

Assignment for the Case AML (System Development for Fintech)

09 March 2023

1. Convert a MT103 SWIFT message

(<https://www2.swift.com/knowledgecentre/products/Standards%20MT>) into the following data structure. Write a code in your chosen language to convert the message to the following data structure. The **notEmpty** fields are mandatory. (25 points)

Converting each of the mandatory fields correctly carries 1 point and converting each of the non-mandatory fields contains 0.5 points (15+8.5+1.5). 1.5 points are given for coding style.

```
transaction_date: xDateTimeTz
transaction_id: notEmpty
transaction_message: notEmpty
// ISO 4217
transaction_currency:
regex("(^(AED|AFN|ALL|AMD|ANG|AOA|ARS|AUD|AWG|AZN|BAM|BBD|BDT|BGN|BHD|BIF|BMD|BND|BOB|BOV|BRL|BSD|BTN|BWP|BYR|BZD|CAD|CDF|CHE|CHF|CHW|CLF|CLP|CNY|COP|COU|CRC|CUC|CUP|CVE|CZK|DJF|DKK|DOP|DZD|EGP|ERN|ETB|EUR|FJD|FKP|GBP|GEL|GHS|GIP|GMD|GNF|GTQ|GYD|HKD|HNL|HRK|HTG|HUF|IDR|ILS|INR|IQD|IRR|ISK|JMD|JOD|JPY|KES|KGS|KHR|KMF|KPW|KRW|KWD|KYD|KZT|LAK|LBP|LKR|LRD|LSL|LTL|LVL|LYD|MAD|MDL|MGA|MKD|MMK|MNT|MOP|MRO|MUR|MVR|MWK|MXN|MXV|MYR|MZN|NAD|NGN|NIO|NOK|NPR|NZD|OMR|PAB|PEN|PGK|PHP|PKR|PLN|PYG|QAR|RON|RSD|RUB|RWF|SAR|SBD|SCR|SDG|SEK|SGD|SHP|SLL|SOS|SRD|SSP|STD|SVC|SYD|SZL|THB|TJS|TMT|TND|TOP|TRY|TTD|TWD|TZS|UAH|UGX|USD|USN|USS|UYI|UYU|UZS|VEF|VND|VUV|WST|XAF|XAG|XAU|XBA|XBB|XBC|XBD|XCD|XDR|XFU|XOF|XPD|XPF|XPT|XSU|XTS|XUA|XXX|YER|ZAR|ZMW|ZWL)$")
// Amount rounded to the smallest currency unit
transaction_amount: notEmpty
// Populate as follows:
// SWIFT messages: MTXXX where XXX is sourced from "message type"
field as per
https://www2.swift.com/knowledgecentre/products/Standards%20MT
// ISO format messages: According to xsd for the "message id" e.g.
pain.008.001.09 https://www.iso20022.org/iso-20022-message-definitions
```

```
// Fedwire/ACH/CHIPS messages: "Business function code" as per Fedwire
(3600) proprietary message format specification
// For other transaction types, please contact us before submission
transaction_type: notEmpty
transaction_direction: any("i", "o", "io")
transaction_status: any("accepted", "rejected")
instrument_type:
any("cash", "check", "ach/lcy_transfers", "wire", "securities", "e-
money/mobile_money", "travellers_cheques", "prepaid_cards", "certified_ch
eques", "vouchers", "cashier_cheques/money_order", "precious_metal", "cryp
to/virtual_assets", "interest/dividend", "other")
originator_full_name: notEmpty
originator_first_name: notEmpty or empty
originator_middle_names_patronymic: notEmpty or empty
originator_last_name: notEmpty or empty
originator_address: notEmpty
// ISO 3166-1 alpha-2
originator_country:
regex("^(AF|AX|AL|DZ|AS|AD|AO|AI|AQ|AG|AR|AM|AW|AU|AT|AZ|BS|BH|BD|BB|B
Y|BE|BZ|BJ|BM|BT|BO|BQ|BA|BW|BV|BR|IO|BN|BG|BF|BI|KH|CM|CA|CV|KY|CF|TD
|CL|CN|CX|CC|CO|KM|CG|CD|CK|CR|CI|HR|CU|CW|CY|CZ|DK|DJ|DM|DO|EC|EG|SV|
GQ|ER|EE|ET|FK|FO|FJ|FI|FR|GF|PF|TF|GA|GM|GE|DE|GH|GI|GR|GL|GD|GP|GU|G
T|GG|GN|GW|GY|HT|HM|VA|HN|HK|HU|IS|IN|ID|IR|IQ|IE|IM|IL|IT|JM|JP|JE|JO
|KZ|KE|KI|KP|KR|KW|KG|LA|LV|LB|LS|LR|LY|LI|LT|LU|MO|MK|MG|MW|MY|MV|ML|
MT|MH|MQ|MR|MU|YT|MX|FM|MD|MC|MN|ME|MS|MA|MZ|MM|NA|NR|NP|NL|NC|NZ|NI|N
