

Garrett Strange

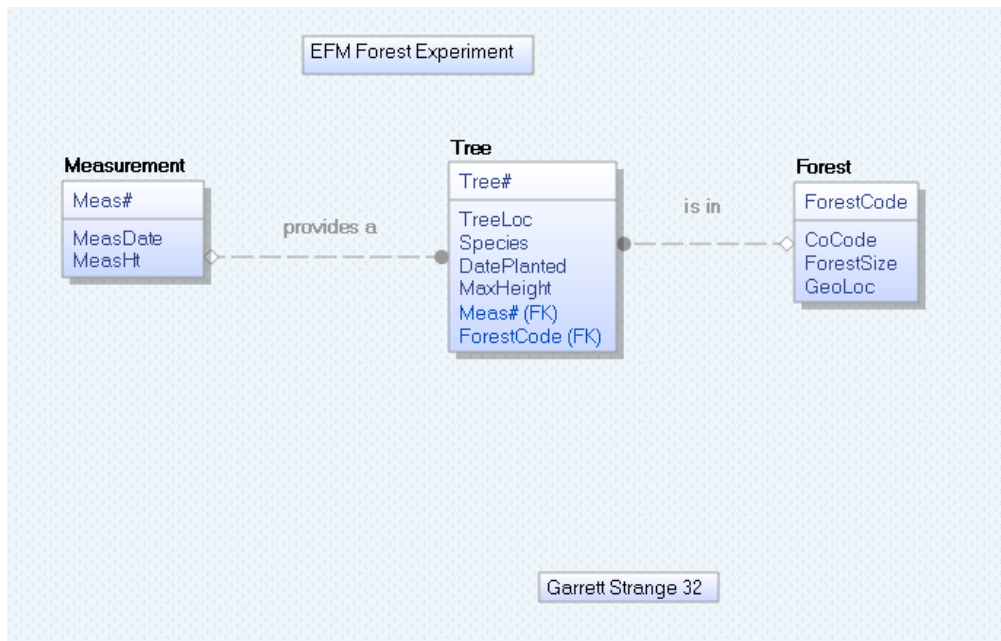
EFM Final Report

November 23, 2019

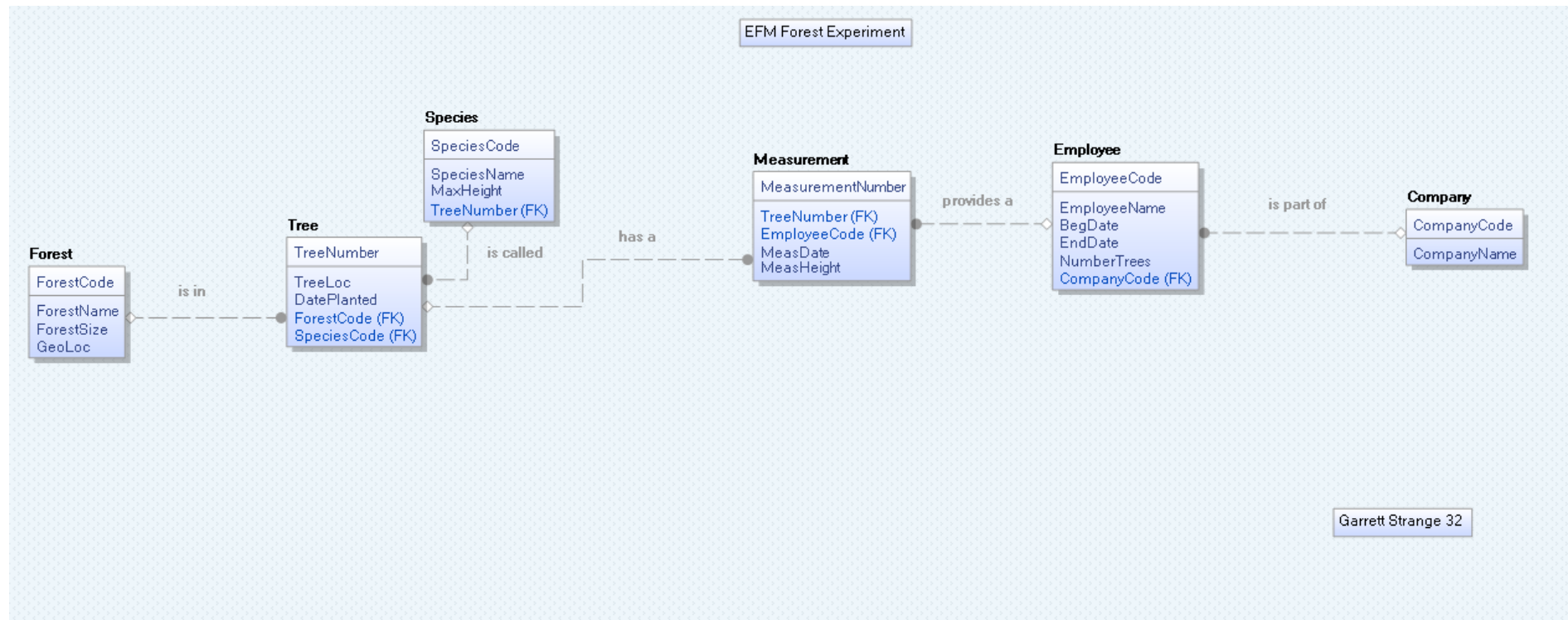
Problem Statement

To create a database that solves the problem of Environment Forest Management and solve a set of common queries that could be presented in the future.

