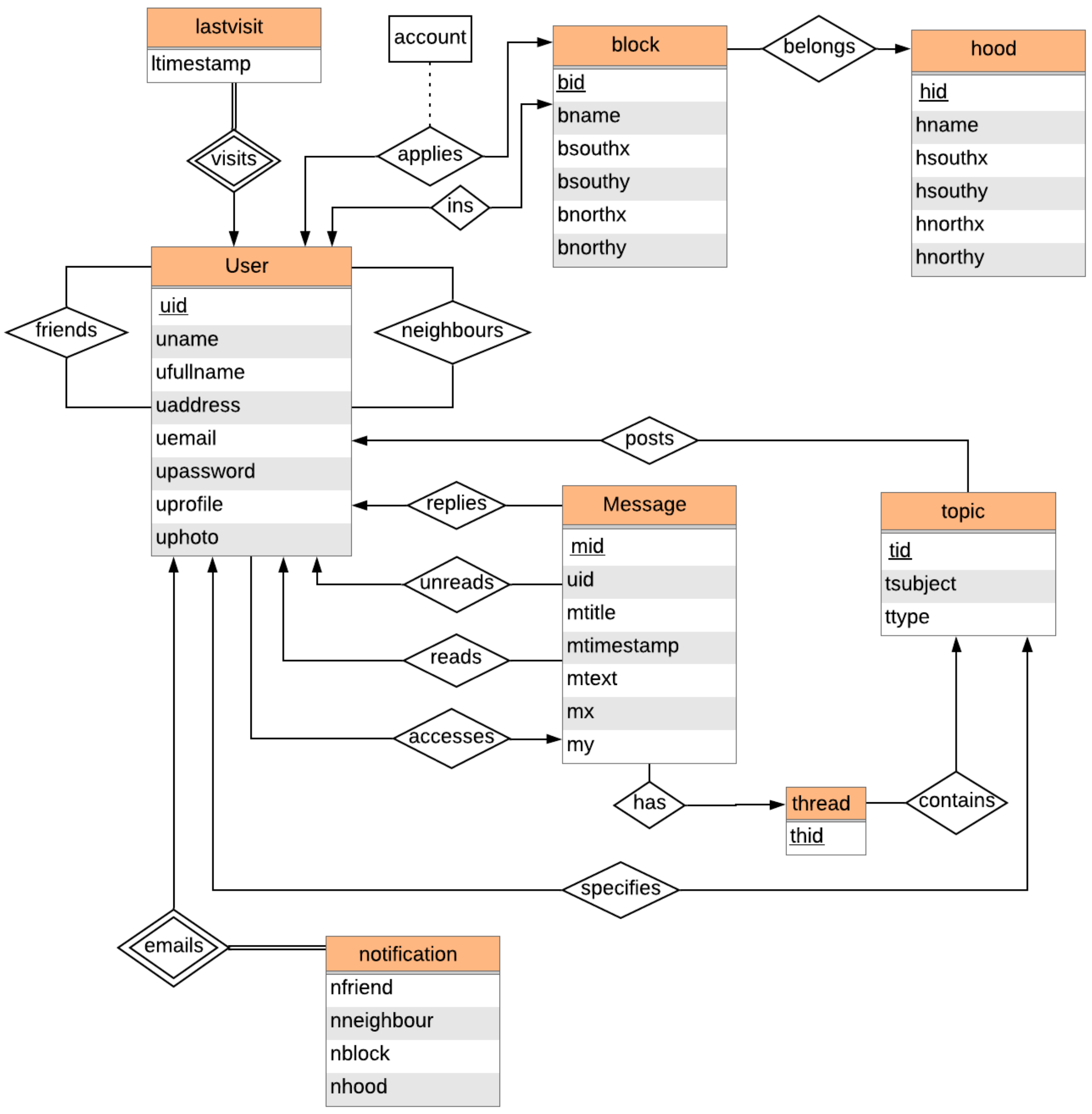
Introduction

This project is based for a website that allows people to communicate with other people that live in their neighborhood. The users can sign up for the service and specify where they live; they can then send and receive messages to other users living close by, and participate in discussions with those users. We present the following ER diagram to represent our database.



