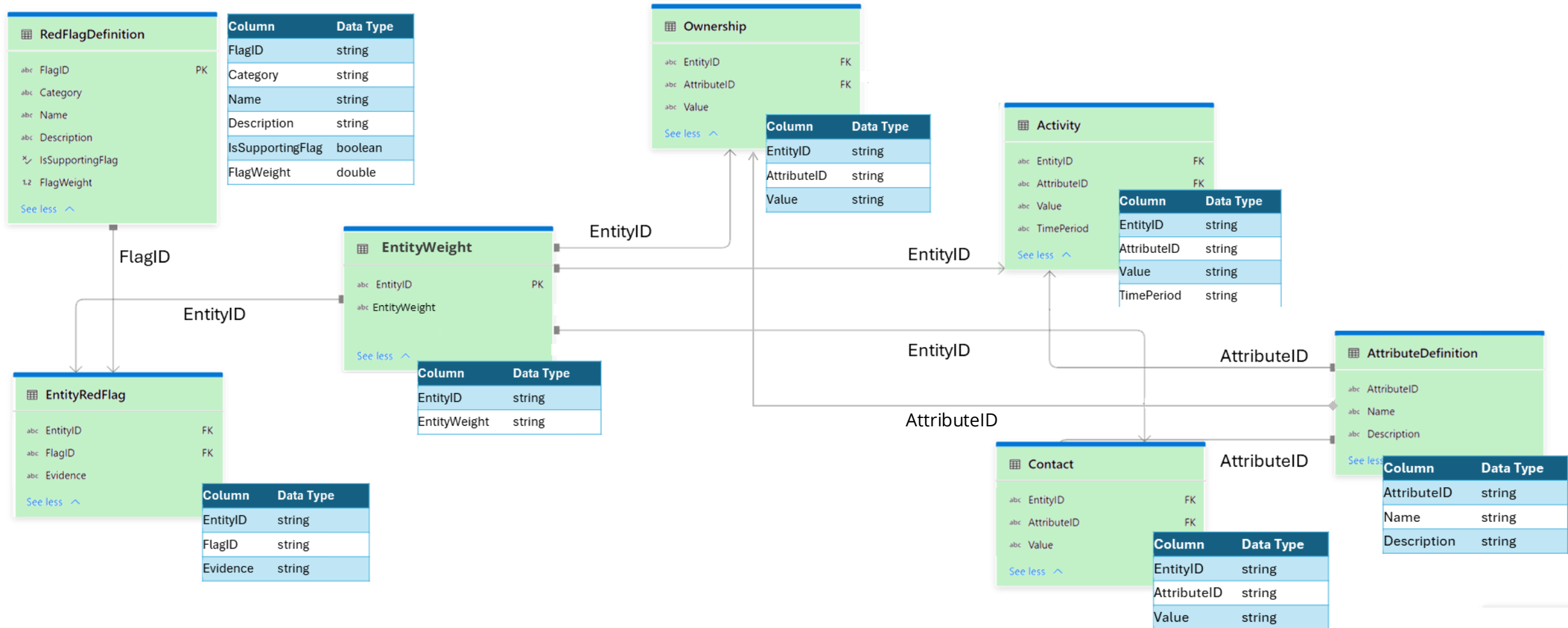


Beneficial Ownership Engine Data Model^{1,2}



1 – Tables highlighted in green correspond to Beneficial Ownership Engine input files.

2 – Table names in this diagram may differ from the filenames used for Beneficial Ownership Engine input csv format files.

Steps to Create Beneficial Ownership Engine input datafiles.

Step 1: **Entity Weight** file – create a list of companies you want to include. Weight each company in the list. For example, the Entity Weight could be the contract value over a specified period of time.

Step 2: **Red Flag and Red Flag Definition** files - Create a list of the types of red flags (we can help provide additional guidance if needed). Start with a small set, for example 10 red flags. At the same time, create the Entity Red Flag file, which contains the red flags for each company. Each company can have 0 or more than 1 red flag.

Step3: **Ownership** file. Create a list of owners and partners/shareholders for each company.

Step 4: **Contact** file. Create a list of information about the companies that are in the Entity Weight file.

Step 5: **Activity** file. For each company aggregated to a given period of time, for example quarterly, list the important procurement activities.

Step 6: **Attribute Definition** file. Create a list of the attributes that were referenced in Activity, Contact, and Ownership input files.

Step 1: Entity Weight

This file contains a weight for each entity that will impact total risk score. Entities with larger values will have higher risk scores.

