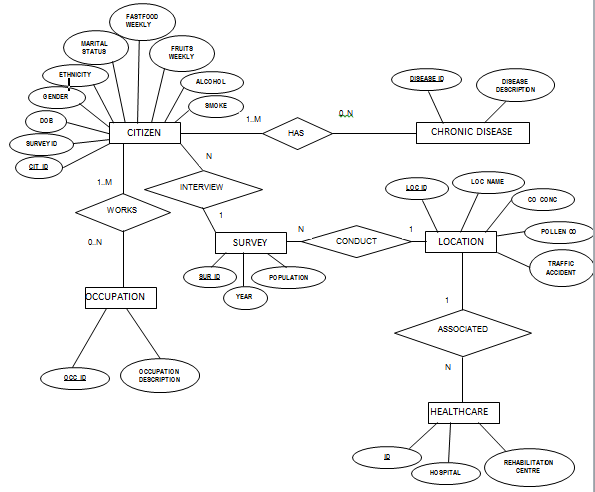
CSE 5330: Database Systems I

Development of a Public Health Information System

1. a) The ERD of the Public Health Information System



1. b) Description of the transformation of the ERD to relational algorithm

Step1: Mapping of regular entity types

* For each regular entity type E in the ER schema, create a relation R that includes all the simpleattributes of E.
* Choose one of the key attributes of E as primary key for R.
* If the chosen key of E is composite, the set of simple attributes that form it will together form the primary key of R.

There are six regular entity types in population surveillance as shown below:

LOCATION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LOC\_ID | LOC\_NAME | CO\_CONC | POLLEN\_CONC | TRAFFIC ACCIDENTS |

HEALTHCARE

|  |  |  |
| --- | --- | --- |
| ID | HOSPITAL | REHABILITATION CENTRE |

SURVEY

|  |  |  |
| --- | --- | --- |
| SUR\_ID | YEAR | POPULATION |

CHRONIC\_DISEASE

|  |  |
| --- | --- |
| DISEASE\_ID | DISEASE DESCRIPTION |

CITIZEN

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cit\_id | Gender | DOB | Ethnicity | Marital\_status | Fastfood\_weekly | Fruits\_weekly | Alcohol | Smoke |

OCCUPATION

|  |  |
| --- | --- |
| OCC\_ID | OCCUPATION DESCRIPTION |

Step2: Mapping of weak entity types

There are no weak entity types in the population surveillance ERD.

Step3: Mapping of Binary 1:1 relationship types

There are no Binary 1:1 relationship types in the population surveillance ERD.

Step4: Mapping of Binary 1:N relationship types

* For each regular binary 1:N relationship type R, identify the relation S that represent the participating entity type *at the N-side* of the relationship type.
* Include as foreign key in S the primary key of the relation T that represents the other entity type participating in R.
* Include any simple attributes of the 1:N relation type as attributes of S.

There are three relations with 1:N relationship scenario as shown below:

1. CITIZEN <---> SURVEY
2. SURVEY <---> LOCATION
3. LOCATION <---> HEALTHCARE

LOCATION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LOC\_ID | LOC\_NAME | CO\_CONC | POLLEN\_CONC | TRAFFIC ACCIDENTS |

HEALTHCARE

|  |  |  |  |
| --- | --- | --- | --- |
| ID | HOSPITAL | REHABILITATION CENTRE | LOC\_ID |

SURVEY

|  |  |  |  |
| --- | --- | --- | --- |
| SUR\_ID | LOC\_ID | YEAR | POPULATION |

CITIZEN

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cit\_id | SUR\_ID | Gender | DOB | Ethnicity | Marital  Status | Fastfood  weekly | Fruits  weekly | Alcohol | Smoke |

Step5: Mapping of Binary M:N relationship types

* For each regular binary M:N relationship type R, *create a new* relation S to represent R.
* Include as foreign key attributes in S the primary keys of the relations that represent the participating entity types; *their combination will form the primary* key of S.
* Also include any simple attributes of the M:N relationship type (or simple components of composite attributes) as attributes of S.

