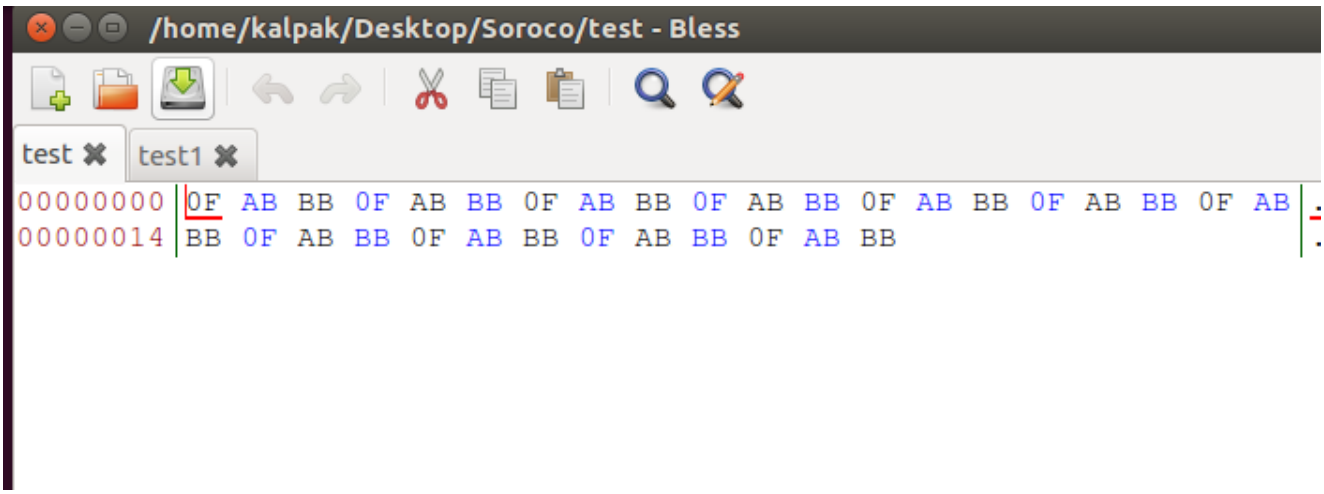
Solution

Below are some snapshots showing the execution of the given problem statement.

```
kalpak@kalpak-vm:~/Desktop/Soroco$ ls
deconstruct.py  reconstruct.py  test  test1
kalpak@kalpak-vm:~/Desktop/Soroco$
```

