



HL7 Generator Tool Overview (CSV File Input)

Version 20200921

<i>Version number</i>	<i>Changes made</i>
20200921	<i>Added capability to customize the file name (Step 5 to Step 5A and 5B)</i> <i>Updated notes around replacement value handling</i>



This tool is built into Microsoft Excel and has various tabs, some of which are for data input and some of which are for configuration data.

Note: When you have to update to a new version of the tool it is recommended to copy over the entire tabs EXCEPT for the Admin tab - copy only your settings (values in Column B) over to it.

Description of Tabs in the HL7 Generator Tool

Instructions Tab: Contains overall instructions and buttons to execute the generation

Gap_Analysis_7-8 Tab: Contains the overall data guidance/constraints provided by CDC and HHS on 7/8/2020

Flatfile_Result_Use Tab: Data entry tab which allows the user to manually enter data into the required fields to generate an HL7 v.2.5.1 compliant message. This provides the file layout and column headers that the imported file must contain – the tab itself is not used when using csv file input option.

Configuration Tab: Contains two parts that determine data mapping for each message generated by the tool.

1. Static values to be included in specific data fields for all messages generated
 - a. If Column E – “Corresponding input column name (to replace if empty)” is populated, the tool will only populate this entry if the corresponding input column is empty.
2. References that map valid values from the dropdownvalues tab to the HL7 replacement value for each column configured. The dropdowns are manually configured to the data input fields on the Flatfile_Result_Use tab using data validation.

dropDownValues Tab: Defines specific value sets that are valid for certain HL7 elements and fields. Referenced by Configuration Tab and Flatfile_Result_Use Tab and allows for mapping local codes used in the csv file that is being imported to the standard codes to be included in the HL7 messages. If the lookup of the local value fails, it will then check to see if the input is in column D (Standard code). If it matches the value in Column D, it will map the replacement value to the HL7 message for that field.

Admin Tab: Defines overall flat file configuration (input/output directories for processing, flatfile naming parameters) as well as validations and lookups to be used for various fields

For a video of this section see (The video uses the previous version of the tool, so if some screens look different don't despair – the screenshots in this document show the updated views):

<https://youtu.be/3SdD0D4vPwQ>



Summary of Steps to Generate HL7 Output Files from CSV Input File

Setting up the tool

Step 1: Set up folder structures for files

Step 2: Open the HL7 Generator Tool

Step 3: In *Admin* tab, specify file directory paths

Step 4: In *Admin* tab, specify 'Test' or 'Prod'

Step 5A: For AIMS Routing Service: In *Admin* tab, select "InterPartner" in Cell B13 and specify the *Interpartner "From"* Value in Cell B16, which will be the ID assigned to your organization by the AIMS team.

Step 5B: For direct connections with jurisdictions: In *Admin* tab, select the desired file naming schema in Cell B13 and enter the specific requirements for the jurisdiction you are working with in Cell B14.

Step 6: In *Admin* tab, specify the .csv file name for the tool to look for in the "Input" file directory path

Step 7: In *Admin* tab, specify the delimiter character to note multiple values (repeats) in a single segment.

Step 8: Take test file (named to input filename specified in Step 6) and put in "Input" file directory

Step 9: In *Instructions* tab, click "Process CSV and Generate HL7" button to generate test output

Step 10: In *Configuration* tab, populate static meta-data values.

Step 11: In *dropDownValues* tab, map local lab values to standard HL7 values

Step 12: In *Configuration* tab, ensure that all standard HL7 values from *dropDownValues* tab are represented in the bottom half of the tab

For videos of the above steps see here (The video uses the previous version of the tool, so if some screens look different don't despair – the screenshots in this document show the updated views):

<https://youtu.be/5ZEK1JXRN5c>

https://youtu.be/6_6v4cCv7y0

Creating the CSV file

Step 13: In *Gap Analysis* tab, view minimum required fields and indicate fields that your lab supports; if your lab is missing required fields, those will either need to be added or default values will need to be defined.

Step 14: Create CSV file for input

Step 15: Validate the csv file using the flat file validator tool: <https://validator.aimsplatform.org/> (select the Flatfile Validator),



Step 16: Take CSV file (named to input filename specified in Step 6) and put in “Input” file directory

Step 17: In *Instructions* tab, click “Process CSV and Generate HL7” button to generate output

Step 18: Automation of the csv file conversion process

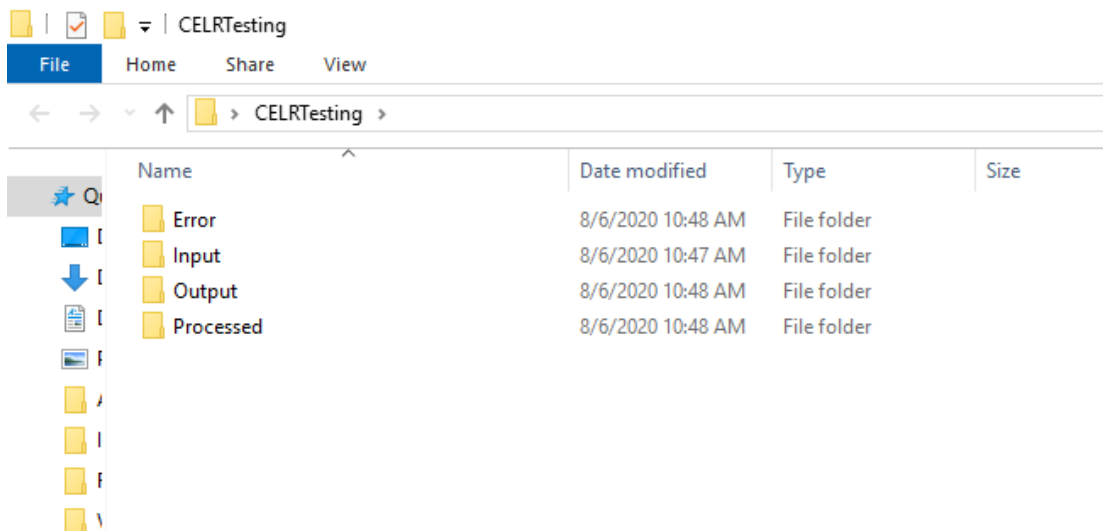
For a video of the above steps see here (The video uses the previous version of the tool, so if some screens look different don’t despair – the screenshots in this document show the updated views):

<https://youtu.be/Ryp2z1MZIKg>

Detailed Steps to Generate HL7 Output Files from CSV Input File

Setting up the tool

Step 1: Create a folder structure (suggested on Desktop of your Computer) with four folders: Input, Output, Processed, Error. Write down the full paths of each of the folders.



Step 2: Open the HL7 Generator tool Excel file (*NatELRFlatFile_GapAnalysis_HL7Generator.xlsm*). Enable all content and macros. Click on “Save As” and add your own unique filename to save your specific configurations separate from the base tool file (i.e. *NatELRFlatFile_GapAnalysis_HL7Generator_Testing.xlsm*).

Step 3. Go to the *Admin* tab of the tool. Note that Config items highlighted in orange on the *Admin* tab are the fields that need to be configured. Enter the full directory paths for the Input, Output, Processed and Error Directories from Step 1.

Please note that the tool can process files automatically that are placed in a network drive. Please contact informatics.support@aphl.org to discuss configuration and other necessary considerations for optimal processing performance.



