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# Dynamic Ledger: a tutorial

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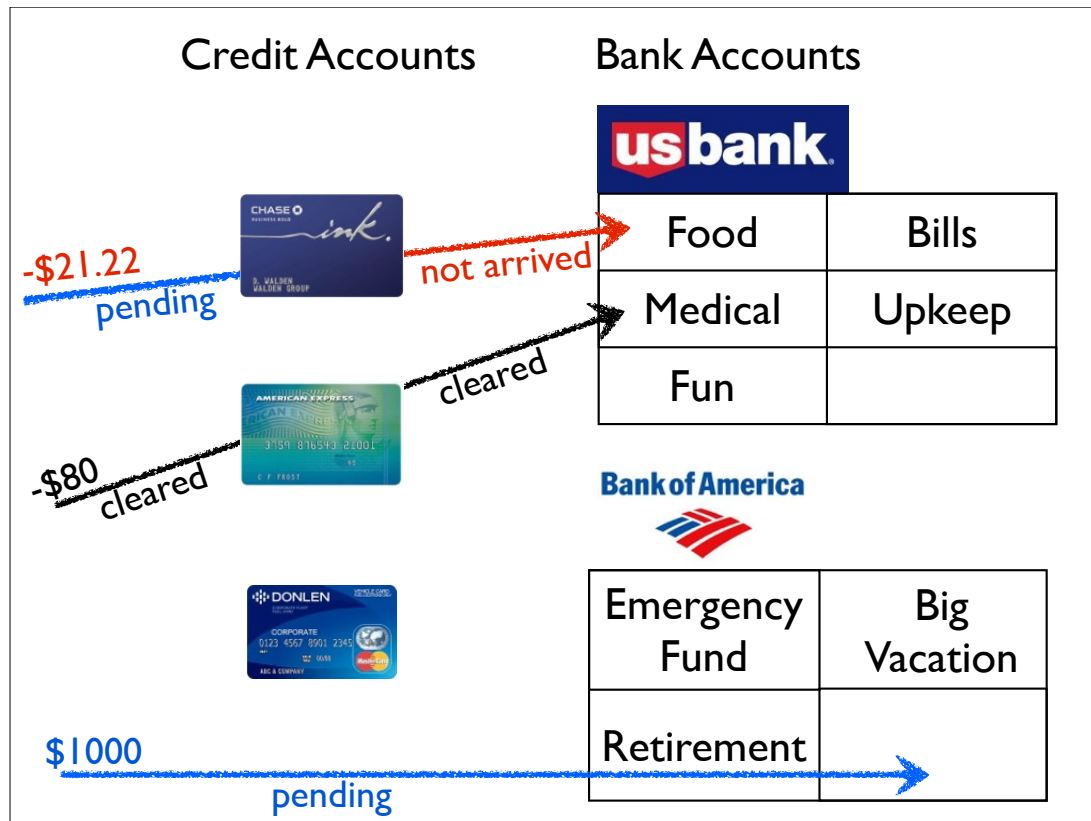
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## 1 Introduction and basic usage

Dynamic Ledger is a standalone C program for managing personal finances. Unlike most other accounting software, it takes into account transaction delays and multiple credit accounts when it computes summaries. It also allows the user to easily condense the ledger periodically so that the file remains lightweight over time.

According to the program's conceptual model, transactions flow through credit accounts and eventually arrive in partitions of bank accounts (i.e., Food, Bills, Medical, etc.).

