Assignment 1

Group 20:

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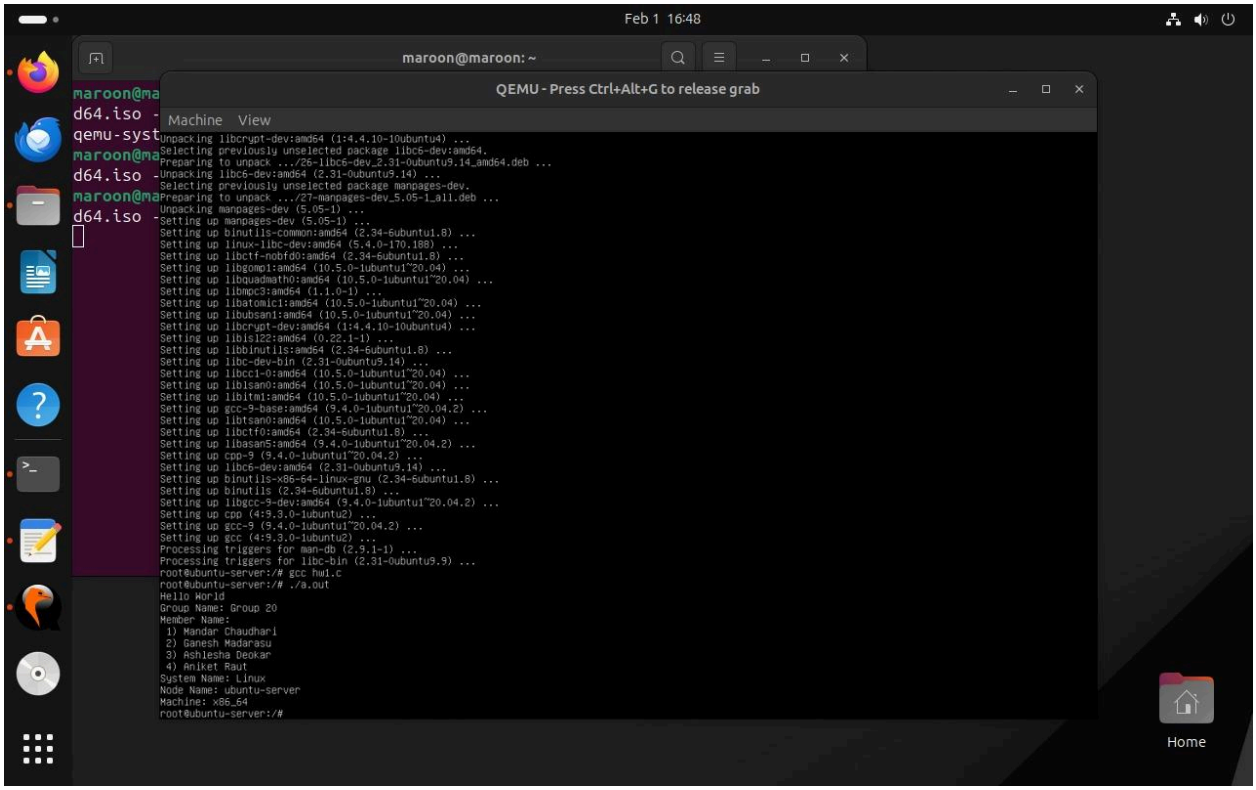
1. **QEMU to emulate a Linux system on an x86_64 platform**

    - installing qemu
        - sudo apt-get install qemu
    - create image
        - qemu-img create -f qcow2 linux.img 10G
    - download the iso file
        - wget -c https://www.releases.ubuntu.com/focal/ubuntu-20.04.6-live-server-amd64.iso
    - start qemu server
        - qemu-system-x86_64 -m 2048 -cdrom ubuntu-20.04.6-live-server-amd64.iso -boot d -drive file=linux.img, format=qcow2-accel tcg
    - open a new file
        - nano hw1.c
    - Executing the c program
        - gcc hw1.c
        - ./a.out



2. QEMU emulator for the RaspberryPi 4

- First install Git and the build dependencies
  - sudo apt install git bc bison flex libssl-dev make

- Navigate to the root of the cloned Linux kernel source directory
  - git clone --depth=1 https://github.com/raspberrypi/linux