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PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing

G34 - X ✓ fx REQUIRED_COMBO_4

Config Item	Value	Description	FlatFile_Col
Input Directory	C:\runMacro\test1\Input		Abnormal_flag
Output Directory	C:\runMacro\test1\Output		Comments
Processed Directory	C:\runMacro\test1\Processed		Date_result_rel
Error Directory	C:\runMacro\test1>Error		Disease_symptom
FlatFile_order_use column to count rows	A		Employed_in_h
FlatFile_Result_Use final column	DP		Employed_in_h
Timer on	FALSE		First_test
Number of Errors before exit	0		flatfile_version
Include Batch header and footer	TRUE		Hospitalized
File Naming option	ManualAndTimeStamp		ICU
Manual file Name	ELR~		Illness_onset_d
Current Usage (and MSH-11 mapping)	Prod		Instrument_inst
InterPartner "From" value	eTrueNorth		Instrument_mo
InterPartner "To" value	AIMSPlatform		Instrument_mo
Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test		Link_test_to_pa
Multiple value separator	;		Link_test_to_pa
Input file name	csvToConvert.csv		Order_result_st
Debug mode	FALSE		Order_test_dat
Time zone	ET		Ordered_test_c
			Ordered_test_c
			Ordered_test_c
			Ordering_facilit

Step 4: On the *Admin* tab, select the appropriate value (Test or Prod) from the drop down for the field *Current Usage (and MSH-11 mapping)*.

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Config Item	Value	Description	FlatFile_Col
Input Directory	C:\runMacro\test1\Input		Abnormal_flag
Output Directory	C:\runMacro\test1\Output		Comments
Processed Directory	C:\runMacro\test1\Processed		Date_result_rel
Error Directory	C:\runMacro\test1>Error		Disease_symptom
FlatFile_order_use column to count rows	A		Employed_in_h
FlatFile_Result_Use final column	DP		Employed_in_h
Timer on	FALSE		First_test
Number of Errors before exit	0		flatfile_version
Include Batch header and footer	TRUE		Hospitalized
File Naming option	ManualAndTimeStamp		ICU
Manual file Name	ELR~		Illness_onset_d
Current Usage (and MSH-11 mapping)	Prod		Instrument_inst
InterPartner "From" value	eTrueNorth		Instrument_mo
InterPartner "To" value	AIMSPlatform		Instrument_mo
Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test		Link_test_to_pa
Multiple value separator	;		Link_test_to_pa
Input file name	csvToConvert.csv		Order_result_st
Debug mode	FALSE		Order_test_dat
Time zone	ET		Ordered_test_c
			Ordered_test_c
			Ordered_test_c
			Ordering_facilit

Step 5A: Setting up for Use of InterPartner file naming convention: On the *Admin* tab, in Cell B13 select InterPartner.

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B13 ManualAndTimeStamp

Config Item	Value	Description	FlatFile_Col
Input Directory	C:\runMacro\test1\Input		Abnormal_flag
Output Directory	C:\runMacro\test1\Output		Comments
Processed Directory	C:\runMacro\test1\Processed		Date_result_relea
Error Directory	C:\runMacro\test1\Error		Disease_symptom
FlatFile_order_use column to count rows	A		Employed_in_h
FlatFile_Result_Use final column	DP		Employed_in_high
			First_test
Timer on	FALSE		flatfile_version_nc
Number of Errors before exit	0		Hospitalized
Include Batch header and footer	TRUE		ICU
			Illness onset date
File Naming option	ManualAndTimeStamp		Instrument instan
Manual file Name	InterPartner		Instrument_mode
Current Usage (and MSH-11 mapping)	InputFileNameOnly		Instrument_mode
InterPartner "From" value	Manual		Link test to pare
InterPartner "To" value	ManualAndTimeStamp		Link test to pare
Test result exclude from normal processing	ManualAndInputFileName		Order_result_stat
Multiple value separator	ManualAndInputFileNameAndTimeStamp		Order_test_date
Input file name	;		Ordered test cod
Debug mode	FALSE		Ordered test cod
Time zone	ET		Ordered test des
			Ordering facilit

On the *Admin* tab, in Cell B16 *Interpartner "From" Value*, input the appropriate value for your organization (example below shows "eTrueNorth"), which will be the ID assigned to your organization by the AIMS team. For more information about setting up the Interpartner filename follow instructions in ["AIMS - CentralizedELR InterPartner Messaging Guide"](#) This step is important when using AIMS routing services.

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G34 REQUIRED_COMBO_4

Config Item	Value	Description	FlatFile_Col
Input Directory	C:\runMacro\test1\Input		Abnormal_flag
Output Directory	C:\runMacro\test1\Output		Comments
Processed Directory	C:\runMacro\test1\Processed		Date_result_rel
Error Directory	C:\runMacro\test1\Error		Disease_symptom
FlatFile_order_use column to count rows	A		Employed_in_h
FlatFile_Result_Use final column	DP		Employed_in_h
			First_test
Timer on	FALSE		flatfile_version
Number of Errors before exit	0		Hospitalized
Include Batch header and footer	TRUE		ICU
			Illness onset d
File Naming option	ManualAndTimeStamp		Instrument insi
Manual file Name	ELR~		Instrument mo
Current Usage (and MSH-11 mapping)	Prod		Instrument mo
InterPartner "From" value	eTrueNorth		Link test to pa
InterPartner "To" value	AIMSPlatform		Link test to pa
Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes		Order_result_st
Multiple value separator	;		Order_test dat
Input file name	csvToConvert.csv		Ordered test c
Debug mode	FALSE		Ordered test c
Time zone	ET		Ordered test d
			Ordering facilit



Step 5B: Setting up for Use of other file naming conventions: When working directly with a jurisdiction they may have other requirements for file naming conventions, which can be configured using cell B14 in the *Admin* tab.

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PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing			
G34 REQUIRED_COMBO_4			
Config Item	Value	Description	FlatFile_Col
Input Directory	C:\runMacro\test1\Input		Abnormal flag
Output Directory	C:\runMacro\test1\Output		Comments
Processed Directory	C:\runMacro\test1\Processed		Date_result_rel
Error Directory	C:\runMacro\test1\Error		Disease_sympt
FlatFile_order_use column to count rows	A		Employed_in_h
FlatFile_Result_Use final column	DP		Employed_in_h
Timer on	FALSE		First_test
Number of Errors before exit	0		flatfile_version
Include Batch header and footer	TRUE		Hospitalized
File Naming option	ManualAndTimeStamp		ICU
Manual file Name	ELR~		Illness_onset_d
Current Usage (and MSH-11 mapping)	Prod		Instrument_insi
InterPartner "From" value	eTrueNorth		Instrument_mo
InterPartner "To" value	AIMSPlatform		Instrument_mo
Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Test		Link_test_to_pa
Multiple value separator	;		Link_test_to_pa
Input file name	csvToConvert.csv		Order_result_st
Debug mode	FALSE		Order_test_dat
Time zone	ET		Ordered_test_c
			Ordered_test_c
			Ordering_facilit

Cell B13 in the *Admin* tab allows selection of one of 4 basic file naming schemes:

- Manual – where the filename is defined in the *Admin* tab in cell B14
- Manual with timestamp – uses the value from cell B14 in *Admin* tab and appends with the file creation date and time
- Manual with the name of the input file – uses the value from cell B14 in *Admin* tab and appends with the file name defined in cell B20
- Manual with the name of the input file and timestamp– uses the value from cell B14 in *Admin* tab and appends with the file name defined in cell B20 and the file creation date and time

