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Internal Assessment Test 2– Dec 2021

Sub:	Cloud Computing and its Applications				Sub Code:	15CS742/ 17CS742	Branch :	CSE		
Date:	21/12/2021	Duration:	90 mins	Max Marks:	50	Sem / Sec:	7D	OBE		
<u>Answer any FIVE FULL Questions</u>								MARKS	CO	RB T
1	Explain the three types of services that are hosted inside the Aneka Container Diagram-1M 3 Services 3M Each					[10]		CO2	L4	
2	Demonstrate the Overview of Aneka Framework Framework- 5M Explanation-5M					[10]		CO1	L3	
3	Differentiate Aneka threads with Local threads 5 Differences- 2M Each					[10]		CO2	L2	
4	Distinguish between Domain and Functional Decomposition techniques with illustrative example Domain- 3M Functional-3M Examples- 2M Each					[10]		CO2	L2	
5	Describe MPI program structure with a neat diagram Structure-4M Explanation-4M Diagram of MPI-2M					[10]		CO2	L1	
6	Describe the two workflow technologies for designing and executing workflow based applications 5M each for two technologies					[10]		CO2	L1	

Solutions

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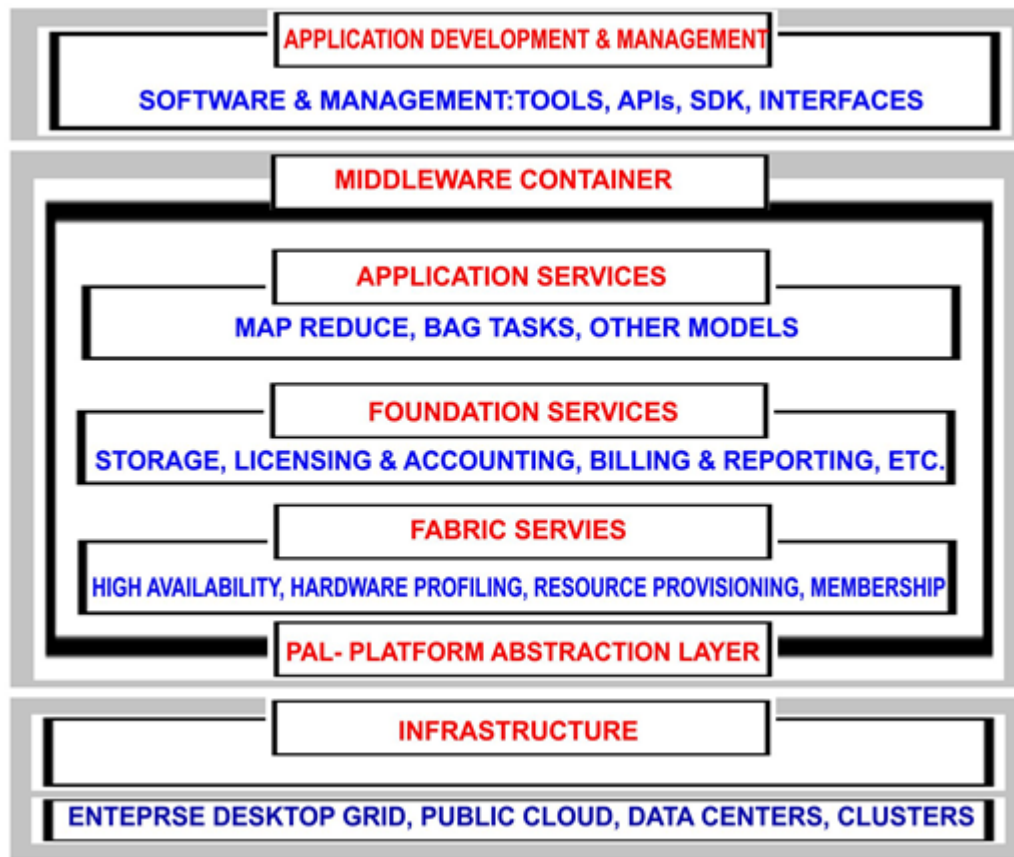
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Answer any FIVE FULL Questions