Kernel configuration:
For Raspberry Pi 4 and 400, and Raspberry Pi Compute Module 4 default 32-bit build configuration:

- Navigate to the root of the cloned Linux kernel source directory
  - cd /path/to/linux

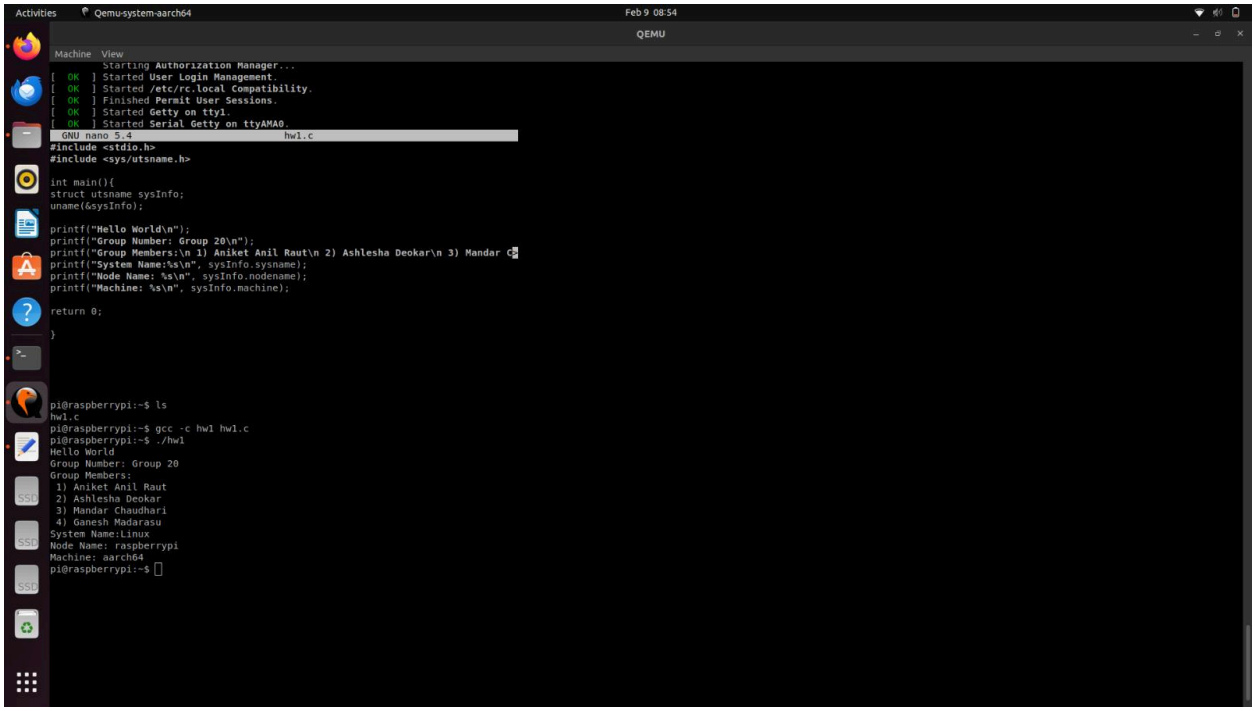
- Set environment variables for ARM64 architecture and the cross-compiler prefix
  - export ARCH=arm64
  - export CROSS_COMPILE=aarch64-linux-gnu-

- Make the default configuration for Raspberry Pi 4 (BCM2711)
  - make bcm2711_defconfig

- Build the kernel
    - make -j$(nproc)

- make changes to configuration
    - make menuconfig (Enable all the Virt services in menu configuration)

- Running Qemu
    - qemu-system-aarch64 \
      -M virt \
      -cpu cortex-a72 \
      -m 2G \
      -kernel /home/aniket/linux/arch/arm64/boot/Image \
      -append "root=/dev/vda2 rw console=ttyAMA0,115200 rootwait" \
      -drive
      file=/home/aniket/linux/2022-01-28-raspios-bullseye-arm64-lite.img,format=raw,id
      =hd,if=none \
      -device virtio-blk-device,drive=hd \
      -netdev user,id=net0,hostfwd=tcp::5022-:22 -device
      virtio-net-device,netdev=net0



