

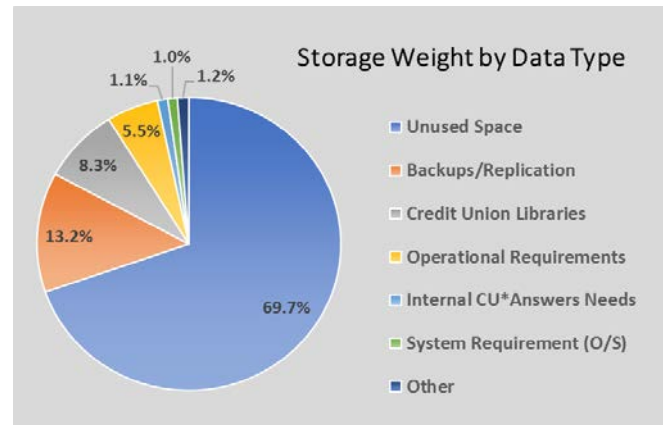
PROD - System Storage Analysis

February-2017

Across the network, momentum is growing behind credit union interest in data and looking at operations analytically. As more credit unions incorporate data strategies into their operations we see increasing questions surrounding CU*Answers data policies. Can we retain additional history within CU*BASE? Where can I store data I want to keep? Can CU*Answer's resources be used in these strategies? Does CU*Answers have the required capacity to store more of my data, and how would such services be priced? To start us towards answering these questions the following analysis was conducted.

Today, PROD has a maximum storage capacity of 24 Terabytes

	Total Size (Gigabytes)	% of Total Disk
Unused Space	16,931.1	69.7%
Backups/Replication	3,208.4	13.2%
Credit Union Libraries	2,006.6	8.3%
Operational Requirements	1,337.2	5.5%
Internal CU*Answers Needs	269.0	1.1%
System Requirement (O/S)	246.7	1.0%
Other	293.5	1.2%
	24,292.4	



Today, we are using roughly 30% of our total storage capacity. Of the space being used, approximately 71% of it is used for credit union data (CU libraries and backups/replication). Although it appears that there is excess capacity there are a few other factors we must consider. CU*Answers leases our IBM servers typically for 36-month terms. This server is in its first year of production meaning we must be prepared to accommodate over two years of growth, both in terms of conversions as well as new CU*BASE features. Additionally, it is important to consider our end-of-day routines, where disk utilization spikes during stand-in and as FILEx libraries are backed up. Finally, it is best practice to keep disk utilization under 80% to ensure optimal server performance.

7.3 terabytes of data is currently stored on PROD

When considering the storage demand implications resulting from adjustments to retention policies, we are primarily talking about credit union libraries. Backup and replication processes and their storage demand will also need to be considered, but roughly a third of the data that is stored on PROD would not be materially impacted by adjustments to retention periods. In the following pages we analyze the makeup of credit union libraries and calculate the estimated storage impact of potential adjustments to retention policies.

Credit Union Files, by Storage Size

The table below aggregates the total storage requirement of like files across all credit union libraries. Insight into current retention schedules helps to further quantify the data. Interestingly, Trackers represent the largest files, combining to approximately 500 gigabytes or half a terabyte, which represents 2% of total system resources.