There are two relations with M:N relationship scenario as shown below:

CITIZEN <--> OCCUPATION

CITIZEN <--> CHRONIC\_DISEASE

**LOCATION­­­­**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LOC\_ID | LOC\_NAME | CO\_CONC | POLLEN\_­­­­­CONC | TRAFFIC ACCIDENTS |

**HEALTHCARE**

|  |  |  |  |
| --- | --- | --- | --- |
| ID | HOSPITAL | REHABILITATION CENTRE | LOC\_ID |

**SURVEY**

|  |  |  |  |
| --- | --- | --- | --- |
| SUR\_ID | LOC\_ID | YEAR | POPULATION |

**DIS\_CIT**

|  |  |
| --- | --- |
| CIT\_ID | DIS\_ID |

**CHRONIC\_DISEASE**

|  |  |
| --- | --- |
| DISEASE DESCRIPTION | DISEASE\_ID |

**CITIZEN**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cit\_id | Sur\_id | Gender | DOB | Ethnicity | Marital  Status | Fastfood  weekly | Fruits  weekly | Alcohol | Smoke |

**OCC\_CIT**

|  |  |
| --- | --- |
| CIT\_ID | OCC\_ID |

**OCCUPATION**

|  |  |
| --- | --- |
| OCCUPATION DESCRIPTION | OCC\_ID |

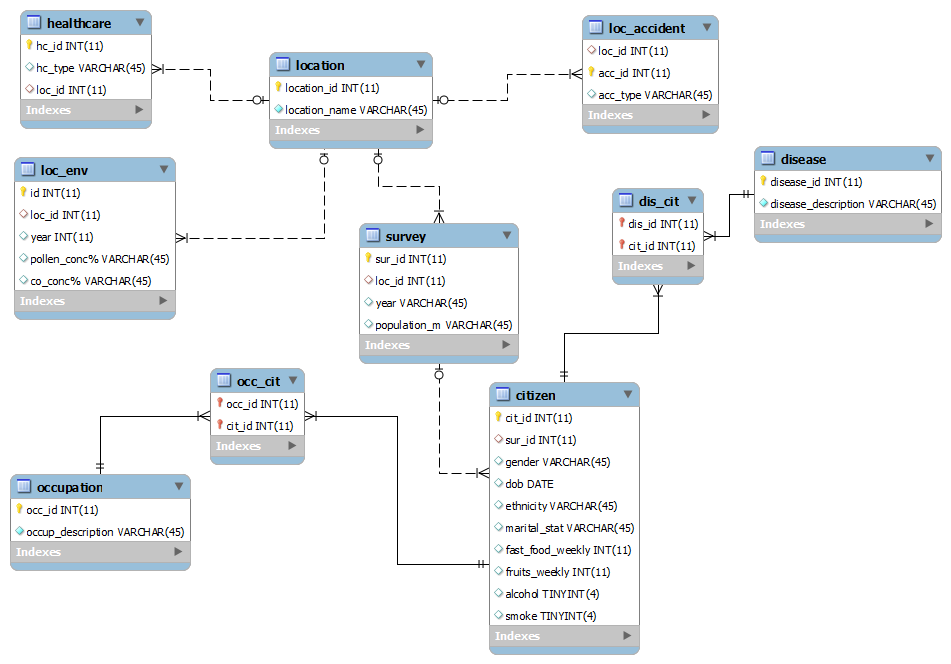
Step 6 & Step 7:

The population surveillance ERD does not have multivalued attributes and N-array relationship types.

