

HYBRID APP DEV

WEB SERVICES

D R . J A V E D K H A N

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C R E A T I V E A P P S , M A R 2 0 1 6

PREVIOUS WEEK

- Sensors

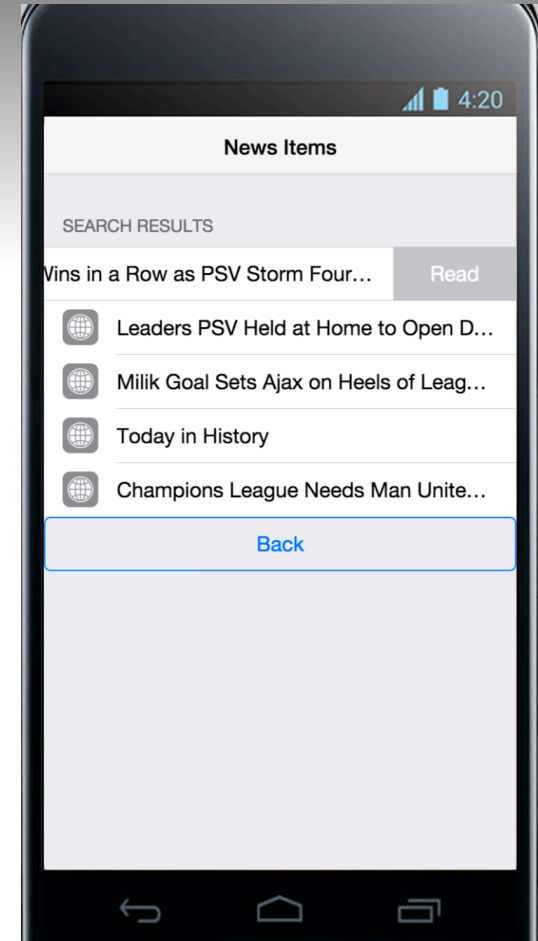
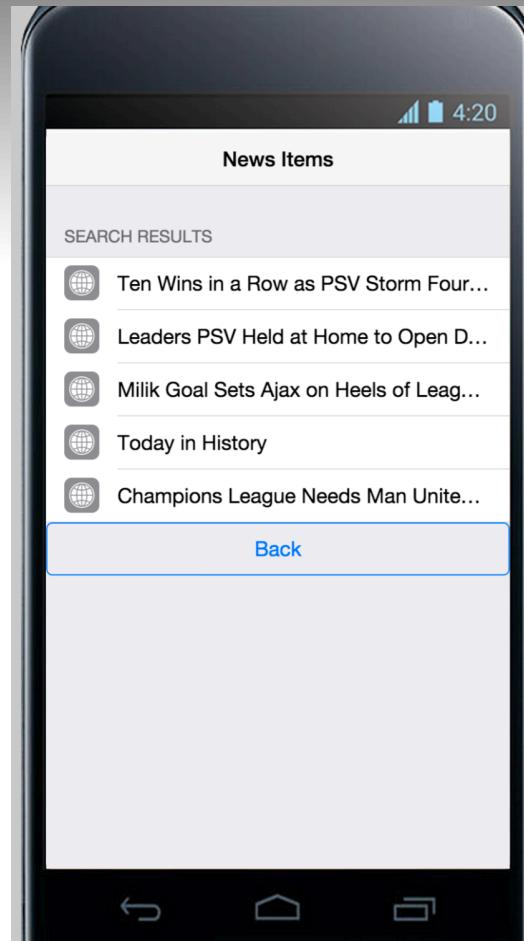
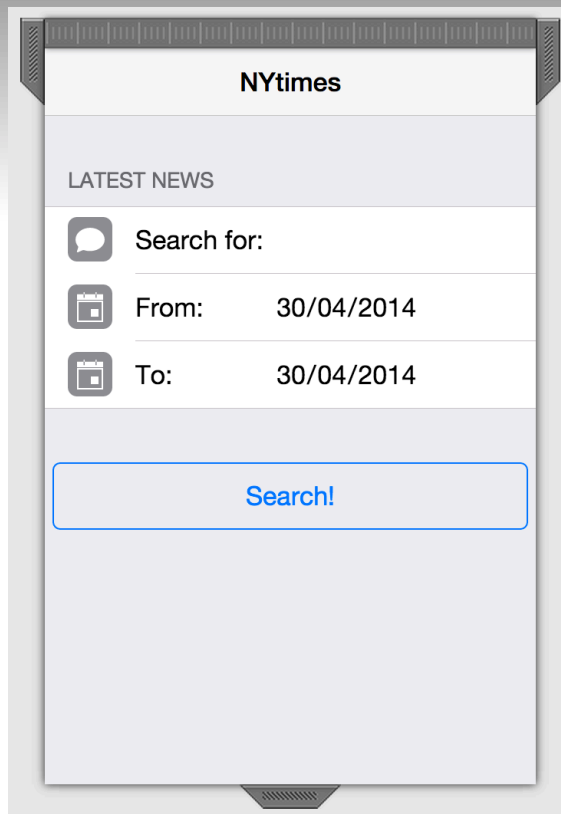
LEARNING OBJECTIVE

- Work with AJAX & APIs
- Be able to develop data models for small and medium size apps

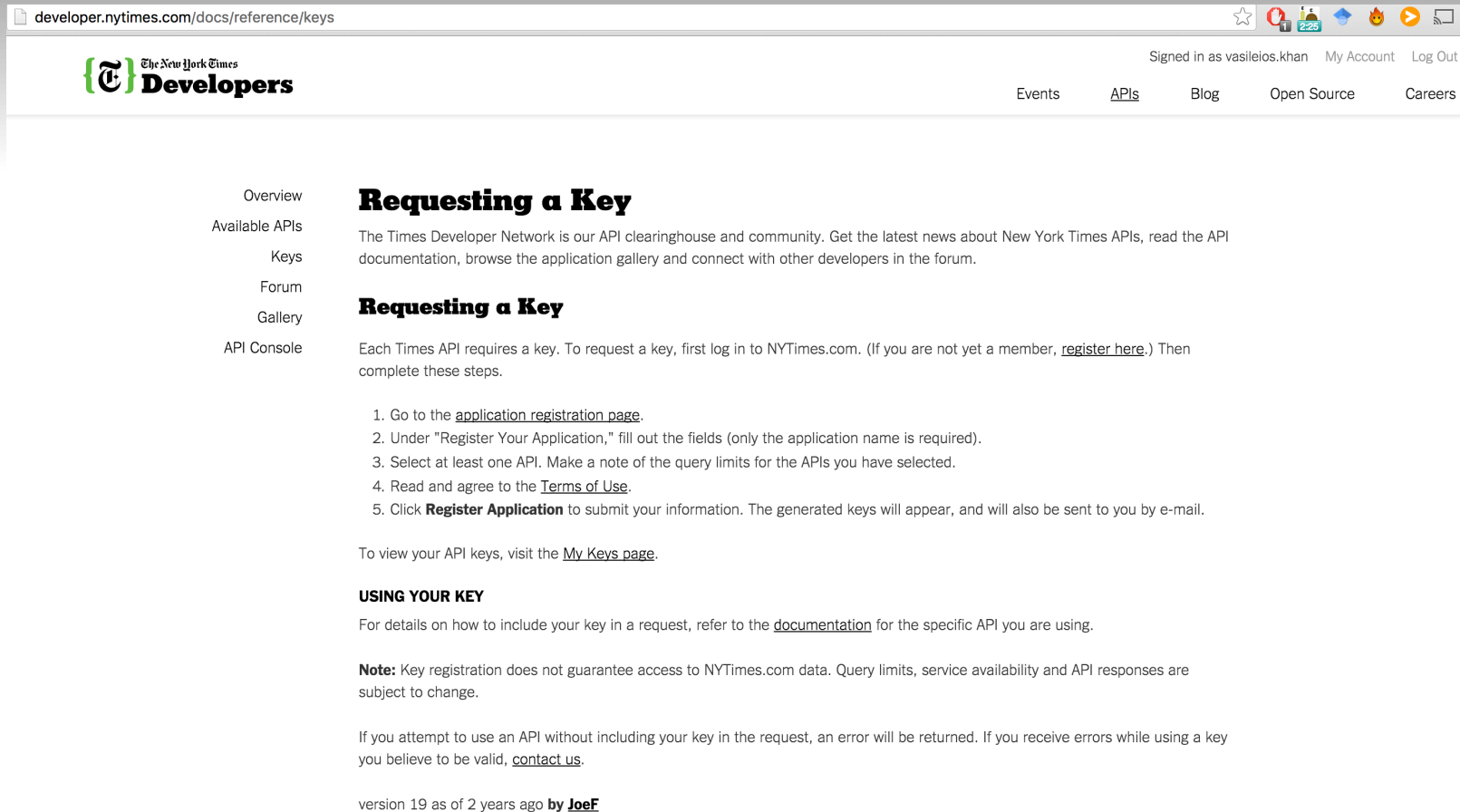
AJAX

- Ajax (short for asynchronous JavaScript and XML) is a set of web development techniques using many web technologies on the client-side to create asynchronous Web applications
- With Ajax, web applications can send data to and retrieve from a server asynchronously (in the background) without interfering with the display and behavior of the existing page
- [[https://en.wikipedia.org/wiki/Ajax_\(programming\)](https://en.wikipedia.org/wiki/Ajax_(programming))]

NY Times Custom App



Before coding...



The screenshot shows a web browser window with the URL `developer.nytimes.com/docs/reference/keys`. The page header includes the New York Times logo and the word "Developers". The main content area is titled "Requesting a Key" and contains a list of steps for requesting an API key. A sidebar on the left lists navigation options: Overview, Available APIs, Keys, Forum, Gallery, and API Console. The page also includes a "USING YOUR KEY" section and a "Note" about key registration.

developer.nytimes.com/docs/reference/keys

Signed in as vasilios.khan My Account Log Out

Events APIs Blog Open Source Careers

Requesting a Key

The Times Developer Network is our API clearinghouse and community. Get the latest news about New York Times APIs, read the API documentation, browse the application gallery and connect with other developers in the forum.

Requesting a Key

Each Times API requires a key. To request a key, first log in to NYTimes.com. (If you are not yet a member, [register here](#).) Then complete these steps.

1. Go to the [application registration page](#).
2. Under "Register Your Application," fill out the fields (only the application name is required).
3. Select at least one API. Make a note of the query limits for the APIs you have selected.
4. Read and agree to the [Terms of Use](#).
5. Click **Register Application** to submit your information. The generated keys will appear, and will also be sent to you by e-mail.

To view your API keys, visit the [My Keys page](#).

USING YOUR KEY

For details on how to include your key in a request, refer to the [documentation](#) for the specific API you are using.

Note: Key registration does not guarantee access to NYTimes.com data. Query limits, service availability and API responses are subject to change.

If you attempt to use an API without including your key in the request, an error will be returned. If you receive errors while using a key you believe to be valid, [contact us](#).

version 19 as of 2 years ago by [JoeF](#)

Select a Framework

Select

Select a
Framework

- ☐ App Framework 3
- ☐ Ratchet
- ☐ Ionic
- ☒ Framework 7
- ☐ Twitter Bootstrap 3
- ☐ jQuery Mobile
- ☐ Topcoat

Framework7 is a free and open source HTML mobile framework to develop hybrid mobile apps or web apps with iOS native look and feel.

Example App



WELCOME TO THIS AWESOME APP

Couple of words here because this app is so awesome!

Duis sed erat ac eros ultrices pharetra id ut tellus. Praesent rhoncus enim ornare ipsum aliquet ultricies. Pellentesque sodales erat quis elementum sagittis.

WHAT ABOUT SIMPLE NAVIGATION?

