Programming Exercise

DATA SOLUTIONS ENGINEER POSITION

Exercise

Develop a program to compute score for each measure. The measures include; AMI, COPD, HF, HWR, PN and THA-TKA.

The program is invoked with the following command line:

```
<program_name> <measure_name>
```

Sample

```
<program_name> ami
```

Your solution will be evaluated for approach, selection of technologies and quality of code unit.

Programming Steps

Steps to compute measure score:

1. Select a measure

2. Filter records with diagnosis_codes that corresponds to the selected measure
   Refer to the Diagnosis Codes table for diagnosis_codes for a given measure

3. Calculate comorbidity value for each row depending on set of comorbidity columns for the selected measure

   Comorbidity value for a row can be calculated as count of 'yes' in corresponding comorbidity column set.Refer to the Comorbidity Columns table to find comorbidity columns for a given measure

4. Calculate lace score for each row in the dataset as sum of points for each LACE variable
   Refer to the Lace Index table to find lace point for a given LACE variable

5. Select count of records as denominator

6. Select count of records with lace score > 9 as numerator

7. Calculate score for selected measure as numerator/denominator

Instructions

- Create a blank GIT repo with initial commit.
- Commit your progress regularly.
- Zip up the repo and send that back to us.
- Use language and Big data technology of your choice.
- The sample dataset; a CSV file is attached for this exercise.
- If you have questions or run into problems, feel free to reach out to us.

References

Diagnosis Codes Table

Measure Name	Diagnosis Codes
AMI	410.00, 410.01, 410.10, 410.11, 410.20, 410.21, 410.30, 410.31, 410.40, 410.41, 410.50, 410.51, 410.60, 410.61, 410.70, 410.71, 410.80, 410.81, 410.90, 410.91
COPD	491.21, 491.22, 491.8, 491.9, 492.8, 493.20, 493.21, 493.22, 496, 518.81, 518.82, 518.84, 799.1
HF	402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.xx
HWR	CCS
PN	480.0, 480.1, 480.2, 480.3, 480.8, 480.9, 481, 482.0, 482.1, 482.2, 482.30, 482.31, 482.32, 482.39, 482.40, 482.41, 482.42, 482.49, 482.81, 482.82, 482.83, 482.84, 482.89, 482.9, 483.0, 483.1, 483.8, 485, 486, 487.0, 488.11
THA-TKA	81.51, 81.54

Comorbidity Columns Table

Measure Name	Comorbidity Columns
AMI	HistoryofPTCA, HistoryofCABG, Congestiveheartfailure, Acutecoronarysyndrome, Anteriormyocardialinfarction, Otherlocationofmyocardialinfarction, Anginapectorisoldmyocardialinfarction, Coronaryatherosclerosis, Valvularorrheumaticheartdisease, Specifiedarrhythmias, Historyofinfection, Metastaticcanceroracuteleukemia, Cancer, Diabetesmellitus(DM)orDMcomplications, Protein-caloriemalnutrition, Disordersoffluidelectrolyteacid-base, Irondeficiencyorotheranemiasandblooddisease, Dementiaorotherspecifiedbraindisorders,

	Hemiplegiaparaplegiaparalysisfunctionaldisability, Stroke, Cerebrovasculardisease, Vascularorcirculatorydisease, Chronicobstructivepulmonarydisease, Asthma, Pneumonia, End-stagerenaldiseaseordialysis, Renalfailure, Otherurinarytractdisorders, Decubitusulcerorchronicskinulcer
COPD	HistoryofMechanicalVentilation, SleepApnea, Respiratordependence/tracheostomystatus, Cardio-respiratoryfailureorcardio-respiratoryshock, Congestiveheartfailure, Acutecoronarysyndrome, Coronaryatherosclerosisoranginacerebrovasculardisease, Specifiedarrhythmias, OtherandUnspecifiedHeartDisease, Vascularorcirculatorydisease, Fibrosisoflungandotherchroniclungdisorders, Pneumonia, Historyofinfection, Metastaticcanceroracuteleukemia, LungUpperDigestiveTractandOtherSevereCancers, LymphaticHeadandNeckBrainandOtherMajorCancers;BreastColorectalandotherCancersandTumors;OtherRespiratoryandHeartNeoplasms, OtherDigestiveandUrinaryNeoplasms, Diabetesmellitus(DM)orDMcomplications, Protein-caloriemalnutrition, Disordersoffluidelectrolyteacid-base, OtherEndocrine/Metabolic/NutritionalDisorders, PancreaticDisease, PepticUlcerHemorrhageOtherSpecifiedGastrointestinalDisorders, OtherGastrointestinalDisorders, SevereHematologicalDisorders, Irondeficiencyorotheranemiasandblooddisease, Dementiaorotherspecifiedbraindisorders, Drug/AlcoholInducedDependence/Psychosis, MajorPsychiatricDisorders, Depression, AnxietyDisorders, OtherPsychiatricDisorders, QuadriplegiaParaplegiaParalysisFunctionalDisability, Polyneuropathy, HypertensiveHeartandRenalDiseaseorEncephalopathy
HF	HistoryofCABG, Septicemia/shock, Congestiveheartfailure, Acutecoronarysyndrome, Coronaryatherosclerosisoranginacerebrovasculardisease, Valvularorrheumaticheartdisease, Specifiedarrhythmias, Vascularorcirculatorydisease, OtherandUnspecifiedHeartDisease, Metastaticcanceroracuteleukemia, Cancer, Diabetesmellitus(DM)orDMcomplications, Protein-caloriemalnutrition, Disordersoffluidelectrolyteacid-base, Liverandbiliarydisease, PepticUlcerHemorrhageOtherSpecifiedGastrointestinalDisorders, OtherGastrointestinalDisorders, SevereHematologicalDisorders, Irondeficiencyorotheranemiasandblooddisease, Dementiaorotherspecifiedbraindisorders, Drug/AlcoholInducedDependence/Psychosis, MajorPsychiatricDisorders, Depression, OtherPsychiatricDisorders, Hemiplegiaparaplegiaparalysisfunctionaldisability, Stroke, Chronicobstructivepulmonarydisease, Fibrosisoflungandotherchroniclungdisorders, Asthma, Pneumonia, End-stagerenaldiseaseordialysis, Renalfailure, Nephritis, Otherurinarytractdisorders, Decubitusulcerorchronicskinulcer
HWR	Historyofinfection, Pneumonia, Metastaticcanceroracuteleukemia, LungUpperDigestiveTractandOtherSevereCancers, LymphaticHeadandNeckBrainandOtherMajorCancers;BreastColorectalandotherCancersandTumors;OtherRespiratoryandHeartNeoplasms, Diabetesmellitus(DM)orDMcomplications, Protein-caloriemalnutrition, End-stageliverdisease, Coagulationdefectsandotherspecifiedhematologicaldisorders, Drug/AlcoholInducedDependence/Psychosis, MajorPsychiatricDisorders,

