www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume2 Issue 8 August, 2013 Page No. 2620-2627

Advance Reservations And Scheduling For Bulk Transfers In Research Networks

N.Naveen Kumar[1] Sk.Meeravali[2] B.Bobby Arun Kumar[3] Nakka Thirupathi Rao[4] Kuda Nageswara Rao[5]

Department of CSE, Scient Institute of Technology, Andhra Pradesh
Department of IT, Sir C.R.R.E.C, Eluru, A.P, India
Department of CSE, Scient Institute of Technology, Andhra Pradesh
Department of CS&SE, A.U. College of Engineering (A) , AU, Visakhapatnam
Department of CS&SE , A.U. College of Engineering (A), AU, Visakhapatnam

Abstract:
Data-intensive e-science collaborations often require the transfer of large files with predictable performance. To meet this need, we design novel admission control (AC) and scheduling algorithms for bulk data transfer in research networks for e-science. Due to their small sizes, the research networks can afford a centralized resource management platform. In our design, each bulk transfer job request, which can be made in advance to the central network controller, specifies a start time and an end time. If admitted, the network guarantees to complete the transfer before the end time. To improve the network resource utilization or lower the job rejection ratio, the network controller solves optimization problems in making AC and scheduling decisions. Our design combines the following elements into a cohesive optimization-based framework: advance reservations, multipath routing, and bandwidth reassignment via periodic

reoptimization. We evaluate our algorithm in terms of both network efficiency and the performance level of individual transfer. We

also evaluate the feasibility of our scheme by studying the algorithm execution time.

Key words: TCP/IP, HEP, AC Algorithm, Advance Reservation, MBA, MRC, MRC System.

1. INTRODUCTION

The advance of communication and networking technologies, together with the computing and storage technologies is dramatically changing the ways how scientific research is conducted. A new term e-science, has emerged to describe the "large-scale science carried out through distributed global collaborations enabled by networks, requiring access to very large scale data collections, computing resources, and high-performance visualization".Well quoted e-science (and the related grid computing) examples include high-energy nuclear physics (HEP), radio astronomy, geosciences, and climate studies. The need for transporting large volume of data in e-science has been well argued.

To meet the need of e-science, this paper studies admission control (AC) and scheduling algorithms for high bandwidth data transfers in research networks. The results will not only advance the knowledge and techniques in that area but also compliment the protocol, architecture, and infrastructure projects currently underway in support of e-science and grid computing, by providing more efficient network resource reservation and management algorithms. Our AC and scheduling algorithms handle two classes of jobs, bulk data transfer and those that require a minimum bandwidth guarantee. Bulk transfer is not sensitive to the network delay but may be sensitive to the delivery deadline. It is useful for distributing high volumes of scientific data, which currently often relies on ground transportation of the storage media. The process of determining the manner of data transfer is known as scheduling.

EXISTING SYSTEM

Existing system allows the admission of new requests and bandwidth reallocation to existing jobs while not violating the end-time requirements of the existing jobs. First, it cancels the existing flow assignment to the old jobs on the future time slices and restores the network to its original capacity. The bandwidth of existing jobs may be reallocated in the single link case but not in the network case. The routes and bandwidth of existing jobs are unchanged.

1.2 PROBLEM ANALYSIS

1.2.1 EXISTING SYSTEM

Existing system allows the admission of new requests and bandwidth reallocation to existing jobs while not violating the end-time requirements of the existing jobs. First, it cancels the existing flow assignment to the old jobs on the future time slices and restores the network to its original capacity. The bandwidth of existing jobs may be reallocated in the single link case but not in the network case. The routes and bandwidth of existing jobs are unchanged.

1.2.2 PROPOSED SYSTEM

In proposed system, Admission Control and scheduling algorithms handle two classes of jobs, bulk data transfer and those that require a minimum bandwidth guarantee (MBG). Bulk transfer is not sensitive to the network delay but may be sensitive to the delivery deadline. It is useful for distributing high volumes of scientific data, which currently often relies on ground transportation of the storage media. The MBG class is useful for real-time rendering or visualization of data remotely.

In our framework, the algorithms for handling bulk transfer also contain the main ingredients of those for handling the MBG class. For this reason, we will only focus on bulk transfer. One distinguishing feature in this study is that each job request can be made in advance and can specify a start time and an end time. The reservation-based approach gives the network users more predictability and control over their work schedule and is deemed very useful by the e-science community. If a job is admitted, as determined by the AC algorithm, the network guarantees that it will finish the data transfer for the job before the requested end time. The challenge is how to provide this guarantee while maintaining efficient utilization of the network resources and keeping the request rejection ratio low. The process of determining the manner of

data transfer is known as scheduling. The result is greatly improved efficiency in network resource utilization. Developing similar protocols and adding new components to the existing toolkits in support of our algorithms are among the future tasks.