E|NG|NU|NF|MP|NO|OM|PK|PW|PS|PA|PG|PY|PE|PH|PN|PL|PT|PR|QA|RE|RO|RU|RW
|BL|SH|KN|LC|MF|PM|VC|WS|SM|ST|SA|SN|RS|SC|SL|SG|SX|SK|SI|SB|SO|ZA|GS|
SS|ES|LK|SD|SR|SJ|SZ|SE|CH|SY|TW|TJ|TZ|TH|TL|TG|TK|TO|TT|TN|TR|TM|TC|T
V|UG|UA|AE|GB|US|UM|UY|UZ|VU|VE|VN|VG|VI|WF|EH|YE|ZM|ZW)$")
// Internal customer account number
originator_account_number: notEmpty
originator_branch_id: if($beneficiary_branch_id/empty, notEmpty, empty
or notEmpty)
originator_bic: notEmpty
originator_fi_name: notEmpty
originator_fi_country: notEmpty
```

```

// incoming_intermediary_fi_bic can be one or a list of BIC codes
// separated by `;` they should contain all intermediaries before the
// processor institution
incoming_intermediary_fi_bic: regex("/([a-z]{4}[a-z]{2}[a-z0-9]{2}([a-
z0-9]{3})?;?)+/gmi") or empty
// outgoing_intermediary_fi_bic can be one or a list of BIC codes
// separated by `;` they should contain all intermediaries after the
// processor institution
outgoing_intermediary_fi_bic: regex("/([a-z]{4}[a-z]{2}[a-z0-9]{2}([a-
z0-9]{3})?;?)+/gmi") or empty
beneficiary_full_name: notEmpty
beneficiary_first_name: notEmpty or empty
beneficiary_middle_names_patronymic: notEmpty or empty
beneficiary_last_name: notEmpty or empty
beneficiary_address: notEmpty
// ISO 3166-1 alpha-2
beneficiary_country:
regex("^(AF|AX|AL|DZ|AS|AD|AO|AI|AQ|AG|AR|AM|AW|AU|AT|AZ|BS|BH|BD|BB|B
Y|BE|BZ|BJ|BM|BT|BO|BQ|BA|BW|BV|BR|IO|BN|BG|BF|BI|KH|CM|CA|CV|KY|CF|TD
|CL|CN|CX|CC|CO|KM|CG|CD|CK|CR|CI|HR|CU|CW|CY|CZ|DK|DJ|DM|DO|EC|EG|SV|
GQ|ER|EE|ET|FK|FO|FJ|FI|FR|GF|PF|TF|GA|GM|GE|DE|GH|GI|GR|GL|GD|GP|GU|G
T|GG|GN|GW|GY|HT|HM|VA|HN|HK|HU|IS|IN|ID|IR|IQ|IE|IM|IL|IT|JM|JP|JE|JO
|KZ|KE|KI|KP|KR|KW|KG|LA|LV|LB|LS|LR|LY|LI|LT|LU|MO|MK|MG|MW|MY|MV|ML|
MT|MH|MQ|MR|MU|YT|MX|FM|MD|MC|MN|ME|MS|MA|MZ|MM|NA|NR|NP|NL|NC|NZ|NI|N
E|NG|NU|NF|MP|NO|OM|PK|PW|PS|PA|PG|PY|PE|PH|PN|PL|PT|PR|QA|RE|RO|RU|RW
|BL|SH|KN|LC|MF|PM|VC|WS|SM|ST|SA|SN|RS|SC|SL|SG|SX|SK|SI|SB|SO|ZA|GS|
SS|ES|LK|SD|SR|SJ|SZ|SE|CH|SY|TW|TJ|TZ|TH|TL|TG|TK|TO|TT|TN|TR|TM|TC|T
V|UG|UA|AE|GB|US|UM|UY|UZ|VU|VE|VN|VG|VI|WF|EH|YE|ZM|ZW)$")
beneficiary_account_number: notEmpty
beneficiary_branch_id: if($originator_branch_id/empty, notEmpty, empty
or notEmpty)
beneficiary_bic: notEmpty
beneficiary_fi_name: notEmpty
beneficiary_fi_country: notEmpty

```

2. Use this structure to either write python functions or sql code to identify the following risk patterns(75 points)
 - a. Round Amount payments - 15 points

- b. Payments from high risk countries - 15 points (<https://www.fatf-gafi.org/en/countries/black-and-grey-lists.html>) to tax havens (<https://fsi.taxjustice.no/fsi/2022/world/score/top>)
- c. Smurfing - 10 points
- d. Nesting - 10 points
- e. Non-adherence to FATF Recommendation 16 - 10 points
- f. (<https://www.fatf-gafi.org/content/dam/recommandations/pdf/FATF%20Recommendations%202012.pdf.coredownload.inline.pdf>) - 5 points
- g. Shell company characteristics using address and name data. - 5 points
- h. Trade based money laundering - 5 points (<https://www.fatf-gafi.org/content/fatf-gafi/en/publications/Methodsandtrends/Trade-based-money-laundering-indicators.html>, https://stats.wto.org/dashboard/tradeconnectivity_en.html)