API1

DELIMITER $$

CREATE procedure API1(in C varchar(20), in T varchar(30),in P varchar(50))

BEGIN

if(SELECT DATE\_FORMAT(T,'%Y-%m-%d')) IS NULL

then select 'incorrect timestamp' as result;

elseif (C!='Trump' and C!='Biden') then

select 'wrong candidate' as jieguo limit 1;

elseif (P not in(select distinct precinct from Penna) )then

select 'wrong precinct' as jieguo limit 1;

elseif C='Trump' and T>=(select Timestamp from Penna where precinct=P order by Timestamp limit 1) then

select Trump from Penna where Timestamp<=T and precinct =P order by Timestamp desc limit 1;

elseif C='Trump' and T<=(select Timestamp from Penna where precinct= P order by Timestamp limit 1) then

select @ccc:=0 as Trump from Penna limit 1;

elseif C='Biden' and T>=(select Timestamp from Penna where precinct=P order by Timestamp limit 1) then

select Biden from Penna where Timestamp<=T and precinct =P order by Timestamp desc limit 1;

else

select @ccc:=0 as Biden from Penna limit 1;

end if; end $$

DELIMITER ;

API2

DELIMITER $$

CREATE PROCEDURE API2(in days varchar(30))

begin

if(SELECT DATE\_FORMAT(days,'%Y-%m-%d')) IS NULL

then select 'incorrect timestamp' as result;

elseif char\_length(days) !=10

then select 'incorrect timestamp' as result;

else

select aaa.candidate,bbb.votes from

(select if(c.biden<c.trump,'Trump','Biden')as candidate FROM

(select sum(Biden) as biden ,sum(Trump) as trump from Penna p, (select Timestamp from Penna where Timestamp like concat(days,'%') order by Timestamp desc limit 1)times where p.Timestamp = times.Timestamp )c)aaa,

(select if(c.biden<c.trump,trump,biden)as votes FROM

(select sum(Biden) as biden,sum(Trump) as trump from Penna p, (select Timestamp from Penna where Timestamp like concat(days,'%') order by Timestamp desc limit 1)times where p.Timestamp = times.Timestamp )c)bbb;

end if;

end $$

DELIMITER ;

API3

DELIMITER $$

CREATE PROCEDURE API3(in people varchar(30))

begin

if (people!='Trump' and people!='Biden') then

select 'wrong candidate' as jieguo limit 1;

elseif (people='Trump')then

select p.precinct from Penna p,

(select Timestamp from Penna order by Timestamp desc limit 1)aaa

where p.Trump>p.Biden and p.Timestamp=aaa.Timestamp

order by p.totalvotes desc

limit 10;

else

select p.precinct from Penna p,

(select Timestamp from Penna order by Timestamp desc limit 1)aaa

where p.Trump<p.Biden and p.Timestamp=aaa.Timestamp

order by p.totalvotes desc

limit 10;

end if;

end $$

DELIMITER ;

Api4

DELIMITER $$

CREATE PROCEDURE API4(in precincts varchar(100))

begin

if (precincts not in(select distinct precinct from Penna) )then

select 'wrong precinct' as jieguo limit 1;

else

select

if(aaa.biden<aaa.trump, 'Trump','Biden') as winner,

if(aaa.biden<aaa.trump, concat((aaa.trump/aaa.total)\*100,'%'),concat((aaa.biden/aaa.total)\*100,'%')) as rate

from

(select p.precinct, p.Biden as biden, p.Trump as trump, p.totalvotes as total

from Penna p,

(select Timestamp from Penna order by Timestamp desc limit 1)ccc

where precinct = precincts

and ccc.Timestamp = p.Timestamp

)aaa;

end if;

end $$

DELIMITER ;

API5

DELIMITER $$

CREATE PROCEDURE API5(in precincts varchar(100))

begin

if((select count(\*) from Penna where precinct like concat('%',precincts,'%'))=0)

then select "incorrect precinct" as result limit 1;

else

select

if(sum(aaa.biden)<sum(aaa.trump), 'Trump','Biden') as winner,

if(sum(aaa.biden)<sum(aaa.trump), sum(aaa.trump),sum(aaa.biden)) as winnnertotal

from

(select p.precinct, p.Biden as biden, p.Trump as trump,p.totalvotes

from Penna p,

(select max(Timestamp) as Timestamp from Penna)abc

where p.precinct like concat('%',precincts,'%') and p.Timestamp=abc.Timestamp)aaa;

end if;

end $$

DELIMITER ;

