Linnaeus University

Faculty of Technology – Department of Computer Science

20HT –1DV512 – Operating Systems
Group Assignment 2

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Task 1: Inter-Process Communication with Named Pipes

Before we start work, we need to know why we should use named pipe.

The obvious reason is that it provides an easy way to send output from one command to another and end up with only the data you want to see without having to write scripts to do all of the selecting and reformatting.

So, I had made *"test_named_pipe"* by using command *mkfifo test_named_pipe* to use named pipe.

1. Input sample data into *test_named_pipe*

- To input sample data into *test_named_pipe* I used command like below.

```
$ echo "Hello" > test_named_pipe &
$ echo "How are you?" > test_named_pipe &
$ echo "Good morning" > test_named_pipe &
$ echo "Welcome" > test_named_pipe &
$ echo "Thanks" > test_named_pipe &
$ echo "See you" > test_named_pipe &
```

And then press "Ctrl + c" to exit inputing data.

- After check the inputed data of *test_named_pipe*

Write command like `cat test_named_pipe`

The result is same as below

```
Hello
How are you?
Good morning
Welcome
```

```
Thanks
See you
```

2. Run Main.java

- Compile the Main.java.

On terminate type the command *javac Main.java* to make class Main.

And then *java Main.*

The result is same as below

```
============== Step 1 ==============
<PID 4260> <00:25:50.135> Process started
<PID 4364> <00:25:50.797> Process started
<PID 4480> <00:25:51.097> Process started
<PID 4564> <00:25:51.433> Process started
<PID 4632> <00:25:51.732> Process started
<PID 4648> <00:25:51.838> Process started
<PID 4668> <00:25:51.942> Process started
<PID 4692> <00:25:52.026> Process started
<PID 4972> <00:25:52.451> Process started
<PID 5096> <00:25:52.741> Process started
<PID 5264> <00:25:55.059> Process started
<PID 5472> <00:25:56.100> Process started
<PID 5652> <00:25:56.746> Process started
<PID 5904> <00:25:57.512> Process started
<PID 5976> <00:25:57.754> Process started
<PID 6040> <00:25:57.963> Process started
<PID 6268> <00:25:58.992> Process started
<PID 6392> <00:25:59.466> Process started
```

<PID 6424> <00:25:59.684> Process started
<PID 6480> <00:26:00.045> Process started
<PID 7080> <00:26:06.889> Process started
<PID 5944> <00:26:12.648> Process started
<PID 6736> <00:26:13.517> Process started
<PID 6752> <00:26:13.893> Process started
<PID 6788> <00:26:46.039> Process started
<PID 1668> <00:26:47.323> Process started
<PID 1764> <00:27:37.123> Process started
<PID 5068> <00:36:36.095> Process started
<PID 1020> <00:36:42.464> Process started
<PID 7140> <00:36:43.427> Process started
<PID 4628> <00:38:05.732> Process started
<PID 3628> <01:25:07.207> Process started
<PID 224> <01:25:09.065> Process started
<PID 1188> <01:25:10.074> Process started
<PID 3988> <01:42:08.216> Process started
<PID 7064> <01:44:26.872> Process started
<PID 248> <01:44:30.420> Process started
<PID 3820> <01:44:31.210> Process started
<PID 3200> <01:44:34.969> Process started
<PID 5668> <01:44:35.900> Process started
<PID 2528> <01:44:39.263> Process started
<PID 2136> <01:44:44.328> Process started
<PID 7500> <02:10:54.580> Process started
<PID 3616> <02:22:46.662> Process started
<PID 772> <02:22:46.762> Process started
<PID 2440> <02:28:14.852> Process started

```
<PID 7184> <02:28:15.249> Process started
<PID 8492> <02:29:11.444> Process started
<PID 8556> <02:29:11.993> Process started
<PID 8884> <02:29:16.969> Process started
<PID 7244> <02:29:27.649> Process started
<PID 7400> <02:29:27.691> Process started
<PID 1780> <02:29:27.775> Process started
<PID 860> <02:29:27.916> Process started
<PID 6776> <02:29:27.948> Process started
<PID 7728> <02:29:27.997> Process started
<PID 5000> <02:29:28.022> Process started
<PID 3952> <02:42:25.987> Process started
<PID 4376> <03:01:54.942> Process started
=============== Step 2 ===============
<PID 1028> <19:02:24.956> Pipe opened
Hello
How are you?
Good morning
Welcome
Thanks
See you
<PID 1028> <19:02:24.972> Pipe closed
---------------------------------------
<PID 1028> <19:02:32.640> Pipe opened
Hello
How are you?
Good morning
Welcome
```

```
Thanks
See you
<PID 1028> <19:02:32.640> Pipe closed
```

Step 1 is corresponding to information of all processes.

Step 2 is corresponding to *test_named_pipe*.

The values was inputed before we run the java program.

3. Start two instances of Java program.

Open new terminal and repeat **2** to start another Java program

Below shows the results of two instances.

- First instance.

```
=============== Step 1 ===============
... ... ... ... ... ... ... ... ... ...
=============== Step 2 ===============
<PID 9120> <19:06:22.818> Pipe opened
Hello
How are you?
Good morning
Welcome
Thanks
See you
<PID 9120> <19:06:22.849> Pipe closed
---------------------------------------
<PID 9120> <19:06:25.886> Pipe opened
Hello
How are you?
Good morning
Welcome
```

```
Thanks
See you
<PID 9120> <19:06:25.886> Pipe closed
```

- Second Instance.

```
=============== Step 1 ===============
... ... ... ... ... ... ... ... ... ...
=============== Step 2 ===============
<PID 1028> <19:06:56.819> Pipe opened
Hello
How are you?
Good morning
Welcome
Thanks
See you
<PID 1028> <19:06:56.504> Pipe closed
--------------------------------------
<PID 1028> <19:06:59.165> Pipe opened
Hello
How are you?
Good morning
Welcome
Thanks
See you
<PID 1028> <19:06:59.257> Pipe closed
```

As we can see, the outputing results are same.

4. Repeat with other source file

- Copy source file "Main.java" and rename that file as "previousTitleModified".

And then change the class name as previousTitleModified.

Repeat above step to compile and run the new file and class.

Thus, the new class "previousTitleModified.class" is created.

To compare two results of other class, below shows each output.

