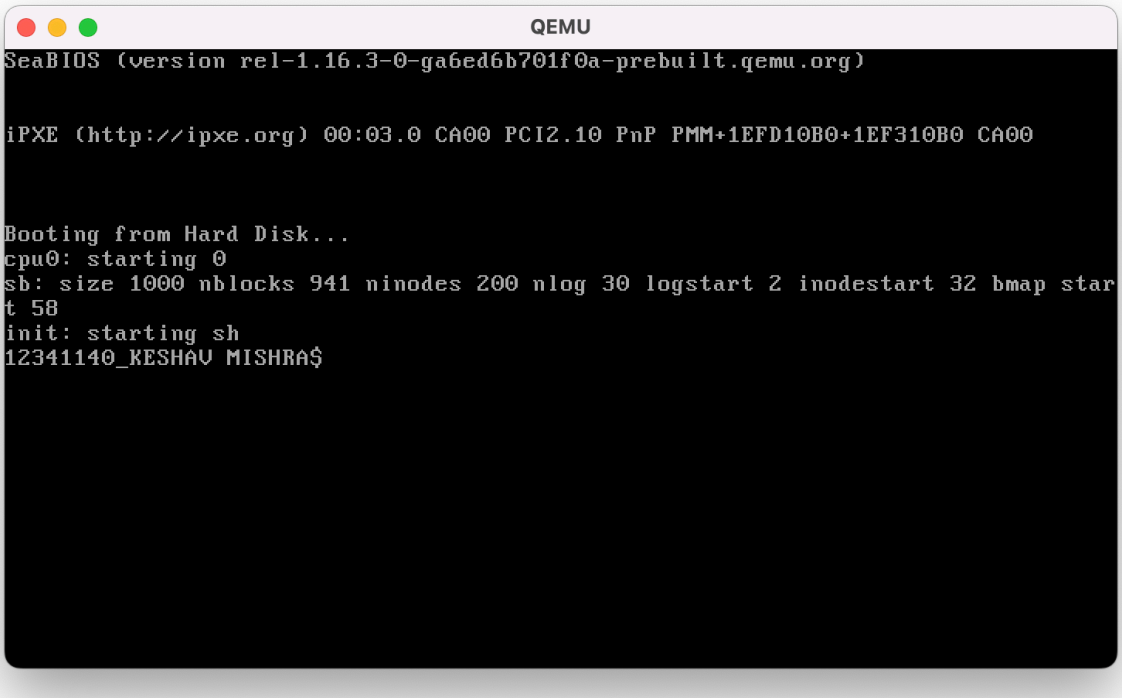
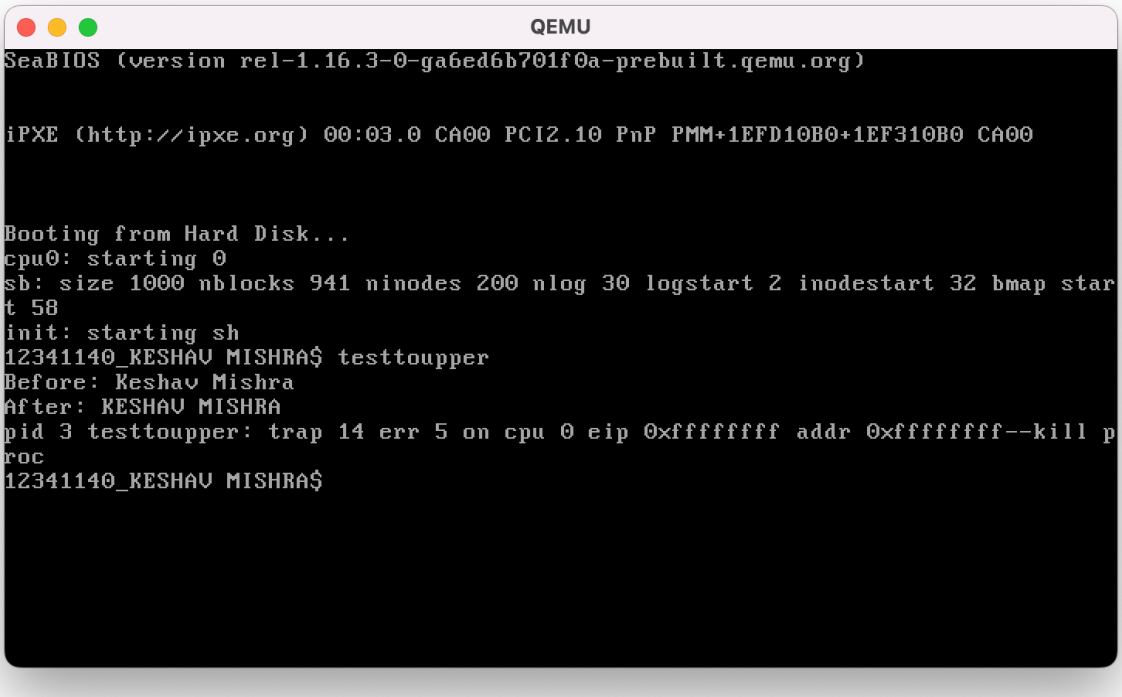
Q1:

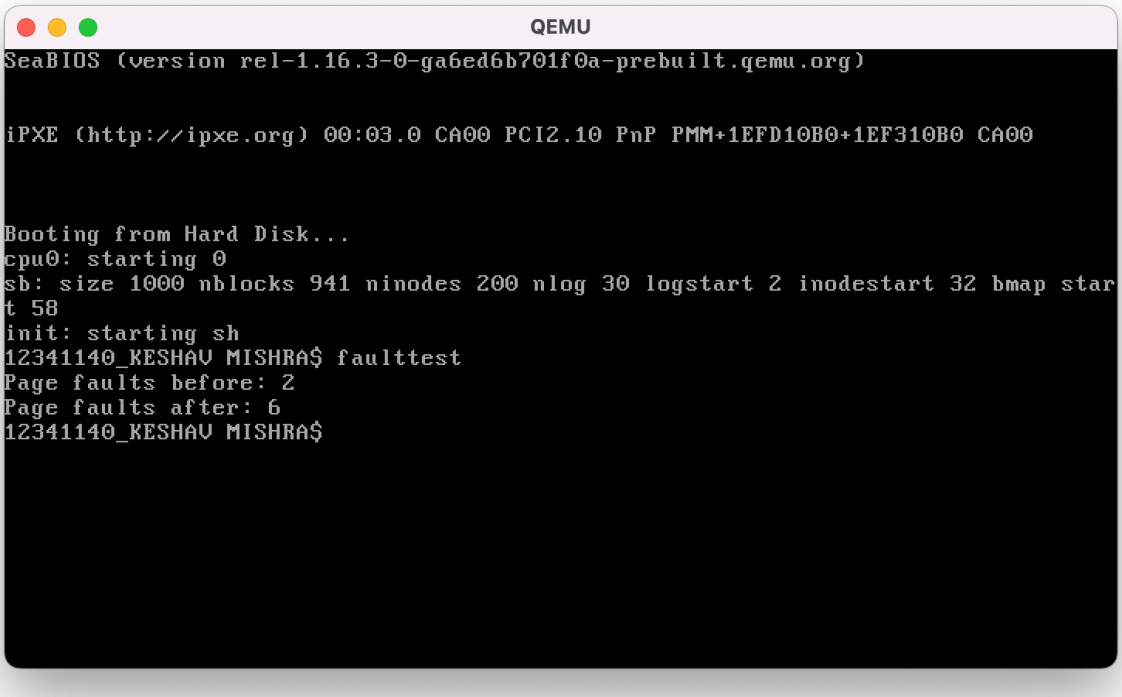

QEMU
SeaBIOS (version rel-1.16.3-0-ga6ed6b701f0a-prebuilt.qemu.org)
iPXE (http://ipxe.org) 00:03.0 CA00 PCI2.10 PnP PMM+1EFD10B0+1EF310B0 CA00
Booting from Hard Disk...
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 bmap start 58
init: starting sh
12341140_KESHAV MISHRA$

Q2:

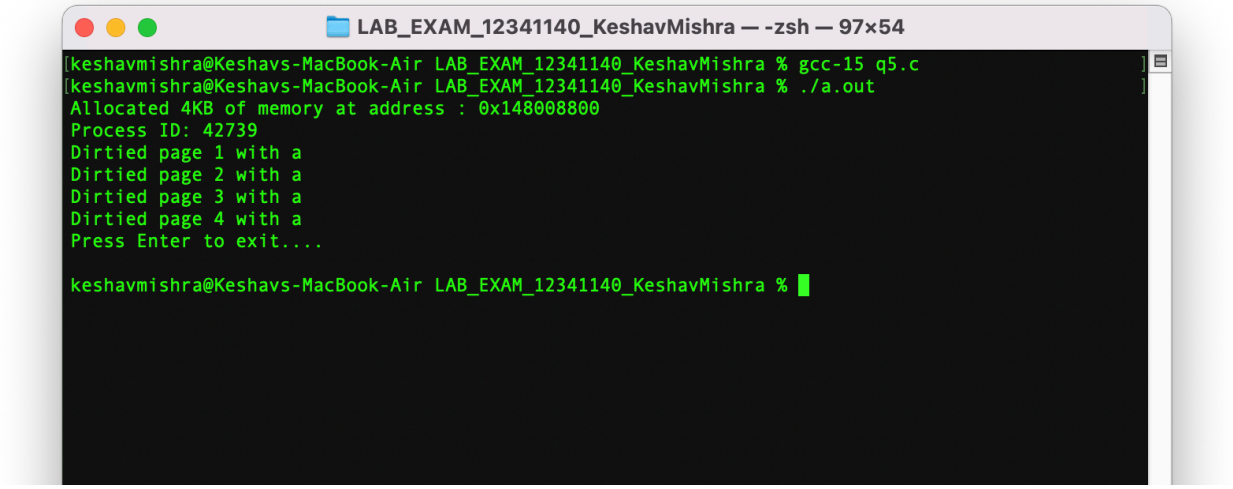

QEMU
SeaBIOS (version rel-1.16.3-0-ga6ed6b701f0a-prebuilt.qemu.org)
iPXE (http://ipxe.org) 00:03.0 CA00 PCI2.10 PnP PMM+1EFD10B0+1EF310B0 CA00
Booting from Hard Disk...
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 bmap start 58
init: starting sh
12341140_KESHAV MISHRA$ testtoupper
Before: Keshav Mishra
After: KESHAV MISHRA
pid 3 testtoupper: trap 14 err 5 on cpu 0 eip 0xffffffff addr 0xffffffff--kill proc
12341140_KESHAV MISHRA$