NatELRFlatFile_GapAnalysis_HL7Generator_20200921 [Protected View] - Excel

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B13 ManualAndTimeStamp

Config Item	Value	Description	FlatFile_Column
Input Directory	C:\runMacro\test1\Input		Abnormal flag
Output Directory	C:\runMacro\test1\Output		Comments
Processed Directory	C:\runMacro\test1\Processed		Date result released
Error Directory	C:\runMacro\test1\Error		Disease symptom
FlatFile_order_use column to count rows	A		Employed in head
FlatFile_Result_Use final column	DP		Employed in high
Timer on	FALSE		First test
Number of Errors before exit	0		flatfile version number
Include Batch header and footer	TRUE		Hospitalized
			ICU
			Illness onset date
File Naming option	ManualAndTimeStamp		Instrument instance
Manual file Name	InterPartner		Instrument mode
Current Usage (and MSH-11 mapping)	InputFileNameOnly		Instrument mode
InterPartner "From" value	InputFileNameAndTimeStamp		Link test to parent
InterPartner "To" value	Manual		Link test to parent
Test result exclude from normal processing	ManualAndTimeStamp		Link test to parent
Multiple value separator	ManualAndInputFileName		Order result status
Input file name	ManualAndInputFileNameAndTimeStamp		Order result status
Debug mode	csvToConvert.csv		Order test date
Time zone	FALSE		Ordered test code
	ET		Ordered test code
			Ordered test description
			Ordering facility

On the *Admin* tab, note that Columns D-K contains the logic by which the different data fields are read, transformed and output to the flat file. Please do not change these columns or the tool macros may break.

On the Admin tab, the fields “Timer on” , “Number of Errors before exit” and “Debug mode” should be used by developers or those trained with the macro to perform integration testing. This is documented in “Developer Instructions”. By default “Timer on” and “Debug Mode” should be set to “FALSE” and “Number of Errors before exit” should be set to 0.

If you notice any issues please contact AIMS Technical Assistance at informatics.support@aphl.org.

Step 6: In *Admin* tab, specify the .csv file name for the tool to look for in the “Input” file directory path. Note that the input CSV file that you use MUST be named this or the tool will not process it. Note that Config items highlighted in orange on the *Admin* tab are the fields that need to be configured.



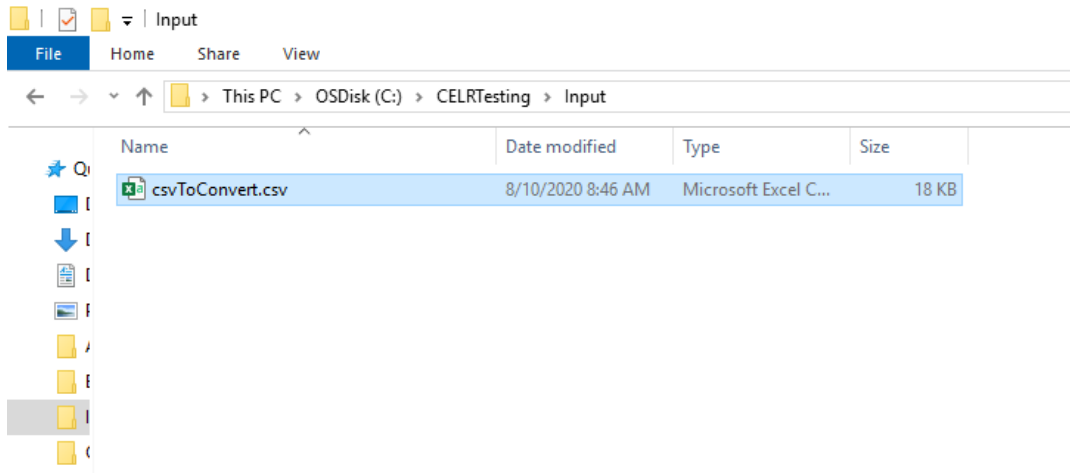
File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...			
PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing			
G34 X ✓ fx REQUIRED_COMBO_4			
	A	B	C
1	Config Item	Value	Description
2	Input Directory	C:\runMacro\test1\Input	Abnormal_flag
3	Output Directory	C:\runMacro\test1\Output	Comments
4	Processed Directory	C:\runMacro\test1\Processed	Date_result_rel
5	Error Directory	C:\runMacro\test1>Error	Disease_symptc
6	FlatFile_order_use column to count rows	A	Employed_in_h
7	FlatFile_Result_Use final column	DP	Employed_in_h
8			First_test
9	Timer on	FALSE	flatfile_version_
10	Number of Errors before exit	0	Hospitalized
11	Include Batch header and footer	TRUE	ICU
12			Illness_onset_d
13	File Naming option	ManualAndTimeStamp	Instrument_inst
14	Manual file Name	ELR~	Instrument_mo
15	Current Usage (and MSH-11 mapping)	Prod	Instrument_mo
16	InterPartner "From" value	eTrueNorth	Link_test_to_pa
17	InterPartner "To" value	AIMSPlatform	Link_test_to_pa
18	Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes	Order_result_st
19	Multiple value separator	;	Order_test_dat
20	Input file name	csvToConvert.csv	Ordered_test_c
21	Debug mode	FALSE	Ordered_test_c
22	Time zone	ET	Ordered_test_d
23			Ordering_facilit

Step 7: In *Admin* tab, specify the delimiter character to note multiple values (repeats) in a single field. Note that the default character used is a semicolon (;). Use this delimiter to list multiple values in the Disease_symptoms column. In the output, each value will be mapped to a separate OBX segment.

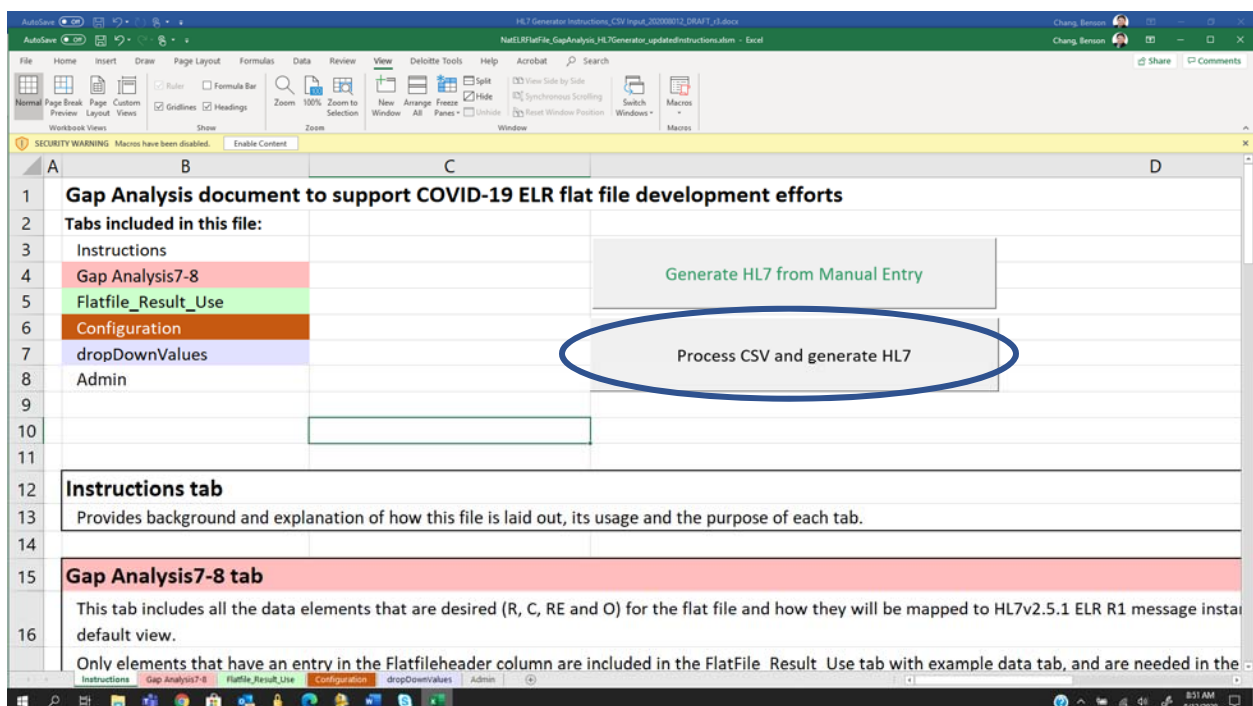
File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do...			
PROTECTED VIEW Be careful—files from the Internet can contain viruses. Unless you need to edit, it's safer to stay in Protected View. Enable Editing			
G34 X ✓ fx REQUIRED_COMBO_4			
	A	B	C
1	Config Item	Value	Description
2	Input Directory	C:\runMacro\test1\Input	Abnormal_flag
3	Output Directory	C:\runMacro\test1\Output	Comments
4	Processed Directory	C:\runMacro\test1\Processed	Date_result_rel
5	Error Directory	C:\runMacro\test1>Error	Disease_symptc
6	FlatFile_order_use column to count rows	A	Employed_in_h
7	FlatFile_Result_Use final column	DP	Employed_in_h
8			First_test
9	Timer on	FALSE	flatfile_version_
10	Number of Errors before exit	0	Hospitalized
11	Include Batch header and footer	TRUE	ICU
12			Illness onset d
13	File Naming option	ManualAndTimeStamp	Instrument_inst
14	Manual file Name	ELR~	Instrument_mo
15	Current Usage (and MSH-11 mapping)	Prod	Instrument_mo
16	InterPartner "From" value	eTrueNorth	Link_test_to_pa
17	InterPartner "To" value	AIMSPlatform	Link_test_to_pa
18	Test result exclude from normal processing	Test_kit_EUA_ID,Test_kit_model_ID,Test_kit_model_name,Test_result_code_system,Tes	Order_result_st
19	Multiple value separator	;	Order_test dat
20	Input file name	csvToConvert.csv	Ordered_test_c
21	Debug mode	FALSE	Ordered_test_c
22	Time zone	ET	Ordered_test d
23			Ordering facilit



