

Figure 2: Operations at Gas Stations

Also many times, it is suspected that the gas stations adapt to some malpractices such as fuel adulterations. Any system implementation at gas stations can track such anomalies quite easily bringing in controls which are so essential in managing this very valuable supply chain.

Based on the above activities, it is apparent that to plan the operations and also for the purpose of managing inventory and accounting transactions, the Gas Station operations need implementation of system to take care such activities. Now this poses a challenge as well as an opportunity for the oil companies, as to integrate all their gas stations by providing a robust integrated application for managing the gas station operations can only help them manage supply chain well.

We all are aware that hydrocarbon fuel has a finite availability and a time is not far when we may have to administer strict controls over consumption even to the extent of capturing data of fuel consumed per person or per vehicle.

3. Literature Survey for this Research Report

A detailed literature survey was performed to analyze the data on the number of gas stations in India and the consumption of Motor Gasoline as well as High Speed Diesel Oil in the country. This data was obtained based on the reports published by Ministry of Petroleum and Natural Gas through their notification published yearly.

Apart from this data, a detailed literature survey was conducted to analyze the types of cloud applications and its applicability for various industry sectors. Gas stations operations being very standard and repeatable, is found to be perfect candidate for cloud based systems. The reasons are:

- High numbers
- Identical operations
- Similar functional requirements
- Low margin business with limited ability to invest in infrastructure
- Operations fairly comprehensive needing system support
- Similar report requirements
- Regulated business
- Needing high level of automation due to volume

The solution presented addresses all these aspects as may be noted from below sections.

4. Proposed Cloud Offering for Managing Gas Station Operations

The basic principal of cloud based application is to create an infrastructure which can be sourced by many entities or consumers. The application in itself is developed in such a manner that not only it is replicable, but shares the common code set and common database segregated in a secured manner so that there is no violation of data privacy. The entire application is hosted on a single hardware stack and is made accessible to all the consumers over the internet. There are features such as multi-tenanted architecture which enable several different firms, entities; organizations access the same set of code for processing their business needs. The business processes are common and configurable and can be fine-tuned based on specific needs. Also the workflows are highly configurable and even the looks and feel of transactions screens can be personalized depending on various business needs. The overall architecture of any cloud based application looks as per the schematic Figure 3 given below:

Shared Cloud Principles :: Security & Isolation

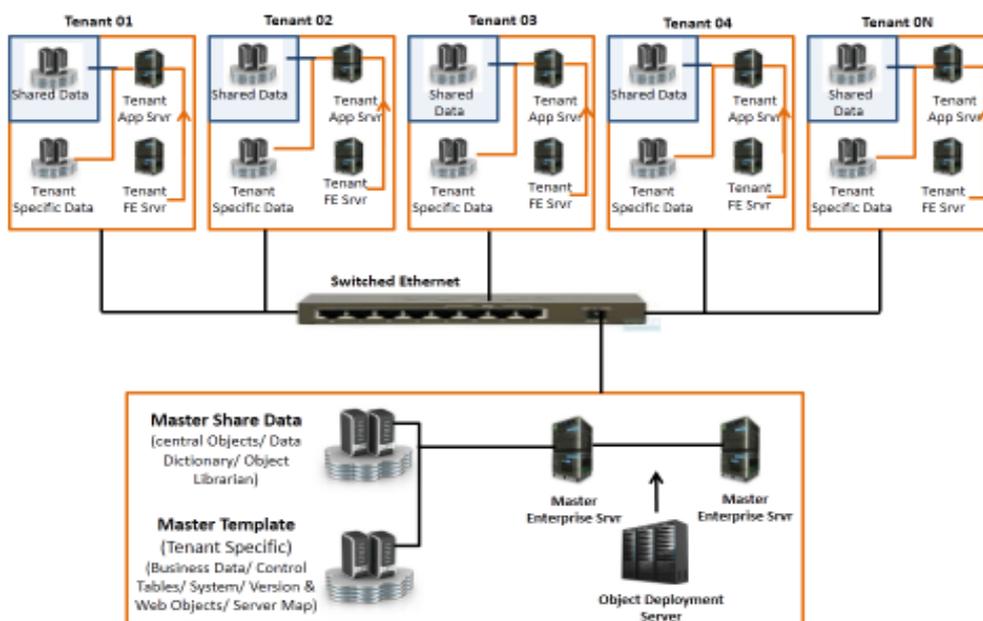


Figure 3: Overall architecture of any cloud based application

Based on the above principles, all the gas stations can actually be accessing a common application set for managing their operations. The application can be fully secured and logically partitioned so that there would be no data privacy violation. The tenant’s apps and front end servers give the flexibility of configuring applications based on the type of operations being managed by the gas station. The following table provides the brief information on various modules applicable for running Cloud infrastructure and applicability to other business lines such as service station and convenience stores. All these modules could be hosted on cloud basis for retail gas stations to avail the functionality for running their day to day operations.

