INFO6210 | Sec 06

17th Dec 2015

Smart Pet

Abstract

When people talk about “the next big thing,” they’re never thinking big enough. It’s not a lack of imagination; it’s a lack of observation. With the idea of Smart Pet, we know that the future is always within sight, and we don’t need to imagine what’s already there. Hence we have used the existing to provide a solution for a very basic pet management problem for all the pet owners.

Team IndoChina Data Crunchers

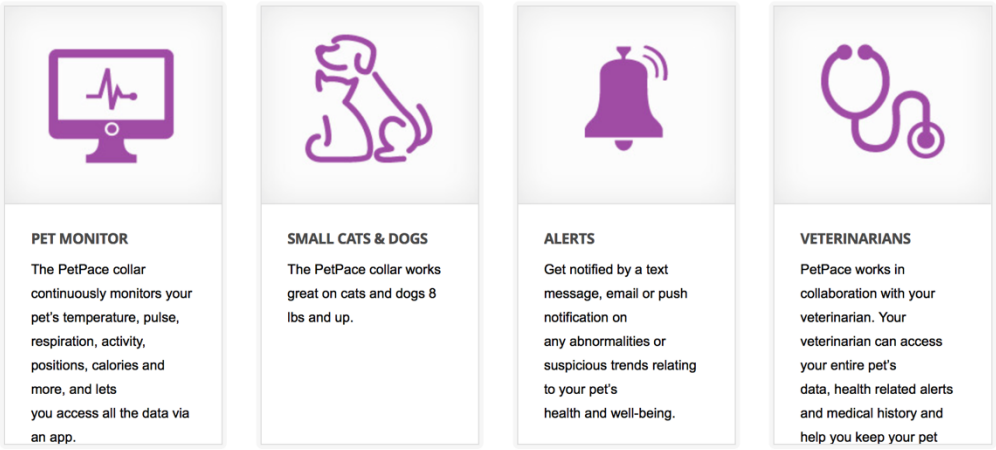
What is Smart Pet?

Smart Pet is an application that let you manage your pet in all the possible ways. Starting from the basic food habit needs to managing the vital signs of your pet. The application also let you control the appliances in the house so that you can restrict the movement of your pet or play some music or video for then in your absence. In short we have tried to make "**Internet of Animals**" to help the pets as well as their owners live a happy and peaceful life.

Key Element

Smart Collar: We have used a "**PetPace**" based smart collar which records the vitals signs and sends notifications to the user via mail or push notification.

The key features of the PetPace smart collar are:

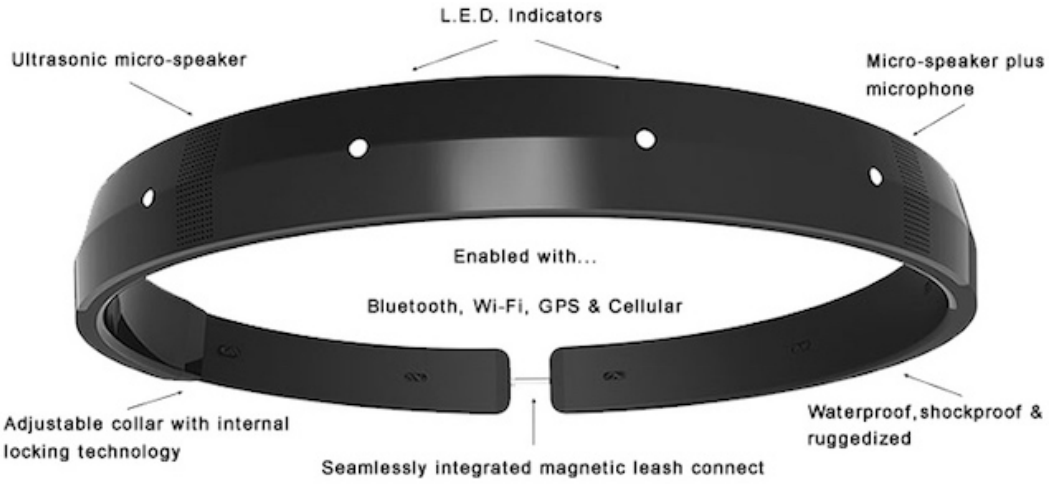


- Notifications: Sends alerts whenever the smart collar detects a cause Activity: Keeps a track of the pet's activities throughout the day and notify if something deviates from normal.
- Postures: Monitors the postures of the pet to detect medical, pain or behavioral problems.
- Temperature: Detecting fever or hyperthermia.

