

# Merging of External Removable Storage Drives Using Drive Merger

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## Abstract

This paper proposes informative process approach regarding Merging of two or more External Removable Drivers (MERD) to the computer. This helps users to merge two or more external removable drivers to merge and increase the storage capacity for best optimised usage of the left over low level storage drivers with High data security which will reduce e-waste as well and also it works as a combination of both merger and USB extender as per the user selected drives.

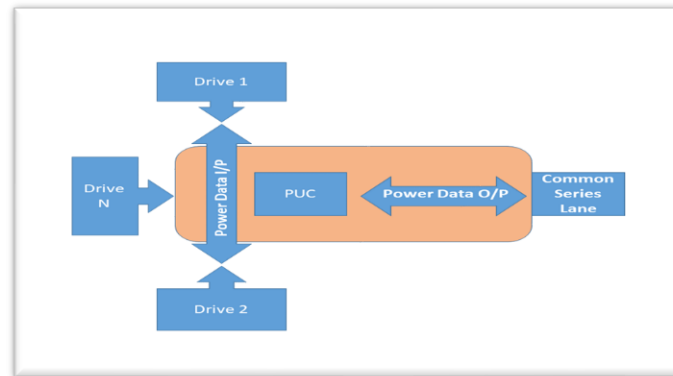
**Keywords:** Optimisation, MERD, Merging, Storage, Cache Memory, Extender, Drives

## I. Introduction

In Good olden days, the hard disk capacity followed by RAM of a computer was upgraded by extending hard disk by adding extra hard disk of required capacity and also extra RAM's were added to speed up the computer processing as required [1]. Similarly let's start new approach of merging removable drives and upgrade their storage capacity.

In our daily life's, we usually keep many removable drives which has less storage capacity where an individual is not able to use it to his maximum requirements due to limited low level storage capacity. For example, when there is situation where a user wants to transfer or store a software, images, videos, etc., which has total file size of 14 GB but the capacity of the removable drive he has is 8 GB, which is not enough to store or transfer the files but he also has second removable drive which has storage capacity of another 8 GB. It would be useless though the user has the desired storage as two individual drives when the desired transmission of the secondary device is not around reachable area or when the data file that needs to be transferred as a single entity as we cannot split into two halves'. When you try to check about the storage merging concepts, all we have is, we can partition a single drive into two or more storage folders when connected to the computer and also we can merge it back by internal formatting but we cannot merge two different drives when connected nor split.

Hence, this research paper would like to propose the new hardware component into computer generation to merge pen drives or hard drives to a single entity unit, by default, when drives are attached to merger and connected to the pc/laptop, it would work as an extender and works as merger when the user selects his desired drivers and opt the merge option to merge the selected drives into one single individual storage entity [2]. when connected as merged drives in one series lane to store and transfer the files safely without any data loss and use the storage capacity to its maximum without any wastage and this merger can be used in parallel lane as USB extender with three inputs and one output.



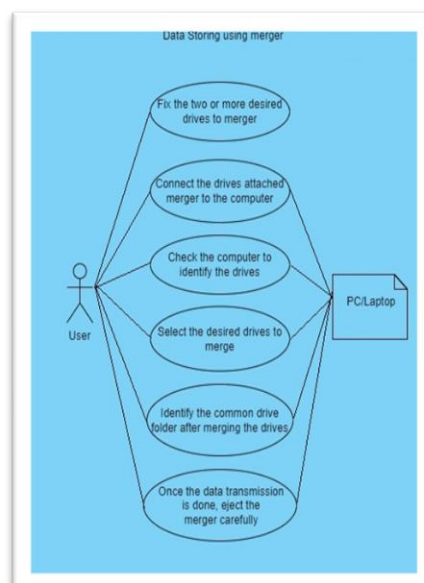
**Figure 1.1: The Working Model of Drive Merger**

This futuristic concept can be future to many unused left over pen drives or other removable drives, which are related to storage and data transfer shown in figure 1.1. One more highly considerable factor in the growing world of computers is **data security**, while using this process of data storing and transferring externally can help us provide security by unmerging the stored data into two equal halves when connected with two external drives to store and transfer [3]. Once after the files/folders are transferred, the merger would transmit the data equally into the drives and can be unplugged from the drive merger after you successfully eject from your pc/laptop and transport it to the destination safely with security.

As even after providing an encoded data in an external drive or with a password protection, which can be decoded or can break the passwords using some special software tools now a day’s. But, even if someone tried to steal the drive which h consists of data needs the other drive as well to access the data which was split into two equal halves hence this process acts as an additional protection to the user.

