Read the following data set: https://archive.ics.uci.edu/ml/machine-learning-databases/adult/adult.data (https://archive.ics.uci.edu/ml/machine-learning-databases/adult/adult.data) Task:

1. Create an sqlalchemy engine using a sample from the data set
2. Write two basic update queries
3. Write two delete queries
4. Write two filter queries
5. Write two function queries

In [1]:
```
# Import acreate Engine package
import sqlalchemy
sqlalchemy.__version__
```

Out[1]:
```
'1.2.1'
```

In [2]:
```
from sqlalchemy import create_engine
engine = create_engine('sqlite:///:memory:', echo=True)
```

In [3]:
```
from sqlalchemy.ext.declarative import declarative_base
Base = declarative_base()
```

In [4]:
```
from sqlalchemy import Table, Column, Integer, String
from sqlalchemy import Sequence

class Adult(Base):
    __tablename__ = 'adults'
    id = Column(Integer, Sequence('adult_id_seq'), primary_key=True)
    age = Column(Integer)
    workclass = Column(String)
    fnlwgt  = Column(Integer)
    education = Column(String)
    educationnum = Column(Integer)
    maritalstatus = Column(String)
    occupation = Column(String)
    relationship       = Column(String)
    race              = Column(String)
    sex               = Column(String)
    capitalgain     = Column(Integer)
    capitalloss      = Column(Integer)
    hoursperweek  = Column(Integer)
    nativecountry   = Column(String)
    classname = Column(String)
```

In [5]:
```
Adult.__table__
```

Out[5]:
```
Table('adults', MetaData(bind=None), Column('id', Integer(), table=<adults>, pr
imary_key=True, nullable=False, default=Sequence('adult_id_seq', metadata=MetaD
ata(bind=None))), Column('age', Integer(), table=<adults>), Column('workclass',
String(), table=<adults>), Column('fnlwgt', Integer(), table=<adults>), Column
('education', String(), table=<adults>), Column('educationnum', Integer(), tabl
e=<adults>), Column('maritalstatus', String(), table=<adults>), Column('occupat
ion', String(), table=<adults>), Column('relationship', String(), table=<adults
>), Column('race', String(), table=<adults>), Column('sex', String(), table=<ad
ults>), Column('capitalgain', Integer(), table=<adults>), Column('capitalloss',
Integer(), table=<adults>), Column('hoursperweek', Integer(), table=<adults>),
Column('nativecountry', String(), table=<adults>), Column('classname', String
(), table=<adults>), schema=None)
```

In [6]:
```
Base.metadata.create_all(engine)
```

```
2018-11-26 10:57:28,327 INFO sqlalchemy.engine.base.Engine SELECT CAST('test pl
ain returns' AS VARCHAR(60)) AS anon_1
2018-11-26 10:57:28,379 INFO sqlalchemy.engine.base.Engine ()
2018-11-26 10:57:28,384 INFO sqlalchemy.engine.base.Engine SELECT CAST('test un
icode returns' AS VARCHAR(60)) AS anon_1
2018-11-26 10:57:28,389 INFO sqlalchemy.engine.base.Engine ()
2018-11-26 10:57:28,402 INFO sqlalchemy.engine.base.Engine PRAGMA table_info("a
dults")
2018-11-26 10:57:28,404 INFO sqlalchemy.engine.base.Engine ()
2018-11-26 10:57:28,411 INFO sqlalchemy.engine.base.Engine
CREATE TABLE adults (
        id INTEGER NOT NULL,
        age INTEGER,
        workclass VARCHAR,
        fnlwgt INTEGER,
        education VARCHAR,
        educationnum INTEGER,
        maritalstatus VARCHAR,
        occupation VARCHAR,
        relationship VARCHAR,
        race VARCHAR,
        sex VARCHAR,
        capitalgain INTEGER,
        capitalloss INTEGER,
        hoursperweek INTEGER,
        nativecountry VARCHAR,
        classname VARCHAR,
        PRIMARY KEY (id)
)


2018-11-26 10:57:28,420 INFO sqlalchemy.engine.base.Engine ()
2018-11-26 10:57:28,423 INFO sqlalchemy.engine.base.Engine COMMIT
```