1. c) The SQL Create code and the relational diagram

CREATE TABLE `disease` (  
  `disease\_id` int(11) NOT NULL DEFAULT '0',  
  `disease\_description` varchar(45) NOT NULL,  
  PRIMARY KEY (`disease\_id`),  
  UNIQUE KEY `disease\_description\_UNIQUE` (`disease\_description`)  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `location` (  
  `location\_id` int(11) NOT NULL DEFAULT '0',  
  `location\_name` varchar(45) NOT NULL,  
  PRIMARY KEY (`location\_id`),  
  UNIQUE KEY `location\_name\_UNIQUE` (`location\_name`)  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `occupation` (  
  `occ\_id` int(11) NOT NULL DEFAULT '0',  
  `occup\_description` varchar(45) NOT NULL,  
  PRIMARY KEY (`occ\_id`),  
  UNIQUE KEY `occup\_description\_UNIQUE` (`occup\_description`)  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `survey` (  
  `sur\_id` int(11) NOT NULL DEFAULT '0',  
  `loc\_id` int(11) DEFAULT NULL,  
  `year` varchar(45) DEFAULT NULL,  
  `population\_m` varchar(45) DEFAULT NULL,  
  PRIMARY KEY (`sur\_id`),  
  KEY `loc\_id2\_idx` (`loc\_id`),      
  CONSTRAINT `loc\_id2` FOREIGN KEY (`loc\_id`) REFERENCES `location` (`location\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `citizen` (  
  `cit\_id` int(11) NOT NULL DEFAULT '0',  
  `sur\_id` int(11) DEFAULT NULL,  
  `gender` varchar(45) DEFAULT NULL,  
  `dob` date DEFAULT NULL,  
  `ethnicity` varchar(45) DEFAULT NULL,  
  `marital\_stat` varchar(45) DEFAULT NULL,  
  `fast\_food\_weekly` int(11) DEFAULT NULL,  
  `fruits\_weekly` int(11) DEFAULT NULL,  
  `alcohol` tinyint(4) DEFAULT NULL,  
  `smoke` tinyint(4) DEFAULT NULL,  
  PRIMARY KEY (`cit\_id`),  
  KEY `sur\_id\_idx` (`sur\_id`),  
  CONSTRAINT `sur\_id` FOREIGN KEY (`sur\_id`) REFERENCES `survey` (`sur\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `dis\_cit` (  
  `dis\_id` int(11) NOT NULL,  
  `cit\_id` int(11) NOT NULL,  
  PRIMARY KEY (`dis\_id`,`cit\_id`),  
  KEY `cit\_id\_idx` (`cit\_id`),  
  CONSTRAINT `cit\_id1` FOREIGN KEY (`cit\_id`) REFERENCES `citizen` (`cit\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION,  
  CONSTRAINT `dis\_id` FOREIGN KEY (`dis\_id`) REFERENCES `disease` (`disease\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `healthcare` (  
  `hc\_id` int(11) NOT NULL DEFAULT '0',  
  `hc\_type` varchar(45) DEFAULT NULL,  
  `loc\_id` int(11) DEFAULT NULL,  
  PRIMARY KEY (`hc\_id`),  
  KEY `loc\_id\_idx` (`loc\_id`),  
  CONSTRAINT `loc\_id1` FOREIGN KEY (`loc\_id`) REFERENCES `location` (`location\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `loc\_accident` (  
  `loc\_id` int(11) DEFAULT NULL,  
  `acc\_id` int(11) NOT NULL DEFAULT '0',  
  `acc\_type` varchar(45) DEFAULT NULL,  
  PRIMARY KEY (`acc\_id`),  
  KEY `loc\_id\_idx` (`loc\_id`),  
  CONSTRAINT `loc\_id` FOREIGN KEY (`loc\_id`) REFERENCES `location` (`location\_id`) ON UPDATE CASCADE  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `loc\_env` (  
  `id` int(11) NOT NULL,  
  `loc\_id` int(11) DEFAULT NULL,  
  `year` int(11) DEFAULT NULL,  
  `pollen\_conc%` varchar(45) DEFAULT NULL,  
  `co\_conc%` varchar(45) DEFAULT NULL,  
  PRIMARY KEY disease (`id`),  
  KEY `loc\_id4\_idx` (`loc\_id`),  
  CONSTRAINT `loc\_id4` FOREIGN KEY (`loc\_id`) REFERENCES `location` (`location\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION) ENGINE=InnoDB DEFAULT CHARSET=utf8;  
  