“Entities” are companies.

EntityWeight is assigned a value of 1 by default.

To assign risk relative to company size, different EntityWeights can be entered for different companies.

All other factors being equal, Beneficial Ownership Engine will assign higher risk to companies with a higher EntityWeight.

For example, EntityWeight could be assigned values equal to the total yearly revenue for each entity/company.

Used in
EntityRedFlag, Ownership,
Contact, and Activity, csv
files.

Column	Data Type
EntityID	string
EntityWeight	string

EntityID	EntityWeight
0	4680148.5
1	6651819.5
2	5618855
3	5249877
4	3989045.2
5	3988944.5
6	3428937.5
7	6108496
8	5256234.5
9	5547763
10	2958185.5
11	6879470.5
12	5963863
13	4201670
14	4091569.2

For example, the weight could be the 5-year total contract value.

Step 2: Red Flag Definition & Red Flags

Column	Data Type
FlagID	string
Category	string
Name	string
Description	string
IsSupportingFlag	boolean
FlagWeight	double

Red Flag Definition

This file contains data on company red flag types.

Note: IsSupportingFlag provides a simple mechanism to reduce noise in the risk calculation process based on domain knowledge. A supporting red flag with IsSupportingFlag = TRUE is only considered if it appears together with red flags from other categories.

Red Flags

This file contains details of red flags associated with an entity. The Evidence attribute can be any text or a JSON-formatted string that contains fine-grained details of a given red flag. This information is displayed in the company risk report.

Column	Data Type
EntityID	string
FlagID	string
Evidence	string

FlagID	Category	Name	Description	IsSupportingFlag	FlagWeight
F1	Procurement	Noncompetitive processes	contract awarded without call for tenders	FALSE	1
F2	Procurement	Noncompetitive processes	Contract awarded after shortened advertised period	FALSE	5
F3	Procurement	Noncompetitive processes	High winning rate	FALSE	1
F4	Collusion	Top Loser	Number of competitivors	FALSE	2
F5	Collusion	Top loser	Low winning rate	FALSE	5
F6	Political Connections	politically-exposed person	A company owner is a politically-exposed person	TRUE	2
F7	Blacklisted	Sanctioned	The company was sanctioned	FALSE	3
F8	Blacklisted	Contracts while sanctioned	company was awarded while sanctioned	FALSE	3
F9	Supplier Characteristics	Convicted owner	The company is owned by a convicted person	FALSE	3

EntityID	FlagID	Evidence
1416	F7	FININT: Entity 1416 is linked to flag market division in data sources on money transactions
1525	F6	OSINT: Entity 1525 is linked to flag politically-exposed person in open data sources
1537	F3	OSINT: Entity 1537 is linked to flag litigated in open data sources
1666	F4	DNINT: Entity 1666 is linked to flag front person in digital network intelligence data
1728	F1	OSINT: Entity 1728 is linked to flag fined in open data sources
1863	F7	FININT: Entity 1863 is linked to flag market division in data sources on money transactions
2067	F9	FININT: Entity 2067 is linked to flag price fixing in data sources on money transactions
2399	F9	FININT: Entity 2399 is linked to flag price fixing in data sources on money transactions
2649	F8	FININT: Entity 2649 is linked to flag bid rigging in data sources on money transactions
2846	F9	FININT: Entity 2846 is linked to flag price fixing in data sources on money transactions
2862	F5	OSINT: Entity 2862 is linked to flag convicted criminal in open data sources
2870	F2	OSINT: Entity 2870 is linked to flag sanctioned in open data sources

Step 3: Ownership

This table contains company ownership structure.

For example, individual partners, corporate partners.

This is modelled as a static relationship.

Note: Corporate partners should be included in the Entity table.

EntityID	AttributeID	Value
	3beneficial_owner	JACQUELINE MONROE(ID:9)
3066	beneficial_owner	BRIDGET WALLACE(ID:34)
30	beneficial_owner	JAMES ROBINSON(ID:69)
9744	beneficial_owner	STEPHANIE MANNING(ID:163)
10518	beneficial_owner	SEAN MORROW(ID:247)
192	beneficial_owner	JENNIFER ALI(ID:425)
202	beneficial_owner	PETER SHEPHERD(ID:443)
205	beneficial_owner	MIRANDA HICKS(ID:450)
206	beneficial_owner	TYLER ZAVALA(ID:452)
225	beneficial_owner	WILLIE LARA(ID:485)
227	beneficial_owner	ASHLEY MORENO(ID:493)
6	beneficial_owner	MONICA ELLIS(ID:508)
8	beneficial_owner	SAMANTHA HALE(ID:540)
196	beneficial_owner	VANESSA HOWARD(ID:605)
294	beneficial_owner	JONATHAN BATES(ID:632)

Column	Data Type
EntityID	string
AttributeID	string
Value	string

Step 4: Contact

This file contains company contact details.

