DEVELOPMENT OF WEB SERVICE RESTFUL PARTNER API INTEGRATED WITH EPP API FROM PANDI FOR INDONESIA CCTLD REGISTRATION AT QWORDS

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ABSTRACT

PT Qwords Company International is a company that sells domain name / ccTLD Indonesia to resellers. So far, the registration process of a domain name / ccTLD Indonesia is done manually by Qwords's resellers staff request to Qwords's registrar staff via email after that staff registrar login and process every ccTLD Indonesia registration in PANDI's application one by one which the process is slow and depend on the working hours of Qwords's registrar staff.

Web service support interaction and interoperability between systems on a network and the EPP API is a web service to process domain name/ccTLD Indonesia registration that provided by the PANDI registry only to registrars. In designing this web service, the author uses EPP API to connect reseller application with PANDI server as a problem solution in facilitating and accelerating the registration process of a domain name / ccTLD Indonesia.

The result of this research is by using this web service, the reseller staff and registrar staff can process domain name / Indonesia ccTLD registration easier, faster and not depends on registrar staff working hours.

Keywords: Application Programming Interface(API), Extensible Provisioning Protocol(EPP), Country Code Top-Level Domain(ccTLD), Restful, Web Service

1. INTRODUCTION

Domain Name Indonesia or ccTLD Indonesia is familiar to internet users, we can find a lot of Indonesian domain names are indexed in google search engine, there is used in government websites, online stores, company profile and even personal blog.

One of the companies that sell Indonesia domain name is PT Qwords Company International with the name of Registrar Qwords. In 2016, it has just registered to become one of the Registrar of the institution which is the central server for registration ccTLD Indonesia as known as PANDI, one of the benefits of being a Registrar is Registrar Qwords get access to the EPP API central server PANDI to register domain directly from the website owned By Registrar Qwords to make the registration process faster.

But the Registrar Qwords has not felt the benefits yet because the Registrar Qwords is still process the domain name registration manually, where Registrar Qwords Staff are required to login to the central server and then input one by one order and order data to the central server PANDI. Based on experiments conducted by the author for 10 times, the average processing time currently required for a single domain name is 6 minutes, whereas the domain is "who fastest the winner" and "one domain name for one person" so that everyone race to get a domain with a name they like or need, therefore is dangerous thing if the buyer who has paid does not succeed getting the domain he ordered because slow processing can cause domain already registered by other company.

In addition, PT. Qwords Company International here also acts as a reseller Domain of itself as a Qwords registrar, so basically Qwords buys a domain to a Qwords registrar then sells it to its client while selling its main product ie web hosting. Qwords resellers can market Indonesian domains and then inform them to Qwords Registrars thereby increasing sales of domains in Registrar Qwords. Unfortunately, with a process that is still manual, sales of Qwords cannot be maximal because of the long process and depend on the work hour and availability of the staff, which after the buyer has placed an order to the reseller Qwords website then the reseller Qwords staff make the order to the registrar Qwords via email and staff Qwords registrar login to the PANDI center server to fill in the details of the existing order from the email, if the Qwords registrar staff has ended their working hours or is not in working hours when the staff reseller Qwords already sent an order message then the domain registration process will be processed the next day.

Based on the above problem, it required a system that supports communication between client applications in this case is reseller Qwords and server in this case is the central server PANDI. It also required an application for online purchase of a

website to facilitate ordering / reseller Qwords in ordering a domain name.

The purpose of this research are:

1. Accelerate and simplify the registration process ccTLD Indonesia
2. Provide System that can serve the registration process ccTLD whenever needed without dependent on the presence or absence of staff registrar Qwords.

2. RESEARCH CONTENTS

2.1 Extensible Provisioning Protocol (EPP)

EPP or Extensible Provisioning Protocol is a layered XML state protocol that consists of several transport protocols. Protected by using the lower-layer security protocol, the client exchanges identification, authentication, and choice information, and then engages in a series of client commands initiated response exchange. All EPP commands are atomic (no partial success or partial failure) and are designed so that they can be created idempotent (execute commands more than once having the same net effect on the state of the system as it successfully executes the command once).