## II. Procedure

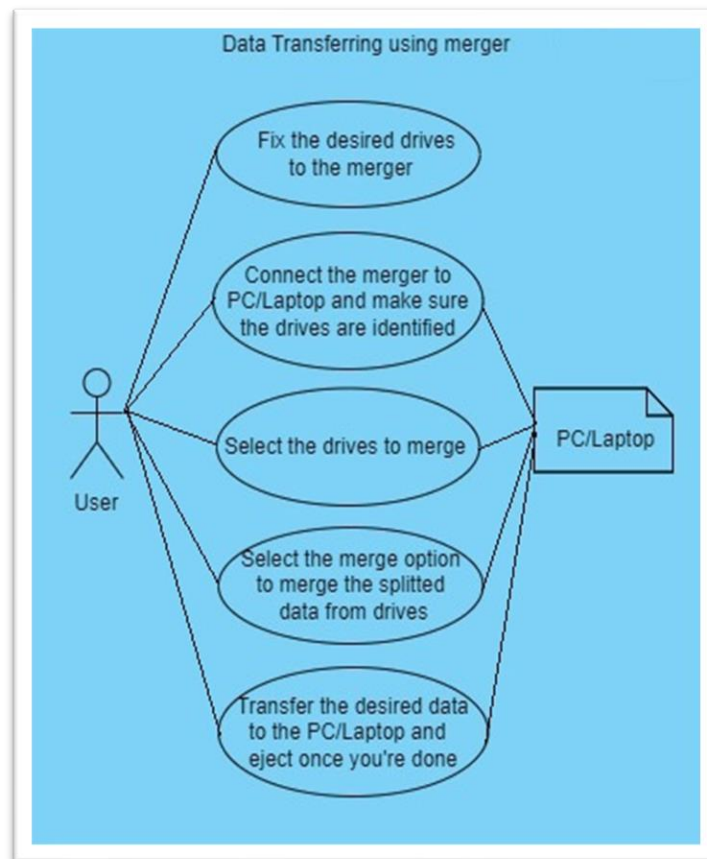
It would be an excellent choice to reuse the left over old unused pen drives and hard drives by merging their low level storage capacities into one single series lane entity by using an external component called **Drive Merger**.



**Figure 1.2: Use Case Diagram of Storage Process**

The Use case diagram 1.2, represents the steps that would be involved in the procedure to work out the merging process of the drives by opting the merger option. Initially, prepare the drives which are available, which can be pen drives or hard disks, fix them to the driver merger in the right place in right direction and then connect them to the computer. See whether the computer recognises the connected drives through merger. Once the computer recognises the drives, select the drives that you want to merge and right click on those to choose the option to merge drives. The merged drive storage is the combination of drives which shows as a single entity to store data. The merger would notify the user that, “The merge is successful” as a pop up. Now the user can transmit his/her files followed by carefully eject from pc/laptop once the data transfer is finished and carefully unplug the driver merger and the external drives.

The use case diagram 1.3, represents the process of transmission in the final stage of data transfer to the users defined destination without any data loss or security breach. Initially, prepare your external drives attached to the drive merger followed by connecting to the pc/laptop with merger.