Part 2 1)

set @T=0;

set @Bi=0;

set @Tr=0

set @pre='0';

create table newPenna

select a.precinct,a.Timestamp,a.new\_total,a.new\_Biden,a.new\_Trump from(

select p.precinct as precinct,p.Timestamp as Timestamp, if(@pre!=p.precinct, (p.totalvotes+(@T:=p.totalvotes)-@T),(0-@T + (@T:=p.totalvotes))) as new\_total,

if(@pre=p.precinct,(0-@Bi + (@Bi:=p.Biden)), p.Biden+(@Bi:=p.Biden)-@Bi) as new\_Biden,

if(@pre=p.precinct,(0-@Tr + (@Tr:=p.Trump)), p.Trump+(@Tr:=p.Trump)-@Tr) as new\_Trump

,if(@pre=p.precinct,p.precinct,(@pre:=p.precinct)) as l\_precinct

from (select Timestamp,precinct,totalvotes,Biden,Trump from Penna order by precinct,Timestamp)p

)a

Part 2 2)

Create table Swtich

select \* from

(select distinct if(ccc.result != bbb.result1, ccc.precinct, '') as outcome

from (select precinct, Timestamp ,Biden,Trump, if(Biden<Trump, True, False) as result

from Penna

where Timestamp = (select Timestamp from Penna

where Timestamp <= (select Timestamp from Penna order by Timestamp desc limit 1) - interval 24 hour

order by Timestamp desc limit 1)) ccc

left join (select precinct, Timestamp ,Biden,Trump, if(Biden<Trump, True, False) as result1 from Penna

where Timestamp = (select Timestamp from Penna order by Timestamp desc limit 1)) bbb on ccc.precinct = bbb.precinct)aaaa;

Part 3

select distinct if(Biden+Trump <= totalvotes, 'True', 'False') as result

from Penna;

select distinct if('2020-11-03'<Timestamp<'2020-11-11', 'True', 'False') as result

from Penna;

set @precede = '0';

set @totalvotes = 0;

select if(count(result) = 1, 'False', 'True') as newresult

from

(select distinct if(new.newvotes<0, 'False', 'True')as result

from

(select ddd.precinct,ddd.Timestamp,

if(@precede=ddd.precinct,(0-@totalvotes + (@totalvotes:=ddd.totalvotes)), ddd.totalvotes+(@totalvotes:=ddd.totalvotes)-@totalvotes) as newvotes,

if(@precede=ddd.precinct,ddd.precinct,(@precede:=ddd.precinct)) as new\_precinct

from (select Timestamp,precinct,totalvotes,Biden,Trump from Penna where Timestamp > '2020-11-05' order by precinct,Timestamp)ddd)new)aaa

where result = 'False';

Table

Description automatically generated

Part4\_1

create table Insertedpenna

select \* from Penna where 1=0;

create table Deletedpenna

select \* from Penna where 1=0;

create table Updatedpenna

select \* from Penna where 1=0;

delimiter $$

create trigger Before\_Insert before INSERT on Penna

For each row

begin

insert into Insertedpenna values (NEW.ID,NEW.Timestamp,NEW.state,NEW.locality,NEW.precinct,NEW.geo,

NEW.totalvotes,NEW.Biden,NEW.Trump,NEW.filestamp);

END $$

delimiter ;

delimiter $$

create trigger Before\_Delete before Delete on Penna

For each row

begin

insert into Deletedpenna values (OLD.ID,OLD.Timestamp,OLD.state,OLD.locality,OLD.precinct,OLD.geo,

OLD.totalvotes,OLD.Biden,OLD.Trump,OLD.filestamp);

END $$

delimiter ;

delimiter $$

create trigger Before\_Update before update on Penna

For each row

begin

insert into Updatedpenna values (OLD.ID,OLD.Timestamp,OLD.state,OLD.locality,OLD.precinct,OLD.geo,

OLD.totalvotes,OLD.Biden,OLD.Trump,OLD.filestamp);

END $$

delimiter ;

PART4\_2 movevote()

DELIMITER $$

CREATE procedure PART4\_2(in P varchar(50), in T varchar(30),in C varchar(100), in N varchar(10))

begin

if (C!='Trump' and C!='Biden') then

select 'wrong candidate' as result limit 1;

elseif

(T not in(select Timestamp from Penna where P=precinct) )then

select 'unknown Timestamp' as result limit 1;

elseif(C='Trump' and (N> (select Biden from Penna where Timestamp=T and precinct=P)))then

select 'not enough votes' as result limit 1;

elseif(C='Biden' and (N> (select Trump from Penna where Timestamp=T and precinct=P)))then

select 'not enough votes' as result limit 1;

elseif(C='Trump')then

select precinct,Timestamp,(Biden-N),(Trump+N) from Penna where Timestamp>=T and precinct=P;

else

select precinct,Timestamp,(Biden+N),(Trump-N) from Penna where Timestamp>=T and precinct=P;

end if;

end $$

DELIMITER ;