

# INFO 6210: DB Project: Jobs Database: COVID/ Corona/ Temporary Jobs Database

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In this project we will contribute to building a jobs database using mysql and python. We will each focus on job domains like COVID Jobs, Corona Virus Jobs and Temporary Jobs. The database is focused around specific roles, We have used an API interface to generate RAW data files containing web scrapped listings from Glassdoor and Indeed.

## Project Abstract

The growing spread of coronavirus has left many Americans in fear of losing their jobs, as businesses continue to shutter and authorities tell people to stay at home. Unemployment claims multiplied, reaching an all-time high of over 3.3 million in mid-March, with analysts expecting that number to climb. Conversely, a surge of companies – not just in the health care industry – are looking to hire additional employees to meet increased demands onset by the virus.

Data Source: Our objective was to generate data from Job dashboards like Glassdoor and Indeed, as these websites freely do not allow web scrapping, we used an automated API to fetch data from them.

APIFY interfaces:

1. Glassdoor - alexey/glassdoor-jobs-scraper
2. Indeed - hynekhruska/indeed-scraper

```
In [ ]: # JSON parameters for Indeed Jobs with keyword 'temporary'
# POST - https://api.apify.com/v2/actor-tasks/Kp8SPPqNvsDjhZGbL/runs?token=2y8rTxfoTByNFTWZS3S7D73XD&ui=1
{
  "query": "temporary",
  "category": "Jobs",
  "location": "boston",
  "locationstate": "MA",
  "maxResults": 100000000000,
  "proxy": {
    "useApifyProxy": true
  }
}
```

```
In [ ]: # JSON parameters for Indeed Jobs with keyword 'corona'
{
  "query": "corona",
  "category": "Jobs",
  "location": "boston",
  "locationstate": "MA",
  "maxResults": 100000000000,
  "proxy": {
    "useApifyProxy": true
  }
}
```

```
In [ ]: # JSON parameters for Indeed Jobs with keyword 'COVID'
{
  "query": "COVID",
  "category": "Jobs",
  "location": "boston",
  "locationstate": "MA",
  "maxResults": 100000000000,
  "proxy": {
    "useApifyProxy": true
  }
}
```

```
In [ ]: # JSON parameters for Glassdoor Jobs with keyword 'temporary'
{
  "query": "temporary",
  "category": "Jobs",
  "location": "boston",
  "locationstate": "MA",
  "maxResults": 100000000000,
  "proxy": {
    "useApifyProxy": true
  }
}
```

```
In [ ]: # JSON parameters for Glassdoor Jobs with keyword 'corona'
{
  "query": "corona",
  "category": "Jobs",
  "location": "boston",
  "locationstate": "MA",
  "maxResults": 100000000000,
  "proxy": {
    "useApifyProxy": true
  }
}
```

```
In [ ]: # JSON parameters for Glassdoor Jobs with keyword 'COVID'
{
  "query": "COVID",
  "category": "Jobs",
  "location": "boston",
  "locationstate": "MA",
  "maxResults": 100000000000,
  "proxy": {
    "useApifyProxy": true
  }
}
```

