malicious attacks such as deletion of important files from any unauthorized personnel.

II. RELATED WORK

Taking into consideration the menace of complexity and to provide simplified user interface in modern technologies, a lot of research is being conducted. There are numerous projects where Intelligent Autonomous systems are inculcated in the computing paradigm.

1. Ocean Store: architecture of global file storage system that provides persistent and highly durable information in peer to peer environment. This Project engages factors like self optimization by updating the information in the files, self protection by preventing any alteration by an unauthorized person or an organization, the system includes continuous evaluation, testing and repairing of data.
2. E-Sourcing: The process of obtaining bids from different suppliers via a single online portal. The benefits of e-Sourcing include streamlining the sourcing process, reducing prices by maximizing supplier competition, and creating a repository for sourcing information. E-sourcing is the ability to deliver IT as a utility, when you need it, in the amount you must have to accomplish the task at hand. Autonomic computing will create huge opportunities for these kinds of services.
3. Grid Computing: Collection of computer resources from multiple locations to reach a common goal. This plays an important role in development of "Super Virtual Computers".
4. SMART: Self-Managing and Resource Tuning DB2 (Middleware) IBM will be building a SMART (Self-Managing and Resource Tuning) database into upcoming versions of DB2. This database is designed to reduce the human intervention needed to run and maintain a database. For example, the user can opt not to be involved and the database will automatically detect failures when they occur and correct them. The database will also configure itself by installing operating systems and data automatically to cope with the changing demands of e-business and the Internet.

Apart from above stated projects there are other examples also, such as a group of engineering students at INSA Toulouse realized their computing project applied to SMART Homes. They used several devices, such as Phidgets and Intel Galileo, able to interact with each other autonomously. Thus we conclude that there is lot of research being conducted at global level so that complexity can be reduced.

III. PROPOSED WORK

Considering the problem of increasing complexity, this paper suggests the basic architecture behind the IT systems that will engage the autonomic computing paradigm. The system will consist of number of Autonomic Dexterous Machines (ADM) and each of which will have its own storage hub which will store the previous data and other log files which will contain the information about the past policies of an administration.

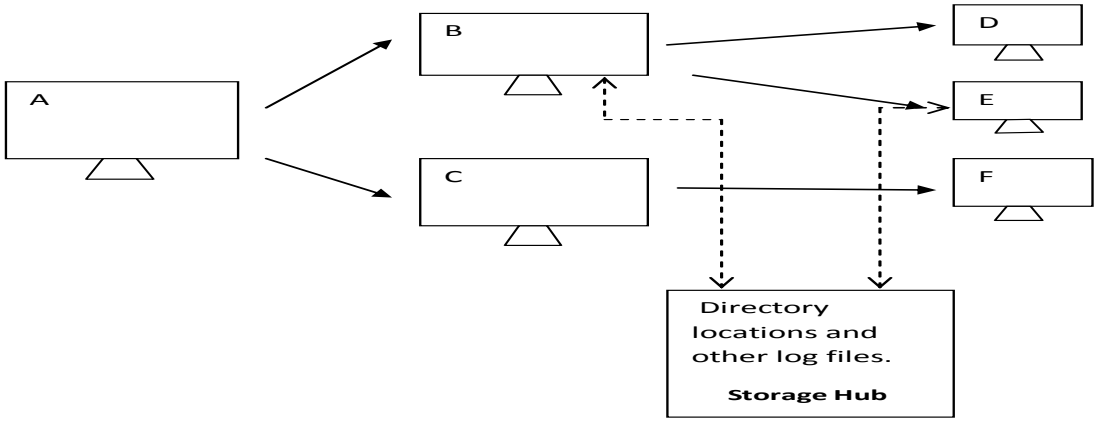

Fig 1: Architecture of Autonomic Dexterous Machines

Fig:1 depicts outline of an Autonomic dexterous machine which will self-manage itself according to the present situation of the administration in market. Let us suppose after an upgrade we are given 6 modules, each an autonomic element. Minutes after installation, the sensors and testers recognizes a wrong output at E module. The module goes to the storage hub and replaces its present output with the average of previous values stored at the same directory path then it will revert back to its older state (i.e. B) which will install the upgrades or new software by checking the new log files.