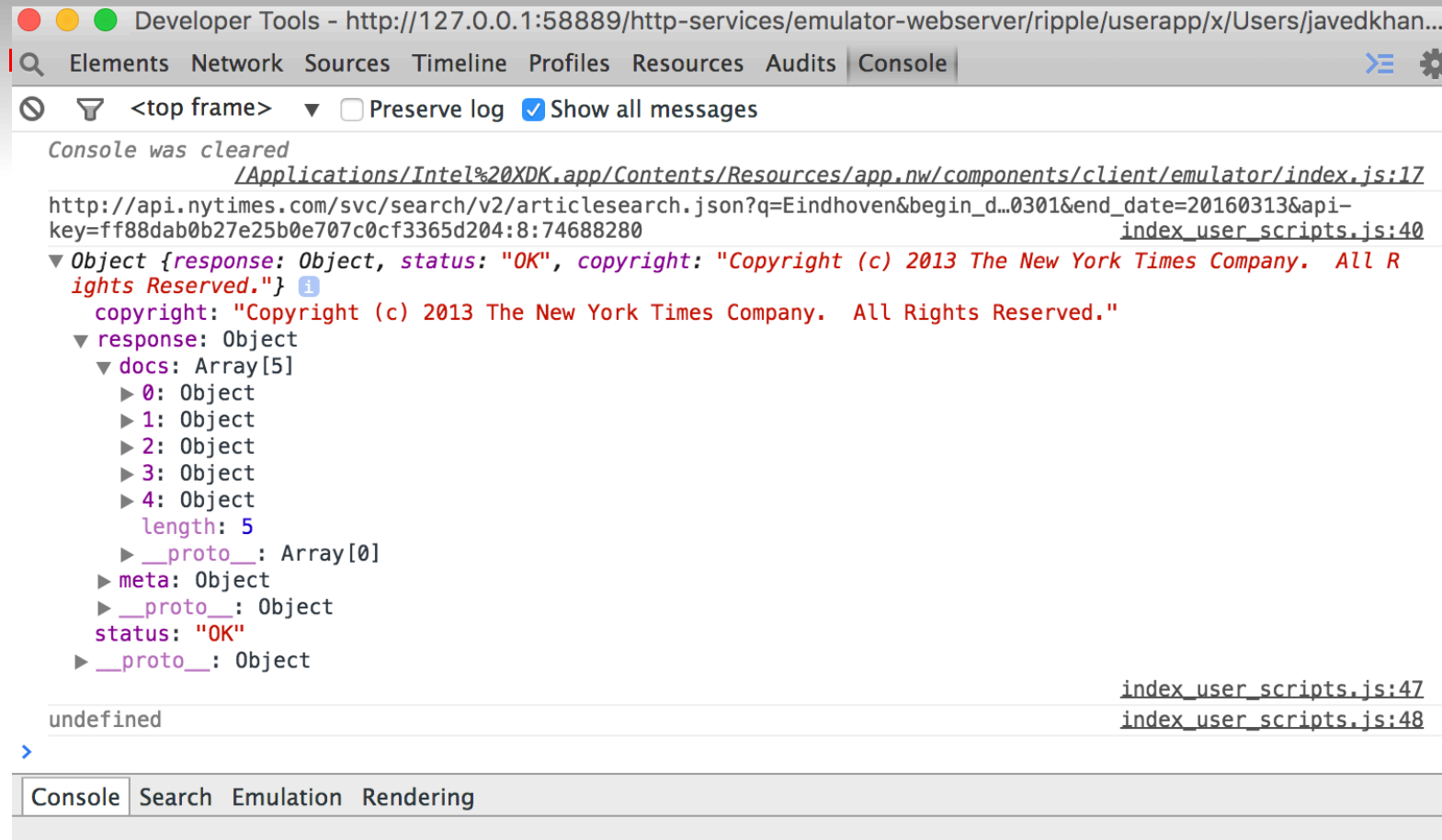
About



[Link 1](#)

[Link 2](#)

APIs might send back more data than you need...



The screenshot shows the Chrome Developer Tools Console with the following content:

```
Developer Tools - http://127.0.0.1:58889/http-services/emulator-webserver/ripple/userapp/x/Users/javedkhan...
Elements Network Sources Timeline Profiles Resources Audits Console
<top frame> Preserve log Show all messages
Console was cleared
/Applications/Intel%20XDK.app/Contents/Resources/app.nw/components/client/emulator/index.js:17
http://api.nytimes.com/svc/search/v2/articlesearch.json?q=Eindhoven&begin_d...0301&end_date=20160313&api-
key=ff88dab0b27e25b0e707c0cf3365d204:8:74688280 index_user_scripts.js:40
▼ Object {response: Object, status: "OK", copyright: "Copyright (c) 2013 The New York Times Company. All R
ights Reserved."} ⓘ
  copyright: "Copyright (c) 2013 The New York Times Company. All Rights Reserved."
  ▼ response: Object
    ▼ docs: Array[5]
      ► 0: Object
      ► 1: Object
      ► 2: Object
      ► 3: Object
      ► 4: Object
      length: 5
      ► __proto__: Array[0]
    ► meta: Object
    ► __proto__: Object
    status: "OK"
    ► __proto__: Object
index_user_scripts.js:47
undefined index_user_scripts.js:48
>
Console Search Emulation Rendering
```



```

1 {"response":
2   {"meta":
3     {"hits":5,"time":43,"offset":0},
4     "docs":[
5       {"web_url":"http://www.nytimes.com/reuters/2016/03/05/sports/soccer/05reuters-soccer-dutch.html",
6         "snippet":"AMSTERDAM, March 5 (Reuters) &#8211; PSV Eindhoven claimed a 10th successive league win as they cruised to a 4-0 victory over FC Utrecht on Saturday.",
7         "lead_paragraph":"AMSTERDAM, March 5 (Reuters) &#8211; PSV Eindhoven claimed a 10th successive league win as they cruised to a 4-0 victory over FC Utrecht on Saturday.",
8         "abstract":null,
9         "print_page":null,
10        "blog":[],
11        "source":"Reuters",
12        "multimedia":[],
13        "headline":
14          {"main":"Ten Wins in a Row as PSV Storm Four Points Clear",
15            "print_headline":"Ten Wins in a Row as PSV Storm Four Points Clear"},
16        "keywords":[],
17        "pub_date":"2016-03-05T16:58:01Z",
18        "document_type":"article",
19        "news_desk":"None",
20        "section_name":"Sports",
21        "subsection_name":"Soccer",
22        "byline":
23          {"person":[],
24            "original":"By REUTERS",
25            "organization":"REUTERS"},
26        "type_of_material":"News",
27        "id":"56db570138f0d861835e273a",
28        "word_count":"176",
29        "slideshow_credits":null},
30      {"web_url":"http://www.nytimes.com/reuters/2016/03/12/sports/soccer/12reuters-soccer-dutch.html",
31        "snippet":"Leaders PSV Eindhoven were held to a 1-1 home draw by Heerenveen on Saturday, opening the door for Ajax to clinch the Eredivisie title.",
32        "lead_paragraph":"Leaders PSV Eindhoven were held to a 1-1 home draw by Heerenveen on Saturday, opening the door for Ajax to clinch the Eredivisie title.",
33        "abstract":null,
34        "print_page":null,
35        "blog":[],
36        "source":"Reuters",
37        "multimedia":[],
38        "headline":
39          {"main":"Leaders PSV Held at Home to Open Door for Ajax",
40            "print_headline":"Leaders PSV Held at Home to Open Door for Ajax"},
41        "keywords":[],
42        "pub_date":"2016-03-12T16:59:16Z",
43        "document_type":"article",
44        "news_desk":"None",
45        "section_name":"Sports",
46        "subsection_name":"Soccer",
47        "byline":

```

```

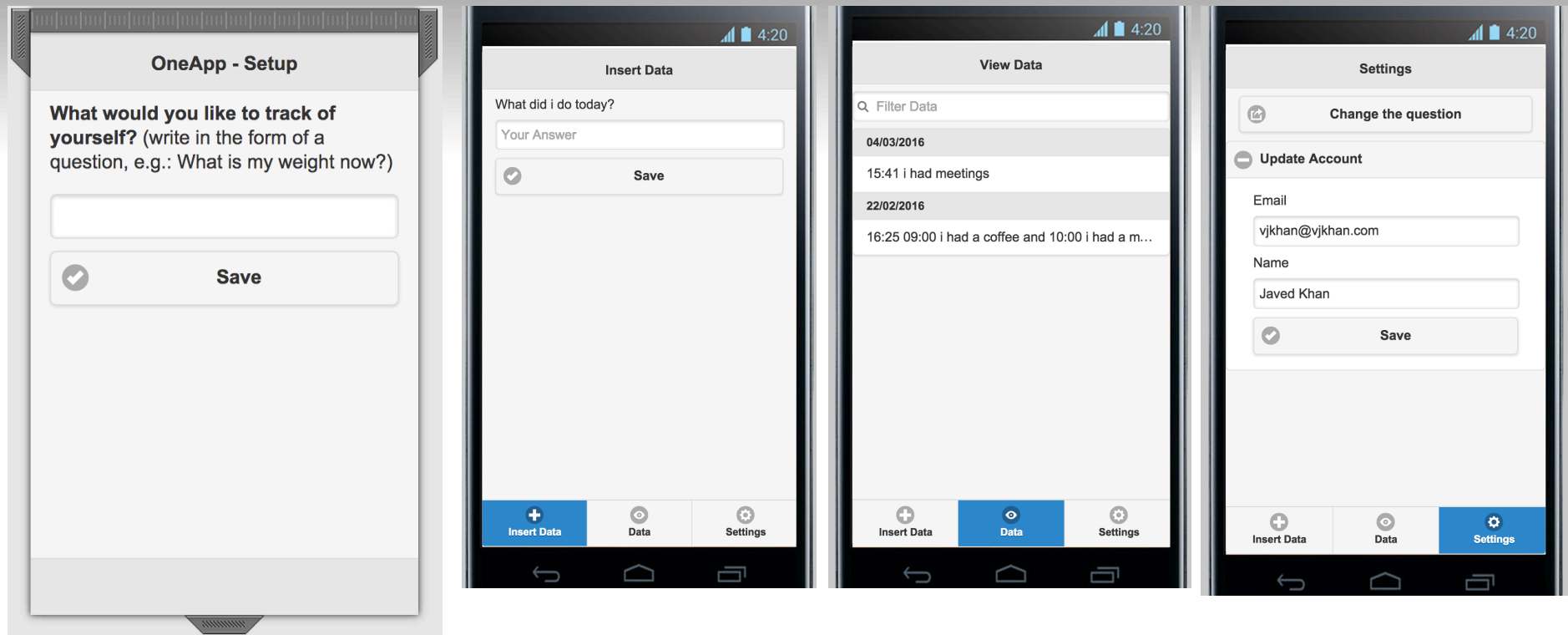
28  /* button Search! */
29  $(document).on("click", ".uib_w_3", function(evt)
30  {
31      //Get all inputs from user
32      var q = $("input[name='q']").val();
33      var begin_date = $("input[name='begin_date']").val();
34      begin_date = begin_date.replace(/-/g, '');
35      var end_date = $("input[name='end_date']").val();
36      end_date = end_date.replace(/-/g, '');
37      var apikey = 'ff88dab0b27e25b0e707c0cf3365d204:8:74688280';
38      //create url according to NyTimes instructions
39      var url = 'http://api.nytimes.com/svc/search/v2/articlesearch.json?q=' + q + '&begin_date=' + begin_date + '&end_date=' + end_date
+ '&api-key=' + apikey;
40
41  $.ajax({//AJAX request starts here
42      type: 'GET',
43      url: url,
44      success: function(data){//if successful then get only the returned article's snippets and show them in a list
45          myApp.showIndicator();
46          var showResults = '<div class="content-block-title">Search Results</div><div class="list-block"><ul>';
47          $.each(data.response.docs, function(index, element) {
48              var snippet = element.snippet;
49              showResults += '<li class="swipeout">'+
50                  '<div class="swipeout-content item-content">'+
51                      '<div class="item-media"><i class="icon icon-form-url"></i></div>'+
52                      '| <div class="item-inner">'+
53                          '<div class="item-title">'+ element.headline.main + '</div>'+
54                          '</div>'+
55                      '</div>'+
56                      '<div class="swipeout-actions-right"><a href="#" class="action1">Read</a></div>'+
57                      '</li>';
58          });
59          showResults += '</ul><a href="#" class="button button-big" id="back">Back</a></div>';
60          $('#showNewsItems').html(showResults);
61          mainView.router.load({pageName: 'newsItemsPage'});
62          myApp.hideIndicator();
63      },
64      error: function(xhr){console.log('ajax error'+ xhr.status + ' ' + xhr.statusText);},
65      dataType: 'json'
66  });
67  });

