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Efficient network in Heterogeneous Computing Environment using GridSim

A.Revanth Kumar1, V. Pradeep2, V. Krishna Chaitanya3, T. Vijaya Sudarsan Reddy4

Abstract: *Heterogeneous computing environment consist of grid computing, cloud computing, utility computing. Heterogeneous computing are growing as the future generation of parallel and distributed computing granting the aggregation of sources that are geographically distributed accrete different locations. Network performance play key role in Heterogeneous computing environment. The network performance must be taken into account while performing task such like as scheduling, monitoring of jobs. Network buffer management policies affect the network performance. If buffer size if large it leads poor latencies but also leading to a lot of packet droppings and low utilization of links. When trying keep a low buffer size. In this paper we use the Gridsim toolkit and we put in policies into toolkit. Simulation toolkit to carry out research object at providing quality of network performance in Heterogeneous computing environment.*

Keywords: *Buffer management, Grid resource, Gridsim tool, Grid user, Heterogeneous computing*

I Introduction

Heterogeneous computing environment is now days very important (organizations, data enters).The network performance [11] play key role in Heterogeneous computing. Heterogeneous computing has some entities such user, data, services. It are growing as the future generation of parallel and distributed computing granting the aggregation of sources that are geographically distributed accrete different locations. Distributed computing [6] is a process of computation, where a program is divided into modules and is processed on different computers of a network in parallel. Heterogeneous computing[12] has growing as an enable for e-science as it permits the creation of virtual organization that bring together communicates with common objectives. Heterogeneous [12] computing the highly variable environment built of series independent formation. It is calculate the large number of problems, compute the high calculation and different resource [7] for clearing different kinds of large scale applications. In this paper used Gridsim toolkit. Gridsim toolkit for modelling, scheduling. Gridsim toolkit [10] can be used to simulate application scheduler for one or more organization domains. Heterogeneous computing in affect the network performance and grid by network buffer management .A number of policies have been developed to manage network buffers [1, 8].according to Floyd etal[1] Random early detection for traffic avoidance in packet switched networks which is similar compute grids. Queue size low in Random early detection. The RED is useful detect incipient congestion by computing the average queue size. Random early detection algorithm is inefficient because under varying traffic condition. Suppose RED is efficient when constant tuning of its parameters to be able to work. In this Floyd etal [8] suggest Adaptive random early detection. We find that this revised version of Adaptive RED, which can be implemented as a simple extension within RED routers, removes the sensitivity to parameters that affect RED's performance and can reliably achieve a specified target average queue length in a wide variety of traffic scenarios. The adaptive RED is sufficiently robust for deployment.The architecture of network [9] able to provide end to end proportional packet loss probabilities at the flow level.The RED algorithm for congestion control called by dynamic RED from gradient optimization perspective. Random early detection schemes are to stabilize the queue lengths in routers. Gazi et al. [5] propose a threshold based dynamic buffer management policy, decay function threshold, to regulate the lengths of very active queues and avoid performance degradations. The buffer management policies are FIFO, RED and Adaptive RED on Gridsim toolkit. Gridsim resource have class are Alloc policies, AR gridresource, Time sharedARpolicies, space shared, AR simple space shared. Network buffer management policies affect the network performance, if buffers size if large it leads to poor latencies but also leading to lot of packets droppings and utilization of links, when trying to keep a low buffer size. In this, grid performance also degrades.

I. Related Work

In this paper, we are using the Gridsim [10] tool kit, JDK1.7, Eclipse. Gridsim [6] is a tool for developing grid scheduling applications. It supports the java and also used for modelling simulation of computational resources for evaluation of resources. Gridsim for evolving the applications in Gridsim uses the effective resource algorithms and policies. The main drawback of Gridsim simulation tool kit[6] is it uses the huge amount of computing power especially in parallel and cluster computing system. Gridsim provides the flexibility and extensibility. Applications can be easily developed by integrating Gridsim jar files with eclipse. Simulations are widely used in networking research areas. For Example, Opnet, Qualnet, NS2.Buffer management policies are FIFO, RED, and Adaptive RED. FIFO (First in First Out) is a straight forward policy, which just enqueue the packets into buffer and packets, get dropped when buffers are full.