- Main.class

```
=============== Step 1 ===============
... ... ... ... ... ... ... ... ... ...
=============== Step 2 ===============
<PID 8756> <19:22:33.702> Pipe opened
Hello
How are you?
Good morning
Welcome
Thanks
See you
<PID 8756> <19:22:33.733> Pipe closed
```

- previousTitleModified

```
=============== Step 1 ===============
... ... ... ... ... ... ... ... ... ...
=============== Step 2 ===============
<PID 1956> <19:25:25.961> Pipe opened
Hello
How are you?
Good morning
Welcome
```

```
Thanks
See you
<PID 1956> <19:25:25.961> Pipe closed
```

The two results are same.

Let discuss the reasons of these.

I think the one reason is that it is because of advantage of named pipe.

The named pipe enable to open, read and write at once.

Even if, while the processes are reading the content of named pipe, we can write new content in it.

To see that, open new termianl.

And then command one line like *echo "The end" > test_named_pipe*

Let see two results of another java classes.

To simplify, step 1 is ommitted.

- First

```
----------------------------------------
<PID 8756> <19:31:58.141> Pipe opened
Hello
How are you?
Good morning
Welcome
Thanks
See you
The end
<PID 8756> <19:31:58.141> Pipe closed
```

- Second

```
---------------------------------------
<PID 1956> <19:31:55.290> Pipe opened
Hello
How are you?
Good morning
Welcome
Thanks
See you
The end
<PID 1956> <19:31:55.290> Pipe closed
```

We can see the same results.

Whenever we change the value, the program will show the same changed results.

And the second is by thread.

We can see the step 1's result.

It shows the running precesses by thread.

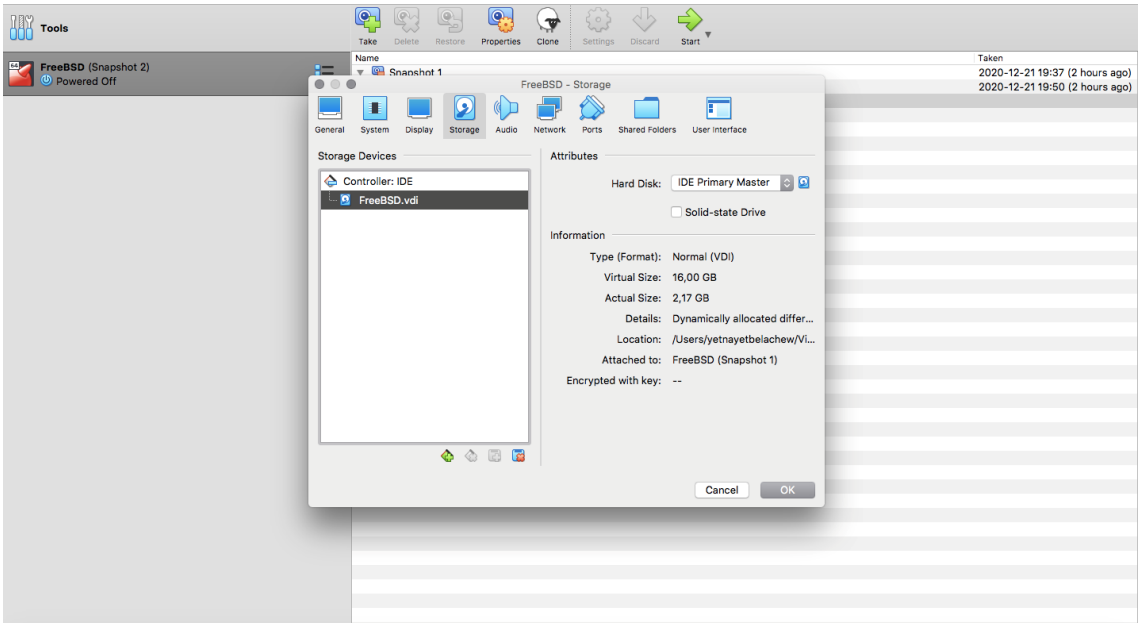
By thread we can do many tasks and run many processes.

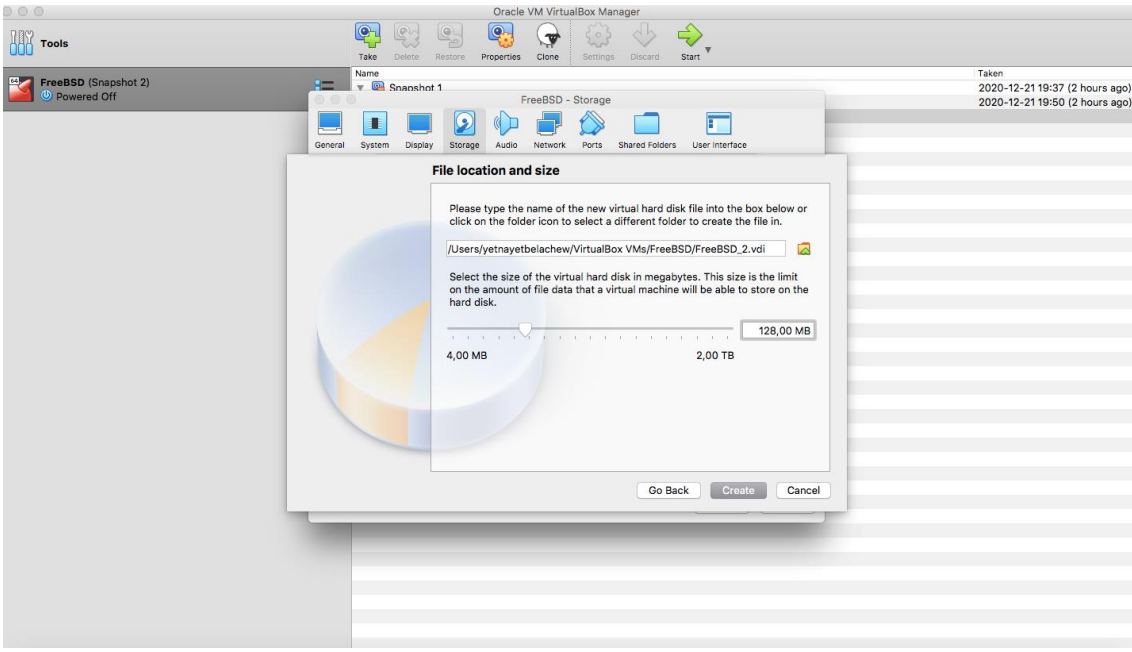
Perhaps while writing report, the two other class processes are checking *test_named_pipe* and showing the same content.

