

Database Application Development Methodology[©] - an Example

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Assumptions

- Business process is well-designed
- Documents are known
- Tasks are known
- System boundary is known
- One database schema unifying all views can be designed
 - difficult: interests, goals, power, politics
 - problems with the methodology?
 - problems with the organization?
 - or-ga-ni-za-tion: “an entity created to pursue a shared set of goals”

The Software Process

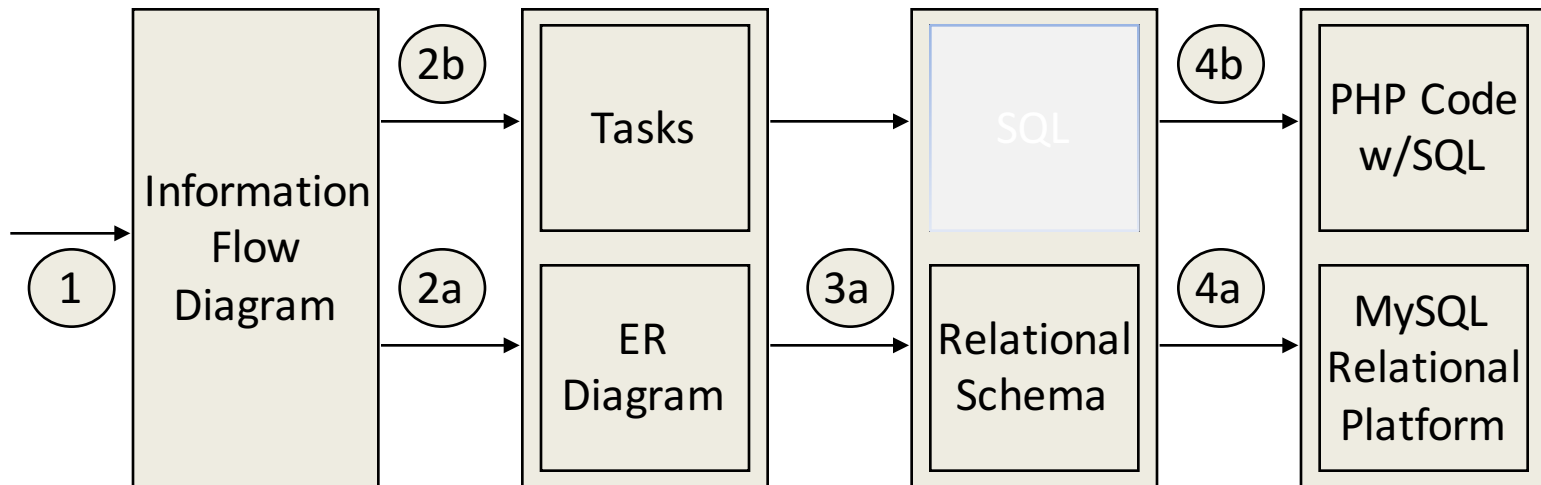
Unique for Database
Methodology

- Business process (re-)design
- Analysis
- Specification
- Design
- Implementation
- Testing
- Operation
- Maintenance

Management

Overview of the Methodology

- data first!!



- ① Analysis
- ② Specification
- ③ Design
- ④ Implementation

Example Project Description

- The project description represents the customer:
 - Business process
 - Documents
 - Tasks
 - System boundary

GTOonline



*Lite Social Networking
for Networking Socialites*

GTOonline is a simple social networking application with a set of basic features similar to those found on sites like Facebook and LinkedIn. GTOonline users maintain a basic profile including their name, birth date, hometown, current city, schools they have attended, and places of employment. Users can connect to other users by sending friend requests. If a request is accepted, then a friendship link is established between the two users. In addition to maintaining basic profile information, users can let their friends know what they are currently doing by writing status updates. Users can also comment on their friends' status updates as well as their own status updates. The GTOonline application also supports administrative users who maintain the list of schools and places of employment.

GTOonline



Lite Social Networking
for Networking Socialites



networking application with a set of
ose found on sites lik
maintain a basic profi
wn, current city, scho
employment. He



Read the full example project description!

Screen shots and small requirement snippets are shown on the following slides. These are not sufficient to develop the application in this example.

maintaining basic pro
know what they are c
Users can also comm
their own status updates.
administrative users who maintain
employment.

GTOOnline Login

GTOOnline  Lite Social Networking
for Networking Socialites

Email

Password

New users click here to create a new GTOOnline account

GTOOnline New User Registration

GTOOnline  Lite Social Networking
for Networking Socialites

First Name

Last Name

Email

Password

Confirm Password

Returns to the login screen

Edit GTOOnline Profile for Michael Bluth

Michael Bluth

Sex

Birthdate

Current City

Hometown

Interests Tennis
Watching Inception Over and Over Again
Seinfeld

Education

School

Year Graduated

School

Year Graduated

Professional

Employer

Job Title

Adds a new interest and refreshes the page

Adds another box on the user interface with School and Year Graduated.

Lists available schools and their type

May be left blank

All fields are required

Adds another box to the user interface with Employer and Job Title.

View GTOOnline Profile for Michael Bluth

Michael Bluth

[View Status Updates](#)
[View Friends](#)
[Log Out](#)

[Search for Friends](#)
[View Pending Requests](#)
[Edit Profile](#)

Sex Male
Birthdate 1968-06-20
Current City Scranton, PA
Hometown Beverly Hills, CA
Interests Tennis
 Watching Inception Over and Over Again
 Seinfeld

Education

School	Georgia Institute of Technology (College/University)
Year Graduated	1990

School Name	William McKinley (High School)
Year Graduated	1986

Professional

Employer	Dunder Mifflin
Job Title	Assistant to the Regional Manager

Search for Friends, View Pending Requests, and Edit Profile are only visible if this is the profile of the currently logged in user

Only show Year Graduated if field is not null

Request New Friend for Michael Bluth

Request New Friend for Michael Bluth

Name Phyllis Lapin-Vance
Hometown Scranton, PA
Relationship

The user provides any value for the relationship

Friend is not immediately added. Instead, a request is sent to the other user.