- Heart Rate: Detects disease, fitness, stress, pain and notify if something abnormal.
- Respiration: Tracks the breathing pattern of the pet and detects if something anomalous.
- Pulse: Monitors pulse rate – high, low or irregular.

Components of the Smart collar:

- GPS: Tracks the location of the pet.
- Camera: Shows the surroundings.
- Speaker: Soothes the pet in case of hyperactivity and receive messages from the owner.
- Transmitter: To send signals to the wireless router.
- Sensor: To track the vital signs of the pet.



Project Scope:

The smart collar can:

- Monitor the vital signs (Pulse, Respiration, Activity, Position, Calories, panting, Vasodilation)
- Send the vital sign report to the pet owner
- Can be opened with a master key otherwise it sends alerts
- Communicates to all the devices in the house by transmitting signals to the wireless router

Note:

- Panting is the primary method for a pet to release excessive heat.
- Vasodilation is the second way. Vasodilation helps bring hot blood directly to the surface of the skin, allowing for the blood to cool before returning back to the heart.

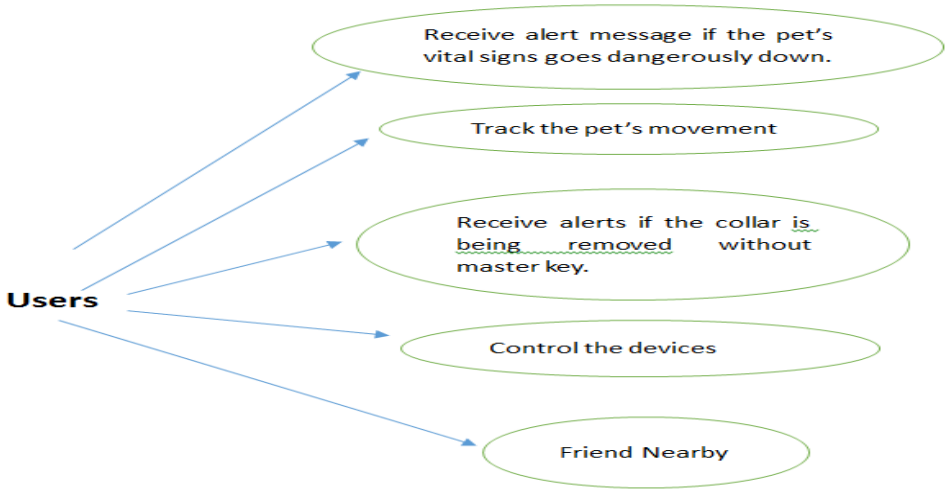
Assumptions:

- As we are dealing with the idea of "Internet of Things" we are assuming that the appliances in the house are smart and they can talk to each other.
- Also, we are assuming that the pet has been pre-trained.

Constraints:

As much as we try to control the moody behavior of the pets and their outcomes; we can never achieve the control over their behavior. We can pre-train them to behave in a civilized manner but what they do in owners' absence can only be tried to manage.

USE CASE Diagram:



Main Table with Attributes:

We have a total of 24 tables in our EER diagram out of which the major tables are listed below

1. **User** (UserId, SSN, Name, Age, DateOfBirth, Gender, Email)
2. **Veterinarian** (VetId, Name,Gender, HospitalName, PersonalPhoneNo, OfficePhoneNo, HomeAddress, Qualification, Specialization)
3. **House** (HouseId, Address, ApplianceId)
4. **WirelessRouter** (RouterId, CollarId, Bandwidth, NoOfPorts)
5. **Pet** (PetId, VitalSIgnId, Name, Age,Type,Breed)
6. **VitalSign** (VitalSignId, PulseRate, RespiratoryRate, BloodPressure, Weight, calories, BMI, MaximumPosition, DateRecorded)
7. **SmartCollar** (CollarId, ComponentId, Component, Smart collar has a hierarchical relationship with its components as subtypes. The subtype tables are mentioned below:

- **Camera**
- **GPS**
- **Speaker**

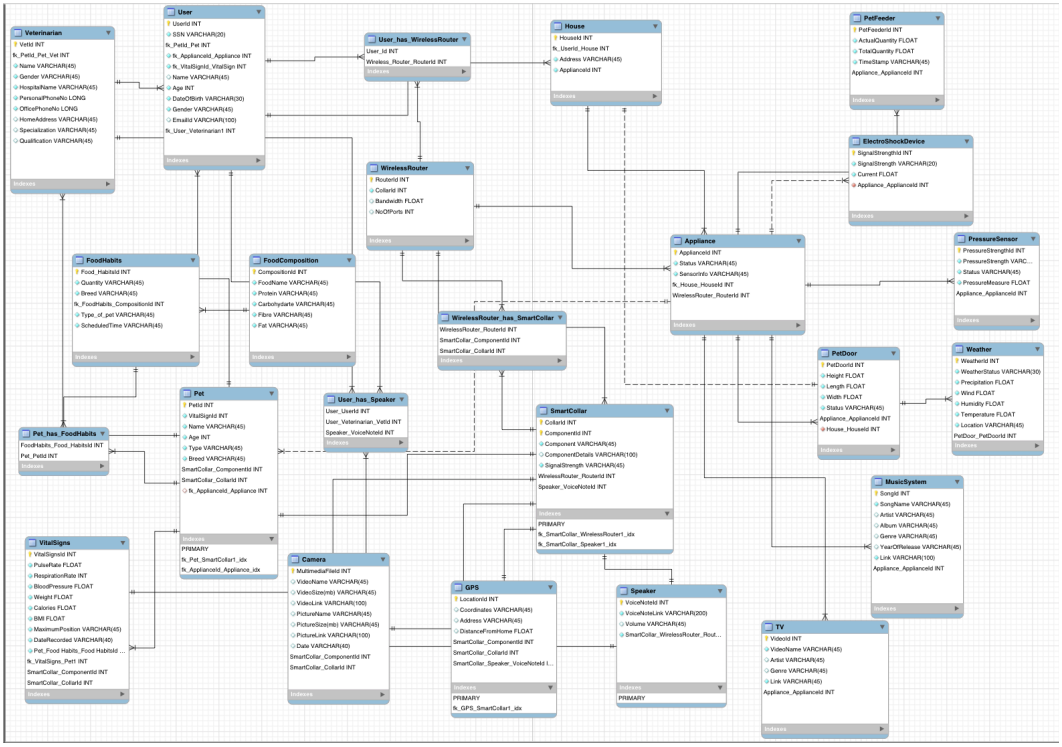
8. **Appliances** (ApplianceId, Status, SensorInfo)
9. Appliances has a hierarchical relationship with all the appliances in the house. Listed below are the list of appliance tables:
    - **PetFeeder**
    - **PetDoor**
    - **ElectroShock Device**
    - **Pressure Sensor**
    - **Music System**
    - **TV**

Relationships with cardinalities:

Relationship define how entities are related with each other. Following list shows the important relationships with their cardinalities:

- **User and pet** (One to Many)
- **Pet and SmartCollar** (One to One)
- **Veterinarian and Pet** (One to Many)
- **Pet and VitalSign** (One to many)
- **SmartCollar and WirelessRouter** (Many to Many)
- **WirelessRouter to Appliance** (One to Many)
- **User and House** (One to Many)
- **House and Appliance** (One to Many)

EER Diagram:



USE CASES:

1. **If the owner wants the pet to stay indoors**
   The owner can lock the door and restrict the movement of the pet.

```
1   /*----------------------usecase 2.1--------------------------*/
2
3   select pd.PetDoorId, a.status from user as u
4   join house as h on u.UserId = h.UserId
5   join appliance as a on h.ApplianceId = a.ApplianceId
6   join petdoor as pd on a.ApplianceId= pd.Appliance_ApplianceId
7   where a.ApplianceId = 200;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

PetDoorId	status
1	OFF

2. The owner can also switch on the TV/Play music if the pet is bored inside the house.

