MongoDB and PHP

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Who is this fellow?

Paraguayan :-)

Zealot of

- Open Source (BSD-license)
- PHP
- MongoDB

PHP/PECL Developer

Work for a cool company (btw, we're hiring)

... and few other things

MongoDB

<EN>Mongo</EN> != <PT>Mongo</PT>

Document oriented database

Fast, Scalable, Easy to use (devel-friendly)

Support Indexes

- Simple
- Compound
- Geo spatial

Schemaless

Support sharding

Nested documents

PECL client

Documents?

It's just an Array()

In fact everything is an Array() in MongoDB

http://bit.ly/mongodb-php

MongoDB - Operations

Select

- $gt, $lt, $gte, $lte, $eq, $neq: >, <, >=, <=, ==, !=
- $in, $nin, $or
- $size, $exists
- $where: Any javascript expression
- group()
- limit()
- skip()

Update

- $set
- $unset
- $push
- $pull
- $inc
- findAndModify()

Is it better than MySQL (or Pg)?

NO.

It is different.

Differences with a rel. database

Denormalize data is not bad

- It makes queries simplest and faster
- Disk-space is much cheaper than CPU (and your user's time)
- Much simple to distribute data across multiple nodes

No CPU wasting doing ORM

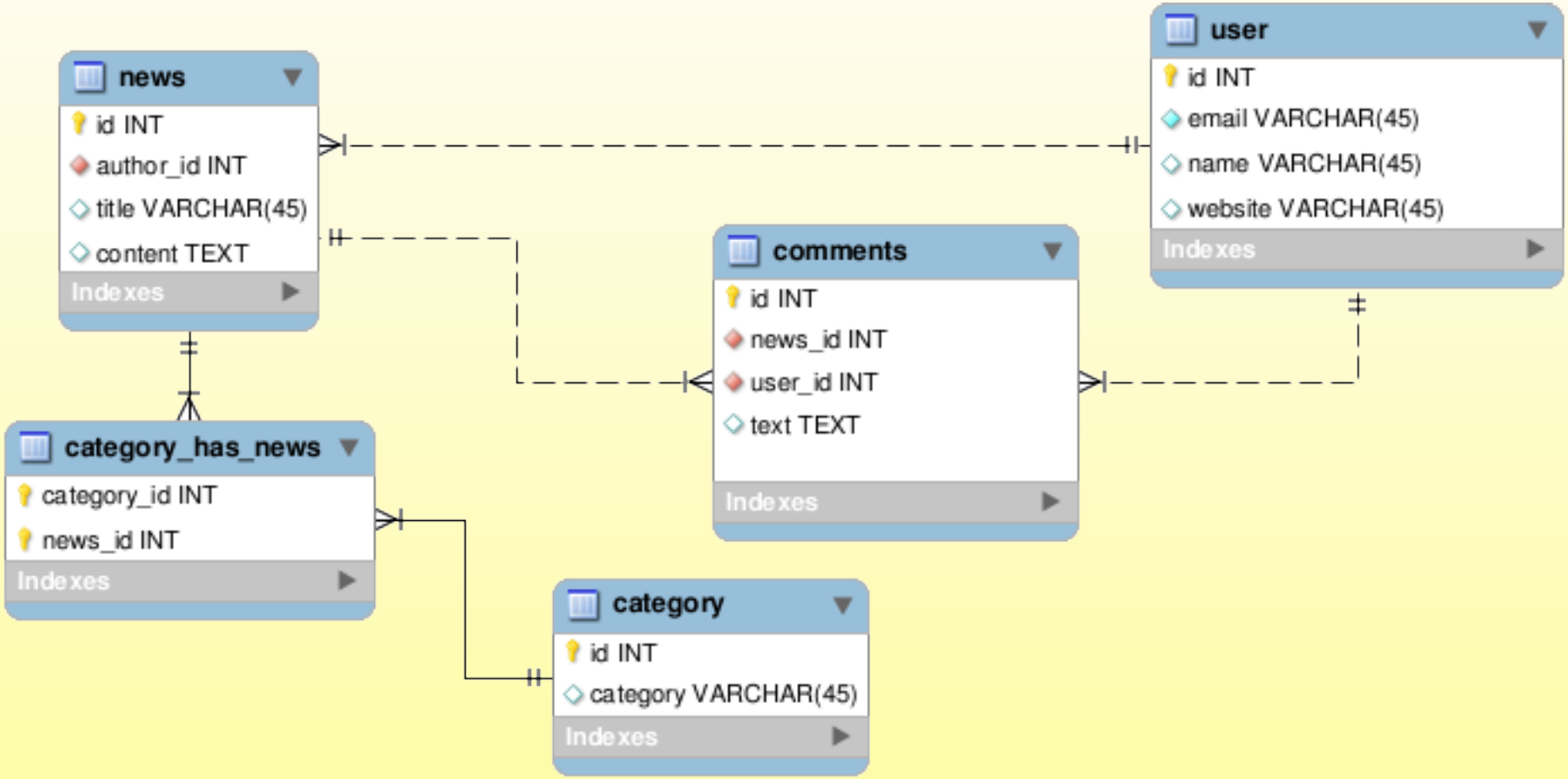
- Objects in the programming language and in the database
- No abstraction to generate SQL

