Grid performance, cost and usersquality-of-service requirements [1][3].

Business, Accounting

Grid Computing1 Introduction1. 1 Definition” Grid” computing is to reach a common goal frommultiple location by using a collection of computer resource is called the GridComputing, the computers on the network can work on a task together, thusfunctioning as a supercomputer. Grid computing is the combination of computerresources from multiple administrative domains applied to a common task, usually to a scientific, technical or business problem that requires a greatnumber of computer processing cycles or the need to process large amounts ofdata.

It is a type of parallel and distributed system that enables the sharing, selection, and aggregation of geographically distributed autonomousresourcesdynamically at runtime depending on theiravailability, capability, performance, cost and usersquality-of-service requirements 13. It is a shared collection of reliable &unreliable resources andinteractively communicating researchers ofdifferentvirtual organizations (doctors, biologists). This systemcontrols andcoordinates the integrity of the Grid bybalancing the usage of reliable andunreliable resourcesamong its participants providing better quality ofservice. It can also be denoted by large-scale clustercomputing, as well as a form ofnetwork-distributedparallel processing. It is a collection of servers thatareclustered together to attack a single problem 73.

1. 2 Reasons for Grid Computing Why grids? A well designed grid can improve performance ifsome applications running on the grid are idle when resources are needed forother applications. Computational approaches to

problem solving have proventheir worth in almost every field of human endeavour.

But, there are somechallenging problems that increase computer’s ability to solve them, therefore, one important factor is that the much of the computing environment isincompletefor such computationally sophisticated purposes. While today’s PC is fasterthan the supercomputer of 10 years ago, it is still far from adequate forpredicting the outcome of complex actions or selecting from among many choices. That, after all, is why super computing environments have continued to evolve. 81. 3 History of GridIn the early 1970’s when computers werefirst linked by networks, the idea of harnessing unused CPU cycles was born. Afew early experiments with distributed computing including a pair of programscalled Creeper and Reaper ran on the Internet’s predecessor, the ARPAnet. In 1973, the Xerox Palo Alto ResearchCenter (PARC) installed the first Ethernet network and the first full-fledgeddistributed computing effort was underway.

Scientists John F. Shoch and Jon A. Hupp created a worm, as they called it, and envisioned it moving from machineto machine using idle resources for beneficial purposes. In another effort, Richard Crandall startedputting idle, networked NeXT™ computers to work. Crandall installed softwarethat allowed the machines, when not in use, to perform computations and tocombine efforts with other machines on the network.

In 1991, Zilla won theComputerWorld Smithsonian Award for Science. In another project started in 1995, I-WAY(Information Wide Area Year) was an

experimental high-performance networklinking many high-performance computers and advanced visualizationenvironments. The idea was not to create a new network, but to integrateexisting high bandwidth networks. So I-WAY combine resources at multiplesupercomputing centers. It was designed to provide an infrastructure to a rangeof high performance applications.

The reason why I-WAY is so important is thatit is the startup of Globus, which is the de facto standard for developing gridapplications. 91. 3. 1 The Role of Internet inGrid EnvironmentDistributed computing jumpto a global level with the maturation of the Internet in the 1990’s.

Twoprojects in particular have proven that the concept works extremely well evenbetter than many experts had introduce. First of theserevolutionary projects used thousands of independently owned computers acrossthe Internet to crack encryption codes. This project wascalled distributed. net affectionately known as “ dnet”. The second one is the”” project which was the most successful and popular of distributedcomputing projects in history. Over three million peoplehave installedsoftware agent since the project started in May 1999. This project completelyproved that distributed computing could sharpen computing project results whilemanaging project costs.

Since 1999 gridcomputing has further developed to encompass more of IT than just computers anddata. Grid enables a loosely-coupled, service-based IT environment. It is thebroad spectrum of IT “ resources” that can be a “

service” that elevates Grid beyond just scientific computing. 9 2. GridArchitectureGridis the collection of resources provided by multiple systems in the network thusgrid provide protocols and services at five different layers as identified inthe Grid protocol architecture. Following are five layers in grid architecture.

2. 1 FabricGrids provide access to differentresource types such as compute, storage and network resource, code repository, etc. Grids usually rely on existing fabric components, for instance, localresource managers. 2. 2 Connectivity ProtocolsIt defines core communication andauthentication protocols for easy and secure network transactions.

