

# **Aneka: Cloud Application Platform**

**Dr. Prasenjit Chanak**  
**Assistant Professor**

**Department of Computer Science and Engineering**  
**Indian Institute of Technology (BHU), Varanasi-221005**

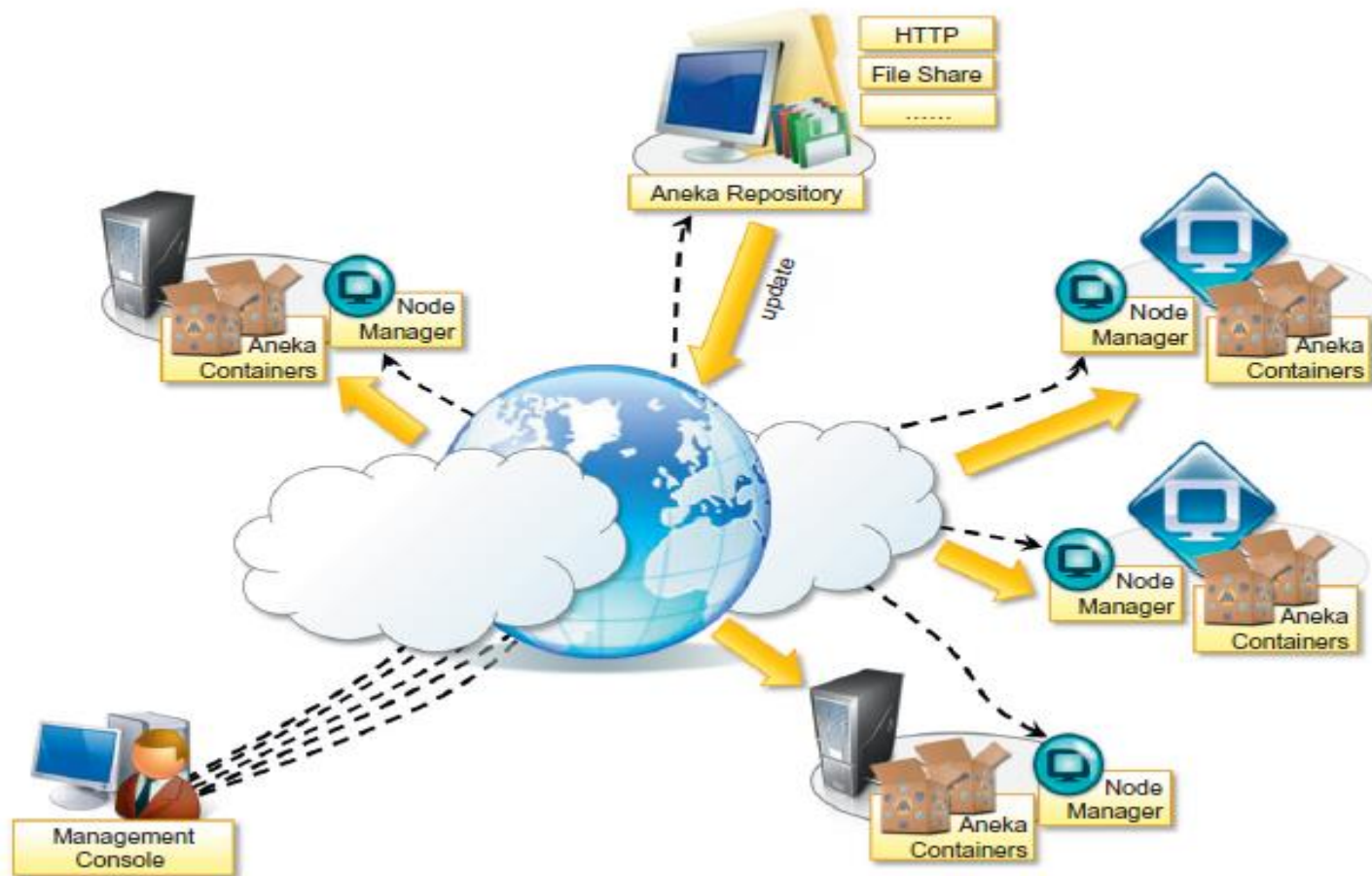
# Building Aneka Clouds

- Aneka is primarily a platform for developing distributed applications for clouds
- As a software platform it requires infrastructure on which to be deployed; this infrastructure needs to be managed
- Infrastructure management tools are specifically designed for this task, and building clouds is one of the primary tasks of administrators
- Aneka supports various deployment models for public, private, and hybrid clouds

