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Efficient MCC Self Driven Car Using Dynamic Priority Based Resource Allocation Algorithm

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Abstract: Smart vehicles are equipped with a variety of sensing devices that provide a variety of multimedia applications and services related to smart driving assistance, weather forecasting, traffic congestion information, road safety alarms, and a variety of entertainment and comfort-related applications in an intelligent transportation system. Due to their limited computational capacity and storage capabilities, these smart cars generate a tremendous volume of multimedia-related data that requires quick and real-time processing, which can't be completely handled by independent on-board computer systems. As a result, changing the underpinning networking and computing architectures was required to handle such multimedia applications and services.
Keywords: Multimedia Cloud Computing, Quality of Experience, Resource Manager, Load Manage, Intelligent Transportation System, Response Time.

I. INTRODUCTION

A. Purpose

The multimedia cloud computing (MCC) focuses on how to provide required quality of service (QoS) to the multimedia applications. But the way multimedia processes the data is more critical and challenging because the data need to be processed fast by responding to the request on time with reduced cost. To understand this concept we can take a example that the MCC has to process the weather conditions or some fog covered a particular area, so if such information is not processed more lives are at stake.

B. Scope

In all the smart transportation systems, vehicles are all equipped with multiple sensors, cameras, audio devices that provide huge amount of multimedia contents for processing of multimedia cloud computing (MCC). All these devices are used to produce multimedia contents which cannot be performed by the standalone devices due to the limited storage capacity. Therefore the integration of vehicle with all the smart equipment is highly required to provide a powerful computing tool that gives efficient breakdown of vehicles multimedia application and services. Since the conventional cloud computing is not suitable for such delay sensitive application and services. Thus in order to handle such delay sensitive application and services multimedia cloud computing (MCC) was introduced. The scheme DP-ERACOM is used to divide multimedia tasks into four subtasks to allocate media. Hence the three main computing and processing units are

1) Load Manager
2) Computing Cluster unit
3) Transmission unit

C. Model Diagram/Overview

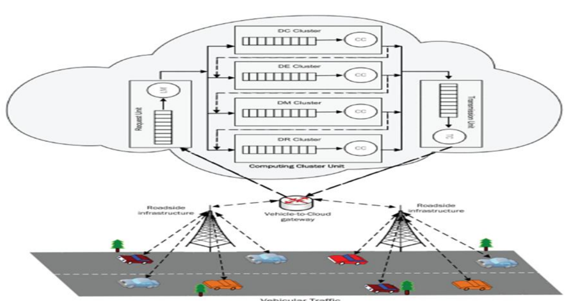

Fig. Model Diagram

The above categorization is divided into four phases However, in the DP-ERACOM all of these four computation phases are performed separately by four dedicated computing clusters rather than a single computing cluster. Thus, in order to minimize the computing cost, computing resources to each computing cluster are assigned dynamically according to the need or load information.

II. SYSTEM ANALYSIS

A. Existing System

These days, the automobile industry, in partnership with academia, is focused on autonomous or driverless automobiles all over the world, with high-speed Internet being a fundamental requirement. For a successful and smooth journey, as well as to enjoy a variety of multimedia applications and services ranging from comfort to entertainment, these smart vehicles can snap high resolution images, record movies, and interpret a large amount of sensory data. Furthermore, self - driving cars may interact and share many forms of information with one another via a roadside infrastructure, such as road map images, accident prevention, and traffic load information for safe driving. Furthermore, such vehicles can share a variety of other data. As a result, cars generate a large amount of essential and time-sensitive data, which requires on-time processing to assure on-time delivery and preserve the quality of the experience. However,because to the limited storage and computational capabilities of isolated onboard devices, such a large volume of multimedia-related data cannot be processed.

DISADVANTAGES OF EXISTING SYSTEM

This affects the performance of vehicular communication. The response time should be faster. Even if the result does not stop the vehicle the priority is still taken.

