[2CEIT603 CLOUD COMPUTING]

Practical: 8

AIM – Aneka Cloud Architecture

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Department of

Computer Engineering

Aneka 5.0

➢ What is Aneka?

- "Aneka" is a middleware platform for developing and deploying cloud applications.
- It provides a platform for running parallel and distributed applications in the cloud and supports a wide range of programming languages and application development models.
- Aneka enables the deployment and management of applications on cloud computing infrastructures, including public and private clouds, as well as hybrid clouds.
- It provides features such as resource provisioning, automatic scaling, load balancing, and fault tolerance to ensure high availability and performance of cloud applications.
- Using the Aneka we can enables cloud applications across different cloud infrastructures.
- A key component of the Aneka platform is the Aneka Management Studio, a portal for managing your infrastructure and clouds.
- Administrators use the Aneka Management Studio to define their infrastructure, deploy Aneka Daemons, and install and configure Aneka Containers.
- Aneka also allows you to build different run-time environments and build new applications.

➢ Aneka Component:

Aneka technology primarily consists of two key components:

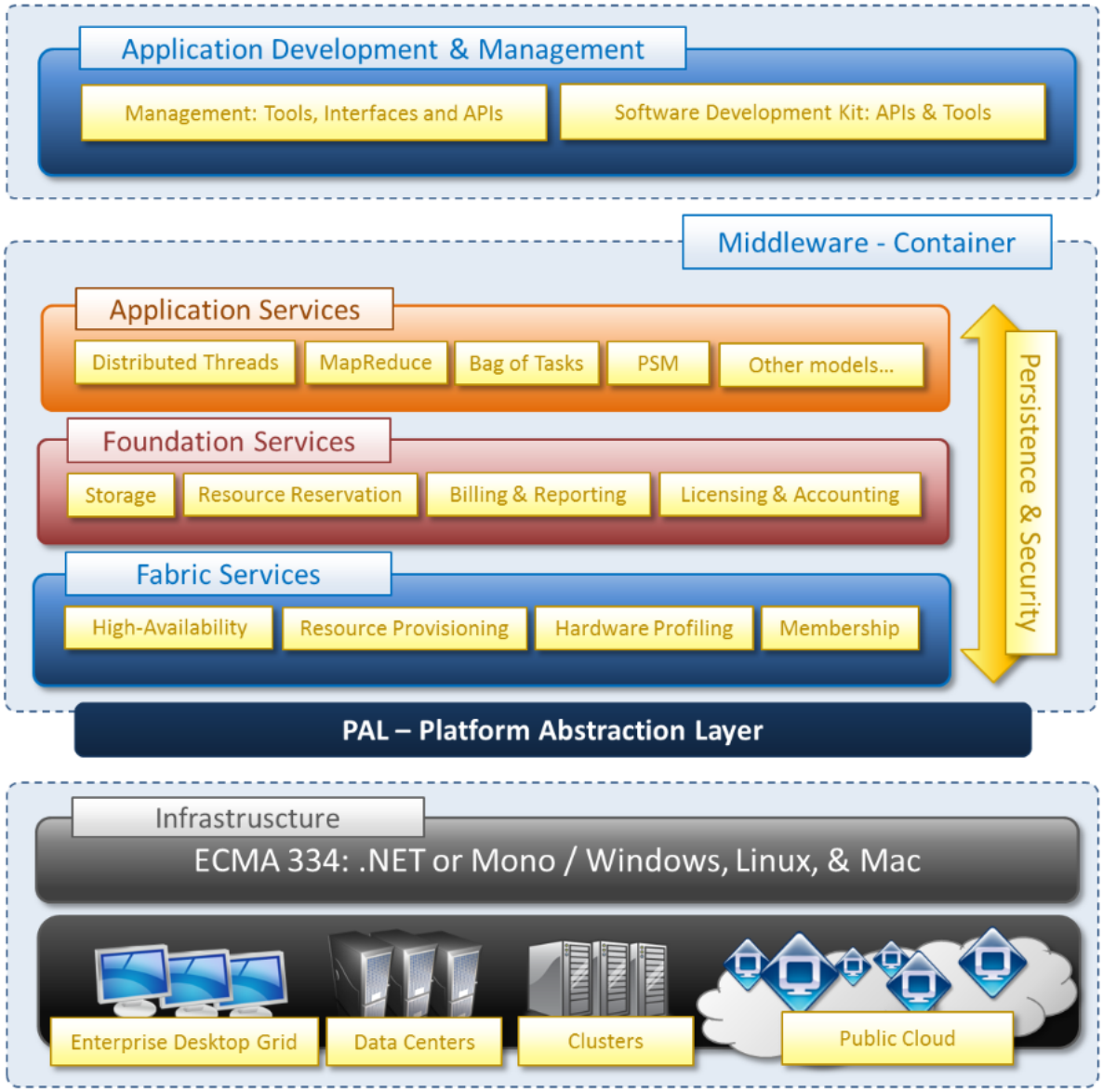
1. SDK (Software Development Kit) containing application programming interfaces (APIs) and tools essential for rapid development of applications. Aneka APIs supports three popular Cloud programming models: Task, Thread, and Map Reduce.
2. A Runtime Engine and Platform for managing deployment and execution of applications on private or public Clouds.

One of the notable characteristics of Aneka PaaS is to support provisioning of private cloud resources ranging from desktops, clusters to virtual datacenters using VMWare, Citrix Zen server and public cloud resources such as Windows Azure, Amazon EC2, and Go Grid Cloud Service.

The potential of Aneka as a Platform as a Service has been successfully harnessed by its users and customers in three various sectors including engineering, life science, education, and business intelligence.

➢ Aneka Architecture

Aneka is a platform and a framework for developing distributed applications on the Cloud. It harnesses the spare CPU cycles of a heterogeneous network of desktop PCs and servers or datacenters on demand. Aneka provides developers with a rich set of APIs for transparently exploiting such resources and expressing the business logic of applications by using the preferred programming abstractions. System administrators can leverage on a collection of tools to monitor and control the deployed infrastructure. This can be a public cloud available to anyone through the Internet, or a private cloud constituted by a set of nodes with restricted access.



The Aneka based computing cloud is a collection of physical and virtualized resources connected through a network, which are either the Internet or a private intranet. Each of these

resources hosts an instance of the Aneka Container representing the runtime environment where the distributed applications are executed. The container provides the basic management features of the single node and leverages all the other operations on the services that it is hosting. The services are broken up into fabric, foundation, and execution services. Fabric services directly interact with the node through the Platform Abstraction Layer (PAL) and perform hardware profiling and dynamic resource provisioning. Foundation services identify the core system of the Aneka middleware, providing a set of basic features to enable Aneka containers to perform specialized and specific sets of tasks. Execution services directly deal with the scheduling and execution of applications in the Cloud.

One of the key features of Aneka is the ability of providing different ways for expressing distributed applications by offering different programming models; execution services are mostly concerned with providing the middleware with an implementation for these models. Additional services such as persistence and security are transversal to the entire stack of services that are hosted by the Container. At the application level, a set of different components and tools are provided to: 1) simplify the development of applications (SDK); 2) porting existing applications to the Cloud; and 3) monitoring and managing the Aneka Cloud.

A common deployment of Aneka is presented at the side. An Aneka based Cloud is constituted by a set of interconnected resources that are dynamically modified according to the user needs by using resource virtualization or by harnessing the spare CPU cycles of desktop machines. If the deployment identifies a private Cloud all the resources are in house, for example within the enterprise. This deployment is extended by adding publicly available resources on demand or by interacting with other Aneka public clouds providing computing resources connected over the Internet.

➢ Highlights of Aneka:

➢ Technical Value

- Support of multiple programming and application environments
- Simultaneous support of multiple run-time environments
- Rapid deployment tools and framework
- Simplicity in developing applications on Cloud
- Dynamic Scalability
- Ability to harness multiple virtual and/or physical machines for accelerating application result
- Provisioning based on QoS/SLA

➢ Business Value

- Improved reliability
- Simplicity
- Faster time to value
- Operational Agility
- Definite application performance enhancement
- Optimizing the capital expenditure and operational expenditure

All these features make Aneka a winning solution for enterprise customers in the Platform-as-a-Service scenario.

➢ Aneka provides APIs and tools that enable applications to be virtualized over a heterogeneous network.