Export Logs: my-task alexey/glassdoor-jobs-scraper 10 check\_circleSUCCEEDED 4 minutes 2020-04-23 19:17:19  
search check\_circleSUCCEEDED 0.1.19 2020-04-23 19:17:19 4 minutes 4096 MB 0.2799 WEB  
cancelFAILED 0.1.19 2020-04-23 19:15:54 a minute 4096 MB 0.0702 WEB cancelFAILED 0.1.19 2020-04-23 19:13:13 a minute 4096 MB 0.0739 WEB check\_circleSUCCEEDED 0.1.19 2020-04-23 19:11:45 a few seconds 4096 MB 0.0465 WEB check\_circleSUCCEEDED 0.1.19 2020-04-23 19:10:33 a few seconds 4096 MB 0.0327 WEB check\_circleSUCCEEDED 0.1.19 2020-04-23 19:02:39 3 minutes 4096 MB 0.1697 WEB cancelFAILED 0.1.19 2020-04-23 19:00:59 a minute 4096 MB 0.0765 WEB check\_circleSUCCEEDED 0.1.19 2020-04-23 18:44:09 a minute 4096 MB 0.0566 WEB cancelFAILED 0.1.19 2020-04-23 18:42:59 a few seconds 4096 MB 0.0415 WEB cancelFAILED 0.1.19 2020-04-23 18:42:40 2 minutes 4096 MB 0.1465 WEB my-task-1 hynekhruska/indeed-scraper 4 check\_circleSUCCEEDED 16 minutes 2020-04-23 20:11:26 se check\_circleSUCCEEDED 0.1.8 2020-04-23 20:11:26 16 minutes 1024 MB 0.2626 WEB check\_circleSUCCEEDED 0.1.8 2020-04-23 20:00:07 10 minutes 1024 MB 0.1493 WEB access\_timeTIMED-OUT 0.1.8 2020-04-23 19:38:16 5 minutes 1024 MB 0.0835 WEB access\_timeTIMED-OUT 0.1.8 2020-04-23 19:24:01 5 minutes 1024 MB 0.0835 WEB

```
In [3]: import requests
import json
import pandas as pd
import numpy as np
from urllib.request import urlopen
```