The GSI(Grid Security Infrastructure) protocol underlies every Grid transaction. 42. 3 Resource It defines protocols for the publication, discovery, negotiation, monitoring, accounting and payment of sharing operations onindividual resources. The GRAM (Grid Resource Access and Management) protocolis used for allocation of computational resources and for monitoring andcontrol of computationOn those resources, and Grid FTP for data access andhigh-speed data transfer. 42. 4 Collective ServicesThe Collective layer captures interactions acrosscollections of resources, directory services such as MDS (Monitoring andDiscovery Service) allows for the monitoring and discovery of VO resources.

4 2. 5 User Application It comprises whatever user applications built on topof the above protocols and APIs and operate in VO environments. Two examplesare Grid workflow systems, and Grid portals.

4 3 Grid Middleware3. 1 IntroductionGrid Middleware are software stacks designed topresent disparate compute and data resources in a uniform manner, such thatthese resources can be accessed remotely by client software without needing toknow a priori the systems' configurations. Currently The CSAR machines supportbasic Globus and UNICORE access. Globus is a middleware constructed from anumber of components which make up a toolkit. This toolkit provides client, server and development components for the three Globus " pillars" ofGrid Computing: Resource management, Information Management and DataManagement. UNICORE (UNiform Interface to COmputeREsources) provides a science and engineering grid combining resources ofsupercomputer centres and making them available through the Internet. Strongauthentication is performed in a consistent and transparent manner, and the differencesbetween platforms are hidden from the user thus creating a seamless HPC portalfor accessing supercomputers, compiling and running applications, andtransferring input/output data. Access to both flavours of middleware is basedupon user owned X509 certificates (such as those issued by the UK eScienceCertificate Authority).

UNICORE makes use of these certificates directlywhereas Globus allows the use of GSI (Grid Security Infrastructure) proxyimpersonation certificates. Both methods allow for single sign-on to varyingextents3. 2 Middleware ApplicationsThe grid middleware allows the users to submit theirprogram requests to execute jobs, or computations, to their grid. This is simple, because it allows the jobs to be executed anywhere on computer network.

Thesoftware components, like resource brokers, pass the job to the node, ornetwork point, that is the most appropriate.

Middleware is also useful for thesecurity functions, since it allows the users to give themselves authorizationthrough standard certificate infrastructure. In the business world, time is money and gridmiddleware can save companies precious time. It offers businessesinteroperability and seamlessly sends the jobs to the appropriate networkpoint. Grid middleware is what makes everything on a computer network to runwell and to ensure that a company is working to its fullest capacity. 10When searching for a supplier for grid middleware, it’s important to search for a company that has a long history of satisfiedcustomers. Apprenda is a company that knows the importance of smooth operationsand has created many applications suited to the needs of today’s companies, including grid middleware. 4 Grid security In grid the security is defined in theresource layer of grid architecture. The resource which is use in grid and the taskwhich is to be solved are both important and valuable.

The security problems ingrid environment are complex because resources are located in differentadministrative domains with each resource potential having its own policies andprocedures. The security service is a processing or communication service providedby a system to give a specific kind of protection to system resources. Securityservices implement security plans and are implemented by security mechanism. Security concerns are difficult by the fact that there are differentrequirements by users, resource owners,

designers who are creating or adaptingtheir current products and tools to take pro of the grid technology.

Followingare the main Issues in grid security. 4. 1 ArchitectureRelated IssuesThese issues address the pointsrelated to the architecture of thegrid. The users of the grid are concerned about the data powdered by the gridand hence there is a need to protect the data confidentiality and integrity aswell as the user validation. Architecture level issues may include issues likeinformation security, authorization and service level security whichdestabilize the whole system and hence an architectural level solution isneeded to prevent those. 4. 2 Infrastructure Related IssuesThese issues are related to the network and host which are found inthe grid infrastructure. Host level security issues are individual’s issuesthat make a host apprehensive about affiliating itself to the grid system.

The issues that are related to the infrastructure may include dataprotection, job starvation, and host accessibility. The infrastructure relatedissues are of two types: host security issues and network security issues. Thehost level security issues are introduce above. The network security issuesarise mainly due to the heterogeneity and high speed requirements of many gridapplications. Many of the grid network issues are active areas of research andare most developed in labs and not yet commercialized. 4. 3 Management Related IssuesThe third set of issues relate to the management of the grid.