➢ Supported APIs include:

- Task Model for batch and legacy applications
- Thread Model for applications that use object oriented thread
- Map Reduce Model for data intensive applications like data mining or analytics
- Others such as MPI (Message Passing) and Actors (Distributive Active Objects/Agents) can be customized

➢ Supported Tools include:

- Design Explorer for Parameter Sweep applications. Built on-top of task model with no additional requirements for programming
- Work Flow applications. Built on-top of task model with some additional requirements for programming

➢ Build different types of Run-time environments:

- PC Grids (also called Enterprise Grids)
- Data Centres (Clusters)
- MultiCore Computers
- Public and/or private networks
- Virtual Machine or Physical

Use APIs and Tools **to build new applications** or **enable existing applications** over different Run-time environments.

➢ How we accelerate Development and Deployment:

1. Rapid Deployment includes support of Parameter Sweep using Design Explorer Tool. Parameter sweep takes existing applications that are controlled by a set of parameters passed as a command line and produces multiple distributed executions of the same application with different parameter sets.
2. Building on-top of Microsoft .NET framework allows multiple programming languages to be supported, thereby making it faster to get existing applications running.
3. Develop Application once and run in multiple environments simultaneously. Support for Multiple Run-time environments saves you time in programming your applications. Aneka supports Virtual Machine and Physical hardware in private and public networks.
4. Optimized for networked multi-core computers, Aneka effectively virtualizes your application which allows you to harness the power of multiple computers for the same workload. This gives you results in near real-time allowing you to make faster decisions.
5. Aneka Scheduler allows you to run multiple applications on same Run-time environment either concurrently (simultaneously) or in a queue arrangement.

➢ Installation and Configuration:

- First download and install Aneka software from its website.
- Whenever we create a machine it isrequired to use administrator rights.
- Add machine in master and worker machines.
- Install master container in master machine and install worker container in worker machine.
- Add credentials for worker in master machine
- Run application in worker machine with the credentials defined in master machine.
- You can see in master machine which applications are executed by workers with which credentials.
- You can download the Aneka Installation and User Guide for below link: http://www.manjrasoft.com/download/InstallationGuide.pdf

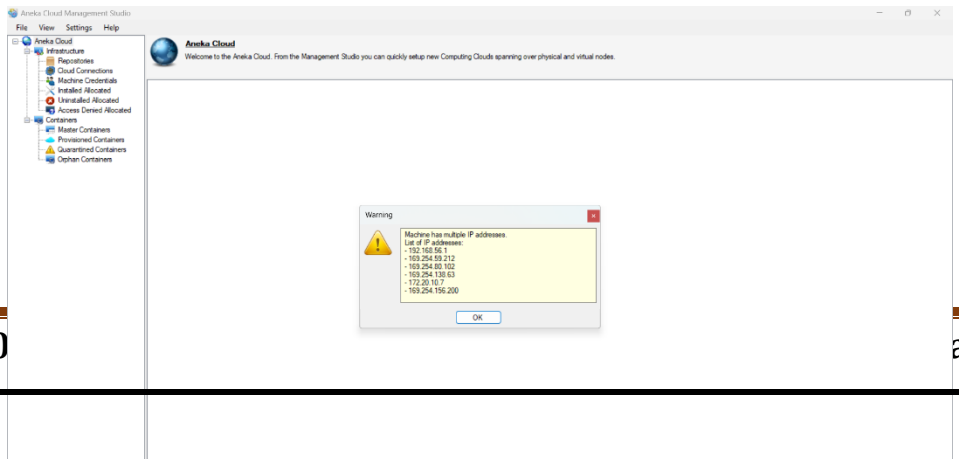


Figure-1 machine have a multiple IP

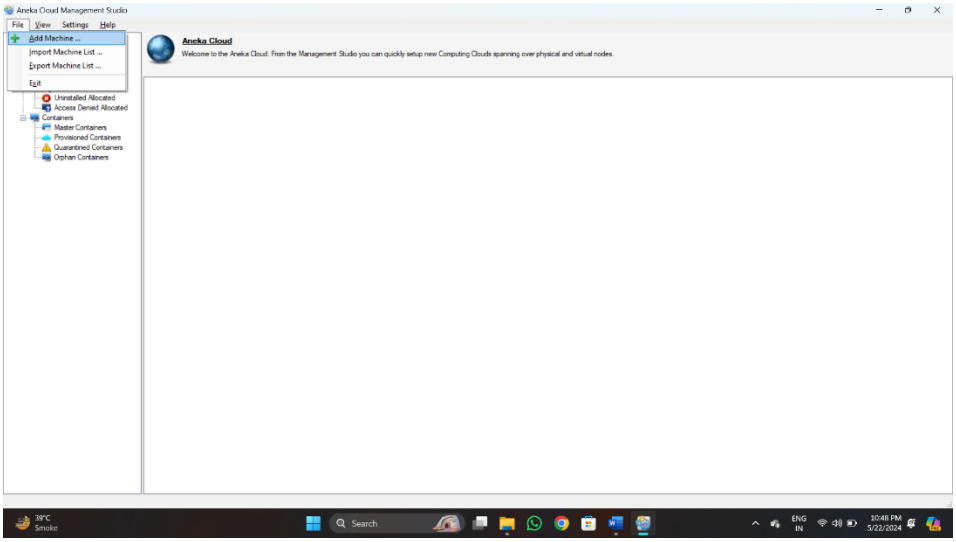


Figure-2 Add machine

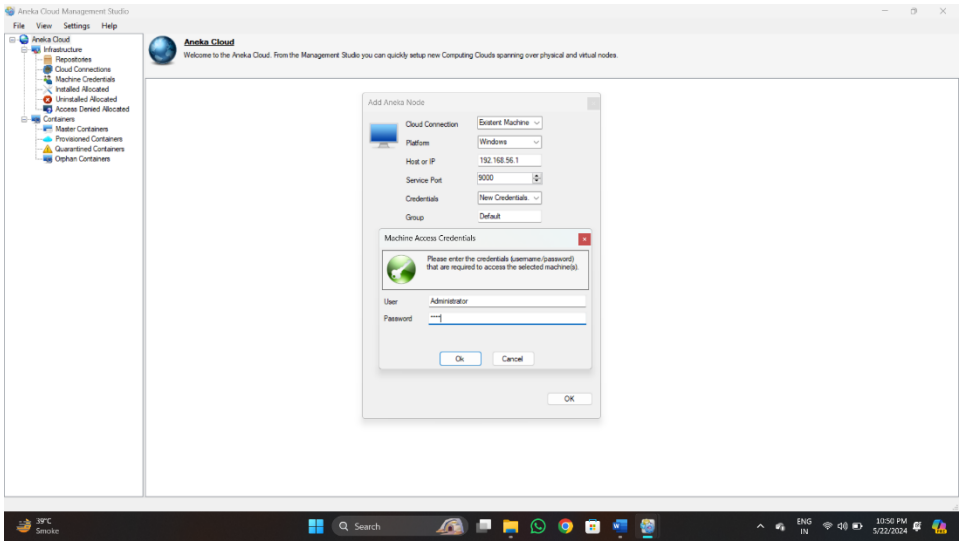
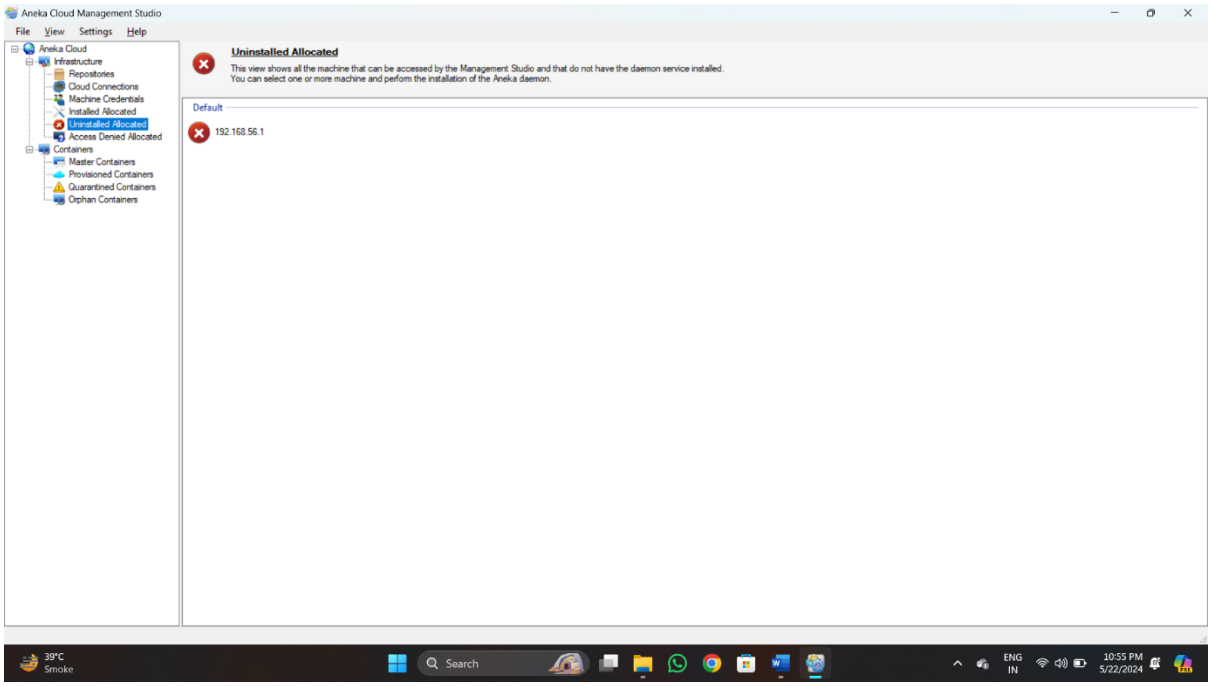