B. Problem Statement

Vehicles are producing a huge amount of critical and delay sensitive data which required on-time processing to ensure on time delivery to maintain the quality of experience. However, due to limited storage and computational capabilities such a huge amount of multimedia-related data cannot be processed on the standalone onboard devices. Furthermore, intermittent connectivity, short radio communication, lack of bandwidth, and high mobility can make the task more challenging.

C. Proposed System

We are proposing a dynamic priority-based efficient resource allocation and computing architecture for vehicles to address the challenges of fast response time, guaranteed quality of experience, and minimum computing cost. In our proposed scheme, multimedia tasks are divided into four sub-tasks and assigned to appropriate dedicated computing cluster for processing. Priority non-preemptive queue is used to ensure the on-time response delivery to different vehicular multimedia tasks with different priorities. Moreover, in our proposed scheme, computing resource are dynamically updated based on load information. The performance of the proposed scheme is evaluated using Cloudsim simulator with static resource allocation scheme and baseline single cluster-based computing scheme in terms of the QoE, resource cost, and response time. We proposed Dynamic Priority-based Efficient Resource Allocation and COMputing (DP-ERACOM) scheme to process the delay-sensitive and multimedia related computation for vehicular networks at reduced cost based on multimedia tasks priority. In particular, cloud computing for automobiles has evolved very rapidly since the introduction of connected cars, self-driving cars, and intelligent vehicle functions. Today, automakers around the world are investing in cloud technology to improve their driving experience. Car cloud technology helps save lives by preventing accidents and enabling cars to communicate with each other.

ADVANTAGES OF PROPOSED SYSTEM

The performance of the proposed scheme is evaluated in terms of quality of experience. Service response time is faster by using Cloudsim stimulator. Reduced cost. The proposed system gives the result faster instead of waiting for one response we get multiple results from different data centers but the one that is selected as result is based on first come first serve basis.

III. SYSTEM REQUIREMENT SPECIFICATION

A. Functional Requirements

1) Entering scheme option
2) Configuring simulation
3) Loading configuration
4) Data center configuration
5) Running simulation

6) Simulation results

B. Non Functional Requirements

Non- functional Requirements allows you to impose constraints or restrictions on the design of the system across the various agile backlogs. For example the site should load within few seconds to give faster results.

1) Data Integrity
2) Scalability
3) Interoperability
4) Reliability

C. Hardware Requirements

The bare minimum hardware needs vary greatly depending on the software being developed by a given Java/Python/Canopy/VS Code user. Applications that need to swiftly do a large number of calculations or activities will need a faster CPU, but applications that need to store big arrays or objects in memory would need more RAM

1) Operating system : windows, linux
2) Processor : minimum intel i3
3) Ram : minimum 4 GB
4) Hard disk : minimum 250 GB
5) Floppy drive : 1.44 Mb
6) Mouse : Logitech

D. Software Requirements

The software requirements are description of features and functionalities of the target system. Requirements convey the expectations of users from the software product. The requirements can be obvious or hidden, known or unknown, expected or unexpected from client's point of view. The appropriation of requirements and implementation constraints gives the general overview of the project in regards to what the areas of strength and deficit are and how to tackle them.

1) Technology : Java 2 Standard Edition, JDBC
2) Web Server : Tomcat 7.0
3) Database Server : MySQL
4) Editor : Netbeans 8.1
5) Client Side Technologies : html, css, javascript
6) Server Side Technologies : Servlets, JSP