Step 8: Take the CSV file you intend to use (or a test validation CSV file provided by AIMS) and place it in the “Input” file directory that you specified in Step 3. Rename the file to the input CSV filename you specified in the *Admin* tab in Step 6 (make sure the filename matches exactly or the tool will not process it)

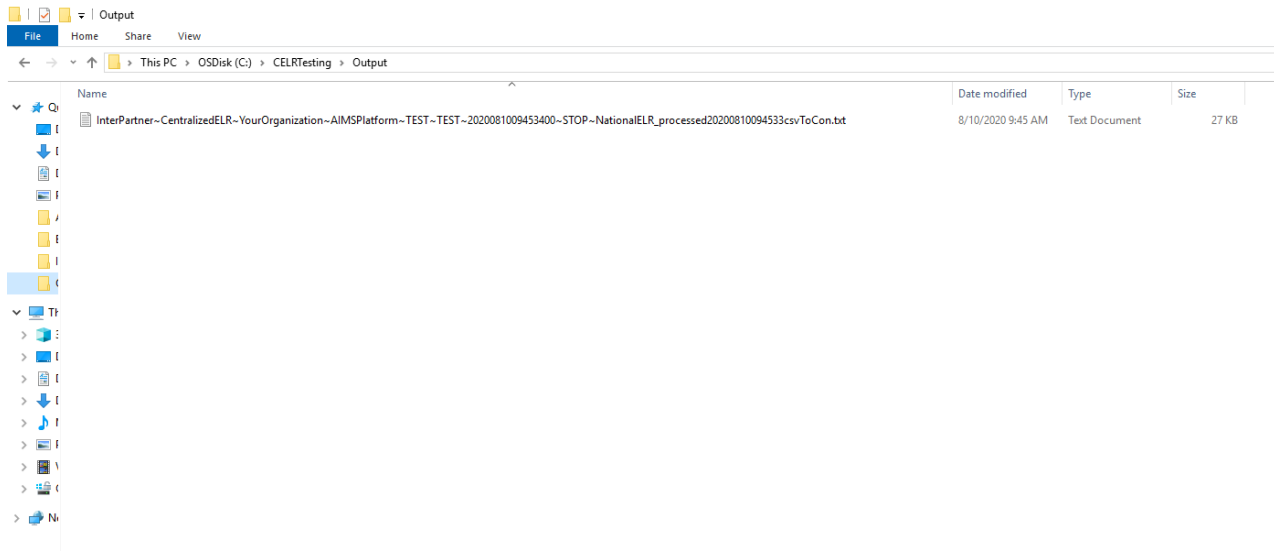


Step 9: Under the *Instructions* tab, click the “Process CSV and generate HL7” button to generate a test output. If a runtime error pops up, go through Steps 1 to 8 (especially Step 3 and Step 6) to ensure that all setup steps are correct. If no runtime error is generated or no message appears, the tool should take you to the *Admin* tab to the Input File Name field. Go to the Output directory set up in Step 3 to find an output file generated from the input CSV. The output is generated as an HL7 batch file. If there are errors in processing, such as missing required fields, improper data, wrong format, or lookup failure, it will not output an HL7 file and output the error file in the “Error” directory.





Output folder showing generated file:



Step 10: Go to the *Configuration* tab. The top part of the tab specifies static values that will be sent with every HL7 message generated (i.e. your lab address and CLIA number) and which fields they are mapped to in the HL7 message. If a field is left empty on the “Flatfile_Result_Use” tab, the field will be automatically populated with the appropriate value from the “Configuration” tab if column E “Corresponding input column name (to replace if empty)” is configured. Populate all fields in Column B, *Answer (local value)* that are highlighted in yellow. The tool will reference these values to populate the appropriate field when generating the HL7 message. You will need to create 1 tool file for each submitting laboratory, if you are a data aggregator. Be sure to get the right values for MSH-5 (Cells B32 and B33) and MSH-6 (Cells B34 and B35) from the jurisdiction you are working with – if you are using the AIMS routing service make sure these fields are left blank.