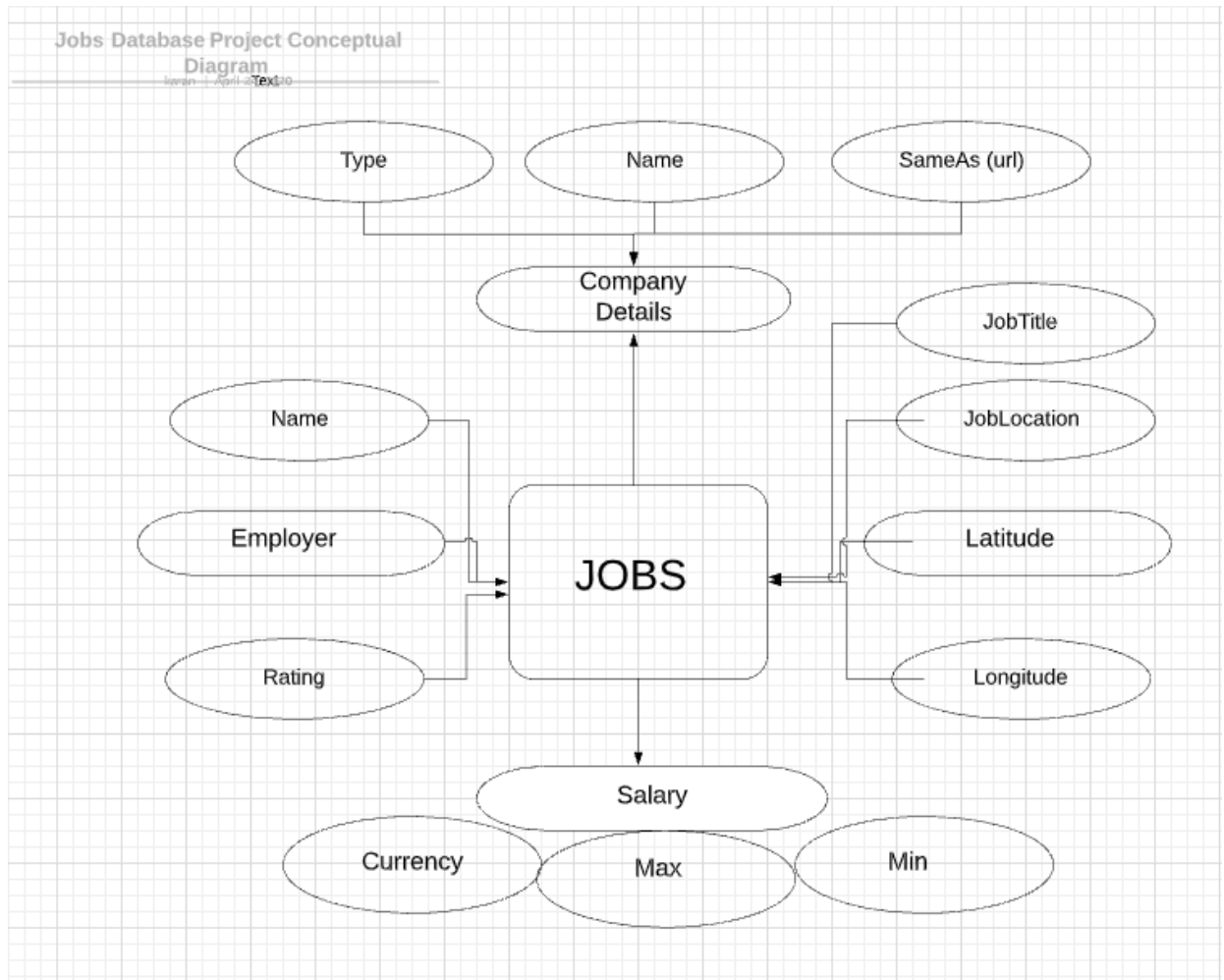
## # Glassdoor data

Description of Data: glassdoor1 = /Users/karansoni/Desktop/semester 2/DMDD/jobs-projects/data/glassdoor-covid.csv glassdoor2 = /Users/karansoni/Desktop/semester 2/DMDD/jobs-projects/data/glassdoor-corona.csv glassdoor3 = /Users/karansoni/Desktop/semester 2/DMDD/jobs-projects/data/glassdoor-temporary.csv

## Conceptual Model

```
In [87]: from IPython.display import Image
Image(r'/Users/karansoni/Desktop/semester 2/DMDD/jobs-projects/conceptual.png')
```

Out[87]:



```
In [4]: glassdoor1= pd.read_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/job
s-projects/data/glassdoor-covid.csv')
glassdoor2= pd.read_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/job
s-projects/data/glassdoor-corona.csv')
glassdoor3= pd.read_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/job
s-projects/data/glassdoor-temporary.csv')
glassdoor1.head()
```

Out[4]:

	companyDetails/@type	companyDetails/logo	companyDe
0	Organization	<a href="https://media.glassdoor.com/sql/371652/johnle...">https://media.glassdoor.com/sql/371652/johnle...</a>	JOHNLEON.
1	Organization	<a href="https://media.glassdoor.com/sql/371652/johnle...">https://media.glassdoor.com/sql/371652/johnle...</a>	JOHNLEON.
2	Organization	<a href="https://media.glassdoor.com/sql/118246/simon-...">https://media.glassdoor.com/sql/118246/simon-...</a>	Simon-Kuch & &
3	Organization	<a href="https://media.glassdoor.com/sql/5631/trader-j...">https://media.glassdoor.com/sql/5631/trader-j...</a>	Trader Joe&
4	Organization	<a href="https://media.glassdoor.com/sql/371652/johnle...">https://media.glassdoor.com/sql/371652/johnle...</a>	JOHNLEON.

5 rows × 27 columns

```
In [88]: glassdoor2.head()
```

Out[88]:

	employerName	employerRating	id	jobDetails	jobLocation/geo/longitu
0	Bayer	3.9	3546663504	Bayer is a global enterprise with core compete...	-71.0603
1	Boston Organics	3.4	3560714989	If you like working early mornings, being part...	-71.0603
2	Skyward Federal LLC	NaN	3549734457	Do you find yourself probing for vulnerabiliti...	-71.0603
3	Business Payment Services	NaN	3538918366	We are welcoming sales agents with experience ...	-71.0603
4	K Source Inc	3.7	3547910274	Role AWS Admin Location Cambridge, MA (Locals ...	-71.1061

In [89]: `glassdoor3.head()`

Out[89]:

	employerName	employerRating	id	jobDetails	jobLocation/geo
0	JOHNLEONARD	4.8	3474481524	Temporary Paralegal\n\nSalary: DOE\n\n3+ years...	-71.0603
1	JOHNLEONARD	4.8	3498359986	Temporary Administrative Assistant\n\nSalary: ...	-71.0603
2	Simon-Kucher & Partners	4.1	3284376296	About Simon-Kucher & Partners For over 30 year...	-71.0824
3	Trader Joe's	4.2	3536984411	At this time workers across the country are im...	-71.0603
4	JOHNLEONARD	4.8	3549912036	Temporary Billing Specialist\n\nSalary: DOE\n\n...	-71.0603