Search for Friends

Search for Friends

[Back to Profile](#)

Name
Email
Hometown

Search Results

Name	Hometown
Bob Vance	Scranton, PA
Phyllis Lapin-Vance	Scranton, PA

These three fields are ORed together

Existing friends should not be shown in the list

Clicking on a name shows the Add Friend dialog box

After clicking Search, any relevant results appear here (or on a new page)

Friends of Michael Bluth

[Back to Profile](#)

<u>Name</u> ▲	<u>Relationship</u>	<u>Connected Since</u>
Angela Martin	Co-worker	August 17, 2009
Dwight Schrute	Co-worker	July 9, 2009
George Bluth, Sr.	Father	March 10, 2008
George Michael Bluth	Son	March 10, 2008
Jim Halpert	Co-worker	July 9, 2009
Lindsey Funke	Sister	November 22, 2009
Michael Scott	Boss	April 1, 2009
Pam Beasley	Co-worker	June 14, 2009
Tobias Funke	Brother-in-law	November 23, 2009

Clicking on the header re-sorts the list of friends

Return to this user's profile

Clicking on a name shows that friend's profile

Pending Friend Requests for Michael Bluth

The following people have requested to be friends with you &

<u>Name</u>	<u>Hometown</u>	<u>Relationship</u>		
Sue Sylvester	Lima, OH	Former Coach	Accept	Reject
Will Schuester	Lima, OH	Former Director	Accept	Reject

You have requested to be friends with these people &

<u>Name</u>	<u>Hometown</u>	<u>Relationship</u>	
Phyllis Lapin-Vance	Scranton, PA	Co-worker	Cancel

Close

Clicking Accept adds the user as a friend and records the current date

Clicking Reject cancels the request

Cancel a request before it is accepted or rejected

Clicking on a user's name shows his or her profile

It is possible to close the window even with pending requests. Those requests should still appear the next time the user views this page.

[Requirement]: Logging In to GTOOnline via the login screen. All users are uniquely identified by his or her **Email Address**. Providing a valid **Email Address** and **Password** combination will log the user into the system. Providing invalid login credentials should display an error message and return the user to the login screen.

[Requirement]: Users who are new to GTOOnline must register first. A Register button is provided directly on the login page. Clicking this button displays the new user registration form. After the user clicks **Register**, the system should verify that all fields are filled in, that the **Email Address** has not already been registered, and that the **Password** and Confirm **Password** fields are equal.

[Requirement]: All GTOOnline users (except administrative users) have a **User Profiles** containing basic information about them. After a new user registers with GTOOnline, they should be taken immediately to the Edit Profile screen. The basic profile properties include the user's **Sex**, **Birthdate**, **Current City**, **Hometown**, and any number of **Interests**.

[Requirement]: Social networks are all about making connections. **GTOonline allows users to search for friends and connect to them.** There are several steps involved in making a connection with a new friend on GTOonline:

- The user searches for a friend based on several profile criteria including **Name, Email Address, and Hometown.**
- Then, the user submits a friend request to another user with whom they wish to connect.
- Finally, the other user receives the friend request and accepts it or rejects it.

[Requirement]: There are a number of links on the **View Profile screen:**

- Clicking **View Friends** shows the list of friends for this user.
- Clicking **Log Out** signs the user out of the system and shows the login screen.

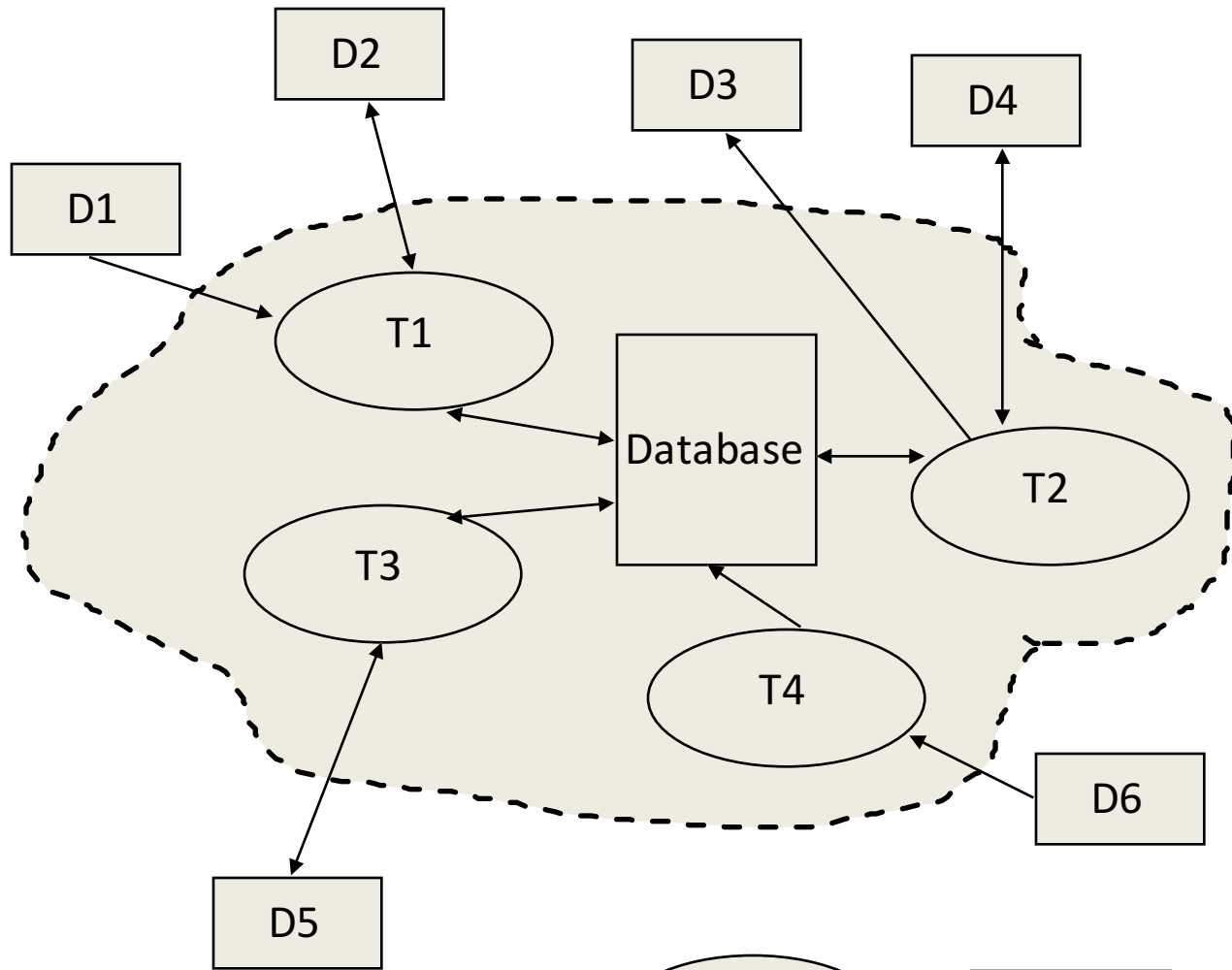
In addition, the **currently logged in user can:**