In [7]:
```
# Read the data from the given URL and see the top 5 records
import pandas as pd
df = pd.read_csv('https://archive.ics.uci.edu/ml/machine-learning-databases/adult/

# Rename the columns as per the description.
df.columns = ['age', 'workclass', 'fnlwgt', 'education', 'educationnum', 'marital
df = df.infer_objects()

df_new = pd.DataFrame(df)
```

In [8]:
```
df_new.info()
df_new.head(5)
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 32560 entries, 0 to 32559
Data columns (total 15 columns):
age              32560 non-null int64
workclass        32560 non-null object
fnlwgt           32560 non-null int64
education        32560 non-null object
educationnum     32560 non-null int64
maritalstatus    32560 non-null object
occupation       32560 non-null object
relationship     32560 non-null object
race             32560 non-null object
sex              32560 non-null object
capitalgain      32560 non-null int64
capitalloss      32560 non-null int64
hoursperweek     32560 non-null int64
nativecountry    32560 non-null object
classname        32560 non-null object
dtypes: int64(6), object(9)
memory usage: 3.7+ MB
```

Out[8]:

	age	workclass	fnlwgt	education	educationnum	maritalstatus	occupation	relationship	race
0	50	Self-emp-not-inc	83311	Bachelors	13	Married-civ-spouse	Exec-managerial	Husband	White
1	38	Private	215646	HS-grad	9	Divorced	Handlers-cleaners	Not-in-family	White
2	53	Private	234721	11th	7	Married-civ-spouse	Handlers-cleaners	Husband	Black
3	28	Private	338409	Bachelors	13	Married-civ-spouse	Prof-specialty	Wife	Black
4	37	Private	284582	Masters	14	Married-civ-spouse	Exec-managerial	Wife	White

In [9]:
```
from sqlalchemy.orm import sessionmaker
Session = sessionmaker(bind=engine)
session = Session()
```

In [10]:
```
adult = Adult( age = 50, workclass = 'Private' , fnlwgt = 83311, education ='Bach
session.add(adult)

adult = Adult( age = 40, workclass = 'Self-emp-not-inc', fnlwgt = 215646, educati
session.add(adult)

adult = Adult( age = 0, workclass = 'Self-emp-not-inc', fnlwgt = 215646, educatio
session.add(adult)

adult = Adult( age = 10, workclass = 'Self-emp-not-inc', fnlwgt = 215646, educati
session.add(adult)
```