II Buffer Management Policies

3.1 Random Early Detection

The random early detection [1] is the main important for the find out average queue size. Random early detection algorithm having the average queue size low when allowing occasional burst of packets in the queue. RED algorithm very good algorithm, according to traffic conditions it is difficult, but is not easy. In this find out average queue size. The average queue size [1] for detect incipient congestion. Random early detection gateway avoids the global synchronization of many connections decreasing their window at the same time. It [1]can be improving the performance received by users, minimizing delay, maximizing throughput. Random early detection having the inefficient under varying traffic conditions.

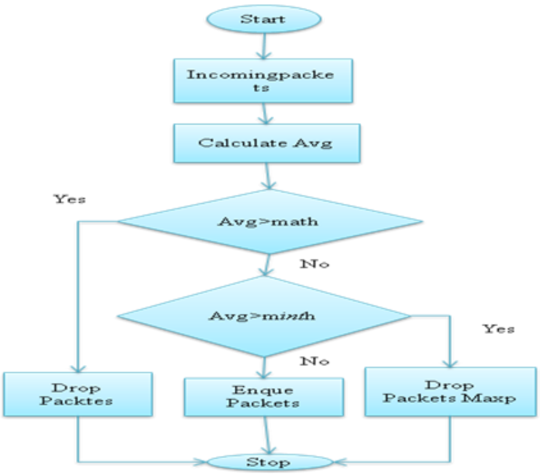


Fig. 1: Flow chart of RED

The network Quality of Service (QoS) is inefficient in random early detection algorithm. The RED had parameters $threshold_{u}$, $threshold_{l}$ avg. The RED congestion control mechanism monitor the average queue size for each output queue. Random early detection gateway has the one advantage that is congestion control mechanism that works with current transport protocols. It is had the simple mechanism for congestion avoidance [16].Random early detection Fig. 1 consist are total incoming packets, find out the average queue length, compute packets dropping, drop packets, enqueue packets, high probability. Random early detection algorithm consist of parameters are present average queue size: average, current queue size: q, current queue: time, previous average queue size: old average, threshold upper: upper limit for the average queue size, q_w: queue weight, typically transmission time, lower limit for the average queue size: threshold lower, the queue got empty for the last time: qtime, max probability for an entering packet to get dropped $maximum_{p.}$ The above algorithm calculates the max_paverage queue size. Random early detection [8] consist of weakness that is through put is sensitivity to the traffic load and to parameters. Goals meet by RED gateway are congestion avoidance, appropriate time scale, no global synchronization, simplicity, maximizing global power, fairness, appropriate of a wide range of environment. One of RED [8] main goals is to use this combination of queue length averaging and early congestion notification to simultaneously achieve low average queuing delay and high throughput.

3.2 Adaptive RED

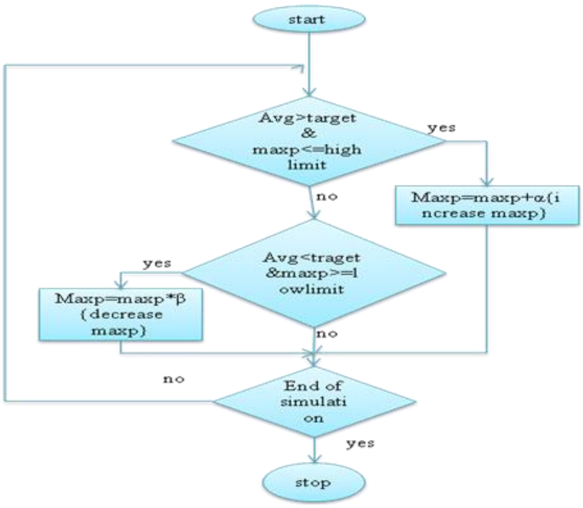


Fig. 2: Flow chart of ARED

Adaptive random early detection algorithm is the very important algorithm in traffic conditions. It [8, 15] is independent on the presumption that the resulting average queue length is quite sensible to the level of congestions and to the random early detection parameter settings, and is hence non predictable further. Kumar etal [9] now day's buffer management model for reaching end to end proportional loss differentiation in network which is independent on random early detection.Aweya et al[4] now a technical for improving effectiveness of random early detection by dynamic changing the threshold settings as the number of connections and the system load changes. In this impact random early detection operation and can reliable reach a particular target average queue length widespread of congestion scenarios. Therefore Adaptive random early detection is alike random early detection, but it upgrade the $maximum_p$parameters with given way frequency, so average queue length is maintained reasoned stage at all times. Adaptive random early Fig. 2 detection consists of some parameters high limit, low limit, α, β, target, and $maximum_p$.

