Assessment Test

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| --- | --- | --- | --- |
| First name: | Roy | Date of submission: | Juanuary 28, 2015 |
| Last name: | Taza Rojas | Time to complete (hrs): |  |
| Educational Institution: | Universidad Peruana de Ciencias Aplicadas | Hrs. avail. per week |  |
|  |  | Score: |  |

## Introduction

The purpose of this test is to evaluate the applicant's technical knowledge for the position and his talent to face new challenges.

Unlike many tests, this assessment looks to replicate how real life is in the IT industry: The ability to find solutions and answers in a reasonable time period.

So we do not expect that the applicant masters all the fields the questions are related to, but the applicant's ability to do research, ask the right persons and come up with a solution.

But we recommend the applicant not to answer questions that he don't understand with all the background he already has. So having strong theory and knowledge in Software Development is a must.

## Rules and Recommendations

These are the **rules** to follow to be able to qualify for the test:

- Submit the completed Assessment Test before the deadline (see Test Duration)

- Complete every answer with an explanation.

- Document code when applies.

**Recommendations**:

- Complete the test in English. It is not mandatory but it will definitely add value to the application.

- Propose more than one solutions when possible, and explain why each one has its one merits.

- Use Google, books or any other source to answer the test. In any case, the applicant should explain and demonstrate that he understands the question and answers provided.

## Methodology

After being contacted by the recruiter, the applicant should receive an email with this test. If you have any question about the test, please contact the recruiter.

The applicant should submit the completed test by email with any attachment that he might consider appropriate.

The applicants who passes the assessment will be contacted by a recruiter to arrange an interview. In that interview we will validate that the applicant actually completed the assessment by himself and we will also check the English level.

## Test Duration

The applicant has **3 days** to complete the test from the moment he received the call from the recruiter explaining the test. The deadline is at 12am GMT+5. For the person who has knowledge in all these areas, the full exam can be answered in less than 2 hours.

## Questions

For all the test's purposes, the programming language to use is PHP. It is recommended to provide a link where the code can be tested. Bonus questions are optional but will help compensate when other questions can't be answered.

## PHP

Answer the following questions:

a. What command do you use to output data when you are testing functionality:

**var\_dump**— Dumps information about a variable.

The function displays structured information about the expression that receives as parameter.

void var\_dump ( [mixed](http://php.net/manual/en/language.pseudo-types.php#language.types.mixed) $expression [, [mixed](http://php.net/manual/en/language.pseudo-types.php#language.types.mixed) $... ] )

Source: http://php.net/manual/en/function.var-dump.php

b. Using a PHP function if it exists or by creating a custom function, convert a string such as "red, green, yellow, blue" into an array like this: array(0=>"red", 1=>"green", 2=>"yellow", 3=>"blue")

**preg\_split** — Split string by a regular expression. In this case, split the phrase by any number of commas or space characters,which include " ", \r, \t, \n and \f

<?php

$colorString = "red, green, yellow, blue";

$colorArray = preg\_split("/[\s,]+/", $colorString);

print\_r($colorArray);

?>

Source: http://php.net/manual/en/function.preg-split.php

c. From the previous array, extract the 2nd element into a variable so the array is left with only 3 elements.

**F**irst extract the 2nd element, then delete the element from the array and order the indices of the array.

<?php

$extractedElement = $colorArray[1];

unset($colorArray[1]);

array\_values($arrayAnswer);

print\_r($extractedElement . PHP\_EOL);

print\_r($colorArray);

?>

Source: http://php.net/manual/en/function.unset.php

d. Merge the array with a similar one but with the colors in Spanish

**array\_merge** — Merge one or more arrays

<?php

$spanishColorArray = array("rojo", "amarillo", "azul");

print\_r(array\_merge($colorArray,$spanishColorArray));

?>

Source: http://php.net/manual/en/function.array-merge.php

**Bonus:** Create a function that receives the 2 previously created arrays and merge them into an new array like this: array("red" => "rojo", "yellow" => "amarillo", "blue" => "azul")

**array\_combine** — Creates an array by using one array for keys and another for its values

<?php

print\_r(array\_combine($colorArray,$spanishColorArray));

?>

Source: http://php.net/manual/en/function.array-combine.php

## Algorithms

Using PHP, create a method that transforms an $arrayA into a where clause from a SQL statement

called $stringB. In the example, S, N and B represent String, Number and Binary types.

$array A => **array**(

// Associative array of custom 'AttributeName' key names

'AttributeName1'=> **array**(

'AttributeValueList' => **array**(

**array**(

'S' => 'Value1',

'N' => 'string',

'B' => 'string',

'NULL' => **true** || **false**,

'BOOL' => **true** || **false**,

),

),

// ComparisonOperator is required

'ComparisonOperator' => 'string',

),

// ... repeated

$string A => 'WHERE AttributeName1 ComparisonOperator1 Value1 AND AttributeName2 ComparisonOperator1 Value2**..."**

**Bonus:** Create and algorithm to do the opposite: Transform a where clause into an array.

## UI

Create a webpage with HTML, CSS and Javascript/JQuery that presents:

- A header of 100px high always at the top of the page with any size of window.

- A footer of a 80px high always at the bottom of the page with any size of window.

- The main page or container is 100% the width of the window and up to 1200px maximum. After that it keeps 1200px width but centered in the browser window.

- Use different colors for each section.

**Bonus:** Add a navigation menu using Twitter Bootstrap. The content to the menu is up to you.

I used the code below to resolve this excersice.

<html>

<head>

<title>5.3. UI</title>

<style>

html,body {

margin:0;

padding:0;

height:100%;

}

#wrapper {

min-height:100%;

position:relative;

}

#header {

background: blue;

padding:100px;

}

#content {

background: gray;

padding-bottom:80px;

min-height: 5px;

width: 100%;

max-width: 1200px;

margin: auto;

}

#footer {

background: green;

width:100%;

height:80px;

position:absolute;

bottom:0;

left:0;

}

</style>

</head>

<body>

<div id="wrapper">

<div id="header">

</div>

<div id="content">

</div>

<div id="footer">

</div>

</div>

</body>

</html>

## Object Oriented Programming

a. Create a class that handles Command that inherits from the BasicCommand class. Propose any attribute you want. In the constructor, make sure you invoke the parent's constructor. Explain why inheritance is useful and why not use interfaces.

<?php

class BasicCommand {

public $name;

public $state;

public function \_\_construct($name, $state){

$this->name = $name;

$this->state = $state;

}

}

class Command extends BasicCommand {

public $type;

public function \_\_construct($name, $type, $state){

parent::\_\_construct($name, $state);

$this->type = $type;

}

}

?>

The inheritance is useful for abstracting and defining functionality without repeating so much code, and re-implementing the functionalities without changing all the classes that share the same parent.

b. Create a class that handles Events that implements a BasicEvent Interface that has 2 methods: register and boot. Implement both method with any code you like. Explain why interfaces are useful and why not use inheritance.

<?php

interface BasicEvent {

public function register();

public function boot();

}

class Event implements BasicEvent {

public $type;

public function \_\_construct($type){

$this->type = $type;

}

public function register(){

return "The event of type " . $this->type . "was registered.";

}

public function boot(){

return strlen($this->type);

}

}

?>

Interfaces are useful when the methods of the parent class have the same functionality name but are implemented in different ways. It’s good to use interfaces to make standards of variables and functions names.

c. Create a trait called SoftDeleting, with a delete method and use it in the previous 2 classes. Explain why traits are useful.

<?php

**trait SoftDeleting {**

**public function delete(){**

**echo "I'm the delete function!";**

**}**

**}**

class BasicCommand {

public $name;

public $state;

public function \_\_construct($name, $state){

$this->name = $name;

$this->state = $state;

}

}

class Command extends BasicCommand {

**// trait**

**use SoftDeleting;**

public $type;

public function \_\_construct($name, $type, $state){

parent::\_\_construct($name, $state);

$this->type = $type;

}

}

interface BasicEvent {

public function register();

public function boot();

}

class Event implements BasicEvent {

**// trait**

**use SoftDeleting;**

public $type;

public function \_\_construct($type){

$this->type = $type;

}

public function register(){

return "The event of type " . $this->type . "was registered.";

}

public function boot(){

return strlen($this->type);

}

}

?>

Traits allows to re-use a group of methods and use those methods on classes independent between them. the application of class members without requiring inheritance.

Source: http://php.net/manual/en/language.oop5.traits.php

**Bonus:** Create a static method in the Command class that creates a new Event.

<?php

class Command extends BasicCommand {

// trait

use SoftDeleting;

public $type;

public function \_\_construct($name, $type, $state){

parent::\_\_construct($name, $state);

$this->type = $type;

}

**public static function newEventCreation(){**

**$newEvent = new Event("Beach");**

**$newEvent->register();**

**$newEvent->boot();**

**}**

}

?>

## Relational Databases

a. Create a database schema that support ACL functionality with these characteristics:

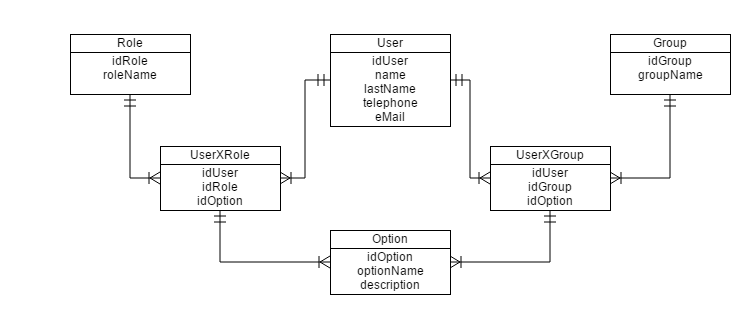
- I want to support User, Roles and Groups

- A user can have multiple Roles and belong to many Groups

- A Role can be assigned to several Users.

- A Group can be composed by any number of Users

- I want to control access to menu options for an application that can have any number of menus.



b. Given a table Users and Roles, provide the SQL statement that get the list of all Users that don't have an specific Role ABC but belong to a Group XYZ.

Select \*

From User u join UserXRole uxr on u.idUser = uxr.idUser

join Role r on r.idRole = uxr.idRole

join UserXGroup uxg on u.idUser = uxg.idUser

join Group g on g.idGroup = uxg.idGroup

Where r.roleName != “ABC” and g.groupName = “XYZ”

c. What are transactions? Why are they important?

The transactions are a set of operation that are executed like an only one block, it means, if an operation fails, all the operations of the transaction too. If a transaction has success, the modifications are confirmed and saved permanently in the database.

Transactions are important because they allow to make safe operations, avoiding losing important data.

**Bonus:** For question a, add support for access to specific links not accessible from menus.

## Document versioning

a. What tools have you used for control versioning. Have you used GIT?

I´ve used Git and I have my account in GitHub.com: RoyTR. I have contribuited to some repositories like PeruRetouchProject and MatriculaFacil.

b. Using GIT, how do you connect your local repository with your remote repository in Github

*Following the next steps if the project is new:*

$ git init

$ git add .

$ git commit –m “Commit comment”

$ git remote add origin *gitRepositoryUrl*

$ git push origin master

*remote name : branch*

*Adding a new file to commit:*

$ git add .

$ git commit –m “Commit comment”

$ git push origin master

c. Using GIT, how do you rollback the last commit you did in your local repository?

$ git reset --soft HEAD~1

The format of the function is: $ git reset HEAD~N, where N is the number of commits.

Source: http://stackoverflow.com/questions/2618989/how-can-i-remove-my-last-commit-in-my-local-git-repository

d. Using GIT, how do you avoid adding to the repository specific files like public images or so?

I avoid adding to the repository specific files using .gitignore file. This file contains folders and files extensions that will be ignored to commits.

**Bonus:** Create a public Github account and push all the answers into a repository. Provide the link to review the code. If you are familiar with Bitbucket, you can work with that service instead.

In this link is my repository. I´ve made some commits. I’m including this test, if it can´t be there please send me a message.

<https://github.com/RoyTR/AssessmentTest.git>

## MVC

- Explain the benefits of using an MVC approach. Mention any limitation or drawback.

MVC separates business logic (model), presentation (view) and request (controller), then easier maintenance is achieved in the applications (if we want to execute the application in a cellphone, we only have to create a new view, and the controller and the model don’t change). With MVC we get ease to make unit tests, reuse components, easy maintenance, scalable development and facility to develop prototypes.

On the other hand, there are disadvantages of using MVC, which in my opinion the most significant is the large number of files that have to be created and maintained, this due to the distribution of components that MVC requires.

- Mention all the MVC frameworks used in the past, if any.

I have used ASP.NET MVC at the university and a little about JSF for about 2 weeks.

**Bonus.** Research the 4 most popular MVC frameworks available today and make a comparison analysis.

## Project Management

- What is Agile Scrum. Have you used it in the past? How is it different in comparison with Waterfall methodology.

Agile Scrum is an agile development characterized by:

* Instead of planning and full implementation of the product, the strategy is incremental development.
* Trust that the quality of the result is the knowledge of people in self-organizing teams than the quality of the processes used.
* Flexibility to changes and productivity.

I’ve used Scrum in one project at the university. Our product was MatriculaFacil and was made with some springs.

Waterfall methodology is about phases, one phase after another, it’s hard to go back to another phase. On the other hand, Scrum allows to add requirements while the development, it’s easier to change requirements with Scrum than witch Waterfall.

- What are the roles for Agile Scrum? What are their responsibilities?. What role will you be assigned as Software Developer?

Roles for Agile Scrum:

**Product Owner** represents client voice. He ensures the team works properly from the perspective of the business. He writes User Histories, organize them and put them in the Product Backlog.

**Scrum Master** remove the obstacles that makes the team can’t reach the objectives of the sprint. He isn’t the team leader but makes the rules are followed.

**Development Team**. They have the responsibility to deliver the product. Everyone in the team has the abilities to make a good team work.

**Stakeholders** make possible the project. They only participate directly during the sprint review.

**Managers** establish the environment for the product development.

As software developer I would be assigned to Development Team.

- What reports/tools do we have available to analyze the project progress? Explain.

**Product backlog** is a document for all the project. It has generic descriptions, desirable functionalities, etc. It is open and can be modified only by the product owner. Also, it has estimations about the project like the benefits for the business and effort required for development. This estimation helps the product owner to adjust the temporal line of priorities of the different tasks.

**Sprint backlog** describes how the team will implement the requirements during the next spring. The tasks are divided in hours (maximum 16 hours, otherwise, it has to be divided in little task). The tasks in the sprint backlog are not assigned, they´re taken by the members of the development team.

**Burn down chart** is a picture that shows how many requirements from the backlog of the project are pendent at the beginning of each spring, so we can see the project progress.

**Bonus.** Research the 4 most popular Agile Scrum tools available today and make a comparison analysis.

## NoSQL Databases

a. Why NoSQL are important? What are the differences with Relational Databases?

Nowadays, there are millions of people surfing in the internet, and the applications have to be able to support this amount of visitors, so NoSQL is important for big data. NoSQL Databases simplifies the interaction between the application and the database and can scale and change easily.

The difference with Relational Databases are the scalability, NoSQL scale horizontally while Relational Databases vertically. In Relational Databases is harder to make changes than in NoSQL databases.

b. How would you protect your application so you avoid developers mistakenly updating data using wrong attribute names/types?

I would make a document with a convention of names and types for every kind of variable and data and I would make that everyone in the team review it so everybody know what to do.

c. Create a NoSQL Schema for question 5.5. a, using DynamoDB.

**Bonus.** What means Horizontally Scaling and why is important?

Horizontal Scaling means (talking about databases) that the size of the DB can grow without limits and **complications**. This is the great advantage of NoSQL Databases and the reason why they can save big data.

## Behavioral Questions

In this section, there is not right or wrong answer. The goal of this is to know how would you approach real life scenarios. You can choose multiple answers (specify sequence when applies).

1. You are working on a functionality you are assigned. You have several questions, so you:

a).  Call your manager to ask all the questions you have

b).  Send an email to your manager to ask for a meeting to solve all your questions

c).  Read all the documentation you a have been provided to look for answers

d).  Contact a peer/team member to ask questions

e).  Wait until the next programmed meeting to avoid interrupting others.

2. You are asked to code some task that is new to you, so you:

a).  Start from scratch to avoid wasting time doing research

b).  Tell your manager you are not the best person to code the task

c).  Ask all the team members for any advice to reuse code

d).  Go to Google and start searching for the best solution available

e).  Ask you manager for more time or to postpone the task.

3. You know that an estimation for one of your tasks is probably wrong, so you:

a).  Report immediately in the next meeting about this and propose a new estimation

b).  Try to do your best to complete the task in that time, to avoid the inconvenience

c).  Ask for help from other team members to finish your task

d).  Work hard, doing extra-time to complete the task

e).  Request the manager to reassign the task to a team member with more knowledge

4. You are asked for help from other team member, so you:

a).  Ask the team member for a time later during the day to talk about the issue

b).  Immediately leave all your tasks on hold and try to provided help as soon as possible

c).  Tell him you are busy and that he should contact the manager for help

d).  Help your peer but ask the manager for more time to compensate for your help

e).  Guide your peer through some guidelines so he can find the answer by himself

5. You are coding a functionality and while examining the available solutions, you:

a).  Choose the fastest solution so you can do some catch up with other activities

b).  Choose the best solution available

c).  Talk about the options available in your next meeting to ask for suggestions

d).  Choose the best solution for the project in terms of flexibility and maintenance cost

e).  Choose the best solution that you can deliver in the time assigned for the task

**THANK YOU FOR YOUR TIME!**