- Clicking **View Pending Requests** to see the list of friend requests that have not yet been accepted or rejected
- Clicking **Edit Profile** shows the Edit Profile screen allowing the user to make changes to his or her own profile.

[Requirement]: The profile also contains professional information. The user will select his or her **Employer** from the list and then provide a **Job Title.**

[Requirement]: The profile also contains information about the user's education. The set of available **Schools** and their **Types** is maintained by the GTOonline. A user can have any number of schools associated with his or her profile and can also provide a **Graduation Date** for each school.

Analysis – Information Flow Diagram



- information flow; **not** control flow
- **never** connect two documents
- **never** connect two tasks

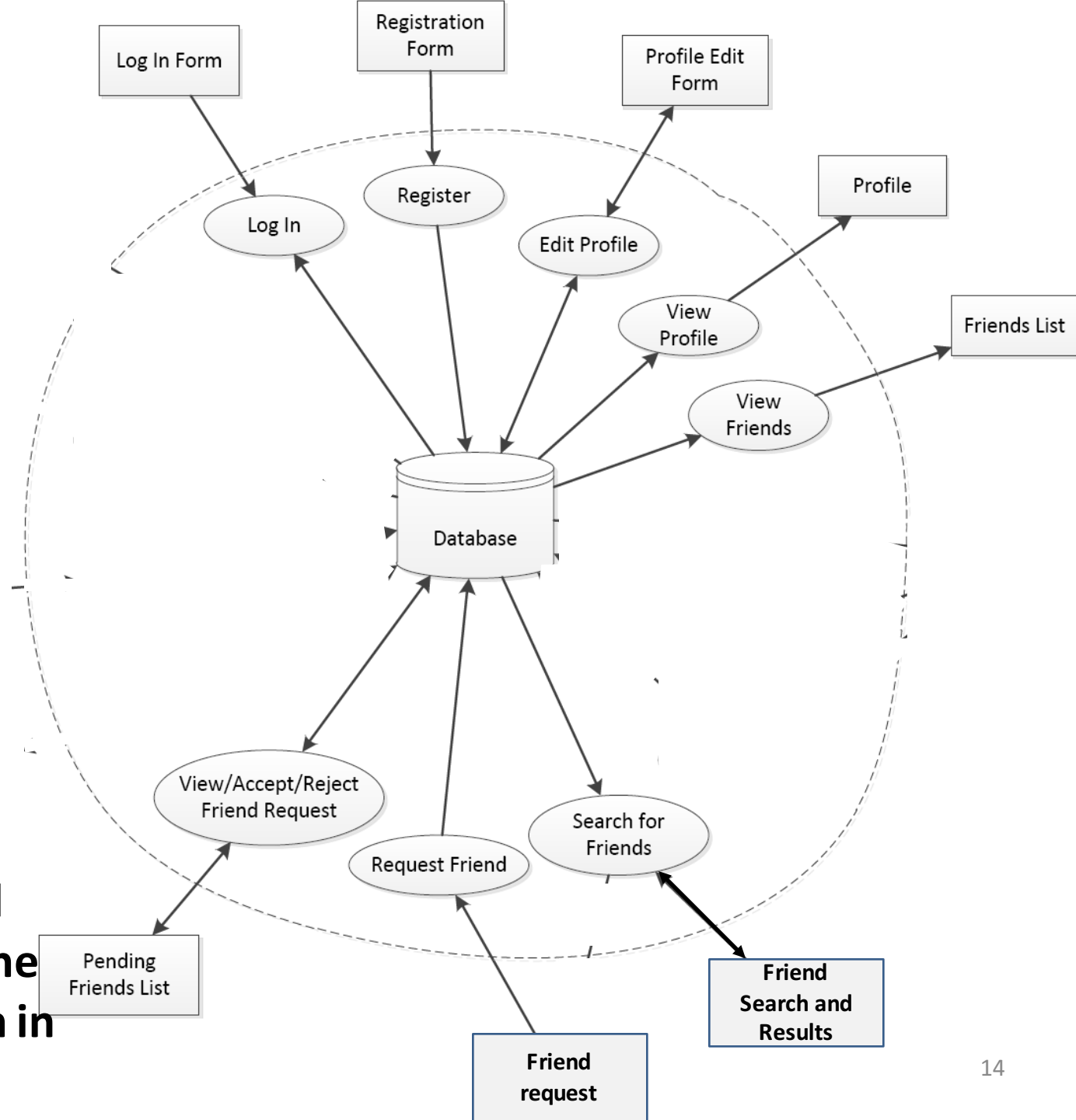
task name

document name

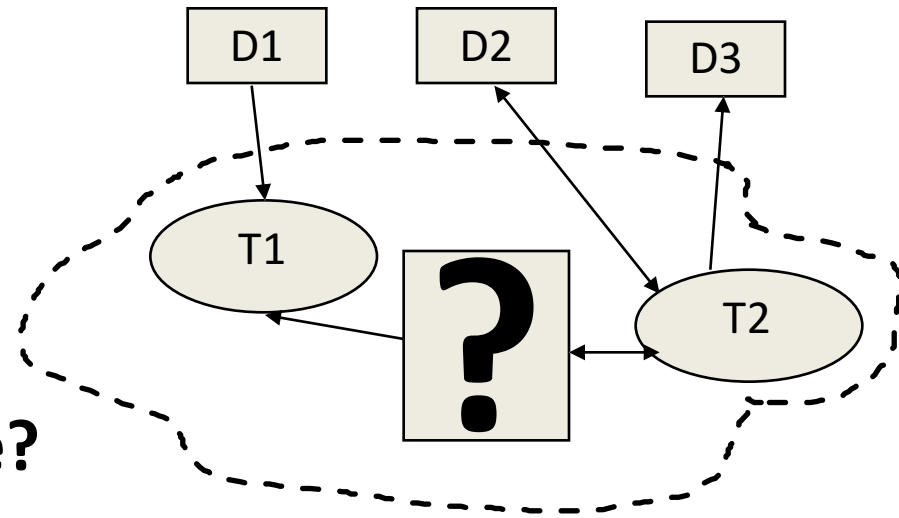
information flow

system boundary

IFD



Use document and task names from the project description in the IFD!



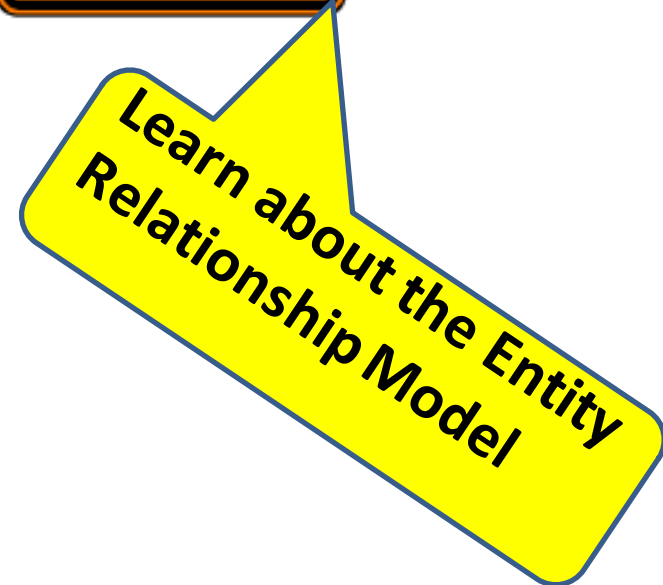
What goes into the database?

What comes out of the database?

- Everything in the database must come from somewhere