Data Validation

In [ ]:

```
In [5]: glassdoor1.isnull().any()
```

```
Out[5]: companyDetails/@type      False
         companyDetails/logo      True
         companyDetails/name       False
         companyDetails/sameAs     True
         datePosted                 False
         employerName               False
         employerRating             True
         id                         False
         jobDetails                 False
         jobLocation/@type          False
         jobLocation/address/@type  False
         jobLocation/address/addressCountry/@type False
         jobLocation/address/addressCountry/name False
         jobLocation/address/addressLocality False
         jobLocation/address/addressRegion False
         jobLocation/address/postalCode True
         jobLocation/geo/@type      False
         jobLocation/geo/latitude   False
         jobLocation/geo/longitude  False
         jobTitle                   False
         salary/@type               True
         salary/currency             True
         salary/value/@type         True
         salary/value/maxValue      True
         salary/value/minValue      True
         salary/value/unitText      True
         url                         False
         dtype: bool
```



```
In [6]: glassdoor2.isnull().any()
```

```
Out[6]: companyDetails/@type      False
        companyDetails/logo      True
        companyDetails/name       False
        companyDetails/sameAs     True
        datePosted                False
        employerName              False
        employerRating            True
        id                       False
        jobDetails                False
        jobLocation/@type         False
        jobLocation/address/@type False
        jobLocation/address/addressCountry/@type False
        jobLocation/address/addressCountry/name False
        jobLocation/address/addressLocality False
        jobLocation/address/addressRegion False
        jobLocation/address/postalCode True
        jobLocation/geo/@type     False
        jobLocation/geo/latitude  False
        jobLocation/geo/longitude False
        jobTitle                  False
        salary/@type              True
        salary/currency           True
        salary/value/@type        True
        salary/value/maxValue     True
        salary/value/minValue     True
        salary/value/unitText     True
        url                       False
        dtype: bool
```

```
In [7]: glassdoor3.isnull().any()
```

```
Out[7]: companyDetails/@type      False
        companyDetails/logo      True
        companyDetails/name       False
        companyDetails/sameAs     True
        datePosted                False
        employerName              False
        employerRating            True
        id                       False
        jobDetails                False
        jobLocation/@type         False
        jobLocation/address/@type False
        jobLocation/address/addressCountry/@type False
        jobLocation/address/addressCountry/name False
        jobLocation/address/addressLocality False
        jobLocation/address/addressRegion False
        jobLocation/address/postalCode True
        jobLocation/geo/@type     False
        jobLocation/geo/latitude  False
        jobLocation/geo/longitude False
        jobTitle                  False
        salary/@type              True
        salary/currency           True
        salary/value/@type        True
        salary/value/maxValue     True
        salary/value/minValue     True
        salary/value/unitText     True
        url                       False
        dtype: bool
```

## Data Manipulation

```
In [47]: #All the data from the 3 tables are then stored to the file glassdoor.csv
        glassdoormain= pd.read_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/
        jobs-projects/data/glassdoor.csv')
```

```
In [48]: glassdoormain.head()
```

```
Out[48]:
```

