



Elastic Quota File System (EQFS)

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Introduction

- **Typical Network Scenario**

- **Different types of users with different needs**
- **Variable quota usage**
- **Not practical to set different quota limits for large number of users**
- **Loss of user space if users do not use the quota allocated to them effectively**
- **No flexibility**

Some Statistics

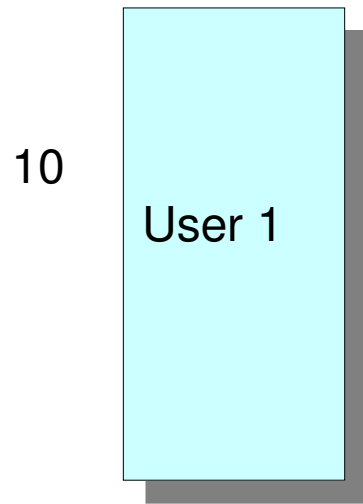
- **At 95% of the times all the users don't use 100% of their quota**
- **47% of the users use 60% of their quota**
- **22% of the users use less than 15% of their quota**

Source: based on a study results by BCC Inc. on popular email services

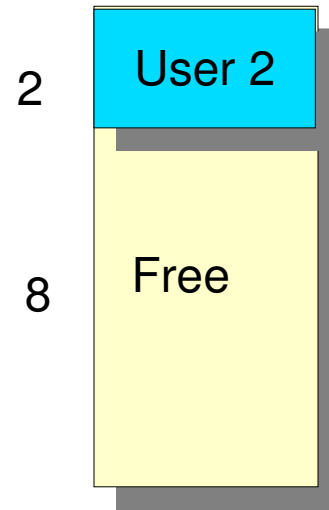
What is EQFS?

- **EQFS is Elastic Quota File System**
- **EQFS:**
 - **Provides controlled flexibility for users to effectively use more than the allocated quota**
 - **Handles variable quota usage**
 - **Eliminates the need to assign different quota limits for users with variable needs**
 - **Provides disk limits for a network irrespective of any user quota**
 - **Postpones deletion of files on crossing the quota limit**
 - **Extends the quota limit on requirement by allocating free unused user space**

How it works?

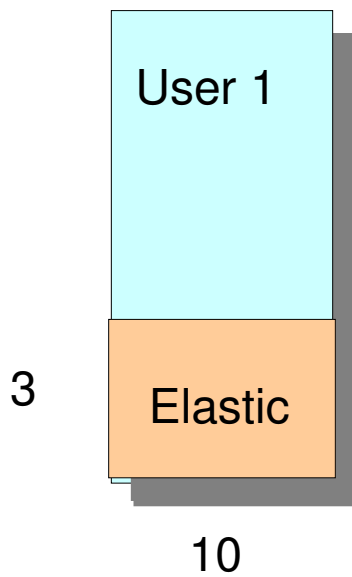


User 1

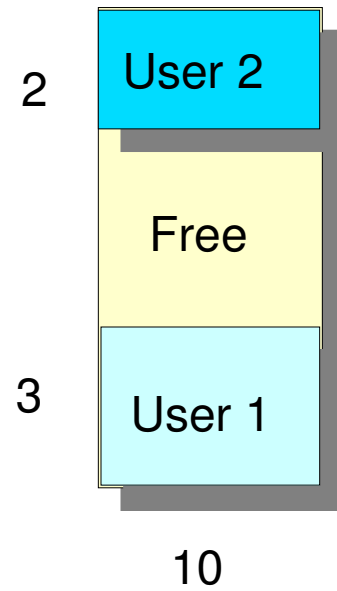


User 2

How it works? Contd...