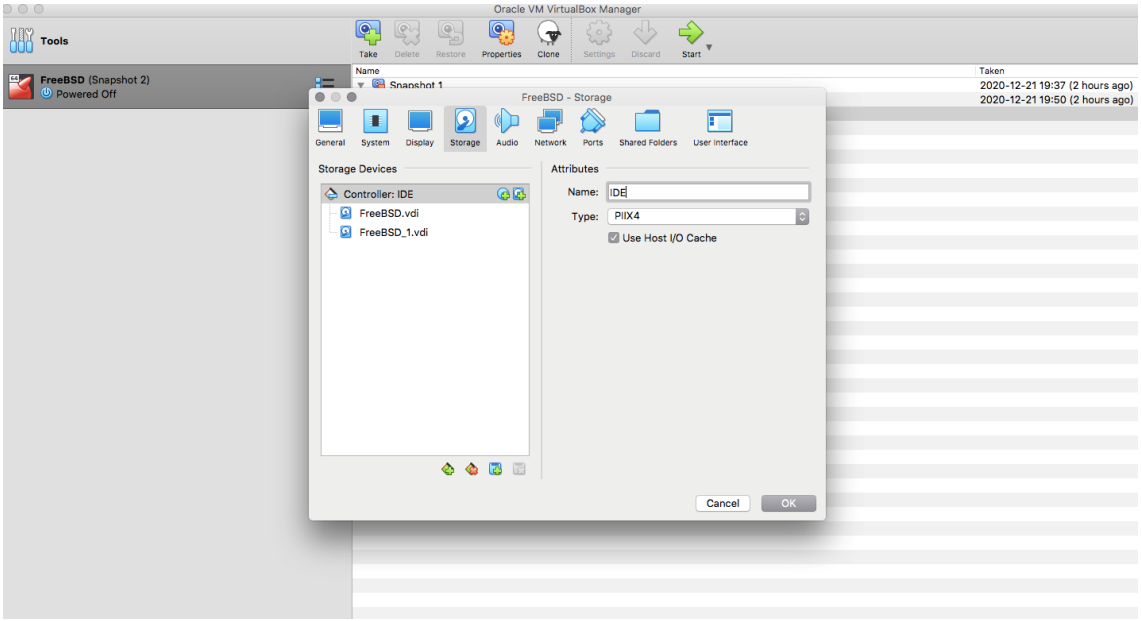
There might me other reasons. But I think the main are those two reasons.

Task 2: File System Configuration

1 Create a new virtual disk drive within VirtualBox — a small size, 200 or even 128 MB, is sufficient for the task. Add the virtual disk to your FreeBSD VM. Afterwards, you should start the VM.







2 Use the gpart tool

```
root@freebsd-vm-group31:/usr/home/yb222ce # gpart status
   Name  Status  Components
 ada0s1      OK  ada0
ada0s1a      OK  ada0s1
ada0s1b      OK  ada0s1
```

```
root@freebsd-vm-group31:/usr/home/yb222ce # gpart show
=>      63  33554369  ada0  MBR  (16G)
        63         1        - free -  (512B)
        64  33554368     1  freebsd  [active]  (16G)

=>       0  33554368  ada0s1  BSD  (16G)
         0  31457280       1  freebsd-ufs  (15G)
  31457280   1677312       2  freebsd-swap  (819M)
  33134592    419776          - free -  (205M)

root@freebsd-vm-group31:/usr/home/yb222ce #
```

```
root@freebsd-vm-group31:/usr/home/yb222ce # gpart show
=>      63  33554369  ada0  MBR  (16G)
        63         1        - free -  (512B)
        64  33554368     1  freebsd  [active]  (16G)

=>       0  33554368  ada0s1  BSD  (16G)
         0  31457280       1  freebsd-ufs  (15G)
  31457280   1677312       2  freebsd-swap  (819M)
  33134592    419776          - free -  (205M)

root@freebsd-vm-group31:/usr/home/yb222ce # gpart status
   Name  Status  Components
 ada0s1      OK  ada0
ada0s1a      OK  ada0s1
ada0s1b      OK  ada0s1
root@freebsd-vm-group31:/usr/home/yb222ce #
```

3 fmx mx

```
root@freebsd-vm-group31:/usr/home/yb222ce # sysctl kern.disks
kern.disks: ada1 ada0
root@freebsd-vm-group31:/usr/home/yb222ce #
```

4 Use the *gpart* tool to create a new partition

Crating a new partition

```
root@freebsd-vm-group31:/usr/home/yb222ce # sysctl kern.disks
kern.disks: ada1 ada0
root@freebsd-vm-group31:/usr/home/yb222ce # sudo gpart create -s GPT ada1
ada1 created
root@freebsd-vm-group31:/usr/home/yb222ce #
```

Then adding new partition with type *Linux-data* in the second disk get the status of the currently attached drives and partitions again.

```
root@freebsd-vm-group31:/usr/home/yb222ce # sudo gpart add -t linux-data -s 100M
B ada1
ada1p1 added
root@freebsd-vm-group31:/usr/home/yb222ce # gpart status
                          Name  Status  Components
                       ada0s1      OK  ada0
                      ada0s1a      OK  ada0s1
                      ada0s1b      OK  ada0s1
                       ada1p1      OK  ada1
diskid/DISK-VB5bbe58cd-c2eef9bfp1      OK  diskid/DISK-VB5bbe58cd-c2eef9bf
root@freebsd-vm-group31:/usr/home/yb222ce #
```

Loading the kernel module for supporting the EXT2 file system, the module already loaded inkernel so I can't provide screenshots.

```
root@freebsd-vm-group31:/usr/home/yb222ce # kldload ext2fs
kldload: can't load ext2fs: module already loaded or in kernel
root@freebsd-vm-group31:/usr/home/yb222ce # sudo kldload ext2fs
kldload: can't load ext2fs: module already loaded or in kernel
root@freebsd-vm-group31:/usr/home/yb222ce #
```