Figure-3 Enter IPv4 address and create new credentials

Figure-4 Credentials

Uninstalled Machine:



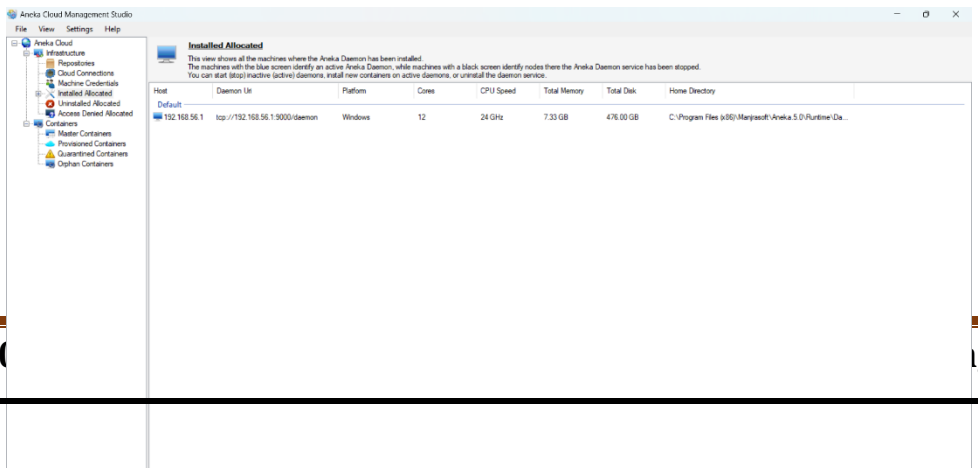
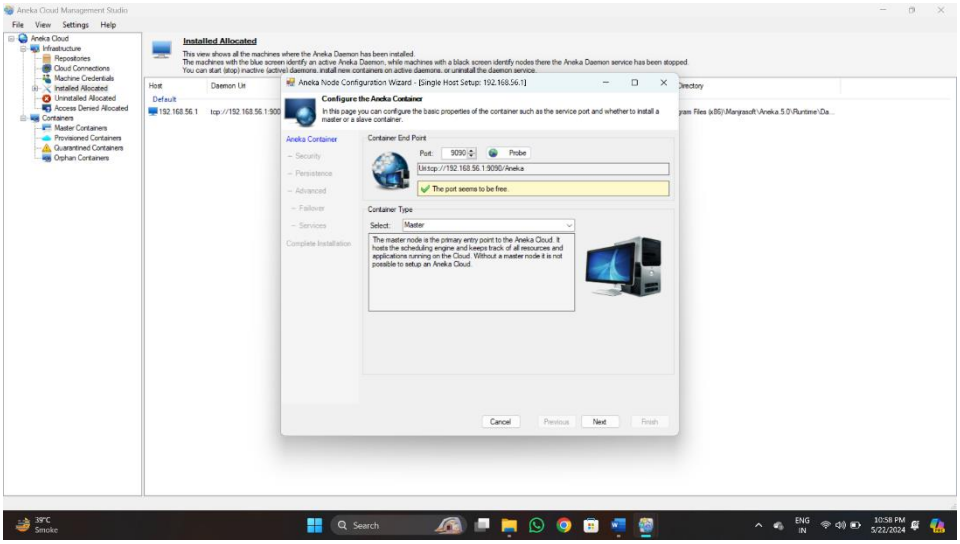
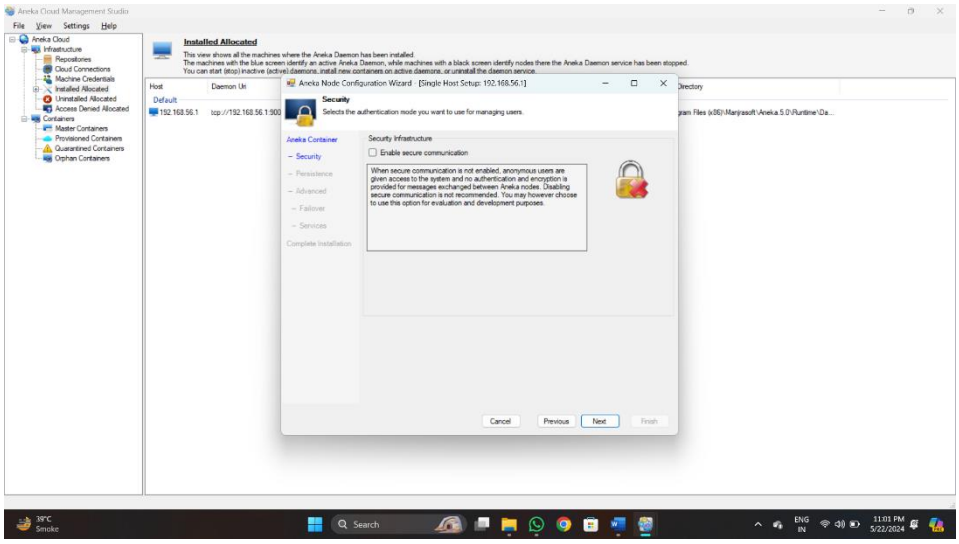
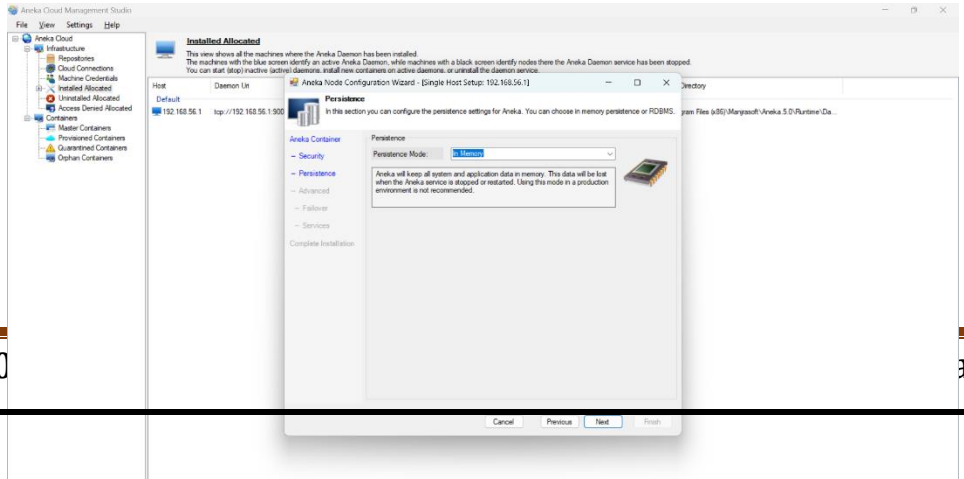
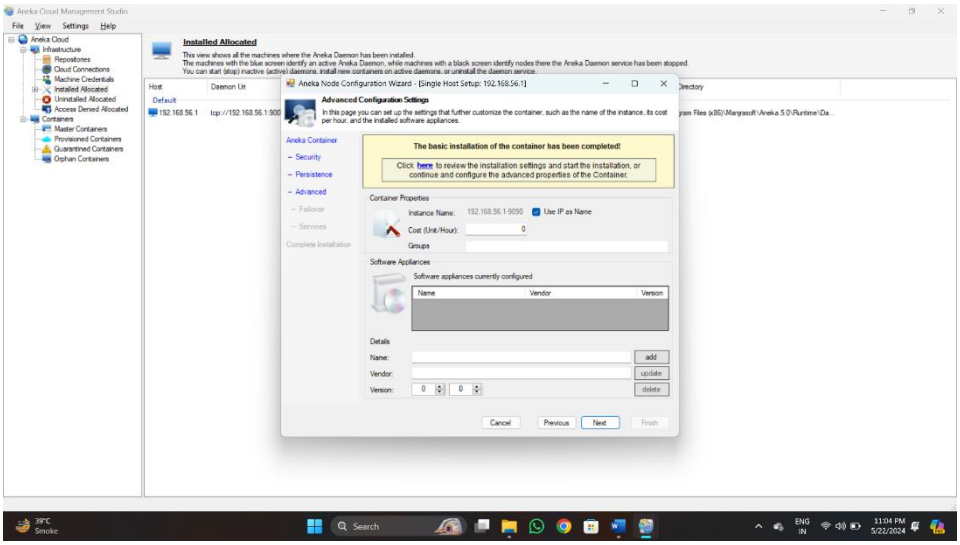


