CS 307 - Programming Assignment 4 Report

Kaan Berk Karabıyık 34424

1.initOS:

It sets the metadata,current process is initialized to 0XFFFF to show no process is running right now.

The freepage bitmap marks the first three bits as used and the remaining pages free

2.AllocMem and freeMem:

AllocMem:It allocates memory by searching through bitmap to find the available frame,it calculatess the PFN,mark the bit as used,updates PTE with the PFN and with the protection bits.

FreeMem:Extracts PFN from the table,sets the bit to free

3.createProc and LoadProc:

createProc:Checks OS_status to make sure OS region is not full,calculates the adress for a new PCB and sets PID,PC to default and PTBR.

Code segment is allocated with two pages VPN 6 and VPN 7 and heap segment is VPN 8 and VPN 9 through allocMem.

Ld_img writes the files to the pyhsical adresses got from PFN'S.

If a allocation is failed the allocated memory is freed.

laodProc: helper to context switch by updating current processID and loading PC and PTBR registers from the PCB state

4.MR AND MW

They are modified to perform virtual to pyhsical adress translation.

Translation:

For every access the VPN is extracted and offset.If not the VPN is is in the reserved region a segmentation fault is given.

Protection:

Page table is accessed using PTBR.Valid bit is used for verification,if it is 0 program gives segmentation fault inside free space.Bit 1 and Bit 2 is checked for mw to check if permissions are violated.

5. Trap instructions

Yield(tyld):Saves the current process PCB and PTBR to its PCB,performs a search to find the next active process.I a process is found it calls loadProc to switch context and prints a message.

Halt(thalt):It is responsible for termination of a process.Iteratıng through possible VPNs and calls freeMem to free physical pages.It setsthe PID to 0XFFF.The PC is not updated in the PCB in termination.It then searches for avaible processes,if not found ser running false and stops.

Break(tbrk):From the R0 register it extracts information to determine the targetVPN and what type it is like allocation or deallacation.It checks request is not in OS reserved region.It checks if the page is already valid or in physical memory before calling allocation.Before freeing it checks if the page is allocated.Messages are printed for different situations.