```

Code

- <http://wiki.id.tue.nl/creapps/FrontPage/CreativeApps201602?action=AttachFile&do=view&target=nytimesNews.zip>

Developing your own DB



Data is sent to a PHP page

```
23     $(document).on("click", "#saveQuestion", function(evt)
24     {
25         /* record Q to DB along with Device ID then raise a flag locally so that user does not see any more the 1st screen */
26         //console.log('user inserted: '+document.getElementById('question').value);
27         $('#feedbackPageQH').html('Message');
28         $('#feedbackPageQP').html('Please wait while we process the data.');
```

29 \$('#popupDialogQ').popup("open");

30 var q =document.getElementById('question').value;

31 if(q == ''){

32 \$('#feedbackPageQH').html('Error');

33 \$('#feedbackPageQP').html('You forgot to insert a question. Please insert a question before saving.');

34 \$('#popupDialogQ').popup("open");

35 } else {

36 //Write to DB

37 //console.log(device.uuid +' '+q);

38 \$('#saveQuestion').attr('disabled', 'disabled');

39 \$.ajax({

40 type: 'POST',

41 url: 'http://vjkhan.com/projects/oneApp/db.php',

42 data: {deviceId:device.uuid,questionText:q},

43 success: function(data,textStatus){

44 //console.log('ajax success:');

45 //console.log(data.error+' '+data.questionId);

46 localStorage.setItem('questionId',data.questionId);

47 localStorage.setItem('question',q);

48

49 document.getElementById('questionLabel').innerHTML =q;

50 window.location.href = '#uib_page_1';

51 },

52 error: function(xhr){console.log('ajax error'+ xhr.status + ' ' + xhr.statusText);},

53 dataType: 'json'

54 });

55

56 }

57 });

58

PHP checks data & inserts in DB

Returns an “error” code & questionId

```
$servername = "localhost";
$username = "YOUR-USERNAME";
$password = "YOUR-PWD";
$dbname = "YOUR-DB-NAME";

// Create connection
$conn = new mysqli($servername, $username, $password, $dbname);

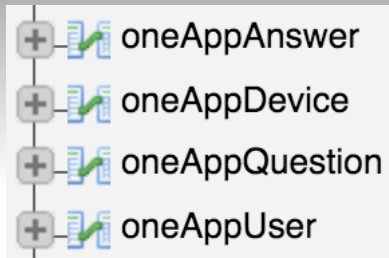
// Check connection
if ($conn->connect_error) {
    $error = "error:3";
    die($error);
}
$echo .= "Connected successfully\n";

// Check whether this $deviceId already exists, if that is the case then retrieve the FKoneAppUserId and insert a new row in oneAppQuestion only
$sql = "SELECT FKoneAppUserId FROM oneAppDevice WHERE deviceId='".$deviceId."'";
$result = $conn->query($sql);
if ($result->num_rows == 0) { // first time deviceId
    $sql = "INSERT INTO oneAppUser (email, name, date) VALUES (NULL, NULL, CURRENT_TIMESTAMP);";
    if ($conn->query($sql) === TRUE) { $echo .= "\nNew record created successfully\n"; } else { $echo .= "Error: " . $sql . "<br>"; $conn->error; $error = "error:4"; exit($error); }
    $lastInsertId = $conn->insert_id;

    $sql = "INSERT INTO oneAppDevice (deviceId, FKoneAppUserId) VALUES ('$deviceId', $lastInsertId);";
    if ($conn->query($sql) === TRUE) { $echo .= "\nNew record created successfully\n"; } else { $echo .= "Error: " . $sql . "<br>"; $conn->error; $error = "error:5"; exit($error); }
    $sql = "INSERT INTO oneAppQuestion (questionText, FKoneAppUserId, type, date) VALUES ('$questionText', $lastInsertId, NULL, CURRENT_TIMESTAMP);";
    if ($conn->query($sql) === TRUE) { $echo .= "\nNew record created successfully\n"; } else { $echo .= "Error: " . $sql . "<br>"; $conn->error; $error = "error:6"; exit($error); }
    $questionId = $conn->insert_id;
} else { // $deviceId already exists
    $row = $result->fetch_assoc();
    $FKoneAppUserId = $row["FKoneAppUserId"];
    $sql = "INSERT INTO oneAppQuestion (questionText, FKoneAppUserId, type, date) VALUES ('$questionText', $FKoneAppUserId, NULL, CURRENT_TIMESTAMP);";
    if ($conn->query($sql) === TRUE) { $echo .= "\nNew record created successfully\n"; } else { $echo .= "Error: " . $sql . "<br>"; $conn->error; $error = "error:7"; exit($error); }
    $questionId = $conn->insert_id;
}

$conn->close();
echo '{'. $error. ', "questionId": '. $questionId. '}';
?>
```

DB Schema has 4 tables



Tabelstructuur

Relatie overzicht

#	Naam	Type	Collatie	Attributen	Leeg	Standaardwaarde	Extra	Actie
<input type="checkbox"/>	1	id			Nee	Geen	AUTO_INCREMENT	Veranderen Verwijderen Primaire sleutel Unieke waarde Index Meer
<input type="checkbox"/>	2	answerText	latin1_swedish_ci		Nee	Geen		Veranderen Verwijderen Primaire sleutel Unieke waarde Index Meer
<input type="checkbox"/>	3	FKoneAppQuestionId			Nee	Geen		Veranderen Verwijderen Primaire sleutel Unieke waarde Index Meer
<input type="checkbox"/>	4	date			Nee	CURRENT_TIMESTAMP		Veranderen Verwijderen Primaire sleutel Unieke waarde Index Meer

INDEX

- Database Modeling
 - Entity-Relationship Diagram (ERD)
 - Normalization

SOURCES

- Elmasri, R. & Navathe, S. (2010). Fundamentals of Database Systems, 6th Ed. Chapter 7: Data Modeling Using the Entity-Relationship (ER) Model. Addison Wesley.
- Davis, M.E. & Phillips, J.A. (2007). Learning PHP & MySQL, Second Edition. Chapter 8: Database Best Practices. O'Reilly Media, Inc.

DATABASES

- What are they?
- Why are they important?
- Who is using them?

WHAT IS A DATABASE?

- An application which stores data (lots of it!)

WHAT IS A DATABASE?

- Much more than a flat-file or a spreadsheet

Flat_File - Notepad

This is a sample data file.

CustomerID	CompanyName	ContactName	ContactTitle
ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative
ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner
ANTON	Antonio Moreno Taqueria	Antonio Moreno	Owner
AROUT	Around the Horn	Thomas Hardy	Sales Representative
BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator
BLAUS	Blauer See Delikatessen	Hanna Moos	Sales Representative
BLONP	Blondesddsl père et fils	Frédérique Citeaux	Marketing Manager
BOLID	Bólido Comidas preparadas	Martin Sommer	Owner
BONAP	Bon app'	Laurence Lebihan	Owner
BOTTM	Bottom-dollar Markets	Elizabeth Lincoln	Accounting Manager
BSBEV	B's Beverages	Victoria Ashworth	Sales Representative
CACTU	Cactus Comidas para llevar	Patricio Simpson	Sales Agent
CENTC	Centro comercial Moctezuma	Francisco Chang	Marketing Manager
CHOPS	Chop-suey Chinese	Yang Wang	Owner
COMMI	Comércio Mineiro	Pedro Afonso	Sales Associate
CONSH	Consolidated Holdings	Elizabeth Brown	Sales Representative
DRACD	Drachenblut Delikatessen	Sven Ottlieb	Order Administrator
DUMON	Du monde entier	Janine Labrune	Owner
EASTC	Eastern Connection	Ann Devon	Sales Agent
ERNSH	Ernst Handel	Roland Mendel	Sales Manager
FAMIA	Familia Arquibaldo	Aria Cruz	Marketing Assistant
FISSA	FISSA Fabrica Inter. Salchichas S.A.	Diego Roel	Accounting Manager

starwars-works.mdb - Microsoft Works Database

	ItemID	ItemName	ItemDescription	Episode	Category	UnitsInStock	YearMade	YearAcquired	HowAcquired
1	00001	Blockbuster	Life-size figure	1 - The Phantom Menor	Large store	00001	01998	02000	Asked for it
2	00002	Watto's	Cut-Life Size stand-up	1 - The Phantom Menor	Cardboard c	00001	19990	02000	Asked for it
3	00003	Anakin	Skywalker backpack	all 1 - The Phantom Menor	Action Figure	00001	01998	01998	Gift
4	00004	Jar Jar	Binks with Gungan	all 1 - The Phantom Menor	Action Figure	00001	01998	01998	Gift
5	00005	Obi-Wan	Ki-Adi-Mundi Lightsaber	1 - The Phantom Menor	Action Figure	00001	01998	01998	Gift
6	00006	Queen Amidala	with blaster pistol	1 - The Phantom Menor	Action Figure	00001	01998	01998	Gift
7	00007	Senator Palpatine	Senate Car	1 - The Phantom Menor	Action Figure	00001	01998	01998	Gift
8	00008	Chewbacca		4 - A New Hope	Action Figure	00001	01977	00000	Bought retail
9	00009	C3PO		4 - A New Hope	Action Figure	00001	01977	00000	Bought retail
10	00010	Greedo		4 - A New Hope	Action Figure	00001	01978	00000	Bought retail
11	00011	Boush	Leia disguised	5 - Return of the Jedi	Action Figure	00001	01986	01986	Bought retail
12	00012	Luke Skywalker	white shirt, mustache	4 - A New Hope	Action Figure	00001	01985	01985	Bought retail
13	00013	Mace Windu	with lightsaber	all 1 - The Phantom Menor	Action Figure	00001	01998	01998	Bought retail
14	00014	Boss Nass	with Gungan	all 1 - The Phantom Menor	Action Figure	00001	01998	01998	Bought retail
15	00015	Queen Amidala	in red dress	1 - The Phantom Menor	Ornament	00001	01998	01998	Gift

WHAT IS A DATABASE?

- An application which stores data (lots of it!)
- Manages the data
 - Makes it easy to insert, select, update, delete, backup, etc...

WHO IS USING DATABASES?



RELATIONAL DATABASE MODEL

- WHAT IS IT?
- HOW TO DEVELOP ONE?

WHY IS DATABASE MODELING IMPORTANT?

