Cloud Computing

SEWP ZG527

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Virtual Machine Migration Services

Migration service -

The process of moving a virtual machine from one host server or storage location to another;

There are different techniques of VM migration-

- Hot/live migration,

- Cold/regular migration, and

- Live storage migration of a virtual machine.

In this process, all key machines' components, such as CPU, storage disks, networking, and memory, are completely virtualized, thereby facilitating the entire state of a virtual machine to be captured by a set of easily moved data files.

Cold/regular migration

Cold migration is the migration of a powered-off virtual machine and is done in the following tasks:

- If the option to move to a different datastore was chosen, the configuration files, including the NVRAM file (BIOS settings), and log files are moved from the source host to the destination host's associated storage area. If you chose to move the virtual machine's disks, these are also moved.

- The virtual machine is registered with the new host.

- After the migration is completed, the old version of the virtual machine is deleted from the source host if the option to move to a different datastore was chosen.

Live Migration Technique

Pre-assumption :

– We assume that all storage resources are separated from computing resources.

– Storage devices of VMs are attached from network :

- **_NAS_**: NFS, CIFS
- **_SAN_**: Fibre Channel
- **_iSCSI_**, network block device
- **_drdb_** network RAID

– Require high quality network connection

- Common L2 network (LAN)
- L3 re-routing
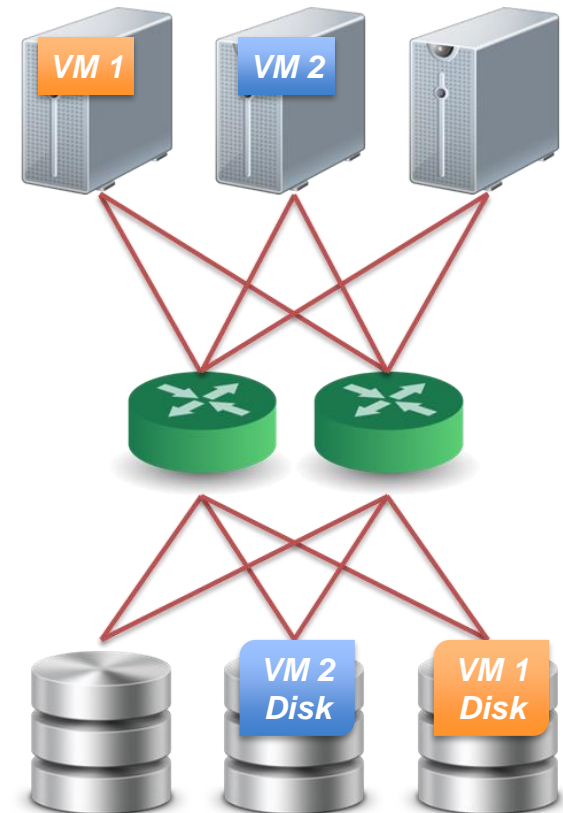
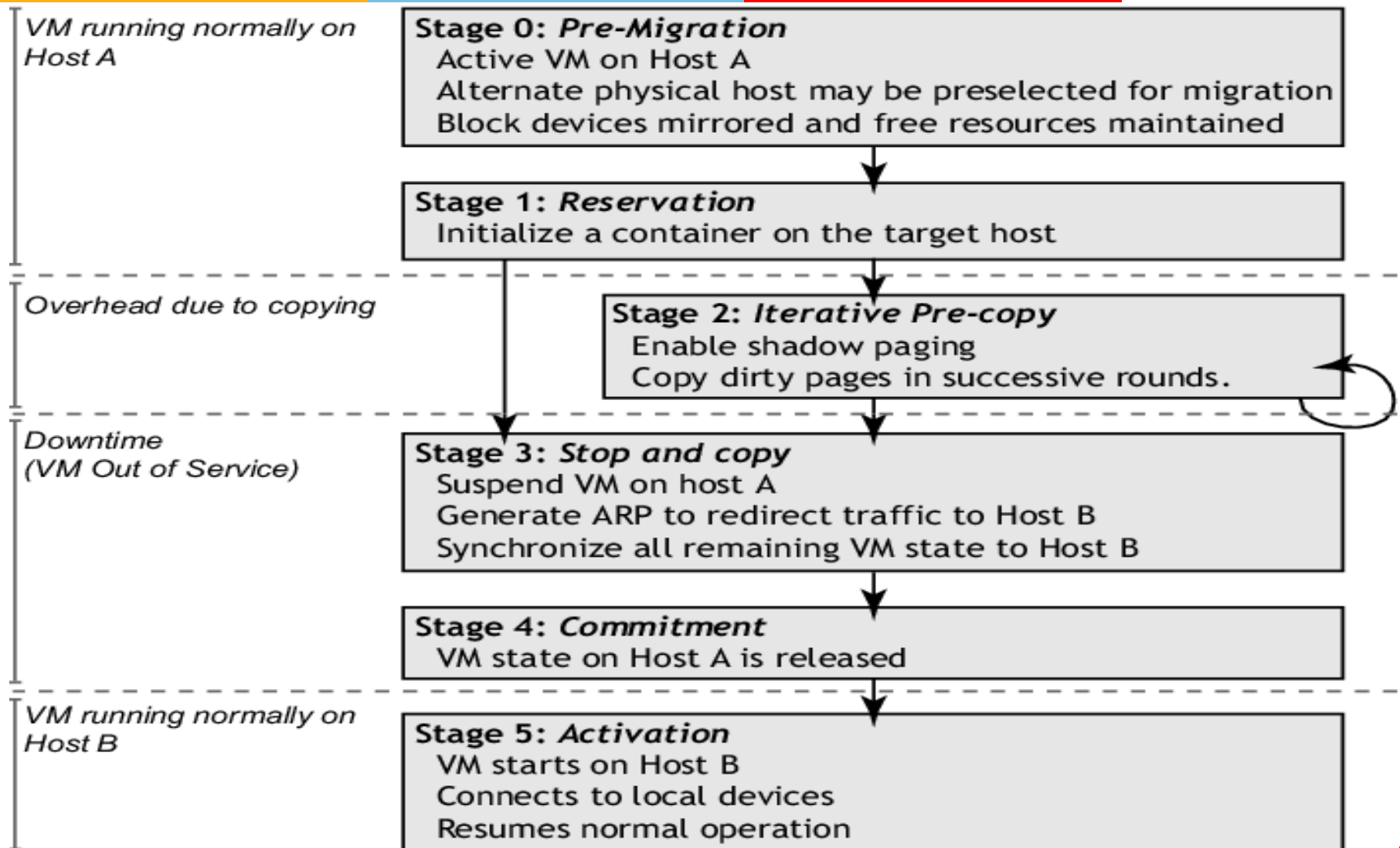# Live Migration Technique