Installing the *e2fsprogs* package.

```
root@freebsd-vm-group31:/usr/home/yb222ce # kldload ext2fs
kldload: can't load ext2fs: module already loaded or in kernel
root@freebsd-vm-group31:/usr/home/yb222ce # sudo kldload ext2fs
kldload: can't load ext2fs: module already loaded or in kernel
root@freebsd-vm-group31:/usr/home/yb222ce # pkg install e2fsprogs
Updating FreeBSD repository catalogue...
FreeBSD repository is up to date.
All repositories are up to date.
The following 4 package(s) will be affected (of 0 checked):

New packages to be INSTALLED:
        e2fsprogs: 1.45.6_4
        e2fsprogs-libblkid: 1.45.6_1
        e2fsprogs-libss: 1.45.6
        e2fsprogs-libuuid: 1.45.6

Number of packages to be installed: 4

The process will require 6 MiB more space.
1 MiB to be downloaded.

Proceed with this action? [y/N]: y
```

```
root@FreeBSD-vm-group31:/usr/home/yb222ce # gpart show
=>      63  33554369  ada0  MBR  (16G)
        63         1        - free -  (512B)
        64  33554368     1  freebsd  [active]  (16G)

=>       0  33554368  ada0s1  BSD  (16G)
         0  31457280       1  freebsd-ufs  (15G)
  31457280   1677312       2  freebsd-swap  (819M)
  33134592    419776          - free -  (205M)

=>      40  262064  ada1  GPT  (128M)
        40  204800     1  linux-data  (100M)
  204840   57264        - free -  (28M)

=>      40  262064  diskid/DISK-VB9309a781-a6fe64af  GPT  (128M)
        40  204800                                    1  linux-data  (100M)
  204840   57264                                       - free -  (28M)

root@FreeBSD-vm-group31:/usr/home/yb222ce # ls /dev/ad*
/dev/ada0       /dev/ada0s1a    /dev/ada1
/dev/ada0s1     /dev/ada0s1b    /dev/ada1p1
root@FreeBSD-vm-group31:/usr/home/yb222ce #
```

Create an EXT2 file system in the previously created partition by using *mke2fs*

```
root@FreeBSD-vm-group31:/usr/home/yb222ce # gpart show
=>      63  33554369  ada0  MBR  (16G)
        63         1        - free -  (512B)
        64  33554368     1  freebsd  [active]  (16G)

=>       0  33554368  ada0s1  BSD  (16G)
         0  31457280       1  freebsd-ufs  (15G)
  31457280   1677312       2  freebsd-swap  (819M)
  33134592    419776          - free -  (205M)

=>    40  262064  ada1  GPT  (128M)
      40  204800     1  linux-data  (100M)
  204840   57264        - free -  (28M)

=>    40  262064  diskid/DISK-VB9309a781-a6fe64af  GPT  (128M)
      40  204800                                   1  linux-data  (100M)
  204840   57264                                      - free -  (28M)

root@FreeBSD-vm-group31:/usr/home/yb222ce # ls /dev/ad*
/dev/ada0       /dev/ada0s1a    /dev/ada1
/dev/ada0s1     /dev/ada0s1b    /dev/ada1p1
root@FreeBSD-vm-group31:/usr/home/yb222ce #
```

```
root@freebsd-vm-group31:/usr/home/yb222ce # gpart show
=>      63  33554369  ada0  MBR  (16G)
        63         1        - free -  (512B)
        64  33554368     1  freebsd  [active]  (16G)

=>       0  33554368  ada0s1  BSD  (16G)
         0  31457280       1  freebsd-ufs  (15G)
  31457280   1677312       2  freebsd-swap  (819M)
  33134592    419776          - free -  (205M)

=>    40  262064  ada1  GPT  (128M)
      40  204800     1  linux-data  (100M)
  204840   57264        - free -  (28M)

=>    40  262064  diskid/DISK-VB5bbe58cd-c2eef9bf  GPT  (128M)
      40  204800                                   1  linux-data  (100M)
  204840   57264                                      - free -  (28M)

root@freebsd-vm-group31:/usr/home/yb222ce # ls /dev/ad*
/dev/ada0       /dev/ada0s1a    /dev/ada1
/dev/ada0s1     /dev/ada0s1b    /dev/ada1p1
root@freebsd-vm-group31:/usr/home/yb222ce #
```

```
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo mke2fs /dev/ada1p1
mke2fs 1.45.6 (20-Mar-2020)
Creating filesystem with 102400 1k blocks and 25688 inodes
Filesystem UUID: 2d9bc60a-18cf-4af4-a9d1-f5660eba8423
Superblock backups stored on blocks:
        8193, 24577, 40961, 57345, 73729

Allocating group tables: done
Writing inode tables: done
Writing superblocks and filesystem accounting information: done

root@FreeBSD-vm-group31:/usr/home/yb222ce #
```

6 Create a new directory */mnt/second-disk* . Mount the previously created file system to this mount point by using *mount -t ext2fs path-to-partition /mnt/second-disk.*

```
root@freebsd-vm-group31:/usr/home/yb222ce # sudo mkdir /mnt/second-disk
root@freebsd-vm-group31:/usr/home/yb222ce # ls /mnt
second-disk     secong-disk
root@freebsd-vm-group31:/usr/home/yb222ce # sudo mount -t ext2fs /dev/ada1p1 /mn
t/second-disk
```

Change the permissions for the mount point so that all users can read, write, and execute programs there.

```
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo mkdir /mnt/second-disk
mkdir: /mnt/second-disk: File exists
root@FreeBSD-vm-group31:/usr/home/yb222ce # ls /mnt
second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo mount -t ext2fs /dev/ada1p1 /mn
t/second-disk
mount: /dev/ada1p1: Device busy
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod r+w+x /mnt/second-disk
chmod: invalid file mode: r+w+x
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod rwx /mnt/second-disk
chmod: invalid file mode: rwx
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod g+rwx /mnt/second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce #
```