- All applications are completely dependent on the structure of that underlying database
- If the database model must be altered at a later stage, everything constructed based on the database model probably must be changed and perhaps even completely rewritten

ENTITY-RELARIONSHIP DIAGRAM (ERD)

- Method to model a database
- Based on the ERD you develop an actual database

- As an Architect's plan is actually developed in a physical building, an ERD is developed in a database



ERD: ELEMENTS

- ENTITIES
 - RELATIONSHIPS
 - (BETWEEN ENTITIES)
 - ATTRIBUTES
 - (OF ENTITIES)
- *(In practice it is a bit more complex – more info in sources)*

DEFINITIONS

- Entity

- *“is a thing in the real world with an independent existence”* (Elmasri & Navathe, 2010)
- *“An entity may be an object with a physical existence (for example, a particular person, car, house, or employee) or it may be an object with a conceptual existence (for instance, a company, a job, or a university course)”* (Elmasri & Navathe, 2010)

DEFINITIONS

- Attribute
 - “*Each entity has attributes—the particular properties that describe it.*” (Elmasri & Navathe, 2010)
 - E.g.: Entity: EMPLOYEE may be described by: name, age, phone, job title, etc.
 - An *entity* has value for each of its *attributes*
 - E.g.: ‘Javed’, ‘39’, ‘0402472665’, ‘Assistant Professor’

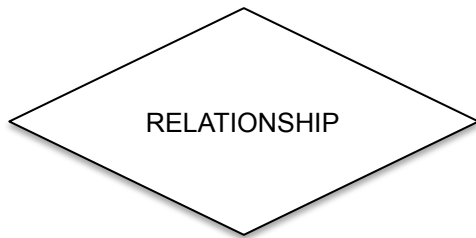
DEFINITIONS

- Relationship
 - Defines an association between *Entities*
 - E.g.: *EMPLOYEE* **works** on *PROJECT X*.

ERD: SYMBOLS



- RECTANGLE for *ENTITY*



- DIAMOND for *RELATIONSHIP*

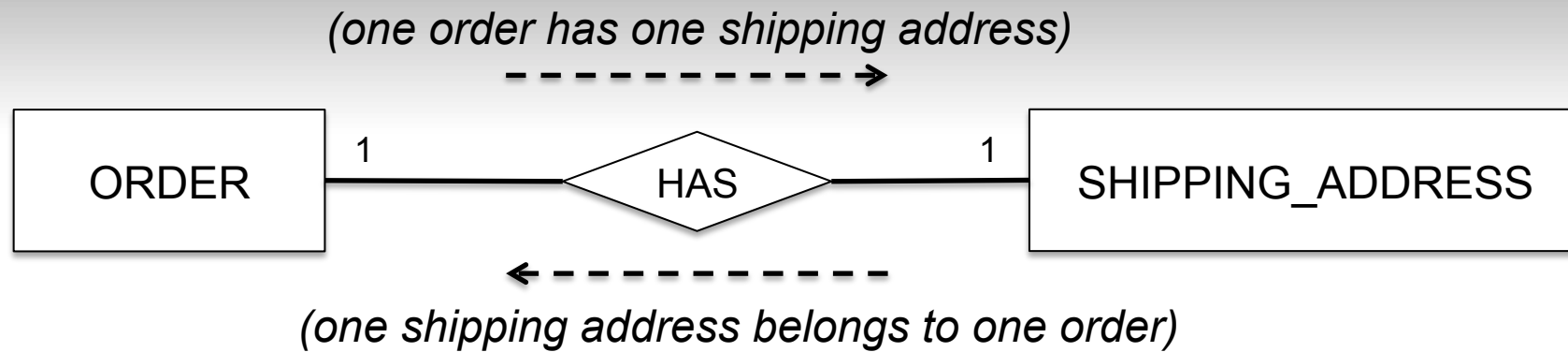


- OVAL for *ATTRIBUTE*

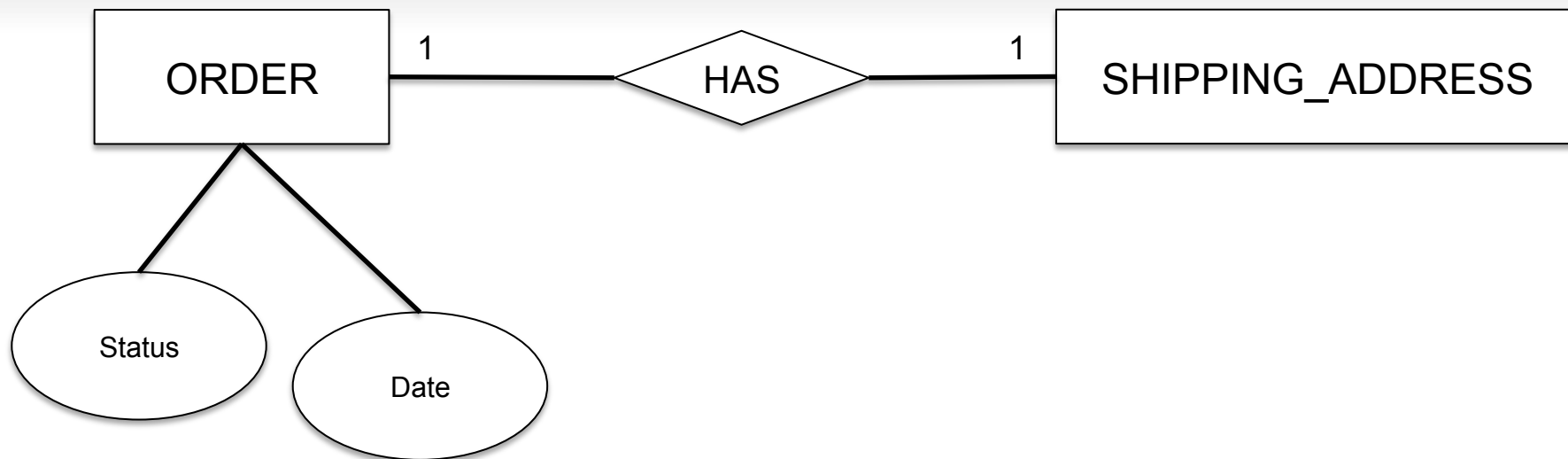
ERD: TYPES OF RELATIONSHIPS (CARDINALITY)

- ONE-TO-ONE
- ONE-TO-MANY
- MANY-TO-MANY

ONE-TO-ONE



ONE-TO-ONE + ATTRIBUTES



ENTITY-RELATIONSHIP DIAGRAM

- ERD needs to be converted into TABLES, COLUMNS
- ENTITIES become: TABLES
- ATTRIBUTES become: COLUMNS
- ACTUAL DATA are: ROWS

ERD TO TABLE

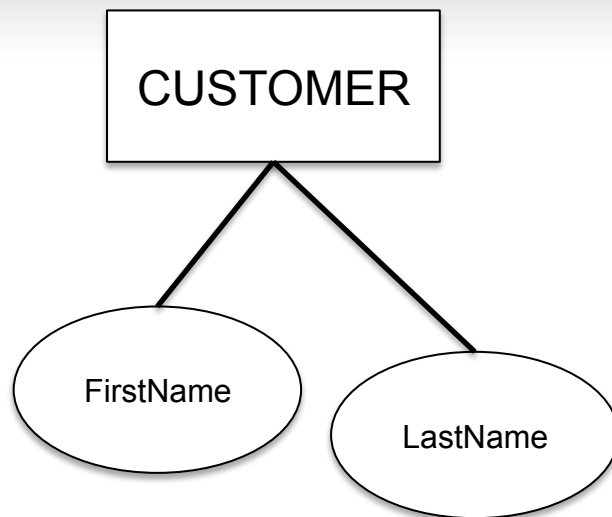


TABLE: CUSTOMER	
FirstName	LastName
Will	Smith
Adam	Smith
Kees	Jansen
Adam	Sandler
Kees	Jansen

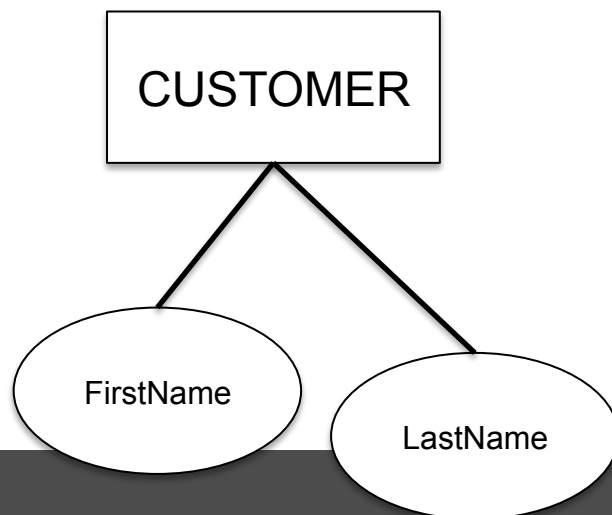


TABLE: CUSTOMER	
FirstName	LastName
Will	Smith
Adam	Smith
Kees	Jansen
Adam	Sandler
Kees	Jansen

NORMALIZATION

NORMALIZATION

- Process of removing duplication in data
- Divide information into smaller, more manageable parts, preferably not too small
- Primary objectives are:
 - Save space
 - Organize data for usability and manageability
- Normalization has several “Rules”
- Formal way of checking the quality of your model

NORMAL FORMS: RULES

- There must be an attribute (known as primary key) that uniquely defines rows

ERD TO TABLE

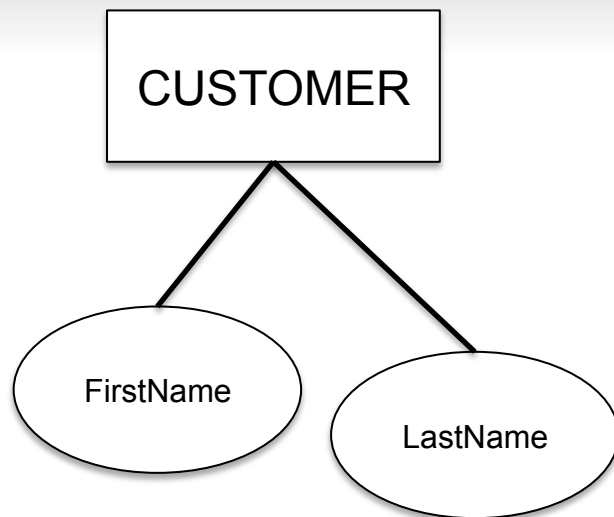


TABLE: CUSTOMER	
FirstName	LastName
Will	Smith
Adam	Smith
Kees	Jansen
Adam	Sandler
Kees	Jansen

PRIMARY KEY

- EACH TABLE MUST HAVE A PRIMARY KEY (ID)
- A primary key is used to uniquely identify a record (row) in a table
- Primary key can be one attribute but could also be a combination of attributes

PRIMARY KEY: EXAMPLE

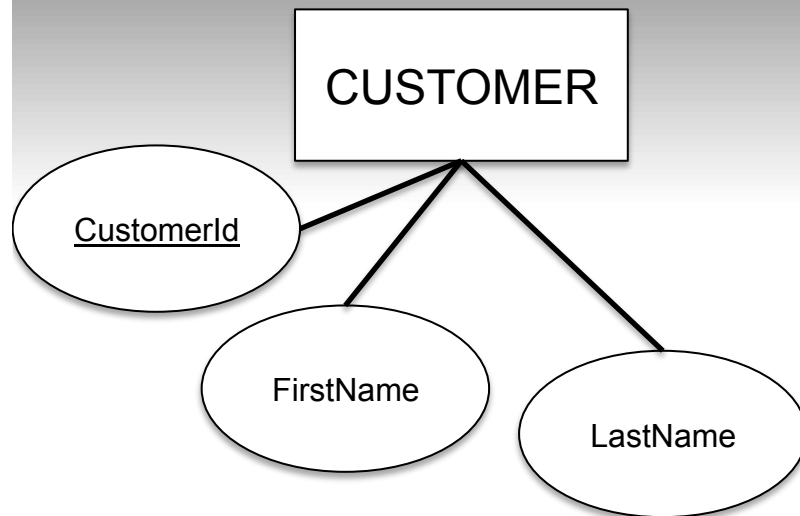


TABLE: USER		
<u>UserId</u>	FirstName	LastName
1	Will	Smith
2	Adam	Smith
3	Adam	Sandler

