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# Introduction

The document discusses the SEC (Saudi Electric Company) invoice (energy consumption bill) parsing application. KAUST Facilities and Management team receives energy consumption bill through SEC. The energy consumption bill data is different for different types like industrial, commercial, charity, medical, residential, etc. usage. The energy consumption bill is more than 500 pages of PDF (Portable Document Format) document and mostly the data in Arabic language.

The document contains energy consumption data fields like subscription number, meter readings (to and from), meter reading dates (to and from), invoice number, invoice date, cost, value added tax, total cost, etc., for each type inside KAUST like villas, town houses, academic buildings, and other facilities. In the case of industry, the bill contains active power consumption, re-active power consumption etc. fields.

Storing energy consumption data to a digital form is very time consuming, error prone by entering the data values manually. This process is repetitive on every month. Once the data is stored in the digital form, different reports can be generated and viewed.

Develop an application that runs either in UI (User Interface) or command line mode. The application is aimed to develop a software package to digitize the energy consumption bills. The output will be a CSV (Comma Separated Value) file. The CSV file data contains the different energy consumption field’s data in English numerals.

The developed application will be packaged along with the necessary third party executables (in this case pdftotxt.exe (from XPDF)), DLLs (Dynamic Link Libraries), and system files. The application runs on the desktop that has Windows 7 or Windows 8 Operating Systems.

# Installation

The application is developed in QT and C++. The tool is internally uses pdftotxt.exe. The application is bundled in a zip file contains following sub folders:

* bin, contains the binary (executable) files and other related executables (QT)
* tools, contains pdftotxt.exe.
* temp, a directory used for temporary purposes.

The necessary application folder is stored at Git Hub and can be downloaded. Download the application folder from GitHub to the desired directory in a Windows computer, say C:\KAUST\sec.

Using Cmd (command prompt application) prompt user can go to C:\KAUST\sec\application\bin\ and then execute the [arabictranslate.exe](https://github.com/premchedella/saudielectric/blob/master/application/bin/arabictranslate.exe) application along with command line parameters. The command line parameters will be explained in the later section.

There is no need for the user to download any other files. All the required libraries or DLLs(Dynamic Link Libraries) or executables are bundled and placed in the application folder.

# SEC Invoices

KAUST receives SEC invoices in the form of .pdf file. The SEC invoice file (.pdf) has mainly two kinds of invoices. One invoice has many (more) fields and other invoices have a smaller number of fields. The many fields invoice is called **bigger invoice,** and a smaller number of fields is called **smaller invoice**.

Most of the time all bigger invoices are in one file, all smaller invoices in another file. Sometimes smaller and bigger invoices are available in the same file.

The earlier executable takes type (KAU 1 or 2) an input parameter which says whether the input file is a bigger or smaller invoice file. Based on this input, the parser parses and generates the data accordingly. Whenever the input file contains both smaller and bigger invoices, the executable is not able to generate all the invoices since there is a mismatch for the input parameter, either it generates all the bigger invoices with **Complete** and all the smaller invoices with **Partial** data or it generates all the smaller invoices with **Complete** and all the bigger invoices with **Partial** data. To solve this problem, a new kind of parser is required.

Each invoice starts with **الاسم** phrase. Whenever the line starts with this phrase then it is considered a block or invoice.

To differentiate between smaller and bigger invoices, **: طاقة غير فاعلة)** phrased is used. If the invoice contains this phrase, then the invoice is called a bigger invoice otherwise the invoice is called a smaller invoice. In the case of bigger invoices, in most cases, the differentiated phrase is available in the last 6th line. Whenever this phrase is found in the last 6 lines then the corresponding invoice is called a bigger invoice otherwise it is called a smaller invoice.

# Execution

Generate the invoice data with the following options:

## Option 1

Following is the command line instruction:

**arabictranslate.exe 7 2023 D:\KAUST\projects\tests\misc\saudi\_electric\Aug\_2023\KAU1-6F-JulAuginv2023.pdf D:\KAUST\projects\tests\misc\saudi\_electric\Aug\_2023\output**

The following are the parameters:

1. Invoice Month
2. Invoice Year
3. Invoice file (with .pdf)
4. Output Path

Assume that name of the input file is **KAU1-6F-JulAuginv2023.pdf.**  The parser generates **KAU1-6F-JulAuginv2023\_invocies.csv** and

**KAU1-6F-JulAuginv2023\_summary.csv** in the

**D:\KAUST\projects\tests\misc\saudi\_electric\Aug\_2023\output** folder.

## Option 2

Following is the command line instruction:

**arabictranslate.exe 7 2023 D:\KAUST\projects\tests\misc\saudi\_electric\Aug\_2023\KAU1-6F-JulAuginv2023.pdf**

The following are the parameters:

1. Invoice Month
2. Invoice Year
3. Invoice file (with .pdf)

The application generates output file(s) automatically in the same folder where the input .pdf file exists.

Assume that name of the input file is **KAU1-6F-JulAuginv2023.pdf.**  The parser generates **KAU1-6F-JulAuginv2023\_invocies.csv** and

**KAU1-6F-JulAuginv2023\_summary.csv** in the

**D:\KAUST\projects\tests\misc\saudi\_electric\Aug\_2023** folder.

# Summary

# Bigger Invoice Field Names

Following is the bigger invoice snippet from the KAU2\_18F\_Jun\_Jul\_inv\_2023.pdf file.