Confirm that everything is working properly by running *mount*

```
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo mkdir /mnt/second-disk
mkdir: /mnt/second-disk: File exists
root@FreeBSD-vm-group31:/usr/home/yb222ce # ls /mnt
second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo mount -t ext2fs /dev/ada1p1 /mn
t/second-disk
mount: /dev/ada1p1: Device busy
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod r+w+x /mnt/second-disk
chmod: invalid file mode: r+w+x
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod rwx /mnt/second-disk
chmod: invalid file mode: rwx
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod g+rwx /mnt/second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # mount
/dev/ada0s1a on / (ufs, local, journaled soft-updates)
devfs on /dev (devfs, local, multilabel)
/dev/ada1p1 on /mnt/second-disk (ext2fs, local)
root@FreeBSD-vm-group31:/usr/home/yb222ce #
```

then *ls -lh /mnt/*

```
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo mkdir /mnt/second-disk
mkdir: /mnt/second-disk: File exists
root@FreeBSD-vm-group31:/usr/home/yb222ce # ls /mnt
second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo mount -t ext2fs /dev/ada1p1 /mn
t/second-disk
mount: /dev/ada1p1: Device busy
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod r+w+x /mnt/second-disk
chmod: invalid file mode: r+w+x
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod rwx /mnt/second-disk
chmod: invalid file mode: rwx
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod g+rwx /mnt/second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # mount
/dev/ada0s1a on / (ufs, local, journaled soft-updates)
devfs on /dev (devfs, local, multilabel)
/dev/ada1p1 on /mnt/second-disk (ext2fs, local)
root@FreeBSD-vm-group31:/usr/home/yb222ce # ls -lh /mnt/
total 1
drwxrwxr-x  3 root  wheel   1.0K Dec 20 21:35 second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # df -h
Filesystem      Size    Used   Avail Capacity  Mounted on
/dev/ada0s1a     15G    1.4G     12G    10%    /
devfs           1.0K    1.0K      0B   100%    /dev
/dev/ada1p1      95M     14K     90M     0%    /mnt/second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce #
```

df -h

```
t/second-disk
mount: /dev/ada1p1: Device busy
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod r+w+x /mnt/second-disk
chmod: invalid file mode: r+w+x
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod rwx /mnt/second-disk
chmod: invalid file mode: rwx
root@FreeBSD-vm-group31:/usr/home/yb222ce # sudo chmod g+rwx /mnt/second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # mount
/dev/ada0s1a on / (ufs, local, journaled soft-updates)
devfs on /dev (devfs, local, multilabel)
/dev/ada1p1 on /mnt/second-disk (ext2fs, local)
root@FreeBSD-vm-group31:/usr/home/yb222ce # ls -lh /mnt/
total 1
drwxrwxr-x  3 root  wheel   1.0K Dec 20 21:35 second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # df -h
Filesystem      Size    Used   Avail Capacity  Mounted on
/dev/ada0s1a     15G    1.4G     12G    10%    /
devfs           1.0K    1.0K      0B   100%    /dev
/dev/ada1p1      95M     14K     90M     0%    /mnt/second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce # df -h
Filesystem      Size    Used   Avail Capacity  Mounted on
/dev/ada0s1a     15G    1.4G     12G    10%    /
devfs           1.0K    1.0K      0B   100%    /dev
/dev/ada1p1      95M     14K     90M     0%    /mnt/second-disk
root@FreeBSD-vm-group31:/usr/home/yb222ce #
```

7 To make sure the file system in the second disk is mounted automatically on system startup, first add the line with *ext2fs_load="YES"* to */boot/loader.conf*

```
^[ (escape) menu  ^y search prompt  ^k delete line   ^p prev li   ^g prev page
^o ascii code     ^x search         ^l undelete line ^n next li   ^v next page
^u end of file    ^a begin of line  ^w delete word   ^b back 1 char
^t top of text    ^e end of line    ^r restore word  ^f forward 1 char
^c command        ^d delete char    ^j undelete char ^z next word
=====line 1 col 17 lines from top 1 ========================================
ext2fs_load="YES"
```

Then, edit the file */etc/fstab* and add a line for your partition and mount point, in this question we had struggle from the first assignment so it can't let as to edit

```
^[ (escape) menu  ^y search prompt  ^k delete line   ^p prev li   ^g prev page
^o ascii code     ^x search         ^l undelete line ^n next li   ^v next page
^u end of file    ^a begin of line  ^w delete word   ^b back 1 char
^t top of text    ^e end of line    ^r restore word  ^f forward 1 char
^c command        ^d delete char    ^j undelete char ^z next word
=====line 1 col 0 lines from top 1 ============================================
# Device        Mountpoint      FStype  Options Dump    Pass#
/dev/ada0s1a    /               ufs     rw      1       1
/dev/ada0s1b    none            swap    sw      0       0
/dev/ada1p1     /mnt/second-disk        ext2fs  rw      0   0









file "/etc/fstab", 4 lines
```

Reboot the system and confirm that it is started, and the partition is mounted

```
root@FreeBSD-vm-group31:/usr/home/yb222ce # cd /mnt/second-disk
root@FreeBSD-vm-group31:/mnt/second-disk # ls
automount       lost+found
root@FreeBSD-vm-group31:/mnt/second-disk # sudo mkdir automount
mkdir: automount: File exists
root@FreeBSD-vm-group31:/mnt/second-disk # ls
automount       lost+found
root@FreeBSD-vm-group31:/mnt/second-disk # unount /mnt/second-disk
unount: Command not found.
root@FreeBSD-vm-group31:/mnt/second-disk # sudo unmount /mnt/second-disk
sudo: unmount: command not found
root@FreeBSD-vm-group31:/mnt/second-disk # cd :
:: No such file or directory.
root@FreeBSD-vm-group31:/mnt/second-disk # cd..
cd..: Command not found.
root@FreeBSD-vm-group31:/mnt/second-disk # cd ..
root@FreeBSD-vm-group31:/mnt # sudo umount /mnt/second-disk
root@FreeBSD-vm-group31:/mnt # cd second-disk
root@FreeBSD-vm-group31:/mnt/second-disk # ls
root@FreeBSD-vm-group31:/mnt/second-disk #
```

```
Security Advisories:   https://www.FreeBSD.org/security/
FreeBSD Handbook:      https://www.FreeBSD.org/handbook/
FreeBSD FAQ:           https://www.FreeBSD.org/faq/
Questions List: https://lists.FreeBSD.org/mailman/listinfo/freebsd-questions/
FreeBSD Forums:        https://forums.FreeBSD.org/

Documents installed with the system are in the /usr/local/share/doc/freebsd/
directory, or can be installed later with:  pkg install en-freebsd-doc
For other languages, replace "en" with a language code like de or fr.

Show the version of FreeBSD installed:  freebsd-version ; uname -a
Please include that output and any error messages when posting questions.
Introduction to manual pages:  man man
FreeBSD directory layout:      man hier

Edit /etc/motd to change this login announcement.
Can't delete /usr/obj? Enter "chflags -R noschg /usr/obj" to remove the
system immutable flag for all files in /usr/obj.
```

