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Advanced Transporatation System Using Cloud Computing

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Abstract:

Intelligent transportation clouds could provide Services such as autonomy, mobility, decision support and the 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. To deal with this problem, we propose a prototype urban-traffic management system using multi agent based intelligent traffic clouds. Cloud computing can help us to handle the large amount of storage resources and mass transportation of data effectively and efficiently.

Key word : *Adapts, Intelligent clouds, Traffic management, and mobile agents.*

1.Introduction

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 Systems Cope With The Large Amounts Of Storage And Computing Resources Required To Use Traffic Strategy Agents And Mass Transport Data Effectively. 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 C 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. To Deal With This Problem, We Propose A Prototype Urban-Traffic C Management System Using Intelligent Traffic Clouds.

2.Agent Based Traffic Management System

Agent Technology Agent Technology Was Used In Traffic Management Systems As Early As 1992, While Multi-Agent Traffic Management Systems Were Presented Later. In 2004, Mobile Agent Technology Began To Attract The Attention Of The Transportation Field. The Characteristics Of Mobile Agents—Autonomous, Mobile, And Adaptive—Make Them Suitable To Handling The Uncertainties And Inconstant States In A Dynamic Environment. In 2005, The Agent-Based Distributed And Adaptive Platforms For Transportation Systems (Adapts) Was Proposed As A Hierarchical Urban Traffic- Management System. The Three Layers In Adapts Are Organization, Coordination, And Execution, Respectively. Currently, Adapts Is Part Of Ptms, Which Can Take Advantage Of Mobile Traffic Strategy Agents To Manage A Road Map. The Organization Layer, Which Is The Core Of Our System, Has Four Functions, Agent-Oriented Task Decomposition, Agent Scheduling, Encapsulating Traffic Strategy, And Agent Management. As One Traffic Strategy Has Been Proposed, The Strategy Code Is Saved In The Traffic Strategy Database. Typical Traffic Scenes, Which Are Stored In A Typical Intersections Database, Can Determine The Performance Of Various Agents. If The Urban Management System Cannot Deal With A Transportation Scene With Its Existing Agents, It Will Send A Traffic Task To The Organization Layer For Help. The Traffic Task Contains The Information About The State Of Urban Transportation, So A

Traffic Task Can Be Decomposed Into A Combination Of Several Typical Traffic Scenes. With Knowledge About The Most Appropriate Traffic Strategy Agent To Deal With Any Typical Traffic Scene. This Way, This System Takes Advantage Of The Strategy Agent To Manage A Road Map. Lastly, We Set Up An Ats To Test Performance Of The Urban-Traffic Management System Based On The Map Showing The Distribution Of Agents.

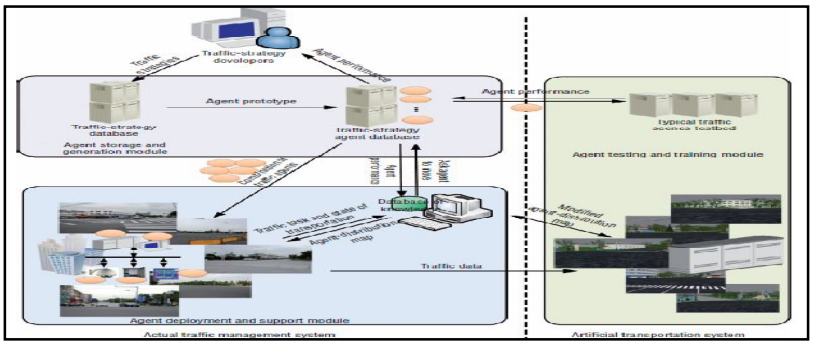

Figure 1: Organizational Layers Of Agent Based Distributed Transportation System

3.New Challenges

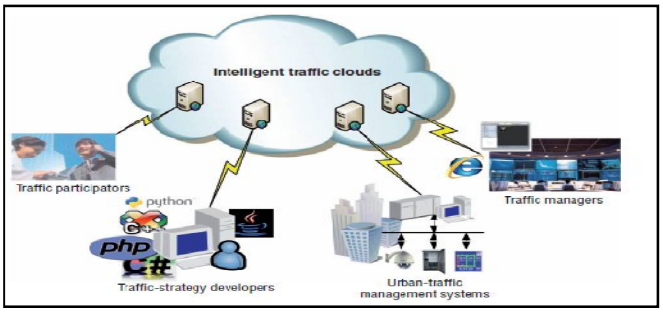

Figure 2: Overview Of Urban-Traffic Management Systems Based On Cloud Computing.

A Complete Urban Traffic Management System Also Requires Traffic Control, Detection, Guidance, Monitoring, And Emergency Subsystems. To Handle The Different States In A Traffic Environment, An Urban-Traffic Management System Must Provide Appropriate Traffic Strategy Agents. And To Handle Performance Improvements And The Addition Of New Subsystems, New Traffic Strategies Will Be Introduced Continually. So Future Urban-Traffic Management Systems Will Generate, Store, Manage, Test, Optimize, And Effectively Use A Large Number Of Mobile Agents. A Comprehensive, Powerful Decision- Support System With A Friendly Human-Computer

Interface Is An Inevitable Trend In The Development Of Urban-Traffic Management Systems. Thus, Future Systems Will Have The Following Capabilities. Agents Themselves Can Be Humans, Vehicles, And So On. To Ensure Ats Mirrors Real Urban Transportation, We Will Need Large Computing Resources To Run Many Agents.