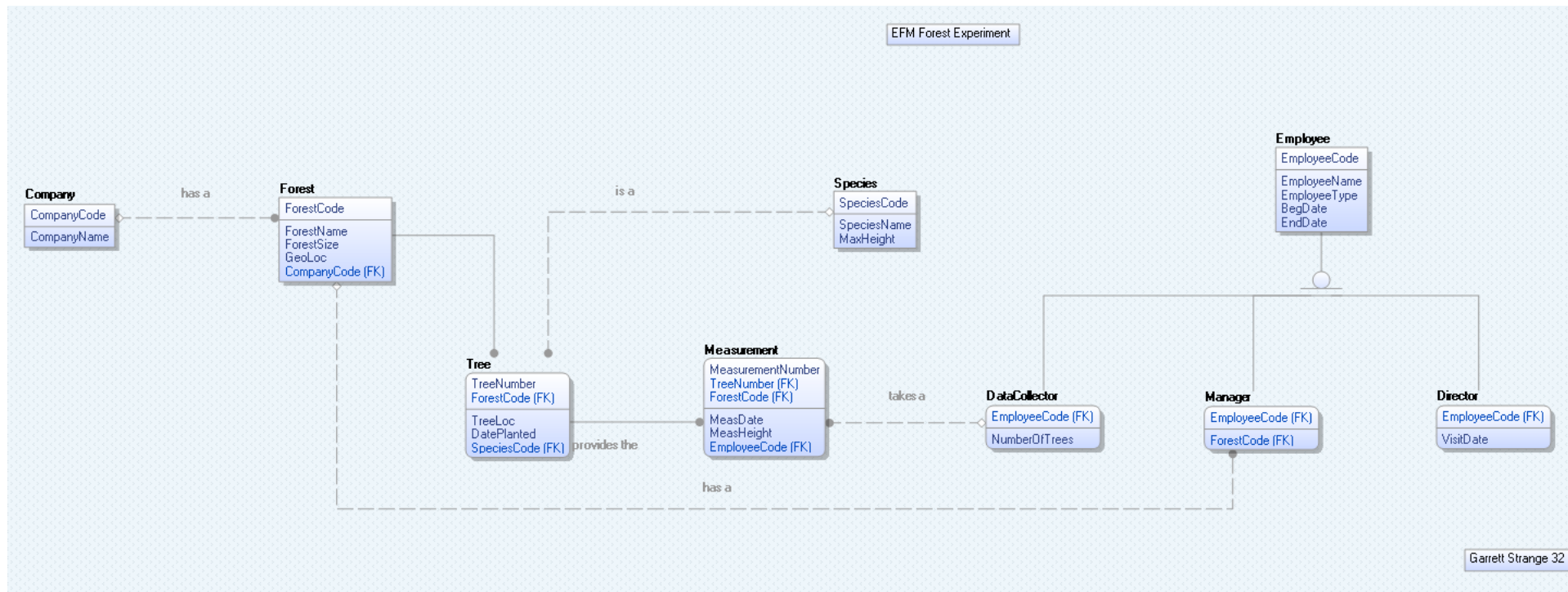
LDM 1



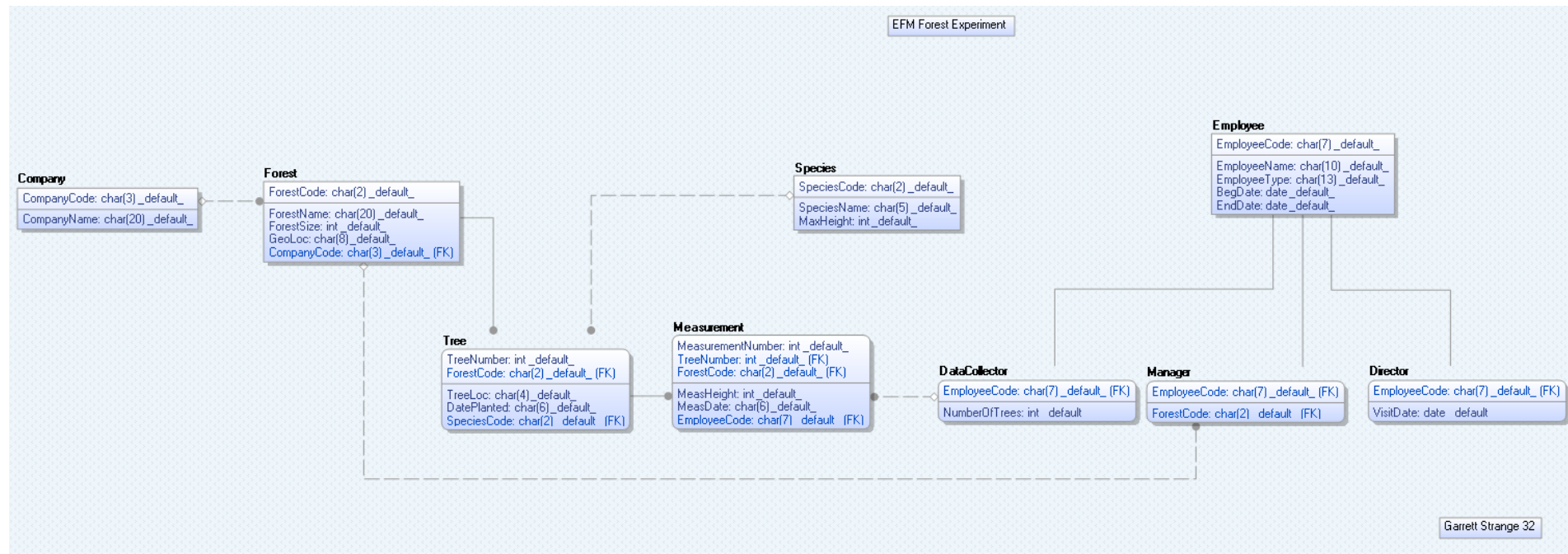
LDM 2



Final LDM



Final PDM



FDs (Old and New)