The Rows of the Table hold the actual data

↑ ↑ ↑
Attributes of the ERD become Columns

NORMAL FORMS: RULES

- ☒ There must be an attribute (known as primary key) that uniquely defines rows

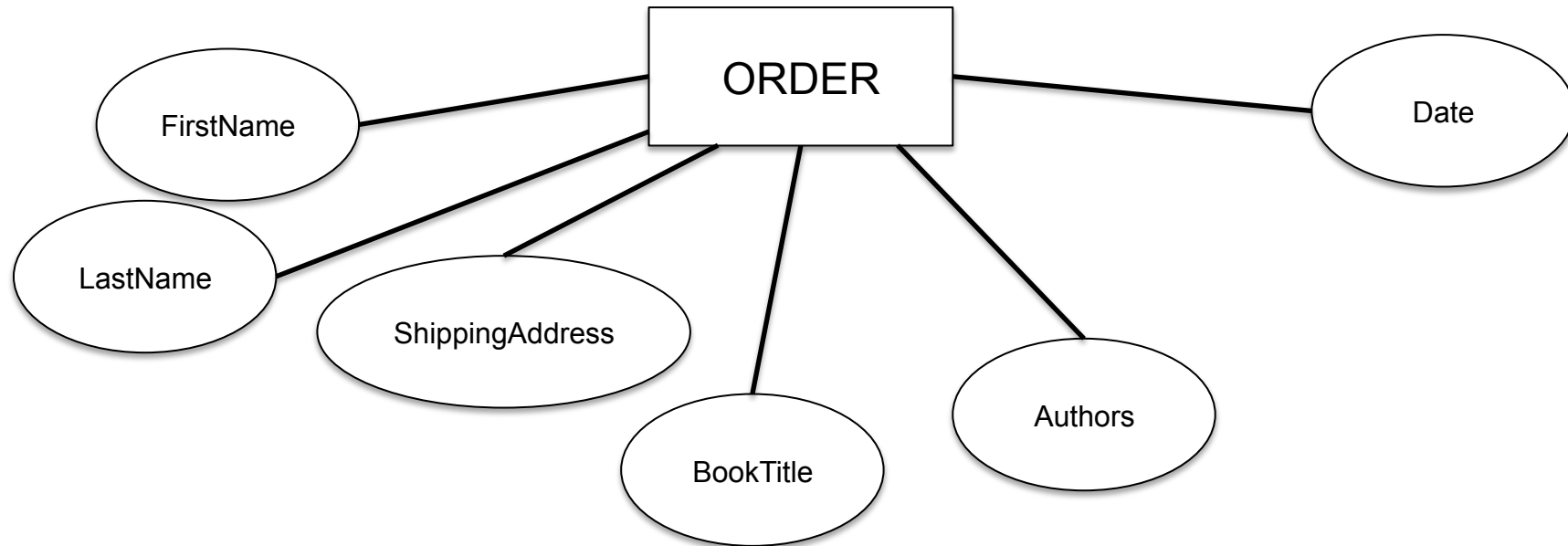
NORMAL FORMS: RULES

- There must be an attribute (known as primary key) that uniquely defines rows

EXAMPLE (BAD)

TABLE: ORDER					
FirstName	LastName	ShippingAddress	BookTitles	Authors	Date
Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Learning PHP and MySQL, 2 nd edition, Database Design	Michelle Davis, Jon Phillips	17-04-2011
Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Beginning Database Solutions	Rod Stephens	09-03-2010
Mark	Atkinson	Hopmansstraat 1, 4800DX, Breda, Nederland	Project Management	Adam Smith, Karl Popper	01-02-2009

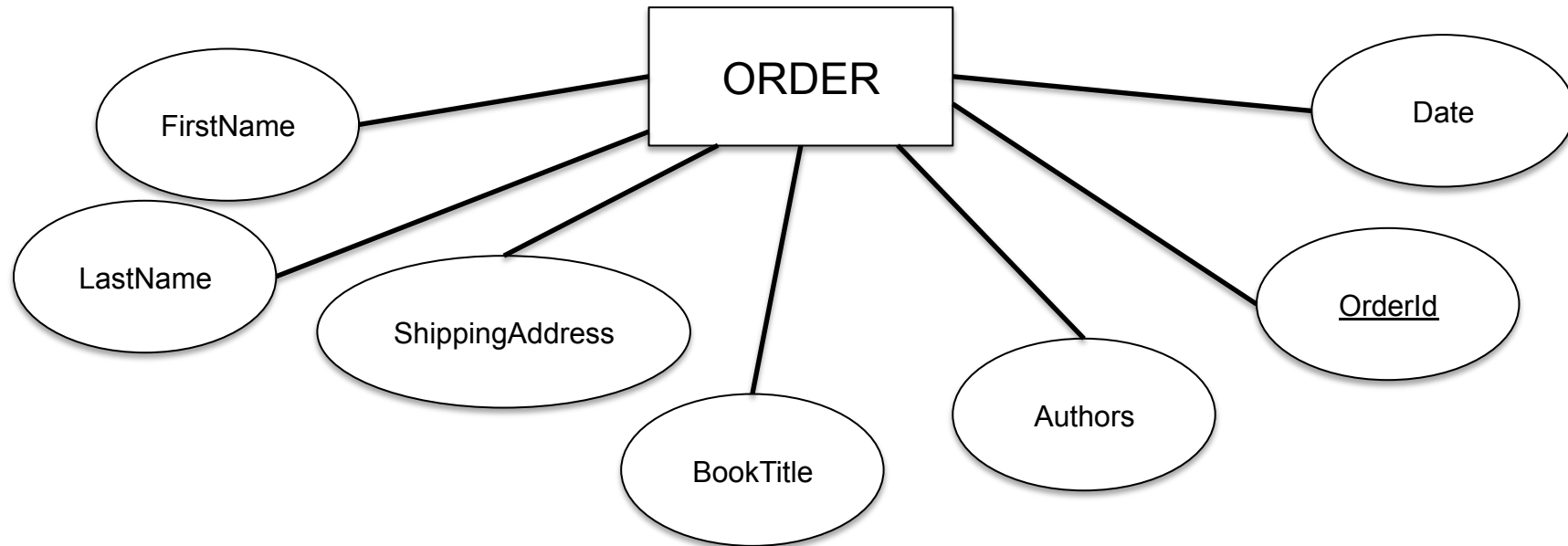
EXAMPLE (BAD): ERD



EXAMPLE (BAD)

TABLE: ORDER						
<u>OrderId</u>	FirstName	LastName	ShippingAddress	BookTitles	Authors	Date
1001	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Learning PHP and MySQL, 2 nd edition, Database Design	Michelle Davis, Jon Phillips	17-04-2011
1002	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Beginning Database Solutions	Rod Stephens	09-03-2010
1003	Mark	Atkinson	Hopmansstraat 1, 4800DX, Breda, Nederland	Project Management	Adam Smith, Karl Popper	01-02-2009

EXAMPLE (BAD): ERD



(complies with aforementioned Normalization Rule but it is still bad because it does not comply with other Rules)

NORMAL FORMS: RULES

- ☒ There must be an attribute (known as primary key) that uniquely defines rows
- All column cells must contain only one value
 - Think of the term “value” in its abstract form, i.e. “One Address” or “One Author” or “One BookTitle”

EXAMPLE (BAD)

TABLE: ORDER						
<u>OrderId</u>	FirstName	LastName	ShippingAddress	BookTitles	Authors	Date
1001	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Learning PHP and MySQL, 2 nd edition, Database Design	Michelle Davis, Jon Phillips	17-04-2011
1002	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Beginning Database Solutions	Rod Stephens	09-03-2010
1003	Mark	Atkinson	Hopmansstraat 1, 4800DX, Breda, Nederland	Project Management	Adam Smith, Karl Popper	01-02-2009

PROBLEMS WITH EXAMPLE

- Problems of the previous example:
 - In row with OrderId 1001 there are 2 BookTitles: 1) Learning PHP and MySQL, 2nd edition & 2) Database Design. There also are 2 Authors: 1) Michelle Davis & 2) Jon Phillips
 - Such a design raises the question:
 - Which book-titles are authored by which authors?
 - Question cannot be answered with certainty

EXAMPLE (BAD)

TABLE: ORDER								
<u>OrderId</u>	FirstName	LastName	ShippingAddress	BookTitle1	BookTitle2	Author1	Author2	Date
1001	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Learning PHP and MySQL, 2 nd edition	Database Design	Michelle Davis	Jon Phillips	17-04-2011
1002	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	Beginning Database Solutions		Rod Stephens		09-03-2010
1003	Mark	Atkinson	Hopmansstraat 1, 4800DX, Breda, Nederland	Project Managem ent		Adam Smith	Karl Popper	01-02-2009

NORMAL FORMS: RULES

- ☒ There must be an attribute (known as primary key) that uniquely defines rows
- ☒ All column cells must contain only one value
 - Think of the term “value” in its abstract form, i.e. “One Address” or “One Author” or “One BookTitle”

PROBLEMS WITH EXAMPLE

- Several problems of the previous example:
 - Authors & BookTitles are limited to two
 - Empty cells (book might have one author)
 - Repetition of customer's data
 - What if we need to update?
 - What if there is a typographical mistake during insertion?

NORMAL FORMS: RULES

- ☒ There must be an attribute (known as primary key) that uniquely defines rows
- ☒ All column cells must contain only one value
 - Think of the term “value” in its abstract form, i.e. “One Address” or “One Author” or “One BookTitle”
- No table may have repeating columns that contain the same kind of information

EXAMPLE (BETTER)

TABLE: ORDER

<u>OrderId</u>	FirstName	LastName	ShippingAddress	Date
1001	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	17-04-2011
1002	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	09-03-2010
1003	Mark	Atkinson	Hopmansstraat 1, 4800DX, Breda, Nederland	01-02-2009