Challenges of live migration :

– VMs have lots of state in memory

– Some VMs have soft real-time
  requirements :

- For examples, web servers,
  databases and game servers, …etc.

- Need to minimize down-time

Relocation strategy :

1. Pre-migration process
2. Reservation process
3. Iterative pre-copy
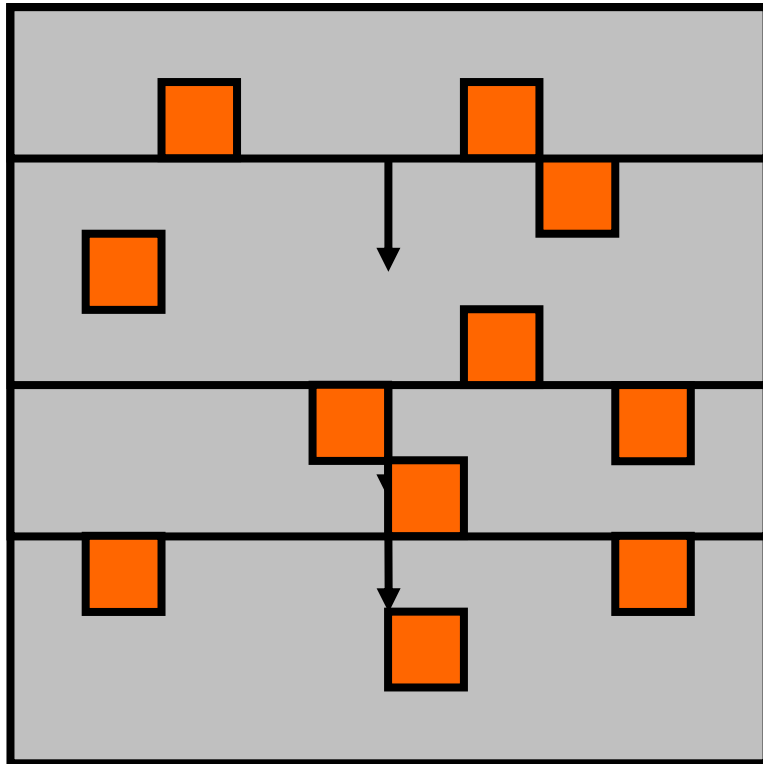4. Stop and copy
5. Commitment

