CSCI 465/680-J9 **Assignment 5 – COBOL** **Fall 2019**
250 points

This assignment's objective is to give you experience using the basics of the COBOL programming language. For this assignment, you will be building upon the report you created for Assignment 4.

Orchestras around the world depend greatly on their endowment fund to pay their musicians, staff, purchase music, rent their performance space, etc. At various points during an orchestra's fiscal year, a lump deposit to and/or withdrawal from the orchestra's endowment fund is processed. Some of the deposits will be calculated capital gains earned on the endowment fund's investments. Each record in the input file represents a transaction that was processed during the past month for each of the orchestras listed in the input file.

The Data

The input records are to be found in the semester's PDS in a member named **DATA5**.

The First Record:

The first record in the input file contains the name of the banking institution managing the endowments for the orchestras listed in the report to be created. It also contains four capital gains percentages, one of which will be used to calculate a capital gains increase in the endowment amount for orchestra's with transaction type of C (transaction type is described below). The orchestra's capital gains percent flag (also described below) will be used to choose which percentage to apply in the calculation of the endowment increase.

Institution Name:	30 bytes character
Capital Gains Percent 1:	6 bytes zoned decimal (Example: 100000 = 100.000%)
Capital Gains Percent 2:	6 bytes zoned decimal (Example: 000025 = 0.025%)
Capital Gains Percent 3:	6 bytes zoned decimal (Example: 000005 = 0.005%)
Capital Gains Percent 4:	6 bytes zoned decimal (Example: 001075 = 1.075%
Unused:	26 bytes

The Remaining Records:

The remaining records in the input file contains the orchestra's name, its current endowment amount, a capital gains percent flag, a transaction type and, if a deposit or withdrawal, an endowment change amount.

Orchestra Name:	45 bytes character
Endowment Amount:	11 bytes zoned decimal with two decimal places (max. $999,999,999.99)
Unused:	1 byte
Capital Gains Percent Flag:	1 byte zoned decimal (value of either 1, 2, 3 or 4)
Unused:	1 byte
Transaction Type:	1 byte character (value of either D = Deposit, W = Withdrawal or C = Capital Gains Increase)
Endowment Change Amount:	11 bytes zoned decimal with two decimal places (max. $999,999,999.99)
Unused:	9 bytes

Once a record is read from the input file, the transaction type will determine the arithmetic calculation to make. If the transaction type is D, the endowment change amount will be added to the endowment amount, if the transaction type is W, the endowment change amount will be subtracted from the endowment amount, and, finally, if the transaction type is C, the capital gains percent flag will be used to determine which of the four capital gains percentages to use in the calculation of the increase to the endowment amount. Note that those records with transaction type of C have no endowment change amount; that is because the change amount will be calculated by multiplying the endowment amount by the correct capital gains percentage.

The Program

Write a COBOL program that creates two well-designed reports and write them to the *same* DD SYSOUT=*.

Get the date and time using the COBOL Intrinsic Date Function only ONCE, perhaps in a subroutine performed at the very beginning of your program before you open any files for reading or writing.

Open and read the first record from the file and save the four capital gains percentages to use in calculations of capital gains earned by orchestra endowments. Move the institution name to the header.

Begin reading the remaining records in the file, each representing a transaction to be processed against an orchestra's endowment fund. Read until end-of-file creating the first report with a single detail line for each record processed.

As you go through the input file and after you calculate the change to the endowment amount, determine if it is less than $1,000,000.00. If so, write a record to a third data set to be known as the low-balance data set. The only two fields to be written to this third data set are the orchestra's name and the new endowment amount. The LRECL of the new data set should *only be long enough* to accommodate 1) the 45 alphanumeric bytes of the name of the orchestra and 2) the new endowment amount *in packed decimal* and with a maximum value of $999,999,999.99. NO EXTRA BYTES! In the JCL, this low-balance data set will be defined as a temporary data set. It will have to be opened for output while the input file is being processed.

Note: To simplify things, though, get the first report done correctly and THEN you can come back to the processing described in the above paragraph.

The First Report

Using all 132 bytes available across the printed page. Spread the first report headers and detail lines and any summary totals lines at the end of the report across the entire 132 bytes but make sure they look as good and clear to read as possible and are appropriately spaced.

The first report should have three appropriate header lines, single spaced, at the top of each printed page. The first header line should include the date in the form MM/DD/YYYY in the upper left hand corner, the name of the institution (from the first record in the file) in the middle of the line and the page number in the form of PAGE: nn in the upper right hand corner. *Be sure that the month and day of the date show the leading 0 when months January through September and days 1 through 9 of each month*. See the example output.

The second header line should be single spaced after the first header and should include, directly under the date, the time in the form HH:MM and, in the middle of the page, centered under the name of the institution, the text MONTHLY ENDOWMENT FUND CHANGES for this first report. See the example output.

Double spaced below the second header, print column headers for the information to be included in the detail lines below it such as:

ORCHESTRA NAME ENDOWMENT AMOUNT TRANSACTION etc.