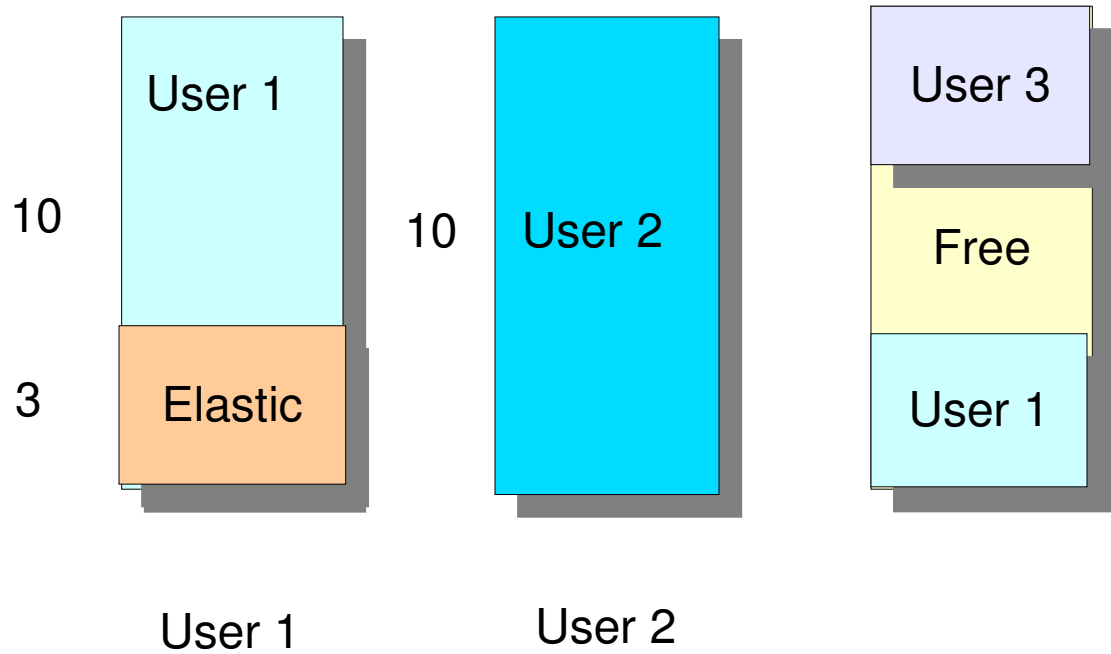


User 1



User 2

How it works?



What is EQFS?

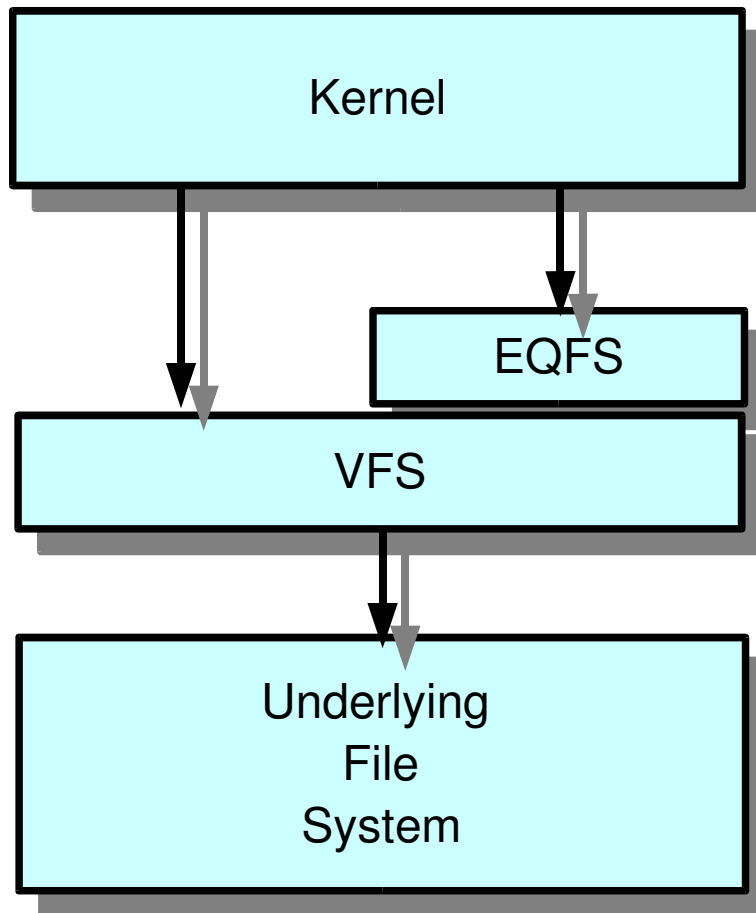
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EQFS Operation