	ID	jobDetails	jobTitle	url	employerRating
0	1001	FamilyAid Boston, the citys largest human serv...	Bilingual (Spanish) Licensed/MSW Social Worker	<a href="https://www.glassdoor.com/job-listing/bilingua...">https://www.glassdoor.com/job-listing/bilingua...</a>	NaN
1	1002	Summary\n\nThis position is in the Region 1, ...	Program Analyst	<a href="https://www.glassdoor.com/job-listing/program-...">https://www.glassdoor.com/job-listing/program-...</a>	3.3
2	1003	COVID -19 Social Compliance Officer - Military...	COVID-19 Social Compliance Officer - Military ...	<a href="https://www.glassdoor.com/job-listing/covid-19...">https://www.glassdoor.com/job-listing/covid-19...</a>	2.1
3	1004	If you like working early mornings, being part...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/part-tim...">https://www.glassdoor.com/job-listing/part-tim...</a>	3.4
4	1005	Do you have a clean driving record and enjoy n...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/delivery...">https://www.glassdoor.com/job-listing/delivery...</a>	3.4

```
In [49]: glassdoormain.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 511 entries, 0 to 510  
Data columns (total 5 columns):  
ID                511 non-null int64  
jobDetails        511 non-null object  
jobTitle          511 non-null object  
url               511 non-null object  
employerRating    478 non-null float64  
dtypes: float64(1), int64(1), object(3)  
memory usage: 20.0+ KB
```

```
In [50]: # Drop attributes that we don't need and check for null values
glassdoormain.drop(['employerRating'], inplace=True, axis = 1)
glassdoormain.isnull().any()
```

```
Out[50]: ID                False
jobDetails                False
jobTitle                  False
url                       False
dtype: bool
```

```
In [51]: glassdoormain.head()
```

```
Out[51]:
```

	ID	jobDetails	jobTitle	url
0	1001	FamilyAid Boston, the citys largest human serv...	Bilingual (Spanish) Licensed/MSW Social Worker	<a href="https://www.glassdoor.com/job-listing/bilingua...">https://www.glassdoor.com/job-listing/bilingua...</a>
1	1002	Summary\n\n This position is in the Region 1, ...	Program Analyst	<a href="https://www.glassdoor.com/job-listing/program-...">https://www.glassdoor.com/job-listing/program-...</a>
2	1003	COVID -19 Social Compliance Officer - Military...	COVID-19 Social Compliance Officer - Military ...	<a href="https://www.glassdoor.com/job-listing/covid-19...">https://www.glassdoor.com/job-listing/covid-19...</a>
3	1004	If you like working early mornings, being part...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/part-tim...">https://www.glassdoor.com/job-listing/part-tim...</a>
4	1005	Do you have a clean driving record and enjoy n...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/delivery...">https://www.glassdoor.com/job-listing/delivery...</a>

```
In [46]: glassdoormain['ID'].is_unique
```

```
Out[46]: True
```

```
In [54]: # Writing the cleaned data into a new csv file named data1.csv
glassdoormain.to_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/jobs-pr
jects/data/data1.csv')
```

## Indeed data

```
In [52]: #All the data from the 3 tables are then stored to the file indeed.csv
indeed= pd.read_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/jobs-pr
jects/data/indeed.csv')
```

```
In [53]: indeed.head()
```

```
Out[53]:
```

	ID	jobDetails	jobTitle	
0	2001	Are you a skilled craftsman or motivated train...	SHEETMETAL INSTALLER-ESSENTIAL COVID SAFE BUS...	<a href="https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...">https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...</a>
1	2002	Description:\nThe Lowell General Hospital Alte...	Patient Care Technician, Nursing Assistant, CN...	<a href="https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...">https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...</a>
2	2003	You will receive a \$300 SIGN-ON BONUS when you...	Caregiver for COVID Clients	<a href="https://www.indeed.com/rc/clk?jk=2b9e199638761...">https://www.indeed.com/rc/clk?jk=2b9e199638761...</a>
3	2004	Type: Temporary approximately for 1 monthShift...	Health Screener	<a href="https://www.indeed.com/company/Biokinetix/job">https://www.indeed.com/company/Biokinetix/job</a>
4	2005	CNAs and HHAs and Nurses Needed to Care for Se...	CNAs pos COVID clients PPE+ Bonuses Plymouth, ...	<a href="https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...">https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...</a>

```
In [55]: indeed.isnull().any()
```

```
Out[55]: ID                False
jobDetails                False
jobTitle                  False
url                       False
dtype: bool
```

```
In [56]: indeed.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 1996 entries, 0 to 1995  
Data columns (total 4 columns):  
ID                1996 non-null int64  
jobDetails        1996 non-null object  
jobTitle          1996 non-null object  
url               1996 non-null object  
dtypes: int64(1), object(3)  
memory usage: 62.5+ KB
```

```
In [58]: indeed['ID'].is_unique
```

```
Out[58]: True
```

```
In [59]: # Writing the cleaned data into a new csv file named data1.csv  
indeed.to_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/jobs-projects  
/data/data2.csv')
```