8 confirm that everything is working properly and the proper permissions are set, navigate to the mounted partition, create a file there, and run *ls -lh*

```
root@FreeBSD-vm-group31:/mnt/second-disk # ls /mnt/second-disk
automount       lost+found
root@FreeBSD-vm-group31:/mnt/second-disk # ls
automount       lost+found
root@FreeBSD-vm-group31:/mnt/second-disk # mkdir permission-test
root@FreeBSD-vm-group31:/mnt/second-disk # ls
automount       lost+found      permission-test
root@FreeBSD-vm-group31:/mnt/second-disk # echo "permission-test" > confirmation
.txt
root@FreeBSD-vm-group31:/mnt/second-disk # ls
automount               lost+found
confirmation.txt        permission-test
root@FreeBSD-vm-group31:/mnt/second-disk # cat confirmation.txt
permission-test
root@FreeBSD-vm-group31:/mnt/second-disk #
```

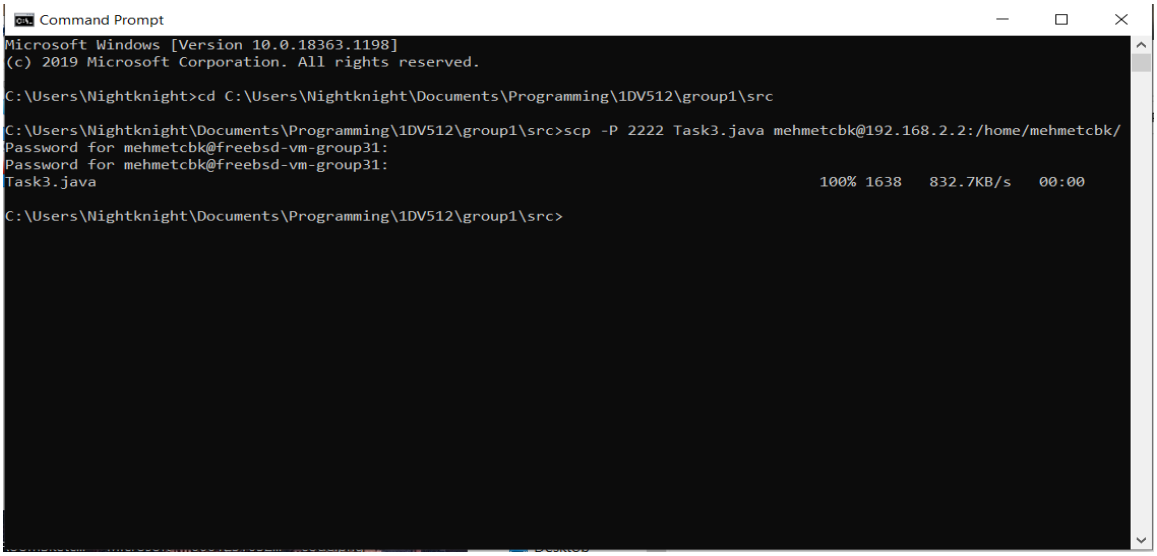
```
root@FreeBSD-vm-group31:/mnt/second-disk # cd /mnt/second-disk
root@FreeBSD-vm-group31:/mnt/second-disk # ls -lh
total 15
drwxr-xr-x  2 root  wheel   1.0K Dec 25 23:27 automount
-rw-r--r--  1 root  wheel    16B Dec 26 00:16 confirmation.txt
drwx------  2 root  wheel    12K Dec 25 23:12 lost+found
drwxr-xr-x  2 root  wheel   1.0K Dec 26 00:16 permission-test
root@FreeBSD-vm-group31:/mnt/second-disk #
```

Task 3: File System Interaction

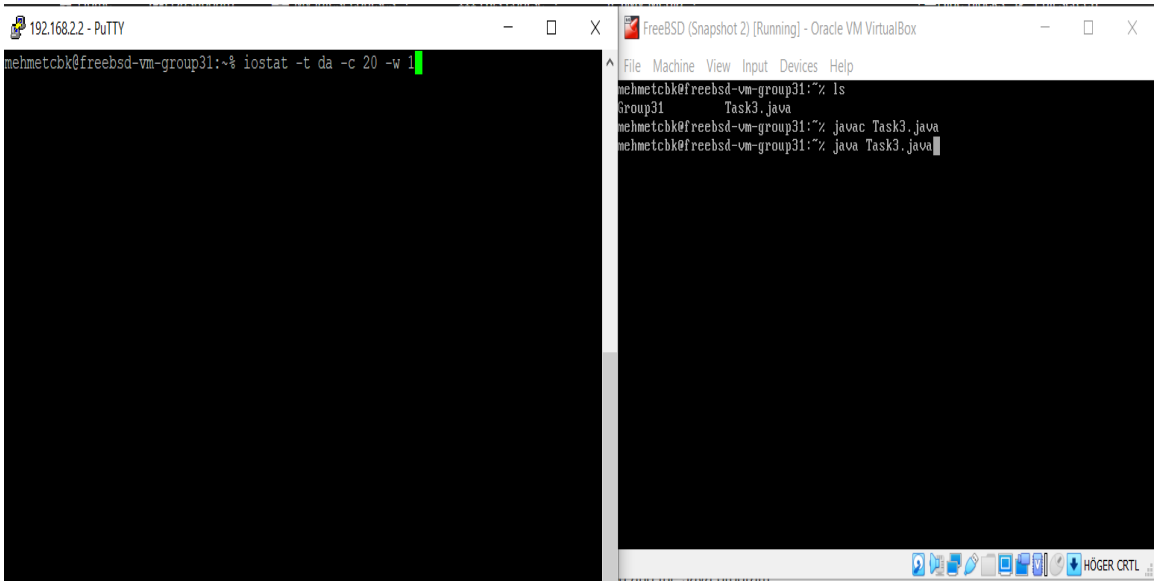
1. General comments on Java code

The java code meets the requirements given. It creates 500 text files with 10000 +1 lines each. The “flushing” term was confusing, but I believe it is already handled with filewriter’s close method.

