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A Prototype Implementation on Real-Time Point-of-Sale System Using Open Source Technologies

Madhuri.A[1], Soja Rani.S[2]

[1]Department of CSE, New Horizon College of Engineering, VTU, India
[2]Department of CSE, New Horizon College of Engineering, VTU, India
[1] madhu.ksmile@gmail.com; [2] soja.naveen@gmail.com

Abstract— Today business has become more demanding than ever. E-commerce applications are expanding markets and functionalities to meet the evolving needs. A complete solution is what the market is looking towards like a Real-time Point of Sale Application handling additional functionalities like Inventory management/supply chaining, Staff Management, Business Intelligence, Work Hours tracking etc. This paper aims at providing a prototype implementation for supply management of point-o-f sale application using evolving open source technologies like Django, RabbitMQ and Node.js and protocols like AMQP, MQTT support for asynchronous messaging. An automated end-to-end flow is implemented from a customer purchase to supplier being intimated over email via Mailgun service for business opportunity.

Keywords— Real-Time Point-of-Sale, Inventory Management/Supply Chain, Django, RabbitMQ, Message Broker, Node.js, MailGun, AMQP, MQTT

I. Introduction

The point of sale (POS) or point of purchase (POP) is the time and place where a retail transaction is completed. At the point of sale, the merchant would calculate the amount owed by the customer and indicate the amount, and may prepare an invoice for the customer (which may be a cash register printout), and indicate the options for the customer to make payment. It is also the point at which a customer makes a payment to the merchant in exchange for goods or after provision of a service. After receiving payment, the merchant may issue a receipt for the transaction, which is usually printed, but is increasingly being dispensed with or sent electronically. The point of sale is often referred to as the point of service because it is not just a point of sale but also a point of return or customer order.

Additionally, current POS terminal software may include additional features to cater for different functionality, such as inventory management, CRM, financials, or warehousing.

II. LITERATURE

As business competition is driving products to support umbrella of activities not mere payment. Lot of opportunity and importance is being given to add on functionality like Supply chaining or Staff billability and Work hours tracking etc. Due to distributed model operation of transactions executed online, support for various protocols and technology based Merchants/Customers/Suppliers become indispensable. Right from customer placing order in web application to Merchant dispatching the product with payment details and intimating the Supplier about the new shipment, create a competitive edge for the products in market by enhancing the overall POS capability.

III.PROPOSED SYSTEM

After studying the developing trends in the direction of POS, with various messaging protocols available today to handle real-time demands like asynchronous message reliable delivery and publisher/subscriber implementation to allow the routing of specific messages between merchant and suppliers, we provide a end-tot-end prototype implementation using the Open Source technologies like Django web framework, RabbitMQ Message broker with AMQP and MQTT support and Node.js simulating small end-user applications running on any possible portable IoT devices supporting MQTT and AMQP protocols to send and receive emails.

IV. METHODOLGY AND EFFICIENCY STUDY

In order to meet the fast and robust application demand, we decided on the web framework based on python language. i.e. Django web framework. Model-view-template pattern of Django boosted the application in terms of extensibility and clear separation of logic between the three layers-Model, View and templates. Also support for OAuth2.0 within the framework removed need to have an extra authentication functionality within the system by allowing Merchant/Customer of the application-MeetYourBusiness.com to login using Facebook/Google login credentials.

RabbitMQ support for python language made the messaging possible within the Django's function based views. Using Pika 0.10.0 library all the required functionality for channel creation, declaring queue and topic routing were elegantly handled.

To simulate the simple applications listening for particular topics i.e. Supplier for product, we worked up Node.js applications using AMQP protocol and MQTT protocol to receive the messages send over AMPQ.topic routing key – 'MerchantName.SupplierName'

Node.js being a powerful and effective JavaScript based framework for single page applications, we mapped each supplier to a node.js program listening to an individual topic/routing key.

Finally support for subscribing to Mailgun free service to send and receive mails from node.js ,added required dynamism to the application.

V. IMPLENTATION

MeetYourBusiness.com application is an Django based web application designed to handle Customer and Merchant POS requirements. Implementation and data flow for this application is shown in Fig.1.