Table 2: Additional Revenue Models adopted by Gas Stations

Modules	Gas Station	Service Station	Convenience Stores
Product Data Management	✓	✗	✓
Inventory Management	✓	✗	✓
Purchase Order Management	✓	✗	✓
Sales Order Management	✓	✓	✓
Work Order Management	✗	✓	✗
Accounts Payable	✓	✓	✓
Accounts Receivable	✓	✓	✓
General Ledger	✓	✓	✓
Fixed Asset Management	✓	✗	✓
Merchandizing	✗	✗	✓
Advance pricing	✗	✗	✓
Integration with Card system	✓	✗	✓
Automated replenishment system	✓	✗	✓
Maintenance Management	✓	✓	✗

One of the biggest advantage of making these applications available on cloud is the retail gas station operators can make payment for the system on “Pay Per Use” basis eliminating need of upfront investment in costly hardware and software.

Also these applications can be maintained centrally without any financial burden to any of the retail gas station operator to incur additional expenses. Moreover the retail gas station operator can track each and every customer by vehicle number enabling generation of reports of fuel dispensed vs replenished, giving accurate tally of inventory as well as financials.

The overall Cloud application will be as per the schema (Figure 4) below:

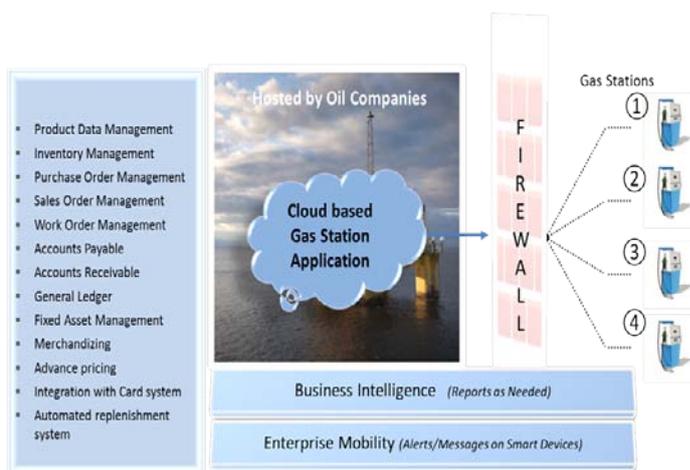


Figure 4: Overall Cloud Application

The above will give immense benefit to not only the gas station owners but also the oil companies.

5. Benefits Derived

The proposed architecture can immensely benefit multiple stakeholders who are part of the entire ecosystem. These

benefits will eventually also help the government to bring in regulations in terms of controlling the consumption of fuel oil by vehicle number if needed, which is so vital for India's economy.

The below table summarizes the benefits:

<i>Benefit to Gas Station Operator</i>	<i>Benefit to Oil Companies</i>
<ul style="list-style-type: none"> • Low cost system for accounting Effective Inventory management <ul style="list-style-type: none"> • Ability to manage expense • Keeping track of all manpower <ul style="list-style-type: none"> • Accurate Payroll processing • Automated reorder point • Easier account reconciliation Ability to accurately assess profits Ability to book service orders on web	<ul style="list-style-type: none"> • Visibility of supply chain • Assessment of dry point status <ul style="list-style-type: none"> • Auto replenishment • Makes adulteration difficult • Better distribution planning

<i>Benefit to Consumers</i>	<i>Benefits to Government</i>
Better quality of Oil Transparency of billing Faster turnaround of billing Web based booking No stock outs	Tracking consumption Cleaner environment due to less adulteration Enforcing regulations is easy

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Author Profile



Arvind Ankalikar received the Bachelor of Mechanical Engineering from REC Surat (now NIT, Surat) and of Masters in Management from JBIMS, Mumbai University. Also certified in Advanced Manufacturing and Supply Chain Management from National Institute of Industrial Engineering (NITTE) and has participated in Executive Development program of Ross School Of Management, USA. He is pursuing Ph D in University of Mumbai under the guidance of Dr S S Mantha, Chairman AICTE.

6. Formation of National Energy Grid and Way Forward

It is apparent that hydrocarbon energy, being finite in terms of availability, is depleting rapidly. While there is a fairly robust process exists to track crude oil being supplied to refineries and products being dispatched from refineries to depots and depots to retail station, there is no control whatsoever post retail gas stations when the fuel is dispensed to vehicles. Such Cloud based application is an opportunity for all downstream Oil and Gas companies to provide a platform for all retail gas station operators for managing their business. This will also facilitate creating a proper energy balance across the nation with accurate assessment of fuel available across all the gas station. Moreover this gives an opportunity to create a “National Energy Grid” that can be leveraged for obtaining accurate status of fuel available across the country. Such a grid can then be calibrated based on the industry types, region and if required, quota for restricted use of this vital energy. Also such National Energy Grid can be very vital in the case of defense needs and other government eventualities by accurately assessing availability in the grid.

References

- [1] Indian School of Petroleum, “Downstream Business Process”, August 2007, Final Report
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- [3] Success through the continuous innovation, JD Edwards summit – 2013
- [4] Oracle JDE Cloud White Paper, 2013