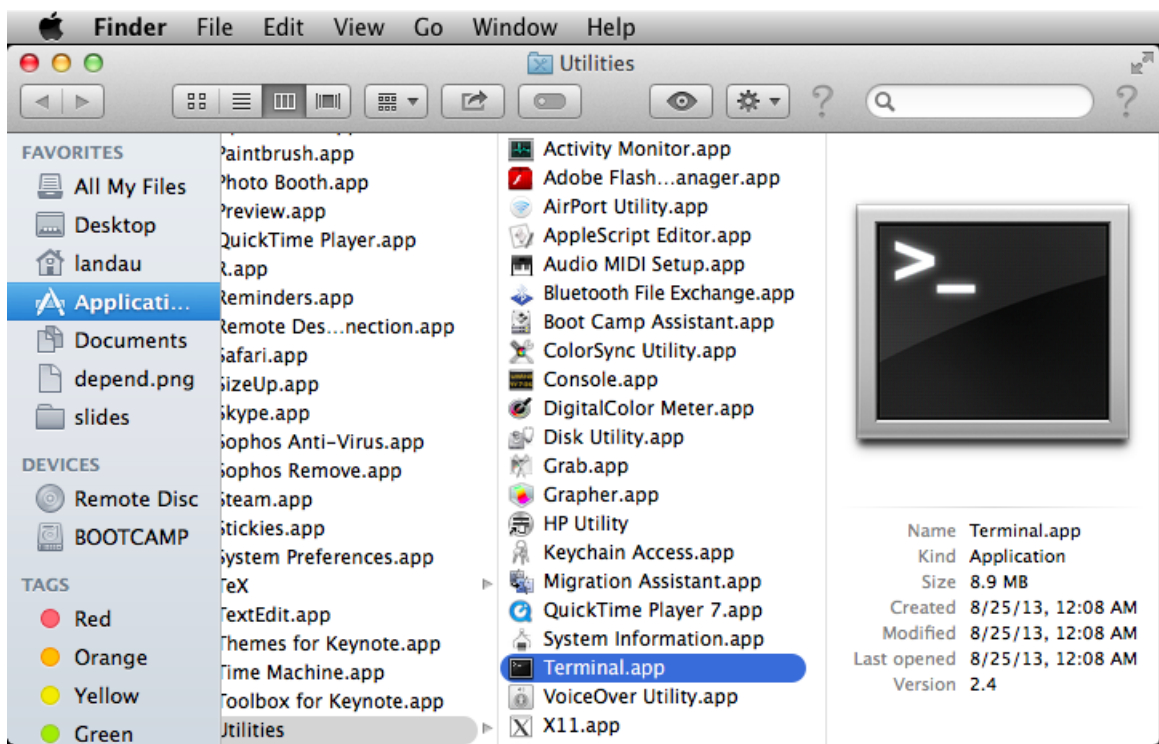
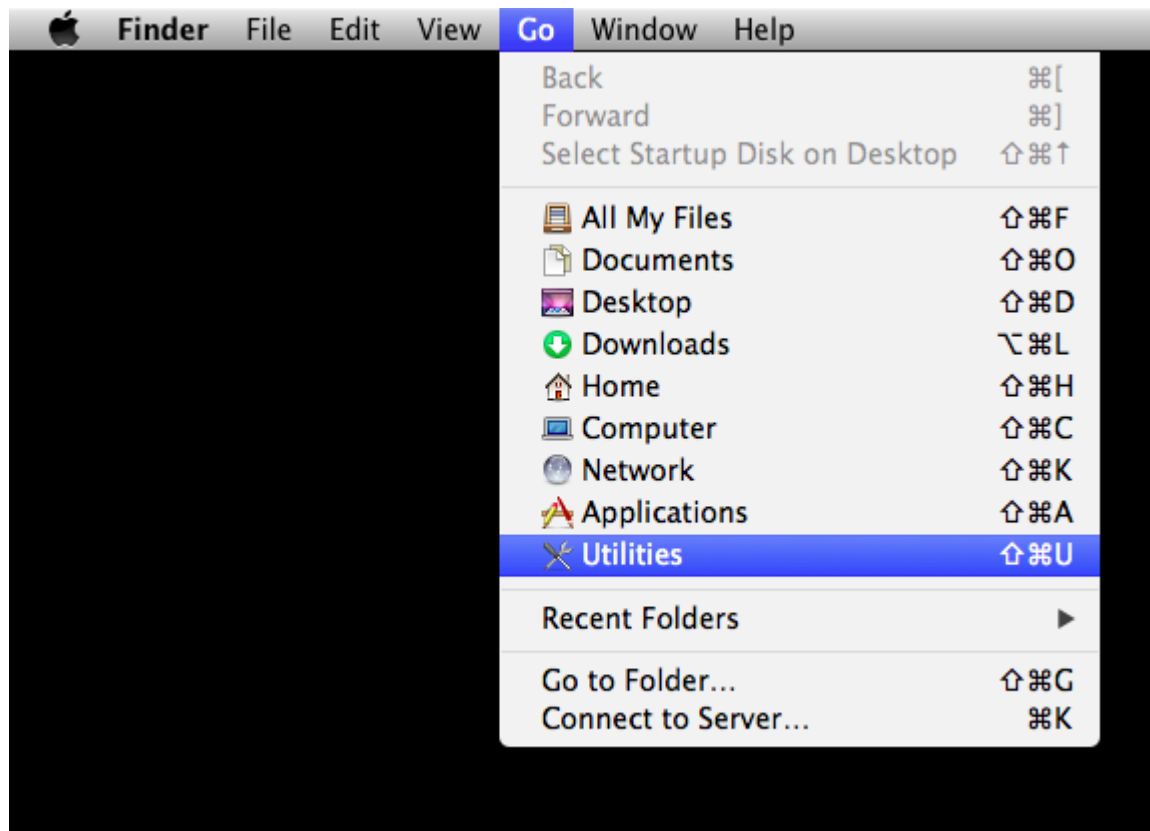