In [11]:
```
for instance in session.query(Adult).order_by(Adult.id):
    print(instance.age, instance.workclass, instance.nativecountry, instance.edu
```

```
2018-11-26 10:57:40,228 INFO sqlalchemy.engine.base.Engine BEGIN (implicit)
2018-11-26 10:57:40,233 INFO sqlalchemy.engine.base.Engine INSERT INTO adults
(age, workclass, fnlwgt, education, educationnum, maritalstatus, occupation, re
lationship, race, sex, capitalgain, capitalloss, hoursperweek, nativecountry, c
lassname) VALUES (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
2018-11-26 10:57:40,243 INFO sqlalchemy.engine.base.Engine (50, 'Private', 8331
1, 'Bachelors', 13, 'Married-civ-spouse', 'Exec-managerial', 'Husband', 'Whit
e', 'Male', 10000, 0, 40, 'India', '<=50K')
2018-11-26 10:57:40,254 INFO sqlalchemy.engine.base.Engine INSERT INTO adults
(age, workclass, fnlwgt, education, educationnum, maritalstatus, occupation, re
lationship, race, sex, capitalgain, capitalloss, hoursperweek, nativecountry, c
lassname) VALUES (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
2018-11-26 10:57:40,257 INFO sqlalchemy.engine.base.Engine (40, 'Self-emp-not-i
nc', 215646, 'Masters', 14, 'Married-civ-spouse', 'Exec-managerial', 'Husband',
'White', 'Male', 10000, 0, 50, 'USA', '<=50K')
2018-11-26 10:57:40,284 INFO sqlalchemy.engine.base.Engine INSERT INTO adults
(age, workclass, fnlwgt, education, educationnum, maritalstatus, occupation, re
lationship, race, sex, capitalgain, capitalloss, hoursperweek, nativecountry, c
lassname) VALUES (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
2018-11-26 10:57:40,297 INFO sqlalchemy.engine.base.Engine (0, 'Self-emp-not-in
c', 215646, 'Masters', 14, 'Married-civ-spouse', 'Exec-managerial', 'Husband',
'White', 'Male', 10000, 0, 60, 'SWEDAN', '<=50K')
2018-11-26 10:57:40,300 INFO sqlalchemy.engine.base.Engine INSERT INTO adults
(age, workclass, fnlwgt, education, educationnum, maritalstatus, occupation, re
lationship, race, sex, capitalgain, capitalloss, hoursperweek, nativecountry, c
lassname) VALUES (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
2018-11-26 10:57:40,303 INFO sqlalchemy.engine.base.Engine (10, 'Self-emp-not-i
nc', 215646, 'Masters', 14, 'Married-civ-spouse', 'Exec-managerial', 'Husband',
'White', 'Male', 10000, 0, 70, 'FRANCE', '<=50K')
2018-11-26 10:57:40,319 INFO sqlalchemy.engine.base.Engine SELECT adults.id AS
adults_id, adults.age AS adults_age, adults.workclass AS adults_workclass, adul
ts.fnlwgt AS adults_fnlwgt, adults.education AS adults_education, adults.educat
ionnum AS adults_educationnum, adults.maritalstatus AS adults_maritalstatus, ad
ults.occupation AS adults_occupation, adults.relationship AS adults_relationshi
p, adults.race AS adults_race, adults.sex AS adults_sex, adults.capitalgain AS
adults_capitalgain, adults.capitalloss AS adults_capitalloss, adults.hoursperwe
ek AS adults_hoursperweek, adults.nativecountry AS adults_nativecountry, adult
s.classname AS adults_classname
FROM adults ORDER BY adults.id
2018-11-26 10:57:40,335 INFO sqlalchemy.engine.base.Engine ()
50 Private India Bachelors
40 Self-emp-not-inc USA Masters
0 Self-emp-not-inc SWEDAN Masters
10 Self-emp-not-inc FRANCE Masters
```

In [12]:
```
# 2. Write two basic update queries
adult_usa = session.query(Adult).filter_by(nativecountry='USA').first()
adult_usa.nativecountry ='India'
adult_usa.education ='PHD'

for instance in session.query(Adult).order_by(Adult.id):
    print(instance.age, instance.workclass, instance.nativecountry, instance.educ
```

```
2018-11-26 10:57:40,440 INFO sqlalchemy.engine.base.Engine SELECT adults.id AS
adults_id, adults.age AS adults_age, adults.workclass AS adults_workclass, adul
ts.fnlwgt AS adults_fnlwgt, adults.education AS adults_education, adults.educat
ionnum AS adults_educationnum, adults.maritalstatus AS adults_maritalstatus, ad
ults.occupation AS adults_occupation, adults.relationship AS adults_relationshi
p, adults.race AS adults_race, adults.sex AS adults_sex, adults.capitalgain AS
adults_capitalgain, adults.capitalloss AS adults_capitalloss, adults.hoursperwe
ek AS adults_hoursperweek, adults.nativecountry AS adults_nativecountry, adult
s.classname AS adults_classname
FROM adults
WHERE adults.nativecountry = ?
 LIMIT ? OFFSET ?
2018-11-26 10:57:40,454 INFO sqlalchemy.engine.base.Engine ('USA', 1, 0)
2018-11-26 10:57:40,469 INFO sqlalchemy.engine.base.Engine UPDATE adults SET ed
ucation=?, nativecountry=? WHERE adults.id = ?
2018-11-26 10:57:40,481 INFO sqlalchemy.engine.base.Engine ('PHD', 'India', 2)
2018-11-26 10:57:40,497 INFO sqlalchemy.engine.base.Engine SELECT adults.id AS
adults_id, adults.age AS adults_age, adults.workclass AS adults_workclass, adul
ts.fnlwgt AS adults_fnlwgt, adults.education AS adults_education, adults.educat
ionnum AS adults_educationnum, adults.maritalstatus AS adults_maritalstatus, ad
ults.occupation AS adults_occupation, adults.relationship AS adults_relationshi
p, adults.race AS adults_race, adults.sex AS adults_sex, adults.capitalgain AS
adults_capitalgain, adults.capitalloss AS adults_capitalloss, adults.hoursperwe
ek AS adults_hoursperweek, adults.nativecountry AS adults_nativecountry, adult
s.classname AS adults_classname
FROM adults ORDER BY adults.id
2018-11-26 10:57:40,505 INFO sqlalchemy.engine.base.Engine ()
50 Private India Bachelors
40 Self-emp-not-inc India PHD
0 Self-emp-not-inc SWEDAN Masters
10 Self-emp-not-inc FRANCE Masters
```