CREATE TABLE `occ\_cit` (  
  `occ\_id` int(11) NOT NULL,  
  `cit\_id` int(11) NOT NULL,  
  PRIMARY KEY (`occ\_id`,`cit\_id`),  
  KEY `cit\_id\_idx` (`cit\_id`),  
  CONSTRAINT `cit\_id` FOREIGN KEY (`cit\_id`) REFERENCES `citizen` (`cit\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION,  
  CONSTRAINT `occ\_id` FOREIGN KEY (`occ\_id`) REFERENCES `occupation` (`occ\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION  
) ENGINE=InnoDB DEFAULT CHARSET=utf8;

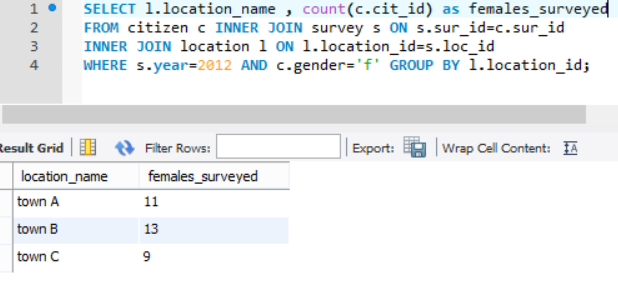
Relational Diagram:

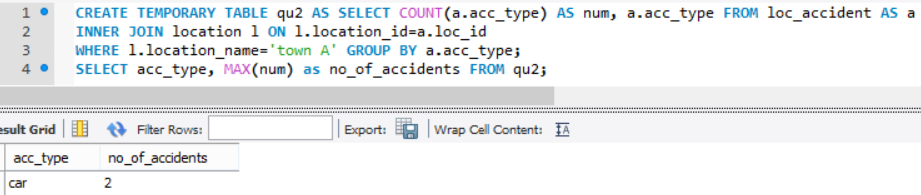


1. d) Insert code present in insertdata.sql
2. e) The SQL code of the queries and screenshots

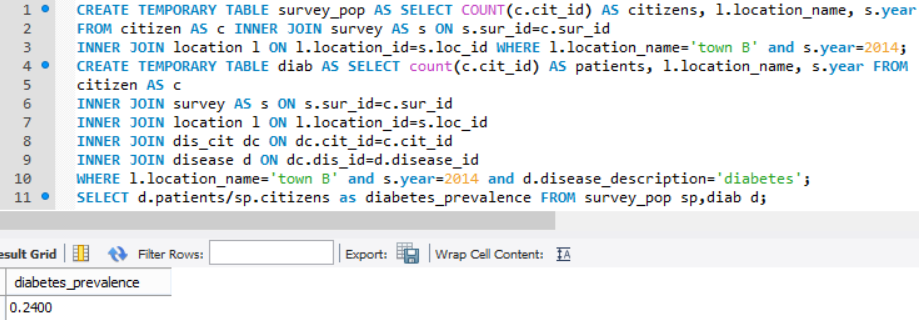
**Task 4**

**Query 1: The surveyed female population for each town during the year 2012**

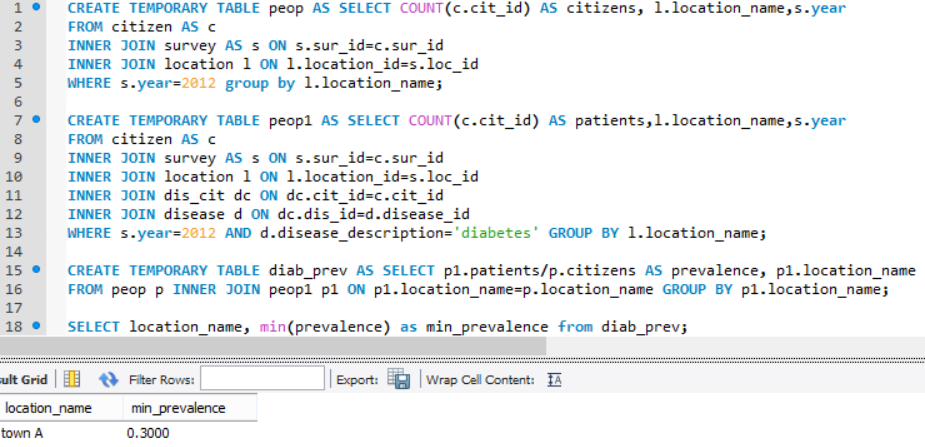
**Query 2: Most common accident type for Town A.**

