

APPLIES TO:

MEMORY MANAGEMENT

SUMMARY

This article explains how to Perform the MEMORY MANAGEMENT..

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MEMORY

- Memory is assigned to the work process to roll in the user context into task handler.
- Depending up on the user request the memory is allocated to the process ID up to a max of 2GB to 4GB. The OS command “**memlimits**” specifies the maximum amount of memory a process can be allocated.

Physical Memory:

The memory that is available (installed) on the system. If more than one instance is installed on the same machine then the parameter **PHYS_MEMSIZE** determines the amount of memory that can be used by the instance.

Virtual memory:

The physical memory is not sufficient to handle the memory requirement of the SAP instance. So it is recommended to configure virtual memory (SWAP/PAGE) on the disk. It is around three times the size of physical memory on 32bit machines. And minimum 20GB is required for 64 bit machines.

32/64 bit Machines:

32 bit systems were once desired because they could address up to 4GB of memory in one go. Some modern applications require more than 4GB of memory to complete their tasks so 64bit systems are now becoming more attractive because they can potentially provide more than 4GB of memory to complete the task.

- More bits means that data can be processed in large chunks, which also means more accurately.
- More bits means other system can point to or address a large number of locations in physical memory and with faster speed.

Extended Memory:

The memory that is exclusively used by the SAP R3 work process is referred as extended memory.

Roll Memory / Local Memory:

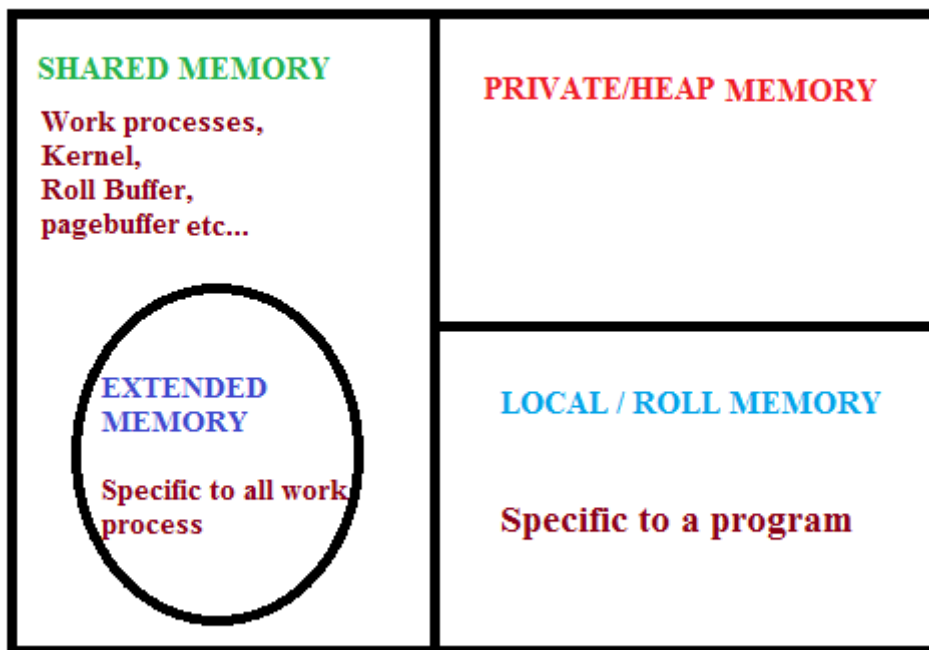
The memory that is extensively dedicated to a work process user context referred as roll memory.

Shared Memory:

The memory that is used by the entire instance for R3 work processes, buffers and kernel etc...