Live Migration Technique

VM running normally on Host A	**Stage 0: *Pre-Migration*** Active VM on Host A Alternate physical host may be preselected for migration Block devices mirrored and free resources maintained
	Stage 1: *Reservation* Initialize a container on the target host
Overhead due to copying	**Stage 2: *Iterative Pre-copy*** Enable shadow paging Copy dirty pages in successive rounds.
Downtime (VM Out of Service)	**Stage 3: *Stop and copy*** Suspend VM on host A Generate ARP to redirect traffic to Host B Synchronize all remaining VM state to Host B
	Stage 4: *Commitment* VM state on Host A is released
VM running normally on Host B	**Stage 5: *Activation*** VM starts on Host B Connects to local devices Resumes normal operation

Live Migration Technique

Live migration process :

Pre-copy migration : Round 1, Enable Shadow Paging
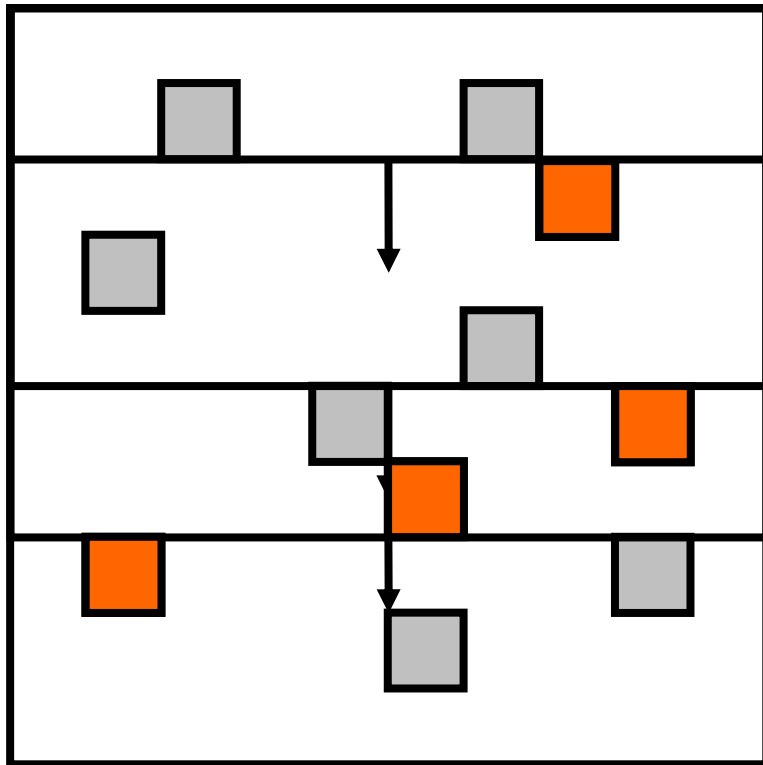