# Infrastructure Organization

- The scenario is a reference model for all the different deployments Aneka supports
- A central role is played by the Administrative Console, which performs all the required management operations
- A fundamental element for Aneka Cloud deployment is constituted by repositories
- A repository provides storage for all the libraries required to lay out and install the basic Aneka platform
- These libraries constitute the software image for the node manager and the container programs
- Repositories can make libraries available through a variety of communication channels, such as HTTP, FTP, common file sharing, and so on

# Infrastructure Organization



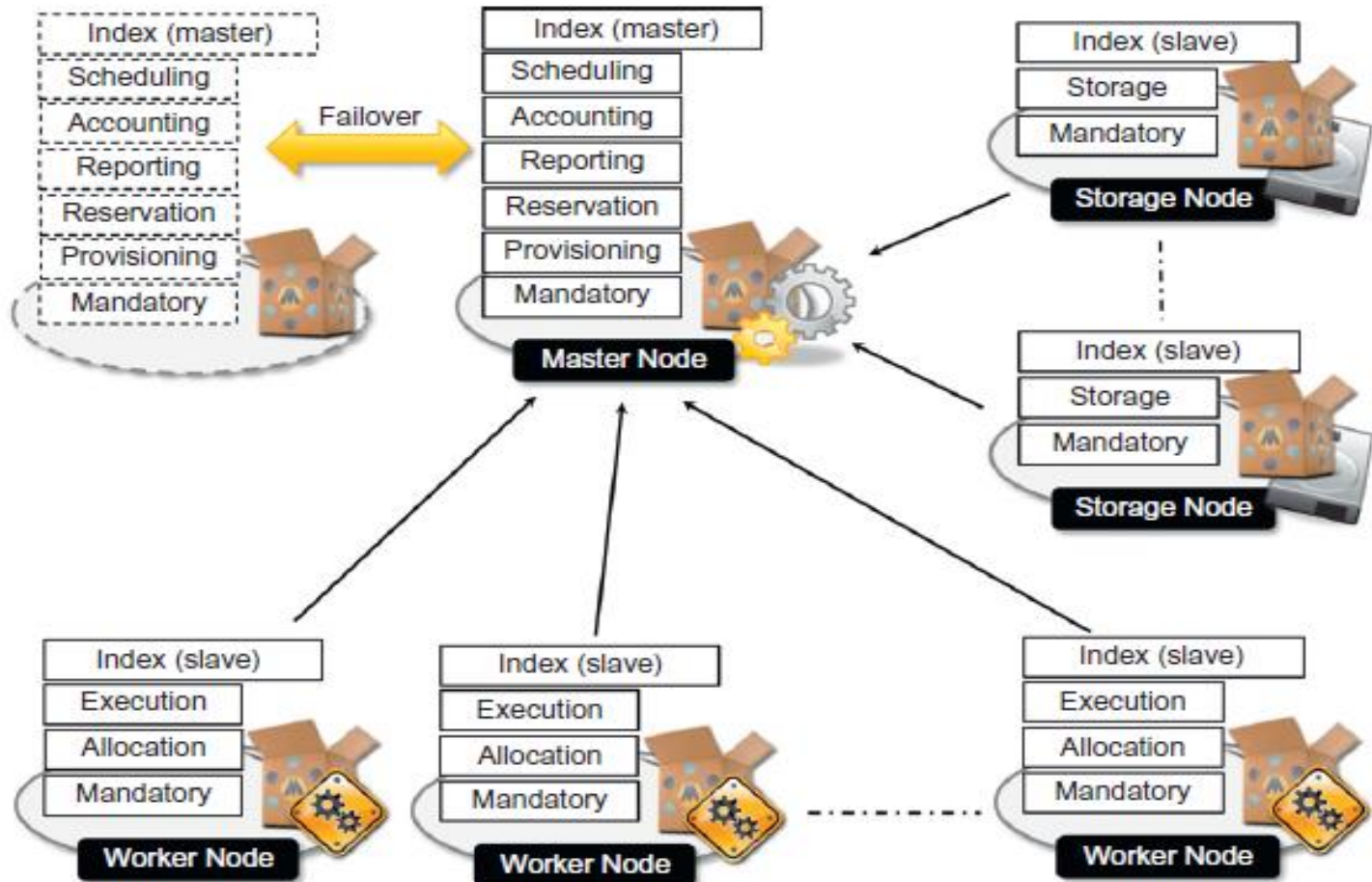
# Infrastructure Organization

- From an infrastructure point of view, the management of physical or virtual nodes is performed uniformly as long as it is possible to have an Internet connection and remote administrative access to the node
- A different scenario is constituted by the dynamic provisioning of virtual instances; these are generally created by prepackaged images already containing an installation of Aneka, which only need to be configured to join a specific Aneka Cloud
- It is also possible to simply install the container or install the Aneka daemon, and the selection of the proper solution mostly depends on the lifetime of virtual resources

# Logical Organization

- The logical organization of Aneka Clouds can be very diverse, since it strongly depends on the configuration selected for each of the container instances belonging to the Cloud
- The most common scenario is to use a master-worker configuration with separate nodes for storage