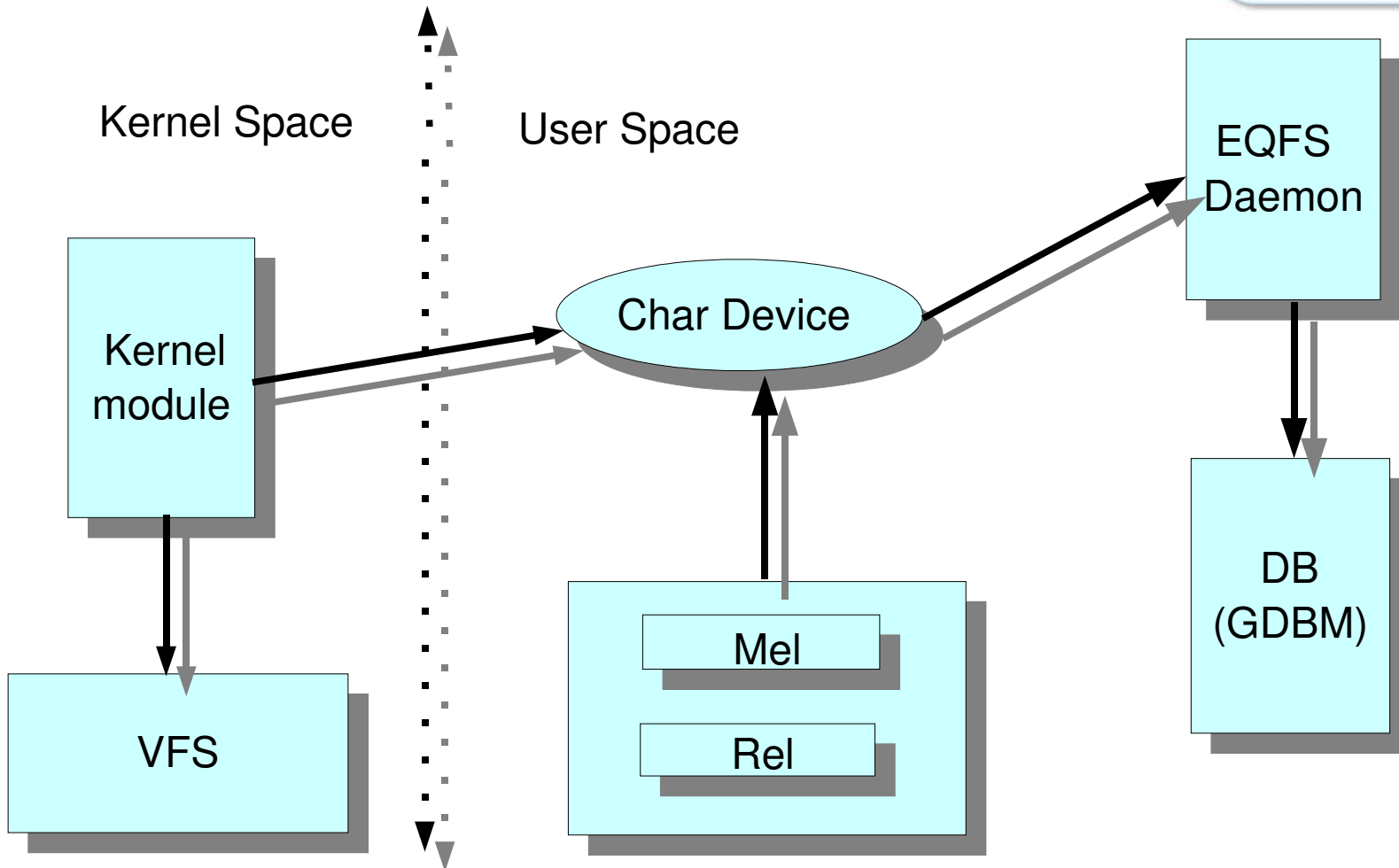
- **Elastic files**
- **When to make files elastic**
 - When quota is full and you need additional space
- **What happens when a file is made elastic**
 - Owner's quota is increased by amount of that file's size
 - That elastic file belongs to the same owner
 - The additional space is taken from others unused space (0.95)
- **Which files to make elastic**
 - Files with less importance
 - Temporary files
- **Risk involved**
 - When the thresholds(user,disk,group) are reached, the elastic files are acted upon as per the policy set (0.05)

Where is EQFS?