Host A   Host B
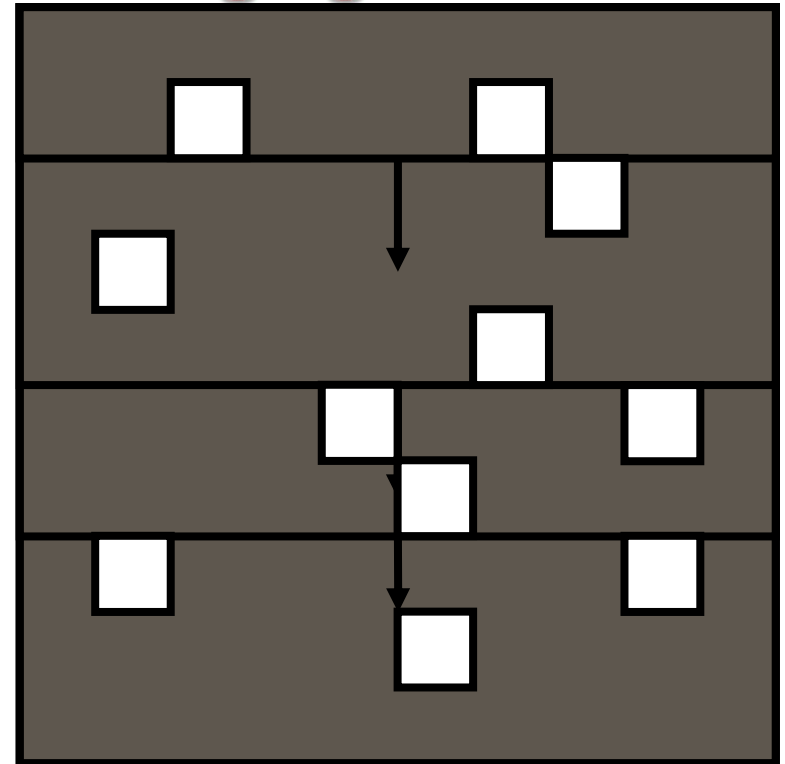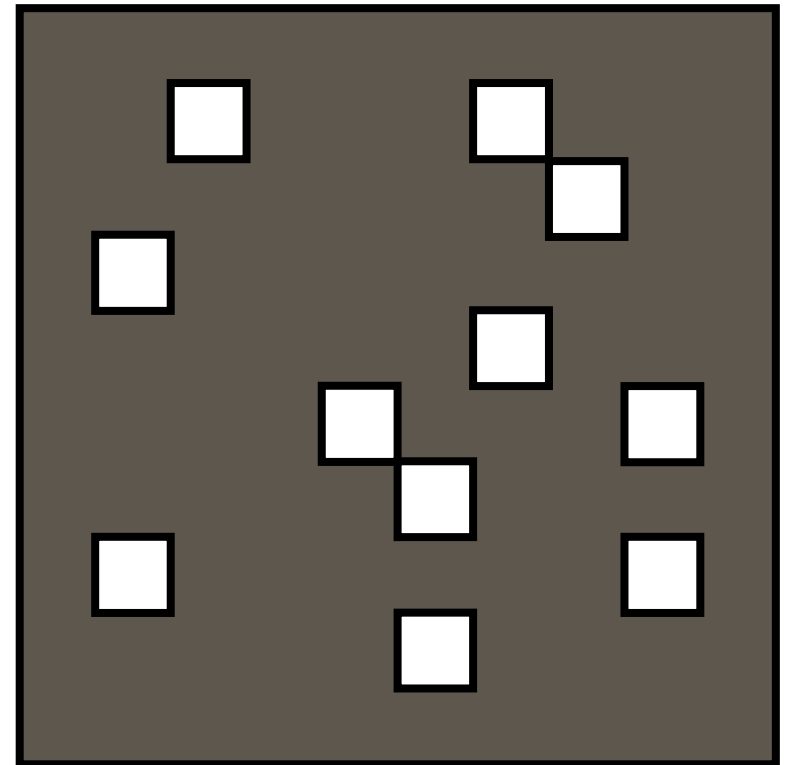
Live Migration Technique

Live migration process :