	Hemiplegiaparaplegiaparalysisfunctionaldisability, Seizuredisordersandconvulsions, Chronicheartfailure, Coronaryatherosclerosisoranginacerebrovasculardisease, Specifiedarrhythmias, Chronicobstructivepulmonarydisease, Fibrosisoflungandotherchroniclungdisorders, Dialysisstatus, Decubitusulcerorchronicskinulcer, Septicemia/shock, Disordersoffluidelectrolyteacid-base, Irondeficiencyorotheranemiasandblooddisease, Renalfailure, PancreaticDisease, Rheumatoidarthritisandinflammatoryconnectivetissuedisease, Respiratordependence/tracheostomystatus, Transplants, Coagulationdefectsandotherspecifiedhematologicaldisorders, Hipfracture/dislocation
PN	HistoryofCABG, Historyofinfection, Septicemia/shock, Metastaticcanceroracuteleukemia, LungUpperDigestiveTractandOtherSevereCancers, LymphaticHeadandNeckBrainandOtherMajorCancers;BreastColorectalandotherCancersandTumors;OtherRespiratoryandHeartNeoplasms, Diabetesmellitus(DM)orDMcomplications, Protein-caloriemalnutrition, Disordersoffluidelectrolyteacid-base, OtherGastrointestinalDisorders, SevereHematologicalDisorders, Irondeficiencyorotheranemiasandblooddisease, Dementiaorotherspecifiedbraindisorders, Drug/AlcoholInducedDependence/Psychosis, MajorPsychiatricDisorders, OtherPsychiatricDisorders, Hemiplegiaparaplegiaparalysisfunctionaldisability, Cardio-respiratoryfailureorcardio-respiratoryshock, Congestiveheartfailure, Acutecoronarysyndrome, Coronaryatherosclerosisoranginacerebrovasculardisease, Valvularorrheumaticheartdisease, Specifiedarrhythmias, Stroke, Vascularorcirculatorydisease, Chronicobstructivepulmonarydisease, Fibrosisoflungandotherchroniclungdisorders, Asthma, Pneumonia, Pleuraleffusion/pneumothorax, End-stagerenaldiseaseordialysis, Renalfailure, Urinarytractinfection, Otherurinarytractdisorders, Decubitusulcerorchronicskinulcer, VertebralFractures, Otherinjuries
THA-TKA	Skeletaldeformities, Posttraumaticosteoarthritis, Morbidobesity, Historyofinfection, Metastaticcanceroracuteleukemia, Cancer, Diabetesmellitus(DM)orDMcomplications, Protein-caloriemalnutrition, Disordersoffluidelectrolyteacid-base, Rheumatoidarthritisandinflammatoryconnectivetissuedisease, SevereHematologicalDisorders, Dementiaorotherspecifiedbraindisorders, MajorPsychiatricDisorders, Hemiplegiaparaplegiaparalysisfunctionaldisability, Polyneuropathy, Congestiveheartfailure, Coronaryatherosclerosis, Hypertension, Specifiedarrhythmias, Stroke, Vascularorcirculatorydisease, Chronicobstructivepulmonarydisease, Pneumonia, End-stagerenaldiseaseordialysis, Renalfailure, Decubitusulcerorchronicskinulcer, CellulitisLocalSkinInfection, Otherinjuries

LACE Index Table

Attribute	Data Column	Value	Points
Length of Stay	LengthOfStay	< 1	0
		1	1
		2	2
		3	3
		4-6	4
		7-13	5
		>= 14	7
Acute Admissions	EmergencyAdmission	Yes	3
Comorbidity Score	Not in Data set; Need to calculate as count of 'yes' in comorbidity columns for a given measure.	0	0
		1	1
		2	2
		3	3
		>= 4	5
ED Visits	EDVisit	0	0
		1	1
		2	2
		3	3
		>= 4	4

Lace score for a record = Lace point for Length of Stay + Lace point for Acute Admissions + Lace point for Comorbidity Score + Lace point for ED Visits