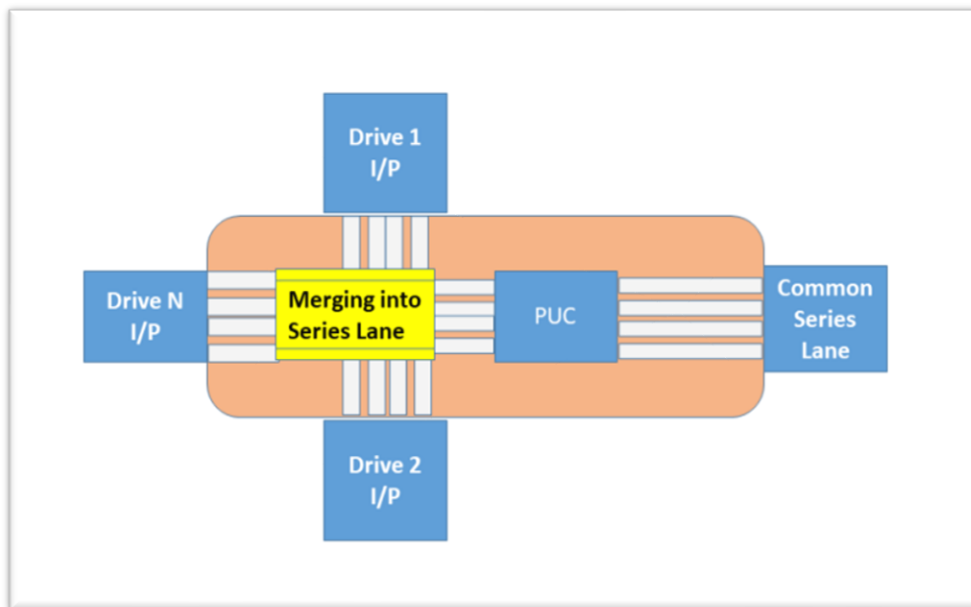


**Figure 1.3: Use Case Diagram of data transfer Process**

Make sure the drives are identified by the computer, now select the drives again which were used in the process of data storage that consists of files to be transferred to this pc/laptop. Now right click and select merge option which will automatically combine the selected drives and pop the single storage entity. The user would be now ready to open and access his desired files and transfer them into the pc/laptop, eject once the task is accomplished.

### III. Implementation

There are three major factors that the merger consists of, **Processing Unit Chip (PUC)**, **Data-Power Input, Data-Power Output** as shown in the figure 1.4. Here the PUC has the main processing code of merging the drives and cache memory to recognise the split data followed by data-power input which has the key to interconnect the drives without any loss of data and power with series circuiting as shown in the figure 1.4, the merger series lane is shown as one common source with two different drives attached and data-power output is responsible for producing the merging results to the computer as single entity without any loss of power and data to or from computer while transmission and also for detecting drives. The merger can be used as extender while user using the merger to merge two drives out of third drive connected for processing the data, user would be provided an option of merging selected drivers upon the interest of user. Once the data is stored in the drive, when the drives are unplugged from the merger and also the computer, the cache memory would make a record of the data split into the drive when later on connected to transfer the files.



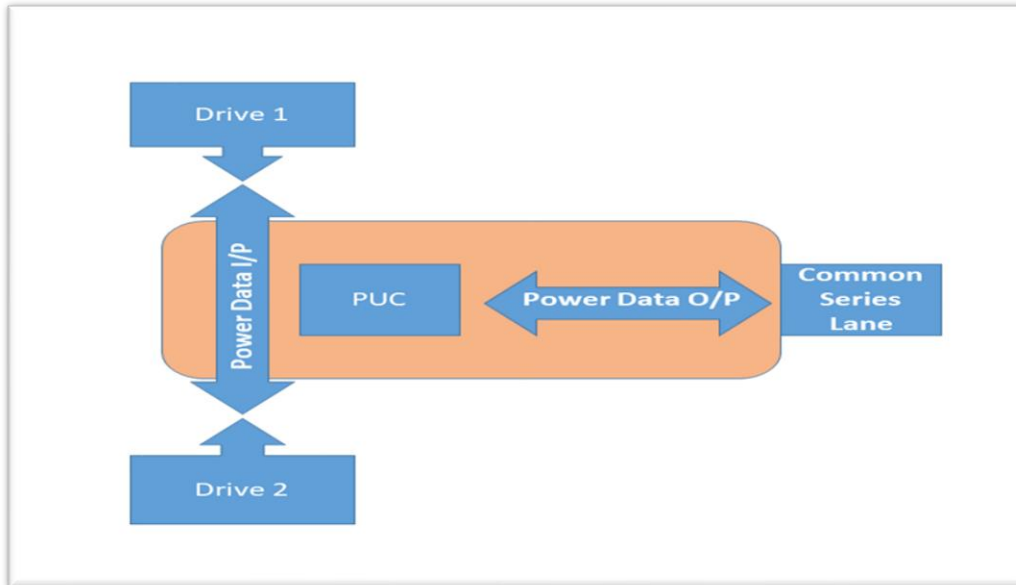
**Figure 1.4: Series Lane Connecting View**

when it is time to transfer the files into the destination computer by connecting the drives to the merger, the cache memory in the PUC of the merger would identify the split data from the two or more drives and passes over the signal to the PUC and helps to merge the drives upon the user select the merge option and display the stored data without any data loss.