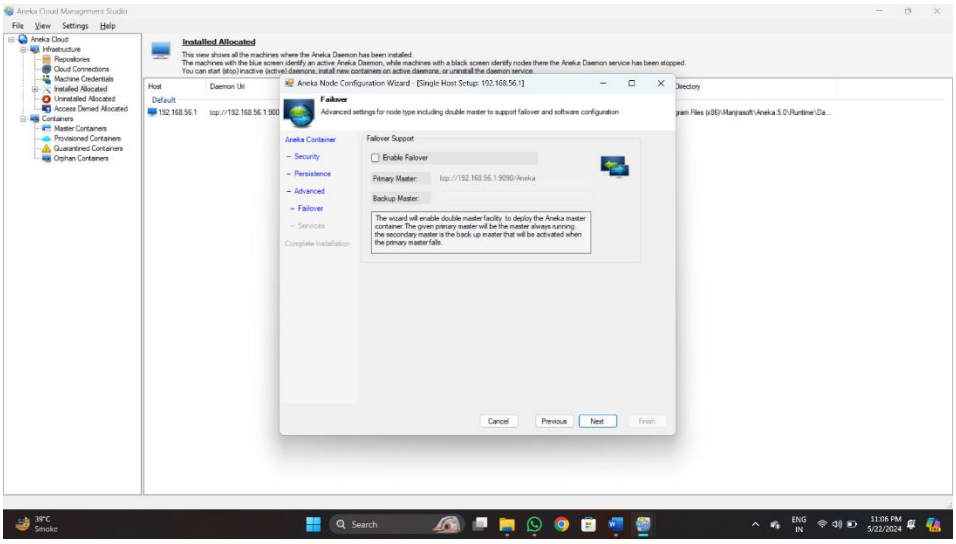
Figure-6 installed machine

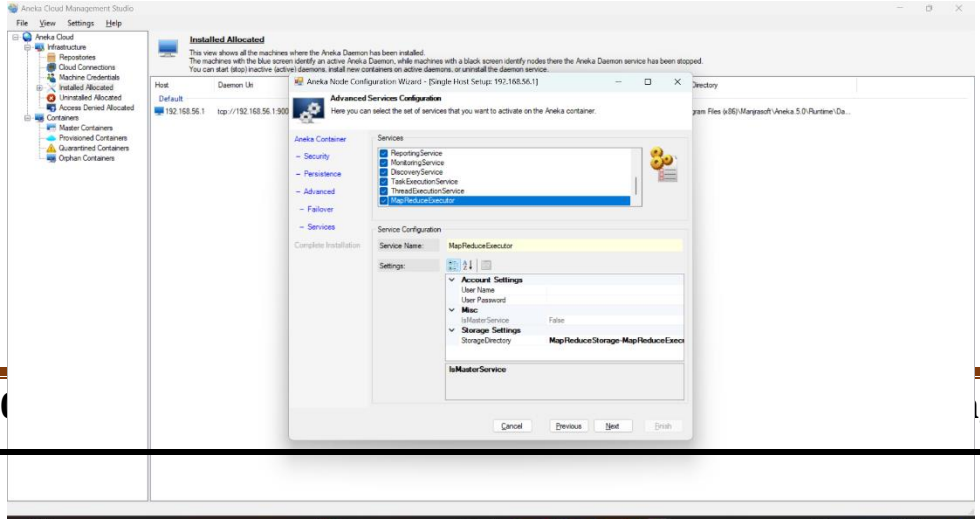


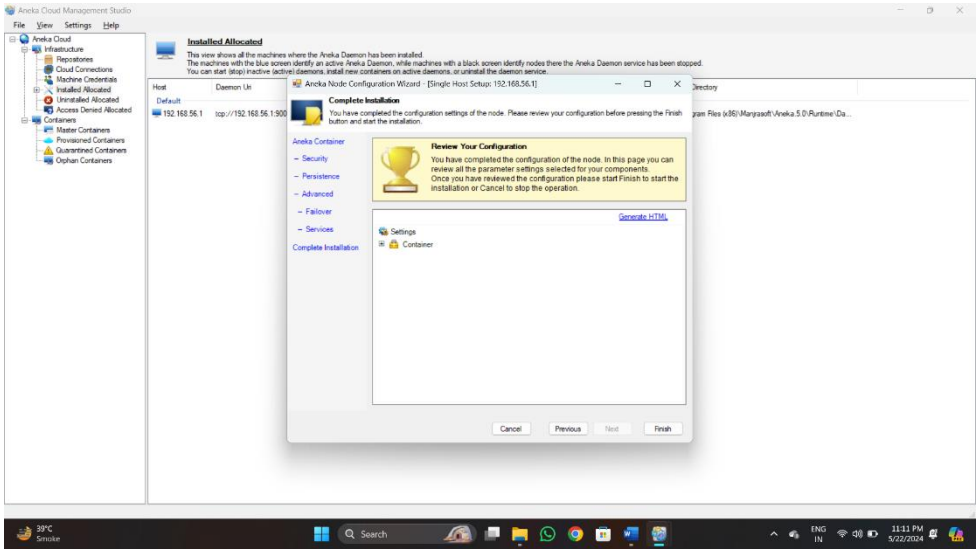


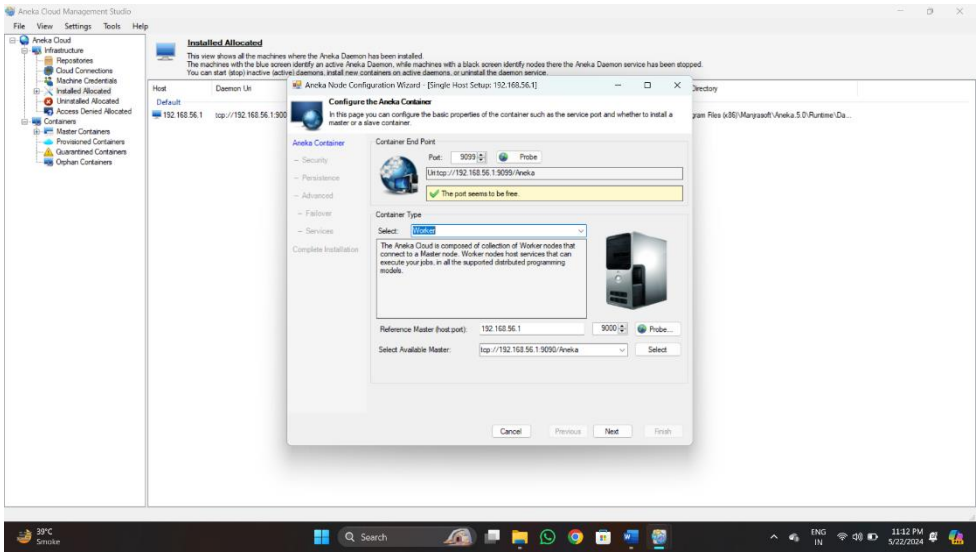


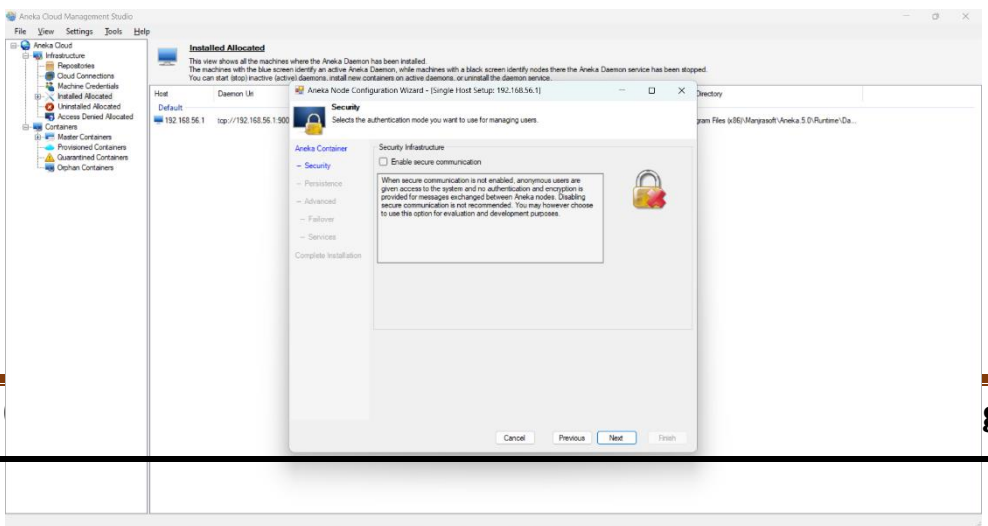

Aneka Cloud Management Studio
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Advanced Configuration Settings
The basic installation of the container has been completed!
Container Properties
Software Appliances
Cancel
Previous
Next