The amount, delay status, credit account, and bank account of each transaction are recorded in a tab-delimited file. For example,

example_ledger1.txt					
amount	status	credit	bank	partition	description
-21.22	cp	chase ink	us bank	food	groceries 12/7/13
-80		am ex	us bank	medical	coinsurance
1000		bank of am			misc savings

Note that “cp” in the status column indicates a transaction that is pending with respect to its credit account and still completely absent from its final destination bank account. For more information on transaction status codes, please see Section 4.

To output a summary of `example_ledger1.txt` on a Mac, I first locate and open Terminal.



Then, I compile and run the program in a Terminal window.

```

Terminal  Shell  Edit  View  Window  Help
dynamic-ledger — bash
landau.local /Users/landau> cd dynamic-ledger/
landau.local /Users/landau/dynamic-ledger> make --silent
landau.local /Users/landau/dynamic-ledger> ./ledger tutorial/ledgers/example_ledger1.txt

Credit account: chase ink

    Delayed money:
                -21.22  pending

    Balances:
                0.00  "available"
                -21.22  true balance

Bank account: bank of am

    Balances:
                1000.00  true balance
                All charges cleared.

Bank account: us bank

    Delayed money:
                -21.22  not arrived

    Balances:
                -80.00  "available"
                -101.22  true balance

    Partitions:
                -21.22  food
                -80.00  medical

landau.local /Users/landau/dynamic-ledger> |

```

The output gives the true balance of each account, along with other summaries that reflect transaction delays. Note that the program ignores accounts and partitions with balances of zero.

For the next major feature of the program, consider a longer ledger file.

example_ledger2.txt					
amount	status	credit	bank	partition	description
-30.14	cn	card1	checking	food	groceries 12/3/13
-15.36	cn	card2	checking	food	produce 12/2/13
-10.41	cp	card1	checking	food	dinner 11/21/13
-7.31	c	card2	checking	fun	movie 11/18/13
-500	p		checking	bills	December rent
-30	l		checking	bills	November electric
-50	l		checking	bills	November heat
-45			checking	bills	The Economist
800	p		checking	rent	November paycheck

400	p	checking	food	November paycheck
500	p	checking	upkeep	November paycheck
50	p	checking	fun	November paycheck
50		checking	fun	won \$50 in poker
200		savings	bike	gift money
200		savings	bike	October paycheck
100		savings		general savings
200				cash