The EPP server must respond to client initiated communications (which can be either a bottom-layer connection or service discovery) by responding to the greeting process to the client. A server must respond promptly to every EPP command with a coordinated response describing the results of processing commands [1]. The following is a machine-server diagram illustrating the detailed message exchange process in Figure 1:

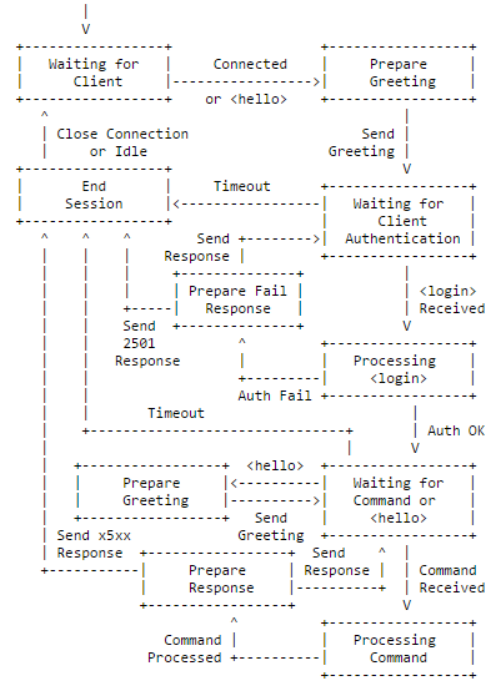


Figure 1. EPP *Server State Machine*

2.2 Web Service

Web service is a software system designed to support interaction and interoperability between systems on a network.

Web services are used as a facility that provides services (in the form of information or data) to other systems, so as to interact with the system through the services provided. Web services store data information in JSON or XML format, so this data can be accessed by other systems although different platforms, operating systems, and programming languages [2].

In general, the web service architecture can be seen in Figure 2 below:

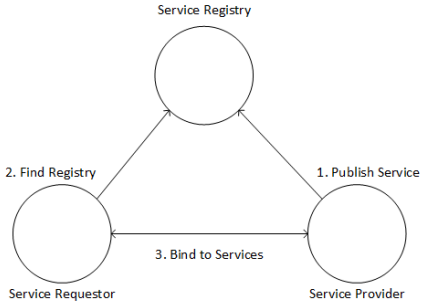


Figure 2. Architecture Web Service

In the figure above, there are three main components of the web service are:

1. Service Provider is a web service provider that serves to provide a collection of web services that can be accessed by the user.
2. Service Requestor is an application that acts as a user who performs a service request (a web service) to a service provider.
3. The Service Registry is the place where the service provider publishes its services. In the web service architecture, the Service registry is optional. [3]
4.

2.3 Restful

REST is a design philosophy that encourages us to use existing protocols and features on the web to map requests for resources on various representations and data manipulations on the Internet (Scribner, 2009).

REST is an architectural style that has rules like a uniform interface, so if the rules are applied to the web service will be able to maximize the performance of web services, especially on performance, scalability, and ease to be modified. In the REST architecture data and functions are considered as resources that can be accessed via Uniform Resource Identifier (URI), usually in the form of links on the web.

REST uses a stateless HTTP protocol. HTTP commands that can be used are GET, POST, PUT or DELETE functions. The results sent from the server are usually in the form of simple XML or JSON format without any packet data protocol, so the

information received is more readable and parsed on the client side.

In its application, REST is more widely used for resource-oriented web services. The purpose of resource orientation is an orientation that provides resources as a service rather than a collection of activities that process that resource. The form of web service using REST style is suitable for use as a backend of mobile based applications because of the easy access and the results of data that is sent in JSON format so that the file size becomes smaller [3]

2.4 *Application Programming Interface*(API)

API stands for application programming interface. APIs can provide links between third-party coworkers, partners, or developers to access data and services to build apps like iPhone apps quickly. Twitter and Facebook API are well known examples. There are APIs open to any developers, APIs that are only open to partners, and internally-used APIs to help run the business better and facilitate collaboration between teams. [4].

In the API partner approach, API providers use APIs to integrate and automate interactions with their partners. This approach is popular especially among businesses operating in a business-to-business market environment. Well-defined documentation will make it easier to integrate business processes when new business relationships are being built. APIs reduce the need for system-to-system integration adjustments and facilitate communication between partners that have been built and documented in advance and implemented using standard technology. [5]

2.5 Currently System Analysis

System analysis is a description of the system currently underway at PT Qwords Company International. The analysis that the authors do consists of analysis of system objects running, looking for weaknesses that run the system according to predetermined standards, and evaluate the system is running so as to generate new system design proposal. System analysis is the decomposition of a complete information system into its component parts with the purpose of identifying and evaluating the deficiencies that occur and the expected needs so that it can be proposed improvements.

The running system can be seen in Figure 3 below

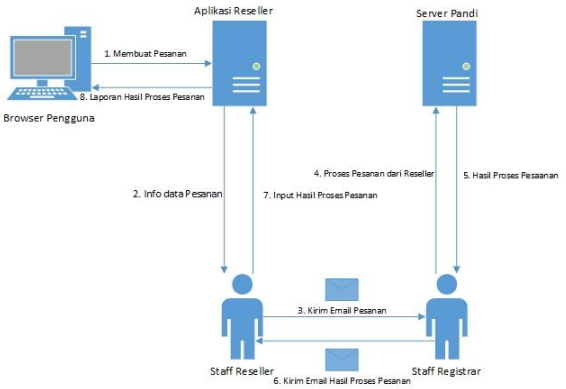


Figure 3. System architecture is running

Based on interviews with staff of Registrar Qwords and Reseller Qwords, the procedure of ordering domain name that is running in PT Qwords Company International is as follows:

1. Users access reseller application then do order domain name
2. Order data information is checked and checked by reseller staff on excel document
3. Reseller staff sends an email containing the details of the domain name order to the Registrar Staff's email address
4. Registrar Staff processes orders from Reseller in PANDI Server
5. Staff Registrar gets the order processing result from PANDI Server
6. Staff Registrar sends the result of order processing to Reseller Staff email address
7. Reseller staff input the result of order processing to Reseller application
8. Reports on orders can be accepted / read by Users

2.6 System Proposal Plan

In accordance with the current system analysis, the new system to be built is an Indonesian ccTLD ordering system on the Qwords reseller side connected to the Qwords registrar and integrated with the EPP API from PANDI, consisting of: Qwords reseller application used by users, applications Registrar Qwords, and PANDI Server Below is a description of the ccTLD domain name booking application in PT Qwords Company International, as shown in Figure 4 below



Figure 4. Architecture System to be built

Here's an explanation of the system architecture analysis.

1. Booking the domain name will be done using the Qwords reseller application used by the user
2. Booking the domain name by the User submitted to the application registrar Qwords via web service resful

3. Registrar Qwords application process web service request by checking the balance of existing deposit in Qwords reseller account, if sufficient registrar Qwords send request to PANDI server through web service / EPP API from PANDI, otherwise registrar Qwords return result parsing data in the form of information lack Balance on Qwords reseller account
4. PANDI server will process the request of the domain order and then issued a response in the form of information related to the domain name ordered
5. Registrar Qwords application stores information related to domain name then sends it to Qwords reseller application
6. Client got notification result of ordering process

The system to be built is the ordering system ccTLD Indonesia. For web-based applications owned by Qwords resellers to be able to place orders and input orders by the User, it must be provided device that can transfer data between web applications owned by Qwords reseller with application server PANDI in this case web based, in this case web service architecture can be seen In Figure 5 below

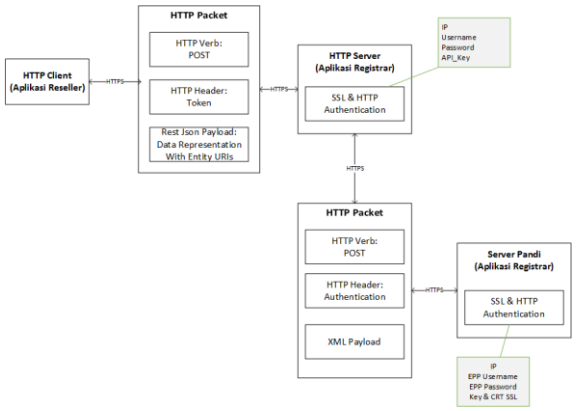


Figure 5. Web Service architecture

2.7 *Use Case Diagram*

Use case diagrams are used to model business processes and represent an interaction between actors and systems. Describing the function of a system from a user perspective, the use case works by describing the typical interaction between a user of a system and its own system through a story of how a system is used, the use case diagram can be seen in Figure 6 below

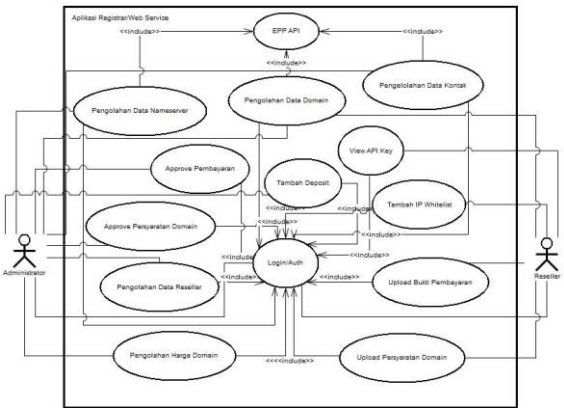


Figure 6. Use Case Diagram Registrar Application /Web Service

2.8 *Class Diagram*

Class diagrams describe the types of objects in the system and the various static relationships that occur. Class diagrams also show the properties and operations of a class and the constraints contained in relation to the object. Class describes the state (attribute or property) of a system while offering a service to manipulate the situation (method or function). Class diagram of the system to be built can be seen in Figure 7 below.

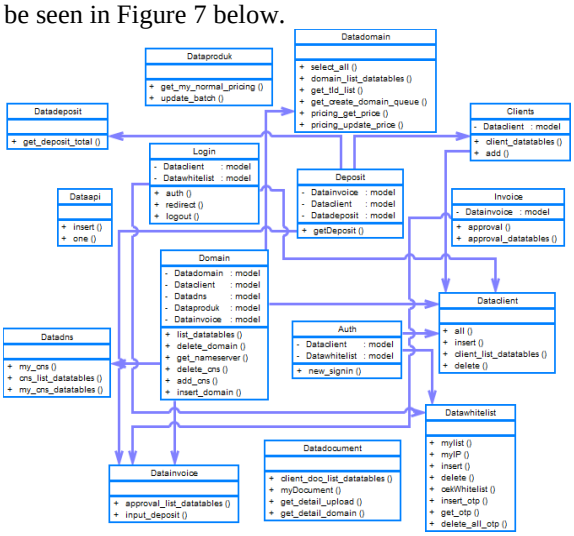


Figure 7. Class Diagram

2.9 Relation Scheme

Relation scheme or process of relationship between files is a combination of files that have the same primary key, so that the files become one entity connected by the key field. In this process the data elements are grouped into one database file with entities and their relationships. This registrar application relation scheme can be seen in Figure 8 below.

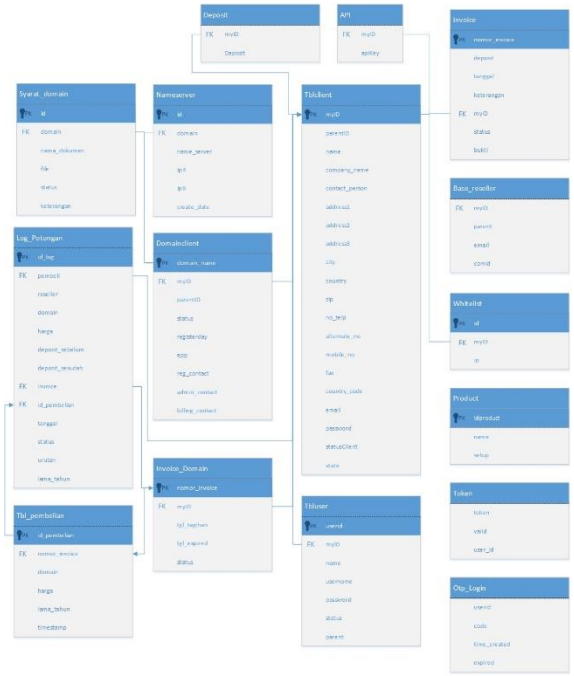


Figure 8. System Relation Scheme to be Built

2.10 Hardware Implementation

The hardware used during the implementation process of the web service system / Registrar application there are 2 parts of local computer and server computer:

1. Local Computer Hardware Specifications can be seen in table 1 below.

Table 1. Implementation of Local Computer Hardware

No	Hardware	Specification
1	Processor	Intel® Core™ CPU i5 @ 2.60GHz
2	Memory	RAM 16GB
3	VGA Card	2 GB
4	Harddisk	1,5 TB
5	Monitor	14 Inch Screen
6	Internet Connection	10 Mbps

1. Server Computer Hardware specification can be seen in table 2 below.

Table 2. Implementation of Server Computer Hardware

No	Hardware	Spesification
1	Processor	Intel® Core™ Xeon® CPU E5-2620 0 @ 2.00GHz
2	Memory	RAM 2GB
3	VGA Card	256 MB
4	Harddisk	200 GB
5	Internet Connection	1 Gbps

2.11 Software Implementation

The software used during the implementation process of the web service system / registrar application there are 2 parts of local computer and server computer:

1. Local Computer Software Specifications can be seen in table 3 below.

Table 3. Implementation of Local Computer Software

No	Hardware	Specification
1	Operating system	Windows 7 Ultimate
2	Browser	Browser Google Chrome
3	Source Code Editor	Notepad ++

1. Server Computer Software Specifications can be seen in table 4 below.

Table 4. Implementation of Server Computer Software

No	Hardware	Specification
1	Operating system	Linux Centos 6.8 64 Bit
2	Control Panel	Centos Web Panel 0.9.8.249 (For registrar application) Cpanel (on reseller application)
3	Web Server	Apache
4	Database Server	MySQL

2.11 Interface Implementation

Implementation of the interface is done with every page of registrar application built using the web. Here are some interface views that have been implemented.

Login is the application page registrar / dashboard can be seen in the picture 9 below

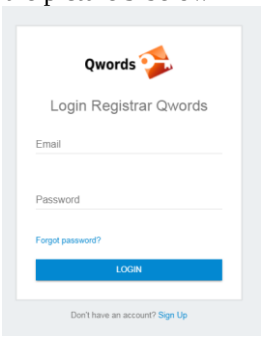


Figure 9. Login page

On the Login page there are 3 functions: A. Login Button Login in the click will do the auth process which if the email and password fields and IP are used accordingly it will take the user to the home page / homepage dashboard B. Forgot Password Forgot Password is provided for users who forgot their account password, if the user click it then it will bring the user to the form that

serves to resend the password to the user's email. C. Sign Up Sign Up is provided for new users who do not have an account yet. If the click will take the user to the user registration form.

Register domain is the application page / dashboard for web service / rest / register_domain consisting of 3 pages ie

a. Check Availability Domain

This page is used to check the availability of the domain so that users can choose the domain that is available to be ordered, the domain's check availability page can be seen in Figure 10 below

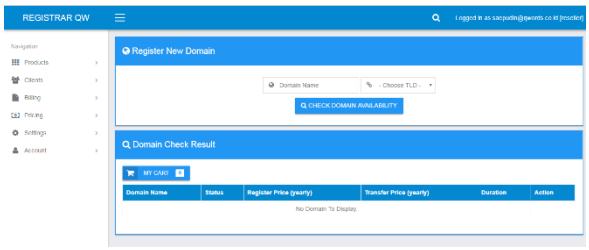


Figure 10. Check Domain Availability page

b. My Cart

This page is used to check the domain order and the price so that users can know the total cost required and choose the domain to be removed from the order, my cart page can be seen in Figure 11 below

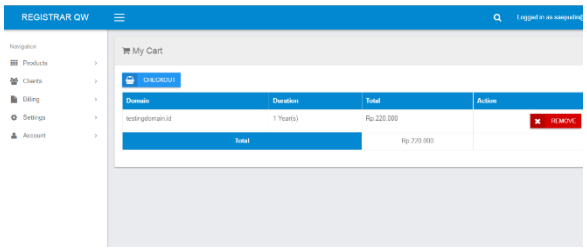


Figure 11. My Cart page

c. Checkout

This page is used for domain activation confirmation process so that user can activate domain already check in previous page. Checkout page can be seen in the picture 12 below.

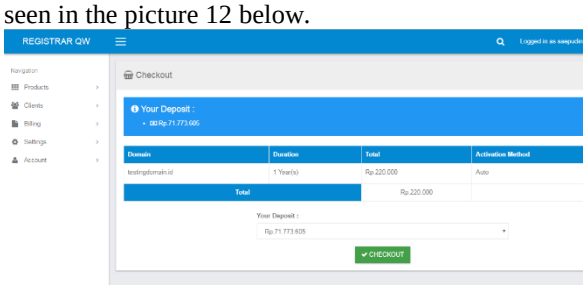


Figure 12. Page Checkout

Add child nameserver is an application / dashboard page in the form that can be seen in Figure 13 below

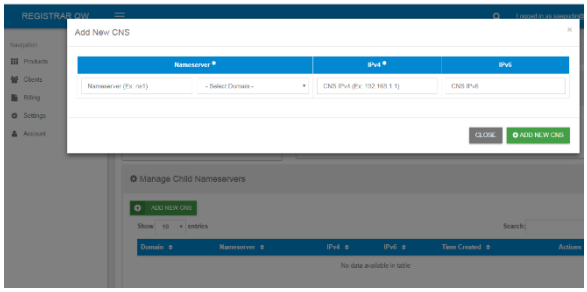


Figure 13. Page Add New CNS

Add clients is an application / dashboard page in the form that can be seen in Figure 14 below

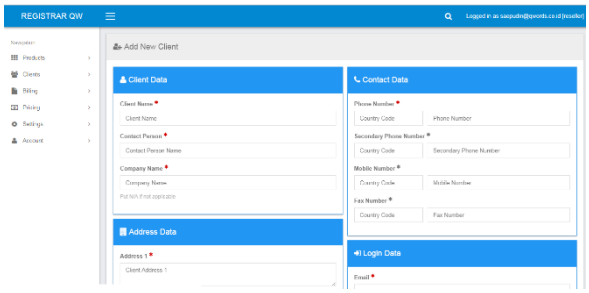


Figure 14. Page Add Clients

2.12 Domain Process Speed Testing

Testing the speed of the domain registration process is done to determine whether the system that is integrated with the web service / application registrar Qwords can overcome the slow problem and the difficulty of registering ccTLD Indonesia on the system running earlier.

The testing process is done 10 times by way of registration process and domain name booking by payment method through deposit / balance in account, test is measured using stopwatch so it finds the average time needed to register ccTLD Indonesia. Test results can be seen in table 5.

Table 5. Test Results Domain Registration Speed Process

Attempt Number	Before Implementation	After Implementation
1	6 Minutes 1 Seconds	2 Minutes 10 Seconds
2	6 Minutes 5 Seconds	2 Minutes 1 Seconds
3	6 Minutes 10 Seconds	2 Minutes 5 Seconds
4	6 Minutes 4 Seconds	2 Minutes 6 Seconds
5	6 Minutes 11 Seconds	2 Minutes 5 Seconds
6	6 Minutes 9 Seconds	2 Minutes 4 Seconds
7	6 Minutes 10 Seconds	2 Minutes 6 Seconds
8	6 Minutes	2 Minutes

Attempt Number	Before Implementation	After Implementation
	2 Seconds	5 Seconds
9	6 Minutes 5 Seconds	2 Minutes 3 Seconds
10	6 Minutes 3 Seconds	2 Minutes 4 Seconds
Average	**6** Minutes **1** Seconds	**2** Minutes **5** Seconds

2.13 System Availability Testing

Testing the availability of the system is done to determine whether the system can overcome the problem of delayed registration of ccTLD Indonesia caused by registrar Qwords staff hours that are not 24 hours so that the need for systems that can run for 24 hours a day and 7 days a week.

The testing process is done for 10 times which consists of 5 times in working hours and 5 times outside the working hours of registrar Qwords staff, the test results can be seen in table 6 below

Table 6. System Availability Test Results

Domain Name	Date and Time Register
sulseljaya.id	18-Jul-2017 23:45:20 UTC+7
smpalwafa.sch.id	19-Jul-2017 14:36:31 UTC+7
no-ex.id	18-Jul-2017 18:57:09 UTC+7
sipbefishery.web.id	17-Jul-2017 08:16:36 UTC+7
jualanlarisdarigoogle.id	15-Jul-2017 17:55:43 UTC+7
alfadhli.id	16-Jul-2017 20:12:49 UTC+7
pribumifutsal.web.id	13-Jul-2017 21:21:00 UTC+7
sokko.co.id	15-Jul-2017 12:18:30 UTC+7
skmkicau.web.id	14-Jul-2017 15:53:40 UTC+7
neoplasproduct.co.id	18-Jul-2017 19:57:03 UTC+7

2.14 Web Service Testing

Web service testing is done to determine the performance of web service in processing every request from Qwords reseller application. This testing process is done 20 times for each web service using Apache JMeter tool with parameters according to web service analysis so that get the average value (average time Required), min (minimum time required), max (maximum time required), received data (total data received) per second and sent data (data size sent) per second.

1. POST /rest/auth

Web service test results / rest / auth can be seen in table 7 below

Table 7. Web Service Testing Results / rest / auth

	Total
Samples	20
Average (milisec)	168
Min (milisec)	147
Max (milisec)	218
Received KB/sec	14.45
Sent KB/sec	5.23

2. POST /rest/create_registrant

Web service test results / rest / create_registrant can be seen in table 8 below

Table 8. Web Service Test Results rest / create_registrant

	Total
Samples	20
Average (milisec)	178
Min (milisec)	137
Max (milisec)	247
Received KB/sec	10.4
Sent KB/sec	13.84

3. POST /rest/register_child_nameserver

Web service test results / rest / register_child_nameserver can be seen in table 9 below

Table 9. Web Service Testing Results / rest / register_child_nameserver

	Total
Samples	20
Average (milisec)	163
Min (milisec)	143
Max (milisec)	203
Received KB/sec	10.17
Sent KB/sec	9.54

4. POST /rest/register_domain

Web service test results / rest / register_child_nameserver can be seen in table 10 below

Table 10. Web Service Test Results / rest / register_domain

	Total
Samples	20
Average (milisec)	704
Min (milisec)	294
Max (milisec)	1286
Received KB/sec	8.96
Sent KB/sec	9.42

3. CONCLUSION AND FUTURE SCOPE

3.1. CONCLUSION

Based on the results of research, analysis and testing system, can be concluded as follows:

1. Web service RESTful partner API can facilitate registrar and reseller Qwords staff in processing ccTLD registration Indonesia
2. Web service RESTful partner API can accelerate the registration process ccTLD Indonesia

3.2. FUTURE SCOPE

Web service RESTful partner API is still no shortage. Therefore it is necessary to do further development and refinement. As for some suggestions that may be applied for further development is:

1. Add a functional feature for domain transfer either from other registrar or fellow reseller.
2. Add a functional features to sub-resellers so resellers can have other resellers below them
3. Add a functional feature to change the url of registrar application page as reseller desire so that application can be white-label.

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