III System Design

The Design Methodology diagram Fig. 3 represents the layered architecture of my project; this architecture consists of Jdk, Eclipse, Gridsim, operating system. Each and every layer is been inter linked. The first layer is the operating system on the top of this layer a GridSim is been placed this GridSim is nothing but the Grid Simulator this is used to perform any grid computational operations. The Java Development Kit (JDK) is an Oracle Corporation product aimed at Java developers. Jdk is developed by Sun Micro systems Jdk contains java virtual machine.

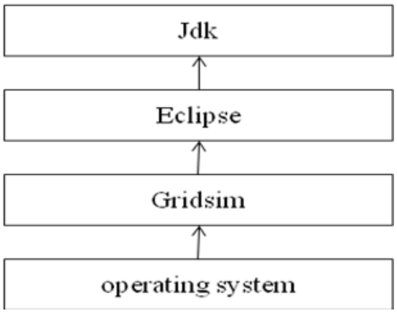


Fig.3: System design

Eclipse is a multi-language software development environment comprising Integrated Development Environment (IDE). Import GridSim libraries into an Eclipse project. It is written mostly in Java and can be used to develop applications in Java. It provides comprehensive facility for creating different class of heterogeneous resource that can be aggregated using resource brokers for solving compute and data intensive applications. Toolkit for Modelling and Scheduling Resources in Distributed Environments.

1. Execution Of Buffers Management Policies In Gridsim Tool Kit

Buffer management policies are Random early detection, Adaptive random early detection and FIFO. First in first out buffer management has the finite storage space. In this some classes are create for different limited buffers functionality. Class are Fnbuser, FnbSCFQscheular, RED, ARED, FIFO, Net IO, Fnbinput, Fnboutput, FnbRouter, FnbRIPRouter, First last packets Grid let, source packet number, Grid resource. Fnbuser implements are creative of jobs; submit of jobs to resource, receipt of successes of jobs. Buffer management policies are ARED, RED and FIFO. Adaptive random early detection policy depends on random early detection. Adaptive random early detection class extends random early detection. Gridsim mainly consists of Grid resource and Grid user.

5.1 Grid resource and Grid user

Create a grid resource that consists of one or more machines. Each machine contains one or more processing elements. In this we have taken three machines Fig: 4 each machine contains three processing element. Each resource has number of processes, speed of processing and internal process scheduling policies. Grid user contains one or more Gridlets or jobs to be processed. Gridlet contains the job information or data. In this we can consider the three Gridlets Fig. 5.