We include the following Entities in our Entity – Relational diagram that models the project.

1. User – It stores the details about all the user. Each user is identified using a unique username, user’s full name, user’s address, user’s email address, user’s account password, a short profile where user can describe himself and a profile photo.

2. Block – It stores the details about all the blocks that are identified using a block id and axis-aligned rectangles that can be defined by location coordinates of Southwest and Northeast corner of the rectangle. We also store the name associated with that block.
3. Hood – It stores the details about all the hoods. The data organisation in this relation is similar to the data organisation of the block relation.
4. Message – It stores the details about all the messages that exchanged amongst the users. Each message is identified using a unique message id. We store the sender of the message, the message title, the message text, the timestamp when the message is sent and coordinates of location from where the message was sent.
5. Topic – It stores the details about various topics and each topic is identified using a unique topic id. We store the subject and type of the topic. The type specifies the accessibility of that topic indicating the type of people who can read and reply to that topic.
6. Thread – It stores all the threads which are present in the system and each thread is uniquely identified by a thread id.
7. LastVisit – lastvisit stores the timestamps of all users which specifies the last time when a user accessed the system.
8. Notification – It stores the notification preference of all users. It indicates whether a user prefers a notification when a content is posted by a friend, neighbour, block member and/or a hood member.

We include the following relations in our Entity – Relational diagram that models the project.

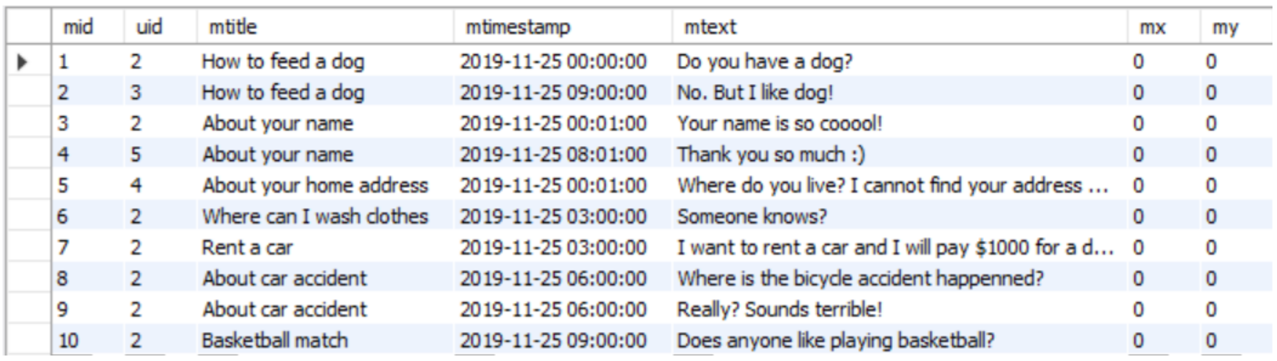
1. Neighbours, one user can be neighbour of many other users.
2. Friends, one user can be friends with many other users.
3. Applies, each user submits an application for a particular block and acount maintains the number of people who have accepted the application.
4. Ins, specifies the block that a particular user belongs to.
5. Belongs, many blocks belong to a single hood.
6. Visits, each user has a timestamp which specifies the last time when that user used the system.
7. Posts, one user can create a number of topics.
8. Replies, one user can reply to many messages.
9. Unreads, each user has different unread messages.
10. Reads, each user has different read messages. Since, a message can be read and unread by many users depending on the message's accessibility, we maintain 2 different relations to store the read and unread messages.
11. Accesses, each message can be accessible to many users and is used to specify the users to whom a particular message is accessible.
12. Has, specifies the thread that a particular message belongs to.
13. Contains, each topic contains many threads.
14. Specifies, each user defines the type of the topic. The user specifies if the topic is visible to his friends, neighbours, block members and/or hood members.
15. Emails, each user has its own preference for receiving an email notification when a new content is posted.