	Species	Forest Code	Co Code	Date Planted	Forest Siz	Geograph	Meas Ht	Max Ht	Meas Dat	Meas No	Tree No	Tree Loc	EmplCode	BegDate	EndDate	NoTrees
Species	_	2&3	2&3	2&3	2&3	2&3	1&8		1&8	1&8	2&3	2&3	6&7	1&9		1&9
Forest Code	1&3	_		1&3			1&3	1&3	1&3	1&3	1&3	1&3	1&3	1&4		1&3
Co Code	1&3		_	1&3			1&3	1&3	1&3	1&3	1&3	1&3	1&3	1&4		1&3
Date Planted	18&19	18&19	18&19		12&13	18&19	1&8	18&19	1&8	1&8	18&19	7&14	3&9	5&12		5&12
Forest Size	1&3	1&5	1&5	1&3	_	1&5	1&3	1&3	1&3	1&3	1&3	1&3	1&3	1&3		1&5
Geographic Location	1&3	2&5	2&5	1&3	2&5	_	1&3	1&3	1&3	1&3	1&3	1&3	1&3	1&3		1&6
Meas Ht	1&6	8&11	5&9	1&6	8&11	8&11	_	1&6	8&11	1&6	1&6	1&6	1&6	1&3		6&17
Max Ht	1&5	1&5	1&5	1&5	2&3	1&5	1&5	_	1&5	1&5	1&5	1&5	1&5	1&6		1&5
Meas Date	1&6	4&10	4&10	1&6	4&10	4&10	3&8	1&6	_	1&6	1&6	1&6	1&6	1&6		1&6
Meas No	2&13	2&13	2&13	2&13	2&13	10&19	2&13	2&13	2&13	_	2&13	2&13	2&13	2&13		2&13
Tree No	3&18	3&18	3&18	3&18		3&18	1&8	3&18	1&8	1&8	_	3&18	6&9	6&9		3&9
Tree Loc	1&2	1&2	1&2	1&2	1&2	1&2	1&2	1&2	1&2	1&2	1&2	_	1&2	4&9		1&2
EmplCode	18&19	18&19	18&19	1&9	2&3	1&13	18&19	18&19	18&19	18&19	18&19	1&9	_			
BegDate	18&19	18&19	18&19	1&13	7&18	18&19	18&19	18&19	18&19	18&19	18&19	7&18	7&18	_	20&21	20&21
EndDate	18&19	18&19	18&19	1&2	1&2	18&19	18&19	18&19	18&19	18&19	18&19	1&3	20&21		_	20&21
NoTrees	18&19	18&19	18&19	1&7	1&7	18&19	18&19	18&19	18&19	18&19	18&19	1&9	1&7	1&7	2&21	_
OLD FDs																
Species->	Max Ht	Date Planted->	Species	Meas No->	All											
Forest Code->	Co Code		Forest Code	Tree No->	Species											
	Forest Size		Co Code		Forest Code											
	Geographic Location		Forest Size		Co Code											
Co Code->	Forest Code		Geographic Location		Date Planted											
	Forest Size		Max Ht		Forest Size											
	Geographic Location		Tree No		Geographic Location											
			Tree Loc		Max Ht											
NEW FDs					Tree Loc											
Species->	Max Ht															
Forest Code->	Co Code	Co Code->	Forest Code													
	Forest Size		Forest Size													
	Geography		Geography													
EmplCode->	BegDate															

```

insert into Employee values ('EMP0000', 'Bob', 'Director', NULL,
NULL),
('EMP0101', 'Sam', 'Manager', NULL, NULL),
('EMP0102', 'Mary', 'Manager', NULL, NULL),
('EMP0103', 'Fred', 'Manager', NULL, NULL),
('EMP1010', 'Bill', 'DataCollector', '2011/02/12', NULL),
('EMP1011', 'Joe', 'DataCollector', '2011/02/12', NULL),
('EMP1012', 'Vern', 'DataCollector', '2011/04/12',
'2011/12/31'),
('EMP1013', 'Ann', 'DataCollector', '2011/04/12', '2011/12/31'),
('EMP1014', 'Mike', 'DataCollector', '2013/01/01', NULL),
('EMP1015', 'Kelly', 'DataCollector', '2013/03/12', NULL),
('EMP2032', 'Garrett', 'DataCollector', NULL, NULL)

```

```
select * from Employee
```

EmployeeCode	EmployeeName	EmployeeType	BegDate	EndDate
EMP0000	Bob	Director	NULL	NULL
EMP0101	Sam	Manager	NULL	NULL
EMP0102	Mary	Manager	NULL	NULL
EMP0103	Fred	Manager	NULL	NULL
EMP1010	Bill	DataCollector	2011-02-12	NULL
EMP1011	Joe	DataCollector	2011-02-12	NULL
EMP1012	Vern	DataCollector	2011-04-12	2011-12-31
EMP1013	Ann	DataCollector	2011-04-12	2011-12-31
EMP1014	Mike	DataCollector	2013-01-01	NULL
EMP1015	Kelly	DataCollector	2013-03-12	NULL
EMP2032	Garrett	DataCollector	NULL	NULL

(11 rows affected)

```

insert into Forest values('IF', 'Indiana Forest', 50, 'Area-
311', 'INF'),
('SS', 'South State Forest', 75, 'Area-933', 'SSF'),
('NS', 'North State Forest', 50, 'Area-933', 'NSF')

```

```
select * from Forest
```

ForestCode	ForestName	ForestSize	GeoLoc	CompanyCode
IF	Indiana Forest	50	Area-311	INF
NS	North State Forest	50	Area-933	NSF
SS	South State Forest	75	Area-933	SSF