Static Values	Do not move these columns. The macro code references specific cells.	Mapping to HL7	Corresponding input column name (to replace if empty)	Additional mapping instructions	Related mapping value
1. Question	Answer (local value)	More information about the question			
2. Data on this tab is assumed to be the same for each site, where testing is performed, so could be pre-populated for manual user entry or populated automatically if entry is blank					
3. Testing Laboratory Street	202 South Main St	OBX-24.1	Testing_lab_street		
4. Testing Laboratory Street 2	Box 11-FromStatic	OBX-24.2	Testing_lab_street2		
5. Testing Laboratory City	Little Rock-From static	OBX-24.3	Testing_lab_city		
6. Testing Laboratory State	AR	OBX-24.4	Testing_lab_state		
7. Testing Laboratory County	Test19	OBX-24.9	Testing_lab_county		
8. Testing Laboratory Zip	72205	OBX-24.5	Testing_lab_zip_code		
9. Name of the reporting facility	Public Health Laboratory, AR-FromStatic	MSH-4.1	Reporting_facility_name	MSH-4.3	OID
10. Identifier of the reporting facility	AR-LittleRockSPH-FromStatic	MSH-4.2	Reporting_facility_id	MSH-3.3	OID
11. Name of the reporting system	AR-LittleRockSPH-FromStatic2	MSH-3.1	Report_facil_data_source_app		
12. Name of the reporting system (if known)	dummyMSHQID	MSH-3.2			
13. Testing Lab ID assigner	testingLabIDAssignerRequired				
14. Testing Lab ID assigner	testingLabIDAssigner-Required				
15. Name of the testing laboratory	WMAAC-FromStatic	OBX-23.1	Testing_lab_name		
16. CLIA number of the testing laboratory	0401044169-FromStatic	OBX-23.10	Testing_lab_id		
17. Name of the organization that assigns the Patient Identifier	Acumid	PID-3.4.1-5			
18. PID of organization that assigns the Patient Identifier	Public Health Laboratory, AR-FromStatic	PID-3.4.2-5			
19. Name of the organization that assigns the Patient Identifier	dummyOID2	PID-3.4.3-5			
20. Name of the organization that assigns the Patient Identifier		PID-3.4.2-5			
21. Test instrument or kit		OBX-17.1		populate if OBX-17.1 empty	
22. Test instrument or kit		OBX-17.1		populate if OBX-17.1 empty	
23. Default Specimen Type Description	Specimen of unknown material	OBX-17.1	Specimen_type_description	populate if OBX-17.1 empty	
24. Default specimen type code	119324002	SPM-4.1	Specimen_type_code		
25. Software vendor	software vendor				
26. Software version or release number	V12				
27. Software Name	software name				
28. Binary ID	Binary ID unknown				
29. Install date	20181208	Date in HL7 format 'YYYYMMDD'			
30. Receiving Application Name	US-WMD-Civilian Lab	MSH-5.1			
31. Receiving Application OID	2.16.840.1.114222.4.3.3.7	MSH-5.2			
32. Receiving Facility Name	CDC-EPH Surv Branch	MSH-5.1			
33. Name of the health department receiving the data	2.16.840.1.114222.4.1.10418	MSH-5.2			

The bottom part of the *Configuration* tab refers to cells on the *dropDownValues* tab and indicates which range of dropdown values are mapped to particular HL7 fields. See next step for more details on the *dropDownValues* tab.

Input Column Name	Local code values Range (in dropDownValues Tab)	HL7 range is hard coded to replace "C" with "G" do not remove columns
Patient_id_type	C2-C7	
Patient_gender	C9-C13	
YHS	C173-C175	
Patient_race	C15-C20	
Patient_ethnicity	C28-C25	
Patient_state	C28-C87	
Ordering_facility_state	C28-C87	
Ordering_provider_state	C28-C87	
Testing_lab_state	C28-C87	
Ordered_test_code_system	C89-C91	
Test_result_code_system	C93-C95	
Result_status_code	C97-C100	
Specimen_type_code_system	C102-C105	
Specimen_source_site_code_sys	C107-C109	
Patient_gender	C111-C112	Must have more than one in range
Patient_location	C114-C121	
Symptoms_for_disease	C278-C275	
Disease_symptoms	C333-C351	
Patient_age_units	C134-C137	
Pregnant	C139-C142	
Abnormal_Flag	C144-C161	
Ordered_test_code	C167-C169	
Test_performed_description	C176-C203	
Test_result_code	C206-C219	
Test_result_description	C206-C219	
Test_result_free_text	C206-C219	
Specimen_type	C238-C258	
Specimen_type_free_text	C238-C258	
Specimen_source_site_code	C260-C262	
Specimen_source_site_desc	C260-C262	
Order_result_status	C97-C100	
Test_result_units	C224-C236	
First_test	C278-C275	
Employed_in_high_risk_setting	C277-C292	
Patient_occupation	C294-C313	
Patient_residence_type	C316-C317	
Result_units	C300-C303	
Patient_id_assigner	C354-C358	
Patient_id_2_assigner	C354-C358	
Patient_source	C1100-C4245	
Ordering_facility_county	C1100-C4245	
Ordering_provider_county	C1100-C4245	
Testing_lab_county	C1100-C4245	

Step 11: The *dropDownValues* tab maps input values from your lab for certain fields that may be plaintext or locally coded to standard values to be included in the HL7 output. Note that any input



values in the Column C of the *dropDownValues* tab will be replaced with corresponding values in Column G of the same row.

- On the *dropDownValues* tab, enter any transformation values for particular data fields as new rows at the bottom of the tab, if additional values are needed, else update to your local values in column C.
- Ensure that Column A, *HL7 element / Field Name* matches the name of the data column in Row 1 of the *Flatfile_Result_Use* tab.
- Also ensure that each row in Column C, *Local Code* represents all the local values that could be received from your system.
 - Notes:
 - For all coded entries the following hierarchy applies:
 - If the input value for the code (i.e. *Ordered_test_code* or *Test+performed_code*, or *Test_result_coded* or *Specimen_type_code* or *Specimen_source_site_code*) matches a value in the Local Code (Column C) or the Standard Code (Column D) then the entire replacement value will be used and entries in the respective *_code_system fields will be ignored; if the input value does not match the values from the respective fields in the input file will be used.
 - If you need to map different local codes to the same standard codes (for example Detected and D both need to be mapped to detected, then you need to create a second version of the standard code entry in column D, or the tool will not process properly (the tool uses the replacement value from Column G, so that will not affect the HL7 file output values.
 - Transformation for county values starts on row 1100 (scroll way down!) – because many counties have the same name in different states, it is recommended that you include the state in the same field (we may update the tool in the future to use a combined search, but for now) to get the right county mapped.
 - Column G *Replacement Value* is the standard value that will populate and replace your local code in the output file. Verify that that this replacement value is correct. In most instances you will want to use the standard code found in Column D. For example, in the screen below, a Local Code value of “Medical Record Number” in cell C2 (yellow) will be replaced with the value of “MR” as specified in cell G2, which is the standard code populated in cell D2 (orange).

NatELRFlatFile_GapAnalysis_HL7Generator - Excel

File Home Insert Page Layout Formulas Data Review View ACROBAT Tell me what you want to do... Riki Merrick

Clipboard Font Alignment Number Styles Cells Editing

G379

HL7 element / Field name	Local Description	Local Code	Standard Code	Standard Code Description	Standard Code System	Replacement Value	Comment
Patient_ID_Type		Medical Record Number	MR	Medical Record Number		MR	
Patient_ID_Type		Specimen Identifier	SID	Specimen Identifier		SID	
Patient_ID_Type		Patient Internal ID	PI	Patient Internal ID		PI	
Patient_ID_Type		Social Security Number	SS	Social Security Number		SS	
Patient_ID_Type		Patient External ID	PT	Patient External ID		PT	
Patient_ID_Type		Public Health Case ID	PHC	Public Health Case ID		PHC	
Patient_gender		Male	M	M		M	
Patient_gender		Female	F	F		F	
Patient_gender		Other	O	O		O	
Patient_gender		Unknown	U	U		U	
Patient_gender		Ambiguous	A	A		A	
Patient_race		American Indian or Alaska Native	1002-5	American Indian or Alaska Nat	HL70005	1002-5^American Indian or Alaska Native^HL70005	
Patient_race		Asian	2028-9	Asian	HL70005	2028-9^Asian^HL70005	
Patient_race		Black or African American	2054-5	Black or African American	HL70005	2054-5^Black or African American^HL70005	
Patient_race		Native Hawaiian or Other Pacific Islander	2076-8	Native Hawaiian or Other Paci	HL70005	2076-8^Native Hawaiian or Other Pacific Islander^HL70005	
Patient_race		White	2106-3	White	HL70005	2106-3^White^HL70005	
Patient_race		Other Race	2131-1	Other Race	HL70005	2131-1^Other Race^HL70005	
Patient_race		Asked but no answer / unknown	ASKU	Asked but unknown	NULLFL	ASKU^Asked but unknown^NULLFL	
Patient_ethnicity		Hispanic or Latino	H	Hispanic or Latino	HL70189	H^Hispanic or Latino^HL70189	
Patient_ethnicity		Not-Hispanic or latino	N	Not-Hispanic or latino	HL70189	N^Not-Hispanic or latino^HL70189	
Patient_ethnicity		Unknown	U	Unknown	HL70189	U^Unknown^HL70189	
Patient_ethnicity		Asked but no answer / unknown	ASKU	Asked but unknown	NULLFL	ASKU^Asked but unknown^NULLFL	

Step 12: Once you are done entering transformation values in the *dropDownValues* tab, go back to the *Configuration* tab and ensure that all values from the *dropDownValues* tab match those listed in the bottom half of the tab. For example, it specifies that rows C15 through C20 will be input values for the field Patient_Race.