1.2.3 PROBLEM SOLUTION

In this paper studies admission control (AC) and scheduling algorithms for high bandwidth data transfers in research networks. The results will not only advance the knowledge and techniques in that area but also compliment the protocol, architecture, and infrastructure projects currently underway in support of e-science and grid computing, by providing more efficient network resource reservation and management algorithms. Our AC and scheduling algorithms handle two classes of jobs, bulk data transfer and those that require a minimum bandwidth guarantee. Bulk transfer is not sensitive to the network delay but may be sensitive to the delivery deadline. It is useful for distributing high volumes of scientific data, which currently often relies on ground transportation of the storage media. The process of determining the manner of data transfer is known as scheduling.

1.3 SYSTEM REQUIREMENT SPECIFICATION

1.3.1 Functional Requirements

ADVANCE PATH RESERVATION

- Reservation is done in first phase of the module. In this module we reserve path to specify reservation details start-time, end-time, date and path. Before reserving path the Admission Control check availability for specified path already reserved or not.
- In Reservation form it will collect the start time, end time, date, destination, source to check for availability. If it is not available it will reject the job and ask the user to reserve some other time or some other path.

INPUT: Input for this module from the user will be as follows

Reservation includes

  - Start time
  - End time
  - Date
  - Path

MINIMUM BANDWIDTH ALLOCATION

- Minimum Band Width Allocation is done in second phase of the module. Admission Control and scheduling algorithms handle two classes of jobs, bulk data transfer and allocate minimum bandwidth guarantee for a particular time in a particular path. So that data can be transferred within the time to the destination. The bandwidth cannot be used by others.

INPUT: User will not provide any input for this module. This is an automatically guided module A bulk transfer request may optionally specify a minimum bandwidth and/or a maximum bandwidth

TIME MANAGEMENT

- Time Management is another phase of the module. Each job request can be made in advance and can specify a start time and an end time. The bandwidth assigned to a particular path of a job remains constant for the entire time slice, but it may change the transfer time.

INPUT: User will not provide any input for this module. This is an automatically guided module. The bandwidth assigned to a particular path of a job remains constant for the entire time slice, but it may change the transfer time. That means the transfer may be completed within the time and remaining time reservation will be allocated for (unreserved users).

ADMISSION CONTROL

- Admission controller is centralized sever which manage job reservations and Transfers. It collect reservation request from node and check for availability then it reject or accept the job.

INPUT: User will not provide any input for this module. This is an automatically guided module. It improves the network resource utilization or lowers the job rejection ratio; the network controller solves optimization problems in making AC and scheduling decisions. Using AC algorithm, the network guarantees that it will finish the data transfer for the job before the requested end time.

3.1 EXISTING SYSTEM:

IP networks are intrinsically robust, since IGP routing protocols like OSPF are designed to update the forwarding information based on the changed topology after a failure. Much effort has been devoted to optimizing the different steps of the convergence of IP routing, i.e., detection, dissemination of information and shortest path calculation, but the convergence time is still too large for applications with real time demands.

Disadvantages:

This network-wide IP re-convergence is a time consuming process and a link or node failure is typically followed by a period of routing instability. During this period, packets may be dropped due to invalid routes.

The IGP convergence process is slow because it is reactive and global. It reacts to a failure after it has happened. For the existing system global routing information is needed.

4.1 RESERVATION

This flow diagram provides the flow for reservation in System. The sequence of steps are provided below

- In this module we reserve path to specify reservation details start-time, end-time, date and path. Before reserving path the Admission Control check availability for specified path already reserved or not.
- In Reservation form it will collect the start time, end time, date, destination, source to check for availability. If it is not available it will reject the job and ask the user to reserve some other time or some other path.

- If it ready to accept the job then it will check for the file size and time duration given by user. Then in calculate the time slice with bandwidth and file size. Otherwise it will ask the user to provide the correct time duration.

4.2 MINIMUM BANDWIDTH GUARANTEE

- Admission Control and scheduling algorithms handle two classes of jobs, bulk data transfer and allocate minimum bandwidth guarantee for a particular time in a particular path.
- So that data can be transferred within the time to the destination. The bandwidth cannot be used by others.
- The need for efficient network resource utilization is especially relevant in the context of advance reservations and large file sizes or long-lasting flows. As argued in there is an undesirable phenomenon known as bandwidth fragmentation.
- A bulk transfer request may optionally specify a minimum bandwidth and/or a maximum bandwidth. In practice, even more parameters can be added if needed, such as an estimated range for the demand size or for the end times when the precise information is unknown.