test and test1 are the two binary files present in the directory

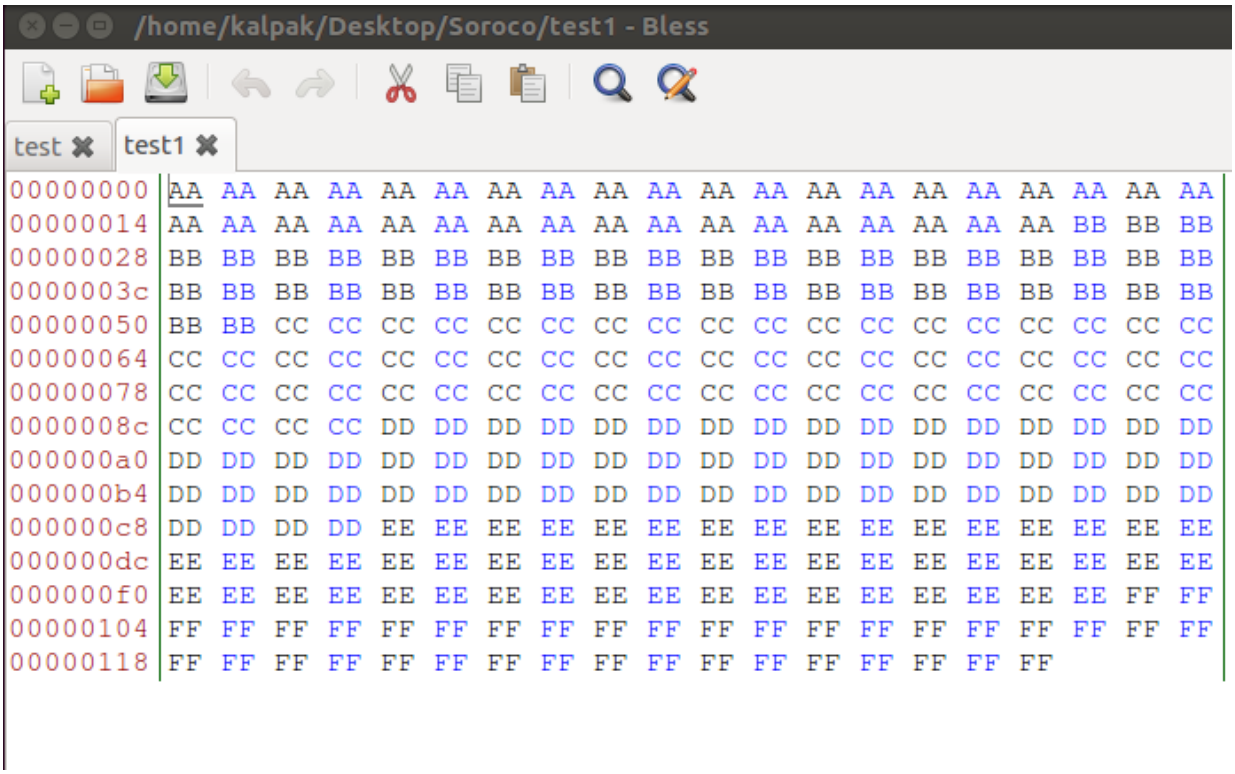
test has



which is the given as an example in the question. Size = **11 bytes**

and test1 has repetitions of AA BB CC DD EE and FF in random frequencies.

Size = **297 bytes**

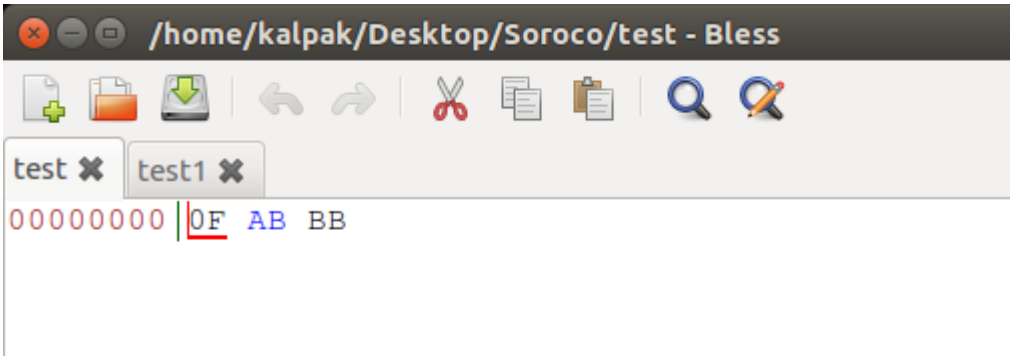


On running the **deconstruct.py** along with the two arguments, I am keeping the metadata for future retrieval of the file in a **hidden file** in the same directory, which here is named as **.metadata.txt**.

The size of the test file can be seen to be reduced to 3 bytes and output is 1, as it is the repeating sequence.

```
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ./deconstruct.py test 3
1
kalpak@kalpak-vm:~/Desktop/Soroco$ ls -al
total 32
drwxrwxr-x 2 kalpak kalpak 4096 Mar 23 20:21 .
drwxr-xr-x 4 kalpak kalpak 4096 Mar 23 20:21 ..
-rwxrwxrwx 1 kalpak kalpak 3174 Mar 23 20:17 deconstruct.py
-rw-rw-r-- 1 kalpak kalpak   19 Mar 23 20:25 .metadata.txt
-rwxrwxrwx 1 kalpak kalpak 1942 Mar 23 20:12 reconstruct.py
-rwxrwxrwx 1 kalpak kalpak    3 Mar 23 20:25 test
-rw-rw-r-- 1 kalpak kalpak  297 Mar 22 23:40 test1
kalpak@kalpak-vm:~/Desktop/Soroco$
```

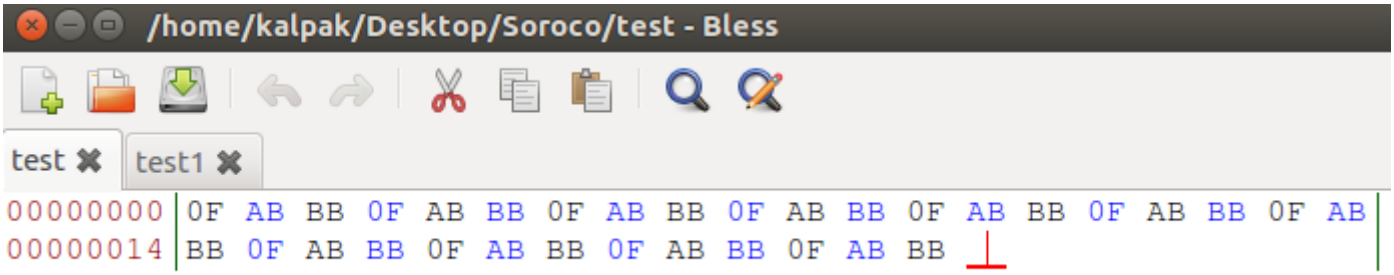
The test file viewed in bless editor:



On running the reconstruct script, it can be seen that the original test file has been retrieved back and the size is again 33 bytes.

```
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ./reconstruct.py
kalpak@kalpak-vm:~/Desktop/Soroco$ ls -al
total 32
drwxrwxr-x 2 kalpak kalpak 4096 Mar 23 20:21 .
drwxr-xr-x 4 kalpak kalpak 4096 Mar 23 20:21 ..
-rwxrwxrwx 1 kalpak kalpak 3174 Mar 23 20:17 deconstruct.py
-rw-rw-r-- 1 kalpak kalpak   19 Mar 23 20:25 .metadata.txt
-rwxrwxrwx 1 kalpak kalpak 1942 Mar 23 20:12 reconstruct.py
-rwxrwxrwx 1 kalpak kalpak   33 Mar 23 20:26 test
-rw-rw-r-- 1 kalpak kalpak  297 Mar 22 23:40 test1
kalpak@kalpak-vm:~/Desktop/Soroco$
```

The test file after retrieval:



The metadata which I have stored is displayed here:

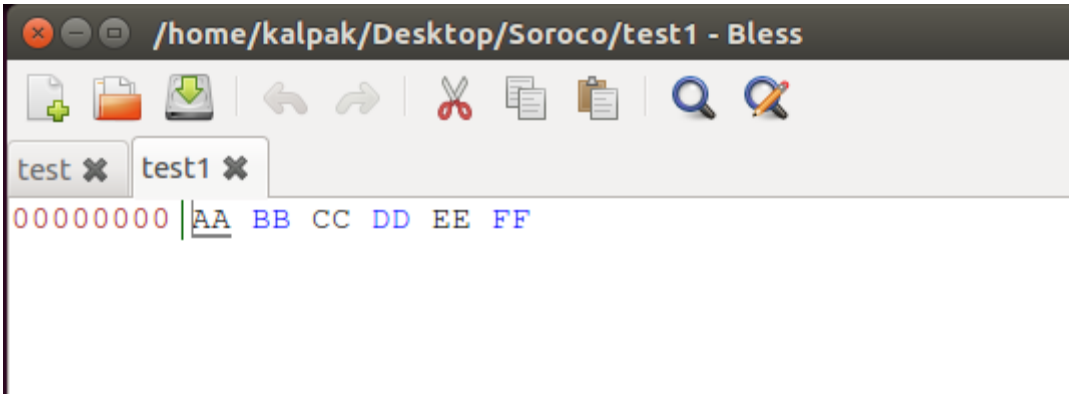
I am storing the filename, data and their corresponding repetition, which are delimited by characters of my choice.

```
kalpak@kalpak-vm:~/Desktop/Soroco$ cat .metadata.txt
test$15+171+187:11
kalpak@kalpak-vm:~/Desktop/Soroco$
```

The following example runs on **test1** binary file, with **block size = 1**

```
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ./deconstruct.py test1 1
6
kalpak@kalpak-vm:~/Desktop/Soroco$
```