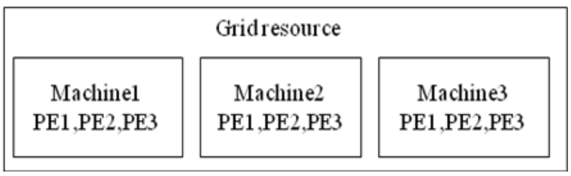


Fig.4: gridresource

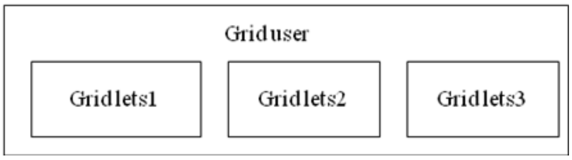


Fig. 5: Grid user

2. Gridsim Environment

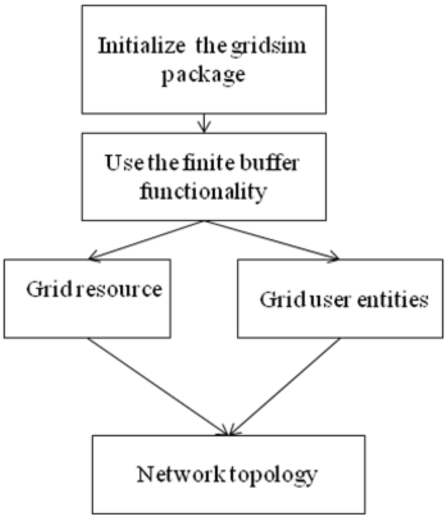


Fig. 6: Gridsim environment

Gridsim environment is very important in the buffer management policies. The process of creating an experiment in Gridsim requires following [2] [3]. In this first we initialize the Gridsim package by callingGridSim.init () andGridSim.initNetworkTypemethods (GridSimTags.NET_BUFFER_PACKET_LEVEL). In this we wanttousethefinitebufferfunctionalitiesareFnbinput,Fnboutput,RED, ARED, FIFO, NETIO,Fnbuser,Gridresource,Fnbrouter,Fnbriprouter,Firstlastpacketgridlet,SourceNumpacket.These functionalities are explained above. Fig. 6 And we create one or more grid resource. Each grid resource contains single or many machines and every machine have one or more processing elements. Grid user entities have one or more Gridlets or jobs to be processed. Gridlets have the job description or the data. We create the network topology by connecting the grid user and resource entities Fig. 6. In this aim is to display Gridsim ability to simulate adequate size grid test bed. Finally we develop the network scenario based on the EUDataGridTestBed1Fig. 7.Resource specifications are resource name, policy, MIPS, nodes, users Table 1.

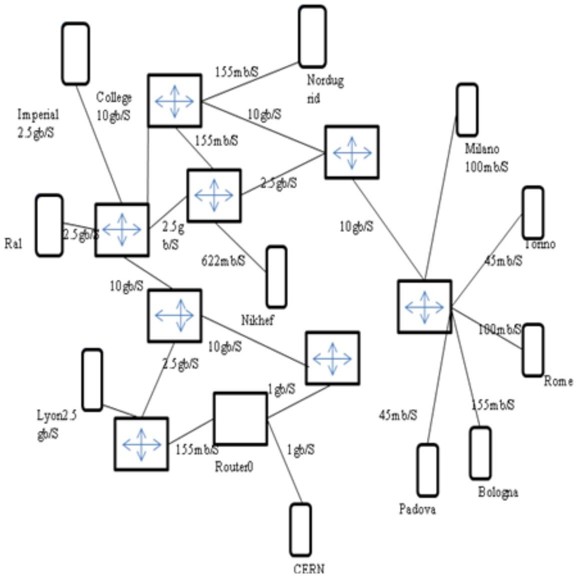


Fig. 7: EU Data Grid Test Bed1

IV Use Case Scenario

Describes the sequence diagram in which a user sends a job to resource and total packets reach the resource. Fnbuser0 submit the job0 to FnbOutput and it creates object job0, firstpkt0, lastpkt2. The output port also creates FirstLastPacketGridlet object contain the ID of the first and last packet of that job, in this case 0, 2. Then packets are transmitted via network to the router which calls FnbSCFQSheduler. In this scenario no packets are dropped hence they are forwarded to the input port of the resource Fig. 8 FnbSCFQSheduler runs the policy algorithm.

Table 1.Resource specifications

Resource name	policy	MIPS	nodes	users
RAL	Space Shared	49000	41	12
Bologna	Space Shared	80000	67	12
Lyon	Space shared	14000	12	12
Torino	Tine shared	3000	2	2
Imp. college	Space shared	62000	52	16
Padova	Time shared	1000	1	2.
CERN	Space shared	70000	59	24
Nordu grid	Space shared	20000	17	4
Rome	Space shred	6000	5	4
NIKHEF	Space shared	21000	18	8
Milano	Space shared	70000	5	4

This scenario have one of the packets is dropped by running FnbSCFQSheduler algorithm. The SCFQ Fig. 9scheduler informs the output port of the user about the dropping. The output port checks which job this packet belong to and inform the user. Also the input port of the resource will discover the dropping when the packet does not reach it.