4.3 ADMISSION CONTROL

- To meet the need of e-science, this paper studies admission control (AC) and scheduling algorithms for high bandwidth data transfers (also known as jobs) in research networks.
- Admission controller is centralized sever which manage job reservations and Transfers. It collect reservation request from node and check for availability then it reject or accept the job.
- It improves the network resource utilization or lowers the job rejection ratio; the network controller solves optimization problems in making AC and scheduling decisions.
- Using AC algorithm, the network guarantees that it will finish the data transfer for the job before the requested end time.

4.4 TIME MANAGEMENT

- Each job request can be made in advance and can specify a start time and an end time.
- The bandwidth assigned to a particular path of a job remains constant for the entire time slice, but it may change the transfer time. That means the transfer may be completed within the time and remaining time reservation will be allocated for (unreserved users).
- Rejection ratio: This is the ratio between the number of jobs rejected and total number of job requests. From the network's perspective, it is desirable to admit as many jobs as possible. From the user's perspective, it is desirable to have a small chance of job rejection.
- Response time: This is the difference between the completion time of a job and the time when it is first being transmitted. From an individual job's perspective, it is desirable to have shorter response time.

4.5 Database Design: This project uses MY SQL Server as its backend. This has its own schema to store data in the database. Sample SQL Schemas are given below.

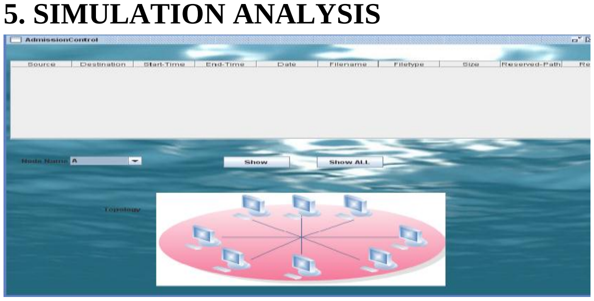
4.6 Table Description

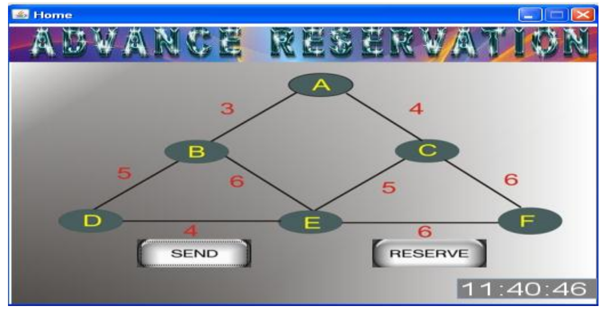
ADMISSION CONTROL

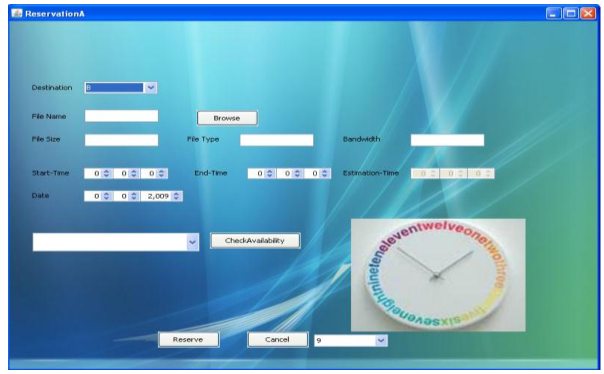
This table stores the data of the reserved path.

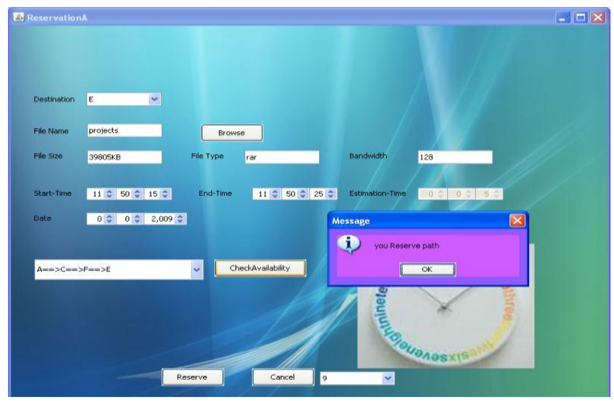
- Source: This field stores the name of the node that is able to send the file.
- Destination: this field stores the name of the node that is able to receive the file.
- Time: Indicates the time at which the reservation ensures.
- End time: end time indicates expires of reservation.
- Date: It indicates the reseved date.
- File name: Indicates name of the file to be send.
- File type: It indicates the format of the file.
- File size: It indicates the size of the file.
- Path: The path that is selected in the reservation form is indicated.
- Refno: It indicates serial no.