4.Storage

Vast Amounts Of Traffic Data Such As The Configuration Of Traffic Scenes, Regulations, And Information Of Different Types Of Agents In Ats Need Vast Amounts Of Storage. Similarly, Numerous Traffic Strategy Agents And Relative Information Such As Control Performances About Agents Under Different Traffic Scenes Also Consume A Lot Of Storage Resources. Finally, The Decision-Support System Requires Vast Amounts Of Data About The State Of Urban Transportation Time. This Way We Will Make Full Use Of Existing Cheap Servers And Minimize The Upfront Investment Of An Entire System.

5.Intelligent Traffic Cloud

Urban Traffic Management Systems Using Intelligent Traffic Clouds Have Overcome The Issues We've Described. With The Support Of Cloud Computing Technologies, It Will Go Far Beyond Than Any 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.

6.Prototype

Urban-Traffic Management Systems Based On Cloud Computing Has Two Roles: Service Provider And Customer. All The Service Providers Such As The Test Bed Of Typical Traffic Scenes, Ats, Traffic Strategy Database, And Traffic Strategy Agent Database Are All Veiled In The Systems Core: Intelligent Traffic Clouds. The Cloud Will Provide Strategic Information To The Developers As Per Different Location. It Could Also Deal With The Varying Customer Request For Traffic Related Data. With The Development Of Intelligent Traffic Clouds, Numerous Traffic Management Systems Could Connect And Share The Clouds' Infinite Capability, Thus Saving Resources. This Would Facilitate Seamless Connectivity Between The Cloud Data And Customer

Interface Improving The Capability And The Saving Further Resource Investment And Lead To A Development Of New Transportation Science.

7.Architecture

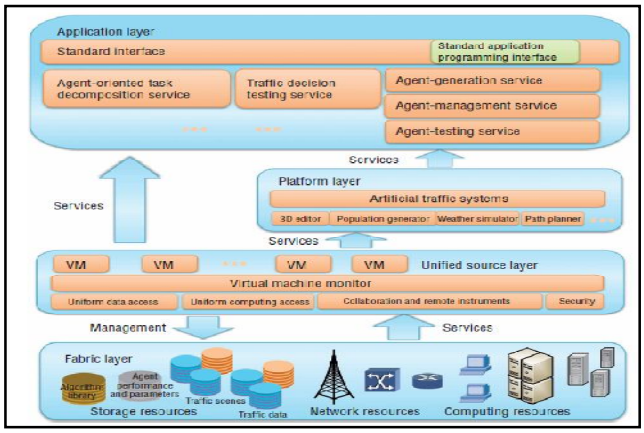

Figure 3: Intelligent Traffic Clouds Have Fabric, Unified Source Layer, Platform And Application Layers.

According To The Basic Structure Of Cloud Computing, An Intelligent Traffic Clouds Have Four Architecture Layers: Application, Platform, Unified Source, And Fabric. Figure 5 Shows The Relationship Between The Layers And The Function Of Each Layer. The Application Layer Contains All Applications That Run In The Clouds. It Supports Applications Such As Agent Generation, Agent Management, Agent Testing, Agent Optimization, Agent Oriented Task Decomposition, And Traffic Decision Support. The Clouds Provide All The Services To Customers Through A Standard Interface. The Platform Layer Is Made Of Ats, Provided Platform As A Service. This Layer Contains A Population Synthesizer, Weather Simulator, Path Planner, 3d Game Engine, And So On To Provide Services To Upper Traffic Applications And Agent Development. The Unified Source Layer Governs The Raw Hardware Level Resource In The Fabric Layer To Provide Infrastructure As A Service. It Uses Virtualization Technologies Such As Virtual Machines To Hide The Physical Characteristics Of Resources From Users To Ensure The Safety Of Data And Equipment. It Also Provides A Unified Access Interface For The Upper And Reasonable Distribute Computing Resources. All Those Will Help Solve Information Silo Problems In Urban Traffic And Help Fully Mine Useful Information In The Traffic Data. Lastly, The Fabric Layer Contains The Raw Hardware Level Resources Such As Computing, Storage, And Network Resources. The Intelligent

Traffic Clouds Use These Distributed Resources To Cater The Peak Demand Of Urban-Traffic Management Systems, Support The Running Of Agents And Ats Test Beds, And Efficiently Store Traffic Strategy Agents And Their Performances.

8.Conclusion

Cloud Computing Based Intelligent Transportation Systems (Itss) Concept Has Recently Emerged To Meet This Challenge. Many People See This Emergence As Part Of Normal Evolutionary Adaptation To New Traffic Conditions And Technology. They Consider Current Its Applications Perfectly Adequate To The Times And A Safer, Wiser Response To Today's And Tomorrow's Transportation Problems.

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