3. QEMU emulator for the LEON 3 processor

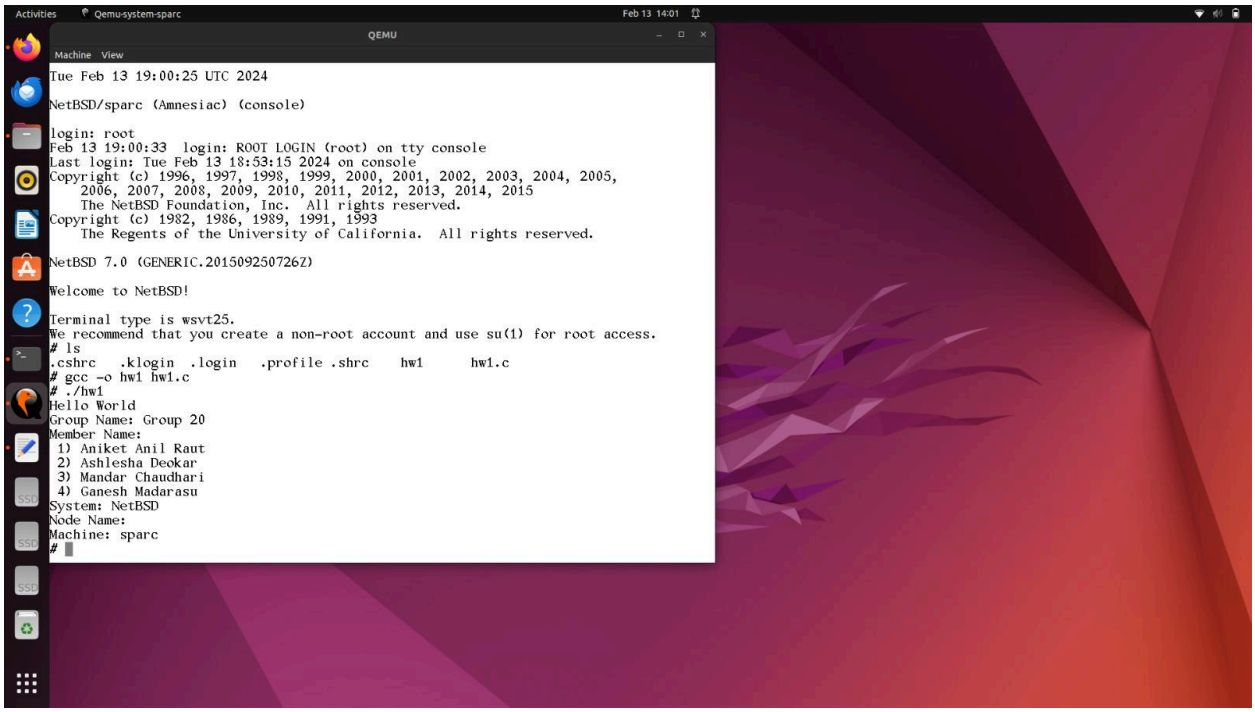
- For the leon3 processor, we used these links as reference:
  - https://www.iram.fr/~blanchet/tutorials/netbsd-sparc-qemu.html

- To download NetBSD
  - mkdir ~/netbsd-sparc
  - cd ~/netbsd-sparc
  - wget \
    https://archive.netbsd.org/pub/NetBSD-archive/images/7.0/NetBSD-7.0-sparc.iso
  -
- Virtual Machine Creation
  - cd ~/netbsd-sparc
  - qemu-img create -f raw ./netbsd7_sparc_hda.img 8G

- running qemu
  - sudo qemu-system-sparc -hda netbsd7_sparc_hda.img -m 256 -nographic \
    -net nic -net tap,ifname=tap0,script=no,downscript=no

- writing the c program
  - sudo vi hw1.c

- executing the program
  - gcc -o hw1.c hw1
  - ./hw1



4. **QEMU emulator for the Beagle Bone Black**

- install armv7l machine on ubuntu
  - sudo apt-get install gcc-arm-linux-gnueabihf
- running c code
  - arm-linux-gnueabihf-gcc-static hw1.c -o hw1
- checking the file format
  - file hw1
- installing the qemu user static
  - sudo apt-get install qemu-user-static
- executing the program
  - ./hw1