2. Transferring source code to VM

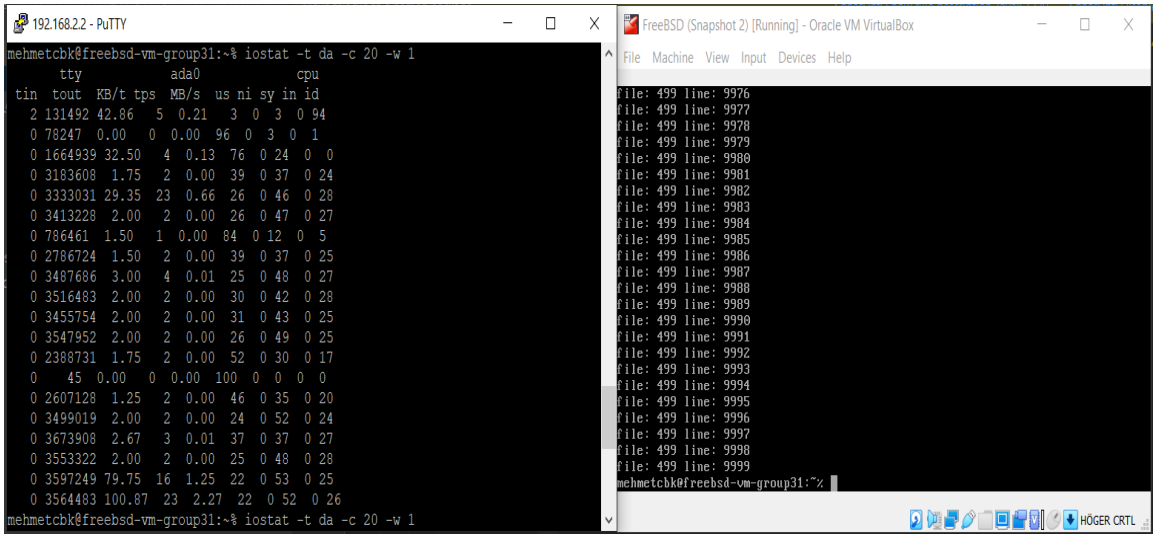


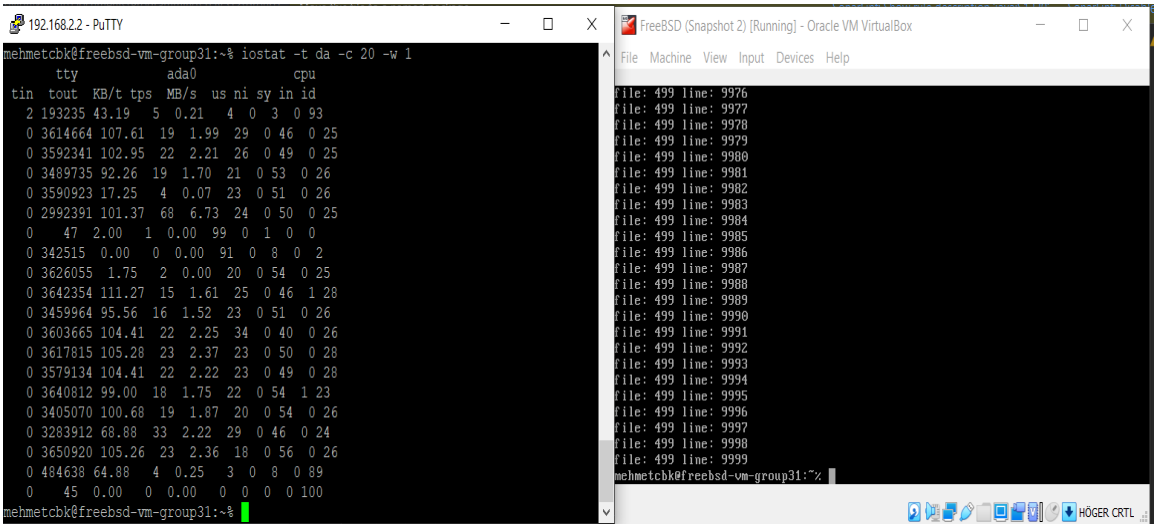
3. Running programs from several shell windows



4. The results for iostat command

The iostat command has run twice because by the time first one is finished the execution of program was not finished.





5. Total size and number of files in test directory

500 files created, and the size of directory is 62 megabytes.

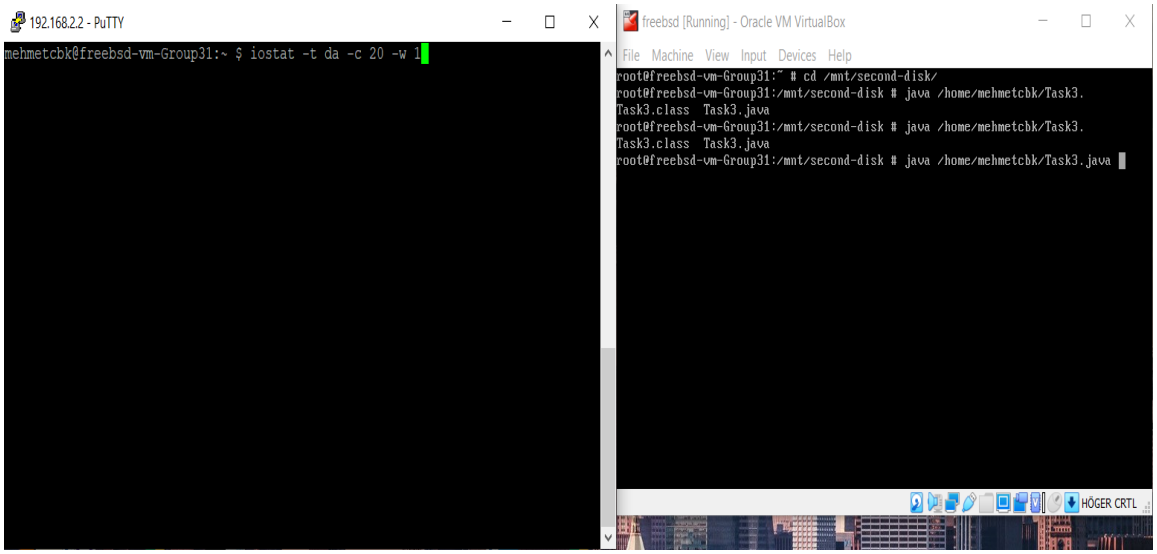
```
file: 499 line: 9987
file: 499 line: 9988
file: 499 line: 9989
file: 499 line: 9990
file: 499 line: 9991
file: 499 line: 9992
file: 499 line: 9993
file: 499 line: 9994
file: 499 line: 9995
file: 499 line: 9996
file: 499 line: 9997
file: 499 line: 9998
file: 499 line: 9999
mehmetcbk@freebsd-vm-group31:~% ls -l . | egrep -c '^-'
3
mehmetcbk@freebsd-vm-group31:~% cd test+dir
mehmetcbk@freebsd-vm-group31:~/test+dir% ls -l . | egrep -c '^-'
500
mehmetcbk@freebsd-vm-group31:~/test+dir% cd ..
mehmetcbk@freebsd-vm-group31:~% du -h
 16K    ./.ssh
 62M    ./test+dir
 62M    .
mehmetcbk@freebsd-vm-group31:~%
```

