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| **Oil Transaction System** |
| Trade Your Way! |
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| Bhargavi Ravula(bxr140530)  Chitra Harihara Pranadarthan(cxh141330)  Purva Dahake (pad140130)  Rahul Ratnagiri(rxr146230) |
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**1. PROBLEM STATEMENT:**

Motivated by the recent increases in oil prices, a good friend asked help to develop software to assist traders working in her company in managing oil transactions issued by customers. In particular, she wants us to create convenient and easy-to-use software for oil traders who are trying to buy and sell oil for their clients. Thus to help her, we developed a software system called OTS (Oil Transaction System) that is based on a relational DBMS and modern technologies such as PhpMyAdmin.

**2. DESCRIPTION GIVEN AND ASSUMPTIONS MADE:**

* There will be only one manager but there can be multiple users.
* User can be a manager, trader or a client.
* Users have login information: auto-generated user\_id, user\_type, custom login\_name and passwords.
* Users have personal information: name(first and last), address(street address, city, state, zip code), phone number, cell phone number, email address.
* Clients have account information: amount due (to his trader), oil reserve (his oil stored by company), Oil Shipped to his Address.
* Clients will have a level. Each level will have a commission rate for both(gold and silver) oil and cash commission types.
* Silver clients are upgraded to gold at the end of every calendar month if he makes 30 barrels transactions in that month.
* Manager, Traders and Clients do not have any specific attributes.
* Every client is associated with one of the traders based on the choice of the client during registration. This association cannot be changed. (trader cannot drop from the system)
* Every transaction that the client makes goes through the trader he is associated with.
* Traders will have total visibility of information of the clients who are associated with him and can also issue trades on behalf of his clients.
* Transactions have a auto-generated transaction id, a transaction type(buy or sell), transaction fee, oil requested, commission amount, commission type(oil or cash), total amount, total oil.
* Clients can issue transactions for themselves or a trader can issue transactions for their clients. Date of request is stored.
* Traders can accept or reject transactions. Date of acceptance is stored. If rejected the transaction row is pushed into a log file(viewable by manager). Null value in date of acceptance field means the request is pending acceptance or rejection.
* Transaction fee is calculated based on the rate on the date of acceptance.
* Clients make payment transactions to settle their dues with their traders.
* Payment transactions have payment transaction id, amount paid, date of payment, date of acceptance.

**3.INTRODUCTION TO OIL TRADING SYSTEM:**

**Online Oil Trading:**

Clients can trade Crude Oil online with ease. Crude Oil is traded against the US Dollar. As a result, Crude Oil prices are at all times stated in US Dollars. On OTS trading platform, Crude Oil (CLD/USD) is priced per barrel, spreads are fixed at 6 pips and leverage is 1:200.

**Crude Oil Trading Details:**

The process of Crude Oil trading at occurs directly between buyers and sellers. Please note that the actual physical buying and selling of Crude Oil is not involved while trading Crude Oil with us, as this commodity is bought/sold for speculative purposes only. All Crude Oil prices on our trading platform are quoted in US Dollars and are per barrel.

**4. CODE OVERVIEW:**

**User – Client**

***Login/Register***

When the client logs in to the OTS homepage for the first time, the client has to register in the system. The client needs to provide his/her personal details like first name, last name, address information such as street, city, state and zip code and contact information such as his phone number and cell phone number. At the time of registration, the client also has to select one trader among the list of traders registered in the system. Once the client registers, he/she can now sign in to the system to make transactions.

Once the client signs in with his username and password, the client is redirected to his homepage wherein he/she is allowed three options – Buy, Sell and Pay.

***Buy***

When the client selects the buy option, the client is allowed to enter the amount of barrels he wants to buy and the commission type that he wants to select. Commission type is either cash or oil. If the client chooses to select commission by cash, then the commission amount based on the client level is computed and added to the transaction fee. This total amount is the amount the client has to pay for this transaction. If the client chooses commission type as oil, then based on the client’s level, the commission in oil is subtracted. Once the client enters the amount of oil he/she wants to buy and specifies the commission type and clicks submit, the transaction fee, total amount and total oil is computed and displayed. The client then has to confirm the transaction by clicking Confirm button.

There is an option for the client to ship the amount of oil he/she wants to buy. If the client selects the shipped option, then the account information of the client is updated. The amount of oil he/she wishes to buy will not be reflected in the client’s oil reserve as the oil will be shipped.

***Sell***

When the client selects the sell option, the client needs to enter the amount of oil he/she wants to sell. The amount of oil in barrels that the client wants to sell should be less than or equal to the client’s total oil reserve. If the client enters amount of oil in barrels greater than his/her oil reserve, then an error message is popped asking the client to enter a valid amount of oil in barrels. Once the client specifies the amount of oil he/she wants to sell and enters submit, the system updates the clients account information by adjusting the oil reserve of the client.

***Pay***

When the client selects the pay option, the client needs to specify for which transaction he/she wants to pay. So the client selects one transaction at a time to settle his/her costs. When the client selects the transaction he/she wants to pay, the payment information is stored. Also the system updates the clients account information by adjusting the total amount due by the client.

**User – Trader**

***Login/Register***

When the trader logs in to the OTS homepage for the first time, the trader has to register in the system. The trader needs to provide his/her personal details like first name, last name, address information such as street, city, state and zip code and contact information such as his phone number and cell phone number. Once the trader registers, he/she can now sign in to the system to process transactions.

Once the trader signs in with his/her username and password, the trader is redirected to his/her homepage wherein he/she is allowed the following options – Make a transaction on behalf of the client, Accept/Reject transactions, Accept/Reject Payments and Search clients.

***Make a transaction***

The trader can issue transactions on behalf of the client. The transaction can be either buy or sell. If the trader has to issue a transaction on behalf of the client, the trader first needs to enter the id of the client from the list of clients under his name.

***Buy***

The trader should specify the client id and choose the option buy. Now the trader needs to enter the amount of oil he/she wants to buy on behalf of the client and the commission type and enter submit. Based on the client level information, the system computes the transaction fee, total amount and total oil. The trader then needs to click on Confirm button to post the transaction.

***Sell***

The trader should specify the client id and choose the option sell. Now the trader needs to enter the amount of oil he/she wants to sell on behalf of the client. The amount of oil specified should be lesser than or equal to the oil reserve of the client the trader chooses. The trader then has to enter submit to post the transaction. The account information of the client that the trader chooses will be adjusted based on the amount of oil entered in barrels.

***Accept/Reject transactions***

When the trader logs in to the system, he/she can wish to accept or reject the transactions that have been posted by his clients. The trader then needs to specify the client for which he needs to accept or reject transactions. If the trader accepts the transaction, then the client account information is updated as well as the date of acceptance of the transaction is stored. If the trader rejects a transaction, a log file is created and the transaction is deleted. The trader can select any number of transactions that he/she wishes to accept/reject from the lit of transactions of the client the trader chooses.

***Accept/Reject payments***

When the trader logs in to the system, he/she can wish to accept or reject the payments that have been posted by his clients. The trader then needs to specify the client for which he needs to accept or reject payments. If the trader accepts the payment, then the client account information is updated as well as the date of acceptance of the payment is stored.

***Search clients***

The trader can search clients based on their first name or address information. When the trader specifies the search string and presses enter, the list of clients which satisfy the search string are listed. This option is for the traders to view the profile and account information of the clients.

**User – Manager**

***Login***

When the manager logs in to the OTS homepage he/she can view transactions history.

***View History***

The manager will be able to view the daily, weekly and monthly transactions. The manager can also view the list of traders, the clients with silver level and clients with gold level.

**5.TECHNIQUES USED TO AVOID SQL INJECTIONS:**

**SQL injection** is a code injection technique, used to attack data-driven applications, in which malicious SQL statements are inserted into an entry field for execution (e.g. to dump the database contents to the attacker).

**Escaping:** A straightforward though error prone way to prevent injections is to escape characters that have a special meaning in SQL. SQL allows creating a comprehensive [blacklist](http://en.wikipedia.org/wiki/Blacklist_(computing)) of characters that need translation. For instance, every occurrence of a single quote (') in a parameter must be replaced by two single quotes ('') to form a valid SQL string literal.

For example, in [PHP](http://en.wikipedia.org/wiki/PHP) it is usual to escape parameters using the function

 mysqli\_real\_escape\_string()

before sending the SQL query:

$mysqli = **new** mySqli('hostname', 'db\_username', 'db\_password', 'db\_name');

$query = sprintf("SELECT \* FROM `Users` WHERE UserName='**%s**' AND Password='**%s**'",

$mysqli->real\_escape\_string($Username),

$mysqli->real\_escape\_string($Password));

$mysqli->query($query);

This function prepends backslashes to the following characters: \x00, \n, \r, \, ', " and \x1a. This function is normally used to make data safe before sending a query to [MySQL](http://en.wikipedia.org/wiki/MySQL).   
There are other functions for many database types in PHP such as pg\_escape\_string() for [PostgreSQL](http://en.wikipedia.org/wiki/PostgreSQL" \o "PostgreSQL). The function addslashes(string $str ) works for escaping characters, and is used especially for querying on databases that do not have escaping functions in PHP. It returns a string with backslashes before characters that need to be quoted in database queries, etc. These characters are single quote ('), double quote ("), backslash (\) and NUL (the NULL byte).   
Routinely passing escaped strings to SQL is error prone because it is easy to forget to escape a given string. Creating a transparent layer to secure the input can reduce this error-proneness, if not entirely eliminate it.

### Pattern check: Integer, float or boolean parameters can be checked if their value is valid representation for the given type. Strings that must follow some strict pattern (date, UUID, alphanumeric only, etc) can be checked if they match this pattern.

### 6. SOFTWARE TOOLS AND ARCHITECTURE:

PHP

As a derivation of Perl, PHP, is a server side, user interactive, programming language, works nearly in on all platforms. We can say that it is a general purpose scripting language. It can be embedded into html. It can use various databases such as MySQL, SQL, Oracle, MS SQL etc. Also contains many server interfaces. Open source is one of the best specifications of PHP. Among several frameworks, the most popular one is zen .

MySQL

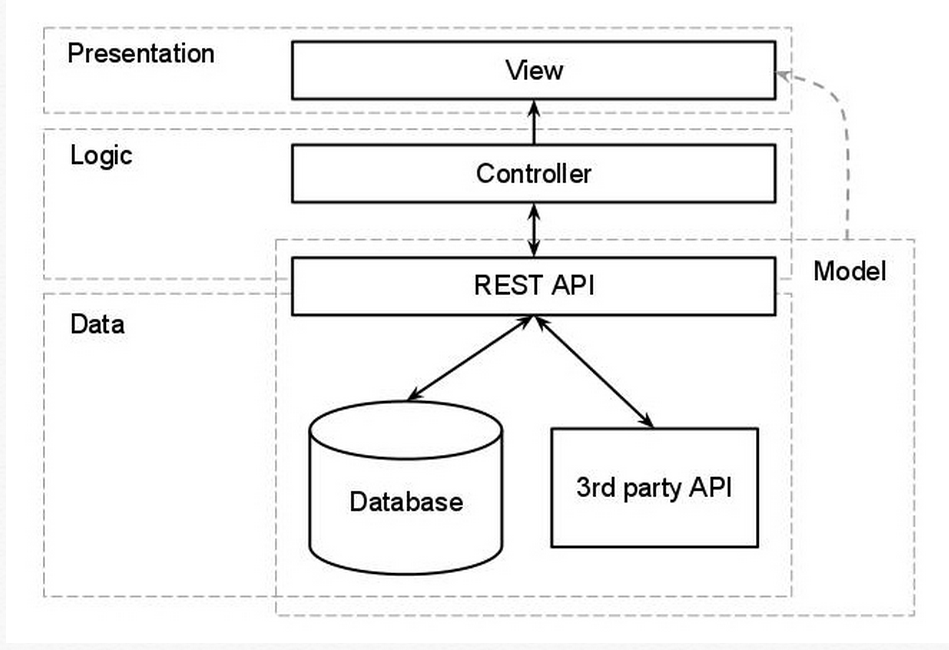
MySQL is the most popular open source database software. It is easy to use, fast and reliable. Also it is a good match with PHP

phpMyAdmin

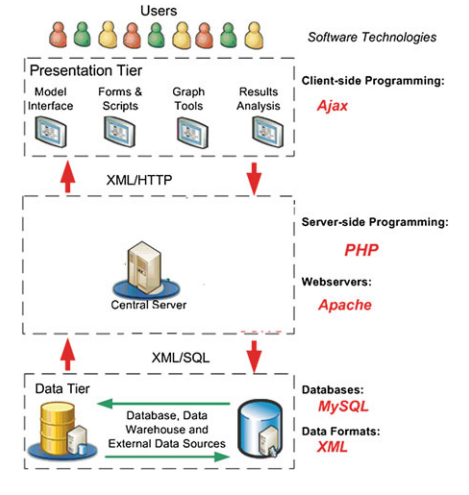
It is a software, coded with PHP. The main function of this software is to manage MySQL database through Internet. It can create databases, add/edit/delete tables, run SQL queries, manage user authorization and manage field keys are some of the features.

There are two important structures of the system is the database and the Graphic User Interface (GUI). In between, JavaScript and PHP provides the connection and interaction. GUI is located in the view section. With XHTML and CSS, the visual is generated. Javascript updates the HTML by the data sent by other layers and connects the GUI with working PHP structure. In the controller layer, dataflow decision codes take place which are Javascript and PHP.

And in the Model section, PHP logic base code is placed.

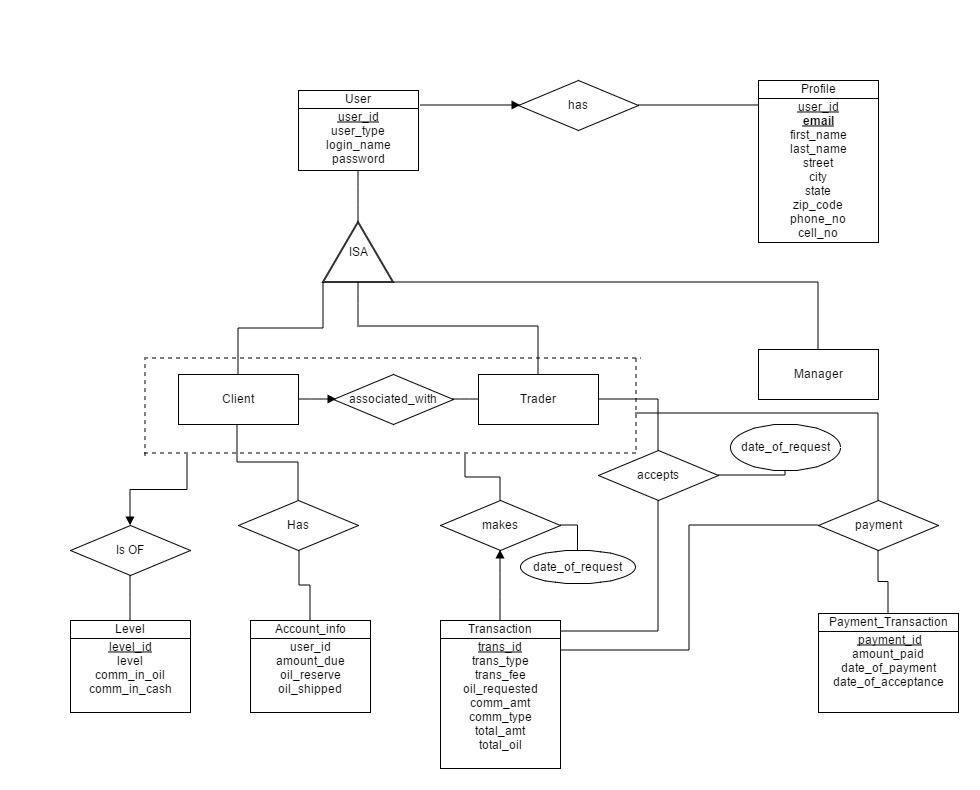


All codes are produced with CodeIgniter framework. The basic directory of the framework can be shown in the above figure, and a general look of OTS architecture is given in below.



APPENDIX A:

ER DIAGRAM:



APPENDIX B:

RELATIONAL SCHEMA:

