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Review on Cloud Computing For Agent Based Urban Transportation Systems

Miss Poonam Wavare

Lecturer, Computer Engineering Department, V.P.M's Polytechnic, Thane, Maharashtra, India

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Abstract - *Agent-based traffic management systems can use the autonomy, mobility, and adaptability of mobile agents to deal with dynamic traffic environments. Cloud computing can help such system cope with the large amounts of storage and computing resources required to use traffic strategy agents and mass transport data effectively. This article reviews the history of the development of traffic control and management systems within the evolving computing paradigm and shows the state of traffic control and management systems based on mobile multi agent technology. Intelligent transportation clouds could provide services such as decision support, a standard development environment for traffic management strategies, and so on. With mobile agent technology, an urban-traffic management system based on Agent-Based Distributed and Adaptive Platforms for Transportation Systems (Adapts) is both feasible and effective. However, the large-scale use of mobile agents will lead to the emergence of a complex, powerful organization layer that requires enormous computing and power resources.*

Key Words: **Cloud Computing, Intelligent traffic clouds, Adaptive Platforms for Transportation Systems, Intelligent traffic cloud, etc.**

1. INTRODUCTION

IBM introduces urban traffic management system in the year of 1956. Today, transportation research and development is no longer a field dominated by civil, mechanical, operations research, and other traditional engineering and management disciplines. Rather, computer sciences, control, communication, the Internet, and methods developed in artificial intelligence (AI), computational intelligence, web sciences, and many other emerging information sciences and engineering areas have formed the core of new ITS technology and become integral and important parts of modern transportation engineering. Cloud computing control the traffic allocation process provides optimal solution with five stages specification. In the first phase, computers were huge and costly, so mainframes were usually shared by many terminals. In the 1960s, the whole traffic management system shared the resources of one computer in a centralized model. Introduction of large-scale integrated circuits and the miniaturization of computer technology, the IT industry welcomed the second transformation in computing paradigm. In this paradigm, microcomputer was powerful enough to handle a single user's computing requirements.

1.1 Existing System

In the first phase of computer evolution, computers were huge and costly, so mainframes were usually shared by many terminals. In the 1960s, a whole traffic management system always shared the resources of one computer in a centralized model. Thanks to large-scale integrated (LSI) circuits and the miniaturization of computer technology, the IT industry welcomed the second transformation in computing paradigm. At this point, a microcomputer was powerful enough to handle a single user's computing requirements. At that time, the same technology led to the appearance of the traffic signal controller (TSC). In phase three, local area networks (LANs) appeared to enable resource sharing and handle the increasingly complex requirements. One such LAN, the Ethernet, was invented in 1973 and has been widely used since.

1.2 Proposed System

To overcome the drawback of the previous Agent Based Traffic Management System we are proposing "Cloud Computing for Agent-Based Urban Transportation System" is the system that will provide the user all the recent traffic update whenever they request for update. Along with the traffic update system will also provide the information about the nearest hospital and the police station in case any emergency. Agent will always give the information about the dynamic traffic environment to the traffic manager. Only requiring a runtime environment, mobile agents can run computations near data to improve performance by reducing communication time and costs.

The IT industry has ushered in the fifth computing paradigm: cloud computing. Based on the Internet, cloud computing provides on demand computing capacity to individuals and businesses in the form of heterogeneous and autonomous services. With cloud computing, users do not need to understand the details of the infrastructure in the "clouds;" they need only know what resources they need and how to obtain appropriate services, which shields the computational complexity of providing the required services.

2. Modules

2.1 Agent-Based Traffic Management Systems

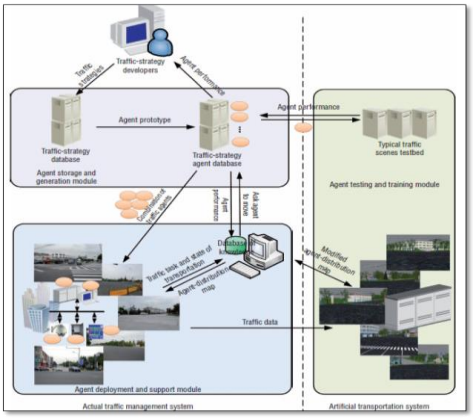

Fig-1: Overview of the main functional elements in the organization layer of Adapts.

The organization layer consists of a management agent (MA), three databases (control strategy, typical traffic scenes, and traffic strategy agent), and an artificial transportation system. As one traffic strategy has been proposed, the strategy code is saved in the traffic strategy database. Then, according to the agent's prototype, the traffic strategy will be encapsulated into a traffic strategy agent that is saved in the traffic strategy agent database. Also, the traffic strategy agent will be tested by the typical traffic scenes to review its performance. Typical traffic scenes, which are stored in a typical intersections database, can determine the performance of various agents. With the support of the three databases, the MA embodies the organization layer's intelligence.