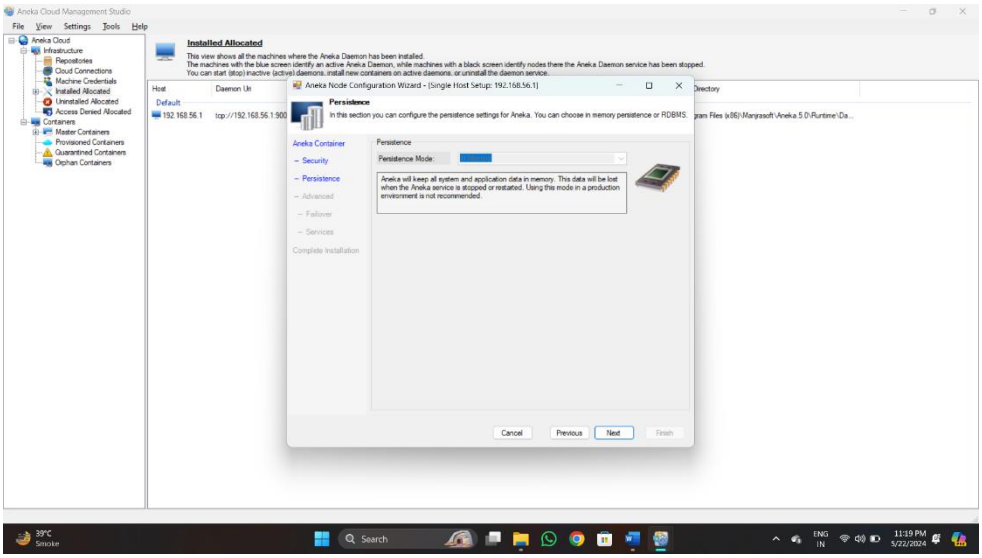

Aneka Cloud Management Studio
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Failover
Advanced settings for node type including double master to support failover and software configuration
Failover Support
Enable Failover
Primary Master:
Backup Master:
Cancel
Previous
Next

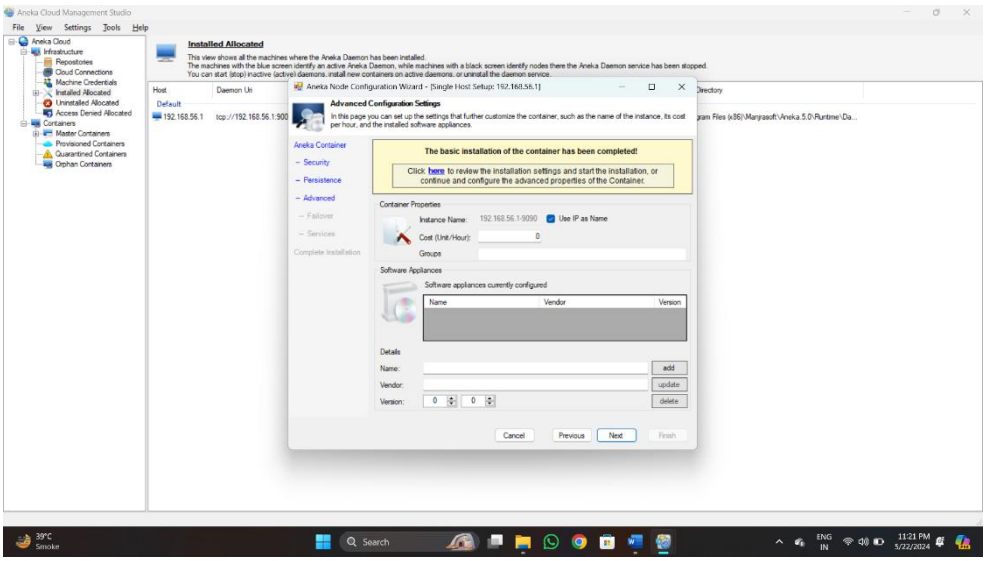

Aneka Cloud Management Studio
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Advanced Services Configuration
Here you can select the set of services that you want to activate on the Aneka container.
Services
ReportingService
MonitoringService
DiscoveryService
TaskExecutionService
ThreadExecutionService
MapReduceExecutor
Service Configuration
Service Name:
MapReduceExecutor
Settings:
Account Settings
User Name
User Password
Misc
IsMasterService
False
Storage Settings
StorageDirectory
IsMasterService
Cancel
Previous
Next


Aneka Cloud Management Studio
File View Settings Help
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Complete Installation
You have completed the configuration settings of the node. Please review your configuration before pressing the Finish button and start the installation.
Review Your Configuration
You have completed the configuration of the node. In this page you can review all the parameter settings selected for your components.
Once you have reviewed the configuration please start Finish to start the installation or Cancel to stop the operation.
Generate HTML
Settings
Container
Cancel
Previous
Next
Finish


Aneka Cloud Management Studio
File View Settings Tools Help
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Configure the Aneka Container
In this page you can configure the basic properties of the container such as the service port and whether to install a master or a slave container.
Container End Point
Port: 9099
Probe
The port seems to be free.
Container Type
Select: Worker
The Aneka Cloud is composed of collection of Worker nodes that connect to a Master node. Worker nodes host services that can execute your jobs, in all the supported distributed programming models.
Reference Master (host:port): 192.168.56.1 9090
Probe...
Select Available Master:
Select
Cancel
Previous
Next
Finish


Aneka Cloud Management Studio
File View Settings Tools Help
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Security
Selects the authentication mode you want to use for managing users.
Security Infrastructure
Enable secure communication
When secure communication is not enabled, anonymous users are given access to the system and no authentication and encryption is provided for messages exchanged between Aneka nodes. Disabling secure communication is not recommended. You may however choose to use this option for evaluation and development purposes.
Cancel
Previous
Next
Finish