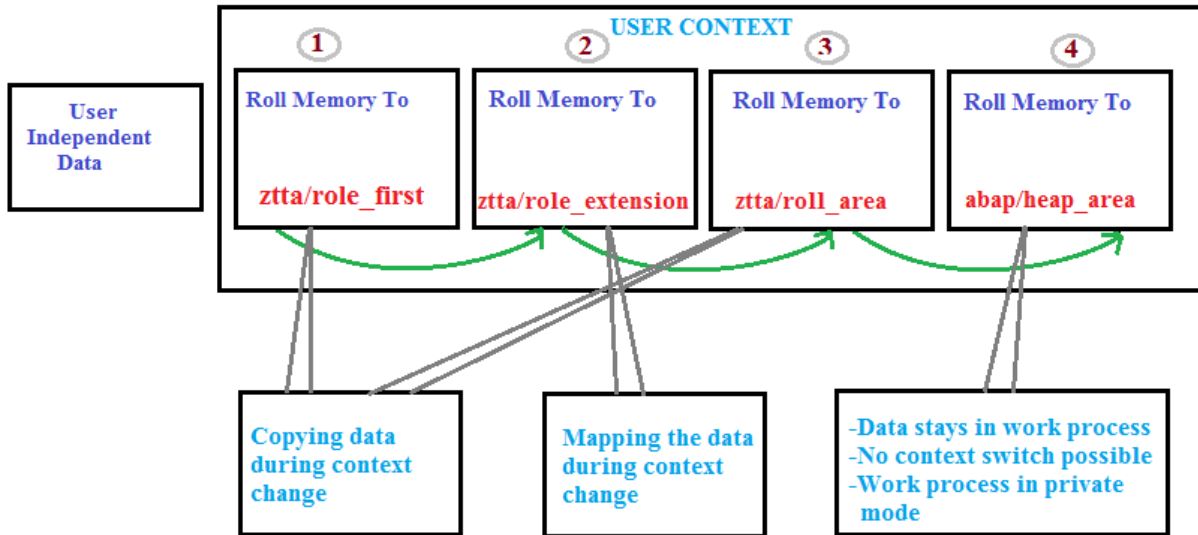
Heap Memory:

If the extended memory is fully occupied, or the limit for the work processes has been exceeded, the work process allocates heap memory because it is specific to the process.



Memory allocation to dialog process:

Sequence in which memory allocated (dialog process):



Memory allocation sequence to dialog work process in SAP:

1. Initially a dialog roll area is used. The roll area is defined by the sap parameter **ztta/roll_area**. The part of the roll area which is defined by parameter **Ztta/roll_first = 20kb** is used initially before start using extended memory.
2. Extended memory is used until the extended memory is full or until the user quota is reached. Extended memory is defined by the parameter **em/initial_size_mb**, and the user quota for dialog work process is defined by the parameter **ztta/roll_extension_dia**.
3. If this memory also not sufficient then, the rest of the roll area is used .This rest of the memory area is configured by using the difference between **ztta/roll_area - ztta/roll_first**.
4. Once this is also fully occupied then, the statement is forced to use local heap memory (Private memory) which is configured by parameter **“abap/heap_area_dia”** and the work process goes into private mode. Heap (local/private) memory is available until one of the following occurs.

- Either the limit of the heap memory for dialog work process is reached (**abap/heap_area_dia**) or the entire heap memory of all work processes (**abap/heap_area_total**) for an application server reaches its limit.
- OS limit for allocation of memory.
- The SWAP space in the host system is used up or the upper limit of the OS address Space is reached.
- The task is completed or the process is timed out by parameter **rdisp/max_priv_time = 60sec**. The work process cannot be terminated by the parameter **rdisp/max_wprun_time** when a work process enters private mode, it remains connected to the user until the user ends the transaction or it is timed out by the system due to memory or explicitly logged out the user using **SM04 / DPMON/ SM50**.

User complains that they could not access the system (globally), users are encountering hour glass mode and transactions SM50/SM66/SM21/SM04 are not accessible.

- Check the system status using **dpmon/sapmmc**.
- Identify the process that has been in logged for longer time.
- Kill the process (if dpmon could not kill) then use “**task handler**” on windows or “**kill**” command in UNIX.
- Restrict the process that goes into work process private mode by using parameter **rdisp/wppriv_max_no = 1 or 2**. And set the parameter **rdisp/max_priv_time = 60sec** to terminate the processes that are in private mode for longer than 60 sec.