## Combining the data files

```
In [79]: data1= pd.read_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/jobs-pro  
jects/data/data1.csv')  
data2= pd.read_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/jobs-pro  
jects/data/data2.csv')
```

```
In [80]: data1.head()
```

```
Out[80]:
```

	ID	jobDetails	jobTitle	url
0	1001	FamilyAid Boston, the citys largest human serv...	Bilingual (Spanish) Licensed/MSW Social Worker	<a href="https://www.glassdoor.com/job-listing/bilingua...">https://www.glassdoor.com/job-listing/bilingua...</a>
1	1002	Summary\n\n This position is in the Region 1, ...	Program Analyst	<a href="https://www.glassdoor.com/job-listing/program-...">https://www.glassdoor.com/job-listing/program-...</a>
2	1003	COVID -19 Social Compliance Officer - Military...	COVID-19 Social Compliance Officer - Military ...	<a href="https://www.glassdoor.com/job-listing/covid-19...">https://www.glassdoor.com/job-listing/covid-19...</a>
3	1004	If you like working early mornings, being part...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/part-tim...">https://www.glassdoor.com/job-listing/part-tim...</a>
4	1005	Do you have a clean driving record and enjoy n...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/delivery...">https://www.glassdoor.com/job-listing/delivery...</a>

```
In [81]: data2.head()
```

Out[81]:

	ID	jobDetails	jobTitle	
0	2001	Are you a skilled craftsman or motivated train...	SHEETMETAL INSTALLER- ESSENTIAL COVID SAFE BUS...	<a href="https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...">https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...</a>
1	2002	Description:\nThe Lowell General Hospital Alte...	Patient Care Technician, Nursing Assistant, CN...	<a href="https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...">https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...</a>
2	2003	You will receive a \$300 SIGN-ON BONUS when you...	Caregiver for COVID Clients	<a href="https://www.indeed.com/rc/clk?jk=2b9e199638761...">https://www.indeed.com/rc/clk?jk=2b9e199638761...</a>
3	2004	Type: Temporary approximately for 1 monthShift...	Health Screener	<a href="https://www.indeed.com/company/Biokinetix/job">https://www.indeed.com/company/Biokinetix/job</a>
4	2005	CNAs and HHAs and Nurses Needed to Care for Se...	CNAs pos COVID clients PPE+ Bonuses Plymouth, ...	<a href="https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...">https://www.indeed.com/pagead/clk?mo=r&amp;ad=-6NY...</a>

```
In [82]: alljobs = pd.concat([data1, data2], ignore_index=True)
```



```
In [83]: alljobs.head()
```

```
Out[83]:
```

	ID	jobDetails	jobTitle	url
0	1001	FamilyAid Boston, the citys largest human serv...	Bilingual (Spanish) Licensed/MSW Social Worker	<a href="https://www.glassdoor.com/job-listing/bilingua...">https://www.glassdoor.com/job-listing/bilingua...</a>
1	1002	Summary\n\n This position is in the Region 1, ...	Program Analyst	<a href="https://www.glassdoor.com/job-listing/program-...">https://www.glassdoor.com/job-listing/program-...</a>
2	1003	COVID -19 Social Compliance Officer - Military...	COVID-19 Social Compliance Officer - Military ...	<a href="https://www.glassdoor.com/job-listing/covid-19...">https://www.glassdoor.com/job-listing/covid-19...</a>
3	1004	If you like working early mornings, being part...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/part-tim...">https://www.glassdoor.com/job-listing/part-tim...</a>
4	1005	Do you have a clean driving record and enjoy n...	GeoCoordinates	<a href="https://www.glassdoor.com/job-listing/delivery...">https://www.glassdoor.com/job-listing/delivery...</a>

```
In [84]: alljobs.info()
```