		MARKS	CO	RB T
1	<p>Explain the three types of services that are hosted inside the Aneka Container</p> <ol style="list-style-type: none"> 1. Fabric Services 2. Foundation Services 3. Application Services <p>1. Fabric services: Fabric Services define the lowest level of the software stack representing the Aneka Container. They provide access to the resource-provisioning subsystem and to the monitoring facilities implemented in Aneka.</p> <p>2. Foundation services: Fabric Services are fundamental services of the Aneka Cloud and define the basic infrastructure management features of the system. Foundation Services are related to the logical management of the distributed system built on top of the infrastructure and provide supporting services for the execution of distributed applications.</p> <p>3. Application services: Application Services manage the execution of applications and constitute a layer that differentiates according to the specific programming model used for developing distributed applications on top of Aneka.</p>	[10]	CO2	L4
2	<p>Demonstrate the Overview of Aneka Framework</p> <ul style="list-style-type: none"> ▶ Services operate at container level ▶ Except for platform abstraction layer <ul style="list-style-type: none"> ▶ they provide developers, users, and administrators with all features offered by the framework ▶ Services also constitute the extension and customization point of Aneka Clouds 	[10]	CO1	L3

- ▶ Infrastructure allows for integration
- ▶ The framework includes the basic services for **infrastructure and node management**, **application execution**, **accounting** and **system monitoring**



- 3 Differentiate Aneka threads with Local threads
- Interface Compatibility
 - Thread Life Cycle
 - Type Serialization
 - Aneka Thread vs. Common Thread
 - Thread Priorities
 - Thread Synchronization

[10] CO2 L2

Aneka thread

- Aneka offers the capability of implementing multi-threaded applications over the Cloud by means of Thread Programming Model.
- This model introduces the abstraction of distributed thread, also called Aneka thread, which mimics the behavior of local threads but executes over a distributed infrastructure.

Local thread.

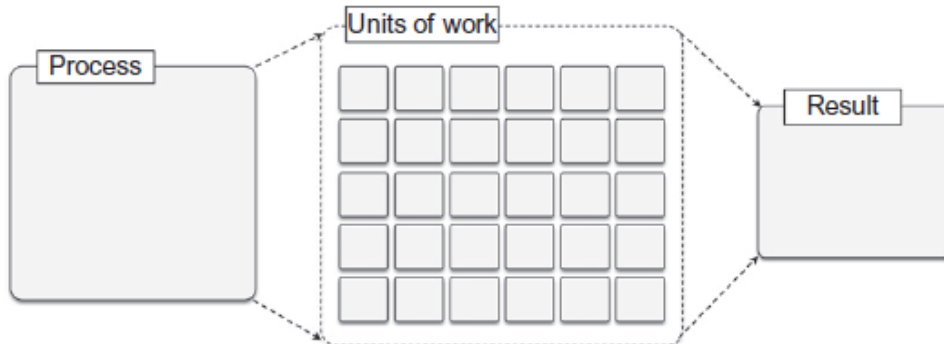
- In computer science, a thread of execution is the smallest sequence of programmed instructions that can be managed independently by a scheduler, which is typically a part of the operating system.

- The implementation of threads and processes differs between operating systems, but in most cases a thread is a component of a process.
- Multiple threads can exist within one process, executing concurrently and sharing resources such as memory, while different processes do not share these resources.
- In particular, the threads of a process share its executable code and the values of its dynamically allocated variables and non-thread-local global variables at any given time.