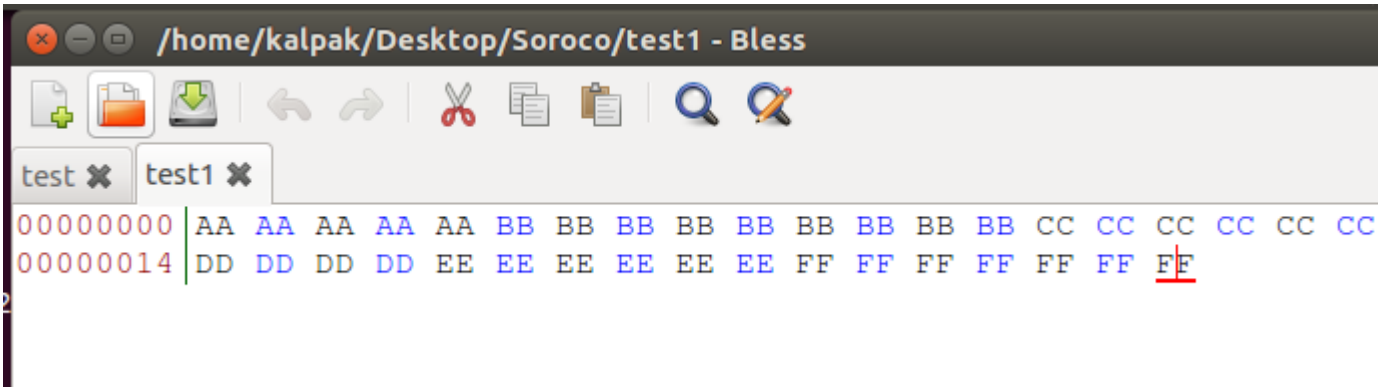
```
kalpak@kalpak-vm:~/Desktop/Soroco$ ls -al
total 32
drwxrwxr-x 2 kalpak kalpak 4096 Mar 23 20:21 .
drwxr-xr-x 4 kalpak kalpak 4096 Mar 23 20:21 ..
-rwxrwxrwx 1 kalpak kalpak 3174 Mar 23 20:17 deconstruct.py
-rw-rw-r-- 1 kalpak kalpak   48 Mar 23 20:27 .metadata.txt
-rwxrwxrwx 1 kalpak kalpak 1942 Mar 23 20:12 reconstruct.py
-rwxrwxrwx 1 kalpak kalpak   33 Mar 23 20:26 test
-rw-rw-r-- 1 kalpak kalpak    6 Mar 23 20:27 test1
kalpak@kalpak-vm:~/Desktop/Soroco$
```



Now considering **block size as 4**

```
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ./deconstruct.py test1 4
10
kalpak@kalpak-vm:~/Desktop/Soroco$ cat .metadata.txt
test1$170+170+170+170:9-170+187+187+187:1-187+187+187+187:10-187+187+204+204:1-204+204+204+204:15-221+221+221+221:15-238+238+238+238:13-238+238+255+255:1-255+255+255+255:9-255:1
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ls -al
total 32
drwxrwxr-x 2 kalpak kalpak 4096 Mar 23 20:21 .
drwxr-xr-x 4 kalpak kalpak 4096 Mar 23 20:21 ..
-rwxrwxrwx 1 kalpak kalpak 3174 Mar 23 20:17 deconstruct.py
-rw-rw-r-- 1 kalpak kalpak  178 Mar 23 20:37 .metadata.txt
-rwxrwxrwx 1 kalpak kalpak 1942 Mar 23 20:12 reconstruct.py
-rwxrwxrwx 1 kalpak kalpak   33 Mar 23 20:26 test
-rw-rw-r-- 1 kalpak kalpak   37 Mar 23 20:37 test1
kalpak@kalpak-vm:~/Desktop/Soroco$
```

```
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ./reconstruct.py
kalpak@kalpak-vm:~/Desktop/Soroco$ ls -al
total 32
drwxrwxr-x 2 kalpak kalpak 4096 Mar 23 20:21 .
drwxr-xr-x 4 kalpak kalpak 4096 Mar 23 20:21 ..
-rwxrwxrwx 1 kalpak kalpak 3174 Mar 23 20:17 deconstruct.py
-rw-rw-r-- 1 kalpak kalpak   48 Mar 23 20:27 .metadata.txt
-rwxrwxrwx 1 kalpak kalpak 1942 Mar 23 20:12 reconstruct.py
-rwxrwxrwx 1 kalpak kalpak   33 Mar 23 20:26 test
-rw-rw-r-- 1 kalpak kalpak  297 Mar 23 20:28 test1
kalpak@kalpak-vm:~/Desktop/Soroco$
```




```
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ./reconstruct.py
kalpak@kalpak-vm:~/Desktop/Soroco$
kalpak@kalpak-vm:~/Desktop/Soroco$ ls -al
total 32
drwxrwxr-x 2 kalpak kalpak 4096 Mar 23 20:21 .
drwxr-xr-x 4 kalpak kalpak 4096 Mar 23 20:21 ..
-rwxrwxrwx 1 kalpak kalpak 3174 Mar 23 20:17 deconstruct.py
-rw-rw-r-- 1 kalpak kalpak  178 Mar 23 20:37 .metadata.txt
-rwxrwxrwx 1 kalpak kalpak 1942 Mar 23 20:12 reconstruct.py
-rwxrwxrwx 1 kalpak kalpak   33 Mar 23 20:26 test
-rw-rw-r-- 1 kalpak kalpak  297 Mar 23 20:39 test1
kalpak@kalpak-vm:~/Desktop/Soroco$
```