Managingpass is absolutely important in grid systems because nature of the grid frameand applications is mixed. Like any distributed system, managing belief is alsoserious and falls below the purview of management related issues. The differentmanagement issues are credential management, trust management and monitoringrelated issues. Management of credentials is very important in grid context asthere are multiple different systems which varied credentials to access them. Management of trust is very difficult in a dynamic grid scenario where gridnodes and users join and leave the system.

Monitoring of resources consists ofdifferent stages such as collection, processing, transmission, storage andpresentation of the data. 5 Challenges of grid computingA lot of heterogeneous hardware is used in order tocreate the Grid and, in addition, these devicesare not managed by only oneperson but by different system administrators in each of the companies. Gridfollows the challenges that need to be resolved to harness the full power ofgrid.

1 5. 1No clear standardGrid computing uses various standards, but all gridsare not use same standards. Example all grid operating system such as Linux, Apache and My SQL are using WSRF, UDDI, WWW, SOAP and XML standards. Oracle 10genterprise implement without WSRF. IBM develops the Grid middleware based onJ2EE. We cannot use different OS at the same machine in the same time in gridcomputing. 5.

2 Distributed computing Vs Grid computingGrid computing involves dynamic virtual organization, resource sharing and peer to peer computing. TheGrid intends to make access to computing power, scientific data repositories and

experimental facilitiesAs easy as the Web makes access to information. Sameall facilities provide the grid computing. So it is a challenge for gridcomputing. 5. 3 Lack of grid enabled softwareThe software, which are enabled the grid computingare less, It has limited software on Grid. Much software has not copyrightissues and source code of license.

It is need for more company developinggrid-enabled version, need more developers on grid development and need todevelop open source software. 5. 4 Sharing Resources between Various Types ofServicesGrid used for sharing resource from various sitesand grid hosts. It handles a massive amount of data as a grid platform. A lotof sites and multiple servers gathered there it is so complex infrastructure. It provides difficulty for hardware resource sharing within virtual organization.

5. 5 Managementand AdministrationMany institutes and organizations used gridcomputing. It distributes the resources on largegeographicallydistributedenvironments and accessesthe heterogeneous devices andmachines. So it is amajor challenge tomanage the administration of the grid computing.

6 Current Grid Projects Grid Computing have a lots of active projects some of the projectsare under. 6. 1 Drug Discovery @Home (BOINC)Help Drug Discovery @Home “ model the behavior of leadingcompounds that could be developed into new medicines.” The project” is in an early alpha phase and does not have a formal relationship withacademia or the pharmaceutical industry.” The project uses a BOINC-based client. See the BOINC

platforminformation for the latest version of the BOINC client. See the project’sapplications page for a list of its clients, their latest versions, and theplatforms they are available for. 6.

2 RNA World (BOINC)The project’s first goal is to systematically identify all knownRNA family members in all organisms currently known and to make the informationavailable to the public. The project will also run sub-projects submitted byRNA researchers. The project uses a BOINC-based client.

See the BOINC platforminformation for the latest version of the BOINC client. 6. 3 Spinhenge @home (BOINC)” Berkeley Open Infrastructure for Network Computing (BOINC)is a platform for projects, like distributed. net and SETI @home that usemillions of volunteer computers as a parallel supercomputer.

” It providestools create and manage distributed computing projects, to create projectwebsites, to automate the translation of project websites, and tools forBOINC-based project participants to easily manage their multiple accounts. Source code is available for the platform, and interested C++ developers areencouraged to help develop the platform code6. 4 Distributed. net RC5Distributed. Net’s RC5 project crack data encryption schemes(legally).

distributed. net, which began in 1997, was the first well-knownpublic distributed computing project and the RC5 project (specifically theRC5-32/12/7 (56-bit) project) was its first project. The RC5 project uses abrute-force search technique to find an encryption key, testing each possiblekey until it finds one which successfully decrypts a test message.

6. 5 Enigma @Home (BOINC)The project uses a BOINC-based client. See the BOINC platforminformation for the latest version of the BOINC client. Version 5.

17 of the project’sEnigma 0. 76 application is available for Windows as of September 11, 2007. Version 5. 20 of the application is available for Linux as of September 25, 2007.

Version 5. 22 of the project’s Enigma 0. 76b application is available forWindows and Linux as of August 24, 2008