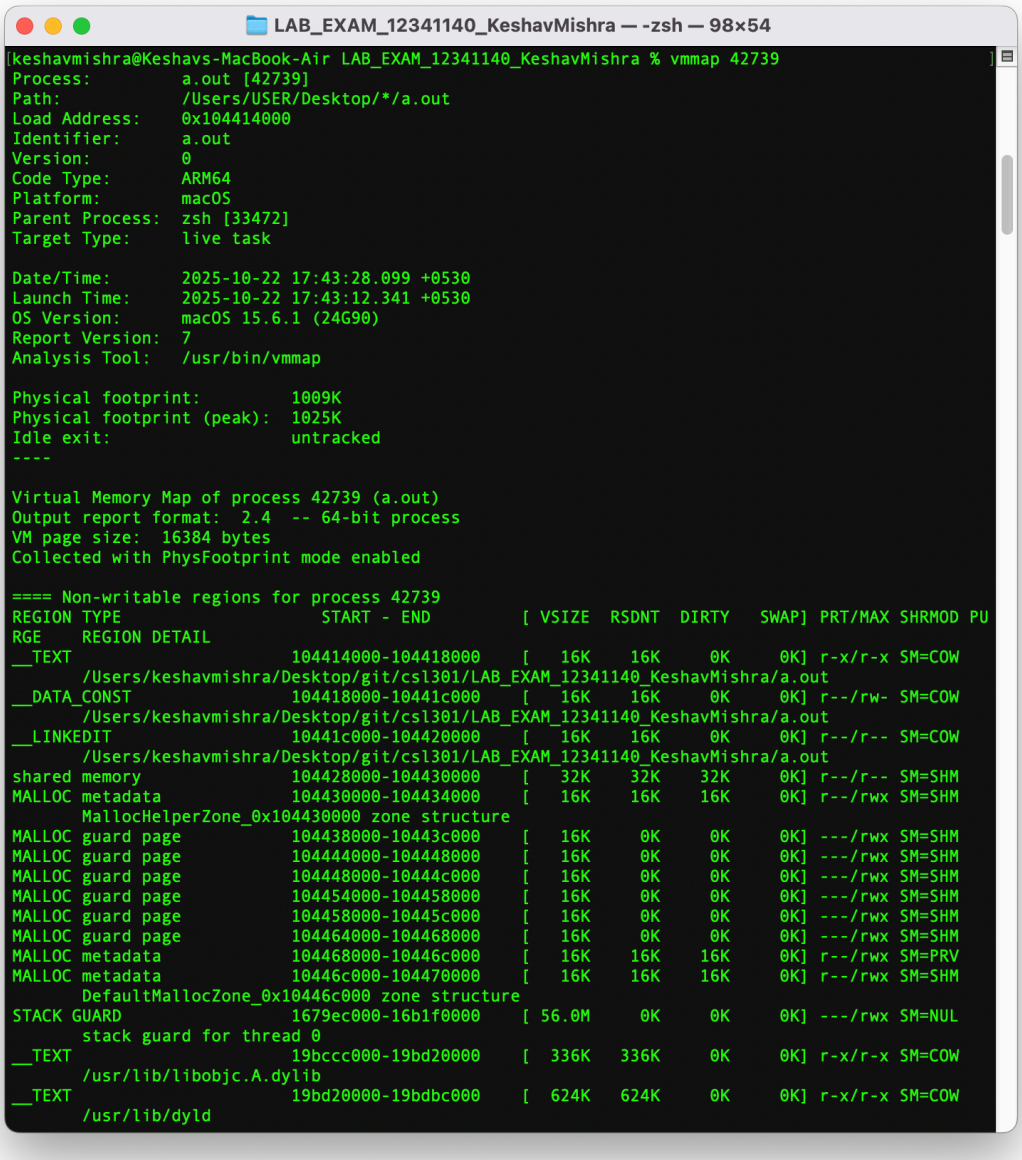
Q3:

Q4:


QEMU
SeaBIOS (version rel-1.16.3-0-ga6ed6b701f0a-prebuilt.qemu.org)
iPXE (http://ipxe.org) 00:03.0 CA00 PCI2.10 PnP PMM+1EFD10B0+1EF310B0 CA00
Booting from Hard Disk...
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 bmap start 58
init: starting sh
12341140_KESHAV MISHRA$ faulttest
Page faults before: 2
Page faults after: 6
12341140_KESHAV MISHRA$

Q5:

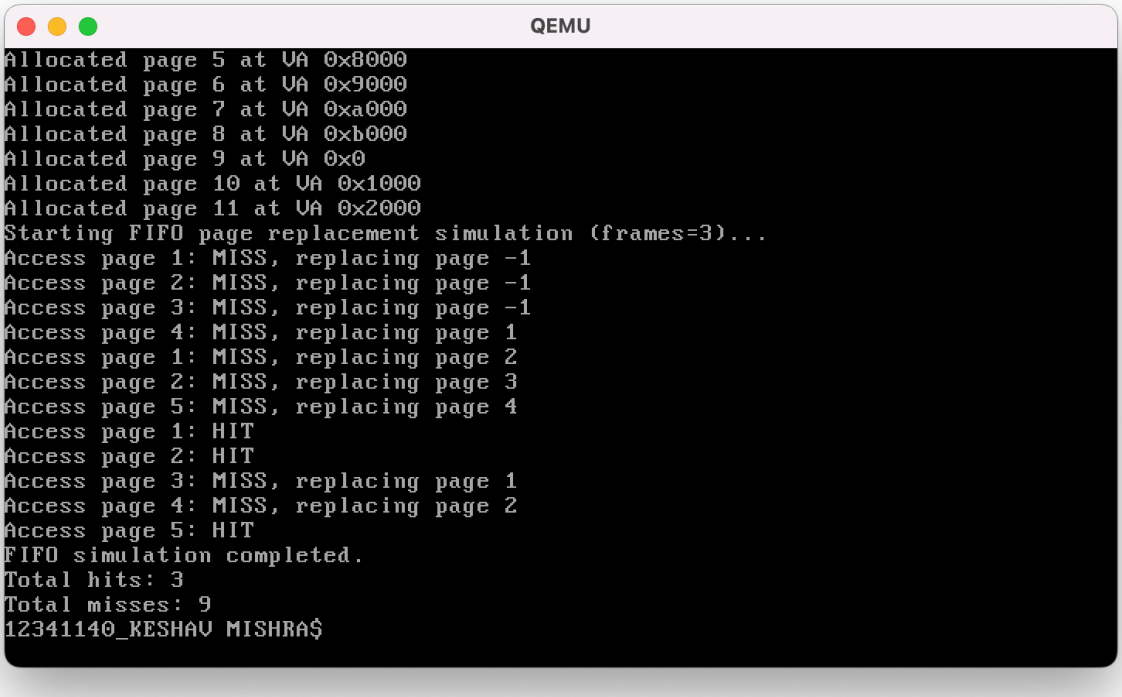

LAB_EXAM_12341140_KeshavMishra — -zsh — 97×54
[keshavmishra@Keshavs-MacBook-Air LAB_EXAM_12341140_KeshavMishra % gcc-15 q5.c
[keshavmishra@Keshavs-MacBook-Air LAB_EXAM_12341140_KeshavMishra % ./a.out
Allocated 4KB of memory at address : 0x148008800
Process ID: 42739
Dirtied page 1 with a
Dirtied page 2 with a
Dirtied page 3 with a
Dirtied page 4 with a
Press Enter to exit....
keshavmishra@Keshavs-MacBook-Air LAB_EXAM_12341140_KeshavMishra %


LAB_EXAM_12341140_KeshavMishra — -zsh — 98×54
[keshavmishra@Keshavs-MacBook-Air LAB_EXAM_12341140_KeshavMishra % vmmap 42739
Process: a.out [42739]
Path: /Users/USER/Desktop/*/a.out
Load Address: 0x104414000
Identifier: a.out
Version: 0
Code Type: ARM64
Platform: macOS
Parent Process: zsh [33472]
Target Type: live task
Date/Time: 2025-10-22 17:43:28.099 +0530
Launch Time: 2025-10-22 17:43:12.341 +0530
OS Version: macOS 15.6.1 (24G90)
Report Version: 7
Analysis Tool: /usr/bin/vmmap
Physical footprint: 1009K
Physical footprint (peak): 1025K
Idle exit: untracked