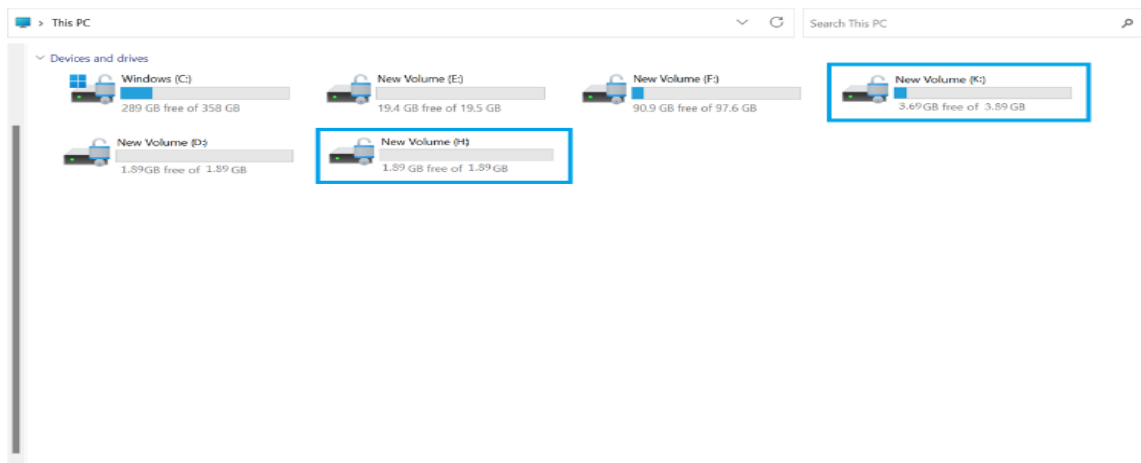
The main key task would be the series lane circuit board connection, where we need to be careful in proceeding the series joining of the circuit lines to differ from power lane and data transfer lane and maintain the individual series lane connections without any interruptions and drive corruption shown in the figure 1.4. It is mandatory as, drives connected should not be removed or disturbed while transferring the data or in working mode.

The implementation is shown in the figure 1.5 for two drives merging to upgrade their storage capacity. Consider two pen drives with 4 GB and 8 GB respectively which after merging, it would be around 12 GB. When the drives 1 and 2 are fixed in their positions as shown in figure 1.5, the power and data lanes will be merged into the main series lane as input and reach out the PUC (Processing Unit Chip) which will

take the drive 1 n 2 data and power lane in a series and combine into one single storage drive outcome. The drive will be connected to the computer through the power-data output lane to make sure the external drives could be found when connected to computer.

