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TUTORIAL 7

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1.) Analyse all three methods for address space transfer mechanism.

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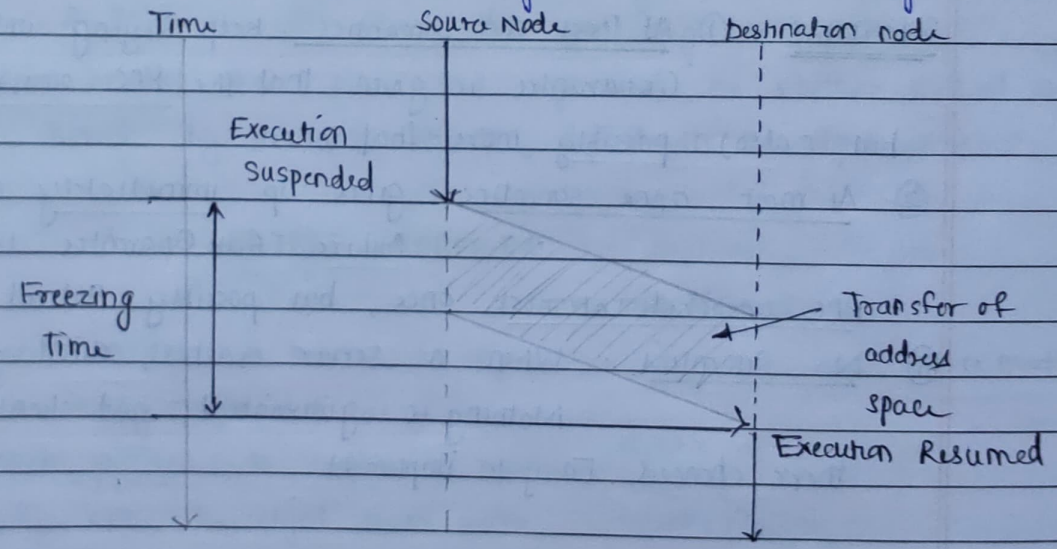
The three methods for address space transfer are -

(i) Total Freezing - ① Here, a process's execution is stopped while its address is being transferred.

② This method is used in DEMOS/MP, sprite and LOCUS and is simple and easy to implement

③ It's main disadvantage is that if a process is suspended for a long time during migration, timeouts may occur, and if process is interactive, the delay will be noticed by user.

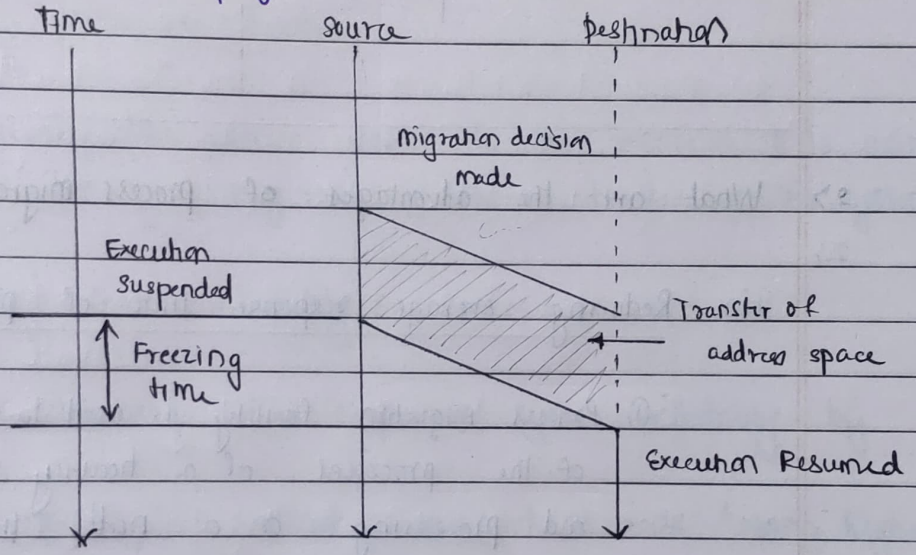


(ii) Pre Transferring - ① Here, the address space is transferred while the process is still running on the source node.

② Thus, once the decision has been made to migrate a process it continues to run on its source node until its address space has been transferred to the destination node.

③ Initial Transfer of the complete address space is followed by repeated transfers of all pages modified during previous transfer.

④ Remaining modified pages are retransferred after the process is frozen for transferring its state information. This type of operation is executed at a higher priority than all other programs on source node.



(iii) Transfer on Refrenca

① This method is based on assumption that processes tend to use only a relatively small part of their address space while executing.

② Here, the process address space is left behind on its source node, and the relocated process executes on its destination node, attempts to reference memory pages results in generation of requests to copy in the desired blocks from their remote locations

③ It is a demand driven copy-on-refrenca approach. Here, switching time is very short and independent of the size of address space.