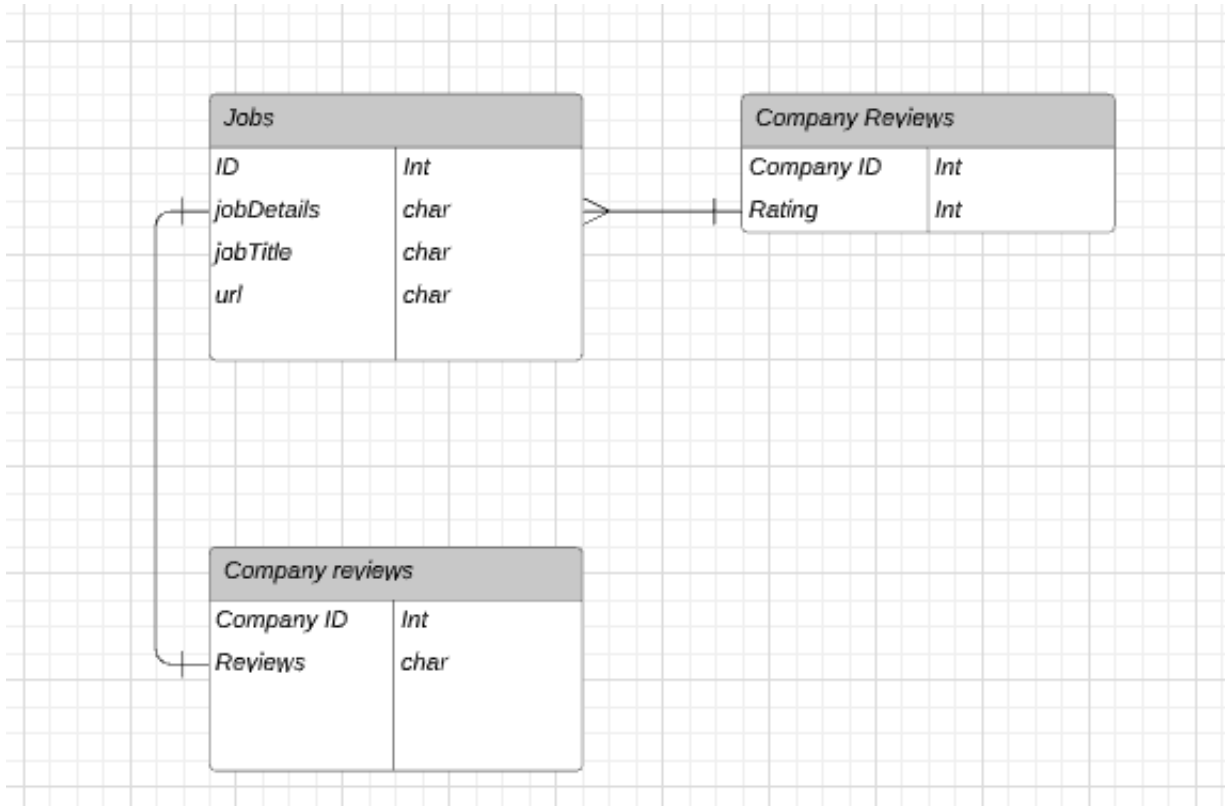
```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 2507 entries, 0 to 2506  
Data columns (total 4 columns):  
ID                2507 non-null int64  
jobDetails        2507 non-null object  
jobTitle          2507 non-null object  
url               2507 non-null object  
dtypes: int64(1), object(3)  
memory usage: 78.4+ KB
```

```
In [85]: alljobs = alljobs.to_csv(r'/Users/karansoni/Desktop/semester 2/DMDD/jobs-projects/data/jobs.csv')
```

We have now generated a collection of 2507 job listings extracted from Glassdoor and Indeed.

```
In [86]: from IPython.display import Image
Image(r'/Users/karansoni/Desktop/basic-er.png')
```

Out[86]:



## Conclusion

Here, we have successfully created a database containing 2507 job listings extracted from Job boards like Glassdoor and Indeed, we have kept the Job\_ID or 'ID' as the primary key used to track each listing from the data.

## License

Copyright 2020 Karan Soni Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions: The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software. THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.