Aneka Cloud Management Studio
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Persistence
Cancel
Previous
Next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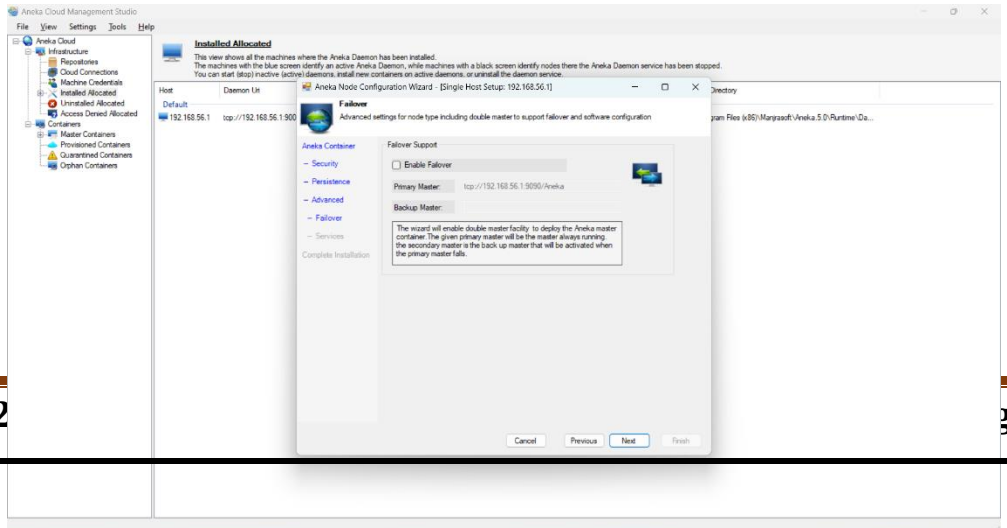
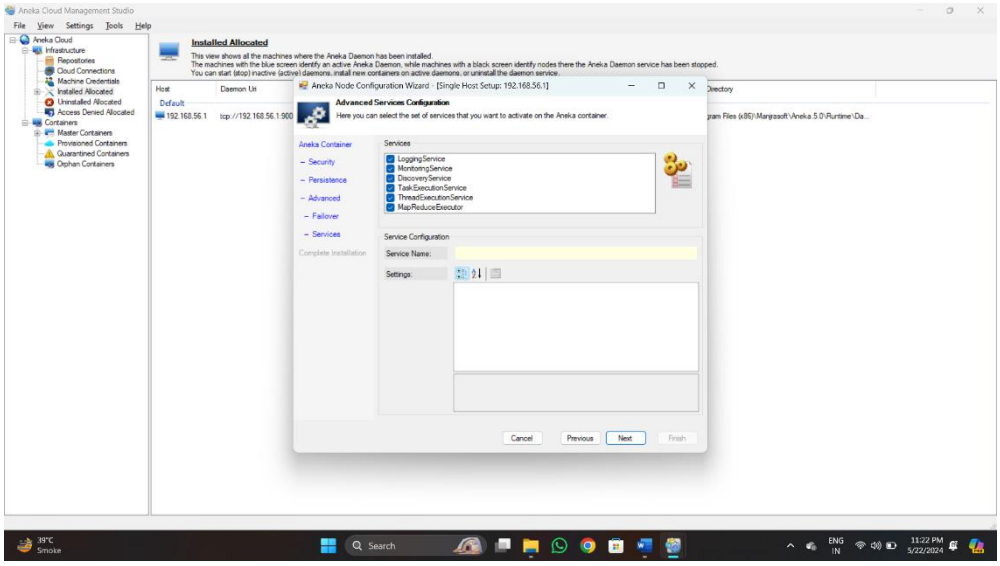
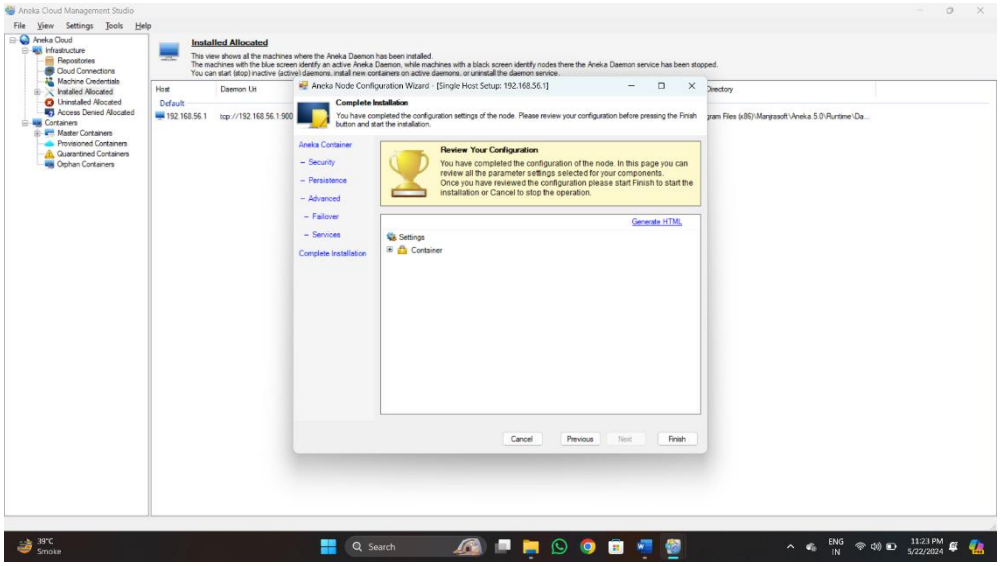
Advanced Configuration Settings
The basic installation of the container has been completed!
Cancel
Previous
Next


Aneka Cloud Management Studio
Installed Allocated
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Failover
Cancel
Previous
Next


Aneka Cloud Management Studio
File View Settings Tools Help
Installed Allocated
This view shows all the machines where the Aneka Daemon has been installed.
The machines with the blue screen identify an active Aneka Daemon, while machines with a black screen identify nodes there the Aneka Daemon service has been stopped.
You can start (stop) inactive (active) daemons, install new containers on active daemons, or uninstall the daemon service.
Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Advanced Services Configuration
Here you can select the set of services that you want to activate on the Aneka container.
Aneka Container
Security
Persistence
Advanced
Failover
Services
Complete Installation
Services
LoggingService
MonitoringService
DiscoveryService
TaskExecutionService
ThreadExecutionService
MapReduceExecutor
Service Configuration
Service Name:
Settings:
Cancel
Previous
Next
Finish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Aneka Node Configuration Wizard - [Single Host Setup: 192.168.56.1]
Complete Installation
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Security
Persistence
Advanced
Failover
Services
Complete Installation
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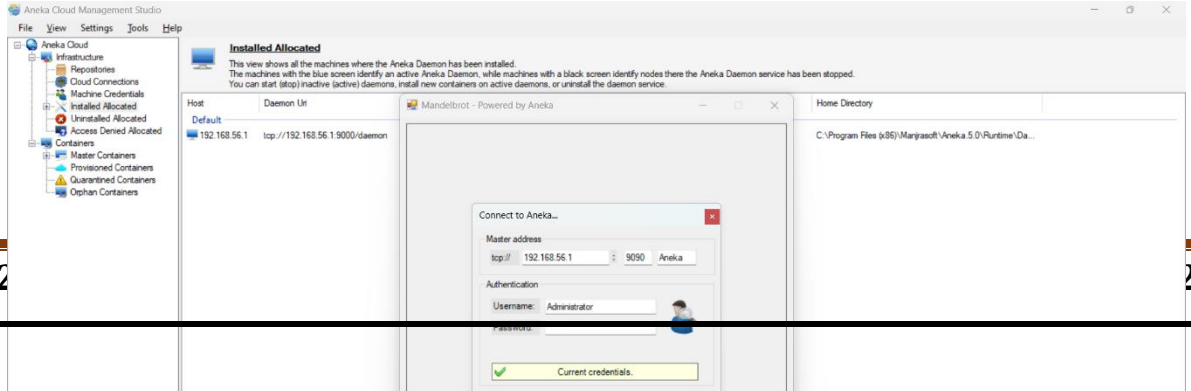
Generate HTML
Settings
Container
Cancel
Previous
Next
Finish