No SQL injection :-)

No Joins (they are evil!)

Batch processing

No CREATE TABLE (or ALTER TABLE) needed


news
id INT
author_id INT
title VARCHAR(45)
content TEXT
Indexes
user
id INT
email VARCHAR(45)
name VARCHAR(45)
website VARCHAR(45)
Indexes
comments
id INT
news_id INT
user_id INT
text TEXT
Indexes
category_has_news
category_id INT
news_id INT
Indexes
category
id INT
category VARCHAR(45)
Indexes

The fun part

Data-structure

```
$user = array(
    'name' => 'crodas',
    'email' => 'crodas@ferpectos.com',
    'website' => 'http://cesarodas.com',
);

$category = array(
    array('name' => 'Sport', 'description' => 'foo'),
    array('name' => 'Politcs', 'description' => 'bar')
);

$comment = array(
    'news' => $news['_id'],
    'text' => 'I like MongoDB',
    // these are duplicated!
    'name' => $user['name'], /* 'crodas' */
    'website' => $user['website'], /*'http://cesarodas.com',*/
);
```

```php
$news = array(
    'title' => 'My Talk about MongoDB',
    'content' => 'MongoDB rules, bla, bla!'
    'author' => $user['_id'],
    // duplicated items
    'authorName' => $user['user'],
    'categories' => array(
        // copy all categories (incuding _id and name)
        array('id' => $category[0]['_id'], 'name' => $category[0]['name']),
    ),
    'comments' => array(
        // copy 10 comments (we show 10 comments and pagination buttons)
        $comment[0],
        $comment[1],
    ),
    // total comments for this news, to made easier pagination
    'totalComments' => count($comment),
);
```

Select

```
// MySQL
"SELECT news.*, user.name FROM news
INNER JOIN user ON user.id = news.author_id  WHERE id = 1"

"SELECT category.category FROM category_has_news
INNER JOIN category ON category WHERE news_id = 1"

"SELECT * FROM comments
INNER JOIN user ON user.id = comments.user_id
WHERE news_id = 1"

// In MongoDB
$mongo = new MongoDB;
$db = $mongo->database;

$news = $db->news->find(array('_id' => 1));
```

Select

```
// Get 10-most commented news
$db->news->find(array())->sort(array('totalComments' => -1))->limit(5);

// MySQL
// I'm bored to think in SQL
```

Add new comment

```
$query = array('_id' => $_POST['news_id']);
$properties = array('totalComments' => true);
$news = $db->news->findOne($query, $properties);

if (empty($news)) throw new Exception("not valid news");

$new_comment = array(
    'name' => $_SESSION['user']['name'],
    'website' => $_SESSION['user']['website'],
    'text' => $_POST['text'], 'news' => $_POST['news_id'],
);
$db->comment->save($new_comment);

$update = array('$inc' => array('totalComments' => 1));
if ($news['totalComments'] < 10)
    $update['$push'] = array('comments' => $new_comment);
$db->news->update($news, $update);
```

What if the user changes its name?