- Everything on the input documents must go somewhere
- Everything in the database must be used for something
- Everything on the output documents must come from somewhere

Specification

- EER Diagram
- Data Formats
- Constraints
- Task Decomposition

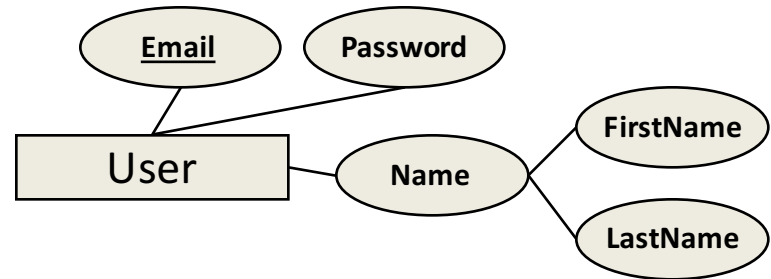


New users click here to create a new GTOonline account

All fields are required

Returns to the login screen

[Requirement]: All users are uniquely identified by his or her **Email Address**. Providing a valid **Email Address** and **Password** combination will log the user into the system



[Question]: Should Name be a composite attribute? Well, you decide, sort of

These snippets of task requirements are taken from a comprehensive project description and are just part of what is used to design the ER Diagram.

Edit GTOOnline Profile for Michael Bluth

Michael Bluth

Sex

Birthdate

Current City

Hometown

Interests Tennis
Watching Inception Over and Over Again
Seinfeld

Education

School

Year Graduated

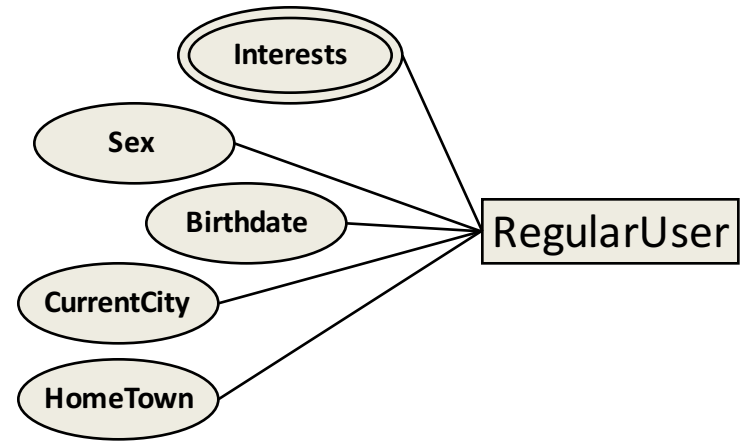
School

Year Graduated

Professional

Employer

Job Title



Adds a new interest and refreshes the page

Adds another box on the user interface with School and Year Graduated.