(3 rows affected)

```
insert into Director values('EMP0000', NULL);
```

```
select * from Director  
EmployeeCode LastVisit
```

```
-----  
EMP0000      NULL
```

```
(1 row affected)
```

```
insert into Manager values('EMP0101', 'IF'),  
('EMP0102', 'SS'),  
('EMP0103', 'NS')
```

```
select * from Manager  
EmployeeCode ForestCode
```

```
-----  
EMP0101      IF  
EMP0102      SS  
EMP0103      NS
```

```
(3 rows affected)
```

```
insert into DataCollector values('EMP2032', 1),  
('EMP1010', 3),  
('EMP1011', 1),  
('EMP1012', 5),  
('EMP1013', 0),  
('EMP1014', 3),  
('EMP1015', 2);
```

```
select * from DataCollector  
EmployeeCode NumberOfTrees
```

```
-----  
EMP1010      3  
EMP1011      1  
EMP1012      5  
EMP1013      0  
EMP1014      3  
EMP1015      2  
EMP2032      1
```

```
(7 rows affected)
```

```

insert into Tree values(728, 'IF', '5W7S', 'Nov 96', 'OK'),
(391, 'SS', '5W7S', 'Jan 96', 'MP'),
(836, 'IF', '3E5N', 'Dec 95', 'MP'),
(859, 'NS', '4W6N', 'Feb 96', 'PN'),
(836, 'NS', '2W5N', 'Mar 17', 'PN'),
(859, 'SS', '4W6N', 'Feb 96', 'MP'),
(859, 'IF', '2W5N', 'Jan 96', 'MP'),
(191, 'SS', '5W7S', 'Jan 95', 'MP'),
(850, 'NS', '4W6N', 'Feb 96', 'PN'),
(837, 'NS', '2W5N', 'Jan 96', 'MP')

```

```
select * from Tree
```

TreeNumber	ForestCode	TreeLoc	DatePlanted	SpeciesCode
191	SS	5W7S	Jan 95	MP
391	SS	5W7S	Jan 96	MP
728	IF	5W7S	Nov 96	OK
836	IF	3E5N	Dec 95	MP
836	NS	2W5N	Mar 17	PN
837	NS	2W5N	Jan 96	MP
850	NS	4W6N	Feb 96	PN
859	IF	2W5N	Jan 96	MP
859	NS	4W6N	Feb 96	PN
859	SS	4W6N	Feb 96	MP

```

insert into Measurement values(77, 728, 'IF', 40, 'Mar 17',
'EMP1014'),
(20, 391, 'SS', 31, 'Feb 15', NULL),
(21, 836, 'IF', 33, 'Mar 15', NULL),
(33, 836, 'IF', 38, 'Feb 16', NULL),
(57, 859, 'NS', 42, 'Apr 17', 'EMP1015'),
(54, 836, 'IF', 40, 'Mar 17', 'EMP2032'),
(98, 391, 'SS', 39, 'Feb 18', 'EMP1010'),
(30, 728, 'IF', 35, 'Mar 15', NULL),
(80, 836, 'IF', 42, 'Feb 18', 'EMP1014'),
(44, 391, 'SS', 29, 'Feb 16', NULL),
(45, 191, 'SS', 35, 'Feb 16', 'EMP1010'),
(43, 859, 'SS', 51, 'Mar 18', 'EMP1010'),
(20, 850, 'NS', 46, 'Mar 17', 'EMP1015'),
(22, 837, 'NS', 31, 'Mar 14', NULL),
(42, 837, 'NS', 33, 'Feb 16', NULL),
(46, 837, 'NS', 46, 'Feb 18', NULL),
(80, 728, 'IF', 40, 'Mar 17', 'EMP1015'),
(54, 836, 'NS', 36, 'Mar 17', 'EMP1011'),
(44, 859, 'IF', NULL, NULL, 'EMP1011')

```

(10 rows affected)


```
select * from Measurement
MeasurementNumber TreeNumber ForestCode MeasHeight MeasDate EmployeeCode
-----
```

20	391	SS	31	Feb 15	NULL
20	850	NS	46	Mar 17	EMP1015
21	836	IF	33	Mar 15	NULL
22	837	NS	31	Mar 14	NULL
30	728	IF	35	Mar 15	NULL
33	836	IF	38	Feb 16	NULL
42	837	NS	33	Feb 16	NULL
43	859	SS	51	Mar 18	EMP1010
44	391	SS	29	Feb 16	NULL
44	859	IF	NULL	NULL	EMP1011
45	191	SS	35	Feb 16	EMP1010
46	837	NS	46	Feb 18	NULL
54	836	IF	40	Mar 17	EMP2032
54	836	NS	36	Mar 17	EMP1011
57	859	NS	42	Apr 17	EMP1015
77	728	IF	40	Mar 17	EMP1014
80	728	IF	40	Mar 17	EMP1015
80	836	IF	42	Feb 18	EMP1014
98	391	SS	39	Feb 18	EMP1010

(19 rows affected)

Questions

1. What is the largest height observed for Maple?

```
select Max(MeasHeight) as 'Largest Maple Height' from Tree,
Species, Measurement
where Tree.SpeciesCode = Species.SpeciesCode
and Tree.SpeciesCode = 'MP'
and Measurement.TreeNumber = Tree.TreeNumber
and Measurement.MeasHeight is not NULL
Largest Maple Height
-----
```

51

(1 row affected)

2. For each tree, list all of its measured heights (along with its tree number) in chronological (date) order.

3. What forest does NSF Company manage?

```
select ForestName from Forest
where CompanyCode = 'NSF'
ForestName
-----
```

North State Forest

(1 row affected)

4. List the trees that are within 5 feet of their maximum height.

```
select distinct Tree.TreeNumber from Tree, Measurement, Species
where abs(MeasHeight - MaxHeight) < 5
and Measurement.TreeNumber = Tree.TreeNumber
and Tree.SpeciesCode = Species.SpeciesCode
TreeNumber
-----
836
837
850
859
```

(4 rows affected)

5. List the measurements in the Indiana Forest made in 2015 and 2018.

```
select MeasurementNumber from Measurement
where ForestCode = 'IF'
and RIGHT(MeasDate, 2) >= 15
and RIGHT(MeasDate, 2) <= 18
MeasurementNumber
-----
21
30
33
54
77
80
80
```

(7 rows affected)

6. What companies planted Maples in January 1996

```
select distinct CompanyName from Company, Forest, Tree
where Forest.ForestCode = Tree.ForestCode
and SpeciesCode = 'MP'
and DatePlanted = 'Jan 96'
CompanyName
-----
Indiana Forest
North State Forest
South State Forest
```

(3 rows affected)

7. Where is the Indiana Forest located and how big is it?

```
GeoLoc    ForestSize
-----
Area-311  50
```

(1 row affected)

8. Who (Name and EMP code) manages the South State Forest?

```
select EmployeeName, Employee.EmployeeCode from Employee,
Manager
where Employee.EmployeeCode = Manager.EmployeeCode
and ForestCode = 'SS'
EmployeeName EmployeeCode
-----
Mary          EMP0102
```

(1 row affected)

9. Who (Name and EMP code) has access to data about Indiana Forest?

```
select distinct EmployeeName, Employee.EmployeeCode from
Employee, Measurement, DataCollector
where Measurement.EmployeeCode = DataCollector.EmployeeCode
and DataCollector.EmployeeCode = Employee.EmployeeCode
and ForestCode = 'IF'
EmployeeName EmployeeCode
-----
Joe          EMP1011
Mike         EMP1014
Kelly        EMP1015
Garrett      EMP2032
```

(4 rows affected)

10. How many trees are assigned to each data collector
(Name and EMP code)?

```
select EmployeeName, Employee.EmployeeCode, NumberOfTrees from
DataCollector, Employee
where Employee.EmployeeCode = DataCollector.EmployeeCode
EmployeeName EmployeeCode NumberOfTrees
```

```
-----
Bill          EMP1010      3
Joe           EMP1011      1
Vern          EMP1012      5
Ann           EMP1013      0
Mike          EMP1014      3
Kelly         EMP1015      2
Garrett       EMP2032      1
```

(7 rows affected)

11. List the measurements made by EMP1015.

```
select EmployeeCode from Measurement
where EmployeeCode = 'EMP1015'
MeasDate MeasHeight
```

```
-----
Mar 17      46
Apr 17      42
Mar 17      40
```

(3 rows affected)