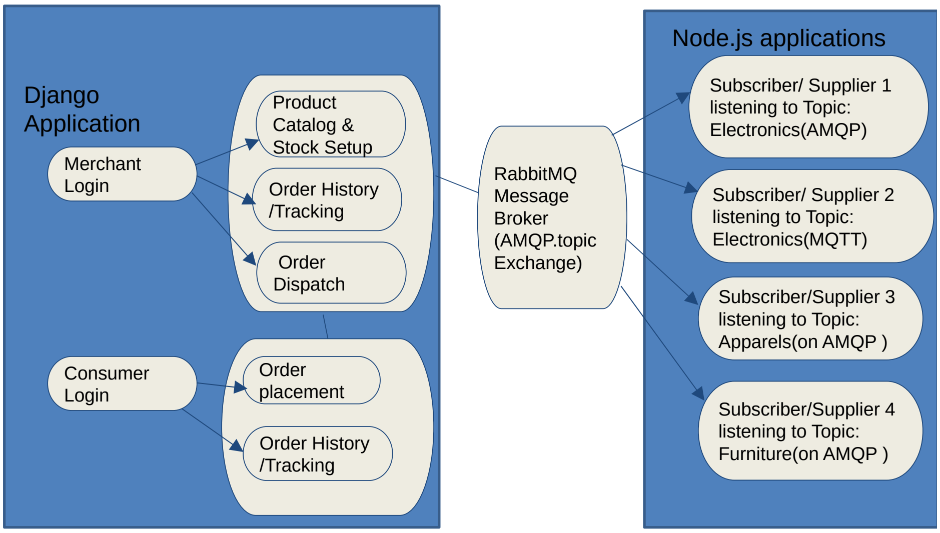
Django Application
Merchant Login
Product Catalog & Stock Setup
Order History /Tracking
Order Dispatch
Consumer Login
Order placement
Order History /Tracking
RabbitMQ Message Broker (AMQP.topic Exchange)
Node.js applications
Subscriber/ Supplier 1 listening to Topic: Electronics(AMQP)
Subscriber/ Supplier 2 listening to Topic: Electronics(MQTT)
Subscriber/Supplier 3 listening to Topic: Apparels(on AMQP)
Subscriber/Supplier 4 listening to Topic: Furniture(on AMQP)

Fig 1: Implementation of MeetYourBusiness Application

This application authenticates Customers and Merchants to access product catalogue online through OAuth2.0 protocol support in Django. And through the admin portal super user status is assigned to the Merchant logins.

A Merchant enters the Category, Product and Quantity for each of the commodity available for purchase and builds the Catalogue. Customer logs into website and places the order to a particular commodity mapped to a Merchant. These screens are implemented as function based views in Django. Application is hosted on Apache webserver. The merchant dispatches the order logging into the portal by marking the status of request as ‘closed’.

RabbitMQ server is used as a Message broker and is setup on the same server machine. Using Pika package API’s in Django, a message is prepared and published creating a new channel with exchange AMQP.topic and message text appended with details of commodity being sold i.e. Product name and quantity.

Suppliers/Subscribers are the node.js application listening on Advanced Message Queue Protocol and Message Queue Telemetry Transport protocols clients.

The message is captured at respective supplier for the product subscribed and email intimation is sent using Mailgun free service subscriber (or any other email service provider) to prior accepted email addresses of the suppliers from database/text file.

VI. CONCLUSIONS AND FUTURE SCOPE

In this paper, we described the prototype/implementation for overall flow of events handled in POS application(excluding payments) using the open source technologies. A online purchase over the web application is captured and message corresponding to the same is dispatched to end Suppliers on MQTT or AMQP protocols. These end applications can run on any IoT device with the support of protocols being enabled.
The mere possibility to provide such value add makes the business model more robust and successful prototype over the open source technologies Django, RabbitMQ and Node.js ,with multi-protocol support through AMQP and MQTT protocols.

Further the system can be scaled up to handle more extensive business requirements by having many-many ties between Suppliers and Merchants with more tightly bound data needs like Business intelligence gathering, CRM activities, SMS alerts to Suppliers etc. Django's MVT pattern and Publisher/subscriber model of RabbitMQ Message broker makes the system extendable with new modules with enhanced functionalities of messaging on demand.

REFERENCES

[1] Jorge E. Luzuriaga et al ,A comparative evaluation of AMQP and MQTT protocols over unstable and mobile networks, Conference: Consumer Communications and Networking Conference (CCNC), 2015 Annual IEEE, At Las Vegas, NV, Volume: 12th

[2] Carl Burch et al,Django, a web framework using Python: tutorial presentation, Journal of Computing Sciencces in College archive, Volume 25 Issue, May 2010 Page 154-155

[3] Madhuri.A et al, International Journal of Computer Science and Mobile Computing, Vol.5 Issue.2, February- 2016, pg. 16-23

[4] Madhuri.A et al, International Journal of Computer Science and Mobile Computing, Vol.6 Issue.1, February- 2017, pg. 103-106

[5] https://docs.djangoproject.com/en/1.11/intro/tutorial01/

[6] https://oauth.net/2/

[7] https://www.rabbitmq.com/

[8] https://artandlogic.com/2014/04/tutorial-adding-facebooktwittergoogle-authentication-to-a-django-application/

[9] https://www.rabbitmq.com/resources/specs/amqp0-9-1.pdf

[10] https://www.rabbitmq.com/mqtt.html

[11] https://www.rabbitmq.com/web-mqtt.html

[12] https://docs.djangoproject.com/en/1.11/

[13] https://www.npmjs.com/package/mqtt

[14] https://www.amqp.org/

[15] http://mqtt.org/

[16] https://www.mailgun.com/

[17] https://www.python.org/

[18] https://nodejs.org/en/

A.Madhuri, M.Tech student, having 5.5 years of IT Industry experience worked in Microsoft .Net framework and Microsoft Business Intelligence Studio. Currently pursuing M.Tech –Computer Science Engineering from New Horizon College of Engineering, VTU Belgaum.

Soja Rani S, Asst Professor having 7 years of experience in academics has pursued her BTech from Kerala University, Trivandrum and M.Tech from VTU, Belgaum. She is currently working in NHCE, Dept of CSE, Bangalore. She has guided many UG and PG students for their projects. Her areas of interest include Cryptography, Data Security, Cloud Computing and Data Science and Analytics.