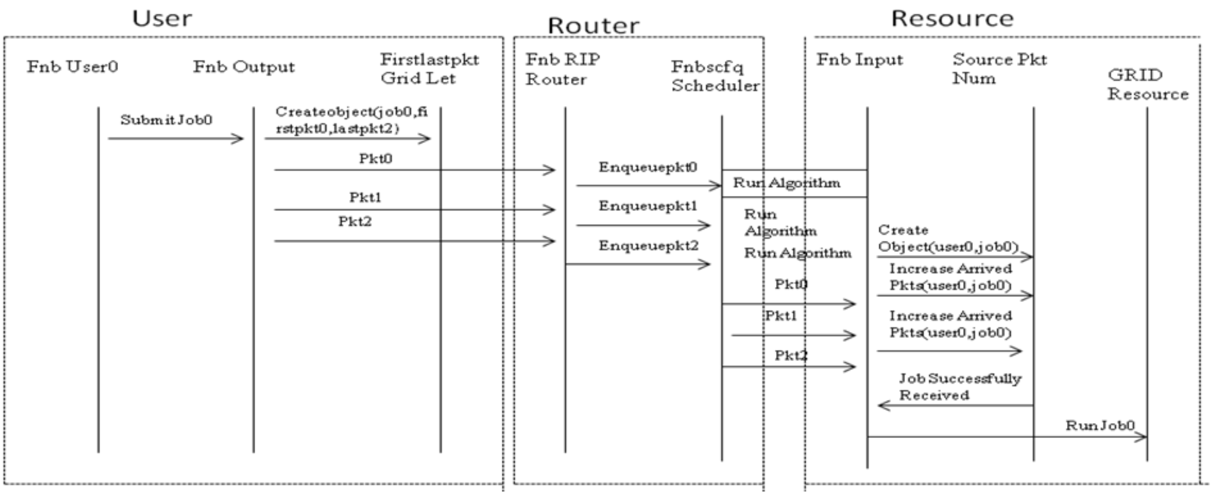


Fig. 8: Transmission with no dropped packets

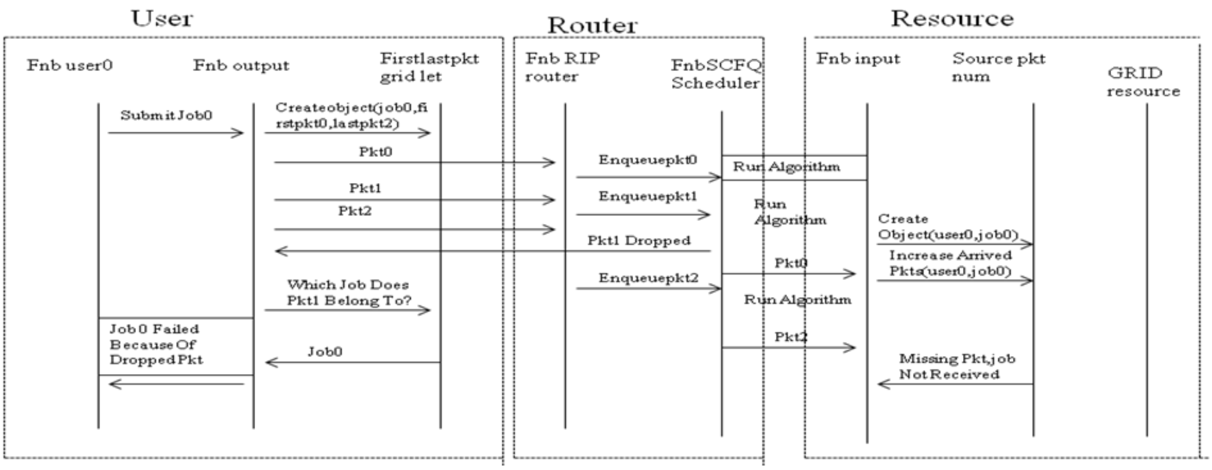


Fig. 9: Transmission with one dropped packets

Table 2. Values of ARED parameters

Parameter	**Value**
1.lowlimit	0.01
2.highlimit	0.5
3.interval	0.5 seconds
4.target	$[min_{th}+0.4*(max_{th}-min_{th}),min_{th}+0.6*(max_{th}-min_{th})]$
5. β	0.9
6. α	$Min(0.001,max_p/4)$
7. $delay_{target}$	0.005seconds