Creating the CSV file

Step 13: Go to the *Gap Analysis7-8* tab. Filter on Column L, *MUST SUPPORT in flatfile* = Y. This displays the minimum data fields that must be populated in the input and output file.



	I	J	K	L	M	N	O	P
1	HHS guidance elements							
2	HHS element name / description	HHS Guidance comment	HHS guidance 6/4/2020 verbiage	MUST SUPPORT in flatfile	Supported by Lab (Y/N)	GAP ANALYSIS NOTES	Sort for HL7 mapping	HL7 Field
3	Performing facility name and/or CLIA number, if known		C(R/RE)	Y			121	OBX-23.1
4	Performing facility name and/or CLIA number, if known		RF	Y			123	OBX-23.1

Review each data element and mark in Column M, *Supported by Lab* whether your lab can support the particular required data field (Y/N). Enter any notes, database field names, other documentation that may help with understanding what you are using to populate the field or anything needed for follow up in Column N, *Gap Analysis Notes*, as necessary. Once you have validated that your lab can provide data for each of the minimum required fields, proceed to Step 11.

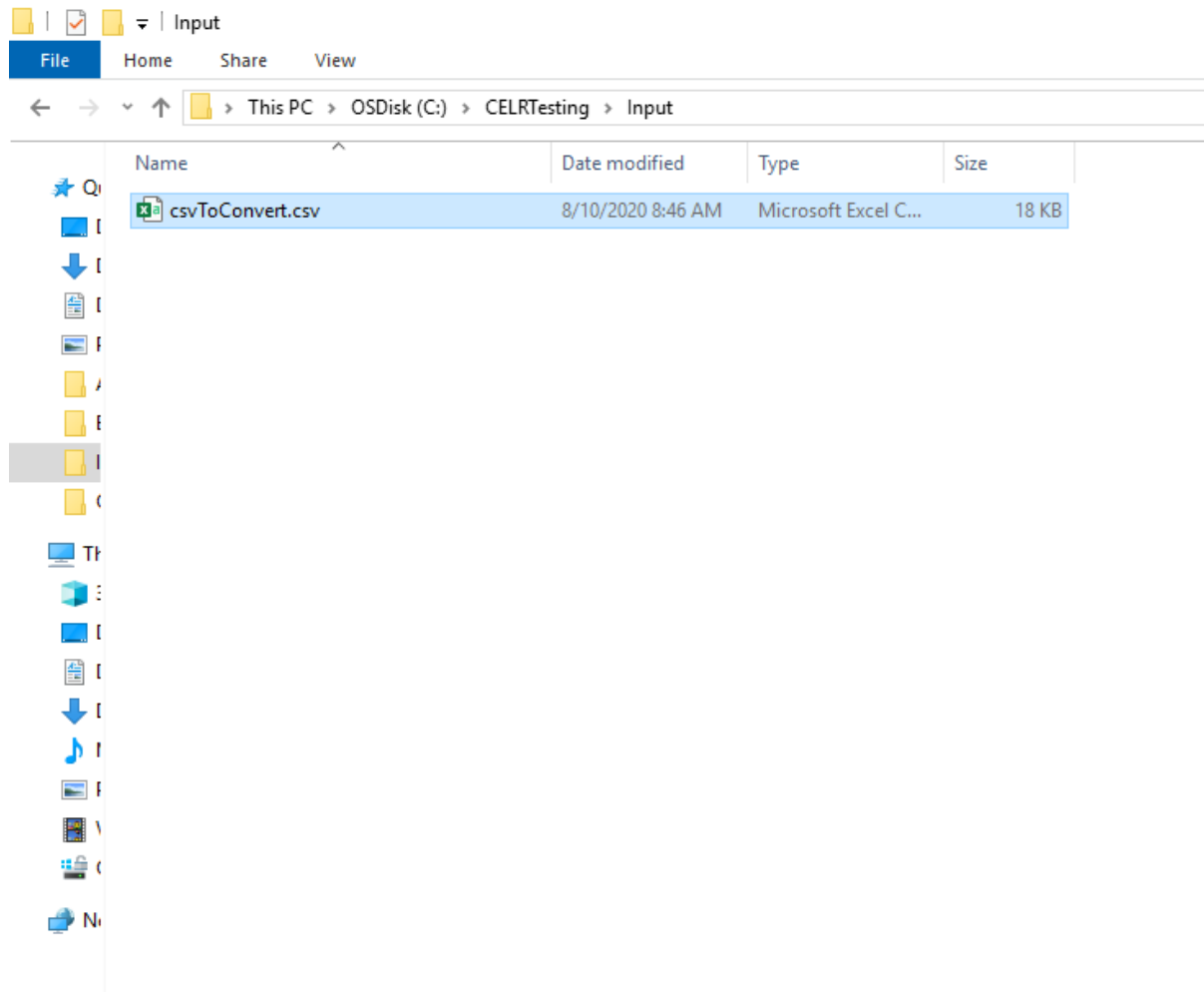
Step 14: Generate a CSV that includes all of the column headers listed in the *Gap Analysis7-8* tab. Ensure that the minimum required data fields determined in Step 10 are populated using the specified CSV file format. The Gap Analysis7-8 tab provides all the details about each of the data elements, expected values etc. Or you can copy the headers from the FlatFile_Result_Use tab and use that as the starting point for your csv file definition. Note that each row represents one test result. If there are more than one test result for a specimen, you will need to copy all the other information into the next row and then add the second test result. The tool will create a separate HL7 message for each accession (Testing_lab_accession_number); all HL7 messages will be batched into a single output file.

Note that every column header listed on the *Gap Analysis7-8* tab MUST be included in the CSV file, even if your lab does not send all of the data. Column headers are not case sensitive and can be sent in any order.