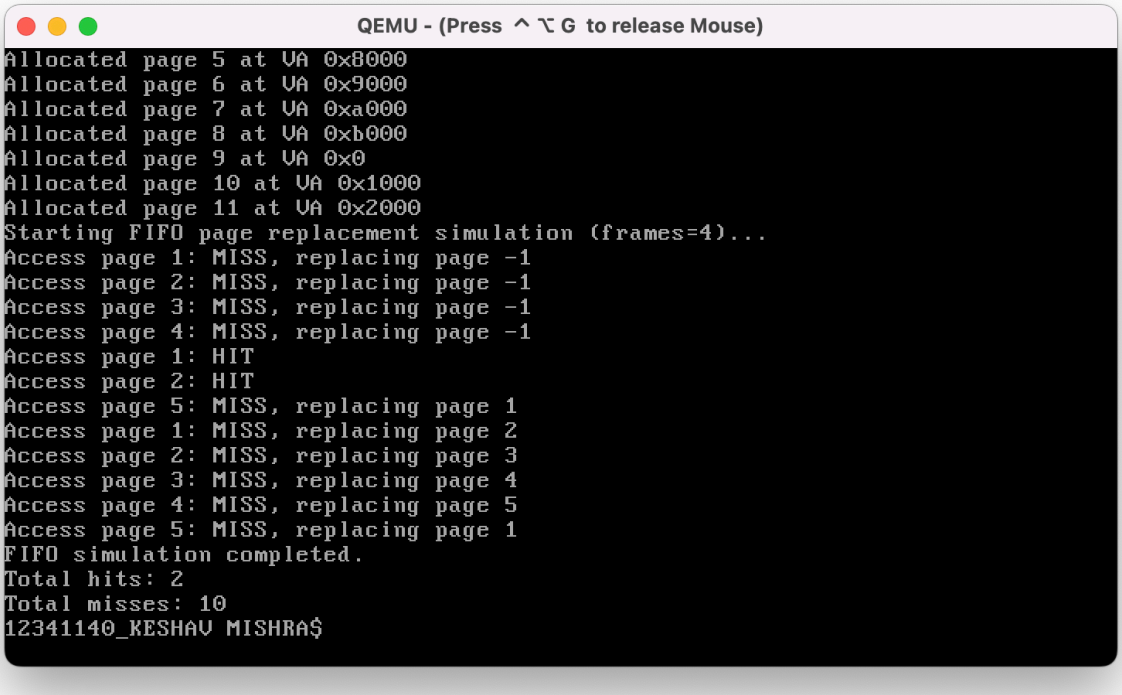
Virtual Memory Map of process 42739 (a.out)
Output report format: 2.4 -- 64-bit process
VM page size: 16384 bytes
Collected with PhysFootprint mode enabled
==== Non-writable regions for process 42739
REGION TYPE START - END [VSIZE RSDNT DIRTY SWAP] PRT/MAX SHRMOD PU
RGE REGION DETAIL
__TEXT 104414000-104418000 [16K 16K 0K 0K] r-x/r-x SM=COW
/Users/keshavmishra/Desktop/git/csl301/LAB_EXAM_12341140_KeshavMishra/a.out
__DATA_CONST 104418000-10441c000 [16K 16K 0K 0K] r--/rw- SM=COW
/Users/keshavmishra/Desktop/git/csl301/LAB_EXAM_12341140_KeshavMishra/a.out
__LINKEDIT 10441c000-104420000 [16K 16K 0K 0K] r--/r-- SM=COW
/Users/keshavmishra/Desktop/git/csl301/LAB_EXAM_12341140_KeshavMishra/a.out
shared memory 104428000-104430000 [32K 32K 32K 0K] r--/r-- SM=SHM
MALLOC metadata 104430000-104434000 [16K 16K 16K 0K] r--/rwx SM=SHM
MallocHelperZone_0x104430000 zone structure
MALLOC guard page 104438000-10443c000 [16K 0K 0K 0K] ---/rwx SM=SHM
MALLOC guard page 104444000-104448000 [16K 0K 0K 0K] ---/rwx SM=SHM
MALLOC guard page 104448000-10444c000 [16K 0K 0K 0K] ---/rwx SM=SHM
MALLOC guard page 104454000-104458000 [16K 0K 0K 0K] ---/rwx SM=SHM
MALLOC guard page 104458000-10445c000 [16K 0K 0K 0K] ---/rwx SM=SHM
MALLOC guard page 104464000-104468000 [16K 0K 0K 0K] ---/rwx SM=SHM
MALLOC metadata 104468000-10446c000 [16K 16K 16K 0K] r--/rwx SM=PRV
MALLOC metadata 10446c000-104470000 [16K 16K 16K 0K] r--/rwx SM=SHM
DefaultMallocZone_0x10446c000 zone structure
STACK GUARD 1679ec000-16b1f0000 [56.0M 0K 0K 0K] ---/rwx SM=NUL
stack guard for thread 0
__TEXT 19bccc000-19bd20000 [336K 336K 0K 0K] r-x/r-x SM=COW
/usr/lib/libobjc.A.dylib
__TEXT 19bd20000-19bdbc000 [624K 624K 0K 0K] r-x/r-x SM=COW
/usr/lib/dyld

Q6:

Frames = 3



Frames = 4



Hence proving Belady's Anomaly.