IV. SYSTEM DESIGN

A. System Architecture

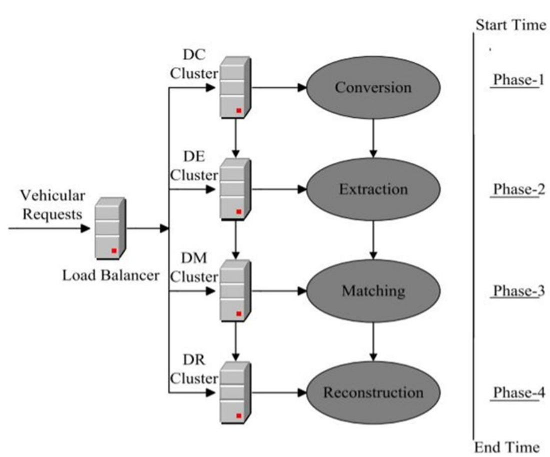

Fig SYSTEM ARCHITECTURE

Honeybee is implemented on Android, using Wi-Fi Direct as the communication protocol [6]. Application developers can use the methods and interfaces provided by the framework for writing work sharing mobile apps.

As shown in Figure, the framework contains three main components responsible for the main areas of Application interfacing, Job Handling, and Communication[9].

1) *Cloud Computing:* Cloud computing is not a new concept. Companies in the software technology industry use cloud computing for software development and testing, data backup, disaster recovery, and more. However, the cloud is becoming more and more popular in other sectors such as healthcare, insurance, education, retail and automotive. In particular, cloud computing for automobiles has evolved very rapidly since the introduction of connected cars, self-driving cars, and intelligent vehicle functions.
2) *Cloud Computing through vehicles:* A connected car is a car, truck, bus, or other vehicle that can connect to nearby devices via the Internet. These vehicles are based on Internet of Things (IoT) technology and can download software upgrades, access and send vehicle data, and connect passenger devices. Connected Car Technology enhances the driving experience by triggering important communications and events. In other words, connected car technology enables cars, buses, trucks, and other vehicles to communicate with each other and share important safety and mobility information. Because a large amount of data needs to be stored and shared with networked vehicles. Data about the vehicle itself, the environment, and other vehicles. These require a large data storage space (cloud). The Connected Car Cloud Platform gives drivers valuable insights into vehicle conditions, safe driving routes, real-time traffic conditions, environmental changes, usage patterns and more.

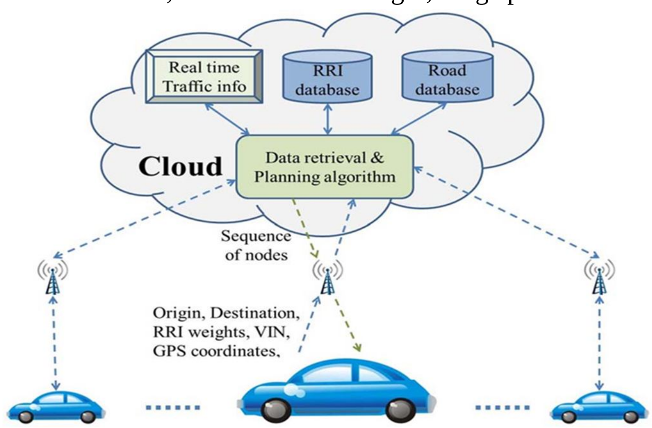

Fig : CC through vehicles

3) *Resource Allocation:* Resource allocation faces key challenges such as cost efficiency, response time, reallocation, computing power, and scheduling tasks. Consumers of cloud computing services aim to perform their tasks at the lowest possible cost. Resource allocation includes providing services and storage space for specific user-specified tasks. This is achieved using a variety of resource allocation strategies. The resource allocation strategy involves integrating the activities of cloud providers to allocate and utilize the missing cloud resources to meet the needs of cloud applications and perform the tasks of interest. . Cloud providers encourage high resource utilization to maximize profits, but users have the opposite goal. They want to reduce the cost of cloud computing without sacrificing performance requirements.

B. System Components (Modules)

In propose paper author is performing following steps:

->VMCC (Vehicle Mobile Cloud Computing) Architecture: This architecture consists of Request UNIT (RU) which accept request and send to Load Manager (LM) and then Load Manager assigned request to computing clustering unit (CCU). This CCU is further divided into 4 sub clusters such as Conversion cluster, Extraction Cluster, Matching and Reconstruct Cluster.

1) *Cluster:* Conversion cluster evaluate load on each data center
2) *Extraction Cluster:* Extraction cluster extract available free data centers
3) *Matching Cluster:* Matching cluster assigned best matching data center to request
4) *Reconstruct Cluster:* This layer built object of best matching center
5) *MVCC Job queue model:* This layer manages requests of queues

6) *Dynamic Resource Allocation:* This component help matching cluster to allocate resources dynamically to each incoming queue request.

C. Approch

Upon the delivery of real-time and multimedia jobs from diverse automobile users in the time range, αt, the initial assignments and analyses were completed. Then, based on their priority values, all received multimedia requests are evaluated. The lower the priority value, the higher the priority of the task for processing in this paper. The resources for job processing are distributed among the four computing clusters. The computing resources given to each CC are determined by analysing the initial workload received in time αt. As a result, the number of computer resources available the following time will vary depending on the workload received. This is done to utilize the most of computational resources efficiently and meeting the multimedia tasks delay deadline. LM allocates each multimedia task to the suitable CC and places it in the job queue for further processing. Based on the task processing nature, the CC processes multimedia tasks and places them in the job queue of a subsequent computing unit or transmission unit. For example, if the task has been entirely processed, it will be delivered to the transmission unit's job queue for transmission to the intended vehicular user(s), or it will be forwarded to the job queue of the next CC if the task has not yet been fully processed. Finally, the processed multimedia tasks are forwarded towards their intended vehicular user(s) simultaneously to avoid any further queuing delay and to meet the delay deadline of multimedia tasks for achieving better quality of experience (QoE).

V. CONCLUSION:

The following conclusions can be presented :

1) *Conclusion 1:* In intelligent transportation systems, standalone computing devices are unable to handle this workload due to their constrained storage, battery life, and processing power. Since a result, it is imperative that automobiles be integrated with MCC, as it offers a suitable computing tool that enables the quick and effective computation of multimedia applications and services for vehicles.
2) *Conclusion 2:* In order to meet the difficulties of quick reaction time, guaranteed quality of experience, and minimal computing cost, we suggested an efficient dynamic priority-based resource allocation and computing architecture for cars in this work. Multimedia jobs are broken down into four smaller tasks in our suggested method and assigned to the proper computing cluster for processing.
3) *Conclusion 3:* Our suggested approach dynamically updates computational resources based on demand data. Using the Cloudsim simulator and a baseline single cluster-based computing scheme, the performance of the proposed scheme is assessed in terms of quality of experience (QoE), resource cost, and reaction time. According to the simulation results, the suggested approach performs better than the standard single cluster-based computing and static resource allocation scheme.

VI. FUTURE ENHANCEMENT

In future the algorithms will handle the difficulties of quick reaction time, guaranteed quality of experience, and low computing cost by utilising dynamic priority-based efficient resource allocation and computing architecture for cars. Out of the next applied methods, the simulation results must demonstrate that the proposed scheme outperforms the baseline single cluster-based computing and static resource allocation scheme. Cloud computing (CC) is a new paradigm in computing that provides customers with quick and high-speed processing capabilities as a service without requiring them to install any hardware. Therefore, CC is a cost-effective method for processing a lot of data. Enhancing access to multimedia services through the integration of CC with smart vehicles is a practical approach to do so. This also opens up a wide range of possible research and application areas. For these delay-sensitive and important multimedia-related applications and services, the standard CC is not appropriate. Thus, a new computing paradigm known as multimedia cloud computing is created to manage such delay-sensitive and important multimedia applications and services (MCC). The MCC focuses on how to give multimedia applications the necessary quality of service (QoS). Multimedia processing of vehicular data is more crucial and difficult since it calls for quick processing, prompt responses, and low costs.