The summary output for this file looks like

```

Terminal  Shell  Edit  View  Window  Help
dynamic-ledger — bash
landau.local /Users/landau> cd dynamic-ledger/
landau.local /Users/landau/dynamic-ledger> ./ledger tutorial/ledgers/example_ledger2.txt

Credit account: card1

    Delayed money:
      -38.14 not arrived
      -18.41 pending

    Balances:
      0.00 "available"
      -18.41 pending balance
      -48.55 true balance

Credit account: card2

    Delayed money:
      -15.36 not arrived

    Balances:
      -7.31 "available"
      -22.67 true balance

Bank account: checking

    Delayed money:
      -63.22 not arrived
      1250.00 pending

    Balances:
      -75.00 "available"
      1175.00 pending balance
      1111.78 true balance

    Partitions:
      -625.00 bills
      344.09 food
      92.69 fun
      800.00 rent
      500.00 upkeep

Bank account: savings

    Balances:
      500.00 true balance
      All charges cleared.

    Partitions:
      400.00 bike
      100.00 unpartitioned

Bank account with no name

    Balances:
      200.00 true balance
      All charges cleared.

landau.local /Users/landau/dynamic-ledger>

```

I may wish make a shorter ledger by condensing all the “unlocked” (status  $\neq$  “l”) transactions that have cleared. In that case, I can simply run the program, but specify an output file.

```

Terminal  Shell  Edit  View  Window  Help
dynamic-ledger — bash
landau.local /Users/landau/dynamic-ledger> ./ledger tutorial/ledgers/example_ledger2.txt condensed_ledger.txt
landau.local /Users/landau/dynamic-ledger>

```

The output, `condensed_ledger.txt`, contains only the locked transactions, delayed transactions, and bank partition totals.

condensed_ledger.txt					
amount	status	credit	bank	partition	description
-30.14	cn	card1	checking	food	groceries 12/3/13
-15.36	cn	card2	checking	food	produce 12/2/13
-10.41	cp	card1	checking	food	dinner 11/21/13
-7.31	c	card2	checking	fun	movie 11/18/13
-500.00	p		checking	bills	December rent
-30.00	l		checking	bills	November electric
-50.00	l		checking	bills	November heat
800.00	p		checking	rent	November paycheck
400.00	p		checking	food	November paycheck
500.00	p		checking	upkeep	November paycheck
50.00	p		checking	fun	November paycheck
-45.00			checking	bills	condensed
50.00			checking	fun	condensed
400.00			savings	bike	condensed
100.00			savings		condensed
200.00					condensed

The summary output of `condensed_ledger.txt` agrees with that of `example_ledger2.txt`.

```

landau.local /Users/landau/dynamic-ledger> ./ledger condensed_ledger.txt

Credit account: card1

    Delayed money:
        -30.14 not arrived
        -10.41 pending

    Balances:
        0.00 "available"
        -10.41 pending balance
        -40.55 true balance

Credit account: card2

    Delayed money:
        -15.36 not arrived

    Balances:
        -7.31 "available"
        -22.67 true balance

Bank account: checking

    Delayed money:
        -63.22 not arrived
        1250.00 pending

    Balances:
        -75.00 "available"
        1175.00 pending balance
        1111.78 true balance

    Partitions:
        -625.00 bills
        344.09 food
        92.69 fun
        800.00 rent
        500.00 upkeep

Bank account: savings

    Balances:
        500.00 true balance
        All charges cleared.

    Partitions:
        400.00 bike
        100.00 unpartitioned

Bank account with no name

    Balances:
        200.00 true balance
        All charges cleared.

landau.local /Users/landau/dynamic-ledger>

```

## 2 Installation requirements

- A command line interface program like Terminal. Windows users will need to download [Cygwin](#) or [MinGW](#). (Command Prompt is not sufficient.)
- The [GNU Compiler Collection](#). Mac users should obtain it by installing [Xcode command line tools](#). Windows users should be able to obtain it through Cygwin or MinGW.