Following is the equivalent relational schema of the above ER diagram.

1. user (uid, uname, ufullname, uaddress, uemail, upassword, uprofile, uphoto)
   uid,uname is the primary key.
2. hood (hid, hname, hsouthx, hsouthy, hnorthx, hnorthy)
   hid is the primary key.
3. block (bid, bname, bsouthx, bsouthy, bnorthx, bnorthy)
   bid is the primary key.
4. message (mid, uid, mtitle, mtimestamp, mtext, mx, my)
   mid is the primary key.
   uid references uid in user.
5. topic (tid, tsubject, ttype)
   tid is the primary key.
6. thread (thid)
   thid is the primary key.
7. notification (uid, nfriend, nneighbor, nblock, nhood)
   uid reference uid in user.
8. lastvisit (uid, ltimestamp)
   uid reference uid in user.
9. applies (uid, bid, acount)
   uid, bid is the primary key.
   uid reference uid in user.
   bid references bid in block.
10. ins (uid, bid)
    uid, bid is the primary key.
    uid reference uid in user.
    bid references bid in block.
11. belongs (hid, bid)
    hid, bid is the primary key.
    hid references hid in hood.
    bid references bid in block.
12. friends (uid, fid)
    uid, fid is the primary key.
    uid reference uid in user.
    fid references uid in user.
13. neighbours (uid, nid)
    uid, nid is the primary key.
    uid reference uid in user.
    fid references uid in user.
14. posts (uid, tid)
    uid, tid is the primary key.
    uid references uid in user.
    tid references tid in topic.

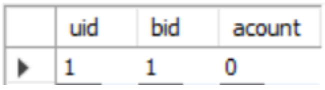
15. contains (<u>tid, thid</u>)
    tid, thid is the primary key.
    tid references tid in topic.
    thid references thid in thread.
16. has (<u>thid, mid</u>)
    thid, mid is the primary key.
    thid references thid in thread.
    mid references mid in message.
17. replies (<u>uid, mid</u>)
    uid, mid is the primary key.
    uid references uid in user.
    mid references mid in message.
18. unreads (<u>uid, mid</u>)
    uid, mid is the primary key.
    uid references uid in user.
    mid references mid in message.
19. reads (<u>uid, mid</u>)
    uid, mid is the primary key.
    uid references uid in user.
    mid references mid in message.
20. accesses (<u>uid, mid</u>)
    uid, mid is the primary key.
    uid references uid in user.
    mid references mid in message.
21. specifies (<u>tid,uid</u>)
    tid, uid is the primary key.
    tid references topic id in topic.
    uid references uid in user.

Sample Data



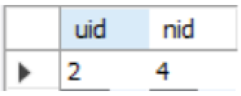
mid	uid	mtitle	mtimestamp	mtext	mx	my
1	2	How to feed a dog	2019-11-25 00:00:00	Do you have a dog?	0	0
2	3	How to feed a dog	2019-11-25 09:00:00	No. But I like dog!	0	0
3	2	About your name	2019-11-25 00:01:00	Your name is so cooool!	0	0
4	5	About your name	2019-11-25 08:01:00	Thank you so much :)	0	0
5	4	About your home address	2019-11-25 00:01:00	Where do you live? I cannot find your address ...	0	0
6	2	Where can I wash clothes	2019-11-25 03:00:00	Someone knows?	0	0
7	2	Rent a car	2019-11-25 03:00:00	I want to rent a car and I will pay $1000 for a d...	0	0
8	2	About car accident	2019-11-25 06:00:00	Where is the bicycle accident happenned?	0	0
9	2	About car accident	2019-11-25 06:00:00	Really? Sounds terrible!	0	0
10	2	Basketball match	2019-11-25 09:00:00	Does anyone like playing basketball?	0	0