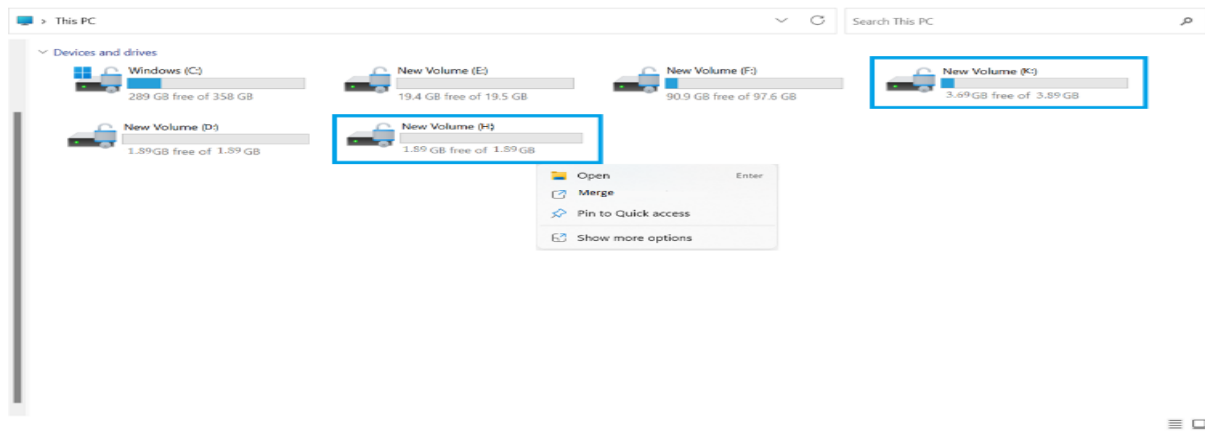


**Figure 1.5: Two Drive Merging Working Model**



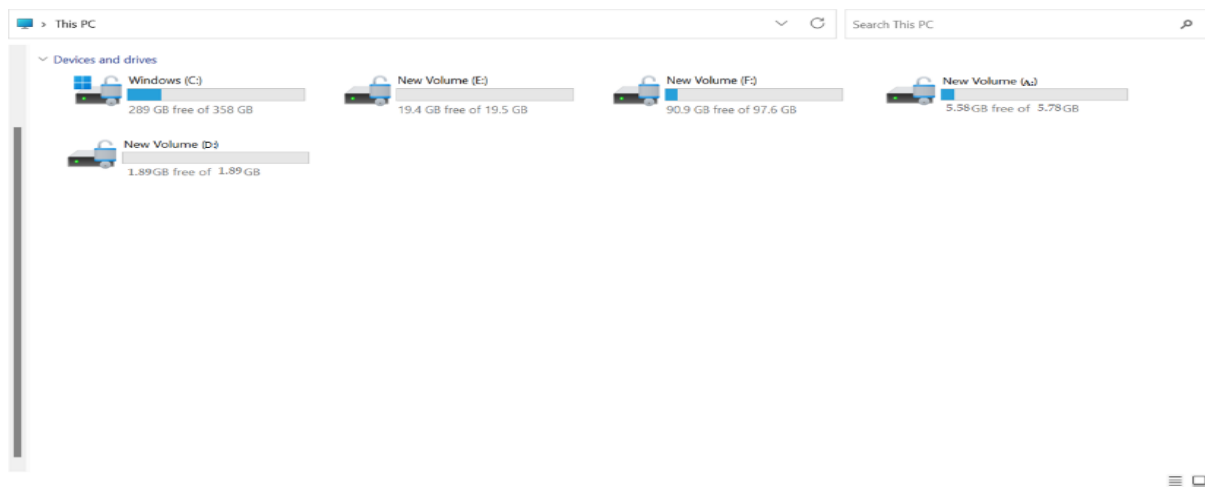
**Figure 1.6: Real time working model for selected drives**

Figure 1.6 represents the real time example of working model of the drives connected to the merger where there are more than two to optimise the storage capacity. Where the user can connect three or use USB extender to connect drive merger and connect many pen drives to connect the merger, which connects the computer, which increase the storage capacity but still, it is not recommended not to connect more than three drives at once as it can lead to data loss or circuit corruption which can lead to hardware issues soon or later on.



**Figure 1.7: Real time working model for opting Merge option**

The figure 1.7, represents the real time working model for opting merge option by the user after selecting the desired drives to merge, this will combine the storage capacities and optimise the working strategy results followed by the figure 1.8 which represents the real time working model for demonstrating the driver merger’s merging process by the user, where the user can utilize the optimised storage to his maximum upgrade as shown in the figure 1.8.



**Figure 1.8: Real time working model for demonstrating drive merger merging process**

Though we can connect N number of drives using an extender but still preferred number would be two or three for efficient and maximum optimised results with speed, but if there are more number of drives connected, the efficiency and speed will be reduced as it gets way to complex and complex when new drive is connected one by one by using another extender connect to the drive merger followed by circuit internal lane damage.

#### IV. Applications

1. The leftover Pen drives can be used efficiently now without any hesitation.
2. With an efficient usage, we can reduce the unused junk that people leave often here and there which will automatically reduce e-wastage [4].
3. Best way to store or transfer files with huge data where there is no internet.

4. Pocket size drive merger can be used both as merger and extender which we can carry anywhere anytime easily.
5. User can access the files/folders, which are previously stored in drive without any effect on data after merging drives also.
6. As the data is stored in terms of split data in different drives after merging, the both drives acts as two triggers in terms of security, where to access the files those are stored in the drivers using merger needs the two drives to access it, without the second drive the first drive won't be helpful to access the data. Highly confident information can be transported using this split data concept which will provide security in terms of encoding-decoding or password cracking and hacking as well.

## V. Limitations

1. Need to buy/borrow the external pen drive merger before using this concept of merging the storage capacities of two or more pen drive/ hard disks.
2. Need to carry the merger everywhere when there is a requirement, absence of the merger cannot help solving the issue.
3. Removing or disturbing the merger while data transmission while it is active would lead to data loss or the drive can be corrupted.
4. For preventing data loss, we should connect the drives to the merger and then connect to the computer rather than directly connect drives which has the stored split data when you want to transfer to another computer.
5. Need to be careful about the drives which consists of the split data stored in the drives as, even if one drive is missing or lost can lead to data loss and data cannot be recovered.

## VI. Conclusion

The concept of merging is never a new concept but using this concept in a rightful way defines the better usage of this concept. It would be one best approach for merging of external drives to upgrade storage instantly without any internet source and computer software dependency by using the drive merger. Though we can connect more than two drives but it is advised to merge not more than two or three only for better efficient usage and there won't be any interruption while data transfer or storage in terms of speed, recovery and quality. This is hardware merger for now, in future software inbuilt in both windows and mac would be a new generation update for reducing complexity of carrying the drive merger. It would be a better choice to back up the data which is already in the drives before you start this process of data transfer as there are few exceptional cases where data loss can happen. As of now, it is only pen drives and hard drives but in future we can include the micro SD cards as well. People now can no need to buy extender and a merger to utilize this concept as the drive merger would also act as both merger and extender too. Reusing the left over low limit old drives is the main agenda of this concept which will partially reduce the e-wastage in the environment.

## VII. References

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