- **EQFS** is a thin file system layer above **VFS**



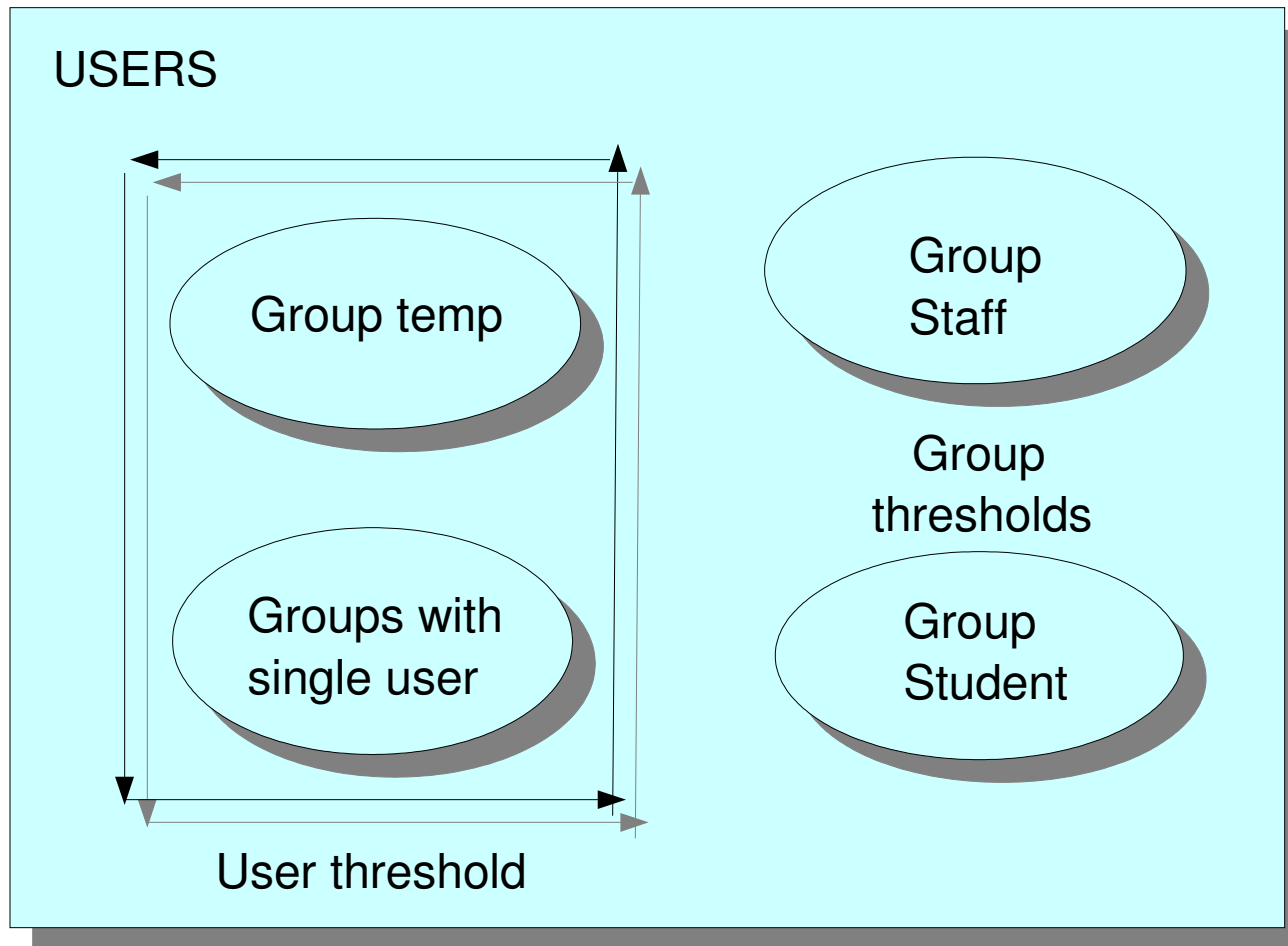
EQFS Architecture



Thresholds

- **EQFS works around 3 Thresholds**
 - **User Threshold**
 - **Disk Threshold**
 - **Group Threshold**

Thresholds contd...



EQFS Commands

- **EQFS provides following commands for the user**
 - **Mel – make elastic**
syntax: **#mel <filename> <operation> [parameter]**
filename: path to the file
operation: action to be taken on the file
parameter: destination in case of move & compress
 - **Rel – remove elastic**
syntax: **#rel <filename>**
 - **Sel – Show elastic**
syntax: **# sel**

Benchmarks *(using Caldera AIM Independent Resource Suite IX)*

- **Without EQFS**

- **CPU (thousand ops per second)**

	Add	Div	Mult
Short	2354400	29160	346830
Int	2215568	30119	394525
Long	2271768	30708	375312
Float	766800	129000	432000
Double	766800	125400	461077

- **Disk / File System / IO (per second)**

Dir searches	34950	
Copy	56945	Kb
Seq Read	247048	Kb
Create / Close	142300	files
Link / Unlink	54085	pairs

Benchmarks *(using Caldera AIM Independent Resource Suite IX)*

- **With EQFS**

- **CPU (thousand ops per second)**

	Add	Div	Mult
Short	2354308	29605	346826
Int	2215448	30106	394522
Long	2271429	30746	375309
Float	766670	128920	431969
Double	766650	125379	461075

- **Disk / File System / IO (per second)**

Dir searches	34946	
Copy	56940	Kb
Seq Read	247044	Kb
Create / Close	142229	files
Link / Unlink	54064	pairs

Advantages

- **EQFS maximises the server space utilization for the users**
- **EQFS meets the variable quota needs**
- **Transparent reclaiming mechanism**
- **Avoid the individual allocation of quota for users with different needs, which is not practical where the number of users are large**
- **Handles the group quotas and keeps the overall usage within check without internal interference**
- **Postpones the deletion of files unless the threshold is reached**

Advantages contd...

- **EQFS is**
 - **Independent of the underlying filesystem**
 - **Works with the standard quota system (libquota, edquota)**
 - **Low CPU usage**
 - **Transparent to the user**

Thank You!

Further Info: eqfs.sourceforge.net



may the source be with you

Questions...