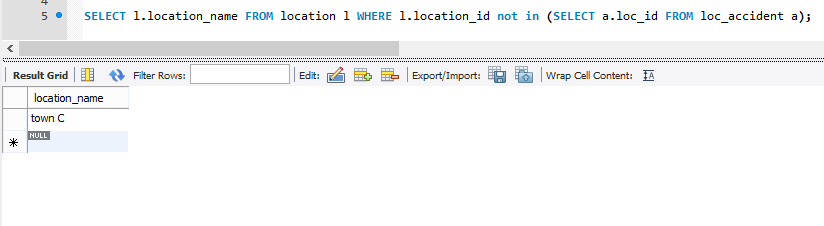


**Query 3: Prevalence of diabetes in Town B for the year 2014**

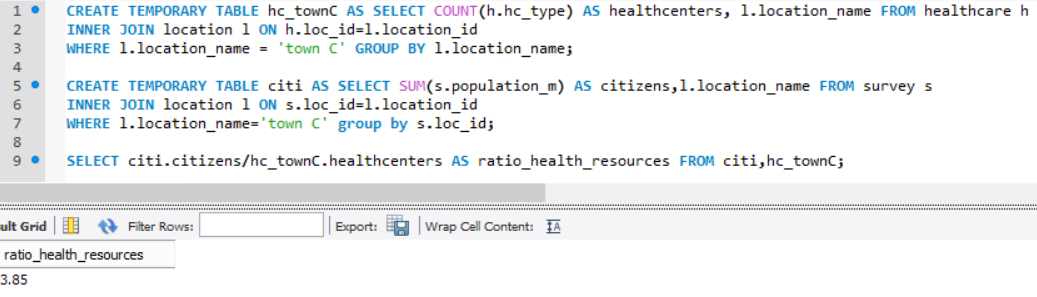


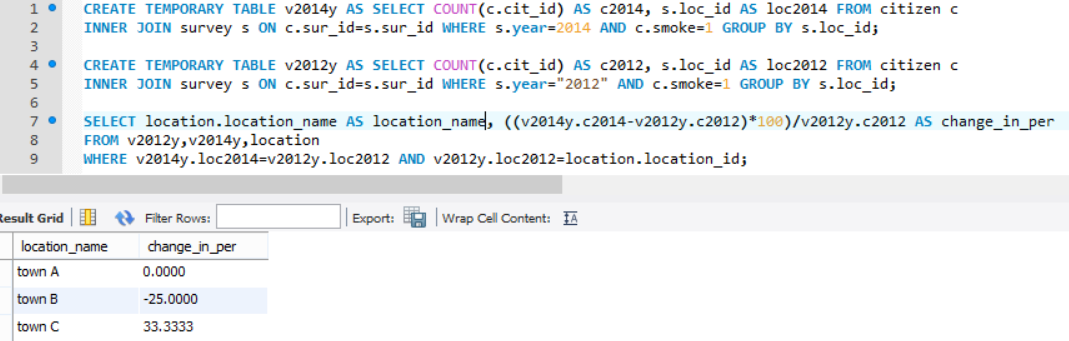
**Query 4: Town with the lowest diabetes prevalence for the year 2012**

**Query 5: The town(s) where no accidents have been reported**

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**Query 6: The availability of health resources for Town C for the whole observation period.**

**Query 7: The change in the smoking habit between in 2014 compared to 2012, for all towns**



References:

http://www.cvauni.edu.vn/imgupload\_dinhkem/file/CSDL/Fundamentals\_of\_Database\_Systems,\_6th\_Edition.pdf