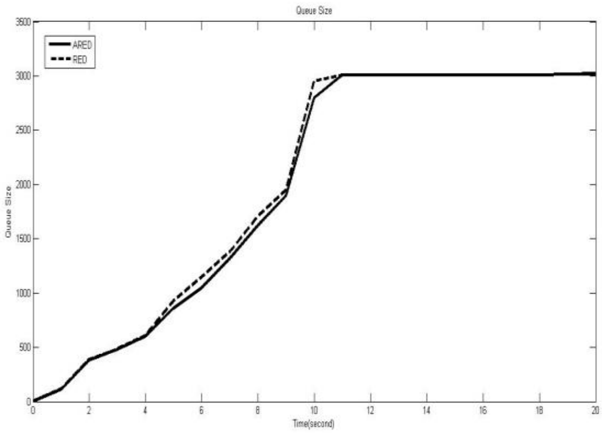
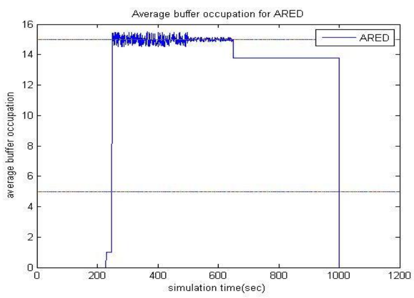


Fig. 10: Queue size



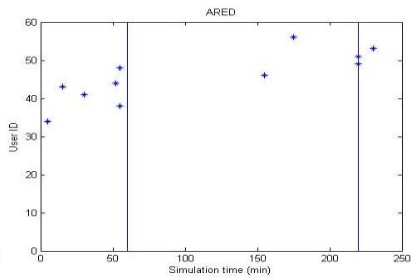


Fig. 11 Average buffer occupation for AREDFig. 12: The moment when users from CERN receive packet dropped

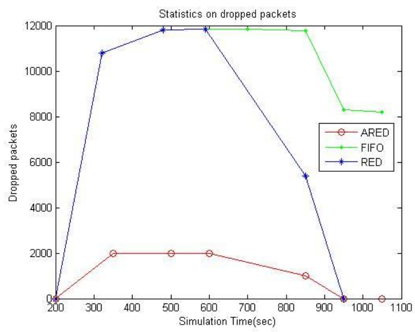


Fig. 13: Statistics on dropped packets

Fig. 13 mainly focuses on the dropped packets. In this dropped packets at the link among the router and CERN resource. It is directly connected to. In this more packets dropped link is FIFO .because no control buffer occupations. RED, ARED perform that kind of control. These buffer management policies very important. Adaptive random early detection and random early detection schedulers at link in the topology filter packets when the very too high that is average queue size in a real environment means the retransmission of the lost packets, and it is a TCP connection. TCP is a connection oriented.fig display different of queue size for random early detection and adaptive random early detection. The Fig. 10 queue size is found out the number of packets. The queue lost is evaluate the number of packets at gateway during to congestion control in the network .in this network have the set of nodes.Fig. 11 display average buffet occupation for ARED. Fig. 12 display timelines the moment when users from CERN receive a packet dropped.

V Conclusion And Future Work

Heterogeneous computing environment is consisting of grid computing, cloud computing, utility computing. It is mainly use for calculate the large calculations such bio medical, organization. In this we used Gridsim simulation toolkit for simulation modelling and scheduling. The gridsim tool kits add the new component. In this established the buffer management policy also calculated the queue size and queue lost and increased the network performance. According to future work is we are planning to use perform simulation tool to carry out research at quality of service. We have presented results demonstrating the correctness of our work.

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THE AUTHORS

A.Revanth Kumar, finished B.Tech from J.N.T.Unisversity, Hyderabad, India and finished M.Tech CST from GITAM UNIVERSITY, Visakhapatnam, Andhra Pradesh, India.

Pradeep Vunnam, finished B.Tech from J.N.T.Unisversity, Kakinada, India and finished M.Tech CST from GITAM UNIVERSITY, Visakhapatnam, Andhra Pradesh, India.

V. Krishna Chaitanya, finished B.Tech from SASTRA University, Thanjavur, TamilNadu, India.

T.Vijaya Sudarsan Reddy, finished B.Tech from PONDICHERRY UNIVERSITY, and finished M.Tech CST from GITAM UNIVERSITY, Visakhapatnam, Andhra Pradesh, India