6. “iostat -t da -c 20 -w 1” command

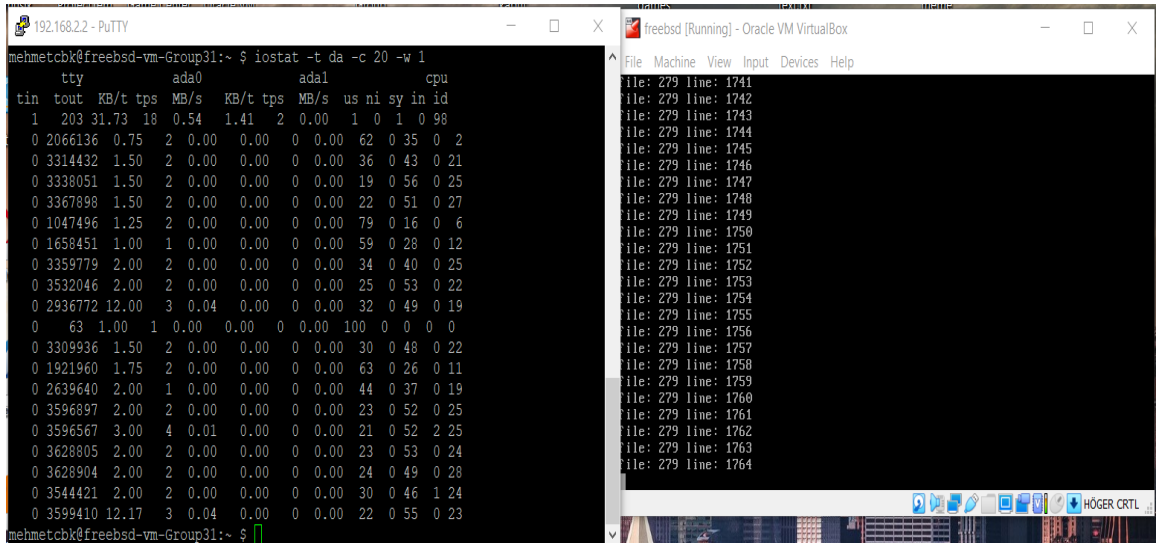
The iostat utility displays kernel I/O statistics on terminal, device and CPU operations. -t specifies which types of devices to display. da stands for direct access devices. -c repeats the display count times. By putting 20 we say repeat it 20 times. -w pauses or waits between each display as specified seconds. By putting 1 we say wait 1 second for each display. If this was not specified it was going to be 1 seconds as default.

7. Results of running Java from second disk’s partition

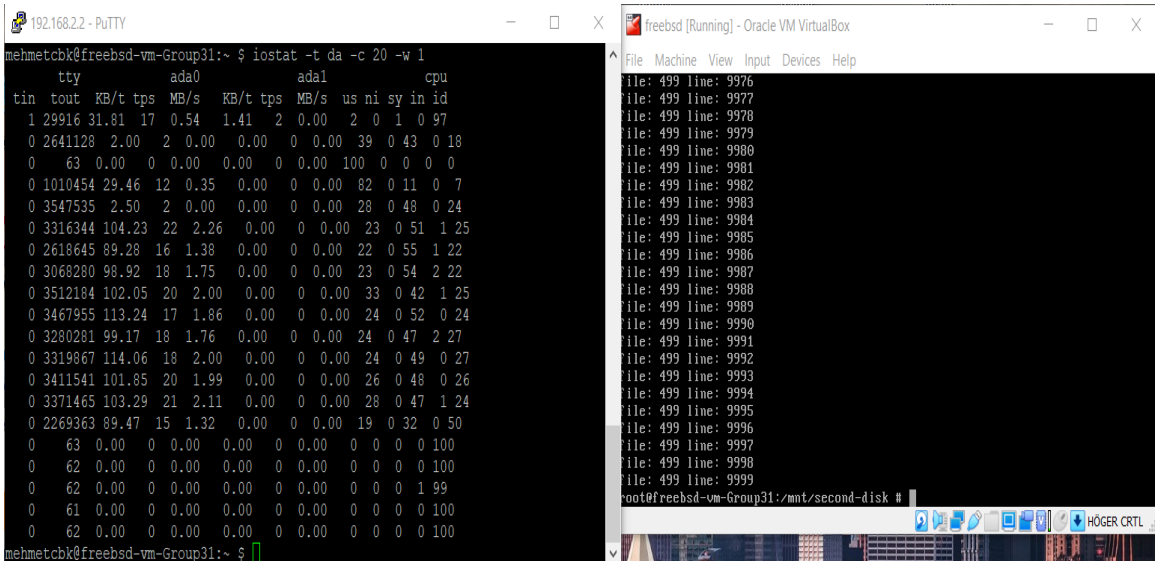
Getting ready for running



First result



Second result



When the java program run from second partition there are no major changes in results.

Description of the work distribution between group members

We divided all the tasks to each member, so everyone contributed %33 of solution.