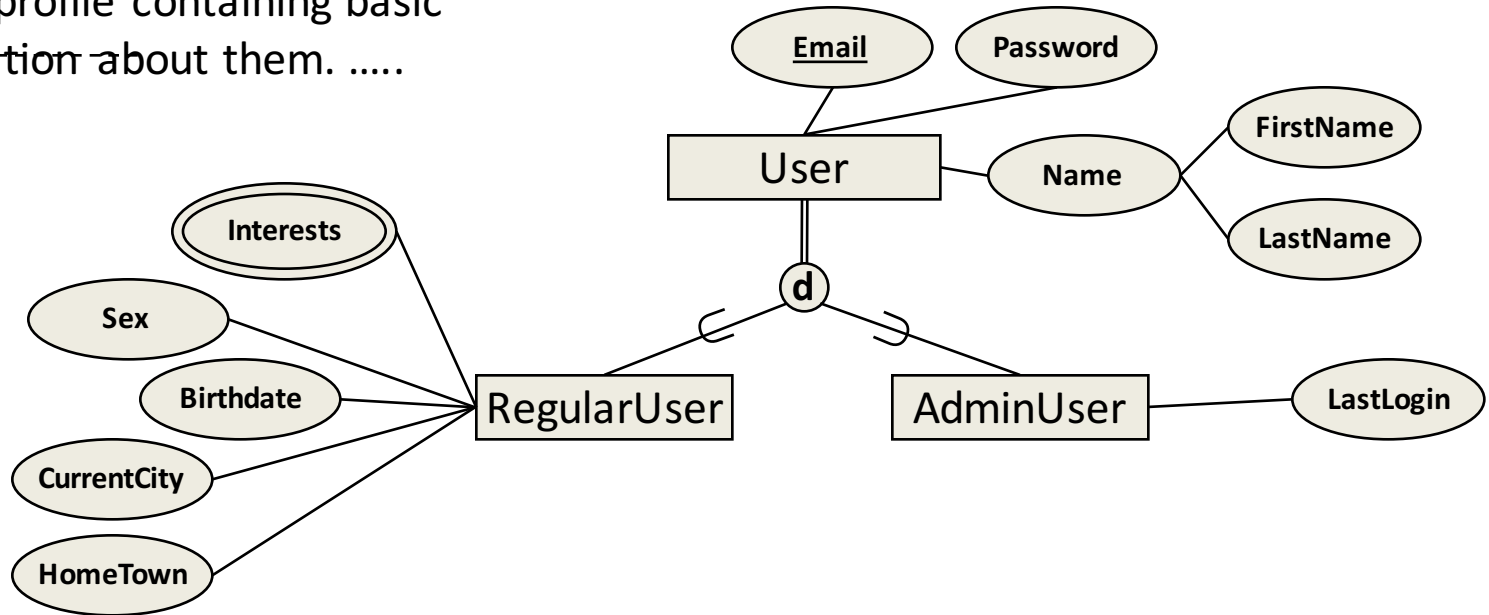
Lists available schools and their type

May be left blank

Adds another box to the user interface with Employer and Job Title.

Use attribute names from the documents in the EER Diagram!

[Requirements]: All GTOonline users (except administrative users) have a profile containing basic information about them.



[Requirements]: Administrative users have some of the same information as regular users (**Email Address, Password, First Name, and Last Name**), but do not have a full profile and cannot request friends, etc. A user must be either an administrator or a regular user, but never both. GTOonline also tracks the **last** date and time that an admin user **logged in** to the system

[Requirements]: ... A list of **Schools**, from which the user can select, is maintained in the system. Assume that all **School Names** will be unique. A user can have any number of schools associated with him or her and can provide a **Graduation Date** for each school. It is possible that the same school will appear multiple times with different graduation dates.

Edit GTOOnline Profile for Michael Bluth

Michael Bluth

Sex: Male

Birthdate: 1968-06-20

Current City:

Hometown:

Save

Interests: Tennis, Watching Inception Over and Over Again, Seinfeld

Add

Education

Add Another School

School: Georgia Institute of Technology (College/University)

Year Graduated: 1990

Save Delete this School

May be left blank

School: William McKinley (High School)

Year Graduated: 1986

Save Delete this School

Professional

Add Another Job

Employer: Dunder Mifflin

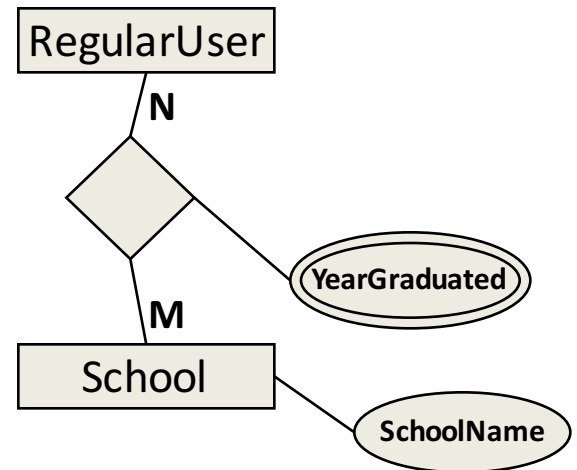
Job Title: Assistant to the Regional Manager