Update

We're duplicating the user name in several places

Update the name in every collection

MongoDB can update multiple documents at once

Update

```
// Catch the update event somewhere in your app and run this:

// update comments
$update = array(
    '$set' => array('name' => $new_name)
);
$opt = array('multiple' => true);
$db->comments->update(array('news' => 1), $update, $opt);

// update news (and embed comments)
$update = array( '$set' => array('comments.name' => $new_name );
$db->news->update(array('comments._id' => $user_id), $update, $opt);

$update = array( '$set' => array('authorName' => $new_name) );
$db->news->update(array('author' => $user_id), $update, $opt);
```

What about schema migration?

Schemaless

We don't have constraints in the DB

Update the name in every collection

MongoDB can update multiple documents at once

Update Schema

```
// MySQL
"ALTER TABLE news ADD COLUMN url VARCHAR(250) NOT NULL"

// MongoDB (simple version – one node)
foreach ($db->news->find() as $news) {
    $query = array('_id' => $news['_id']);
    $update = array('$set' =>
        array('url' => get_url_from_title($news['title']))
    );
    $db->news->update($query, $update);
}
```

Update Schema

```
// better approach (can run multiple instances safely)
while (true) {
    $news = $db->command(array(
        'findAndModify' => 'news',
        // where url doesn't exists (much better than $exists => false)
        'query' => array('url' => null),
        // set a new value for url, diff than null
        'update' => array('$set' => array('url' => ' ')),
    ));
    if ($news['ok'] != 1)  break;
    $query = array('_id' => $news['value']['_id']):
    $update = array('$set' => array('url' => get_url_from_title($news['value']['title'])));
    $db->news->update($query, $update);
}
```

Beyond SQL!

Store files

No need of any distributed File system

Each file has a checksum

100% customizable

- Open data structure
- You can extend it to support locking
- You can save as much meta data as you want

