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SOFTWARE ARCHITECTURE MODEL FOR MATTU GULLA CULTIVATORS

Abstract:

Service Oriented Architecture aids in building IT systems that empower the existing resources and allows for easy modifications that may be required later. This paper proposes a Service Based Software Architecture Model that may provide a solution to the problems of Mattu Gulla growers of Mattu. This papers provides an outline of the architecture and further research can help in the implementation and improvement of the model. Mattu is a village in the Udupi district of Karnataka state in India, also known by name of Matti. This village is famous for a particular variety of brinjal (eggplant) that is grown only in this village famously known as Mattu Gulla. It is grown in an area of about 60 acres. 'Mattu Gulla' is also a produce with a GI (geographical indication) tag. The cultivators of Mattu gulla face problems many like price fluctuations, insect attacks, soil related diseases, untimely rain, limited marketing,lack of labour and poor transportation facilities. This paper proposes a Service Based Software Architecture Model that aims to take care of the grievances of the Mattu gulla cultivators.

Keywords:

SOA, Software Architecture, Matti, Mattu Gulla

JEL Classification: O33, O39, Q16

1. Introduction

Mattu is a village in the Udupi District,Karnataka, India, also known by name of Matti. Mattu is famous for a variety of Brinjal (eggplant) that is endemic to this region. This Brinjal is famously known as Mattu Gulla. The Mattu Gulla is unique as it has a spherical shape and a light green coloured skin, unlike the normal-purple colour. It has a very thin skin and virtually gets dissolved on boiling. It is less astringent than other varieties; seeds are less in number and are not bitter. It is grown in an area of about 60 acres. 'Mattu Gulla' is also a produce with a GI (geographical indication) tag. . The people of this village have been cultivating and preserving this variety of brinjal for over 500 years and plays an important role in the traditions and festivities of this village. The 'Mattu Gulla' is an example of man-plant-god relationship, according to legend the seeds of this plant were created by a sage named Shree Vadhirajaru with his divine powers and were given to the Mattu Brahmins, hence the name 'Mattu Gulla'. And that is also a reason why the villagers offer their first harvest to the Udupi temple every year, and the dishes made out of 'Mattu Gulla' have a special place in 'Anna Santarpanam'. According to a news report in 'THE HINDU' there are as many as 150 farmers who cultivate Mattu Gulla. This variety of Brinjal grows on lands with well drained silt loam and clay loam soil with slightly acidic nature and this particular soil is found mainly in the region of Mattu village and surrounding region of Udupi District. It also been found that if this variety is grown elsewhere it loses spines on the fruit stalk and calyx and also the taste and particular colour.

Price Fluctuation: One of the main problems faced by the farmers here is the fluctuations in price due to poor marketing and artificial shortage created by the middlemen to earn more profits.

Untimely rain: Poor weather conditions have been known to affect the quality of the produce leading to reduction in market value. Unprecedented weather conditions like excessive rain can wash away the seeds of Mattu Gulla and can also lead to rotting away of the grown plants as well due to water stagnation. This can cause heavy losses in productivity and revenue.

Labourer shortage: The recent increase in demand for labourers in the construction industry has left the agricultural industry with an extreme shortage of labourers leading to lesser productivity and yield. At the same time it has also led to the increases in cost of cultivation leading to lower profit values for the farmers.
Limited Marketing: This variety of brinjal is mainly limited to markets in Udupi and Dakshina Kannada districts, and has not been marketed in other places. This also limits the profit margin of the farmers. A wider market would ensure better prices for the produce helping the farmers.

Poor transportation facilities: The region lacks sufficient infrastructure especially in terms of transportation facilities which clearly hinders the farmers reach in the market and makes them dependent on the middlemen.

Insect attacks and soil related diseases: The Mattu Gulla plant is known to get affected by soil related diseases and insect attacks which not only reduce the quality of the produce but also reduce the yield as well.

2. Objective

To propose a Service Oriented Software Architecture Model (SOSAM) to address the problems faced by the Mattu Gulla cultivators.

3. SOSAM Use-Case Diagram

The Functionality that is expected from the proposed system is shown in Figure 1 and described in Table 1.

Figure 1: Use Case diagram for SOSAM

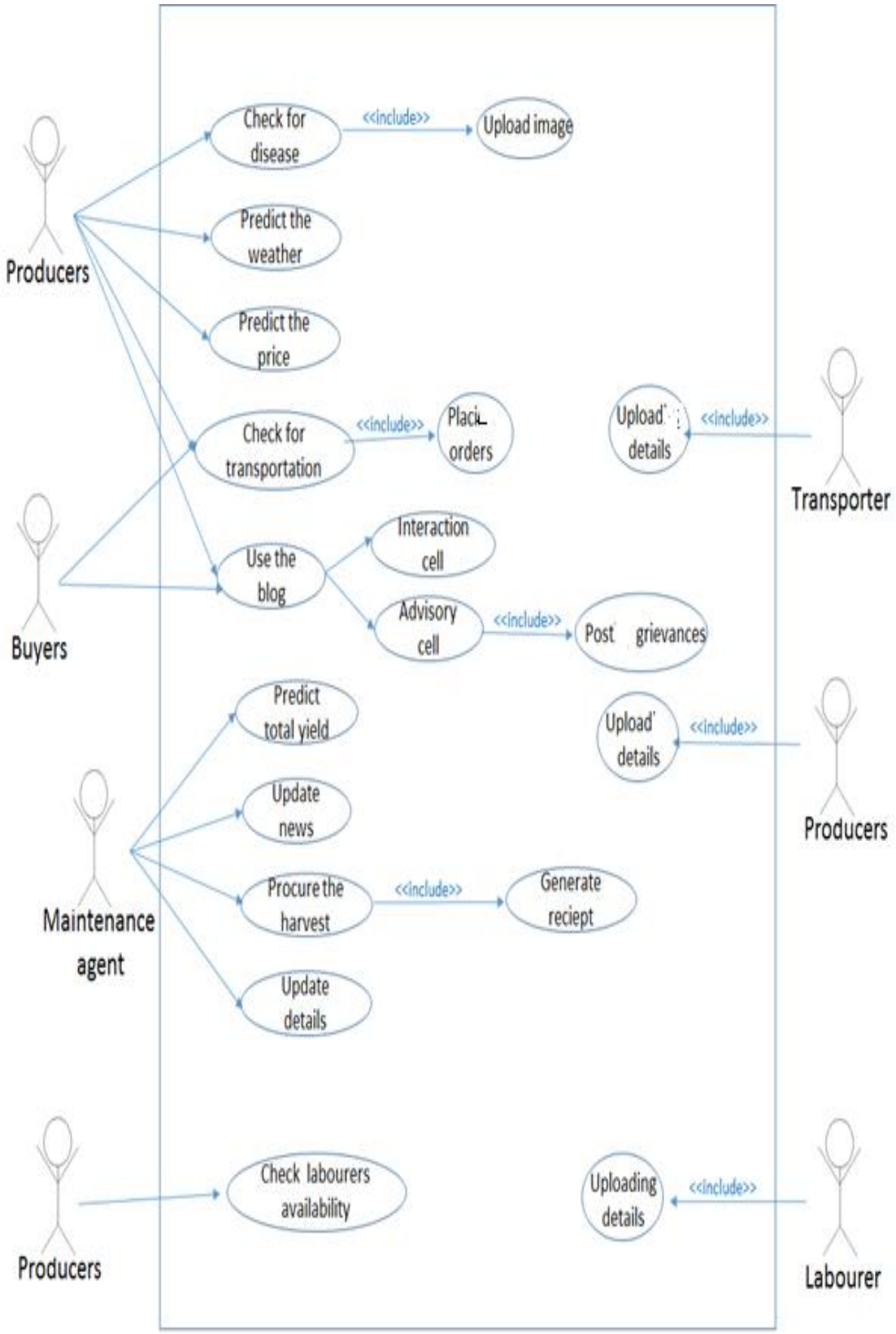
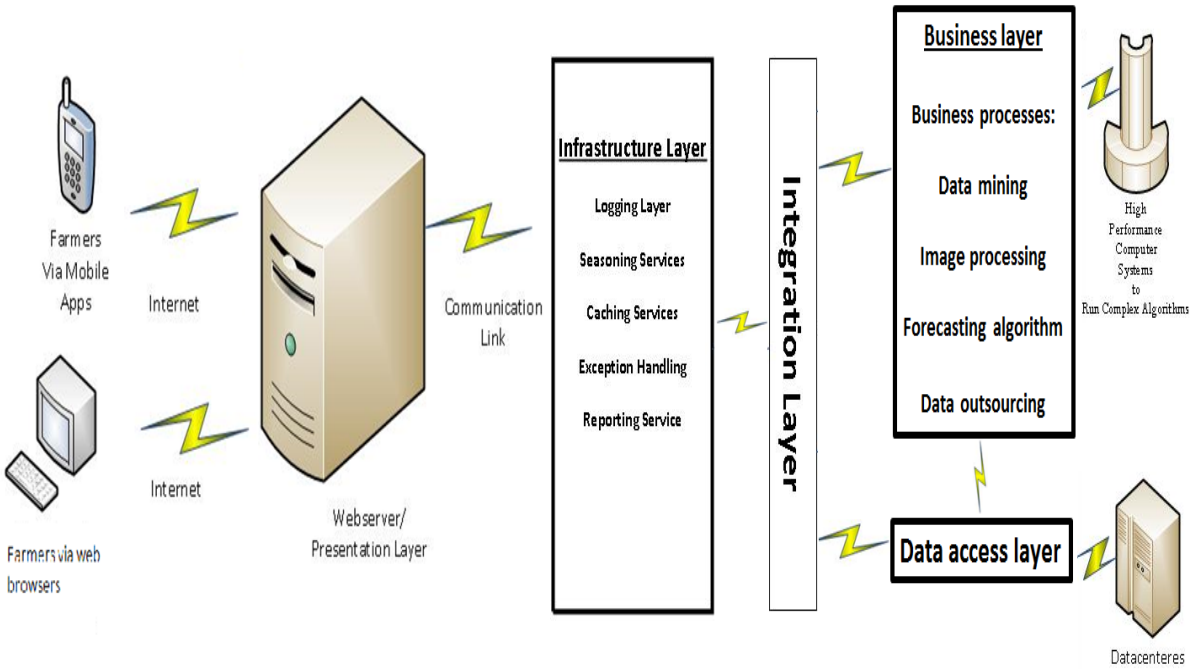


Table 1: Use Case Description for SOSAM

Uses case	Description	Actors
Check for disease	• Ask the farmers to upload images of the diseased plants. • Image processing techniques like “Ridge Based Segmentation” and “Color Detection”, an algorithm can be proposed to check the possibility of a plant being affected by a disease	Producers
Check for Weather forecast	•Display weather forecast in the system by linking it with applications that provide weather forecasts. • This will keep the farmer updated about the bad weather conditions.	Producers
Predict price	• Provide the farmers with expected price by comparing values from previous records and applying data mining and few forecasting algorithms	Producers
Check for Transportation	• Involves the farmers or the agents putting up requests with details like load weight, destination etc. • Outsourcing these requests to various transportation companies and letting the buyers choose by comparison or by an online biding service providing the lowest bidder with the contract.	Producers, Buyers
Use the Blog	It will consists of mainly two sub divisions Interaction cell: - where the farmers can interact with other farmers and dealers. Advisory cell:-It would be linked with governmental agencies and NGO’S which are in charge of the agricultural department, so that the farmers can post their grievances or ask for assistance when necessary	Producers, Buyers
Update News	Using data mining techniques or by linking the system to applications that can provide the farmers with easy access to all agriculture related news	Producers
Procure the harvest	Involves agents procuring the harvest from the producers at rates slightly lower than the market rate(max difference=10% of market rate) and issue receipts to the farmers	Agent
Check labourers availability	Involves labourers in nearby areas putting up details like wages, contact details etc. Mainly aims at tackling the issue of labour shortage	Producers
Predict total yield	Involves farmers uploading details like area cultivated. Collecting weather forecasts, uploaded data, and other information and applying forecasting algorithms to predict the yield	Buyers
Update details	The agent responsible for maintenance I expected to collect data from agents in the market about selling price, demand for produce etc. and update the system	Maintenance agent
Display Details	Will provide information about the produce like selling price, no. of farmers cultivating Mattu Gulla etc.	Buyers, Producers

4. SOSAM(Service Oriented Software Architecture Model)

Figure 2: Service Based Software Architecture Model



The proposed system has five layers

Presentation layer:

This layer acts as the user interface for system where all the data and content is displayed based on the end user generated events. The system will be made accessible through a variety of platforms like android, web browser, mobile browser. Based on the user end demand appropriate requests will be sent to the server and end results generated in the business layer are displayed to the client.

Infrastructure Service layer:

This layer will mainly consist of services like authentication, authorization, caching, validation, logging, exception handling and session management. Logging of trace information generated during business processes helps in exception handling, it also facilitates authentication and validation of the user inputs and the resources shared in the system. Caching helps in improving performance by moving frequently accessed data from the slow secondary store to the primary memory. Authorization prevents unnecessary tampering of data resources.

Business layer:

This layer will mainly consist of the business processes like data mining, image processing, data (example: orders for transportation) outsourcing, forecasting algorithms etc.

Data access layer:

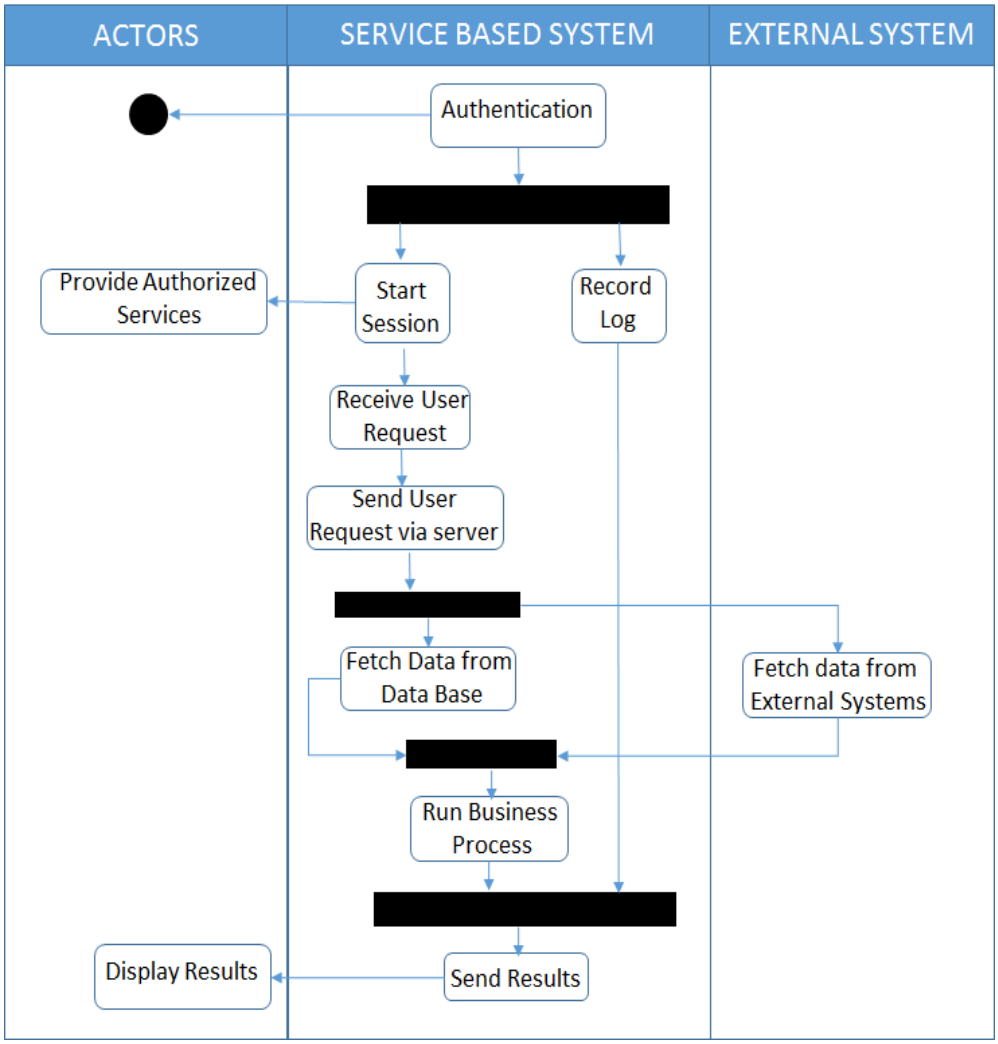
Data needed by the business processes from the form the database is fetched by the business layer through the data access layer.

Integration layer:

Integration layer helps the layers communicate with each other.

Figure 3 explains how the flow of activities in the proposed SOSAM.

Figure 3: Activity diagram showing SOSAM functionality



The client has to register himself only once. The users will have to authenticate themselves every time they access the system. During every session trace information of all user actions are logged into the system. Based on the authorization of the user various options are displayed. Every time a request is made, appropriate data is fetched by the business layer from the data bases and external sources for application of the business logic and the appropriate results are displayed on the presentation layer. The business logic mainly consists of processes like data mining, image processing, data outsourcing, forecasting. The data outsourcing refers to outsourcing the order placed by the clients to transportation companies and based on the response either the client can choose to which company the contract must be given or the winner can be chosen by using a biding model where the lowest bidder is given the contract hence ensuring quality services at reasonable rates.

Conclusion

This service based model has been proposed to reduce the impact of problems faced by the cultivators of Mattu Gulla. The main aim of the model is to tackle the issue of middleman and shortage of workers on the field. The models aims at providing the farmers with necessary information like demand, market price etc. which they are most often unaware of. This helps the farmers to plan better and earn better profits. This model may also help commercialize various agricultural services preventing them from being limited to the middlemen alone. Hence on the whole this model aims at improving the standards of agriculture and help the farmers earn better with the right information.

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