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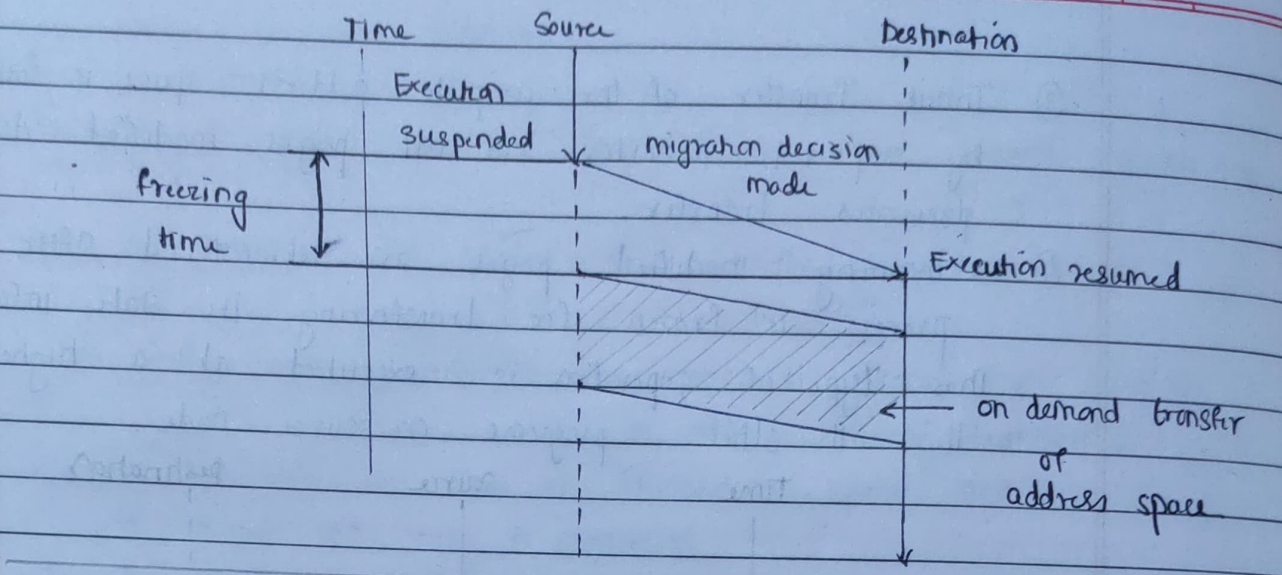

2.) What are the advantages of process migration?

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(i) Reducing average response time of processes

① Process migration facility is used to reduce avg. response time of the processes of a heavily loaded node by migrating and processing on a node that is idle or processing capacity is underutilized.

(ii) Speeding up individual jobs

① Done by migration of the tasks of a job to different nodes of the system and execute them concurrently or migrate to a node having faster CPU.

(iii) Gaining higher throughput

① In a system having process migration facility, the capabilities of the CPU's of all nodes can be better utilized by using a suitable load balancing policy.

(iv) Utilizing resources effectively

① Process migration facilitates the use of software and hardware resources by a process of any node because the process can be migrated to the resource location for its successful execution.

(v) Reducing Network traffic

① Migrating a process closer to the resources it is using most heavily may reduce network traffic in the system.

(vi) Improving system reliability

PM. may be used to improves system reliability by

- ✓ migrating a critical process to a node having higher reliability
- ✓ migrating a copy of critical process to another node and executing original & copy concurrently.
- ✓ process may be migrated to another for a node which may be going into manual shutdown.

(vii) Improving system security

① Sensitive process may be migrated on a secure node inaccessibly by general user.

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3.) What are the desirable features of a good process migration mechanism?

(i) Transparency - ① desired for transparent redirection of messages during the transient state of a process that recently migrated.
② Has two levels (i) object access level (ii) system call & inter process comm. level.

(ii) Minimal Interference - ① can be achieved by minimizing the freezing time of the process being migrated.

(iii) Minimal residual dependies - ① migrated process should not continue to depend on its previous node after executing on ~~th~~ new node.

(iv) Efficiency - cost of locating an object, cost of supporting remote execution once process is migrated, and time required for migrating a process should be kept to a minimum.

(v) Robustness - ① Failure of a node other than the one on which a process is running should not affect the accessibility / execution of that process.

(vi) communication between coprocesses of a Job -

① Parallel processing among the processes of a single job distributed over several nodes.

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4.) What are the different steps involved in process migration?

4.) P.M. involved proper handling of several sub-~~division~~ activities to meet the good process migration mechanism requirements

Four major sub-activities involved are -

(i) Freezing the process on its source node and restarting it on its destination node.

(ii) Transfer of processes addresses space from source to destination node.

(iii) Forwarding messages intended for the migrant process.

(iv) Handling communication between Cooperating processes that have been seperated (placed on different nodes) as a result of Process Migration.

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