

- he modern data center is now full of virtualization and virtual machines. T
- I n using solutions like Citrix's Provisioning Server or Unidesk's layering software technologies, administrators are able to take workload provisioning to a whole new level.
- I magine being able to set a process that will kick-start the creation of a new virtual server when one starts to get over-utilized.
- ow, administrators can create truly automated virtual machine environments where each workload is monitored, managed and controlled. N

Cloud layer.

- his is a new and still emerging field. Still, some very large organizations are already deploying technologies like CloudStack, OpenStack, and even Open Nebula. Furthermore, they're tying these platforms in with big data management solutions like MapReduce and Hadoop. T
- rganizations can deploy distributed data centers and have the entire cloud layer managed by a cloud-control software platform. O
- ngineers are able to monitor workloads, how data is being distributed, and the health of the cloud infrastructure. E
- he great part about these technologies is that organizations can deploy a true private cloud, with as much control and redundancy as a public cloud instance. T

Data center layer.

- Although entire data center automation technologies aren't quite here yet, we are seeing more robotics appear within the data center environment.
- Robotic arms already control massive tape libraries for Google and robotics automation is a thoroughly discussed concept among other large data center providers. Many experts agree that eventually, data center automation and robotics will likely make its way into the data center of tomorrow.
- The need to deploy more advanced cloud solution is only going to grow.
- More organizations of all verticals and sizes are seeing benefits of moving towards a cloud platform. At the end of the day, all of these resources, workloads and applications have to reside somewhere. That somewhere is always the data center.
- In working with modern data center technologies administrators strive to be as efficient and agile as possible.
- This means deploying new types of automation solutions which span the entire technology stack. Over the upcoming couple of years, automation and orchestration technologies will continue to become popular as the data center becomes an even more core piece for any organization.

UNIT IV PROGRAMMING MODEL

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

4.1 OPEN SOURCE GRID MIDDLEWARE PACKAGES

- The Open Grid Forum and Object Management are two well- formed organizations behind the standards
- Middleware is the software layer that connects software components. It lies between operating system and the applications.
- Grid middleware is specially designed a layer between hardware and software, enable the sharing of heterogeneous resources and managing virtual organizations created around the grid.

The popular grid middleware are

1. BOINC -Berkeley Open Infrastructure for Network Computing.
2. UNICORE - Middleware developed by the German grid computing community.
3. Globus (GT4) - A middleware library jointly developed by Argonne National Lab., Univ. of Chicago, and USC Information Science Institute, funded by DARPA, NSF, and NIH.
4. CGSP in ChinaGrid - The CGSP (ChinaGrid Support Platform) is a middleware library developed by 20 top universities in China as part of the Open source grid middleware
5. Condor-G - Originally developed at the Univ. of Wisconsin for general distributed computing, and later extended to Condor-G for grid job management.
6. Sun Grid Engine (SGE) - Developed by Sun Microsystems for business grid applications. Applied to private grids and local clusters within enterprises or campuses.
7. gLight -Born from the collaborative efforts of more than 80 people in 12 different academic and industrial research centers as part of the EGEE Project, gLite provided a framework for building grid applications tapping into the power of distributed computing and storage resources across the Internet.

Grid Standards and APIs

- The Open Grid Forum and Object Management Group are two well-formed organizations behind those standards.
- OGSA - Open Grid Services Architecture
- GLUE - Grid Laboratory Uniform Environment
- SAGA - Simple API for Grid Applications
- GSI - Grid Security Infrastructure
- OGSI - Open Grid Service Infrastructure
- WSRE - Web Service Resource Framework
- The grid standards have guided the development of several middleware libraries and API tools for grid computing.
- They are applied in both research grids and production grids today.
- Research grids tested include the