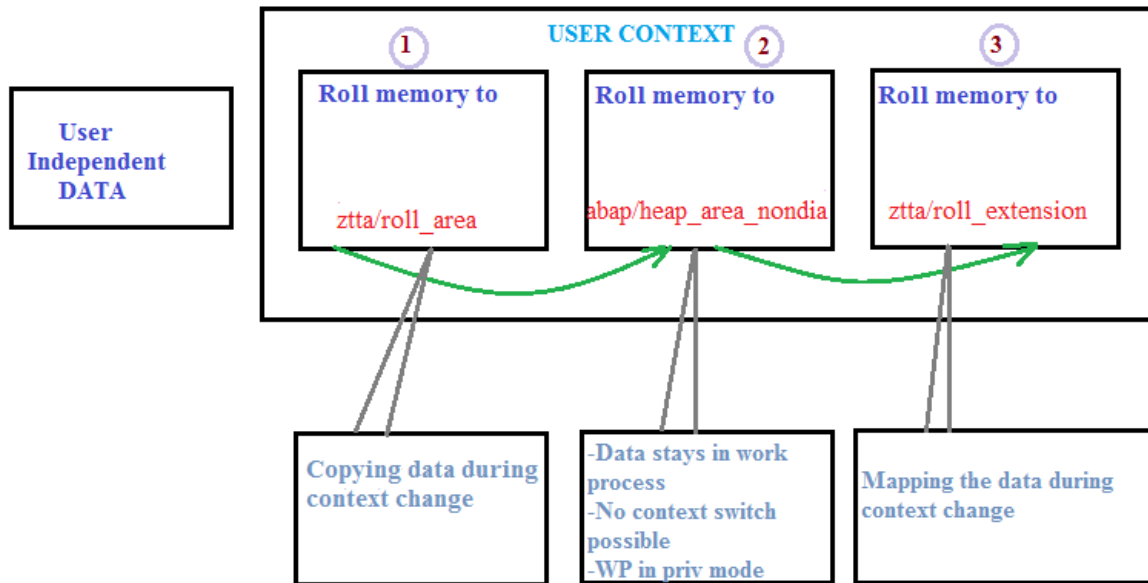
Monitoring Memory:

- Execute **ST02** for roll, extended and heap memory usage. (Instance specific run time Memory).
- Execute **SM04** for identifying the memory usage by user sessions (Instance specific).
- Execute **ST03N** to identify the memory used by program/transactions/btc/user jobs.

- Execute **SM66** to identify runtime memory consumed by process.
- Execute **ST06** to identify the physical & virtual (SWAP) memory configured on the system (Instance specific).
- Execute **ST07** to identify DB memory consumed based on modules.
- Execute task manager to identify the memory used by the process and application.
- Execute **“TOP”** command in Linux, identify memory used by the processes.
- If memory is not released then use command **“ipcrm”** or use **“cleanipc”** to release the Memory blocked at OS level.

Memory allocation to btc (non-dia) process:

Sequence in which memory allocated (non dialog process):



- Initially a defined roll area is used. This roll area is defined by SAP parameter Ztta/roll_area. The complete roll area which is defined by parameter ztta/roll_area = 6MB is used initially before start using heap memory.

→Heap memory is defined by parameter abap/heap_area_nondia. If it is not sufficient then it uses extended memory.

→Extended memory is defined by parameter ztta/role_extention_nondia.

The factors that affect the memory on the system are:

→Program errors (Ex: endless loop , expensive sql statements).

→SAP profile parameters are set incorrectly.

→The swap space on the OS is not large enough.

→Configuration parameters of the OS are set incorrectly or OS limits have been reached (Configure OS kernel parameters).

The memory of user context is used up and the following are the errors which are thrown into ABAP dumps.

1. STORAGE_PARAMETERS_WRONG_SET
2. SYSTEM_ROLL_IN_ERROR
3. TSV_TNEW_BLOCKS_NO_ROLL_MEMORY
4. TSV_TNEW_PAGE_ALLOC_FAILED
5. TSV_TNEW_INDEX_NO_ROLL_MEMORY
6. SYSTEM_NO_MORE_PAGING

→**PXA_NO_SHARED_MEMORY:** System cannot create the program buffer, because there is no sufficient shared memory at that time.

→The program encounters a memory bottle neck during an operation in the database interface DBIF_RTAB_NO_MEMORY, DBIF_RSQL_NO_MEMORY.

→The program encounters a memory bottle neck during sorting EXSORT_NOT_ENOUGH_MEMORY.

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