- The master node features all the services that are most likely to be present in one single copy and that provide the intelligence of the Aneka Cloud. What specifically characterizes a node as a master node is the presence of the Index Service (or Membership Catalogue) configured in master mode; all the other services, except for those that are mandatory, might be present or located in other nodes

# Logical Organization



# Logical Organization

- A common configuration of the master node is as follows:
  - Index Service (master copy)
  - Heartbeat Service
  - Logging Service
  - Reservation Service
  - Resource Provisioning Service
  - Accounting Service
  - Reporting and Monitoring Service
  - Scheduling Services for the supported programming models
- The master node also provides connection to an RDBMS facility where the state of several services is maintained. For the same reason, all the scheduling services are maintained in the master node
- They share the application store that is normally persisted on the RDBMS in order to provide a fault-tolerant infrastructure
- The master configuration can then be replicated in several nodes to provide a highly available infrastructure based on the failover mechanism



# Logical Organization

- The worker nodes constitute the workforce of the Aneka Cloud and are generally configured for the execution of applications. They feature the mandatory services and the specific execution services of each of the supported programming models in the Cloud
- A very common configuration is the following:
  - Index Service
  - Heartbeat Service
  - Logging Service
  - Allocation Service
  - Monitoring Service
  - Execution Services for the supported programming models
- A different option is to partition the pool of worker nodes with a different selection of execution services in order to balance the load between programming models and reserve some nodes for a specific class of applications