Pre-copy migration : Round 2

Host A   *Host B*

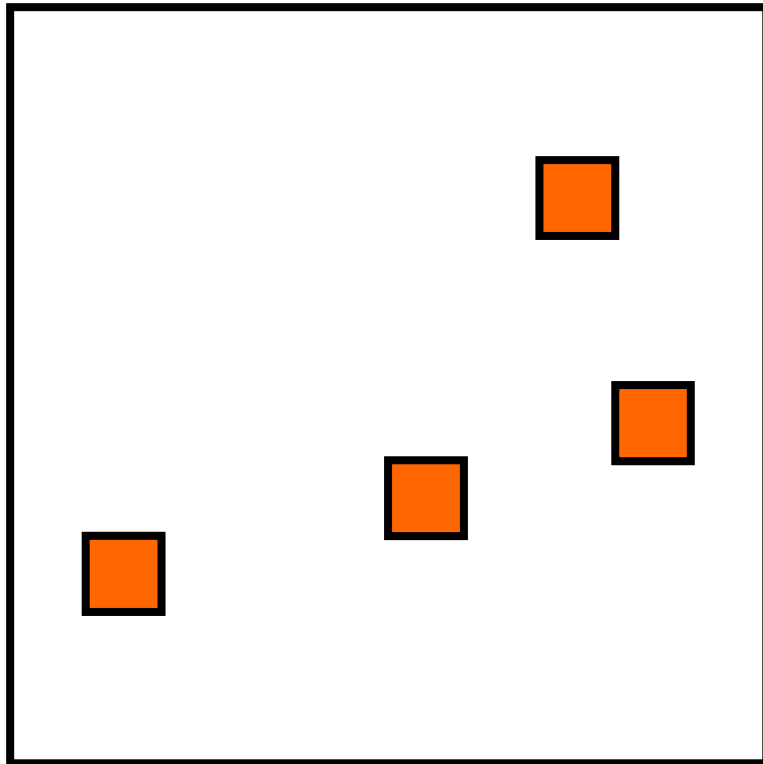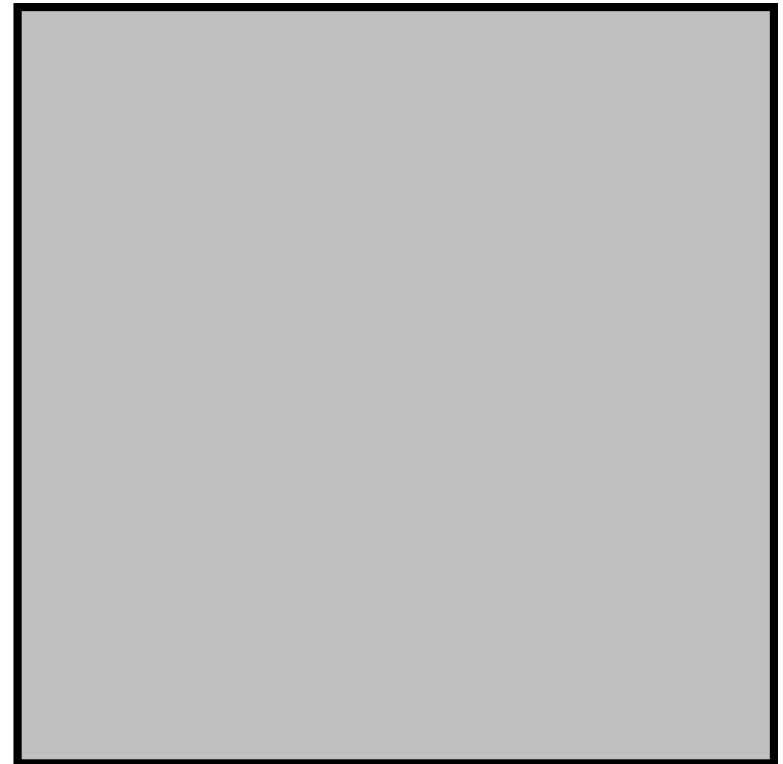# Live Migration Technique

Live migration process :

Stop and copy : Final Round

Host A   *Host B*

Live Migration Demo

- Using Proxmox deployment tool