Note: When creating column headers, it is always best to place headers for character data, like ORCHESTRA NAME and TRANSACTION in this program, left-justified over the detail line columns, and, for numeric data, like ENDOWMENT AMOUNT, right-justified over the detail line columns. It is also good to put some appropriately placed hyphens single-spaced underneath the column headers. They should indicate the maximum size of the field itself. If the column header is longer than the maximum size of the field itself, put a hyphen under every character of the column header.

There should be no more than 15 double-spaced detail lines (not including headers and column headers) per page. Of course, be sure that the header lines are printed and the page number increased by one for each new page of the report, including the summary totals page.

Each detail line should include, in this order from left to right:

Orchestra Name
Endowment Amount
Transaction Type (printed as DEPOSIT, WITHDRAWAL or REINVESTMENT, this last one representing a capital gains increase)
Increase/Decrease Amount (if a decrease, use the DB indicator to indicate a negative change)
Updated Endowment Amount (if the resulting amount is negative, also use the DB indicator here)

As stated above, use the DB indicator at the end of the floating dollar sign numeric-edited output fields of both Increase/Decrease Amount and Updated Endowment Amount.

The exact output file named 465 Assign 5 Exact Output Fa19.txt will eventually be provided on Blackboard.

The First Report Totals

As you process records from the input file, keep running totals of 1) the number of records, i.e., number of orchestra transactions processed, 2) the total of all the starting endowment amounts processed, 3) the net total of the calculated change amounts – subtracting withdrawals and adding increases – and 4) the total of the updated endowment amounts.

You will report the totals across a single summary line on a separate summary page at the end of the printed endowment changes report. Although on a new page, place the totals for starting endowment amount, net changes amount and updated endowment amount directly under the columns for those items in the detail lines. You can print the number of transaction on the same line but to the left of total starting endowment amount. Add new column headers on the final totals page for these totals.

See the example output provided.

The Second Report

Just like the first report, use all 132 bytes available across the printed page but "center" the orchestra name and low balance amount in the 132 bytes. Make sure they look as good and clear to read as possible and are appropriately spaced.

The second report should also have two appropriate header lines, single spaced, at the top of each printed page. The first header line should include the date in the form MM/DD/YYYY in the upper left hand corner, the name of the institution (from the first record in the main input file) in the middle of the line and the page number in the form of PAGE: nn in the upper right hand corner. Be sure to reset your beginning page number to 1 for this report.

The second header line should include, directly under the date, the time in the form HH:MM and, in the middle of the page (horizontally speaking), centered under the name of the mutual fund company, the text ORCHESTRA LOW BALANCE ENDOWMENT REPORT for this second report.

Each detail line should be double-spaced. Below the headers, print column headers for the information to be included in the detail lines below it such as:

ORCHESTRA NAME LOW ENDOWMENT AMOUNT

Note: Once again, when creating column headers, it is always best to place headers for character data, like ORCHESTRA NAME in this program, left-justified over the detail line columns, and, for numeric data, like LOW ENDOWMENT AMOUNT right-justified over the detail line columns. It is also good to put some appropriately placed hyphens single-spaced underneath the column headers. They should indicate the maximum size of the field itself. If the column header is longer than the maximum size of the field itself, put a hyphen under every character of the column header.

There should be no more than 15 double-spaced detail lines (not including headers and column headers) per page of detail lines. Of course, be sure that the header lines are printed and the page number increased by one for each new page of the report, including the summary totals page.

Each detail line should include, in this order from left to right, the orchestra name and the endowment amount

See the example output provided.

The Second Report Totals

As you process records from this low-balance file, keep a running total of 1) the number of low-balance records and 2) the total updated endowment amounts.

You will report the totals across a single summary line on a separate summary page at the end of the printed low-balance report. Display the number of orchestras with a low-balance endowment and their low balances in the middle of the page as there are only two numbers to display. You should add new column headers on this page for the two numbers you are displaying.

See the example output provided.

The Output of Your Job

What you will hand in will be ***one single three-step job .txt file*** with an **instream** COBOL program followed by a Binder step followed by a fetch step similar to what you have done before.

Document both your COBOL program and your JCL as dictated in Chapter 1 of the Course Notes.
Additional Programming Notes:

- Except for adding 1 to counters, use only COMPUTE ROUNDED for all calculations.
- All dollar amount calculations must be rounded to two decimal places.
- Be sure to edit all numbers to be displayed by suppressing leading zeros if not a dollar amount and adding commas and a floating dollar sign for any dollar amount. Use the DB indicator for negative change amounts and possible negative updated endowment amounts.
- Please remove display commands used for debugging before you submit your file for grading.
- Be sure that EVERY byte of your output 132-byte records are either fields receiving data or in-between bytes initialized as spaces. ***Remember that there should be NO byte undefined.***
- Note the addition of the word TOTALS to the second header of each of the two reports' totals pages.
- Use only the READ AT END form of the read statement.