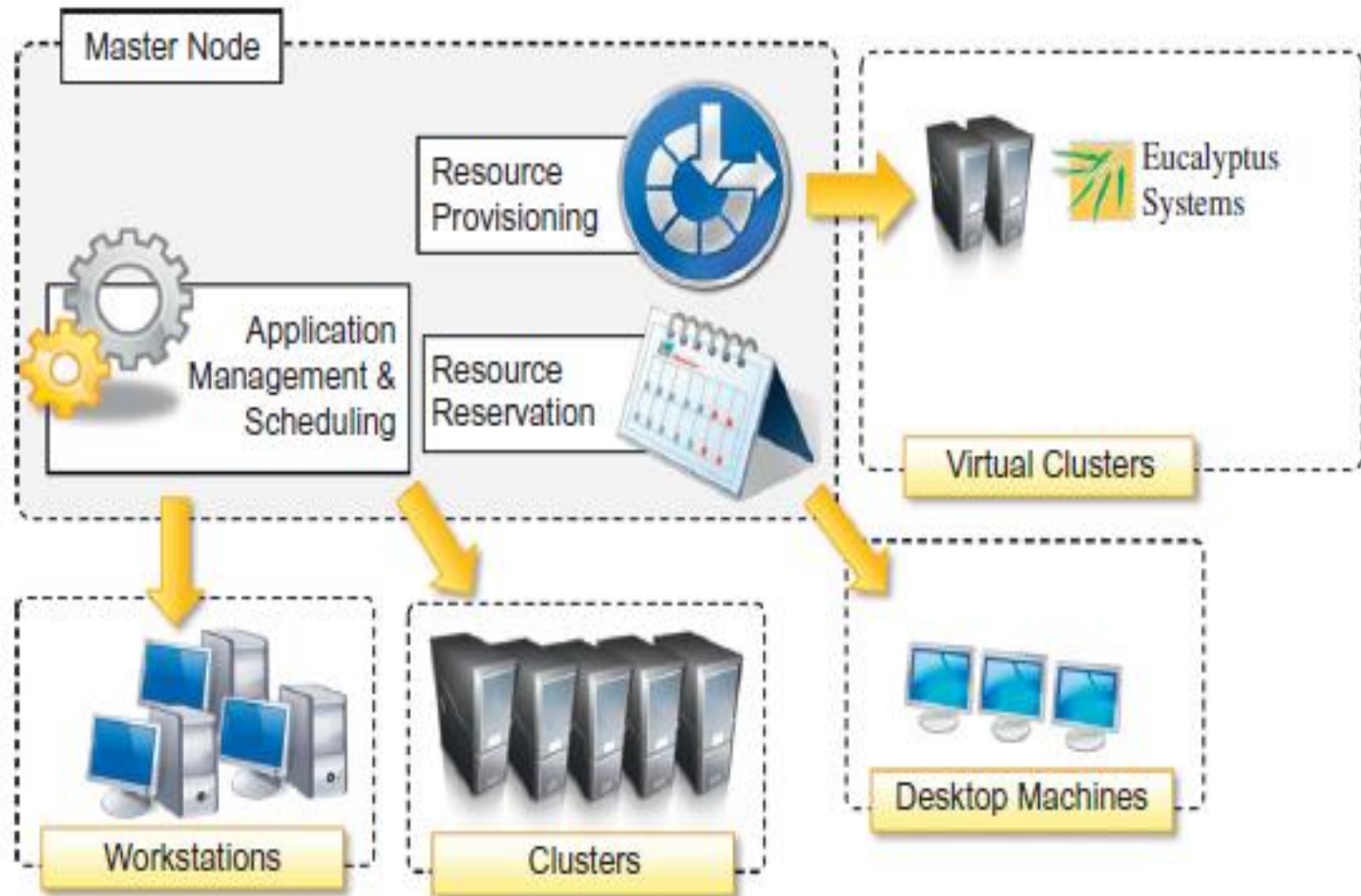
# Logical Organization

- Storage nodes are optimized to provide storage support to applications
- They feature, among the mandatory and usual services, the presence of the Storage Service
- The number of storage nodes strictly depends on the predicted workload and storage consumption of applications
- Storage nodes mostly reside on machines that have considerable disk space to accommodate a large quantity of files
- The common configuration of a storage node is the following:
  - Index Service
  - Heartbeat Service
  - Logging Service
  - Monitoring Service
  - Storage Service

# Private Cloud Deployment Mode

- A private deployment mode is mostly constituted by local physical resources and infrastructure management software providing access to a local pool of nodes, which might be virtualized
- In this scenario Aneka Clouds are created by harnessing a heterogeneous pool of resources such as desktop machines, clusters, or workstations
- These resources can be partitioned into different groups, and Aneka can be configured to leverage these resources according to application needs
- This deployment is acceptable for a scenario in which the workload of the system is predictable and a local virtual machine manager can easily address excess capacity demand
- Most of the Aneka nodes are constituted of physical nodes with a long lifetime and a static configuration and generally do not need to be reconfigured often