Works in a sharded-environment

Native extension for NGINX

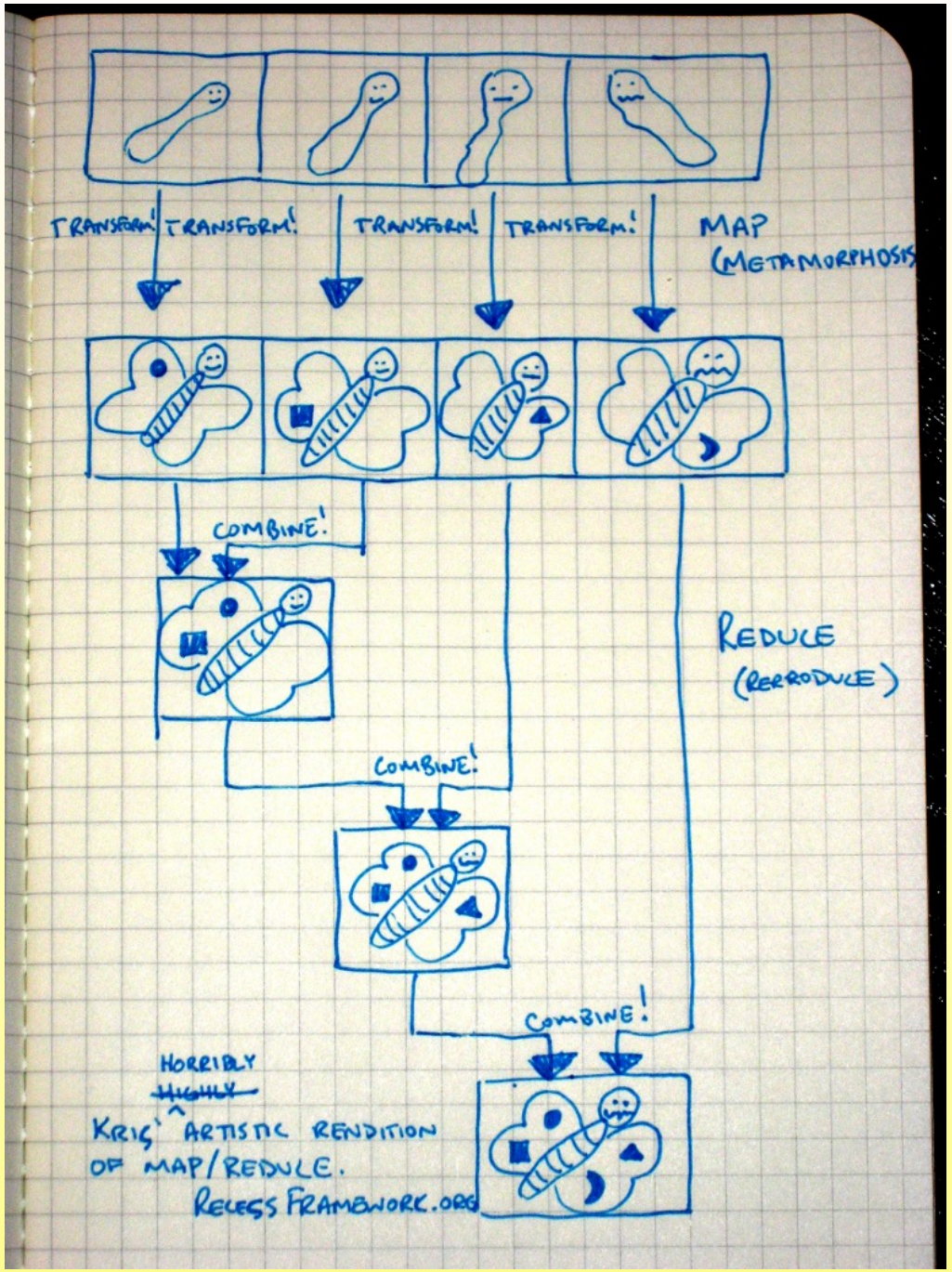
Store files

```
$grid = $db->getGridFS();

$metadata = array(
    "whatever" => "metadata",
    "path" => "/foo",
    "download" => 0
);

$grid->storeFile($filename, $metadata);

// or

$grid->storeBytes($bytes, $metadata);

// Or (save $_FILE['foo'])

$grid->storeUpload('foo', $metadata);
```

Read file

```
$grid = $db->getGridFS();

$file = $grid->findOne(array('path' => '/foo'));

// update download
$update = array('$inc' => array('download' => 1));
$id = array('_id' => $file->file['_id']);
$grid->update($id, $update);

// print it
echo $file->Bytes();

// or (a bit better)
$tmp = '/tmp/apache/' . $file->file['_id'];
if (!is_file($tmp)) $file->write($tmp);
virtual($tmp);
```

Map/Reduce


TRANSFORM!
TRANSFORM!
TRANSFORM!
TRANSFORM!
MAP
(METAMORPHOSIS)
COMBINE!
COMBINE!
COMBINE!
REDUCE
(REPRODUCE)
HORRIBLY
~~HIGHLY~~
KRIS' ARTISTIC RENDITION
OF MAP/REDUCE.
RECESS FRAMEWORK.ORG

Map/Reduce

Well known (Google's) map/reduce approach to process tons of data

Move the computation where the data is

Similar to GROUP BY, but more powerful (Javascript)

One function is applied to each news (map)

Map() produces 0 to N new values (key, value)

MongoDB sort everything by key.

Reduce is called for each (key, values) and return 1 value

Map/Reduce

```
// This method will be executed for each news
var $map = function() {
    // if the document doesn't have categories
    if (!this.categories) {
        // return nothing
        return;
    }
    for ($index in this.categories) {
        // return (several times) a new document
        // with _id: category_name, and value: 1
        emit(this.categories[$index].name, 1);
    }
}
```

Map/Reduce

```
// we get (category.name, [1, 1, 1, 1]) and we
// return the sum to get {_id: category.name, value: 4}
var $reduce = function($key, $values) {
    var $count = 0;
    for ($index in $values) {
        $count += $values[$index];
    }
    return $count;
}
```

Questions?

Thanks

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