```
17  /*----------------------usecase 2.2.1--------------------------*/
18
19  select a.applianceid, a.status,tv.Link, tv.VideoName, tv.VideoId from user as
20  join house as h on u.UserId = h.UserId
21  join appliance as a on h.ApplianceId = a.ApplianceId
22  join TV as tv on a.ApplianceId= tv.Appliance_ApplianceId
23  where tv.VideoId= 21;
24
25
26  /*----------------------usecase 2.2.2--------------------------*/
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

applianceid	status	Link	VideoName	VideoId
220	ON	https://www.youtube.com/watch?v=e-ORhEE9...	feugiat	21

3. If the pet is already outside and the owner wants the pet to come inside, the pet collar will play an audio message recorded in the owner's voice asking the pet to come inside.

```
34
35  /*----------------------usecase 2.3: If the pet is already outside--------------------------*/
36
37
38  select s.VoiceNoteLink, s.VoiceNoteId, s.volume  from pet as p join smartcollar sm on p.SmartCollar_CollarId=sm.Collar
39  join gps as g on g.SmartCollar_CollarId= sm.CollarId
40  join speaker as s on sm.Speaker_VoiceNoteId= s.VoiceNoteId
41  where p.Name= 'Murphy'
42  and sm.componentId = 3
43  and sm.collarId = 1
44  and g.address = '5451 Eget St.';
45
46
47
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

VoiceNoteLink	VoiceNoteId	volume
http://www.saavn.com/p/radio/hindi-artist-stati...	3	55

4. **If the pet is outside and the weather goes bad:**

If the pet is outside and weather condition goes bad the collar will play recorded messages in the voice of owner asking the pet to come inside.

```
/*----------------------usecase 6: when pet is outside and weather is bad-------------------------
select p.name,p.PetId, gps.DistanceFromHome, gps.address, s.VoiceNoteLink  from pet as p
join smartcollar as sm on p.SmartCollar_CollarId = sm.CollarId
join GPS as gps on gps.SmartCollar_CollarId= sm.CollarId
join wirelessrouter as wr on wr.CollarId=sm.CollarId
join appliance as a on wr.RouterId= a.WirelessRouter_RouterId
join petdoor as pd on pd.Appliance_ApplianceId= a.ApplianceId
join weather as w on w.PetDoor_PetDoorId= pd.PetDoorId
join speaker as s on s.VoiceNoteId=sm.Speaker_VoiceNoteId
where p.Name= 'Murphy'
and sm.componentId = 2
and sm.collarId = 1
and wr.RouterId= 2
and gps.address = '251-5000 Neque St.'
and gps.DistanceFromHome>5;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

name	PetId	DistanceFromHome	address	VoiceNoteLink
Murphy	1	7	251-5000 Neque St.	http://www.saavn.com/p/radio/hindi-artist-stati...

5. If the pet wants to go outside, the pet door will have a proximity sensor and can open the door when the pet walks towards it.

```
/*----------------------usecase 3.1: automatic pet door-------------------------*/


select g.Address, g.DistanceFromHome,p.Name,PetDoorId, a.Status as appliance_status, ps.status as pressure_sensor_status from pet as
join GPS as g on g.SmartCollar_ComponentId= sm.componentId
join wirelessrouter as w on w.RouterId= sm.WirelessRouter_RouterId
join appliance a on a.WirelessRouter_RouterId= w.RouterId
join petdoor as pd on pd.Appliance_ApplianceId= a.applianceId
join pressuresensor as ps on ps.Appliance_ApplianceId= a.applianceId
where p.Name= 'Murphy'
and sm.componentId = 3
and sm.collarId = 1
and g.address = '5451 Eget St.'
and g.DistanceFromHome < 20;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Address	DistanceFromHome	Name	PetDoorId	appliance_status	pressure_sensor_status
5451 Eget St.	11	Murphy	3	ON	ON

Implementation of Functions:

1. Views:

Providing access to user to view their personal details and their pet related information

```
CREATE VIEW User_Pet_SmartCollar AS
    SELECT
        u.UserId, u.Name, u.Gender
    FROM
        User AS u
            JOIN
        Pet AS p ON u.fk_PetId_Pet = p.PetId
            JOIN
        SmartCollar AS sc ON p.SmartCollar_CollarId = sc.CollarId
            AND p.SmartCollar_ComponentId = sc.ComponentId;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

UserId	Name	Gender
1	Curran Lancaster	F
7	Carter Morales	M
13	Maia Hicks	M
19	Edward Montgomery	M
25	Summer Jordan	M
31	Tanner Peck	M
37	Dalton Fernandez	M
43	Martha Sears	M

Result 3

Display the weather details and respective pet door status:

```
CREATE VIEW User_Pet_SmartCollar AS
    SELECT
        u.UserId, u.Name, u.Gender,sc.CollarId,p.PetId
    FROM
        User AS u
            JOIN
        Pet AS p ON u.fk_PetId_Pet = p.PetId
            JOIN
        SmartCollar AS sc ON p.SmartCollar_CollarId = sc.CollarId
            AND p.SmartCollar_ComponentId = sc.ComponentId;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

UserId	Name	Gender	CollarId	PetId
1	Curran Lancaster	F	1	1
7	Carter Morales	M	1	7
13	Maia Hicks	M	1	13
19	Edward Montgomery	M	1	19
25	Summer Jordan	M	1	25
31	Tanner Peck	M	1	31
37	Dalton Fernandez	M	1	37
43	Martha Sears	M	1	43

2. Stored Procedures:

Displaying the status of pet door for a particular ApplianceId

```
632
633   DROP procedure IF EXISTS `sp_PetDoorStatus()`;
634   DELIMITER $$
635   USE `projectIC`$$
636   CREATE PROCEDURE  sp_PetDoorStatus()
637   begin
638   SELECT
639       pd.PetDoorId, a.status
640   FROM
641       user AS u
642           JOIN
643       house AS h ON u.UserId = h.UserId
644           JOIN
645       appliance AS a ON h.ApplianceId = a.ApplianceId
646           JOIN
647       petdoor AS pd ON a.ApplianceId = pd.Appliance_ApplianceI
648   WHERE
649       a.ApplianceId = 200;
650   END
651   $$
652   DELIMITER ;
653
654   call sp_PetDoorStatus();
655
656    /*----------------------------------------------INSERT TAB
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

PetDoorId	status
1	OFF

Calculate the distance of the pet from house.

```
592   DROP procedure IF EXISTS `sp_calPetDistfromPetDoor()`;
593   DELIMITER $$
594   USE `projectIC`$$
595   CREATE PROCEDURE  sp_calPetDistfromPetDoor()
596   begin
597   SELECT
598       g.Address,
599       g.DistanceFromHome,
600       p.Name,
601       PetDoorId,
602       a.Status AS appliance_status,
603       ps.status AS pressure_sensor_status
604   FROM
605       pet AS p
606           JOIN
607       smartcollar AS sm ON p.SmartCollar_CollarId = sm.collarId
608           JOIN
609       GPS AS g ON g.SmartCollar_ComponentId = sm.componentId
610           JOIN
611       wirelessrouter AS w ON w.RouterId = sm.WirelessRouter_RouterId
612           JOIN
613       appliance a ON a.WirelessRouter_RouterId = w.RouterId
614           JOIN
615       petdoor AS pd ON pd.Appliance_ApplianceId = a.applianceId
616           JOIN
617       pressuresensor AS ps ON ps.Appliance_ApplianceId = a.applianceId
618   WHERE
619       p.Name = 'Murphy' AND sm.componentId = 3
620           AND sm.collarId = 1
621           AND g.address = '5451 Eget St.'
622           AND g.DistanceFromHome < 20;
623   END
624   $$
625   DELIMITER ;
626
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Address	DistanceFromHome	Name	PetDoorId	appliance_status	pressure_sensor_status
5451 Eget St.	11	Murphy	3	ON	ON

3. Triggers:

Updating user information with the use of trigger

```
/*-----------------------------------------------TRIGGERS-----------------------------------------------*/

use projectIC;

CREATE TABLE user_audit (
    id INT AUTO_INCREMENT PRIMARY KEY,
    user_Id INT NOT NULL,
    Name VARCHAR(50) NOT NULL,
    changedat DATETIME DEFAULT NULL,
    action VARCHAR(50) DEFAULT NULL
);

DELIMITER $$
CREATE TRIGGER before_user_update
    BEFORE UPDATE ON user
    FOR EACH ROW
BEGIN
    INSERT INTO customer_audit
    SET action = 'update',
     userId = OLD.userId,
        Name = OLD.Name,
        changedat = NOW();
END$$
DELIMITER ;

SHOW TRIGGERS;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Trigger	Event	Table	Statement	Timing	Created	sql_mode	Definer	character_set_client	collation_conn
before_user_update	UPDATE	user	BEGIN INSERT INTO customer_...	BEFORE	NULL	STRICT_TRANS_TABLES,NO_AUTO_CREATE_U...	root@localhost	utf8	utf8_general_

4. Transaction:

Inserting values into Veterinarian table

```
/*-------------------------COMMIT,ROLLBACK,SAVEPOINT, ROLLBACK TO SAVEPOINT-------------------------------------*/
use projectIC;


start transaction;

SAVEPOINT savepoint1;

INSERT INTO Veterinarian VALUES (2000, 299,'jason','Male', 'Rosewood',09876543212,1234567890,'Rosewood','Student','High School');
SELECT * FROM Veterinarian;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

VetId	fk_PetId_Pet_Vet	Name	Gender	HospitalName	PersonalPhoneNo	OfficePhoneNo	HomeAddress	Specialization	Q
2000	299	jason	Male	Rosewood	9876543212	1234567890	Rosewood	Student	Hig

After rollback:

```
start transaction;

SAVEPOINT savepoint1;

INSERT INTO Veterinarian VALUES (2000, 299,'jason','Male', 'Rosewood',09876543212,1234567890,'Rosewood','Student','High School');
SELECT * FROM Veterinarian;

ROLLBACK TO SAVEPOINT savepoint1;

INSERT INTO Veterinarian VALUES (2001, 299,'jason','Male', 'new York',09876543212,1234567890,'New York','Teacher','Graduate');
SELECT * FROM Veterinarian;

COMMIT;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

VetId	fk_PetId_Pet_Vet	Name	Gender	HospitalName	PersonalPhoneNo	OfficePhoneNo	HomeAddress	Specialization	Qualification
2001	299	jason	Male	new York	9876543212	1234567890	New York	Teacher	Graduate
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

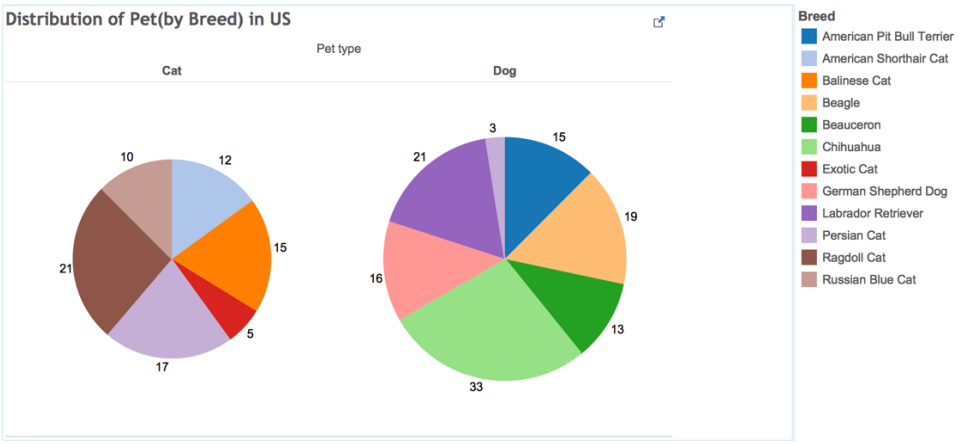
5. BackUp:

Differential backup scheduled to happen every night

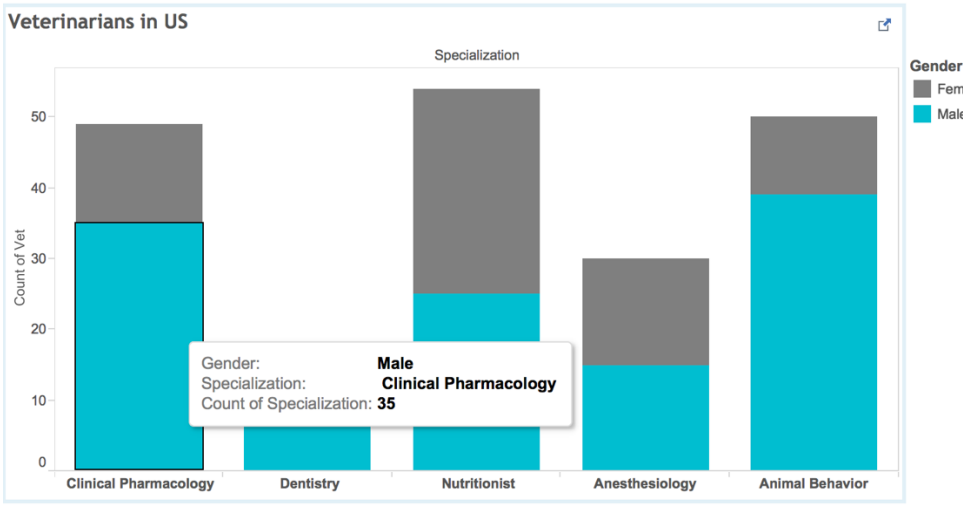
```
DELIMITER //

create procedure takingBackUp ()

declare @startTime varchar(45)
set @startTime  = ((SELECT convert(varchar(10),GETDATE(),20)) + ' 21:47:00')
declare @endTime varchar(45)
set @endTime  = ((SELECT convert(varchar(10),GETDATE(),20)) + ' 21:55:00')
while 1=1
begin
WHILE (CURRENT_TIMESTAMP < = @endTime and (CURRENT_TIMESTAMP > = @startTime))
BEGIN
BACKUP DATABASE Project
TO DISK='/Users/jha_anamika/Project.bak'
WITH DIFFERENTIAL
END
end

DELIMITER;

exec takingBackUp;
```

Business Analysis with the data available:

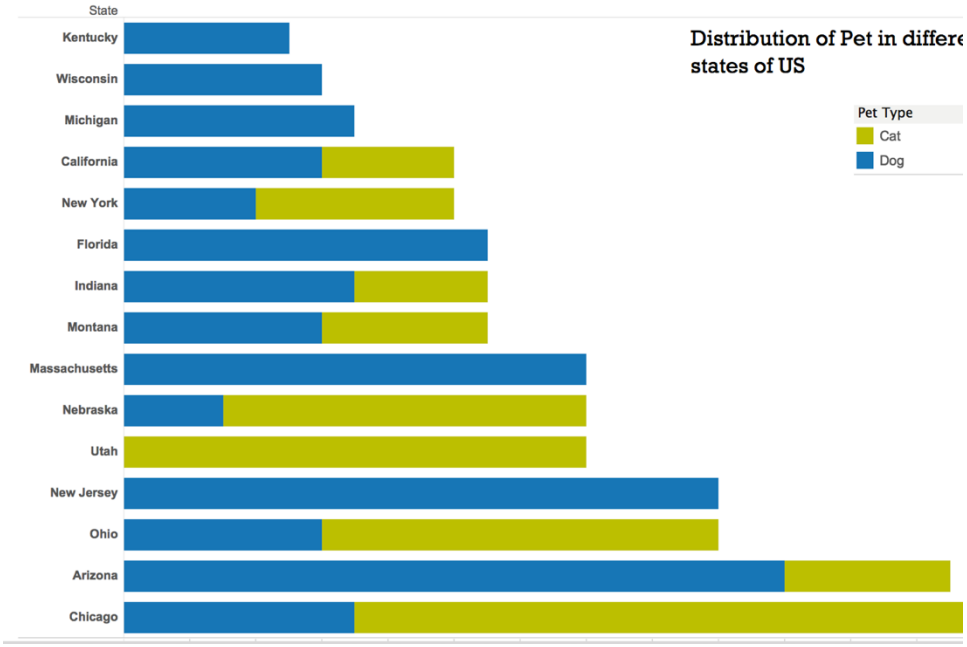
1. Distribution of pets by breed in United States:



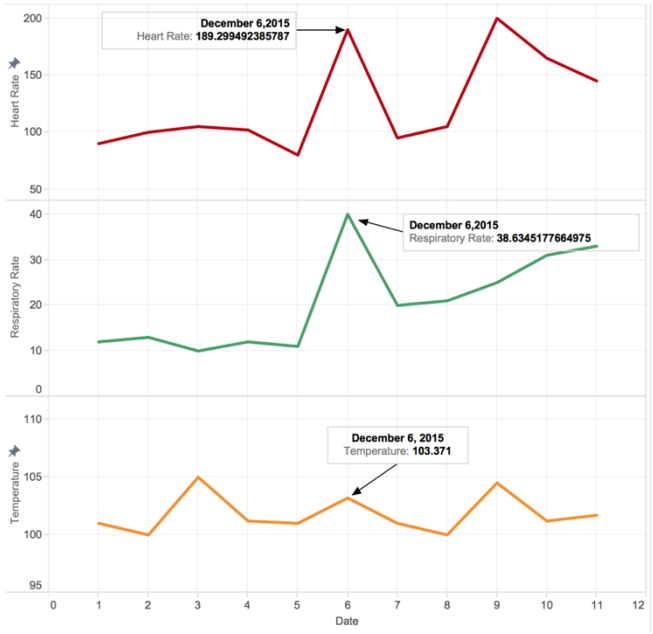
2. Distribution of Veterinarians in US:



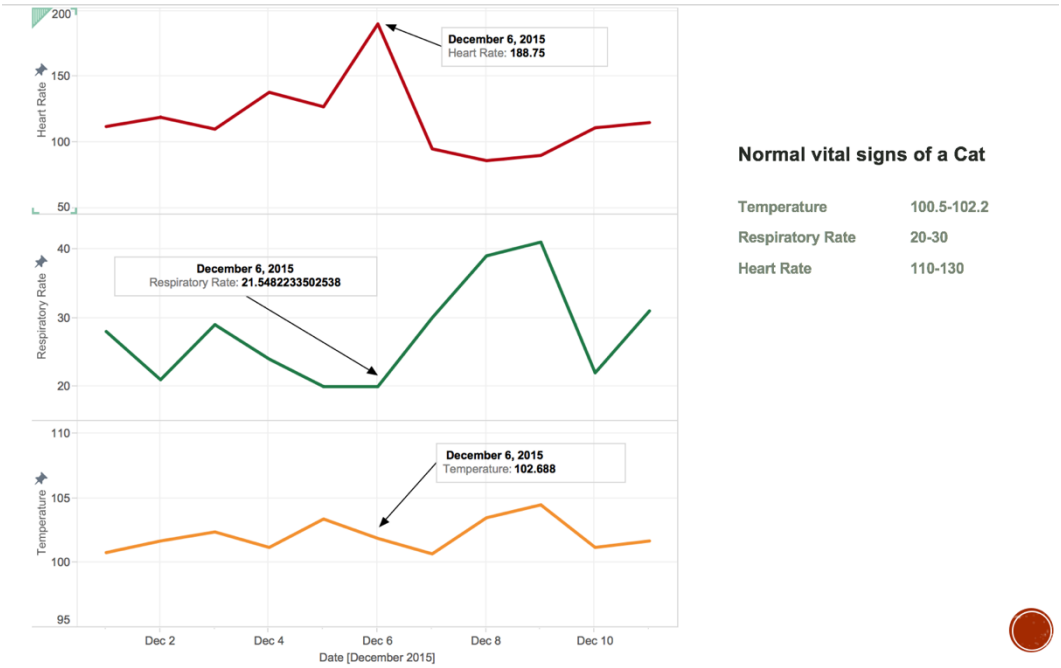
3. Distribution of pet by type:



4. Vital Sign distribution of a Dog:



5. Vitals Sign distribution of a Cat:



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