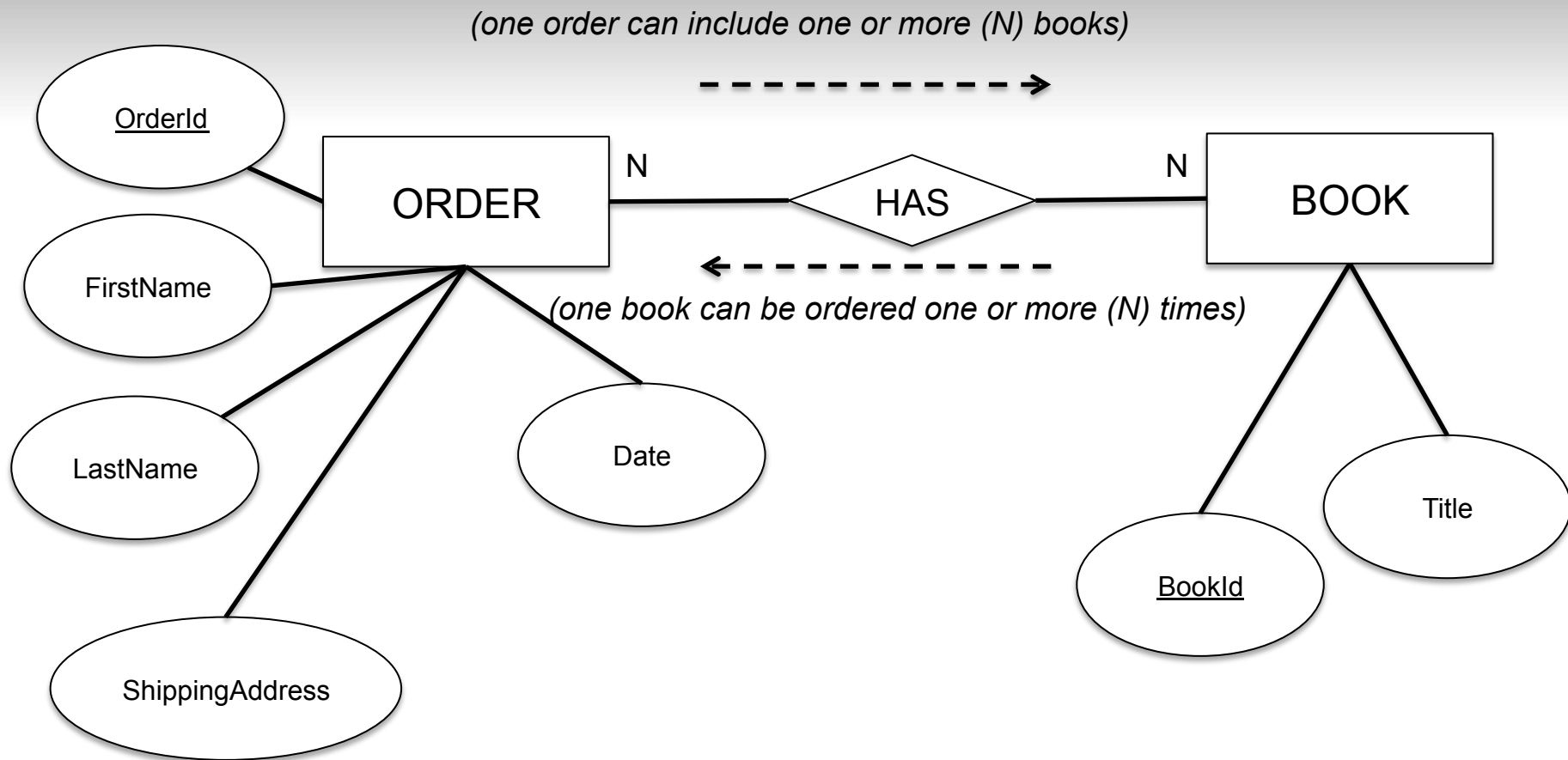
TABLE: BOOK

<u>BookId</u>	Title
1	Learning PHP and MySQL, 2 nd edition
2	Database Design
3	Beginning Database Solutions
4	Project Management

TABLE: AUTHOR

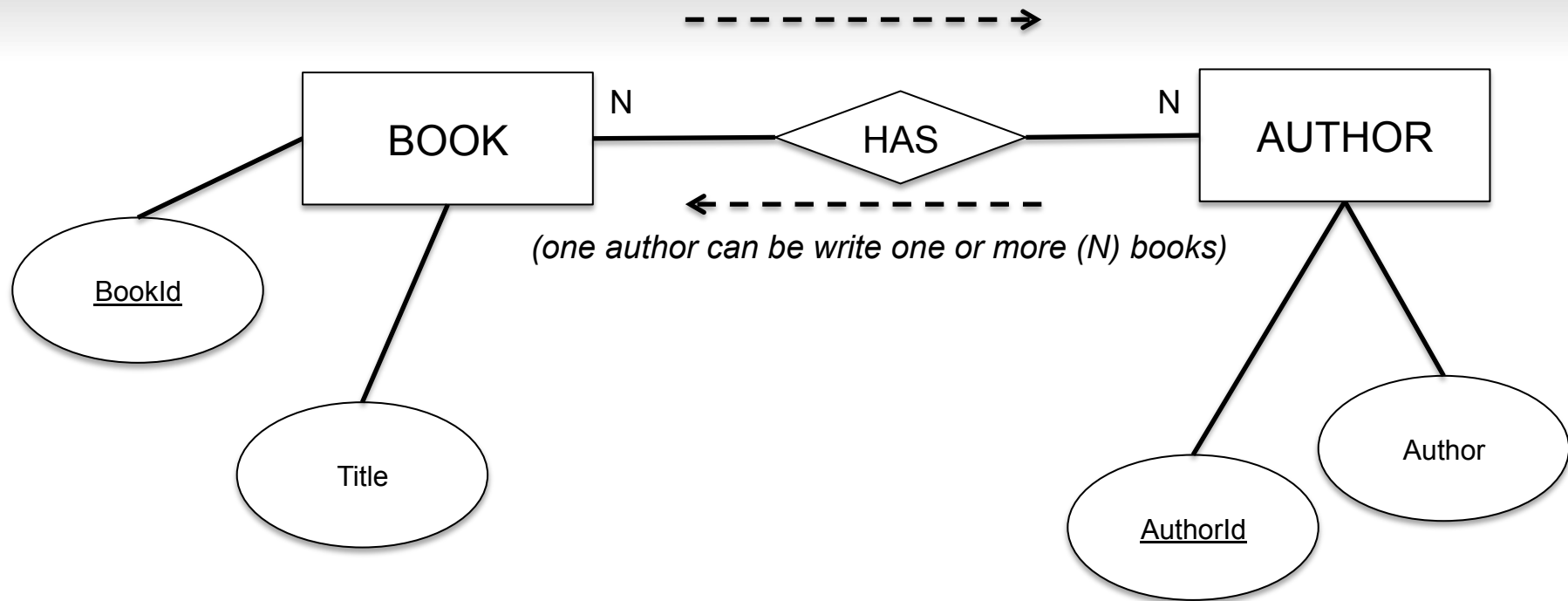
<u>AuthorId</u>	Author
1	Jon Phillips
2	Michelle Davis
3	Rod Stephens
4	Adam Smith
5	Karl Popper

EXAMPLE (BETTER): ERD

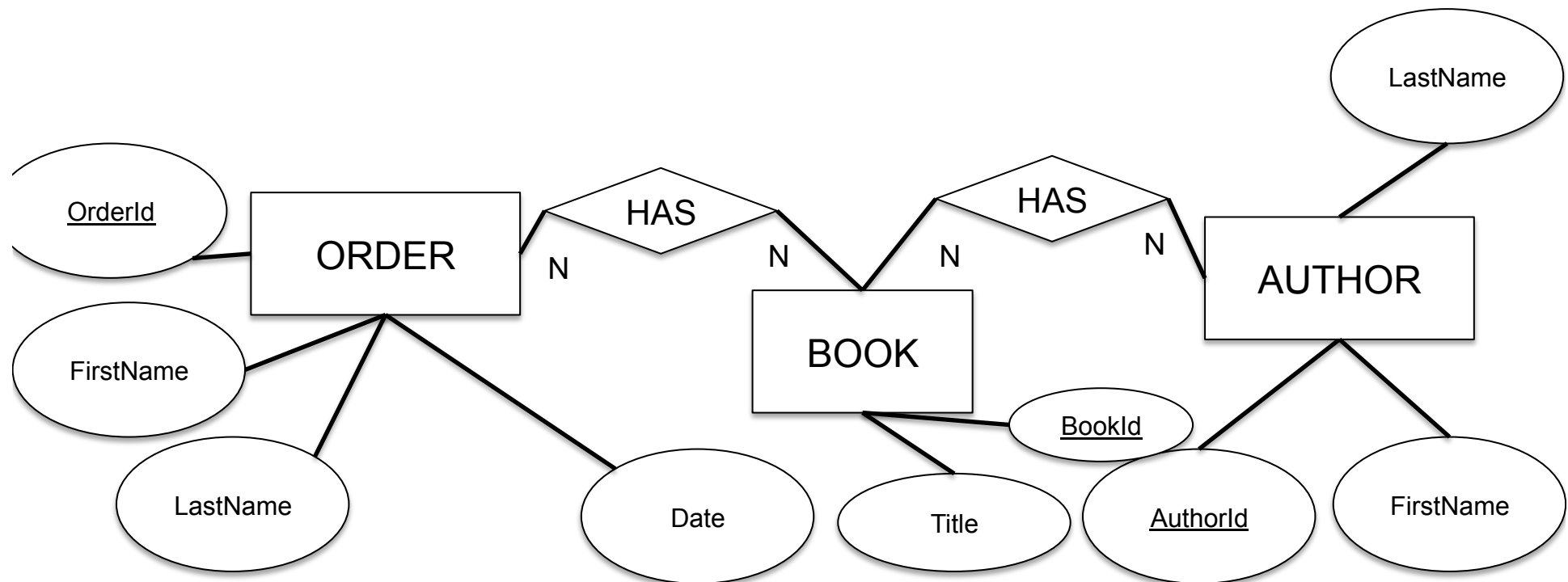


EXAMPLE (BETTER): ERD

(one book can be authored by one or more (N) authors)



EXAMPLE (EVEN BETTER): ERD



NORMAL FORMS: RULES

- ☒ There must be an attribute (known as primary key) that uniquely defines rows
- ☒ All column cells must contain only one value
 - Think of the term “value” in its abstract form, i.e. “One Address” or “One Author” or “One BookTitle”
 - Can the value in the cell be broken down?
- ☒ No table may have repeating columns that contain the same kind of information

EXAMPLE (BETTER)

TABLE: ORDER

<u>OrderId</u>	FirstName	LastName	ShippingAddress	Date
1001	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	17-04-2011
1002	Javed	Khan	Den Dolech 2, 5600MB, Eindhoven, Nederland	09-03-2010
1003	Mark	Atkinson	Hopmansstraat 1, 4800DX, Breda, Nederland	01-02-2009

TABLE: BOOK

<u>BookId</u>	Title
1	Learning PHP and MySQL, 2 nd edition
2	Database Design
3	Beginning Database Solutions
4	Project Management

TABLE: AUTHOR

<u>AuthorId</u>	Author
1	Jon Phillips
2	Michelle Davis
3	Rod Stephens
4	Adam Smith
5	Karl Popper

EXAMPLE (EVEN BETTER)