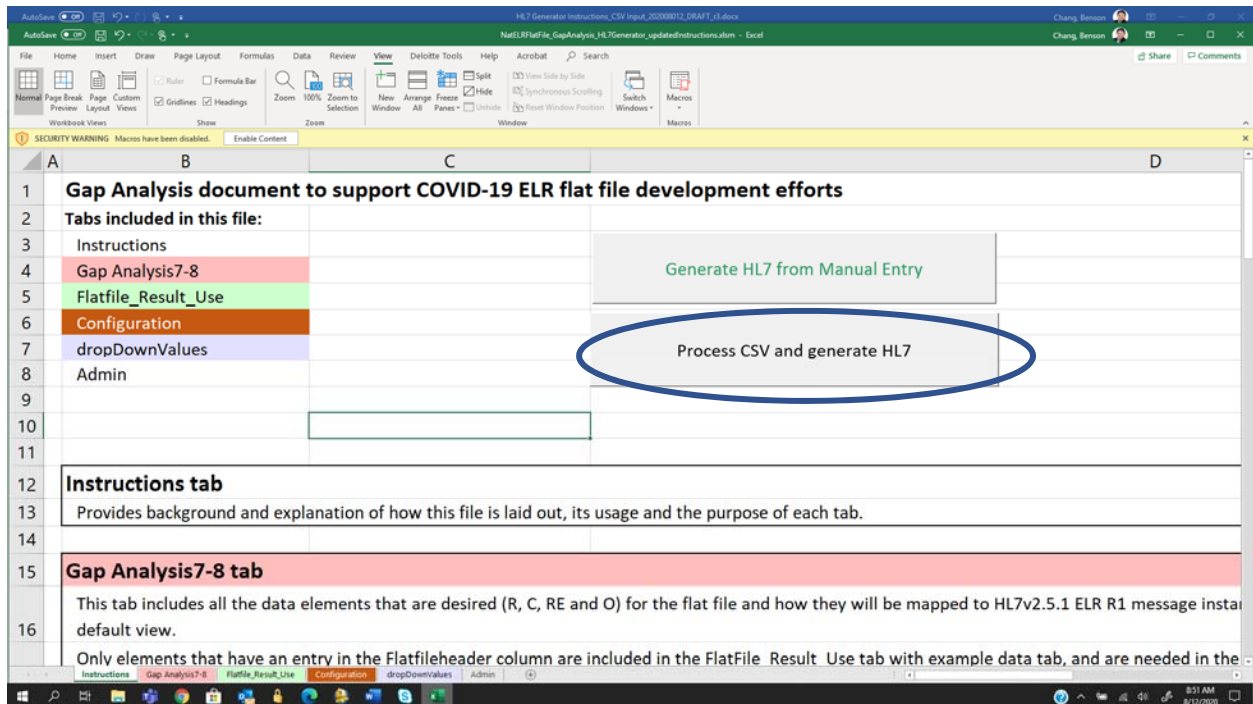
Step 15: Validate the csv file using the flat file validator tool: <https://validator.aimsplatform.org/> to ensure it has all column headers, data in all required elements and that the entries are formatted correctly; if you are using standard codes the tool will also validate those values (they are under warnings). See the document *Flatfile Validator Use Instructions* for more details.



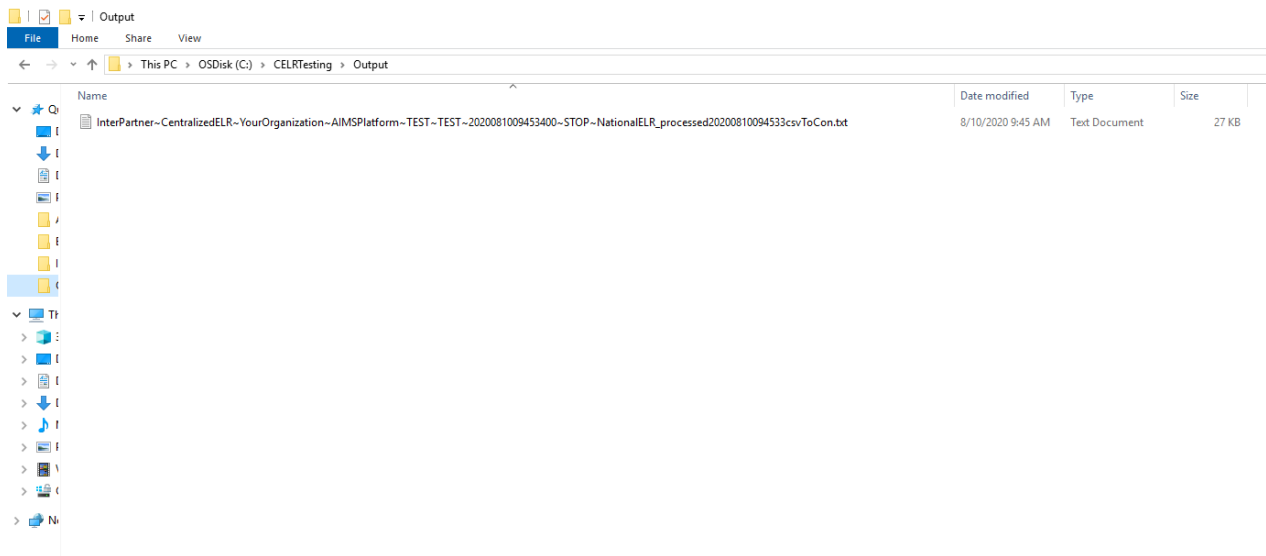
Step 16: Take the CSV file and place it in the “Input” file directory that you specified in Step 3. Rename the file to the input CSV filename you specified in the *Admin* tab in Step 6 (make sure the filename matches exactly or the tool will not process it)



Step 17: Under the *Instructions* tab, click the “Process CSV and generate HL7” button to generate an output file. If a runtime error pops up, go through Steps 1 to 8 (especially Step 3 and Step 6) to ensure that all setup steps are correct. If no runtime error is generated or no message appears, the tool should take you to the *Admin* tab to the Input File Name field. Go to the Output directory set up in Step 3, and you will find the output file generated from the input CSV.



Output folder showing generated file:



If the output file is not present, check the Error directory for the “NationalELRLog<timestamp>.txt” or “CSVLoadErrorLog<timestamp>.txt” for errors.

Step 18: Automation of the csv file conversion process

To automate the csv file conversion process:



1. Create a text file and change the extension of the file to “.bat”
2. The text of the batch file should be: “C:\Windows\System32\cscript.exe C:\runMacro\MacroLauncher.vbs //nologo”. The path of MacroLauncher.vbs is configurable.
3. Create a text file and change the extension to “.vbs” The name of the vb script should be “MacroLauncher.vbs” with the following text:

'Input Excel File's Full Path

ExcelFilePath = "C:\runMacro\NatELRFlatFile_GapAnalysis_HL7Generator.xlsm"

'Input Module/Macro name within the Excel File

MacroPath = "Module1.LoadCSV"

'Create an instance of Excel

Set ExcelApp = CreateObject("Excel.Application")

'Do you want this Excel instance to be visible?

ExcelApp.Visible = False 'or "False"

'Prevent any App Launch Alerts (ie Update External Links)

ExcelApp.DisplayAlerts = False

'Open Excel File

Set wb = ExcelApp.Workbooks.Open(ExcelFilePath)

'Execute Macro Code

ExcelApp.Run MacroPath

'Save Excel File (if applicable)

wb.Save

'Reset Display Alerts Before Closing

ExcelApp.DisplayAlerts = False

'Close Excel File

wb.Close

'End instance of Excel

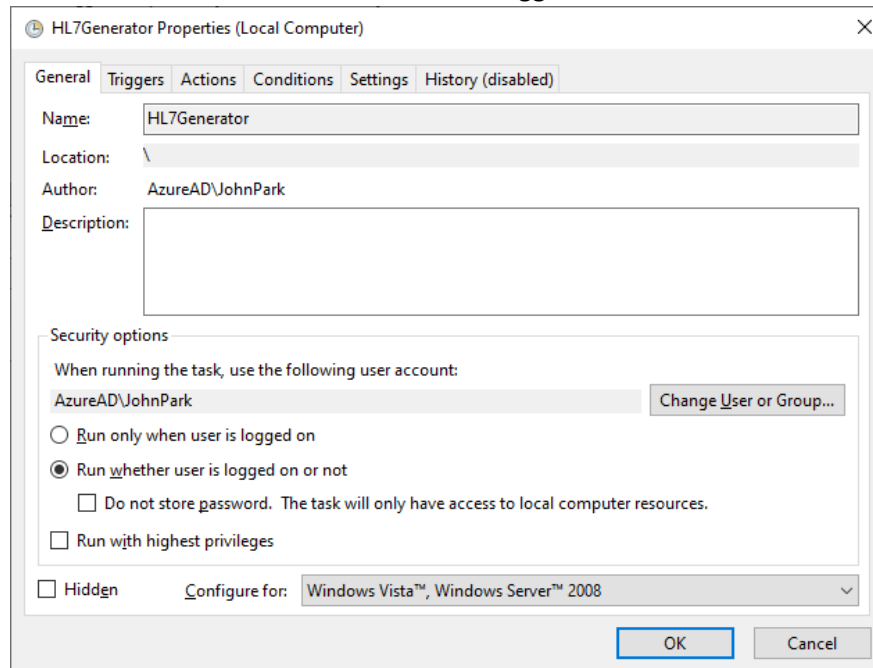
ExcelApp.Quit

'Leaves an onscreen message!