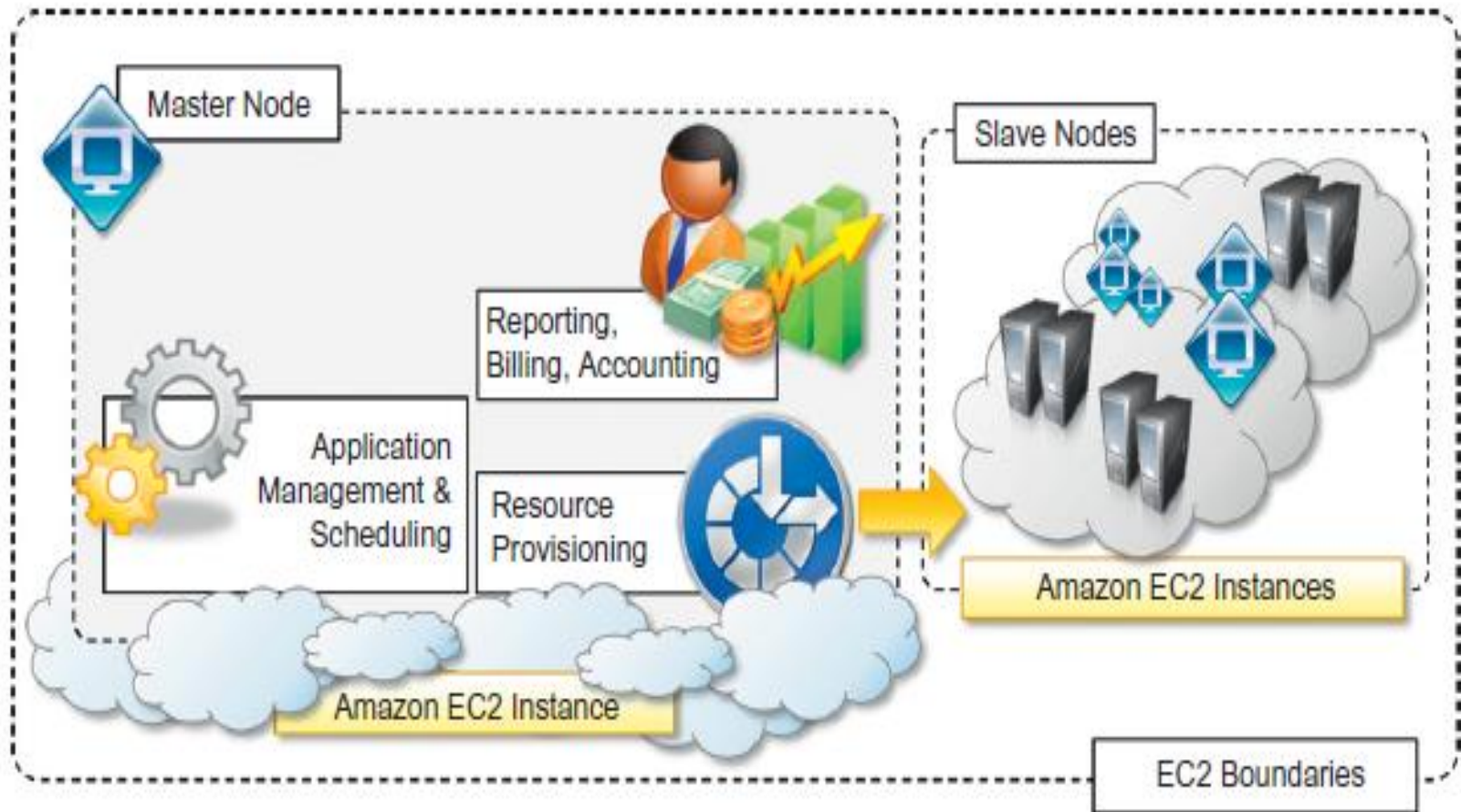
# Private Cloud Deployment Mode



# Public Cloud Deployment Mode

- Public Cloud deployment mode features the installation of Aneka master and worker nodes over a completely virtualized infrastructure that is hosted on the infrastructure of one or more resource providers such as Amazon EC2 or GoGrid
- In this case it is possible to have a static deployment where the nodes are provisioned beforehand and used as though they were real machines
- This deployment merely replicates a classic Aneka installation on a physical infrastructure without any dynamic provisioning capability
- More interesting is the use of the elastic features of IaaS providers and the creation of a Cloud that is completely dynamic
- The deployment is generally contained within the infrastructure boundaries of a single IaaS provider

# Public Cloud Deployment Mode



# Hybrid Cloud Deployment Mode

- The hybrid deployment model constitutes the most common deployment of Aneka
- In many cases, there is an existing computing infrastructure that can be leveraged to address the computing needs of applications. This infrastructure will constitute the static deployment of Aneka that can be elastically scaled on demand when additional resources are required
- This scenario constitutes the most complete deployment for Aneka that is able to leverage all the capabilities of the framework:
  - Dynamic Resource Provisioning
  - Resource Reservation
  - Workload Partitioning
  - Accounting, Monitoring, and Reporting



# Hybrid Cloud Deployment Mode