Mandelbrot


Aneka Cloud Management Studio
File View Settings Tools Help
Installed Allocated
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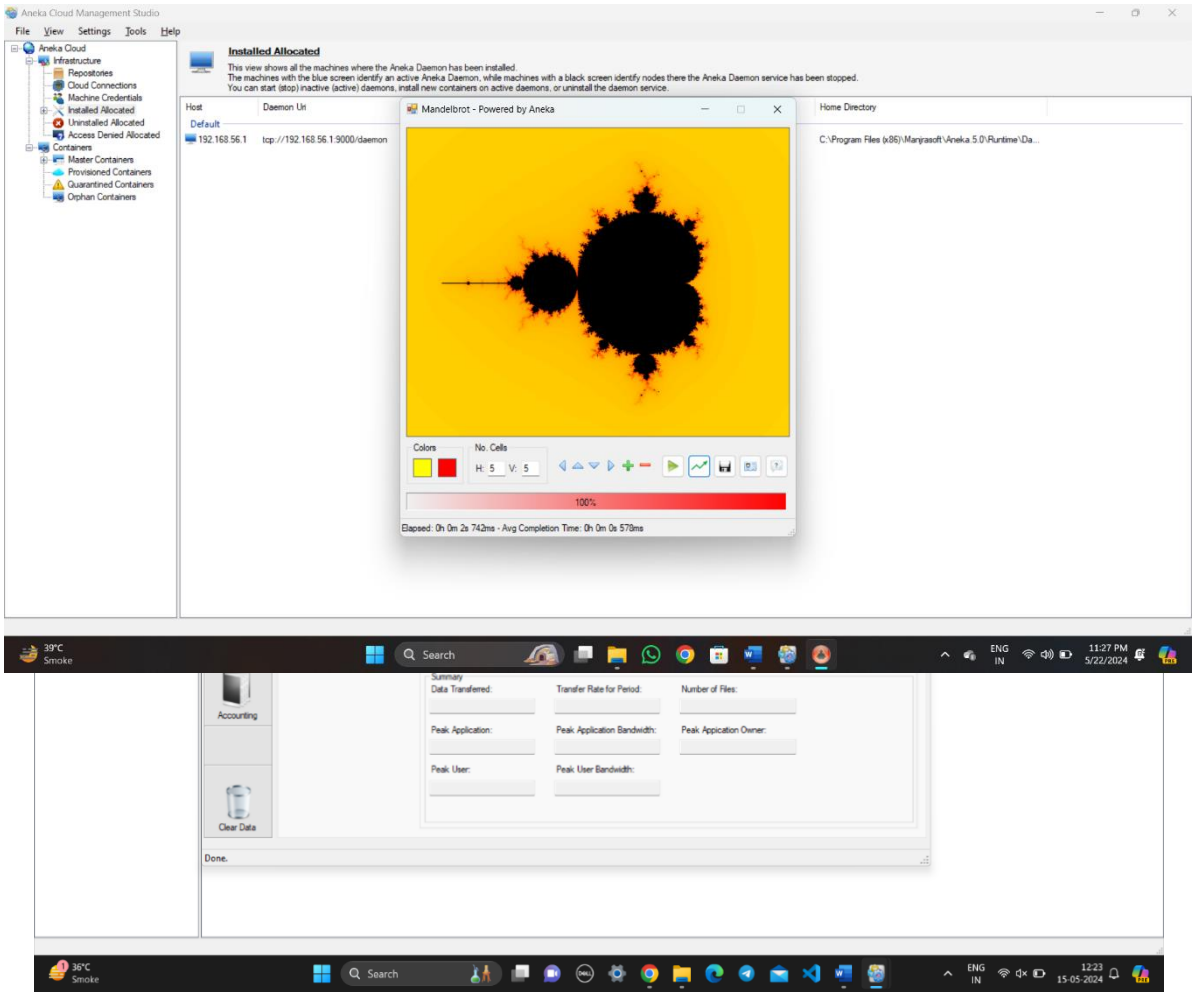
You can start (stop) inactive (active) daemons, install new containers on active daemons, or uninstall the daemon service.
Mandelbrot - Powered by Aneka
Connect to Aneka...
Master address
tcp:// 192.168.56.1 9090 Aneka
Authentication
Username: Administrator
Current credentials.


Aneka Cloud Management Studio
File View Settings Tools Help
Aneka Cloud
Infrastructure
Repositories
Cloud Connections
Machine Credentials
Installed Allocated
Uninstalled Allocated
Access Denied Allocated
Containers
Master Containers
Provisioned Containers
Quarantined Containers
Orphan Containers
Installed Allocated
This view shows all the machines where the Aneka Daemon has been installed.
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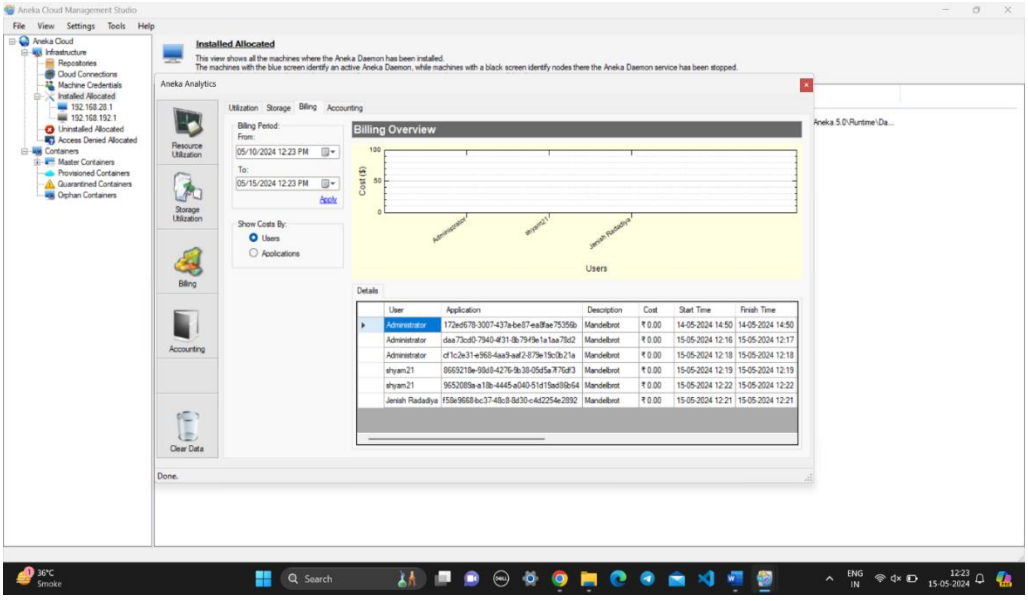
You can start (stop) inactive (active) daemons, install new containers on active daemons, or uninstall the daemon service.
Host
Daemon Uri
Default
192.168.56.1
tcp://192.168.56.1:9000/daemon
Home Directory
C:\Program Files (x86)\Manjrasoft\Aneka.5.0\Runtime\Da...
Mandelbrot - Powered by Aneka
Colors
No. Cells
H: 5 V: 5
100%
Elapsed: 0h 0m 2s 742ms - Avg Completion Time: 0h 0m 0s 578ms
39°C
Smoke
Search
ENG
IN
11:27 PM
5/22/2024
Accounting
Clear Data
Summary
Data Transfered:
Transfer Rate for Period:
Number of Files:
Peak Application:
Peak Application Bandwidth:
Peak Application Owner:
Peak User:
Peak User Bandwidth:
Done.
36°C
Smoke
Search
ENG
IN
12:23
15-05-2024