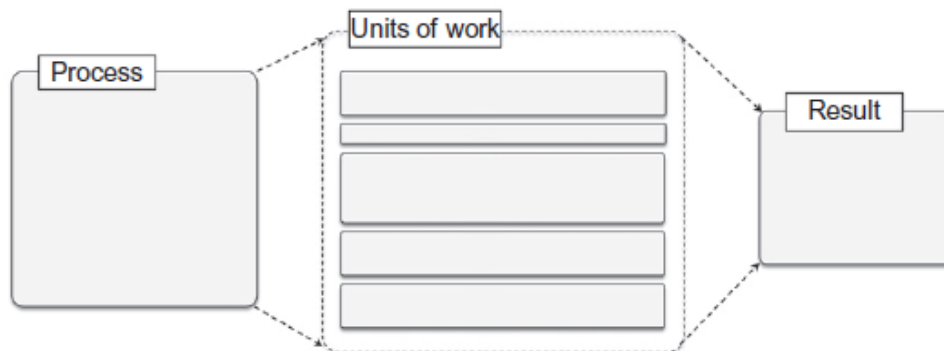
4 Distinguish between Domain and Functional Decomposition techniques with illustrative example

[10]

CO2 L2

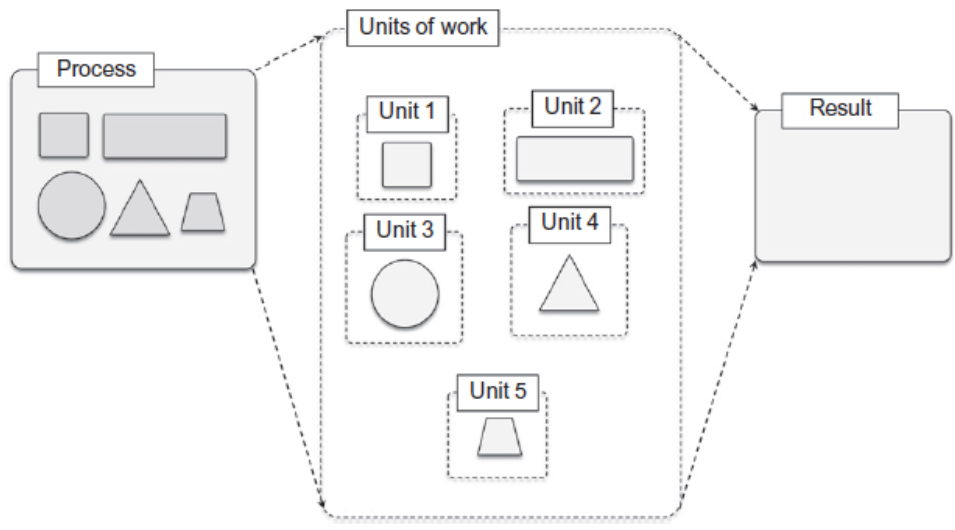


a. Embarrassingly parallel



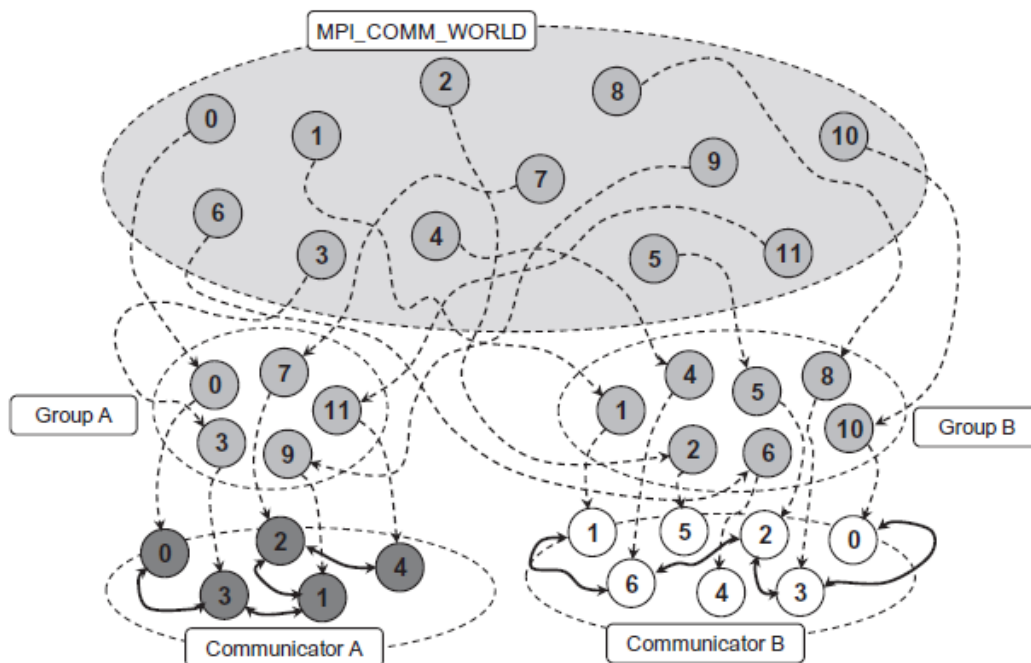
b. Inherently sequential

- ▶ Matrix multiplication using multiple threads.
- ▶ Obtained as a result of linear transformation of the original matrices.
- ▶ The **number of columns in the first matrix** must match the **number of rows in the second matrix**.
- ▶ Computation is embarrassingly parallel
- ▶ The inner computation can be done in parallel using threads.
- ▶ <https://www.javaprogramto.com/2020/01/java-matrix-multiplication-threads.html>



sine, cosine, and tangent functions are performed in 3 separate threads and the results are put together.

- ▶ a function pointer is passed to each thread so that it can update the **final result** at the end of the computation.
- ▶ **Lock** ensures that a critical section can be accessed by one thread at a time and guarantees that the final result is updated.
- ▶ <http://manigandan2693.blogspot.com/2014/10/p-sinx-cosy-tanz-java-program.html>



Message Passing Interface(MPI) is a specification for developing parallel programs that communicate by exchanging messages.