Table/File	Table/File Description	# of Occurrences	Total size for all online CUs	Table/File Retention
TKLRHN (*)	Tracker (headers)	173	365.3 Gb	
TKLRDN	Tracker (details)	173	133.5 Gb	
TRANS/HTRANS (*)	Member transactions	173	83.5 Gb	Configured by CU
OFACNOTE (*)	OFAC non-members	173	75.9 Gb	Since 08/2016, no purge. Reg requirement?
TRDESC (*)	Extended transaction descriptions	173	57.4 Gb	Purges in conjunction with HTRANS purge
ACHADA (*)	ACH addenda info	173	55.9 Gb	Retain most recent 90 days. Archive 7 days.
CBTRPTH (*)	Credit bureau reporting history	173	37.8 Gb	Since 10/2016. Unsure of purge.
GHITRN (*)	G/L tran audit (bread crumbs?)	173	37.4 Gb	Since 01/2015. Unsure of purge.
GLHIST (*)	G/L history	173	28.5 Gb	Since 01/2015. Retain 24 months.
SMNOTEDT (*)	Secured message center e-notice detail	173	23.2 Gb	Since 12/2008.
CRDDTLP	Credit card details	173	21.0 Gb	
COSLOG	National shared branching log	90	19.0 Gb	Purge being fixed.
AKACCT (*)	Akcelerant	2	19.0 Gb	Daily file. Archive 7 days.
TIERDS (*)	Tiered services point history	173	16.9 Gb	No purge.
GLBALA (*)	G/L balance	173	16.1 Gb	
STMAUDIT	Member statement audit from vendor	169	15.9 Gb	Since 01/2010. No active purge.
MSCSECH (*)	Miscellaneous secured history	173	13.9 Gb	Retain most recent 90 days.
CRBRPT	Credit reports pulled	173	9.7 Gb	Retain most recent 6 months.
SMMBRMDT	Secured message center detail	173	8.7 Gb	
MBRBAL	Member balances by year/month	173	8.6 Gb	Since 2013. No purge.
FORMLN	E-Forms log	173	8.0 Gb	
MBALDET	G/L member balance totals	173	6.8 Gb	Since 12/1996. No purge.
TAX	Tax info	173	6.0 Gb	Since 2005. No active purge.
AHDET	Audio/home banking totals	173	4.6 Gb	Since 09/2003. No purge.
CRDHRH	Credit card statement data	173	4.5 Gb	Since 11/2005.
PCMBRPINH (*)	Online banking PIN change history	173	4.4 Gb	Since 02/2016.
ACHDST (*)	ACH distribution master	173	4.4 Gb	Special purge of dormant records.
LNHIST	Loan history for risk analysis	173	4.2 Gb	Since 04/2013.
TA1	Teller audit keys	173	3.8 Gb	Since 01/2017. Retain xx days.
SVJRNL	Supplemental vault journal	173	3.8 Gb	Since 12/2012. No active purge.
SMMBRMHD	Secured message center header	173	3.7 Gb	
AUDICC	Audio/home banking usage	173	3.6 Gb	Since 11/2016. Retain most recent 90 days.
COMMLN	Loan application comments	173	3.3 Gb	
PLASTIC	Plastic card info	173	2.9 Gb	Rebuilt every night with ATM/Debit info.
APYTIS	TIS info for statements	173	2.8 Gb	Since 12/2012. No active purge.
ACHXCP	ACH exception work file	173	2.3 Gb	Needs a file reorg in ACH processing.
PANRCNV	PAN recon file	173	2.3 Gb	Daily file.
COMMNT	Household comments	173	2.0 Gb	
CSHINV	Supplemental vault cash inventory	173	1.9 Gb	Since 08/1994.
ACHIST5	Closed closed-end loans	173	1.9 Gb	Closed accounts. Retain all closed accounts.
PCMBRCFG	Online banking member preferences	173	1.8 Gb	Active and closed records.
NSFTR	NSF transaction detail	173	1.8 Gb	Since 01/2015.

(*) - Represents combined storage size of physical data as well as supporting indexes

End-of-Month Retention Analysis

Currently as an online offering, CU*Answers provides 3 months of EOM files. This allows credit unions to pull reports and run queries over the previous three EOMs. Should the need arise for historical EOM files to be loaded back into PROD, CU*Answers performs this service by request for a fee of \$25 per EOM. Within 2016, 63 EOM reloads were requested generating \$1,575.

Today, FILExxE End-of-Month Files Total 299 gigabytes

As this figure represents 3 sets of EOM files, we can divide by 3 to calculate the current average storage requirement of a single set of EOM files for all online credit unions, **99.6 gigabytes** or 0.41% of total system resources.

All Online Credit Unions (PROD)

	Total Size	% of System Total	Average Per CU
Current FILExxE EOM file size (3mo)	298.9 Gb	1.23%	1.7 Gb
Current FILExxE EOM file size (1mo)	99.6 Gb	0.41%	0.6 Gb

The above chart can be used to easily multiply out the projected impact of adjustments made to retention schedules. For example, from a pure storage perspective, doubling the retention in CU*BASE to 6 months of FILExxE EOM files would result in an increase of approximately 299 gigabytes of additional storage, representing 1.23% of additional system resources consumed.

Each additional EOM file set adds approximately 100 gigabytes of data, or 0.4% of total resources

**Note - File sizes vary wildly by client, although the average is 1.7 gigabytes per credit union, the largest data user's 3 EOM file sets requires over 25 gigabytes of storage.

Member Transactions Retention Analysis

Currently as an online offering, CU*Answers provides credit unions with 6 months of history of checking and savings transactions and 24 months of other transaction types such as loans and certificates. Credit unions have the option to expand these retention periods at a cost of \$10 per month, per product. Currently 11 credit unions have elected to expand one or more of their retention schedules, in total generating \$1,800 a month in additional retention charges.

Today, FILExxE transactional data totals 81.5 gigabytes

As this data must be studied in aggregate, it is difficult to project the impact of adjustments to the retention term of just a single transaction type. To clarify, 6 months of savings transactions varies greatly from 6 months of checking transactions. Also note, the already purchased retention extensions are included within these figures.

For the sake of argument, should these retention schedules be doubled, it is expected that total storage required would also double, requiring an estimated 81 gigabytes of additional storage, representing 0.34% of additional system resources consumed.

WARNING - it is critical that all aspects of increased data be taken into account when considering changes to retention schedules. This report details estimated changes to credit union libraries but does not include the impact on data backups or replication, Query response times, or EOD cycles.