2.2 Intelligent traffic Module

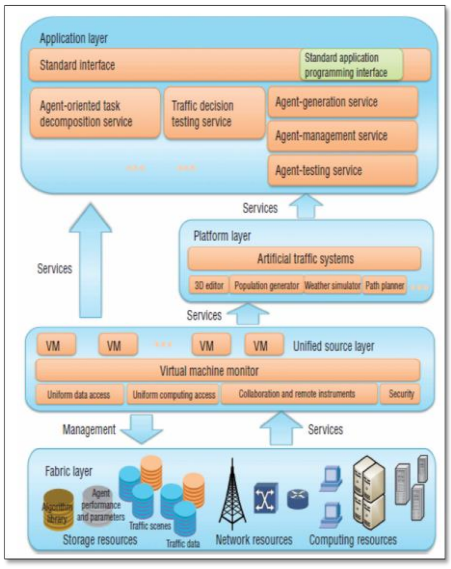

Fig-2: Intelligent traffic clouds structure has application, platform, unified source, and fabric layers.

With the development of intelligent traffic clouds, numerous traffic management systems could connect and share the clouds' infinite capability, thus saving resources. Moreover, new traffic strategies can be transformed into mobile agents so such systems can continuously improve with the development of transportation science.

Platform Layer: The second layer in the architecture is the platform layer, it is made up of ATS. This layer also consists of various different types of Services which are as follows: Population synthesizer, weather simulator, Path planner, 3D game engine and so on which provide service to the upper traffic Application and agent development.

Unified source Layer: This is the third layer in the system architecture ,this layer also provide various other types of services ,its job is to govern the raw hardware level resource in the fabric layer which helps to provide infrastructure as service. It also make use of virtualization technologies such as virtual machines to hide the physical characteristics of resources from users to ensure the safety of data and equipment. The other job of unified source layer is to provide access interface for the upper and reasonable distributed computing resources. The information created by this access interface solve many different other types of urban traffic problem.

Fabric Layer: This is the last layer of the system architecture; it also provides many different types of services, which proves to be very important in solving urban traffic problem. It also contains many other services which are as follows: it has raw hardware level resource such as computing, storage and network resources which plays a very important role in urban traffic management system. The cloud make use of this distributed resource which cater all the peak demand of urban traffic management system which support the running of agent and ATS test beds which efficiently store traffic strategy agents and their performance.

2.3 Traffic-strategy agent Module

The more typical traffic scenes used to test a traffic-strategy agent, the more detailed the learning about the advantages and disadvantages of different traffic strategy agents will be. In this case, the initial agent-distribution map will be more accurate. To achieve this superior performance, however, testing a large amount of typical traffic scenes requires enormous computing resources. Researchers have developed many traffic strategies based on AI. Some of them such as neural networks consume a lot of computing resources for training in order to achieve satisfactory performance. However, if a traffic strategy trains on actuator, the actuator's limited computing power and inconstant traffic scene will damage the performance of the traffic AI agent. As a result, the whole system's performance will deteriorate. If the traffic AI agent is trained before moving it to the actuator, however, it can better serve the traffic management system.

2.3 Intelligent Traffic Clouds Storage

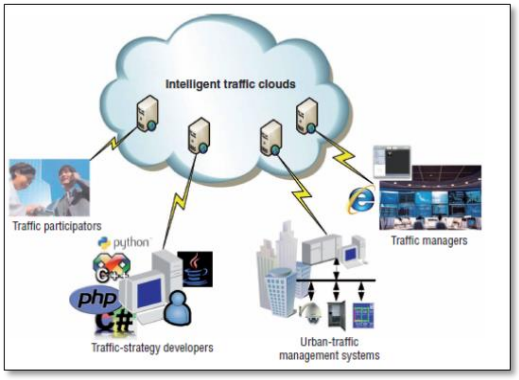

Fig-3: Urban-traffic management system based on cloud computing

We propose urban-traffic management systems using intelligent traffic clouds to overcome the issues we've described so far. With the support of cloud computing technologies, it will go far beyond other multi agent traffic management systems, addressing issues such as infinite system scalability, an appropriate agent management scheme, reducing the upfront investment and risk for users, and minimizing the total cost of ownership.

3. Advantages

- With cloud computing, users do not need to understand the details of the infrastructure in the "clouds;" they need only know what resources they need and how to obtain appropriate services
- Such systems can take advantage of cloud computing to organize computing experiments, test the performance of different traffic strategies.
- Cell phones are very convenient to carry.
- Assistance about traffic at any time and at any place.
- User friendly environment.
- Centralized database.

4. CONCLUSION

Urban traffic management systems based on cloud computing. The intelligent traffic clouds could provide traffic strategy agents and agent-distribution maps to the traffic management systems, traffic-strategy performance to the traffic-strategy developer, and the state of urban traffic transportation and the effect of traffic decisions to the traffic managers. It could also deal with different customers' requests for services such as storage service for traffic data and strategies, mobile traffic-strategy agents, and so on. With the development of intelligent traffic clouds, numerous traffic management systems could connect and share the clouds' infinite capability, thus saving resources.

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