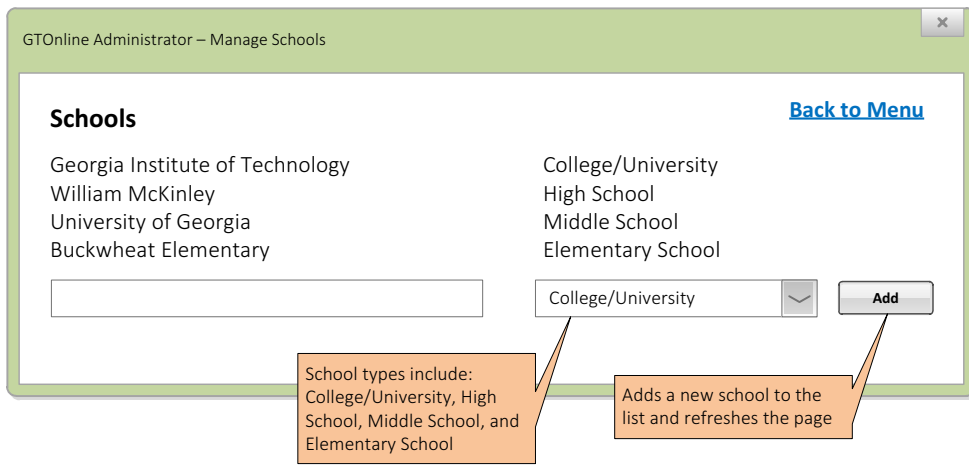
Save Delete this Job

Cancel

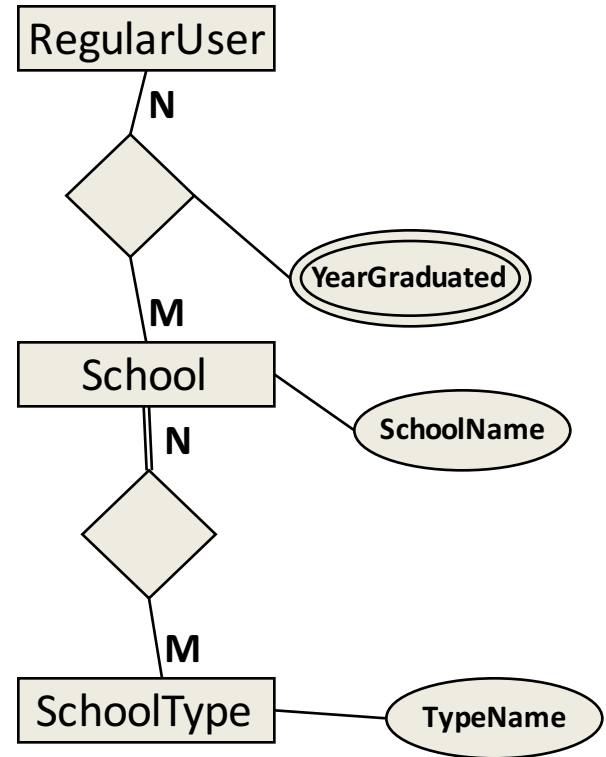
Annotations:

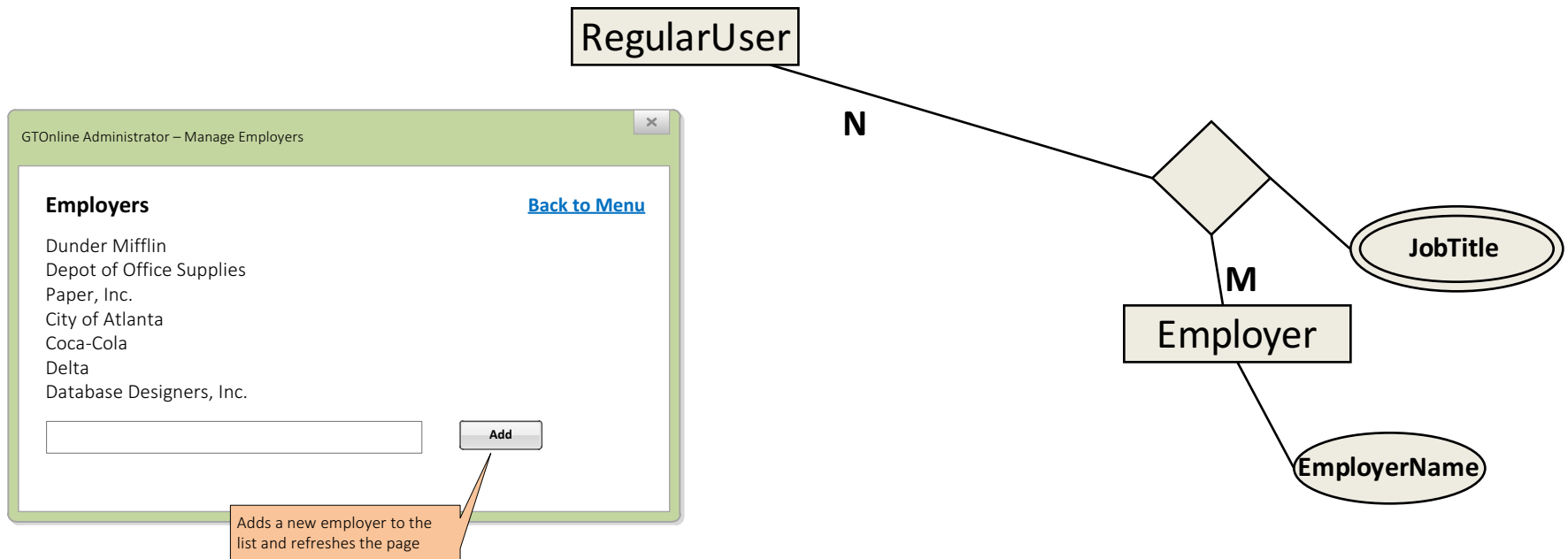
- Adds a new interest and refreshes the page
- Adds another box on the user interface with School and Year Graduated.
- Lists available schools and their type
- Adds another box to the user interface with Employer and Job Title.