## 3 Data format

Roughly speaking, each row in a ledger file represents a transaction, and each column represents a feature of that transaction. Here are more details about the columns.



<b>amount</b>	Amount of money transferred in the transaction. All entries must be legal numbers. Negative numbers represent payments, and positive numbers represent deposits.
<b>status</b>	Transaction status codes, explained later, reflect the delay status of each transaction. A blank status indicates that the transaction has cleared. You can also use the status column to label any cleared transactions that you want to remain untouched in a condensed ledger. Warning: all unrecognized status codes will be ignored and those transactions will be treated as cleared.
<b>credit</b>	Names of the credit accounts.
<b>bank</b>	Names of the bank accounts.
<b>partition</b>	Names of the bank account partitions. It is useful to divide your accounts into different partitions: for example, food, medical, rent, etc.
<b>description</b>	A short memo describing the transaction, possibly including the merchant and the date. This field is the most flexible and it will not be processed by the program.

## 4 Transaction status codes

Transaction status codes are listed in the “status” column of a ledger file, and they reflect the delay status of transactions. They are defined in `include/user_settings.h`.

```
#define CREDIT_NOT_THERE_YET "cn" /** HASN'T REACHED CREDIT COMPANY YET **/
#define CREDIT_PENDING      "cp" /** PENDING CHARGE IN CREDIT ACCOUNT ****/
#define CREDIT_CLEARED      "c"  /** CLEARED IN CREDIT ACCOUNT *****/
#define NOT_THERE_YET       "n"  /** HASN'T REACHED BANK YET *****/
#define PENDING             "p"  /** PENDING IN BANK *****/
#define LOCKED              "l"  /** CLEARED, BUT NOT OKAY TO CONDENSE **/
```

Here is how you should think about transaction status codes.

CREDIT_NOT_THERE_YET	Say you just made a purchase with a credit card, but the transaction has not appeared yet on your credit company's website yet. Temporarily label transactions like these as such until the credit company thinks that transaction is "pending" or cleared .
CREDIT_PENDING	Transactions shown as "pending" in your account on your credit company's website.
NOT_THERE_YET	Say you wrote a check to a friend, but he's lazy and doesn't deposit it for two weeks. Transactions like these, which you know you made but do not appear on the webpage of your bank account yet, should be labeled as such.
PENDING	Formally listed as "pending" on your bank account website.
LOCKED	Say you want to condense your ledger, but you do not want to lose the information for a particular transaction or set of transactions. Label these transactions as locked.

## 5 Row and column separators

By default, the program expects the ledger file to have tab-delimited columns and rows delimited by either the newline character or the carriage return character. The user can change these settings at

```
#define ROW_SEPARATORS      "\n\r"
#define COLUMN_SEPARATORS  "\t"
```

For example, If I change `COLUMN_SEPARATORS` to the comma,

```
#define ROW_SEPARATORS      "\n\r"
#define COLUMN_SEPARATORS  ","
```

then the program would expect a CSV (comma-separated values) file as input. These characters should only be used to separate fields. They should not be used in the actual entries of the ledger as content.

## 6 Column order

The ordering of the columns in the ledger file is defined in the section of `include/user_settings.h` below.

```
#define AMOUNT      0  /** COLUMN FOR TRANSACTION AMOUNTS *****/
#define STATUS      1  /** COLUMN FOR TRANSACTION STATUS CODES *****/
#define CREDIT      2  /** COLUMN FOR NAMES OF CREDIT ACCOUNTS *****/
#define BANK        3  /** COLUMN FOR NAMES OF BANK ACCOUNTS *****/
#define PARTITION   4  /** COLUMN FOR NAMES OF BANK PARTITIONS *****/
#define DESCRIPTION 5  /** COLUMN FOR DESCRIPTIONS OF TRANSACTIONS ***/
```