'MsgBox "Your Automated Task successfully ran at " & TimeValue(Now), vbInformation

'Note: change the Excel file path to the path of the excel macro enabled file on your local system

4. Open the Windows task scheduler as administrator and create a new scheduled task called HL7Generator and configure the following:
 - a. Under General click “Run whether use is logged on or not”



HL7Generator Properties (Local Computer)

General Triggers Actions Conditions Settings History (disabled)

Name: HL7Generator

Location: \

Author: AzureAD\JohnPark

Description:

Security options

When running the task, use the following user account:

AzureAD\JohnPark [Change User or Group...](#)

☐ Run only when user is logged on

☒ Run whether user is logged on or not

☐ Do not store password. The task will only have access to local computer resources.

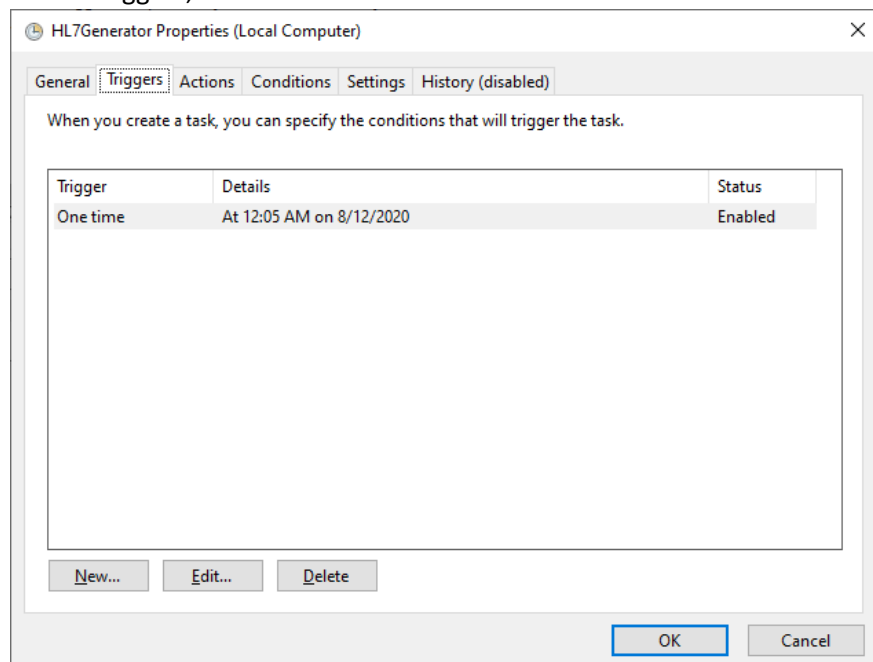
☐ Run with highest privileges

☐ Hidden

Configure for: Windows Vista™, Windows Server™ 2008

OK Cancel

- b. Under Triggers, select the schedule desired



HL7Generator Properties (Local Computer)

General Triggers Actions Conditions Settings History (disabled)

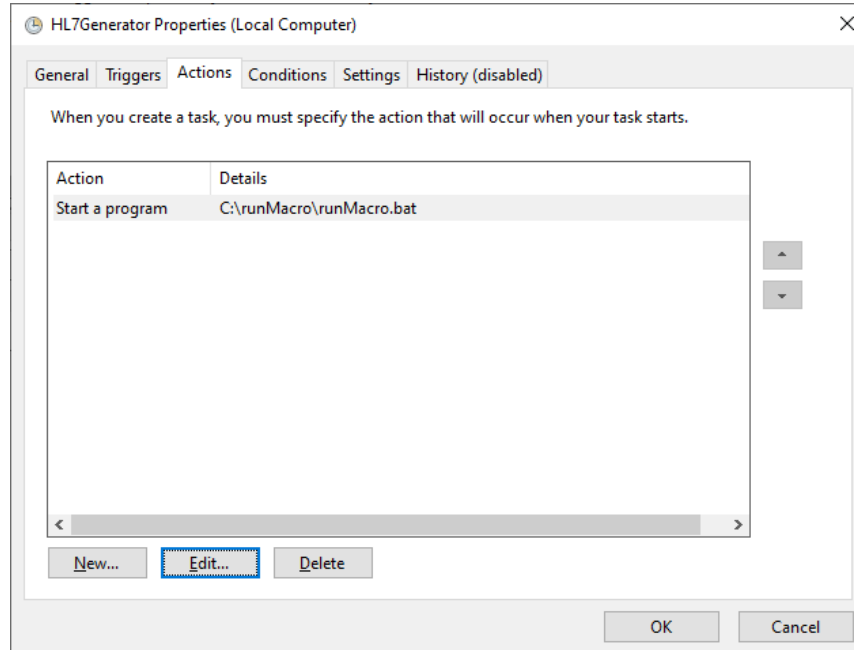
When you create a task, you can specify the conditions that will trigger the task.

Trigger	Details	Status
One time	At 12:05 AM on 8/12/2020	Enabled

[New...](#) [Edit...](#) [Delete](#)

OK Cancel

c. Under Actions, select runMacro.bat



The scheduled task can be tested by right clicking on “HL7Generator” and clicking “Run”

Trouble shooting other tool outputs etc.

When the scheduled task runs the following happens:

1. The macro reads the CSV and loads all the information
2. If the load is successful it removes it from the “Input” directory and places it in the “Processed” directory renamed with “prc” and the timestamp pre-pended to the name.
3. It processes the CSV and outputs the HL7 batch to the output directory only if there are no errors (although there could be warnings in the NationalELRLog file). The HL7 file will generate if there are warnings.
4. If there are errors, it will output the error file (and warnings if any) to the error directory describing what happened. Possible outputs are:
 - a. A file named “NationalELRLog<timestamp>.txt” with: “Not generating HL7 because of the following errors:” (with a list of the errors that prevented processing)
 - i. Use the error entries to fix the data being input into CSV file
 - b. A file named “CSVLoadErrorLog<timestamp>.txt” with: “File not processed because it could not be found.”
5. If there are no errors, it will output a file named “NationalELRLog<timestamp>.txt” with: “HL7 batched produced with no errors” and may have warnings in the file.

Note: the CSV to HL7 conversion was benchmarked to process 2000 records in about 2 minutes. Performance will vary based on data entry and number of rows per distinct HL7 record. Macros have a limitation where it cannot fully utilize the resources of multi core processor computers. If more than 2000 rows at a time need to be processed, please refer to the Developer’s guide to implement parallel



processing with the CSV file. Parallel processing separates the file into smaller files and processes them in parallel with multiple instances of the vb script that invokes the macro enabled excel document.