A white sheet with black lines and black text

Description automatically generated with medium confidence

AV {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AP {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AM {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AL {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

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AU {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AN {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AT {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AO {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AJH {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

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AQ {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

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A – Account Number – 10089521822

B – Subscription Number – 22044000003777

C – Site Number – 4008579736

D – Address – 0001

E – Invoice Date – 13-Jul-23

F – Type – 02

G – Sub-Type – Industrial

H – Invoice Number – 280023279756

I – Reading To (Date) – 11-Jul-23

J – Reading From (Date) – 11-Jun-23

K – Multiplication Factor – 82800.0000

L – Circuit Breaker Capacity – 1250

M – Reading Days – 30

N – Meter Number – KFM2120560005306

O – Power Consumption – 1821600.0000

P – Current Reading – 121.0000

Q – Previous Reading – 99.0000

R – Reactive Power Consumption – 0.0000

S – Reactive Power Current Reading – 8.0000

T – Reactive Power Previous Reading – 5.0000

U – Taxable Amount – 327918.00

V – Active Power Consumption Cost – 327888.00

W – VAT – 49187.70

X – Meter Service – 0.00

Y – Total Cost – 377105.70

Z – Reactive Power Cost – 0.00

AA – Non - Taxable Amount – 0.00

AB – Other Fees – 0.00

AC – Settlement – 0.00

AD – Required Amount – 377105.70

AE – Total Reactive Power Consumption (UP) – 248400.0000

AF – Allowed Reactive Power Consumption – 598730.9566

AG – Power Factor – 0.99

AH – Total Active Power Consumption – 1821600.0000

AI – Active Power Consumption Factor – 1.00

AJ – Active Power Multiplication Factor – 82800.0

AK – Active Power Previous Reading – 99.0000

AL – Active Power Current Reading – 121.0000

AM – Active Power Circuit Breaker Capacity – 1250

AN – Active Power Meter Number - KFM21205600053

AO – Total Reactive Power Consumption (Down) – 248400.0000

AP – Reactive Power Consumption Factor – 1.00

AQ – Reactive Power Multiplication Factor – 82800.0

AR – Reactive Power Previous Reading – 5.0000

AS – Reactive Power Current Reading – 8.0000

AT – Reactive Power Circuit Breaker Capacity – 1250

AU – Reactive Power Meter Number - KFM21205600053

AV – Total Consumption - 248400.0000

# Smaller Invoice Field Names

Following is the smaller invoice snippet from the KAU2\_18F\_Jun\_Jul\_inv\_2023.pdf file.

A close-up of a computer screen

Description automatically generated

AJ {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

AG {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

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AE {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

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AA {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0} {"batch":"scarlette\_chicago\_20221022","country":"USA","city":"Chicago","lat":41.8755616,"lon":-87.6244212,"time offset":0.0}

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A – Account Number – 10089528341

B – Subscription Number – 22044000003785

C – Site Number – 4008579760

D – Address – 0001

E – Invoice Date – 14-Jul-2023

F – Type – 09

G – Sub-Type – Industrial

H – Invoice Number – 215018916333

I – Reading To (Date) – 11-Jul-23

J – Reading From (Date) – 11-Jun-23

K – Multiplication Factor – 82800.0000

L – Circuit Breaker Capacity – 278

M – Reading Days – 30

N – Meter Number – KFM2120560005353

O – Power Consumption – 331200.0000

P – Current Reading – 22.0000

Q – Previous Reading – 18.0000

R – Taxable Amount – 59637.00

S – Active Power Consumption Cost – 59616.00

T – VAT – 8945.55

U – Meter Service – 21.00

V – Total Cost – 68582.55

W – Other Fees – 0.00

X – Settlement – 0.00

Y – Non - Taxable Amount – 0.00

Z – Required Amount – 68582.55

AA –Total Active Power Consumption – 331200.0000

AB – Active Power Consumption Factor – 1.0000

AC – Active Power Multiplication Factor – 82800.0

AD – Active Power Previous Reading – 18.0000

AE – Active Power Current Reading – 22.0000

AF – Active Power Circuit Breaker Capacity – 278

AG – Active Meter Number – 0.0000

AH – Total Meters Consumption – 0.0000

AI – Total Meters Consumption Factor -1.0000

AJ – Total Consumption – 331200.0000

# Summary Field Names

Following is the summary or 1st page snippet from the KAU2\_18F\_Jun\_Jul\_inv\_2023.pdf file.

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Description automatically generated

T

J

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A – VAT Number – 300000361310003

B – Invoice Number – 200022922169

C – Collective Account Number – 20000260048

D – Invoice Issue Date – 3-Aug-2023

E – VAT Account – 300127814200003

F – Reading To (Date) – 11-Jul-2023

G – Reading From (Date) – 12-Jun-2023

H – Account Number – 108969204

I – Taxable Amount – 2488787.14

J – Active Power Consumption Cost – 2441265.54

K – Active Power Consumption – 13544675.0000

L – VAT – 373318.09

M – Reactive Power Consumption Cost – 40006.60

N – Reactive Power Consumption – 800131.9200

O – Total Cost – 2862105.23

P – Meters Service Cost – 7515.00

Q – Non - Taxable Amount – 0.00

R – Other Fees – 0.00

S – Required Amount – 2862105.23

T – Settlements – 0.00