The program would then expect a ledger file of the following form:

amount	status	credit	bank	partition	description
-30.14	cn	card1	checking	food	groceries 12/3/13
-15.36	cn	card2	checking	food	produce 12/2/13
-10.41	cp	card1	checking	food	dinner 11/21/13
-7.31	c	card2	checking	fun	movie 11/18/13
-500	p		checking	bills	December rent
-30	l		checking	bills	November electric
-50	l		checking	bills	November heat
-45			checking	bills	The Economist
800	p		checking	rent	November paycheck
400	p		checking	food	November paycheck
500	p		checking	upkeep	November paycheck
50	p		checking	fun	November paycheck
50			checking	fun	won \$50 in poker
200			savings	bike	gift money
200			savings	bike	October paycheck
100			savings		general savings
200					cash

which is the current default. But if I were to switch the order of the values of STATUS and AMOUNT,

#define	AMOUNT	1	/** COLUMNS FOR TRANSACTION AMOUNTS ***/
#define	STATUS	0	/** COLUMNS FOR TRANSACTION STATUS CODES ***/
#define	CREDIT	2	/** COLUMNS FOR NAMES OF CREDIT ACCOUNTS ***/
#define	BANK	3	/** COLUMNS FOR NAMES OF BANK ACCOUNTS ***/
#define	PARTITION	4	/** COLUMNS FOR NAMES OF BANK PARTITIONS ***/
#define	DESCRIPTION	5	/** COLUMNS FOR DESCRIPTIONS OF TRANSACTIONS ***/

Then the program would expect a ledger file of the form,

status	amount	credit	bank	partition	description
cn	-30.14	card1	checking	food	groceries 12/3/13
cn	-15.36	card2	checking	food	produce 12/2/13
cp	-10.41	card1	checking	food	dinner 11/21/13
c	-7.31	card2	checking	fun	movie 11/18/13
	-500		checking	bills	December rent
l	-30		checking	bills	November electric
l	-50		checking	bills	November heat
	-45		checking	bills	The Economist
p	800		checking	rent	November paycheck
p	400		checking	food	November paycheck
p	500		checking	upkeep	November paycheck
p	50		checking	fun	November paycheck
	50		checking	fun	won \$50 in poker
	200		savings	bike	gift money
	200		savings	bike	October paycheck
	100		savings		general savings
	200				cash

## 7 Summary output options

The user can tweak some of the macros in `user_settings.h` to customize the output of the summaries.

```
#define PRINT_ZEROED_ACCOUNTS    0

#define USE_COLOR                1

#define NORMAL_COLOR             "\x1B[0m"      /** REGULAR TEXT ***/
#define NEGATIVE_COLOR           "\x1B[31m"      /** NEGATIVE TOTALS ***/
#define POSITIVE_COLOR           "\x1B[32m"      /** POSITIVE TOTALS ***/
#define ZERO_COLOR               "\x1B[34m"      /** EMPTY TOTALS ***/
```

PRINT_ZEROED_ACCOUNTS	Set to 1 to print out all accounts, including those with balances of \$0.00. Set to 0 to ignore all empty accounts.
USE_COLOR	Set to 1 to print out summaries in color. Set to 0 otherwise. Coloring is best for viewing summaries in the terminal window, but if you want to pipe the output to a file and view it there, then the color codes create extra annoying characters.
NORMAL_COLOR	Shell color code for regular text. The default is white.
POSITIVE_COLOR	Shell color code for positive totals in the summaries. The current default is green.
NEGATIVE_COLOR	Shell color code for negative totals. The current default is red.
ZERO_COLOR	Shell color code for zero totals. The current default is blue.

## 8 Disclaimer

This software is still new and may still have nontrivial bugs. Also, I have not actually implemented some of the minor features I described here. In particular, some of the user settings are not supported yet.

## 9 License

This software is licensed under the GNU public license 3.0.