- ▶ Compared to earlier models, MPI introduces the constraint of communication that involves MPI tasks that need to run at the same time.
- ▶ MPI has originated as an attempt to create common ground from the several distributed shared memory and message-passing infrastructures available for distributed computing.
- ▶ MPI provides developers with a set of routines that:
 - ▶ Manage the distributed environment where MPI programs are executed
 - ▶ Provide facilities for point-to-point communication
 - ▶ Provide facilities for group communication
 - ▶ Provide support for data structure definition and memory allocation
 - ▶ Provide basic support for synchronization with blocking calls

MPI applications that share the same MPI runtime are by default as part of a global group called MPI_COMM_WORLD

Within this group, all the distributed processes have a unique identifier that allows the MPI runtime to localize and address them

It is possible to create specific groups as sub- sets of this global group—for example, for isolating all the MPI processes that belong to the same application

Each MPI process is assigned a rank within the group to which it belongs. The rank is a unique identifier that allows processes to communicate with each other

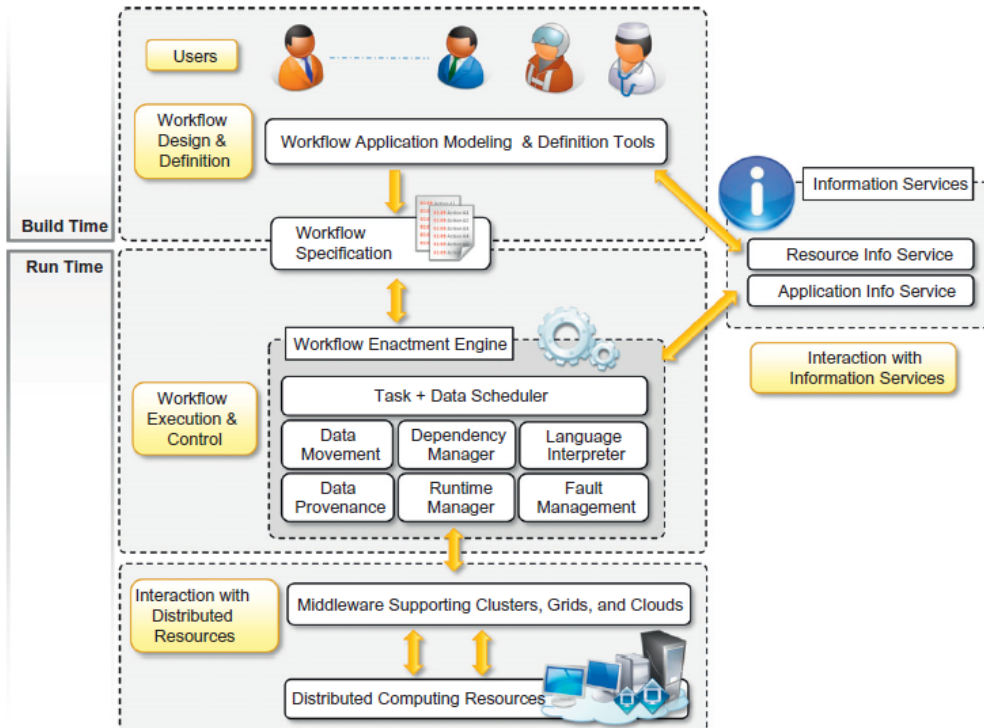
within a group.