Aneka Cloud Management Studio
File View Settings Tools Help
Installed Allocated
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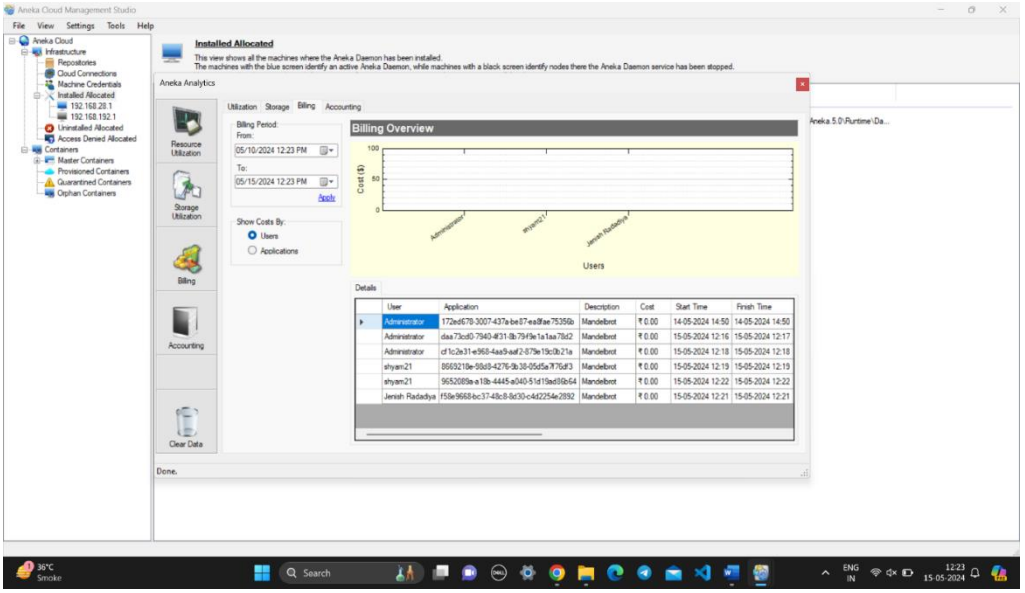
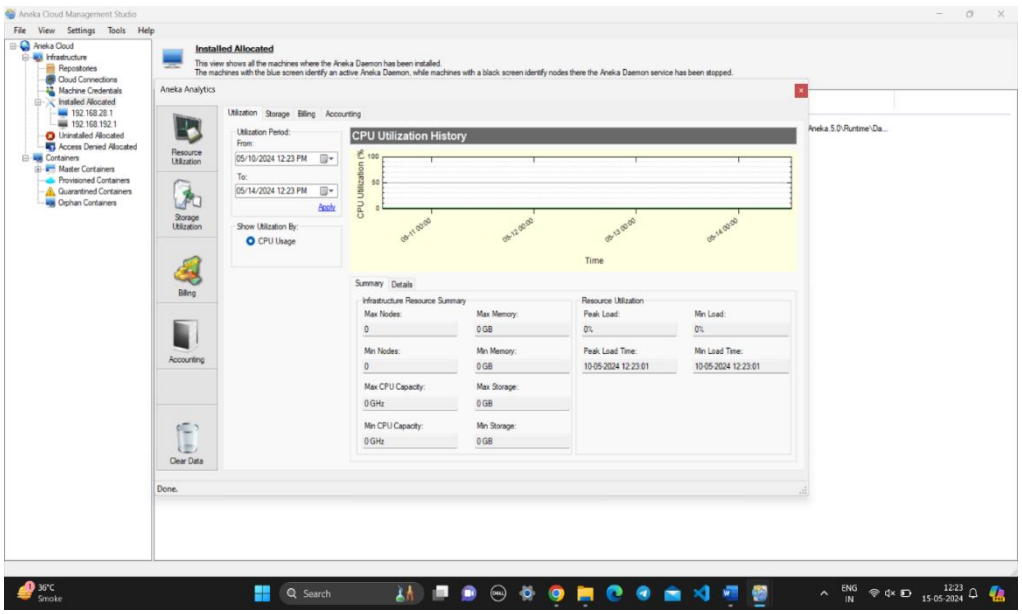
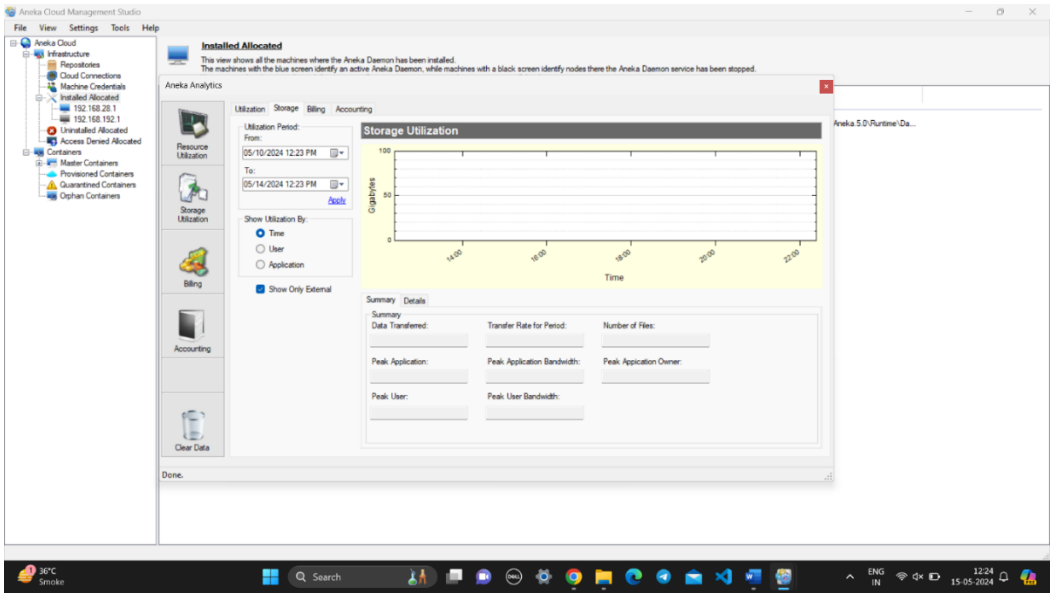
The machines with the blue screen identify an active Aneka Daemon, while machines with a black screen identify nodes there the Aneka Daemon service has been stopped.
Aneka Analytics
Utilization Storage Billing Accounting
Billing Overview
Billing Period:
From:
05/10/2024 12:23 PM
To:
05/15/2024 12:23 PM
Apply
Show Costs By:
Users
Applications
Cost ($)
Users
Details
User Application Description Cost Start Time Finish Time
Administrator 172ed678-3007-437a-be87-ea8fae75356b Mandelbrot ₹ 0.00 14-05-2024 14:50 14-05-2024 14:50
Administrator daa73cd0-7940-4f31-8b79-f9e1a1aa78d2 Mandelbrot ₹ 0.00 15-05-2024 12:16 15-05-2024 12:17
Administrator cf1c2e31-e968-4aa9-aaf2-879e19c0b21a Mandelbrot ₹ 0.00 15-05-2024 12:18 15-05-2024 12:18
shyam21 8669218e-98d9-4276-9b38-05d5a7f76df3 Mandelbrot ₹ 0.00 15-05-2024 12:19 15-05-2024 12:19
shyam21 9652089a-a18b-4445-a040-51d19ad89b64 Mandelbrot ₹ 0.00 15-05-2024 12:22 15-05-2024 12:22
Jenish Radadiya f58e9668-bc37-48c8-8d30-c4d2254e2892 Mandelbrot ₹ 0.00 15-05-2024 12:21 15-05-2024 12:21
Done.


Aneka Cloud Management Studio
File View Settings Tools Help
Installed Allocated
This view shows all the machines where the Aneka Daemon has been installed.
The machines with the blue screen identify an active Aneka Daemon, while machines with a black screen identify nodes there the Aneka Daemon service has been stopped.
Aneka Analytics
Utilization Storage Billing Accounting
Billing Overview
Billing Period:
From:
05/10/2024 12:23 PM
To:
05/15/2024 12:23 PM
Apply
Show Costs By:
Users
Applications
Cost ($)
Users
Details
User Application Description Cost Start Time Finish Time
Administrator 172ed678-3007-437a-be87-ea8fae75356b Mandelbrot ₹ 0.00 14-05-2024 14:50 14-05-2024 14:50
Administrator daa73cd0-7940-4f31-8b79-f9e1a1aa78d2 Mandelbrot ₹ 0.00 15-05-2024 12:16 15-05-2024 12:17
Administrator cf1c2e31-e968-4aa9-aaf2-879e19c0b21a Mandelbrot ₹ 0.00 15-05-2024 12:18 15-05-2024 12:18
shyam21 8669218e-98d9-4276-9b38-05d5a7f76df3 Mandelbrot ₹ 0.00 15-05-2024 12:19 15-05-2024 12:19
shyam21 9652089a-a18b-4445-a040-51d19ad89b64 Mandelbrot ₹ 0.00 15-05-2024 12:22 15-05-2024 12:22
Jenish Radadiya f58e9668-bc37-48c8-8d30-c4d2254e2892 Mandelbrot ₹ 0.00 15-05-2024 12:21 15-05-2024 12:21
Done.


Aneka Cloud Management Studio
File View Settings Tools Help
Installed Allocated
This view shows all the machines where the Aneka Daemon has been installed.
The machines with the blue screen identify an active Aneka Daemon, while machines with a black screen identify nodes there the Aneka Daemon service has been stopped.
Aneka Analytics
Utilization Storage Billing Accounting
CPU Utilization History
Utilization Period:
From:
05/10/2024 12:23 PM
To:
05/14/2024 12:23 PM
Apply
Show Utilization By:
CPU Usage
CPU Utilization (%)
Time
Summary Details
Infrastructure Resource Summary
Max Nodes: 0
Max Memory: 0 GB
Min Nodes: 0
Min Memory: 0 GB
Max CPU Capacity: 0 GHz
Max Storage: 0 GB
Min CPU Capacity: 0 GHz
Min Storage: 0 GB
Resource Utilization
Peak Load: 0%
Min Load: 0%
Peak Load Time: 10-05-2024 12:23:01
Min Load Time: 10-05-2024 12:23:01
Done.


Aneka Cloud Management Studio
File View Settings Tools Help
Aneka Cloud
Infrastructure
Repositories
Cloud Connections
Machine Credentials
Installed Allocated
192.168.28.1
192.168.192.1
Uninstalled Allocated
Access Denied Allocated
Containers
Master Containers
Provisioned Containers
Quarantined Containers
Orphan Containers
Installed Allocated
This view shows all the machines where the Aneka Daemon has been installed.
The machines with the blue screen identify an active Aneka Daemon, while machines with a black screen identify nodes there the Aneka Daemon service has been stopped.
Aneka Analytics
Resource Utilization
Storage Utilization
Billing
Accounting
Clear Data
Utilization Storage Billing Accounting
Utilization Period:
From:
05/10/2024 12:23 PM
To:
05/14/2024 12:23 PM
Apply
Show Utilization By:
Time
User
Application
Show Only External
Storage Utilization
Gigabytes
100
50
0
14:00
16:00
18:00
20:00
22:00
Time
Summary Details
Summary
Data Transferred:
Transfer Rate for Period:
Number of Files:
Peak Application:
Peak Application Bandwidth:
Peak Application Owner:
Peak User:
Peak User Bandwidth:
Done.
Aneka.5.0\Runtime\Da...
36°C
Smoke
Search
ENG
IN
12:24
15-05-2024