For example, company name, address, phone, email, website.

This is modelled as a static relationship.

EntityID	AttributeID	Value
2502	address	0120 KEY VILLAGE LISASHIRE LOUISIANA 25612 UNITED STATES
2487	address	88795 JACOBS VILLAGE ALISONPORT MISSOURI 29333 UNITED STATES
2531	address	178 BROWN INLET EAST ROYTON MICHIGAN 88697 UNITED STATES
2737	address	3886 STEPHEN GLENS FRANKLINHAVEN WASHINGTON 40598 UNITED STATES
2557	address	326 LEE DAM MORRISTON WEST VIRGINIA 46319 UNITED STATES
2590	address	41467 RUSSELL VALLEYS RICHARDSBERG ARKANSAS 68344 UNITED STATES
2595	address	43162 NORMAN LOCKS WEST ANDREWFORT WASHINGTON 89995 UNITED STATES
2599	address	47129 SARAH STREET WEST KYLEBOROUGH MARYLAND 39029 UNITED STATES
2601	address	8699 MARY FORT PORT LEONARD ARIZONA 83389 UNITED STATES
14105	address	36255 LUCAS STRAVENUE NORTH MICHAELPORT OKLAHOMA 82402 UNITED STATES
2626	address	104 ALVARADO PRAIRIE NEW MARYVILLE GEORGIA 26728 UNITED STATES
2639	address	4016 JOSEPH SKYWAY BRYANVIEW SOUTH DAKOTA 37109 UNITED STATES
2639	address	78740 PAULA CIRCLES SOUTH DAVIDMOUTH NEVADA 78223 UNITED STATES
16650	address	8470 MCGRATH FLAT AYALABOROUGH ARIZONA 12027 UNITED STATES
2714	address	014 WILLIAMS KNOLLS PORT KIMBERLY ALABAMA 72374 UNITED STATES
2720	address	9295 DEBORAH MEWS SARABERG ALASKA 20523 UNITED STATES
2754	address	75134 EARL BRIDGE MATTHEWBURGH MISSOURI 57503 UNITED STATES
11353	address	834 BENNETT RADIAL ROWETON MONTANA 44211 UNITED STATES

Column	Data Type
EntityID	string
AttributeID	string
Value	string

Step 5: Activity

This file contains company procurement (e.g., bidding) activity aggregated to a given period length, e.g., quarterly.

This is typically the largest file (1-100MB).

EntityID	AttributeID	Value	TimePeriod
1293	tender	tender:396	2023-01
9058	item	item:57282	2023-11
19997	buyer	buyer:63682	2023-06

Column	Data Type
EntityID	string
AttributeID	string
Value	string
TimePeriod	string

Step 6: Attribute Definition

This file contains:

1. Attribute ID: an ID for the attribute (no spaces)
2. Name: a descriptive text label for the attribute
3. Description: a longer text description for the attribute

For example, company's headquarter details, size, number of partners, etc.

These attributes:

- Establish links or connections between company nodes
 - That is, they determine covariates in the relational risk computations
- Comprise the Summary Attributes in the Entity Overview section of the final report

Note: some attributeIDs will be used as part of node labels in the evidence graphs, so keep labels as compact strings instead of numeric IDs, and use the Description for verbose details.

Used in Activity, Contact, Ownership csv files.

AttributeID	Name	Description
company_name	name	company name
phone	phone number	company phone number
email	email	company email
address	address	company address
beneficial_owner	beneficial owner	beneficial owner of the company
director	company director	director of the company
tender	Tender	id of tender in public procurement
item	Item	id of line item in public procurement
buyer	Buyer	id of buyer in public procurement
EntityWeight	contract value	total contract value awarded to the entity in the past 5 years

Column	Data Type
AttributeID	string
Name	string
Description	string

Configuration Parameters

- File sizes – processing time is a function of the number of companies. Reduce the number or company entities to lower processing time.
- Change BOE configuration parameters:
 - Modify or remove fuzzy matching
 - Make 'n_connected_components' small
 - Reduced depth parameter: max_path_length