To create an MPI application it is necessary to define the code for the MPI process that will be executed in parallel

6 Describe the two workflow technologies for designing and executing workflow based applications

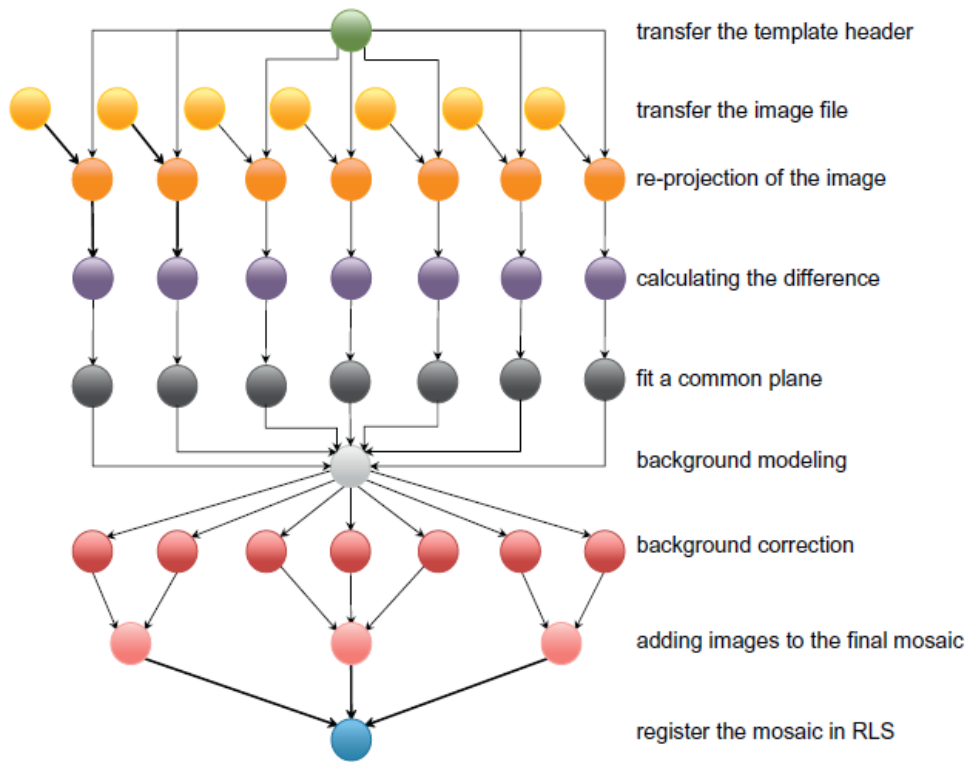
[10]

CO2 L1



design tools allow users to visually compose a workflow application

- ▶ normally stored in the form of an XML document
- ▶ controls the execution of the workflow by leveraging a distributed infrastructure
- ▶ Some frameworks can natively support the execution of workflow applications



An automation of a business process, in whole or in part, during which, documents, information, or tasks are passed from one participant (a resource, human or machine) to another for action, according to a set of procedural rules.

- ▶ DAG(Directed Acyclic Graph)

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