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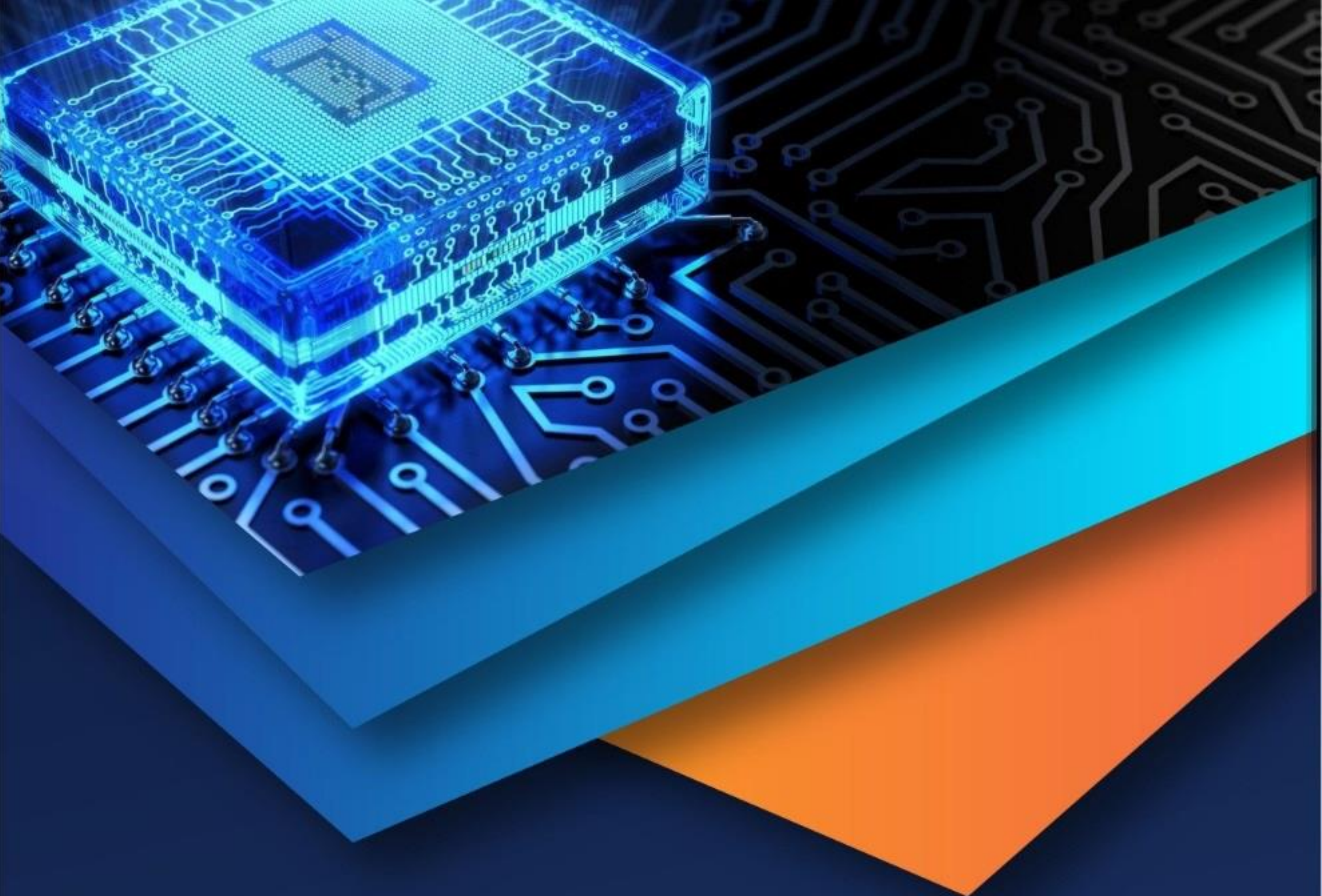

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