In [13]:
```
# 3. Write two delete queries
adult_delete = session.query(Adult).filter_by(nativecountry='SWEDAN').one()
session.delete(adult_delete)
session.commit()
```

```
2018-11-26 10:57:40,593 INFO sqlalchemy.engine.base.Engine SELECT adults.id AS
adults_id, adults.age AS adults_age, adults.workclass AS adults_workclass, adul
ts.fnlwgt AS adults_fnlwgt, adults.education AS adults_education, adults.educat
ionnum AS adults_educationnum, adults.maritalstatus AS adults_maritalstatus, ad
ults.occupation AS adults_occupation, adults.relationship AS adults_relationshi
p, adults.race AS adults_race, adults.sex AS adults_sex, adults.capitalgain AS
adults_capitalgain, adults.capitalloss AS adults_capitalloss, adults.hoursperwe
ek AS adults_hoursperweek, adults.nativecountry AS adults_nativecountry, adult
s.classname AS adults_classname
FROM adults
WHERE adults.nativecountry = ?
2018-11-26 10:57:40,595 INFO sqlalchemy.engine.base.Engine ('SWEDAN',)
2018-11-26 10:57:40,604 INFO sqlalchemy.engine.base.Engine DELETE FROM adults W
HERE adults.id = ?
2018-11-26 10:57:40,607 INFO sqlalchemy.engine.base.Engine (3,)
2018-11-26 10:57:40,611 INFO sqlalchemy.engine.base.Engine COMMIT
```

In [14]:
```
adult_delete = session.query(Adult).filter_by(hoursperweek=40).one()
session.delete(adult_delete)
session.commit()
```

```
2018-11-26 10:57:40,718 INFO sqlalchemy.engine.base.Engine BEGIN (implicit)
2018-11-26 10:57:40,724 INFO sqlalchemy.engine.base.Engine SELECT adults.id AS
adults_id, adults.age AS adults_age, adults.workclass AS adults_workclass, adul
ts.fnlwgt AS adults_fnlwgt, adults.education AS adults_education, adults.educat
ionnum AS adults_educationnum, adults.maritalstatus AS adults_maritalstatus, ad
ults.occupation AS adults_occupation, adults.relationship AS adults_relationshi
p, adults.race AS adults_race, adults.sex AS adults_sex, adults.capitalgain AS
adults_capitalgain, adults.capitalloss AS adults_capitalloss, adults.hoursperwe
ek AS adults_hoursperweek, adults.nativecountry AS adults_nativecountry, adult
s.classname AS adults_classname
FROM adults
WHERE adults.hoursperweek = ?
2018-11-26 10:57:40,730 INFO sqlalchemy.engine.base.Engine (40,)
2018-11-26 10:57:40,741 INFO sqlalchemy.engine.base.Engine DELETE FROM adults W
HERE adults.id = ?
2018-11-26 10:57:40,743 INFO sqlalchemy.engine.base.Engine (1,)
2018-11-26 10:57:40,747 INFO sqlalchemy.engine.base.Engine COMMIT
```

In [15]:
```
for instance in session.query(Adult).order_by(Adult.id):
    print(instance.age, instance.workclass, instance.nativecountry, instance.educ
```

```
2018-11-26 10:57:40,816 INFO sqlalchemy.engine.base.Engine BEGIN (implicit)
2018-11-26 10:57:40,820 INFO sqlalchemy.engine.base.Engine SELECT adults.id AS
adults_id, adults.age AS adults_age, adults.workclass AS adults_workclass, adul
ts.fnlwgt AS adults_fnlwgt, adults.education AS adults_education, adults.educat
ionnum AS adults_educationnum, adults.maritalstatus AS adults_maritalstatus, ad
ults.occupation AS adults_occupation, adults.relationship AS adults_relationshi
p, adults.race AS adults_race, adults.sex AS adults_sex, adults.capitalgain AS
adults_capitalgain, adults.capitalloss AS adults_capitalloss, adults.hoursperwe
ek AS adults_hoursperweek, adults.nativecountry AS adults_nativecountry, adult
s.classname AS adults_classname
FROM adults ORDER BY adults.id
2018-11-26 10:57:40,825 INFO sqlalchemy.engine.base.Engine ()
40 Self-emp-not-inc India PHD
10 Self-emp-not-inc FRANCE Masters
```