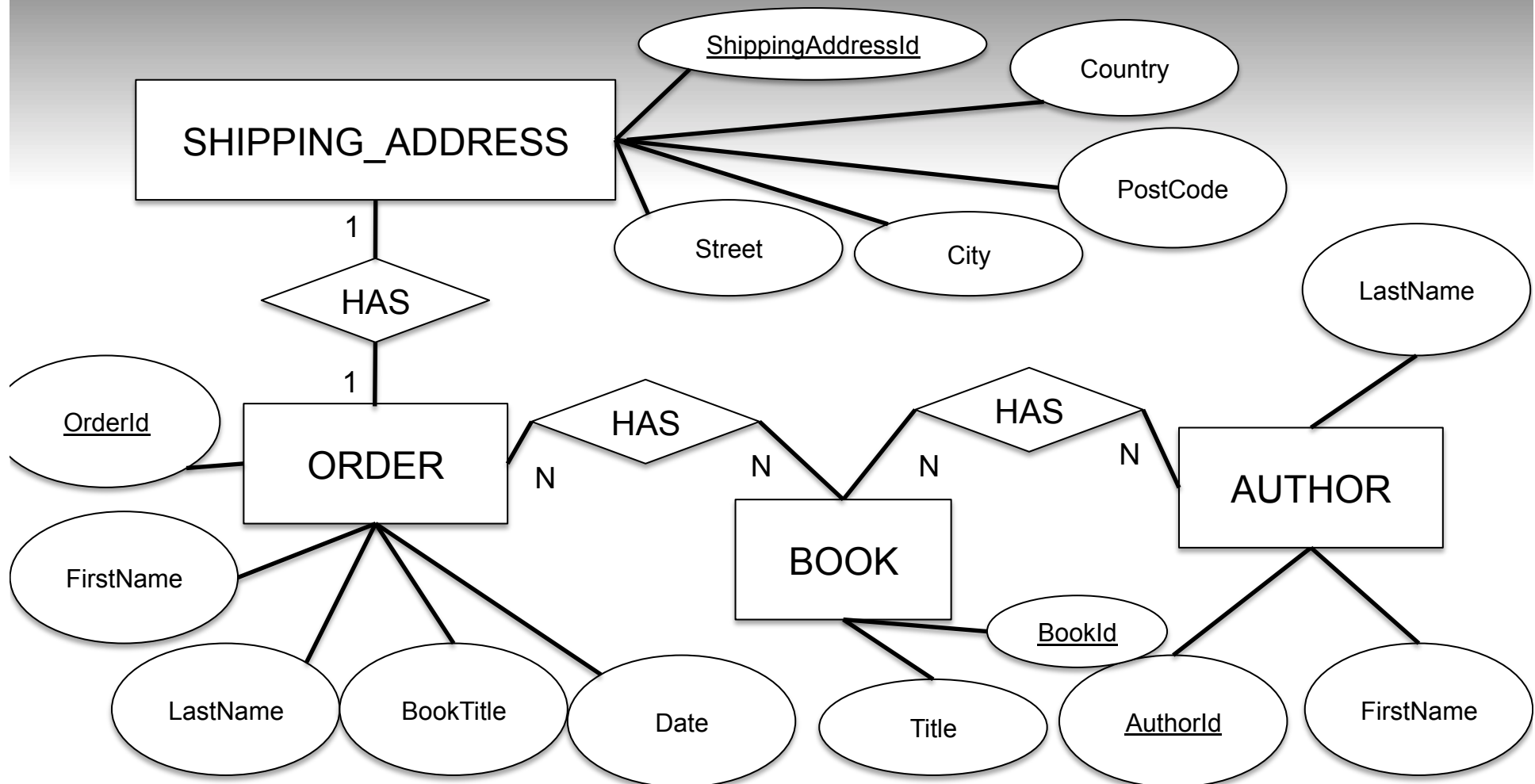
SHIPPING_ADDRESS				
<u>ShippingAddressId</u>	Street	City	PostCode	Country
1	Den Dolech 2	Eindhoven	5600MB	Nederland
2	Hopmansstraat 1	Breda	4800DX	Nederland

TABLE: ORDER			
<u>OrderId</u>	FirstName	LastName	Date
1001	Javed	Khan	17-04-2011
1002	Javed	Khan	09-03-2010
1003	Mark	Atkinson	01-02-2009

TABLE: AUTHOR	
<u>AuthorId</u>	Author
1	Jon Phillips
2	Michelle Davis
3	Rod Stephens
4	Adam Smith
5	Karl Popper

TABLE: BOOK	
<u>BookId</u>	Title
1	Learning PHP and MySQL, 2 nd edition
2	Database Design
3	Beginning Database Solutions
4	Project Management

EXAMPLE (EVEN BETTER): ERD



NOTE

- This ERD is not optimal, needs to be developed further
- E.g.
 - needs a new entity: CUSTOMER
 - (to solve: Repetition of customer's data)
 - The relation of Order-Shipping_Address might make sense if it ONE-TO-MANY
- For space/time reasons this will not developed further
- Homework: try to develop it yourself

WHAT ABOUT THE RELATIONS?

SHIPPING_ADDRESS				
<u>ShippingAddressId</u>	Street	City	PostCode	Country
1	Den Dolech 2	Eindhoven	5600MB	Nederland
2	Hopmansstraat 1	Breda	4800DX	Nederland

- Relations depicted in ERD are not existing

TABLE: ORDER			
<u>OrderId</u>	FirstName	LastName	Date
1001	Javed	Khan	17-04-2011
1002	Javed	Khan	09-03-2010
1003	Mark	Atkinson	01-02-2009

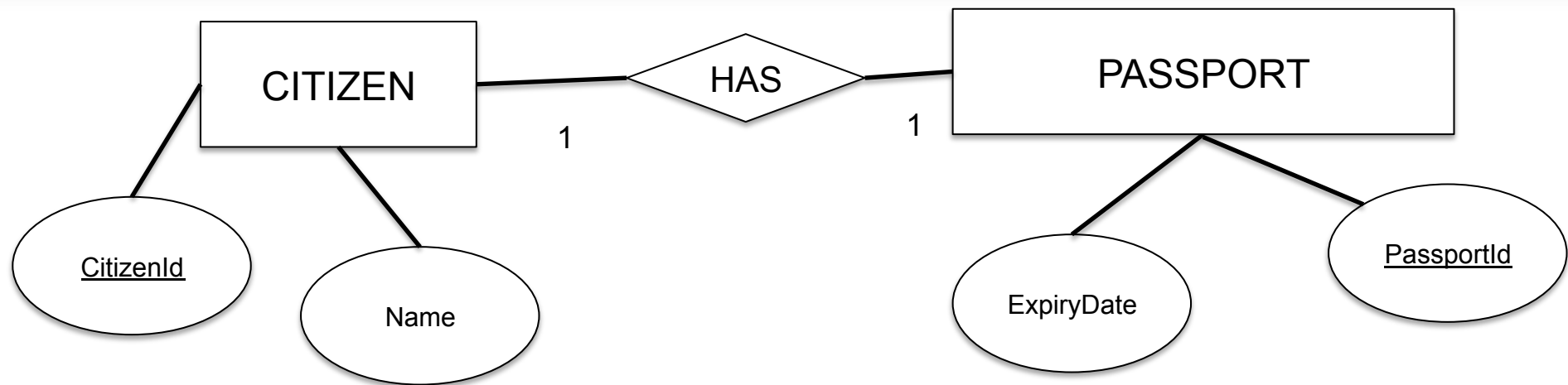
TABLE: AUTHOR	
<u>AuthorId</u>	Author
1	Jon Phillips
2	Michelle Davis
3	Rod Stephens
4	Adam Smith
5	Karl Popper

TABLE: BOOK	
<u>BookId</u>	Title
1	Learning PHP and MySQL, 2 nd edition
2	Database Design
3	Beginning Database Solutions
4	Project Management

ENTITY-RELATIONSHIP DIAGRAM

- ERD needs to be converted into TABLES, COLUMNS
- ENTITIES become: TABLES
- ATTRIBUTES become: COLUMNS
- RELATIONSHIPS
 - ONE-TO-ONE : COLUMN (FOREIGN KEY)
 - ONE-TO-MANY: COLUMN (FOREIGN KEY)
 - MANY-TO-MANY: TABLE (FOREIGN KEYS)
- ACTUAL DATA -> ROWS

EXAMPLE: ONE-TO-ONE



ONE-TO-ONE : COLUMN

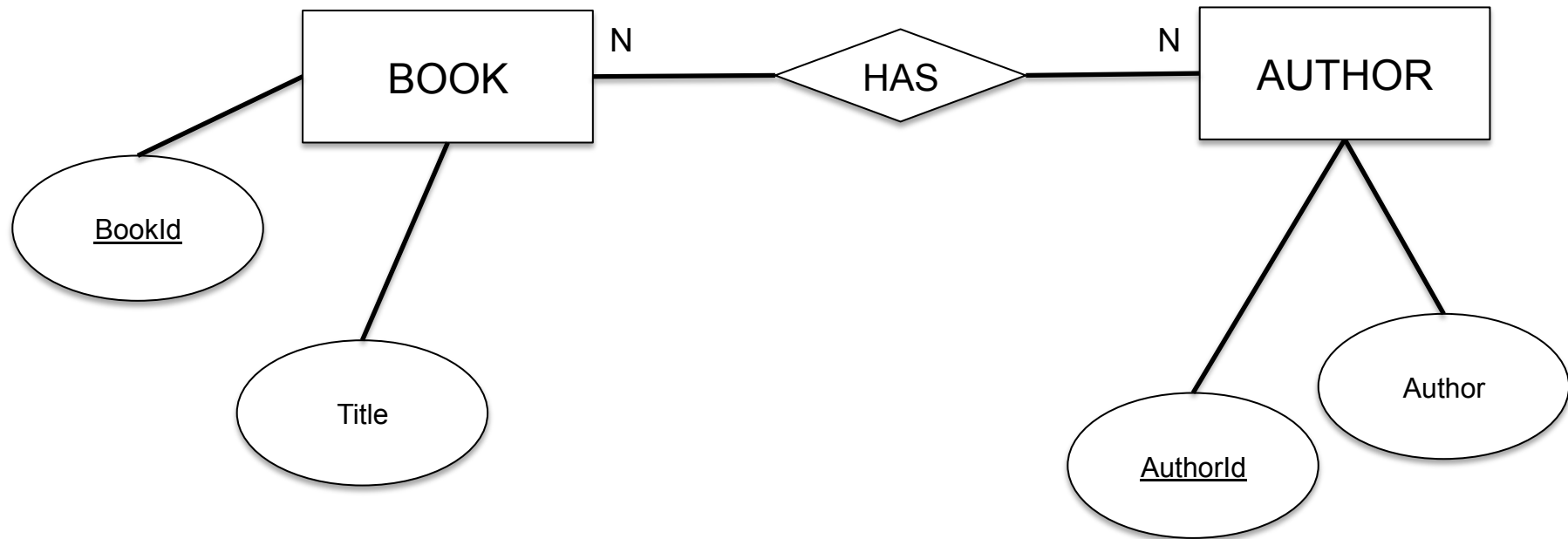
CITIZEN	
<u>CitizenId</u>	Name
1	George Bush
2	Bill Clinton
3	Barack Obama

PASSPORT		
<u>PassportId</u>	ExpiryDate	CitizenId
TUE891234	23/2/2019	1
KLM901234	24/3/2018	2
UPC879873	12/1/2010	3

FOREIGN KEY

- Foreign keys are the copies of primary keys created into connecting tables
- Establishes a relation between 2 tables
- In previous example the CitizenId becomes a *Foreign key* in the PASSPORT table

EXAMPLE: MANY-TO-MANY



MANY-TO-MANY: TABLE

BOOK	
<u>BookId</u>	Title
1	Learning PHP and MySQL, 2 nd edition
2	Database Design
3	Beginning Database Solutions
4	Project Management