The ADM element is the fundamental building block of an autonomic system. It consists of an autonomic manager and managed elements. The Autonomic manager will manage and monitor the performance of each managed element. The managed elements will consist of four parts: analyze, plan, organize and execute. The analyze part provides mechanisms to collect information from database of the administration and manage it. It helps autonomic manager to predict future states. Plan uses policy information and what is analyzed to achieve goals. Policies can be a set of administrator ideas and are stored as knowledge to guide the manager. Plan assigns tasks and resources based on the policies, add, modify, and delete the policies. Organizer can change resource allocation to optimize performance according to the policies. Finally, the execute part controls the execution of a plan and dispatches recommended actions into managed elements .Communications between managers provide self-managing and context-awareness. External behavior of ADMs is related to relationships among them.

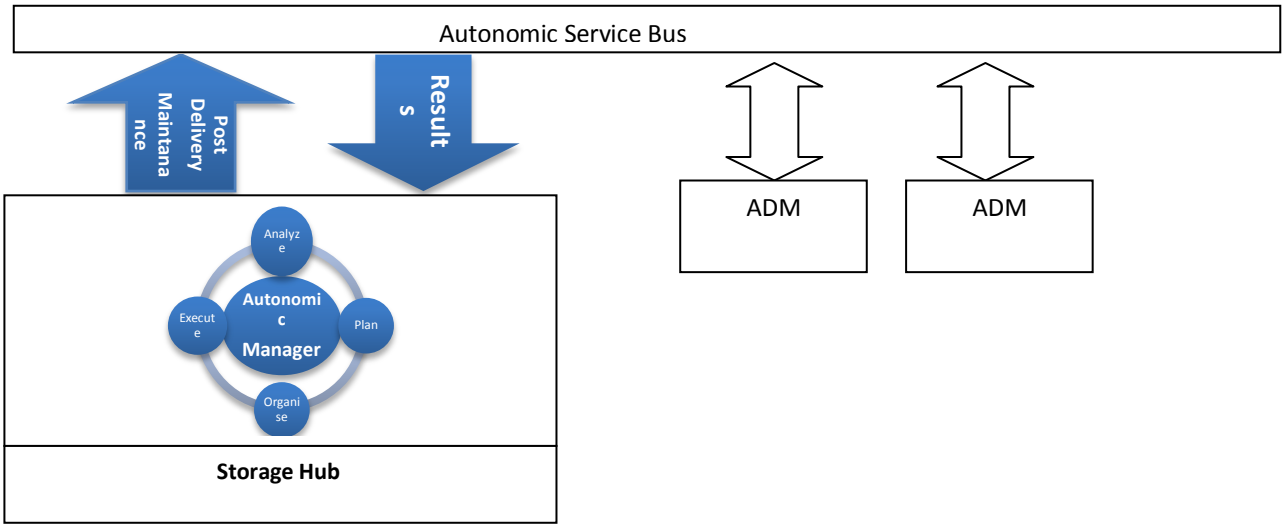

Fig 2: Autonomic System

IV. CONCLUSION

Despite vigorous advancement in technology, the complexity is something that is increasing rampantly. Virtual machine-based environments nowadays are manually managed by system administrators using GUI-based management tools that do not provide any automation capabilities which lead to increase in number of employees as well as increased total cost of ownership (TCO) of the administration when the concept of Autonomic computing will take place, the machines will self-manage, leading to reduced employee count which in turn will lead to reduced Total cost of ownership. Several research efforts are focusing on various factors to efficiently implement this concept at hardware levels, software systems and applications. At the hardware level, systems may be dynamically upgradable, while at the operating system level, active operating system code may be replaced dynamically. Efforts have also focused on autonomic middle-ware, programming systems and run-time. At the application level, self optimizing databases and web servers dynamically reconfigure to adapt service performance. This intelligent perception concept needs to be provided with the robust platform in forthcoming years to deal with perpetually cumulating complexity in IT systems.

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