[Requirements]: Each school must have a **School Type**. There are four possible types: College/University, High School, Middle School, and Elementary School. It should be possible for the database administrator to add new school types from behind the scenes.





[Requirements]: Administrators are responsible for managing the list of **Employers**. Assume that all Employers have a unique **Name**.

[Requirements]: The **Job Title** field is not managed by the administrator and can be any value provided by the user. A profile can contain multiple **Employers** and the same **Employer** may even appear multiple times as long as the **Job Title** is different in each case.

Clicking Accept adds the user as a friend and records the current date

Clicking Reject cancels the request

The following people have requested to be friends with you

Name	Hometown	Relationship	Accept	Reject
Sue Sylvester	Lima, OH	Former Coach	Accept	Reject
Will Schuester	Lima, OH	Former Director	Accept	Reject

You have requested to be friends with these people

Name	Hometown	Relationship	Cancel
Phyllis Lapin-Vance	Scranton, PA	Co-worker	Cancel

Cancel a request before it is accepted or rejected

Request New Friend for Michael Bluth

Name: Phyllis Lapin-Vance

Hometown: Scranton, PA

Relationship: Co-worker

Buttons: Cancel, Send Friend Request

The user provides any value for the relationship

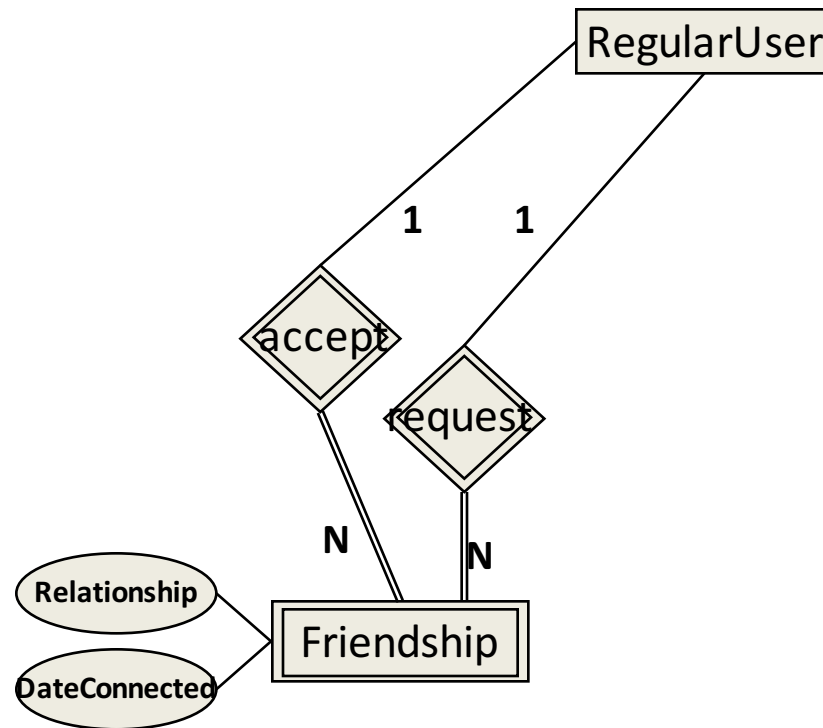
Clicking on a user's name shows his or her profile

It is possible to close the window even with pending requests. Those requests should still appear the next time the user views this page.

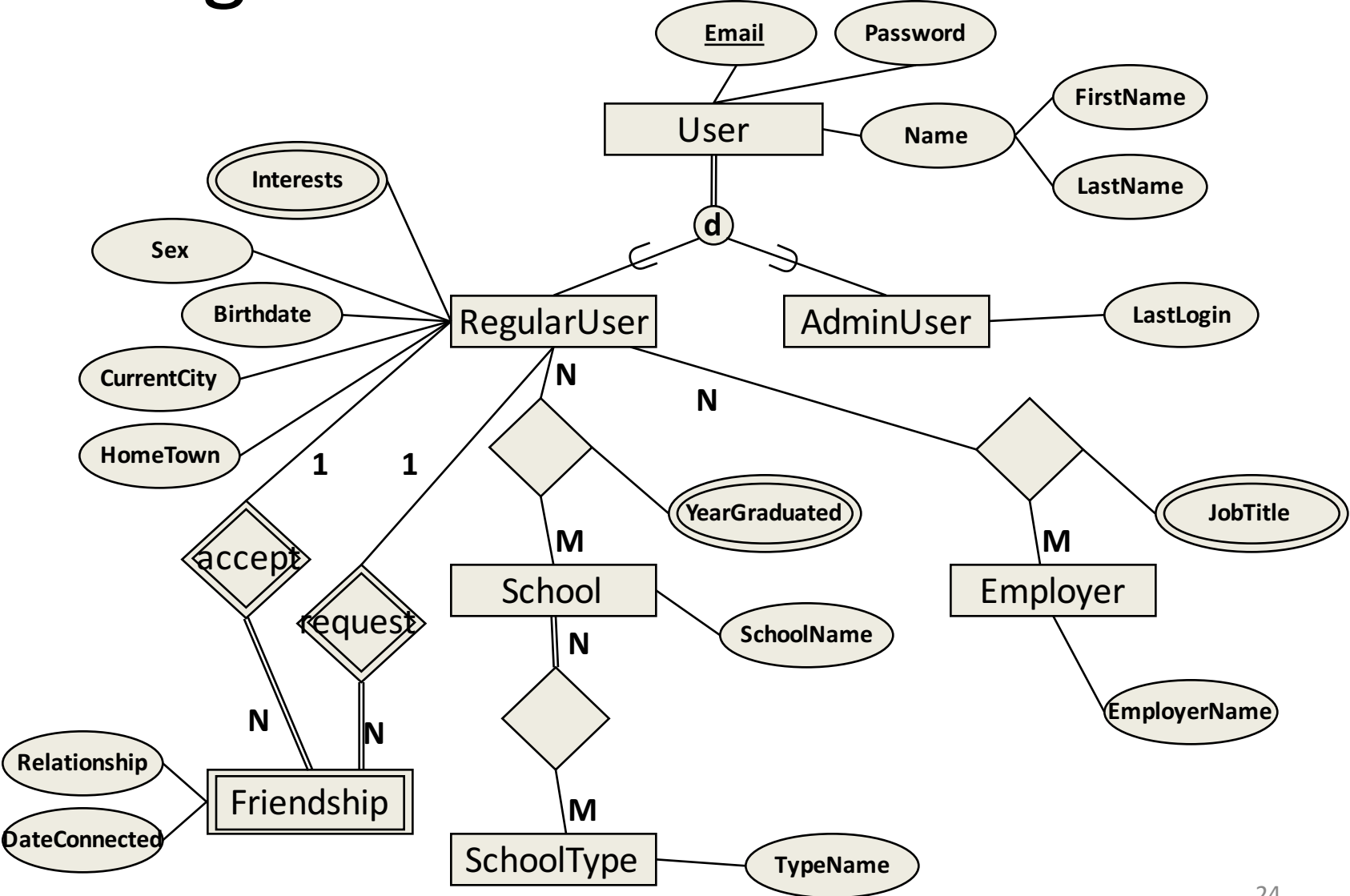
Friend is not immediately added. Instead, a request is sent to the other user.