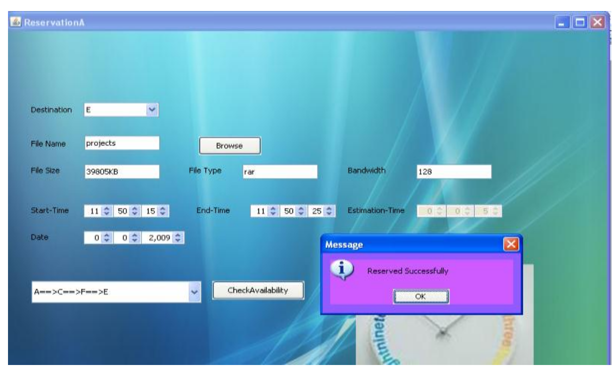
5. SIMULATION ANALYSIS

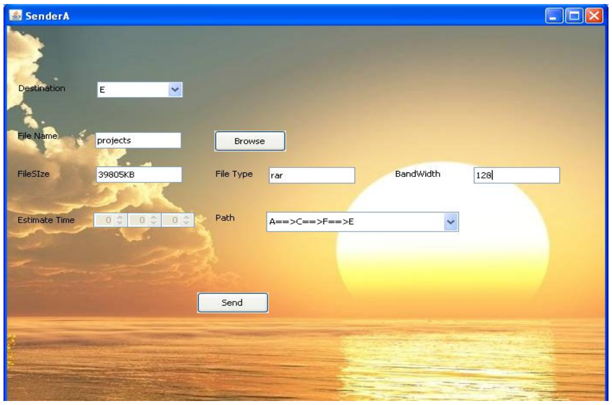


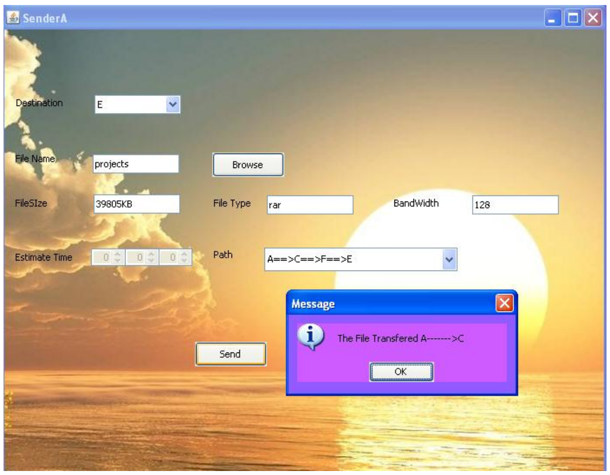












6. CONCLUSIONS

This study aims at contributing to the management and resource allocation of research networks for data-intensive e-science collaborations. The need for large file transfer and high-bandwidth, low-latency network paths is among the main requirements posed in such environments. The opportunities lie in the fact that research networks are generally much smaller in size than the public Internet, and hence afford a centralized resource management platform.

This work combines the following novel elements into a cohesive framework of AC and flow scheduling: advance reservations for bulk transfer and minimum bandwidth guaranteed traffic, multipath routing, bandwidth reassignment via periodic reoptimization. To handle start and end time requirement of advance reservations, as well as the advancement of time, it identifies a suitable family of discrete time-slice structures, namely, the congruent slice structures.

6.1 FUTURE ENHANCEMENT

- In our system we used centralized control (Admission control) to reserve the path so that in future bottle neck problem may occur, to solve this problem we can store the reservation data in relevant router (Distributed manner).
- Also we can use some other efficient scheduling algorithms for scheduling.

7. REFERENCES

[1] The U.K. Research Councils,http://www.research-councils.ac.uk/e-Science/, Feb. 2008.

[2] I. Foster and C. Kesselman, the Grid: Blueprint for a New Computing Infrastructure. Morgan Kaufmann, 1999.

[3] H.B. Newman, M.H. Ellisman, and J.A. Orcutt, "Data-Intensive E-Science Frontier Research," Comm. ACM, vol. 46, no. 11,pp. 68-77, Nov. 2003.

[4] J. Bunn and H. Newman, "Data-Intensive Grids for High-Energy Physics," Grid Computing: Making the Global Infrastructure a Reality, F. Berman, G. Fox, and T. Hey, eds., John Wiley & Sons, 2003.

[5] T. DeFanti, C.d. Laat, J. Mambretti, K. Neggers, and B. Arnaud, "Translight: A Global-Scale LambdaGrid for e-Science," Comm. ACM, vol. 46, no. 11, pp. 34-41, Nov. 2003.

[6] Herbert Schildt, "Java : The complete reference".

[7] Behrouz Forozan, “Computer Networks (edition 3)”.