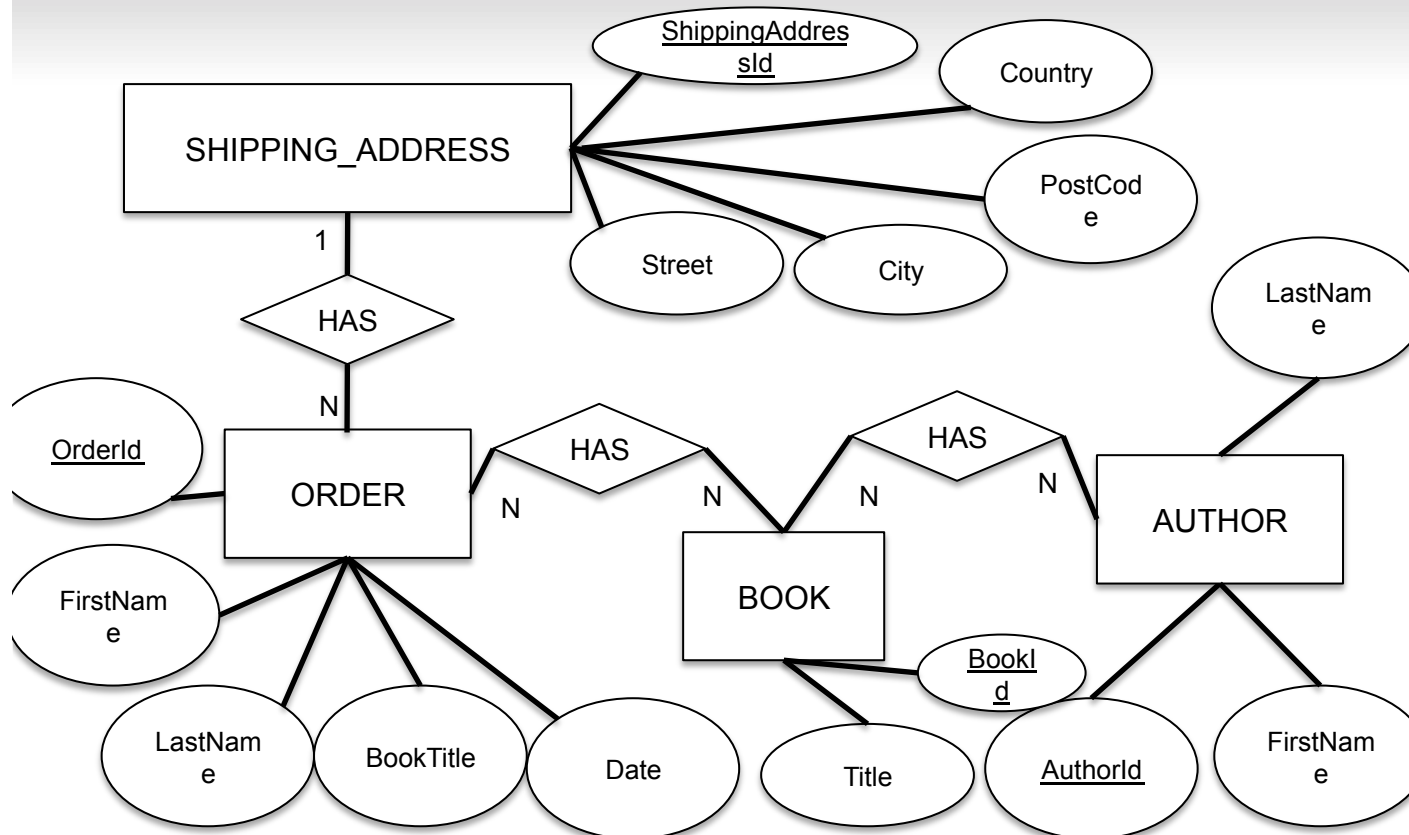
BOOK_AUTHOR	
<u>BookId</u>	<u>AuthorId</u>
1	1
1	2
3	3
4	4
4	5

AUTHOR	
<u>AuthorId</u>	Author
1	Jon Phillips
2	Michelle Davis
3	Rod Stephens
4	Adam Smith
5	Karl Popper

EXERCISE

- Think of two entities that have a ONE-TO-MANY relation
- How would they link when we convert them to tables?

EXAMPLE (EVEN BETTER): ERD (Corrected the relationship between ORDER-SHIPPING_ADDRESS)



The primary key from the N-side of the relationship becomes a foreign key in the 1-side of the relationship

SHIPPING_ADDRESS				
<u>ShippingAddressId</u>	Street	City	PostCode	Country
1	Den Dolech 2	Eindhoven	5600MB	Nederland
2	Hopmansstraat 1	Breda	4800DX	Nederland

ORDER_BOOK	
<u>OrderId</u>	<u>BookId</u>
1001	1
1001	2
1002	3
1003	4

ORDER				
<u>OrderId</u>	FirstName	LastName	Date	ShippingAddressId
1001	Javed	Khan	17-04-2011	1
1002	Javed	Khan	09-03-2010	1
1003	Mark	Atkinson	01-02-2009	2

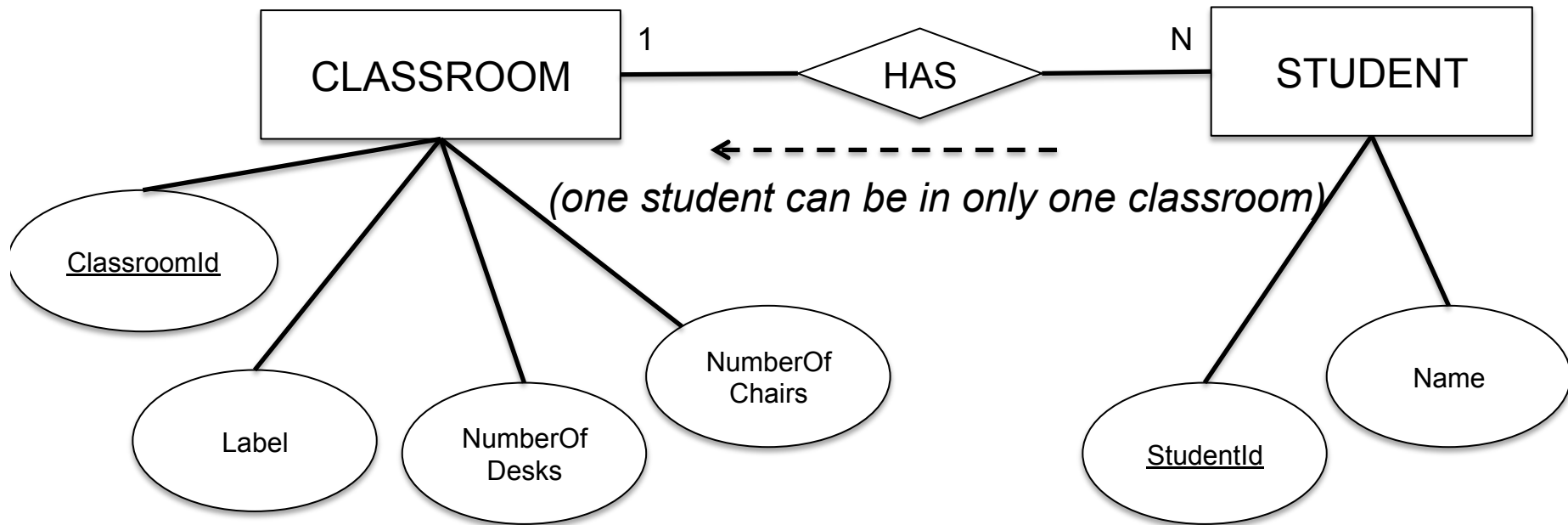
BOOK	
<u>BookId</u>	Title
1	Learning PHP and MySQL, 2 nd edition
2	Database Design
3	Beginning Database Solutions
4	Project Management

BOOK_AUTHOR	
<u>BookId</u>	<u>AuthorId</u>
1	1
1	2
3	3
4	4
4	5

AUTHOR	
<u>AuthorId</u>	Author
1	Jon Phillips
2	Michelle Davis
3	Rod Stephens
4	Adam Smith
5	Karl Popper

EXAMPLE: ONE-TO-MANY

(one classroom has (can potentially have) many students)



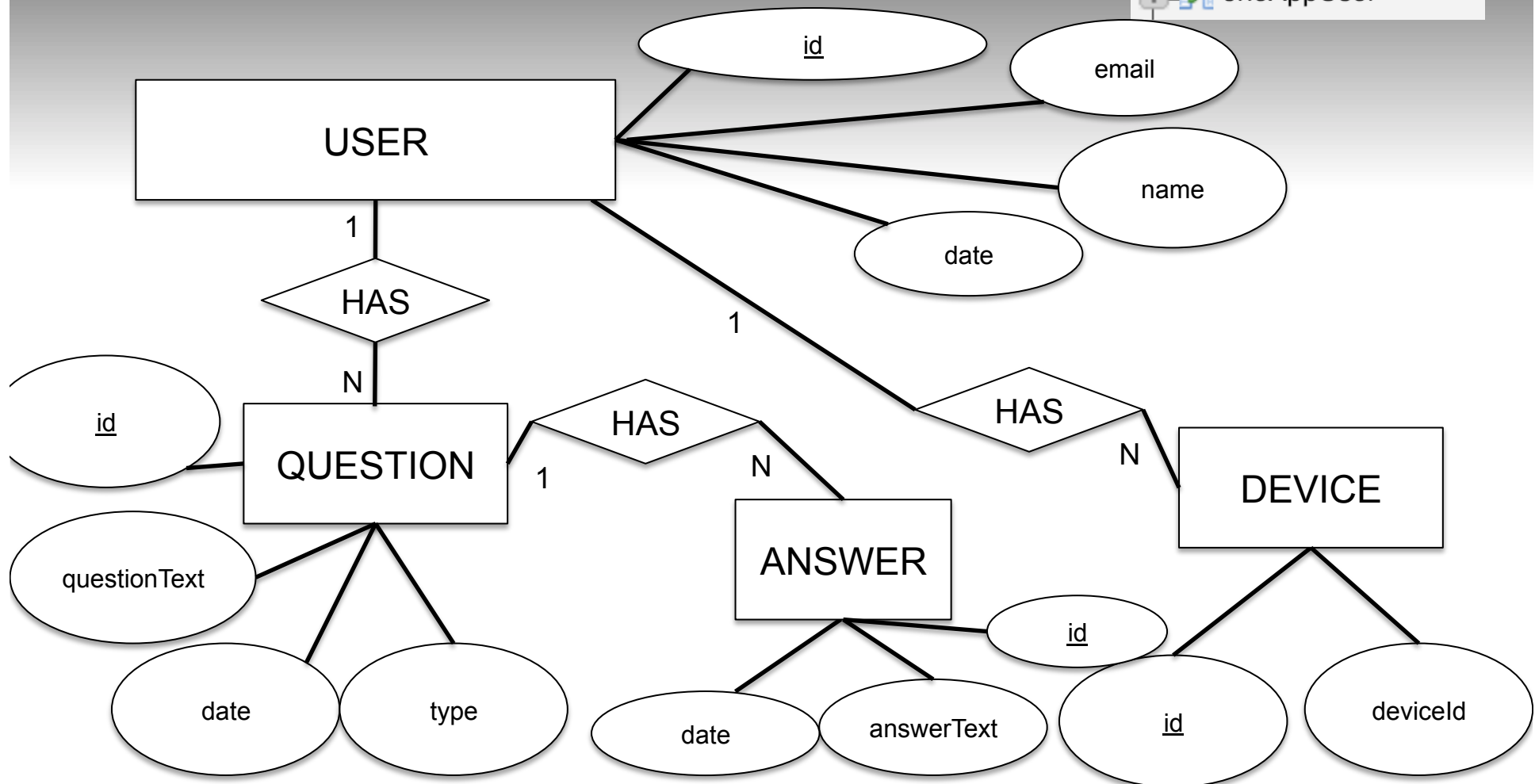
ONE-TO-MANY: COLUMN

STUDENT		
<u>StudentId</u>	Name	ClassroomId
1	Alexander	1
2	Dennis	1
3	George	1
4	Nick	2

CLASSROOM			
<u>ClassroomId</u>	Label	NumberOfDesks	NumberOfChairs
1	N3.111	20	25
2	N1.112	30	35
3	H0.102	100	05

ERD: iQuantifyMe

- + oneAppAnswer
- + oneAppDevice
- + oneAppQuestion
- + oneAppUser



Code

- <http://wiki.id.tue.nl/creapps/FrontPage/CreativeApps201602?action=AttachFile&do=view&target=iQuantifyMe.zip>
- You do need a webserver & MySQL db-server with PHP
- Need to upload the PHP files to the webserver
- Need to import the MySQL statements to your MySQL Database
- Edit the PHP files for database name, user & pwd

Assignment

- Please keep on using FeedbackCamp on Peter's account (Javed will be checking that)
- Assignment for this week needs to have a web-service component, either from a third-party source (API) or your own database

SUMMARY

- Work with AJAX & APIs
- Be able to develop data models for small and medium size apps

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