Message



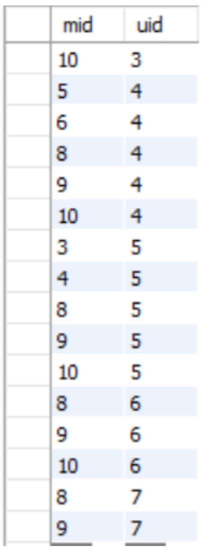
uid	bid	acount
1	1	0

Applies



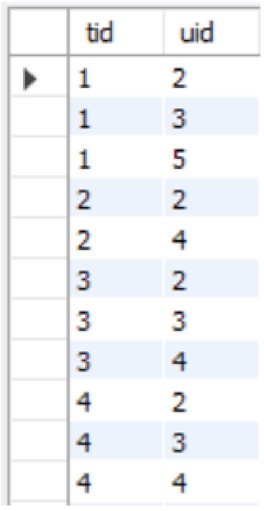
uid	nid
2	4

Neighbours



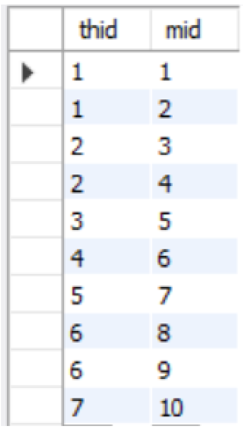
mid	uid
10	3
5	4
6	4
8	4
9	4
10	4
3	5
4	5
8	5
9	5
10	5
8	6
9	6
10	6
8	7
9	7

Accesses



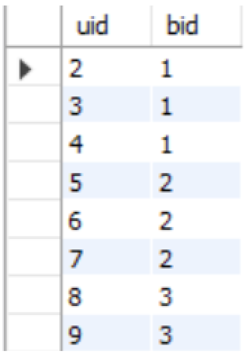
tid	uid
1	2
1	3
1	5
2	2
2	4
3	2
3	3
3	4
4	2
4	3
4	4

Specifies



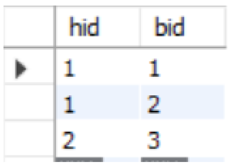
thid	mid
1	1
1	2
2	3
2	4
3	5
4	6
5	7
6	8
6	9
7	10

Has



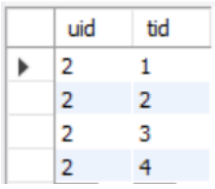
uid	bid
2	1
3	1
4	1
5	2
6	2
7	2
8	3
9	3

Ins



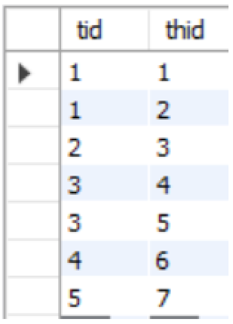
hid	bid
1	1
1	2
2	3

Belongs



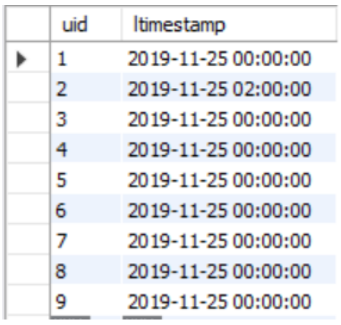
uid	tid
2	1
2	2
2	3
2	4

Posts



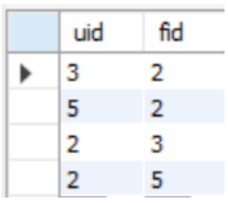
tid	thid
1	1
1	2
2	3
3	4
3	5
4	6
5	7

Contains



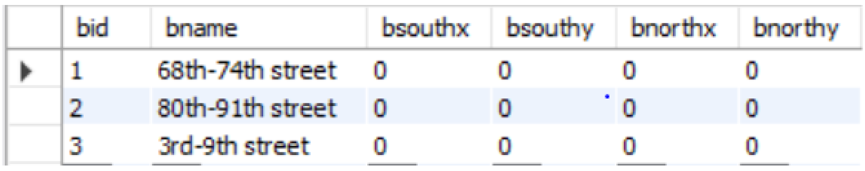
uid	ltimestamp
1	2019-11-25 00:00:00
2	2019-11-25 02:00:00
3	2019-11-25 00:00:00
4	2019-11-25 00:00:00
5	2019-11-25 00:00:00
6	2019-11-25 00:00:00
7	2019-11-25 00:00:00
8	2019-11-25 00:00:00
9	2019-11-25 00:00:00

LastVisit



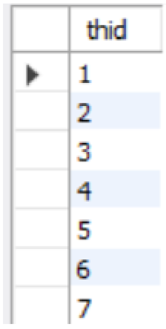
uid	fid
3	2
5	2
2	3
2	5

Friends



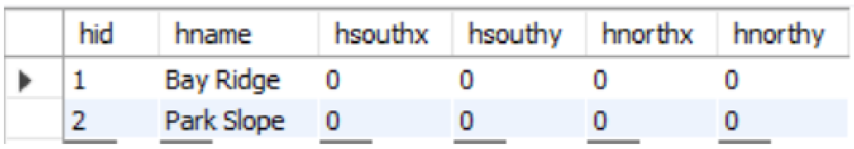
bid	bname	bsouthx	bsouthy	bnorthx	bnorthy
1	68th-74th street	0	0	0	0
2	80th-91th street	0	0	0	0
3	3rd-9th street	0	0	0	0

Block



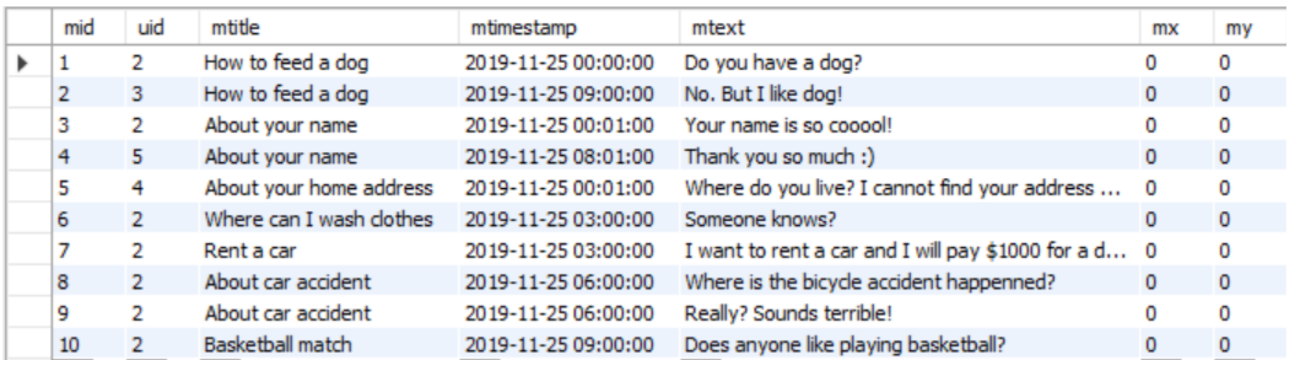
thid
1
2
3
4
5
6
7

Threads



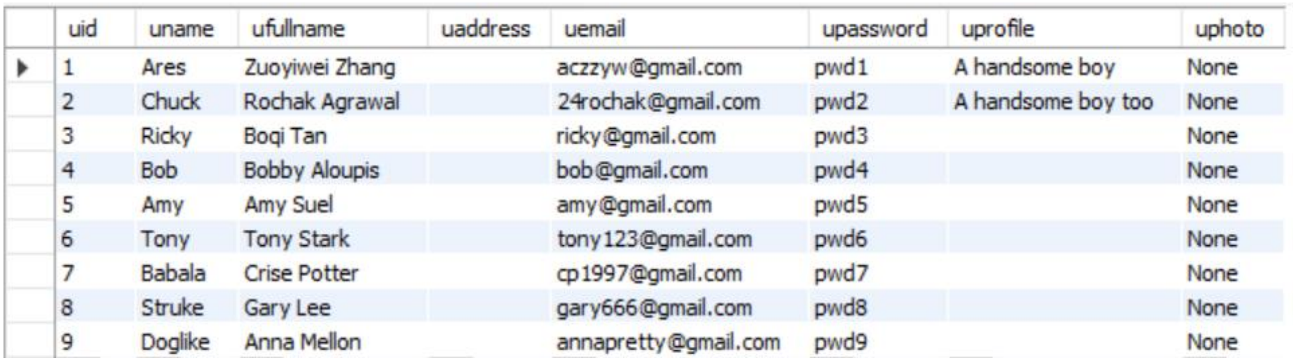
hid	hname	hsouthx	hsouthy	hnorthx	hnorthy
1	Bay Ridge	0	0	0	0
2	Park Slope	0	0	0	0

Hood



mid	uid	mtitle	mtimestamp	mtext	mx	my
1	2	How to feed a dog	2019-11-25 00:00:00	Do you have a dog?	0	0
2	3	How to feed a dog	2019-11-25 09:00:00	No. But I like dog!	0	0
3	2	About your name	2019-11-25 00:01:00	Your name is so cooool!	0	0
4	5	About your name	2019-11-25 08:01:00	Thank you so much :)	0	0
5	4	About your home address	2019-11-25 00:01:00	Where do you live? I cannot find your address ...	0	0
6	2	Where can I wash clothes	2019-11-25 03:00:00	Someone knows?	0	0
7	2	Rent a car	2019-11-25 03:00:00	I want to rent a car and I will pay $1000 for a d...	0	0
8	2	About car accident	2019-11-25 06:00:00	Where is the bicycle accident happenned?	0	0
9	2	About car accident	2019-11-25 06:00:00	Really? Sounds terrible!	0	0
10	2	Basketball match	2019-11-25 09:00:00	Does anyone like playing basketball?	0	0

Message



uid	uname	ufullname	uaddress	uemail	upassword	uprofile	uphoto
1	Ares	Zuoyiwei Zhang		aczzyw@gmail.com	pwd1	A handsome boy	None
2	Chuck	Rochak Agrawal		24rochak@gmail.com	pwd2	A handsome boy too	None
3	Ricky	Boqi Tan		ricky@gmail.com	pwd3		None
4	Bob	Bobby Aloupis		bob@gmail.com	pwd4		None
5	Amy	Amy Suel		amy@gmail.com	pwd5		None
6	Tony	Tony Stark		tony123@gmail.com	pwd6		None
7	Babala	Crise Potter		cp1997@gmail.com	pwd7		None
8	Struke	Gary Lee		gary666@gmail.com	pwd8		None
9	Doglike	Anna Mellon		annapretty@gmail.com	pwd9		None

User

Sample Queries

Joining

Sign-up:
```
insert into `user` (`uid`, `uname`, `ufullname`, `uaddress`,
`uemail`, `upassword`, `uprofile`, `uphoto`)
values (1, 'Ares', 'Zuoyiwei Zhang', '', 'aczzyw@gmail.com',
'pwd1', 'A handsome boy', 'None');
```

Check if email has signed up or not:
```
select * from user where uemail = 'aczzyw@gmail.com';
```

Apply to be a member:
```
insert into `applies` (`uid`, `bid`, `acount`)
values (1, 1, 0);
```

Accept new block members:
```
update `applies`
set acount=(select `acount` from `applies` where `uid` =1) + 1
where uid = 1;
```

Update a profile:
```
update `user` set uprofile = 'add something', uphoto = 'url'
where uid = 1;
```

Content Posting

Starting a new topic:
```
insert into `topic` (`tid`, `tsubject`, `ttype`)
values (1, 'dog', 'friend'), (2, 'cat', 'neighbor'), (3, 'car',
'block'), (4, 'food', 'hood');

insert into `posts` (`uid`, `tid`) values (2, 1), (2, 2), (2,
3), (2, 4);
```

Specify who can chat under this topic:
```
insert into `specifies` (`tid`, `uid`)
values (2, 2), (3, 2), (4, 2);
```

Starting a new thread with an initial message and specifying who can access it:
```
insert into `thread` (`thid`) values (1);

insert into `contains` (`tid`, `thid`) values (1, 1);

insert into `message` (`mid`, `uid`, `mtitle`, `mtimestamp`,
`mtext`, `mx`, `my`) values (1, 1, 'How to feed a dog', '2019-
11-25 00:00:00', 'Do you have a dog?', 0, 0);

insert into `has` (`thid`, `mid`) values (1, 1);
insert into `accesses` (`mid`, `uid`) values (1, 1);
```

Replying to a message:

```
insert into `message` (`mid`, `uid`, `mtitle`, `mtimestamp`,
`mtext`, `mx`, `my`)
values (2, 2, 'A reply', '2019-11-25 01:00:00', 'Dogs like
meat.', 0, 0);

insert into `has` (`thid`, `mid`) values (1, 2);
insert into `accesses` (`mid`, `uid`) values (2, 1);
```

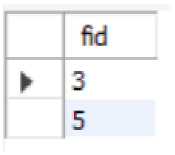
Friendship

add someone as a friend or neighbour:

```
insert into `friends` (`uid`, `fid`) values (1, 2), (2, 1);
insert into `neighbors` (`uid`, `nid`) values (1, 2);
```

List current friends:

```
select f1.fid
from friends as f1, friends as f2
where f1.uid = f2.fid and f1.fid = f2.uid and f1.uid = 1;
```



	fid
▶	3
	5

List current neighbors:

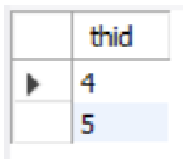
```
select nid from neighbors where uid = 1;
```

Browse and search messages

list all threads in a user's block feed that have new messages since the last time the user accessed the system last time the user accessed the system:

```
create view block_topic as
select tid
from topic natural join specifies
where ttype = 'block' and uid = 2;

create view block_thread as
select thid
from `contains` join block_topic
on `contains`.tid = block_topic.tid;

create view accessable_message as
select has.thid as thid, has.mid as mid
from (block_thread join has on block_thread.thid = has.thid)
join accesses on has.mid = accesses.mid
where uid = 2;

select thid
from accessable_message natural join message, lastvisit
where lastvisit.uid = 2 and ltimestamp < mtimestamp;
```

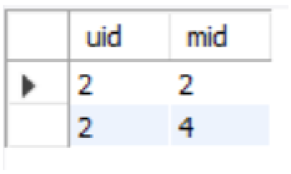
```
drop view block_topic;
drop view block_thread;
drop view accessable_message;
```



	thid
▶	4
	5

All threads in friend feed that have unread message:

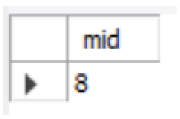
```
create view friend_topic as
select tid
from topic natural join specifies
where ttype = 'friend' and uid = 2;

create view friend_thread as
select thid
from `contains` join friend_topic
on `contains`.tid = friend_topic.tid;

create view accessable_message as
select has.thid as thid, has.mid as mid
from (friend_thread join has on friend_thread.thid = has.thid)
join accesses on has.mid = accesses.mid
where uid = 2;

select lastvisit.uid, message.mid
from accessable_message natural join message, lastvisit
where lastvisit.uid = 2 and ltimestamp < mtimestamp;

drop view friend_topic;
drop view friend_thread;
drop view accessable_message;
```



	uid	mid
▶	2	2
	2	4

All messages containing the words “bicycle accident” across all feeds that the user can access:

```
select message.mid
from accesses join message on accesses.mid = message.mid
where accesses.uid = 2 and mtext like '%bicycle accident%';
```



	mid
▶	8