[Requirements]: *friendship is not always reciprocal* just because Emily is friends with Sarah, this does not imply that Sarah is friends with Emily.

..... the **DateConnected** field is set when the friend request is accepted, *not* when the request is originally sent.

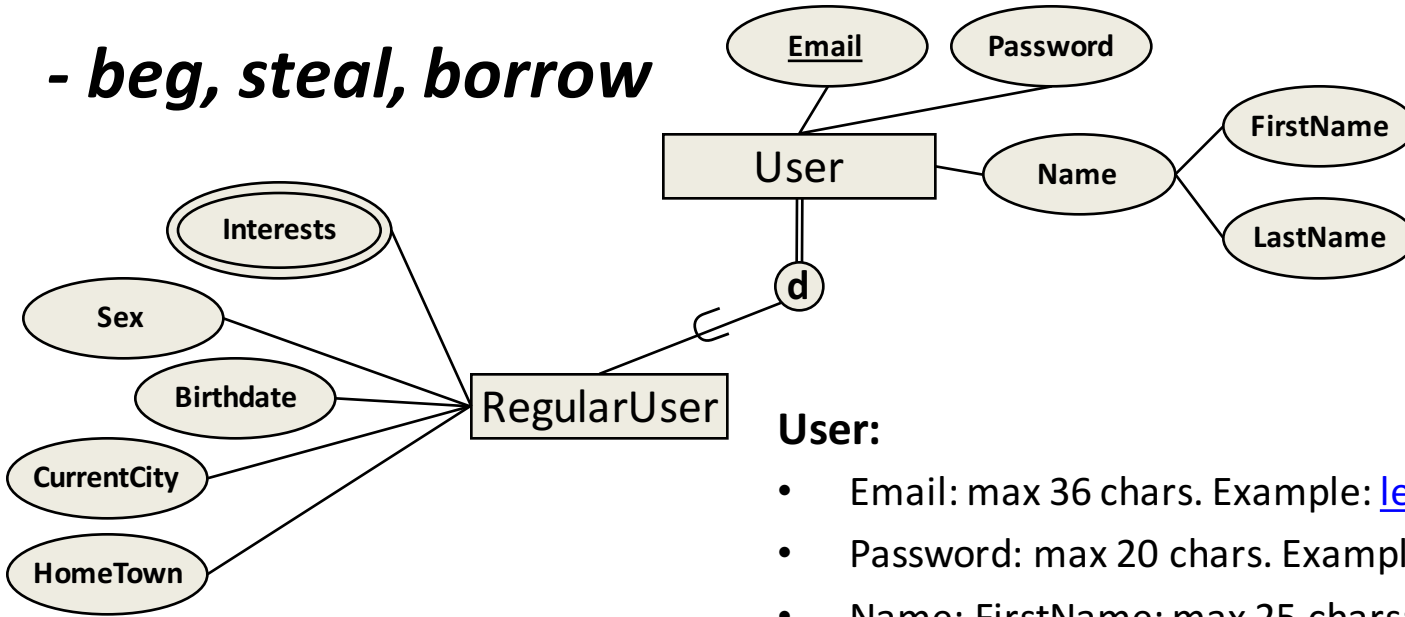


EER Diagram



Data Formats

- *beg, steal, borrow*



GTOOnline New User Registration

GTOOnline  Lite Social Network for Networking

First Name

Last Name

Email

Password

Confirm Password

Returns to the login screen

User:

- Email: max 36 chars. Example: leomark@cc.gt.edu
- Password: max 20 chars. Example: qwerty
- Name: FirstName: max 25 chars; Last: max 40 chars
- Addresses (when needed) are very very difficult. E.g., look at the 208 page guideline at <http://pe.usps.com/cpim/ftp/pubs/pub28/pub28.pdf>

RegularUser:

- Birthdate: Date: 'YYYY-MM-DD'
- Sex: {M, F}
- CurrentCity, HomeTown: max 20 chars, each
- Interests: multi-value with 16 chars, each

Edit GTOOnline Profile for Michael Bluth

Michael Bluth

Sex

Birthdate

Current City

Hometown

Interests

Adds a new interest and returns to the profile page

Constraints

Examples:

- DateConnected is NULL until request is accepted.
- Cannot be Friend with yourself.
- Can only comment on Status of Friends.

Ignore:

- Data formatting constraints
- Constraints that can be expressed in the EER Diagram