

Implementing Oracle Utility-Meter Data Management For Power Consumption

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ABSTRACT: In this digital mobile world, it's need of time to streamline and increase efficiency in business processes like effective data collection, measurement, automatic validation, editing and estimation of measurement data, analysis and dashboard for forecasting and ease in end user accessibility with Just in Time. This paper is following two methodology in this process. CEMLI is an extensive framework for developing and implementing for Oracle whereas OUM is business process and use case driven process which supports products, tool, technologies and documentation.

This paper have focused on analytical data, system automation functionality along with prototype designing. For this, analysts and administrators will collect and define calculation rule for data collection and measurement, deployment methods, dashboards and security features. This paper gives measure understanding of cloud technologies and their features like services (SaaS), deployment methods, security and ability to reduce overhead cost, downtime, and automate business processes with 360 degree review and analysis.

It consolidates data in one system with volumes of analog and interval data which facilitates new customer with offering and effective program. Also it maximizes return on investments and protects revenue through comprehensive exception management.

Index Terms: Meter data management, system architecture, Saas computing, CEMLI & OUM Method, Oracle database etc.

I. INTRODUCTION

Oracle Utilities Meter Data Management (MDM) is a powerful platform critical to leveraging the full potential of meter data across your organization. With Oracle Utilities MDM's robust data management capabilities, utilities maximize the impact of their technology and infrastructure investments by effectively harnessing the power of data. Oracle Utilities MDM gathers and processes data from any type, variety, or brand of device. The application loads, validates, stores, and formats the data in ways that facilitate business processes across multiple internal and external systems. Oracle Utilities MDM includes standard functionality for aggregations, event subscriptions, usage subscriptions, bill determinant and smart meter transition processes. Oracle Utilities MDM includes out-of-the-box functionality to automatically analyze usage and event data and issue Service Investigative Orders based on exceptions, events, commands, missing readings and meter reader remarks. This proactive analysis supports revenue protection by initiating maintenance or repair tasks as needed, improving the performance, and prolonging the life of meter and network devices. In addition, Oracle Utilities MDM includes a 360 degree user interface. This analytical tool allows users to graphically view usage and overlay related information such as: weather data, average usage profiles, similar premise usage, AMI events, VEE exceptions, installation and removal activities, outage periods, meter reader remarks, and service orders.

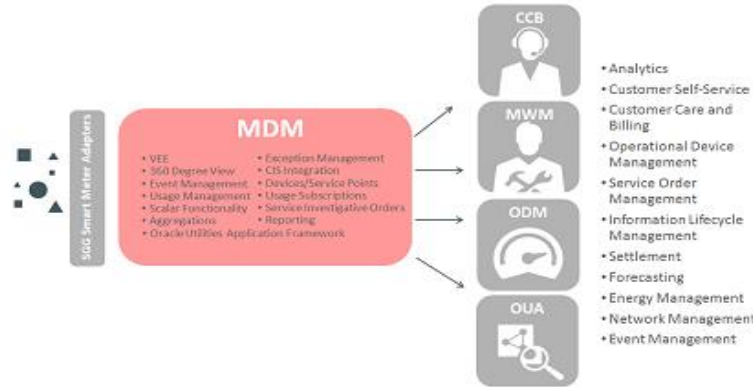


Figure 1. Oracle Utilities MDM capture massive data sets, validates and corrects data and allows data to be leveraged easily across multiple platforms.

A. Cloud Computing.

Cloud computing is derived from 'cloud' that refers to Internet and 'computing' that refers to computer technology. The Internet acts as a warehouse to store virtualized and scalable resources which are provided as a service. Cloud computing makes computing much more centralized and reduces the role of local computers. The resource provider is responsible for cloud management and handling security issues. Cloud computing is a highly efficient platform as it enhances innovation, development and business agility and thus reduces costing. On the basis of transactions, bandwidth consumed and data transferred, it inculcates the 'pay-per-use' concept. Users need not have knowledge of the implementation or control over the technology in the cloud. Cloud computing finds its application in emails, spreadsheets, data backup, word processors etc. However, storing and managing data in third party cloud makes it very prone to threats and attacks. Thus, security and privacy are key issues that envelope the cloud market today. New techniques to make the cloud computing.

II. LITERATURE SURVEY

Electric Energy is the driving force behind the growth of any country. With the abrupt increase in residential, commercial, and industrial consumers of electricity across the world, it has now become essential for utilities companies to design better, non-intruding, environment-friendly techniques of scaling utilities electricity usage so that correct bills can be produced and recorded. Traditionally, the electric meters are equipped on customer's premises and the consumption data is collected by meter-readers during their monthly visits to the consumer's premises.

This method of appraising the electricity usage has the following drawbacks:

- Sometimes if the meters are fixed inside people's homes and, if the user is not there at home, then it's not possible for the meter-reader to record the monthly consumption and then the utility provider has to consider the average bill-amount of the prior months as a gauge of the likely consumption of the current month. This results in obstruction for both consumer and the utility company. There is a possibility that the consumer has not used similar amount of electricity in the current month compared to the previous months due to some reasons such as, enjoying vacations elsewhere or being treated in the hospital, etc. during that month, and sending him a bill for a greater amount formed on his history of electricity usage may result in his/her financial labour. This method of estimating the bills is also not suitable for the utility company because it gives inaccuracy in the consumer's bills and may finally result in fallacies in future planning by the utility company.
- Hiring a number of meter readers for billing and providing means of transportation for their monthly visits to the consumers premises is an expensive load on the company's budgets. There is a possibility that the meter readers may do some

There is a possibility that the meter readers may do some errors while reading the consumed unit which will result in false billing due to human mistake. [1] In order to overcome these drawbacks a new meter reading system 'Automatic Meter Reading (AMR)' was developed that automates the meter reading task. That is, it collects the energy utilization data automatically and transfers that data to the utility providers. [5] Currently many AMR systems are implemented using GPRS, Bluetooth and Global System for Mobile communication (GSM) technology. GPRS is mainly used for long distance transmission of data but it is not possible to implement, since regular use of GPRS is difficult for common people. Using GSM technology remote billing is possible but there is a possibility of missing SMS which will decrease the performance of the system. [4] In "Automated EB Billing System Using GSM and Ad-Hoc Wireless Routing" there is a central office that has remote access to all the electric meters of the consumer

using Radio Frequency (RF) system. The electric meter in each home is connected via wireless system with the office which gets regular updates from the electric meter. Then, according to the number of units consumed amount to be paid is calculated. [6] In “Prepaid Energy Meter based on AVR Microcontroller” prepaid feature has been introduced and AVR controller has been used as it consumes less energy. These meters are cheaper since only a small modification has been made on existing traditional meters which change them to prepaid meters. [3] The paper “Design and Development of GSM based Energy Meter” presents design and implementation of AMR system. This system provides power consumption data, total load used to the utilities with the help of GSM. [2]

Here, there is no option for prepaid recharging, changing tariff rates, and changing threshold values. ‘Automated Controlling of Smart Meters’ is a system that allows us to set and read tariff rates, threshold values by sending commands to the smart meters remotely.

III. PROPOSED SYSTEM

Smart Meters are advanced sophisticated meters that collect the energy utilization data more accurate than the traditional electric meters and communicate that information back to the utility providers for monitoring, controlling and billing purposes.

Smart Meter are the ones that

- Collects and stores the energy consumption data at regular intervals
- Allows for two way communication between the utility provider and user.

The proposed techniques are used for records of files. As a research work, web logic server by using confidence data reading to store in database. Block diagram for proposed work is stated in figure 2.

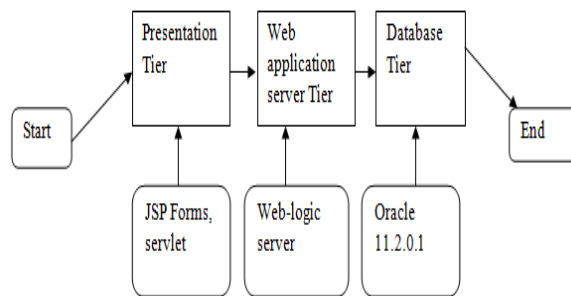


Figure 2.Block Diagram for proposed system

The proposed system is subdivided into following two modules:

A : Desktop/Client, or Presentation Tier

This tier is implemented in a browser-based client. Users use a desktop client Web browser to log in two and use the Oracle Utilities Meter Data Management application.

B : Web Application Server, Business Application Server Tier

This tier is implemented in a Web application server, business application server, or the batch server. The business application component can be installed as part of the Web application server,

C: Database, or Persistence Tier

This tier is implemented in a database server. The database server stores data maintained by the Oracle Utilities Meter Data Management application. The database tier contains the data server files and database executables that physically store the tables, indexes, and other database object for your system.

IV. METHODOLOGY

A. CEMLI Method

CEMLI stand for : Configuration/Customization,Extensions,Modifications,Localization Localization, Integration. CEMLI methods have following five phases.

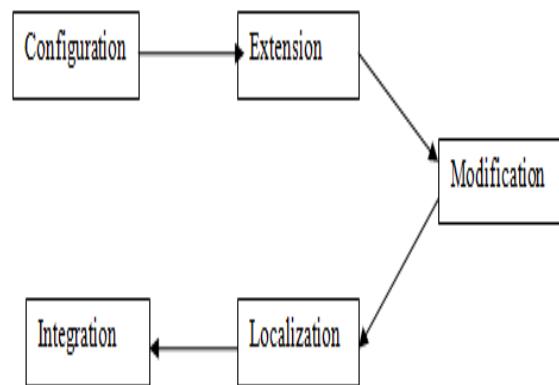


Figure 3.CEMLI Phases

- **Configurations :** Configure the existing, pre-built application features according to your client’s requirement. Changing setups and profile values can be the example of configurations.
- **Customization :** Customization means altering/changing the standard objects or creation of custom object to meet client’s business need. It may be Extensions or Modifications.
- **Extensions :** Extension means creating custom code from scratch, existing objects (views, packages and java classes etc) can be used. It is having different behavior from seeded one.
- **Modifications :** Modifications is enhancing/changing the existing code to meet the client’s requirements. It is the modification of seeded behavior.
- **Localization :** It is to define the different legislative support provided by oracle Applications based on country/region/language requirements.

B. OUM Method

The Oracle Unified Method (OUM) is Oracle’s standards-based method that enables the entire Enterprise Information Technology (IT) lifecycle. OUM provides an implementation approach that is rapid, broadly adaptive, and business-focused.

Project Phases for Control

Projects are delivered by phase, in order to reduce risk. Each phase allows a checkpoint against project goals and measurement against quality criteria. OUM includes the following phases

- **Inception:** The overriding goal of the Inception phase is to have concurrence among all stakeholders on the lifecycle objectives for the project.
- **Elaboration :** The goal of the Elaboration phase is to move development of the solution from the scoping and high-level requirements done during the Inception phase to developing the detailed requirements, creating any necessary prototypes, and base lining the architecture of the system .
- **Construction:** The goal of the Construction phase is to take the solution from detailed requirements models, through configuration of standard packaged software functionality, development and testing of custom components, and integration to a system.
- **Transition :** The goal of the Transition phase is to take the completed solution from installation onto the production system through the acceptance test to launch of the live application, open, and ready for business.
- **Production :** The goal of the Production phase is to operate the newly developed system, assess the success of the system, and monitor and address system issues.

C. Saas Cloud Computing

Software as a Service (SaaS) is what most people mean when they say "the Cloud." SaaS provides a complete software solution. This software could be email management, calendaring, enterprise resource planning (ERP), customer relationship management (CRM), documentation management, and so on. The easiest way to think about SaaS is that it is some type of standard software package that can be used on demand and is paid for by subscription, by use, by advertising, or by sharing information like mail address of users. Most Application Program Interfaces (APIs) are associated with SaaS Cloud Providers.

Software Cloud Service (SaaS)

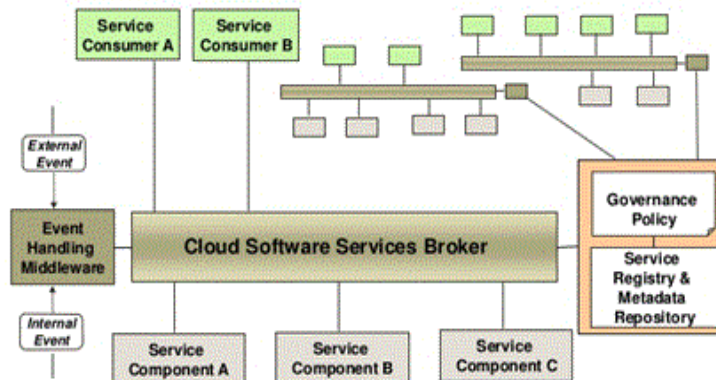


Figure 4. Software cloud service in cloud computing

D. Oracle Database Architecture

A database is a collection of data treated as a unit. The purpose of a database is to store and retrieve related information. A database server is the key to information management. In general, a server reliably manages a large amount of data in a multiuser environment so that many users can concurrently access the same data. A database server also prevents unauthorized access and provides efficient solutions for failure recovery. Oracle Database is the first database designed for enterprise grid computing, the most flexible and cost-effective way to manage information and applications. Enterprise grid computing creates large pools of industry-standard, modular storage and servers. With this architecture, each new system can be rapidly provisioned from the pool of components. The two most common database architectures are client/server and multitier. As internet computing becomes more prevalent in computing environments, many database management systems are moving to a multitier environment. This section includes the following topics:

- Client/Server Architecture
 - Multitier Architecture: Application Servers
 - Multitier Architecture: Service-Oriented Architecture
- Client/Server Architecture

a) Client/Server Architecture : In this architecture, the database system has two parts: a front-end or a client, and a back-end or a server. The client is a database application that initiates a request for an operation to be performed on the database server. It requests, processes, and presents data managed by the server. For example, the client might not need large disk capacity, or it might benefit from graphic capabilities. Many clients can simultaneously run against one server. The server runs Oracle Database software and handles the functions required for concurrent, shared data access. The server receives and processes requests that originate from client applications. The computer that manages the server can be optimized for its duties. For example, the server computer can have large disk capacity and fast processors.

b) Multitier Architecture: Application Servers A traditional multitier architecture has the following components:

- A client or initiator process that starts an operation
- One or more application servers that perform parts of the operation.
- An end server or database server that stores most of the data used in the operation This architecture enables use of an application server to do the following:
 - Validate the credentials of a client, such as a Web browser
 - Connect to an Oracle Database server Perform the requested operation on behalf of the client

c) Multitier Architecture: Service-Oriented Architecture : Service-oriented architecture (SOA) is a multitier architecture in which application functionality is encapsulated in services. SOA services are usually implemented as Web services. Web services can be accessed with the HTTP protocol and are based on a set of XML-based open standards, such as WSDL and SOAP. Oracle Database 11g, Oracle Database can act as a Web service provider in a SOA environment.

V. EXPECTED RESULT

According to Proposed system, meter consolidates data in one system with volumes of analog and interval data which facilitates new customer with offering and effective program. Also it maximizes return on investments and protects revenue through comprehensive exception management. From above Figure 5. meter gives cost, downtime and automate business processes with 360 degree review and analysis.

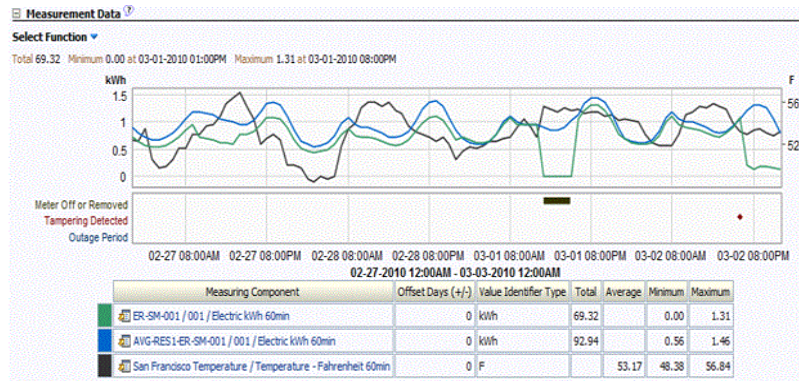


Figure 5. Oracle Utilities MDM provides a 360 degree view of meter data.

VI. CONCLUSION

In this paper, Meter data management system gives measure understanding of cloud technologies and their features like services (SaaS), deployment methods, security and ability to reduce overhead cost, downtime, and automate business processes with 360 degree review and analysis.

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