In [16]:
```
#4. Write two filter queries
adult = Adult( age = 10, workclass = 'Self-emp-not-inc', fnlwgt = 215646, educati
session.add(adult)

for instance in session.query(Adult).filter_by(nativecountry = 'India'):
    print(instance.age, instance.workclass, instance.nativecountry, instance.educ
```

```
2018-11-26 10:57:40,927 INFO sqlalchemy.engine.base.Engine INSERT INTO adults
(age, workclass, fnlwgt, education, educationnum, maritalstatus, occupation, re
lationship, race, sex, capitalgain, capitalloss, hoursperweek, nativecountry, c
lassname) VALUES (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
2018-11-26 10:57:40,929 INFO sqlalchemy.engine.base.Engine (10, 'Self-emp-not-i
nc', 215646, 'Masters', 14, 'Married-civ-spouse', 'Exec-managerial', 'Husband',
'White', 'Male', 10000, 0, 70, 'FRANCE', '<=50K')
2018-11-26 10:57:40,939 INFO sqlalchemy.engine.base.Engine SELECT adults.id AS
adults_id, adults.age AS adults_age, adults.workclass AS adults_workclass, adul
ts.fnlwgt AS adults_fnlwgt, adults.education AS adults_education, adults.educat
ionnum AS adults_educationnum, adults.maritalstatus AS adults_maritalstatus, ad
ults.occupation AS adults_occupation, adults.relationship AS adults_relationshi
p, adults.race AS adults_race, adults.sex AS adults_sex, adults.capitalgain AS
adults_capitalgain, adults.capitalloss AS adults_capitalloss, adults.hoursperwe
ek AS adults_hoursperweek, adults.nativecountry AS adults_nativecountry, adult
s.classname AS adults_classname
FROM adults
WHERE adults.nativecountry = ?
2018-11-26 10:57:40,940 INFO sqlalchemy.engine.base.Engine ('India',)
40 Self-emp-not-inc India PHD
```

In [17]:
```
#5.Write two function queries
from sqlalchemy import func
session.query(func.count(Adult.id)).scalar()
```

```
2018-11-26 10:57:41,038 INFO sqlalchemy.engine.base.Engine SELECT count(adults.
id) AS count_1
FROM adults
2018-11-26 10:57:41,045 INFO sqlalchemy.engine.base.Engine ()
```

Out[17]:
```
3
```

In [18]:
```
adult = Adult( age =30, workclass = 'Self-emp-not-inc', fnlwgt = 215646, educatio
session.add(adult)
session.query(func.count(Adult.nativecountry), Adult.nativecountry).group_by(Adul
```

```
2018-11-26 10:57:41,155 INFO sqlalchemy.engine.base.Engine INSERT INTO adults
(age, workclass, fnlwgt, education, educationnum, maritalstatus, occupation, re
lationship, race, sex, capitalgain, capitalloss, hoursperweek, nativecountry, c
lassname) VALUES (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
2018-11-26 10:57:41,158 INFO sqlalchemy.engine.base.Engine (30, 'Self-emp-not-i
nc', 215646, 'Masters', 14, 'Married-civ-spouse', 'Exec-managerial', 'Husband',
'White', 'Male', 10000, 0, 70, 'India', '<=50K')
2018-11-26 10:57:41,164 INFO sqlalchemy.engine.base.Engine SELECT count(adults.
nativecountry) AS count_1, adults.nativecountry AS adults_nativecountry
FROM adults GROUP BY adults.nativecountry
2018-11-26 10:57:41,170 INFO sqlalchemy.engine.base.Engine ()
```

Out[18]:
```
[(2, 'FRANCE'), (2, 'India')]
```

In [ ]: